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RALLIART

WORKSHOP MANUAL

LANCER EVOLUTION-VII



Pub. No. S0105CT9A

RALLIART **MITSUBISHI** **LANCER** **EVOLUTION-VII**

WORKSHOP **MANUAL**

FOREWORD

This Workshop Manual contains procedures for service mechanics, including removal, disassembly, inspection, adjustment, reassembly and installation. Use the following manuals in combination with this manual as required.

TECHNICAL INFORMATION MANUAL
N0104CT9A

All information, illustrations and product descriptions contained in this manual are current as at the time of publication. We, however, reserve the right to make changes at any time without prior notice or obligation.

The EVOLUTION-VII is sold exclusively through RALLIART Inc. Since the EVOLUTION-VII is a rally-based model, it will not be warranted and will not be homologated for general production. Therefore, any service matters on the EVOLUTION-VII should be inquired to RALLIART Inc. as usual.

 **MITSUBISHI MOTORS CORPORATION**
RALLIART INC.

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WARNING REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLE

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).**
- (2) The SRS components should not be subjected to temperature of 93°C or more. So, remove the SRS-ECU, driver's and front passenger's air bag modules and clock spring before drying or baking the vehicle after painting.**
- (3) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.**
- (4) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS), before beginning any service or maintenance of any SRS component or any SRS-related component.**

NOTE

Section titles with asterisks (*) in the table of contents in each group indicate operations requiring warnings.

GENERAL

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HOW TO USE THIS MANUAL

SCOPE OF MAINTENANCE, REPAIR AND SERVICING EXPLANATIONS

This manual provides explanations, etc. concerning procedures for the inspection, maintenance, repair and servicing of the subject model. Note, however, that for engine and transmission-related component parts, this manual covers only on-vehicle inspections, adjustments, and the removal and installation procedures for major components.

For detailed information concerning the inspection, checking, adjustment, disassembly and reassembly of the engine, transmission and major components after they have been removed from the vehicle, please refer to separate manuals covering the engine and the transmission.

ON-VEHICLE SERVICE

“On-vehicle Service” is procedures for performing inspections and adjustments of particularly important locations with regard to the construction and for maintenance and servicing, but other inspection (for looseness, play, cracking, damage, etc.) must also be performed.

INSPECTION

Under this title are presented inspection and checking procedures to be performed by using special tools and measuring instruments and by feeling, but, for actual maintenance and servicing procedures, visual inspections should always be performed as well.

INDICATION OF DESTINATION

General Export and GCC are used for convenience to indicate destination.

NOTE

- (1) “General Export” means territories other than Europe, GCC, Australia, New Zealand, the U.S.A. and Canada.
- (2) “GCC” indicates countries that are members of the (Persian) Gulf Cooperation Council of nations.
- (3) In some instances, vehicles with other specifications may be shipped to some countries.

DEFINITION OF TERMS

STANDARD VALUE

Indicates the value used as the standard for judging the quality of a part or assembly on inspection or the value to which the part or assembly is corrected and adjusted. It is given by tolerance.

LIMIT

Shows the standard for judging the quality of a part or assembly on inspection and means the maximum or minimum value within which the part or assembly must be kept functionally or in strength. It is a value established outside the range of standard value.

REFERENCE VALUE

Indicates the adjustment value prior to starting the work (presented in order to facilitate assembly and adjustment procedures, and so they can be completed in a shorter time).

CAUTION

Indicates the presentation of information particularly vital to the worker during the performance of maintenance and servicing procedures in order to avoid the possibility of injury to the worker, or damage to component parts, or a reduction of component or vehicle function or performance, etc.

INDICATION OF TIGHTENING TORQUE

Tightening torques (units: N·m) are set to take into account the central value and the allowable tolerance. The central value is the target value, and the allowable tolerance provides the checking range for tightening torques. If bolts and nuts are not provided with tightening torques, refer to P.00-28.

MODEL INDICATIONS

The following abbreviations are used in this manual for classification of model types.

MPI: Indicates the multipoint injection, or engine equipped with the multipoint injection.

DOHC: Indicates an engine with the double overhead camshaft, or a model equipped with such an engine.

M/T: Indicates the manual transmission, or models equipped with the manual transmission.

A/C: Indicates the air conditioner.

EXPLANATION OF MANUAL CONTENTS

Indicates procedures to be performed before the work in that section is started, and procedures to be performed after the work in that section is finished.

Component Diagram

A diagram of the component parts is provided near the front of each section in order to give a reader a better understanding of the installed condition of component parts.

Indicates (by symbols) where lubrication is necessary.

Maintenance and Servicing Procedures

The numbers provided within the diagram indicate the sequence for maintenance and servicing procedures.

- Removal steps:
The part designation number corresponds to the number in the illustration to indicate removal steps.
- Disassembly steps:
The part designation number corresponds to the number in the illustration to indicate disassembly steps.

- Installation steps:
Specified in case installation is impossible in reverse order of removal steps. Omitted if installation is possible in reverse order of removal steps.
- Reassembly steps:
Specified in case reassembly is impossible in reverse order of disassembly steps. Omitted if reassembly is possible in reverse order of disassembly steps.

Classifications of Major Maintenance/Service Points

When there are major points relative to maintenance and servicing procedures (such as essential maintenance and service points, maintenance and service standard values, information regarding the use of special tools, etc.), these are arranged together as major maintenance and service points and explained in detail.

- ◀A▶ : Indicates that there are essential points for removal or disassembly.
▶A◀ : Indicates that there are essential points for installation or reassembly.

Symbols for Lubrication, Sealants and Adhesives

Information concerning the locations for lubrication and for application of sealants and adhesives is provided, by using symbols, in the diagram of component parts or on the page following the component parts page, and explained.



: Grease
(multipurpose grease unless there is a brand or type specified)



: Sealant or adhesive



: Brake fluid or automatic transmission fluid



: Engine oil, gear oil or air conditioner compressor oil



: Adhesive tape or butyl rubber tape

Indicates the group title.

Indicates the section title.

Indicates the group number.

Indicates the page number.

STEERING – Power Steering Oil Pump 37A-29

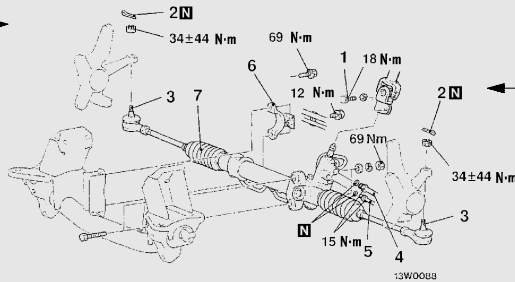
POWER STEERING GEAR BOX

12000039

REMOVAL AND INSTALLATION

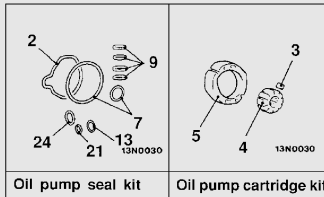
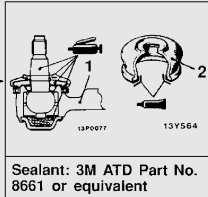
Pre-removal Operation
 (1) Power Steering Fluid Draining (Refer to P. 37A-10.)
 (2) Air Cleaner Assembly Removal
 (3) Under Cover Removal (Refer to GROUP 42 – Under Cover.)

<2WD>



N denotes non-re-usable part.

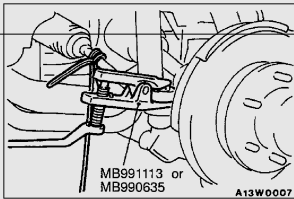
Denotes tightening torque. For bolts and nuts which do not have a tightening torque listed, refer to the "Standard Parts-tightening-torque Table".



Repair kit or set parts are shown. (Only very frequently used parts are shown.)

Removal steps

1. Lower shaft assembly and gear box connecting bolt
2. Split pin
3. Connection for tie-rod end and knuckle
4. Connection for return tube
5. Connection for pressure tube
6. Clamp
7. Gear box assembly

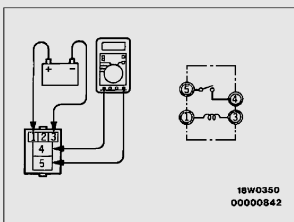


REMOVAL SERVICE POINTS

◀A▶ TIE-ROD END DISCONNECTION

- Caution**
1. Using the special tool, loosen the tie rod end mounting nut. Only loosen the nut; do not remove it from the ball joint.
 2. Support the special tool with a cord, etc. to prevent it from coming off.

Operating procedures, cautions, etc. on removal, installation, disassembly and reassembly are described.



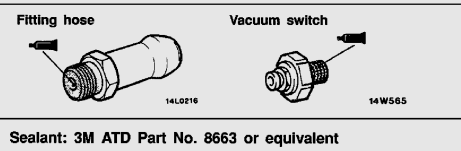
HEADLAMP RELAY CONTINUITY INSPECTION

Battery voltage	Terminal No.			
	1	3	4	5
Power is not supplied	○—○	○—○	○—○	○—○
Power is supplied	⊕—○	⊖—○	○—○	○—○

○—○ indicates that there is a continuity between the terminals.
 ⊕—○ indicates terminals to which battery voltage is applied.

35A-26 BASIC BRAKE SYSTEM – Master Cylinder and Brake Booster

Lubrication and sealing points



The title of the page (following the page on which the diagram of component parts is presented) indicating the locations of lubrication and sealing procedures.

HOW TO USE TROUBLESHOOTING/INSPECTION SERVICE POINTS

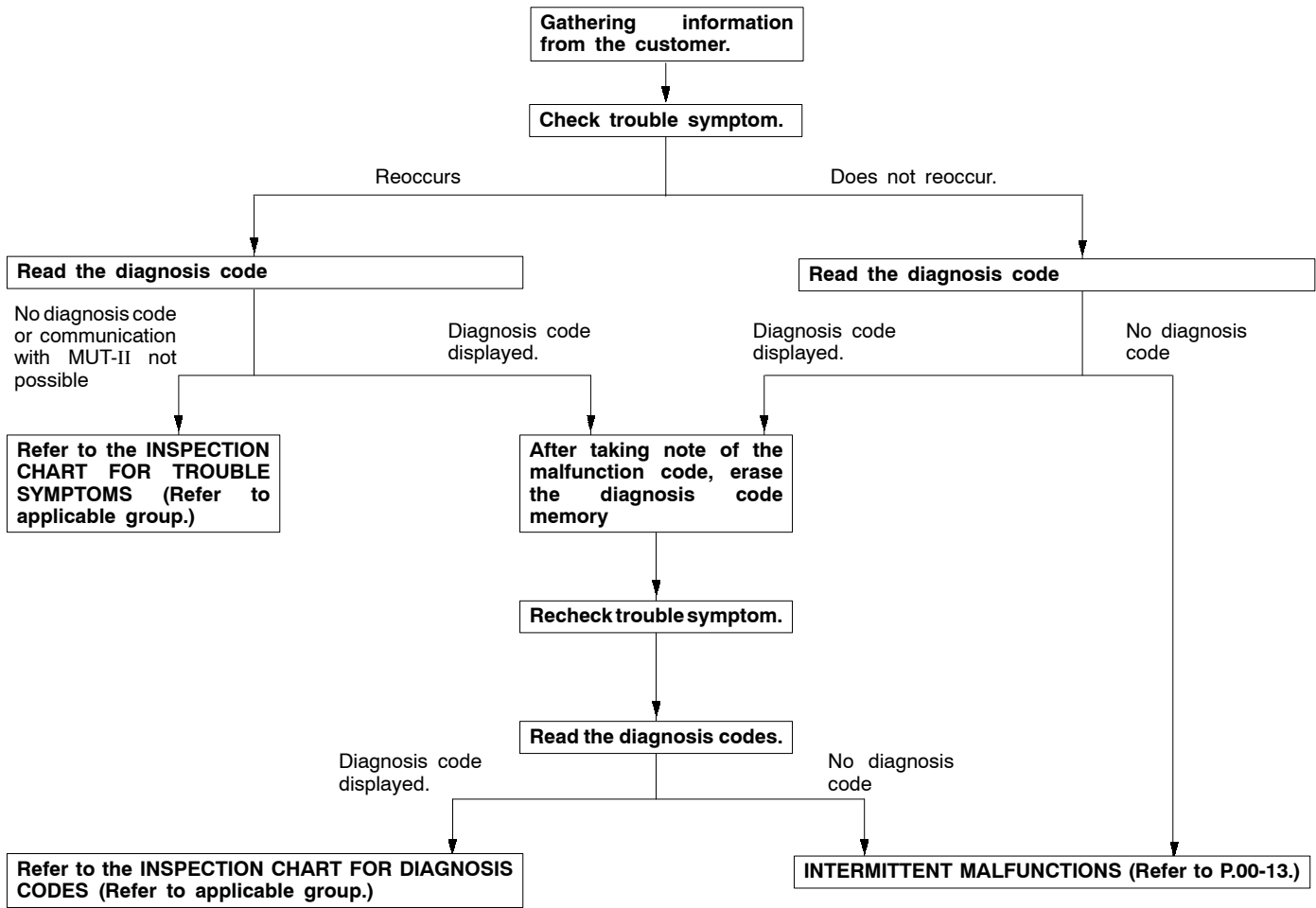
Troubleshooting of electronic control systems for which the MUT-II can be used follows the basic outline described below. Furthermore, even in systems for which the MUT-II cannot be used, part of these systems still follow this outline.

TROUBLESHOOTING CONTENTS

1. STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

The troubleshooting sections follow the basic diagnosis flow which is given below. If the diagnosis flow is different from that given below, or if additional explanation is required, the details of such differences or additions will also be listed.

Diagnosis method



2. SYSTEM OPERATION AND SYMPTOM VERIFICATION TESTS

If verification of the trouble symptoms is difficult, procedures for checking operation and verifying trouble symptoms are shown.

3. DIAGNOSIS FUNCTION

Details which are different from those in the “Diagnosis Function” section on the next page are listed.

4. INSPECTION CHART FOR DIAGNOSIS CODES**5. INSPECTION PROCEDURE FOR DIAGNOSIS CODES**

Indicates the inspection procedures corresponding to each diagnosis code. (Refer to P.00-10 for how to use the inspection procedures.)

6. INSPECTION CHART FOR TROUBLE SYMPTOMS

If there are trouble symptoms even though the results of inspection using the MUT-II show that all diagnosis codes are normal, inspection procedures for each trouble symptom will be found by means of this chart.

7. INSPECTION PROCEDURE FOR TROUBLE SYMPTOM

Indicates the inspection procedures corresponding to each trouble symptoms classified in the Inspection Chart for Trouble Symptoms. (Refer to P.00-10 for how to use the inspection procedures.)

8. SERVICE DATA REFERENCE TABLE

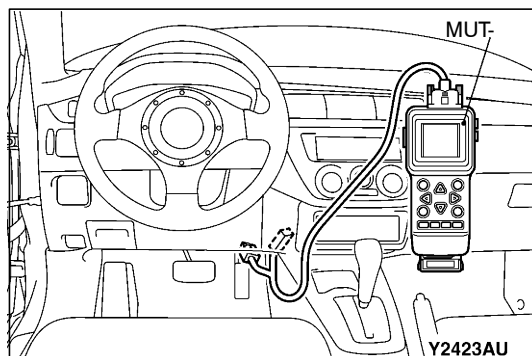
Inspection items and normal judgement values have been provided in this chart as reference information.

9. CHECK AT ECU TERMINALS

Terminal numbers for the ECU connectors, inspection items and standard values have been provided in this chart as reference information.

10. INSPECTION PROCEDURES USING AN OSCILLOSCOPE

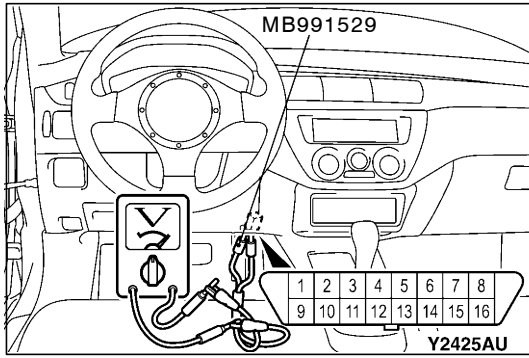
When there are inspection procedures using an oscilloscope, these are listed here.

**DIAGNOSIS FUNCTION****METHOD OF READING DIAGNOSIS CODES****WHEN USING THE MUT-II**

Connect the MUT-II to the diagnosis connector and take a reading of the diagnosis codes.

Caution

Turn the ignition switch to “LOCK”(OFF) position before connecting or disconnecting the MUT-II.



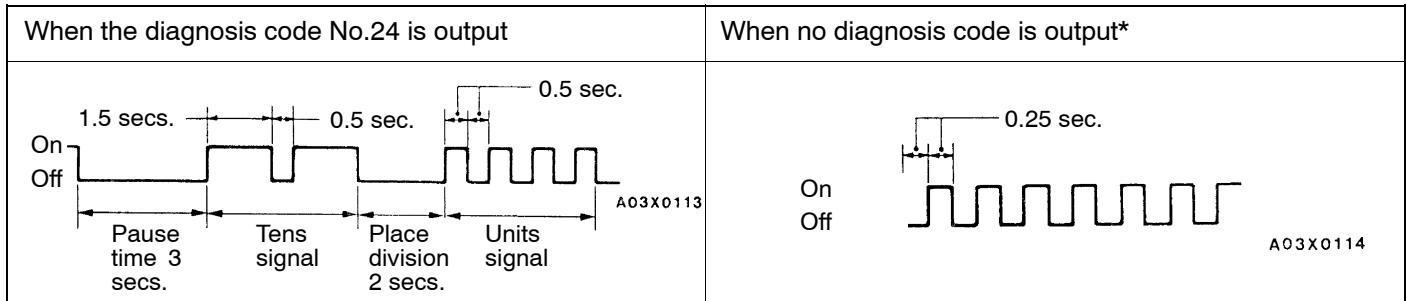
WHEN USING THE WARNING LAMP

1. Use the special tool to earth No.1 terminal (diagnosis control terminal) of the diagnosis connector.
2. Turn the ignition switch to "ON" position.
3. Read out a diagnosis code by observing how the warning lamp flashes.

Applicable systems

System name	Warning lamp name
ACD, AYC	ACD mode indicator lamp
ABS	ABS warning lamp

Indication of diagnosis code by warning lamp



METHOD OF ERASING DIAGNOSIS CODES

WHEN USING THE MUT-II

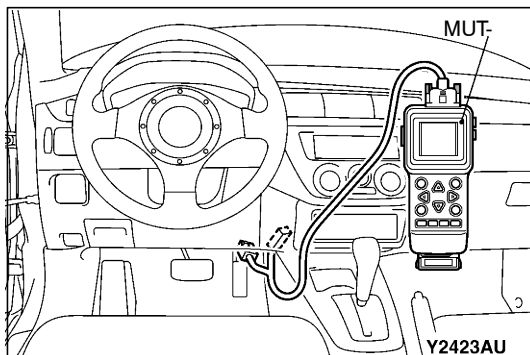
Connect the MUT-II to the diagnosis connector and erase the diagnosis code.

Caution

Turn the ignition switch to "LOCK"(OFF) position before connecting or disconnecting the MUT-II.

WHEN NOT USING THE MUT-II

1. Turn the ignition switch to "LOCK"(OFF) position.
2. After disconnecting the battery cable from the battery (-) terminal for 10 seconds or more, reconnect the cable.
3. After the engine has warmed up, run it at idle for about 15 minutes.

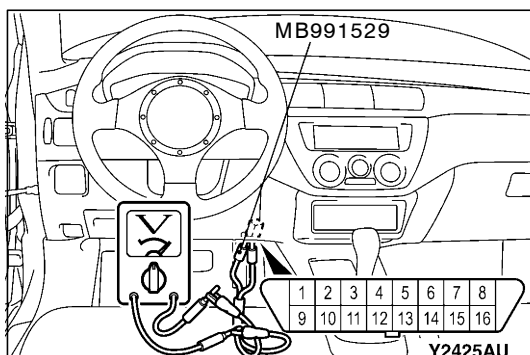
**INPUT SIGNAL CHECK <SWS>****WHEN USING THE MUT-II**

1. Connect the MUT-II to the diagnosis connector and erase the diagnosis code.

Caution

Turn the ignition switch to “LOCK”(OFF) position before connecting or disconnecting the MUT-II.

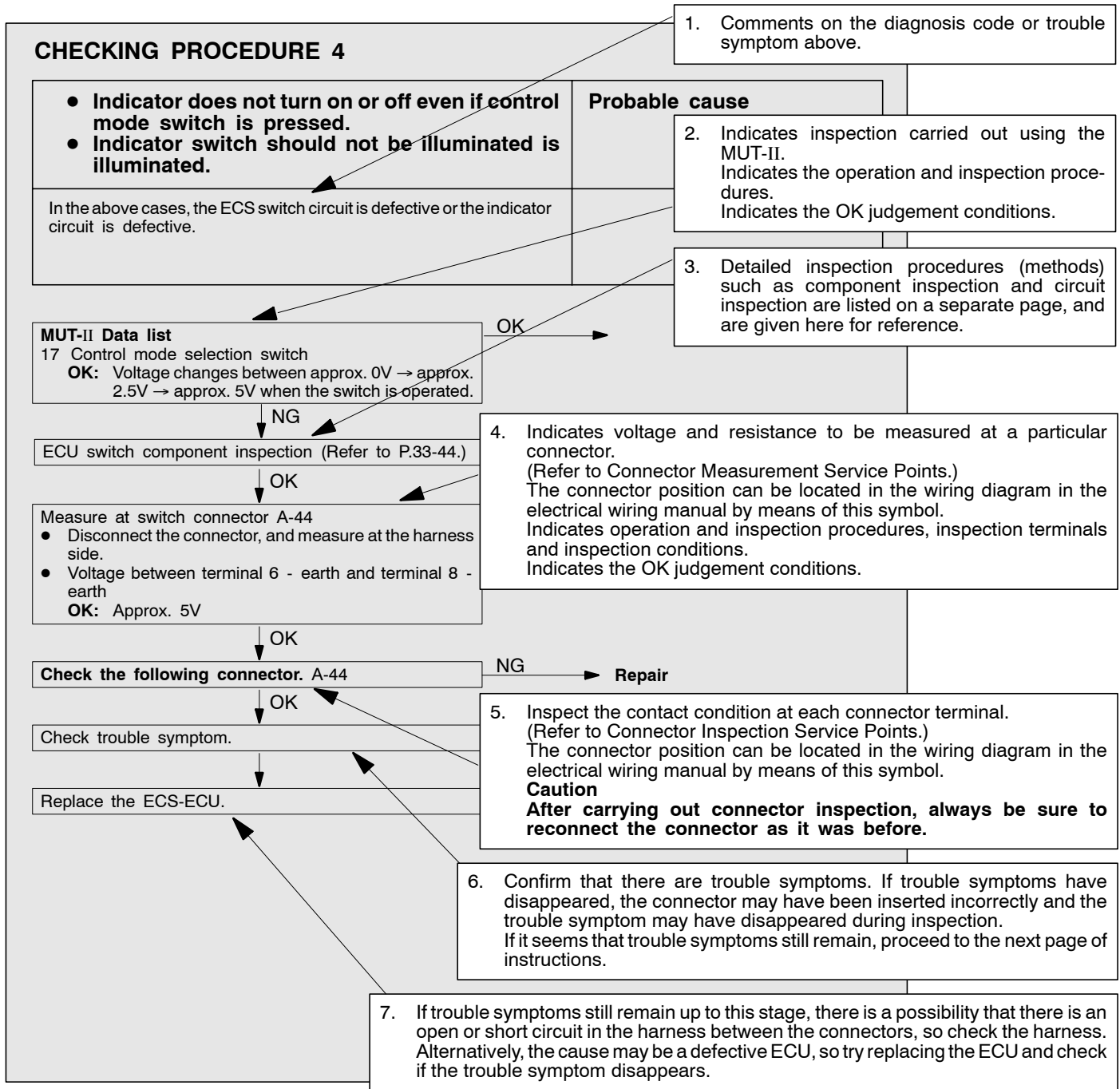
2. If the MUT-II buzzer sounds once when each switch is operated (ON/OFF), the input signal for that switch circuit system is normal.

**WHEN USING A VOLTMETER**

1. Use the special tool to connect the ETACS terminal (terminal 9) and the earth terminals (terminals 4 and 5) of the diagnosis connector to the voltage meter.
2. If the needle of the voltage meter flickers once when each switch is operated (ON/OFF), the input signal for that switch circuit system is normal.

HOW TO USE THE INSPECTION PROCEDURES

The causes of a high frequency of problems occurring in electronic circuitry are generally the connectors, components, the ECU and the harnesses between connectors, in that order. These inspection procedures follow this order, and they first try to discover a problem with a connector or a defective component.



HARNESS INSPECTION

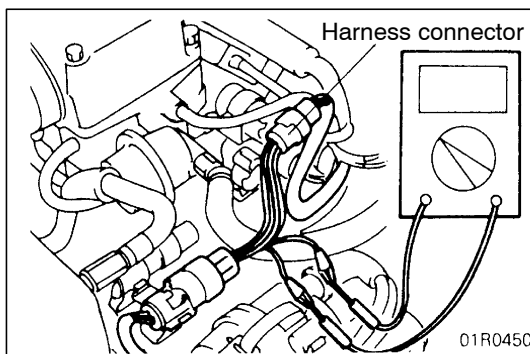
Check for an open or short circuit in the harness between the terminals which were defective according to the connector measurements. Carry out this inspection while referring to the electrical wiring manual. Here, "Check harness between power supply and terminal xx" also includes checking for blown fuses. For inspection service points when there is a blown fuse, refer to "Inspection Service Points for a Blown Fuse."

MEASURES TO TAKE AFTER REPLACING THE ECU

If the trouble symptoms have not disappeared even after replacing the ECU, repeat the inspection procedure from the beginning.

CONNECTOR MEASUREMENT SERVICE POINTS

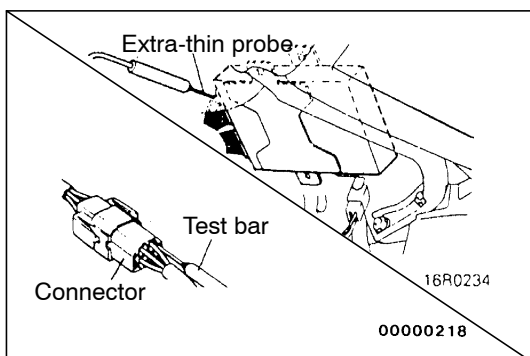
Turn the ignition switch to OFF when connecting disconnecting the connectors, and turn the ignition switch to ON when measuring if there are no instructions to be contrary.



IF INSPECTING WITH THE CONNECTOR CONNECTED (WITH CIRCUIT IN A CONDITION OF CONTINUITY)

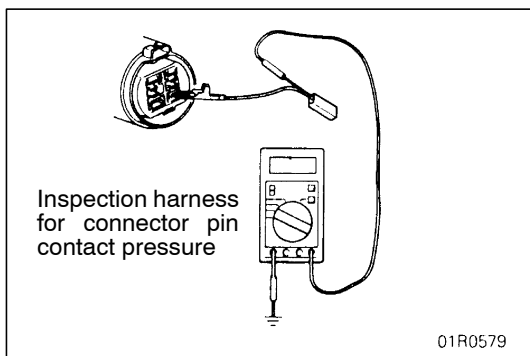
Waterproof Connectors

Be sure to use the special tool (harness connector). Never insert a test bar from the harness side, because to do so will reduce the waterproof performance and result in corrosion.



Ordinary (non-waterproof) Connectors

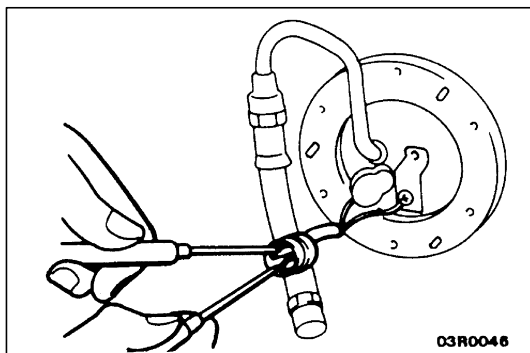
Check by inserting the test bar from the harness side. Note that if the connector (control unit, etc.) is too small to permit insertion of the test bar, it should not be forced; use a special tool (the extra-thin probe in the harness set for checking for this purpose).



IF INSPECTING WITH THE CONNECTOR DISCONNECTED

<When Inspecting a Female Pin>

Use the special tool (inspection harness for connector pin contact pressure in the harness set for inspection). The inspection harness for connector pin contact pressure should be used. the test bar should never be forcibly inserted, as it may cause a defective contact.

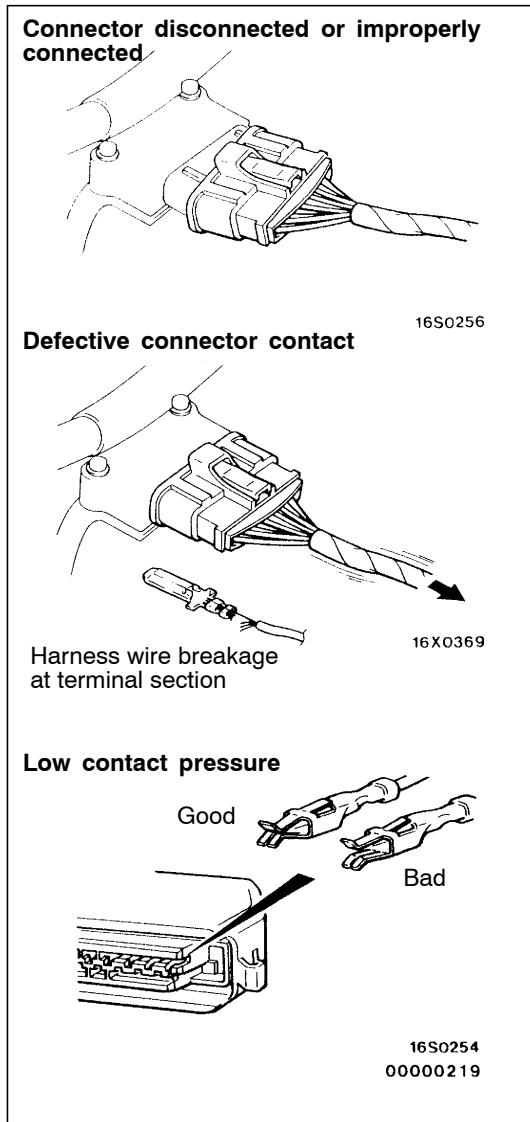


<When Inspecting a Male Pin>

Touch the pin directly with the test bar.

Caution

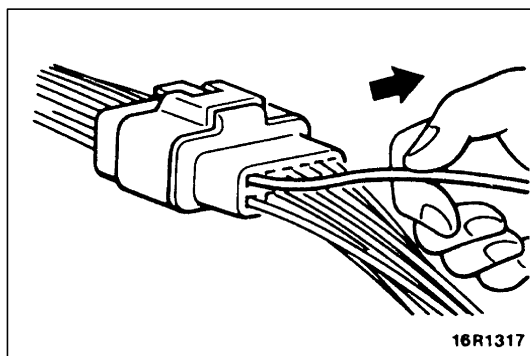
At this time, be careful not to short the connector pins with the test bars. To do so may damage the circuits inside the ECU.



CONNECTOR INSPECTION

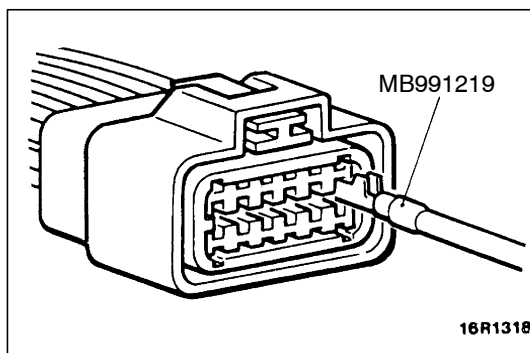
VISUAL INSPECTION

- Connector is disconnected or improperly connected
- Connector pins are pulled out
- Due to harness tension at terminal section
- Low contact pressure between male and female terminals
- Low connection pressure due to rusted terminals or foreign matter lodged in terminals



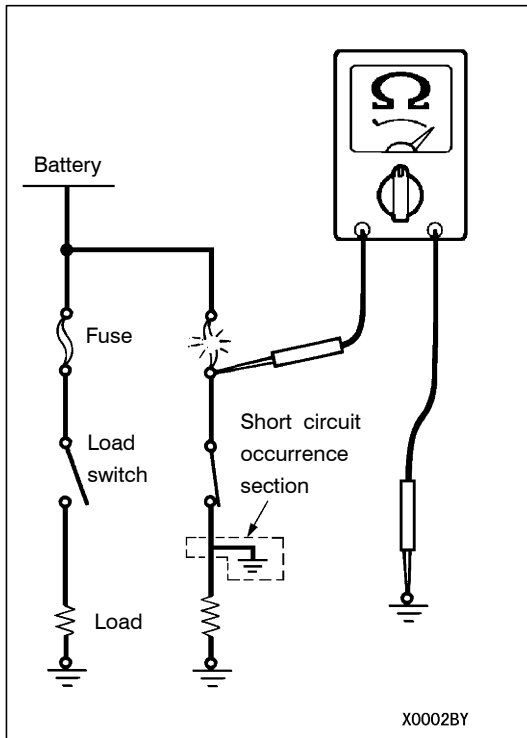
CONNECTOR PIN INSPECTION

If the connector pin stopper is damaged, the terminal connections (male and female pins) will not be perfect even if the connector body is connected, and the pins may pull out of the reverse side of the connector. Therefore, gently pull the harnesses one by one to make sure that no pins pull out of the connector.



CONNECTOR ENGAGEMENT INSPECTION

Use the special tool (connector pin connection pressure inspection harness of the inspection harness set) to inspect the engagement of the male pins and females pins. (Pin drawing force : 1 N or more)

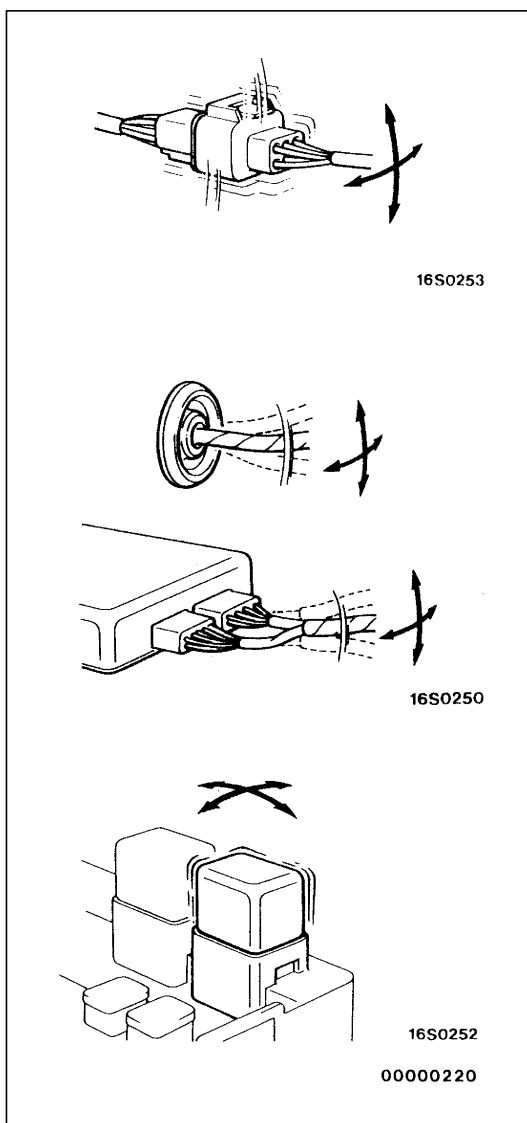


INSPECTION SERVICE POINTS FOR A BLOWN FUSE

Remove the blown fuse and measure the resistance between the load side of the blown fuse and the earth. Set the switches of all circuits which are connected to this fuse to a condition of continuity. If the resistance is almost 0 Ω at this time, there is a short somewhere between these switches and the load. If the resistance is not 0 Ω, there is no short at the present time, but a momentary short has probably caused the fuse to blow.

The main causes of a short circuit are the following.

- Harness being clamped by the vehicle body
- Damage to the outer casing of the harness due to wear or heat
- Water getting into the connector or circuitry
- Human error (mistakenly shorting a circuit, etc.)



POINTS TO NOTE FOR INTERMITTENT MALFUNCTIONS

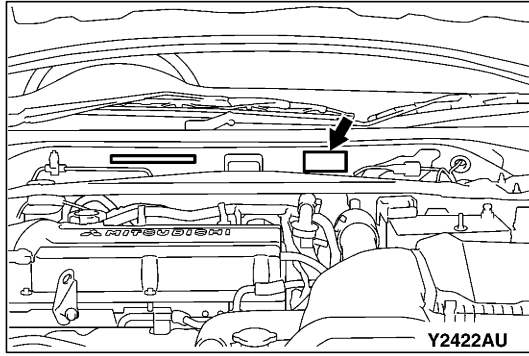
Intermittent malfunctions often occur under certain conditions, and if these conditions can be ascertained, determining the cause becomes simple. In order to ascertain the conditions under which an intermittent malfunction occurs, first ask the customer for details about the driving conditions, weather conditions, frequency of occurrence and trouble symptoms, and then try to recreate the trouble symptoms. Next, ascertain whether the reason why the trouble symptom occurred under these conditions is due to vibration, temperature or some other factor. If vibration is thought to be the cause, carry out the following checks with the connectors and components to confirm whether the trouble symptom occurs.

The objects to be checked are connectors and components which are indicated by inspection procedures or given as probable causes (which generates diagnosis codes or trouble symptoms.)

- Gently shake the connector up, down and to the left and right.
- Gently shake the wiring harness up, down and to the left and right. Check the branch point of wiring harness connector closely.
- Gently rock each sensor and relay, etc. by hand.
- Gently shake the wiring harness at suspensions and other moving parts.

NOTE

If determining the cause is difficult, the flight recorder function of the MUT-II can also be used.

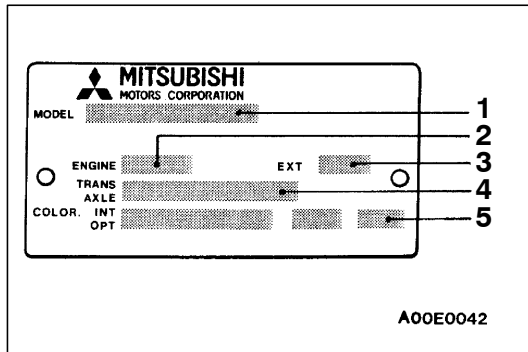


VEHICLE IDENTIFICATION

VEHICLE INFORMATION CODE PLATE

LOCATION

Vehicle information code plate is riveted on the toeboard inside the engine compartment.



CODE PLATE DESCRIPTION

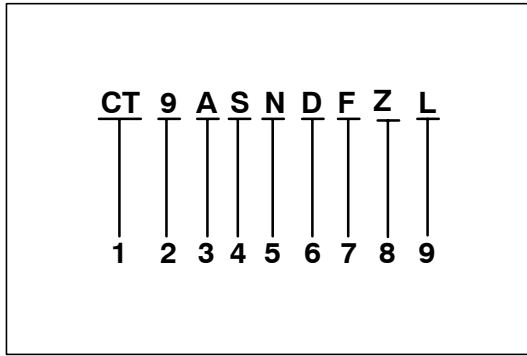
The plate shows model code, engine model, transmission model, and body colour code.

No.	Item	Contents	Contents
1	MODEL	CT9A SNDFZL	CT9A: Vehicle model
			SNDFZL: Model series
2	ENGINE	4G63-DOHC	Engine model
3	EXT	A37B	Exterior code
4	TRANS AXLE	W5M51	W5M51: Transmission code
5	COLOR INT OPT	A37 14H R11	A37: Body colour code
			14H: Interior code
			R11: Equipment code

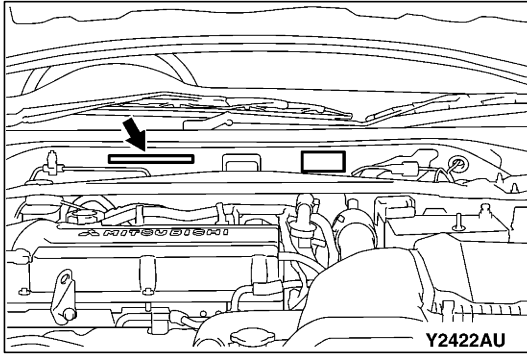
For monotone colour vehicles, the body colour code shall be indicated. For two-tone or three-way two-tone colour vehicles, each colour code only shall be indicated in series.

MODELS

Model code	Class code	Grade	Engine model	Transmission model	Fuel supply system
CT9A	SNDFZL/R	RS	4G63 (1,997 mL-DOHC-16 valves-intercooler turbo)	W5M51 <4WD-5M/T>	MPI
	SNGFZL/R	RS-II			

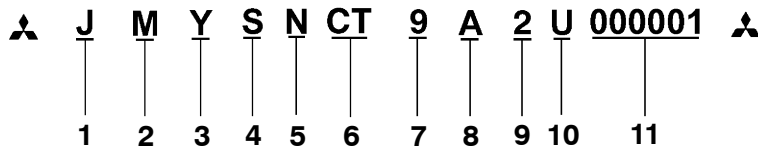
**MODEL CODE**

No.	Items	Contents
1	Development	CT: MITSUBISHI LANCER EVOLUTION-VII
2	Engine type	9: 1,997 mL petrol engine
3	Sort	A: Passenger car
4	Body style	S: 4-door sedan
5	Transmission type	N: 5-speed manual transmission
6	Trim level	D: RS G: RS-II or GSR
7	Specification engine feature	F: MPI-DOHC-intercooler turbo
8	Special feature	Z: 4WD
9	Steering wheel location	L: Left hand R: Right hand

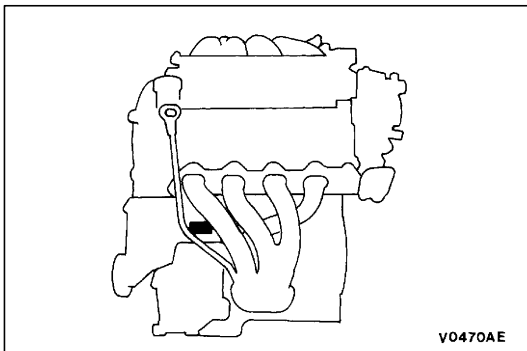


CHASSIS NUMBER

The chassis number is stamped on the toeboard inside the engine compartment.



No.	Items	Contents
1	Fixed figure	J Asia
2	Distribution channel	M Japan channel
3	Destination	Y For Europe and General Export
4	Body style	S 4-door sedan
5	Transmission type	N 5-speed manual transmission
6	Development order	CT MITSUBISHI LANCER EVOLUTION-VII
7	Engine	9 4G63: 1,997 mL petrol engine
8	Sort	A Passenger car
9	Model year	2 2002
10	Plant	U MIZUSHIMA-1
11	Serial number	-



ENGINE MODEL NUMBER

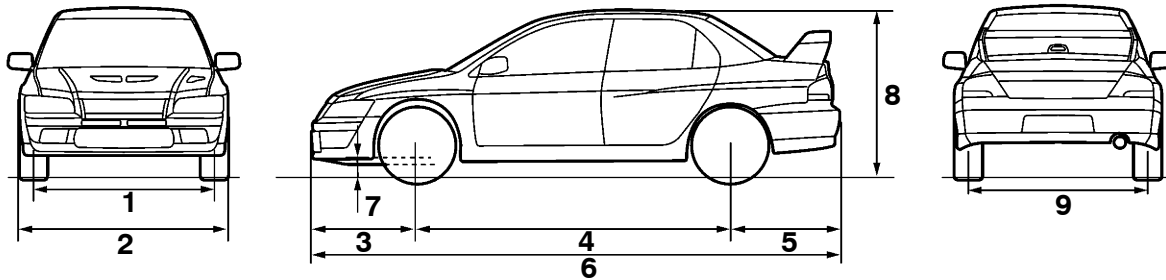
1. The engine model number is stamped on the cylinder block as shown below.

Engine model	Engine displacement mL
4G63	1,997

2. The engine serial number is stamped near the engine model number.

Engine serial number	AA0201 to YY9999

MAJOR SPECIFICATIONS



Items		CT9A		
		SNDFZL/R	SNGFZL/R	
Vehicle dimensions mm	Front track	1	1,500, 1,515 *1	
	Overall width	2	1,770	
	Front overhang	3	895	
	Wheel base	4	2,625	
	Rear overhang	5	935	
	Overall length	6	4,455	
	Ground clearance (unladen)	7	140	
	Overall height (unladen)	8	1,450	
	Rear track	9	1,500, 1,515 *1	
Vehicle weight kg	Kerb weight		1,320	1,380
	Max. gross vehicle weight		1,655	1,695
	Max. axle weight rating-front		950	970
	Max. axle weight rating-rear		705	725
Seating capacity			5	
Engine	Model No.	4G63		
	Total displacement mL	1,997		
Transmission	Model No.	W5M51		
	Type	5-speed manual		
Fuel system	Fuel supply system	MPI		

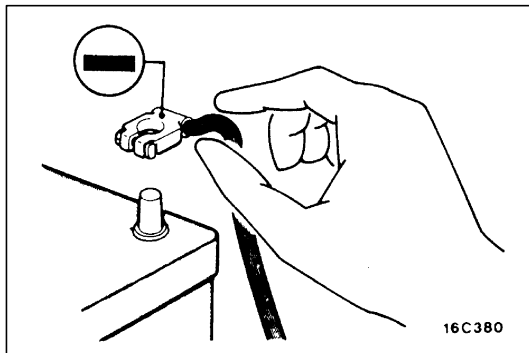
NOTE

*1: Vehicles with 17 inch wheels.

PRECAUTIONS BEFORE SERVICE

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

1. Items to follow when servicing SRS
 - (1) Be sure to read GROUP 52B - Supplemental Restraint System (SRS).
For safe operations, please follow the directions and heed all warnings.
 - (2) Wait at least 60 seconds after disconnecting the battery cable before doing any further work.
The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.
 - (3) Warning labels must be heeded when servicing or handling SRS components. Warning labels are located in the following locations.
 - Sun visor
 - Glove box
 - SRS-ECU
 - Steering wheel
 - Steering Joint Cover
 - Air bag module (driver's side and front passenger's side)
 - Clock spring
 - Seat belt with pre-tensioner
 - (4) Always use the designated special tools and test equipment.
 - (5) Store components removed from the SRS in a clean and dry place.
The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward.
Do not place anything on top of it.
 - (6) Never attempt to disassemble or repair the SRS components (SRS-ECU, air bag module, clock spring and seat belt with pre-tensioner).
 - (7) Whenever you finish servicing the SRS, check the SRS warning lamp operation to make sure that the system functions properly.
 - (8) Be sure to deploy the air bag before disposing of the air bag module or disposing of a vehicle equipped with an air bag. (Refer to GROUP 52B - Air Bag Module Disposal Procedures.)
2. Observe the following when carrying out operations on places where SRS components are installed, including operations not directly related to the SRS air bag.
 - (1) When removing or installing parts do not allow any impact or shock to the SRS components.
 - (2) SRS components should not be subjected to heat, so remove the SRS components before drying or baking the vehicle after painting.
 - SRS-ECU, air bag module, clock spring: 93°C or more
 - Seat belt with pre-tensioner: 90°C or moreAfter re-installing them, check the SRS warning lamp operation to make sure that the system functions properly.



SERVICING THE ELECTRICAL SYSTEM

Before replacing a component related to the electrical system and before undertaking any repair procedures involving the electrical system, be sure to first disconnect the negative (-) cable from the battery in order to avoid damage caused by short-circuiting.

Caution

Before connecting or disconnecting the negative (-) cable, be sure to turn off the ignition switch and the lighting switch.

(If this is not done, there is the possibility of semiconductor parts being damaged.)

APPLICATION OF ANTI-CORROSION AGENTS AND UNDERCOATS

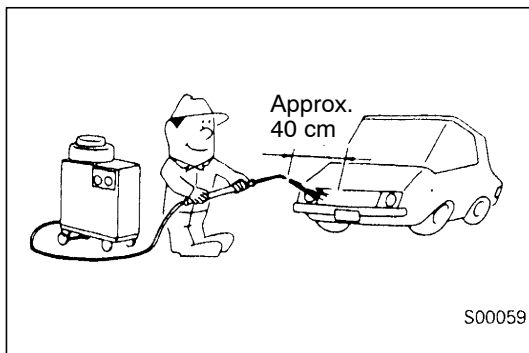
If oil or grease gets onto the oxygen sensor, it will cause a drop in the performance of the sensor.

Cover the oxygen sensor with a protective cover when applying anti-corrosion agents and undercoats.

PRE-INSPECTION CONDITION

“Pre-inspection condition” refers to the condition that the vehicle must be in before proper engine inspection can be carried out. If you see the words “Set the vehicle to the pre-inspection condition”. in this manual, it means to set the vehicle to the following condition.

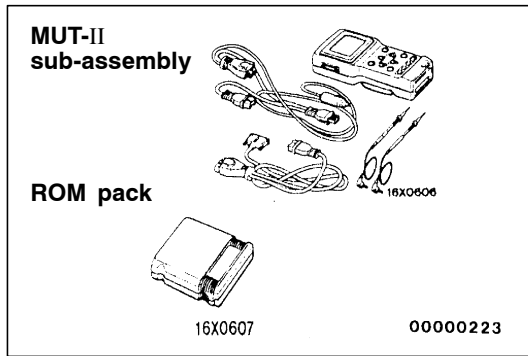
- Engine coolant temperature: 80 to 90°C
- Lamps, electric cooling fan and all accessories: OFF
- M/T: Neutral
- A/T: P range



VEHICLE WASHING

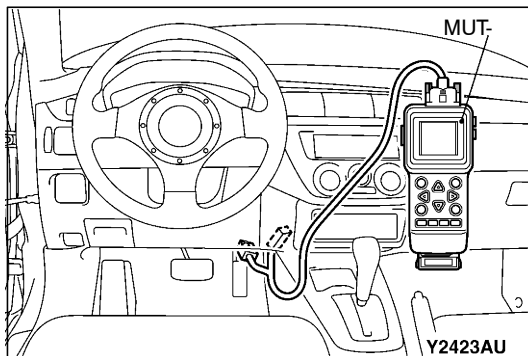
If high-pressure car-washing equipment or steam car-washing equipment is used to wash the vehicle, be sure to note the following information in order to avoid damage to plastic components, etc.

- Spray nozzle distance: Approx. 40 cm or more
- Spray pressure: 3,900 kPa or less
- Spray temperature: 82°C or less
- Time of concentrated spray to one point: within 30 sec.



MUT-II

Refer to the "MUT-II REFERENCE MANUAL" or "MUT-II OPERATING INSTRUCTIONS" for instructions on handling the MUT-II.



Connect the MUT-II to the diagnosis connector as shown in the illustration.

Caution

Turn the ignition switch to the LOCK (OFF) position before connecting or disconnecting the MUT-II.

IN ORDER TO PREVENT VEHICLES FROM FIRE

"Improper installation of electrical or fuel related parts could cause a fire. In order to retain the high quality and safety of the vehicle, it is important that any accessories that may be fitted or modifications/repairs that may be carried out which involve the electrical or fuel systems, MUST be carried out in accordance with MMC's information/Instructions".

ENGINE OILS

Health Warning

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities must be provided.

Recommended Precautions

The most effective precaution is to adapt working practices which prevent, as far as practicable, the risk of skin contact with mineral oils, for example by using enclosed systems for handling used engine oil and by degreasing components, where practicable, before handling them.

Other precautions:

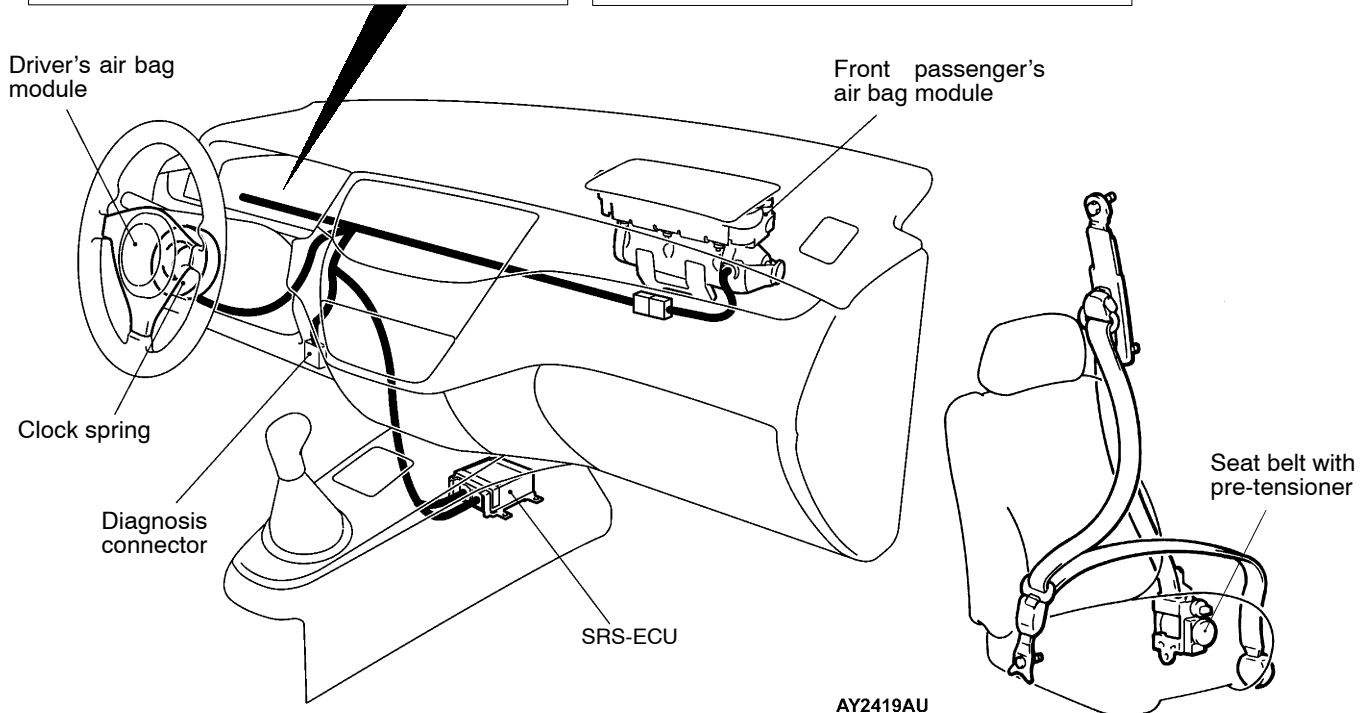
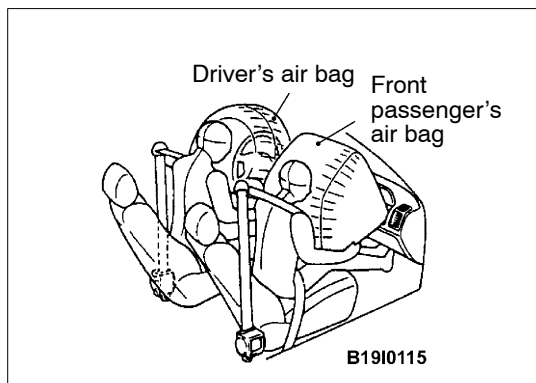
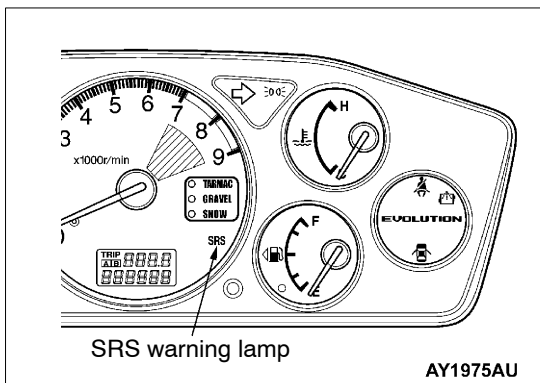
- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Avoid contaminating clothes, particularly underpants, with oil.
- Do not put oily rags in pockets, the use of overalls without pockets will avoid this.
- Do not wear heavily soiled clothing and oil-impregnated foot-wear. Overalls must be cleaned regularly and kept separately from personal clothing.
- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.
- Obtain First Aid treatment immediately for open cuts and wounds.
- Wash regularly with soap and water to ensure all oil is removed, especially before meals (skin cleansers and nail brushes will help). After cleaning, the application of preparations containing lanolin to replace the natural skin oils is advised.
- Do not use petrol, kerosine, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin after work.
- If skin disorders develop, obtain medical advice without delay.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

To improve safety, the SRS and seat belts with pre-tensioner. These systems enhance collision safety by restraining the front passengers in case of an accident. The SRS works with the pre-tensioner simultaneously when a collision is detected.

The SRS consists of two air bag modules, SRS air bag control unit (SRS-ECU), SRS warning lamp and clock spring. The air bags are located in the center of the steering wheel, above the glove box. Each air bag has a folded air bag and an inflator unit. The SRS-ECU under the floor console monitors the system and has a safing G-sensor and an analog G-sensor. The warning lamp on the

instrument panel indicates the operational status of the SRS. The clock spring is installed in the steering column. The seat belt pre-tensioner is built into the front seat belt retractor. Only authorized service personnel should do work on or around the SRS components and seat belt with pre-tensioner. Those service personnel should read this manual carefully before starting any such work. Extreme care must be used when servicing the SRS to avoid injury to the service personnel (by inadvertent deployment of the air bags or inadvertent operation of the seat belt with pre-tensioner) or the driver (by rendering the SRS or the seat belt with pre-tensioner inoperative).



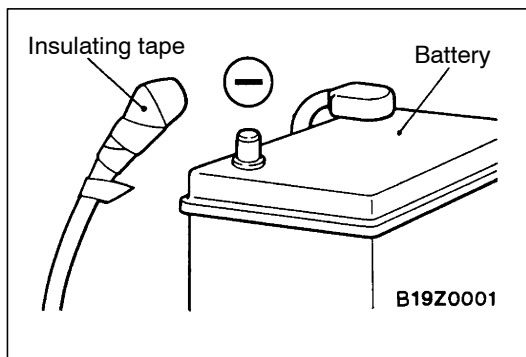
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SRS SERVICE PRECAUTIONS

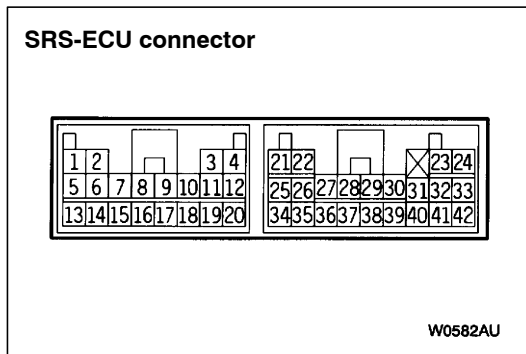
1. In order to avoid injury to yourself or others from accidental deployment of the air bag and accidental operation of the seat belt with pre-tensioner during servicing, read and carefully follow all the precautions and procedures described in this manual.
2. Do not use any electrical test equipment on or near SRS components, except those specified on P.52B-6.
3. **Never Attempt to Repair the Following Components:**
 - SRS air bag control unit (SRS-ECU)
 - Clock spring
 - Driver's and front passenger's air bag modules
 - Seat belt with pre-tensioner

NOTE

If any of these components are diagnosed as faulty, they should only be replaced, in accordance with the **INDIVIDUAL COMPONENTS SERVICE** procedures in this manual. (Refer to P.52B-49.)



4. **After disconnecting the negative (-) battery cable, wait 60 seconds at least before any service and insulate the disconnected cable with tape. The SRS retain enough voltage to deploy the air bags for a short time even after the disconnection of the battery. So, serious injury may result by accidental air bag deployment if a work is done on the SRS just after the disconnection of the battery.**

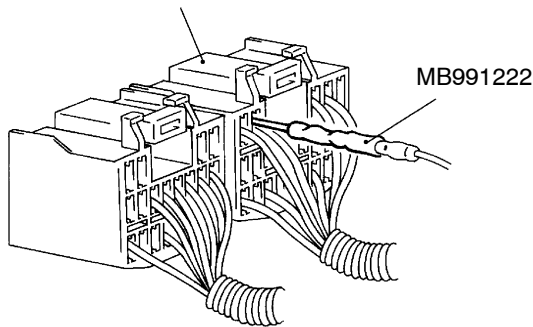


5. Do not attempt to repair the wiring harness connectors of the SRS. If the connector(s) are diagnosed as defective, replace the wiring harness(es). If the harness(es) are diagnosed as faulty, replace or repair the wiring harness(es) according to the table that follows.

SRS-ECU Terminal No.	Destination of harness	Corrective action
7	Instrument panel wiring harness → Earth	Repair or replace each wiring harness
8	Instrument panel wiring harness → Combination meter (SRS warning lamp)	
9, 10	Instrument panel wiring harness → Front passenger's air bag module	
11, 12	Instrument panel wiring harness → Clock spring → Driver's air bag module)	Repair or replace the dash wiring harness. Replace clock spring.
13	Instrument panel wiring harness → Junction block (fuse No.3)	Repair or replace each wiring harness.
16	Instrument panel wiring harness → Junction block (fuse No.2)	
20	Instrument panel wiring harness → Diagnosis connector	
29, 30	Floor wiring harness Driver's seat belt pre-tensioner	
27, 28	Floor wiring harness Front passenger's seat belt pre-tensioner	

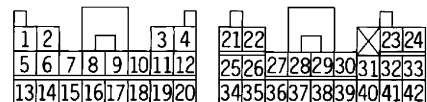
6. Inspection of the SRS-ECU harness connector should be carried out by the following procedure. Insert the special tool (probe, MB991222, in the harness set) into the connector from harness side (rear side), and connect the tester to this probe. If any tool than specified is used, damage to the harness and other components will result. Furthermore, measurement should not be carried out by touching the probe directly against the terminals from the front of the connector. The terminals are plated to increase their conductivity, so that if they are touched directly by the probe, the plating may break, which will cause drops in reliability.

SRS-ECU harness connector



V0132AE

SRS-ECU harness connector (rear view)



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7. SRS components and seat belt with pre-tensioner should not be subjected to heat, so remove the SRS-ECU, driver's and front passenger's air bag modules, clock spring, and seat belt with pre-tensioner before drying or baking the vehicle after painting.
- SRS-ECU, air bag module, clock spring : 93 or more
 - Seat belt with pre-tensioner : 90 or more
8. Whenever you finish servicing the SRS, check warning lamp operation to make sure that the system functions properly. (Refer to P.52B-6.)
9. Make certain that the ignition switch is LOCK (OFF) position when the MUT-II is connected or disconnected.
10. If you have any questions about the SRS, please contact your local distributor.

NOTE

SERIOUS INJURY CAN RESULT FROM UNINTENDED AIR BAG DEPLOYMENT, SO USE ONLY THE PROCEDURES AND EQUIPMENT SPECIFIED IN THIS MANUAL.

SUPPORT LOCATIONS FOR LIFTING AND JACKING

Caution

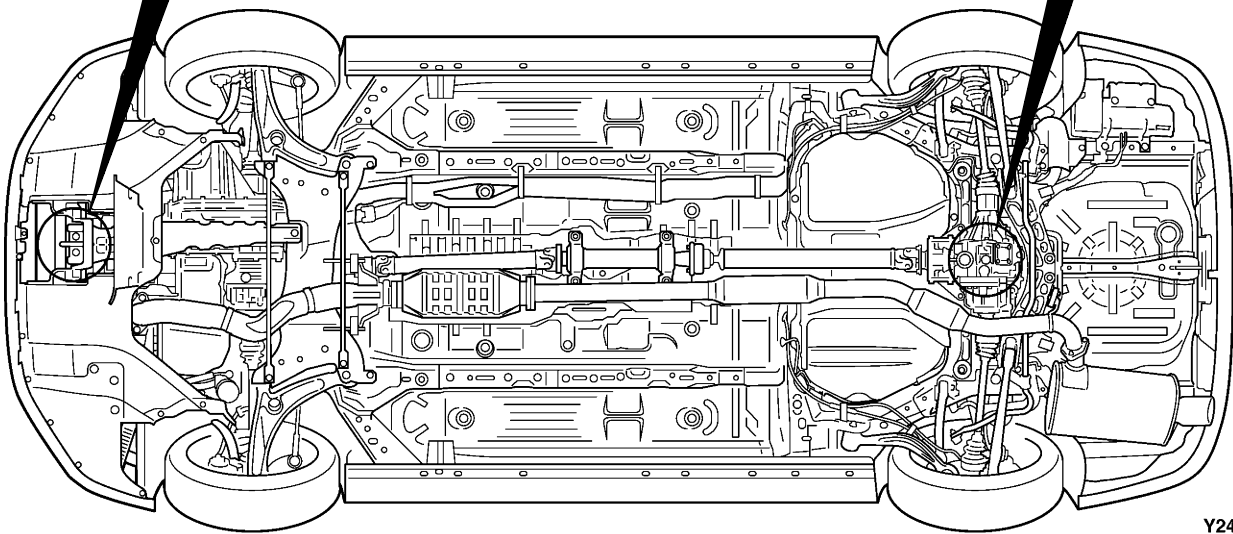
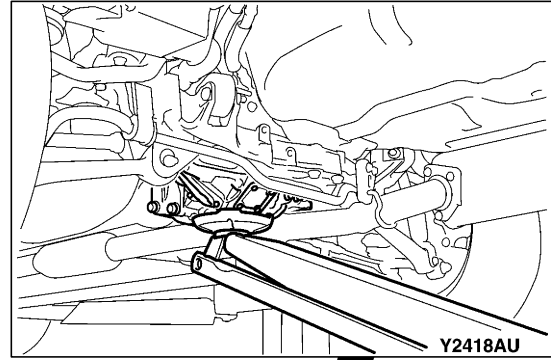
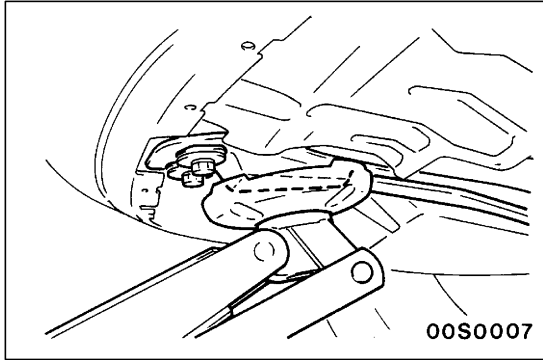
Do not support the vehicles at locations other than specified supporting points. Doing so will cause damage, etc.

SUPPORT POSITIONS FOR A GARAGE JACK AND AXLE STANDS

GARAGE JACK

Caution

Never support any point other than the specified ones, or deformation will result.



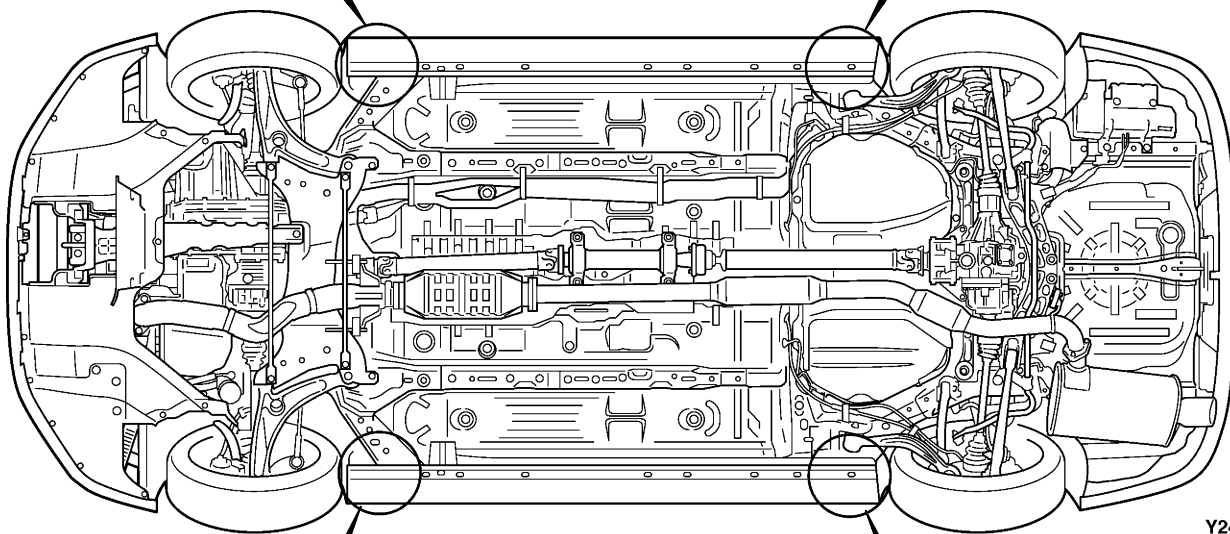
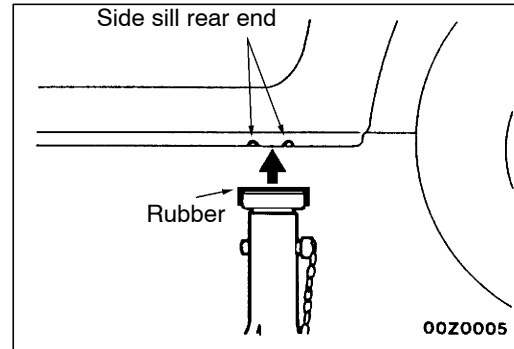
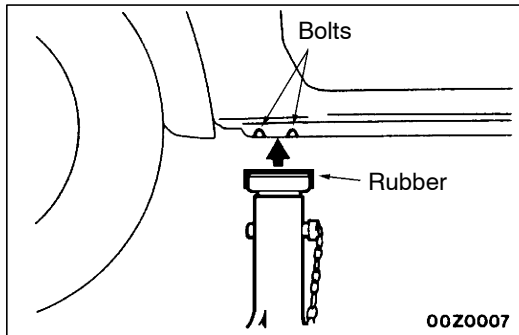
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SUPPORT POSITIONS FOR AXLE STANDS AND A SINGLE-POST LIFT OR DOUBLE-POST LIFT

Caution

1. If rubber attachments with grooves that are too thick are used at the front support positions, the front fender may become bent, so be sure to use rubber attachments with groove thicknesses of 18 mm or less.
2. If attachments which are not high enough are used, they may damage areas such as the side step. Be sure to use attachments which are high enough, or remove the side step if not using attachments.

AXLE STANDS



SINGLE-POST LIFT OR DOUBLE-POST LIFT

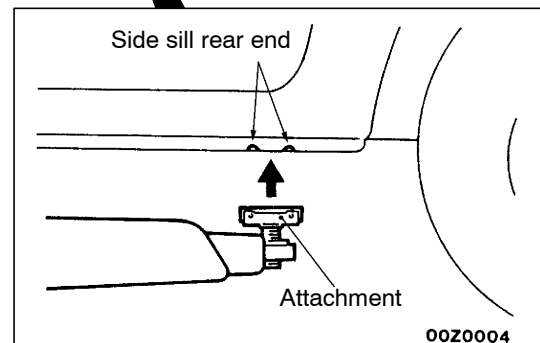
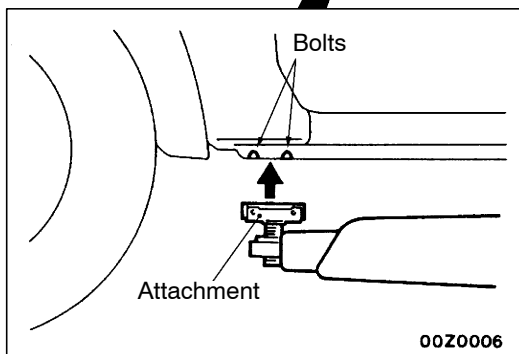
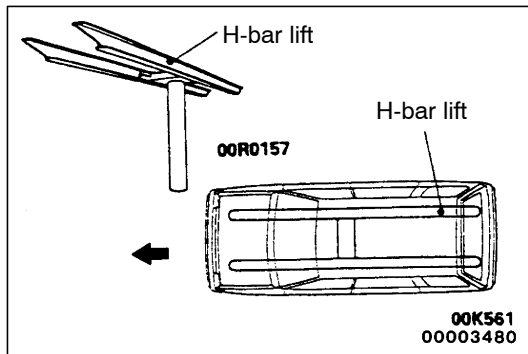


PLATE TYPE LIFT

To avoid damaging the side sill garnish, put a wooden block between the side sill and a lift.

NOTE

The wooden block should be 100 mm wide and 50 mm high.

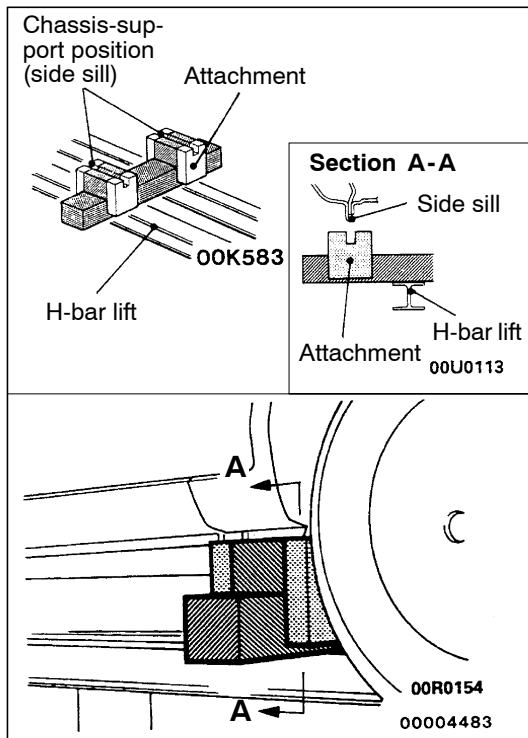


SUPPORT POSITIONS AND SUPPORT METHOD FOR AN H-BAR LIFT

Caution

When service procedures require removing the rear suspension, fuel tank, spare tyre and rear bumper, place additional weight on rear end of vehicle or anchor vehicle to hoist to prevent tipping of centre of gravity changes.

When H-bar lift is used to lift up vehicles, use of metallic attachment attached to the H-bar lift may cause damage to the suspension arm etc. Therefore, lift up the vehicle by the following procedure.

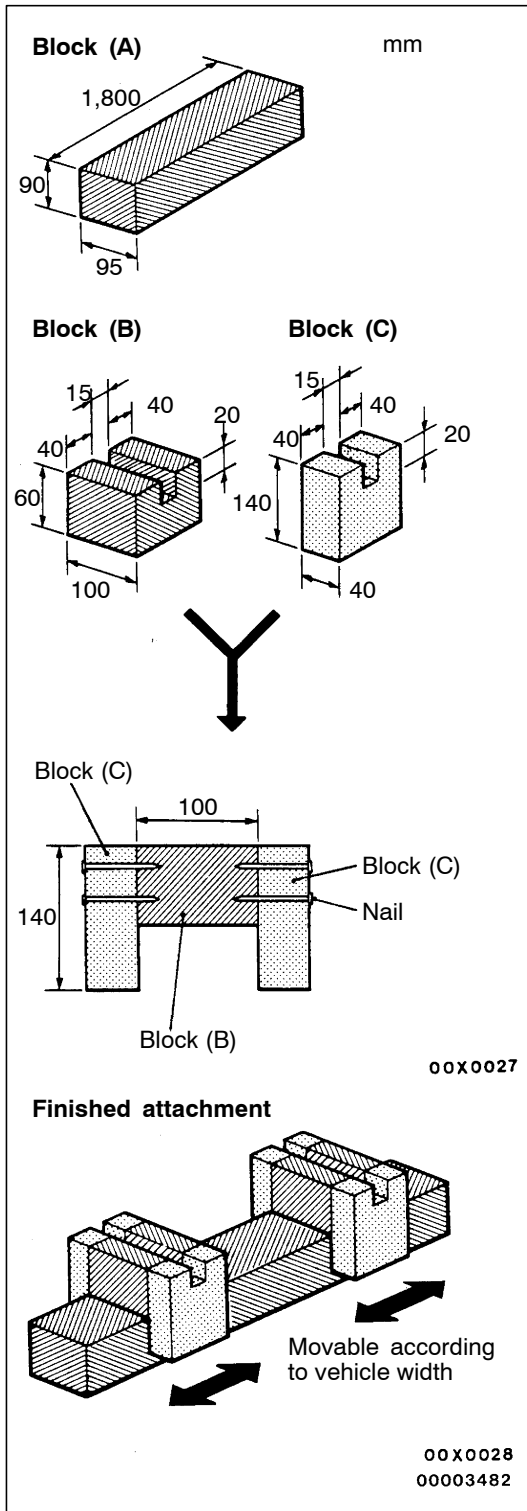


1. Place the vehicle on the H-bar lift (same direction).
2. Place attachments on the H-bar lift at the designated chassis-support positions. When making the attachments, refer to the section concerning making them.

Caution

If support is at any location other than the designated positions, the body or suspension might be deformed or otherwise damaged, so care should be taken to support only at the correct (designated) positions.

3. Raise the H-bar lift to the height at which the vehicle is slightly raised and check to be sure that the vehicle is correctly and sufficiently secured; then raise the vehicle.



PREPARATION OF "ATTACHMENTS"

1. Prepare the blocks (wooden) and nails as shown in the figure.

Item	Dimensions mm	Quantity
Block (A)	90 × 95 × 1,800	2
Block (B)	60 × 100 × 95	4
Block (C)	140 × 40 × 95	8
Nail	70 or more	32

Caution

The wood selected for the blocks must be hard.

2. For the (B) blocks and (C) blocks, use a saw and chisel or similar tool to make grooves of the dimensions shown in the figure.
3. Make four "ATTACHMENTS" such as shown in the figure nailing (B) and (C) blocks so that each (B) blocks is sandwiches between (C) blocks.

STANDARD PART/TIGHTENING-TORQUE TABLE

Each torque value in the table is a standard value for tightening under the following conditions.

- (1) Bolts, nuts and washers are all made of steel and plated with zinc.
- (2) The threads and bearing surface of bolts and nuts are all in dry condition.

The values in the table are not applicable:

- (1) If toothed washers are inserted.
- (2) If plastic parts are fastened.
- (3) If bolts are tightened to plastic or die-cast inserted nuts.
- (4) If self-tapping screws or self-locking nuts are used.

Standard bolt and nut tightening torque

Thread size		Torque N·m		
Bolt nominal diameter (mm)	Pitch (mm)	Head mark "4"	Head mark "7"	Head mark "8"
M5	0.8	2.5±0.5	5.0±1.0	6.0±1.0
M6	1.0	5.0±1.0	9.0±2.0	10±2
M8	1.25	12±2	22±4	25±4
M10	1.25	24±4	44±10	53±7
M12	1.25	41±8	83±12	98±12
M14	1.5	73±12	140±20	155±25
M16	1.5	110±20	210±30	235±35
M18	1.5	165±25	300±40	340±50
M20	1.5	225±35	410±60	480±70
M22	1.5	300±40	555±85	645±95
M24	1.5	395±55	735±105	855±125

Flange bolt and nut tightening torque

Thread size		Torque N·m		
Bolt nominal diameter (mm)	Pitch (mm)	Head mark "4"	Head mark "7"	Head mark "8"
M6	1.0	5.0±1.0	10±2	12±2
M8	1.25	13±2	24±4	27±5
M10	1.25	26±4	49±9	58±7
M10	1.5	24±4	45±8	55±10
M12	1.25	46±8	95±15	105±15
M12	1.75	43±8	83±12	98±12

NOTE

1. Be sure to use only the specified bolts and nuts, and always tighten them to the specified torques.
2. Bolts marked with indications such as 4T or 7T are reinforced bolts. The larger the number, the greater the bolt strength.

ENGINE

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ENGINE OVERHAUL	11B



ENGINE

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GENERAL INFORMATION

Items		4G63	
Total displacement mL		1,997	
Bore × Stroke mm		85.0 × 88.0	
Compression ratio		8.8	
Combustion chamber		Pentroof type	
Camshaft arrangement		DOHC	
Number of valve	Intake	8	
	Exhaust	8	
Valve timing	Intake	Opening	BTDC 21°
		Closing	ABDC 59°
	Exhaust	Opening	BBDC 58°
		Closing	ATDC 18°
Fuel system		Electronically controlled multipoint fuel injection	
Rocker arm		Roller type	
Auto-lash adjuster		Equipped	

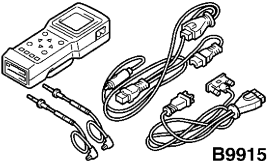
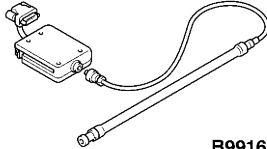
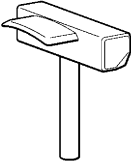
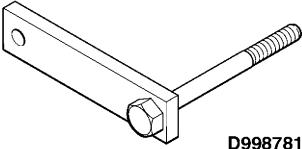
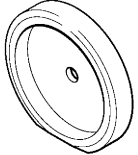
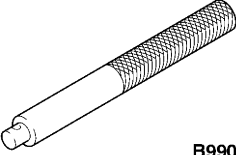
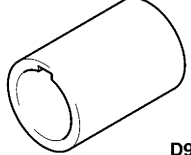
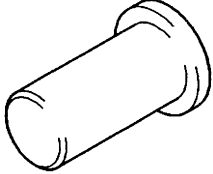
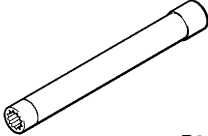
SERVICE SPECIFICATIONS

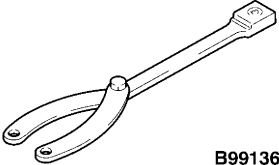
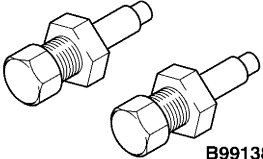
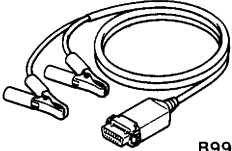
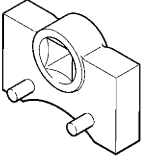
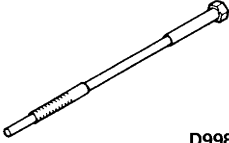
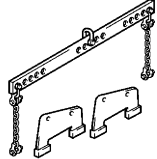
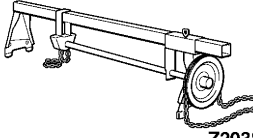
Items		Standard value	Limit
Drive belt tension	Vibration frequency Hz (Reference)	110 - 144	-
	Tension N (Reference)	245 - 412	-
Basic ignition timing		5° BTDC ± 3°	-
Ignition timing		Approximately 5° BTDC	-
Idle speed r/min		850 ± 100	-
CO contents %		0.1 or less	-
HC contents ppm		100 or less	-
Compression pressure (250 - 400 r/min) kPa		1,128	951
Compression pressure difference of all cylinder kPa		-	Max. 98
Intake manifold vacuum kPa		-	Min. 60
Cylinder head bolt shank length mm		-	99.4
Timing belt B tension (When checked)	Vibration frequency Hz	52 - 92	-
	Deflection mm (Reference)	5 - 10	-
Timing belt B tension (When adjusted)	Vibration frequency Hz	76 - 92	-
	Deflection mm (Reference)	5 - 7	-
Timing belt B tension (When replaced)	Vibration frequency Hz	76 - 92	-
	Deflection mm (Reference)	5 - 7	-
Auto-tensioner rod protrusion amount mm		3.8 - 4.5	-
Auto-tensioner rod sink in amount mm		Within 1	-

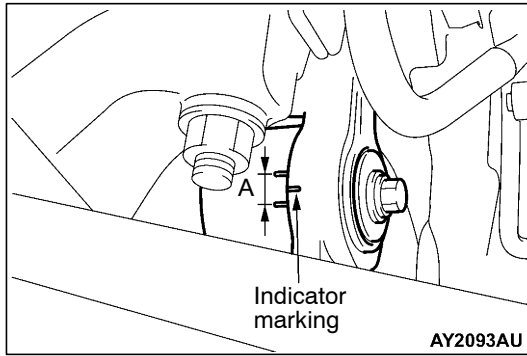
SEALANTS

Items	Specified Sealants	Remarks
Rocker cover	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant
Rocker cover gasket		
Cylinder head		
Camshaft position sensor support		
Oil pan		
Camshaft end seal	3M ATD Part No. 8660 or equivalent	

SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub assembly	<ul style="list-style-type: none"> • Measuring the drive belt tension • Checking the ignition timing • Checking the idle speed • Erasing diagnosis code • Measuring the timing belt B tension
 B991668	MB991668	Belt tension meter set	<ul style="list-style-type: none"> • Measuring the drive belt tension (used together with MUT-II) • Measuring the timing belt B tension (used together with MUT-II)
 D998727	MD998727	Oil pan remover	For removing the oil pan
 D998781	MD998781	Flywheel stopper	For fixing the flywheel
 D998776	MD998776	Crankshaft rear oil seal installer	For pressfitting the crankshaft rear oil seal
 B990938	MB990938	Installer bar	
 D998285	MD998285	Crankshaft front oil seal guide	For pressfitting the crankshaft front oil seal
 MD998382	MD998382	Crankshaft front oil seal installer	
 B991654	MB991654	Cylinder head bolt wrench	For removal and installation of cylinder head bolts

Tool	Number	Name	Use
 <p>B991367</p>	MB991367	Special spanner	For retaining the crankshaft sprocket
 <p>B991385</p>	MB991385	Pin	
 <p>B991704</p>	MB991704	Battery harness	Measuring the timing belt B tension (used together with MUT-II)
 <p>D998767</p>	MD998767	Tensioner pulley socket wrench	For adjusting timing belt tension
 <p>D998738</p>	MD998738	Adjusting bolt	For retaining the tensioner arm and the auto-tensioner
 <p>B991453</p>	MB991453	Engine hanger attachment set	Supporting the engine assembly during removal and installation of the transmission
 <p>Z203827</p>	GENERAL SERVICE TOOL MZ203827	Engine lifter	



ON-VEHICLE SERVICE

DRIVE BELT TENSION CHECK

1. Check that the indicator marking of the auto-tensioner is within the range as shown in the illustration A of the tensioner bracket.

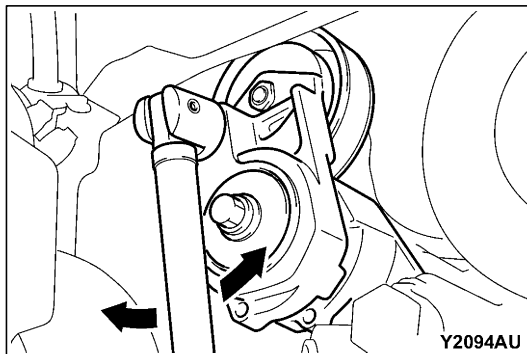
Caution

Inspection must be carried out after turning the crankshaft clockwise for more than once.

2. If the marking is outside the range as shown in the illustration A, replace the drive belt.

NOTE

Due to the adoption of the auto-tensioner, no adjustment for belt tension is required.



AUTO-TENSIONER CHECK

1. Check that the driver belt stays within the width of the pulley of the auto-tensioner after turning off the engine at idle.
2. Remove the drive belt.(Refer to P.11C-15.)
3. Use the 12.7sq. spinner handle and etc. to check that the auto-tensioner is not stuck by turning it in both directions.
4. If there is any abnormality in the above-mentioned 1 or 3, replace the auto-tensioner.
5. Install the drive belt.(Refer to P.11C-15.)

<Reference>

To determine whether the auto-tensioner is acceptable can be done by checking the drive belt tension.

1. Use the following procedure to check the drive belt tension.

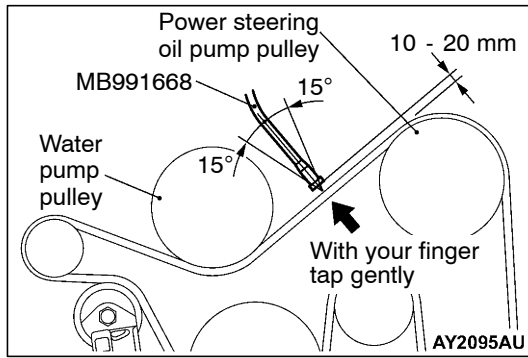
<When using MUT-II>

- (1) Connect the special tool (MB991668) to the MUT-II.
- (2) Connect the MUT-II to the diagnosis connector.

Caution

Connection and disconnection of the MUT-II must be carried out after turning the ignition switch to the "LOCK" (OFF) position.

- (3) Turn the ignition switch to the "ON" position and select "Belt Tension Measurement" from the menu screen.

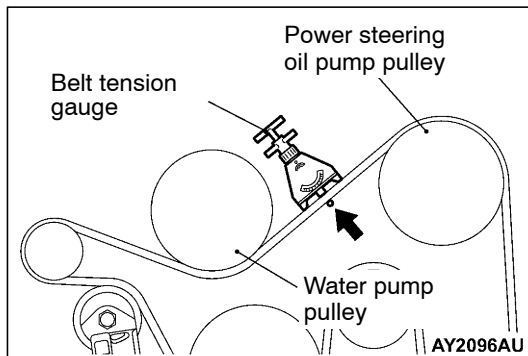


- (4) Hold the special tool (MB991668) to the middle of the belt between the pulleys (at the place indicated by the arrow) about 10 - 20 mm away from the rear surface and so that it is perpendicular to the belt (within an angle of $\pm 15^\circ$).
- (5) Gently tap the middle of the belt between the pulleys (at the place indicated by the arrow) with your finger as shown in the illustration, and check that the vibration frequency of the belt is within the standard value.

Standard value: 110 - 144 Hz

Caution

- 1) Check the vibration frequency of the belt when the temperature of the surface of the belt is as close as possible to normal temperature.
- 2) Do not let any contaminants such as water or oil get onto the microphone.
- 3) If strong gusts of wind blow against the microphone or if there are any loud sources of noise nearby, the values measured by the microphone may not correspond to actual values.
- 4) If the microphone is touching the belt while the measurement is being made, the values measured by the microphone may not correspond to actual values.
- 5) Do not take the measurement while the vehicle's engine is running.

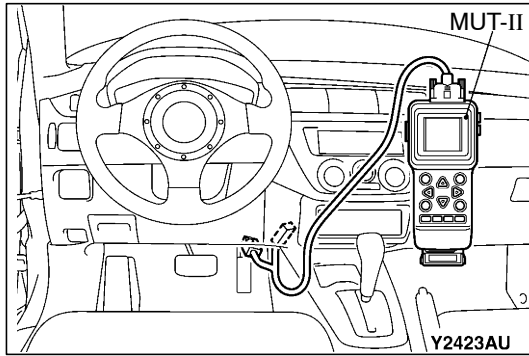


<When using belt tension gauge>

Use the belt tension gauge and check that the belt tension of the middle of the belt between pulleys (at the place indicated by arrow) is within the standard value.

Standard value: 245 - 412 N

2. If the value is outside the standard value, replace the drive belt.



IGNITION TIMING CHECK

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to "LOCK" (OFF) position and then connect the MUT-II to the diagnosis connector.
3. Set up a timing light.
4. Start the engine and run at idle.
5. Check that engine idle speed is within the standard value.

Standard value: 850 ± 100 r/min

6. Select No.17 of the MUT-II Actuator test.
7. Check that basic ignition timing is within the standard value.

Standard value: 5° BTDC ± 3°

8. If the basic ignition timing is outside the standard value, inspect the MPI system while referring to GROUP 13A - Troubleshooting.
9. Press the MUT-II clear key (Select a forced driving cancel mode) to release the Actuator test.

Caution

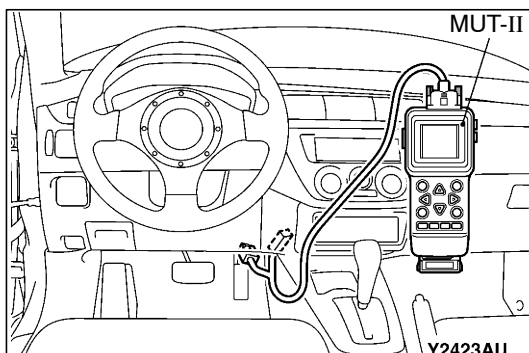
If the test is not cancelled, a forced driving will continue for 27 minutes. Driving under this condition may damage the engine.

10. Check that ignition timing is at the standard value.

Standard value: approximately 5° BTDC

NOTE

- (1) Ignition timing is variable within about ± 7, even under normal operating.
 - (2) And it is automatically further advanced by approximately 5° from standard value at higher altitudes.
11. Remove the timing light.
 12. Turn the ignition switch to "LOCK" (OFF) position and then remove the MUT-II.



IDLE SPEED CHECK

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to "LOCK" (OFF) position, and then connect the MUT-II to the diagnosis connector.
3. Set the timing light.
4. Check that the basic ignition timing is within the standard value.

Standard value: 5° BTDC \pm 3°

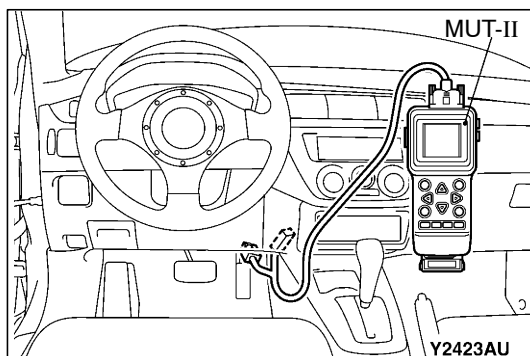
5. Run the engine at idle for 2 minutes.
6. Check the idle speed. Select item No. 22 and take a reading of the idle speed.

Curb idle speed: 850 ± 100 r/min

NOTE

The idle speed is controlled automatically by the idle speed control (ISC) system.

7. If the idle speed is outside the standard value, check the MPI components by referring to GROUP 13A - Troubleshooting.
8. Remove the timing light.
9. Turn the ignition switch to the "LOCK" (OFF) position and then remove the MUT-II.



IDLE MIXTURE CHECK

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to the "LOCK" (OFF) position, and then connect the MUT-II to the diagnosis connector.
3. Set the timing light.
4. Check that the basic ignition timing is within the standard value.

Standard value: 5° BTDC \pm 3°

5. Run the engine at 2,500 r/min for 2 minutes.
6. Set the CO, HC tester.
7. Check the CO contents and the HC contents at idle.

Standard value

CO contents: 0.1% or less

HC contents: 100 ppm or less

8. If there is a deviation from the standard value, check the following items:
 - Diagnosis output
 - Closed-loop control (When the closed-loop control is normal, the output signal of the oxygen sensor changes between 0 - 400 mV and 600 - 1,000 mV at idle.)
 - Fuel pressure
 - Injector
 - Ignition coil, spark plug cable, spark plug
 - Evaporative emission control system
 - Compression pressure

NOTE

Replace the three way catalyst when the CO and HC contents are not within the standard value, even though the result of the inspection is normal on all items.

9. Remove the timing light.

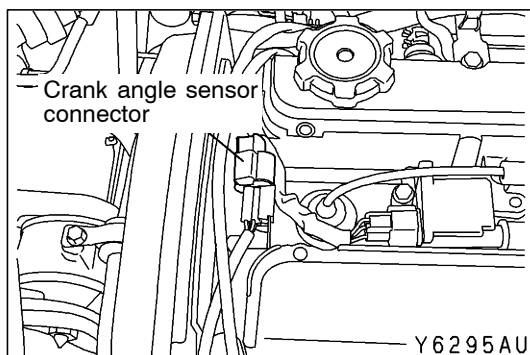
10. Turn the ignition switch to the "LOCK" (OFF) position and then remove the MUT-II.

COMPRESSION PRESSURE CHECK

1. Before inspection, check that the engine oil, starter and battery are normal. In addition, set the vehicle to the pre-inspection condition.
2. Remove the ignition coils and spark plug cables.
3. Remove all of the spark plugs.
4. Disconnect the crank angle sensor connector.

NOTE

Doing this will prevent the engine-ECU from carrying out ignition and fuel injection.



5. Cover the spark plug hole with a shop towel etc., and after the engine has been cranked, check that no foreign material is adhering to the shop towel.

Caution

- (1) **Keep away from the spark plug hole when cranking.**
 - (2) **If compression is measured with water, oil, fuel, etc., that has come from cracks inside the cylinder, these materials will become heated and will gush out from the spark plug hole, which is dangerous.**
6. Set compression gauge to one of the spark plug holes.
 7. Crank the engine with the throttle valve fully open and measure the compression pressure.

Standard value (at engine speed of 250 r/min):

1,128 kPa

Limit (at engine speed of 250 r/min):

Min. 951 kPa

8. Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

Limit: Max. 98 kPa

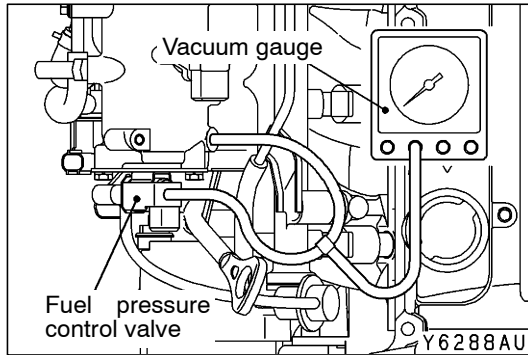
9. If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the spark plug hole, and repeat the operations in steps 7 and 8.
 - (1) If the compression increases after oil is added, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
 - (2) If the compression does not rise after oil is added, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.

10. Connect the crank angle sensor connector.
11. Install the spark plugs.

12. Install the ignition coils and spark plugs.
13. Use the MUT-II to erase the self-diagnosis codes or disconnect the battery cable from the battery (-) terminal for 10 seconds or more and then reconnect the cable.

NOTE

This will erase the diagnosis code resulting from the crank angle sensor connector being disconnected.

**MANIFOLD VACUUM CHECK**

1. Set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to the "LOCK" (OFF) position.
3. Set the engine tachometer or connect the MUT-II.
4. Check that the idle speed is within the standard value.

NOTE

When using the MUT-II, select the code No.22.

5. Connect the three-way union joint to the vacuum hose between the fuel pressure control valve and the air intake plenum, and connect a vacuum gauge.
6. Check the manifold vacuum at idle.

Limit: 58 kPa

7. Turn the ignition switch to the "LOCK" (OFF) position.
8. Remove the vacuum gauge and install the vacuum hose in its original location.
9. Remove the engine tachometer or the MUT-II.

LASH ADJUSTER CHECK

If an abnormal noise (knocking) that seems to be coming from the lash adjuster is heard after starting the engine and does not stop, carry out the following check.

NOTE

- (1) The abnormal noise which is caused by a problem with the lash adjusters is generated after the engine is started, and will vary according to the engine speed. However, this noise is not related to the actual engine load.

Because of this, if the noise does not occur immediately after the engine is started, if it does not change in accordance with the engine speed, or if it changes in accordance with the engine load, the source of the noise is not the lash adjusters.

(2) If there is a problem with the lash adjusters, the noise will almost never disappear, even if the engine has been run at idle to let it warm up.

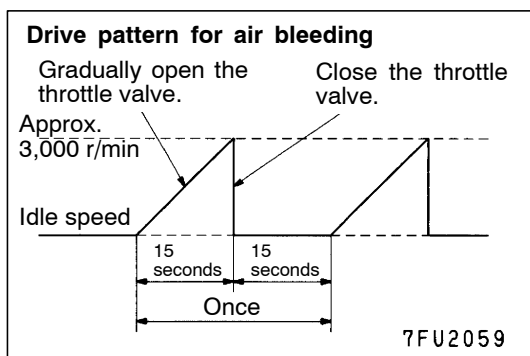
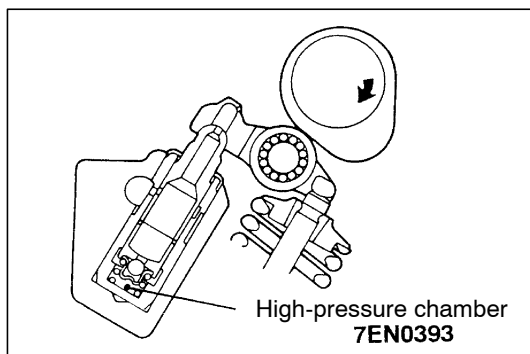
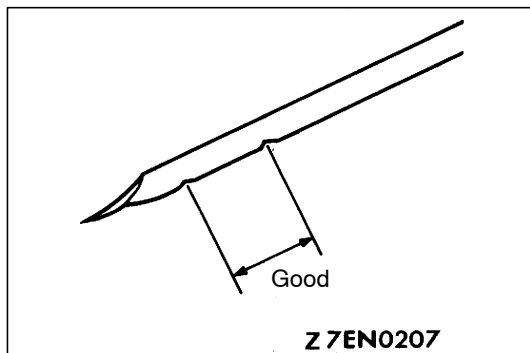
The only case where the noise might disappear is if the oil in the engine has not been looked after properly and oil sludge has caused the lash adjusters to stick.

1. Start the engine.
2. Check that the noise occurs immediately after the engine is started, and that the noise changes in accordance with changes in the engine speed.
If the noise does not occur immediately after the engine is started, or if it does not change in accordance with the engine speed, the problem is not being caused by the lash adjusters, so check for some other cause of the problem. Moreover, if the noise does not change in accordance with the engine speed, the cause of the problem is probably not with the engine. (In these cases, the lash adjusters are normal.)
3. While the engine is idling, check that the noise level does not change when the engine load is varied.
If the noise level changes, the cause of the noise is probably parts striking because of worn crankshaft bearings or connecting rod bearings. (In such cases, the lash adjusters are normal.)
4. After the engine has warmed up, run it at idle and check if any noise can be heard.
If the noise has become smaller or disappeared, oil sludge could make the lash adjusters stick. Clean the lash adjusters. (Refer to the Engine Workshop Manual.) If not improved, go to step 5.
5. Bleed air from the lash adjusters.
6. If the noise has not disappeared even after the air bleeding, clean the lash adjusters.
(Refer to GROUP 11B - Rocker Arms and Camshaft.)

<LASH ADJUSTER AIR BLEEDING>

NOTE

- (1) If the vehicle is parked on a slope for a long period of time, the amount of oil inside the lash adjuster will decrease, and air may get into the high pressure chamber when starting the engine.
- (2) After parking the vehicle for long periods, the oil drains out of the oil passage, and it takes time for the oil to be supplied to the lash adjuster, so air can get into the high pressure chamber.
- (3) If either of the above situations occur, the abnormal noise can be eliminated by bleeding the air from inside the lash adjusters.



1. Check the engine oil and replenish or replace the oil if necessary.

NOTE

- (1) If there is a only small amount of oil, air will be drawn in through the oil screen and will get into the oil passage.
 - (2) If the amount of oil is greater than normal, then the oil will being mixed by the crankshaft and a large amount of air may get mixed into the oil.
 - (3) If the oil is degenerated, air and oil will not separate easily in oil, and the amount of air mixed into the oil will increase.
 - (4) If the air which has been mixed in with the oil due to any of the above reasons gets into the high pressure chamber of the lash adjuster, the air inside the high pressure chamber will be compressed when the valve is open and the lash adjuster will over-compress, resulting in abnormal noise when the valve closes. This is the same effect as if the valve clearance is adjusted to be too large by mistake. If the air inside the lash adjusters is then released, the operation of the lash adjusters will return to normal.
2. Run the engine at idle for 1 - 3 minutes to let it warm up.
 3. With no load on the engine, repeat the drive pattern shown in the illustration at left and check if the abnormal noise disappears. (The noise should normally disappear after 10 - 30 repetitions, but if there is no change in the noise level after 30 repetitions or more, the problem is probably not due to air inside the lash adjusters.)
 4. After the noise has disappeared, repeat the drive pattern shown in the illustration at left a further 5 times.
 5. Run the engine at idle for 1 - 3 minutes and check that the noise has disappeared.

CRANKSHAFT PULLEY

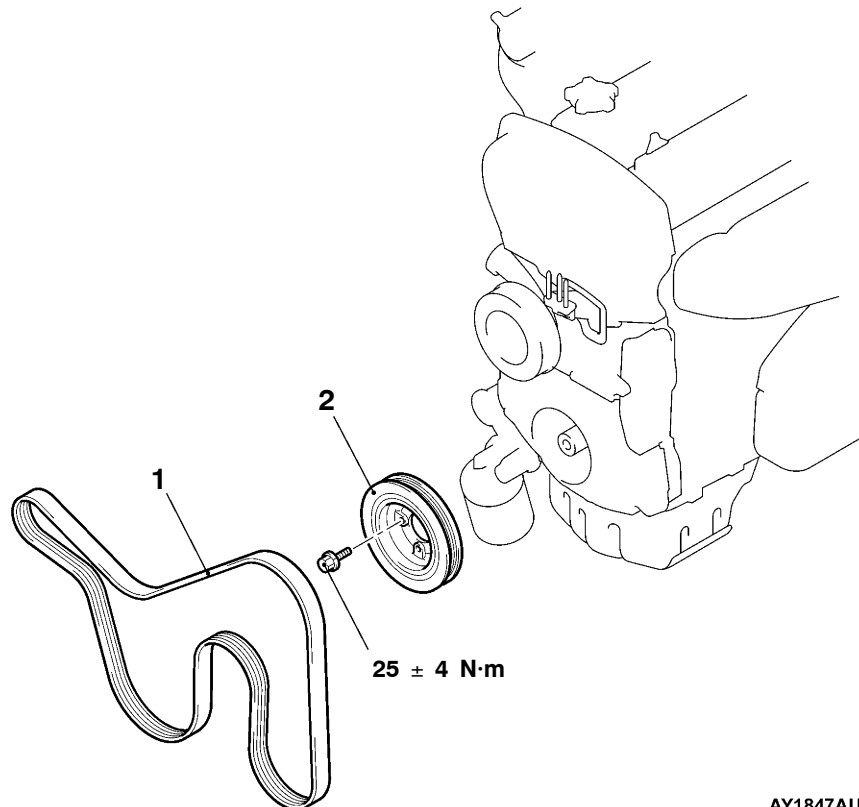
REMOVAL AND INSTALLATION

Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Side Cover Removal and Installation
- Drive Belt Tension Check (Refer to P.11A-7.) <After installation only>

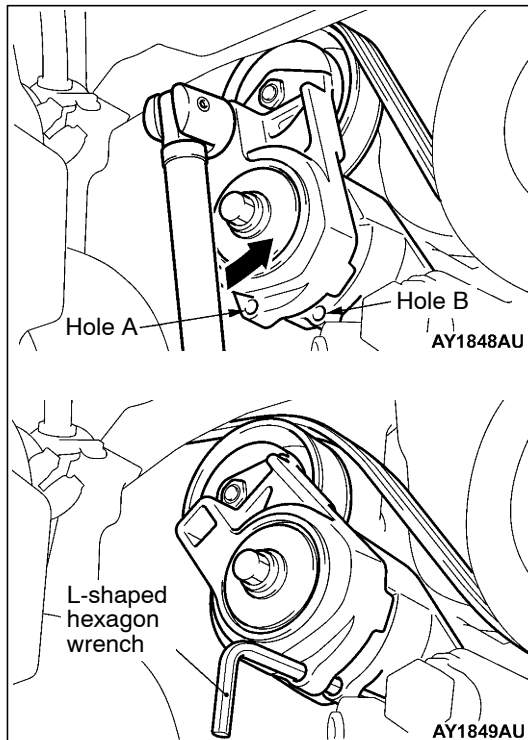


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Removal steps

1. Drive belt
2. Crankshaft pulley



REMOVAL SERVICE POINT

◀▶ DRIVE BELT REMOVAL

Due to the adoption of the Serpentine drive system with the auto-tensioner, the following operation is required:

1. Insert the 12.7sq. spinner handle and etc. into the tool hole of the auto-tensioner and rotate it counterclockwise until the auto-tensioner gets to the stopper.
2. Align hole A with hole B for fixing by inserting the L-shaped hexagon wrench, then remove the drive belt.

Caution

When the drive belt is reused, use a chalk to indicate an arrow of rotation direction on the back of the belt so that it can be re-assembled in the same direction as before.

CAMSHAFT AND CAMSHAFT OIL SEAL

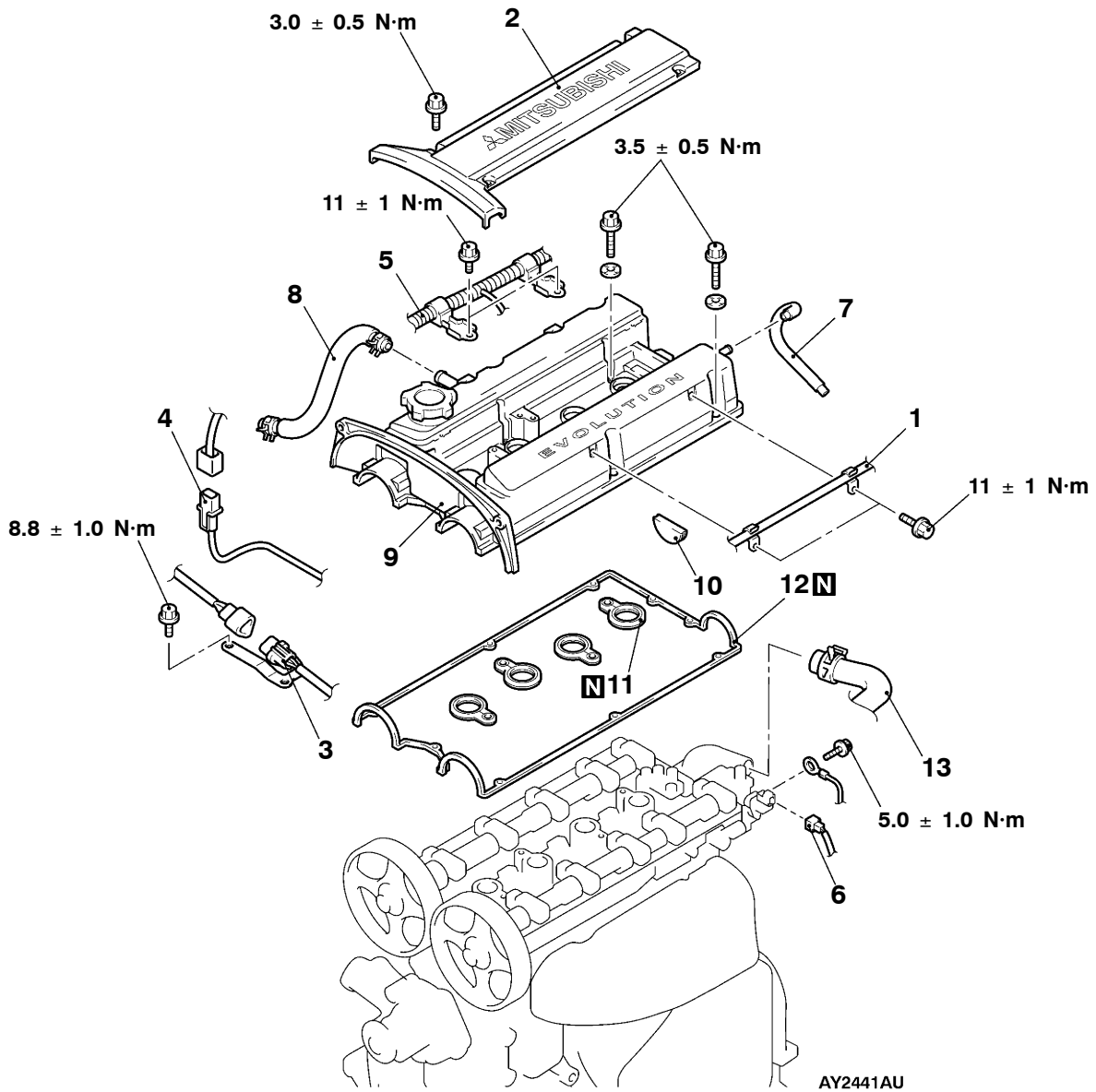
REMOVAL AND INSTALLATION

Caution

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Pre-removal and Post-installation Operation

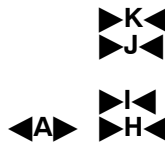
- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Drive Belt Tension Check (Refer to P.11A-7.) <After installation only>
- Drainage and Refilling of Engine Coolant (Refer to GROUP 14 - On-vehicle Service.)
- Air Duct Removal and Installation (Refer to Group 15 - Air Cleaner.)
- Air Pipe C Removal and Installation (Refer to GROUP 15 - Intercooler.)
- Secondary Air Pipe Assembly Removal and Installation (Refer to GROUP 15 - Secondary Air Supply System.)
- Timing belt Removal and Installation (Refer to P.11A-34.)

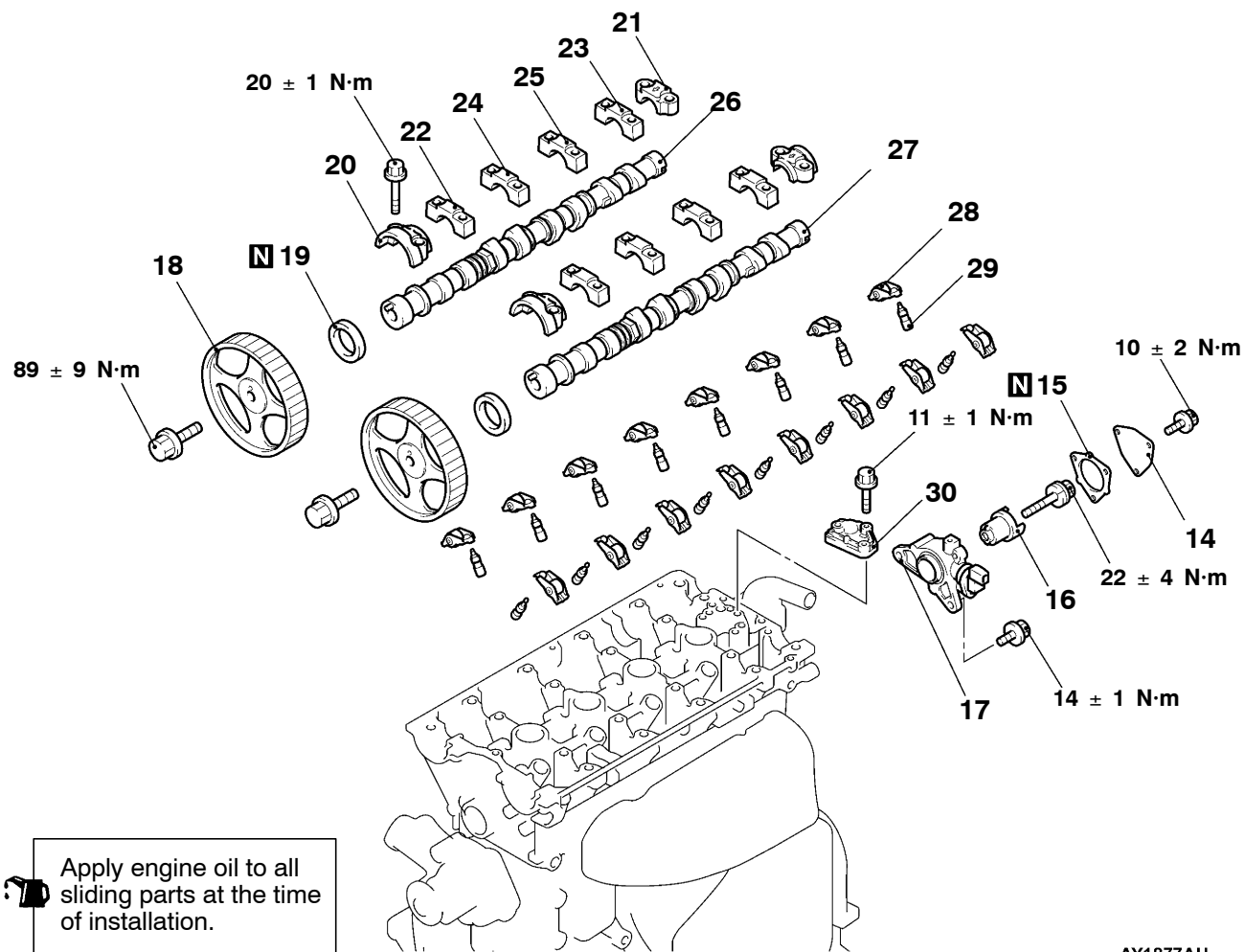


Removal steps

1. Accelerator cable connection
<L.H. drive vehicles>
2. Center cover
 - Ignition coil
(Refer to Group 16 - Ignition System.)
3. Crank angle sensor connector
4. Oxygen sensor connector
5. Control wiring harness connection

6. Camshaft position sensor connector
7. Breather hose
8. PCV hose
9. Rocker cover
10. Camshaft end seal
11. Spark plug hole gasket
12. Rocker cover gasket
13. Radiator upper hose connection





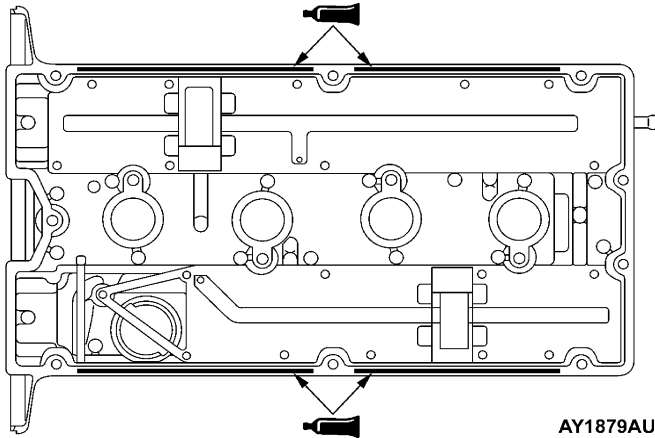
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- 14. Camshaft position sensor support cover
- 15. Camshaft position sensor support cover gasket
- ▶G◀ 16. Camshaft position sensing cylinder
- ▶F◀ 17. Camshaft position sensor support
- ▶E◀ 18. Camshaft sprocket
- ▶D◀ 19. Camshaft oil seal
- ▶C◀ 20. Camshaft bearing cap front

- ▶C◀ 21. Camshaft bearing cap rear
- ▶C◀ 22. Camshaft bearing cap No. 2
- ▶C◀ 23. Camshaft bearing cap No. 5
- ▶C◀ 24. Camshaft bearing cap No. 3
- ▶C◀ 25. Camshaft bearing cap No. 4
- ▶B◀ 26. Intake camshaft
- ▶B◀ 27. Exhaust camshaft
- 28. Rocker arm
- ▶A◀ 29. Lash adjuster
- 30. Oil delivery body

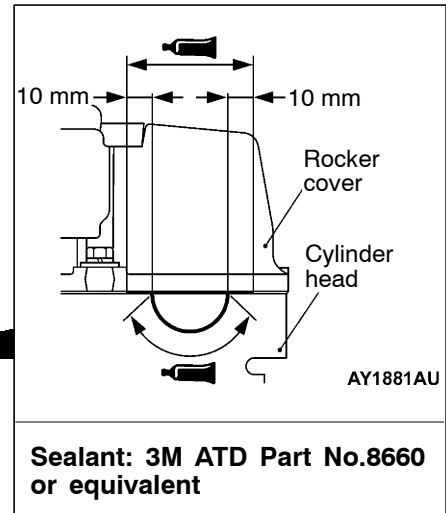
LUBRICATION AND SEALING POINTS

<The bottom view of the rocker cover>



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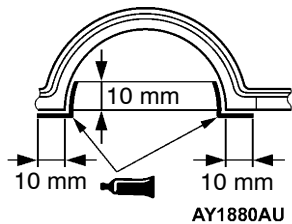
Sealant: MITSUBISHI GENUINE PART MD970389 or equivalent



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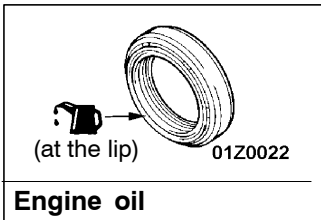
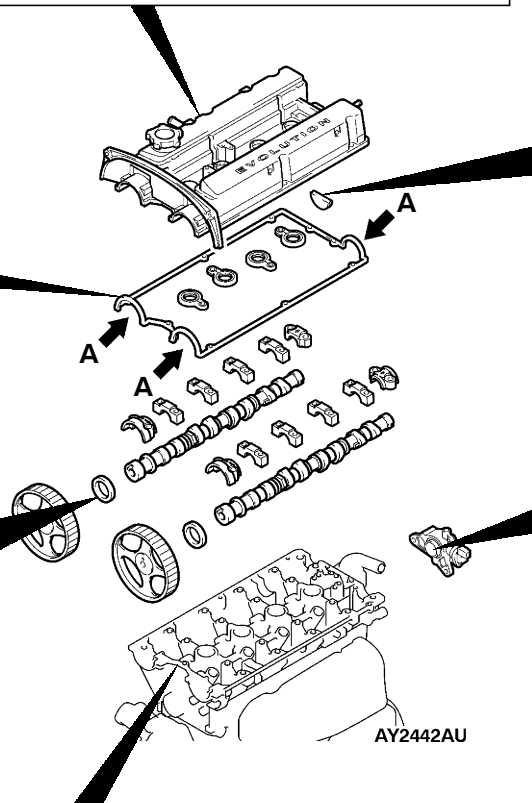
Sealant: 3M ATD Part No.8660 or equivalent

<View A>



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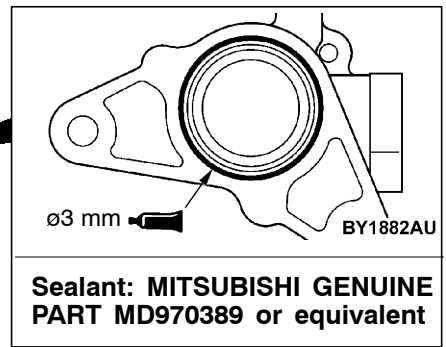
Sealant: MITSUBISHI GENUINE PART MD970389 or equivalent



(at the lip)

0120022

Engine oil

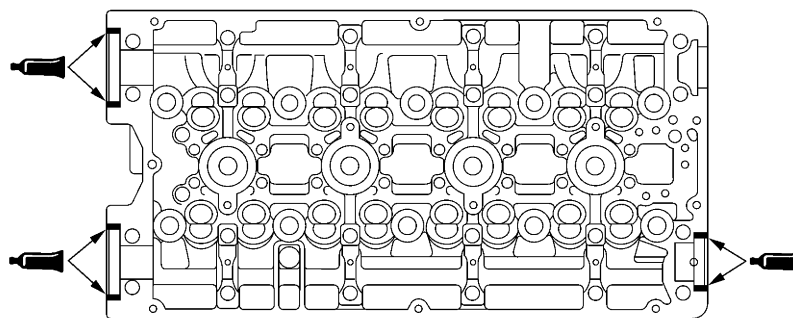


ø3 mm

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Sealant: MITSUBISHI GENUINE PART MD970389 or equivalent

<Top View of cylinder head>

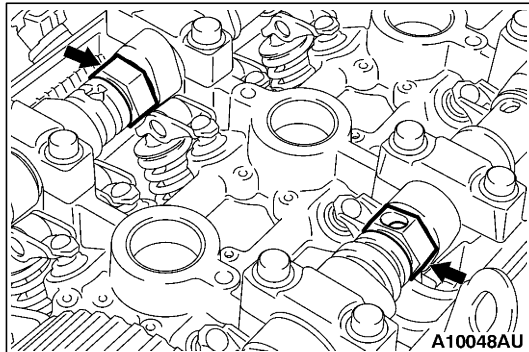


AY1883AU

Sealant: MITSUBISHI GENUINE PART MD970389 or equivalent

REMOVAL SERVICE POINTS**◀A▶ RADIATOR UPPER HOSE DISCONNECTION**

Indicate the mating marks on the radiator upper hose and the hose clamp for release.

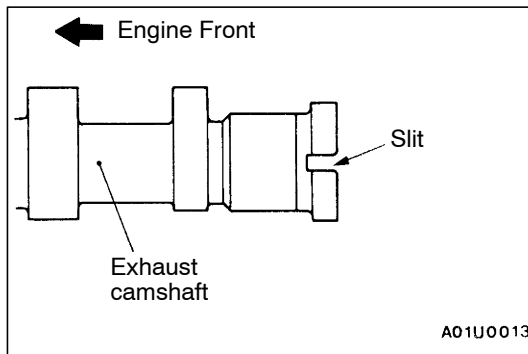
**◀B▶ CAMSHAFT SPROCKET REMOVAL**

Hold the hexagon part of the camshaft with a wrench and loosen the mounting bolt, then remove the camshaft sprocket.

INSTALLATION SERVICE POINTS**▶A◀ LASH ADJUSTER INSTALLATION****Caution**

When the lash adjuster is reused, always install it after cleaning and inspecting.

(Refer to GROUP 11B - Rocker Arms and Camshaft.)

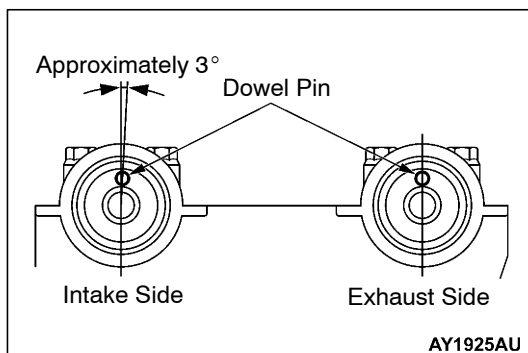
**▶B◀ EXHAUST CAMSHAFT/INTAKE CAMSHAFT INSTALLATION**

1. Remove sealant remained on the cylinder head.
2. Apply engine oil to the cam and the journal of the camshaft.
3. Install the camshaft to the cylinder head.

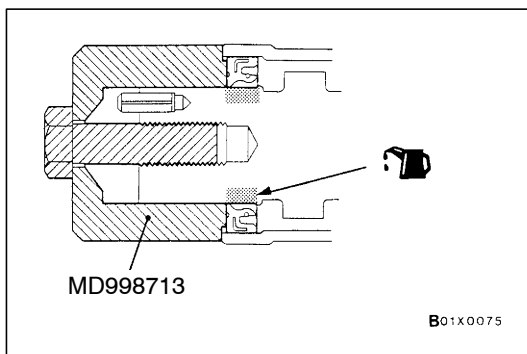
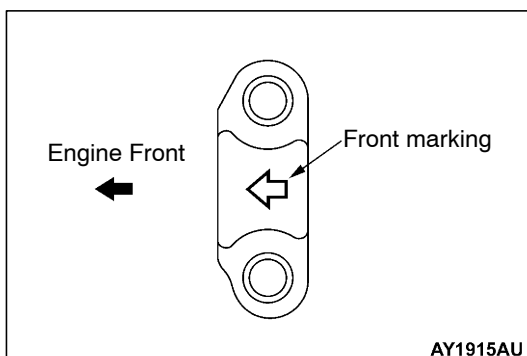
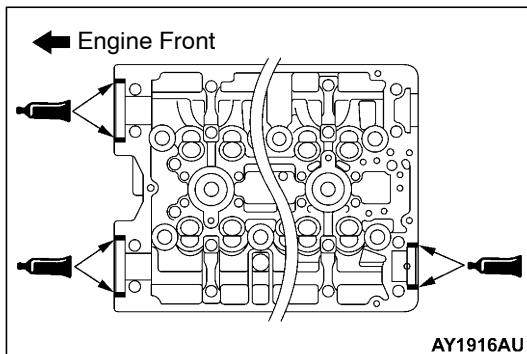
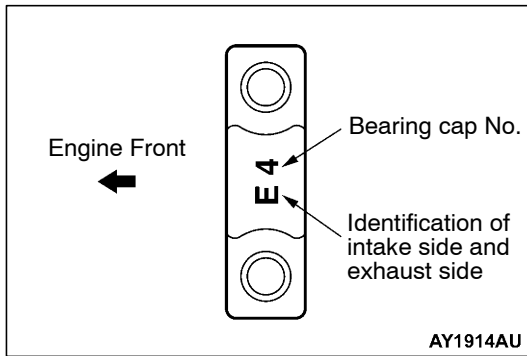
Caution

Do not install wrong camshaft at the side of intake or exhaust.

The exhaust camshaft has a slit at the rear surface.

**▶C◀ CAMSHAFT BEARING CAP NO.4/CAMSHAFT BEARING CAP NO.3/CAMSHAFT BEARING CAP NO.5/CAMSHAFT BEARING CAP NO.2/CAMSHAFT BEARING CAP REAR/CAMSHAFT BEARING CAP FRONT INSTALLATION**

1. Set the dowel pin of the camshaft to the position as shown in the illustration.



- Since the shape of camshaft bearing caps No.2 - 5 is identical, check the identification marks so that the bearing cap No., intake side, or exhaust side cannot be mistaken to install to the direction as shown in the illustration.

Identification mark (engraved on the front and bearing caps No.2 - 5)

- I: Intake side
- E: Exhaust side

- Apply sealant to the positions (6 areas) of the upper side of the cylinder head as shown in the illustration.

Specified sealant:

MITSUBISHI GENUINE PART MD970389 or equivalent

- Position the camshaft bearing cap rear in the direction as shown in the illustration for installation.
- Check the identification marks on the camshaft bearing cap front so that intake side and exhaust side cannot be mistaken in the same way as that of bearing caps No.2 - 5.
- Tighten the bearing cap mounting bolt increasing the pressure in 2 to 3 times and finally tighten to the specified torque.

Tightening Torque: 20 ± 1 N·m

- Ensure that the rocker arm is installed properly.
- NOTE**
Remove an excess of sealant completely.

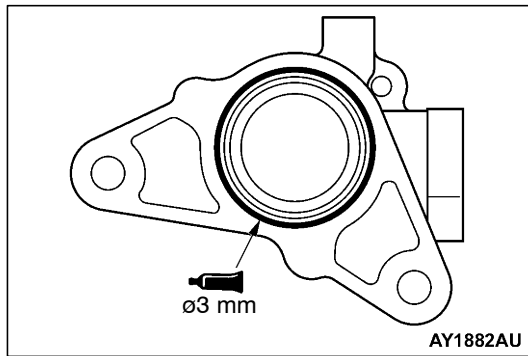
►D◄ CAMSHAFT OIL SEAL INSTALLATION

- Apply engine oil on the circumference of oil seal lip.
- Use the special tool as shown in the illustration to pressfit the oil seal.

►E◄ CAMSHAFT SPROCKET INSTALLATION

Hold the hexagon part of the camshaft with a wrench and tighten the mounting bolt to the specified torque in the same way as that for removal.

Tightening Torque: 89 ± 9 N·m



►F◄ CAMSHAFT POSITION SENSOR SUPPORT INSTALLATION

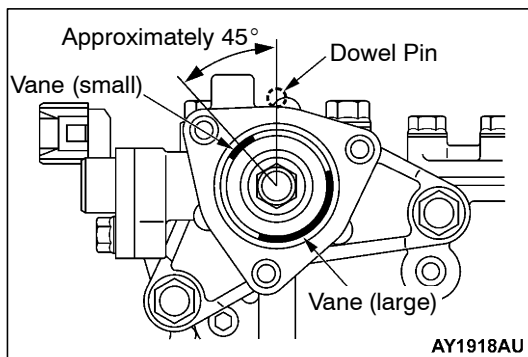
1. Remove sealant remained on the camshaft position sensor support.
2. Apply sealant to the flange of the camshaft position sensor support and install to the cylinder head.

Specified sealant:

MITSUBISHI GENUINE PART MD970389 or equivalent

3. Tighten the camshaft position sensor support mounting bolt to the specified torque.

Tightening Torque: 14 ± 1 N·m



►G◄ CAMSHAFT POSITION SENSING CYLINDER INSTALLATION

1. Set the dowel pin of the exhaust camshaft to the position (No.1 cylinder at compression TDC) as shown in the illustration.

NOTE

Use the force of the exhaust valve spring to rotate counterclockwise.

2. Install the vane (small) of the camshaft position sensing cylinder at an angle of approximately 45 degrees to the position of the dowel pin of the exhaust camshaft.
3. Tighten the camshaft position sensing cylinder mounting bolt to the specified torque.

Tightening Torque: 22 ± 4 N·m

►H◄ RADIATOR UPPER HOSE CONNECTION

1. Insert the radiator upper hose to the convex part of the water outlet fitting.
2. Make the mating marks on the upper hose and the hose clamp for installation.

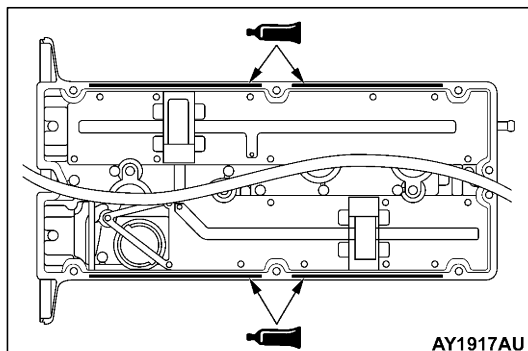
►I◄ ROCKER COVER GASKET INSTALLATION

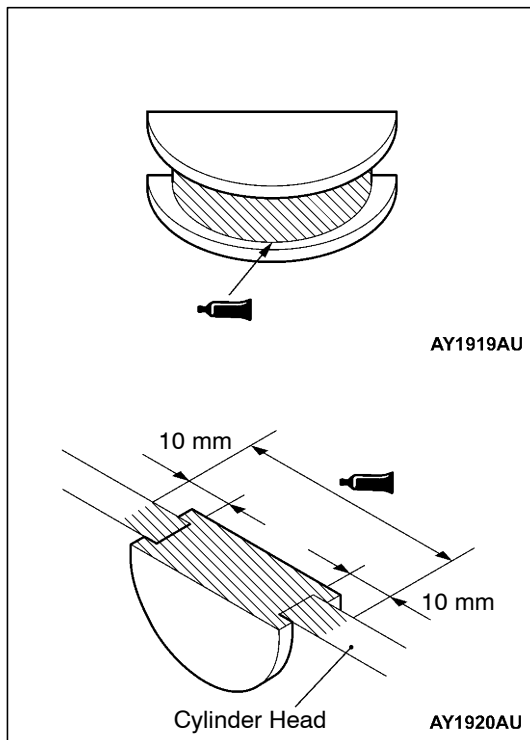
1. Remove sealant remained on the rocker cover.
2. Apply sealant to the positions (4 areas) of the lower side of the rocker cover as shown in the illustration.

Specified sealant:

MITSUBISHI GENUINE PART MD970389 or equivalent

3. Install the rocker cover gasket to the rocker cover.

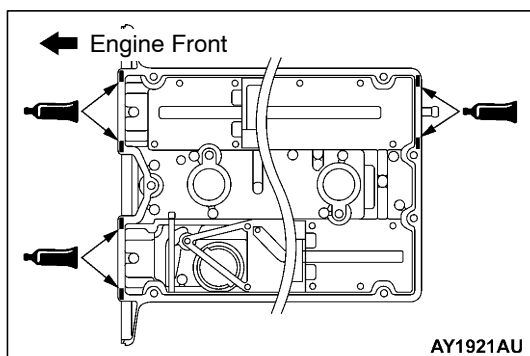




►J◄ CAMSHAFT END SEAL INSTALLATION

Apply sealant to the positions of the camshaft end seal as shown in the illustration and install to the cylinder head.

Specified sealant: 3M ATD Part No.8660 or equivalent



►K◄ ROCKER COVER INSTALLATION

1. Apply sealant to the positions of the rocker cover gasket (6 areas) as shown in the illustration.

Specified sealant:
MITSUBISHI GENUINE PART MD970389 or equivalent

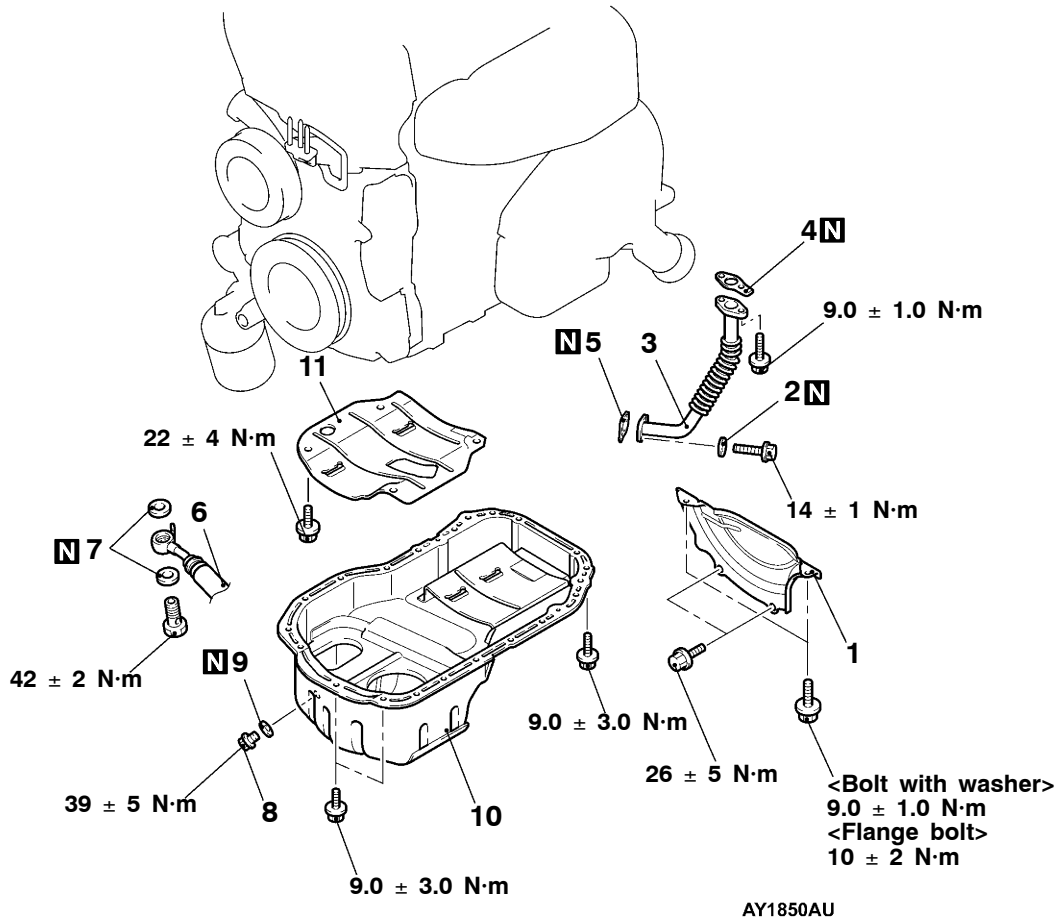
2. Install the rocker cover to the cylinder head.

OIL PAN

REMOVAL AND INSTALLATION

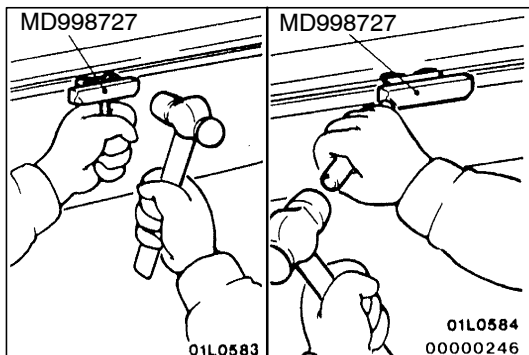
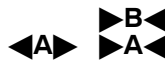
Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Drainage and Refilling of Engine Oil (Refer to GROUP 12 - On-vehicle Service.)
- Crossmember Bar Removal and Installation (Refer to GROUP 32 - Engine Roll Stopper, Centermember.)
- Front Exhaust Pipe Removal and Installation (Refer to GROUP 15.)
- Starter Removal and Installation (Refer to GROUP 16.)



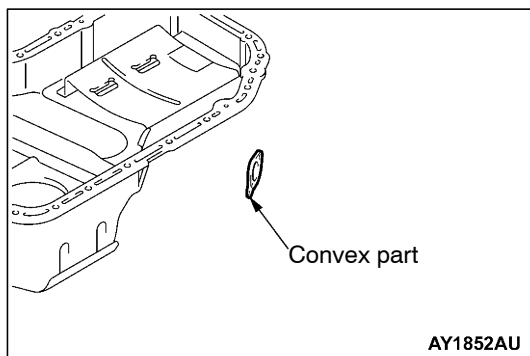
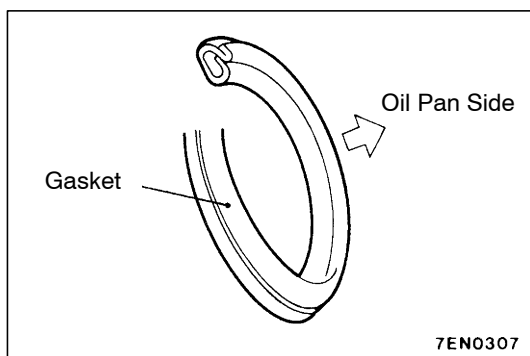
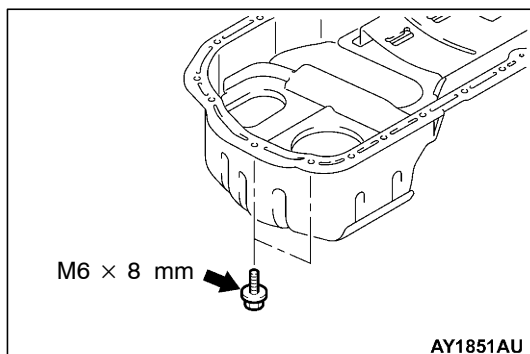
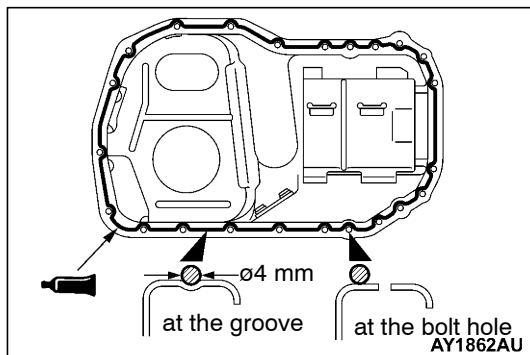
Removal steps

1. Bell housing cover
2. Oil return pipe gasket
3. Oil return pipe
4. Oil return pipe gasket
5. Oil return pipe gasket
6. Engine oil cooler return hose
7. Engine oil cooler tube gasket
8. Drain plug
9. Drain plug gasket
10. Oil pan
11. Baffle plate



REMOVAL SERVICE POINT

◀A▶ OIL PAN REMOVAL



INSTALLATION SERVICE POINTS

▶A◀ OIL PAN INSTALLATION

1. Remove sealant remained on the oil pan and the cylinder block.
2. Apply sealant on the mounting surface of oil pan without any gap as indicated in the figure, and install oil pan on cylinder block.

Specified sealant:

MITSUBISHI GENUINE PART MD970389 or equivalent

3. Tighten the mounting bolt of oil pan to the specified torque. Be careful not to use a wrong bolt when tightening the bolt as shown in the illustration.

Tightening Torque: 9.0 ± 3.0 N·m

▶B◀ DRAIN PLUG GASKET INSTALLATION

Gasket should be replaced with a new one, and install it in the direction specified in the figure.

▶C◀ OIL RETURN PIPE GASKET INSTALLATION

Gasket should be replaced with a new one, and set the convex part to the position as shown in the illustration for installation.

NOTE

There is no specific direction indicated for installing the turbocharger side of the oil return pipe gasket.

INSPECTION

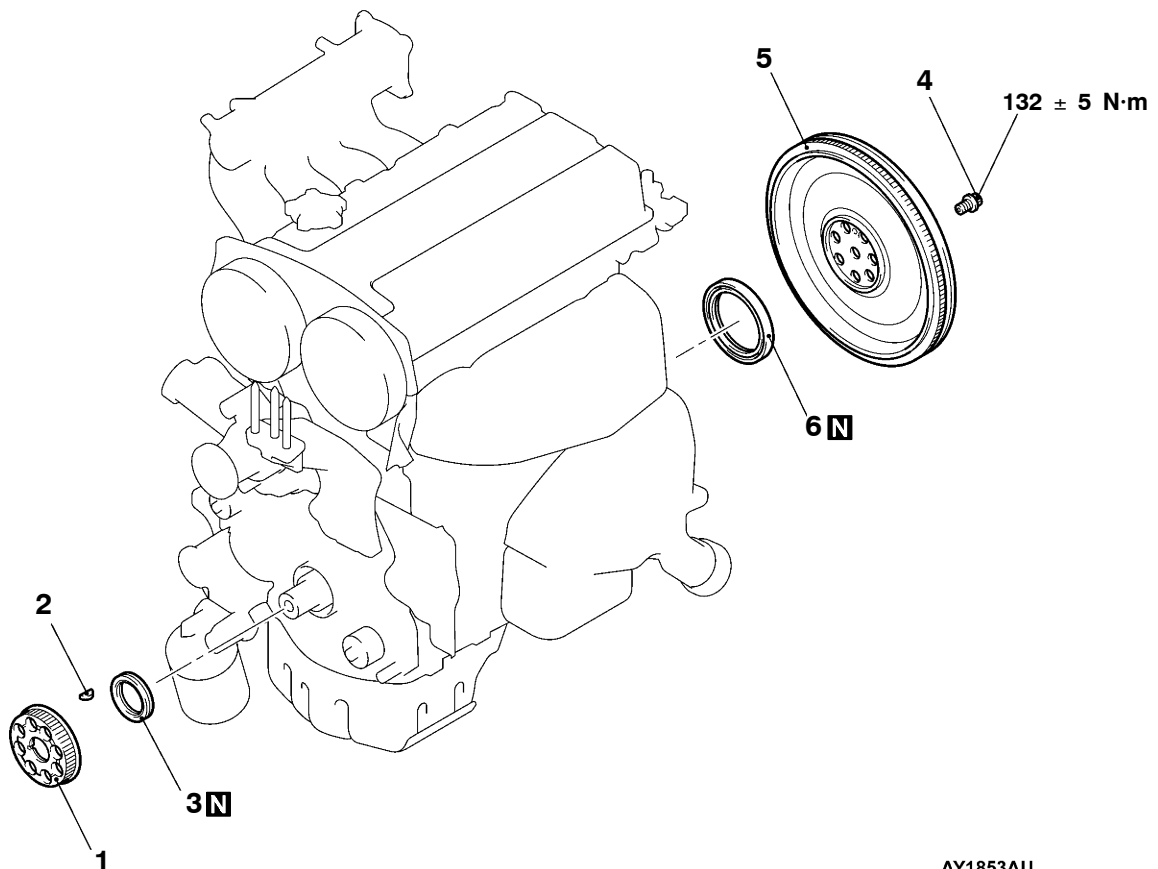
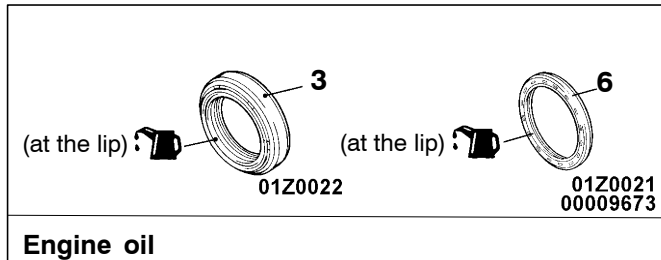
- Check oil pan for cracks.
- Check oil pan sealant-coated surface for damage and deformation.
- Check oil screen for cracked, clogged or damaged wire net and pipe.

CRANKSHAFT OIL SEAL

REMOVAL AND INSTALLATION

Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.



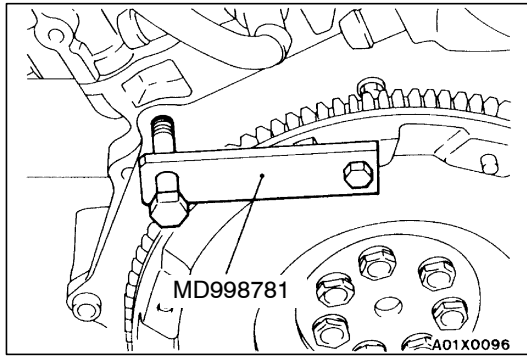
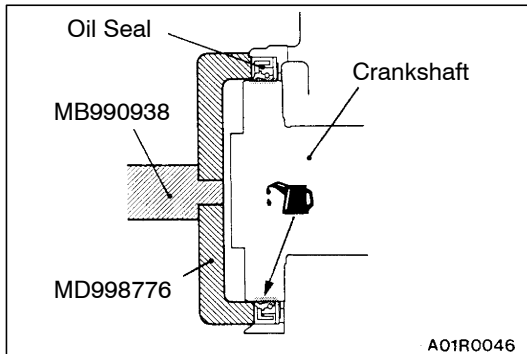
AY1853AU

Crankshaft Front Oil Seal Removal Steps

- Timing belt and timing belt B (Refer to P.11A-34.)
- ▶D◀ 1. Crankshaft sprocket B
- ▶C◀ 2. Key
- ▶A◀ 3. Crankshaft front oil seal

Crankshaft Rear Oil Seal Removal Steps

- Transfer assembly (Refer to GROUP 22A.)
 - Transmission assembly (Refer to GROUP 22A.)
 - Clutch cover, disc
- ◀A▶ ▶B◀ 4. Flywheel bolt
- ▶A◀ 5. Flywheel
- ▶A◀ 6. Crankshaft rear oil seal

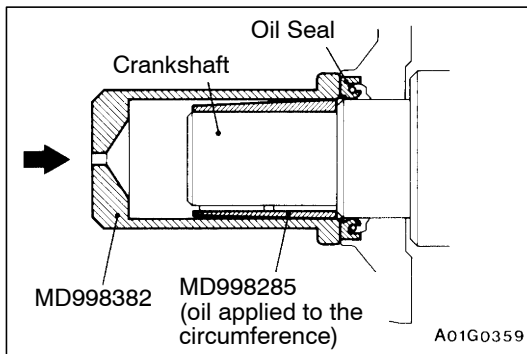
**REMOVAL SERVICE POINT****◀▶ FLYWHEEL BOLT REMOVAL****INSTALLATION SERVICE POINTS****▶◀ CRANKSHAFT REAR OIL SEAL INSTALLATION**

1. Apply small quantity of engine oil on the circumference of oil seal lip.
2. Use special tool to press in oil seal up to the chamfered surface of oil seal case.

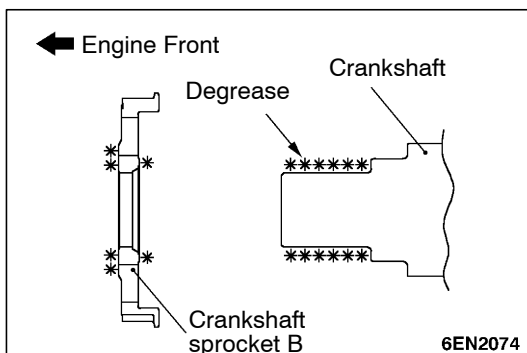
▶◀ FLYWHEEL BOLT INSTALLATION

Use the special tool to fix the flywheel and tighten the bolt to the specified torque in the same way as that for removal.

Tightening Torque: 132 ± 5 N·m

**▶◀ CRANKSHAFT FRONT OIL SEAL INSTALLATION**

1. Apply small quantity of engine oil on the circumference of oil seal lip.
2. Use special tool to press in oil seal up to the chamfered surface of oil seal case.

**▶◀ CRANKSHAFT SPROCKET B INSTALLATION**

1. Clean and degrease crankshaft sprocket B and crankshaft sprocket B mounting surface of crankshaft.

NOTE

Degrease to prevent the friction coefficient of pressed surface from dropping by stuck oil.

2. Position crankshaft sprocket B to the direction as shown in the illustration.

CYLINDER HEAD GASKET

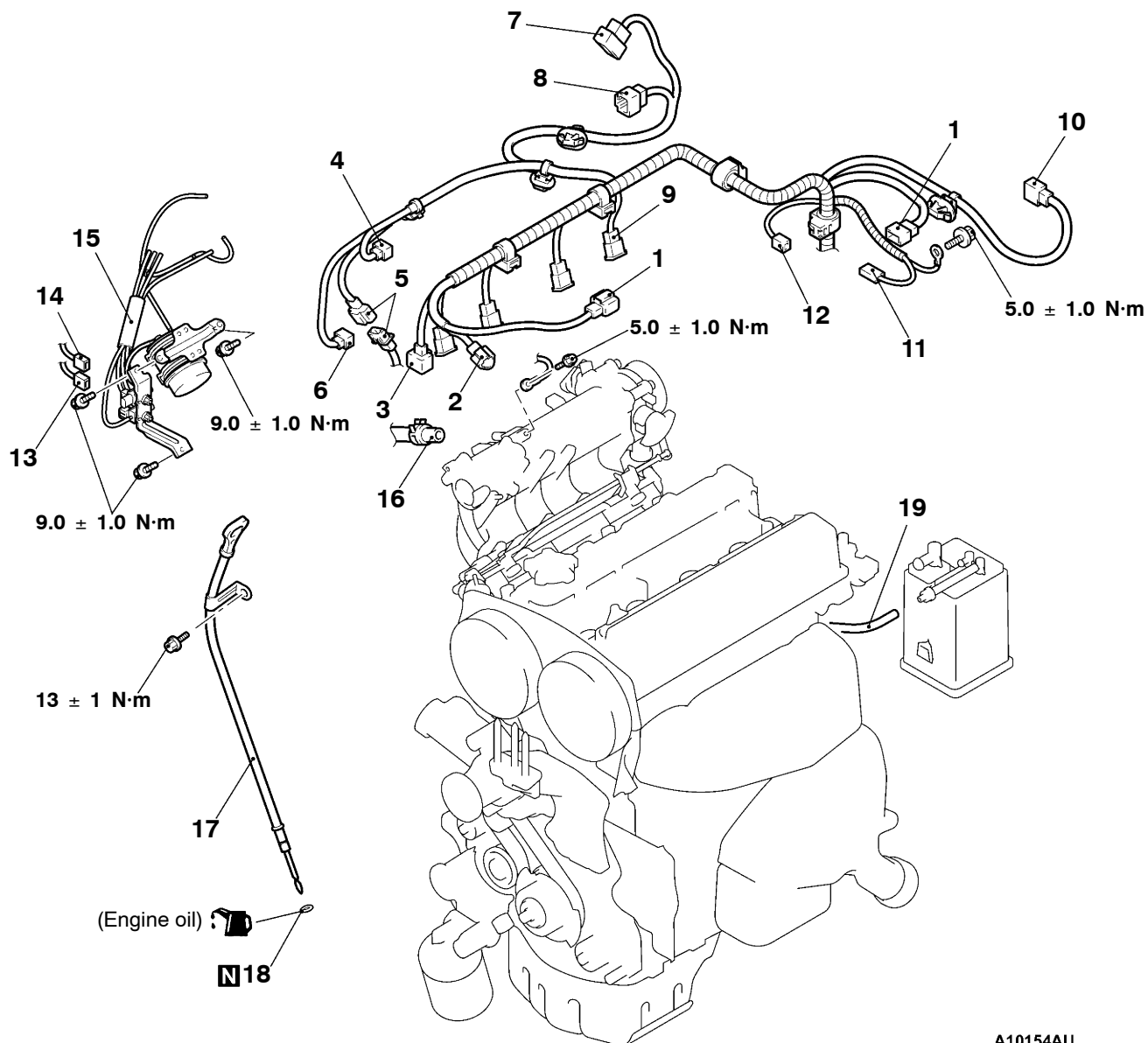
REMOVAL AND INSTALLATION

Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.

Pre-removal and Post-installation Operation

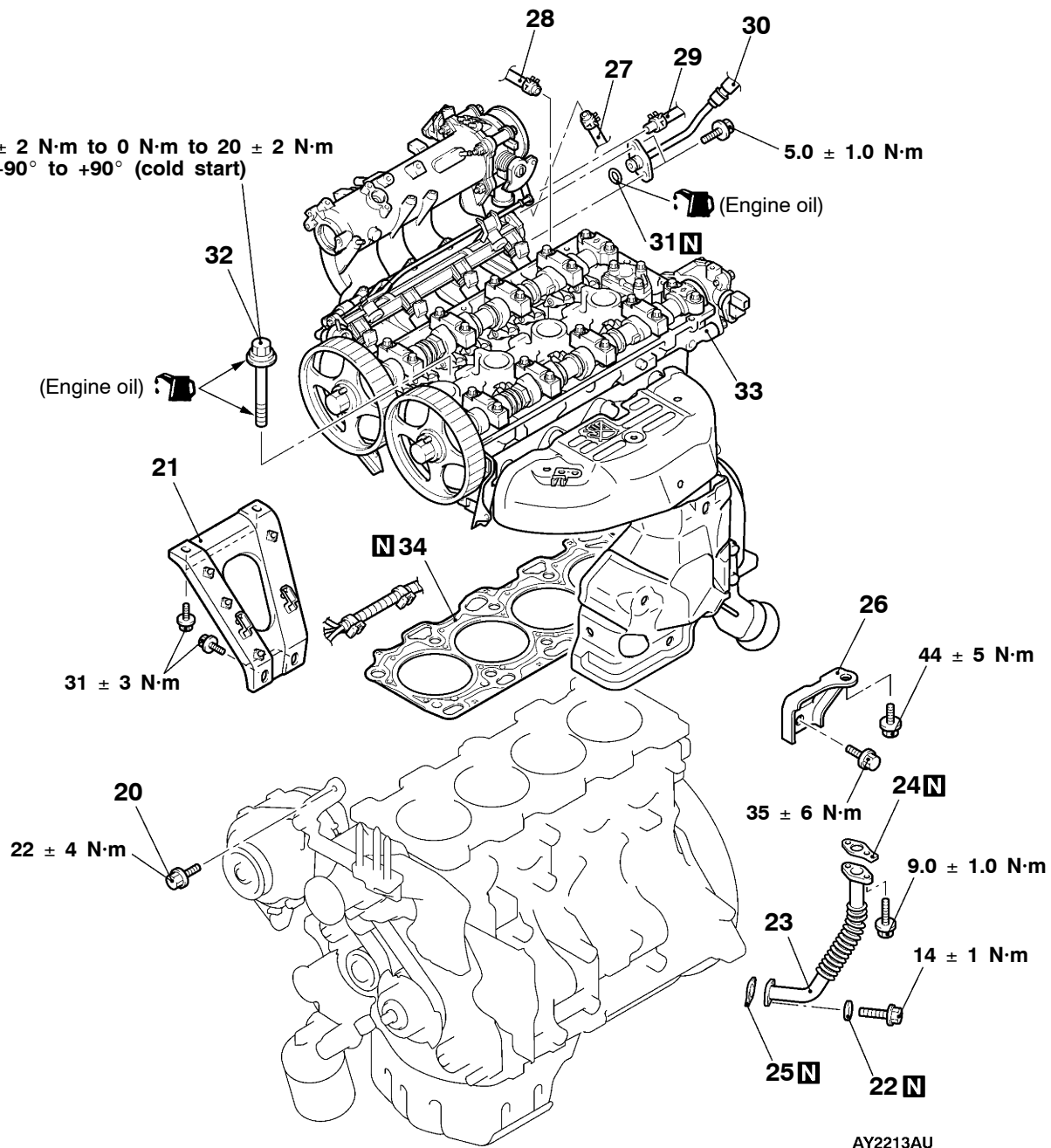
- Fuel Outflow Preventive Operation (Refer to GROUP 13A - On-vehicle Service.) <Before removal only>
- Fuel Leak Check <After installation only>
- Strut Tower Bar Removal and Installation (Refer to GROUP 42.)
- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Drive Belt Tension Check (Refer to P.11A-7.) <After installation only>
- Accelerator Cable Adjustment (Refer to GROUP 17 - On-vehicle Service.) <After installation only>
- Drainage and Refilling Engine Oil (Refer to GROUP 12 - On-vehicle Service.)
- Drainage and Refilling of Engine Coolant (Refer to GROUP 14 - On-vehicle Service.)
- Air Cleaner Assembly Removal and Installation (Refer to GROUP 15.)
- Air Hose E, Air Pipe C, Air hose D Removal and Installation (Refer to GROUP 15 - Intercooler.)
- Battery Removal and Installation
- Center Cover Removal and Installation (Refer to P.11A-17.)
- Accelerator Cable Removal and Installation (Refer to GROUP 17.)
- Radiator Removal and Installation (Refer to GROUP 14.)
- Secondary Air Control Valve Bracket Removal and Installation (Refer to GROUP 15 - Secondary Air Supply System.)
- Crossmember Bar Removal and Installation (Refer to GROUP32 - Engine Roll Stopper, Centermember.)
- Front Exhaust Pipe Removal and Installation (Refer to GROUP 15.)
- Starter Removal and Installation (Refer to GROUP 16.)
- Timing Belt Removal and Installation (Refer to P.11A-34.)



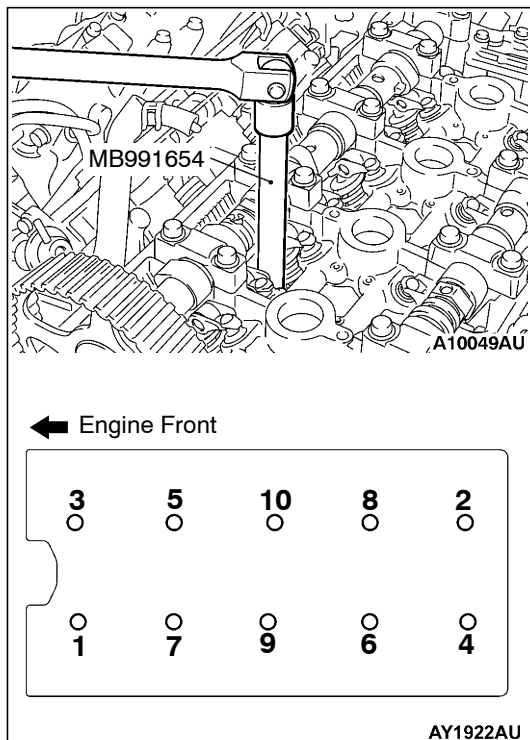
A10154AU

Removal steps

1. Ignition coil connector
2. Crank angle sensor connector
3. Oxygen sensor connector
4. Fuel pressure solenoid valve connector
5. Detonation sensor connector
6. Purge control solenoid valve connector
7. Throttle position sensor connector
8. Idle speed control servo connector
9. Injector connector
10. Camshaft position sensor connector
11. Engine coolant temperature gauge unit connector
12. Engine coolant temperature sensor connector
 - Rocker cover (Refer to P.11A-17.)
13. EGR solenoid valve connector
14. Secondary air control solenoid valve connector
15. Vacuum tank, solenoid valve, vacuum pipe and hose assembly
16. Brake booster vacuum hose connection
17. Oil level gauge and guide assembly
18. O-ring
19. Purge hose connection



- | | |
|--|---|
| <p>20. Alternator brace connection</p> <p>21. Intake manifold stay</p> <p>22. Oil return pipe gasket</p> <p>23. Oil return pipe</p> <p>24. Oil return pipe gasket</p> <p>25. Oil return pipe gasket</p> <p>26. Exhaust fitting bracket</p> <p>• Water outlet fitting and thermostat case assembly (Refer to Group 15 - Water Hose and Pipe.)</p> | <p>27. Water hose connection</p> <p>28. Heater hose connection</p> <p>29. Fuel return hose connection</p> <p>30. Fuel high pressure hose connection</p> <p>31. O-ring</p> <p>32. Cylinder head bolt</p> <p>33. Cylinder head assembly</p> <p>34. Cylinder head gasket</p> |
|--|---|



REMOVAL SERVICE POINT

◀A▶ CYLINDER HEAD BOLTS REMOVAL

Use the special tool to loosen the bolt in 2 to 3 times in the order of the numbers shown in the illustration for removal.

INSTALLATION SERVICE POINTS

▶A◀ CYLINDER HEAD GASKET INSTALLATION

1. Remove residual gasket attached on the mounting surface of the gasket.

Caution

Do not let contaminants get into engine coolant, oil passage or cylinder.

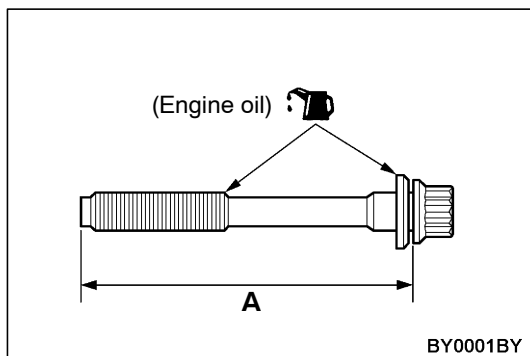
2. With individual holes of cylinder head aligned on individual holes of cylinder head gasket, install cylinder head gasket on cylinder head.

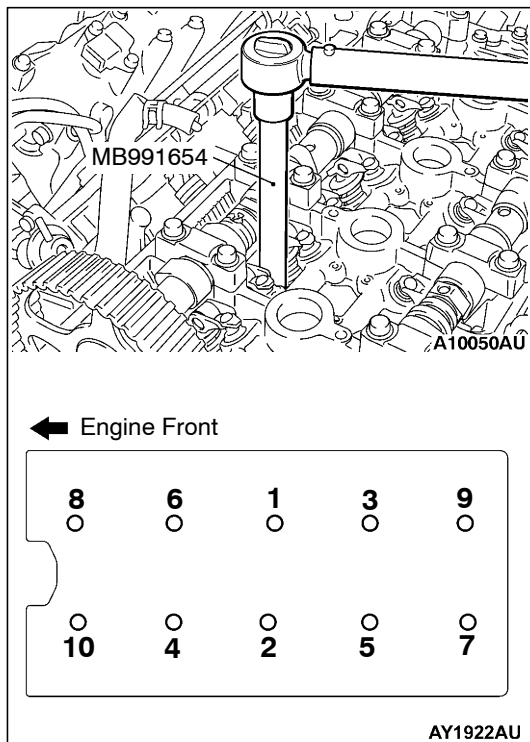
▶B◀ CYLINDER HEAD BOLTS INSTALLATION

1. Ensure that the length under head of cylinder head bolts is under the limit value. When the measured value exceeds the limit value, replace the bolt with new one.

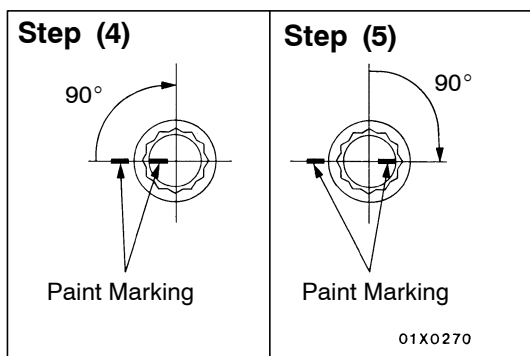
Limit (A): 99.4 mm

2. Apply small quantity of engine oil at the threads of cylinder head bolts and the washers.





3. Use special tool to tighten bolts according to the following procedure (tightening for plastic zone)
 - (1) According to the sequence specified in the figure, tighten the bolt to the specified torque 78 ± 2 N·m.
 - (2) In the reverse sequence of the figure, fully loosen bolts.
 - (3) According to the sequence specified in the figure, tighten bolts to the specified torque 20 ± 2 N·m.



- (4) Indicate paint markings on the heads of cylinder head bolts and cylinder head, and tighten bolts at the angle of 90 degree in the sequence specified in the figure.
- (5) When bolts are tightened at the angle of 90 degree according to the figure, ensure that the paint markings on the heads of cylinder head bolts and cylinder head are standing in line.

Caution

- 1) When the tightening angle is under 90 degree, the bolt is not sufficiently tightened.
- 2) When the tightening angle exceeds the specified value, remove the bolt and repeat the same procedure beginning with Step 1.

▶◀ O-RING/FUEL HIGH PRESSURE HOSE INSTALLATION

1. Apply small quantity of new engine oil on O-ring.

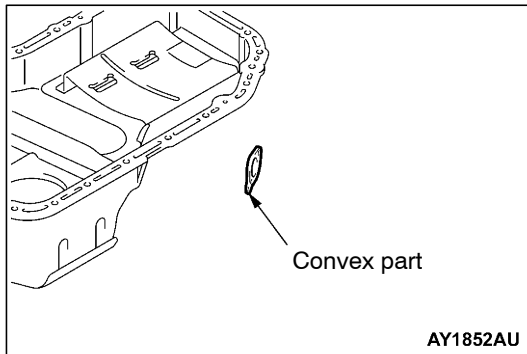
Caution

Do not let engine oil get into the delivery pipe.

2. Install the fuel high pressure pipe to the delivery pipe rotating in both directions without damaging the O-ring and check that it rotates smoothly.

3. In case of not rotating smoothly, remove the fuel high pressure hose and insert it to the delivery pipe again after checking damage of the O-ring since there is a possibility of O-ring engagement.
4. Tighten fuel high pressure hose mounting bolts to the specified torque.

Tightening Torque: 5.0 ± 1.0 N·m



►D◄ OIL RETURN PIPE GASKET INSTALLATION

Gasket should be replaced with a new one, and set the convex part to the position as shown in the illustration for installation.

NOTE

There is no specific direction indicated for installing the turbocharger side of the oil return pipe gasket.

TIMING BELT AND TIMING BELT B

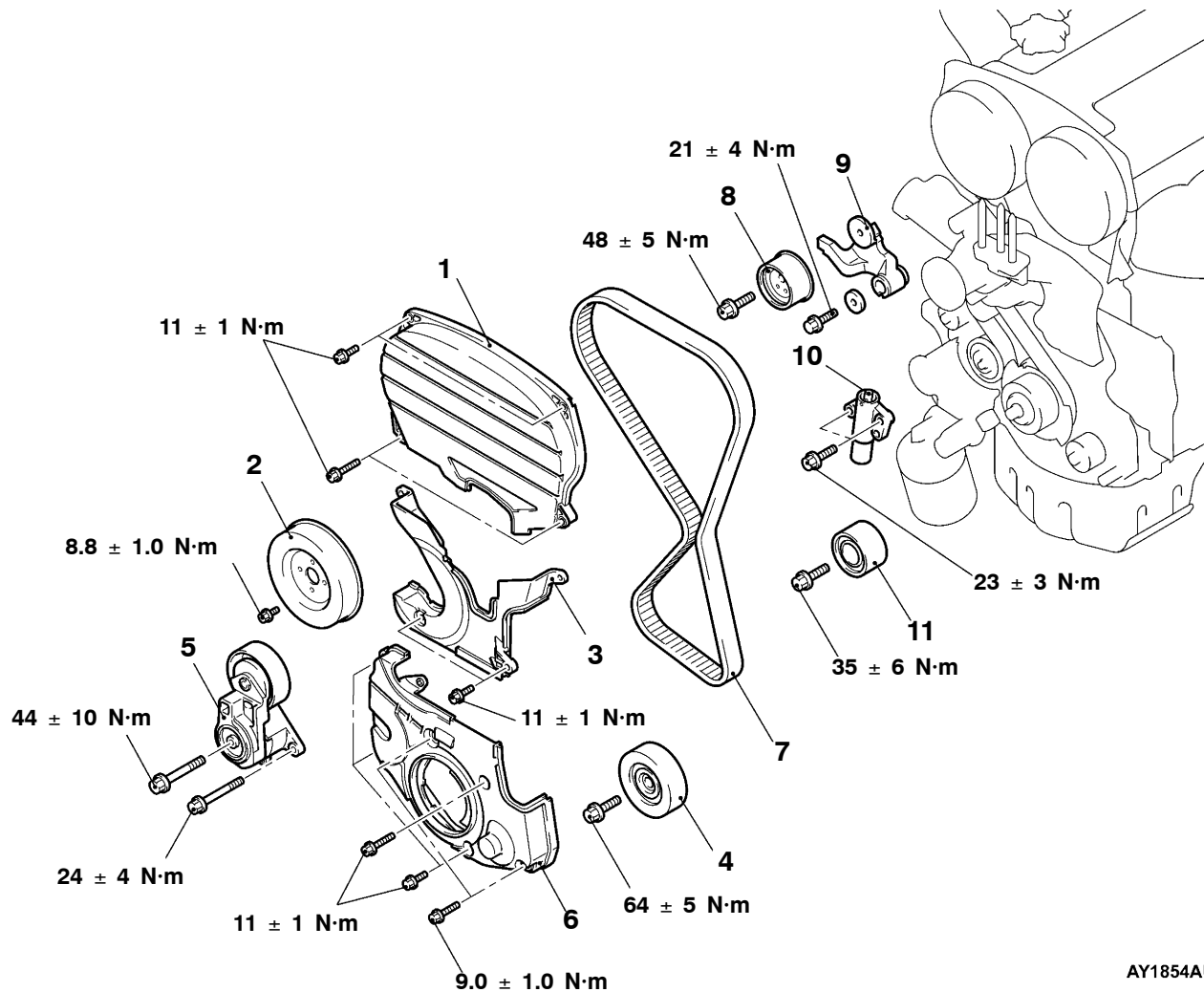
REMOVAL AND INSTALLATION

Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Side Cover Removal and Installation
- Drive Belt Tension Check (Refer to P.11A-7.) <After installation only>
- Crankshaft Pulley Removal and Installation (Refer to P.11A-15.)
- Crossmember Bar Removal and Installation (Refer to GROUP 32 - Engine Roll Stopper, Centermember.)
- Front Exhaust Pipe Removal and Installation (Refer to GROUP 15.)
- Engine Mounting Removal and Installation (Refer to GROUP 32.)

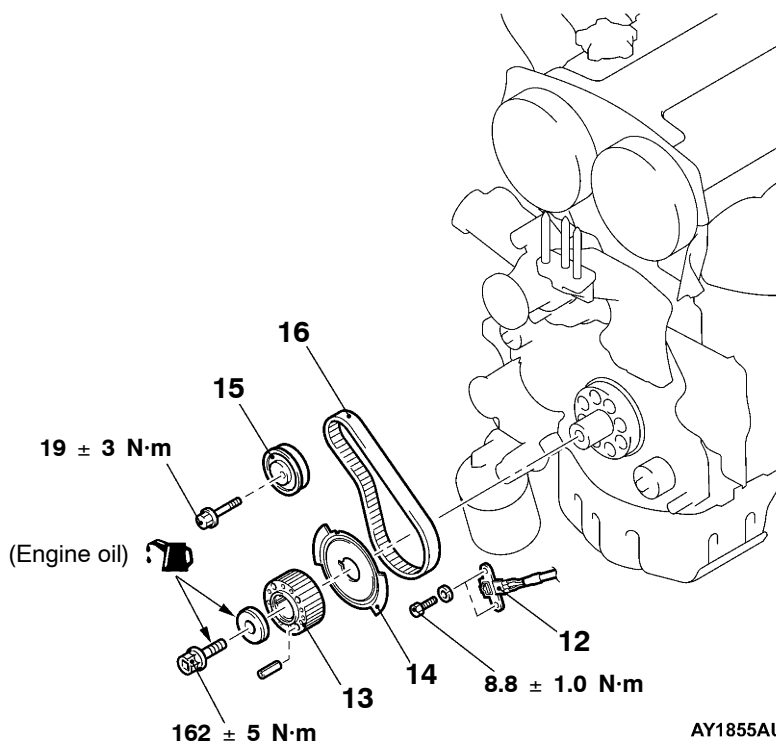


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Removal steps

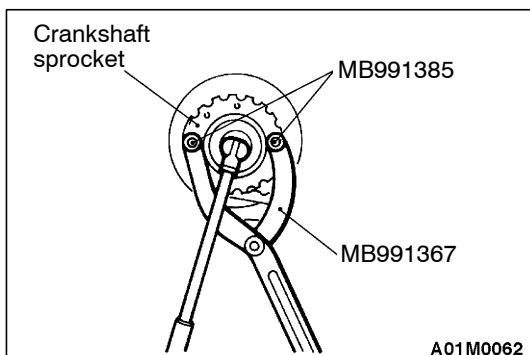
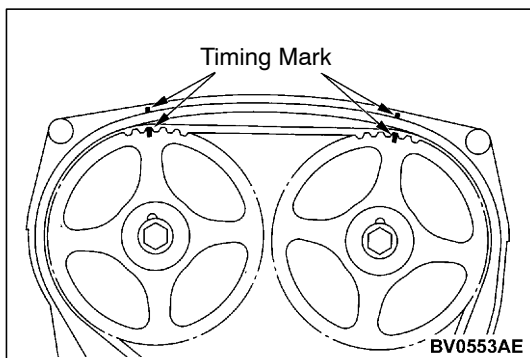
1. Timing belt front upper cover
2. Water pump pulley
3. Timing belt front center cover
4. Idler pulley
5. Drive belt auto-tensioner
6. Timing belt front lower cover

- ◀A▶ ● Timing belt tension adjustment
- ▶G◀ 7. Timing belt
- ▶F◀ 8. Tensioner pulley
- ▶E◀ 9. Tensioner arm
- ▶D◀ 10. Auto-tensioner
- ▶ 11. Idler pulley



- ◀B▶ 12. Crank angle sensor
- ▶C▶ 13. Crankshaft sprocket
- ▶C▶ 14. Crankshaft sensing blade

- ▶B▶ ● Timing belt B tension adjustment
- ▶A▶ 15. Timing belt B tensioner
- ▶A▶ 16. Timing belt B



REMOVAL SERVICE POINTS

◀A▶ TIMING BELT REMOVAL

1. Rotate the crankshaft clockwise and mate timing marks with each other to position No.1 cylinder at compression TDC.

Caution

Ensure that the crankshaft always rotates clockwise.

2. Loosen the mounting bolt of the tensioner pulley and remove the timing belt.

Caution

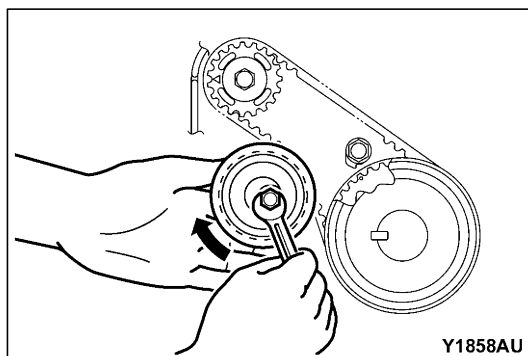
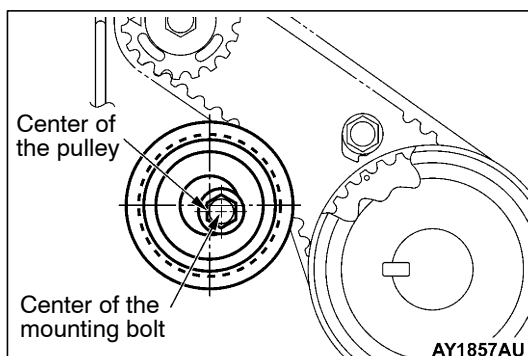
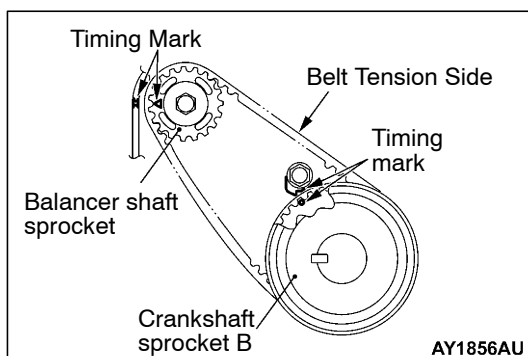
When the timing belt is reused, use a chalk to indicate an arrow of rotation direction on the back of the belt so that it can be re-assembled in the same direction as before.

◀B▶ CRANKSHAFT SPROCKET REMOVAL

◀C▶ TIMING BELT B REMOVAL

Caution

When the timing belt B is reused, use a chalk to indicate an arrow of rotation direction on the back of the belt so that it can be re-assembled in the same direction as before.



INSTALLATION SERVICE POINTS

▶A◀ TIMING BELT B/TIMING BELT B TENSIONER INSTALLATION

1. Check that timing marks of crankshaft sprocket B and balancer shaft sprocket are aligned with each other.
2. Install timing belt B to crankshaft sprocket B and balancer shaft sprocket. Prevent the tension side of the belt from sagging.
3. Position the center of the timing belt tensioner B at the center or upper left of the mounting bolt and flange pulley at the engine front to assemble and fix them temporarily.
4. Adjust the tension of timing belt B.

▶B◀ TIMING BELT B TENSION ADJUSTMENT

1. Apply force to the timing belt B tensioner in the direction indicated by the arrow to give tension torque (3.0 ± 0.4 N·m) to the timing belt B so that the tension side of the timing belt B can become tense. Maintaining the condition, tighten the mounting bolt to the specified torque for fixing.

Tightening Torque: 19 ± 3 N·m

Caution

Be careful not to let the tensioner rotate together when tightening the mounting bolt. If the tensioner rotates together, belt tension becomes too much.

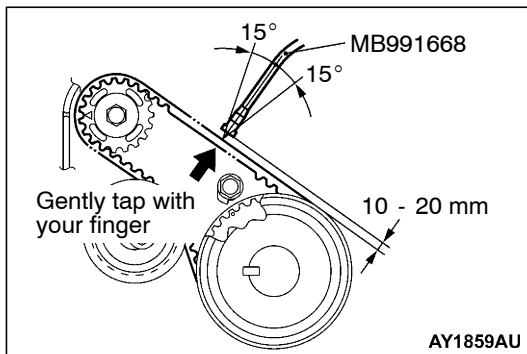
2. Measure the tension of timing belt B by following procedures.

Standard value:

Item	When adjusted	When replaced
Vibration frequency Hz	76 - 92	76 - 92
Deflection mm (Reference)	5 - 7	5 - 7

<When using MUT-II>

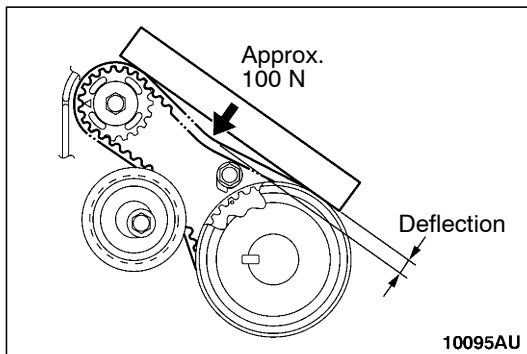
- (1) Connect the special tool (MB991668) to the MUT-II.
- (2) Connect the special tool (MB991704) to the MUT-II and the battery.
- (3) Rotate the crankshaft clockwise for two rounds to position No.1 cylinder at compression TDC and check that timing marks of each sprocket are aligned with each other.
- (4) Select "Belt Tension Measurement" from the menu screen of the MUT-II.



- (5) Hold the special tool (MB991668) to the middle of the belt between sprockets (at the place indicated by the arrow) as shown in the illustration about 10 - 20 mm away from the rear surface of the belt and so that it is perpendicular to the belt (within an angle of $\pm 15^\circ$).
- (6) Gently tap the middle of the belt between sprockets (the place indicated by the arrow) with your finger as shown in the illustration and check that the vibration frequency of the belt is within the standard value.

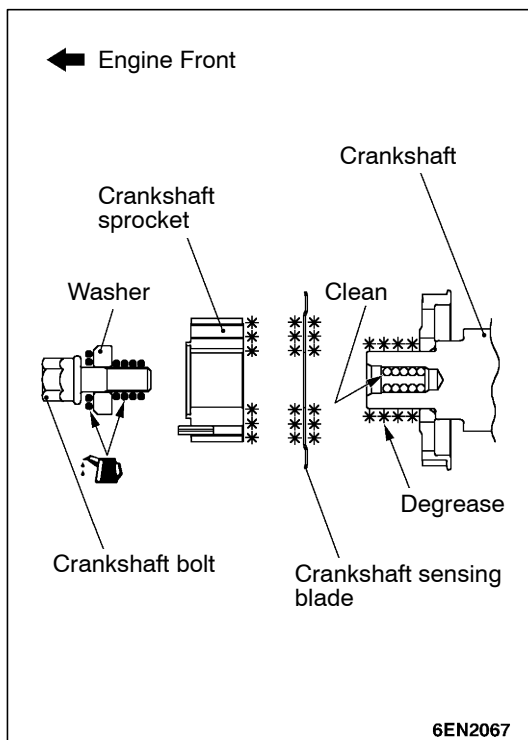
Caution

- 1) If strong gusts of wind blow against the microphone or if there are any loud sources of noise nearby, the values measured by the microphone may not correspond to actual values.
- 2) If the microphone is touching the belt while the measurement is being made, the values measured by the microphone may not correspond to actual values.

**<When checking the deflection>**

Apply a force of approx.100N to the middle (arrow part) of pulley shown in the figure, and check that the deflection is within the standard value.

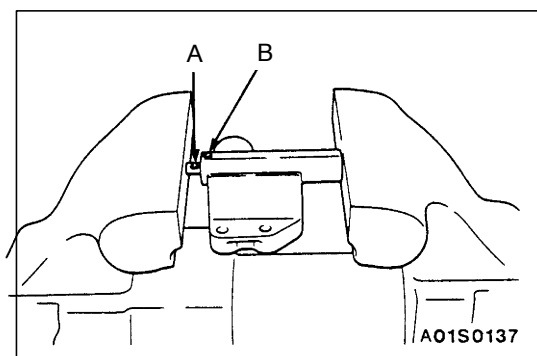
3. If it is outside the standard value, re-adjust belt tension.



►C◄ CRANKSHAFT SENSING BLADE/CRANKSHAFT SPROCKET INSTALLATION

1. Clean and degrease the crankshaft sensing blade and the crankshaft sprocket mounting surfaces of the crankshaft sprocket and the crankshaft.
2. Install the crankshaft sensing blade and crankshaft sprocket to the direction as shown in the illustration.
3. Clean the tapped hole of the crankshaft.
4. Position the chamfered side of the washer to the direction as shown in the illustration and install to the crankshaft bolt.
5. Apply a small quantity of engine oil to the contact surface and the threads of crankshaft bolts.
6. Use the special tool to hold the crankshaft sprocket and tighten the the crankshaft bolt to the specified torque in the same way as that for removal.

Tightening Torque: 162 ± 5 N·m

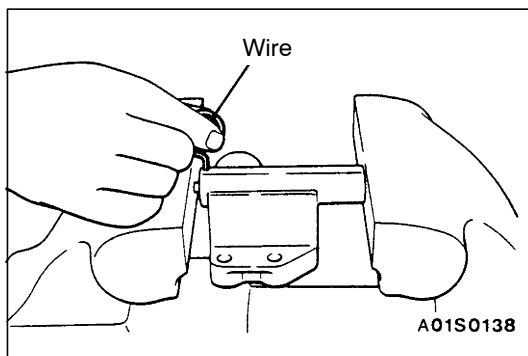


►D◄ AUTO-TENSIONER INSTALLATION

1. If the auto-tensioner rod is being extended, set according to the following procedure.
 - (1) Use a press or a vise to compress the rod of the auto-tensioner slowly and align the mounting hole A of the rod with the mounting hole B of the tensioner cylinder.

Caution

Ensure that the operation should be done slowly because quick compression could damage a rod.



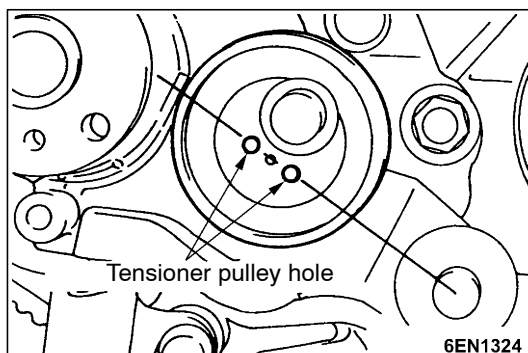
- (2) Insert a wire or etc. into the mated mounting hole.

NOTE

If the automatic tensioner is replaced with a new one, the automatic tensioner comes with a new pin.

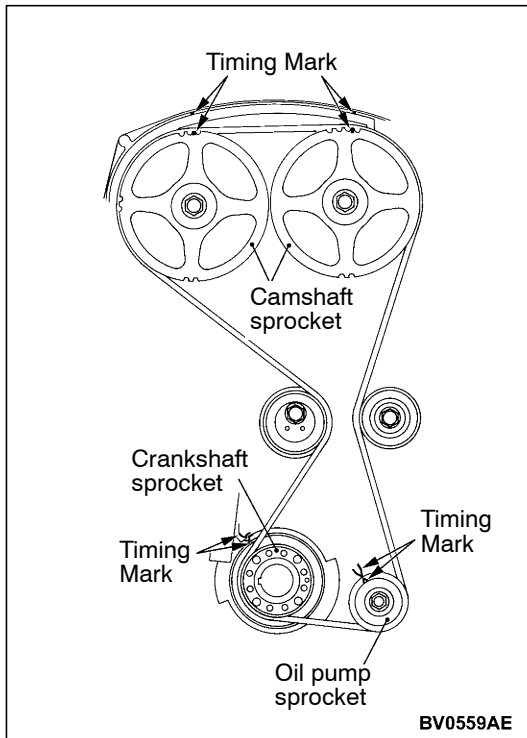
2. Install the auto-tensioner to the engine and tighten the mounting bolt to the specified torque. Do not remove a wire or a pin before completing timing belt tension adjustment.

Tightening Torque: 23 ± 3 N·m



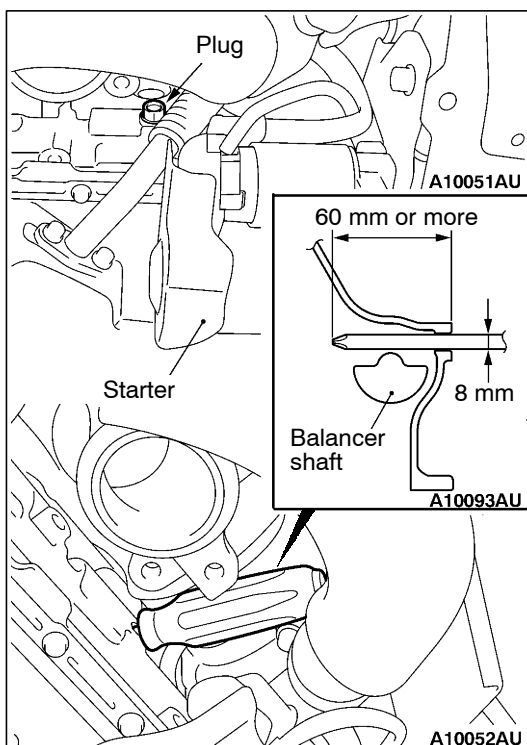
►E◄ TENSIONER PULLEY INSTALLATION

Secure the tensioner pulley temporarily as shown in the illustration.

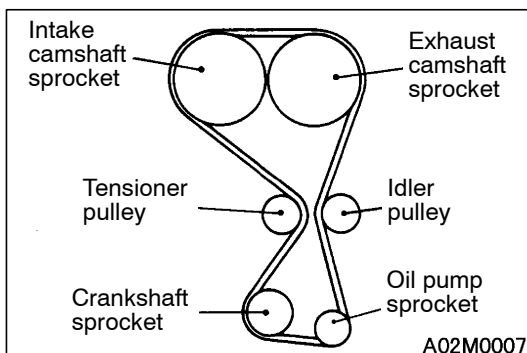


►◄ TIMING BELT INSTALLATION

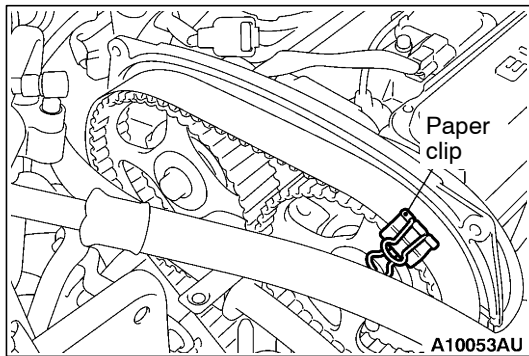
1. Check that timing marks of camshaft sprocket, crankshaft sprocket, and oil pump sprocket are aligned with each other.



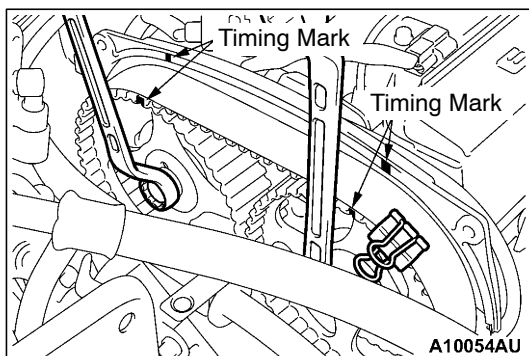
2. After aligning the timing marks of the oil pump sprocket, remove the cylinder block plug and insert a Phillips screw driver with a shaft diameter of 8 mm through the plug hole to check that the shaft of the screw driver can be inserted for 60 mm or more. If the screw driver makes contact with the balancer shaft and can be inserted for only 20 - 25 mm, turn the sprocket for one round and align timing marks again to check that screw driver can be inserted for 60 mm or more. Do not take the screw driver out before completing installation of the timing belt.



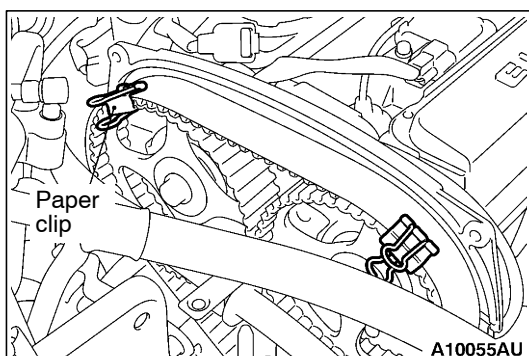
3. Position the timing belt without having any slack at the tension side of the belt.
 - (1) Hook the timing belt to the crankshaft sprocket, the oil pump sprocket, and the idler pulley in the sequence.



- (2) Hook the timing belt with exhaust side of the camshaft sprocket and retain the specified position indicated in the figure with paper clips.



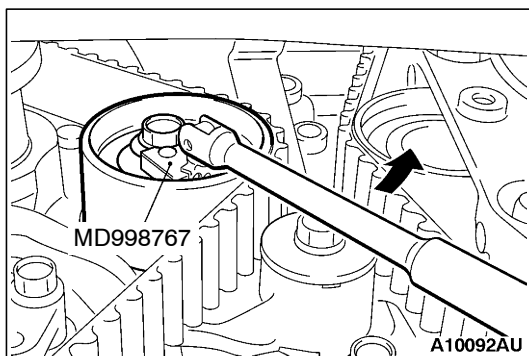
- (3) Use two wrenches to hook the timing belt to the intake side of the camshaft sprocket while aligning the timing marks on the rocker cover and camshaft sprocket.



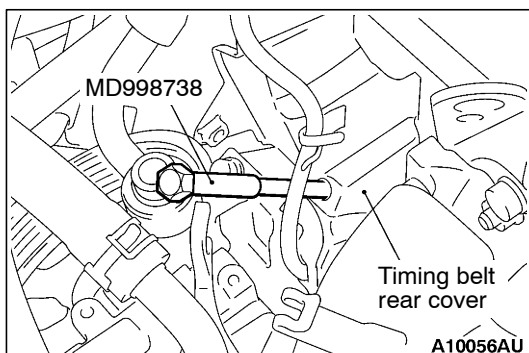
- (4) Retain timing belt at the specified positions with paper clips according to the figure.
- (5) Hook the timing belt to the tensioner pulley.
- (6) Remove two paper clips.

Caution

After hooking the timing belt, apply force to the camshaft sprocket counterclockwise (in left turn) and reconfirm that each timing mark is in the proper position while the belt is being stretched.



4. Use the special tool to rotate the tensioner pulley in the direction indicated in the figure, tighten the timing belt, and temporarily tighten the mounting bolt of the tensioner pulley for fixing.
5. Check that each timing mark is properly aligned.
6. Remove the screw driver and install a plug.
7. Adjust timing belt tension.



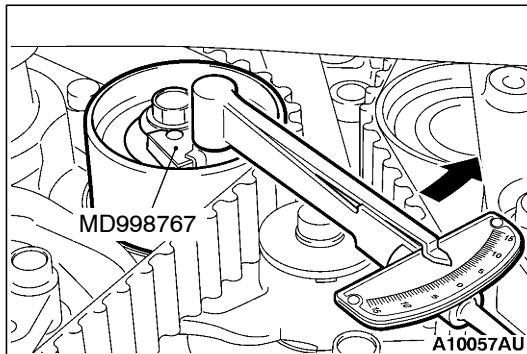
▶G◀ TIMING BELT TENSION ADJUSTMENT

1. After removal of the rubber plug of the timing belt rear cover, prepare the special tool to insert the special tool into the position where a wire or a pin inserted during installation of automatic tensioner can be moved easily.

Caution

Be sure to pressfit the special tool with a hand because pressfitting the special tool with tools, such as spanner, and etc. could damage a wire or a pin inserted into the automatic tensioner.

2. Rotate the crankshaft counterclockwise for 1/4 round.
3. Rotate the crankshaft clockwise and mate timing marks with each other to position No.1 cylinder at compression TDC.
4. Loosen the temporarily tightened tensioner pulley mounting bolt.

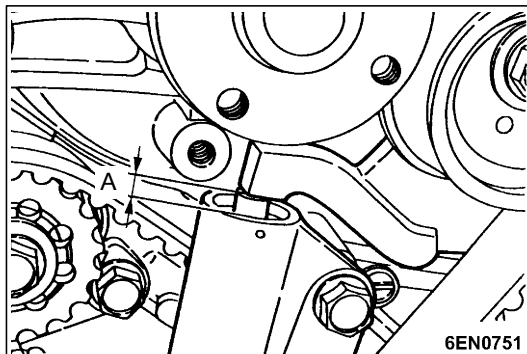


5. Use the special tool and torque wrench to apply tension torque (3.5 N·m) to the timing belt in the direction indicated in the figure and tighten the tensioner pulley mounting bolt to the specified torque.

Tightening Torque: 48 ± 5 N·m

Caution

Be careful not to let the tensioner pulley rotate together when tightening the mounting bolt. If the tensioner rotates together, belt tension becomes too loose.



6. Remove a wire or a pin inserted during installation of the automatic tensioner.
7. Remove the special tool installed in the above-mentioned 1 with a hand.
8. Rotate the crankshaft clockwise for two rounds and leave it alone for approximately 15 minutes.
9. Insert the removed wire or pin in the above-mentioned 6 again to check that it can be removed easily. If either wire or pin can be removed easily, the timing belt tension is correct and remove a wire or a pin. Then, check that projection of the automatic tensioner rod is within the standard value.

Standard value (A): 3.8 - 4.5 mm

10. If a wire or a pin cannot be easily removed, repeat the above-mentioned operations 1 - 8 to obtain the correct timing belt tension.
11. Check that timing marks of each sprocket are aligned with each other.

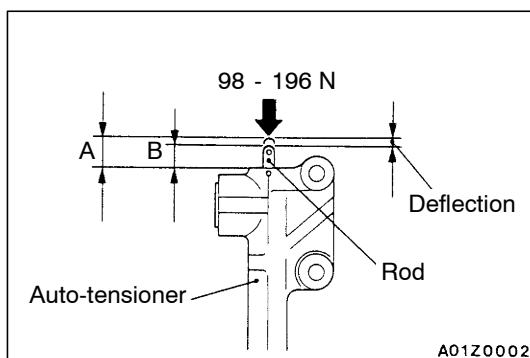
Caution

After turning the crankshaft bolt counterclockwise, always check the tightening torque of the crankshaft bolt and tighten it again if it becomes loose.

INSPECTION

AUTO-TENSIONER CHECK

1. Check the sealant for oil leakage and replace if necessary.
2. Check the rod end for wear or damage and replace if necessary.



3. Measure the deflection of the rod end pressed against the metal (cylinder block, etc) with the force of 98 - 196 N while holding the auto-tensioner with a hand.

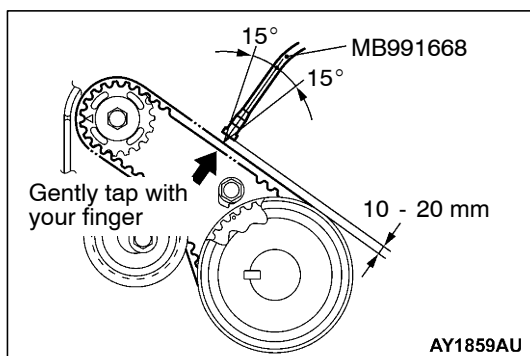
Standard value: Within 1 mm

A: Length in the released state

B: Length in the pressed state

A - B: Deflection

4. If the value is outside the standard value, replace the auto-tensioner.



TIMING BELT B TENSION CHECK

1. Measure the tension of timing belt B by following procedures.

Standard value:

Item	When checked
Vibration frequency Hz	52 - 92
Deflection mm (Reference)	5 - 10

<When using MUT-II>

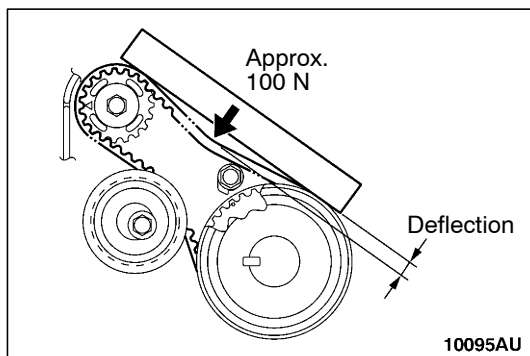
Tap the center of the belt between the pulleys (arrow), and check that the belt vibration frequency is within the standard values.

NOTE

For the vibration frequency measurement using the MUT-II, refer to P11A-37.

<When checking the deflection>

Apply a force of approx.100N to the middle (arrow part) of pulley shown in the figure, and check that the deflection is within the standard value.



2. If it is outside the standard value, re-adjust belt tension. (Refer to P.11A-36.)

ENGINE ASSEMBLY

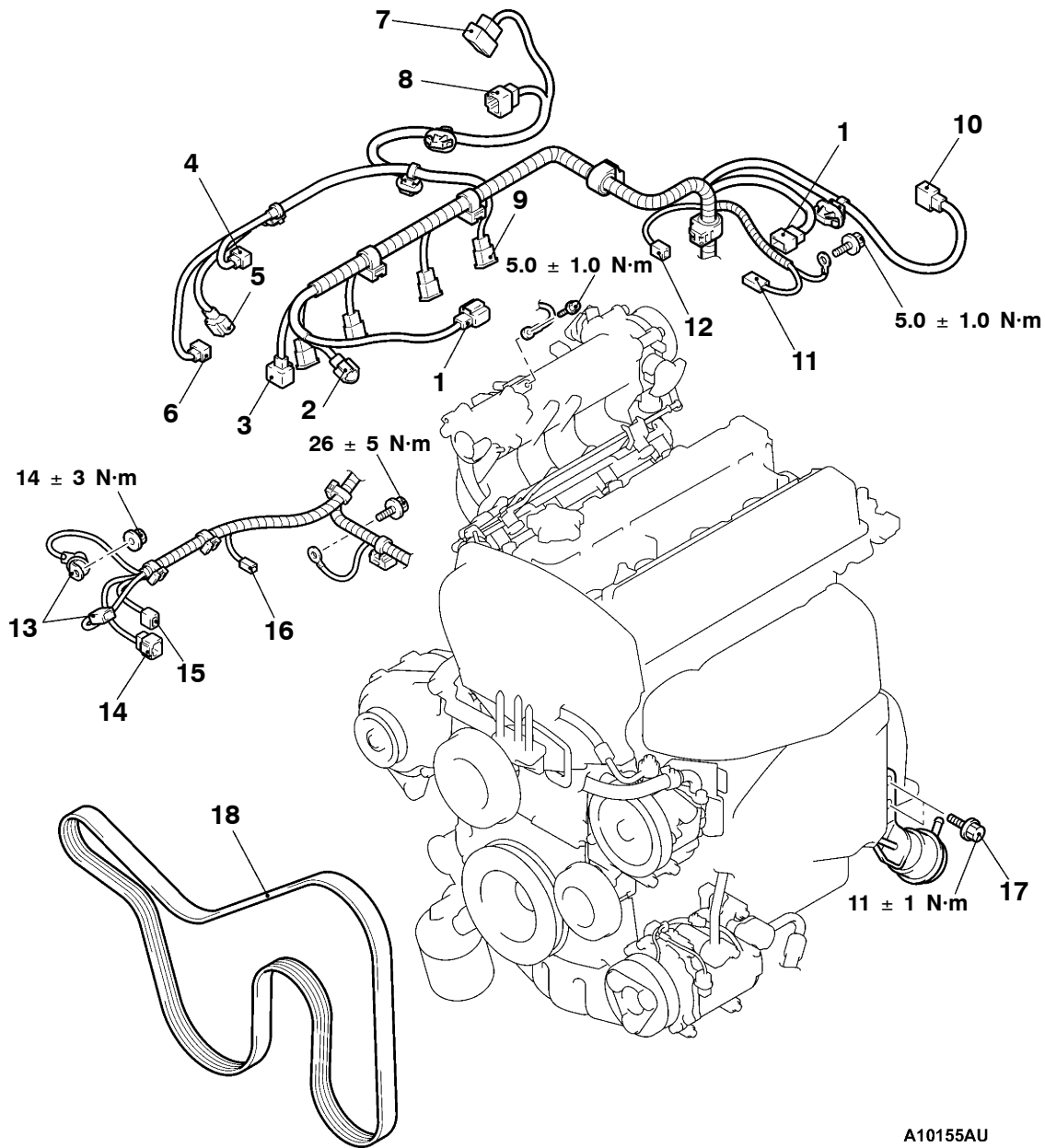
REMOVAL AND INSTALLATION

Caution

1. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.
2. Tightening sections indicated in the mark (*) should be finally tightened with engine weight applied on the body after lightly tightening.

Pre-removal and Post-installation Operation

- Fuel Outflow Preventive Operation (Refer to GROUP 13A - On-vehicle Service.) <Before removal only>
- Fuel Leak Check <After installation only>
- Removal and Installation of Hood (Refer to GROUP 42.)
- Removal and Installation of Strut Tower Bar (Refer to GROUP 42.)
- Removal and Installation of Under Cover (Refer to GROUP 51 - Front Bumper.)
- Removal and Installation of Side Cover.
- Drive Belt Tension Check (Refer to P.11A-7.) <After installation only>
- Accelerator Cable Adjustment (Refer to GROUP 17 - On-vehicle Service.) <After installation only>
- Drainage and Refilling Engine Oil(Refer to GROUP 12 - On-vehicle Service.)
- Drainage and Refilling of Engine Coolant (Refer to GROUP 14 - On-vehicle Service.)
- Air Cleaner Removal and Installation (Refer to GROUP 15)
- Removal and Installation of Air Pipe C, Air Pipe B and Air Hose A (Refer to GROUP 15 - Intercooler.)
- Battery and Battery Tray Removal and Installation
- Removal and Installation of Center Cover (Refer to P.11A-17.)
- Removal and Installation of Accelerator Cable (Refer to GROUP 17.)
- Removal and Installation of Radiator (Refer to GROUP 14.)
- Removal and Installation of Crossmember Bar (Refer to GROUP 32 - Engine Roll Stopper, Centermember.)
- Removal and Installation of Front Exhaust Pipe (Refer to GROUP 15.)
- Removal and Installation of Air Outlet Fitting (Refer to GROUP 15 - Exhaust manifold.)

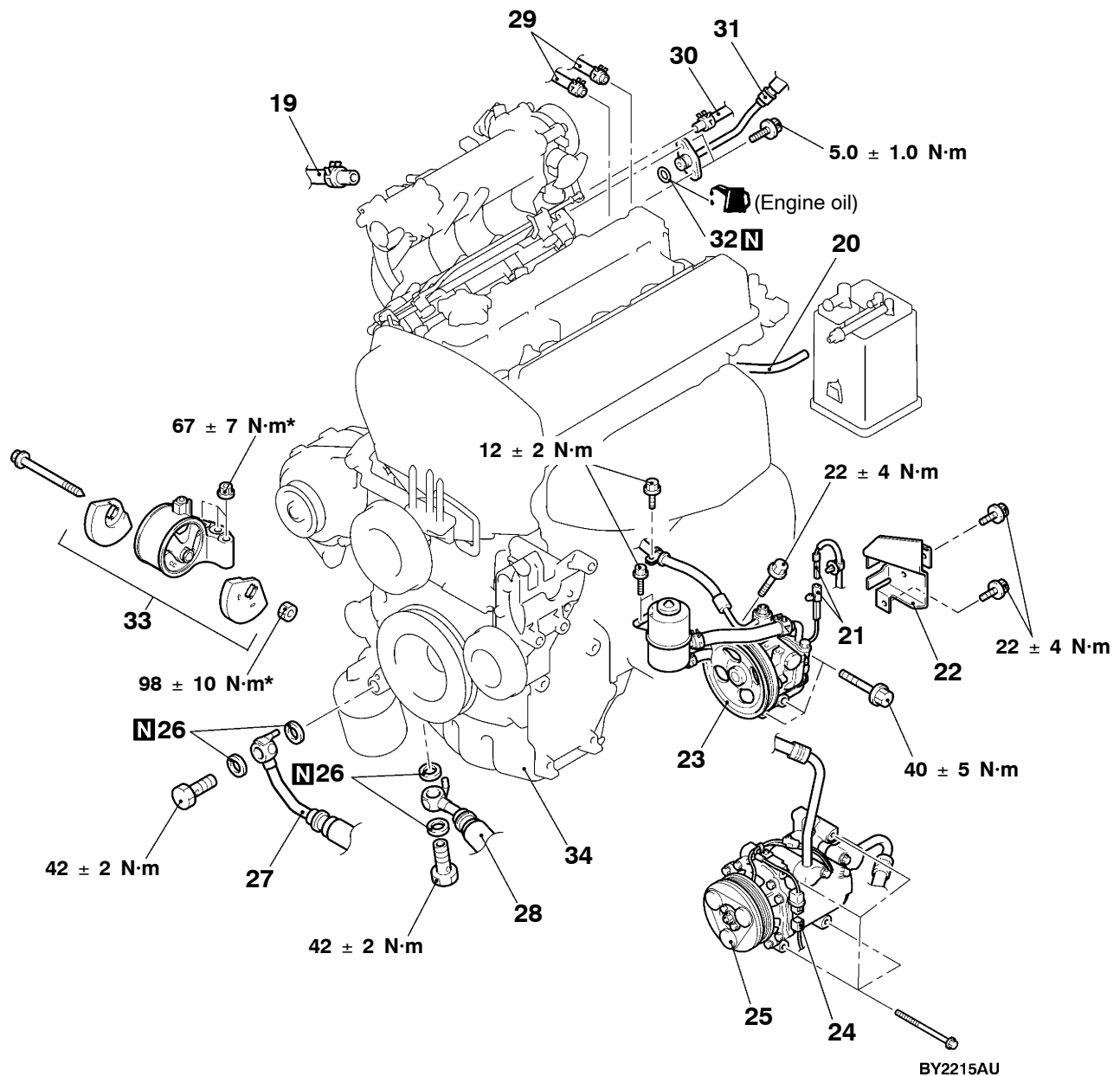


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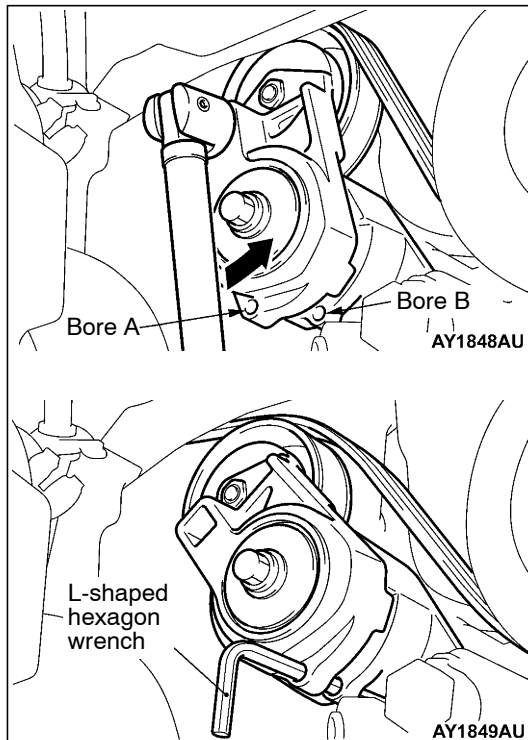
Removal steps

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Ignition coil connector 2. Crank angle sensor connector 3. Oxygen sensor connector 4. Fuel pressure solenoid valve connector 5. Detonation sensor connector 6. Purge control solenoid valve connector 7. Throttle position sensor connector 8. Idle speed control servo connector 9. Injector connector 10. Camshaft position sensor connector | <ol style="list-style-type: none"> 11. Engine coolant temperature gauge unit connector 12. Engine coolant temperature sensor connector 13. Alternator connector 14. EGR solenoid valve connector 15. Secondary air control solenoid valve connector 16. Engine oil pressure switch connector 17. Waste gate actuator mounting bolt 18. Drive belt |
|--|---|





- | | |
|---|--|
| 19. Brake booster vacuum hose connection | 28. Engine oil cooler return hose connection |
| 20. Purge hose connection | 29. Heater hose connection |
| 21. Power steering oil pressure switch connector | 30. Fuel return hose connection |
| 22. Heat protector | ▶C◀ 31. Fuel high pressure hose connection |
| ◀B▶ 23. Power steering oil pump, bracket and oil reservoir assembly | ▶C◀ 32. O-ring |
| | • Transfer assembly (Refer to Group 22.) |
| | • Transmission assembly (Refer to Group 22.) |
| ◀B▶ 24. A/C compressor connector <Vehicle with A/C> | ◀C▶ ▶B◀ 33. Engine mounting bracket and stopper assembly |
| 25. A/C compressor <Vehicle with A/C> | ◀D▶ ▶A◀ 34. Engine assembly |
| 26. Engine oil cooler tube gasket | |
| 27. Engine oil cooler feed hose connection | |



REMOVAL SERVICE POINTS

◀▶ DRIVE BELT REMOVAL

Due to the adoption of the Serpentine drive system with the auto-tensioner, the following operation is required:

1. Insert the 12.7sq. spinner handle into the tool hole of the auto-tensioner and rotate it counterclockwise until the auto-tensioner reaches to the stopper.
2. Align hole A with hole B for fixing by inserting the L shaped-hexagon wrench, then remove the drive belt.

Caution

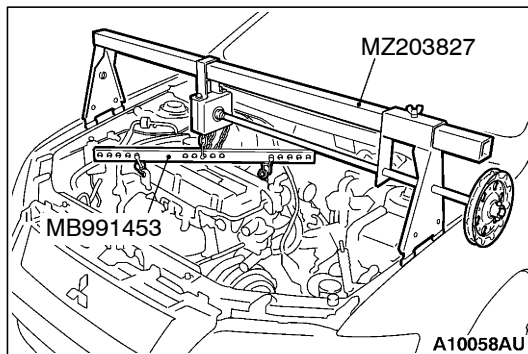
When the drive belt is reused, use a chalk to indicate an arrow of rotation direction on the back of the belt so that it can be re-assembled in the same direction as before.

◀▶ POWER STEERING OIL PUMP, BRACKET AND OIL RESERVOIR ASSEMBLY / A/C COMPRESSOR REMOVAL

Remove the power steering oil pump, bracket, oil reservoir and A/C compressor with the hose attached from the bracket.

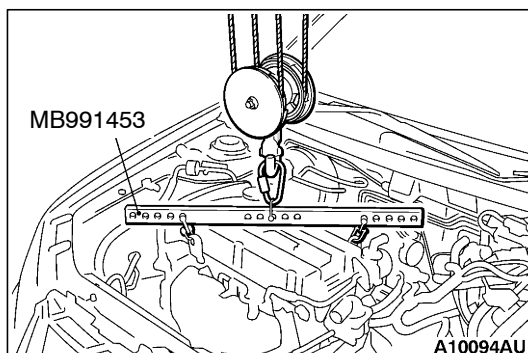
NOTE

Tie the removed oil pump and A/C compressor with a rope and set aside where they cannot hinder the removal of the engine assembly.



◀▶ ENGINE MOUNTING BRACKET AND STOPPER ASSEMBLY REMOVAL

1. Support the engine with a garage jack.
2. Remove special tool (MZ203827).
(Tool used for removal of transmission assembly)



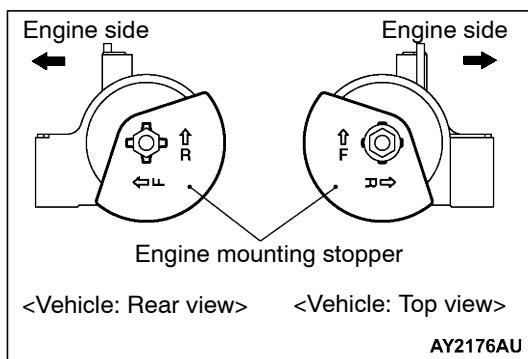
3. Hold the engine assembly with a chain block.
4. Support the engine oil pan with a garage jack via a block of wood cut without applying the weight of the engine and remove the engine mounting bracket and stopper assembly.

◀D▶ ENGINE ASSEMBLY REMOVAL

After checking that all the cables, hoses, and harness connectors have been disconnected, lift the engine with a chain block slowly and remove the engine assembly located at the upper engine room.

INSTALLATION SERVICE POINTS**▶A◀ ENGINE ASSEMBLY INSTALLATION**

Install the engine assembly while checking that none of cables, hoses, or harness connectors, etc. has been engaged.

**▶B◀ ENGINE MOUNTING BRACKET AND STOPPER ASSEMBLY INSTALLATION**

1. Support the engine oil pan with a garage jack via a block of wood cut adjusting the engine position and install the engine mounting bracket and stopper assembly. Position the engine mounting stopper so that a mark indicated by an arrow can face the direction shown in the illustration.
2. Support engine with garage jack.
3. Remove the chain block and hold the engine assembly with the special tool. (Tool used for removal of transmission assembly)

▶C◀ O-RING/FUEL HIGH PRESSURE HOSE INSTALLATION

1. Apply small quantity of new engine oil on O-ring.

Caution

Do not let engine oil get into the delivery pipe.

2. Install the fuel high pressure pipe to the delivery pipe rotating in both directions without damaging the O-ring and check that it rotates smoothly.
3. In case of not rotating smoothly, remove the fuel high pressure hose and insert it to the delivery pipe again after checking damage of the O-ring since there is a possibility of O-ring engagement.
4. Tighten fuel high pressure hose mounting bolt to the specified torque.

Tightening Torque: 5.0 ± 1.0 N·m

NOTES

ENGINE OVERHAUL

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GENERAL DESCRIPTION**LIST OF MODELS**

Vehicle name	Vehicle model	Engine model	Displacement mL	Specifications
LANCER Evolution VII	CT9A	4G63-7	2000	DOHC 16 valve T/C

SPECIFICATIONS

Items		Specifications
Bore × stroke mm		85 × 88
Total displacement mL		1,997
Combustion chamber shape		Pentroof type
Number of cylinders		4
Valve mechanism	Type	DOHC
	Intake valve	2
	Exhaust valve	2
	Lash adjuster	Hydraulic type
	Rocker arm	Roller follower type
Compression ratio		8.8
Fuel injection device		Electronic control MPI
Ignition device type		Electronic control type 2-coil
Alternator type		Alternating current type (IC regulator built in)
Starter motor type		Deceleration drive

SPECIFICATIONS

SERVICE SPECIFICATIONS

Unit: mm

Items	Standard value	Limited value
Timing belt		
Timing belt B		
Vibration frequency Hz (during inspection)	56 - 92	
Vibration frequency Hz (when re-tensing working belt)	76 - 92	
Vibration frequency Hz (when mounting new belt)	76 - 92	
Deflection amount <reference value> (during inspection)	5 - 10	
Deflection amount <reference value> (when re-tensing working belt)	5 - 7	
Deflection amount <reference value> (when mounting new belt)	5 - 7	
Auto-tensioner		
Rod protrusion length (free length)	12.0	-
Rod protrusion length (when mounting timing belt)	3.8 - 4.5	-
Rod recess amount (when pressed at 98 to 196 N•m)	Within 1	-
Rocker arm, camshaft		
Camshaft		
Cam height		
Intake	35.79	35.29
Exhaust	35.49	34.99
Cylinder head, valve		
Cylinder head		
Lower surface strain	0.05	0.2
Lower surface grinding limit (in combination with combined cylinder block)	-	0.2
Total height	131.9 - 132.1	-
Valve		
Margin		
Intake	1.0	0.5
Exhaust	1.5	1.0
Total length		
Intake	109.50	109.00
Exhaust	109.70	109.20
Valve spring		
Free height	48.3	47.3
Squareness	1.5° or less	4°
Valve guide		
Clearance between valve guide and valve stem		
Intake	0.02 - 0.05	0.10
Exhaust	0.05 - 0.09	0.15
Total length		
Intake	45.5	-
Exhaust	50.5	-
Protrusion amount	19.2 - 19.8	-
Valve seat		
Contact width	0.9 - 1.3	-
Valve protrusion amount from spring seat surface		
Intake	49.20	49.70
Exhaust	48.40	48.90

Unit: mm

Items	Standard value	Limited value
Oil pump, oil pan		
Oil pump		
Side clearance		
Drive gear	0.08 - 0.14	-
Driven gear	0.06 - 0.12	-
Piston, connecting rod		
Piston		
Press-in load N	7,355 - 17,162	-
Piston ring		
Clearance between ring and ring groove		
No. 1 ring	0.03 - 0.07	0.1
No. 2 ring	0.02 - 0.06	0.1
Closed gap		
No. 1 ring	0.20 - 0.30	0.8
No. 2 ring	0.35 - 0.50	0.8
Oil	0.10 - 0.40	1.0
Connecting rod		
Large end thrust clearance	0.10 - 0.25	0.4
Crankshaft		
Pin section oil clearance	0.03 - 0.05	0.1
Crankshaft, cylinder block		
Crankshaft		
End play	0.05 - 0.25	0.4
Journal section oil clearance	0.03 - 0.04	0.1
Cylinder block		
Upper surface strain	0.05	0.1
Upper surface grinding limit (in combination with combined cylinder head)	-	0.2
Cylinder bore	85.0	-
Cylindricity	0.01 or less	-
Clearance between piston and cylinder	0.02 - 0.04	-
Turbocharger		
Waste gate actuator operation pressure	100 kPa	-
Alternator		
Alternator		
Rotor coil resistance Ω	3 - 5	-
Brush protrusion length	-	2
Starter motor		
Starter motor		
Deviation on commutator periphery	0.05	0.1
Commutator outer diameter	29.4	28.8
Undercut depth	0.5	0.2

MACHINING STANDARDS

Unit: mm

Items	Standard value	Limited value
Cylinder head, valve		
Cylinder head		
Oversize valve guide hole diameter		
0.05 O.S.	12.05 - 12.07	-
0.25 O.S.	12.25 - 12.27	-
0.50 O.S.	12.50 - 12.52	-
Oversize valve seat hole diameter		
Intake		
0.3 O.S.	35.30 - 35.33	-
0.6 O.S.	35.60 - 35.63	-
Exhaust		
0.3 O.S.	33.30 - 33.33	-
0.6 O.S.	33.60 - 33.63	-

TIGHTENING TORQUE

Items	Tightening torque N·m
Alternator, ignition system	
Oil level gauge guide bolt	13 ± 1
Water pump pulley bolt	8.8 ± 1.0
Alternator brace bolt (flange)	23 ± 3
Alternator brace bolt (washer)	22 ± 4
Alternator nut	44 ± 10
Crankshaft pulley bolt	25 ± 4
Center cover bolt	3 ± 0.5
Ignition coil bolt	10 ± 2
Spark plug	25 ± 5
Connector bracket bolt	8.8 ± 1.0
Timing belt	
Timing belt cover bolt (flange)	11 ± 1
Timing belt cover bolt (washer)	9 ± 1
Power steering pump bracket bolt	49 ± 9
Tensioner pulley bolt	49 ± 6
Tensioner arm bolt	21 ± 4
Auto tensioner bolt	23 ± 3
Idler pulley bolt	35 ± 6
Crank angle sensor bolt	8.8 ± 1.0
Oil pump sprocket nut	54 ± 5
Crankshaft bolt	162 ± 5
Tensioner B bolt	19 ± 3
Counter balance shaft sprocket bolt	46 ± 3
Rocker cover bolt	3.5 ± 0.5
Engine support bracket bolt	49 ± 5

Items	Tightening torque N·m
Camshaft sprocket bolt	88 ± 10
Fuel system	
Throttle body bolt	19 ± 3
EGR valve bolt	20 ± 2
Fuel pressure regulator bolt	8.8 ± 2.0
Delivery pipe and injector bolt	11 ± 1
Vacuum hose and pipe bolt	11 ± 1
Solenoid assembly bolt	9 ± 1
Vacuum tank bracket bolt	9 ± 1
Secondary air system, intake manifold	
Exhaust manifold heat protector bolt	14 ± 1
Vacuum hose and pipe bolt	11 ± 1
Air pipe assembly bolt (eye bolt)	49 ± 5
Air pipe assembly bolt (M6 flange)	11 ± 1
Air pipe assembly bolt (M8 flange)	24 ± 3
Air pipe assembly bolt (M8 washer)	14 ± 1
Air control valve assembly bolt	22 ± 4
Air control valve bracket bolt	22 ± 4
MDP sensor bolt	5 ± 1
Intake manifold stay bolt	31 ± 3
Intake manifold bolt (M8)	20 ± 2
Intake manifold bolt nut (M8)	36 ± 6
Exhaust manifold	
Engine hanger bolt	19 ± 3
Turbocharger heat protector bolt	14 ± 1
O ₂ sensor	44 ± 5
Exhaust fitting bracket bolt	47 ± 6
Exhaust fitting bolt nut	59 ± 5
Air outlet fitting bolt	19 ± 1
Oil return pipe bolt (flange)	14 ± 1
Oil return pipe bolt (washer)	9 ± 1
Turbocharger assembly and pipe bolt, nut	59 ± 5
Oil pipe bolt (M10 eye bolt)	17 ± 2
Oil pipe bolt (M12 eye bolt)	31 ± 2
Oil pipe bolt (M12 flange)	11 ± 1
Water pipe bolt (flange)	10 ± 1
Water pipe bolt (eye bolt)	42 ± 7
Exhaust manifold nut (M8)	33 ± 6
Exhaust manifold nut (M10)	55 ± 10
Water pump, water hose	
Engine coolant temperature sensor	29 ± 10
Engine coolant temperature gauge unit	10.8 ± 1.0

Items	Tightening torque N·m
Water outlet fitting bolt	10 ± 1
Thermostat housing bolt	23 ± 4
Water inlet pipe bolt (M6)	10 ± 1
Water inlet pipe bolt (M8)	13 ± 2
Water pump bolt	14 ± 1
Knock sensor	23 ± 2
Rocker arm, camshaft	
Cam position sensor bolt	8.8 ± 1.0
Cover bolt	10 ± 2
Cam position sensing cylinder bolt	22 ± 4
Cam position sensor support bolt	14 ± 1
Bearing cap bolt	20 ± 1
Oil delivery body bolt	11 ± 1
Cylinder head, valve	
Cylinder head bolt	78 ± 2 → Completely loosen → 20 ± 2 → 90° + 90°
Oil pump, oil pan	
Drain plug	39 ± 5
Oil pan bolt	9 ± 3
Oil screen bolt	19 ± 3
Baffle plate bolt	22 ± 4
Oil pressure switch	19 ± 3
Oil cooler bypass valve	54 ± 5
Relief plug	44 ± 5
Oil filter bracket bolt	19 ± 3
Plug cap	23 ± 3
Flange bolt	36 ± 3
Oil pump case bolt	23 ± 3
Oil pump cover bolt	17 ± 1
Oil pump cover screw	10 ± 2
Piston, connecting rod	
Connecting rod cap nut	20 ± 2 + 90° - 94°
Crankshaft, cylinder block	
Flywheel bolt	132 ± 5
Rear plate bolt	11 ± 1
Bell housing cover bolt	9 ± 1
Rear oil seal case bolt	11 ± 1
Beam bearing cap bolt	25 ± 2 + 90° - 100°
Check valve	32 ± 2
Throttle body	
Throttle position sensor bolt	2.0 ± 0.5
Turbocharger	
Waste gate actuator bolt	11.3 ± 1.5

SEALANTS

Item	Specified sealant	Quantity
Engine support bracket bolt	3M™ AAD Part No. 8672 or equivalent	As required
Semi-circular packing	3M™ AAD Part No. 8672 or equivalent	As required
Rocker cover	3M™ AAD Part No. 8672 or equivalent	As required
Water outlet fitting	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Engine coolant temperature gauge unit	3M™ AAD Part No. 8672 or equivalent	As required
Engine coolant temperature sensor	3M™ AAD Part No. 8672 or equivalent	As required
Cylinder head (camshaft bearing cap mounting section)	3M™ AAD Part No. 8672 or equivalent	As required
Cam position sensor support	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Oil pressure switch	3M™ AAD Part No. 8672 or equivalent	As required
Oil pan	Mitsubishi Genuine Part No. MD970389 or equivalent	As required
Oil seal case	Mitsubishi Genuine Part No. MD970389 or equivalent	As required

FORM-IN-PLACE-GASKET

FIPG is used for several members of this engine. With this gasket, caution is required to the application amount, application procedure and state of the application surface so that the performance is sufficiently attained.

If sufficient gasket is not applied, leaks could occur, and if too much is applied, the gasket could protrude and plug or restrict the oil and water flow passage. Thus, to prevent leaks from the joined sections, it is absolutely necessary to evenly apply the correct amount.

The FIPG used for the engine parts reacts with moisture in the air and hardens so use it for the normal metal flange parts.

DISASSEMBLY

The parts assembled with FIPG can be easily disassembled without special means. However, in some cases, the sealant on the seams must be broken by lightly tapping with a wood hammer or similar tool. A smooth and thin gasket scraper can be lightly tapped into the seams but in this case, take care not to damage the seams.

The special tool oil pan remover (MD998727) is set for this purpose.

WASHING THE GASKET SURFACE

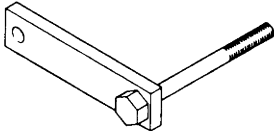
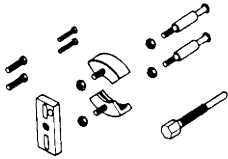
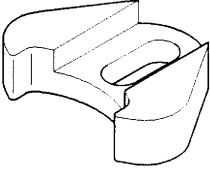
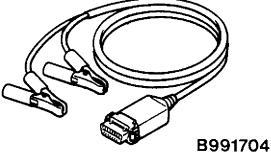
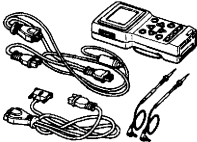
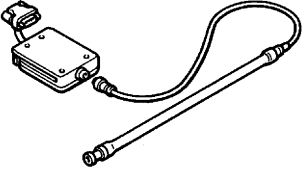
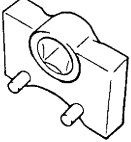
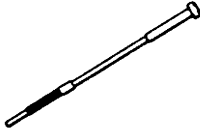
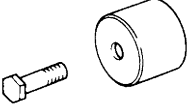
Completely remove all matters adhered on the gasket surfaces with a gasket scraper or wire brush. Confirm that the FIPG application surface is smooth. There must be no grease or foreign matter on the gasket surface.

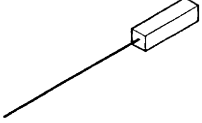
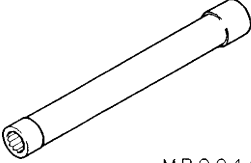
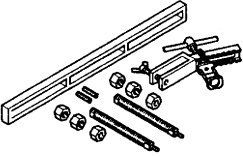
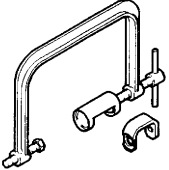
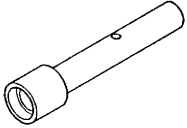
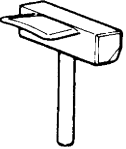

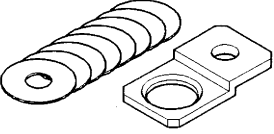
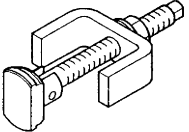
Always remove the old FIPG that has entered the mounting holes and screw holes.

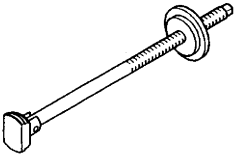
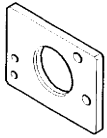
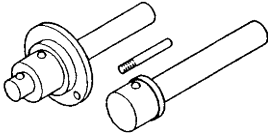
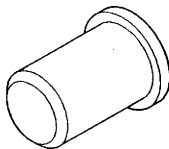
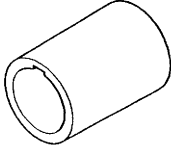
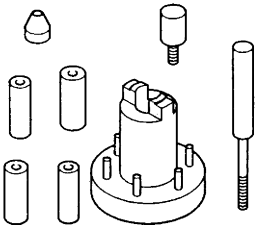
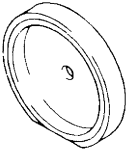
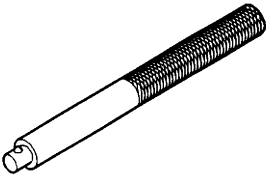
APPLICATION PROCEDURES

Apply an even coat of FIPG within the predetermined radius. Completely cover the areas around the mounting holes. The FIPG can be wiped off if it has not hardened. Install at the set position while the FIPG is still wet (within 15 minutes). When installing, make sure that the FIPG does not get on areas other than the required areas. After installing, do not subject the application areas to oil or water or start the engine until the FIPG has sufficiently hardened (approx. one hour). The FIPG application procedures differ according to the member, so follow the procedures given in this manual and apply the FIPG.

SPECIAL TOOLS

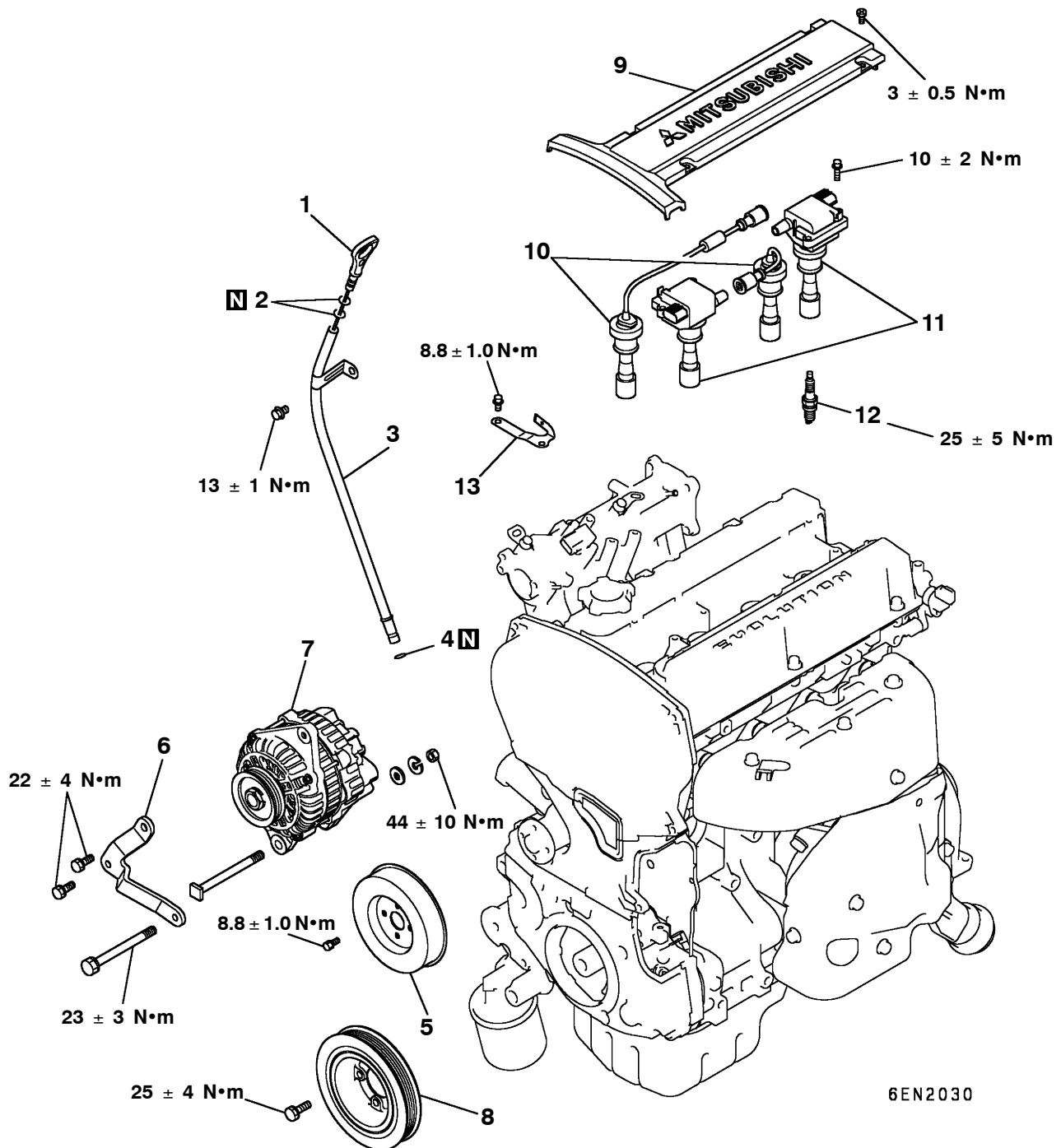
Tool	Number	Name	Use
	MD998781	Flywheel stopper	Fixing of flywheel
	MD998778	Crankshaft sprocket	Removal of crankshaft sprocket and crankshaft sprocket B
	MB998785	Sprocket stopper	Holding of counter balance shaft sprocket
 B991704	MB991704	Battery harness	Measurement of timing belt B tension (Use together with MUT-II.)
	MB991502	MUT-II sub assembly	Measurement of timing belt B tension (Use together with MB991704 and MB991668.)
	MB991668	Belt tension meter set	Measurement of timing belt B tension (Use together with MUT-II.)
	MD998767	Tension pulley socket wrench	Operation of tensioner pulley during adjustment of timing belt tension
	MD998738	Set screw	Holding of tensioner arm and auto tensioner during installation of timing belt
	MD998713	Camshaft oil seal installer	Installation of camshaft oil seal

Tool	Number	Name	Use
	MD998442	Air bleed wire	Bleeding of lash adjuster
 <p>MB991654</p>	MB991654	Cylinder head bolt wrench	Loosening/tightening of cylinder head bolt
	MD998772	Valve spring compressor	Compression of valve spring
	MD998735	Valve spring compressor	Compression of valve spring
	MD998737	Valve stem seal installer	Installation of valve stem seal
	MD998727	Oil pan remover	Removal of oil pan
	MD998162	Plug wrench	Removal and installation of front case plug cap (Use together with MD998783.)
	MD998783	Plug wrench retainer	Removal and installation of front case plug cap (Use together with MD998162.)
	MD998371	Silent shaft bearing puller	Removal of counter balance shaft front bearing

Tool	Number	Name	Use
	MD998372	Silent shaft bearing puller	Removal of counter balance shaft rear bearing
	MB991603	Silent shaft bearing installer stopper	Guide stopper when removing/pressing in counter balance shaft rear bearing
	MD998705	Silent shaft bearing installer	Press in of counter balance shaft front and rear bearings
	MD998375	Crankshaft front oil seal installer	Installation of crankshaft front oil seal
	MD998285	Crankshaft front oil seal guide	Guide for installation of crankshaft front oil seal
	MD998780	Piston pin setting tool	Removal/press in of piston pin
	MD998776	Crankshaft rear oil seal installer	Installation of crankshaft rear oil seal
	MD990938	Handle	Installation of crankshaft rear oil seal (Use together with MD998776.)

ALTERNATOR AND IGNITION SYSTEM

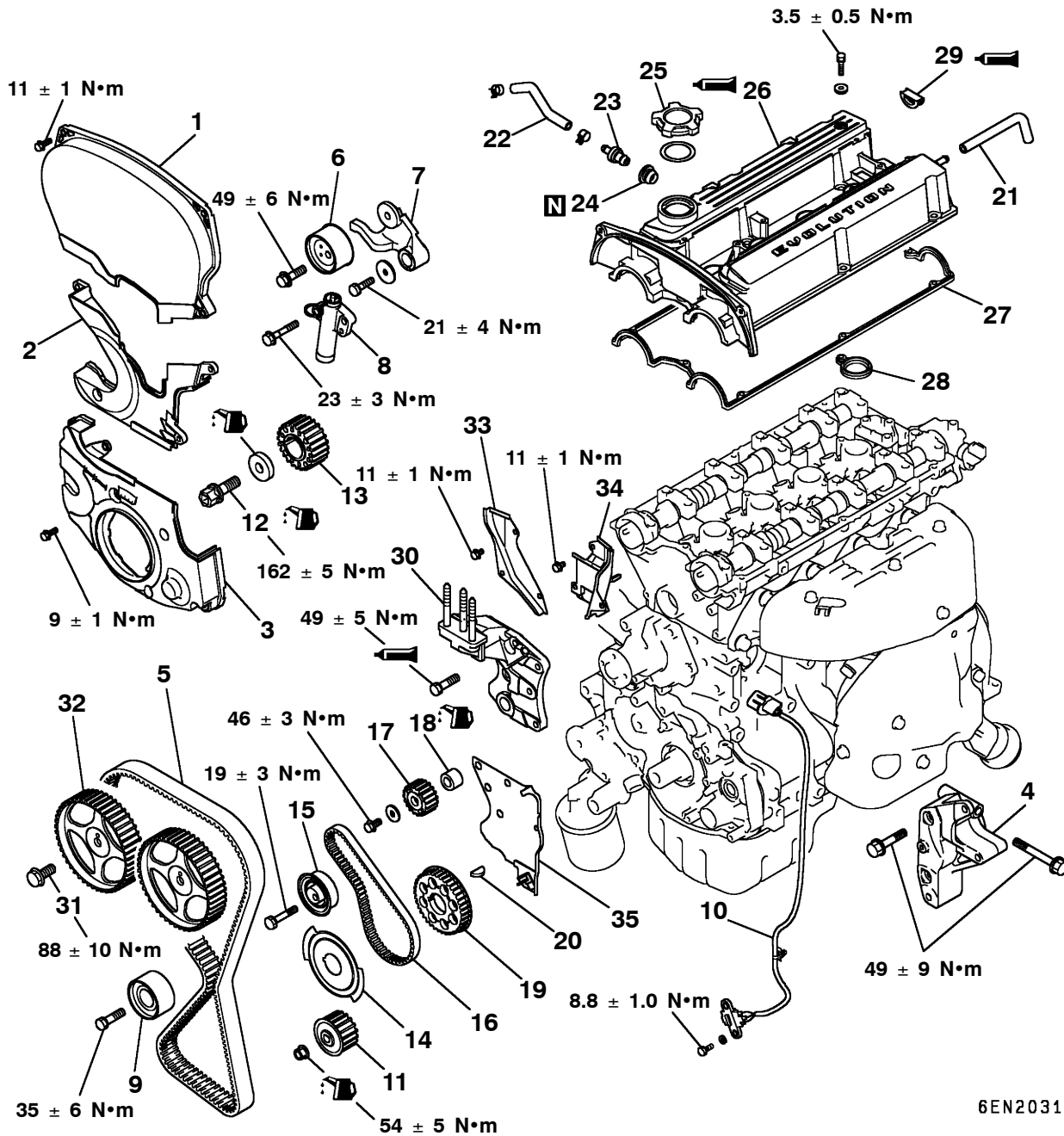
REMOVAL AND INSTALLATION

**Removal steps**

- | | |
|--------------------------|-----------------------|
| 1. Oil level gauge | 8. Crankshaft pulley |
| 2. O-ring | 9. Center cover |
| 3. Oil level gauge guide | 10. Spark plug cable |
| 4. O-ring | 11. Ignition coil |
| 5. Water pump pulley | 12. Spark plug |
| 6. Alternator brace | 13. Connector bracket |
| 7. Alternator | |

TIMING BELT

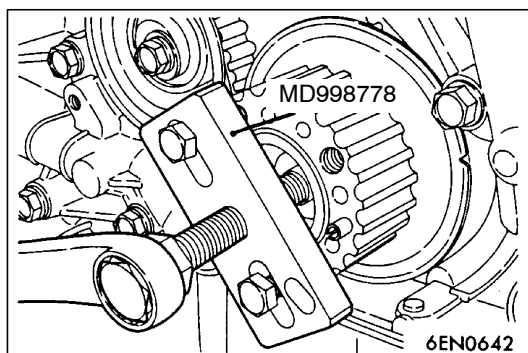
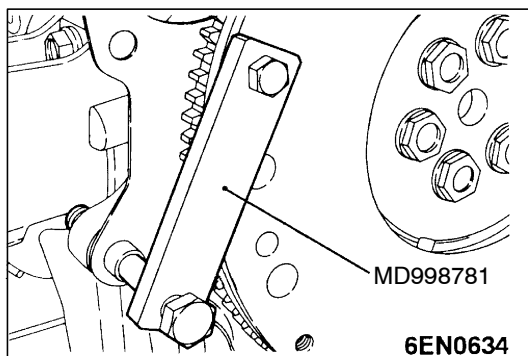
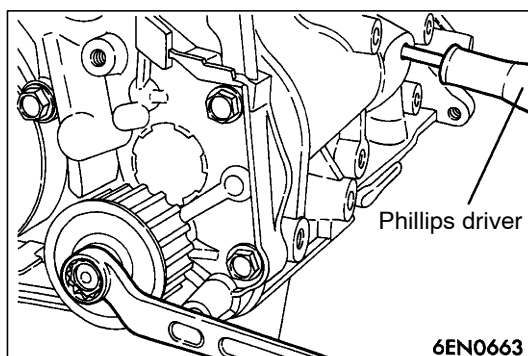
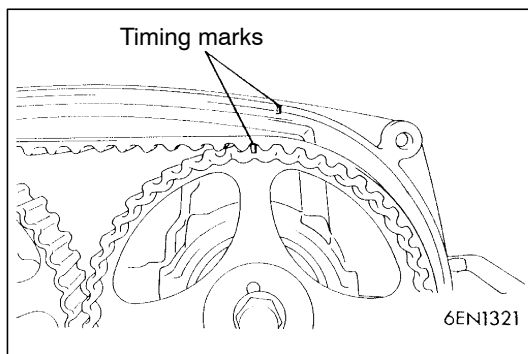
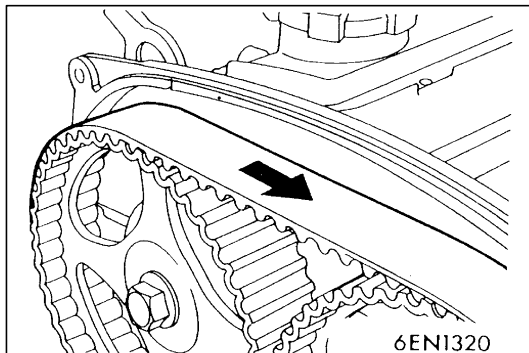
REMOVAL AND INSTALLATION



6EN2031

Removal steps

- | | | | | | | |
|-----|-----|------------------------------------|-----|-----|--|---------------------------------------|
| | | 1. Timing belt front upper cover | | | | 19. Crankshaft sprocket B |
| | | 2. Timing belt front center cover | | | | 20. Crankshaft key |
| | | 3. Timing belt front lower cover | | | | 21. Breather hose |
| | | 4. Power steering pump bracket | | | | 22. PCV hose |
| ◀A▶ | ▶M▶ | 5. Timing belt | ◀G▶ | ▶E▶ | | 23. PCV valve |
| | ▶L▶ | 6. Tensioner pulley | | | | 24. PCV valve gasket |
| | ▶K▶ | 7. Tensioner arm | | | | 25. Oil filler cap |
| | | 8. Auto tensioner | | | | 26. Rocker cover |
| | | 9. Idler pulley | | | | 27. Rocker cover gasket A |
| | | 10. Crank angle sensor | | | | 28. Rocker cover gasket B |
| ◀B▶ | ▶J▶ | 11. Oil pump sprocket | | | | 29. Semi-circular packing |
| ◀C▶ | ▶I▶ | 12. Crankshaft bolt | | | | 30. Engine support bracket |
| ◀D▶ | ▶I▶ | 13. Crankshaft sprocket | | | | 31. Camshaft sprocket bolt |
| | ▶I▶ | 14. Crankshaft sensing blade | ◀H▶ | ▶A▶ | | 32. Camshaft sprocket |
| | | 15. Tensioner B | | | | 33. Timing belt rear right cover |
| ◀E▶ | ▶H▶ | 16. Timing belt B | | | | 34. Timing belt rear left upper cover |
| ◀F▶ | ▶G▶ | 17. Counter balance shaft sprocket | | | | 35. Timing belt rear left lower cover |
| | ▶F▶ | 18. Spacer | | | | |



REMOVAL SERVICE POINTS

◀▶ TIMING BELT REMOVAL

1. To ensure that the timing belt is assembled in the same direction when reused, using chalk, etc., make an arrow showing the rotation direction on the back surface of the timing belt.
2. Position the exhaust camshaft sprocket's timing mark by approx. one tooth before the No. 1 cylinder compression top dead centre.

Caution

When removed at the compression top dead centre, since the exhaust camshaft is at the position pressing down on the valve, the sprocket could rotate in reverse due to the force of the valve spring creating a hazardous situation.

3. Loosen the lock nut for the tensioner pulley, and remove the timing belt.

◀▶ OIL PUMP SPROCKET REMOVAL

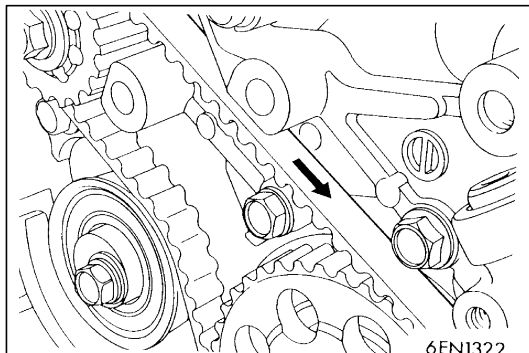
1. Remove the plug on the left side of the cylinder block.
2. Insert a Phillips driver (shaft diameter 8 mm) to stop the counter balance shaft left from rotating.
3. Loosen the flange bolt.
4. Remove the oil pump sprocket.

◀▶ CRANKSHAFT BOLT REMOVAL

1. Fix the flywheel with the special tool.
2. Remove the crankshaft bolt.

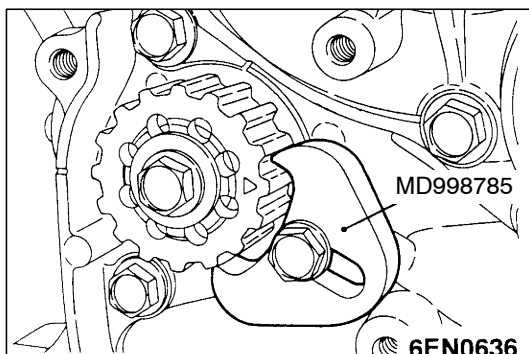
◀▶ CRANKSHAFT SPROCKET REMOVAL

Use the special tool to remove the sprocket if it is stuck and hard to remove.



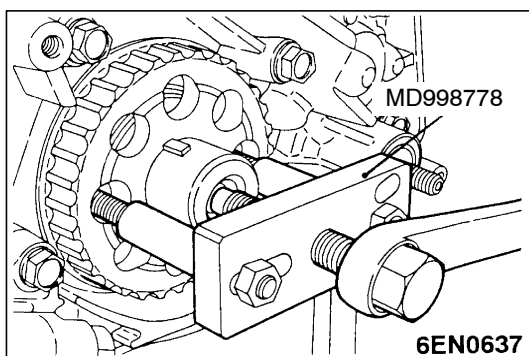
◀E▶ TIMING BELT B REMOVAL

To ensure that the timing belt is assembled in the same direction when reused, using chalk, etc., make an arrow showing the rotation direction on the back surface of the timing belt.



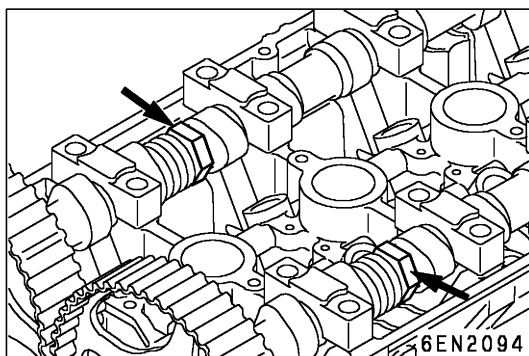
◀F▶ COUNTER BALANCE SHAFT SPROCKET REMOVAL

1. Fix the counter balance shaft sprocket with the special tool.
2. Remove the installation bolt of the counter balance shaft.



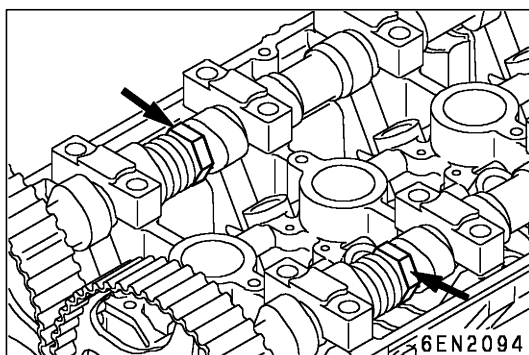
◀G▶ CRANKSHAFT SPROCKET B REMOVAL

Use the special tool to remove the sprocket if it is stuck and hard to remove.



◀H▶ CAMSHAFT SPROCKET BOLT REMOVAL

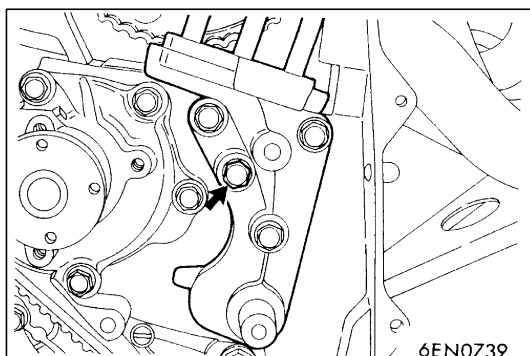
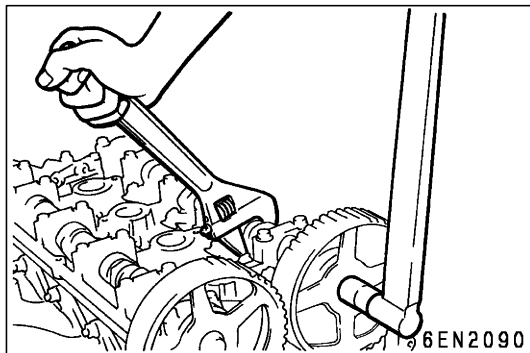
Hold the hexagon part of the camshaft with a wrench, and remove the camshaft sprocket bolt.



INSTALLATION SERVICE POINTS

▶A◀ CAMSHAFT SPROCKET BOLT INSTALLATION

Hold the hexagon part of the camshaft with a wrench, and tighten the camshaft sprocket bolt at the specified torque $88 \pm 10 \text{ N}\cdot\text{m}$.

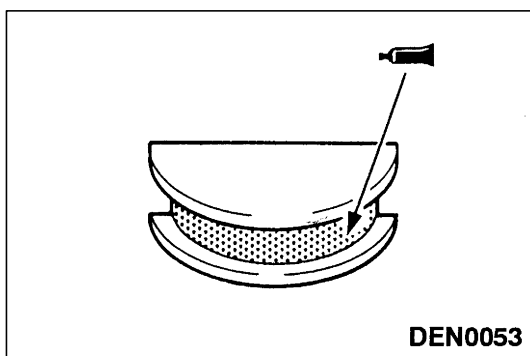


►B◄ ENGINE SUPPORT BRACKET INSTALLATION

Before tightening, apply sealant on the bolt at the position shown in the illustration.

Sealant

Specified sealant:
3M™ AAD Part No. 8672 or equivalent

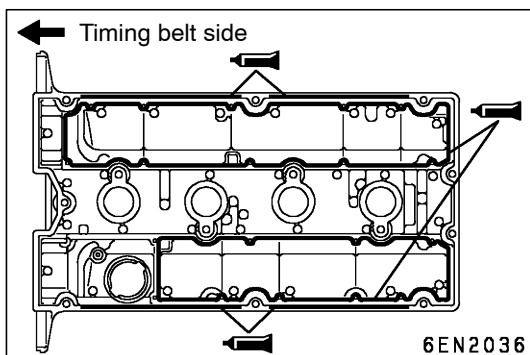
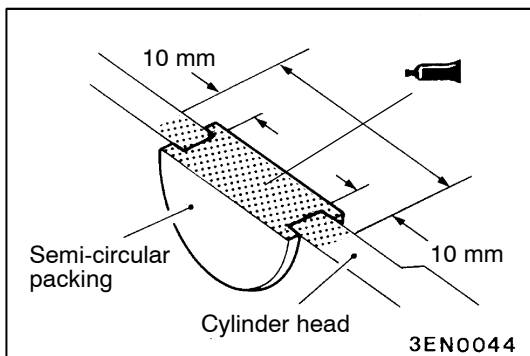


►C◄ SEMI-CIRCULAR PACKING INSTALLATION

Apply sealant at the position shown in the illustration.

Sealant

Specified sealant:
3M™ AAD Part No. 8672 or equivalent



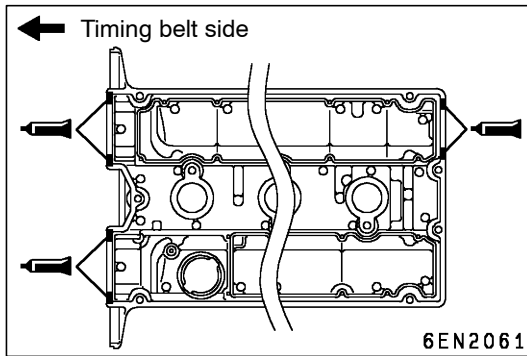
►D◄ ROCKER COVER/ROCKER COVER GASKET A INSTALLATION

1. Apply form-in-place gasket on the rocker cover at the position shown in the illustration.

Sealant

Specified sealant:
3M™ AAD Part No. 8672 or equivalent

2. Install the rocker cover gasket A onto the rocker cover before the form-in-place gasket hardens.



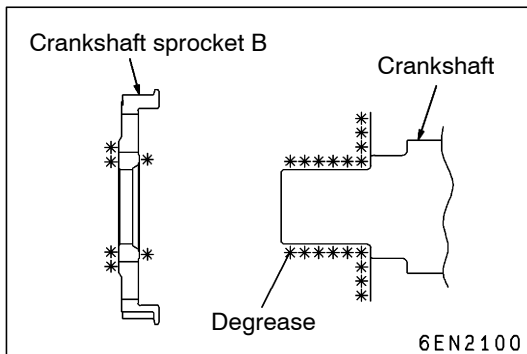
3. Apply form-in-place gasket on the rocker cover at the position shown in the illustration.

Sealant

Specified sealant:

3M™ AAD Part No. 8672 or equivalent

4. Install the rocker cover onto the cylinder head before the form-in-place gasket hardens.

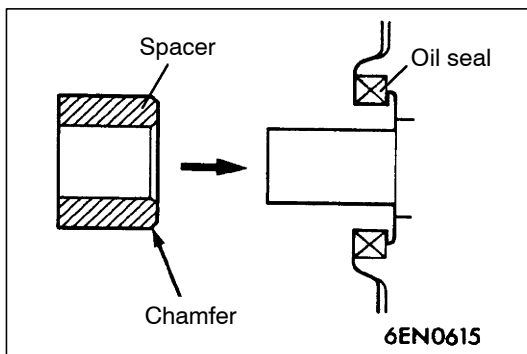


►E◄ CRANKSHAFT SPROCKET B INSTALLATION

Clean the crankshaft sprocket B installation surface before degreasing the crankshaft sprocket B.

NOTE

Always degrease the surface to prevent a drop in the frictional coefficient at the pressing section caused by the adherence of oil.

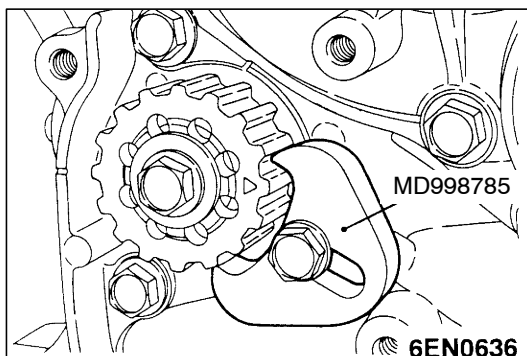


►F◄ SPACER INSTALLATION

1. Apply a slight amount of oil on the outer periphery of the spacer (oil seal contact section).
2. Insert the spacer from the chamfered side as shown in the illustration.

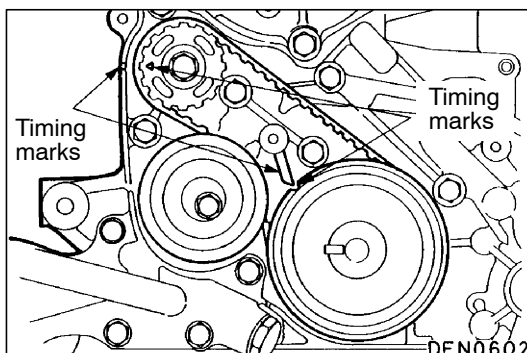
Caution

Reversed insertion of the spacer can cause damage to the oil seal lip.



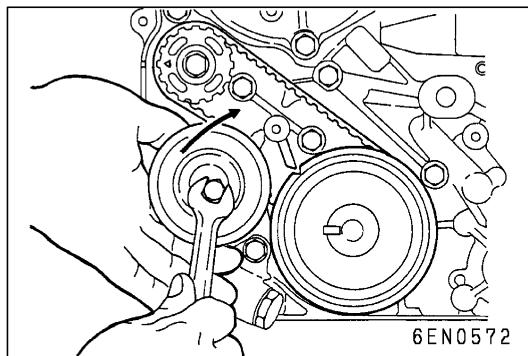
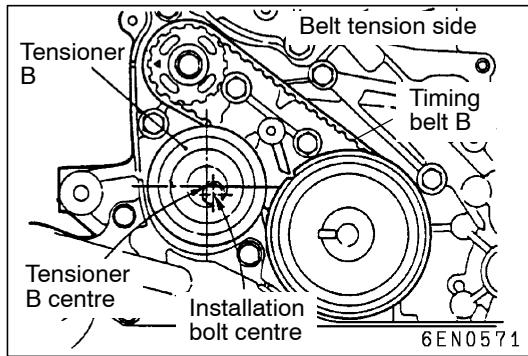
►G◄ COUNTER BALANCE SHAFT SPROCKET INSTALLATION

1. Fix the counter balance shaft sprocket with the special tool.
2. Tighten the counter balance shaft sprocket installation bolt at the specified torque $46 \pm 3 \text{ N}\cdot\text{m}$.



►H◄ TIMING BELT B INSTALLATION

1. Align the crankshaft sprocket B and counter balance shaft sprocket timing marks with the timing mark on the oil pump case.
2. Attach the timing belt B to the crankshaft sprocket B and counter balance shaft sprocket.
Do not loosen the belt tension too much at this time.



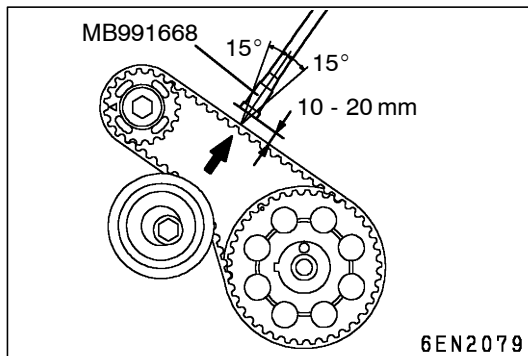
3. Confirm that the tensioner B centre and bolt centre are positioned as shown in the illustration.

4. Apply tension on the timing belt by lifting tensioner B in the direction of the arrow with a finger, and tension the tension side until it is "tight". Fix tensioner B in this state by tightening the bolt.

NOTE

Make sure that the tensioner B shaft does not rotate when tightening the bolt. If the shaft rotates, the timing belt becomes too tense.

5. Connect the special tool (MB991704) to MUT-II and the battery.
6. Connect the special tool (MB991668) to MUT-II.
7. Rotate the crankshaft clockwise two turns, and align each timing mark.
8. Select "Belt Tension Measurement" from the MUT-II menu screen.



9. Separate the special tool (MB991668) 10 to 20 mm from the centre back between the sprockets (shown with an arrow), and hold so that it is vertical (inclination within $\pm 15^\circ$) in respect to the belt.
10. Lightly tap the section shown with an arrow with fingers, and measure the belt vibration frequency. If the results are deviated from the standard value, loosen the bolt, tension the belt again, and then measure the vibration frequency again. Repeat this step until the standard value is attained. Tighten the bolt when the standard value is attained.

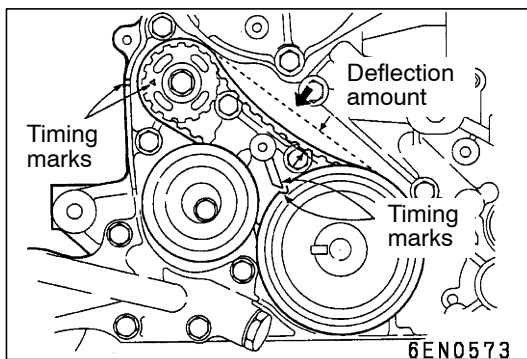
Standard value:

Item	When check	When adjusted	When replaced
Vibration frequency Hz	52 - 92	76 - 92	76 - 92
Deflection (Reference value) mm	5 - 10	5 - 7	5 - 7

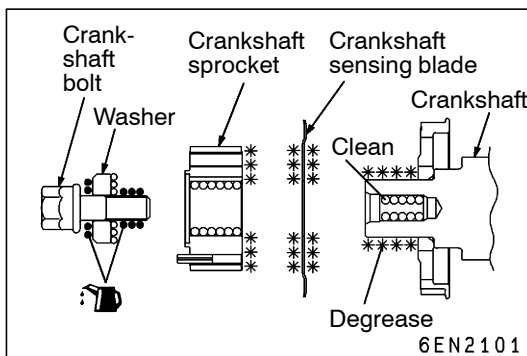
Caution

- (1) Measure when the belt's surface temperature is close to room temperature.
- (2) Make sure that water or oil, etc., do not get on the mike.
- (3) If strong winds contact the mike or if noise is generated in the area while measuring, a value that differs from the actual value may be indicated.
- (4) If the measurement is carried out with the mike contacted against the belt, a value that differs from the actual value may be indicated.
- (5) Do not measure while the engine is running.

11. Disconnect MUT-II.

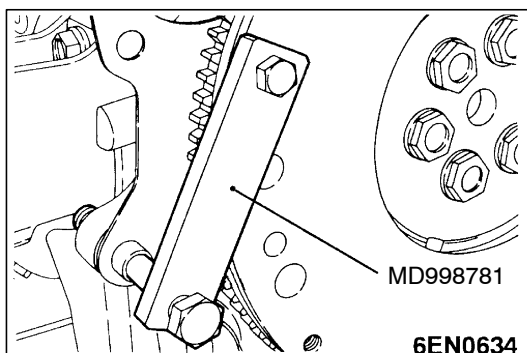


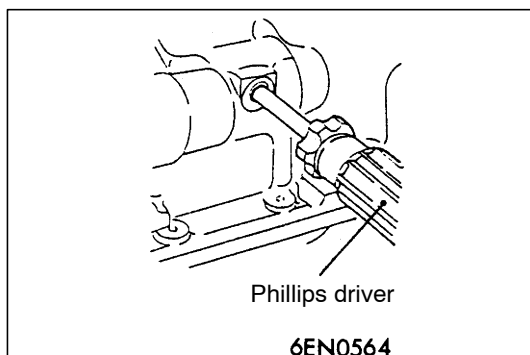
12. When measuring with the deflection amount, press the centre of the tensed side of timing belt B with your index finger in the arrow direction, and confirm that the deflection is between 5 and 7 mm.



▶◀ CRANKSHAFT BOLT/CRANKSHAFT SPROCKET/CRANKSHAFT SENSING BLADE INSTALLATION

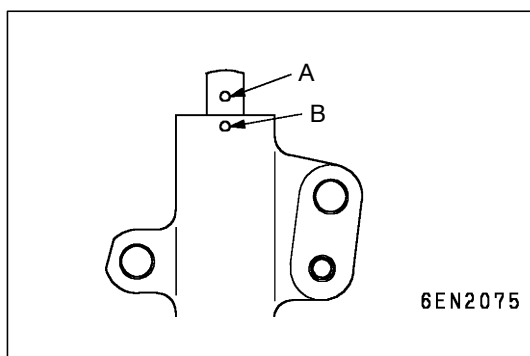
1. Clean and degrease the crankshaft sprocket, crankshaft sprocket installation surface of crankshaft and crankshaft sensing blade, and then install the crankshaft sprocket and crankshaft sensing blade.
2. Clean the crankshaft bolt hole section.
3. Apply the minimum required amount of engine oil on the crankshaft bolt section and upper surface of the washer.
4. Fix the flywheel with the special tool.
5. Tighten the crankshaft bolt at the specified torque $162 \pm 5 \text{ N}\cdot\text{m}$.





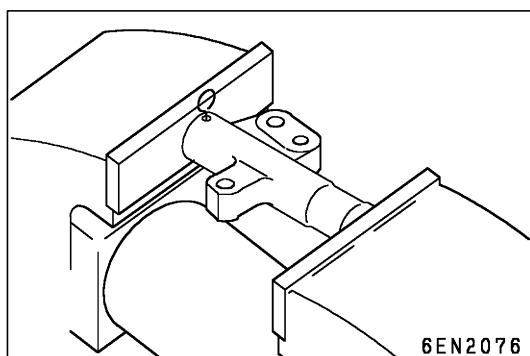
▶J◀ OIL PUMP SPROCKET INSTALLATION

1. Stop the rotation of the counter balance shaft in the same manner as for removal.
2. Install the oil pump sprocket.
3. Apply the minimum required amount of engine oil on the flange nut seat surface.
4. Tighten the flange nut at the specified torque 54 ± 5 N•m.



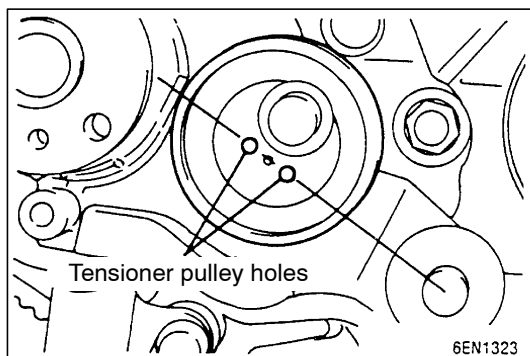
▶K◀ AUTO TENSIONER INSTALLATION

1. If the auto tensioner rod is in the extended state, set it with the following steps.
 - (1) Set the rod of the auto tensioner into a vice so that it is straight and not inclined.
 - (2) Press in the rod gradually with the vice, and align the rod's set hole A with the cylinder's set hole B.



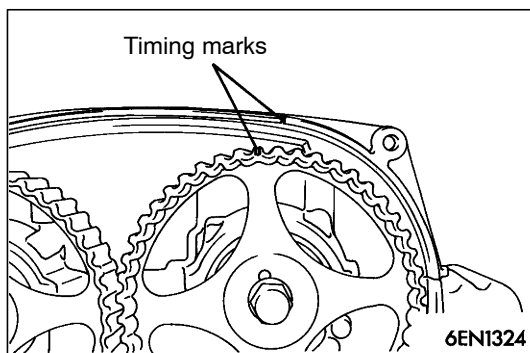
- (3) Insert a wire (diameter 1.4 mm) into the set holes.
- (4) Remove the auto tensioner from the vice.

2. Install the auto tensioner.
Do not remove the wire until the timing belt has been installed.



▶L◀ TENSIONER PULLEY INSTALLATION

Set the tensioner pulley as shown in the illustration.

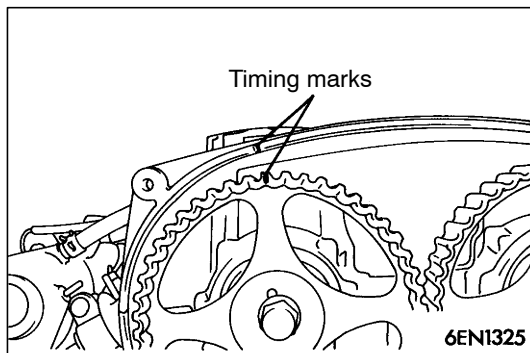


▶M◀ TIMING BELT INSTALLATION

1. Set the timing mark on the exhaust side camshaft sprocket so that it is deviated by one tooth in the counterclockwise direction from the timing mark on the rocker cover.

NOTE

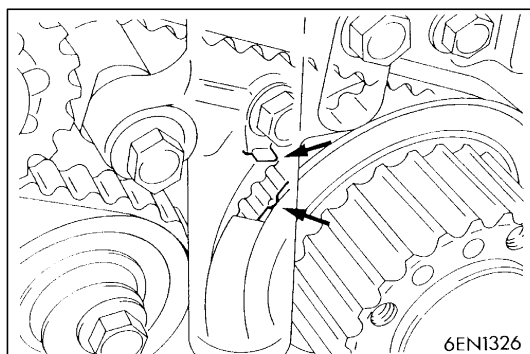
Even if the sprocket and rocker cover timing marks are aligned, the exhaust camshaft will return in the counterclockwise direction by the force of the valve spring and will stabilize at a position deviated by one tooth.



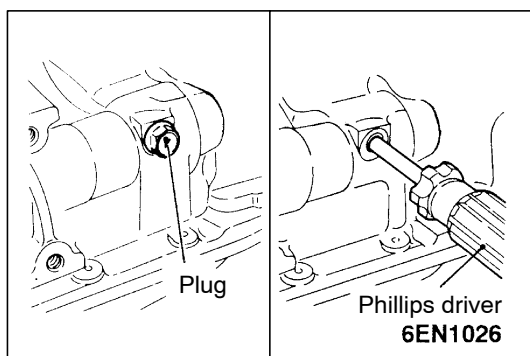
- Align the timing mark of the intake side camshaft sprocket to the timing mark on the rocker cover.

NOTE

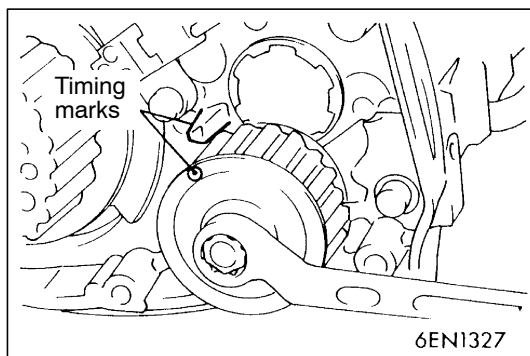
Even when the sprocket and rocker cover timing marks are aligned, the intake camshaft will rotate slightly in the clockwise direction by the force of the valve spring and will stabilize.



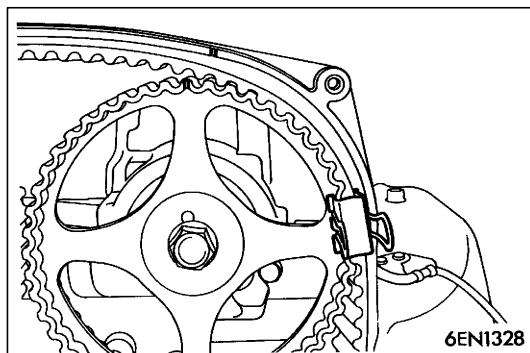
- Shift and set the crankshaft sprocket timing mark by one tooth in the counterclockwise direction in the same manner as the exhaust side camshaft sprocket.



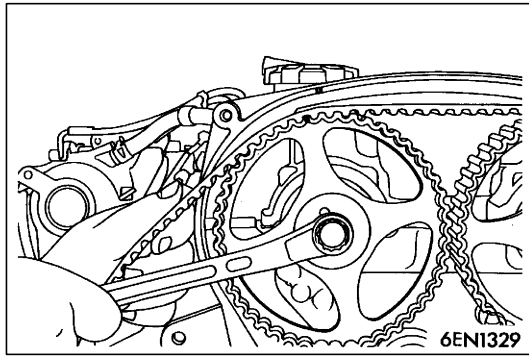
- Align the oil pump sprocket timing marks.
- When aligning the oil pump sprocket timing marks, remove the cylinder block plug, and insert an 8 mm shaft diameter Phillips driver into the plug hole, and confirm that the driver shaft can be inserted by 60 mm or more. Do not remove the Phillips driver until the timing belt has been attached. If the driver shaft contacts the silent shaft and only enters 20 to 25 mm, rotate the sprocket once, align the timing marks again, and then confirm that the Phillips driver can be inserted by 60 mm or more.



- Remove the Phillips driver, and set the oil pump sprocket at a position returned by one tooth in the counterclockwise direction.



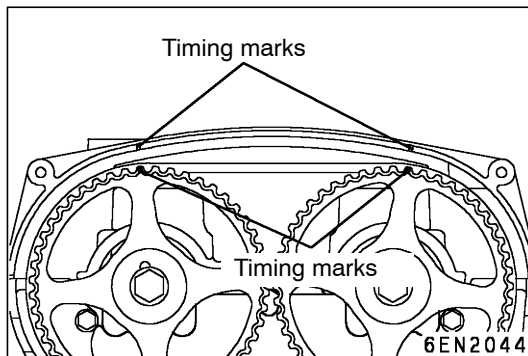
- Attach the timing belt to the exhaust side camshaft sprocket, and fix with a paper clip at the position shown in the illustration.



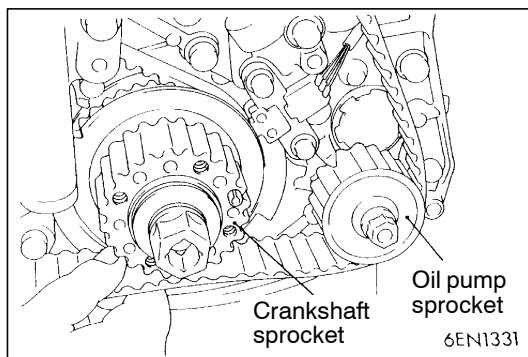
8. Rotate the intake side camshaft sprocket in the counterclockwise direction. Attach the belt at a position where the timing mark is deviated by one tooth in the counterclockwise direction, and then fix with a paper clip.

NOTE

Even if the belt is attached at a position deviated by one tooth, the intake camshaft will rotate slightly in the clockwise direction by the force of the valve spring and will stabilize.



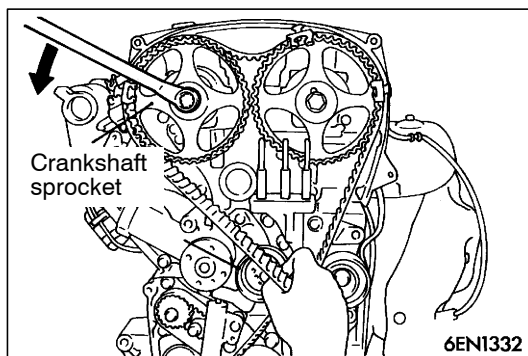
9. Rotate the exhaust side camshaft sprocket in the clockwise direction, and confirm that the intake side camshaft sprocket's timing marks are aligned when the timing marks are aligned.



10. Attach the timing belt in the order of the idler pulley, oil pump sprocket and crankshaft sprocket.

NOTE

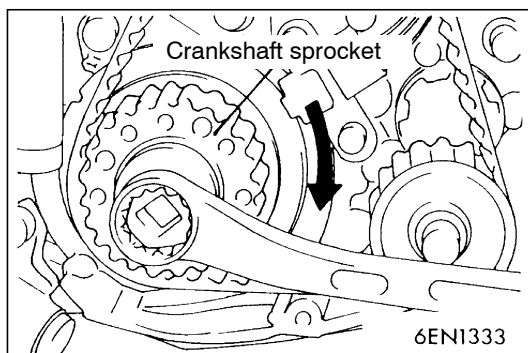
Attach the timing belt so that it is not deflected.



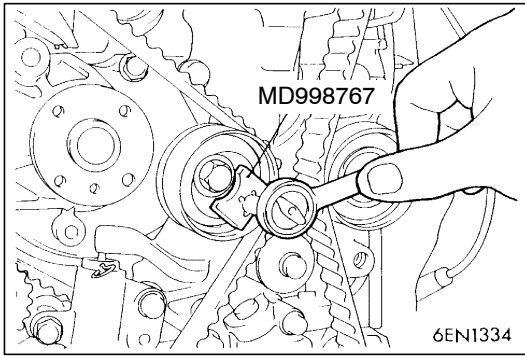
11. Attach the timing belt to the tensioner pulley.

NOTE

The timing belt can be attached easily to the tensioner pulley by rotating the intake side camshaft sprocket slightly in the counterclockwise direction.



12. Rotate the crankshaft sprocket slightly in the clockwise direction, and remove the timing belt deflection on the idler pulley side.
13. Confirm that the timing marks on the crankshaft, oil pump and exhaust camshaft are each deviated by one tooth in the counterclockwise direction.

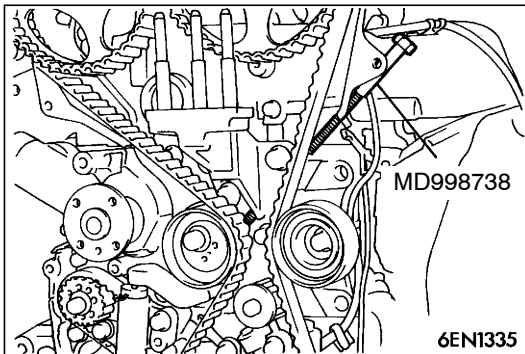


14. Using the special tool, rotate the tensioner pulley in the counterclockwise direction to tense the timing belt, and then fix by temporarily tightening the tensioner fixing bolt.

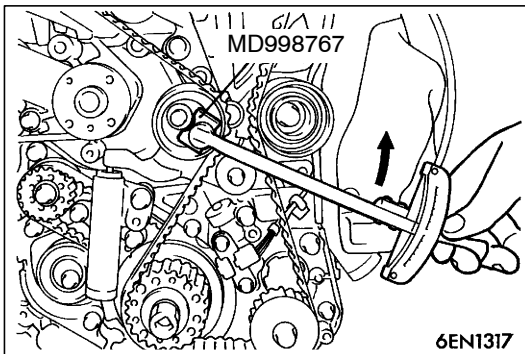
NOTE

Remove the deflection of the timing belt between the intake side and exhaust side camshafts.

15. Rotate the crankshaft in the clockwise direction, and set the timing mark at the No. 1 cylinder compression top dead centre.



16. Set the special tool, and screw it in until the wire inserted when the auto tensioner was installed slightly moves.

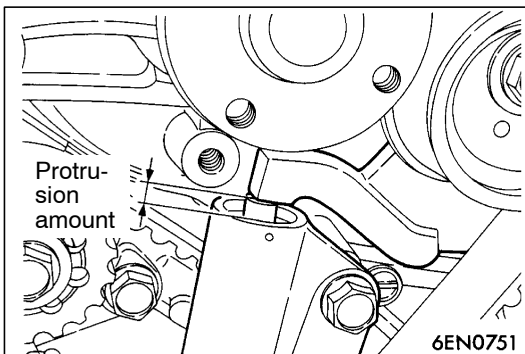


17. Loosen the tensioner pulley fixing bolt.

Caution

The timing belt will loosen at this time due to the rotation of the intake and exhaust camshafts, so make sure that the timing belt does not deviate.

18. Rotate the special tool and torque wrench in the counterclockwise direction to remove the timing belt deflection.
19. From that state, return to the position where the torque wrench scale reads 3.5 N•m, and then tighten the fixing bolt.



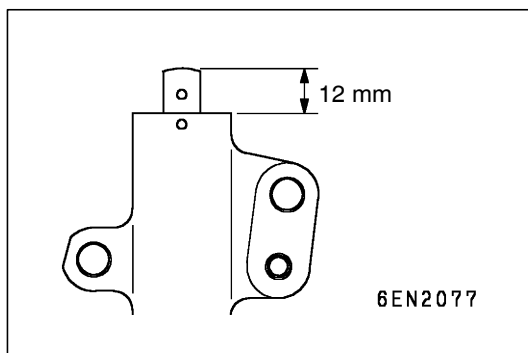
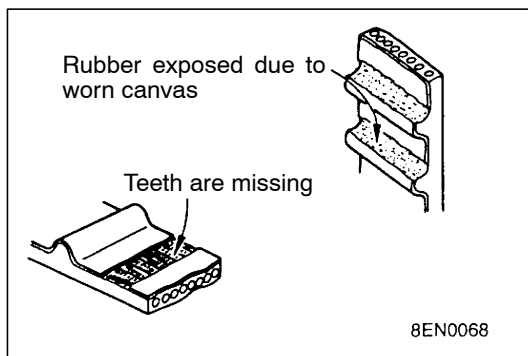
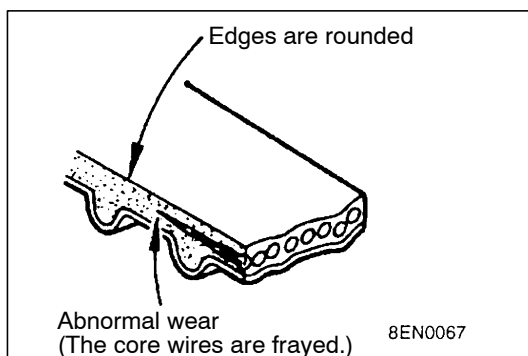
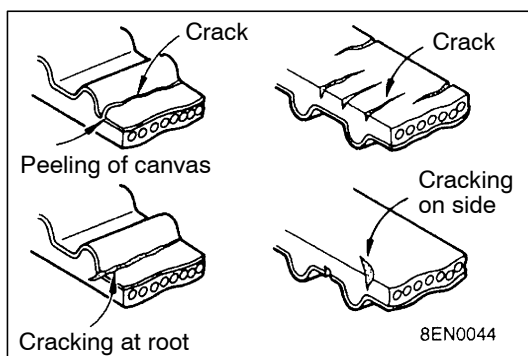
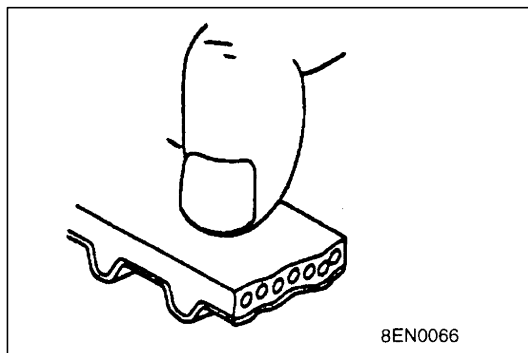
20. Remove the special tool installed in step 16.
21. Rotate the crankshaft two rotations in the clockwise direction, and let stand for approx. 15 minutes.
22. Confirm whether the wire inserted when the auto tensioner was installed can be pulled out easily. If it can be removed easily, the belt tension is appropriate, so remove the wire. If the auto tensioner rod's protrusion amount is at the standard value, the tension is appropriate.

Standard value: 3.8 - 4.5 mm

23. If the wire cannot be pulled out easily, repeat steps 16 to 21, and tense the belt to the appropriate tension.

Caution

When the crankshaft bolt has been rotated in the counterclockwise direction, always check the crankshaft bolt's tightening torque. If loosen, re-tighten.



INSPECTION

1. TIMING BELT

Inspect each section of the belt in detail, and if any of the following type of damage is found, replace the belt with a new part.

- (1) Hardening of backface rubber.
The backface is glossy, marks are not made even when a fingernail is run cross it, and there is no elasticity.
- (2) Cracking of backface rubber.
- (3) Cracking of canvas.
- (4) Cracking at root.
- (5) Cracking on side of belt.

- (6) Abnormal wear on side of belt.

NOTE

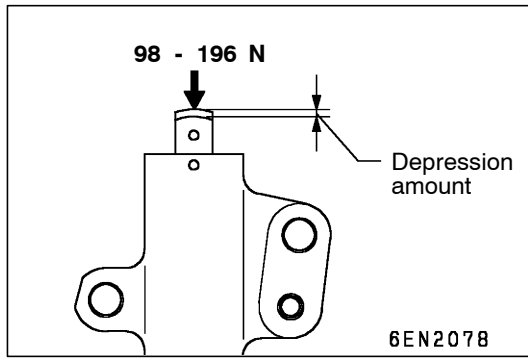
The state is normal if the cutting surface is neat as if cut with a sharp knife.

- (7) Abnormal wear of teeth.
First stages: Canvas is worn (canvas fibres are raised, rubber is removed and whitish, and canvas seams are unclear).
Latter stages: Canvas is worn off, and rubber is exposed (face width is narrow).
- (8) Teeth are missing.

2. AUTO TENSIONER

- (1) Check for oil leaks. If any leaks are found, replace.
- (2) Check whether the rod end is worn or damaged, and replace if necessary.
- (3) Measure the rod protrusion length. If not at the standard value, replace the auto tensioner.

Standard value: 12 mm

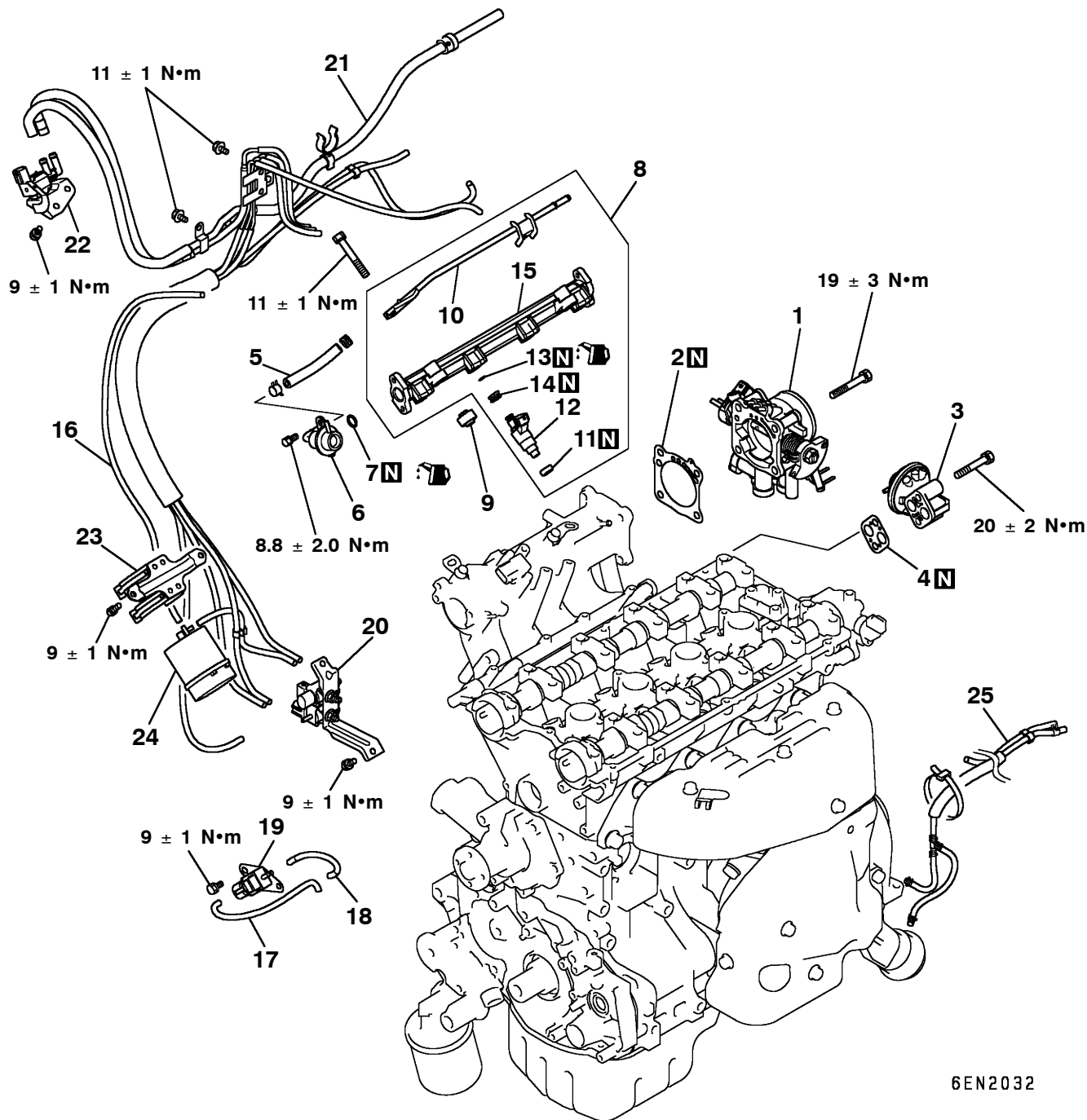


- (4) Measure the depression amount when the rod is pressed with a force of 98 to 196 N. If not at the standard value, replace the auto tensioner.

Standard value: 1 mm or less

FUEL SYSTEM

REMOVAL AND INSTALLATION



6EN2032

Removal steps

- | | | |
|------------|--|---|
| <p>▶C◀</p> | <p>1. Throttle body assembly
2. Throttle body gasket
3. EGR valve
4. EGR gasket</p> | <p>14. Grommet
15. Delivery pipe
16. Vacuum hose
17. Vacuum hose
18. Vacuum hose</p> |
| <p>▶B◀</p> | <p>5. Fuel hose
6. Fuel pressure regulator
7. O-ring
8. Delivery pipe and injector
9. Insulator
10. Fuel return pipe
11. Insulator</p> | <p>19. Solenoid valve assembly
20. Solenoid valve assembly
21. Vacuum hose and pipe
22. Solenoid valve assembly
23. Vacuum tank bracket
24. Vacuum tank</p> |
| <p>▶A◀</p> | <p>12. Injector
13. O-ring</p> | <p>25. Vacuum tank hose assembly</p> |

INSTALLATION SERVICE POINTS**►A◄ INJECTOR INSTALLATION**

1. Apply a small amount of new engine oil on the O-ring.
2. While rotating the injector to the left and right, insert the O-ring into the delivery pipe while taking care not to damage it.

Caution

Make sure that the engine oil does not enter the delivery pipe.

3. Confirm that the injector rotates smoothly. If it does not rotate smoothly, the O-ring may be biting in. Remove the injector, check the O-ring for damage, and then insert it into the delivery pipe. Check the rotation again.

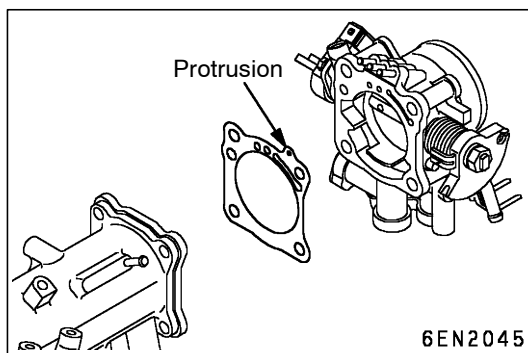
►B◄ FUEL PRESSURE REGULATOR INSTALLATION

1. Apply a small amount of new engine oil on the O-ring.
2. While rotating the fuel pressure regulator to the left and right, insert the O-ring into the delivery pipe while taking care not to damage it.

Caution

Make sure that the engine oil does not enter the delivery pipe.

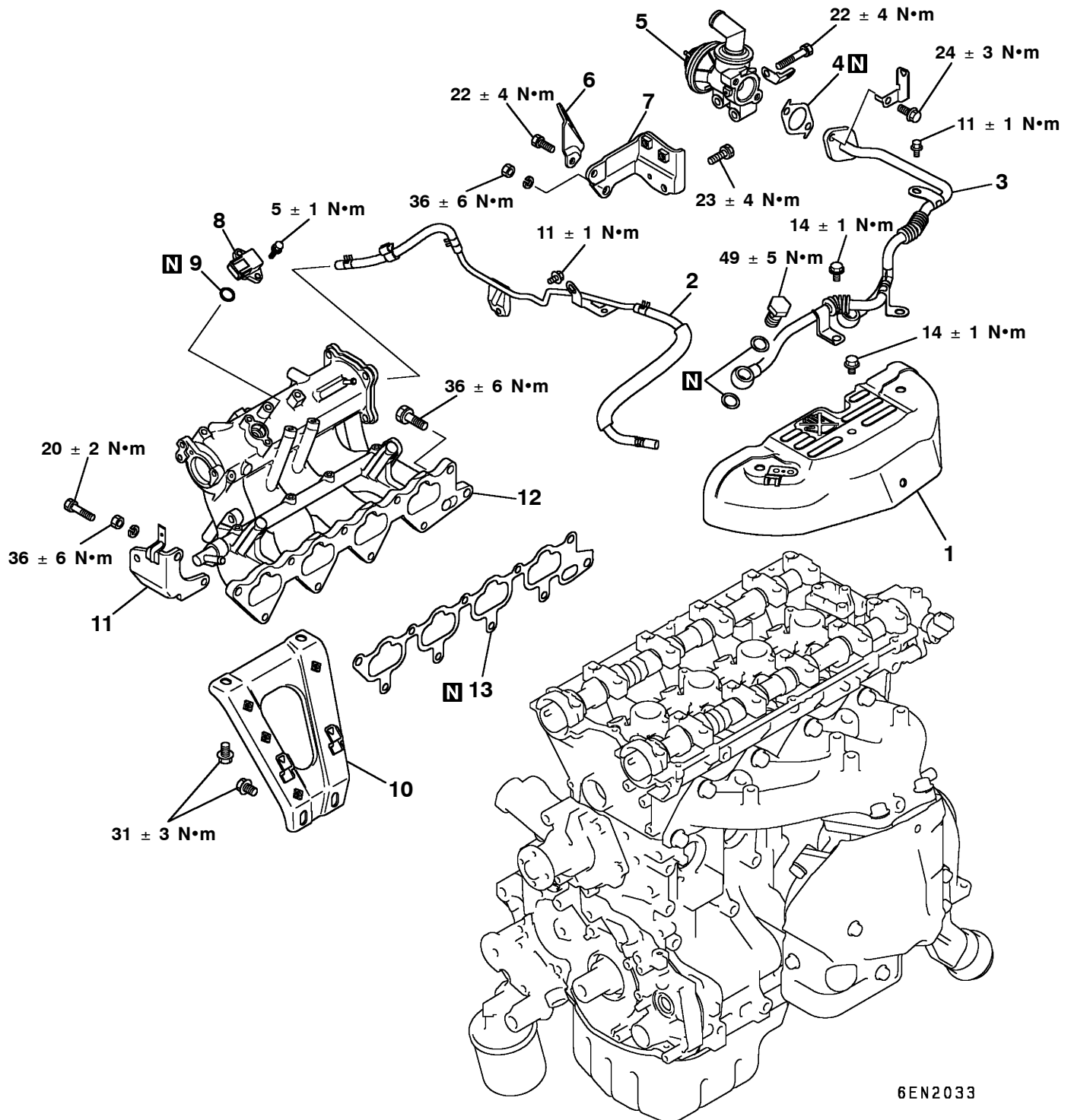
3. Confirm that the fuel pressure regulator rotates smoothly. If it does not rotate smoothly, the O-ring may be biting in. Remove the fuel pressure regulator, check the O-ring for damage, and then insert it into the delivery pipe. Check the rotation again.

**►C◄ THROTTLE BODY GASKET INSTALLATION**

Assembly so that the protrusion on the throttle body gasket is at the position shown in the illustration.

SECONDARY AIR SYSTEM AND INTAKE MANIFOLD

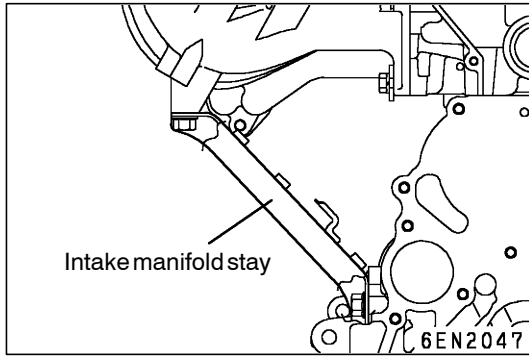
REMOVAL AND INSTALLATION



6EN2033

Removal steps

- | | | | |
|-----|------------------------------------|-----|--|
| | 1. Exhaust manifold heat protector | ►B◄ | 8. Manifold differential pressure (MDP) sensor |
| ►D◄ | 2. Vacuum hose and pipe | | 9. O-ring |
| | 3. Air pipe assembly | ►A◄ | 10. Intake manifold stay |
| | 4. Air control valve gasket | | 11. Alternator brace stay |
| | 5. Air control valve assembly | | 12. Intake manifold |
| ►C◄ | 6. Engine hanger | | 13. Intake manifold gasket |
| | 7. Air control valve bracket | | |



INSTALLATION SERVICE POINTS

▶A◀ INTAKE MANIFOLD STAY INSTALLATION

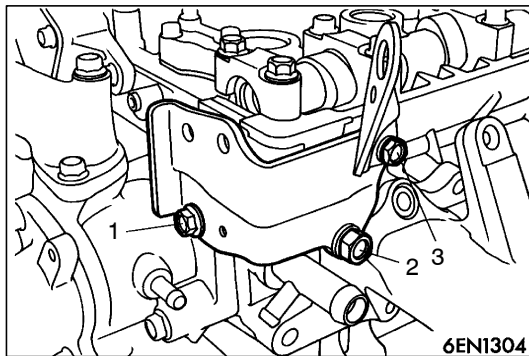
Check that the intake manifold stay is seated against the intake manifold and cylinder block boss, and then tighten at the specified torque $31 \pm 3 \text{ N}\cdot\text{m}$.

▶B◀ MANIFOLD DIFFERENTIAL PRESSURE (MDP) SENSOR INSTALLATION

Caution

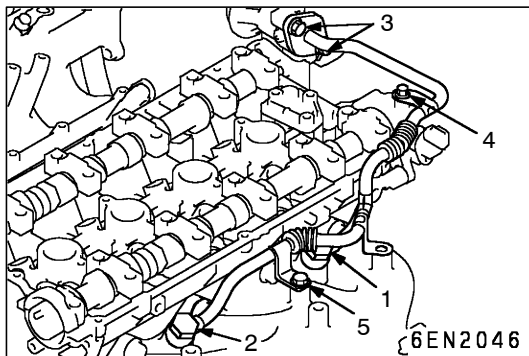
Make sure not to apply impact against the sensor when installing.

Do not use a sensor that has been dropped.



▶C◀ AIR CONTROL VALVE BRACKET INSTALLATION

1. Temporarily tighten the air control valve bracket and engine hanger with the bolt for tightening with the intake manifold.
2. Tighten the bolt 1 shown in the illustration at the specified torque $23 \pm 4 \text{ N}\cdot\text{m}$.
3. Tighten the bolt 2 shown in the illustration at the specified torque $36 \pm 6 \text{ N}\cdot\text{m}$.
4. Tighten the bolt 3 shown in the illustration with the engine hanger at the specified torque $22 \pm 4 \text{ N}\cdot\text{m}$.

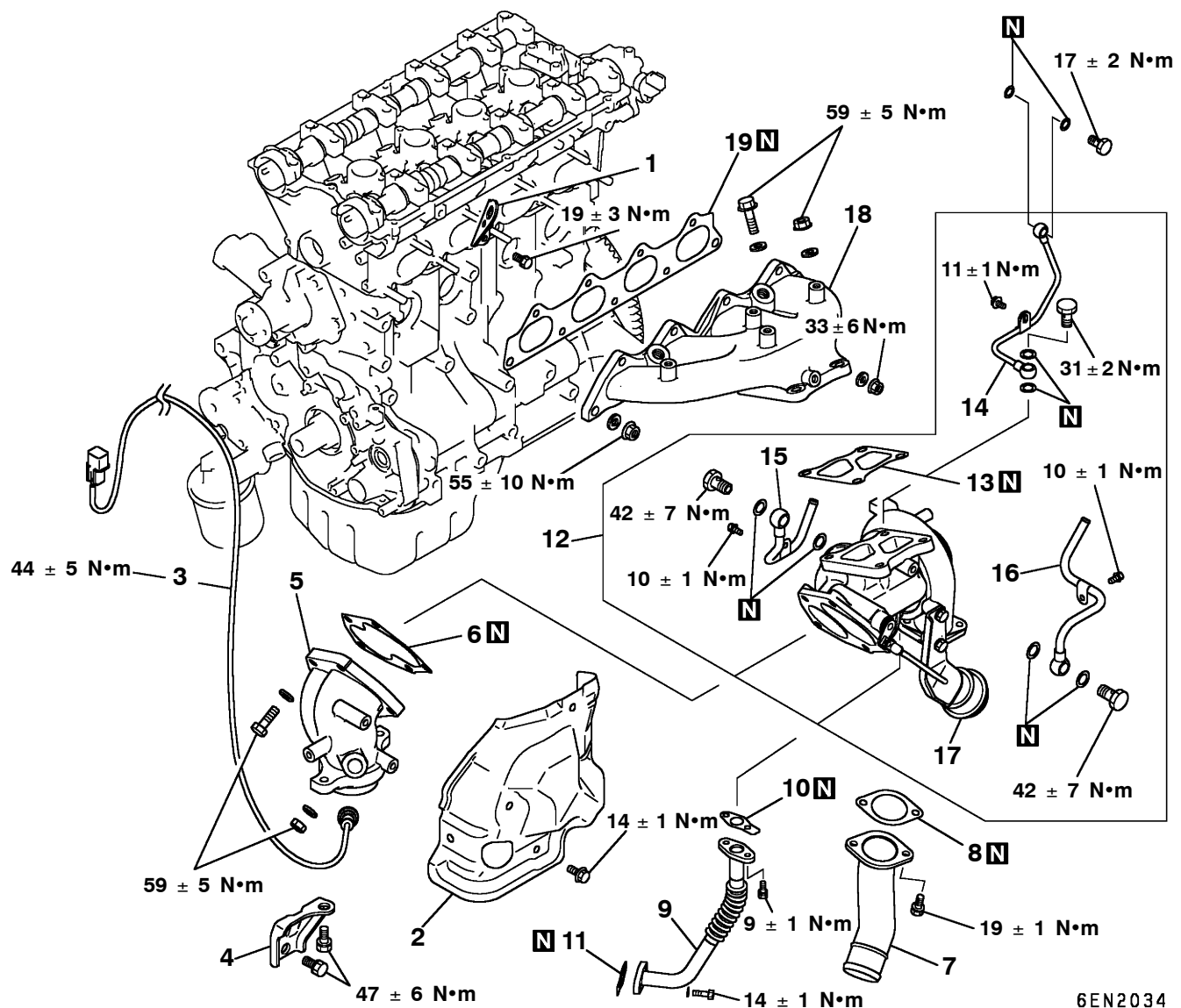


▶D◀ AIR PIPE ASSEMBLY INSTALLATION

1. Temporarily tighten air pipe assembly onto the air control valve.
2. Tighten the bolts 1 and 2 shown in the illustration to the exhaust manifold at the specified torque $49 \pm 5 \text{ N}\cdot\text{m}$.
3. Tighten the bolt 3 shown in the illustration to the air control valve at the specified torque $24 \pm 3 \text{ N}\cdot\text{m}$.
4. Tighten the bolt 4 shown in the illustration to the cam position sensor support at the specified torque $11 \pm 1 \text{ N}\cdot\text{m}$.
5. Tighten the bolt 5 shown in the illustration to the exhaust manifold at the specified torque $14 \pm 1 \text{ N}\cdot\text{m}$.

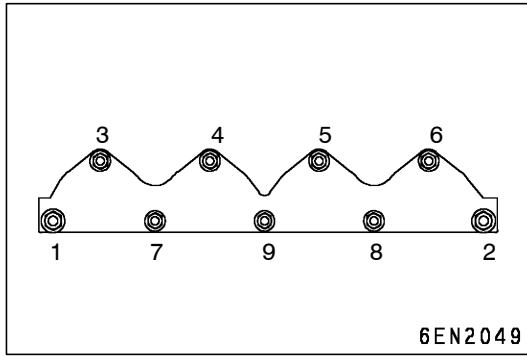
EXHAUST MANIFOLD

REMOVAL AND INSTALLATION

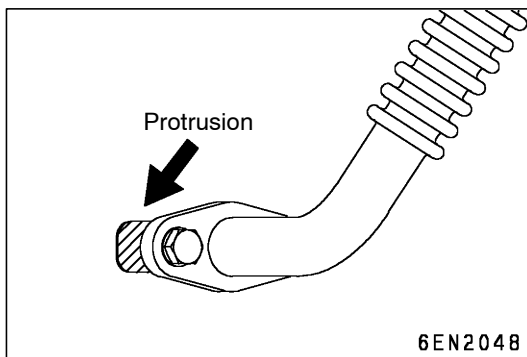
**Removal steps**

- | | |
|---|---|
| <p>1. Engine hanger</p> <p>2. Turbocharger heat protector</p> <p>3. Oxygen sensor</p> <p>4. Exhaust fitting bracket</p> <p>5. Exhaust fitting</p> <p>6. Exhaust fitting gasket</p> <p>7. Air outlet fitting</p> <p>▶C◀ 8. Air outlet fitting gasket</p> <p>9. Oil return pipe</p> <p>10. Oil return pipe gasket</p> | <p>▶B◀ 11. Oil return pipe gasket</p> <p>12. Turbocharger assembly and pipe assembly</p> <p>13. Turbocharger gasket</p> <p>14. Oil pipe</p> <p>15. Water pipe B</p> <p>16. Water pipe A</p> <p>17. Turbocharger assembly</p> <p>▶A◀ 18. Exhaust manifold</p> <p>19. Exhaust manifold gasket</p> |
|---|---|

6EN2034

**INSTALLATION SERVICE POINTS****►A◄ EXHAUST MANIFOLD INSTALLATION**

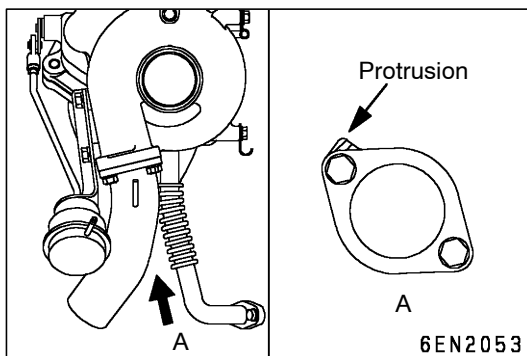
1. Lightly tighten the installation nut for the exhaust manifold.
2. Following the tightening order shown in the illustration, tighten the M8 nuts at the tightening torque 29 N•m.
3. Following the tightening order shown in the illustration, tighten the M10 nuts at the tightening torque 49 N•m.
4. Following the tightening order shown in the illustration, tighten the M8 nuts again at the tightening torque 29 N•m.
5. Finally, following the tightening order shown in the illustration, tighten the M10 nuts at the tightening torque 55 ± 10 N•m, and tighten the M8 nuts at the tightening torque 33 ± 6 N•m.

**►B◄ OIL RETURN PIPE GASKET INSTALLATION**

Assembly so that the protrusion of the oil return pipe gasket on the oil pan side is at the position shown in the illustration.

NOTE

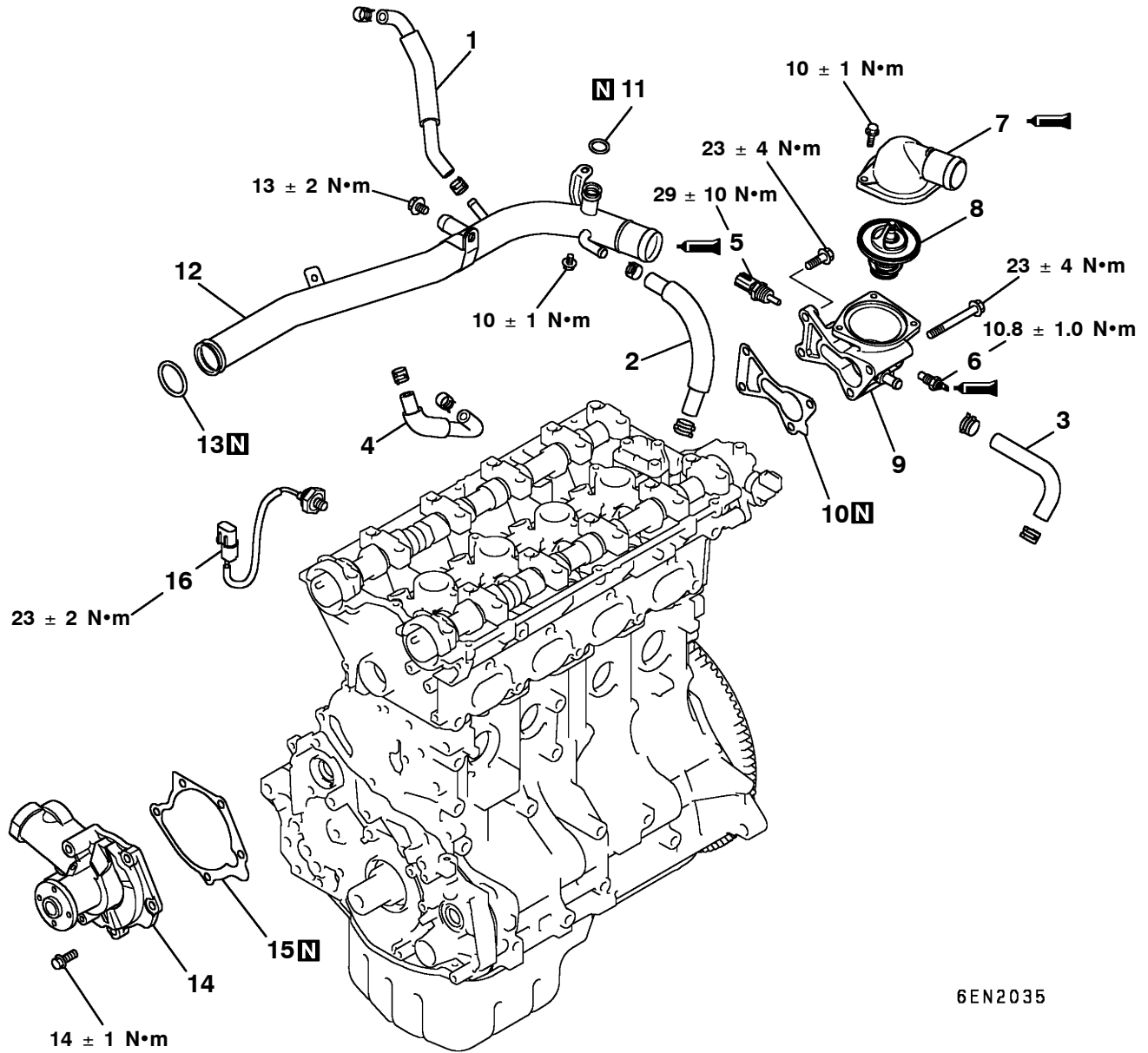
There is no designated assembly direction for the gasket on the turbocharger side.

**►C◄ AIR OUTLET FITTING GASKET**

Assembly so that the protrusion of the air outlet fitting gasket is at the position shown in the illustration.

WATER PUMP AND WATER HOSE

REMOVAL AND INSTALLATION



6EN2035

Removal steps

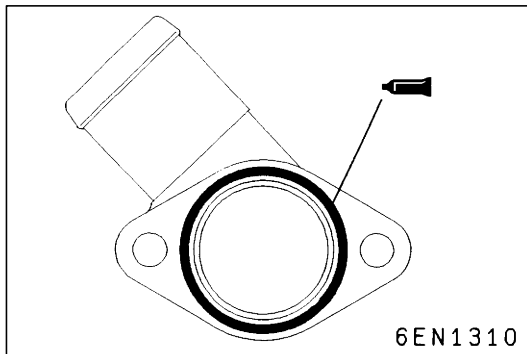
- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Water hose 2. Water hose 3. Water hose 4. Water hose ▶D▶ 5. Engine coolant temperature sensor ▶C▶ 6. Engine coolant temperature gauge unit ▶B▶ 7. Water outlet fitting 8. Thermostat | <ul style="list-style-type: none"> 9. Thermostat housing 10. Gasket ▶A▶ 11. O-ring ▶A▶ 12. Water inlet pipe ▶A▶ 13. O-ring 14. Water pump 15. Water pump gasket 16. Knock sensor |
|--|--|

INSTALLATION SERVICE POINTS**▶A◀ O-RING/WATER INLET PIPE INSTALLATION**

Replace the O-ring for the water inlet pipe with a new part, and apply water on the periphery of the O-ring so that it can be inserted easily into the water pump and thermostat housing.

Caution

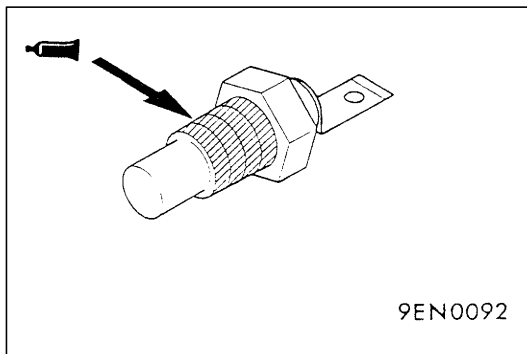
- (1) Never apply grease or oil, such as engine oil, on the O-ring.
- (2) Install the water inlet pipe onto the thermostat housing, and then fix.

**▶B◀ WATER OUTLET FITTING INSTALLATION**

Squeeze out form-in-place gasket at a 3 mm width, and apply at the position shown in the illustration.

Form-in-place gasket**Specified gasket:**

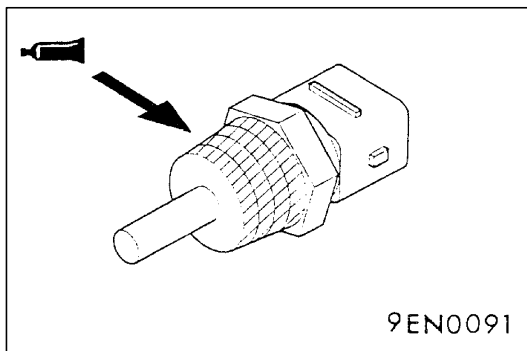
Mitsubishi Genuine Part No. MD970389 or equivalent

**▶C◀ ENGINE COOLANT TEMPERATURE GAUGE UNIT INSTALLATION**

When reusing the bolts, apply the specified sealant on the threads.

Sealant**Specified sealant:**

3M™ AAD Part No. 8672 or equivalent

**▶D◀ ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION**

Apply the specified sealant onto the threads.

Sealant**Specified sealant:**

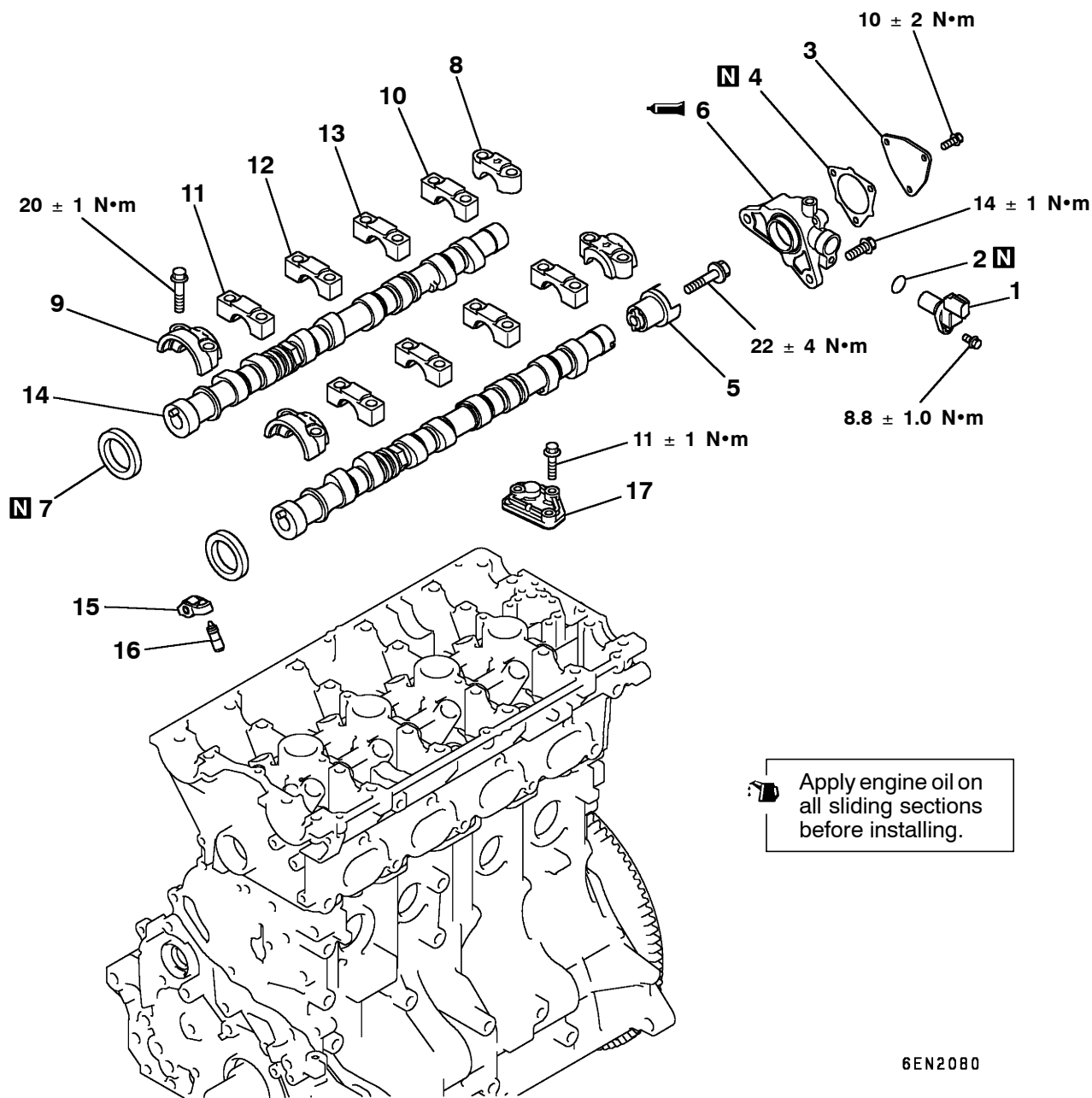
3M™ AAD Part No. 8731 or equivalent

Caution

Make sure that the tool does not contact the connector section (resin section).

ROCKER ARM AND CAMSHAFT

REMOVAL AND INSTALLATION



Removal steps

- | | | | |
|-----|----------------------------------|-----|-----------------------|
| ▶F◀ | 5. Cam position sensing cylinder | ▶C◀ | 10. Bearing cap No. 5 |
| ▶E◀ | 6. Cam position sensor support | ▶C◀ | 11. Bearing cap No. 2 |
| ▶D◀ | 7. Camshaft oil seal | ▶C◀ | 12. Bearing cap No. 3 |
| ▶C◀ | 8. Bearing cap, rear | ▶C◀ | 13. Bearing cap No. 4 |
| ▶C◀ | 9. Bearing cap, front | ▶B◀ | 14. Camshaft |
| | | ▶A◀ | 15. Rocker arm |
| | | ▶A◀ | 16. Lash adjuster |
| | | | 17. Oil delivery body |

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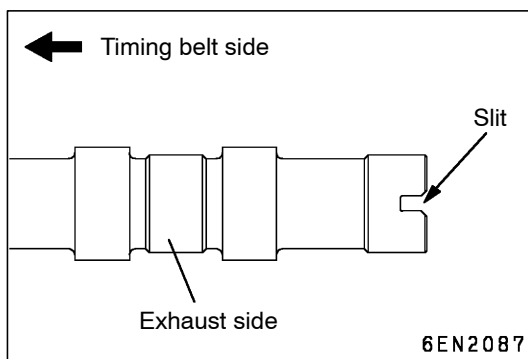
REMOVAL SERVICE POINT**◀A▶ LASH ADJUSTER REMOVAL****Caution**

When reusing the lash adjuster, always clean and inspect it before installing. (Refer to the section on checking the lash adjuster.)

INSTALLATION SERVICE POINTS**▶A◀ LASH ADJUSTER INSTALLATION****Caution**

When reusing the lash adjuster, always clean and inspect it before installing. (Refer to the section on checking the lash adjuster.)

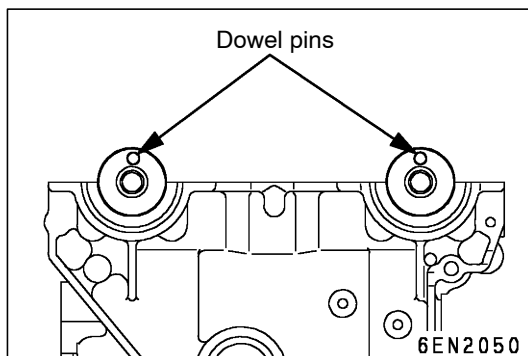
Assembly the lash adjuster onto the rocker arm while taking care not to spill out diesel oil in it.

**▶B◀ CAMSHAFT INSTALLATION**

1. Apply engine oil on the camshaft journal and cam.
2. Install the camshaft onto the cylinder head.

Caution

Do not mistake the intake and exhaust camshafts. There is a 4 mm width slit on the back end of the exhaust side camshaft.

**▶C◀ BEARING CAP INSTALLATION**

1. Set the camshaft's dowel pin to the approximate top.

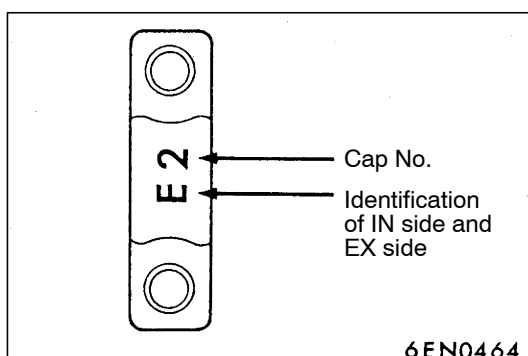
2. The bearing caps No. 2 to 5 have the same shape. Check the identification symbol before installing to prevent mistaking the cap No., intake side and exhaust side.

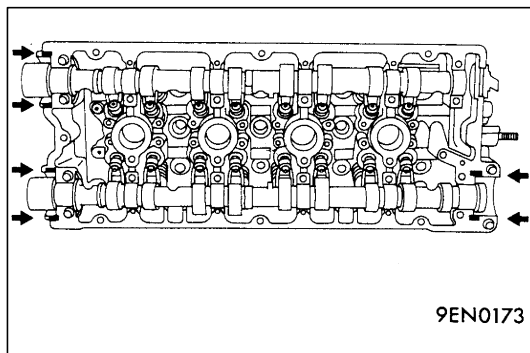
Identification symbol

(Stamped on front and on No. 2 to 5 bearing caps)

I : Intake side

E : Exhaust side





3. Apply sealant on the contact surfaces with the head shown in the illustration.

Sealant

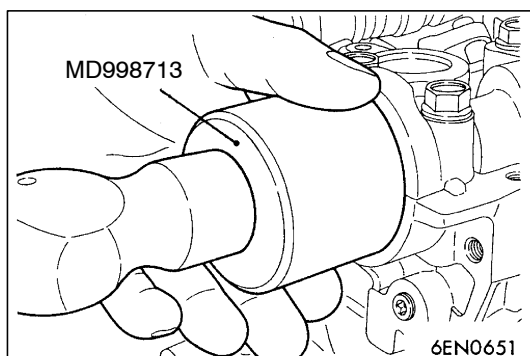
Specified sealant:

3M™ AAD Part No. 8672 or equivalent

4. Install the bearing caps onto the cylinder head, and in two to three steps tighten strongly.
5. Finally, tighten at the specified torque $20 \pm 1 \text{ N}\cdot\text{m}$.
6. Confirm that the rocker arm is correctly installed.

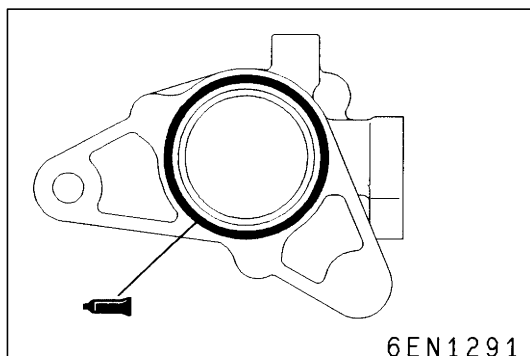
NOTE

Wipe off all excessive sealant.



►D◄ CAMSHAFT OIL SEAL INSTALLATION

Install the oil seal using the special tool.



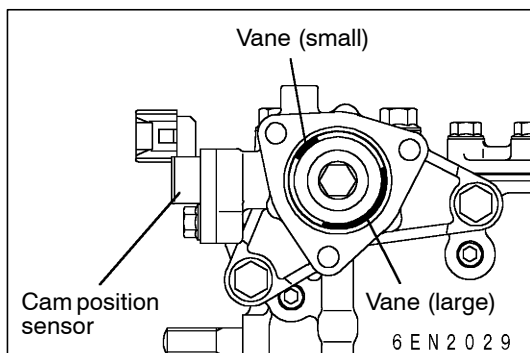
►E◄ CAM POSITION SENSOR SUPPORT INSTALLATION

Apply a 3 mm width of form-in-place gasket at the position shown in the illustration.

Form-in-place gasket

Specified gasket:

Mitsubishi Genuine Part No. MD970389 or equivalent



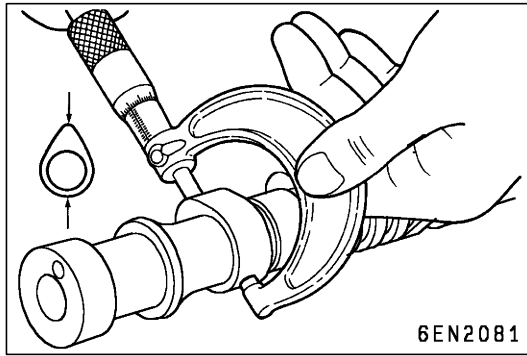
►F◄ CAM POSITION SENSING CYLINDER INSTALLATION

1. Set the exhaust camshaft at the No. 1 compression top dead centre.

NOTE

The shaft will rotate slightly in the counterclockwise direction by the force of the exhaust valve spring.

2. Install the cam position sensing cylinder's vane (small) and vane (large) at the positions shown in the illustration.



INSPECTION

1. CAMSHAFT

Measure the cam height (length). Replace if it exceeds the limit value.

Standard value:

Intake 35.79 mm
Exhaust 35.49 mm

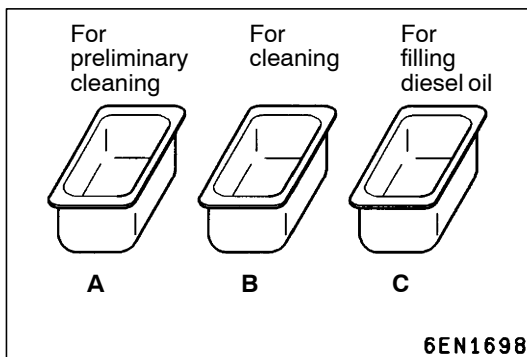
Limit value:

Intake 35.29 mm
Exhaust 34.99 mm

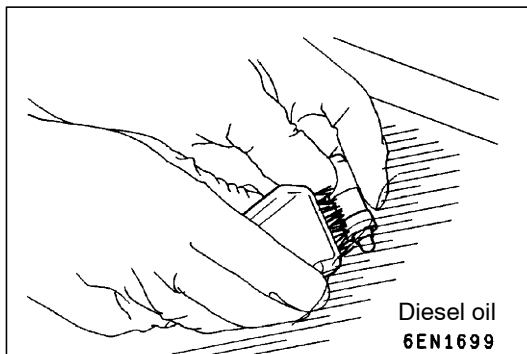
2. LASH ADJUSTER

Caution

- (1) The lash adjuster is a sophisticated part, so make sure that foreign matter, such as dirt, does not enter it.
- (2) Do not disassemble the lash adjuster.
- (3) When cleaning the lash adjuster, use clean diesel oil.



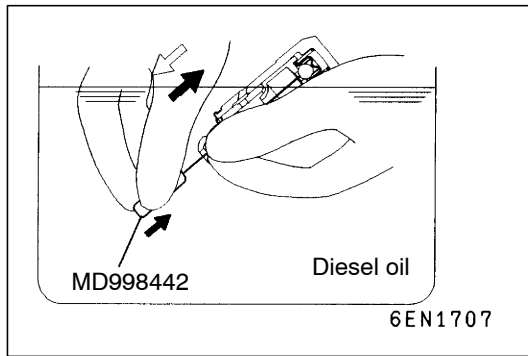
- (1) Prepare three vats and approx. five litres of diesel oil. Fill the vats with diesel oil so that the lash adjuster will be submerged when placed standing in the vat.



- (2) Submerge the lash adjuster in vat A, and clean the outside.

NOTE

Use a nylon brush if the lash adjuster is heavily contaminated.



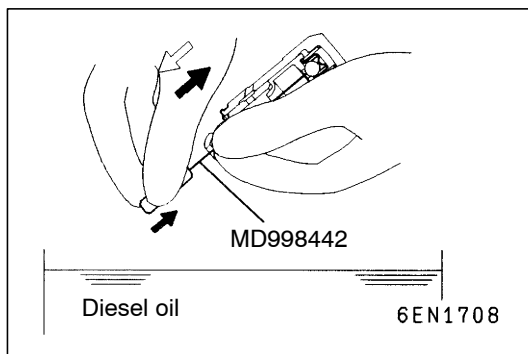
- (3) Lightly press down on the steel ball inside using the special tool MD998442. Remove all matter and deteriorated oil adhered on the plunger by pressing the tool back and forth five to ten times until the plunger moves smoothly.

Caution

The steel ball spring's load is extremely weak, so if the special tool is pressed in with force, the functions of the lash adjuster could be damaged.

NOTE

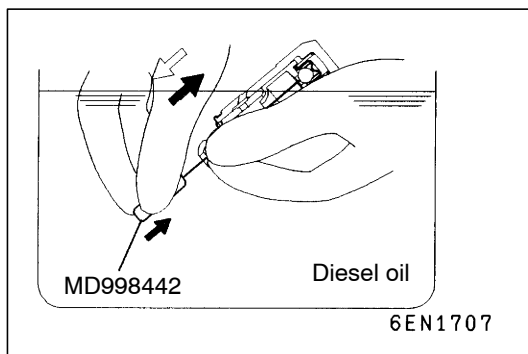
The plunger movement must not snag at this time. If the movement is abnormal, replace the lash adjuster.



- (4) Remove the lash adjuster from the vat, and while lightly pressing down on the steel ball, press the plunger and removal all diesel oil, etc., inside the pressure chamber.

Caution

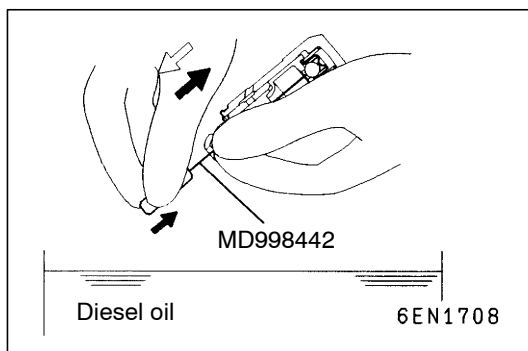
Always face the oil hole on the side of the lash adjuster toward vat A. Never face the oil hole toward people.



- (5) Submerge the lash adjuster in vat B. Lightly press down on the steel ball inside using the special tool MD998442. Clean the inside of the lash adjuster pressure chamber by pressing the tool back and forth five to ten times until the plunger moves smoothly.

Caution

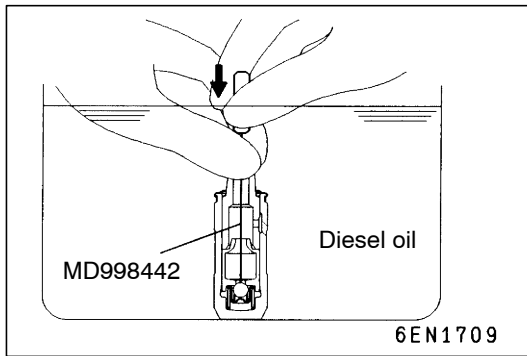
The steel ball spring's load is extremely weak, so if the special tool is pressed in with force, the functions of the lash adjuster could be damaged.



- (6) Remove the lash adjuster from the vat, and while lightly pressing down on the steel ball, press the plunger and removal all diesel oil, etc., inside the pressure chamber.

Caution

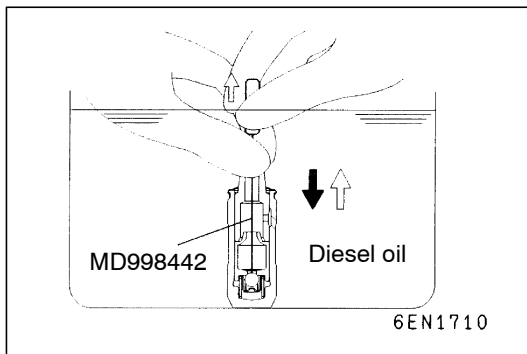
Always face the oil hole on the side of the lash adjuster toward vat A. Never face the oil hole toward people.



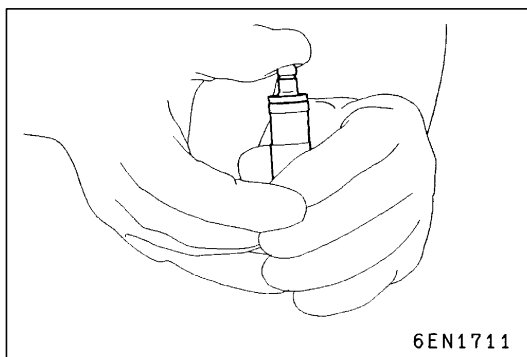
- (7) Submerge the lash adjuster in vat C, and lightly press down on the steel ball inside using the special tool MD998442.

Caution

Do not use vat C for cleaning. If vat C is used for cleaning, foreign matter, etc., could enter the pressure chamber when filling it with diesel oil.



- (8) Stand the lash adjuster with the plunger at the top position. Press down on the plunger with force, and after it has reached the maximum stroke, gradually return it. Then, release the steel ball to fill the pressure chamber with diesel oil.



- (9) Remove the lash adjuster from the vat, and stand the lash adjuster with the plunger at the top position. The plunger should not move when pressed down with force.

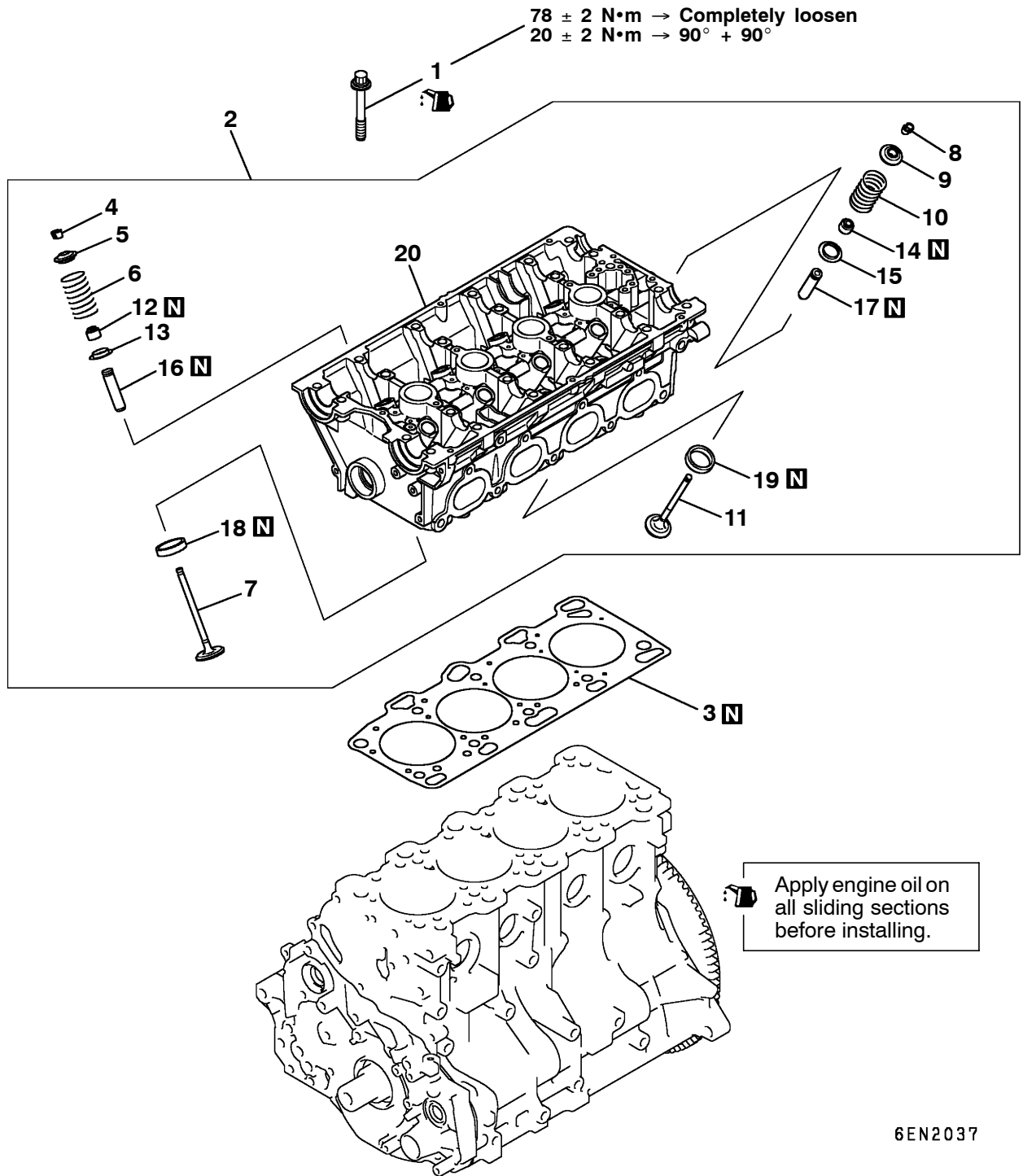
NOTE

If the lash adjuster compresses, repeat steps (7) to (9). Replace the lash adjuster if the same phenomenon occurs even after diesel oil has been filled in the pressure chamber (after the air has been bled).

- (10) Store the lash adjuster in the vertical state so that the internal diesel oil will not spill out, and so that foreign matter, such as dirt, will not adhere. Install it onto the engine as soon as possible.

CYLINDER HEAD AND VALVE

REMOVAL AND INSTALLATION

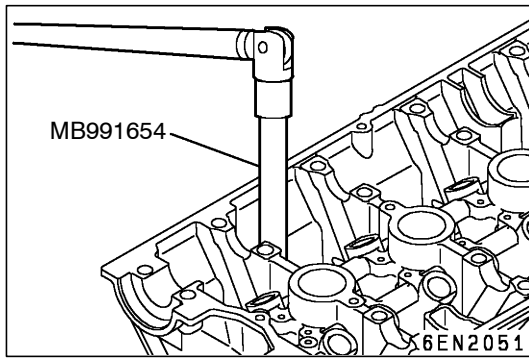


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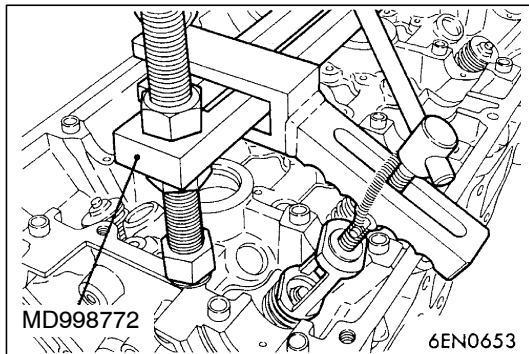
Removal steps

- ◀A▶ ▶D▶ 1. Cylinder head bolt
- ◀B▶ ▶C▶ 2. Cylinder head assembly
- ◀B▶ ▶C▶ 3. Cylinder head gasket
- ▶B▶▶ 4. Retainer lock
- ▶B▶▶ 5. Valve spring retainer
- ▶B▶▶ 6. Valve spring
- ▶B▶▶ 7. Intake valve
- ◀B▶ ▶C▶ 8. Retainer lock
- ▶B▶▶ 9. Valve spring retainer
- ▶B▶▶ 10. Valve spring

- ◀C▶ ▶A▶ 11. Exhaust valve
- ◀C▶ ▶A▶ 12. Valve stem seal
- ▶C▶▶ 13. Valve spring seat
- ▶C▶▶ 14. Valve stem seal
- ▶C▶▶ 15. Valve spring seat
- ▶C▶▶ 16. Intake valve guide
- ▶C▶▶ 17. Exhaust valve guide
- ▶C▶▶ 18. Intake valve seat
- ▶C▶▶ 19. Exhaust valve seat
- ▶C▶▶ 20. Cylinder head

**REMOVAL SERVICE POINTS****◀A▶ CYLINDER HEAD BOLT REMOVAL**

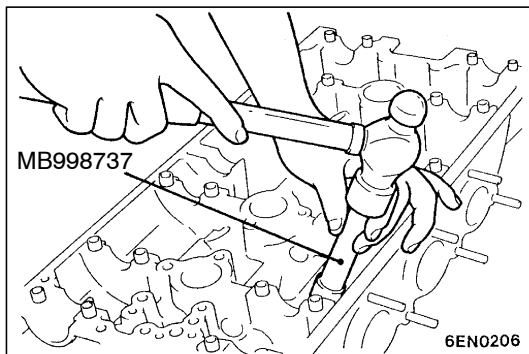
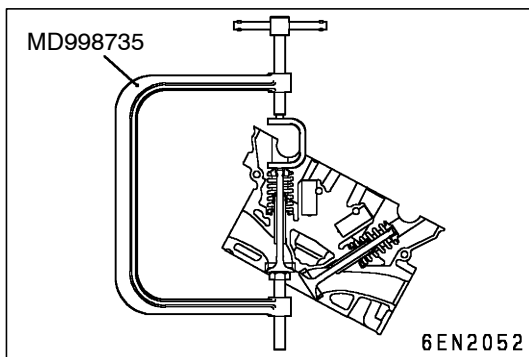
Remove the cylinder head bolt using the special tool.

**◀B▶ RETAINER LOCK REMOVAL**

Compress the valve spring using the special tool, and remove the retainer lock.

NOTE

Attach a tag indicating the cylinder No. and installation position onto the parts including the removed valve and springs so that they can be reassembled later.

**INSTALLATION SERVICE POINTS****▶A◀ VALVE STEM SEAL INSTALLATION**

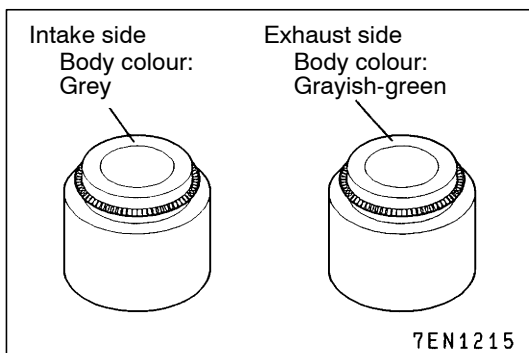
1. Install the valve spring seat.
2. Install the valve.
3. Apply a small amount of engine oil on the valve stem seal.
4. Using the valve stem as a guide, press in the valve guide using the special tool.

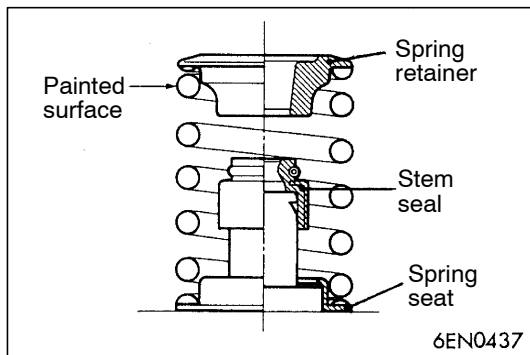
Caution

Improper installation of the valve stem seal can lead to oil reduction, so always install using the special tool.

NOTE

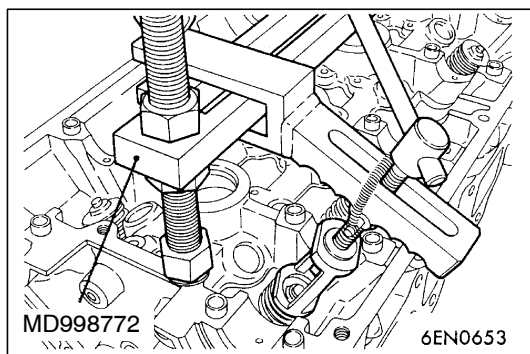
Note that the valve stem seals for the intake side and exhaust side are different.





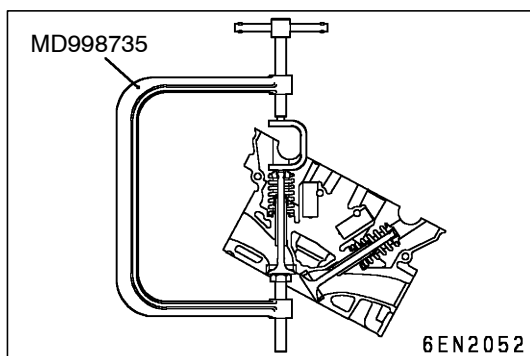
►B◄ VALVE SPRING INSTALLATION

Install the valve spring so that the painted surface faces the rocker arm.



►C◄ RETAINER LOCK INSTALLATION

Compress the valve spring using the special tool, and install the retainer lock.

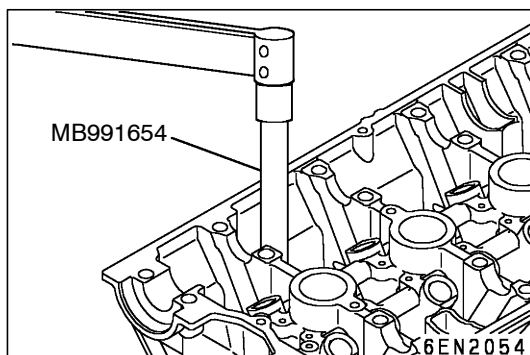
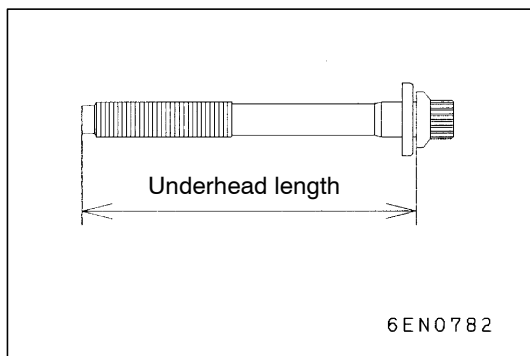


►D◄ CYLINDER HEAD BOLT INSTALLATION

1. Before reusing the cylinder head bolt, confirm that the bolt's underhead length is less than the limit value. Replace the bolt if it exceeds the limit value.

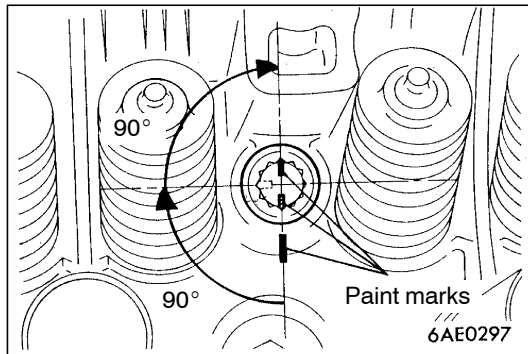
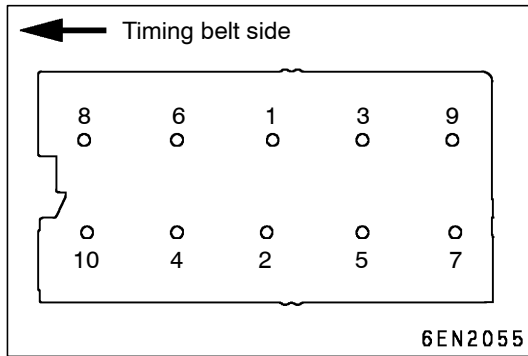
Limit value: 99.4 mm

2. Apply engine oil on the bolt threads and washer.



NOTE

Use the special tool to tighten the cylinder head bolt.

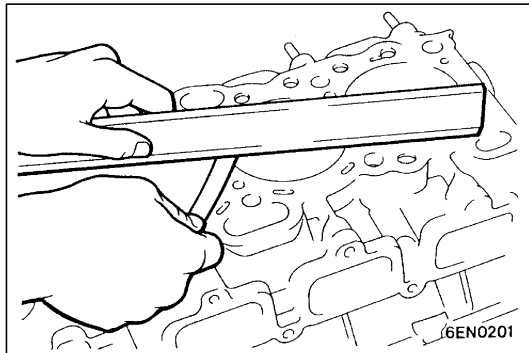


3. Following the tightening order, tighten at $78 \pm 2 \text{ N}\cdot\text{m}$.
4. Completely loosen the bolts.
5. Next, following the tightening order, tighten the loosened bolts at the torque $20 \pm 2 \text{ N}\cdot\text{m}$ again.

6. Make paint marks on the cylinder head bolt's head and cylinder head.
7. Following the tightening order, tighten the cylinder head by 90° .
8. Tighten by another 90° , and confirm that the paint mark made on the cylinder head bolt's head and the paint mark on the cylinder head are positioned on the same line.

Caution

- (1) If the tightening angle is less than 90° , the connection performance may not be attained, so take special care to the tightening angle when tightening.
- (2) If the tightening angle is larger than the specified value, completely loosen the bolt and start again from step 1.



INSPECTION

1. CYLINDER HEAD

- (1) Before cleaning the cylinder head, check it for water leaks, gas leaks, damage or cracks.
- (2) Completely remove the oil, water deposits, sealant and carbon, etc. After cleaning the oil path, blow air and confirm that there is not clogging.
- (3) Using a straight edge and thickness gauge, inspect the flatness of the bottom of the cylinder head for strain.

If the strain exceeds the limit value, grind the end and correct the flatness.

Standard value for lower surface strain: 0.05 mm

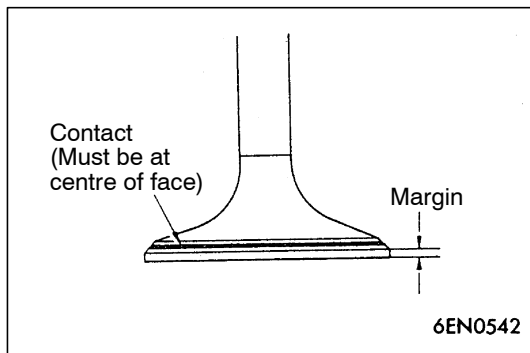
Limit value for lower surface strain: 0.2 mm

Grinding limit value: 0.2 mm

Cylinder head height (standard value for new part): 131.9 - 132.1 mm

Caution

The grinding limit is within 0.2 mm together with the combined cylinder block.



2. VALVE

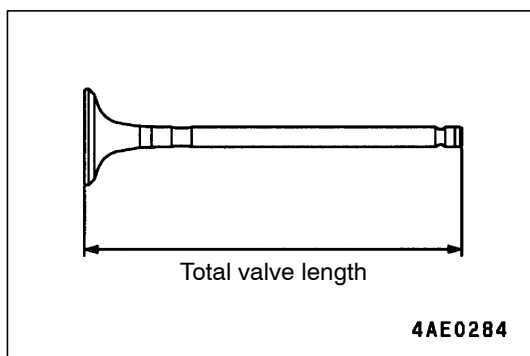
- (1) If there is a faulty contact, one-sided contact or improper seating with the valve seat, correct the valve seat.
- (2) Replace the valve if the margin exceeds the limit value.

Standard value:

Intake	1.0 mm
Exhaust	1.5 mm

Limit value:

Intake	0.5 mm
Exhaust	1.0 mm



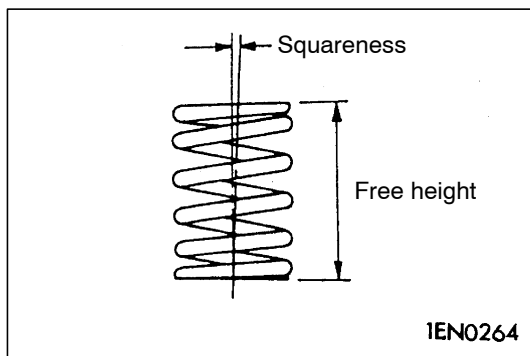
- (3) Measure the total length of the valve, and replace the valve if the length exceeds the limit value.

Standard value:

Intake	109.50 mm
Exhaust	109.70 mm

Limit value:

Intake	109.00 mm
Exhaust	109.20 mm



3. VALVE SPRING

- (1) Measure the free height of the spring, and replace the valve spring if the height exceeds the limit value.

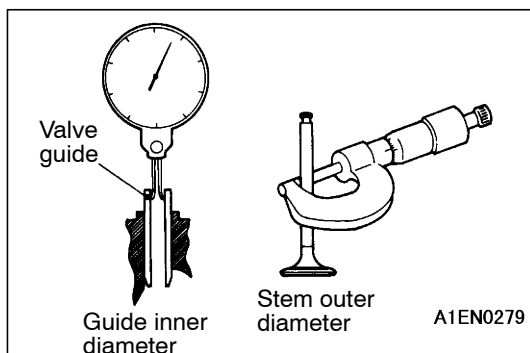
Standard value: 48.3 mm

Limit value: 47.3 mm

- (2) Measure the spring squareness, and replace the valve spring if the inclination exceeds the limit value.

Standard value: 1.5° or less

Limit value: 4°



4. VALVE GUIDE

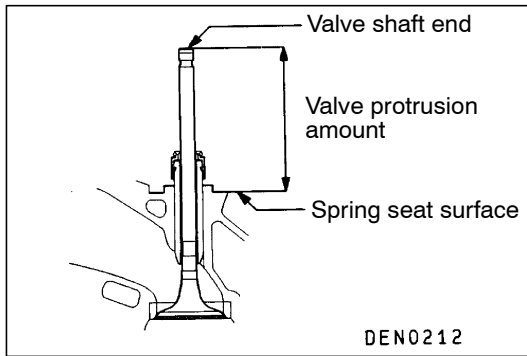
Measure the clearance between the valve guide and valve stem. If the clearance exceeds the limit value, replace the valve guide, valve or both parts.

Standard value:

Intake	0.02 - 0.05 mm
Exhaust	0.05 - 0.09 mm

Limit value:

Intake	0.10 mm
Exhaust	0.15 mm



5. VALVE SEAT

Assemble the valve, and measure the amount that the valve protrudes from the valve shaft end between the spring seat surfaces when the valve is pressed against the valve seat. Replace the valve seat if the protrusion amount exceeds the limit value.

Standard value:

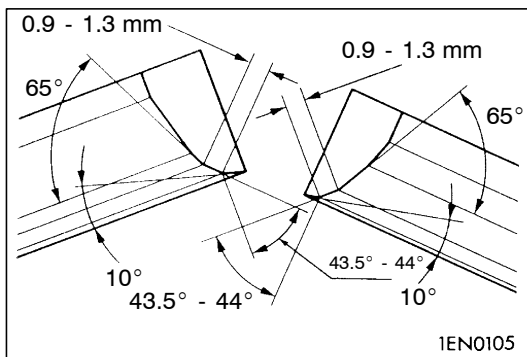
Intake 49.20 mm

Exhaust 48.40 mm

Limit value:

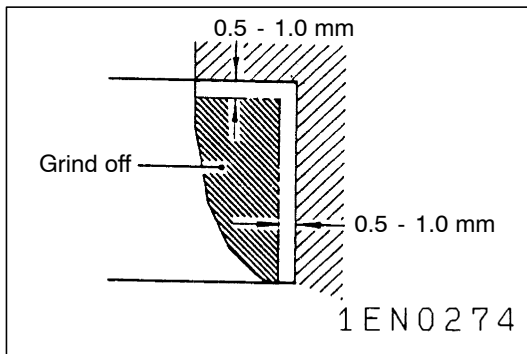
Intake 49.70 mm

Exhaust 48.90 mm



Valve Seat Correction

1. Before correcting the valve seat, inspect the clearance between the valve guide and valve, and replace the valve guide if necessary.
2. Correct so that the seat width and seat angle are at the specified shape.
3. After correcting, apply wrapping compound, and fit the valve and valve seat together.



Valve Seat Replacement

1. Grind off the valve seat to be replaced from the inside to reduce the thickness and then remove the valve seat.
2. Machine the valve seat hole on the cylinder head to match the diameter of the oversized valve seat into which it is to be pressed in.

Intake valve seat hole diameter:

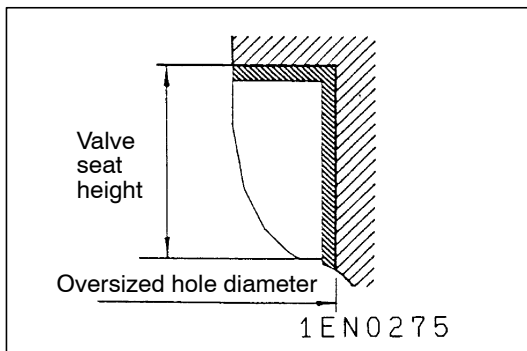
0.3 O.S. 35.30 - 35.33 mm

0.6 O.S. 35.60 - 35.63 mm

Exhaust valve seat hole diameter:

0.3 O.S. 33.30 - 33.33 mm

0.6 O.S. 33.60 - 33.63 mm



3. When pressing in the valve seat, cool the valve seat with liquid nitrogen, and make sure that the inner diameter of the cylinder head is not galled.
4. Refer to the "Valve Seat Correction" procedures, and machine the valve seat.

Valve Guide Replacement

1. Using a press, push the valve guide to the cylinder block side.
2. Machine the valve guide hole on the cylinder head to match the oversized valve guide into which it is to be pressed in.

Caution

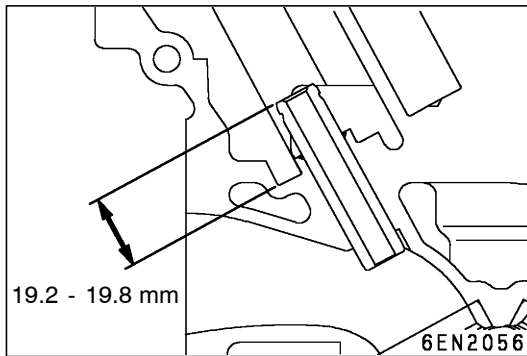
Do not use a valve guide having the same size as the removed valve guide.

Valve guide hole diameter:

0.05 O.S. 12.05 - 12.07 mm

0.25 O.S. 12.25 - 12.27 mm

0.50 O.S. 12.50 - 12.52 mm



3. Press in the valve guide to the dimensions shown in the illustration.

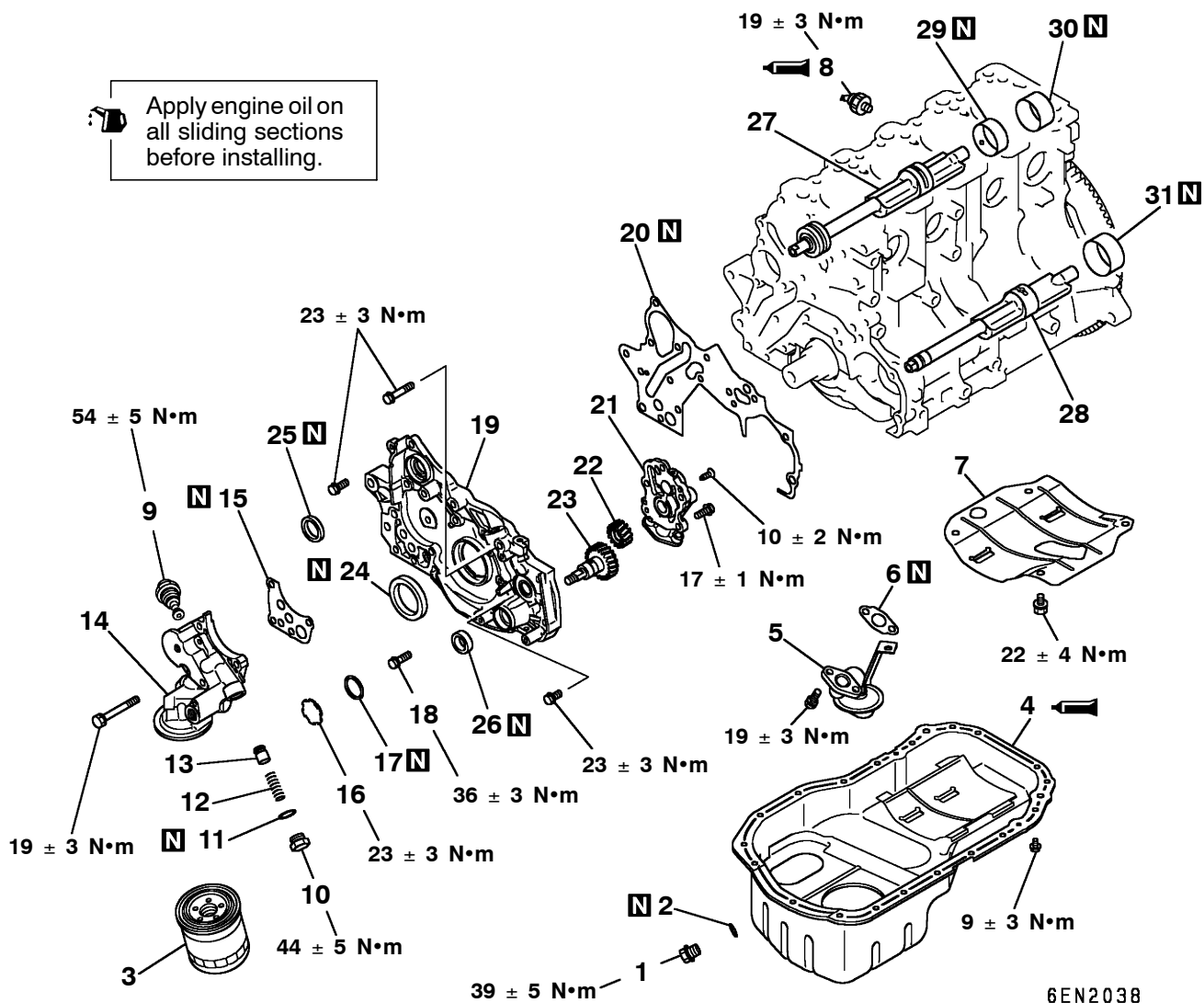
NOTE

- (1) Press in the valve guide from the top of the cylinder head.
 - (2) Note that the length of the valve guides differs.
Intake 45.5 mm
Exhaust 50.5 mm
4. After pressing in the valve guide, insert a new valve, and confirm the sliding state.

OIL PUMP AND OIL PAN

REMOVAL AND INSTALLATION

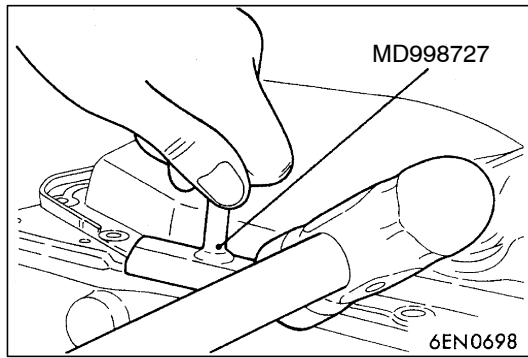
Apply engine oil on all sliding sections before installing.



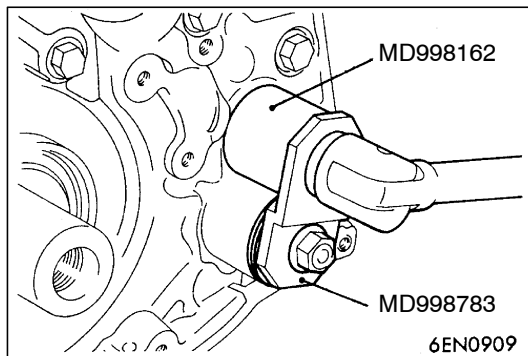
6EN2038

Removal steps

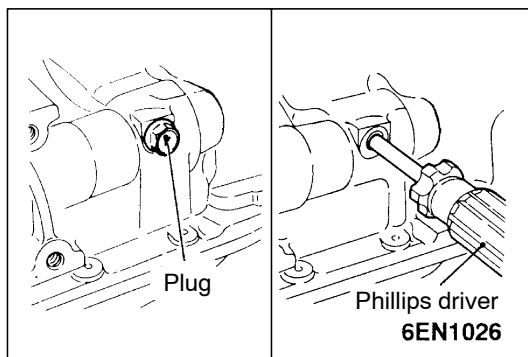
- | | | | |
|-----|-------------------------------|-----|---|
| ▶N◀ | 1. Drain plug | ▶I◀ | 18. Flange bolt |
| ▶M◀ | 2. Drain plug gasket | ▶H◀ | 19. Oil pump case |
| ▶L◀ | 3. Oil filter | | 20. Oil pump case gasket |
| ◀A▶ | 4. Oil pan | ▶G◀ | 21. Oil pump cover |
| | 5. Oil screen | ▶G◀ | 22. Oil pump driven gear |
| | 6. Oil screen gasket | ▶F◀ | 23. Oil pump drive gear |
| | 7. Baffle plate | ▶E◀ | 24. Crankshaft front oil seal |
| ▶K◀ | 8. Oil pressure switch | ▶D◀ | 25. Counter balance shaft oil seal |
| | 9. Oil cooler bypass valve | | 26. Oil pump oil seal |
| | 10. Relief plug | ◀D▶ | 27. Counter balance shaft, right |
| | 11. Gasket | ◀C▶ | 28. Counter balance shaft, left |
| | 12. Relief spring | ◀E▶ | 29. Counter balance shaft front bearing |
| | 13. Relief plunger | ▶B▶ | 30. Counter balance shaft rear bearing, right |
| | 14. Oil filter bracket | ◀E▶ | ▶A▶ |
| ◀B▶ | 15. Oil filter bracket gasket | | 31. Counter balance shaft rear bearing, left |
| | 16. Plug cap | | |
| | 17. O-ring | | |

**REMOVAL SERVICE POINTS****◀A▶ OIL PAN REMOVAL**

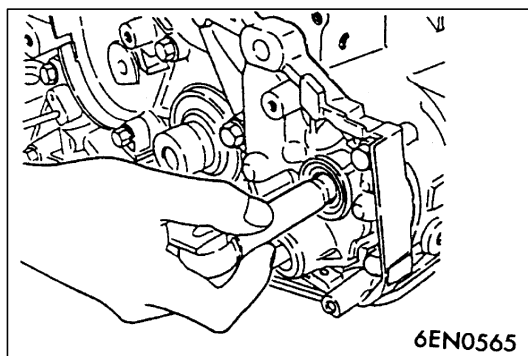
1. Remove the oil pan tightening bolts.
2. Tap the special tool between the oil pan and cylinder block.
3. Tap on the edge of the special tool, slide the tool and remove the oil pan.

**◀B▶ PLUG CAP REMOVAL**

Fit the special tool (MD998162) into the notch on the plug cap as shown in the illustration. Loosen the plug cap while supporting with the special tool (MD998783).

**◀C▶ FLANGE BOLT REMOVAL**

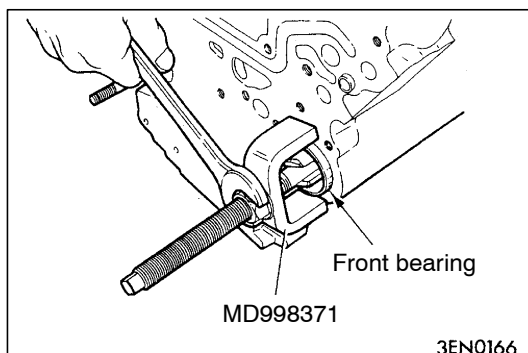
1. Remove the plug on the left side of the cylinder block, and insert a Phillips driver (shaft diameter 8 mm) by 60 mm or more to stop the rotation of the counter balance shaft left.
2. Loosen the flange bolt.

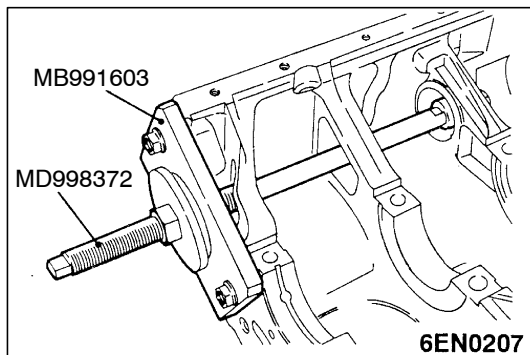
**◀D▶ COUNTER BALANCE SHAFT FRONT BEARING REMOVAL**

Pull out the counter balance shaft front bearing from the cylinder block using the special tool.

Caution

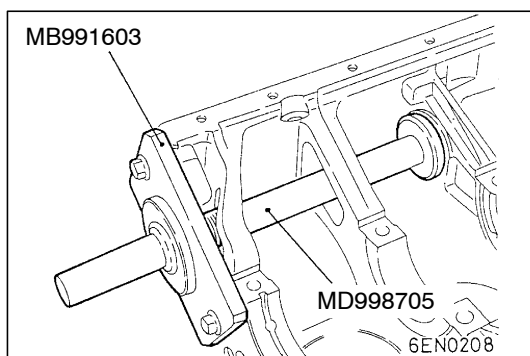
Always remove the counter balance shaft front bearing first. Otherwise, the counter balance shaft rear bearing cannot be removed.





◀E▶ COUNTER BALANCE SHAFT REAR BEARING REMOVAL

1. Pull out the counter balance shaft rear bearing right from the cylinder block using the special tool (MD998372).
2. When removing the counter balance shaft rear bearing left, install the special tool (MB991603) onto the front of the cylinder block, and then remove the bearing using the special tool (MD998372).



INSTALLATION SERVICE POINTS

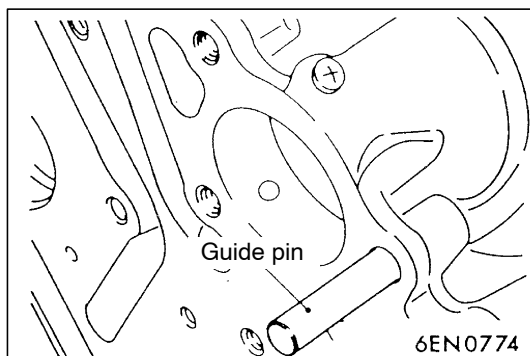
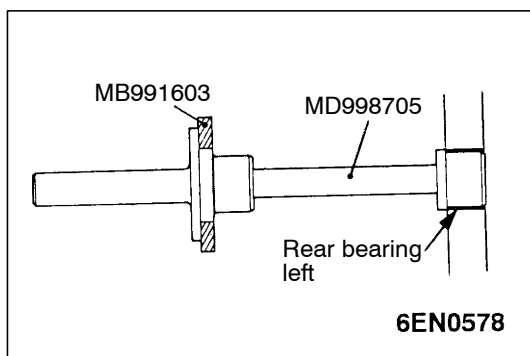
▶A▶ COUNTER BALANCE SHAFT REAR BEARING LEFT INSTALLATION

1. Install the special tool (MB991603) onto the cylinder block.
2. Set the counter balance shaft rear bearing left into the special tool (MD998705).

NOTE

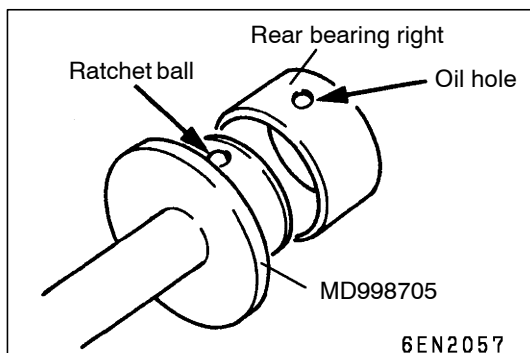
There is no oil hole on the counter balance shaft rear bearing left.

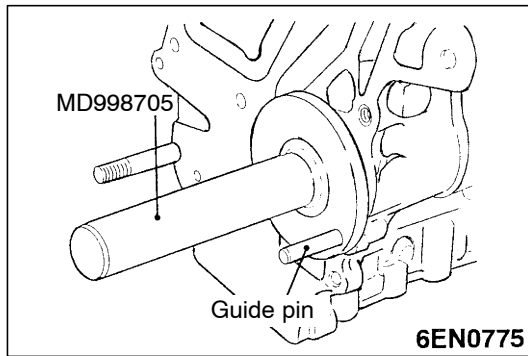
3. Tap in the counter balance shaft rear bearing left.



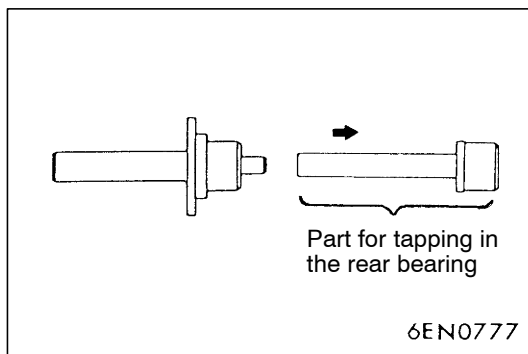
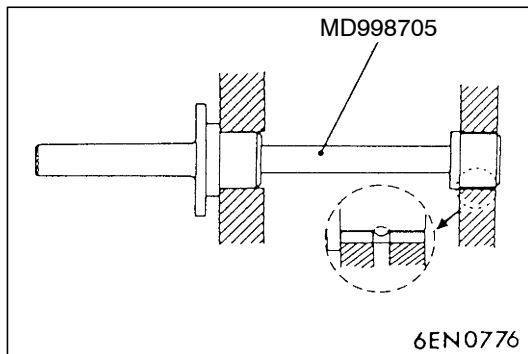
▶B▶ COUNTER BALANCE SHAFT REAR BEARING RIGHT INSTALLATION

1. Install the guide pin onto the cylinder block.
2. Align the ratchet ball of the special tool with the oil hole, and set the counter balance shaft rear bearing right.



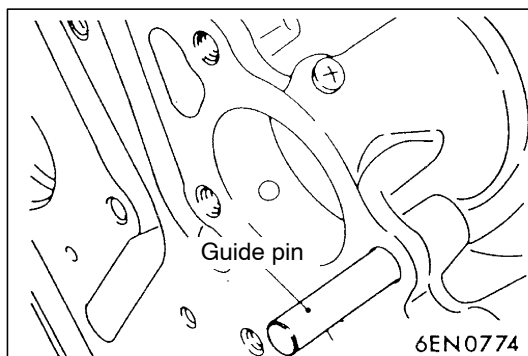


- Align and insert the special tool into the guide pin, and tap in the counter balance shaft rear bearing right.

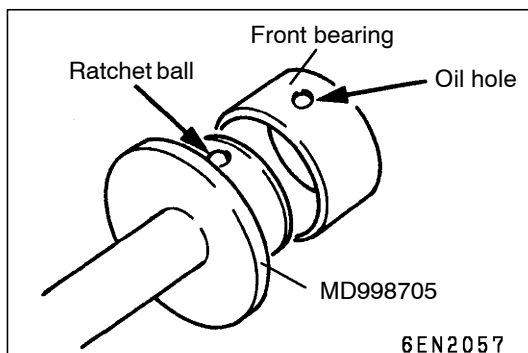


▶◀ COUNTER BALANCE SHAFT FRONT BEARING INSTALLATION

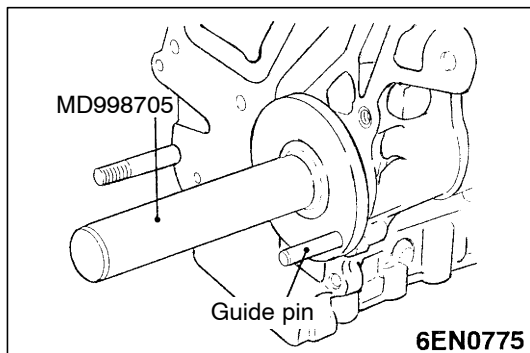
- Remove the part for tapping in the rear bearing from the special tool.



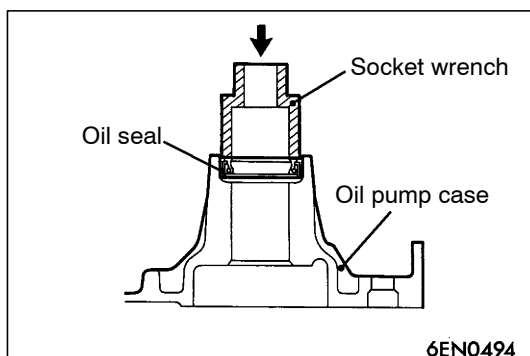
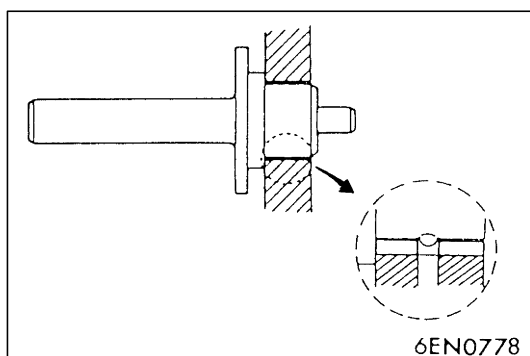
- Install the guide pin onto the cylinder block.



- Align the ratchet ball of the special tool with the oil hole, and set the counter balance shaft front bearing.

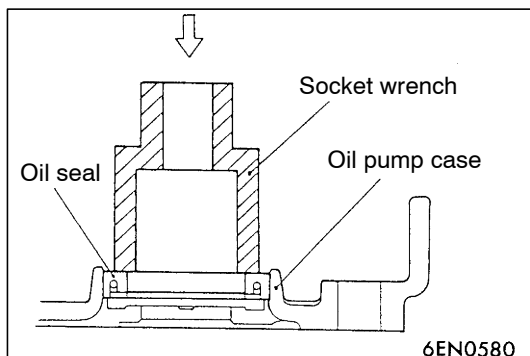


- Align and insert the special tool into the guide pin, and tap in the counter balance shaft front bearing.



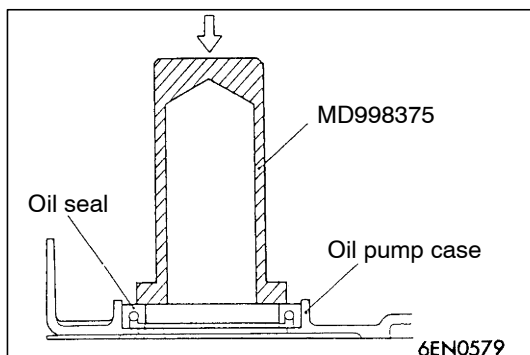
►D◄ OIL PUMP OIL SEAL INSTALLATION

Install the oil pump oil seal using an appropriate socket wrench.



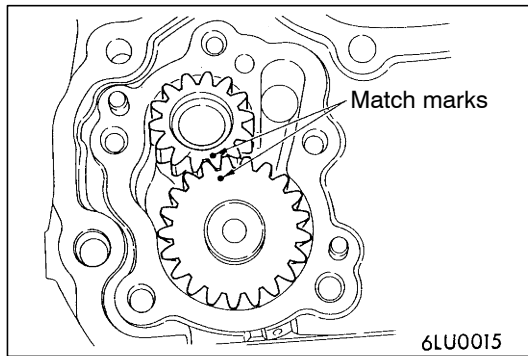
►E◄ COUNTER BALANCE SHAFT OIL SEAL INSTALLATION

Install the counter balance shaft oil seal using an appropriate socket wrench.



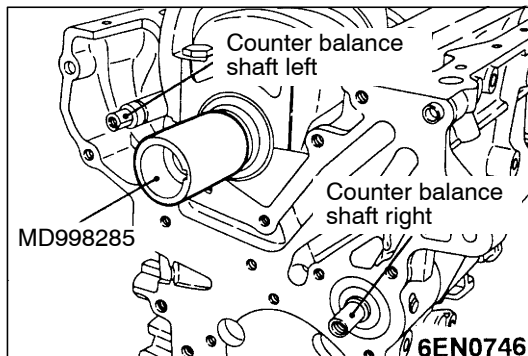
►F◄ CRANKSHAFT FRONT OIL SEAL INSTALLATION

Install the crankshaft front oil seal using the special tool.



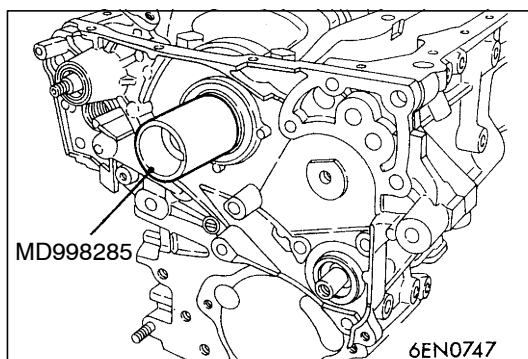
►G◄ OIL PUMP DRIVE GEAR/OIL PUMP DRIVEN GEAR INSTALLATION

Apply sufficient engine oil onto the gears, align the match marks, and assemble.

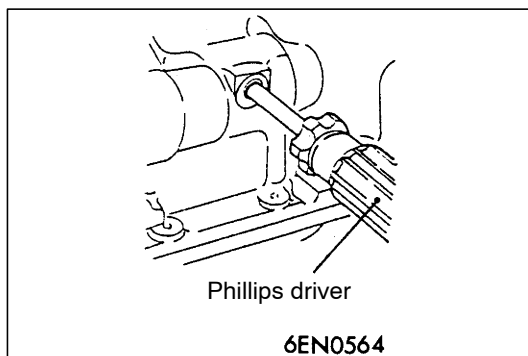


►H◄ OIL PUMP CASE INSTALLATION

1. Install the special tool onto the front end of the crankshaft, and apply a light coat of engine oil onto the periphery of the guide. If an oil seal is installed on the oil pump case, always use a guide.

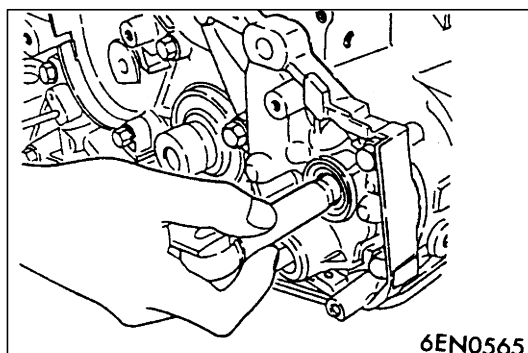


2. Install the oil pump case through the new oil pump case gasket, and temporarily tighten the bolts other than the oil filter bracket tightening bolt.
3. Install the oil filter bracket through the oil filter bracket gasket, and temporarily tighten with the bolt.
4. Tighten the oil pump case at the specified torque $23 \pm 3 \text{ N}\cdot\text{m}$, and the oil filter bracket at the specified torque $19 \pm 3 \text{ N}\cdot\text{m}$.

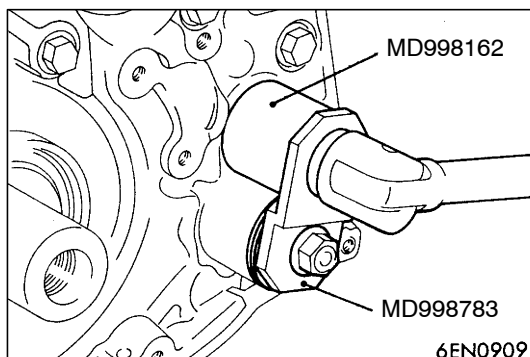


►I◄ FLANGE BOLT INSTALLATION

1. Insert a Phillips driver (shaft diameter 8 mm) by 60 mm or more into the hole on the left side of the cylinder block to stop the rotation of the counter balance shaft left.

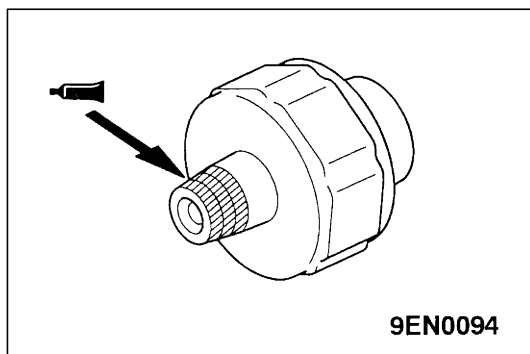


2. Tighten the flange bolt at the specified torque $36 \pm 3 \text{ N}\cdot\text{m}$.



►J◄ PLUG CAP INSTALLATION

1. Install a new O-ring onto the oil pump case.
2. Lightly tighten the plug cap by hand.
3. As shown in the illustration, fit the special tool (MD998162) into the notch on the plug cap, and while supporting with the special tool (MD998783), tighten the plug cap at the specified torque $23 \pm 3 \text{ N}\cdot\text{m}$.



►K◄ OIL PRESSURE SWITCH INSTALLATION

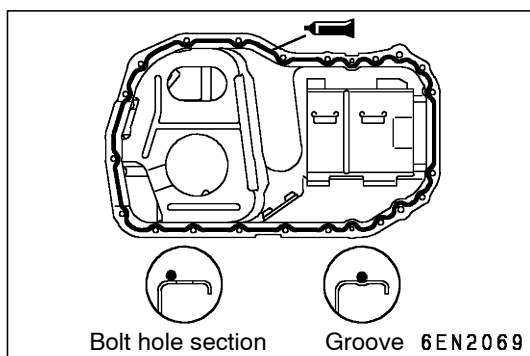
Sealant

Specified sealant:

3M™ AAD Part No. 8672 or equivalent

Caution

- (1) Make sure that the sealant does not protrude to the end of the threads.
- (2) Do not tighten too far.



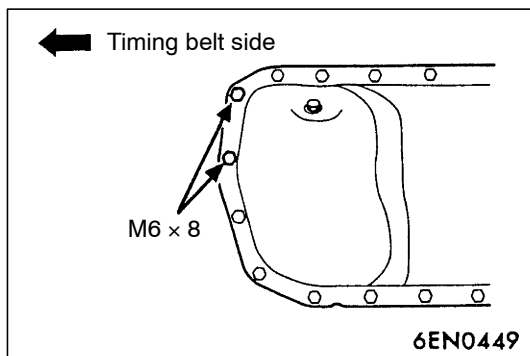
►L◄ OIL PAN INSTALLATION

1. Clean the surface of the cylinder block and oil pan onto which gasket is to be applied.
2. Squeeze out form-in-place gasket at a 4 mm width, and apply onto the entire periphery of the oil pan flange.

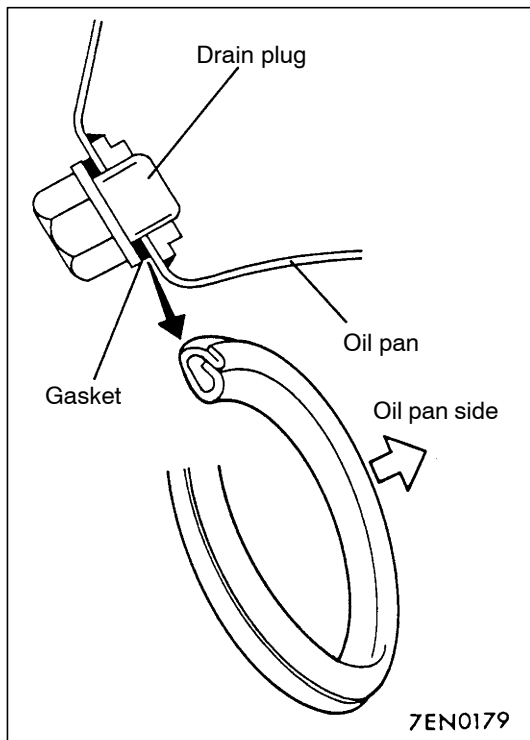
Form-in-place gasket

Specified gasket:

Mitsubishi Genuine Part No. MD970389 or equivalent



3. Note that the lengths of the bolts shown in the illustration differ, so take care when installing.

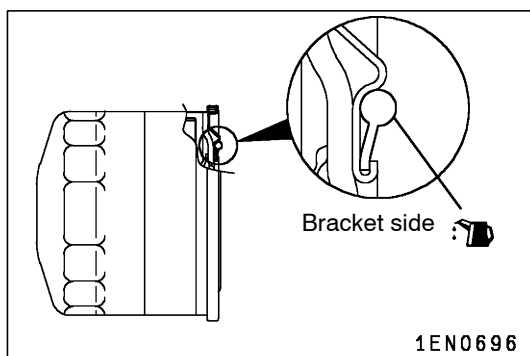


►M◄ DRAIN PLUG GASKET INSTALLATION

Replace the gasket with a new part, and install at the direction shown in the illustration.

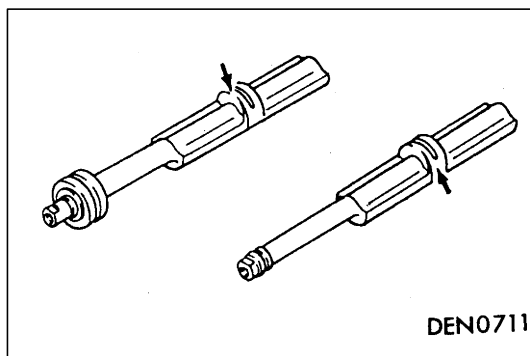
Caution

Incorrect installation direction will lead to oil leaks.



►N◄ OIL FILTER INSTALLATION

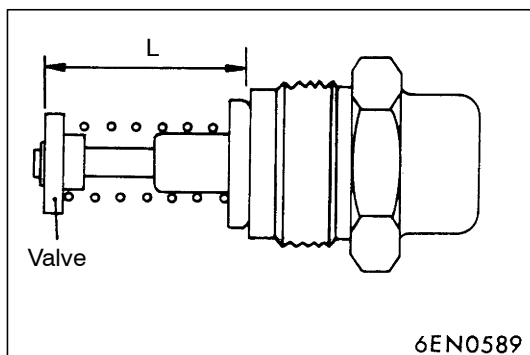
1. Clean the installation surface on the cylinder block side.
2. Apply engine oil on the O-ring for the oil filter.
3. Screw in the oil filter, and tighten approx. 3/4 of a rotation (approx. $14 \pm 2 \text{ N}\cdot\text{m}$) from where the O-ring contacts the installation surface.



INSPECTION

1. COUNTER BALANCE SHAFT

- (1) Make sure that the oil hole is not clogged.
- (2) Check the journal (bearing section) for seizure or damage, and check the state of contact with the bearings. If any faults are found, replace the counter balance shaft, bearing or oil pump case assembly.



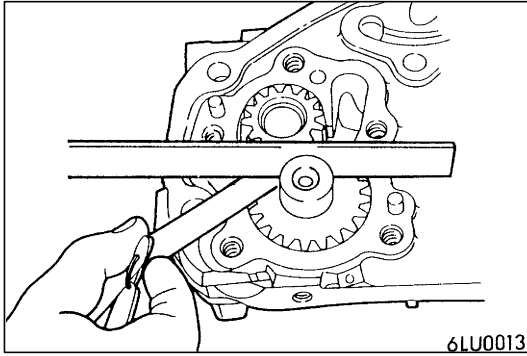
2. OIL COOLER BYPASS VALVE

- (1) The valve must move smoothly.
- (2) The L dimension must be at the standard value at a constant temperature, constant humidity state.

Standard value: 34.5 mm

- (3) The protruded dimensions must be at the standard value after submerging into 100°C oil.

Standard value: 40 mm



3. OIL PUMP

- (1) Assemble the drive gear and driven gear into the oil pump case.
- (2) Inspect the side clearance with a thickness gauge.


Standard value:

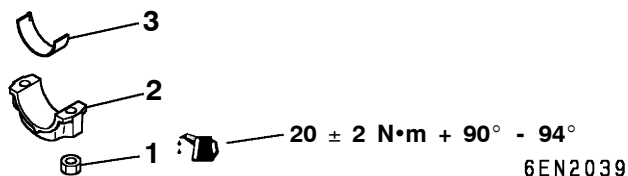
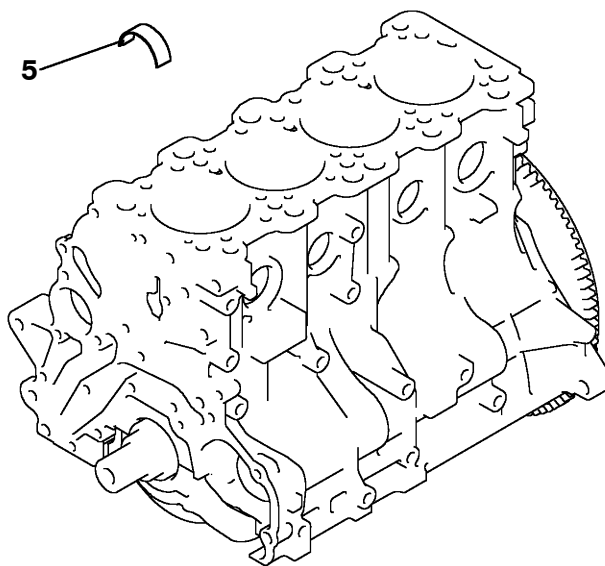
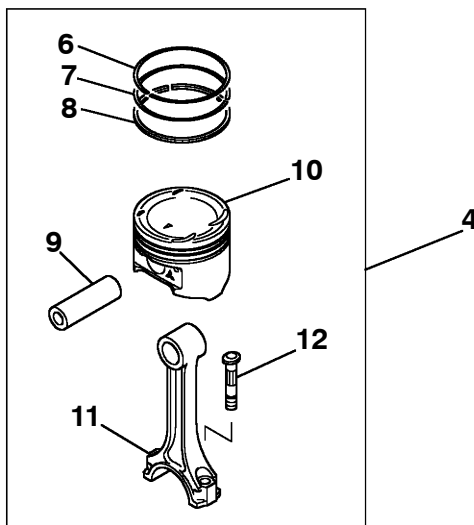
Drive gear 0.08 - 0.14 mm

Driven gear 0.06 - 0.12 mm

PISTON AND CONNECTING ROD

REMOVAL AND INSTALLATION

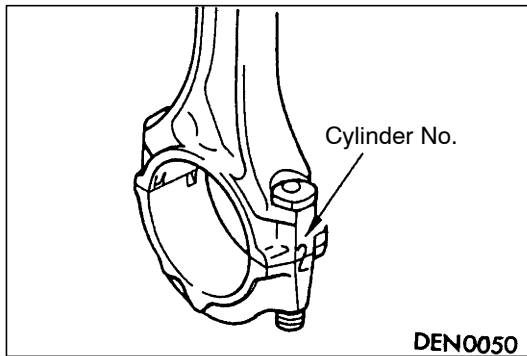
 Apply engine oil on all sliding sections before installing.



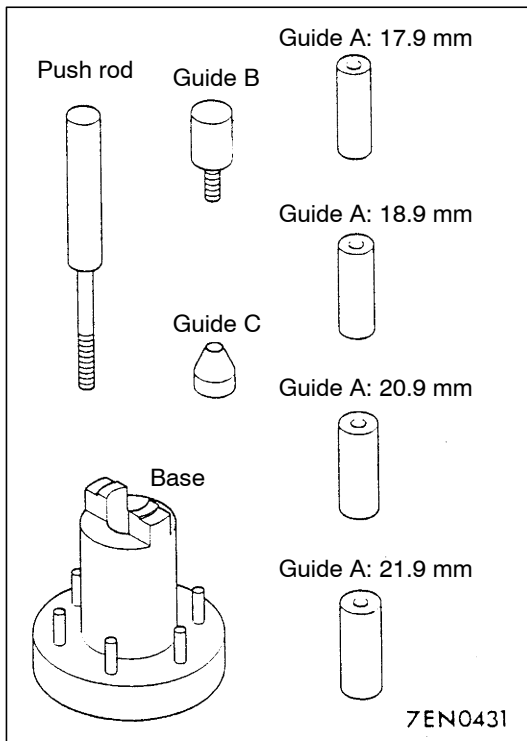
Removal steps

- ◀A▶** **▶G▶** 1. Connecting rod cap nut
- ▶F▶** 2. Connecting rod cap
- ▶E▶** 3. Connecting rod bearing
- ▶D▶** 4. Piston connecting rod
- ▶C▶** 5. Connecting rod bearing
- ▶C▶** 6. Piston ring No. 1

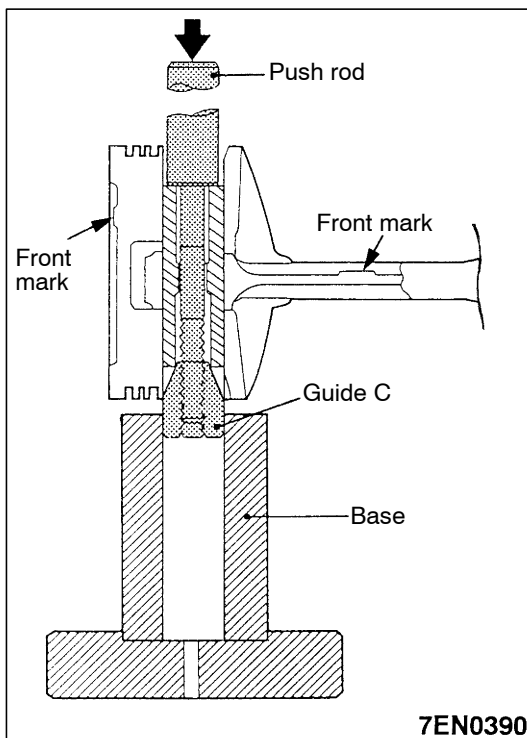
- ▶C▶** 7. Piston ring No. 2
- ▶B▶** 8. Oil ring
- ▶A▶** 9. Piston pin
- ▶B▶** 10. Piston
- 11. Connecting rod
- 12. Bolt

**REMOVAL SERVICE POINTS****◀A▶ CONNECTING ROD CAP REMOVAL**

Note the cylinder No. on the side of the connecting rod's large end for identification during reassembly.

**◀B▶ PISTON PIN REMOVAL**

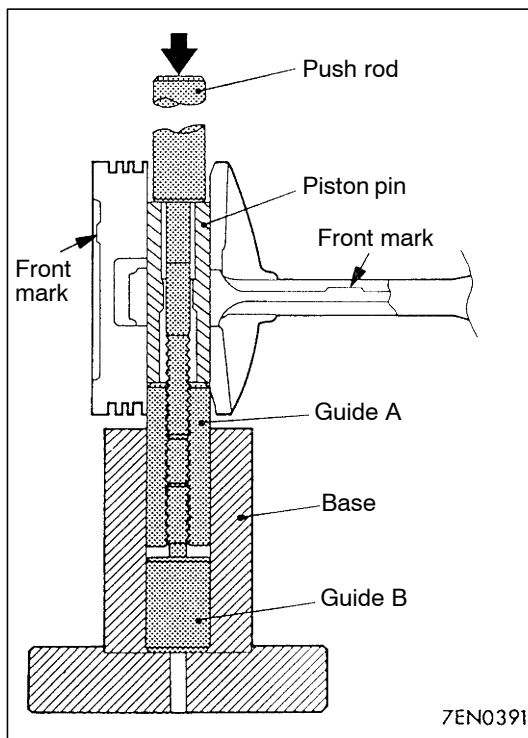
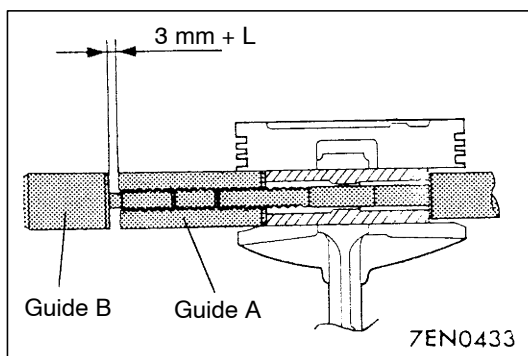
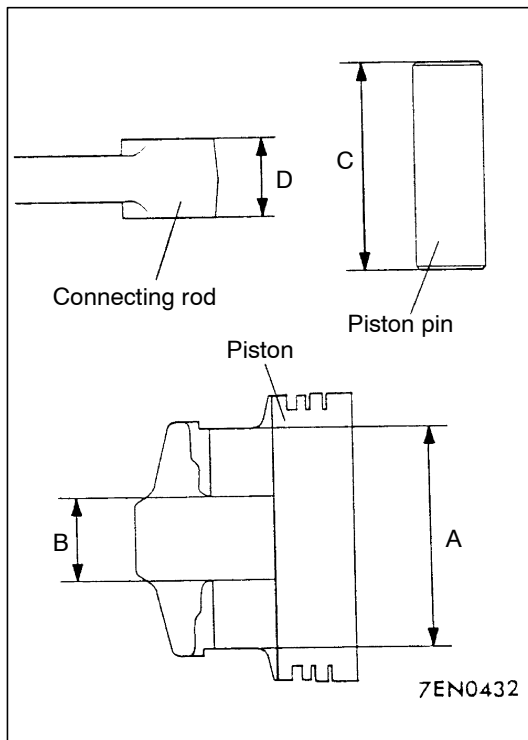
The special tool's piston pin setting tool (MD998780) is configured of the parts shown in the left illustration.



1. Insert the special tool's push rod in from the front mark (arrow) side of the piston's front face, and install guide C.
2. Set the piston and connecting rod assembly onto the special tool's piston pin setting base so that the front mark faces upward.
3. Push out the piston pin using a press.

NOTE

After removing the piston pin, group the piston, piston pin and connecting rod for each cylinder No.



INSTALLATION SERVICE POINTS

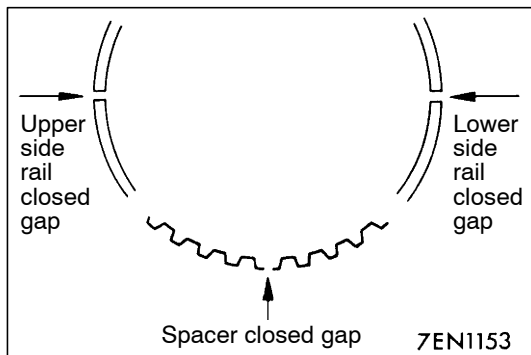
▶A◀ PISTON PIN INSTALLATION

1. Measure the length of the following parts.
 A : Piston pin installation section
 B : Between piston boss
 C : Piston pin
 D : Connecting rod
2. Calculate using the following expression.

$$L = ((A - C) - (B - D)) \div 2$$
3. Insert the special tool's push rod into the piston pin, and remove guide A.
4. Align the piston and connecting rod front marks, and assemble.
5. Apply engine oil on the periphery of the piston pin.
6. Insert the guide A side of the piston pin assembled in step 3 into the pin hole from the front mark side of the piston.
7. Screw guide B into guide A, and assemble so that the clearance is the value 3 mm more than the value (L) obtained in step 2.

8. Set onto the special tool's piston setting base so that the front mark faces upward.
9. Press in the piston pin using a press. If the press in load is less than the standard value, replace the piston pin (piston assembly), connecting rod or both parts.

Standard value: 7,355 - 17,162 N



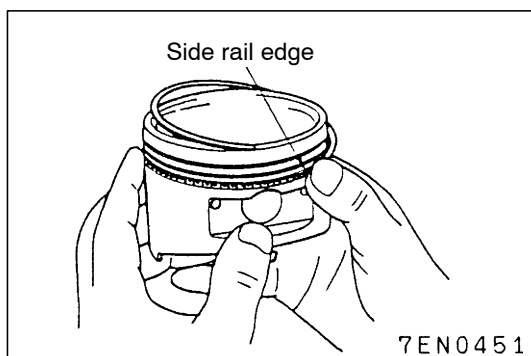
►B◄ OIL RING INSTALLATION

1. Assemble the oil ring's spacer into the piston ring groove. Next, assemble the upper side rail, and then assemble the lower side rail.

NOTE

- (1) Install so that the side rail and spacer closed gaps are at the position shown in the illustration.
- (2) The following identification colours are applied on the spacer and side rail (new parts) according to the size.

Size	Identification colour
S.T.D.	None
0.50 mm O.S.	Blue
1.00 mm O.S.	Yellow

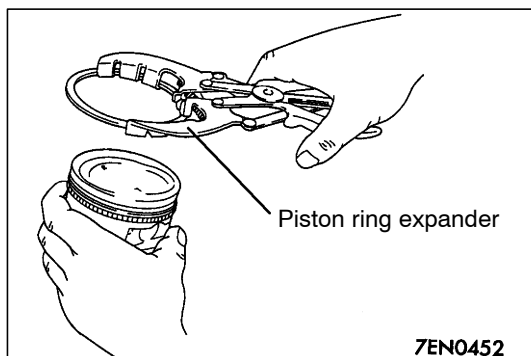


2. The side rail can be assembled easily by fitting one end of the side rail into the piston groove and then pressing on it with fingers as shown in the illustration.

Caution

The side rail's closed gap could break if it is spread open with a ring expander in the same manner as the other piston rings.

3. After assembling into the piston, check that the side rail rotates smoothly in either direction.

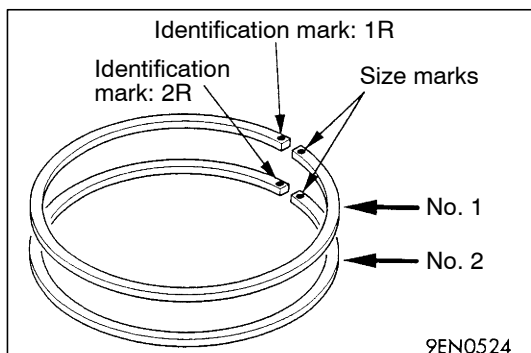


►C◄ PISTON RING NO. 2/PISTON RING NO. 1 INSTALLATION

Using a piston ring expander, assemble the ring with the identification mark facing upward.

Identification mark

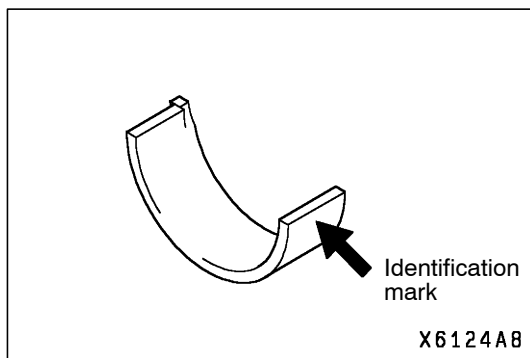
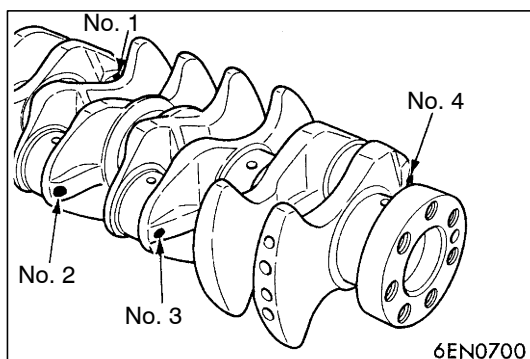
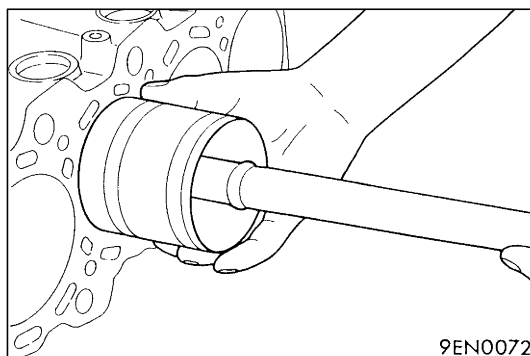
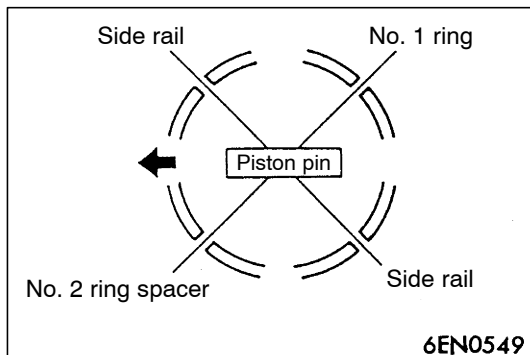
- No. 1 ring 1R
- No. 2 ring 2R



NOTE

The following size marks are stamped on the piston ring according to the size.

Size	Size mark
S.T.D.	(None)
0.50 mm O.S.	50
1.00 mm O.S.	100



►D◄ PISTON AND CONNECTING ROD ASSEMBLY INSTALLATION

1. Apply sufficient engine oil on the piston ring's periphery, piston ring and oil ring.
2. Align the piston ring and oil ring (side rail, spacer) closed gap positions as shown in the illustration.
3. Insert the piston and connecting rod assembly from the top of the cylinder so that the front mark (arrow) on the piston's front face faces the camshaft sprocket side.
4. Securely hold the piston ring with a ring band, and insert the piston and connecting rod assembly.

Caution

- (1) The piston ring could break if tapped in with force.
- (2) Make sure not to contact the oil jet when tapping in.

►E◄ CONNECTING ROD BEARING INSTALLATION

When replacing the bearing, use the following procedure to select and assemble the bearing.

1. Measure the diameter of the crankshaft pin, and confirm the class shown below.
When using a spare part, each identification colour is painted at the position shown in the illustration.
2. The identification marks of the connecting rod bearings are attached at the position shown in the illustration.

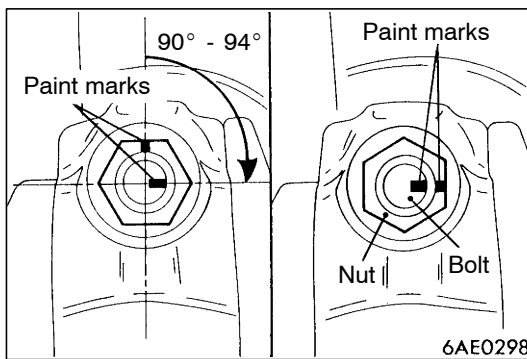
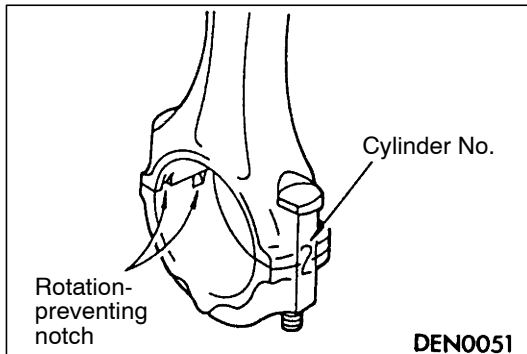
Crankshaft pin section				Connect- ing rod bearing
Class	Product identifica- tion colour	Spare part iden- tification colour	Diameter mm	Identifica- tion mark
1	None	Yellow	44.995 - 45.000	0
2	None	None	44.985 - 44.995	1
3	None	White	44.980 - 44.985	2

3. Select the bearing from the above table according to the identification confirmed in steps 1 and 2.

Example of selecting bearing

If the measured outer diameter of the crankshaft pin is 44.996 mm, Class 1 applies, and the spare part identification colour is yellow. Thus, select a bearing with identification mark 0.

- If there is no identification, measure the oil clearance and select.



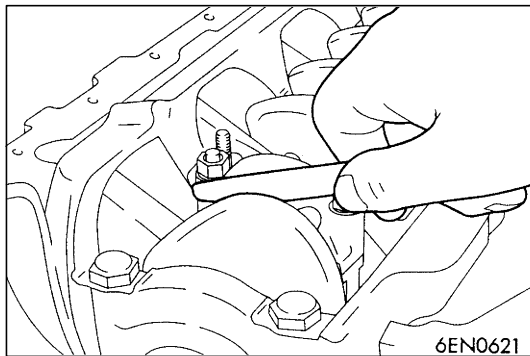
►F◄ CONNECTING ROD CAP INSTALLATION

- Align the marks made during disassembly, and install the bearing cap onto the connecting rod. When using a new connecting rod that has no match marks, assemble so that the bearing rotation-preventing notch comes to the same side as shown in the illustration.
- The plasticity range tightening method is adopted for the connecting rod bolt and nut, so elongate and inspect the bolt before reusing it. Inspect that the bolt is elongated to the extent that the nut can be screwed onto the last thread when screwed by hand. If the nut cannot be screwed on smoothly to the end, the bolt threads are elongated and the bolt must be replaced.
- Apply engine oil on the nut's threads and seat surface before installing the nut.
- After installing each nut onto the bolt with fingers, alternately tighten the nuts to assemble the cap correctly.
- Tighten the nut at a 20 N•m torque.
- Make a paint mark on the head of the nut.
- Using the position of the mark painted on the nut as reference, make paint marks on the bolt at the 90° to 94° positions in the nut tightening direction.
- Tighten the nut between 90° and 94°, and confirm that the paint marks on the nut and bolt match.

Caution

If the tightening angle is less than 90°, the connection performance may not be attained, so take special care to the tightening angle when tightening.

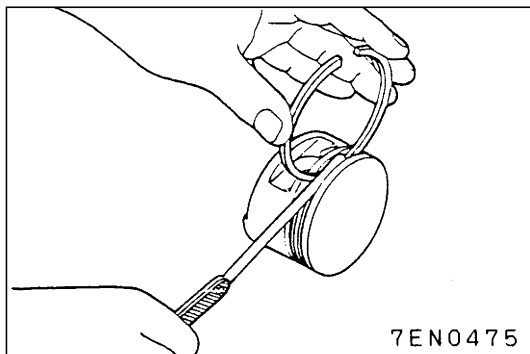
If the tightening angle is larger than 94°, completely loosen the nut and start again from step 1.



9. Check that the thrust clearance at the large end of the connecting rod is correct.

Standard value: 0.10 - 0.25 mm

Limit value: 0.4 mm



INSPECTION

1. PISTON RING

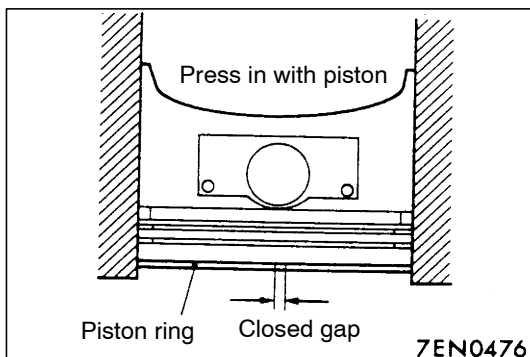
- (1) Inspect the clearance between the piston ring and ring groove. If the limit value is exceeded, replace the piston ring or the piston ring and piston.

Standard value:

No. 1 0.03 - 0.07 mm

No. 2 0.02 - 0.06 mm

Limit value: 0.1 mm



- (2) Place the piston ring and oil ring side rail into the cylinder bore, and contact the piston front face side, and press in. After attaining a right angle, measure the closed gap with a thickness gauge.

NOTE

Press in the closed gap of the piston ring and oil ring's side rail at the position of the piston shown in the illustration, and measure the closed gap.

Standard value:

No. 1 0.20 - 0.30 mm

No. 2 0.35 - 0.50 mm

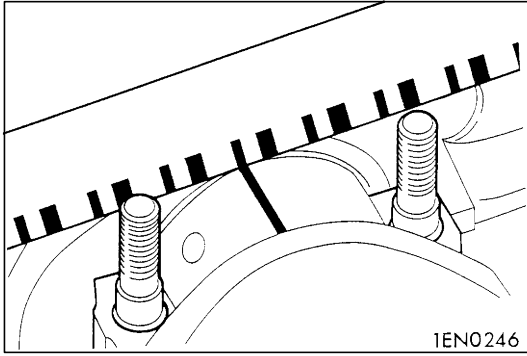
Oil ring 0.10 - 0.40 mm

Standard value:

No. 1 0.8 mm

No. 2 0.8 mm

Oil ring 1.0 mm



2. CRANKSHAFT PIN OIL CLEARANCE (PLASTIC GAUGE METHOD)

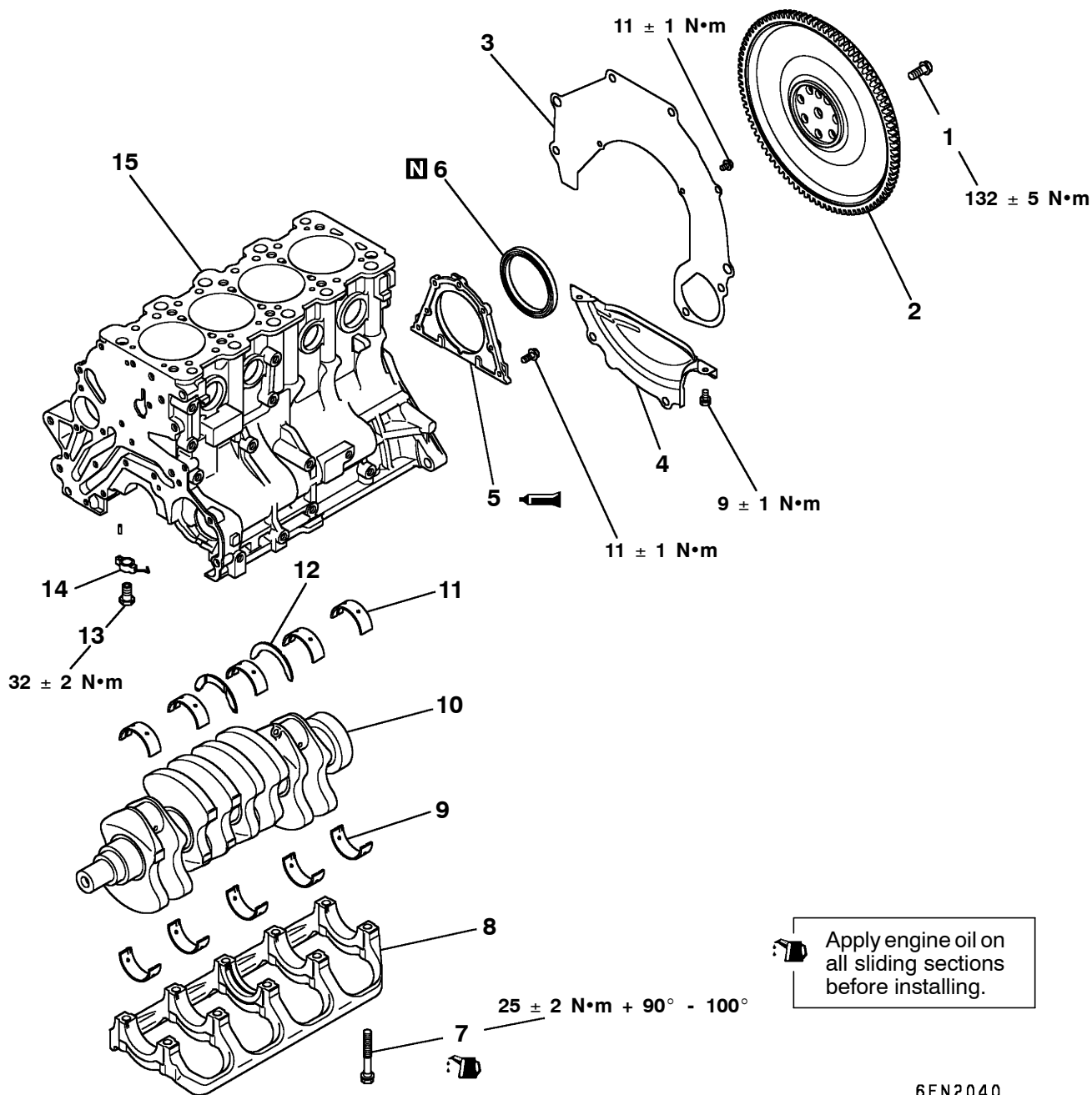
- (1) Wipe off the oil from the crankshaft pin and connecting rod bearing.
- (2) Set a plastic gauge as long as the bearing width on the pin shaft so that straightly aligned with the shaft centre.
- (3) Carefully set the connecting rod cap, and tighten the nut at the specified torque $20 \pm 2 \text{ N}\cdot\text{m} + 90^\circ$ to 94° .
- (4) Remove the nut, and carefully remove the connecting rod cap.
- (5) Measure the width of the crushed plastic gauge (at the section crushed the most) with the scale printed on the plastic gauge bag.

Standard value: 0.03 - 0.05 mm

Limit value: 0.1 mm

CRANKSHAFT AND CYLINDER BLOCK

REMOVAL AND INSTALLATION



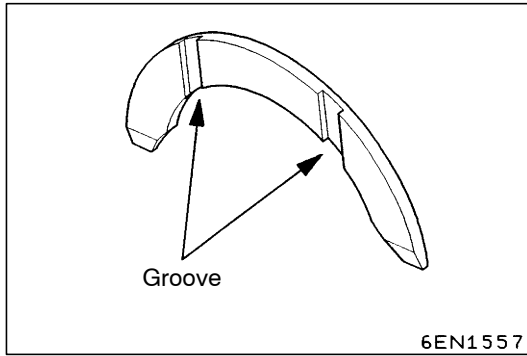
Apply engine oil on all sliding sections before installing.

6EN2040

Removal steps

1. Flywheel bolt
2. Flywheel
3. Rear plate
4. Bell housing cover
5. Rear oil seal case
6. Rear oil seal
7. Bearing cap bolt
8. Beam bearing cap

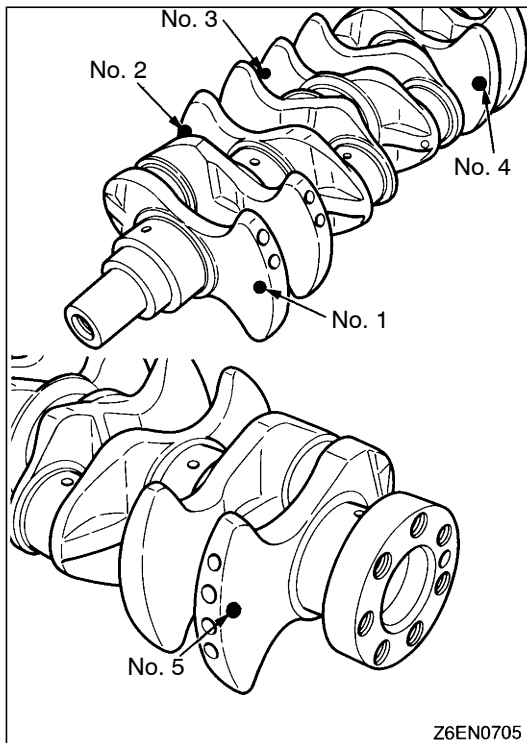
9. Crankshaft bearing lower
10. Crankshaft
11. Crankshaft bearing upper
12. Thrust bearing
13. Check valve
14. Oil jet
15. Cylinder block



INSTALLATION SERVICE POINTS

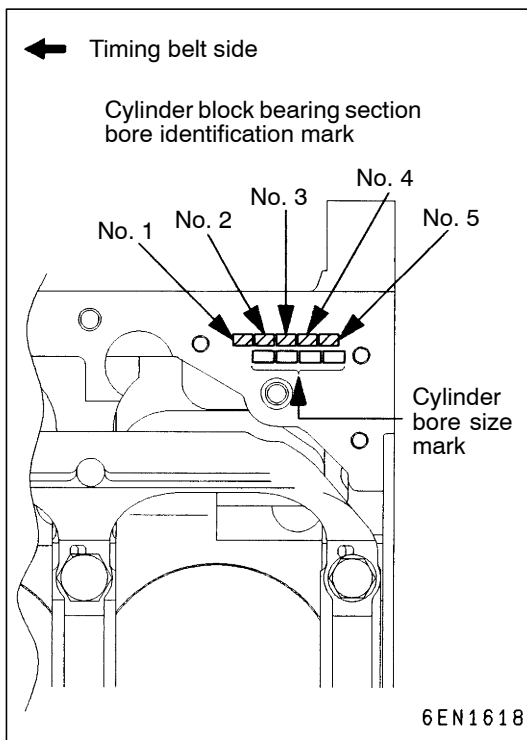
►A◄ THRUST BEARING INSTALLATION

1. Install the thrust bearing onto the cylinder block side of the No. 3 bearing section. The bearing can be installed easily by applying engine oil.
2. Install the thrust bearing so that the side with the groove faces the crankshaft weight side.



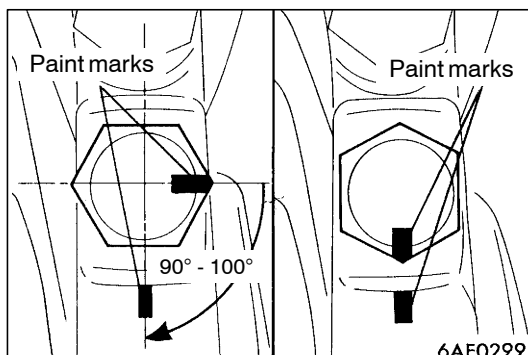
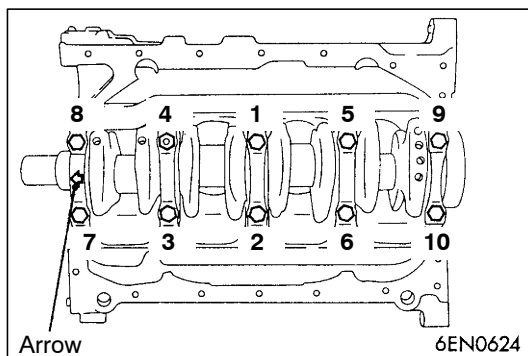
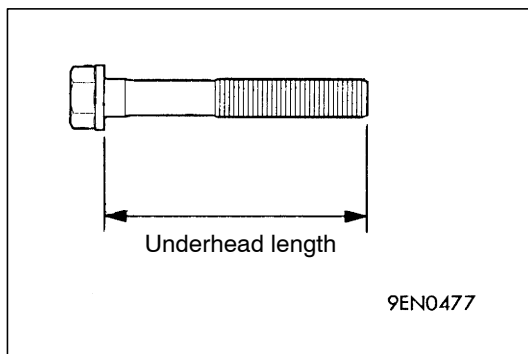
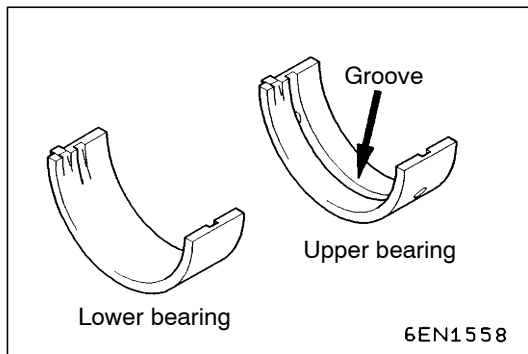
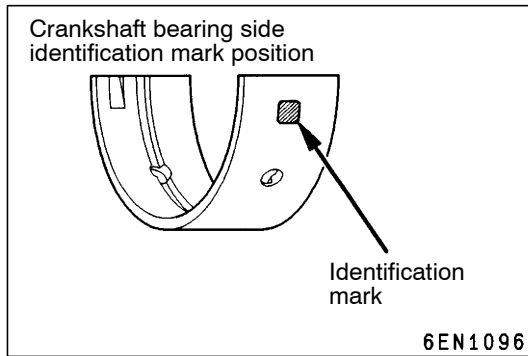
►B◄ CRANKSHAFT BEARING INSTALLATION

1. Measure the diameter of the crankshaft journal, and confirm the class shown below. When using a spare part, each identification colour is painted at the position shown in the illustration.



2. The cylinder block bearing section bore identification mark is stamped at the position shown in the illustration.

Crankshaft journal				Cylinder block bearing section bore identification mark	Spare bearing identification mark
Class	Product identification colour	Spare part identification colour	Journal diameter mm		
1	None	Yellow	56.994 - 57.000	0	0
				1	1
				2	2
2	None	None	56.988 - 56.994	0	1
				1	2
				2	3
3	None	White	56.982 - 56.988	0	2
				1	3
				2	4



3. Select the bearing from the above table according to the identification confirmed in steps 1 and 2.

[Example of selecting bearing]

- (1) If the measured outer diameter of the crankshaft journal is 57.000 mm, Class 1 applies, and the identification colour is yellow.
 - (2) If the cylinder block bearing bore identification mark is 0, select identification mark 0 in consideration of step (1).
4. Install the grooved bearing on the cylinder block side.
 5. Install the bearing with no oil groove onto the beam bearing cap side.

▶◀ BEAM BEARING CAP/BEARING CAP BOLT INSTALLATION

1. Install the beam bearing cap with the arrow facing the timing belt side.
2. Before installing the bearing cap bolt, confirm that the bolt's underhead length is less than the limit value. Replace the bolt if it exceeds the limit value.

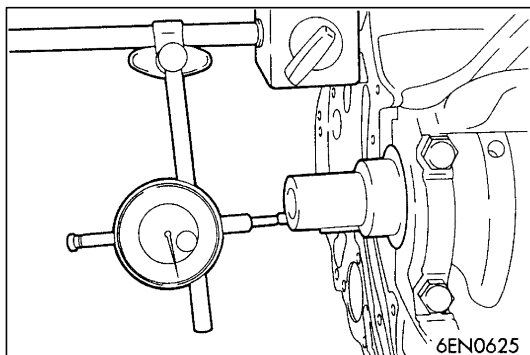
Limit value: 71.1 mm

3. Apply engine oil on the bolt threads and bolt surface.
4. Following the tightening order, tighten the bearing cap bolt at $25 \pm 2 \text{ N}\cdot\text{m}$.
5. Make paint marks on the bolt head.
6. Using the position of the mark painted on the bolt head as reference, make paint marks on the seat surface at the 90° to 100° positions in the tightening direction.

7. Following the tightening order, tighten the bolt by 90° to 100° , and confirm that the paint marks made on the bolt and seat surface match.

Caution

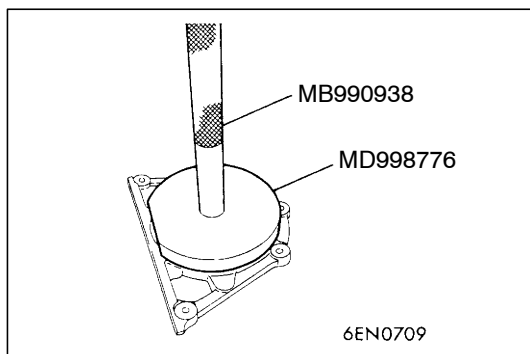
- (1) If the tightening angle is less than 90° , the connection performance may not be attained, so take special care when tightening.
- (2) If the tightening angle exceeds 100° , completely loosen the nut, and start again from step 1.



- After installing the beam bearing cap, inspect the end play of the crankshaft. If the end play exceeds the limit value, replace the crankshaft bearing.

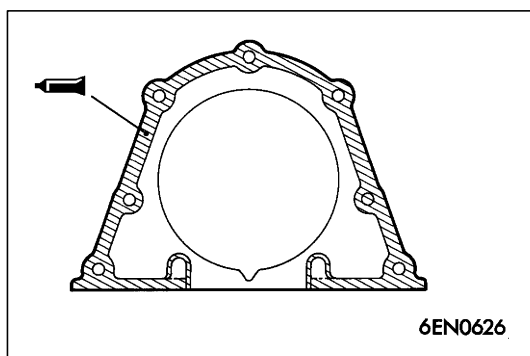
Standard value: 0.05 - 0.25 mm

Limit value: 0.4 mm



►D◄ REAR OIL SEAL INSTALLATION

Press in the rear oil seal using the special tool.



►E◄ REAR OIL SEAL CASE INSTALLATION

- Apply form-in-place gasket onto the rear oil seal case at the position shown in the illustration.

Form-in-place gasket

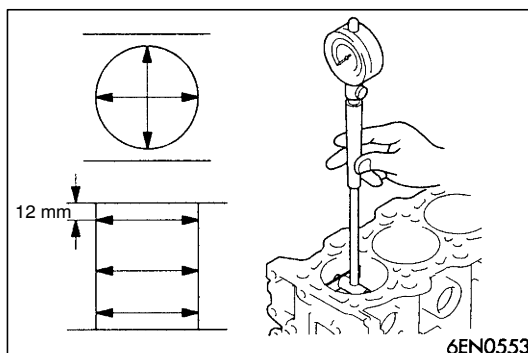
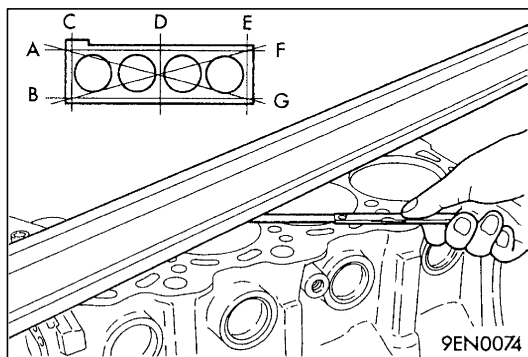
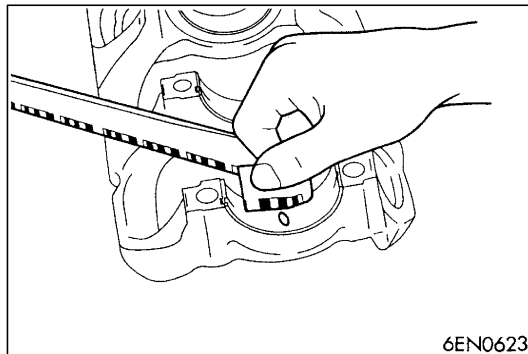
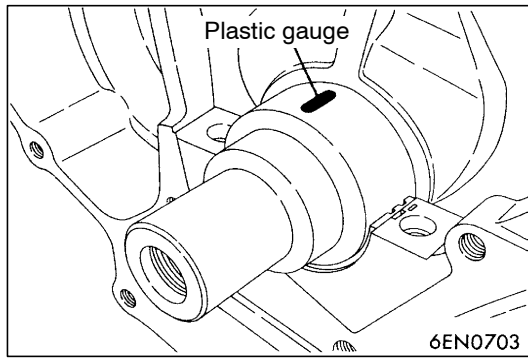
Specified gasket:

Mitsubishi Genuine Part No. MD970389 or equivalent

Caution

Evenly squeeze out the form-in-place gasket so that it is not insufficient or excessive.

- Apply an appropriate amount of engine oil on the entire periphery of the oil seal lip, and install on the cylinder block.



INSPECTION

1. CRANKSHAFT OIL CLEARANCE (PLASTIC GAUGE METHOD)

The oil clearance can be measured easily by using the "plastic gauge".

Use the following steps to use the "plastic gauge".

- (1) Wipe off all oil from the crankshaft's outer diameter and bearing's inner diameter.
- (2) Assemble the crankshaft.
- (3) Set a plastic gauge as long as the bearing width on the journal shaft so that straightly aligned with the shaft centre.
- (4) Carefully install the beam bearing cap, and tighten the bolt at the specified torque $25 \pm 2 \text{ N}\cdot\text{m} + 90^\circ$ to 100° .
- (5) Remove the bolt, and carefully remove the beam bearing cap.
- (6) Measure the width of the crushed plastic gauge (at the section crushed the most) with the scale printed on the plastic gauge bag.

Standard value: 0.03 - 0.04 mm

Limit value: 0.1 mm

2. CYLINDER BLOCK

- (1) Visually check for the presence of scratches, rusting, or corrosion, and using flaw detection agent, etc., check for cracks. If any faults are found, repair or replace the part.
- (2) Using a straight edge and thickness gauge, measure the flatness of the cylinder block's upper surface. Make sure that no gasket pieces, etc., are adhered to the upper surface of the cylinder block when measuring.

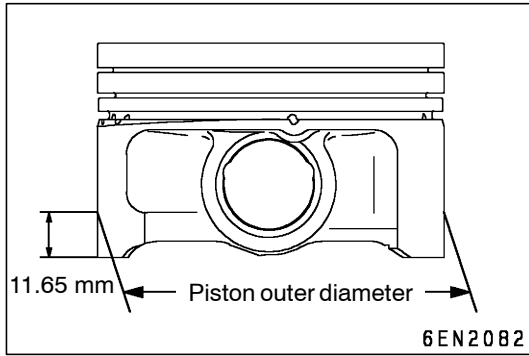
Standard value: 0.05 mm

Limit value: 0.1 mm

- (3) Check for the presence of scratches or seizure on the cylinder wall. If any faults are found, repair (over size) or replace the part.
- (4) Using a cylinder gauge, measure the inner diameter and cylindricity of the cylinder. If greatly worn, repair the cylinder to the over size, and replace the piston ring.

Standard value: 85.0 mm

Cylindricity: 0.01 mm



3. CYLINDER BORING

- (1) Select the oversized piston to be used using the maximum inner diameter cylinder as a reference.
- (2) There are two types of oversized pistons (0.50 mm, 1.00 mm), so bore so that the clearance is at the specified value that matches the piston's outer diameter. The reference points for measuring the piston's outer diameter are shown in the illustration.
- (3) Calculate the boring finish dimensions based on the piston outer diameter measurement value.
Boring finish dimension = Piston outer diameter + 0.02 to 0.04 mm (clearance with cylinder) - 0.02 mm (honing margin)
- (4) Bore each cylinder to the boring finish dimensions calculated above.

Caution

To prevent strain caused by a temperature rise during boring, bore in the order of the No. 2 → No. 4 → No. 1 → No. 3 cylinders.

- (5) Hone to the final finish dimension (piston outer diameter + clearance with cylinder).
- (6) Confirm the clearance between the piston and cylinder.

Standard value: 0.02 - 0.04 mm

NOTES

ENGINE LUBRICATION

CONTENTS

GENERAL INFORMATION	2	ON-VEHICLE SERVICE	4
SERVICE SPECIFICATIONS	3	Engine Oil Check	4
SEALANT	3	Engine Oil Replacement	4
LUBRICANTS	3	Oil Filter Replacement	5
SPECIAL TOOL	3	Oil Pressure Check	5
		ENGINE OIL COOLER	7



GENERAL INFORMATION

The lubrication method is a fully force-fed, full-flow filtration type. The oil pump is a gear type which is driven by the crankshaft via the timing belt.

ENGINE OILS

Health Warning

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially

harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities must be provided.

Recommended Precautions

The most effective precaution is to adapt working practices which prevent, as far as practicable, the risk of skin contact with mineral oils, for example by using enclosed systems for handling used engine oil and by degreasing components, where practicable, before handling them.

Other precautions:

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Avoid contaminating clothes, particularly underpants, with oil.
- Do not put oily rags in pockets, the use of overalls without pockets will avoid this.
- Do not wear heavily soiled clothing and oil-impregnated foot-wear. Overalls must be cleaned regularly and kept separate from personal clothing.

- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.
- Obtain First Aid treatment immediately for open cuts and wounds.
- Wash regularly with soap and water to ensure all oil is removed, especially before meals (skin cleansers and nail brushes will help). After cleaning, the application of preparations containing lanolin to replace the natural skin oils is advised.
- Do not use petrol, kerosine, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin after work.
- If skin disorders develop, obtain medical advice without delay.

SERVICE SPECIFICATIONS

Items		Standard value
Oil pressure kPa	at idle	29 or more
	at 3,500 r/min	294 - 686

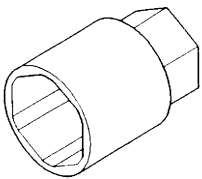
SEALANT

Items	Specified sealant	Remark
Oil pressure switch	3M ATD Part No. 8660 or equivalent	Semi-drying sealant

LUBRICANTS

Items		Specifications
Engine oil ACEA classification	For Europe	A1, A2, A3
Engine oil API classification	For Europe	SG or higher
	For General Export	SE or higher
Engine oil quantity L	Oil filter	0.3
	Oil cooler	0.3
	Total	5.1

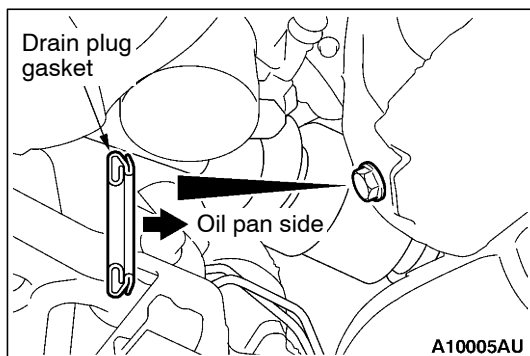
SPECIAL TOOL

Tool	Number	Name	Use
	MD998054	Oil pressure switch wrench	Removal and installation of oil pressure switch

ON-VEHICLE SERVICE

ENGINE OIL CHECK

1. Pull out the level gauge slowly and check that the oil level is in the illustrated range.
2. Check that the oil is not excessively dirty, that there is no coolant or petrol mixed in, and that it has sufficient viscosity.



ENGINE OIL REPLACEMENT

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C.
2. Remove the engine oil filler cap.
3. Remove the drain plug to drain oil.

Caution

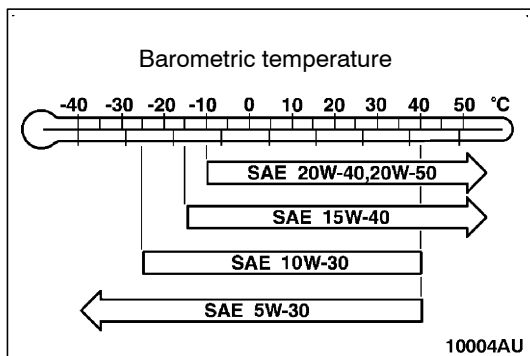
Use care as oil could be hot.

4. Install a new drain plug gasket so that it faces in the direction shown in the illustration, and then tighten the drain plug to the specified torque.

Tightening torque: 39 ± 5 N·m

NOTE

Install the drain plug gasket so it faces in the direction shown in the illustration.



5. Refill with specified quantity of oil.

Specified Engine Oil (ACEA and API classification):

<For Europe>

ACEA A1, A2, A3 / API SG or higher

<For General Export>

API SE or higher

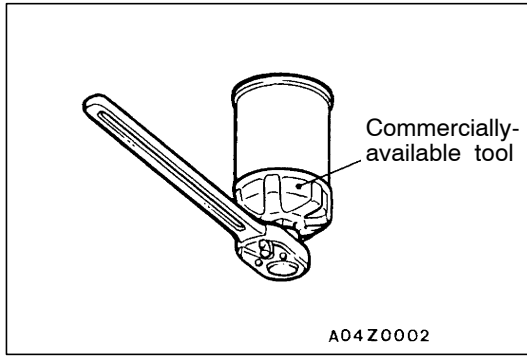
Total quantity

**(Includes volume inside oil filter and oil cooler):
5.1 L**

NOTE

SAE 5W-30 can be only used at the area where the lowest temperature is lower than the applicable temperature of SAE 5W-30.

6. Install the engine oil filler cap.
7. Check oil level.



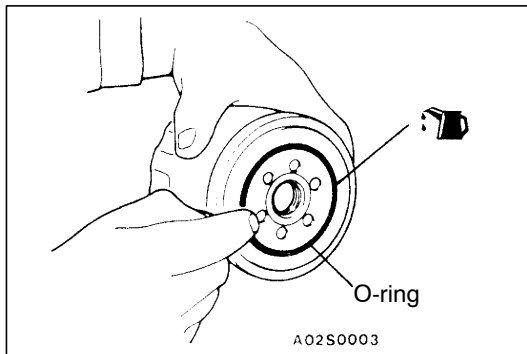
OIL FILTER REPLACEMENT

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C.
2. Remove the engine oil filler cap.
3. Remove the drain plug to drain oil.

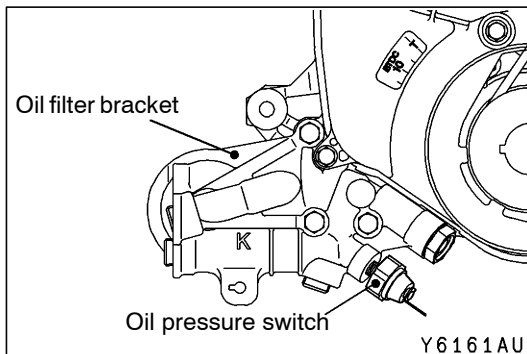
Caution

Use care as oil could be hot.

4. Remove the under cover.
5. Use the respective tool in the following table to remove the engine oil filter.
6. Clean the filter bracket side mounting surface.

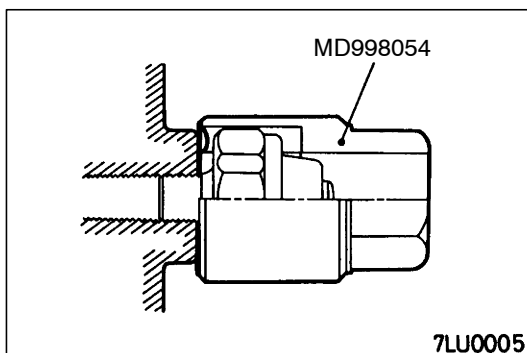


7. Apply a small amount of engine oil to the O-ring of the new oil filter.
8. Once the O-ring of the oil filter is touching the flange, use the generic tool to turn for approximately 3/4 round and tighten to $(14 \pm 2 \text{ N}\cdot\text{m})$.
9. Install the drain plug and refill the engine oil. (Refer to Engine Oil Replacement P.12-4.)
10. Race the engine 2-3 times, and check to be sure that no engine oil leaks from installation section of the oil filter.



OIL PRESSURE CHECK

1. Check engine oil quantity.
2. Remove the oil pressure switch terminal.



3. Use the special tool (oil pressure switch wrench) to remove the oil pressure switch.

Caution

Since sealant is applied to the thread of oil pressure switch, take care not to damage the oil pressure switch when removing it.

4. Install the oil pressure gauge.

NOTE

Use a adapter of PT 1/8 thread.

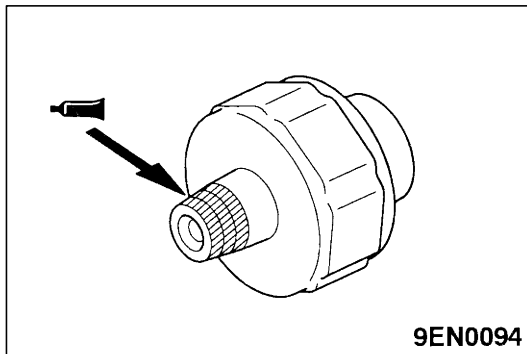
5. Run the engine to warm it.
6. After the engine has been warmed up, check that oil pressure is within the standard value.

Standard value:

At idle: 29 kPa or more

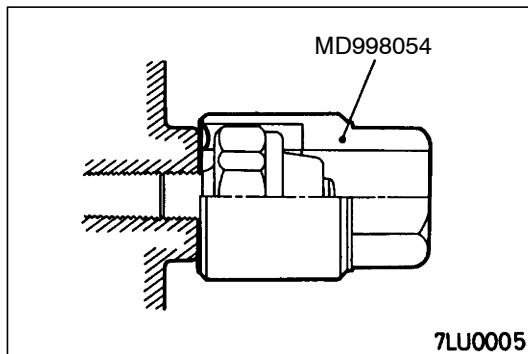
At 3,500 r/min: 294 - 686 kPa

7. Remove the oil pressure gauge.



8. Apply the specified sealant to the thread of oil pressure switch.

Specified sealant: 3M ATD Part No. 8660 or equivalent



9. Use the special tool to tighten the oil pressure switch to the specified torque.

Tightening torque: 10 ± 2 N·m

Caution

Do not start the engine within one hour after the oil pressure switch has been installed.

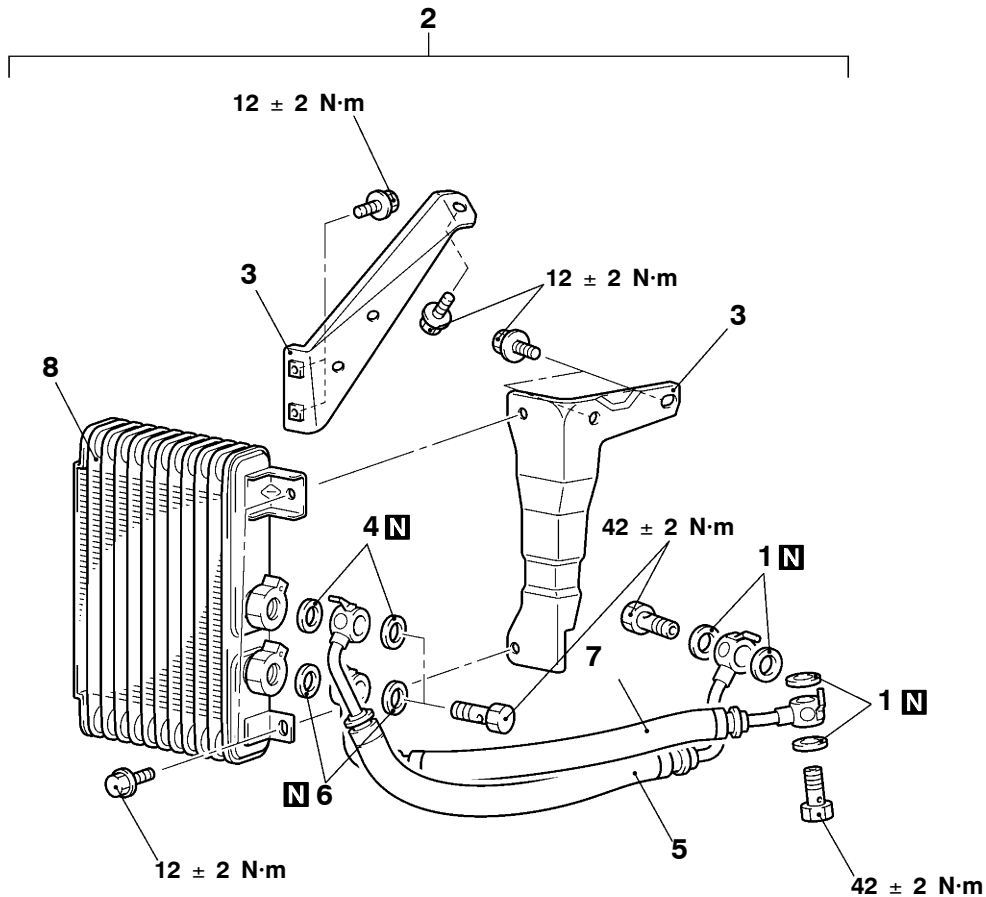
10. Install the oil pressure switch terminal.

ENGINE OIL COOLER**REMOVAL AND INSTALLATION****Caution**

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.

Pre-removal and Post-installation Operation

- Engine Oil Draining and Supplying (Refer to P.12-4.)
- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Side Cover Removal and Installation



AY2069AU

Removal steps

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Engine oil cooler tube gasket 2. Engine oil cooler, bracket and hose assembly 3. Engine oil cooler bracket 4. Engine oil cooler tube gasket | <ol style="list-style-type: none"> 5. Engine oil cooler feed hose 6. Engine oil cooler tube gasket 7. Engine oil cooler return hose 8. Engine oil cooler |
|---|--|

NOTES

FUEL

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MULTIPOINT FUEL INJECTION (MPI)

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GENERAL INFORMATION

The Multipoint Fuel Injection System consists of sensors which detect the engine conditions, the engine-ECU which controls the system based on signals from these sensors, and actuators which operate under the control of the engine-ECU. The engine-ECU carries out

activities such as fuel injection control, idle speed control and ignition timing control. In addition, the engine-ECU is equipped with several diagnosis modes which simplify troubleshooting when a problem develops.

FUEL INJECTION CONTROL

The injector drive times and injector timing are controlled so that the optimum air/fuel mixture is supplied to the engine to correspond to the continually-changing engine operation conditions.

A single injector is mounted at the intake port of each cylinder. Fuel is sent under pressure from the fuel tank by the fuel pump, with the pressure being regulated by the fuel pressure regulator. The fuel thus regulated is distributed to each of the injectors.

Fuel injection is normally carried out once for each cylinder for every two rotations of the crankshaft. The firing order is 1-3-4-2. This is

called sequential fuel injection. The engine-ECU provides a richer air/fuel mixture by carrying out "open-loop" control when the engine is cold or operating under high load conditions in order to maintain engine performance. In addition, when the engine is warm or operating under normal conditions, the engine-ECU controls the air/fuel mixture by using the oxygen sensor signal to carry out "closed-loop" control in order to obtain the theoretical air/fuel mixture ratio that provides the maximum cleaning performance from the three way catalyst.

IDLE AIR CONTROL

The idle speed is kept at the optimum speed by controlling the amount of air that bypasses the throttle valve in accordance with changes in idling conditions and engine load during idling. The engine-ECU drives the idle speed control motor to keep the engine running at the pre-set idle target speed in accordance with the engine coolant temperature and air

conditioner load. In addition, when the air conditioner switch is turned off and on while the engine is idling, the idle speed control motor operates to adjust the throttle valve bypass air amount in accordance with the engine load conditions in order to avoid fluctuations in the engine speed.

IGNITION TIMING CONTROL

The power transistor located in the ignition primary circuit turns ON and OFF to control the primary current flow to the ignition coil. This controls the ignition timing in order to provide the optimum ignition timing with respect to the

engine operating conditions. The ignition timing is determined by the engine-ECU from the engine speed, intake air volume, engine coolant temperature and barometric pressure.

SELF-DIAGNOSIS FUNCTION

- When an abnormality is detected in one of the sensors or actuators related to emission control, the engine warning lamp (check engine lamp) illuminates as a warning to the driver.
- When an abnormality is detected in one of the sensors or actuators, a diagnosis code corresponding to the abnormality is output.

- The RAM data inside the engine-ECU that is related to the sensors and actuators can be read by means of the MUT-II. In addition, the actuators can be force-driven under certain circumstances.

OTHER CONTROL FUNCTIONS

1. Fuel Pump Control
Turns the fuel pump relay ON so that current is supplied to the fuel pump while the engine is cranking or running.
2. A/C Relay Control
Turns the compressor clutch of the A/C ON and OFF.
3. Fan Motor Control
The revolutions of the radiator fan and condenser fan are controlled in response to the engine coolant temperature and vehicle speed.
4. Purge Control Solenoid Valve Control
Refer to GROUP 17.
5. EGR Control Solenoid Valve Control
Refer to GROUP 17.

GENERAL SPECIFICATIONS

Items		Specifications
Throttle body	Throttle bore mm	60
	Throttle position sensor	Variable resistor type
	Idle speed control servo	Stepper motor type (Stepper motor type by-pass air control system with the air volume limiter)
Engine-ECU	Identification No.	E6T34874
Sensors	Air flow sensor	Karman vortex type
	Barometric pressure sensor	Semiconductor type
	Intake air temperature sensor	Thermistor type
	Engine coolant temperature sensor	Thermistor type
	Oxygen sensor	Zirconia type
	Vehicle speed sensor	Magnetic resistive element type
	Camshaft position sensor	Hall element type
	Crank angle sensor	Hall element type
	Detonation sensor	Piezoelectric type
	Power steering fluid pressure switch	Contact switch type
Actuators	Engine control relay type	Contact switch type
	Fuel pump relay type	Contact switch type
	Injector type and number	Electromagnetic type, 4
	Injector identification mark	MDL560
	EGR control solenoid valve	Duty cycle type solenoid valve
	Purge control solenoid valve	Duty cycle type solenoid valve
	Fuel pressure control solenoid valve	ON/OFF type solenoid valve
	Waste gate solenoid valve	Duty cycle type solenoid valve
	Secondary air control solenoid valve	ON/OFF type solenoid valve
Fuel pressure regulator	Regulator pressure kPa	294

MULTI-POINT FUEL INJECTION SYSTEM DIAGRAM

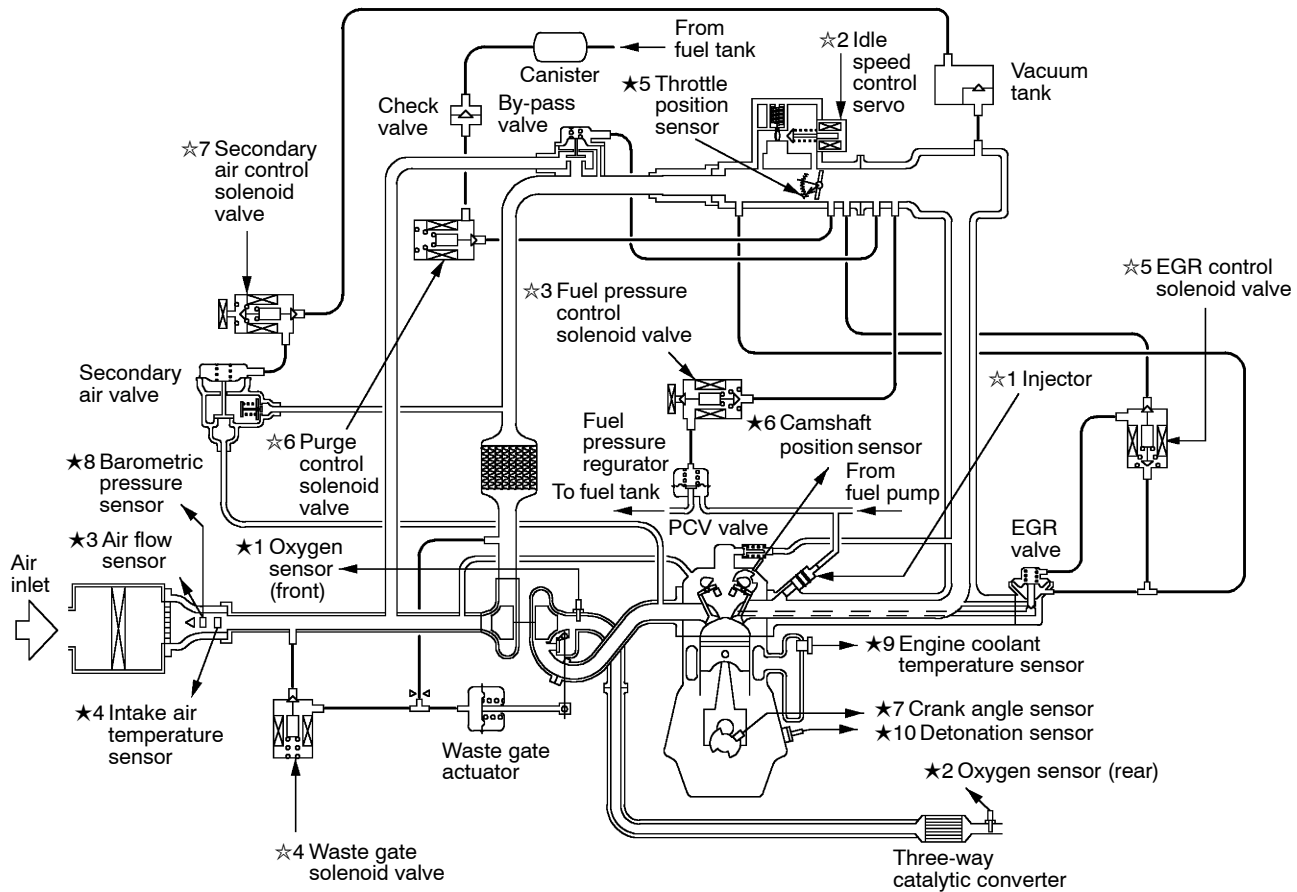
- ★1 Oxygen sensor (front)
- ★2 Oxygen sensor (rear)
- ★3 Air flow sensor
- ★4 Intake air temperature sensor
- ★5 Throttle position sensor
- ★6 Camshaft position sensor
- ★7 Crank angle sensor
- ★8 Barometric pressure sensor
- ★9 Engine coolant temperature sensor
- ★10 Detonation sensor

- Power supply
- Ignition switch IG
- Ignition switch ST
- Vehicle speed sensor
- A/C switch
- A/C load signal
- Tachometer
- Power steering fluid pressure switch
- Alternator FR terminal
- Diagnosis control terminal
- Intercooler water spray switch (automatic)
- Intercooler water spray switch (manual)

- ☆1 Injector
- ☆2 Idle speed control servo
- ☆3 Fuel pressure control solenoid valve
- ☆4 Waste gate solenoid valve
- ☆5 EGR control solenoid valve
- ☆6 Purge control solenoid valve
- ☆7 Secondary air control solenoid valve

- Engine control relay
- Fuel pump relay 2, 3
- A/C relay
- Ignition coil
- Fan controller
- Condenser fan relay (HI)
- Condenser fan relay (LOW)
- Engine warning lamp
- Diagnosis output
- Alternator G terminal
- Intercooler water spray relay
- Intercooler water spray lamp

Engine-ECU



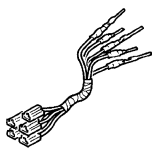
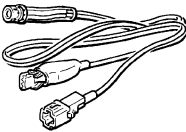
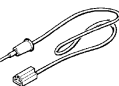

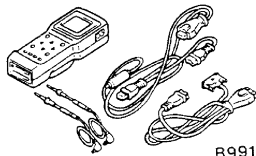
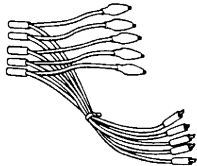
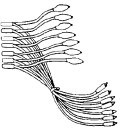
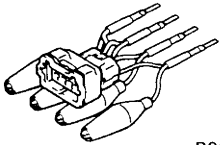
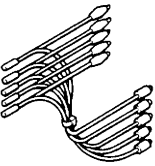
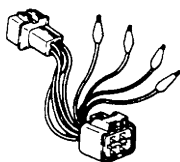
SERVICE SPECIFICATIONS


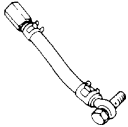

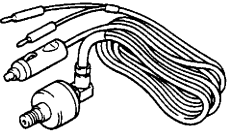
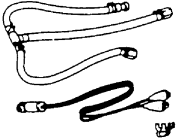
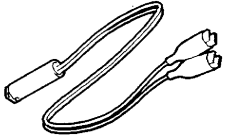
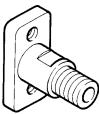
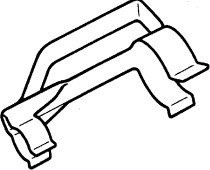
Items		Specifications
Basic idle speed r/min		850 ± 100
Throttle position sensor adjusting voltage mV		535 - 735
Throttle position sensor resistance kΩ		3.5 - 6.5
Idle speed control servo coil resistance (at 20°C) Ω		28 - 33
Intake air temperature sensor resistance kΩ	-20°C	13 - 17
	0°C	5.7 - 6.7
	20°C	2.3 - 3.0
	40°C	1.0 - 1.5
	60°C	0.56 - 0.76
	80°C	0.30 - 0.42
Engine coolant temperature sensor resistance kΩ	-20°C	14 - 17
	0°C	5.1 - 6.5
	20°C	2.1 - 2.7
	40°C	0.9 - 1.3
	60°C	0.48 - 0.68
	80°C	0.26 - 0.36
Oxygen sensor heater resistance (at 20°C) Ω	Front	4.5 - 8.0
	Rear	11 - 18
Oxygen sensor output voltage (at racing) V		0.6 - 1.0
Fuel pressure kPa	Vacuum hose disconnection	289 - 309 at curb idle
	Vacuum hose connection	Approximately 230 at curb idle
Fuel pressure control solenoid valve resistance (at 20°C) Ω		28 - 36
Fuel pump resistor resistance Ω		0.45 - 0.65
Injector coil resistance (at 20°C) Ω		2 - 3
Injector fuel leakage rate Drop/minute		1 or less
Resistor (for injector) resistance (at 20°C) Ω		5.8 - 6.2

SEALANT

Item	Specified sealant	Remark
Engine coolant temperature sensor threaded portion	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

SPECIAL TOOLS

Tool	Number	Name	Use
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>C991223</p>	<p>MB991223</p> <p>A: MB991219</p> <p>B: MB991220</p> <p>C: MB991221</p> <p>D: MB991222</p>	<p>Harness set</p> <p>A: Test harness</p> <p>B: LED harness</p> <p>C: LED harness adapter</p> <p>D: Probe</p>	<ul style="list-style-type: none"> ● Check at the ECU terminals A: Connector pin contact pressure inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection
 <p>B991502</p>	MB991502	MUT-II sub assembly	<ul style="list-style-type: none"> ● Reading diagnosis code ● MPI system inspection
	MB991348	Test harness set	<ul style="list-style-type: none"> ● Inspection using an analyzer
 <p>MB991709</p>	MB991709	Test harness	<ul style="list-style-type: none"> ● Measurement of voltage during troubleshooting ● Inspection using an analyzer ● Idle speed control servo (stepper motor) check
 <p>B991536</p>	MB991536	Check harness for TPS adjustment	<ul style="list-style-type: none"> ● Adjustment of throttle position sensor ● Measurement of voltage during troubleshooting
 <p>B991658</p>	MB991658	Test harness	<ul style="list-style-type: none"> ● Measurement of voltage during troubleshooting ● Inspection using an analyzer
	MD998464	Test harness (4 pin, square)	<ul style="list-style-type: none"> ● Measurement of voltage during troubleshooting ● Oxygen sensor (front) check

Tool	Number	Name	Use
	MD998478	Test harness (3-pin, triangle)	<ul style="list-style-type: none"> ● Measurement of voltage during troubleshooting ● Inspection using an analyzer
	MD998709	Adaptor hose	Measurement of fuel pressure
	MD998742	Hose adaptor	
 <p style="text-align: center;">B991637</p>	MB991637	Fuel pressure gauge set	
	MD998706	Injector test set	
 <p style="text-align: center;">MB991607</p>	MB991607	Injector test harness	Checking the spray condition of injectors
 <p style="text-align: center;">MD998741</p>	MD998741	Injector test adaptor	
	MB991608	Clip	

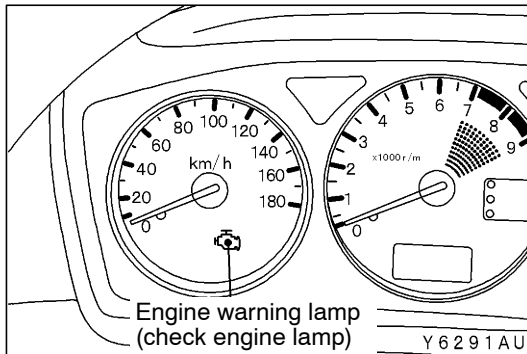
TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Point.

NOTE

If the engine-ECU is replaced, the immobilizer-ECU and ignition key should be replaced together with it.



DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

If an abnormality occurs in any of the following items related to the MPI system, the engine warning lamp will illuminate or flash. If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output.

However, the warning lamp will illuminate as bulb check for 5 seconds whenever the ignition switch is turned to the ON position.

Engine warning lamp inspection items

Code No.	Diagnosis item
-	Engine-ECU
P0100	Air flow sensor system
P0105	Barometric pressure sensor system
P0110	Intake air temperature sensor system
P0115	Engine coolant temperature sensor system
P0120	Throttle position sensor system
P0130	Oxygen sensor (front) system
P0135	Oxygen sensor heater (front) system
P0136	Oxygen sensor (rear) system
P0141	Oxygen sensor heater (rear) system
P0201	No.1 injector system
P0202	No.2 injector system
P0203	No.3 injector system
P0204	No.4 injector system
P0325	Detonation sensor system
P0335	Crank angle sensor system
P0340	Camshaft position sensor system
P0403	EGR control solenoid valve system

Code No.	Diagnosis item
P0443	Purge control solenoid valve system
P0500	Vehicle speed sensor system
P0505	Idle speed control system
P0551	Power steering fluid pressure switch
P1104	Waste gate solenoid valve system
P1105	Fuel pressure control solenoid valve system

NOTE

If the engine warning lamp illuminates because of a malfunction of the engine-ECU, communication between MUT-II and the engine-ECU is impossible. In this case, the diagnosis code cannot be read.

METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING

1. Carry out inspection by means of the data list and the actuator test function. If there is an abnormality, check and repair the chassis harnesses and components.
2. After repairing, re-check using the MUT-II and check that the abnormal input and output have returned to normal as a result of the repairs.
3. Erase the diagnosis code memory.
4. Remove the MUT-II, and then start the engine again and carry out a road test to confirm that the problem has disappeared.

CONFIRMING FREEZE FRAME DATA

When the engine-ECU detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called "Freeze frame" data. By analyzing this "Freeze frame" data with MUT-II, an effective troubleshooting can be performed.

NOTE

If malfunctions have been detected in multiple systems, engine-ECU stores one malfunction only, which has been detected first.

Item No.	Data item	Unit/State	Item No.	Data item	Unit/State
21	Engine coolant temperature sensor	°C	81	Learn value	%
22	Crank angle sensor	r/min	82	Feedback	%
24	Vehicle speed	km/h	87	Engine load	%

FAIL-SAFE FUNCTION REFERENCE TABLE

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

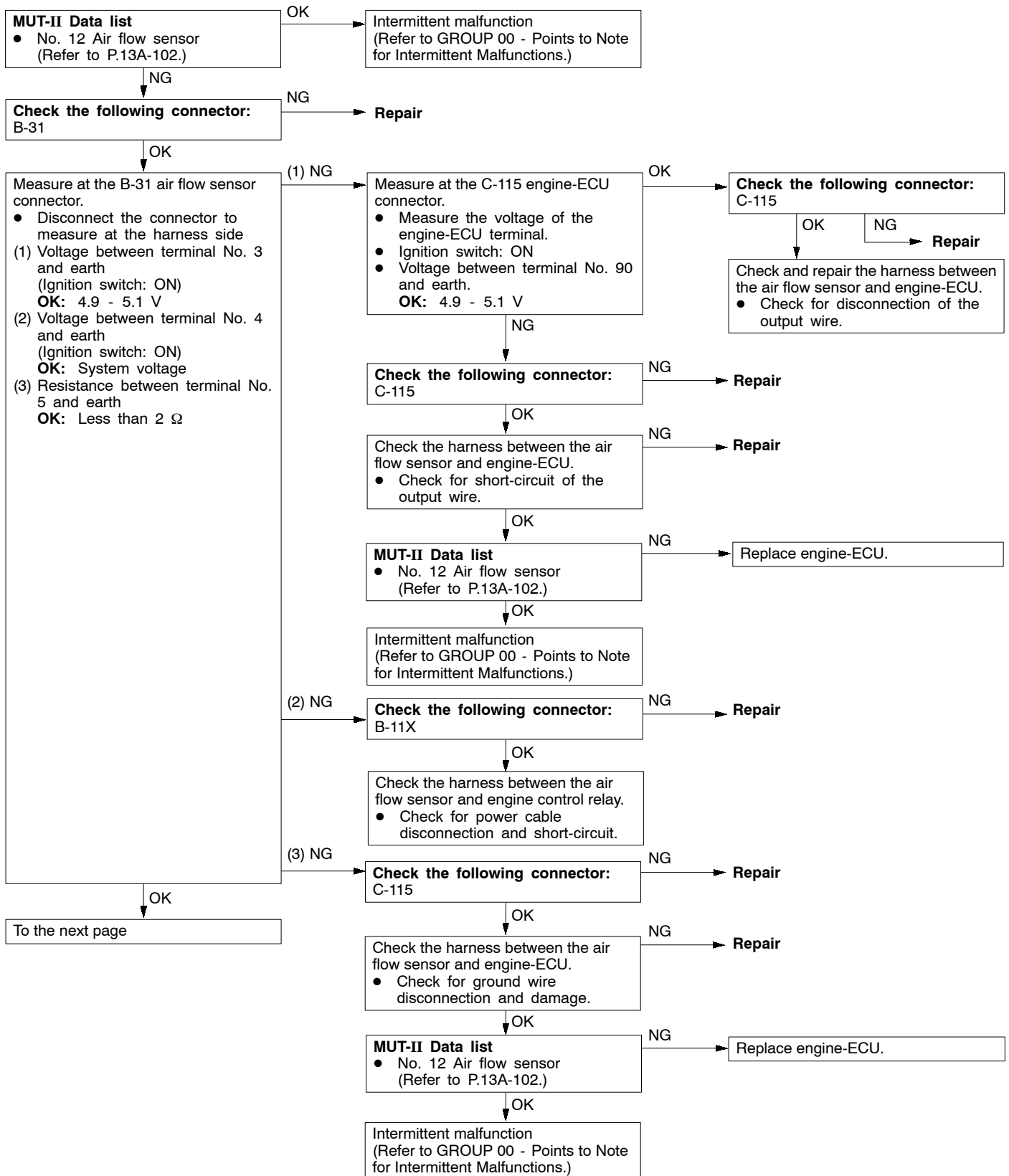
Malfunctioning item	Control contents during malfunction
Air flow sensor	<ol style="list-style-type: none"> 1. Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping. 2. Fixes the idle speed control servo in the appointed position so idle control is not performed.
Intake air temperature sensor	Controls as if the intake air temperature is 25°C.
Throttle position sensor	No increase in fuel injection amount during acceleration due to the throttle position sensor signal.
Engine coolant temperature sensor	<ol style="list-style-type: none"> 1. Controls as if the engine coolant temperature is 80°C. (Even after sensor signal is correctly recovered, continues until the ignition switch is set to the "LOCK" (OFF) position.) 2. Rotates radiator fan and condenser fan at high speed.
Camshaft position sensor	<ol style="list-style-type: none"> 1. Inject all fuel cylinders simultaneously. (However, when the No.1 cylinder top dead centre is not detected at all after the ignition switch is turned to "ON" position.) 2. Shuts off fuel supply after 4 seconds have passed since a failure was detected. (However, when the No.1 cylinder top dead centre is not detected at all after the ignition switch is turned to "ON" position.)
Barometric pressure sensor	Controls as if the barometric pressure is 101 kPa.
Detonation sensor	Switches the ignition timing from ignition timing for super petrol to ignition timing for standard petrol.
Alternator FR terminal	Does not control the output of the alternator according to an electrical load. (works as a normal alternator)

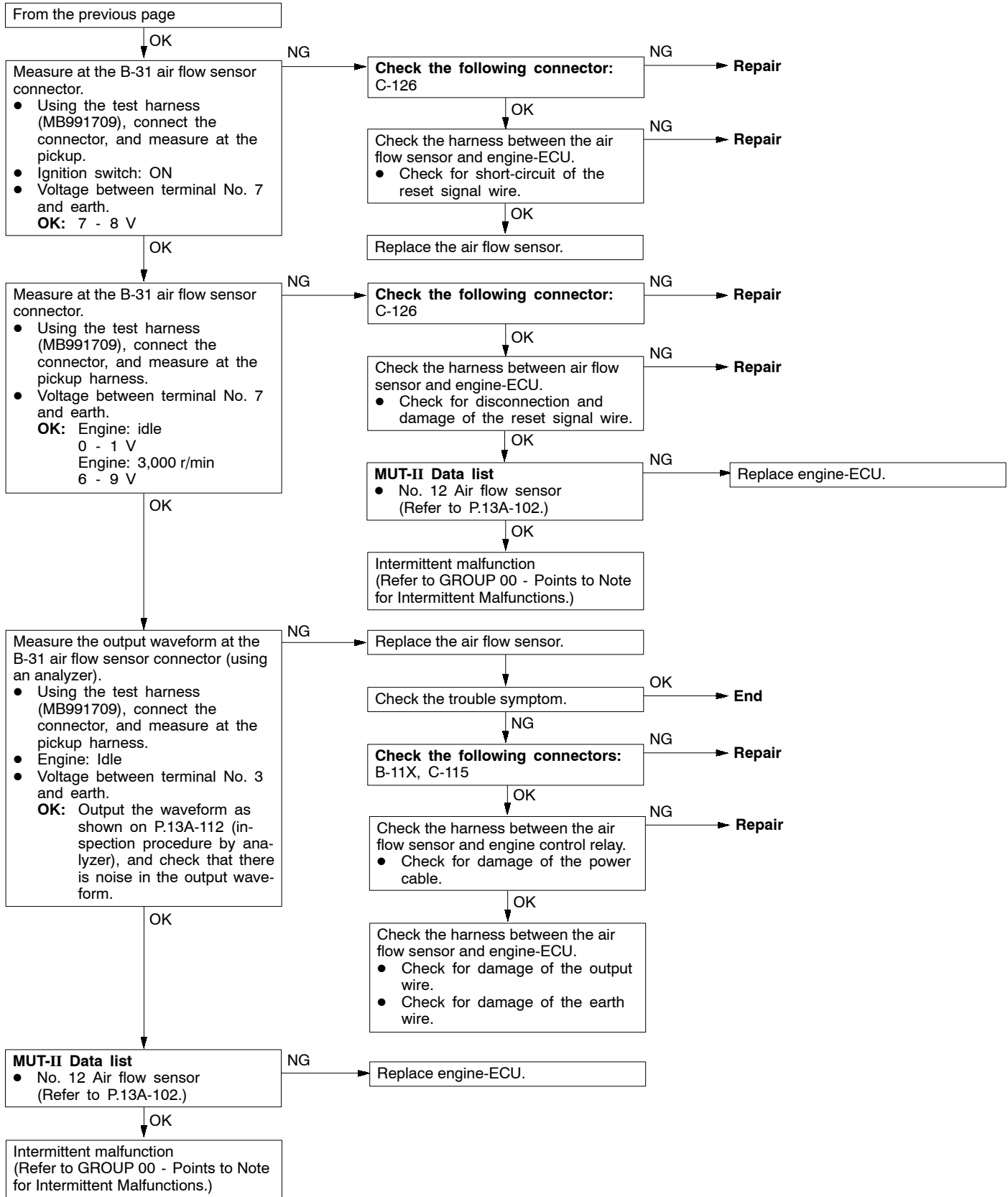
INSPECTION CHART FOR DIAGNOSIS CODES

Code No.	Diagnosis item	Reference page
P0100	Air flow sensor system	13A-13
P0105	Barometric pressure sensor system	13A-15
P0110	Intake air temperature sensor system	13A-16
P0115	Engine coolant temperature sensor system	13A-19
P0120	Throttle position sensor system	13A-21
P0130	Oxygen sensor (front) system	13A-24
P0135	Oxygen sensor heater (front) system	13A-26
P0136	Oxygen sensor (rear) system	13A-27
P0141	Oxygen sensor heater (rear) system	13A-29
P0201	No.1 injector system	13A-30
P0202	No.2 injector system	13A-31
P0203	No.3 injector system	13A-32
P0204	No.4 injector system	13A-33
P0325	Detonation sensor system	13A-34
P0335	Crank angle sensor system	13A-35
P0340	Camshaft position sensor system	13A-37
P0403	EGR control solenoid valve system	13A-39
P0443	Purge control solenoid valve system	13A-41
P0500	Vehicle speed sensor system	13A-43
P0505	Idle speed control system	13A-44
P0551	Power steering fluid pressure switch system	13A-46
P1104	Waste gate solenoid valve system	13A-47
P1105	Fuel pressure control valve system	13A-48
P1500	Alternator FR terminal system	13A-49
P1603	Battery backup line malfunction	13A-50
P1610	Immobilizer system	13A-51

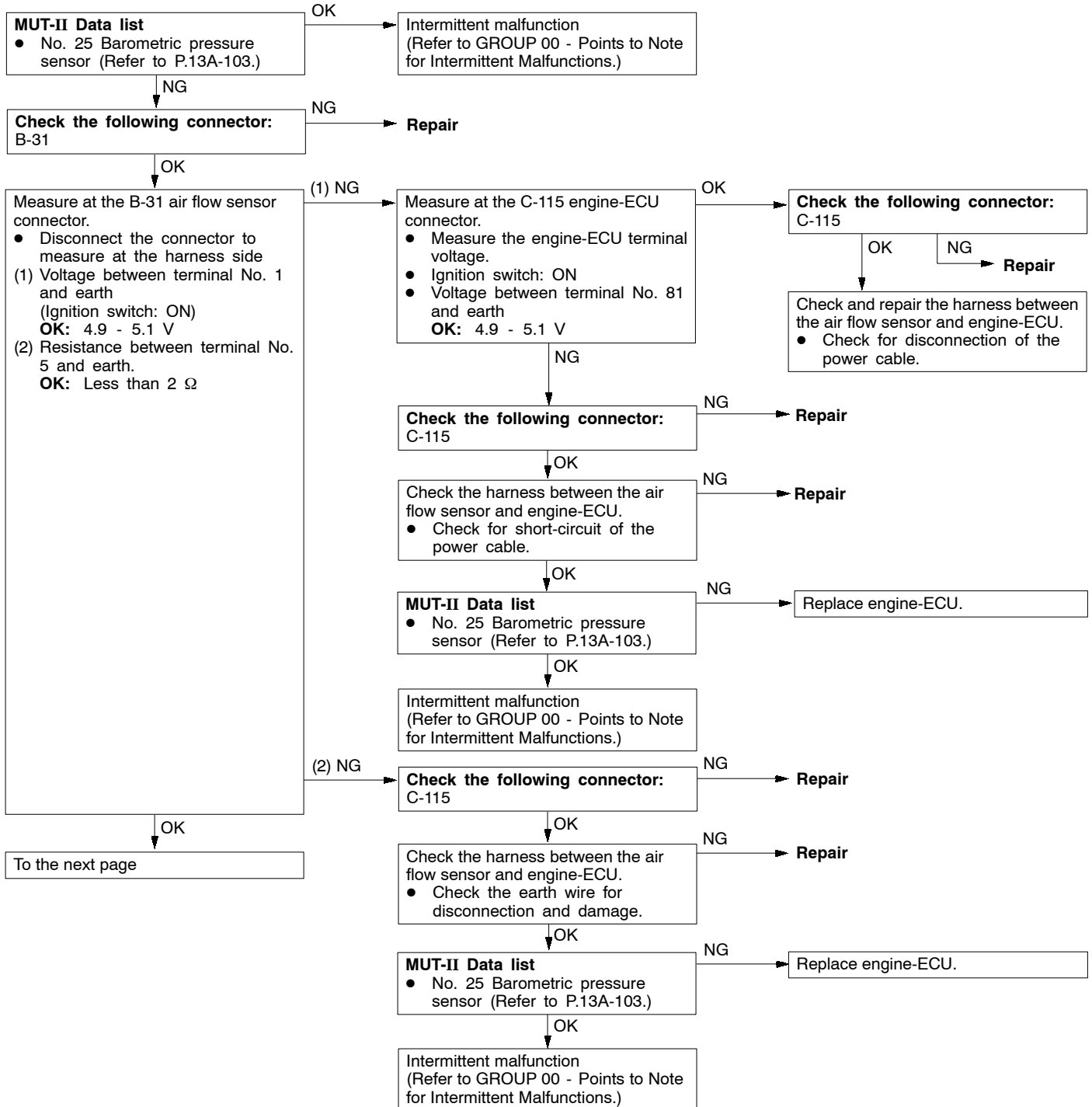
DIAGNOSTIC TROUBLE CODE INSPECTION PROCEDURE

Code No. P0100 Air flow sensor system	Probable cause
Inspection Range ● Engine speed: More than 500 r/min Evaluation Conditions ● The sensor output frequency is less than 3 Hz for 4 seconds.	● Air flow sensor malfunction ● Air flow sensor circuit disconnection, short-circuit, or connector contact defect ● Engine-ECU malfunction

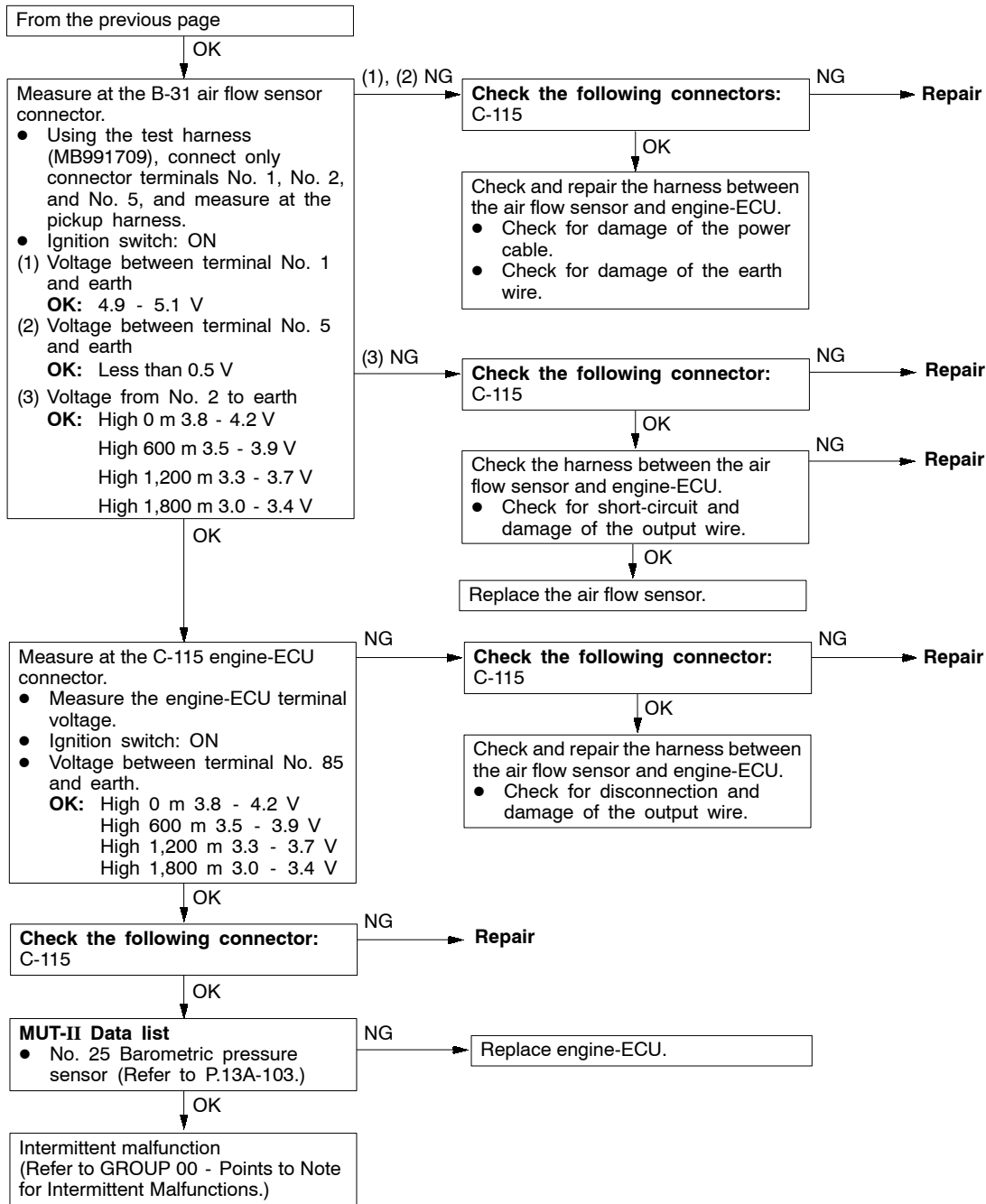




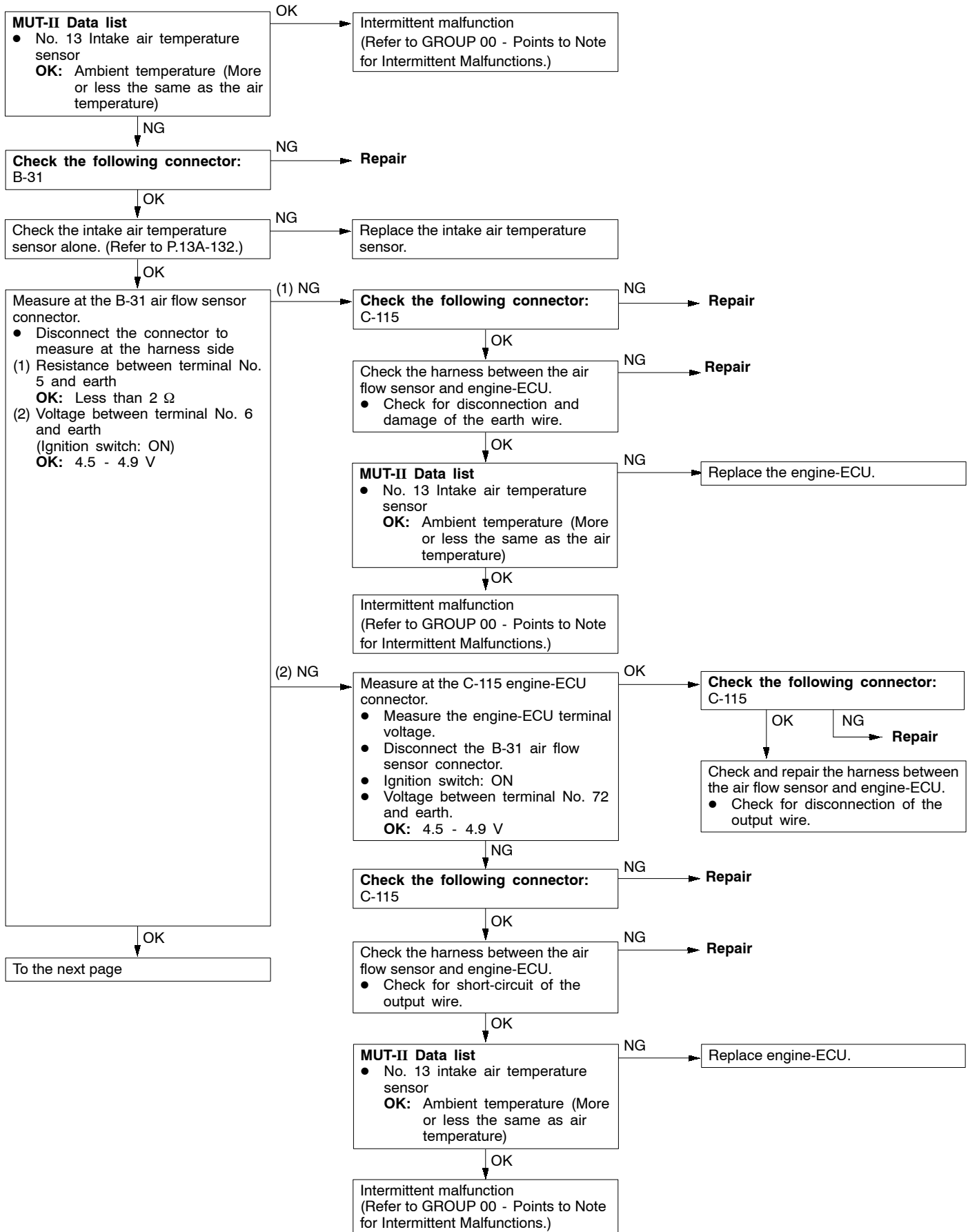
Code No. P0105 Barometric pressure sensor system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> 2 seconds after the ignition switch is set to the "ON" position, or after the completion of start of engine. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> The sensor output voltage is more than 4.5 V for 4 seconds (Equivalent to air pressure of more than 114 kPa) <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is less than 0.2 V for 4 seconds (Equivalent to air pressure of less than 5 kPa) 	<ul style="list-style-type: none"> Barometric pressure sensor malfunction Barometric pressure sensor circuit disconnection, short-circuit, or connector contact defect Engine-ECU malfunction

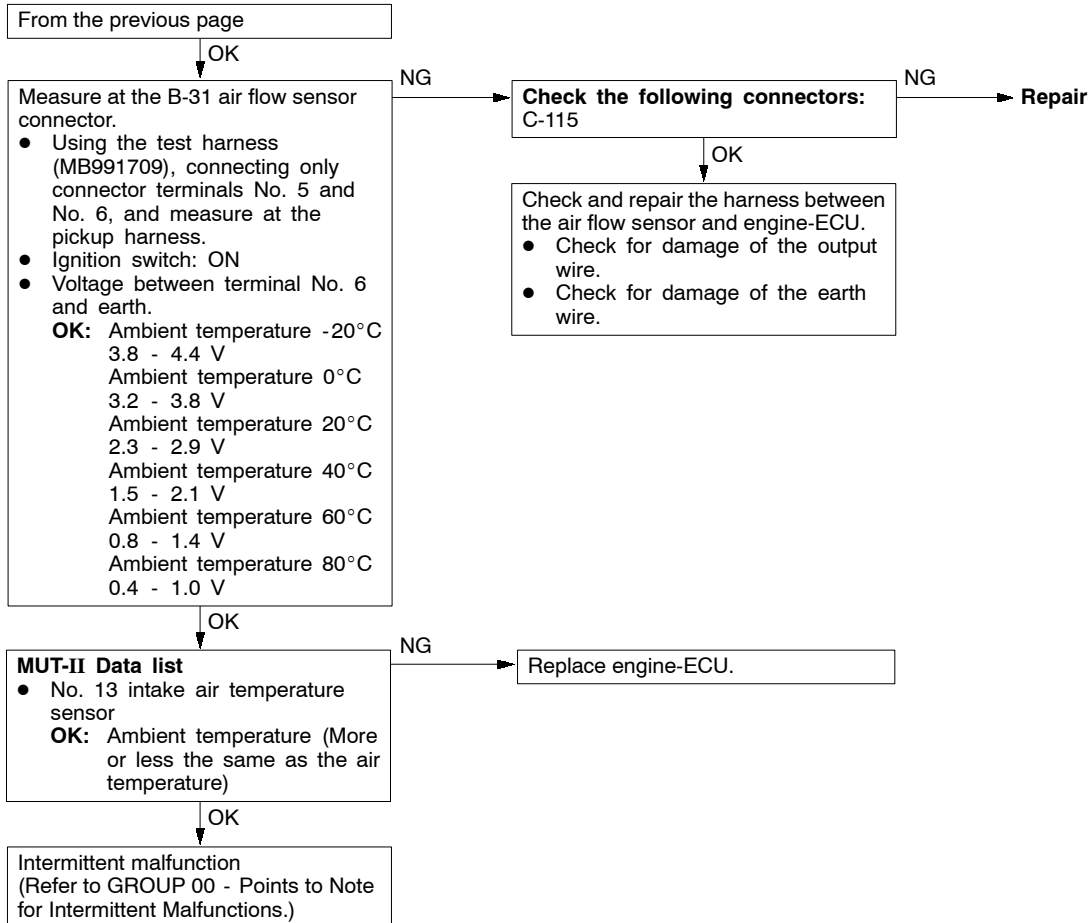


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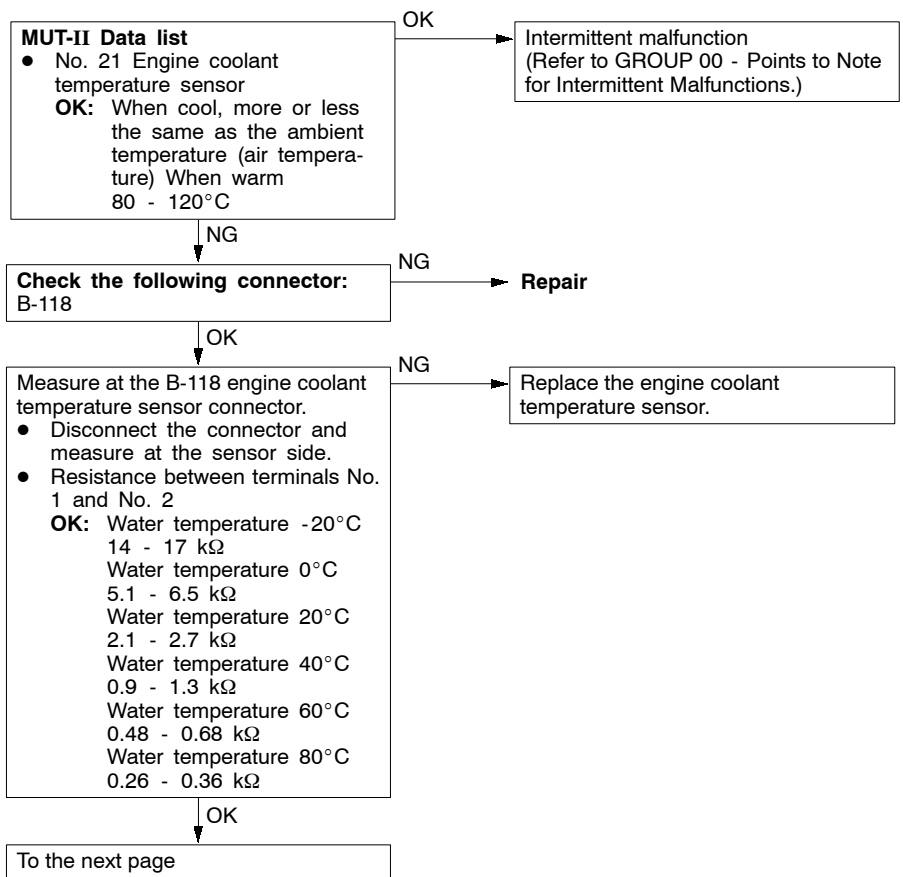


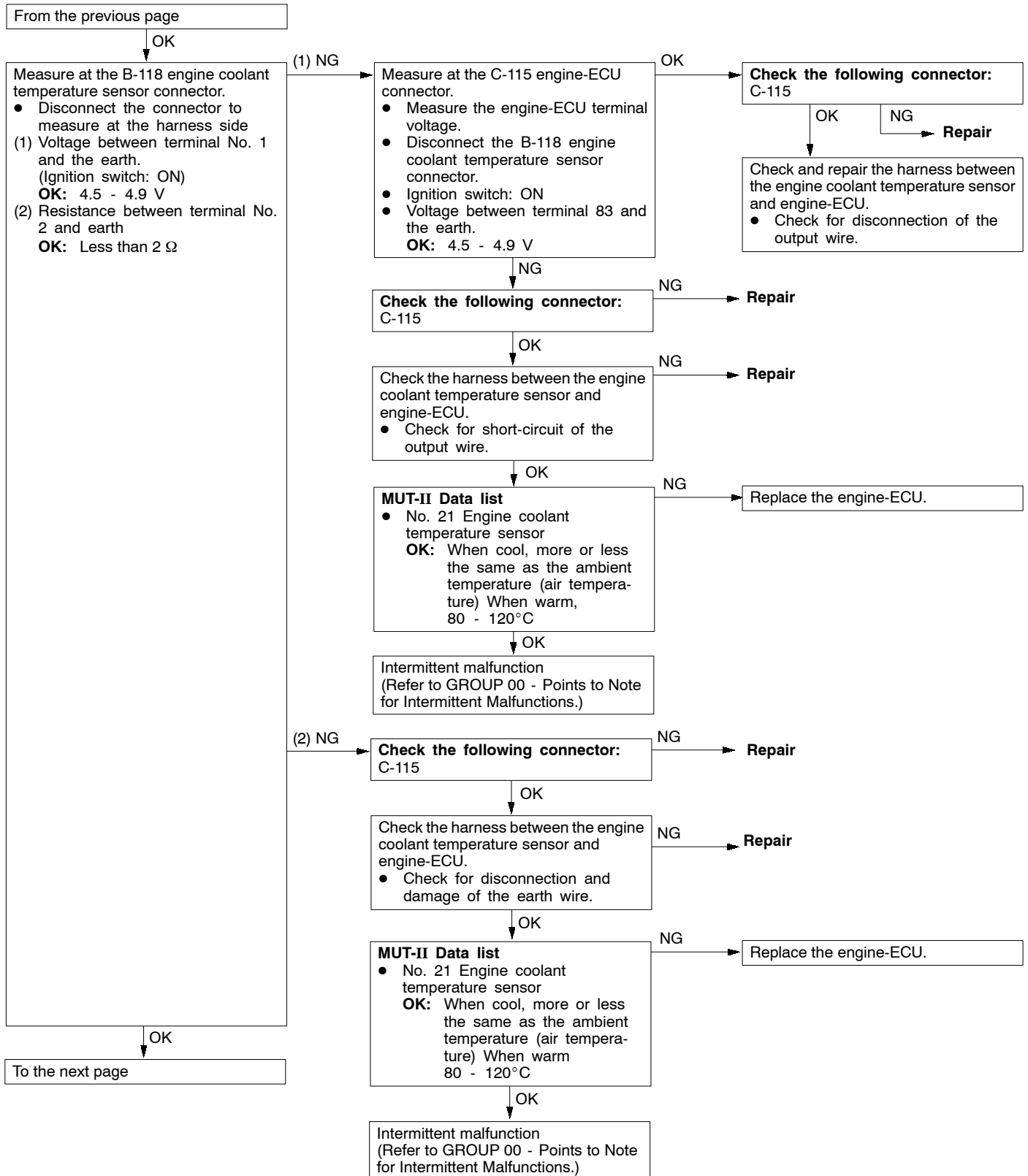
Code No. P0110 Intake air temperature sensor system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> After setting the ignition switch to the "ON" position, or after 2 seconds from completion of start. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> The sensor output voltage is more than 4.6 V for 4 seconds (Equivalent to intake air temperature less than -40°C) <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is less than 0.2 V for 4 seconds (Equivalent to intake air temperature of more than 120°C) 	<ul style="list-style-type: none"> Intake air temperature sensor malfunction Intake air temperature sensor circuit disconnection, short-circuit, or connector contact defect Engine-ECU malfunction

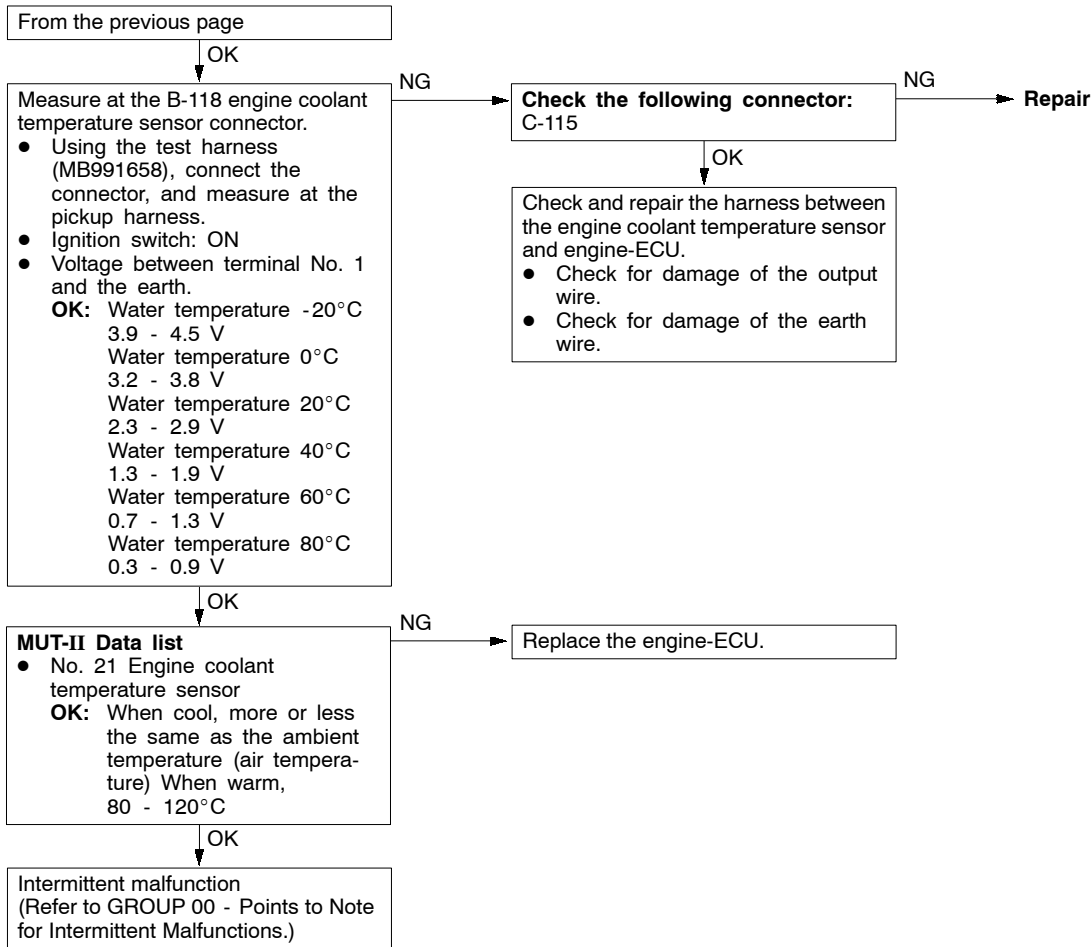




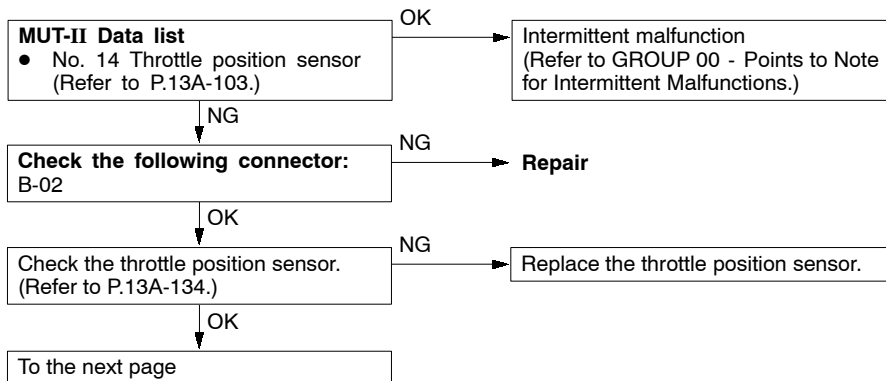
Code No. P0115 Engine coolant temperature sensor system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> After setting the ignition switch to the "ON" position, or 2 seconds after completion of engine start. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> When the sensor output voltage is more than 4.6 V for 4 seconds (Equivalent to water temperature of less than -45°C) <p>or</p> <ul style="list-style-type: none"> When the sensor output voltage is less than 0.1 V for 4 seconds (Equivalent to water temperature of more than 140°C) 	<ul style="list-style-type: none"> Engine coolant temperature sensor malfunction Engine coolant temperature sensor circuit disconnection and short-circuit or connector contact defect Engine-ECU malfunction
<p>Inspection Range</p> <ul style="list-style-type: none"> Ignition switch: ON The engine speed is approximately 50 r/min or more. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> From less than 1.6 V (Equivalent to water temperature of more than 40°C), the sensor output voltage rises to more than 1.6 V (Equivalent to water temperature of less than 40°C) The sensor output voltage is more than 1.6 V for 5 minutes 	

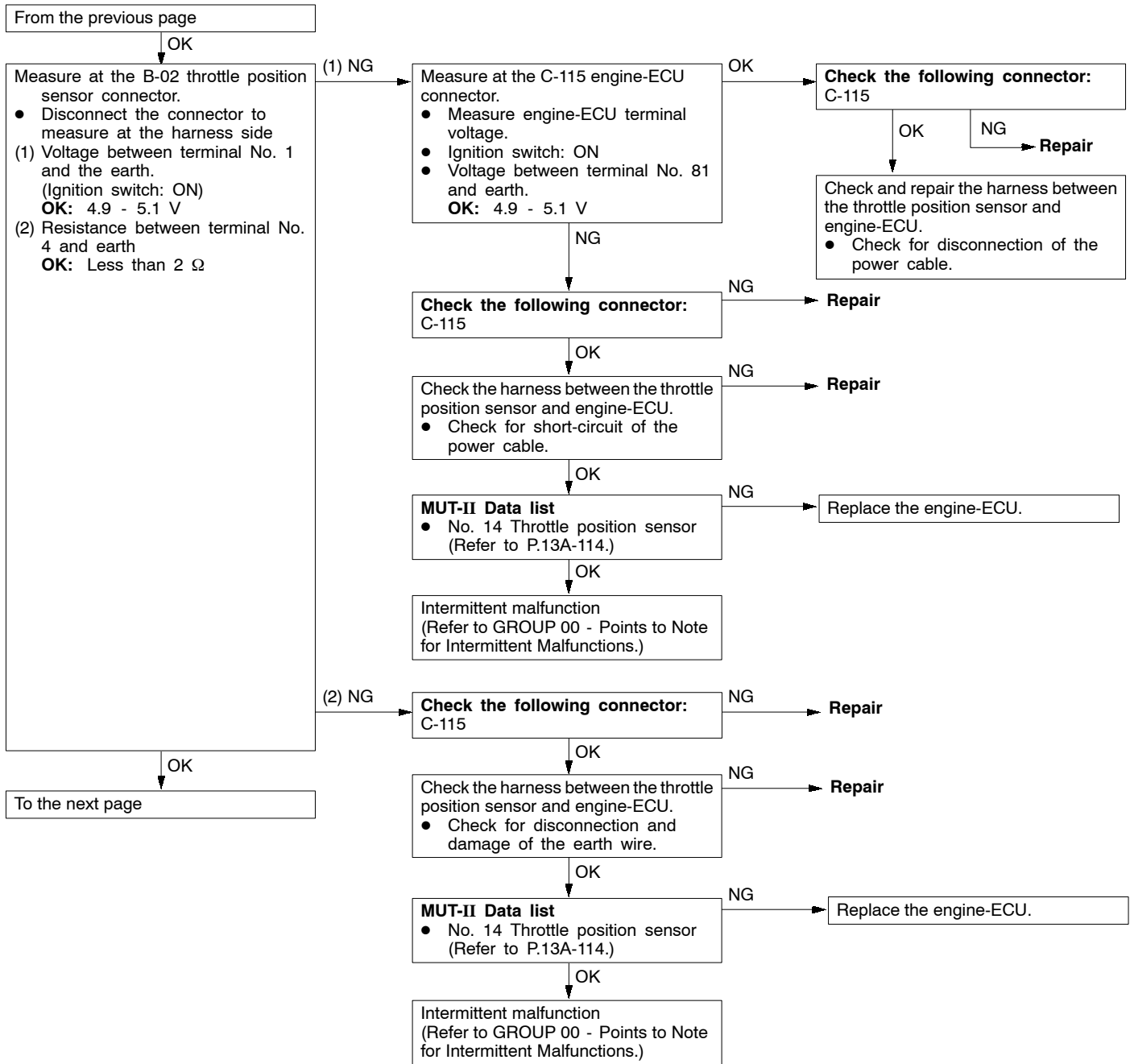


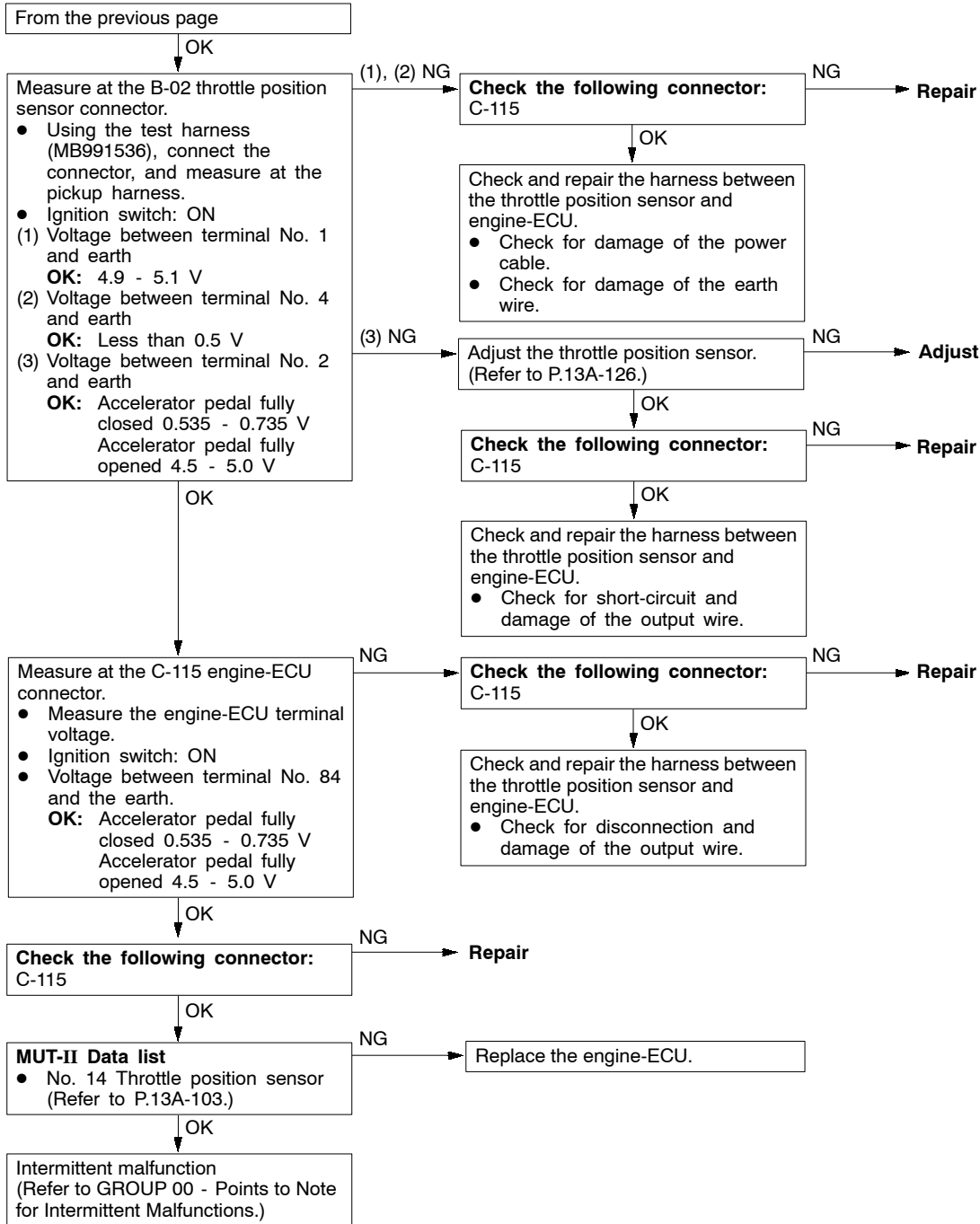




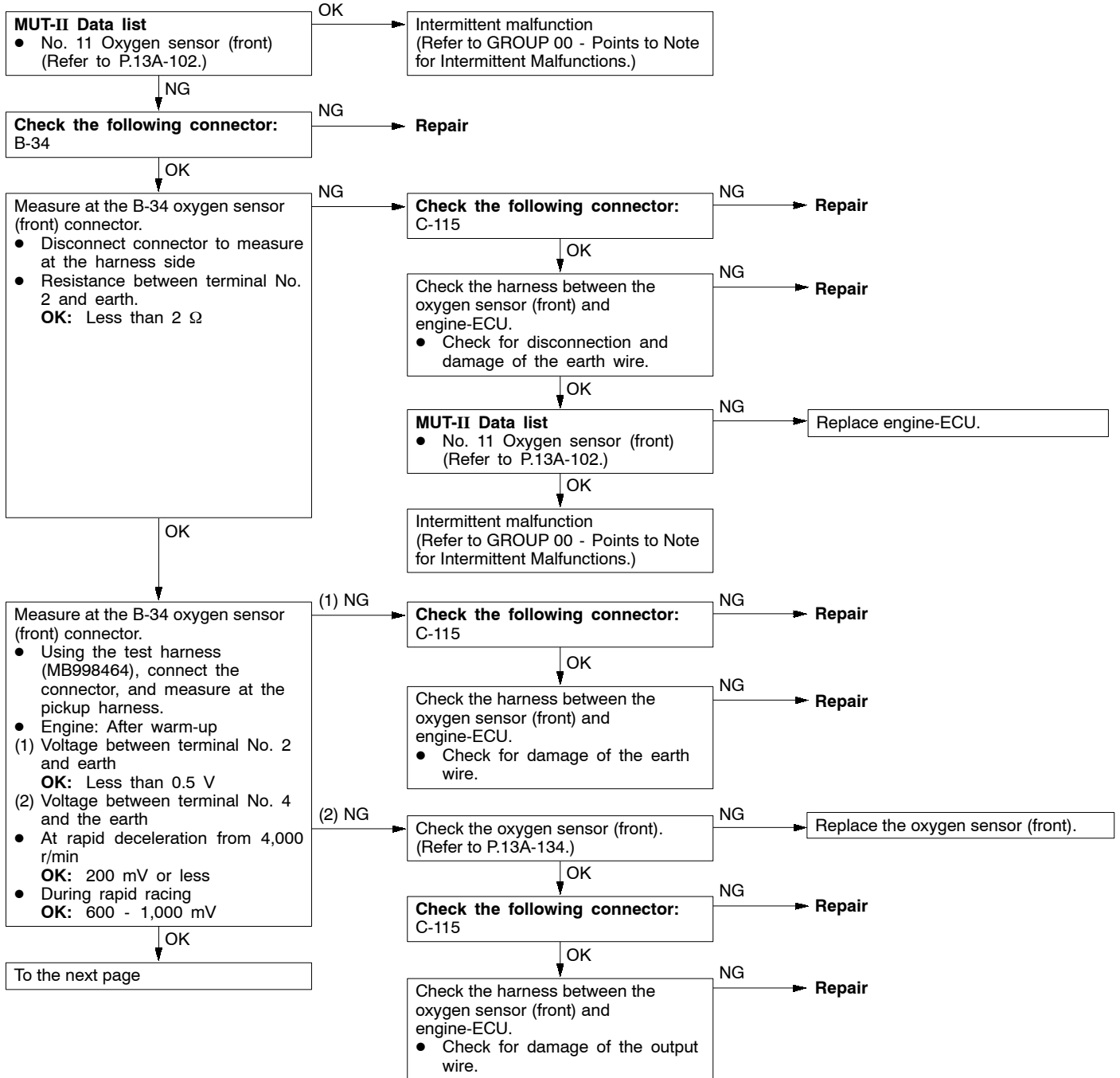
Code No. P0120 Throttle position sensor system	Probable cause
Inspection Range • Ignition switch: ON • Excluding for two seconds after ignition switch is set to "ON" position or two seconds after engine start is completed. Evaluation Conditions • The sensor output voltage is 0.2 V or less for 2 seconds.	• Throttle position sensor malfunction • Throttle position sensor circuit disconnection, short-circuit, or connector contact defect • Engine-ECU malfunction
Inspection Range • The engine speed is 1,000 r/min or less. • The volumetric efficiency is 60 % or less. Evaluation Conditions • The sensor output voltage is 2.0 V or less for 2 seconds.	

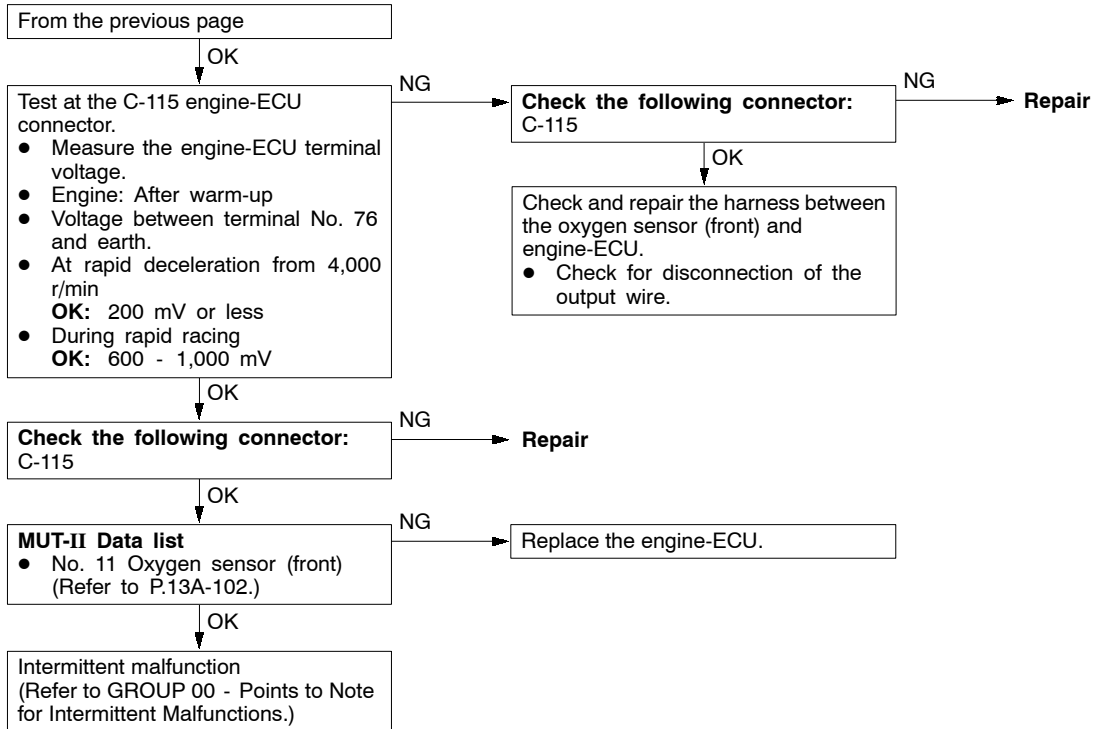




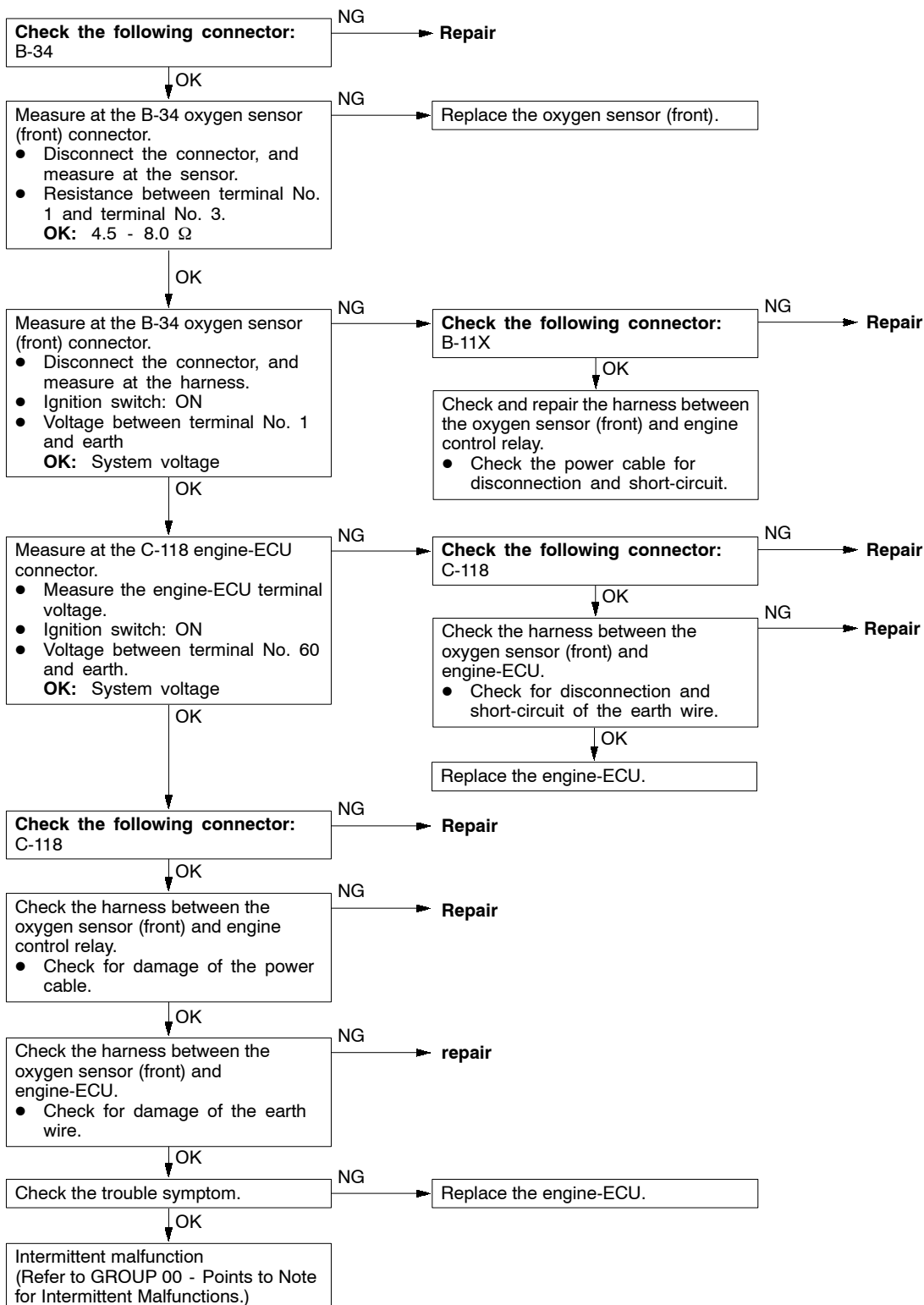


Code No. P0130 Oxygen sensor (front) system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> • More than 3 minutes passed after completion of start of engine • The engine coolant temperature is approximately more than 80°C. • The engine speed is more than 1,200 r/min. • The volumetric efficiency is 25% or more. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> • When 5 V is applied to oxygen sensor (front) in engine-ECU while oxygen sensor (front) output voltage is 0.2 V or less, the sensor output voltage is 4.5 V or more. 	<ul style="list-style-type: none"> • Oxygen sensor (front) malfunction • Oxygen sensor (front) circuit disconnection, short-circuit, or connector contact defect. • Engine-ECU malfunction

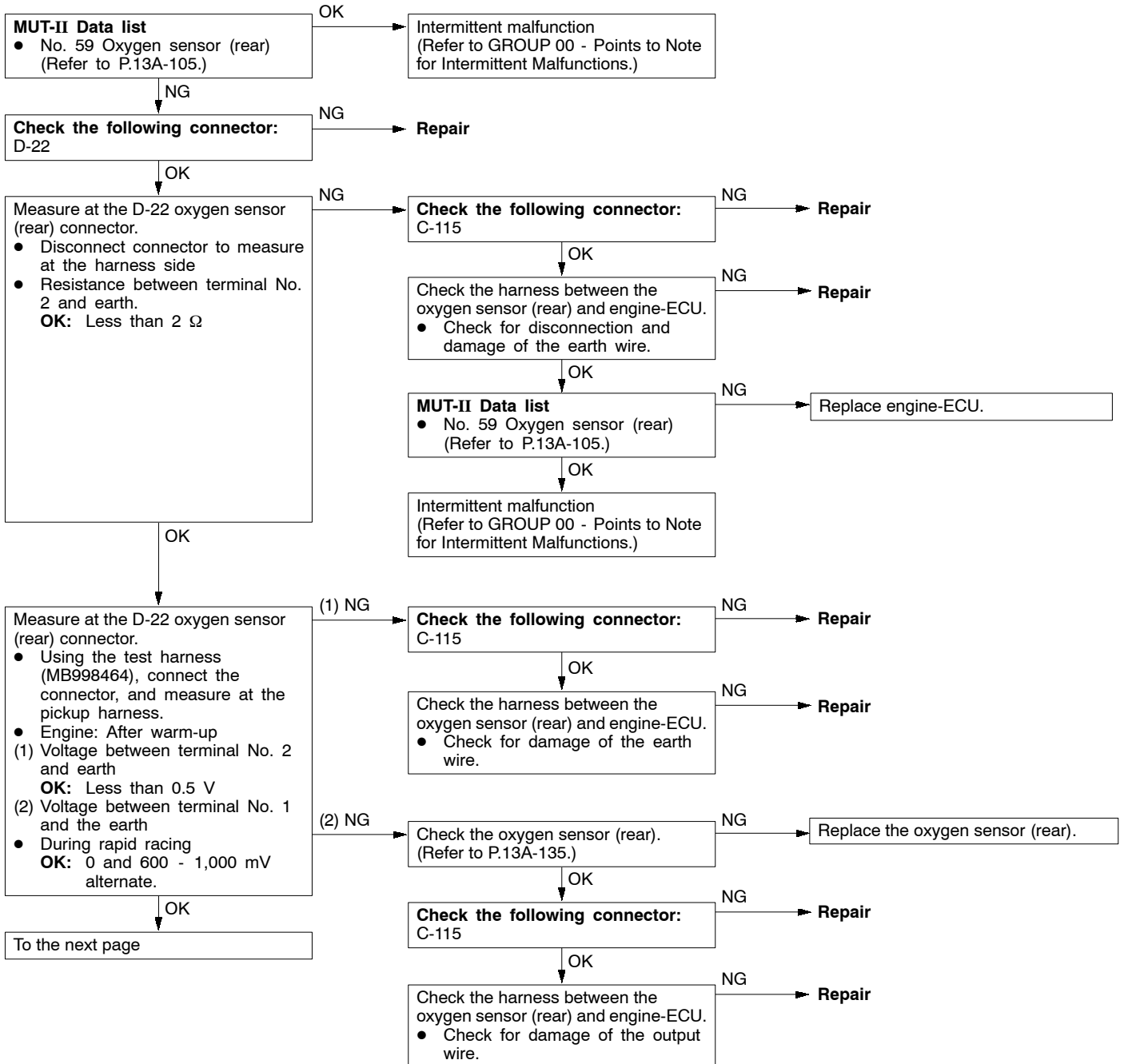


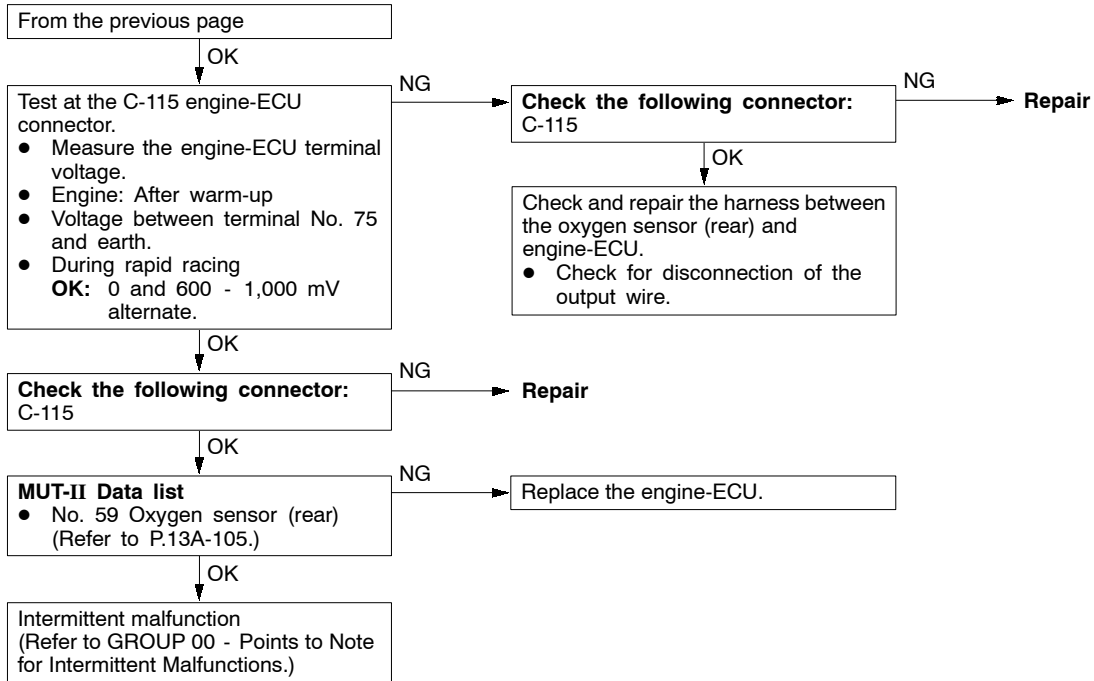


Code No. P0135 Oxygen sensor heater (front) system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> • The engine coolant temperature is approximately more than 20°C. • The oxygen sensor heater (front) is ON. • The engine speed is more than 50 r/min. • A/C relay: OFF, radiator fan: OFF • The battery voltage is 11 - 16 V. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> • The oxygen sensor heater (front) current is less than 0.2 A or more than 3.5 A for 4 seconds. 	<ul style="list-style-type: none"> • Oxygen sensor heater (front) malfunction • Oxygen sensor heater (front) circuit disconnection, short-circuit, or connector contact defect • Engine-ECU malfunction

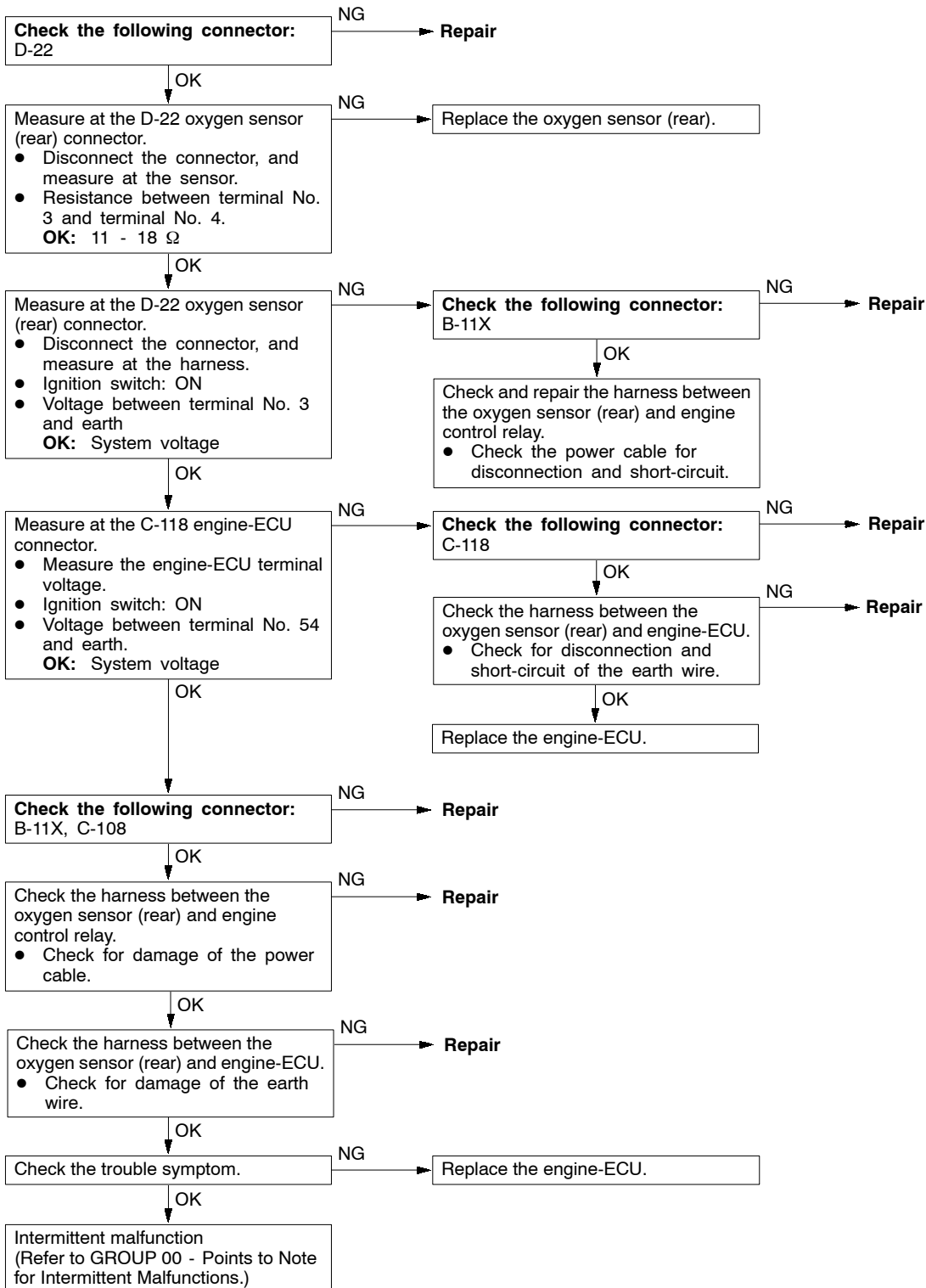


Code No. P0136 Oxygen sensor (rear) system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> • More than 3 minutes passed after completion of start of engine • The engine coolant temperature is approximately more than 80°C. • The engine speed is more than 1,200 r/min. • The volumetric efficiency is 25% or more. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> • When 5 V is applied to the oxygen sensor (rear), the output voltage is more than 4.5 V. 	<ul style="list-style-type: none"> • Oxygen sensor (rear) malfunction • Oxygen sensor (rear) circuit disconnection, short-circuit, or connector contact defect. • Engine-ECU malfunction

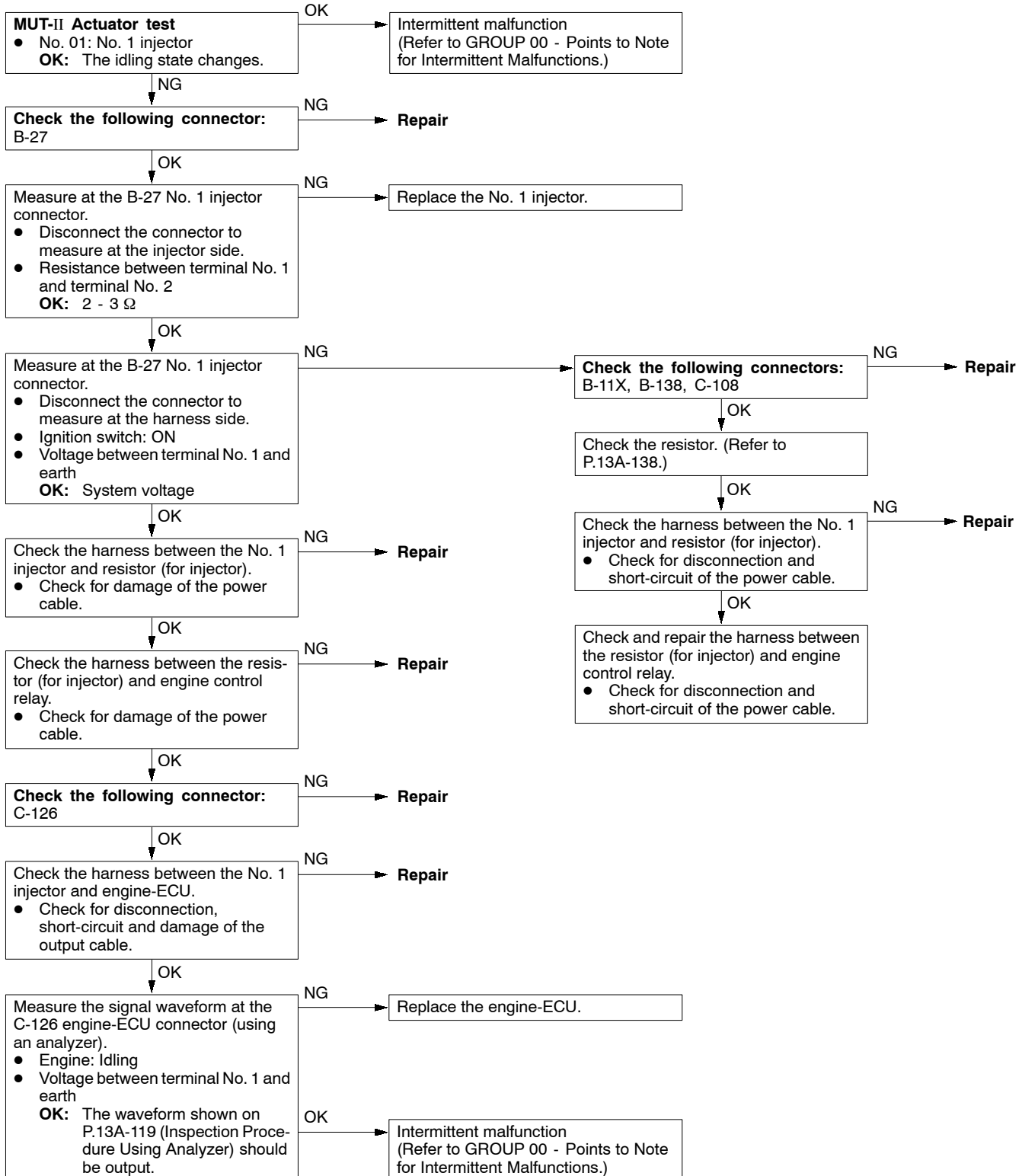




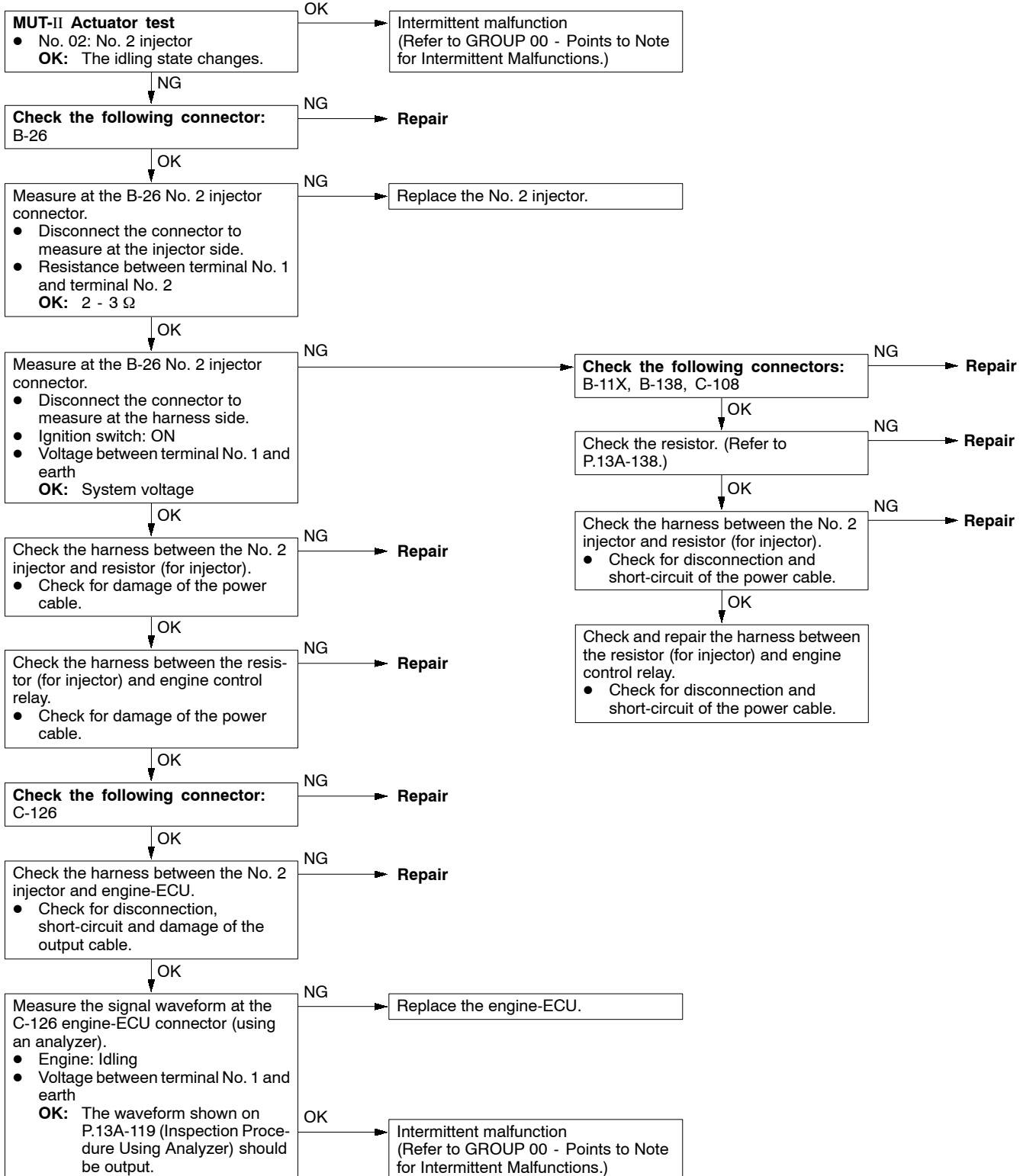
Code No. P0141 Oxygen sensor heater (rear) system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> • The engine coolant water temperature is approximately more than 20°C. • The oxygen sensor heater (rear) is ON. • The engine speed is more than 50 r/min. • A/C relay: OFF, radiator fan: OFF • The battery voltage is 11 - 16 V. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> • The oxygen sensor heater (rear) current is less than 0.2 A or more than 3.5 A for 4 seconds. 	<ul style="list-style-type: none"> • Oxygen sensor heater (rear) malfunction • Oxygen sensor heater (rear) circuit disconnection, short-circuit, or connector contact defect • Engine-ECU malfunction



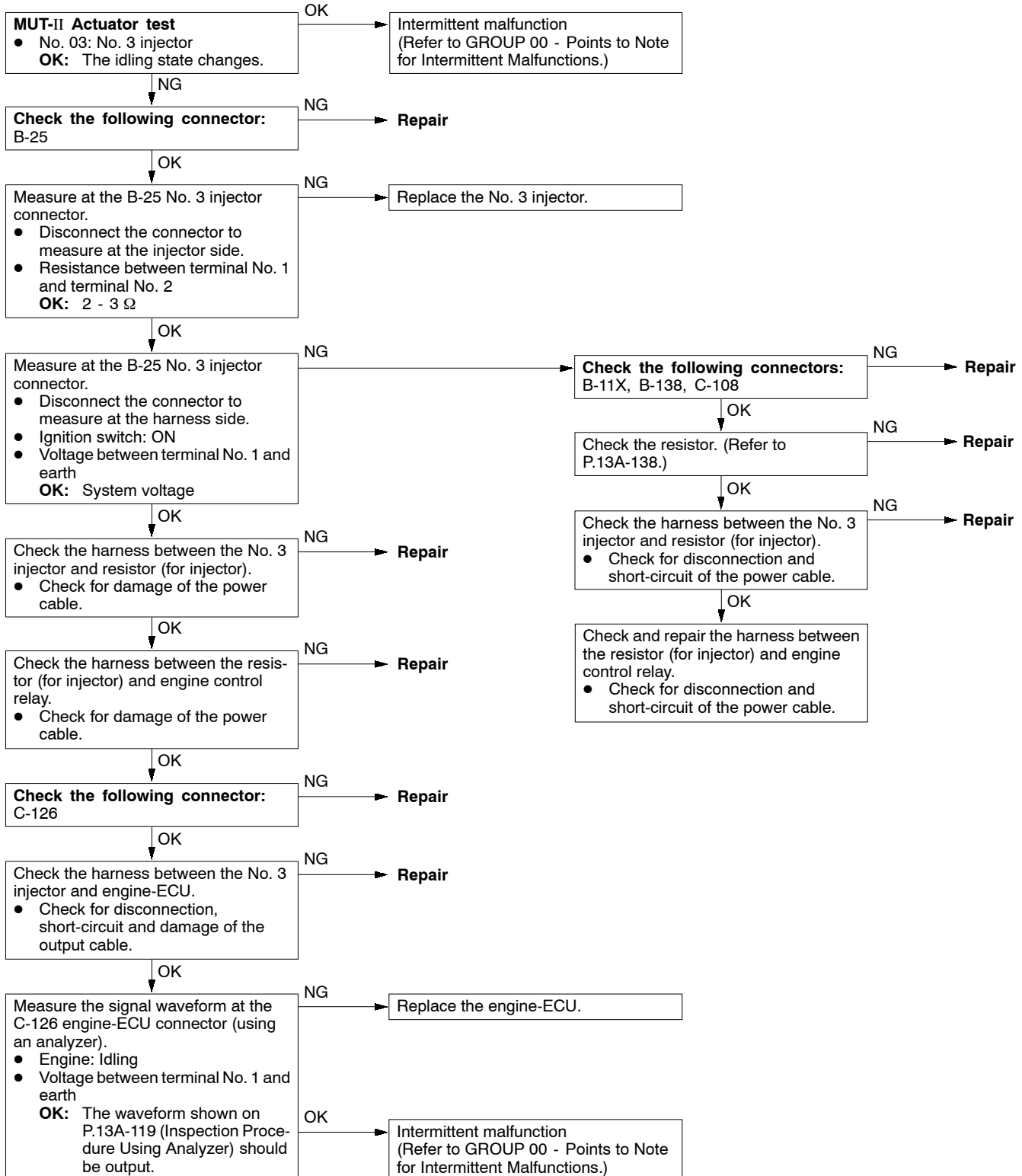
Code No. P0201 No. 1 injector system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> The engine speed is 50 - 1,000 r/min. The throttle position sensor output voltage is 1.15 V or less. MUT-II forced drive (actuator test) is not being carried out. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> Surge voltage at injector coil is not detected for 2 seconds. 	<ul style="list-style-type: none"> No. 1 injector malfunction No. 1 injector circuit disconnection, short-circuit, or connector contact defect Engine-ECU malfunction



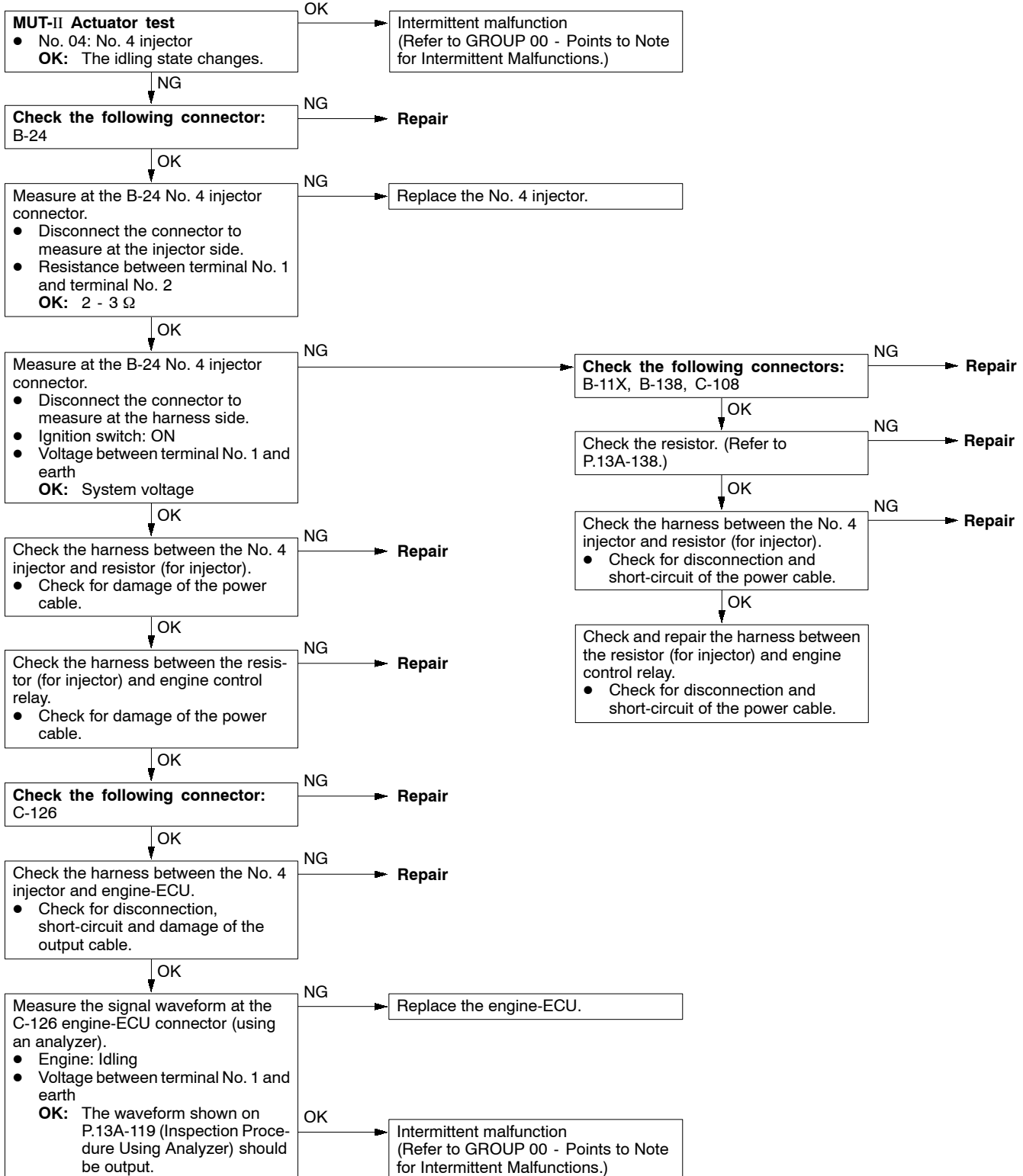
Code No. P0202 No. 2 injector system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> • The engine speed is 50 - 1,000 r/min. • The throttle position sensor output voltage is 1.15 V or less. • MUT-II forced drive (actuator test) is not being carried out. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> • Surge voltage at injector coil is not detected for 2 seconds. 	<ul style="list-style-type: none"> • No. 2 injector malfunction • No. 2 injector circuit disconnection, short-circuit, or connector contact defect • Engine-ECU malfunction



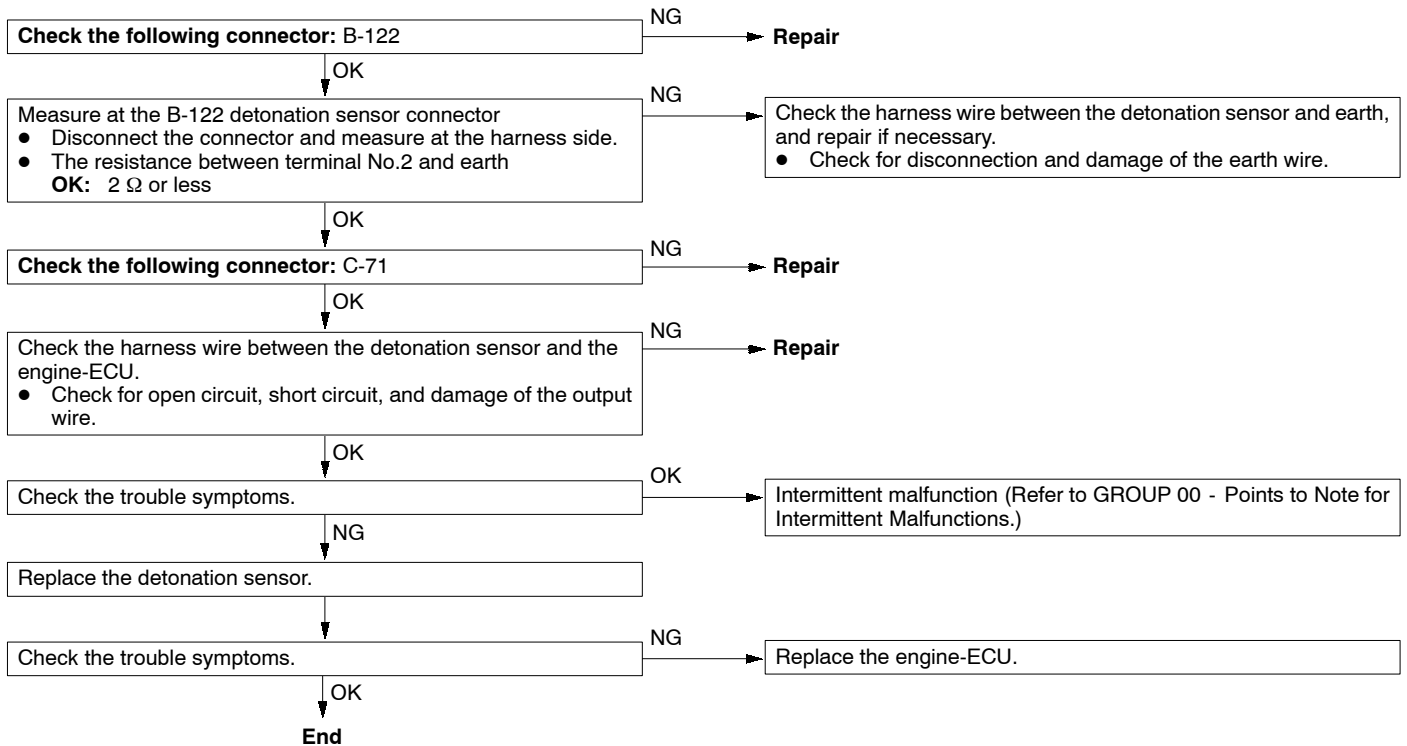
Code No. P0203 No. 3 injector system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> The engine speed is 50 - 1,000 r/min. The throttle position sensor output voltage is 1.15 V or less. MUT-II forced drive (actuator test) is not being carried out. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> Surge voltage at injector coil is not detected for 2 seconds. 	<ul style="list-style-type: none"> No. 3 injector malfunction No. 3 injector circuit disconnection, short-circuit, or connector contact defect Engine-ECU malfunction



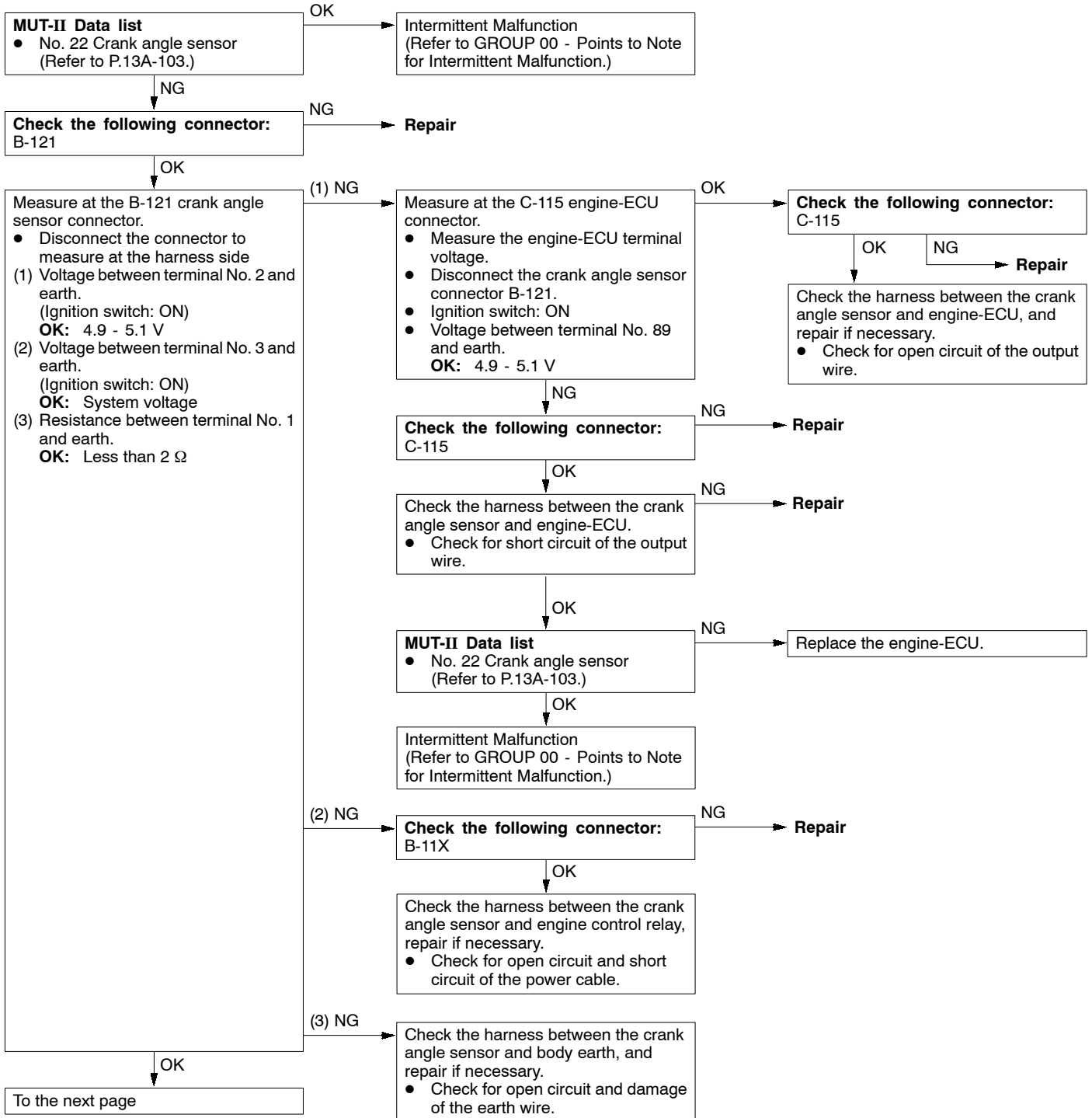
Code No. P0204 No. 4 injector system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> The engine speed is 50 - 1,000 r/min. The throttle position sensor output voltage is 1.15 V or less. MUT-II forced drive (actuator test) is not being carried out. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> Surge voltage at injector coil is not detected for 2 seconds. 	<ul style="list-style-type: none"> No. 4 injector malfunction No. 4 injector circuit disconnection, short-circuit, or connector contact defect Engine-ECU malfunction

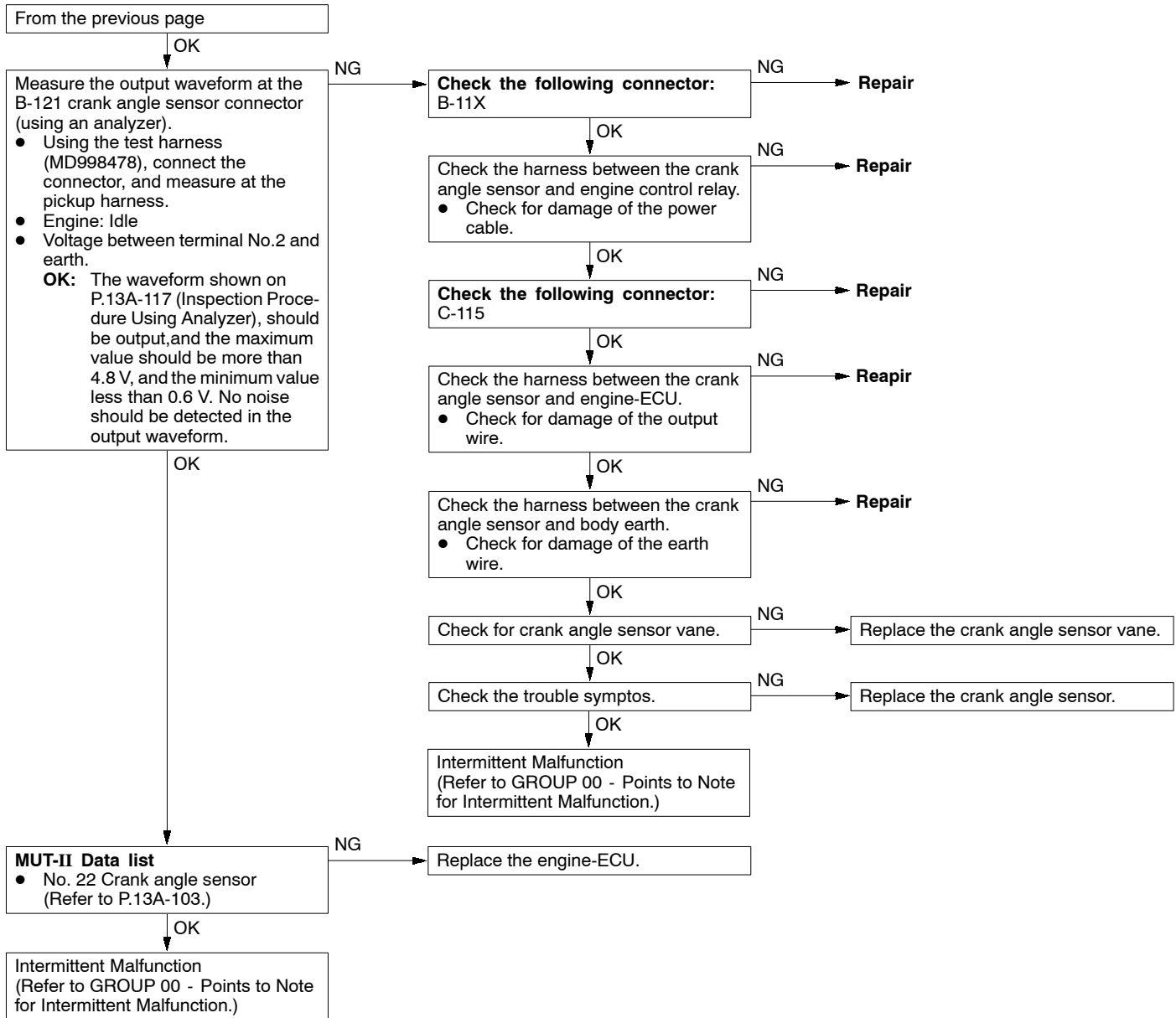


Code No. P0325 Detonation sensor system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> ● Ignition switch: ON ● Excluding for 2 seconds after ignition switch is set to "ON" position or 2 seconds after engine start is completed. ● The engine speed is approximately 2,000 r/min or more. ● The volumetric efficiency is 30% or more. <p>Set Conditions</p> <ul style="list-style-type: none"> ● Changes in sensor output voltage (detonation sensor peak voltage per 1/2 crankshaft rotation) in 200 consecutive cycles are 0.06 V or less. 	<ul style="list-style-type: none"> ● Malfunction of the detonation sensor ● Detonation sensor circuit disconnection, short-circuit, or connector contact defect ● Malfunction of engine-ECU

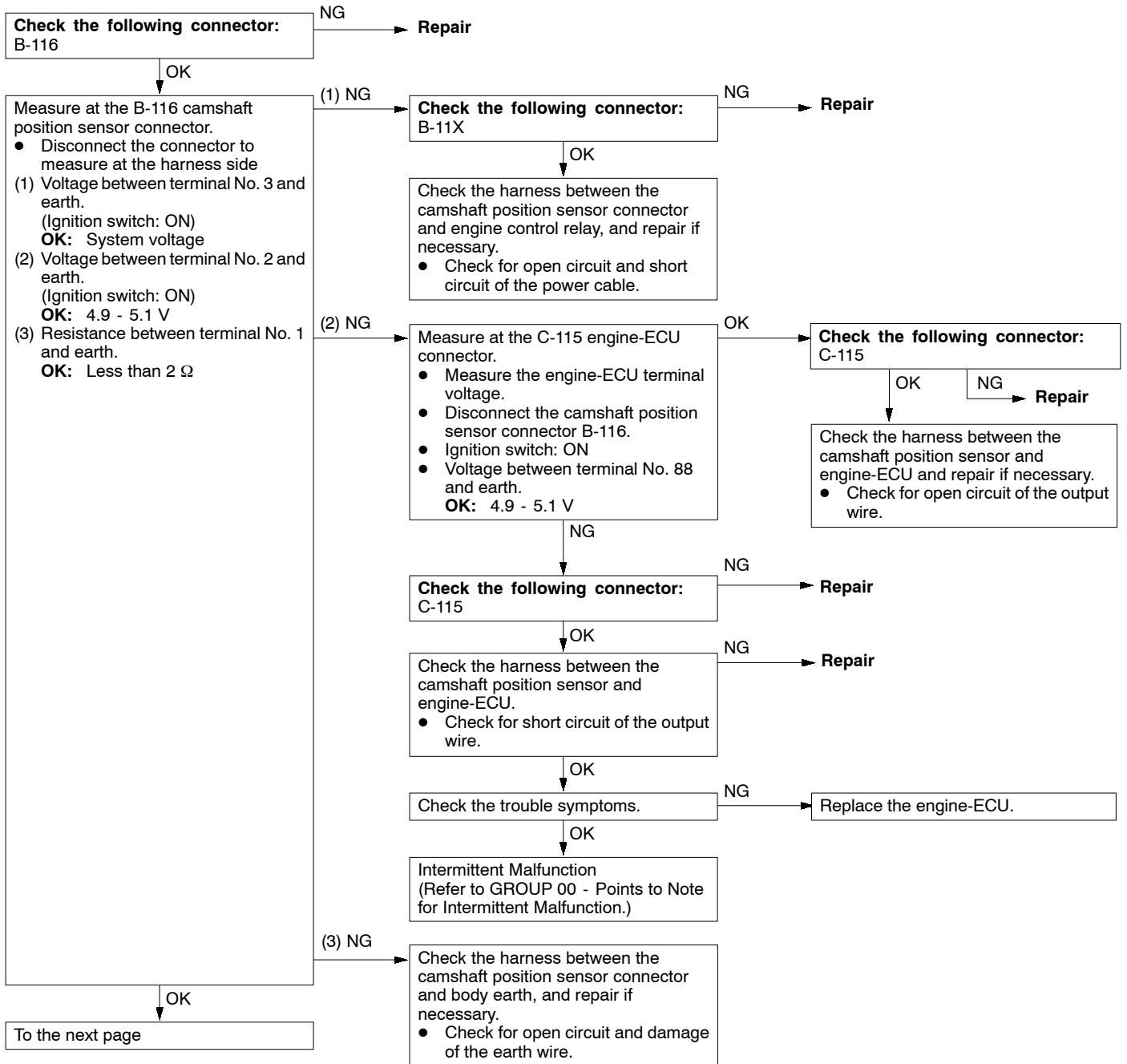


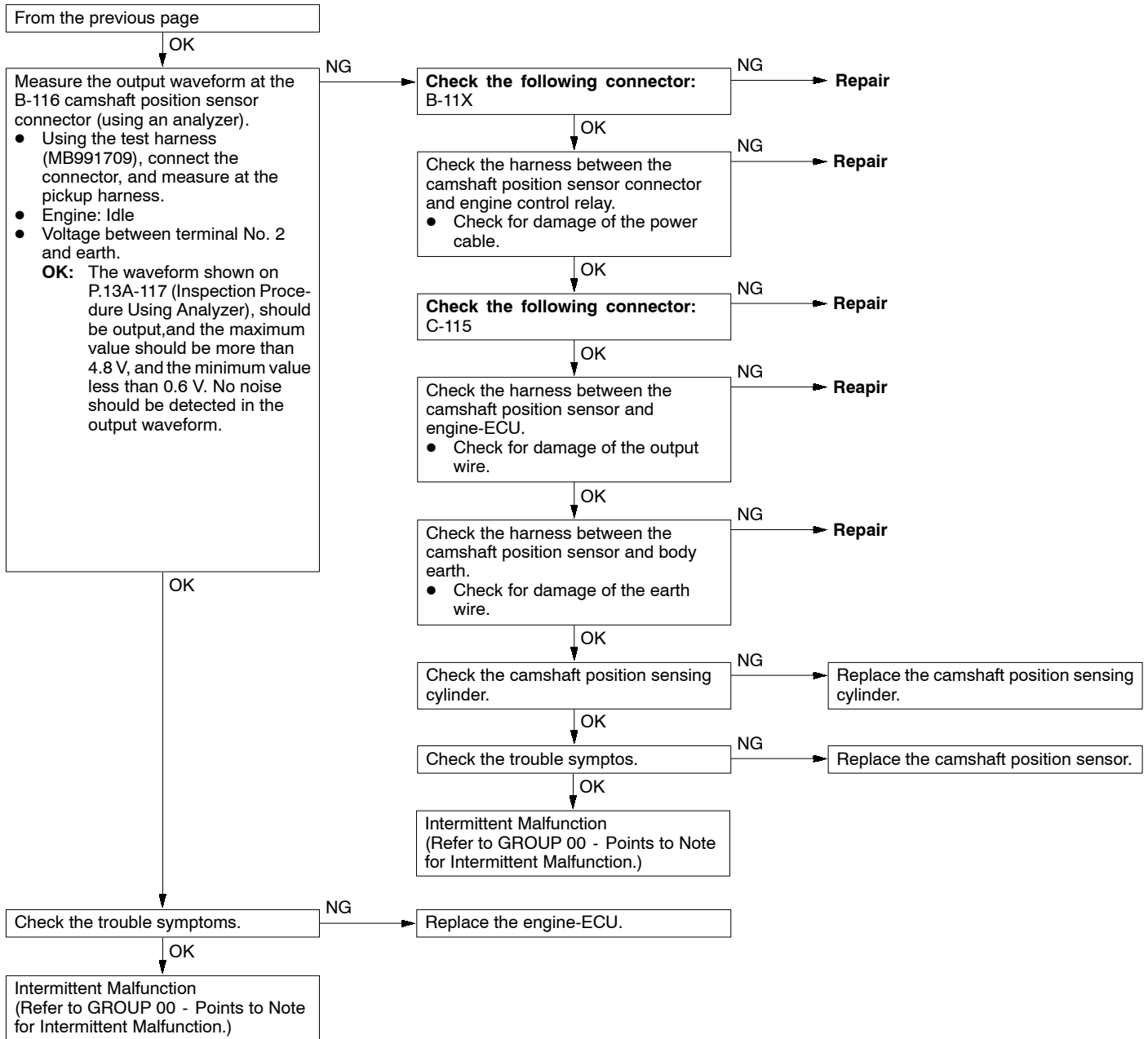
Code No. P0335 Crank angle sensor system	Probable cause
Inspection Range ● Engine: During cranking Evaluation Conditions ● The sensor output voltage does not change for 2 seconds (no pulse signal output)	● Malfunction of crank angle sensor ● Open or short circuit in the crank angle sensor circuit or loose connector contact ● Malfunction of engine-ECU



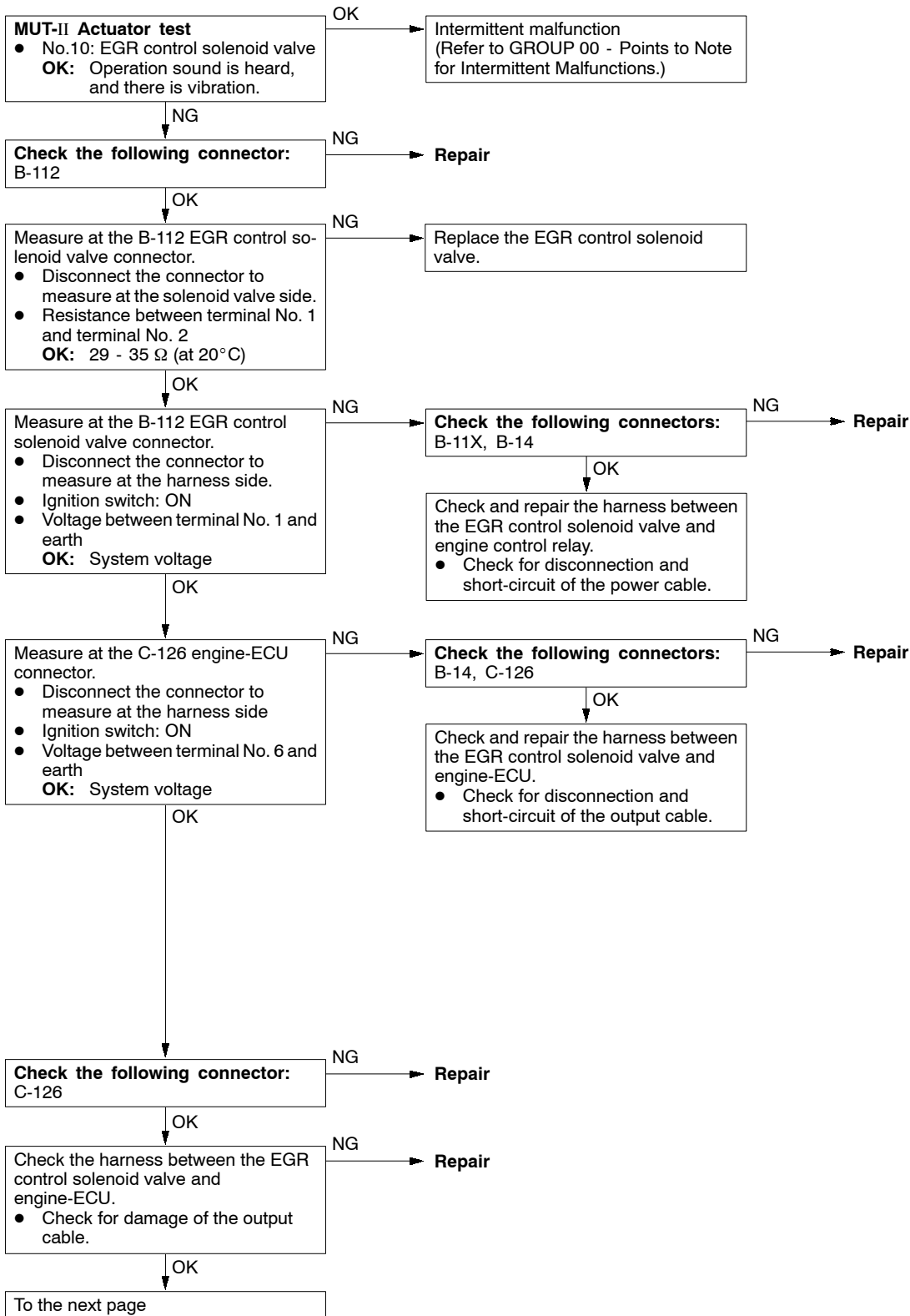


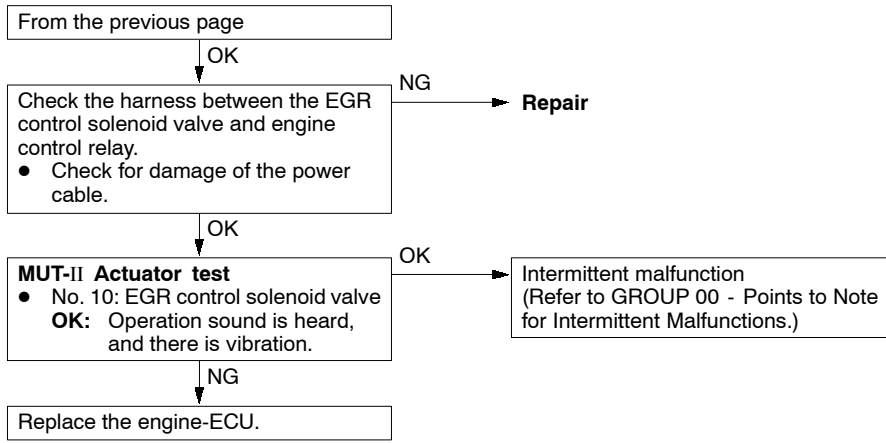
Code No. P0340 Camshaft position sensor system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> ● Ignition switch: ON ● The engine speed is approximately 50 r/min or more. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> ● The sensor output voltage does not change for 2 seconds (no pulse signal output) 	<ul style="list-style-type: none"> ● Malfunction of camshaft position sensor ● Open or short circuit in the camshaft position sensor or loose connector contact ● Malfunction of engine-ECU



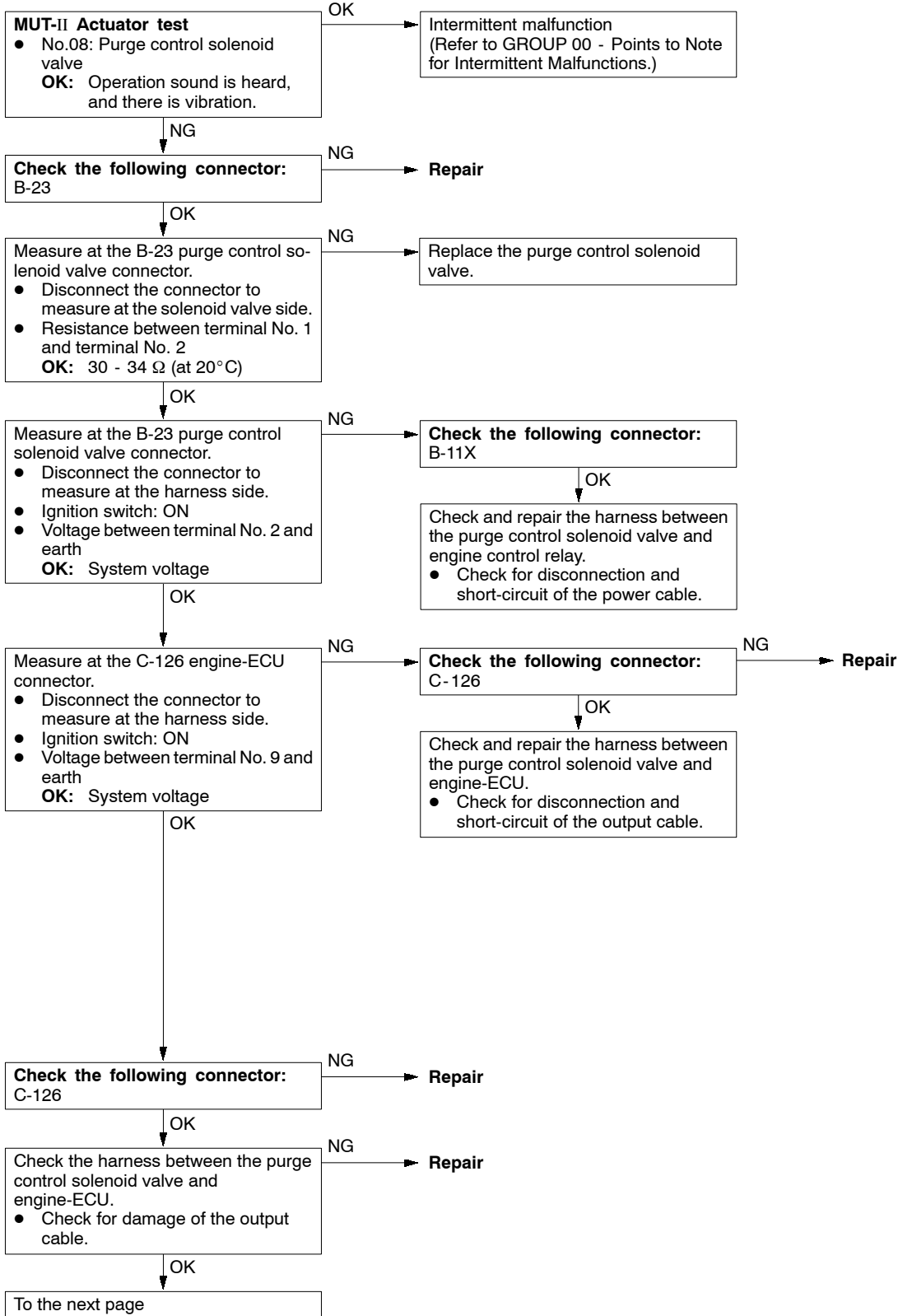


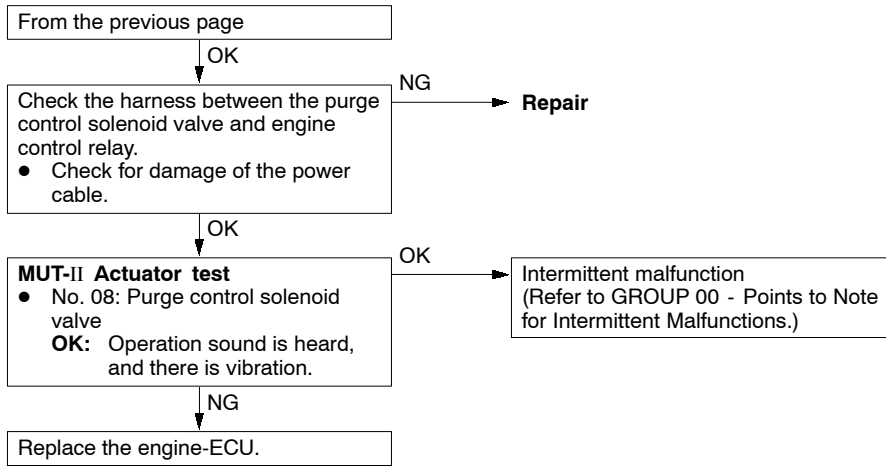
Code No. P0403 EGR control solenoid valve system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> The battery voltage is 10 V or more. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> Solenoid coil's surge voltage (battery voltage +2 V) is not detected when EGR control solenoid valve is turned OFF from ON. 	<ul style="list-style-type: none"> EGR control solenoid valve malfunction EGR control solenoid valve circuit disconnection, short-circuit, or connector contact defect Engine-ECU malfunction



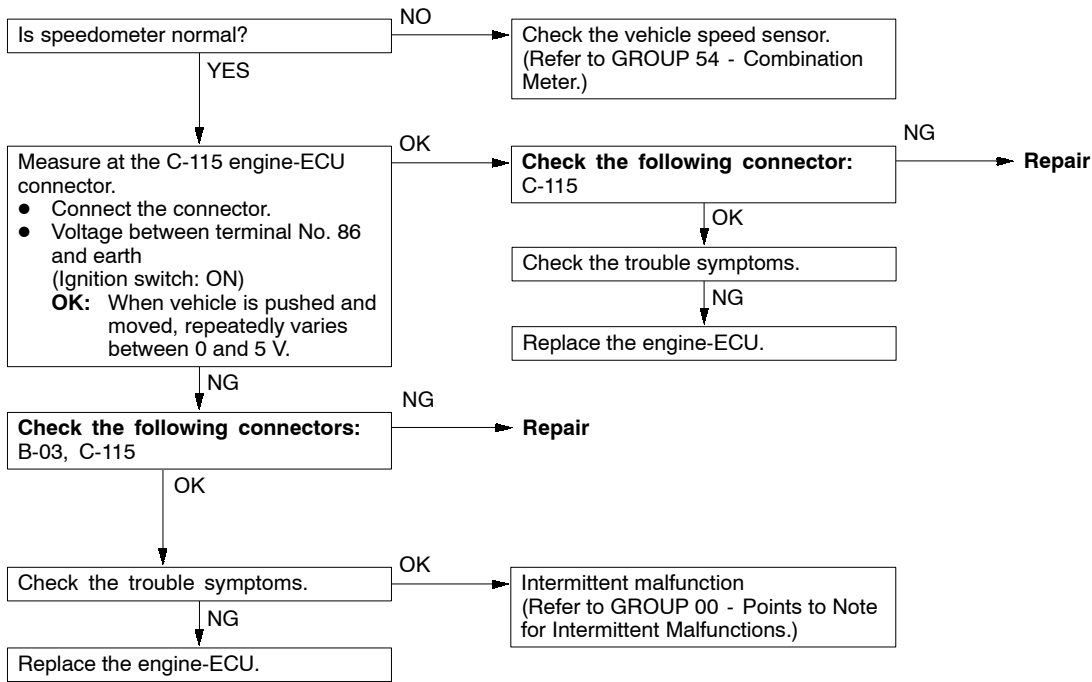


Code No. P0443 Purge control solenoid valve system	Probable cause
<p>Range of check</p> <ul style="list-style-type: none"> Ignition switch: ON Battery voltage is 10 V or more. <p>Set Conditions</p> <ul style="list-style-type: none"> The solenoid coil surge voltage (battery voltage +2 V) is not detected when the purge control solenoid valve is turned from ON to OFF. 	<ul style="list-style-type: none"> Malfunction of the purge control solenoid valve Open or short circuit in the purge control solenoid valve circuit or loose connector contact. Malfunction of Engine-ECU

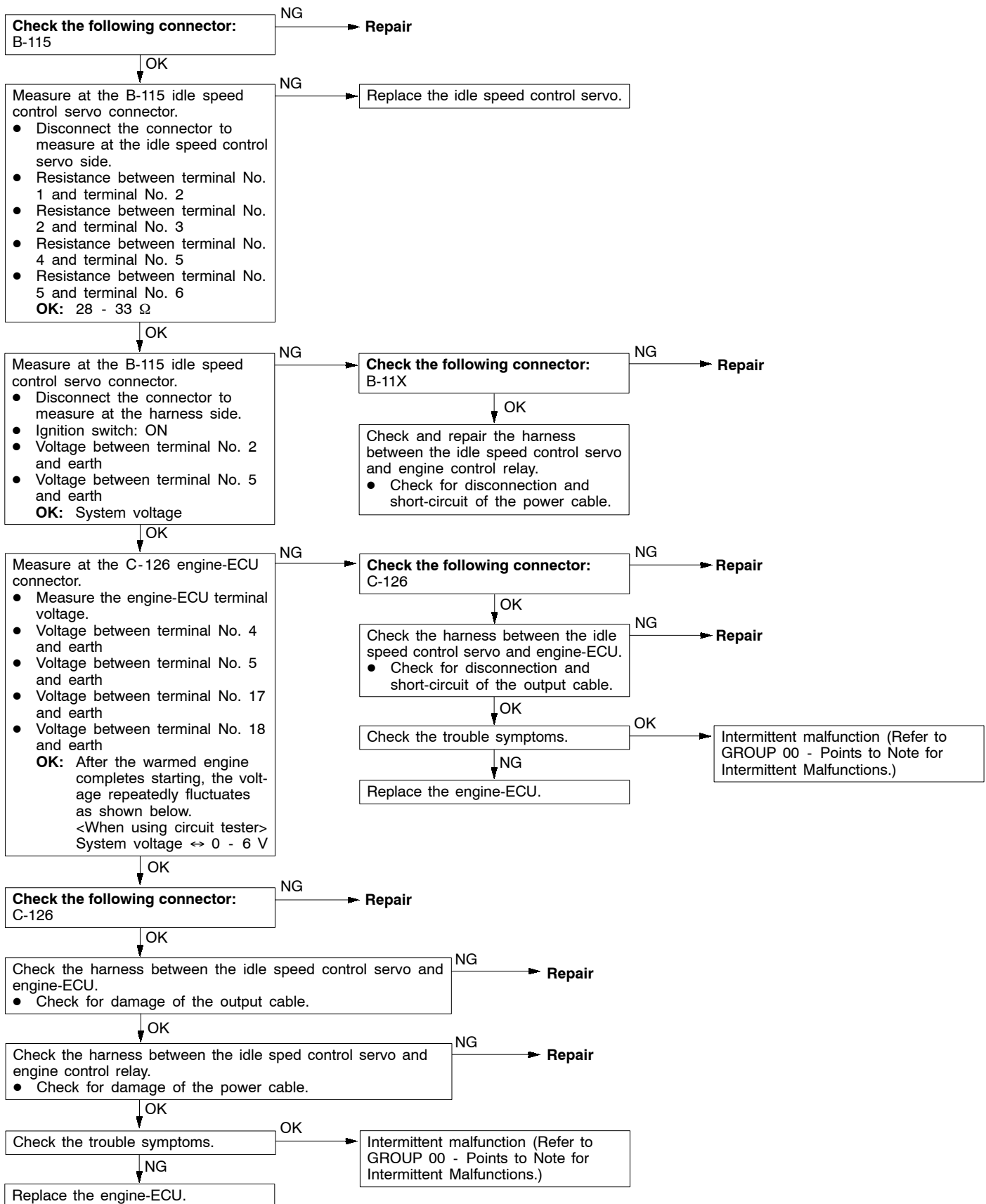




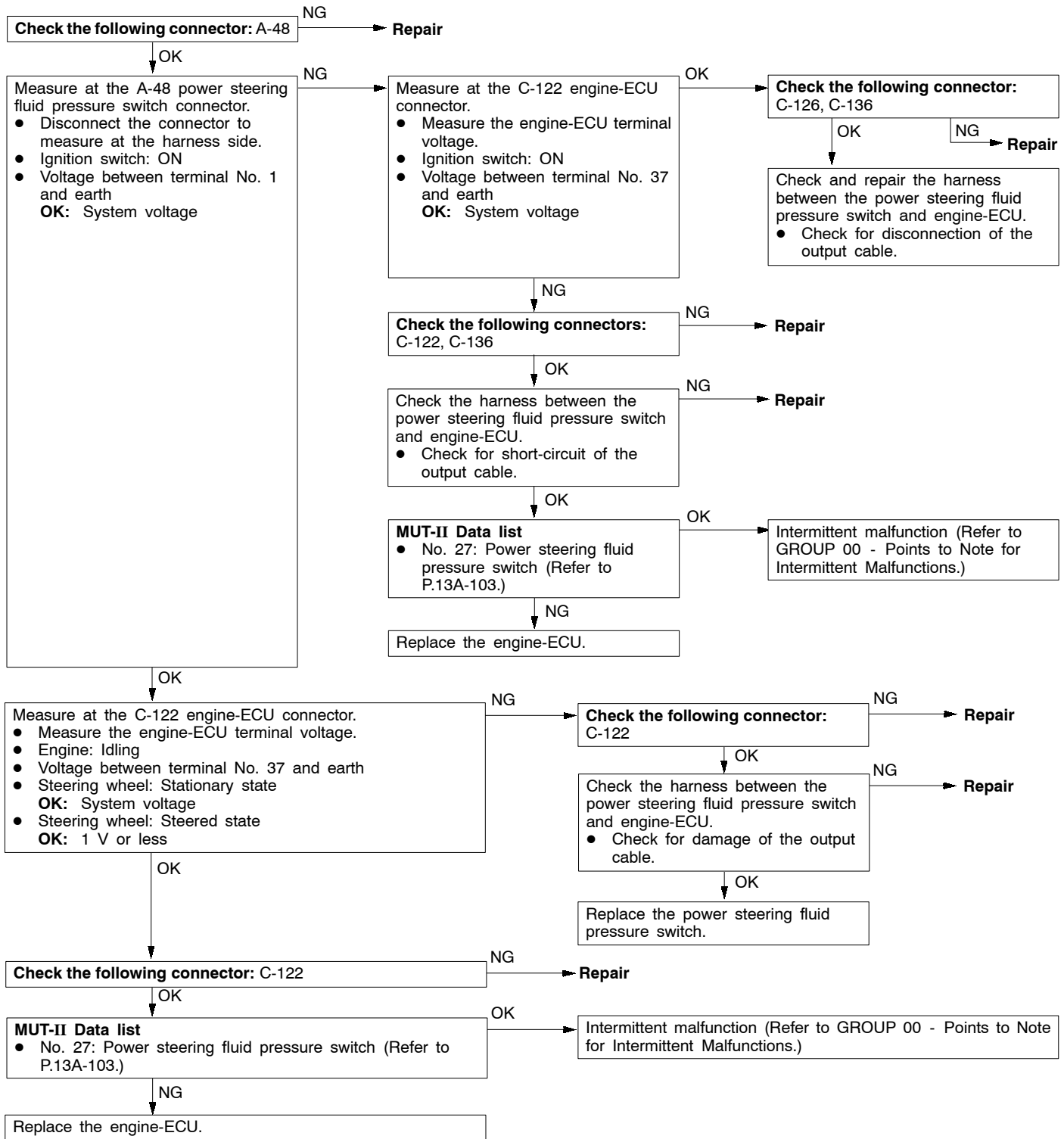
Code No. P0500 Vehicle speed sensor system	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> ● Ignition switch: ON ● After 2 seconds from setting ignition switch to ON position or completion of engine starting ● The engine speed is approximately 2,000 - 4,000 r/min or more. ● The volumetric efficiency is 60 - 80%. <p>Evaluation Conditions</p> <ul style="list-style-type: none"> ● Vehicle speed signal does not change for 2 seconds. (Pulse signal is not input.) 	<ul style="list-style-type: none"> ● Vehicle speed sensor malfunction ● Vehicle speed sensor circuit disconnection, short-circuit, or connector contact defect ● Engine-ECU malfunction



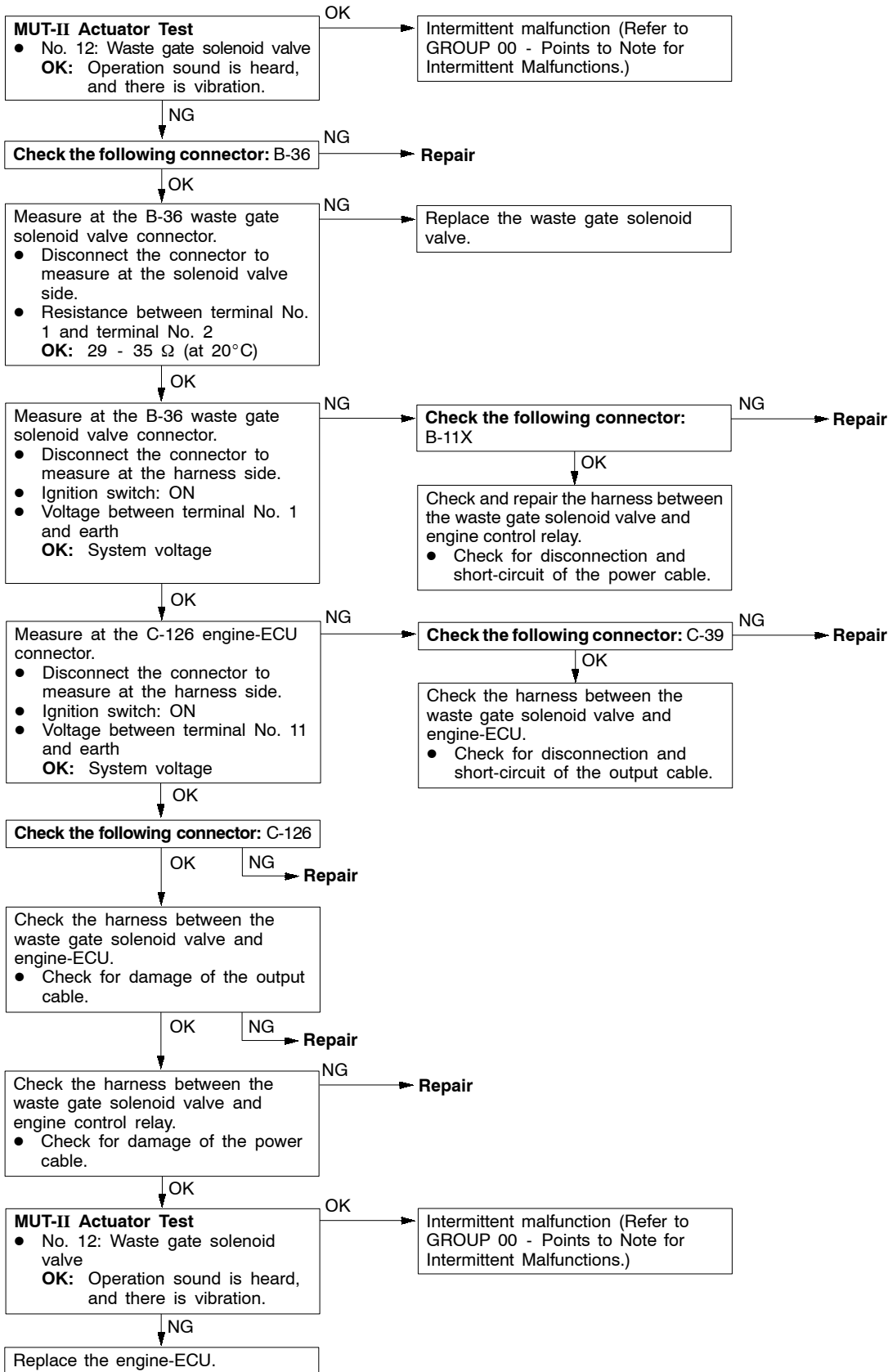
Code No. P0505 Idle speed control system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> ● Vehicle speed has reached 1.5 Km/h at least once. ● Under the closed loop idle speed control. <p>Set Conditions</p> <ul style="list-style-type: none"> ● Actual idle speed has continued to be higher than the target idle speed by 300 r/min or more for 10 seconds. <p>Range fo Check</p> <ul style="list-style-type: none"> ● Vehicle speed has reached 1.5 km/h at least once. ● During idle speed closed loop control. ● The highest temperature at the last drive is 45°C or less. ● Engine coolant temperature is approximately 80°C or more. ● Battery voltage is 10 V or more. ● Barometric pressure is 76 kPa or higher. ● Intake air temperature is - 10°C or more. <p>Set Conitions</p> <ul style="list-style-type: none"> ● Actual idle speed has been minimum 200 r/min higher than the target idle speed for 10 seconds. <p>Range of Check</p> <ul style="list-style-type: none"> ● During idle speed closed loop control. ● Engine coolant temperature is approximately 80°C or higher. ● Battery voltage is 10 V or higher. ● Power steering switch is off. ● Volumetric efficiency is 40 % or lower. ● Barometric pressure is 76 kPa or higher. ● Intake air temperature is - 10°C or more. <p>Set Conitions</p> <ul style="list-style-type: none"> ● Actual idle speed has been minimum 100 r/min higher than the target idle speed for 10 seconds. 	<ul style="list-style-type: none"> ● Malfunction of idle speed control servo ● Open or short circuit in the idle speed control servo circuit or loose connector contact ● Malfunction of engine-ECU



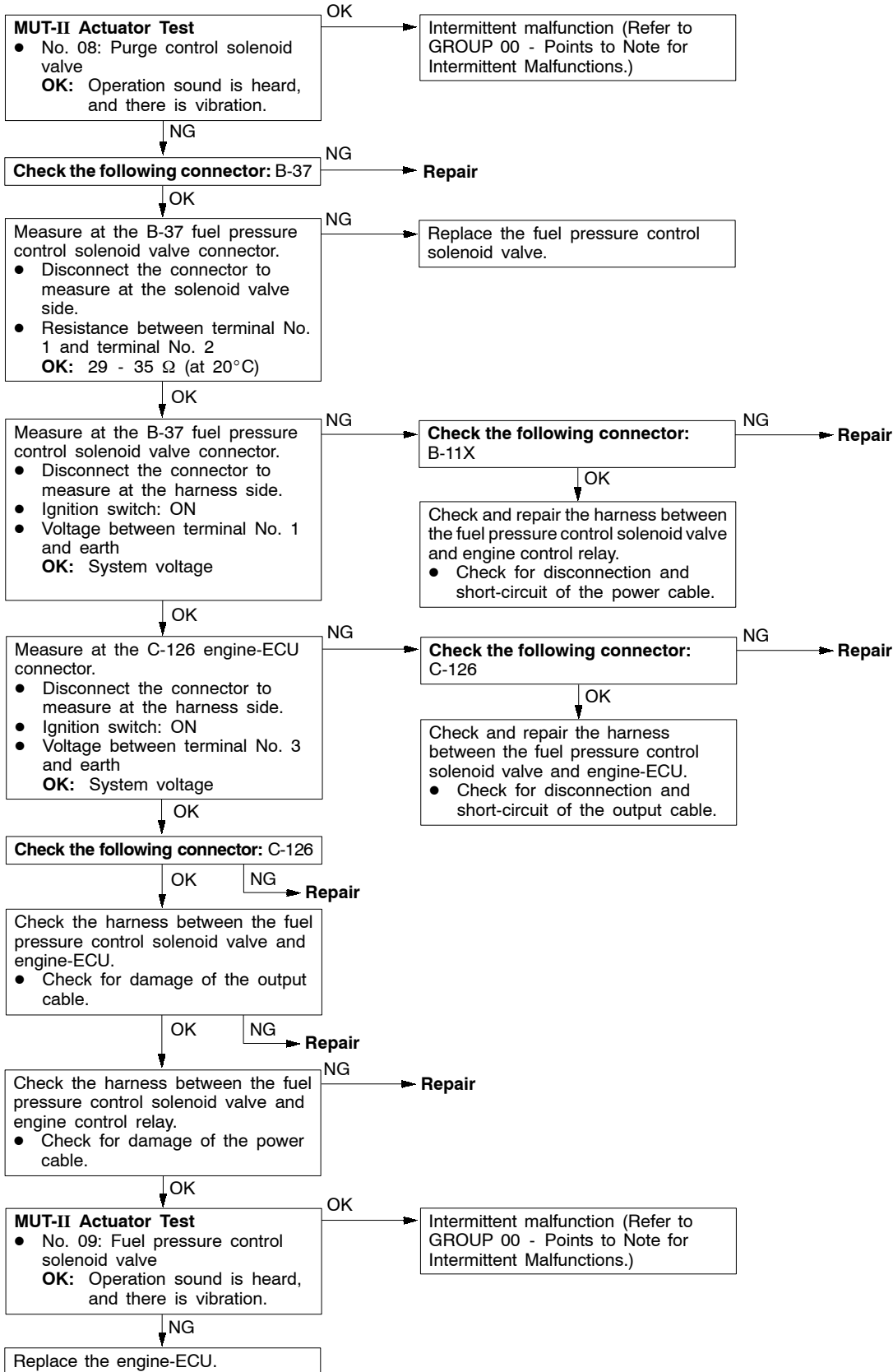
Code No. P0551 Power steering fluid pressure switch system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> ● Intake air temperature is - 10°C or higher. ● Barometric pressure is 76 kPa or more. ● Engine coolant temperature is 30°C or more. ● Repeat the *1 drive and *2 stop ten times or more. <p>*1: Engine speed is 2500 r/min or higher, volumetric efficiency is 55 % or higher and vehicle speed is 5 km/h or higher for 4 seconds or more.</p> <p>*2: Vehicle speed is 1.5 km/h or lower.</p> <p>Set Conditions</p> <ul style="list-style-type: none"> ● Power steering fluid pressure switch remains on. 	<ul style="list-style-type: none"> ● Power steering fluid pressure switch failed ● Open or short circuit in the power steering fluid pressure switch circuit or loose connector contact ● Multifunction of engine-ECU



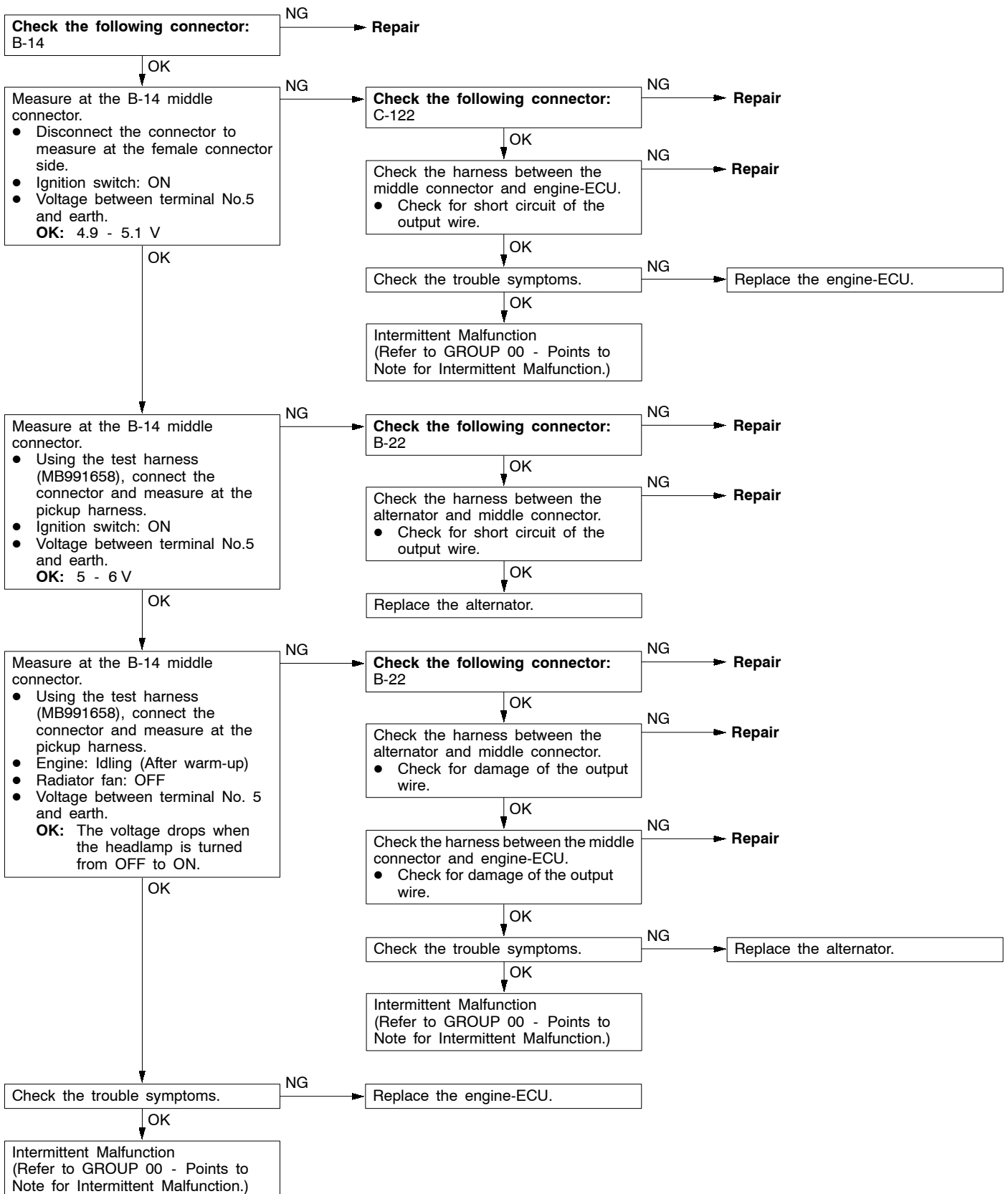
Code No. P1104 Waste gate solenoid valve system	Probable cause
Inspection Range ● Battery voltage is more than 10 V. Evaluation Conditions ● Solenoid coil's surge voltage (battery voltage +2 V) is not detected when the waste gate solenoid valve turned from ON to OFF.	● Waste gate solenoid valve malfunction ● Engine-ECU malfunction



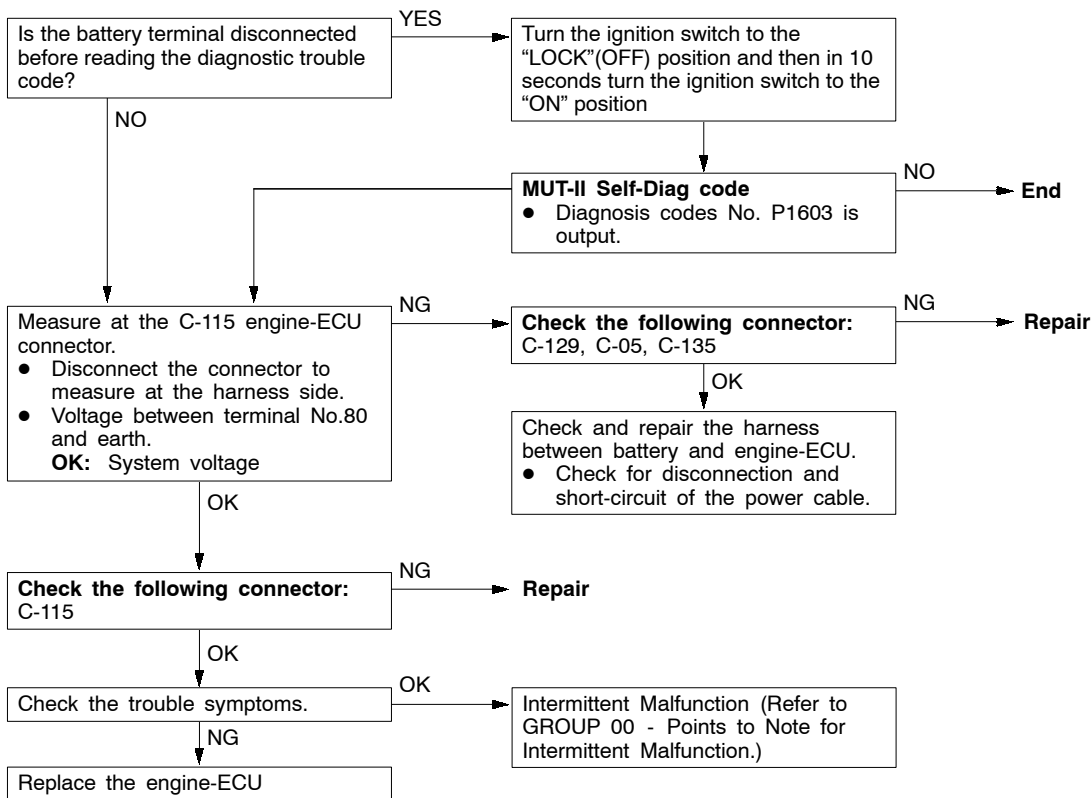
Code No. P1105 Fuel pressure control solenoid valve system	Probable cause
Inspection Range ● Battery voltage is more than 10 V. Evaluation Conditions ● Solenoid coil's surge voltage (battery voltage +2 V) is not detected when the fuel pressure control solenoid valve turned from ON to OFF.	● Fuel pressure control solenoid valve malfunction ● Engine-ECU malfunction



Code No. P1500 Alternator FR terminal system	Probable cause
Inspection Range ● Engine speed: More than 50 r/min Evaluation Conditions ● The input voltage from the alternator FR terminal is between 4.8 V and 5.2 V or is the battery voltage for 20 seconds.	● Open circuit in the alternator FR terminal circuit ● Malfunction of engine-ECU



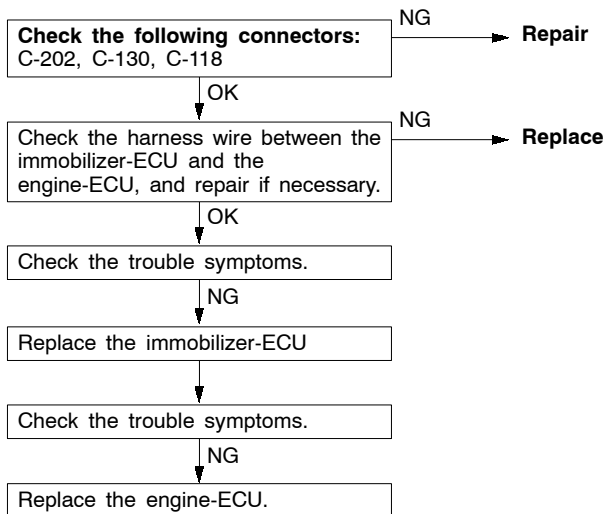
Code No. P1603 Battery backup line malfunction	Probable cause
<p>Inspection Range</p> <ul style="list-style-type: none"> Ignition switch: ON <p>Evaluation Conditions</p> <ul style="list-style-type: none"> The backup RAM information set at the last time when the ignition switch was turned to the OFF position is not memorized. 	<ul style="list-style-type: none"> Battery backup line disconnection, short circuit or connector contact defect Engine-ECU malfunction



Code No.P1610 Immobilizer system <Europe and General Export-spec. models>	Probable cause
Inspection Range ● Ignition switch: ON Set Conditions ● Improper communication between the engine-ECU and the immobilizer-ECU	● Open or short circuit, or loose connector contact ● Malfunction of the immobilizer-ECU ● Malfunction of the engine-ECU

NOTE

- (1) If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
- (2) This code may be displayed when registering the key encrypted code.

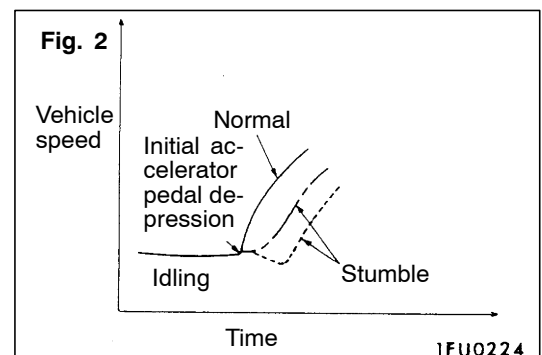
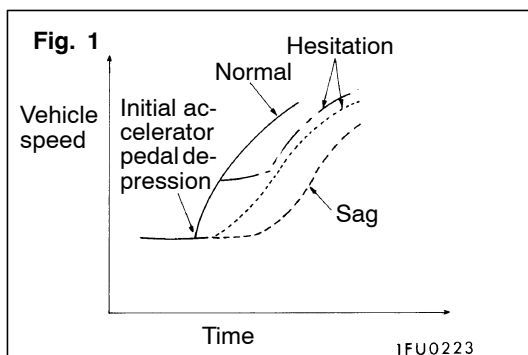


INSPECTION CHART FOR TROUBLE SYMPTOMS

Inspection procedure	Check items	Reference page
1	Communication between MUT-II and entire system is not possible.	13A-54
2	Only communication between MUT-II and engine-ECU is not possible.	13A-55
3	Engine warning lamp does not illuminate immediately after ignition switch is set to ON position.	13A-56
4	Engine warning lamp stays illuminated and does not turn OFF.	13A-57
5	Starting disabled (Starter does not rotate.)	13A-58
6	Starting disabled (Starter rotates but initial combustion does not occur.)	13A-59
7	Starting disabled (Initial combustion occurs but is incomplete.)	13A-61
	Improper starting (Starting time is long.)	
8	Unstable idling (Rough idling, hunting)	13A-63
	Inappropriate idling speed (High or low idling speed)	
	Engine stalls (Die out) during idling	
9	Engine stalls when starting travel. (Pass out)	13A-66
10	Engine stalls during deceleration	13A-67
11	Pulsation (Hesitation, sag)	13A-68
	Poor acceleration	
	Stumbling	
	Surging	
12	Shock during acceleration	13A-70
13	Shock during deceleration	13A-71
14	Knocking	13A-72
15	Deviation of ignition interval	13A-73
16	Run on (Dieseling)	13A-74
17	Abnormal odor, white smoke, black smoke, high CO or HC concentration when idling	13A-75
18	Battery dies	13A-77
19	Overheating	13A-79
20	Abnormal radiator fan motor rotation	13A-80
21	A/C ineffective	13A-81
22	Engine-ECU power supply, engine control relay, ignition switch-IG1 system	13A-82
23	Fuel pump system	13A-85
24	Radiator fan control relay system	13A-87
25	Condenser fan relay system	13A-89
26	A/C switch system	13A-92
27	A/C compressor relay system	13A-93
28	A/C load signal system	13A-95
29	Secondary air control solenoid valve system	13A-96
30	Intercooler water spray circuit system	13A-97
31	Intercooler water spray lamp system	13A-99
32	Ignition coil (integrated power transistor) system	13A-100

PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

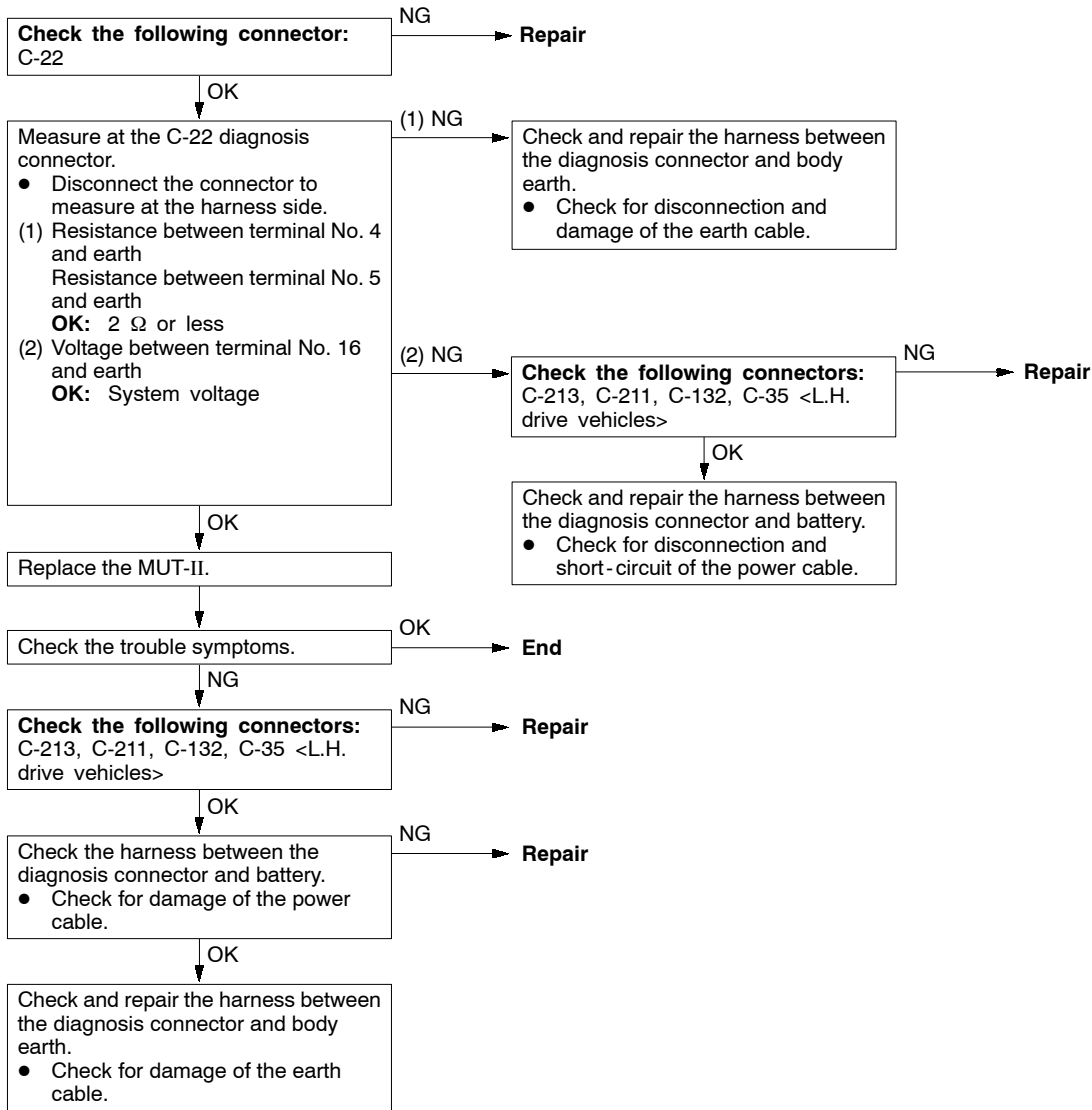
Items		Symptom
Starting	Won't start	The starter is used to crank the engine, but there is no combustion within the cylinders, and the engine won't start.
	Fires up and dies	There is combustion within the cylinders, but then the engine soon stalls.
	Hard starting	Engine starts after cranking a while.
Idling stability	Hunting	Engine speed doesn't remain constant; changes at idle.
	Rough idle	Usually, a judgement can be based upon the movement of the tachometer pointer, and the vibration transmitted to the steering wheel, shift lever, body, etc. This is called rough idle.
	Incorrect idle speed	The engine doesn't idle at the usual correct speed.
	Engine stall (Die out)	The engine stalls when the foot is taken from the accelerator pedal, regardless of whether the vehicles is moving or not.
	Engine stall (Pass out)	The engine stalls when the accelerator pedal is depressed or while it is being used.
Driving	Hesitation Sag	"Hesitation" is the delay in response of the vehicle speed (engine speed) that occurs when the accelerator is depressed in order to accelerate from the speed at which the vehicle is now traveling, or a temporary drop in vehicle speed (engine speed) during such acceleration. Serious hesitation is called "sag". (Refer to Fig. 1)
	Poor acceleration	Poor acceleration is inability to obtain an acceleration corresponding to the degree of throttle opening, even though acceleration is smooth, or the inability to reach maximum speed.
	Stumble	Engine speed increase is delayed when the accelerator pedal is initially depressed for acceleration. (Refer to Fig. 2)
	Shock	The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.
	Surge	This is repeated surging ahead during constant speed travel or during variable speed travel.
	Knocking	A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.
Stopping	Run on ("Dieseling")	The condition in which the engine continues to run after the ignition switch is turned to "LOCK" (OFF) position. Also called "Dieseling".



INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

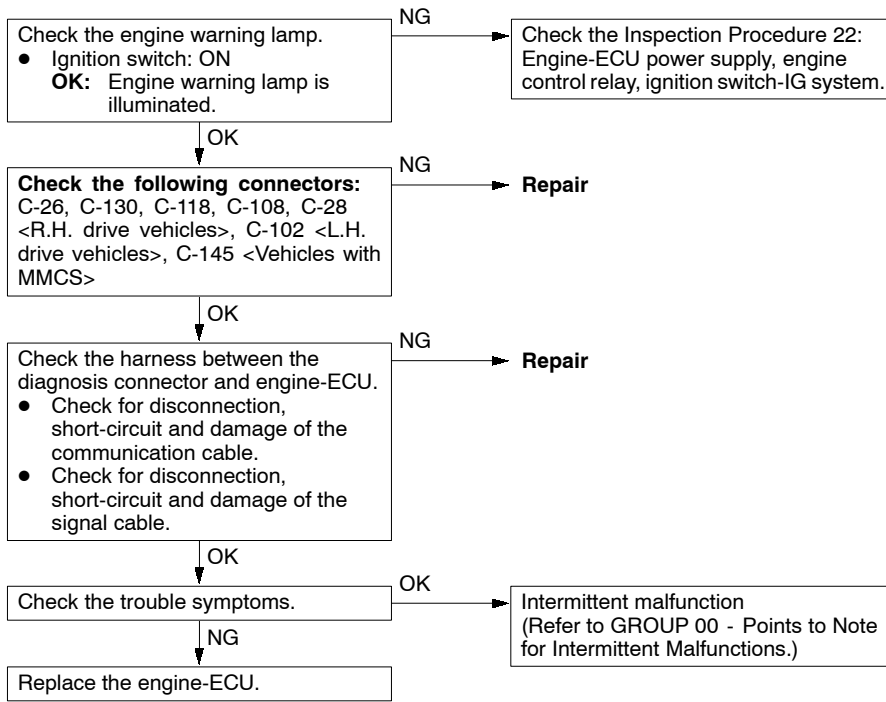
Inspection Procedure 1

Communication between MUT-II and entire system is not possible.	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Diagnosis connector malfunction ● MUT-II malfunction



Inspection Procedure 2

Only communication between MUT-II and engine-ECU is not possible.	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Ignition switch malfunction ● Engine control relay malfunction ● Engine-ECU malfunction

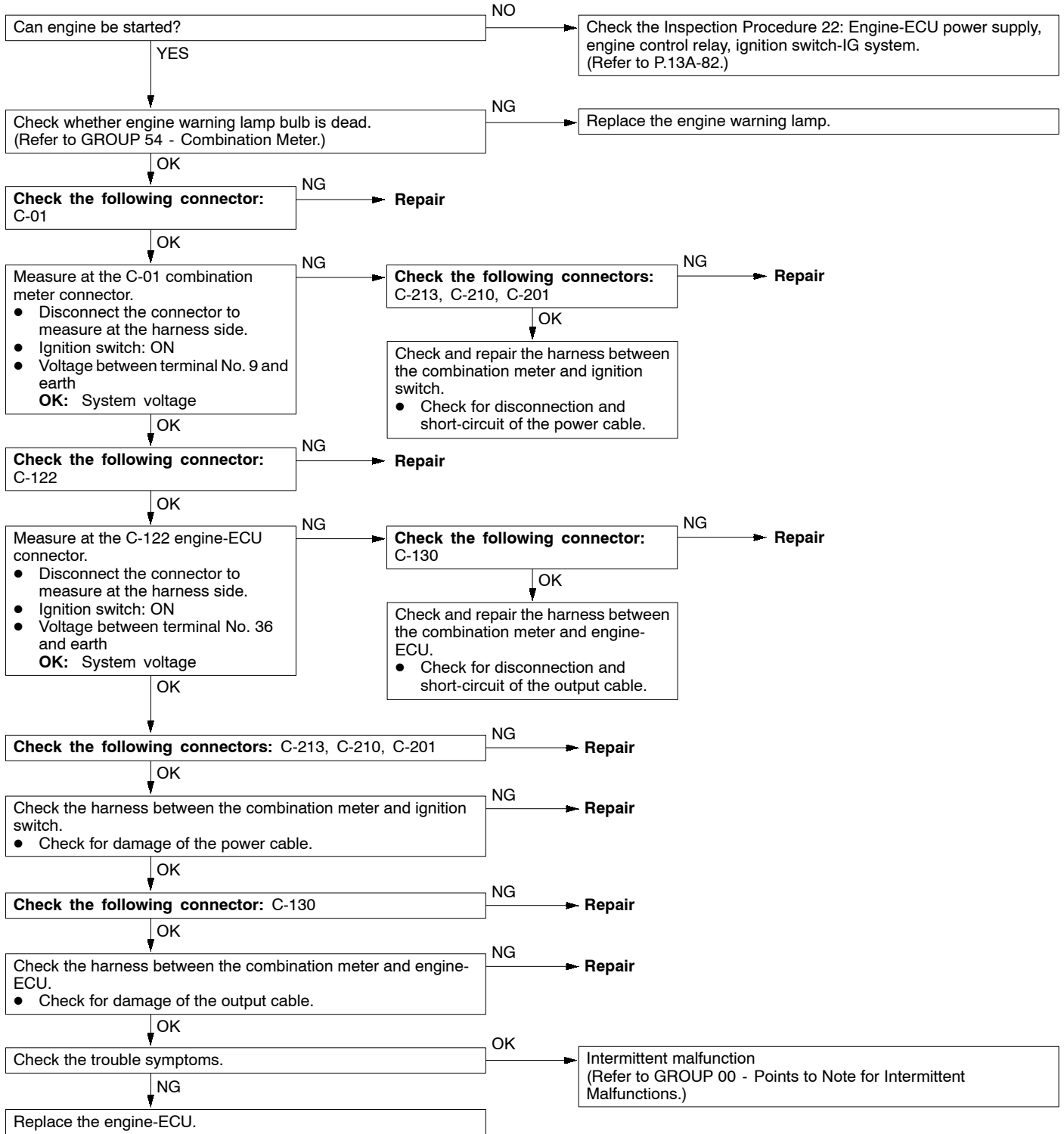


NOTE

If the problem symptom does not disappear in the vehicle with MMCS after carrying out the above-mentioned inspection procedure, there may be a malfunction in the multi-center display.

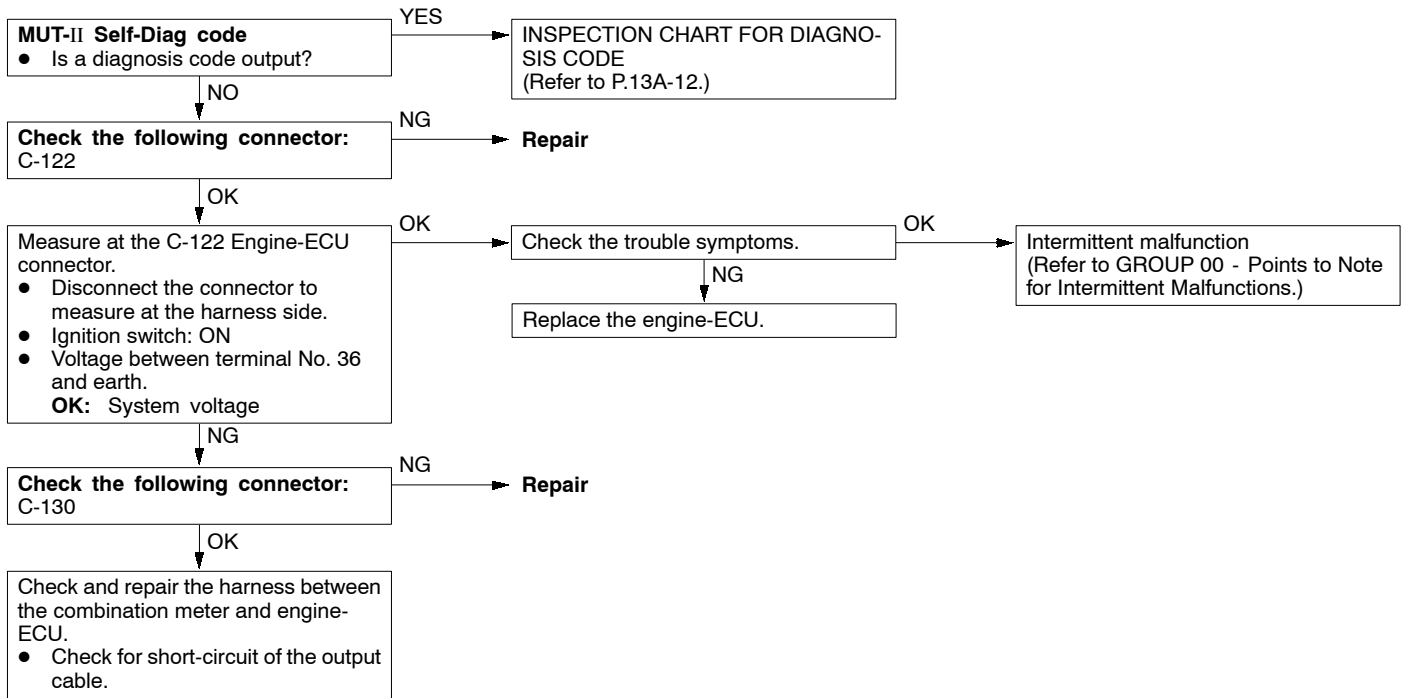
Inspection Procedure 3

Engine warning lamp does not illuminate immediately after ignition switch is set to ON position.	Probable cause
The engine-ECU illuminates the engine warning lamp for 5 seconds immediately after ignition switch is set to "ON" position to check whether the engine warning lamp bulb is dead.	<ul style="list-style-type: none"> ● Engine warning lamp bulb dead ● Ignition switch malfunction ● Engine control relay malfunction ● Engine-ECU malfunction



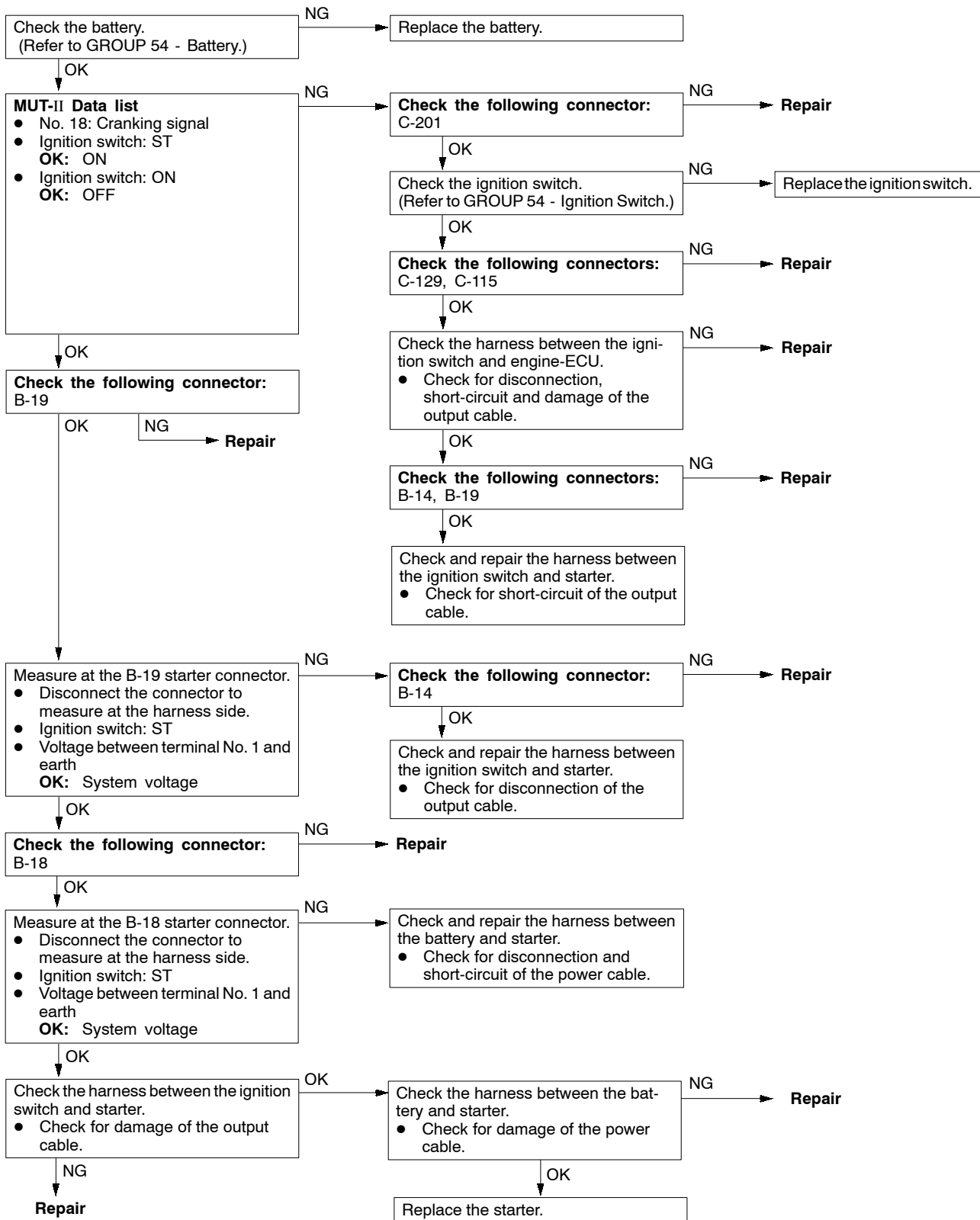
Inspection Procedure 4

Engine warning lamp stays illuminated and does not turn OFF.	Probable cause
The engine-ECU illuminates the engine warning lamp when the occurrence of a diagnosis code is recorded.	<ul style="list-style-type: none"> Engine-ECU malfunction



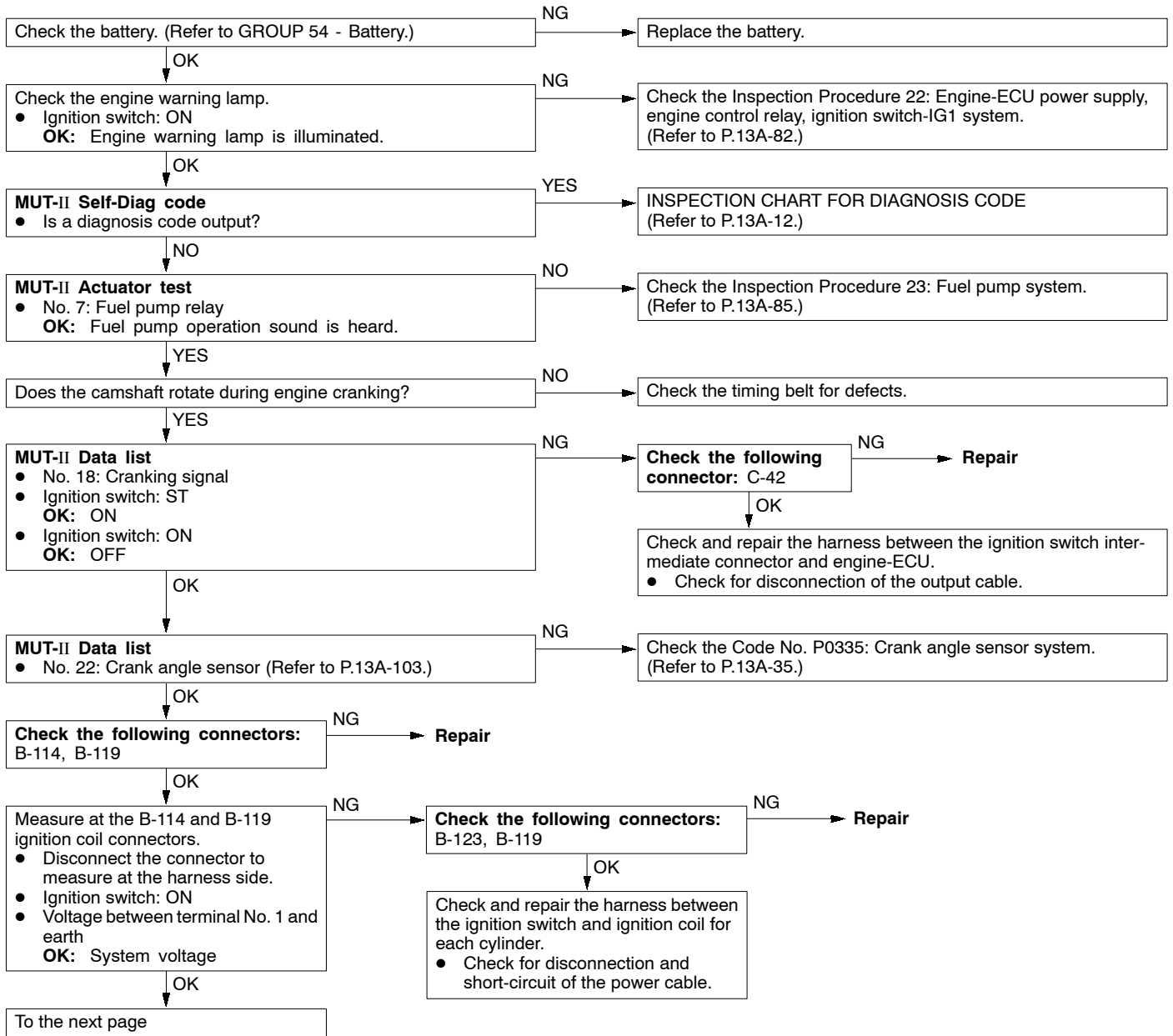
Inspection Procedure 5

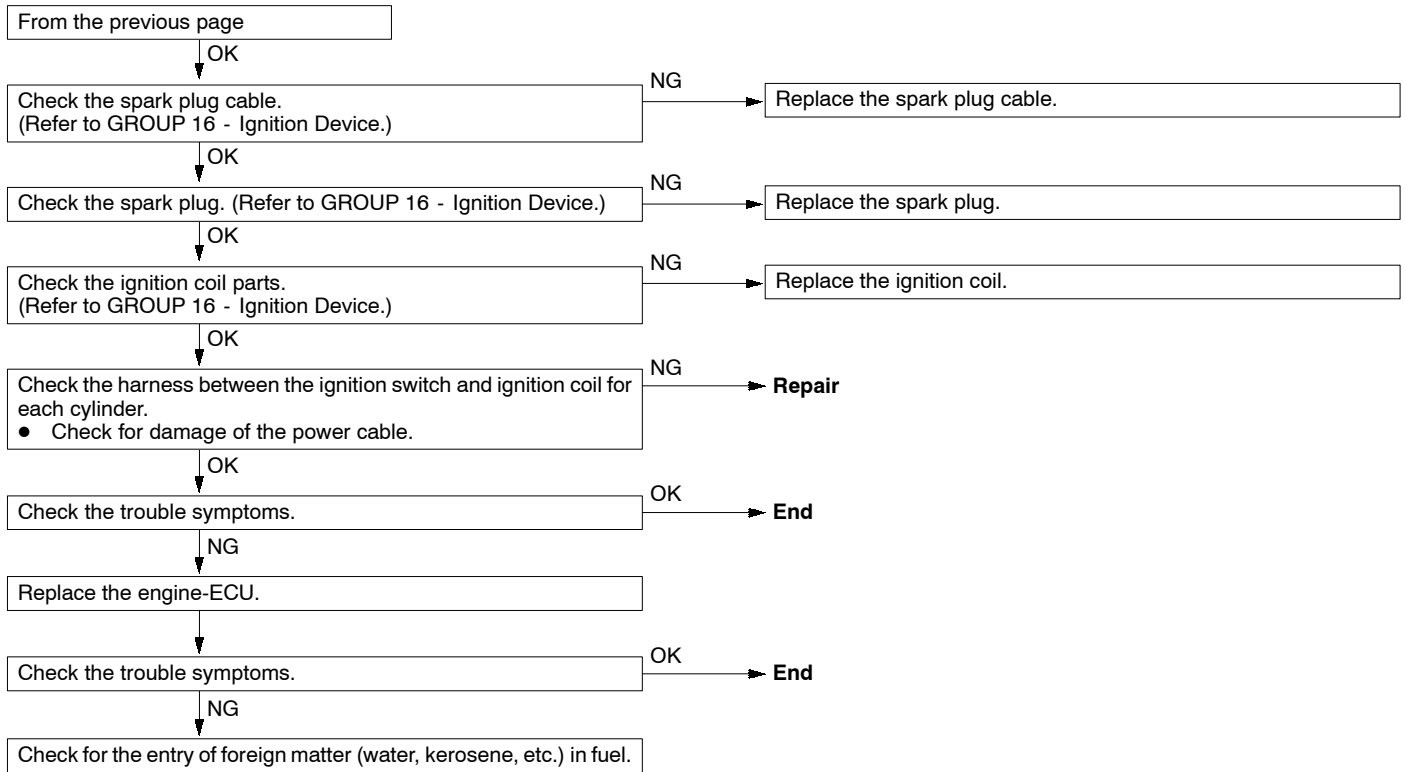
Starting disabled (Starter does not rotate.)	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Battery malfunction ● Ignition switch malfunction ● Starter malfunction



Inspection Procedure 6

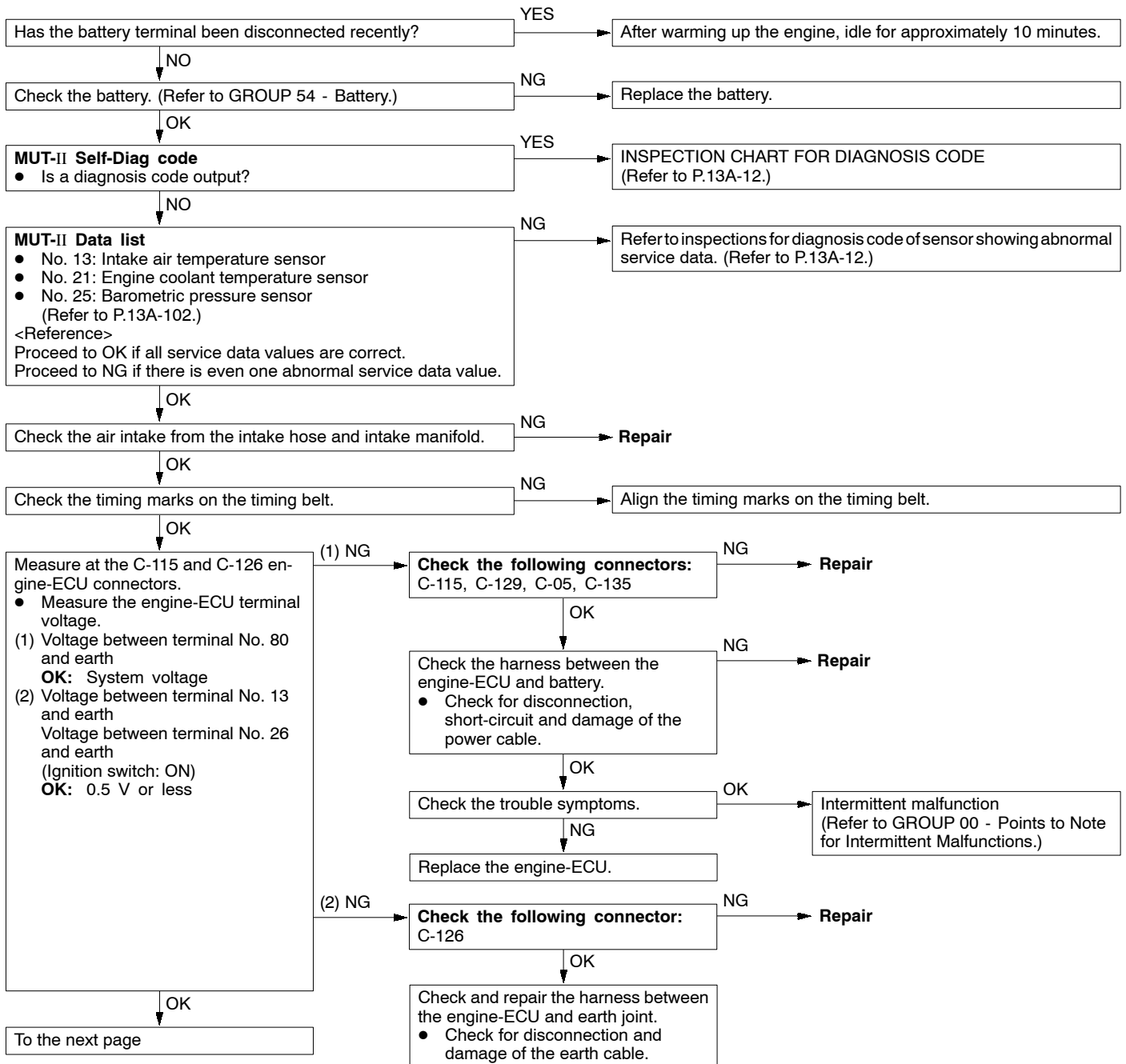
Starting disabled (Starter rotates but initial combustion does not occur.)	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Battery malfunction ● Ignition switch malfunction ● Ignition system malfunction ● Fuel system malfunction ● Throttle valve malfunction ● Timing belt malfunction ● Engine-ECU malfunction-

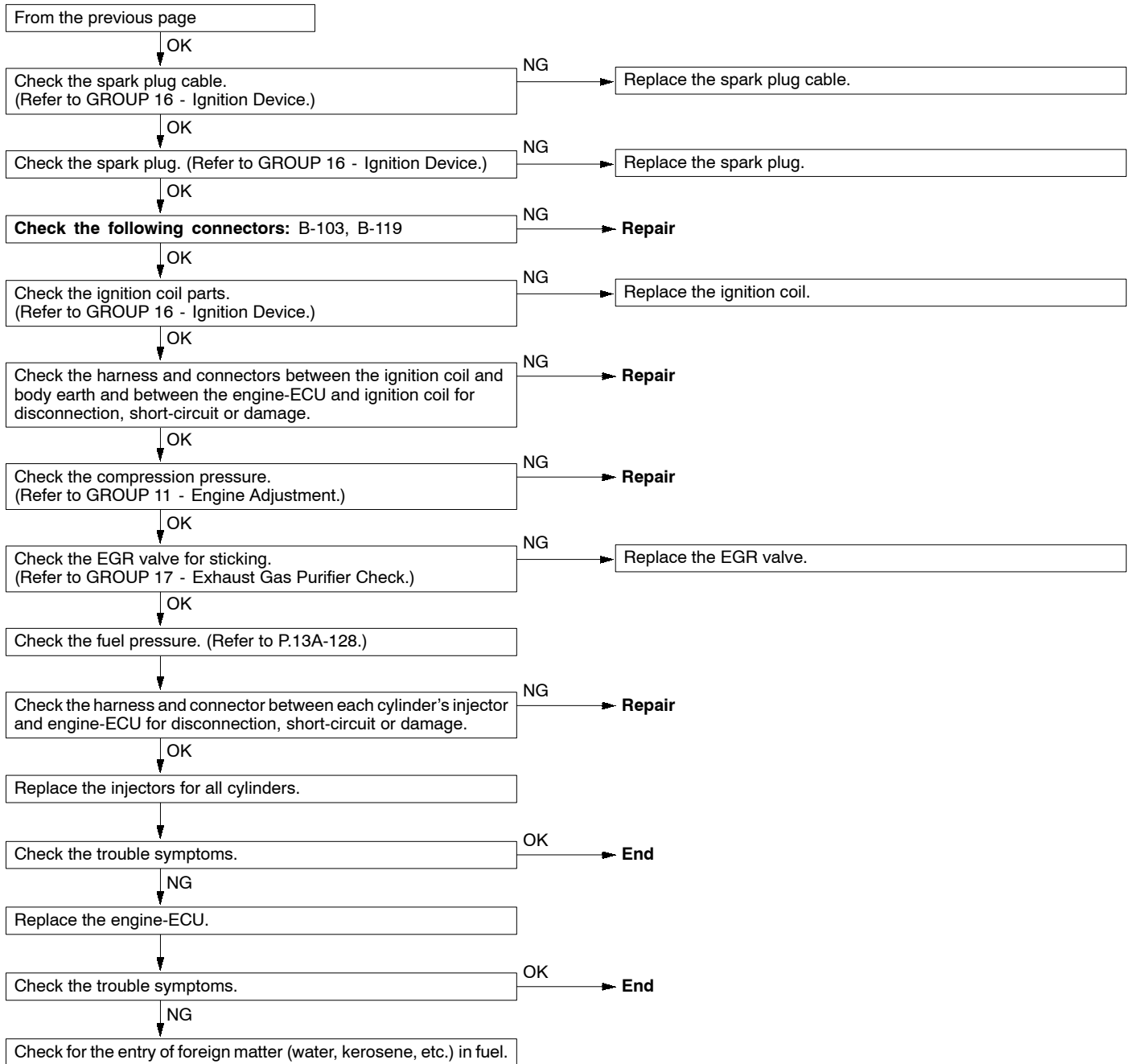




Inspection Procedure 7

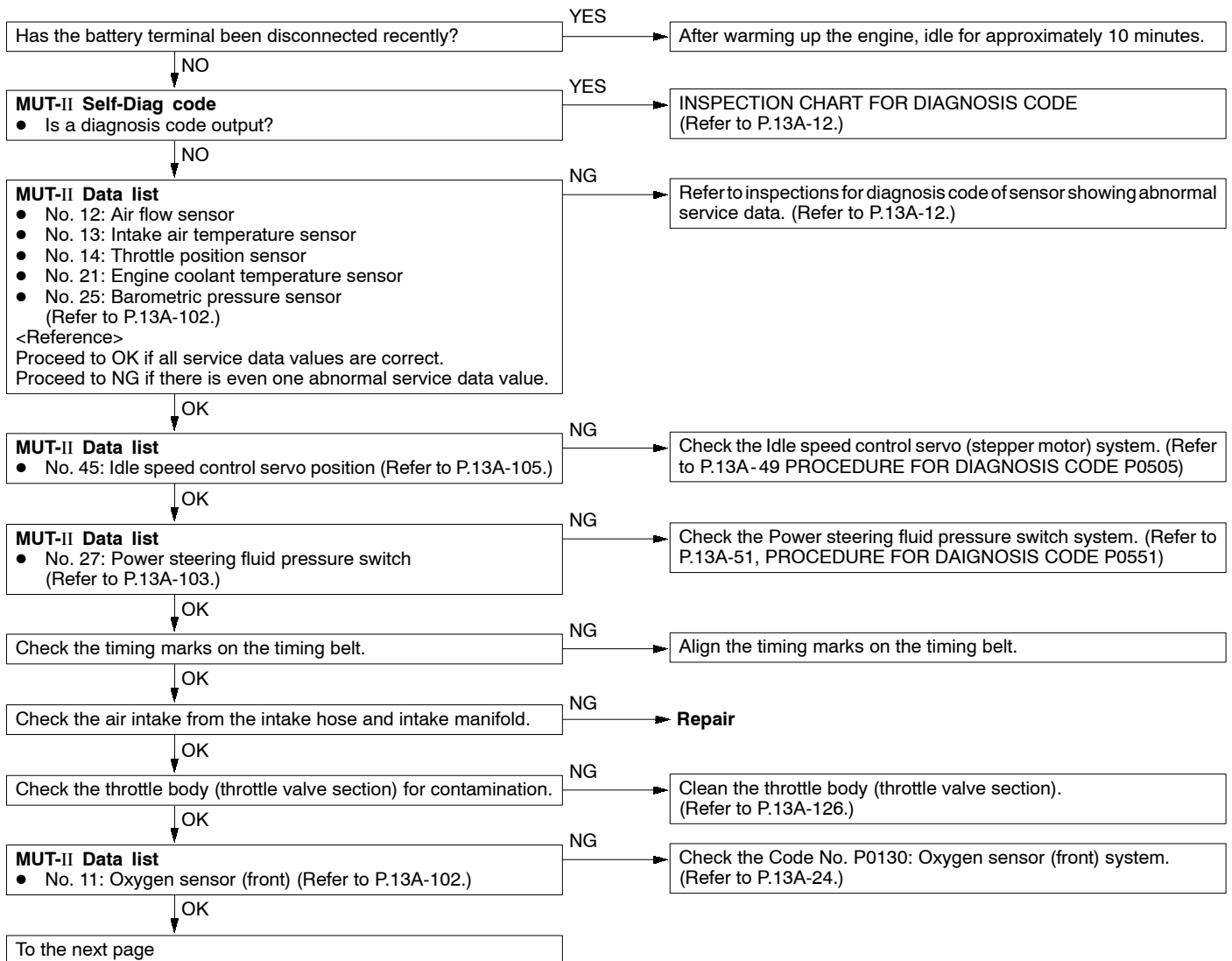
Starting disabled (Initial combustion occurs but is incomplete.), improper starting (Starting time is long.)	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Battery malfunction ● Ignition system malfunction ● Fuel system malfunction ● Intake system malfunction ● EGR valve malfunction ● Timing belt malfunction ● Improper compression pressure ● Engine-ECU malfunction

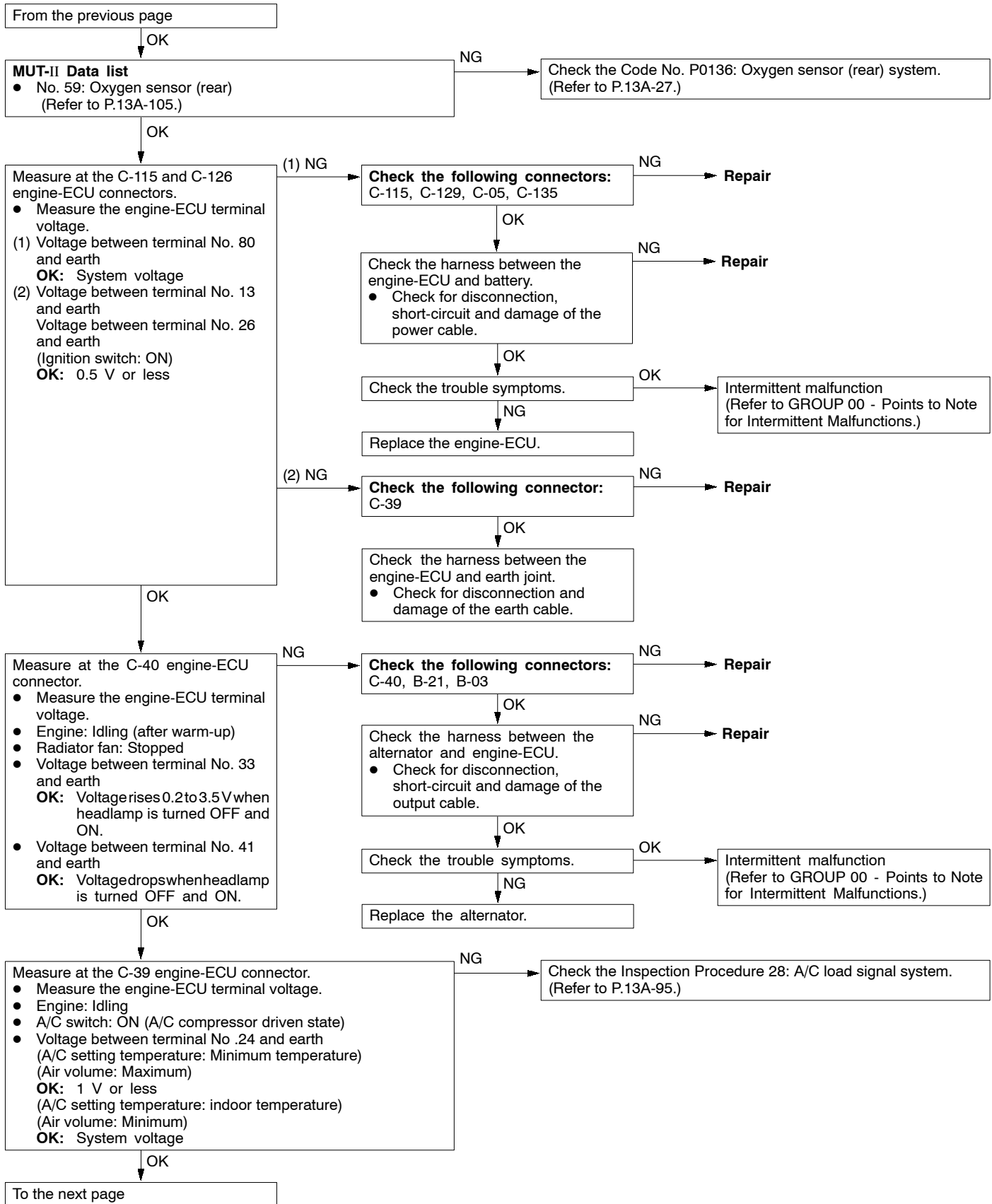


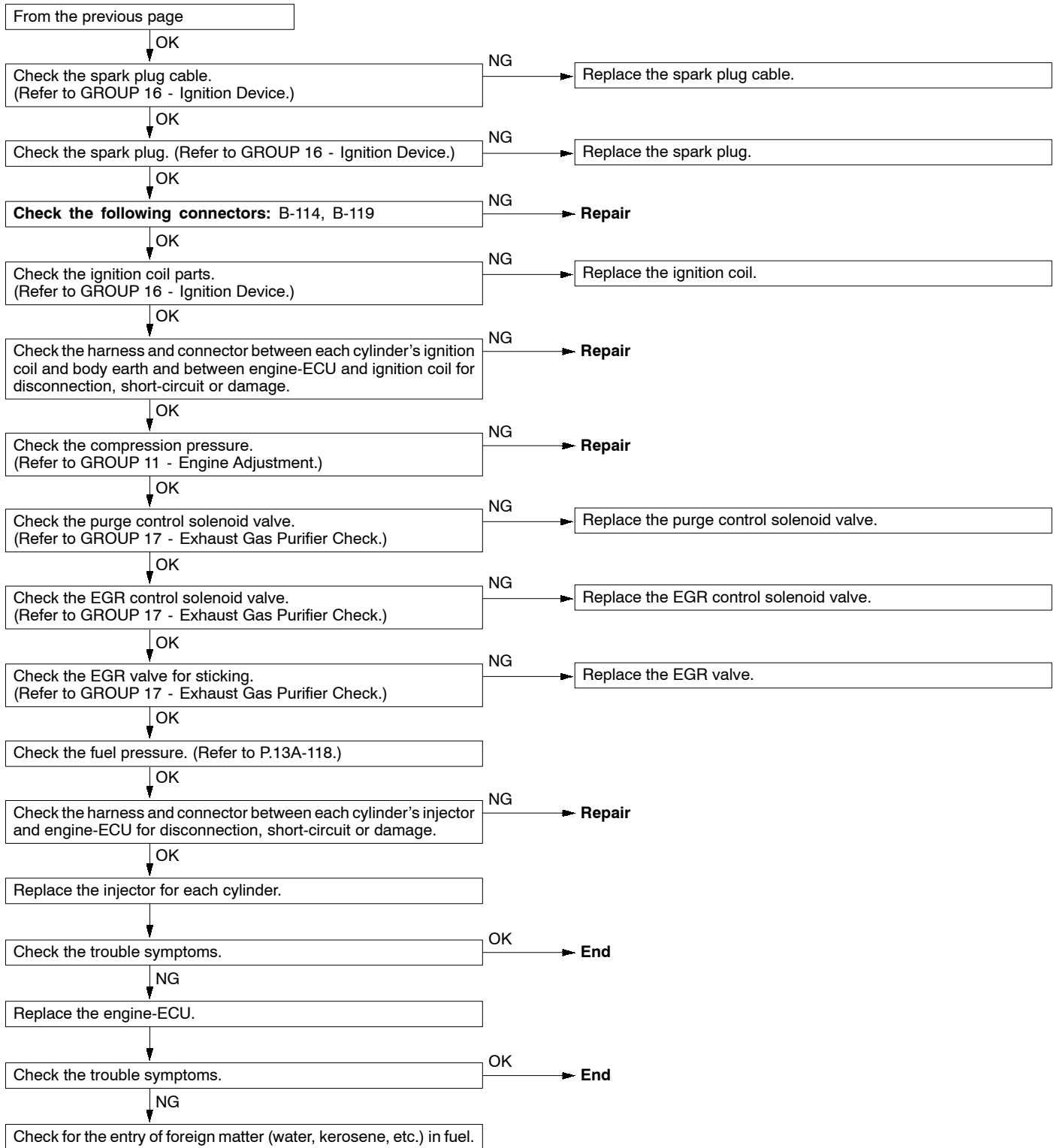


Inspection Procedure 8

Unstable idling (Rough idling, hunting), inappropriate idling speed (High or low idling speed), engine stalls (Die out) during idling	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Idle speed control system malfunction ● Air/fuel ratio control system malfunction ● Ignition system malfunction ● Fuel system malfunction ● Intake and exhaust system malfunction ● Exhaust gas purifier system malfunction ● Throttle valve malfunction ● Timing belt malfunction ● Improper compression pressure ● Engine-ECU malfunction

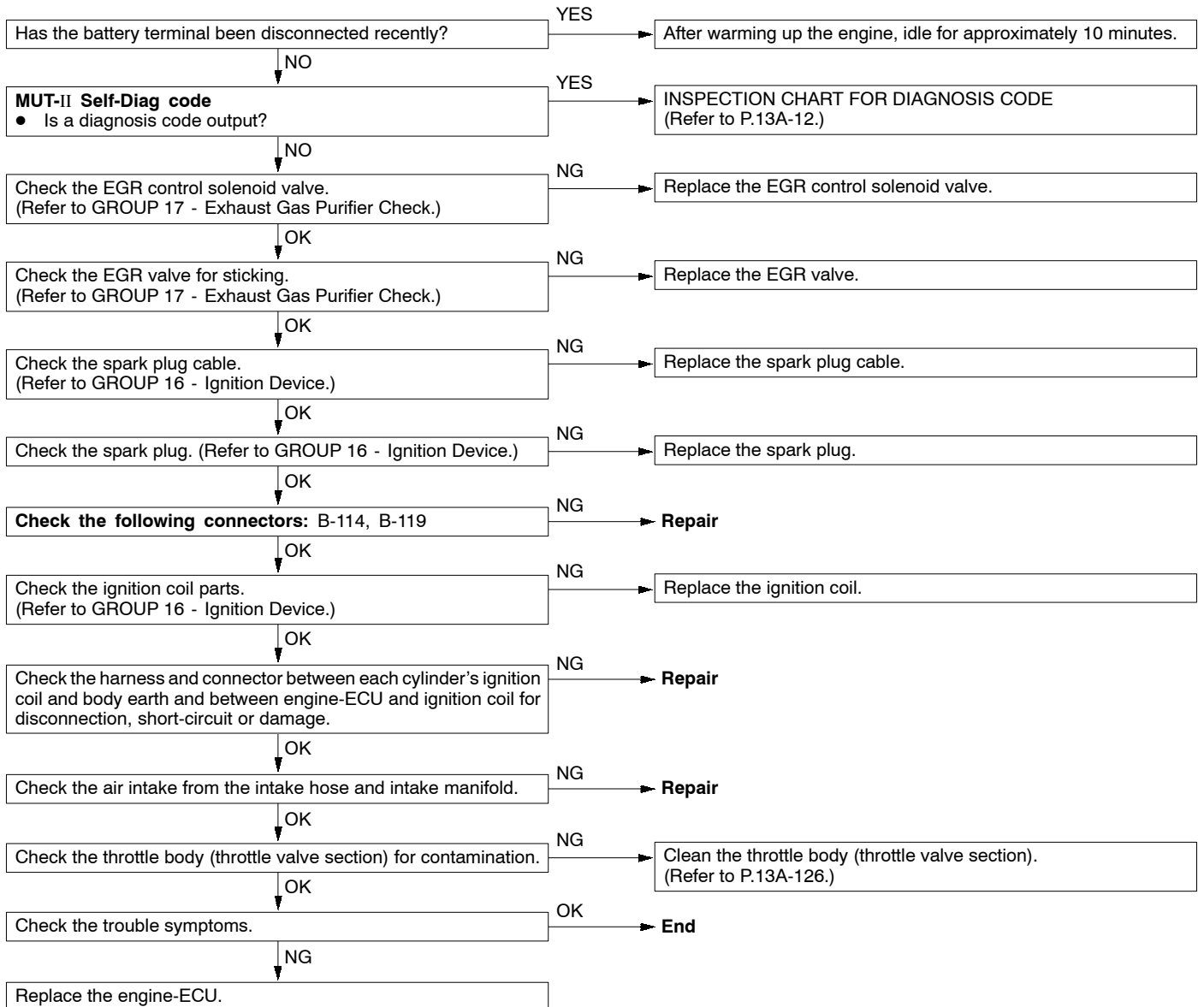






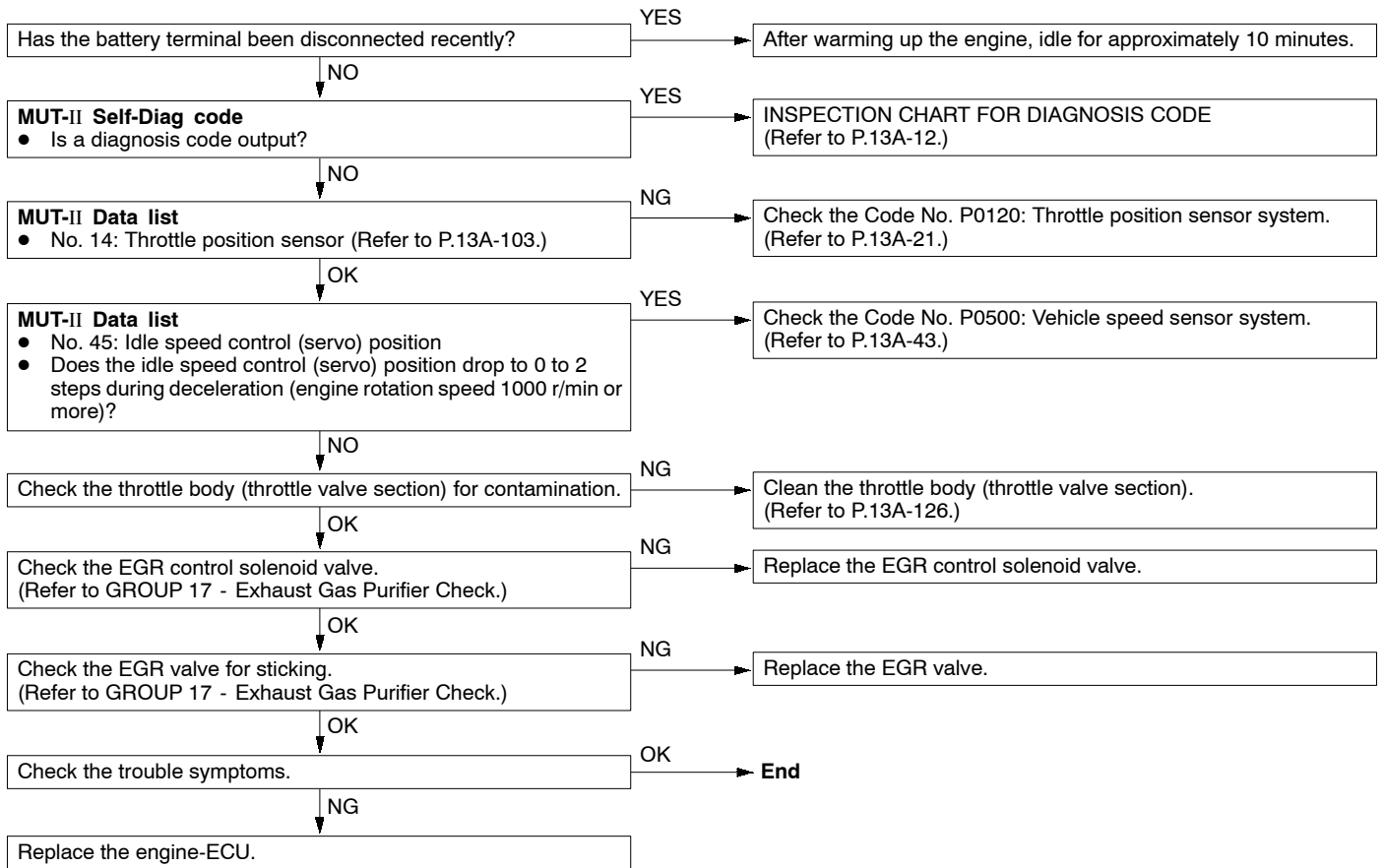
Inspection Procedure 9

Engine stalls when starting travel. (Pass out)	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Ignition system malfunction ● Intake system malfunction ● Exhaust gas purifier system malfunction ● Throttle body malfunction ● Engine-ECU malfunction



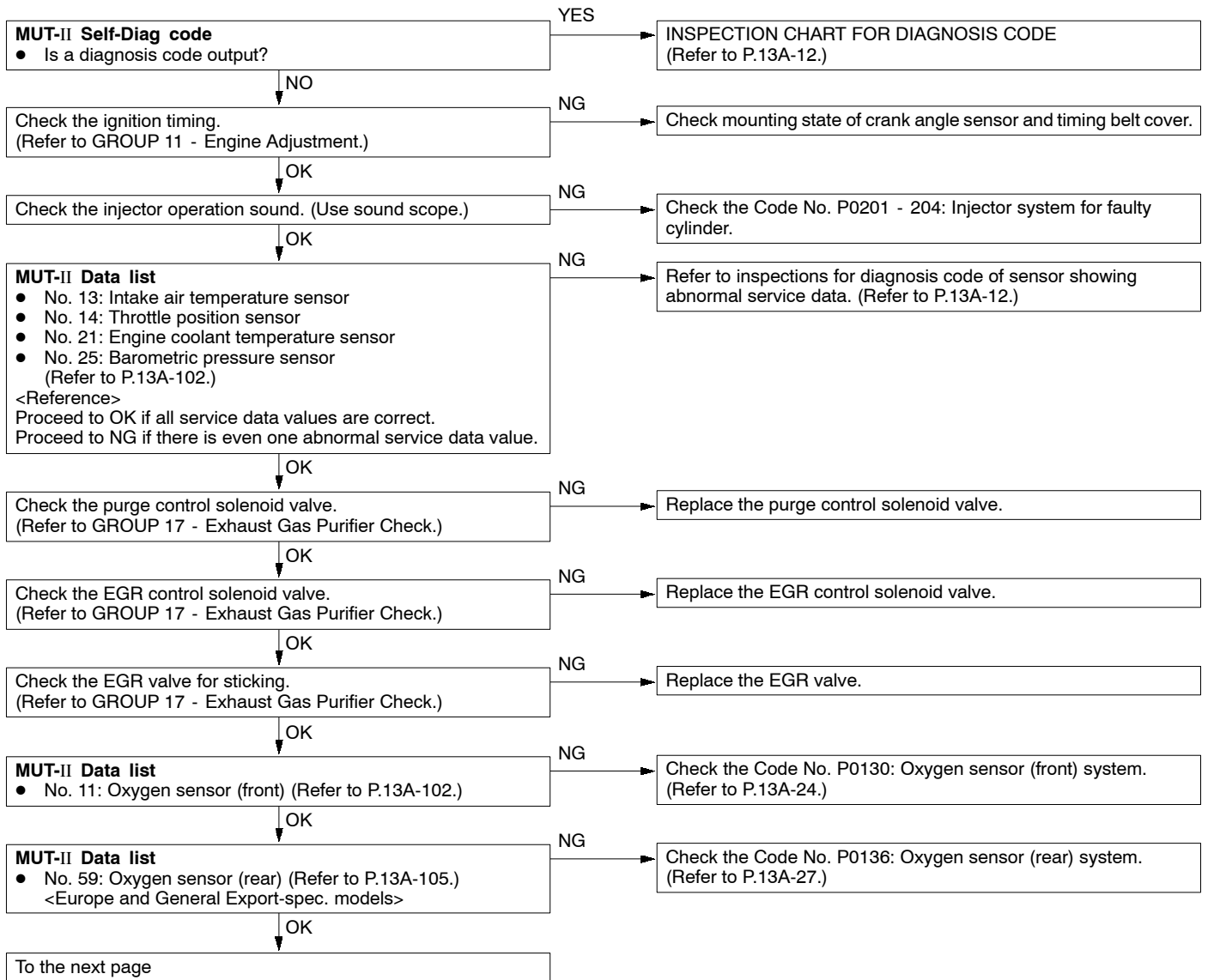
Inspection Procedure 10

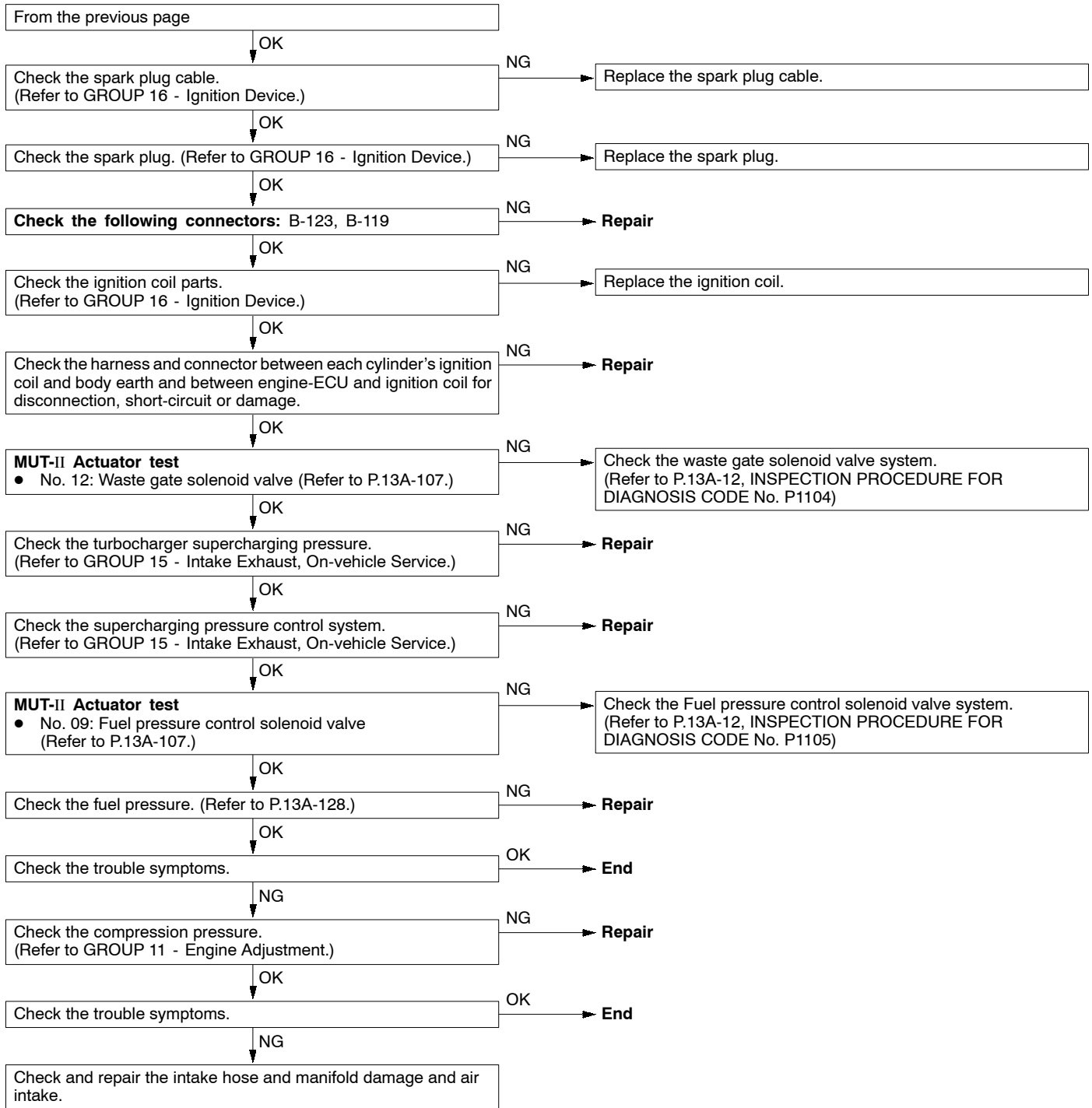
Engine stalls during deceleration	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Idle speed control system malfunction ● Exhaust gas purifier system malfunction ● Throttle valve malfunction ● Engine-ECU malfunction



Inspection Procedure 11

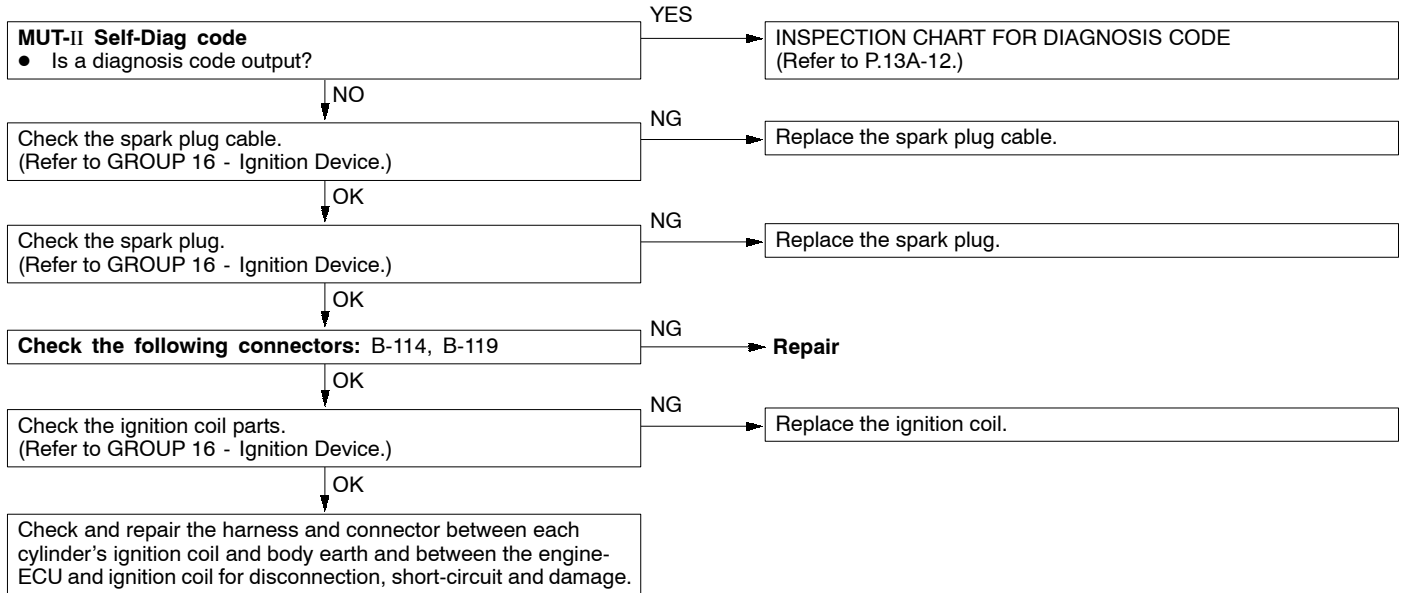
Pulsation (Hesitation, sag), poor acceleration, stumbling, surging	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Air/fuel ratio control system malfunction ● Ignition system malfunction ● Fuel system malfunction ● Intake and exhaust system malfunction ● Exhaust gas purifier system malfunction ● Improper compression pressure ● Turbocharger system malfunction





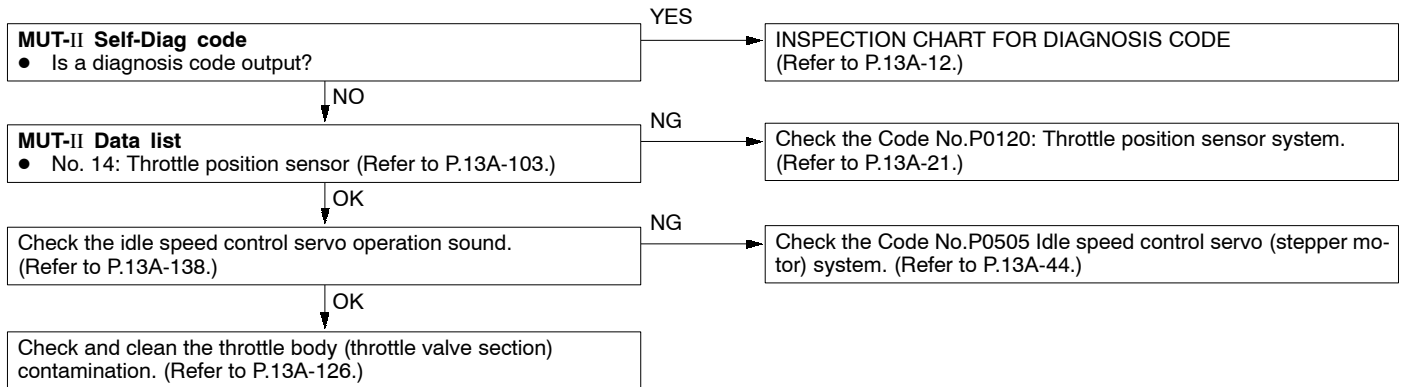
Inspection Procedure 12

Shock during acceleration	Probable cause
The occurrence of ignition leaks, etc., due to the rise in voltage required for the spark plugs during acceleration is a probable cause.	<ul style="list-style-type: none"> Ignition system malfunction



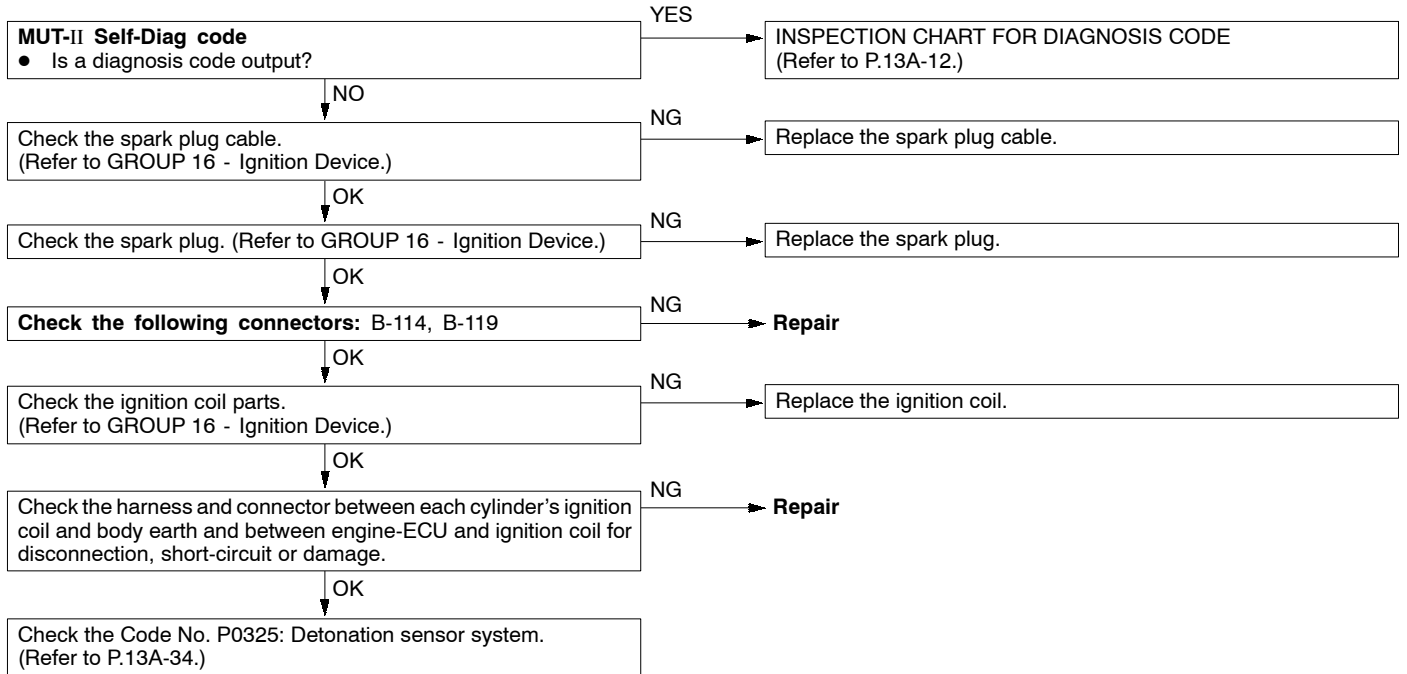
Inspection Procedure 13

Shock during deceleration	Probable cause
The idle speed control may be incorrect.	<ul style="list-style-type: none"> Idle speed control system malfunction



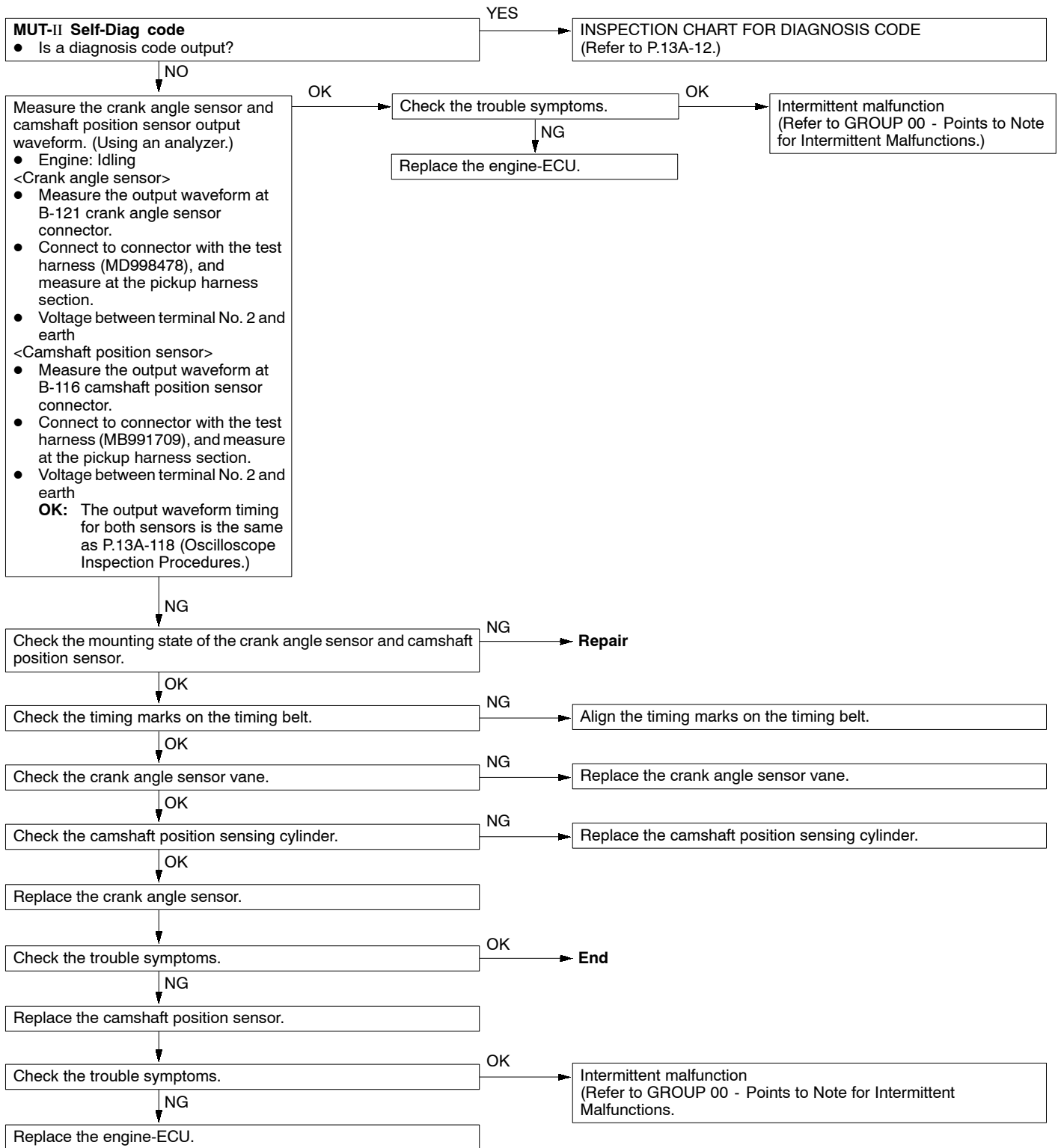
Inspection Procedure 14

Knocking	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Detonation sensor malfunction ● Knocking control system malfunction ● Spark plug malfunction ● Ignition system malfunction ● Engine-ECU malfunction



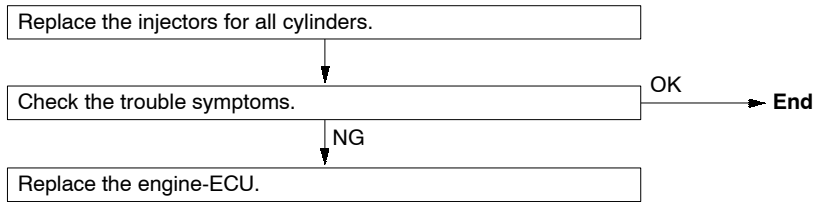
Inspection Procedure 15

Deviation of ignition interval	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Crank angle sensor malfunction ● Camshaft position sensor malfunction ● Timing belt malfunction ● Engine-ECU malfunction



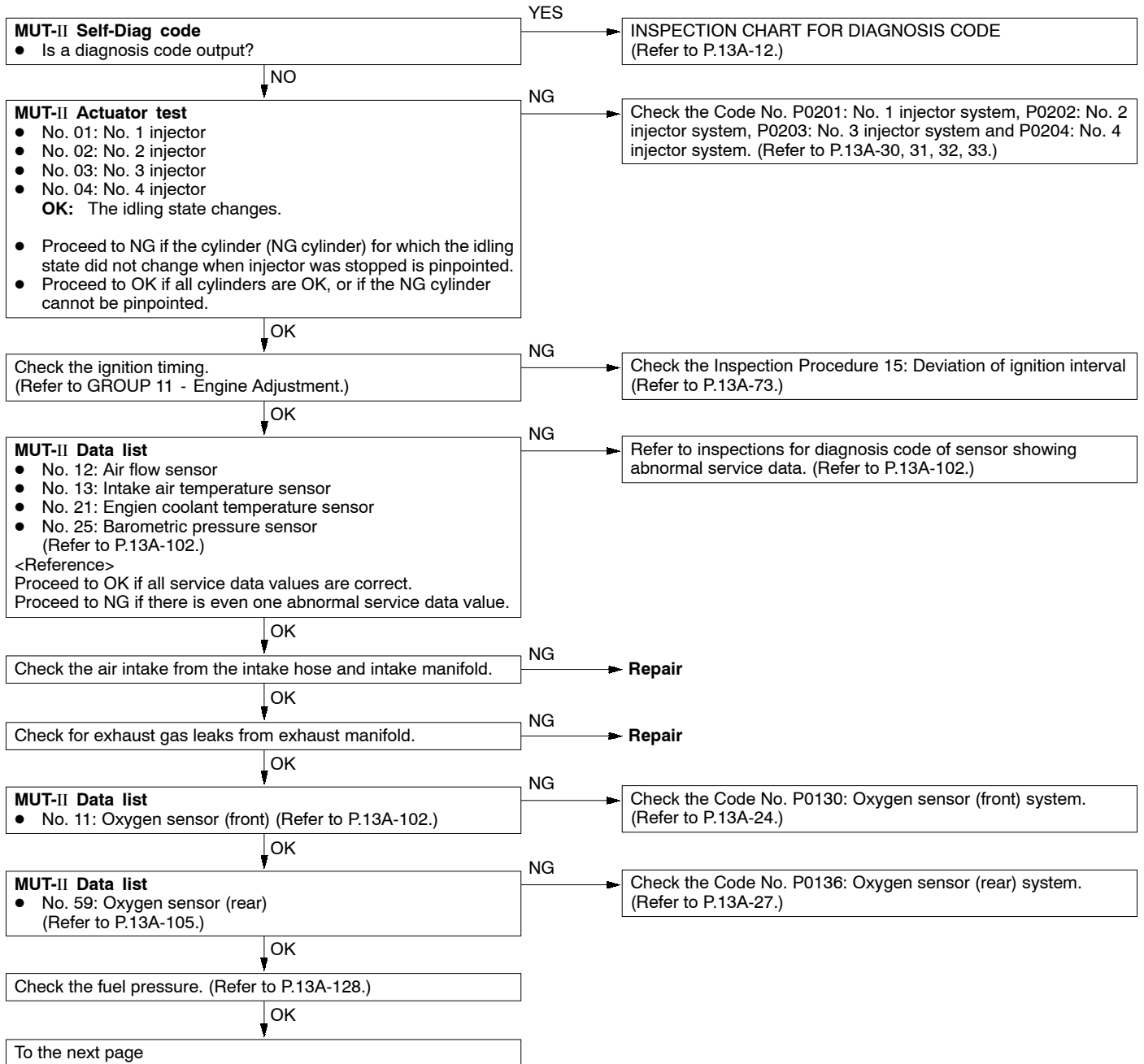
Inspection Procedure 16

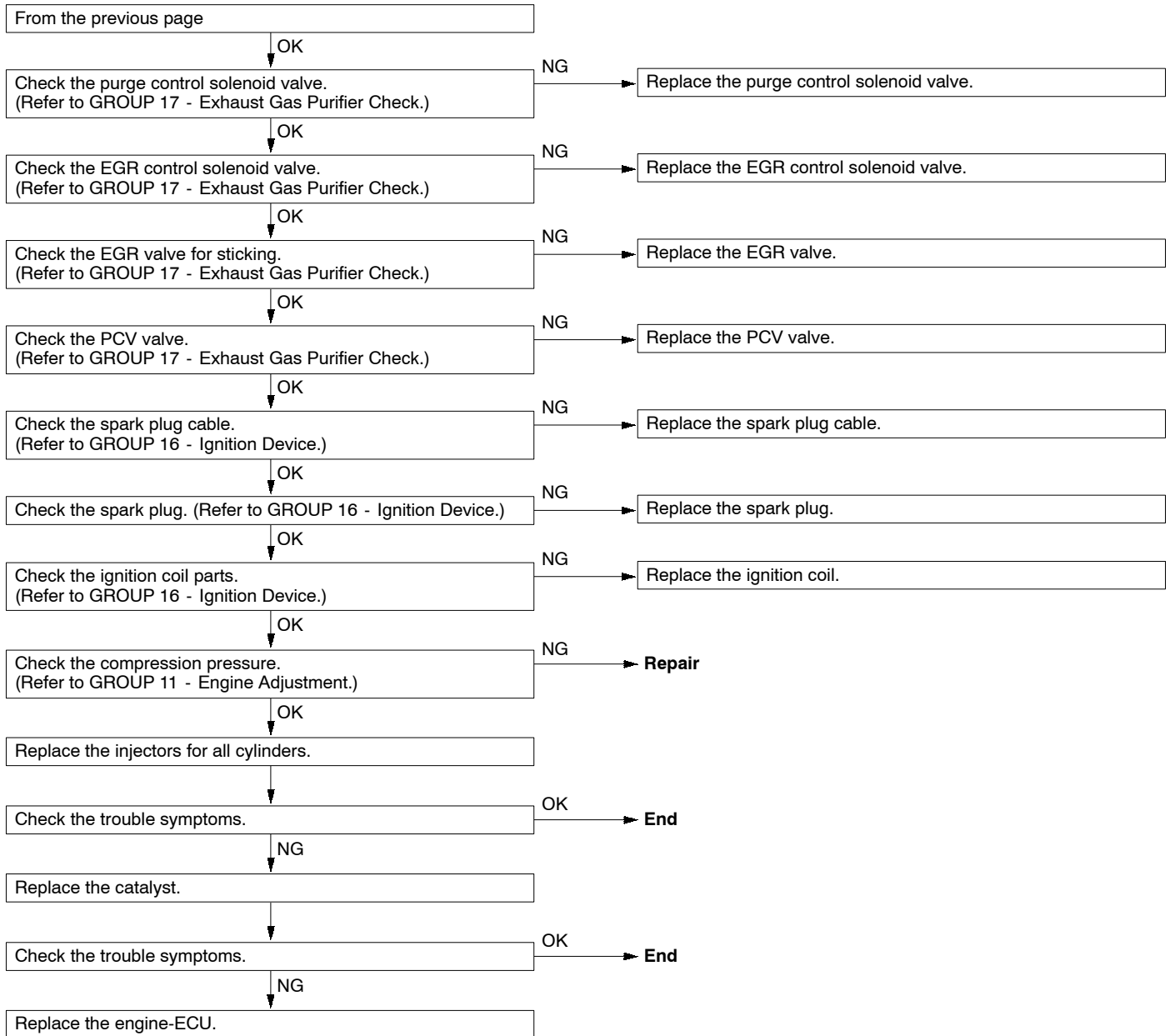
Run on (Dieseling)	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none">● Injector malfunction● Engine-ECU malfunction



Inspection Procedure 17

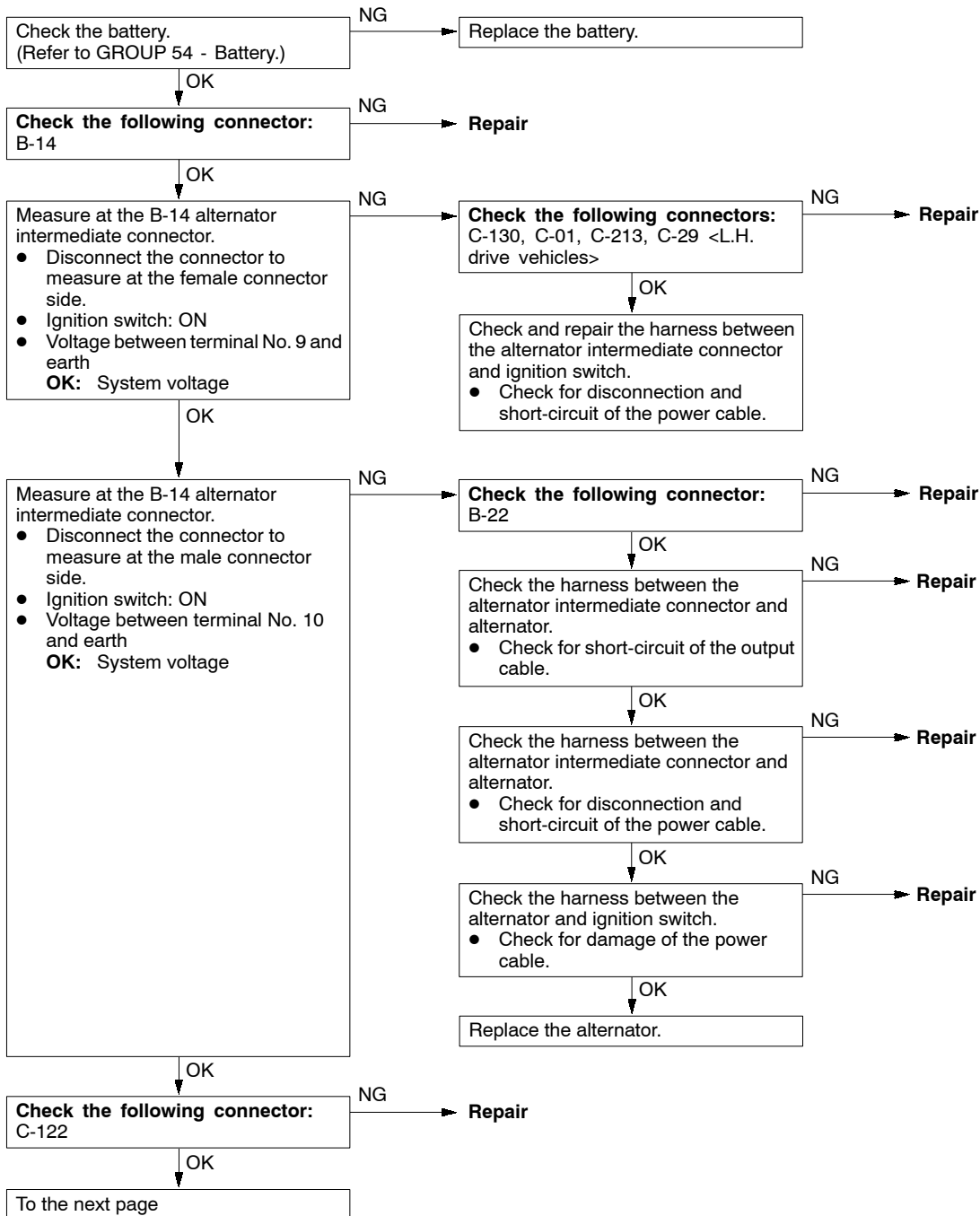
Abnormal odor, white smoke, black smoke, high CO or HC concentration when idling	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Air/fuel ratio control system malfunction ● Ignition system malfunction ● Fuel system malfunction ● Intake and exhaust system malfunction ● Exhaust gas purifier system malfunction ● Improper compression pressure ● Catalyst defect ● Engine-ECU malfunction

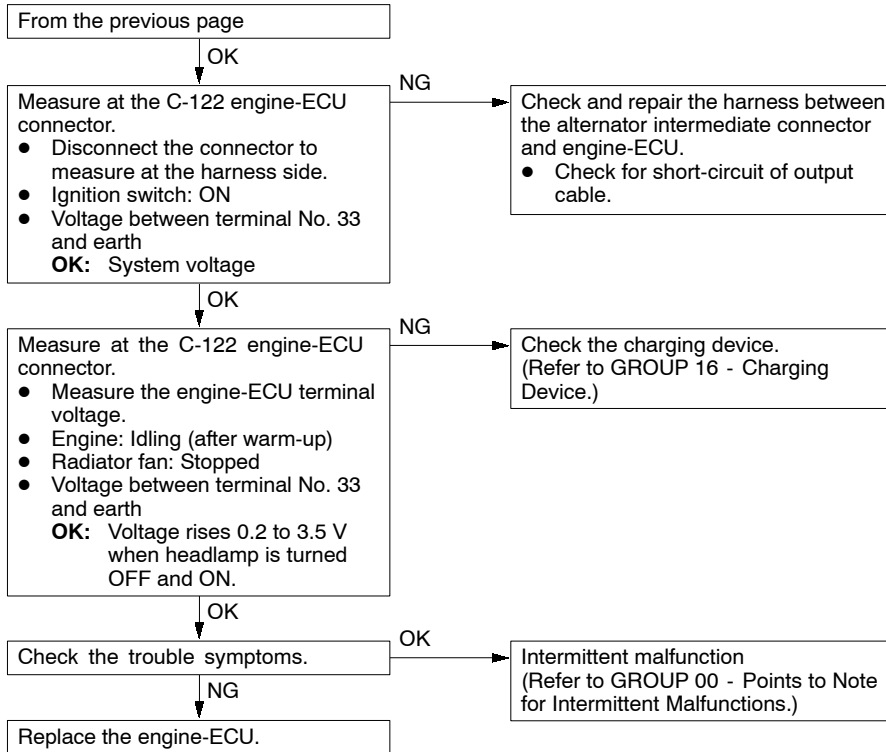




Inspection Procedure 18

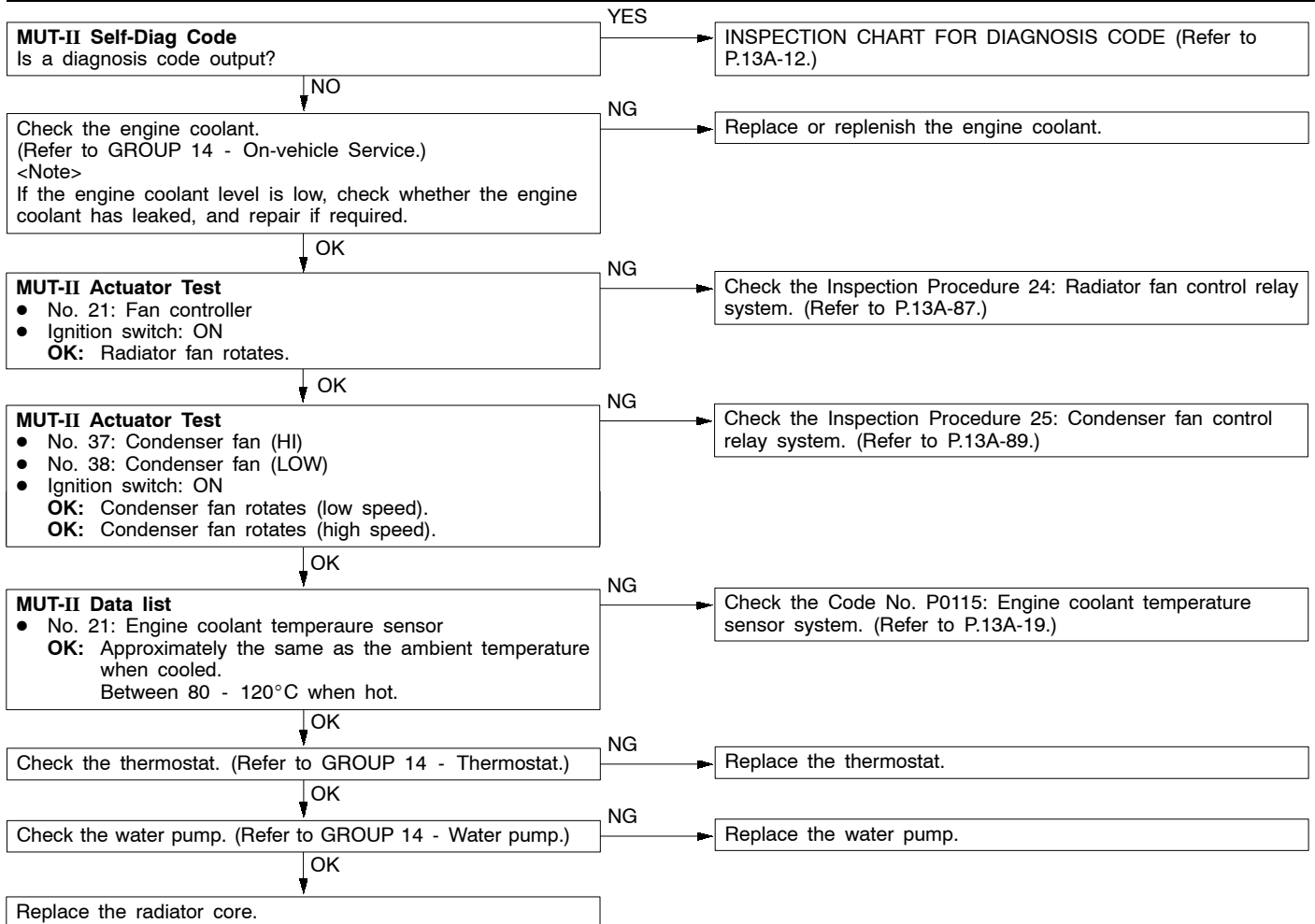
Battery dies	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Battery malfunction ● G terminal short-circuit ● Alternator malfunction ● Engine-ECU malfunction





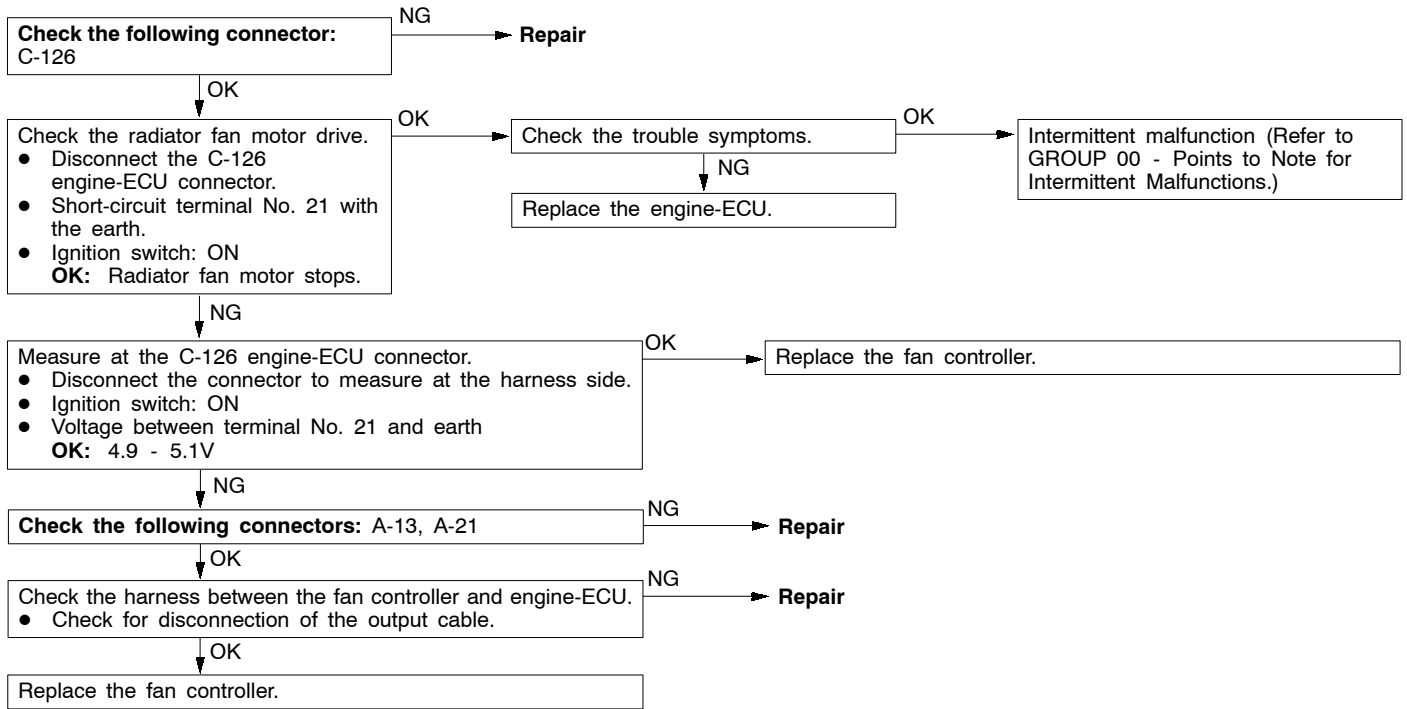
Inspection Procedure 19

Overheating	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● Engine coolant insufficient or deteriorated ● Fan controller malfunction ● Engine coolant temperature sensor malfunction ● Thermostat malfunction ● Water pump malfunction ● Condenser fan relay malfunction ● Radiator core malfunction ● Engine-ECU malfunction



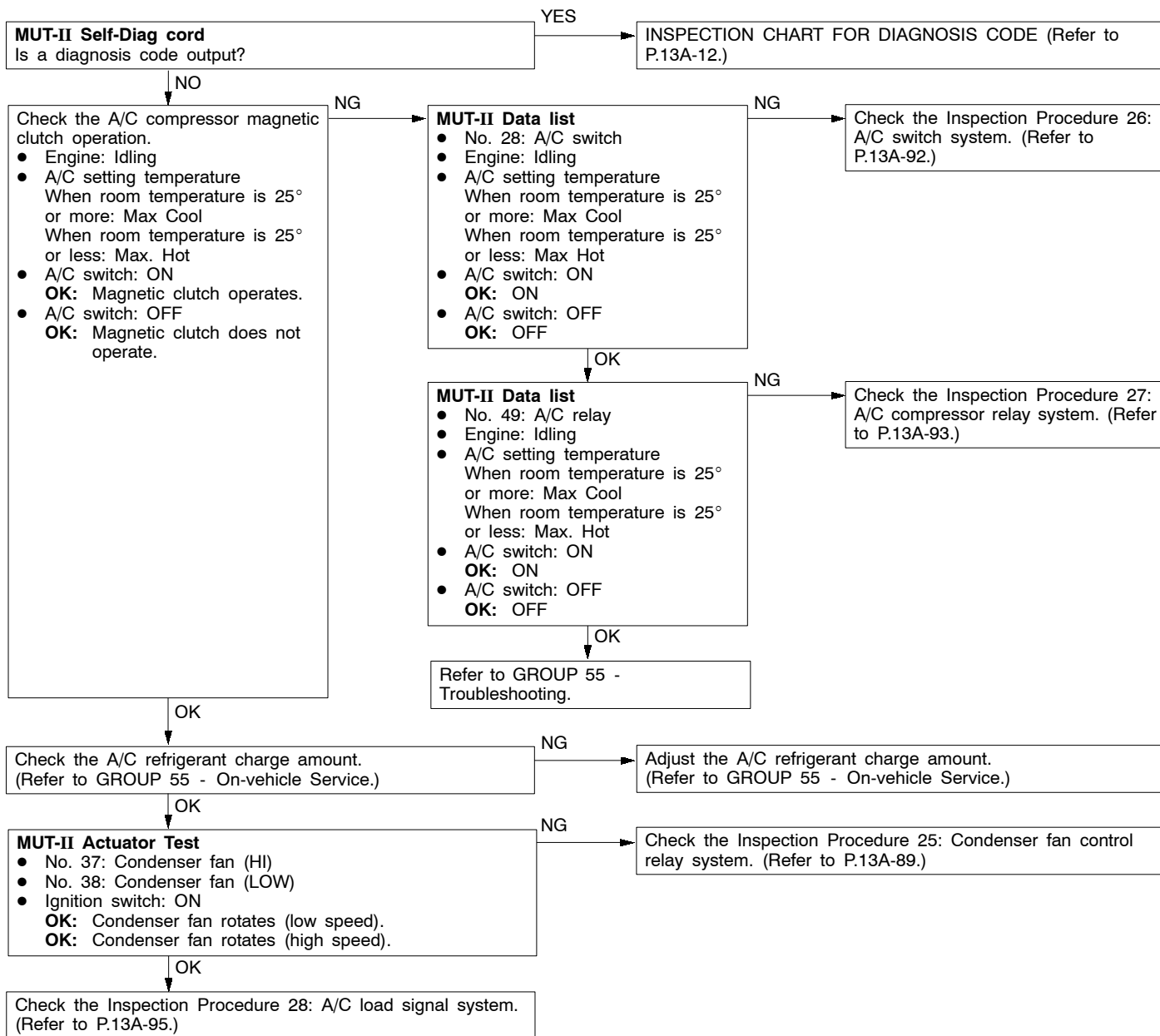
Inspection Procedure 20

Abnormal radiator fan motor rotation	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> • Fan controller malfunction • Engine-ECU malfunction



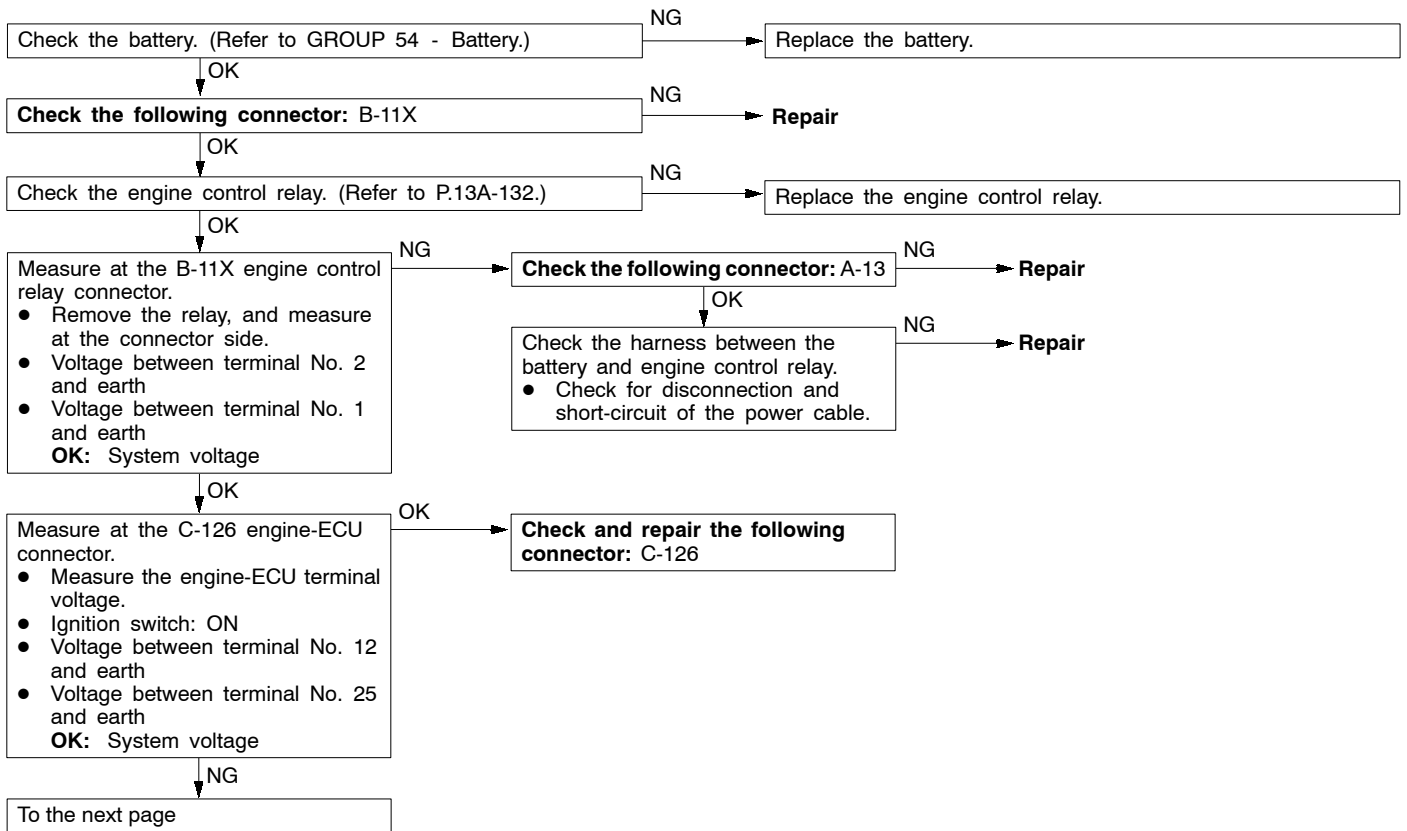
Inspection Procedure 21

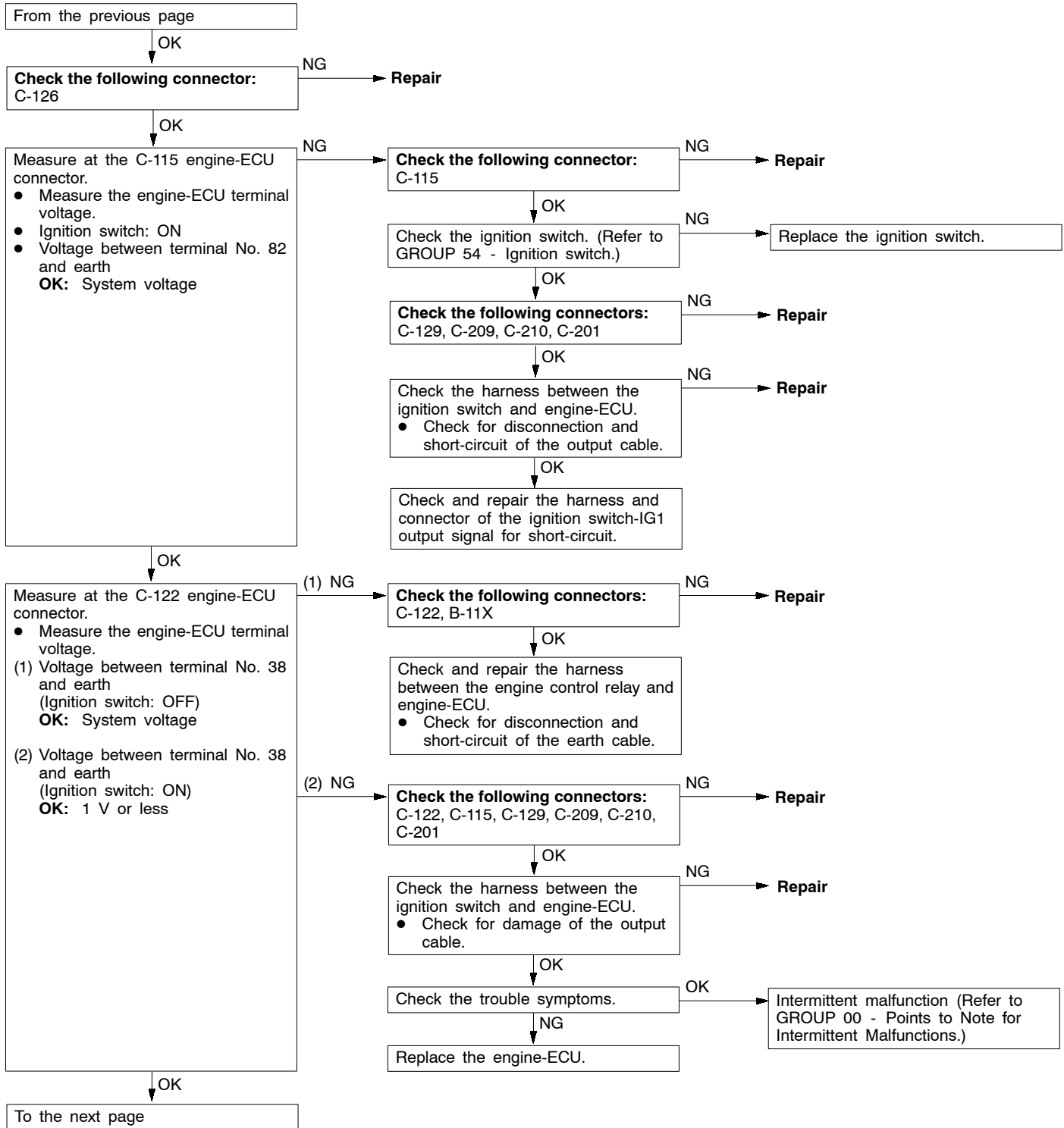
A/C ineffective	Probable cause
Causes shown on right are suspected.	<ul style="list-style-type: none"> ● A/C refrigerant insufficient or over-charged ● A/C compressor relay malfunction ● Condenser fan system malfunction ● A/C-ECU malfunction ● Engine-ECU malfunction

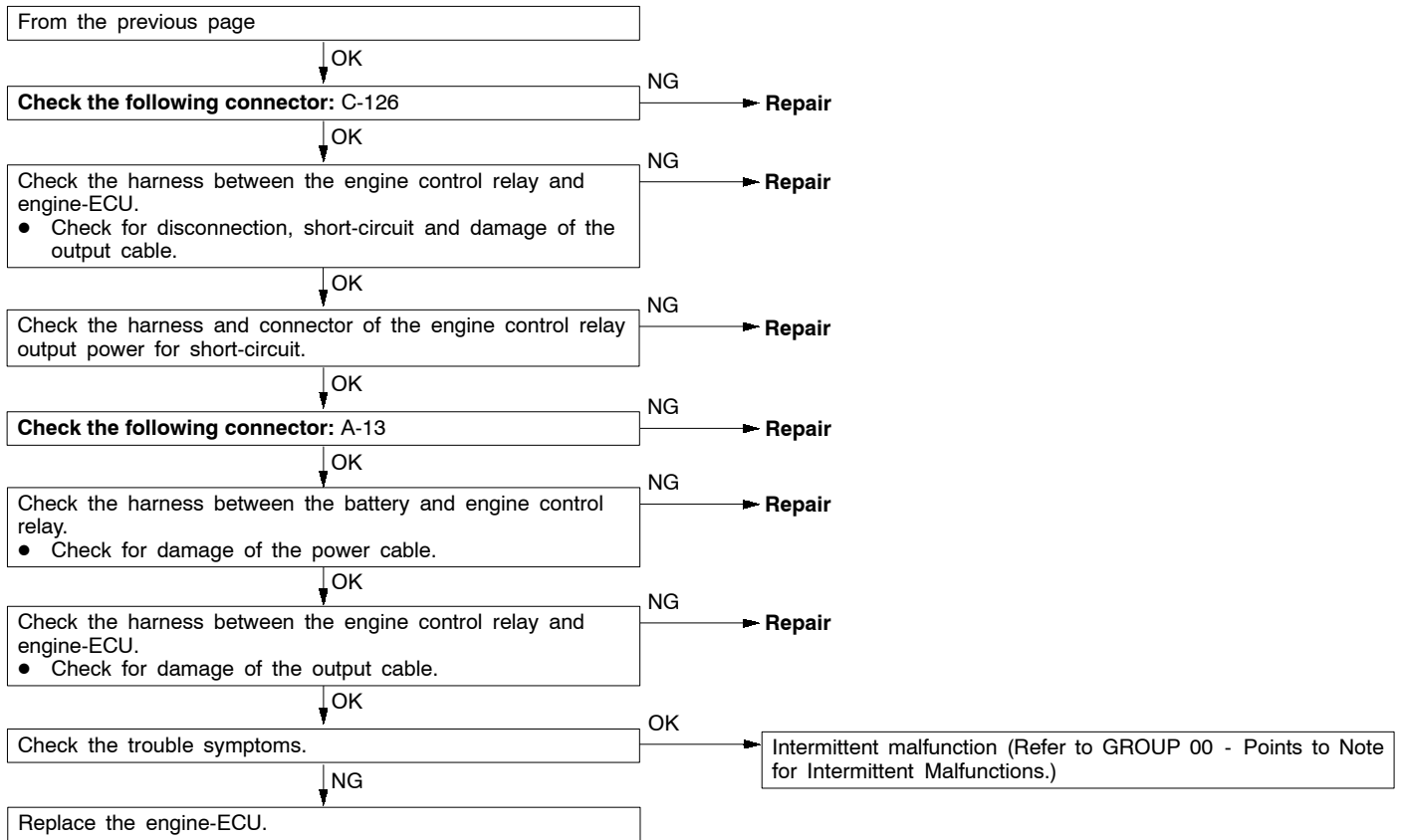


Inspection Procedure 22

Engine-ECU power supply, engine control relay, ignition switch-IG1 system	Probable cause
When the ignition switch ON signal is input to the engine-ECU, the engine-ECU turns the engine control relay ON. This starts the supply of the battery voltage to the engine-ECU, sensor and actuator.	<ul style="list-style-type: none"> ● Ignition switch malfunction ● Engine control relay malfunction ● Engine-ECU malfunction

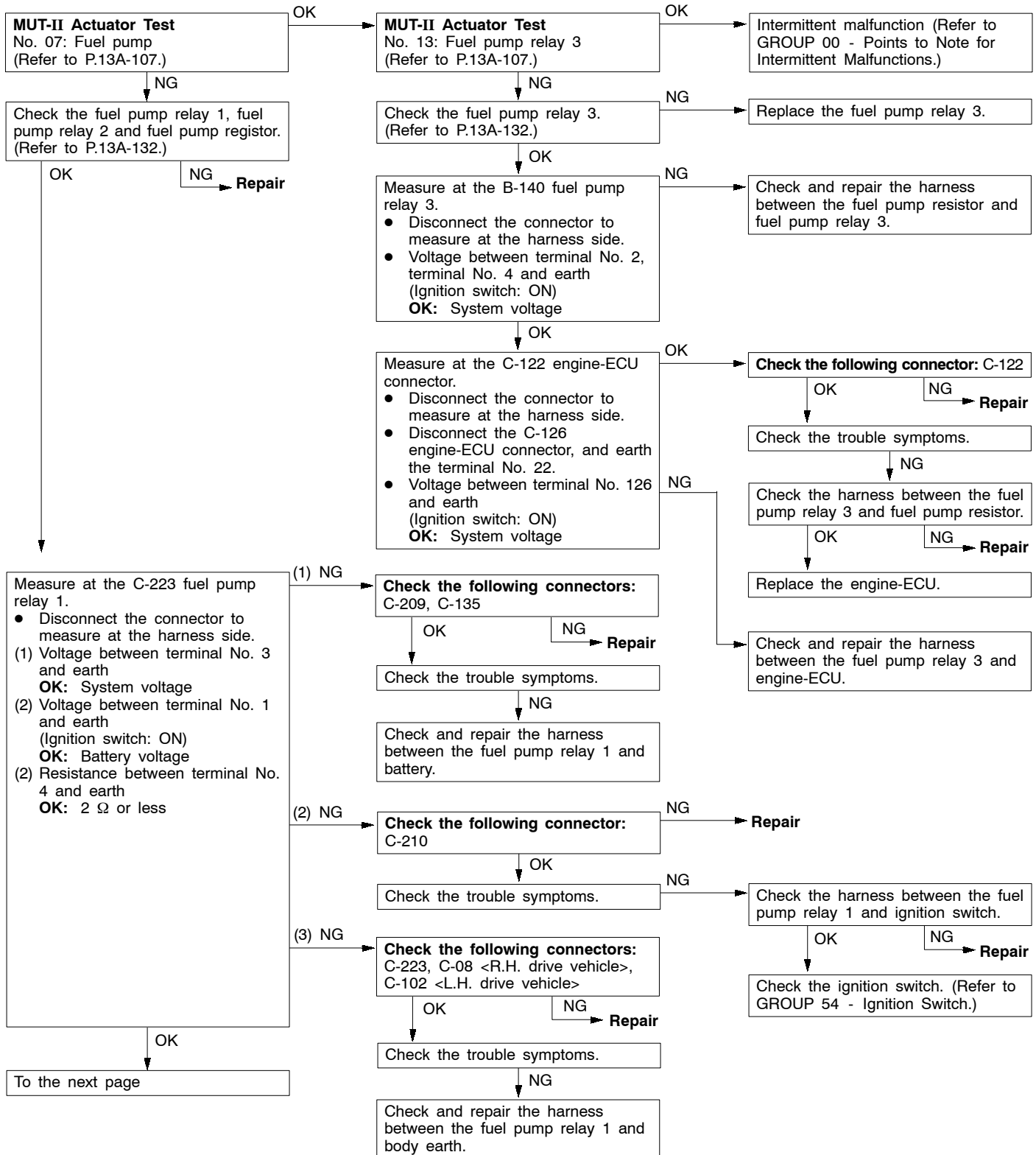


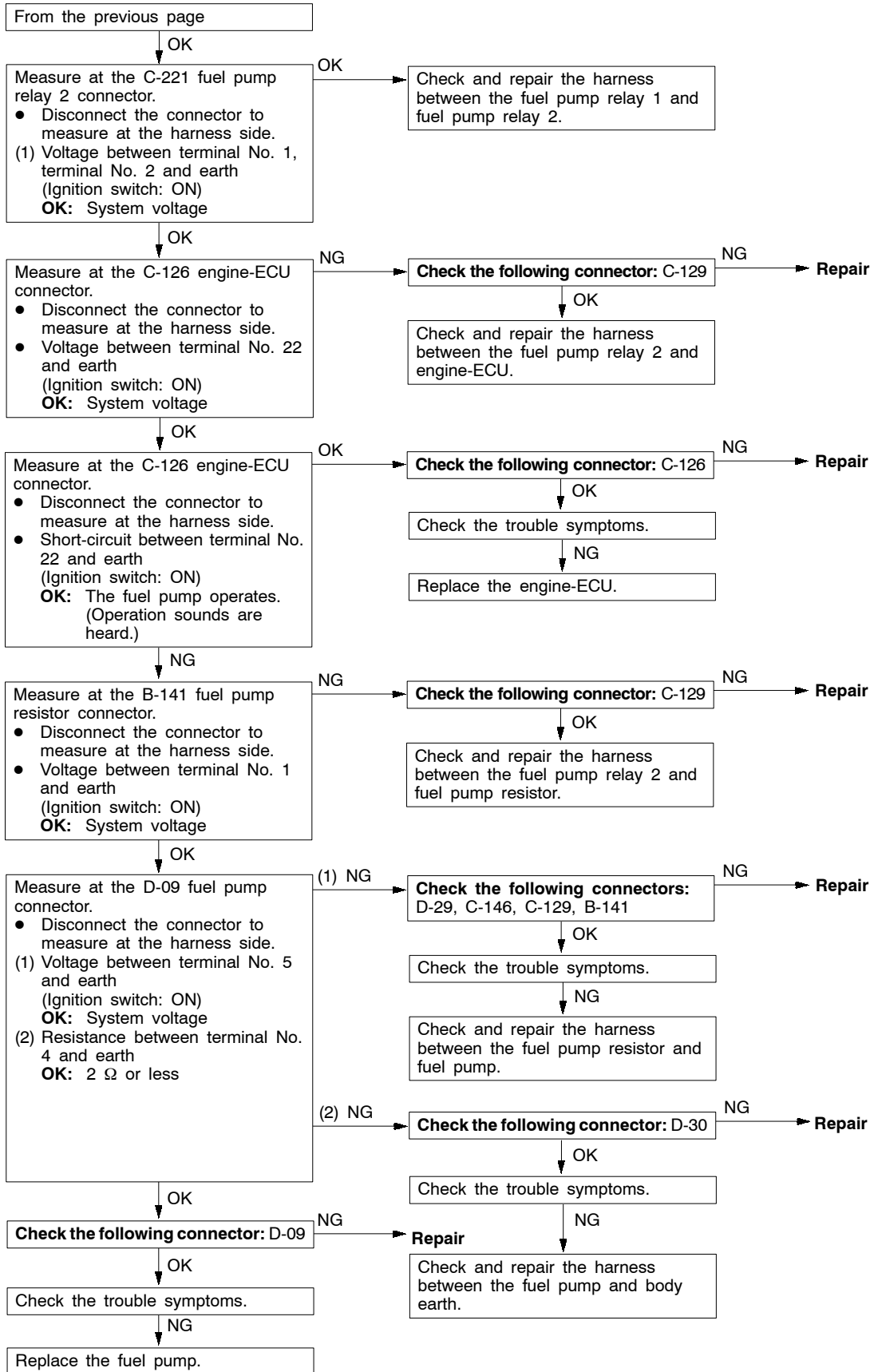




Inspection Procedure 23

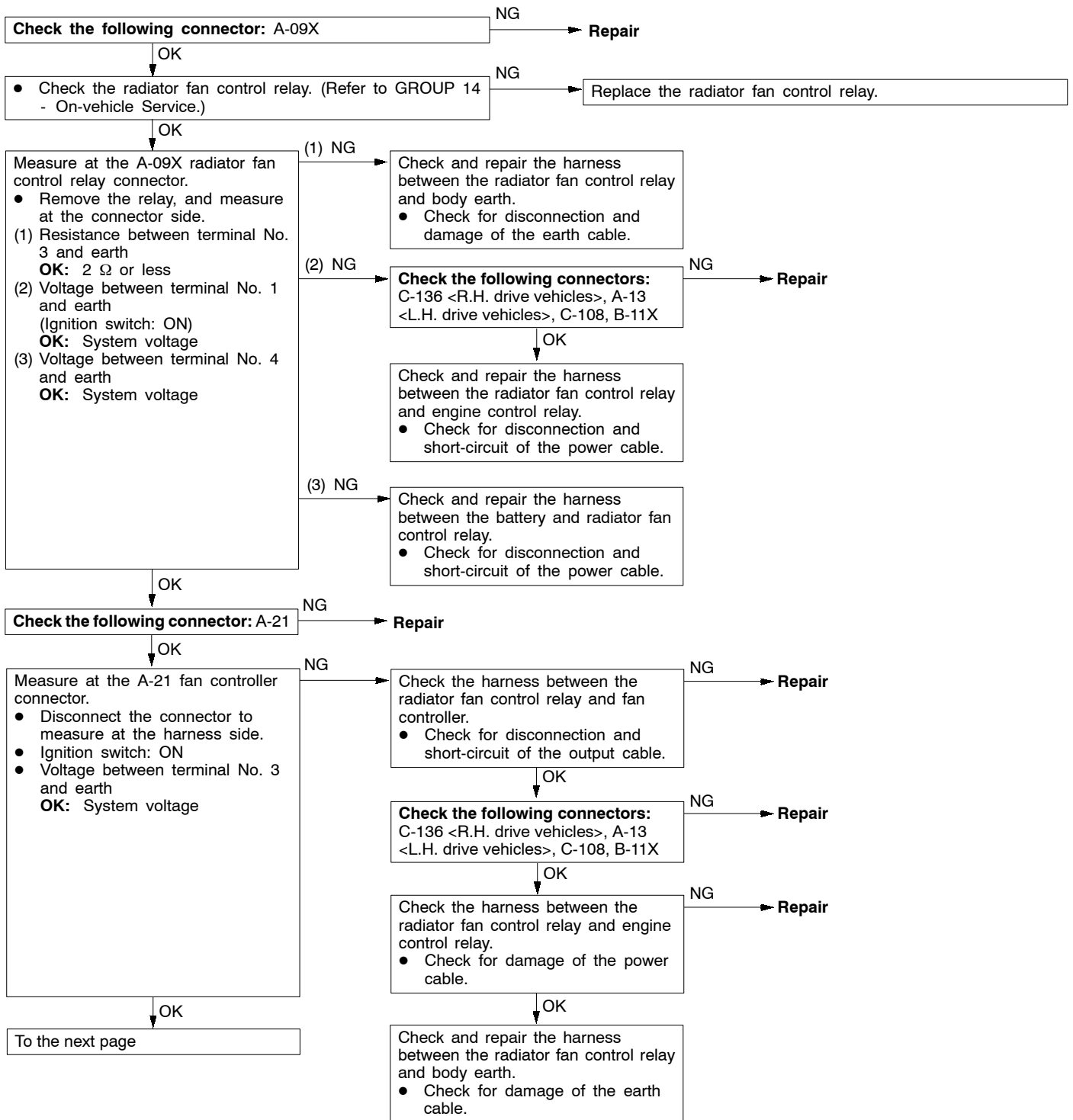
Fuel pump system	Probable cause
<ul style="list-style-type: none"> The engine-ECU turns the fuel pump relay ON during cranking and engine operation, and supplies the drive power to the fuel pump. When operating with a low load, the engine-ECU supplies power to the fuel pump via the resistor. When operating with a high load, power is directly supplied and the fuel pump fuel discharge amount is increased. 	<ul style="list-style-type: none"> Fuel pump relay 1 malfunction Fuel pump relay 2 malfunction Fuel pump relay 3 malfunction Fuel pump resistor malfunction Fuel pump malfunction Fuel pump circuit disconnection, short-circuit, or connector contact defect Engine-ECU malfunction

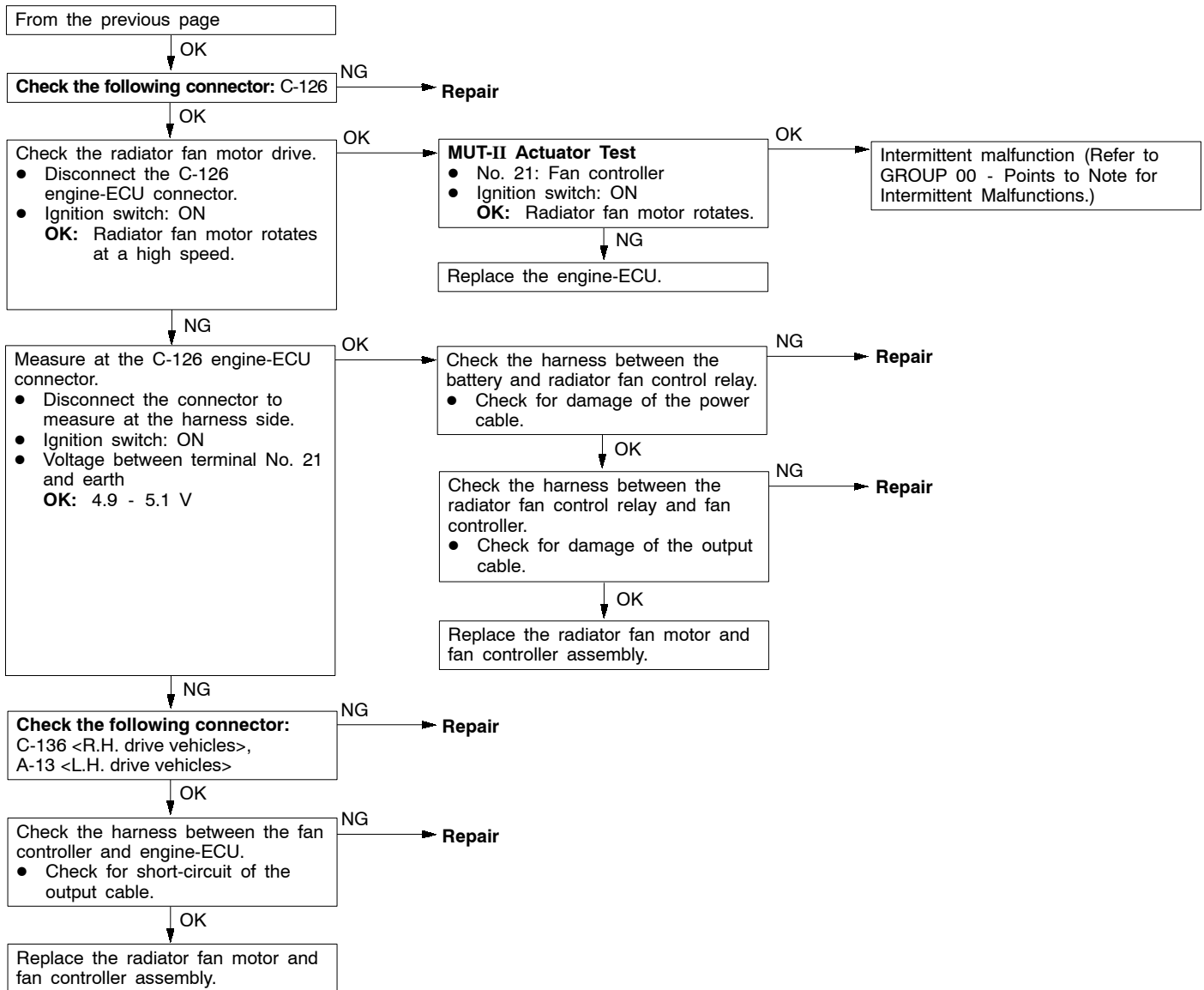




Inspection Procedure 24

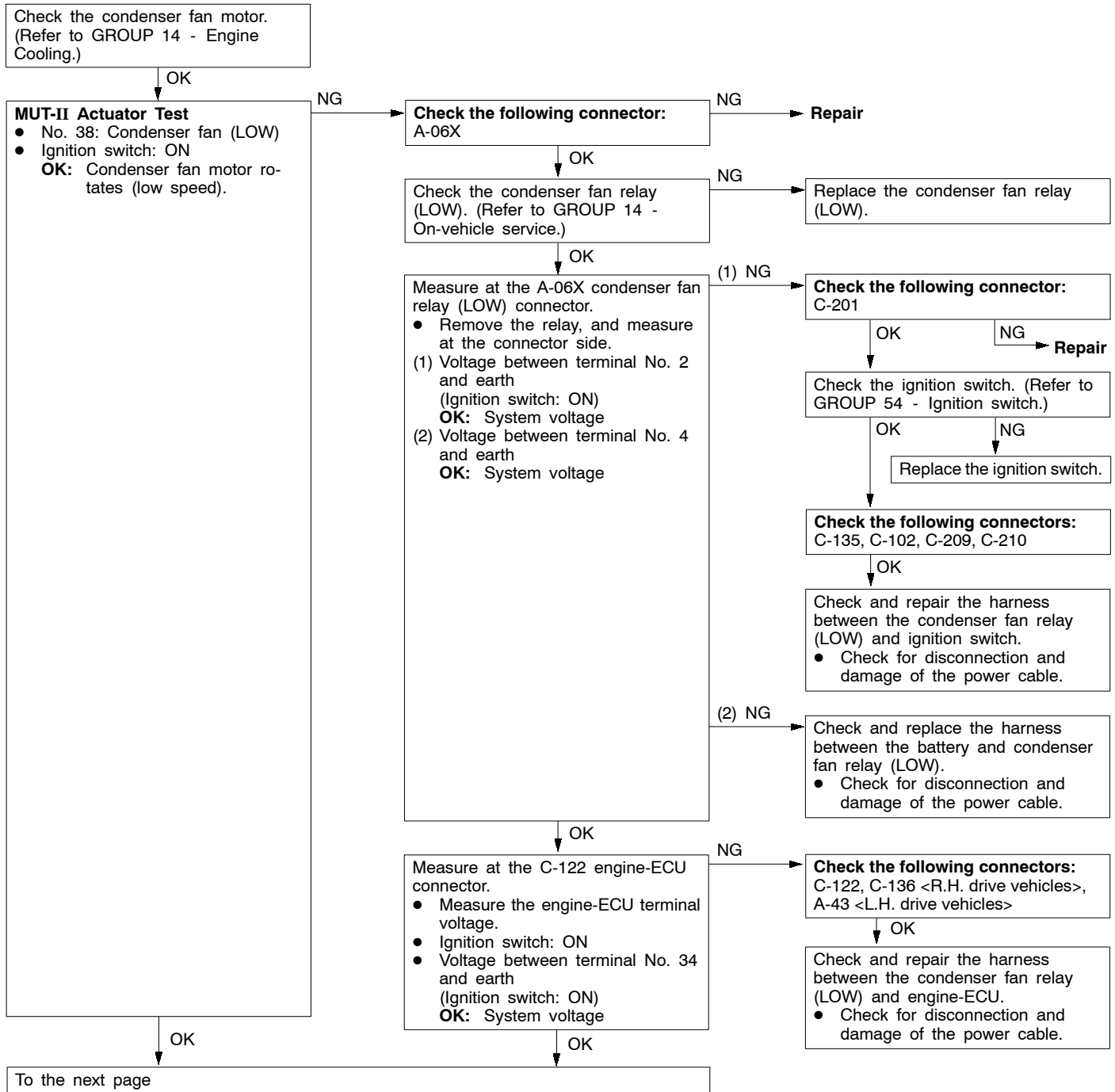
Radiator fan control relay system	Probable cause
When the engine control relay turns ON, the radiator fan control relay turns ON simultaneously, and power is supplied to the fan controller. The radiator fan motor is driven when the fan motor drive signal is input to the fan controller from the engine-ECU.	<ul style="list-style-type: none"> ● Radiator fan control relay malfunction ● Fan controller malfunction ● Radiator fan motor malfunction ● Engine-ECU malfunction

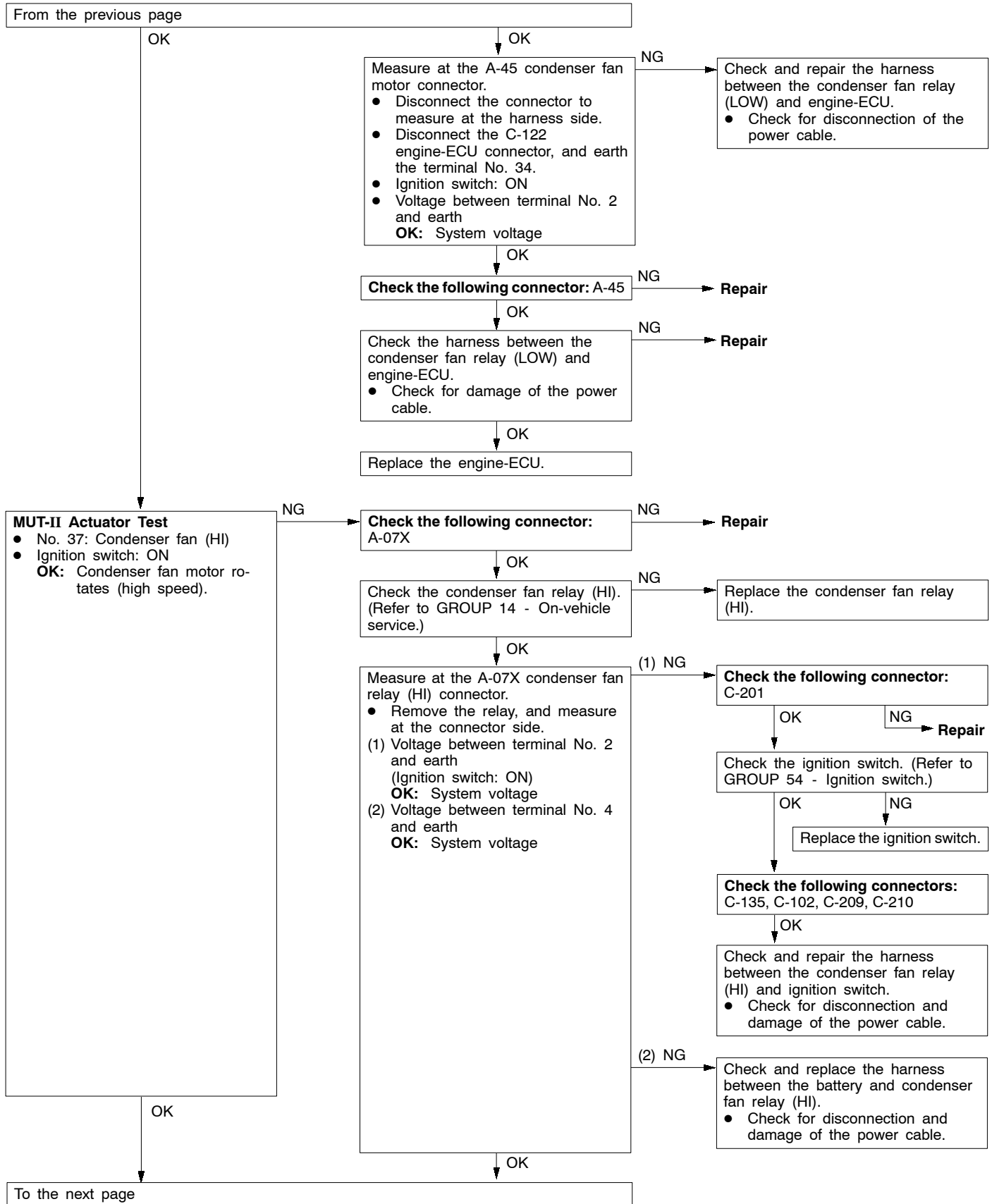


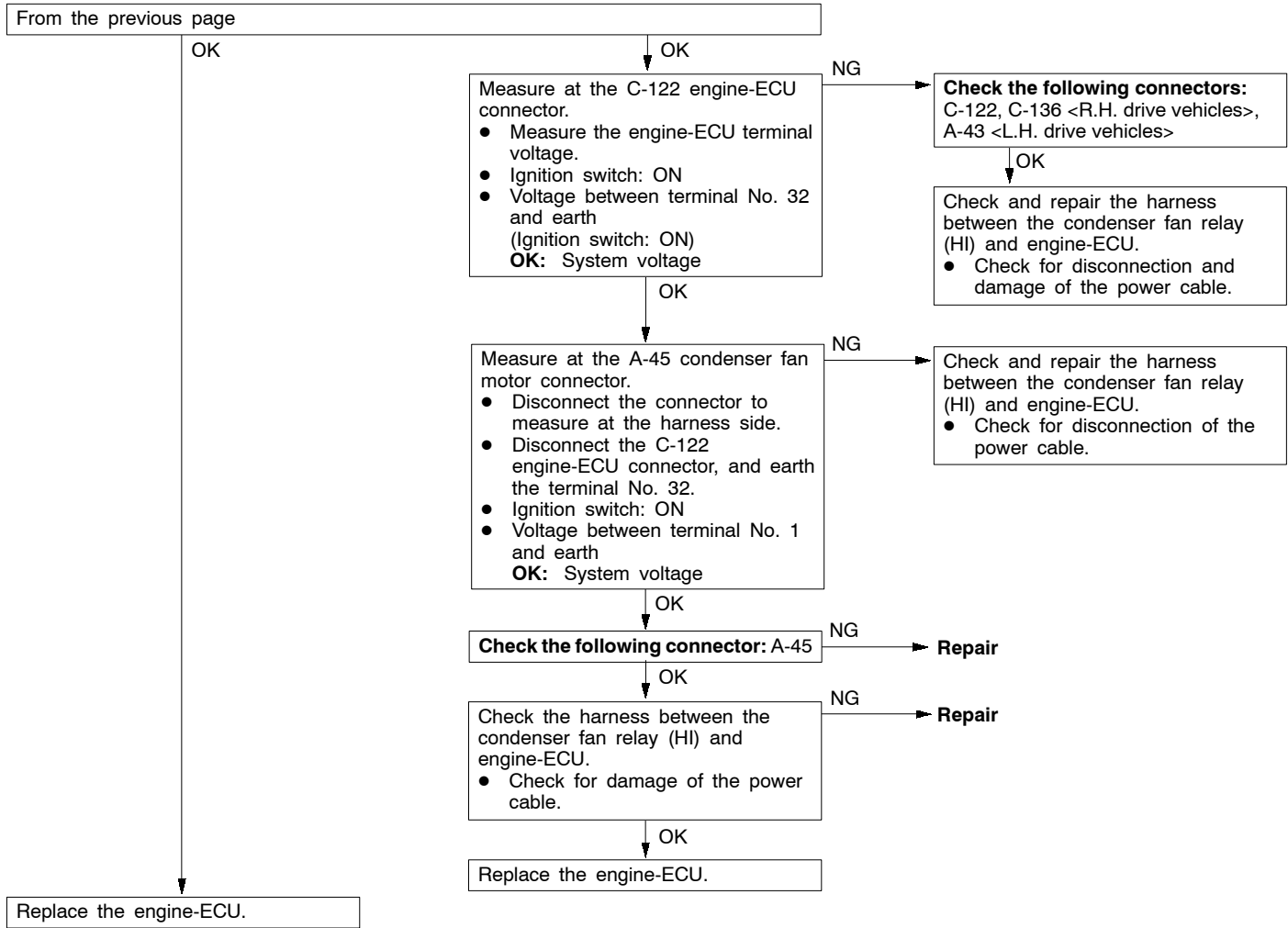


Inspection Procedure 25

Condenser fan relay system	Probable cause
The condenser fan relay turns ON with the signal from the engine-ECU, and power is supplied to the condenser fan motor.	<ul style="list-style-type: none"> ● Condenser fan relay (HI) malfunction ● Condenser fan relay (LOW) malfunction ● Condenser fan motor malfunction ● Condenser fan circuit disconnection, short-circuit, or connector contact defect ● Engine-ECU malfunction

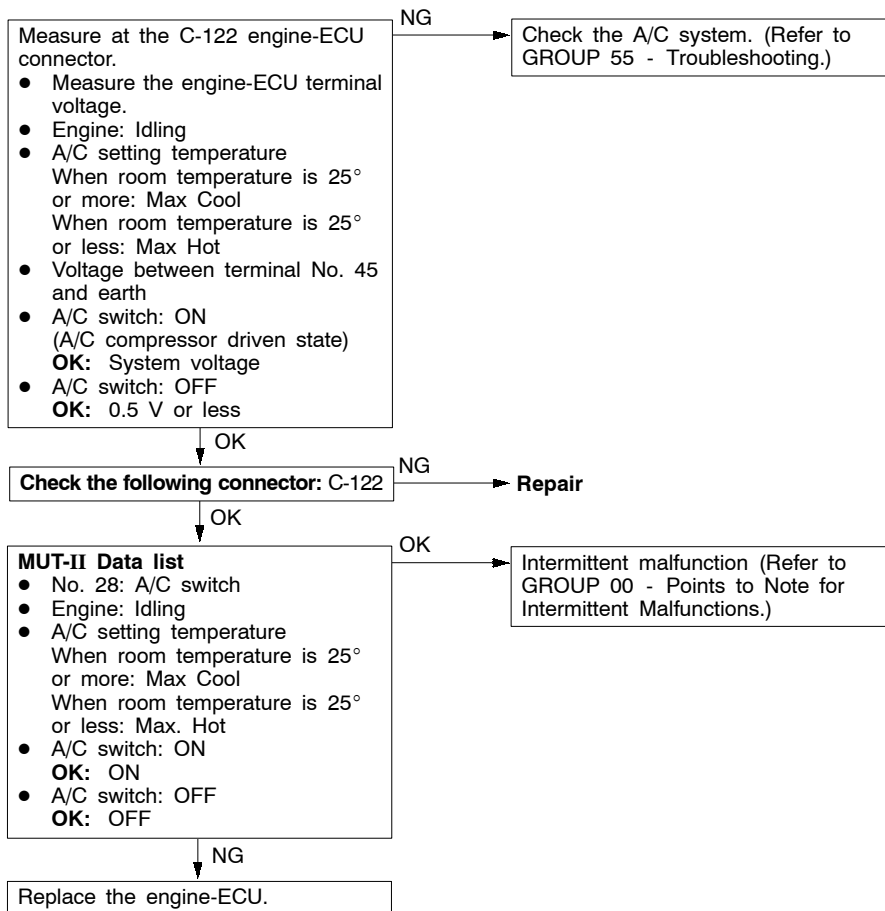






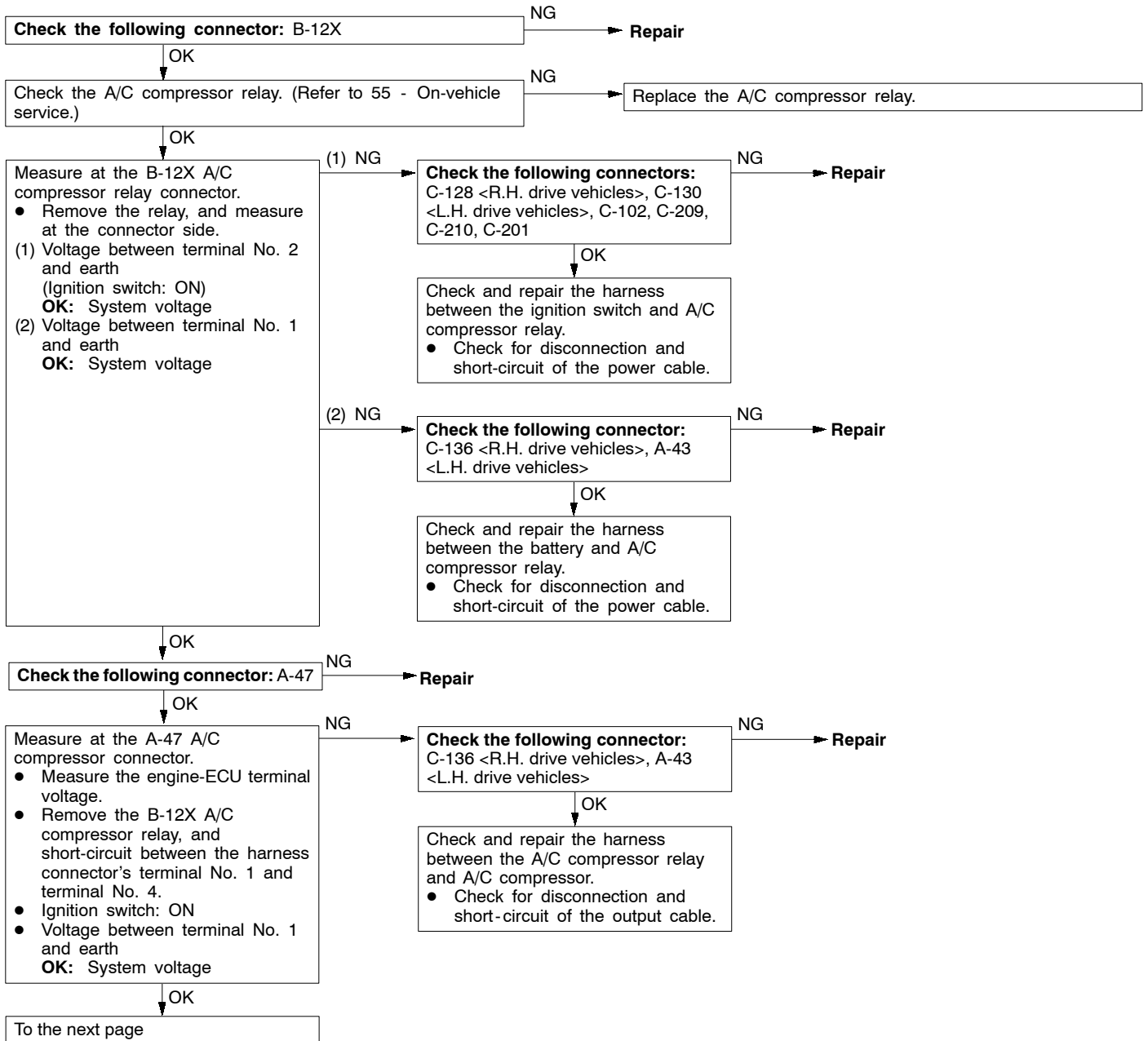
Inspection Procedure 26

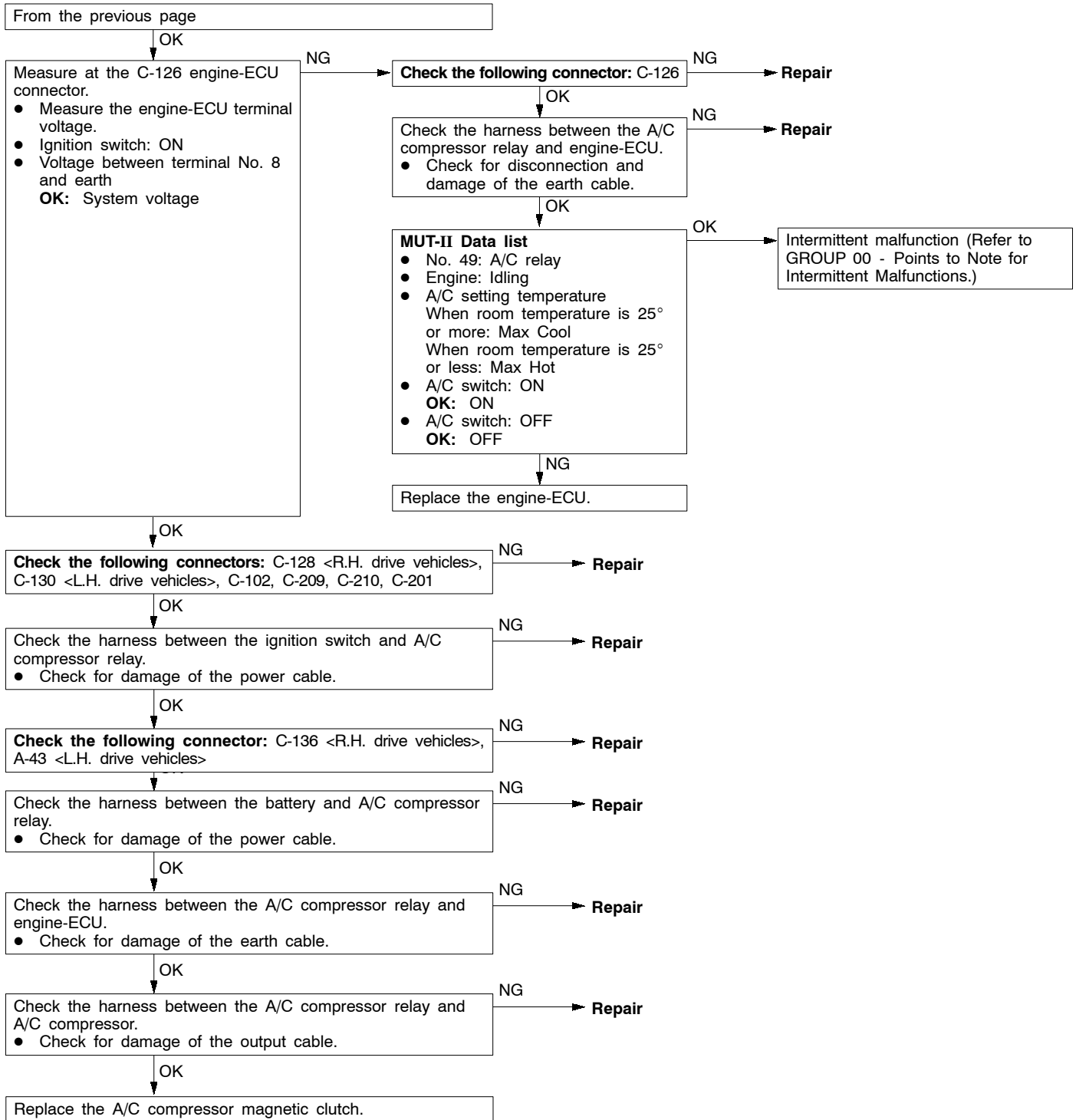
A/C switch system	Probable cause
When the A/C switch on the control panel is turned ON, the A/C switch ON signal is input to the engine-ECU. After receiving this signal, the engine-ECU turns the A/C compressor ON.	<ul style="list-style-type: none"> ● Control panel A/C switch malfunction ● A/C system malfunction ● Engine-ECU malfunction



Inspection Procedure 27

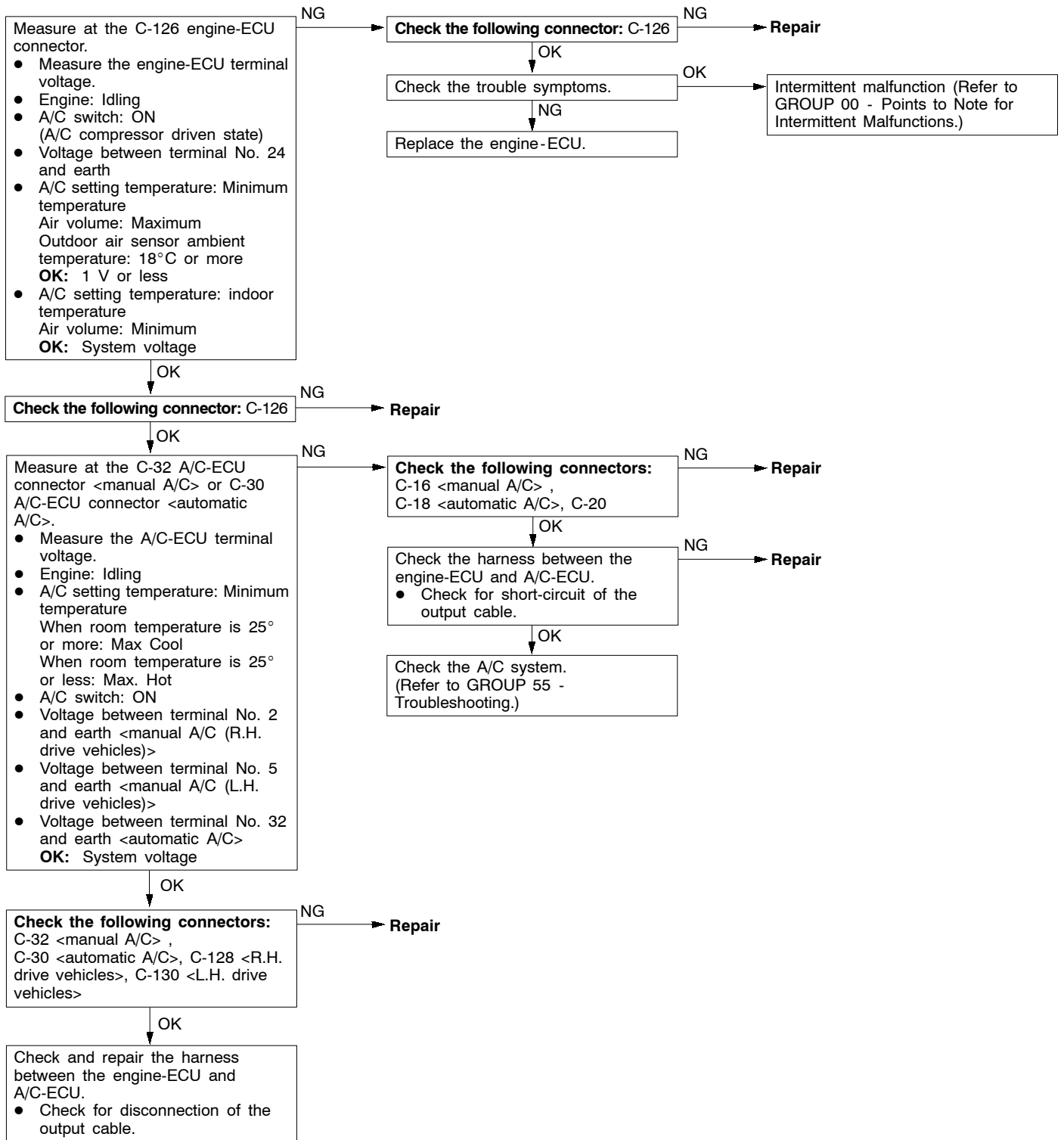
A/C compressor relay system	Probable cause
When the A/C switch ON signal is input to the engine-ECU, the engine-ECU turns the A/C compressor relay ON. The A/C compressor magnetic clutch starts with this.	<ul style="list-style-type: none"> ● A/C compressor relay malfunction ● A/C compressor magnetic clutch malfunction ● Engine-ECU malfunction





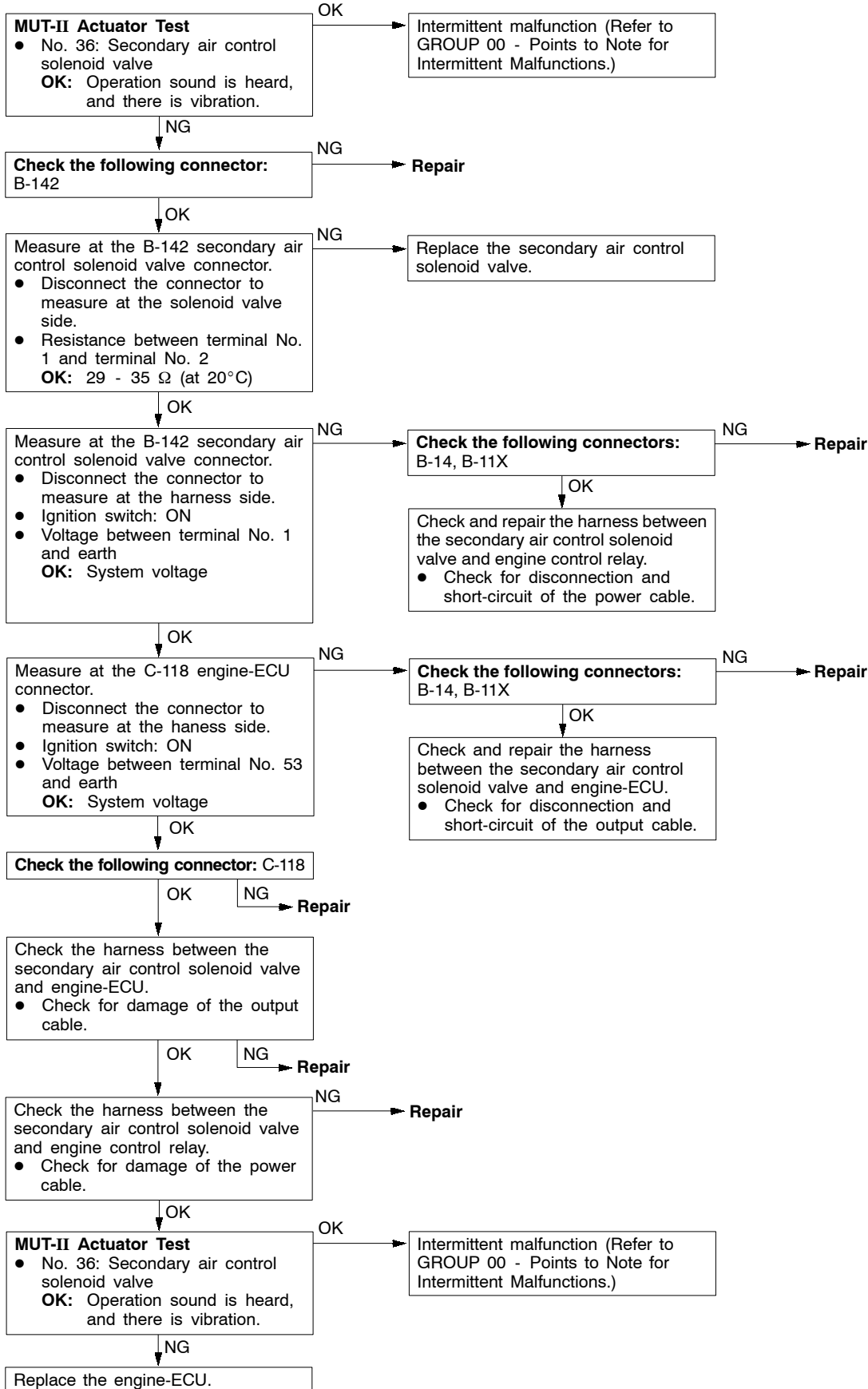
Inspection Procedure 28

A/C load signal system	Probable cause
The size of the A/C compressor load is detected according to the difference in set temperature. When the A/C large load signal is input to the engine-ECU, the engine-ECU judges that the A/C compressor load is large, and controls the throttle valve control servo so that the idling speed increases.	<ul style="list-style-type: none"> • A/C-ECU malfunction • Engine-ECU malfunction



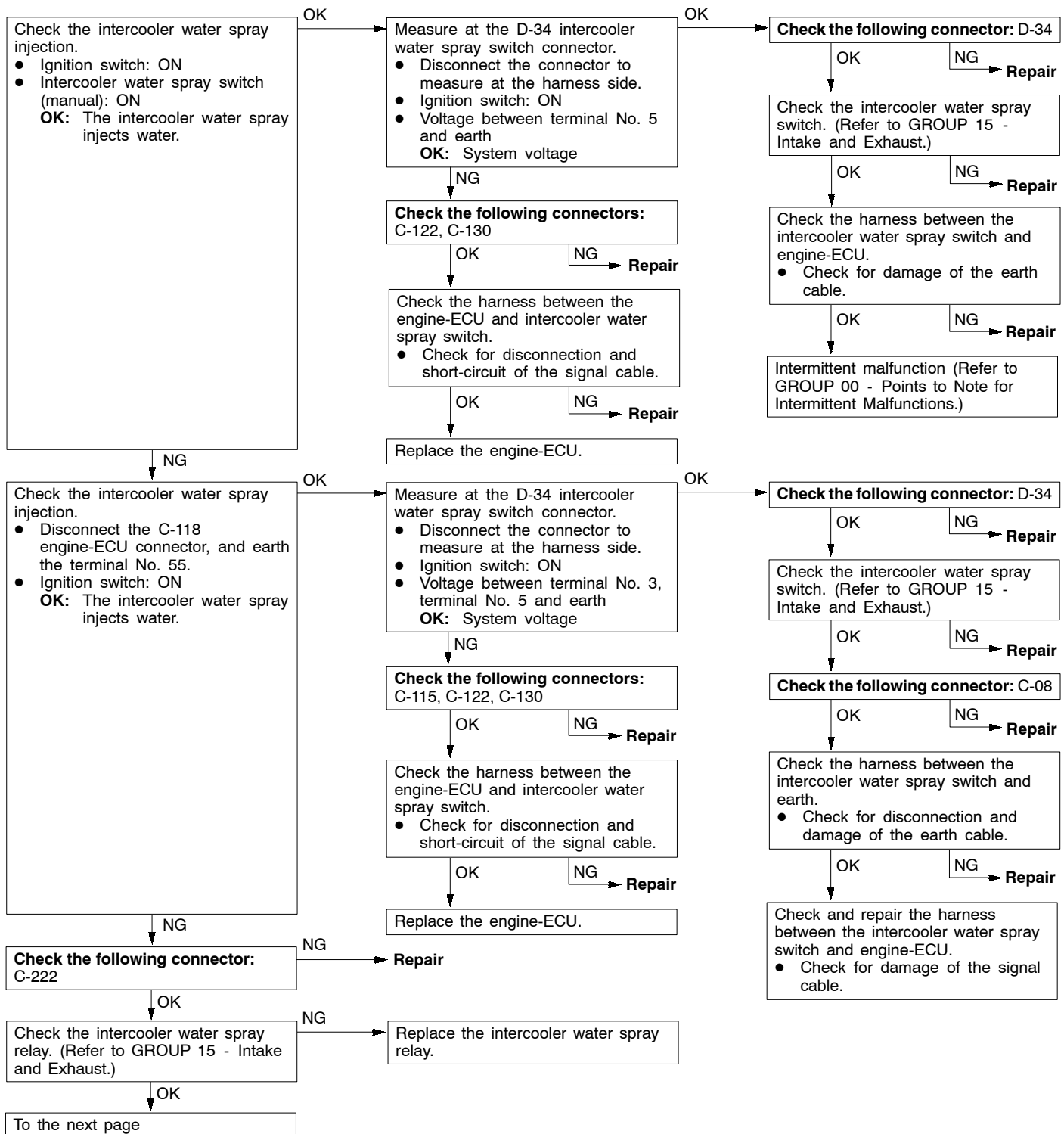
Inspection Procedure 29

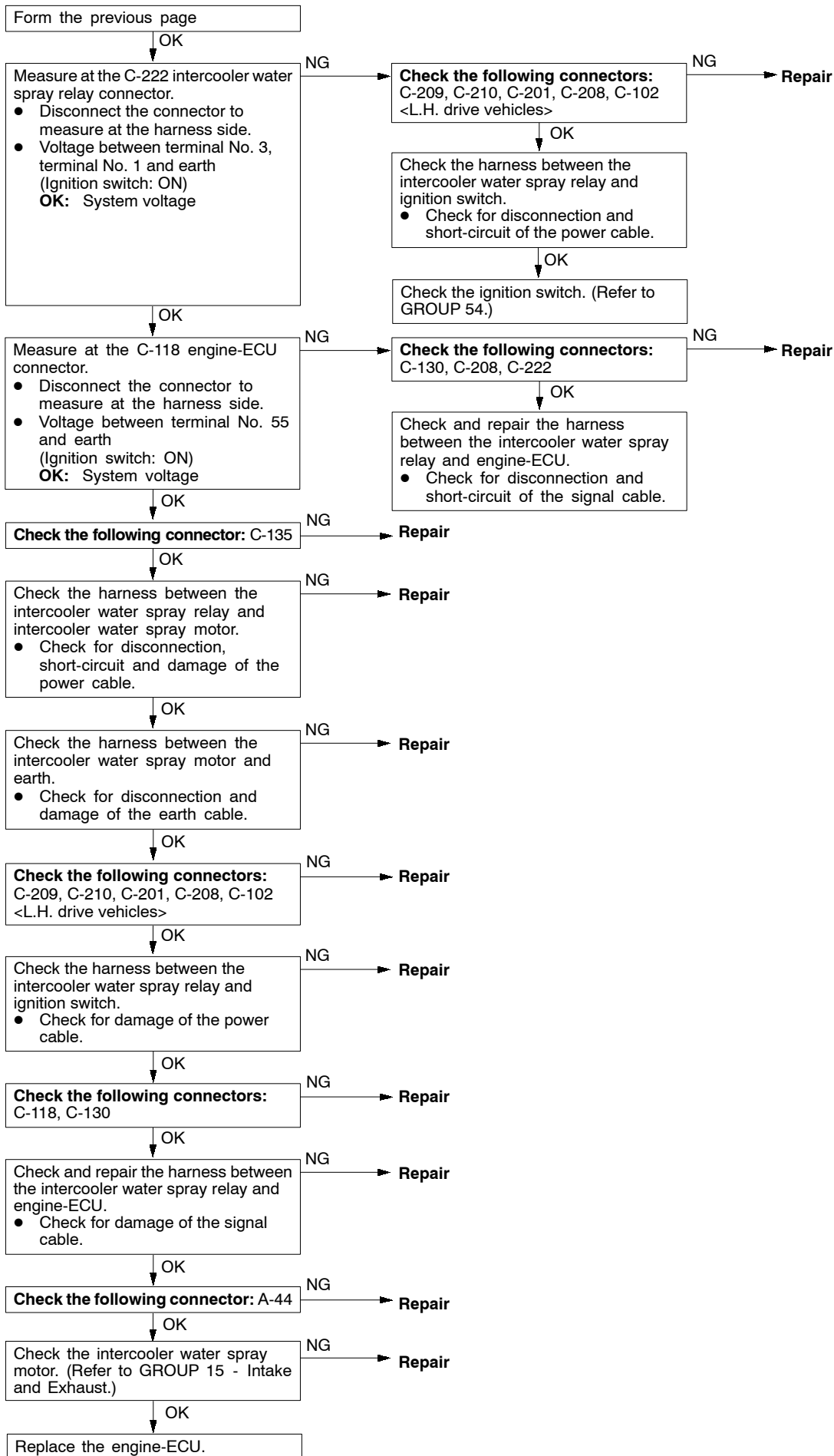
Secondary air control solenoid valve system	Probable cause
The secondary air control solenoid valve switches the pressure led into the secondary air valve between the intake manifold and the atmospheric pressure.	<ul style="list-style-type: none"> Secondary air control solenoid valve malfunction Engine-ECU malfunction



Inspection Procedure 30

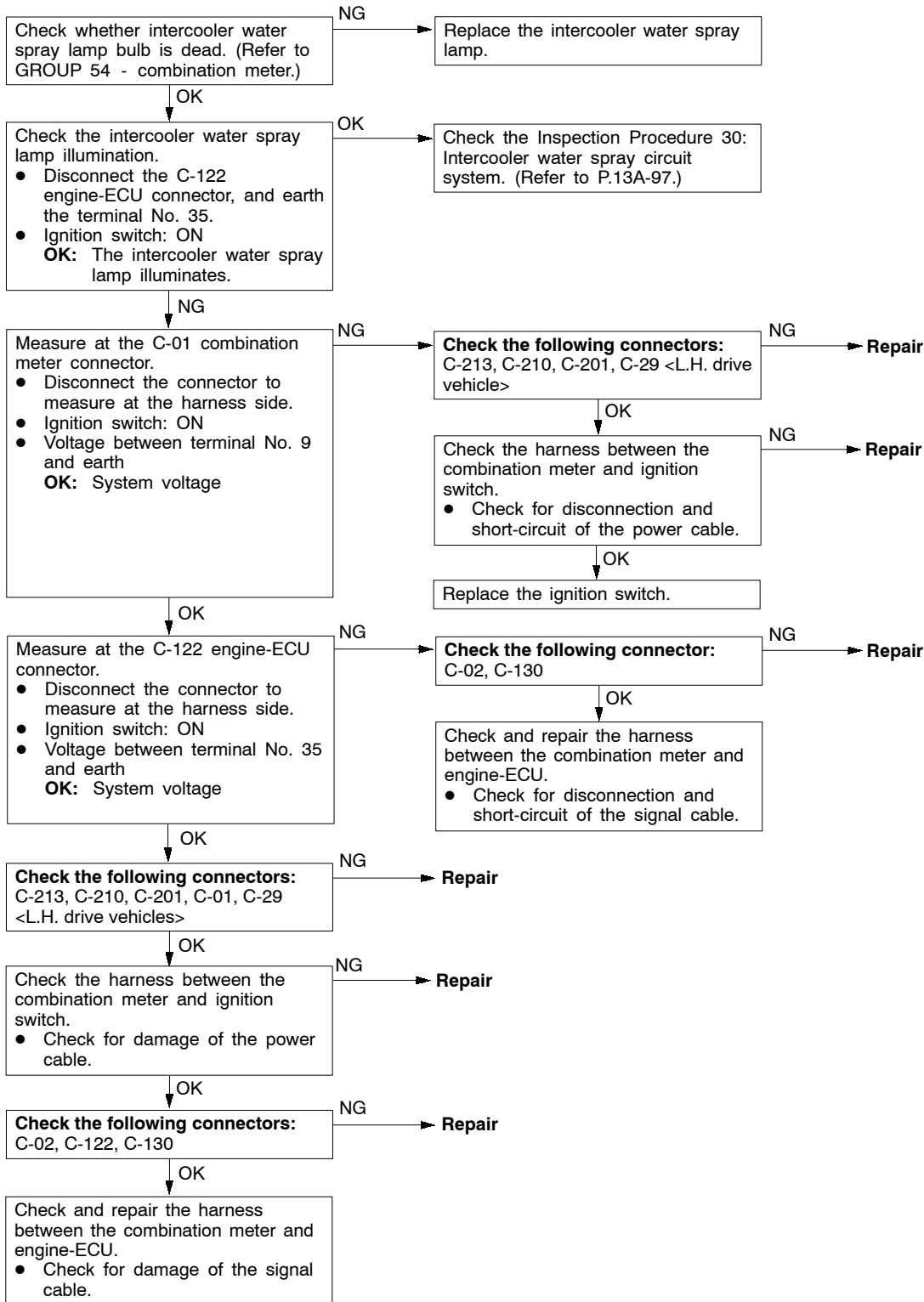
Intercooler water spray circuit system	Probable cause
<ul style="list-style-type: none"> When the intercooler water spray switch (manual) turns ON, the intercooler water spray manual ON signal is input to the engine-ECU. After receiving this signal, the engine-ECU turns the intercooler water spray relay ON. The intercooler water spray motor is driven to inject the water for air cooling into the intercooler and increase the filling performance. When the intercooler water spray switch (automatic) turns ON, the intercooler water spray automatic ON signal is input to the engine-ECU. After receiving this signal, the engine-ECU turns the intercooler water spray relay ON intermittently during high-load operation. The intercooler water spray motor is driven to inject the water for air cooling into the intercooler and increase the filling performance. 	<ul style="list-style-type: none"> Intercooler water spray switch malfunction Intercooler water spray relay malfunction Intercooler water spray motor malfunction Intercooler water spray relay circuit disconnection, short-circuit, or connector contact defect Intercooler water spray switch circuit disconnection, short-circuit, or connector contact defect Ignition switch malfunction Engine-ECU malfunction





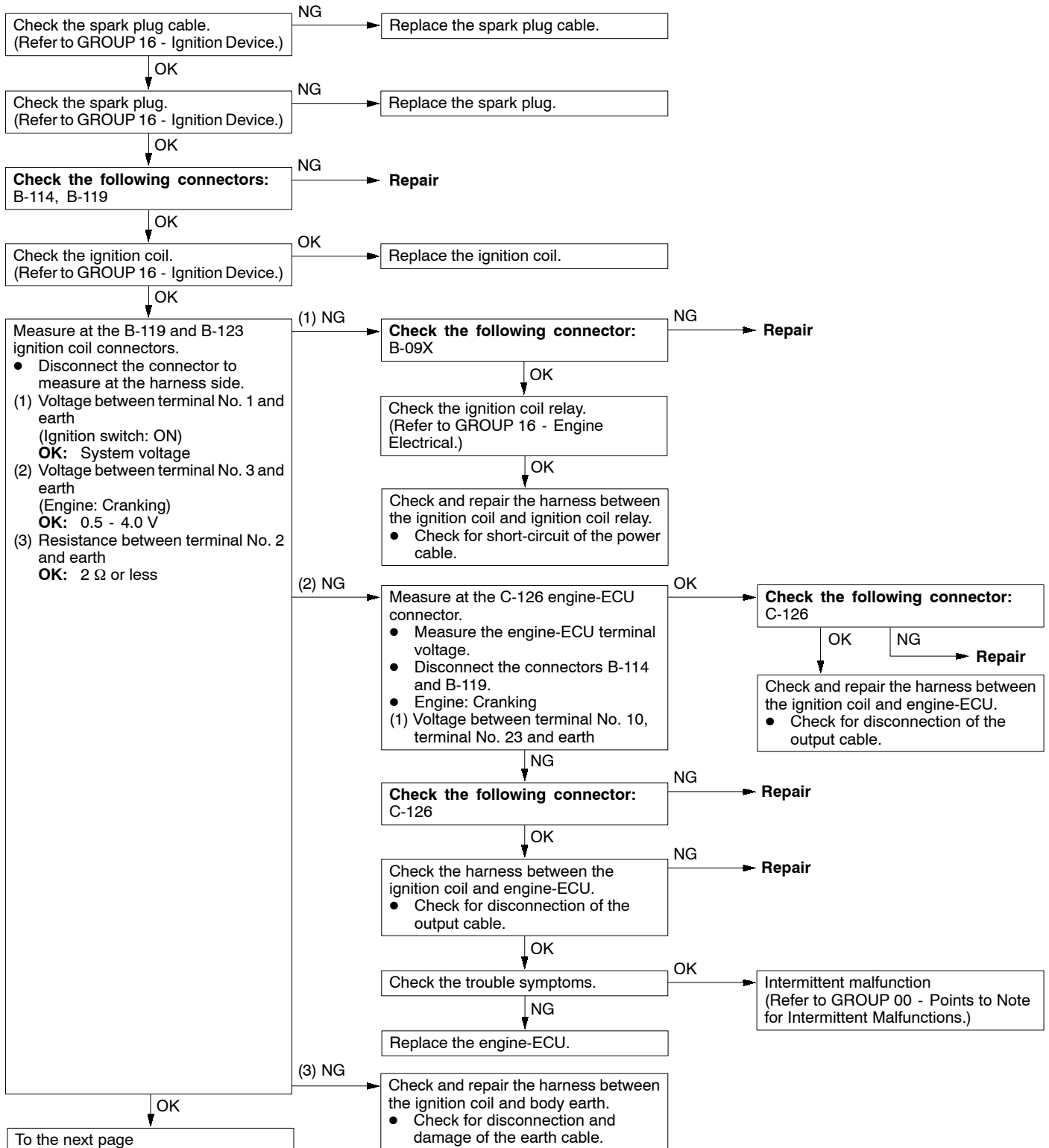
Inspection Procedure 31

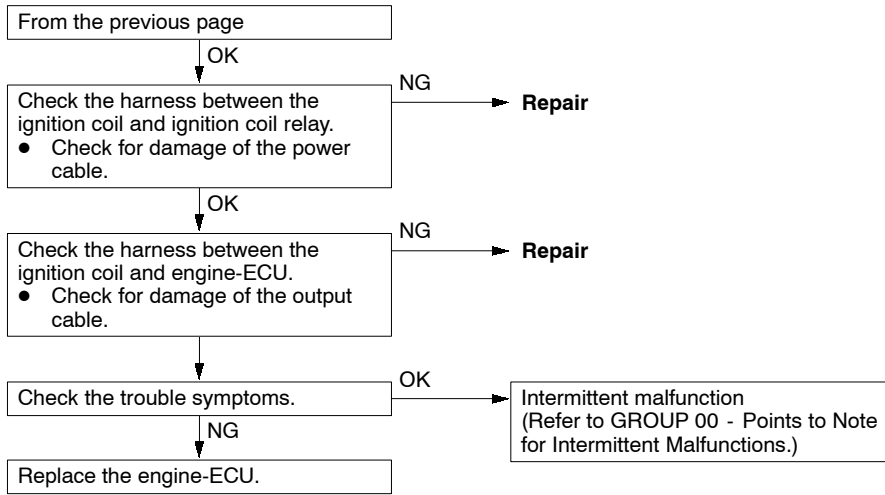
Intercooler water spray lamp system	Probable cause
The engine-ECU illuminates the intercooler water spray lamp when the intercooler water spray switch (automatic) is ON.	<ul style="list-style-type: none"> ● Intercooler water spray lamp bulb dead ● Ignition switch malfunction ● Intercooler water spray lamp circuit disconnection, short-circuit, or connector contact defect ● Intercooler water spray switch circuit disconnection, short-circuit, or connector contact defect ● Engine-ECU malfunction



Inspection Procedure 32

Ignition coil (integrated power transistor) system	Probable cause
The engine-ECU allows the ignition coil primary current to flow intermittently by turning the power transistor in the unit OFF and ON.	<ul style="list-style-type: none"> ● Ignition coil malfunction ● Spark plug malfunction ● Spark plug cable malfunction ● Ignition primary circuit disconnection, short-circuit, or connector contact defect ● Engine-ECU malfunction





DATA LIST REFERENCE TABLE

NOTE

- *1. In a new Vehicle [driven approximately 500 km or less], the air flow sensor output frequency time is sometimes 10% longer than the standard time.
- *2. The injector drive time represents the time when the cranking speed is at 250 r/min or below when the power supply voltage is 11 V.
- *3. In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10% longer than the standard time.
- *4. In a new vehicle [driven approximately 500 km or less], the step of the stepper motor is sometimes 30 steps greater than the standard value.

Item No.	Inspection item	Inspection contents	Normal condition	Inspection procedure No.	Reference page		
11	Oxygen sensor (front)	Engine: After having warmed up (Air/fuel mixture is made leaner when decelerating, and is made richer when racing.)	When at 4,000 r/min, engine is suddenly decelerated	200 mV or less	Code No. P0130	13A-24	
			When engine is suddenly raced	600 - 1,000 mV			
		Engine: After having warmed up (The oxygen sensor (front) signal is used to check the air/fuel mixture ratio, and control condition is also checked by the engine-ECU.)	Engine is idling	400 mV or less ↔ 600 - 1,000 mV (Varies)			
			2,500 r/min				
12	Air flow sensor*1	<ul style="list-style-type: none"> ● Engine coolant temperature: 80 - 95°C ● Lightning and all accessories: OFF ● Transmission: Neutral 	Idle operation	17 - 43 Hz	-	-	
				2,500 r/min			40 - 100 Hz
				Acceleration			According to acceleration, frequency is amplified.
13	Intake air temperature sensor	Ignition switch: "ON" or engine running	When intake air temperature is -20°C	-20°C	Code No. P0110	13A-13	
			When intake air temperature is 0°C	0°C			
			When intake air temperature is 20°C	20°C			
			When intake air temperature is 40°C	40°C			
			When intake air temperature is 80°C	80°C			

Item No.	Inspection item	Inspection contents	Normal condition	Inspection procedure No.	Reference page	
14	Throttle position sensor	Ignition switch: "ON"	Set to idle position	535 - 735 mV	Code No. P0120	13A-21
			Gradually open	Increases in proportion to throttle opening angle		
			Open fully	4,500 - 5,000 mV		
16	Battery voltage	Ignition switch: "ON"	System voltage	Procedure No. 22	13A-82	
18	Cranking signal (ignition switch-ST)	Ignition switch: "ON"	Engine: Stopped	OFF	Procedure No.22	13A-82
			Engine: Cranking	ON		
21	Engine coolant temperature sensor	Ignition switch: "ON" or engine running	When engine coolant temperature is -20°C	-20°C	Code No. P0115	13A-19
			When engine coolant temperature is 0°C	0°C		
			When engine coolant temperature is 20°C	20°C		
			When engine coolant temperature is 40°C	40°C		
			When engine coolant temperature is 80°C	80°C		
22	Crank angle sensor	<ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected 	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	-	-
			<ul style="list-style-type: none"> Engine: Idle operation 	When engine coolant temperature is -20°C		
		When engine coolant temperature is 0°C		1,300 - 1,500 r/min		
		When engine coolant temperature is 20°C		1,300 - 1,500 r/min		
		When engine coolant temperature is 40°C		1,150 - 1,350 r/min		
		When engine coolant temperature is 80°C	600 - 900 r/min			
24★	Vehicle speed sensor	Drive at 40 km/h	Approximately 40 km/h	Code No. P0500	13A-43	

Item No.	Inspection item	Inspection contents	Normal condition	Inspection procedure No.	Reference page	
25	Barometric pressure sensor	Ignition switch: ON	Altitude: 0 m	101 kPa	Code No. P0105	13A-15
			Altitude: 0 m	95 kPa		
			Altitude: 0 m	88 kPa		
			Altitude: 0 m	81 kPa		
27	Power steering fluid pressure switch	Engine: Idle operation	Steering wheel stationary	OFF	Code No. P0551	13A-46
			Steering wheel turning	ON		
28	A/C switch	Engine: Idle operation (When A/C switch is ON, A/C compressor should be operating.)	A/C switch: OFF	OFF	Procedure No. 26	13A-92
			A/C switch: ON	ON		
34	Air flow sensor reset signal	Engine: After warm-up	Idle operation	ON	Code No. P0100	13A-13
			3,000 r/min	OFF		
37	Volumetric efficiency	<ul style="list-style-type: none"> Engine coolant temperature: 85 - 95°C Lightning and accessories: OFF 	Idle operation	15 - 35%	-	-
			2,500 r/min	15 - 35%		
			Excessive acceleration	According to acceleration, volumetric efficiency is increased.		
41	Injectors*1	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	25 - 37 ms	-	-
			When engine coolant temperature is 20°C	15 - 22 ms		
			When engine coolant temperature is 80°C	4.2 - 6.3 ms		
41	Injectors*2	<ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral 	Engine: Idle operation	1.5 - 2.7 ms	-	-
			2,500 r/min	1.2 - 2.4 ms		
			When engine is suddenly raced	Increases		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
44	Ignition advance	<ul style="list-style-type: none"> Engine: After having warmed up Timing lamp is set. (The timing lamp is set in order to check actual ignition timing.) 	Engine: Idle operation	0 - 13° BTDC	-	-
			2,500 r/min	20 - 40° BTDC		
45	Idle speed control (stepper) motor position*3	<ul style="list-style-type: none"> Engine coolant temperature: 80 - 90°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral Engine: Idle operation When A/C switch is ON, A/C compressor should be operating 	A/C switch: OFF	2 - 25 STEP	-	-
			A/C switch: OFF → ON	Increases by 10 - 70 steps		
49	A/C relay	Engine: After having warmed up/Engine is idling	A/C switch: OFF	OFF (Compressor clutch is not operating)	Procedure No. 27	13A-92
			A/C switch: ON	ON (Compressor clutch is operating)		
59	Oxygen sensor (rear)	Engine: After having warmed-up	When engine is suddenly raced	0 and 600 - 1,000 mV alternate.	Code No. P0136	13A-27
81★	Learned value	Engine: After having warmed up, running with no load at 2,500 r/min. (During air/fuel ratio feedback control)		-12.5 - 12.5%	-	-
82★	Feedback	Engine: After having warmed up, running with no load at 2,500 r/min. (During air/fuel ratio feedback control)		-20 - 20%	-	-
87★	Engine load	Engine: After having warmed up	Idle operation	15 - 35%	-	-
			2,500 r/min	15 - 35%	-	-

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
A1★	Oxygen sensor (front)	Engine: After having warmed up (Air/fuel mixture is made leaner when decelerating, and is made richer when racing.)	When at 4,000 r/min, engine is suddenly decelerated	200 mV or less	Code No. P0130	13A-24
			When engine is suddenly raced	600 - 1,000 mV		
		Engine: After having warmed up (By using oxygen sensor, check air/fuel mixture as well as control status by engine-ECU)	Idle operation	400 mV or less ↔ 600 - 1,000 mV (altered)		
			2,500 r/min			
A2★	Oxygen sensor (rear)	Engine: After having warmed up	When engine is suddenly raced	0 and 600 - 1,000 mV alternate.	Code No. P0136	13A-27
8A★	Throttle position sensor (Throttle position opening angle)	<ul style="list-style-type: none"> ● Engine: After having warmed up ● Ignition switch: "ON" (Engine stopped) 	Release the accelerator pedal.	8 - 16%	Code No. P0120	13A-21
			Depress the accelerator pedal gradually.	Increase in response to the pedal depression stroke.		
			Depress the accelerator pedal fully.	80 - 100%		

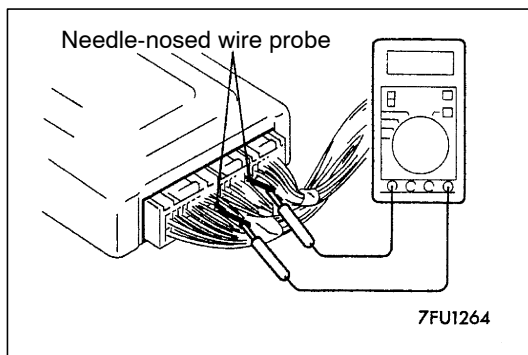
NOTE

Items marked by ★ will not displayed if service data is selected on the check mode.

ACTUATOR TEST REFERENCE TABLE

Item No.	Inspection item	Drive contents	Inspection contents	Normal condition	Inspection procedure No.	Reference page
01	Injectors	Cut fuel to No. 1 injector	Engine: After having warmed up/Engine is idling (Cut the fuel supply to each injector in turn and check cylinders which don't affect idling.)	Idling condition becomes different (becomes unstable).	Code No. P0201	13A-30
02		Cut fuel to No. 2 injector			Code No. P0202	13A-31
03		Cut fuel to No. 3 injector			Code No. P0203	13A-32
04		Cut fuel to No. 4 injector			Code No. P0204	13A-33
07	Fuel pump	Fuel pump operates and fuel is recirculated.	<ul style="list-style-type: none"> ● Engine: Cranking ● Fuel pump: Forced driving Inspect according to both the above conditions. 	Pinch the return hose with fingers to feel the pulse of the fuel being recirculated.	Procedure No. 23	13A-85
				Listen near the fuel tank for the sound of fuel pump operation.		
08	Purge control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: "ON"	Sound of operation can be heard when solenoid valve is driven.	Code No. P0443	13A-41
09	Fuel pressure control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: "ON"	Sound of operation can be heard when solenoid valve is driven.	Code No. P1105	13A-48
10	EGR control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: "ON"	Sound of operation can be heard when solenoid valve is driven.	Code No. P0403	13A-39
12	Waste gate solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: "ON"	Sound of operation can be heard when solenoid valve is driven.	Code No. P1104	13A-47
13	Fuel pump relay 3	Fuel pump relay 3 turns from OFF to ON.	<ul style="list-style-type: none"> ● Ignition switch: "ON" ● Listen near the fuel tank for the sound of fuel pump operation. 	Sound of operation is heard.	Procedure No. 23	13A-85
17	Basic ignition timing	Set to ignition timing adjustment mode	Engine: Idling Timing light is set	5° BTDC	-	-

Item No.	Inspection item	Drive contents	Inspection contents	Normal condition	Inspection procedure No.	Reference page
21	Fan controller	Radiator fan motor is driven.	Ignition switch: "ON"	Fan motor rotates at high speed.	Procedure No. 24	13A-87
36	Secondary air control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: "ON"	Sound of operation can be heard when solenoid valve is driven.	Procedure No. 29	13A-96
37	Condenser fan (HI)	Condenser fan motor is driven.	Ignition switch: "ON"	Fan motor rotates at high speed.	Procedure No. 25	13A-89
38	Condenser fan (LOW)	Second air control solenoid valve	Ignition switch: "ON"	Fan motor rotates at low speed.		



CHECK AT THE ENGINE-ECU TERMINALS

TERMINAL VOLTAGE CHECK CHART

1. Connect a needle-nosed wire probe (test harness: MB991223 or paper clip) to a voltmeter probe.
2. Insert the needle-nosed wire probe into each of the engine-ECU connector terminals from the wire side, and measure the voltage while referring to the check chart.

NOTE

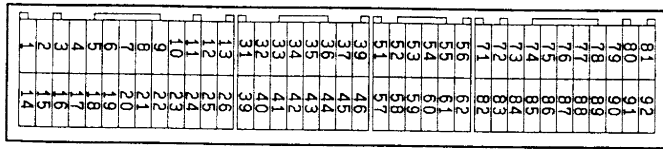
- (1) Make the voltage measurement with the engine-ECU connectors connected.
- (2) You may find it convenient to pull out the engine-ECU to make it easier to reach the connector terminals.
- (3) The checks can be carried out off the order given in the chart.

Caution

Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-ECU or all of them. Be careful to prevent this!

3. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
4. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

Engine-ECU Connector Terminal Arrangement



9FU0393

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
1	No. 1 injector	While engine is idling after having warmed up, suddenly depress the accelerator pedal.	From 11 - 14 V, momentarily drops slightly
14	No. 2 injector		
2	No. 3 injector		
15	No. 4 injector		
3	Fuel pressure control solenoid valve	Ignition switch: "ON"	System voltage
		Engine: Cranking → Idle operation (within approximately 2 minutes or less)	1 V or less → System voltage
4	Stepper motor coil <A1>	Engine: Soon after the warmed up engine is started	System voltage ↔ 0 - 6 V (Changes repeatedly)
17	Stepper motor coil <A2>		
5	Stepper motor coil <B1>		
18	Stepper motor coil <B2>		
6	EGR control solenoid valve	Ignition switch: "ON"	System Voltage
		While engine is idling, suddenly depress the accelerator pedal.	From system voltage, momentarily drops
8	A/C relay	<ul style="list-style-type: none"> Engine: Idle operation A/C switch: OFF → ON (A/C compressor runs) 	System voltage or momentarily 6 V or more → 1 V or less
9	Purge control solenoid valve	Ignition switch: "ON"	System voltage
		Engine: Idle operation	1 V or less
10	Ignition coil - No.1, No.4	Engine speed: 3,000 r/min	0.3 - 3.0 V
23	Ignition coil - No.2, No.3		
11	Waste gate solenoid valve	Ignition switch: "ON"	System voltage
		Engine: After warm-up, idle operation (When using premium gasoline)	1 V or less

Terminal No.	Check item	Check condition (Engine condition)	Normal condition	
12	Power supply	Ignition switch: "ON"	System voltage	
25				
19	Air flow sensor reset signal	Engine: Idle operation	0 - 1 V	
		Engine speed: 3,000 r/min	6 - 9 V	
21	Fan controller	Radiator fan is not operating	0 - 0.3 V	
		Radiator fan is operating	0.7 V or more	
22	Fuel pump relay 2	Ignition switch: "ON"	System voltage	
		Engine: Idle operation	1 V or less	
24	A/C load signal	<ul style="list-style-type: none"> ● Engine: Idle operation ● A/C switch: ON (A/C compressor runs) 	<ul style="list-style-type: none"> ● Outdoor air sensor ambient temperature: 18°C or more ● A/C setting temperature: Minimum temperature ● A/C air volume: Maximum 	1 V or less
			<ul style="list-style-type: none"> ● A/C setting temperature: indoor temperature ● A/C air volume: Minimum 	System voltage
32	Condenser fan motor relay (HI)	Fan inactive state (Engine coolant temperature: 90°C or less)	System voltage	
		Fan high-speed rotation state (Engine coolant temperature: 105°C or more)	1 V or less	
33	Alternator G terminal	<ul style="list-style-type: none"> ● Engine: After warm-up, idle operation ● Radiator fan: Not operating ● Headlamp: OFF → ON ● Stop lamp: OFF → ON ● Rear defogger switch: OFF → ON 	Voltage increases by 0.2 - 3.5 V	
34	Condenser fan motor relay (LOW)	Fan inactive state (Engine coolant temperature: 90°C or less)	System voltage	
		Fan low-speed rotation state (Engine coolant temperature: 95 - 100°C or more)	1 V or less	
35	Intercooler water spray lamp	Ignition switch: "ON"	System voltage	
		Ignition switch: "LOCK" (OFF)	1 V or less	
36	Engine warning lamp	Ignition switch: "LOCK" (OFF) → "ON"	1 V or less → System voltage (After several seconds have elapsed)	

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
37	Power steering fluid pressure switch	Engine: Idling after warming up	When steering wheel is stationary System voltage
			When steering wheel is turned 1 V or less
38	Engine control relay	Ignition switch: "LOCK" (OFF)	System voltage
		Ignition switch: "ON"	1 V or less
39	Fuel pump relay 3	While engine is idling, suddenly depress the accelerator pedal.	Temporarily rises slightly from 1 V or less.
41	Alternator FR terminal	<ul style="list-style-type: none"> ● Engine: After warm-up, idle operation ● Radiator fan: Not operating ● Head lamp: OFF → ON ● Stop lamp: OFF → ON ● Rear deffogger switch: OFF → ON 	Voltage decrease
44	Intercooler water spray switch (Auto)	<ul style="list-style-type: none"> ● Ignition switch: "ON" ● Intercooler water spray switch: ON 	1 V or less
		<ul style="list-style-type: none"> ● Ignition switch: "ON" ● Intercooler water spray switch: OFF 	System voltage
45	A/C switch	Engine: Idle operation	Turn the A/C switch OFF 0.5 V or less
			<ul style="list-style-type: none"> ● A/C switch: ON ● A/C setting temperature When room temperature is 25°C or more: Max Cool When room temperature is 25°C or less: Max. Hot
53	Secondary air control solenoid valve	Ignition switch: "ON"	System voltage
54	Oxygen sensor heater (Rear)	Engine: Idling after warming up	1 V or less
		Engine speed: 5,000r/min	System voltage
55	Intercooler water spray relay	Ignition switch: "ON"	System voltage
		Ignition switch: "LOCK" (OFF)	1 V or less
58	Tachometer signal	Engine speed: 3,000r/min	0.3 - 3.0 V
60	Oxygen sensor heater (front)	Engine: Idling after warming up	1 V or less
		Engine speed: 5,000r/min	System voltage
71	Ignition switch - ST	Engine: Cranking	8 V or more

Terminal No.	Check item	Check condition (Engine condition)	Normal condition	
72	Intake air temperature sensor	Ignition switch: "ON"	Intake air temperature: -20°C	3.8 - 4.4 V
			Intake air temperature: 0°C	3.2 - 3.8 V
			Intake air temperature: 20°C	2.3 - 2.9 V
			Intake air temperature: 40°C	1.5 - 2.1 V
			Intake air temperature: 60°C	0.8 - 1.4 V
			Intake air temperature: 80°C	0.4 - 1.0 V
75	Oxygen sensor (Rear)	<ul style="list-style-type: none"> ● Transmission: Second gear ● Driving with the throttle widely open ● Engine: 3,500 r/min or more 	0.6 - 1.0 V	
76	Oxygen sensor (front)	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)	0 ↔ 0.8 V (Changes repeatedly)	
80	Backup power supply	Ignition switch: "LOCK" (OFF)	System voltage	
81	Sensor impressed voltage	Ignition switch: "ON"	4.9 - 5.1 V	
82	Ignition switch - IG	Ignition switch: "ON"	System voltage	
83	Engine coolant temperature sensor	Ignition switch: "ON"	Coolant temperature: -20°C	3.9 - 4.5 V
			Coolant temperature: 0°C	3.2 - 3.8 V
			Coolant temperature: 20°C	2.3 - 2.9 V
			Coolant temperature: 40°C	1.3 - 1.9 V
			Coolant temperature: 60°C	0.7 - 1.3 V
			Coolant temperature: 80°C	0.3 - 0.9 V
84	Throttle position sensor	Ignition switch: "ON"	Set throttle valve to idle position	0.535 - 0.735 V
			Fully open throttle valve	4.5 - 5.0 V
85	Barometric pressure sensor	Ignition switch: "ON"	Altitude: 0 m	3.8 - 4.2 V
			Altitude: 600 m	3.5 - 3.9 V
			Altitude: 1,200 m	3.2 - 3.8 V
			Altitude: 1,800 m	3.0 - 3.4 V

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
86	Vehicle speed sensor	<ul style="list-style-type: none"> ● Ignition switch: "ON" ● Move the vehicle slowly forward 	0 ↔ 5 V (Changes repeatedly)
88	Camshaft position sensor	Engine: Cranking	0.4 - 3.0 V
		Engine: Idle operation	0.5 - 2.0 V
89	Crank angle sensor	Engine: Cranking	0.4 - 4.0 V
		Engine: Idle operation	1.5 - 2.5 V
90	Air flow sensor	Engine: Idle operation	2.2 - 3.2 V
		Engine speed: 2,500 r/min	
91	Intercooler water spray switch (Manual)	<ul style="list-style-type: none"> ● Ignition switch: "ON" ● Intercooler water spray switch: ON 	1 V or less
		<ul style="list-style-type: none"> ● Ignition switch: "ON" ● Intercooler water spray switch: OFF 	System voltage

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

1. Turn the ignition switch to "LOCK" (OFF) position.
2. Disconnect the engine-ECU connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU harness-side connector while referring to the check chart.

NOTE

- (1) When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.
- (2) Checking need not be carried out in the order given in the chart.

Caution

If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to earth, damage may be caused to the vehicle wiring, sensors, engine-ECU and/or ohmmeter. Be careful to prevent this!

4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and then repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

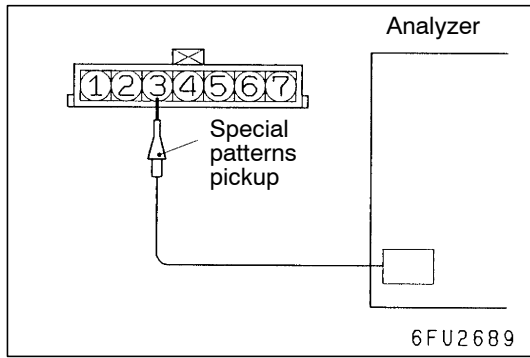
Engine-ECU Harness Side Connector Terminal Arrangement



9FU0392

Terminal No.	Inspection item	Normal condition (Check condition)
1 - 12	No. 1 injector	2 - 3 Ω (at 20°C)
14 - 12	No. 2 injector	
2 - 12	No. 3 injector	
15 - 12	No. 4 injector	

Terminal No.	Inspection item	Normal condition (Check condition)
3-12	Fuel pressure control solenoid valve	28 - 36 Ω (at 20°C)
4-12	Stepper motor coil (A1)	28 - 33 Ω (at 20°C)
17-12	Stepper motor coil (A2)	
5-12	Stepper motor coil (B1)	
18-12	Stepper motor coil (B2)	
6-12	EGR control solenoid valve	36 - 44 Ω (at 20°C)
9-12	Purge control solenoid valve	22 - 26 Ω (at 20°C)
11-12	Waste gate solenoid valve	62 - 74 Ω (at 20°C)
13-Body earth	ENGINE-ECU earth	Continuity (0 Ω)
26-Body earth	ENGINE-ECU earth	
53-12	Secondary air control solenoid valve	28 - 36 Ω (at 20°C)
54-12	Oxygen sensor heater (Rear)	11 - 18 Ω (at 20°C)
60-12	Oxygen sensor heater (Front)	4.5 - 8.0 Ω (at 20°C)
72-92	Intake air temperature sensor	13 - 17 k Ω (When intake air temperature is -20°C)
		5.7 - 6.7 k Ω (When intake air temperature is 0°C)
		2.3 - 3.0 k Ω (When intake air temperature is 20°C)
		1.0 - 1.5 k Ω (When intake air temperature is 40°C)
		0.56 - 0.76 k Ω (When intake air temperature is 60°C)
		0.30 - 0.42 k Ω (When intake air temperature is 80°C)
83-92	Engine coolant temperature sensor	14 - 17 k Ω (When coolant temperature is -20°C)
		5.1 - 6.5 k Ω (When coolant temperature is 0°C)
		2.1 - 2.7 k Ω (When coolant temperature is 20°C)
		0.9 - 1.3 k Ω (When coolant temperature is 40°C)
		0.48 - 0.68 k Ω (When coolant temperature is 60°C)
		0.26-0.36 k Ω (When coolant temperature is 80°C)



INSPECTION PROCEDURE USING AN ANALYZER

AIR FLOW SENSOR

Measurement Method

1. Disconnect the air flow sensor connector, and connect the special tool (test harness: MB991709) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to air flow sensor connector terminal No. 3.

Alternate Method (Test harness not available)

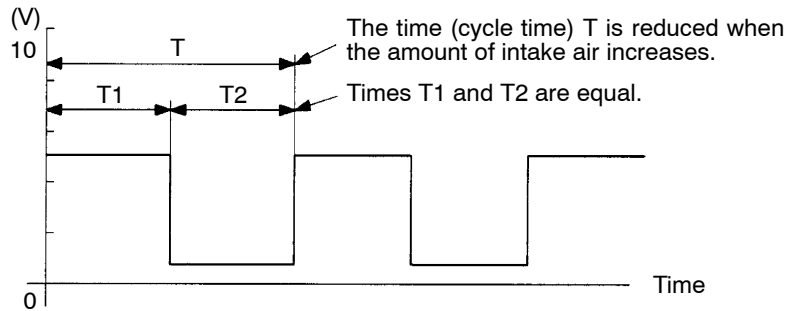
1. Connect the analyzer special patterns pickup to engine-ECU terminal No. 65.

Standard Wave Pattern

Observation conditions

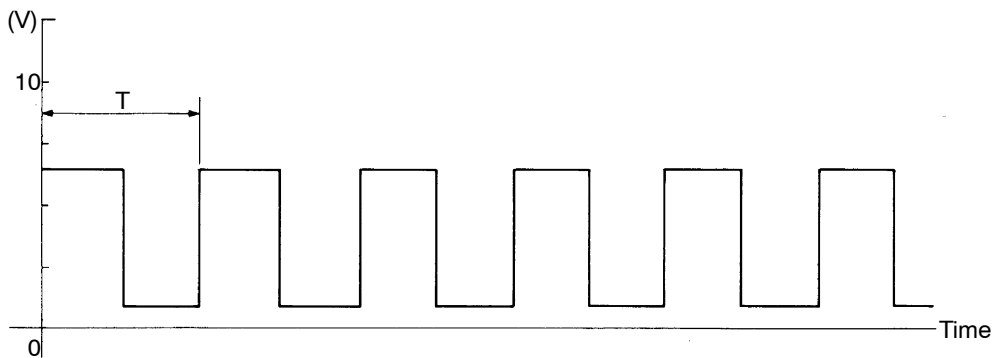
Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine r/min	Idle speed

Standard wave pattern



7FU1199

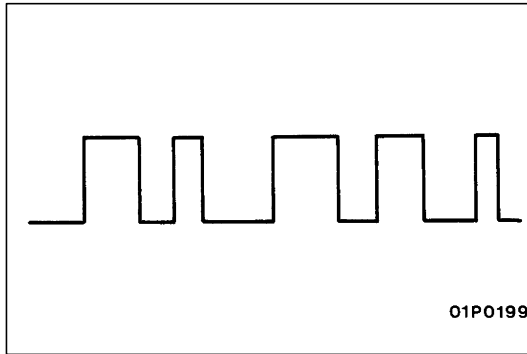
Observation conditions (from conditions above engine speed is increased by racing.)



7FU0880

Wave Pattern Observation Points

Check that cycle time T becomes shorter and the frequency increases when the engine speed is increased.



Examples of Abnormal Wave Patterns

- **Example 1**

Cause of problem

Sensor interface malfunction

Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.

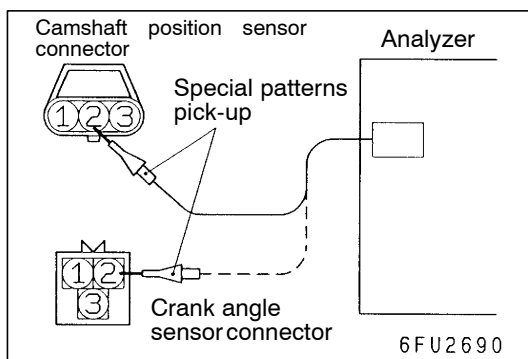
- **Example 2**

Cause of problem

Damaged rectifier or vortex generation column

Wave pattern characteristics

Unstable wave pattern with non-uniform frequency. However, when an ignition leak occurs during acceleration, the wave pattern will be distorted temporarily, even if the air flow sensor is normal.



CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR

Measurement Method

1. Disconnect the camshaft position sensor connector and connect the special tool (test harness: MB991709) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to camshaft position sensor terminal No. 2.
3. Disconnect the crank angle sensor connector and connect the special tool (test harness: MD998478) in between.
4. Connect the analyzer special patterns pickup to crank angle sensor terminal No. 2.

Alternate Method (Test harness not available)

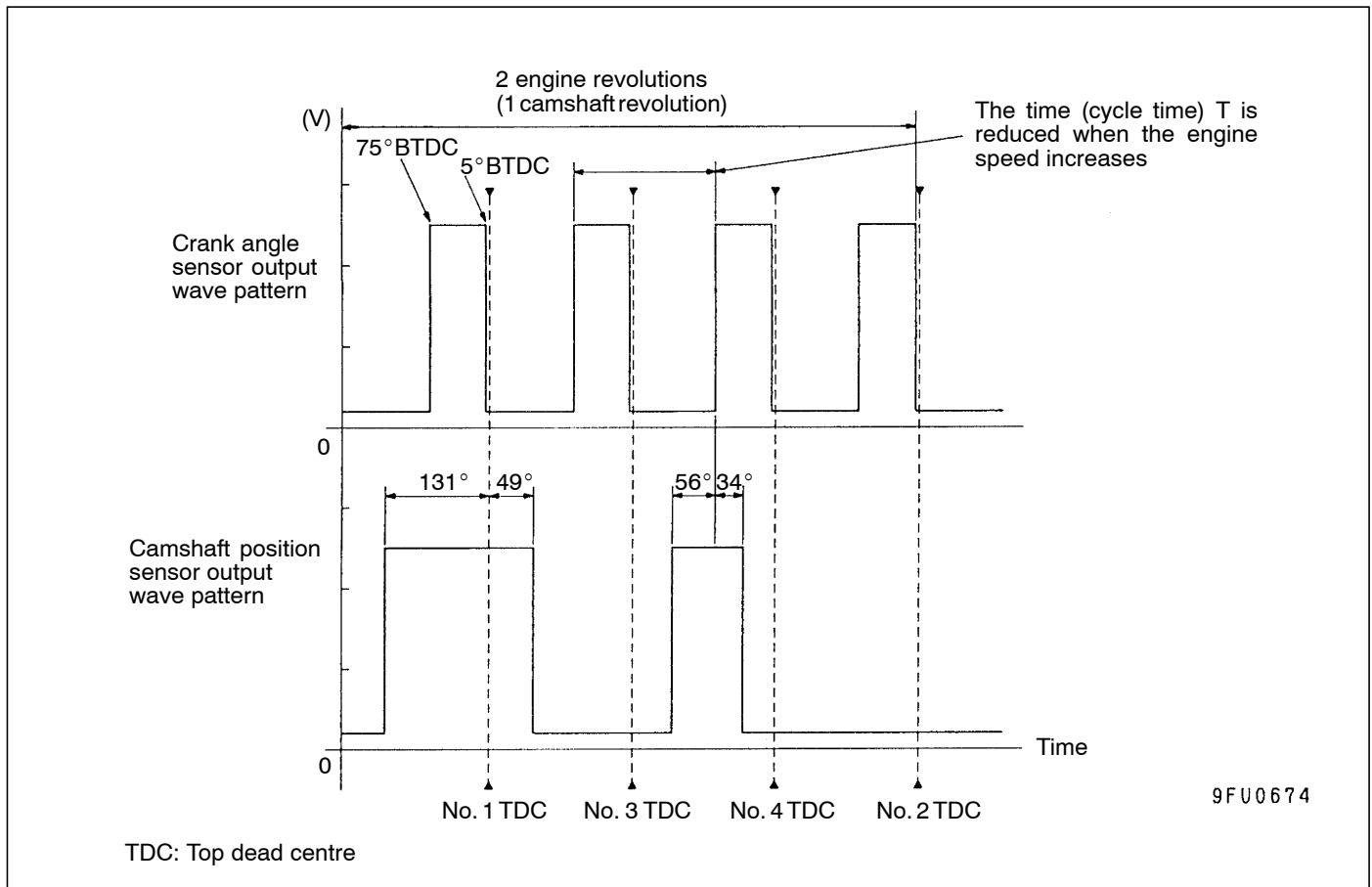
1. Connect the analyzer special patterns pickup to engine-ECU terminal No. 88. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-ECU terminal No. 89. (When checking the crank angle sensor signal wave pattern.)

Standard Wave Pattern

Observation condition

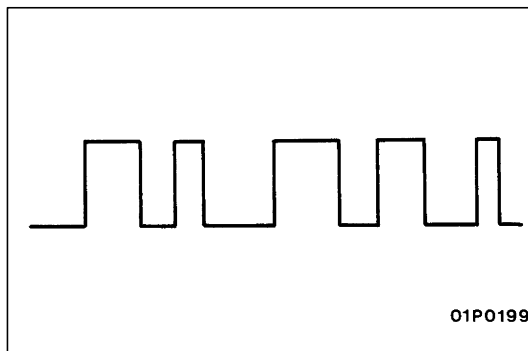
Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine r/min	Idle speed

Standard Wave Pattern



Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.



Examples of Abnormal Wave Patterns

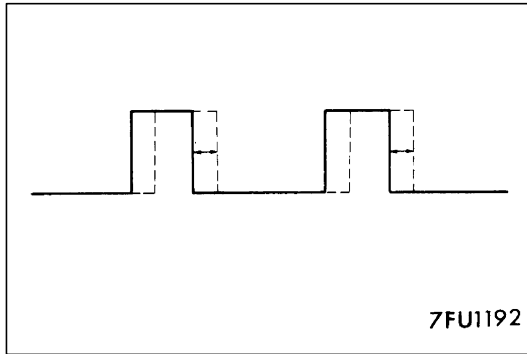
- Example 1

Cause of problem

Sensor interface malfunction

Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.



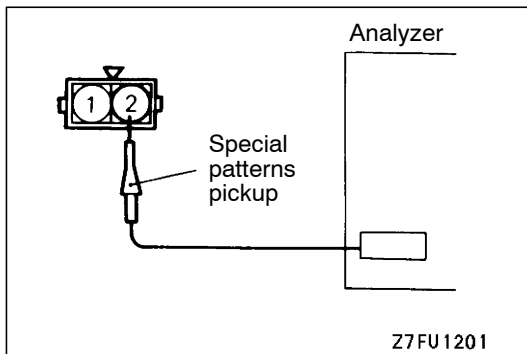
- Example 2

Cause of problem

Loose timing belt
Abnormality in sensor disk

Wave pattern characteristics

Wave pattern is displaced to the left or right.

**INJECTOR****Measurement Method**

1. Disconnect the injector connector, and then connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to terminal No. 2 of the injector connector.

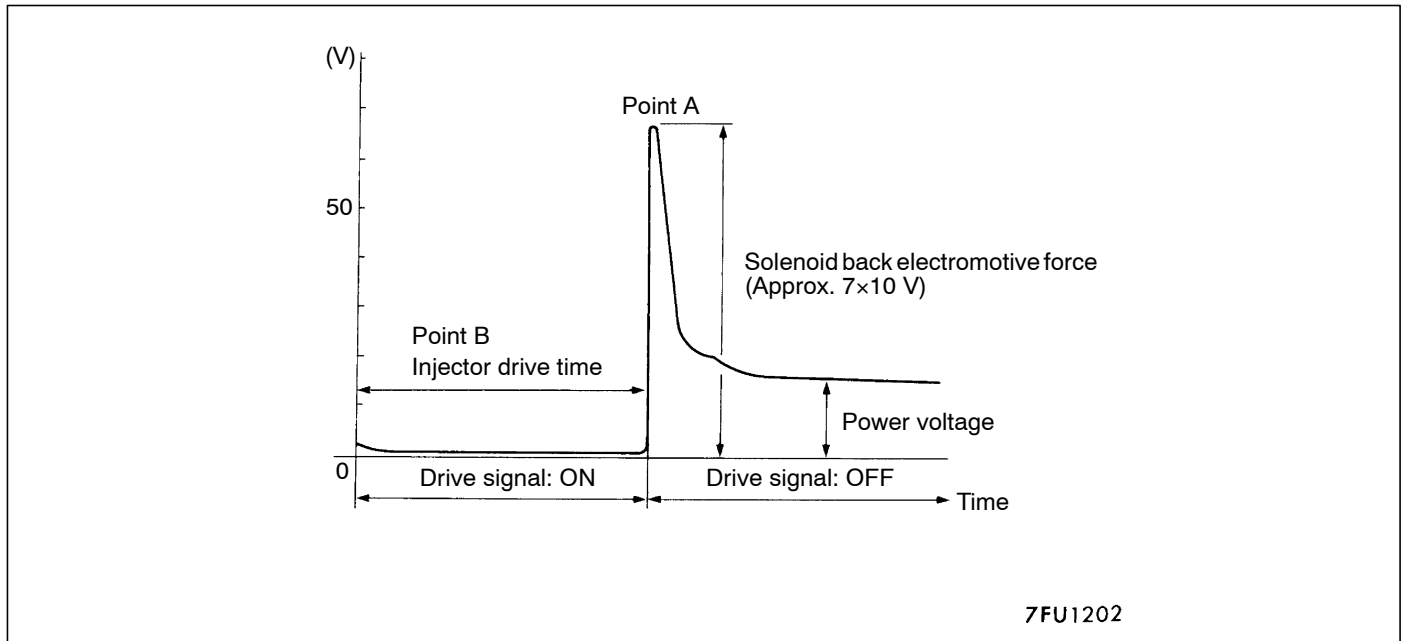
Alternate Method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal No. 1. (When checking the No. 1 cylinder.)
2. Connect the analyzer special patterns pickup to engine-ECU terminal No. 14. (When checking the No. 2 cylinder.)
3. Connect the analyzer special patterns pickup to engine-ECU terminal No. 2. (When checking the No. 3 cylinder.)
4. Connect the analyzer special patterns pickup to engine-ECU terminal No. 15. (When checking the No. 4 cylinder.)

Standard Wave Pattern**Observation conditions**

Function	Special patterns
Pattern height	Variable
Variable knob	Adjust while viewing the wave pattern
Pattern selector	Display
Engine r/min	Idle speed

Standard wave pattern



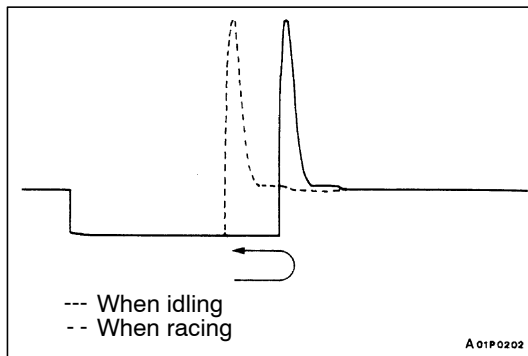
7FU1202

Wave Pattern Observation Points

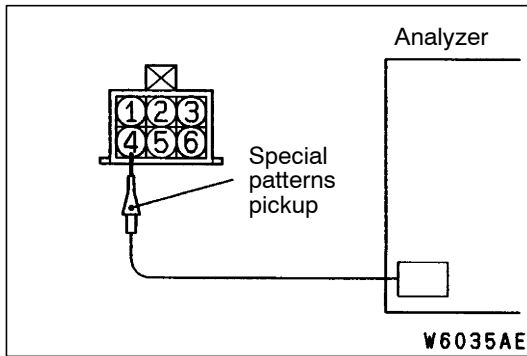
Point A: Height of solenoid back electromotive force

Contrast with standard wave pattern	Probable cause
Solenoid coil back electromotive force is low or doesn't appear at all.	Short in the injector solenoid

Point B: Injector drive time



- The injector drive time will be synchronized with the MUT-II tester display.
- When the engine is suddenly raced, the drive time will be greatly extended at first, but the drive time will soon match the engine speed.



IDLE SPEED CONTROL SERVO (STEPPER MOTOR)

Measurement Method

1. Disconnect the idle speed control servo connector, and connect the special tool (test harness: MB991709) in between.
2. Connect the analyzer special patterns pickup to the idle speed control servo-side connector terminal No. 1, terminal No. 3, terminal No. 4 and terminal No. 6 respectively.

Alternate Method (Test harness not available)

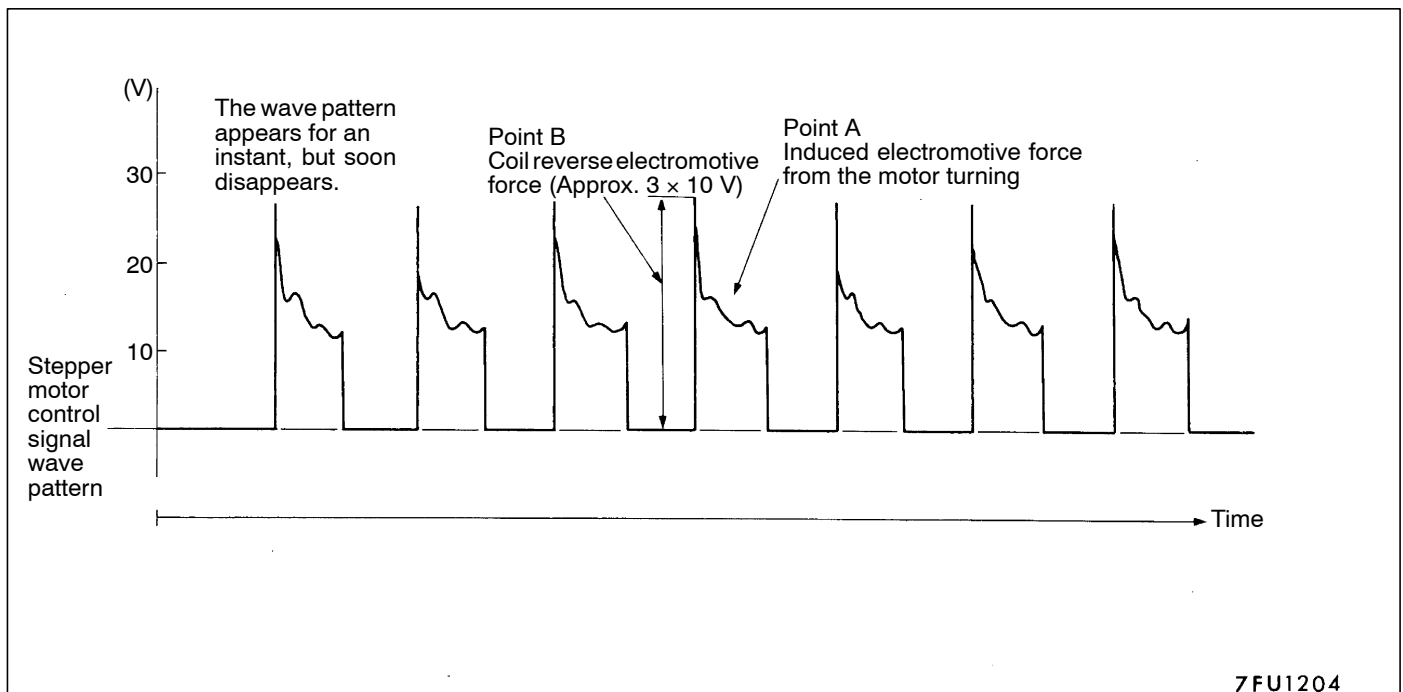
1. Connect the analyzer special patterns pickup to engine-ECU terminal No. 4, connection terminal No. 5, connection terminal No. 17, and connection terminal No. 18 respectively.

Standard Wave Pattern

Observation conditions

Function	Special patterns
Pattern height	High
Pattern selector	Display
Engine condition	When the engine coolant temperature is 20°C or below, turn the ignition switch from "LOCK" (OFF) position to "ON" position (without starting the engine).
	While the engine is idling, turn the A/C switch to ON.
	Immediately after starting the warm engine

Standard wave pattern



Wave Pattern Observation Points

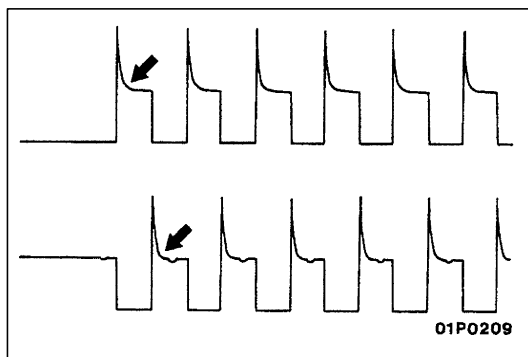
Check that the standard wave pattern appears when the stepper motor is operating.

Point A: Presence or absence of induced electromotive force from the motor turning. (Refer to the abnormal wave pattern.)

Contrast with standard wave pattern	Probable cause
Induced electromotive force does not appear or is extremely small.	Motor is malfunctioning

Point B: Height of coil reverse electromotive force

Contrast with standard wave pattern	Probable cause
Coil reverse electromotive force does not appear or is extremely small.	Short in the coil



Examples of Abnormal Wave Pattern

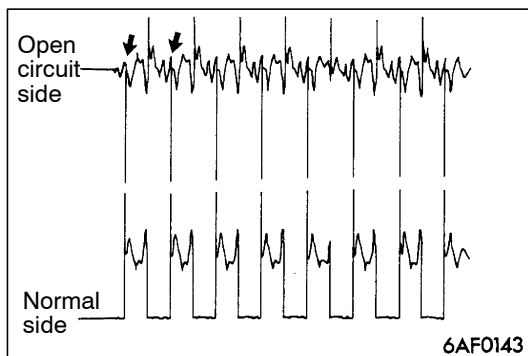
- Example 1

Cause of problem

Motor is malfunctioning. (Motor is not operating.)

Wave pattern characteristics

Induced electromotive force from the motor turning does not appear.



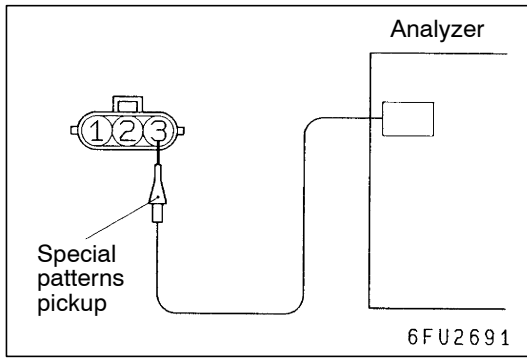
- Example 2

Cause of problem

Open circuit in the line between the stepper motor and the engine-ECU.

Wave pattern characteristics

Current is not supplied to the motor coil on the open circuit side. (Voltage does not drop to 0 V.) Furthermore, the induced electromotive force waveform at the normal side is slightly different from the normal waveform.



IGNITION COIL AND POWER TRANSISTOR

- Ignition coil primary signal
Refer to GROUP 16 - Ignition system.
- Power transistor control signal

Measurement Method

1. Disconnect the ignition coil connector, and connect the special tool (test harness: MB991658) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to terminal No. 3 of each ignition coil connector in turn.

Alternate Method (Test harness not available)

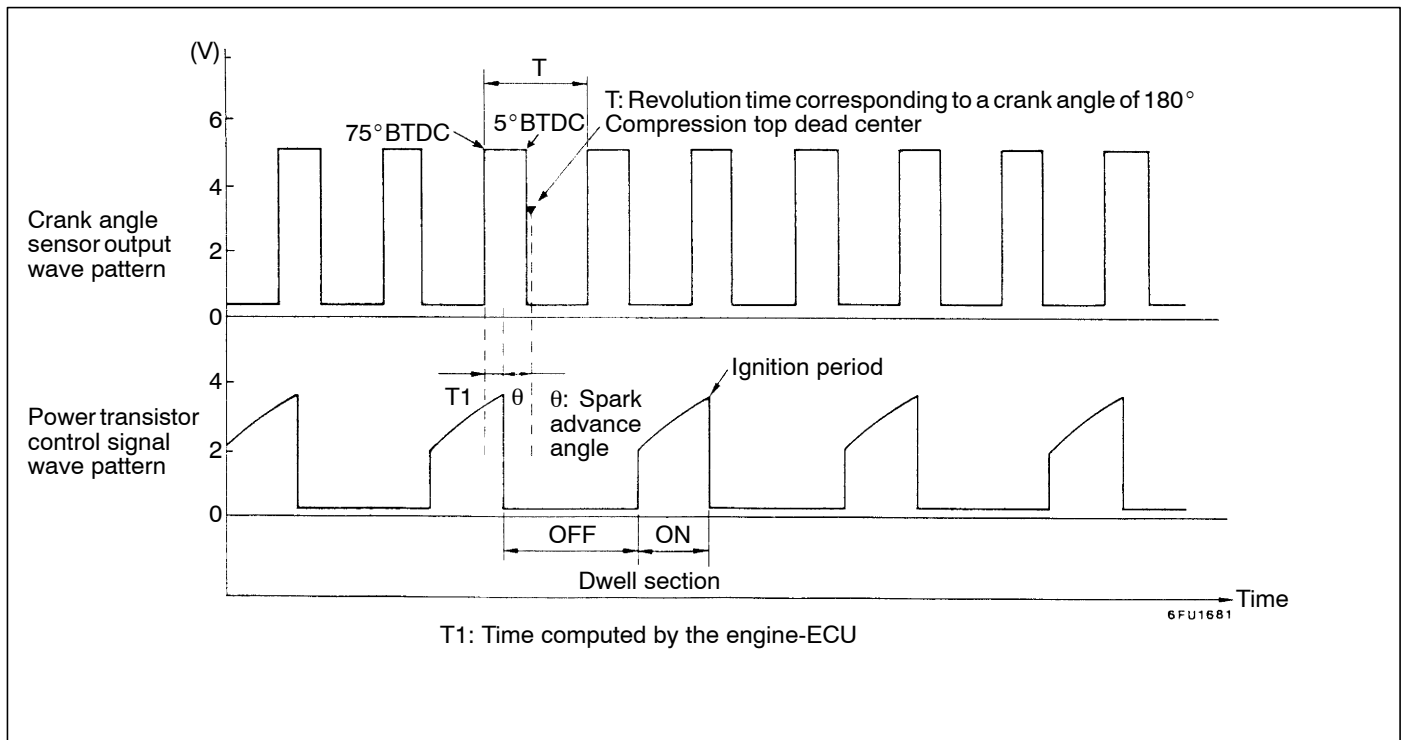
1. Connect the analyzer special patterns pickup to engine-ECU terminal No. 10 (No. 1 - No. 4), terminal No. 23 (No. 2 - No. 3) respectively.

Standard Wave Pattern

Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine r/min	Approximately 1,200 r/min

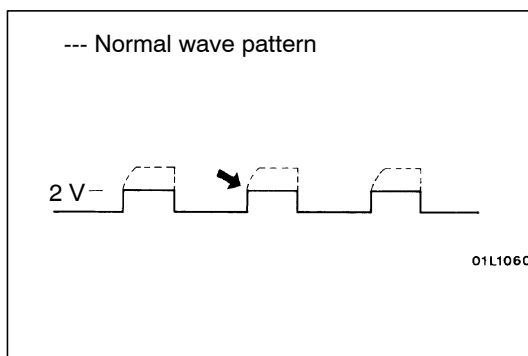
Standard wave pattern



Wave Pattern Observation Points

Point: Condition of wave pattern build-up section and maximum voltage (Refer to abnormal wave pattern examples 1 and 2.)

Condition of wave pattern build-up section and maximum voltage	Probable cause
Rises from approximately 2 V to approximately 4.5 V at the top-right	Normal
2 V rectangular wave	Open-circuit in ignition primary circuit
Rectangular wave at power voltage	Power transistor malfunction

**Examples of Abnormal Wave Patterns**

- Example 1

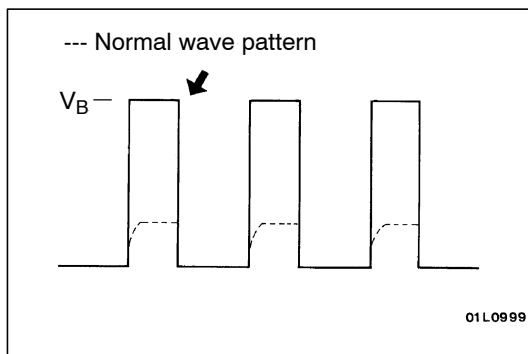
Wave pattern during engine cranking

Cause of problem

Open-circuit in ignition primary circuit

Wave pattern characteristics

Top-right part of the build-up section cannot be seen, and voltage value is approximately 2 V too low.



- Example 2

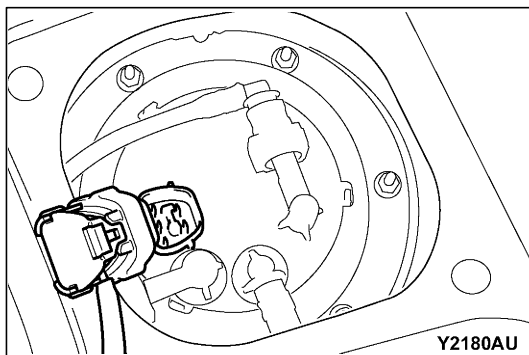
Wave pattern during engine cranking

Cause of problem

Malfunction in power transistor

Wave pattern characteristics

Power voltage results when the power transistor is ON.



ON-VEHICLE SERVICE

FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE THE FUEL PRESSURE)

When removing the fuel pipe, hose, etc., since fuel pressure in the fuel pipe line is high, do the following operation so as to release the fuel pressure in the line and prevent fuel from running out.

1. Remove the rear seat assembly. (Refer to GROUP 52A.)
2. Remove the protector.
3. Disconnect the fuel pump module connector.
4. After starting the engine and letting it run until it stops naturally, turn the ignition switch to "LOOK" (OFF) position.
5. Connect the fuel pump module connector.
6. Install the protector and rear seat assembly. (Refer to GROUP 52A.)

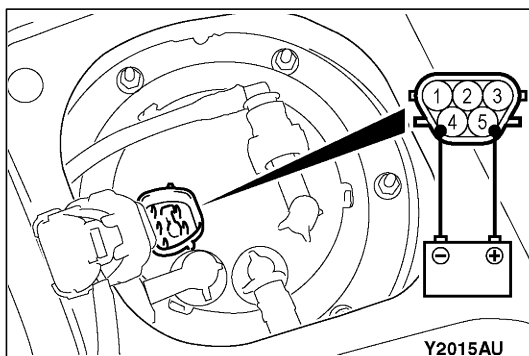
FUEL PUMP OPERATION CHECK

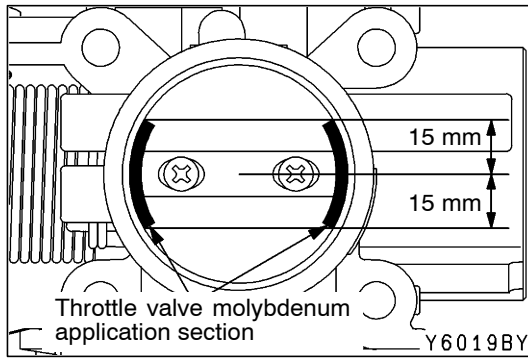
1. Check the operation of the fuel pump by using the MUT-II to force-drive the fuel pump.
2. If the fuel pump will not operate, check by using the following procedure, and if it is normal, check the drive circuit.
 - (1) Turn the ignition switch to "LOOK" (OFF) position.
 - (2) Remove the rear seat assembly. (Refer to GROUP 52A.)
 - (3) Remove the protector.
 - (4) Disconnect the fuel pump module connector.
 - (5) When the fuel pump drive connector is attached directly to the battery, check if the sound of the fuel pump operation can be heard.

NOTE

As the fuel pump is an in-tank type, the fuel pump sound is hard to hear, so remove the fuel filler cap and check from the tank inlet.

- (6) Check the fuel pressure by pinching the fuel hose with the fingertips.
- (7) Connect the fuel pump module connector.
- (8) Install the protector and rear seat assembly. (Refer to GROUP 52A.)



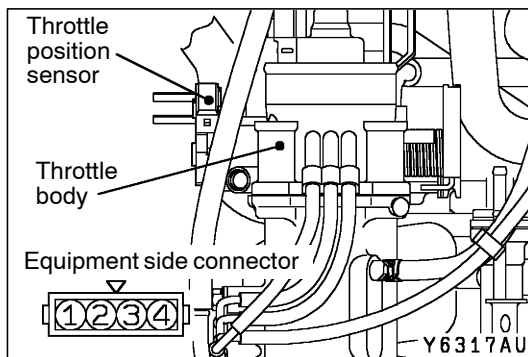


THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

1. Remove the air intake hose from the throttle body.
2. Spray cleaning fluid on a clean cloth.
3. Wipe off the dirt around the throttle valve with the cloth sprayed with cleaning fluid.

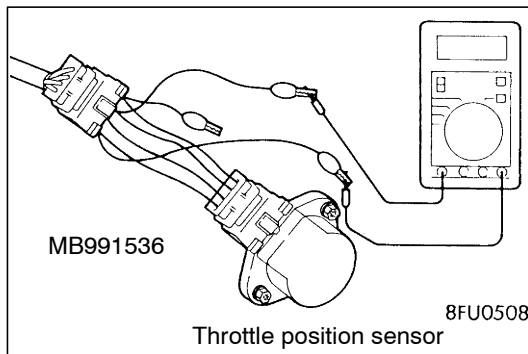
Caution

- (1) Do not spray the cleaning fluid directly to the throttle valve.
 - (2) Make sure the cleaning fluid does not enter the motor from the bypass line. Also make sure it does not enter the sensor through the shaft.
 - (3) Be careful not to rub off the molybden applied around the throttle valve shaft.
4. Attach the air intake hose.
 5. Adjust the basic idle speed. (Refer to P.13A-127.)



THROTTLE POSITION SENSOR ADJUSTMENT

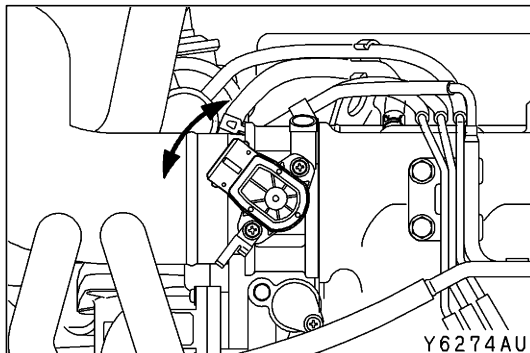
1. Connect the MUT-II to the diagnosis connector. When not using the MUT-II, proceed as follows:



- (1) Disconnect the throttle position sensor connector, and connect the special tool (test harness: MB991536) between the disconnected connector taking care not to confuse the terminal to be connected.
- (2) Connect digital voltmeter between the terminal No. 2 and the terminal No. 4 of the throttle position sensor connector.

2. Turn the ignition switch to "ON" position (but do not start the engine).
3. Check the output voltage of the throttle position sensor.

Standard value: 535 - 735 mV



4. If not within the standard value, loosen the throttle position sensor mounting bolts. Then rotate the sensor body to adjust.
5. Turn the ignition switch to "LOCK" (OFF) position.
6. Remove the MUT-II. If the MUT-II is not used, remove the special tool, and then connect the throttle position sensor connector.
7. If a diagnosis code is displayed, erase the diagnosis code by using the MUT-II or disconnect the negative battery cable from the battery terminal and then leave it for at least ten seconds. After that, reconnect the battery cable, and then let the engine run at idle for approximately 10 minutes.

BASIC IDLE SPEED ADJUSTMENT

NOTE

- (1) The basic idling speed has been adjusted by the speed adjusting screw by the manufacturer, and there should usually be no need for readjustment.
 - (2) If the adjustment has been changed by mistake, the idle speed may become too high or the idle speed may drop too low when loads from components such as the A/C are placed on the engine. If this occurs, adjust by the following procedure.
 - (3) The adjustment, if made, should be made after first confirming that the spark plugs, the injectors, the idle speed control servo, the compression pressure, etc., are all normal.
1. Before inspection and adjustment, set the vehicle to the pre-inspection condition.
 2. Connect the MUT-II to the diagnosis connector (16-pin).

NOTE

When the MUT-II is connected, the diagnosis control terminal should be earthed.

3. Start the engine and run at idle.
4. Select the item No. 30 of the MUT-II Actuator test.

NOTE

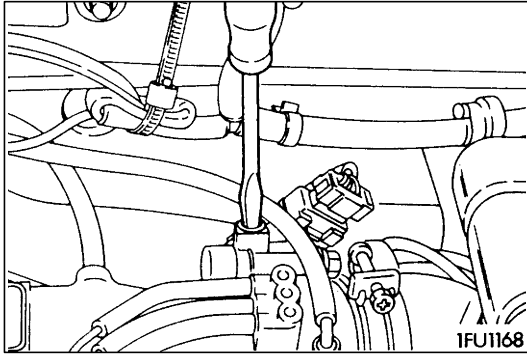
This holds the idle speed control servo at the basic step to adjust the basic idle speed.

5. Check the basic idle speed.

Standard value: 850 ± 100 r/min

NOTE

- (1) The engine speed may be 20 to 100 r/min lower than indicated above for a new vehicle [driven approximately 500 km or less], but no adjustment is necessary.
- (2) If the engine stalls or the engine speed is low even though the vehicle has been driven approximately 500 km or more, it is probable that deposits are adhered to the throttle valve, so clean it. (Refer to P.13A-126.)



6. If not within the standard value range, turn the speed adjusting screw to make the necessary adjustment.
7. Press the MUT-II clear key, and release the idle speed control servo from the Actuator test mode.

NOTE

Unless the idle speed control servo is released, the Actuator test mode will continue 27 minutes.

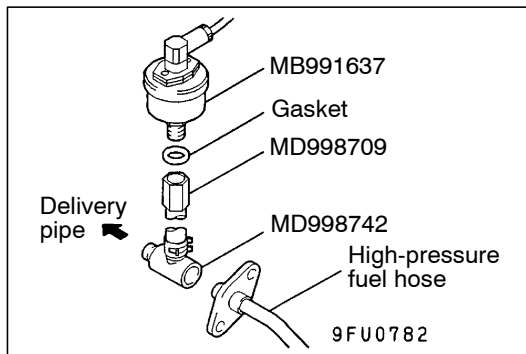
8. Turn the ignition switch to "LOCK" (OFF) position.
9. Disconnect the MUT-II.
10. Start the engine again and let it run at idle speed for approximately 10 minutes; check that the idling condition is normal.

FUEL PRESSURE TEST

1. Release residual pressure from the fuel pipe line to prevent fuel gush out. (Refer to P.13A-125.)
2. Disconnect the high-pressure fuel hose at the delivery pipe side.

Caution

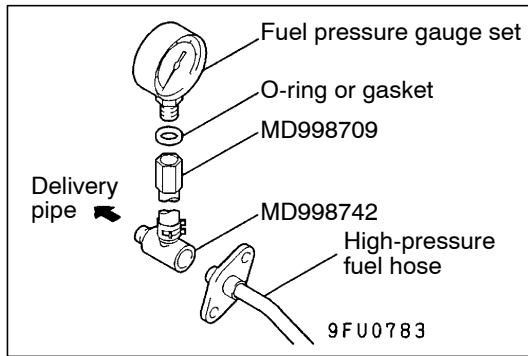
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



3. Remove the union joint and bolt from the special tool (adapter hose) and instead attach the special tool (hose adapter) to the adapter hose.
4. Install the special tool (for measuring the fuel pressure) that was set up in step 3.

<When using the fuel pressure gauge set (special tool)>

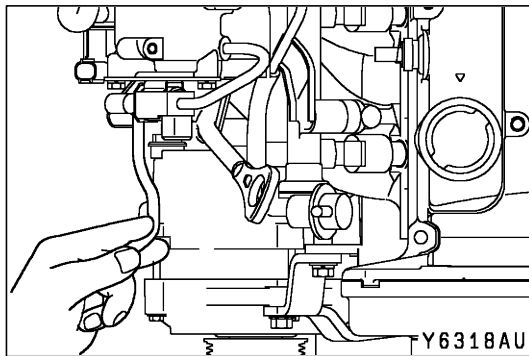
- (1) Install the special tool (for measuring the fuel pressure) between the high-pressure fuel hose and the delivery pipe.
- (2) Install the fuel pressure gauge set (special tool) on the special tool (for measuring the fuel pressure) putting the gasket between them.
- (3) Connect the lead wire of the fuel pressure gauge set (special tool) to the power supply (cigarette lighter socket) and to the MUT-II.



<When using the fuel pressure gauge>

- (1) Install the fuel pressure gauge on the special tool (for measuring the fuel pressure) putting a suitable O-ring or gasket between them.
- (2) Install the special tool which was set up in step (1) between the high-pressure fuel hose and the delivery pipe.
5. Connect the MUT-II to the diagnosis connector.
6. Turn the ignition switch to "ON" position. (But do not start the engine.)
7. Select "Item No. 07" from the MUT-II Actuator test to drive the fuel pump. Check that there are no fuel leaks from any parts.
8. Finish the actuator test or turn the ignition switch to "LOCK" (OFF) position.
9. Start the engine and run at idle.
10. Measure fuel pressure while the engine is running at idle.

Standard value: Approximately 230 kPa at curb idle



11. Disconnect the vacuum hose from the fuel pressure regulator and measure fuel pressure with the hose end closed by a finger.

Standard value: 289 - 309 kPa at curb idle

12. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
13. Racing the engine repeatedly, hold the fuel return hose lightly with fingers to feel that fuel pressure is present in the return hose.

NOTE

If the fuel flow rate is low, there will be no fuel pressure in the return hose.

14. If any of fuel pressure measured in steps 10 to 13 is out of specification, troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
<ul style="list-style-type: none"> ● Fuel pressure too low ● Fuel pressure drops after racing ● No fuel pressure in fuel return hose 	Clogged fuel filter	Replace fuel filter
	Fuel leaking to return side due to poor fuel regulator valve seating or settled spring	Replace fuel pressure regulator
	Low fuel pump delivery pressure	Replace fuel pump
Fuel pressure too high	Binding valve in fuel pressure regulator	Replace fuel pressure regulator
	Clogged fuel return hose or pipe	Clean or replace hose or pipe
Same fuel pressure when vacuum hose is connected and when disconnected	Damaged vacuum hose or clogged nipple	Replace vacuum hose or clean nipple
	Fuel pressure control system malfunction	Check the fuel pressure control system

15. Stop the engine and check change of fuel pressure gauge reading. Normal if the reading does not drop within 2 minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
Fuel pressure drops gradually after engine is stopped	Leaky injector	Replace injector
	Leaky fuel regulator valve seat	Replace fuel pressure regulator
Fuel pressure drops sharply immediately after engine is stopped	Check valve in fuel pump is held open	Replace fuel pump

16. Release residual pressure from the fuel pipe line.
(Refer to P.13A-125.)
17. Remove the fuel pressure gauge and special tool from the delivery pipe.

Caution

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

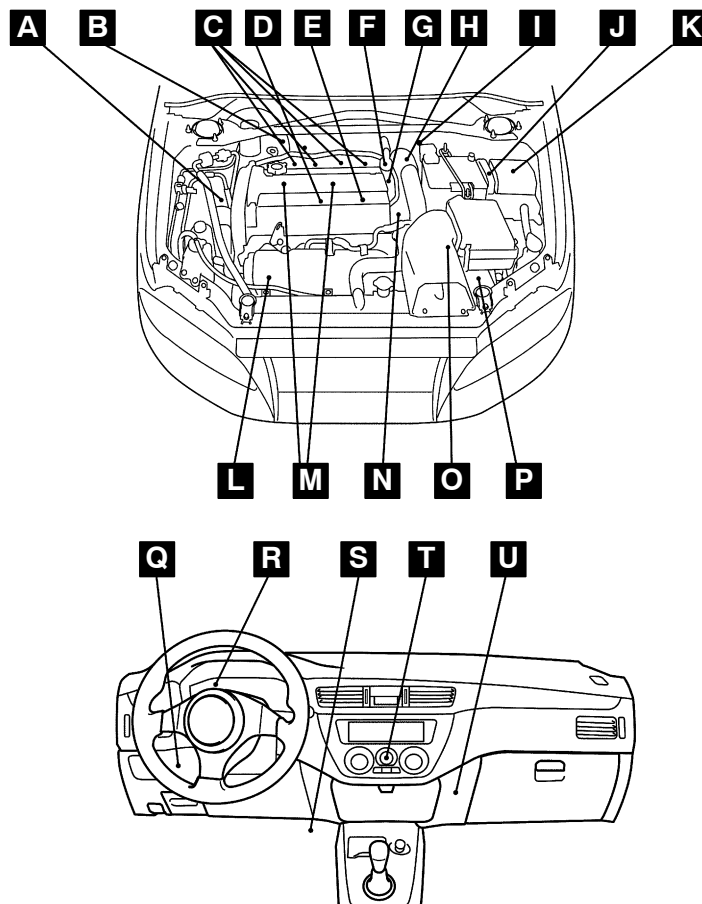
18. Replace the O-ring at the end of the fuel high pressure hose with a new one. Furthermore, apply engine oil to the new O-ring before replacement.
19. Fit the fuel high pressure hose over the delivery pipe and tighten the bolt to specified torque.

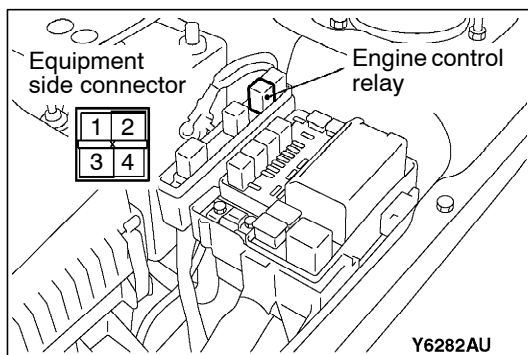
Tightening torque: 5.0 ± 1.0 N·m

20. Check for any fuel leaks by following the procedure in step 7.
21. Disconnect the MUT-II.

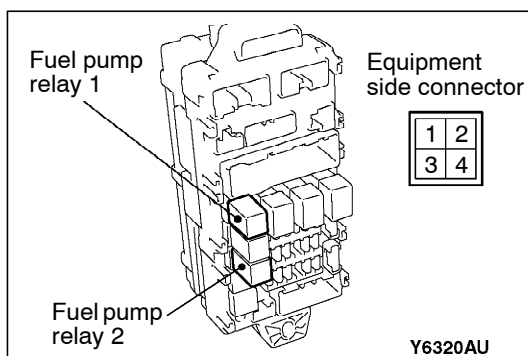
COMPONENT LOCATION

Name	Symbol	Name	Symbol
A/C relay	J	Fuel pump relay 1, 2	Q
A/C switch	T	Fuel pump relay 3	H
Air flow sensor (integrated intake air temperature sensor and barometric pressure sensor)	O	Fuel pump resistor	H
Camshaft position sensor	N	Idle speed control servo (stepper motor)	G
Crank angle sensor	K	Ignition coil (integrated power transistor)	M
Detonation sensor	E	Injector	C
Diagnosis connector	S	Oxygen sensor (front)	L
EGR control solenoid valve	D	Oxygen sensor (rear)	X
Engine control relay	I	Power steering fluid pressure switch	A
Engine coolant temperature sensor	N	Resistor (for injector)	H
Engine warning lamp (check engine lamp)	R	Secondary air control solenoid valve	D
Engine-ECU	U	Throttle position sensor	G
Fan motor relay	J	Vehicle speed sensor	F
Fuel pressure control solenoid valve	B	Waste gate solenoid valve	P

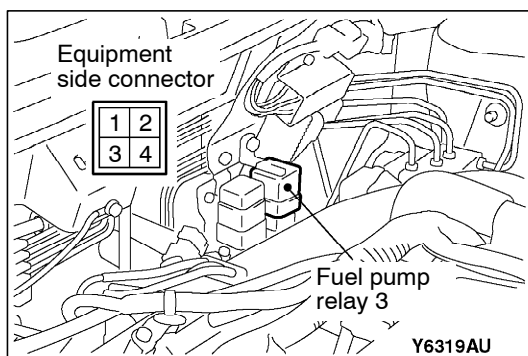


**ENGINE CONTROL RELAY CONTINUITY CHECK**

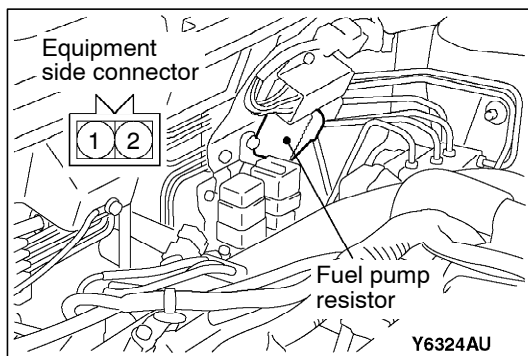
Tester connection terminal	Battery voltage	Normal state
2-3	Not energized	Continuity
1-4	Not energized	No continuity
	Energized [Connect terminal No. 2 to battery (+) terminal, and connect terminal No. 3 to battery (-) terminal.]	Continuity

**FUEL PUMP RELAY 1, 2 CONTINUITY CHECK**

Tester connection terminal	Battery voltage	Normal state
1-4	Not energized	Continuity
2-3	Not energized	No continuity
	Energized [Connect terminal No. 1 to battery (+) terminal, and connect terminal No. 4 to battery (-) terminal.]	Continuity

**FUEL PUMP RELAY 3 CONTINUITY CHECK**

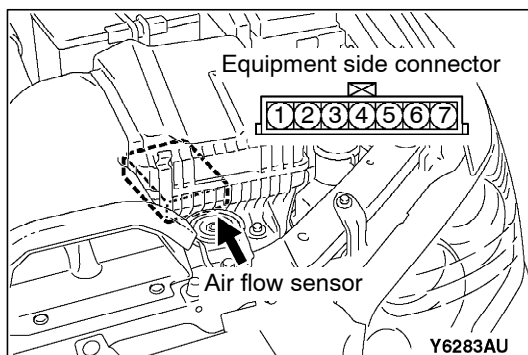
Tester connection terminal	Battery voltage	Normal state
3-4	Not energized	Continuity
1-2	Not energized	Continuity
	Energized [Connect terminal No. 2 to battery (+) terminal, and connect terminal No. 1 to battery (-) terminal.]	No continuity

**FUEL PUMP RESISTOR CHECK**

1. Disconnect the fuel pump resistor connector.
2. Measure the resistance between the terminals.

Standard value: 0.45 - 0.65 Ω

3. If the value is deviated from the standard value, replace the fuel pump resistor.

**INTAKE AIR TEMPERATURE SENSOR CHECK**

1. Disconnect the air flow sensor connector.
2. Measure resistance between terminal No. 5 and terminal No. 6.

Standard value:

13 - 17 k Ω (at -20°C)

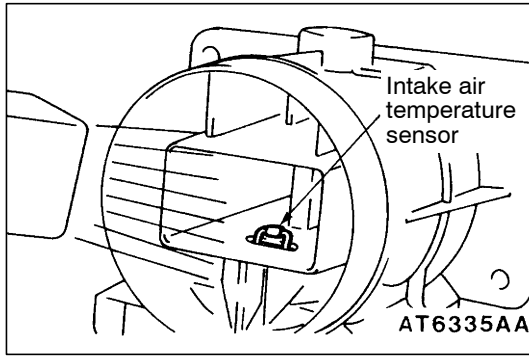
5.7 - 6.7 k Ω (at 0°C)

2.3 - 3.0 k Ω (at 20°C)

1.0 - 1.5 k Ω (at 40°C)

0.56 - 0.76 k Ω (at 60°C)

0.30 - 0.42 k Ω (at 80°C)

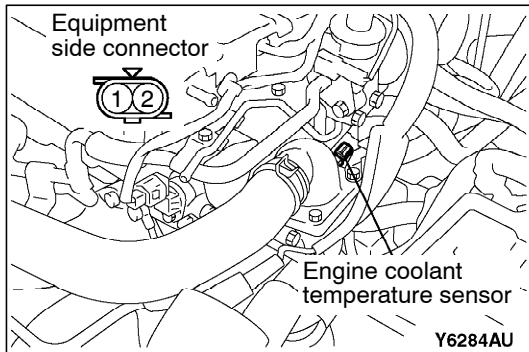


3. Measure resistance while heating the sensor using a hair drier.

Normal condition:

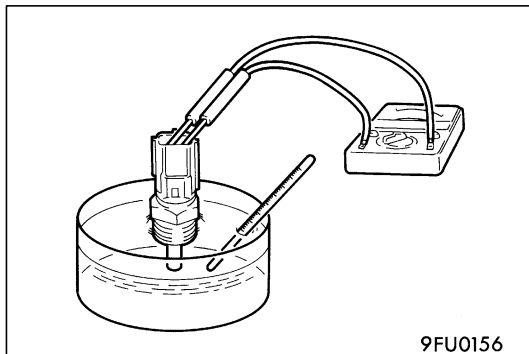
Temperature (°C)	Resistance (kΩ)
Higher	Smaller

4. If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.

**ENGINE COOLANT TEMPERATURE SENSOR CHECK****Caution**

Be careful not to touch the connector (resin section) with the tool when removing and installing.

1. Remove the engine coolant temperature sensor.



2. With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

Standard value:

14 - 17 kΩ (at -20°C)

5.1 - 6.5 kΩ (at 0°C)

2.1 - 2.7 kΩ (at 20°C)

0.9 - 1.3 kΩ (at 40°C)

0.48 - 0.68 kΩ (at 60°C)

0.26 - 0.36 kΩ (at 80°C)

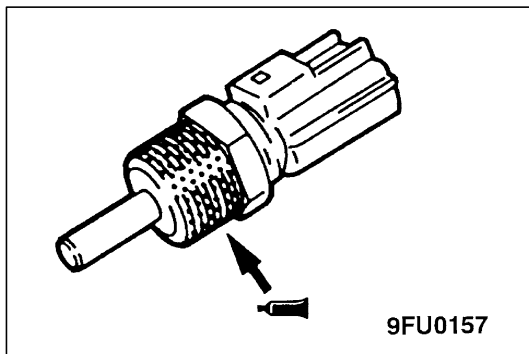
3. If the resistance deviates from the standard value greatly, replace the sensor.
4. Apply sealant to threaded portion.

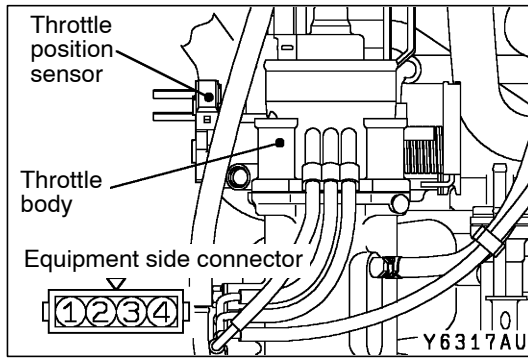
Specified sealant:

3M NUT Locking Part No. 4171 or equivalent

5. Install the engine coolant temperature sensor and tighten it to the specified torque.

Tightening torque: 29 ± 9 N·m





THROTTLE POSITION SENSOR CHECK

1. Disconnect the throttle position sensor connector.
2. Measure the resistance between the throttle position sensor side connector terminal No. 1 and terminal No. 4.

Standard value: 3.5 - 6.5 k Ω

3. Measure the resistance between the throttle position sensor side connector terminal No. 2 and terminal No. 4.

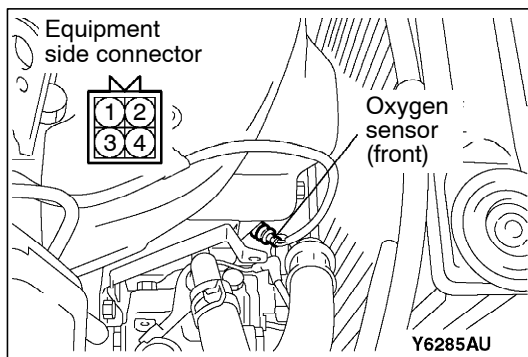
Normal condition:

Throttle valve slowly open until fully open from the idle position	Changes smoothly in proportion to the opening angle of the throttle valve
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4. If the resistance is outside the standard value, or if it doesn't change smoothly, replace the throttle position sensor.

NOTE

For the throttle position sensor adjustment procedure, refer to P.13A-90.

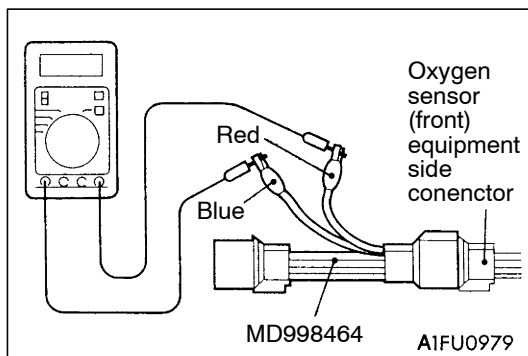


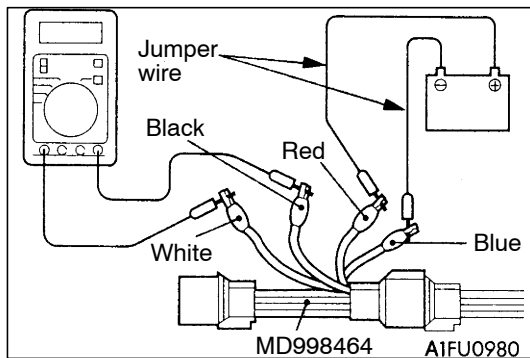
OXYGEN SENSOR CHECK

<Oxygen sensor (front)>

1. Disconnect the oxygen sensor connector and connect the special tool (test harness: MB998464) to the connector on the oxygen sensor side.
2. Make sure that there is continuity (4.5 - 8.0 Ω at 20°C) between terminal No. 1 and terminal No. 3 on the oxygen sensor connector.

3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.





- Use the jumper wire to connect terminal No. 1 of the oxygen sensor connector to the battery (+) terminal and terminal No. 3 to the battery (-) terminal.

Caution

Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.

- Connect a digital voltage meter between terminal No. 2 and terminal No. 4.
- While repeatedly racing the engine, measure the oxygen sensor output voltage.

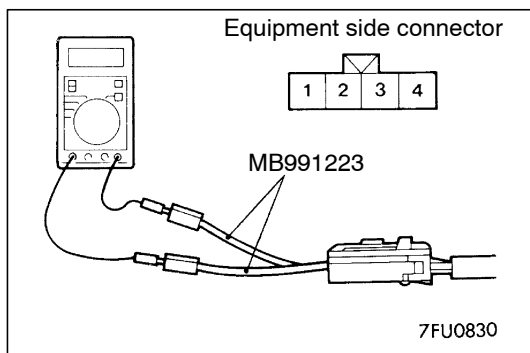
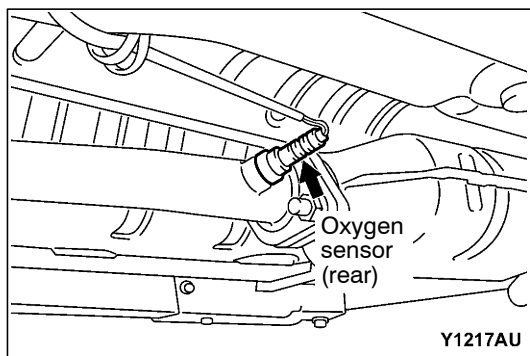
Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 - 1.0 V	If you make the air/fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 - 1.0 V.

- If the sensor is defective, replace the oxygen sensor.

NOTE

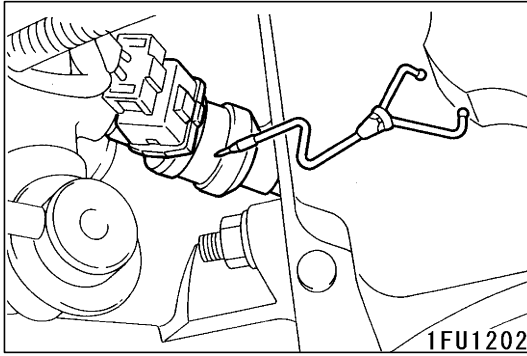
For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.

**<Oxygen sensor (rear)>**

- Disconnect the oxygen sensor connector and connect the special tool (test harness set) to the connector on the oxygen sensor side.
- Make sure that there is continuity (11 - 18 Ω at 20°C) between terminal No. 3 and terminal No. 4 on the oxygen sensor connector.
- If there is no continuity, replace the oxygen sensor.

NOTE

- If the MUT-II does not display the standard value although no abnormality is found by the above mentioned continuity test and harness check, replace the oxygen sensor (rear).
- For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.



INJECTOR CHECK

OPERATION SOUND CHECK

Using a sound scope, check the operation sound of the injector ("chh" sound) during idling and cranking.

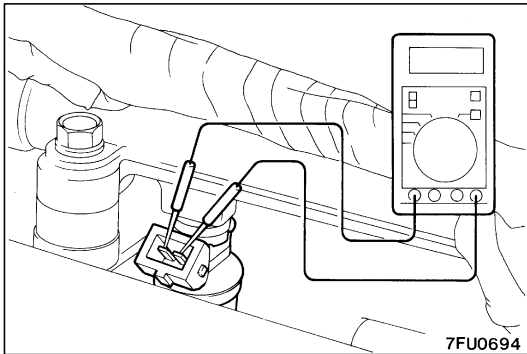
Check that the operation sound increases when the speed increases.

Caution

The sound of other injectors operating may be heard even when the injector being checked is not operated.

NOTE

If no operation sound is heard, check the injector drive circuit. If the circuit is normal, the injector or engine-ECU may be faulty.



Measurement of Resistance between Terminals

1. Remove the injector connector.
2. Measure the resistance between terminals.

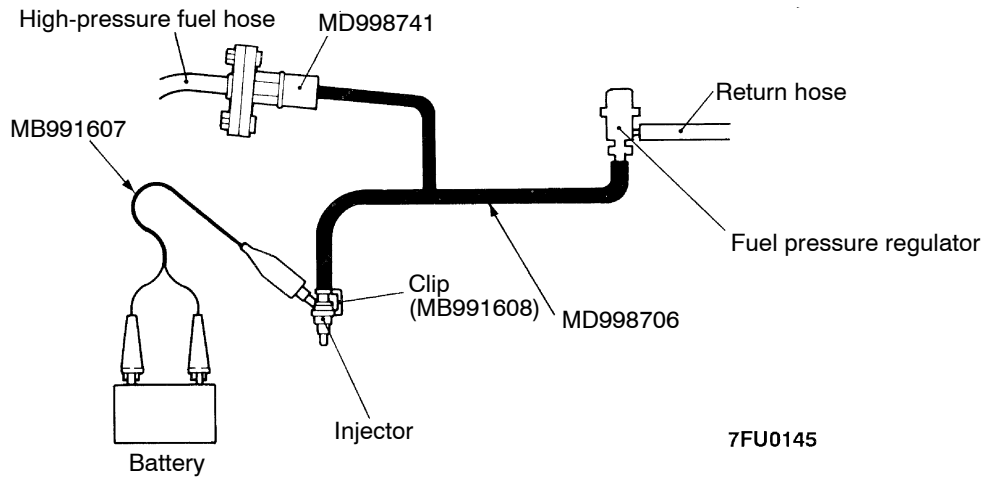
Standard value: 2 - 3 Ω (at 20°C)

3. Install the injector connector.

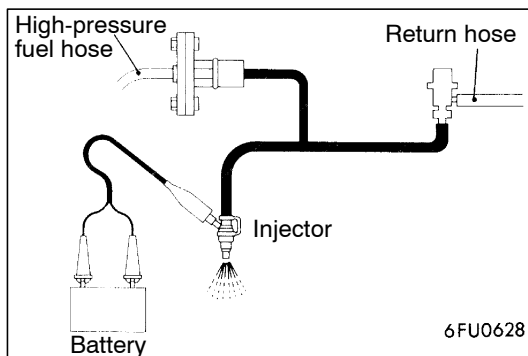
Checking the Injection Condition

1. Following the steps below, bleed out the residual pressure within the fuel pipe line to prevent flow of the fuel. (Refer to P.13A-96.)
2. Remove the injector.

3. Arrange the special tool (injector test set), adaptor, fuel pressure regulator and clips as shown in the illustration below.



4. Connect the MUT-II to the diagnosis connector.
5. Turn the ignition switch to "ON" position. (But do not start the engine.)
6. Select "Item No. 07" from the MUT-II Actuator test to drive the fuel pump.

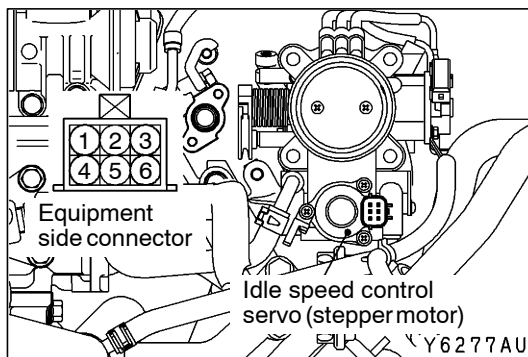
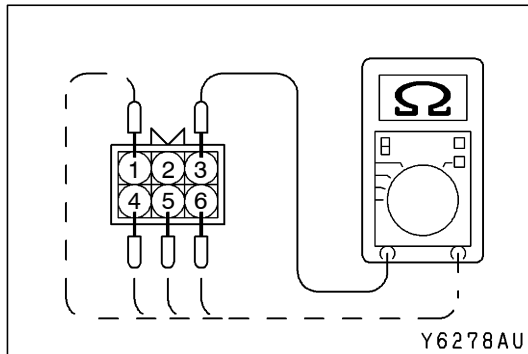
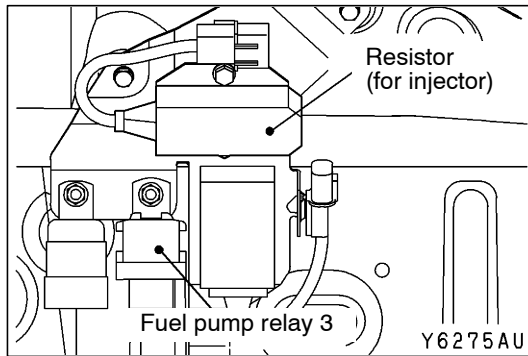


7. Activate the injector and check the atomized spray condition of the fuel. The condition can be considered satisfactory unless it is extremely poor.

8. Stop the actuation of the injector, and check for leakage from the injector's nozzle.

Standard value: 1 drop or less per minute

9. Activate the injector without activating the fuel pump; then, when the spray emission of fuel from the injector stops, disconnect the special tool and restore it to its original condition.
10. Disconnect the MUT-II.



RESISTOR (FOR INJECTOR) CHECK

1. Disconnect the resistor connector.
2. Measure the resistance between each terminal.

Standard value:

Measurement terminal	Resistance Ω
1 - 3	5.8 - 6.2 (at 20°C)
4 - 3	
5 - 3	
6 - 3	

IDLE SPEED CONTROL SERVO (STEPPER MOTOR) CHECK

Checking the Operation Sound

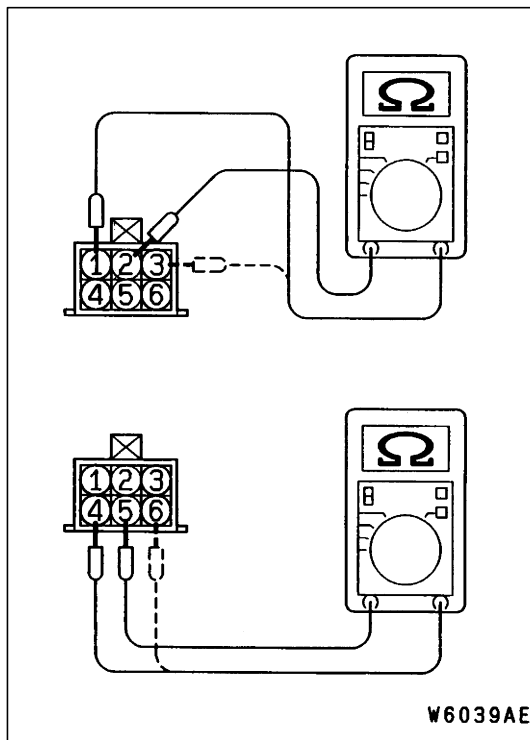
1. Check that the engine coolant temperature is 20°C or below.

NOTE

Disconnecting the engine coolant temperature sensor connector and connecting the harness-side of the connector to another engine coolant temperature sensor that is at 20°C or below is also okay.

2. Check that the operation sound of the stepper motor can be heard after the ignition is switched "ON" position. (but without starting the engine.)
3. If the operation sound cannot be heard, check the stepper motor's activation circuit.

If the circuit is normal, it is probable that there is a malfunction of the stepper motor or of the engine-ECU.



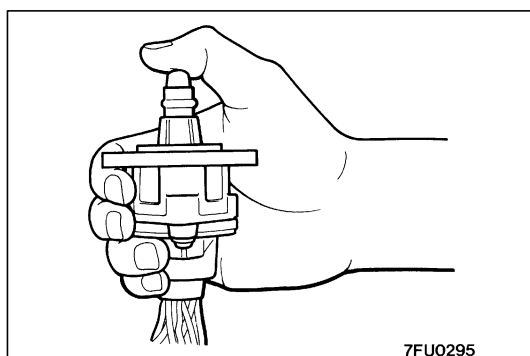
Checking the Coil Resistance

1. Disconnect the idle speed control servo connector.
2. Measure the resistance between terminal No. 2 and either terminal No. 1 or terminal No. 3 of the connector at the idle speed control servo side.

Standard value: 28 - 33 Ω (at 20°C)

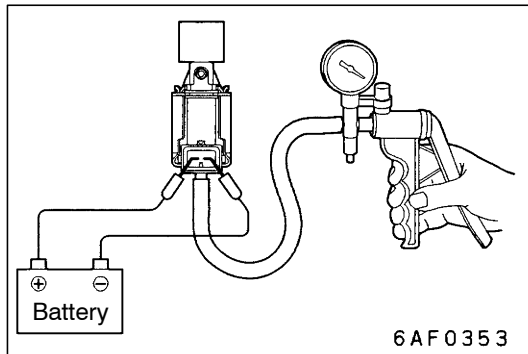
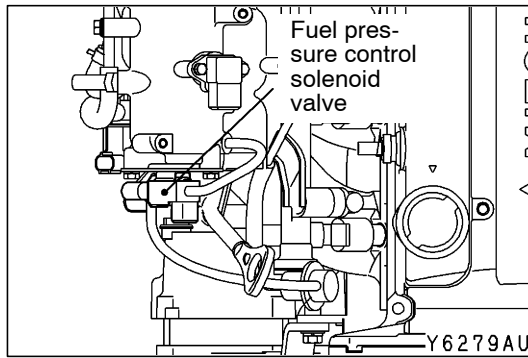
3. Measure the resistance between terminal No. 5 and either terminal No. 6 or terminal No. 4 of the connector at the idle speed control servo side.

Standard value: 28 - 33 Ω (at 20°C)



Operation Check

1. Remove the throttle body.
2. Remove the stepper motor.
3. Connect the special tool (test harness: MB991709) to the idle speed control servo connector.
4. Connect the positive (+) terminal of a power supply (approximately 6 V) to the terminals No. 2 and No. 5.
5. With the idle speed control servo as shown in the illustration, connect the negative (-) terminal of the power supply to each clip as described in the following steps, and check whether or not a vibrating feeling (a feeling of very slight vibration of the stepper motor) is generated as a result of the activation of the stepper motor.
 - (1) Connect the negative (-) terminal of the power supply to the terminals No. 1 and No. 4.
 - (2) Connect the negative (-) terminal of the power supply to the terminals No. 3 and No. 4.
 - (3) Connect the negative (-) terminal of the power supply to the terminals No. 3 and No. 6.
 - (4) Connect the negative (-) terminal of the power supply to the terminals No. 1 and No. 6.
 - (5) Connect the negative (-) terminal of the power supply to the terminals No. 1 and No. 4.
 - (6) Repeat the tests in sequence from (5) to (1).
6. If, as a result of these tests, vibration is detected, the stepper motor can be considered to be normal.



FUEL PRESSURE CONTROL SOLENOID VALVE CHECK

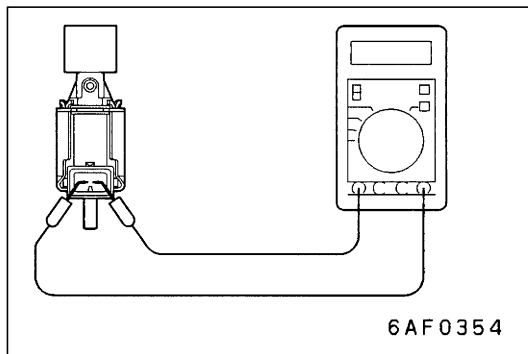
OPERATION CHECK

1. Disconnect the vacuum hose from the solenoid valve.
2. Separate the harness connector.

3. Connect the hand vacuum pump to the solenoid valve's A nipple.
4. Connect the solenoid valve terminal and battery terminal with a jumper wire.
5. Disconnect the jumper wire between the battery's (-) terminals, apply a negative pressure, and inspect the tightness.

Standard value:

Jumper wire	State of B nipple	Normal state
Connected	Opened	Negative pressure leaks.
	Closed	Negative pressure is maintained.
Disconnected	Opened	Negative pressure is maintained.



COIL RESISTANCE CHECK

Measure the resistance between the solenoid valve terminals.

Standard value: 28 – 36 Ω (at 20°C)

PURGE CONTROL SOLENOID VALVE CHECK

Refer to GROUP 17 - Emission Control System.

EGR CONTROL SOLENOID VALVE CHECK

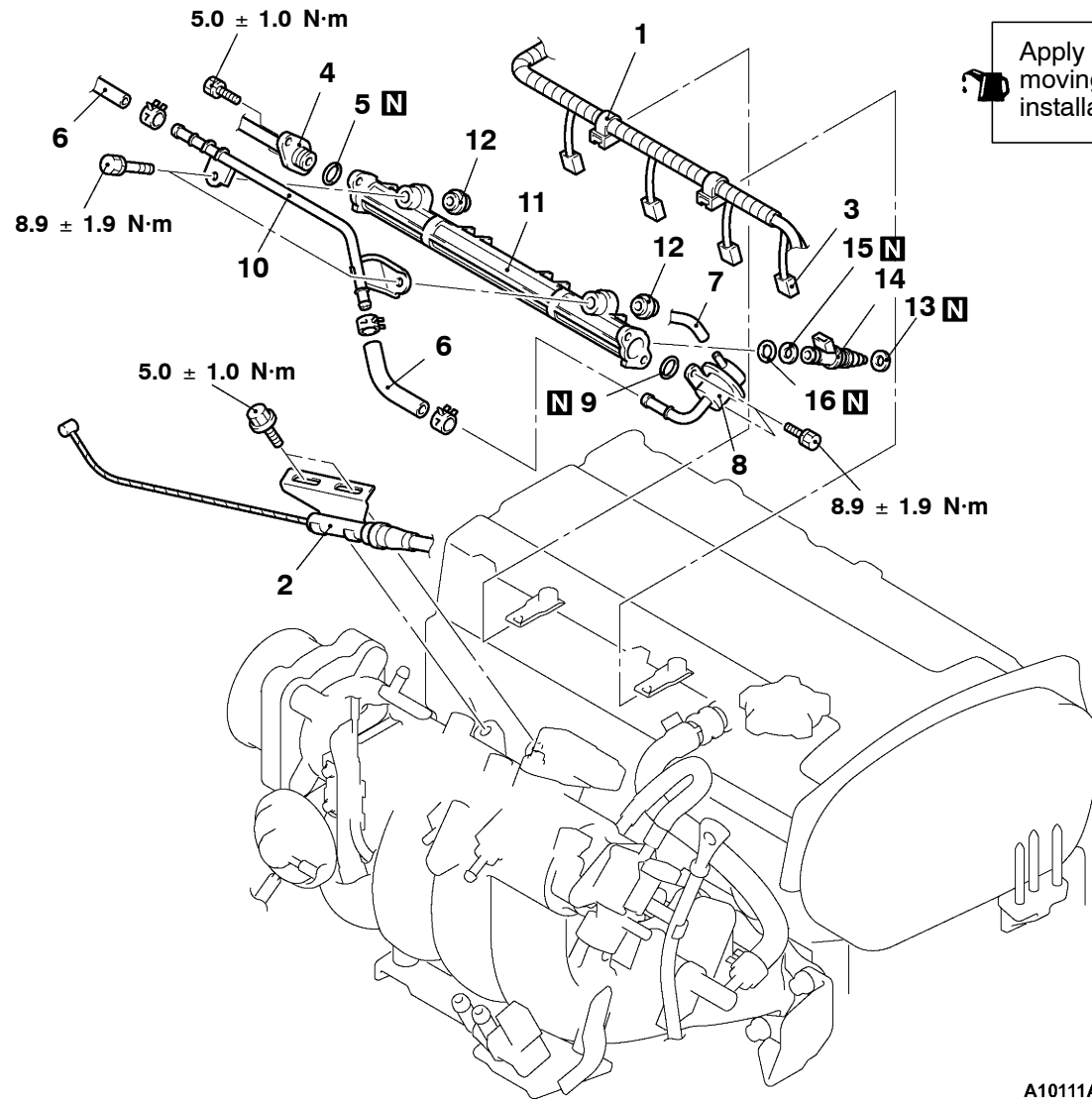
Refer to GROUP 17 - Emission Control System.

INJECTOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Fuel Discharge Prevention (Refer to P.13A-125.)
- Strut Tower Bar Removal and Installation (Refer to GROUP 42.)
- Air Hose E, Air By-pass Hose, Air Pipe C Removal and Installation (Refer to GROUP 15 - Intercooler.)
- Fuel Leakage Check



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Removal steps

- | | |
|--|---|
| <ul style="list-style-type: none"> 1. Control harness connector 2. Accelerator cable assembly connection (Throttle body side) ▶A◀ 3. Injector harness connector ▶A◀ 4. High-pressure fuel hose connection 5. O-ring 6. Fuel return hose connection 7. Vacuum sensor connector ▶A◀ 8. Fuel pressure regulator | <ul style="list-style-type: none"> 9. O-ring 10. Fuel return pipe 11. Delivery pipe 12. Insulator ▶A◀ ▶A◀ 13. Insulator ▶A◀ 14. Injector 15. Grommet 16. O-ring |
|--|---|

REMOVAL SERVICE POINT**◀A▶ DELIVERY PIPE/INJECTOR REMOVAL**

Remove the delivery pipe (with the injectors attached to it).

Caution

Care must be taken, when removing the delivery pipe, not to drop the injector.

INSTALLATION SERVICE POINT**▶A◀ INJECTOR/FUEL PRESSURE REGULATOR
/HIGH-PRESSURE FUEL HOSE INSTALLATION**

1. Apply a drop of new engine oil to the O-ring.

Caution

Be sure not to let engine oil enter the delivery pipe.

2. While turning the injector, high-pressure fuel hose and fuel pressure regulator to the right and left, install the delivery pipe, while being careful not to damage the O-ring. After installing, check that the hose turns smoothly.
3. If it does not turn smoothly, the O-ring may be trapped, remove the injector, high-pressure fuel hose or fuel pressure regulator and then re-insert it into the delivery pipe and check once again.
4. Tighten the high-pressure fuel hose and fuel pressure regulator to the specified torque.

Tightening torque:

5.0 ± 1.0 N·m (High-pressure fuel hose)

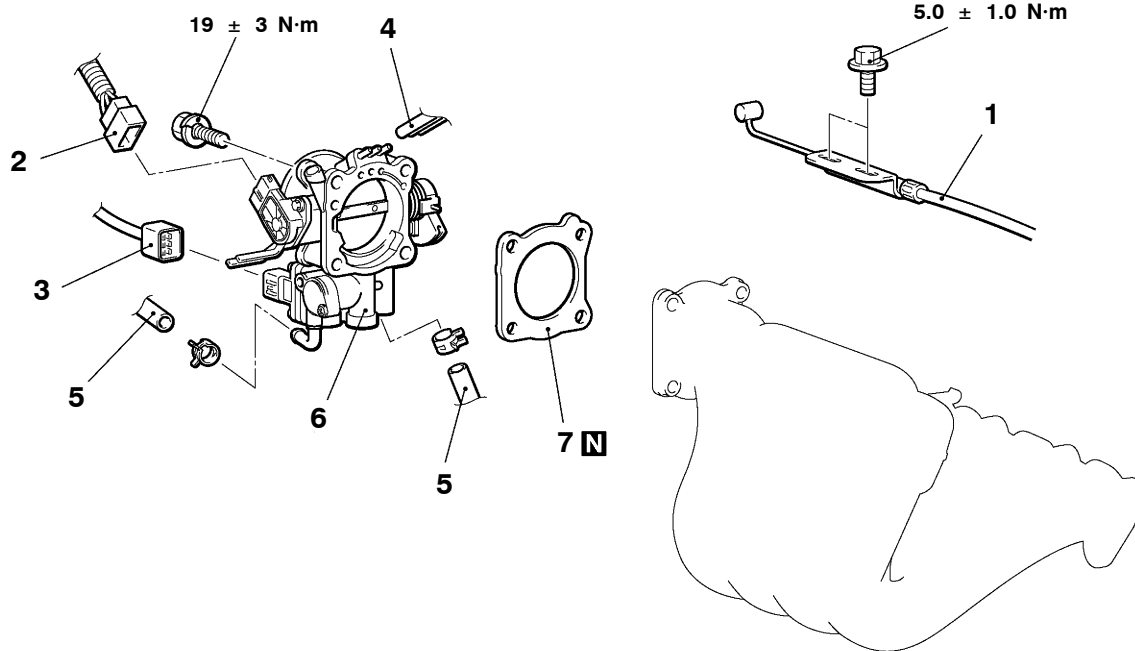
8.9 ± 1.9 N·m (Fuel pressure regulator)

THROTTLE BODY

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Engine Coolant Draining and Supplying (Refer to GROUP 14 - On-vehicle Service.)
- Strut Tower Bar Removal and Installation (Refer to GROUP 42.)
- Air Hose E, Air By-pass Hose, Air Pipe C Removal and Installation (Refer to GROUP 15 - Intercooler.)
- Accelerator Cable Adjustment (Refer to GROUP 17 - On-vehicle Service.) <Post-installation>

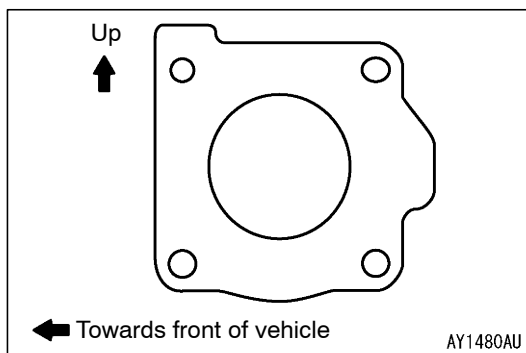


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Removal steps

1. Accelerator cable connection
2. Throttle position sensor connector
3. Idle speed control servo connector
4. Vacuum hose connection

5. Water hose connection
6. Throttle body
7. Throttle body gasket



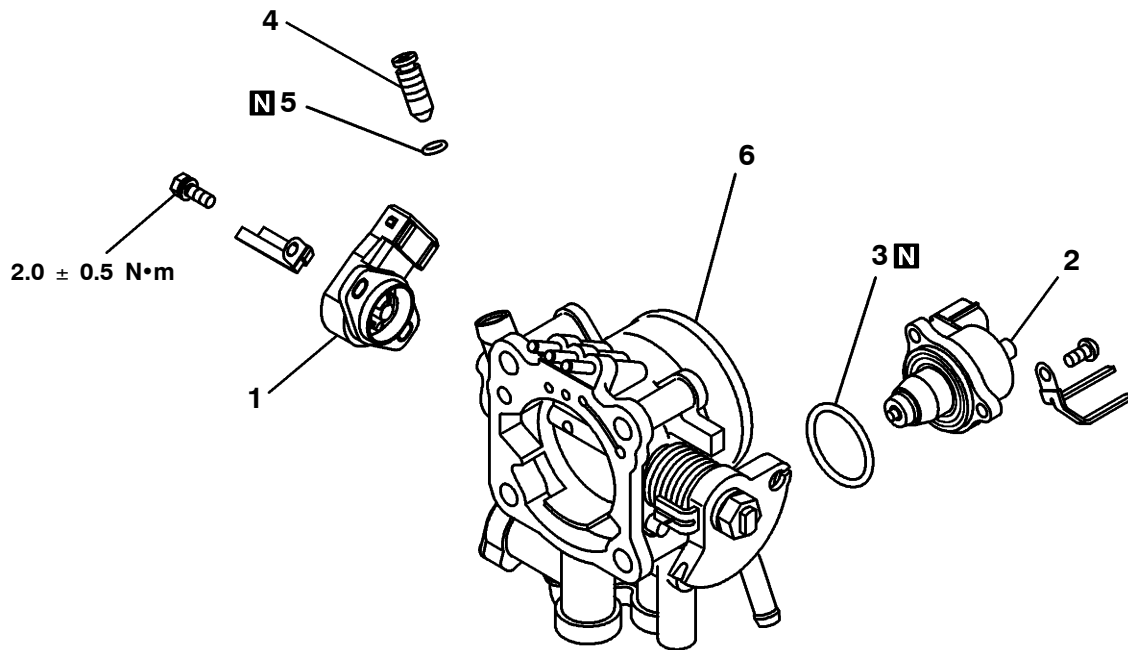
AY1480AU

INSTALLATION SERVICE POINT

►A◀ THROTTLE BODY GASKET INSTALLATION

Place the gasket so that the projecting part is positioned as shown in the illustration, and then install it between the intake manifold and the throttle body.

DISASSEMBLY AND REASSEMBLY



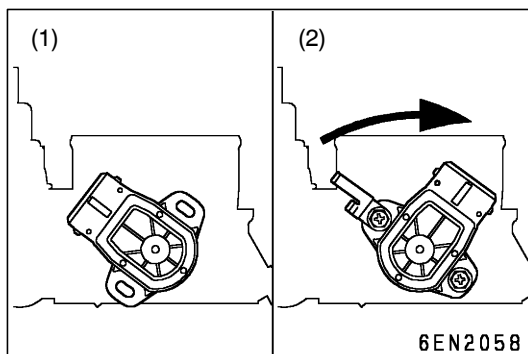
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Removal steps



1. Throttle position sensor
2. Idle speed control servo
3. O-ring

4. Fixed SAS
5. O-ring
6. Throttle body

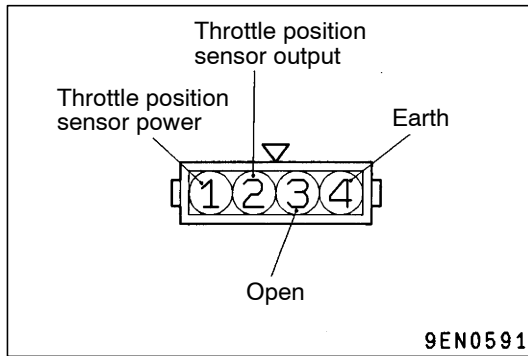


INSTALLATION SERVICE POINT

▶◀ THROTTLE POSITION SENSOR INSTALLATION

1. Set the throttle position sensor on the throttle body as shown in illustration (1).
2. Turn and set the throttle position sensor to the position shown in illustration (2), connect a circuit tester across terminal No. 2 (Throttle position sensor output) and terminal No. 4 (earth), and measure the output voltage. Tighten the throttle position sensor with a screw at the position where the output voltage is at the standard value.

Standard value: 0.535 - 0.735 V



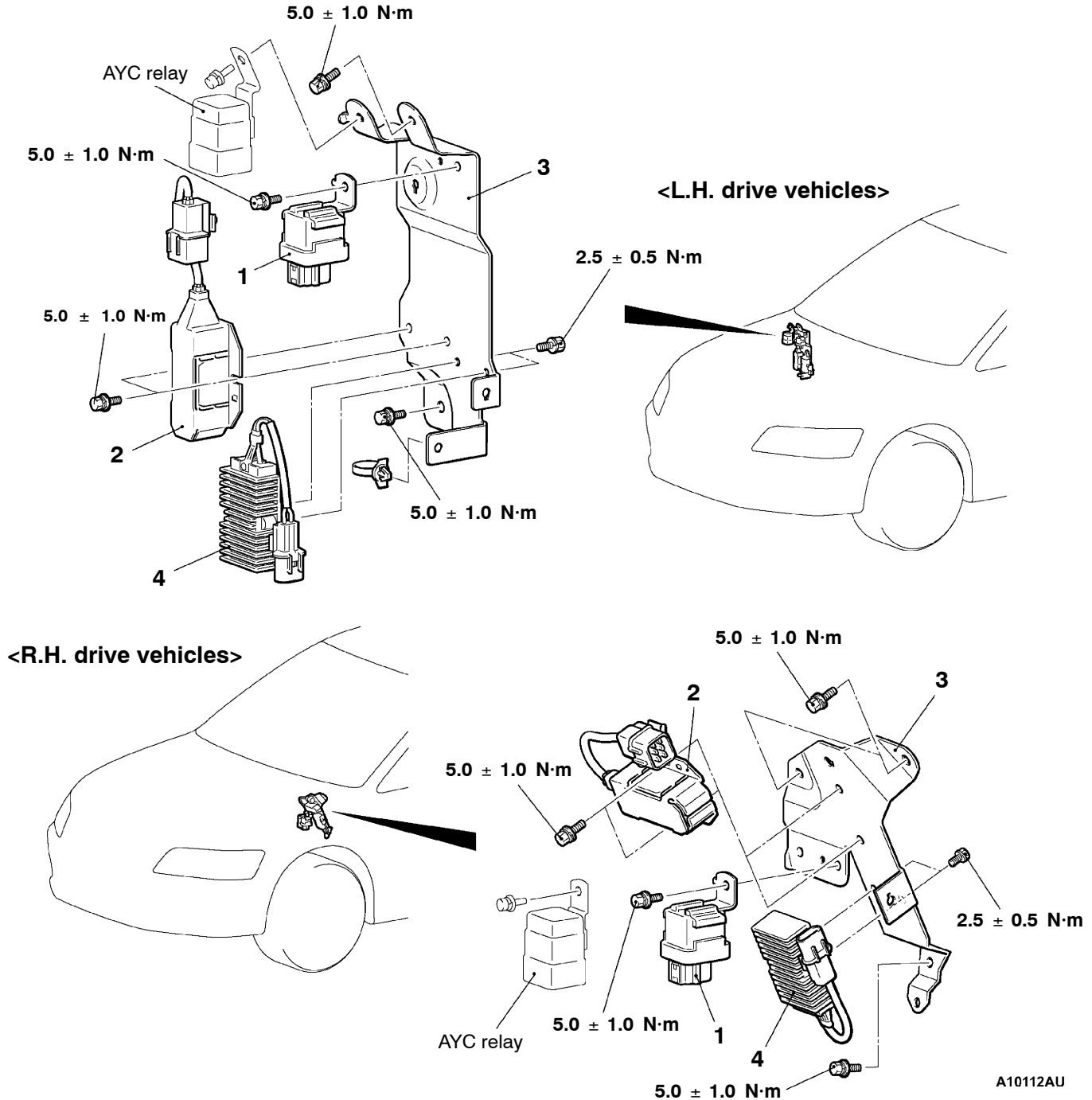
3. After installing the Throttle position sensor, check that the output voltage is at the standard value. If deviated from the standard value, loosen the screw, readjust to the standard position, and then fix. Repeat this step until the output voltage is at the standard value.
4. Connect a circuit tester across terminal No. 1 (Throttle position sensor power) and terminal No. 2 (Throttle position sensor output). Check that the resistance changes smoothly when the throttle valve is slowly moved to the fully opened position.

ENGINE CONTROL RESISTOR, RELAY

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Strut Tower Bar Removal and Installation (Refer to GROUP 42.)
- Harness Connector Connection



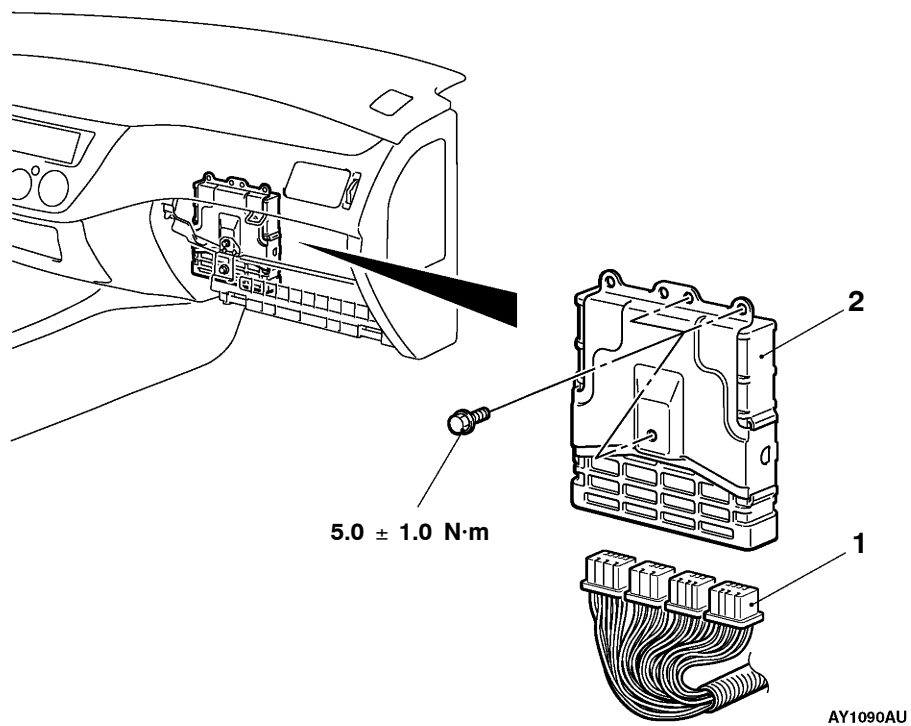
Removal steps

- AYC relay
- 1. Fuel pump relay
- 2. Injector resistor
- 3. Bracket
- 4. Fuel pump resistor

ENGINE-ECU

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations
Glove Box Assembly Removal and Installation (Refer to GROUP 52A - Instrument Panel.)



Removal steps

1. Engine-ECU connector
2. Engine-ECU

NOTES

FUEL SUPPLY

CONTENTS

GENERAL INFORMATION	2	FUEL TANK	3
ON-VEHICLE SERVICE	2		



GENERAL INFORMATION

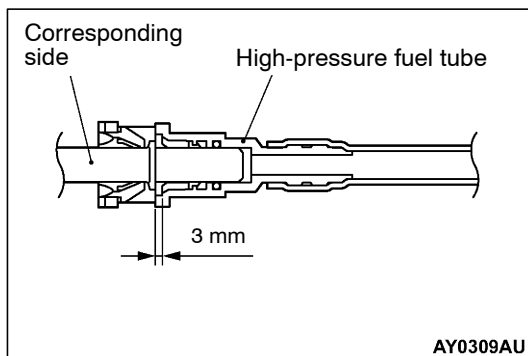
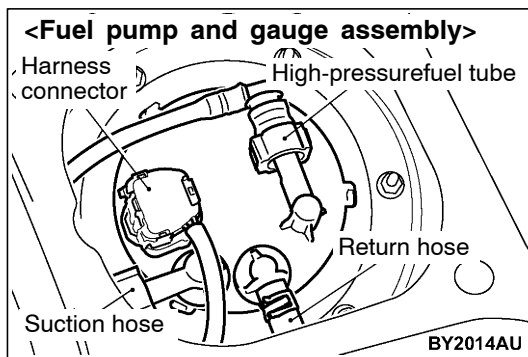
- The steel fuel tank is located under the floor of the rear seats to provide increased safety and increase the amount of luggage compartment space.
- The fuel tank has been equipped with a valve assembly which incorporates a fuel cut-off valve to prevent fuel from leaking out in the event of a collision for adjusting the pressure inside the fuel tank.
- The fuel pump module contains a fuel pump, fuel filter, and fuel pressure regulator.

ON-VEHICLE SERVICE

FUEL PUMP AND GAUGE ASSEMBLY (FUEL PUMP)

1. FUEL PUMP OPERATION CHECK

Refer to GROUP 13A - On-vehicle service



2. FUEL PUMP REPLACEMENT

- (1) Remove the rear seat cushion assembly. (Refer to GROUP 52A.)
- (2) Remove the service hole cover.
- (3) Disconnect the harness connector, high-pressure fuel tube, suction hose and return hose.
- (4) Unscrew the mounting nuts to remove the fuel pump and gauge assembly.
- (5) Replace the fuel pump. (Refer to P.13B-7.)
- (6) Install the fuel pump and gauge assembly. Tighten the mounting nuts to the specified torque.

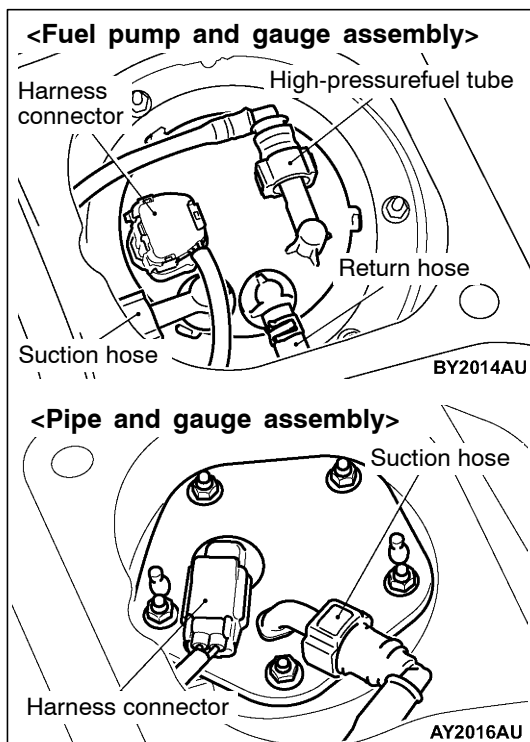
Specified torque: 2.5 ± 0.5 N·m

- (7) Connect the harness connector, high-pressure fuel tube, suction hose, and return hose.

Caution

- 1) Snap the high-pressure fuel hose or suction hose one-touch joint into place, then pull back slightly on the hose to assure it is securely fitted. However, the connection should have a play of approx. 3 mm.
- 2) Insert the return hose for 20 - 30 mm for connection.

- (8) Install the service hole cover.
- (9) Install the rear seat cushion assembly. (Refer to GROUP 52A.)



FUEL PUMP AND GAUGE ASSEMBLY, PIPE AND GAUGE ASSEMBLY (FUEL GAUGE UNIT)

1. Remove the rear seat cushion assembly. (Refer to GROUP 52A.)
2. Remove the service hole cover.
3. Disconnect the harness connector, high-pressure fuel tube, suction hose, and return hose.
4. Unscrew the mounting nuts to remove the fuel pump and gauge assembly or pipe and gauge assembly.
5. Fuel gauge unit check. (Refer to GROUP 54 - Combination Meter.)

NOTE

If the inspection shows that the basic resistance and the height of float are out of the standard value, replace the gauge unit.

(Refer to P.13B-8.)

6. Install the fuel pump and gauge assembly or pipe and gauge assembly. Tighten the mounting nuts to the specified torque.

Specified torque: 2.5 ± 0.5 N·m

7. Connect the harness connector, high-pressure fuel tube, suction hose, and return hose.

Caution

- (1) Snap the high-pressure fuel hose or suction hose one-touch joint into place, then pull back slightly on the hose to assure it is securely fitted. However, the connection should have a play of approx. 3 mm.
 - (2) Insert the return hose for 20 - 30 mm for connection.
8. Install the rear seat cushion assembly. (Refer to GROUP 52A.)

FUEL TANK

REMOVAL AND INSTALLATION

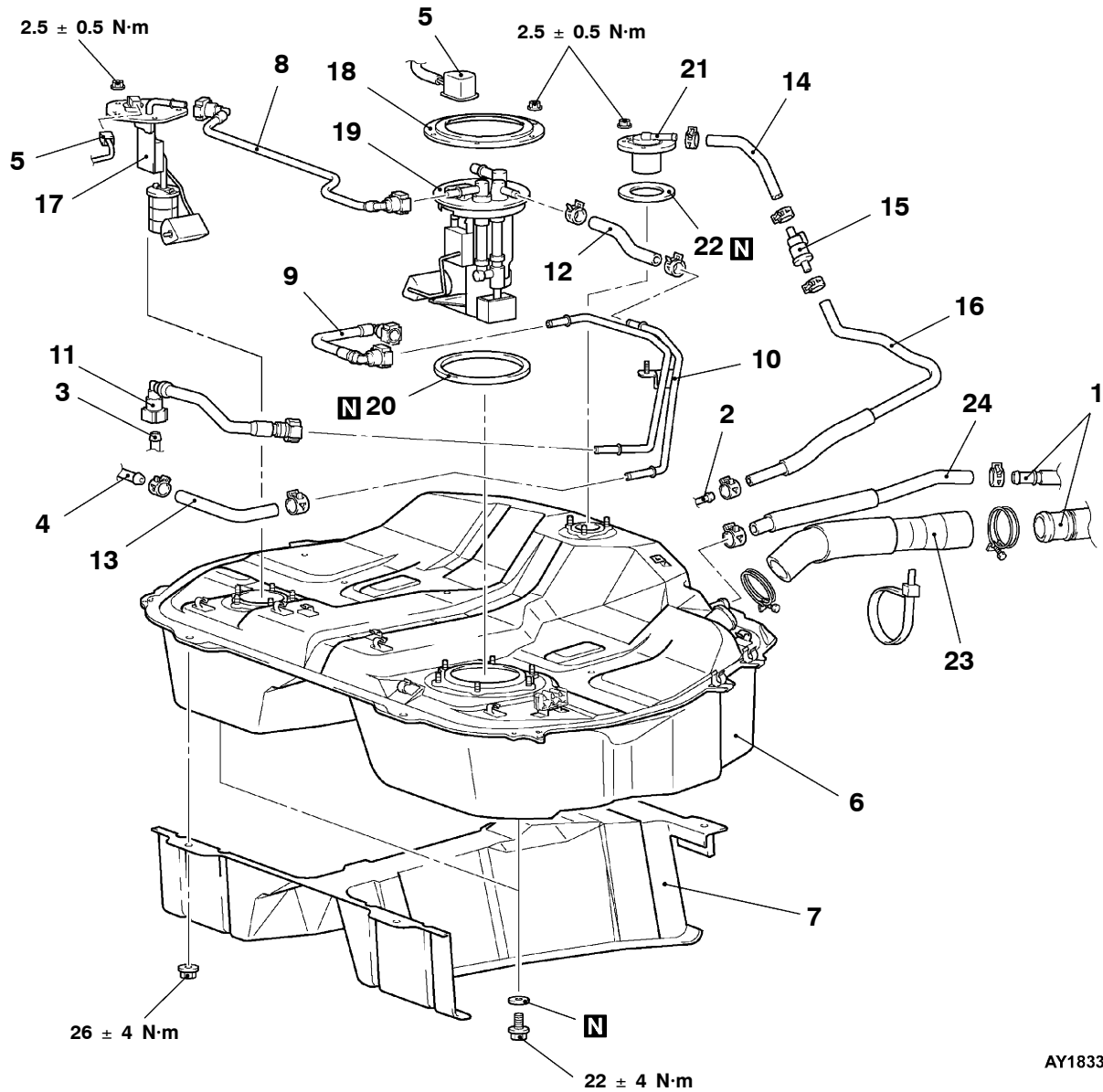
Pre-removal Operation

- Draining Fuel
- Fuel Pump Connector Disconnection (How To Reduce Fuel Pressure) (Refer to GROUP 13A - On-vehicle Service.)
- Center Exhaust Pipe Removal (Refer to GROUP 15.)

Post-installation Operation

- Center Exhaust Pipe Removal (Refer to GROUP 15.)
- Refilling Fuel
- Checking for Fuel Leaks

<Fuel tank assembly>



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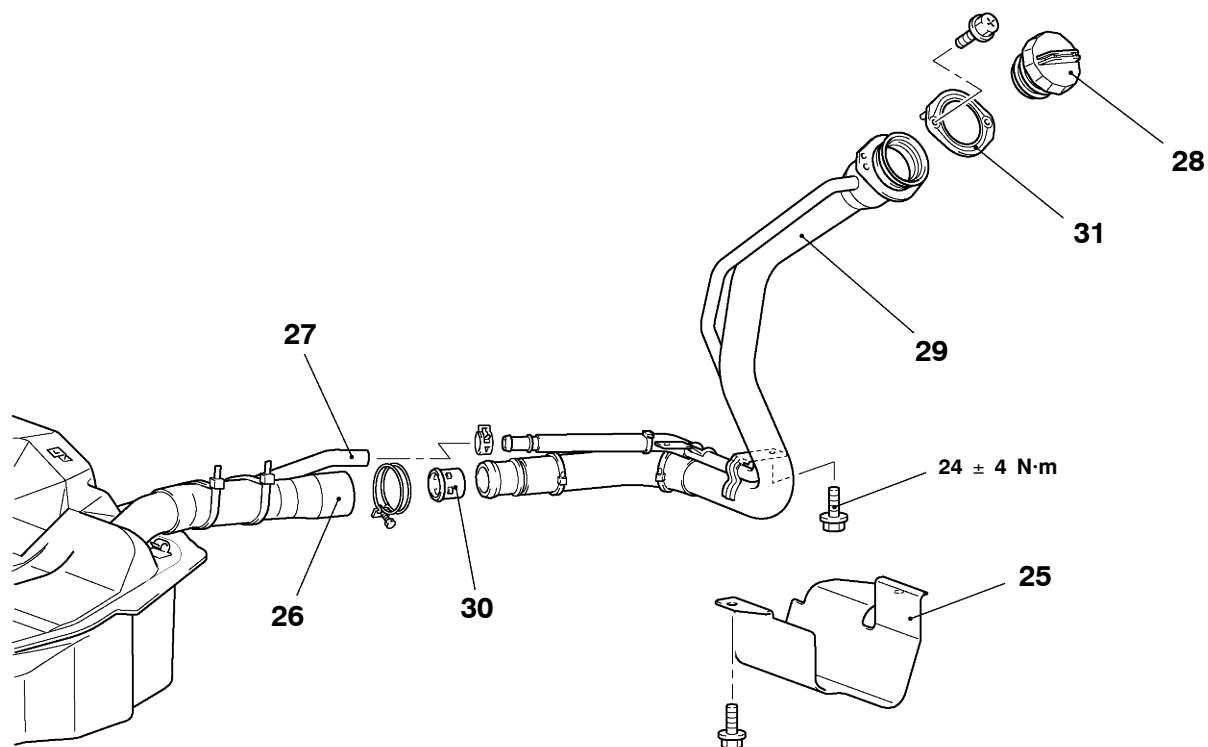
Removal steps <Fuel tank assembly>

1. Filler neck pipe, Filler neck vapour pipe connection
2. Vapour pipe connection
3. Main pipe connection
4. Return pipe connection
- Parking brake cable clamp (LH) connection (Refer to GROUP 36.)
- Rear wheel speed sensor (RH) connection (Refer to GROUP 35 - Wheel speed sensor.)
- Rear wheel speed sensor harness connector connection (Refer to GROUP 35 - Wheel speed sensor.)
5. Harness connector connection
6. Fuel tank assembly
7. Fuel tank protector

- | | |
|-----|----------------------------------|
| ▶A◀ | 8. Suction hose |
| ▶A◀ | 9. High-pressure fuel hose |
| | 10. Fuel tank pipe assembly |
| ▶A◀ | 11. High-pressure fuel hose |
| ▶B◀ | 12. Fuel tank return hose |
| | 13. Return hose |
| | 14. Fuel tank vapour hose |
| | 15. Check valve |
| | 16. Vapour hose |
| | 17. Pipe and gauge assembly |
| | 18. Plate |
| | 19. Fuel pump and gauge assembly |
| | 20. Parking |
| | 21. Fuel cut off valve assembly |
| | 22. Parking |
| | 23. Filler neck hose |
| | 24. Filler neck vapour hose |

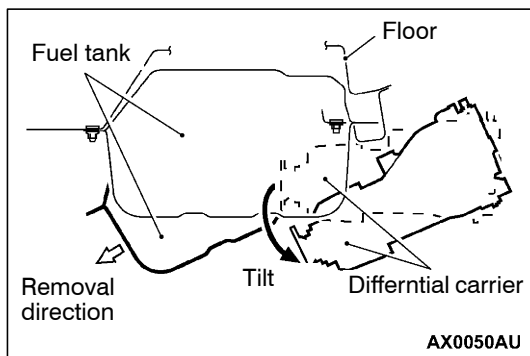


<Fuel filler neck assembly>



Removal steps <Filler neck assembly>

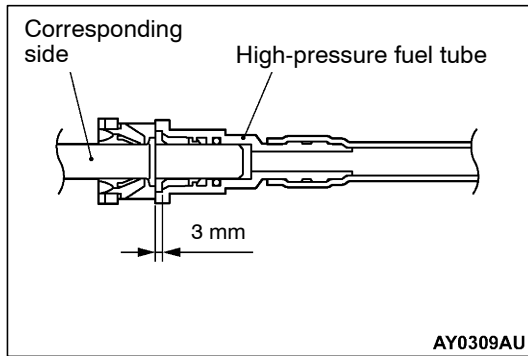
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|--|-------------------------------|
| 25. Filler neck protector | 29. Fuel filler neck assembly |
| 26. Filler neck hose connection | 30. Fuel shut-off valve |
| 27. Filler neck vapour hose connection | 31. Parking |
| 28. Fuel filler cap | |



REMOVAL SERVICE POINT

◀A▶ HARNESS CONNECTOR CONNECTION/FUEL TANK ASSEMBLY DISCONNECTION

1. Remove the differential support member and tilt the differential carrier.
(Refer to GROUP 27B.)
2. Hold the fuel tank with a transmission jack and remove the nut connected to the fuel tank.
3. Tilt the fuel tank to allow access with a hand and disconnect the harness connector.
4. Remove the fuel tank in the tilting direction to avoid contact with the differential carrier.



INSTALLATION SERVICE POINT

▶A◀ HIGH-PRESSURE FUEL HOSE/SUCTION HOSE INSTALLATION

Caution

Snap the high-pressure fuel hose or suction hose one-touch joint into place, then pull back slightly on the hose to assure it is securely fitted. However, the connection should have a play of approx. 3 mm.

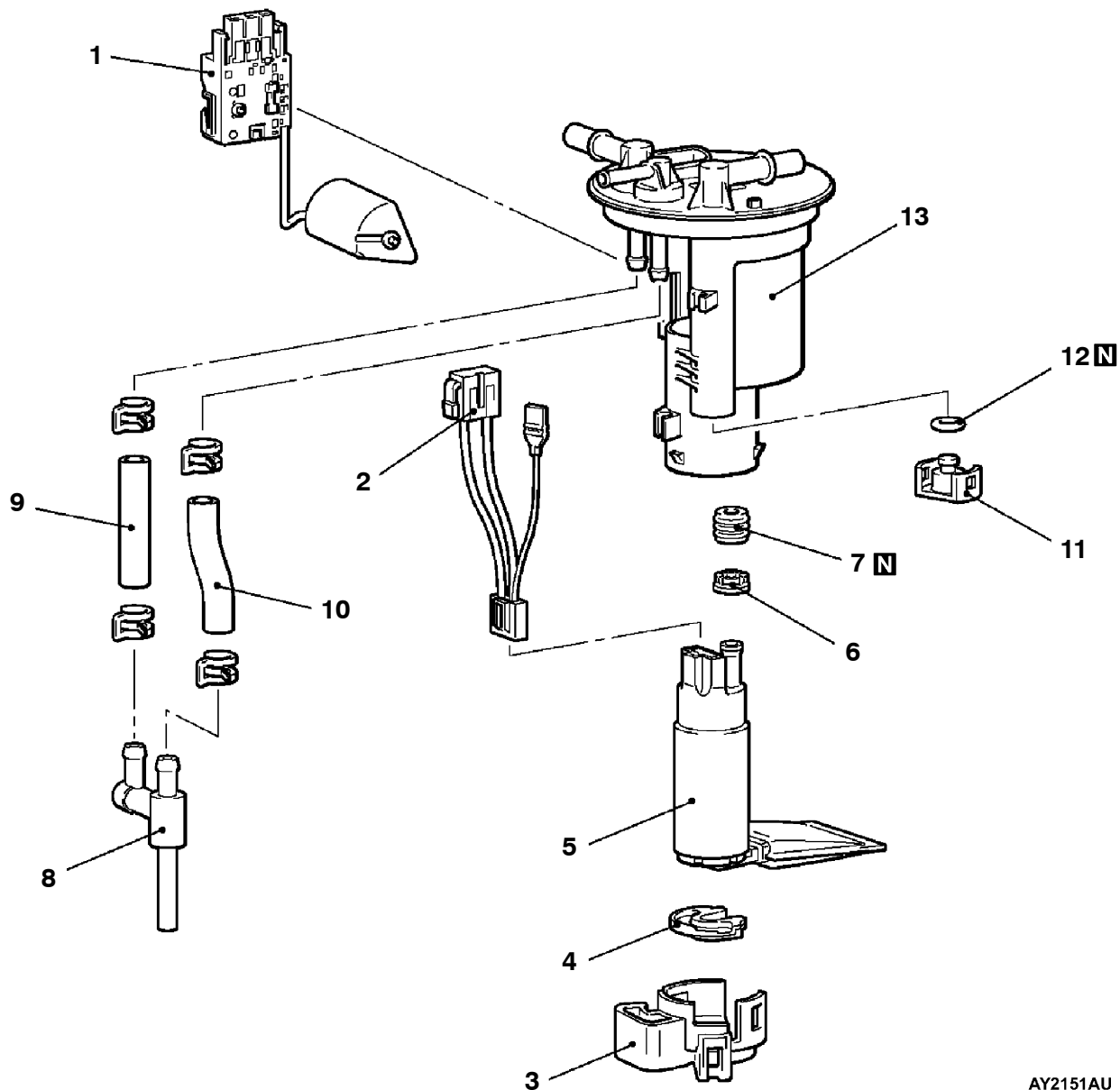
▶B◀ FUEL TANK RETURN HOSE INSTALLATION

Caution

Insert the return hose for 20 - 30 mm for connection.

DISASSEMBLY AND REASSEMBLY

<FUEL PUMP AND GAUGE ASSEMBLY>



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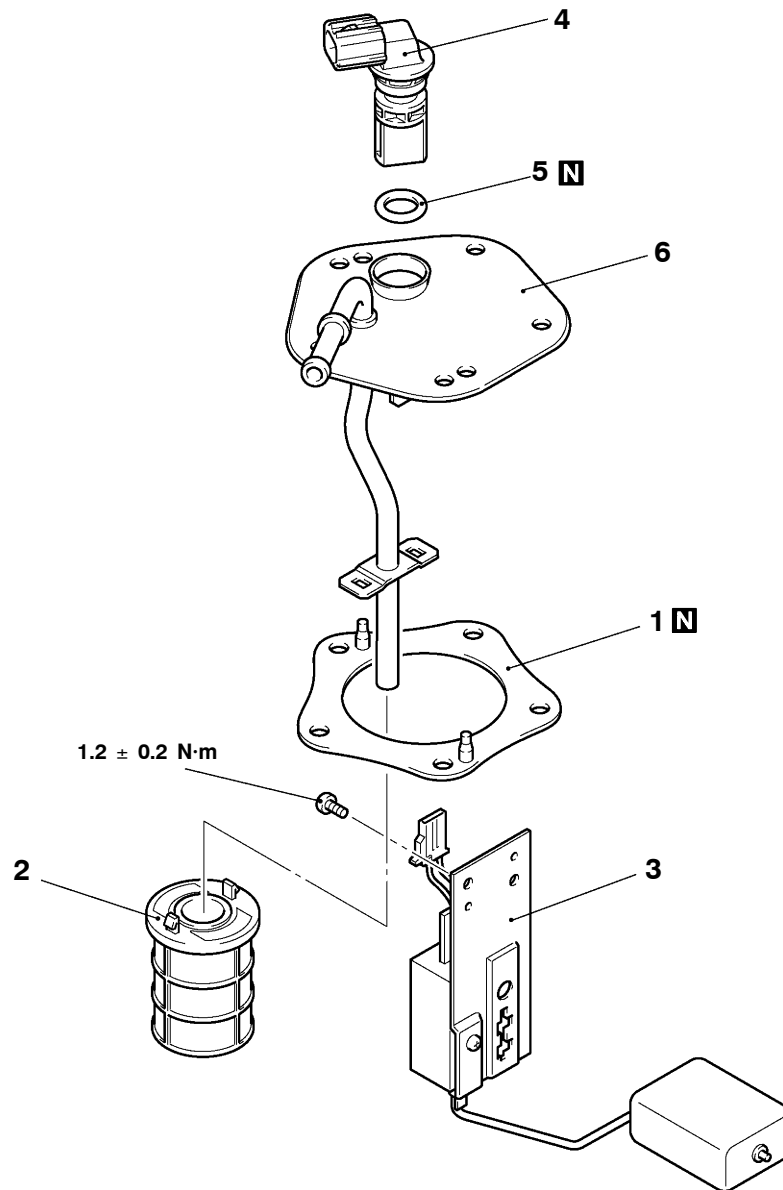
Removal steps

1. Fuel gauge unit
2. Gauge harness
3. Bracket
4. Fuel pump cushion
5. Fuel pump
6. Spacer
7. Grommet



8. Assist pump
9. Fuel suction hose
10. Fuel return hose
11. Cap
12. O-ring
13. Fuel filter assembly

<PIPE AND GAUGE ASSEMBLY>



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Removal steps

1. Packing
2. Filter
3. Gauge unit

- ▶A◀
4. Connector
 5. O-ring
 6. Pipe assembly

INSTALLATION SERVICE POINT**▶A◀ O-RING/GROMMET INSTALLATION**

Apply a fuel to O-ring and grommet before installing them, to prevent them from being damaged or twisted.

ENGINE COOLING

CONTENTS

GENERAL INFORMATION	2	Engine Coolant Replacement	6
SERVICE SPECIFICATIONS	2	Concentration Measurement	7
LUBRICANT	2	Radiator Fan Relay Continuity Check	8
SEALANT	2	Radiator Fan Controller Check	8
SPECIAL TOOLS	3	Radiator Fan Motor Check	10
TROUBLESHOOTING	3	THERMOSTAT	11
ON-VEHICLE SERVICE	6	WATER PUMP	13
Engine Coolant Leak Checking	6	WATER HOSE AND WATER PIPE	14
Radiator Cap Opening Pressure Check	6	RADIATOR	15

GENERAL INFORMATION

The cooling system is designed to keep every part of the engine at appropriate temperature in whatever condition the engine may be operated. The cooling method is of the water-cooled, pressure forced circulation type in which the water pump pressurizes coolant and circulates it throughout the engine. If the coolant temperature exceeds the prescribed temperature, the thermostat opens to circulate the coolant through the radiator as well so that the heat absorbed by the coolant may be radiated into the air.

The water pump is of the centrifugal type and is driven by the drive belt from the crankshaft. The radiator is the corrugated fin, down flow type. The cooling fan is controlled by the radiator fan controller and engine-ECU depend on driving conditions.

Item	Specification
Radiator performance kJ/h	216,700

SERVICE SPECIFICATIONS

Items	Standard value	Limit
Radiator cap opening pressure kPa	93 - 123	83
Range of coolant antifreeze concentration of radiator %	30 - 60	-
Thermostat	Valve opening temperature of thermostat °C	80 ± 1.5
	Full-opening temperature of thermostat °C	93
	Valve lift (at 93°C) mm	9.5 or more

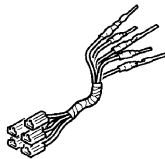
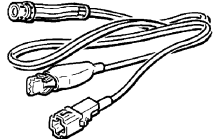
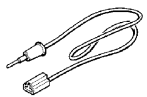

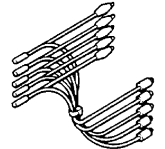
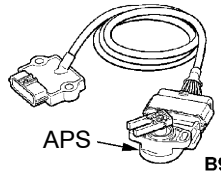
LUBRICANT

Item	Specified coolant	Quantity L
Engine coolant (including reserve tank)	MITSUBISHI GENUINE COOLANT or equivalent	6.0

SEALANT

Item	Specified sealant	Remark
Cylinder block drain plug	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

SPECIAL TOOLS

Tool	Number	Name	Use
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>C991223</p>	<p>MB991223</p> <p>A: MB991219</p> <p>B: MB991220</p> <p>C: MB991221</p> <p>D: MB991222</p>	<p>Harness set</p> <p>A: Test harness</p> <p>B: LED harness</p> <p>C: LED harness adapter</p> <p>D: Probe</p>	<ul style="list-style-type: none"> ● Measurement of terminal voltage ● Inspection of radiator fan controller <p>A: Connector pin contact pressure inspection</p> <p>B: Power circuit inspection</p> <p>C: Power circuit inspection</p> <p>D: Commercial tester connection</p>
 <p>B991658</p>	MB991658	Test harness	Inspection of radiator fan controller
 <p>APS</p> <p>B991791</p>	MB991791	Throttle controller	Inspection of radiator fan controller [Use the accelerator pedal position sensor disconnected from harness.]

TROUBLESHOOTING

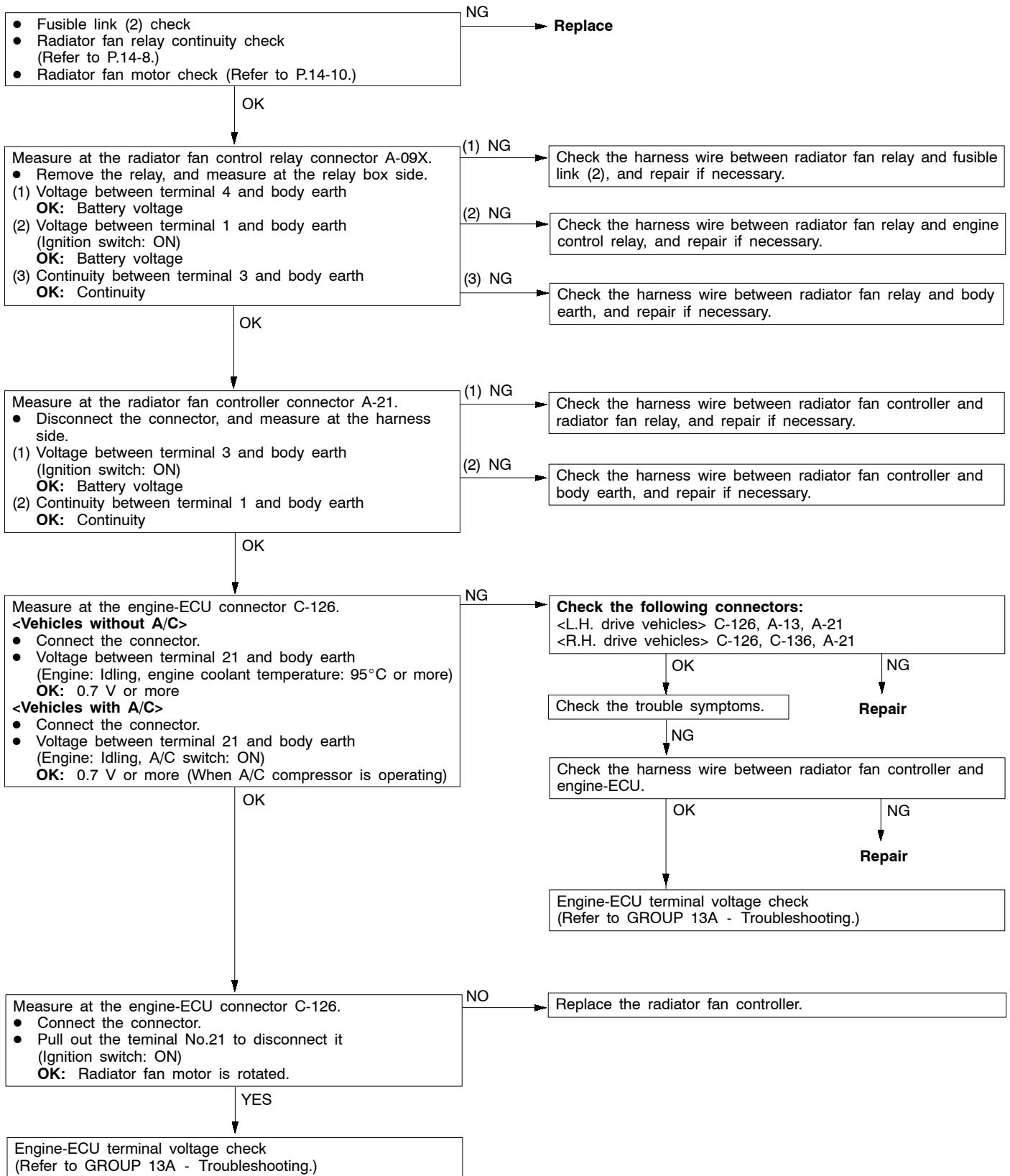
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptoms	Inspection procedure No.	Reference page
Radiator fan does not operate.	1	14-3
Radiator fan does not change speed or stop.	2	14-5

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

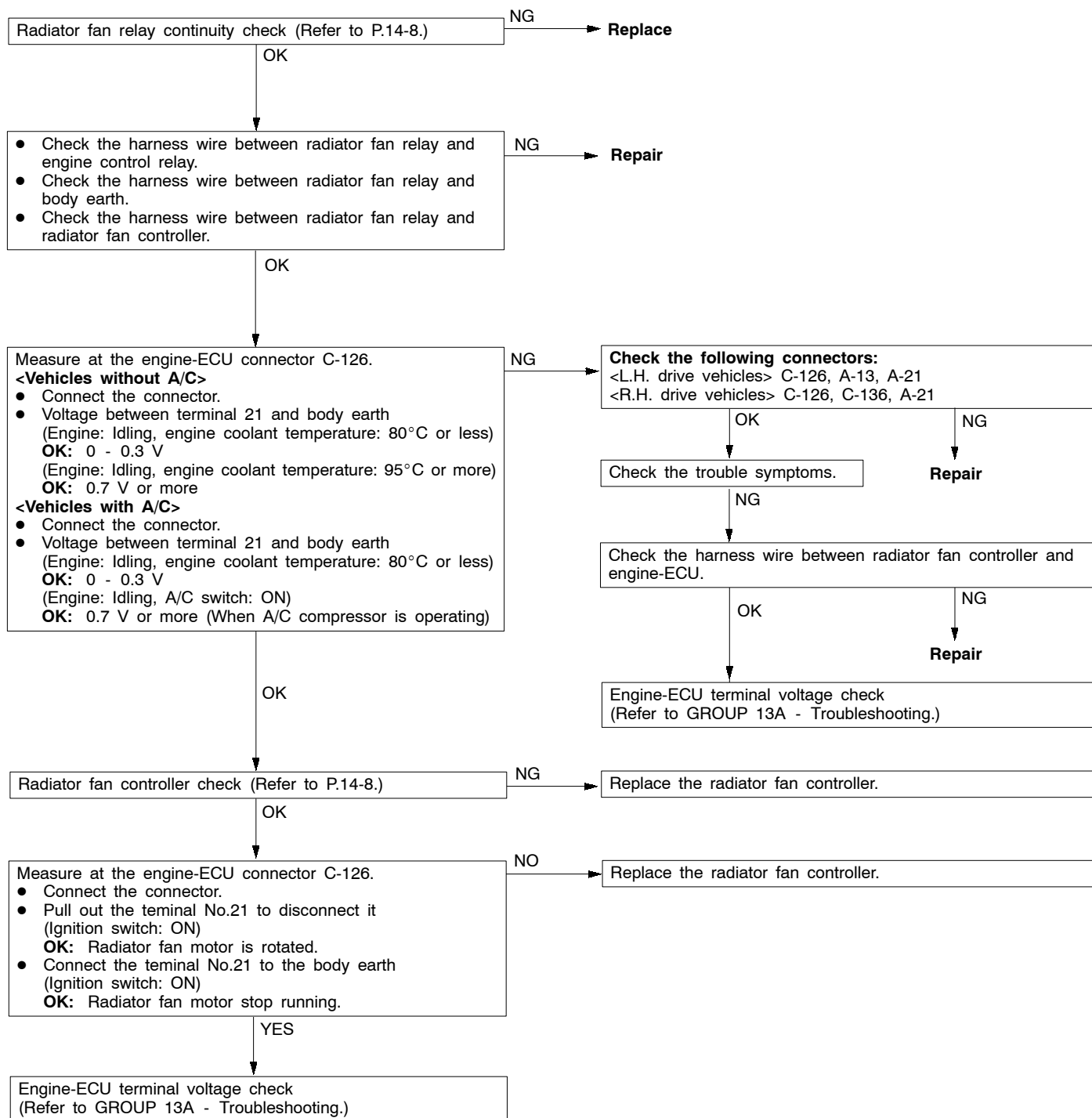
Inspection Procedure 1

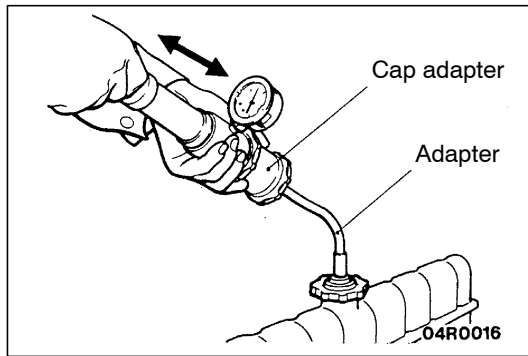
Radiator fan does not operate.	Probable cause
<p>Failure may occur on the power supply of the radiator fan controller and the earth circuit.</p> <p>Failure may also occur on the radiator fan controller and engine-ECU.</p>	<ul style="list-style-type: none"> ● Malfunction of fusible link ● Malfunction of radiator fan relay ● Malfunction of radiator fan controller ● Malfunction of radiator fan motor ● Malfunction of engine-ECU ● Malfunction of harness, connector



Inspection Procedure 2

Radiator fan does not change speed or stop.	Probable cause
Radiator fan controller uses the signal from engine-ECU to control radiator fan motor in a continuously variable mode.	<ul style="list-style-type: none"> ● Malfunction of radiator fan relay ● Malfunction of radiator fan controller ● Malfunction of engine-ECU ● Malfunction of harness, connector





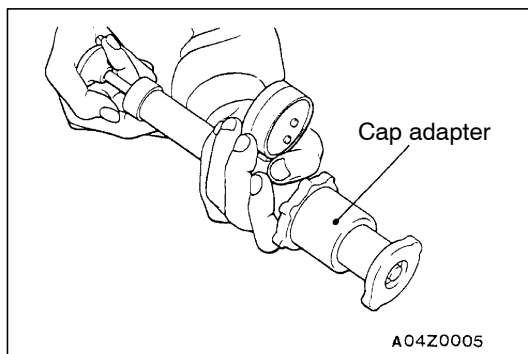
ON-VEHICLE SERVICE

ENGINE COOLANT LEAK CHECKING

1. Confirm that the coolant level is up to the filler neck. Install a radiator cap tester and apply 160 kPa pressure, and then check for leakage from the radiator hose or connections.

Caution

- (1) **Be sure to completely clean away any moisture from the places checked.**
 - (2) **When the tester is taken out, be careful not to spill any coolant from it.**
 - (3) **Be careful, when installing and removing the tester and when testing, not to deform the filler neck of the radiator.**
2. If there is leakage, repair or replace the appropriate part.



RADIATOR CAP OPENING PRESSURE CHECK

1. Use a cap adapter to attach the cap to the tester.
2. Increase the pressure until the indicator of the gauge stops moving.

Limit: 83 kPa

Standard value: 93 - 123 kPa

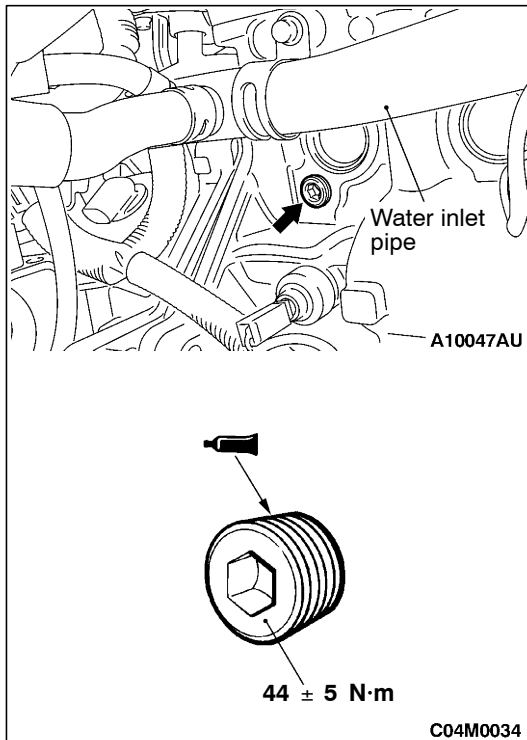
3. Replace the radiator cap if the reading does not remain at or above the limit.

NOTE

Be sure that the cap is clean before testing, since rust or other foreign material on the cap seal will cause an improper indication.

ENGINE COOLANT REPLACEMENT

1. Remove the under cover.
(Refer to GROUP 51 - Front Bumper.)
2. Drain the engine coolant by removing the drain plug and then the radiator cap.



3. Remove the cylinder block drain plug from the cylinder block to drain the engine coolant.
4. Remove the reserve tank to drain the engine coolant.
5. When the engine coolant has drained, pour in water from the radiator cap to clean the engine coolant line.
6. Coat the thread of the cylinder block drain plug with the specified sealant and tighten to the specified torque.

Specified sealant:

3M Nut Locking Part No. 4171 or equivalent

7. Securely tighten the radiator drain plug.
8. Install the under cover.
(Refer to GROUP 51 - Front Bumper.)
9. Install the reserve tank.
10. Slowly pour the engine coolant into the mouth of the radiator until the radiator is full, and pour also into the reserve tank up to the FULL line.

Recommended anti-freeze:

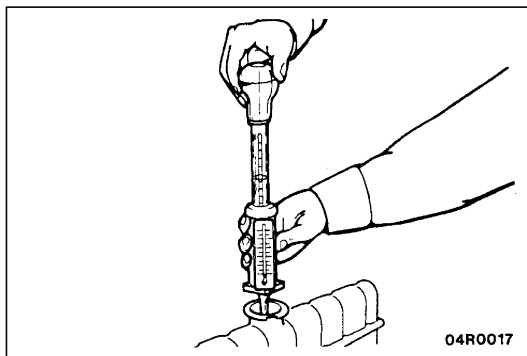
MITSUBISHI GENUINE COOLANT or equivalent

Quantity: 6.0 L

Caution

Do not use alcohol or methanol anti-freeze or any engine coolants mixed with alcohol or methanol anti-freeze. The use of an improper anti-freeze can cause the corrosion of the aluminium components.

11. Install the radiator cap securely.
12. Start the engine and warm the engine until the thermostat opens. (Touch the radiator hose with your hand to check that warm water is flowing.)
13. After the thermostat opens, race the engine several times, and then stop the engine.
14. Cool down the engine, and then pour engine coolant into the reserve tank until the level reaches the FULL line. If the level is low, repeat the operation from step 11.



CONCENTRATION MEASUREMENT

Measure the temperature and specific gravity of the engine coolant to check the antifreeze concentration.

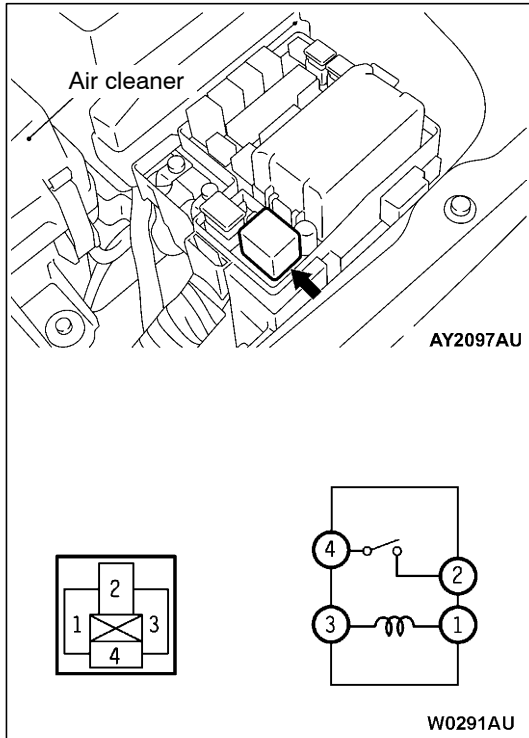
Standard value: 30 - 60 % (allowable concentration range)

RECOMMENDED ANTI-FREEZE

Antifreeze	Allowable concentration
MITSUBISHI GENUINE COOLANT or equivalent	30 - 60 %

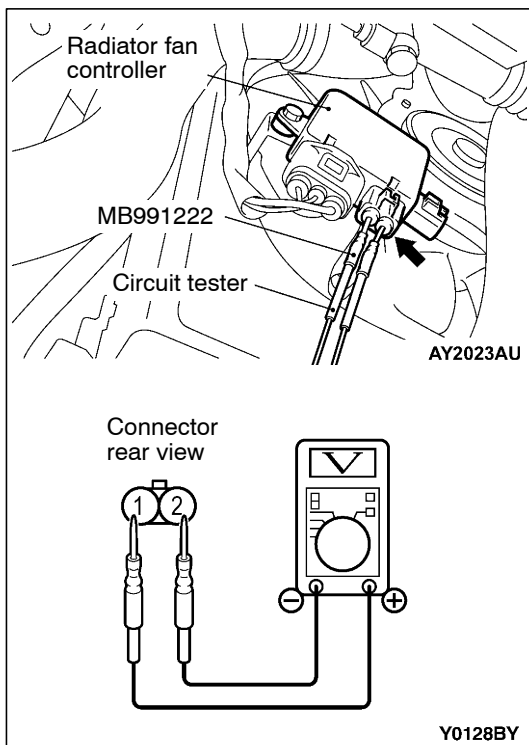
Caution

If the concentration of the anti-freeze is below 30 %, the anti-corrosion property will be adversely affected. In addition, if the concentration is above 60 %, both the anti-freezing and engine cooling properties will decrease, affecting the engine adversely. For these reasons, be sure to maintain the concentration level within the specified range.



RADIATOR FAN RELAY CONTINUITY CHECK

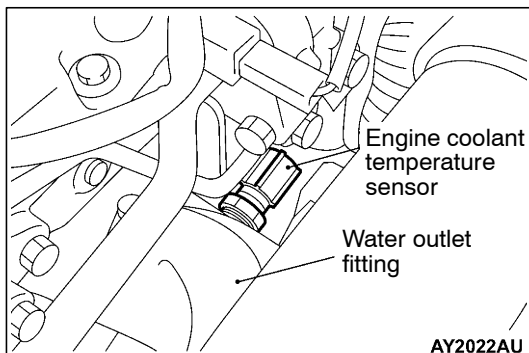
Battery voltage	Terminal No.			
	1	2	3	4
When current is not supplied	○	—	○	
When current is supplied	⊕	○	⊖	○



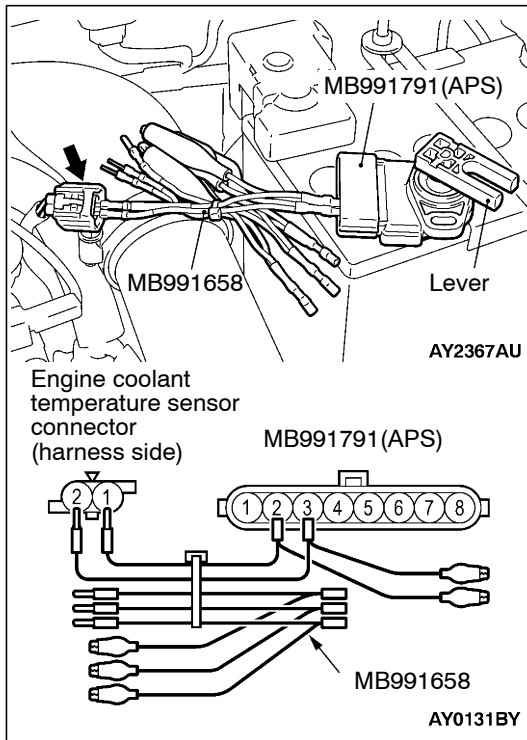
RADIATOR FAN CONTROLLER CHECK

<Vehicles without A/C>

1. Remove the center under cover.
(Refer to GROUP 51 - Front Bumper.)
2. Insert the special tool at the back of the radiator fan motor connector.
3. Connect the special tool to the circuit tester.



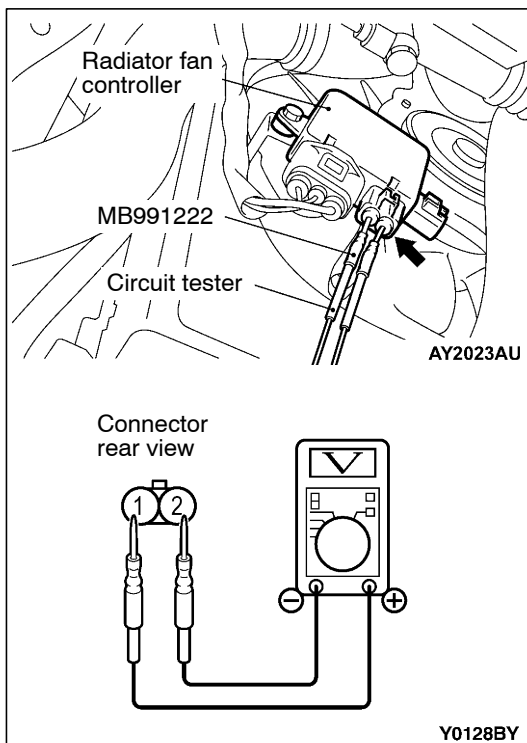
4. Disconnect the engine coolant temperature sensor connector.



5. Connect the special tool (MB991658) to the harness side of the engine coolant temperature sensor connector.
6. Connect the special tool [MB991791 (APS)] to the special tool (MB991658).
7. Start the engine and let it run at idle.

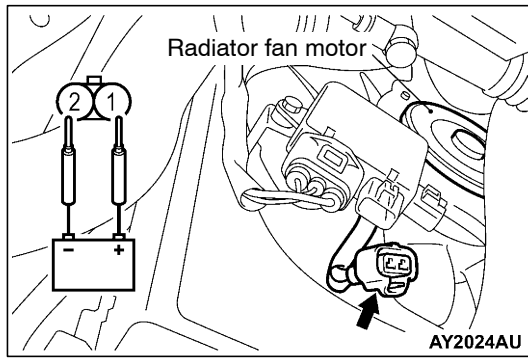
NOTE

Since the resistance value of the special tool (APS) indicates a low engine coolant temperature, engine speed increases.
8. When the lever of the special tool (APS) is turned to the end, check that the engine speed decreases and the radiator fan motor rotates.
9. When the lever of the special tool (APS) is turned to the reverse direction, check that the voltage between terminals of the radiator fan motor connector gradually decreases from the battery voltage to 0 V.
10. If inoperable, replace the radiator fan controller. (Refer to P.14-15.)
11. Install the center under cover. (Refer to GROUP 51 - Front Bumper.)
12. Connect the engine coolant temperature sensor connector.



<Vehicles with A/C>

1. Remove the center under cover. (Refer to GROUP 51 - Front Bumper.)
2. Insert the special tool at the back of the radiator fan motor connector.
3. Connect the special tool to the circuit tester.
4. Start the engine and run it at idle.
5. Turn the A/C switch to the ON position and hold the engine coolant temperature at 80°C or lower.
6. When the voltage between the terminals of the radiator fan motor connector, the following values of (1) - (3) can be detected at random.
 - (1) 0 V
 - (2) 8.2 ± 2.6 V
 - (3) Battery voltage ± 2.6 V
7. If inoperable, replace the radiator fan controller. (Refer to P.14-15.)
8. Install the center under cover. (Refer to GROUP 51 - Front Bumper.)



RADIATOR FAN MOTOR CHECK

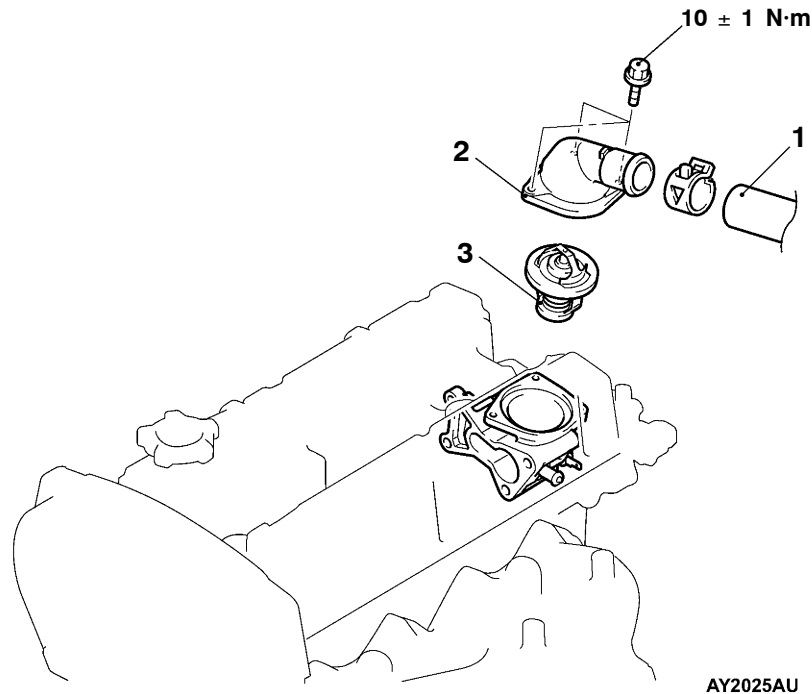
1. Remove the center under cover.
(Refer to GROUP 51 - Front Bumper.)
2. Disconnect the radiator fan motor connector.
3. Check that the motor rotates when energizing battery voltage between the terminals of connectors of the radiator fan motor side. Check that there is abnormal noise from the radiator fan motor then.
4. If inoperable, replace the radiator fan motor.
(Refer to P.14-15.)
5. Install the center under cover.
(Refer to GROUP 51 - Front Bumper.)

THERMOSTAT

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Supplying (Refer to P.14-6.)
- Air Duct Assembly Removal and Installation (Refer to GROUP 15 - Air Cleaner.)
- Vacuum Pipe, Secondary Air Pipe Assembly Removal and Installation (Refer to GROUP 15 - Secondary Air Supply System.)



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Removal steps

- ◀A▶ ▶B▶ 1. Radiator upper hose connection
 ▶A▶ 2. Water outlet fitting
 ▶A▶ 3. Thermostat

REMOVAL SERVICE POINT

◀A▶ RADIATOR UPPER HOSE DISCONNECTION

After making mating marks on the radiator hose and the hose clamp, disconnect the radiator hose.

INSTALLATION SERVICE POINTS**►A◄ THERMOSTAT INSTALLATION**

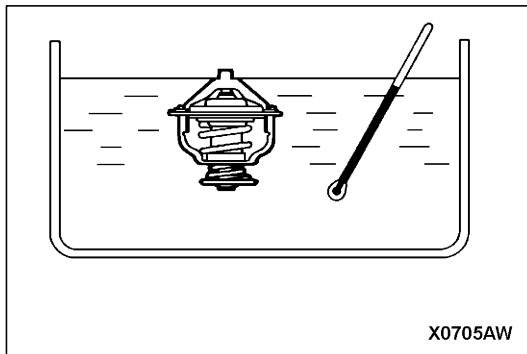
Install the thermostat being careful not to fold over or scratch the rubber ring.

Caution

Make absolutely sure that no oil is adhering to the rubber ring of the thermostat. In addition, be careful not to fold over or scratch the rubber ring when inserting. If the rubber ring is damage, replace the thermostat.

►B◄ RADIATOR UPPER HOSE CONNECTION

1. Insert each hose as far as the projection of the water outlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

**INSPECTION****THERMOSTAT CHECK**

1. Immerse the thermostat in water, and heat the water while stirring. Check the thermostat valve opening temperature.

Standard value:

Valve opening temperature: $80 \pm 1.5^{\circ}\text{C}$

2. Check that the amount of valve lift is at the standard value when the water is at the full-opening temperature.

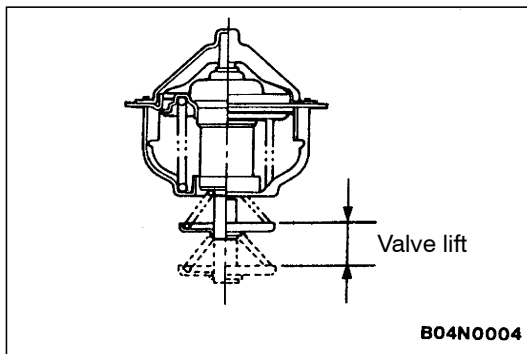
Standard value:

Full-opening temperature: 93°C

Amount of valve lift: 9.5 mm or more

NOTE

Measure the valve height when the thermostat is fully closed, and use this measurement to calculate the valve height when the thermostat is fully open.



WATER PUMP

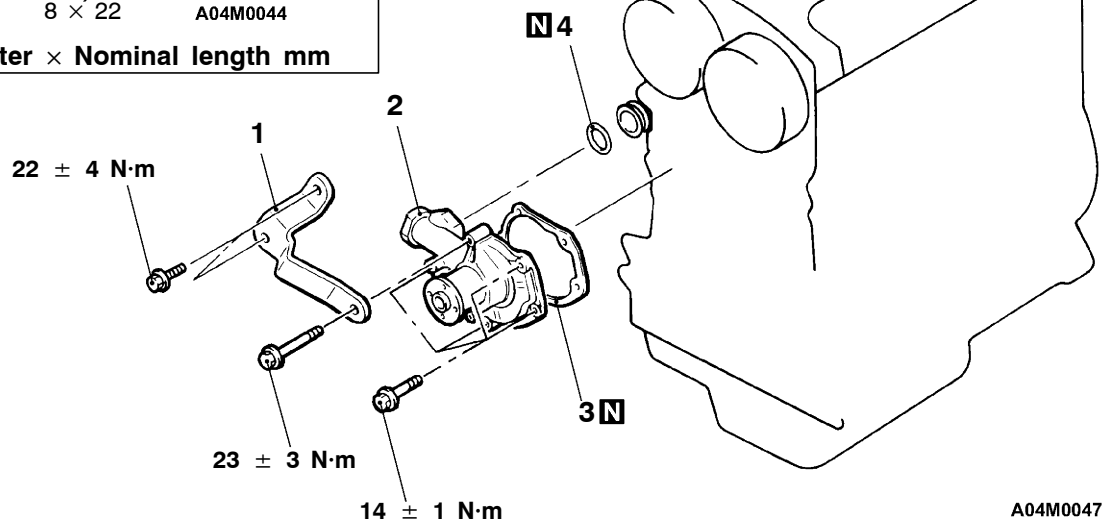
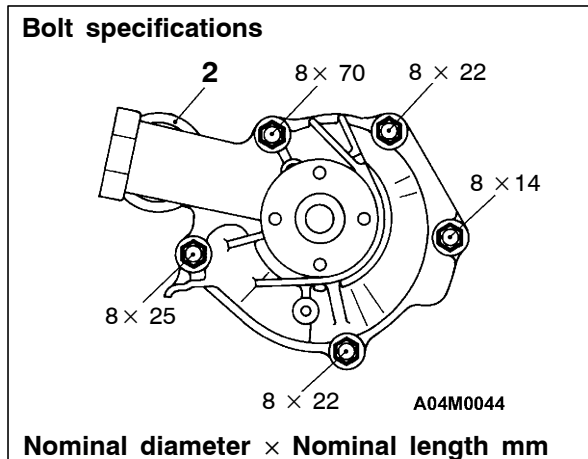
Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.

REMOVAL AND INSTALLATION

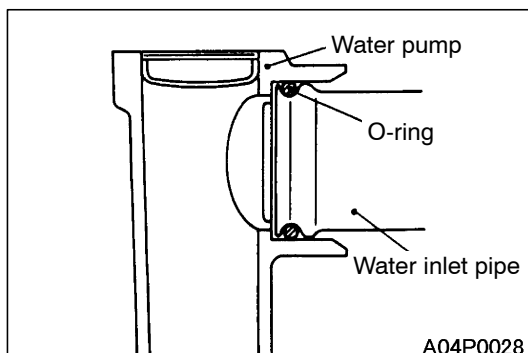
Pre-removal and Post-installation Operation

- Engine Coolant Draining and Supplying (Refer to P.14-6.)
- Timing Belt Removal and installation (Refer to GROUP 11A.)



Removal steps

1. Alternator brace
2. Water pump
3. Water pump Gasket
4. O-ring



INSTALLATION SERVICE POINT

▶◀ O-RING INSTALLATION

Fit an O-ring into the O-ring groove located at the end of the water inlet pipe and apply water to the O-ring or the inside of the mounting surface of the water pump for insertion.

CAUTION

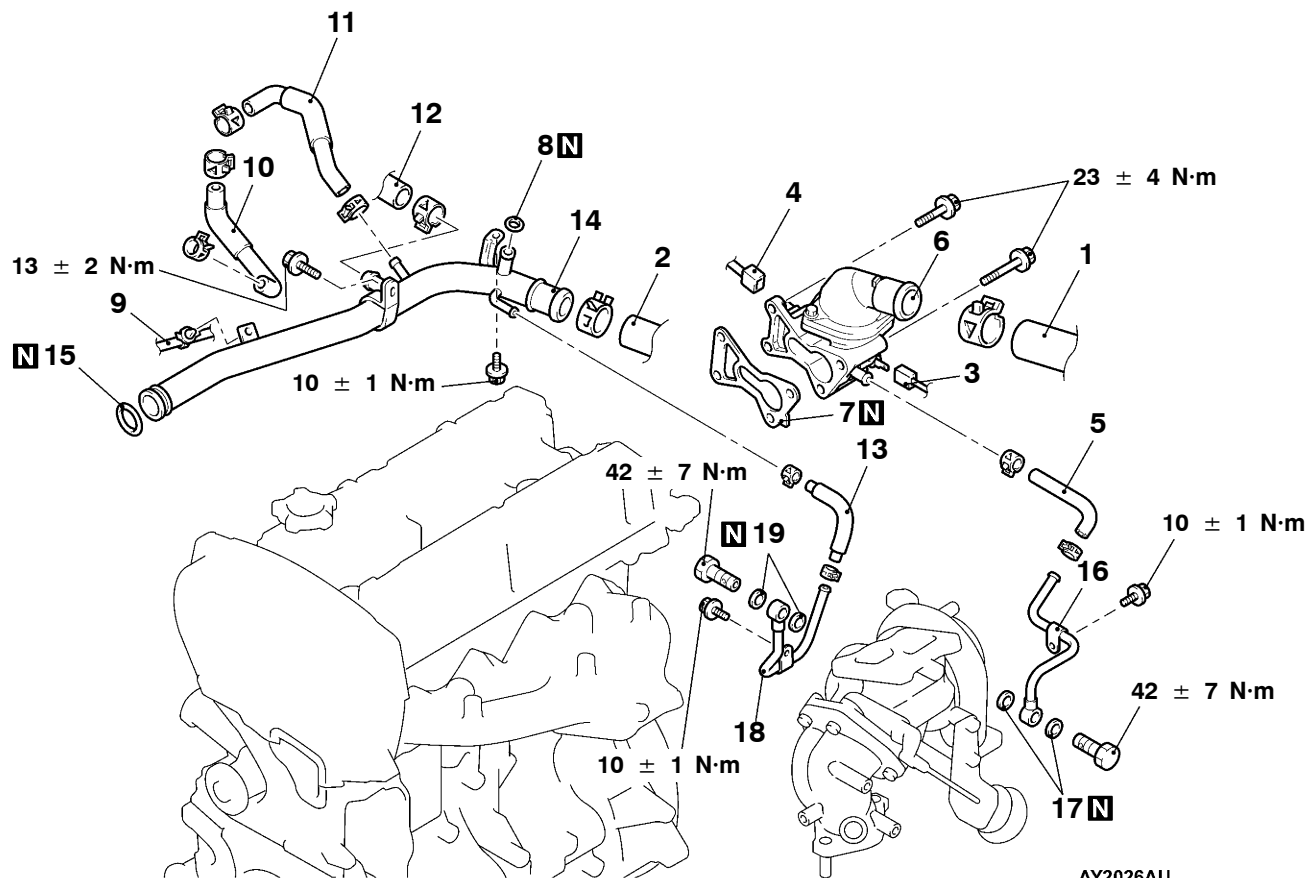
Do not let the O-ring get contaminated with grease, such as engine oil.

WATER HOSE AND WATER PIPE

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Supplying (Refer to P.14-6.)
- Air Cleaner Assembly Removal and Installation (Refer to GROUP 15 - Air Cleaner.)
- Air Bypass Valve Assembly, Air Bypass Hose, Air Hose E and Air Pipe C, Air Hose D Removal and Installation (Refer to GROUP 15 - Intercooler.)
- Secondary Air Control Valve Bracket Removal and Installation (Refer to GROUP 15 - Secondary Air Supply System.)
- Battery, Battery Tray Removal and Installation

**Removal steps**

1. Radiator upper hose connection
2. Radiator lower hose connection
3. Engine coolant temperature gauge unit connector
4. Engine coolant temperature sensor connector
5. Water hose
6. Water outlet fitting and thermostat case assembly
7. Thermostat case gasket
8. O-ring
9. Detonation sensor connection
10. Water hose

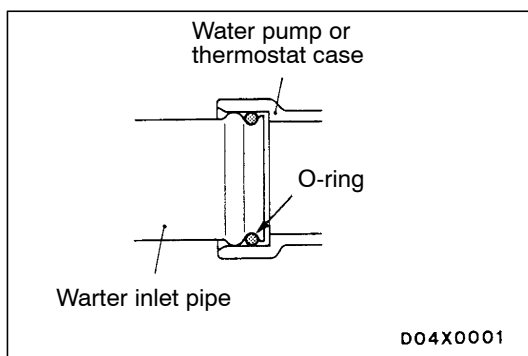


11. Water hose
12. Heater hose connection
13. Water hose
14. Water inlet pipe
15. O-ring
16. Turbocharger water feed pipe
17. Gasket
 - Turbocharger assembly (Refer to GROUP 15.)
18. Turbocharger water return pipe
19. Gasket

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REMOVAL SERVICE POINT**◀A▶ RADIATOR UPPER HOSE/RADIATOR LOWER HOSE DISCONNECTION**

After making mating marks on the hose and the hose clamp, disconnect the hose.

**INSTALLATION SERVICE POINTS****▶A◀ O-RING INSTALLATION**

Fit an O-ring into the groove of the water inlet pipe and apply water to the circumference of the O-ring or the inside of the mounting surface of the pipe for insertion.

CAUTION

Do not let the O-ring get contaminated with grease, such as engine oil.

▶B◀ WATER INLET PIPE INSTALLATION

After installing the water outlet fitting and the thermostat case assembly, tighten the mounting bolt of the water inlet pipe to the specified torque.

▶C◀ RADIATOR LOWER HOSE/RADIATOR UPPER HOSE CONNECTION

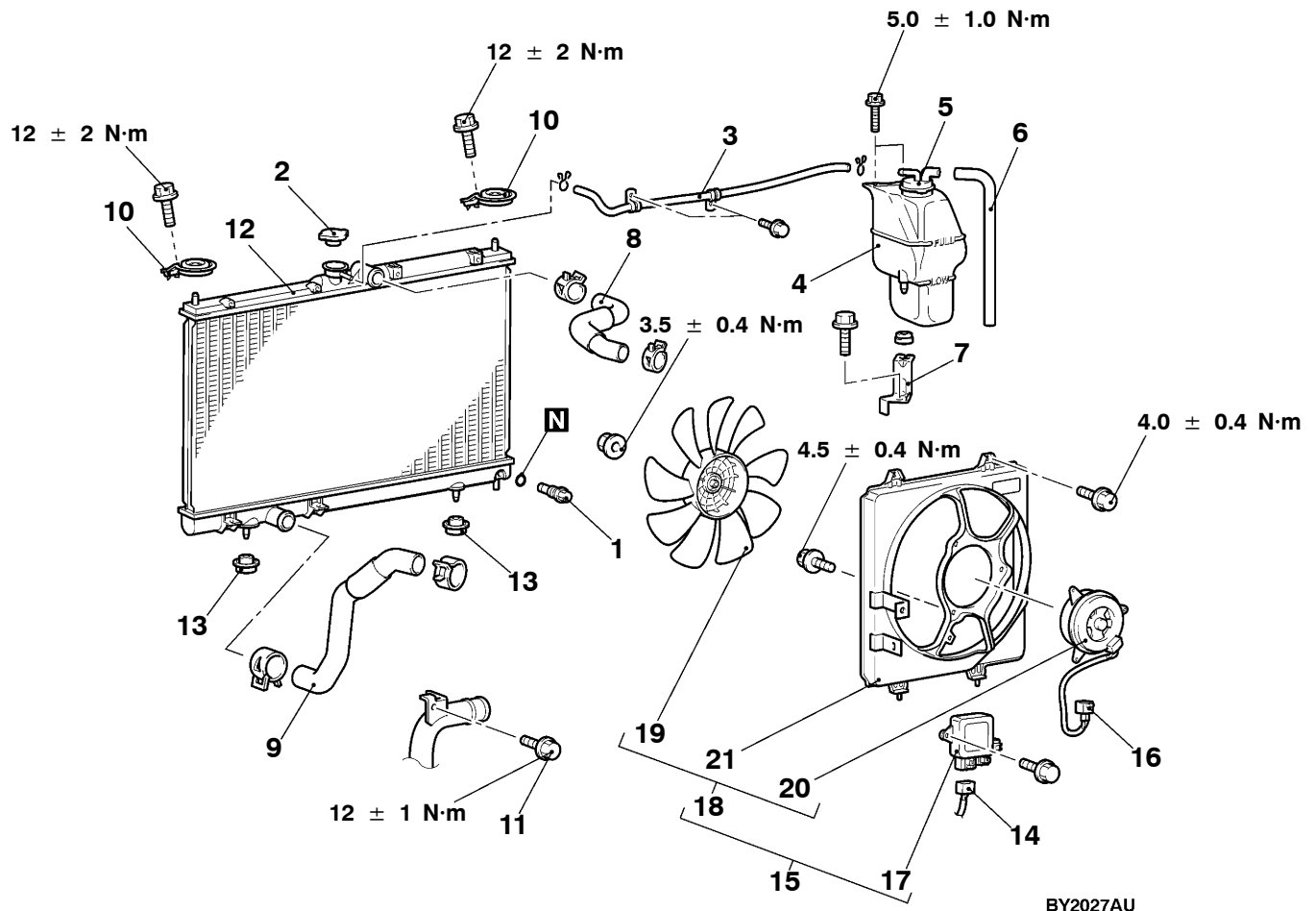
1. Insert each hose as far as the projection of the water inlet pipe or water outlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

INSPECTION**WATER PIPE AND HOSE CHECK**

Check the water pipe and hose for cracks, damage, clog and replace them if necessary.

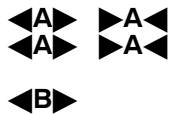
RADIATOR**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

- Engine Coolant Draining and Supplying (Refer to P.14-6.)
- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Air Cleaner Assembly Removal and Installation (Refer to GROUP 15.)
- Air Hose E, Air Pipe C, Air hose D Removal and Installation (Refer to GROUP 15 - Intercooler.)
- Battery and Battery Tray Removal and Installation



Radiator removal steps

1. Radiator drain plug
2. Radiator cap
3. Reserve tank hose
4. Reserve tank
5. Reserve tank cap
6. Reserve tank hose
7. Reserve tank bracket
8. Radiator upper hose
9. Radiator lower hose
10. Upper insulator
11. Air Pipe B mounting bolt
12. Radiator assembly
13. Lower insulator
14. Radiator fan controller connector
15. Radiator fan controller, radiator fan motor, fan and shroud assembly



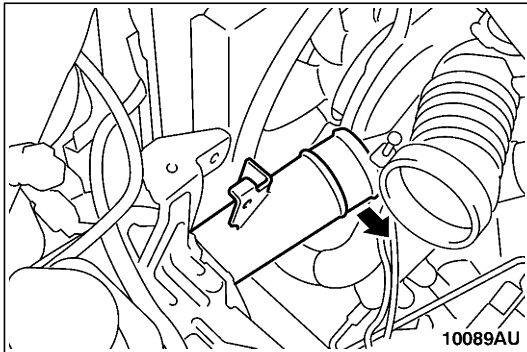
Radiator fan controller and radiator fan motor removal steps

11. Air Pipe B mounting bolt
14. Radiator fan controller connector
16. Radiator fan motor connector
17. Radiator fan controller
18. Radiator fan motor fan and shroud assembly
19. Fan
20. Radiator fan motor
21. Shroud



REMOVAL SERVICE POINTS**◀A▶ RADIATOR UPPER HOSE/RADIATOR LOWER HOSE REMOVAL**

After making mating marks on the radiator hose and the hose clamp, disconnect the radiator hose.

**◀B▶ AIR PIPE B MOUNTING BOLT REMOVAL**

After removing the bolt, position air pipe B out of the way so that the pipe does not interfere with the radiator assembly or the radiator fan motor, the fan and shroud assembly.

INSTALLATION SERVICE POINT**▶A◀ RADIATOR LOWER HOSE/RADIATOR UPPER HOSE INSTALLATION**

1. Insert each hose as far as the projection of the water inlet pipe, water outlet fitting or radiator.
2. Align the mating marks on the radiator upper hose and hose clamp, and then connect the radiator hose.

NOTES

INTAKE AND EXHAUST

CONTENTS

GENERAL INFORMATION	2	Vacuum Tank Check	7
SERVICE SPECIFICATION	3	AIR CLEANER	8
SPECIAL TOOL	3	INTERCOOLER	9
ON-VEHICLE SERVICE	3	INTERCOOLER WATER SPRAY	10
Turbocharger Supercharging Pressure Check ...	3	SECONDARY AIR SUPPLY SYSTEM	14
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Waste Gate Actuator Check	4	EXHAUST MANIFOLD	19
Waste Gate Solenoid Valve Check	5	TURBOCHARGER	22
Air Bypass Valve Check	5	EXHAUST PIPE AND MAIN MUFFLER	26
Intake Manifold Pressure Check	6	CATALYTIC CONVERTER (REFER TO GROUP 17.)	
Secondary Air Control System Check	6		
Secondary Air Control Solenoid Valve Check ...	6		
Secondary Air Valve Check	7		

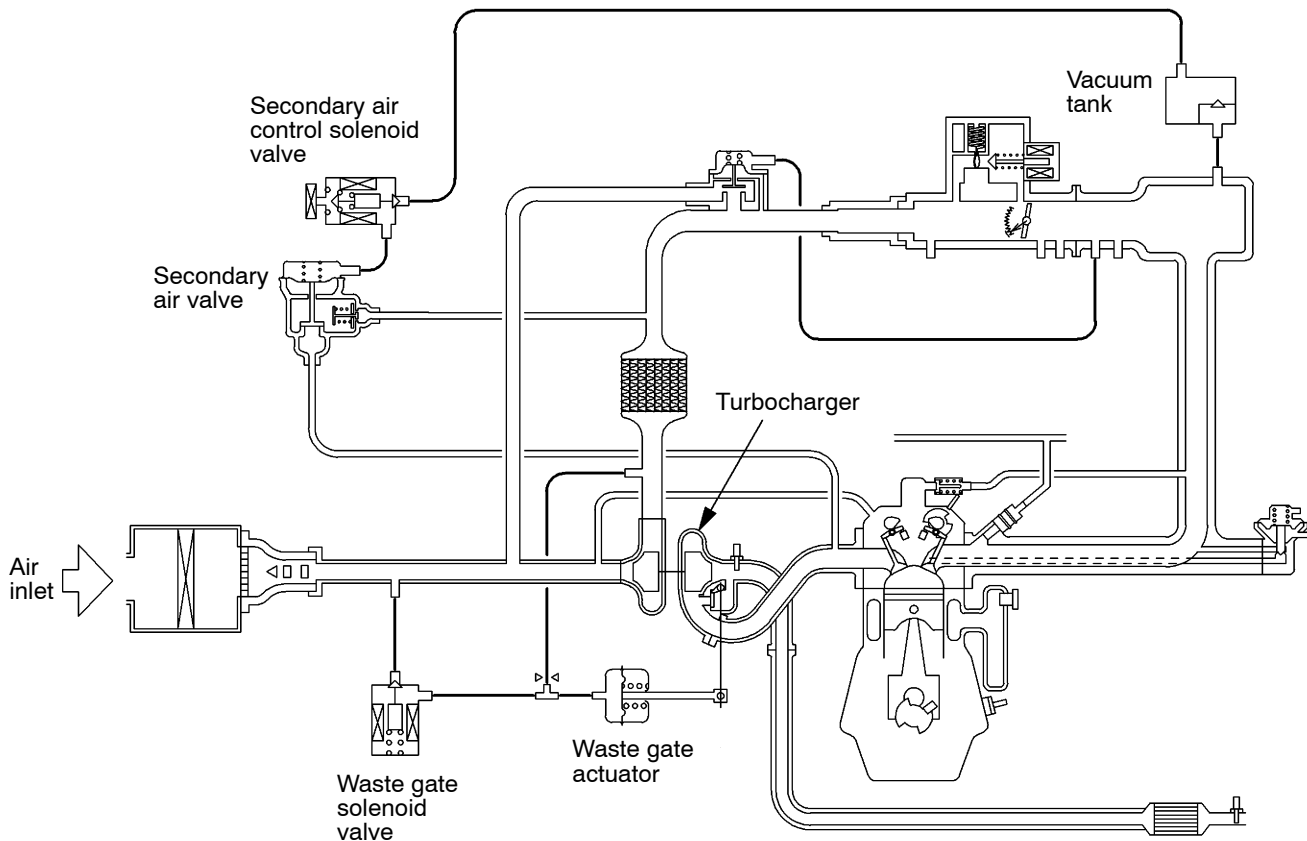
GENERAL INFORMATION

SUPERCHARGING PRESSURE CONTROL

By controlling the duty of the waste gate solenoid valve, the waste gate actuator functions to control the supercharging pressure. This allows a supercharged pressure matching the engine operation state to be attained. Control is carried out to prevent excessive supercharging and thereby prevent engine damage.

SECONDARY AIR CONTROL

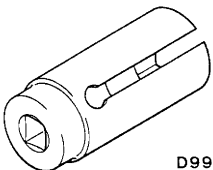
When decelerating during high-speed travel, the secondary air is introduced into the upstream of the turbocharger to prevent the turbine speed from dropping and to increase the acceleration responsiveness after deceleration. The secondary air is introduced into each cylinder of the exhaust manifold to maximize the effect.

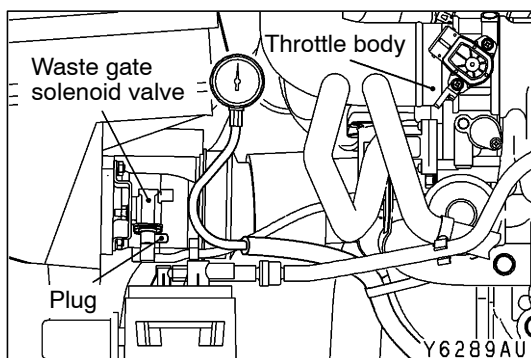


SERVICE SPECIFICATIONS

Item	Standard value	Limit
Turbocharger supercharging pressure (waste gate solenoid valve not operating) kPa	59 - 84	-
Initial activation pressure of waste gate actuator (at the stroke of approximately 1 mm) kPa	Approximately 100	-
Waste gate solenoid valve coil resistance (at 20°C) Ω	29 - 35	-
Initial activation pressure of air bypass valve kPa	Approximately 53	-
Secondary air control solenoid valve coil resistance (at 20°C) Ω	29 - 35	-
Manifold distortion of the installation surface mm	0.15 or less	0.20

SPECIAL TOOL

Tool	Number	Name	Use
 <p>D998770</p>	MD998770	Oxygen sensor wrench	Removal and installation of oxygen sensor



ON-VEHICLE SERVICE

TURBOCHARGER SUPERCHARGING PRESSURE CHECK

Caution

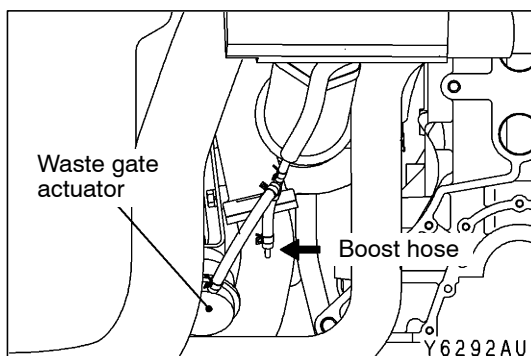
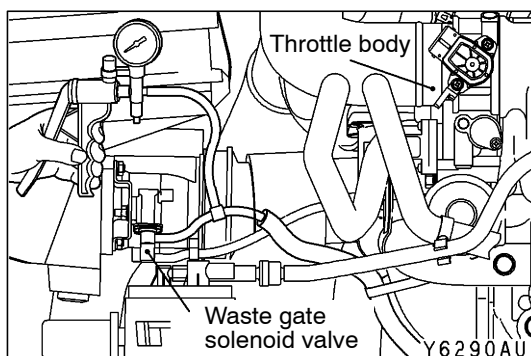
Two persons should be in the vehicle when the test is conducted; the person in the passenger seat should read the indications shown by the pressure meter.

1. Disconnect the hose (black) from the turbocharger waste gate solenoid valve, and connect the pressure gauge to the hose. Plug the nipple of the solenoid valve from which the hose (black) has been disconnected.
2. Drive at full-throttle acceleration in second gear and then measure the supercharging pressure when the engine speed is in about 3,000 r/min.

Standard value: 59 – 84 kPa

3. If the supercharging pressure deviates from the standard value, check the following items for possible cause.
 - Malfunction of the waste gate actuator
 - Leakage of supercharging pressure
 - Malfunction of the turbocharger

4. When the indicated supercharging is more than standard value, supercharging control may be faulty, therefore check the followings.
 - Malfunction of the waste gate actuator
 - Malfunction of waste gate valve
 - Disconnection or cracks of the waste gate actuator rubber hose



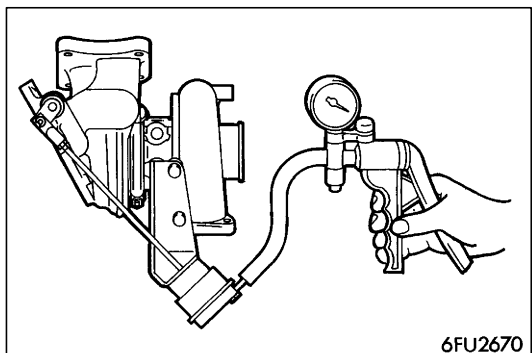
SUPERCHARGING PRESSURE CONTROL SYSTEM CHECK

1. Disconnect the hose (black) from the turbocharger waste gate solenoid valve and connect a three-way joint between the hose and the solenoid valve.
2. Connect a hand vacuum pump to the three-way joint.
3. Disconnect the hose from the turbocharger waste gate actuator control boost nipple and plug the nipple.
4. Applying a negative pressure with the hand vacuum pump, check tightness both when the hose end is closed and when it is open.

Engine state	Hose end	Normal state
Stop (Ignition switch: "ON" position)	Opened	Negative pressure leaks.
	Closed	Negative pressure is maintained.
Idling (after warm-up)		Negative pressure leaks.

NOTE

If this check indicates an abnormal condition, the turbocharger waste gate actuator, turbocharger waste gate solenoid or hose is broken.



WASTE GATE ACTUATOR CHECK

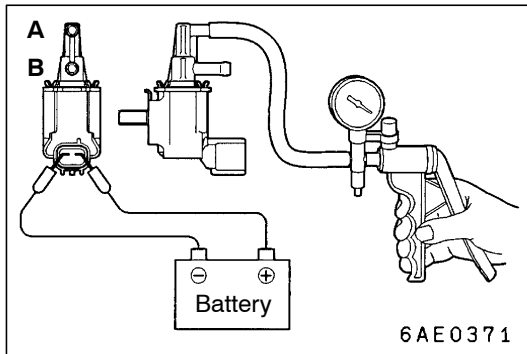
1. Connect a manual pump (pressure-application type) to nipple.
2. While gradually applying pressure, check the pressure that begins to activate (approximately 1 mm stroke) the waste gate actuator rod.

Standard value: Approximately 100 kPa

Caution

In order to avoid damage to the diaphragm, do not apply a pressure of 117 kPa or higher.

- If there is a significant deviation from the standard value, check the actuator or the waste gate valve: replace actuator or turbocharger assembly if necessary.

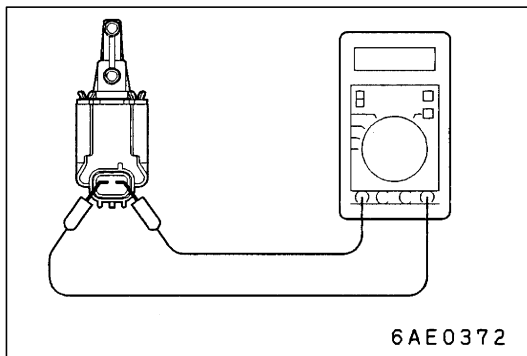


WASTE GATE SOLENOID VALVE CHECK

OPERATION CHECK

- Connect a hand vacuum pump to the solenoid valve nipple A.
- Using a jumper wire, connect between the solenoid valve terminal and battery terminal.
- Connecting and disconnecting the jumper wire at the battery negative terminal to apply a negative pressure, check tightness.

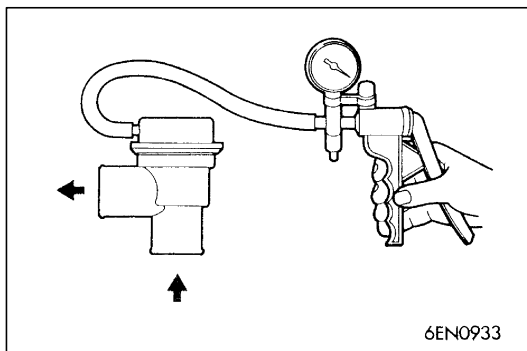
Jumper wire	B nipple condition	Normal condition
Connected	Opened	Negative pressure leaks.
	Closed	Negative pressure is held.
Disconnected	Opened	Negative pressure is held.



COIL RESISTANCE CHECK

Measure the resistance between solenoid valve terminals.

Standard value: 29 – 35 Ω (at 20°C)



AIR BYPASS VALVE CHECK

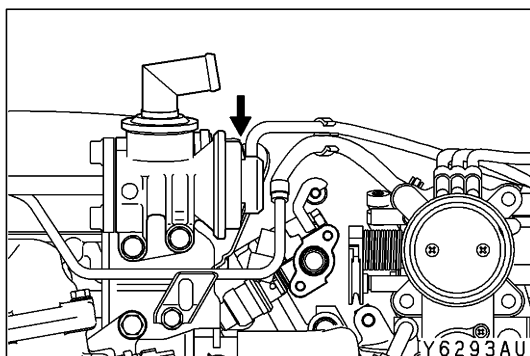
- Remove the air bypass valve.
- Connect the hand vacuum pump to the nipple of the air bypass valve.
- Apply a negative pressure of approximately 49 kPa, and check that air tightness is maintained.
- Also check operation of the valve.

Standard value:

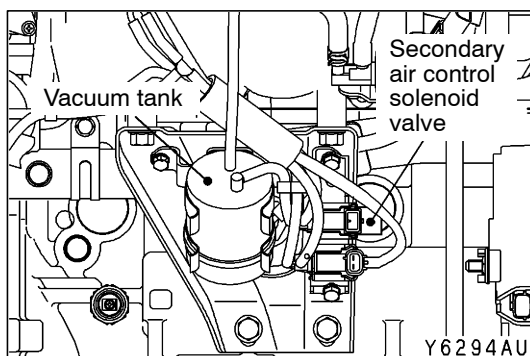
Negative pressure	Valve operation
Approximately 53 kPa	It starts opening

INTAKE MANIFOLD PRESSURE CHECK

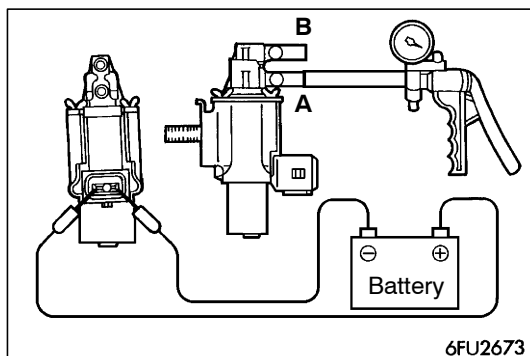
Refer to GROUP 11A – On-vehicle Service.

**SECONDARY AIR CONTROL SYSTEM CHECK**

1. Start the engine and carry out idling.
2. Confirm that the secondary air valve lifts up when the engine-ECU connector No. 53 terminal is short-circuited with the earth using a jumper wire.
The engine-ECU connector must be connected at this time.

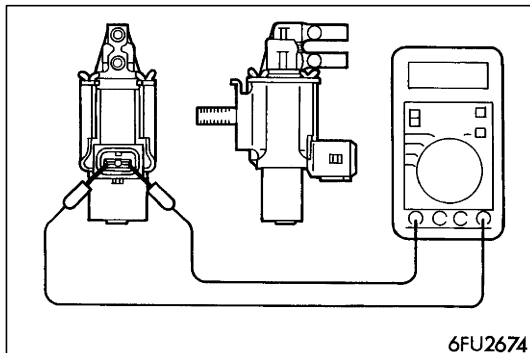
**SECONDARY AIR CONTROL SOLENOID VALVE CHECK****OPERATION CHECK**

1. Disconnect the vacuum hose (white-striped, yellow-striped) from the solenoid valve.
2. Separate the harness connector.



3. Connect the hand vacuum pump to the solenoid valve's A nipple.
4. Connect the solenoid valve terminal and battery terminal with a jumper wire.
5. Disconnect the jumper wire between the battery's (-) terminals, apply a negative pressure, and inspect the tightness.

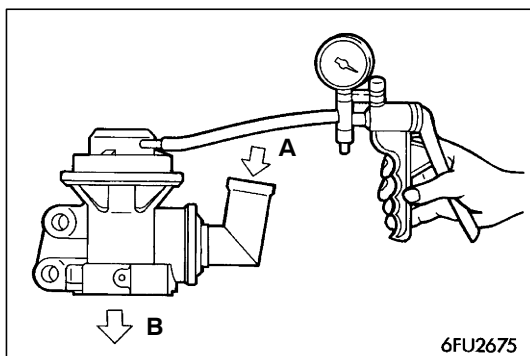
Jumper wire	State of B nipple	Normal state
Connected	Opened	Negative pressure leaks.
	Closed	Negative pressure is maintained.
Disconnected	Closed	Negative pressure leaks.



COIL RESISTANCE CHECK

Measure the resistance between the solenoid valve terminals.

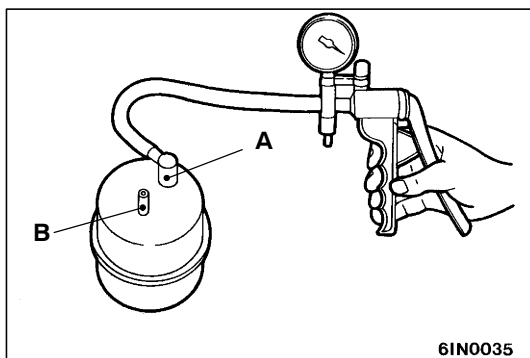
Standard value: 29 – 35 Ω (at 20°C)



SECONDARY AIR VALVE CHECK

1. Disconnect the secondary air valve.
2. Connect the hand vacuum pump to the secondary air valve's nipple.
3. Apply a negative pressure of 67 kPa, and confirm that the negative pressure is maintained.
4. Blow in air from the (A) side and (B) side of the secondary air valve, and inspect the ventilation.

Negative pressure	Air blow-in direction	Air ventilation
0 kPa (State without negative pressure)	(A) → (B)	Not ventilated
40 kPa or more	(A) → (B)	Ventilated
	(B) → (A)	Not ventilated



VACUUM TANK CHECK

1. Connect the hand vacuum pump to the vacuum tank's A nipple. Apply a negative pressure of 67 kPa, and confirm that the negative pressure is maintained.
2. Connect the hand vacuum pump to the vacuum tank's B nipple.
3. Plug the A nipple with a finger, and apply a negative pressure of 67 kPa. Confirm that the negative pressure leaks immediately when the finger is released.

AIR CLEANER

REMOVAL AND INSTALLATION

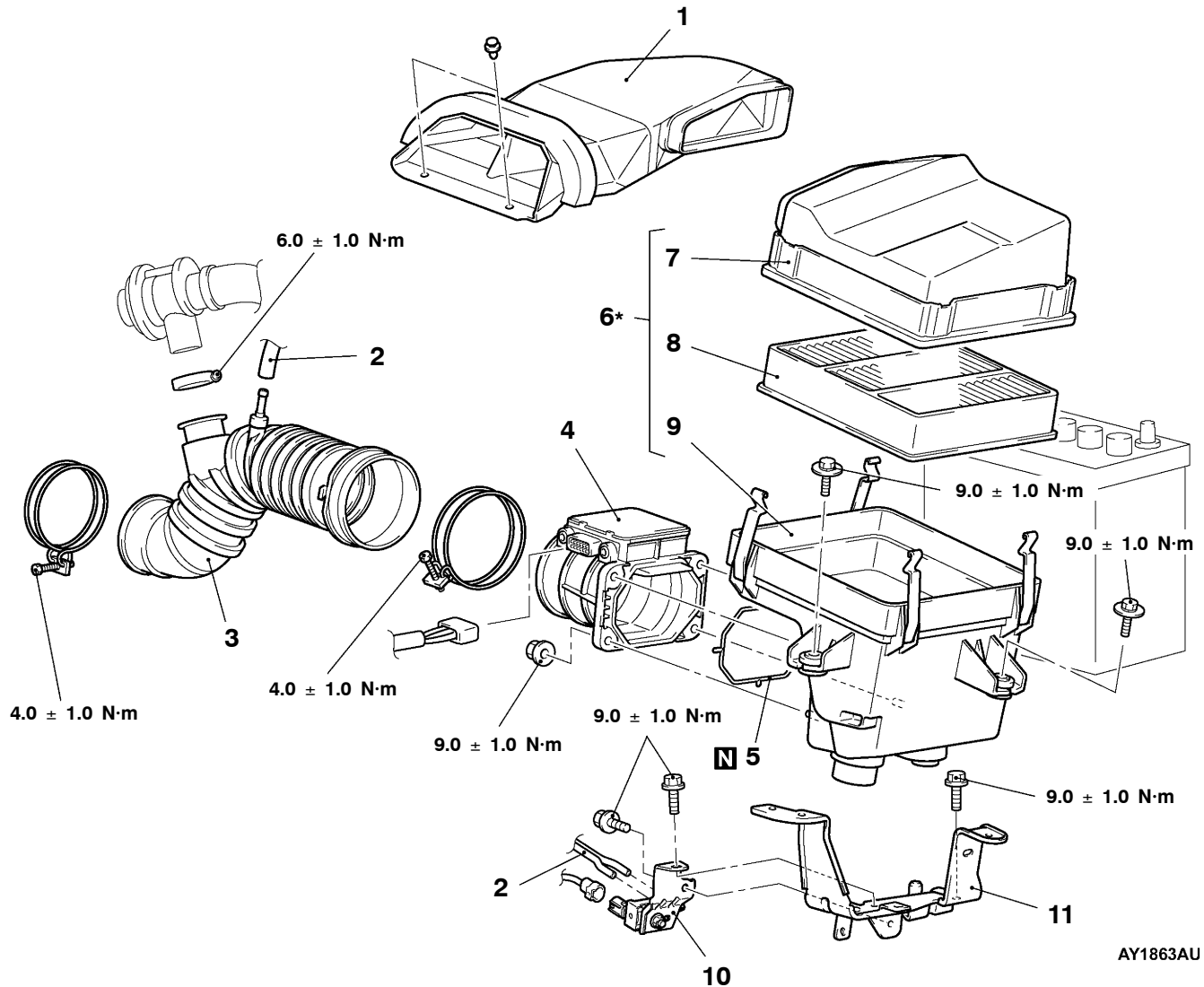
Caution

Parts marked by * are made of recycled-paper mixed plastic material, so observe the following precautions.

1. Avoid any shock or load to these parts when removing and installing them.
2. Engage the case hinges securely when assembling these parts.

NOTE

Parts marked by * are made of recycled-paper mixed plastic material, so can be disposed of by incineration.



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Removal steps

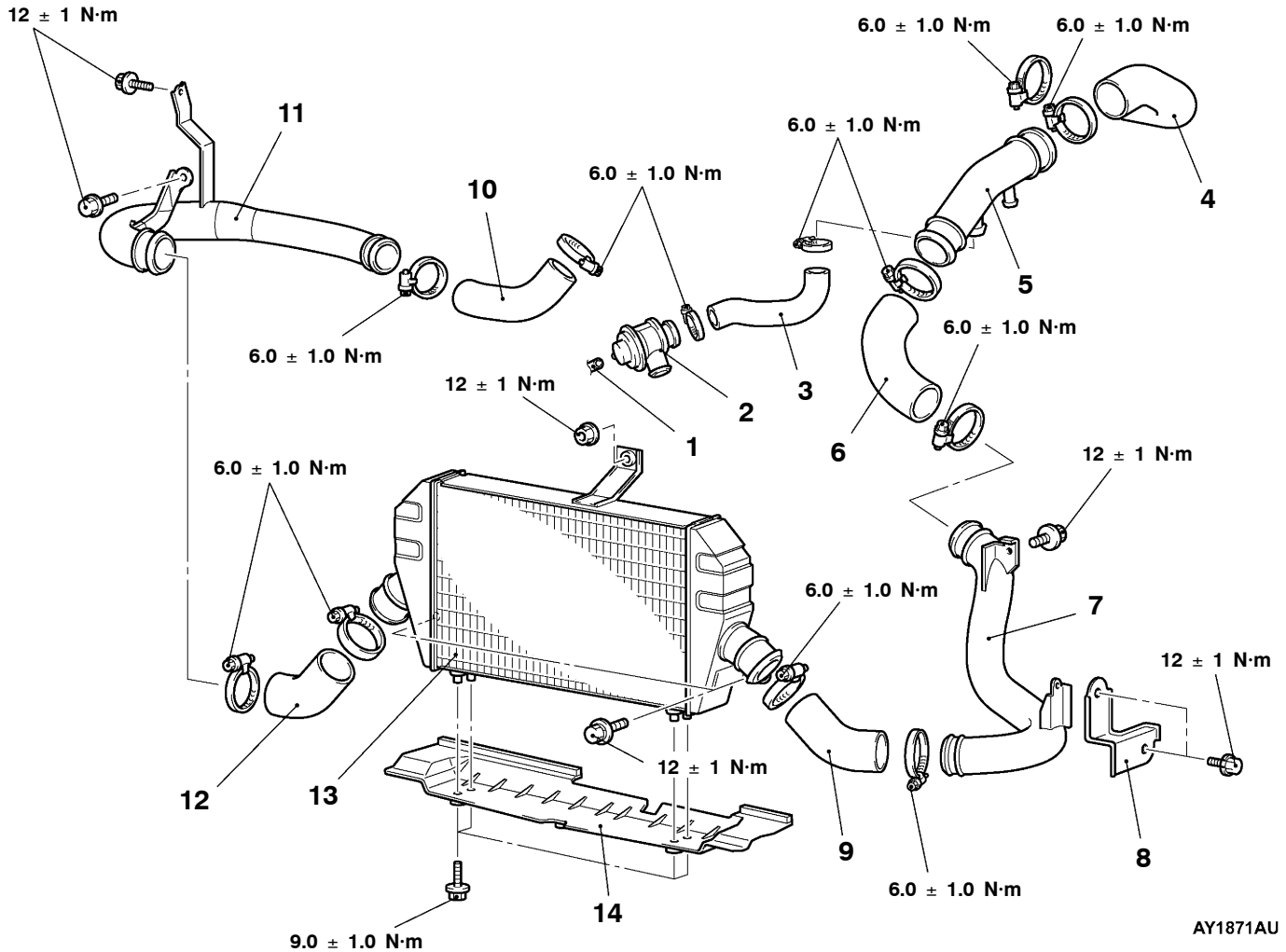
- Battery
- 1. Air duct
- 2. Vacuum hose
- Air pipe E, Air by-pass valve assembly, Air by-pass hose (Refer to P.15-9.)
- 3. Air intake hose
- 4. Air flow sensor assembly
- 5. Gasket
- 6. Air cleaner assembly
- 7. Air cleaner cover
- 8. Air cleaner element
- 9. Air cleaner body
- 10. Waste gate solenoid valve
- 11. Air cleaner bracket

INTERCOOLER

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Air Cleaner Removal and Installation (Refer to P.15-8.)
- Water Spray Hose Connection removal and Installation (Refer to P.15-10.)
- Front Bumper Removal and Installation (Refer to GROUP 51.)



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Removal steps

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Vacuum hose 2. Air by-pass valve assembly 3. Air by-pass hose 4. Air hose E 5. Air pipe C 6. Air hose D 7. Air pipe B | <ol style="list-style-type: none"> 8. Bracket 9. Air hose C 10. Air hose A 11. Air pipe A 12. Air hose B 13. Intercooler assembly 14. Air guide |
|--|--|

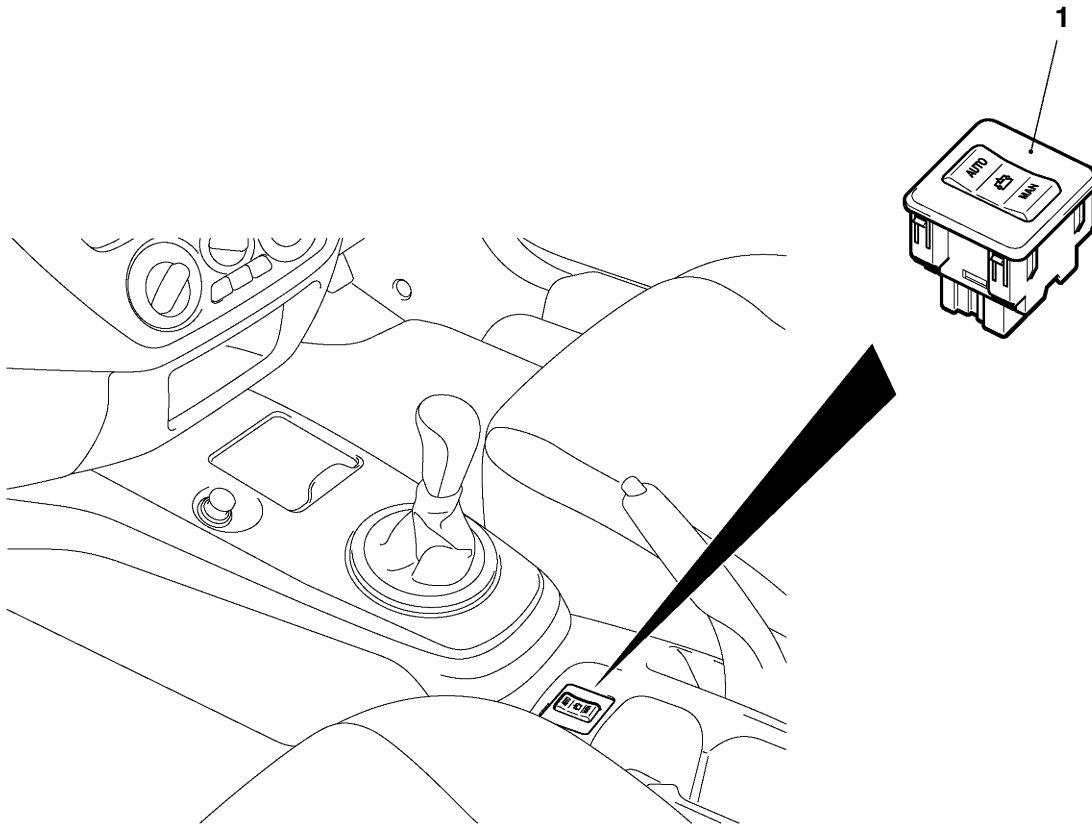
INTERCOOLER WATER SPRAY

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Front Bumper Removal and Installation (Refer to GROUP 51.)

REMOVAL AND INSTALLATION

<WATER SPRAY SWITCH>

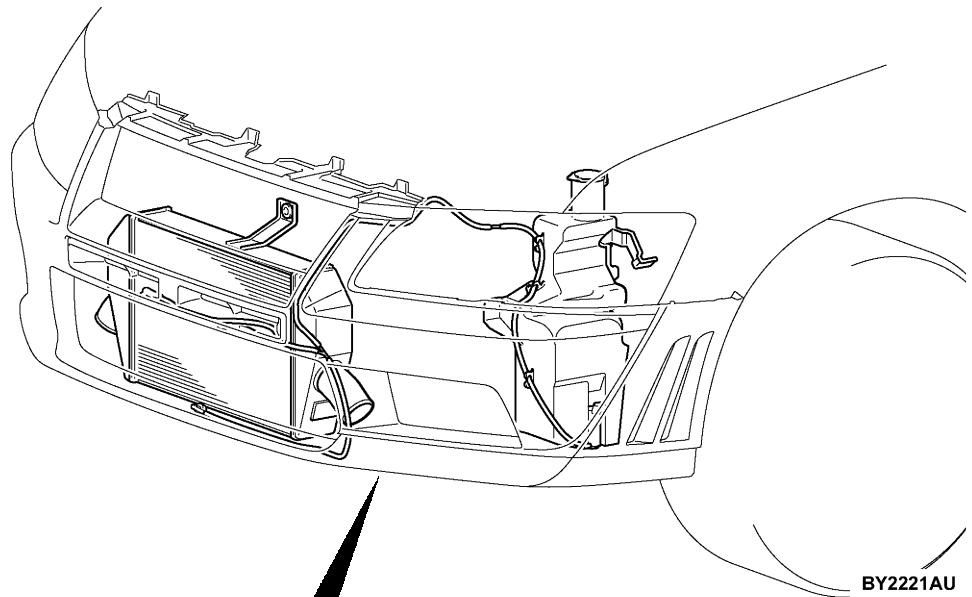


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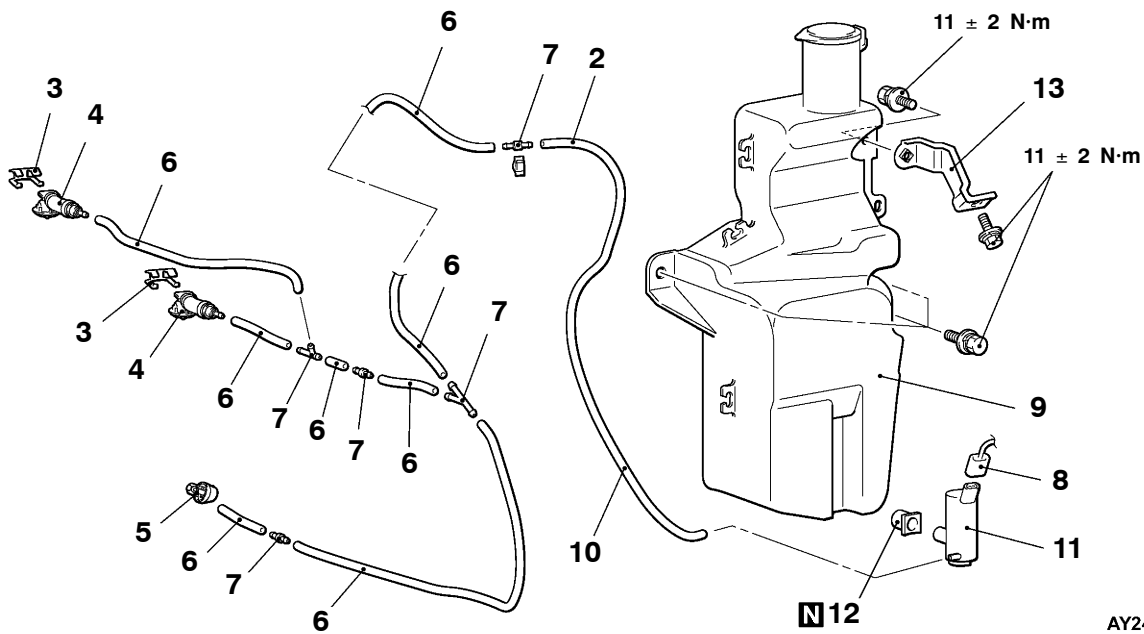
Water spray switch removal steps

1. Water spray switch
 - Harness connector connection

<WATER SPRAY NOZZLE/WATER SPRAY HOSE/WASHER TANK>



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Water spray nozzle/Water spray hose removal steps

- ▶◀ A ▶◀ 2. Water spray hose connection
- Tape
- 3. Clamp
- 4. Water spray nozzle (Upper)
- 5. Water spray nozzle (Lower)
- ▶◀ A ▶◀ 6. Water spray hose
- 7. Hose Joint

Washer tank removal steps

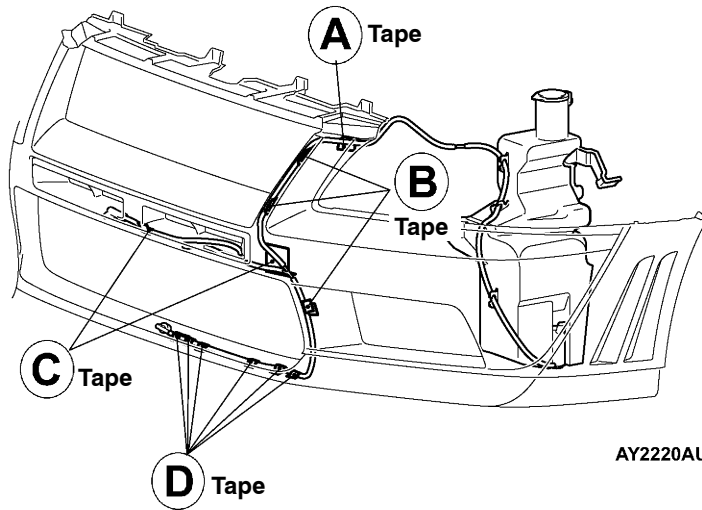
- 2. Water spray hose connection
- 8. Water spray motor harness connector connection
- 9. Washer tank
- 10. Water spray hose
- 11. Water spray motor
- 12. Packing
- 13. Washer tank bracket

INSTALLATION SERVICE POINTS

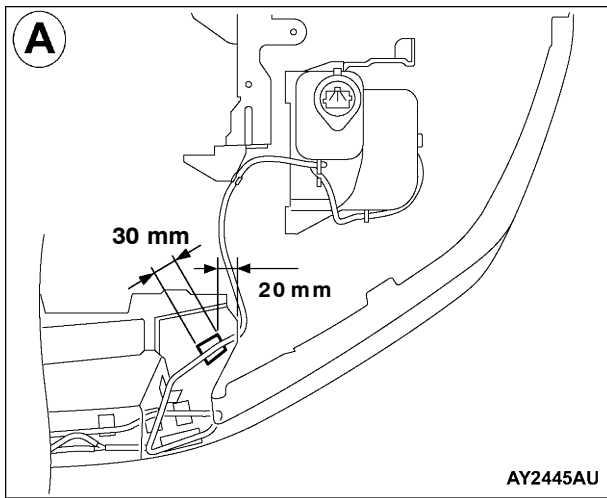
▶A◀ WATER SPRAY HOSE/TAPE INSTALLATION

Attach the water spray hose to the front bumper with a tape as shown in the illustration.

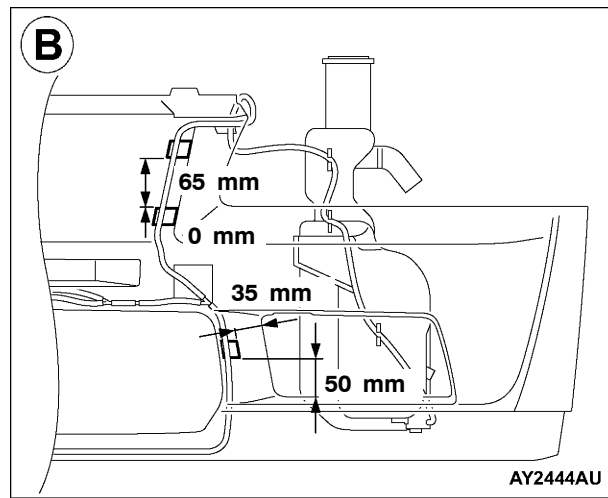
<Tape attachment position>



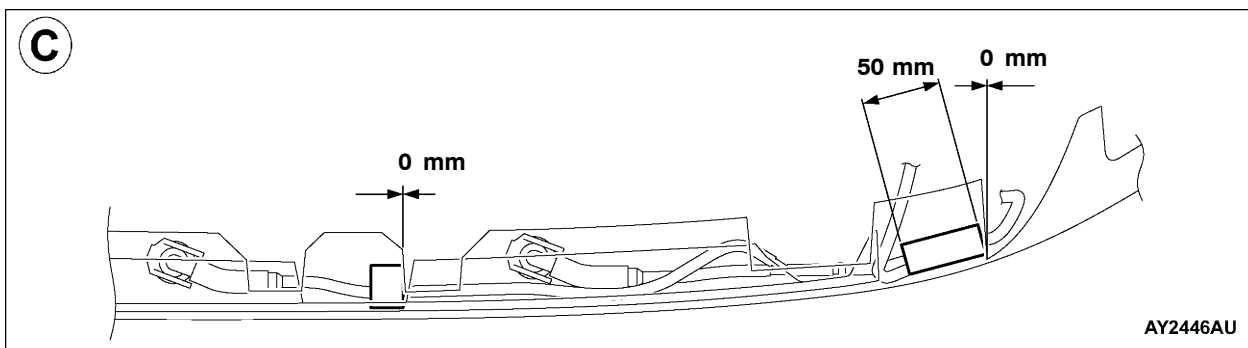
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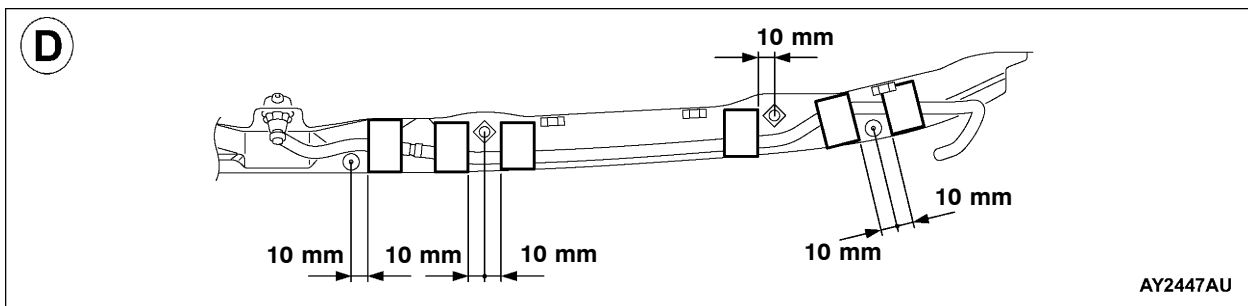
AY2445AU



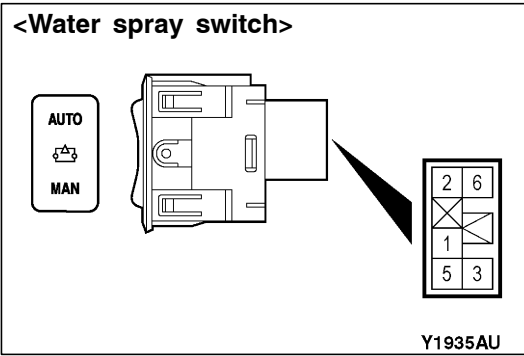
AY2444AU



AY2446AU



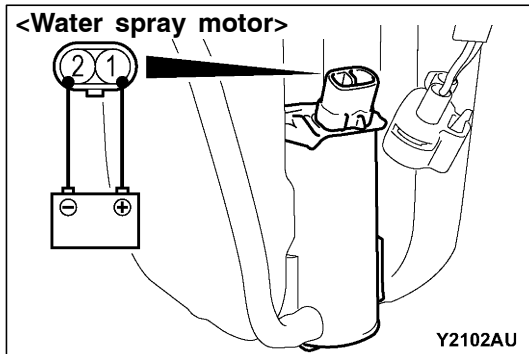
AY2447AU



INSPECTION

1. WATER SPRAY SWITCH CONTINUITY CHECK

Switch position	Terminal No.				
	AUTO	MANUAL	EARTH	ILL (+)	ILL (-)
	1	2	3	5	6
AUTO	○	—	○	ILL	
NEUTRAL				○ — (M) — ○	
MAN		○	○		



2. WATER SPRAY MOTOR CHECK

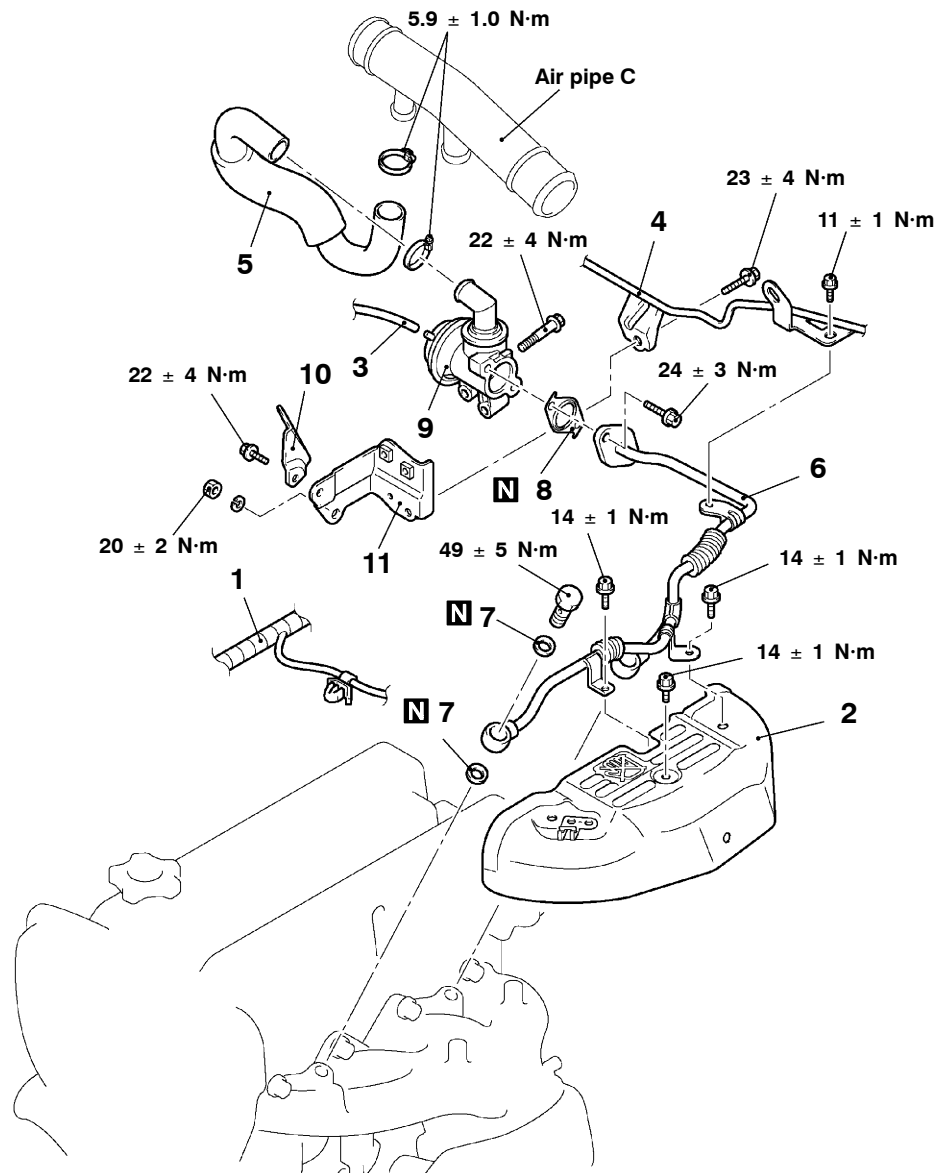
- (1) Check the water spray motor with the washer tank attached after the washer tank is supplied with water.
- (2) Check that the water is supplied with strong pressure after energizing terminal number 1 with battery voltage and earthing terminal number 2.

SECONDARY AIR SUPPLY SYSTEM

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Air Duct Removal and Installation (Refer to P.15-8.)
- Strut Tower Bar Removal and Installation (Refer to GROUP 42.)



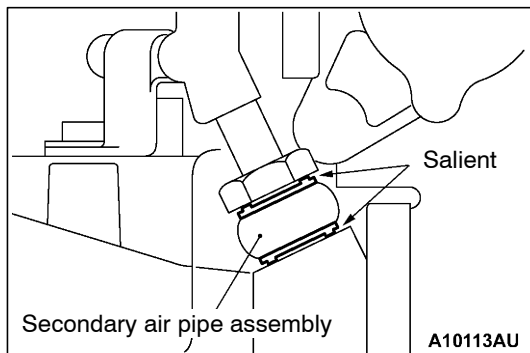
AY1873AU

Removal steps

1. Control harness connector connection
2. Heat protector
3. Vacuum hose connection
 - Air pipe C (Refer to P.15-9.)
4. Vacuum pipe
5. Secondary air hose



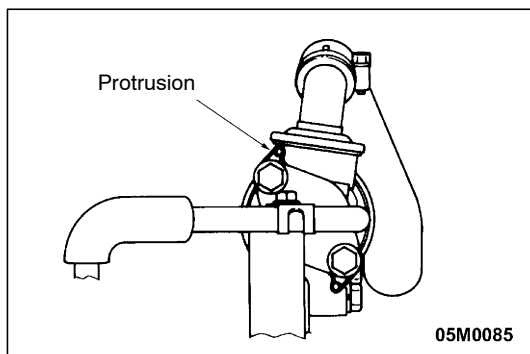
6. Secondary air pipe assembly
7. Gasket
8. Gasket
9. Secondary air control valve
10. Engine hanger
11. Secondary air control valve bracket



INSTALLATION SERVICE POINTS

▶A◀ GASKET INSTALLATION

Install the gasket so that its salient can face towards the direction as shown in the illustration.



▶B◀ GASKET INSTALLATION

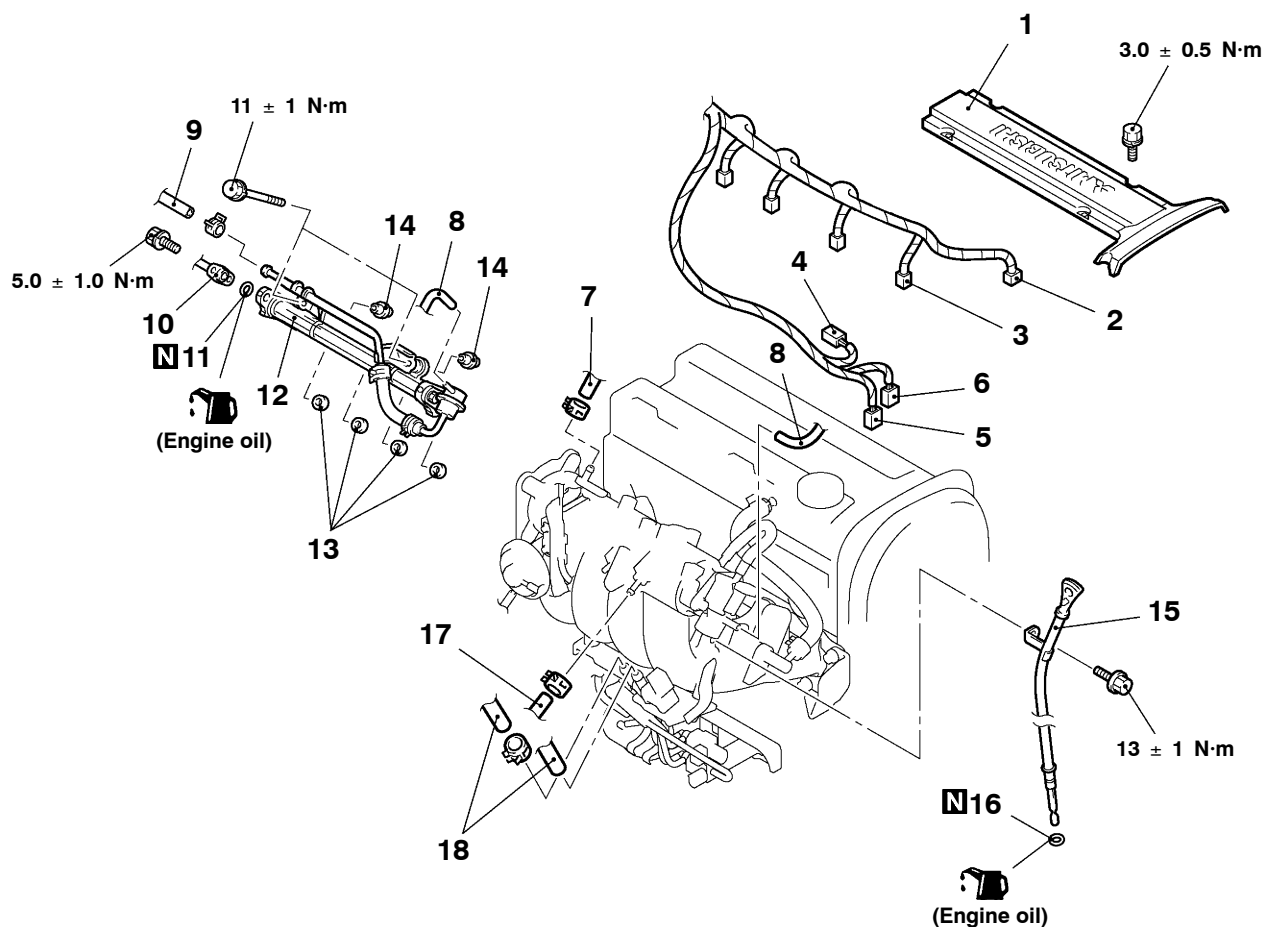
Install the gasket so that its protrusion can face towards the direction as shown in the illustration.

INTAKE MANIFOLD

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

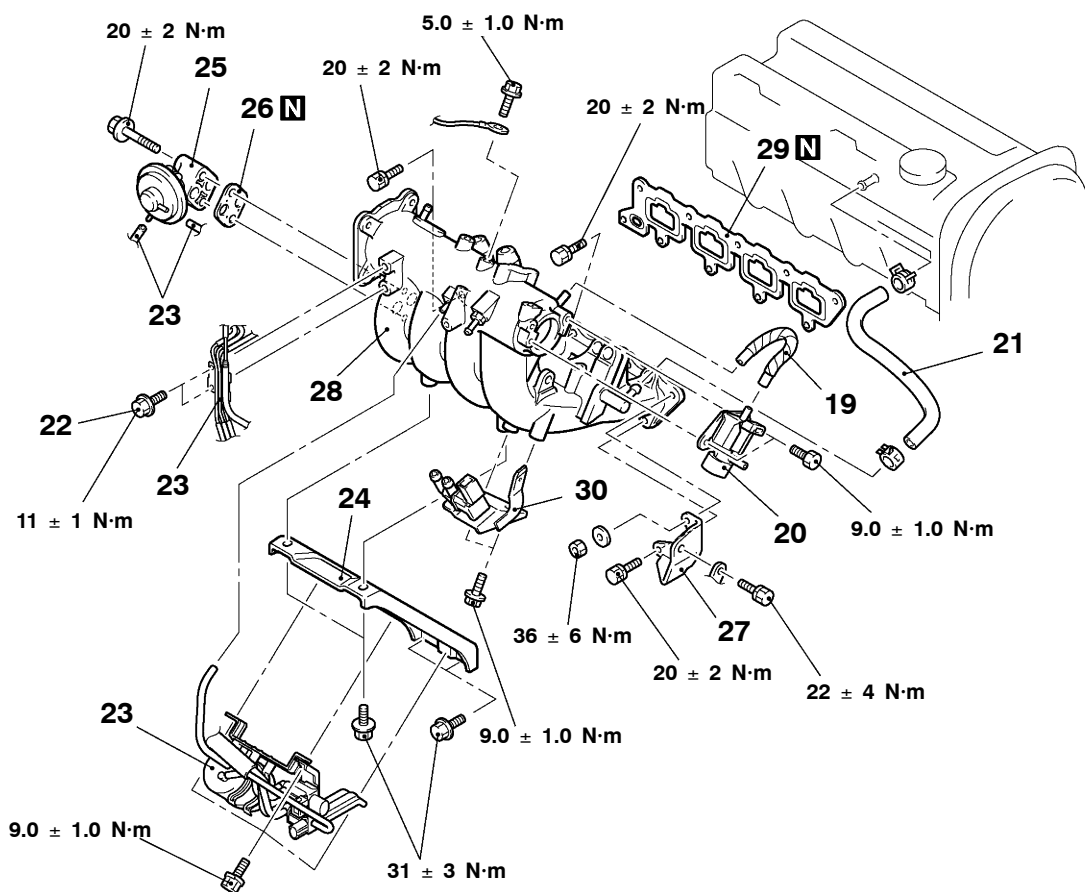
- Air Duct Removal and Installation (Refer to P.15-8.)
- Strut Tower Bar Removal and Installation (Refer to GROUP 42.)
- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Engine Coolant Draining and Supplying (Refer to GROUP 14 - On-vehicle Service.)
- Throttle Body Removal and Installation (Refer to GROUP 13A - Throttle Body.)
- Crossmember Bar Removal and Installation (Refer to GROUP 32 - Engine Roll Stopper, Centermember.)
- Front Exhaust Pipe Removal and Installation (Refer to GROUP 15 - Exhaust Pipe and Main Muffler.)
- Secondary Air Control Valve Bracket Removal and Installation (Refer to P.15-14.)
- Engine Oil Draining and Supplying



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Removal steps

1. Center cover
2. Oxygen sensor connector connection
3. Injector connector connection
4. Fuel pressure solenoid valve connector connection
5. Purge control solenoid valve connector connection
6. Knock sensor connector connection
7. Vacuum hose connection
8. Vacuum hose
9. Fuel return hose connection
10. Fuel high-pressure hose connection
11. O-ring
12. Delivery pipe, Injector and fuel pressure regulator assembly
13. Insulator
14. Insulator
15. Oil level gauge and guide
16. O-ring
17. Brake booster vacuum hose connection
18. Purge hose connection



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- | | |
|---|---|
| 19. Vacuum hose | 24. Intake manifold stay |
| 20. Fuel pressure solenoid valve | 25. EGR gasket |
| 21. PCV hose | 26. EGR gasket |
| ● Alternator (Refer to GROUP 16.) | 27. Alternator brace stay |
| 22. Vacuum hose and Vacuum pipe assembly connecting bolt | 28. Intake manifold |
| 23. Vacuum tank, EGR solenoid valve, Secondary air control solenoid valve, Vacuum hose assembly | 29. Intake manifold gasket |
| | 30. Purge control solenoid valve assembly |

REMOVAL SERVICE POINTS

◀▶ DELIVERY PIPE, INJECTOR AND FUEL PRESSURE REGULATOR ASSEMBLY REMOVAL

The delivery pipe must be removed with the injector and fuel pressure regulator attached.

Caution

Take care not to drop delivery pipe, injector, or fuel pressure regulator assembly when removing those parts.

INSTALLATION SERVICE POINTS

▶A◀ FUEL HIGH-PRESSURE HOSE CONNECTION

1. Apply a drop of new engine oil to the O-ring.

Caution

Be sure not to let engine oil enter the delivery pipe.

2. While turning the injector, high-pressure fuel hose and fuel pressure regulator to the right and left, install the delivery pipe, while being careful not to damage the O-ring. After installing, check that the hose turns smoothly.
3. If it does not turn smoothly, the O-ring may be trapped, remove the injector, high-pressure fuel hose or fuel pressure regulator and then re-insert it into the delivery pipe and check once again.
4. Tighten the high-pressure fuel hose to the specified torque.

Tightening torque: 5.0 ± 1.0 N·m

INSPECTION

Check the following points; replace the part if a problem is found.

INTAKE MANIFOLD CHECK

1. Check for damage or cracking of any part.
2. Check for obstruction of the negative pressure (vacuum) outlet port, and for obstruction of the water passage or gas passage.
3. Using a straight edge and thickness gauge, check for distortion of the cylinder head installation surface.

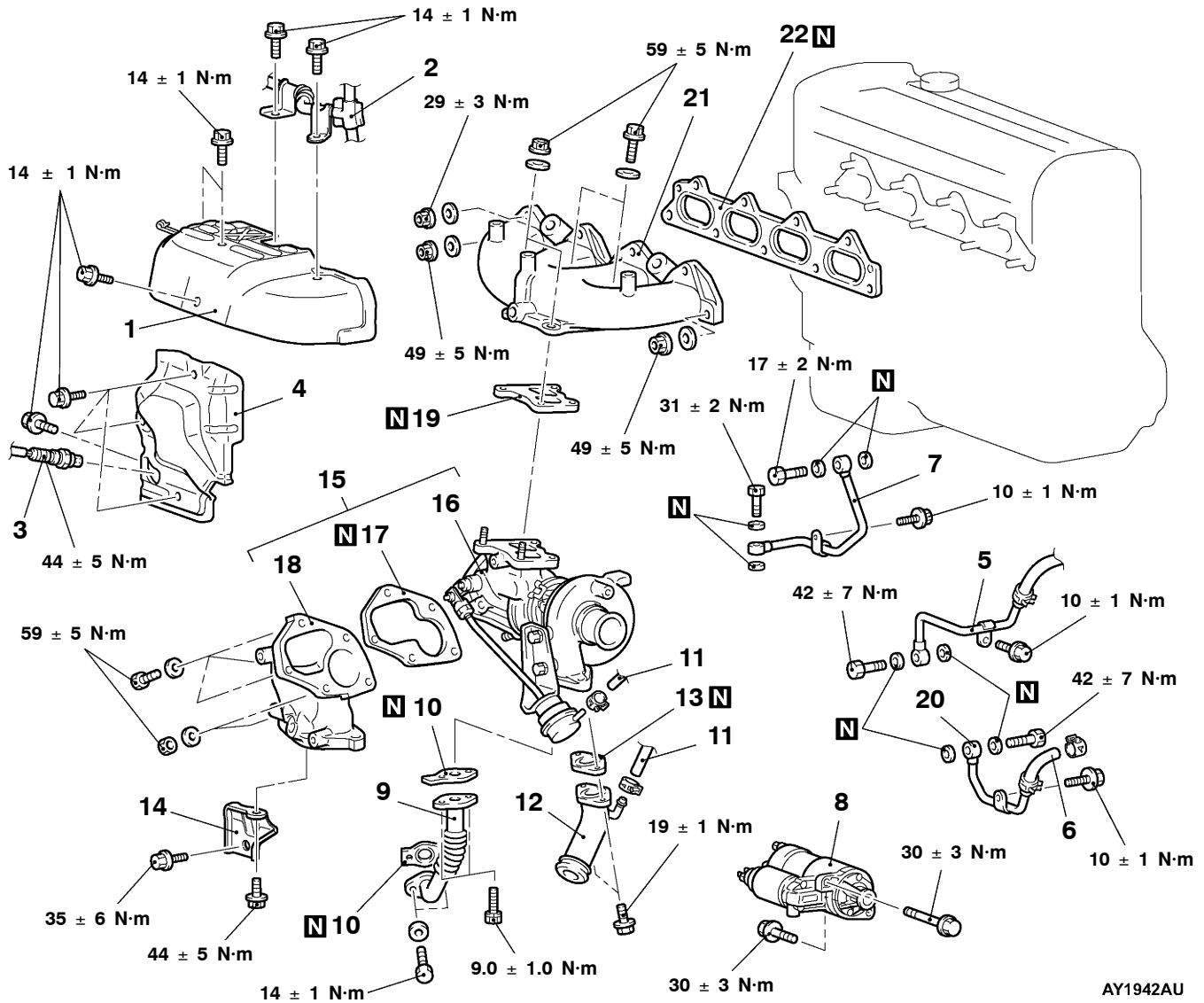
Standard value: 0.15 mm

Limit: 0.20 mm

EXHAUST MANIFOLD REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

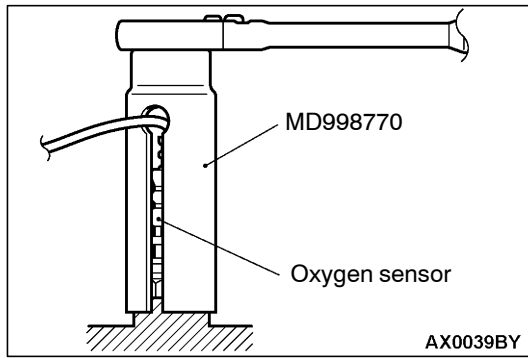
- Under Cover Removal and Installation (Refer to GROUP 51 - Front bumper.)
- Radiator Removal and Installation (Refer to GROUP 14.)
- Air Intake Hose Removal and Installation (Refer to P.15-8.)
- Air Pipe A, Air Pipe C, Air Hose D, Air Pipe B Removal and Installation (Refer to P.15-9.)
- Crossmember Bar Removal and Installation (Refer to GROUP 32 - Engine Roll Stopper, Centermember.)
- Front Exhaust Pipe Removal and Installation (Refer to P.15-26.)



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Removal steps

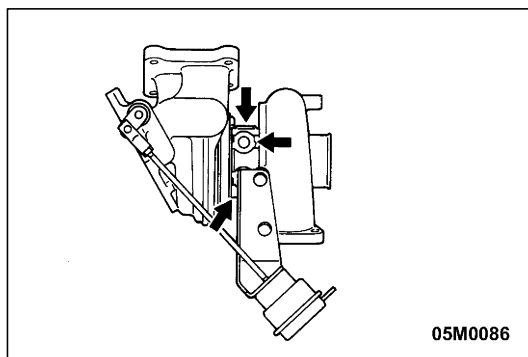
- | | | |
|----------------------------------|---|--|
| <p>◀A▶</p> <p>◀B▶</p> <p>▶C▶</p> | <ol style="list-style-type: none"> 1. Exhaust manifold heat protector 2. Air pipe assembly 3. Oxygen sensor 4. Turbocharger heat protector 5. Turbocharger water feed pipe assembly connection 6. Turbocharger water return hose connection 7. Oil feed pipe 8. Starter Motor 9. Oil return pipe 10. Oil return pipe gasket 11. Vacuum hose connection | <ol style="list-style-type: none"> 12. Air outlet fitting 13. Air outlet fitting gasket 14. Exhaust fitting bracket 15. Turbocharger assembly 16. Turbocharger 17. Exhaust fitting gasket 18. Exhaust fitting 19. Turbocharger gasket 20. Turbocharger water return pipe assembly connection 21. Exhaust manifold 22. Exhaust manifold gasket |
|----------------------------------|---|--|

**REMOVAL SERVICE POINT****◀A▶ OXYGEN SENSOR REMOVAL**

Use special tool to remove the oxygen sensor.

◀B▶ OIL FEED PIPE REMOVAL

Take care not to let foreign objects get into the oil passage hole of the turbocharger after the oil feed pipe is removed.

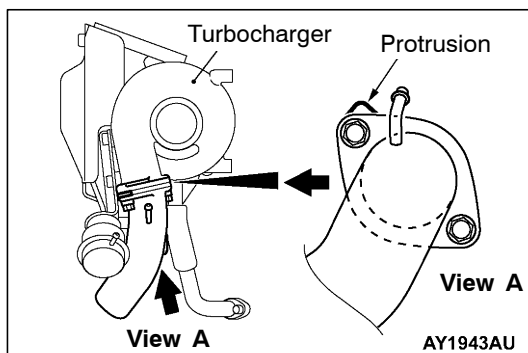
**INSTALLATION SERVICE POINT****▶A◀ TURBOCHARGER INSTALLATION**

1. Clean the oil feed pipe, oil return pipe, water pipe fitting, the inside of eye bolt, and individual pipe for clogs.
2. Clean or blow the air if carbon particles are stuck to the oil passage of the turbocharger.

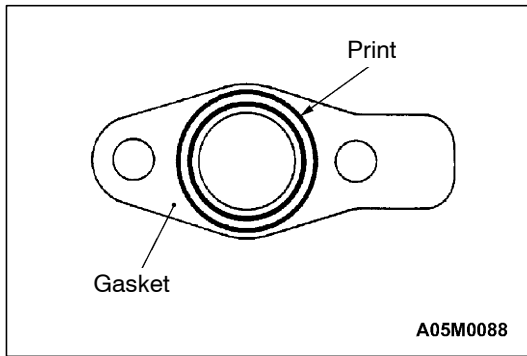
Caution

Take care not to let foreign objects get into the turbocharger.

3. Refill new engine oil at the oil feed pipe fitting hole of the turbocharger.

**▶B◀ AIR OUTLET FITTING GASKET INSTALLATION**

Install the gasket so that its protrusion can face towards the direction as shown in the illustration.



►◀ OIL RETURN PIPE GASKET INSTALLATION

Install the gasket so that its print part can face towards the oil pan side.

INSPECTION

Check the following points; replace the part if a problem is found.

1. EXHAUST MANIFOLD CHECK

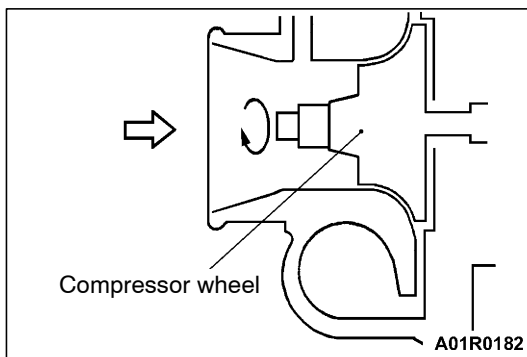
- (1) Check for damage or cracking of any part.
- (2) Using a straight edge and a feeler gauge, check for distortion of the cylinder head installation surface.

Standard value: 0.15 mm or less

Limit: 0.20 mm

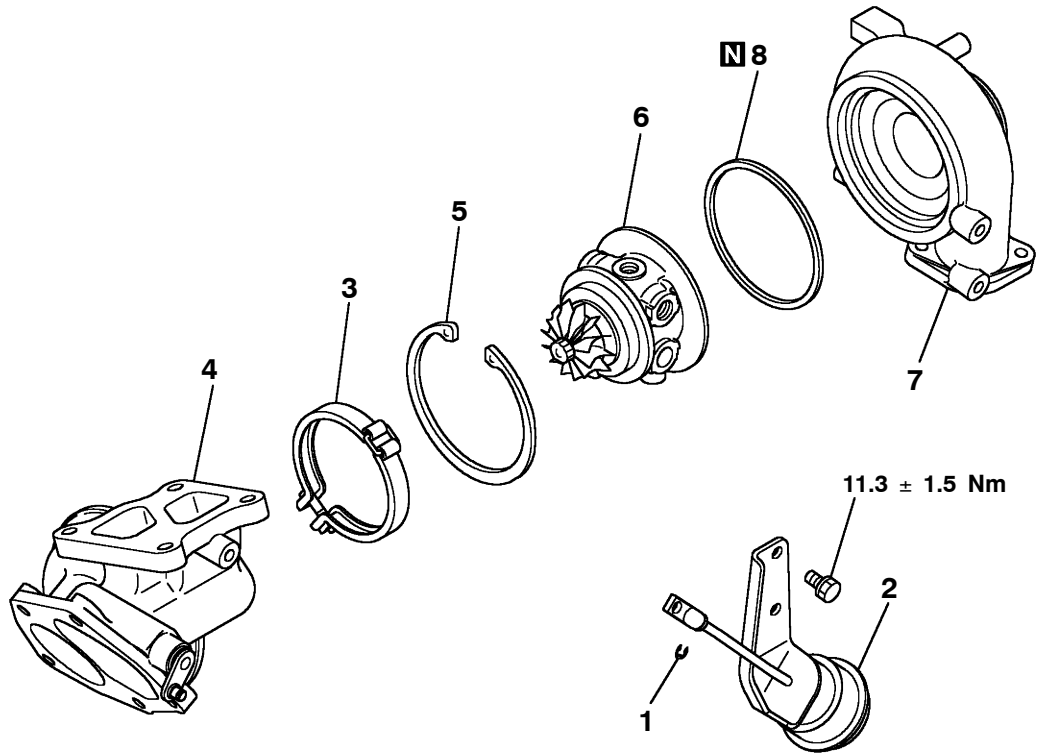
2. TURBOCHARGER ASSEMBLY CHECK

- (1) Visually check the turbine wheel and the compressor wheel for cracking or other damage.
 - (2) Check whether the turbine wheel and the compressor wheel can be easily turned by hand.
 - (3) Check for oil leakage from the turbocharger assembly.
 - (4) Check whether or not the waste gate valve remains open.
- If any problem is found, replace the part after disassembly.



TURBOCHARGER

DISASSEMBLY AND REASSEMBLY

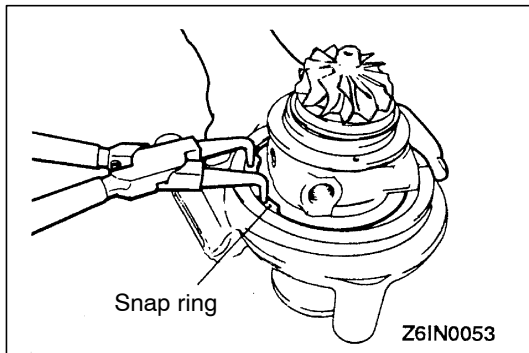


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Disassembly steps

- F◄ • Inspection of turbocharger waste gate actuator operation
1. E-ring
2. Waste gate actuator
- E◄ 3. Coupling

- D◄ 4. Turbine housing
- C◄ 5. Snap ring
- B◄ 6. Turbine wheel assembly
7. Compressor cover
- A◄ 8. O-ring



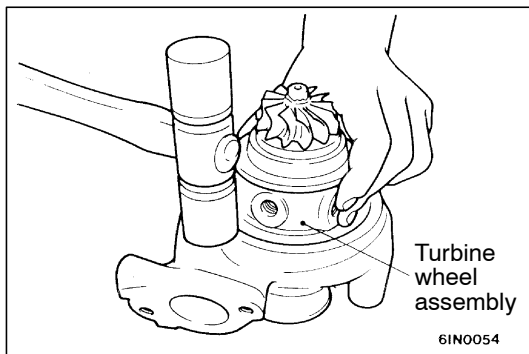
DISASSEMBLY SERVICE POINTS

◀A▶ SNAP RING REMOVAL

Lay the unit with the compressor cover side facing down and using snap ring pliers, remove the compressor cover attaching snap ring.

Caution

When removing the snap ring, hold it with fingers to prevent it from springing away.

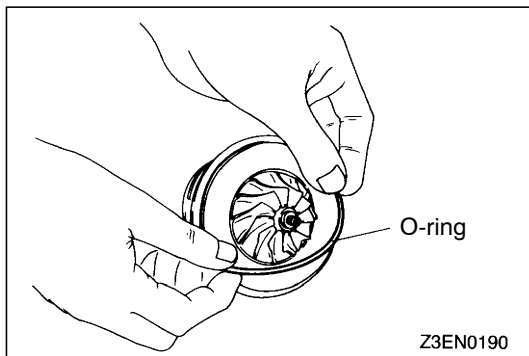


◀B▶ TURBINE WHEEL ASSEMBLY REMOVAL

Remove the turbine wheel assembly, striking the circumference of the compressor cover with a plastic hammer. The turbine wheel assembly may be a little hard to remove due to an O-ring put on the outer circumference.

CLEANING

1. Use a clean cleaning oil commercially available. Do not use corrosive cleaning oils as they could damage to some parts.
2. Use a plastic scraper or hard brush to clean aluminum parts.



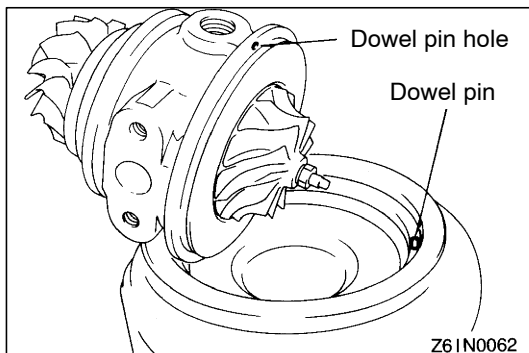
REASSEMBLY SERVICE POINTS

▶A◀ O-RING INSTALLATION

Apply a light coat of engine oil to a new O-ring and fit in the turbine wheel assembly groove.

Caution

When installing the O-ring, use care not to damage it. A damaged O-ring causes oil leaks.

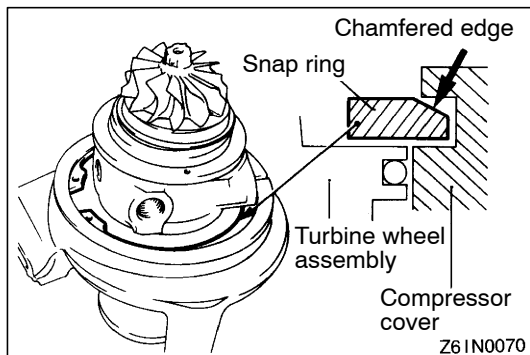


▶B◀ TURBINE WHEEL ASSEMBLY

1. Apply a light coat of engine oil to the periphery of the O-ring.
2. Install the turbine wheel assembly to the compressor cover in relation to the dowel pin.

Caution

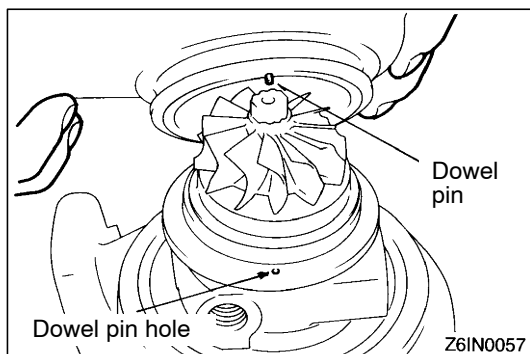
Use care not to damage the blades of turbine wheel and compressor wheel.

**►C◄ SNAP RING INSTALLATION**

Lay the assembly with the compressor cover facing down and fit the snap ring.

Caution

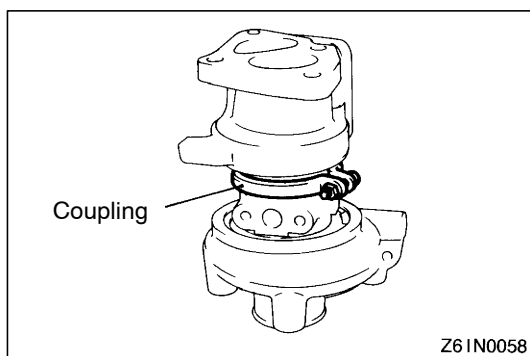
Fit the snap ring with its chamfered side facing up.

**►D◄ TURBINE HOUSING INSTALLATION**

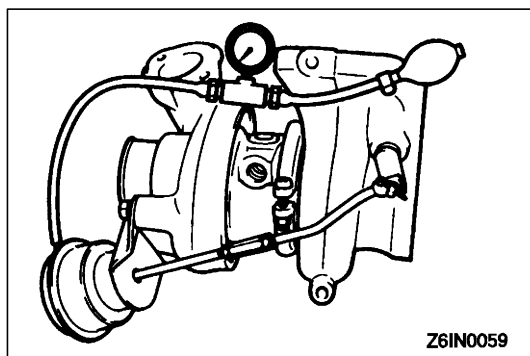
Install the turbine housing in relation to the dowel pin.

Caution

Use care not to damage the blades of turbine wheel.

**►E◄ COUPLING INSTALLATION**

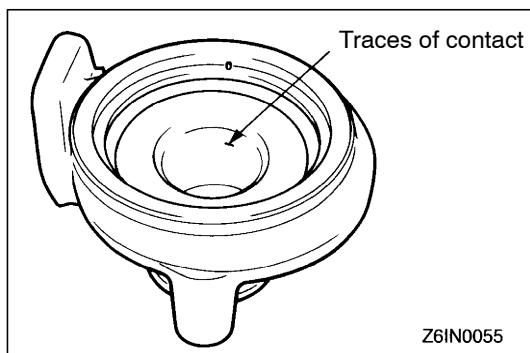
Install the coupling and tighten to the specified torque.

**►F◄ WASTE GATE ACTUATOR OPERATION CHECK**

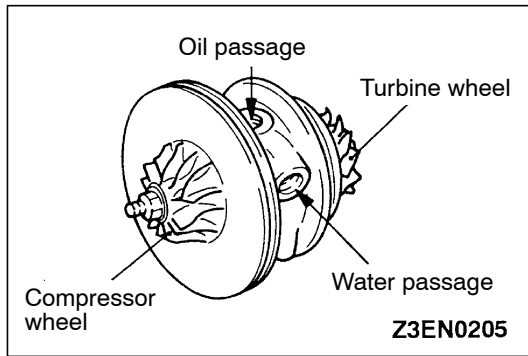
Using a tester, apply a pressure of approx. 100.0 kPa to the actuator and make sure that the rod moves.

Caution

Do not apply a pressure of more than 113.3 kPa to the actuator. Otherwise, diaphragm may be damaged. Never attempt to adjust the waste gate valve.

**INSPECTION****TURBINE HOUSING**

1. Check the housing for traces of contact with the turbine wheel, cracks due to overheating, pitching, deformation and other damage. Replace with a new turbine housing if cracked.
2. Operate the waste gate valve lever manually to check that the gate can be operated and closed smoothly.



COMPRESSOR COVER

Check the compressor cover for traces of contact with the compressor wheel and other damage.

TURBINE WHEEL ASSEMBLY

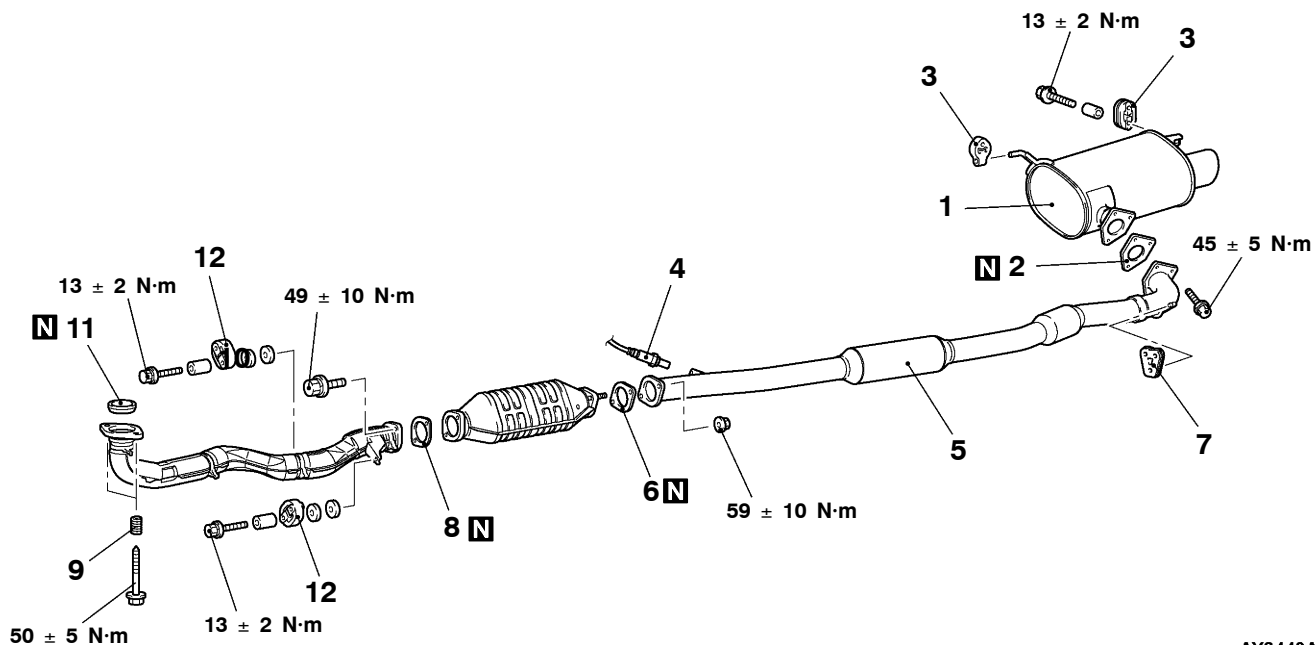
1. Check the turbine and compressor wheel blades for bend, burr, damage, corrosion and traces of contact on the back side and replace if defective.
2. Check the oil passage of the turbine wheel assembly for deposit and clogging.
3. In the case of water cooled type, check also the water passage for deposit and clogging.
4. Check the turbine wheel and compressor wheel for light and smooth turning.

EXHAUST PIPE AND MAIN MUFFLER

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Crossmember Bar Removal and Installation (Refer to GROUP 32 - Engine Roll Stopper, Centermember.)



AY2440AU

Exhaust main muffler removal steps

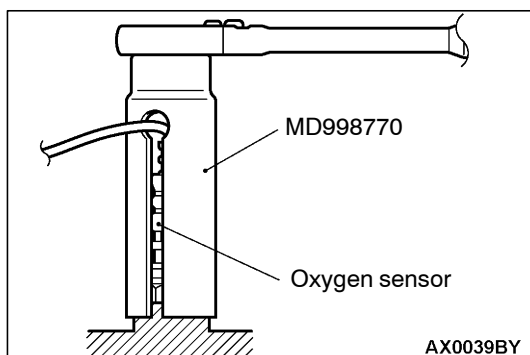
1. Exhaust main muffler
2. Exhaust pipe gasket
3. Exhaust muffler hanger

Center exhaust pipe removal steps

4. Oxygen sensor
5. Center exhaust pipe
2. Exhaust pipe gasket
6. Exhaust pipe gasket
7. Exhaust pipe hanger

Front exhaust pipe removal steps

8. Exhaust pipe gasket
9. Spring
10. Front exhaust pipe
11. Seal ring
12. Exhaust pipe hanger



REMOVAL SERVICE POINT

◀▶ OXYGEN SENSOR REMOVAL

Use special tool to remove the oxygen sensor.

ENGINE ELECTRICAL

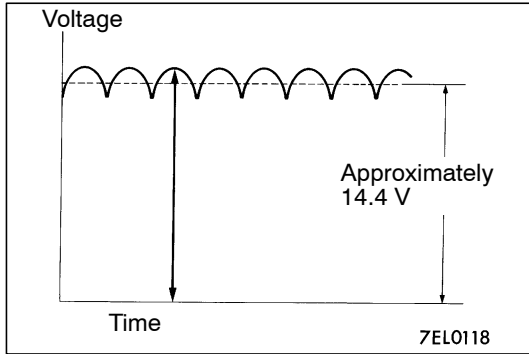
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CHARGING SYSTEM

GENERAL INFORMATION

The charging system uses the alternator output to keep the battery charged at a constant level under various electrical loads.



OPERATION

Rotation of the excited field coil generates AC voltage in the stator.

This alternating current is rectified through diodes to DC voltage having a waveform shown in the illustration at left. The average output voltage fluctuates slightly with the alternator load condition.

When the ignition switch is turned on, current flows in the field coil and initial excitation of the field coil occurs.

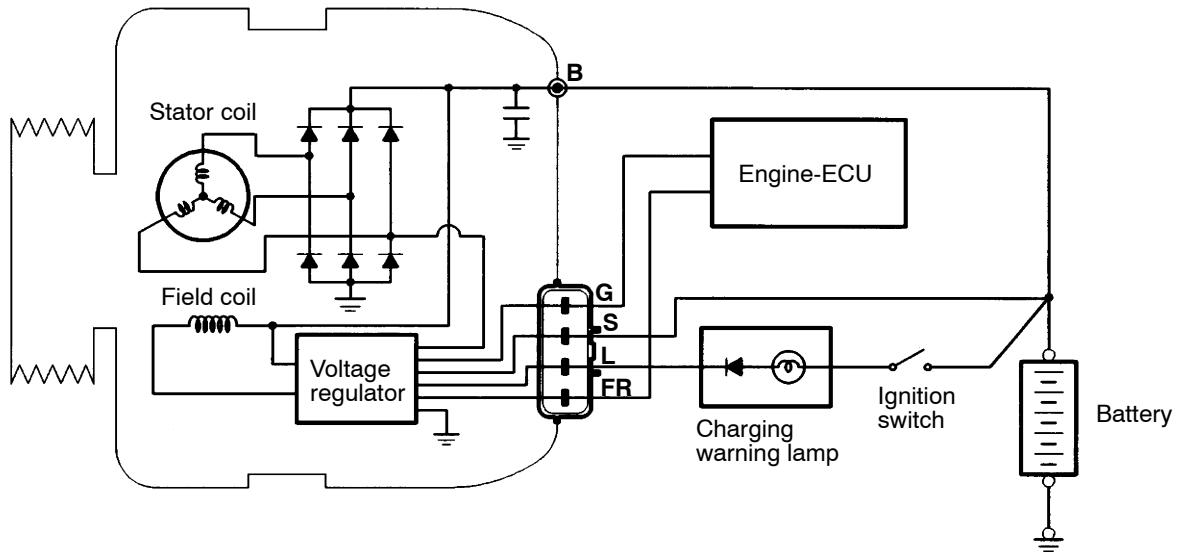
When the stator coil begins to generate power after the engine is started, the field coil is excited by the output current of the stator coil.

The alternator output voltage rises as the field current increases and it falls as the field current decreases. When the battery voltage (alternator S terminal voltage) reaches a regulated voltage

of approximately 14.4 V, the field current is cut off. When the battery voltage drops below the regulated voltage, the voltage regulator regulates the output voltage to a constant level by controlling the field current.

In addition, when the field current is constant, the alternator output voltage rises as the engine speed increases.

SYSTEM DIAGRAM



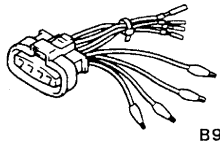
ALTERNATOR SPECIFICATIONS

Items	Specifications
Type	Battery voltage sensing
Rated output V/A	12/90
Voltage regulator	Electronic built-in type

SERVICE SPECIFICATIONS

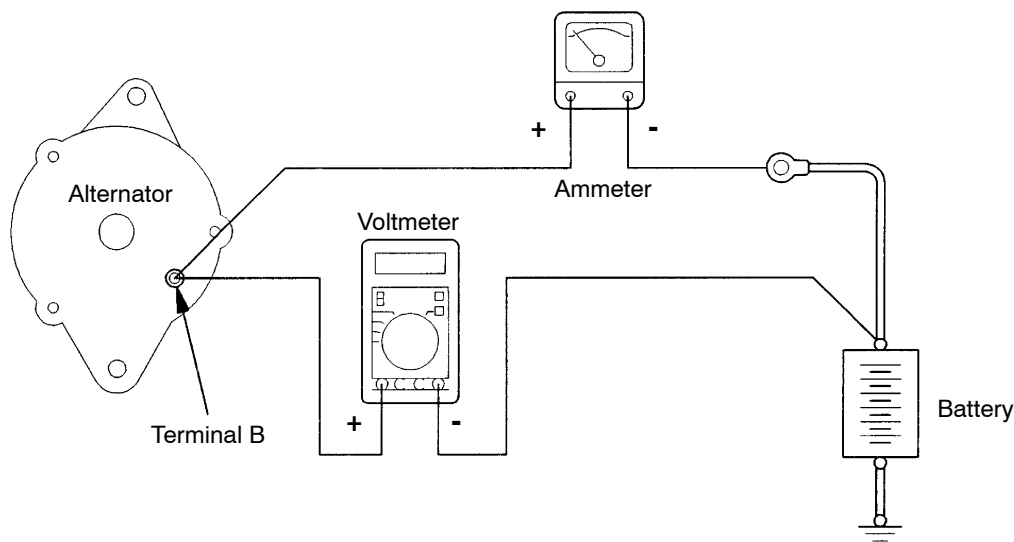
Items	Standard value	Limit
Alternator output line voltage drop (at 30 A) V	-	max. 0.3
Regulated voltage ambient temp. at voltage regulator V	-20°C	14.2 - 15.4
	20°C	13.9 - 14.9
	60°C	13.4 - 14.6
	80°C	13.1 - 14.5
Output current	-	70 % of normal output current
Rotor coil resistance Ω	Approx. 3 - 5	-
Protrusion length of brush mm	-	2

SPECIAL TOOL

Tool	Number	Name	Use
 B991519	MB991519	Alternator test harness	Checking the alternator (S terminal voltage)

ON-VEHICLE SERVICE

ALTERNATOR OUTPUT LINE VOLTAGE DROP TEST



9EN0468

This test determines whether the wiring from the alternator "B" terminal to the battery (+) terminal (including the fusible line) is in a good condition or not.

- (1) Always be sure to check the following before the test.
 - Alternator installation
 - Alternator drive belt tension (Refer to GROUP 11 - On-vehicle Service.)
 - Fusible link
 - Abnormal noise from the alternator while the engine is running
- (2) Turn the ignition switch to the "LOCK" (OFF) position.
- (3) Disconnect the negative battery cable.
- (4) Disconnect the alternator output wire from the alternator "B" terminal and connect a DC test ammeter with a range of 0 - 100 A in series

between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal, and then connect the (-) lead of the ammeter to the disconnected output wire.)

NOTE

An inductive-type ammeter which enables measurements to be taken without disconnecting the alternator output wire should be recommended. Using this equipment will lessen the possibility of a voltage drop caused by a loose "B" terminal connection.

- (5) Connect a digital-type voltmeter between the alternator "B" terminal and the battery (+) terminal. (Connect the (+) lead of the voltmeter to the "B" terminal and the connect the (-) lead of the voltmeter to the battery (+) cable.)

- (6) Reconnect the negative battery cable.
- (7) Connect a tachometer or the MUT-II.
(Refer to GROUP 11 - On-vehicle Service.)
- (8) Leave the hood open.
- (9) Start the engine.
- (10) With the engine running at 2,500 r/min, turn the headlamps and other lamps on and off to adjust the alternator load so that the value displayed on the ammeter is slightly above 30 A.
Adjust the engine speed by gradually decreasing it until the value displayed on the ammeter is 30 A. Take a reading of the value displayed on the voltmeter at this time.

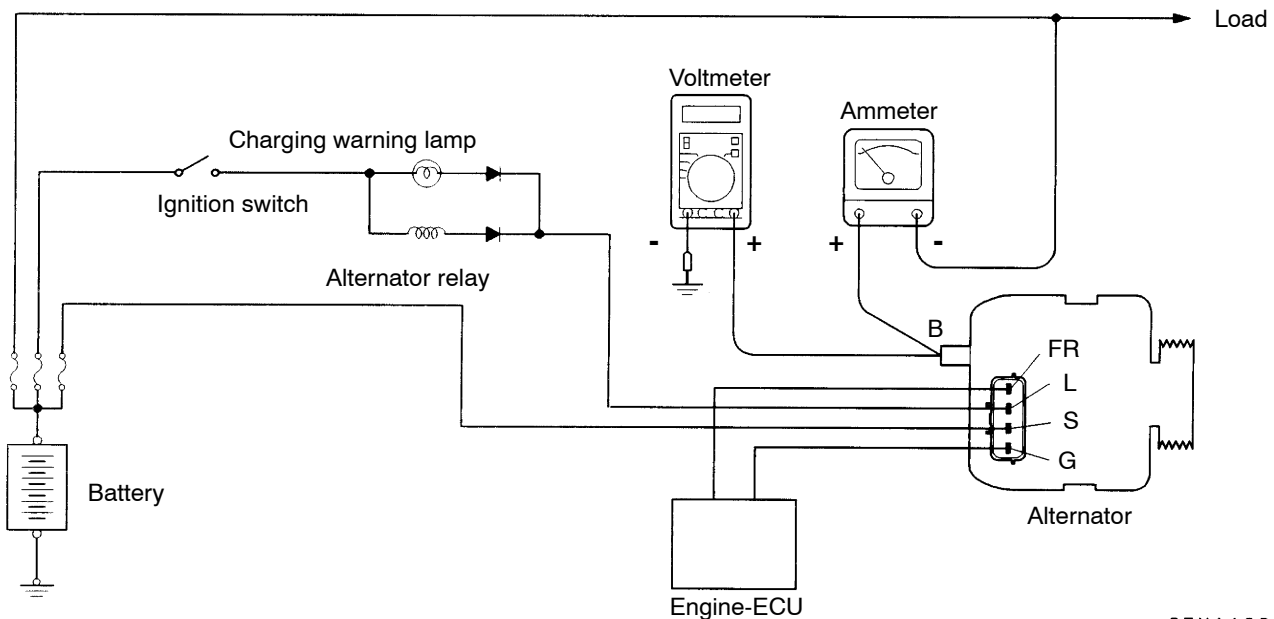
Limit: max. 0.3 V

NOTE

When the alternator output is high and the value displayed on the ammeter does not decrease until 30 A, set the value to 40 A. Read the value displayed on the voltmeter at this time. When the value range is 40 A, the limit is max. 0.4 V.

- (11) If the value displayed on the voltmeter is above the limit value, there is probably a malfunction in the alternator output wire, so check the wiring between the alternator "B" terminal and the battery (+) terminal (including fusible link).
If a terminal is not sufficiently tight or if the harness has become discolored due to overheating, repair and then test again.
- (12) After the test, run the engine at idle.
- (13) Turn off all lamps and the ignition switch.
- (14) Remove the tachometer or the MUT-II.
- (15) Disconnect the negative battery cable.
- (16) Disconnect the ammeter and voltmeter.
- (17) Connect the alternator output wire to the alternator "B" terminal.
- (18) Connect the negative battery cable.

OUTPUT CURRENT TEST



6EN1162

This test determines whether the alternator output current is normal.

(1) Before the test, always be sure to check the following.

- Alternator installation
- Battery (Refer to GROUP 54 - Battery.)

NOTE

The battery should be slightly discharged. The load needed by a fully-charged battery is insufficient for an accurate test.

- Alternator drive belt tension (Refer to GROUP 11 - On-vehicle Service.)
 - Fusible link
 - Abnormal noise from the alternator while the engine is running.
- (2) Turn the ignition switch to the "LOCK" (OFF) position.
- (3) Disconnect the negative battery cable.
- (4) Disconnect the alternator output wire from the alternator "B" terminal. Connect a DC test ammeter with a range of 0 - 100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal. Connect the (-) lead of the ammeter to the disconnected output wire.)

Caution

Never use clips but tighten bolts and nuts to connect the line. Otherwise loose connections (e.g. using clips) will lead to a serious accident because of high current.

NOTE

An inductive-type ammeter which enables measurements to be taken without disconnecting the alternator output wire should be recommended.

- (5) Connect a voltmeter with a range of 0-20 V between the alternator "B" terminal and the earth. (Connect the (+) lead of the voltmeter to the "B" terminal, and then connect the (-) lead of the voltmeter to the earth.)
- (6) Connect the negative battery cable.
- (7) Connect a tachometer or the MUT-II. (Refer to GROUP 11 - On-vehicle Service.)
- (8) Leave the hood open.
- (9) Check that the reading on the voltmeter is equal to the battery voltage.

NOTE

If the voltage is 0 V, the cause is probably an open circuit in the wire or fusible link between the alternator "B" terminal and the battery (+) terminal.

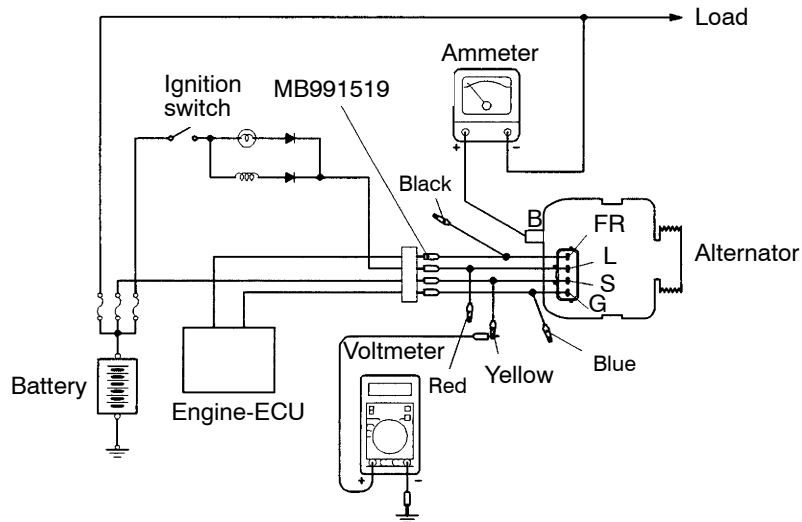
- (10) Turn the light switch on to turn on headlamps and then start the engine.
- (11) Immediately after setting the headlamps to high beam and turning the heater blower switch to the high revolution position, increase the engine speed to 2,500 r/min and read the maximum current output value displayed on the ammeter.

Limit: 70 % of normal current output

NOTE

- For the nominal current output, refer to the Alternator Specifications.
 - Because the current from the battery will soon drop after the engine is started, the above step should be carried out as quickly as possible in order to obtain the maximum current output value.
 - The current output value will depend on the electrical load and the temperature of the alternator body.
 - If the electrical load is small while testing, the specified level of current may not be output even though the alternator is normal. In such cases, increase the electrical load by leaving the headlamps turned on for some time to discharge the battery or by using the lighting system in another vehicle, and then test again.
 - The specified level of current also may not be output if the temperature of the alternator body or the ambient temperature is too high. In such cases, cool the alternator and then test again.
- (12) The reading on the ammeter should be above the limit value. If the reading is below the limit value and the alternator output wire is normal, remove the alternator from the engine and check the alternator.
- (13) Run the engine at idle after the test.
- (14) Turn the ignition switch to the "LOCK" (OFF) position.
- (15) Remove the tachometer or the MUT-II.
- (16) Disconnect the negative battery cable.
- (17) Disconnect the ammeter and voltmeter.
- (18) Connect the alternator output wire to the alternator "B" terminal.
- (19) Connect the negative battery cable.

REGULATED VOLTAGE TEST



6AE0355

This test determines whether the voltage regulator is correctly controlling the alternator output voltage.

- (1) Always be sure to check the following before the test.
 - Alternator installation
 - Check that the battery installed in the vehicle is fully charged. (Refer to GROUP 54 - Battery.)
 - Alternator drive belt tension (Refer to GROUP 11 - On-vehicle Service.)
 - Fusible link
 - Abnormal noise from the alternator while the engine is running
- (2) Turn the ignition switch to the "LOCK" (OFF) position.
- (3) Disconnect the negative battery cable.
- (4) Use the special tool (Alternator test harness: MB991519) to connect a digital voltmeter between the alternator S terminal and earth. (Connect the (+) lead of the voltmeter to the "S" terminal, and then connect the (-) lead of the voltmeter to a secure earth or to the battery (-) terminal.)
- (5) Disconnect the alternator output wire from the alternator "B" terminal.

- (6) Connect a DC test ammeter with a range of 0 - 100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal. Connect the (-) lead of the ammeter to the disconnected output wire.)
- (7) Reconnect the negative battery cable.
- (8) Connect a tachometer or the MUT-II. (Refer to GROUP 11 - On-vehicle Service.)
- (9) Turn the ignition switch to the ON position and check that the reading on the voltmeter is equal to the battery voltage.

NOTE

If the voltage is 0 V, the cause is probably an open circuit in the wire or fusible link between the alternator "S" terminal and the battery (+) terminal.

- (10) Turn all lamps and accessories off.
- (11) Start the engine.
- (12) Increase the engine speed to 2,500 r/min.
- (13) Read the value displayed on the voltmeter when the alternator output current alternator becomes 10 A or less.

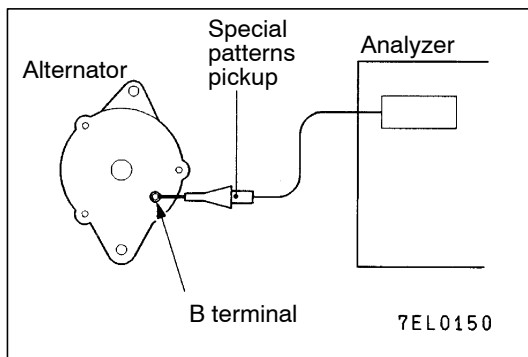
- (14) If the voltage reading conforms to the value in the voltage regulation, then the voltage regulator is operating normally. If the voltage is not within the standard value, there is a malfunction of the voltage regulator or of the alternator.
- (15) After the test, lower the engine speed to the idle speed.
- (16) Turn the ignition switch to the "LOCK" (OFF) position.

- (17) Remove the tachometer or the MUT-II.
- (18) Disconnect the negative battery cable.
- (19) Disconnect the ammeter and voltmeter.
- (20) Connect the alternator output wire to the alternator "B" terminal.
- (21) Remove the special tool, and return the connector to the original condition.
- (22) Connect the negative battery cable.

Voltage Regulation Table

Standard value:

Inspection terminal	Voltage regulator ambient temperature °C	Voltage V
Terminal "S"	- 20	14.2 - 15.4
	20	13.9 - 14.9
	60	13.4 - 14.6
	80	13.1 - 14.5



WAVEFORM CHECK USING AN ANALYZER

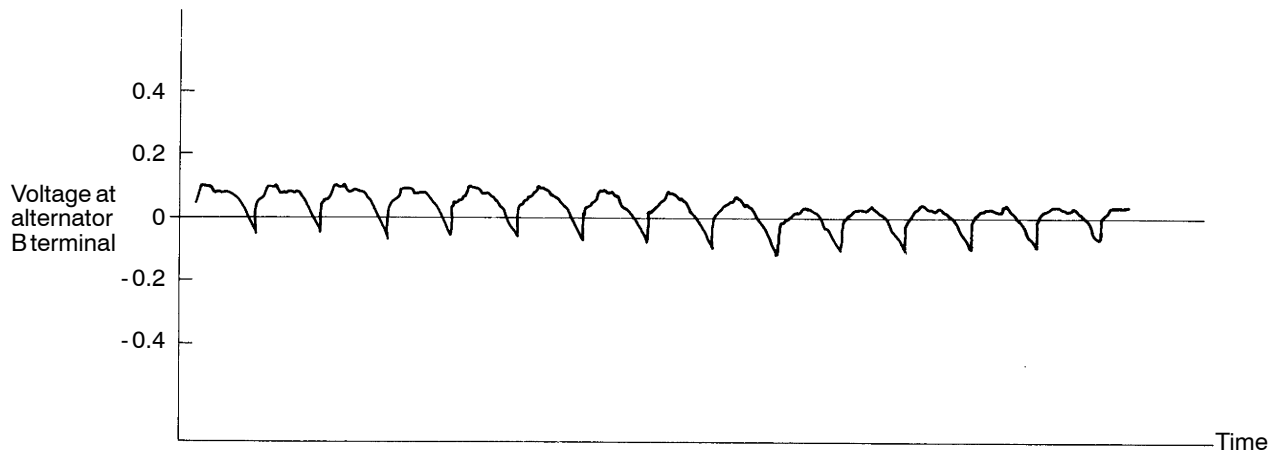
MEASUREMENT METHOD

Connect the analyzer special patterns pick-up to the alternator B terminal.

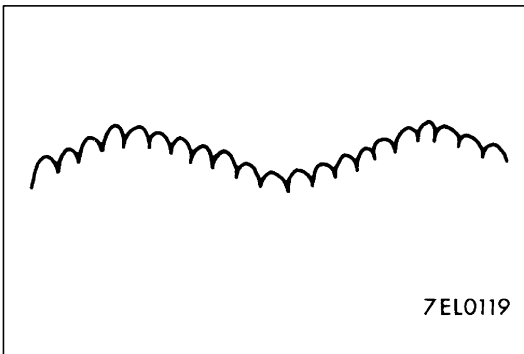
STANDARD WAVEFORM

Observation Conditions

FUNCTION	SPECIAL PATTERNS
PATTERN HEIGHT	VARIABLE
VARIABLE knob	Adjust while viewing the waveform.
PATTERN SELECTOR	RASTER
Engine speed	Curb idle speed



7EL0115



7EL0119

NOTE






The voltage waveform of the alternator B terminal can undulate as shown at left. This waveform is produced when the regulator operates according to fluctuations in the alternator load (current), and is normal for the alternator.

In addition, when the voltage waveform reaches an excessively high value (approximately 2 V or higher at idle), it often indicates an open circuit due to a blown fuse between alternator B terminal and battery, but not a defective alternator.

EXAMPLES OF ABNORMAL WAVEFORMS

NOTE

1. The size of the waveform patterns differs largely, depending on the adjustment of the variable knob on the analyzer.
2. Identification of abnormal waveforms is easier when there is a large output current (regulator is not operating). (Waveforms can be observed when the headlamps are illuminated.)
3. Check the conditions of the charging warning lamp (illuminated/not illuminated). Also, check the charging system totally.

Abnormal waveforms	Problem cause	Abnormal waveforms	Problem cause
Example 1  A7EL0120	Open diode	Example 4  A7EL0123	Short in stator coil
Example 2  A7EL0121	Short in diode	Example 5  A7EL0124	Open supplementary diode
Example 3  A7EL0122	Broken wire in stator coil	At this time, the charging warning lamp is illuminated.	

ALTERNATOR

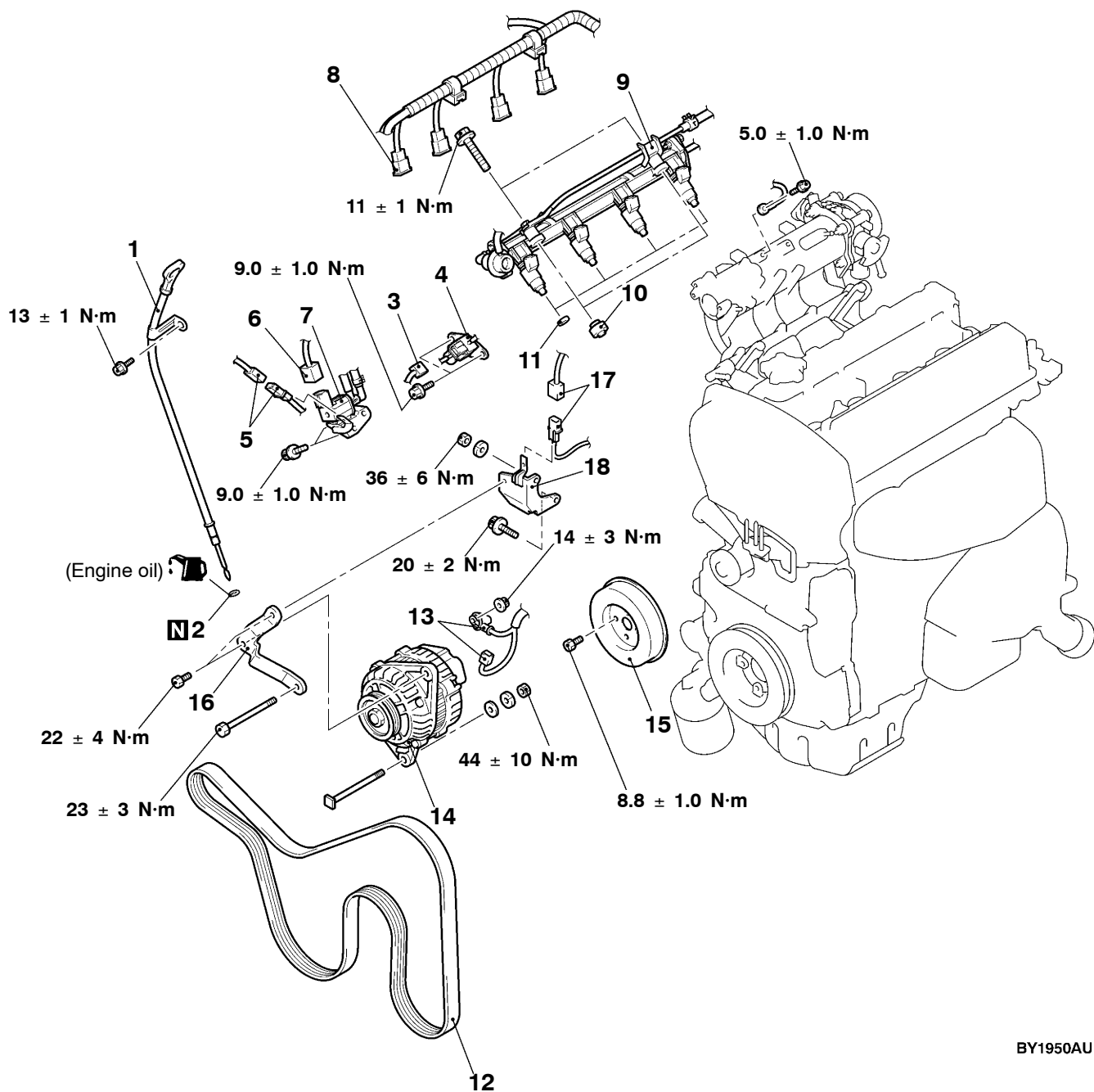
REMOVAL AND INSTALLATION

Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Drive Belt Tension Check (Refer to GROUP 11A - On-vehicle Service.) <After installation only>
- Strut Tower Bar Removal and Installation (Refer to GROUP 42.)
- Crossmember Bar Removal and Installation (Refer to GROUP 32 - Engine Roll Stopper, Centermember.)
- Front Exhaust Pipe Assembly Removal and Installation (Refer to GROUP 15.)



BY1950AU

Removal steps

- 1. Oil level gauge and guide assembly
- 2. O-ring
- 3. Fuel pressure solenoid valve connector
- 4. Fuel pressure solenoid valve assembly
- 5. Detonation sensor connector
- 6. Purge control solenoid valve connector
- 7. Purge control solenoid valve assembly
- 8. Injector connector
- 9. Delivery pipe, injector, and fuel pressure regulator assembly

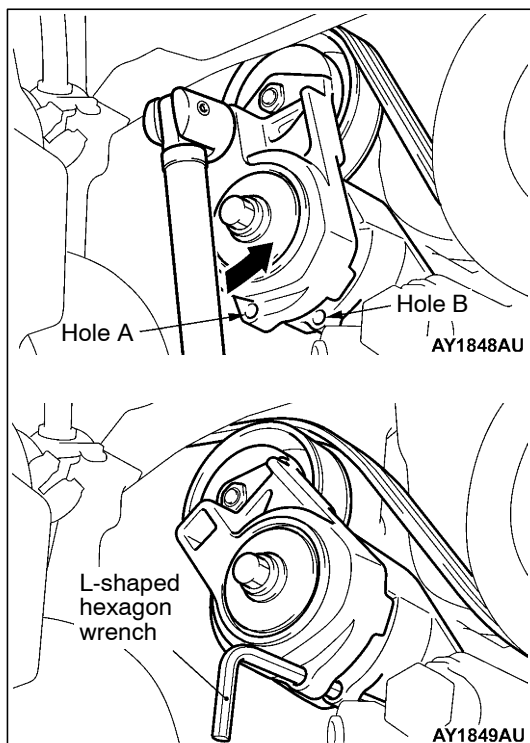


- 10. Insulator
- 11. Insulator
- 12. Drive belt
- 13. Alternator connector
 - Engine mounting (Refer to GROUP 32.)
- 14. Alternator
- 15. Water pump pulley
- 16. Alternator brace
- 17. Oxygen sensor connector
- 18. Alternator brace stay



REMOVAL SERVICE POINTS**◀A▶ DELIVERY PIPE, INJECTOR, AND FUEL PRESSURE REGULATOR ASSEMBLY REMOVAL**

After loosening the installed parts, set the related parts aside to make some space for removing the alternator.

**◀B▶ DRIVE BELT REMOVAL**

Due to the adoption of the Serpentine drive system with the auto-tensioner, the following operation is required:

1. Insert the 12.7sq. spinner handle into the tool hole of the auto-tensioner and rotate it counterclockwise until the auto-tensioner reaches to the stopper.
2. Align hole A with hole B for fixing by inserting the L-shaped hexagon wrench, then remove the drive belt.

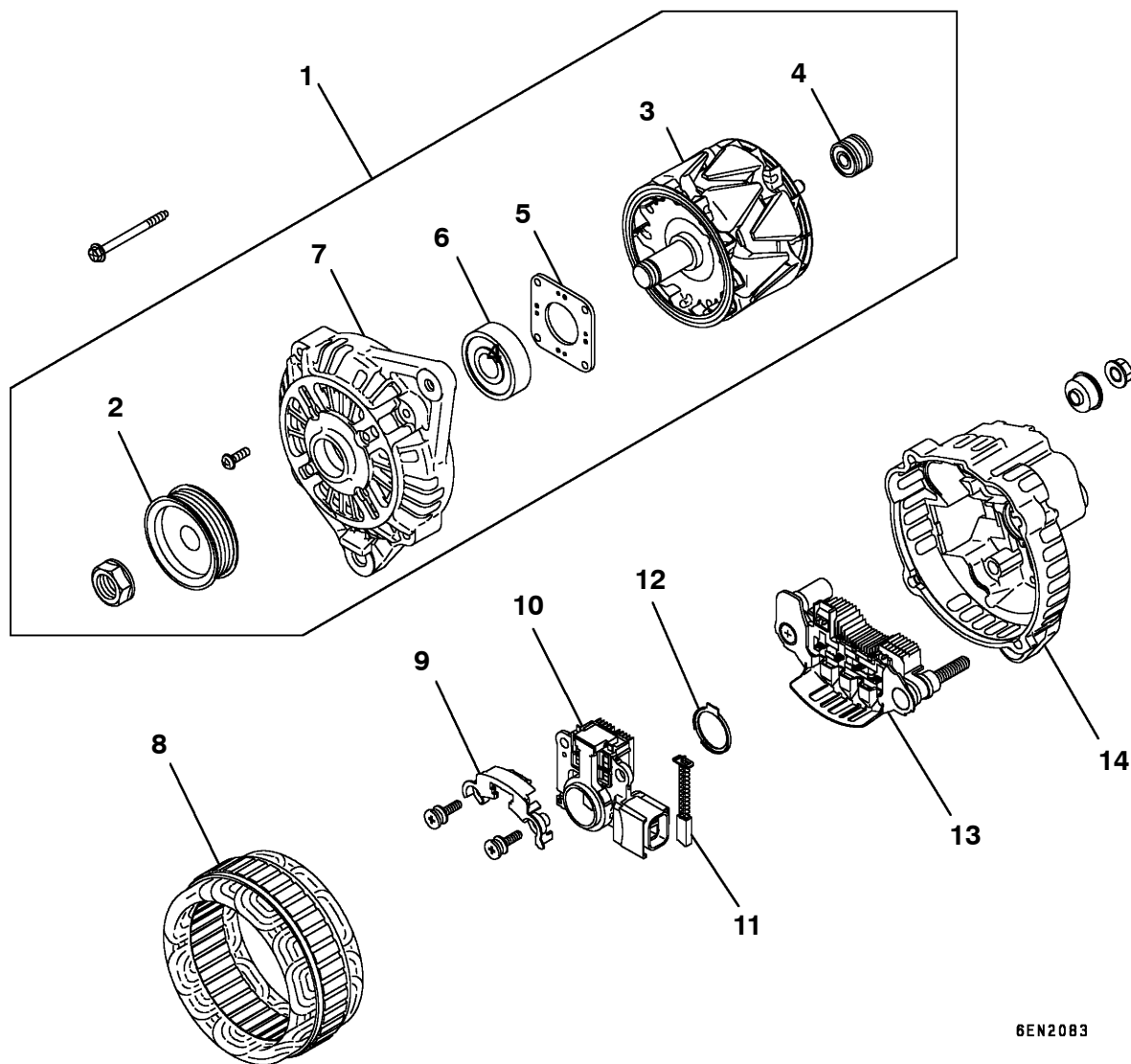
Caution

When the drive belt is reused, use a chalk to indicate an arrow of rotation direction on the back of the belt so that it can be re-assembled in the same direction as before.

◀C▶ ALTERNATOR REMOVAL

Push up the engine with a garage jack to the top and remove the alternator upward from the engine room.

DISASSEMBLY AND REASSEMBLY



6EN2083

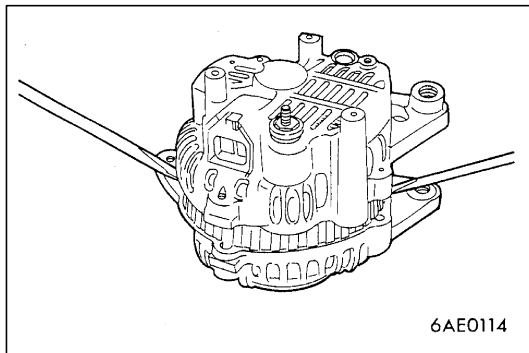
Disassembly steps



1. Front bracket assembly
2. Alternator pulley
3. Rotor
4. Rear bearing
5. Bearing retainer
6. Front bearing
7. Front bracket



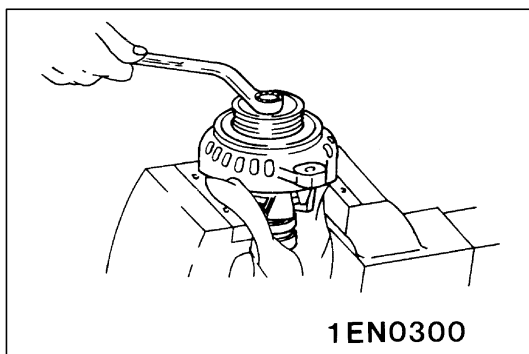
8. Stator
9. Plate
10. Regulator assembly
11. Brush
12. Packing
13. Rectifier
14. Rear bracket

**DISASSEMBLY SERVICE POINTS****◀A▶ FRONT BRACKET ASSEMBLY REMOVAL**

Insert a flat tip screwdrivers or the like in the clearance between the front bracket assembly and stator core, to pry open and separate the stator and front bracket.

Caution

Do not insert a screwdriver too far, or the stator coil gets damaged.

**◀B▶ ALTERNATOR PULLEY REMOVAL**

Face pulley side upward, fix the rotor with a work bench and remove the pulley.

Caution

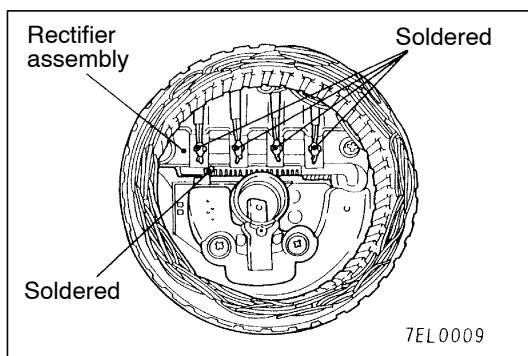
Use care not to damage the rotor.

◀C▶ STATOR/REGULATOR ASSEMBLY REMOVAL

1. Unsolder the stator with a soldering iron (180 to 250 W). Complete this work within four seconds not to transfer heat to the diode.
2. When removing rectifier from the regulator assembly, remove the soldered sections to rectifier.

Caution

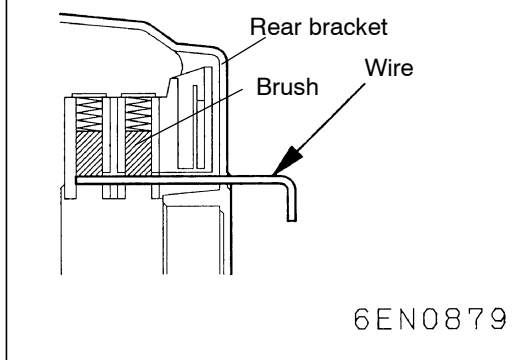
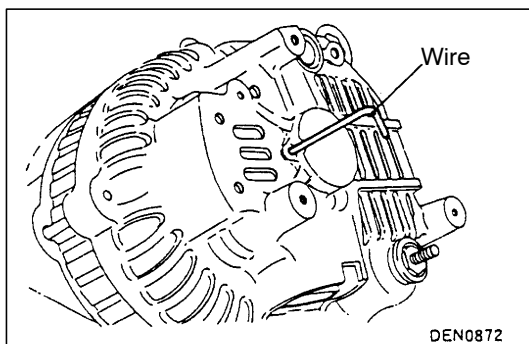
- (1) Use care to make sure that the heat of the soldering iron is not transmitted to the diodes for a long period.
- (2) Use care that no undue force is exerted to the lead wires of the diodes.

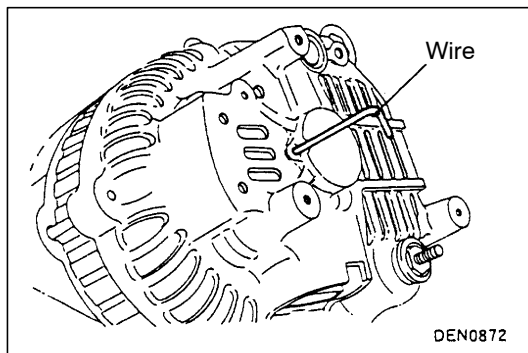
**REASSEMBLY SERVICE POINTS****▶A◀ REGULATOR ASSEMBLY INSTALLATION**

After installing the regulator assembly, insert a wire into the hole provided on the rear bracket while pressing in the brush to fix the brush.

NOTE

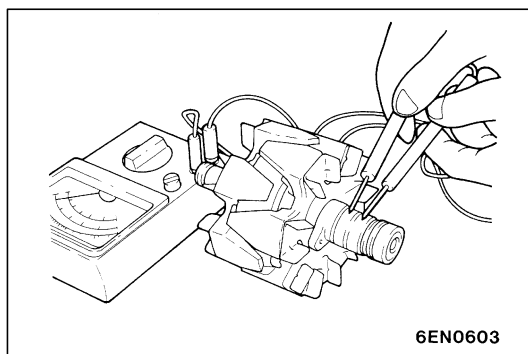
The brush is fixed when a wire is inserted, making rotor installation easier.





►B◄ ROTOR INSTALLATION

After installing the rotor, remove the wire used to fix the brush.

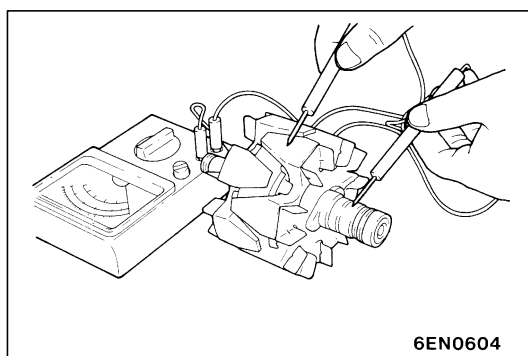


INSPECTION

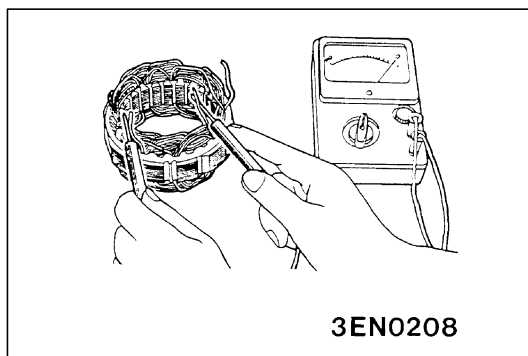
ROTOR CHECK

1. Check the continuity between the rotor coil slip rings, and replace the rotor if the resistance value is not at the standard value.

Standard value: 3 - 5 Ω

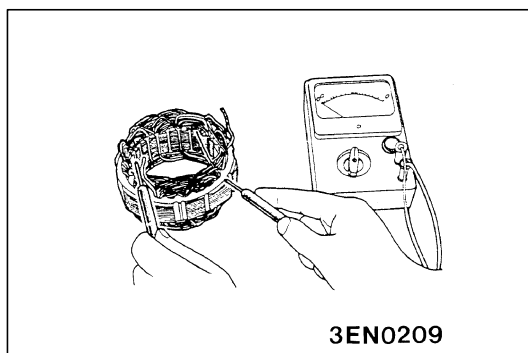


2. Check the continuity between the slip ring and core, and if there is continuity, replace the rotor.

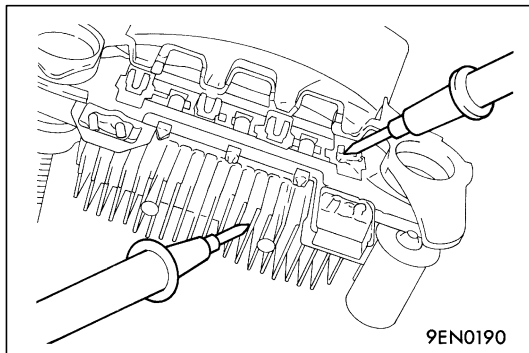


STATOR CHECK

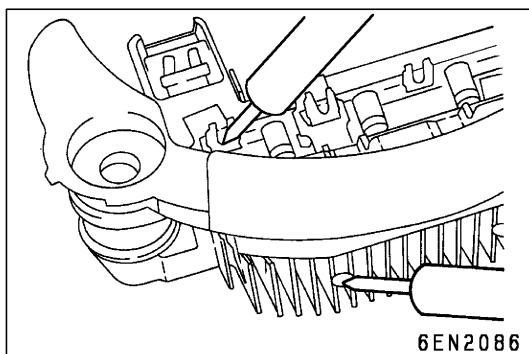
1. Check the continuity between the coil leads, and if there is continuity, replace the stator.



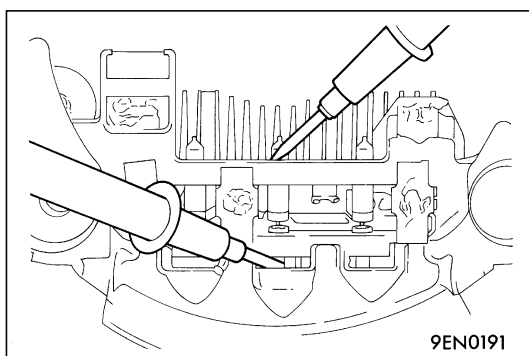
2. Check the continuity between the coil and core, and if there is continuity, replace the stator.

**RECTIFIERS CHECK**

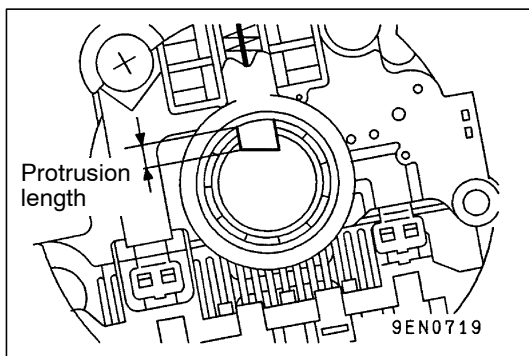
1. Inspect the (+) heat sink by checking the continuity between the (+) heat sink and stator coil lead wire connection terminal using a tester probe.
If there is a continuity at both, the diode is short circuited, so replace the rectifier.



2. Inspect the (-) heat sink by checking the continuity between the (-) heat sink and stator coil lead wire connection terminal using a tester probe.
If there is a continuity at both, the diode is short circuited, so replace the rectifier.

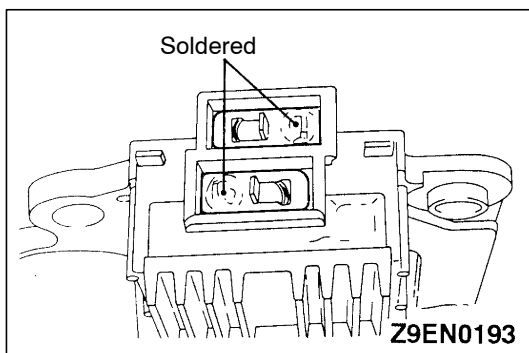


3. Check the diode trio by connecting an ohmmeter to both ends of each diode and check the continuity of the three diodes.
If there is a continuity at both ends, or if there is no continuity, the diode is damaged so replace the rectifier.

**BRUSH CHECK**

1. Measure the length of the brush protrusion shown in the illustration, and replace the brush if the measured value is below the limit value.

Limit: 2 mm or less



2. The brush can be removed if the solder of the brush lead wire is removed.
3. When installing a new brush, insert the brush into the holder as shown in the illustration, and then solder the lead wires.

STARTING SYSTEM

GENERAL INFORMATION

If the ignition switch is turned to the "START" position, current flows in the pull-in and holding coils provided inside magnetic switch, attracting the plunger. When the plunger is attracted, the lever connected to the plunger is actuated to engage the starter clutch.

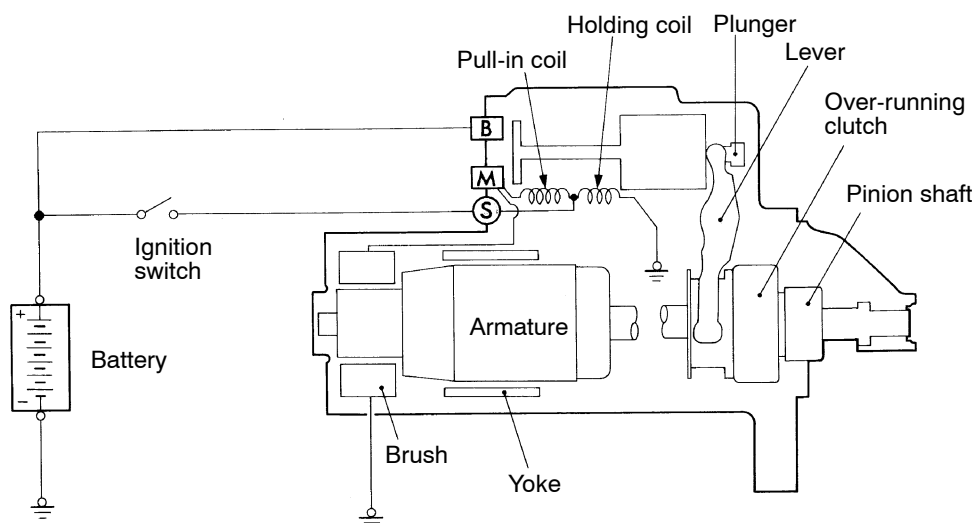
On the other hand, attracting the plunger will turn on the magnetic switch, allowing the B terminal

and M terminal to conduct. Thus, current flows to engage the starter motor.

When the ignition switch is returned to the "ON" position after starting the engine, the starter clutch is disengaged from the ring gear.

An overrunning clutch is provided between the pinion and the armature shaft, to prevent damage to the starter.

SYSTEM DIAGRAM



6EN0939

STARTER MOTOR SPECIFICATIONS

Items	Specifications
Type	Reduction drive with planetary gear
Rated output kW/V	1.2/12
No. of pinion teeth	8

SERVICE SPECIFICATIONS

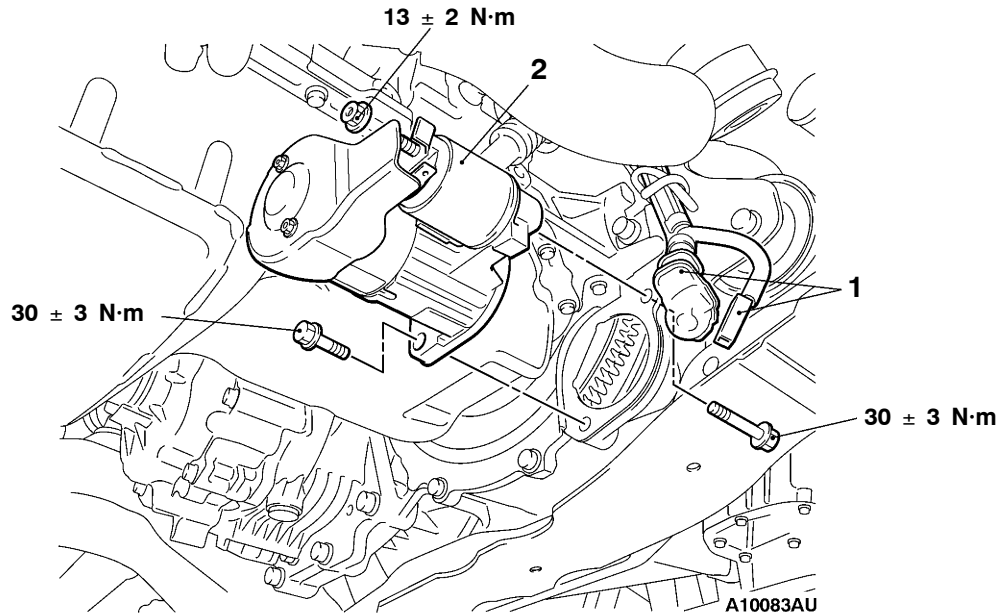
Items	Standard value	Limit
Pinion gap mm	0.5 - 2.0	-
Commutator outer diameter mm	29.4	28.8
Commutator runout mm	0.05	0.1
Commutator undercut mm	0.5	0.2
Brush length mm	-	7.0

STARTER

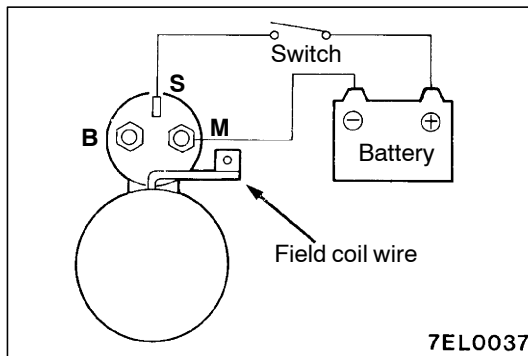
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP51 - Front Bumper.)
- Crossmember Bar Removal and Installation (Refer to GROUP 32 - Engine Roll Stopper, Centermember.)
- Front Exhaust Pipe Assembly Removal and Installation (Refer to GROUP 15.)

**Removal steps**

1. Starter connector
2. Starter

**INSPECTION****PINION GAP ADJUSTMENT**

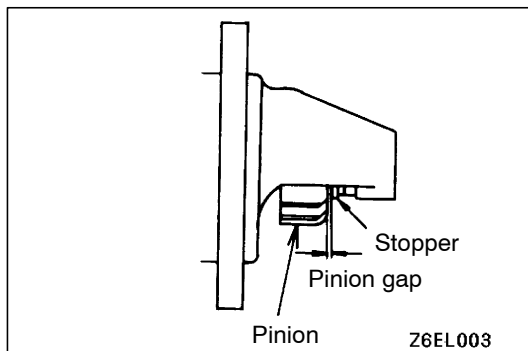
1. Disconnect field coil wire from M-terminal of magnetic switch.
2. Connect a 12 V battery between S-terminal and M-terminal.
3. Set switch to "ON" position, and pinion will move out.

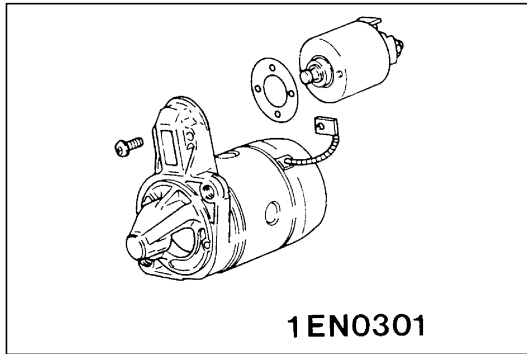
Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

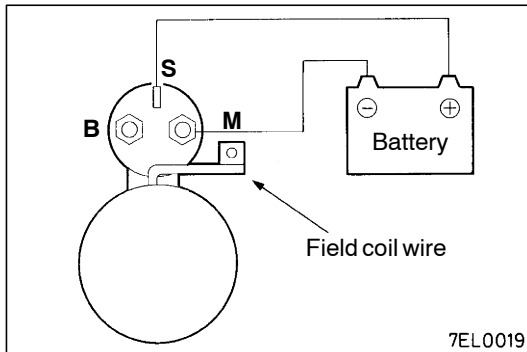
4. Check pinion to stopper clearance (pinion gap) with a thickness gauge.

Standard value: 0.5 - 2.0 mm





- If pinion gap is out of specification, adjust by adding or removing gaskets between magnetic switch and front bracket.



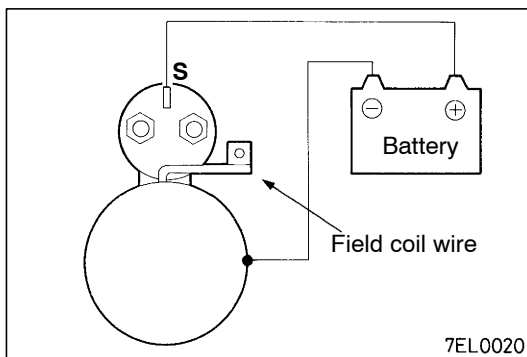
MAGNETIC SWITCH PULL-IN TEST

- Disconnect field coil wire from M-terminal of magnetic switch.
- Connect a 12 V battery between S-terminal and M-terminal.

Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

- If pinion moves out, then pull-in coil is good. If it doesn't, replace magnetic switch.



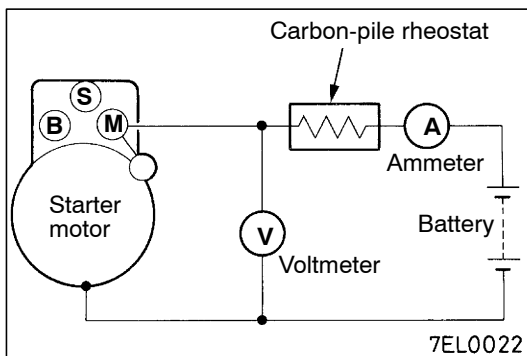
MAGNETIC SWITCH HOLD-IN TEST

- Disconnect field coil wire from M-terminal of magnetic switch.
- Connect a 12 V battery between S-terminal and body.

Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

- Manually pull out the pinion as far as the pinion stopper position.
- If pinion remains out, everything is in order. If pinion moves in, hold-in circuit is open. Replace magnetic switch.

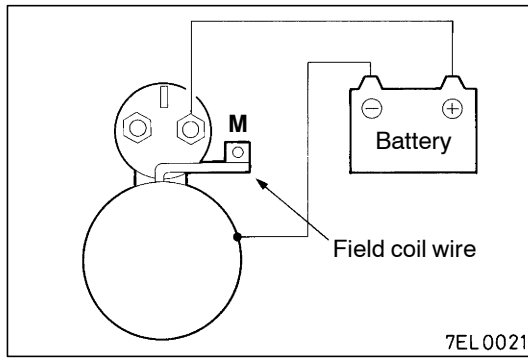


FREE RUNNING TEST

- Place starter motor in a vise equipped with soft jaws and connect a fully-charged 12 V battery to starter motor as follows:
- Connect a test ammeter (100-ampere scale) and carbon pile rheostat in series with battery positive post and starter motor terminal.
- Connect a voltmeter (15 V scale) across starter motor.
- Rotate carbon pile to full-resistance position.
- Connect battery cable from battery negative post to starter motor body.
- Adjust the rheostat until the battery voltage shown by the voltmeter is 11 V Reduction.
- Confirm that the maximum amperage is within the specifications and that the starter motor turns smoothly and freely.

Current:

max. 90 A

**MAGNETIC SWITCH RETURN TEST**

1. Disconnect field coil wire from M-terminal of magnetic switch.
2. Connect a 12 V battery between M-terminal and body.

Caution

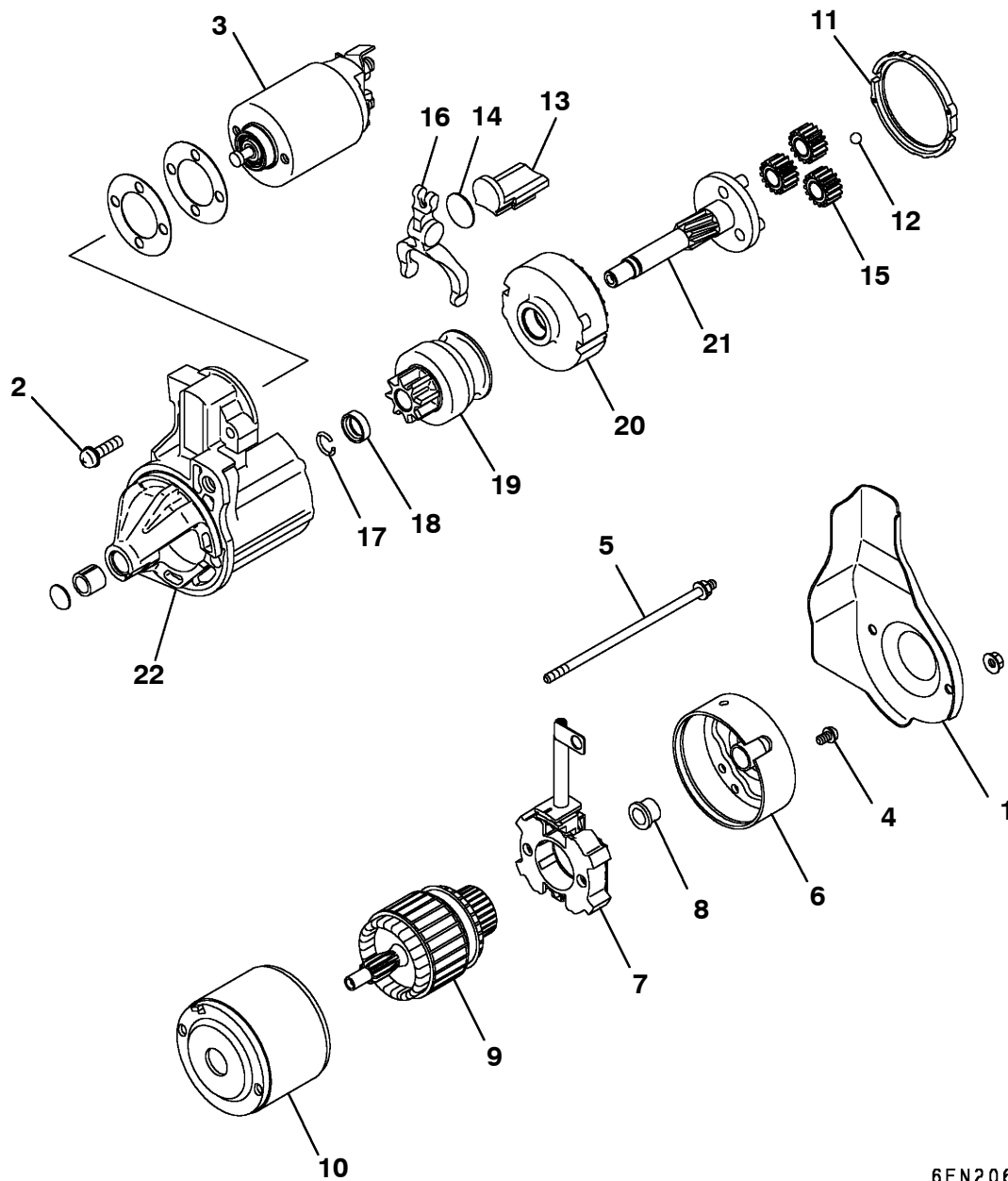
This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

3. Pull pinion out and release. If pinion quickly returns to its original position, everything is in order. If it doesn't, replace magnetic switch.

Caution

Be careful not to get your fingers caught when pulling out the pinion.

DISASSEMBLY AND REASSEMBLY



6EN2060

Disassembly steps

◀A▶

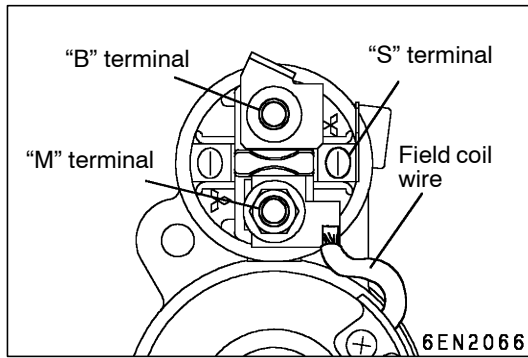
- 1. Cover
- 2. Screw
- 3. Magnetic switch
- 4. Screw
- 5. Through
- 6. Rear bracket
- 7. Brush holder
- 8. Rear bearing
- 9. Armature
- 10. Yoke assembly
- 11. Ball

◀B▶

◀B▶

◀C▶ ▶A▶
▶C▶ ▶A▶

- 12. Packing A
- 13. Packing B
- 14. Plate
- 15. Planetary gear
- 16. Lever
- 17. Snap ring
- 18. Stop ring
- 19. Overrunning clutch
- 20. Internal gear
- 21. Planetary gear holder
- 22. Front bracket



DISASSEMBLY SERVICE POINTS

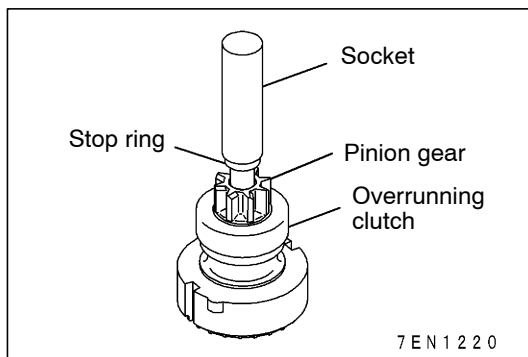
◀A▶ MAGNETIC SWITCH REMOVAL

Disconnect field coil wire from "M" terminal of magnetic switch.

◀B▶ ARMATURE/BALL REMOVAL

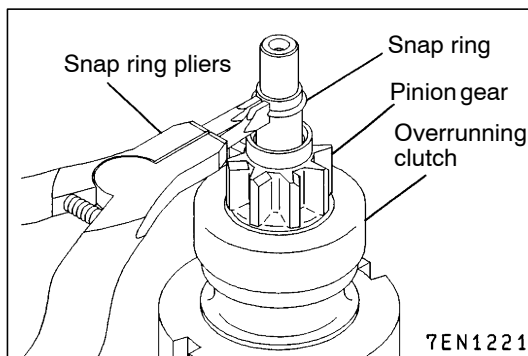
Caution

When removing the armature, take care not to lose the ball (which is used as a bearing) in the armature end.



◀C▶ SNAP RING/STOP RING REMOVAL

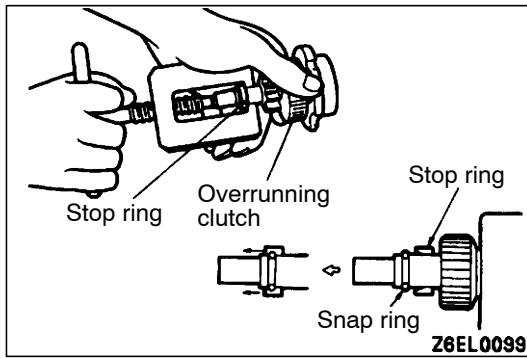
1. Press stop ring off snap ring with a suitable socket.



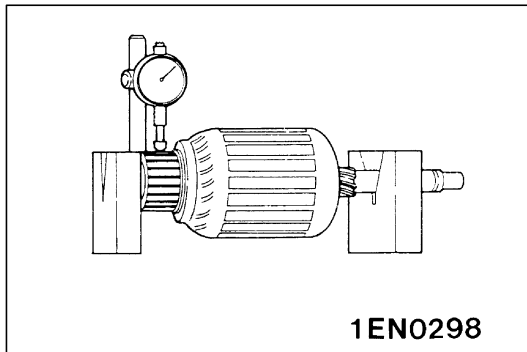
2. Remove snap ring with snap ring pliers and then remove stop ring and overrunning clutch.

STARTER MOTOR PARTS CLEANING

1. Do not immerse parts in cleaning solvent. Immersing the yoke and field coil assembly and/or armature will damage insulation. Wipe motor assembly with a cloth only.
2. Do not immerse drive unit in cleaning solvent. Overrunning clutch is pre-lubricated at the factory and solvent will wash lubrication from clutch.
3. The drive unit may be cleaned with a brush moistened with cleaning solvent and wiped dry with a cloth.

**REASSEMBLY SERVICE POINT****▶A◀ STOP RING/SNAP RING INSTALLATION**

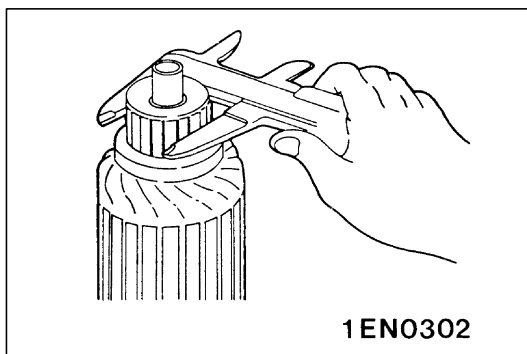
Using a suitable pulling tool, pull overrunning clutch stop ring over snap ring.

**INSPECTION****COMMUTATOR CHECK**

1. Place the armature in a pair of "V" blocks and check the runout with a dial indicator.

Standard value: 0.05 mm

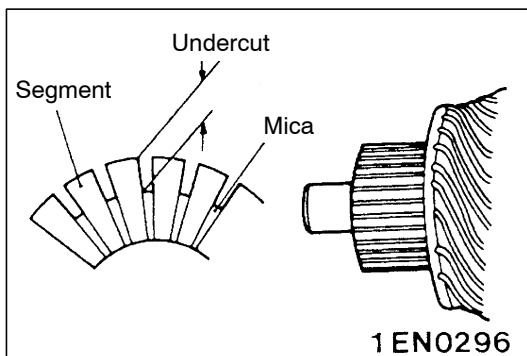
Limit: 0.1 mm



2. Measure the commutator outer diameter.

Standard value: 29.4 mm

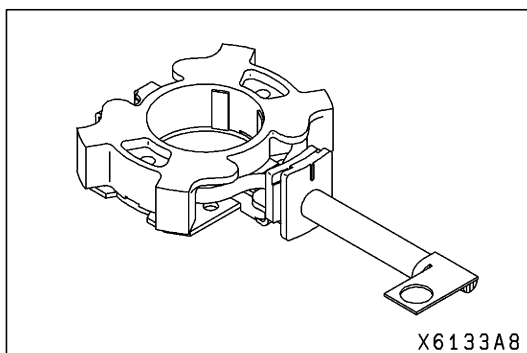
Limit: 28.8 mm



3. Check the undercut depth between segments.

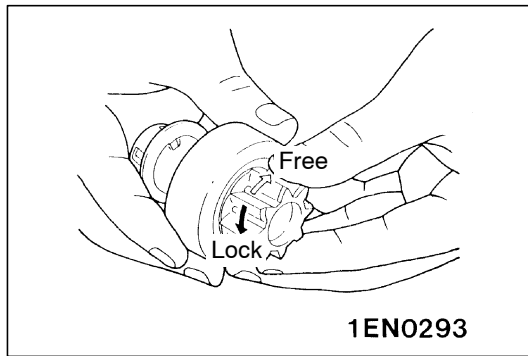
Standard value: 0.5 mm

Limit: 0.2 mm

**BRUSH HOLDER CHECK**

Confirm that the spring is activated when the brush is pressed into the brush holder by hand.

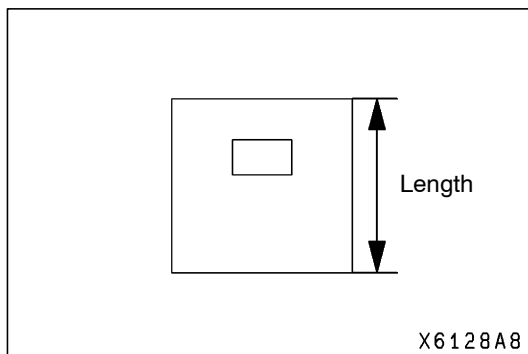
Replace the brush holder if the spring is not activated.

**OVERRUNNING CLUTCH CHECK**

1. While holding clutch housing, rotate the pinion. Drive pinion should rotate smoothly in one direction, but should not rotate in opposite direction. If clutch does not function properly, replace overrunning clutch assembly.
2. Inspect pinion for wear or burrs. If pinion is worn or burred, replace overrunning clutch assembly. If pinion is damaged, also inspect ring gear for wear or burrs.

FRONT AND REAR BRACKET BUSHING CHECK

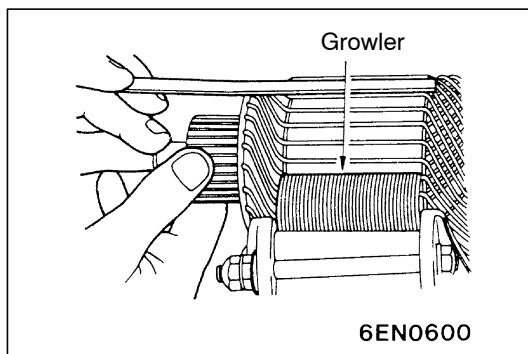
Inspect bushing for wear or burrs. If bushing is worn or burred, replace front bracket assembly or rear bracket assembly.

**BRUSH REPLACEMENT**

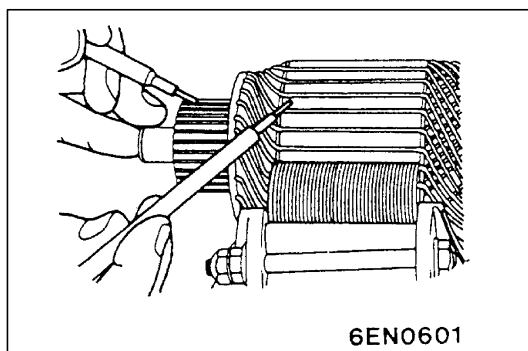
1. Check the surface contacting the commutator for roughness and the brush length.

Limit value: 7.0 mm

2. If the limit is exceeded, replace the brush holder.

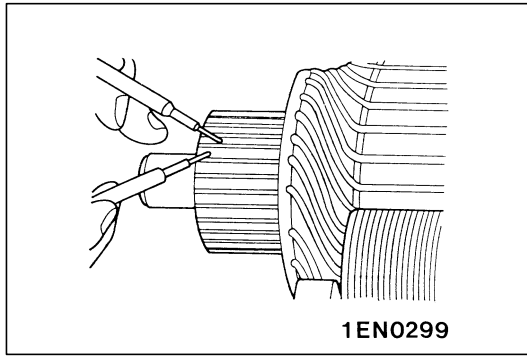
**ARMATURE TEST****ARMATURE COIL SHORT-CIRCUIT TEST**

1. Check that the armature coil is not grounded.
2. Place armature in a growler.
3. Hold a thin steel blade parallel and just above while rotating armature slowly in growler. A shorted armature will cause blade to vibrate and be attracted to the core. Replace shorted armature.

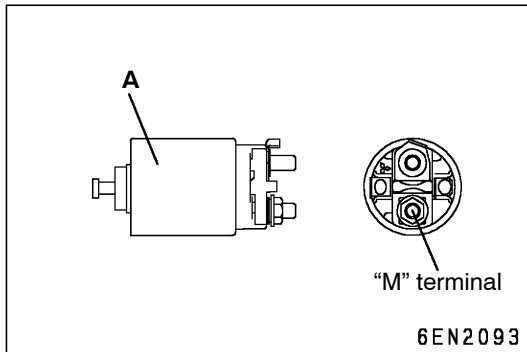
**ARMATURE COIL EARTH TEST**

Check the insulation between each commutator segment and armature coil core.

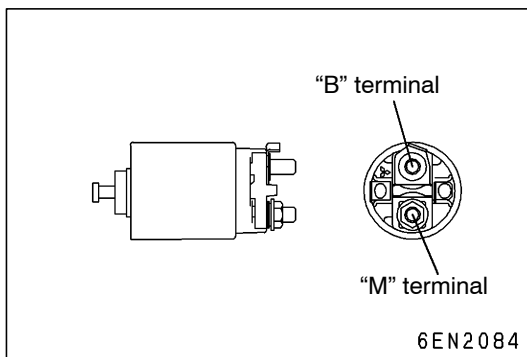
If there is no continuity, the insulation is in order.

**ARMATURE COIL OPEN-CIRCUIT INSPECTION**

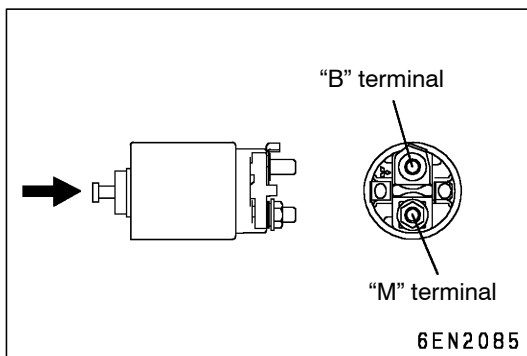
Check the continuity between segments. If there is continuity, the coil is in order.

**MAGNETIC SWITCH****COIL DISCONNECTION TEST**

- Confirm that there is continuity between the "M" terminal and body A.
- If there is no continuity, replace the magnetic switch.

**CONTACT CONTACTING STATE CHECK**

- Confirm that there is no continuity between the "B" terminal and "M" terminal.
- If there is continuity, replace the magnetic switch.

**CONTACT CONTACTING STATE CHECK**

- Press the end of the magnetic switch in with force, and close the internal contact. Confirm that there is continuity between the "B" terminal and "M" terminal in this state.
- If there is no continuity, replace the magnetic switch.

IGNITION SYSTEM

GENERAL INFORMATION

This system is equipped with two ignition coils (A and B) with built-in power transistors for the No. 1 and No. 4 cylinders and the No. 2 and No. 3 cylinders respectively.

Interruption of the primary current flowing in the primary side of ignition coil A generates a high voltage in the secondary side of ignition coil A.

The high voltage thus generated is applied to the spark plugs of No. 1 and No. 4 cylinders to generate sparks. At the time that the sparks are generated at both spark plugs, if one cylinder is at the compression stroke, the other cylinder is at the exhaust stroke, so that ignition of the compressed air/fuel mixture occurs only for the cylinder which is at the compression stroke.

In the same way, when the primary current flowing in ignition coil B is interrupted, the high voltage thus generated is applied to the spark plugs of No. 2 and No. 3 cylinders.

The Engine-ECU turns the two power transistors inside the ignition coils alternately on and off. This

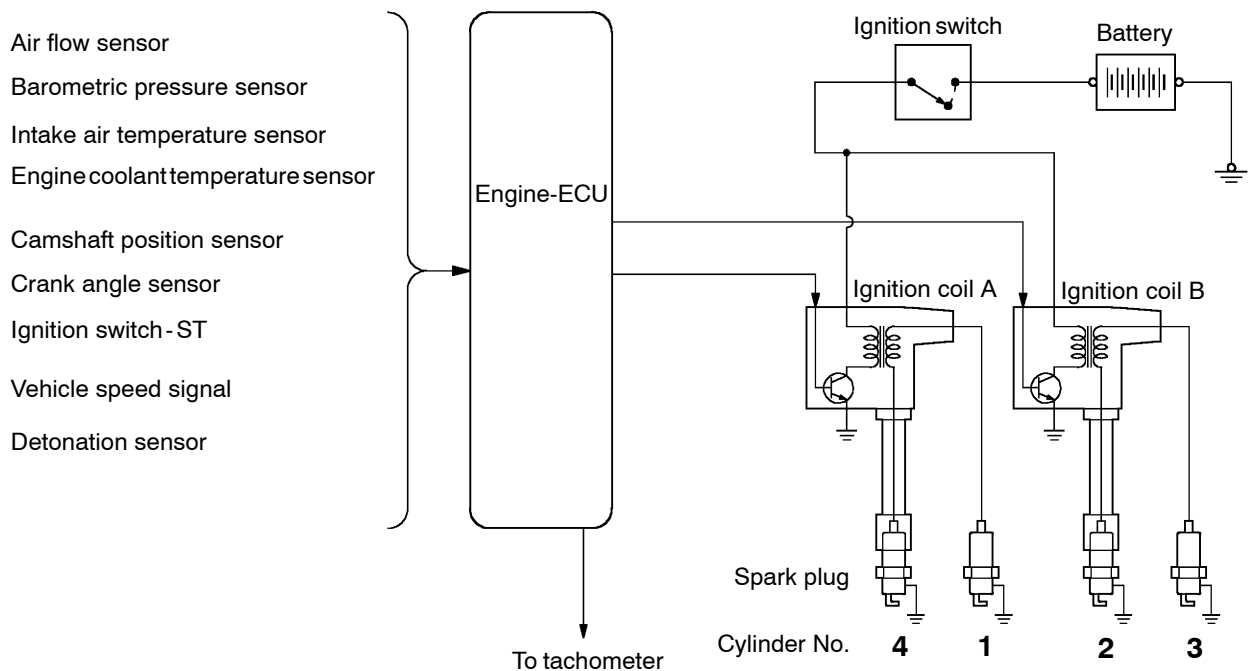
causes the primary currents in the ignition coils to be alternately interrupted and allowed to flow to fire the cylinders in the order 1-3-4-2.

The Engine-ECU determines which ignition coil should be controlled by means of the signals from the camshaft position sensor which is incorporated in the camshaft and from the crank angle sensor which is incorporated in the crankshaft. It also detects the crankshaft position in order to provide ignition at the most appropriate timing in response to the engine operation conditions. It also detects the crankshaft position in order to provide ignition at the most appropriate timing in response to the engine operation conditions.

When the engine is cold or operated at high altitudes, the ignition timing is slightly advanced to provide optimum performance.

When the automatic transmission shifts gears, the ignition timing is also retarded in order to reduce output torque, thereby alleviating shifting shocks.

SYSTEM DIAGRAM



Y6092AU

IGNITION COIL SPECIFICATIONS

Items	Specifications
Type	Molded 2-coil

SPARK PLUG SPECIFICATIONS

Items	Specifications
NGK	IGR7A-G
DENSO	VW22PR-DA7

SERVICE SPECIFICATIONS**IGNITION COIL**

Items	Standard value
Secondary coil resistance k Ω	8.5 - 11.5

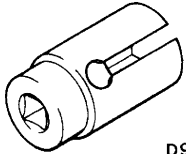
SPARK PLUG

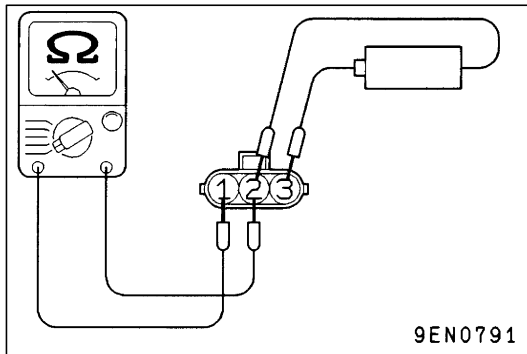
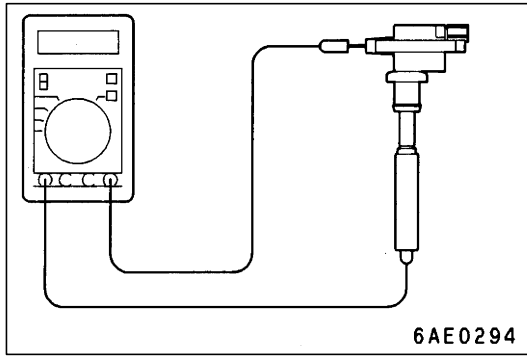
Items	Standard value	Limit
Spark plug gap mm	0.6 - 0.7	0.75

RESISTIVE CORD

Items	Limit
Resistance k Ω	max. 22

SPECIAL TOOL

Tool	Number	Name	Use
 D998773	MD998773	Detonation sensor wrench	Detonation sensor removal and installation



ON-VEHICLE SERVICE

IGNITION COIL (WITH BUILT-IN POWER TRANSISTOR) CHECK

Check by the following procedure, and replace if there is a malfunction.

SECONDARY COIL RESISTANCE CHECK

Measure the resistance between the high-voltage terminals of the ignition coil.

Standard value: 8.5 - 11.5 k Ω

PRIMARY COIL AND POWER TRANSISTOR CONTINUITY CHECK

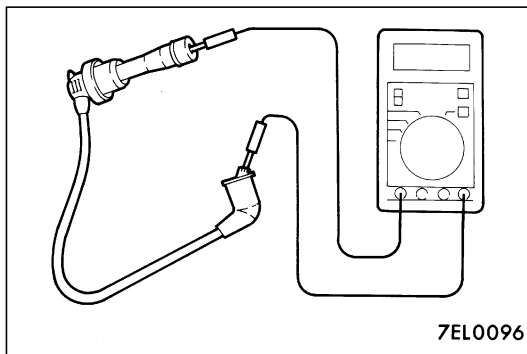
NOTE

1. An analogue-type circuit tester should be used.
2. Connect the negative (-) probe of the circuit tester to terminal 1.

Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning and power transistor from breakage.

1.5V power across 2-3	Continuity across 1-2
When energized	Yes
When not energized	No



RESISTIVE CORD CHECK

Measure the resistance of the all spark plug cables.

1. Check cap and coating for cracks.
2. Measure resistance.

Limit: Max. 22 k Ω

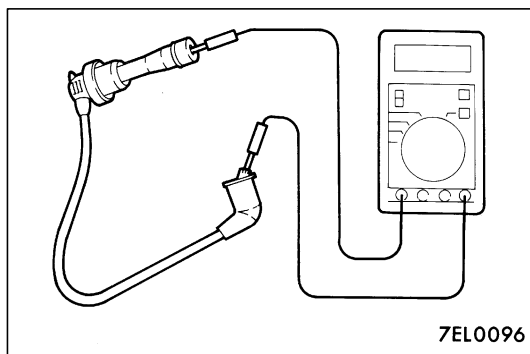
SPARK PLUG CHECK, CLEANING AND REPLACEMENT**SPARK PLUG GAP CHECK****Caution**

1. Do not adjust the gap of the iridium plug.
2. Cleaning of the iridium plug could damage the tip of the electrode. Thus, if the plug must be cleaned because of soot, etc., use a plug cleaner and clean within a short time of 20 seconds or less to protect the electrode. Do not use a wire brush, etc.
3. Even when the functions of the iridium plug are normal, the electrode section may be blackened. However, the adhered carbon has properties that easily burned off compared to the conventional type, so there is no problem. Check the quality of the spark plug by checking the insulation resistance.

Check the plug gap, and replace if the checked value is more than the limit value.

Standard value, limit value:

Maker	Model	Standard value (mm)	Limit value (mm)
NGK	IGR7A-G	0.6 - 0.7	0.75
DENSO	VW22PR-DA7	0.6 - 0.7	0.75

**SPARK PLUG INSULATION RESISTANCE CHECK**

Measure the insulation resistance of the spark plug, and replace if the measured value is less than the limit value.

Limit value: 1 MΩ

CAMSHAFT POSITION SENSOR CHECK

Refer to GROUP 13A - Troubleshooting.

CRANK ANGLE SENSOR CHECK

Refer to GROUP 13A - Troubleshooting.

DETONATION SENSOR CHECK

Check the detonation sensor circuit if self-diagnosis code, No. 31 is shown.

NOTE

For information concerning the self-diagnosis codes, refer to GROUP 13A - Troubleshooting.

WAVEFORM CHECK USING AN ANALYZER**Ignition Secondary Voltage Waveform Check
MEASUREMENT METHOD**

1. Clamp the secondary pickup around the spark plug cable.

NOTE

- (1) The peak ignition voltage will be reversed when the spark cables No. 2 and No. 4, or No. 1 and No. 3 cylinders are clamped.
 - (2) Because of the two-cylinder simultaneous ignition system, the waveforms for two cylinders in each group appear during waveform observation (No. 1 cylinder - No. 4 cylinder, No. 2 cylinder - No. 3 cylinder). However, waveform observation is only applicable for the cylinder with the spark plug cable clamped by the secondary pickup.
 - (3) Identifying which cylinder waveform is displayed can be difficult. For reference, remember that the waveform of the cylinder attached to the secondary pickup will be displayed as stable.
2. Clamp the spark plug cable with the trigger pickup.

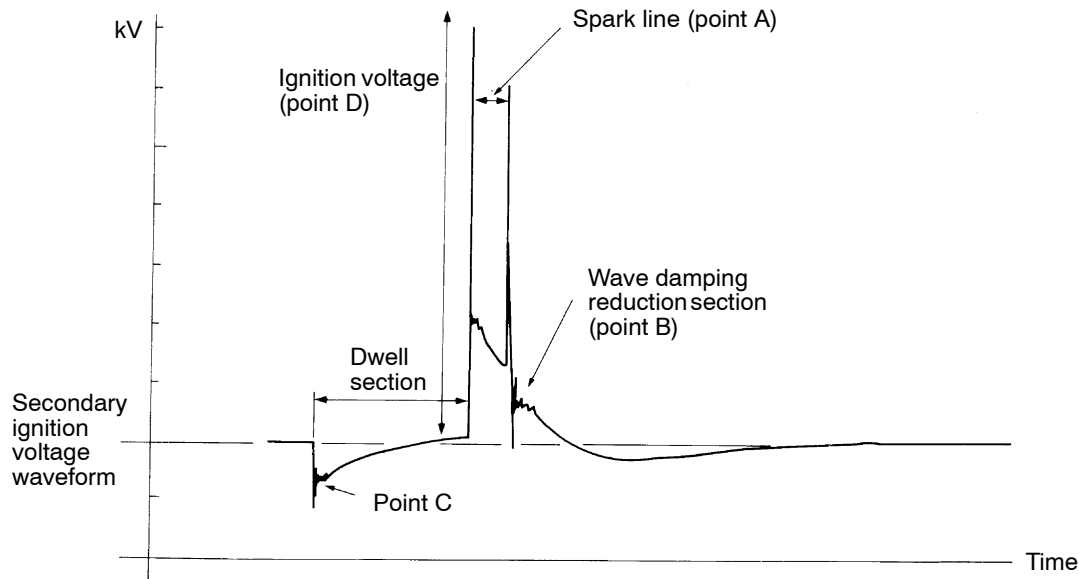
NOTE

Clamp the trigger pickup to the same spark plug cable clamped by the secondary pickup.

STANDARD WAVEFORM

Observation Conditions

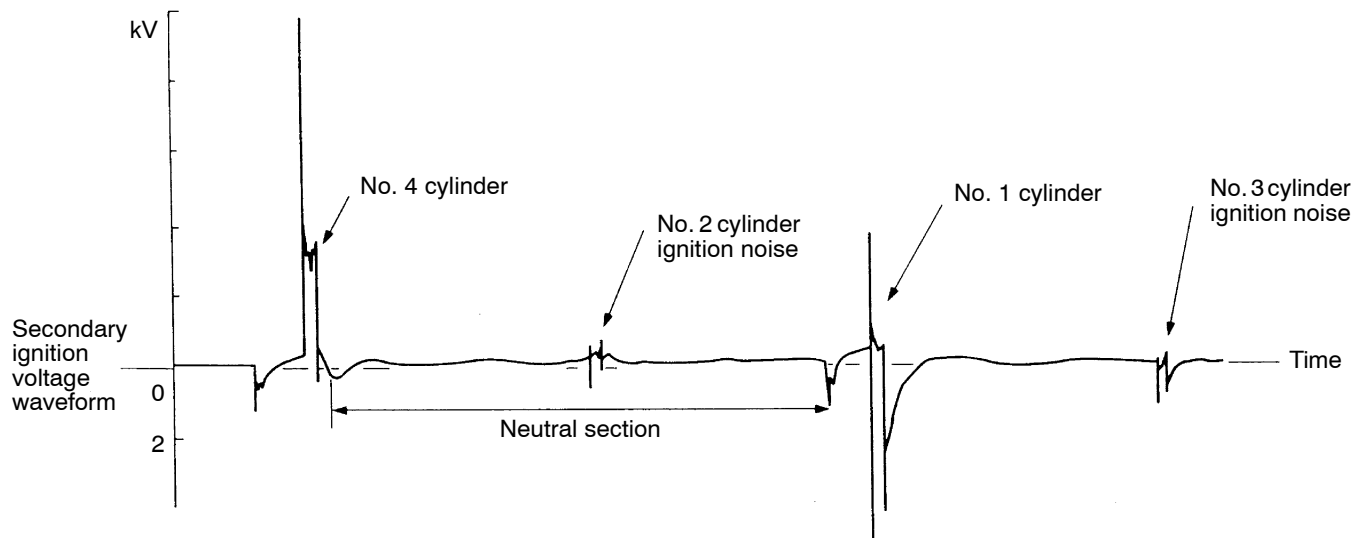
Function	Secondary
Pattern height	High (or Low)
Pattern selector	Raster
Engine revolutions	Curb idle speed



7EL0147

Observation Condition (The only change from above condition is the pattern selector.)

Pattern selector	Display
------------------	---------



6EL0183

WAVEFORM OBSERVATION POINTS

Point A: The height, length and slope of the spark line show the following trends (Refer to abnormal waveform examples, 1, 2, 3 and 4).

Spark line		Plug gap	Condition of electrode	Compression force	Concentration of air mixture	Ignition timing	Spark plug cable
Length	Long	Small	Normal	Low	Rich	Advanced	Leak
	Short	Large	Large wear	High	Lean	Retarded	High resistance
Height	High	Large	Large wear	High	Lean	Retarded	High resistance
	Low	Small	Normal	Low	Rich	Advanced	Leak
Slope		Large	Plug is fouled	-	-	-	-

Point B: Number of vibration in reduction vibration section (Refer to abnormal waveform example 5)

Number of vibrations	Coil and condenser
Three or more	Normal
Except above	Abnormal

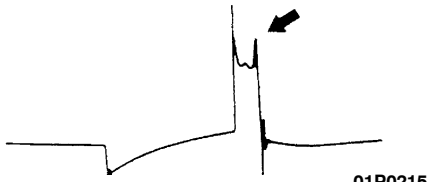

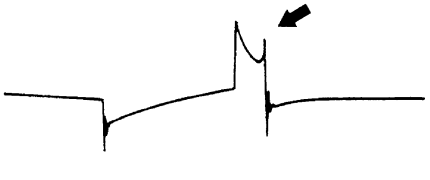
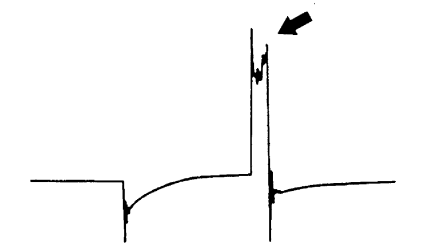
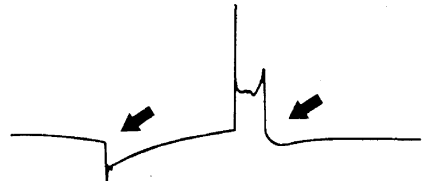
Point C: Number of vibrations at beginning of dwell section (Refer to abnormal waveform example 5)

Number of vibrations	Coil
5 - 6 or higher	Normal
Except above	Abnormal

Point D: Ignition voltage height (distribution per each cylinder) shows the following trends.

Ignition voltage	Plug gap	Condition of electrode	Compression force	Concentration of air mixture	Ignition timing	Spark plug cable
High	Large	Large wear	High	Lean	Retarded	High resistance
Low	Small	Normal	Low	Rich	Advanced	Leak

EXAMPLES OF ABNORMAL WAVEFORMS

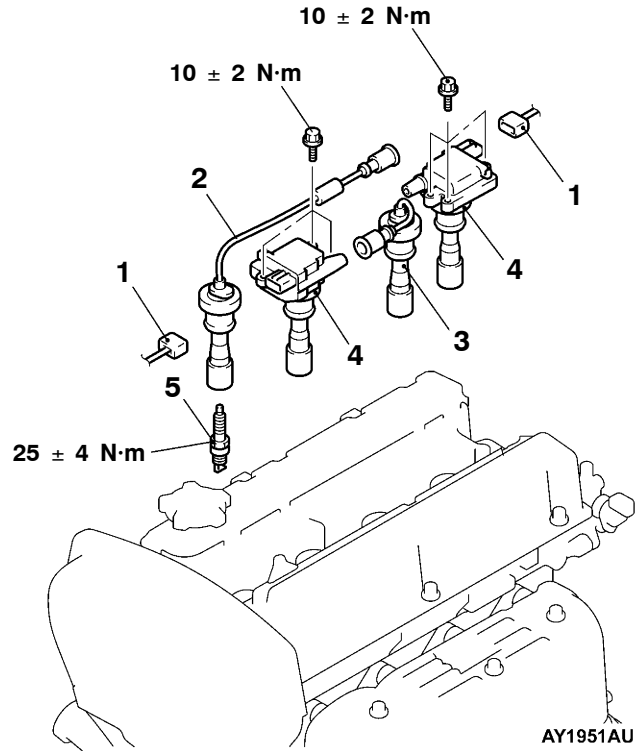
Abnormal waveform	Wave characteristics	Cause of problem
<p>Example 1</p>  <p>01P0215</p>	<p>Spark line is high and short.</p>	<p>Spark plug gap is too large.</p>
<p>Example 2</p>  <p>01P0216</p>	<p>Spark line is low and long, and is sloping. Also, the second half of the spark line is distorted. This could be a result of misfiring.</p>	<p>Spark plug gap is too small.</p>
<p>Example 3</p>  <p>01P0217</p>	<p>Spark line is low and long, and is sloping. However, there is almost no spark line distortion.</p>	<p>Spark plug gap is fouled.</p>
<p>Example 4</p>  <p>01P0218</p>	<p>Spark line is high and short. Difficult to distinguish between this and abnormal waveform example 1.</p>	<p>Spark plug cable is nearly falling off. (Causing a dual ignition)</p>
<p>Example 5</p>  <p>01P0219</p>	<p>No waves in wave damping section.</p>	<p>Layer short in ignition coil</p>

IGNITION COIL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

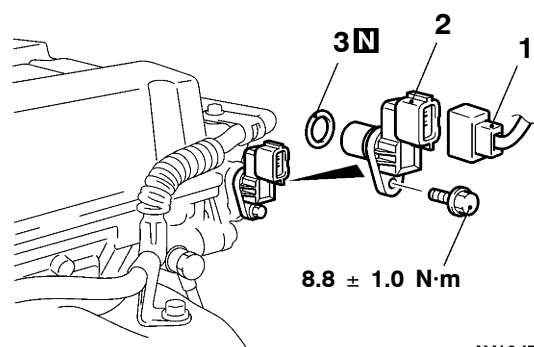
Center Cover Removal and Installation (Refer to GROUP 11A - Camshaft and Camshaft Oil Seal.)

**Removal steps**

1. Ignition coil connector
2. Spark plug cable No.1
3. Spark plug cable No.3
4. Ignition coil
5. Spark plug

CAMSHAFT POSITION SENSOR

REMOVAL AND INSTALLATION



AY1947AU

Removal steps

1. Camshaft position sensor connector
2. Camshaft position sensor
3. O-ring

CRANK ANGLE SENSOR

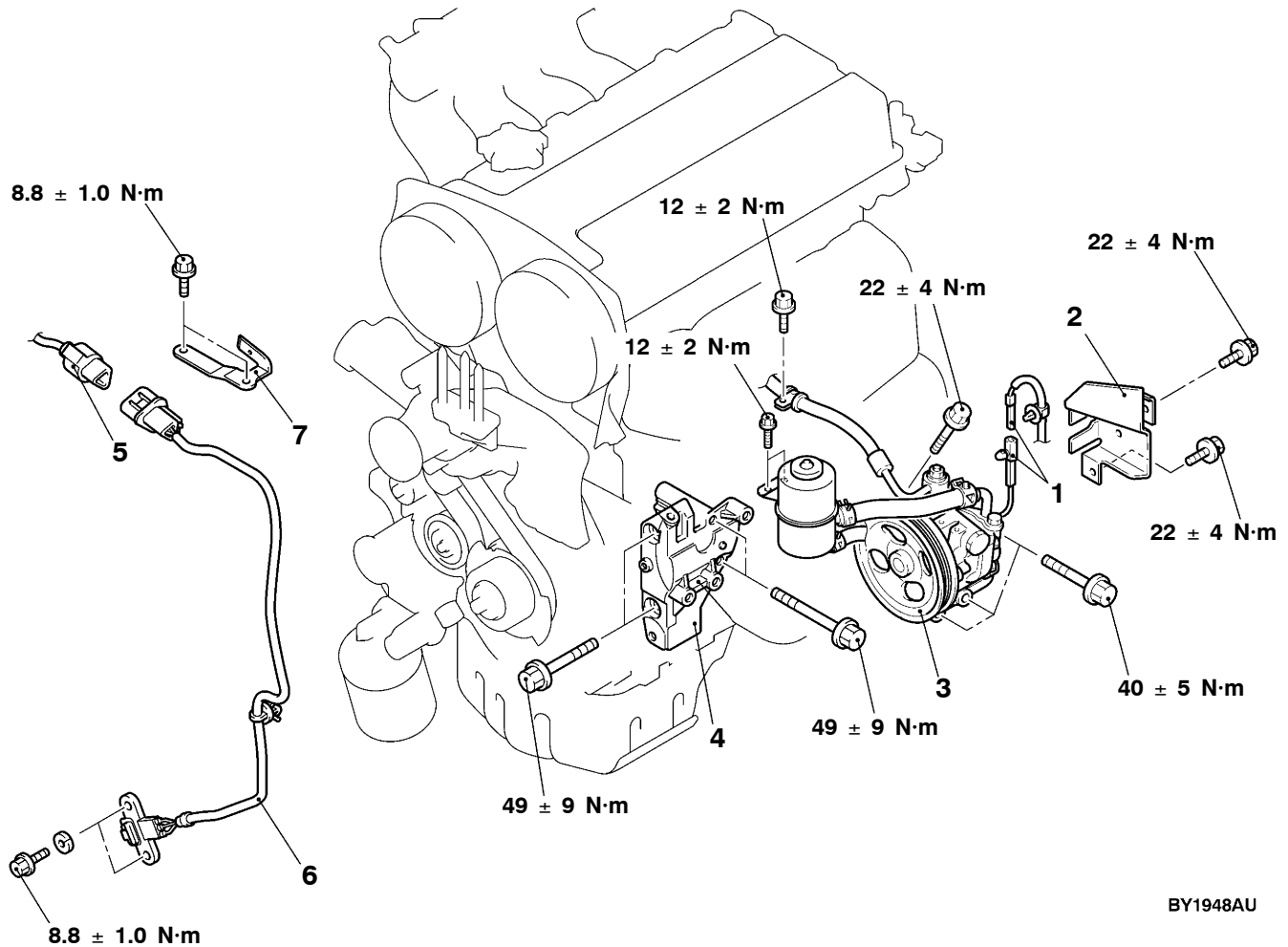
REMOVAL AND INSTALLATION

Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.

Pre-removal and Post-installation Operation

- Center Cover Removal and Installation (Refer to GROUP 11A - Camshaft and Camshaft Oil Seal.)
- Timing Belt Removal and Installation (Refer to GROUP 11A.)
- Reserve Tank Removal and Installation (Refer to GROUP 14 - Radiator.)



BY1948AU

Removal steps

1. Power steering oil pressure switch connector
2. Heat protector
3. Power steering oil pump, bracket and oil reservoir assembly

4. Power steering oil pump bracket
5. Crank angle sensor connector
6. Crank angle sensor
7. Connector bracket

**REMOVAL SERVICE POINT**
◀A▶ POWER STEERING OIL PUMP, BRACKET AND OIL RESERVOIR ASSEMBLY REMOVAL

Remove the power steering oil pump, bracket and oil reservoir assembly with the hose attached from the bracket.

NOTE

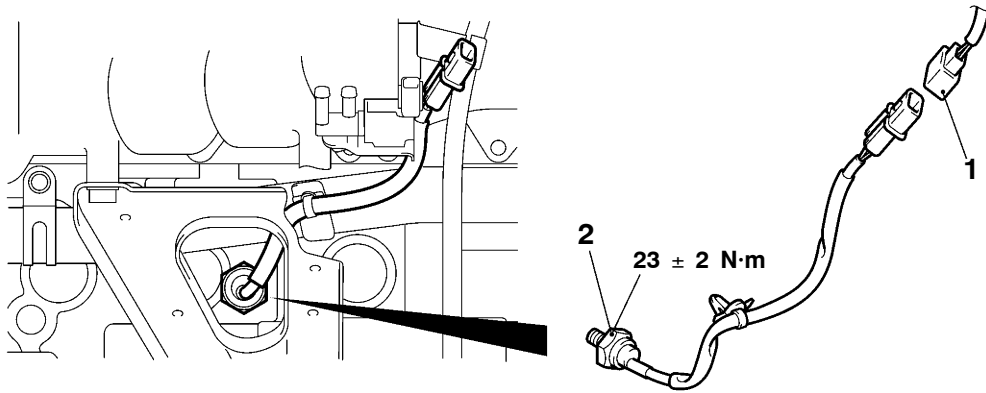
Tie the removed oil pump with a rope and set aside where they cannot hinder the removal of the power steering oil pump bracket.

DETONATION SENSOR**REMOVAL AND INSTALLATION****Caution**

Do not give any impact during removal and installation of detonation sensor.

Pre-removal and Post-installation Operation

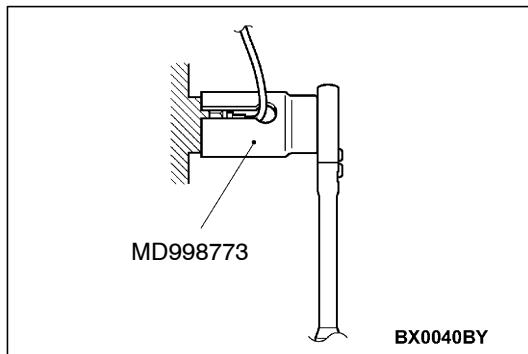
Intake Manifold Stay Removal and Installation (Refer to GROUP 15 - Intake Manifold.)



AY1949AU

Removal steps

1. Detonation sensor connector
2. Detonation sensor

**REMOVAL SERVICE POINT**

◀A▶ DETONATION SENSOR REMOVAL

INSTALLATION SERVICE POINT

▶A◀ DETONATION SENSOR INSTALLATION

NOTES

ENGINE AND EMISSION CONTROL

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PCV Valve Check	9	General Information	19

ENGINE CONTROL SYSTEM

GENERAL INFORMATION

A cable-type accelerator mechanism and a suspended-type pedal have been adopted.

SERVICE SPECIFICATIONS

Items	Standard value
Accelerator cable play mm	1 - 2
Engine idle speed r/min	850 ± 50

ON-VEHICLE SERVICE

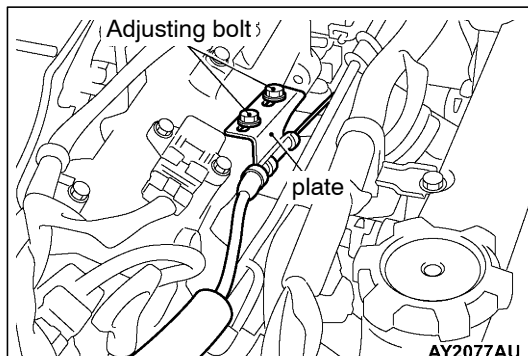
ACCELERATOR CABLE CHECK AND ADJUSTMENT

1. Turn A/C and lamps OFF.
Inspect and adjust at no load.
2. Warm engine until stabilized at idle.
3. Confirm idle speed is at prescribed value.

Standard value: 850 ± 50 r/min

4. Stop engine (ignition switch OFF).
5. Confirm there are no sharp bends in accelerator cable.
6. Check inner cable for correct slack.

Standard value: 1 - 2 mm



7. If there is too much slack or no slack, adjust play by the following procedures.
 - (1) Loosen the adjusting bolt to release the cable.
 - (2) Move the plate until the inner cable play is at the standard value, and then tighten the adjusting bolt to the specified torque.

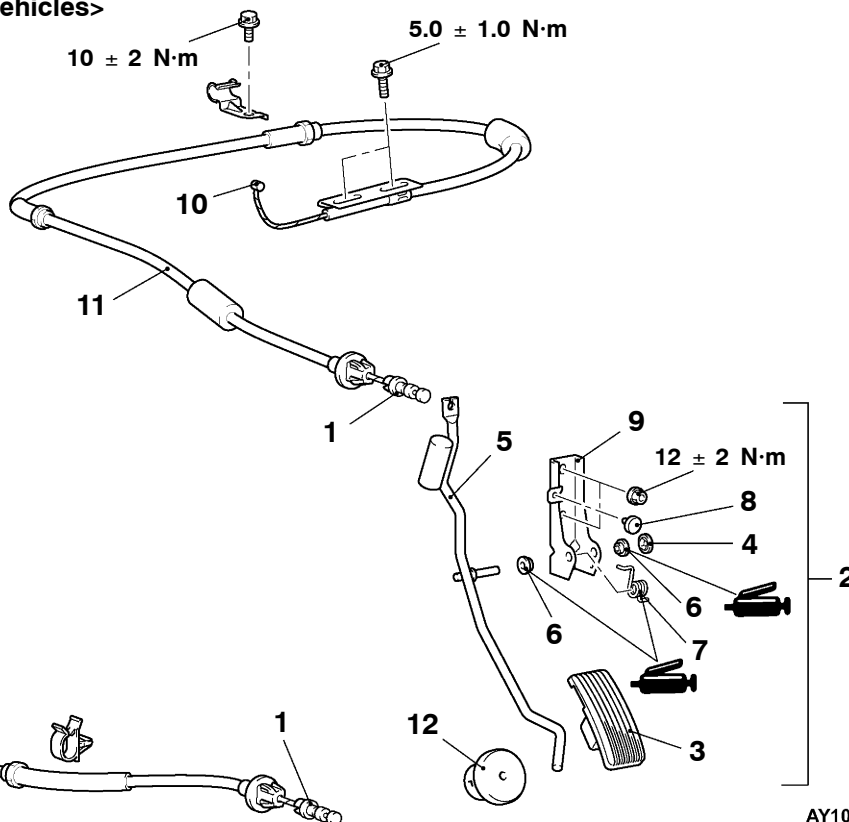
Tightening torque: 5.0 ± 1.0 N·m

ACCELERATOR CABLE AND PEDAL

REMOVAL AND INSTALLATION

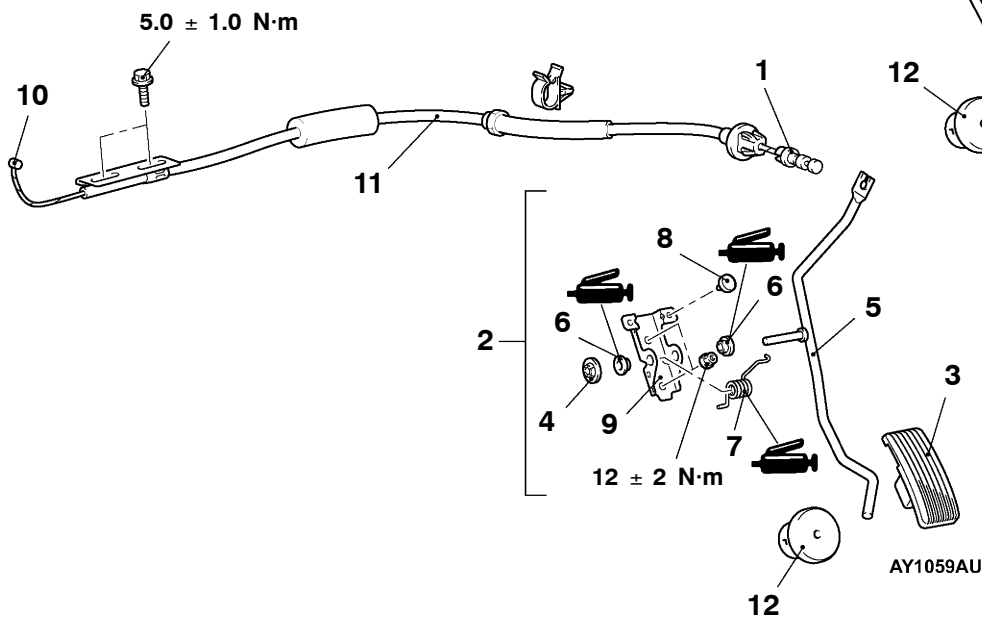
Post-installation Operation
Accelerator Cable Adjustment (Refer to P.17-2.)

<L.H. drive vehicles>



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<R.H. drive vehicles>



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Accelerator pedal removal steps

1. Accelerator cable assembly connection (Accelerator pedal side)
2. Accelerator pedal assembly
3. Pedal pad
4. Push-on spring nut
5. Accelerator arm assembly
6. Bushing
7. Spring
8. Stopper
9. Accelerator pedal bracket

Accelerator cable removal steps

1. Accelerator cable assembly (Accelerator pedal side)
10. Accelerator cable assembly connection (Throttle body side)
11. Accelerator cable assembly

Accelerator pedal stopper removal

12. Accelerator pedal stopper

EMISSION CONTROL SYSTEM

GENERAL INFORMATION

The emission control system consists of the following subsystems:

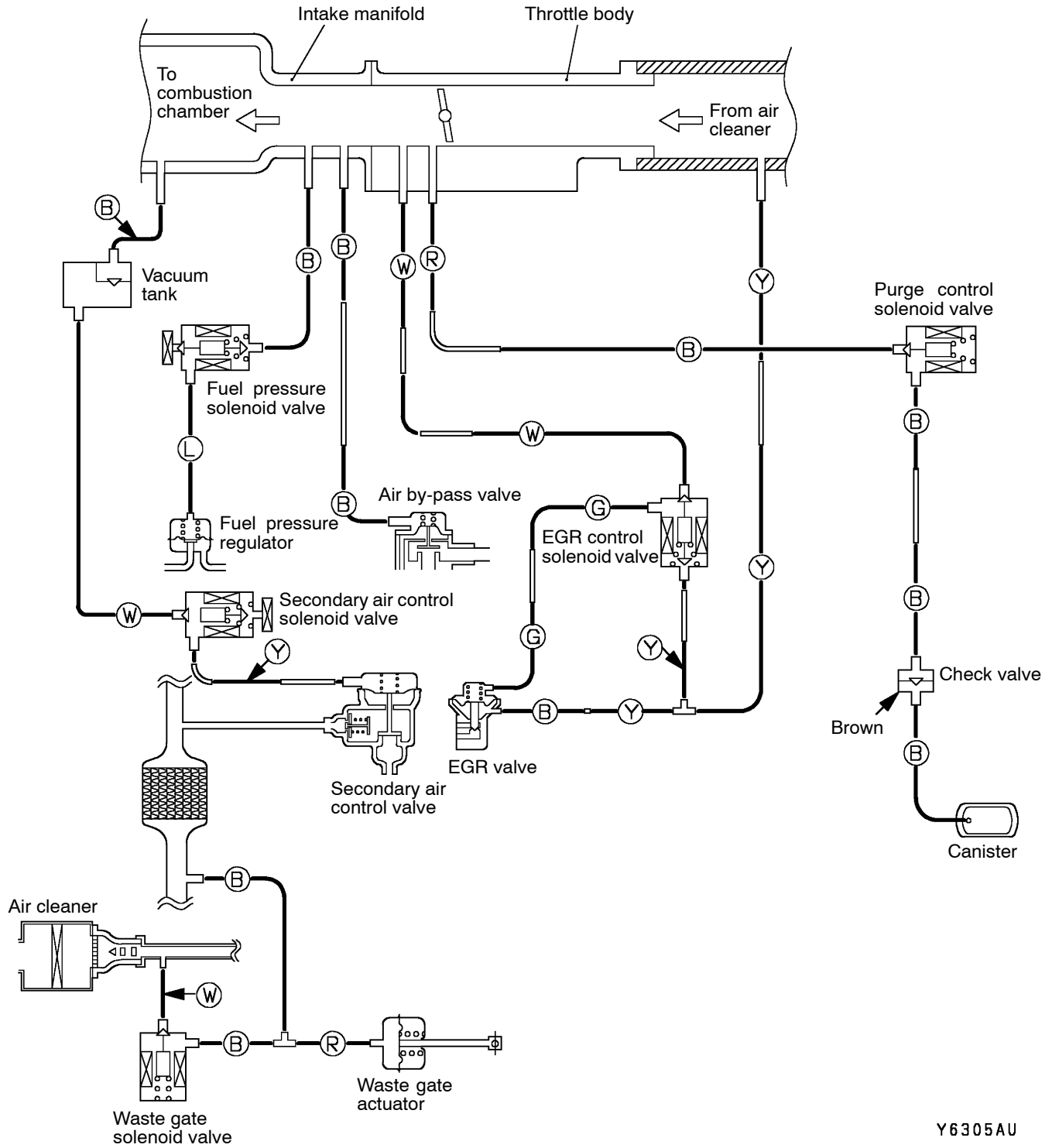
- Crankcase emission control system
- Evaporative emission control system
- Exhaust emission control system

Items	Name	Specification
Crankcase emission control system	Positive crankcase ventilation (PCV) valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister Purge control solenoid valve Check valve	Equipped Duty cycle type solenoid valve Equipped (Purpose: HC reduction)
Exhaust emission control system	Air-fuel ratio control device - MPI system	Oxygen sensor feedback type (Purpose: CO, HC, NOx reduction)
	Exhaust gas recirculation system <ul style="list-style-type: none"> ● EGR valve ● EGR control solenoid valve 	Equipped Single type Duty cycle type solenoid valve (Purpose: NOx reduction)
	Catalytic converter	Monolith type (Purpose: CO, HC, NOx reduction)

EMISSION CONTROL DEVICE REFERENCE TABLE

Related parts	Crankcase emission control system	Evaporative emission control system	Air/fuel ratio control system	Catalytic converter	Exhaust gas recirculation system	Reference page
PCV valve	×					17-9
Purge control solenoid valve		×				17-12
Check valve		×				17-12
MPI system component		×	×			GROUP 13A
Catalytic converter				×		17-19
EGR valve					×	17-15
EGR control solenoid valve					×	17-16

VACUUM CIRCUIT DIAGRAM



VACUUM HOSE CHECK

1. Using the piping diagram as a guide, check to be sure that the vacuum hoses are correctly connected.
2. Check the connection condition of the vacuum hoses, (removed, loose, etc.) and check to be sure that there are no bends or damage.

VACUUM HOSE INSTALLATION

1. When connecting the vacuum hoses, they should be securely inserted onto the nipples.
2. Connect the hoses correctly, using the vacuum hose piping diagram as a guide.

CRANKCASE EMISSION CONTROL SYSTEM

GENERAL INFORMATION

The crankcase emission control system prevents blow-by gases from escaping inside the crankcase into the atmosphere.

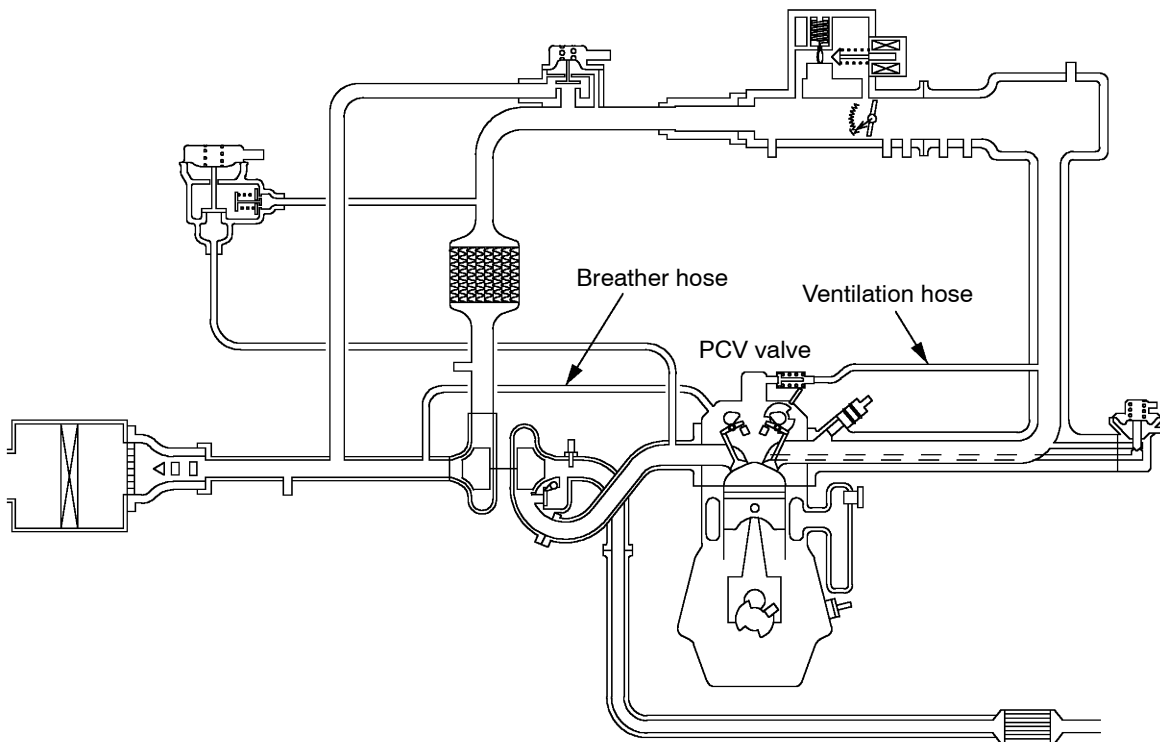
Fresh air is sent from the air cleaner into the crankcase through the breather hose. The air becomes mixed with the blow-by gases inside the crankcase.

The blow-by gas inside the crankcase is drawn into the intake manifold through the positive

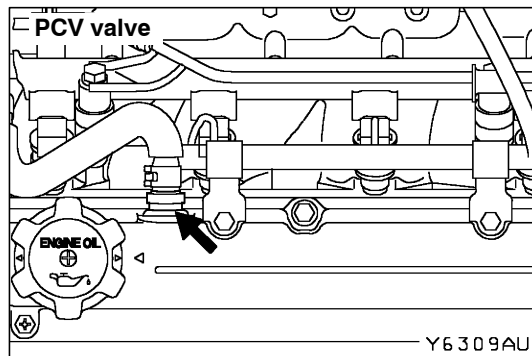
crankcase ventilation (PCV) valve.

The PCV valve lifts the plunger according to the intake manifold vacuum so as to regulate the flow of blow-by gas properly. In other words, the blow-by gas flow is regulated during low load engine operation to maintain engine stability, while the flow is increased during high load operation to improve the ventilation performance.

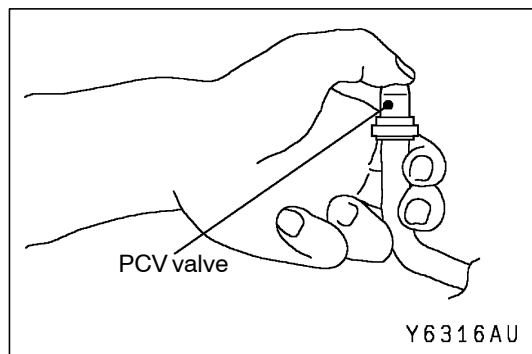
SYSTEM DIAGRAM



Y6303AU

COMPONENT LOCATION**POSITIVE CRANKCASE VENTILATION SYSTEM CHECK**

1. Remove the ventilation hose from the PCV valve.
2. Remove the PCV valve from the rocker cover.
3. Reinstall the PCV valve at the ventilation hose.
4. Start the engine and run at idle.

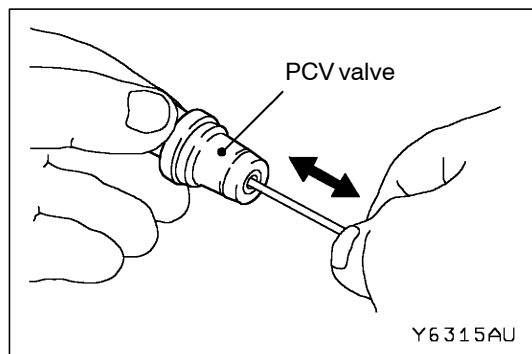


5. Place a finger at the opening of the PCV valve and check that vacuum of the intake manifold is felt.

NOTE

At this moment, the plunger in the PCV valve moves back and forth.

6. If vacuum is not felt, clean the PCV valve or replace it.

**PCV VALVE CHECK**

1. Insert a thin rod into the PCV valve from the side shown in the illustration (rocker cover installation side), and move the rod back and forth to check that the plunger moves.
2. If the plunger does not move, there is a clogging in the PCV valve. In this case, clean or replace the PCV valve.

EVAPORATIVE EMISSION CONTROL SYSTEM

GENERAL INFORMATION

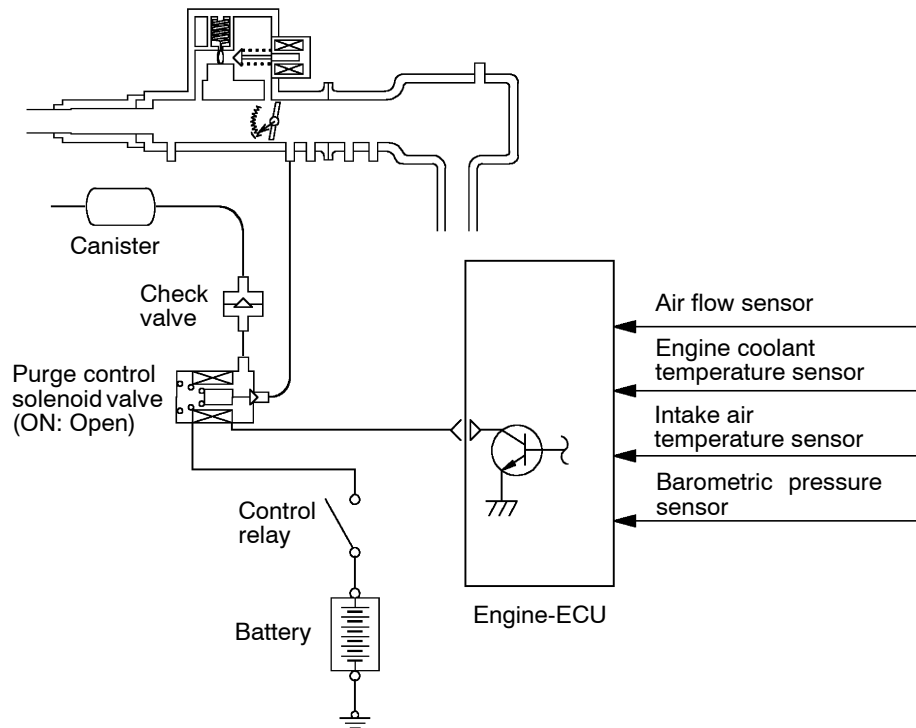
The evaporative emission control system prevents fuel vapours generated in the fuel tank from escaping into the atmosphere.

Fuel vapours from the fuel tank flow through the fuel tank pressure control valve and vapour pipe/hose to be stored temporarily in the canister. When driving the vehicle, fuel vapours stored in the canister flow through the purge solenoid and purge port and go into the intake manifold to be sent to the combustion chamber.

When the engine coolant temperature is low or when the intake air quantity is small (when the engine is at idle, for example), the engine control unit turns the purge solenoid off to shut off the fuel vapour flow to the intake manifold.

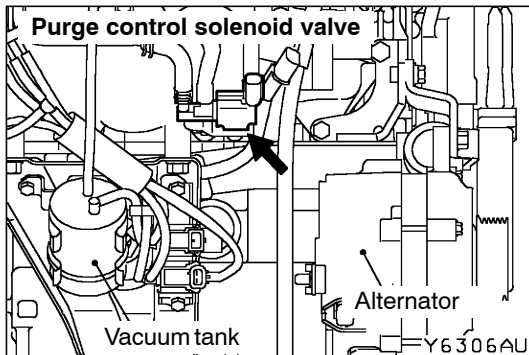
This does not only insure the driveability when the engine is cold or running under low load but also stabilize the emission level.

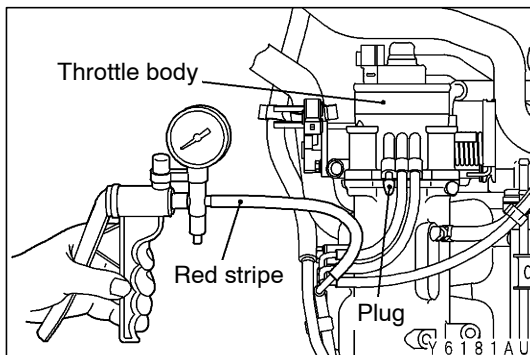
SYSTEM DIAGRAM



Y6304AU

COMPONENT LOCATION





PURGE CONTROL SYSTEM CHECK

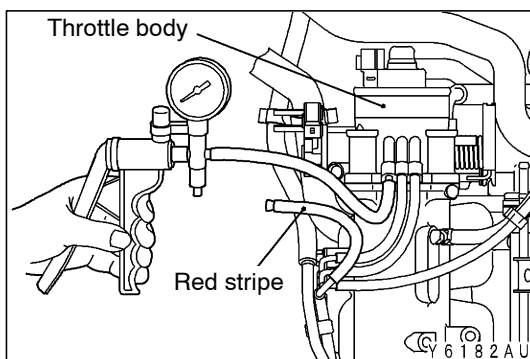
1. Disconnect the vacuum hose (red stripe) from throttle body and connect it to a hand vacuum pump.
2. Plug the nipple from which the vacuum hose was removed.
3. When the engine is cold or hot, apply a vacuum of 53 kPa, and check the condition of the vacuum.

When engine is cold
 (Engine coolant temperature: 40°C or less)

Engine condition	Normal condition
At idle	Vacuum is maintained
3,000 r/min	

When engine is hot
 (Engine coolant temperature: 80°C or higher)

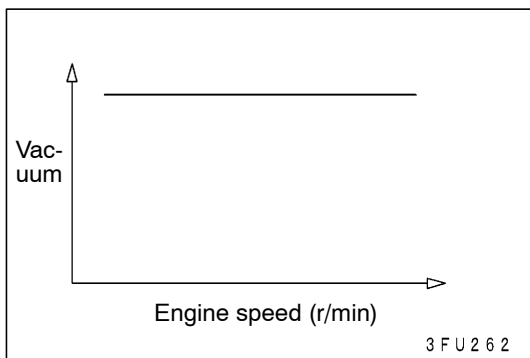
Engine condition	Normal condition
At idle	Vacuum is maintained
3,000 r/min (within 3 minutes after engine starts)	Vacuum will leak.

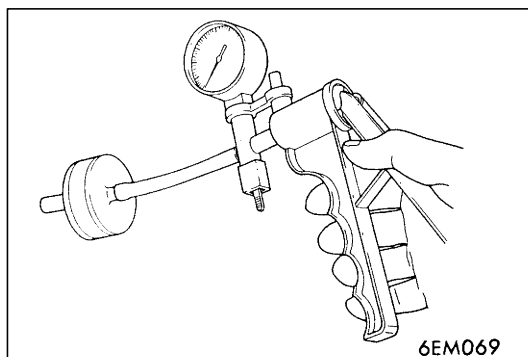
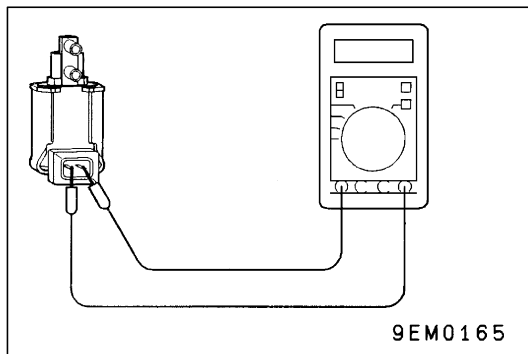
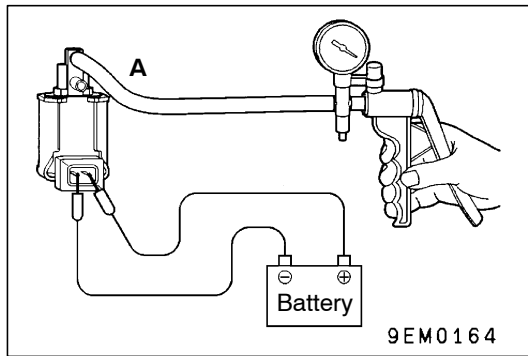


PURGE PORT VACUUM CHECK

1. Disconnect the vacuum hose (red stripe) from the throttle body purge vacuum nipple and connect a hand vacuum pump to the nipple.
2. Confirm that the vacuum is approximately constant regardless of the engine rotation speed.

NOTE
 If vacuum changes, it is possible that the throttle body purge port maybe clogged and require cleaning.





PURGE CONTROL SOLENOID VALVE CHECK

NOTE

When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

1. Disconnect the vacuum hose from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to nipple (A) of the solenoid valve (refer to the illustration at left).
4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the purge control solenoid valve and without applying voltage.

Battery voltage	Normal condition
Applied	Vacuum leaks
Not applied	Vacuum maintained

5. Measure the resistance between the terminals of the solenoid valve.

Standard value: 30 - 34 Ω (at 20°C)

CHECK VALVE CHECK

Connect a hand vacuum pump to the check valve, apply vacuum and check the airtightness.

Connected nipple colour	Normal condition
Black	Vacuum leaks
Brown	Vacuum is maintained

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

GENERAL INFORMATION

The exhaust gas recirculation (EGR) system lowers the nitrogen oxide (NO_x) emission level. When the air/fuel mixture combustion temperature is high, a large quantity of nitrogen oxides (NO_x) is generated in the combustion chamber. Therefore, this system recirculates part of emission gas from

the exhaust port of the cylinder head to the combustion chamber through the intake manifold to decrease the air/fuel mixture combustion temperature, resulting in reduction of NO_x.

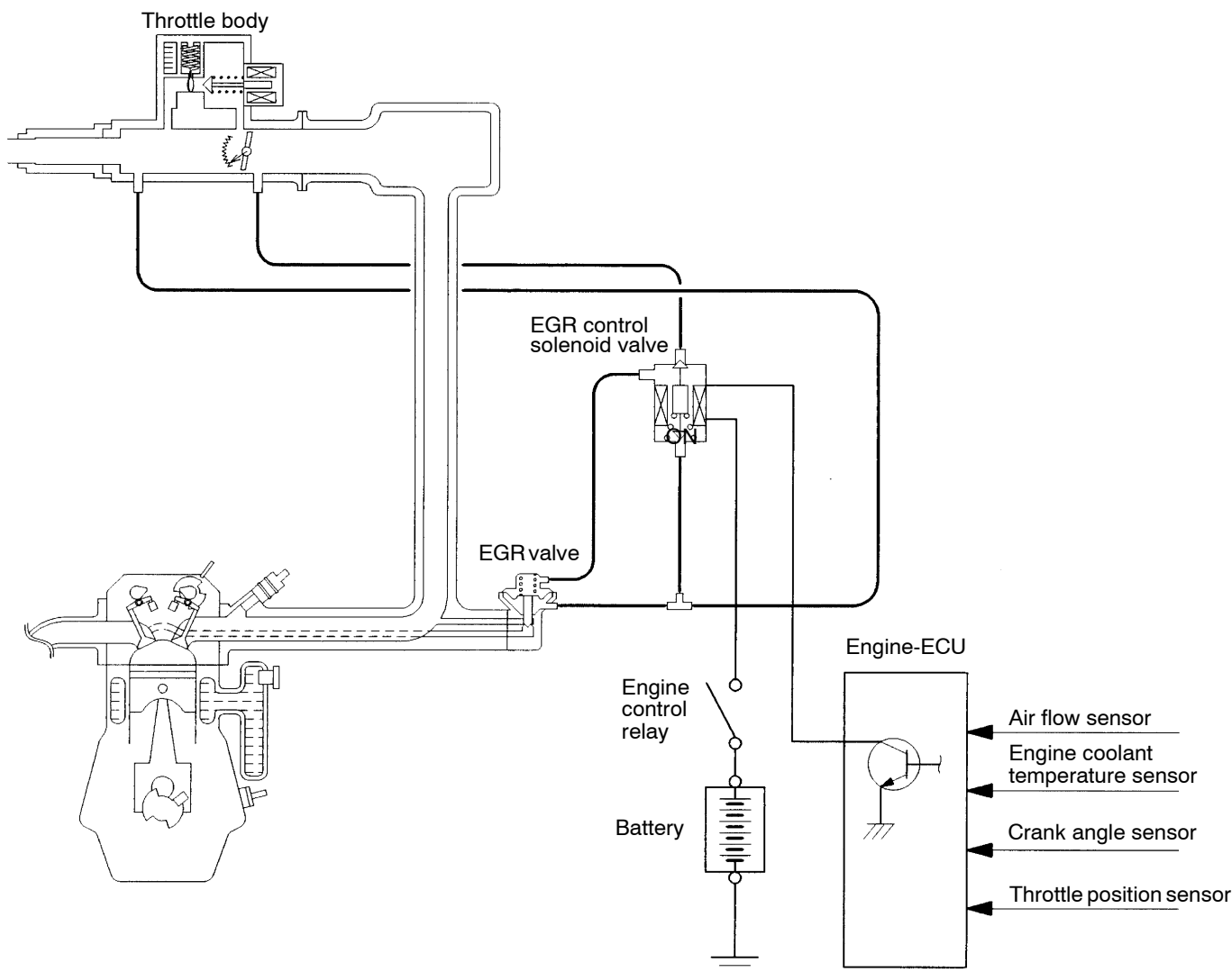
The EGR flow rate is controlled by the EGR valve so as not to decrease the driveability.

OPERATION

The EGR valve is being closed and does not recirculate exhaust gases under one of the following conditions. Otherwise, the EGR valve is opened and recirculates exhaust gases.

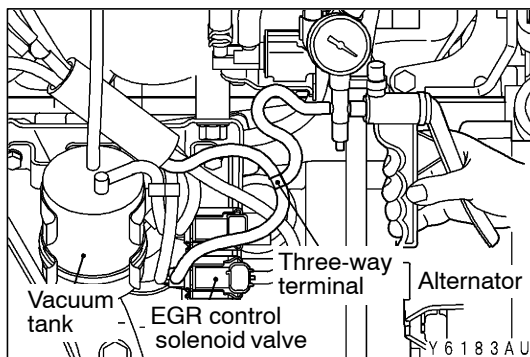
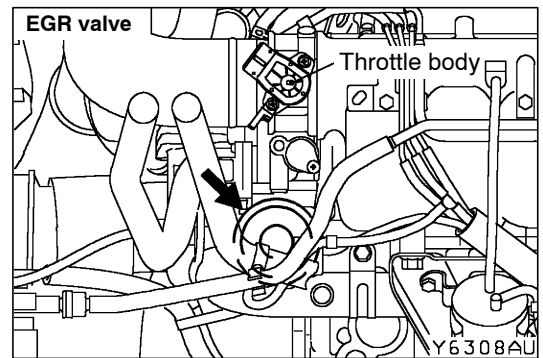
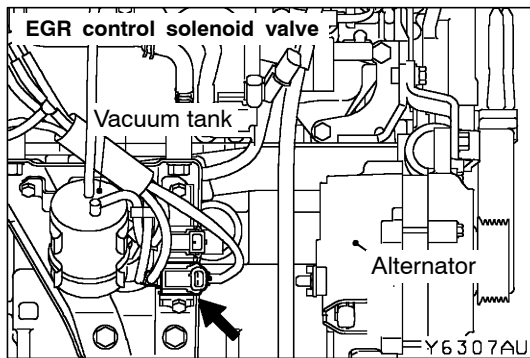
- The engine coolant temperature is low.
- The engine is at idle.
- The throttle valve is widely opened.

SYSTEM DIAGRAM



V6029AE

COMPONENT LOCATION



EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM CHECK

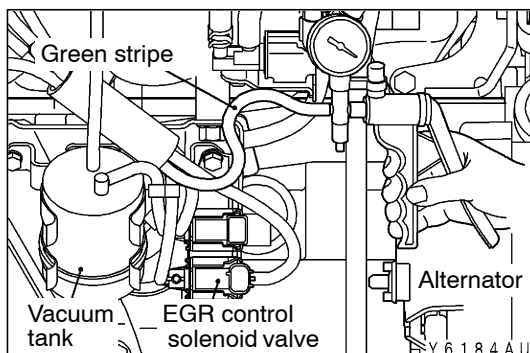
1. Disconnect the vacuum hose (green stripe) from the EGR control solenoid valve, and then connect a hand vacuum pump via the three-way terminal.
2. When the engine is hot or cold, check the condition of vacuum by racing the engine.

When engine is cold**(Engine coolant temperature: 20°C or less)**

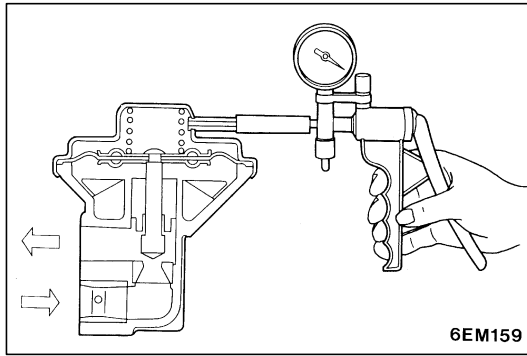
Throttle valve	Normal vacuum condition
Open quickly	No vacuum will generate (the same as barometric pressure.)

When engine is hot**(Engine coolant temperature: 80°C or higher)**

Throttle valve	Normal vacuum condition
Open quickly	It will momentarily rise over 13 kPa



3. Disconnect the three-way terminal.
4. Connect the hand vacuum pump to the vacuum hose (green stripe).
5. Check whether the engine stalls or the idling is unstable when a vacuum of 27 kPa or higher is applied during idling.



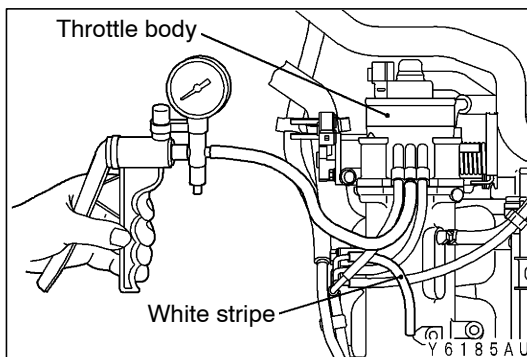
EGR VALVE CHECK

1. Remove the EGR valve and inspect for sticking, carbon deposits, etc. If found, clean with a suitable solvent so that the valve seats correctly.
2. Connect a hand vacuum pump to the EGR valve.
3. Apply 67 kPa of vacuum, and check that the vacuum is maintained.
4. Apply a vacuum and check the passage of air by blowing through one side of the EGR passage.

Vacuum	Passage of air
5.3 kPa or less	Air is not blown out
27 kPa or more	Air is blown out

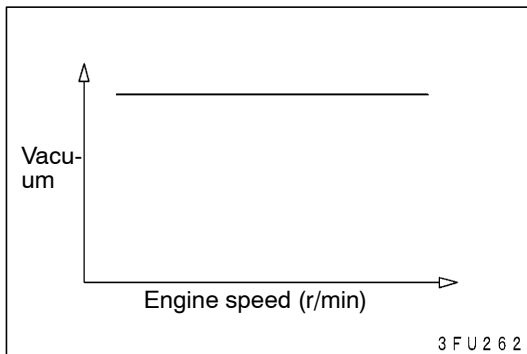
5. Replace the gasket, and tighten to the specified torque.

Tightening torque: 20 ± 2 N·m



EGR PORT VACUUM CHECK

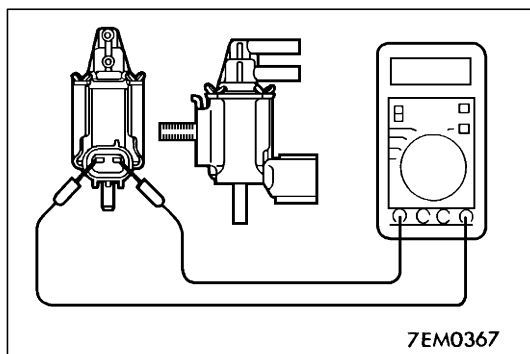
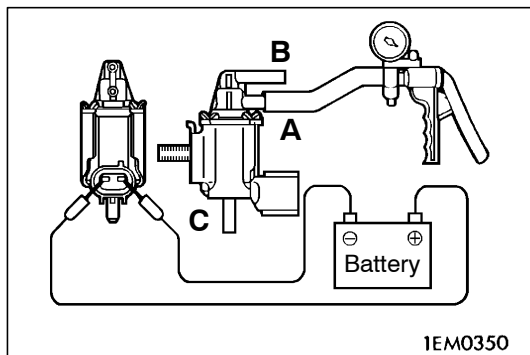
1. Disconnect the vacuum hose (White stripe) from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.



2. Start the engine and check vacuum remains fairly constant after racing the engine.

NOTE

If the vacuum fluctuates, the throttle body EGR port may be clogged and need cleaning.



EGR CONTROL SOLENOID VALVE CHECK

NOTE

When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

1. Disconnect the vacuum hose (yellow stripe, green stripe, white stripe) from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to the nipple to which the green-striped vacuum hose was connected.
4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the EGR control solenoid valve and without applying voltage.

Battery voltage	B nipple condition	Normal condition
Not applied	Open	Vacuum maintained
Applied	Open	Vacuum leaks
	Closed	Vacuum maintained

5. Measure the resistance between the terminals of the solenoid valve.

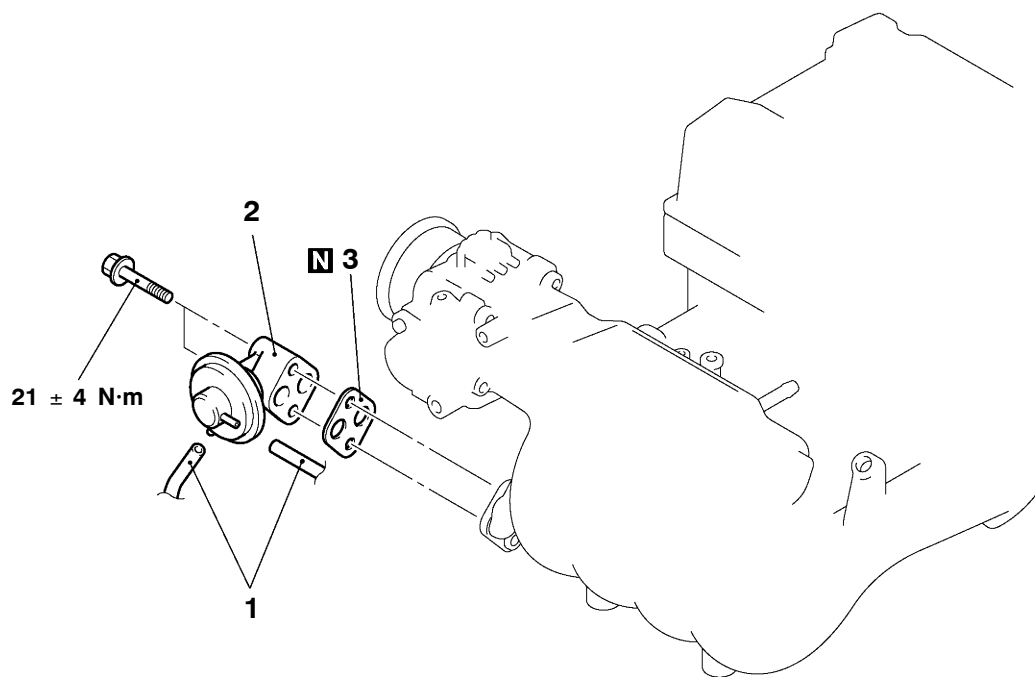
Standard value: 29 - 35 Ω (at 20°C)

EGR VALVE

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

Air Hose E Removal and Installation
(Refer to GROUP 15 - Inter Cooler.)



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Removal steps

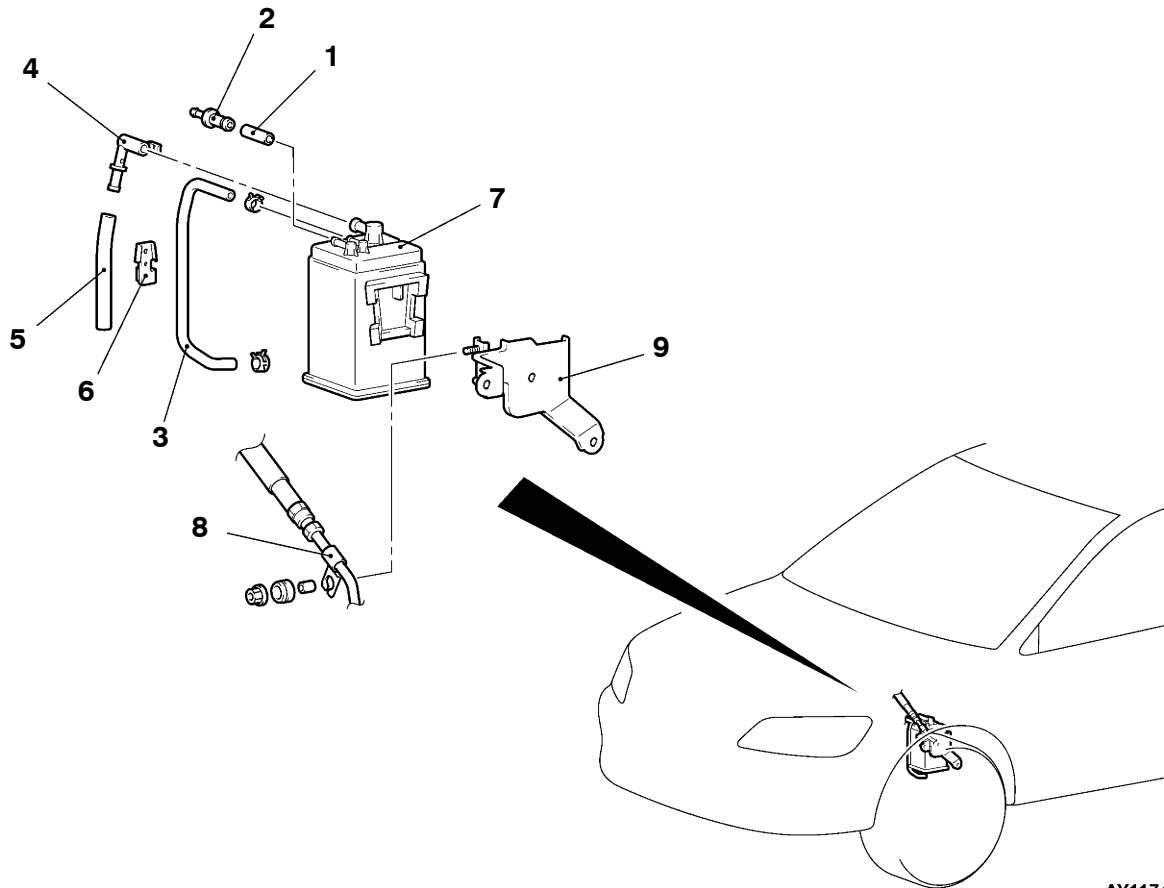
1. Vacuum hose connection
2. EGR valve
3. EGR valve gasket

CANISTER

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Air Pipe C, Air Hose D Removal and Installation (Refer to GROUP 15 - Inter Cooler.)
- Battery and Battery Tray Removal and Installation
- Air Cleaner Assembly Removal and Installation (Refer to GROUP 15 - Air Cleaner.)



AY1174AU

Canister removal steps

- | | |
|-------------------|------------------------------|
| 1. Purge hose | 6. Hose clamp |
| 2. Check valve | 7. Canister |
| 3. Vapor hose | 8. Fuel high pressure hose |
| 4. Vent connector | 9. Canister bracket assembly |
| 5. Vapor hose | |

CATALYTIC CONVERTER

GENERAL INFORMATION

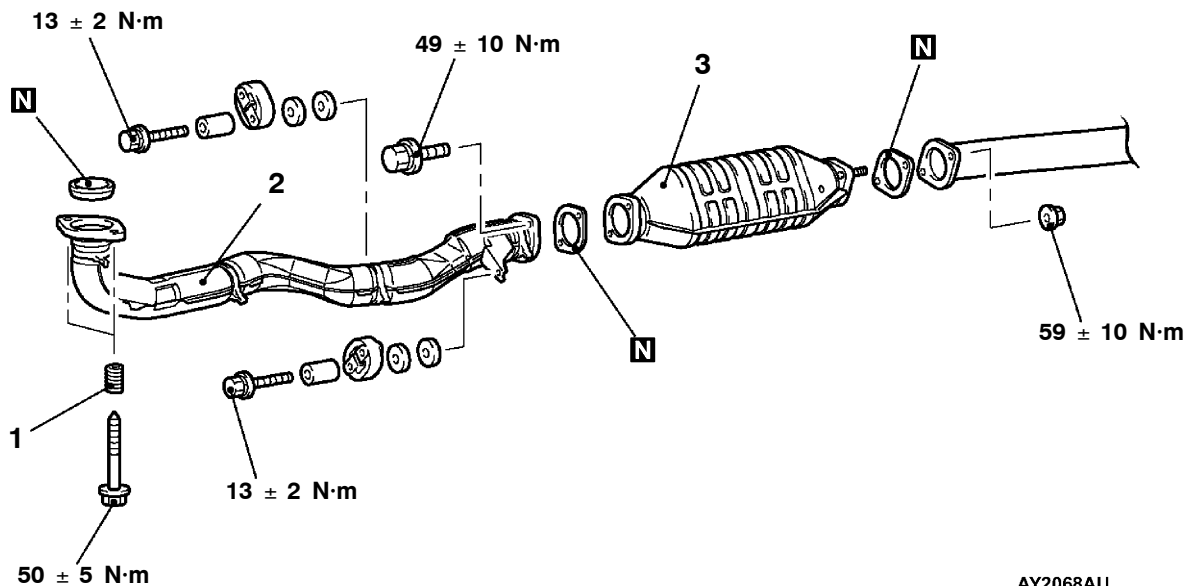
The three-way catalytic converter, together with the closed loop air-fuel ratio control based on the oxygen sensor signal, oxidizes carbon monoxides (CO) and hydrocarbons (HC) and reduces nitrogen oxides (NOx).

When the mixture is controlled at stoichiometric air-fuel ratio, the three-way catalytic converter provides the highest purification against the three constituents, namely, CO, HC and NOx.

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Crossmember Bar Removal and Installation (Refer to GROUP 32 - Engine Roll Stopper, Centermember.)



AY2068AU

Removal steps

1. Spring
2. Front exhaust pipe
3. Catalytic converter

NOTES

CLUTCH

CONTENTS

CLUTCH	21A
CLUTCH OVERHAUL	21B



CLUTCH

CONTENTS

GENERAL INFORMATION	3	Bleeding	4
SERVICE SPECIFICATIONS	3	Clutch Pedal Position Switch Adjustment	4
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ON-VEHICLE SERVICE	3	CLUTCH CONTROL	7
Clutch Pedal Inspection and Adjustment	3	Clutch Master Cylinder	9



GENERAL INFORMATION

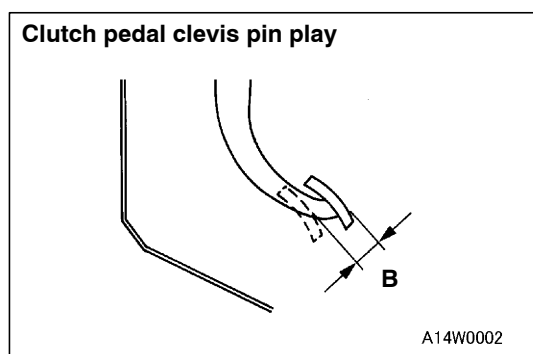
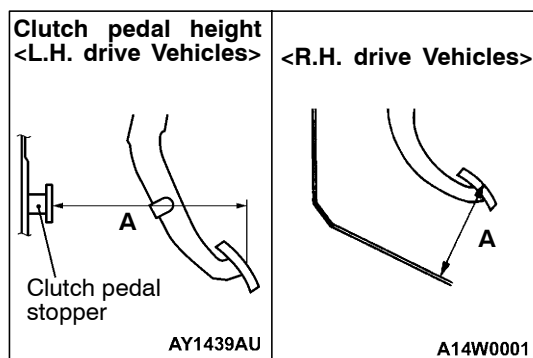
The clutch is a dry single-disc, diaphragm type; hydraulic pressure is used for the clutch control.

SERVICE SPECIFICATIONS

Items	Standard value
Clutch pedal height mm	202.1 - 206.1 <L.H. drive vehicles> 173.5 - 177.5 <R.H. drive vehicles>
Clutch pedal clevis pin play mm	1 - 3
Clutch pedal free play mm	4 - 13
Distance between the clutch pedal and the toeboard when the clutch is disengaged mm	114.3 or more <L.H. drive vehicles> 100 or more <R.H. drive vehicles>

LUBRICANTS

Items	Specified lubricants	Quantity
Clutch fluid	Brake fluid DOT3 or DOT4	As required
Push rod assembly	Rubber grease	
Boot		
Release cylinder push rod	MITSUBISHI genuine grease Part No. 0101011	



ON-VEHICLE SERVICE

CLUTCH PEDAL INSPECTION AND ADJUSTMENT

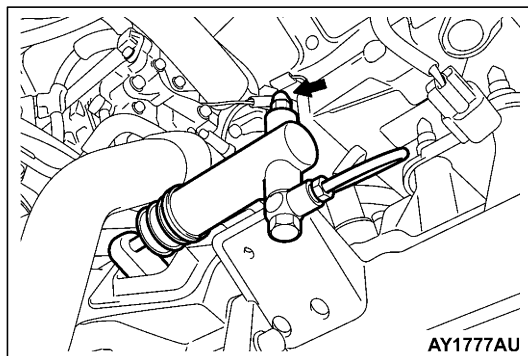
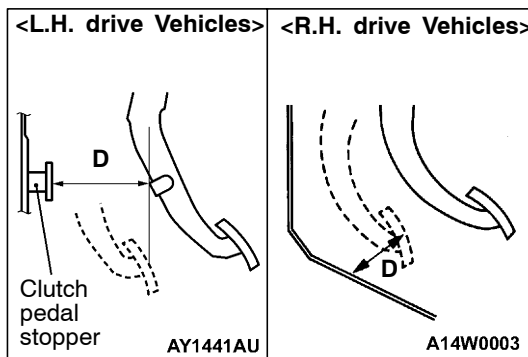
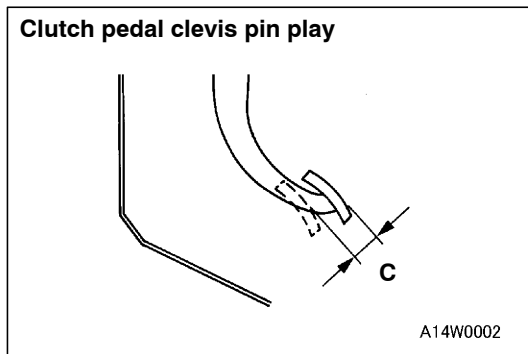
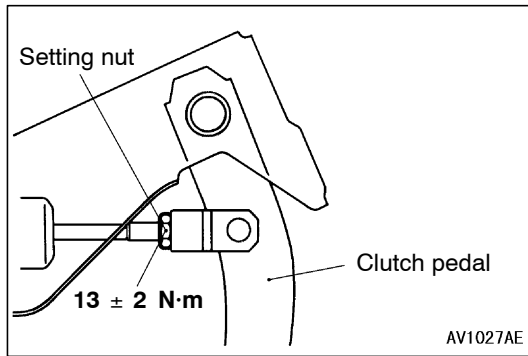
1. Turn up the carpet, etc. under the clutch pedal.
2. Measure the clutch pedal height and the clutch pedal clevis pin play.

Standard value (A):

202.1 - 206.1 mm <L.H. drive vehicles>

173.5 - 177.5 mm <R.H. drive vehicles>

Standard value (B): 1 - 3 mm



- If the height of the clutch pedal is outside the standard value, loosen the setting nut to adjust the pedal height to the standard value.

Caution

Do not push in the master cylinder push rod at this time, otherwise the clutch will not operate properly.

- After completing the adjustments, confirm that the clutch pedal free play (measured at the face of the pedal pad) and the distance between the clutch pedal (the face of the pedal pad) and the clutch pedal stopper or toeboard when the clutch is disengaged are within the standard value ranges.

Standard value (C): 4 - 13 mm

Standard value (D):

114.3 mm or more <L.H. drive vehicles>

100 mm or more <R.H. drive vehicles>

- If the clutch pedal free play and the distance between the clutch pedal and the clutch pedal stopper or toeboard when the clutch is disengaged do not agree with the standard values, it is probably the result of either air in the hydraulic system or a faulty master cylinder, clutch cylinder or clutch. Bleed the air, or disassemble and inspect the master cylinder, clutch cylinder or clutch.
- Turn back the carpet, etc.

BLEEDING

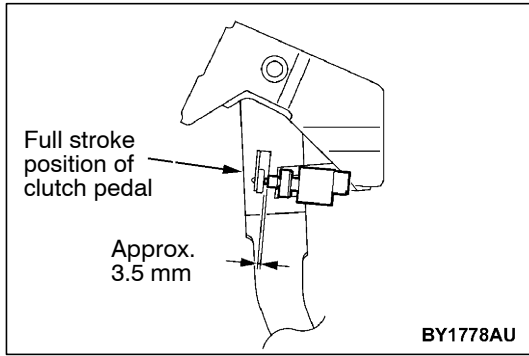
Specified fluid: Brake fluid DOT 3 or DOT 4

Caution

Use the specified brake fluid. Avoid using a mixture of the specified fluid and other fluid.

CLUTCH PEDAL POSITION SWITCH ADJUSTMENT

- Adjust the clutch pedal. (Refer to P. 21A-3).
- Disconnect the connector from clutch pedal position switch.
- Loosen the clutch pedal position switch by rotating approx. quarter turn to counterclockwise.
- Fix the clutch pedal in full stroke.



5. Fix the clutch pedal position switch by rotating approx. quarter turn to clockwise in the position as shown in the illustration.
6. Connect the connector to the clutch pedal position switch.
7. Check that the engine starts when the clutch is released.

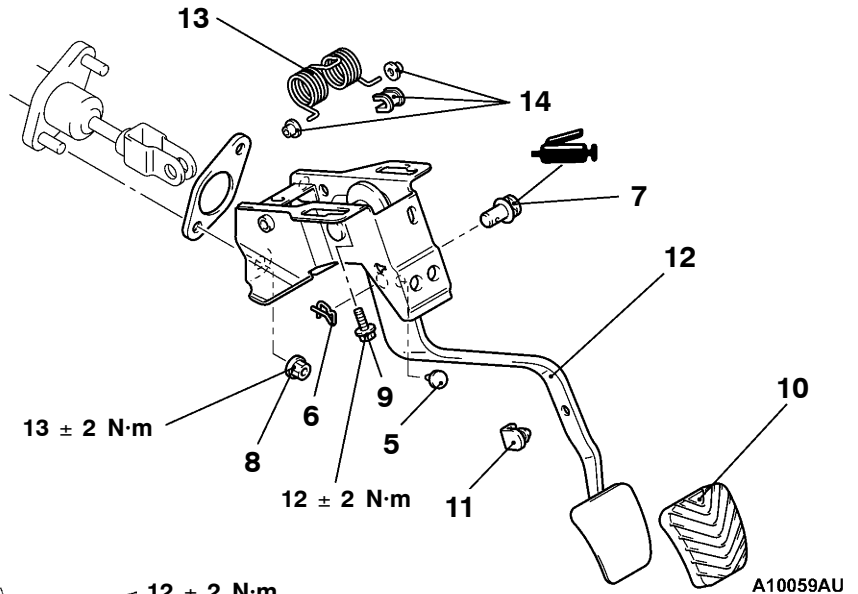
CLUTCH PEDAL

REMOVAL AND INSTALLATION

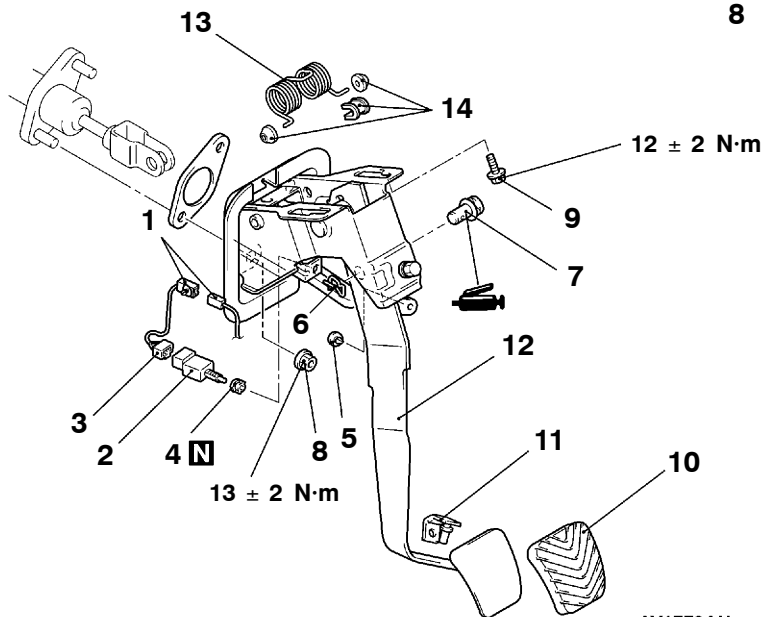
Post-installation Operation

- Clutch Pedal Adjustment (Refer to P.21A-2.)
- Clutch Pedal Position Switch Adjustment (Refer to P.21A-4.)

<L.H. drive vehicles>



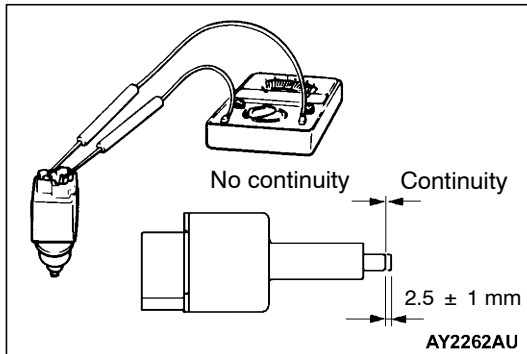
<R.H. drive vehicles>



Removal steps

- Column cover, under cover, lower frame (Refer to GROUP 52A.)
- 1. Connector connection
- 2. Clutch pedal position switch
- 3. Clutch pedal position switch sub-harness
- 4. Clip
- 5. Stopper
- 6. Snap pin

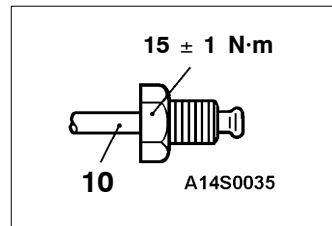
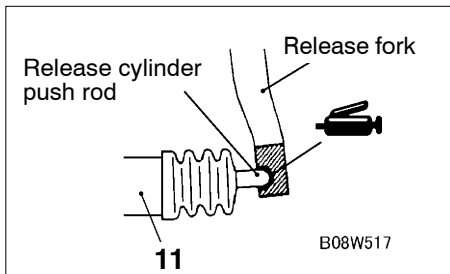
- 7. Clevis pin
- 8. Clutch master cylinder mounting nut
- 9. Master cylinder member mounting bolt
- 10. Pedal pad
- 11. Pedal stopper
- 12. Clutch pedal assembly
- 13. Turn over spring
- 14. Bushing

**INSPECTION****CLUTCH PEDAL POSITION SWITCH CONTINUITY CHECK**

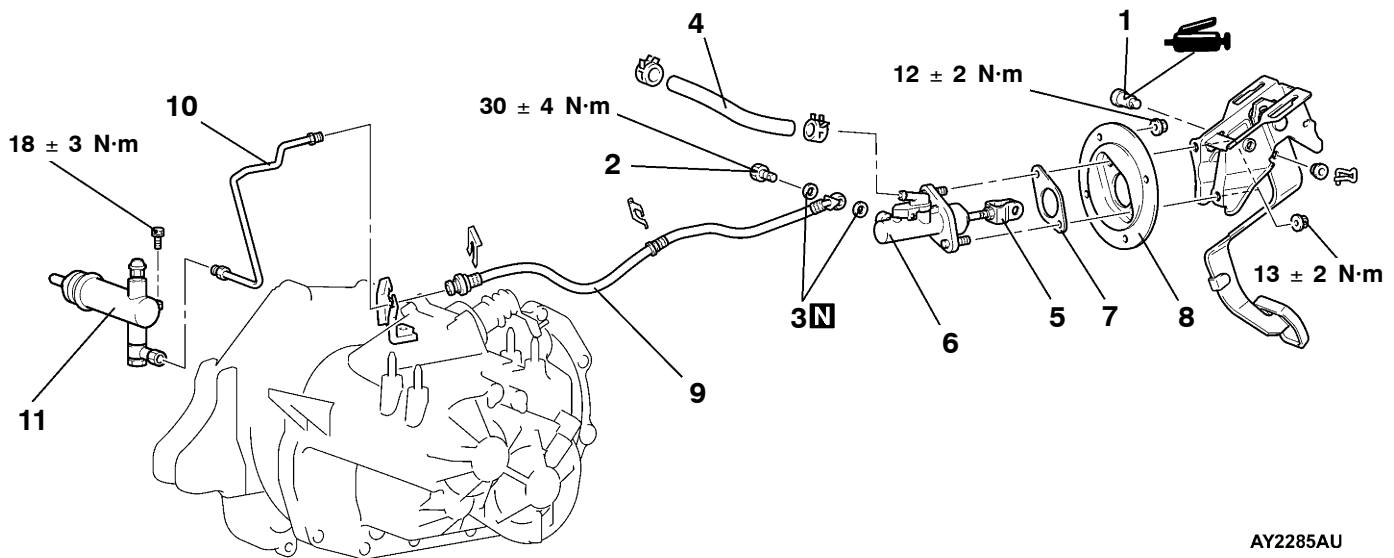
1. Connect the circuit tester (Ω range) to the connector of clutch pedal position switch.
2. When the shaft is pushed more than the dimension as shown in the illustration if there is not continuity, and removing if there is continuity, the switch is good condition.

CLUTCH CONTROL**REMOVAL AND INSTALLATION****Pre-removal Operation**
Clutch Fluid Draining**Post-installation Operation**

- Clutch Fluid Supplying
- Clutch Pedal Adjustment (Refer to P.21A-3.)
- Clutch Pedal Position Switch Adjustment (Refer to P.21A-4.)
- Clutch Line Bleeding (Refer to P.21A-4.)

<L.H. drive vehicles>

Specified grease:
MITSUBISHI genuine grease
Part No. 0101011



AY2285AU

Clutch master cylinder removal steps

1. Clevis pin assembly
2. Eye bolt
3. Gasket
4. Reservoir hose
5. Clevis pin and pushrod assembly connecting part
6. Clutch master cylinder
7. Sealer
8. Retainer assembly

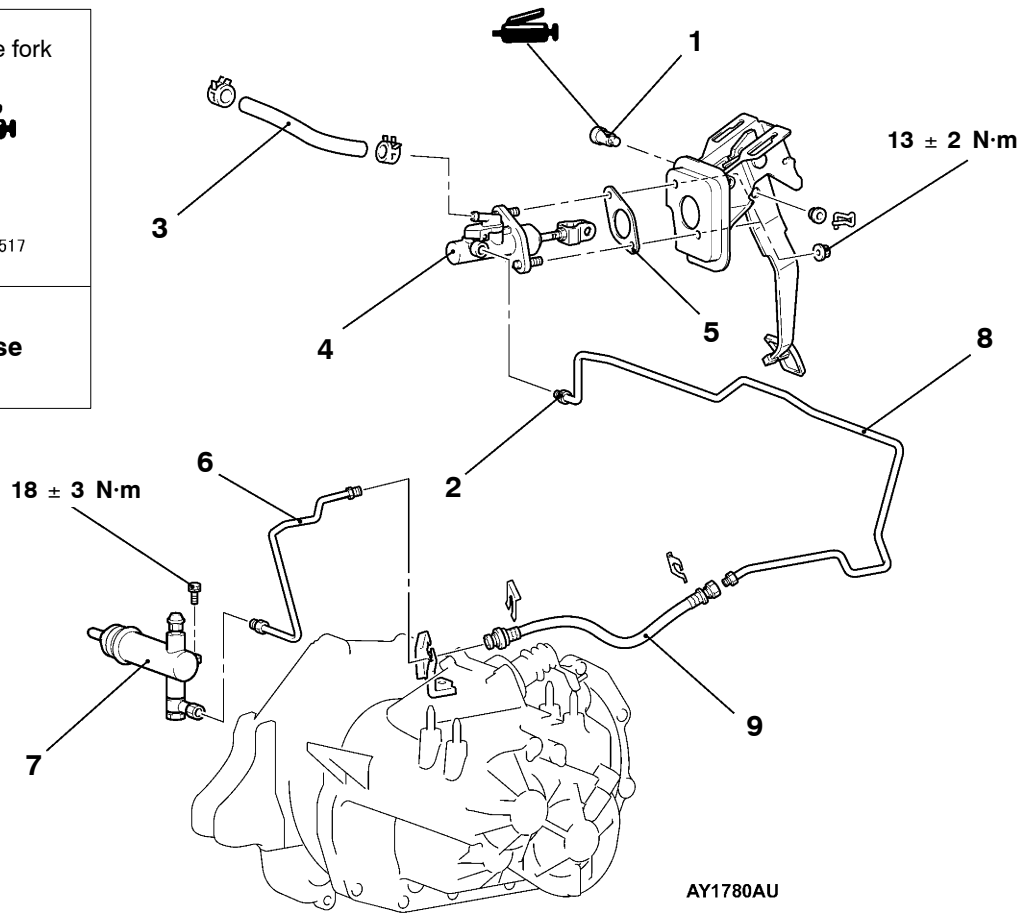
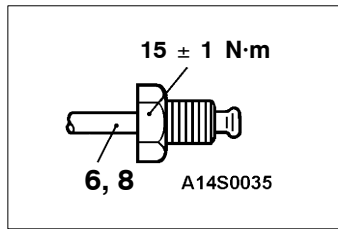
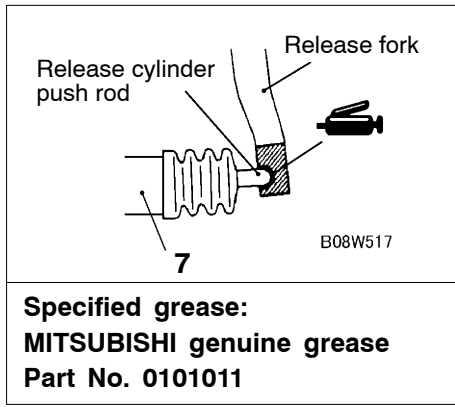
Clutch release cylinder removal steps

10. Clutch pipe
11. Clutch release cylinder

Clutch line removal steps

9. Clutch hose
10. Clutch pipe

<R.H. drive vehicles>



Clutch master cylinder removal steps

1. Clevis pin assembly
2. Clutch pipe connection
3. Reservoir hose
4. Clutch master cylinder
5. Sealer

Clutch release cylinder removal steps

6. Clutch pipe
7. Clutch release cylinder

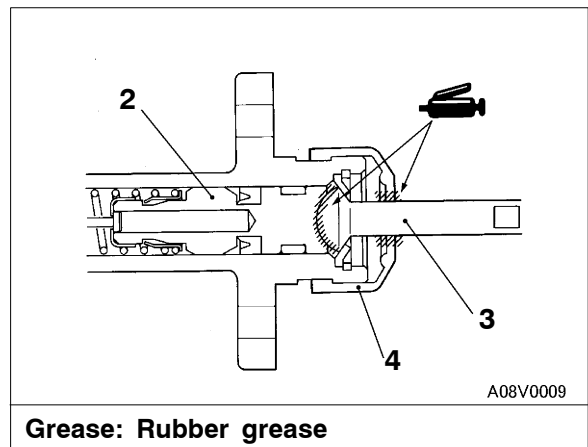
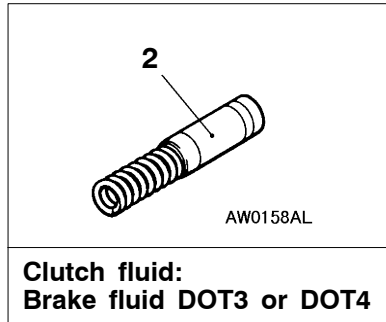
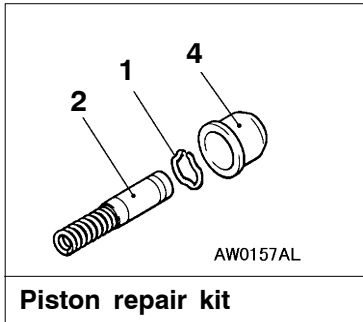
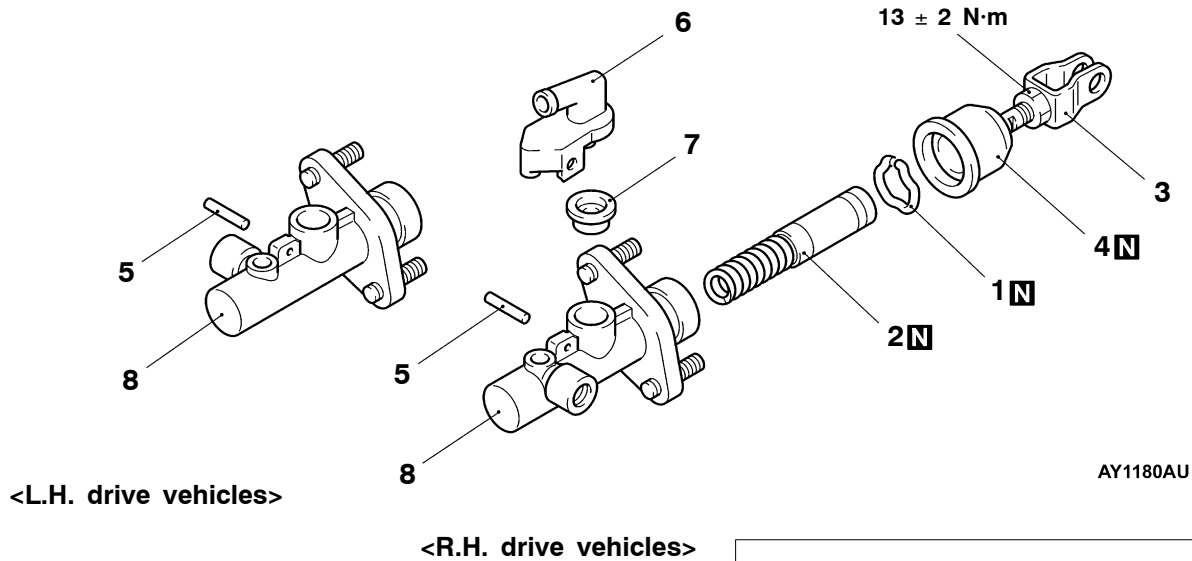
Clutch line removal steps

8. Clutch pipe
9. Clutch hose

DISASSEMBLY AND REASSEMBLY
CLUTCH MASTER CYLINDER

Caution

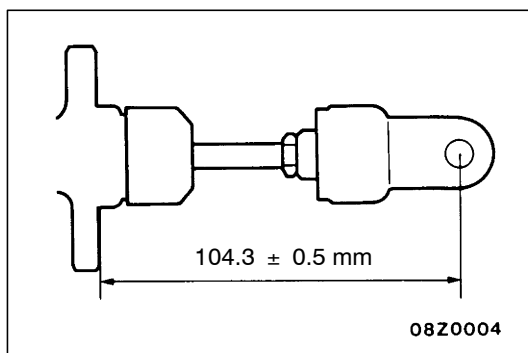
Do not disassemble piston assembly.



Disassembly steps

- ▶A◀
1. Piston stopper ring
 2. Piston assembly
 3. Push rod assembly
 4. Boot

5. Spring pin
6. Reservoir tank
7. Seal
8. Master cylinder body



INSTALLATION SERVICE POINT

▶A◀ **PUSH ROD ASSEMBLY INSTALLATION**

Set the length of the push rod assembly to the shown dimension to make the adjustment of clutch pedal easier.

NOTES

CLUTCH OVERHAUL

CONTENTS

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SPECIFICATIONS	2	CLUTCH	3
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TIGHTENING TORQUE	2		



GENERAL DESCRIPTION

The pull-type clutch has been adopted to improve the cut-off at high rotations and reduce the clutch pedal pressing force.

SPECIFICATIONS

Clutch disc	Type	Dry single-disc type
	Facing dimension mm	240 × 160
Clutch cover	Type	Diaphragm spring, pull-type
	Set load N	9,320
Clutch control method		Hydraulic method

SERVICE SPECIFICATIONS

Items	Limit value mm
Clutch disc facing rivet sink	0.3
Clearance between release cylinder inner diameter and piston outer diameter	0.15

TIGHTENING TORQUE

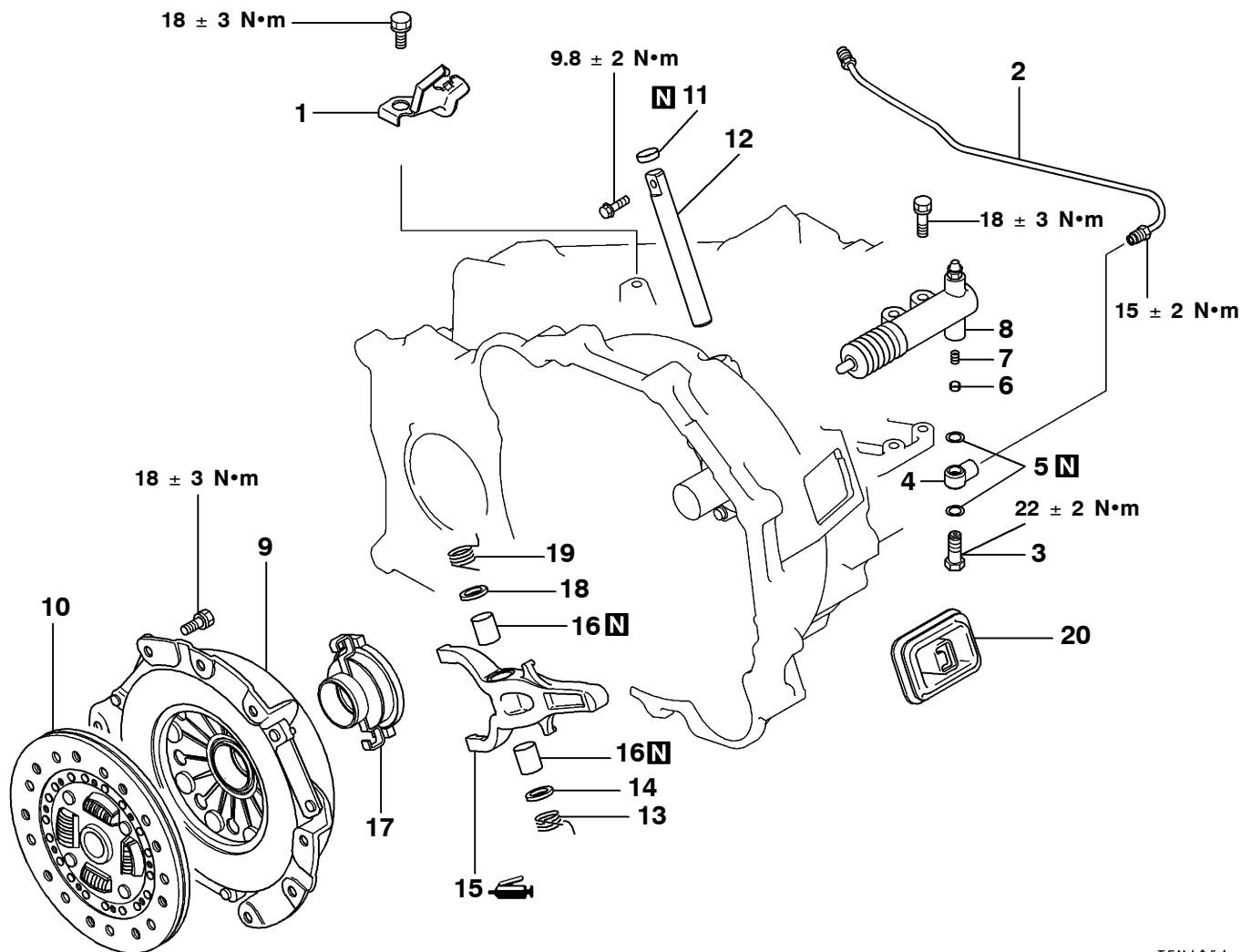
Items	Torque N•m
Clutch tube flare nut	15 ± 2
Clutch fluid line bracket mounting bolt	18 ± 3
Clutch release cylinder air breather	11 ± 1
Clutch release cylinder mounting bolt	18 ± 3
Clutch release fork shaft mounting bolt	9.8 ± 2
Clutch release cylinder union bolt	22 ± 2

LUBRICANTS

Items	Specified lubricants
Release fork and release cylinder push rod contact section	MITSUBISHI genuine grease Part No.0101011 or equivalent
Release fork and release fork shaft sliding section	
Release fork and release bearing contact section	
Piston and piston cup circumference	MITSUBISHI genuine brake fluid "DIA-QUEEN BRAKE FLUID SUPER 4" or equivalent
Release cylinder inner circumference	

CLUTCH

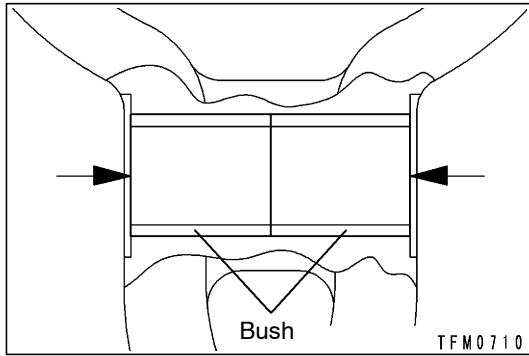
REMOVAL AND INSTALLATION



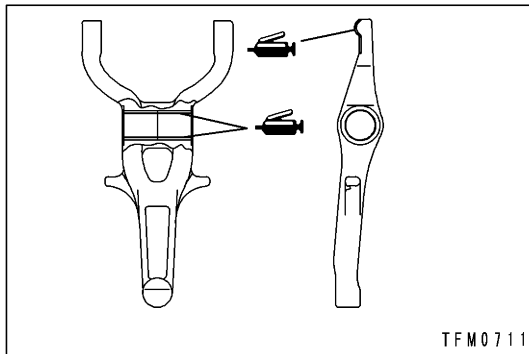
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Removal steps

- | | |
|---|---|
| <ul style="list-style-type: none"> ▶E◀ 6. Valve plate ▶E◀ 7. Valve plate spring ▶D◀ 8. Clutch release cylinder | <ul style="list-style-type: none"> ▶C◀ 11. Sealing cap ▶C◀ 12. Release fork shaft ▶B◀ 15. Release fork ▶A◀ 16. Bush |
|---|---|
- 1. Clutch fluid line bracket
 - 2. Clutch tube
 - 3. Union bolt
 - 4. Union
 - 5. Gasket
 - 6. Valve plate
 - 7. Valve plate spring
 - 8. Clutch release cylinder
 - 9. Clutch cover
 - 10. Clutch disc
 - 11. Sealing cap
 - 12. Release fork shaft
 - 13. Support spring (L)
 - 14. Packing
 - 15. Release fork
 - 16. Bush
 - 17. Clutch release bearing
 - 18. Packing
 - 19. Support spring (R)
 - 20. Release fork boot

**REASSEMBLY SERVICE POINTS****▶A◀ BUSH INSTALLATION**

Press the bush into the position of the release valve shown in the illustration.

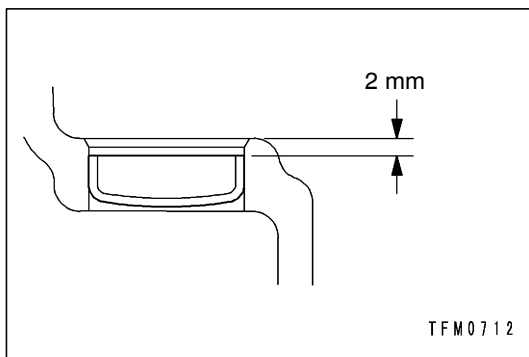
**▶B◀ RELEASE FORK INSTALLATION**

Apply grease on the release fork at the position shown in the illustration.

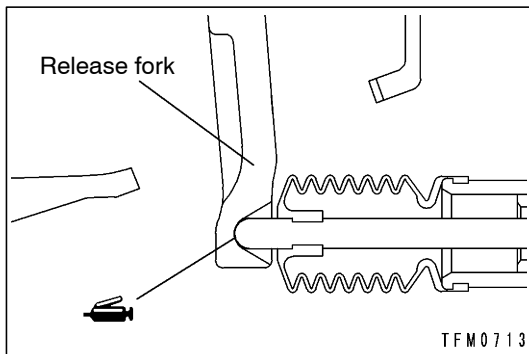
Grease

Specified grease:

**MITSUBISHI genuine grease Part No.0101011
or equivalent**

**▶C◀ SEALING CAP INSTALLATION**

Press the sealing cap into the position shown in the illustration while taking care so that it is not tilted.

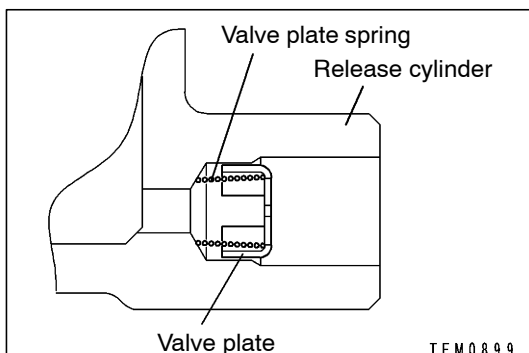
**▶D◀ CLUTCH RELEASE CYLINDER INSTALLATION**

Fill grease in the release fork to the position shown in the illustration.

Grease

Specified grease:

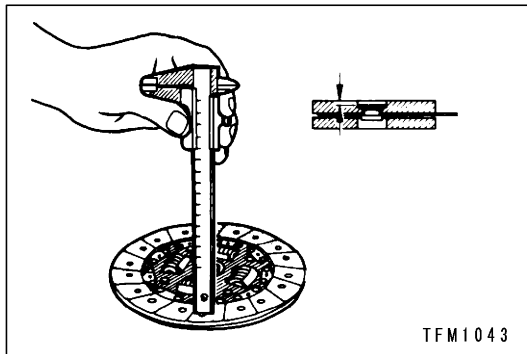
**MITSUBISHI genuine grease Part No.0101011
or equivalent**

**▶E◀ VALVE PLATE SPRING/VALVE PLATE INSTALLATION**

Set the spring's large diameter side to the valve plate side, and install the valve plate spring and valve plate.

INSPECTION**CLUTCH COVER**

- (1) Check the pressure plate surface for wear, cracks or discoloration.
- (2) Check the strap plate rivet for looseness. If loose, replace the clutch cover.

**CLUTCH DISC****Caution**

Do not wash the clutch disc with cleaning oil.

- (1) Check the facing for decomposition caused by rivet looseness, single-side contact or seizure, and check for the presence of grease. If any fault is found, replace the clutch disc.
- (2) Measure the rivet sinking level, and replace the clutch disc if the limit is exceeded.

Limit value: 0.3 mm

- (3) Check the torsion spring for play and breakage. If faulty, replace the clutch disc.
- (4) Set the clutch disc onto the input shaft, and check the sliding state and for play in the rotation direction. If the sliding state is poor, wash the disc, reassemble and then check the state again. If there is extreme play, replace the clutch disc or input shaft or both parts.

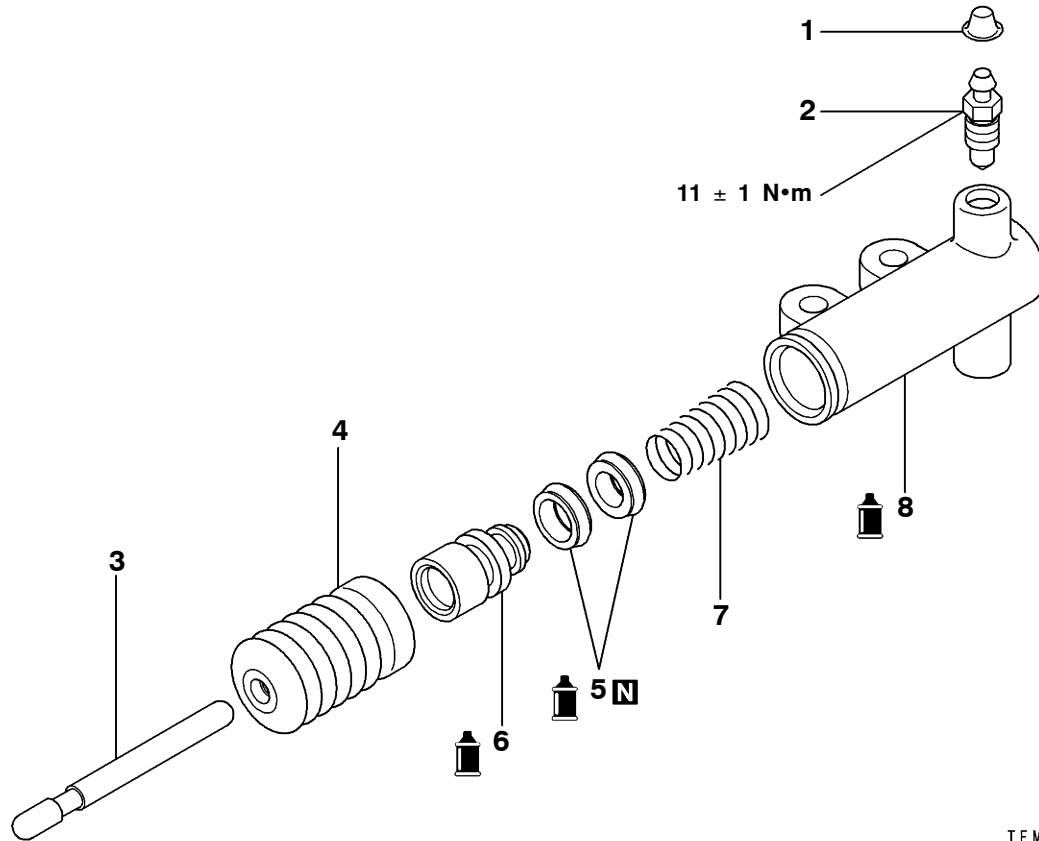
CLUTCH RELEASE BEARING**Caution**

Grease is filled in the release bearing, so do not wash with washing oil.

- (1) Check the bearing for seizure, damage, abnormal noise or improper rotation.
- (2) Check that the pull ring of the release bearing is not worn.
- (3) If the surface where the bearing contacts the release fork is abnormally worn, replace the bearing.

RELEASE FORK AND RELEASE FORK SHAFT

- (1) If the surface where the release fork contacts the bearing is abnormally worn, replace the release fork.
- (2) Check the release fork shaft for bending and wear. If any abnormality is found, replace the release fork shaft.

CLUTCH RELEASE CYLINDER**DISASSEMBLY AND REASSEMBLY**

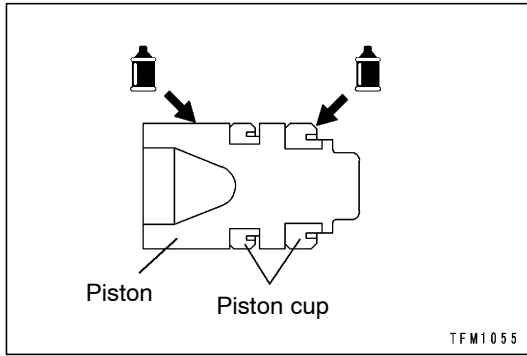
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Disassembly step

1. Cap
2. Air breather
3. Push rod
4. Boot



5. Piston cup
6. Piston
7. Conical spring
8. Release cylinder



REASSEMBLY SERVICE POINT

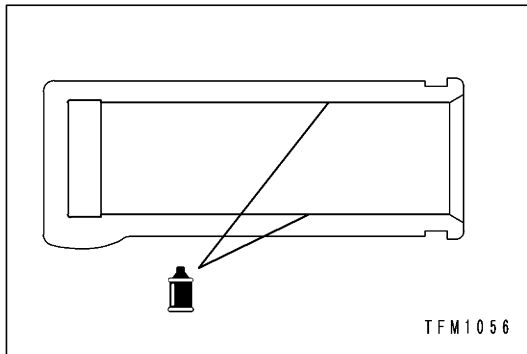
▶◀ PISTON/PISTON CUP INSTALLATION

After applying brake fluid on the inner surface of the release cylinder and circumference of the piston and piston cup, insert the piston and piston cup into the release cylinder.

Brake fluid

Specified fluid:

MITSUBISHI genuine brake fluid "DIA-QUEEN BRAKE FLUID SUPER 4" or equivalent



INSEPCION

RELEASE CYLINDER

- (1) Check the inner surface of the release cylinder for rust and damage.
- (2) Using a cylinder gauge, measure the inner diameter of the release cylinder at approx. three positions (deepest section, middle, opening). If the clearance with the outer diameter of the piston exceeds the limit value, replace the release cylinder assembly.

Limit value: 0.15 mm

NOTES

MANUAL TRANSMISSION

CONTENTS

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MANUAL TRANSMISSION OVERHAUL	22B



MANUAL TRANSMISSION

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Transmission Oil Replacement	40		
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Transfer Oil Replacement	40		
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WARNING REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

GENERAL

OUTLINE OF CHANGE

With the addition of the EVOLUTION-VII, the W5M51 transmission service adjustment procedure has been set as follows.

GENERAL INFORMATION

Items		Specifications	
Grade		RS, RS II	RS, RS II (With super cross gear)
Transmission model		W5M51	
Engine model		4G63-DOHC-T/C	
Type		5-speed, floor-shift	
Gear ratio	1st	2.785	2.785
	2nd	1.950	1.950
	3rd	1.407	1.444
	4th	1.031	1.096
	5th	0.720	0.825
	Reverse	3.416	3.416
Final reduction ratio (Differential gear ratio)		4.529	4.529
Front limited-slip differential (Helical-gear type)		Not provided	Provided
Transfer	Reduction ratio	3.307	3.307
	Limited-slip differential	VCU or hydraulic multi plate clutch (ACD)	VCU or hydraulic multi plate clutch (ACD)

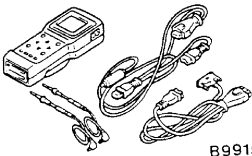
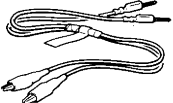
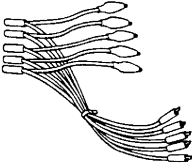
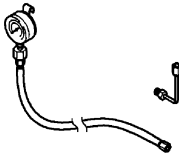
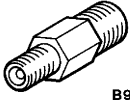
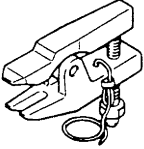
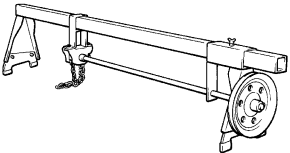
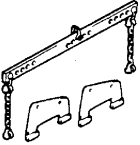
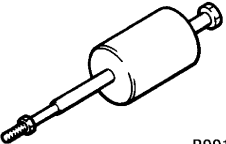
SERVICE SPECIFICATION

Item	Standard value
Hydraulic unit generation oil pressure MPa	1.0 - 1.6

LUBRICANTS

Item		Specified lubricant	Quantity L
Transmission oil		Gear oil SAE 75W-90 or 75W-85W conforming to API GL-4	2.8
Transfer oil	Vehicles without ACD or vehicles without ACD and AYC	MITSUBISHI Genuine Gear Oil Part No.8149630 EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W - 90) or equivalent	0.55
	Vehicles with ACD or vehicles with ACD and AYC		0.6
Fluid	Piping between ACD and hydraulic unit	DIA QUEEN ATF SP III	0.9
	Pipes between ACD and hydraulic unit and between AYC and hydraulic unit		1.0

SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II Sub assembly	Diagnosis code checking
	MB991529	Diagnosis code checking harness	
	MB991348	Test harness set	G sensor check
	MD998330 (including MD998331)	Oil pressure gauge (3.0 MPa)	Hydraulic pressure measurement <ACD>
 B991705	MB991705	Adapter	
 B991113	MB990635, MB991113 or MB991406	Steering linkage puller	Tie rod end and lower disconnection
	GENERAL SERVICE TOOL MZ203827	Engine lifter	Supporting the engine assembly during removal and installation of the transmission
 B991453	MB991453	Engine hanger attachment set	
 B991721	MB991721	Slide hammer	Output shaft removal

TROUBLESHOOTING <ACD>

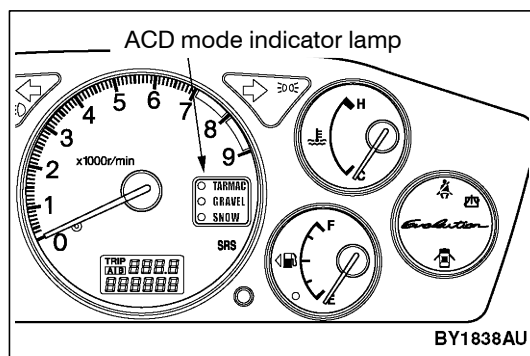
BASIC TROUBLESHOOTING CONDITIONS

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

NOTE

Before starting the troubleshooting procedure, make sure that the following items have been checked okay.

- Is the appropriate steering wheel installed at the center of the steering column shaft correctly?
- Are the tire, wheel size, specifications, air pressure, balance, and wear state normal?
- Is the wheel alignment normal?
- Has the engine, suspension, etc. been remodeled in such a way that it will affect the ACD and AYC systems?



DIAGNOSIS FUNCTION

READING DIAGNOSIS CODE

Read a diagnosis code by the MUT-II or ACD mode indicator lamp. (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)

NOTE

Connect the MUT-II to the diagnosis connector (16-pin).

ERASING DIAGNOSIS CODES

When using the MUT-II

Connect the MUT-II to the diagnosis connector (16-pin) and erase the diagnosis code.

Caution

Turn the ignition switch to the “LOCK”(OFF) position before connecting or disconnecting the MUT-II.

INSPECTION CHART FOR DIAGNOSIS CODES

Diagnosis code No.	Diagnosis items		Reference page
12	Power supply voltage (valve power supply) system	open circuit or short-circuit	22A-8
13	Fail-safe relay system <inside 4WD-ECU>	open circuit or short-circuit	22A-8
21	Wheel speed sensor <FR> system	open circuit or short-circuit	22A-9
22	Wheel speed sensor <FL> system	open circuit or short-circuit	22A-9
23	Wheel speed sensor <RR> system	open circuit or short-circuit	22A-9
24	Wheel speed sensor <RL> system	open circuit or short-circuit	22A-9
25	Wrong-diameter tire		22A-11
26	Wheel speed sensor (faulty output signal)		22A-13
31	Steering wheel sensor <ST-1, ST-2, ST-N> system	open circuit or short-circuit	22A-15
32	Steering wheel sensor <ST-N> system	short-circuit	22A-16
33		fixed	22A-16
34	Steering wheel sensor <ST-1, ST-2> system	short-circuit or output fixed	22A-17
41	TPS system	open circuit or ground	22A-18
42		short-circuit	22A-18
45	Pressure sensor system	open circuit or ground	22A-19
46		open earth	22A-19
47		abnormal power supply	22A-20
51	Longitudinal G sensor system	open circuit or short-circuit	22A-21
52		defective sensor	22A-22
56	Lateral G sensor system	open circuit or short-circuit	22A-23
57		defective sensor	22A-24
61	Stop lamp switch system	open circuit	22A-25
62	ACD mode switch system	stuck	22A-26
63	Parking brake switch system	short-circuit or not returned to original position	22A-27
65	ABS monitor system	open circuit or defective ABS	22A-28
71	Proportional valve <AYC> system	open circuit or short-circuit	Refer to GROUP 27B.
72	Directional control valve <Right> system	open circuit or short-circuit	
73	Directional control valve <Left> system	open circuit or short-circuit	
74	Proportional valve <ACD> system	open circuit or short-circuit	22A-29

Diagnosis code No.	Diagnosis items		Reference page
81	Electric pump relay system	open circuit or short-circuit	22A-29
82		electric pump malfunction or pressure sensor defect	22A-30
84	AYC control error		Refer to GROUP 27B.
85	ACD control error		-

NOTE

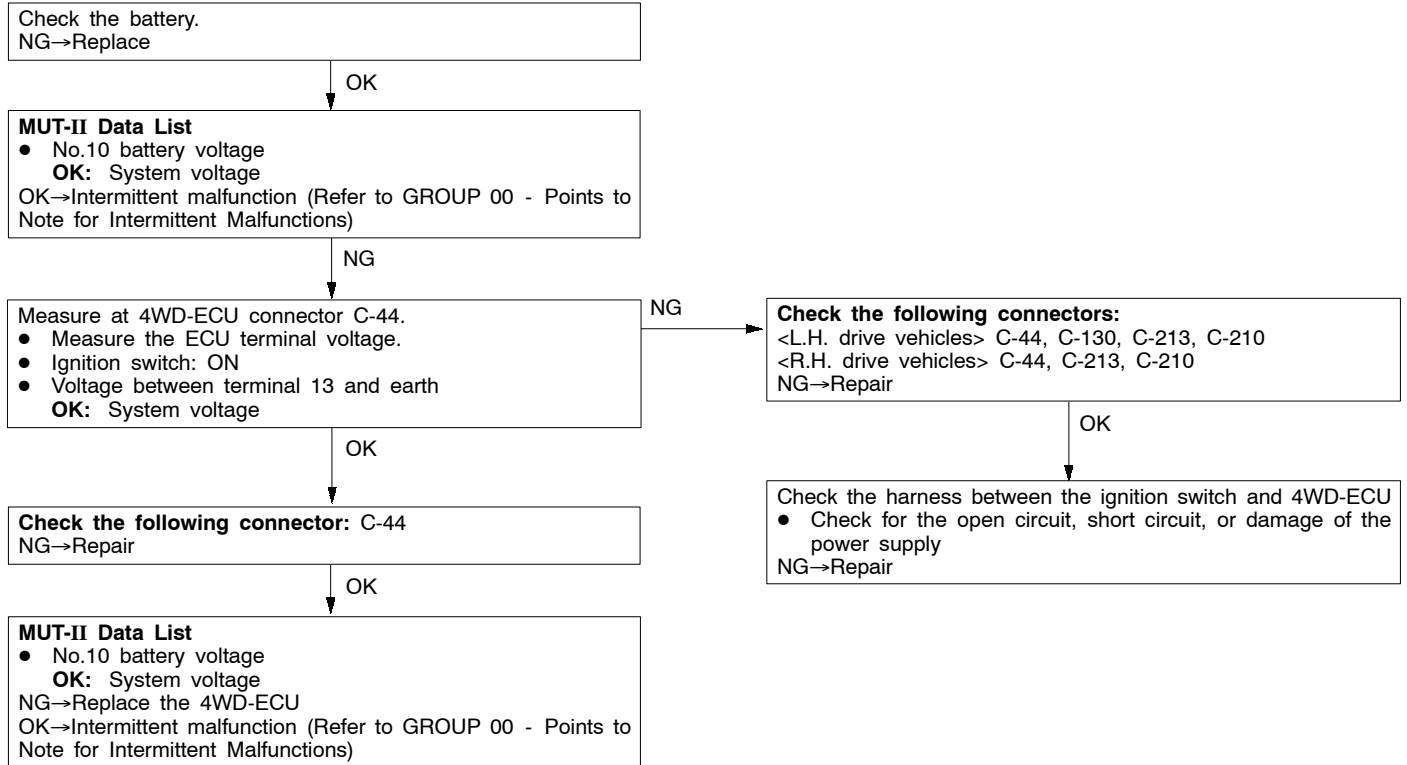
Code No.85 is not a code number output due to malfunction, but a code number output when control for the 4WD-ECU to protect the ACD is stopped in excessive driving. ACD control can be recovered by turning the ignition switch ON to OFF to ON.

INSPECTION PROCEDURES FOR DIAGNOSIS CODES

Code No.12 Power supply voltage (valve power supply) system	Probable cause
The power supply circuit opens or short-circuits if the power supply voltage of the 4WD-ECU is below 9 V or above 18 V. Or code No.12 is output when the battery voltage drops.	<ul style="list-style-type: none"> ● Defective harness or connector ● Defective battery ● Defective 4WD-ECU

NOTE

Refer to the corresponding item if any other diagnosis code is being output.

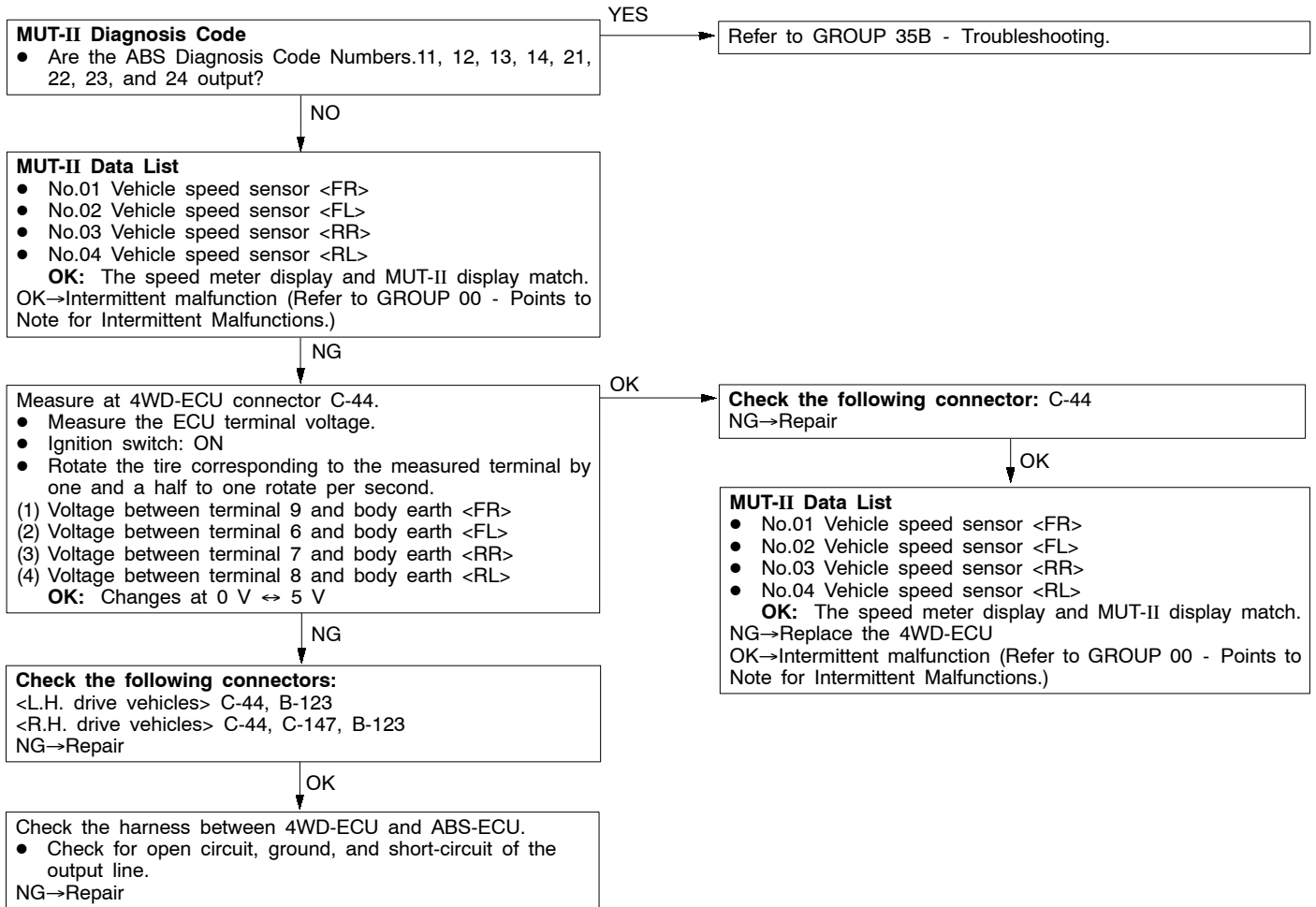


Code No.13 Fail-safe relay system <inside 4WD-ECU>	Probable cause
Code No.13 will be output as the open circuit or short circuit of the fail-safe relay when the voltage is above 6 V during failsafe relay OFF or when the voltage is below 6 V during ON.	<ul style="list-style-type: none"> ● Defective 4WD-ECU

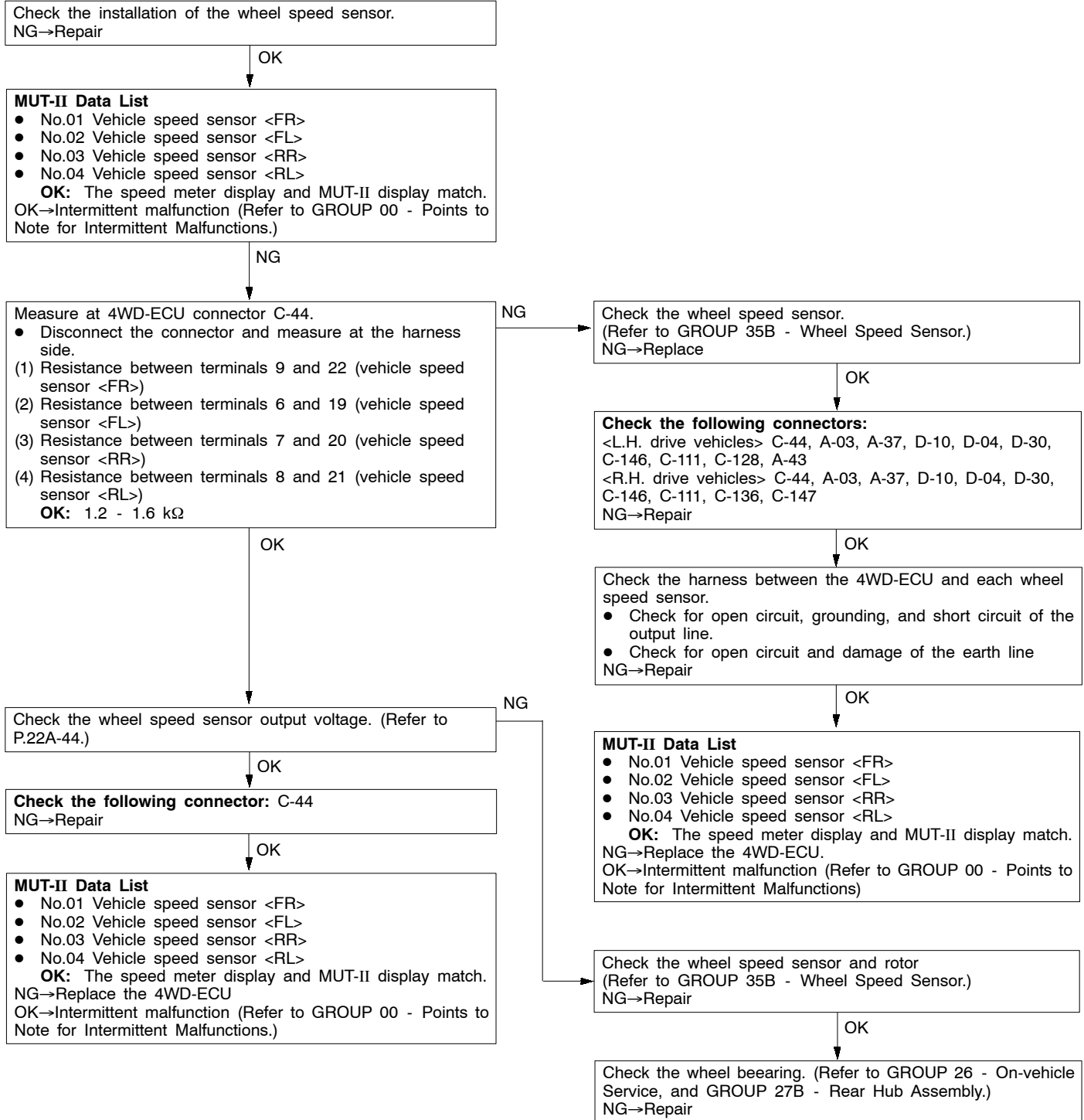
Replace the 4WD-ECU.

Code No.21 Wheel speed sensor <FR> system Code No.22 Wheel speed sensor <FL> system Code No.23 Wheel speed sensor <RR> system Code No.24 Wheel speed sensor <RL> system	Probable cause
A diagnosis code corresponding to the open circuit or short circuit of the wheel speed sensor is output when one wheel speed sensor has detected a vehicle speed of above 15 km/h, but any one of the remaining three wheel speed sensors could not detect the vehicle speed.	<ul style="list-style-type: none"> ● Wheel speed sensor fault ● Rotor fault ● Wheel bearing fault ● Harness or connector fault ● ABS-ECU fault <Vehicles with ACD and AYC> ● 4WD-ECU fault

<Vehicles with ACD and AYC>

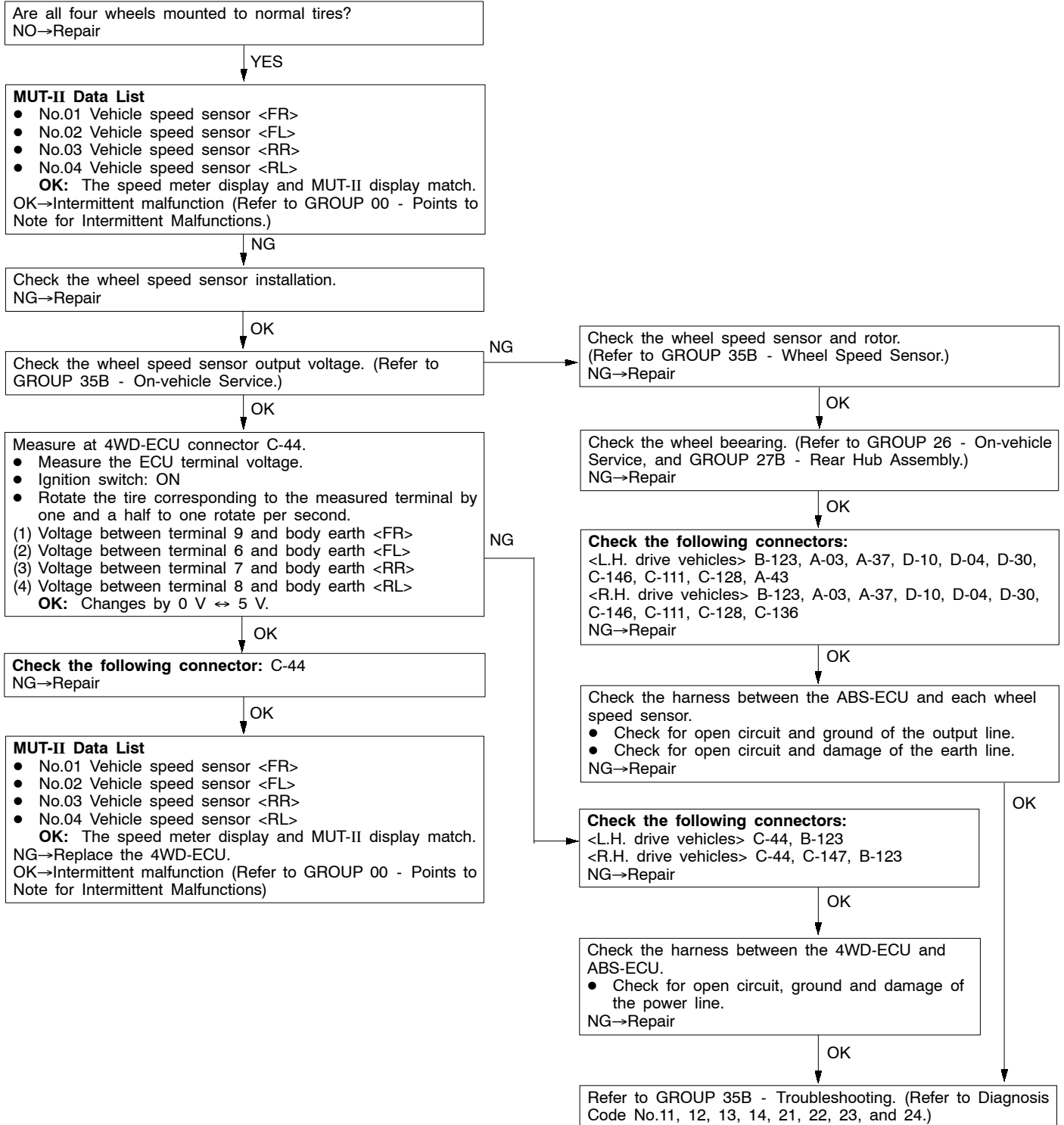


<Vehicles with ACD>



Code No.25 Wrong-diameter tire	Probable cause
<p>Code No.25 is output as wrong-diameter tire when one of the four vehicle speeds is outside the range of specified values in respect to the average of the four vehicle speed sensors, when the vehicle speed is above 20 km/h with the steering wheel in the straight ahead position. However the warning lamp does not light up.</p>	<ul style="list-style-type: none"> ● Tire fault ● Wheel speed sensor fault ● Rotor fault ● Wheel bearing fault ● Harness or connector fault ● ABS-ECU fault <Vehicles with ACD and AYC> ● 4WD-ECU fault

<Vehicles with ACD and AYC>



<Vehicles with ACD>

Check the installation of the wheel speed sensor.
NG→Repair

OK

MUT-II Data List

- No.01 Vehicle speed sensor <FR>
- No.02 Vehicle speed sensor <FL>
- No.03 Vehicle speed sensor <RR>
- No.04 Vehicle speed sensor <RL>

OK: The speed meter display and MUT-II display match.
OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

NG

Measure at 4WD-ECU connector C-44.

- Disconnect the connector and measure at the harness side.

- (1) Resistance between terminals 9 and 22 (vehicle speed sensor <FR>)
- (2) Resistance between terminals 6 and 19 (vehicle speed sensor <FL>)
- (3) Resistance between terminals 7 and 20 (vehicle speed sensor <RR>)
- (4) Resistance between terminals 8 and 21 (vehicle speed sensor <RL>)

OK: 1.2 - 1.6 kΩ

NG

Check the wheel speed sensor.
(Refer to GROUP 35B - Wheel Speed Sensor.)
NG→Replace

OK

Check the following connectors:

<L.H. drive vehicles> C-44, A-03, A-37, D-10, D-04, D-30, C-146, C-111, C-128, A-43
<R.H. drive vehicles> C-44, A-03, A-37, D-10, D-04, D-30, C-146, C-111, C-136, C-147
NG→Repair

OK

Check the harness between the 4WD-ECU and each wheel speed sensor.

- Check for open circuit and ground of the output line.
- Check for open circuit and damage of the earth line.

NG→Repair

OK

Check the wheel speed sensor output voltage. (Refer to P.22A-44.)

NG

OK

Check the following connector: C-44
NG→Repair

OK

MUT-II Data List

- No.01 Vehicle speed sensor <FR>
- No.02 Vehicle speed sensor <FL>
- No.03 Vehicle speed sensor <RR>
- No.04 Vehicle speed sensor <RL>

OK: The speed meter display and MUT-II display match.
NG→Replace the 4WD-ECU.
OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

MUT-II Data List

- No.01 Vehicle speed sensor <FR>
- No.02 Vehicle speed sensor <FL>
- No.03 Vehicle speed sensor <RR>
- No.04 Vehicle speed sensor <RL>

OK: The speed meter display and MUT-II display match.
NG→Replace the 4WD-ECU.
OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

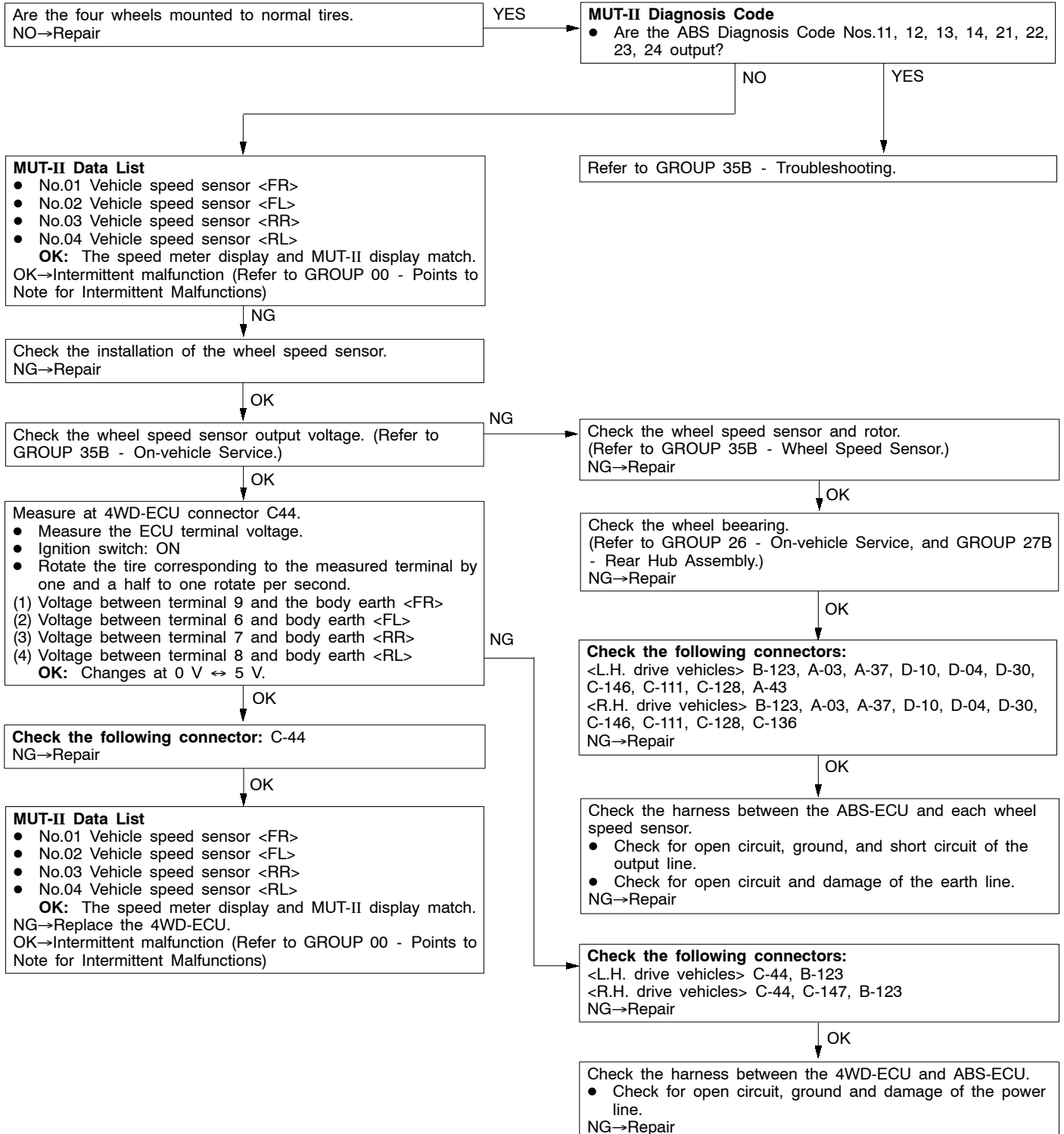
Check the wheel speed sensor and rotor.
(Refer to GROUP 35B - Wheel Speed Sensor.)
NG→Repair

OK

Check the wheel bearing. (Refer to GROUP 26 - On-vehicle Service, and GROUP 27B - Rear Hub Assembly.)
NG→Repair

Code No.26 Wheel speed sensor system (faulty output signal)	Probable cause
Code No.26 is output as output signal error of the wheel speed sensor when one wheel speed is outside the specified range at the vehicle speed of above 20 km/h. However, warning lamp will light up.	<ul style="list-style-type: none"> ● Tire fault ● Wheel speed sensor fault ● Rotor fault ● Wheel bearing fault ● Harness or connector fault ● ABS-ECU fault <Vehicles with ACD and AYC> ● 4WD-ECU fault

<Vehicles with ACD and AYC>



<Vehicles with ACD>

Check the installation of the wheel speed sensor.
NG→Repair

OK

MUT-II Data List

- No.01 Vehicle speed sensor <FR>
- No.02 Vehicle speed sensor <FL>
- No.03 Vehicle speed sensor <RR>
- No.04 Vehicle speed sensor <RL>

OK: The speed meter display and MUT-II display match.
OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

NG

Measure at 4WD-ECU connector C-44.

- Disconnect the connector and measure at the harness side.

- (1) Resistance between terminals 9 and 22 (vehicle speed sensor <FR>)
- (2) Resistance between terminals 6 and 19 (vehicle speed sensor <FL>)
- (3) Resistance between terminals 7 and 20 (vehicle speed sensor <RR>)
- (4) Resistance between terminals 8 and 21 (vehicle speed sensor <RL>)

OK: 1.2 - 1.6 kΩ

NG

Check the wheel speed sensor. (Refer to GROUP 35B - Wheel Speed Sensor.)
NG→Replace

OK

Check the following connectors:

<L.H. drive vehicles> C-44, A-03, A-37, D-10, D-04, D-30, C-146, C-111, C-128, A-43
<R.H. drive vehicles> C-44, A-03, A-37, D-10, D-04, D-30, C-146, C-111, C-136, C-147
NG→Repair

OK

Check the harness between the 4WD-ECU and wheel speed sensor.

- Check for open circuit, grounding, and short-circuit of the output line.
- Check for open circuit and damage of the earth line

NG→Repair

OK

Check the wheel speed sensor output voltage. (Refer to P.22A-44.)

NG

OK

Check the following connector: C-44
NG→Repair

OK

MUT-II Data List

- No.01 Vehicle speed sensor<FR>
- No.02 Vehicle speed sensor<FL>
- No.03 Vehicle speed sensor<RR>
- No.04 Vehicle speed sensor<RL>

OK: The speed meter display and MUT-II display match.
NG→Replace the 4WD-ECU.
OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

MUT-II Data List

- No.01 Vehicle speed sensor <FR>
- No.02 Vehicle speed sensor <FL>
- No.03 Vehicle speed sensor <RR>
- No.04 Vehicle speed sensor <RL>

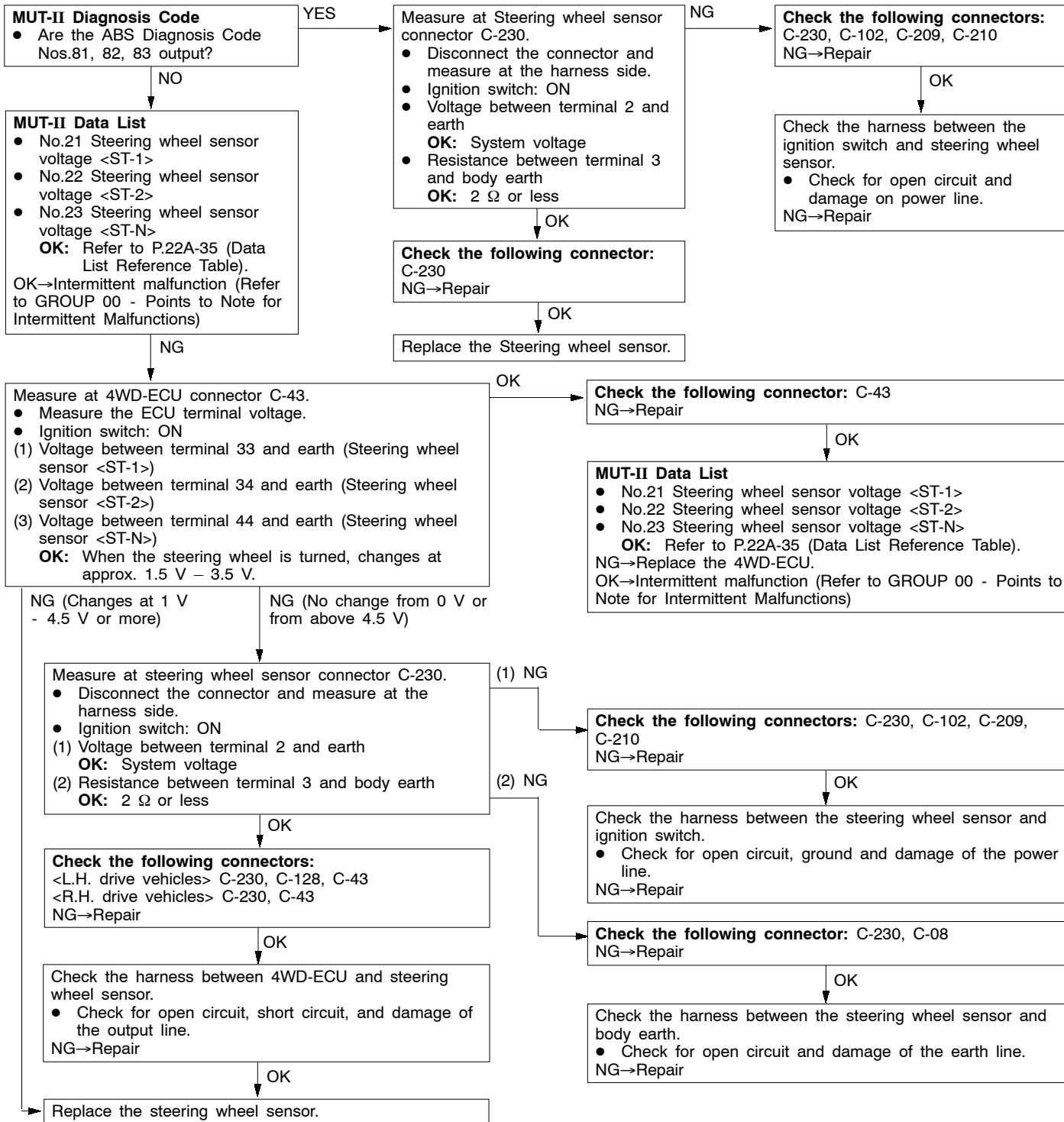
OK: The speed meter display and MUT-II display match.
NG→Replace the 4WD-ECU.
OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

Check the wheel speed sensor and rotor. (Refer to GROUP 35B - Wheel Speed Sensor.)
NG→Repair

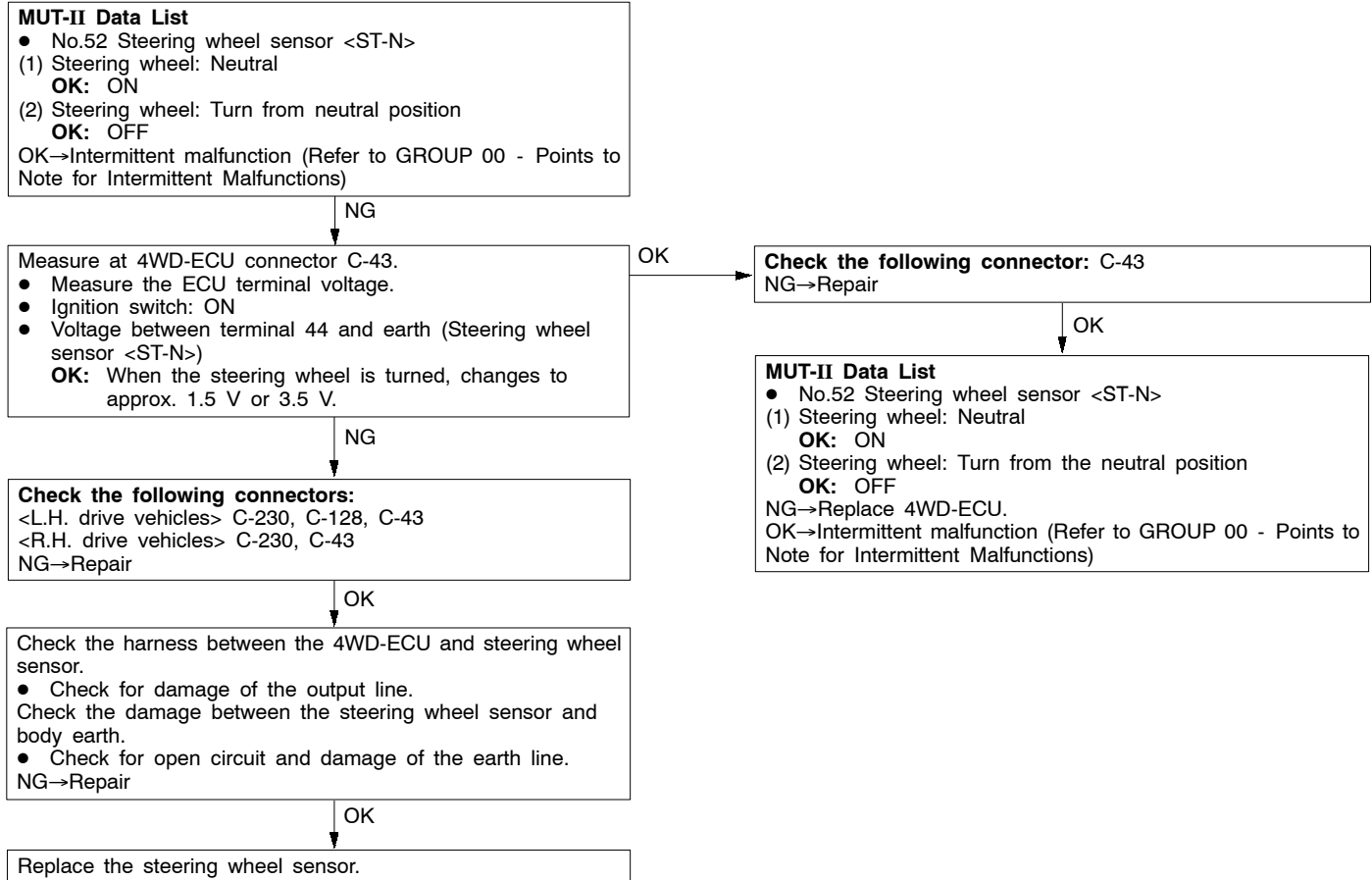
OK

Check the wheel bearing (Refer to GROUP 26 - On-vehicle Service, and GROUP 27B - Rear Hub Assembly.)
NG→Repair

Code No.31 Steering wheel sensor <ST-1, ST-2, ST-N> system	Probable cause
Code No.31 is output when open circuit or short circuit of the steering wheel sensor output line (ST-1, ST-2, or ST-N) occurs.	<ul style="list-style-type: none"> Steering wheel sensor fault Harness or connector fault 4WD-ECU fault



Code No.32, 33 Steering wheel sensor <ST-N> system	Probable cause
Code No.32 is output when the steering wheel sensor ST-N has been detected at the neutral position in a state where the steering wheel has been determined to have changed above 40°C from steering wheel sensor ST-1 and ST-2. Code No.33 is output when the steering wheel sensor ST-N has been detected at the neutral position in a state where the steering wheel has been determined to have changed above 400°C from steering wheel sensor ST-1 and ST-2.	<ul style="list-style-type: none"> ● Harness or connector fault ● Steering wheel sensor fault ● 4WD-ECU fault



Code No.34 Steering wheel sensor <ST-1, ST-2> system	Probable cause
Code No.34 is output when no change in the steering wheel sensor signal at a vehicle speed of above 15 km/h is detected for a total of more than 15 minutes <ST-1, ST-2>, and turning is detected during this time.	<ul style="list-style-type: none"> ● Harness or connector fault ● Steering wheel sensor fault ● 4WD-ECU fault

MUT-II Data List

- No.53 Steering wheel sensor <ST-1>
OK: When the steering wheel is rotated to the left, ON and OFF are repeated.
- No.54 Steering wheel sensor <ST-2>
OK: When the steering wheel is rotated to the right, ON and OFF are repeated.

OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

NG

Measure at 4WD-ECU connector C-43.

- Measure the ECU terminal voltage.
- Ignition switch: ON
- (1) Voltage between terminal 33 and earth (Steering wheel sensor <ST-1>)
- (2) Voltage between terminal 34 and earth (Steering wheel sensor <ST-2>)

OK: When the steering wheel is turned, changes at approx. 1.5 V or 3.5 V

OK

Check the following connector: C-43
 NG→Repair

OK

MUT-II Data List

- No.53 Steering wheel sensor <ST-1>
OK: When the steering wheel is rotated to the left, ON and OFF are repeated
- No.54 Steering wheel sensor <ST-2>
OK: When the steering wheel is rotated to the right ON and OFF are repeated.

NG→Replace the 4WD-ECU.
 OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

NG

Check the following connectors:
 <L.H. drive vehicles> C-230, C-128, C-43
 <R.H. drive vehicles> C-230, C-43
 NG→Repair

OK

Check the harness between the 4WD-ECU and steering wheel sensor.

- Check for damage of the output line.

Check the harness between the steering wheel sensor and body earth.

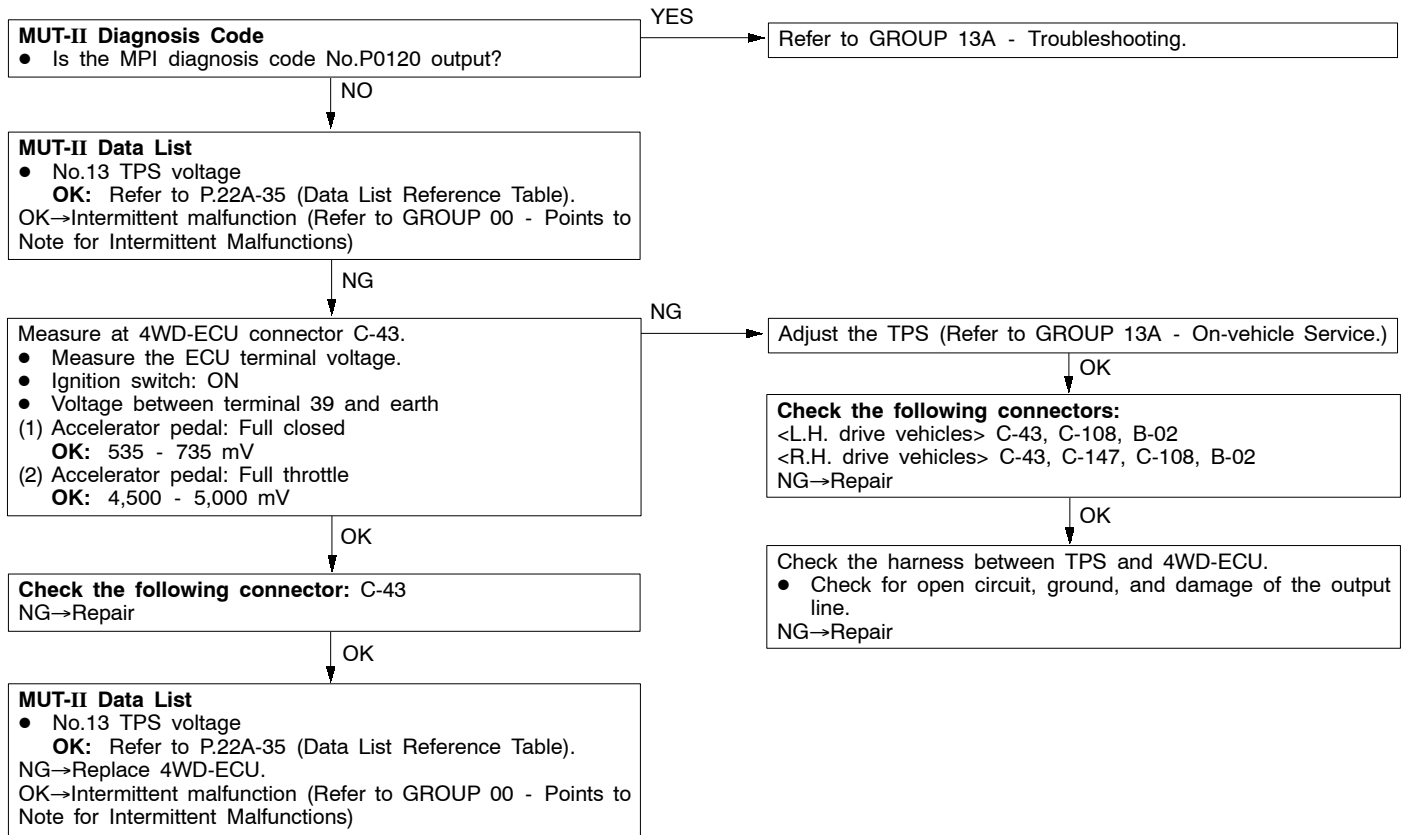
- Check for open circuit and damage of the earth line.

NG→Repair

OK

Replace the steering wheel sensor.

Code No.41, 42 TPS system	Probable cause
Code No.41 is output as excessively small output when the TPS output is below 0.2 V In the idling state. Code No.42 is output as excessively large output when the TPS output is more than 4.8 V for more than 2 minutes continuously below a vehicle speed of 10 km/h.	<ul style="list-style-type: none"> ● TPS fault ● Harness or connector fault ● 4WD-ECU fault

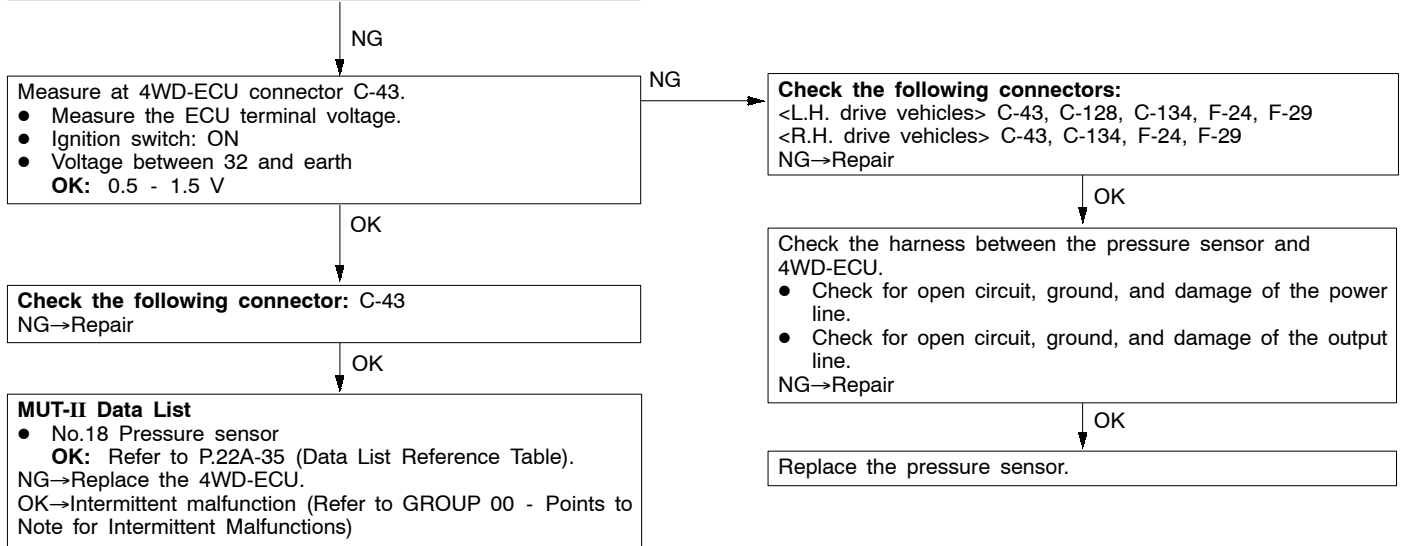


Code No.45 Pressure sensor system (Open circuit or ground)	Probable cause
Code No.45 is output when the output signal from the pressure sensor is below 0.2 V.	<ul style="list-style-type: none"> ● Harness or connector fault ● Pressure sensor fault ● 4WD-ECU fault

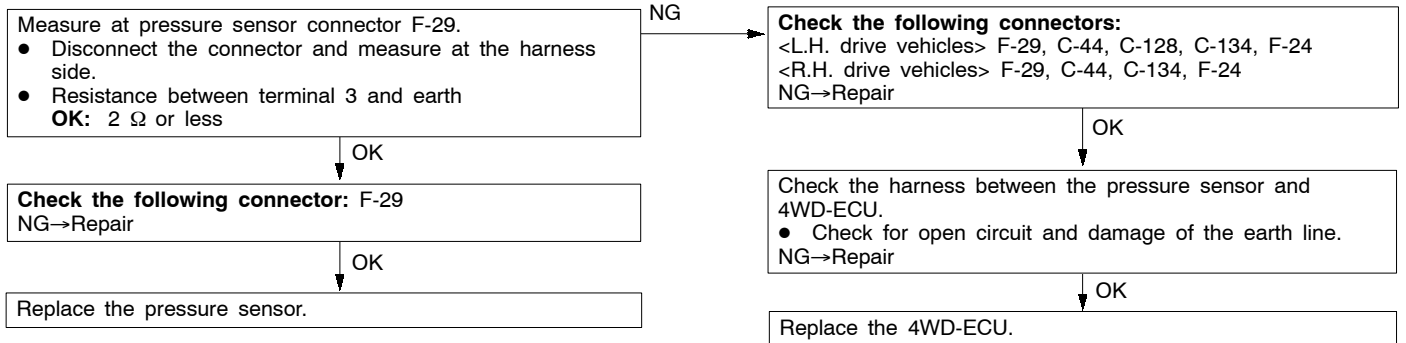
MUT-II Data List

- No.18 Pressure sensor

OK: Refer to P.22A-35 (Data List Reference Table).
 OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)



Code No.46 Pressure sensor system (open earth)	Probable cause
Code No.46 is output when the output signal from the pressure sensor is above 2.0 V.	<ul style="list-style-type: none"> ● Harness or connector fault ● Pressure sensor fault ● 4WD-ECU fault



Code No.47 Pressure sensor system (Abnormal power supply)	Probable cause
Code No.47 is output when the pressure sensor power supply voltage is above 4.0V during pressure sensor power OFF or less than 4.0V during pressure sensor power ON.	<ul style="list-style-type: none"> ● Harness or connector fault ● Pressure sensor fault ● 4WD-ECU fault

MUT-II Data List

- No.19 Pressure sensor power supply
- OK:** Approx. 5 V

OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

NG

Measure at 4WD-ECU connector C-43.

- Measure the ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal 43 and earth
- OK:** 4.9 - 5.1 V

NG

Check the following connectors:
 <L.H. drive vehicles> C-43, C-128, C-134, F-24, F-29
 <R.H. drive vehicles> C-43, C-134, F-24, F-29
 NG→Repair

OK

Check the following connector: C-43
 NG→Repair

OK

Check the harness between the pressure sensor and 4WD-ECU.

- Check for open circuit, ground and damage of the power line.

NG→Repair

OK

MUT-II Data List

- No.19 Pressure sensor power supply
- OK:** Approx. 5 V

NG→Replace the 4WD-ECU.
 OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

OK

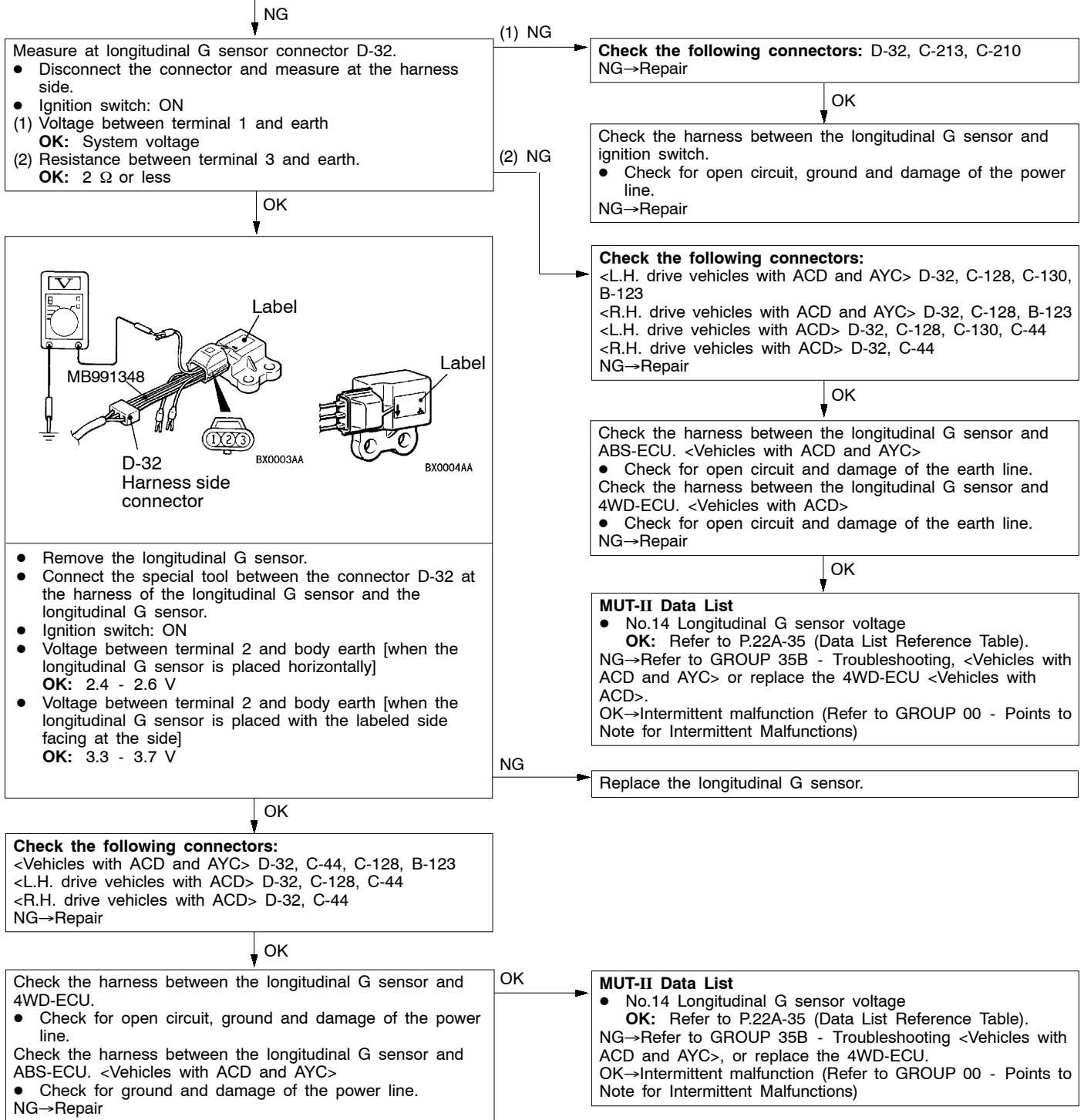
Replace the pressure sensor.

Code No.51 Longitudinal G sensor system	Probable cause
Code No.51 is output when the output signal of the longitudinal G sensor is less than 0.5 V or above 4.5 V.	<ul style="list-style-type: none"> ● Harness or connector fault ● Longitudinal G sensor fault ● ABS-ECU fault <Vehicles with ACD and AYC> ● 4WD-ECU fault

MUT-II Data List

- No.14 Longitudinal G sensor voltage

OK: Refer to P.22A-35 (Data List Reference Table).
 OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

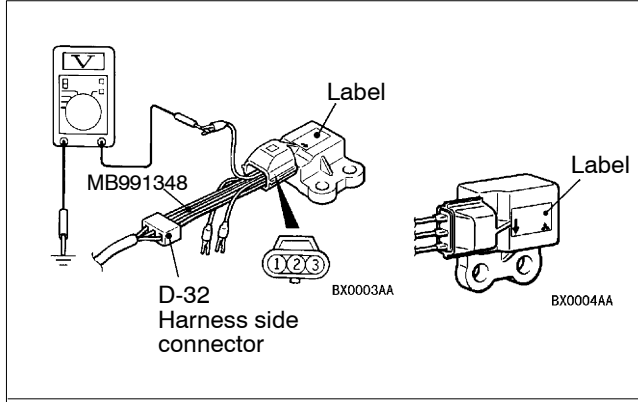


Measure at longitudinal G sensor connector D-32.

- Disconnect the connector and measure at the harness side.
- Ignition switch: ON

(1) Voltage between terminal 1 and earth
OK: System voltage

(2) Resistance between terminal 3 and earth.
OK: 2 Ω or less



- Remove the longitudinal G sensor.
- Connect the special tool between the connector D-32 at the harness of the longitudinal G sensor and the longitudinal G sensor.
- Ignition switch: ON
- Voltage between terminal 2 and body earth [when the longitudinal G sensor is placed horizontally]
OK: 2.4 - 2.6 V
- Voltage between terminal 2 and body earth [when the longitudinal G sensor is placed with the labeled side facing at the side]
OK: 3.3 - 3.7 V

Check the following connectors:
 <Vehicles with ACD and AYC> D-32, C-44, C-128, B-123
 <L.H. drive vehicles with ACD> D-32, C-128, C-44
 <R.H. drive vehicles with ACD> D-32, C-44
 NG→Repair

Check the harness between the longitudinal G sensor and 4WD-ECU.
 ● Check for open circuit, ground and damage of the power line.

Check the harness between the longitudinal G sensor and ABS-ECU. <Vehicles with ACD and AYC>
 ● Check for ground and damage of the power line.
 NG→Repair

MUT-II Data List

- No.14 Longitudinal G sensor voltage

OK: Refer to P.22A-35 (Data List Reference Table).
 NG→Refer to GROUP 35B - Troubleshooting, <Vehicles with ACD and AYC> or replace the 4WD-ECU <Vehicles with ACD>.
 OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

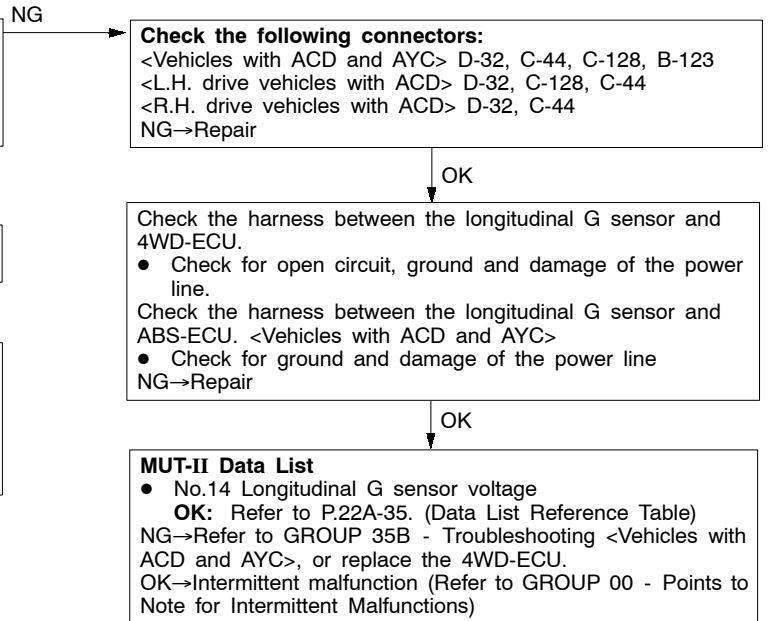
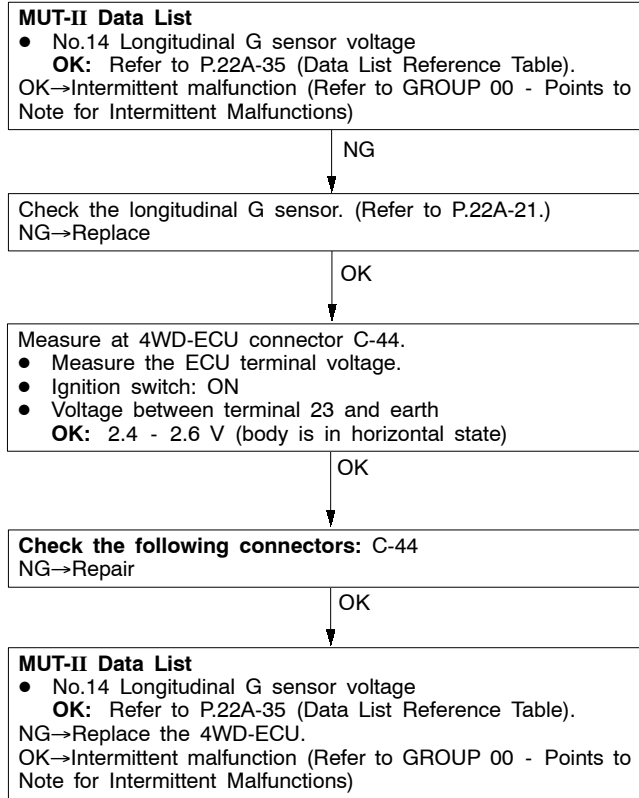
Replace the longitudinal G sensor.

MUT-II Data List

- No.14 Longitudinal G sensor voltage

OK: Refer to P.22A-35 (Data List Reference Table).
 NG→Refer to GROUP 35B - Troubleshooting <Vehicles with ACD and AYC>, or replace the 4WD-ECU.
 OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

Code No.52 Longitudinal G sensor system	Probable cause
Code No.52 is output when the G sensor has exceeded the specified value in a state where the ABS and brake are not operating above the vehicle speed of 10 km/h.	<ul style="list-style-type: none"> ● Harness or connector fault ● Longitudinal G sensor fault ● ABS-ECU fault <Vehicles with ACD and AYC> ● 4WD-ECU fault



Code No.56 Lateral G sensor system	Probable cause
Code No.56 is output when the output signal of the lateral G sensor is below 0.5 V or above 4.5 V.	<ul style="list-style-type: none"> ● Harness or connector fault ● Lateral G sensor fault ● ABS-ECU fault <Vehicles with ACD and AYC> ● 4WD-ECU fault

MUT-II Data List

- No.15 Lateral G sensor voltage
- **OK:** Refer to P.22A-35 (Data List Reference Table).

OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

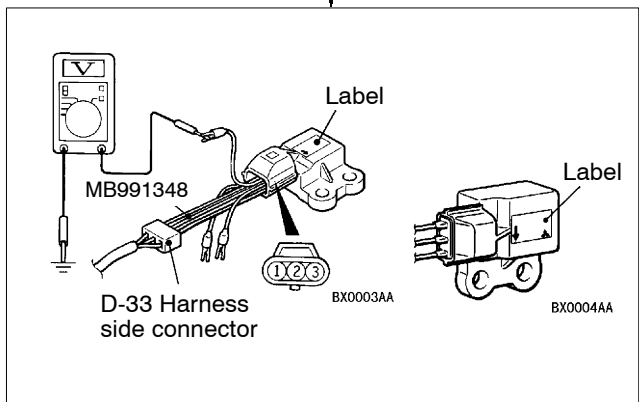
NG

Measure at lateral G sensor connector D-33.

- Disconnect the connector and measure at the harness side.
- Ignition switch: ON

(1) Voltage between terminal 1 and earth.
OK: System voltage

(2) Resistance between terminal 3 and earth.
OK: 2 Ω or less



- Remove the lateral G sensor.
- Connect the special tool between the connector D-33 at the harness of the lateral G sensor connector and the lateral G sensor.
- Ignition switch: ON
- Voltage between terminal 2 and body earth [when the lateral G sensor is placed on a horizontal ground]
OK: 2.4 - 2.6 V
- Voltage between terminal 2 and body earth [when the lateral G sensor is placed with the labeled side facing the side]
OK: 3.3 - 3.7 V

Check the following connectors:
<Vehicles with ACD and AYC> D-33, C-44, C-128, B-123
<L.H. drive vehicles with ACD> D-33, C-128, C-44
<R.H. drive vehicles with ACD> D-33, C-44
NG→Repair

Check the harness between the lateral G sensor and 4WD-ECU.

- Check for open circuit, ground and damage of the power line.

Check the harness between the lateral G sensor and ABS-ECU. <Vehicles with ACD and AYC>

- Check for ground and damage of the power line.

NG→Repair

(1) NG → **Check the following connectors:** D-33, C-213, C-210
NG→Repair

(2) NG → Check the harness between the lateral G sensor and ignition switch.

- Check for the open circuit, ground and damage of the power line.

NG→Repair

Check the following connectors:
<Vehicles with ACD and AYC> D-33, C-128, B-123
<L.H. drive vehicles with ACD> D-33, C-128, C-44
<R.H. drive vehicles with ACD> D-33, C-44
NG→Repair

Check the harness between the lateral G sensor and ABS-ECU. <Vehicles with ACD and AYC>

- Check for open circuit and damage of the earth line.

Check the harness between the lateral G sensor and 4WD-ECU.<Vehicles with ACD>

- Check for open circuit and damage of the earth line.

NG→Repair

MUT-II Data List

- No.15 Lateral G sensor voltage
- **OK:** Refer to P.22A-35. (Data List Reference Table)

NG→Refer to GROUP 35B - Troubleshooting <Vehicles with ACD and AYC>, or replace the 4WD-ECU <Vehicles with ACD>.

OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

NG → Replace the lateral G sensor.

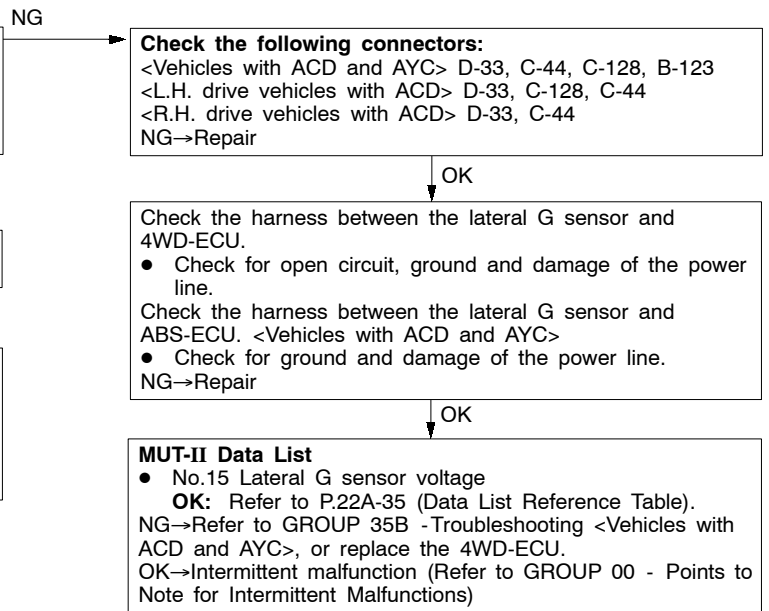
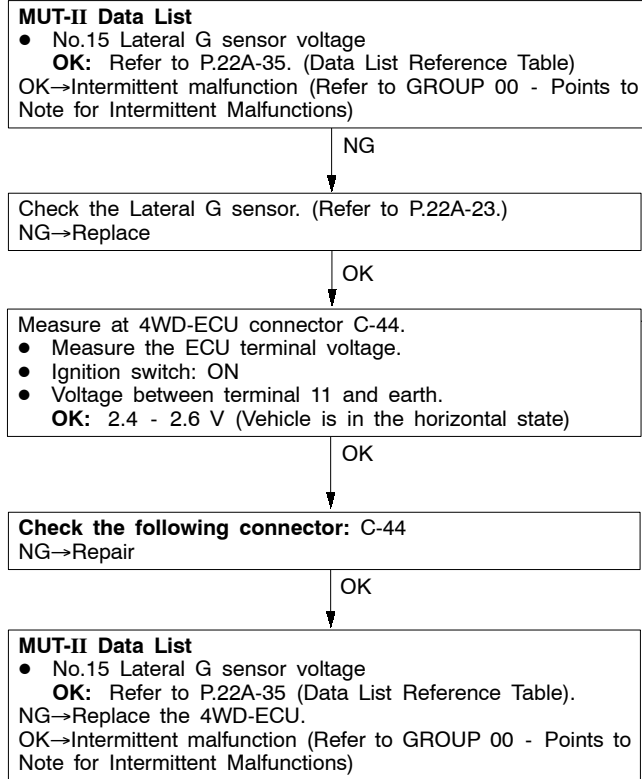
OK → **MUT-II Data List**

- No.15 Lateral G sensor voltage
- **OK:** Refer to P.22A-35. (Data List Reference Table)

NG→Refer to GROUP 35B - Troubleshooting <Vehicles with ACD and AYC>, or replace the 4WD-ECU.

OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

Code No.57 Lateral G sensor system	Probable cause
Code No.57 is output when the G sensor has exceeded the specified value in a state where the ABS and brake are not operating above the vehicle speed of 10 km/h.	<ul style="list-style-type: none"> ● Harness or connector fault ● Lateral G sensor fault ● ABS-ECU fault <Vehicles with ACD and AYC> ● 4WD-ECU fault



Code No.61 Stop lamp switch system	Probable cause
Code No.61 is output when the stop lamp switch is ON for more than 15 minutes when the vehicle speed is above 15 km/h.	<ul style="list-style-type: none"> ● Brake pedal fault ● Stop lamp switch fault ● Harness or connector fault ● 4WD-ECU fault

Check for brake pedal height
(Refer to GROUP 35A – On-vehicle Service.)
NG→Adjust

OK

MUT-II Data List

- No.56 Stop lamp switch

(1) Depress the brake pedal.
OK: ON

(2) Release the brake pedal.
OK: OFF

OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

NG

Check the following connector: C-103
NG→Repair

OK

Check the stop lamp switch.
(Refer to GROUP 35A - Brake Pedal.)
NG→Replace

OK

Measure at stop lamp switch connector C-103.

- Disconnect the connector and measure at the harness side.
- Voltage between terminal 2 and earth
OK: System voltage

NG

Check the following connectors: C-103, C-135
NG→Repair

OK

Check the harness between the stop lamp switch and battery.

- Check for open circuit or damage of the power line.

NG→Repair

OK

Measure at 4WD-ECU connector C-43.

- Measure the ECU terminal voltage.
- Voltage between terminal 38 and earth

(1) Depress the brake pedal.
OK: System voltage

(2) Release the brake pedal
OK: 1 V or less

OK

Check the following connector: C-43
NG→Repair

OK

MUT-II Data List

- No.56 Stop lamp switch

(1) Depress the brake pedal.
OK: ON

(2) Release the brake pedal.
OK: OFF

NG→Replace the 4WD-ECU.
OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

NG

Check the following connectors:
<L.H. drive vehicles> C-103, C-43, C-108, C-130
<R.H. drive vehicles> C-103, C-43
NG→Repair

OK

Check the harness between the 4WD-ECU and stop lamp switch.

- Check for open circuit and damage of the power line.

NG→Repair

OK

Check the stop lamp bulb.
NG→Replace

OK

Check the harness between the stop lamp switch and stop lamp.

- Check for open circuit and damage of the power line.
- Check the harness between the stop lamp and body earth.
- Check for open circuit and damage of the earth line.

NG→Repair

Code No.62 ACD mode switch system	Probable cause
Code No.62 is output when the ACD mode switch is ON for more than 60 seconds.	<ul style="list-style-type: none"> ● ACD mode switch fault ● Harness or connector fault ● 4WD-ECU fault

MUT-II Data List

- No.63 ACD mode switch

(1) Press the ACD mode switch.
OK: ON

(2) Release the ACD mode switch.
OK: OFF

OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

NG

Check the ACD mode switch. (Refer to P.22A-57.)
 NG→Replace

OK

Measure at ACD mode switch connector C-142.

- Disconnect the connector and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal 2 and earth
OK: System voltage

NG

Check the following connectors:
 <L.H. drive vehicles> C-142, C-29, C-213, C-210
 <R.H. drive vehicles> C-142, C-209, C-210
 NG→Repair

OK

Check the harness between the ACD mode switch and ignition switch.

- Check for open circuit or damage of the power line.
 NG→Repair

OK

Check the harness between the junction block and combination meter.

- Check for ground and damage of the power line.
 NG→Repair

OK

Measure at 4WD-ECU connector C-43.

- Measure the ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal 47 and earth

(1) Press the ACD mode switch.
OK: System voltage

(2) Release the ACD mode switch.
OK: 1 V or less

NG

Check the following connectors:
 <L.H. drive vehicles> C-142, C-128, C-43
 <R.H. drive vehicles> C-142, C-43
 NG→Repair

OK

Check the harness between the 4WD-ECU and ACD mode switch.

- Check for open circuit and damage of the power line
 NG→Repair

OK

Check the following connector: C-43
 NG→Repair

OK

MUT-II Data List

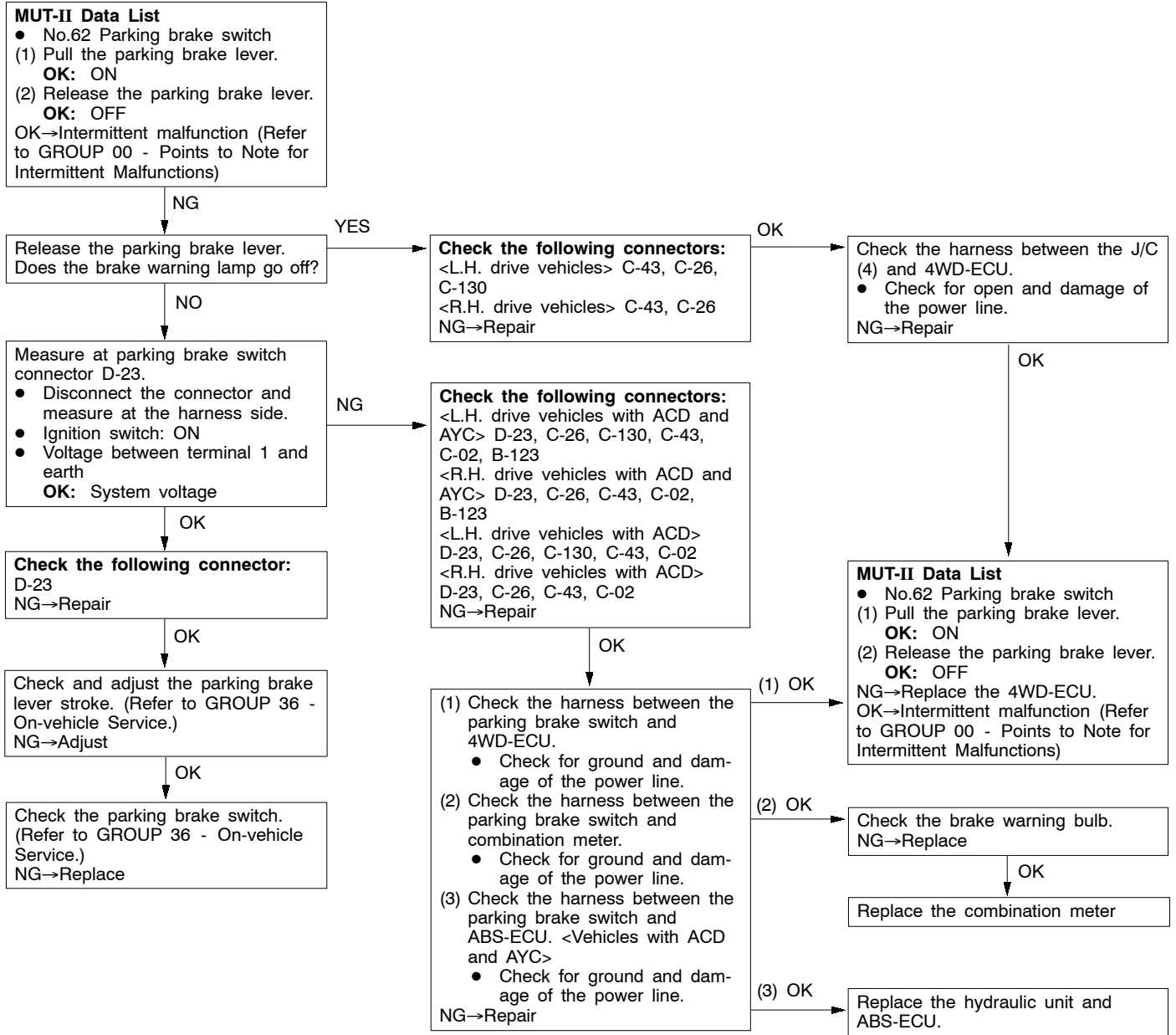
- No.63 ACD mode switch

(1) Press the ACD mode switch.
OK: ON

(2) Release the ACD mode switch.
OK: OFF

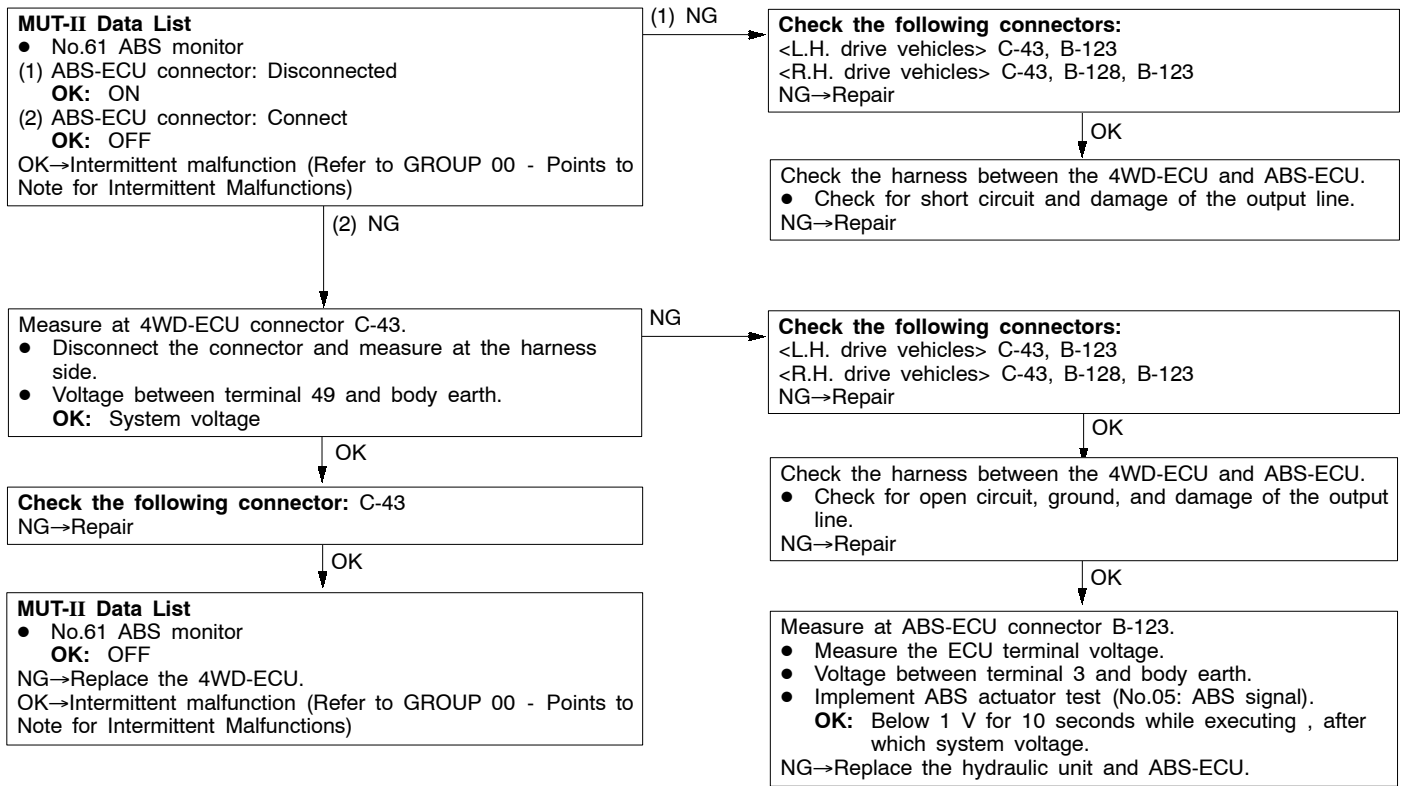
NG→Replace the 4WD-ECU.
 OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)

Code No.63 Parking brake switch system	Probable cause
Code No.63 is output when the parking brake switch is ON for more than 15 minutes with the vehicle speed above 15 km/h.	<ul style="list-style-type: none"> ● Parking brake switch fault ● Harness or connector fault ● ABS-ECU fault <Vehicles with ACD and AYC> ● 4WD-ECU fault

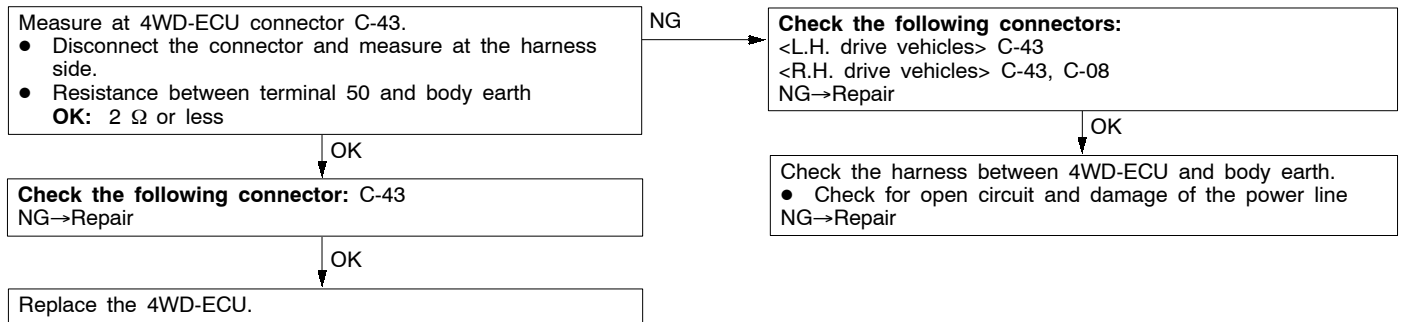


Code No.65 ABS monitor system	Probable cause
Code No.65 is output when ABS is detected to be operating for more than 1 minute continuously.	<ul style="list-style-type: none"> ● Harness or connector fault ● ABS-ECU fault <Vehicles with ACD and AYC> ● 4WD-ECU fault

<Vehicles with ACD and AYC>



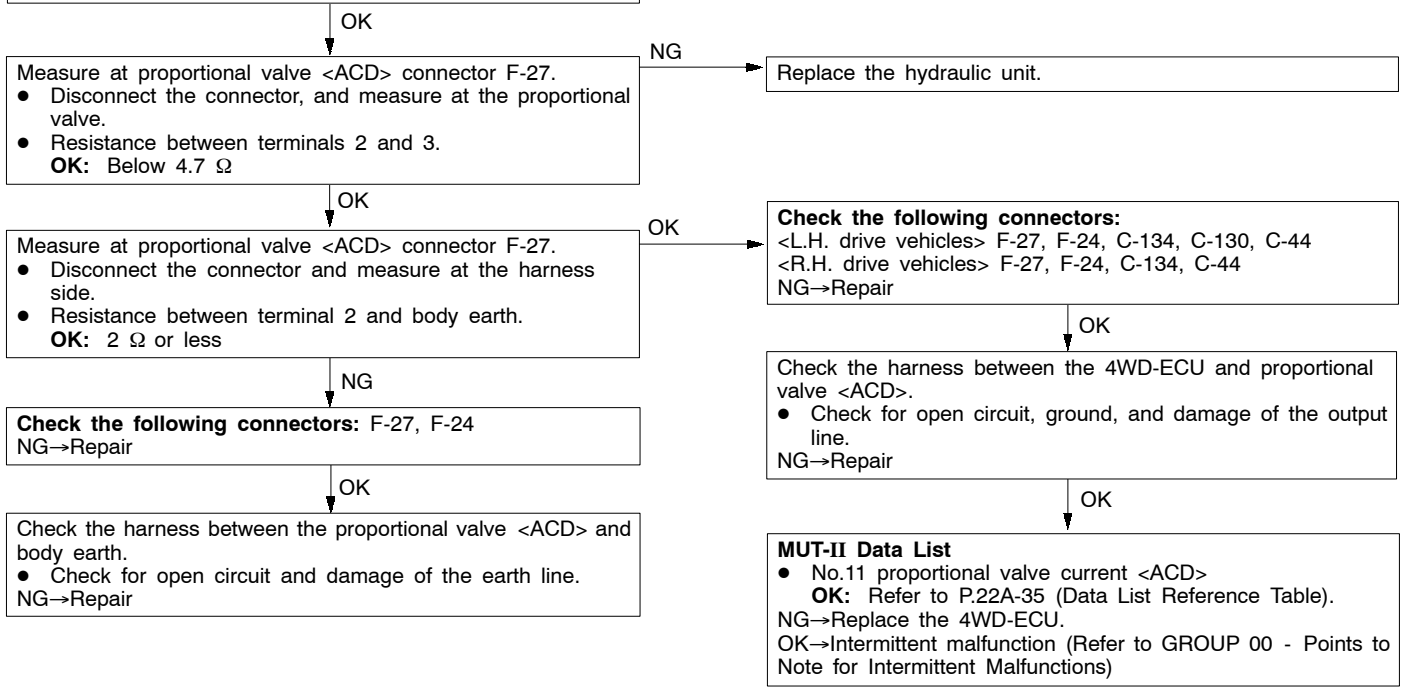
<Vehicles with ACD>



Code No.74 Proportional valve <ACD> system	Probable cause
Code No.74 is output when open circuit or short circuit of the control circuit of the proportional valve <ACD> has occurred.	<ul style="list-style-type: none"> ● Proportional valve <ACD> fault ● Harness or connector fault ● 4WD-ECU fault

MUT-II Data List

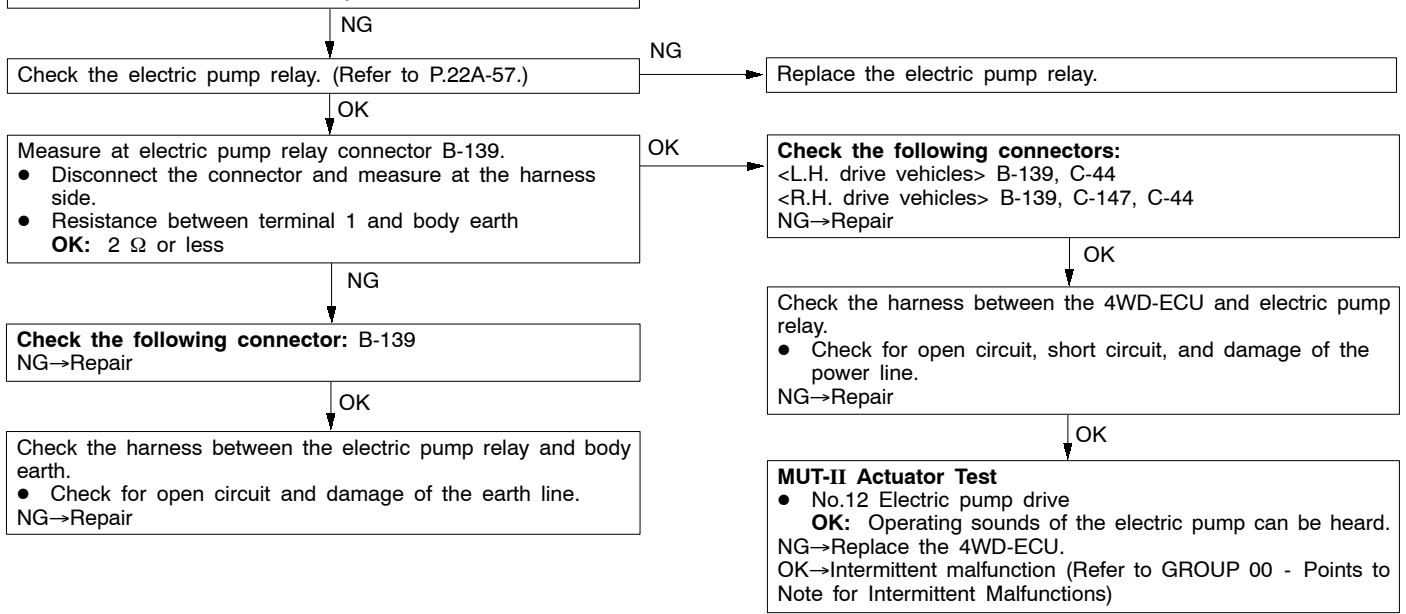
- No.11 Proportional valve current <ACD>
- OK:** Refer to P.22A-35 (Data List Reference Table).
- OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)



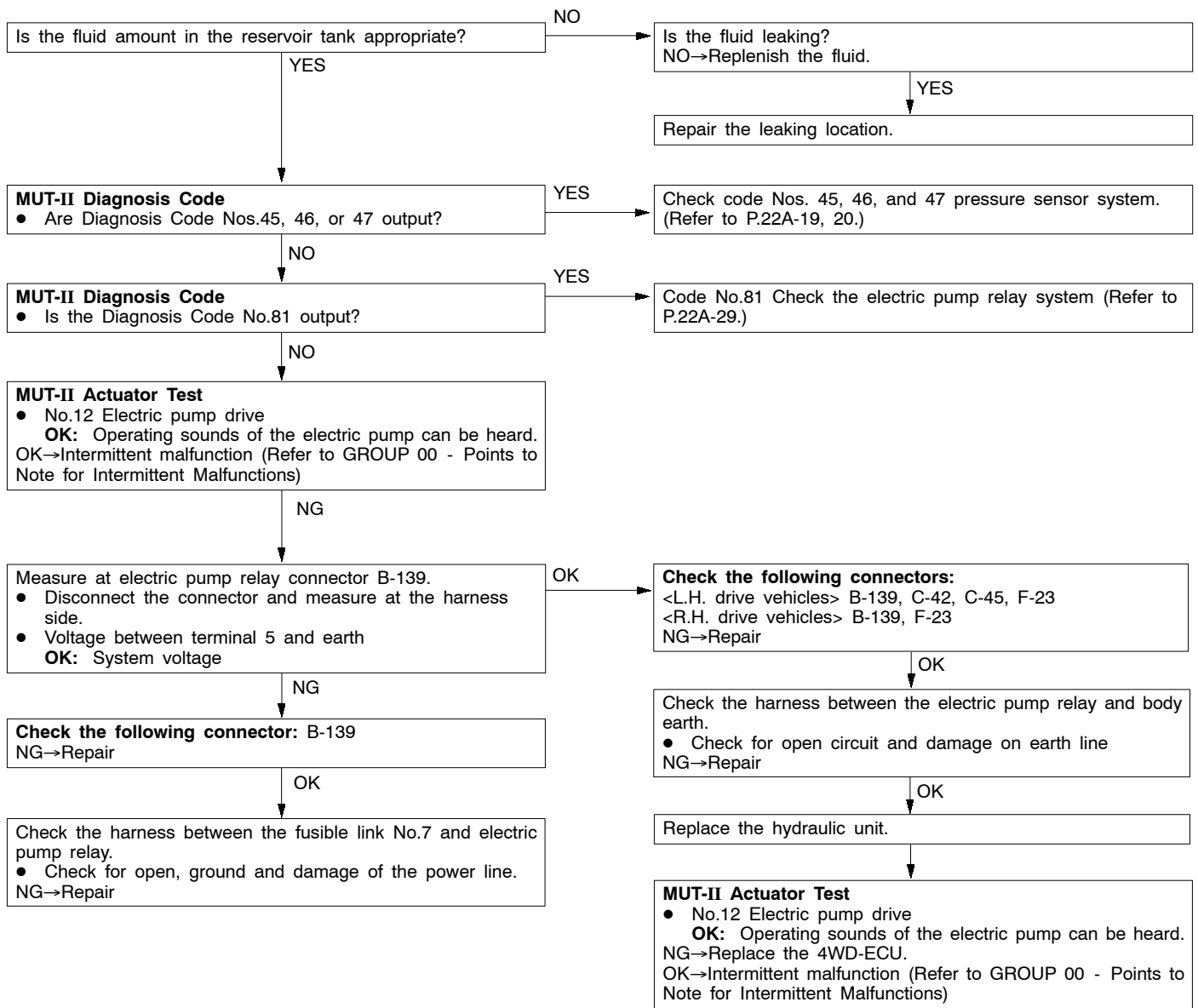
Code No.81 Electric pump relay system	Probable cause
Output when the coil circuit of the electric pump relay has open circuited or short circuited.	<ul style="list-style-type: none"> ● Electric pump relay fault ● Harness or connector fault ● 4WD-ECU fault

MUT-II Actuator Test

- No.12 Electric pump drive
- OK:** The operating sound of the electric pump can be heard.
- OK→Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions)



Code No.82 Electric pump relay system	Probable cause
Code No.82 is output when the pressure sensor does not reach the specified value even if the 4WD-ECU has output the electric pump motor drive command.	<ul style="list-style-type: none"> ● Insufficient fluid ● Pressure sensor fault ● Electric pump relay fault ● Hydraulic unit fault ● Harness or connector fault ● 4WD-ECU fault



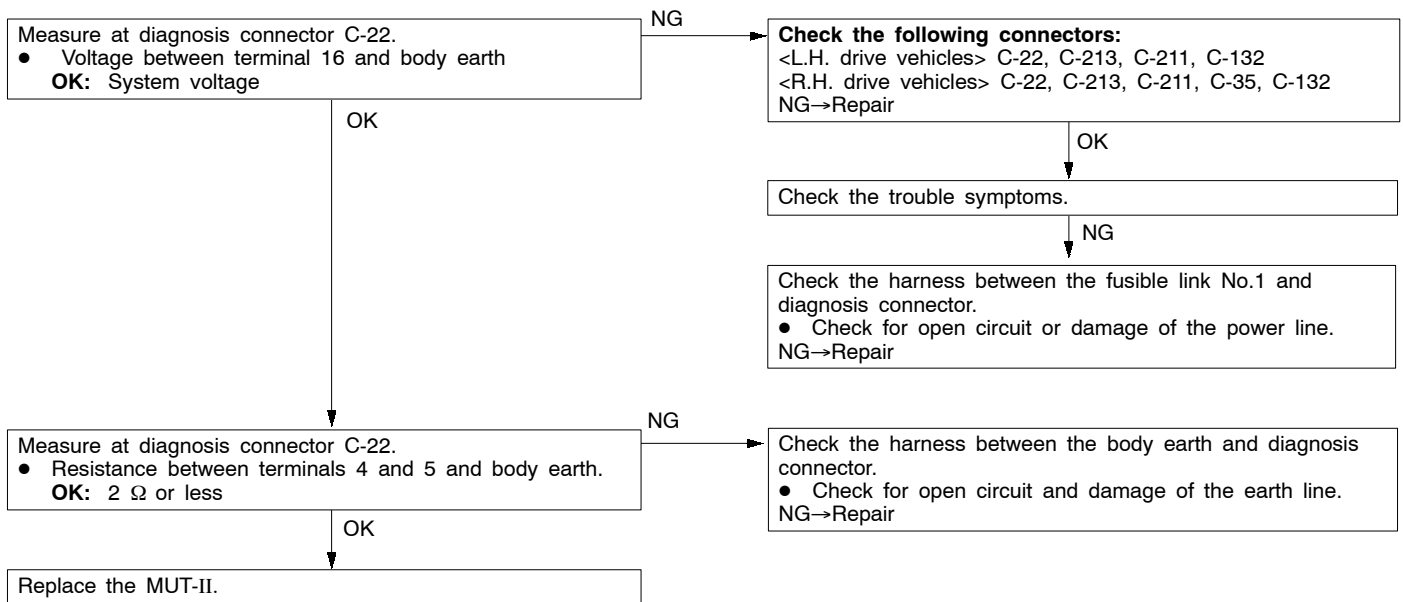
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure No.	Reference page
No communication possible between MUT-II and all systems.	1	22A-31
No communication possible between MUT-II and 4WD-ECU.	2	22A-32
ACD mode indicator lamp does not light up when the ignition switch is set to "ON" (engine is stopped).	3	22A-33
More than two ACD mode indicator lamps remain lit even after the engine is started	4	22A-34
The ACD does not operate (no diagnostic code).	5	22A-34
The AYC does not operate (no diagnostic code).	6	Refer to GROUP 27B.
The rear tire sounds when turning at low speed corners (vehicle slows down)	7	
Noise is produced from the torque transfer differential during turning.	8	

INSPECTION PROCEDURES FOR TROUBLE SYMPTOMS

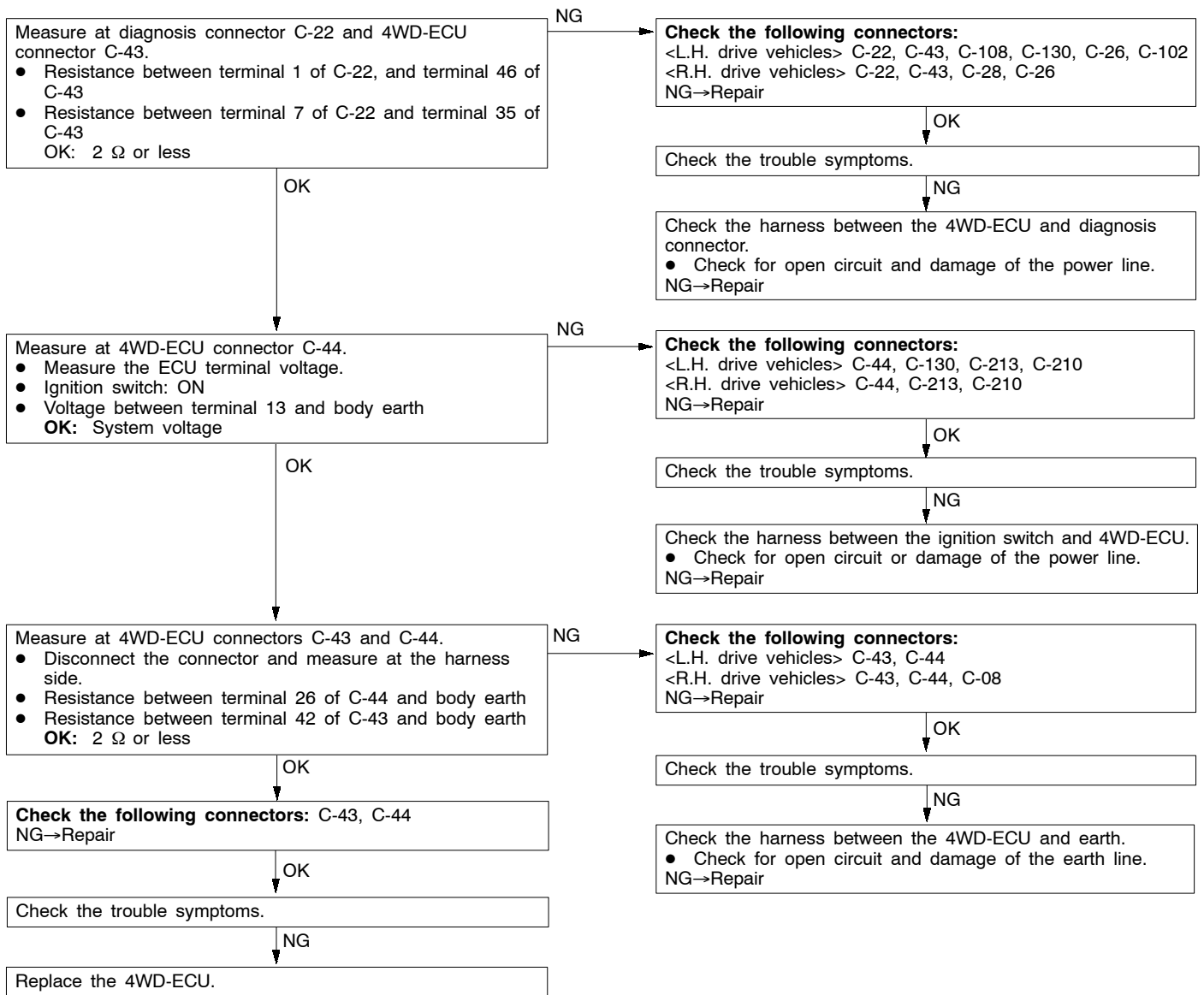
Inspection procedure 1

No communication possible between MUT-II and all systems.	Probable cause
The diagnosis connector power supply circuit, earth circuit, or MUT-II may be faulty.	<ul style="list-style-type: none"> • Diagnostic connector fault • Harness or connector fault • MUT-II fault



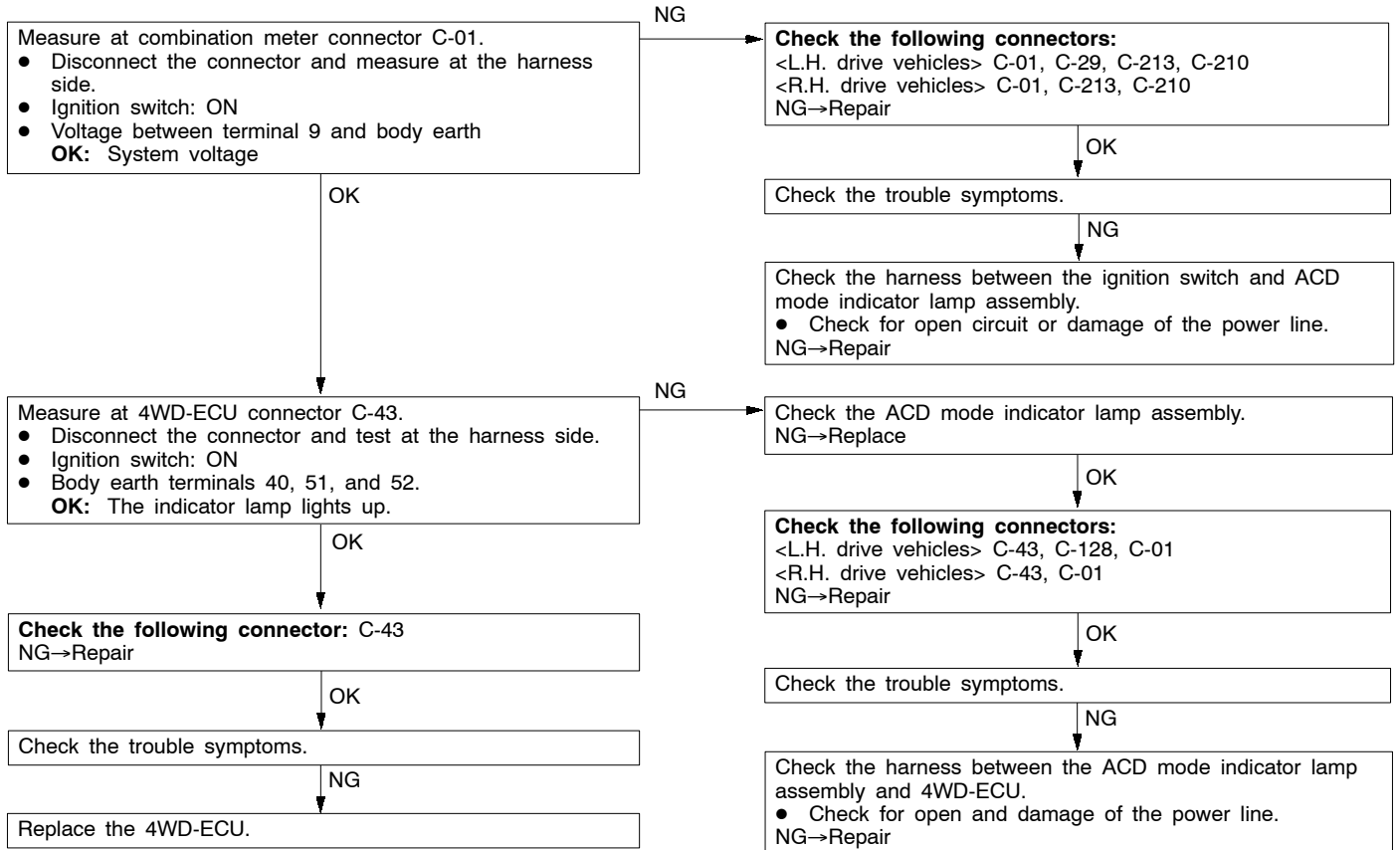
Inspection procedure 2

No communication is possible between the MUT-II and 4WD-ECU.	Probable cause
The diagnostic output circuit, 4WD-ECU power supply circuit, earth circuit, or 4WD-ECU may be faulty.	<ul style="list-style-type: none"> ● Harness or connector fault ● 4WD-ECU fault



Inspection procedure 3

The ACD mode indicator lamp does not light up when the ignition switch is turned "ON" (engine stop).	Probable cause
The ACD mode indicator lamp circuit or 4WD-ECU may be faulty.	<ul style="list-style-type: none"> ● Harness or connector fault ● ACD mode indicator lamp assembly fault ● 4WD-ECU fault

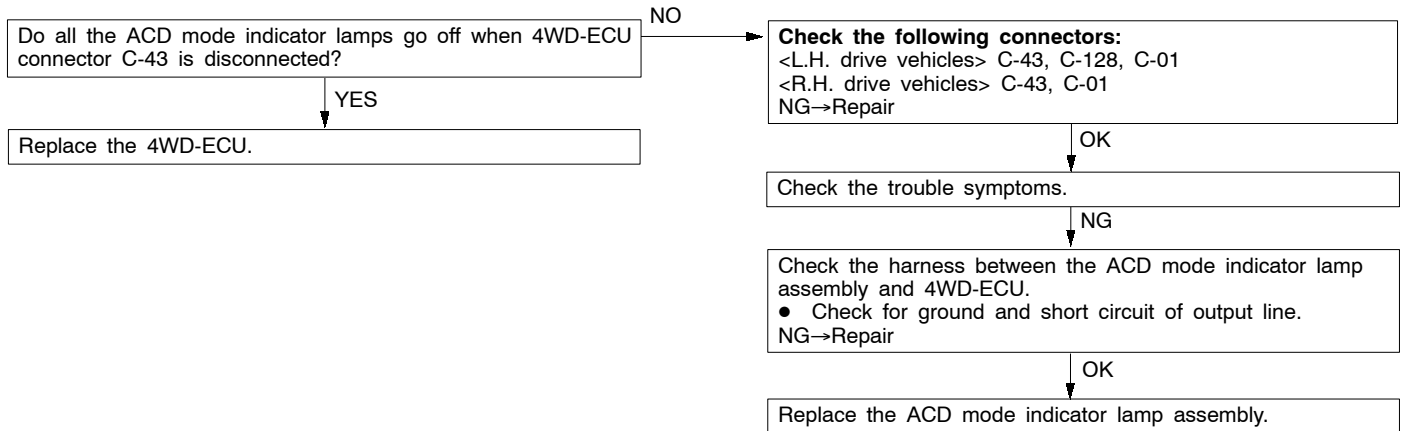


Inspection procedure 4

More than two ACD mode indicator lamps remain lit even after the engine starts	Probable cause
The output circuit of the ACD mode indicator lamp may be faulty.	<ul style="list-style-type: none"> ● Harness or connector fault ● 4WD-ECU fault ● ACD mode indicator lamp assembly fault

NOTE

This phenomenon occurs only when communication with the MUT-II is possible (4WD-ECU power supply fault) and at the same time, no diagnostic code (no trouble code) is output.

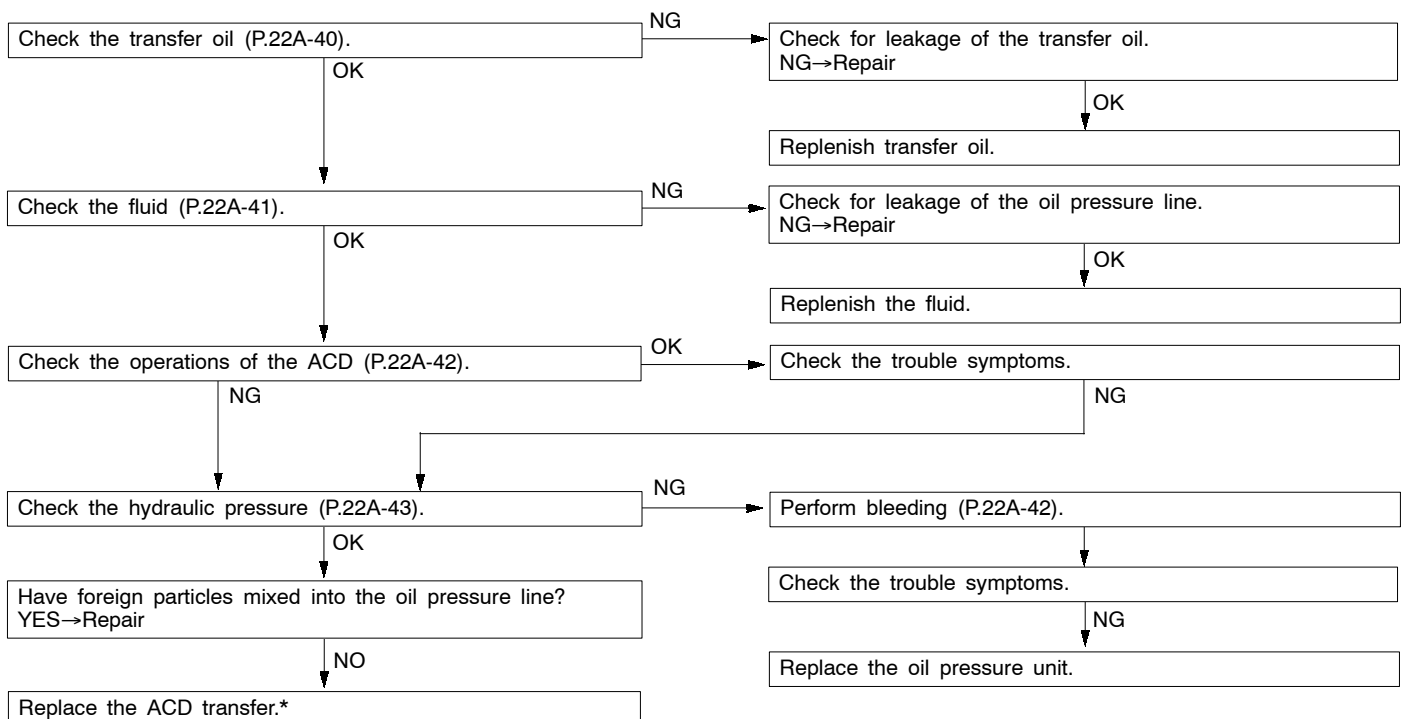


Inspection procedure 5

ACD does not operate (No diagnosis code)	Probable cause
Insufficient operating oil, oil leakage, faulty operations of the oil pressure unit, and faulty operations of the ACD transfer may be suspected.	<ul style="list-style-type: none"> ● Leakage of transfer oil ● Insufficient transfer oil ● Leakage of oil pressure line ● Insufficient fluid ● Hydraulic unit fault ● ACD transfer fault

NOTE:

1. This malfunction is restricted to only when no diagnostic code (no trouble code) is output.
2. *: Refer to GROUP 22B.



DATA LIST REFERENCE TABLE

Item no.	Check item	Check condition		Normal conditions
01	Wheel speed sensor <FR>	Execute actual driving.		The speed meter display and MUT-II display match.
02	Wheel speed sensor <FL>			
03	Wheel speed sensor <RR>			
04	Wheel speed sensor <RL>			
05	Wheel speed sensor <FR> (0.2 km/h)			
06	Wheel speed sensor <FL> (0.2 km/h)			
07	Wheel speed sensor <RR> (0.2 km/h)			
08	Wheel speed sensor <RL> (0.2 km/h)			
09	Vehicle speed			
10	Battery voltage	Ignition switch: ON		System voltage
11	Proportional valve current <ACD>	During ACD operation		50 - 1,000 mA
12	Proportional valve current <AYC>	During AYC operation		50 - 1,000 mA
13	TPS voltage	Ignition switch: ON Engine: Stopped	Accelerator pedal: Full closed	535 - 735 mV
			Accelerator pedal: Press	Gradually rises from the above value
			Accelerator pedal: Full throttle	4,500 - 5,000 mV
14	Longitudinal G sensor voltage	Ignition switch: ON	Vehicle stopped (horizontal) state	2.4 - 2.6 V
			Actual driving	The displayed value increases and decreases mainly around 2.5 V.
15	Lateral G sensor voltage	Ignition switch: ON	Vehicle stopped (horizontal) state	2.4 - 2.6 V
			Perform actual driving	The displayed value increases and decreases mainly around 2.5 V.
16	Steering operation angle	Ignition switch: ON	Steering wheel: Steer by 90 degrees to the right	R90 deg
			Steering wheel: Steer by 90 degrees to the left	L90 deg
17	Steering angle velocity	Ignition switch: ON	Steering wheel: No steering	0 deg/s
			Steering wheel: Steer	The display changes according to the revolution speed.
18	Pressure sensor	During electric pump motor operations		1.0 - 1.6 MPa

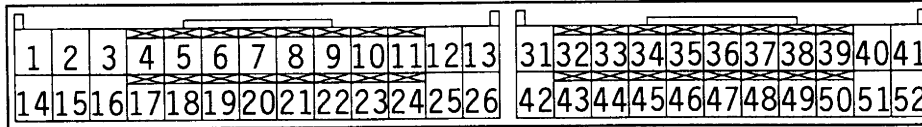
Item no.	Check item	Check condition		Normal conditions
19	Pressure sensor power supply	Ignition switch: ON		Approx.5 V
20	Valve power supply	Ignition switch: ON		System voltage
21	Steering wheel sensor voltage <ST-1>	Ignition switch: ON	Steering wheel: Turn	1 - 2 V and 2.5 - 4.5 V are displayed alternately.
22	Steering wheel sensor voltage <ST-2>	Ignition switch: ON	Steering wheel: Turn	1 - 2 V and 2.5 - 4.5 V are displayed alternately.
23	Steering wheel sensor voltage <ST-N>	Ignition switch: ON	Steering wheel: Neutral	1 - 2 V
			Steering wheel: Turn	2.5 - 4.5 V
51	Idle switch	Ignition switch: ON	Accelerator pedal: Full closed	ON
			Accelerator pedal: Press	OFF
52	Steering wheel sensor <ST-N>	Ignition switch: ON	steering wheel: Neutral	ON
			Steering wheel: Turn from the neutral position	OFF
53	Steering wheel sensor <ST-1>	Ignition switch: ON	Steering wheel: Turn slowly	ON and OFF are displayed alternately.
54	Steering wheel sensor <ST-2>	Ignition switch: ON	Steering wheel: Turn slowly	ON and OFF are displayed alternately
55	Steering wheel sensor learning <ST-N>	Perform actual driving	Steering wheel sensor neutral position learning executed	ON
			Steering wheel sensor neutral position learning unexecuted	OFF
56	Stop lamp switch	Ignition switch: ON Engine: Stopped	Brake pedal: Depress	ON
			Brake pedal: Release	OFF
57	Motor monitor	Electric pump motor is currently operating		ON
		Electric pump motor is currently not operating		OFF
58	Oil pressure state	Electric pump motor is currently operating		LOW
		Electric pump motor is currently not operating		HIGH
59	Directional valve <Right>	AYC clutch right side is currently operating		ON
		AYC clutch right side is currently not operating		OFF
60	Directional valve <Left>	AYC clutch left side is currently operating		ON
		AYC clutch left side is currently not operating		OFF
61	ABS monitor	ABS is currently operating		ON
		ABS is currently not operating		OFF
62	Parking brake switch	Ignition switch: ON Engine: Stopped	Parking brake lever: Pull	ON
			Parking brake lever: Release	OFF
63	ACD mode switch	Ignition switch: ON Engine: Stopped	ACD mode switch: Press	ON
			ACD mode switch: Release	OFF

ACTUATOR TEST JUDGEMENT VALUE

Item no.	Check item	Test description	Normal state
01	Bleeding <ACD>	Input current to the Proportional valve according to the steering angle, and operate the Proportional valve for five minutes.	Make sure no air leaks from the bleeder screw on the transfer.
02	Bleeding <AYC>	Input current to the Proportional valve according to the steering angle, and operate the directional valve for five minutes.	Make sure no air leaks from the bleeder screw on the torque transfer differential.
03	Check the oil volume	Operate the directional valve to the left and right for 20 seconds.	Check that the oil volume of the reservoir tank is appropriate.
04	Electric pump drive	Operate the electric pump for 5 seconds.	Operation sounds of the electric pump can be heard.
05	Check the operations of the ACD	Operate the Proportional valve <ACD> and supply the maximum oil pressure to the multi plate clutch.	9Generate the tight corner braking phenomenon.
06	Check clutch operations <Left>	Operate the direction valve and supply the maximum oil pressure to the left clutch.	When the wheels are lifted, speed difference will occur between the rear left and right wheels.
07	Check clutch operations <Right>	Operate the direction valve and supply the maximum oil pressure to the right clutch.	When the wheels are lifted, speed difference will occur between the rear left and right wheels.
08	Control OFF	Turn OFF the electric pump relay, and turn OFF the control of the ACD and AYC.	In actual driving, there is difference between control ON and OFF.

- (1) The actuator test can be executed only when all the following conditions are satisfied.
- All wheel speed sensor inputs below 20 km/h
 - No system malfunction detected
 - Steering angle is within ± 30 degrees from the neutral position
- (2) When the actuator test corresponds to one of the following conditions, forced driving will be cleared.
- When any one of the wheel speed sensor input is detected to be above 20 km/h (excluding Item No.08 "Control OFF".)
 - When system malfunction is detected (excluding diagnostic code No.82, 84, and 85)
 - When the forced drive time is exceeded
 - When the MUT-II is removed
 - When the Clear key of the MUT-II is operated

CHECK AT 4WD-ECU TERMINALS



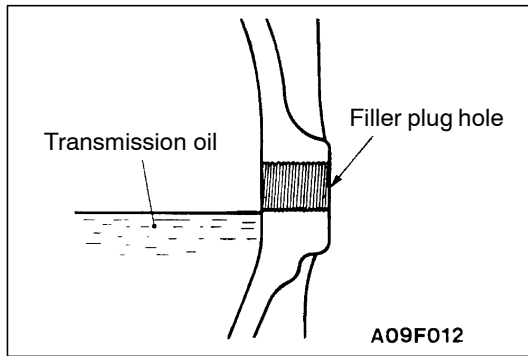
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NOTE:

- *1 indicates the eliminated terminal when only ACD is installed.
- *2 indicates the terminal added when only ACD is installed.

Terminal no.	Check item	Check condition	Normal state	
1	Proportional valve <ACD>	Operate the Proportional valve in the actuator test (Item No.01). <ACD>	While executing the actuator test After completing the actuator test	System voltage 1 V or less
		3*1	Proportional valve <AYC>	Operate the Proportional valve in the actuator test (Item No. 02). <AYC>
6	Wheel speed sensor <FL>			Vehicle is stopping
		Moving forward slowly	0 ↔ 5 V flushing	
7	Wheel speed sensor <RR>	Vehicle is stopping	1 V or less	
		Moving forward slowly	0 ↔ 5 V flushing	
8	Wheel speed sensor <RL>	Vehicle is stopping	1 V or less	
		Moving forward slowly	0 ↔ 5 V flushing	
9	Wheel speed sensor <FR>	Vehicle is stopping	1 V or less	
		Moving forward slowly	0 ↔ 5 V flushing	
10	Pressure sensor earth	Any time	1 V or less	
11	Lateral G sensor	Ignition switch: ON Vehicle horizontal state	2.4 - 2.6 V	
13	4WD-ECU power supply	Ignition switch: OFF	0 V	
		Ignition switch: ON	System voltage	
14*1	Directional valve <Right>	Operate the directional valve <right> in the actuator test (Item No. 07)	While executing the actuator test After completing the actuator test	System voltage 1 V or less
			15*1	Directional valve <Left>
16	Electric pump relay power supply	When the electric pump motor is not operating		
		While the electric pump motor is operating	System voltage	
19*2	Wheel speed sensor earth <FL>	Any time	1 V or less	
20*2	Wheel speed sensor earth <RR>	Any time	1 V or less	
21*2	Wheel speed sensor earth <RL>	Any time	1 V or less	
22*2	Wheel speed sensor earth <FR>	Any time	1 V or less	
23	Longitudinal G sensor	Ignition switch: ON Vehicle horizontal state	2.4 - 2.6 V	

Terminal no.	Check item	Check condition		Normal state
24*2	Longitudinal G sensor earth, lateral G sensor earth	Any time		1 V or less
26	ECU earth	Any time		1 V or less
31	ECU backup power supply	Any time		System voltage
32	Pressure sensor	Ignition switch: ON		0.5 - 1.5 V
33	Steering wheel sensor <ST-1>	Ignition switch: ON	Steering wheel: Turn slowly	1 - 2 V ↔ 2.5 - 4.5 V flushing
34	Steering wheel sensor <ST-2>	Ignition switch: ON	Steering wheel: Turn slowly	1 - 2 V ↔ 2.5 - 4.5 V flushing
35	Diagnosis data input/output	-		-
36	Idle switch	Ignition switch: ON	Accelerator pedal: Full closed	1 V or less
			Accelerator pedal: Depress	4.5 - 5.0 V
37	Parking brake switch	Ignition switch: ON	Parking brake lever: Pull	1 V or less
			Parking brake lever: Release	System voltage
38	Stop lamp switch	Ignition switch: ON	Brake pedal: Depress	System voltage
			Brake pedal: Release	1 V or less
39	TPS	Ignition switch: ON	Accelerator pedal: Full closed	0.5 - 0.7 V
			Accelerator pedal: Full throttle	4.5 - 5.5 V
40	ACD mode indicator lamp <TARMAC>	Ignition switch: ON	ACD mode indicator lamp position: TARMAC	0 V
			ACD mode indicator lamp position: Except for above	Approx. 10.5 V
42	ECU earth	Any time		1 V or less
43	Pressure sensor earth	Any time		1 V or less
44	Steering wheel sensor <ST-N>	Ignition switch: ON	Steering wheel: Neutral	1 - 2 V
			Steering wheel: Turn from the neutral position	2.5 - 4.5 V
46	Diagnosis control	-		-
47	ACD mode switch	Ignition switch: ON	Switch: Press	System voltage
			Switch: Release	0 V
49*1	ABS monitor	With ABS not active		System voltage
		With ABS active		1.5 V or less
50*2	Earth	Any time		1 V or less
51	ACD mode indicator lamp <SNOW>	Ignition switch: ON	ACD mode indicator lamp position: SNOW	0 V
			ACD mode indicator lamp position: Except for above	Approx. 10.5 V
52	ACD mode indicator lamp <GRAVEL>	Ignition switch: ON	ACD mode indicator lamp position: GRAVEL	0 V
			ACD mode indicator lamp position: Except for above	Approx. 10.5 V

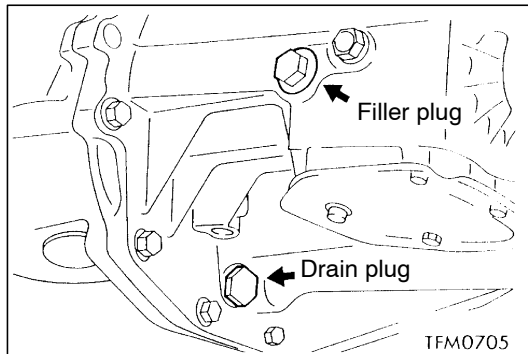


ON-VEHICLE SERVICE

TRANSMISSION OIL CHECK

1. Remove the oil filler plug.
2. Oil level should be at the lower portion of the filler plug hole.
3. Check that the transmission oil is not noticeably dirty, and that it has a suitable viscosity.
4. Tighten the filler plug to the specified torque.

Tightening torque: 32 ± 2 N·m



TRANSMISSION OIL REPLACEMENT

1. Remove oil filler plug and oil drain plug.
2. Drain oil.
3. Tighten the oil drain plug to the specified torque.

Tightening torque: 32 ± 2 N·m

4. Fill with specified oil till the level comes to the lower portion of oil filler plug hole.

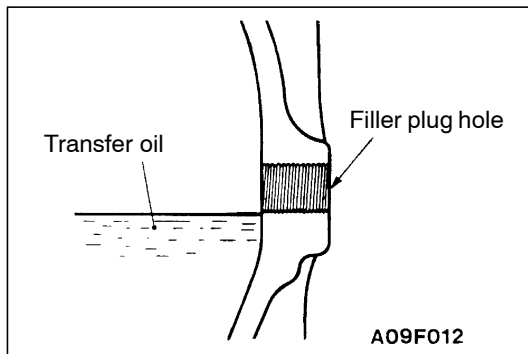
Specified transmission oil:

Gear oil SAE 75W-90 or 75W-85W conforming to API GL-4

Quantity: 2.8 L

5. Tighten the oil filler plug to the specified torque.

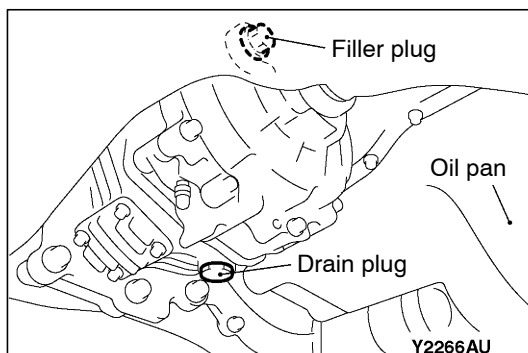
Tightening torque: 32 ± 2 N·m



TRANSFER OIL CHECK

1. Remove the oil filler plug.
2. Oil level should be at the lower portion of the filler plug hole.
3. Check that the transfer oil is not noticeably dirty, and that it has a suitable viscosity.
4. Tighten the filler plug to the specified torque.

Tightening torque: 32 ± 2 N·m



TRANSFER OIL REPLACEMENT

1. Remove oil filler plug and oil drain plug.
2. Drain oil.
3. Tighten the oil drain plug to the specified torque.

Tightening torque: 32 ± 2 N·m

4. Fill with specified oil till the level comes to the lower portion of oil filler plug hole.

Specified transfer oil:

MITSUBISHI Genuine Gear Oil Part No.8149630 EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W - 90) or equivalent

Quantity:

0.55 L <Vehicles without ACD or vehicles without ACD and AYC>

0.6 L <Vehicles with ACD or vehicles with ACD and AYC>

5. Tighten the oil filler plug to the specified torque.

Tightening torque: 32 ± 2 N·m

FLUID CHECK <VEHICLES WITH ACD OR VEHICLES WITH ACD AND AYC>

1. Remove the maintenance lid located in the luggage compartment.
2. **<Not using MUT-II>**
If the vehicle has been run, leave it for 90 min. or more in an ordinary temperature (10°C – 30°C) to allow the accumulator internal pressure to drop.

NOTE

If the ambient temperature is 10°C or less, allow more time to leave the vehicle to stand idle.

<Using MUT-II>

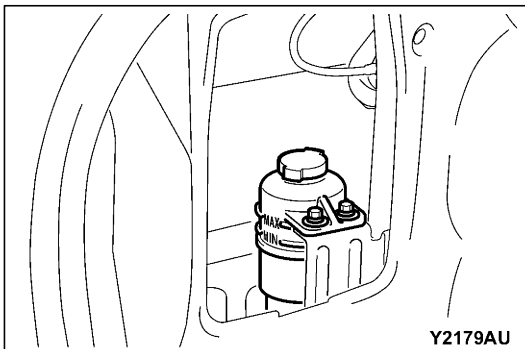
Set the MUT-II to the 16-pin diagnosis connector. Turn ON the ignition switch, perform MUT-II actuator test (Item No.03), forcibly drive the hydraulic unit and remove the pressure in the accumulator.

Caution

Turn the ignition switch to the “LOCK”(OFF) position before connecting or disconnecting the MUT-II.

NOTE

- (1) In the actuator test (Item No. 03: Oil Level Check Mode), the directional valve of the hydraulic unit is moved to the left and right for 20 times, and then the differential is cleared automatically. Drive can also be cleared forcibly using the Clear key of the MUT-II.
- (2) If the function has been stopped by fail-safe, the hydraulic unit cannot be cleared forcibly.



3. Check that the fluid level in the oil reservoir is in the range between MAX and MIN.
4. If the fluid level is lower than MIN, add the specified fluid.

Specified fluid: Dia Queen ATF SP III

5. Reinstall the maintenance lid.

BLEEDING <VEHICLES WITH ACD OR VEHICLES WITH ACD AND AYC>

1. Lift up the vehicle.
2. Set the MUT-II to the 16-pin diagnosis connector.

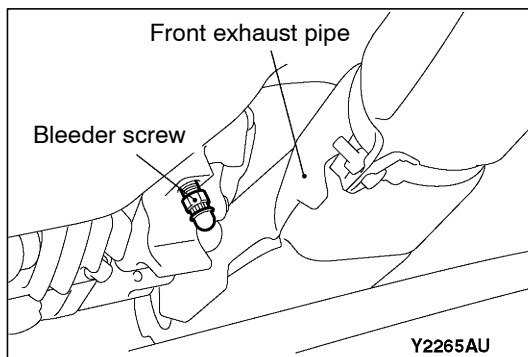
Caution

Turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting the MUT-II.

3. Turn the ignition switch to the "ON" position.
4. Set the steering wheel in the straight-ahead position.
5. Perform the MUT-II actuator test (Item No.02), and forcibly drive the hydraulic unit.

NOTE

- (1) The actuator test (Item No.01: Bleeding Mode) will be performed for 5 minutes, after which it will be cleared automatically. Drive can also be cleared during forced driving using the clear key of the MUT-II.
- (2) If the hydraulic unit function has been stopped by fail-safe, the hydraulic unit cannot be forcibly driven.



6. Remove the cap of the bleeder screw on the transfer, and connect the vinyl hose.
7. Slowly turn the steering wheel to the left or right from the neutral state. Loosen the bleeder screw, and check that air is discharged together with the fluid.
8. After the air is discharged, tighten the bleeder screw, and return the steering wheel to the neutral state.

Caution

During bleeding, replenish the fluid so that some always remains in the oil reservoir.

9. Repeat steps 6 and 7 several 2 to 3 times, and after checking that no more air mixes in, tighten the bleeder screw at the specified torque.

Tightening torque: 5 ± 1 N·m

10. After bleeding, check the fluid level. (Refer to P. 22A-41.)

Caution

If bleeding is not performed completely, noise may be produced from the hydraulic unit, or the durability of the pump, etc. may drop.

11. On vehicles with AYC, perform bleeding when the hydraulic unit is removed. (Refer to GROUP 27B - On-vehicle Service.)

ACD OPERATION CHECK <VEHICLES WITH ACD OR VEHICLES WITH ACD AND AYC>

1. Lift up the vehicle.
2. Set the MUT-II to the 16-pin diagnosis connector.

Caution

Turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting the MUT-II.

3. Start the engine.

4. Set the gear to the 2nd gear or above, operate the MUT-II, and check from the service data (Item No.09) that the wheel speed is within 10 km/h to 20 km/h.

NOTE

- (1) Set the steering wheel to the neutral position
- (2) The ACD may continue operating (operation sounds can be heard) when the steering wheel is steered, this is not a system fault. In this case, set the steering wheel to the neutral position, and perform the following operations to stop the ACD.
 - Release the clutch.
 - Set the gear to "N".
 - Stop the engine

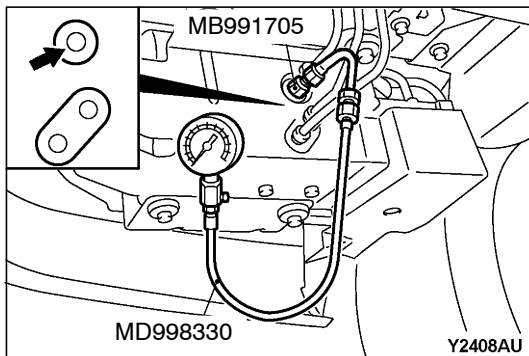
5. Perform the MUT-II actuator test (Item No.05), and forcibly drive the transfer.

NOTE

- (1) The actuator test (Item No. 05: ACD Operation Check Mode) is performed for 1 minute, after which it will be cleared automatically. Drive can also be cleared during forced driving using the clear key of the MUT-II.
 - (2) If the hydraulic unit function has been stopped by fail-safe, the transfer cannot be forcibly driven.
6. Check that the front and rear wheel speeds satisfy the following in the MUT-II actuator test (Item No.05).
<Actuator test: While executing Item No. 05>
The front wheel will be faster than the back wheels by more than 2 km/h.

NOTE

If the above are not satisfied, check the oil pressure as the system may be faulty.



HYDRAULIC PRESSURE CHECK <VEHICLES WITH ACD OR VEHICLES WITH ACD AND AYC>

1. Lift up the vehicle.
2. Set the MUT-II to the 16-pin diagnosis connector.

Caution

Turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting the MUT-II.

3. Disconnect the hydraulic unit and transfer connector assembly, and connect the special tool to the hydraulic unit.
4. Turn the ignition switch to "ON".
5. Perform the MUT-II actuator test (Item No.05), and forcibly drive the hydraulic unit.

NOTE

- (1) The actuator test (Item No. 05 ACD Operation Check Mode) is performed for 1 minute, after which it will be cleared automatically. Drive can also be cleared during forced driving using the clear key of the MUT-II.

- (2) If the hydraulic unit function has been stopped by fail-safe, the hydraulic unit cannot be forcibly driven.
6. Check that the generated oil pressure of the hydraulic unit satisfies the standard value.

Standard value: 1.0 – 1.6 MPa

Caution

While the oil pressure is checked, add fluid as necessary to ensure that it is left in the oil reservoir during the entire procedure.

7. If the measured value exceeds the standard value, replace the hydraulic unit.
8. Connect the hydraulic unit and transfer connector assembly, and tighten the flare nut at the specified torque.

**Tightening torque: 34 ± 5 N·m (when screw is dry)
26 ± 4 N·m (when screw is applied with oil)**

9. Supply the specified fluid up to the MAX level of the oil reservoir, and bleed the oil pressure pipes.

Specified fluid: DIA QUEEN ATF SP III

Quantity:

**0.9 dm³ <Pipes between ACD and hydraulic unit>
1.0 dm³ <Pipes between ACD and hydraulic unit>**

WHEEL SPEED SENSOR OUTPUT VOLTAGE MEASUREMENT <VEHICLES WITH ACD (VEHICLES WITHOUT AYC)>

- Lift the vehicle, and release the parking brake.
- Disconnect the 4WD-ECU connector, and measure at the connector of the harness.

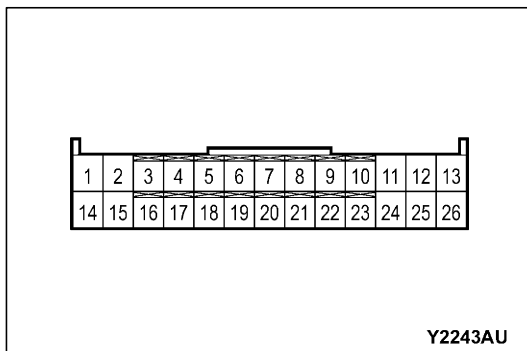
Caution

Insert the probe from the harness of the connector. Inserting in the terminal side may cause contact fault.

- Rotate the measured wheel by about 1/2 to 1 rotations/second, and check the output voltage between the following terminals using a circuit tester (AC mV range) or oscilloscope.

Terminal No.

Front left	Front right	Rear left	Rear right
6	9	8	7
19	22	21	20



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Output voltage:

Above 70 mV when measured with the circuit tester

Above 200 mVP-P when measured with the oscilloscope

4. If the output voltage is lower than the above values, the following reasons may be suspected. Check or replace the wheel speed sensor.
 - Excessive clearance between the ball piece of the wheel speed sensor and ABS rotor
 - Wheel speed sensor fault

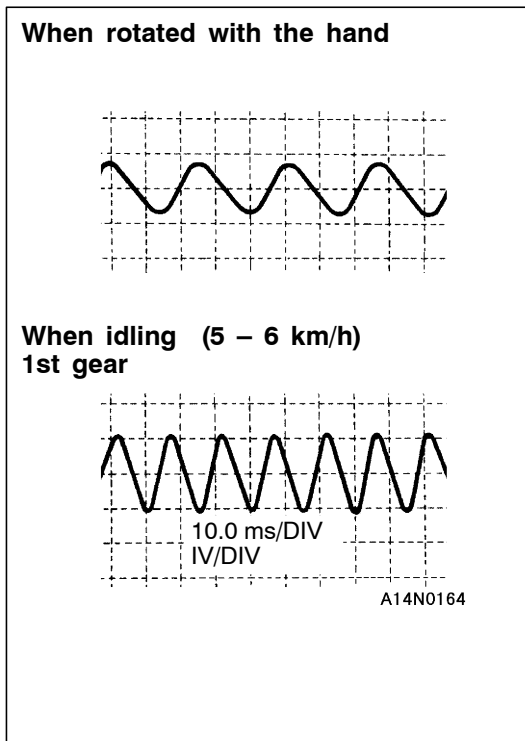
INSPECTION PROCEDURE USING OSCILLOSCOPE

After checking the connected state of the harness of the wheel speed sensor and connector, and measure the output voltage waveform of each wheel speed sensor on the oscilloscope as follows.

Start the engine, shift the transmission to the 1st gear to rotate the driving wheel, and rotate the non-driving wheel at constant velocity with the hand.

NOTE

1. It is also possible to actually drive the vehicle and observe the waveform.
2. The output voltage is low if the wheel speed is low and gradually increases as the speed increases.



<Waveform observation points>

Phenomenon	Probable cause	Solution
Waveform amplitude is too small or not output at all	Wheel seed sensor fault	Replace the sensor
Excessive waveform amplitude (However allowed if above the minimum amplitude of 100 mV)	Excessive vibration or concentricity of the axle hub	Replace the hub
	4WD-ECU earth fault	Correct
Noise in the waveform or waveform is abnormal	Open circuit of the sensor	Replace the sensor
	Open circuit of the harness	Replace the harness
	Wheel speed sensor installation fault	Correct the installation of the sensor
	Chipping or flattening of the ABS rotor	Replace the ABS rotor

Caution

As the wheel speed sensor cable follows the movement of the front or rear suspension, it will change considerably on poor condition roads. Therefore, also observe the output voltage waveform of the wheel speed sensor with the sensor harness vibrated to simulate special conditions such as driving in poor road conditions.

TRANSMISSION CONTROL

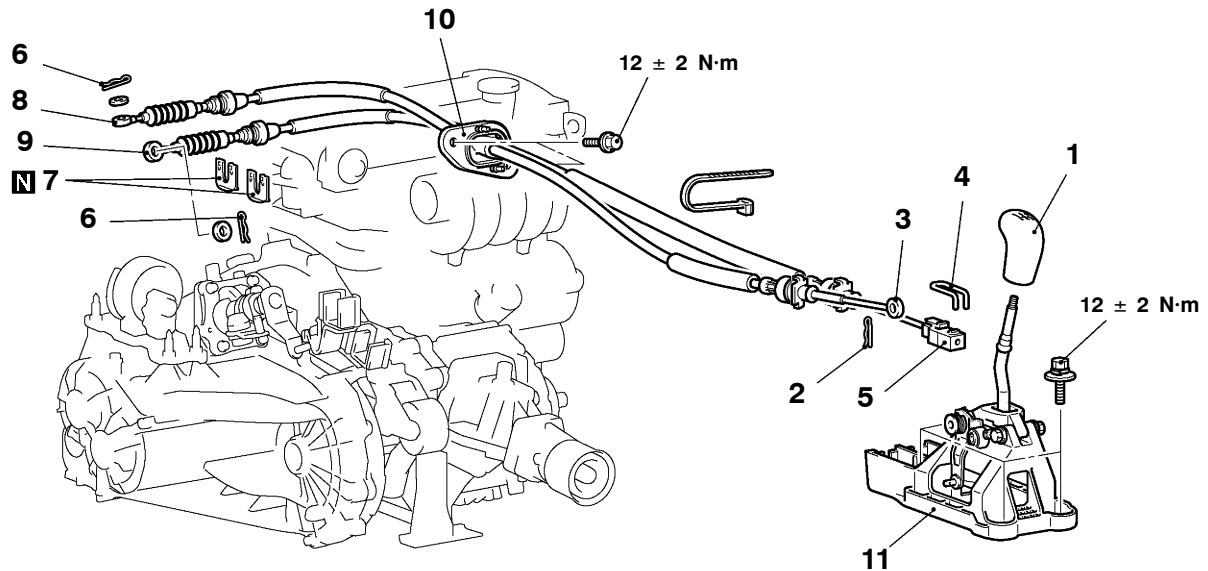
REMOVAL AND INSTALLATION

Pre-removal Operation

- Strut Tower Bar Removal and Installation (Refer to GROUP 42.)
- Air Cleaner Removal (Refer to GROUP 15.)
- Battery and Battery Tray Removal
- Air Pipe C, Air By-pass Hose, Air Hose D, Air Hose E, and Air Hose A Removal (Refer to GROUP 15 - Intercooler.)

Caution: SRS

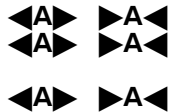
Be careful not to subject the SRS-ECU to any shocks during removal and installation of the shift cable and select cable assembly.



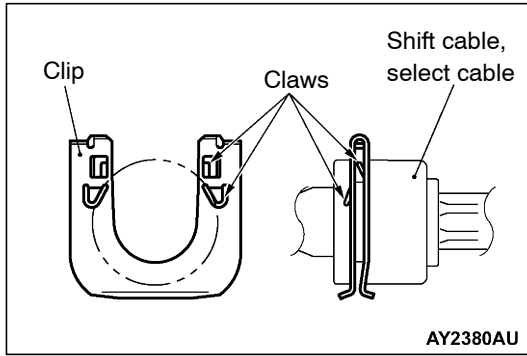
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Shift cable and select cable assembly removal steps

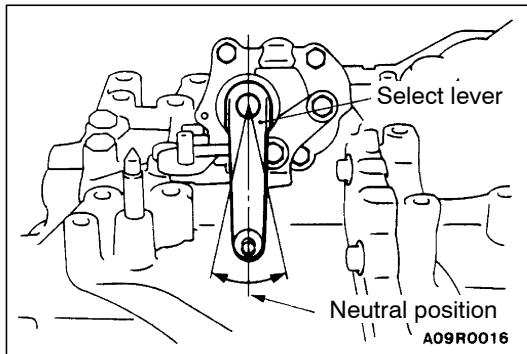
1. Shift knob
 - Front floor console (Refer to GROUP 52A)
2. Snap pin
3. Select cable connection (Shift lever side)
4. Clip
5. Shift cable connection (Shift lever side)
6. Snap pin
7. Clip
8. Select cable connection (Transmission side)
9. Shift cable connection (Transmission side)
10. Shift cable and Select cable assembly

**Shift lever assembly removal steps**

1. Shift knob
 - Front floor console (Refer to GROUP 52A)
2. Snap pin
3. Select cable connection (Shift lever side)
4. Clip
5. Shift cable connection (Shift lever side)
11. Shift lever assembly

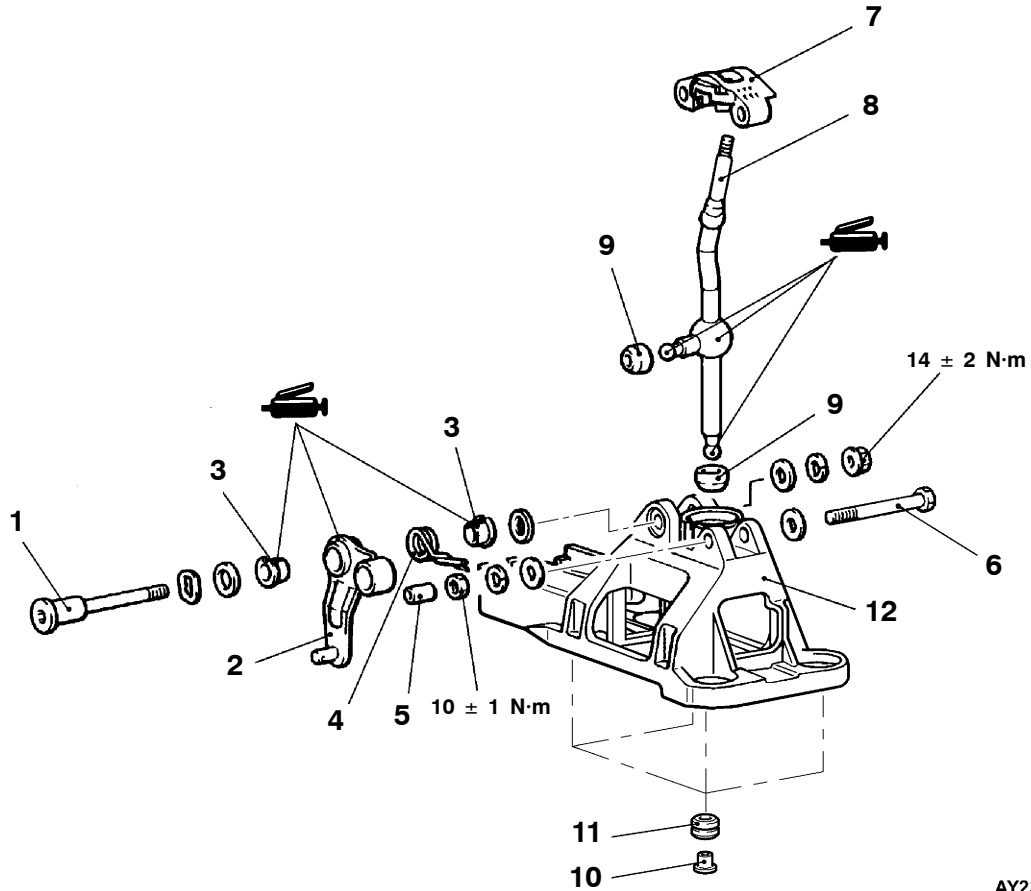
**REMOVAL SERVICE POINT****◀A▶ CLIP/SELECT CABLE CONNECTION (TRANSMISSION)/SHIFT CABLE (TRANSMISSION) INSTALLATION**

Push up the claws of the clip using a screwdriver, etc., and then remove the clip from the bracket together with the cables.

**INSTALLATION SERVICE POINT****▶A◀ CLIP/SELECT CABLE AND SHIFT CABLE ASSEMBLY/SHIFT CABLE CONNECTION/SELECT CABLE CONNECTION INSTALLATION**

1. Set the transmission side shift lever and the passenger compartment side shift lever to the neutral position.
2. Install the painted part of the shift cable end (transmission side) and painted part of the select cable (transmission side) facing the snap pin.
3. After installing the new clip to the cable bracket of the transmission, install the shift cable and select cable to the cable bracket.
4. Move the shift lever to all positions and check that the operation is smooth.

SHIFT LEVER ASSEMBLY DISASSEMBLY AND REASSEMBLY



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Disassembly steps

1. Bolt
2. Select lever
3. Bushing
4. Return spring
5. Collar
6. Bolt

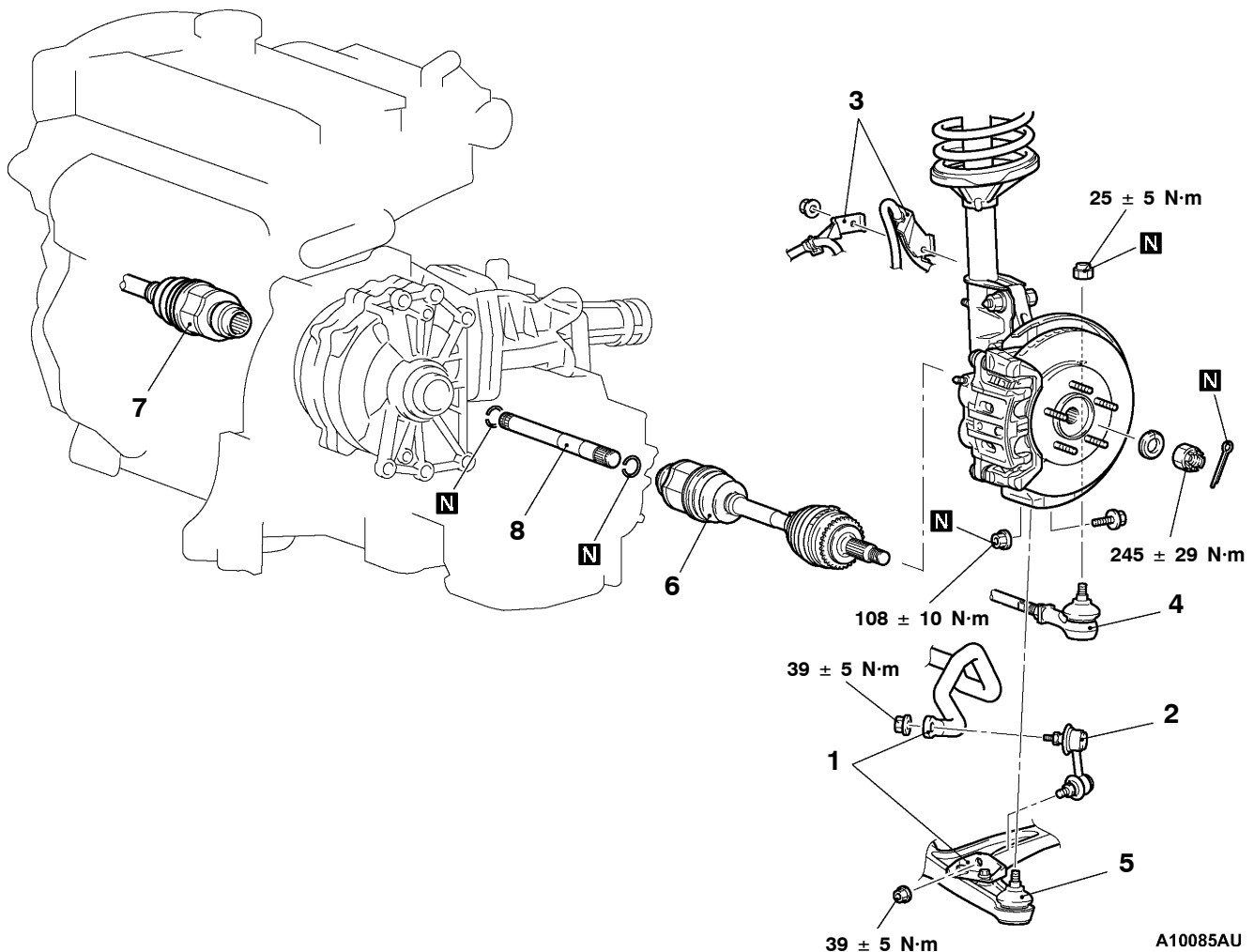
7. Cap
8. Shift lever
9. Shift lever bushing
10. Distance piece
11. Bushing
12. Base block

TRANSFER ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Side Under Cover Removal and Installation
- Transmission Oil Draining and Supplying (Refer to P.22A-40.)
- Transfer Oil Draining and Supplying (Refer to P.22A-40.)
- Engine Coolant Draining and Supplying (Refer to GROUP 14 - On-vehicle Service.)
- Crossmember Bar Removal and Installation (Refer to GROUP 32 - Engine Roll Stopper, Centermember.)
- Front Exhaust Pipe Removal and Installation (Refer to GROUP 15 - Exhaust Pipe and Main Muffler.)
- Battery and Battery Tray Removal and Installation
- Air Cleaner, Air Intake Hose Removal and Installation (Refer to GROUP 15 - Air Cleaner.)
- Secondary Air Hose Removal and Installation (Refer to GROUP 15 - Secondary Air Control System.)
- Strut Tower Bar Removal and Installation (Refer to GROUP 42.)
- Air Hose E, Air By-pass Hose and Air By-pass Valve, Air Pipe C, Air Hose D, Air Pipe B, Air Hose A Removal and Installation (Refer to GROUP 15 - Intercooler.)
- Radiator Removal and Installation (Refer to GROUP 14.)
- Bleeding and Hydraulic Pressure Check <ACD> (Refer to P.22A-42, 43) <after installation only>

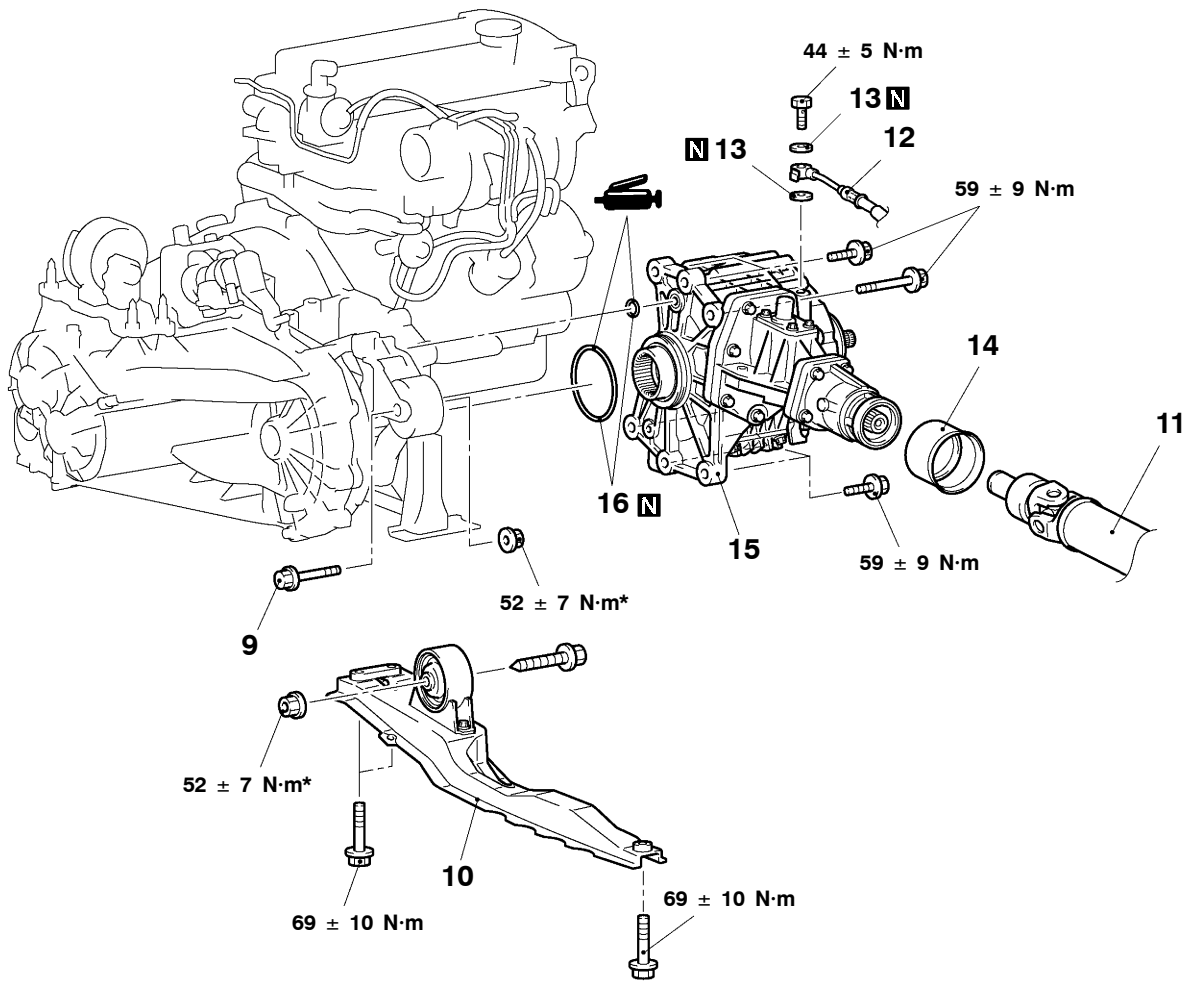


Removal steps

1. Stabilizer bar connection
2. Stabilizer link
3. Wheel speed sensor cable clamp and brake hose clamp



4. Tie rod end connection
5. Lower arm ball joint connection
6. Drive shaft <L.H.> connection
7. Drive shaft <R.H.> connection
8. Output shaft



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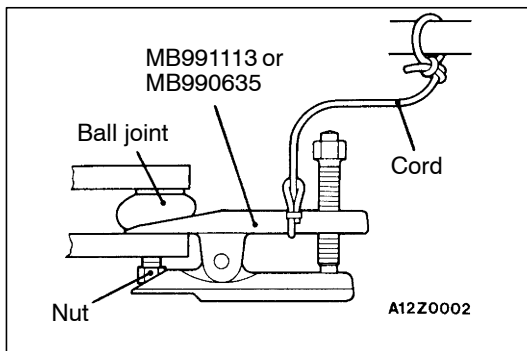
- 9. Rear roll stopper connection bolt
- 10. Centermember assembly
- 11. Front propeller shaft
(Refer to GROUP 25.)
- 12. Transfer oil pressure hose assembly <Vehicle of ACD, ACD+AYC>
- 13. Gasket
<Vehicle of ACD, ACD+AYC>



- 14. Dust seal guard
- 15. Transfer assembly
- 16. O-ring

Caution

*: Indicates parts which should be initially tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.

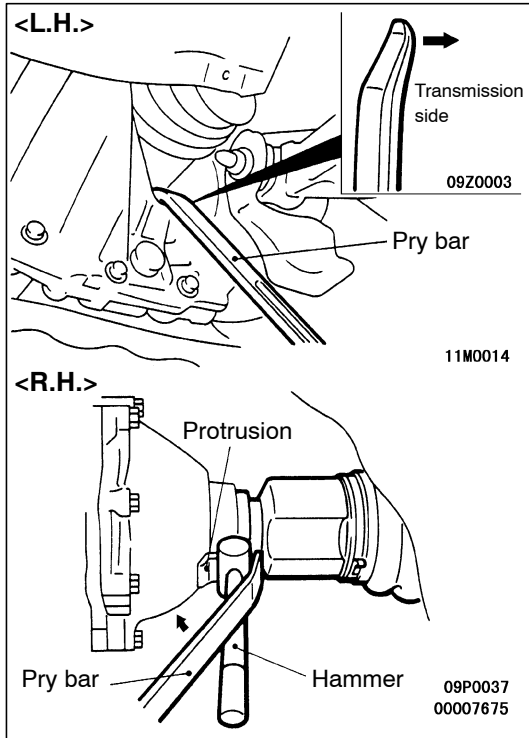


REMOVAL SERVICE POINTS

◀▶ TIE ROD END DISCONNECTION

Caution

1. Loosen the nut only; do not remove it from the ball joint. Otherwise ball joint thread will be damaged.
2. The special tool should be suspended by a cord to prevent it from coming off.



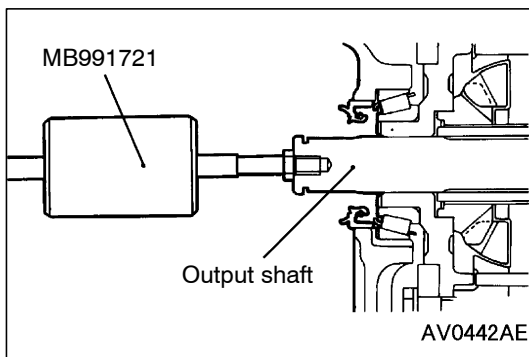
◀B▶ DRIVE SHAFT <L.H.>/DRIVE SHAFT <R.H.> DISCONNECTION

1. As shown in the figure, pull out the transfer shaft <L.H.> from the transmission using the pry bar. As shown in the illustration, press a hammer, etc. against the driveshaft <R.H.>, and pull out the driveshaft from the transfer assembly using the pry shaft.

Caution

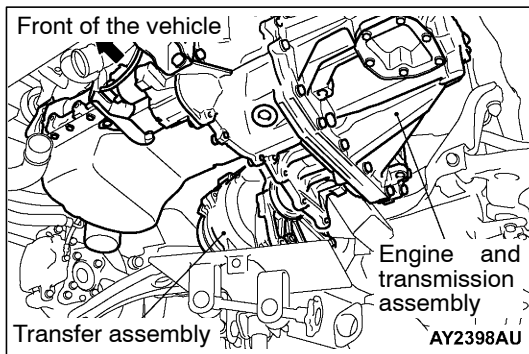
As the TJ may damage when the driveshaft is pulled out from the BJ side, be sure to use the lever.

2. Cover with a cloth to prevent foreign particles from entering the transfer.



◀C▶ OUTPUT SHAFT REMOVAL

1. Using the special tool (MB991721), remove the output shaft.
2. Cover with a cloth to prevent foreign particles from entering the transmission case.



◀D▶ TRANSFER ASSEMBLY REMOVAL

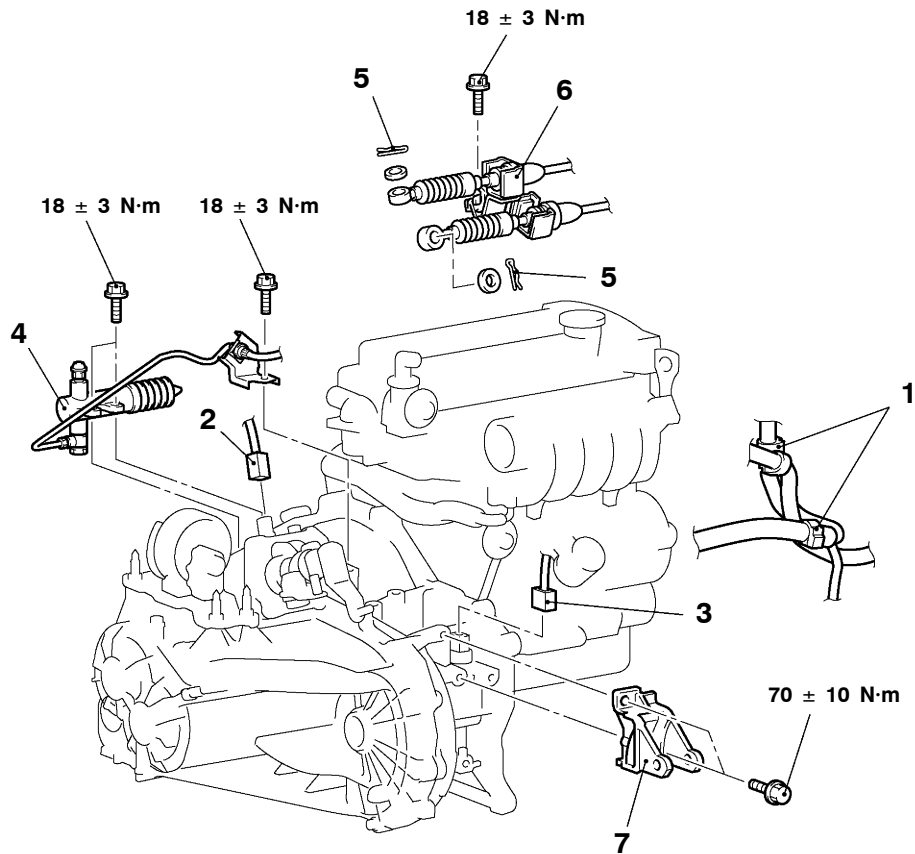
With the engine mount and transmission mount installed, roll the engine and transmission assembly towards the front of the vehicle, and remove the transfer assembly from between the engine block and crossmember.

TRANSMISSION ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Transfer Assembly Removal and Installation (Refer to P.22A-49.)
- Starter Motor Removal and Installation (Refer to GROUP 16.)
- Air Cleaner Bracket Removal and Installation (Refer to GROUP 15 - Air Cleaner.)
- Rear Roll Rod Assembly and Rear Roll Rod Bracket <L.H. Drive Vehicles>, Rear Roll Mount <R.H. Drive Vehicles> Removal and Installation (Refer to GROUP 32 - Engine Roll Stopper.)



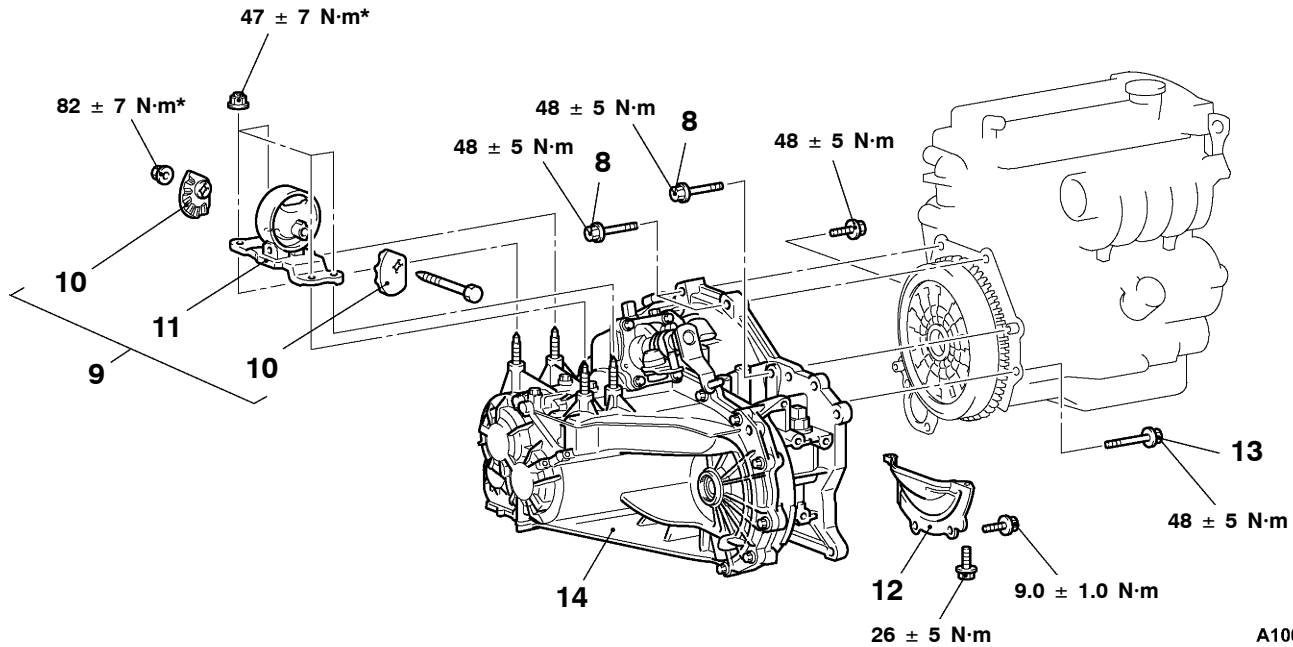
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Removal steps

1. Transmission harness clamp
2. Back-up lamp switch connector connection
3. Vehicle speed sensor connector connection
4. Clutch release cylinder and clutch oil pipe



5. Snap pin
 6. Shift cable and select cable assembly connection
 7. Rear roll mount bracket
- Engine and transmission assembly supporting



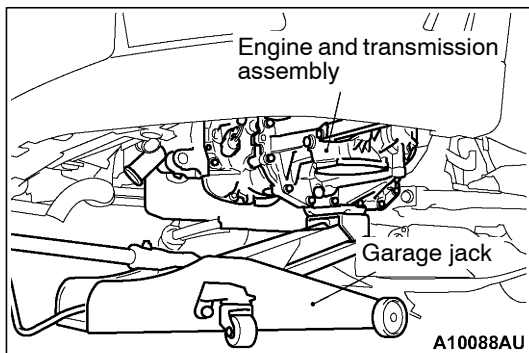
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- 8. Transmission assembly upper part coupling bolts
- 9. Transmission mount assembly
- 10. Transmission mount stopper
- 11. Transmission mount bracket
 - Engine assembly supporting
 - Clutch release bearing connection
- 12. Bell housing cover

- 13. Transmission assembly lower part coupling bolts
- 14. Transmission assembly

Caution

*: Indicates parts which should be initially tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.

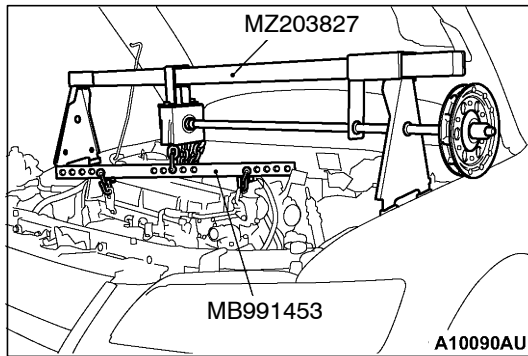


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REMOVAL SERVICE POINTS

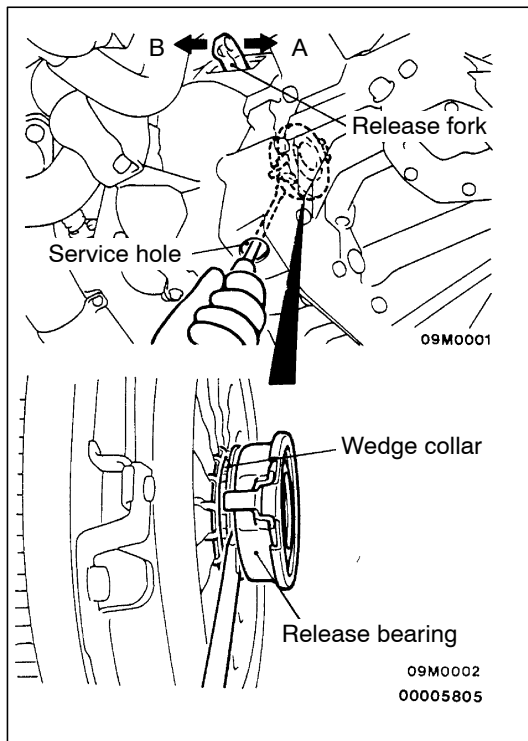
◀▶ ENGINE AND TRANSMISSION ASSEMBLY SUPPORTING/TRANSMISSION MOUNT ASSEMBLY REMOVAL

While supporting the engine and transmission assembly with a garage jack, remove the transmission mount assembly.



◀B▶ ENGINE ASSEMBLY SUPPORTING

Set the special tool to the vehicle to support the engine assembly.



◀C▶ CLUTCH RELEASE BEARING SEPARATION

1. Remove the cover from the service hole in the clutch housing.
2. While pushing the release fork by hand in the direction A, insert a flap-tip screwdriver between the release bearing and the wedge collar.

Caution

Be sure to push the release fork in the direction A before inserting a screwdriver.

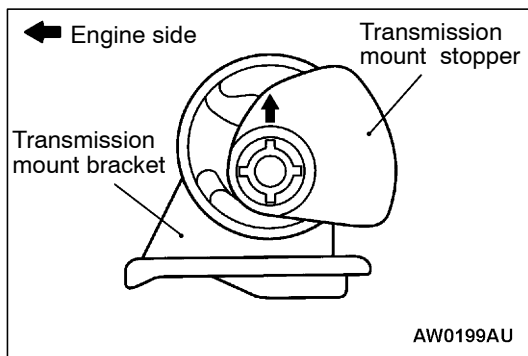
3. Separate the release bearing from the wedge collar by prying with the screwdriver (turning the screwdriver grip 90°).

NOTE

The release fork is forced to move fully in the direction B by the return spring as soon as it is separated from the wedge collar.

Caution

If it is hard to turn the screwdriver (to pry off the release bearing), remove the screwdriver once and repeat the above procedure after pushing the release fork fully in the direction a two to three times. Forcibly prying can cause the release bearing to be damaged.



INSTALLATION SERVICE POINT

▶A◀ TRANSMISSION MOUNT STOPPER INSTALLATION

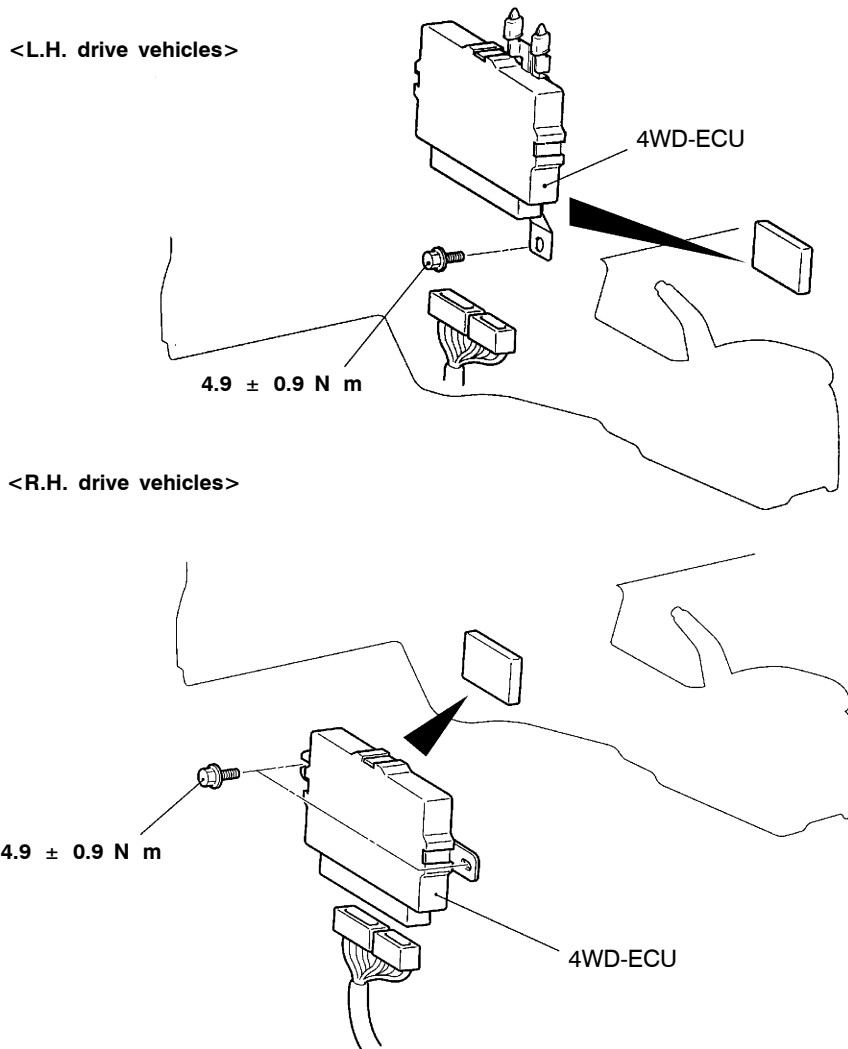
Install so that the arrow on the transmission mounting stopper faces the top of the vehicle.

4WD-ECU <VEHICLES WITH ACD OR VEHICLES WITH ACD AND AYC>

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Cowl Side Trim <R.H.> Removal and Installation. (Refer to GROUP 52A - Trims.) <L.H. drive vehicles>
- Front floor Console Removal and Installation. (Refer to GROUP 52A - Floor Console.) <R.H. drive vehicles>



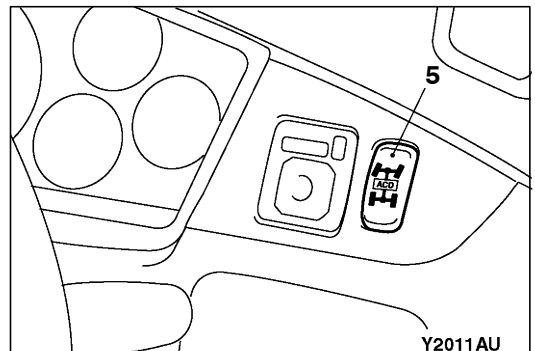
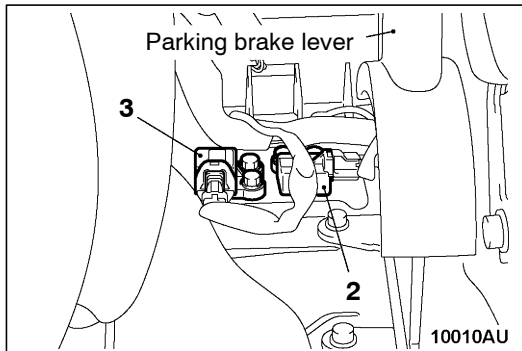
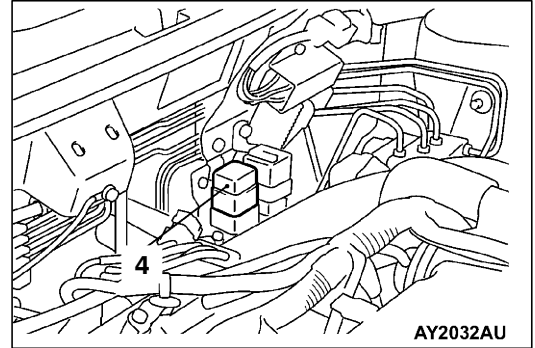
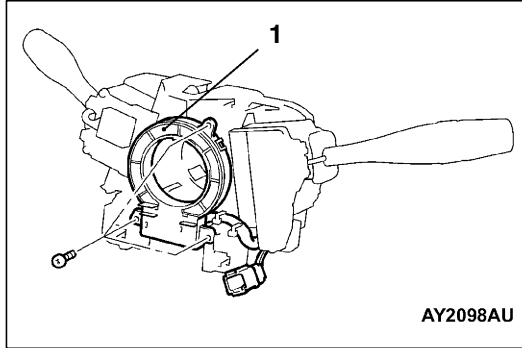
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SENSOR, SWITCH AND RELAY <VEHICLES WITH ACD OR VEHICLES WITH ACD AND AYC>

REMOVAL AND INSTALLATION

Caution

Before removing the steering wheel and air bag module assembly, be sure to refer to GROUP 52B Precautions in Servicing and Airbag Module Clock Spring.



Steering wheel sensor removal steps

- Steering wheel and column cover (Refer to GROUP 37A.)
1. Steering wheel sensor

G sensor removal steps

- Floor console (Refer to GROUP 52A.)
2. Longitudinal G sensor
 3. Lateral G sensor

Electric pump relay removal

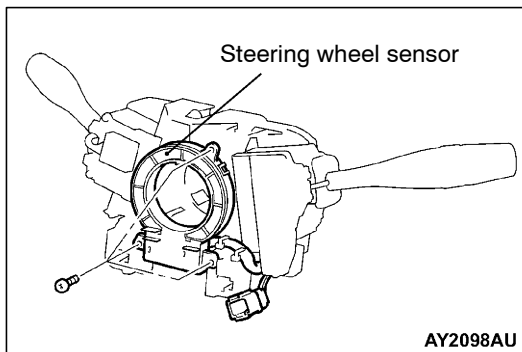
4. Electric pump relay

ACD mode switch removal steps

- Instrument panel ornament (Refer to GROUP 52A – Instrument Panel.)
5. ACD mode switch

NOTE

For details on the wheel speed sensor, refer to GROUP 35B.



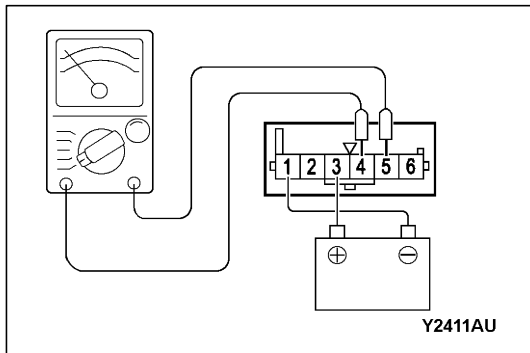
REMOVAL SERVICE POINT

◀A▶ STEERING WHEEL SENSOR REMOVAL

Remove the steering wheel sensor from the column switch.

Caution

Make sure no oil adheres to the steering wheel sensor because a photocoupler is used.

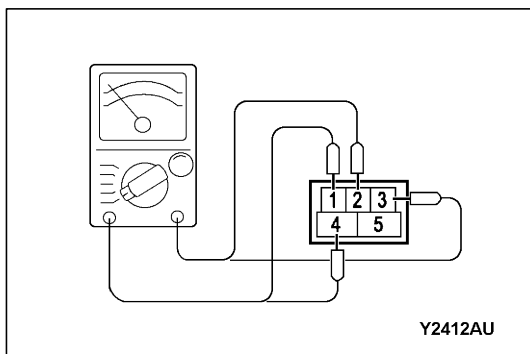


INSPECTION

ELECTRIC PUMP RELAY CONTINUITY CHECK

1. Using a jumper wire, connect a battery (+) to terminal 13 of the electric pump relay and battery (-) to terminal 1.
2. While intermittently disconnecting the jumper wire at the battery side, check for continuity between terminals 4 and 5 of the electric pump relay.

Jumper wire	Continuity between No.4 - No.5
Connected	Continuity
Disconnected	No continuity



ACD MODE SWITCH CONTINUITY CHECK

ACD mode switch terminal	ACD mode switch	Continuity
No.1 - No.2	ON	Continuity
	OFF	No continuity
No.3 - No.4	-	Continuity

NOTES

MANUAL TRANSMISSION OVERHAUL

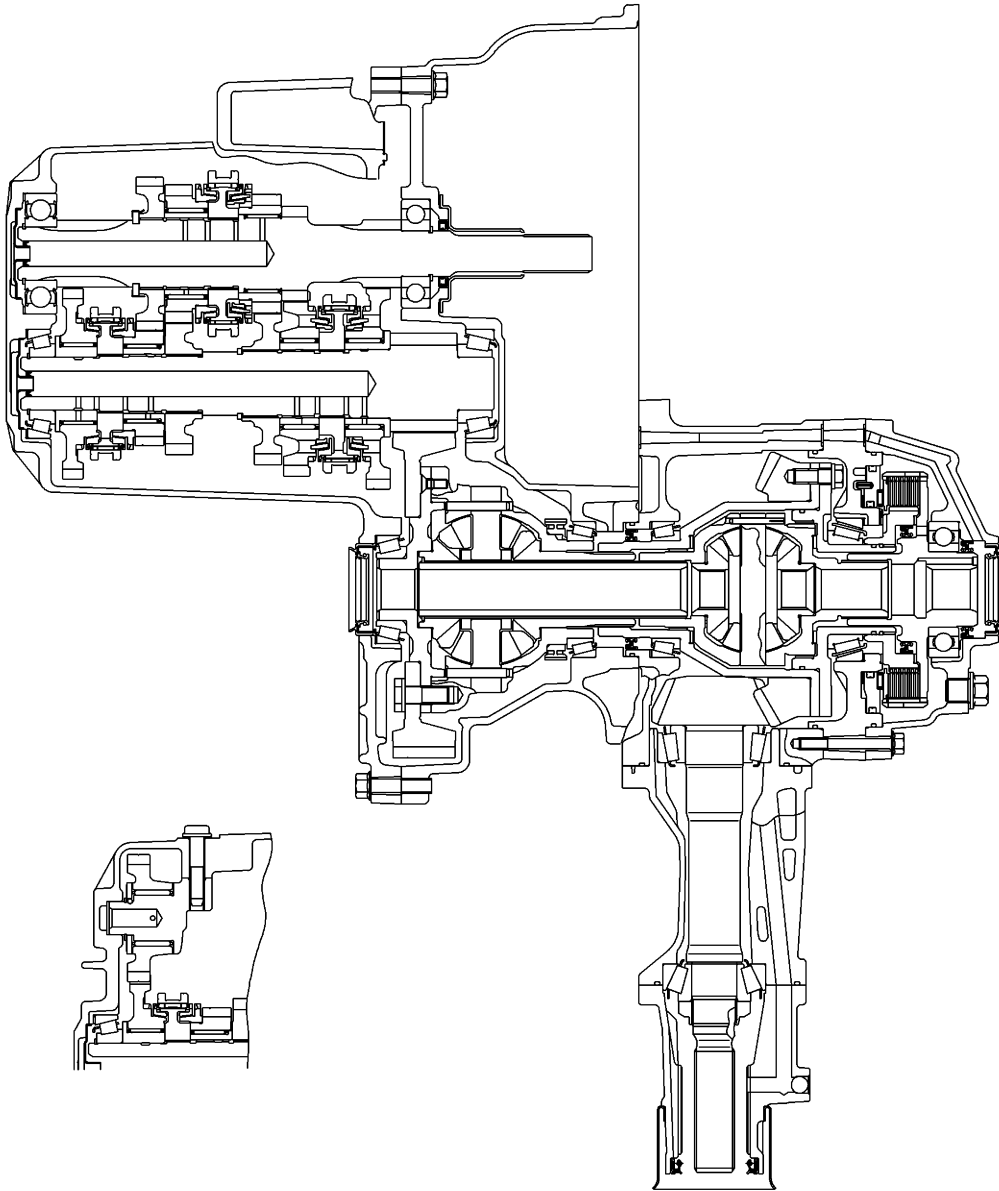
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GENERAL DESCRIPTION

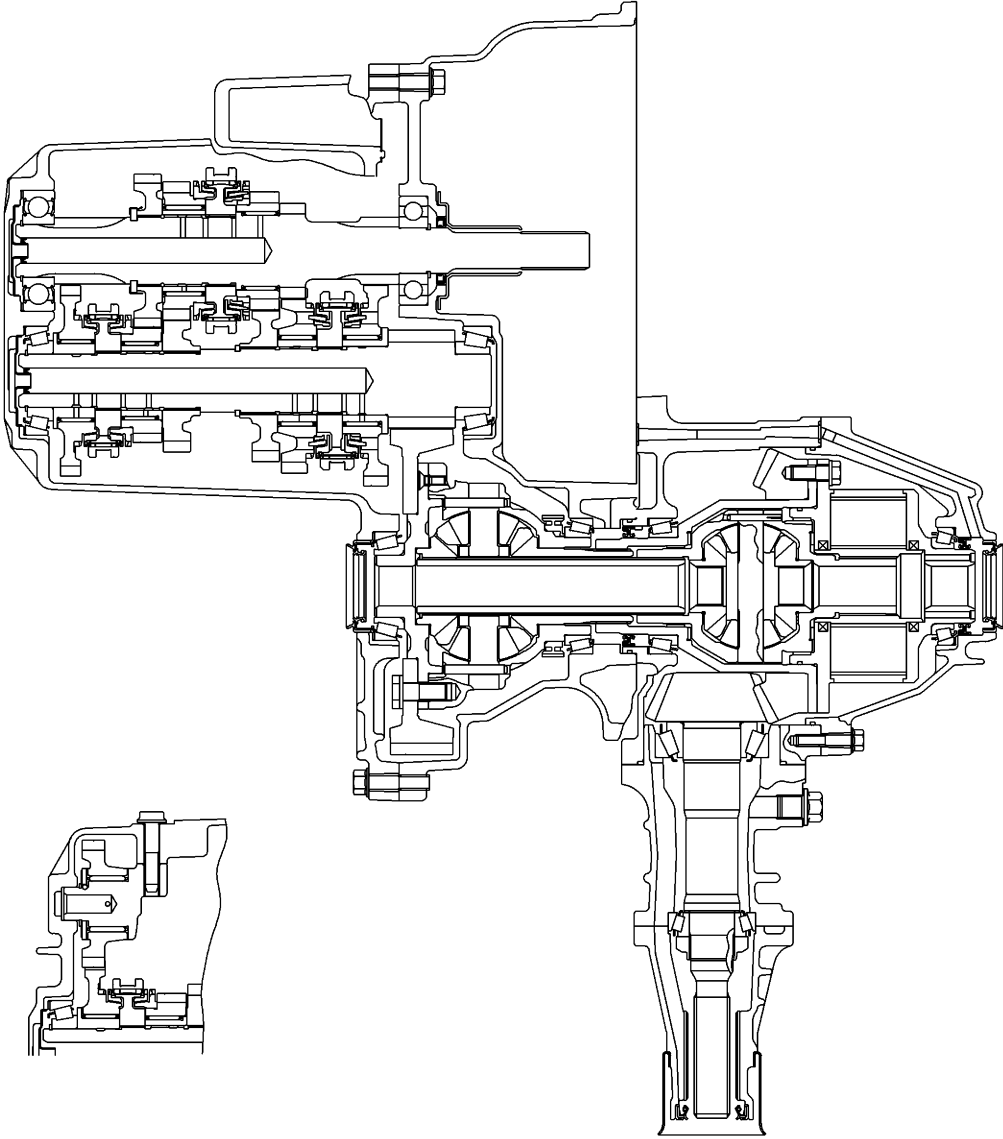
SECTIONAL VIEW

<W5M51-2-X5B3>



SECTIONAL VIEW

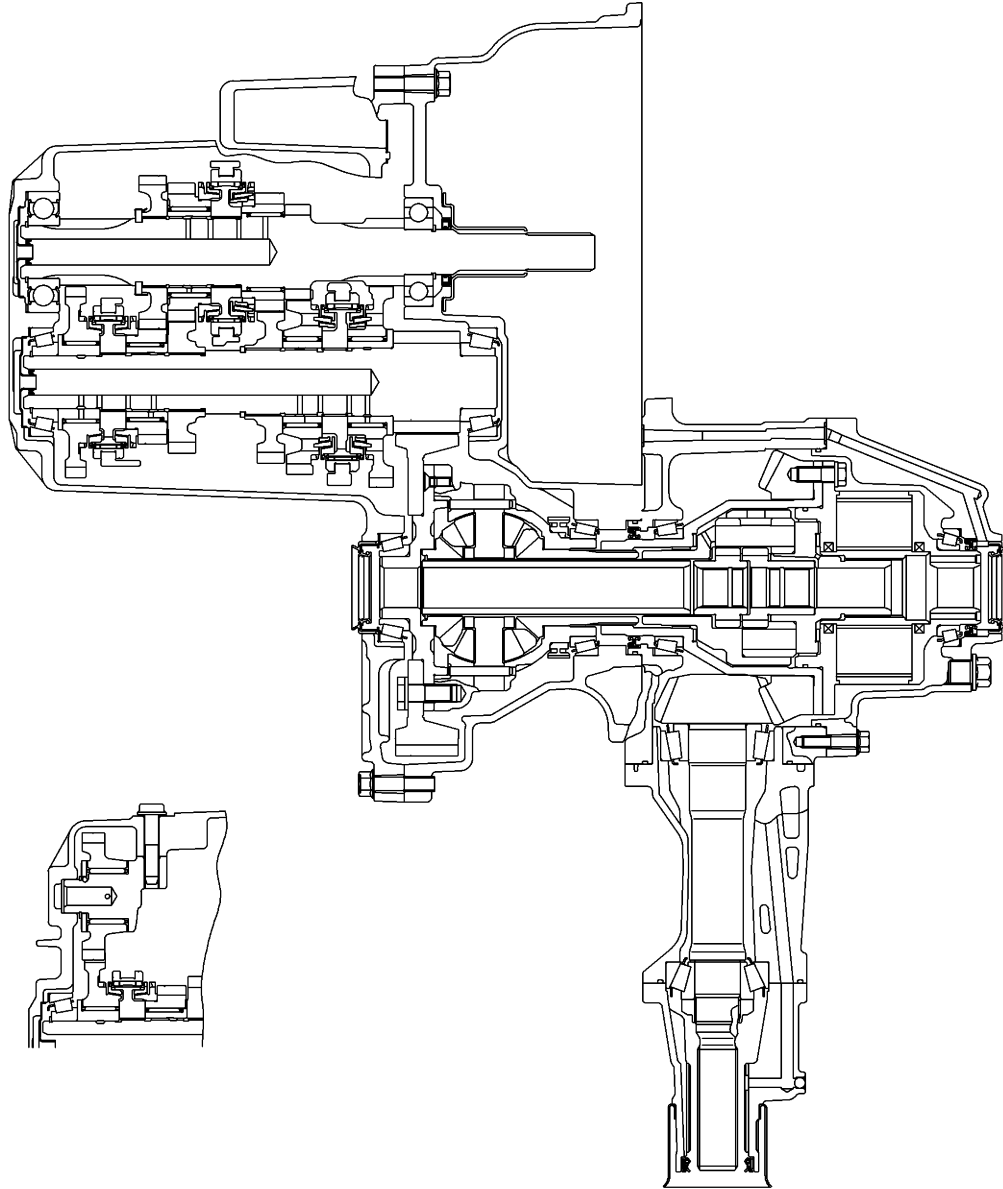
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TFM1051

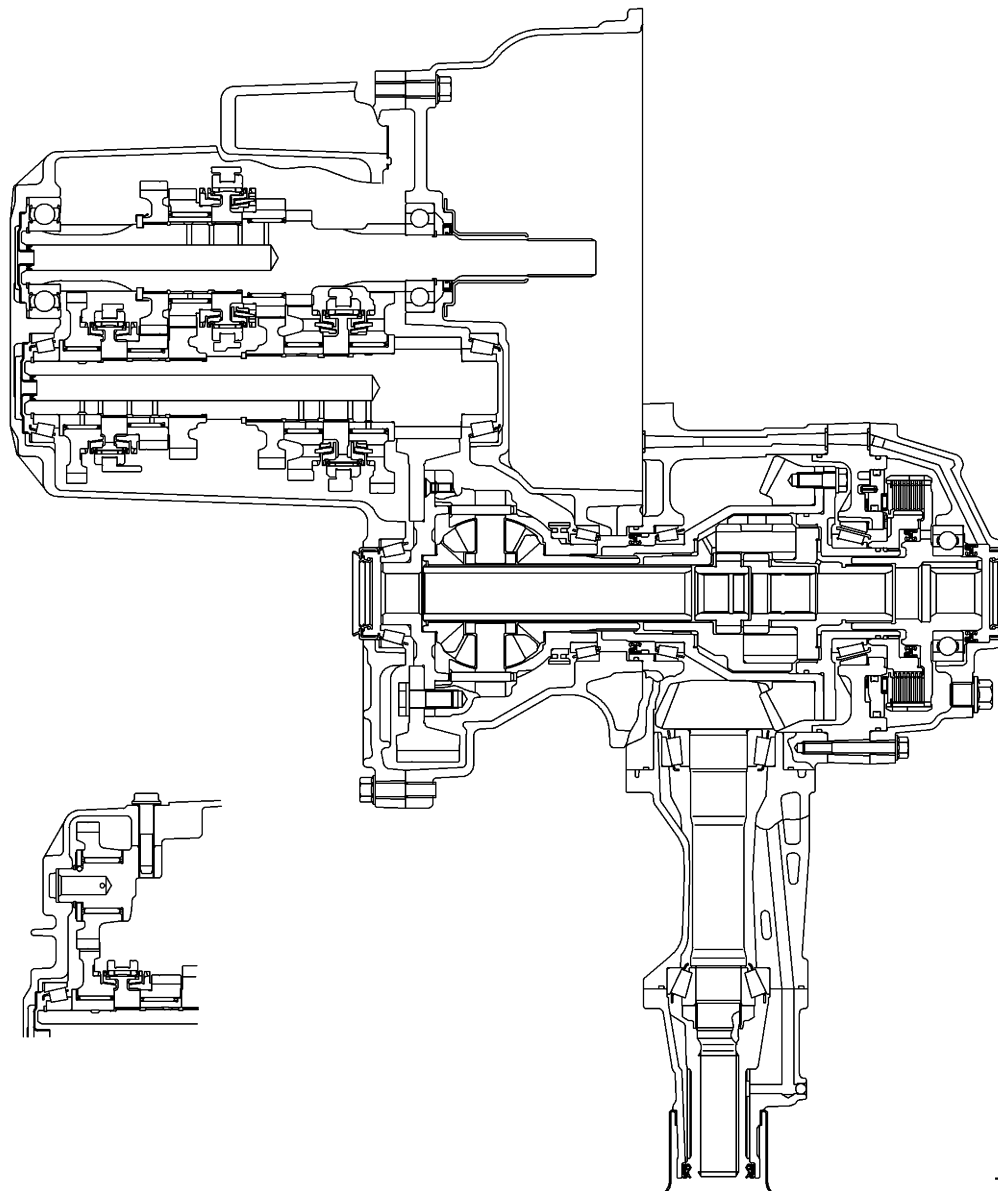
SECTIONAL VIEW

<W5M51-2-X5B2>



SECTIONAL VIEW

<W5M51-2-X5B,X5B4>



TFM1053

SPECIFICATIONS

TRANSMISSION MODEL TABLE

Transmission model	Gear ratio	Speedometer gear ratio	Final reduction ratio	Front LSD	Vehicle model	Engine model
W5M51-2-X5B	A	28/36	4.529	Provided	CT9A	4G63-I/C•T/C
W5M51-2-X5B1	B	28/36	4.529	Not provided	CT9A	4G63-I/C•T/C
W5M51-2-X5B2	C	28/36	4.529	Provided	CT9A	4G63-I/C•T/C
W5M51-2-X5B3	B	28/36	4.529	Not provided	CT9A	4G63-I/C•T/C
W5M51-2-X5B4	C	28/36	4.529	Provided	CT9A	4G63-I/C•T/C

GEAR RATIO TABLE

	A	B	C
1st	2.928	2.785	←
2nd	1.950	←	←
3rd	1.407	←	1.444
4th	1.031	←	1.096
5th	0.720	←	0.825
Reverse	3.416	←	←
Transfer gear ratio	0.3018	←	←

SERVICE SPECIFICATIONS

Items	Standard value mm	Limit value mm
Input shaft end play	0.05 loose to 0.17 loose	-
Input shaft front bearing end play	0.01 tight to 0.12 loose	-
Input shaft rear bearing end play	0.01 tight to 0.12 loose	-
Input shaft 5th speed gear end play	0.01 tight to 0.09 loose	-
Output shaft preload	0.13 tight to 0.18 tight	-
Output shaft bearing end play	0.01 tight to 0.09 loose	-
Output shaft 3rd speed gear end play	0.01 tight to 0.09 loose	-
Center differential case preload	0.05 tight to 0.11 tight	-
Center differential case pinion backlash	0.025 - 0.150	-
Clearance between synchronizer ring rear surface and gears	-	0.5

SEALANTS

TRANSMISSION

Items	Specified sealants
Clutch housing and transmission case contact surface	MITSUBISHI genuine sealant Part No.MD997740 or equivalent
Control housing and transmission case contact surface	
Under cover and transmission case contact surface	
Air breather	3M SUPER WEATHERSTRIP No.8001 or equivalent
Center differential drive gear bolt	3M STUD Locking No.4170 or equivalent

FORM-IN-PLACE GASKET (FIPG)

FIPG is used for several members of this transmission. With this gasket, caution is required to the application amount, application procedure and state of the application surface so that the performance is sufficiently attained.

If sufficient gasket is not applied, leaks could occur, and if too much is applied, the gasket could protrude and plug or restrict the oil flow passage. Thus, to prevent leaks from the joined sections, it is absolutely necessary to evenly apply the correct amount.

DISASSEMBLY

The parts assembled with FIPG can be easily disassembled without special means. However, in some cases, the sealant on the contact surfaces must be broken by lightly tapping with a wood hammer or similar tool.

Washing the gasket surface

Completely remove all matters adhered on the contact surfaces with a gasket scraper. Confirm that the FIPG application surface is smooth. There must be no grease or foreign matter on the contact surfaces. Always remove the old FIPG that has entered the mounting holes and screw holes.

APPLICATION PROCEDURES

Apply an even coat of FIPG within the predetermined radius (1.5 ± 0.3 mm). Completely cover the areas around the mounting holds. The FIPG can be wiped off if it has not hardened. Install at the set position while the FIPG is still wet (within 10 minutes). When installing, make sure that the FIPG does not get on areas other than the required areas. After installing, do not subject the application areas to oil or water or start operation until the FIPG has sufficiently hardened (approx. one hour).

The FIPG application procedures differ according to the member, so follow the procedures given in this manual and apply the FIPG.

LUBRICANTS**TRANSMISSION**

Items	Specified lubricants
Drive shaft oil seal lip section	MITSUBISHI genuine "DIA-QUEEN" multi gear oil <75W/85W> or equivalent
Input shaft oil seal lip section	
Control shaft oil seal lip section	
Select lever shoe	MITSUBISHI genuine grease Part No.0101011 or equivalent

TRANSFER

Items	Specified lubricants
Drive shaft oil seal lip section	MITSUBISHI genuine "DIA-QUEEN SUPER" hypoid gear oil (GL-5) or equivalent
Front differential oil seal lip section	
Each O-ring	

SNAP RINGS, SPACERS AND THRUST PLATES FOR ADJUSTMENT

SPACERS (FOR ADJUSTMENT OF INPUT SHAFT END PLAY)

Thickness mm	Identification	Part No.	Thickness mm	Identification	Part No.
1.34	34	MD723600	1.61	61	MD723609
1.43	43	MD723603	1.70	70	MD756760
1.52	52	MD723606	1.79	79	MD756763

SNAP RINGS (FOR ADJUSTMENT OF INPUT SHAFT FRONT BEARING CLEARANCE)

Thickness mm	Identification	Part No.	Thickness mm	Identification	Part No.
1.43	Green, two pieces	MD746708	1.59	Yellow, two pieces	MD746710
1.51	White, two pieces	MD746709			

SNAP RINGS (FOR ADJUSTMENT OF INPUT SHAFT REAR BEARING CLEARANCE)

Thickness mm	Identification	Part No.	Thickness mm	Identification	Part No.
1.44	None	MD746602	1.58	Brown	MD746604
1.51	Blue	MD746603			

THRUST PLATES (FOR ADJUSTMENT OF INPUT SHAFT 5TH SPEED GEAR CLEARANCE)

Thickness mm	Identification	Part No.	Thickness mm	Identification	Part No.
3.82	0	MD748465	3.98	6	MD748469
3.86	2	MD748466	4.02	7	MD748470
3.90	3	MD748467	4.06	8	MD748471
3.94	5	MD748468	4.10	9	MD748472

SPACERS (FOR ADJUSTMENT OF OUTPUT SHAFT PRELOAD)

Thickness mm	Identification	Part No.	Thickness mm	Identification	Part No.
0.86	86	MD720938	1.19	L	MD710456
0.89	89	MD720939	1.22	G	MD700271
0.92	92	MD720940	1.25	M	MD710457
0.95	95	MD720941	1.28	N	MD710458
0.98	98	MD720942	1.31	E	MD706574
1.01	01	MD720943	1.34	O	MD710459
1.04	04	MD720944	1.37	P	MD710460
1.07	07	MD720945	1.40	None	MD706573
1.10	J	MD710454	1.43	Q	MD710461
1.13	D	MD700270	1.46	R	MD710462
1.16	K	MD710455			

SNAP RINGS (FOR ADJUSTMENT OF OUTPUT SHAFT BEARING CLEARANCE)

Thickness mm	Identification	Part No.	Thickness mm	Identification	Part No.
1.36	Yellow	MD748449	1.55	White	MD748452
1.40	Green	MD748450	1.58	Brown	MD746604
1.44	None	MD746602	1.63	Orange	MD748453
1.48	Black	MD748451	1.68	Blue	MD748454
1.51	Blue	MD746603			

SNAP RINGS (FOR ADJUSTMENT OF OUTPUT SHAFT 3RD SPEED GEAR CLEARANCE)

Thickness mm	Identification	Part No.	Thickness mm	Identification	Part No.
2.81	None	MD746594	2.97	Green	MD746598
2.85	Blue	MD746595	3.01	Black	MD746599
2.89	Brown	MD746596	3.05	White	MD746600
2.93	Yellow	MD746597	3.09	Orange	MD746601

SPACERS (FOR ADJUSTMENT OF CENTER DIFFERENTIAL CASE PRELOAD)

Thickness mm	Identification	Part No.	Thickness mm	Identification	Part No.
0.74	74	MD727660	1.04	04	MD720944
0.77	77	MD754476	1.07	07	MD750945
0.80	80	MD727661	1.10	J	MD710454
0.83	83	MD720937	1.13	D	MD700270
0.86	86	MD720938	1.16	K	MD710455
0.89	89	MD720939	1.19	L	MD710456
0.92	92	MD720940	1.22	G	MD700271
0.95	95	MD720941	1.25	M	MD710457
0.98	98	MD720942	1.28	N	MD710458
1.01	01	MD720943	1.31	E	MD706547

SPACERS (FOR ADJUSTMENT OF CENTER DIFFERENTIAL CASE PINION BACKLASH)

Thickness mm	Identification	Part No.	Thickness mm	Identification	Part No.
0.6	-	MD748362	0.9	-	MD748365
0.7	-	MD748363	1.0	-	MD748366
0.8	-	MD748364	1.1	-	MD748367

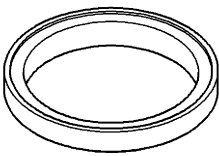
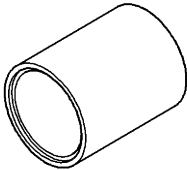
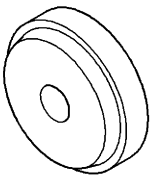
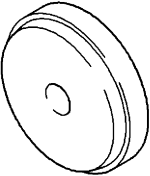
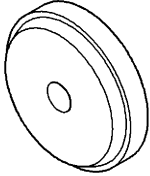
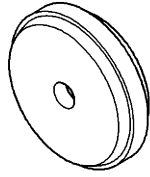
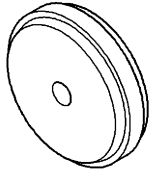
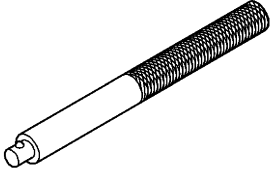
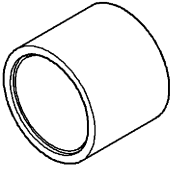
TIGHTENING TORQUE**TRANSMISSION**

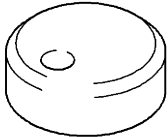
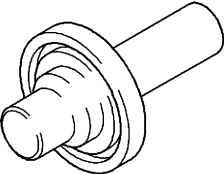
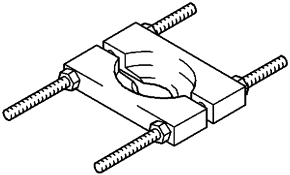
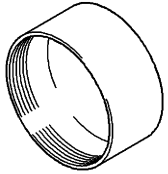
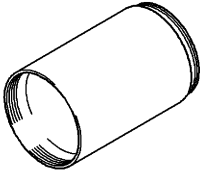
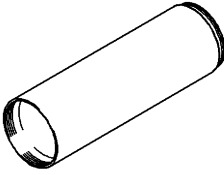
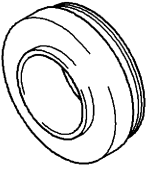
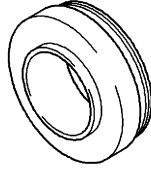
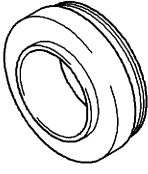
Items	Tightening torque N•m
Under cover mounting bolt	6.9 ± 1
Interlock plate bolt	30 ± 3
Clutch housing and transmission case tightening bolt	44 ± 5
Clutch release bearing retainer mounting bolt	9.8 ± 2
Control housing mounting bolt	18 ± 3
Shift cable bracket mounting bolt	18 ± 3
Speedometer gear mounting bolt	3.9 ± 1
Stopper bracket mounting bolt	18 ± 3
Select lever mounting bolt	18 ± 3
Select lever mounting nut	11 ± 1
Center differential drive gear mounting bolt	132 ± 5
Backup light switch	32 ± 2
Poppet spring	32 ± 2
Reverse idler gear shaft mounting bolt	48 ± 5
Roll stopper bracket mounting bolt	69 ± 9

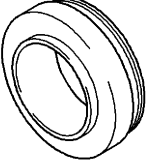
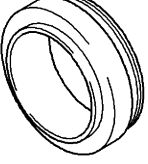
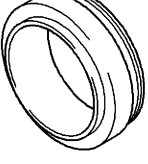
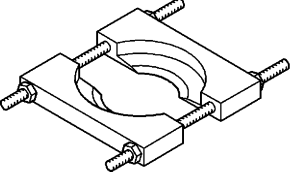
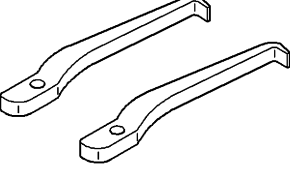
TRANSFER

Items	Tightening torque N•m
Transfer cover mounting bolt	23 ± 3
Transmission and transfer tightening bolt	69 ± 9

SPECIAL TOOLS

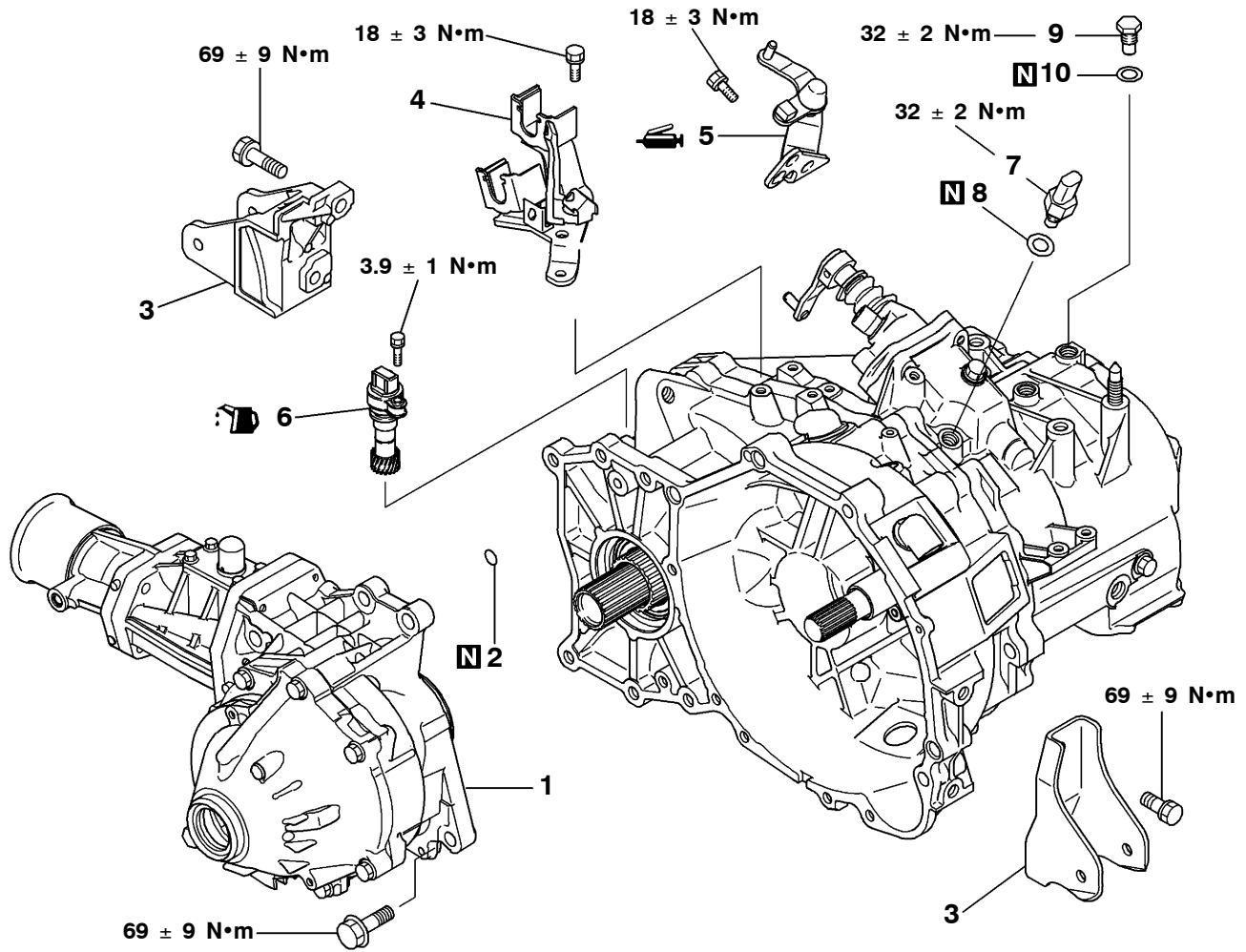
Tool	Number	Name	Use
	MB990887	Arm bush remover and installer ring	Installation of transfer oil seal
	MB990891	Bush remover and installer base	Installation of transfer oil seal
	MB990928	Installer adapter	Installation of input shaft oil seal
	MB990932	Installer adapter	Removal of differential case taper roller bearing
	MB990936	Installer adapter	Installation of transfer oil seal
	MB990935	Installer adapter	Installation of output shaft front taper roller bearing
	MB990937	Installer adapter	Installation of differential case taper roller bearing and transfer extension housing oil seal
	MB990938	Handle	Use for installer adaptor
	MB991445	Bush remover and installer base	Installation of differential case taper roller bearing outer race

Tool	Number	Name	Use
	MD998364	Camshaft oil seal installer	Installation of each gear, bearing and sleeve
	MD998800	Oil seal installer	Installation of differential oil seal and transfer cover oil seal
	MD998801	Bearing remover	Installation and removal of each gear, bearing and sleeve
	MD998812	Installer cap	Use for installer and installer adaptor
	MD998813	Installer 100	Use for installer cap and installer adaptor
	MD998814	Installer 200	Use for installer cap and installer adaptor
	MD998818	Installer adapter (38)	Installation of input shaft front bearing
	MD998819	Installer adapter (40)	Installation of input shaft rear bearing and output shaft taper roller bearing
	MD998820	Installer adapter (42)	Installation of reverse gear bearing sleeve

Tool	Number	Name	Use
	MD998821	Installer adapter (44)	Installation of 4th speed gear, 5th speed gear sleeve and 5th-reverse speed synchronizer hub
	MD998824	Installer adapter (50)	Installation of 1st-2nd speed synchronizer hub, 2nd speed gear sleeve and 3rd speed gear
	MD998825	Installer adapter (52)	Installation of 1st speed gear sleeve, 3rd-4th speed synchronizer hub, 4th speed gear sleeve, 5th speed gear and thrust plate stopper
	MD998917	Bearing remover	Installation and removal of each gear, bearing and sleeve
	MD999566	Claw	Removal of taper roller bearing outer race

TRANSMISSION

DISASSEMBLY AND REASSEMBLY

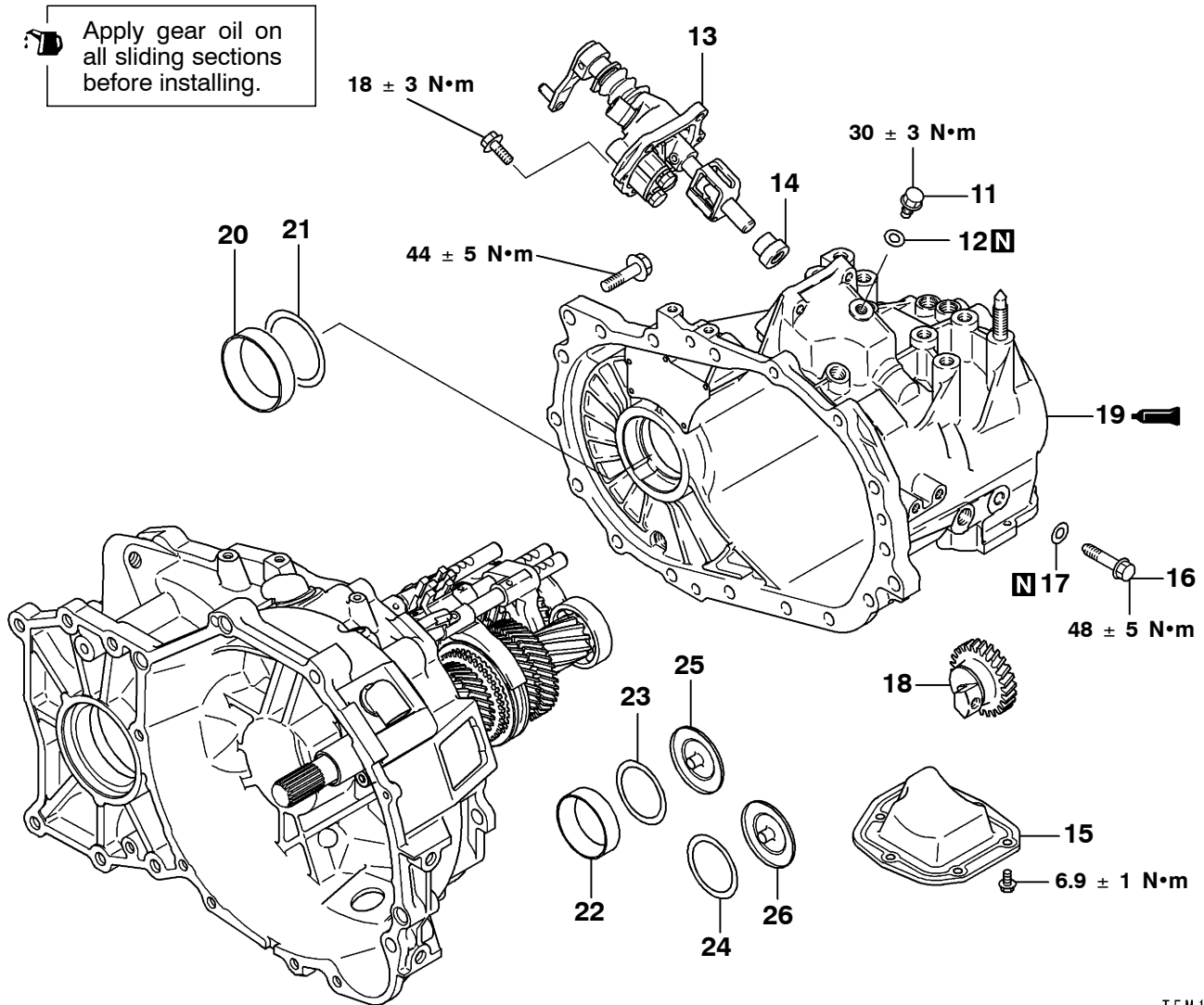


TFM1057

Disassembly steps

1. Transfer
2. O-ring
3. Roll stopper bracket
4. Shift cable bracket
5. Select lever

- ▶J 6. Speedometer gear
- 7. Backup light switch
- 8. Gasket
- ▶I 9. Poppet spring
- ▶H 10. Gasket

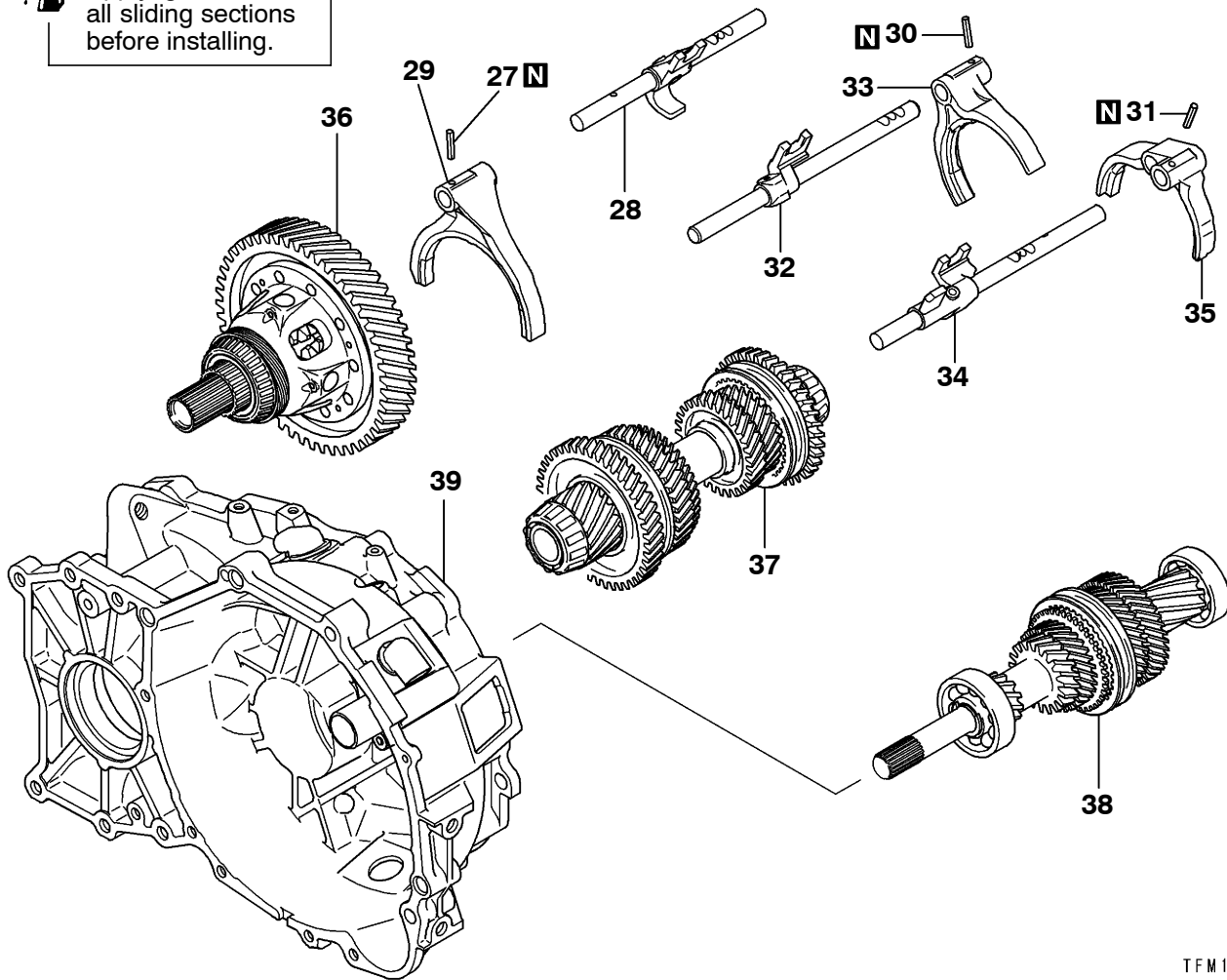


TFM1058

Disassembly steps

- | | | | |
|-----|------------------------------|-----|-----------------------|
| | 11. Interlock plate bolt | ►E◄ | 19. Transmission case |
| | 12. Gasket | | 20. Outer race |
| ►G◄ | 13. Control housing | | 21. Outer race |
| | 14. Neutral return spring | ►D◄ | 22. Spacer |
| ►F◄ | 15. Under cover | ►D◄ | 23. Spacer |
| | 16. Reverse idler shaft bolt | ►D◄ | 24. Spacer |
| | 17. Gasket | | 25. Oil guide |
| | 18. Reverse idler gear | | 26. Oil guide |

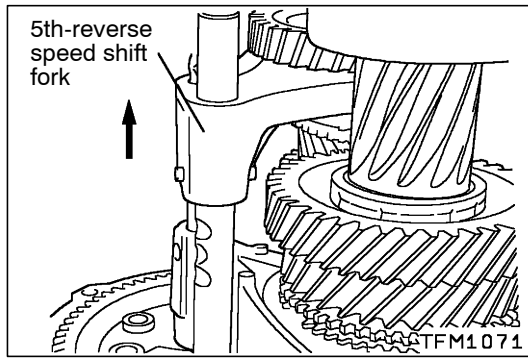
Apply gear oil on all sliding sections before installing.



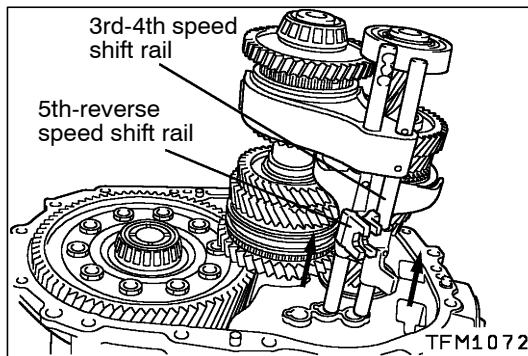
TFM1059

Disassembly steps

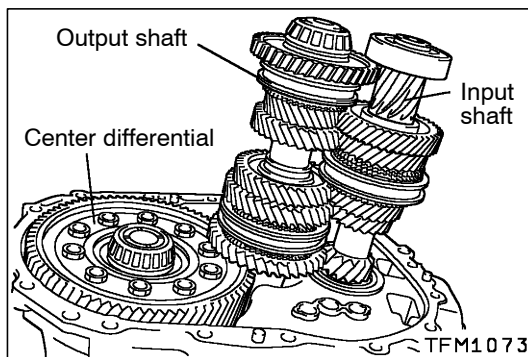
- | | | | |
|-----------|------------------------------|---------------|----------------------------------|
| ▶C◀ | 27. Spring pin | ▶B▶B▶C▶C▶A▶A▶ | 34. 5th-reverse speed shift rail |
| | 28. 1st-2nd speed shift rail | ▶B▶B▶C▶C▶A▶A▶ | 35. 5th-reverse speed shift fork |
| | 29. 1st-2nd speed shift fork | ▶C▶C▶A▶A▶ | 36. Center differential |
| ▶A▶▶B▶▶B▶ | 30. Spring pin | ▶C▶C▶A▶A▶ | 37. Output shaft |
| | 31. Spring pin | | 38. Input shaft |
| | 32. 3rd-4th speed shift rail | | 39. Clutch housing |
| | 33. 3rd-4th speed shift fork | | |

**DISASSEMBLY SERVICE POINTS****◀A▶ SPRING PIN REMOVAL**

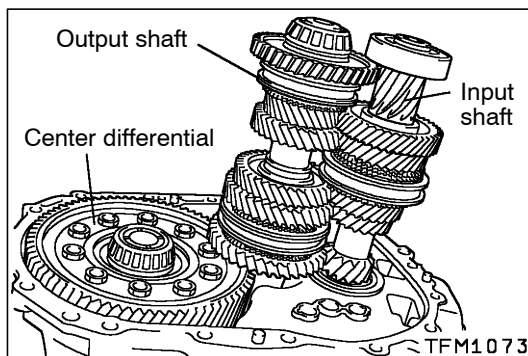
Shift the 5th-reverse speed shift fork in the direction shown in the illustration, and remove the spring pin.

**◀B▶ 3RD-4TH SPEED SHIFT RAIL/3RD-4TH SPEED SHIFT FORK/5TH-REVERSE SPEED SHIFT RAIL/5TH-REVERSE SPEED SHIFT FORK REMOVAL**

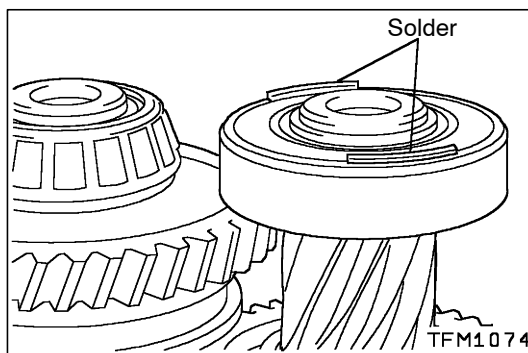
- (1) Move each shift rail in the direction shown in the illustration, and remove from the shift rail hole on the clutch housing.
- (2) Remove each shift rail and shift fork as a set.

**◀C▶ CENTER DIFFERENTIAL/OUTPUT SHAFT/INPUT SHAFT REMOVAL**

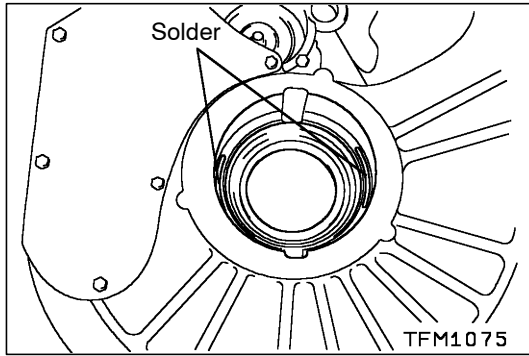
Remove the input shaft, output shaft and center differential from the clutch housing at the same time.

**ADJUSTMENT BEFORE REASSEMBLY****SELECTION OF INPUT SHAFT END PLAY/OUTPUT SHAFT END PLAY/OUTPUT SHAFT PRELOAD AND CENTER DIFFERENTIAL PRELOAD ADJUSTMENT SPACER**

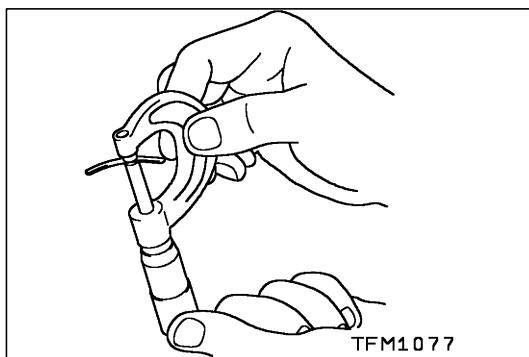
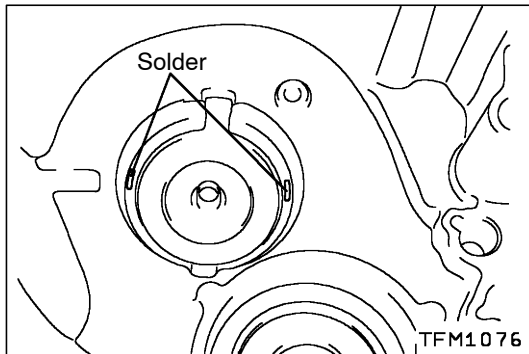
- (1) Install the input shaft, output shaft and center differential onto the clutch housing at the same time.



- (2) Set solder (approx. 10 mm long, 1.6 mm diameter) on the input shaft rear bearing at the position shown in the illustration.



- (3) Set solder (10 mm long, 1.6 mm diameter) on the transmission case at the position shown in the illustration.
- (4) Install the outer race onto the transmission case.
- (5) Install the transmission case, and tighten the bolt with the specified torque.



- (6) If the solder has not been crushed, carry out steps (2) to (5) with solder having a larger diameter.
- (7) Using a micrometer, measure the thickness of the crushed solder, and select a spacer so that the end play and preload are at the standard values.

Standard value:

Input shaft end play

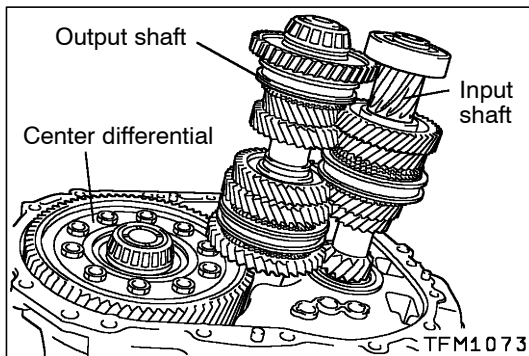
0.05mm loose to 0.17mm loose

Output shaft preload

0.13mm tight to 0.18mm tight

Center differential preload

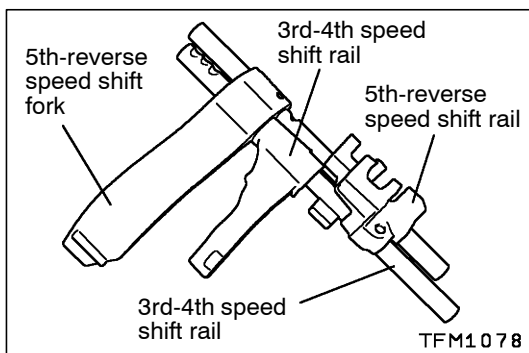
0.05mm tight to 0.11mm tight



REASSEMBLY SERVICE POINTS

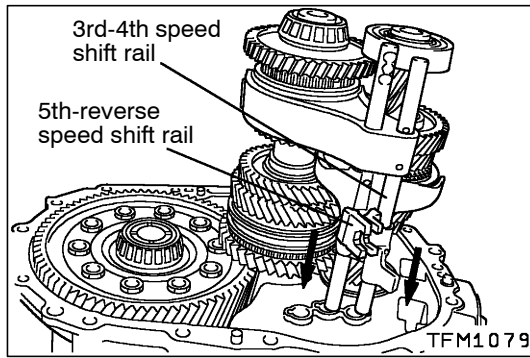
▶A◀ INPUT SHAFT/OUTPUT SHAFT/CENTER DIFFERENTIAL INSTALLATION

Install the input shaft, output shaft and center differential onto the clutch housing at the same time.

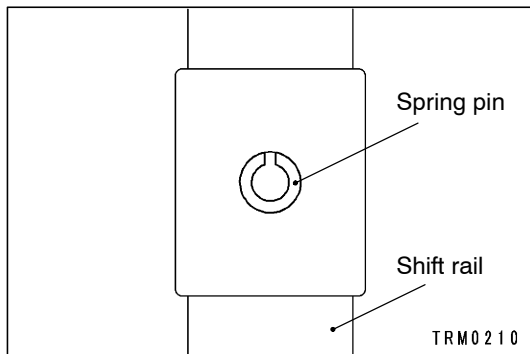


▶B◀ 5TH-REVERSE SPEED SHIFT FORK/5TH-REVERSE SPEED SHIFT RAIL/3RD-4TH SPEED SHIFT FORK/3RD-4TH SPEED SHIFT RAIL INSTALLATION

- (1) Assemble the 3rd-4th speed shift rail, fork and the 5th-reverse speed shift rail and fork.



- (2) Slide each shift rail in the direction shown in the illustration, and then install onto the shift rail hole on the clutch housing.

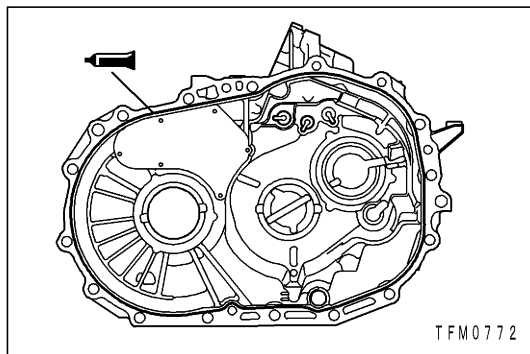


►C◄ SPRING PIN INSTALLATION

Install the spring pin onto the shift rail so that the slit faces the direction shown in the illustration.

►D◄ SPACER INSTALLATION

Install the spacer selected in the section "Adjustment before reassembly".



►E◄ TRANSMISSION CASE INSTALLATION

Apply sealant at the positions of the transmission case shown in the illustration.

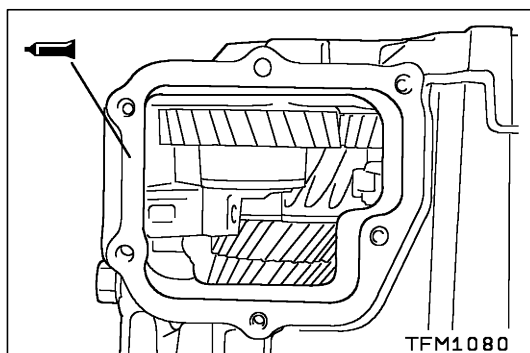
Sealant

Specified sealant:

MITSUBISHI genuine sealant Part No.MD997740 or equivalent

Caution

Evenly squeeze out the agent so that it is not insufficient or excessive.



►F◄ UNDER COVER INSTALLATION

Apply sealant at the positions of the transmission case shown in the illustration.

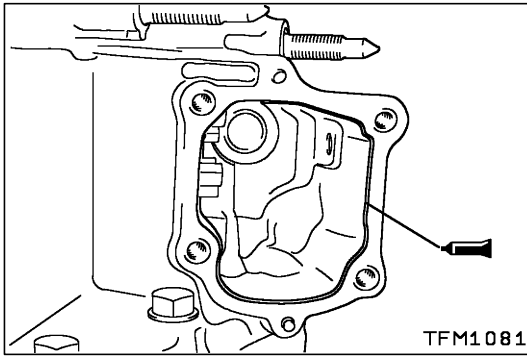
Sealant

Specified sealant:

MITSUBISHI genuine sealant Part No.MD997740 or equivalent

Caution

Evenly squeeze out the agent so that it is not insufficient or excessive.



▶G◀ CONTROL HOUSING INSTALLATION

Apply sealant at the positions of the transmission case shown in the illustration.

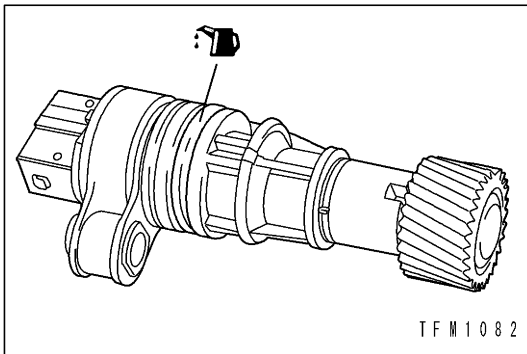
Sealant

Specified sealant:

MITSUBISHI genuine sealant Part No.MD997740 or equivalent

Caution

Evenly squeeze out the agent so that it is not insufficient or excessive.



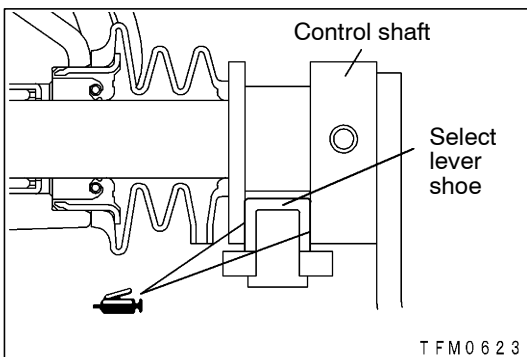
▶H◀ SPEEDOMETER GEAR INSTALLATION

Apply transmission oil on the O-ring for the speedometer gear.

Transmission oil

Specified oil:

MITSUBISHI genuine "DIA-QUEEN" multi gear oil <75W/85W> or equivalent



▶I◀ SELECT LEVER INSTALLATION

Apply grease on the sliding section of the select lever shoe's control shaft.

Grease

Specified grease:

MITSUBISHI genuine grease Part No.0101011 or equivalent

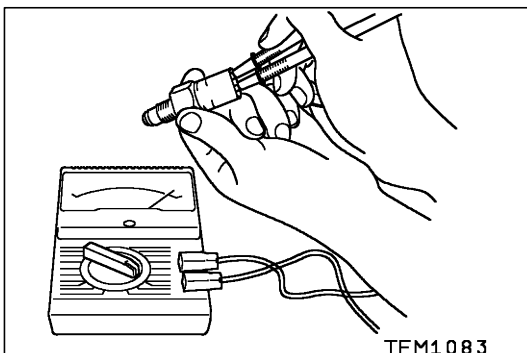
▶J◀ O-RING INSTALLATION

Apply transmission oil on the O-ring.

Transmission oil

Specified oil:

MITSUBISHI genuine "DIA-QUEEN" multi gear oil <75W/85W> or equivalent



INSPECTION

BACKUP LIGHT SWITCH

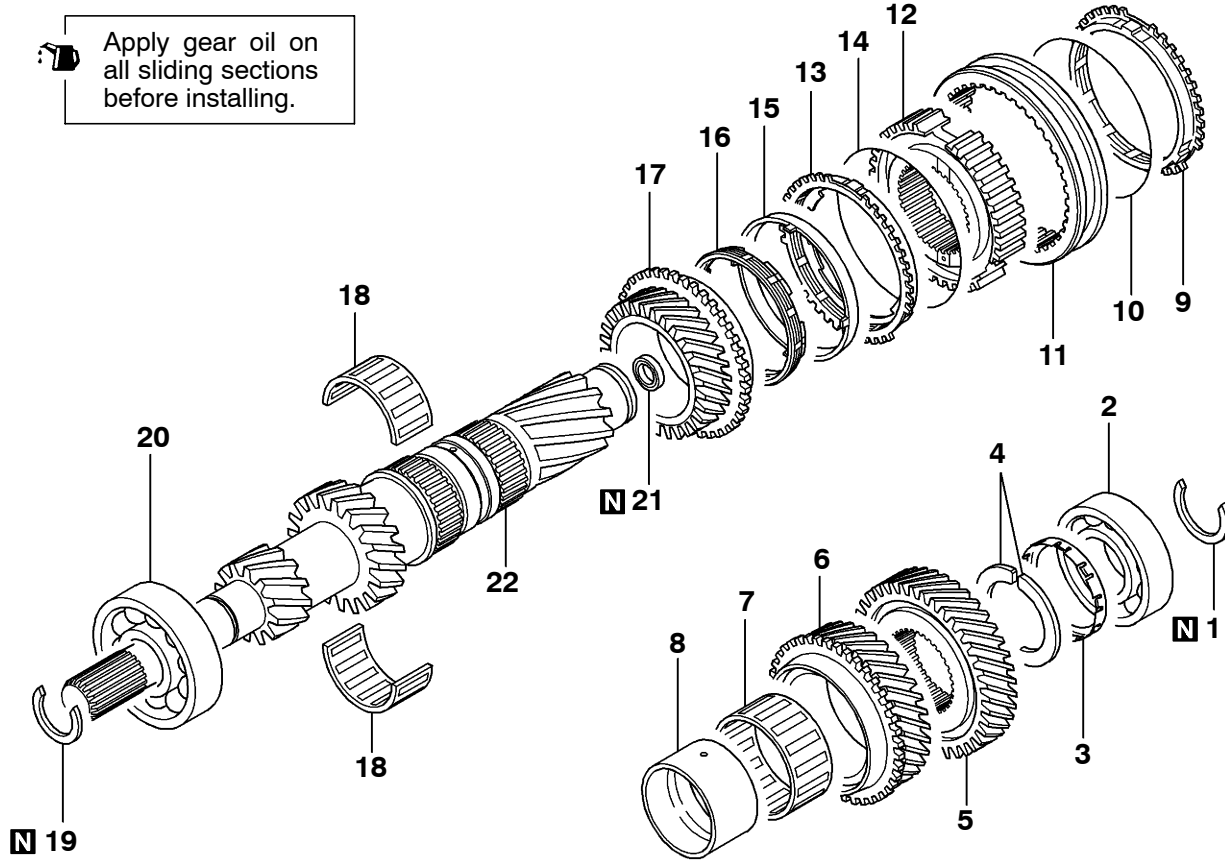
Check the continuity between the terminals.

Items	Continuity
Switch pressed	Continuity not established
Switch released	Continuity established

INPUT SHAFT

DISASSEMBLY AND REASSEMBLY

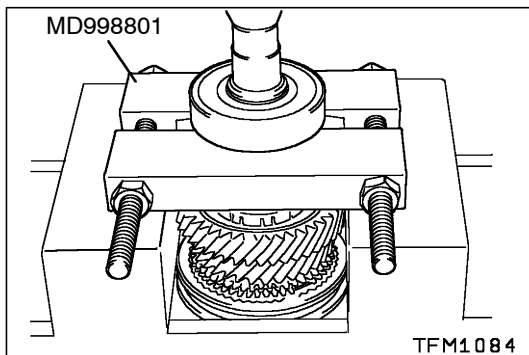
Apply gear oil on all sliding sections before installing.



TFM0716

Disassembly steps

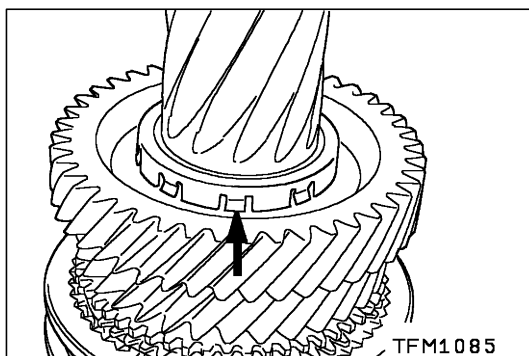
- | | | | | | |
|-----|-----|--------------------------|-----|------------------------------------|------------------|
| ◀A▶ | ▶M▶ | 1. Snap ring | ▶E▶ | 12. 3rd-4th speed synchronizer hub | |
| ◀B▶ | ▶L▶ | 2. Ball bearing | ▶D▶ | 13. Outer synchronizer ring | |
| | ▶K▶ | 3. Thrust plate stopper | | 14. Synchronizer spring | |
| ◀C▶ | ▶J▶ | 4. Thrust plate | | 15. Synchronizer cone | |
| | ▶I▶ | 5. 5th speed gear | | 16. Inner synchronizer ring | |
| ◀D▶ | ▶H▶ | 6. 4th speed gear | | 17. 3rd speed gear | |
| | | 7. Needle roller bearing | | 18. Needle roller bearing | |
| | ▶G▶ | 8. 4th speed gear sleeve | ◀E▶ | ▶C▶ | 19. Snap ring |
| | ▶F▶ | 9. Synchronizer ring | | ▶B▶ | 20. Ball bearing |
| | | 10. Synchronizer spring | | ▶A▶ | 21. Oil seal |
| | | 11. Synchronizer sleeve | | | 22. Input shaft |



DISASSEMBLY SERVICE POINTS

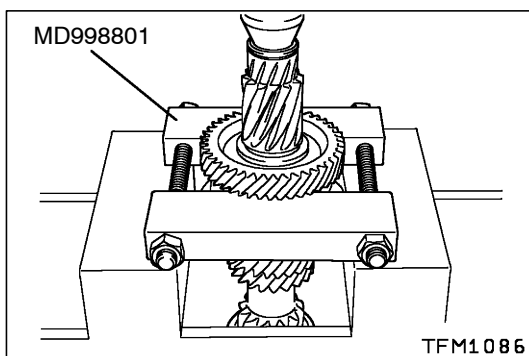
◀A▶ BALL BEARING REMOVAL

Using the special tool, remove the ball bearing from the input shaft.



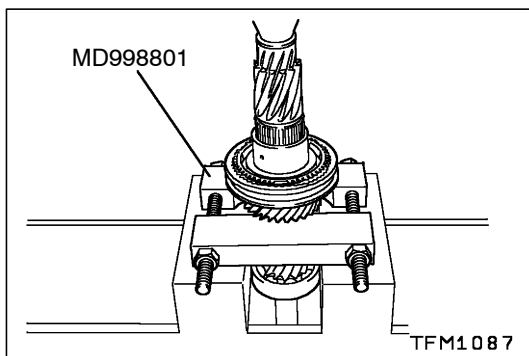
◀B▶ THRUST PLATE STOPPER REMOVAL

Using a screwdriver, lift the stopper at the position shown in the illustration, and remove the thrust plate stopper.



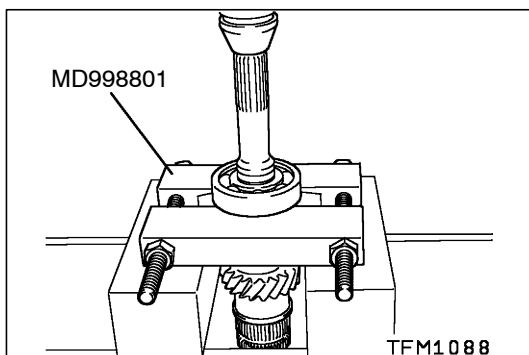
◀C▶ 5TH SPEED GEAR REMOVAL

Using the special tool, remove the 5th speed gear from the input shaft.



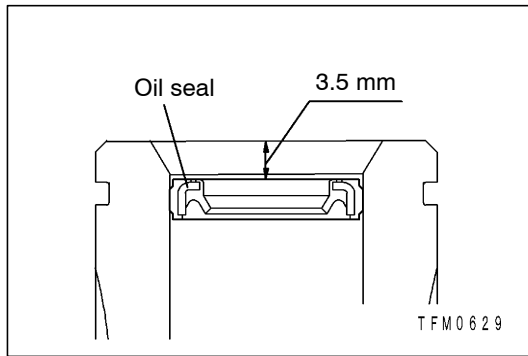
◀D▶ 4TH SPEED GEAR SLEEVE REMOVAL

Install the special tool on the 3rd speed gear, and remove the 4th speed gear sleeve from the input shaft.

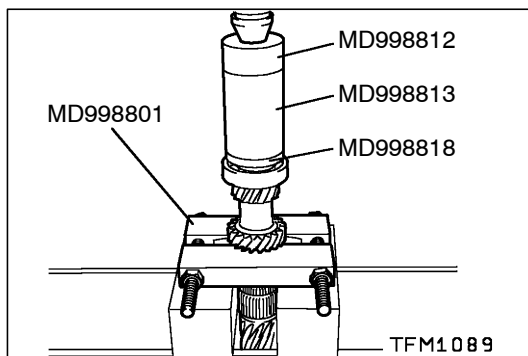


◀E▶ BALL BEARING REMOVAL

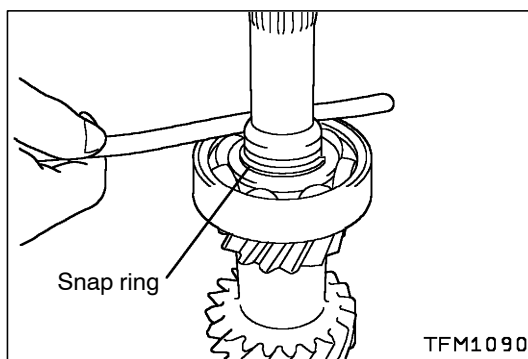
Using the special tool, remove the ball bearing from the input shaft.

**REASSEMBLY SERVICE POINTS****▶A◀ OIL SEAL INSTALLATION**

Accurately tap in the oil seal to the dimensions shown in the illustration.

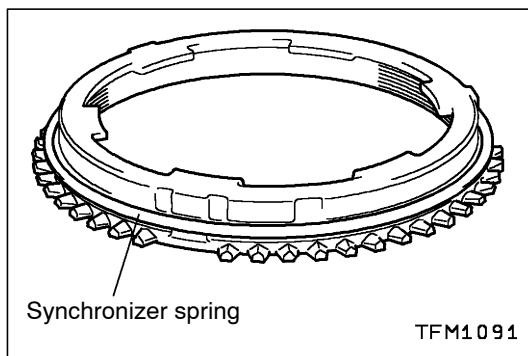
**▶B◀ BALL BEARING INSTALLATION**

Using the special tool, install the ball bearing onto the input shaft.

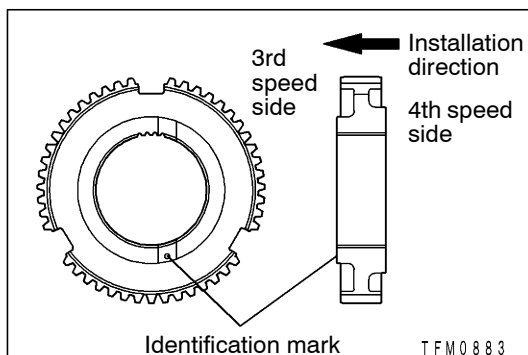
**▶C◀ SNAP RING INSTALLATION**

Select and install the snap ring so that the input shaft front bearing clearance is at the standard value.

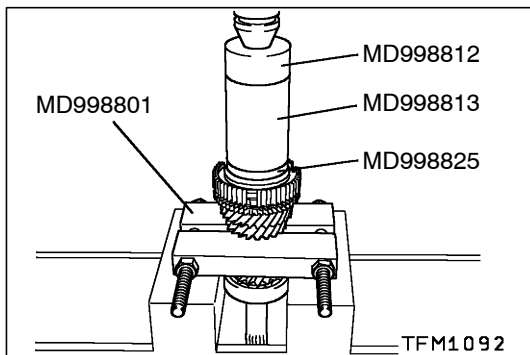
Standard value: 0.01 mm tight to 0.12 mm loose

**▶D◀ SYNCHRONIZER SPRING INSTALLATION**

Accurately install the synchronizer spring onto the position of the synchronizer ring shown in the illustration.

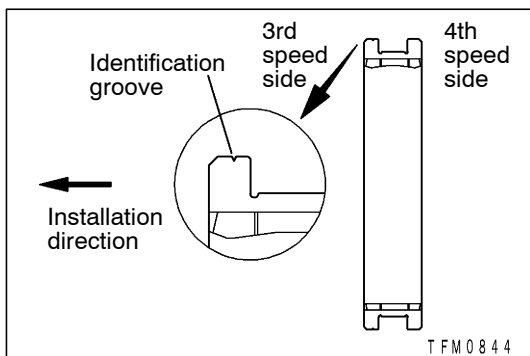
**▶E◀ 3RD-4TH SPEED SYNCHRONIZER HUB INSTALLATION**

Install the 3rd-4th speed synchronizer hub onto the input shaft at the direction shown in the illustration.



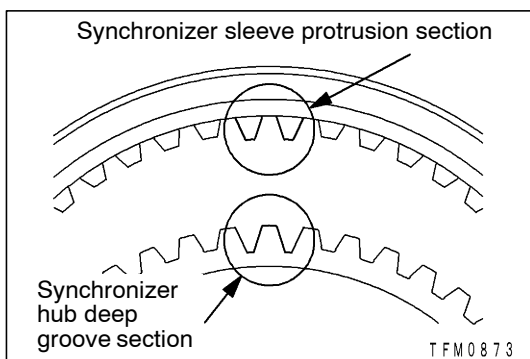
Caution

- (1) Press in so that the synchronizer ring does not bite in.
- (2) After assembling, confirm that the 3rd speed gear rotates smoothly.

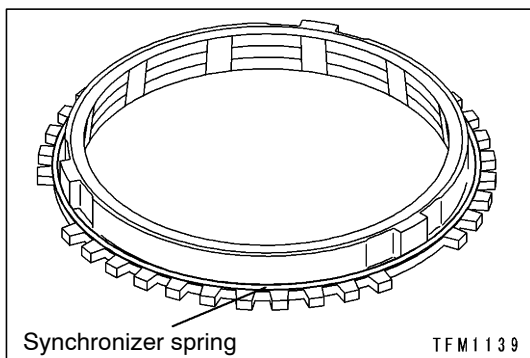


►F◄ SYNCHRONIZER SLEEVE INSTALLATION

- (1) Install the synchronizer sleeve onto the input shaft at the direction shown in the illustration.

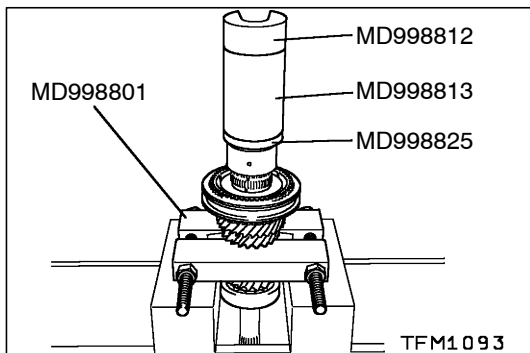


- (2) Align the synchronizer hub deep grooves with the sleeve protrusions and install.



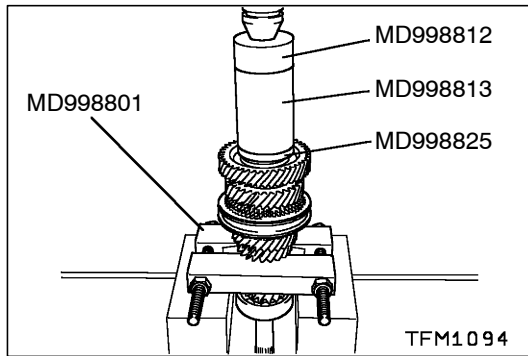
►G◄ SYNCHRONIZER SPRING INSTALLATION

Install the synchronizer spring onto the input shaft.



►H◄ 4TH SPEED GEAR SLEEVE INSTALLATION

Using the special tool, install the 4th speed gear sleeve onto the input shaft.

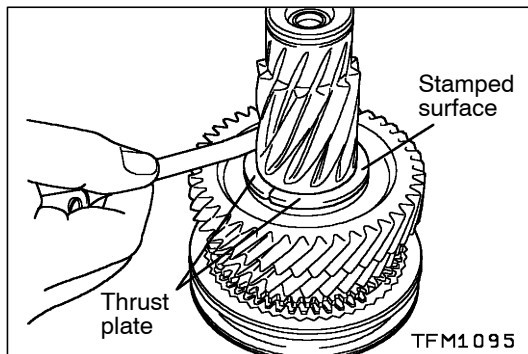


►I◄ 5TH SPEED GEAR INSTALLATION

Using the special tool, install the 5th speed gear onto the input shaft.

Caution

- (1) Press in so that the synchronizer ring does not bite in.
- (2) After assembling, confirm that the 4th speed gear rotates smoothly.



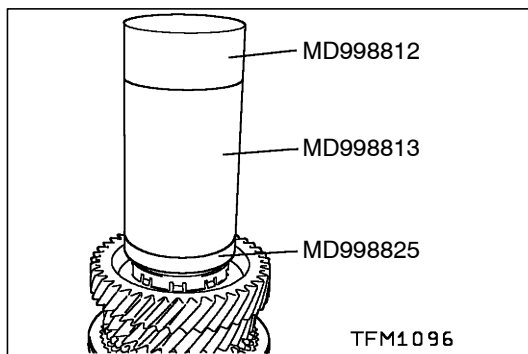
►J◄ THRUST PLATE INSTALLATION

Select and install the thrust plate onto the input shaft so that the input shaft 5th speed gear clearance is at the standard value.

Standard value: 0.01 mm tight to 0.09 mm loose

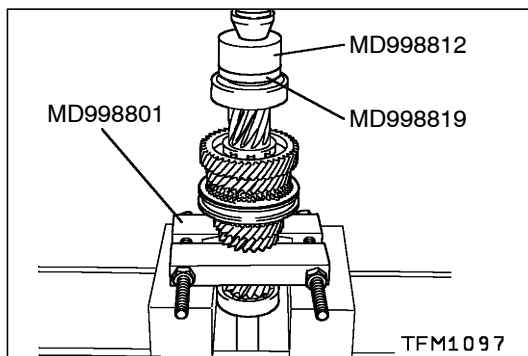
Caution

Assemble the side with the identification stamp facing the thrust plate stopper side.



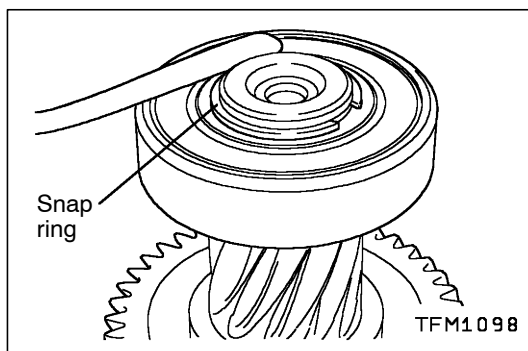
►K◄ THRUST PLATE STOPPER INSTALLATION

Press the special tool by hand, and accurately fit the thrust plate stopper onto the input shaft so that it is not inclined.



►L◄ BALL BEARING INSTALLATION

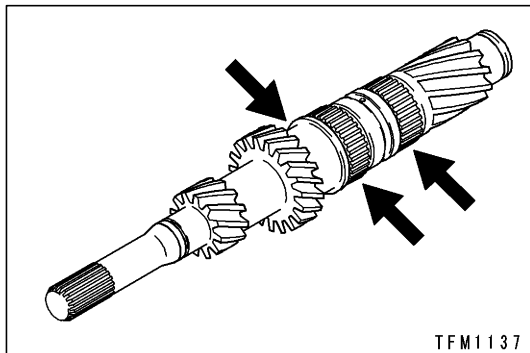
Using the special tool, install the ball bearing onto the input shaft.



►M◄ SNAP RING INSTALLATION

Select and install the snap ring onto the input shaft so that the input shaft rear bearing clearance is at the standard value.

Standard value: 0.01 mm tight to 0.12 mm loose



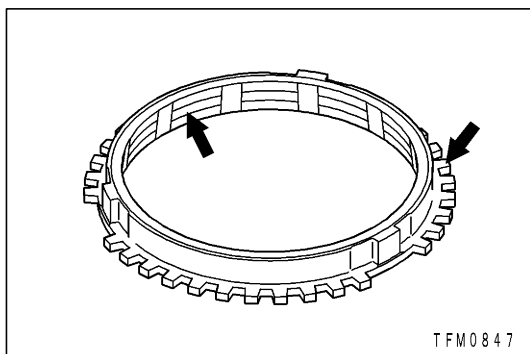
INSPECTION

INPUT SHAFT

- (1) There must be no damage, abnormal wear or seizure on the outer diameter of the needle bearing installation section.
- (2) Check the spline for damage and wear.

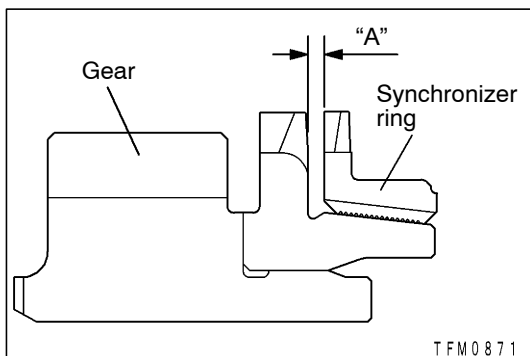
NEEDLE BEARING

- (1) When the needle bearing is assembled with the input shaft and gears and rotated, the needle bearing must rotate smoothly without play or abnormal noise.
- (2) The holder must not be deformed.



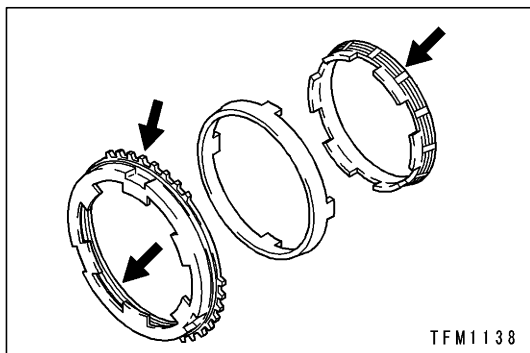
SYNCHRONIZER RING

- (1) The clutch gear teeth must not be damaged or broken.
- (2) The inner diameter of the cone must not be damaged or worn, and the screw threads must not be crushed.



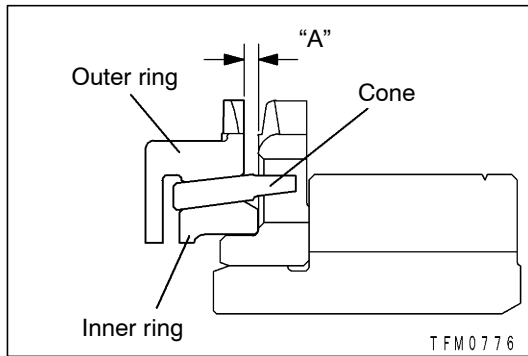
- (3) Press the synchronizer ring against the gears, and check the clearance "A". Replace if "A" is less than the limit value.

Limit value: 0.5 mm



OUTER SYNCHRONIZER RING, INNER SYNCHRONIZER RING AND SYNCHRONIZER CONE

- (1) The gear teeth and cone surface must not be damaged or broken.

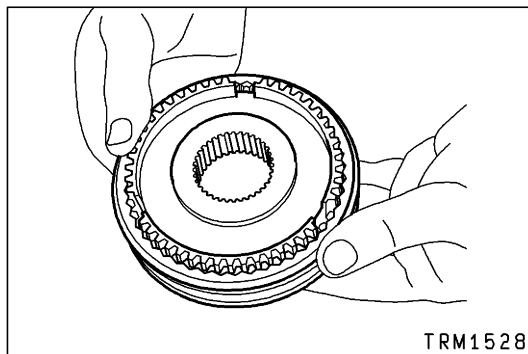


- (2) Assemble the outer ring, inner ring and cone. Press against the gears and check the clearance "A". Replace if "A" is less than the limit value.

Limit value: 0.5 mm

Caution

When replacing, replace the outer ring, inner ring and cone as a set.

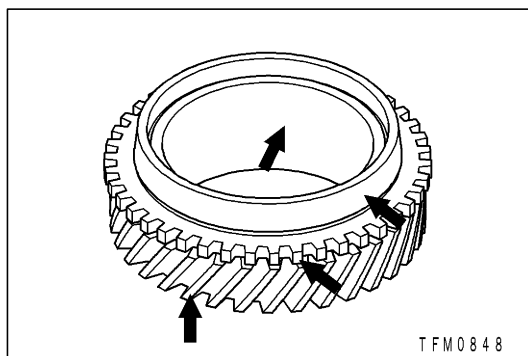


SYNCHRONIZER SLEEVE AND HUB

- (1) When the synchronizer sleeve and hub are assembled and slid, the parts should slide without catching.
- (2) There must be no damage on the front and back ends of the sleeve's inner surface.

SYNCHRONIZER SPRING

The spring must not be weak, deformed or broken.




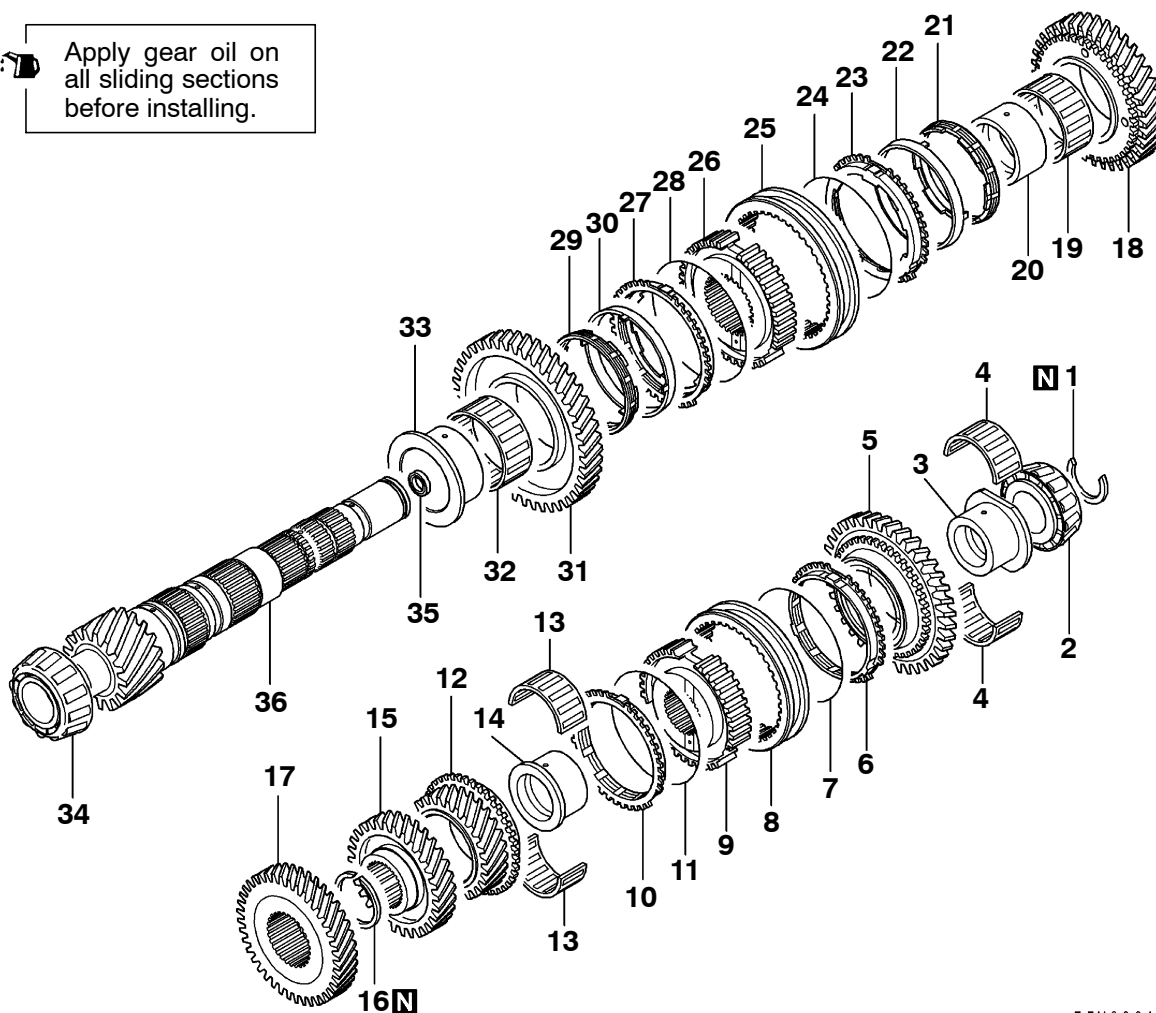
EACH SPEED GEAR

- (1) None of the helical gears or clutch gear teeth must be damaged or worn.
- (2) The synchronizer cone surface must not be rough, damaged or worn.
- (3) The inner diameter and front/back surfaces of the gear must not be damaged or worn.

OUTPUT SHAFT

DISASSEMBLY AND REASSEMBLY

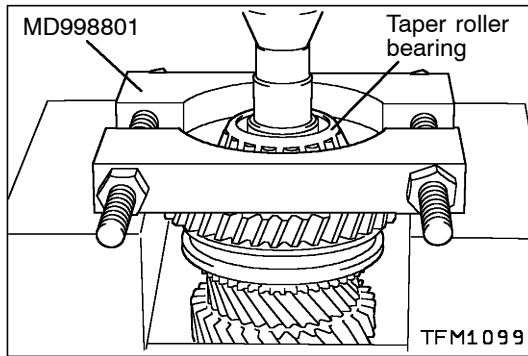
 Apply gear oil on all sliding sections before installing.



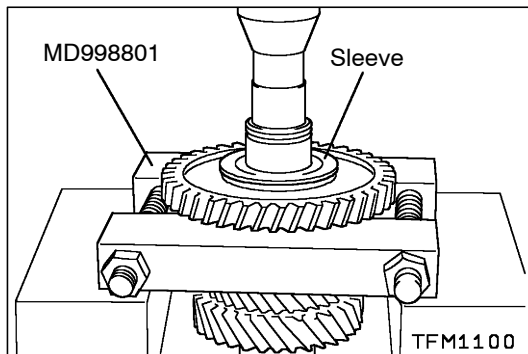
TFM0884

Disassembly steps

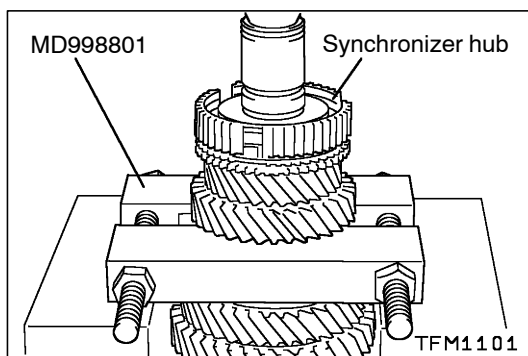
- | | | | | | |
|-----|-----|---------------------------------------|-----|-----|------------------------------------|
| ◀A▶ | ▶P▶ | 1. Snap ring | ◀E▶ | ▶G▶ | 19. Needle roller bearing |
| ◀B▶ | ▶O▶ | 2. Taper roller bearing | | | 20. 2nd speed gear sleeve |
| | ▶N▶ | 3. Reverse gear sleeve | | | 21. Inner synchronizer ring |
| | ▶N▶ | 4. Needle roller bearing | | | 22. Synchronizer cone |
| | ▶N▶ | 5. Reverse gear | | | 23. Outer synchronizer ring |
| | ▶L▶ | 6. Synchronizer ring | | ▶D▶ | 24. Synchronizer spring |
| | ▶F▶ | 7. Synchronizer spring | | ▶F▶ | 25. Synchronizer sleeve |
| ◀C▶ | ▶M▶ | 8. Synchronizer sleeve | | ▶E▶ | 26. 1st-2nd speed synchronizer hub |
| | | 9. 5th-reverse speed synchronizer hub | | ▶D▶ | 27. Outer synchronizer ring |
| | ▶L▶ | 10. Synchronizer ring | | | 28. Synchronizer spring |
| | | 11. Synchronizer spring | | | 29. Inner synchronizer ring |
| | | 12. 5th speed gear | | | 30. Synchronizer cone |
| | ▶K▶ | 13. Needle roller bearing | | | 31. 1st speed gear |
| | ▶J▶ | 14. 5th speed gear sleeve | | ◀F▶ | 32. Needle roller bearing |
| | ▶I▶ | 15. 4th speed gear | ◀G▶ | ▶C▶ | 33. 1st speed gear sleeve |
| ◀D▶ | ▶H▶ | 16. Snap ring | | ▶B▶ | 34. Taper roller bearing |
| | | 17. 3rd speed gear | | ▶A▶ | 35. Oil seal |
| | | 18. 2nd speed gear | | | 36. Output shaft |

**DISASSEMBLY SERVICE POINTS****◀A▶ TAPER ROLLER BEARING REMOVAL**

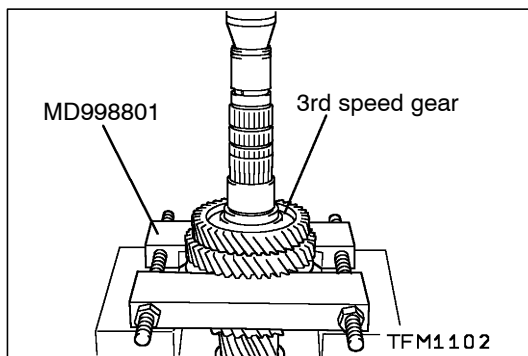
Using the special tool, remove the taper roller bearing from the output shaft.

**◀B▶ REVERSE GEAR BEARING SLEEVE REMOVAL**

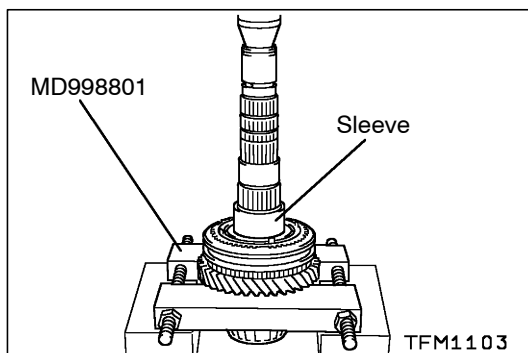
Install the special tool on the reverse gear, and remove the reverse gear bearing sleeve from the output shaft.

**◀C▶ 5TH-REVERSE SPEED SYNCHRONIZER HUB REMOVAL**

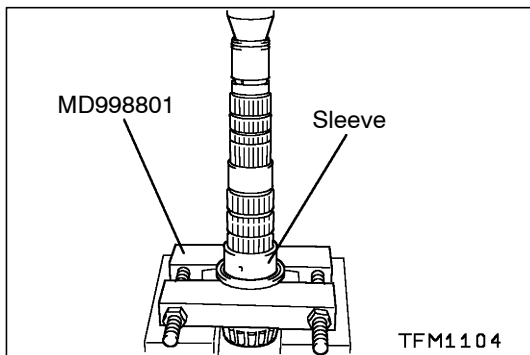
Install the special tool on the 4th speed gear, and remove 5th-reverse synchronizer hub.

**◀D▶ 3RD SPEED GEAR REMOVAL**

Install the special tool on the 2nd speed gear, and remove the 3rd speed gear.

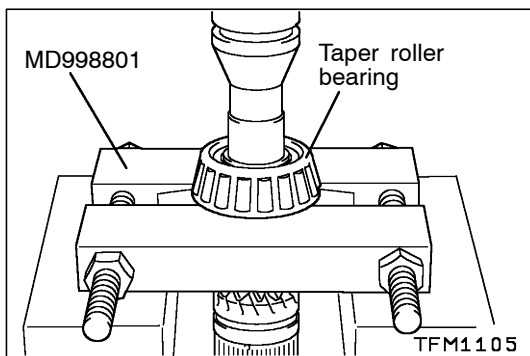
**◀E▶ 2ND SPEED GEAR SLEEVE REMOVAL**

Install the special tool on the 1st speed gear, and remove the 2nd speed gear sleeve.



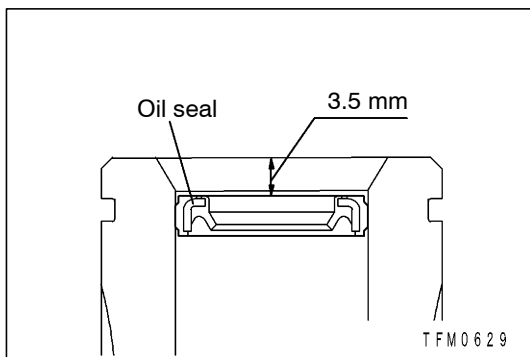
◀F▶ 1ST SPEED GEAR SLEEVE REMOVAL

Using the special tool, remove the 1st speed gear sleeve from the output shaft.



◀G▶ TAPER ROLLER BEARING REMOVAL

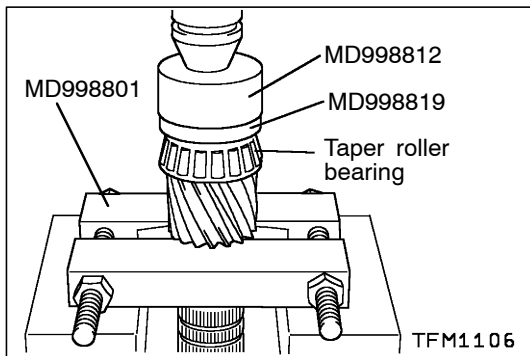
Using the special tool, remove the taper roller bearing from the output shaft.



REASSEMBLY SERVICE POINTS

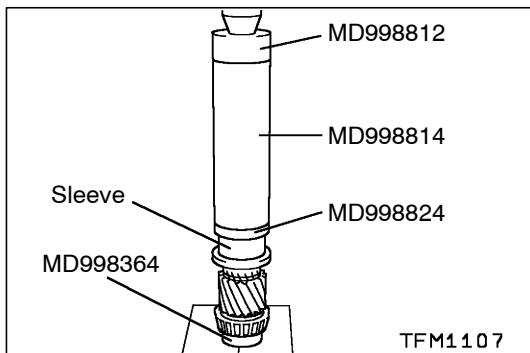
▶A◀ OIL SEAL INSTALLATION

Accurately tap in the oil seal to the dimensions shown in the illustration.



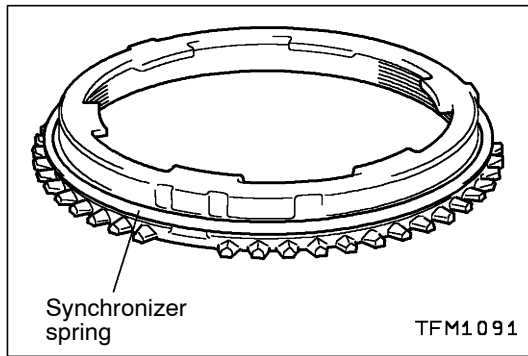
▶B◀ TAPER ROLLER BEARING INSTALLATION

Using the special tool, install the roller bearing onto the output shaft.



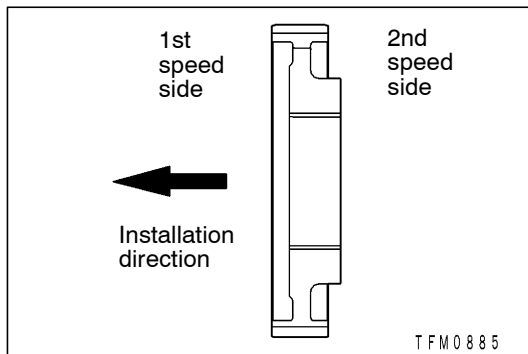
▶C◀ 1ST SPEED GEAR SLEEVE INSTALLATION

Using the special tool, install the 1st speed gear sleeve onto the output shaft.



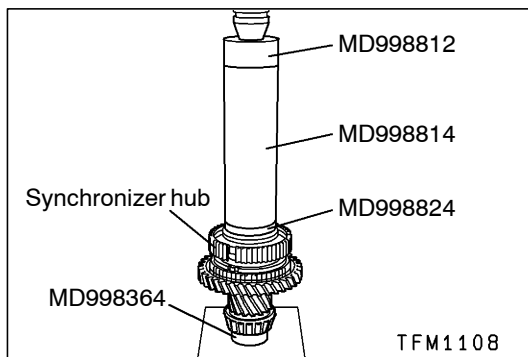
►D◄ SYNCHRONIZER SPRING INSTALLATION

Install the synchronizer spring at the position shown in the illustration.



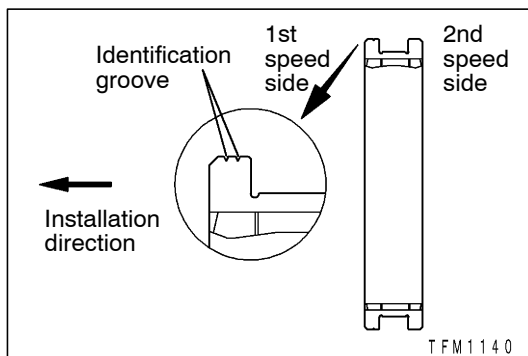
►E◄ 1ST-2ND SPEED SYNCHRONIZER HUB

Using the special tool, install the 1st-2nd speed synchronizer hub onto the output shaft in the direction shown in the illustration.



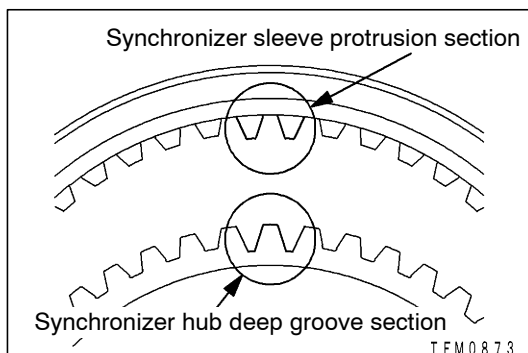
Caution

- (1) Press in so that the synchronizer ring does not bite in.
- (2) After assembling, confirm that the 1st speed gear rotates smoothly.

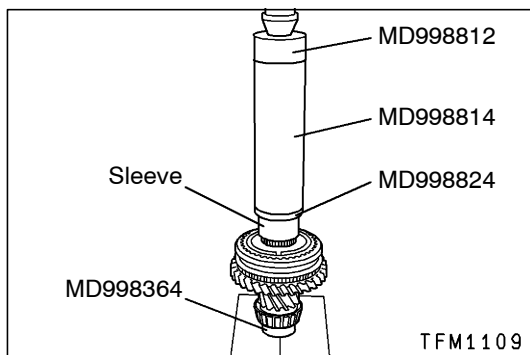


►F◄ SYNCHRONIZER SLEEVE INSTALLATION

- (1) Install the synchronizer sleeve onto the output shaft at the direction shown in the illustration.

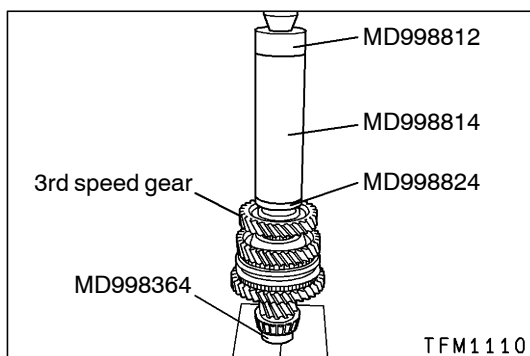


- (2) Align the synchronizer hub deep grooves with the sleeve protrusions and install onto the output shaft.



►G◄ 2ND SPEED GEAR SLEEVE INSTALLATION

Using the special tool, install the 2nd speed gear sleeve onto the output shaft.

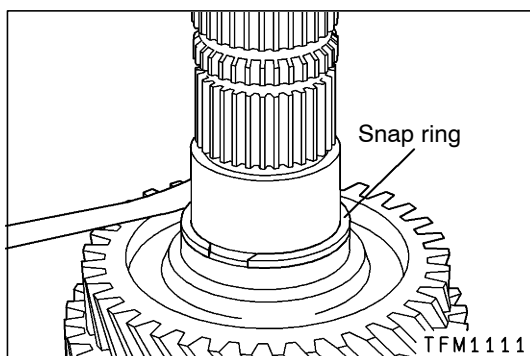


►H◄ 3RD SPEED GEAR INSTALLATION

Using the special tool, install the 3rd speed gear onto the output shaft.

Caution

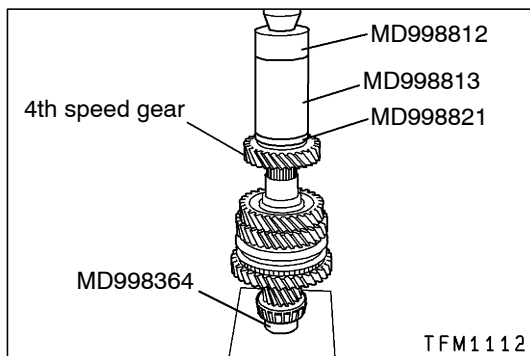
- (1) Press in so that the synchronizer ring does not bite in.
- (2) After assembling, confirm that the 2nd speed gear rotates smoothly.



►I◄ SNAP RING INSTALLATION

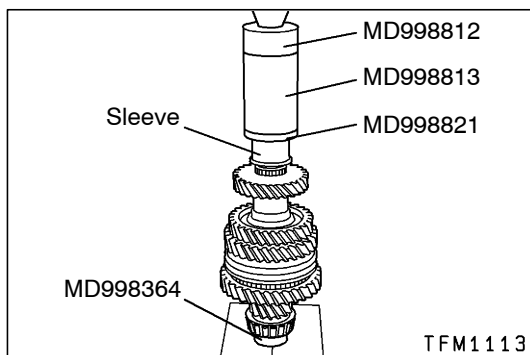
Select and install the snap ring onto the output shaft so that the output shaft 3rd speed gear clearance is at the standard value.

Standard value: 0.01 mm tight to 0.09 mm loose



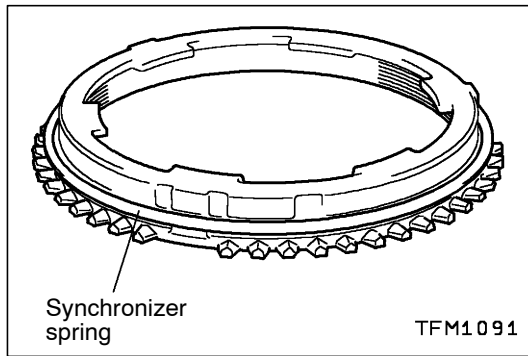
►J◄ 4TH SPEED GEAR INSTALLATION

Using the special tool, install the 4th speed gear onto the output shaft.



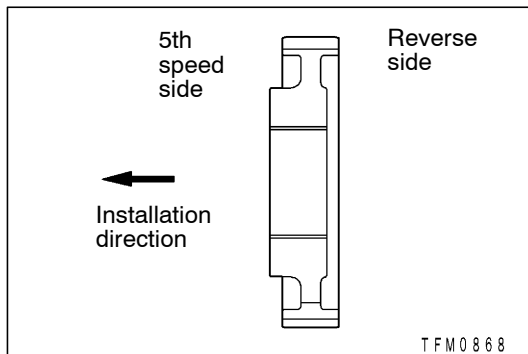
►K◄ 5TH SPEED GEAR SLEEVE INSTALLATION

Using the special tool, install the 5th speed gear sleeve onto the output shaft.



►L◄ SYNCHRONIZER SPRING INSTALLATION

Install the synchronizer spring at the position shown in the illustration.

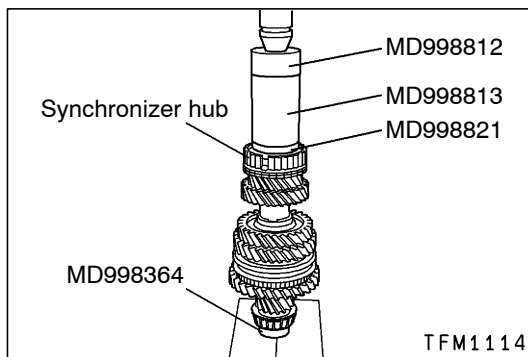


►M◄ 5TH-REVERSE SPEED SYNCHRONIZER HUB INSTALLATION

Using the special tool, install the 5th-reverse synchronizer hub onto the output shaft in the direction shown in the illustration.

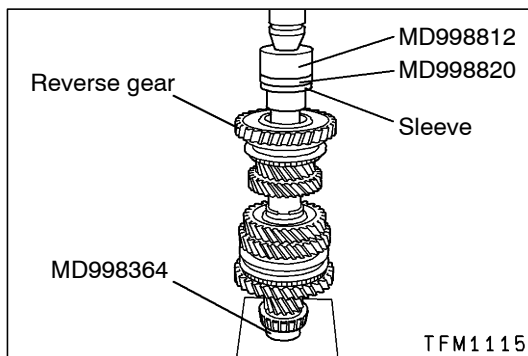
Caution

After assembling, confirm that the 5th speed gear rotates smoothly.



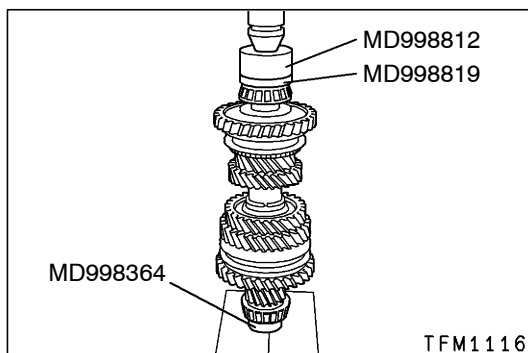
Caution

Press in so that the synchronizer ring does not bite in.



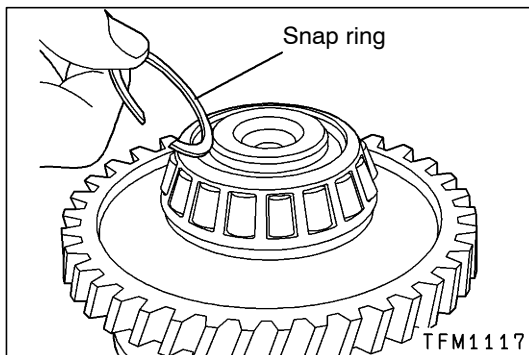
►N◄ REVERSE GEAR/NEEDLE ROLLER BEARING/REVERSE GEAR BEARING SLEEVE INSTALLATION

Using the special tool, install the reverse gear/needle roller bearing/reverse gear bearing sleeve onto the output shaft.



►O◄ TAPER ROLLER BEARING INSTALLATION

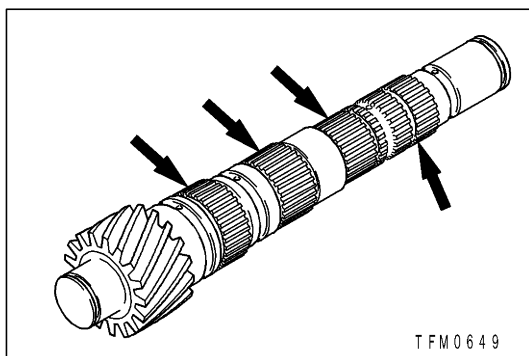
Using the special tool, install the taper roller bearing onto the output shaft.



▶◀ SNAP RING INSTALLATION

Select and install the snap ring onto the output shaft so that the output shaft rear bearing clearance is at the standard value.

Standard value: 0.01 mm tight to 0.09 mm loose



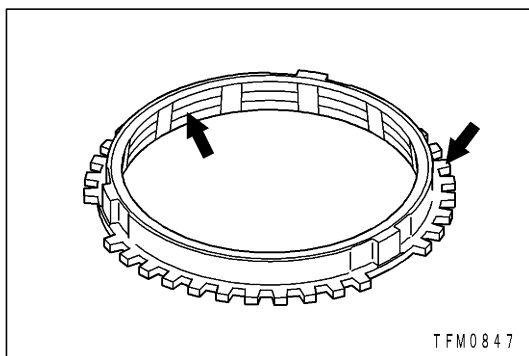
INSPECTION

OUTPUT SHAFT

Check the spline for damage and wear.

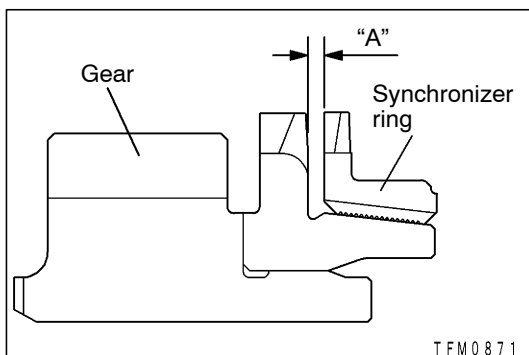
NEEDLE BEARING

- (1) When the needle bearing is assembled with the bearing sleeve and gear and rotated, the needle bearing must rotate smoothly without play or abnormal noise.
- (2) The holder must not be deformed.



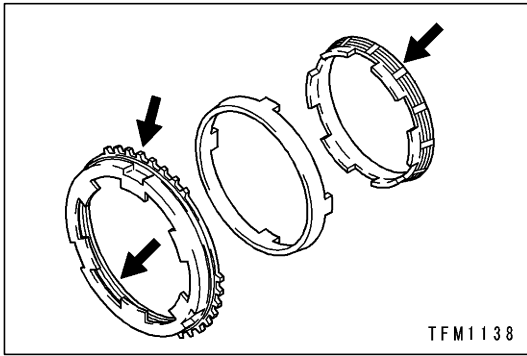
SYNCHRONIZER RING

- (1) The clutch gear teeth must not be damaged or broken.
- (2) The inner diameter of the cone must not be damaged or worn, and the screw threads must not be crushed.



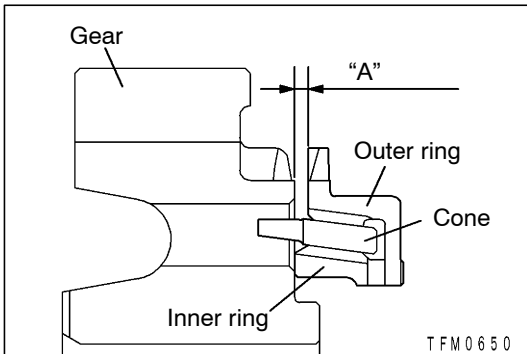
- (3) Press the synchronizer ring against the gears, and check the clearance "A". Replace if "A" is less than the limit value.

Limit value: 0.5 mm



OUTER SYNCHRONIZER RING, INNER SYNCHRONIZER RING AND SYNCHRONIZER CONE

(1) The gear teeth and cone surface must not be damaged or broken.

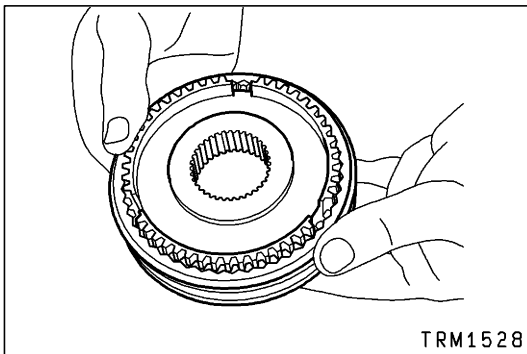


(2) Assemble the outer ring, inner ring and cone. Press against the gears and check the clearance "A". Replace if "A" is less than the limit value.

Limit value: 0.5 mm

Caution

When replacing, replace the outer ring, inner ring and cone as a set.



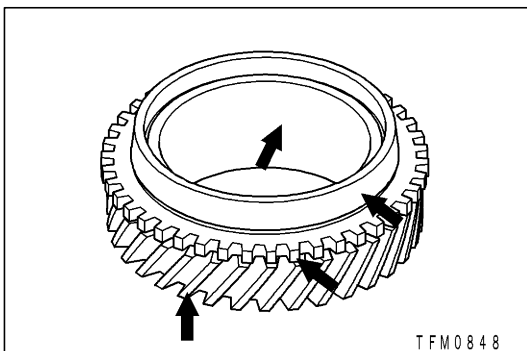
SYNCHRONIZER SLEEVE AND HUB

(1) When the synchronizer sleeve and hub are assembled and slid, the parts should slide without catching.

(2) There must be no damage on the front and back ends of the sleeve's inner surface.

SYNCHRONIZER SPRING

The spring must not be weak, deformed or broken.



EACH SPEED GEAR

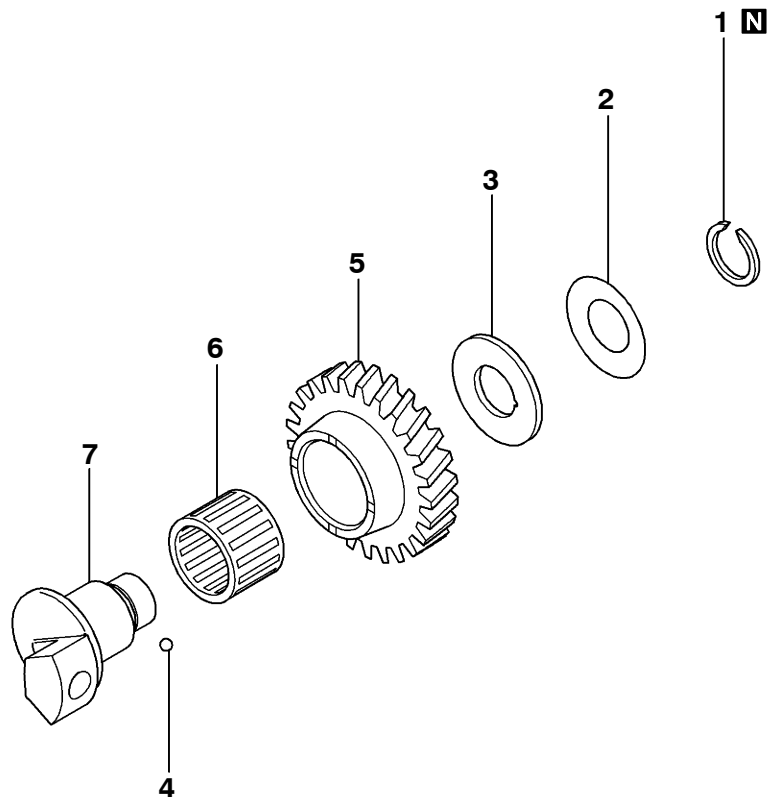
(1) None of the helical gears or clutch gear teeth must be damaged or worn.

(2) The synchronizer cone surface must not be rough, damaged or worn.

(3) The inner diameter and front/back surfaces of the gear must not be damaged or worn.

REVERSE IDLER GEAR**DISASSEMBLY AND REASSEMBLY**

Apply gear oil on all sliding sections before installing.



TFM1033

Disassembly steps

1. Snap ring
2. Cone spring
3. Thrust washer
4. Steel ball


5. Reverse idler gear
6. Needle roller bearing
7. Reverse idler gear shaft

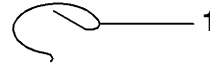
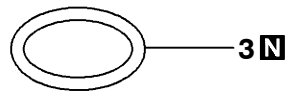
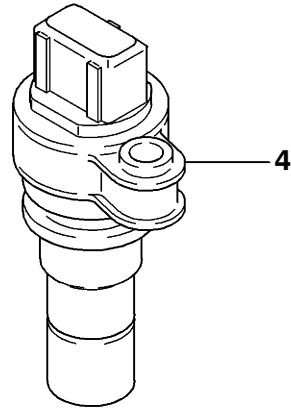
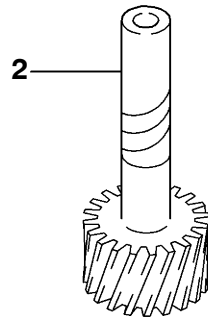
INSPECTION**NEEDLE ROLLER BEARING**

- (1) When the needle bearing is assembled with the shaft and gear and rotated, the needle bearing must rotate smoothly without play or abnormal noise.
- (2) The holder must not be deformed.

SPEEDOMETER GEAR

DISASSEMBLY AND REASSEMBLY

 Apply gear oil on all sliding sections before installing.



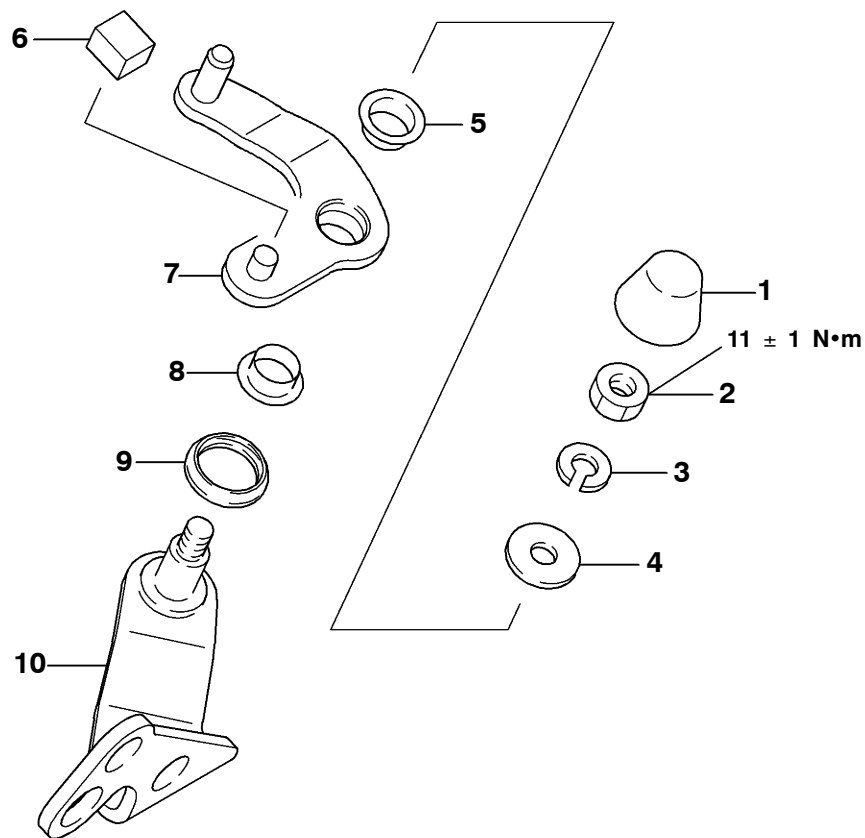
TFM0593

Disassembly steps

1. e-clip
2. Speedometer driven gear
3. O-ring
4. Sleeve

SELECT LEVER

DISASSEMBLY AND REASSEMBLY



TFM0589

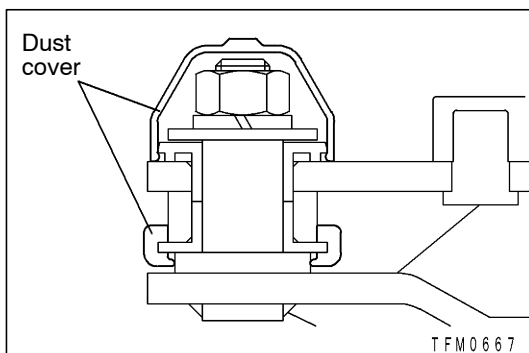
Disassembly steps



1. Dust cover
2. Nut
3. Spring washer
4. Plane washer
5. Select lever bush



6. Select lever shoe
7. Select lever
8. Select lever bush
9. Dust cover
10. Select lever shaft



TFM0667

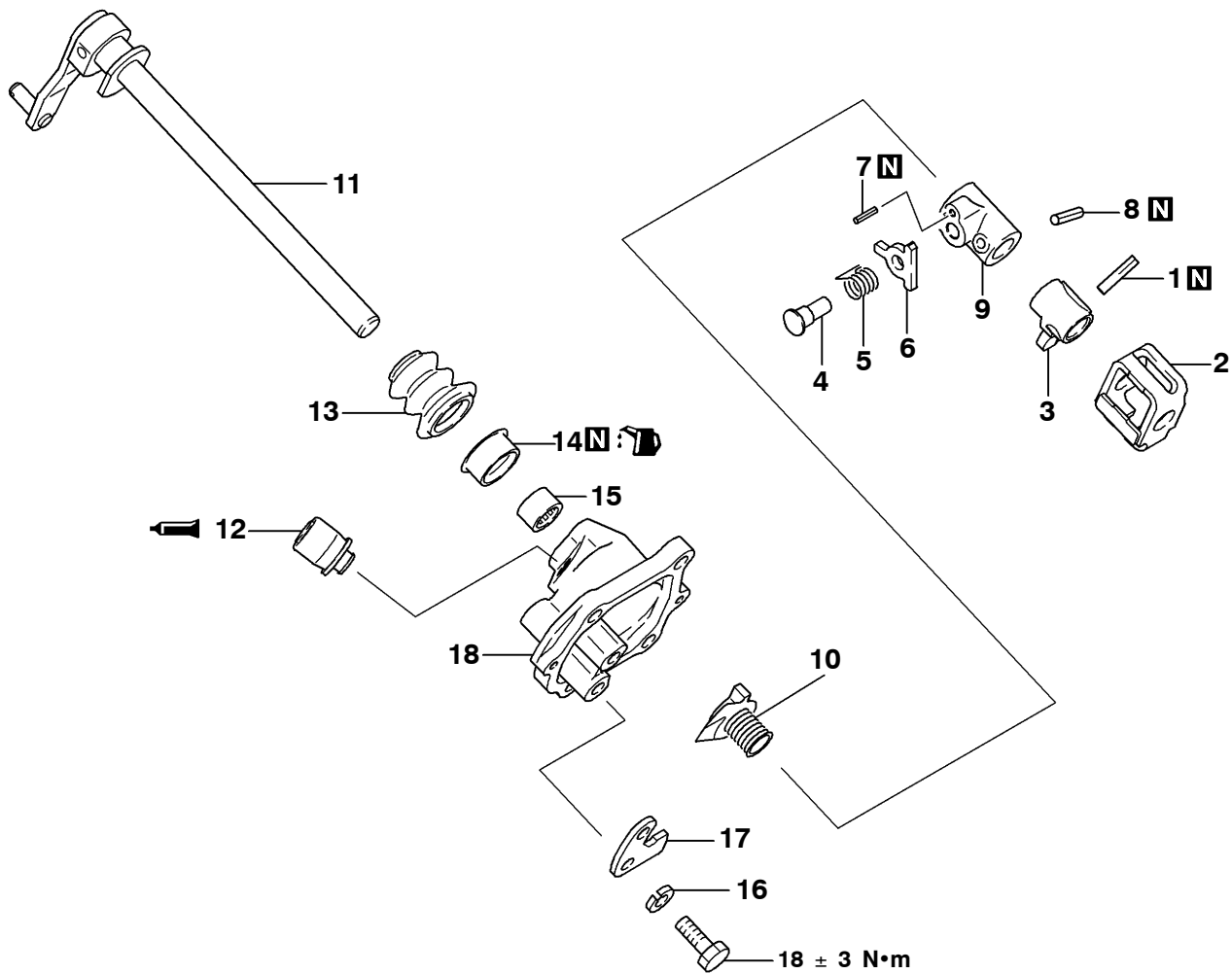
REASSEMBLY SERVICE POINT

▶A◀ DUST COVER INSTALLATION

Install the dust cover onto the select lever.

CONTROL HOUSING

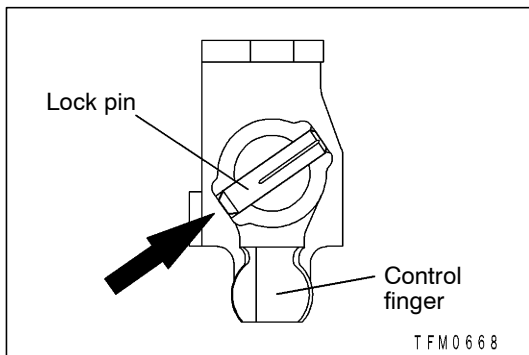
DISASSEMBLY AND REASSEMBLY



TFM1143

Disassembly steps

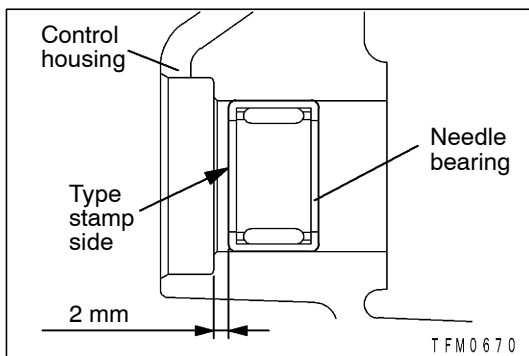
- | | | |
|--------------------------------------|---|---|
| <p>◀A▶ ▶F▶</p> <p>▶E▶</p> <p>▶D▶</p> | <ol style="list-style-type: none"> 1. Lock pin 2. Interlock plate 3. Control finger 4. Pin 5. Return spring 6. Stopper plate 7. Spring pin 8. Spring pin 9. Stopper body | <ol style="list-style-type: none"> 10. Neutral return spring 11. Control shaft <p>▶C▶</p> <p>▶B▶</p> <p>▶A▶</p> <ol style="list-style-type: none"> 12. Air breather 13. Control shaft boot 14. Oil seal 15. Needle bearing 16. Spring washer 17. Stopper bracket 18. Control housing |
|--------------------------------------|---|---|



DISASSEMBLY SERVICE POINT

◀A▶ LOCK PIN REMOVAL

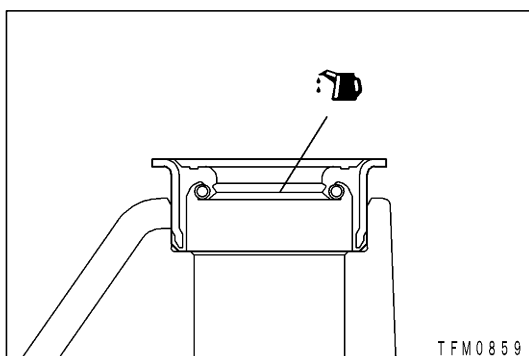
Tap out the lock pin from the direction shown in the illustration.



REASSEMBLY SERVICE POINTS

▶A◀ NEEDLE BEARING INSTALLATION

Press the needle bearing into the dimensions shown in the illustration so that the type stamp side faces the indicated direction.



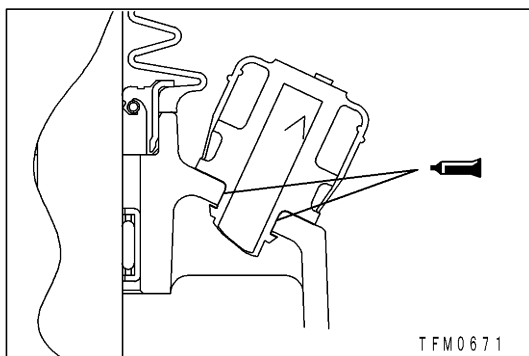
▶B◀ OIL SEAL INSTALLATION

Apply transmission oil on the oil seal lip section.

Transmission oil

Specified oil:

MITSUBISHI genuine "DIA-QUEEN" multi gear oil <75W/85W> or equivalent



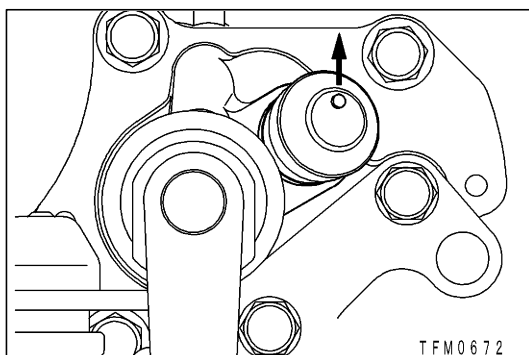
▶C◀ AIR BREATHER INSTALLATION

(1) Apply sealant on the periphery of the insertion section.

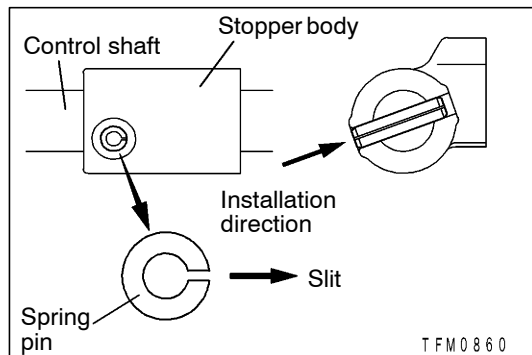
Sealant

Specified sealant:

3M SUPER WEATHERSTRIP No.8001 or equivalent

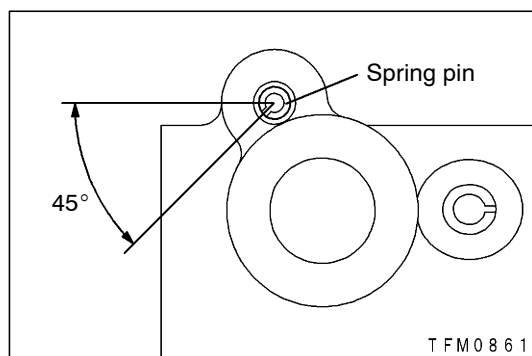


(2) Install so that the protrusion faces the direction shown in the illustration.



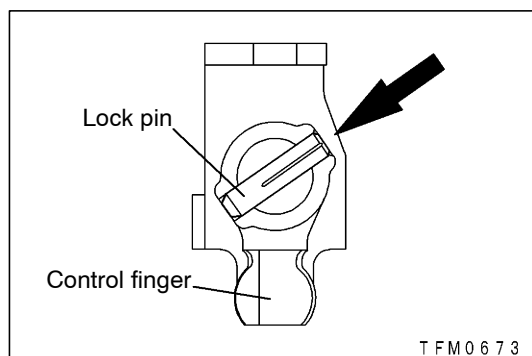
►D◄ SPRING PIN INSTALLATION

Install the spring pin onto the stopper body from the direction shown in the illustration.



►E◄ SPRING PIN INSTALLATION

Install the spring pin onto the stopper body.

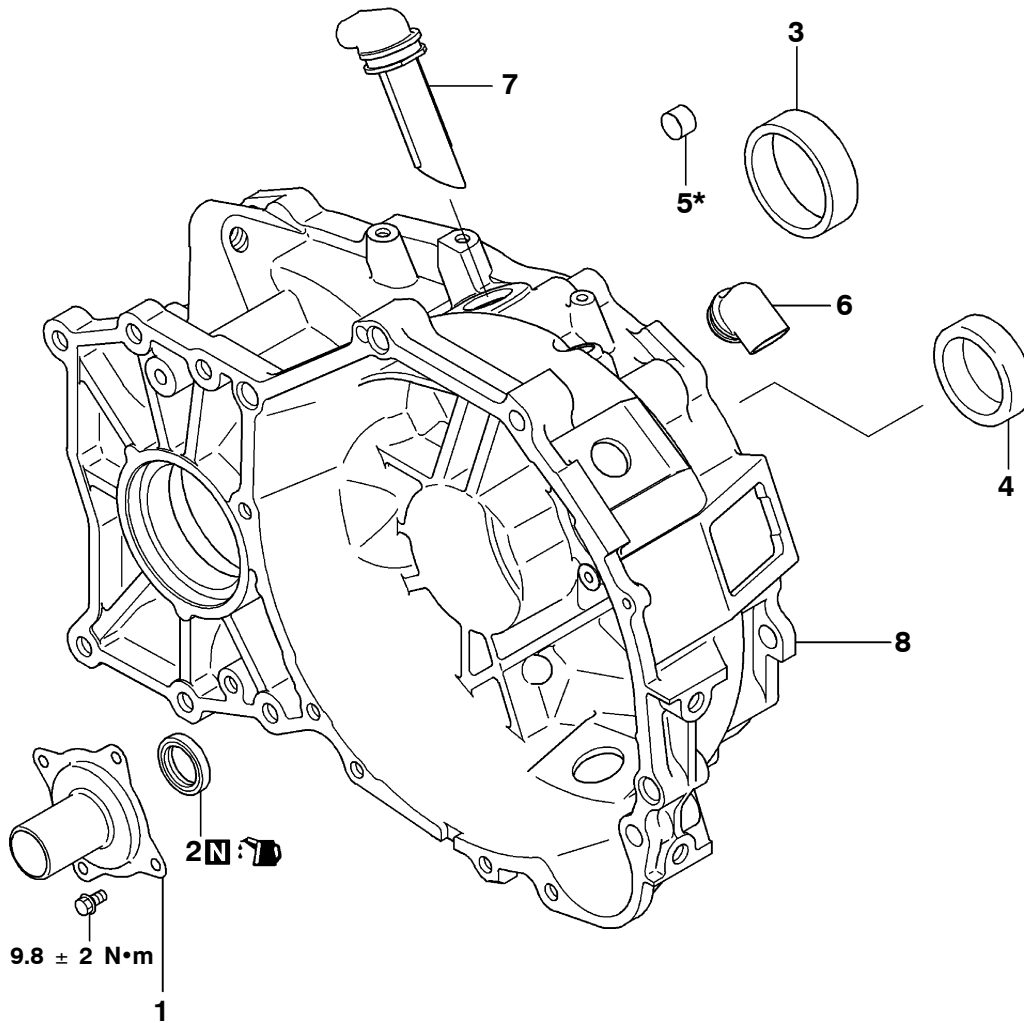


►F◄ LOCK PIN INSTALLATION

Tap the lock pin into the control finger from the direction shown in the illustration.

CLUTCH HOUSING

DISASSEMBLY AND REASSEMBLY



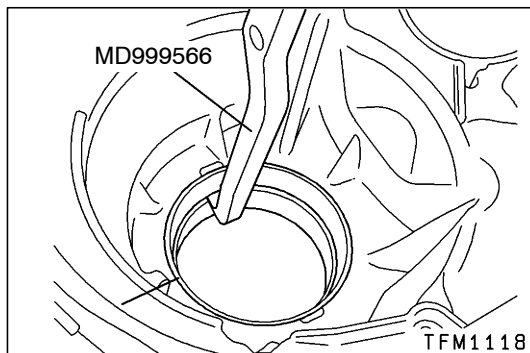
TFM1136

Disassembly steps

- | | | | | |
|---|--|---|--|---|
| <p> ◀A▶
 ▶B▶ </p> | <p> ▶E▶
 ▶D▶
 ▶C▶ </p> | <ol style="list-style-type: none"> 1. Clutch release bearing retainer 2. Oil seal 3. Outer race 4. Outer race | <p> ▶B▶
 ▶A▶
 ▶A▶ </p> | <ol style="list-style-type: none"> 5. Bush* 6. Cover A 7. Cover B 8. Clutch housing |
|---|--|---|--|---|

NOTE

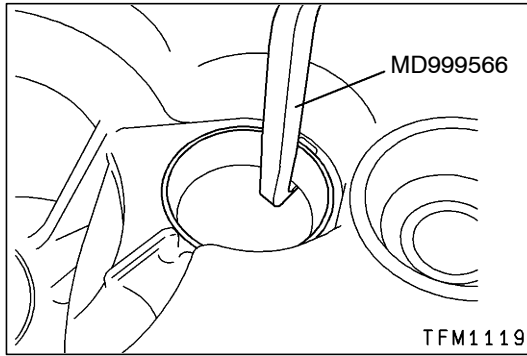
*: Refer to the installation procedures only when replacing the clutch housing.



DISASSEMBLY SERVICE POINTS

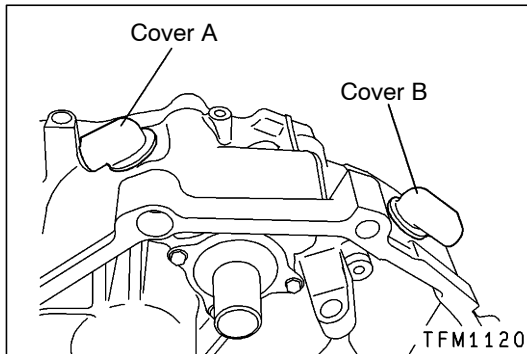
◀A▶ OUTER RACE REMOVAL

Using the special tool, remove the outer race from the clutch housing.



◀B▶ OUTER RACE REMOVAL

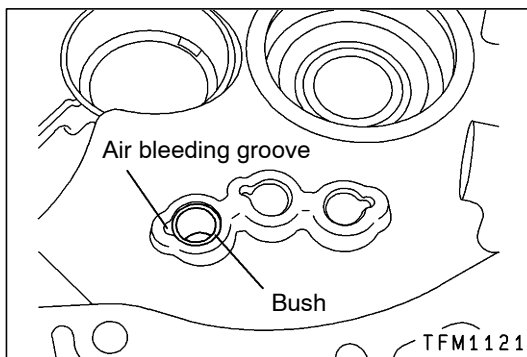
Using the special tool, remove the outer race from the clutch housing.



REASSEMBLY SERVICE POINTS

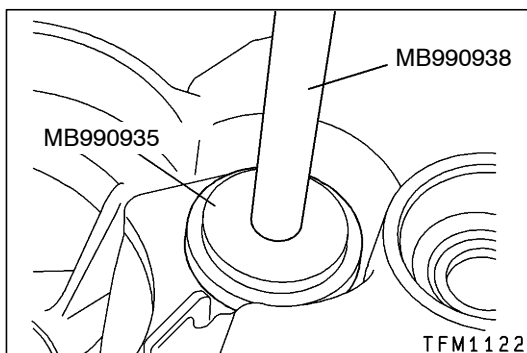
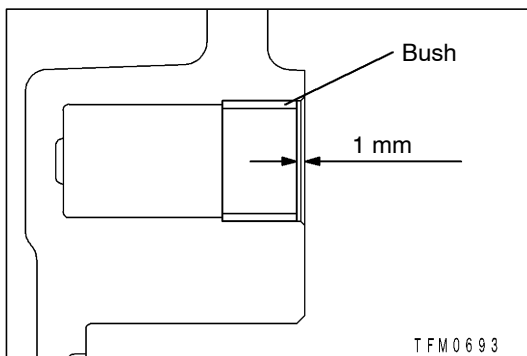
▶A◀ COVER A/COVER B INSTALLATION

Install each cover onto the clutch housing in the direction shown in the illustration.



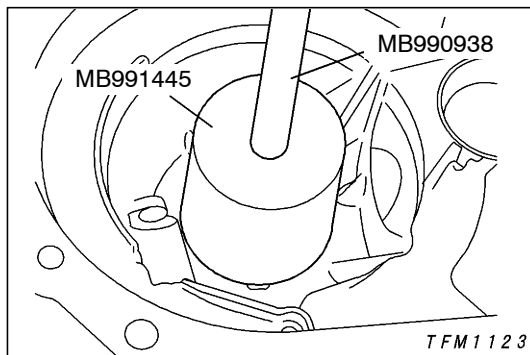
▶B◀ BUSH INSTALLATION

Press the bush into the clutch housing to the position shown in the illustration. Make sure that the split face of the bush does not cover the air bleeding groove on the housing.



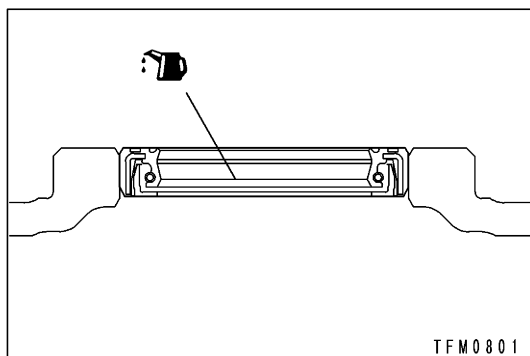
▶C◀ OUTER RACE INSTALLATION

Using the special tool, install the outer race onto the clutch housing.



▶D◀ OUTER RACE INSTALLATION

Using the special tool, install the outer race onto the clutch housing.



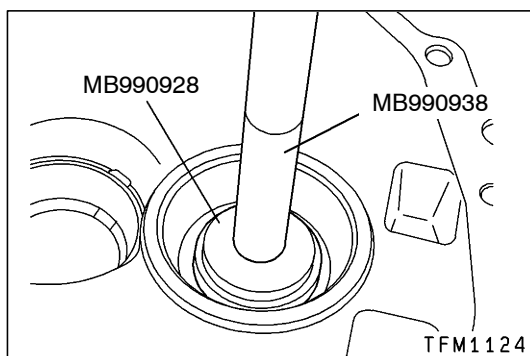
▶E◀ OIL SEAL INSTALLATION

(1) Apply transmission oil on the oil seal lip section.

Transmission oil

Specified oil:

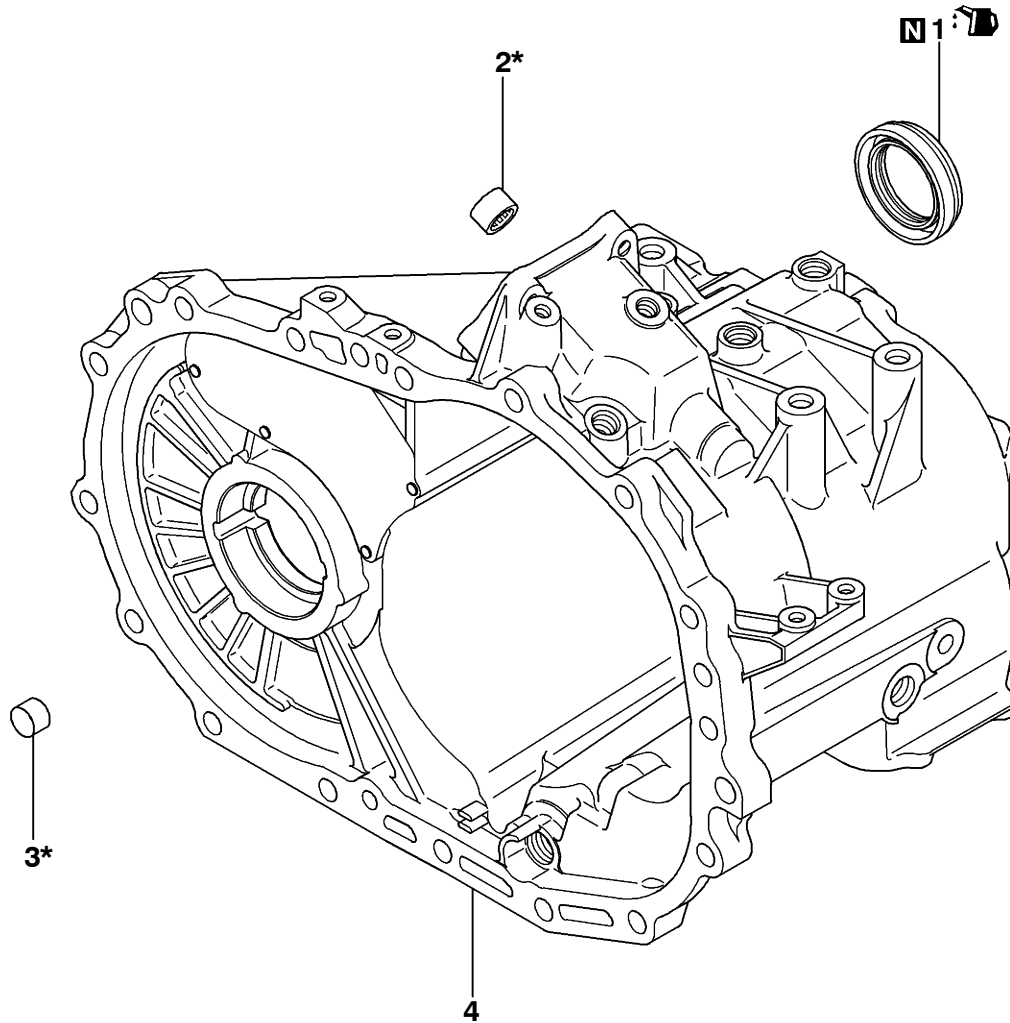
MITSUBISHI genuine "DIA-QUEEN" multi gear oil <75W/85W> or equivalent



(2) Using the special tool, install the oil seal onto the clutch housing.

TRANSMISSION CASE

DISASSEMBLY AND REASSEMBLY



TFM0817

Disassembly steps



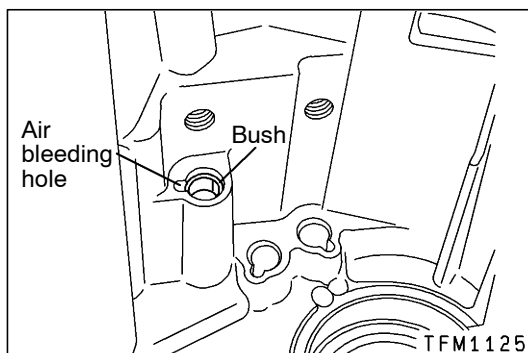
- 1. Oil seal
- 2. Needle bearing*



- 3. Bush*
- 4. Transmission case

NOTE

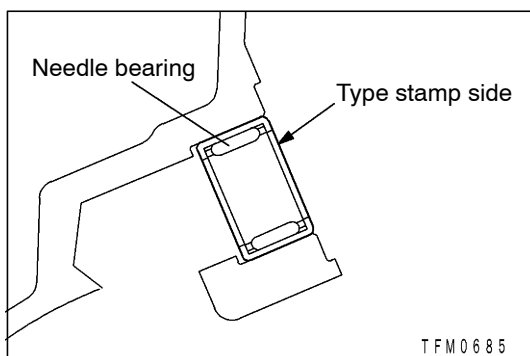
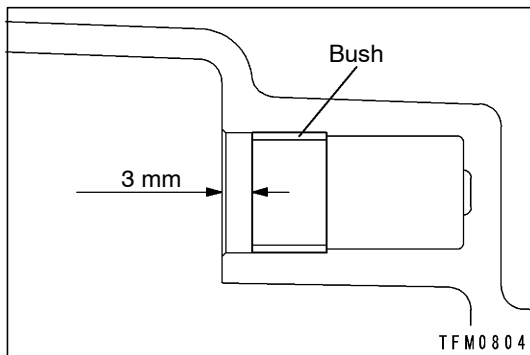
*: Refer to the installation procedures only when replacing the transmission case.



REASSEMBLY SERVICE POINTS

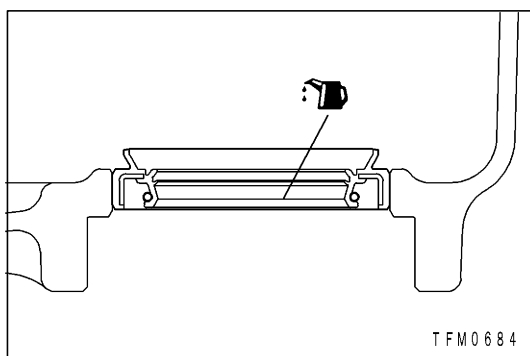
►A◄ BUSH INSTALLATION

Press in the bush to the position shown in the illustration so that the split face of the bush does not cover the air bleeding groove on the case.



►B◄ NEEDLE BEARING INSTALLATION

Press in to the flush with the type stamp side facing the direction shown in the illustration.



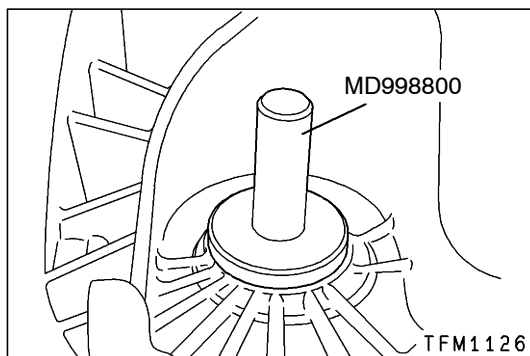
►C◄ OIL SEAL INSTALLATION

(1) Apply transmission oil on the oil seal lip section.

Transmission oil

Specified oil:

MITSUBISHI genuine "DIA-QUEEN" multi gear oil <75W/85W> or equivalent

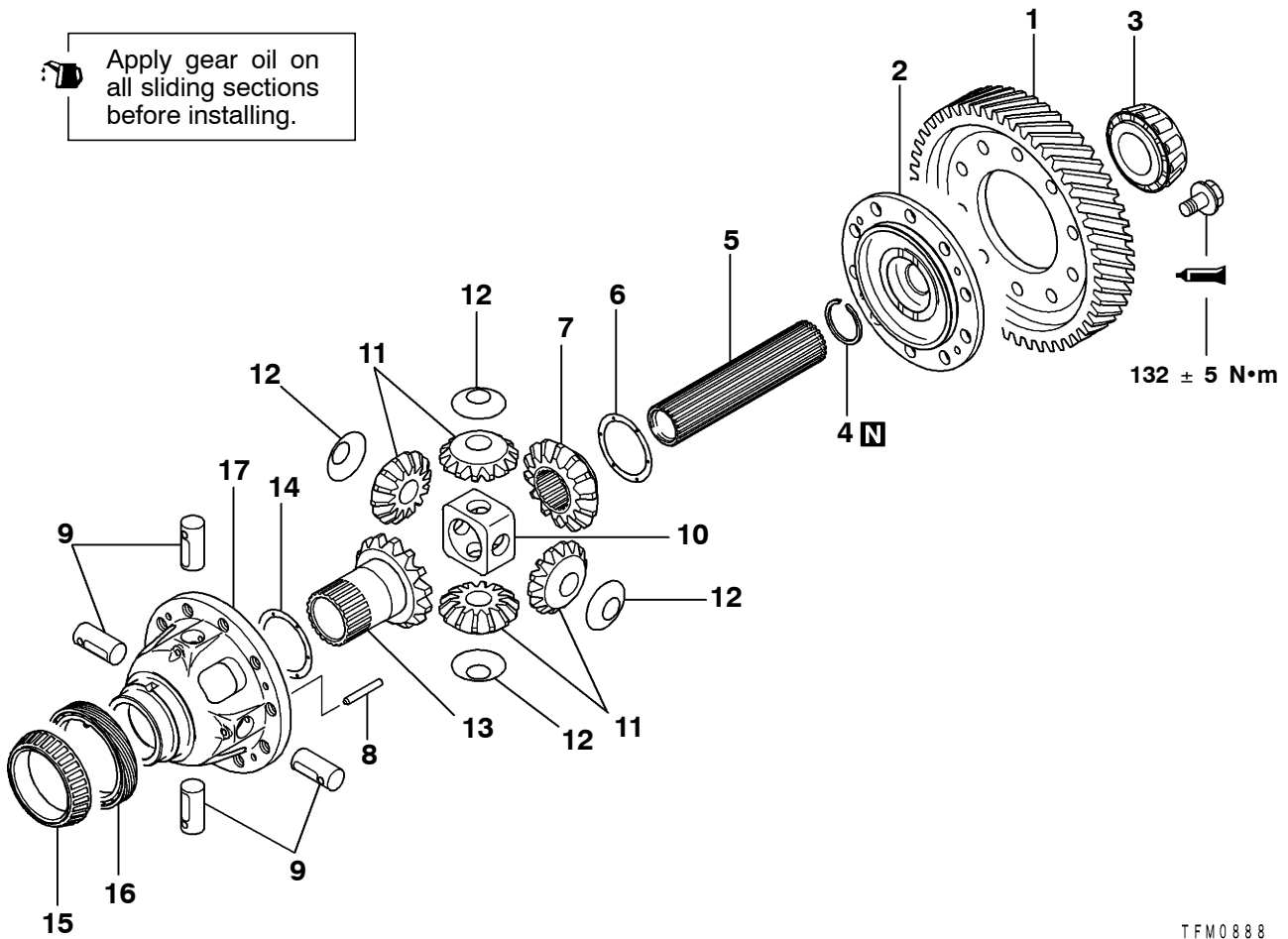


(2) Using the special tool, install the oil seal onto the transmission case.

CENTER DIFFERENTIAL

DISASSEMBLY AND REASSEMBLY

Apply gear oil on all sliding sections before installing.

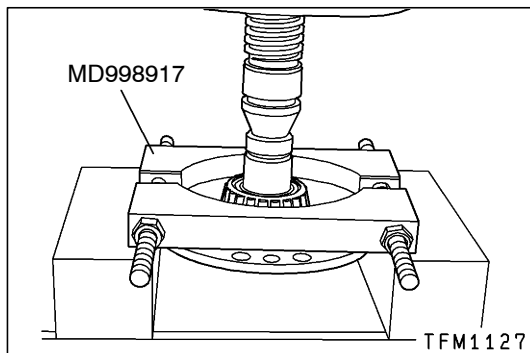


TFM0888

Disassembly steps

- ◀A▶ D 1. Center differential drive gear
- ▶C▶ C 2. Center differential flange
- ▶B▶ B 3. Taper roller bearing
- ▶C▶ C 4. Snap ring
- ▶C▶ C 5. Front output shaft
- ▶C▶ C 6. Spacer
- ▶C▶ C 7. Side gear
- ▶C▶ C 8. Lock pin
- ▶C▶ C 9. Pinion shaft

- ▶C▶ C 10. Pinion shaft holder
- ▶C▶ C 11. Pinion
- ▶C▶ C 12. Washer
- ▶C▶ C 13. Side gear
- ▶C▶ C 14. Spacer
- ▶B▶ ▶A▶ 15. Taper roller bearing
- ▶A▶ 16. Speedometer drive gear
- ▶A▶ 17. Differential case

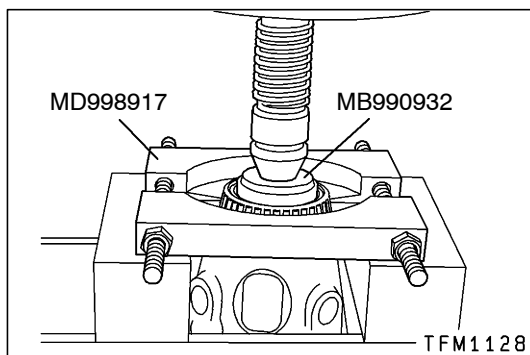


TFM1127

DISASSEMBLY SERVICE POINTS

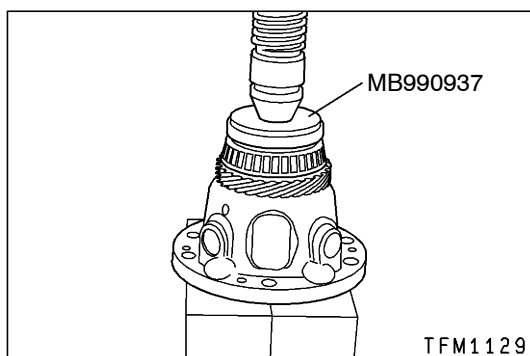
◀A▶ TAPER ROLLER BEARING REMOVAL

Using the special tool, remove the taper roller bearing from the center differential flange.



◀B▶ TAPER ROLLER BEARING REMOVAL

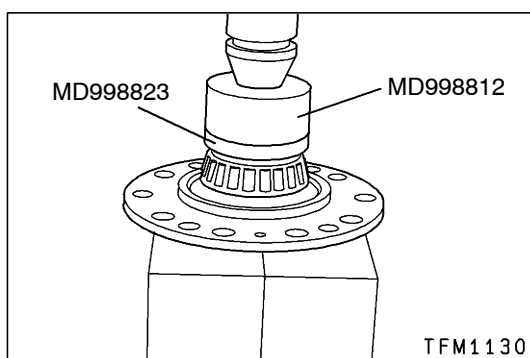
Using the special tool, remove the taper roller bearing from the center differential case.



REASSEMBLY SERVICE POINTS

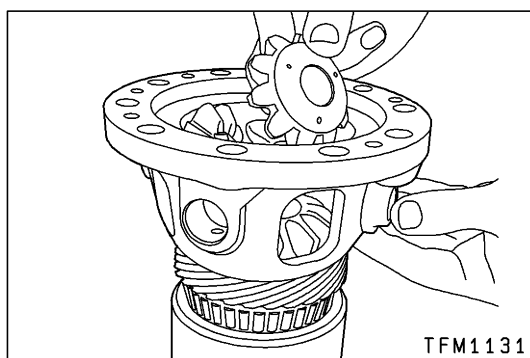
▶A◀ TAPER ROLLER BEARING INSTALLATION

Using the special tool, install the taper roller bearing onto the center differential case.



▶B◀ TAPER ROLLER BEARING INSTALLATION

Using the special tool, install the taper roller bearing onto the center differential flange.



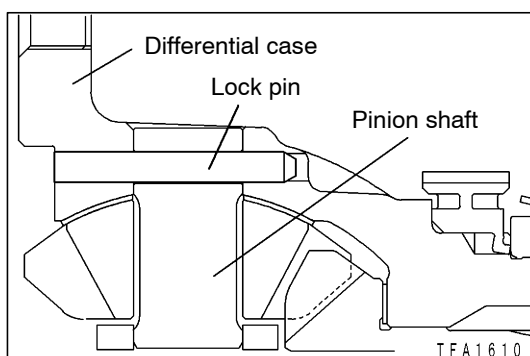
▶C◀ SPACER/SIDE GEAR/WASHER/PINION/PINION SHAFT HOLDER/PINION SHAFT/LOCK PIN/Front OUTPUT SHAFT/SNAP RING/CENTER DIFFERENTIAL FLANGE INSTALLATION

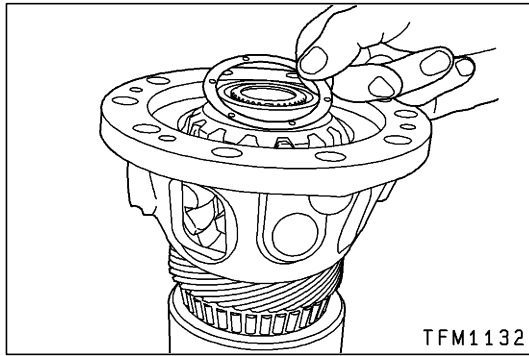
- (1) After assembling the spacer onto the side gear, install the side gear into the center differential case.

NOTE

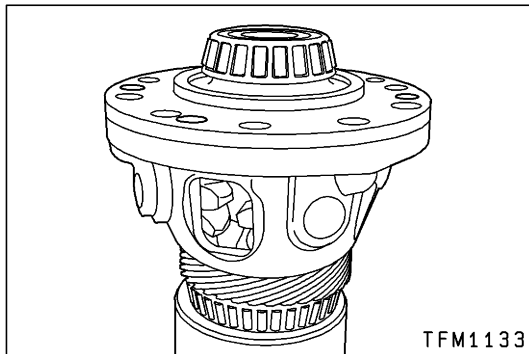
When installing a new side gear, assemble a medium thickness (0.8 or 0.9 mm) spacer.

- (2) Align the washer on the back of the pinion. Engage the four pieces onto the side gear simultaneously, and rotate to install at the specified position. Then, install the pinion shaft holder.
- (3) Insert the pinion shaft into the differential case.
- (4) Install the lock pin in the direction shown in the illustration.

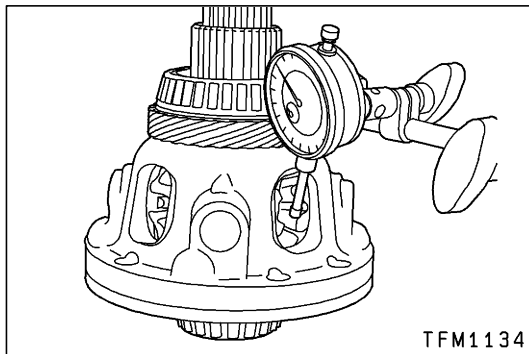




- (5) Install the front output shaft onto the side gear, and install the snap ring.
- (6) After assembling the side gear into the center differential case, install the spacer onto the side gear.



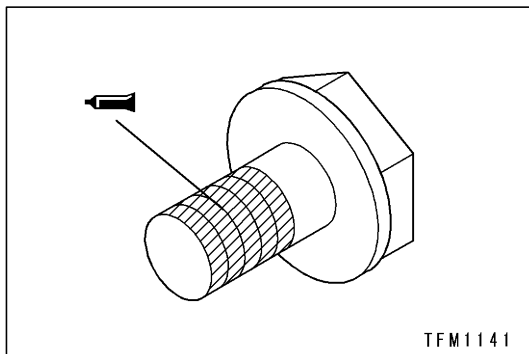
- (7) Match the alignment marks, install the center differential flange, and temporarily fix the machine screw.



- (8) Measure the backlash between the side gear and pinion.
Standard value: 0.025 - 0.150 mm
- (9) If the backlash is not within the standard value, select a spacer, and measure the backlash again.

NOTE

Adjust so that the backlash on both sides is even.



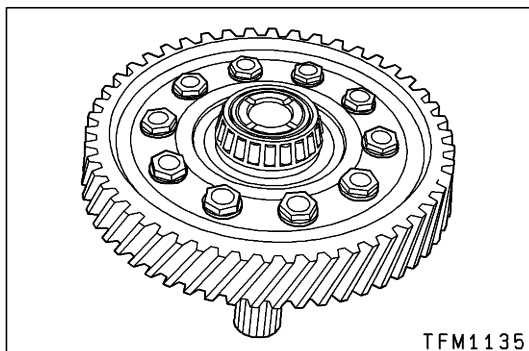
►D◄ CENTER DIFFERENTIAL DRIVE GEAR INSTALLATION

- (1) Confirm that rust-proofing oil is applied, and then apply sealant on all of the bolt threads.

Sealant

Specified sealant:

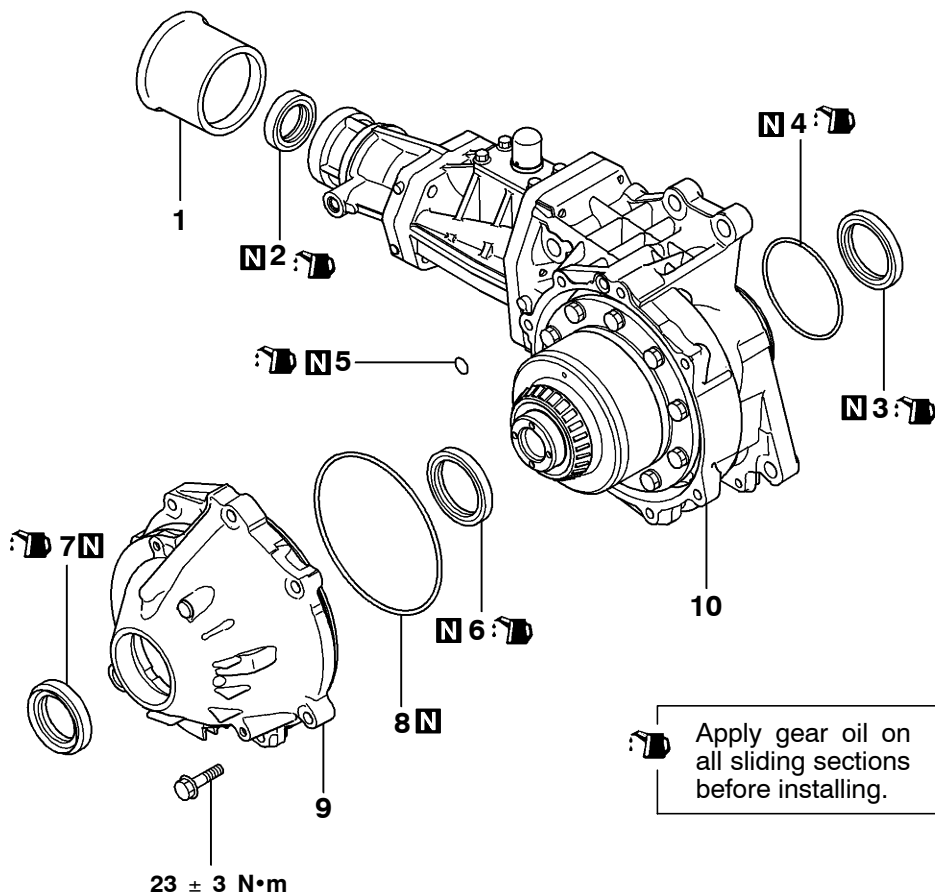
3M STUD Locking No.4170 or equivalent



- (2) Tighten with the specified torque following the order shown in the illustration.

TRANSFER

DISASSEMBLY AND REASSEMBLY



TFM1144

Disassembly steps

- | | |
|--|--|
| <ul style="list-style-type: none"> ▶E▶ 1. Dust seal guard ▶D▶ 2. Oil seal ▶A▶ 3. Oil seal ▶A▶ 4. O-ring ▶A▶ 5. O-ring | <ul style="list-style-type: none"> ▶C▶ 6. Oil seal ▶B▶ 7. Oil seal ▶A▶ 8. O-ring 9. Transfer cover 10. Transfer |
|--|--|

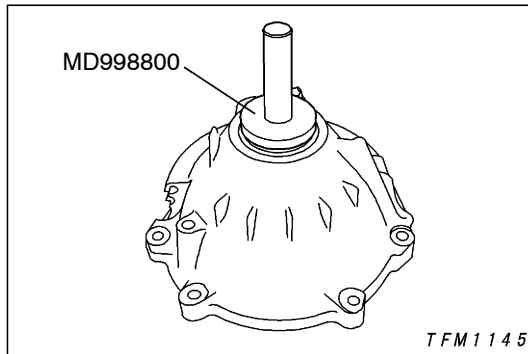
REASSEMBLY SERVICE POINTS**▶A◀ O-RING INSTALLATION**

Apply hypoid gear oil on the O-ring.

Hypoid gear oil

Specified oil:

MITSUBISHI genuine "DIA-QUEEN SUPER" hypoid gear oil (GL-5) or equivalent

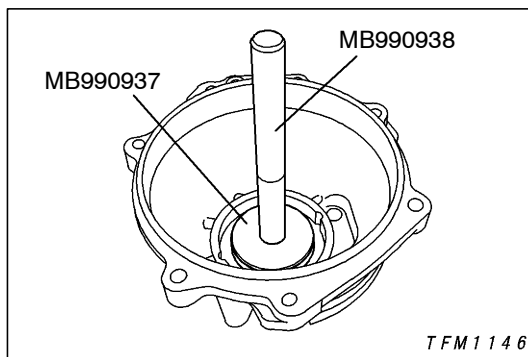
**▶B◀ OIL SEAL INSTALLATION**

Apply hypoid gear oil on the lip section of the oil seal, and install using the special tool.

Hypoid gear oil

Specified oil:

MITSUBISHI genuine "DIA-QUEEN SUPER" hypoid gear oil (GL-5) or equivalent

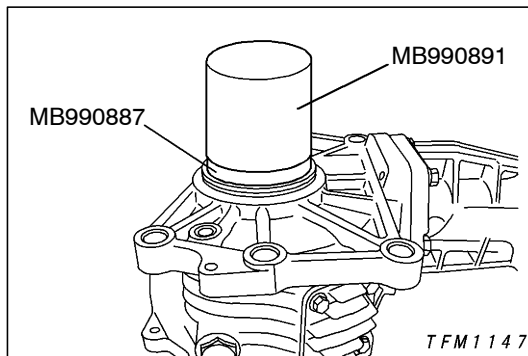
**▶C◀ OIL SEAL INSTALLATION**

Apply hypoid gear oil on the lip section of the oil seal, and install using the special tool.

Hypoid gear oil

Specified oil:

MITSUBISHI genuine "DIA-QUEEN SUPER" hypoid gear oil (GL-5) or equivalent

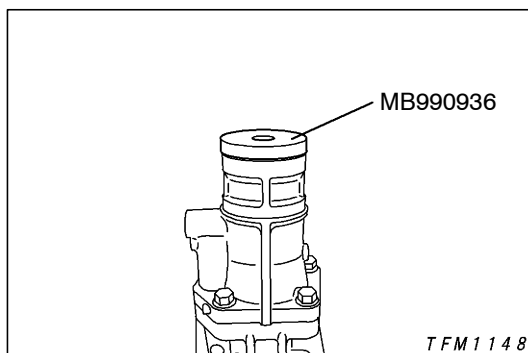
**▶D◀ OIL SEAL INSTALLATION**

Apply hypoid gear oil on the lip section of the oil seal, and install using the special tool.

Hypoid gear oil

Specified oil:

MITSUBISHI genuine "DIA-QUEEN SUPER" hypoid gear oil (GL-5) or equivalent

**▶E◀ OIL SEAL INSTALLATION**

Apply hypoid gear oil on the lip section of the oil seal, and install using the special tool.

Hypoid gear oil

Specified oil:

MITSUBISHI genuine "DIA-QUEEN SUPER" hypoid gear oil (GL-5) or equivalent

PROPELLER SHAFT

CONTENTS

GENERAL INFORMATION	2	SEALANT	2
SERVICE SPECIFICATIONS	2	SPECIAL TOOL	2
LUBRICANT	2	PROPELLER SHAFT	3

GENERAL INFORMATION

3 way split 4-joint type propeller shaft with center bearing is adopted.

SERVICE SPECIFICATION

Items	Standard value	Limit
Propeller shaft runout mm	-	0.5

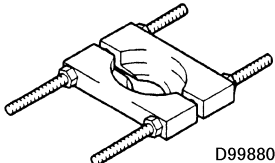
LUBRICANT

Items	Specified lubricant	Quantity
Front propeller shaft sleeve yoke	Hypoid gear oil SAE 75W-90 or 75W-85W or 80W conforming to API GL-4	As required
LJ assembly	Repair kit grease	75 ± 5 g

SEALANT

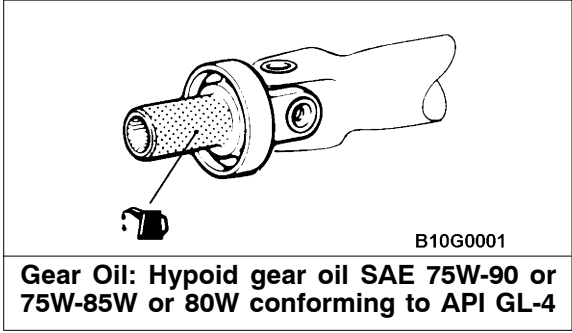
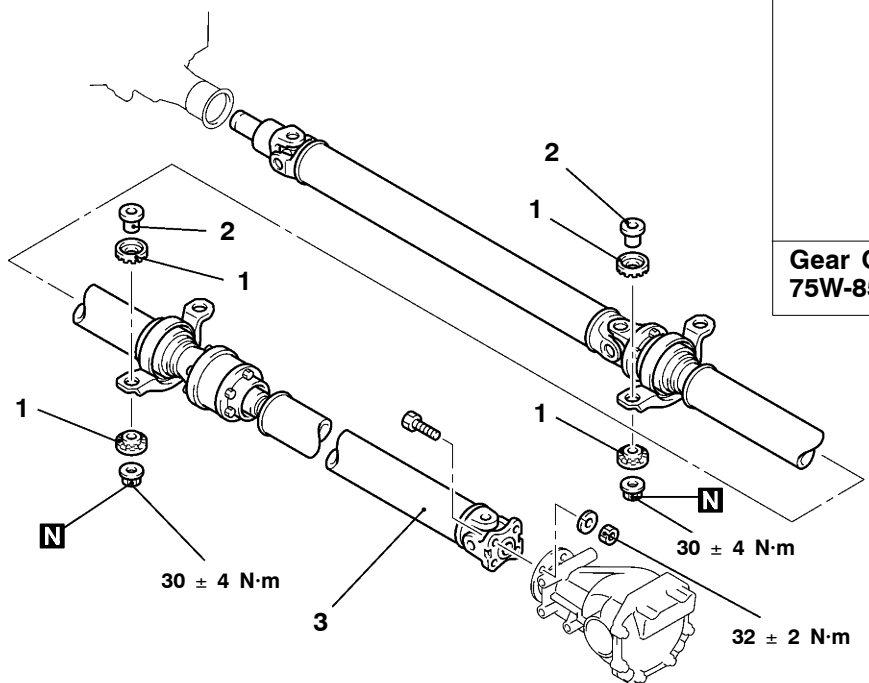
Items	Specified sealants	Remarks
LJ assembly rubber packing	3M Stud Locking 4170 or equivalent	Anaerobic sealant

SPECIAL TOOL

Tool	Number	Name	Use
 D998801	MB998801	Bearing remover	Removal of the center bearing assembly

PROPELLER SHAFT

REMOVAL AND INSTALLATION



AY2177AU

Removal steps

1. Insulator
2. Spacer
3. Propeller shaft assembly



REMOVAL SERVICE POINT

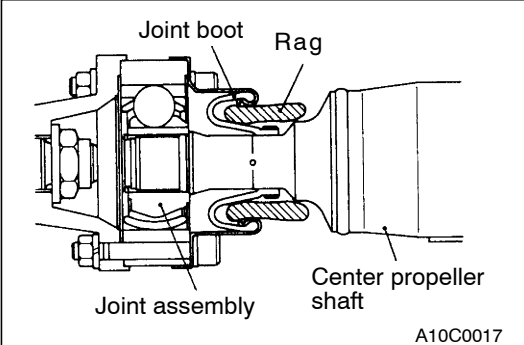
◀▶ PROPELLER SHAFT ASSEMBLY REMOVAL

1. Make mating marks on the differential companion flange and flange yoke, and then remove the front propeller shaft assembly.

2. By filling rag in the boot and align the propeller shaft, remove the propeller shaft assembly

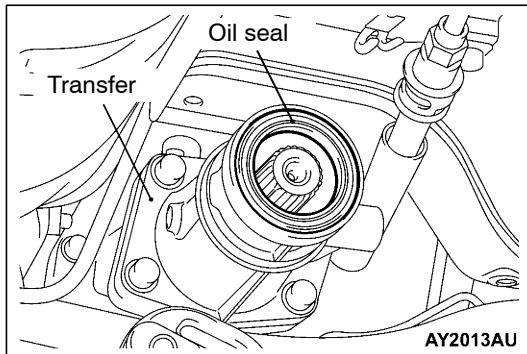
Caution

If the joint part is bent, the joint boot is danger of damage by folding joint boot.

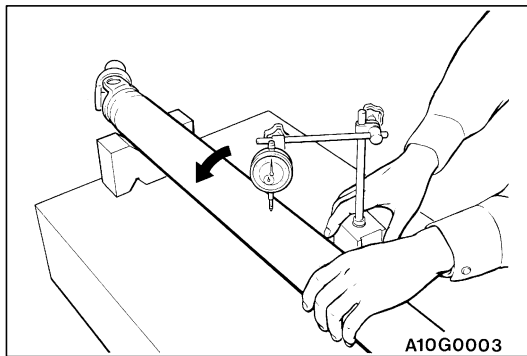


INSTALLATION SERVICE POINT**▶◀ PROPELLER SHAFT ASSEMBLY INSTALLATION**

When reusing the propeller shaft, align the mating marks made during the removal and install the propeller shaft assembly to the companion flange.

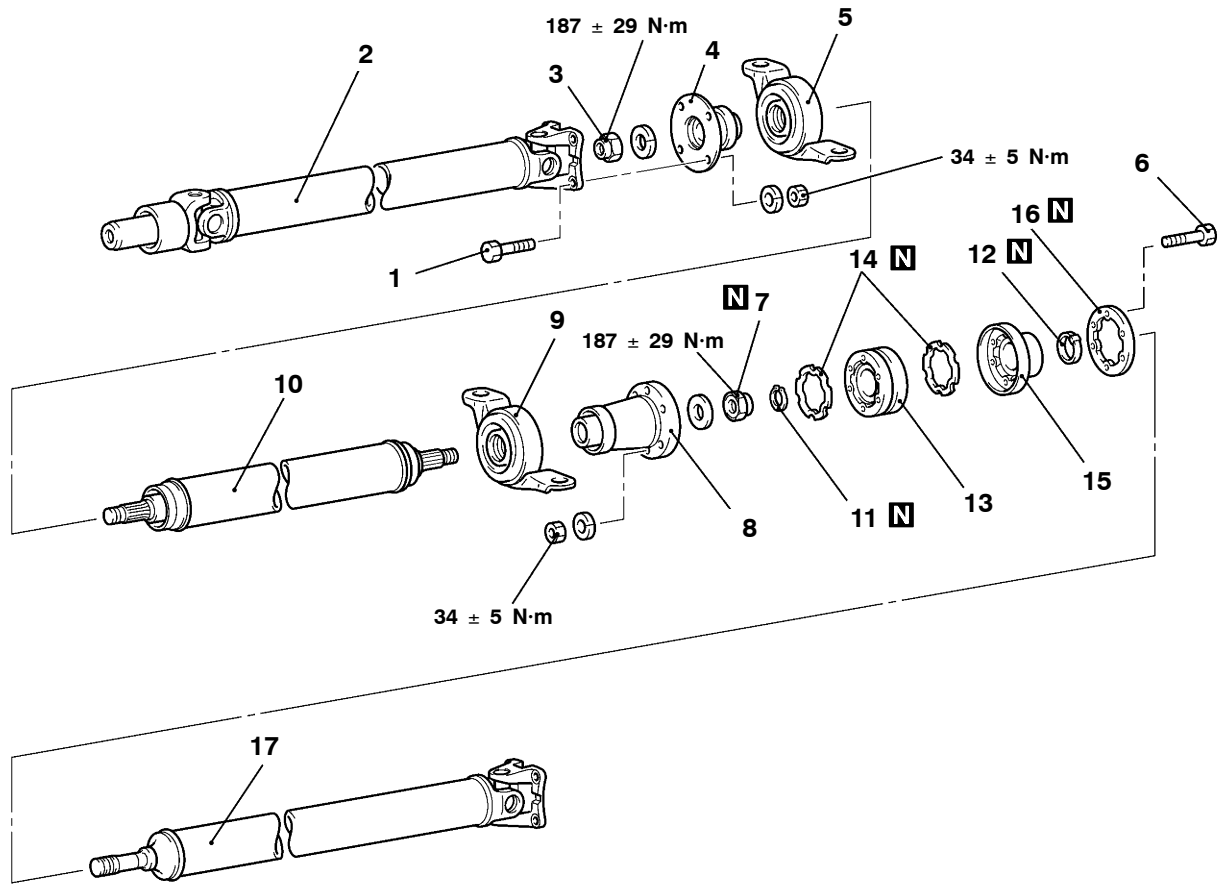
**Caution**

1. Do not damage the oil seal lips of the transmission and transfer.
2. Wipe out oil and grease on the threads of the mounting bolts and nuts before tightening, or they will loosen.
3. If the joint part is bent, the joint boot is in danger of damage by folding joint boot.

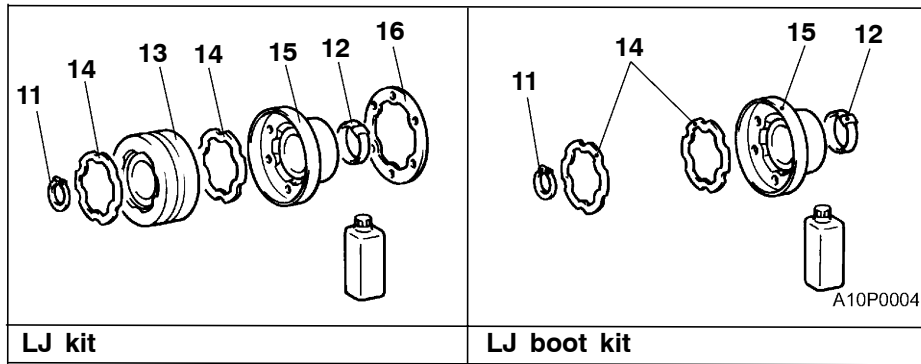
**INSPECTION****PROPELLER SHAFT RUNOUT**

Limit: 0.5 mm

DISASSEMBLY AND REASSEMBLY



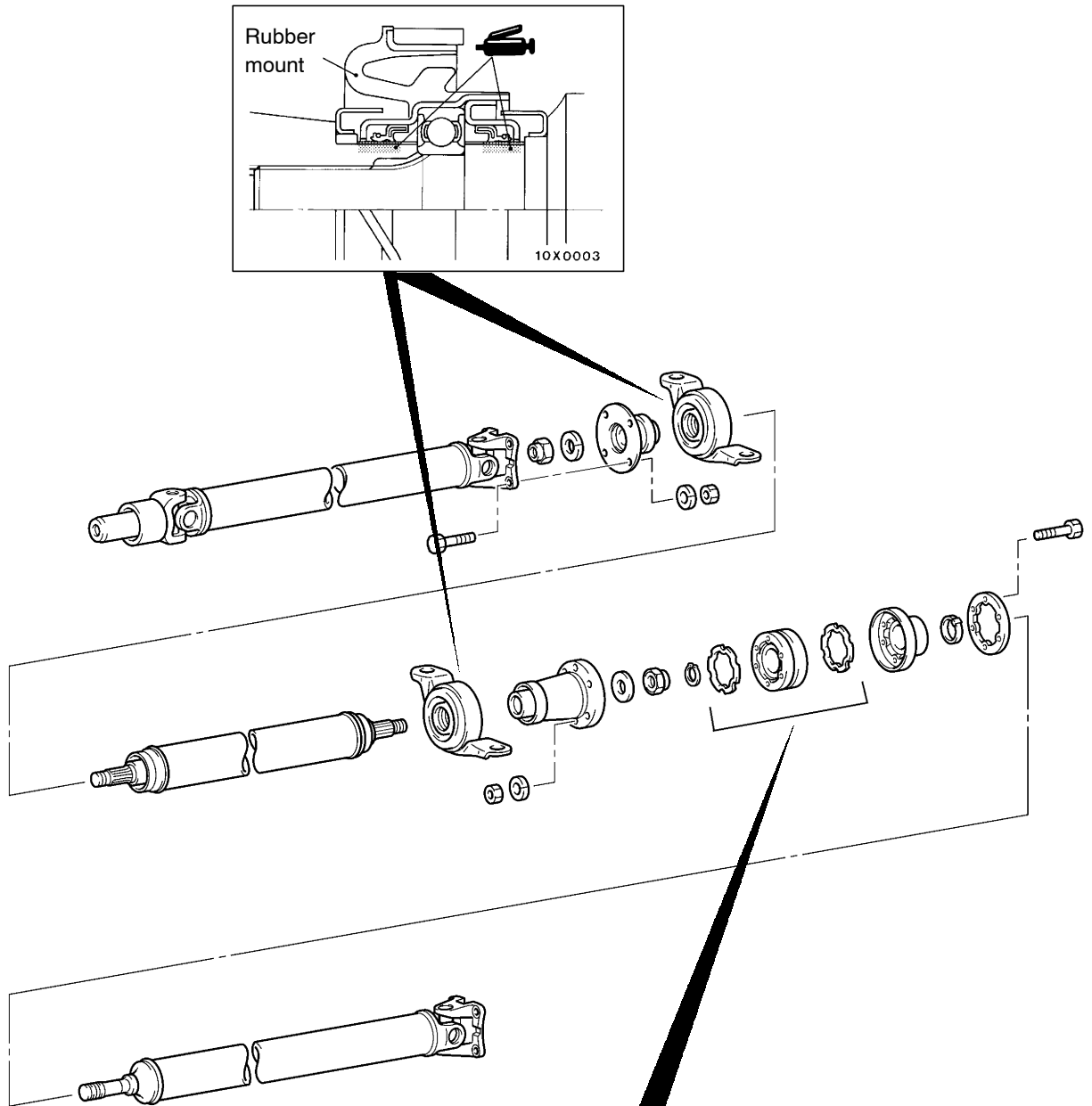
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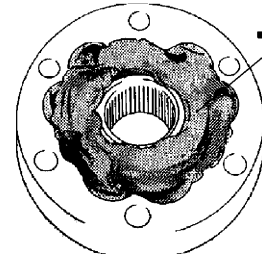
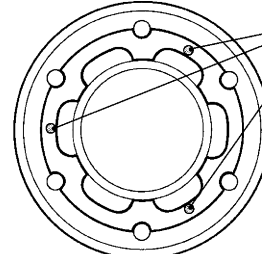
Disassembly steps

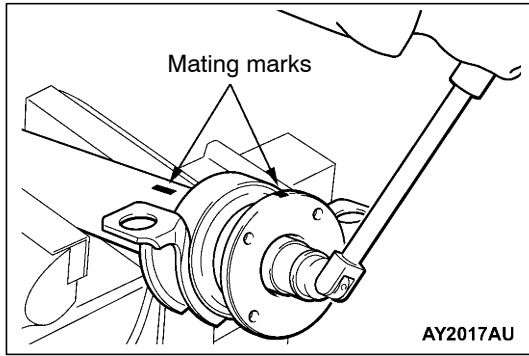
- | | | | |
|-----|-----------------------------------|-----|----------------------------|
| | 1. Bolt | | 10. Center propeller shaft |
| | 2. Front propeller shaft assembly | | 11. Snap ring |
| | 3. Self locking nut | | 12. Boot band |
| | 4. Companion flange | | 13. LJ assembly |
| ◀A▶ | 5. Center bearing assembly | ◀D▶ | 14. Rubber packing |
| ◀B▶ | 6. Bolt | ◀E▶ | 15. LJ boot |
| ◀C▶ | 7. Self locking nut | | 16. Washer |
| | 8. Companion flange | | 17. Rear propeller shaft |
| | 9. Center bearing assembly | | |

Lubrication and Adhesive Points



BY1792AU

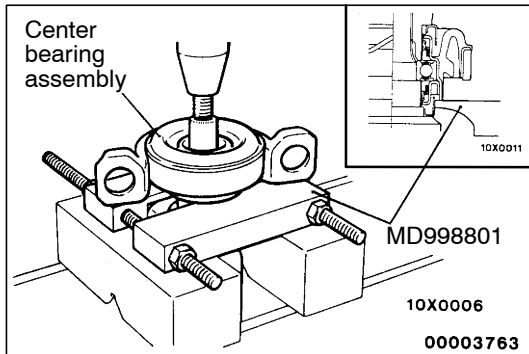
 <p>A10X0040</p>	 <p>10N0009</p>
<p>Repair kit grease: Quantity: 75 ± 5 g</p>	<p>Adhesive: 3M Stud Locking 4170 or equivalent</p>



DISASSEMBLY SERVICE POINTS

◀A▶ COMPANION FLANGE REMOVAL

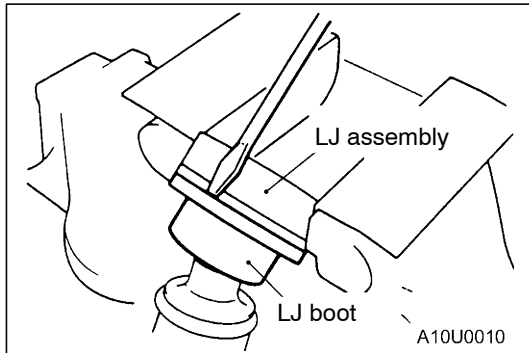
Make mating marks on the companion flange and center propeller shaft. Then, remove the companion flange.



◀B▶ CENTER BEARING ASSEMBLY REMOVAL

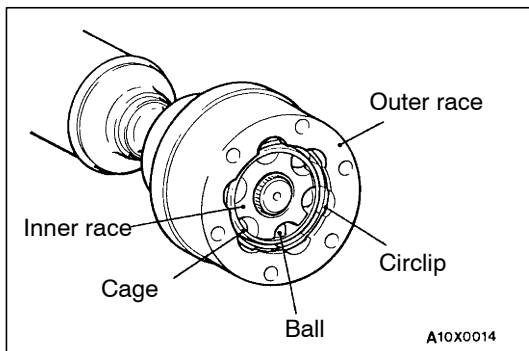
◀C▶ BOLT REMOVAL

Make mating marks on the rear propeller shaft, LJ assembly and companion flange. Then, remove the bolt.



◀D▶ LJ ASSEMBLY REMOVAL

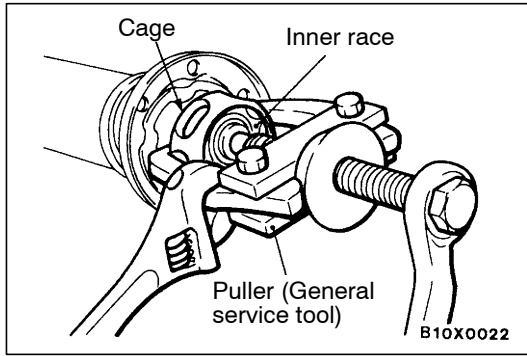
1. Remove the LJ boot from the LJ assembly.



2. Mark the mating marks in outer race, cage and inner race, then remove the circlip, outer race and ball.

NOTE

Ensure the installation position of ball and keep the ball in order to refer in installation.



3. Using puller (general service tool), remove the inner race and cage from the center propeller shaft assembly.
4. Wipe out grease on the outer race, inner race, cage and ball then clean.

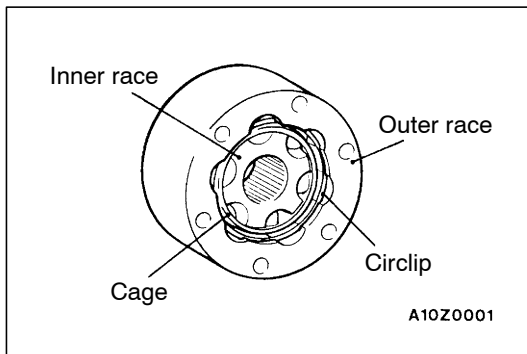
◀E▶ LJ BOOT REMOVAL

If LJ boot will be reused, tape the spline part of the center propeller shaft in order to remove the boot.

REASSEMBLY SERVICE POINTS

▶A▶ LJ BOOT INSTALLATION

1. Install the boot band.
2. After taping the spline part of the center propeller shaft, install the LJ boot.

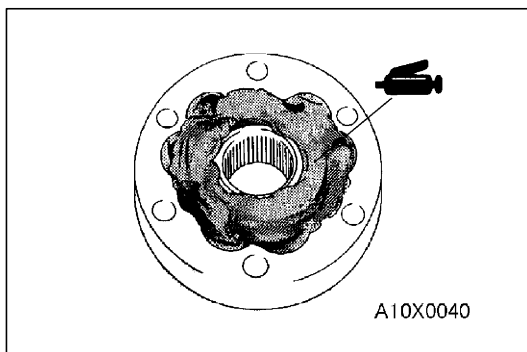


▶B▶ LJ ASSEMBLY INSTALLATION

1. Lubricate the specific grease to ball moving part of the outer race and inner race.

Specified grease: Repair kit grease

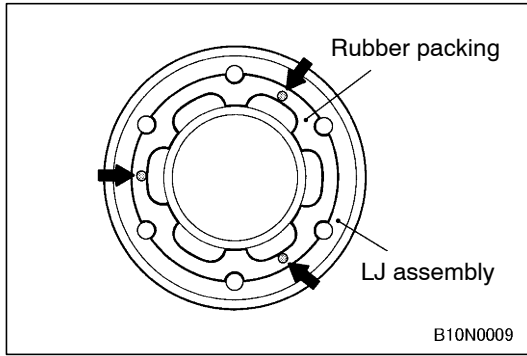
2. Assemble the LJ assembly in following step.
 1. Suit the mating mark and install the outer race, cage, ball and inner race.
 2. Install the circlip.



3. Fill the specified grease evenly in LJ assembly.

Specified grease: Repair kit grease

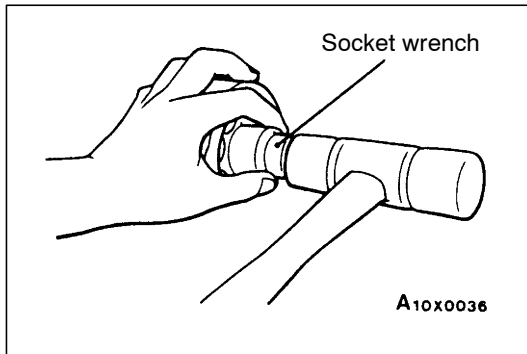
Quantity: 75 ± 5 g



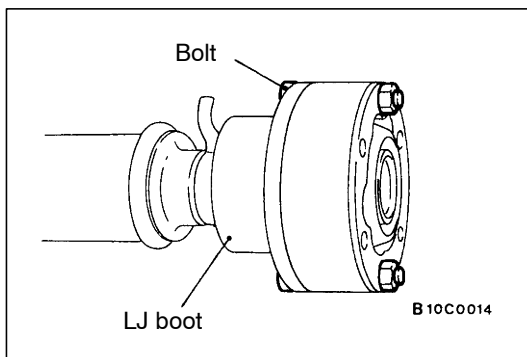
4. Apply a little specific sealant to the surface which has groove (for packing) of LJ assembly (allow as shown in the illustration), fix the rubber packing.

Specified sealant: 3M Stud Locking 4170 or equivalent

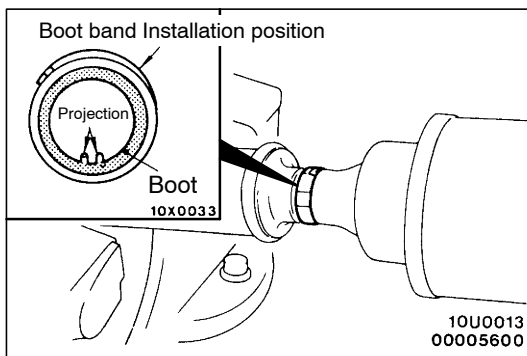
5. Install the surface which has groove (for packing) of LJ assembly to LJ boot side.



6. Aline the mating marks of LJ assembly and center propeller shaft, then punch the LJ assembly to center propeller shaft using socket wrench.



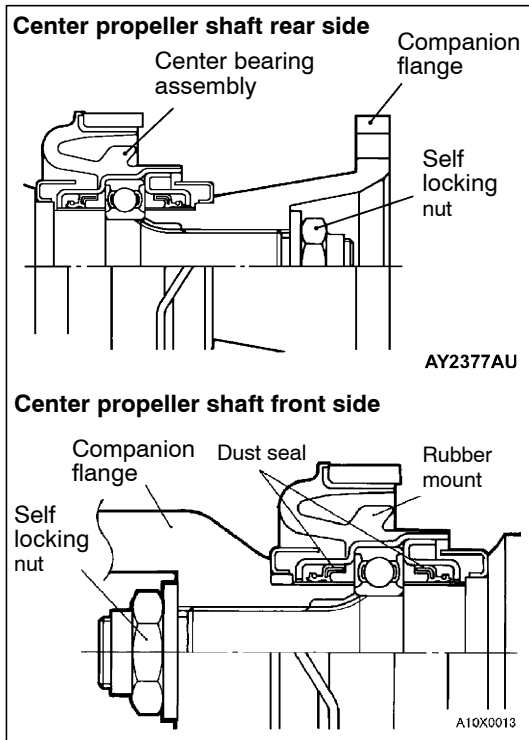
7. Aline the position of bolt holes of LJ boot and LJ assembly, install the LJ boot to LJ assembly.
8. Fix the rubber packing of companion flange side in a similar to step 4.



►◄ **BOOT BAND INSTALLATION**

Caution

1. **Tighten the boot band part in opposite direction of convex part for bleeding the boot.**
2. **If there is grease in the convex part, wipe out the grease in order to bleed the boot.**



►D◄ **CENTER BEARING ASSEMBLY/COMPANION FLANGE/SELF LOCKING NUT INSTALLATION**

1. Install the center bearing assembly to the rear propeller shaft in the direction shown as the illustration.
2. After alining the mating marks of the companion flange and rear propeller shaft, install them.
3. Tightening the self locking nut, press fit the center bearing assembly using companion flange.

FRONT AXLE

CONTENTS

GENERAL INFORMATION	2	ON-VEHICLE SERVICE	5
SERVICE SPECIFICATIONS	3	Wheel Bearing Axial Play Check	5
LUBRICANTS	3	Hub bolt replacement	5
SPECIAL TOOLS	3	HUB AND KNUCKLE ASSEMBLY	6
		DRIVE SHAFT	10

GENERAL INFORMATION

The front axle consists of front hubs, knuckles, wheel bearings and drive shafts, and it has the following features.

- The wheel bearing is unit bearing integrated with hub (Double-row angular contact ball bearing).
- The drive shaft incorporates B.J.-T.J. type constant velocity joints with high transmission efficiency and low vibration and noise.

- ABS rotors for detecting the wheel speeds are press-fitted to the B.J. outer wheels in vehicles with ABS or ACD.

NOTE

1. B.J.: Birfield Joint
2. T.J.: Tripod Joint

SPECIFICATIONS

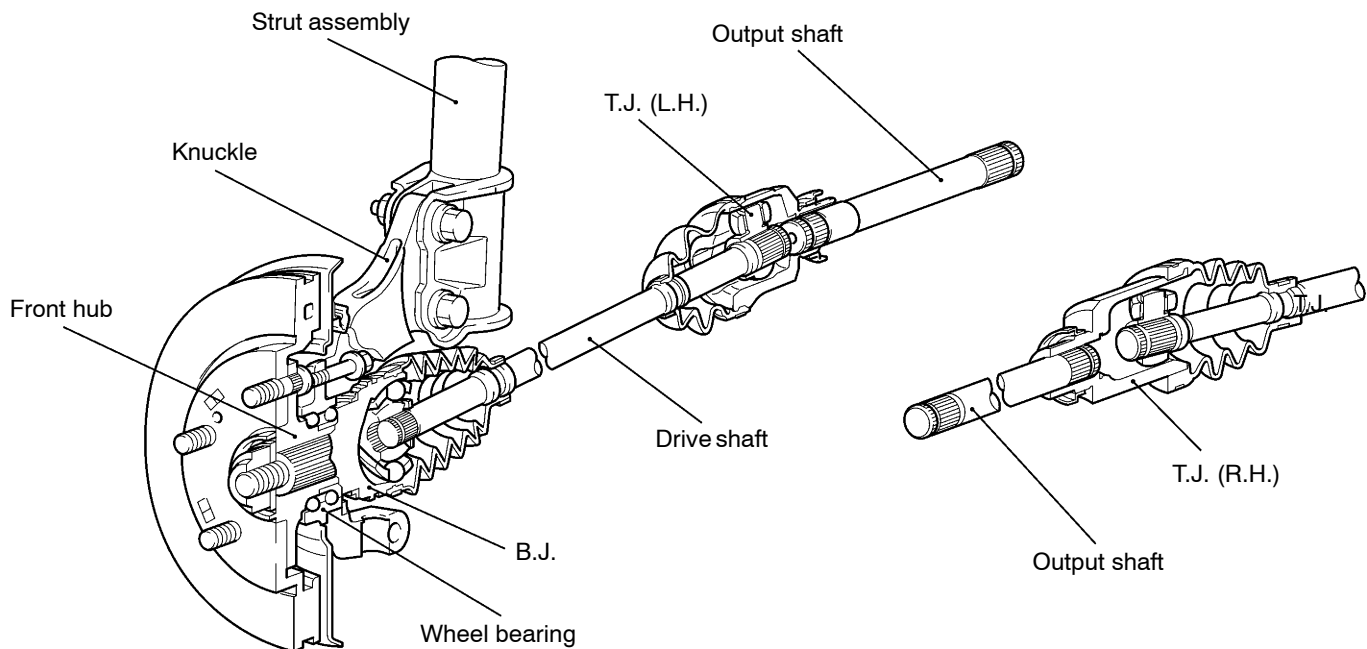
Item		Specifications	
Wheel bearings	Wheel bearing type	Hub unit bearing (Double-row angular contact ball bearing)	
	Bearing (outside diameter) mm	87*1	
Drive shaft	Joint type	Outside	B.J.
		Inside	T.J.
	Shaft length*2 × Shaft diameter mm	Left	350 × 26
		Right	427 × 26

NOTE

*1: The wheel bearing is integrated with hub, only the outer diameter is shown.

*2: The shaft length indicates the length between the center points of each joint.

STRUCTURAL DIAGRAM



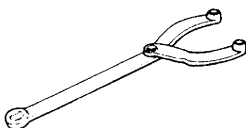
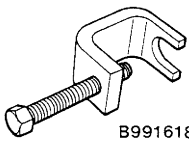
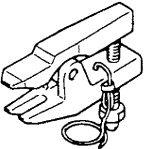
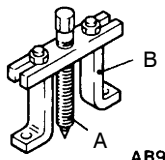
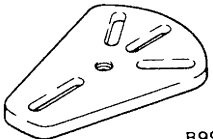
SERVICE SPECIFICATIONS

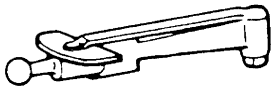
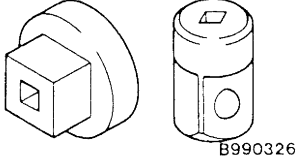
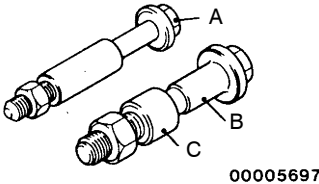
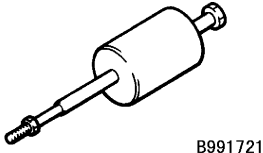
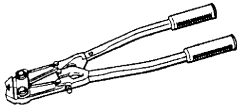
Item		Standard value	Limit
Wheel bearing axial play mm		-	0.06
Wheel bearing rotation starting torque N·m		-	1.03 or less
Setting of T.J. boot length mm		85 ± 3	-
Opening dimension of the special tool (MB991561) mm	When the B.J.boot band (small) is crimped.	2.9	-
	When the B.J.boot band (big) is crimped.	3.2	-
Crimped width of the B.J.boot band mm		2.4 - 2.8	-

LUBRICANTS

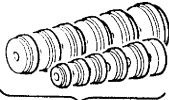
Items	Specified lubricants	Quantity g
T.J. boot grease	Repair kit grease	120 ± 10
B.J.boot grease	Repair kit grease	110 ± 10

SPECIAL TOOLS

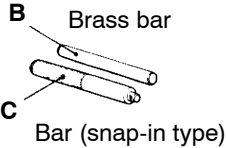
Tool	Number	Name	Use
	MB990767	End yoke holder	Fixing of the hub
 B991618	MB991618	Hub bolt remover	Removal of the hub bolt
 B991113	MB991113 or MB990635	Steering linkage puller	Disconnection of ball joint
 AB990241	MB990241 A: MB990242 B: MB990244	Axle shaft puller A: Puller shaft B: Puller bar	<ul style="list-style-type: none"> ● Removal of the drive shaft ● Removal of the hub
 B991354	MB991354	Puller body	<ul style="list-style-type: none"> ● Removal of the drive shaft ● Removal of the hub

Tool	Number	Name	Use
	MB990685	Torque wrench	Measurement of wheel bearing rotation starting torque
	MB990326	Preload socket	Measurement of wheel bearing rotation starting torque
	A: MB991017 B: MB990998 C: MB991000	A,B: Front hub remover and installer C: Spacer	<ul style="list-style-type: none"> Provisional holding of the wheel bearing Measurement of wheel bearing rotation starting torque Measurement of wheel bearing axial play MB991000, which belongs to MB990998, should be used as a spacer.
	MB991721	Sliding hammer	Output shaft removal
	MB991561	Boot band clipping tool	Resin boot band installation

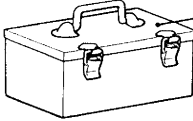
MB990925



A
Installer adapter



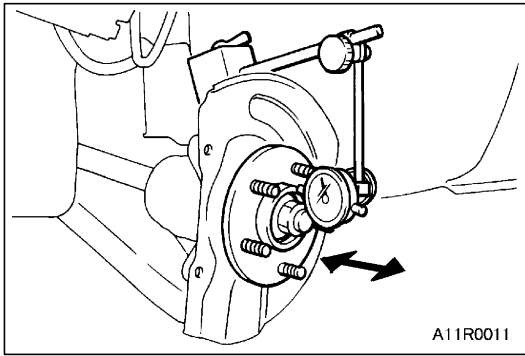
B Brass bar
C Bar (snap-in type)



Tool box

A11W0113

Type	Tool number	O.D. mm	Type	Tool number	O.D. mm
A	MB990926	39	A	MB990933	63.5
	MB990927	45		MB990934	67.5
	MB990928	49.5		MB990935	71.5
	MB990929	51		MB990936	75.5
	MB990930	54		MB990937	79
	MB990931	57	B	MB990938	-
	MB990932	61	C	MB990939	-



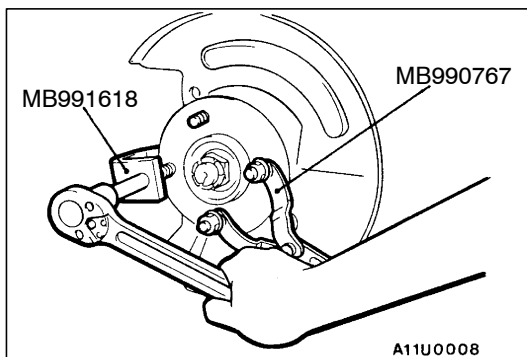
ON-VEHICLE SERVICE

WHEEL BEARING AXIAL PLAY CHECK

1. Remove the disc brake caliper and suspend it with a wire.
2. Remove the brake disc from the front hub.
3. Attach a dial gauge as shown in the illustration, and then measure the axial play while moving the hub in the axial direction.

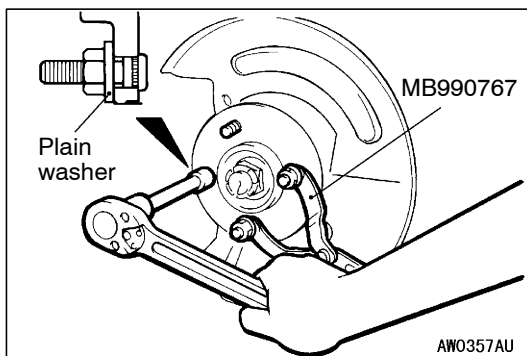
Limit: 0.06 mm

4. If axial play exceeds the limit, replace the front hub assembly.



HUB BOLT REPLACEMENT

1. Remove the caliper assembly and secure it with wire so that it does not fall.
2. Remove the brake disc.
3. Use the special tools to remove the hub bolts.
4. Install the plain washer to the new hub bolt, and install the bolt with a nut.



HUB AND KNUCKLE ASSEMBLY

REMOVAL AND INSTALLATION

Caution

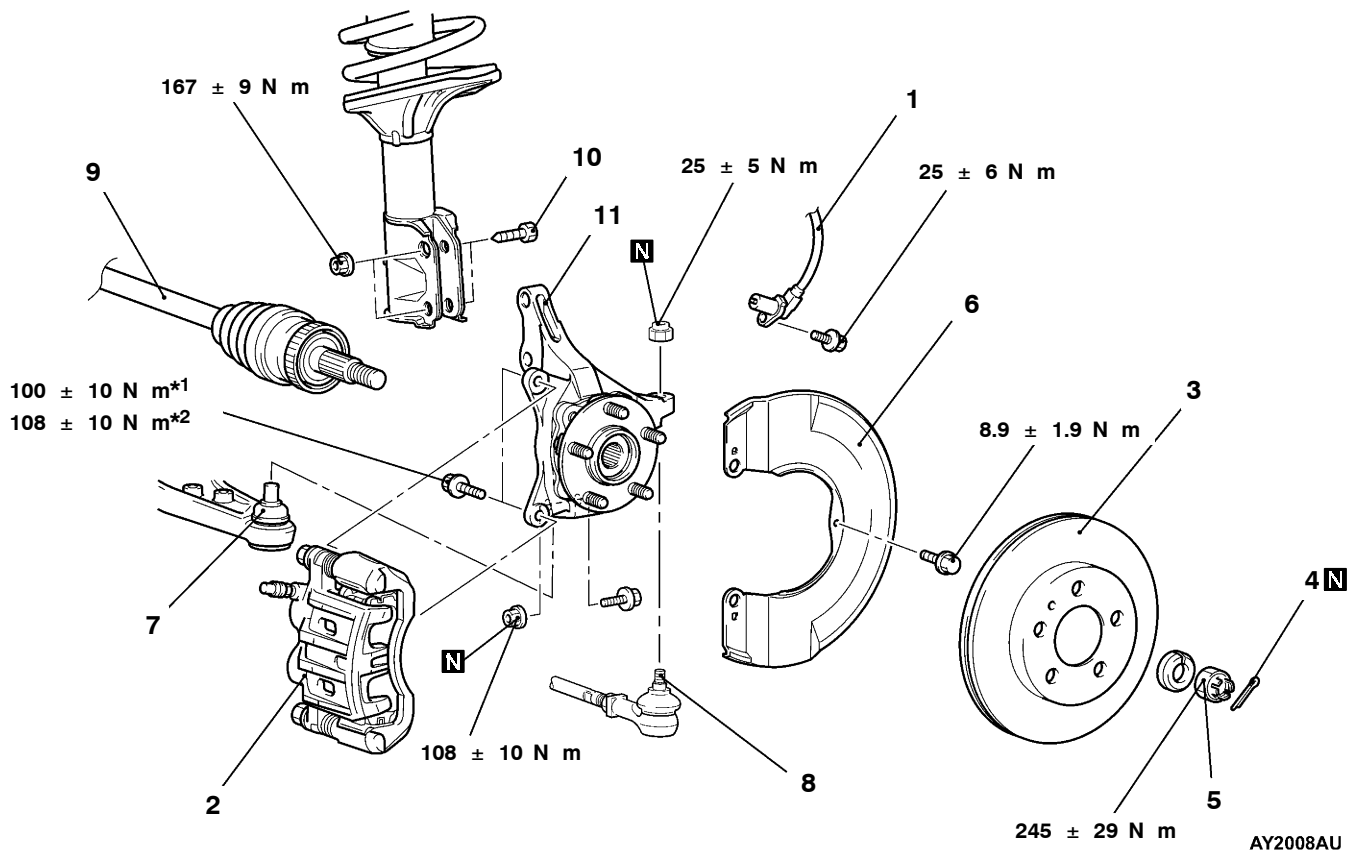
If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

Pre-removal and Post-installation Operation

- Transmission Fluid Draining
- Transfer Oil Draining (Refer to GROUP 22 – On-vehicle Service.)

Pre-removal and Post-installation Operation

- Check the dust cover for cracks or damage by pushing it with finger.
- Transfer Oil Filling (Refer to GROUP 22 – On-vehicle Service.)
- Transmission Fluid Filling



*1: Vehicles without BREMBO disc brake

*2: Vehicles with BREMBO disc brake

Removal steps

- | | | | |
|---------------------------|--|-----------------------|--|
| <p>◀A▶</p> <p>◀B▶ ▶A▶</p> | <p>1. Front speed sensor <Vehicles with ACD or ABS></p> <p>2. Caliper assembly</p> <p>3. Brake disc</p> <p>4. Split pin</p> <p>5. Castle nut</p> <p>6. Dust shield</p> | <p>◀C▶</p> <p>◀D▶</p> | <p>7. Connection for lower arm ball joint</p> <p>8. Connection for tie rod end</p> <p>9. Drive shaft</p> <p>10. Front strut to hub and knuckle mounting bolt and nut</p> <p>11. Hub and knuckle assembly</p> |
|---------------------------|--|-----------------------|--|

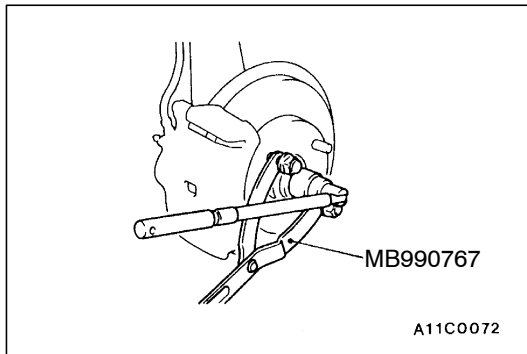
REMOVAL SERVICE POINTS

◀A▶ CALIPER ASSEMBLY REMOVAL

Secure the removed caliper assembly with wire, etc.

Caution

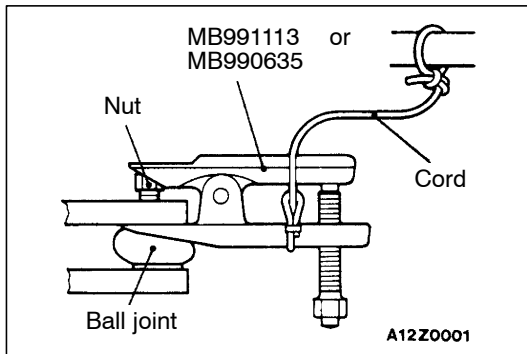
If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.



◀B▶ CASTLE NUT REMOVAL

Caution

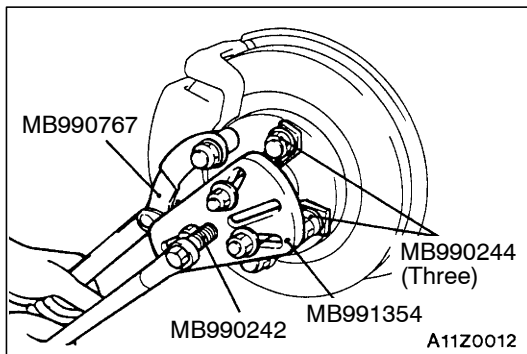
Do not apply the vehicle weight to the wheel bearing while loosening the castle nut. Otherwise wheel bearing will be damaged.



◀C▶ TIE ROD END DISCONNECTION

Caution

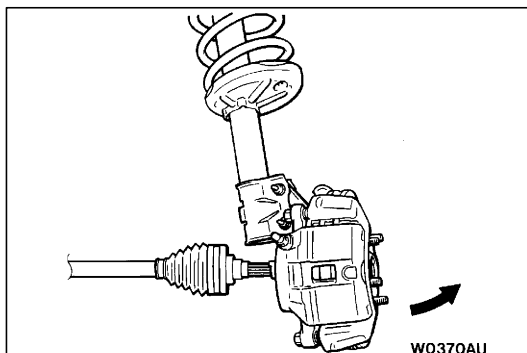
1. Loosen the nut only; do not remove it from the ball joint. Otherwise ball joint thread will be damaged.
2. The special tool should be suspended by a cord to prevent it from coming off.

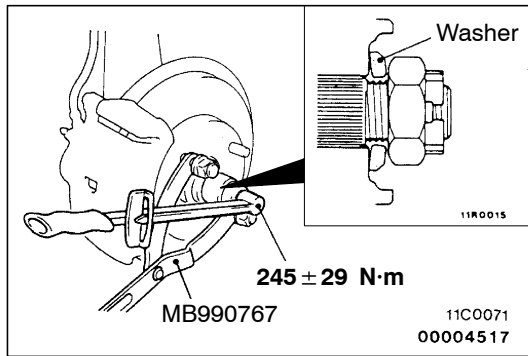


◀D▶ DRIVE SHAFT REMOVAL

1. Use the special tools to push out the drive shaft from the hub.

2. Withdraw the drive shaft from the hub by pulling the bottom of the brake disc towards you, and then remove the hub retaining bolts.





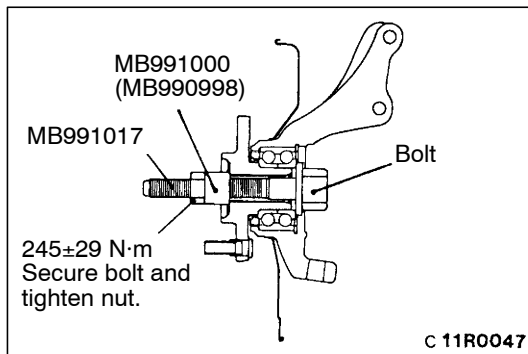
INSTALLATION SERVICE POINT

▶A◀CASTLE NUT INSTALLATION

1. Be sure to install the castle nut washer in the specified direction.
2. Using the special tool, tighten the castle nut.

Caution

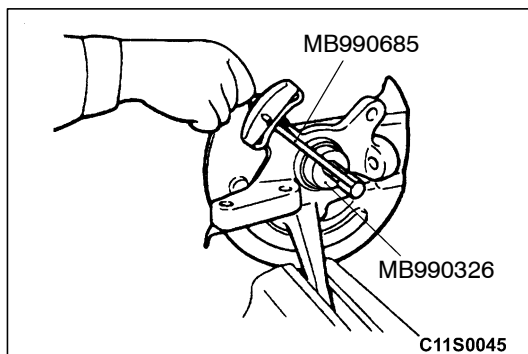
Before securely tightening the castle nuts, make sure there is no load on the wheel bearings. Otherwise wheel bearing will be damaged.



INSPECTION

INSPECTION OF WHELL BEARING ROTATION STARTING TORQUE

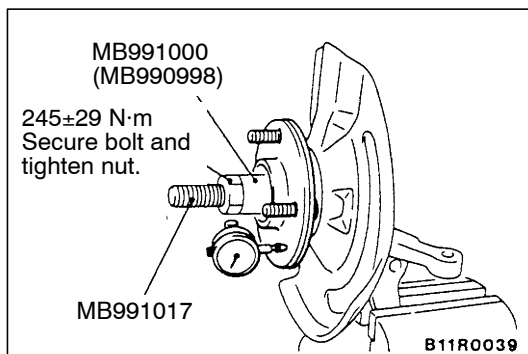
1. Tighten special tools in hub and knuckle assembly to the specified torque.



2. Measure the wheel bearing rotation starting torque with special tools.

Limit: 1.03 N·m or less

3. Wheel bearing rotation starting torque must be under the limit value and there should be no roughness when rotating the hub.



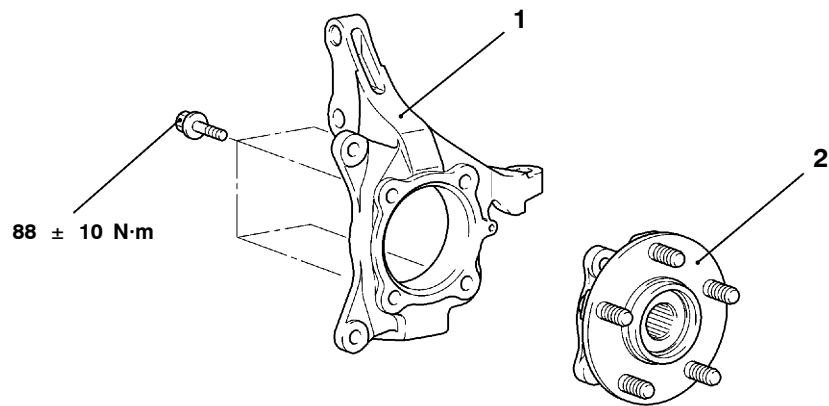
WHEEL BEARING AXLE PLAY CHECK

1. Secure knuckle in a vice to measure axle play in wheel bearing.

Limit: 0.06 mm

2. If the limit value of wheel bearing axle plya cannot be obtained when tightened to the specified torque (245 ± 29 N·m), check mounting bolt for hub and knuckle assembly. If no defects are found, replace hub assembly.

DISASSEMBLY AND REASSEMBLY



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Disassembly steps

1. Knuckle
2. Front hub assembly

DRIVE SHAFT

REMOVAL AND INSTALLATION

Caution

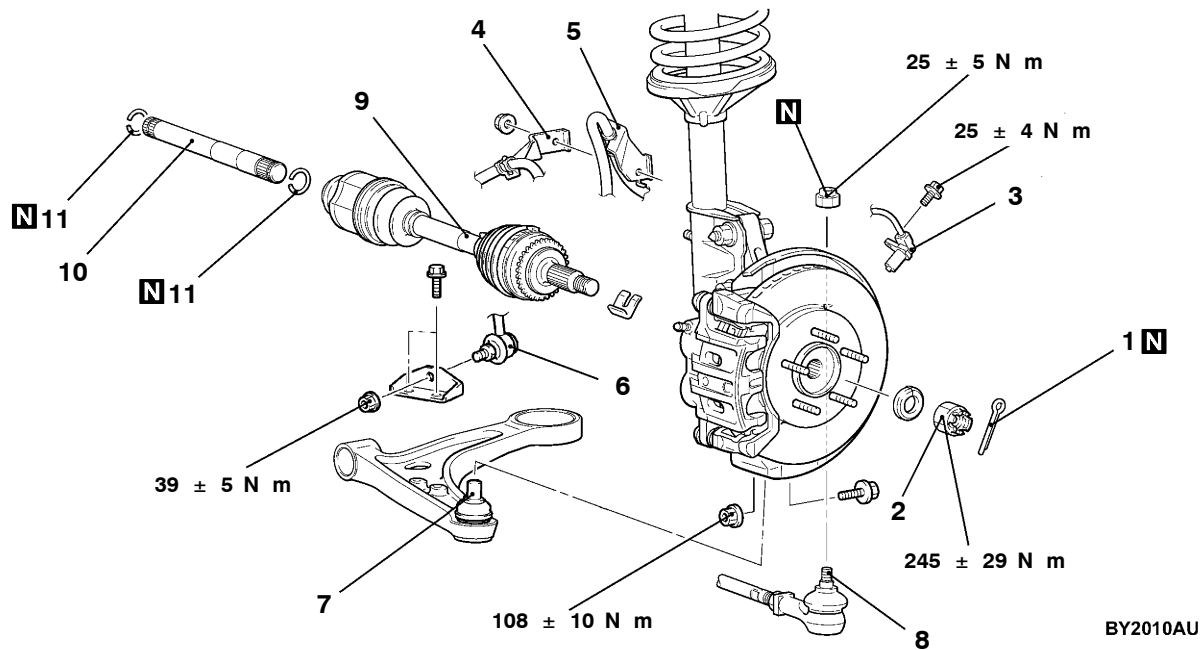
1. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.
2. For vehicles with ABS or ACD, do not strike the rotor for wheel speed sensor installed to the B.J. outer race of drive shaft against other parts when removing or installing the drive shaft. Otherwise the rotor for wheel speed sensor will be damaged.

Pre-removal and Post-installation Operation

- Transmission Fluid Draining
- Transfer Oil Draining (Refer to GROUP 22 – On-vehicle Service.)

Pre-removal and Post-installation Operation

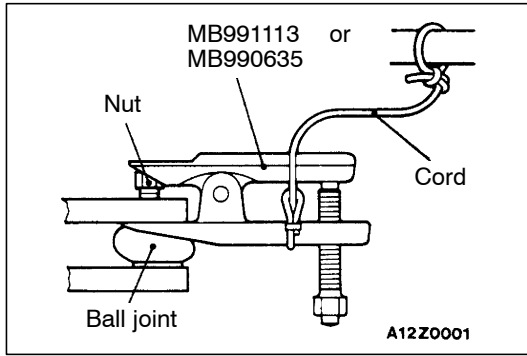
- Check the Dust Cover for cracks or damage by pushing it with finger.
- Transfer Oil Filling (Refer to GROUP 22 – On-vehicle Service.)
- Transmission Fluid Filling



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Removal steps

- | | |
|--|--|
| <p>▶B◀</p> <ol style="list-style-type: none"> 1. Split pin 2. Castle nut 3. Front speed sensor <Vehicles with ABS or ACD> 4. Front speed sensor harness bracket 5. Brake hose bracket | <p>▶A◀</p> <p>▶A◀</p> <p>▶A◀</p> <ol style="list-style-type: none"> 6. Stabilizer bar link connection 7. Lower arm ball joint connection 8. Tie rod end connection 9. Drive shaft 10. Output shaft 11. Circlip |
|--|--|

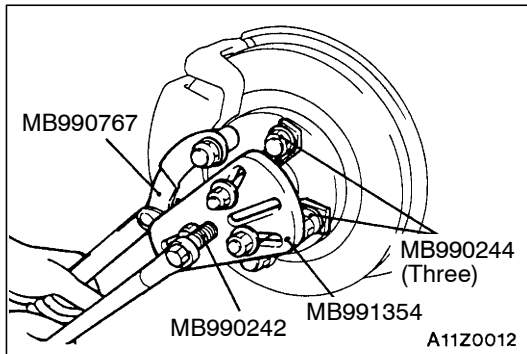


REMOVAL SERVICE POINTS

◀A▶ TIE ROD END DISCONNECTION

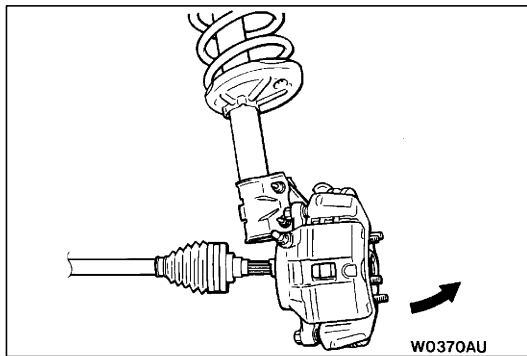
Caution

1. Loosen the nut only; do not remove it from the ball joint. Otherwise ball joint thread will be damaged.
2. The special tool should be suspended by a cord to prevent it from coming off.

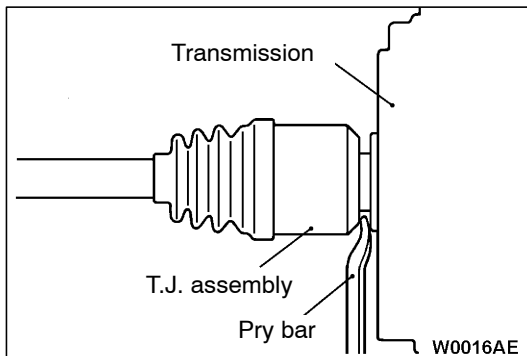


◀B▶ DRIVE SHAFT REMOVAL

1. Use the special tools to push out the drive shaft from the hub.



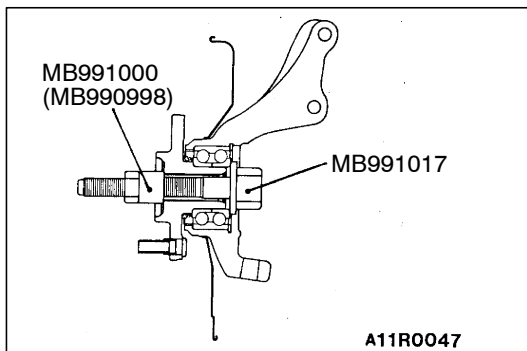
2. Withdraw the drive shaft from the hub by pulling the bottom of the brake disc towards you, and then remove the hub retaining bolts.

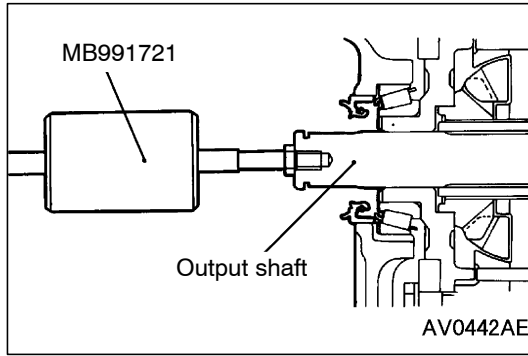


3. Remove the drive shaft from the transmission by the following procedure.
Insert a pry bar between the transmission case and the drive shaft, and then pry the drive shaft from the transmission.

Caution

- (1) Do not pull on the drive shaft; doing so will damage the T.J.; be sure to use the pry bar.
- (2) When pulling the drive shaft out from the transmission, be careful that the spline part of the drive shaft does not damage the oil seal.
- (3) Do not apply the vehicle weight to the wheel bearing while loosening the drive shaft nut. Otherwise wheel bearing will be damaged. If, however, the vehicle weight must be applied to the bearing (because of moving the vehicle), temporarily secure the wheel bearing by using the special tool.





◀C▶ OUTPUT SHAFT REMOVAL

Use the special tool to pull out the output shaft.

Caution

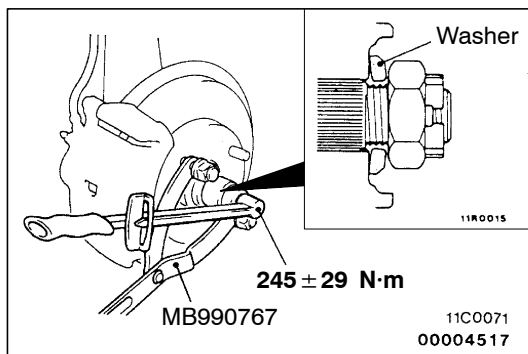
Do not damage the oil seal of the transmission by the output shaft splines.

INSTALLATION SERVICE POINTS

▶A◀ OUTPUT SHAFT/DRIVE SHAFT INSTALLATION

Caution

Do not damage the oil seal of the transmission by the output shaft and drive shaft splines.



▶B◀ CASTLE NUT INSTALLATION

1. Be sure to install the castle nut washer in the specified direction.
2. Using the special tool, tighten the castle nut.

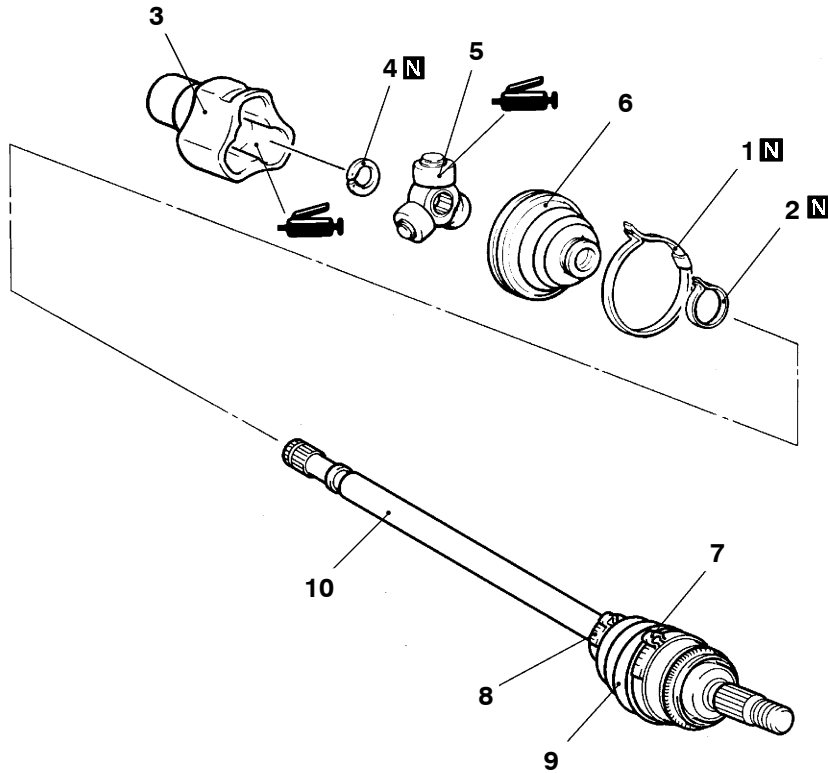
Caution

Before securely tightening the castle nuts, make sure there is no load on the wheel bearings. Otherwise wheel bearing will be damaged.

DISASSEMBLY AND REASSEMBLY

Caution

- (1) On the vehicles with ABS or ACD, when the drive shaft is disassembled or reassembled, be careful not to interfere with the rotor for wheel speed sensor installed to the B.J. outer race to prevent the rotor from damage.
- (2) Never disassemble the B.J. assembly except when replacing the B.J. boot.



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<p>1110100</p>	<p>1110101</p>	<p>A11H0090</p>
<p>T.J. repair kit</p>	<p>T.J. boot repair kit</p>	<p>B.J. boot repair kit</p>

Disassembly steps

- | | | |
|---|------------|--|
| <p>◀A▶ ▶B▶ 1. T.J. boot band (large)</p> <p>▶B▶ ▶A▶ 2. T.J. boot band (small)</p> <p>▶A▶ ▶A▶ 3. T.J. case</p> <p>▶A▶ ▶A▶ 4. Snap ring</p> <p>▶A▶ ▶A▶ 5. Spider assembly</p> | <p>◀B▶</p> | <p>6. T.J. boot</p> <p>7. B.J. boot band (large)</p> <p>8. B.J. boot band (small)</p> <p>9. B.J. boot</p> <p>10. B.J. assembly</p> |
|---|------------|--|

DISASSEMBLY SERVICE POINTS**◀A▶ T.J. CASE/SPIDER ASSEMBLY REMOVAL**

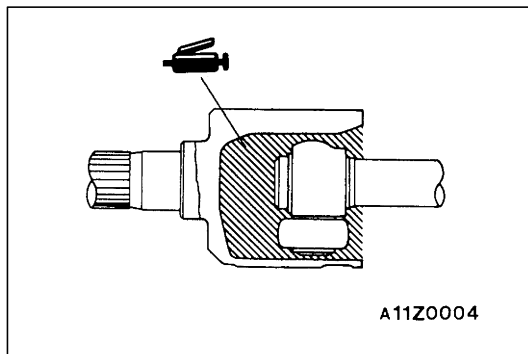
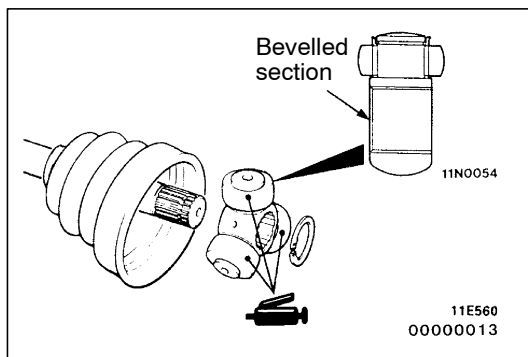
1. Wipe off grease from the spider assembly and the inside of the T.J. case.
2. Always clean the spider assembly when the grease contains water or foreign material.

Caution

Do not disassemble the spider assembly.

◀B▶ T.J. BOOT REMOVAL

1. Wipe off grease from the shaft spline.
2. When reusing the T.J. boot, wrap plastic tape around the shaft spline to avoid damaging the boot.

**REASSEMBLY SERVICE POINTS****▶A◀ SPIDER ASSEMBLY/T.J. CASE INSTALLATION**

1. Apply the specified grease furnished in the repair kit to the spider assembly between the spider axle and the roller.

Specified grease: Repair kit grease**Caution**

- (1) **The drive shaft joint uses special grease. Do not mix old and new or different types of grease.**
- (2) **If the spider assembly has been cleaned, take special care to apply the specified grease.**

2. Install the spider assembly to the shaft from the direction of the spline bevelled section.
3. After applying the specified grease to the T.J. case, insert the drive shaft and apply grease one more time.

Specified grease: Repair kit grease

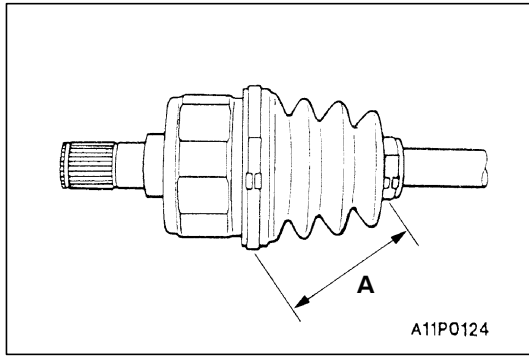
Amount to use: 120 ± 10 g

NOTE

The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.

Caution

The drive shaft joint uses special grease. Do not mix old and new or different types of grease.



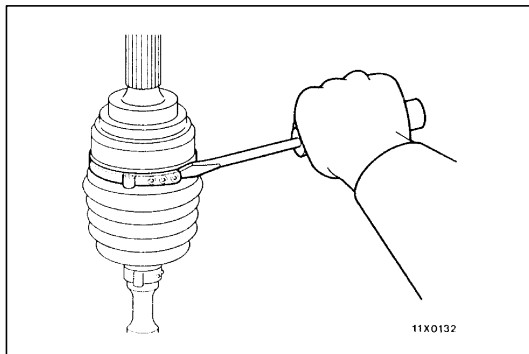
►B◄ T.J. BOOT BAND (SMALL)/T.J. BOOT BAND (LARGE) INSTALLATION

Set the T.J. boot bands at the specified distance in order to adjust the amount of air inside the T.J. boot, and then tighten the T.J. boot bands securely.

Standard value (A): 85±3 mm

INSPECTION

- Check the drive shaft for damage, bending or corrosion.
- Check the drive shaft spline part for wear or damage.
- Check the spider assembly for roller rotation, wear or corrosion.
- Check the groove inside T.J. case for wear or corrosion.
- Check the boots for deterioration, damage or cracking.
- Check the dust cover for damage or deterioration.



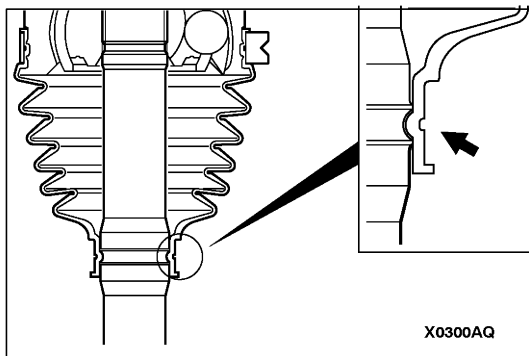
B.J. BOOT (RESIN BOOT) REPLACEMENT

1. Remove the B.J. boot bands (large and small).

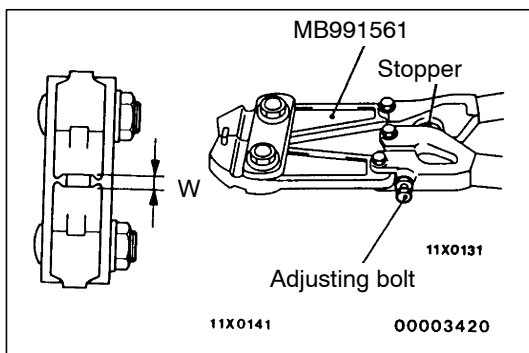
NOTE

The B.J. boot bands cannot be re-used.

2. Remove the B.J. boot.
3. Wrap a plastic tape around the shaft spline, and assemble the B.J. boot band and B.J. boot.



4. Install the groove in the center of the small diameter part of the resin boot by fitting to the groove of the shaft.



5. Turn the adjusting bolt on the special tool so that the size of the opening (W) is at the standard value.

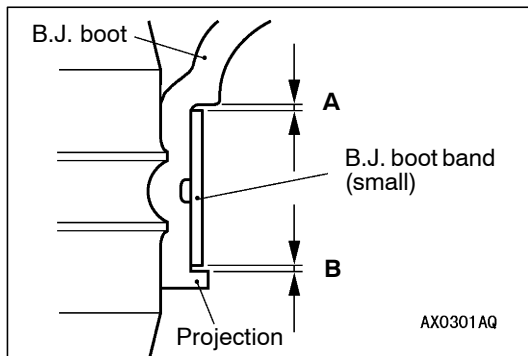
Standard value (W): 2.9 mm

- <If it is larger than 2.9 mm>
Tighten the adjusting bolt.
- <If it is smaller than 2.9 mm>
Loosen the adjusting bolt.

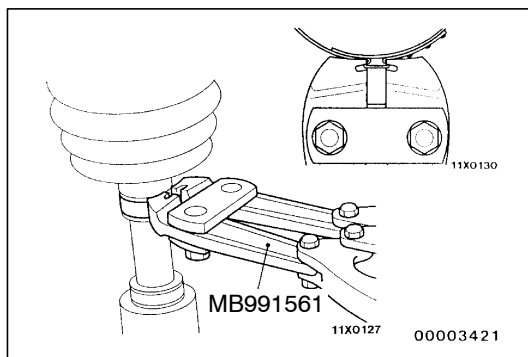
NOTE

- (1) The value of W will change by approximately 0.7 mm for each turn of the adjusting bolt.

- (2) The adjusting bolt should not be turned more than once.



6. Install the boot band (small) in order to create clearance as A and B in the illustration.



7. Use the special tool to crimp the B.J. boot band (small).

Caution

- (1) **Secure the drive shaft in an upright position and clamp the part of the B.J. boot band to be crimped securely in the jaws of the special tool.**
- (2) **Crimp the B.J. boot band until the special tool touches the stopper.**
8. Check that the crimping amount (C) of the B.J. boot band is at the standard value.

Standard value (C): 2.4 - 2.8 mm

<If the crimping amount is larger than 2.8 mm>
Readjust the value of (W) in step 5 according to the following formula, and then repeat the operation in step 7.

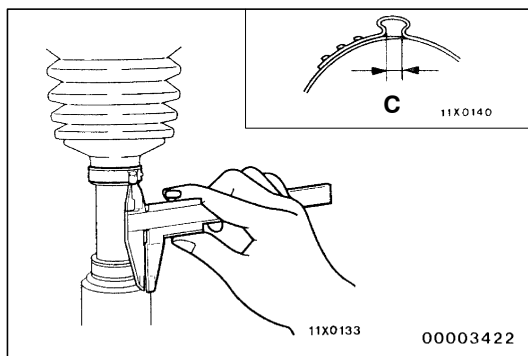
$$W = 5.5 \text{ mm} - C$$

Example: If C = 2.9 mm, then W = 2.6 mm.

<If the crimping amount is smaller than 2.4 mm>
Remove the B.J. boot band, readjust the value of (W) in step 5 according to the following formula, and then repeat the operations in steps 6 and 7 using a new B.J. boot band.

$$W = 5.5 \text{ mm} - C$$

Example: If C = 2.3 mm, then W = 3.2 mm.



9. Check that the B.J. boot band is not sticking out past the place where it has been installed.

If the B.J. boot band is sticking out, remove it and then repeat the operations in steps 6 to 8 using a new B.J. boot band.

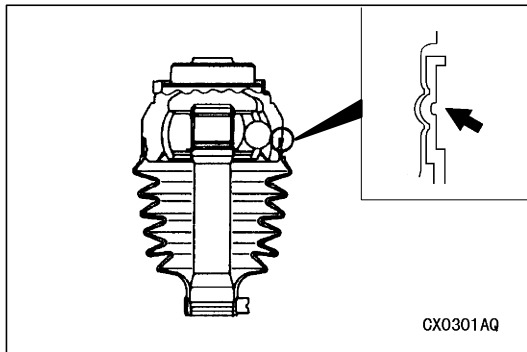
10. Fill the inside of the B.J. boot with the specified amount of the specified grease.

Specified grease: Repair kit grease

Amount to use: 110 ± 10 g

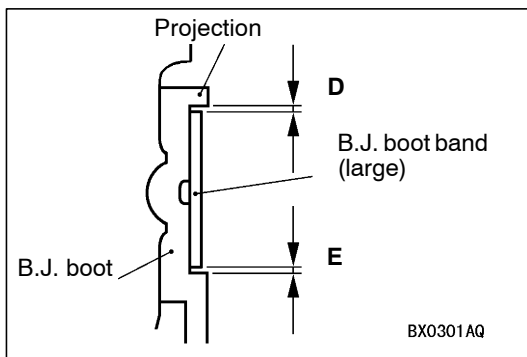
Caution

The drive shaft joint uses special grease. Do not mix old and new or different types of grease.

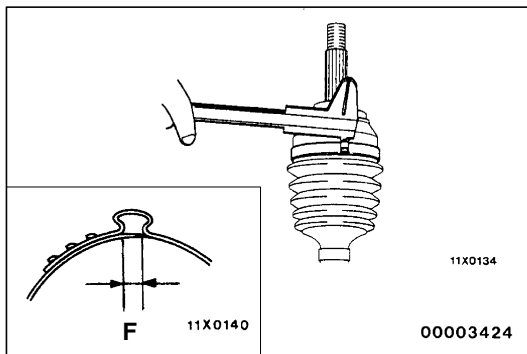


11. Install the groove in the center of the large diameter part of the resin boot by fitting to the groove of the shaft.
 12. Follow the same procedure as in step 5 to adjust the size of the opening (W) on the special tool so that it is at the standard value.

Standard value (W): 3.2 mm



13. Install the boot band (large) in order to create clearance as D and E in the illustration.
 14. Use the special tool to crimp the B.J. boot band (large) in the same way as in step 7.



15. Check that the crimping amount (F) of the B.J. boot band is at the standard value.

Standard value (F): 2.4 - 2.8 mm

**<If the crimping amount is larger than 2.8 mm>
 Readjust the value of (W) in step 12 according to the following formula, and then repeat the operation in step 14.**

$$W = 5.8 \text{ mm} - F$$

Example: If $F = 2.9$ mm, then $W = 2.9$ mm.

**<If the crimping amount is smaller than 2.4 mm>
 Remove the B.J. boot band, readjust the value of (W) in step 12 according to the following formula, and then repeat the operations in steps 13 and 14 using a new B.J. boot band.**

$$W = 5.8 \text{ mm} - F$$

Example: If $F = 2.3$ mm, then $W = 3.5$ mm.

16. Check that the B.J. boot band is not sticking out past the place where it has been installed.
 If the B.J. boot band is sticking out, remove it and then repeat the operations in steps 13 to 15 using a new B.J. boot band.

NOTES

REAR AXLE

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GENERAL INFORMATION

The rear axle consists of rear hubs, wheel bearings, drive shafts, and rear differential and, it has the following features.

- The wheel bearing is a unit bearing (double-row angular contact ball bearing).
- The drive shaft incorporates B.J.-T.J. type constant velocity joints with high transmission efficiency and low vibration and noise.

- ABS rotors for detecting the wheel speeds are press-fitted to the B.J. outer wheels in vehicles with ABS or ACD.

NOTE

1. B.J.: Birfield Joint
2. T.J.: Tripod Joint

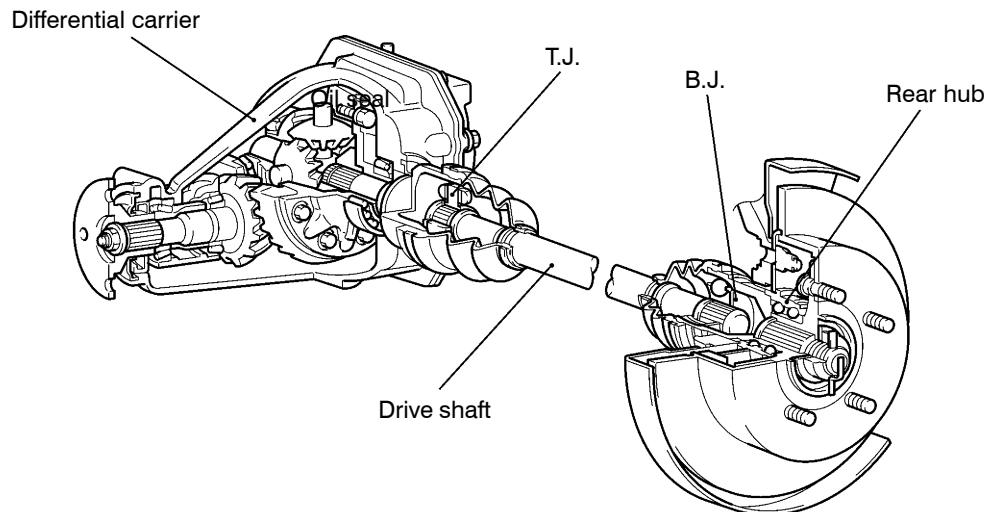
SPECIFICATIONS

Item		Vehicles without AYC	Vehicles with AYC	
Wheel bearings	Wheel bearing type	Unit bearing (Double-row angular contact ball bearing)		
	Bearing (outside diameter × inside diameter) mm	78 × 40		
Drive shaft	Joint type	Outside	B.J.	
		Inside	T.J.	
	Shaft length*1 × Shaft diameter mm	Left	483 × 25	426 × 25
		Right	573 × 25	446 × 25

NOTE

*1: The shaft length indicates the length between the center points of each joint.

STRUCTURAL DIAGRAM



AY1837AU

SERVICE SPECIFICATIONS

Item		Standard value	Limit	
Rear axle total backlash mm		-	6	
Wheel bearing rotation starting torque N·m		-	1.0	
Wheel bearing axial play mm		-	0.05 or less	
Wheel bearing rotary-sliding resistance N		-	22 or less	
TJ boot assembly dimension mm		90 ± 3	-	
Drive gear backlash mm		0.11 – 0.16	-	
Drive gear runout mm		-	0.05	
Drive pinion turning torque N·m	Without oil seal	0.88 – 1.17	-	
	With oil seal	Companion flange (oil seal contacting area) with anti-rust agent	0.98 – 1.27	
		Companion flange (oil seal contacting area) with gear oil applied	0.49 – 0.58	
Vehicles with mechanical LSD	Right-to-left difference in combined thickness of friction plate and friction disc mm		0 – 0.05	
	Clearance between spring plate and differential case mm		0.06 – 0.25	
	LSD differential torque N·m	When new clutch plate is installed	5 – 19	
		When existing clutch plate is installed	2 – 19	
	Distortion of friction plate and friction disc mm		-	0.08
	Difference in thickness between friction plate, friction disc, and spring plate mm		-	0.1
Vehicles with ACD and AYC	Pressure generated by hydraulic unit (pressure sensor value) MPa		0.9 – 1.1	

LUBRICANTS

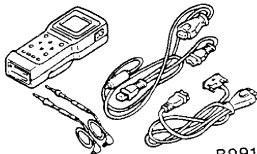
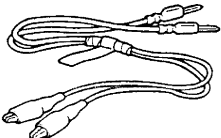
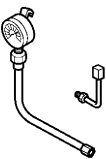
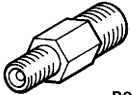
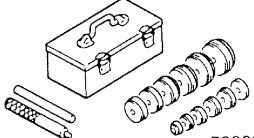
Item		Specified lubricants	Quantity
Vehicles with mechanical LSD	Gear oil	Hypoid gear oil MITSUBISHI Genuine Gear Oil Part No. 8149630 EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W - 90) or equivalent	0.55 L
Vehicles with ACD and AYC	Gear oil	Differential	Hypoid gear oil API classification GL-5 or higher SAE viscosity No.90, 80W
		Torque transfer mechanism	ATF-SP

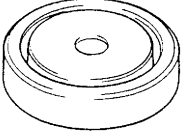
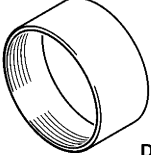
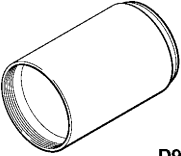
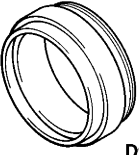
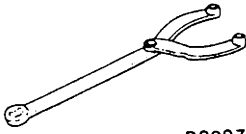
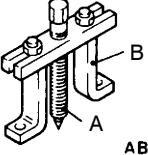
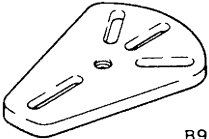
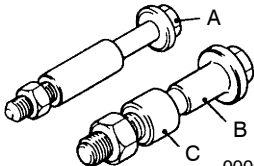
Item		Specified lubricants	Quantity
Vehicles with ACD and AYC	Hydraulic piping fluid	ATF-SP	1 L
	Torque transfer mechanism oil seal lips	Vaseline	As required
B.J. joint		Repair kit grease	85 ± 10 g
T.J. joint		Repair kit grease	105 ± 10 g


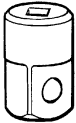
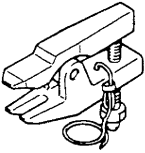
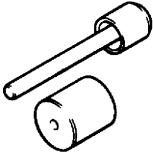
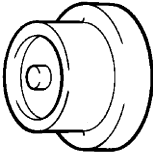

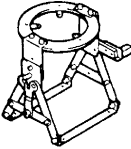
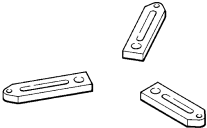

SEALANTS

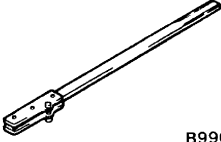
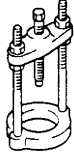
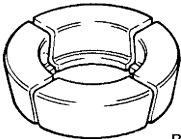
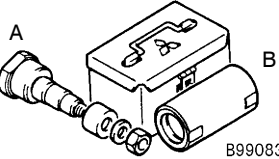
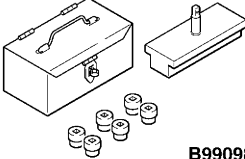
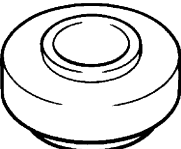
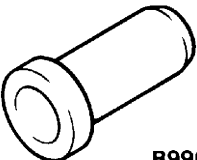
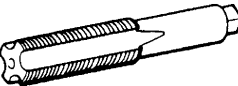
Items		Specified sealants	Remarks
Vehicles with mechanical LSD	Vent plug	3M ATD Part No. 8661, 8663 or equivalent	Semi-drying sealant
	Differential cover assembly		
Vehicles with ACD and AYC	Vent plug		
	Differential carrier cover mounting part		
Vehicles with mechanical LSD	Drive gear and differential case mounting part	3M Stud Locking 4170 or equivalent	Anaerobic sealant

SPECIAL TOOLS

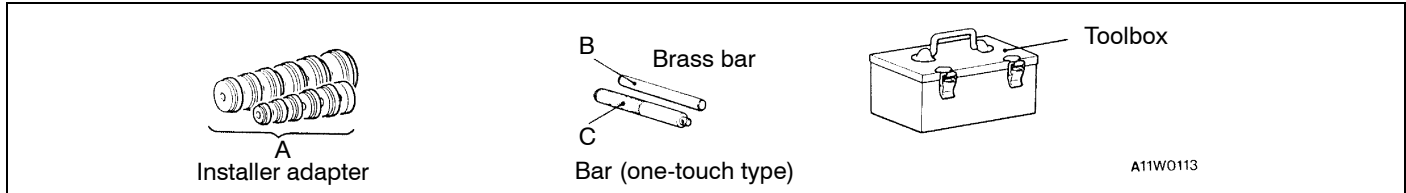
Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub assembly	Inspection of AYC (diagnosis display by MUT-II)
 B991529	MB991529	Diagnosis code check harness	Inspection of AYC (diagnosis display by ACD mode indicator lamp)
 D998330	MD998330 (MD998331)	Oil pressure gauge	Hydraulic pressure measurement <vehicles with AYC>
 B991705	MB991705	Hose adapter	
 B990925	MB990925	Bearing and oil seal installer set	Removal of wheel bearing

Tool	Number	Name	Use
 <p>B991115</p>	MB991115	Oil seal installer	Press-fitting of oil seal (AYC differential: used in combination with MB990938)
 <p>D998812</p>	MD998812	Installer cap	Press-fitting of oil seal (torque transfer mechanism of vehicles with AYC)
 <p>D998813</p>	MD998813	Installer100	
 <p>D998829</p>	MD998829	Installer adapter (60)	
 <p>B990767</p>	MB990767	Front hub and flange yoke holder	Removal, installation of the drive shaft nut
 <p>AB990241</p>	MB990241 A: MB990242 B: MB990244	Rear axle shaft puller A: Puller shaft B: Puller bar	<ul style="list-style-type: none"> ● Removal of drive shaft ● Removal of rear hub assembly
 <p>B991354</p>	MB991354	Puller body	
 <p>00005697</p>	A: MB991017 B: MB990998 C: MB991000	A,B: Front hub remover and installer C: Spacer	<ul style="list-style-type: none"> ● Temporary fixing of wheel bearing ● Measurement of wheel bearing rotation starting torque ● Measurement of wheel bearing axial play Use MB991000 (component of MB990998) for the spacer.

Tool	Number	Name	Use
	MB990685	Torque wrench	Measurement of the starting torque of wheel bearing
	MB990326	Preload socket	
 <p>B991113</p>	MB991113 or MB990635	Steering linkage puller	Disconnection of ball joint
 <p>B990641</p>	MB990641	Lower arm bush (A) remover & installer	Removal and press-fitting of differential support member bush
 <p>B991439</p>	MB991439	Bush remover & installer	Removal and press-fitting of differential support arm bush
 <p>B991460</p>	MB991460	Plug	Prevention of differential oil from being discharged and entry of foreign matter <AYC differential>
 <p>B990909</p>	MB990909	Working base	Supporting of the differential carrier
	MB991116	Adapter	Support of differential carrier assembly
 <p>B990810</p>	MB990810	Side bearing puller	<ul style="list-style-type: none"> ● Removal of the side bearing inner race ● Removal of the companion flange

Tool	Number	Name	Use
 <p>B990850</p>	MB990850	End yoke holder	<ul style="list-style-type: none"> ● Removal of the self-locking nut ● Adjustment of the drive pinion turning torque
 <p>B990339</p>	MB990339	Bearing puller	Drive pinion rear bearing inner race removal
 <p>B990374</p>	MB990648	Bearing remover	
 <p>B990835</p>	MB990835 A: MB990836 B: MB990392	Drive pinion setting gauge set A: Drive pinion gauge assembly B: Cylinder gauge	Adjustment of drive pinion height
 <p>B990988</p>	MB990988	Side gear holding tool set	Measurement of clutch plate preload (vehicles with mechanical LSD)
 <p>B990829</p>	MB990728	Side & rear bearing inner race installer	Press-fitting of drive pinion rear bearing inner race
 <p>B990727</p>	MB990727	Oil seal installer	Press-fitting of drive pinion oil seal
	MB990813	Tap	Removal of adhesive

	Number	Name	O.D. mm
	MB990551	Box	–
	MB990989	Base	–
	MB990990	Tool A	25
	MB990991	Tool B	28
	MB990992	Tool C	31



	Tool number	O.D. mm		Tool number	O.D. mm
A	MB990926	39	A	MB990933	63.5
	MB990927	45		MB990934	67.5
	MB990928	49.5		MB990935	71.5
	MB990929	51		MB990936	75.5
	MB990930	54		MB990937	79
	MB990931	57	B	MB990938	-
	MB990932	61	C	MB990939	-

TROUBLESHOOTING <AYC>

BASIC TROUBLESHOOTING CONDITIONS

Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.

NOTE

Before starting the troubleshooting procedure, make sure that the following items have been checked okay.

- The correct steering wheel has been properly installed in the neutral position of the steering column shaft.
- Tire and wheel sizes are correct with correct specifications. Inflation pressure, balance, and wear conditions are okay.
- Wheel alignment is correct.
- The engine, suspension, and other parts have not been remodeled so as to affect the AYC system.

DIAGNOSIS FUNCTION

READING THE DIAGNOSIS CODES

Read the diagnosis code using MUT-II or ACD mode indicator lamp. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)

NOTE

Connect the MUT-II to the 16-pin diagnosis connector.

ERASING THE DIAGNOSIS CODES

Connect the MUT-II to the 16-pin diagnosis connector and erase the diagnosis code. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)

Caution

Turn the ignition switch to the **LOCK (OFF)** position before connecting or disconnecting the MUT-II.

INSPECTION CHART FOR DIAGNOSIS CODE

Diagnosis code No.	Diagnosis items	Reference page
12	Power supply voltage (valve power supply) system	Refer to GROUP 22.
	open- or short-circuit	
13	Failsafe relay system <inside of 4WD-ECU>	
	open- or short-circuit	
21	FR wheel speed sensor system	
	open- or short-circuit	
22	FL wheel speed sensor system	
	open- or short-circuit	
23	RR wheel speed sensor system	
	open- or short-circuit	
24	RL wheel speed sensor system	
	open- or short-circuit	
25	Wrong-diameter tire	
26	Wheel speed sensor (faulty output signal)	
31	Steer sensor (ST-1, ST-2, ST-N) system	
	open- or short-circuit	
32	Steer sensor (ST-N) system	
33		
	fixed	
34	Steer sensor (ST-1, ST-2) system	
	short-circuit or output fixed	
41	TPS system	
		open-circuit or ground
42		
	short-circuit	
45	Pressure sensor system	
		open-circuit or ground
46		open earth
47		
	abnormal power supply	
51	G sensor (longitudinal) system	
		open- or short-circuit
52		
	defective sensor	
56	G sensor (lateral) system	
		open- or short-circuit
57		
	defective sensor	

Diagnosis code No.	Diagnosis items		Reference page
61	Stop lamp switch system	open-circuit	Refer to GROUP 22.
62	ACD mode changeover switch	stuck	
63	Parking brake switch system	short-circuit or not returned	
65	ABS monitor system	open-circuit or defective ABS	
71	Proportioning valve <AYC> system	open- or short-circuit	27B-11
72	Directional control valve (right) system	open- or short-circuit	27B-12
73	Directional control valve (left) system	open- or short-circuit	27B-13
74	Proportioning valve <ACD> system	open- or short-circuit	Refer to GROUP 22.
81	Electric pump relay system	open- or short-circuit	
82		electric pump malfunction or pressure sensor defect	
84	AYC control error		—
85	ACD control error		Refer to GROUP 22.

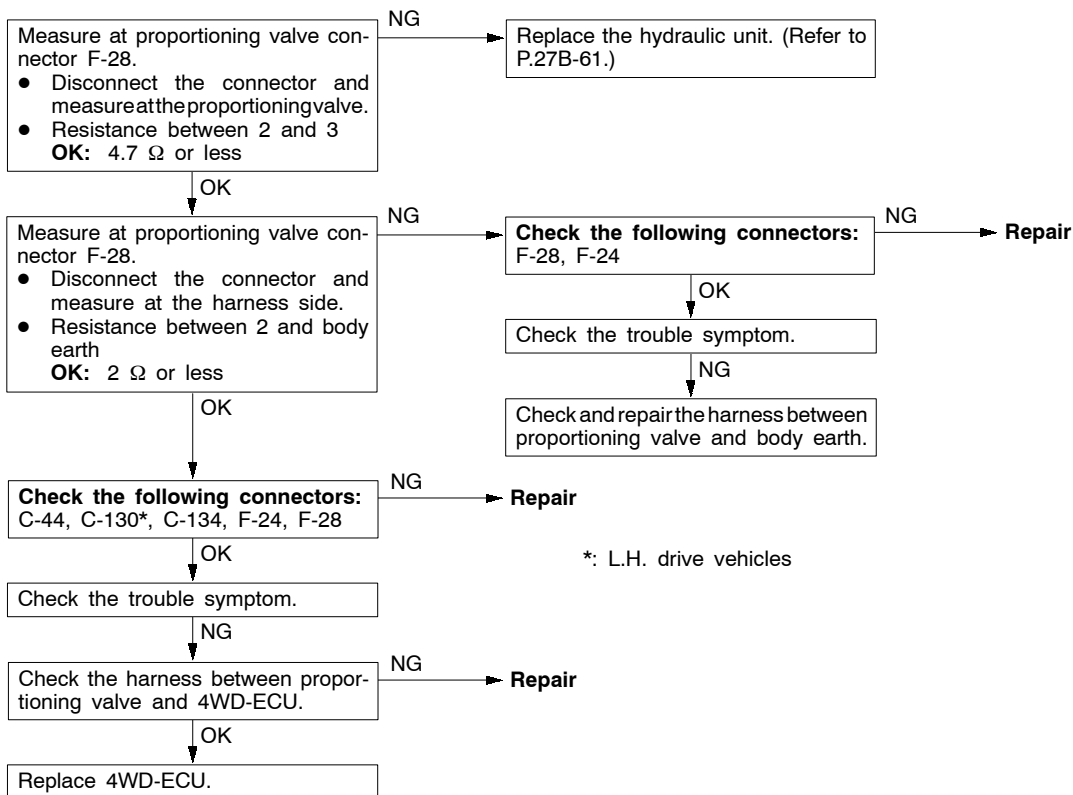
NOTE

Code No.84 is not a code number output due to malfunction, but a code number output when control for the 4WD-ECU to protect the AYC is stopped in excessive driving. AYC control can be recovered by turning the ignition switch ON to OFF to ON.

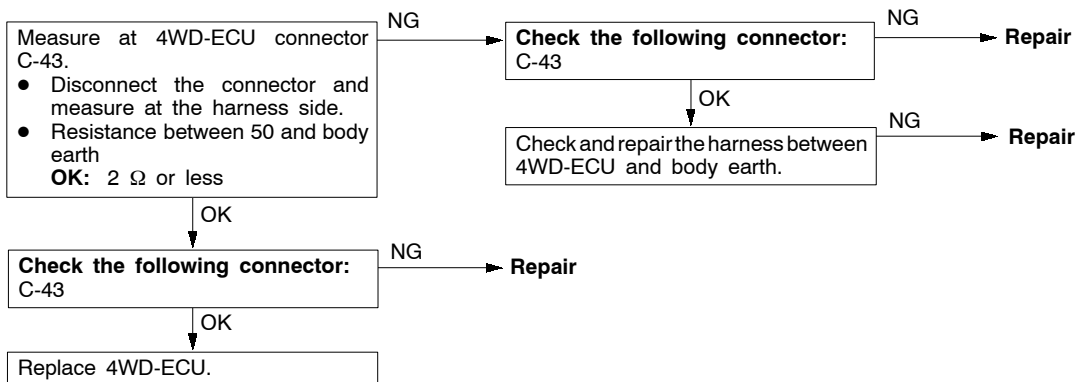
INSPECTION PROCEDURES FOR DIAGNOSIS CODES

Code No. 71 Proportioning valve system	Probable cause
This code is output when the proportioning valve control circuit is open- or short-circuited.	<ul style="list-style-type: none"> ● Defective proportioning valve ● Defective harness or connector ● Defective 4WD-ECU

<Vehicles with ACD + AYC>

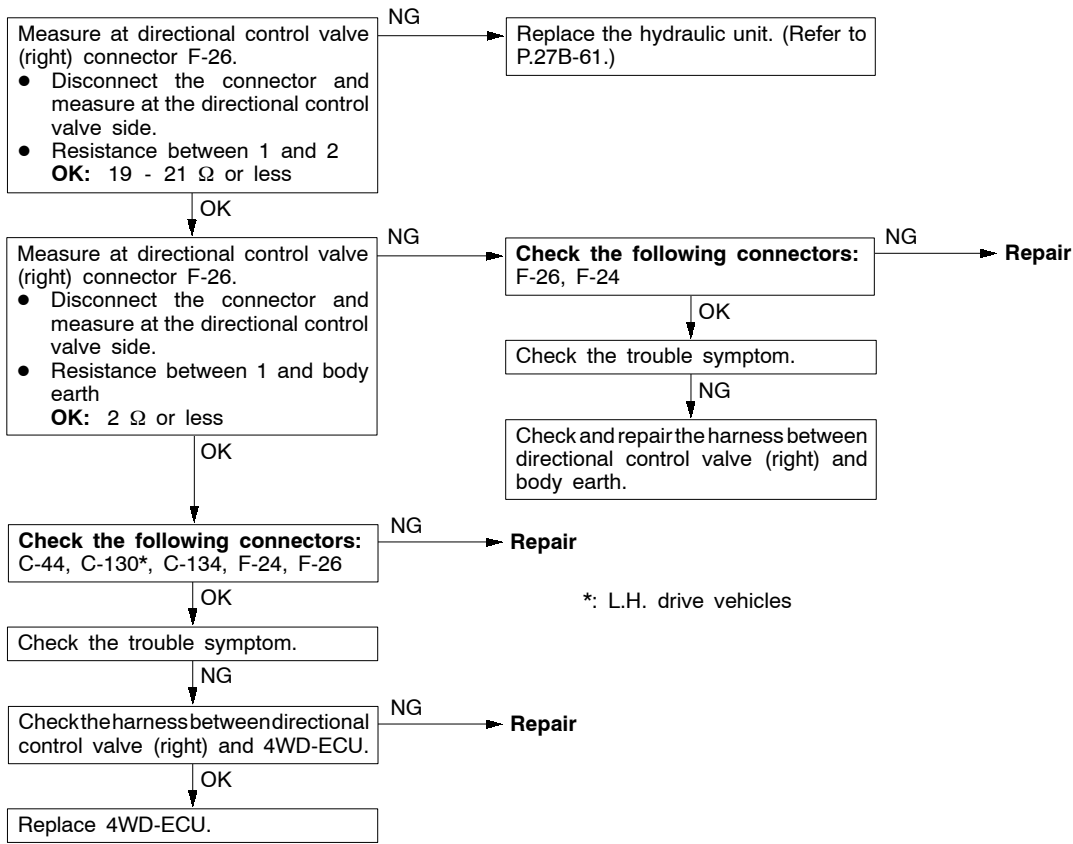


<Vehicles with ACD>

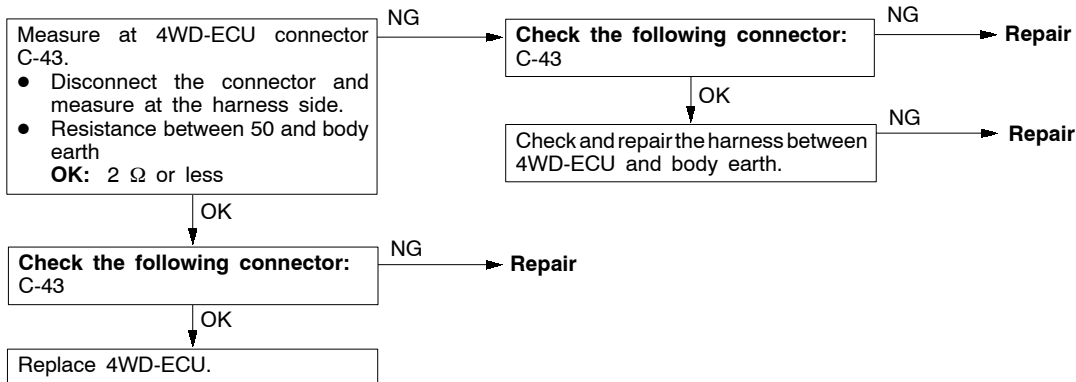


Code No. 72 Directional control valve (right) system	Probable cause
This code is output when the directional control valve (right) control circuit is open or short-circuited.	<ul style="list-style-type: none"> ● Defective directional control valve (right) ● Defective harness or connector ● Defective 4WD-ECU

<Vehicles with ACD + AYC>

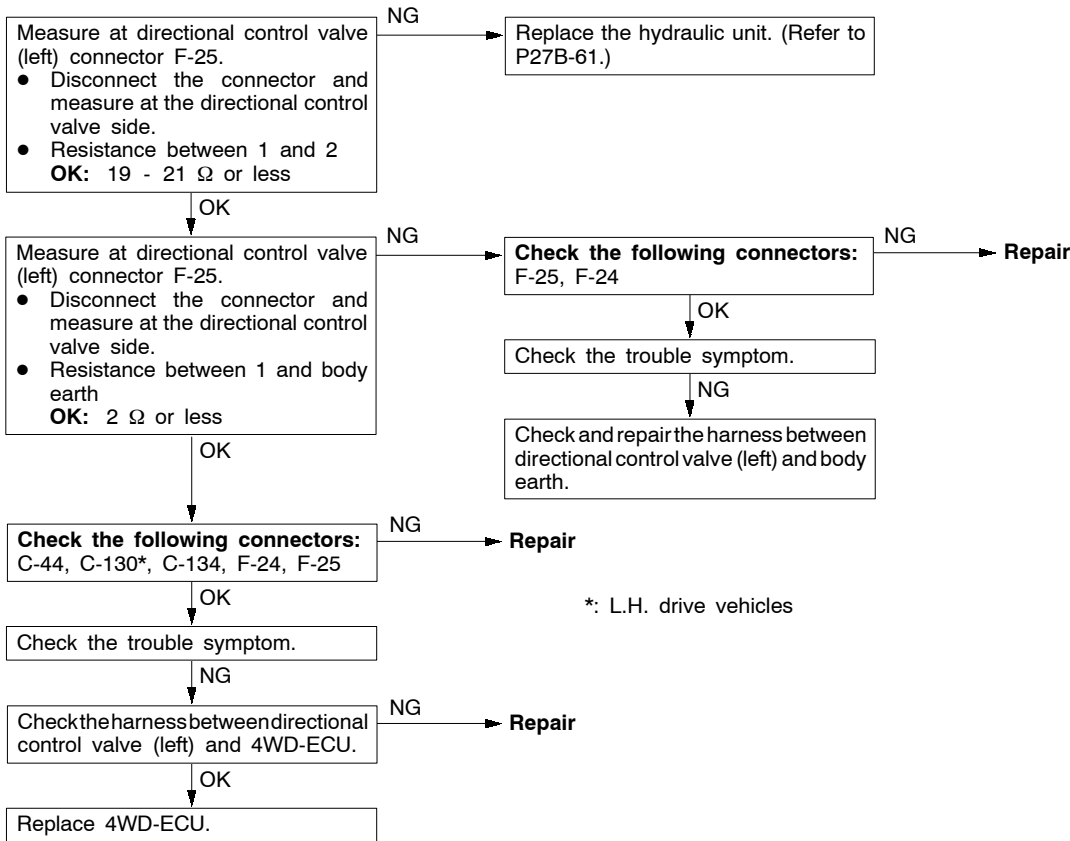


<Vehicles with ACD>

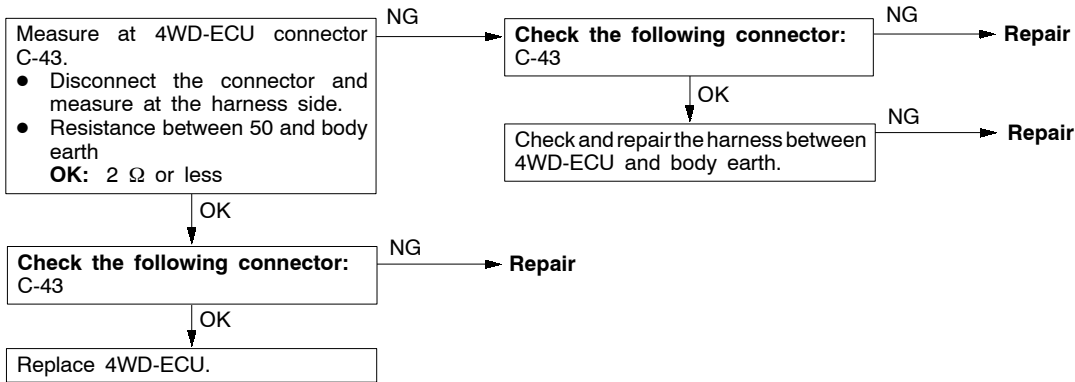


Code No. 73 Directional control valve (left) system	Probable cause
This code is output when the directional control valve (left) control circuit is open- or short-circuited.	<ul style="list-style-type: none"> ● Defective directional control valve (left) ● Defective harness or connector ● Defective 4WD-ECU

<Vehicles with ACD + AYC>



<Vehicles with ACD>



INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure No.	Reference page
Communication between MUT-II and the whole system is not possible.	1	Refer to GROUP 22.
Communication between MUT-II and 4WD-ECU is not possible.	2	
3 ACD mode indicator lamps do not light up when the ignition key is turned to "ON" (engine stationary).	3	
3 ACD mode indicator lamps remain lit up after the engine has started.	4	
AYC is inoperative. Unable to start or accelerate on slippery road surfaces.	5	27B-14
Rear tires are noisy during low-speed cornering. Vehicle skews.	6	27B-15
Noise is produced from the torque transfer differential during turning.	7	27B-15

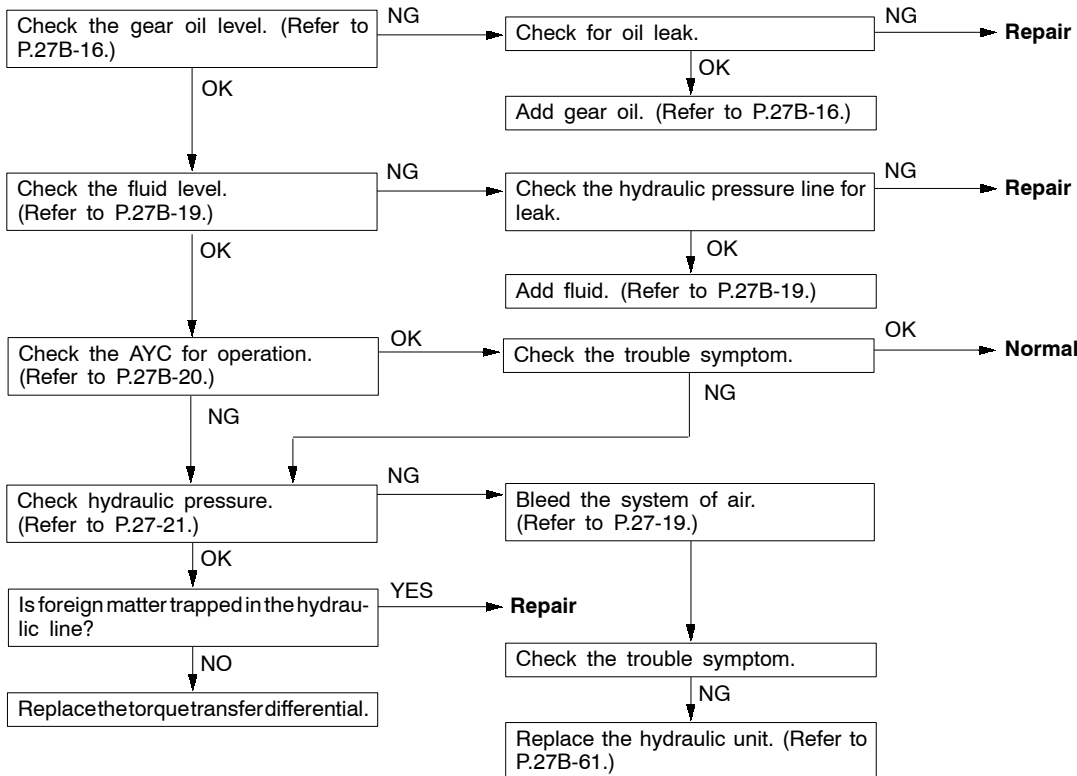
INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 5

AYC is inoperative. Unable to start or accelerate on slippery road surfaces.	Probable cause
The hydraulic oil level is probably low, there is an oil leak, the hydraulic unit is defective, or the torque transfer differential is defective.	<ul style="list-style-type: none"> • Low hydraulic oil level • Oil leak • Defective hydraulic unit • Defective torque transfer differential

NOTE

This symptom is limited only when the diagnosis code is correct.

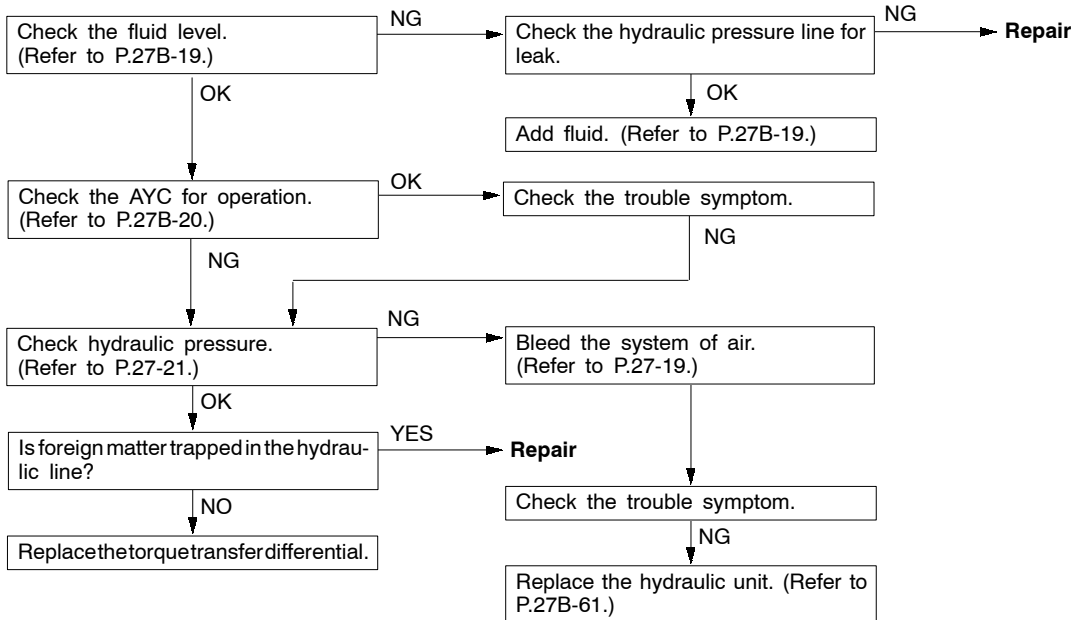


INSPECTION PROCEDURE 6

Rear tires are noisy during low-speed cornering. Vehicle skews.	Probable cause
The hydraulic unit or torque transfer differential is probably defective.	<ul style="list-style-type: none"> ● Defective hydraulic unit ● Defective torque transfer differential

NOTE

This symptom is limited only when the diagnosis code is correct.

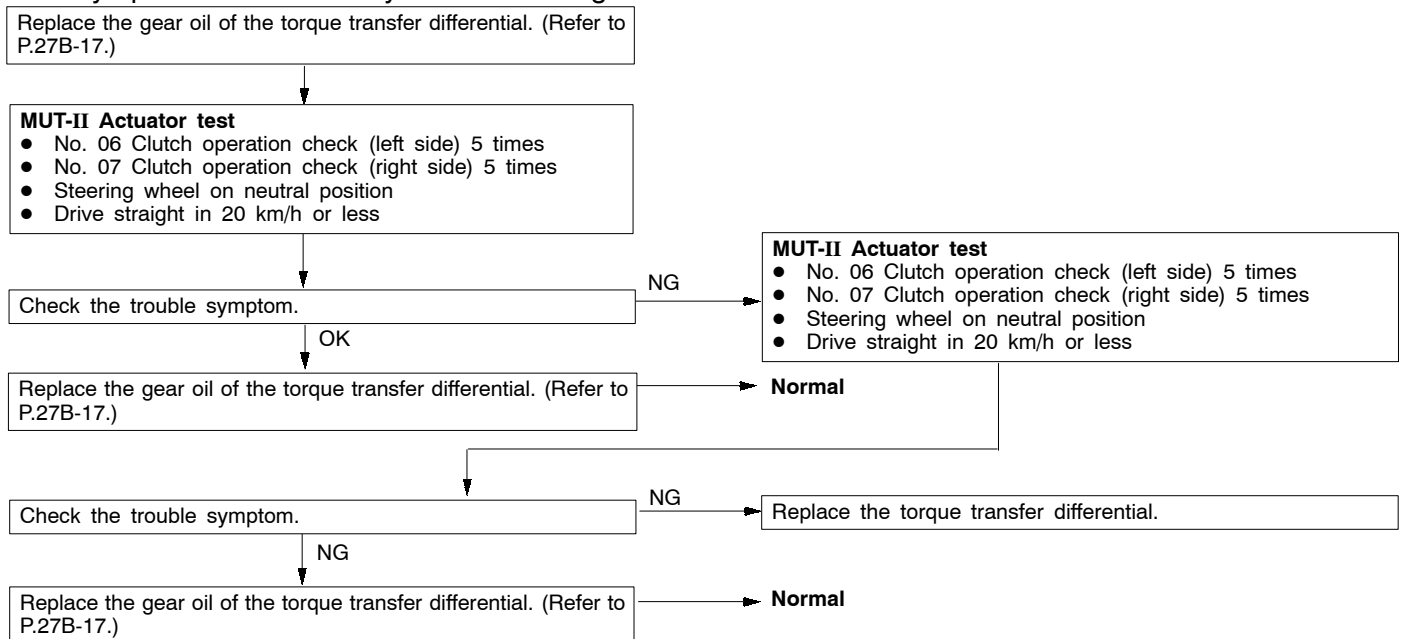


INSPECTION PROCEDURE 7

Noise is produced from the torque transfer differential during turning	Probable cause
The torque transfer differential is probably defective.	<ul style="list-style-type: none"> ● Defective torque transfer differential

NOTE

This symptom is limited only when the diagnosis code is correct.



DATA LIST REFERENCE TABLE

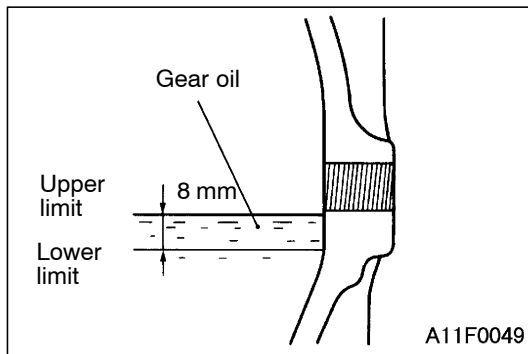
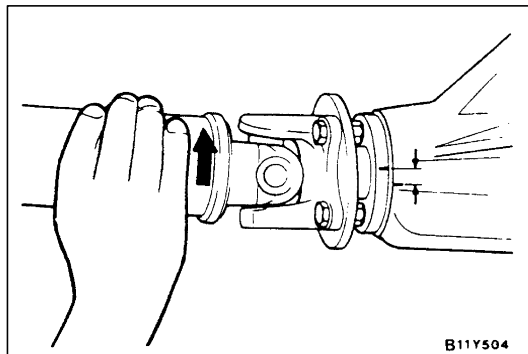
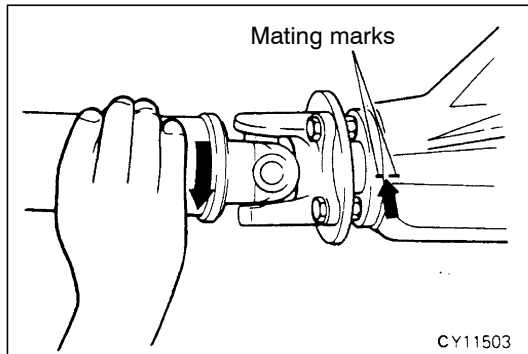
For check, refer to GROUP 22.

ACTUATOR TEST REFERENCE TABLE

For check, refer to GROUP 22.

CHECK AT 4WD-ECU TERMINALS

For check, refer to GROUP 22.

**ON-VEHICLE SERVICE****REAR AXLE TOTAL BACKLASH CHECK**

1. Park the vehicle on a flat, level surface.
2. Move the transmission control lever to the neutral position. Apply the parking brake. Raise the vehicle on a jack.
3. Turn the companion flange clockwise as far as it will go. Make the mating mark on the dust cover of the companion flange and on the differential carrier.
4. Turn the companion flange anti-clockwise as far as it will go, and measure the amount of distance the mating marks moved.

Limit: 6 mm

5. If the backlash exceeds the limit value, replace the differential carrier assembly.

GEAR OIL LEVEL CHECK

<Vehicles with mechanical LSD>

1. Remove the filler plug.
2. Check that the gear oil level is within the specified range from the bottom end of the filler plug hole.
3. If the gear oil level exceeds the standard value, add the specified gear oil up to the bottom end of the filler plug hole.

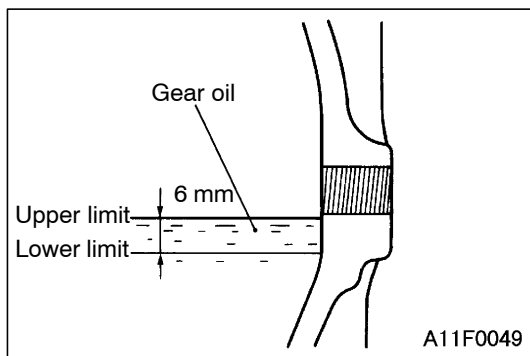
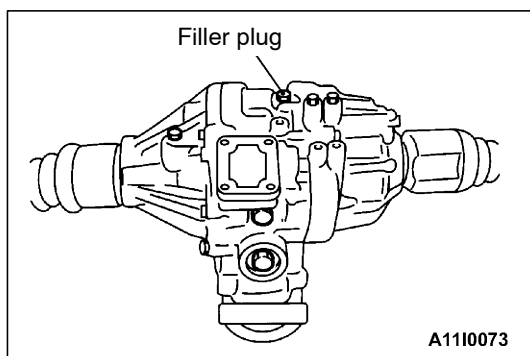
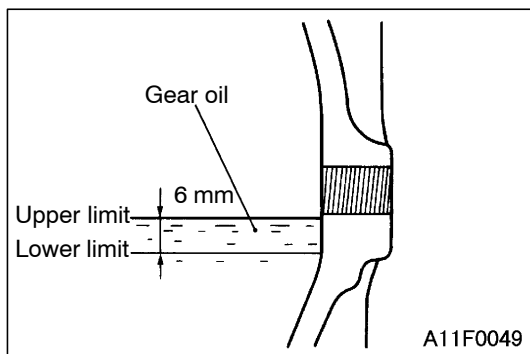
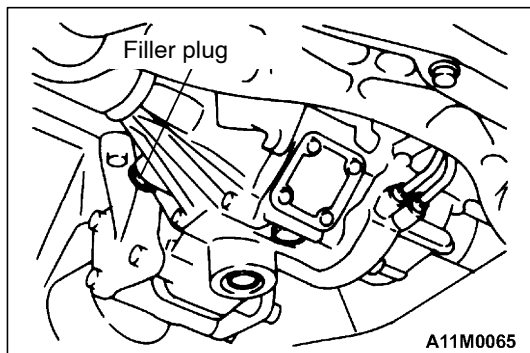
Specified gear oil:

Hypoid gear oil

MITSUBISHI Genuine Gear Oil Part No. 8149630 EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W - 90) or equivalent

4. Fit the filler plug and tighten it to the specified torque.

Tightening torque: 49 ± 9 N·m

**<Vehicles with AYC>****Differential part**

1. Remove the filler plug.
2. Check that the gear oil level is within the specified range from the bottom end of the filler plug hole.
3. If the gear oil level exceeds the standard value, add the specified gear oil up to the bottom end of the filler plug hole.

Specified gear oil:

**Hypoid gear oil API classification GL-5 or higher
SAE viscosity Number 90, 80W**

NOTE

10°C or more: SAE90, less than 10°C: SAE80W

4. Fit the filler plug and tighten it to the specified torque.

Tightening torque: 49 ± 9 N·m

Torque transfer mechanism part

1. Remove the filler plug.
2. Check that the gear oil level is within the specified range from the bottom end of the filler plug hole.
3. If the gear oil level exceeds the standard value, add the specified gear oil up to the bottom end of the filler plug hole.

Specified gear oil: ATF-SP III

4. Fit the filler plug and tighten it to the specified torque.

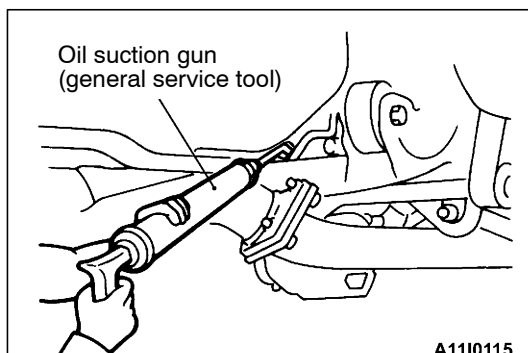
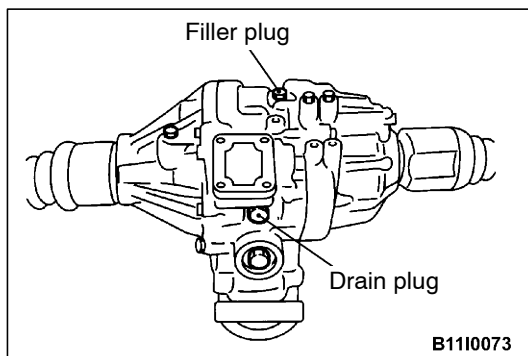
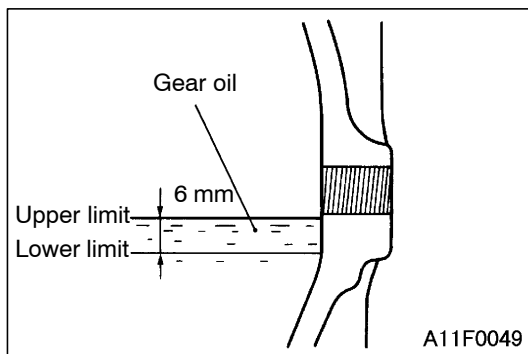
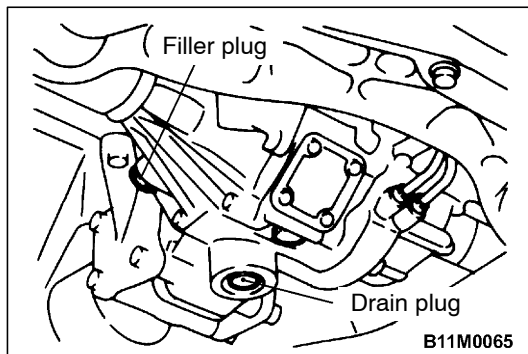
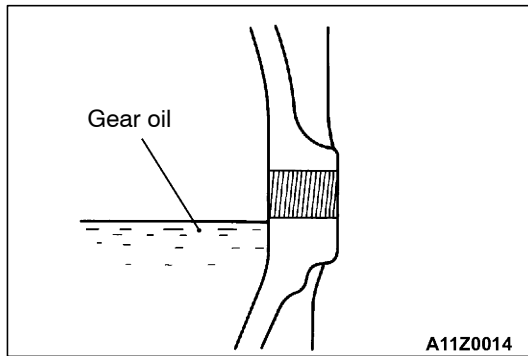
Tightening torque: 49 ± 9 N·m

GEAR OIL CHANGE**<Vehicles with mechanical LSD>**

1. Remove the drain plug to discharge the gear oil.
2. Fit the drain plug and tighten it to the specified torque.

Tightening torque: 49 ± 9 N·m

3. Remove the filler plug and add the specified gear oil up to the bottom end of the filler plug hole.

**Specified gear oil:****Hypoid gear oil**

MITSUBISHI Genuine Gear Oil Part No. 8149630 EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W - 90) or equivalent
Quantity: 0.55 L

4. Fit the filler plug and tighten it to the specified torque.

Tightening torque: 49 ± 9 N·m

<Vehicles with AYC>**Differential part**

1. Remove the drain plug to discharge the gear oil.
2. Fit the drain plug and tighten it to the specified torque.

Tightening torque: 49 ± 9 N·m

3. Remove the filler plug and add the specified gear oil up to the bottom end of the filler plug hole.

Specified gear oil:

Hypoid gear oil API classification GL-5 or higher
SAE viscosity Number 90, 80W
Quantity: 0.55 ± 0.02 L

NOTE

10°C or more: SAE90, less than 10°C: SAE80W

4. Fit the filler plug and tighten it to the specified torque.

Tightening torque: 49 ± 9 N·m

Torque transfer mechanism part

1. Remove the drain plug to discharge the gear oil.
2. Fit the drain plug and tighten it to the specified torque.

Tightening torque: 49 ± 9 N·m

3. Remove the filler plug.
4. Using the oil suction gun (general service tool), between the body and differential support arm, apply the specified gear oil up to the under of the filler plug hall.

Specified gear oil: ATF-SP III

Quantity: 0.65 - 0.7 L

5. Fit the filler plug and tighten it to the specified torque.

Tightening torque: 49 ± 9 N·m

FLUID LEVEL CHECK

1. Remove the maintenance lid located in the luggage compartment.
2. <Not using MUT-II>
If the vehicle has been run, leave it for 90 min. or more in an ordinary temperature (10°C – 30°C) to allow the accumulator internal pressure to drop.

NOTE

If the ambient temperature is 10°C or less, allow more time to leave the vehicle to stand idle.

<Using MUT-II>

Set MUT-II to 16 pin diagnostic connector. Turn the ignition switch to the ON position, operate MUT-II, drive the hydraulic unit (item No.03) forcibly, release the pressure in the accumulator.

Caution

Turn the ignition switch to the LOCK (OFF) position before connecting or disconnecting the MUT-II.

NOTE

- (1) To drive (oil level check mode) forcibly, turn the directional valve of the hydraulic unit 20 turns from side to side, release the differential automatically. Drive can also be cleared forcibly using the Clear key of MUT-II.
- (2) If the function has been stopped by fail safe, the hydraulic unit can not be cleared forcibly.

3. Check that the fluid level in the oil reservoir is in the range between MAX and MIN.
4. If the fluid level is lower than MIN, add the specified fluid.

Specified fluid: ATF-SP III

5. Reinstall the maintenance lid.

BLEEDING

1. Lift up the vehicle.
2. Set the MUT-II to the 16-pin diagnosis connector.

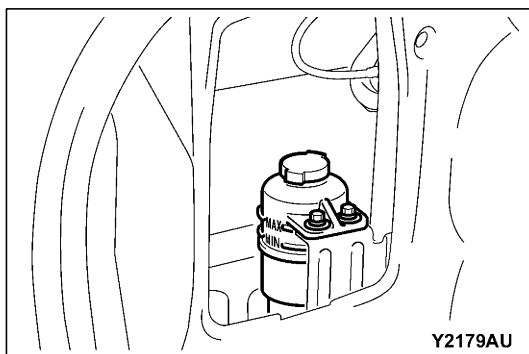
Caution

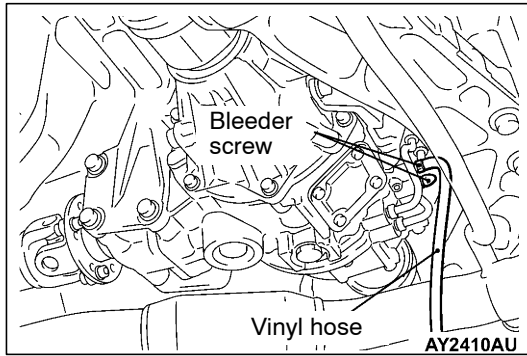
Turn the ignition switch to the LOCK (OFF) position before connecting or disconnecting the MUT-II.

3. Turn the ignition switch to the ON position.
4. Set the steering wheel in the straight-ahead position.
5. Operating the MUT-II, drive the hydraulic unit (item No.02) forcibly.

NOTE

- (1) Drive the bleeding mode forcibly for 5 minutes, release the operation automatically. Drive can also be cleared forcibly using the Clear key of MUT-II.
- (2) If the function has been stopped by fail safe, the hydraulic unit cannot be cleared forcibly.





6. Remove the cap of the left bleeder screw on the torque transfer differential and connect a vinyl hose.
7. Gradually turn the steering wheel clockwise from the straight-ahead position. At this time, loosen the left bleeder screw and check that fluid is discharged with air.
8. After air has been completely discharged, tighten bleeder screw and turn the steering wheel in the straight-ahead position.

Caution

While the system is being bled of air, add fluid as necessary to ensure that it is left in the oil reservoir during the entire procedure.

9. Repeat steps 6 and 7 two to three times until no air bubbles are recognized in the fluid that comes out. Then, tighten the bleeder screw to the specified torque.

Tightening torque: 9 ± 1 N·m

10. Perform steps 5 through 8 for the right bleeder screw. Note, however, that the steering wheel should be turned counterclockwise.
11. When removing the hydraulic unit, bleed the fluid line in ACD side. (Refer to GROUP 22 – On-vehicle Service.)
12. After the system has been completely bled of air, check for the fluid level. (Refer to P. 27B-19.)

Caution

If the system is not completely bled of air, the hydraulic unit could generate noise, degrading pump durability.

AYC OPERATION CHECK

1. Lift up the vehicles.
2. Set the MUT-II to the 16-pin diagnosis connector.

Caution

Turn the ignition switch to the LOCK (OFF) position before connecting or disconnecting the MUT-II.

3. Start the engine.
4. Set the gear to the 2nd gear or above, operate MUT-II, and check from the service data (Item No.09) that the wheel speed is within 10 km/h to 20 km/h.

NOTE

- (1) Set the steering wheel to the neutral position.
- (2) When turning the steering wheel, AYC operates continually (operation sound from the torque transfer differential), but it is not system fault. In this case, set the steering wheel to the neutral position, and perform the following operations in order to stop the ACD.
 - Release the clutch.
 - Set the gear to "Neutral".
 - Stop the engine.

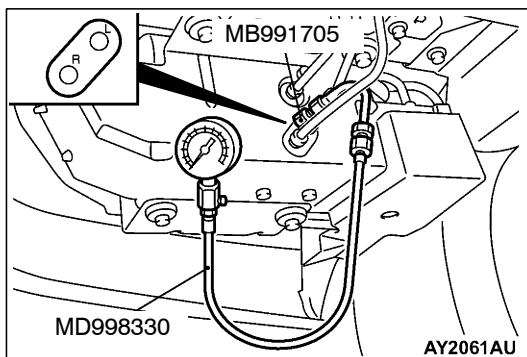
- Operate the MUT-II, drive the torque transfer differential (item No.06 and 07) forcibly.

NOTE

- Drive the clutch operating mode forcibly for 1 minutes, release the operation automatically. Drive can also be cleared forcibly using the Clear key of MUT-II.
 - If the hydraulic unit function has been stopped by fail-safe, the torque transfer differential cannot be forcibly driven.
- Operating the MUT-II, by service data (item no.07 and 08), check the condition of the wheel speed below.
 - <Driving item No.06 forcibly>
The left rear wheel is faster 2km/h than right rear wheel.
 - <Driving item No.07 forcibly>
The right rear wheel is faster 2km/h than left rear wheel.

NOTE

If the above are not satisfied, check the oil pressure as the system may be faulty.



OIL PRESSURE CHECK

- Lift up the vehicle.
- Set the MUT-II to the 16-pin diagnosis connector.

Caution

Turn the ignition switch to the LOCK (OFF) position before connecting or disconnecting the MUT-II.

- Turn the ignition switch to ON.
- Disconnect the hydraulic unit and the hydraulic unit hose assembly, connect the special tool to L port, put the lid to R port or connect the hydraulic unit hose assembly disconnected from L port to R port.
- Operating the MUT-II, drive the hydraulic unit forcibly (item No.02).

NOTE

- Drive the operation check mode of the clutch left side for 1 minutes, release the operation automatically. Drive can also be cleared forcibly using the Clear key of MUT-II.
 - If the function has been stopped by fail safe, the hydraulic unit cannot be cleared forcibly.
- Check that the generated oil pressure of the hydraulic unit satisfies the standard value.

Standard value: 0.9 – 1.1 MPa

Caution

While the oil pressure is checked, add fluid as necessary to ensure that it is left in the oil reservoir during the entire procedure.

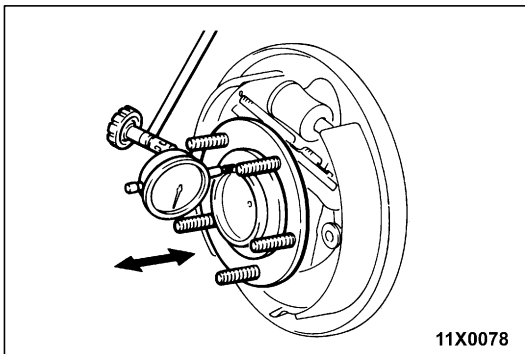
- Check the oil pressure of the clutch right side following step 4 through 6. Connect the special tool to R port, put the lid to L port or hydraulic unit hose assembly disconnected from R port to L port, use the MUT-II drive item No.07 (operation check mode of clutch right side) forcibly.

8. If the measured value exceeds the standard value, replace the hydraulic unit.
9. Connect the hydraulic unit and the hydraulic unit hose assembly, and connect the torque transfer differential and hydraulic unit hose assembly, tighten the flare nut in specified torque.

Tightening torque: $34 \pm 5 \text{ N}\cdot\text{m}$ (Thread is not lubricated)
 $26 \pm 4 \text{ N}\cdot\text{m}$ (Thread is lubricated)

10. Supply the specified fluid up to the MAX level of the oil reservoir, and bleed.

Specified fluid: ATF-SP III
Quantity: 1 L

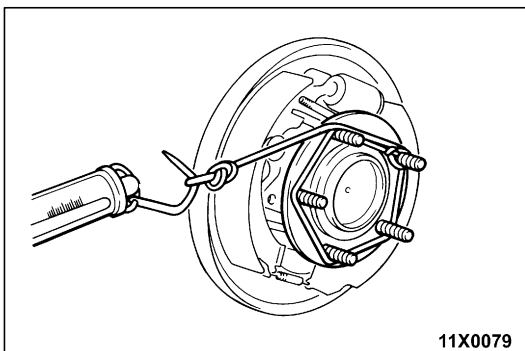


WHEEL BEARING AXIAL PLAY CHECK

1. Remove the brake caliper and brake disc.
2. Check the bearing's axial play.
Place a dial gauge against the hub surface; then move the hub in the axial direction and check whether or not there is axial play.

Limit: 0.05 mm

3. If the axial play exceeds the limit, the castle nut should be tightened to the specified torque $225 \pm 25 \text{ N}\cdot\text{m}$ and check the axial play again.
4. Replace the rear hub assembly if an adjustment cannot be made to within the limit.

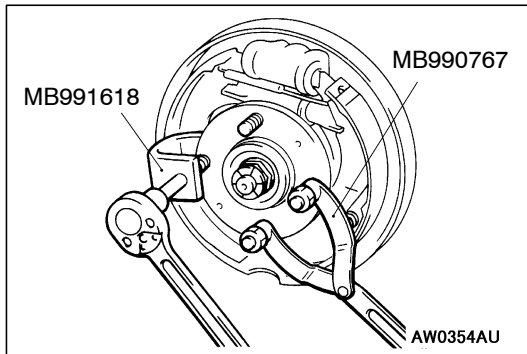


WHEEL BEARING ROTARY-SLIDING RESISTANCE CHECK

1. Remove the brake caliper and brake disc.
2. After turning the hub a few times to seat the bearing, wind a rope around the hub bolt and turn the hub by pulling at a 90° angle with a spring balance. Measure to determine whether or not the rotary-sliding resistance of the rear hub is at the limit value.

Limit: 22 N or less

3. If the limit value is exceeded, loosen the flange nut and then tighten it to the specified torque 225 ± 25 N·m and check the rear hub rotary sliding resistance again.
4. Replace the rear hub assembly if an adjustment cannot be made to within the limit.

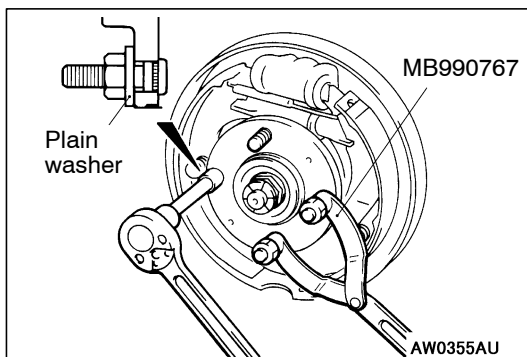


HUB BOLT REPLACEMENT

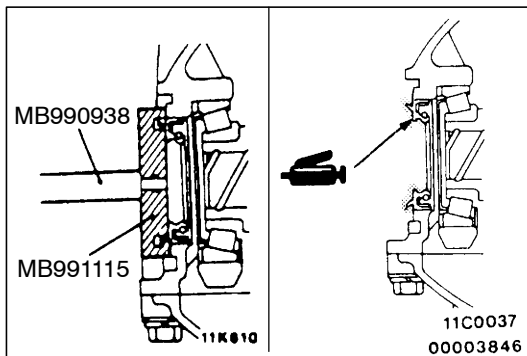
1. Remove the brake caliper and brake disc.
2. Use the special tools to remove the hub bolts.

NOTE

To retain a space for removing the hub bolts, remove near the retainer spring mounting position.



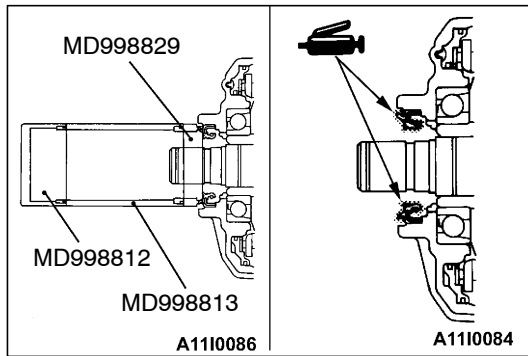
3. Install the plain washer to the new hub bolt, and install the bolt with a nut.



DIFFERENTIAL CARRIER OIL SEAL REPLACEMENT

Differential part

1. Remove the drive shaft. (Refer to P. 27B-29.)
2. Remove the oil seal from the differential carrier.
3. Using the special tool, drive a new oil seal all the way into position.
4. Coat the oil seal lips and the drive shaft surface in contact with the oil seal with multi-purpose grease.
5. Replace the drive shaft circlip with a new one and mount the drive shaft to the differential carrier. (Refer to P. 27B-29.)
6. Check for correct wheel alignment. (Refer to GROUP 34 – On-vehicle Service.)

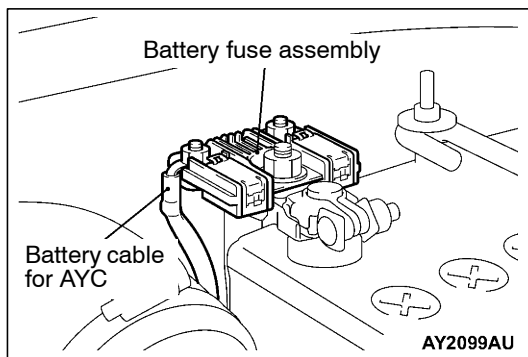


Torque transfer mechanism part

1. Remove the drive shaft. (Refer to P. 27B-29.)
2. Remove the oil seal from the differential carrier.
3. Using the special tool, drive a new oil seal all the way into position.
4. Coat the oil seal lips and the drive shaft surface in contact with the oil seal with the specified grease.

Specified grease: Vaseline

5. Replace the drive shaft circlip with a new one and mount the drive shaft to the differential carrier. (Refer to P. 27B-29.)
6. Check for correct wheel alignment. (Refer to GROUP 34 – On-vehicle Service.)



ACTION WHEN BATTERY RUNS OUT

When the engine is started using a booster cable where the battery has completely run down and you attempt to start the vehicle without waiting for the battery to recover a certain charge, the engine can misfire and you just cannot start to move it. In such cases, charge the battery sufficiently; or, remove the AYC battery cable from the battery fuse assembly to make AYC inactive before attempting to start the vehicles. When the battery cable is removed, the ACD mode indicator lamp lights up. After the battery has been recharged, fit the battery cable back again and start the engine to ensure that the ACD mode indicator lamp is off.

REAR HUB ASSEMBLY

REMOVAL AND INSTALLATION

Caution

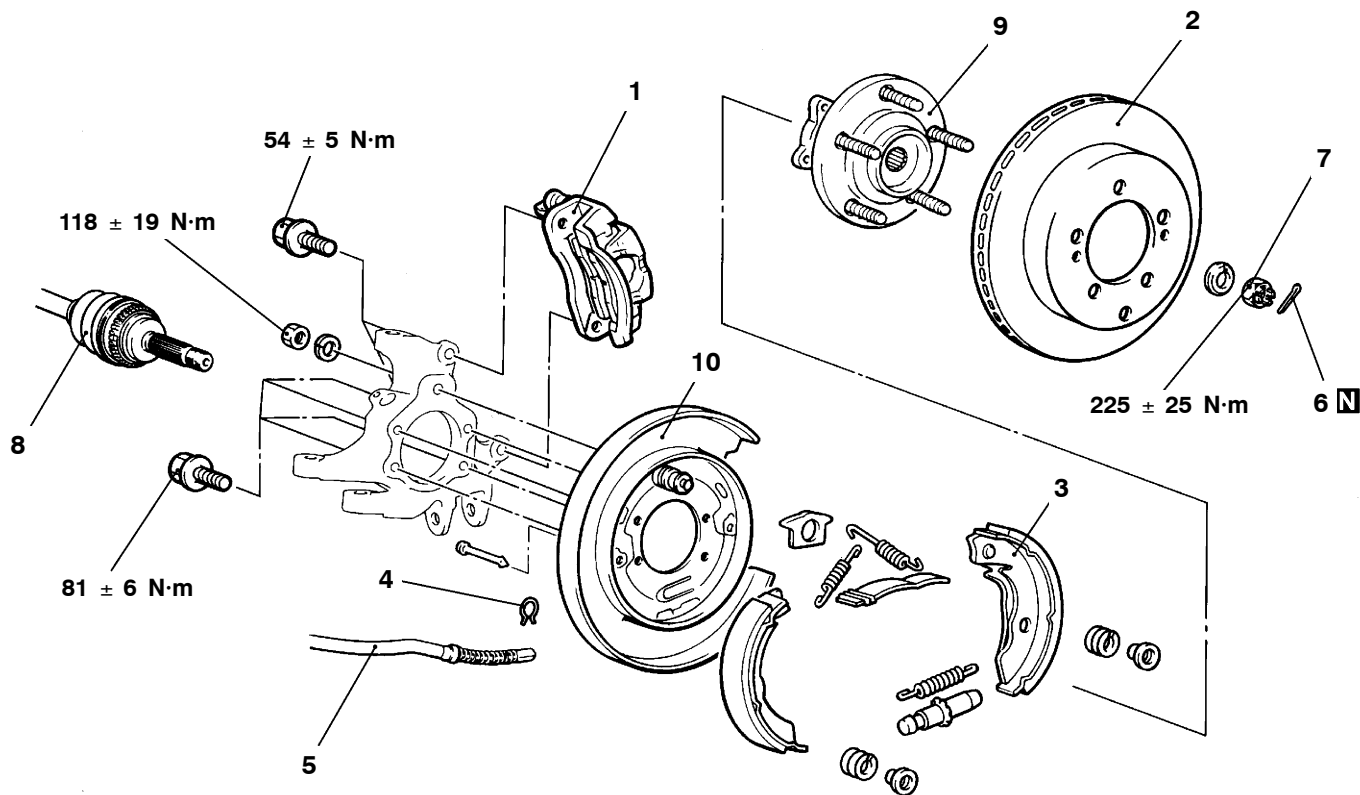
If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

Pre-removal Operation

Gear Oil Draining (Refer to P. 27B-17.)

Post-installation Operation

- Gear Oil Filling (Refer to P. 27B-17.)
- Parking Brake Lever Stroke Adjustment (Refer to GROUP 36 – On-vehicle Service.)



A14M0117

Removal steps



1. Rear brake caliper
2. Rear brake disc
3. Parking brake shoe & lining assembly (Refer to GROUP 36 - Parking Brake Drum.)
4. Clip



5. Parking brake cable connection
6. Split pin
7. Drive shaft pin
8. Rear drive shaft assembly
9. Rear hub assembly
10. Backing plate

REMOVAL SERVICE POINTS**◀A▶ REAR BRAKE CALIPER REMOVAL**

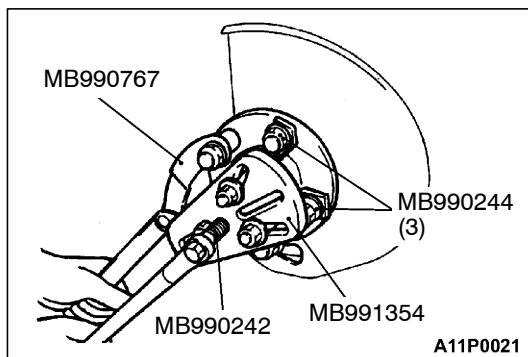
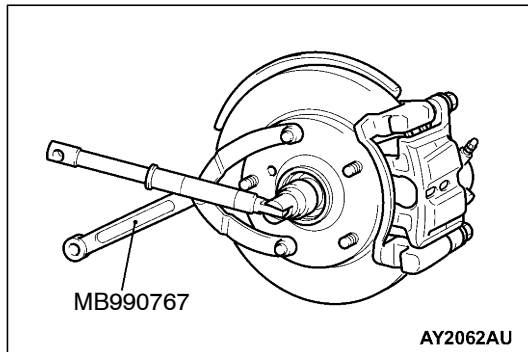
Suspend the rear brake caliper from the body with wire, etc. to prevent it from falling.

Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

◀B▶ DRIVE SHAFT NUT REMOVAL**Caution**

Do not apply pressure to wheel bearing by the vehicle weight to avoid possible damage to wheel bearing before tightening drive shaft nut fully.

**◀C▶ REAR HUB ASSEMBLY REMOVAL**

1. Using the special tool, remove the drive shaft from the rear hub assembly.
2. Remove the mounting bolts and remove the rear hub assembly from the knuckle.

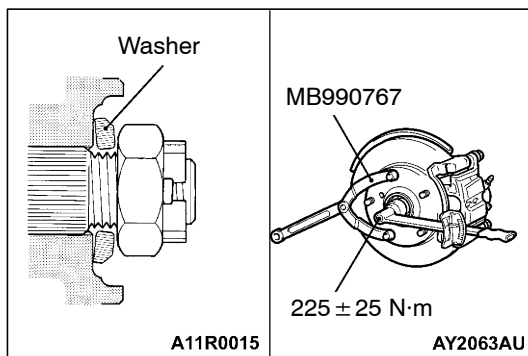
INSTALLATION SERVICE POINT**▶A◀ DRIVE SHAFT NUT INSTALLATION**

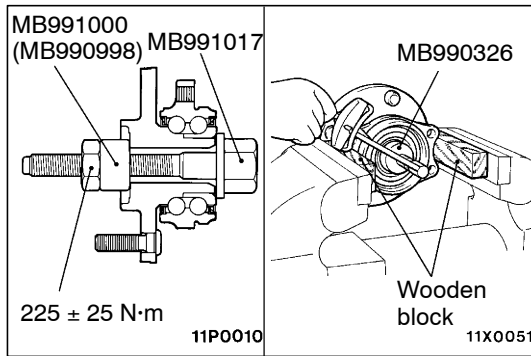
1. Assemble the drive shaft washer in the illustrated direction.
2. Tighten the drive shaft nut fully with special tools.

Caution

Do not apply pressure to wheel bearing by the vehicle weight to avoid possible damage to wheel bearing before tightening drive shaft nut fully.

3. If the pin hole does not align with another, tighten the drive shaft nut (less than 250 N·m) and find the nearest hole then bend the split pin to fit in.

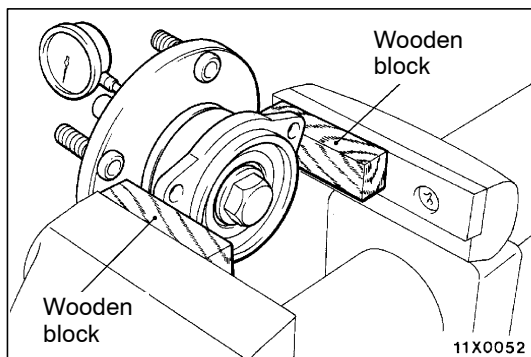


**INSPECTION****WHEEL BEARING ROTATION STARTING TORQUE CHECK**

1. Tighten special tools in rear hub assembly to the specified torque.
2. Hold rear hub assembly in a vice by way of wooden block.
3. Measure the wheel bearing rotation torque with special tools.

Limit: 1.0 N·m

4. Hub rotation starting torque must be under the limit value and there should be no stickiness or roughness when rotating the hub.

**WHEEL BEARING AXIAL PLAY CHECK**

1. Check the wheel bearing axial play.

Limit: 0.05 mm

2. If the wheel bearing axial play exceeds the limit value at the specified torque of $(225 \pm 25 \text{ N}\cdot\text{m})$, replace the rear hub assembly.

KNUCKLE

REMOVAL AND INSTALLATION

Caution

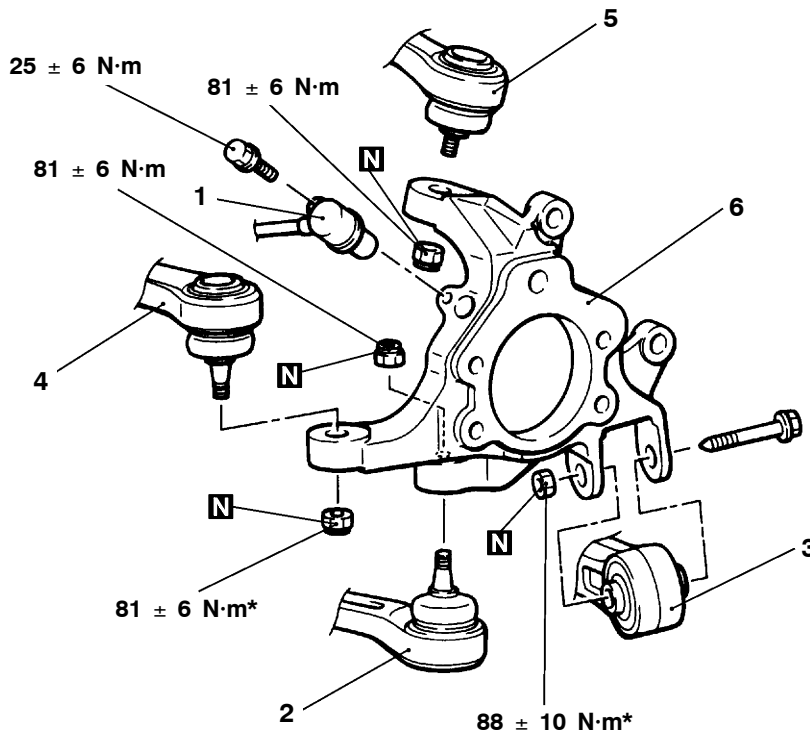
1. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.
2. With the part marked with *, first temporarily tighten it, then ground the vehicle and tighten it to specification in unloaded condition.

Pre-removal Operation

Rear Hub Assembly Removal (Refer to P.27-25.)

Post-installation Operation

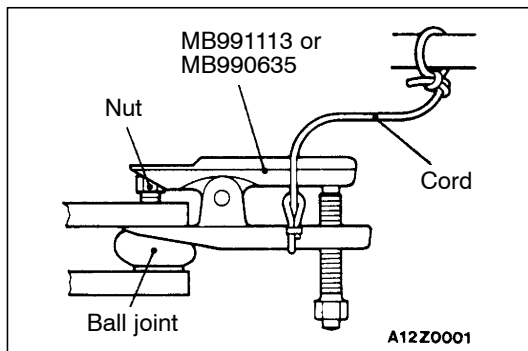
- Press dust cover with a finger to check for crack or damage in the dust cover.
- Rear Hub Assembly Installation (Refer to P.27-25.)



A11M0066

Removal steps

- | | | | |
|-----|--|-----|---|
| ◀A▶ | 1. Vehicle speed sensor <Vehicles with ABS or ACD> | ◀A▶ | 4. Knuckle and toe-control arm connection |
| | 2. Knuckle and trailing arm connection | ◀A▶ | 5. Knuckle and upper arm connection |
| | 3. Knuckle and lower arm connection | | 6. Knuckle assembly |



REMOVAL SERVICE POINT

◀A▶ KNUCKLE AND TRAILING ARM/TOE-CONTROL ARM/UPPER ARM DISCONNECTION

Caution

1. Use special tools to loosen the nut from the ball joint instead of removing it.
2. Hang special tools with ropes to prevent them from falling.

DRIVE SHAFT

REMOVAL AND INSTALLATION

Caution

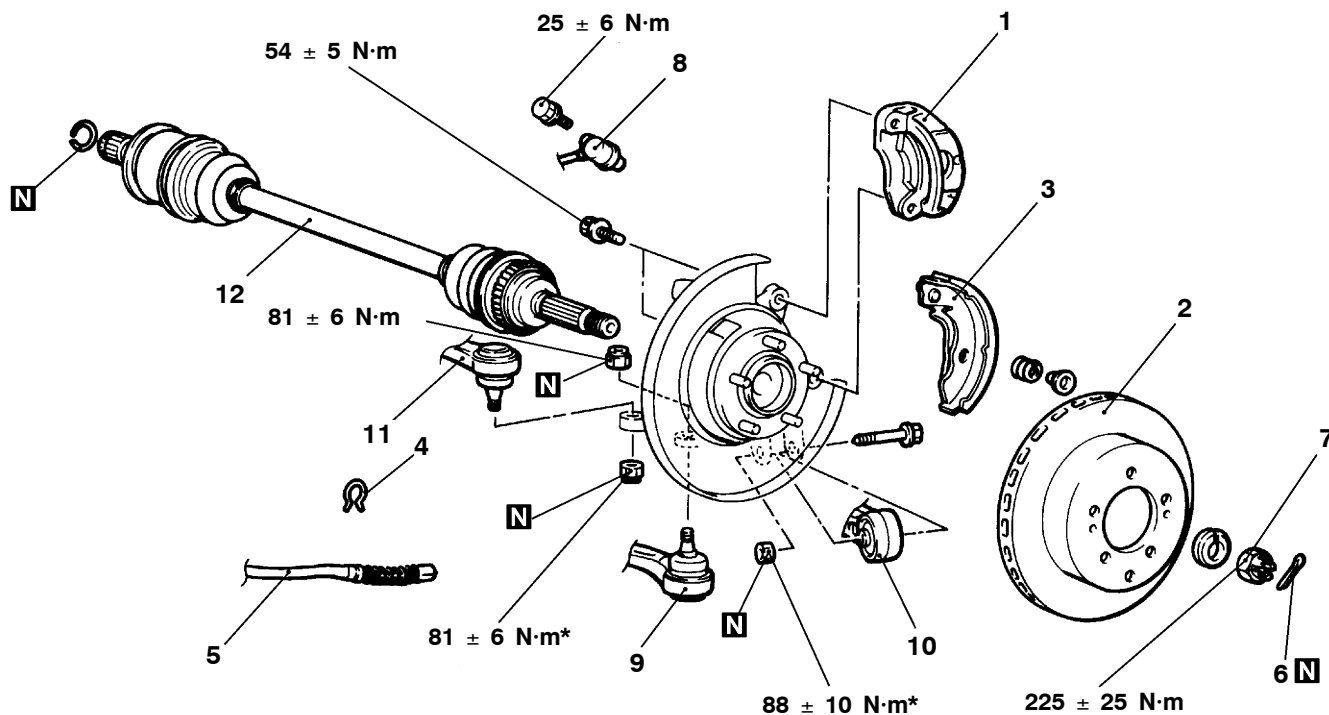
1. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.
2. With the part marked with *, first temporarily tighten it, then ground the vehicle and tighten it to specification in unloaded condition.

Pre-removal Operation

- Gear Oil Draining (Refer to P.27-17.)
- Center Exhaust Pipe Removal (Refer to GROUP 15.)

Post-installation Operation

- Press dust cover with a finger to check for crack or damage in the dust cover.
- Center Exhaust Pipe Installation (Refer to GROUP 15.)
- Gear Oil Filling (Refer to P.27-17.)
- Parking Brake Lever Stroke Check and Adjustment
- Wheel Alignment Check and Adjustment (Refer to GROUP 34 – On-vehicle Service.)



A11M0069

Removal steps



1. Rear brake caliper
2. Rear brake disc
3. Parking brake shoe & lining assembly (Refer to GROUP 36 - Parking Brake Drum.)
4. Clip
5. Parking brake cable connection
6. Split pin



7. Drive shaft nut
8. Vehicle speed sensor <Vehicles with ABS or ACD>
9. Knuckle and trailing arm connection
10. Knuckle and lower arm connection
11. Knuckle and toe-control arm connection



12. Rear drive shaft assembly

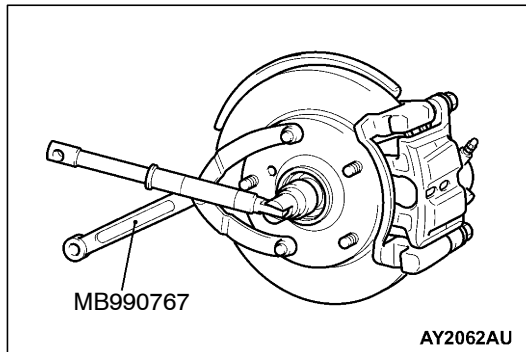
REMOVAL SERVICE POINTS

◀A▶ REAR BRAKE CALIPER REMOVAL

Suspend the rear brake caliper from the body with wire, etc. to prevent it from falling.

Caution

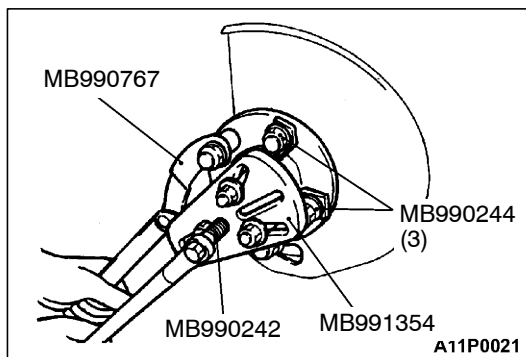
If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.



◀B▶ DRIVE SHAFT NUT REMOVAL

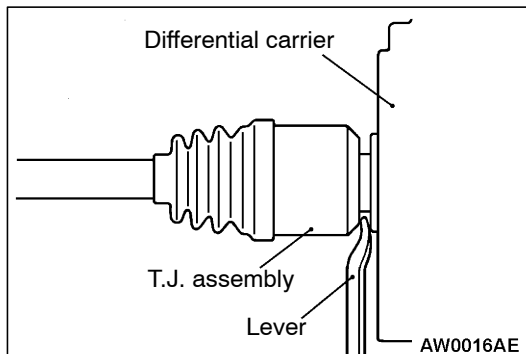
Caution

Do not apply pressure to wheel bearing by the vehicle weight to avoid possible damage to wheel bearing before tightening drive shaft nut fully.



◀C▶ REAR DRIVE SHAFT ASSEMBLY REMOVAL

1. Use the special tools to push out the drive shaft from the hub.

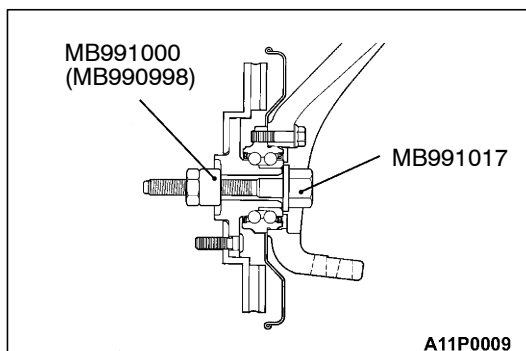


2. Remove the drive shaft from the transmission by the following procedure.

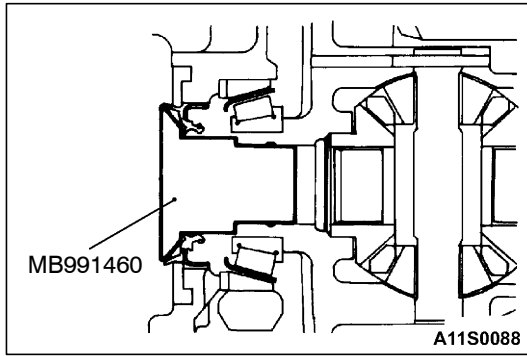
Insert a pry bar between the differential carrier and the drive shaft, and then pry the drive shaft from the differential carrier.

Caution

- (1) Do not pull on the drive shaft; doing so will damage the T.J.; be sure to use the pry bar.
- (2) When pulling the drive shaft out from the differential carrier, be careful that the spline part of the drive shaft does not damage the oil seal.



- (3) Do not apply the vehicle weight to the wheel bearing while loosening the drive shaft nut. Otherwise wheel bearing will be damaged. If, however, the vehicle weight must be applied to the bearing (because of moving the vehicle), temporarily secure the wheel bearing by using the special tool.



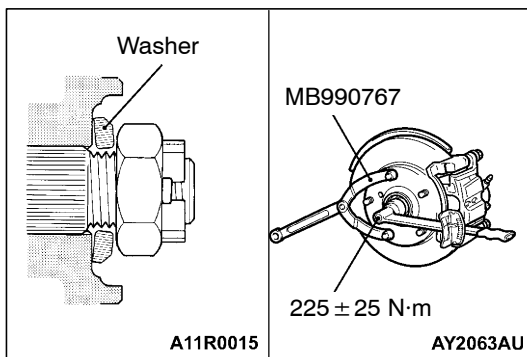
- (4) To prevent entry of foreign matter into the differential carrier, use the special tool as a cover.
<Vehicles with mechanical LSD (RH)>

INSTALLATION SERVICE POINTS

►A◄ DRIVE SHAFT INSTALLATION

Caution

When installing the drive shaft to the differential carrier, be careful that the spline part of the drive shaft does not damage the oil seal.



►B◄ DRIVE SHAFT NUT INSTALLATION

1. Assemble the drive shaft washer in the illustrated direction.
2. Tighten the drive shaft nut fully with special tools.

Caution

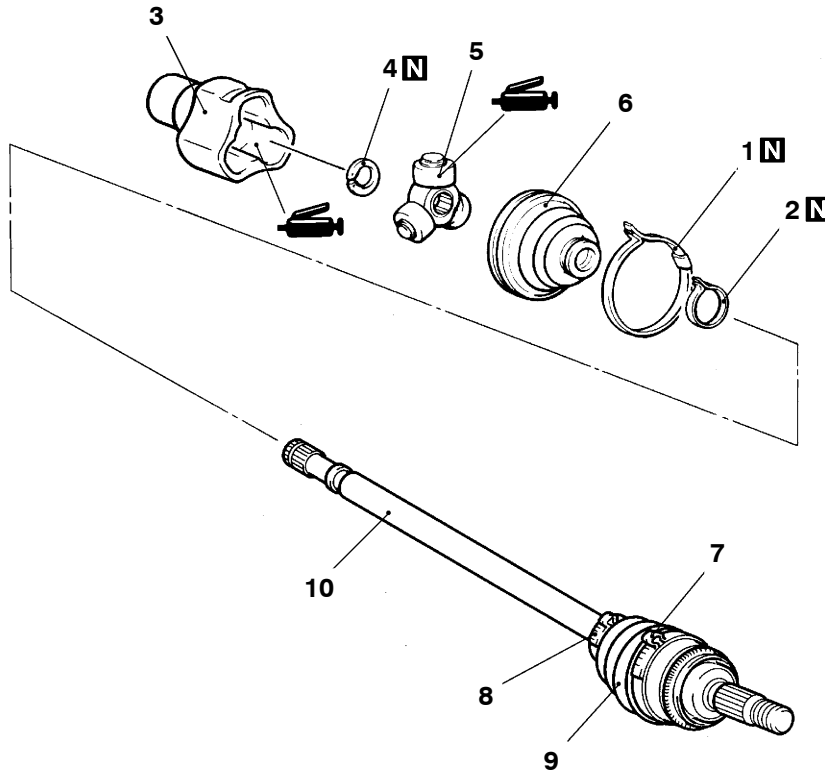
Do not apply pressure to wheel bearing by the vehicle weight to avoid possible damage to wheel bearing before tightening drive shaft nut fully.

3. If the pin hole does not align with another, tighten the drive shaft nut (less than 250 N·m) and find the nearest hole then bend the split pin to fit in.

DISASSEMBLY AND REASSEMBLY

Caution

- (1) On the vehicles with ABS or ACD, when the drive shaft is disassembled or reassembled, be careful not to interfere with the rotor for wheel speed sensor installed to the B.J. outer race to prevent the rotor from damage.
- (2) Never disassemble the B.J. assembly except when replacing the B.J. boot.



CX0228AU

<p>1110100</p>	<p>1110101</p>	<p>A11H0090</p>
<p>T.J. repair kit</p>	<p>T.J. boot repair kit</p>	<p>B.J. boot repair kit</p>

Disassembly steps

- | | |
|---|--|
| <p>◀A▶ ▶B▶ 1. T.J. boot band (large)</p> <p>◀A▶ ▶B▶ 2. T.J. boot band (small)</p> <p>◀A▶ ▶A▶ 3. T.J. case</p> <p>◀A▶ ▶A▶ 4. Snap ring</p> <p>◀A▶ ▶A▶ 5. Spider assembly</p> | <p>◀B▶ ▶A▶ 6. T.J. boot</p> <p>◀B▶ ▶A▶ 7. B.J. boot band (large)</p> <p>◀B▶ ▶A▶ 8. B.J. boot band (small)</p> <p>◀B▶ ▶A▶ 9. B.J. boot</p> <p>◀B▶ ▶A▶ 10. B.J. assembly</p> |
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DISASSEMBLY SERVICE POINTS**◀A▶ T.J. CASE/SPIDER ASSEMBLY REMOVAL**

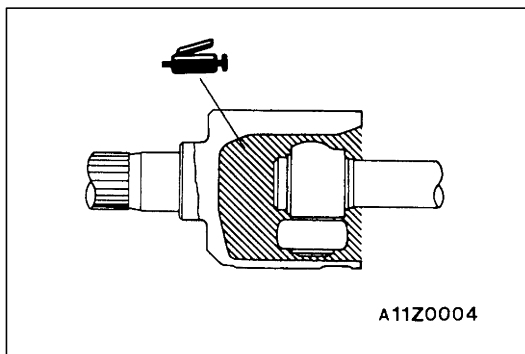
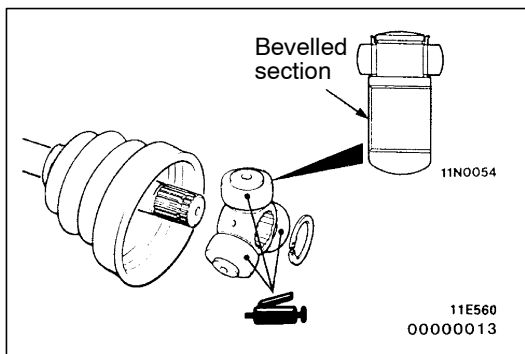
1. Wipe off grease from the spider assembly and the inside of the T.J. case.
2. Always clean the spider assembly when the grease contains water or foreign material.

Caution

Do not disassemble the spider assembly.

◀B▶ T.J. BOOT REMOVAL

1. Wipe off grease from the shaft spline.
2. When reusing the T.J. boot, wrap plastic tape around the shaft spline to avoid damaging the boot.

**REASSEMBLY SERVICE POINTS****▶A◀ T.J. BOOT/SPIDER ASSEMBLY/T.J. CASE INSTALLATION**

1. Apply the specified grease furnished in the repair kit to the spider assembly between the spider axle and the roller.

Specified grease: Repair kit grease**Caution**

- (1) **The drive shaft joint uses special grease. Do not mix old and new or different types of grease.**
- (2) **If the spider assembly has been cleaned, take special care to apply the specified grease.**

2. Install the spider assembly to the shaft from the direction of the spline bevelled section.
3. After applying the specified grease to the T.J. case, insert the drive shaft and apply grease one more time.

Specified grease: Repair kit grease

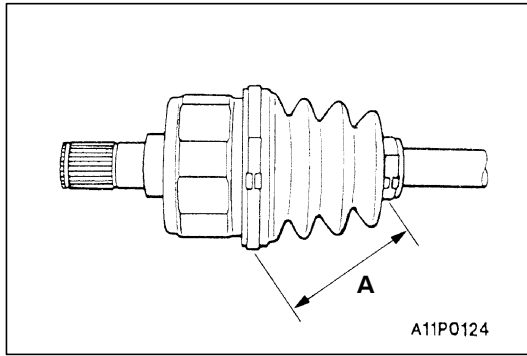
Amount to use: 105 ± 10 g

NOTE

The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.

Caution

The drive shaft joint uses special grease. Do not mix old and new or different types of grease.



►B◄ T.J. BOOT BAND (SMALL)/T.J. BOOT BAND (LARGE) INSTALLATION

Set the T.J. boot bands at the specified distance in order to adjust the amount of air inside the T.J. boot, and then tighten the T.J. boot bands securely.

Standard value (A): 90 ± 3 mm

INSPECTION

- Check the drive shaft for damage, bending or corrosion.
- Check the drive shaft spline part for wear or damage.
- Check the spider assembly for roller rotation, wear or corrosion.
- Check the groove inside T.J. case for wear or corrosion.
- Check the boots for deterioration, damage or cracking.
- Check the dust cover for damage or deterioration.

B.J. BOOT (RESIN BOOT) REPLACEMENT

Refer to GROUP26 Front Axle-Drive shaft.

DIFFERENTIAL CARRIER <VEHICLES WITH MECHANICAL LSD>

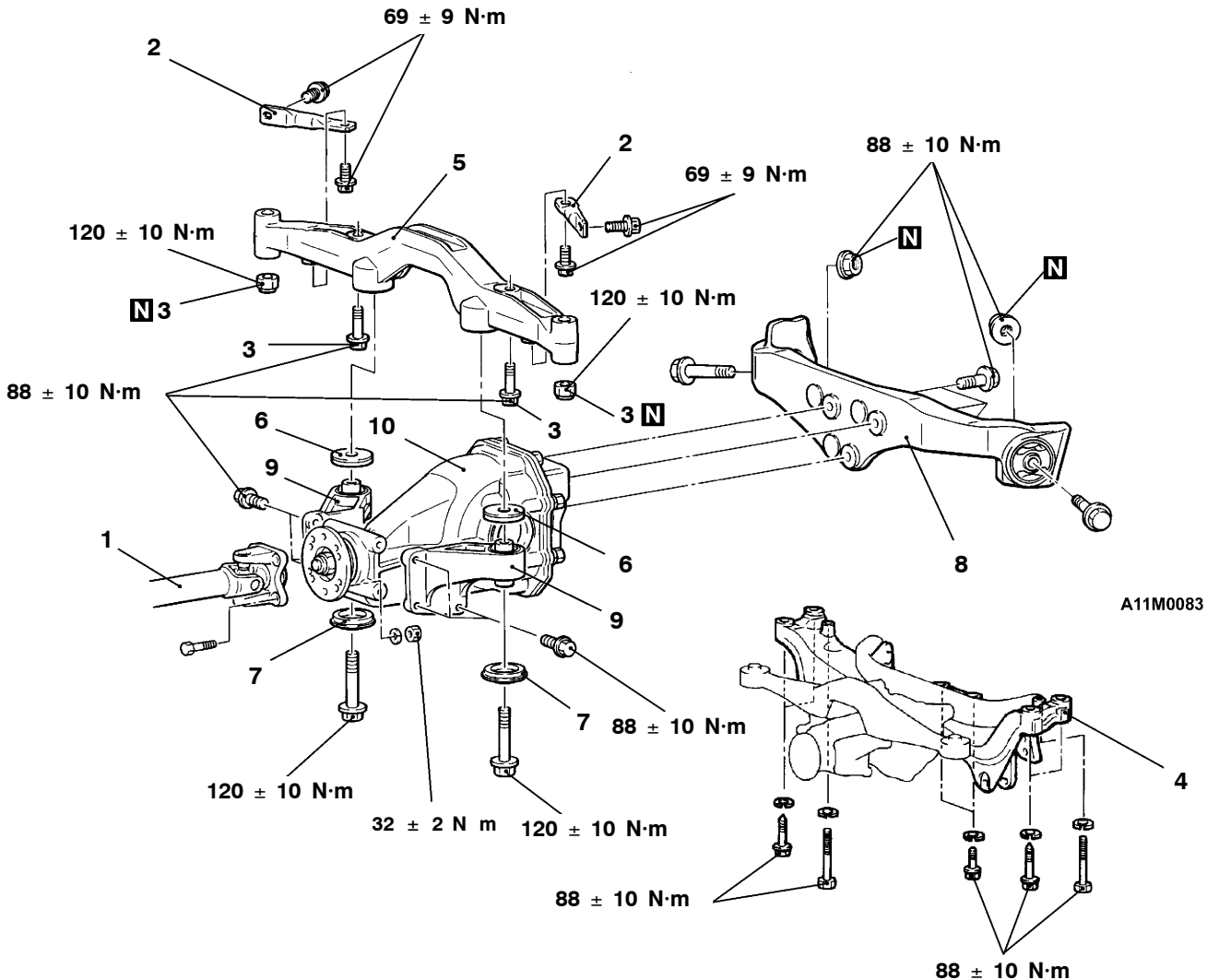
REMOVAL AND INSTALLATION

Pre-removal Operation

- Differential Gear Oil Draining (Refer to P.27B-17.)
- Lower Arm Assembly Removal (Refer to GROUP 34.)
- Rear Stabilizer Removal (Refer to GROUP 34.)
- Drive Shaft Removal (Refer to P. 27B-29.)

Post-installation Operation

- Drive Shaft Installation (Refer to P. 27B-29.)
- Rear Stabilizer Installation (Refer to GROUP 34.)
- Lower Arm Assembly Installation (Refer to GROUP 34.)
- Differential Gear Oil Filling (Refer to P.27B-17.)



Removal steps

- ◀A▶ 1. Propeller shaft connection (Refer to GROUP 25.)
2. Toe control bar
3. Differential support member mounting boots and nuts
- ◀B▶ ▶A▶ 4. Rear crossmember and differential carrier assembly

5. Differential support member
6. Upper stopper
7. Lower stopper
8. Differential support arm
9. Differential mount bracket
10. Differential carrier assembly

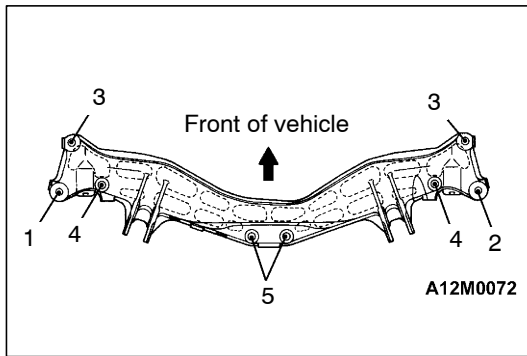
REMOVAL SERVICE POINTS

◀A▶ PROPELLER SHAFT DISCONNECTION

Suspend the removed propeller shaft from the body with a wire to prevent bending.

◀B▶ REAR CROSSMEMBER AND DIFFERENTIAL CARRIER ASSEMBLY REMOVAL

1. Using a jack, support the differential carrier from its underside.
2. Remove the rear crossmember mounting bolts and remove the differential carrier, where it is attached to the rear crossmember, from the vehicle.



INSTALLATION SERVICE POINTS

▶A◀ REAR CROSSMEMBER AND DIFFERENTIAL CARRIER ASSEMBLY INSTALLATION

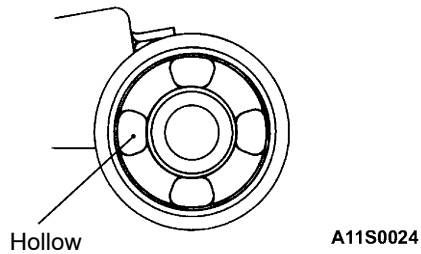
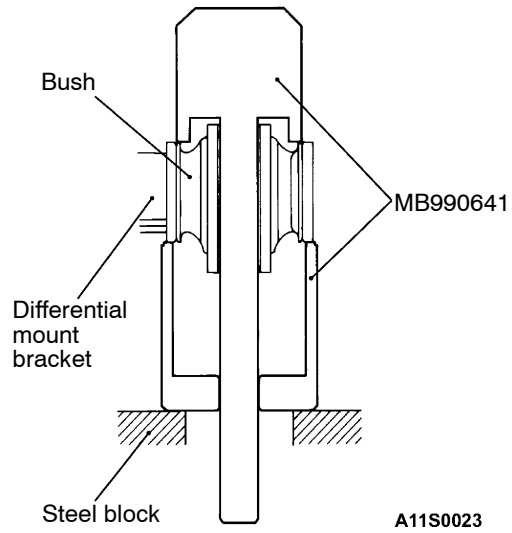
Tighten the rear crossmember mounting bolts in the numerical order shown.

NOTE

To ensure both good installation accuracy and ease of installation, the rear crossmember mounting holes have different diameters between front and rear. This is the reason for specifying the tightening sequence of the mounting bolts.

No.	Bolt type	Bolt size (thread dia. x length) mm
1, 2, 3	Flange bolt (with washer)	12 x 105
4	Bolt (with spring washer and washer)	12 x 152
5	Flange bolt (with washer)	12 x 70

<Differential mount bracket>

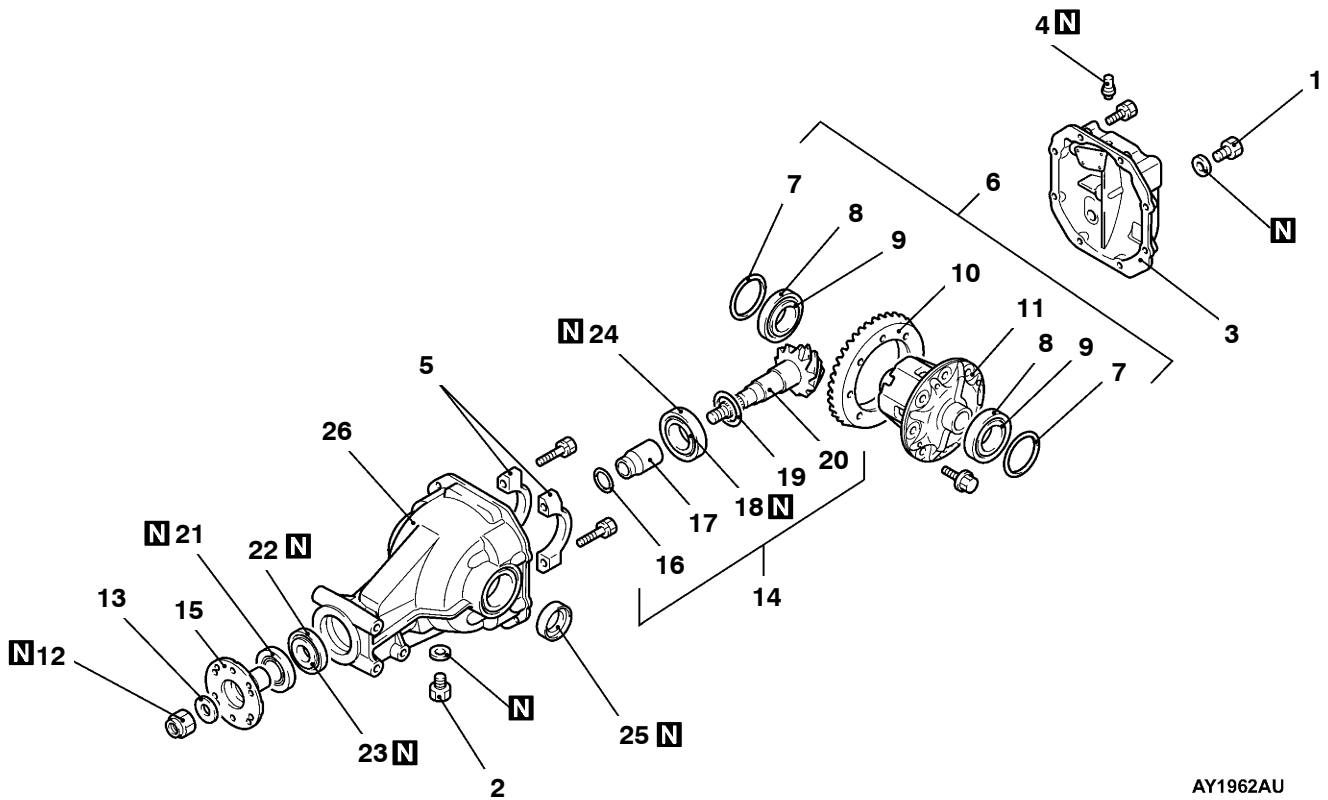


BUSHING REPLACEMENT

1. Remove and press fit the bush with special tool. (About removal and press fitting the bush of the differential support arm, refer to P. 27B-57.)
2. Press fit the bush so that the hollow of the bush is on the position shown as the illustration.
3. Press fill the bush until the surface of the outer sleeve of the bush, differential mounting bracket.

27B-38 REAR AXLE - Differential Carrier <Vehicles with mechanical LSD>

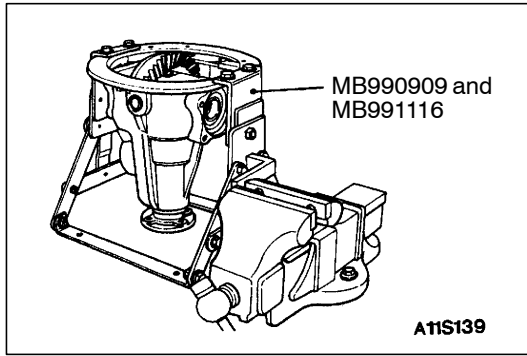
DISASSEMBLY



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Disassembly steps

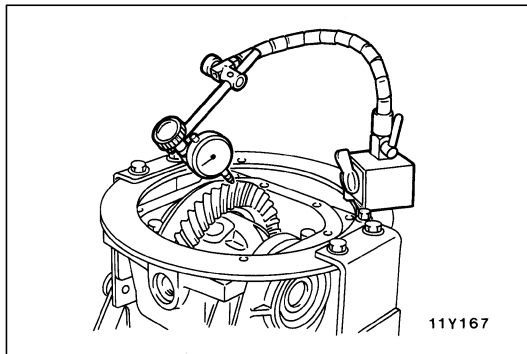
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| <p>◀A▶</p> <p>◀B▶</p> <p>◀B▶</p> <p>◀C▶</p> <p>◀D▶</p> <p>◀E▶</p> <p>◀F▶</p> | <ul style="list-style-type: none"> ● Inspection before disassembly 1. Filler plug 2. Drain plug 3. Differential cover assembly 4. Vent plug 5. Bearing cap 6. Differential case assembly 7. Side bearing spacer 8. Side bearing outer race 9. Side bearing inner race 10. Drive gear 11. Limited slip differential case assembly* 12. Self-locking nut 13. Washer 14. Drive pinion assembly | <p>◀F▶</p> <p>◀G▶</p> <p>◀H▶</p> <p>◀H▶</p> <p>◀H▶</p> | <ul style="list-style-type: none"> 15. Companion flange 16. Drive pinion front shim (For adjusting preload of drive pinion) 17. Drive pinion spacer 18. Drive pinion rear bearing inner race 19. Drive pinion rear shim (For adjusting drive pinion height) 20. Drive pinion 21. Oil seal 22. Drive pinion front bearing inner race 23. Drive pinion front bearing outer race 24. Drive pinion rear bearing outer race 25. Oil seal 26. Differential carrier |
|--|--|--|--|



DISASSEMBLY SERVICE POINTS

◀▶ INSPECTION BEFORE DISASSEMBLY

1. Remove the cover.
2. Hold the special tool in a vise, and install the differential carrier assembly to the special tool.

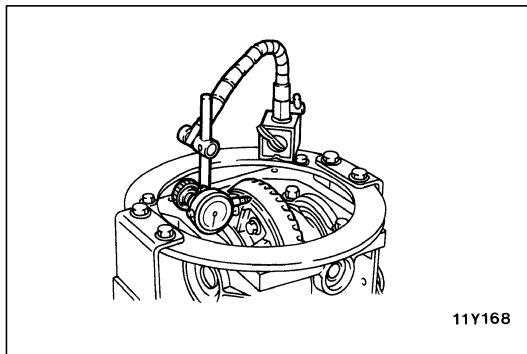


DRIVE GEAR BACKLASH

1. With the drive pinion locked in place, use a dial gauge to measure the drive gear backlash in four or more places on the drive gear.

Standard value: 0.11 - 0.16 mm

2. If the backlash is not within the standard value, adjust the final drive gear backlash. (Refer to P.27B-49.)
3. After the adjustment, inspect the drive gear tooth contact.

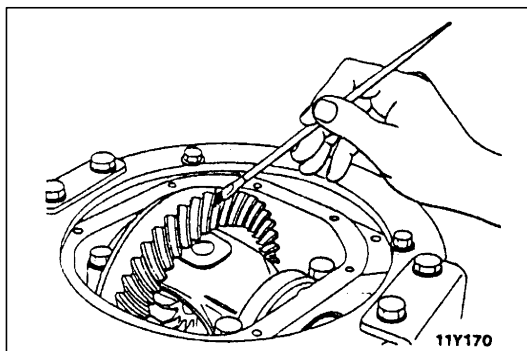


DRIVE GEAR RUNOUT

1. Measure the drive gear runout at the shoulder on the reverse side of the drive gear.

Limit: 0.05 mm

2. When runout exceeds the limit value, check for foreign object between drive gear rear side and differential case, or for loose drive gear installation bolts.
3. When check (2) gives normal results, reposition drive gear and differential case and remeasure.
4. If adjustment is impossible, replace differential case, or replace drive gear and pinion as a set.

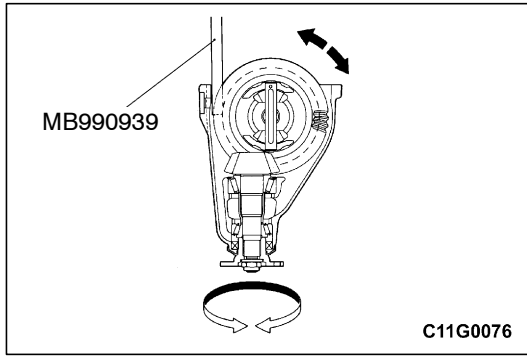


DRIVE GEAR TOOTH CONTACT

Check the tooth contact of drive gear by following the steps below.

1. Apply a thin, uniform coat of machine blue to both surfaces of the drive gear teeth.

27B-40 REAR AXLE - Differential Carrier <Vehicles with mechanical LSD>

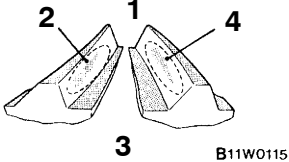
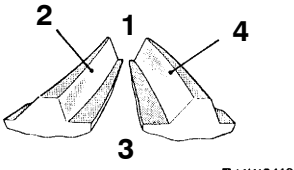
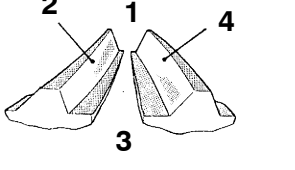
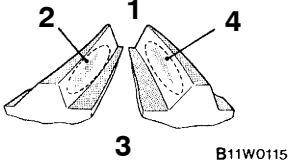
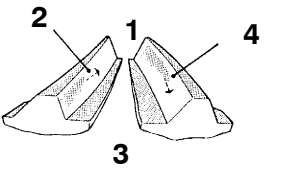
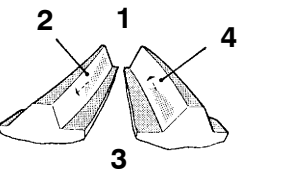


2. Insert the brass between the differential carrier and the differential case, and then rotate the companion flange by hand (once in the normal direction, and then once in the reverse direction) while applying a load to the drive gear so that the revolution torque (approximate 2.5 - 3.0 N·m) is applied to the drive pinion.

Caution

If the drive gear is rotated too much, the tooth contact pattern will become unclear and difficult to check.

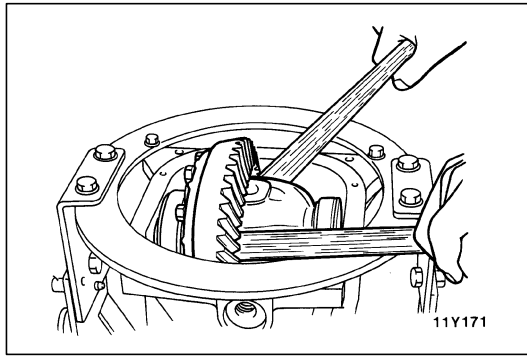
3. Check the tooth contact condition of the drive gear and drive pinion.

Standard tooth contact pattern	Problem	Solution
<p>1 Narrow tooth side 2 Drive-side tooth surface (the side applying power during forward movement) 3 Wide tooth side 4 Coast-side tooth surface (the side applying power during reverse movement)</p>  <p style="text-align: right;">B11W0115</p>	<p>Tooth contact pattern resulting from excessive pinion height</p>  <p style="text-align: right;">B11W0116</p> <p>The drive pinion is positioned too far from the centre of the drive gear.</p>	 <p style="text-align: right;">B11W0118</p> <p>Increase the thickness of the drive pinion rear shim, and position the drive pinion closer to the centre of the drive gear. Also, for backlash adjustment, position the drive gear farther from the drive pinion.</p>
<p>1 Narrow tooth side 2 Drive-side tooth surface (the side applying power during forward movement) 3 Wide tooth side 4 Coast-side tooth surface (the side applying power during reverse movement)</p>  <p style="text-align: right;">B11W0115</p>	<p>Tooth contact pattern resulting from insufficient pinion height</p>  <p style="text-align: right;">B11W0117</p> <p>The drive pinion is positioned too close to the centre of the drive gear.</p>	 <p style="text-align: right;">B11W0119</p> <p>Decrease the thickness of the drive pinion rear shim, and position the drive pinion farther from the centre of the drive gear. Also, for backlash adjustment, position the drive gear closer to the drive pinion.</p>

NOTE

Checking the tooth contact pattern is the way to confirm that the adjustments of the pinion height and backlash have been done properly. Continue to adjust the pinion height and backlash until the tooth contact pattern resembles the standard pattern.

If, even after adjustments have been made, the correct tooth contact pattern cannot be obtained, it means that the drive gear and the drive pinion have become worn beyond the allowable limit. Replace the gear set.



◀B▶ DIFFERENTIAL CASE ASSEMBLY/ SIDE BEARING SPACER/SIDE BEARING OUTER RACE REMOVAL

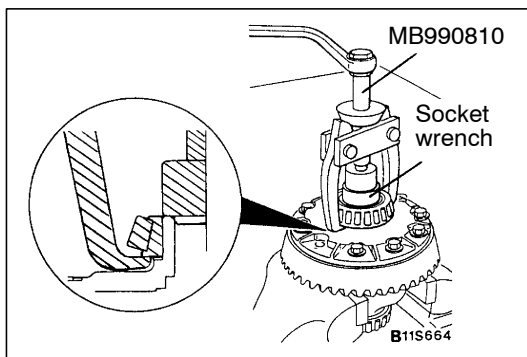
Use the handle of a hammer to remove the differential case assembly, side bearing spacers and side bearings.

Caution

When taking out the differential case assembly, be careful not to drop and damage the side bearing spacers or the side bearing outer races.

NOTE

Keep the right and left side bearings and side bearing outer race separate, so that they do not become mixed at the time of assembly.



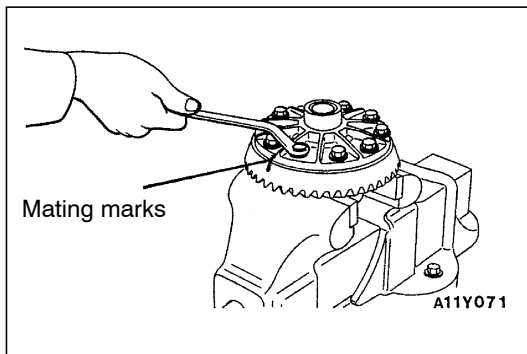
◀C▶ SIDE BEARING INNER RACE REMOVAL

Use special tools to pull out the side bearing inner race.

NOTE

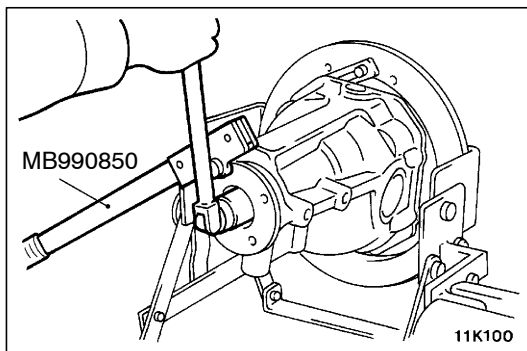
There are two notches provided (at the differential case side) for the claw part of the special tool; use the special tool at that position.

If notches of special tools touch the end of differential case and fail to hook with inner race, file the notches to be able to hook with inner race.



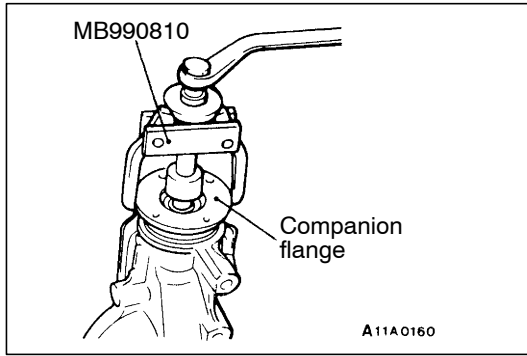
◀D▶ DRIVE GEAR REMOVAL

1. Make the mating marks to the differential case and the drive gear.
2. Loosen the drive gear attaching bolts in diagonal sequence to remove the drive gear.



◀E▶ SELF-LOCKING NUT REMOVAL

Use special tool to hold the companion flange, and then remove the companion flange self-locking nut.



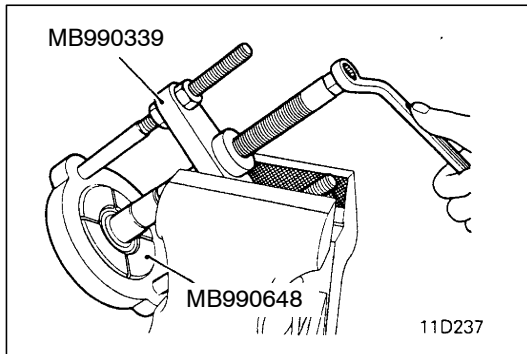
◀F▶ DRIVE PINION ASSEMBLY/COMPANION FLANGE REMOVAL

1. Make the mating marks to the drive pinion and companion flange.

Caution

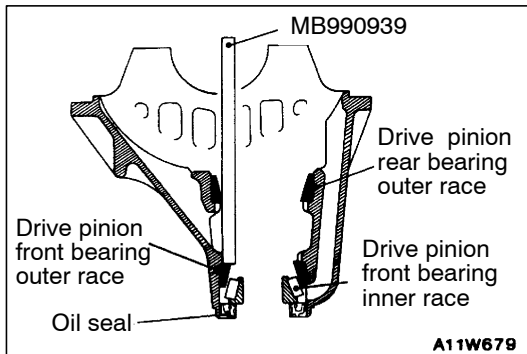
Do not make mating marks on the contact surfaces of the companion flange and propeller shaft.

2. Use special tools to pull out the companion flange.



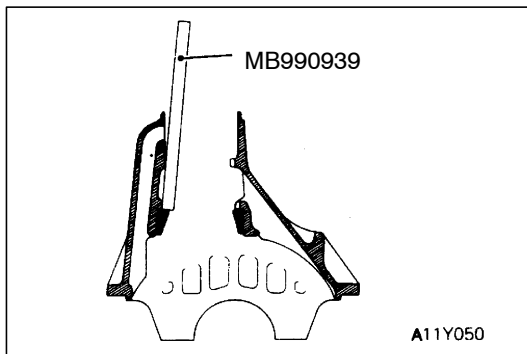
◀G▶ DRIVE PINION REAR BEARING INNER RACE REMOVAL

Use special tools to pull out the front bearing inner race.



◀H▶ OIL SEAL/DRIVE PINION FRONT BEARING INNER RACE/DRIVE PINION FRONT BEARING OUTER RACE REMOVAL

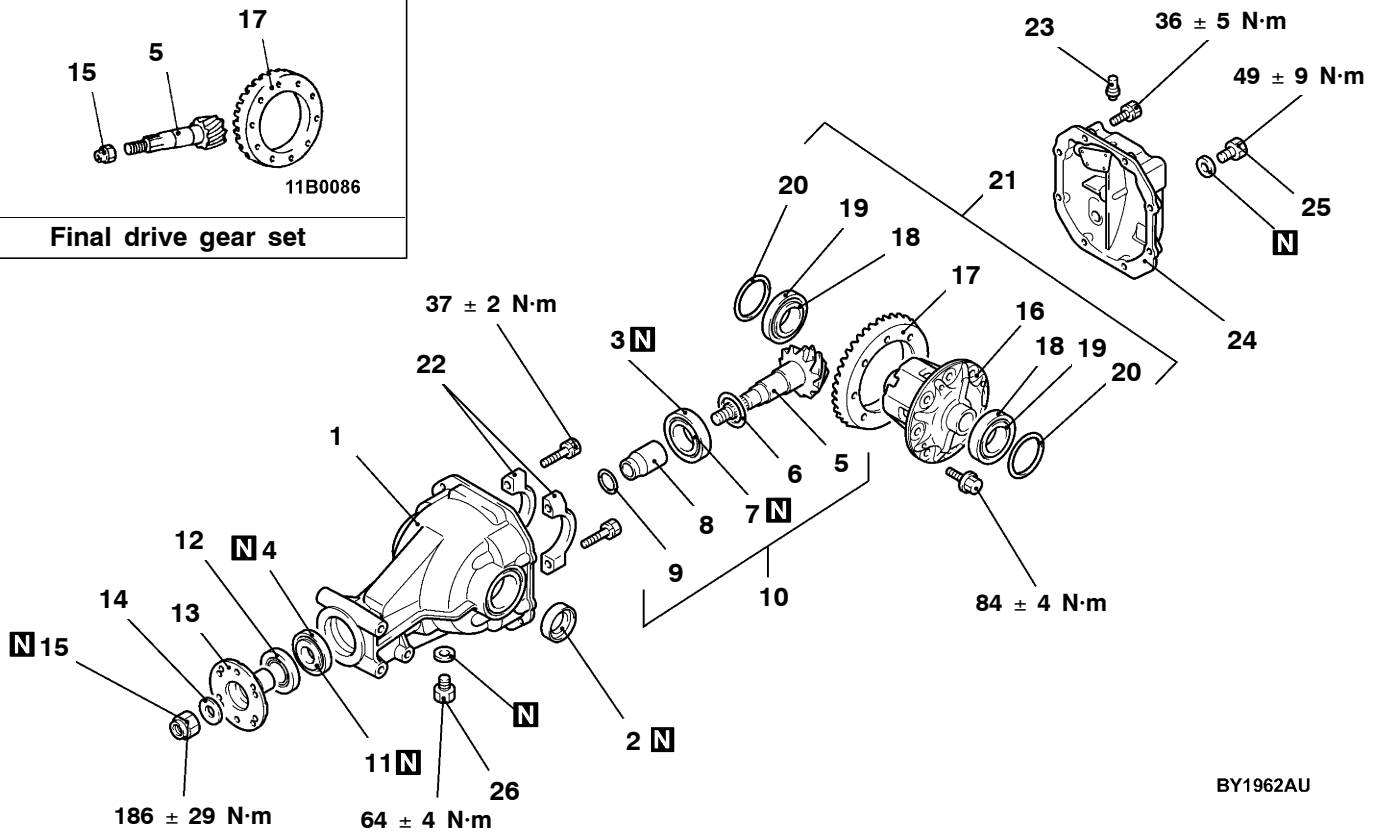
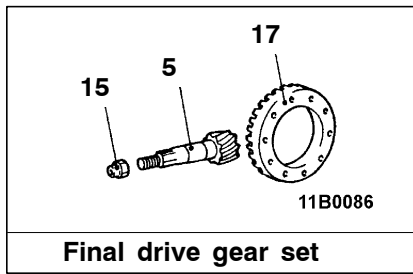
Use special tool to remove drive pinion front bearing outer race.



◀I▶ DRIVE PINION REAR BEARING OUTER RACE REMOVAL

Use special tool to remove the drive pinion rear bearing outer race.

REASSEMBLY



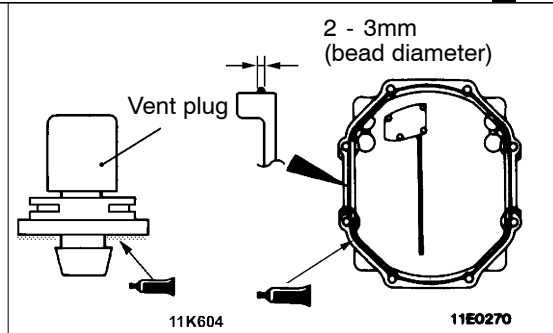
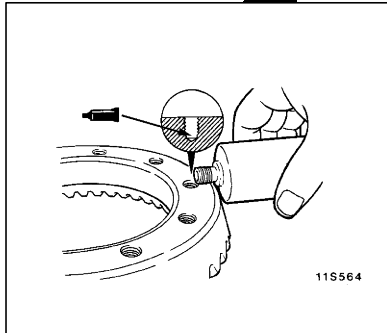
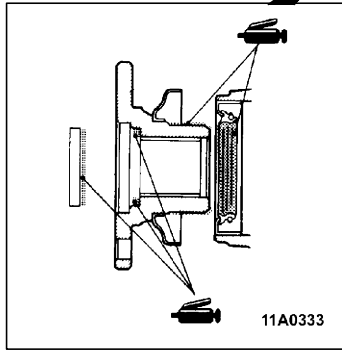
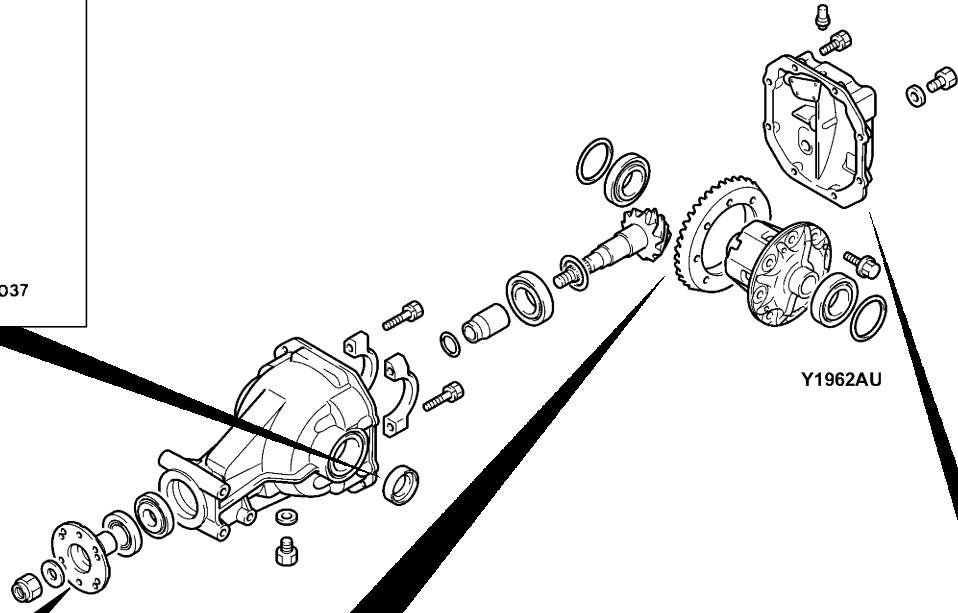
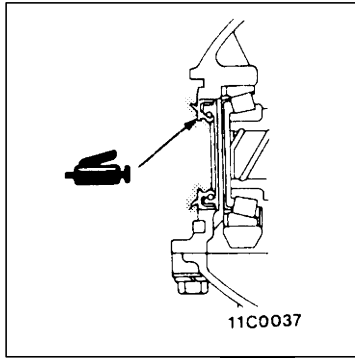
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Reassembly steps

- | | | | |
|---|--|---|--|
| <p>▶A◀</p> <p>▶B◀</p> <p>▶C◀</p> <p>▶D◀</p> <p>▶E◀</p> <p>▶E◀</p> | <p>1. Differential carrier</p> <p>2. Oil seal</p> <p>3. Drive pinion rear bearing outer race</p> <p>4. Drive pinion front bearing outer race</p> <p>● Drive pinion height adjustment</p> <p>5. Drive pinion</p> <p>6. Drive pinion rear shim (For adjusting drive pinion height)</p> <p>7. Drive pinion rear bearing inner race</p> <p>8. Drive pinion spacer</p> <p>● Drive pinion turning torque adjustment</p> <p>9. Drive pinion front shim (For adjusting drive pinion preload)</p> <p>10. Drive pinion assembly</p> <p>11. Drive pinion front bearing inner race</p> <p>12. Oil seal</p> | <p>13. Companion flange</p> <p>14. Washer</p> <p>15. Self-locking nut</p> <p>16. Limited slip differential case assembly</p> <p>▶F◀</p> <p>▶G◀</p> <p>▶H◀</p> <p>▶H◀</p> <p>▶H◀</p> | <p>17. Drive gear</p> <p>18. Side bearing inner race</p> <p>19. Side bearing outer race</p> <p>20. Side bearing spacer</p> <p>21. Differential case assembly</p> <p>22. Bearing cap</p> <p>23. Vent plug</p> <p>24. Differential cover assembly</p> <p>25. Drain plug</p> <p>26. Filler plug</p> <p>● Final drive gear backlash adjustment</p> |
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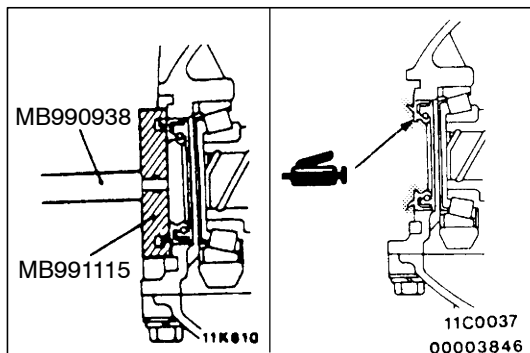
27B-44 REAR AXLE - Differential Carrier <Vehicles with mechanical LSD>

Lubrication and Adhesive Points



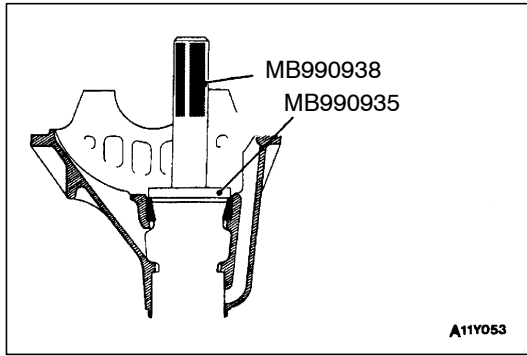
Adhesive: 3M Stud Locking 4170 or equivalent

Sealant: 3M ATD Part No.8661, 8663 or equivalent

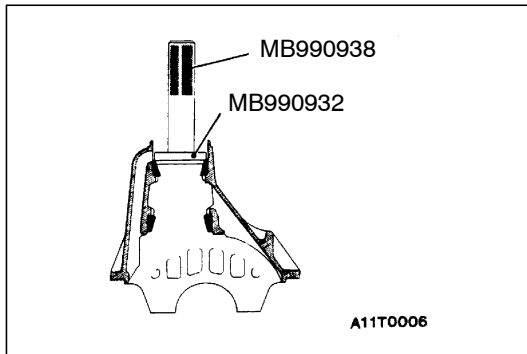


REASSEMBLY SERVICE POINTS

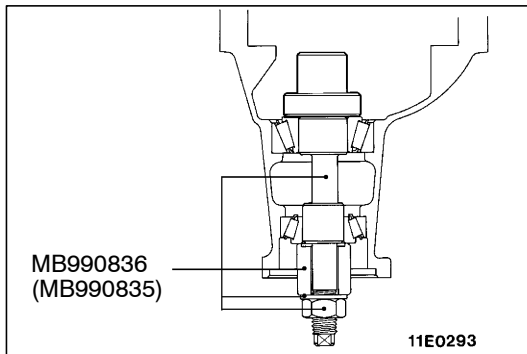
▶A◀ OIL SEAL PRESS-FITTING



►B◄ DRIVE PINION REAR BEARING OUTER RACE PRESS-FITTING



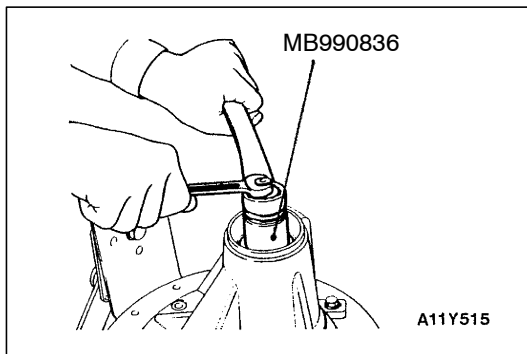
►C◄ DRIVE PINION FRONT BEARING OUTER RACE PRESS-FITTING



►D◄ DRIVE PINION HEIGHT ADJUSTMENT

Adjust the drive pinion height by the following procedures:

1. Apply multipurpose grease to the washer of special tool.
2. Install special tool and drive pinion front and rear bearing inner races to the gear carrier in the sequence shown in the illustration.



3. Tighten the nut of special tool a little at a time while measuring the turning torque of the drive pinion. Then confirm the turning torque (without the oil seal) is at the standard value.

Standard value:

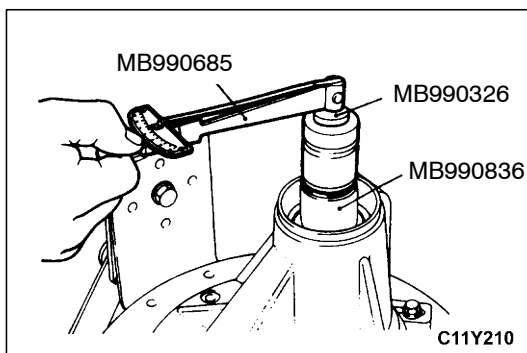
Bearing type	Turning torque
New	0.88 - 1.17 N·m

Caution

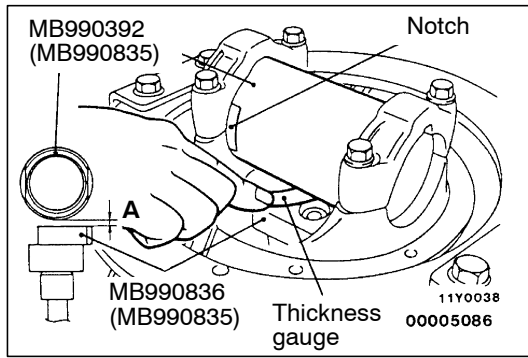
Take care not to fit gear oil on the bearing.

NOTE

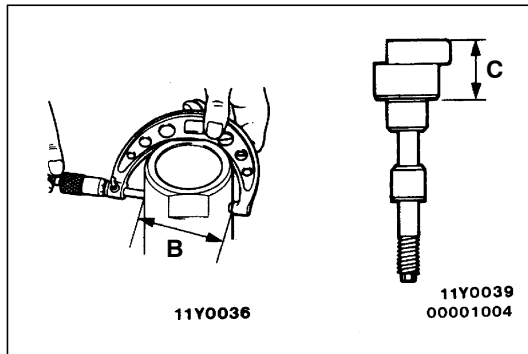
The special tool can not rotate, move several times in moving area, after rotating the bearing, measure the torque.



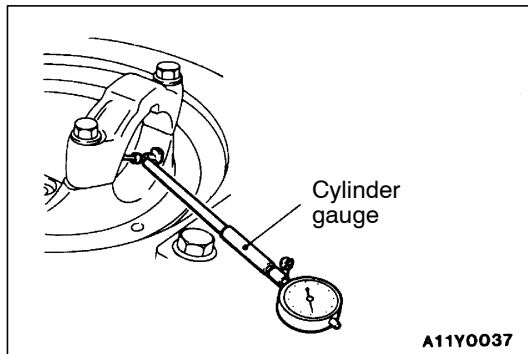
27B-46 REAR AXLE - Differential Carrier <Vehicles with mechanical LSD>



4. Clean the side bearing hub.
5. Place special tool between the side bearing hub of the gear carrier, and position the notch as shown in the illustration. Then tighten side bearing mounting bolt.
6. Use a thickness gauge to measure the clearance (A) between special tools.

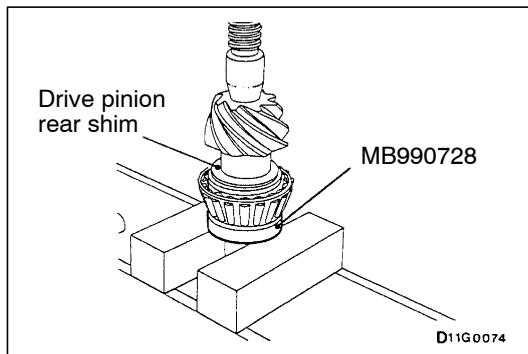


7. Remove special tools (MB990835, MB990326).
8. Use a micrometer to measure the shown dimensions (B, C) of special tools.

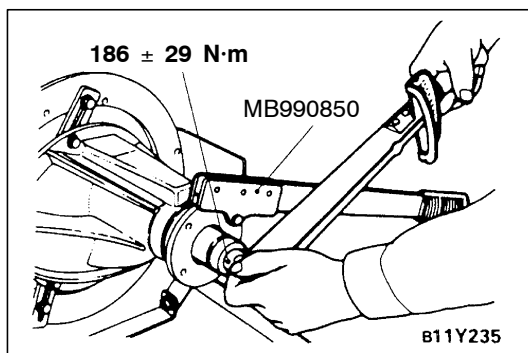


9. Install the bearing cap, and then use a cylinder gauge to measure inside diameter (D) of the bearing cap.
10. Calculate thickness (F) of the required drive pinion rear shim twice by the following formula. Select a shim which most closely matches this thickness.

$$F = A + B + C - 1/2D - 86.00 \text{ mm}$$



11. Fit the selected drive pinion rear shim(s) to the drive pinion, and press-fit the drive pinion rear bearing inner race by using special tool.



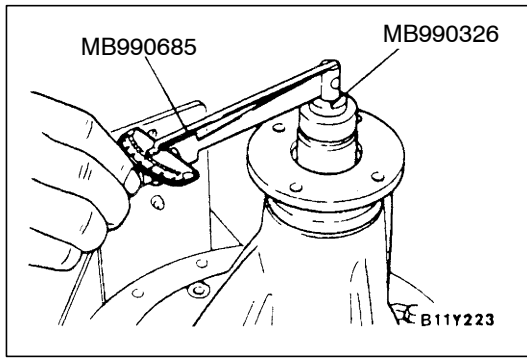
►E◄ DRIVE PINION TURNING TORQUE ADJUSTMENT /OIL SEAL INSTALLATION

1. Insert the drive pinion into the gear carrier, and then install the following parts in sequence from the carrier rear side. Drive pinion spacer, drive pinion front shim and drive pinion front bearing inner race, companion flange.

NOTE

Do not install the oil seal.

2. Tighten the companion flange to the specified torque by using special tool.



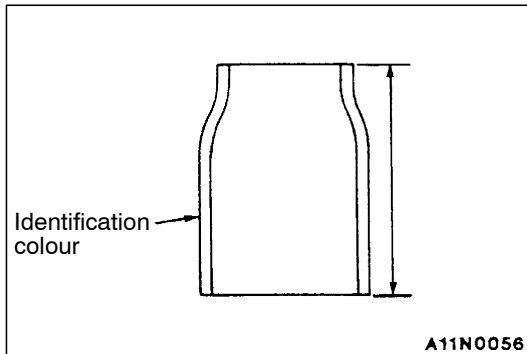
3. Measure the drive pinion turning torque (without the oil seal).

Standard value:

Bearing division	Turning torque
New	0.88 - 1.17 N·m

Caution

Take care not to fit gear oil on the bearing.



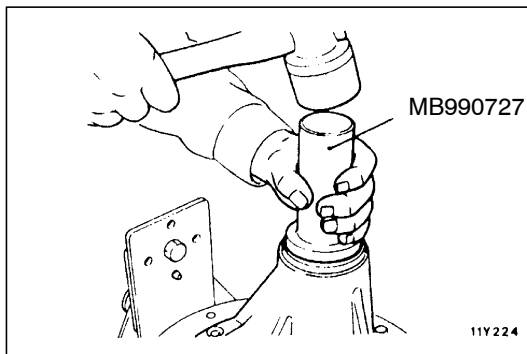
4. If the drive pinion turning torque is not within the standard value, adjust the turning torque by replacing the drive pinion front shim(s) or the drive pinion spacer.

NOTE

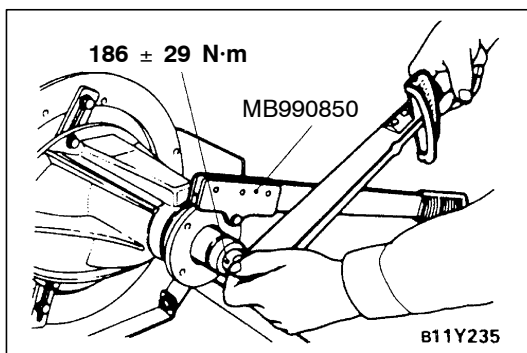
When selecting the drive pinion front shims, if the number of shims is large, reduce the number of shims to a minimum by selecting the drive pinion spacers.

Also, select the drive pinion spacer from the following two types.

Height of drive pinion spacer mm	Identification colour
57.72	-
57.08	Red

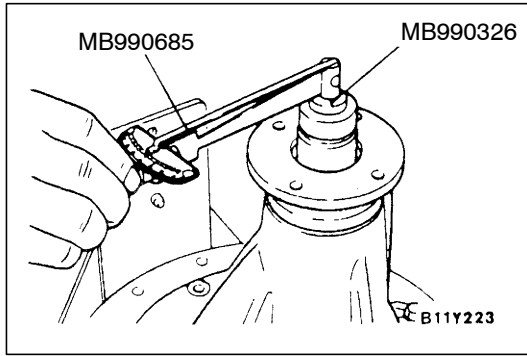


5. Remove the companion flange and drive pinion again. Then insert the drive pinion front bearing inner race into the gear carrier. Use special tool to press-fit the oil seal.



6. Install the drive pinion assembly and companion flange with mating marks properly aligned. Tighten the companion flange self-locking nut to the specified torque using special tool.

27B-48 REAR AXLE - Differential Carrier <Vehicles with mechanical LSD>

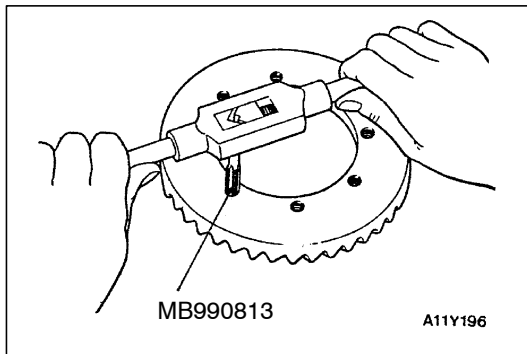


7. Measure the drive pinion turning torque (with oil seal) to verify that the drive pinion turning torque complies with the standard value.

Standard value:

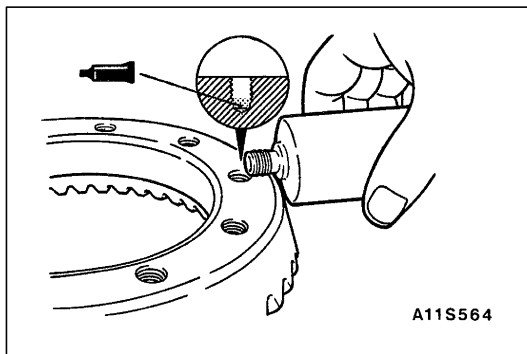
Bearing division	Companion flange lubrication	Turning torque
New	None (With anti-rust agent)	0.98 - 1.27 N·m
	Gear oil applied	0.49 - 0.58 N·m

8. If the turning torque is not within the standard value, check the tightening torque of the companion flange self-locking nut, and the installation of the oil seal.



►F◄ DRIVE GEAR INSTALLATION

1. Clean the drive gear attaching bolts.
2. Remove the adhesive adhered to the threaded holes of the drive gear by turning the special tool (tap M8 x 1.0), and then clean the threaded holes by applying compressed air.



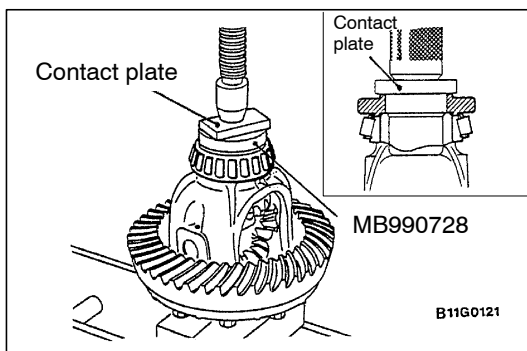
3. Apply the specified adhesive to the threaded holes of the drive gear.

Specified adhesive:

3M Stud Locking 4170 or equivalent

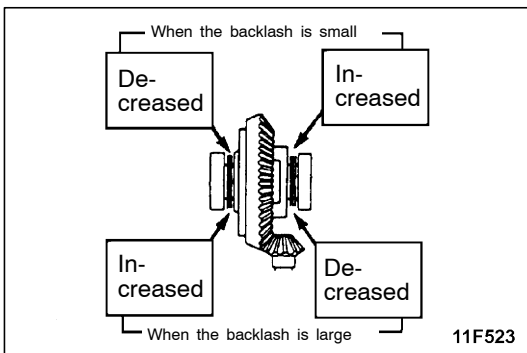
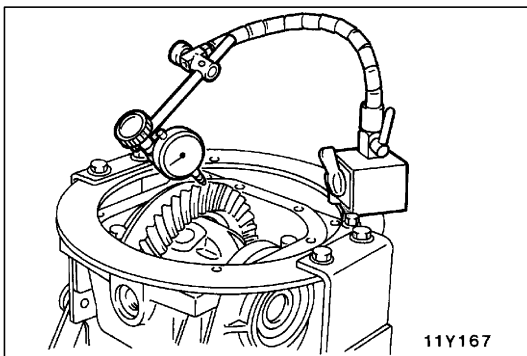
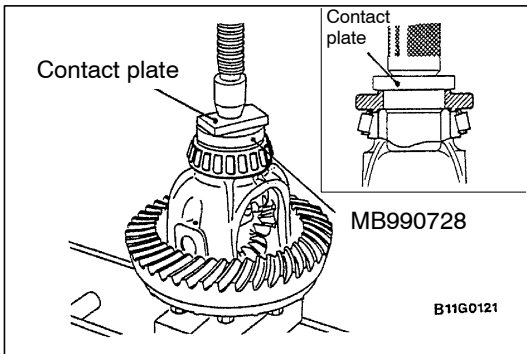
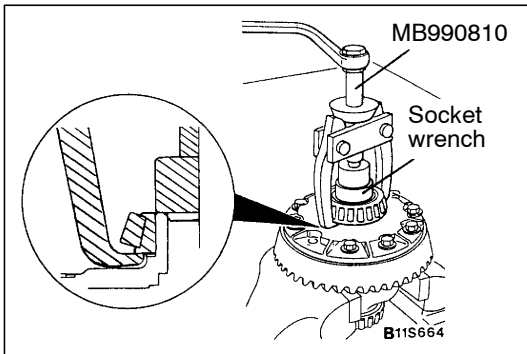
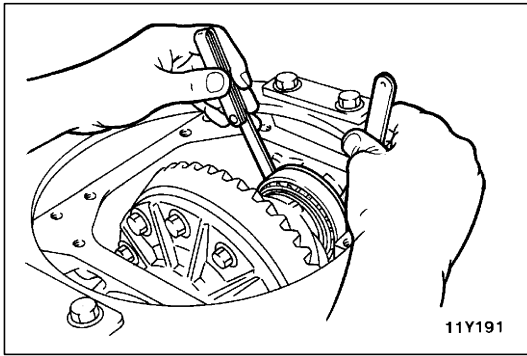
4. Install the drive gear onto the LSD case with the mating marks properly aligned. Tighten the bolts to the specified torque in a diagonal sequence.

Tightening torque: 84 ± 4 N·m



►G◄ SIDE BEARING INNER RACE INSTALLATION

Use special tool to press-fit the side bearing inner races into the differential case.



►H◄ BEARING CAP INSTALLATION/FINAL DRIVE GEAR BACKLASH ADJUSTMENT

Adjust drive gear backlash as follows:

1. Assemble the differential case with the side bearing outer race to the gear carrier.
2. Press the differential case to one side to measure the clearance of the side bearing outer race and the gear carrier.
3. Select two pairs of the side bearing spacer with the thickness derived from the sum of the clearance and a half of pre-load, 0.05 mm.
4. Remove the side bearing with special tools.

NOTE

Hook the claws of the special tool with the side bearing inner race by using the notches (two areas) of the LSD case side.

5. Assemble the selected side bearing spacers to each side.
6. Use special tools to press-fit the side bearing inner case into the LSD case. After installing the outer race, assemble the LSD case to the gear carrier.
7. Align the mating marks of differential carrier and the bearing cap with each other to tighten to the specified torque.

Tightening torque: 37 ± 2 N·m

8. Measure the drive gear backlash.

NOTE

Measure at four points or more on the circumference of the drive gear.

Standard value: 0.11 - 0.16 mm

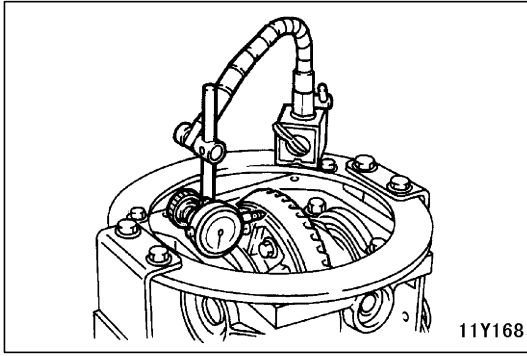
9. If the backlash is not within the standard value, move the side bearing spacer as shown in the illustration to adjust the backlash.

NOTE

The increment of side bearing spacer must be coincided with the decreased amount.

10. Inspect the tooth condition at the final drive gear and make an adjustment if required. (Refer to P.27B-39.)

27B-50 REAR AXLE - Differential Carrier <Vehicles with mechanical LSD>



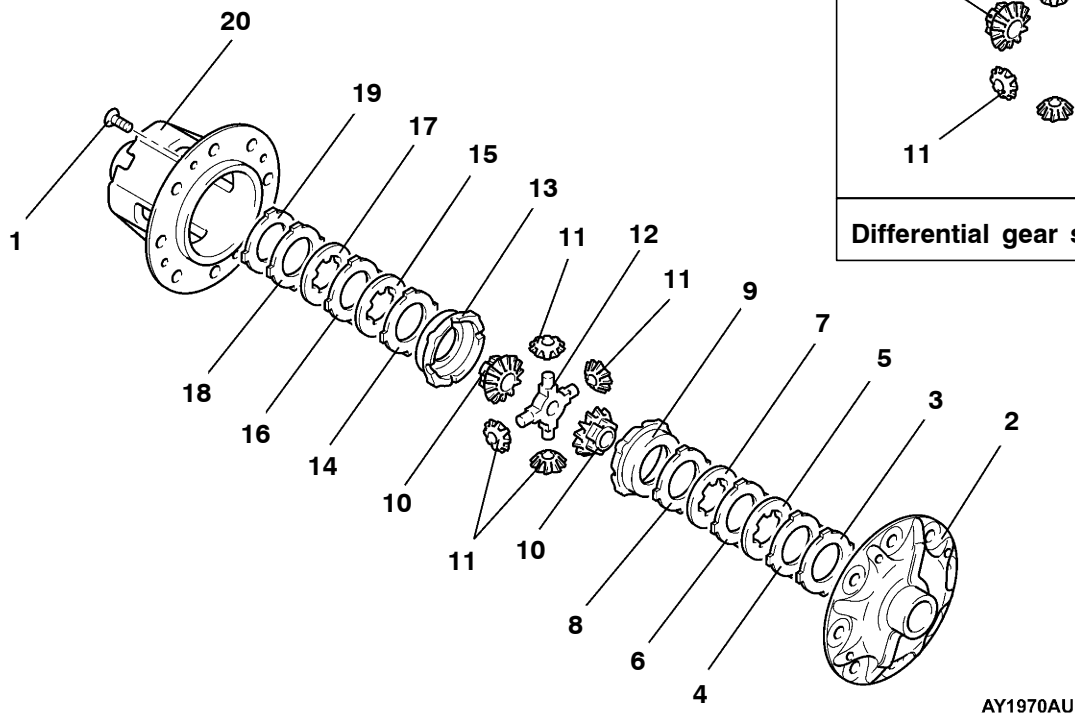
11. Measure the drive gear runout.

Limit: 0.05 mm

12. When drive gear runout exceeds the limit, remove the differential case and then the drive gears, moving them to different positions and reinstall them.

13. If adjustment is not possible, replace the differential case or drive gear and drive pinion as a set.

LSD CASE ASSEMBLY DISASSEMBLY AND REASSEMBLY



Disassembly steps

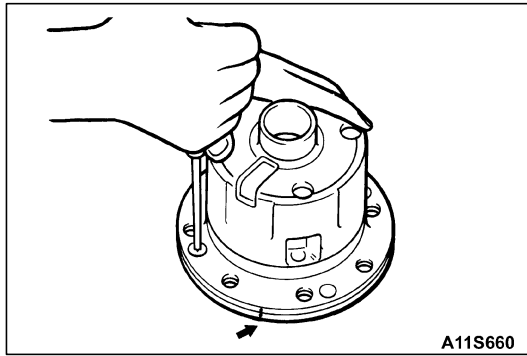
● LSD differential torque check



1. Screw
2. Differential case A
3. Spring plate
4. Friction plate
5. Friction disc
6. Friction plate
7. Friction disc
8. Friction plate
9. Pressure ring

10. Side gear
11. Pinion gear
12. Pinion shaft
13. Pressure ring
14. Friction plate
15. Friction disc
16. Friction plate
17. Friction disc
18. Friction plate
19. Friction plate
20. Differential case B





REMOVAL SERVICE POINT

◀A▶ SCREWS REMOVAL

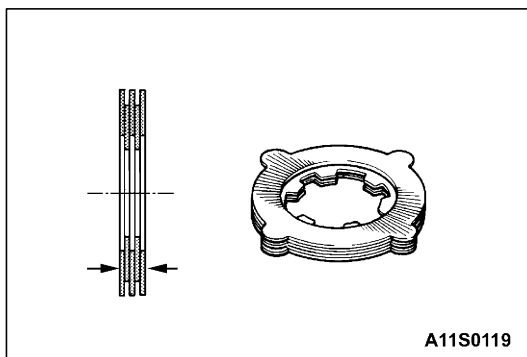
1. Check out the alignment marks.
2. Loosen a uniform amount little by little the screws securing differential case A to B.
3. Separate differential case B from differential case A and remove their components.

Keep the removed spring plates, friction plates, and friction discs organized in the order of removal and for right and left use.

INSTALLATION SERVICE POINTS

▶A◀ DIFFERENTIAL CASE B INSTALLATION

Before starting the assembly procedure, perform the following steps to adjust dimensional differences (clutch plate friction force) in the axial direction of the components inside the differential case and axial clearance of the differential side gear.



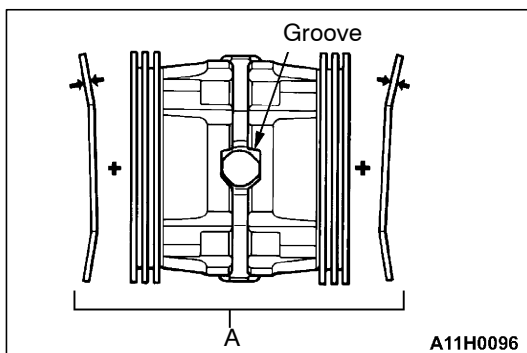
1. Place friction discs (two each) and friction plates (three each) one on top of another as illustrated and, using a micrometer, measure the thickness of each of the right and left assemblies. Select different discs and plates so that the difference between the right and left assemblies falls within the specified range.

Standard value: 0 – 0.05 mm

NOTE

If a new part is used, note that the friction disc comes in two thicknesses: 1.6 mm and 1.7 mm.

2. Measure the thickness of each of the right and left spring plates.



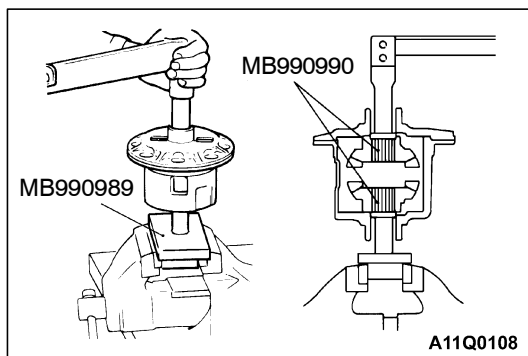
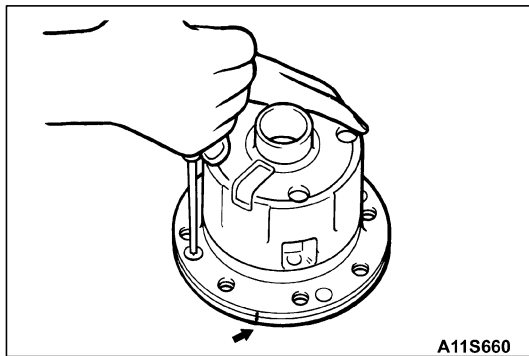
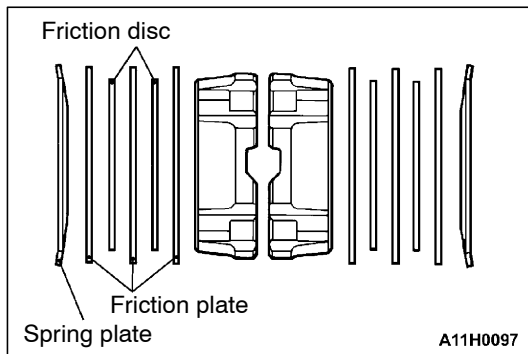
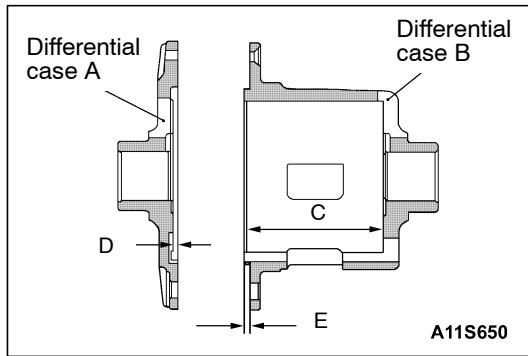
3. Assemble the pressure ring internal parts (pinion shaft and pressure ring), friction plates, and friction discs and, using a micrometer, measure the overall width.

NOTE

When taking measurements, press the assembly from both sides so that the pinion shaft makes a positive contact with the groove in the pressure ring.

4. Find value (A) which is the thickness measured in step (3) added to the thickness of two spring plates.

27B-52 REAR AXLE - Differential Carrier <Vehicles with mechanical LSD>



- Find dimension (B) between the spring plate faying surfaces when differential case A and B are assembled together.
 $B = C + D - E$
- If the clearance between the spring plate and differential case (B - A) is outside the specified range, change the friction discs and make adjustments.

Standard value: 0.06 – 0.25 mm

- Coat each part with the specified gear oil and mount it in the specified direction and order into differential case B.

Specified gear oil:

Hypoid gear oil

MITSUBISHI Genuine Gear Oil Part No. 8149630 EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W - 90) or equivalent

NOTE

Apply a careful coat of gear oil to the contacting and sliding surfaces.

►B◀ SCREW TIGHTENING

- Align the alignment mark on differential case A with that on differential case B.
- Tighten the screws connecting differential case A and B a uniform amount little by little in the diagonal order.

NOTE

If tightening the screws does not bring the two cases properly together, spring plates are not probably assembled properly. Reassemble from the start.

►C◀ LSD DIFFERENTIAL TORQUE CHECK

- Using the special tool, check for differential torque.

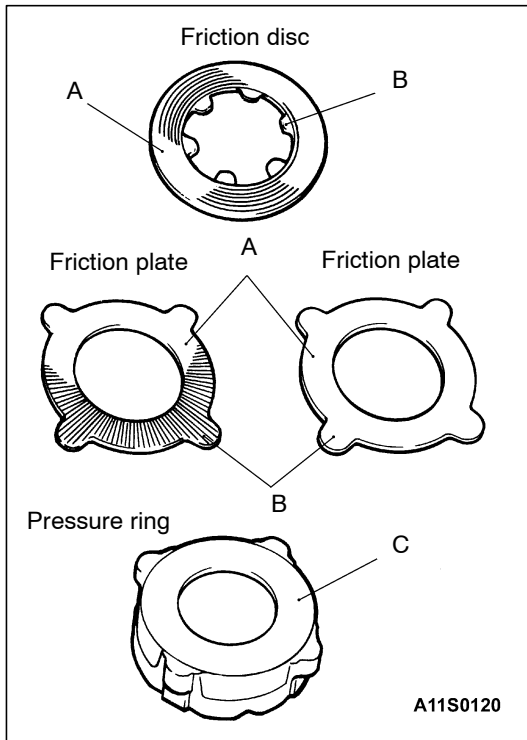
Standard value:

Item	LSD differential torque N·m
When new clutch plate is installed	5 – 19
When existing clutch plate is installed	2 – 19

NOTE

Before measuring the differential torque, first turn the gears so they snug each other, then take measurements during rotation.

- If the measurement falls outside the specified range, disassemble the differential case assembly and repair or replace defective parts.



INSPECTION

DIFFERENTIAL CASE INTERNAL PARTS CONTACT/ SLIDING SURFACE CHECK

1. Clean the disassembled parts with cleaning oil and dry them with compressed air.
2. Check each plate, disc, and pressure ring for the following:
 - A. Friction and sliding surfaces of friction discs, friction plates, and spring plates.
Replace a defective part with heat discoloration and excessive wear with a new one, as it degrades locking performance.

NOTE

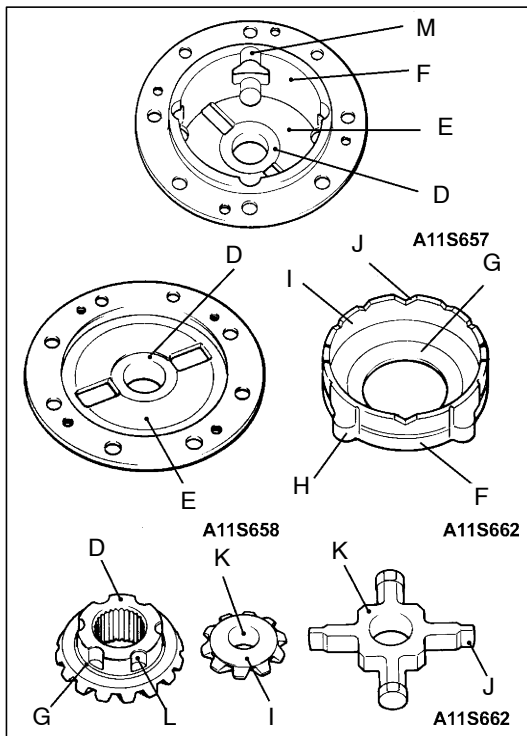
If the inner periphery of the friction face shows traces of harsh contact, it is because of the spring tension of each plate, disc and other part. Do not confuse this with abnormal wear.

- B. Inner periphery and outer periphery protrusions of friction discs, friction plates, and spring plates.
Replace a cracked or damaged part with a new one.

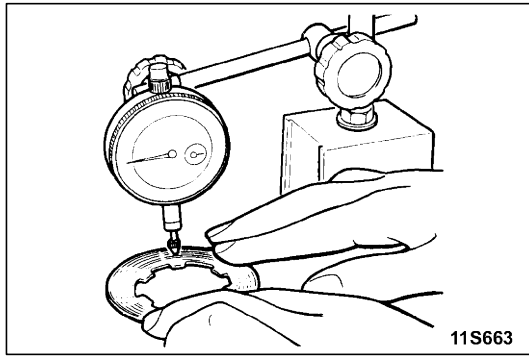
- C. Friction and sliding surfaces between pressure rings and friction discs.
Grind a dented or scratched part with oil stone and then lap and correct with a compound on a surface plate.

NOTE

If the inner periphery of the friction face shows traces of harsh contact, it is because of the spring tension of each plate, disc and other part. Do not confuse this with abnormal wear.



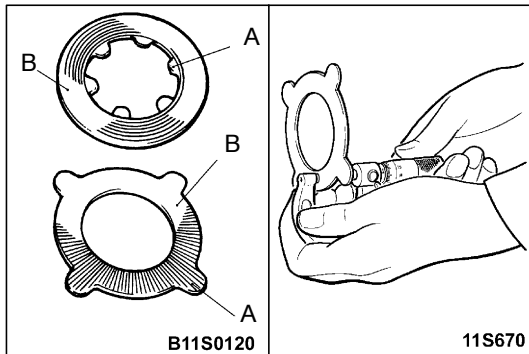
3. Check the following parts for contact and sliding surfaces (D to M) and correct burrs and dents with oil stone.
 - D: Sliding surfaces of side gear and case
 - E: Contacting surfaces of differential case and spring plate
 - F: Contacting surfaces of pressure ring and differential case inner face
 - G: Sliding surfaces of pressure ring hole and side gear
 - H: Protrusions on outer periphery of pressure ring
 - I: Pressure ring inner surface and differential pinion gear spherical surface
 - J: Pressure ring V-groove and pinion shaft V
 - K: Sliding surfaces of pinion shaft and differential pinion gear hole
 - L: Side gear grooves on outer periphery
 - M: Slits in inner periphery of differential



FRICION PLATE AND FRICTION DISC DISTORTION CHECK

Apply a dial indicator to the friction plate or disc on a surface plate and, turning the friction plate or disc, measure the distortion (flatness).

Limit: 0.08 mm (total runout)



FRICION PLATE, FRICTION DISC, AND SPRING PLATE WEAR CHECK

1. For the purpose of determining wear, measure thickness (A, B) of the friction surface and protrusion at several places and find the difference between the two.

Limit: 0.1 mm

2. If the wear exceeds the limit, replace the part with a new one.

DIFFERENTIAL CARRIER <VEHICLES WITH AYC>

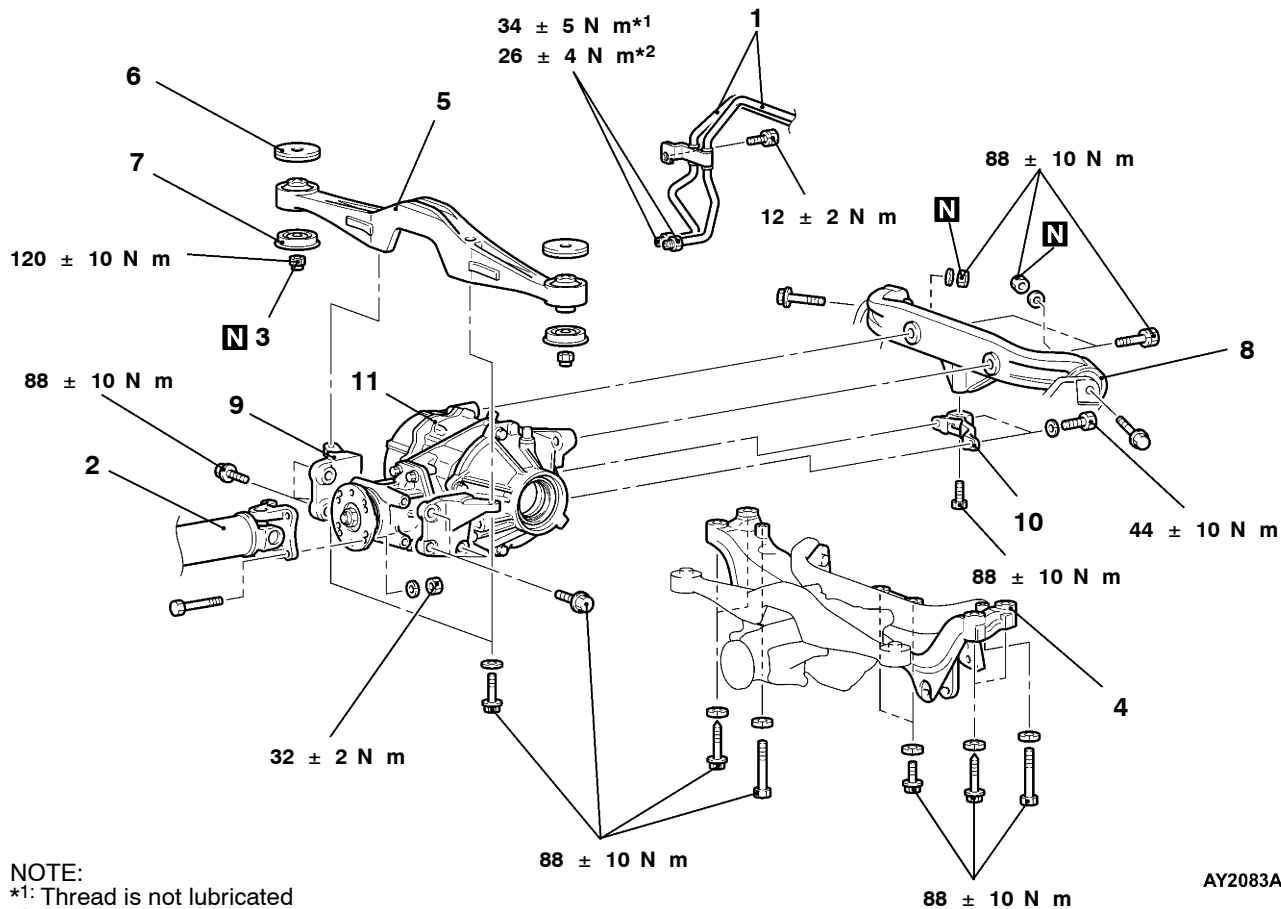
REMOVAL AND INSTALLATION

Pre-removal Operation

- Hydraulic Piping Fluid Draining
- Differential Gear Oil Draining (Refer to P. 27B-17.)
- Lower Arm Assembly Removal (Refer to GROUP 34.)
- Rear Stabilizer Removal (Refer to GROUP 34.)
- Drive Shaft Removal (Refer to P. 27B-29.)

Post-installation Operation

- Drive Shaft Installation (Refer to P. 27B-29.)
- Rear Stabilizer Installation (Refer to GROUP 34.)
- Lower Arm Assembly Installation (Refer to GROUP 34.)
- Differential Gear Oil Filling (Refer to P. 27B-17.)
- Hydraulic Piping Fluid Filling and Bleeding (Refer to P.27B-17 and P.27B-19.)



NOTE:

- *1: Thread is not lubricated
- *2: Thread is lubricated

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Removal steps



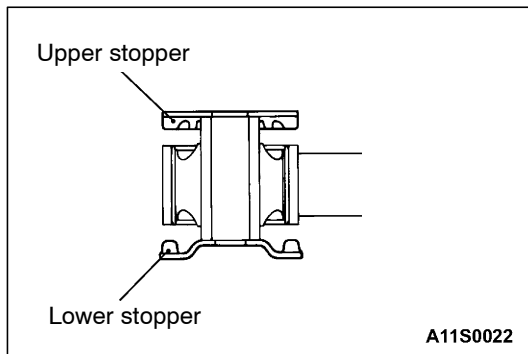
1. Hydraulic unit hose assembly connection
2. Propeller shaft connection (Refer to GROUP 25.)
3. Differential support member mounting nuts
4. Rear crossmember and differential carrier assembly (Refer to P. 27B-35.)



5. Differential support member
6. Upper stopper
7. Lower stopper
8. Differential support arm
9. Differential mount bracket
10. Differential mount bracket
11. Differential carrier assembly

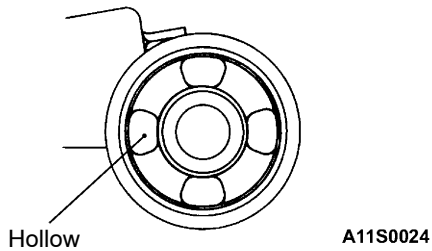
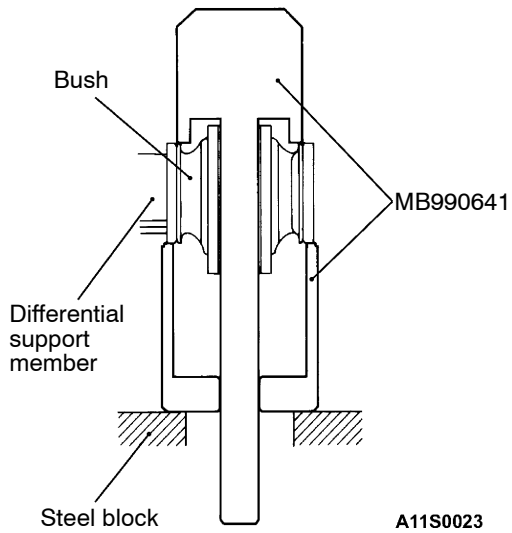
REMOVAL SERVICE POINT**◀A▶ PROPELLER SHAFT DISCONNECTION**

Suspend the removed propeller shaft from the body with a wire to prevent bending.

**INSTALLATION SERVICE POINTS****▶A◀ LOWER STOPPER/UPPER STOPPER INSTALLATION**

Install the lower and upper stopper as shown in the illustration.

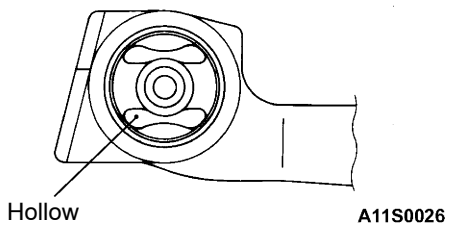
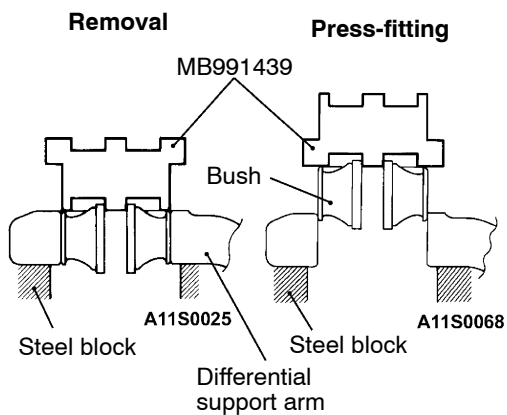
<Differential support member>



BUSHING REPLACEMENT

1. Remove and press fit the bush with special tool.
2. Press fit th bush so that the hollow of the bush is on the position shown as the illustration.
3. Press fill the bush until the surface of the outer sleeve of the bush,differential support member or differential support arm contact.

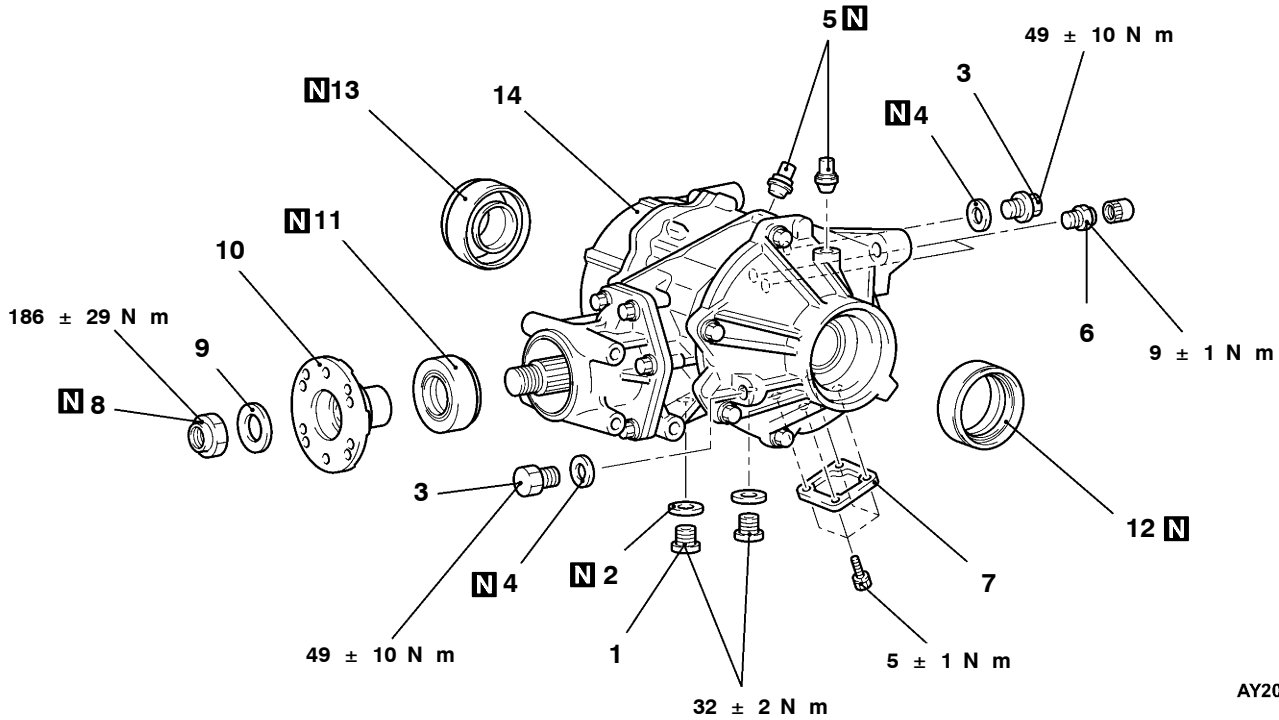
<Differential support arm>



**TORQUE TRANSFER DIFFERENTIAL <VEHICLES WITH AYC>
DISASSEMBLY AND REASSEMBLY**

Caution

1. The differential carrier assembly is non-maintainable.
2. No foreign matter should be allowed inside and at the joints of the differential carrier assembly.



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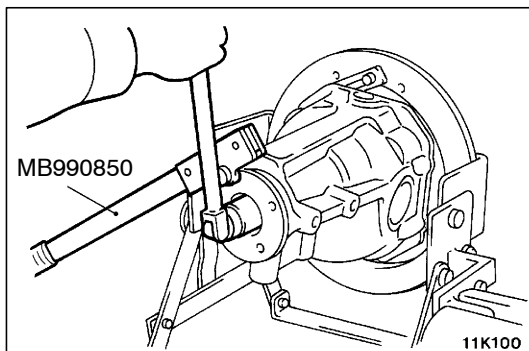
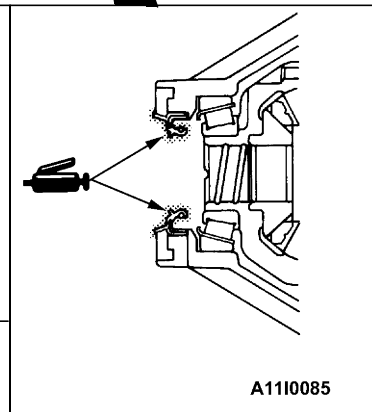
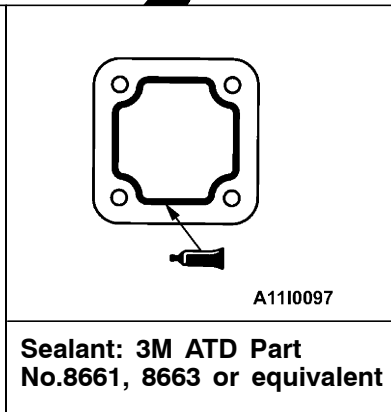
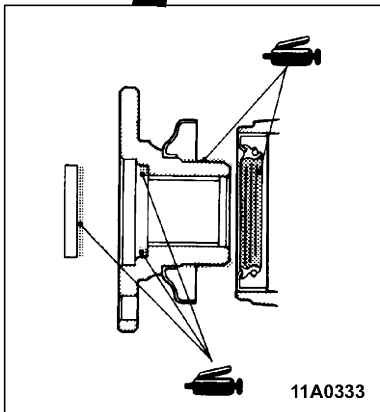
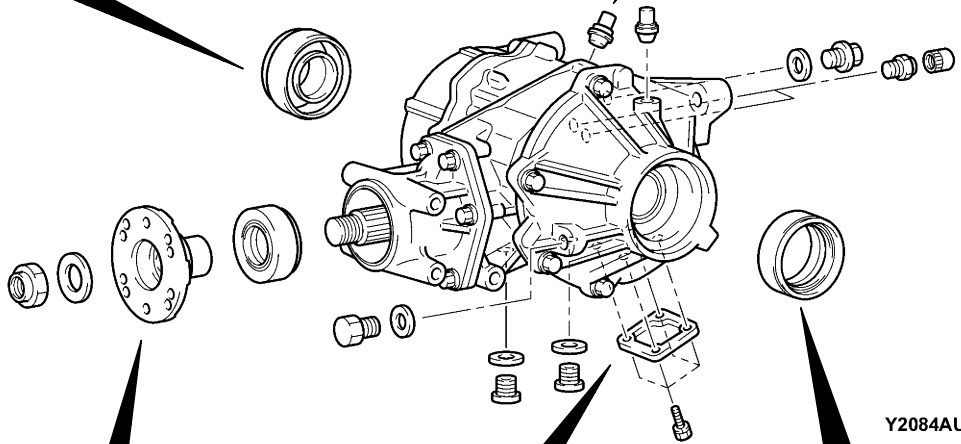
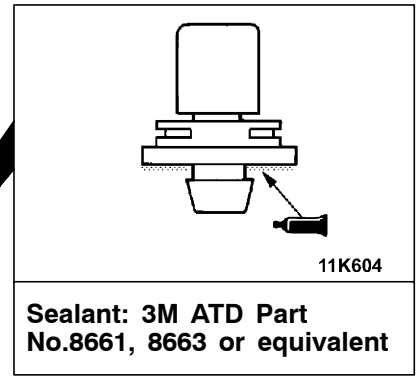
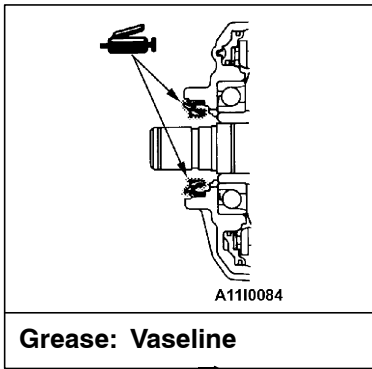
Disassembly steps

1. Drain plug
2. Packing
3. Filler plug
4. Gasket
5. Vent plug
6. Bleeder screw
7. Cover

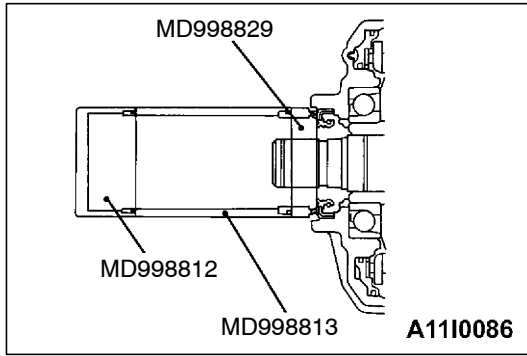


8. Self-locking nut
9. Washer
10. Companion flange
11. Oil seal
12. Oil seal
13. Oil seal
14. Differential carrier assembly

Lubrication and Adhesive Points

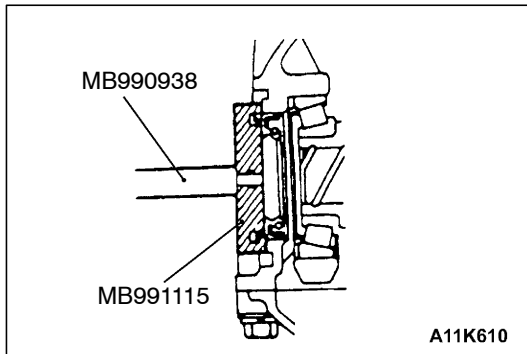


DISASSEMBLY SERVICE POINT
◀A▶ SELF-LOCKING NUT REMOVAL

**ASSEMBLY SERVICE POINTS****▶A◀ OIL SEAL PRESS-FITTING**

1. Using the special tool, pressfit the oil seal as far as it will go.
2. Apply the specified grease to the oil seal lip.

Specified grease: Vaseline

**▶B◀ DRIVE PINION REAR BEARING OUTER RACE PRESS-FITTING**

1. Using the special tool, pressfit the oil seal as far as the oil seal will go.
2. Apply the multipurpose grease to the oil seal lip.

HYDRAULIC UNIT <VEHICLES WITH ACD+AYC>

REMOVAL AND INSTALLATION

Caution

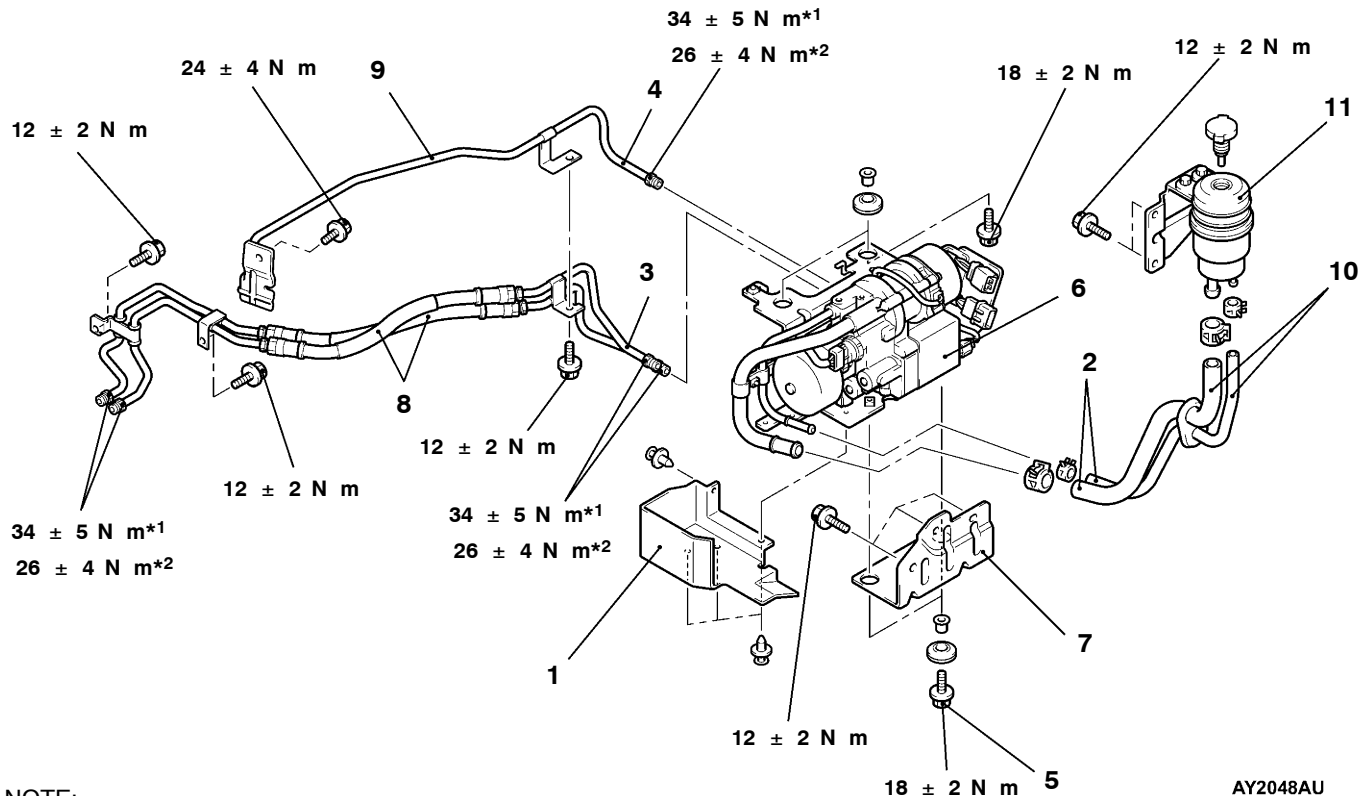
- (1) When connecting the return hose and suction hose, do not apply lubricant.
- (2) No foreign matter should be allowed in the hydraulic piping and joints.

Pre-removal Operation

- Trunk Side Trim Removal (Refer to GROUP 52A.)
- Hydraulic Piping Fluid Draining

Post-installation Operation

- Hydraulic Piping Fluid Filling and Bleeding (Refer to P.27B-17 and P.27B-19.)
- Trunk Side Trim Installation (Refer to GROUP 52A.)



NOTE:

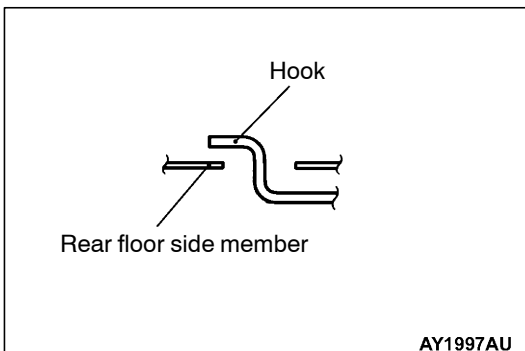
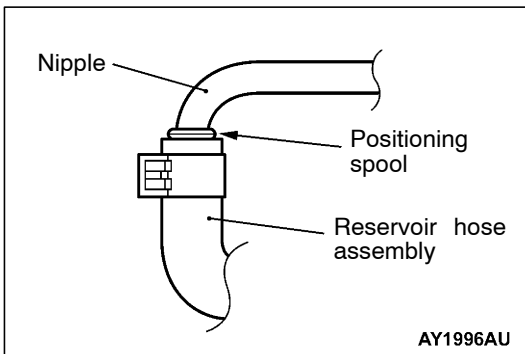
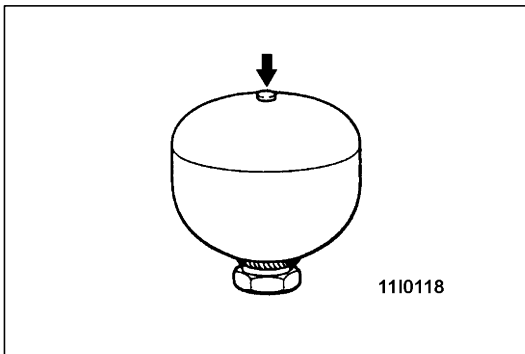
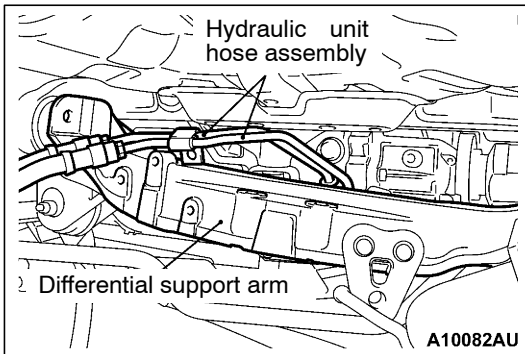
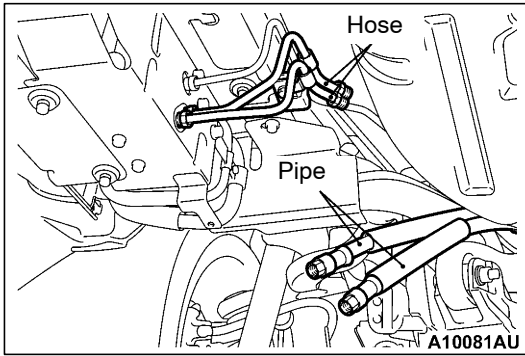
- *1: Thread is not lubricated
- *2: Thread is lubricated

AY2048AU

Removal steps

- | | | |
|--|------------|--|
| <ol style="list-style-type: none"> 1. Dust guard 2. Reservoir hose assembly and hydraulic unit connection 3. Hydraulic unit hose assembly and hydraulic unit connection 4. Transfer connector assembly and hydraulic unit connection 5. Hydraulic unit bracket assembly mounting bolt 6. Hydraulic unit assembly | <p>◀A▶</p> | <ol style="list-style-type: none"> 7. Hydraulic unit bracket <ul style="list-style-type: none"> ● Stabilizer bar to differential support arm connection (Refer to GROUP 34.) ● Differential support arm (Refer to P. 27B-55.) 8. Hydraulic unit hose assembly <vehicles with ACD+AYC> 9. Transfer connector assembly 10. Reservoir hose assembly 11. Oil reserve |
|--|------------|--|





REMOVAL SERVICE POINTS

◀A▶ HYDRAULIC UNIT HOSE ASSEMBLY REMOVAL

1. Disconnect the hydraulic unit side pipe and hose.
2. Put down the differential support arm, remove the hydraulic unit hose assembly.

HYDRAULIC UNIT DISPOSAL

Should the hydraulic unit be discarded, drill a hole in the accumulator at the illustrated position beforehand in order to release the inside gas.

Caution

- (1) The hydraulic unit has its accumulator filled with a high pressure gas. Never throw it into a fire. Also, never attempt to disassemble, press, weld or melt it.
- (2) When drilling a hole in the accumulator, be sure to wear safety goggles since drill chips may blow out together with the gas.

INSTALLATION SERVICE POINTS

▶A◀ RESERVOIR HOSE ASSEMBLY INSTALLATION

Insert the reservoir hose assembly to the positioning spool.

▶C◀ HYDRAULIC UNIT ASSEMBLY INSTALLATION

Hook the hydraulic unit assembly hook to the rear floor side member and tighten the hydraulic unit assembly mounting bolt.

WHEEL AND TYRE

CONTENTS

GENERAL INFORMATION	2	ON-VEHICLE SERVICE	6
SERVICE SPECIFICATIONS	2	Tyre Inflation Pressure Check	6
TROUBLESHOOTING	3	Tyre Wear Check	6
		Wheel Runout Check	6
		WHEEL AND TYRE	6



GENERAL INFORMATION

The wheels and tyres of the following specifications have been established.

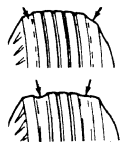
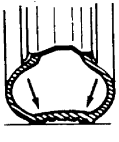
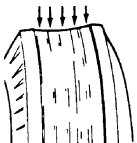
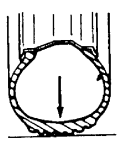

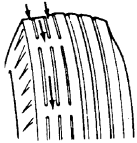
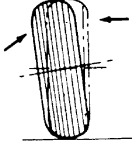
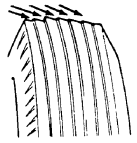
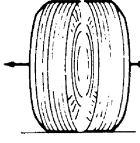
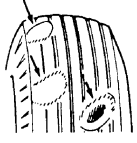
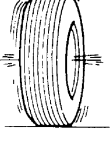
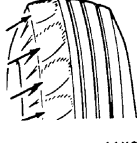
SPECIFICATIONS

Items		RS (standard)	RS (option), RS-II
Wheel	Type	Steel type	Aluminium type
	Size	15 × 6JJ	17 × 8JJ
	Amount of wheel offset mm	46	38
	Pitch circle diameter (P.C.D.) mm	114.3	114.3
Tyre	Size	205/65R15 94H	235/45ZR17
Spare wheel	Type	Steel type	Steel type
	Size	16 × 4T	17 × 4T
	Amount of wheel offset mm	40	30
	Pitch circle diameter (P.C.D.) mm	114.3	114.3
Spare tyre (High pressure)	Size	T125/70D16	T125/70D17

SERVICE SPECIFICATIONS

Items		Limit
Tread depth of tyre mm		1.6
Wheel runout (Radial runout) mm	Steel wheel	1.2 or less
	Aluminium wheel	1.0 or less
Wheel runout (Lateral runout) mm	Steel wheel	1.2 or less
	Aluminium wheel	1.0 or less

TROUBLESHOOTING

Symptom		Probable cause		Remedy	Reference page
Rapid wear at shoulders	 11X0109	Under-inflation or lack of rotation	 11X0116	Adjust the tyre pressure.	31-6
Rapid wear at centre	 11X0110	Over-inflation or lack of rotation	 11X0117		
Cracked treads	 11X0111	Under-inflation		Adjust the tyre pressure.	31-6
Wear on one side	 11X0112	Excessive camber	 11X0118	Inspect the camber.	Refer to GROUP 33A - On-vehicle Service.
Feathered edge	 11X0113	Incorrect toe-in	 11X0119	Adjust the toe-in.	
Bald spots	 11X0114	Unbalanced wheel	 11X0120	Adjust the imbalanced wheels.	31-4
Scalloped wear	 11X0115	Lack of rotation of tyres or worn or out-of-alignment suspension		Rotate the tyres and check the front suspension alignment.	Refer to GROUP 33A - On-vehicle Service.

WHEEL BALANCE ACCURACY

PURPOSE

This section contains tips and procedures for achieving accurate wheel balance. Steering wheel vibration and /or body shake can result if any of these procedures are not carefully observed.

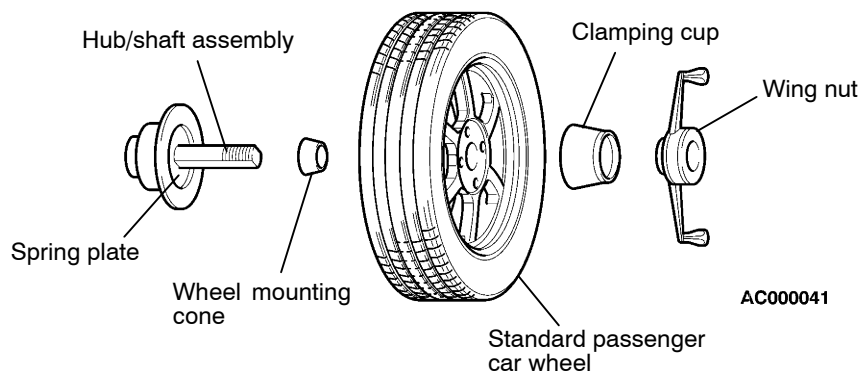
1. Wheels and tires must be properly mounted on a balancer in order to achieve correct balance. Centering the wheel on the shaft of the balancer is essential for proper mounting.
2. Off-the-car wheel balancers must be calibrated periodically to ensure good balancing results. An inaccurately calibrated balancer could cause unnecessary replacement of tires, shocks, suspension components, or steering components.

Check your balancer's calibration approximately every 100 balances. Your wheel balancer's instruction manual should include calibration procedures. If the calibration procedures specifically for your balancer are missing, use the generic steps in this section for zero calibration, static balance, and dynamic balance checks. The wheel balancer calibration checks are also described in the flowchart. (Refer to P.31-5.)

PROCEDURE

Balancing Tips

1. Confirm that the balancer's cone and the wheel mounting cone are undamaged and free of dirt and rust.
2. On this vehicle the wheel's center hole on the hub side has a chamfered edge. Use a back-mounting cone on your wheel balancer to center the wheel on the balancer shaft.
3. Install a wheel mounting cone. The appropriate size cone for this vehicle is 67.0 mm.
4. Before balancing the wheel, remove any wheel weights from both sides. Also check both sides for any damage.
5. When installing wheel weights, hammer them at a straight (not diagonal) angle.



Confirming Proper Balance

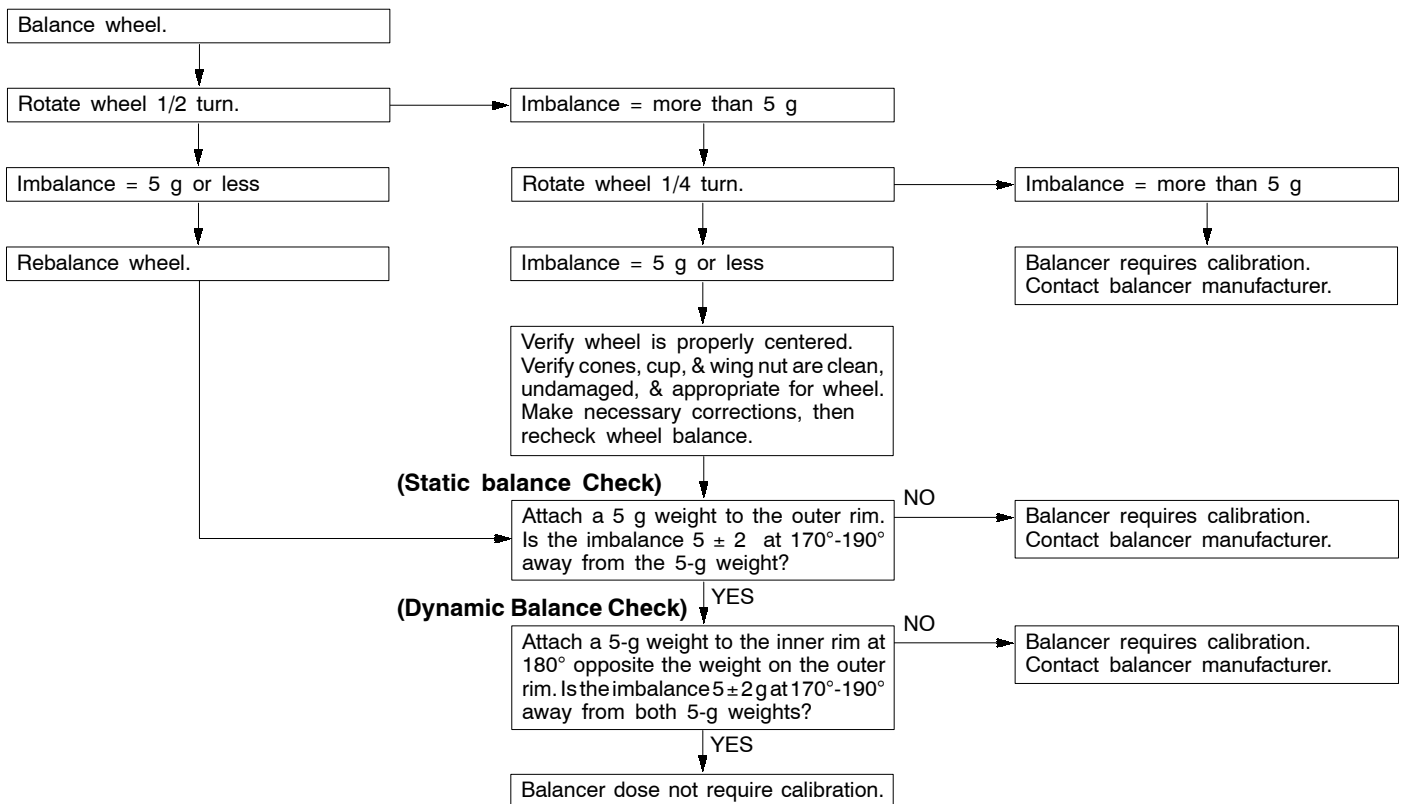
1. After balancing the wheel, loosen the wing nut and turn the wheel 180° against the balancer's hub. Then retighten the wing nut and check the balance again. Repeat wheel balance if necessary.
2. Turn the wheel again 180° against the balancer's hub. If the wheel becomes out-of-balance each time it is turned against the balancer's hub, the wheel balancer may require calibration.

Wheel Balancer Calibration Checks

1. Mount an undamaged original-equipment alloy rim and tire assembly (wheel) onto your off-the-car wheel balancer. Balance the wheel.
2. **<<Zero Calibration Check>>**
Loosen the balancer wing nut, rotate the wheel a half turn (180°), and retighten the nut. Recheck the balance.

- If the imbalance is 5 g or less, the zero calibration is OK. Rebalance the wheel, then go to Step 4 to check static balance.
- If the imbalance is more than 5 g, go to Step 3.
- 3. Loosen the balancer wing nut, rotate the wheel 1/4 turn (90°), and retighten the nut. Recheck the wheel balance.
- If the imbalance is 5 g or less, the wheel may not be centered on the balancer, or the balancing cones, the cup, and/or wing nut are damaged, dirty, or inappropriate for the wheel. You may need to refer to the balancer manufacturer's instructions to verify the correct attachments. After making the necessary corrections, recheck the wheel balance. If OK, then go to Step 4.
- If the imbalance is more than 5 g, the balancer requires calibration. Contact the balancer manufacturer for calibration by their repair representative.
- 4. <<Static Balance Check>>
Attach a 5-g weight to the outer rim. Recheck the balancer. The balancer should detect 5 ± 2 g of imbalance 170° to 190° away from both the inner and outer 5-g weights.
- If the imbalance is within specification, the static balance calibration is correct. Go to Step 5 to check the dynamic balance.
- If the imbalance is out of specification, the balancer requires calibration. Contact the balancer manufacturer for calibration by their repair representative.
- 5. <<Dynamic Balance Check>>
Attach a 5-g weight to the inner rim at 180° opposite the 5-g weight that was added in step 4. Recheck the balance. The balancer should detect 5 ± 2 g of imbalance 170° to 190° away from both the inner and outer 5-g weights.
- If the imbalance is within specification, the dynamic balance calibration is correct. The balancer calibration checks are complete.
- If the imbalance is out of specification, the balancer requires calibration. Contact the balancer manufacturer for calibration by their repair representative.

WHEEL BALANCER CALIBRATION CHECKING FLOW CHART



ON-VEHICLE SERVICE

TYRE INFLATION PRESSURE CHECK

NOTE

For information on tyre inflation pressure, refer to the label attached near the driver's side door striker.

TYRE WEAR CHECK

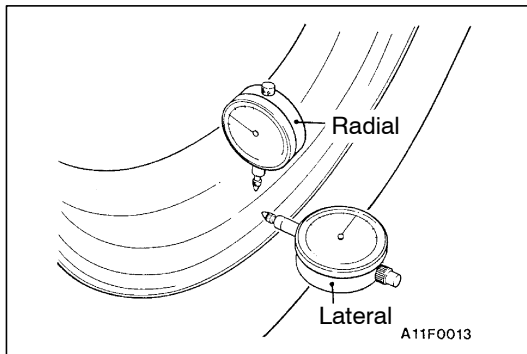
Measure the tread depth of tyres.

Limit: 1.6 mm

If the remaining tread depth is less than the limit, replace the tyre.

NOTE

When the tread depth of tyres is reduced to 1.6 mm or less, wear indicators will appear.



WHEEL RUNOUT CHECK

Jack up the vehicle so that the wheels are clear of the floor. While slowly turning the wheel, measure wheel runout with a dial indicator.

Limit:

Item	Steel wheel	Aluminium wheel
Radial runout mm	1.2	1.0
Lateral runout mm	1.2	1.0

If wheel runout exceeds the limit, replace the wheel.

WHEEL AND TYRE

Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.

INSTALLATION SERVICE POINT

Tighten the wheel nut to the specified torque.

Tightening torque: 98 ± 10 N·m

POWER PLANT MOUNT

CONTENTS

GENERAL INFORMATION	2	TRANSMISSION MOUNTING	5
SPECIAL TOOL	3	ENGINE ROLL STOPPER, CENTERMEMBER	6
ENGINE MOUNTING	4	CROSSMEMBER*	8

WARNING REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

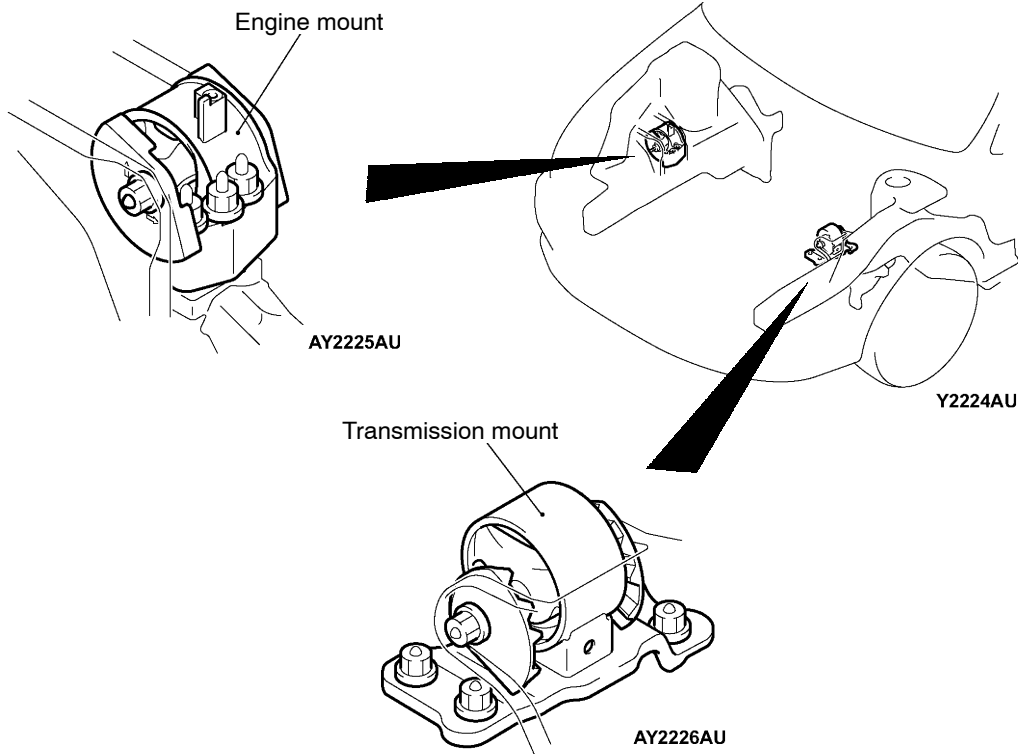
GENERAL INFORMATION

Inertia principal axes system is incorporated into the engine mount system.

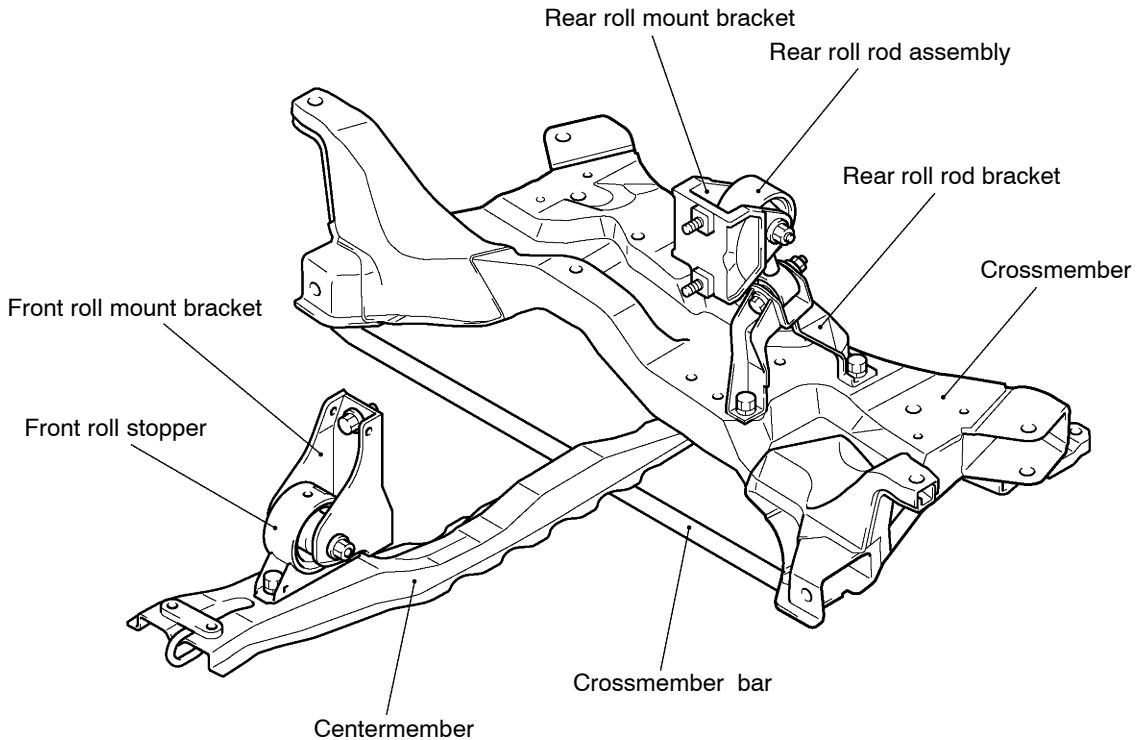
Upper installation of roll mount reduces engine rolling, and increase of insulator bore also reduces idle vibration.

CONSTRUCTION DIAGRAM

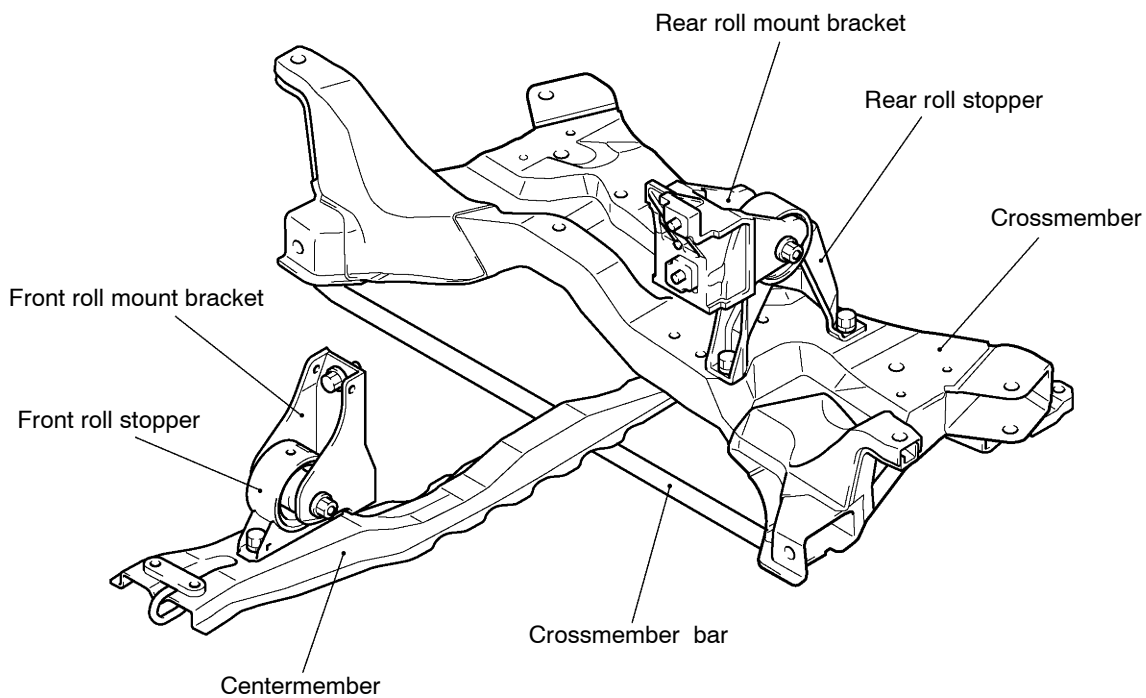
<Engine mount, Transmission mount>



<Engine roll stopper, Centermember, Crossmember: L.H. drive vehicles>

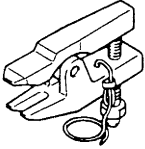


<Engine roll stopper, Centermember, Crossmember: R.H. drive vehicles>



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SPECIAL TOOL

Tool	Number	Name	Use
 <p>B991113</p>	MB990635, MB991113 or MB991406	Steering linkage puller	Tie rod end disconnection

ENGINE MOUNTING

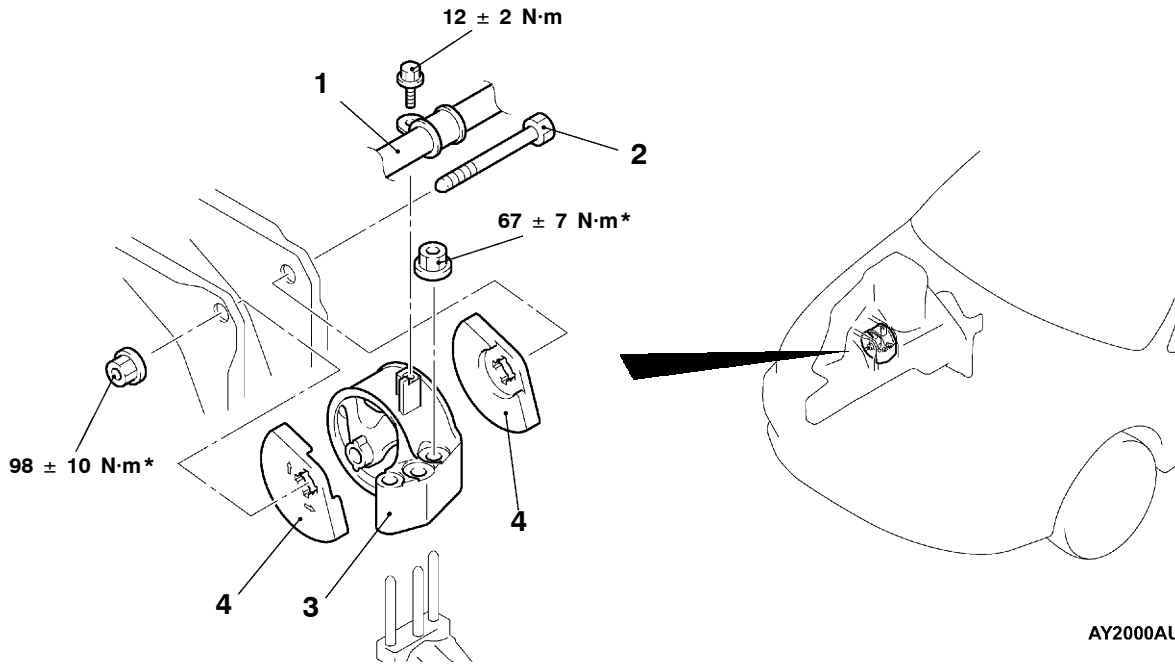
REMOVAL AND INSTALLATION

Caution

*: Indicates parts which should be initially tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)
- Raise the engine and transmission assembly until its weight is not applied to the insulator, and support it securely. <After installation only>

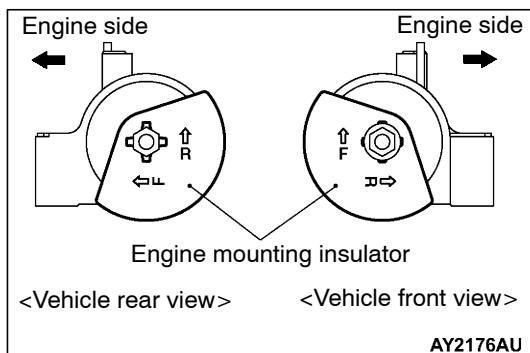


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Removal steps

1. Power steering pressure hose assembly
2. Engine mounting connecting bolt

- ▶A◀ 3. Engine mounting bracket
4. Engine mounting insulator



AY2176AU

INSTALLATION SERVICE POINT

▶A◀ ENGINE MOUNTING INSULATOR INSTALLATION

Arrow marks on the engine mount insulator should face the shown direction.

NOTE

Disregard F and R stamped as a shared part.

TRANSMISSION MOUNTING

REMOVAL AND INSTALLATION

Caution

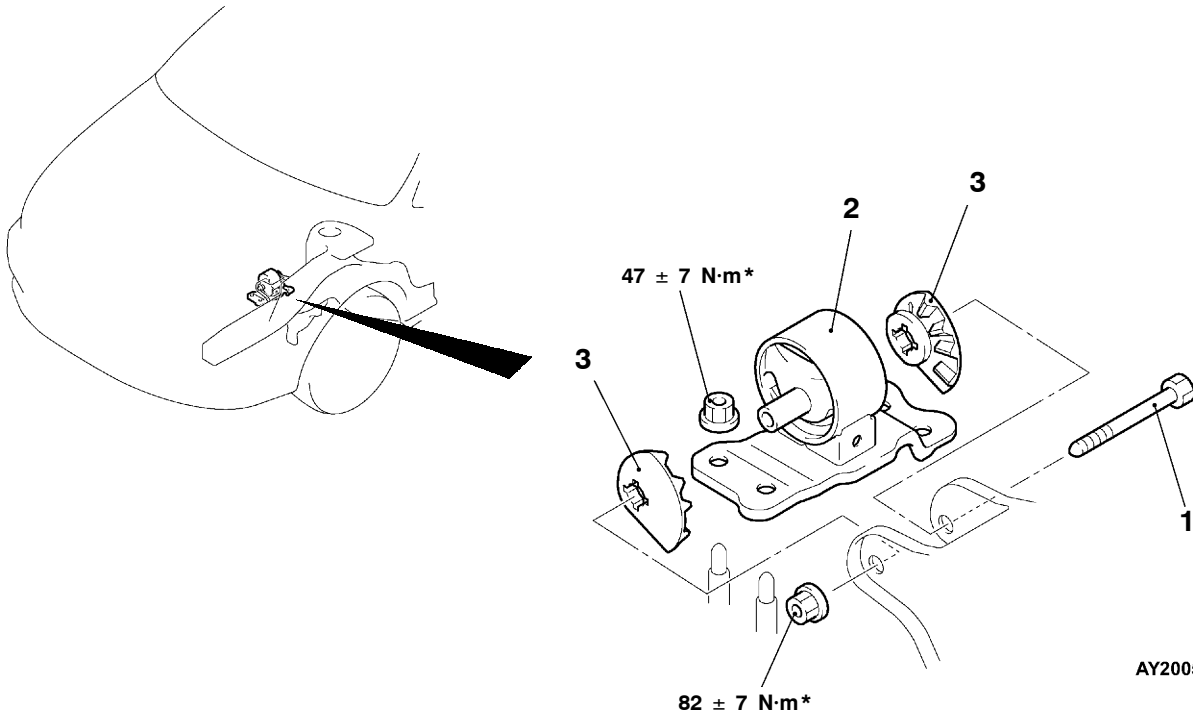
*: Indicates parts which should be initially tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.

Pre-removal Operation

- Under Cover Removal (Refer to GROUP 51 - Front Bumper.)
- Raise the engine and transmission assembly until its weight is not applied to the insulator, and support it securely.
- Battery and Battery Tray Removal
- Air Cleaner Removal (Refer to GROUP 15.)
- Radiator Removal (Refer to GROUP 14.)
- Air Pipe C, Air By-pass Hose, Air Hose D Removal (Refer to GROUP 15 - Inter Cooler.)
- Rear Roll Stopper Removal (Refer to P.32-6.)

Post-installation Operation

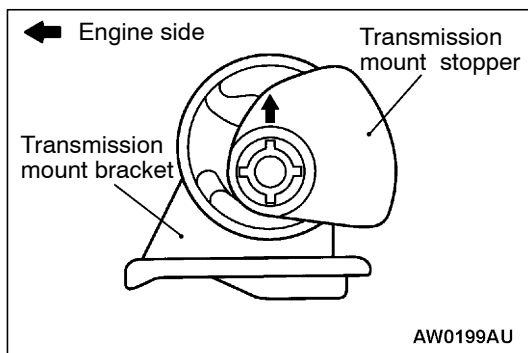
- Rear Roll Stopper Installation (Refer to P.32-6.)
- Air Pipe C, Air By-pass hose, Air Hose D Installation (Refer to GROUP 15.)
- Radiator Installation (Refer to GROUP 15.)
- Air Cleaner Installation (Refer to GROUP 15.)
- Battery and Battery Tray Installation
- Under Cover Installation (Refer to GROUP 51 - Front Bumper.)



Removal steps

1. Transmission mounting connecting bolt

2. Transmission mounting
3. Transmission mounting stopper



INSTALLATION SERVICE POINT

▶A◀ TRANSMISSION MOUNT STOPPER INSTALLATION

Install the transmission mount stopper so that its arrow points upward.

INSPECTION

Check the transmission mounting insulator for cracks, separation or deformation.

ENGINE ROLL STOPPER, CENTERMEMBER

REMOVAL AND INSTALLATION

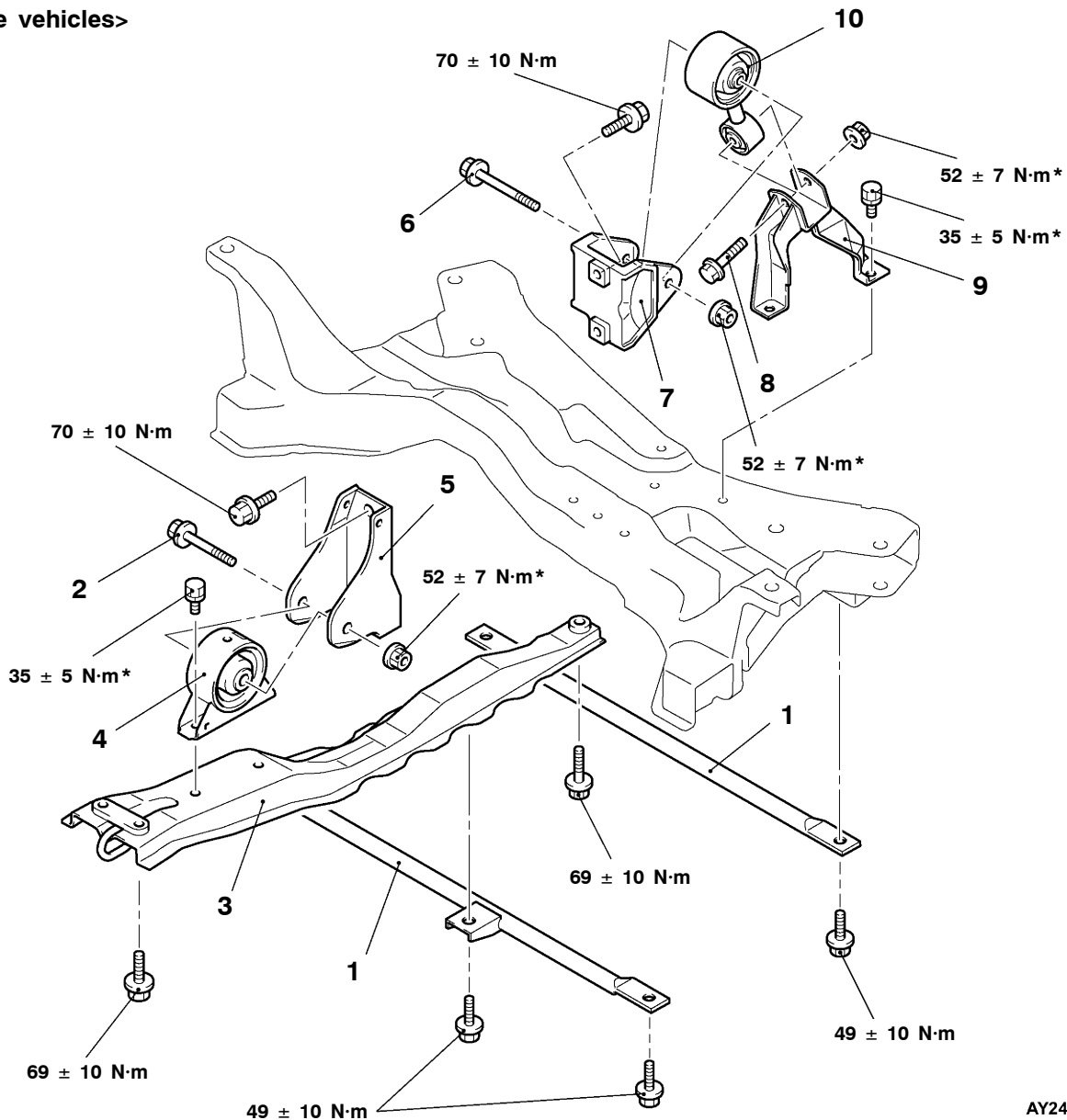
Caution

*: Indicates parts which should be initially tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.

Pre-removal and Post-installation Operation

Under Cover Removal and Installation (Refer to GROUP 51 - Front Bumper.)

<L.H. drive vehicles>



AY2448AU

Front roll stopper and centermember removal steps

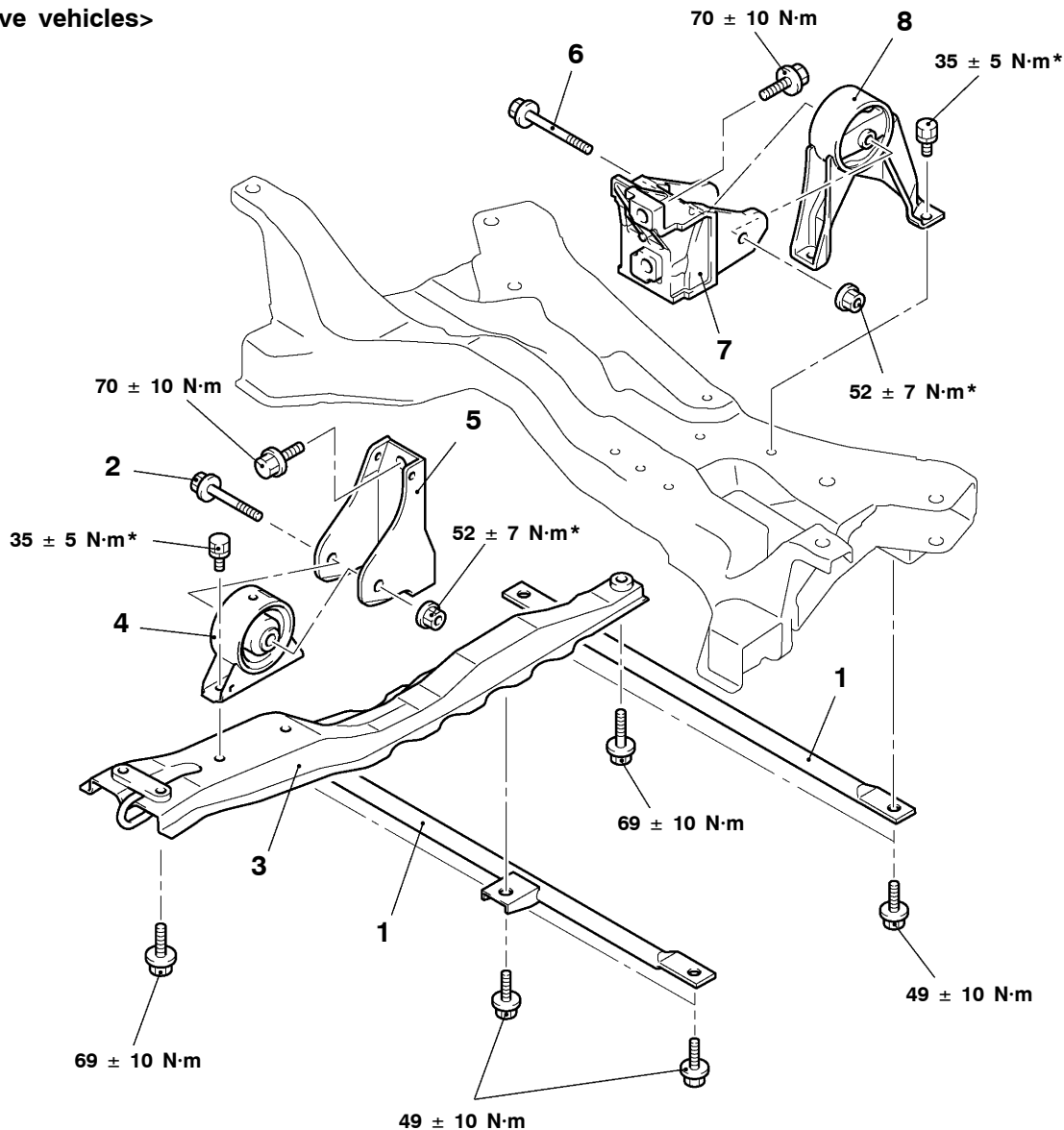
1. Crossmember bar
2. Front roll stopper connecting bolt
3. Centermember
4. Front roll stopper
5. Front roll mount bracket



Rear roll rod removal steps

6. Rear roll rod connecting bolt
7. Rear roll mount bracket
8. Rear roll rod connecting bolt
9. Rear roll rod bracket
10. Rear roll rod assembly

<R.H. drive vehicles>



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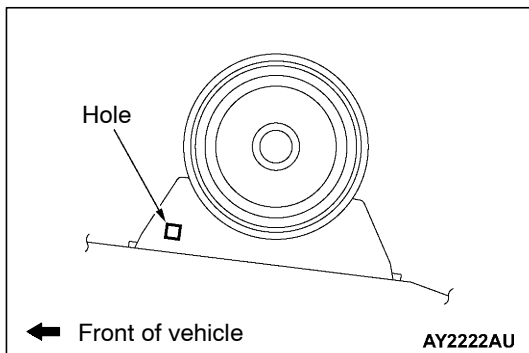
Front roll stopper and centermember removal steps

1. Crossmember bar
2. Front roll stopper connecting bolt
3. Centermember
4. Front roll stopper
5. Front roll mount bracket



Rear roll stopper removal steps

6. Rear roll stopper connecting bolt
7. Rear roll mount bracket
8. Rear roll stopper



INSTALLATION SERVICE POINT

▶◀ FRONT ROLL STOPPER INSTALLATION

Install the front roll stopper so that its hole points towards the front side of the vehicle.

CROSSMEMBER

REMOVAL AND INSTALLATION

Caution

1. Before removing the steering wheel and air bag module assembly, always refer to GROUP 52B - Service Precautions, Air bag Module and Clock Spring. Also, set the front wheels so that they are facing straight forward, and remove the ignition key. If you fail to do this, the SRS clock spring will be damaged, causing the SRS air bag to be inoperative and serious injury.
2. *1: Indicates parts which should be initially tightened, and then fully tightened after placing the vehicle horizontally and loading the full weight of the engine on the vehicle body.
3. *2: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Caution

If the vehicle is equipped the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.

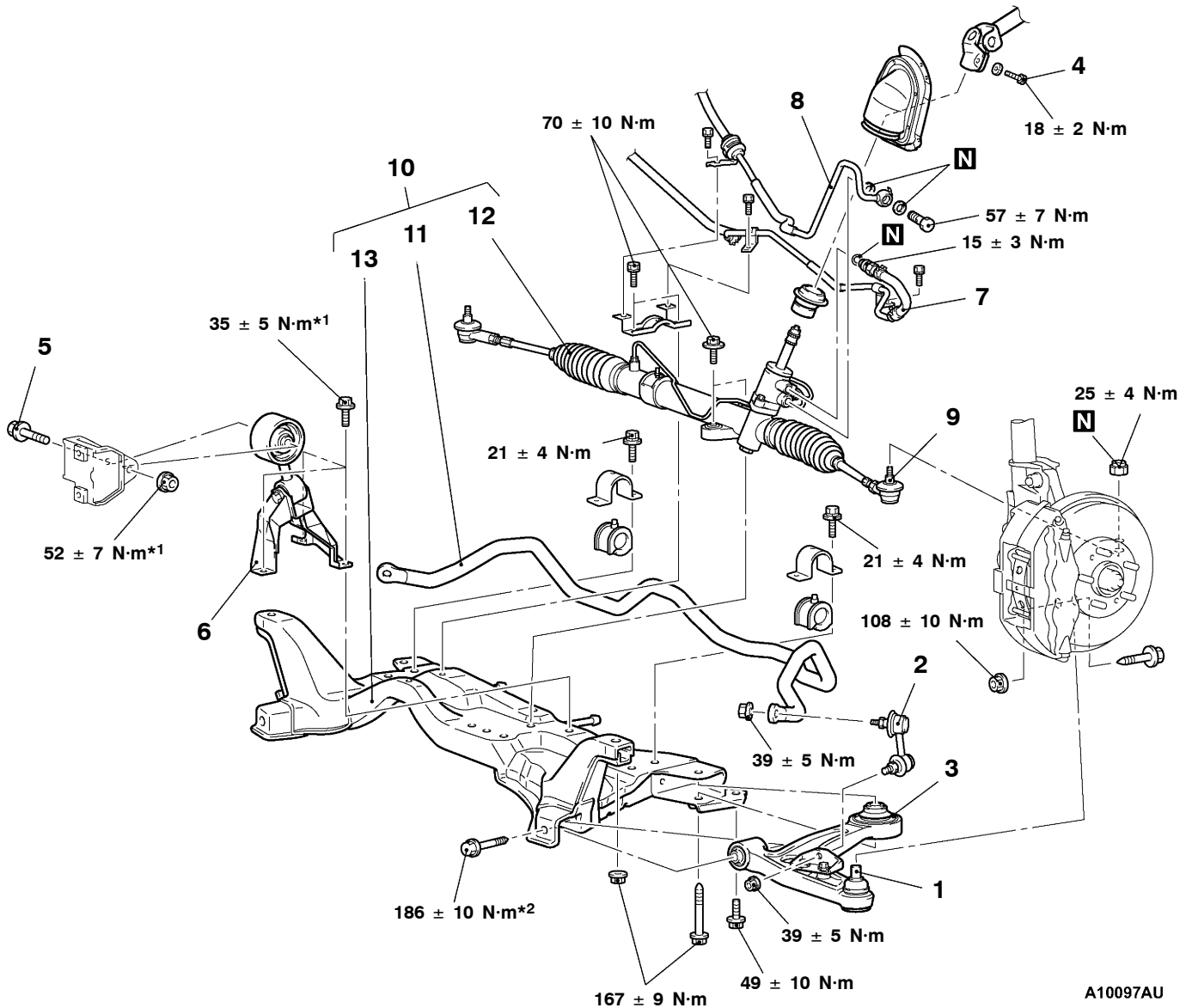
Pre-removal Operations

- Under Cover Removal
(Refer to GROUP 51 - Front Bumper.)
- Centermember, Crossmember Bar Removal
(Refer to P.32-6.)
- Front Exhaust Pipe Removal
(Refer to GROUP 15.)
- Steering Wheel Air Bag Module Assembly Removal
(Refer to GROUP 37A.)
- Power Steering Fluid Draining
(Refer to GROUP 37A - On-vehicle Service.)

Post-installation Operations

- Centermember, Crossmember Bar Installation
(Refer to P.32-6.)
- Front Exhaust Pipe Installation
(Refer to GROUP 15.)
- Steering Wheel Air Bag Module Assembly Installation (Refer to GROUP 37A.)
- Power Steering Fluid Supplying
(Refer to GROUP 37A - On-vehicle Service.)
- Power Steering Fluid Line Bleeding
(Refer to GROUP 37A - On-vehicle Service.)
- Press the dust cover with a finger to check whether the dust cover is cracked or damaged.
- Checking Steering Wheel Position with Wheels Straight Ahead
- Front Wheel Alignment Check and Adjustment
(Refer to GROUP 37A - On-vehicle Service.)
- Under Cover Installation
(Refer to GROUP 51 - Front Bumper.)

<L.H. drive vehicles>



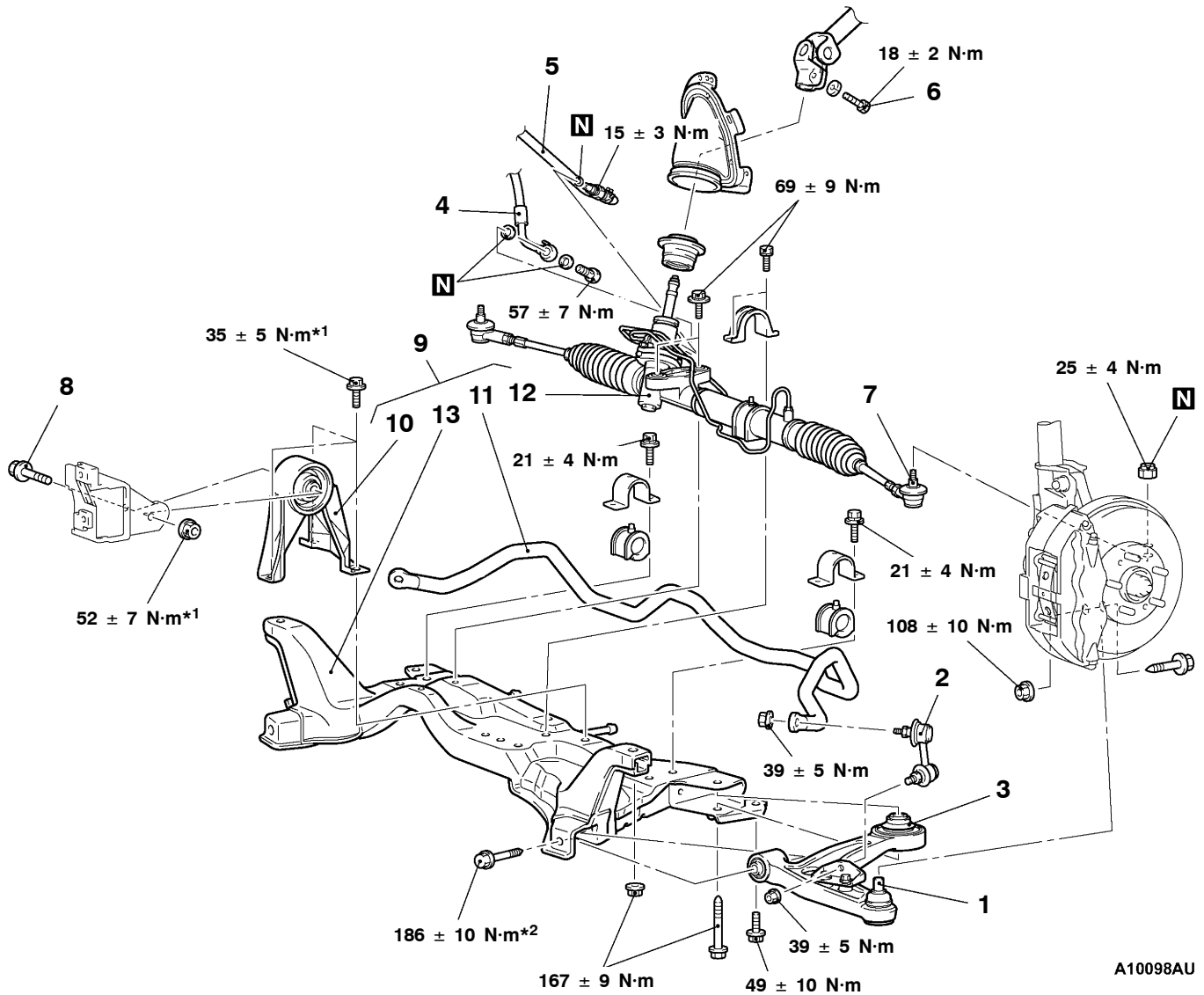
Removal steps

1. Lower arm and knuckle connection
2. Stabilizer link
3. Lower arm assembly
4. Steering shaft assembly and gear box connecting bolt
5. Rear roll stopper connection bolt
6. Rear roll rod assembly and rear roll rod bracket

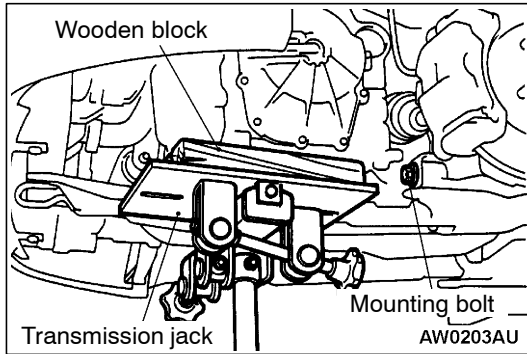


7. Return hose and return pipe
8. Pressure hose connection
9. Tie rod end and knuckle connection
10. Crossmember assembly
11. Stabilizer bar
12. Steering gear and linkage
13. Crossmember

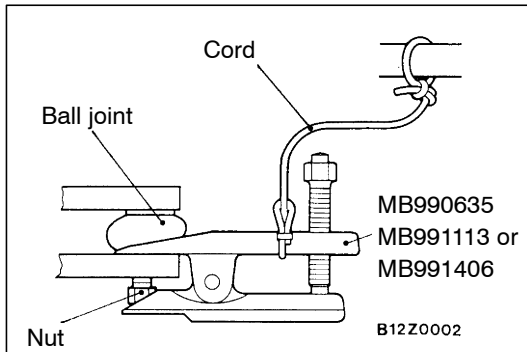
<R.H. drive vehicles>

**Removal steps**

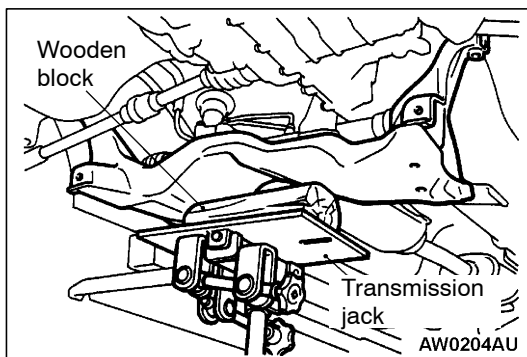
- | | | | |
|-----------------------|--|-----------------------|--|
| <p>◀A▶</p> <p>◀B▶</p> | <ol style="list-style-type: none"> 1. Lower arm and knuckle connection 2. Stabilizer link 3. Lower arm assembly 4. Pressure hose connection 5. Return hose connection 6. Steering shaft assembly and gear box connecting bolt 7. Tie rod end and knuckle connection | <p>◀C▶</p> <p>▶A▶</p> | <ol style="list-style-type: none"> 8. Rear roll stopper connection bolt 9. Crossmember assembly 10. Rear roll stopper 11. Stabilizer bar 12. Steering gear and linkage 13. Crossmember |
|-----------------------|--|-----------------------|--|

**REMOVAL SERVICE POINTS****◀A▶ LOWER ARM ASSEMBLY REMOVAL**

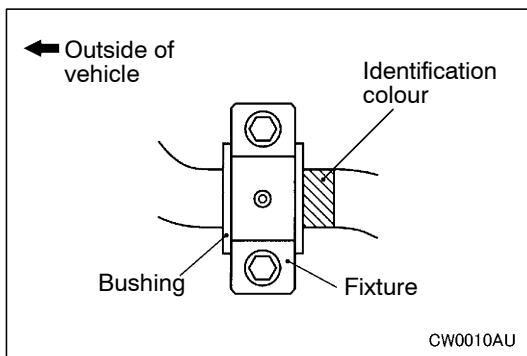
Lift the transmission with a transmission jack, and then withdraw the front mounting bolt on the left lower arm assembly.

**◀B▶ TIE ROD END AND KNUCKLE DISCONNECTION****Caution**

1. The thread on the ball joint may be damaged. Do not remove the tie rod end mounting nut from the ball joint. Just loosen the nut. For this operation, use the special tool.
2. Suspend the special tool with a cord to prevent it from dropping.

**◀C▶ CROSSMEMBER ASSEMBLY REMOVAL**

Retain the crossmember with a transmission jack, and then remove the crossmember mounting bolt.

**INSTALLATION SERVICE POINT****▶A◀ STABILIZER BAR INSTALLATION**

Align the identification colour on the left side of the stabilizer bar with the right end of the bushing.

INSPECTION

- Check the crossmember for cracks and damage.

NOTES

FRONT SUSPENSION

CONTENTS

GENERAL INFORMATION	2	Ball Joint Dust Cover Check	5
SERVICE SPECIFICATIONS	3	STRUT ASSEMBLY	6
SPECIAL TOOLS	3	LOWER ARM ASSEMBLY	9
ON-VEHICLE SERVICE	4	STABILIZER BAR	12
Wheel Alignment Check and Adjustment	4	CROSSMEMBER BAR	15



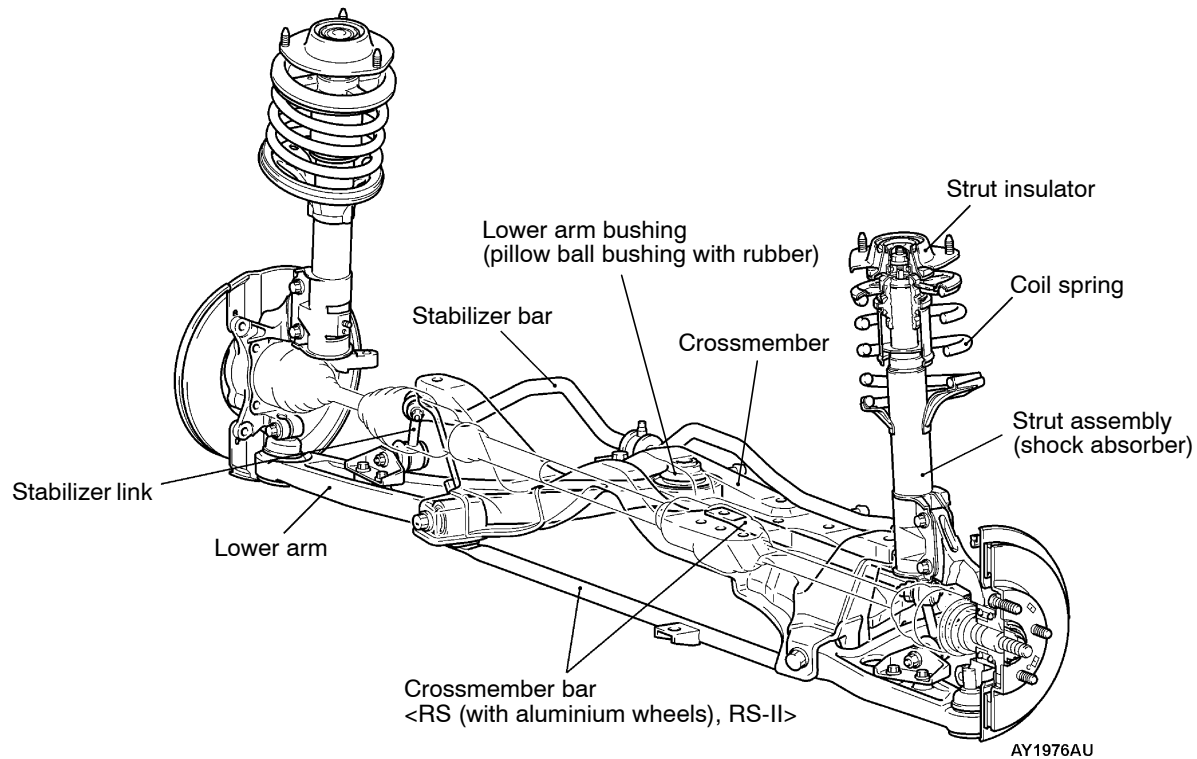
GENERAL INFORMATION

The front suspension is a McPherson strut with coil spring. The shock absorber is gas-filled hydraulic double-acting type.

COIL SPRING

Item	RS <Vehicles with steel wheels>, RS-II	RS <Vehicles with aluminium wheels>
Wire diameter x average diameter x free length mm	14 x 155 x 281	14 x 155 x 275

CONSTRUCTION DIAGRAM



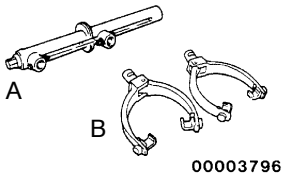
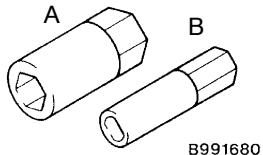
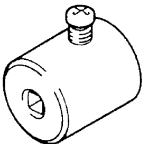
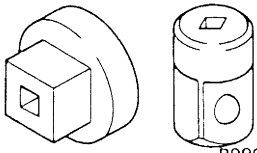
SERVICE SPECIFICATIONS

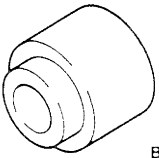
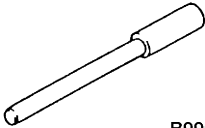
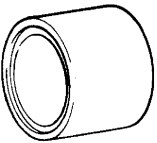
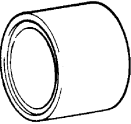
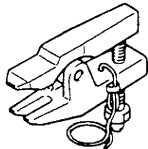
Items		Standard value
Toe-in	At the centre of tyre tread mm	0 ± 2
	Toe-angle (per wheel)	$0^{\circ}00' \pm 05'$
Toe-out angle on turns (inner wheel when outer wheel at 20°)		$22^{\circ}00' \pm 1^{\circ}30'$
Steering angle	Inner wheel	$31^{\circ}45' \pm 1^{\circ}30'$
	Outer wheel (for reference)	$27^{\circ}15'$
Camber (Selectable from 2 options)		$-1^{\circ}00' \pm 30'^*$ or $-2^{\circ}00' \pm 30'^*$
Caster		$3^{\circ}55' \pm 30'^*$
Kingpin inclination		$13^{\circ}45' \pm 1^{\circ}30'$
Lower arm ball joint rotation starting torque N·m		0.5 - 3.4
Lower arm pillow ball bushing rotation starting torque N·m		0.5 - 3.0

NOTE

*: difference between right and left wheels: less than $30'$

SPECIAL TOOLS

Tools	Number	Name	Use
 <p>00003796</p>	A: MB991237 B: MB991238	A: Spring compressor body B: Arm set	Coil spring compression
 <p>B991680</p>	MB991680 A: MB991681 B: MB991682	Wrench set A: Wrench B: Socket	Strut assembly disassembly and reassembly
 <p>B991006</p>	MB991006	Preload socket	Lower arm ball joint rotation starting torque measurement
 <p>B990326</p>	MB990326	Preload socket	Lower arm pillow ball bushing rotation starting torque measurement

Tools	Number	Name	Use
 B990800	MB990800	Ball joint remover & installer	Lower arm ball joint dust cover press-in
 B990883	MB990651	Bar	Lower arm pillow ball bushing removal and press-fitting
	MB990816	Bushing remover & installer base	
	MB991576	Base	
 B991113	MB990635, MB991113 MB991406 or	Steering linkage puller	Tie rod end and knuckle disconnection

ON-VEHICLE SERVICE

WHEEL ALIGNMENT CHECK AND ADJUSTMENT

Measure the wheel alignment with the vehicle parked on a level surface.

The front suspension, steering system, and wheels should be serviced to normal condition prior to measurement of wheel alignment.

TOE-IN

Standard value:

At the centre of tyre tread 0 ± 2 mm

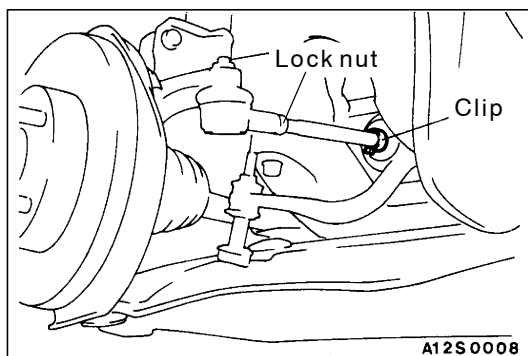
Toe angle (per wheel) $0^{\circ}00' \pm 05'$

1. Adjust the toe-in by undoing the clip and lock nut, and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).

NOTE

The toe will move out as the left turnbuckle is turned toward the front of the vehicle and the right turnbuckle is turned toward the rear of the vehicle.

2. Install the clip and tighten the lock nut to the specified torque.



Tightening torque: 52 ± 2 N·m

3. Confirm that the toe-in is at the standard value.
4. Use a turning radius gauge to check that the steering angle is at the standard value.

Standard value:

Inner wheels	31° 45' ± 1° 30'
Outer wheels (for reference)	27° 15'

TOE-OUT ANGLE ON TURNS

To check the steering linkage, especially after the vehicle has been involved in an accident or if an accident is presumed, it is advisable to check the toe-out angle on turns in addition to the wheel alignment.

Conduct this test on the left turn as well as on the right turn.

Standard value:

Items	Specifications
Toe-out angle on turns (inner wheel when outer wheel at 20°)	22° 00' ± 1° 30'

CAMBER, CASTER AND KINGPIN INCLINATION

Standard value:

Items	Specifications
Camber (Selectable from 2 options)	-1° 00' ± 30'* or -2° 00' ± 30'*
Caster	3° 55' ± 30'*
Kingpin inclination	13° 45' ± 1° 30'

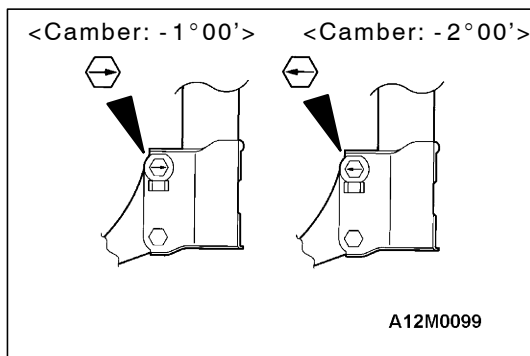
NOTE

1. *: difference between right and left wheels must be less than 30'
2. Caster and kingpin inclination are preset at the factory and cannot be adjusted.

SELECTION THE CAMBER

Select the camber by the installation direction of the allow of the connecting bolt of the strut assembly and the knuckle.

- -1° 00' ± 30': Install the bolt turning the allow to the direction of vehicle inside.
- -2° 00' ± 30': Install the bolt turning the allow to the direction of vehicle outside.



BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the lower arm assembly.

NOTE

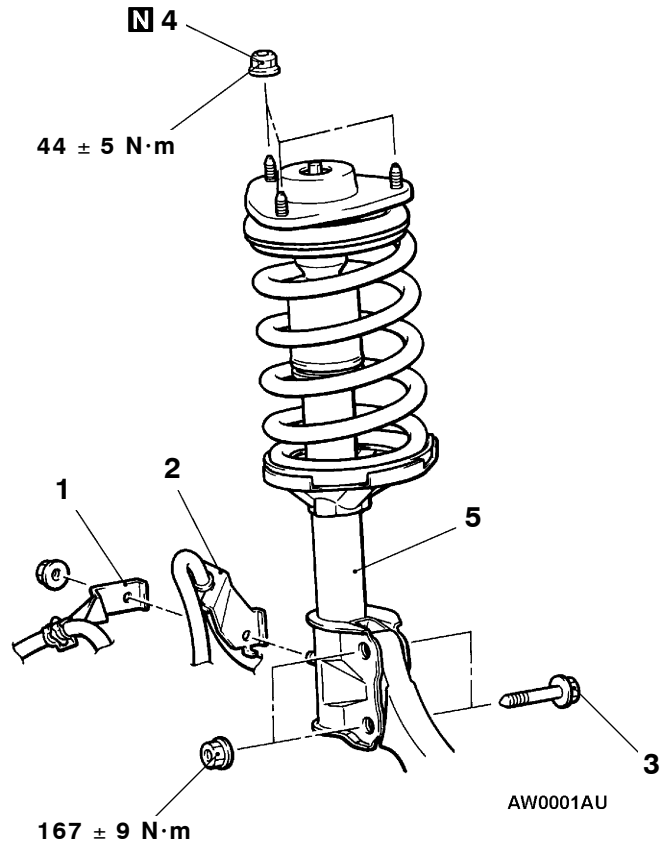
Cracks or damage of the dust cover may cause damage of the ball joint.

STRUT ASSEMBLY

REMOVAL AND INSTALLATION

Post-installation Operation

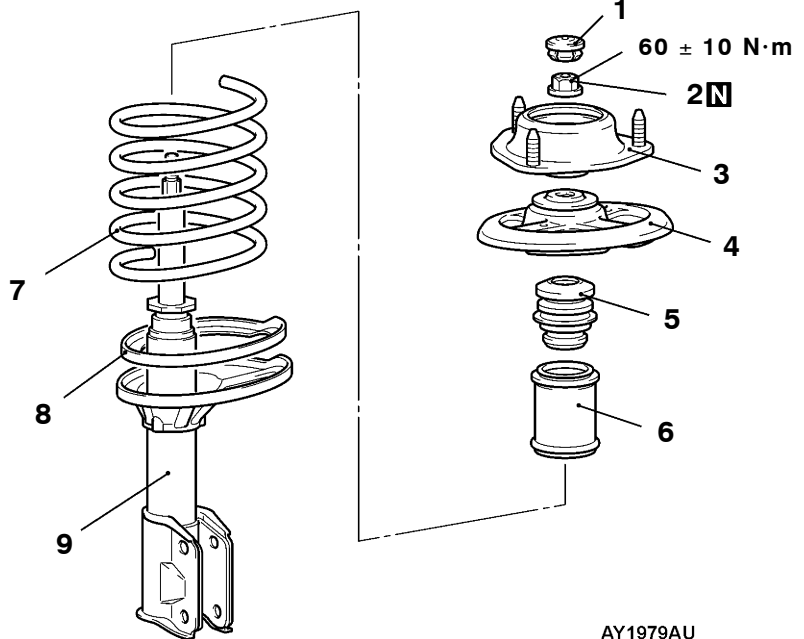
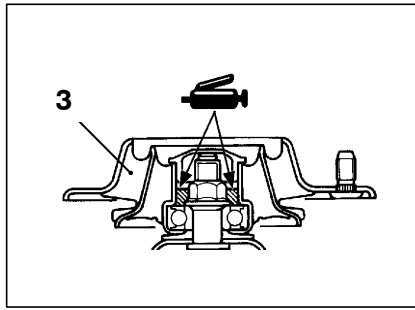
Wheel alignment check and adjustment (Refer to P.33A-4.)

**Removal steps**

1. Front wheel speed sensor harness bracket <Vehicles with ABS or ACD>
2. Brake hose bracket

3. Knuckle connection
4. Strut mounting nut
5. Strut assembly

DISASSEMBLY AND REASSEMBLY



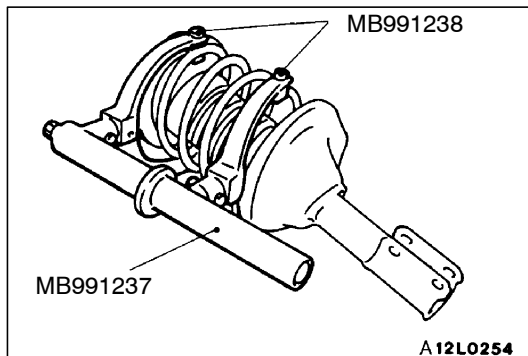
Disassembly steps



1. Dust cover
2. Self-locking nut
3. Strut insulator assembly
4. Upper spring seat assembly
5. Bump rubber



6. Dust cover
7. Coil spring
8. Lower spring pad
9. Strut assembly



DISASSEMBLY SERVICE POINTS

◀A▶ SELF-LOCKING NUT REMOVAL

1. Use the special tools to compress the coil spring.

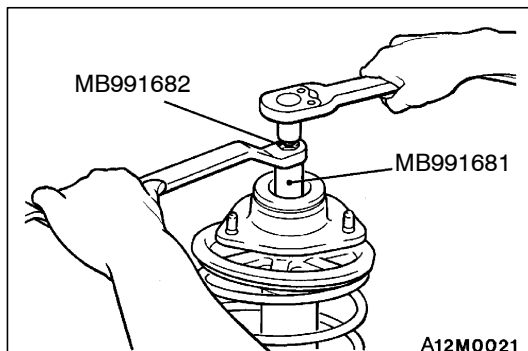
Caution

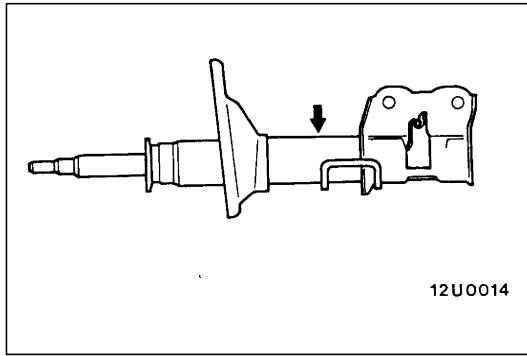
- (1) Do not tighten the special tool bolt too tight. The special tool will be broken if the allowable tightening torque of 74 N·m is exceeded.
- (2) Install the special tools evenly, and so that the maximum length will be attained within the installation range.
- (3) Do not use an impact wrench as it will cause the bolt of the special tool to be seized.

2. Using the special tools, loosen the self-locking nut.

Caution

To prevent the piston rod lock nut inside the strut from loosening, do not use an impact wrench when the self-locking nut is loosened.





◀B▶ STRUT ASSEMBLY REMOVAL

To discard the strut assembly, place the assembly horizontally with its piston rod extended. Then drill a hole approx. 3 mm in diameter at the location shown in the illustration and discharge the gas.

Caution

The gas itself is harmless but it may issue out of the hole together with chips generated by the drill. Therefore, be sure to wear goggles.

REASSEMBLY SERVICE POINT

▶A◀ SELF-LOCKING NUT INSTALLATION

1. Ensure that the bearing is seated correctly.
2. Install the special tool to the strut assembly same as its removal.
3. While the coil spring is being compressed by the special tools, provisionally tighten the self-locking nut.

Caution

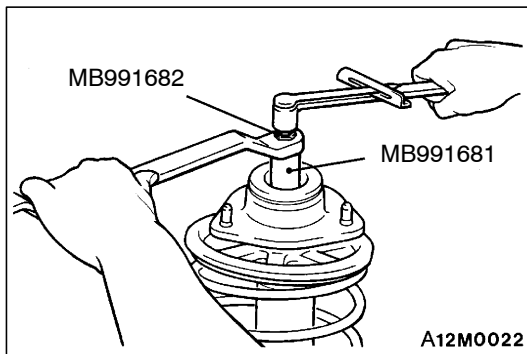
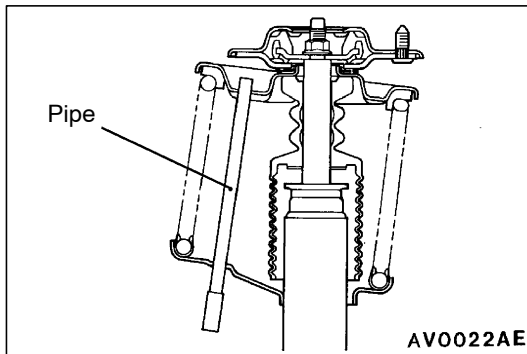
Do not use an impact wrench as it will cause the bolt of the special tool to be seized.

4. Align the hole in the strut assembly lower spring seat with the hole in the upper spring seat.

NOTE

Using a pipe as shown facilitates the alignment.

5. Correctly align both ends of the coil spring with the grooves in the spring seat, and then loosen the special tools.



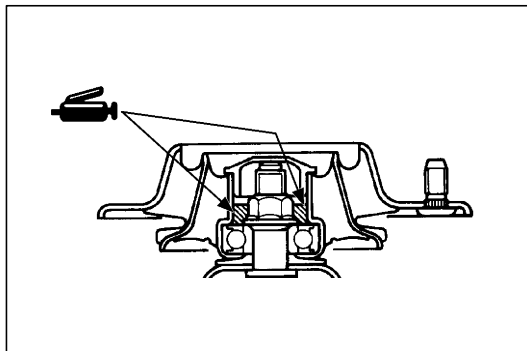
6. Using the special tools, tighten the self-locking nut to the specified torque.

Specified torque: 60 ± 10 N·m

Caution

To prevent the piston rod lock nut inside the strut from loosening, do not use an impact wrench when the self-locking nut is tightened.

7. After tightening self-locking nut, fill the multi purpose grease to the bearing part of strut insulator.



LOWER ARM ASSEMBLY

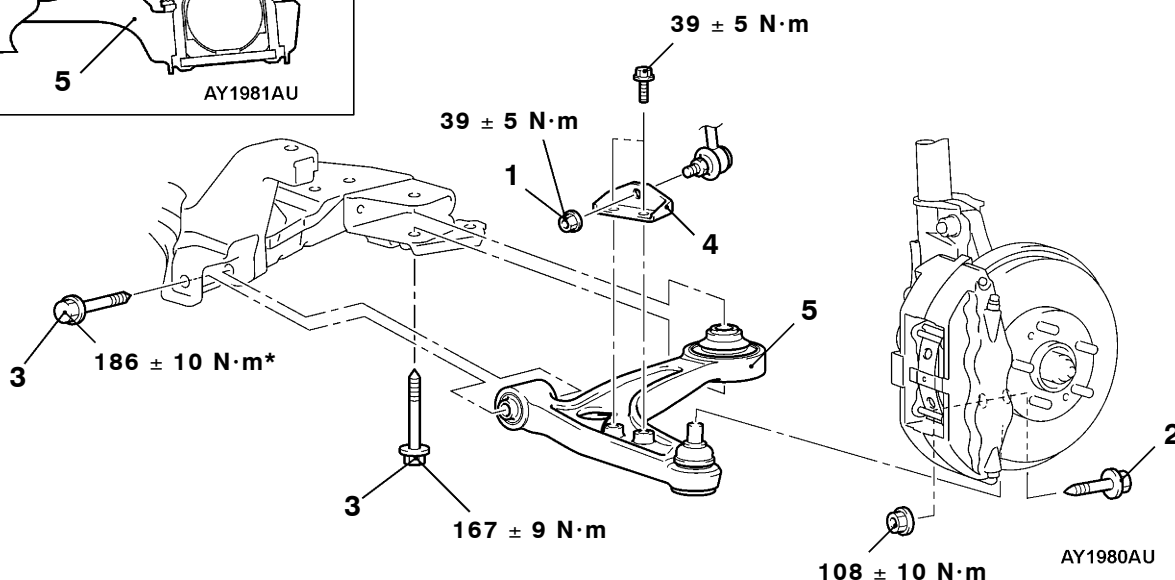
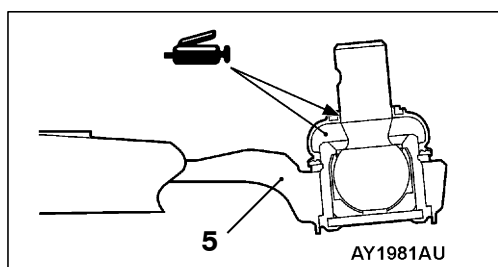
REMOVAL AND INSTALLATION

Caution

1. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.
2. *: To prevent bushings from breakage, the parts indicated by * should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Post-installation Operation

- Check the dust cover for cracks or damage by pushing it with finger.
- Wheel alignment check and adjustment (Refer to P.33A-4.)

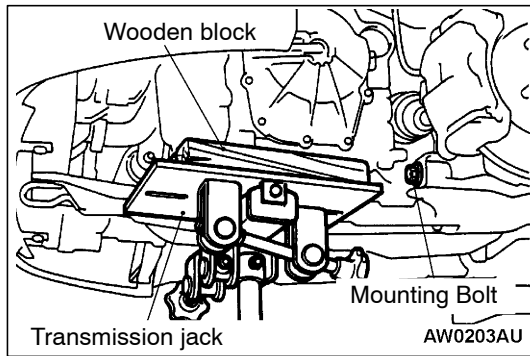


Removal steps

1. Stabilizer link nut
2. Lower arm and knuckle connection
3. Lower arm and crossmember connection

4. Stabilizer bracket
5. Lower arm assembly

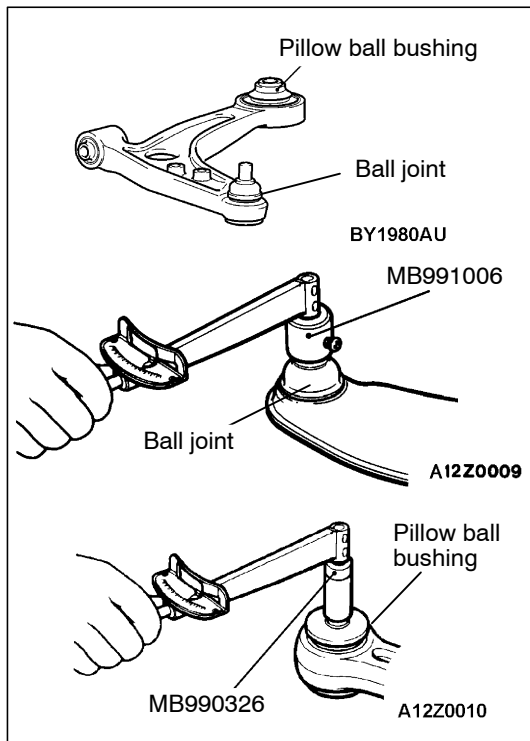




REMOVAL SERVICE POINT

◀▶ LOWER ARM AND CROSSMEMBER DISCONNECTION

Lift the transmission with a transmission jack, and then withdraw the front mounting bolt on the left lower arm assembly.



INSPECTION

LOWER ARM BALL JOINT ROTATION STARTING TORQUE CHECK

1. After shaking the ball joint stud several times, use the special tool to measure the rotation starting torque of the lower arm ball joint.

Standard value: 0.5 - 3.4 N·m

2. When the measured value exceeds the standard value, replace the lower arm assembly.
3. When the measured value is lower than the standard value, check that the lower arm ball joint turns smoothly without excessive play. If there is no excessive play, the ball joint can be reused.

PILLOW BALL BUSHING ROTATION STARTING TORQUE CHECK

1. Insert the bolt to the lower arm pillow ball bushing, in the opposite direction, insert the washer then install the nut. After rotating the inner sleeve (contained washer) several times, measure the rotation starting torque of the lower arm pillow ball bushing using special tool.

Standard value: 0.5 - 3.0 N·m

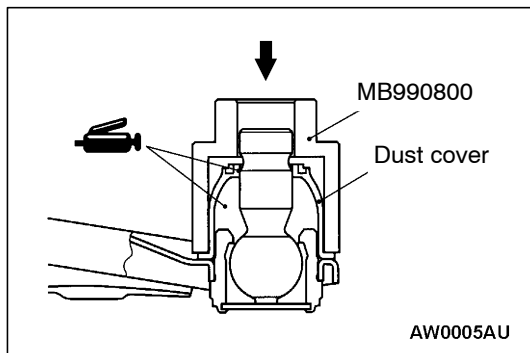
2. When the measured value exceeds the standard value, replace the pillow ball bushing.
3. When the measured value is lower than the standard value, check that the lower arm pillow ball bushing turns smoothly without excessive play. If there is no excessive play, the pillow ball bushing can be reused.

LOWER ARM BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the lower arm assembly.

NOTE

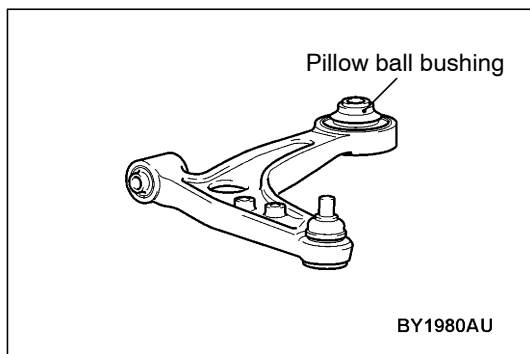
If the dust cover is cracked or damaged, it is possible that there may also be damage to the ball joint. When it is damaged during service work, replace the dust cover.



LOWER ARM BALL JOINT DUST COVER REPLACEMENT

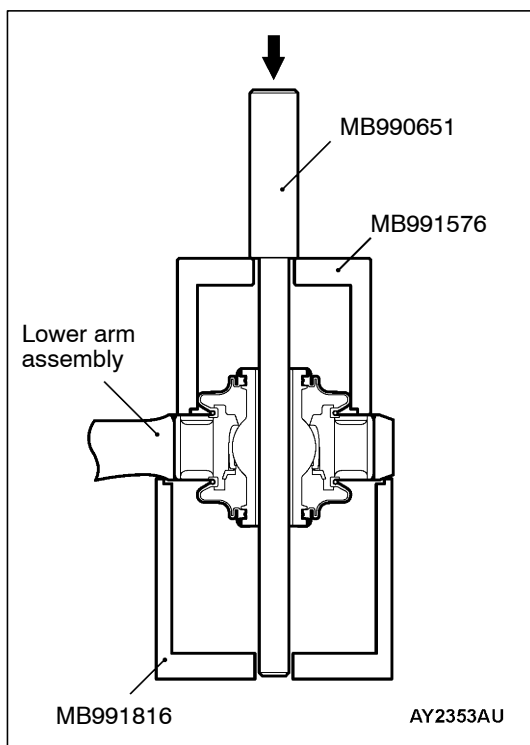
Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Remove the dust cover.
2. Apply multipurpose grease to the lip and inside of the dust cover.
3. Using the special tool, press the dust cover until it contacts the lower arm assembly.
4. Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.

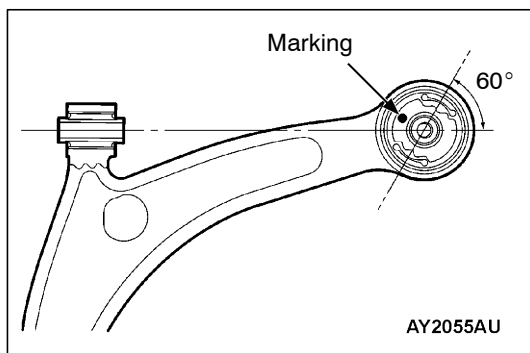


LOWER ARM PILLOW BALL BUSHING REPLACEMENT

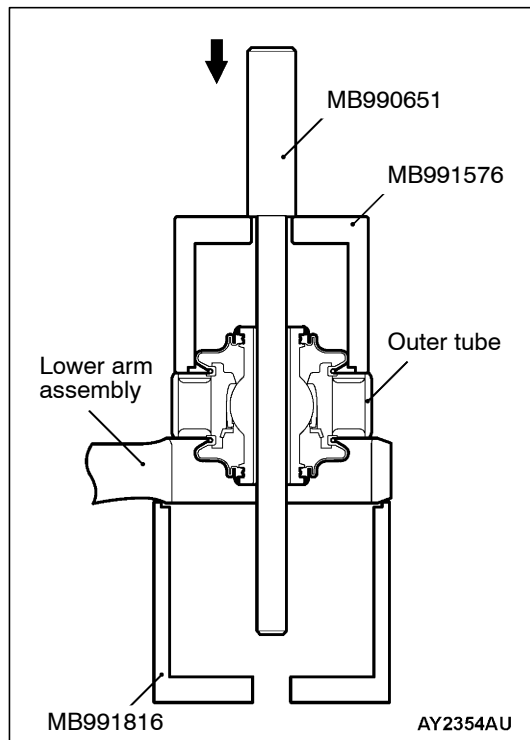
Replace the bushing as follows:



1. Use the special tools to drive out the bushing.



2. Set the bushing to the lower arm assembly in order to the direction of bushing marking is upper, and of the opening is the direction as shown in the illustration.



3. Use the special tools to press in the bushing until its outer tube is flush with the lower arm assembly surface.

STABILIZER BAR

REMOVAL AND INSTALLATION

Caution

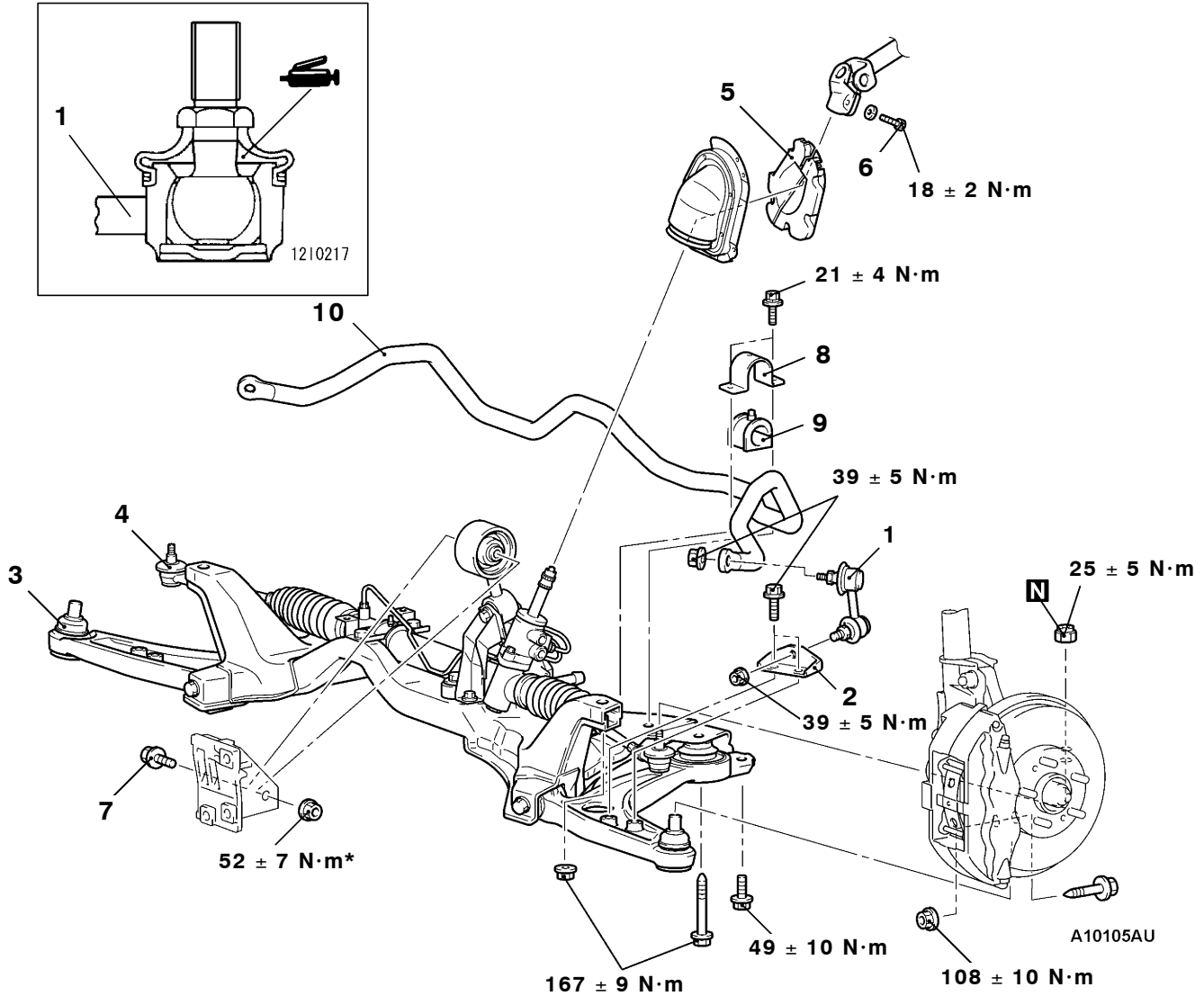
1. Before removing the steering wheel and air bag module assembly, refer to GROUP 52B - Service Precautions and Air Bag Module and Clock Spring. Also, put the front wheels in straight-ahead position. Failure to do so may damage the SRS clock spring and render the SRS air bag inoperative, which results serious driver injury.
2. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.
3. To prevent bushings from breakage, the parts indicated by * should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Pre-removal Operation

- Steering Wheel and Air Bag Module Assembly Removal (Refer to GROUP 37A.)
- Clock Spring Removal (Refer to GROUP 52B.)
- Crossmember Bar Removal (Refer to P.33A-15.)
- Centermember Removal (Refer to GROUP 32.)
- Front Exhaust Pipe Removal (Refer to GROUP 15.)

Post-installation Operation

- Front Exhaust Pipe Installation (Refer to GROUP 15.)
- Centermember Installation (Refer to GROUP 32.)
- Crossmember Bar Installation (Refer to P.33A-15.)
- Clock Spring Installation (Refer to GROUP 52B.)
- Steering Wheel and Air Bag Module Assembly Installation (Refer to GROUP 37A.)
- Check the Dust Cover for Cracks or Damage by Pushing it with Finger.
- Checking Steering Wheel Position with Wheels Straight Ahead
- Front Wheel Alignment Check and Adjustment (Refer to P.33A-4.)

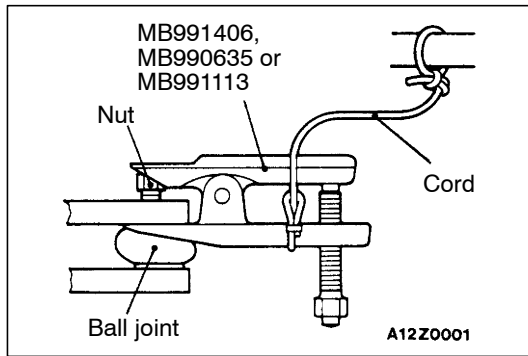


Removal steps

1. Stabilizer link
2. Stabilizer bracket
3. Lower arm and knuckle connection
4. Tie rod end and knuckle connection
5. Steering shaft cover

6. Steering gear and joint connecting bolt
7. Rear roll stopper connecting bolt
8. Fixture
9. Bushing
10. Stabilizer bar



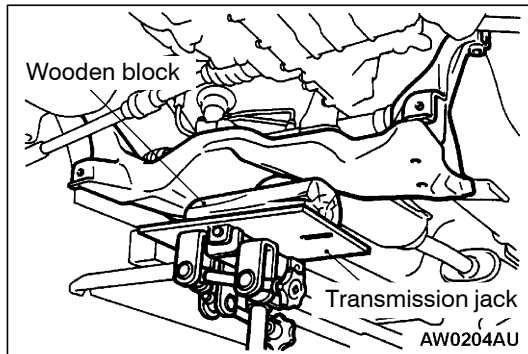


REMOVAL SERVICE POINTS

◀A▶ TIE ROD END AND KNUCKLE DISCONNECTION

Caution

1. To prevent the ball joint thread from damage, the tie rod end mounting nut must be only loosened but not removed from the ball joint. Be sure to use the special tool.
2. Support the special tool with a cord to prevent it from coming off.



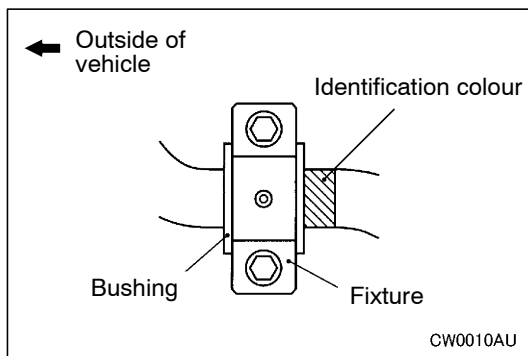
◀B▶ FIXTURE/BUSHING/STABILIZER BAR REMOVAL

Carry out the following operations to ensure working space in order to remove the fixture, the bushing and the stabilizer bar.

1. Use a transmission jack to hold the crossmember, and then remove the crossmember mounting nuts and bolts.
2. Lower the crossmember until the fixture, the bushing and the stabilizer bar can be removed.

Caution

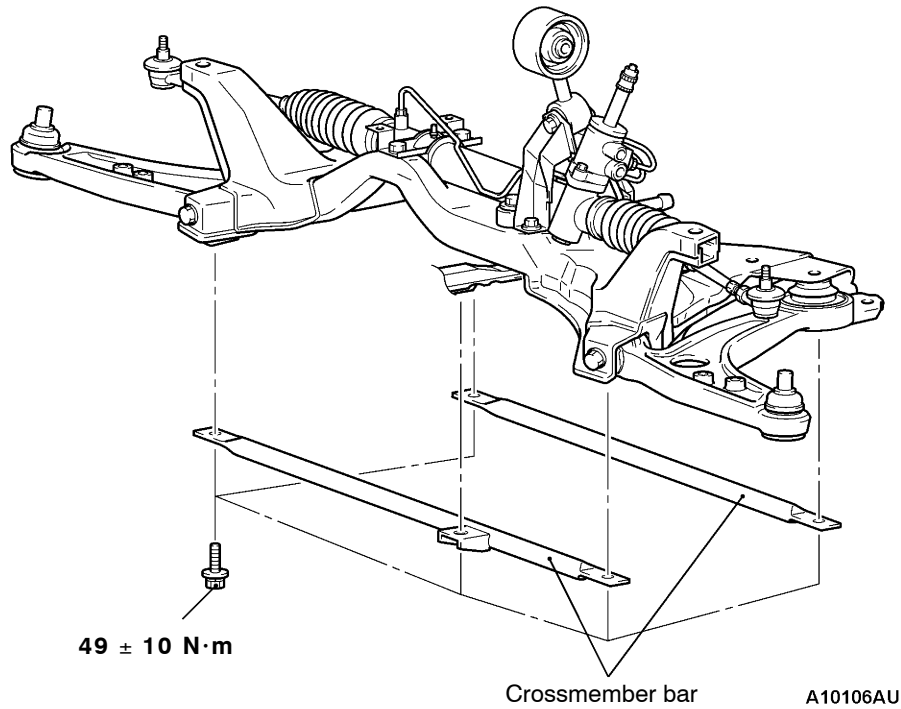
Be careful not to lower the crossmember excessively, otherwise the power steering return hose bracket may deform.



INSTALLATION SERVICE POINT

▶A◀ STABILIZER BAR/BUSHING/FIXTURE INSTALLATION

Align the stabilizer bar identification mark with the right end of the bushing.

CROSSMEMBER BAR**<RS (Vehicles with aluminium wheels), RS-II>****REMOVAL AND INSTALLATION**

NOTES

REAR SUSPENSION

CONTENTS

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SERVICE SPECIFICATIONS	3	TRAILING ARM ASSEMBLY	10
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ON-VEHICLE SERVICE	4	SHOCK ABSORBER ASSEMBLY	16
Wheel Alignment Check and Adjustment	4	STABILIZER BAR	19
Ball Joint Dust Cover Check	5		
REAR SUSPENSION ASSEMBLY	6		

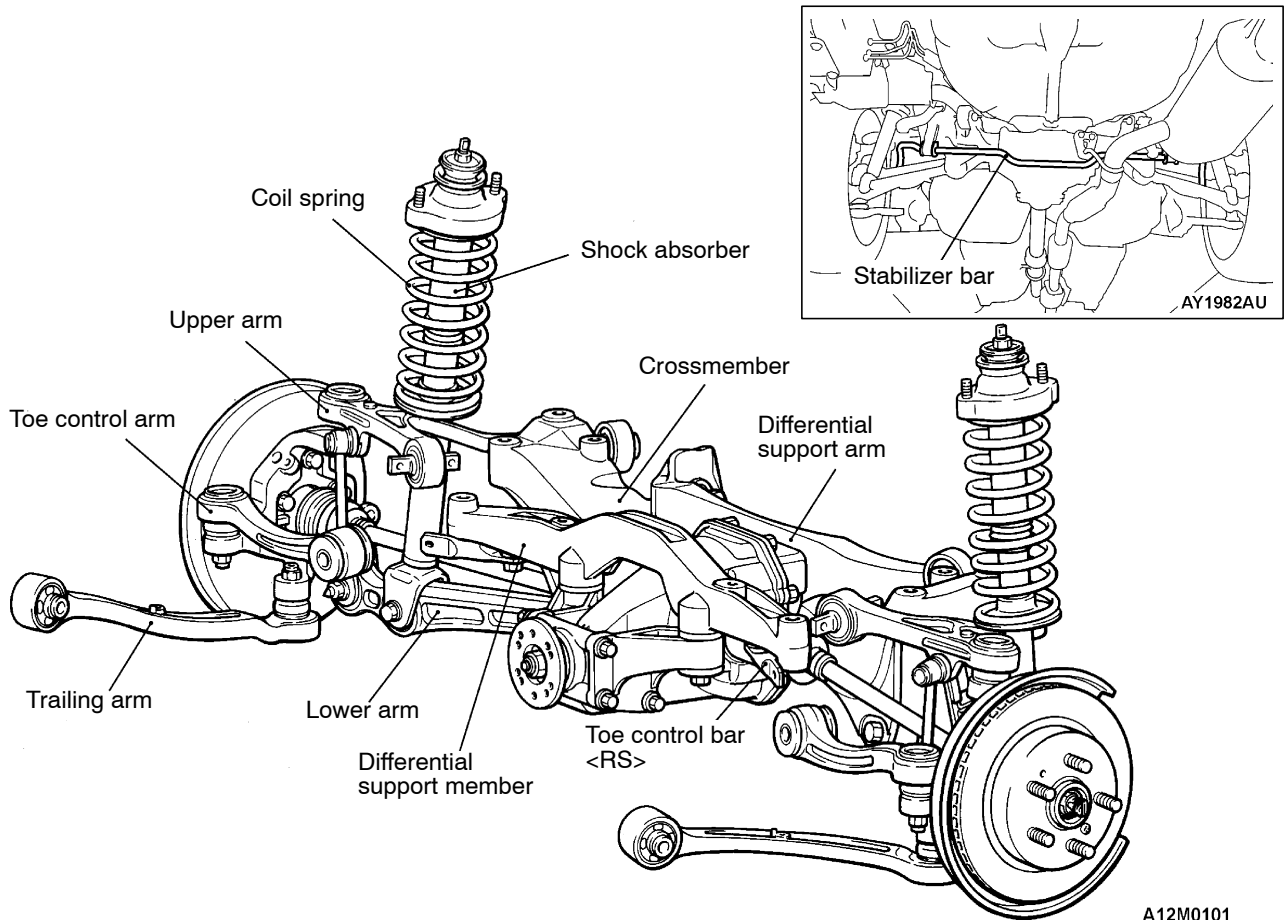
GENERAL INFORMATION

A trailing arm type multi-link suspension has been adopted as the rear suspension. The shock absorber is a hydraulic, cylindrical double-acting type.

COIL SPRING

Item	Specification
Wire diameter mm	9 - 12 <RS > 12 <RS-II>
Average diameter mm	88
Free length mm	287 <RS> 281 <RS-II (Vehicles without AYC)> 284 <RS-II (Vehicles with AYC)>

CONSTRUCTION DIAGRAM



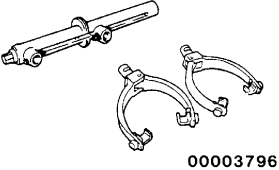
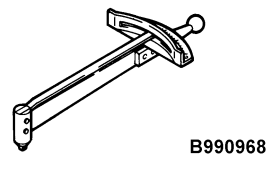
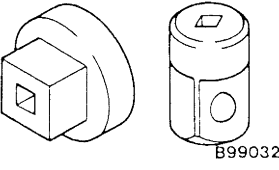
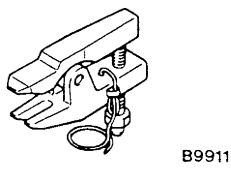
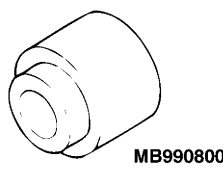
SERVICE SPECIFICATIONS

Items		Standard value
TOE-IN	At the centre of tyre tread mm	3 ± 2
	Toe-angle (per wheel)	$0^{\circ}09' \pm 06'$
Camber		$-1^{\circ}00' \pm 30'^*$
Thrust angle		$0^{\circ}00' \pm 0^{\circ}09'$
Upper arm ball joint rotation torque N·m		0.5 - 2.5
Trailing arm ball joint rotation torque N·m		0.5 - 2.5
Toe control arm ball joint rotation torque N·m		0.5 - 2.5
Toe control arm slide bushing rotation torque N·m		0.5 - 2.0
Lower arm pillow ball bushing rotation torque N·m		0.5 - 3.0
Stabilizer link ball joint turning torque N·m		1.7 - 3.1

NOTE

*: difference between right and left wheels: less than 30'

SPECIAL TOOLS

Tool	Number	Name	Use
 <p>00003796</p>	A: MB991237 B: MB991239	A: Spring compressor body B: Arm set	Coil spring compression Upper arm ball joint, lower arm ball joint and stabilizer link ball joint rotation starting torque measurement
 <p>B990968</p>	MB990968	Torque wrench	
 <p>B990326</p>	MB990326	Preload socket	
 <p>B991113</p>	MB990635, MB991113 MB991406	Steering linkage puller	Ball joint and knuckle disconnection
 <p>MB990800</p>	MB990800	Ball joint remover & installer	Ball joint dust cover press-fitting

ON-VEHICLE SERVICE

WHEEL ALIGNMENT CHECK AND ADJUSTMENT

1. The rear suspension, wheels and tyres should be serviced to normal condition prior to measurement of wheel alignment.
2. Measure the wheel alignment with the vehicle parked on a level surface.

TOE-IN

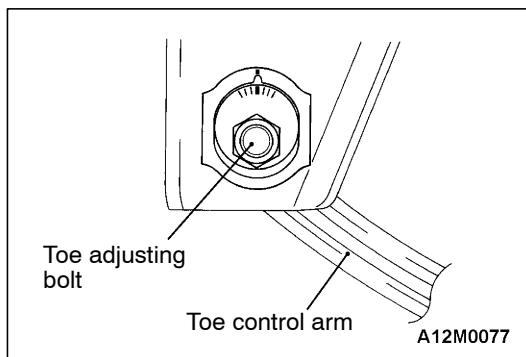
Standard value:

At the centre of tyre tread 3 ± 2 mm

Toe angle (per wheel) $0^{\circ}09' \pm 06'$

If toe-in is not within the standard value, adjust by following procedures.

- (1) Be sure to adjust the camber before making toe adjustment.



- (2) Carry out adjustment by turning the toe adjusting bolt (toe control arm mounting bolt which is located on the inner side of the body).

Left wheel: Turning clockwise (+) toe-in

Right wheel: Turning clockwise (-) toe-in

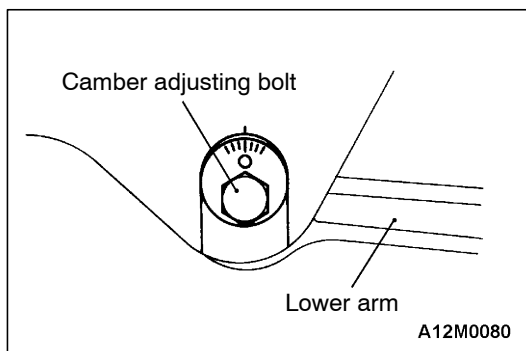
NOTE

The scale has gradations of approximately 3.3 mm (single side toe angle equivalent to 19')

CAMBER

Standard value: $-1^{\circ}00' \pm 30'$

(difference between right and left wheel: less than 30')



If camber is not within the standard value, adjust by following procedures.

- (1) Carry out adjustment by turning the camber adjusting bolt (lower arm to rear crossmember mounting bolt).

Left wheel: Turning clockwise (+) camber

Right wheel: Turning clockwise (-) camber

NOTE

The scale has gradations of approximately 14'.

- (2) After adjusting the camber, the toe should be adjusted.

BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the stabilizer link or suspension arms.

NOTE

Cracks or damage of the dust cover may cause damage of the ball joint.

REAR SUSPENSION ASSEMBLY

REMOVAL AND INSTALLATION

Caution

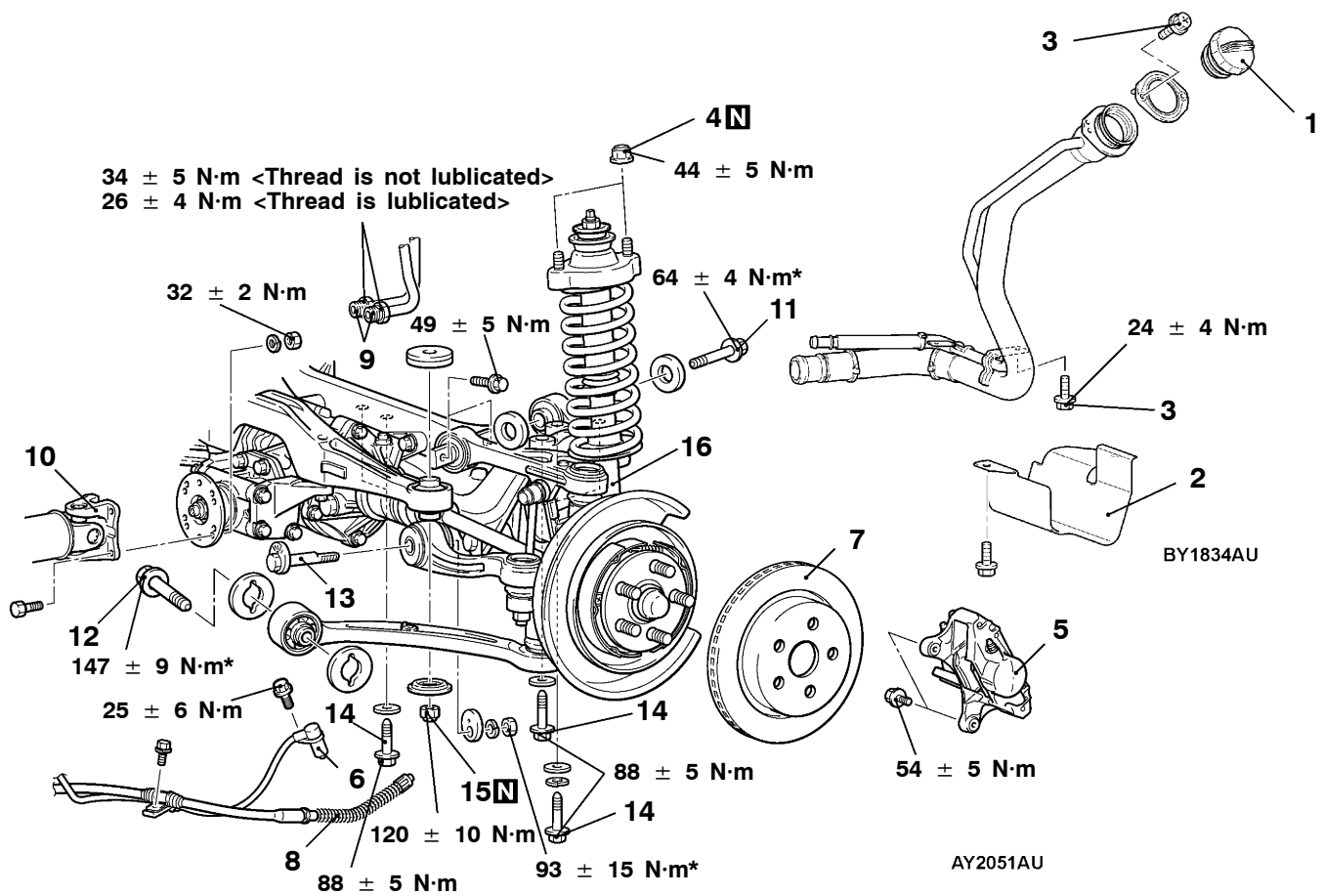
1. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper, because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.
2. *:To prevent bushings from breakage, the parts indicated by * should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Pre-removal Operation

- Center exhaust pipe removal (Refer to GROUP 15)
- Trunk room side trim removal<Vehicles with AYC>(Refer to GROUP 52A)
- AYC fluid removed<Vehicles with AYC> (Refer to GROUP 27B - On Vehicle Service)

Post-installation Operation

- AYC fluid filling and bleeding <Vehicles with AYC> (Refer to GROUP 27B - On Vehicle Service)
- Center exhaust pipe installation (Refer to GROUP 15)
- Trunk room side trim installation <Vehicles with AYC> (Refer to GROUP 52A)
- AYC operation check <Vehicles with AYC> (Refer to GROUP 27 - On Vehicle Service)
- Parking brake lever end play check (Refer to GROUP36-On-Vehicle Service.)
- Wheel Alignment Check And Adjustment (Refer to P.34-4.)



Removal steps

- 1. Fuel filler cap
- 2. Protector
- 3. Bolt
- 4. Shockabsorber mounting nut
- 5. Brake caliper assembly
- 6. Rear speed sensor
<Vehicles with AYC>
- 7. Brake disc
- 8. Parking brake cable end
- 9. AYC fluid line connection
<Vehicles with AYC>

- 10. Propeller shaft connection
- 11. Upper arm mounting bolt
- 12. Trailing arm mounting bolt
- 13. Toe control arm mounting bolt
- 14. Crossmember mounting bolt
- 15. Differential support assembly mounting bolt
- 16. Rear suspension assembly

REMOVAL SERVICE POINTS

◀A▶ BRAKE CALIPER ASSEMBLY REMOVAL

Remove the brake caliper assembly and support with wire.

Caution: Brembo disc brake

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

◀B▶ PROPELLER SHAFT SEPARATING

1. Mark the mating mark on the companion flange of the difference career and the fringe yoke of the propeller shaft.
2. Remove the differential career mounting bolt and nut, propeller shaft mounting bolt and nut.

◀C▶ CROSSMEMBER MOUNTING BOLT REMOVAL

Support the differential case with garage jack or transmission jack, then remove the crossmember mounting bolt.

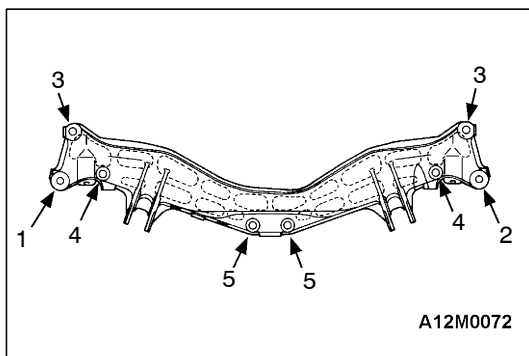
INSTALLATION SERVICE POINTS

▶A◀ CROSSMEMBER MOUNTING BOLT INSTALLING

Tighten the bolt by following the order shown as the illustration. The sort and size of each bolt is different, so tighten by following the table below.

Note

In order to keep the installing accuracy and to ease the installing, the attachment hole diameter of the cross member is changed on forward/rearward. So the tightening order of mounting bolt is stipulated.



A12M0072

No.	Sort of bolt	Size of bolt (Screw diameter × Length) mm
1, 2, 3	Flange bolt (with washer)	12 × 105
4	Bolt (with spring washer and washer)	12 × 152
5	Flange bolt (with washer)	12 × 70

►B◄ PROPELLER SHAFT CONNECTION

Install the difference career and propeller shaft by aligning the mating mark.

Caution

If there is oil or grease on the thread of the mounting bolt or nut, they will loosen. So after wiping out oil or grease of the thread, tighten the mounting bolt.

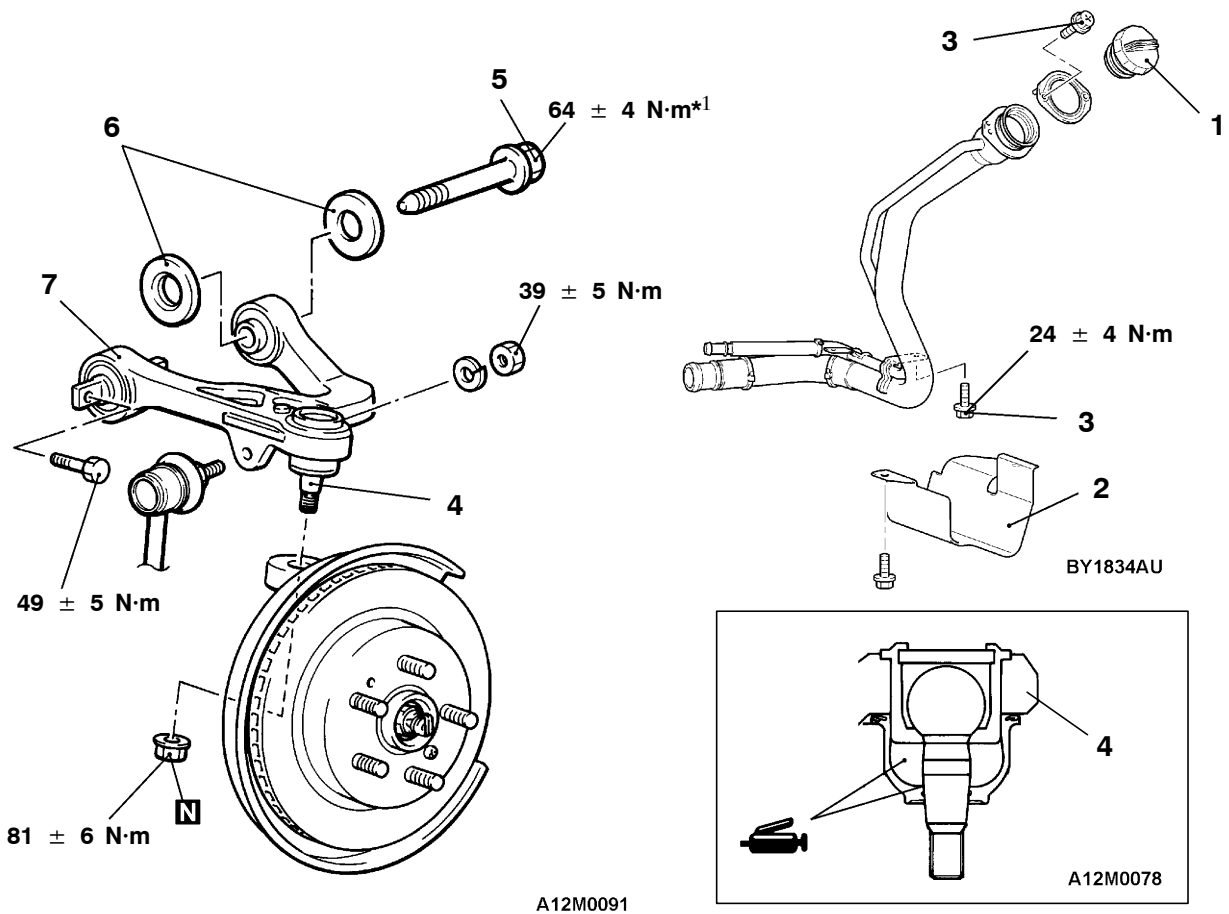
**UPPER ARM ASSEMBLY
REMOVAL AND INSTALLATION**

Caution

1. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper, because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.
2. *1: To prevent bushings from breakage, the parts indicated by * should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Post-installation Operations

- Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.
- Wheel Alignment Check and Adjustment (Refer to P.34-4.)



Removal steps

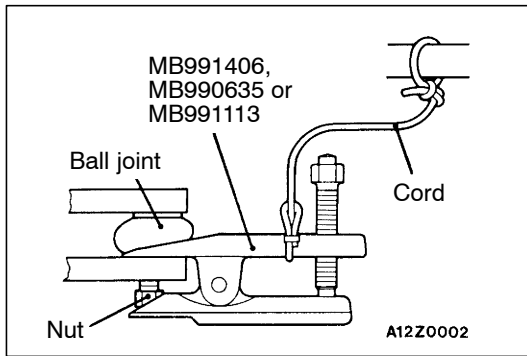
1. Fuel filler cap*2
2. Protector*2
3. Bolt*2
4. Upper arm assembly and knuckle connection
5. Upper arm assembly mounting bolt

6. Stopper
7. Upper arm assembly

Note

Install/remove the parts with the mark "2" when installing/removing the LH side upper arm assembly.



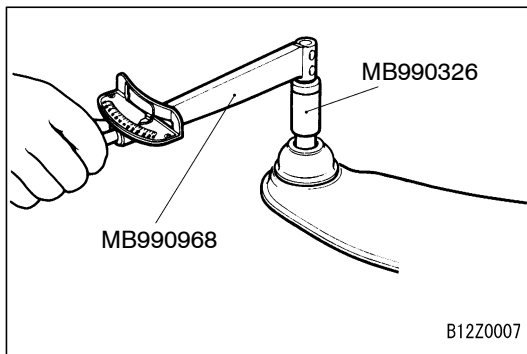


REMOVAL SERVICE POINTS

◀▶ UPPER ARM BALL JOINT AND KNUCKLE DISCONNECTION

Caution

1. To prevent the ball joint thread from damage, only loosen but do not remove the nut securing the upper arm to the knuckle from the ball joint and use the special tool.
2. The special tool should be suspended from a cord to prevent it from being dropped.



INSPECTION

UPPER ARM BALL JOINT ROTATION TORQUE CHECK

1. After shaking the upper arm ball joint stud several times, use the special tool to measure the rotation torque of the upper arm ball joint.

Standard value: 0.5 - 2.5 N·m

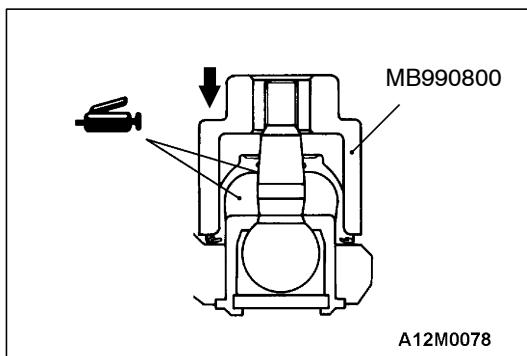
2. When the measured value exceeds the standard value, replace the upper arm assembly.
3. When the measured value is lower than the standard value, check that the upper arm ball joint turns smoothly without excessive play. If there is no excessive play, the ball joint can be reused.

UPPER ARM BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the upper arm assembly.

NOTE

Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.



UPPER ARM BALL JOINT DUST COVER REPLACEMENT

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Remove the dust cover.
2. Fill the multipurpose grease in the dust cover and lubricate the lip. (Amount of filling grease in the dust cover: approx. 7g)
3. Using the special tool, punch the dust cover until it contacts the snap ring.
4. Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.

TRAILING ARM ASSEMBLY

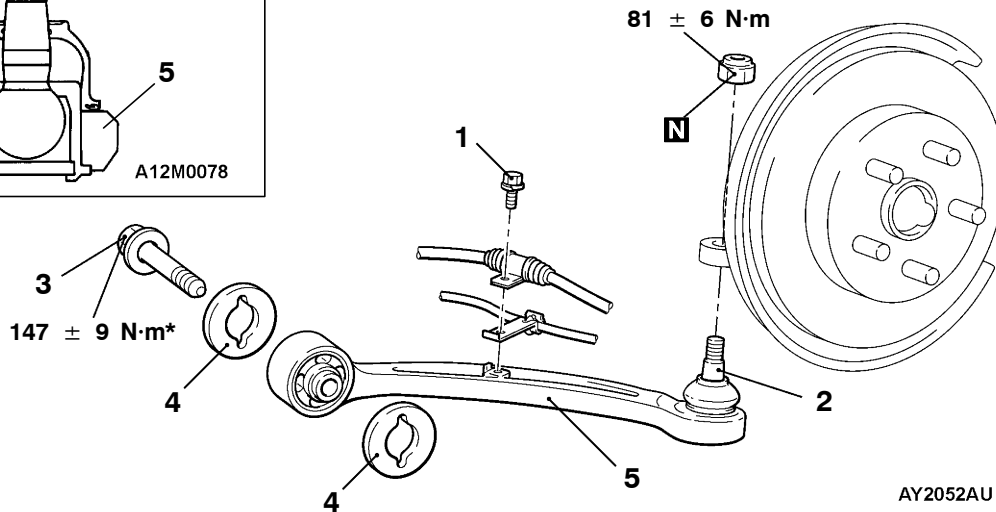
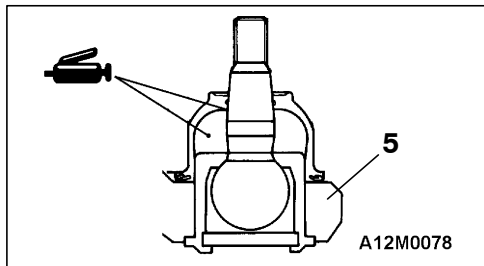
REMOVAL AND INSTALLATION

Caution

1. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper, because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.
2. *:To prevent bushings from breakage, the parts indicated by * should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

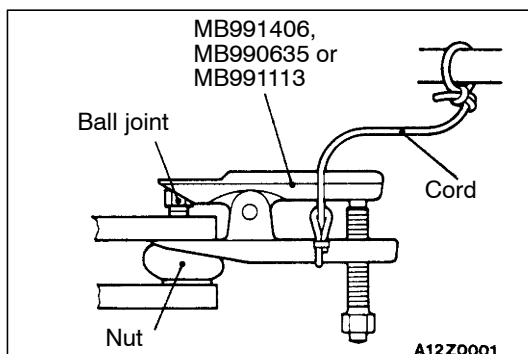
Post-installation Operations

- Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.
- Wheel Alignment Check and Adjustment (Refer to P.34-4.)



Removal steps

- | | | | |
|-----|--|-----|--|
| ◀A▶ | <ol style="list-style-type: none"> 1. Parking brake cable bolt 2. Trailing arm assembly and knuckle connection | ◀B▶ | <ol style="list-style-type: none"> 3. Trailing arm assembly mounting bolt 4. Stopper 5. Trailing arm assembly |
|-----|--|-----|--|

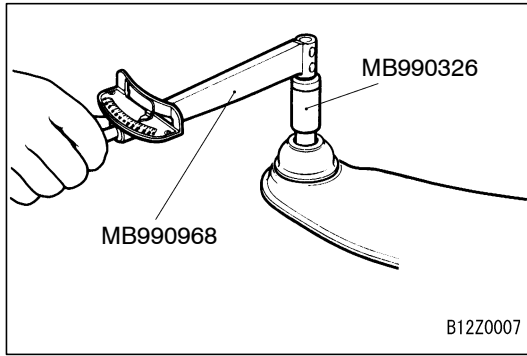


REMOVAL SERVICE POINTS

◀A▶ TRAILING ARM ASSEMBLY AND KNUCKLE DISCONNECTION

Caution

1. To prevent the ball joint thread from damage, only loosen but do not remove the nut securing the upper arm to the knuckle from the ball joint and use the special tool.
2. The special tool should be suspended from a cord to prevent it from being dropped.



INSPECTION

TRAILING ARM BALL JOINT ROTATION TORQUE CHECK

1. After shaking the trailing arm ball joint stud several times, use the special tool to measure the rotation torque of the trailing arm ball joint.

Standard value: 0.5 - 2.5 N·m

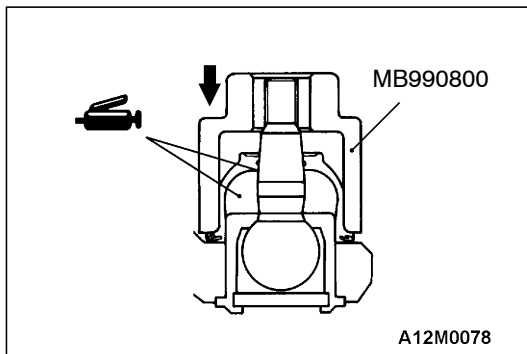
2. When the measured value exceeds the standard value, replace the trailing arm assembly.
3. When the measured value is lower than the standard value, check that the trailing arm ball joint turns smoothly without excessive play. If there is no excessive play, the ball joint can be reused.

TRAILING ARM BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the trailing arm assembly.

NOTE

Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.



TRAILING ARM BALL JOINT DUST COVER REPLACEMENT

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Remove the dust cover.
2. Fill the multipurpose grease in the dust cover and lubricate the lip. (Amount of filling grease in the dust cover: approx. 7g)
3. Using the special tool, punch the dust cover until it contacts the snap ring.
4. Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.

LOWER CONTROL ARM ASSEMBLY/TOE CONTROL ARM ASSEMBLY

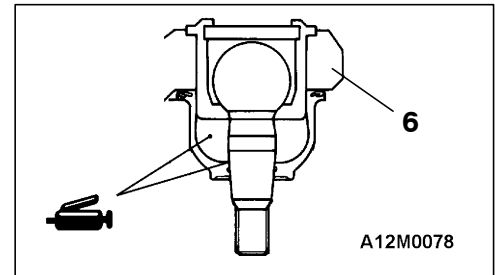
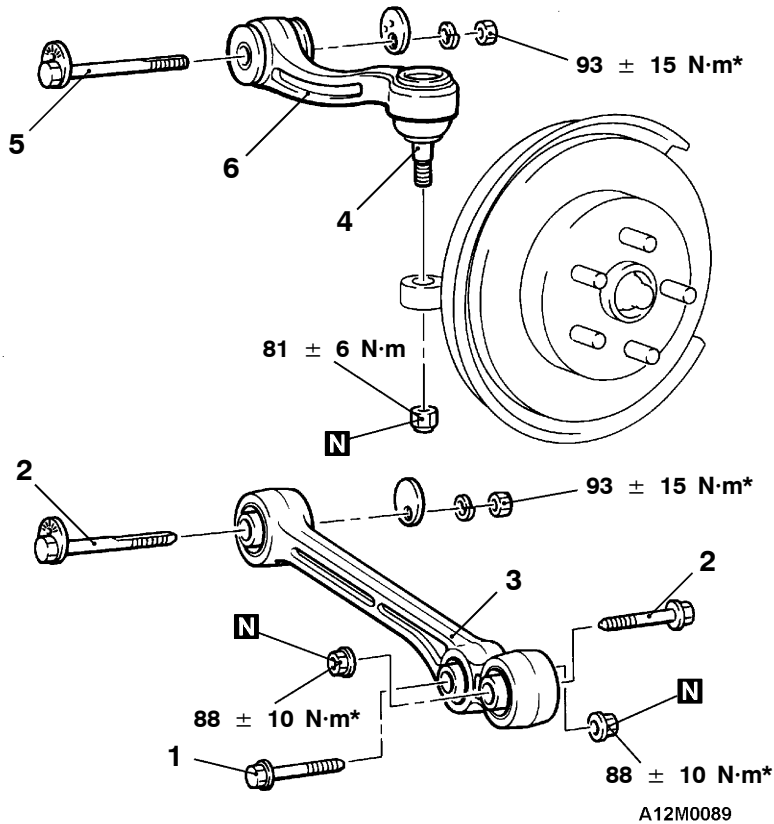
REMOVAL AND INSTALLATION

Caution

1. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper, because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.
2. *:To prevent bushings from breakage, the parts indicated by * should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Post-installation Operations

- Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.
- Wheel Alignment Check and Adjustment (Refer to P.34-4.)



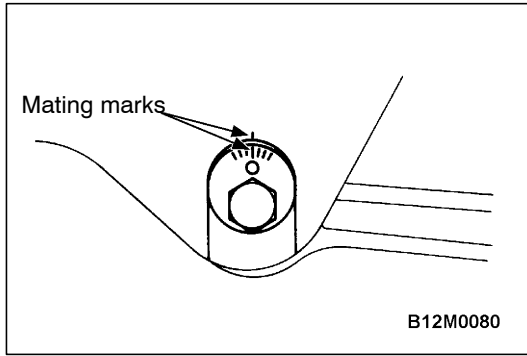
Lower arm assembly removal steps

1. Lower arm assembly to shock absorber connecting bolt
2. Lower arm assembly mounting bolt
3. Lower arm assembly



Toe control arm assembly removal steps

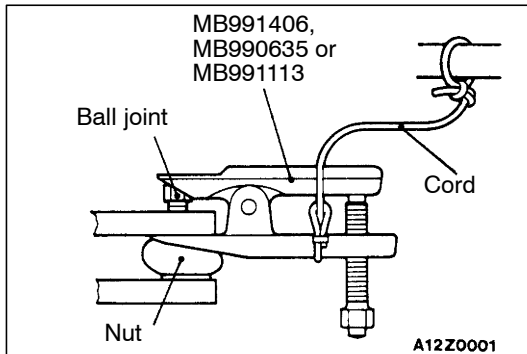
4. Toe control arm assembly and knuckle connection
5. Toe control arm assembly mounting bolt
6. Toe control arm assembly



REMOVAL SERVICE POINTS

◀A▶ LOWER ARM ASSEMBLY MOUNTING BOLT REMOVAL

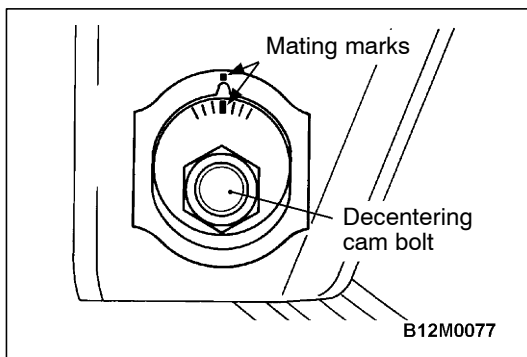
Mark the mating marks on the lower arm and the decentering cam bolt, then remove the lower arm and the decentering cam bolt.



◀B▶ TOE CONTROL ARM ASSEMBLY AND KNUCKLE DISCONNECTION

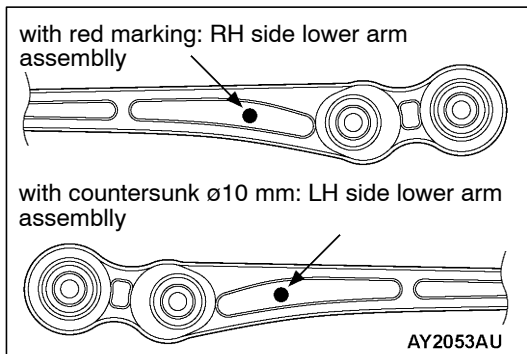
Caution

1. To prevent the ball joint thread from damage, only loosen but do not remove the nut securing the upper arm to the knuckle from the ball joint and use the special tool.
2. The special tool should be suspended from a cord to prevent it from being dropped.



◀C▶ TOE CONTROL ARM ASSEMBLY MOUNTING BOLT REMOVAL

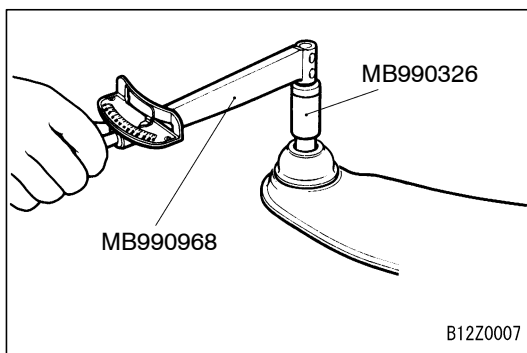
Mark the mating mark on the toe control arm and the decentering cam bolt, then remove the toe control arm and the decentering cam bolt.



INSTALLATION SERVICE POINTS

▶A◀ LOWER ARM ASSEMBLY INSTALLATION

Check the identification mark, install the lower arm assembly.



INSPECTION

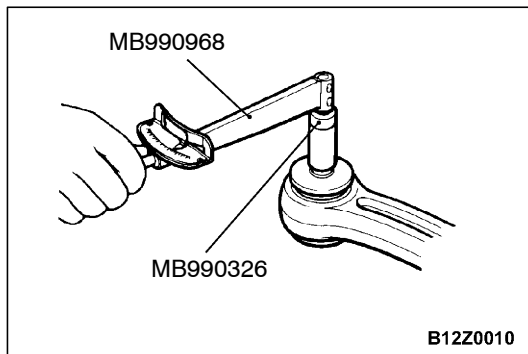
TOE CONTROL ARM BALL JOINT ROTATION TORQUE CHECK

1. After shaking the toe control arm ball joint stud several times, use the special tool to measure the rotation torque of the toe control arm ball joint.

Standard value: 0.5 - 2.5 N·m

2. When the measured value exceeds the standard value, replace the toe control arm assembly.

3. When the measured value is lower than the standard value, check that the toe control arm ball joint turns smoothly without excessive play. If there is no excessive play, the ball joint can be reused.



TOE CONTROL ARM SLIDE BUSHING ROTATION TORQUE CHECK

1. After inserting the bolt to the toe control arm slide bush and attaching the washer in the opposite direction, install the nut. After rotating the inner sleeve (include the washer) several times, measure the rotation torque of the toe control arm slide bush by using the special tool.

Standard value: 0.5 - 2.0 N·m

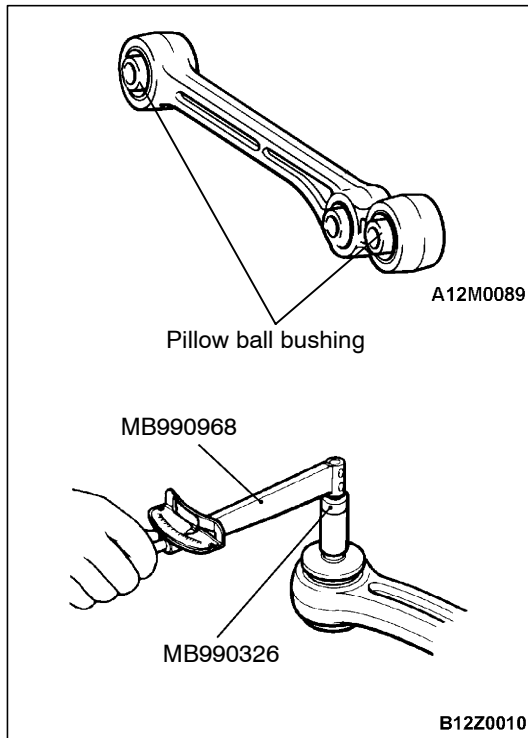
2. When the measured value exceeds the standard value, replace the toe control arm assembly.
3. When the measured value is lower than the standard value, check that the toe control arm slide bushing turns smoothly without excessive play. If there is no excessive play, the slide bushing can be reused.

TOE CONTROL ARM BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the trailing arm assembly.

NOTE

Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.

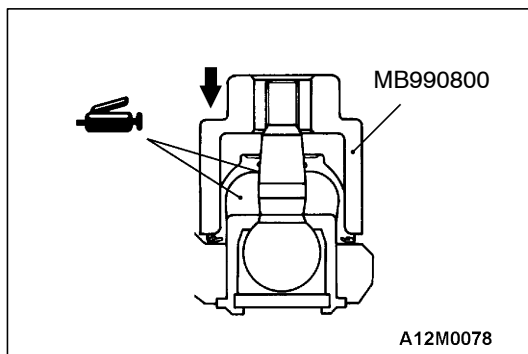


LOWER ARM PILLOW BALL ROTATION TORQUE CHECK

1. Insert the bolt to the lower arm pillow ball bush, in the opposite direction, insert the washer then install the nut. After rotating the inner sleeve (contained washer) several times, measure the rotation torque of the lower arm below ball bush using the special tool.

Standard value: 0.5 - 3.0 N·m

2. When the measured value exceeds the standard value, replace the lower arm assembly.
3. When the measured value is lower than the standard value, check that the lower arm pillow ball bushing turns smoothly without excessive play. If there is no excessive play, the pillow ball bushing can be reused.



TOE CONTROL ARM BALL JOINT DUST COVER REPLACEMENT

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Remove the dust cover.
2. Fill the multipurpose grease in the dust cover and lubricate the lip. (Amount of filling grease in the dust cover: approx. 7g)
3. Using the special tool, punch the dust cover until it contacts the snap ring.
4. Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.

SHOCK ABSORBER ASSEMBLY

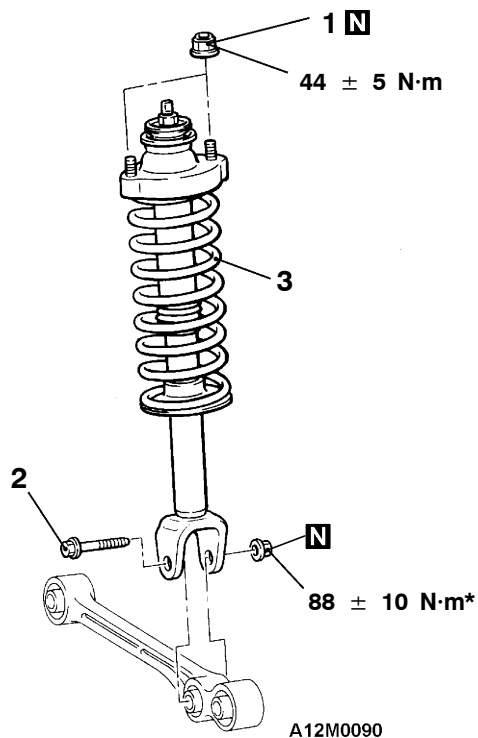
REMOVAL AND INSTALLATION

Caution

1. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper, because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.
2. *:To prevent bushings from breakage, the parts indicated by * should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Pre-removal and Post-installation Operations

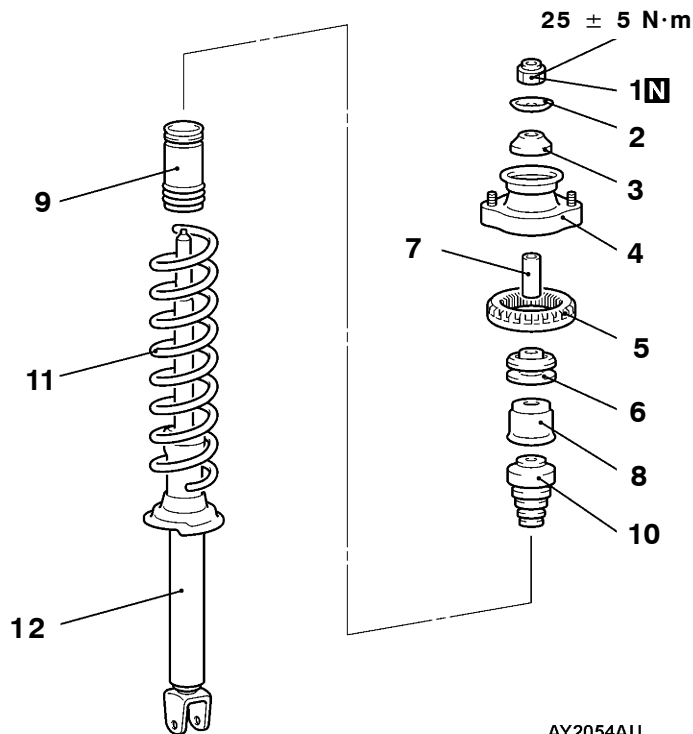
Trunk room side trim removal and installation <Vehicles with AYC> (Refer to GROUP52A.)



Removal steps

1. Self locking flange nut
2. Bolt
3. Shock absorber assembly

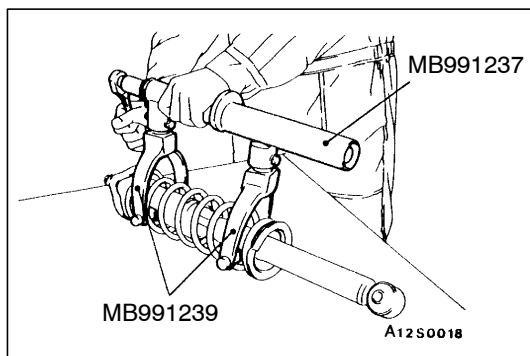
DISASSEMBLY AND REASSEMBLY



AY2054AU

Disassembly steps

- | | | |
|---------|---------------------|---------------------|
| ◀A▶ ▶D▶ | 1. Self-locking nut | 7. Collar |
| | 2. Washer | 8. Cup assembly |
| | 3. Upper bushing B | 9. Dust cover |
| ▶C▶ ▶B▶ | 4. Bracket assembly | 10. Bump rubber |
| | 5. Upper spring pad | ▶A▶ 11. Coil spring |
| | 6. Upper bushing A | 12. Shock absorber |



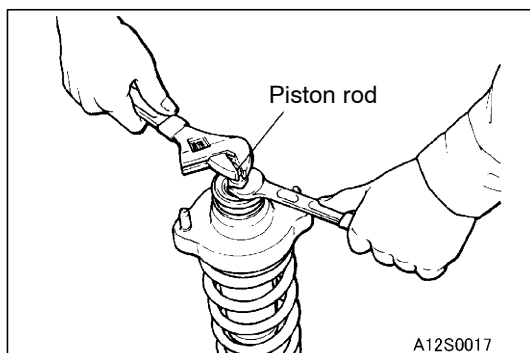
DISASSEMBLY SERVICE POINT

◀A▶ SELF-LOCKING NUT REMOVAL

1. Use the special tools to compress the coil spring.

Caution

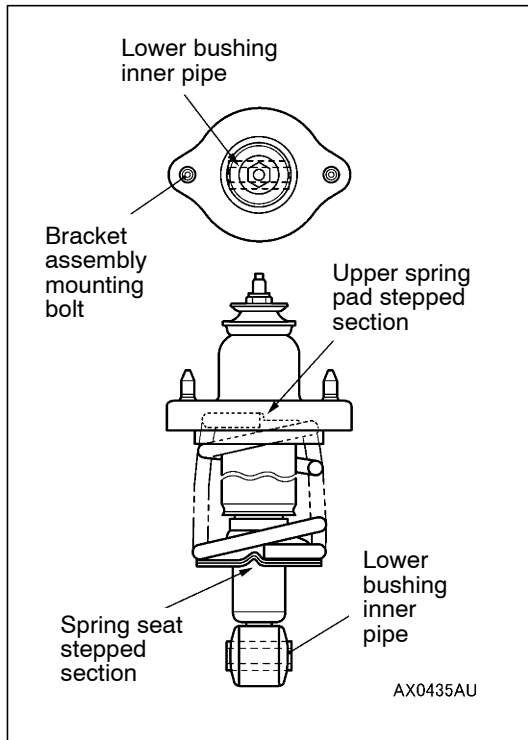
- (1) Install the special tools evenly, and so that the maximum length will be attained within the installation range.
- (2) Do not use an impact wrench as it will cause the bolt of the special tool to be seized.



2. Holding the piston rod, remove the self-locking nut.

Caution

To prevent the piston rod lock nut inside the strut from loosening, do not use an impact wrench when the self-locking nut is loosened.



REASSEMBLY SERVICE POINTS

►A◄ COIL SPRING INSTALLATION

1. Use the special tools (MB991237, MB991239) to compress the coil spring, and install it to the spring seat of the shock absorber.

Caution

Do not use an impact wrench as it will cause the bolt of the special tool to be seized.

2. Align the end of the coil spring with the stepped section of the spring seat of the shock absorber.

►B◄ UPPER SPRING PAD INSTALLATION

Align the stepped section of the upper spring pad with the end of the coil spring, and install the upper spring pad.

►C◄ BRACKET ASSEMBLY INSTALLATION

Install the bracket assembly so that the lower bushing inner pipe of the shock absorber and the line between the bracket mounting bolts are straight when looking from above.

►D◄ SELF-LOCKING NUT INSTALLATION

1. Provisionally tighten the self-locking nut.
2. After removing the special tools (MB991237, MB991239), tighten the self-locking nut to the specified torque.

Specified torque: 25 ± 5 N·m

Caution

To prevent the piston rod lock nut inside the strut from loosening, do not use an impact wrench when the self-locking nut is tightened.

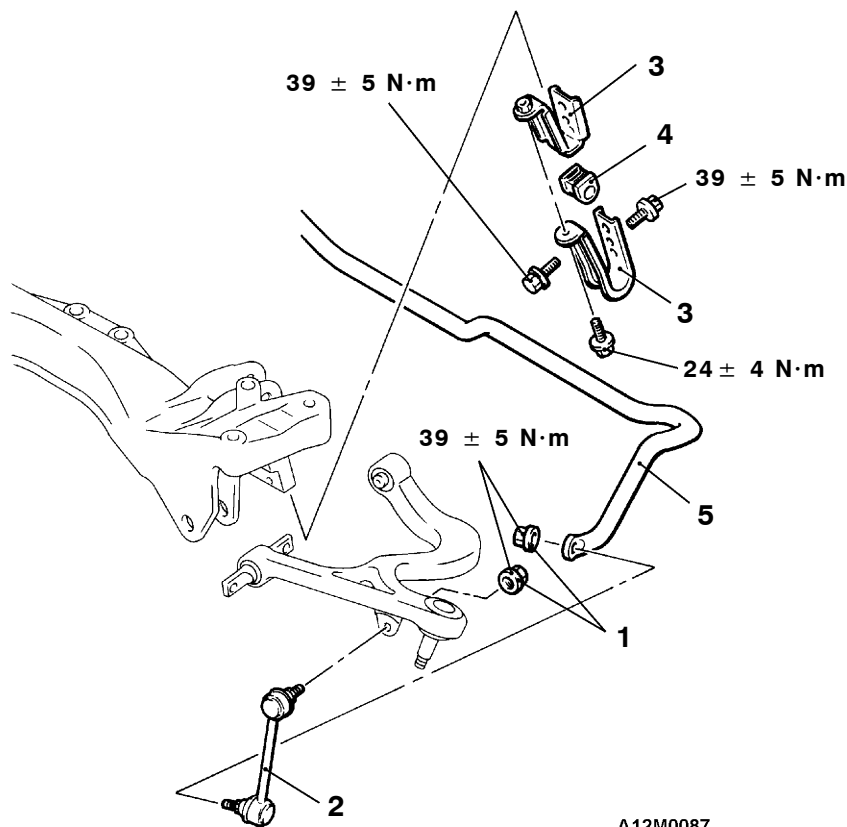
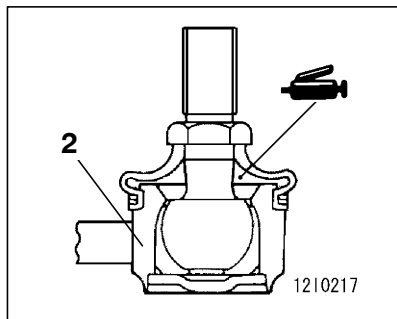
STABILIZER BAR

REMOVAL AND INSTALLATION

Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper, because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

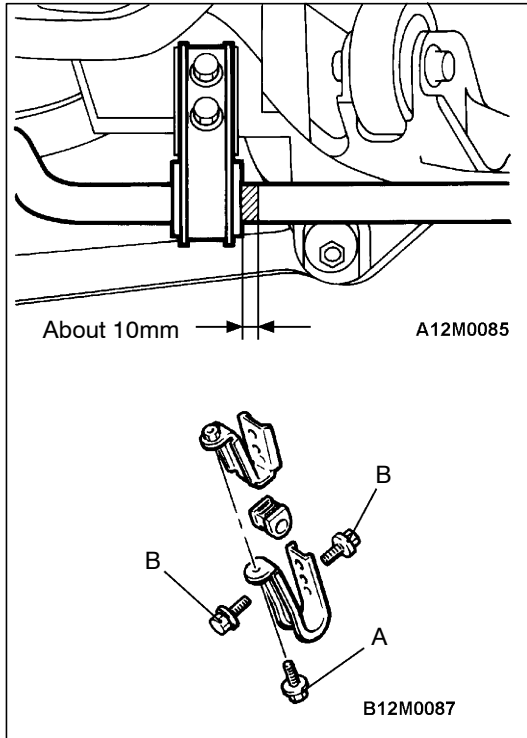
Post-installation Operations
 Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.



Removal steps

- 1. Stabilizer link mounting nut
- 2. Stabilizer link
- ▶A◀ 3. Stabilizer bar bracket

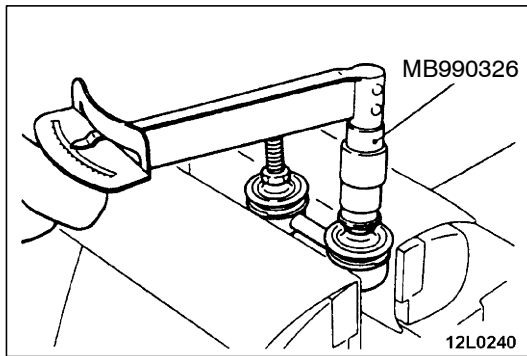
- ▶A◀ 4. Bushing
- ▶A◀ 5. Stabilizer bar



INSTALLATION SERVICE POINTS

▶◀ STABILIZER BAR/BUSHING/STABILIZER BAR BRACKET INSTALLATION

Align the stabilizer bar until the identification color of the stabilizer bar is out of the dimension shown as the illustration from the bush to the vehicle center, after tightening the stabilizer bracket mounting bolt A, tighten the mounting bolt B.



INSPECTION

STABILIZER LINK BALL JOINT TURNING TORQUE CHECK

1. After shaking the stabilizer link ball joint stud several times, install the nut to the stud and use the special tool to measure the turning torque of the stabilizer link ball joint.

Standard value: 1.7 - 3.1 N·m

2. When the measured value exceeds the standard value, replace the stabilizer link.
3. When the measured value is lower than the standard value, check that the ball joint turns smoothly without excessive play. If so, it is possible to reuse that ball joint.

STABILIZER LINK BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the stabilizer link.

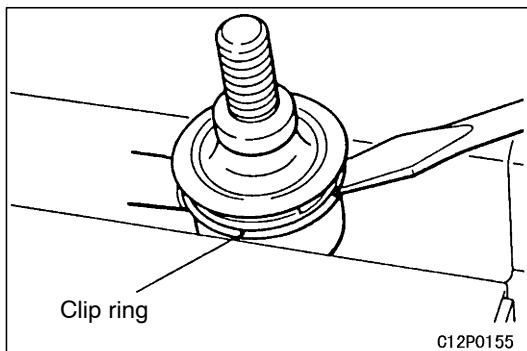
NOTE

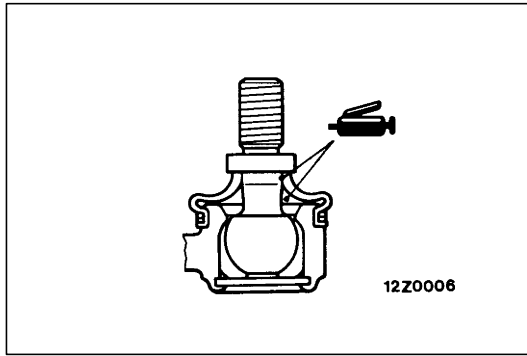
Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.

STABILIZER LINK BALL JOINT DUST COVER REPLACEMENT

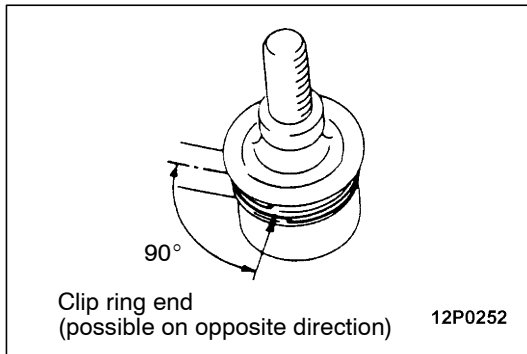
Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Remove the clip ring and the dust cover.





2. Apply multipurpose grease to the inside of the dust cover.



3. Wrap plastic tape around the stabilizer link stud, and then install the dust cover to the stabilizer link.
4. Secure the dust cover by the clip ring. Then install the clip ring end in order to position on 90 degrees toward the axis of the link.
5. Check the dust cover for cracks or damage by pushing it with finger.

NOTES

SERVICE BRAKES

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BASIC BRAKE SYSTEM	35A
ANTI-SKID BRAKING SYSTEM (ABS) <4WD>	35B



BASIC BRAKE SYSTEM

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GENERAL INFORMATION

The brake system offers high dependability and durability along with improved braking performance and brake sensitivity.

SERVICE PRECAUTION <VEHICLES WITH BREMBO BRAKING SYSTEM>

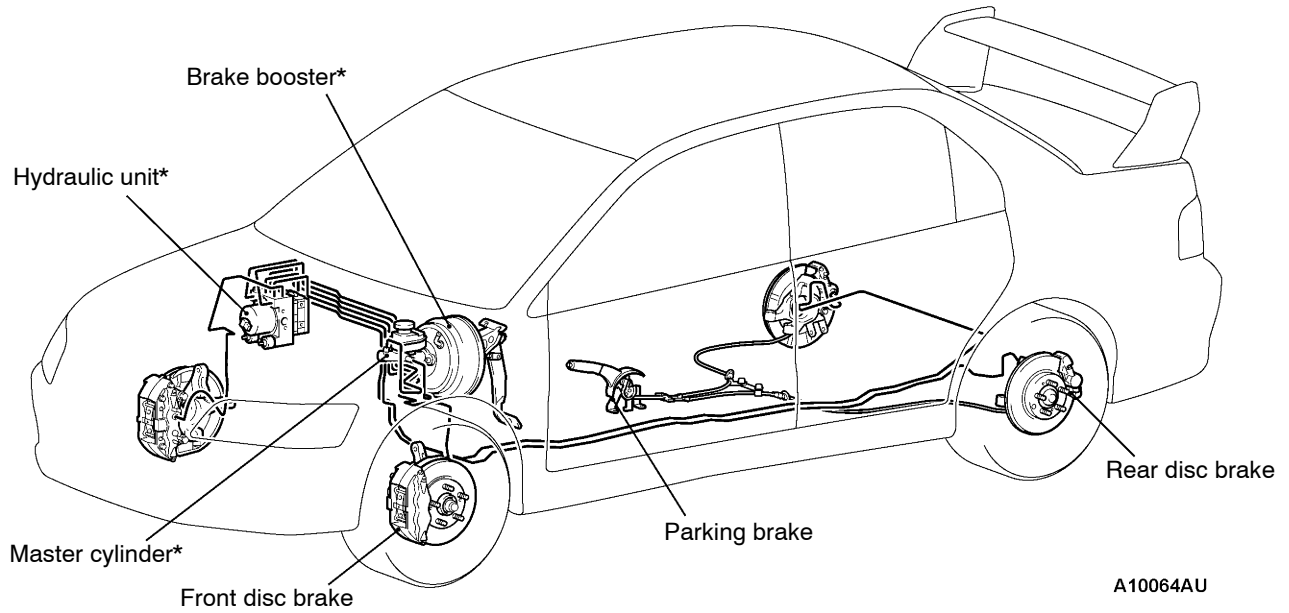
Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched.

SPECIFICATIONS

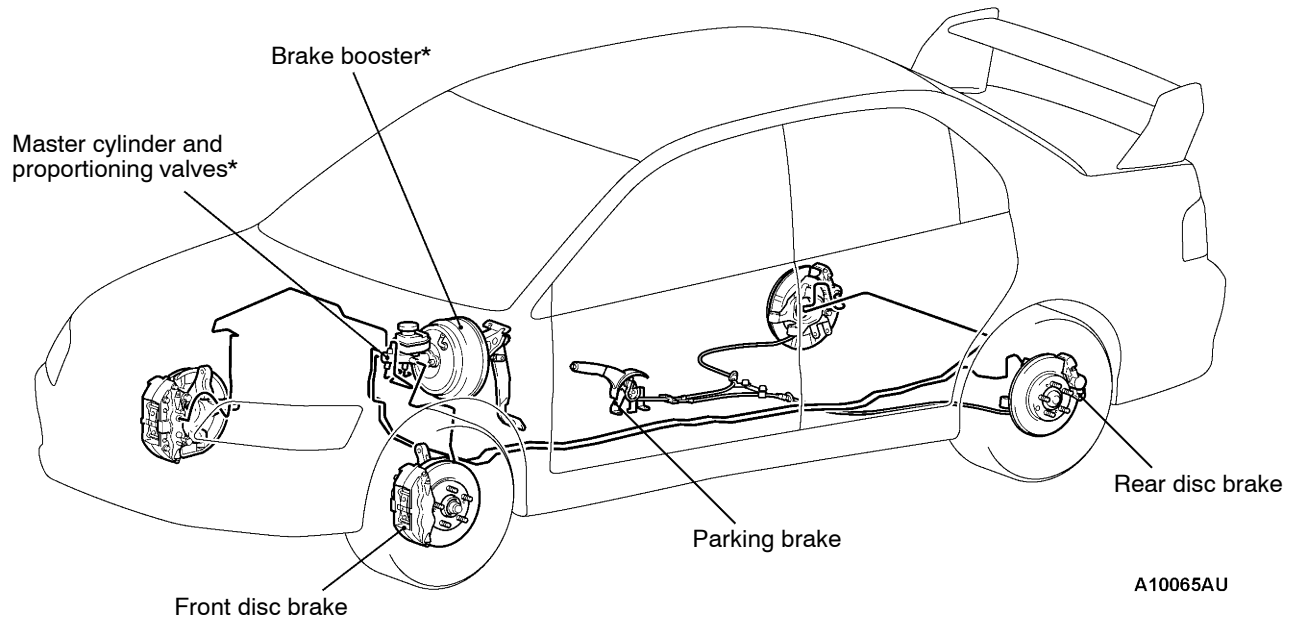
Items		Specifications
Master cylinder	Type	Tandem type
	I.D. mm	26.9
Brake booster	Type	Vacuum type, tandem
	Effective dia. of power cylinder mm	205 + 230
	Boosting ratio	4.5 (Pedal depressing force: 230 N)
Rear wheel hydraulic control method	Vehicles with ABS <RS, RS- >	Electronic brake-force distribution (EBD)
	Vehicles without ABS <RS>	Proportioning valves
Proportioning valves <Vehicles without ABS>	Type	Single type × 2
	Decompression ratio	0.25
Front brakes <RS (standard)>	Type	Floating caliper, 2 piston, ventilated disc
	Disc effective dia. × thickness mm	227 × 24
	Wheel cylinder I.D. mm	42.9 (×2)
	Pad thickness mm	10.0
	Clearance adjustment	Automatic
Front brakes <RS (option), RS-II>	Type	4 opposed piston, ventilated disc <Brembo braking system>
	Disc effective dia. × thickness mm	263 × 32
	Wheel cylinder I.D. mm	40.0 (×2), 46.0 (×2)
	Pad thickness mm	10.0
	Clearance adjustment	Automatic
Rear brakes <RS (standard)>	Type	Floating caliper, 1 piston, ventilated disc
	Disc effective dia. × thickness mm	237 × 20
	Wheel cylinder I.D. mm	34.9
	Pad thickness mm	10.0
	Clearance adjustment	Automatic
Rear brakes <RS (option), RS-II>	Type	2 opposed piston, ventilated disc <Brembo braking system>
	Disc effective dia. × thickness mm	252 × 22
	Wheel cylinder I.D. mm	40.0 (×2)
	Pad thickness mm	9.0
	Clearance adjustment	Automatic
Brake fluid		DOT3 or DOT4

CONSTRUCTION DIAGRAM

<Vehicles with ABS>



<Vehicles without ABS>



NOTE

For R.H. drive vehicles, only the position indicated by the * is symmetrical.

SERVICE SPECIFICATIONS

Items		Standard value	Limit	
Brake pedal height	mm	169.1 - 172.1	-	
Brake pedal play	mm	3 - 8	-	
Brake pedal to floorboard clearance when the brake pedal is depressed	mm	90 or more	-	
Brake booster push rod protrusion amount	mm	8.98 - 9.23	-	
Proportioning valve <Vehicles without ABS>	Split point MPa	2.70 - 3.19	-	
	Output fluid pressure MPa <Input fluid pressure: 6.86Mpa>	3.68 - 4.17	-	
	Output fluid pressure difference between left and right MPa	-	0.49	
Front disc brake <RS (standard)>	Pad thickness	mm	10.0	2.0
	Disc thickness	mm	24.0	22.4
	Disc run-out	mm	-	0.03
	Drag force	N	51 or less	-
Brembo front disc brake <RS (option), RS-II>	Pad thickness	mm	10.0	2.0
	Disc thickness	mm	32.0	29.8
	Disc run-out	mm	-	0.03
	Drag force	N	69 or less	-
Rear disc brake <RS (standard)>	Pad thickness	mm	10.0	2.0
	Disc thickness	mm	20.0	18.4
	Disc run-out	mm	-	0.03
	Drag force	N	69 or less	-
Brembo rear disc brake <RS (option), RS-II>	Pad thickness	mm	9.0	2.0
	Disc thickness	mm	22.0	20.4
	Disc run-out	mm	-	0.03
	Drag force	N	69 or less	-
Front wheel bearing axial play	mm	-	0.06	
Rear wheel bearing axial play	mm	-	0.05	

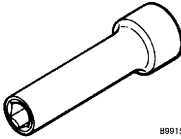
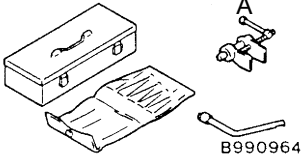
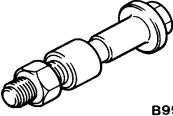
LUBRICANTS

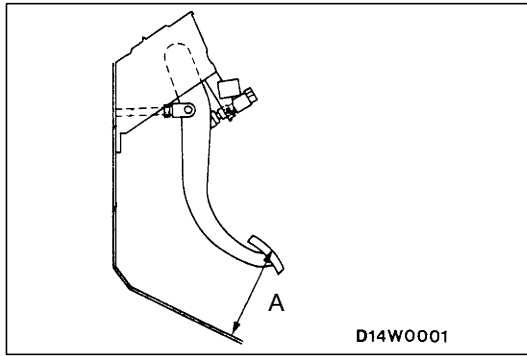
Items	Specified Lubricant	Quantity
Brake fluid	DOT3 or DOT4	As required
Piston, wheel cylinder body	Repair kit grease	
Piston boot, piston seal, shim		
Guide pin, lock pin, pin boot <Except for Brembo disc brake>		
Pad assembly <Brembo disc brake>		

SEALANT

Items	Specified sealant	Remarks
Fitting	3M ATD Part No. 8661, 8663 or equivalent	Semi-drying sealant

SPECIAL TOOLS

Tool	Number	Name	Use
 MB991568	MB991568	Push rod adjusting socket	Adjustment of the brake booster push rod protrusion amount
 MB990964 A: MB990520	MB990964 A: MB990520	Brake tool set	Pushing-in of the disc brake piston <ul style="list-style-type: none"> • Disc brake piston pushing-in
 MB990998	MB990998	Front hub remover and installer	Provisional holding of the wheel bearing



ON-VEHICLE SERVICE

BRAKE PEDAL CHECK AND ADJUSTMENT

BRAKE PEDAL HEIGHT

1. Turn up the carpet, etc. under the brake pedal.
2. Measure the brake pedal height as illustrated.

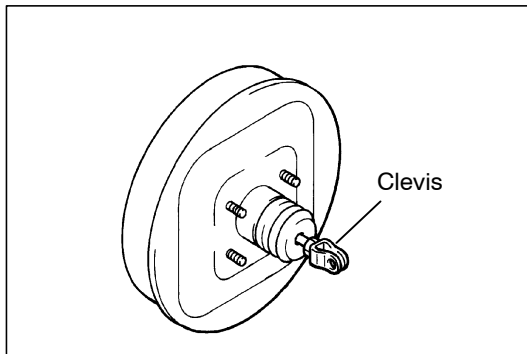
Standard value (A): 169.1 - 172.1 mm

3. If the brake pedal height is not within the standard value, follow the procedure below.

- (1) Disconnect the stop lamp switch connector.
- (2) Loosen the stop lamp switch by turning it approx. 1/4 turns anticlockwise.
- (3) Remove the brake booster. (Refer to P.35A-17.)

NOTE

With the master cylinder and brake pipe connected, remove the brake booster only.

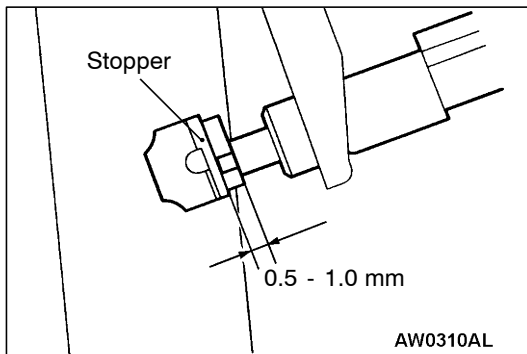


- (4) Adjust the brake pedal height by turning the clevis.

NOTE

When the clevis is turned 180°, the pedal height is changed approximately 2.4 mm.

- (5) Install the brake booster. (Refer to P.35A-17.)
- (6) Measure brake pedal height, and ensure that the measured value is within the specified value. When it is out of the specified value, repeat Step (3) - (6).



- (7) Insert the stop lamp switch until its thread part touches the stopper. Then lock the stop lamp switch by turning it approx. 1/4 turns clockwise, and confirm that the clearance between the switch plunger and the stopper is as shown.

- (8) Connect the connector at the stop lamp switch.

Caution

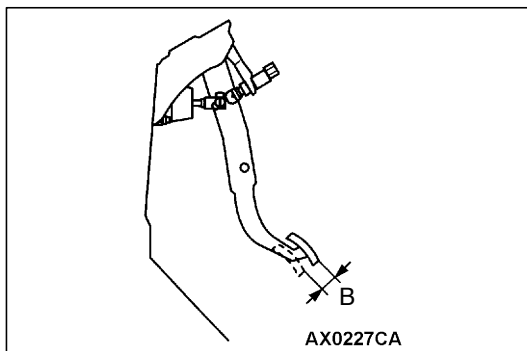
Check that the stop lamp does not illuminate when the brake pedal is not depressed.

4. Return the carpet, etc.

BRAKE PEDAL FREE PLAY

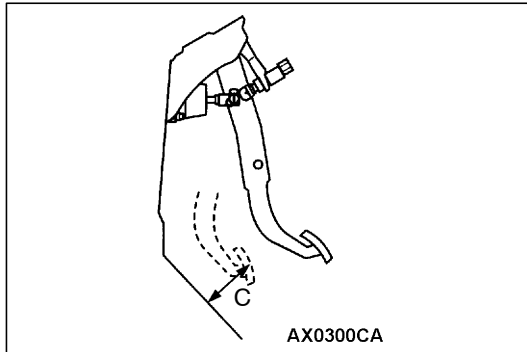
1. With the engine stopped, depress the brake pedal two or three times. After eliminating the vacuum in the power brake booster, press the pedal down by hand, and confirm that the amount of movement before resistance is met (the free play) is within the standard value.

Standard value (B): 3 - 8 mm



2. If the brake pedal play is not within the standard value, check the following, and adjust or replace if necessary:
 - Excessive play between the brake pedal and the clevis pin, or between the clevis pin and the brake booster operating rod
 - Brake pedal height
 - Installation position of the stop lamp switch, etc.

CLEARANCE BETWEEN BRAKE PEDAL AND FLOOR BOARD



1. Turn up the carpet etc. under the brake pedal.
2. Start the engine, depress the brake pedal with approximately 500 N of force, and measure the clearance between the brake pedal and the floorboard.

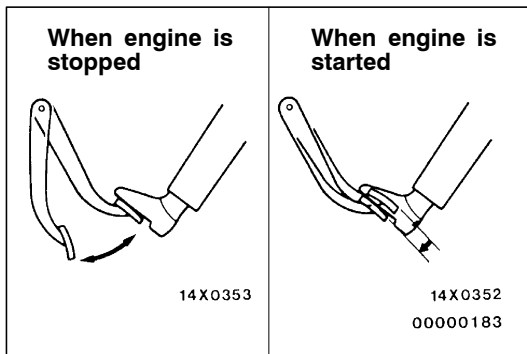
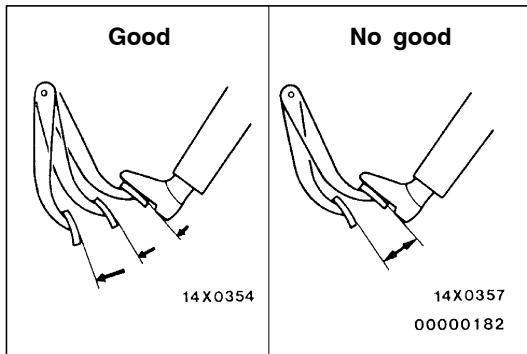
Standard value (C): 90 mm or more

3. If the clearance is outside the standard value, check for air trapped in the brake line and thickness of the disc brake pad and dragging in the parking brake. Adjust and replace defective parts as required.
4. Return the carpet, etc.

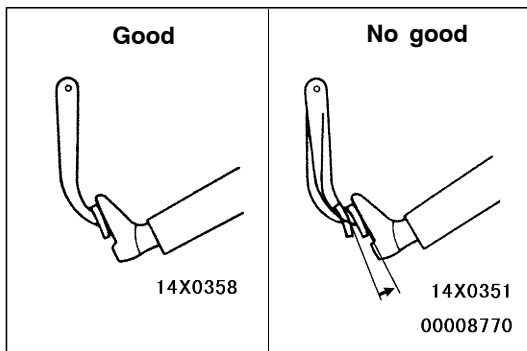
BRAKE BOOSTER OPERATING TEST

For simple checking of the brake booster operation, carry out the following tests:

1. Run the engine for one or two minutes, and then stop it.
If the pedal depresses fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly. If the pedal height remains unchanged, the booster is defective.



2. With the engine stopped, step on the brake pedal several times.
Then start the engine while the brake pedal is stepped on.
If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is defective.



3. With the engine running, step on the brake pedal and then stop the engine.
Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition. If the pedal rises, the booster is defective.

If the above three tests are okay, the booster performance can be determined as good.

If one of the above three tests is not okay at least, the check valve, vacuum hose, or booster will be defective.

CHECK VALVE OPERATION CHECK

1. Remove the vacuum hose. (Refer to P.35A-17.)

Caution

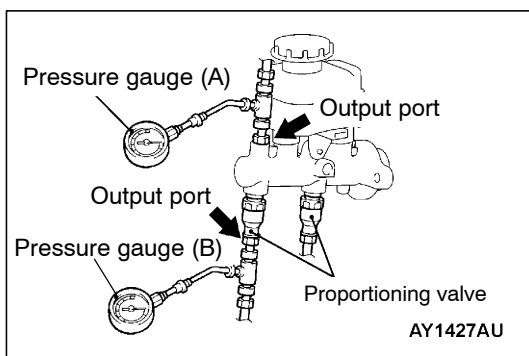
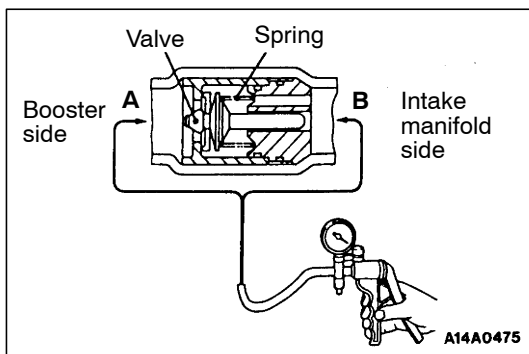
The check valve should not be disassembled from the vacuum hose as they are united as one part.

2. Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Accept/reject criteria
Connection at the brake booster side (A)	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side (B)	A negative pressure (vacuum) is not created.

Caution

If the check valve is defective, always replace it as an assembly unit together with the vacuum hose.

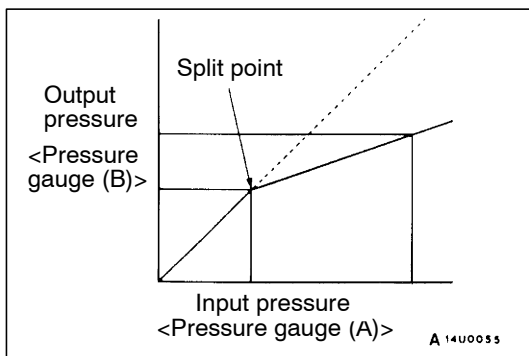


PROPORTIONING VALVE FUNCTION TEST <Vehicles without ABS>

Caution

The proportioning valves are installed independently for the right and left brake lines. Always measure each valve.

1. Connect two pressure gauges to the output port of the master cylinder and output port of the proportioning valve.
2. Bleed the brake line and the pressure gauges. (Refer to P.35A-10.)



3. Depress the brake pedal gradually. Then check that the split point, where the output fluid pressure begins to drop in proportion to the output fluid pressure, is at the standard value.

Standard value: 2.70 - 3.19 MPa

4. Depress the brake pedal more strongly than at the above step. Then check that the output fluid pressure is at the standard value when the input fluid pressure is 6.86 MPa.

Standard value: 3.68 - 4.17 MPa

5. Measure each output fluid pressure at both valves, and check that the difference between the two is at the limit value or less.

Limit: 0.49 MPa

6. If the measured pressure exceeds the limit, replace the proportioning valve.

BLEEDING

Caution

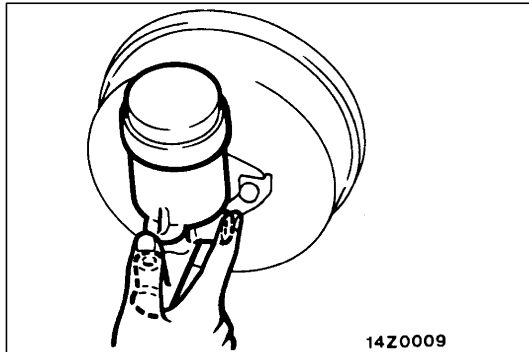
Specified brake fluid: DOT3 or DOT4

Always use the specified brake fluid. Avoid using a mixture of the specified brake fluid and other fluid.

MASTER CYLINDER BLEEDING

The master cylinder used has no check valve, so if bleeding is carried out by the following procedure, bleeding of air from the brake pipeline will become easier. (When brake fluid is not contained in the master cylinder.)

1. Fill the reserve tank with brake fluid.
2. Keep the brake pedal depressed.
3. Have another person cover the master cylinder outlet with a finger.
4. With the outlet still closed, release the brake pedal.
5. Repeat steps 2 - 4 three or four times to fill the inside of the master cylinder with brake fluid.

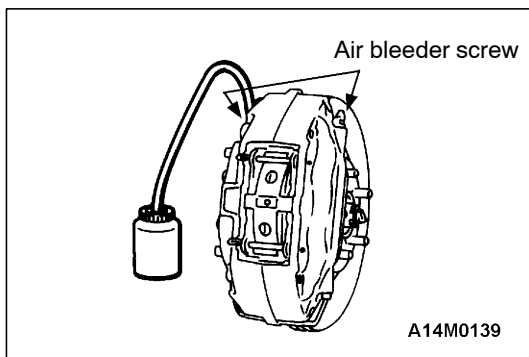


BREMBO DISC BRAKE BLEEDING

Caution

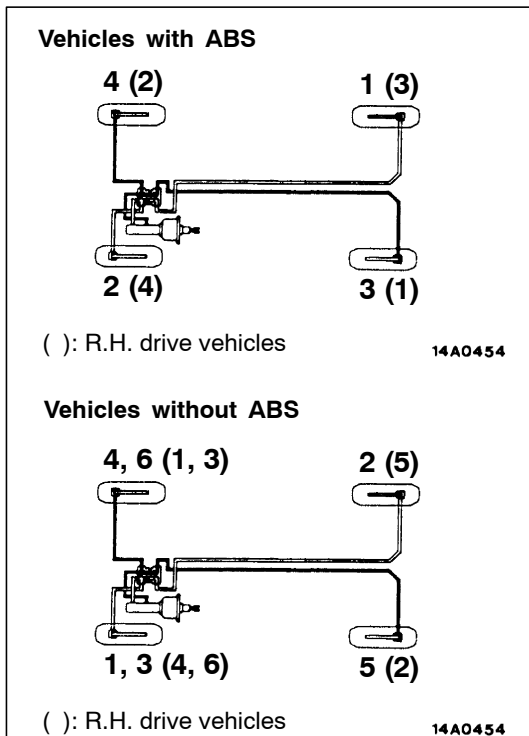
Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

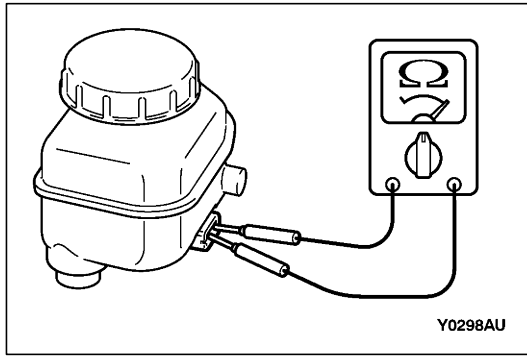
Connect a vinyl tube to the outer end of the air bleeder screw to bleed the circuit of air. Then, connect the vinyl tube to the inner end and bleed the circuit of air. Except for these, the conventional procedures shall be followed. After the circuit has been bled of air, tighten both air bleeder screws securely.



BRAKE PIPE LINE BLEEDING

Bleed the air in the sequence shown in the figure.





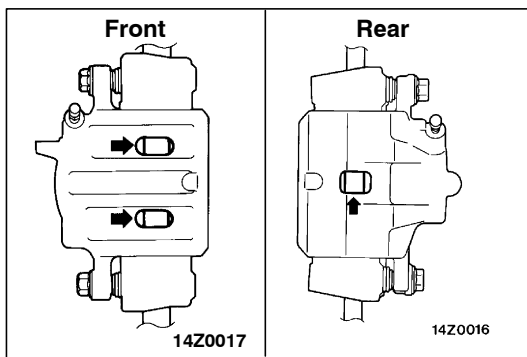
BRAKE FLUID LEVEL SENSOR CHECK

The brake fluid level sensor is in good condition if there is no continuity when the float surface is above “MIN” and if there is continuity when the float surface is below “MIN”.

DISC BRAKE PAD CHECK AND REPLACEMENT <Except for Brembo disc brake>

NOTE

The wear indicator contacts the brake disc when the brake pad thickness reaches approximately 2 mm and emit a squealing sound to warn the driver.

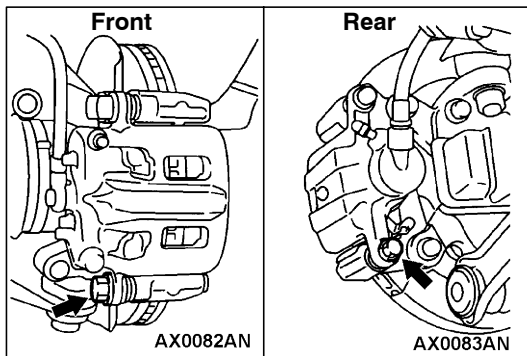


1. Check the brake pad thickness through the caliper body check port.

Standard value: 10.0 mm

Limit: 2.0 mm

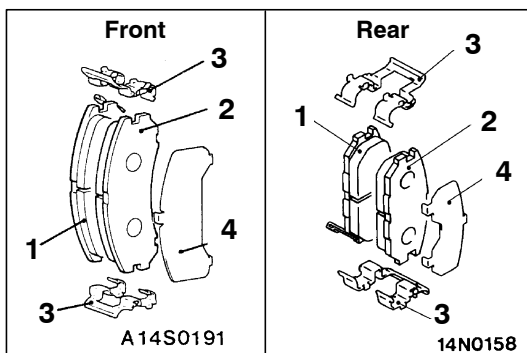
2. When the thickness is less than the limit, always replace the pads at an axle set.



3. Remove the pin bolt. Pivot the caliper assembly and hold it with wires.

Caution

Do not wipe off the special grease that is on the pin or allow it to contaminate the pin.



4. Remove the following parts from the caliper support.
 1. Pad and wear indicator assembly
 2. Pad assembly
 3. Clip
 4. Outer shim
5. In order to measure the brake drag force after pad installation, measure the rotary-sliding resistance of the hub with the pads removed. (Refer to P.35A-21.)
6. Install the pads and caliper assembly, and then check the brake drag force. (Refer to P.35A-21.)

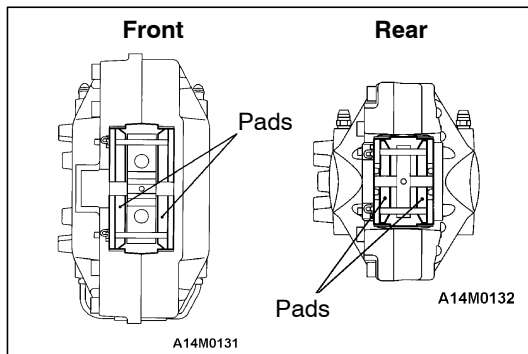
<Brembo disc brake>

Caution

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

NOTE

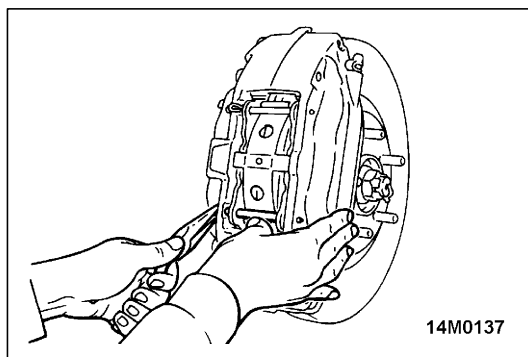
The wear indicator contacts the brake disc when the brake pad thickness reaches approximately 2 mm and emit a squealing sound to warn the driver.



1. Check the brake pad thickness through the caliper body check port.

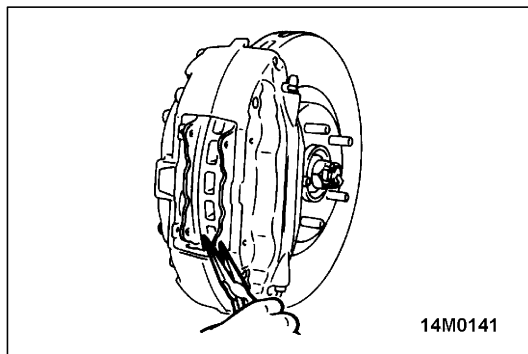
Standard value: 10.0 mm <Front>, 9.0 mm <Rear>

Limit: 2.0 mm

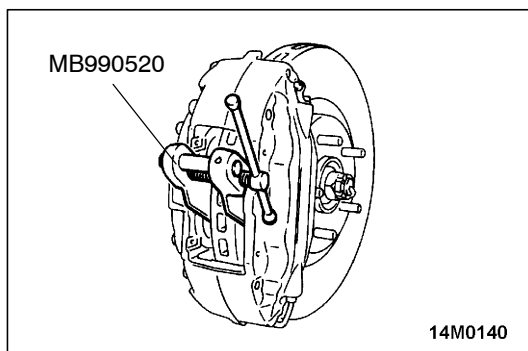


2. When the thickness is less than the limit, always replace the pads at an axle set.

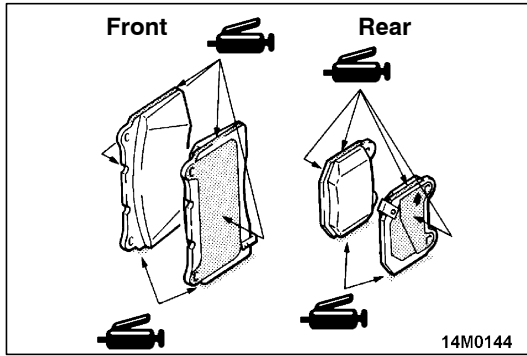
- (1) Holding the cross spring with one hand, pull the pin out of the caliper.



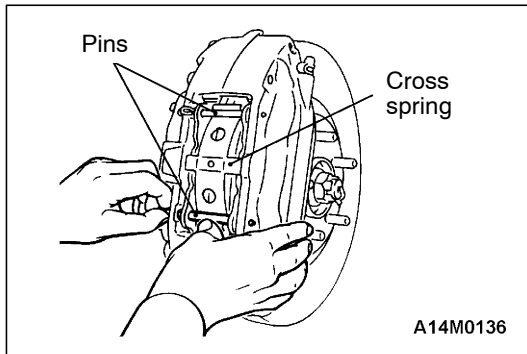
- (2) Remove the pad from the caliper.
- (3) To measure brake drag force after new pads have been installed, use a spring balance to measure the turning sliding resistance of the hub with the pads removed. (Refer to P.35A-21.)



- (4) Clean the piston and, using the special tool, push the piston into the cylinder.



- (5) Apply repair kit grease to the portions of the pads indicated on the left. At this time, make sure that the grease will not be applied to any other surfaces.
- (6) Mount the pads to the caliper so that its side with the wear indicator is on the outside of the vehicle. With the rear pads, ensure that the arrow on the pad faces in the same direction as the brake disc turns when the vehicle moves forward.



- (7) Holding the cross spring with one hand, fit pins in the caliper.
- (8) Using a spring balance, measure the turning sliding resistance of the hub in the forward direction.
- (9) Find the brake disc drag force [the difference in measurements taken in step(3) and in step(8)].

Standard value: 69 N or less

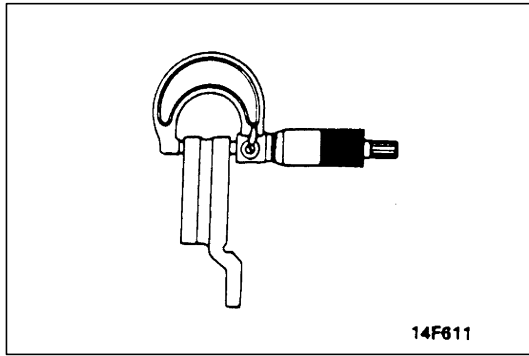
DISC BRAKE ROTOR CHECK

Caution

When servicing disc brakes, it is necessary to exercise caution to keep the disc brakes within the allowable service values in order to maintain normal brake operation.

Before re-finishing or re-processing the brake disc surface, the following conditions should be checked.

Inspection items	Remarks
Scratches, rust, saturated lining materials and wear	<ul style="list-style-type: none"> ● If the vehicle is not driven for a certain period, the sections of the discs that are not in contact with lining will become rusty, causing noise and shuddering. ● If grooves resulting from excessive disc wear and scratches are not removed prior to installing a new pad assembly, there will momentarily be inappropriate contact between the disc and the lining (pad).
Run-out or drift	Excessive run-out or drift of the discs will increase the pedal depression resistance due to piston knock-back.
Change in thickness (parallelism)	If the thickness of the disc changes, this will cause pedal pulsation, shuddering and surging.
Inset or warping (flatness)	Overheating and improper handling while servicing will cause inset or warping.



BRAKE DISC THICKNESS CHECK

Caution: Brembo disc brake

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

1. Using a micrometer, measure disc thickness at eight positions, approximately 45° apart and 10 mm in from the outer edge of the disc.

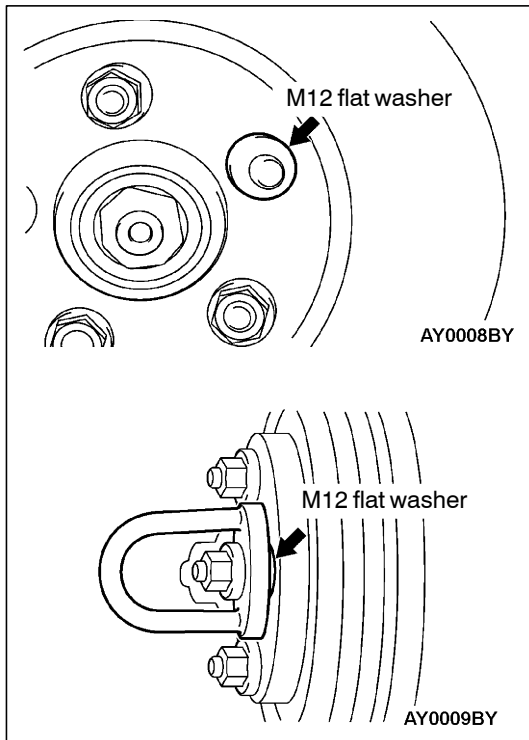
Brake disc thickness <Except for Brembo disc brake>
Standard value: 24.0 mm <Front>, 20.0 mm <Rear>
Limit: 22.4 mm <Front>, 18.4 mm <Rear>

Brake disc thickness <Brembo disc brake>
Standard value: 32.0 mm <Front>, 22.0 mm <Rear>
Limit: 29.8 mm <Front>, 20.4 mm <Rear>

Thickness variation (at least 8 positions)

The difference between any thickness measurements should not be more than 0.015 mm.

2. If the disc is beyond the limits for thickness, remove it and install a new one. If thickness variation exceeds the specification, replace the brake disc or grind it with on-the-car type brake lathe ("MAD, DL-8700PF" or equivalent).



Caution

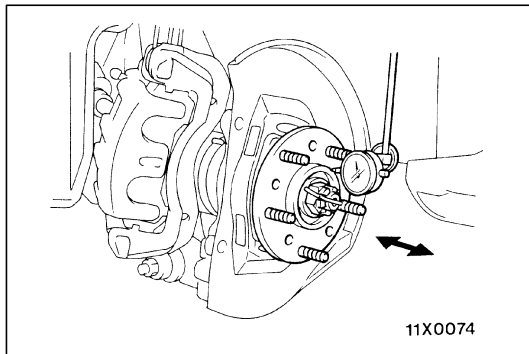
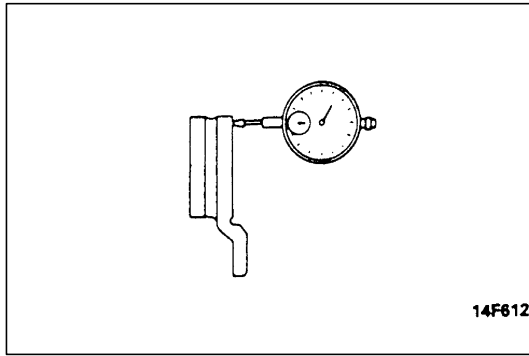
- (1) After a new brake disc is installed, always grind the brake disc with on-the-car type brake lathe. If this step is not carried out, the brake disc run-out exceeds the specified value, resulting in judder.
- (2) When the on-the-car type lathe is used, first install M12 flat washer on the stud bolt in the brake disc side according to the figure, and then install the adapter. If the adapter is installed with M12 flat washer not seated, the brake disc rotor may be deformed, resulting in inaccurate grinding.
- (3) Grind the brake disc with all wheel nuts diagonally and equally tightened to the specified torque 100 N·m. When all numbers of wheel nuts are not used, or the tightening torque is excessive or not equal, the brake disc rotor or drum may be deformed, resulting in judder.

BRAKE DISC RUN-OUT CHECK AND CORRECTION

Caution: Brembo disc brake

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

1. Remove the brake assembly, and then hold it with wire.
2. Temporarily install the disc with the hub nut.



3. Place a dial gauge approximately 5 mm from the outer circumference of the brake disc, and measure the run-out of the disc.

Limit: 0.03 mm or less

4. If the brake disc run-out exceeds the limit, correct it as follows:

- (1) Chalk phase marks on the wheel stud and the brake disc, which run-out is excessive.
- (2) Remove the brake disc. Then place a dial gauge as shown, and measure the wheel bearing axial play by pushing and pulling the wheel hub.

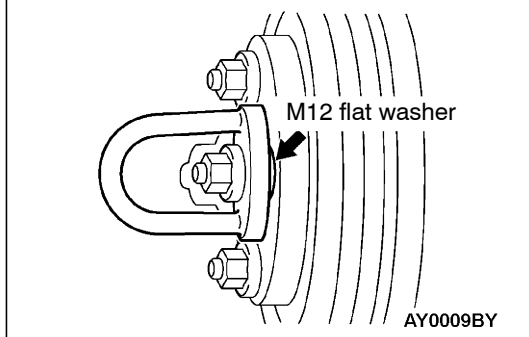
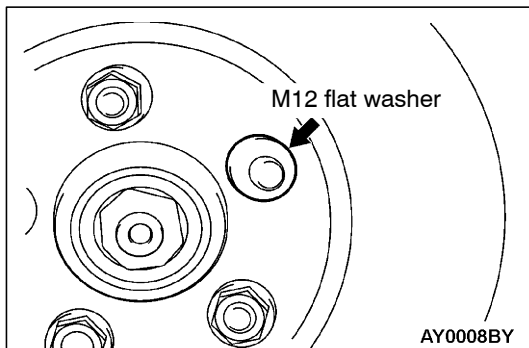
Limit: 0.06 mm <Front>, 0.05 mm <Rear>

- (3) If the wheel bearing axial play exceeds the limit, disassemble the hub and knuckle assembly to check each part.
- (4) If the wheel bearing axial play does not exceed the limit, dephase the brake disc and secure it. Then recheck the brake disc run-out.

5. If the run-out cannot be corrected by changing the phase of the brake disc, replace the brake disc or grind it with the on-the-car type brake lathe ("MAD, DL-8700PF" or equivalent).

Caution

- (1) After a new brake disc is installed, always grind the brake disc with on-the-car type brake lathe. If this step is not carried out, the brake disc run-out exceeds the specified value, resulting in judder.



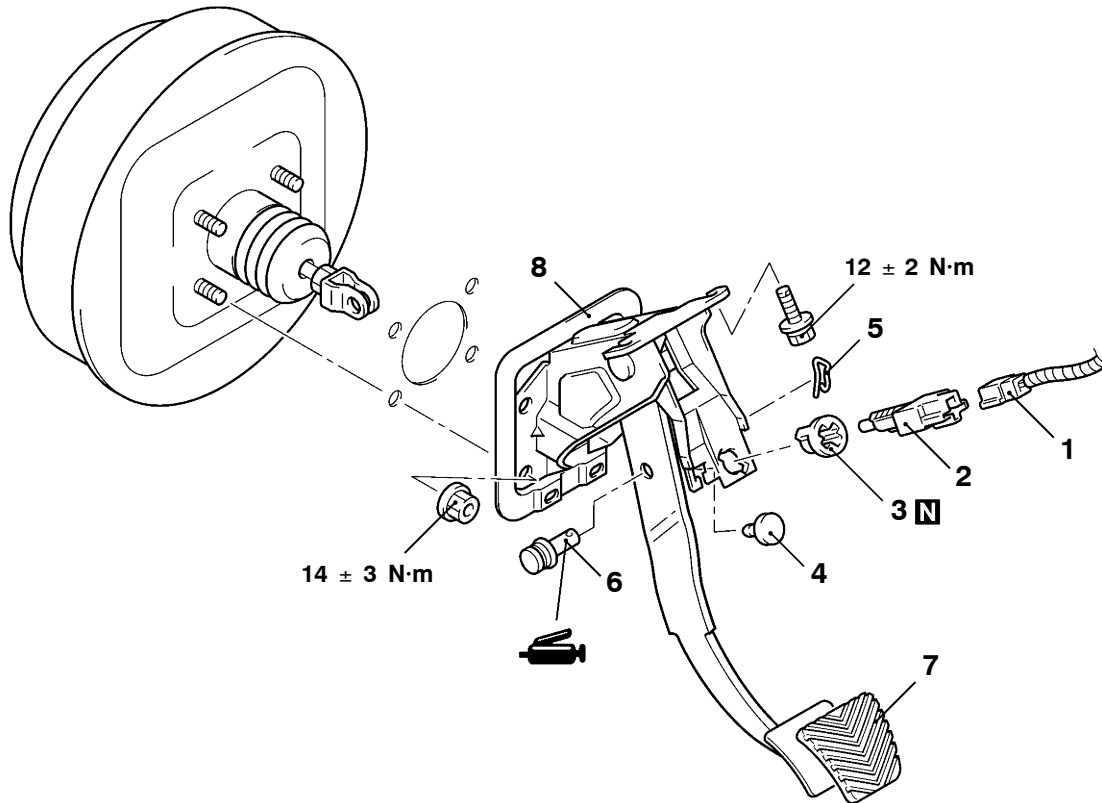
- (2) When the on-the-car type lathe is used, first install M12 flat washer on the stud bolt in the brake disc side according to the figure, and then install the adapter. If the adapter is installed with M12 flat washer not seated, the brake disc rotor may be deformed, resulting in inaccurate grinding.
- (3) Grind the brake disc with all wheel nuts diagonally and equally tightened to the specified torque 100 N·m. When all numbers of wheel nuts are not used, or the tightening torque is excessive or not equal, the brake disc rotor or drum may be deformed, resulting in judder.

BRAKE PEDAL

REMOVAL AND INSTALLATION

Post-installation Operation

Brake Pedal Adjustment (Refer to P.35A-7.)

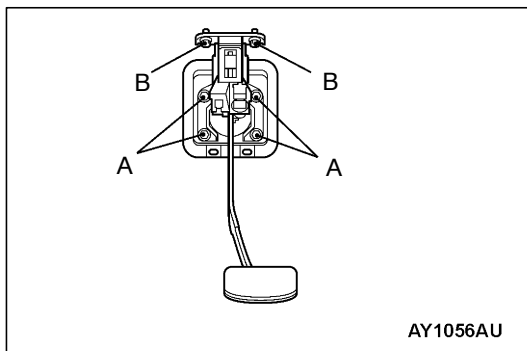


A10071AU

Removal steps

1. Harness connector
2. Stop lamp switch
3. Adjuster
4. Pedal stopper
5. Snap pin

6. Pin assembly
7. Pedal pad
- ▶A◀ 8. Brake pedal and pedal support member



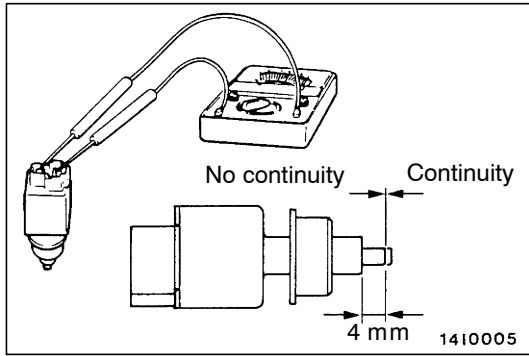
AY1056AU

INSTALLATION SERVICE POINT**▶A◀ BRAKE PEDAL AND PEDAL SUPPORT MEMBER INSTALLATION**

Tighten the brake booster mounting nuts (A), and then the brake pedal mounting bolts (B).

NOTE

The pedal support member can not be positioned correctly if the pedal mounting bolts (B) are tightened first as the their holes are oblong holes.



INSPECTION

STOP LAMP SWITCH CHECK

1. Connect an ohmmeter between the stop lamp switch connector terminals.
2. There should be no continuity between the terminals when the plunger is pushed in as shown. There should be continuity when it is released.

PROPORTIONING VALVE, MASTER CYLINDER AND BRAKE BOOSTER

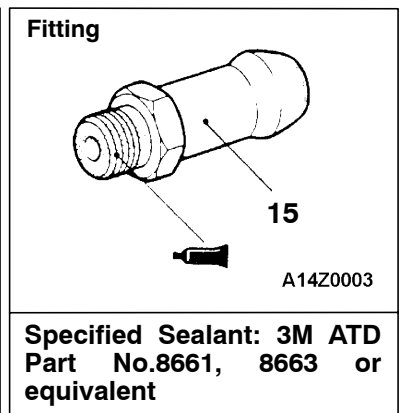
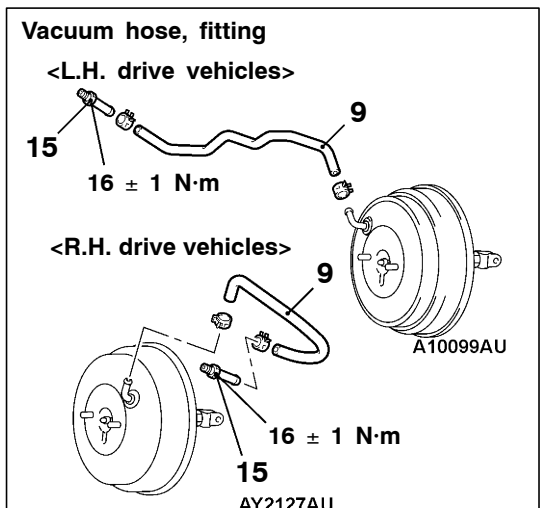
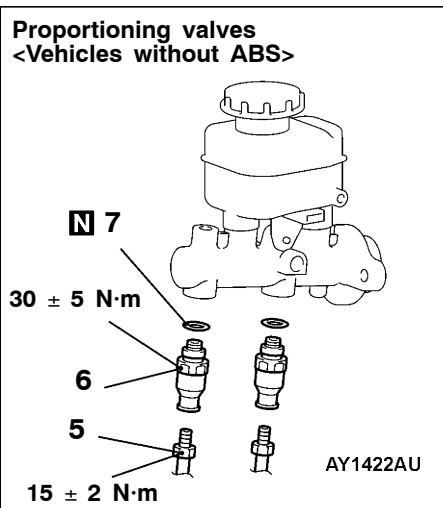
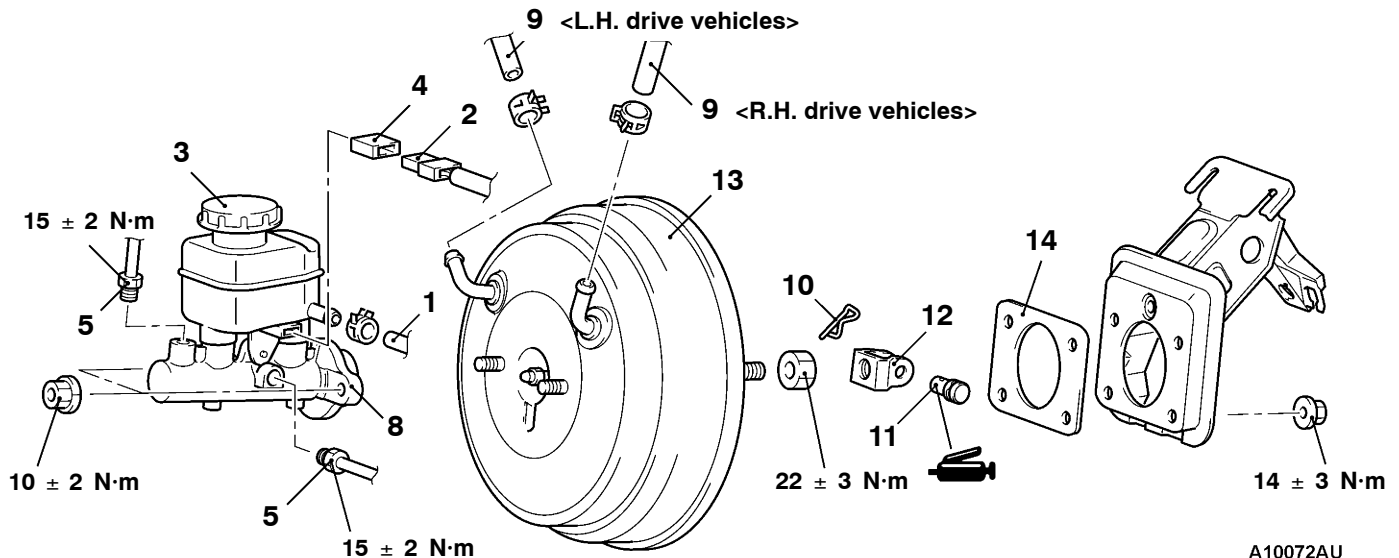
REMOVAL AND INSTALLATION

Pre-removal Operation

- Air Intake Hose and Air Cleaner Removal <L.H. drive vehicles>
- Strut Tower Bar Removal (Refer to GROUP 42.)
- Brake Fluid Draining

Post-installation Operation

- Brake Fluid Supplying and Air Bleeding (Refer to P.35A-10.)
- Brake Pedal Adjustment (Refer to P.35A-7.)
- Air Intake Hose and Air Cleaner Installation <L.H. drive vehicles>
- Strut Tower Bar Installation (Refer to GROUP 42.)



Master cylinder removal steps

1. Clutch hose connection
2. Brake fluid level sensor connector
3. Reservoir cap assembly
4. Brake fluid level sensor
5. Brake pipe connection
6. Proportioning valve
- <Vehicles without ABS>
7. O ring <Vehicles without ABS>
8. Master cylinder

**Proportioning valve removal steps
<Vehicles without ABS>**

5. Brake pipe connection
6. Proportioning valve
7. O ring

Brake booster removal steps

1. Clutch hose connection
2. Brake fluid level sensor connector

5. Brake pipe connection
8. Master cylinder
- B◄ • Push rod protrusion amount check and adjustment
- A◄ 9. Vacuum hose (With built-in check valve)
10. Snap pin
11. Pin assembly
12. Clevis
 - Remove A/C liquid pipe B from the retaining clip. (Refer to GROUP 55A - Refrigerant Line.)
13. Brake booster
14. Sealer

Fitting removal steps

- A◄ 9. Vacuum hose (With built-in check valve)
15. Fitting

INSTALLATION SERVICE POINTS**►A◄ VACUUM HOSE CONNECTION**

Insert the vacuum hose to the brake booster with its paint mark facing upward, and then secure the hose by using the hose clip.

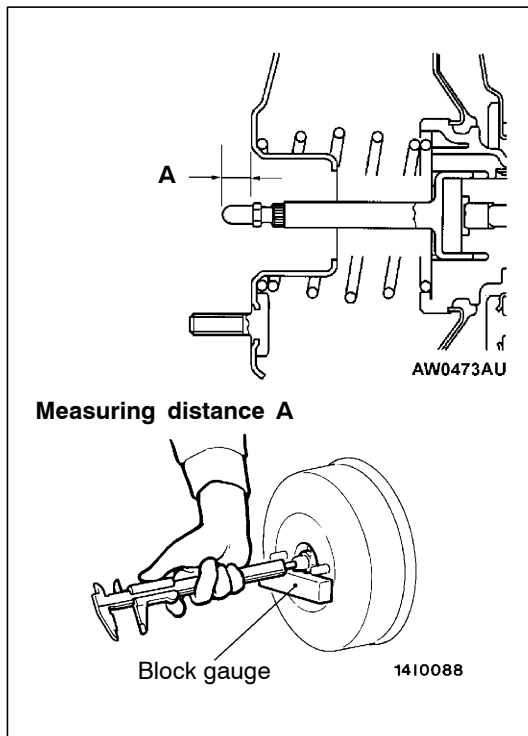
►B◄ PUSH ROD PROTRUSION AMOUNT CHECK AND ADJUSTMENT

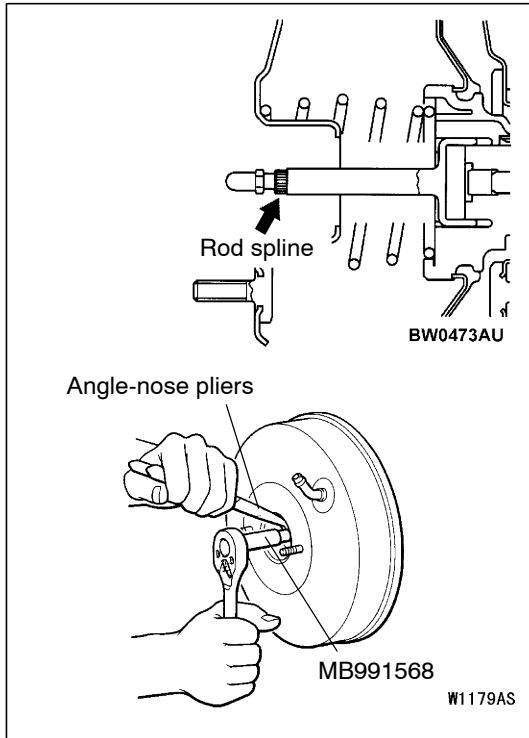
1. Measure dimension (A).

Standard value (A) : 8.98 - 9.23 mm

NOTE

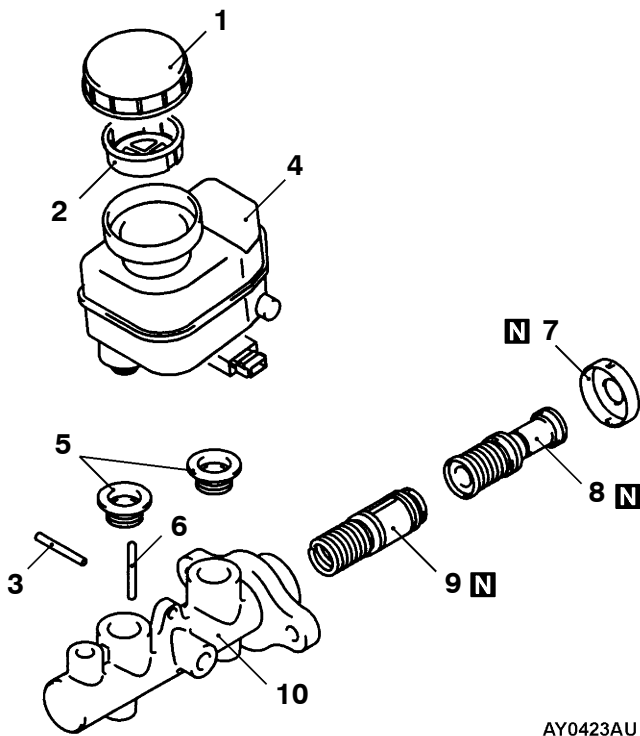
When a negative pressure of 66.7 kPa is applied to the brake booster, the push rod should protrude 10.27 – 10.53 mm.





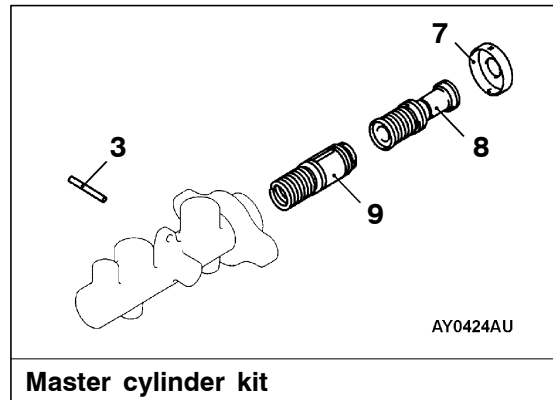
2. If the protrusion amount is not within the standard value range, adjust the push rod length by turning the push rod. Use the special tool to turn the push rod while holding the rod spline with angle-nose pliers.

**MASTER CYLINDER
DISASSEMBLY AND REASSEMBLY**

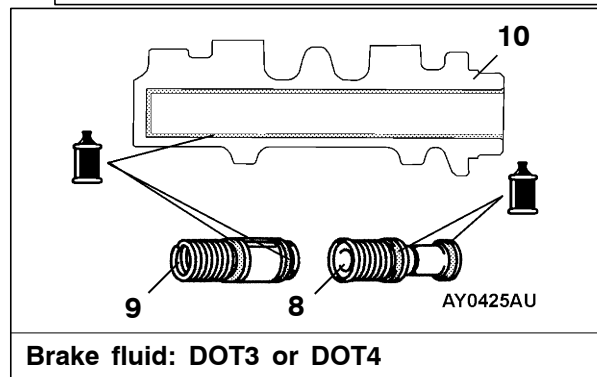


Disassembly steps

1. Reservoir cap
2. Filter <Vehicles with ABS>
3. Spring pin
4. Reservoir tank
5. Reservoir seal



Master cylinder kit



Brake fluid: DOT3 or DOT4

6. Pin <Vehicles with ABS>
7. Piston retainer
8. Primary piston assembly
9. Secondary piston assembly
10. Master cylinder body

DISC BRAKE

REMOVAL AND INSTALLATION

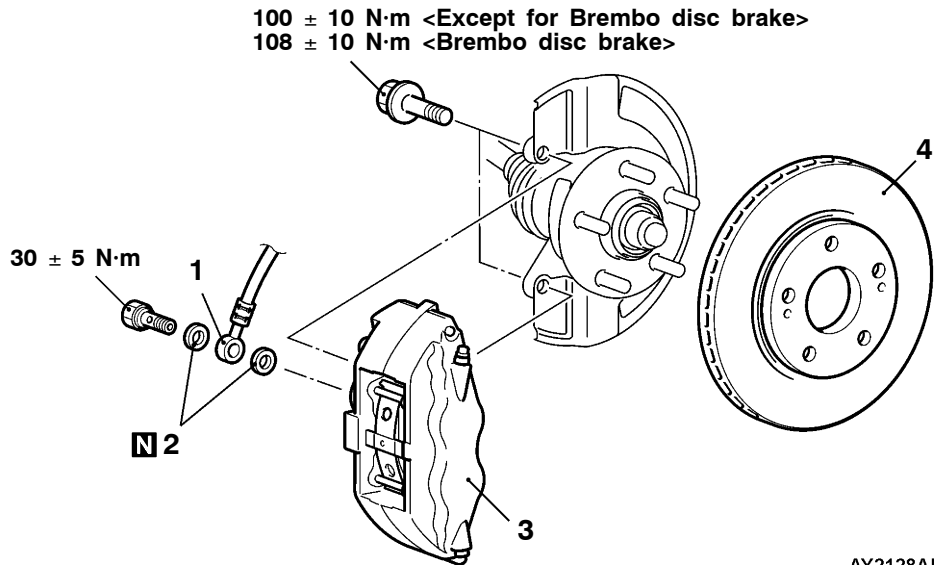
Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

Pre-removal Operation
Brake Fluid Draining

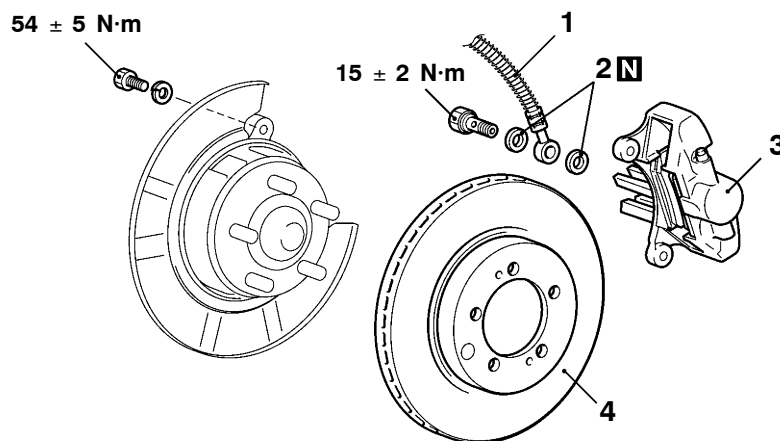
Post-installation Operation
Brake Fluid Supplying and Air Bleeding
(Refer to P.35A-10.)

<Front>



AY2128AU

<Rear>

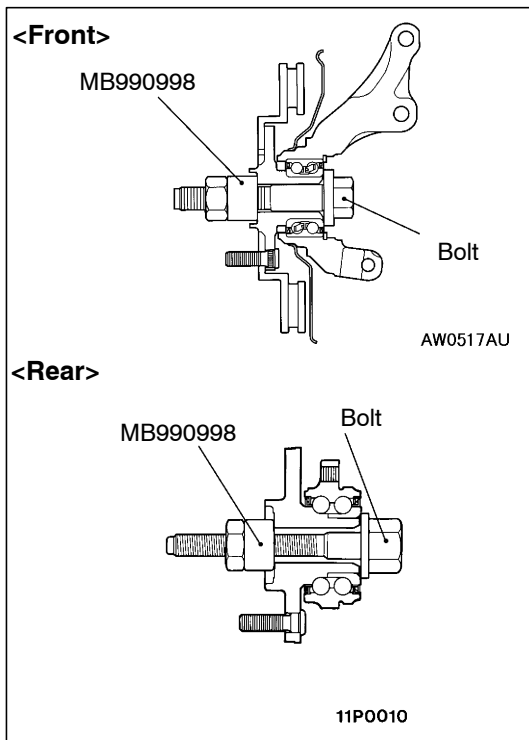


AY2129AU

Removal steps

1. Brake hose connection
2. Gasket
3. Disc brake assembly
4. Brake disc





INSTALLATION SERVICE POINT

▶◀ DISC BRAKE ASSEMBLY INSTALLATION

<Except for Brembo disc brake>

1. In order to measure the brake drag force after pad installation, measure the rotary-sliding resistance of the hub by the following procedure with the pads removed.
 - (1) Withdraw the drive shaft. (Refer to GROUP 26, 27.)
 - (2) Attach the special tool to the front hub assembly as shown in the illustration, and tighten it to the specified torque.

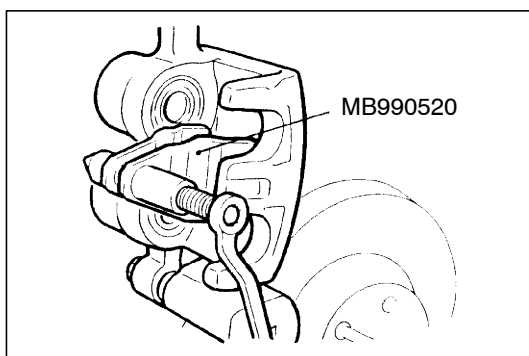
Tightening torque:

245 ± 29 N·m <Front>, 225 ± 25 N·m <Rear>

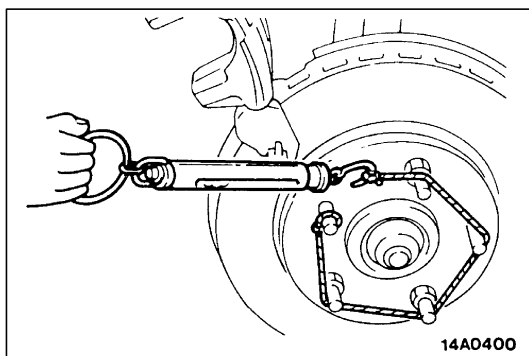
- (3) Use a spring balance to measure the rotary-sliding resistance of the hub in the forward direction.
2. Install the caliper support to the knuckle, and then assemble the pad and the clip to the caliper support.

Caution

Do not contaminate the friction surfaces of the pads and brake discs by any oil or grease.



3. Clean the piston and insert it into the cylinder with the special tool.
4. Be careful that the piston boot does not become caught, when lowering the caliper assembly and install the guide pin to the caliper.
5. Start the engine, and then depress the brake pedal two or three times strongly. Then stop the engine.
6. Turn the brake disc forward 10 times.



7. Use a spring balance to measure the rotary-sliding resistance of the hub in the forward direction.
8. Calculate the drag force of the disc brake [difference between the values measured at steps 1 and 7].

Standard value:

51 N or less <Front>, 69 N or less <Rear>

9. If that drag force exceeds the standard value, disassemble the piston assembly. Then check the piston for contamination or rust, and confirm if the piston or the piston seal is deteriorated, and if the slide pins slide smoothly.

<Brembo disc brake>

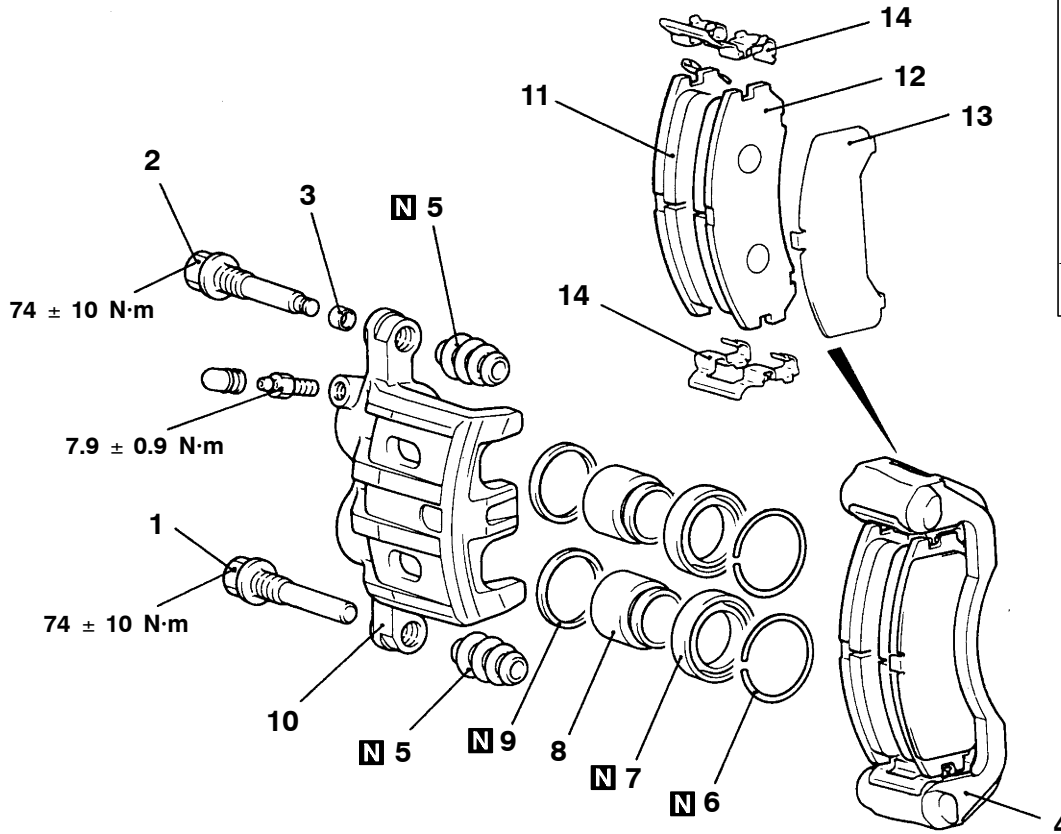
1. Find the drag force of the disc brake. (Refer to P.35A-13.)

Standard value: 69 N or less

2. If that drag force exceeds the standard value, disassemble the piston assembly. Then check the piston for contamination or rust, and confirm if the piston or the piston seal is deteriorated.

DISASSEMBLY AND REASSEMBLY

Front <Except for Brembo disc brake>



14S0190
00007225

<p>14L0296</p>	<p>V0521AE</p>	<p>V0522AE</p>	<p>14L0298</p>
<p>Brake caliper kit</p>	<p>Pad set</p>	<p>Shim set</p>	<p>Seal and boot kit</p>

Disassembly steps



1. Guide pin
2. Lock pin
3. Bushing
4. Caliper support (including pad, clip, and shim)
5. Pin boot
6. Boot ring
7. Piston boot



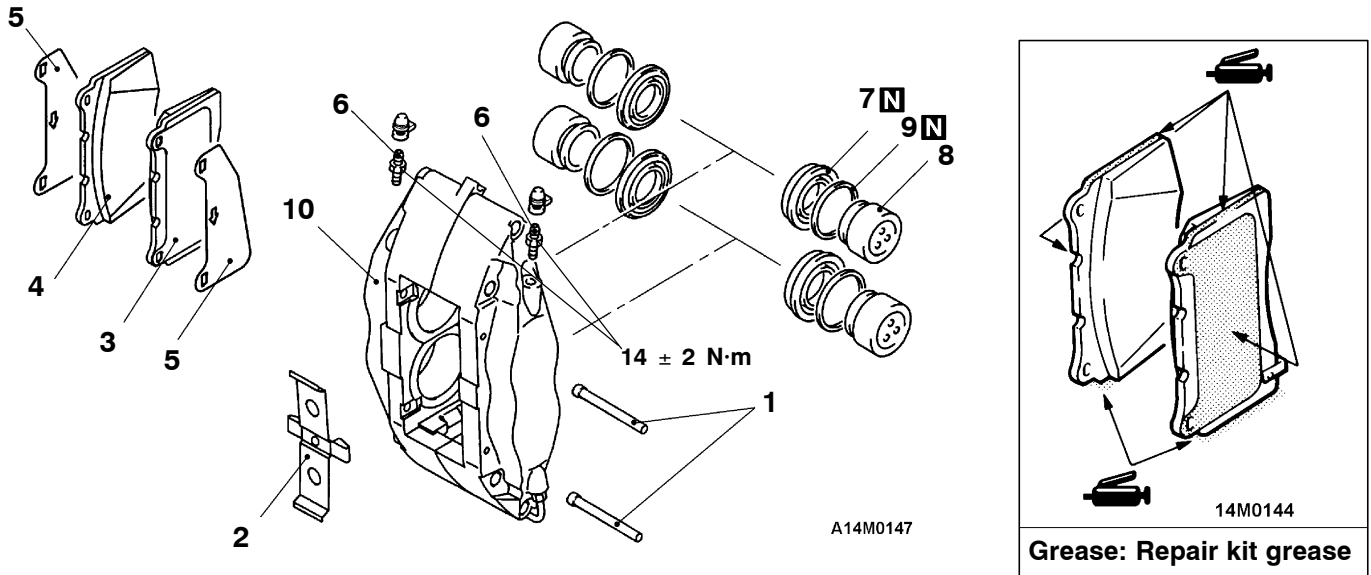
8. Piston
9. Piston seal
10. Caliper body
11. Pad and wear indicator assembly
12. Pad assembly
13. Outer shim
14. Clip



Front <Brembo disc brake>

Caution

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.



<p>A14M0148</p>	<p>A14M0152</p>	<p>A14M0149</p>
<p>Brake caliper kit</p>	<p>Seal and boot kit</p>	<p>Shim set</p>
<p>A14M0150</p>	<p>A14M0151</p>	
<p>Clip set</p>	<p>Pad set</p>	

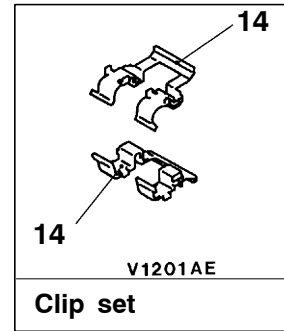
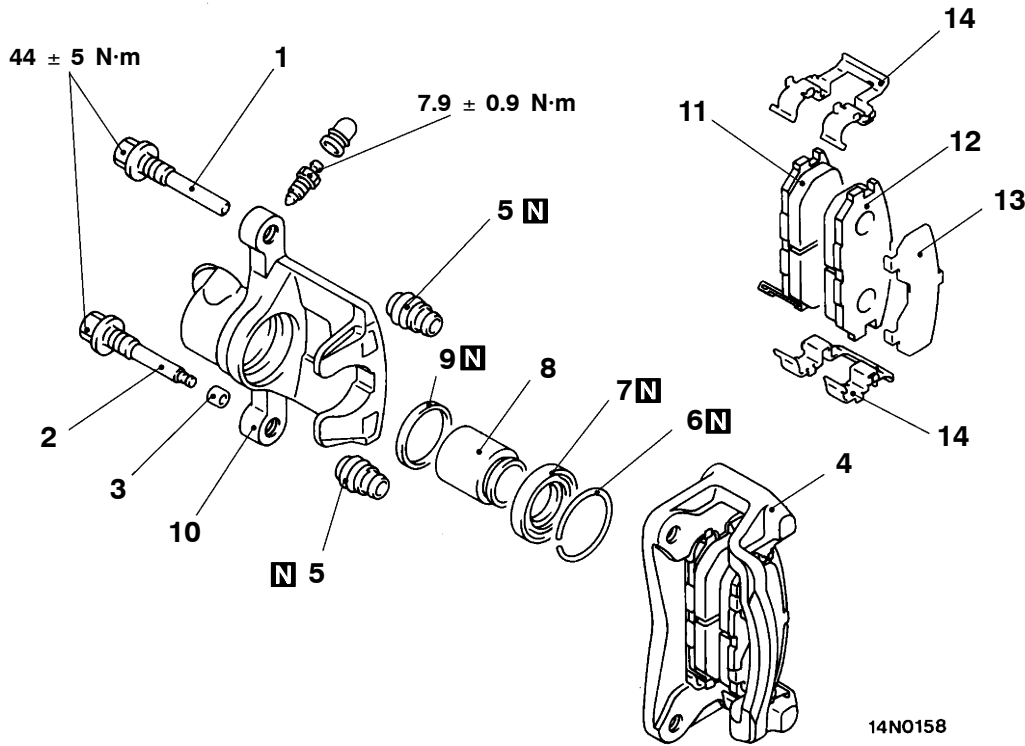
Disassembly steps

1. Pin
2. Cross spring
3. Pad and wear indicator assembly
4. Pad assembly
5. Shim



6. Air bleeder screw
7. Piston boot
8. Piston
9. Piston seal
10. Caliper body

Rear <Except for Brembo disc brake>



14N0158
00007607

<p>14N0159</p>	<p>V1200AE</p>	<p>V1199AE</p>	<p>Grease 14N0161</p>
<p>Brake caliper kit</p>	<p>Pad set</p>	<p>Shim set</p>	<p>Seal and boot kit</p>

Disassembly steps



1. Guide pin
2. Lock pin
3. Bushing
4. Caliper support (including pad, clip, and shim)
5. Pin boot
6. Boot ring
7. Piston boot



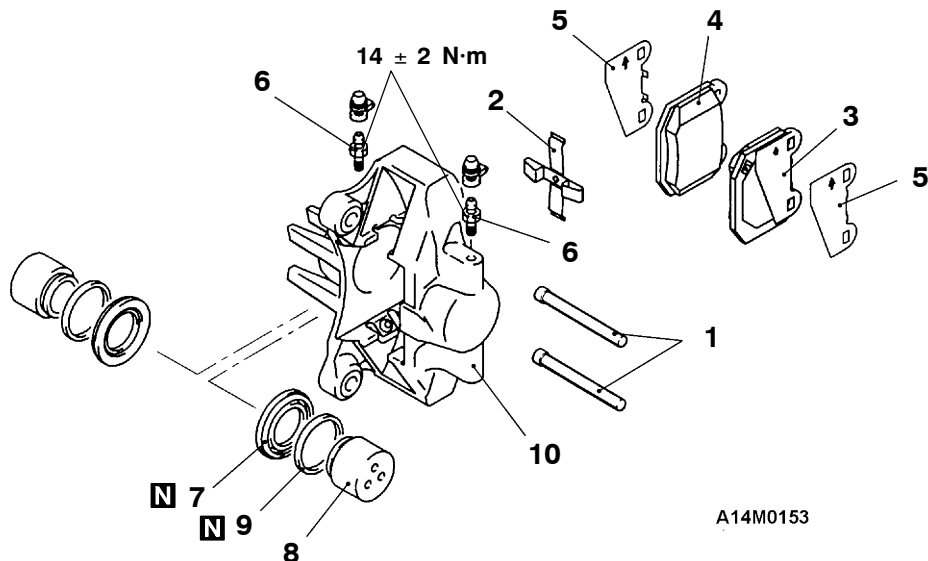
8. Piston
9. Piston seal
10. Caliper body
11. Pad and wear indicator assembly
12. Pad assembly
13. Outer shim
14. Clip



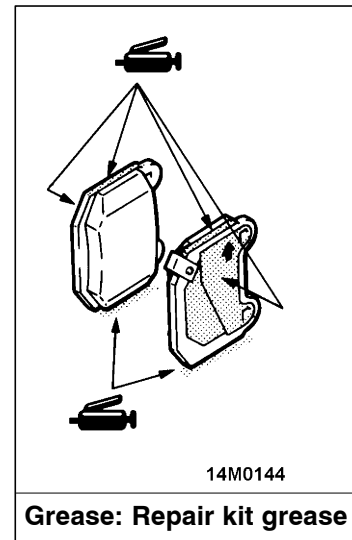
Rear <Brembo disc brake>

Caution

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.



A14M0153



14M0144

Grease: Repair kit grease

<p>A14M0154</p>	<p>A14M0155</p>	<p>A14M0158</p>
<p>Brake caliper kit</p>	<p>Seal and boot kit</p>	<p>Shim set</p>
<p>A14M0156</p>	<p>A14M0157</p>	
<p>Clip set</p>	<p>Pad set</p>	

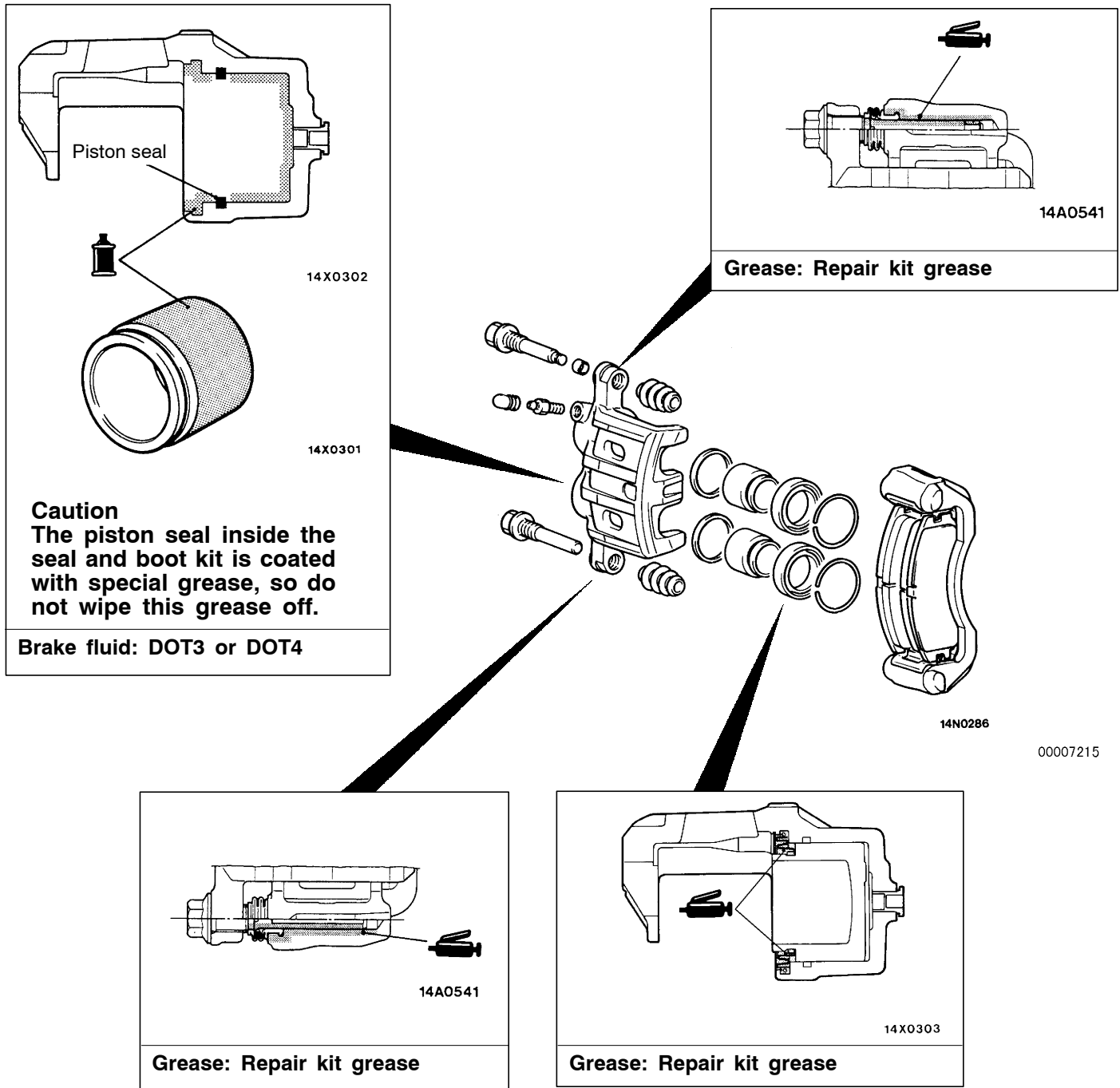
Disassembly steps

1. Pin
2. Cross spring
3. Pad and wear indicator assembly
4. Pad assembly
5. Shim



6. Air bleeder screw
7. Piston boot
8. Piston
9. Piston seal
10. Caliper body

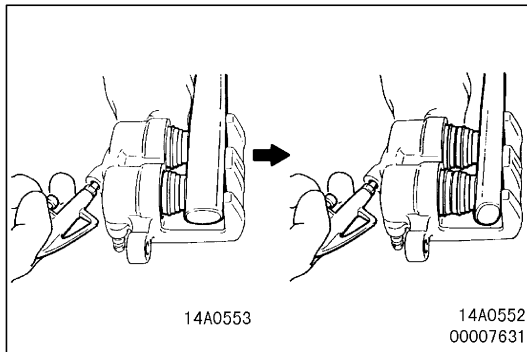
LUBRICATION POINTS <Except for Brembo disc brake>



DISASSEMBLY SERVICE POINTS

Caution: Brembo disc brake

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.



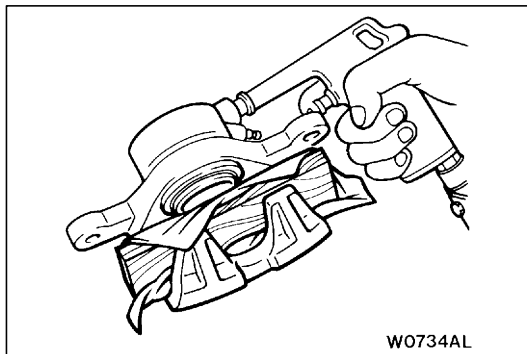
◀A▶ PISTON BOOT/PISTON REMOVAL

<Front>

Remove the piston boot by pumping in air slowly from the brake hose connection. Be sure to use the handle of a plastic hammer and adjust the height of the two pistons while so that the pistons protrude evenly.

Caution

Do not remove one piston completely before trying to remove the other piston, because it will become impossible to remove the second piston.

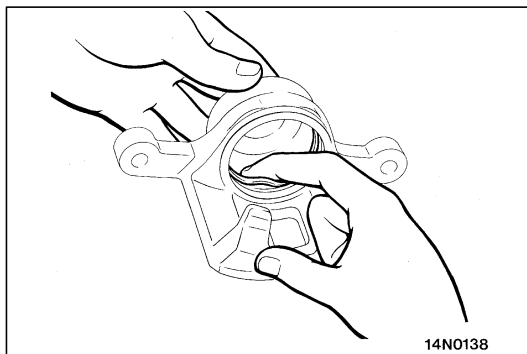


<Rear>

Use a piece of wood to protect the caliper body outer side, and then apply compressed air through the brake hose connection hole to withdraw the piston and piston boot.

Caution

If air is blown into the caliper body suddenly, the piston will pop out, causing damage to the caliper body. Be sure to apply compressed air gradually.



◀B▶ PISTON SEAL REMOVAL

1. Remove the piston seal with finger tip.

Caution

Do not use a flat-tipped screwdriver or other tool to prevent damage to inner cylinder.

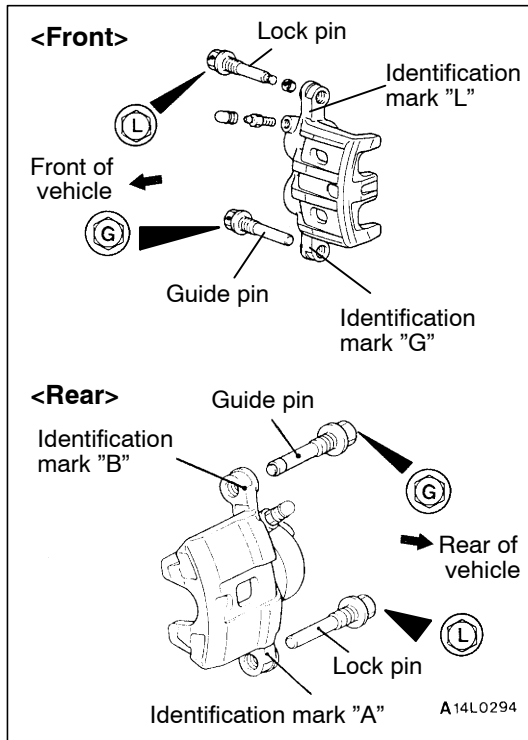
2. Clean piston surface and inner bore with trichloroethylene, alcohol or the specified brake fluid.

Specified brake fluid: DOT3 or DOT4

REASSEMBLY SERVICE POINT

Caution: Brembo disc brake

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.



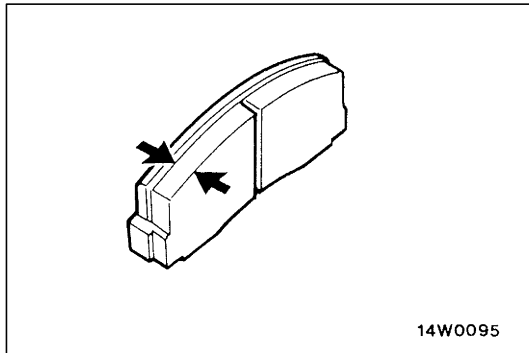
▶A◀ LOCK PIN/GUIDE PIN INSTALLATION

<Except for Brembo disc brake>

As shown in the illustration, align the identification mark on the caliper body and the head mark of the guide pin/lock pin, then install the guide pin/lock pin.

INSPECTION

- Check the cylinder for wear, damage or rust.
- Check the piston surface for wear, damage or rust.
- Check the caliper body or sleeve for wear.
- Check pad for damage or adhesion of grease, check the backing metal for damage.



PAD WEAR CHECK

Measure thickness at the thinnest and worn area of the pad. Replace the pad assembly if the pad thickness is less than the limit value.

Standard value:

10.0 mm <Front, Rear (Except for Brembo disc brake)>,
 9.0 mm <Rear (Brembo disc brake)>

Limit: 2.0 mm

Caution

1. Always replace the brake pads as an axle set.
2. If an excessive difference is found in the thickness between the right and left brake pads, check moving parts.

ANTI-SKID BRAKING SYSTEM (ABS) <4WD>

CONTENTS

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SERVICE SPECIFICATIONS	3	Brake Disc Thickness Check Refer to GROUP 35A	
LUBRICANTS	Refer to GROUP 35A	Brake Disc Run-out Check and Correction Refer to GROUP 35A	
SEALANT	Refer to GROUP 35A	Wheel Speed Sensor Output Voltage Check 26	
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TROUBLESHOOTING	4	Remedy for a Flat Battery 29	
ON-VEHICLE SERVICE	26	BRAKE PEDAL	Refer to GROUP 35A
Brake Pedal Check and Adjustment Refer to GROUP 35A		MASTER CYLINDER AND BRAKE BOOSTER	Refer to GROUP 35A
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Check Valve Operation Check Refer to GROUP 35A		HYDRAULIC UNIT AND ABS-ECU	30
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Brake Fluid Level Sensor Check Refer to GROUP 35A		G SENSORS AND STEERING WHEEL SENSOR	35
Disc Brake Pad Check and Replacement Refer to GROUP 35A			

GENERAL INFORMATION

ABS has been adopted as optional equipment in RS-II to maintain directional stability and steering performance during sudden braking or braking on slippery road surfaces.

The ABS control method is a 4-sensor, 4-channel method which provides independent control for all wheels.

Following system for Lancer EVOLUTION-VII has been modified from Lancer EVOLUTION-VI Tommi Makinen Edition.

- By adding lateral G sensor, longitudinal G sensor and steering wheel sensor, optimized ABS control at the time of cornering.
- By inputting parking brake switch signal to ABS-ECU with pulling parking brake lever, ABS control has been optimized.
- ABS-ECU outputs ABS signal to 4WD-ECU.
- G sensor (lateral), steering wheel sensor and parking brake switch have been added to the diagnosis and service data.
- ABS-ECU connector has been changed.

EBD CONTROL

In ABS, electronic control method is used by which the rear wheel brake hydraulic pressure during braking is regulated by rear wheel control solenoid valves in accordance with the vehicle's rate of deceleration and the front and rear wheel slippage which are calculated from the each wheel speed sensor's signal. EBD control is a control system which provides a high level of control for both vehicle braking force and vehicle stability. The system has the following features:

- Because the system provides the optimum rear wheel braking force regardless of the vehicle

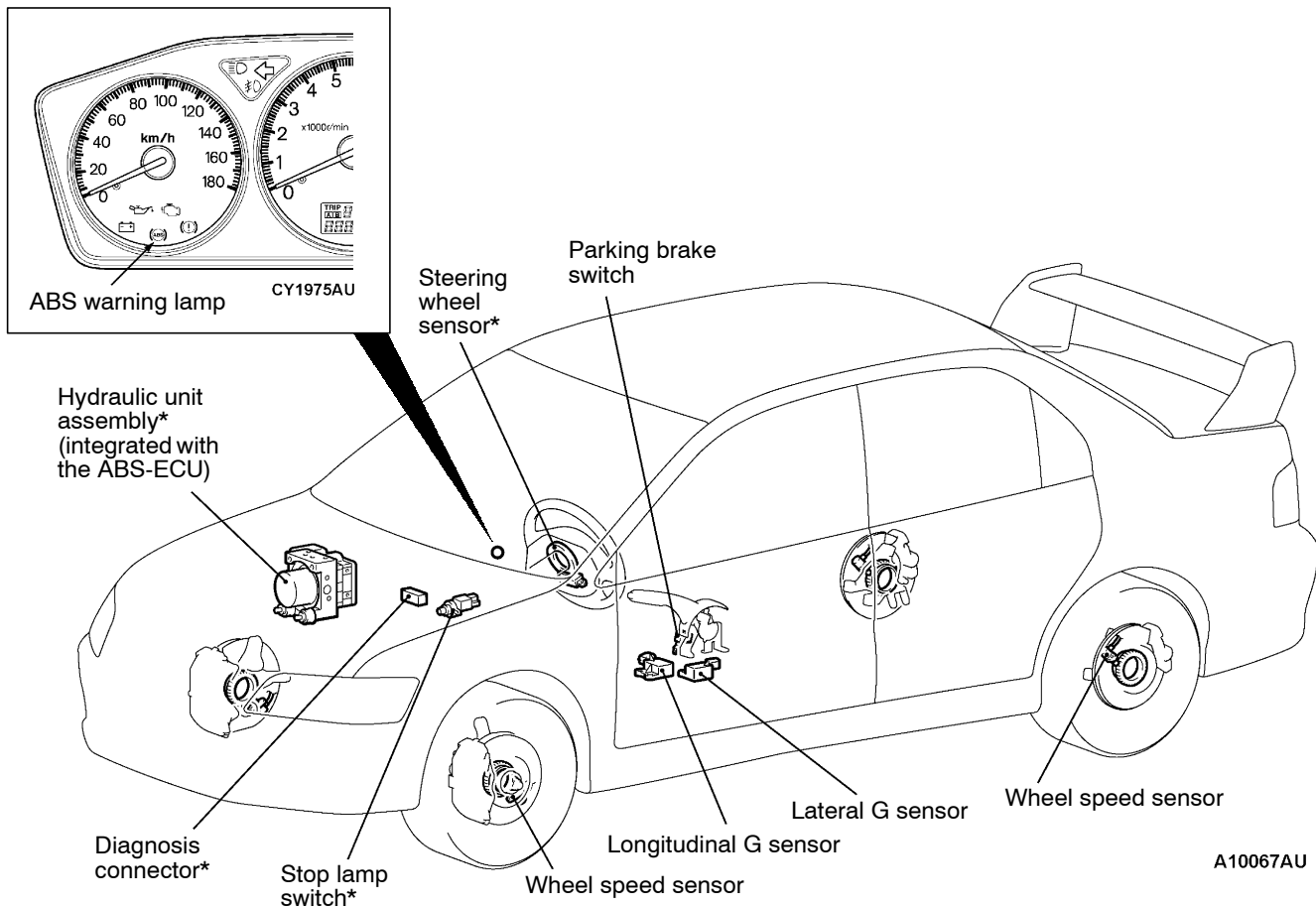
laden condition and the condition of the road surface, the system reduces the required pedal depression force, particularly when the vehicle is heavily laden or driving on road surfaces with high frictional coefficients.

- Because the duty placed on the front brakes has been reduced, the increases in pad temperature can be controlled to improve the wear resistance characteristics of the pad, during front brakes applying.
- Control valves such as the proportioning valve are no longer required.

SPECIFICATIONS

Item		Specifications
ABS control method		4-sensor, 4-channel
No. of ABS rotor teeth	Front	43
	Rear	43
ABS speed sensor	Type	Magnet coil type
	Gap between sensor and rotor mm	0.85 <front>/ 0.60 <rear> (non-adjustable type)

CONSTRUCTION DIAGRAM



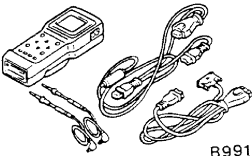
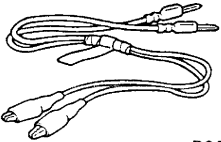
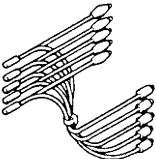
NOTE

For R.H. drive vehicles, only the position indicated by the * is symmetrical.

SERVICE SPECIFICATIONS

Items		Standard value
Wheel speed sensor internal resistance	kΩ	1.24 - 1.64
Wheel speed sensor insulation resistance	kΩ	100 or more
Lateral G sensor/Longitudinal G sensor output voltage	On stationary vehicle	2.4 - 2.6
	With front mark downward	3.4 - 3.6

SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub assembly	For checking of ABS (Diagnosis code display when using the MUT-II)
 B991529	MB991529	Diagnosis code check harness	For checking of ABS (Diagnosis code display when using the ABS warning lamp)
 B991348	MB991348	Test harness set	For checking of G sensor

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

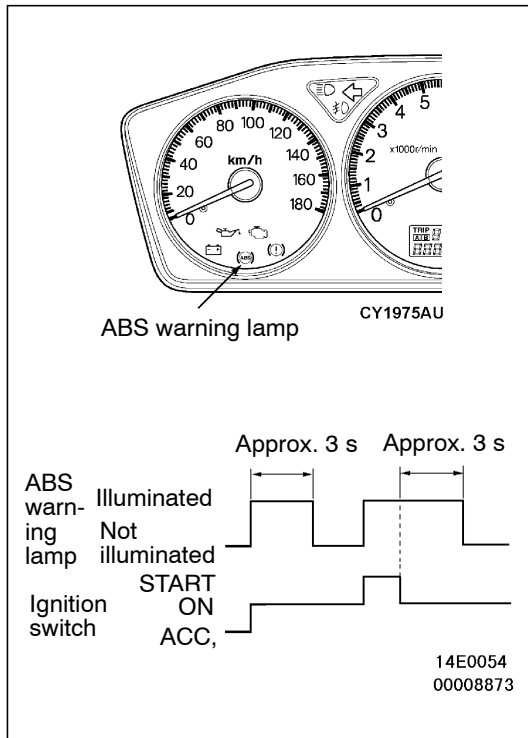
Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

NOTES WITH REGARD TO DIAGNOSIS

1. The phenomena listed in the following table are not abnormal.

Phenomenon	Explanation of phenomenon
System check sound	When starting the engine, a thudding sound can sometimes be heard coming from inside the engine compartment, but this is because the system operation check is being performed, and is not an abnormality.
ABS operation sound	<ol style="list-style-type: none"> 1. Sound of the motor inside the ABS hydraulic unit operation. (whine) 2. Sound is the generated along with vibration of the brake pedal. (scraping) 3. When ABS operates, sound is generated from the vehicle chassis due to repeated brake application and release. (Thump: suspension; squeak: tyres)
System check sound	When depressing the brake pedal during driving, a shock is sometime felt.

2. For road surfaces such as snow-covered roads and gravel roads, the braking distance for vehicles with ABS can sometimes be longer than that for other vehicles. Accordingly, advise the customer to drive safely on such roads by lowering the vehicle speed and not being too overconfident.
3. Diagnosis detection condition can vary depending on the diagnosis code.
Make sure that checking requirements listed in the "Comment" are satisfied when checking the trouble symptom again.



ABS WARNING LAMP INSPECTION

Check that the ABS warning lamp illuminates as follows.

1. When the ignition key is turned to "ON", the ABS warning lamp illuminates for approximately 3 seconds and then switches off.
2. When the ignition key is turned to "START", the ABS warning lamp remains illuminated.
3. When the ignition key is turned from "START" back to "ON", the ABS warning lamp illuminates for approximately 3 seconds and then switches off.

NOTE

The ABS warning lamp may remain on until the vehicle reaches a speed of several km/h. This is limited to cases where diagnosis code Nos.21 to 24, 41 to 44, 53 or 55 have been recorded because of a previous problem occurring. In this case, the ABS-ECU keeps the warning lamp illuminated until the problem corresponding to that diagnosis code can be detected.

4. If the illumination is other than the above, check the diagnosis codes.

DIAGNOSIS FUNCTION

READING DIAGNOSIS CODES

Read a diagnosis code by the MUT-II or ABS warning lamp. (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)

NOTE

Connect the MUT-II to the diagnosis connector (16-pin).

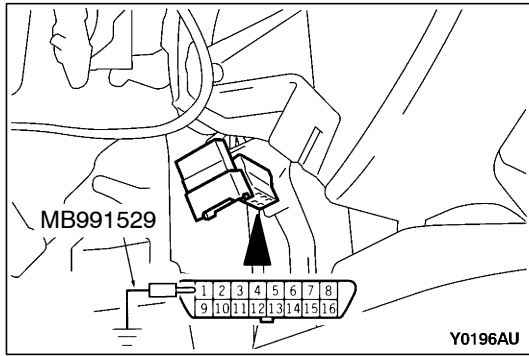
ERASING DIAGNOSIS CODES

When using the MUT-II

Connect the MUT-II to the diagnosis connector (16-pin) and erase the diagnosis code.

Caution

Turn the ignition key to the "LOCK" (OFF) position before connecting or disconnecting the MUT-II.

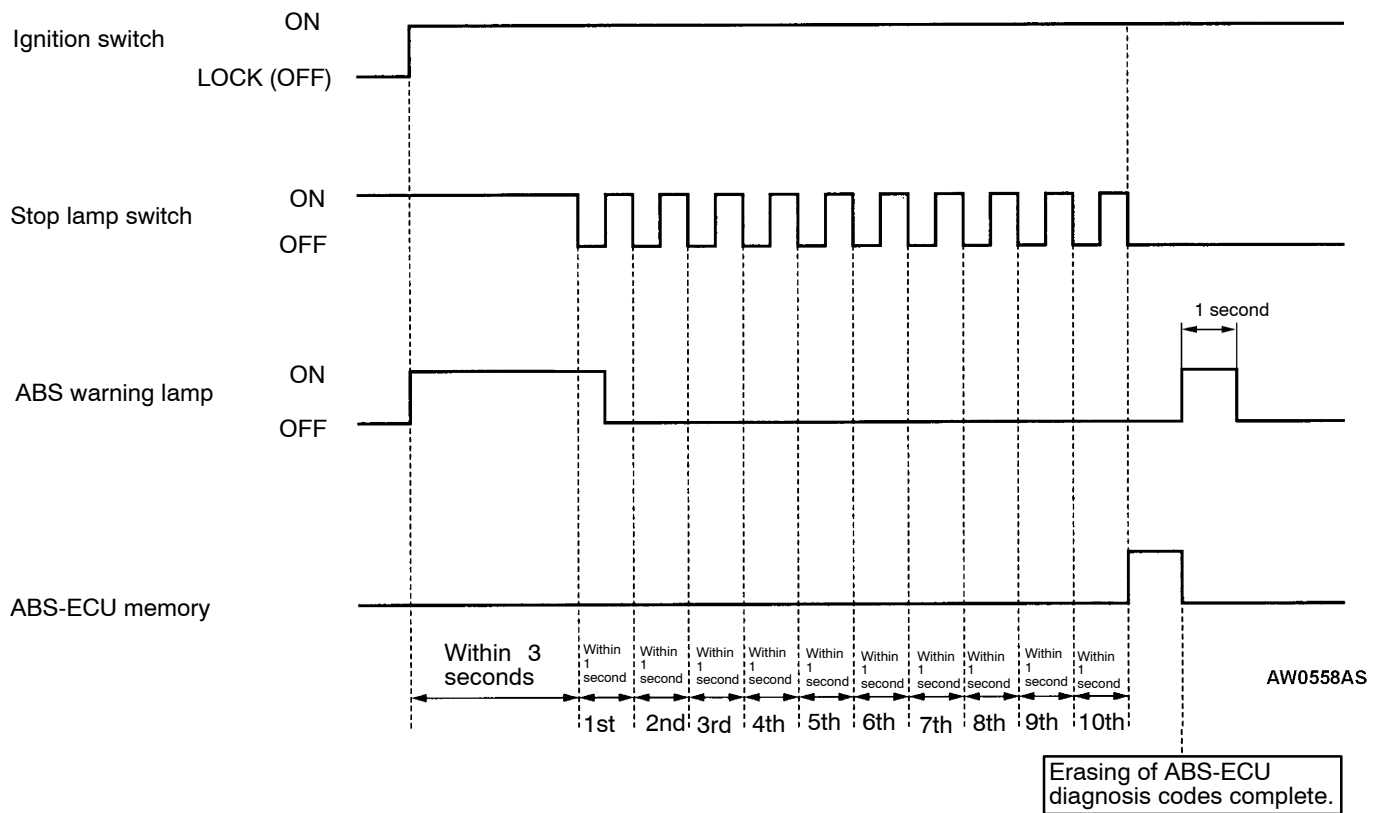


When not using the MUT-II

NOTE

If the ABS-ECU function has been stopped because of fail-safe operation, it will not be possible to erase the diagnosis codes.

1. Stop the engine.
2. Use the special tool to earth terminal (1) (diagnosis control terminal) of the diagnosis connector.
3. Turn on the stop lamp switch. (Depress the brake pedal.)
4. After carrying out steps 1. to 3., turn the ignition switch to "ON". Within 3 seconds after turning the ignition switch to "ON", turn off the stop lamp switch (release the brake pedal). Then, turn the stop lamp switch on and off a total of 10 times.



INSPECTION CHART FOR DIAGNOSIS CODES

Diagnosis code No.	Inspection item	Reference page	
11	Front right wheel speed sensor (Open circuit or short circuit)	35B-9	
12	Front left wheel speed sensor (Open circuit or short circuit)		
13	Rear right wheel speed sensor (Open circuit or short circuit)		
14	Rear left wheel speed sensor (Open circuit or short circuit)		
16*	ABS-ECU power supply system (Abnormal voltage drop or rise)	35B-10	
21	Front right wheel speed sensor	35B-9	
22	Front left wheel speed sensor		
23	Rear right wheel speed sensor		
24	Rear left wheel speed sensor		
32	Longitudinal G sensor system	35B-11	
41	Front right solenoid valve	The diagnosis codes are output when there is no response to the drive signals for respective solenoid valves or the ABS-ECU power supply system is defective.	35B-12
42	Front left solenoid valve		
43	Rear right solenoid valve		
44	Rear left solenoid valve		
51	Valve relay problem (stays on)	35B-30, 31 (Replace the hydraulic unit and ABS-ECU.)	
52	Valve relay problem (stays off) or ABS-ECU power supply system problem	35B-12	
53	Motor relay problem (stays off) or ABS-ECU power supply system problem		
54	Motor relay problem (stays on)	35B-30, 31 (Replace the hydraulic unit and ABS-ECU.)	
55	Motor system (seized pump motor) or ABS-ECU power supply system problem	35B-12	
63	ABS-ECU	35B-30, 31 (Replace the hydraulic unit and ABS-ECU.)	
71	Lateral G sensor system	35B-13	

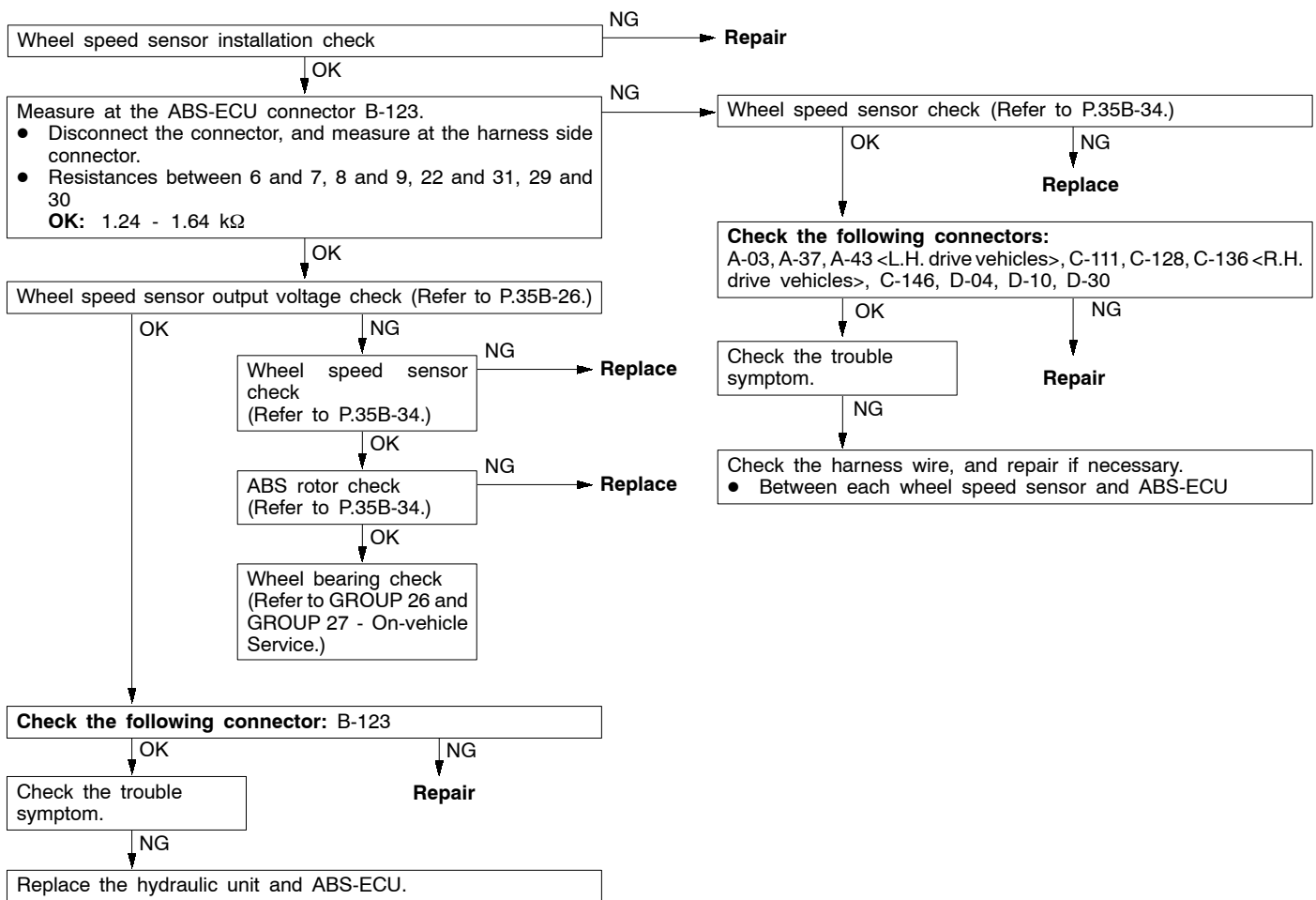
Diagnosis code No.	Inspection item	Reference page
81	Steering wheel sensor (ST-1) system (Open circuit or short circuit)	35B-14
82	Steering wheel sensor (ST-2) system (Open circuit or short circuit)	
83	Steering wheel sensor (ST-N) system (Open circuit or short circuit)	

NOTE: diagnosis code No.16, 52, 63

1. Code No. 16 is cleared from the memory by turning the ignition switch to ACC position. When the system is properly reset, this code is also cleared from the memory.
2. Code No. 52 and 63 are cleared from the memory by turning the ignition switch to ACC position.

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code Nos.11, 12, 13 and 14 Wheel speed sensor (open circuit or short circuit)	Probable cause
Code Nos.21, 22, 23 and 24 Wheel speed sensor	
Code Nos. 11, 12, 13 and 14 are output if the ABS-ECU detects an open circuit or short-circuit in the (+) wire or (-) wire in any one of the four wheel speed sensors.	<ul style="list-style-type: none"> ● Malfunction of wheel speed sensor ● Malfunction of wiring harness or connector ● Malfunction of hydraulic unit and ABS-ECU
Code Nos. 21, 22, 23 and 24 are output in the following cases. <ul style="list-style-type: none"> ● When there is no input from any one of the four wheel speed sensors when travelling at several km/h or more, even though open circuit can not be verified. ● When a chipped or blocked-up ABS rotor is detected and if the anti-lock system operates continuously because a malfunctioning sensor or a warped ABS rotor is causing sensor output to drop. 	<ul style="list-style-type: none"> ● Malfunction of wheel speed sensor ● Malfunction of wiring harness or connector ● Malfunction of ABS rotor ● Too much gap between the sensor and the ABS rotor ● Malfunction of hydraulic unit and ABS-ECU ● Malfunction of wheel bearing

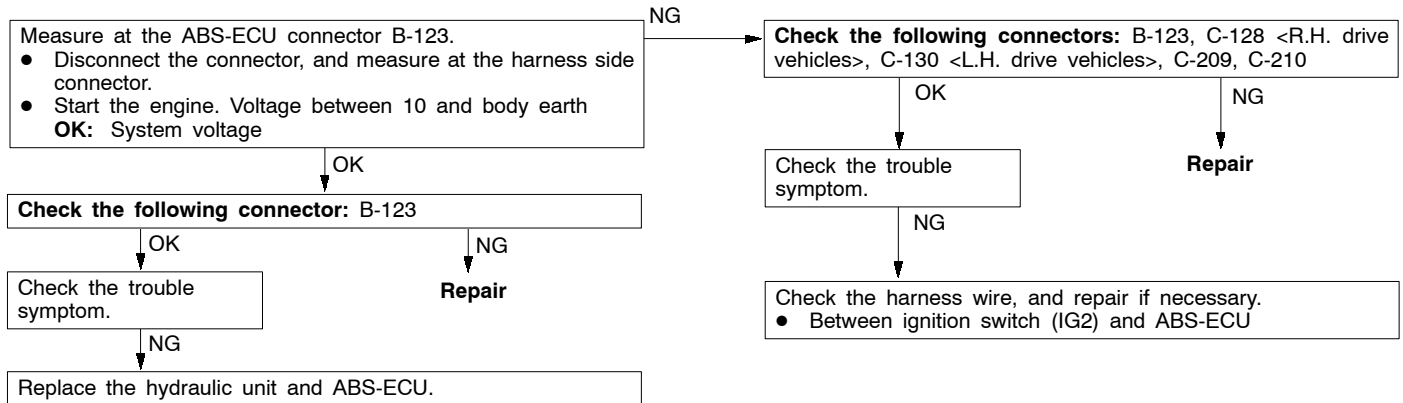


Code No.16 ABS-ECU power supply system (abnormal voltage drop or rise)	Probable cause
This code is output if the ABS-ECU power supply voltage drops below or rises above the rated values. Furthermore, turning the ignition switch to ACC will erase this code.	<ul style="list-style-type: none"> ● Malfunction of battery ● Malfunction of wiring harness or connector ● Malfunction of hydraulic unit and ABS-ECU

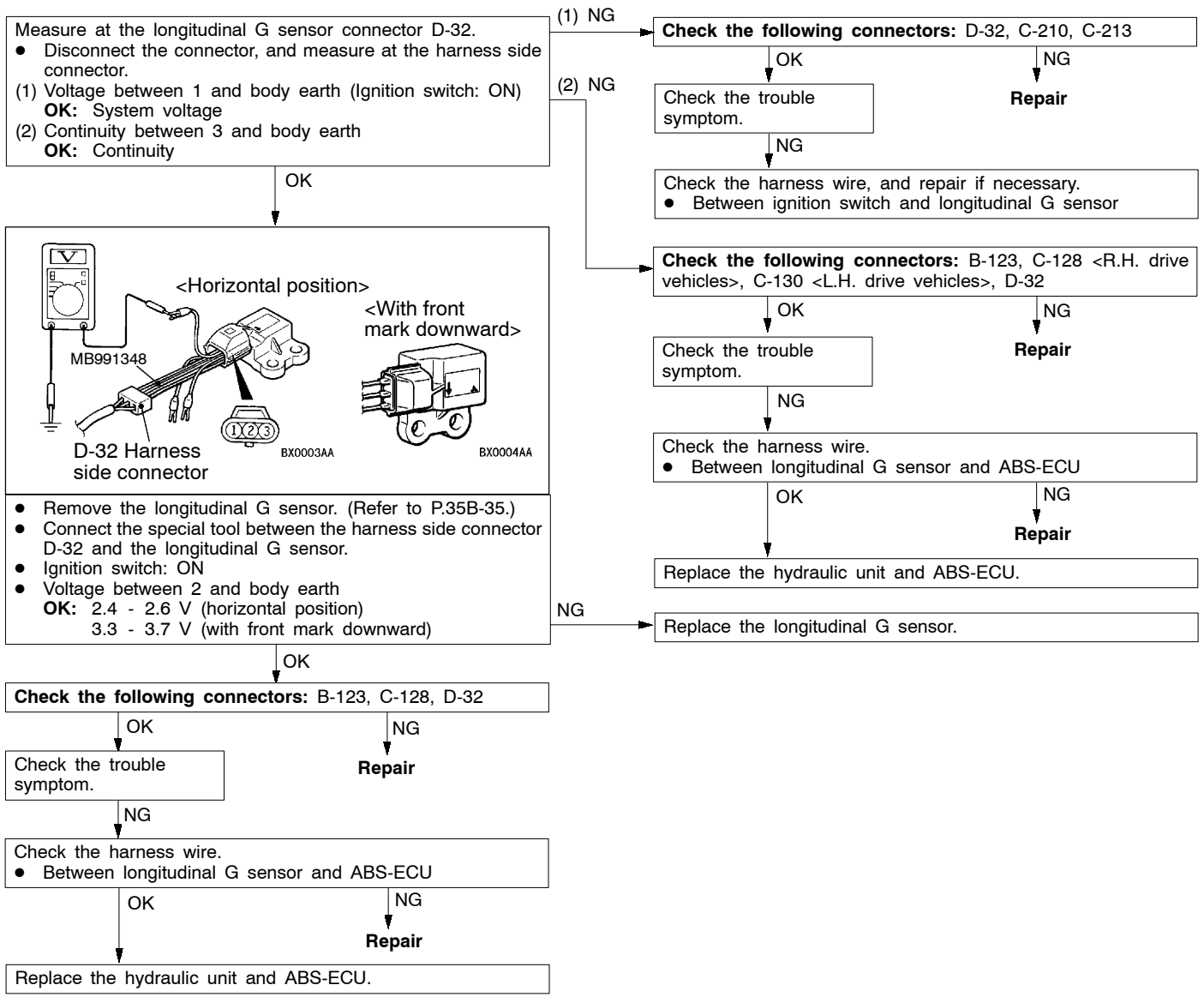
Caution

If battery voltage drops or rises during inspection, this code will be output as well. If the voltage returns to standard value, this code is no longer output.

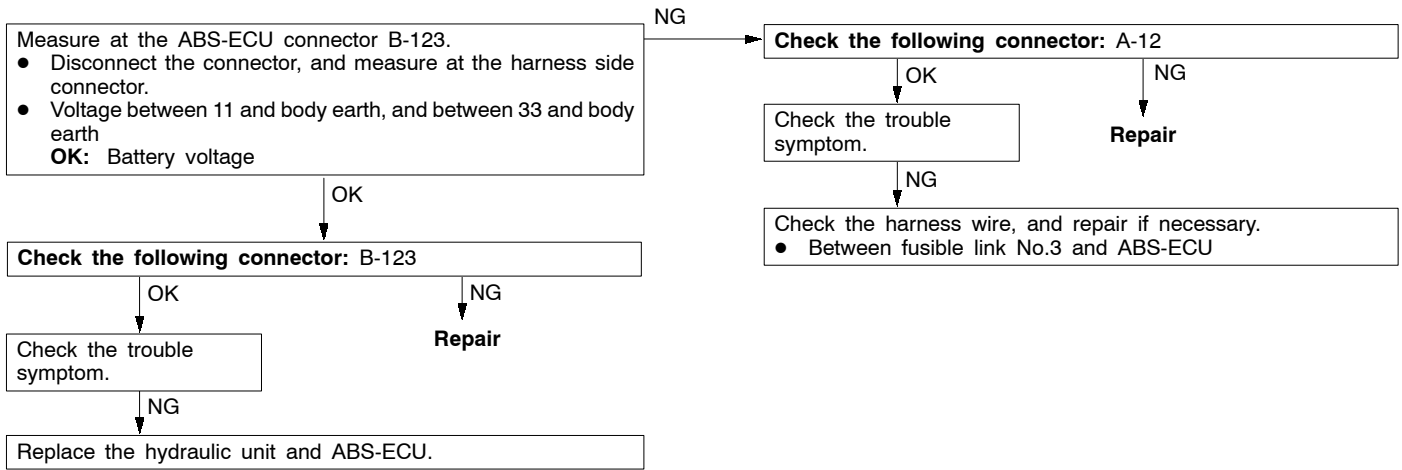
Before carrying out the following inspection, check the battery level, and refill it if necessary.



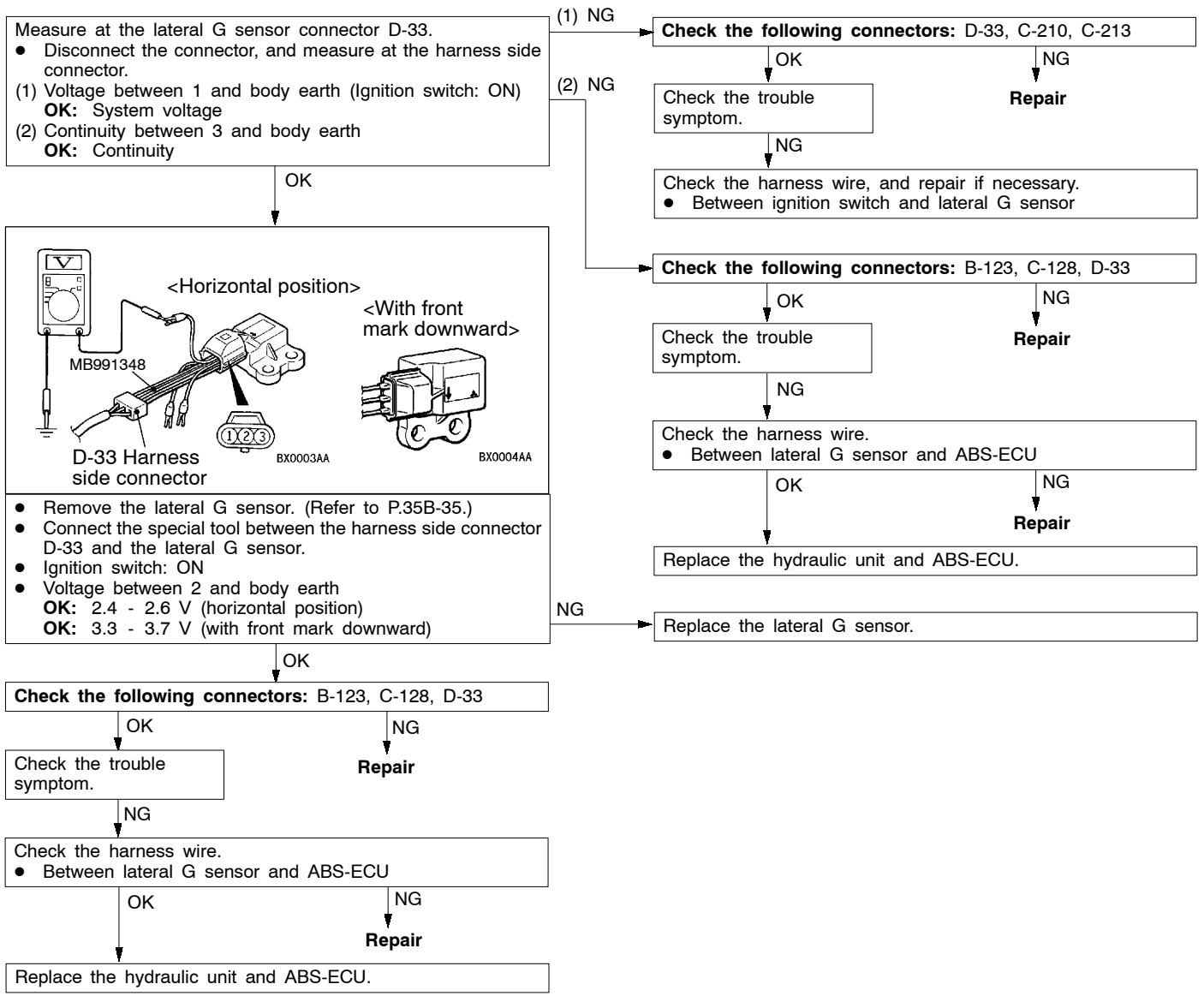
Code No.32 Longitudinal G sensor system	Probable cause
<p>This code is output in the following cases.</p> <ul style="list-style-type: none"> • If the longitudinal G sensor output voltage is less than 0.5 V or more than 4.5 V <open circuit or short circuit of longitudinal G sensor circuit> • If the longitudinal G sensor output voltage does not change <longitudinal G sensor output voltage: fixed> 	<ul style="list-style-type: none"> • Malfunction of longitudinal G sensor • Malfunction of wiring harness or connector • Malfunction of hydraulic unit and ABS-ECU



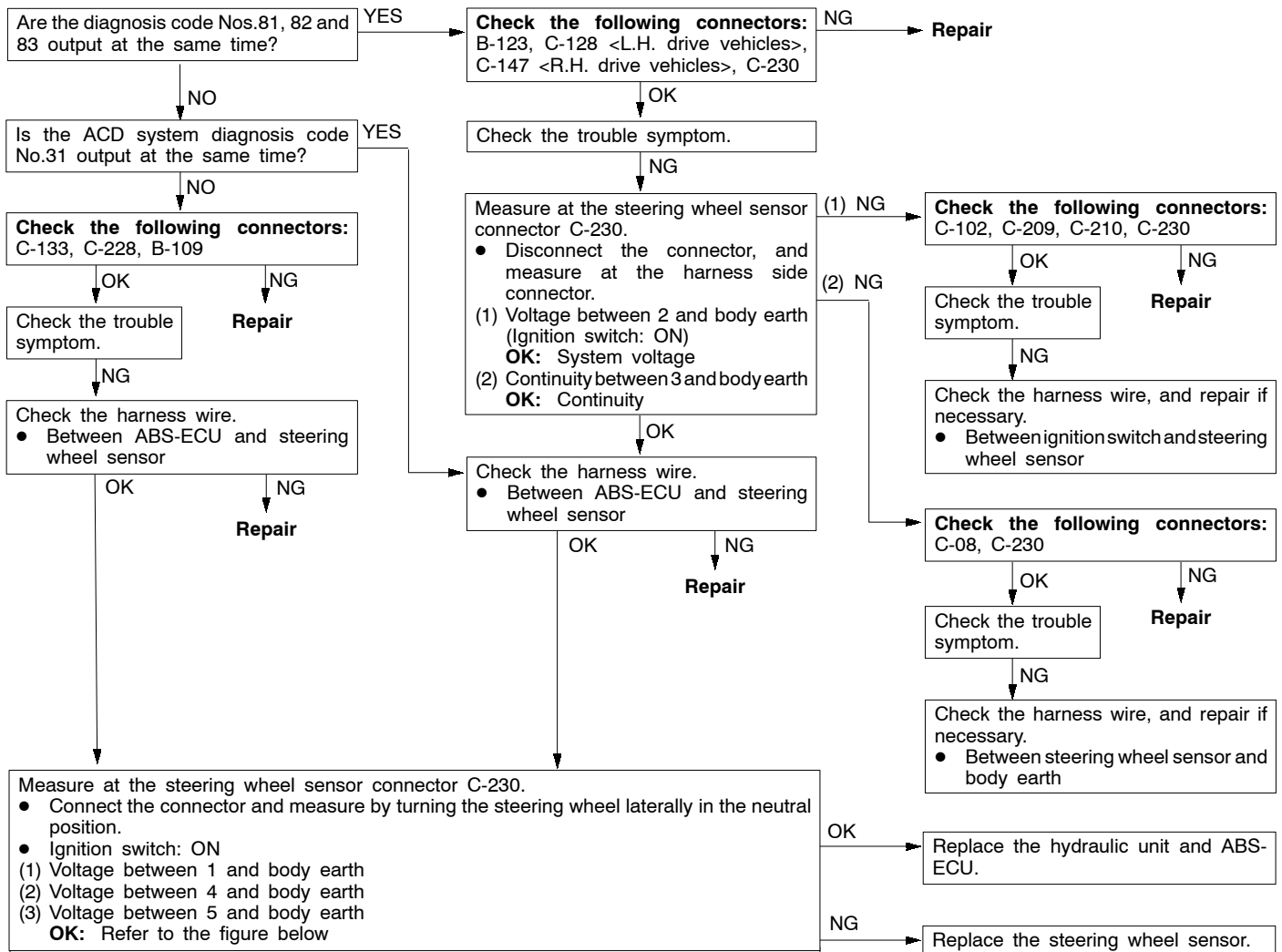
Code Nos.41, 42, 43 and 44 Solenoid valve	Probable cause
Code No.52 Valve relay problem (stays off)	
Code No.53 Motor relay problem (stays off)	
Code No.55 Motor system (seized pump motor)	
These codes are output if there is an open circuit or short-circuit in the ABS-ECU power supply circuit (power supply circuit for solenoid valve and motor), or the internal circuit in the hydraulic unit and ABS-ECU is defective.	<ul style="list-style-type: none"> • Malfunction of wiring harness or connector • Malfunction of hydraulic unit and ABS-ECU



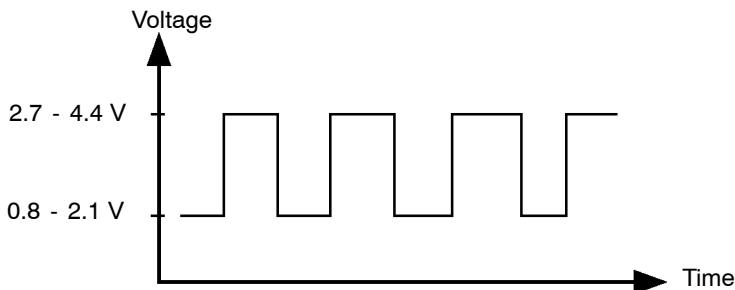
Code No.71 Lateral G sensor system	Probable cause
<p>This code is output in the following cases.</p> <ul style="list-style-type: none"> • If lateral G sensor output voltage is less than 0.5 V or more than 4.5 V <open circuit or short circuit in the lateral G sensor circuit> • If the lateral G sensor output voltage do not change <lateral G sensor output voltage: fixed> 	<ul style="list-style-type: none"> • Malfunction of lateral G sensor • Malfunction of wiring harness or connector • Malfunction of hydraulic unit and ABS-ECU



Code No.81 Steering wheel sensor (ST-1) system (open circuit or short circuit)	Probable cause
Code No.82 Steering wheel sensor (ST-2) system (open circuit or short circuit)	
Code No.83 Steering wheel sensor (ST-N) system (open circuit or short circuit)	
These codes are output if there is a fault in the steering wheel sensor, an open circuit or short circuit in the steering signal line, or the internal circuit in the hydraulic unit and ABS-ECU is defective.	
<ul style="list-style-type: none"> ● Malfunction of steering wheel sensor ● Malfunction of wiring harness or connector ● Malfunction of hydraulic unit and ABS-ECU 	



Variations in voltage when turning the steering wheel laterally



Y2356AU

INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptoms	Inspection procedure No.	Reference page
Communication between the MUT-II and the whole system is not possible.	1	35B-16
Communication between the MUT-II and the ABS-ECU is not possible.	2	35B-17
When the ignition key is turned to "ON" (engine stopped), the ABS warning lamp does not illuminate.	3	35B-18
Even after the engine is started, the ABS warning lamp remains illuminated.	4	35B-18
In the inspection with MUT-II service data, the parking brake switch is not turned ON or turn OFF.	5	35B-19
The neutral position learning of the steering wheel sensor is not finished.	6	35B-20
Faulty ABS operation	7	35B-21

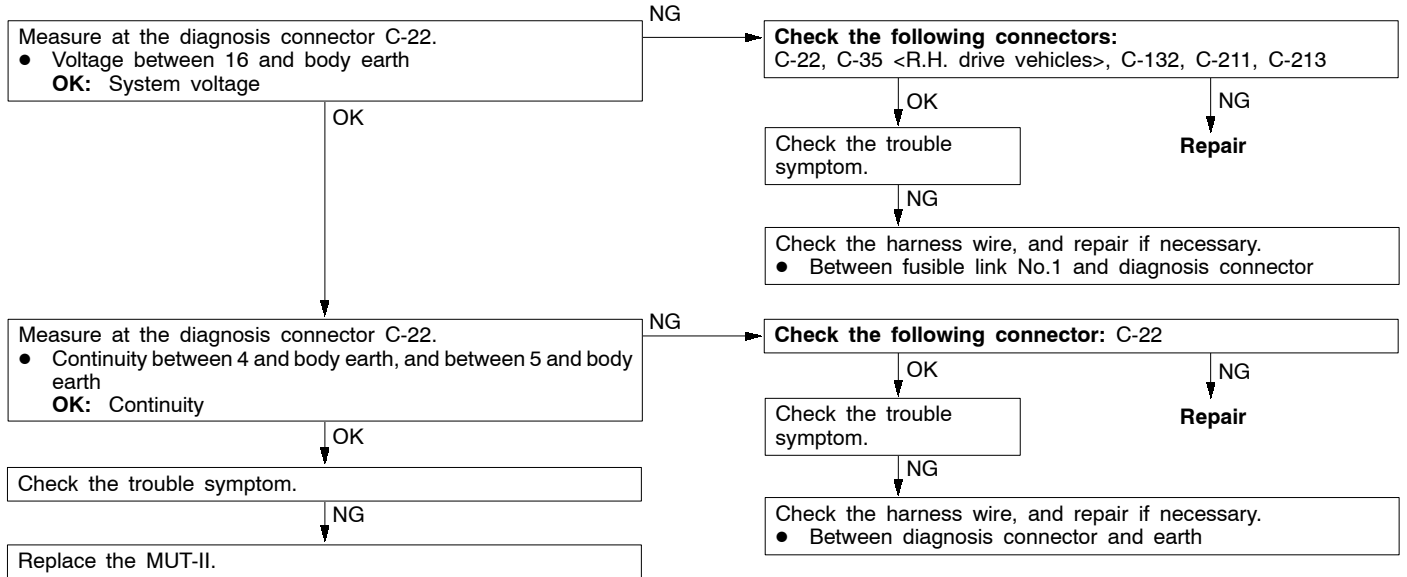
Caution

- 1. If steering movements are made when driving at high speed, or when driving on road surfaces with low frictional resistance, or when passing over bumps, the ABS may operate even though sudden braking is not being applied. Because of this, when getting information from the customer, check if the problem occurred while driving under such conditions as these.**
- 2. During ABS operation, the brake pedal may vibrate or may not be able to be depressed. Such phenomena are due to intermittent changes in hydraulic pressure inside the brake line to prevent the wheels from locking and is not an abnormality.**

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

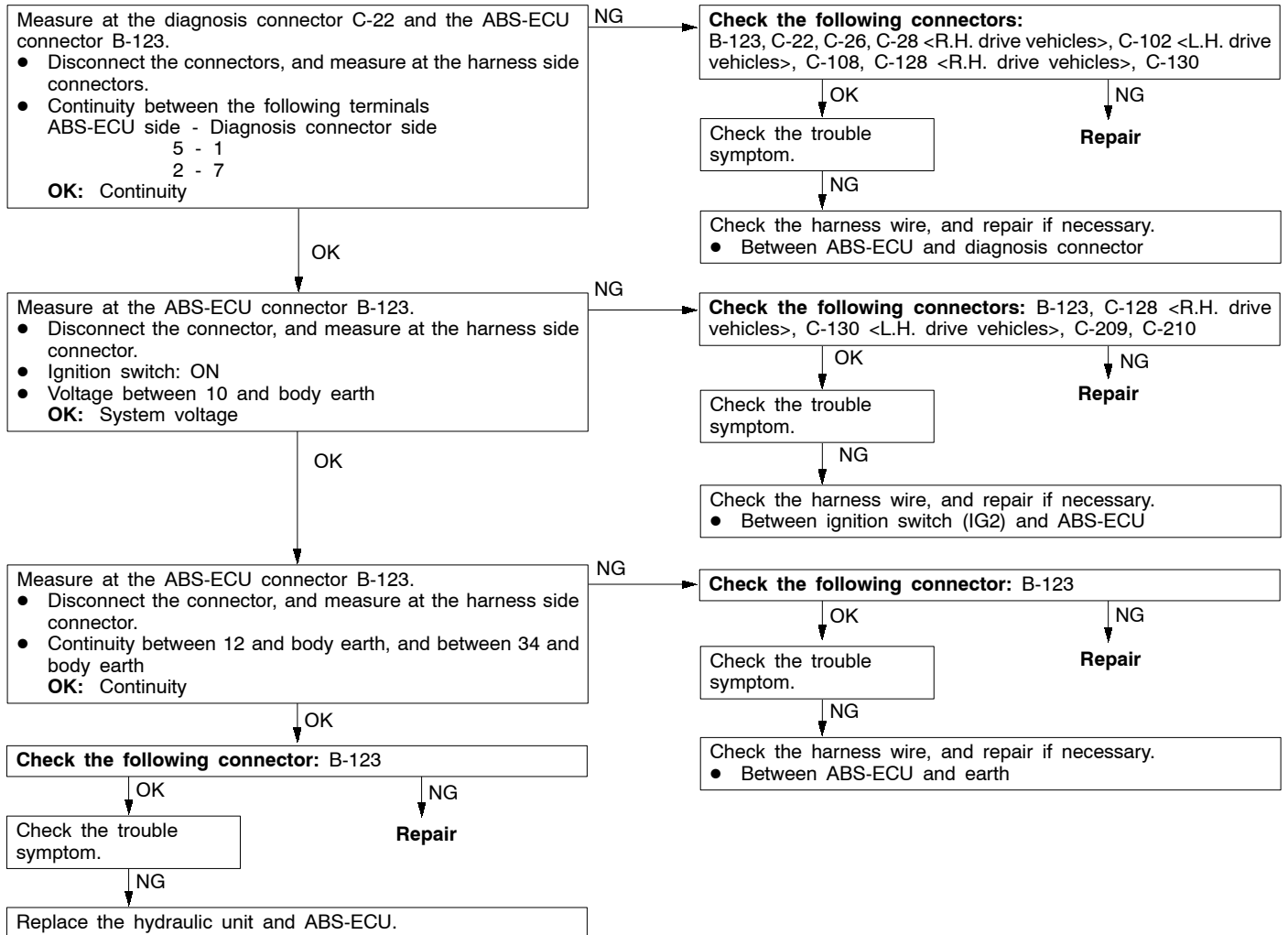
Inspection Procedure 1

Communication between the MUT-II and the whole system is not possible.	Probable cause
The cause may be a malfunction of the power supply circuit or the earth circuit of the diagnosis connector.	<ul style="list-style-type: none"> ● Malfunction of diagnosis connector ● Malfunction of wiring harness or connector



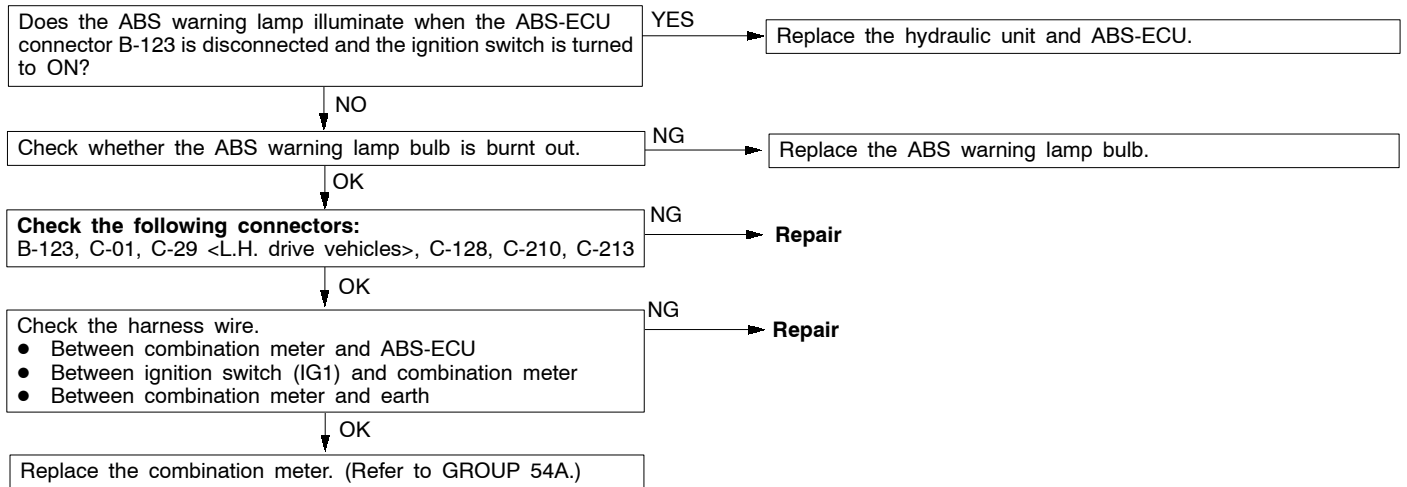
Inspection Procedure 2

Communication between MUT-II and the ABS-ECU is not possible.	Probable cause
The cause may be an open circuit in the ABS-ECU power supply circuit or an open circuit in the diagnosis output circuit.	<ul style="list-style-type: none"> ● Blown fuse ● Malfunction of wiring harness or connector ● Malfunction of hydraulic unit and ABS-ECU



Inspection Procedure 3

When the ignition key is turned to “ON” (engine stopped), the ABS warning lamp does not illuminate.	Probable cause
The cause may be an open circuit in the lamp power supply circuit, a blown lamp, or an open circuit between the ABS warning lamp and the earth.	<ul style="list-style-type: none"> ● Blown fuse ● Burn out ABS warning lamp bulb ● Malfunction of combination meter ● Malfunction of wiring harness or connector ● Malfunction of hydraulic unit and ABS-ECU

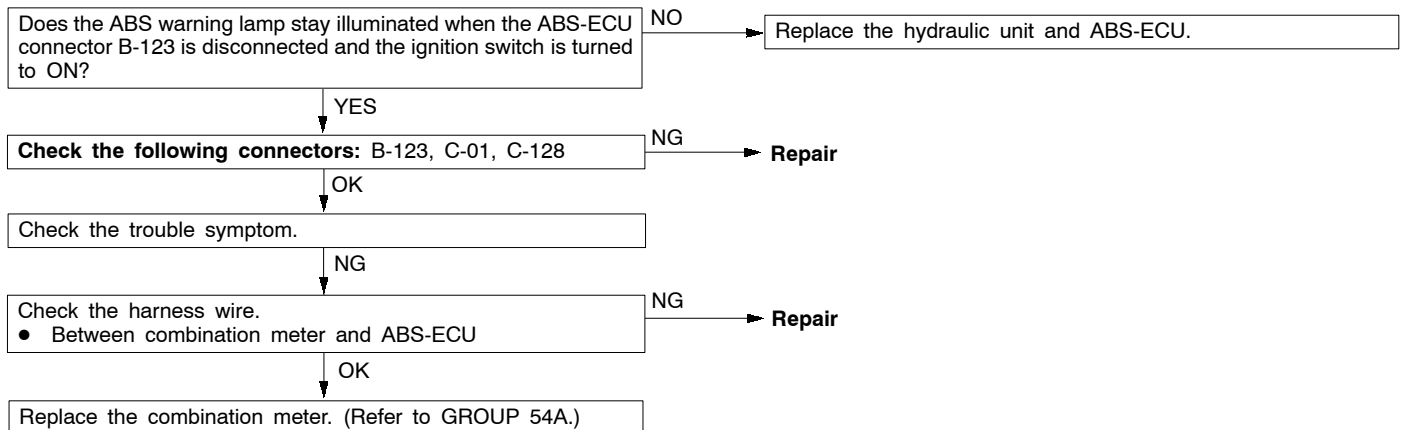


Inspection Procedure 4

Even after the engine is started, the ABS warning lamp remains illuminated.	Probable cause
The cause is probably a short-circuit in the ABS warning lamp illumination circuit.	<ul style="list-style-type: none"> ● Malfunction of combination meter ● Malfunction of wiring harness (short circuit) ● Malfunction of hydraulic unit and ABS-ECU

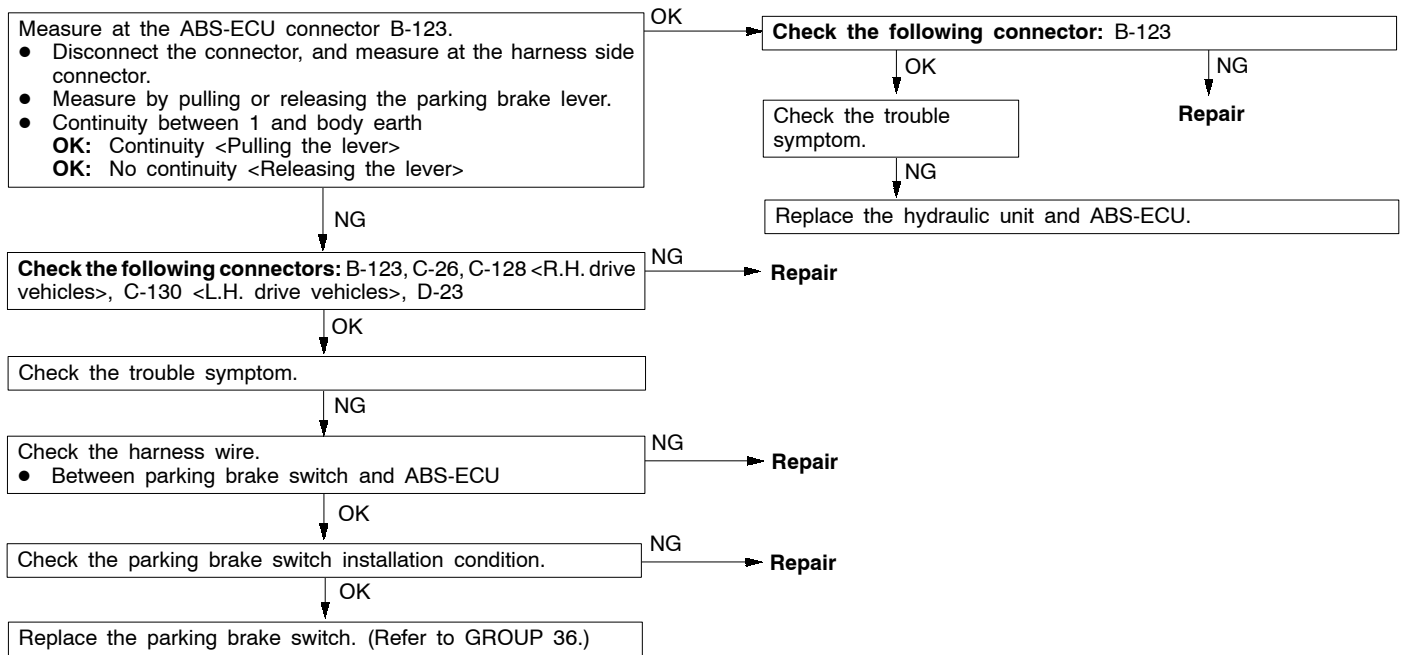
NOTE

This trouble symptom is limited to cases where communication with the MUT-II is possible (ABS-ECU power supply is normal) and the diagnosis code is a normal diagnosis code.



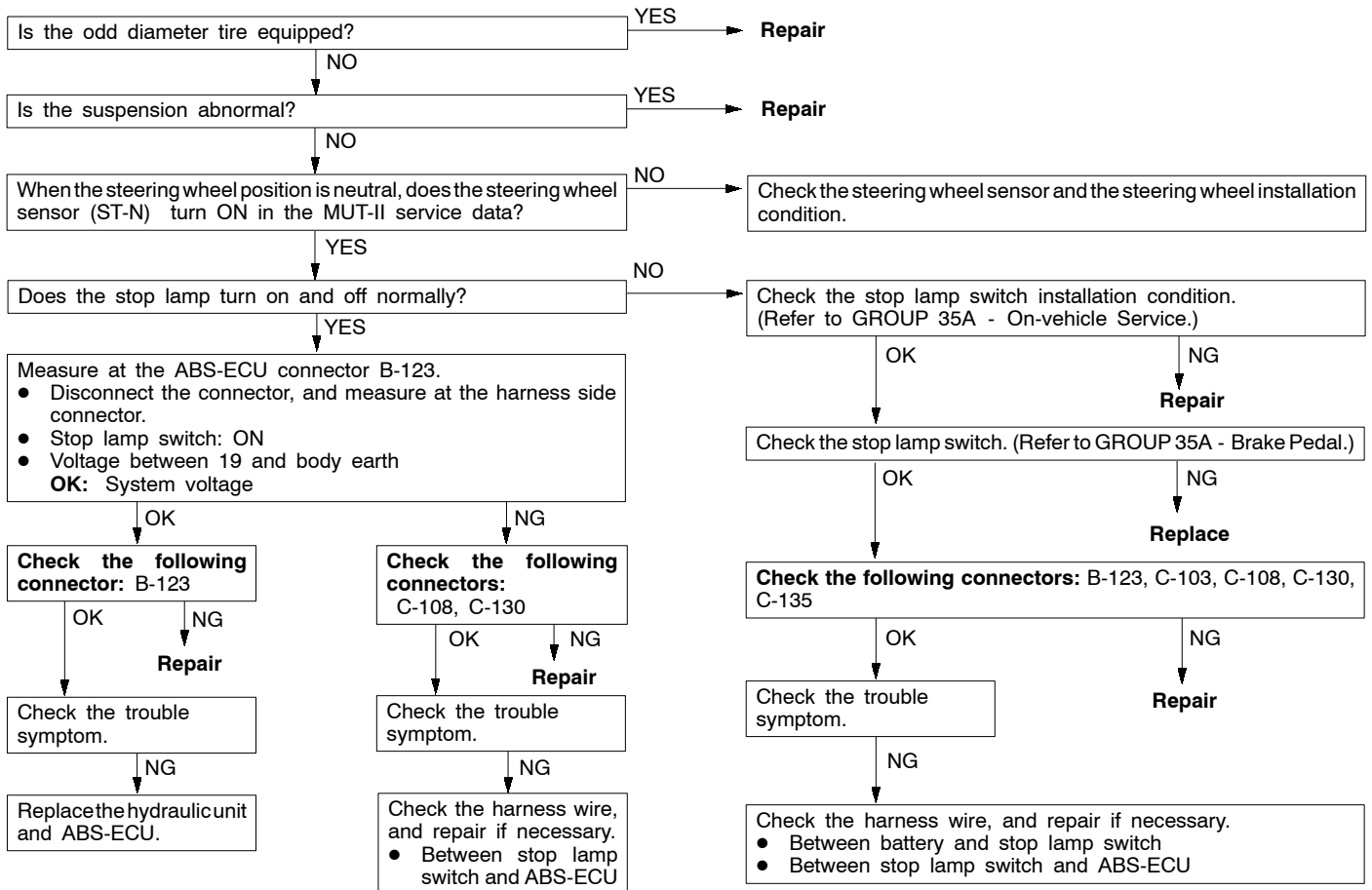
Inspection Procedure 5

In the inspection by MUT-II service data, the parking brake switch is not turned ON or turn OFF.	Probable cause
ABS-ECU optimizes the ABS control when pulling the parking brake lever, parking brake switch signal is used as support. If there is a fault in the parking brake switch system, ABS control is not optimized.	<ul style="list-style-type: none"> ● Malfunction of parking brake switch ● Malfunction of wiring harness or connector ● Malfunction of hydraulic unit and ABS-ECU



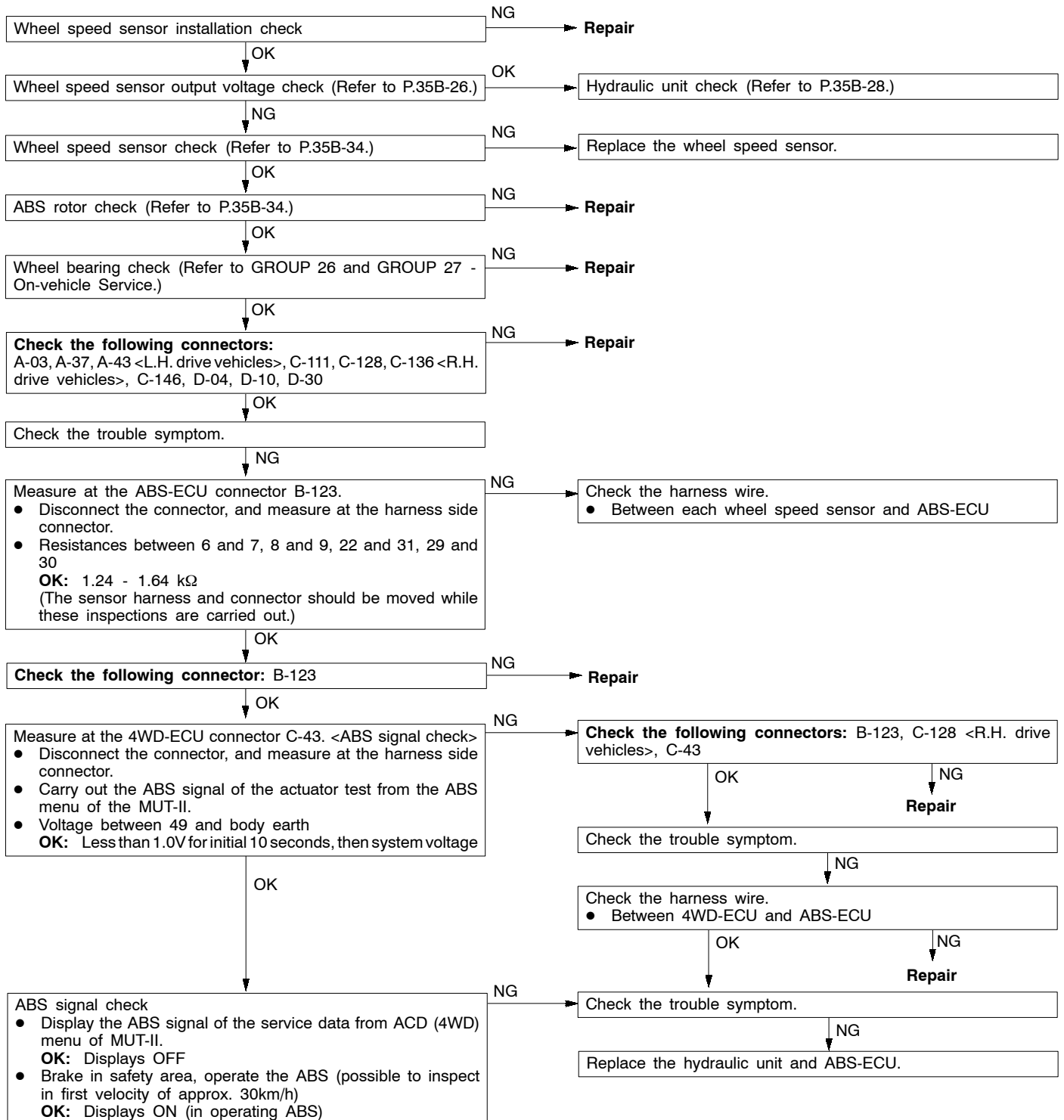
Inspection Procedure 6

The neutral position learning of the steering wheel sensor is not finished.	Probable cause
The diagnosis is difficult because it depends on driving condition and road surface, if the diagnosis code displays the normal code, carry out the following check.	<ul style="list-style-type: none"> ● Equipment the odd diameter tyre ● Malfunction of suspension ● Malfunction of steering wheel sensor installation ● Malfunction of stop lamp switch system ● Malfunction of hydraulic unit and ABS-ECU



Inspection Procedure 7

Faulty ABS operation	Probable cause
This varies depending on the driving conditions and the road surface conditions, so problem diagnosis is difficult. However, if a normal diagnosis code is displayed, carry out the following inspection.	<ul style="list-style-type: none"> ● Improper installation of wheel speed sensor ● Malfunction of wiring harness or connector ● Malfunction of wheel speed sensor ● Malfunction of ABS rotor ● Foreign material adhering to wheel speed sensor ● Malfunction of wheel bearing ● Malfunction of hydraulic unit and ABS-ECU



DATA LIST REFERENCE TABLE

The following items can be read by the MUT-II from the ABS-ECU input data.

1. When the system is normal

Item No.	Check item	Checking requirements		Normal value
11	Front-right wheel speed sensor	Perform a test run		Vehicle speeds displayed on the speedometer and MUT-II are identical.
12	Front-left wheel speed sensor			
13	Rear-right wheel speed sensor			
14	Rear-left wheel speed sensor			
21	Power supply voltage	Ignition switch: ON		10 - 16 V
29	Parking brake switch	Pull the parking brake lever.		ON
		Release the parking brake lever.		OFF
36	Stop lamp switch	Depress the brake pedal.		ON
		Release the brake pedal.		OFF
37	Steering wheel sensor neutral position learning	After driving straightly with vehicle speed more than 10km/h		ON
		Before driving with ignition switch ON		OFF
71	Lateral G sensor	When vehicle stops		2.4 - 2.6 V
		When vehicle drives		1.0 - 4.0 V
74	Steering wheel sensor (ST-N)	Ignition switch: ON	Steering: Neutral position and position near by $\pm 360^\circ$	ON
			Steering: Except for above	OFF
75	Steering wheel sensor (ST-1)	Ignition switch: ON	Steering: Turn laterally slowly	Display ON and OFF alternately
76	Steering wheel sensor (ST-2)			
86	Steering degree	Ignition switch: ON Steering wheel sensor neutral position learning is finished (service data No. 37 displays ON)	Steering: Steer by 90° to the right	+ 90°
			Steering: Neutral	OFF
			Steering: Steer by 90° to the left	- 90°

2. When the ABS-ECU shut off ABS operation

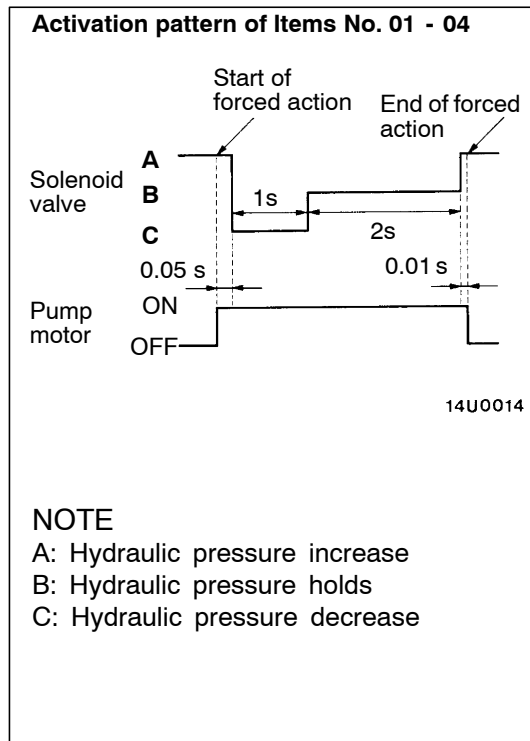
When the diagnosis system stops the ABS-ECU, the MUT-II display data will be unreliable.

ACTUATOR TEST REFERENCE TABLE

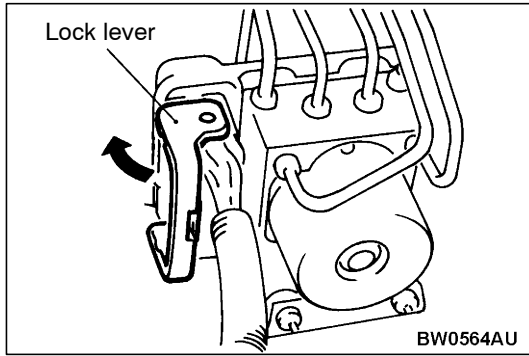
The MUT-II activates the following actuators for testing.

NOTE

1. If the ABS-ECU runs down, actuator testing cannot be carried out.
2. Actuator testing is only possible when the vehicle is stationary.

**ACTUATOR TEST SPECIFICATIONS**

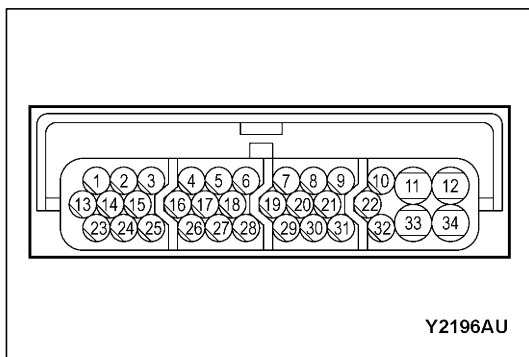
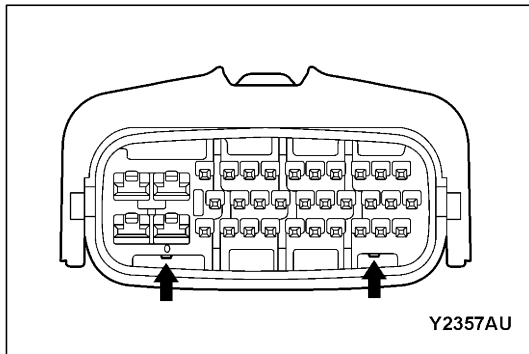
Item No.	Checking item	Activation
01	Solenoid valve for front-right wheel	Solenoid valves and pump motors in the hydraulic unit (simple inspection mode)
02	Solenoid valve for front-left wheel	
03	Solenoid valve for rear-right wheel	
04	Solenoid valve for rear-left wheel	
05	ABS signal	ABS signal (voltage: less than 1.0V) is output for 10 seconds



CHECK AT ABS-ECU

Use the following steps to remove the connector cover and measure the terminal voltage.

1. Move the lock lever of the ABS-ECU connector as shown in the illustration, and then disconnect the ABS-ECU connector.
2. Push up and unlock the hooks of the ABS-ECU connector shown in the illustration, then remove the connector cover.

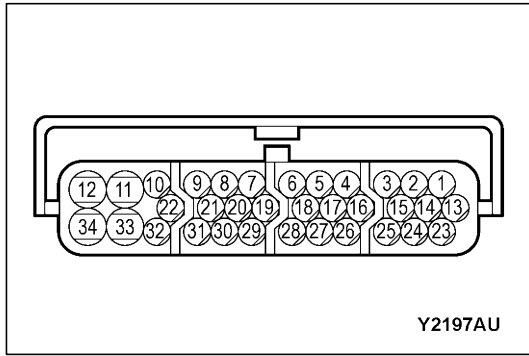


TERMINAL VOLTAGE CHECK CHART

1. Measure the voltage between each terminal and earth (terminal No.12).
2. The terminal layout is shown in the illustration.

Terminal No.	Check item	Checking requirements		Normal condition
1	Parking brake switch input	Parking brake switch: ON		1 V or less
		Parking brake switch: OFF		System voltage
2	MUT-II	When the MUT-II is connected		Serial communication with MUT-II
		When the MUT-II is not connected		1 V or less
3	ABS ON output to 4WD-ECU	With ABS active (reference)		(0.5 V or less)
		With ABS not active		System voltage
4	Steering wheel sensor (ST-N) input	Ignition switch: ON	Steering wheel: Neutral position and position near by $\pm 360^\circ$	0.8 - 2.1 V
			Steering wheel: Except for above	2.7 - 4.4 V
5	Diagnosis changeover input	When the MUT-II is connected		0 V
		When the MUT-II is not connected		Approx. 12 V

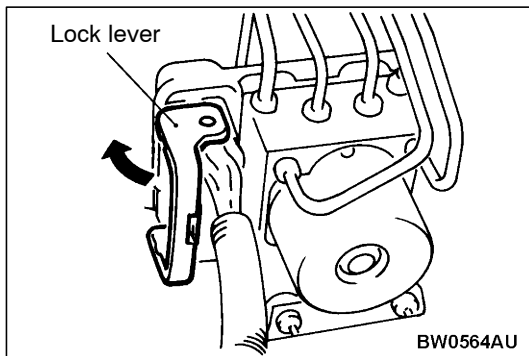
Terminal No.	Check item	Checking requirements		Normal condition
10	ABS-ECU power supply	Ignition switch: ON		System voltage
		Ignition switch: START or ACC		0 V
11	Solenoid valve power supply	Always		System voltage
14	Lateral G sensor input	Ignition switch: ON		2.4 - 2.6 V (horizontal position)
15	Longitudinal G sensor earth	Always		0 V
17	Steering wheel sensor (ST-2) input	Ignition switch: ON	Steering wheel: Turn laterally	Variation in the voltage value 0.8 - 2.1 V and 2.7 - 4.4 V
18	Wheel speed sensor (front right) output	Moving forward slowly		0 - 5 V
19	Stop lamp monitor input	Ignition switch: ON	Stop lamp switch: ON	System voltage
			Stop lamp switch: OFF	1 V or less
20	Wheel speed sensor (rear left) output	Moving forward slowly		0 - 5 V
21	Wheel speed sensor (rear right) output	Moving forward slowly		0 - 5 V
24	Lateral G sensor earth	Always		0 V
25	Longitudinal G sensor input	Ignition switch: ON		2.4 - 2.6 V (horizontal position)
26	Steering wheel sensor (ST-1) input	Ignition switch: ON	Steering wheel: Turn laterally	Variation in the voltage value 0.8 - 2.1 V and 2.7 - 4.4 V
27	ABS warning lamp transistor output	Ignition switch: ON	When the lamp is switched off	1 V or less
			When the lamp is illuminated	7 V or more
32	Wheel speed sensor (front left) output	Moving forward slowly		0 - 5 V
33	Motor power supply	Always		System voltage



RESISTANCE AND CONTINUITY BETWEEN HARNESS-SIDE CONNECTOR TERMINALS

1. Turn the ignition key to the “LOCK” (OFF) position.
2. Disconnect the ABS-ECU connector.
3. Check the resistance and continuity between the terminals indicated in the table below.
4. The terminal layout is shown in the illustration.

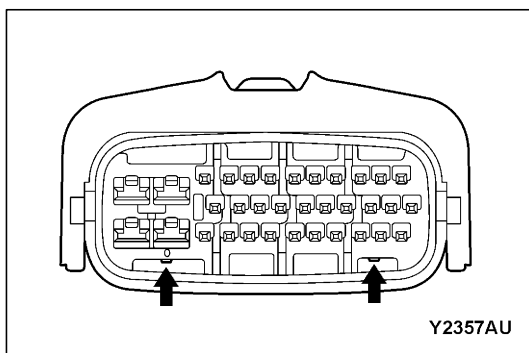
ABS-ECU terminal No.	Signal	Normal condition
6 - 7	Wheel speed sensor (rear left)	1.24 - 1.64 kΩ
8 - 9	Wheel speed sensor (rear right)	
22 - 31	Wheel speed sensor (front left)	
29 - 30	Wheel speed sensor (front right)	
12 - Body earth	Earth	Continuity
34 - Body earth	Earth	

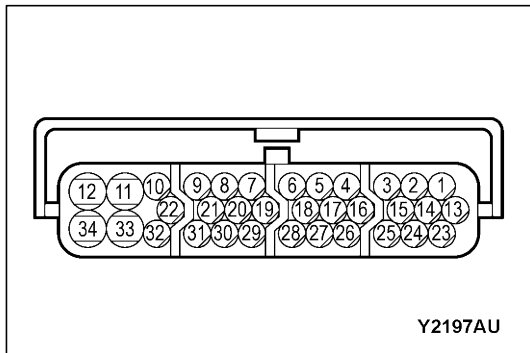


ON-VEHICLE SERVICE

WHEEL SPEED SENSOR OUTPUT VOLTAGE CHECK

1. Lift up the vehicle and release the parking brake.
2. Move the lock lever of the ABS-ECU connector as shown in the illustration, and then disconnect the ABS-ECU connector.
3. Push up and unlock the hooks of the ABS-ECU connector shown in the illustration, then remove the connector cover.





- Rotate the wheel to be measured at approximately 1/2 - 1 rotation per second, and check the output voltage using a circuit tester or an oscilloscope.

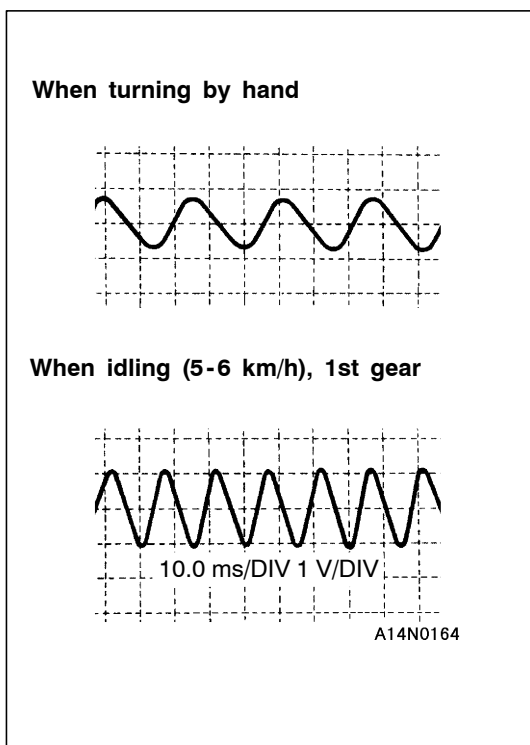
Wheel speed sensor	Front left	Front right	Rear left	Rear right
Terminal No.	22	29	6	8
	31	30	7	9

Output voltage

**When measuring with a circuit tester:
42 mV or more**

**When measuring with an oscilloscope:
120 mV p-p or more**

- The followings are suspected if the output voltage is lower than the value described above. Check the wheel speed sensor, and replace if necessary.
 - Too large clearance between the pole piece of the wheel speed sensor and ABS rotor
 - Faulty wheel speed sensor



Inspecting Waveforms With An Oscilloscope

Use the following method to observe the output voltage waveform from each wheel speed sensor with an oscilloscope.

- Start the engine, and rotate the front wheels by engaging 1st gear. Turn the rear wheels manually so that they rotate at a constant speed.

NOTE

- The waveform measurements can also be taken while the vehicle is actually moving.
- The output voltage will be small when the wheel speed is low, and similarly it will be large when the wheel speed is high.

Points In Waveform Measurement

Symptom	Probable causes	Remedy
Too small or zero waveform amplitude	Faulty wheel speed sensor	Replace sensor
Waveform amplitude fluctuates excessively (this is no problem if the minimum amplitude is 100 mV or more)	Axle hub eccentric or with large runout	Replace hub
	Faulty ABS-ECU earth	Repair

Symptom	Probable causes	Remedy
Noisy or disturbed waveform	Open circuit in sensor	Replace sensor
	Open circuit in harness	Correct harness
	Incorrectly mounted wheel speed sensor	Mount correctly
	ABS rotor with missing or damaged teeth	Replace ABS rotor

Caution

Because the wheel speed sensor cables move together with the front and rear suspension, they vibrate greatly when driving over poor road surfaces. As a result, the sensor harnesses should also be shaken when monitoring of output waveforms of the wheel speed sensors in order to simulate conditions such as driving over poor road surfaces.

HYDRAULIC UNIT CHECK

- Jack up the vehicle and support the vehicle with rigid racks placed at the specified jack-up points or place the wheels which are checked on the rollers of the braking force tester.

Caution

(1) The roller of the braking force tester and the tyre should be dry during testing.

(2) When testing the front brakes, apply the parking brake, and when testing the rear brakes, stop the front wheels by chocking them.

- Turn the ignition key to the "LOCK" (OFF) position and set the MUT-II.

Caution

Turn the ignition key to the "LOCK" (OFF) position before connecting or disconnecting the MUT-II.

- After checking that the shift lever is in neutral, start the engine.
- Use the MUT-II to force-drive the actuator.

NOTE

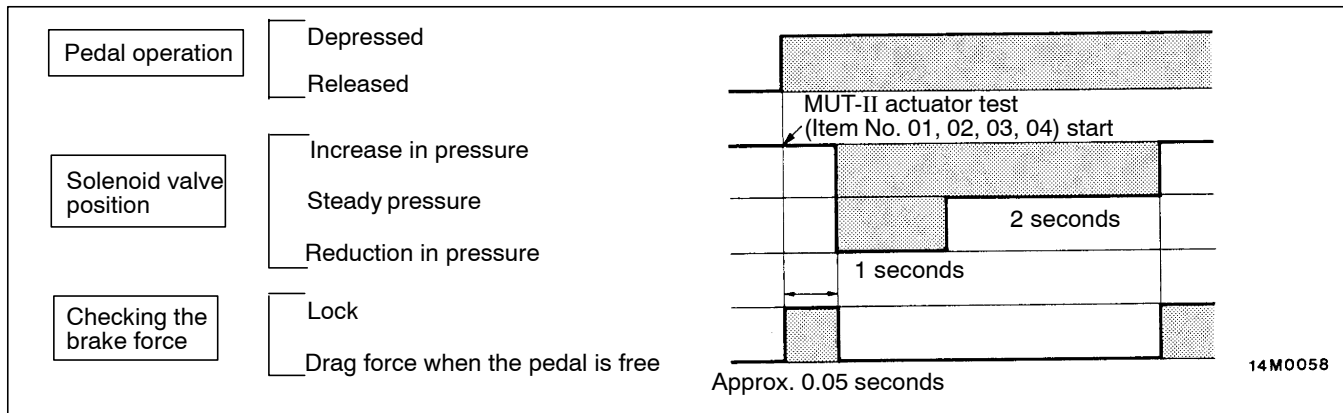
(1) During the actuator test, the ABS warning lamp will illuminate and the anti-skid control will be cancelled.

(2) When the ABS has been interrupted by the fail-safe function, the MUT-II actuator testing cannot be carried out.

- Turn the wheel by hand and check the change in braking force when the brake pedal is depressed. When using the braking force tester, depress the brake pedal until the braking force is at the following values, and check that the braking force decreases when the actuator is force-driven.

Front wheel	785 - 981 N
Rear wheel	588 - 784 N

The result should be as shown in the following diagram.



6. If the result of inspection is abnormal, correct according to the following “Diagnosis Table.”

Diagnosis Table

No.	MUT-II display	Operation	Judgement		Probable cause	Remedy
			Normal	Abnormal		
01	FR VALVE	(1) Depress the brake pedal to lock wheel. (2) Using the MUT-II, select the wheel to be checked and force the actuator to operate. (3) Check the brake force for the selected wheel using a brake force tester or by rotating the wheel by hand.	Brake force released for 3 seconds after locking.	Wheel does not lock when brake pedal is depressed.	Clogged brake line other than hydraulic unit	Check and clean brake line.
02	FL VALVE				Clogged hydraulic circuit in hydraulic unit	Replace hydraulic unit assembly.
03	RR VALVE			Brake force is not released.	Incorrect hydraulic unit brake tube connection	Connect correctly.
04	RL VALVE			Hydraulic unit solenoid valve not functioning correctly		Replace hydraulic unit assembly.

7. After checking, turn the ignition switch to the “LOCK” (OFF) position and then disconnect the MUT-II.

REMEDY FOR A FLAT BATTERY

When booster cables are used to start the engine when the battery is completely flat and then the vehicle is immediately driven without waiting for the battery to recharge itself to some extent, the engine may misfire, and driving might not be possible. This happens because ABS consumes a great amount of current for its self-check function. If this happens, recharge the battery fully.

Caution

The vehicle posture will be unstable during braking, so do not drive the vehicle with the ABS-ECU connector disconnected or with the ABS not operating for any other reason.

HYDRAULIC UNIT AND ABS-ECU

REMOVAL AND INSTALLATION

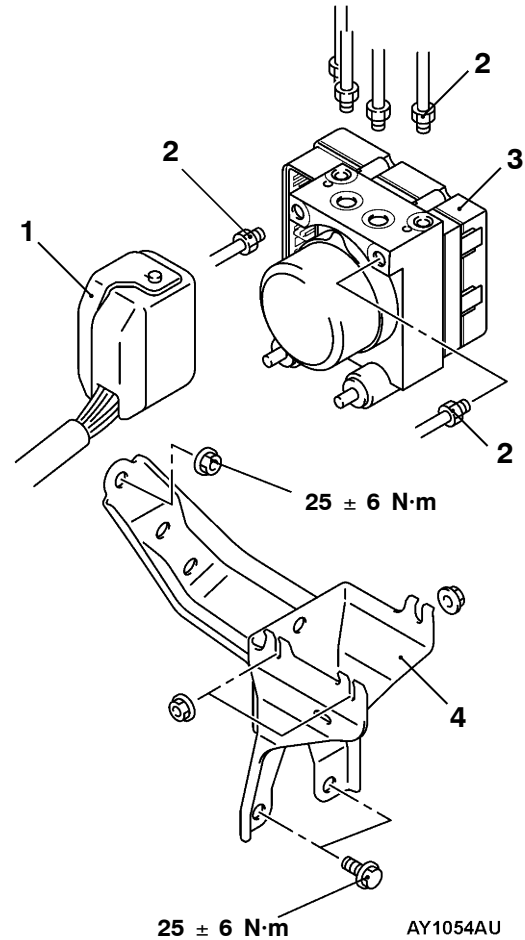
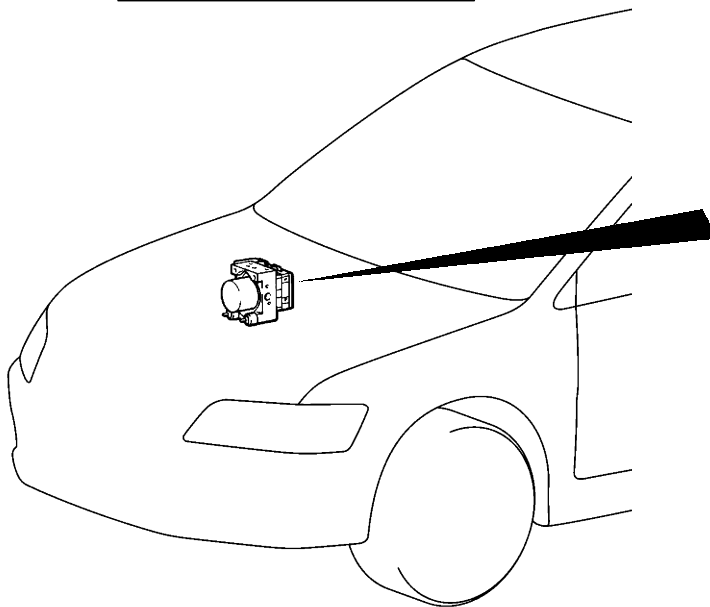
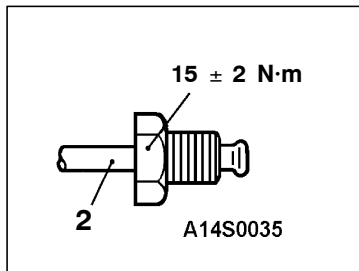
<L.H. drive vehicles>

Pre-removal Operation

- Strut Tower Bar Removal (Refer to GROUP 42.)
- Brake Fluid Draining

Post-installation Operation

- Brake Fluid Supplying and Brake Line Bleeding (Refer to GROUP 35A - On-vehicle Service.)
- Hydraulic Unit Check (Refer to P.35B-28.)
- Strut Tower Bar Installation (Refer to GROUP 42.)

**Removal steps**

- ◀A▶
▶A▶
1. Harness connector
 2. Brake pipe connection

- ◀B▶
3. Hydraulic unit and ABS-ECU
 4. Hydraulic unit bracket assembly

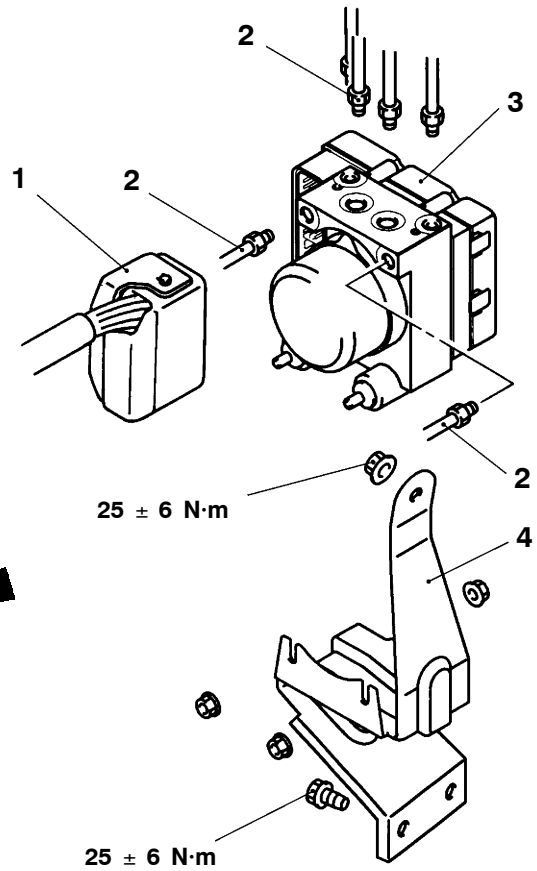
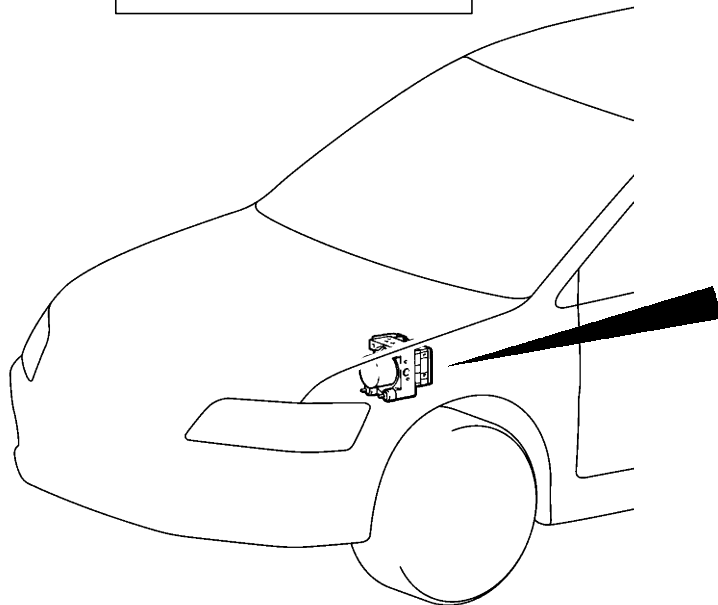
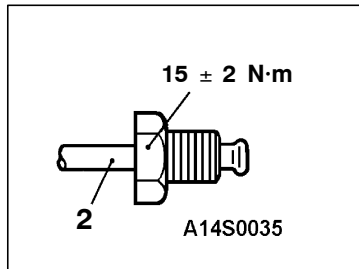
<R.H. drive vehicles>

Pre-removal Operation

- Strut Tower Bar Removal (Refer to GROUP 42.)
- Brake Fluid Draining
- Air Intake Hose and Air Cleaner Removal

Post-installation Operation

- Brake Fluid Supplying and Brake Line Bleeding (Refer to GROUP 35A - On-vehicle Service.)
- Hydraulic Unit Check (Refer to P.35B-28.)
- Air Intake Hose and Air Cleaner Installation
- Strut Tower Bar Installation (Refer to GROUP 42.)



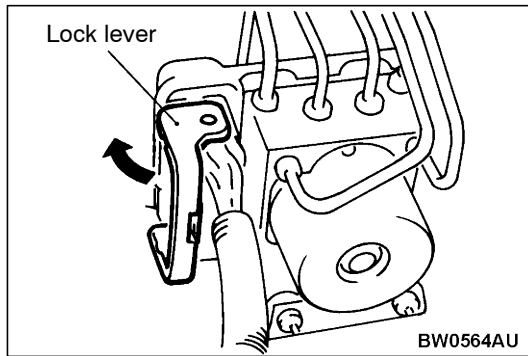
Removal steps



1. Harness connector
2. Brake pipe connection



3. Hydraulic unit and ABS-ECU
4. Hydraulic unit bracket assembly



REMOVAL SERVICE POINTS

◀A▶ HARNESS CONNECTOR DISCONNECTION

Move the lock lever of the ABS-ECU connector as shown in the illustration, and then disconnect the harness connector.

◀B▶ HYDRAULIC UNIT AND ABS-ECU REMOVAL

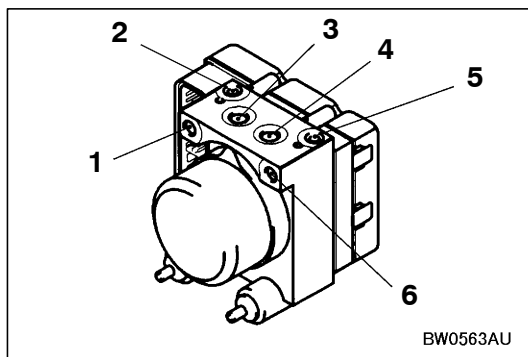
Caution

1. The hydraulic unit assembly is heavy, and so care should be taken when removing it.
2. The hydraulic unit assembly is not to be disassembled; its nuts and bolts should absolutely not be loosened.
3. The hydraulic unit assembly must not be dropped or otherwise subjected to impact shocks.
4. The hydraulic unit assembly must not be turned upside down or laid on its side.

INSTALLATION SERVICE POINT

▶A◀ BRAKE PIPE CONNECTION

Connect the pipes to the hydraulic unit assembly as shown in the illustration.



1. From the master cylinder (Secondary)
2. To the front brake (LH)
3. To the rear brake (RH)
4. To the rear brake (LH)
5. To the front brake (RH)
6. From the master cylinder (Primary)

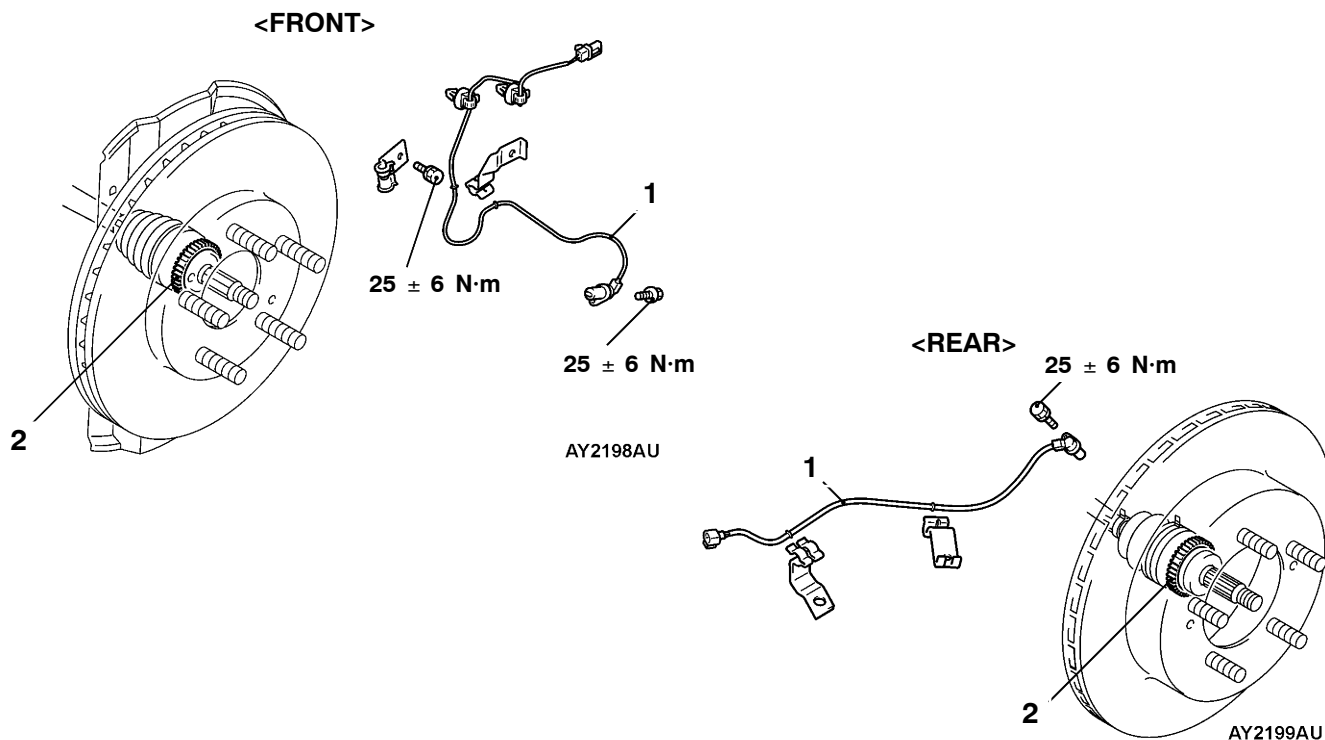
WHEEL SPEED SENSOR

REMOVAL AND INSTALLATION

Caution

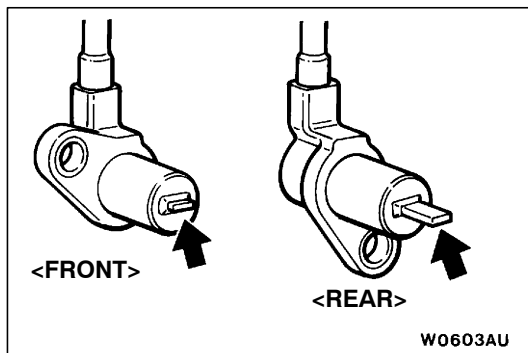
If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

Post-installation Operation
 Wheel Speed Sensor Output Voltage Check
 (Refer to P.35B-26.)



- ◀A▶ ▶A▶
- Removal steps**
1. Wheel speed sensor
 2. ABS rotor
 (Refer to GROUP 26/27 - Drive Shaft.)

NOTE
 The ABS rotors are integrated with the drive shaft and cannot be disassembled.

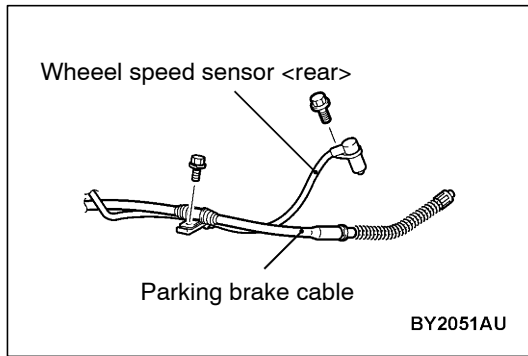


REMOVAL SERVICE POINT

◀A▶ WHEEL SPEED SENSOR REMOVAL

Caution

Do not strike the pole piece at the tip of the wheel speed sensor against the ABS rotor tooth surface or other parts when removing the wheel speed sensor.



INSTALLATION SERVICE POINT

▶◀ WHEEL SPEED SENSOR <REAR> INSTALLATION

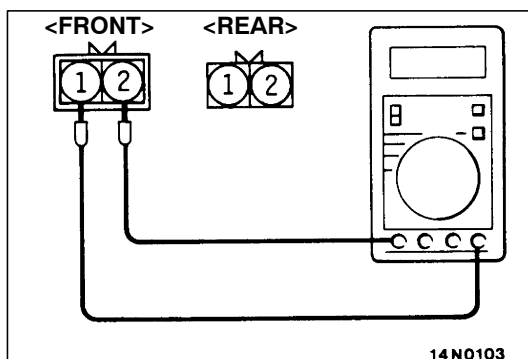
Install the wheel speed sensor crossing with the parking brake cable.

INSPECTION

CHECK OF RESISTANCE BETWEEN WHEEL SPEED SENSOR TERMINALS

Caution

The pole piece can become magnetized because of the magnet built into the wheel speed sensor, with the result that metallic foreign material easily adheres to it. Moreover, the pole piece may not be able to function to correctly sense the wheel rotation speed if it is damaged.



1. Measure the resistance between the wheel speed sensor terminals.

Standard value: 1.24 - 1.64 k Ω

If the internal resistance of the wheel speed sensor is not within the standard value, replace with a new wheel speed sensor.

2. Check the wheel speed sensor cable for breakage, damage or disconnection; replace with a new one if a problem is found.

NOTE

When checking for cable damage, remove the cable clamp part from the body and then bend and pull the cable near the clamp to check whether or not temporary disconnection occurs. Also check the connection of the connector and that the terminals are inserted correctly.

ABS ROTOR CHECK

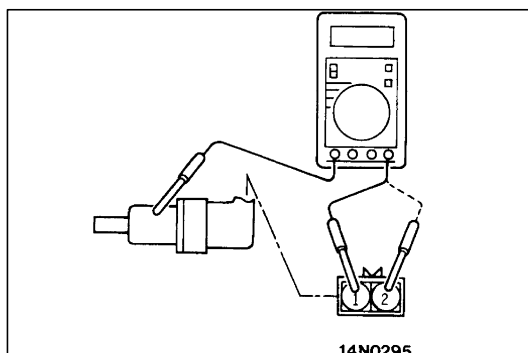
Check whether ABS rotor teeth are broken or deformed, and, if so, replace the ABS rotor.

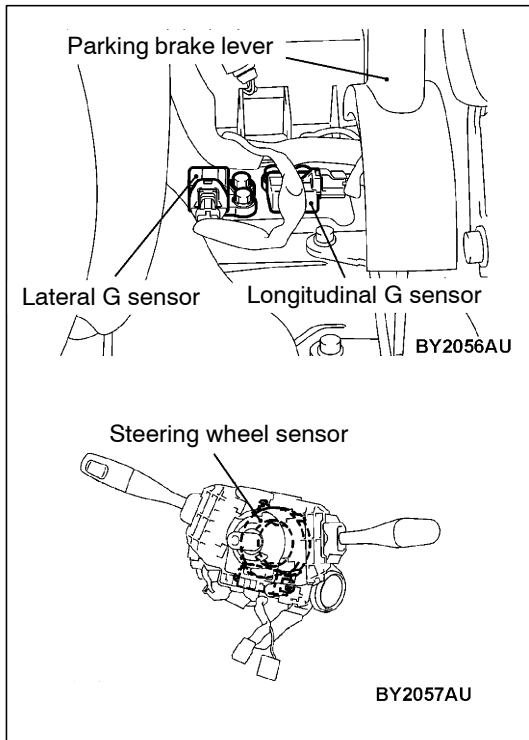
WHEEL SPEED SENSOR INSULATION INSPECTION

1. Remove all connections from the wheel speed sensor, and then measure the resistance between terminal 1 and the body of the wheel speed sensor, and terminal 2 and the body of the wheel speed sensor.

Standard value: 100 k Ω or more

2. If the speed sensor insulation resistance is outside the standard value range, replace with a new speed sensor.





G SENSORS AND STEERING WHEEL SENSOR

REMOVAL AND INSTALLATION

Refer to GROUP 22 - Sensor, Switch and Relay.

NOTES

PARKING BRAKES

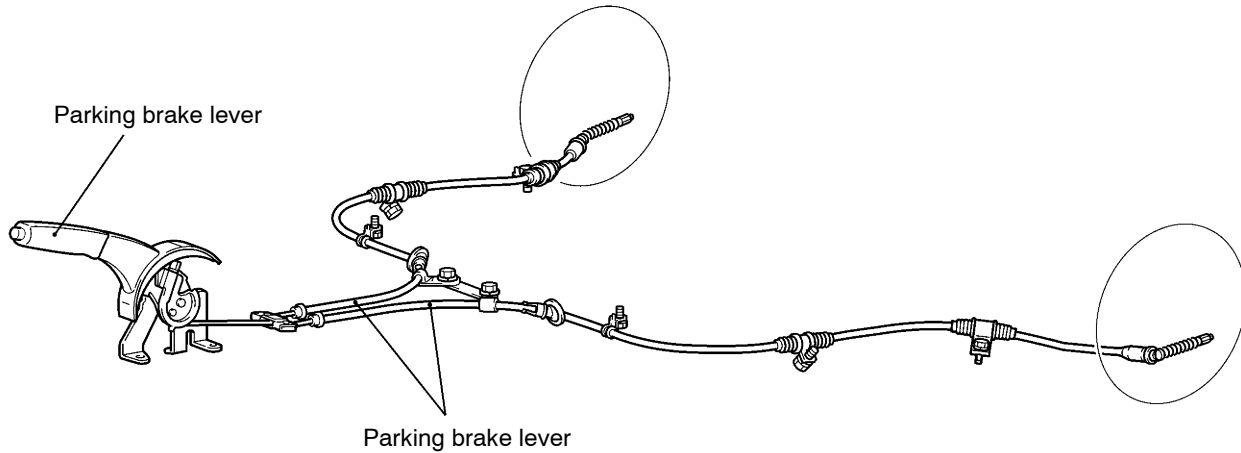
CONTENTS

GENERAL INFORMATION	2	Parking Brake Switch Check	3
SERVICE SPECIFICATIONS	2	Lining Running-In	4
LUBRICANTS	2	PARKING BRAKE LEVER	5
ON-VEHICLE SERVICE	3	PARKING BRAKE CABLE	6
Parking Brake Lever Stroke Check and Adjustment	3	PARKING BRAKE DRUM	7

GENERAL INFORMATION

The parking brake is of a mechanical control type acting on the rear wheels. A lever is used to apply the parking brake.

CONSTRUCTION DIAGRAM



AY2351AU

SERVICE SPECIFICATIONS

Items	Standard value	Limit
Parking brake lever stroke	5 - 7 notches	-
Rear brake lining thickness mm	2.8	1.0
Rear drum inside diameter mm	168.0	169.0

LUBRICANTS

Items	Specified lubricants
Backing plate	Multipurpose grease
Shoe and lining assembly	
Adjuster	

ON-VEHICLE SERVICE

PARKING BRAKE LEVER STROKE CHECK AND ADJUSTMENT

1. Pull the parking brake lever with a force of approx. 200 N and count the number of notches.

Standard value: 5 - 7 notches

2. If the parking brake lever stroke is not the standard value, adjust as described below.

- (1) Remove the floor console assembly. (Refer to GROUP52A)

- (2) Loosen the adjusting nut to move it to the cable rod end so that the cable will be free.

- (3) Depress the brake pedal repeatedly until the lever has no change in its stroke.

NOTE

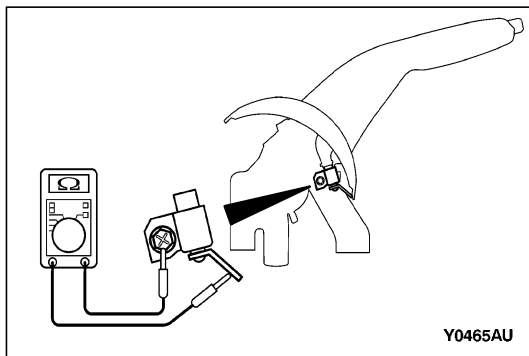
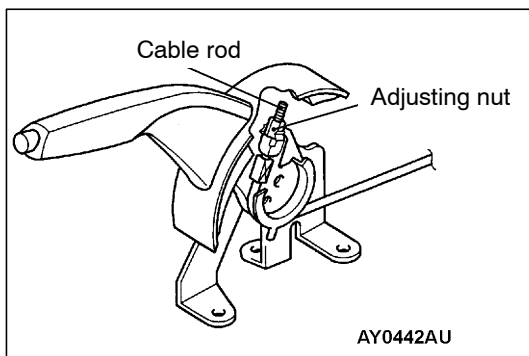
Depressing the brake pedal repeatedly adjusts shoe clearance correctly.

- (4) Turn the adjusting nut to adjust the parking brake lever stroke to the standard value. After adjusting, check that there is no space between the adjusting nut and the parking brake lever. Check that the adjusting nut is secured with the nut holder.

Caution

If the parking brake lever stroke is below the standard value and the braking is too firm, the rear brakes may drag.

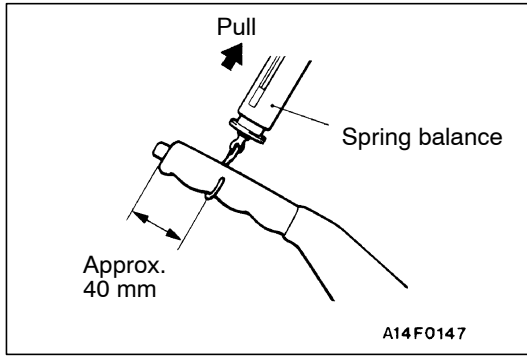
- (5) After adjusting the parking brake lever stroke, jack up the rear end of the vehicle, and then release the parking brake and turn the rear wheels to check that the rear brakes are not dragging.



PARKING BRAKE SWITCH CHECK

1. Remove the floor console assembly. (Refer to GROUP52A)
2. Remove the front seat assembly(RH). (Refer to GROUP52A)
3. Check for continuity between the parking brake switch terminal and the switch mounting bolt.

When parking brake lever is pulled	Continuity
When parking brake lever is released	No continuity



LINING RUNNING-IN

Carry out running-in by the following procedure when replacing the parking brake linings or the rear brake disc rotors, or when brake performance is insufficient.

Caution

Carry out running-in in a place with good visibility, and pay careful attention to safety.

1. Adjust the parking brake stroke to the specified value.

**Standard value [Operation force: Approx. 200 N] :
5 - 7 notches**

2. Hook a spring balance onto the centre of the parking brake lever grip and pull it with a force of 100 - 150 N in a direction perpendicular to the handle.
3. Drive the vehicle at a constant speed of 35 - 50 km/h for 100 metres.
4. Release the parking brake and let the brakes cool for 5 - 10 minutes.
5. Repeat the procedure in steps 2 to 4 four or five times.

PARKING BRAKE LEVER

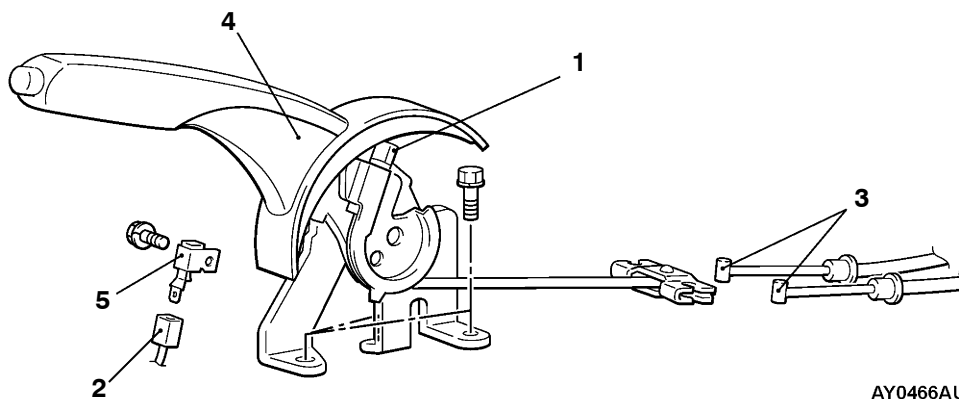
REMOVAL AND INSTALLATION

Pre-removal Operation

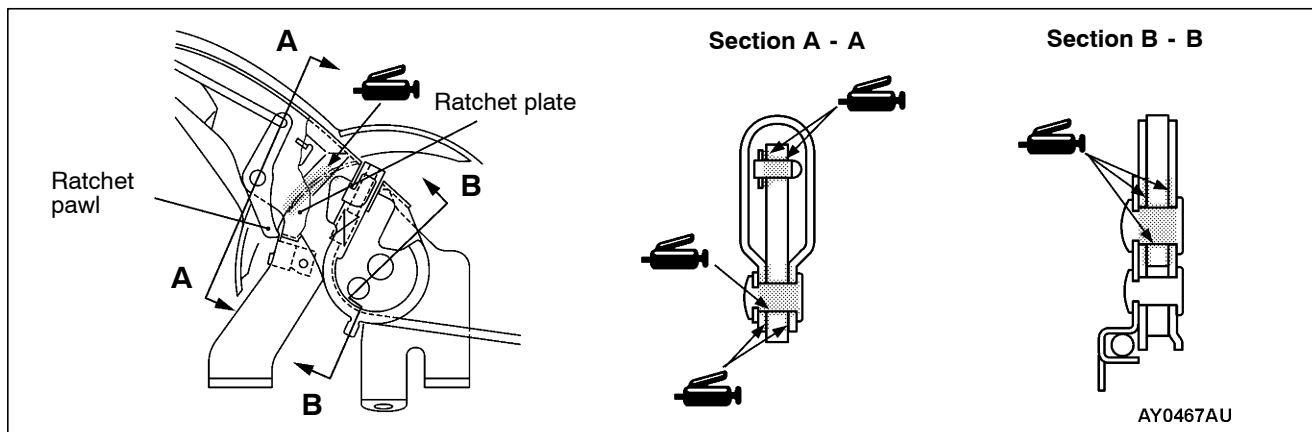
Rear Floor Console Assembly and Rear Console Bracket Removal (Refer to GROUP 52A-Floor Console.)

Post-installation Operation

- Parking Brake Lever Stroke Adjustment (Refer to P.36-3.)
- Rear Floor Console Assembly and Rear Console Bracket Installation (Refer to GROUP 52A-Floor Console.)



AY0466AU



AY0467AU

Removal steps

1. Adjusting nut
2. Parking brake switch connector
3. Parking brake cable connection
4. Parking brake lever assembly
5. Parking brake switch

PARKING BRAKE CABLE

REMOVAL AND INSTALLATION

CAUTION

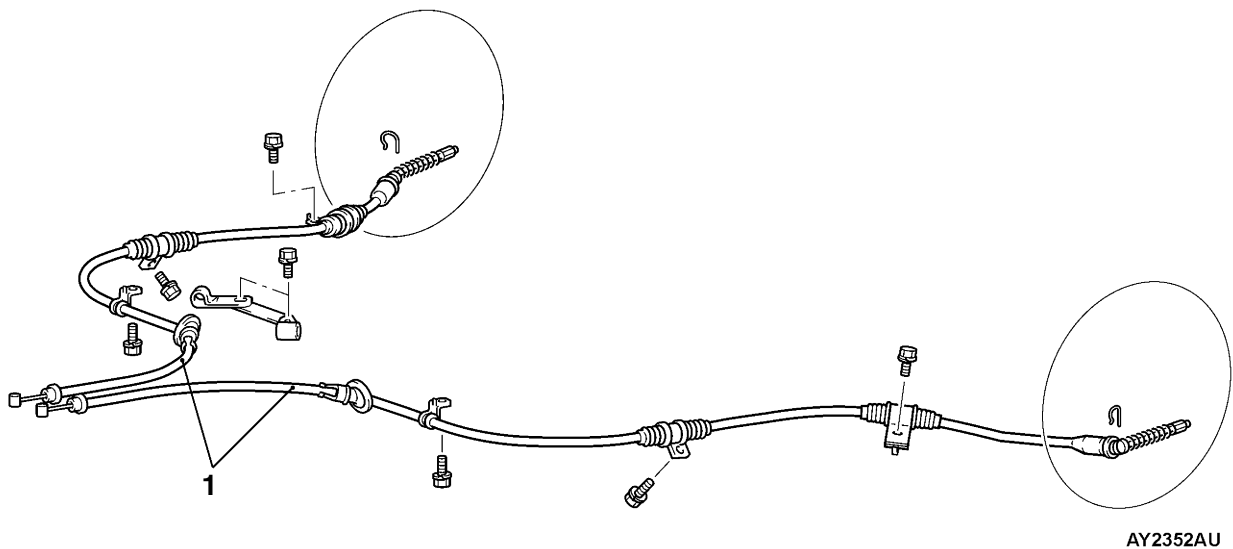
If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

Pre-removal Operation

- Rear Floor Console Assembly and Rear Console Bracket Removal (Refer to GROUP 52A-Floor Console.)
- Rear Seat Cushion Assembly Removal (Refer to GROUP 52A-Seat.)

Post-installation Operation

- Parking Brake Lever Stroke Check and Adjustment (Refer to P.36-3.)
- Rear Seat Cushion Installation (Refer to GROUP 52A-Seat.)
- Rear Floor Console Assembly and Rear Console Bracket Installation (Refer to GROUP 52A-Floor Console.)



Removal steps

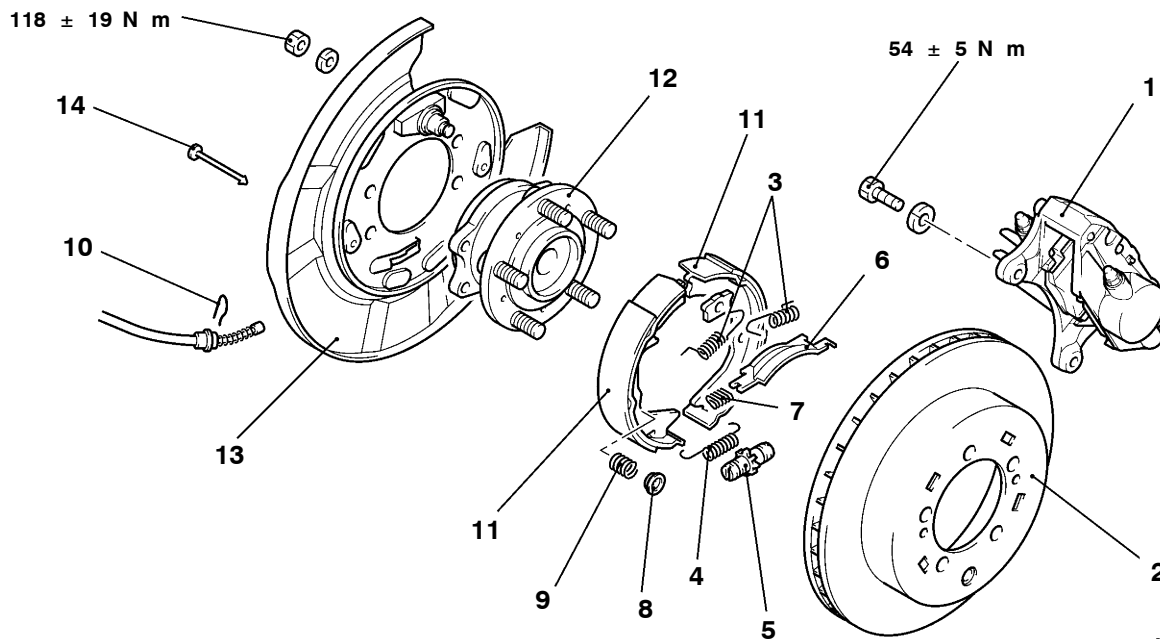
- Shoe and lining assembly
(Refer to P.36-7.)
 - Parking brake cable connection
(Refer to P.36-5.)
1. Parking brake cable

PARKING BRAKE DRUM

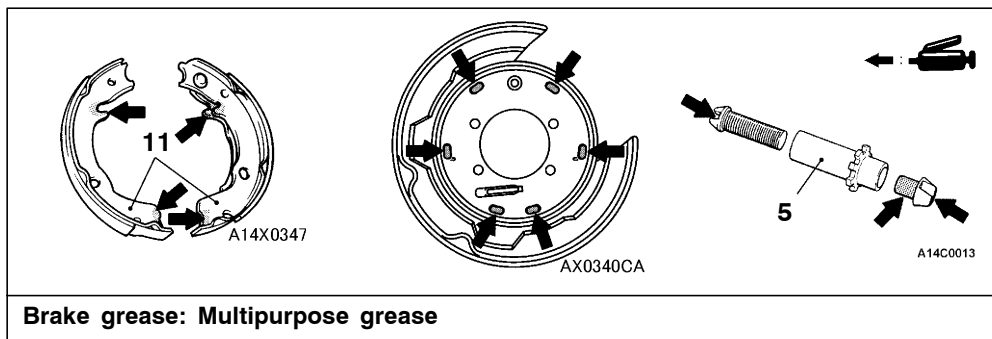
REMOVAL AND INSTALLATION

CAUTION

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.



AY2200AU



Removal steps



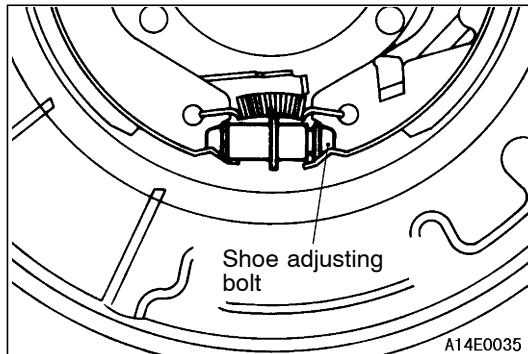
- | | |
|--------------------------------|---|
| 1. Rear brake caliper assembly | 9. Shoe hold-down spring |
| 2. Rear brake disc | 10. Clip |
| 3. Shoe-to-anchor spring | 11. Shoe and lining assembly |
| 4. Adjusting wheel spring | 12. Rear hub assembly
(Refer to GROUP 27.) |
| 5. Adjuster assembly | 13. Backing plate |
| 6. Strut | 14. Shoe hold-down pin |
| 7. Strut-to-shoe spring | |
| 8. Shoe hold-down cup | |

REMOVAL SERVICE POINT**◀A▶ REAR BRAKE CALIPER ASSEMBLY REMOVAL**

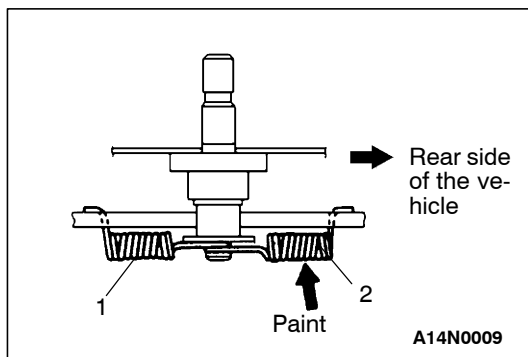
Remove the rear brake caliper assembly and support it with wire or similar.

CAUTION: Brembo disc brake

Take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

**INSTALLATION SERVICE POINTS****▶A◀ ADJUSTER ASSEMBLY INSTALLATION**

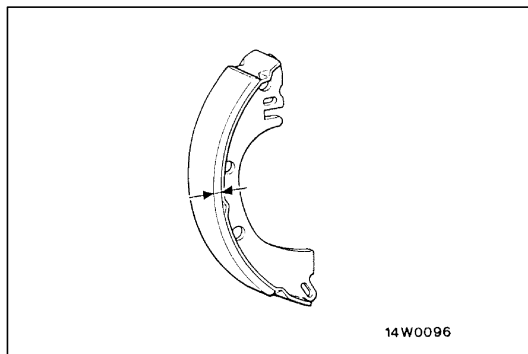
Install the adjuster assembly so that the shoe adjusting bolt of left hand wheel is attached towards the rear of the vehicle, and the shoe adjusting bolt of right hand wheel is towards the front of the vehicle.

**▶B◀ SHOE-TO-ANCHOR SPRING INSTALLATION**

Install the shoe-to-anchor springs in the order shown in the illustration.

NOTE

The figure shows the left wheel; for the right wheel, the position is symmetrical.

**INSPECTION****BRAKE LINING AND BRAKE DRUM CHECK**

1. Measure the thickness of the brake lining at several places.

Standard value: 2.8 mm

Limit: 1.0 mm

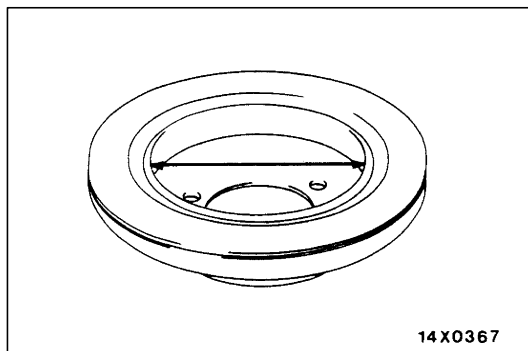
2. If the thickness of the brake lining has worn down to the limit value or more, replace the shoe and lining assemblies on both sides of the vehicle.

3. Measure the inside diameter of the brake disc in two places or more.

Standard value: 168.0 mm

Limit: 169.0 mm

4. If the inside of the brake disc has worn down to the limit value or more, or if it is excessively worn on one side, replace the brake disc.



STEERING

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Steering Wheel Free Play Check	7	STEERING WHEEL*	12
Steering Angle Check	7	STEERING SHAFT*	14
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WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

GENERAL INFORMATION

The system has been equipped with the MOMO leather 3-spoke-type steering wheel with built-in SRS airbag.

The steering column is equipped with tilt steering mechanism.

The power steering is an integral rack and pinion

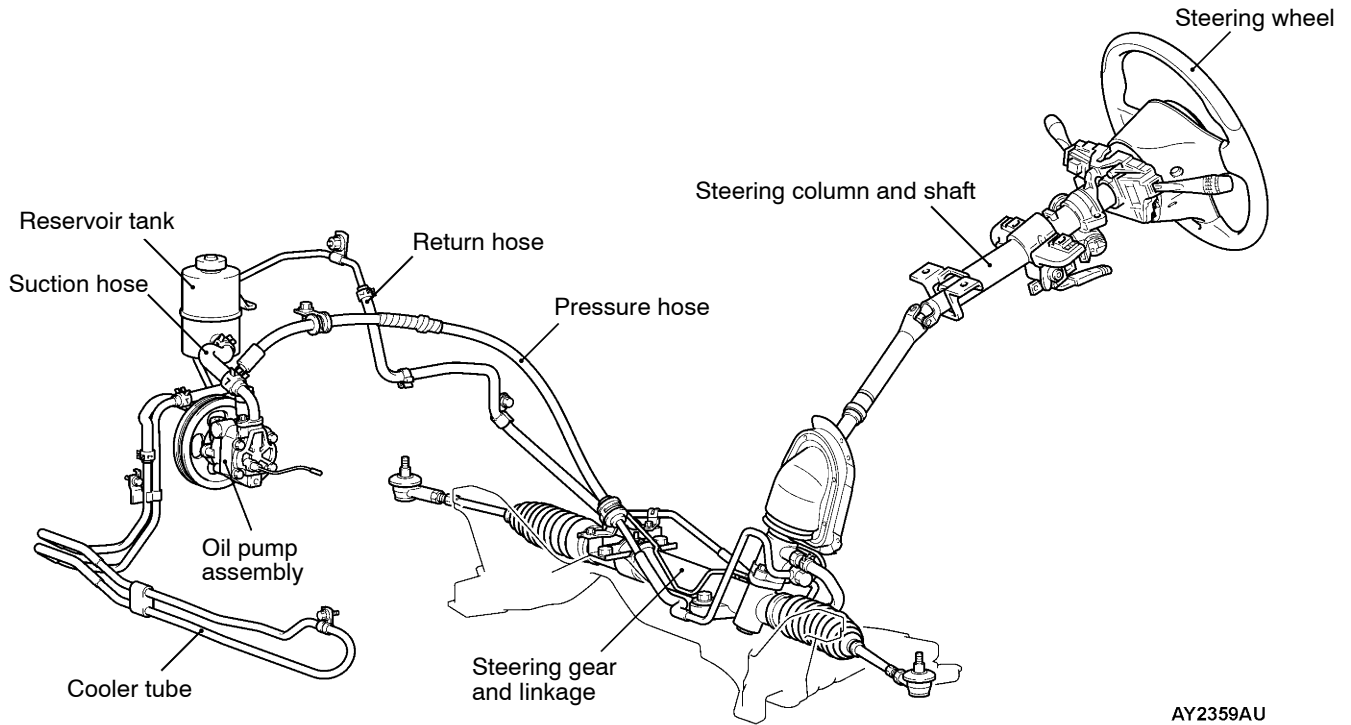
type that combines the steering gear and linkage into one light-weight and compact assembly.

The steering system uses a vane oil pump with a fluid flow control system, so that steering effort varies with engine speed.

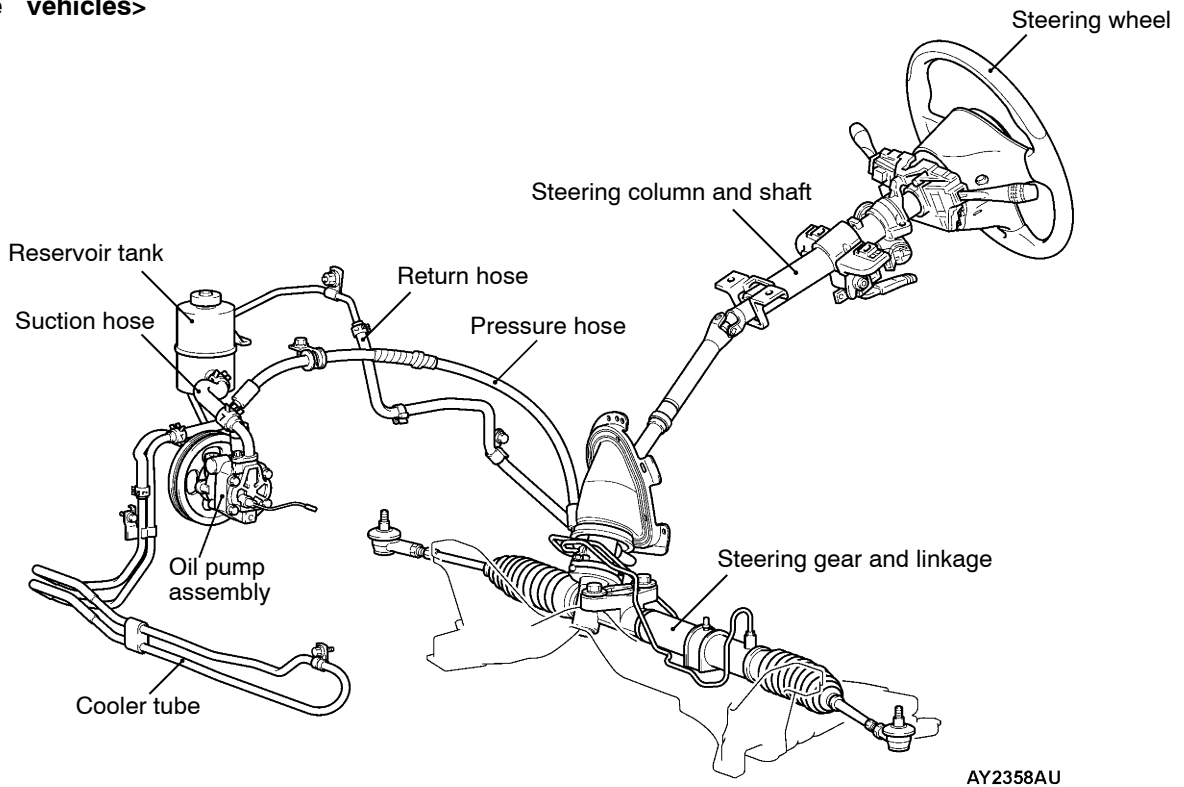
Item		Lancer EVOLUTION-
Steering wheel	Type	MOMO 3-spoke type
	Outside diameter mm	380 <RS (standard)>, 365 <RS(option), RS-II>
	Maximum number of turns	2.1
Steering column	Column mechanism	Tilt steering
Power steering type		Integral type
Oil pump	Type	Variable capacity type (vane pump)
	Basic discharge amount cm ³ /rev.	9.6
	Relief pressure MPa	8.3 - 9.0
	Reservoir type	Separate type
	Pressure switch	Equipped
Steering gear and linkage	Type	Rack and pinion
	Stroke ratio (Rack stroke/Steering wheel Maximum turning radius)	68.61
	Rack stroke mm	146
Steering angle	Inner wheel	32°
	Outer wheel (for reference)	27°
Power steering fluid	Specified lubricants	Automatic transmission fluid DEXRON II
	Quantity L	Approximately 1.0

CONSTRUCTION DIAGRAM

<L.H. drive vehicles>



<R.H. drive vehicles>



SERVICE SPECIFICATIONS

Items		Standard value	Limit
Steering wheel free play mm	when engine running	-	30 or less
	with engine stopped	0 - 10	-
Steering angle	Inner wheel	31°45' ± 1°30'	-
	Outer wheel <for reference>	27°15'	-
Ball joint turning torque N·m		1.0 - 3.0	-
Stationary steering effort N	Steering effort	32 or less	-
	Fluctuation allowance	6.0 or less	-
Oil pump relief pressure MPa		8.4 - 9.0	-
Pressure under no-load conditions MPa		0.2 - 0.8	-
Steering gear retention hydraulic pressure MPa		8.4 - 9.0	-
Oil pressure switch operating pressure MPa	OFF→ON	1.8 - 2.4	-
	ON→OFF	1.0 - 2.4	-
Total pinion torque N·m	Total rotation torque	0.8 - 1.8	-
	Torque variation	0.49 or less	-
Tie rod joint swing resistance N (Tie rod joint swing torque N·m)		8 - 27 (1.5 - 4.9)	-
Opening dimension of special tool (MB991561) mm		2.9	-
Band crimped width mm		2.4 - 2.8	-

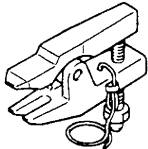
LUBRICANTS

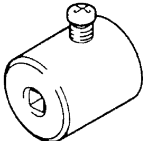
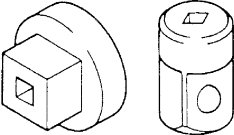
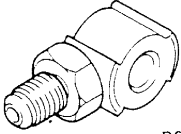
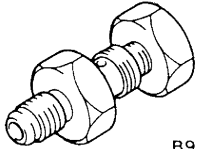
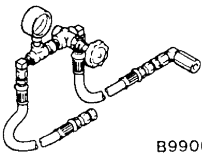
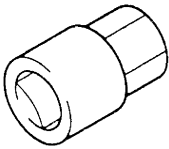
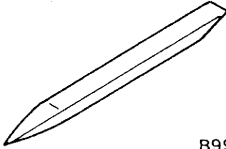
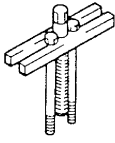
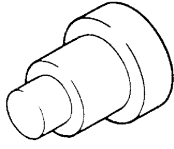
Items	Specified lubricant	Quantity
Power steering fluid	Automatic transmission fluid DEXRON II	Approx. 1.0 L
Tie rod bellows	Silicone grease	As required
Pinion and valve assembly	Repair kit grease	As required
Rack assembly		

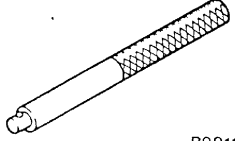
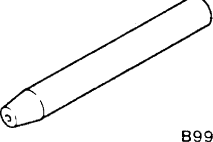
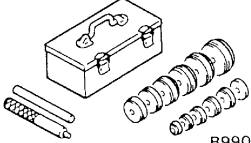
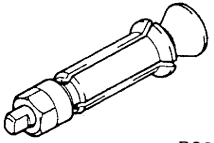
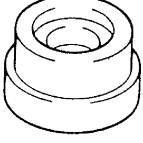
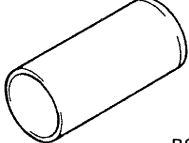
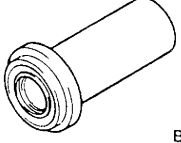
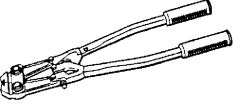
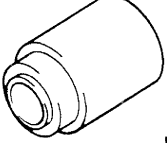
SEALANT

Items	Specified sealant	Remarks
Toe board (steering shaft cover mounting bolt hole)	3M ATD Part No. 8513 or equivalent	Drying sealant
Rack support cover end plug	3M ATD Part No. 8661, 8663 or equivalent	Semi-drying sealant

SPECIAL TOOLS

Tool	Number	Name	Use
 B991113	MB990635, MB991113 or MB991406	Steering linkage puller	Disconnection of tie rod end

Tool	Number	Name	Use
 <p>B991006</p>	MB991006	Preload socket	Measurement of the total pinion torque
 <p>B990326</p>	MB990326	Preload socket	Measurement of the ball joint turning torque
 <p>B990993</p>	MB990993	Power steering oil pressure gauge adapter (pump side)	Measurement of oil pressure
 <p>B990994</p>	MB990994	Power steering oil pressure gauge adapter (hose side)	
 <p>B990662</p>	MB990662	Oil pressure gauge assembly	Measurement of oil pressure
 <p>B991204</p>	MB991204	Torque wrench socket	<ul style="list-style-type: none"> ● Adjustment of rack support ● Removal of rack support cover
 <p>B990784</p>	MB990784	Ornament remover	Removal of steering wheel cover <RS (OPTION), RS-II>
 <p>B990803</p>	MB990803	Steering wheel puller	Disconnection of the steering wheel
 <p>B991202</p>	MB991199	Oil seal and bearing installer	<ul style="list-style-type: none"> ● Press fitting of rack housing bearing ● To press in the oil seal for the rack

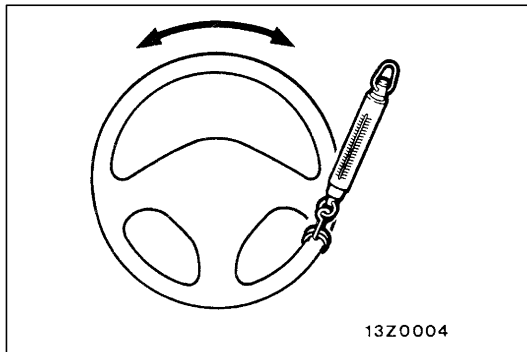
Tool	Number	Name	Use
 <p style="text-align: center;">B991197</p>	MB991197	Bar (long type)	<ul style="list-style-type: none"> ● Press fitting of rack housing bearing ● To press in the oil seal for the rack
 <p style="text-align: center;">B991212</p>	MB991214	Rack installer	Rack installation
 <p style="text-align: center;">B990925</p>	MB990925	Bearing and oil seal installer set	Installation of the oil seal and bearing (Refer to GROUP 26 - Special Tools.)
 <p style="text-align: center;">B991120</p>	MB991120	Needle bearing puller	Removal of rack housing needle bearing
 <p style="text-align: center;">B991203</p>	MB991203	Oil seal and bearing installer	To press in the valve housing oil seal and bearing
 <p style="text-align: center;">B991317</p>	MB991317	Seal ring installer	Compression of the seal rings after replacement of the pinion seal rings
 <p style="text-align: center;">B990941</p>	MB990941	Torque tube bearing installer	Installation of valve housing oil seal
	MB991561	Boot band crimping tool	Installation of bellows band
 <p style="text-align: center;">B990776</p>	MB990776	Front axle base	Installation of dust cover for tie rod end ball joint

ON-VEHICLE SERVICE

STEERING WHEEL FREE PLAY CHECK

1. With engine running (hydraulic operation), set front wheels straight ahead.
2. Measure the play on steering wheel circumference before wheels start to move when slightly moving steering wheel in both directions.

Limit: 30 mm or less



3. When play exceeds the limit, check for play on steering shaft connection and steering linkage. Correct or replace.
4. If the free play still exceeds the limit value, set steering wheel straight ahead with engine stopped. Load 5 N towards steering wheel circumference and check play.

Standard value: 0 - 10 mm

5. If the play exceeds the standard value, remove steering gear box and check total pinion torque. (Refer to P.37A-17.)

STEERING ANGLE CHECK

1. Locate front wheels on turning radius gauge and measure steering angle.

Standard value:

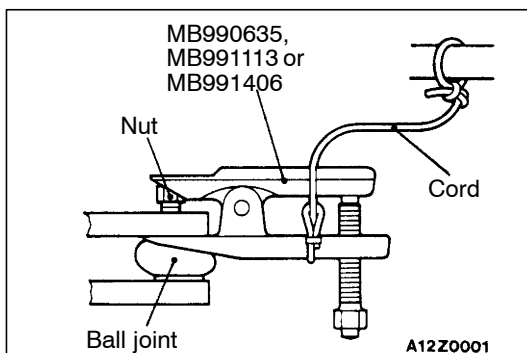
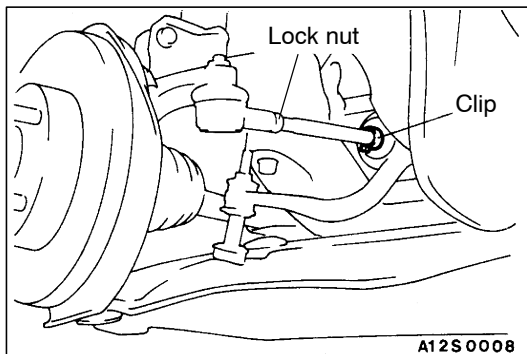
Inner wheel	$31^{\circ}45' \pm 1^{\circ}30'$
Outer wheel<For reference>	$27^{\circ}15'$

2. When the angle is not within the standard value, the toe-in is probably incorrect. Adjust the toe-in.

Standard value: 0 ± 2 mm

Adjust the toe-in by undoing the clip and lock nut, and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).

3. Recheck the steering angle.

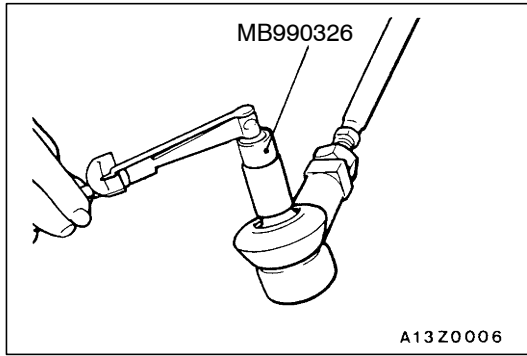


TIE ROD END BALL JOINT TURNING TORQUE CHECK

1. Disconnect tie rod and knuckle with special tool.

Caution

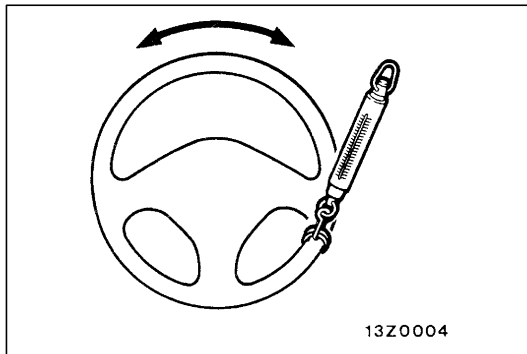
- (1) Loosen the nut of the special tool, but do not remove it. If it is removed, the ball joint thread may be damaged.
- (2) Tie the special tool with a cord so as not to fall off.



2. Move ball joint stud several times and install nut on stud. Measure ball joint turning torque with special tool.

Standard value: 1.0 - 3.0 N·m

3. When the turning torque exceeds the standard value, replace tie rod end.
4. When the turning torque is under the standard value, check ball joint for end play or ratcheting. If none of these, the joint is still serviceable.



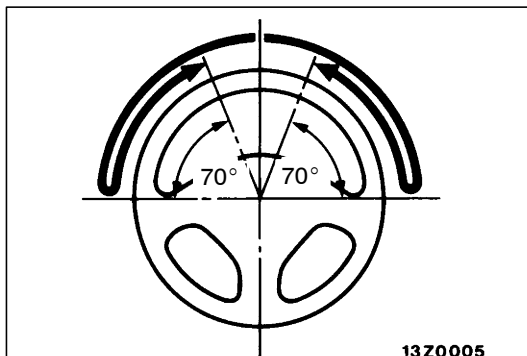
STATIONARY STEERING EFFORT CHECK

1. With the vehicle stopped on a flat, paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and set it to $1,000 \pm 100$ r/min.
3. Attach a spring balance to the outer circumference of the steering wheel and measure the steering force required to turn the steering wheel from the straight ahead position to the left and right (within a range of 0.9 turns). Also check to be sure that there is no significant fluctuation of the required steering force.

Standard value:

Steering effort	32 N or less
Fluctuation allowance	6.0 N or less

4. If the standard values are not met, check and adjust the related parts.



CHECKING STEERING WHEEL RETURN TO CENTRE

To make this test, conduct a road test and check as follows.

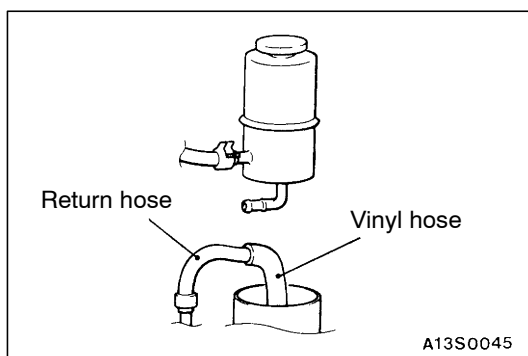
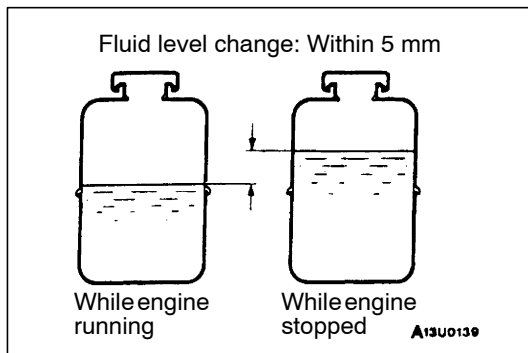
1. Make both gradual and sudden turns and check the steering "feeling" to be sure that there is not difference in the steering force required and the wheel return between left and right turns.
2. At a speed of 35 km/h, turn the steering wheel 90° and release the steering wheel after 1 or 2 seconds. If the steering wheel then returns 70° or more, the return can be judged to be satisfactory.

NOTE

There will be a momentary feeling or "heaviness" when the wheel is turned quickly, but this is not abnormal. (This is because the oil pump discharge amount is especially apt to be insufficient during idling.)

DRIVE BELT TENSION CHECK

Refer to GROUP 11A - On-vehicle Service.



POWER STEERING FLUID LEVEL CHECK

1. Park the vehicle on a flat, level surface, start the engine, and then turn the steering wheel several times to raise the temperature of the fluid to approximately 50-60°C.
2. With the engine running, turn the wheel all the way to the left and right several times.
3. Check the fluid in the oil reservoir for foaming or milkiness. Check the difference of the fluid level when the engine is stopped, and while it is running. If the change of the fluid level is 5 mm or more, air bleeding should be done.

POWER STEERING FLUID REPLACEMENT

1. Raise the front wheels on a jack, and then support them with rigid racks.
2. Disconnect the return hose connection.
3. Connect a vinyl hose to the return hose, and drain the oil into a container.
4. Disconnect the ignition coil connectors. (Refer to GROUP16 - Ignition System.)
5. While operating the starting motor intermittently, turn the steering wheel all the way to the left and right several times to drain all of the fluid.
6. Connect the return hoses securely, and then secure it with the clip.
7. Fill the oil reservoir with specified fluid up to the lower position of the filter, and then bleed air.

Specified fluid:

Automatic transmission fluid DEXRON II

Caution

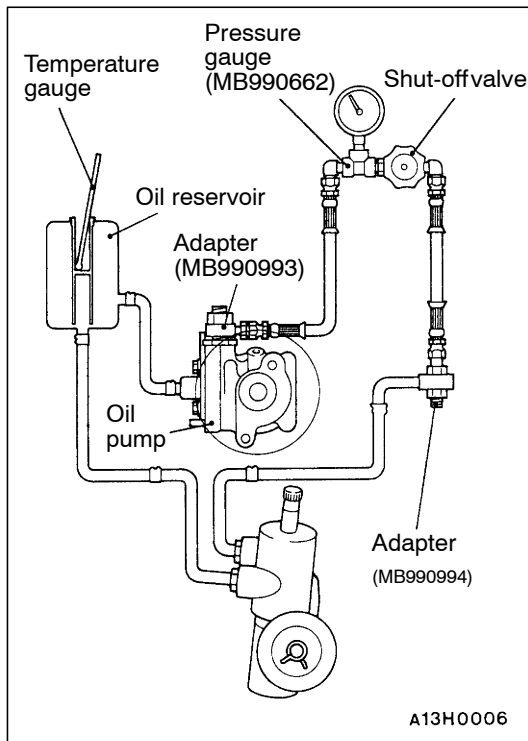
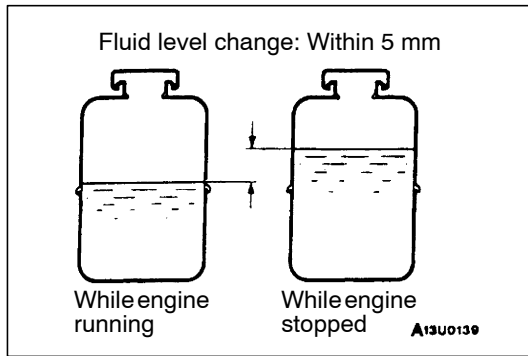
Do not use ATF-SP II M and ATF-SP III.

POWER STEERING SYSTEM BLEEDING

1. Jack up the vehicle and support the front wheels with rigid racks.
2. Disconnect the ignition coil connectors. (Refer to GROUP16 - Ignition System.)
3. Cranking the engine with the starter several times intermittently (during 15 to 20 seconds), turn the steering wheel left and right fully five or six times.

Caution

- (1) **During the bleeding, refill the fluid so that the level never falls below the lower position of the filter.**
- (2) **Be sure to bleed air only while cranking. If the bleeding is done with the engine running, the air will be broken up and absorbed into the fluid.**
4. Connect the ignition coil connectors and idle the engine.
5. Turn the steering wheel left and right fully until no bubbles comes out in the oil reservoir.
6. See that the fluid is not milky and that the fluid level is up to the specified position on the level gauge.
7. See that the fluid level changes little when the steering wheel is turned left and right.
8. Check difference in fluid levels between the engine stopped and running.



9. If the level changes more than 5 mm, the air is badly bled. So, bleed air again.

Caution

- (1) If the fluid level rises suddenly after the engine is stopped, the bleeding is incomplete.
- (2) Incomplete bleeding causes abnormal noises from the pump and the flow-control valve. This could lessen the life of the pump and the other parts.

OIL PUMP PRESSURE TEST

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50-60°C.
3. Start the engine and idle it at 1,000±100 r/min.
4. Fully close the shut-off valve of the pressure gauge and measure the oil pump relief pressure to confirm that it is within the standard value range.

Standard value: 8.4 - 9.0 MPa

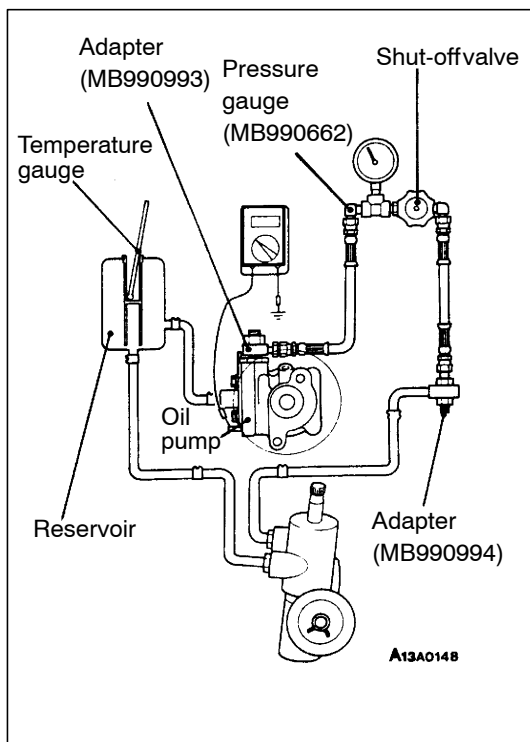
5. If the standard value is not met, the oil pump is defective. So, replace the oil pump. Then, measure oil pressure again.
6. With the pressure gauge shut-off valve fully open, check the hydraulic pressure in unladen condition.
7. If the standard value is not met, the oil line or steering gear is probably defective. So, repair and measure oil pressure again.
8. Turn the steering wheel fully either left or right and check the retention hydraulic pressure.

Standard value: 8.4 - 9.0 MPa

9. If the pressure is below the standard value, disassemble and reassemble the steering gear. If above, replace the oil pump. Then, measure oil pressure again.
10. Remove the special tools, and tighten the pressure hose to the specified torque.

Tightening torque: 18 ± 3 N·m

11. Bleed the system.



POWER STEERING OIL PRESSURE SWITCH CHECK

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50-60°C.
3. The engine should be idling.
4. Disconnect the connection of the connector for the oil pressure switch, and set an ohmmeter in position.
5. Gradually close the shut-off valve of the pressure gauge and increase the hydraulic pressure, then check whether or not the hydraulic pressure that activates the switch is the standard value.

Standard value: 1.8 - 2.4 MPa

6. Gradually open the shut-off valve and reduce the hydraulic pressure; then check whether or not the hydraulic pressure that deactivates the switch is the standard value.

Standard value: 1.0 - 2.4 MPa

7. Remove the special tools, and then tighten the pressure hose to the specified torque.

Tightening torque: 18 ± 3 N·m

8. Bleed the system.

BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the tie rod end.

NOTE

Cracks or damage of the dust cover may cause damage of the ball joint.

STEERING WHEEL

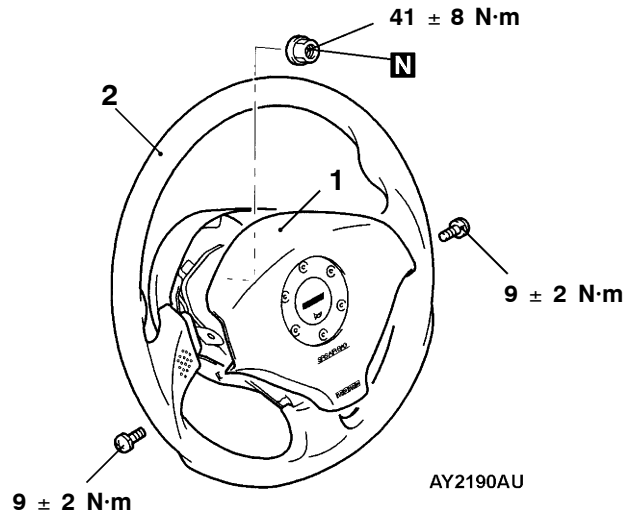
REMOVAL AND INSTALLATION

Caution:

Before removing the steering wheel and air bag module assembly, refer to GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.

Post-installation Operation
Checking Steering Wheel Position with Wheels Straight Ahead

<RS (standard)>

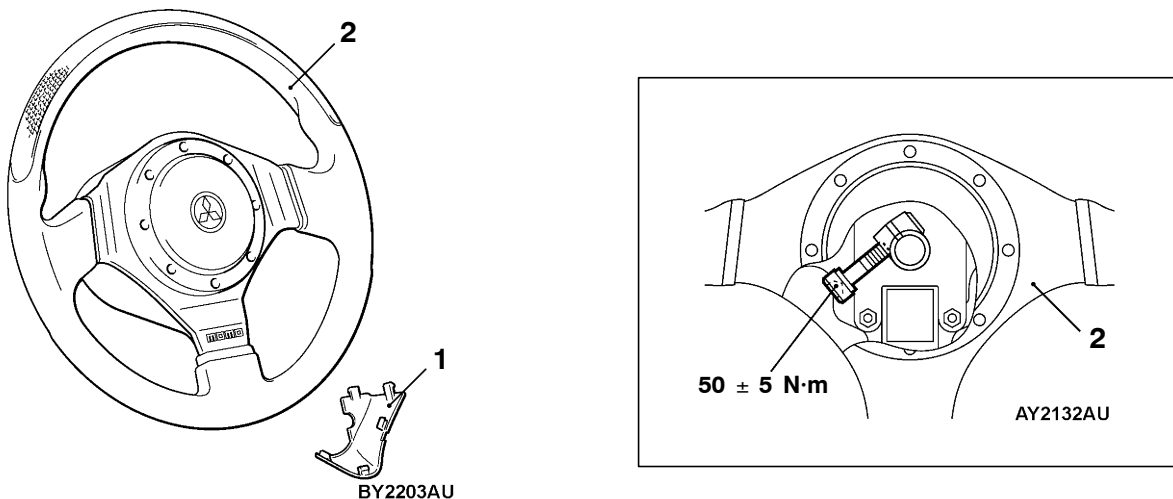


Removal steps

1. Air bag module assembly
2. Steering wheel



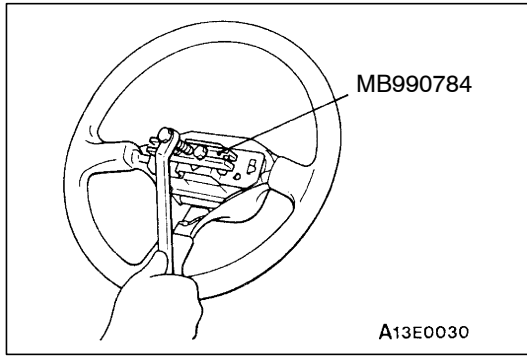
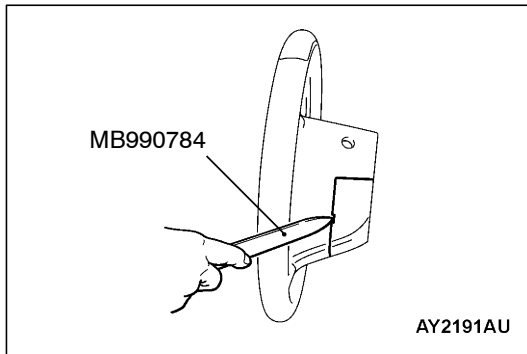
<RS (option), RS-II>



Removal steps

1. Cover
2. Steering wheel and air bag module assembly

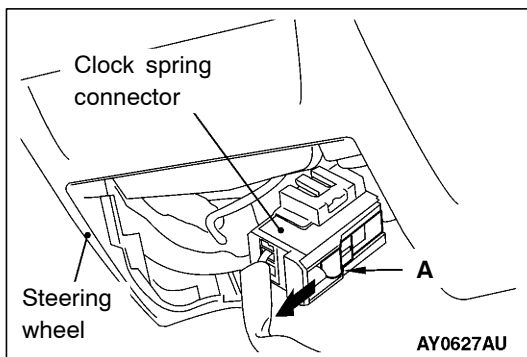


**REMOVAL SERVICE POINTS****◀A▶ STEERING WHEEL REMOVAL <RS (standard)>****◀B▶ COVER REMOVAL <RS (option), RS-II>**

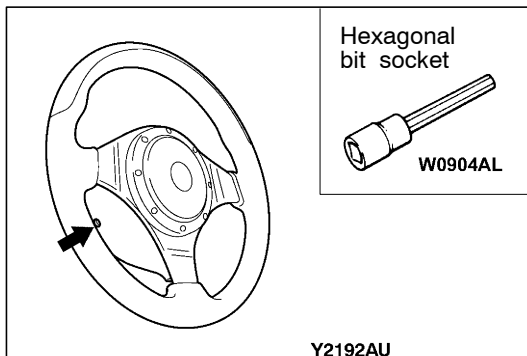
Insert the special tool from the indicated position to remove the cover.

NOTE

The special tool can be inserted through the notch behind the position shown.

**◀C▶ STEERING WHEEL AND AIRBAG MODULE ASSEMBLY REMOVAL <RS (option), RS-II>**

1. By sliding section A of the clock spring connector shown in the illustration in the arrow direction, disconnect the connector.



2. Loosen the bolt completely. Then, remove the steering wheel and airbag module assembly.

NOTE

Use a hexagonal bit socket or a hexagonal wrench having an effective length of 75 mm or more in the hexagonal section and the diameter of 8 mm or more.

STEERING SHAFT

REMOVAL AND INSTALLATION

Caution:

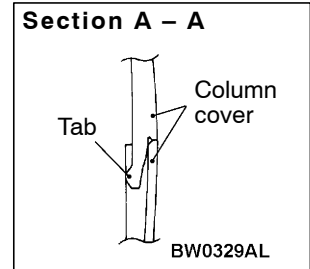
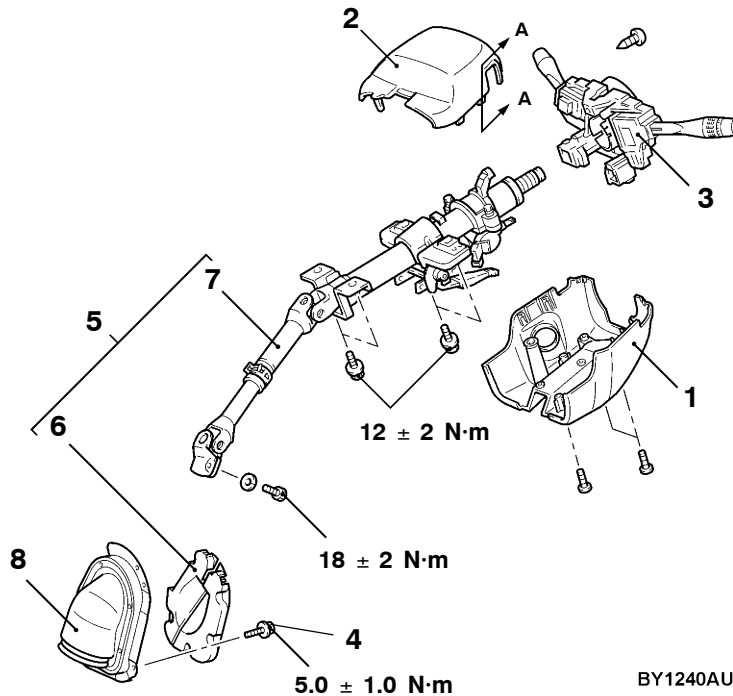
Before removing clock spring, refer to **GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.**

Pre-removal Operation

- Steering Wheel Removal (Refer to P.37A-12.)
- Instrument Under Cover Removal (Refer to GROUP 52A.)

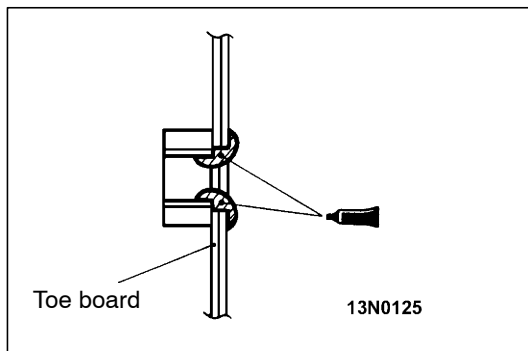
Post-installation Operation

- Instrument Under Cover Installation (Refer to GROUP 52A.)
- Steering Wheel Installation (Refer to P.37A-12.)
- Checking Steering Wheel Position with Wheels Straight Ahead



Removal steps

- | | |
|--|---|
| 1. Lower column cover | 5. Steering column shaft assembly and Shaft cover |
| 2. Upper column cover | 6. Shaft cover |
| 3. Clock spring and column switch assembly (Refer to GROUP 52B.) | 7. Steering column shaft assembly |
| 4. Bolt | 8. Cover assembly |



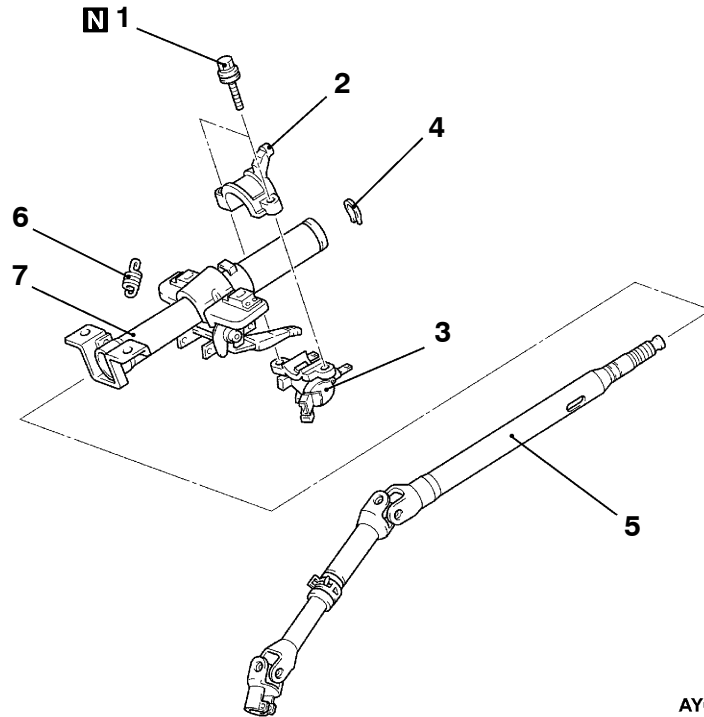
INSTALLATION SERVICE POINT

▶A◀ BOLT INSTALLATION

Before installing the bolt, coat the mounting hole on the toe board with the specified sealant.

Specified sealant: 3M ATD Part No.8513 or equivalent

DISASSEMBLY AND REASSEMBLY



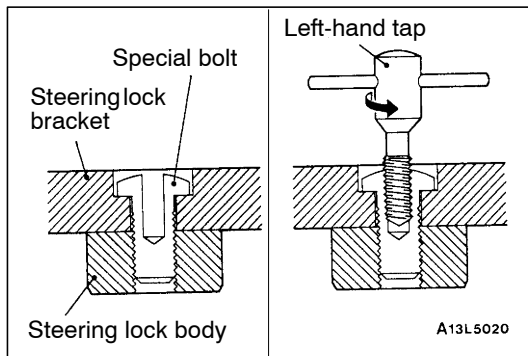
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Disassembly steps



1. Special bolt
2. Steering lock bracket
3. Steering lock cylinder assembly
4. Snap ring

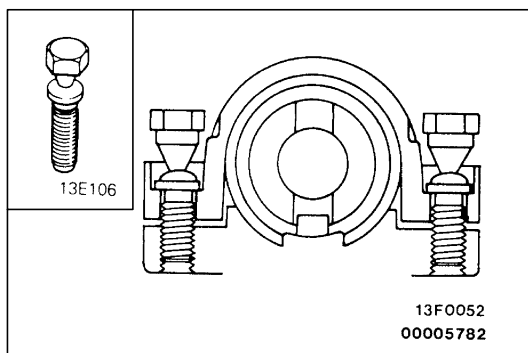
5. Steering shaft assembly
6. Tilt spring
7. Steering column assembly



DISASSEMBLY SERVICE POINT

◀A▶ SPECIAL BOLT REMOVAL

1. Drill in the special bolt a hole deep enough for the tap to stand.
2. Remove the special bolt with a left-hand tap.



REASSEMBLY SERVICE POINT

▶A◀ STEERING LOCK CYLINDER ASSEMBLY/ STEERING LOCK BRACKET/SPECIAL BOLT INSTALLATION

1. When installing the steering lock cylinder assembly and steering lock bracket to the steering column assembly, temporarily install the steering lock in alignment with the column boss.
2. Check that the steering lock works properly. Then, tighten the special bolts until the heads twists off.

POWER STEERING GEAR BOX AND LINKAGE

REMOVAL AND INSTALLATION

Caution: SRS

Before removing steering gear box, refer to GROUP 52B. Also, put the front wheels in straight-ahead position. Failure to do so may damage the SRS clock spring and render the SRS air bag inoperative, which results serious driver injury.

Caution

If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper because the paint of caliper will be scratched. And if there is brake fluid on the caliper, wipe out quickly.

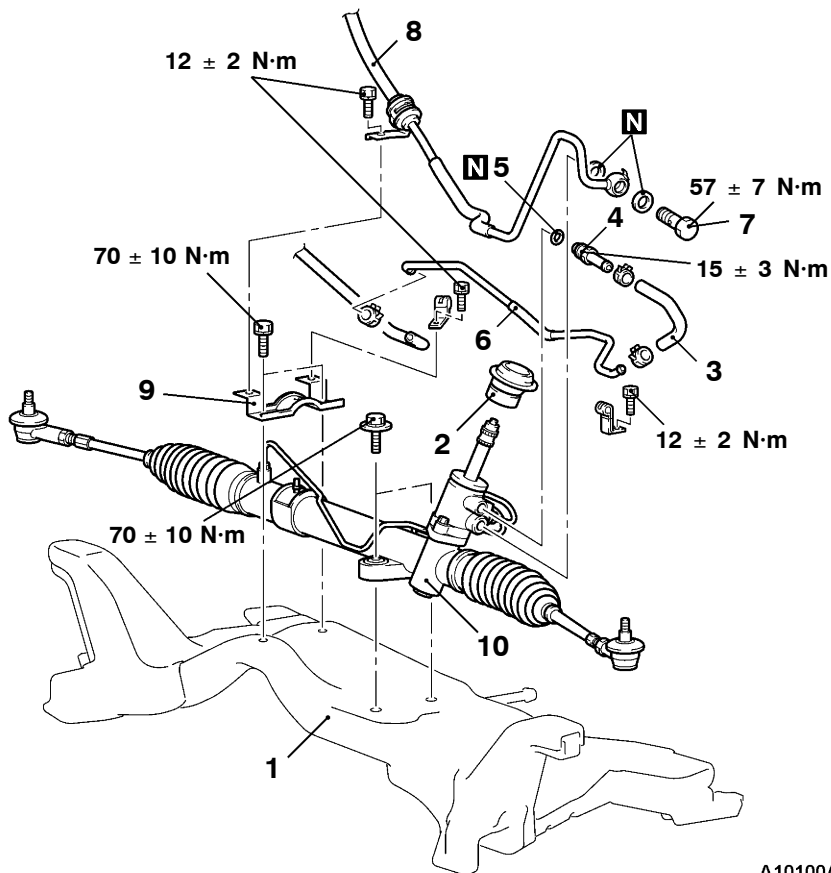
Pre-removal Operation

- Clock Spring Removal (Refer to GROUP 52B.)
- Power Steering Fluid Draining (Refer to P.37A-9.)

Post-installation Operation

- Clock Spring Installation (Refer to GROUP 52B.)
- Power Steering Fluid Supplying and bleeding (Refer to P.37A-9.)
- Checking Steering Wheel Position with Wheels Straight Ahead

<L.H. drive vehicles>



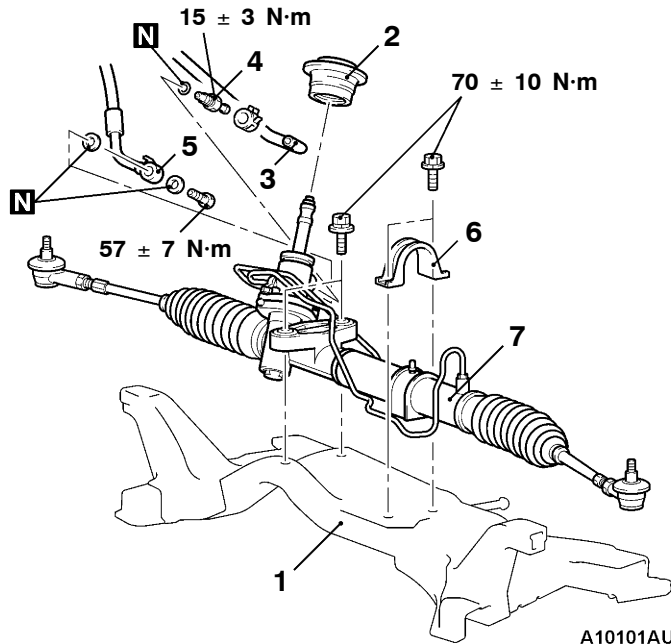
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Removal steps

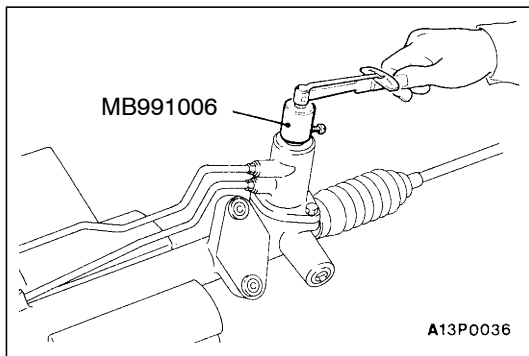
1. Crossmember
(Refer to GROUP 32.)
2. Joint cover grommet
3. Return hose
4. Return tube

5. O ring
6. Return tube
7. Eye bolt
8. Pressure hose assembly
9. Clamp
10. Steering gear and linkage

<R.H. drive vehicles>

**Removal steps**

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Crossmember
(Refer to GROUP 32.) 2. Joint cover grommet 3. Return hose connection | <ol style="list-style-type: none"> 4. Return tube 5. Pressure hose connection 6. Clamp 7. Steering gear and linkage |
|--|---|

**INSPECTION****GEAR BOX PINION TOTAL ROTATION TORQUE CHECK****Caution**

Secure the steering gear box and linkage in their mounting positions only. Otherwise, deformation or damage could result.

1. Using the special tool, turn the pinion gear at a speed of one rotation per 4 to 6 seconds to measure total rotation torque.

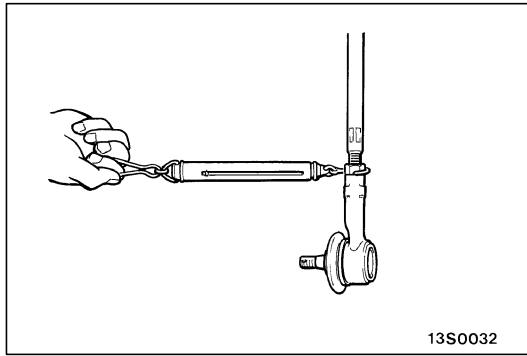
Standard values:

Total rotation torque: 0.8 – 1.8 N·m

Torque fluctuation: 0.49 N·m or less

NOTE

- (1) Remove the bellows from the rack housing before measuring.
 - (2) Measure the total rotation torque by turning the special tool left and right 180° from the neutral position.
2. If the standard values are not met, adjust the pinion total rotation torque. (Refer to P.37A-26.)
 3. In case the adjustment is impossible, disassemble and check the components, and repair if necessary.

**TIE ROD SWING RESISTANCE CHECK**

1. Swing the tie rod 10 times hardly.
2. With the tie rod end downwards as shown, use a spring scale to measure swing resistance (swing torque).

Standard value: 8 - 27 N (1.5 - 4.9 N·m)

3. If the measured value is above the standard value, replace the tie rod.
4. If below, check the ball joint for looseness or ratcheting. The tie rod is still serviceable when the ball joint swings smoothly.

TIE ROD END BALL JOINT DUST COVER CHECK

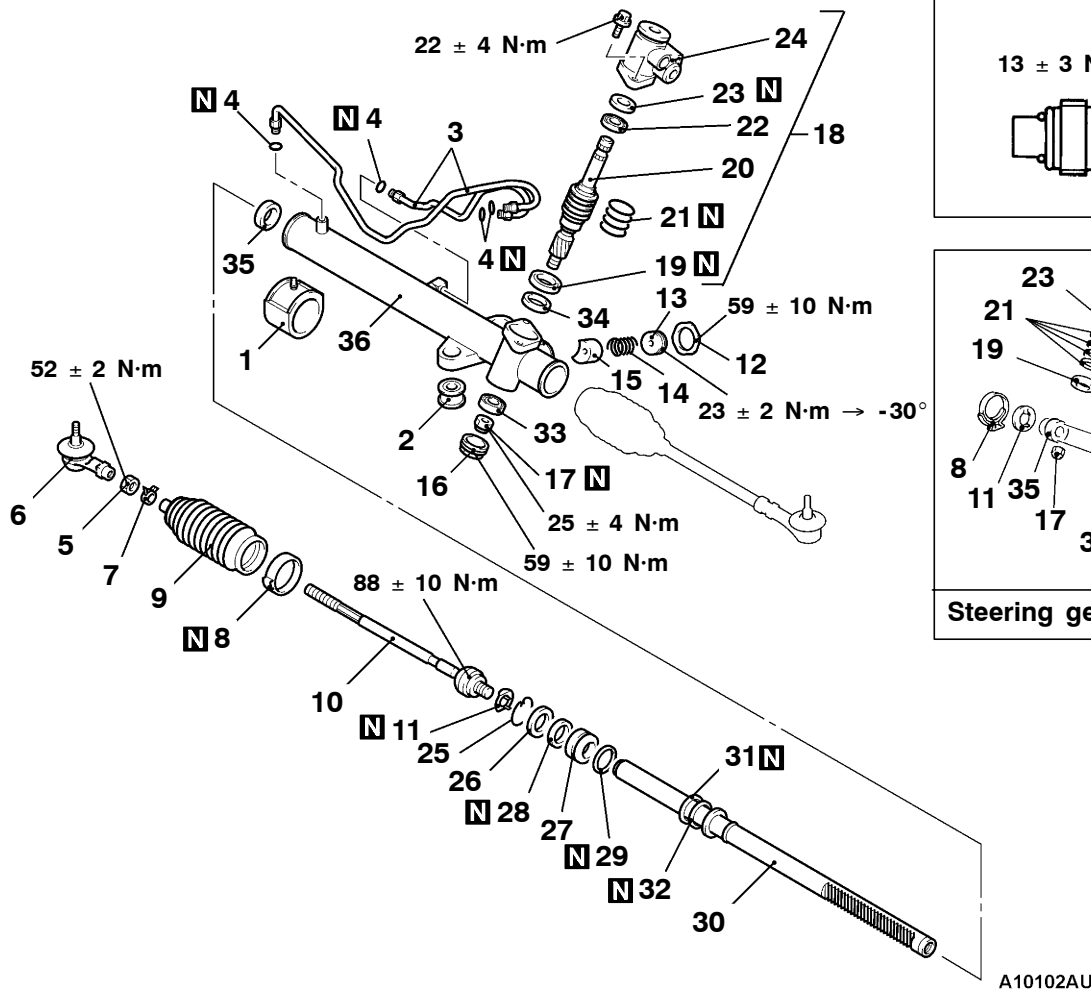
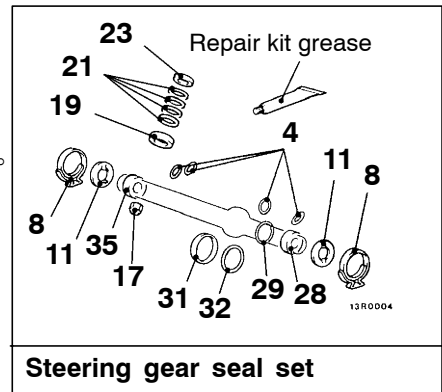
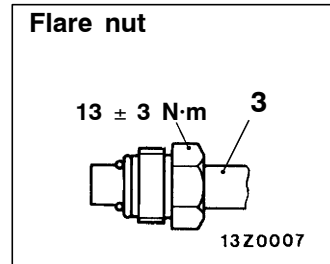
1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the tie rod end. (Refer to P.37A-19, 20.)

NOTE

A cracked or damaged dust cover may damage the ball joint. Replace the dust cover when it is damaged during service work.

DISASSEMBLY AND REASSEMBLY

<L.H. drive vehicles>

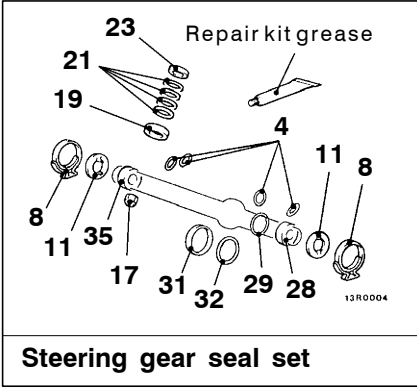
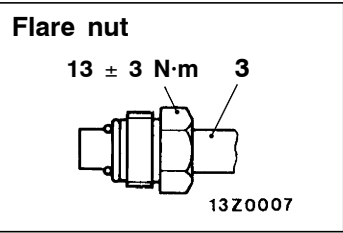
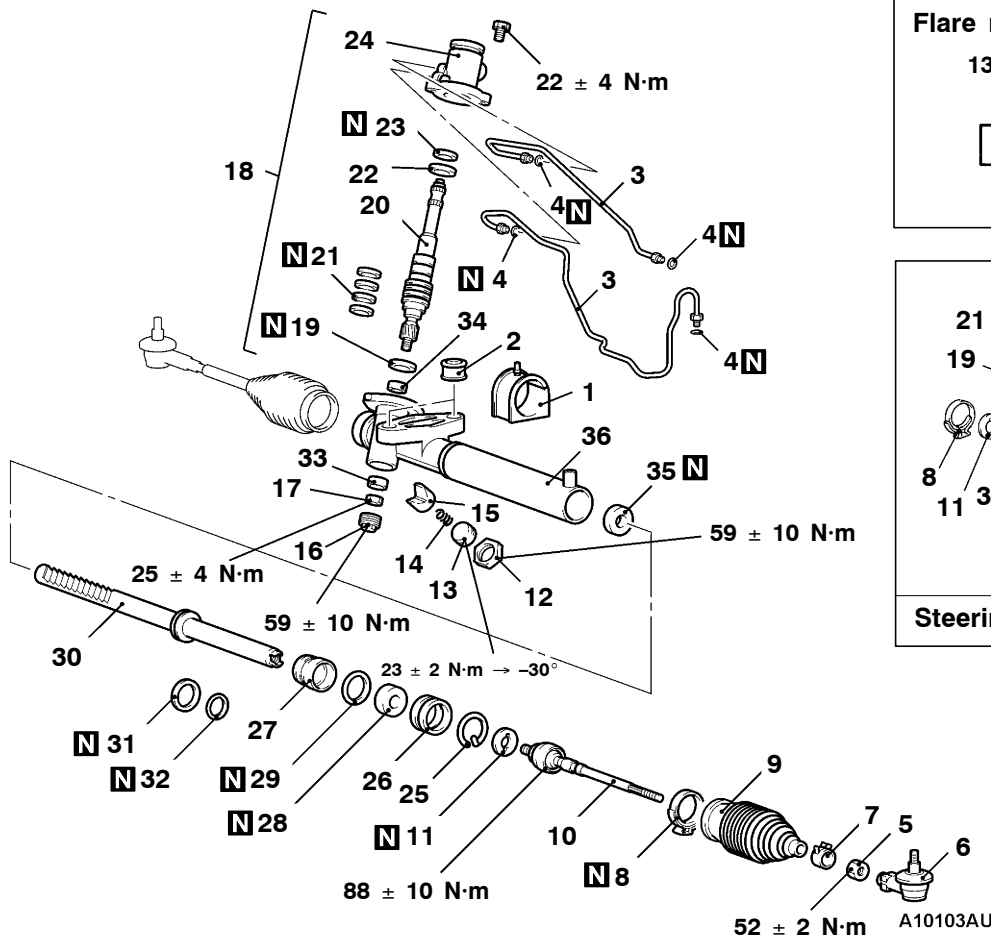


Disassembly steps

- ▶O◀ 1. Gear mounting rubber cushion
- ▶N◀ 2. Gear housing mounting bushing
- ▶N◀ 3. Feed pipe
- ▶N◀ 4. O-ring
- ▶N◀ 5. Lock nut
- ▶N◀ 6. Tie rod end
- ▶N◀ 7. Clip
- ▶M◀ 8. Band
- ▶M◀ 9. Bellows
- ▶L◀ 10. Tie rod
- ▶L◀ 11. Tab washer
- ▶K◀ ● Total pinion rotating torque adjustment
- ▶J◀ 12. Lock nut
- ▶J◀ 13. Rack support cover
- ▶A◀ 14. Support spring
- ▶I◀ 15. Rack support
- ▶I◀ 16. End plug
- ▶I◀ 17. Lock nut

- ▶H◀ 18. Valve housing assembly
- ▶B◀ 19. Lower oil seal
- ▶B◀ 20. Pinion and valve assembly
- ▶G◀ 21. Seal ring
- ▶D◀ 22. Upper bearing
- ▶F◀ 23. Upper oil seal
- ▶F◀ 24. Valve housing
- ▶E◀ 25. Circlip
- ▶F◀ 26. Rack stopper
- ▶D◀ 27. Rack bushing
- ▶D◀ 28. Oil seal
- ▶F◀ 29. O-ring
- ▶F◀ 30. Rack assembly
- ▶C◀ 31. Seal ring
- ▶C◀ 32. O-ring
- ▶B◀ 33. Lower bearing
- ▶B◀ 34. Needle bearing
- ▶A◀ 35. Oil seal
- ▶A◀ 36. Gear housing

<R.H. drive vehicles>

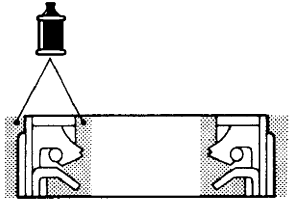


Disassembly steps

- ▶O◀ 1. Gear mounting rubber cushion
- ▶N◀ 2. Gear housing mounting bushing
- ▶N◀ 3. Feed pipe
- ▶N◀ 4. O-ring
- ▶M◀ 5. Lock nut
- ▶M◀ 6. Tie rod end
- ▶L◀ 7. Clip
- ▶L◀ 8. Band
- ▶L◀ 9. Bellows
- ▶L◀ 10. Tie rod
- ▶L◀ 11. Tab washer
- ▶K◀ • Total pinion rotating torque adjustment
- ▶J◀ 12. Lock nut
- ◀A▶▶J◀ 13. Rack support cover
- ▶I◀ 14. Support spring
- ▶I◀ 15. Rack support
- ▶I◀ 16. End plug
- ▶I◀ 17. Lock nut

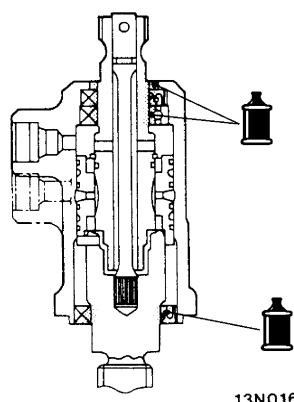
- ▶B◀▶H◀ 18. Valve housing assembly
- ▶B◀▶H◀ 19. Lower oil seal
- ▶C◀▶G◀ 20. Pinion and valve assembly
- ▶D◀▶F◀ 21. Seal ring
- ▶D◀▶F◀ 22. Upper bearing
- ▶E◀▶E◀ 23. Upper oil seal
- ▶F◀▶D◀ 24. Valve housing
- ▶F◀▶D◀ 25. Circlip
- ▶F◀▶D◀ 26. Rack stopper
- ▶F◀▶D◀ 27. Rack bushing
- ▶F◀▶D◀ 28. Oil seal
- ▶F◀▶C◀ 29. O-ring
- ▶C◀▶C◀ 30. Rack assembly
- ▶G◀▶B◀ 31. Seal ring
- ▶H◀▶B◀ 32. O-ring
- ▶H◀▶B◀ 33. Lower bearing
- ▶H◀▶B◀ 34. Needle bearing
- ▶H◀▶A◀ 35. Oil seal
- ▶H◀▶A◀ 36. Gear housing

Lubrication and Sealing Points



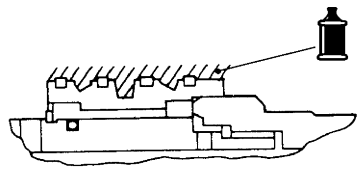
13S0075

Fluid:
Automatic transmission fluid DEXRON II



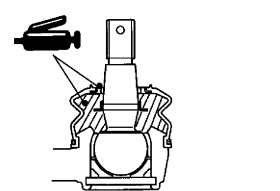
13N0165

Fluid:
Automatic transmission fluid DEXRON II

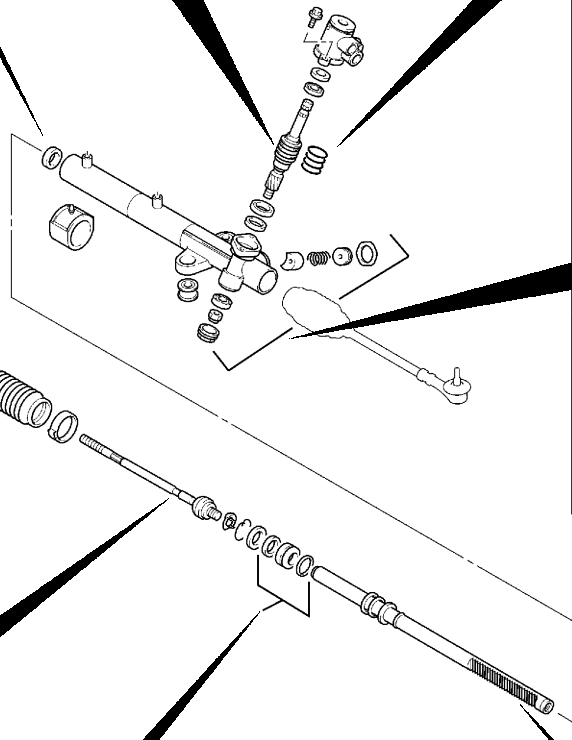
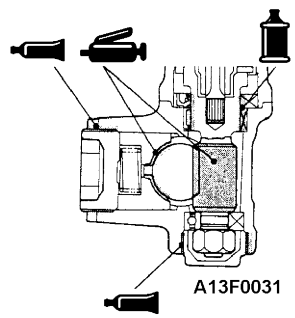


13N0087

Fluid:
Automatic transmission fluid DEXRON II

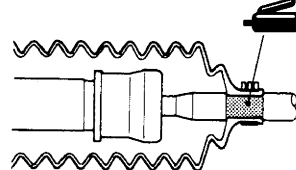


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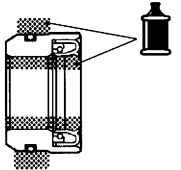
A13F0031

Grease: Repair kit grease
Sealant: 3M ATD part No. 8661, 8663 or equivalent
Fluid:
Automatic transmission fluid DEXRON II



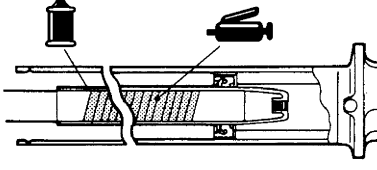
13G0070

Grease: Silicone grease



W0617AU

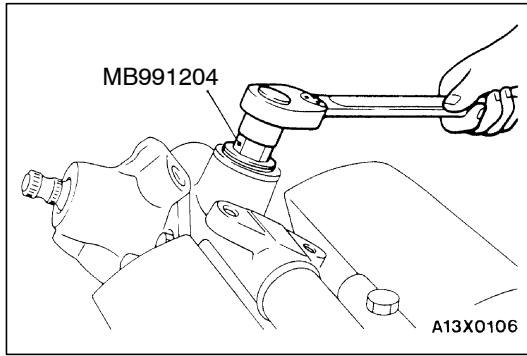
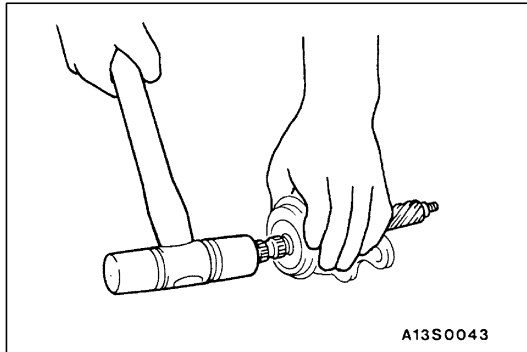
Fluid:
Automatic transmission fluid DEXRON II



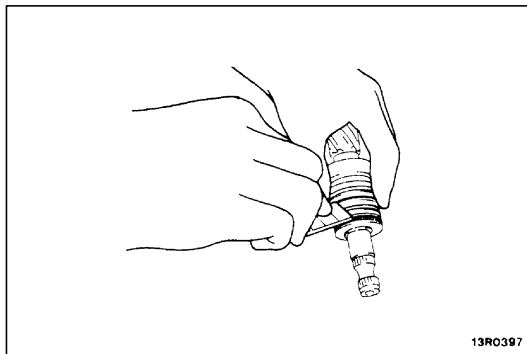
BY1309AU

13S0072

Grease: Repair kit grease
Fluid:
Automatic transmission fluid DEXRON II

**DISASSEMBLY SERVICE POINTS****◀A▶ RACK SUPPORT COVER REMOVAL****◀B▶ LOWER OIL SEAL/PINION AND VALVE ASSEMBLY REMOVAL**

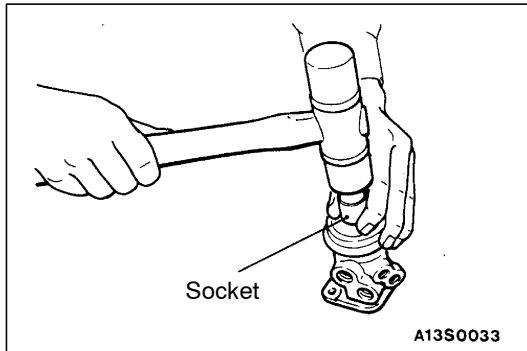
With a plastic hammer, lightly tap the pinion and valve assembly in its spline to remove the lower oil seal and pinion and valve assembly from the valve housing.

**◀C▶ SEAL RING REMOVAL**

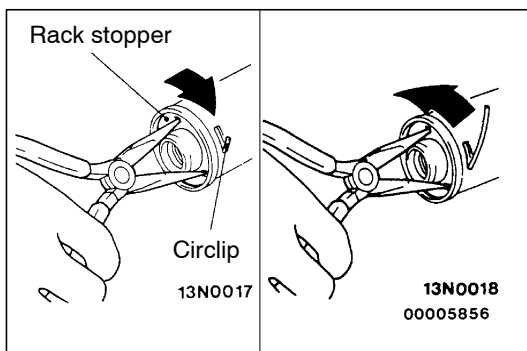
Cut the seal ring to remove from the pinion and valve assembly.

Caution

When cutting the seal ring, be careful not to damage the pinion and valve assembly.

**◀D▶ UPPER BEARING/UPPER OIL SEAL REMOVAL**

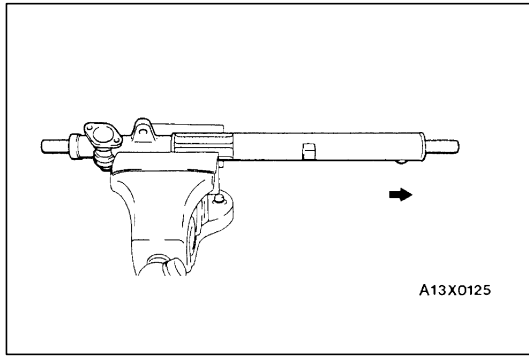
Using a socket, pull out the upper oil seal and bearing from the valve housing.

**◀E▶ CIRCLIP REMOVAL**

1. Turn the rack stopper clockwise until the circlip end comes out of the slot in the rack housing.
2. Turn the rack stopper anticlockwise to remove the circlip.

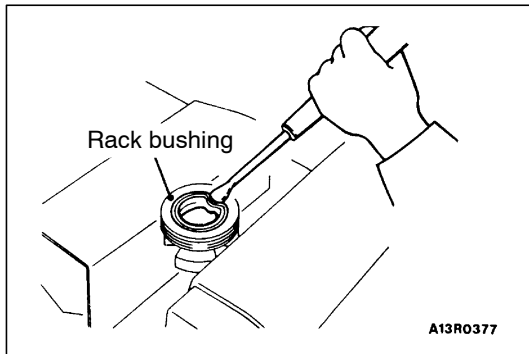
Caution

Do not turn the rack stopper anticlockwise first. Otherwise, the circlip will get caught in the slot in the housing, which makes the rack stopper unable to turn.



◀F▶ **RACK STOPPER/RACK BUSHING/OIL SEAL/O-RING/RACK ASSEMBLY REMOVAL**

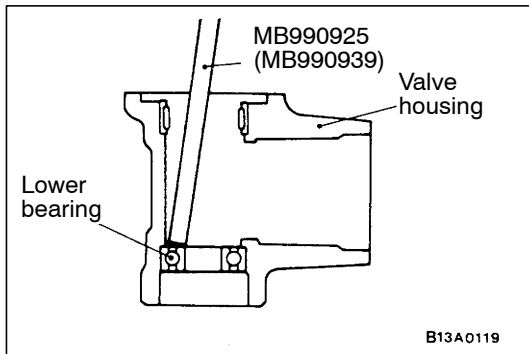
1. Remove the rack stopper, rack bushing, oil seal and O-ring together by pulling out the rack gently.



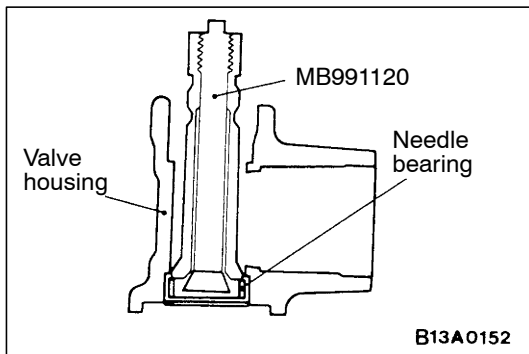
2. Partially bend the oil seal to remove from the rack bushing.

Caution

Use care not to damage the oil seal press-fitting surface of the rack bushing.



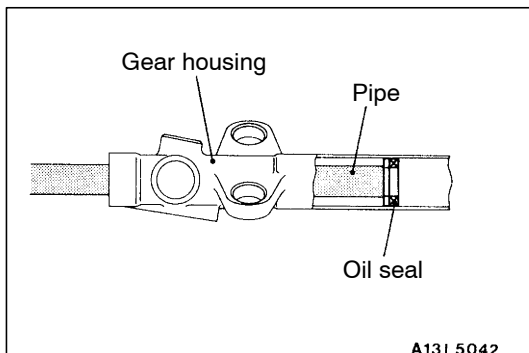
◀G▶ **LOWER BEARING REMOVAL**



◀H▶ **NEEDLE BEARING REMOVAL**

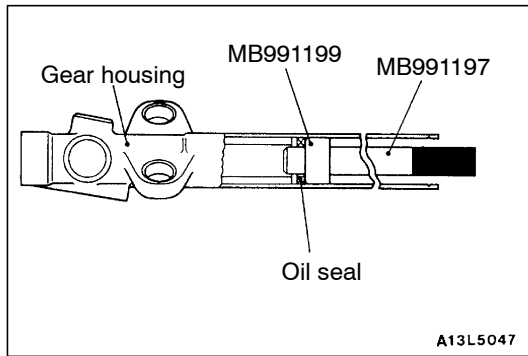
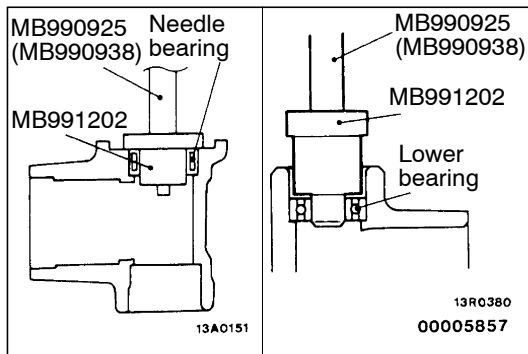
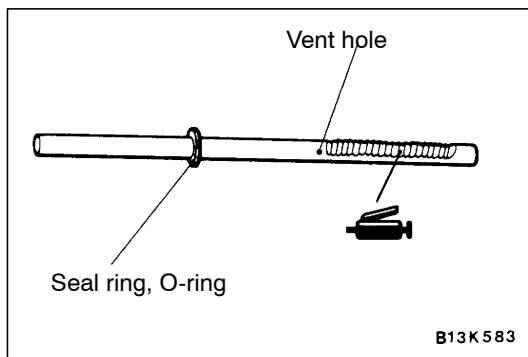
Caution

Do not open the special tool to much, otherwise it may damage the inside surface of the valve housing.



◀I▶ **OIL SEAL REMOVAL**

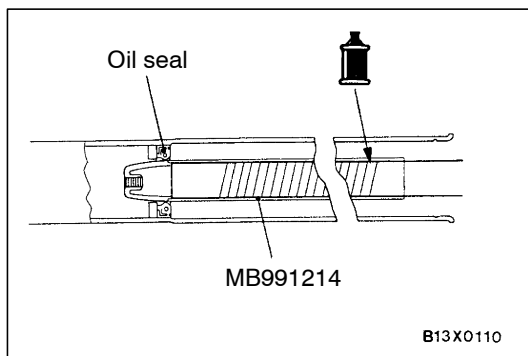
Use a pipe or the like to pull out the oil seal.

**REASSEMBLY SERVICE POINTS****▶A◀ OIL SEAL INSTALLATION****▶B◀ NEEDLE BEARING/LOWER BEARING INSTALLATION****▶C◀ RACK ASSEMBLY INSTALLATION**

1. Apply repair kit grease to the teeth of the rack assembly.

Caution

Use care not to close the vent hole in the rack with grease.



2. Cover the serrations of the rack assembly with the special tool.
3. Apply specified fluid to the outer surfaces of the special tool, seal ring and O-ring.

Specified fluid:

Automatic transmission fluid DEXRON II

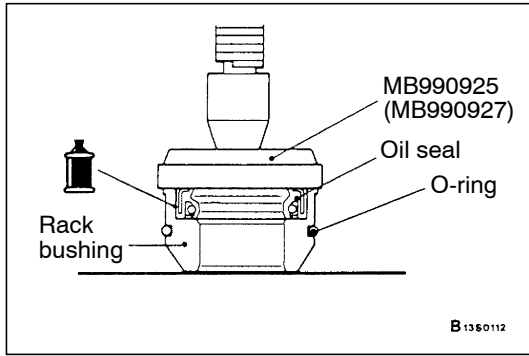
Caution

Do not use ATF-SP II M and ATF-SP III.

4. Slowly insert the rack covered with the special tool from the power cylinder side of the gear housing.

Caution

Carefully push in the rack with the oil seal centre and the special tool end matched. This is to avoid the retainer spring coming off.



►D◄ OIL SEAL/RACK BUSHING INSTALLATION

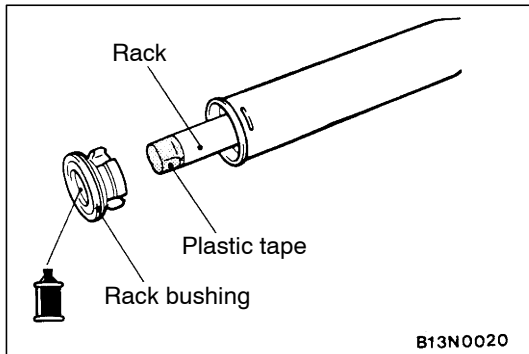
1. Apply specified fluid to the outer surface of the oil seal. Using the special tool, press in the oil seal until it is flush with the bushing end face.

Specified fluid:

Automatic transmission fluid DEXRON II

Caution

Do not use ATF-SP II M and ATF-SP III.



2. Apply the specified fluid to the oil seal inner surface and the O-ring.

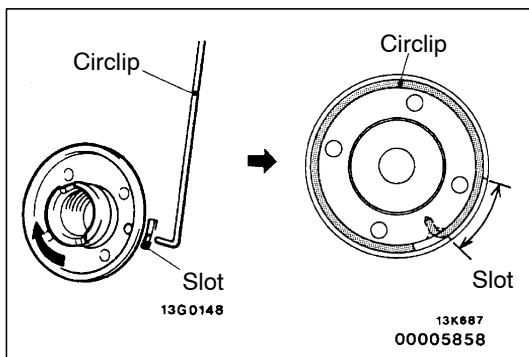
Specified fluid:

Automatic transmission fluid DEXRON II

Caution

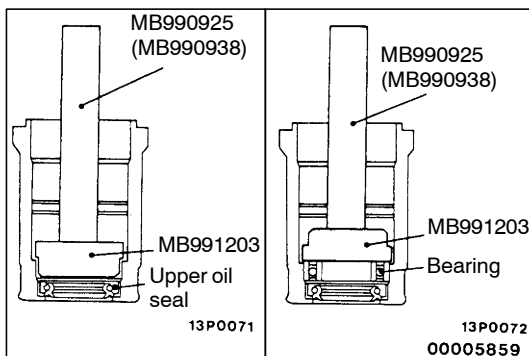
Do not use ATF-SP II M and ATF-SP III.

3. Wrap the rack end with plastic tape, and push the rack bushing onto the rack.

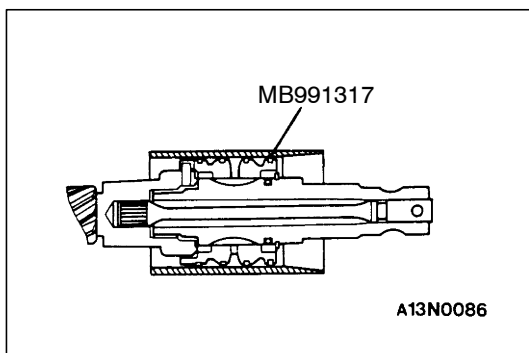


►E◄ CIRCLIP INSTALLATION

Align the mark on the rack stopper and the slot in the cylinder. Then, insert the circlip into the rack stopper hole through the cylinder hole. Turn the rack stopper clockwise and insert the circlip firmly.

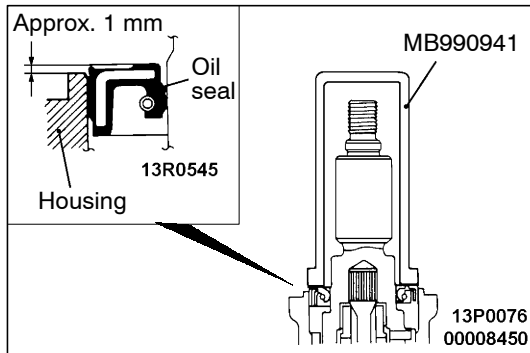


►F◄ UPPER OIL SEAL/UPPER BEARING INSTALLATION



►G◄ SEAL RING INSTALLATION

After installation, using the special tool or by hand, compress seal rings that expand during installation.

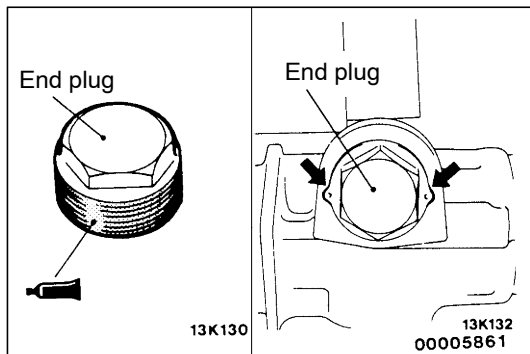


►H◄ LOWER OIL SEAL INSTALLATION

Using the special tool, press the oil seal into the valve housing. The upper surface of the oil seal must project outwards about 1 mm from the housing end surface.

Caution

When the oil seal is flush with or lower than the housing edge, reassemble the components. Otherwise, oil leaks will result.



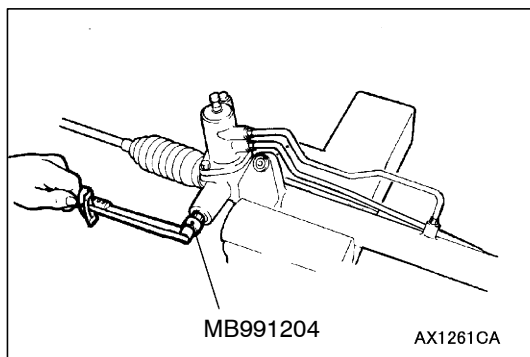
►I◄ END PLUG INSTALLATION

1. Apply specified sealant to the threaded section of the end plug, and then install the end plug to the gear housing.

Specified fluid:

3M ATD Part No.8661, 8663 or equivalent

2. Use a punch to bend over the two tabs on the sides of the end plug to stop the end plug from turning.



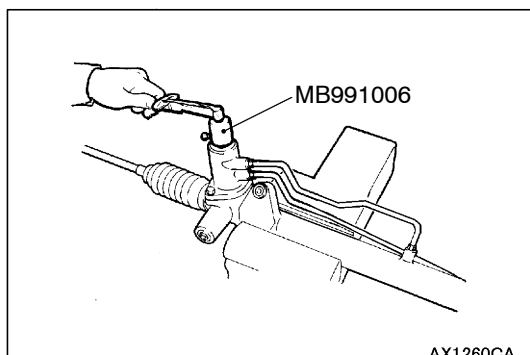
►J◄ RACK SUPPORT COVER/LOCKING NUT INSTALLATION

1. Apply specified sealant to the rack support cover thread.

Specified fluid:

3M ATD Part No.8661, 8663 or equivalent

2. Using the special tool, tighten the rack support cover to 23 ± 2 N·m.
3. Return the rack support cover by about 30° .
4. Tighten the locking nut to the specified torque, using the special tool to prevent the rack support cover from spinning.



►K◄ PINION TOTAL ROTATION TORQUE ADJUSTMENT

1. Using the special tool, measure total rotation torque by turning the pinion gear at a speed of one rotation per 4 to 6 seconds.

Standard value:

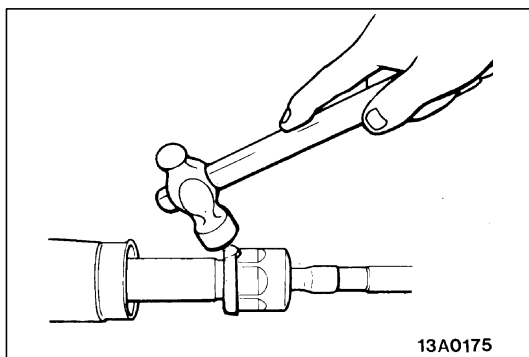
Total rotation torque: 0.8 - 1.8 Nm

Torque fluctuation: 0.49 Nm or less

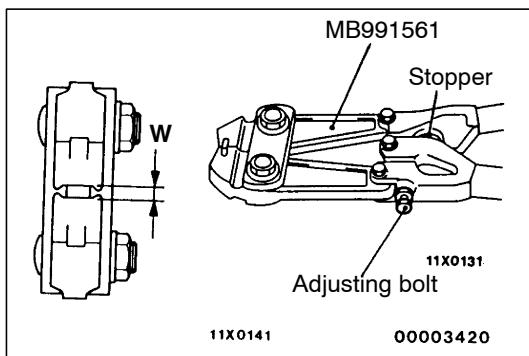
- If the total rotation torque or torque fluctuation does not meet the standard values, adjust by returning the rack support cover within a range of 0 to 30°.

Caution

- Adjust around the maximum limit of the standard values.
 - See that no ratcheting or catching are present when operating the rack towards the shaft direction.
 - Measure the total pinion torque through the whole stroke of the rack.
- If the adjustment is impossible in the given range, check the components of the rack support cover, and replace if necessary.

**►L◄ TAB WASHER/TIE ROD INSTALLATION**

After installing the tie rod to the rack, fold the tab washer end (2 locations) to the tie rod notch.

**►M◄ BELLOWS BAND INSTALLATION**

- Turn the adjusting bolt of the special tool to adjust the opening dimension (W) to the standard value.

Standard value (W): 2.9 mm

<When more than 2.9 mm>

Screw in the adjusting bolt.

<When less than 2.9 mm>

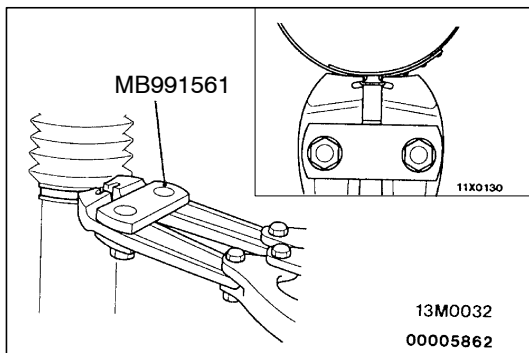
Loosen the adjusting bolt.

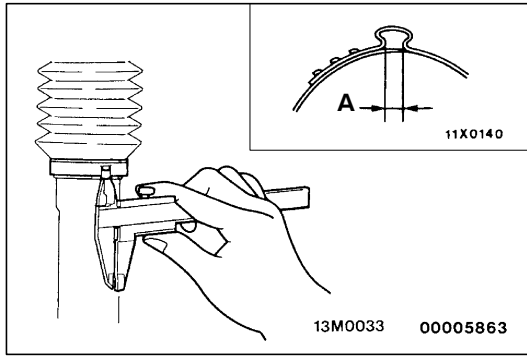
NOTE

- The dimension (W) is adjusted by about 0.7 mm per one turn.
 - Do not turn the adjusting bolt more than one turn.
- Use the special tool to crimp the bellows band.

Caution

- Hold the rack housing, and use the special tool to crimp the bellows band securely.
- Crimp the bellows band until the special tool touches the stopper.





3. See that the crimped width (A) meets the standard value.

Standard value (A): 2.4 - 2.8 mm

<When more than 2.8 mm>

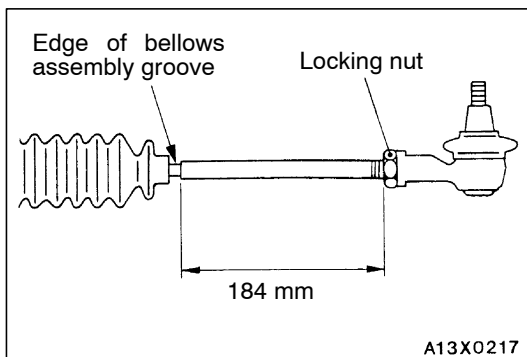
Readjust the dimension (W) of step (1) to the value calculated by the following equation, and repeat step (2).

$W = 5.5 \text{ mm} - A$ [Example: If (A) is 2.9 mm, (W) is 2.6 mm.]

<When less than 2.4 mm>

Remove the bellows band, readjust the dimension (W) of step (1) to the value calculated by the following equation, and use a new bellows band to repeat steps (2) to (3).

$W = 5.5 \text{ mm} - A$ [Example: If (A) is 2.3 mm, (W) is 3.2 mm.]

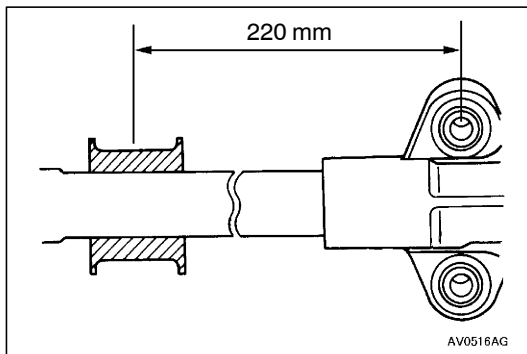


►◄ TIE ROD END/LOCKING NUT INSTALLATION

Screw in the tie rod end until the dimension shown is achieved. Then, temporarily tighten with the locking nut.

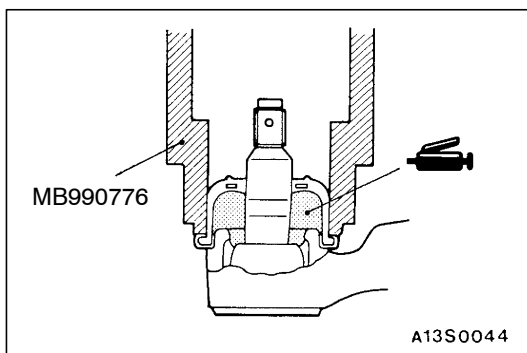
NOTE

The locking nut must be tightened securely only after the power steering gear box and linkage are installed to the vehicle and toe-in is adjusted.



►◄ GEAR MOUNTING RUBBER INSTALLATION

Install the gear mounting rubber to the rack housing so that the distance is as shown in the illustration.



TIE ROD END BALL JOINT DUST COVER REPLACEMENT

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Apply grease to the inside of the dust cover.
2. Drive in the dust cover with special tool until it is fully seated.
3. Check the dust cover for cracks or damage by pushing it with finger.

POWER STEERING OIL PUMP

REMOVAL AND INSTALLATION

Caution

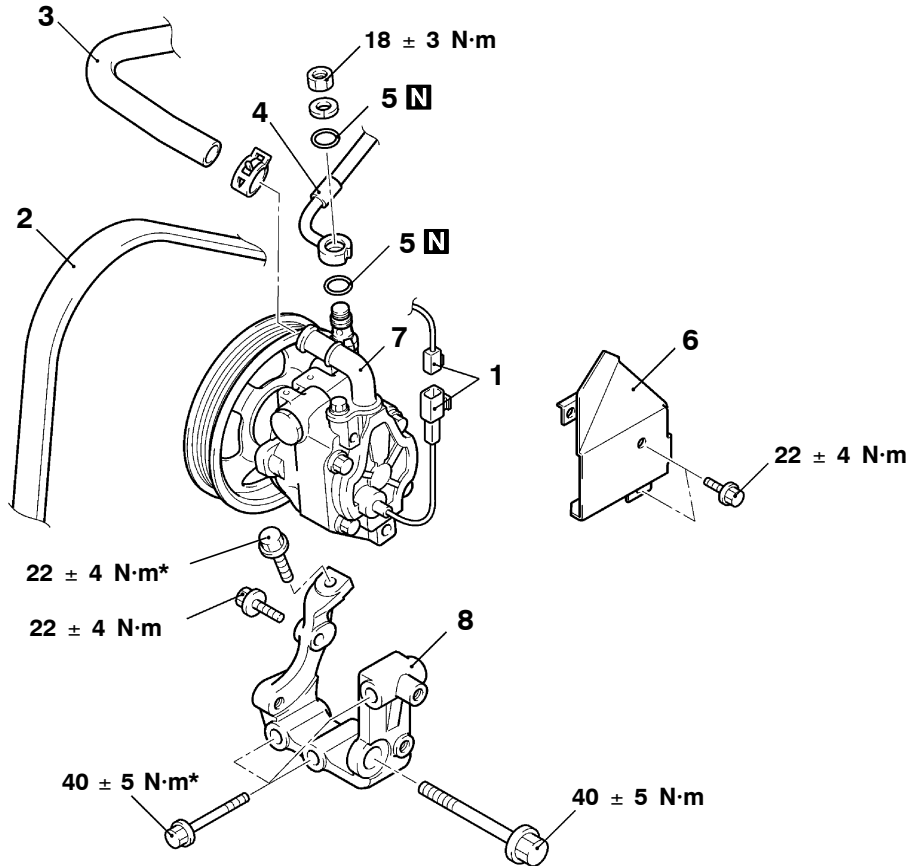
After temporary tightening all bolts in * part, tighten in specific torque.

Pre-removal Operation

Power Steering Fluid Draining (Refer to P.37A-9.)

Post-installation Operation

- Power Steering Fluid Supplying and Bleeding (Refer to P.37A-9.)
- Drive Belt Tension Adjusting (Refer to GROUP 11A – On-vehicle Service.)

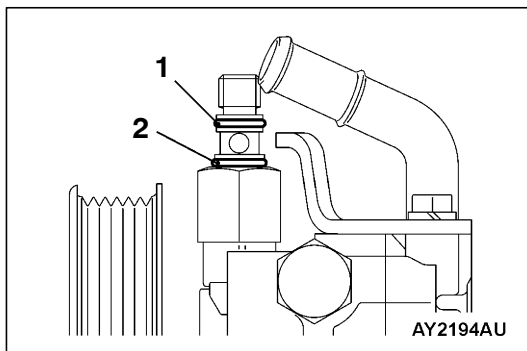


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Removal steps

1. Pressure switch connector
2. Drive belt (Refer to GROUP 11A.)
3. Suction hose connection
4. Pressure hose connection

5. O ring
6. Heat protector
7. Oil pump assembly
8. Power steering pump bracket

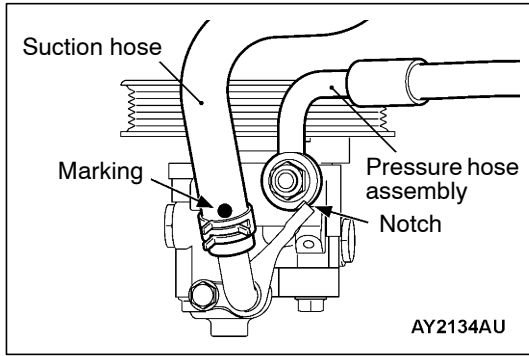


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INSTALLATION SERVICE POINTS

▶A◀ O-RING INSTALLATION

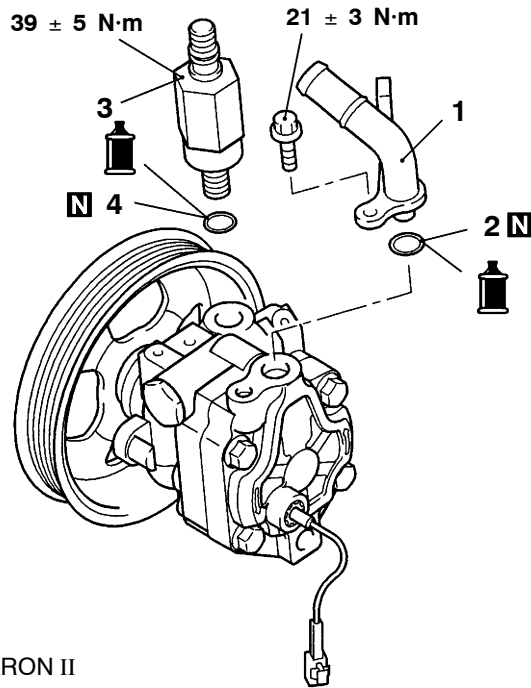
No.	ID × Width mm
1	11.0 × 1.9
2	13.0 × 1.9




▶B◀ PRESSURE HOSE ASSEMBLY/SUCTION HOSE REMOVAL

Install the pressure hose assembly and suction hose as illustrated.

DISASSEMBLY AND REASSEMBLY



NOTE

 : Automatic transmission fluid DEXRON II

Disassembly steps

1. Suction connector
2. O-ring

3. Connector
4. Gasket

POWER STEERING OIL HOSES

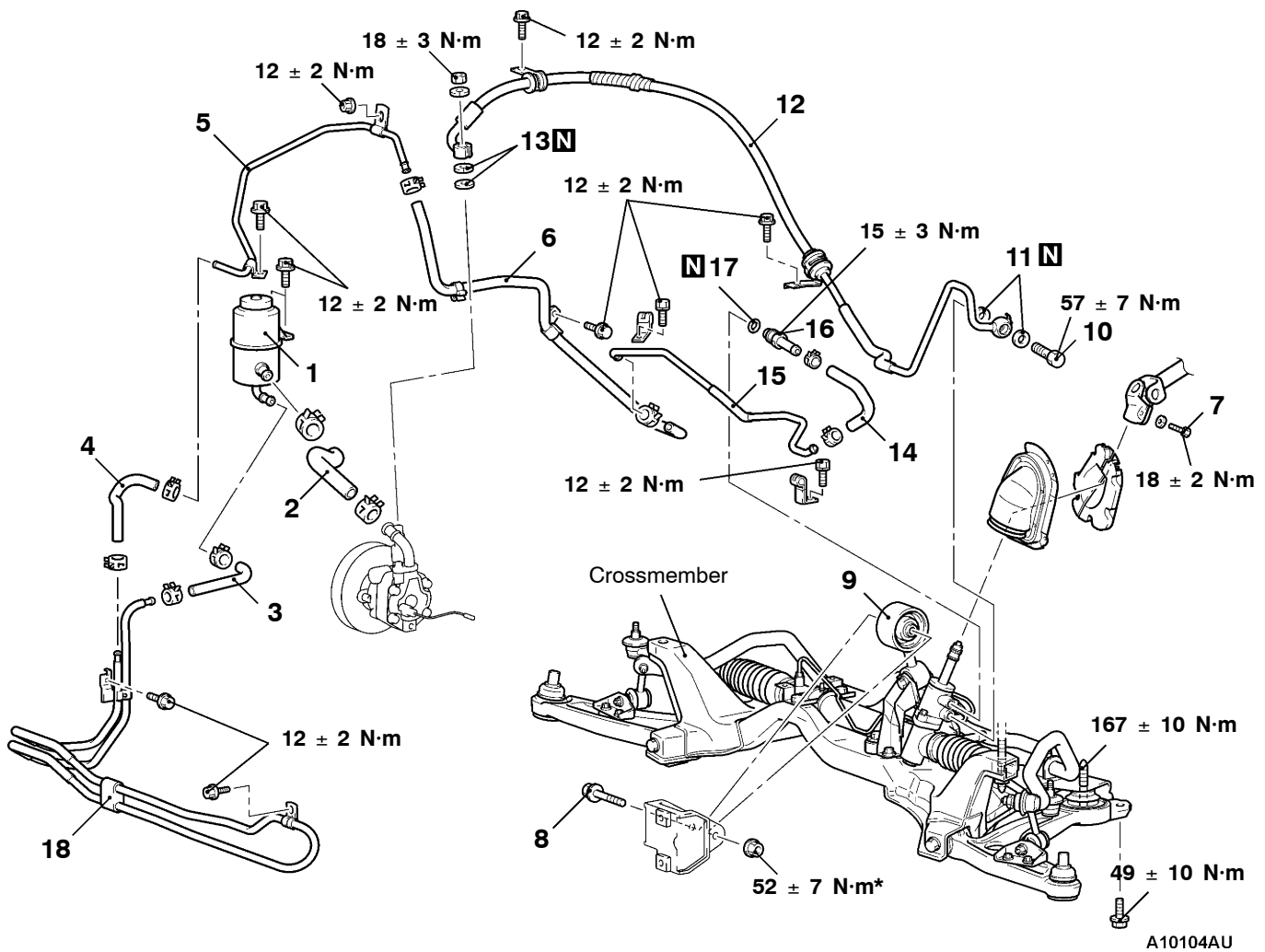
REMOVAL AND INSTALLATION

Caution

1. Before removing the clock spring, always see GROUP 52B - Caution for Service and Air Bag Module Clock Spring
2. If the vehicle is equipped with the Brembo disc brake, during maintenance, take care not to contact the parts or tools to the caliper, because the paint of caliper will be scratched.
3. On the tightening section indicated in the mark (*), lightly tighten the nut first, and then finally tighten it with the engine weight applied on the body.

<L.H. drive vehicles>

Pre-removal and Post-installation Operation
 Power Steering Fluid Draining and Refilling (Refer to P.37A-9.)



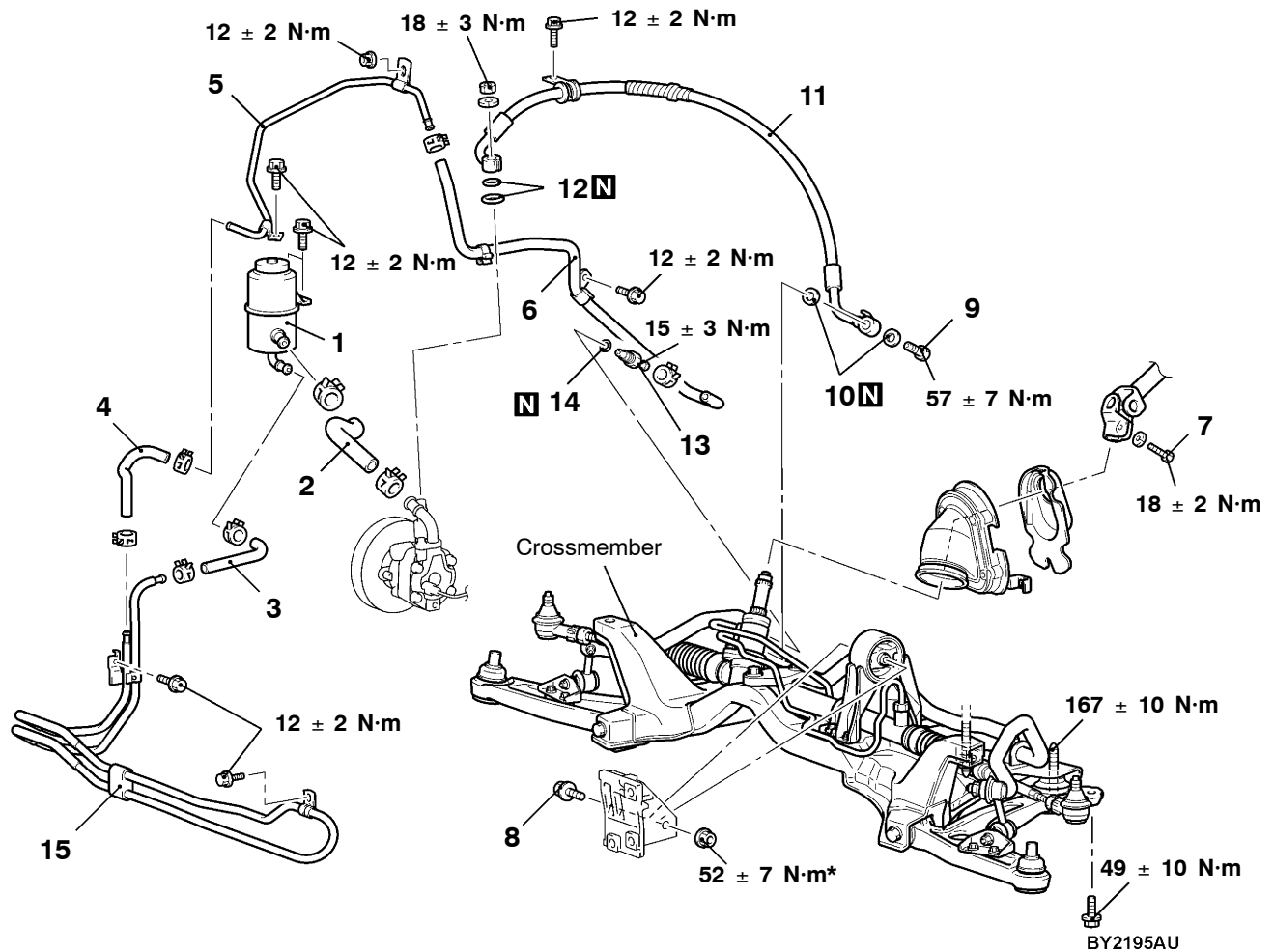
Removal steps

- | | |
|--|--|
| <p>▶B◀</p> <ol style="list-style-type: none"> 1. Oil reservoir 2. Suction hose 3. Return hose 4. Return hose 5. Return tube ● Strut tower bar (Refer to GROUP 42.) 6. Return hose ● Clock spring (Refer to GROUP 52B.) ● Crossmember bar (Refer to GROUP 33A.) ● Center member (Refer to GROUP 32.) ● Front exhaust pipe (Refer to GROUP 15.) 7. Steering gear and joint connecting bolt | <p>◀A▶</p> <ol style="list-style-type: none"> 8. Rear roll stopper connecting bolt 9. Rear roll stopper (Refer to GROUP 32.) <p>▶B◀</p> <p>▶A▶</p> <p>◀A▶</p> <ol style="list-style-type: none"> 10. Eye bolt 11. Gasket 12. Pressure hose assembly 13. O ring 14. Return hose 15. Return tube 16. Return tube 17. O ring ● Front bumper (Refer to GROUP 51.) ● Intercooler (Refer to GROUP 15.) 18. Cooler tube assembly |
|--|--|

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<R.H. drive vehicles>

Pre-removal and Post-installation Operation
Power Steering Fluid Draining and Refilling (Refer to P.37A-9.)

**Removal steps**

- | | | |
|--|----------------------------------|---|
| <p>▶B◀</p> <ol style="list-style-type: none"> 1. Oil reservoir 2. Suction hose 3. Return hose 4. Return hose 5. Return tube ● Strut tower bar (Refer to GROUP 42.) 6. Return hose ● Clock spring (Refer to GROUP 52B.) ● Crossmember bar (Refer to GROUP 33A.) ● Center member (Refer to GROUP 32.) ● Front exhaust pipe (Refer to GROUP 15.) | <p>◀A▶</p> <p>▶B◀</p> <p>▶A▶</p> | <ol style="list-style-type: none"> 7. Steering gear and joint connecting bolt 8. Rear roll stopper connecting bolt 9. Eye bolt 10. Gasket 11. Pressure hose assembly 12. O ring 13. Return tube 14. O ring ● Front bumper (Refer to GROUP 51.) ● Intercooler (Refer to GROUP 15.) 15. Cooler tube assembly |
|--|----------------------------------|---|

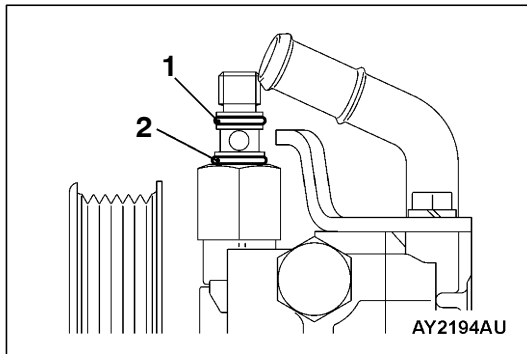
REMOVAL SERVICE POINT**◀A▶ EYE BOLT/RETURN TUBE REMOVAL**

1. Loosen the crossmember mounting bolts and nuts, and lower the crossmember to a position so that the eye bolts or return tube at the steering gear side can be removed.

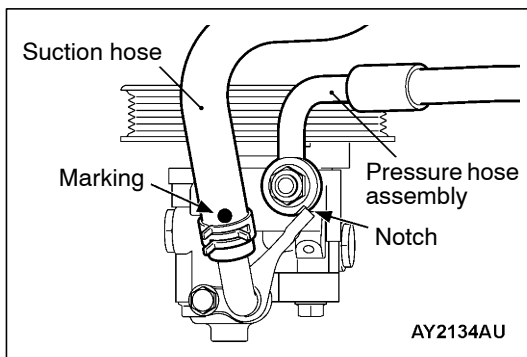
NOTE

In this case, do not remove the crossmember mounting bolts and nuts.

2. Remove the eye bolts or return tube.

**INSTALLATION SERVICE POINTS****▶A◀ O RING INSTALLATION**

No.	ID × Width mm
1	11.0 × 1.9
2	13.0 × 1.9

**▶B◀ PRESSURE HOSE ASSEMBLY/SUCTION HOSE INSTALLATION**

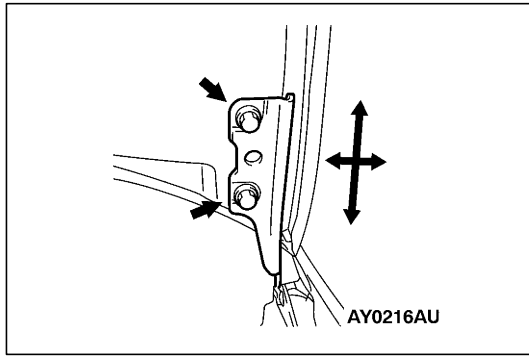
Install the pressure hose assembly and suction hose as illustrated.

NOTES

BODY

CONTENTS

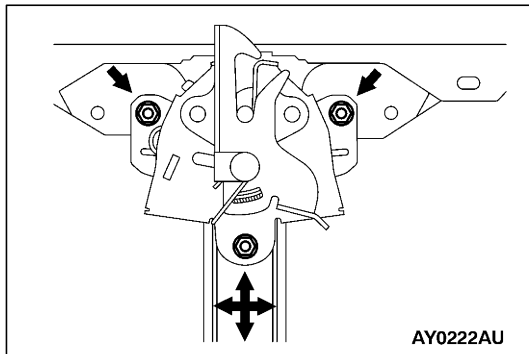
HOOD	2	ADHESIVES	19
ON-VEHICLE SERVICE	2	SPECIAL TOOLS	19
Adjustment of Clearance around Hood	2	TROUBLESHOOTING	20
Adjustment of Alignment of Hood Stepped Portion and Hood Striker	2	ON-VEHICLE SERVICE	20
Adjustment of Hood Height	2	Door Adjustment	20
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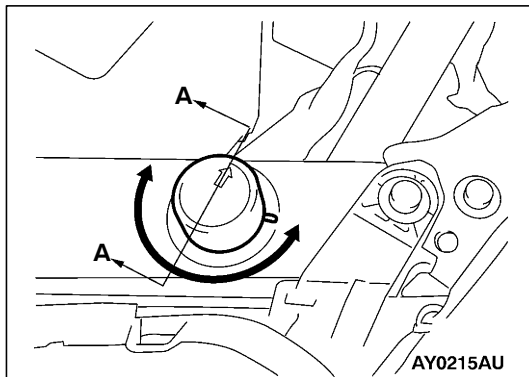
HOOD

ON-VEHICLE SERVICE

ADJUSTMENT OF CLEARANCE AROUND HOOD



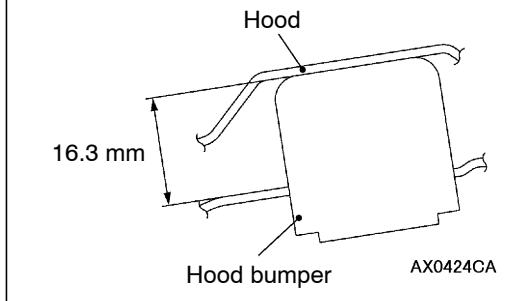
ADJUSTMENT OF ALIGNMENT OF HOOD STEPPED PORTION AND HOOD STRIKER



ADJUSTMENT OF HOOD HEIGHT

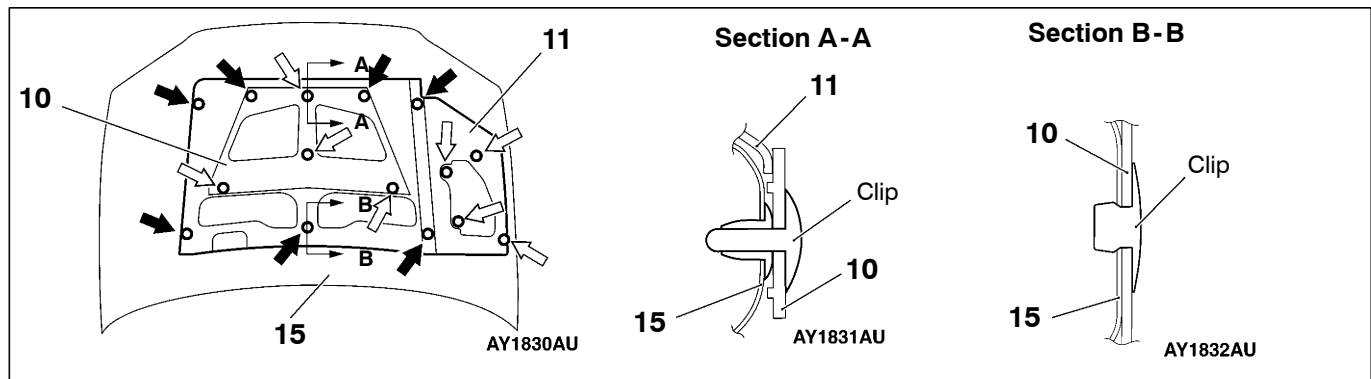
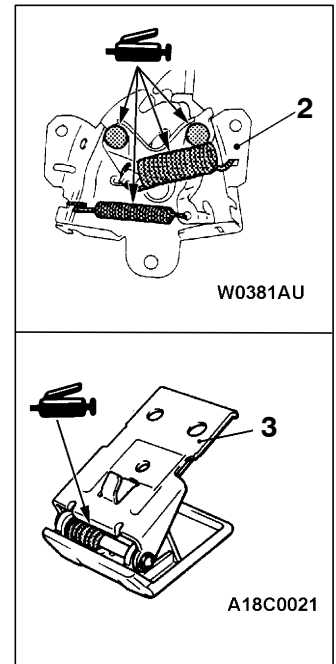
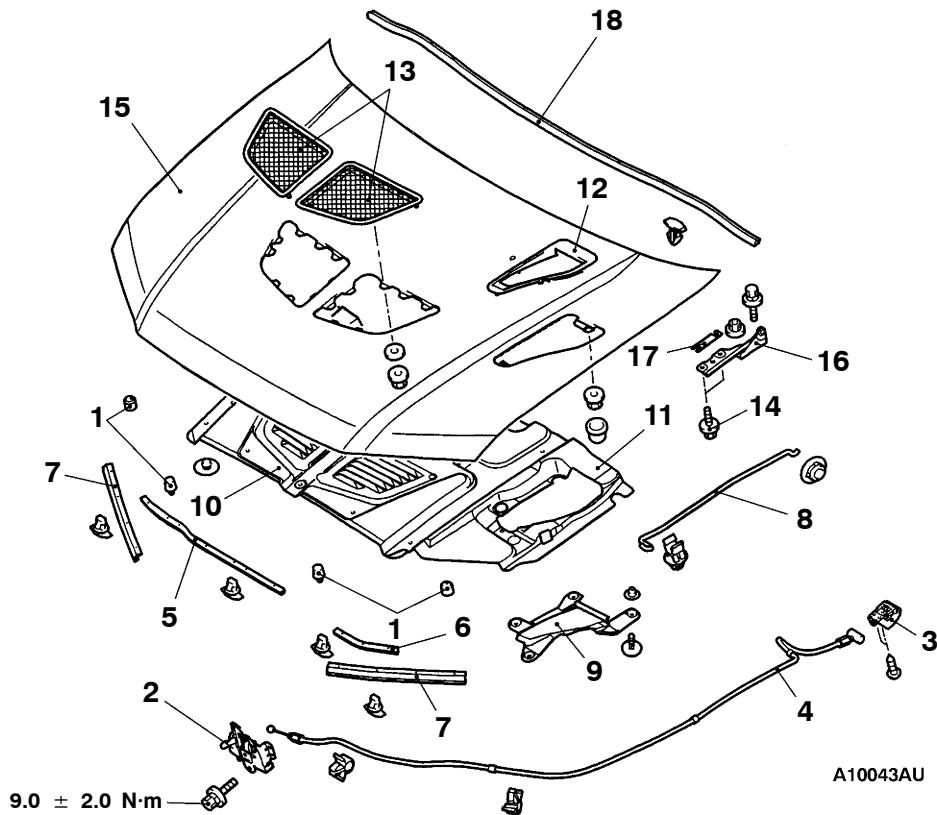
With the marker as guide, turn the hood bumper to adjust the hood height. The hood bumper height changes approx. 3mm (new hood bumper with one complete turn).

Section A-A



HOOD

REMOVAL AND INSTALLATION



Remarks

↔ and ← indicate the clip position.

1. Hood bumper

Hood lock release cable removal steps

- Front bumper assembly (Refer to GROUP 51.)
- Splash shield (Refer to P.42-5.)

2. Hood latch
3. Hood lock release handle
4. Hood lock release cable

Hood removal steps

5. Hood weather strip <Right side>
6. Hood weather strip <Left side>

7. Head lamp weather strip

8. Hood support rod

9. Hood inlet garnish lower

10. Heat protector panel

11. Hood insulator

- Washer hose and nozzle connection (Refer to GROUP 51.)

12. Hood inlet garnish upper

13. Hood outlet garnish

▶A◀ 14. Hood hinge bolt (hood side)

15. Hood

16. Hood hinge

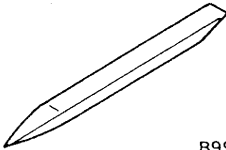
17. Shim

18. Hood weather strip

REMOVAL SERVICE POINTS**▶A◀ HOOD HINGE BOLT INSTALLATION****Caution**

Use the special parts as the aluminum hood uses special coatings on the <hood side> of the hood hinge bolt.

FENDER**SPECIAL TOOLS**

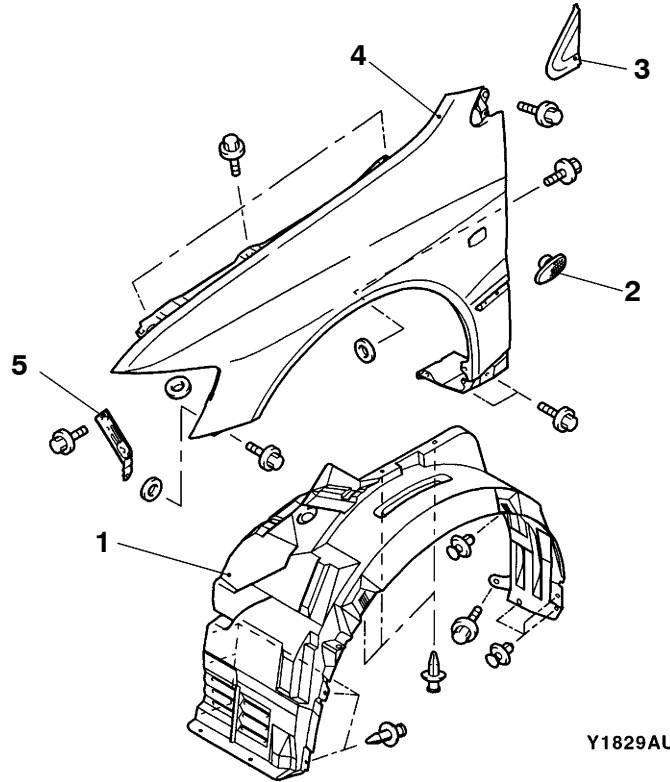
Tool	Number	Name	Use
 8990784	MB990784	Ornament remover	Side turn signal lamp removal

FENDER

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations

- Front Bumper Removal and Installation (Refer to GROUP 51.)
- Front Deck Garnish Removal and Installation (Refer to GROUP 51.)



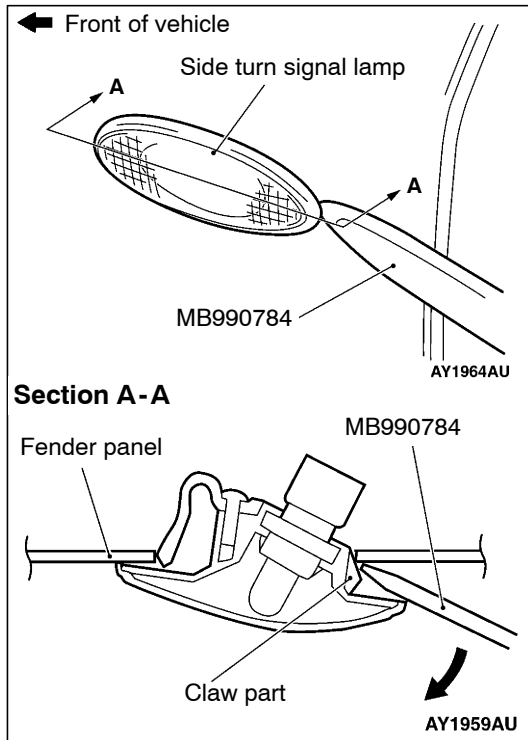
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Removal steps

- Side air dam (Refer to GROUP 51.)
1. Splash shield
 2. Side turn signal lamp (Refer to GROUP 54A.)



3. Deck garnish (Refer to GROUP 51-Windshield Wiper and Washer)
4. Fender
5. Front fender bracket



REMOVAL SERVICE POINTS

◀A▶ SIDE TURN SIGNAL LAMP REMOVAL

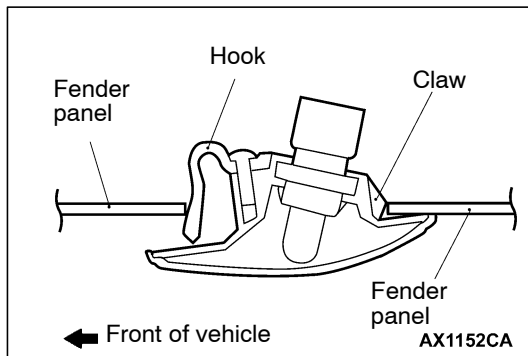
Use the special tool to release the claw part of the fender panel and remove the side turn signal lamp.

INSTALLATION SERVICE POINT

▶A◀ FENDER INSTALLATION

Caution

Use the special parts as the aluminum fender uses special coatings on the fender mounting bolt and the washer.



▶B◀ SIDE TURN SIGNAL LAMP INSTALLATION

Engage the hook into the fender panel, and then install the side turn signal lamp.

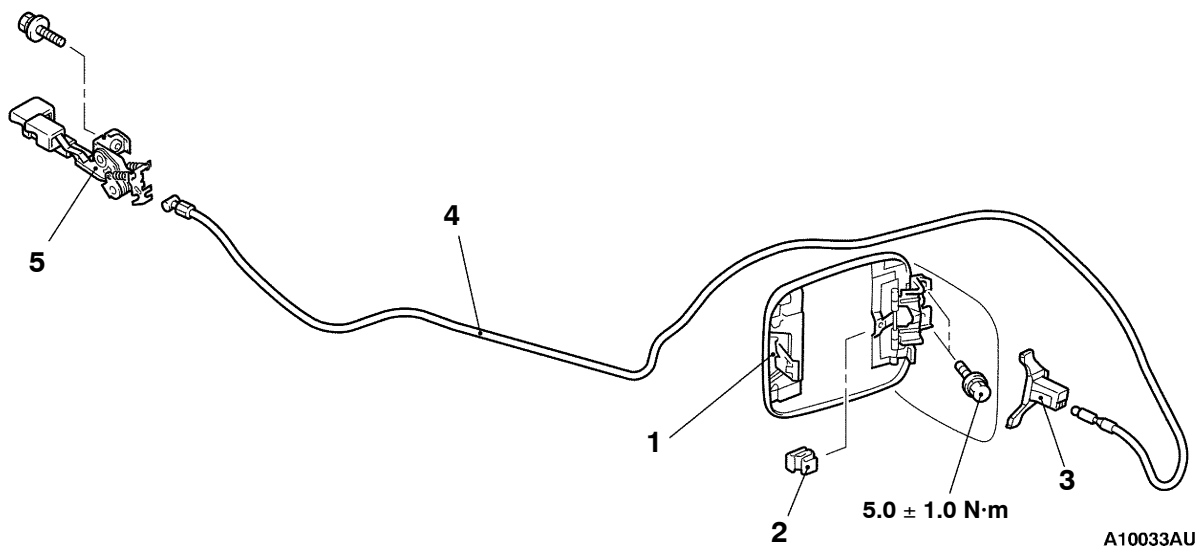
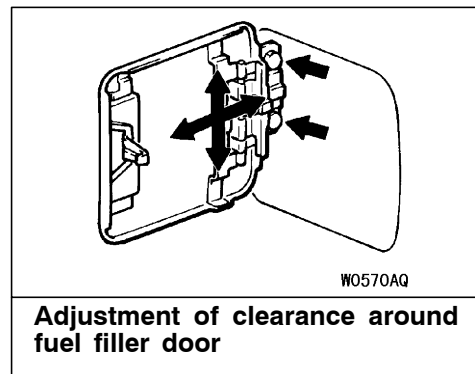
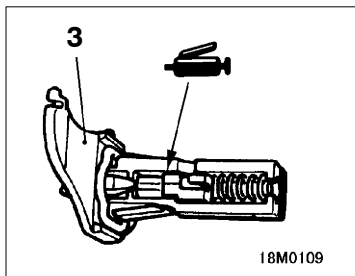
FUEL FILLER DOOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations

- Rear Seat Removal and Installation. (Refer to GROUP 52A.)
- Front Scuff Plate (Driver's Side), Rear Scuff Plate

(Driver's Side), Center Pillar Lower Trim (Driver's Side), Quarter Trim (Driver's Side) Removal and Installation (Refer to GROUP 52A – Trim.)

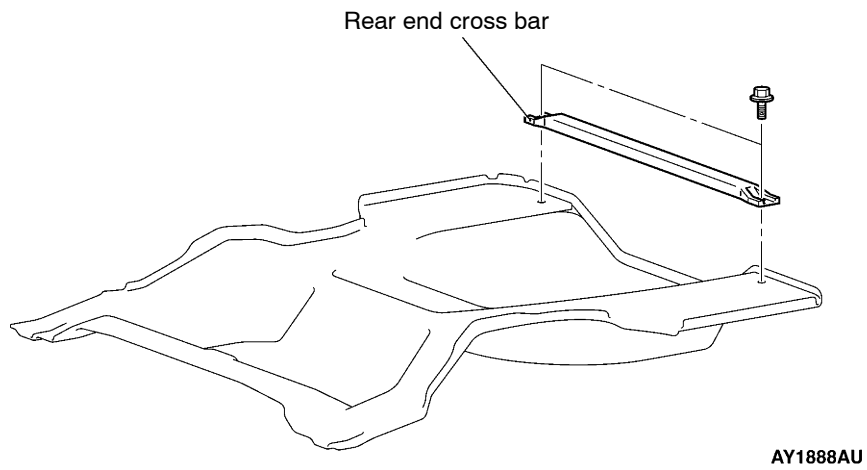
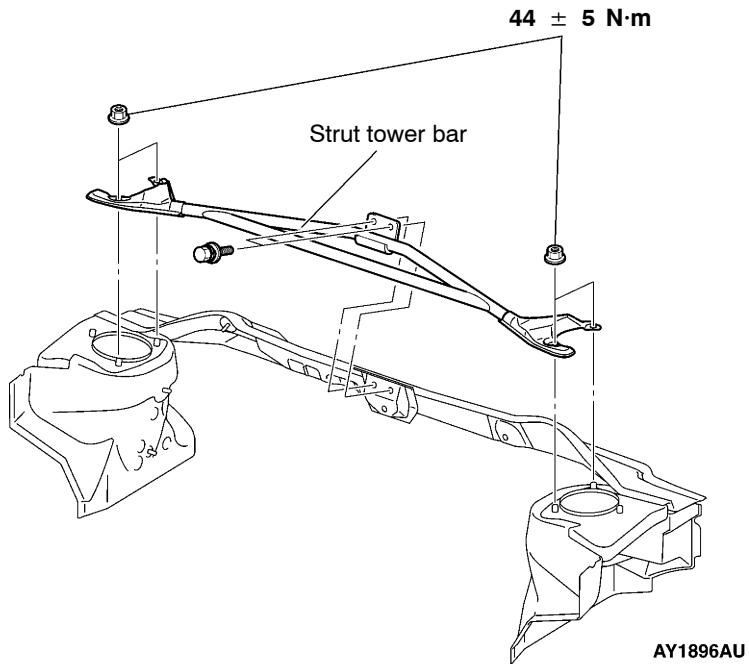


Removal steps

1. Fuel filler door panel assembly
2. Clip
3. Fuel filler door hook assembly

4. Fuel filler door lock release cable
5. Fuel filler door lock release handle

STRUT TOWER BAR AND REAR END CROSS BAR REMOVAL AND INSTALLATION

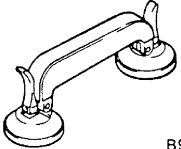
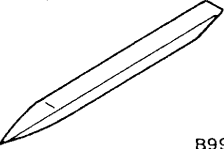


WINDOW GLASS

ADHESIVE

Items	Specified adhesive
Windshield	3M ATD Part No. 8609 Super Fast Urethane Auto Glass Sealant or equivalent
Rear window glass	

SPECIAL TOOLS

Tool	Number	Name	Use
 B990480	MB990480	Window glass holder	Removal and Installation of Window Glass
 B990784	MB990784	Ornament remover	Rear Window Lower Molding Removal

WINDOW REPAIR

The following glass parts are installed with a liquid urethane adhesive method:

- Windshield
- Rear window glass

ITEMS NEEDED

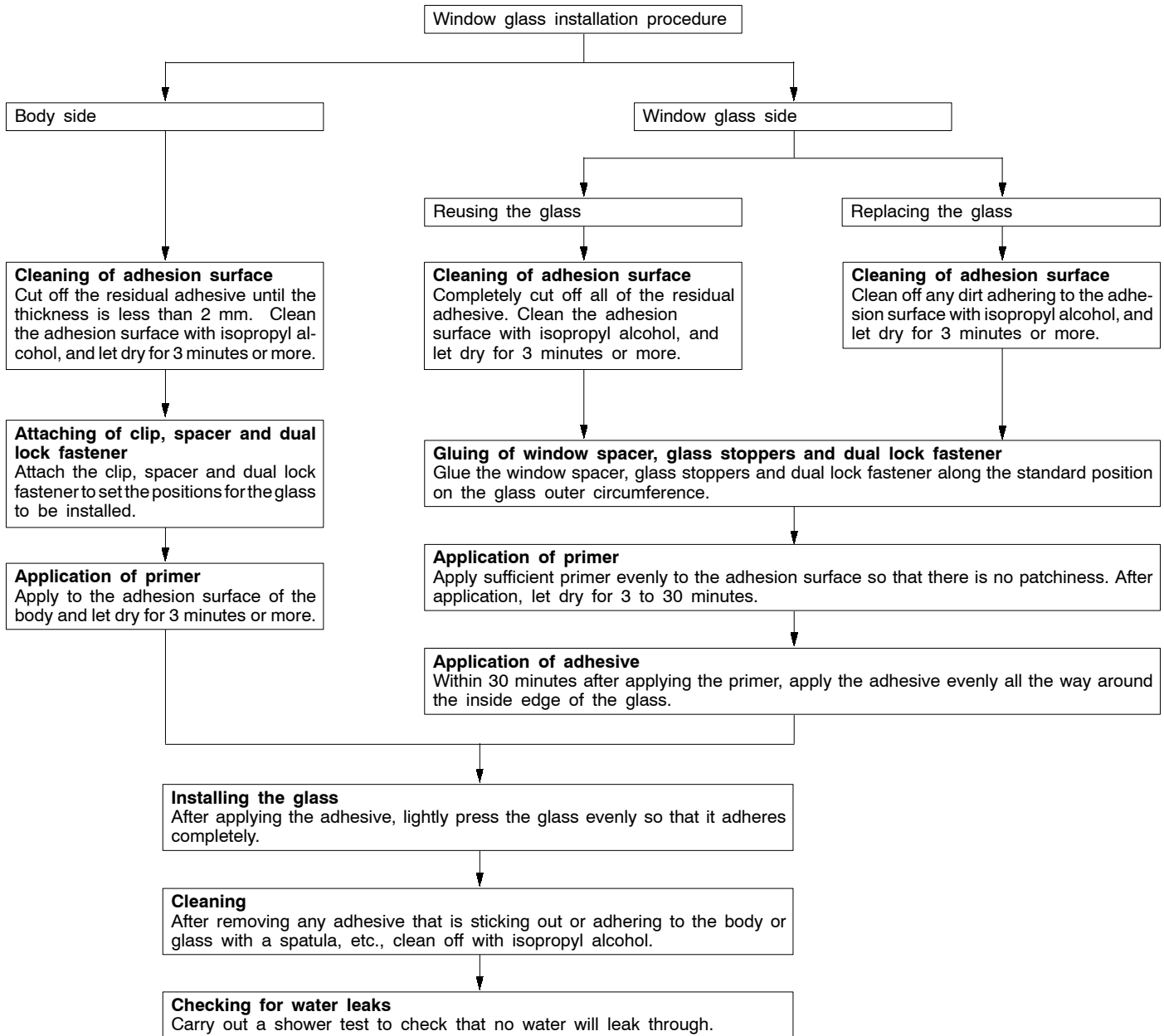
Name	Remarks
Adhesive	3M ATD Part No. 8609 Super Fast Urethane Auto Glass Sealant or equivalent
Primer	3M ATD Part No. 8608 Super Fast Urethane Primer or equivalent
Spacers	Available as service part
Dam	Available as service part
Anti-rust solvent (or Tectyl 506T...Valvoline Oil Company)	For rust prevention
Isopropyl alcohol	For grease removal from bonded surface
Steel piano wire	Dia. y length...0.6mm 1m For cutting adhesive
Adhesive gun	For pressing-out adhesive

HANDLING OF AUTO WINDOW SEALER

Keep the sealant in a cool place, not exposed to the direct rays of the sun. Do not place any heavy article on the sealant nor press it, otherwise it will become deformed. Avoid storing the sealant for more than 6 months, because it will lose its sealing effect.

BODY PINCH-WELD FLANGE SERVICING

Before servicing the body pinch-weld flange, remove old adhesive completely. If the flange requires painting, bake it after painting is completed.

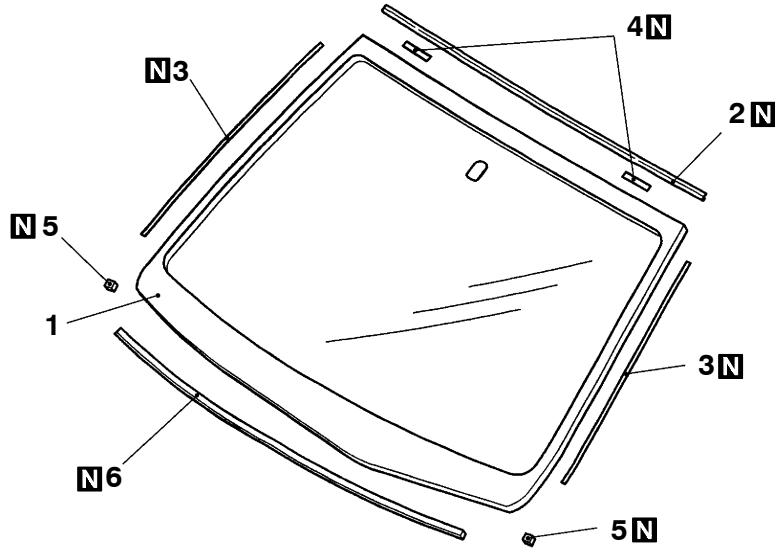
WORKING PROCESS

WINDSHIELD

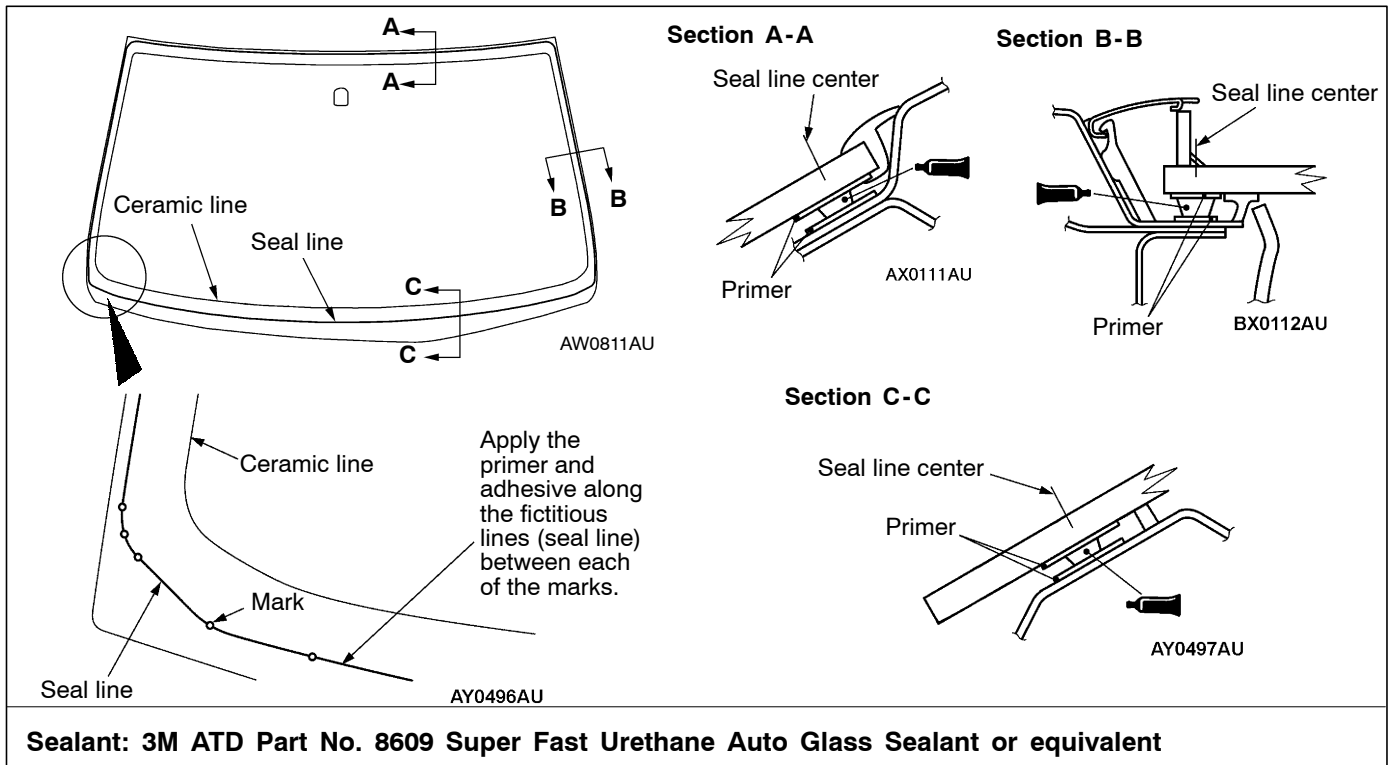
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations

- Deck Garnish Removal and Installation (Refer to GROUP 51-Windshield Wiper and Washer.)
- Front Pillar Trim Removal and Installation (Refer to GROUP 52A.)
- Headlining Removal and Installation



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Removal steps

- Roof drip molding (Refer to GROUP 51.)
1. Windshield
 2. Windshield molding

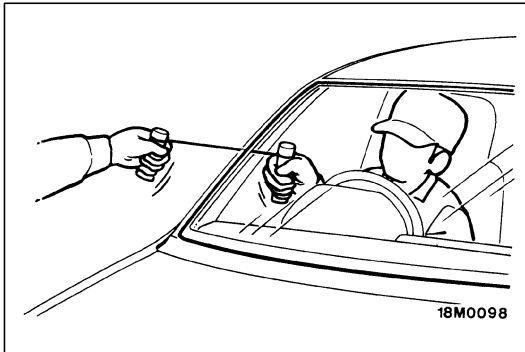


- ▶A◀ 3. Window dam
- ▶A◀ 4. Glass stopper
- ▶A◀ 5. Spacer
- ▶A◀ 6. Windshield spacer

REMOVAL SERVICE POINTS

◀A▶ WINDSHIELD AND WINDSHIELD MOLDING
REMOVAL

1. In order to protect the body (paint surface), apply cloth tape to all body areas around the installed windshield.
2. Use any of the following methods to cut off adhesive.

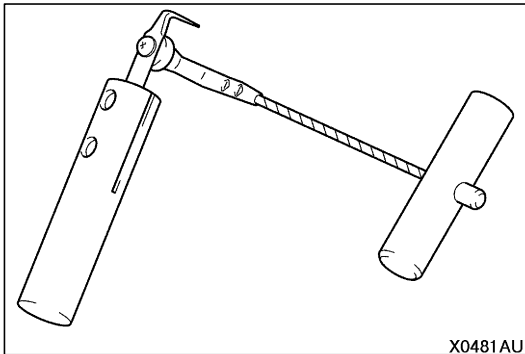


<Using the piano wire>

- (1) Using a sharp-point drill, make hole in the windshield adhesive.
- (2) Pass the piano wire from the inside of the vehicle through the hole.
- (3) Pull the piano wire alternately from the inside and outside along the windshield to cut the adhesive.

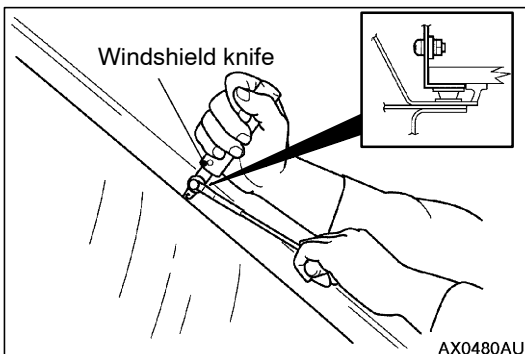
Caution

Do not let the piano wire touch the edge of the windshield.



<Using the windshield knife>

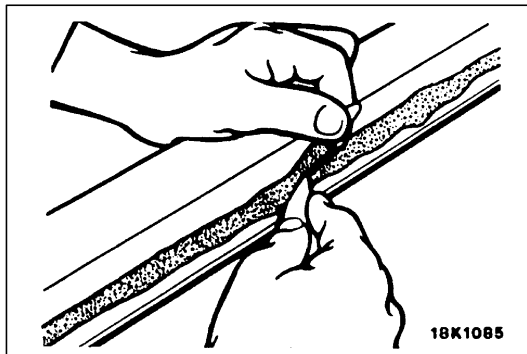
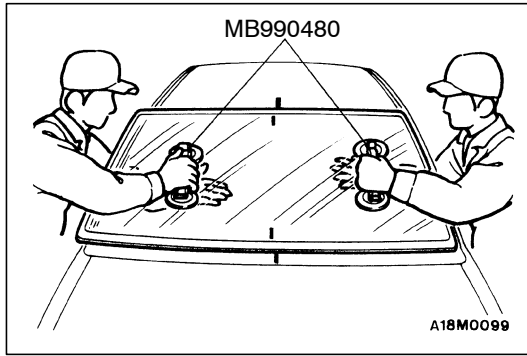
- (1) Prepare a windshield knife.



- (2) Align the windshield knife blade with the windshield surface and the windshield edge while maintaining an angle of 90 degrees between the windshield knife blade and the windshield edge, and then cut off adhesive by knifing parallel with the windshield edge.

Caution

Prying with a windshield knife could damage the windshield.



3. Make alignment marks on the windshield and body.
4. Use the special tool to remove the windshield.

5. Use a knife to cut away remaining adhesive to 2 mm thick or less around the entire circumference of the body flange.
6. Smooth the flange surface.

Caution

- (1) Use care not to remove more adhesive than necessary, or the adhesive could weaken.
 - (2) Be careful also not to damage the paintwork on the body surface with the knife. If the paintwork is damaged, repair the damaged area with repair paint or anti-rust agent.
7. When reusing windshield, remove the remaining adhesive on the windshield completely. Then, decrease the windshield with isopropyl alcohol.
 8. Decrease the body flange in the same way.

Caution

Before the next job, leave the decreased parts for 3 minutes or more to dry. Also, do not touch any cleaned surface.

INSTALLATION SERVICE POINTS

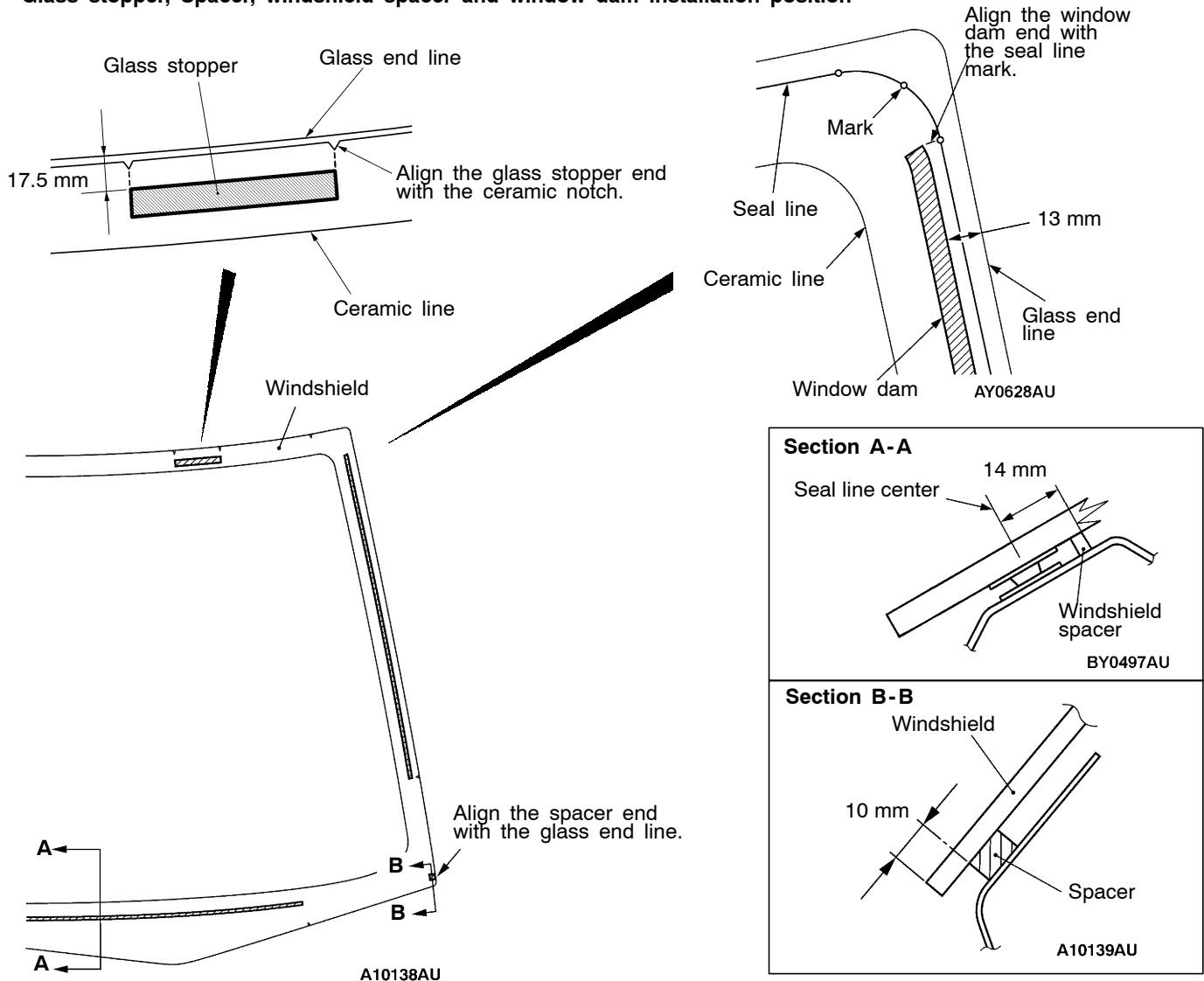
▶A◀ WINDSHIELD SPACER/SPACER/GLASS STOPPER/WINDOW DAM/WINDSHIELD MOLDING/WINDSHIELD INSTALLATION

1. When replacing the windshield, first align it with the body, and then matchmark them.
2. Use isopropyl alcohol to clean the inside edge of the windshield and the body flange.
3. Use a primer dampened to apply to the specified area around the windshield and the body evenly.
4. After applying the primer, let it dry for at least 3 minutes.

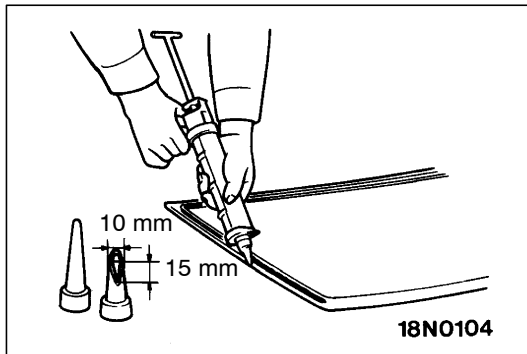
Caution

- (1) **The primer strengthens the adhesive effect, so that be sure to apply it. However, an excessively thick application will weaken the adhesive effect.**
- (2) **Never touch the primer-applied surface.**
5. Ensuring that there are no bends or warpages inside the windshield, position the glass stopper and spacer and windshield spacer on the specified position.

Glass stopper, Spacer, windshield spacer and window dam installation position



6. Install the windshield molding.



7. Within thirty minutes after the primer application, fill a sealant gun with the adhesive, and then apply the adhesive evenly around the windshield.

NOTE

Cut the tip of the sealant gun nozzle into a V shape to simplify adhesive application.

8. After applying adhesive, align the mating marks on the windshield and the body, and then lightly press the windshield evenly so that it adheres completely.
9. After removing any adhesive that is sticking out or adhering to the windshield or body with spatula, etc., clean with isopropyl alcohol. Install the windshield molding before the adhesive sets. After the windshield is installed, wait until the adhesive sets.
10. Adhere the windshield to the body, and install the roof drip molding (Refer to GROUP 51.) promptly before the adhesive sets.
11. After adhering the windshield to the body, wait 30 minutes or more, and then test for water leakage.

Caution

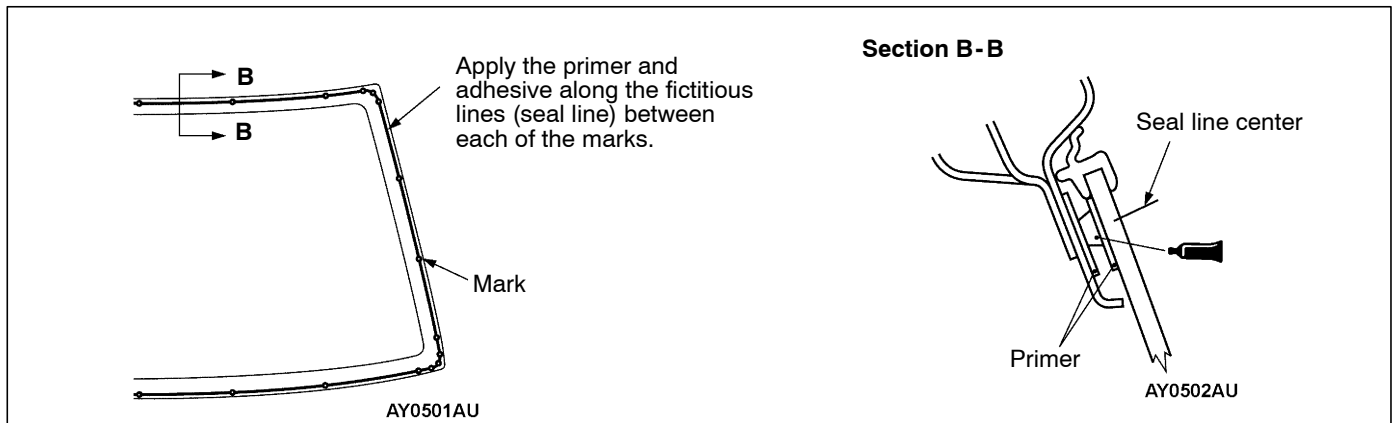
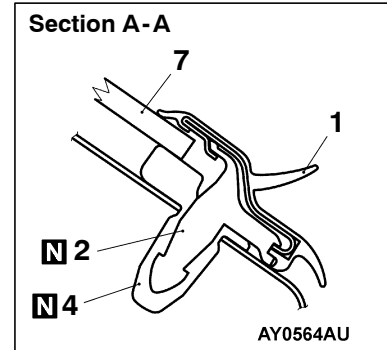
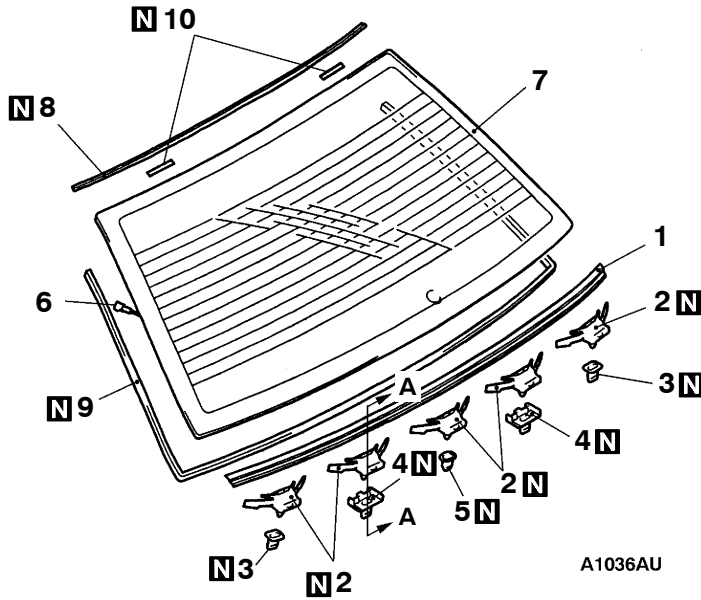
- (1) Move the vehicle carefully.
- (2) When testing for water leakage, do not pinch the end of the hose to spray the water.

REAR WINDOW GLASS

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations

- Rear Pillar Trim Removal and Installation (Refer to GROUP 52A.)
- Headlining Removal and Installation
- Rear Shelf Trim Removal and Installation (Refer to GROUP 52A.)
- High Mount Stop Lamp Assembly Removal and Installation (Refer to GROUP 54A)



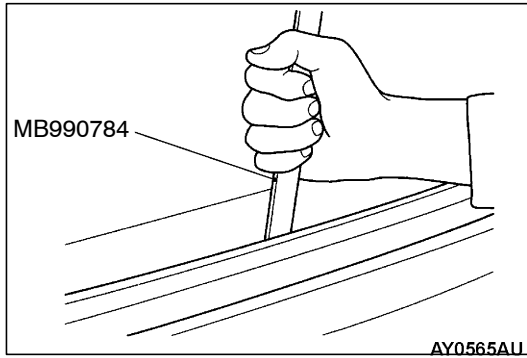
Sealant: 3M ATD Part No. 8609 Super Fast Urethane Auto Glass Sealant or equivalent

Removal steps

- Roof drip molding (Refer to GROUP 51.)
1. Rear window lower molding
 2. Clip
 3. Grommet A
 4. Grommet B



5. Grommet C
6. Connecting the harness connector
7. Rear window glass
8. Rear window upper molding
9. Window dam
10. Glass stopper



REMOVAL SERVICE POINTS

◀A▶ REAR WINDOW LOWER MOLDING REMOVAL

Pry the rear window lower molding off with the special tool.

Caution

Do not use a deformed molding.

◀B▶ REAR WINDOW GLASS REMOVAL

Remove the rear window glass in the same manner as for the windshield. (Refer to P42-12.)

INSTALLATION SERVICE POINTS

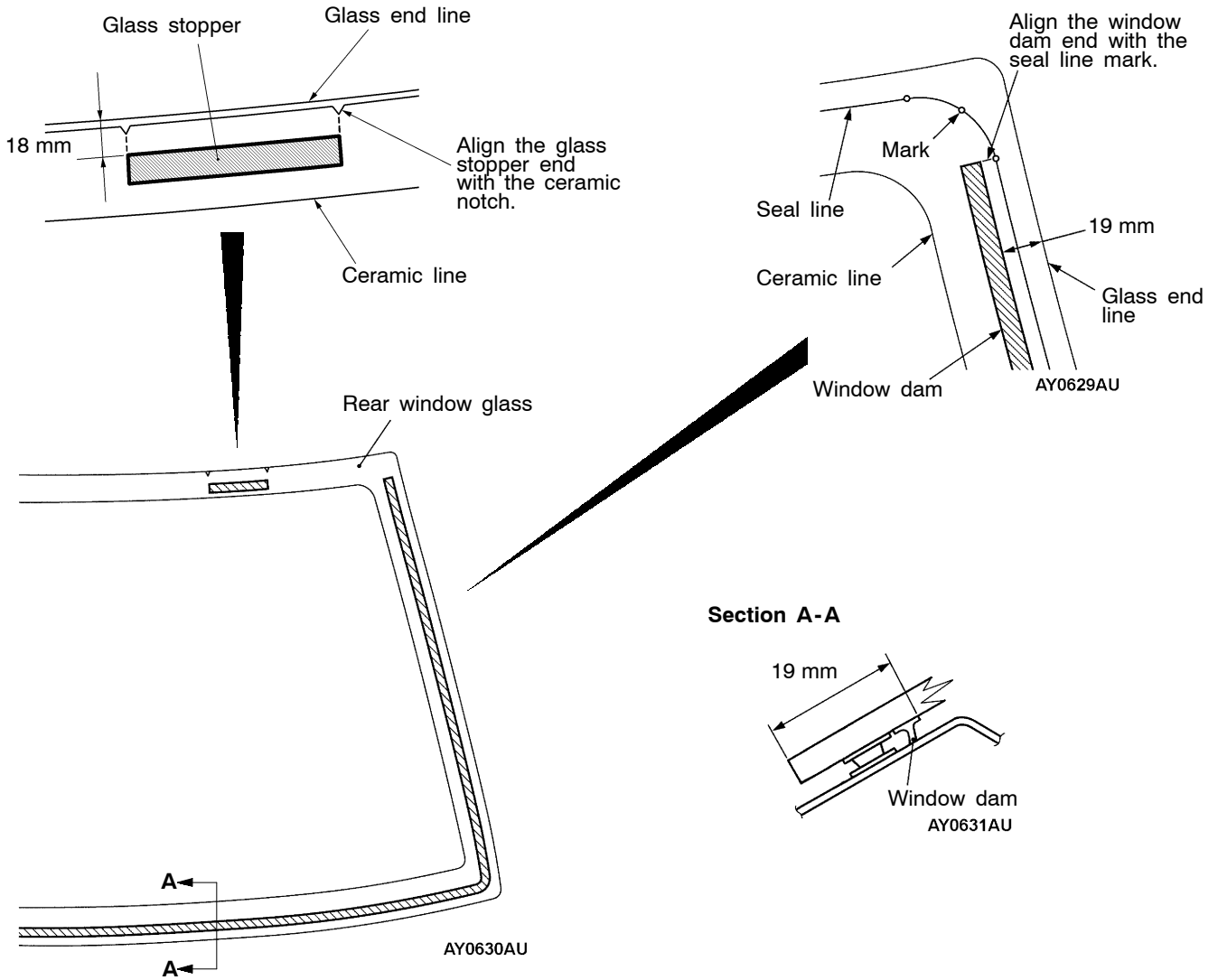
▶A◀ GLASS STOPPER/WINDOW DAM/REAR WINDOW UPPER MOLDING/REAR WINDOW GLASS INSTALLATION

1. When replacing the rear window glass, first align it with the body, and then matchmark them.
2. Use isopropyl alcohol to clean the inside edge of the rear window glass and the body flange.
3. Use a primer dampened sponge to apply the primer to the specified area around the rear window glass and the body evenly.
4. After applying the primer, let it dry for at least 3 minutes.

Caution

- (1) **The primer strengthens the adhesive effect, so that be sure to apply it. However, a too thick application will weaken the adhesive effect.**
 - (2) **Never touch the primer-applied surface.**
5. Position the glass stopper and the window dam in the specified position, ensuring that there are no bends or warpages inside the rear window glass.

Glass stopper and window dam installation position



6. Install the rear window upper molding.
7. Install the glass by the same procedure as for the windshield. (Refer to P.42-14.)

►B◄ REAR WINDOW LOWER MOLDING INSTALLATION

Install the clip into the rear window lower molding, and then install the rear window lower molding in the body.

DOORS

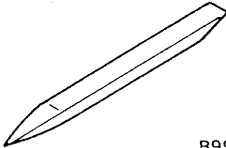
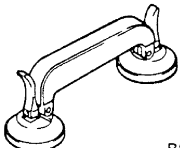
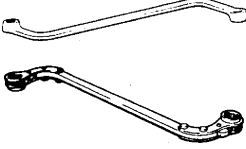
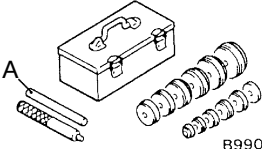
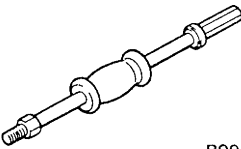
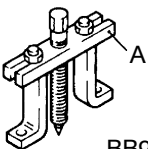
SERVICE SPECIFICATIONS

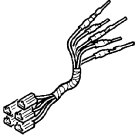
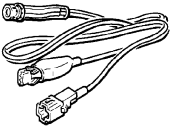
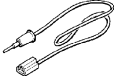

Items	Standard value	
Door outside handle play mm	Front	2.3 ± 2.1
	Rear	1.3 ± 1.7
Power window operating current (power supply 14.5 ± 0.5 V, 25°C) A	5 ± 1	
Door inside handle play mm	Front	9.6 ± 9.2
	Rear	9.0 ± 9.2

ADHESIVE

Items	Specified sealant	Remark
Waterproof film	3M ATD Part No. 8625 or equivalent	Ribbon sealer

SPECIAL TOOLS

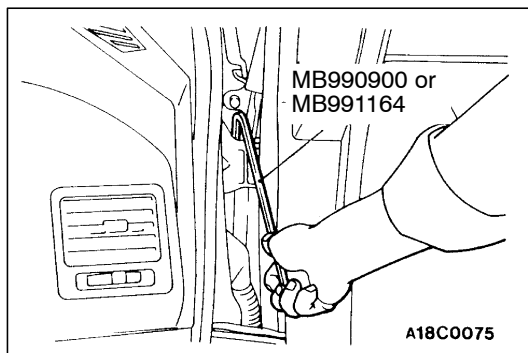
Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Door trim removal
 B990480	MB990480	Window glass holder	Removal of power window regulator and motor assembly
 00003936	MB990900 or MB991164	Door hinge adjusting wrench	Adjustment of door fit
 B990925	MB990925 A: MB990939	Bearing & oil seal installer set A: Brass bar	Adjustment of door striker
 B990211	MB990211	Slide hammer	
 BB990241	MB990241 A: MB990243	Axle shaft puller A: Body puller	

Tool	Number	Name	Use
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>C991223</p>	<p>MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222</p>	<p>Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe</p>	<p>Terminal voltage measurement A: Connector pin contact pressure check B: Power circuit check C: Power circuit check D: Commercial tester connection</p>

TROUBLESHOOTING

DIAGNOSIS FUNCTION

The power window and central door locking is controlled by the Smart Wiring System (SWS). For troubleshooting, refer to GROUP 54B - Troubleshooting.



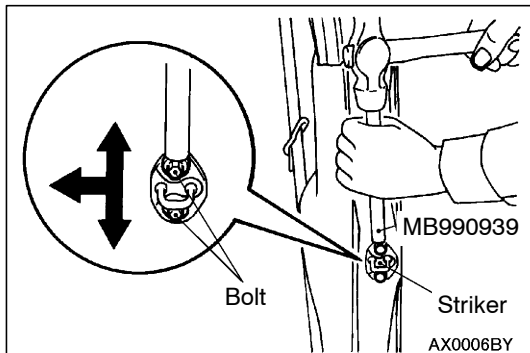
ON-VEHICLE SERVICE

DOOR ADJUSTMENT

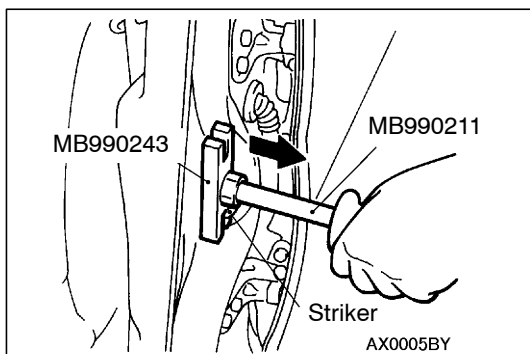
1. If the gap between the door and body is inconsistent, paste protection tape at the fender around the hinge attached portion and at the door edge, use the special tool to loosen the bolt fixing the door hinge at the body side, and move the door to adjust so that the gap around the door becomes consistent.
2. If steps exist between the door and body, use the special tool to loosen the bolt fixing the door hinge at the door side, and move the door and adjust the alignment of the door surface.

Caution

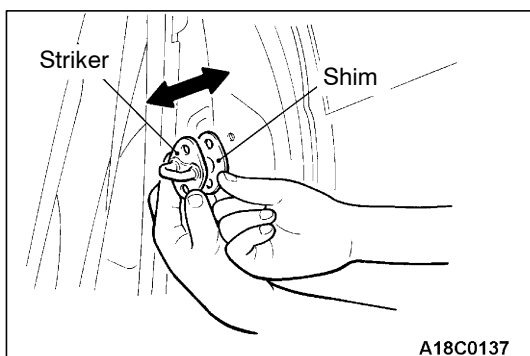
Do not apply torque above 98 N•m for the special tool (MB991164).



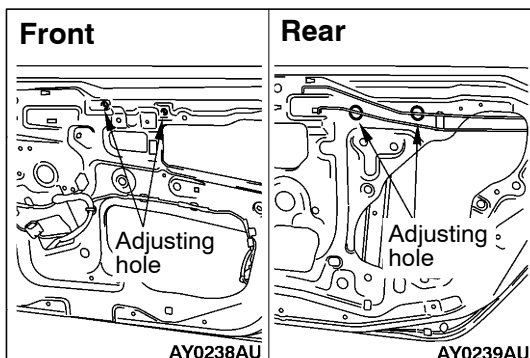
3. If the door does not open and close smoothly
 - (1) Adjustment with the striker (inside the vehicle and up and down directions)
Change the striker fixing bolt to a temporary bolt, and using the special tool (MB990939) and hammer, gently hit the top of the temporary bolt in the direction to be adjusted.



- (2) Adjustment with the striker (outside the vehicle)
Using the special tool (MB990211, MB990243), pull the striker towards the outside of the vehicle and adjust.



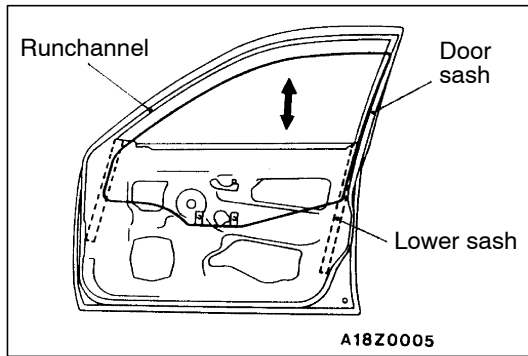
- (3) Adjustment with the shim (to and fro direction)
Adjust the alignment of the door striker and door latch using the shim of the striker attached portion.



DOOR WINDOW GLASS ADJUSTMENT

Check that the door glass operates smoothly and moves along the door glass runchannel when the door window glass is fully raised and fully lowered. If there is a problem, adjust by the following procedure.

1. Remove the door trim, and waterproof film. (P.42-27)
2. With the door window glass fully closed, loosen the screw fixing the door glass from the adjustment hole, and lower the door window glass slightly.
3. Fully close the door window glass again, and tighten the screw fixing the door glass from the adjustment hole.



ADJUSTMENTS AND REPLACEMENT DURING POWER WINDOW MALFUNCTION

If the window glass does not rise but automatically descends, adjust and replace the window glass as follows:

1. Remove the door trim and waterproof film. (P.42-27)
2. Remove the window regulator assembly from the door window glass, and raise and lower the window glass with your hand and check the operating force.

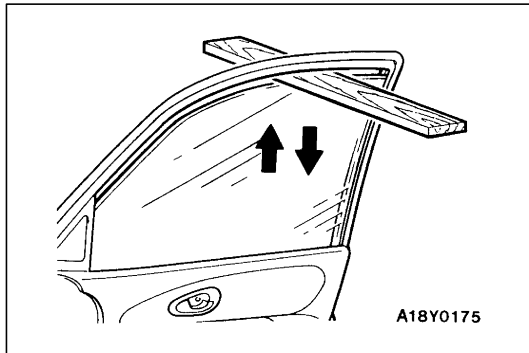
Remarks Insert a cushion, etc. to prevent damage of the glass if it accidentally drops.

3. If the door window glass does not rise and descend smoothly, perform the following check and repair.
 - Check the installation condition of the runchannel.
 - Straighten twist in the door sash.
 - Check the installation condition of the lower sash or the center sash.

NOTE

The lower sash cannot normally be adjusted, but it may be possible to adjust the sash span slightly within the range allowed by manufacturing tolerances by pushing the lower sash outwards while re-installing it.

4. If repair or adjustment is not possible, replace the door assembly.

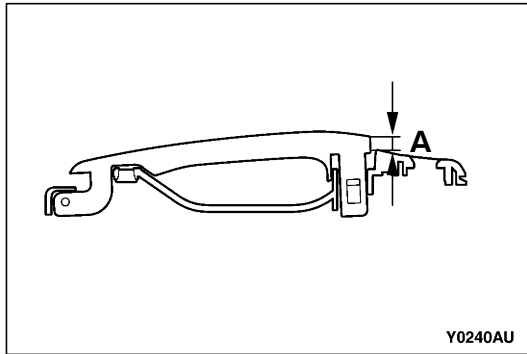


POWER WINDOW SAFETY MECHANISM CHECK

1. Set a wood piece of about 10 mm thick as shown in the figure, and raise the window glass.
2. Check that the window glass descends by about 150 mm when it catches the wood piece. If it does not, perform troubleshooting. (Refer to GROUP 54B.)

POWER WINDOW TIMER FUNCTION CHECK

9Close the door and turn the ignition switch in the OFF position, and then check the power window operates for 30 seconds. If it does not, perform troubleshooting.(Refer to GROUP 54B.)



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DOOR OUTSIDE HANDLE LOOSENESS CHECK

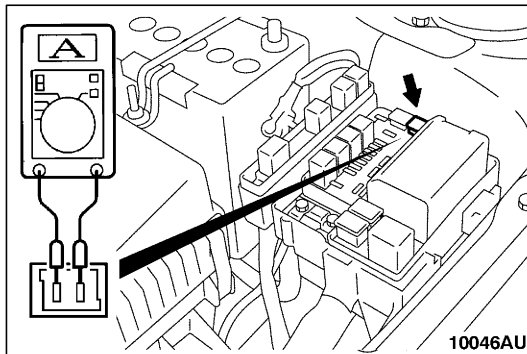
1. Check that the looseness of the door outside handle satisfies the standard value.

Standard value (A):

Front 2.3 ± 2.1 mm

Rear 1.3 ± 1.7 mm

2. Check the door outside handle and door latch assembly. If faulty, replace.



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POWER WINDOW OPERATING CURRENT CHECK

1. Remove the power window fuse, and connect the circuit tester as shown in the figure.
2. When the power window switch is set to the UP side, a large amount of operating current flows when the window is operated or closed. Therefore measure somewhere in between excluding these positions.

Standard value: 5 ± 1 A (Power supply voltage 14.5 ± 0.5 V, 25°C)

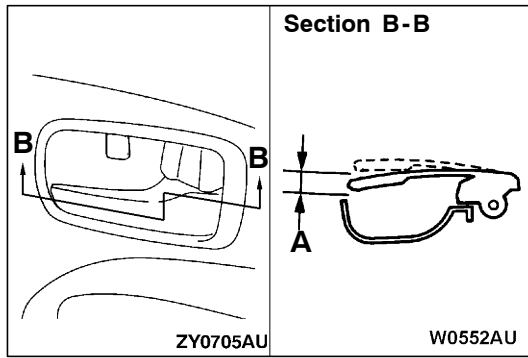
3. If outside the standard value, perform troubleshooting. (Refer to GROUP 54B.)

CIRCUIT BREAKER CHECK (Incorporated in the power window motor)

1. Set the power window switch to the UP side until the window glass closes completely, and continue operating the switch for more than 10 seconds.
2. Release the power window switch at the UP side, and at the same time, press the DOWN side. Under this condition if the window glass starts to lower within 60 seconds, the circuit breaker can be determined as good.

POWER WINDOW CHECK

Check that the power window operates. If it does not, perform troubleshooting. (Refer to GROUP 54B.)



DOOR INSIDE HANDLE LOOSENESS CHECK AND ADJUSTMENT

1. Check that the door inside handle looseness satisfies the standard value.

Standard value (A):

Front 9.6 ± 9.2 mm

Rear 9.0 ± 9.2 mm

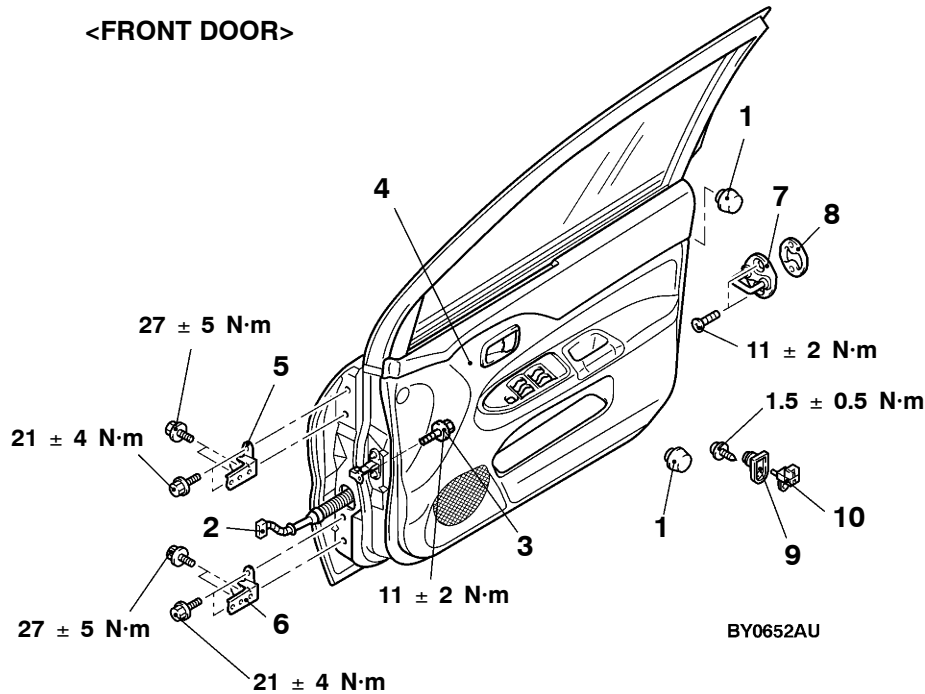
2. If outside the standard value, remove the door trim. (Refer to P.42-27.)
3. Adjust the looseness of the inside handle using the clip joining the inside handle and rod.

DOOR ASSEMBLY

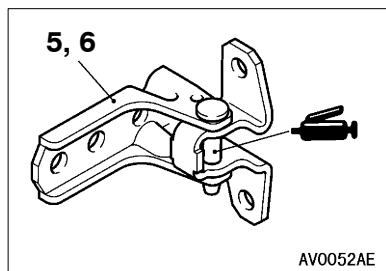
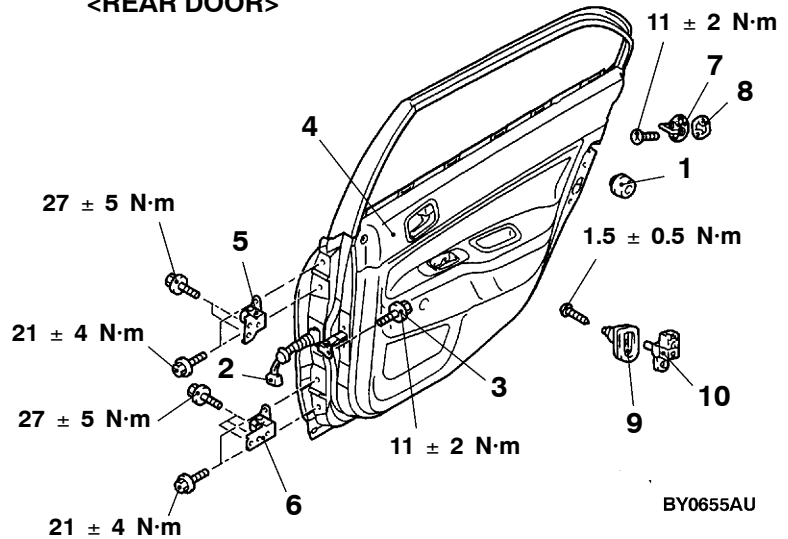
REMOVAL AND INSTALLATION

Post-installation Operation
 Door Adjustment (Refer to P.42-20.)

<FRONT DOOR>

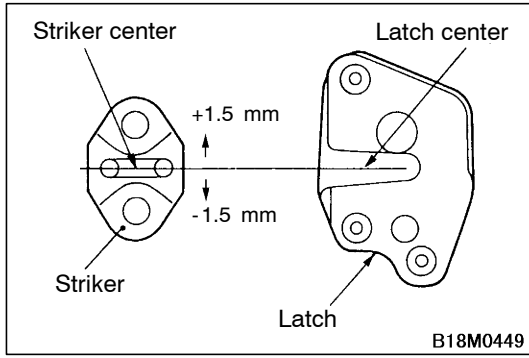


<REAR DOOR>



1. Damper mail
- Door assembly removal steps**
2. Harness connector
 3. Door check connecting bolt
 4. Door assembly
 5. Door upper hinge
 6. Door lower hinge

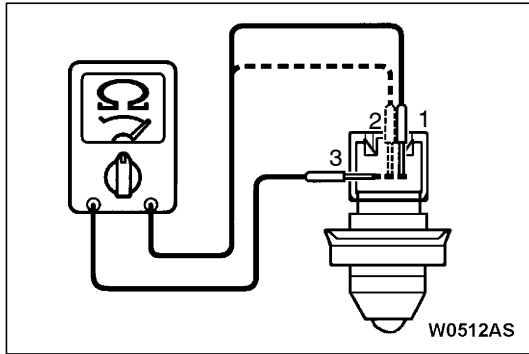
- Striker removal steps**
- ▶A◀
7. Striker
 8. Striker shim
- Door switch removal**
9. Door switch cap
 10. Door switch



INSTALLATION SERVICE POINTS

►A◄ STRIKER INSTALLATION

Align the center of the striker and latch within ± 1.5 mm, and install.



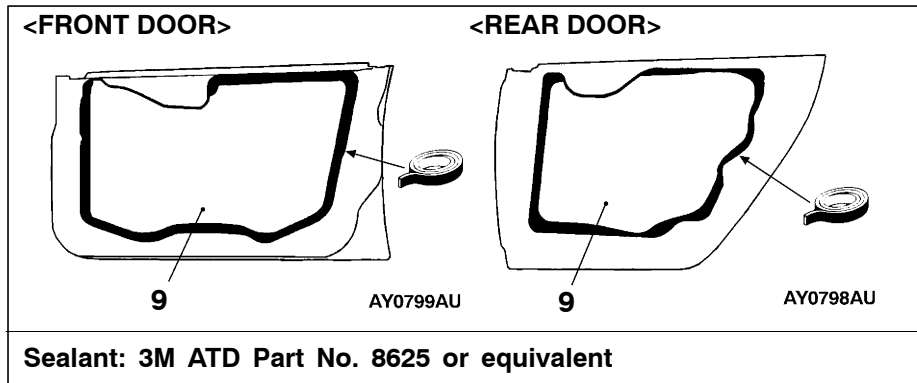
INSPECTION

DOOR SWITCH CONTINUITY CHECK

Switch position	Terminal No.		
	1	2	3
Released (ON)	○	○	○
Depressed (OFF)			

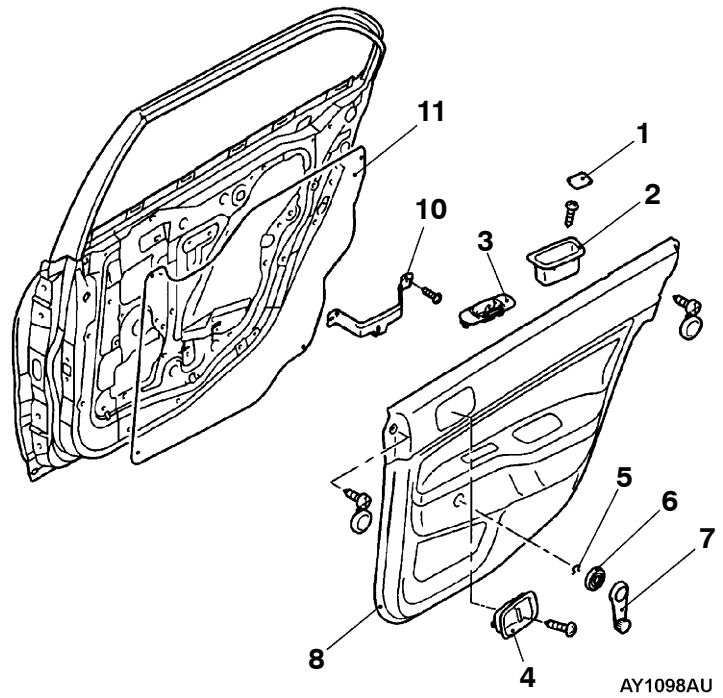
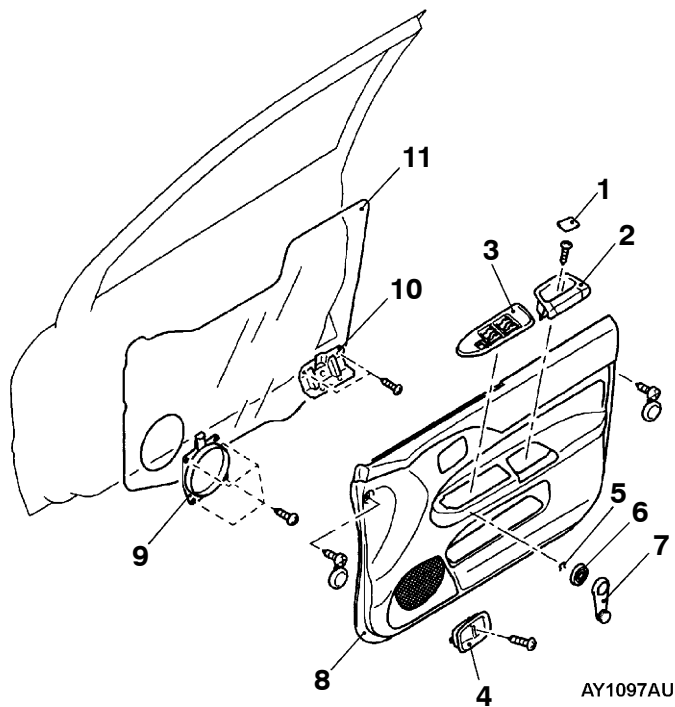
DOOR TRIM AND WATERPROOF FILM

REMOVAL AND INSTALLATION



<FRONT DOOR>

<REAR DOOR>



Removal steps

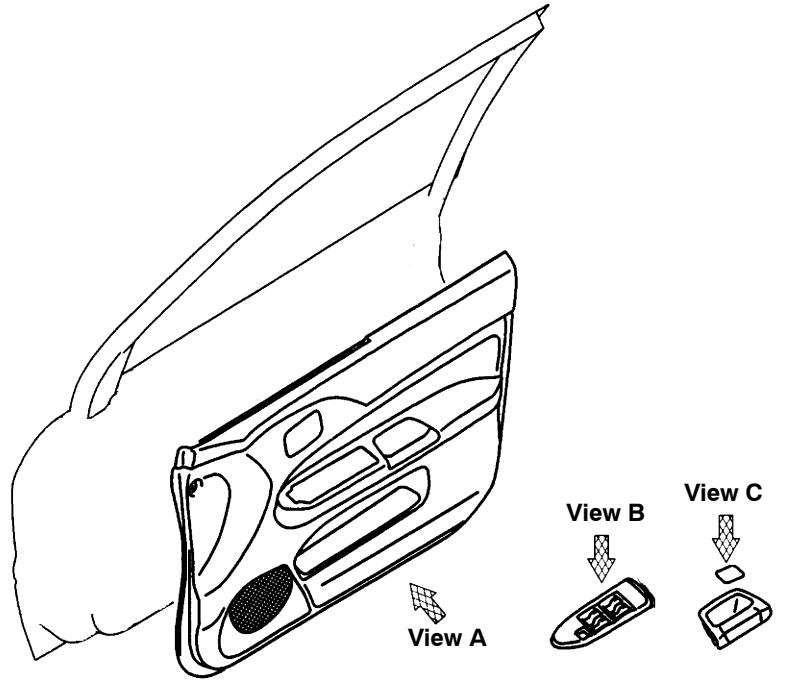
1. Cap
2. Door pull handle
3. Power window switch panel assembly
4. Door inside handle cover
5. Clip <Vehicles without power windows>



- ▶B◀ 6. Escutcheon <Vehicles without power windows>
- ▶B◀ 7. Regulator handle <Vehicles without power windows>
8. Door trim assembly
9. Speaker
10. Power window switch bracket
- ▶A◀ 11. Waterproof film

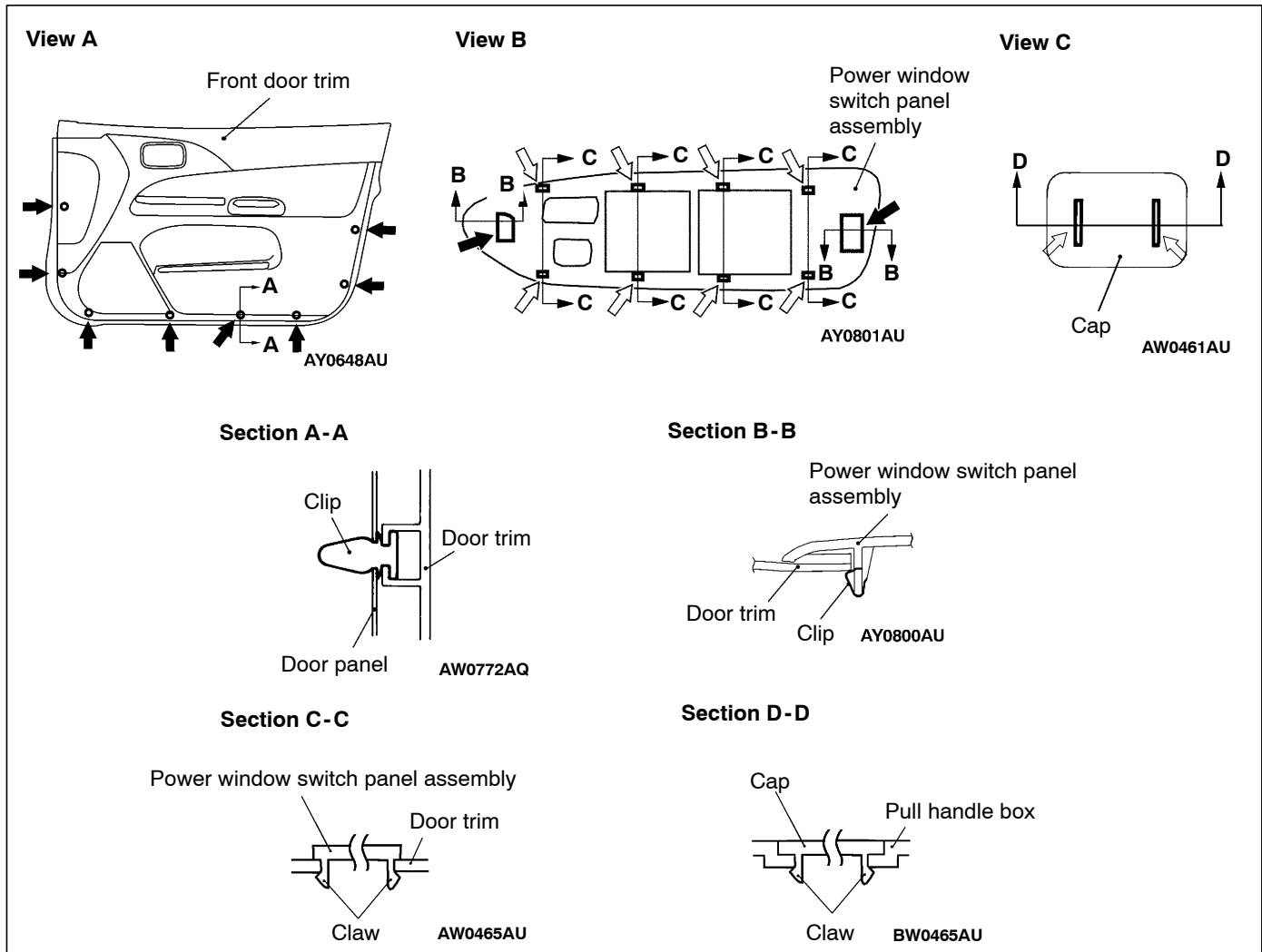
CLIP AND CLAW POSITIONS

<FRONT DOOR>

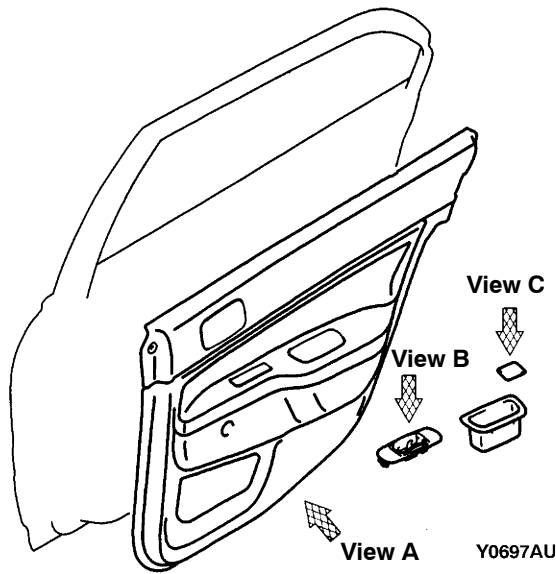


Note
 ← Clips positions
 ↶ Claws positions

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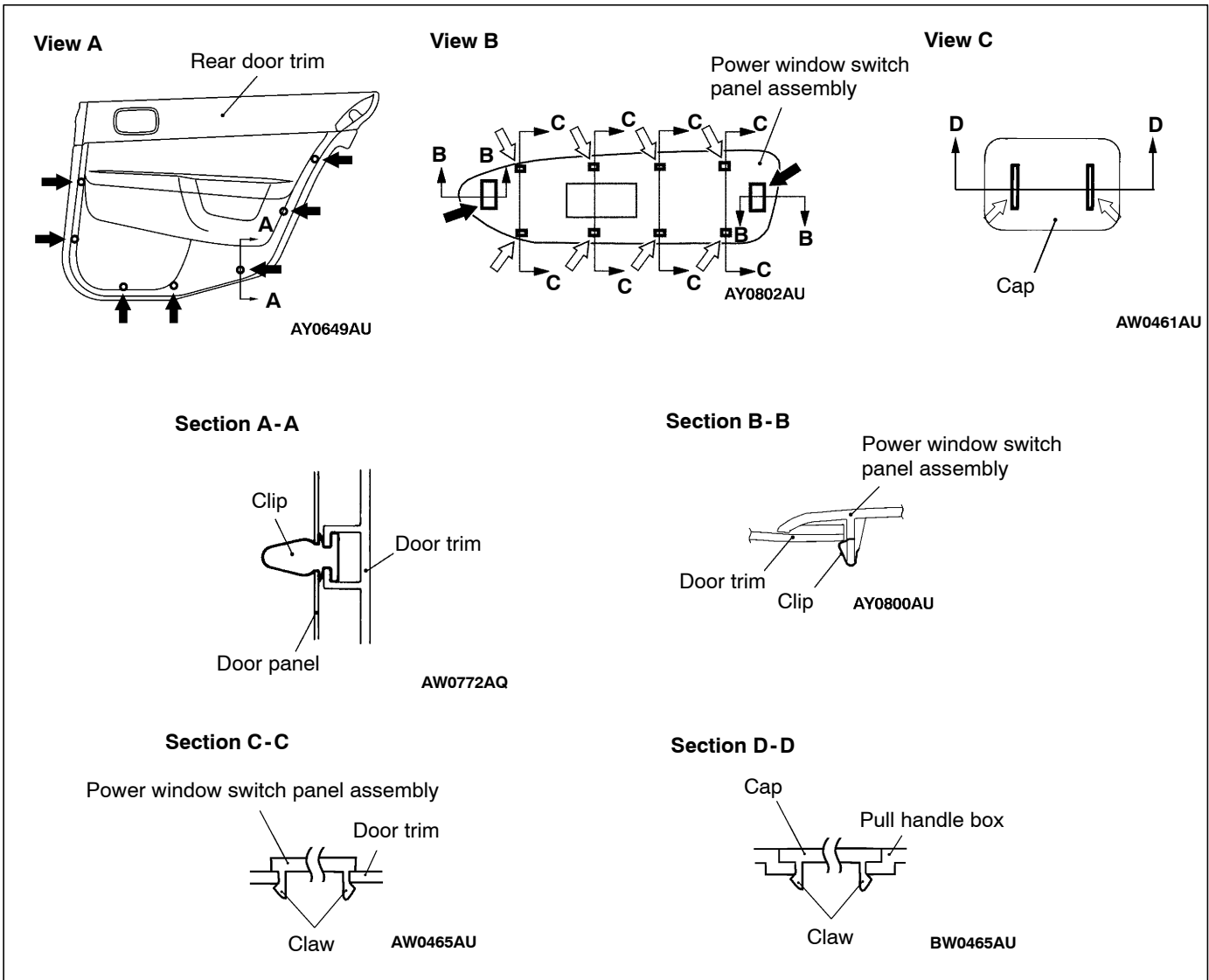


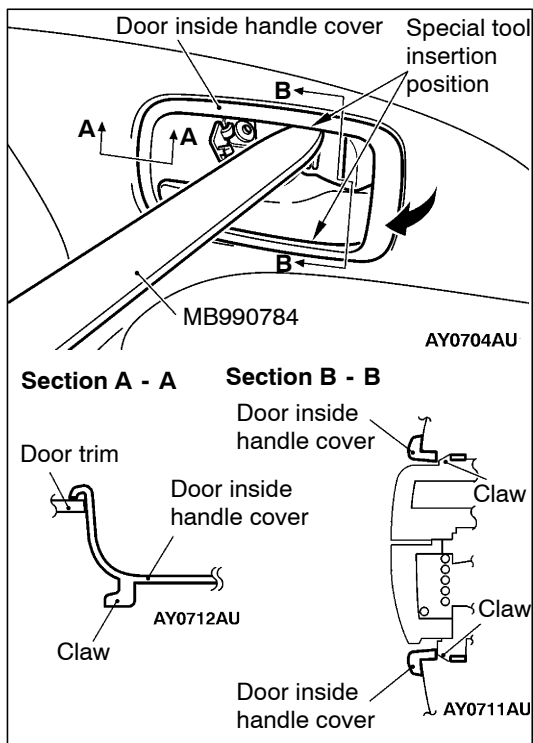
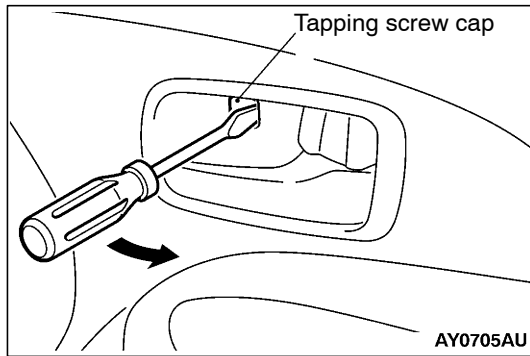
<REAR DOOR>



Note

- ➡ Clips positions
- ↔ Claws positions





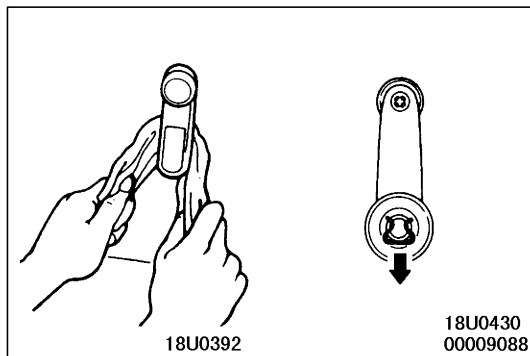
REMOVAL SERVICE POINTS

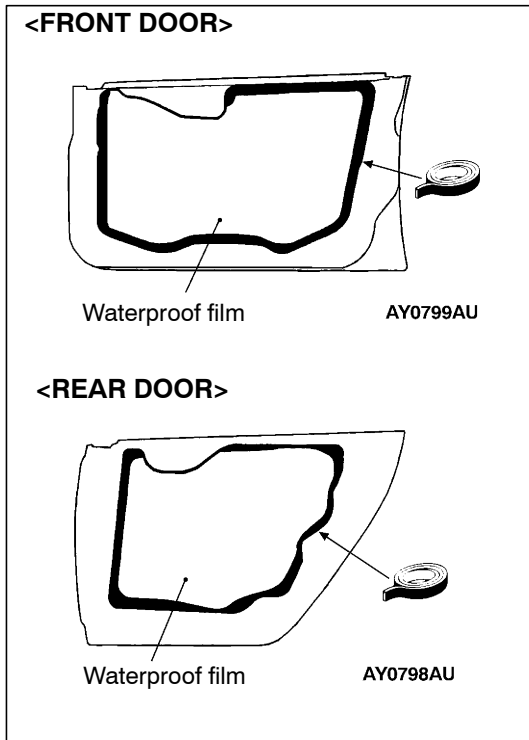
◀A▶ DOOR INSIDE HANDLE COVER REMOVAL

1. Insert the driver into the tapping screw cap end of the door inside handle cover and pry the cap the way shown in the illustration to remove the cap, and then unscrew the tapping screw.
2. As shown in the illustration, insert the special tool between the door inside handle cover and door inside handle, and then disengage the claws of the door inside handle cover and door inside handle.
3. Insert the special tool into the door inside handle cover end, and then pry and remove the door inside handle cover.

◀B▶ CLIP REMOVAL

Use a cloth to remove the clip as shown in the illustration.



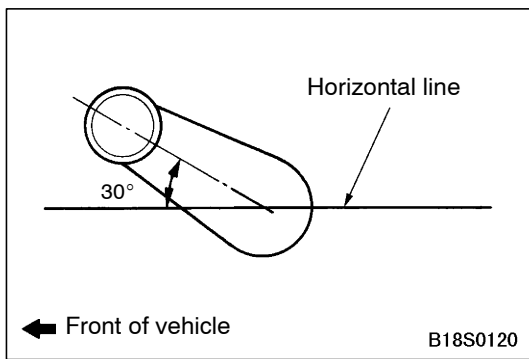


INSTALLATION SERVICE POINTS

▶A◀ WATERPROOF FILM INSTALLATION

Apply the specified adhesive on the waterproof film as shown in the illustration, and then glue it on the door window glass.

Specified sealant: 3M ATD Part No. 8625 or equivalent

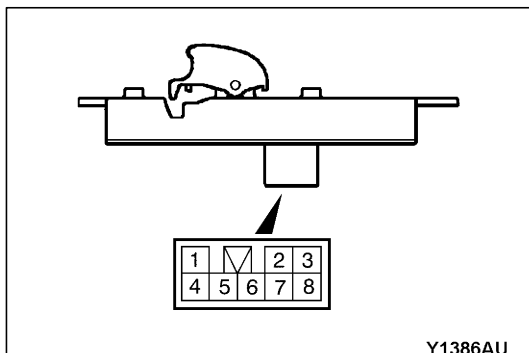


▶B◀ REGULATOR HANDLE/ESCUTCHEON/CLIP INSTALLATION

1. Install the clip and escutcheon to the regulator handle.
2. Close the front door window glass fully, and then install the regulator handle as shown in the illustration.

INSPECTION

Power window main switch uses SWS system, for the power window main switch check, refer to GROUP 54B - SWS.



POWER WINDOW SUB SWITCH CONTINUITY CHECK

Switch position	Terminal No.		
	2	3	6
UP	○	—	○
DOWN	○	○	—

DOOR GLASS AND REGULATOR

REMOVAL AND INSTALLATION

Pre-removal Operation

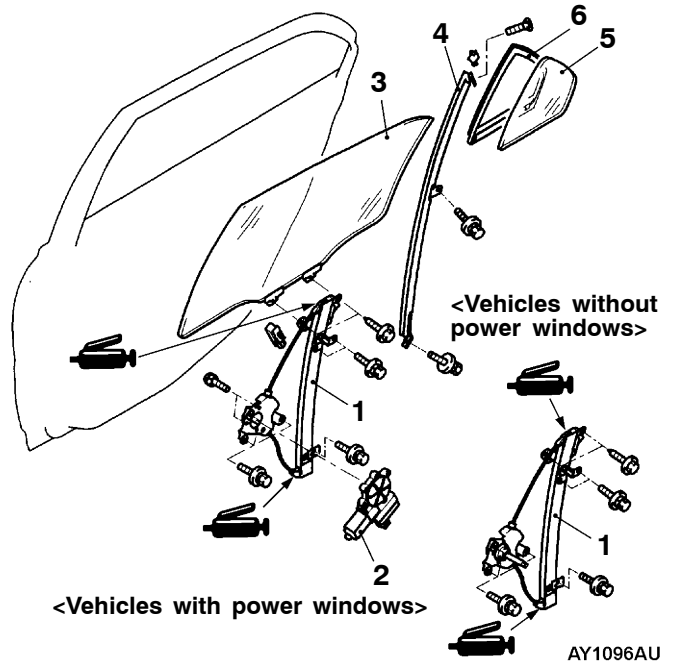
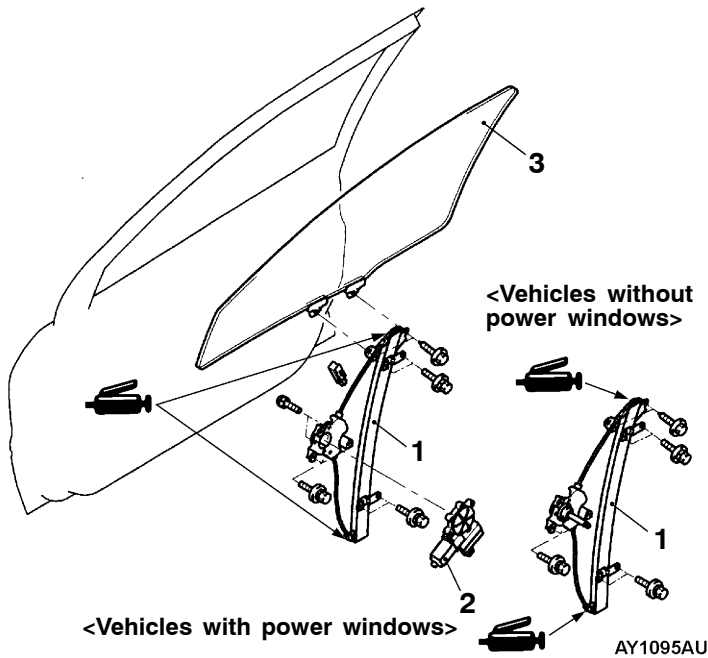
Door Trim and Waterproof Film Removal (Refer to P.42-27.)

Post-installation Operation

- Door Window Glass Adjustment (Refer to P.42-21.)
- Door Trim and Waterproof Film Installation (Refer to P.42-27)

<FRONT DOOR>

<REAR DOOR>



Window regulator assembly removal steps

- ▶B◀ • Operation check <Vehicles with power window>
- ◀A▶ ▶A◀ 1. Window regulator assembly
- ◀A▶ ▶A◀ 2. Power window motor assembly

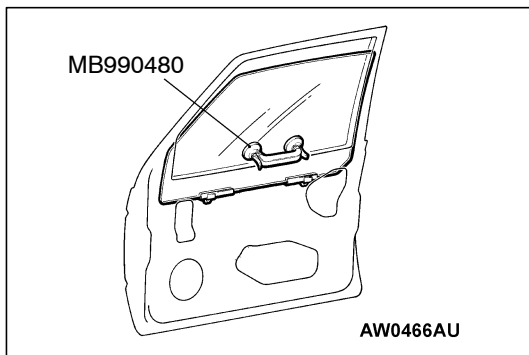
Window glass removal steps

- Window glass runchannel (Refer to P.42-39, 40.)
- 3. Door window glass

Stationary window glass removal steps

- Window glass runchannel (Refer to P.42-38, 39.)
- Door window glass lower runchannel (Refer to P.42-38, 39.)
- 3. Door window glass
- 4. Door center sash
- 5. Stationary window glass
- 6. Stationary window weatherstrip





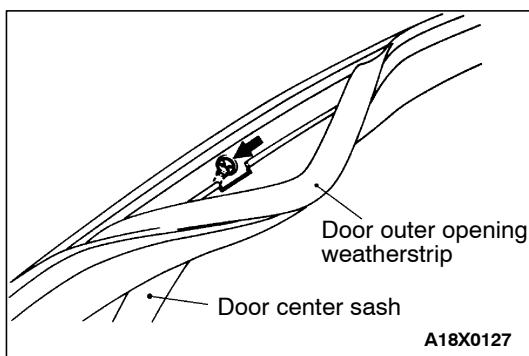
REMOVAL SERVICE POINTS

◀A▶ WINDOW REGULATOR ASSEMBLY/POWER WINDOW MOTOR ASSEMBLY REMOVAL

1. Loosen the door window glass assembly mounting bolts.
2. Raise the door window glass assembly, and then adhere the special tool on the glass as shown in the illustration to prevent from falling.

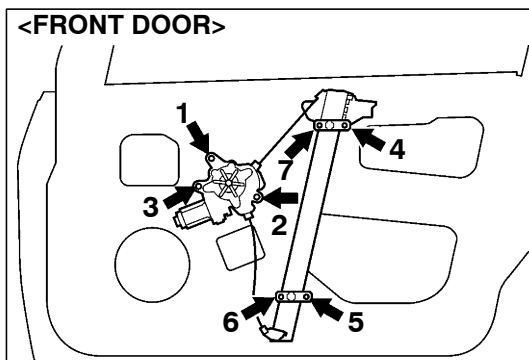
CautionFor the door window glass adhered film and etc., use the special tool from outside the door glass to prevent unsticking.

3. Remove the power window regulator and motor assembly.



◀B▶ DOOR CENTER SASH REMOVAL

1. Remove only the section of the door outer opening weatherstrip
2. Remove the center sash upper mounting screws, and then remove the center sash upper from the door panel.

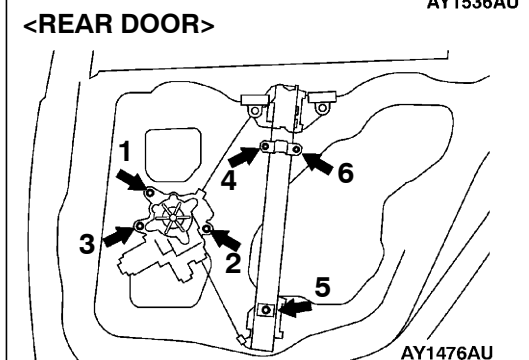


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INSTALLATION SERVICE POINTS

▶A◀ WINDOW REGULATOR ASSEMBLY/POWER WINDOW MOTOR ASSEMBLY INSTALLATION

When installing the window regulator assembly, tighten he bolts at the specified torque in the order shown in the illustration.



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▶B◀ OPERATION CHECK <Vehicles with power window>

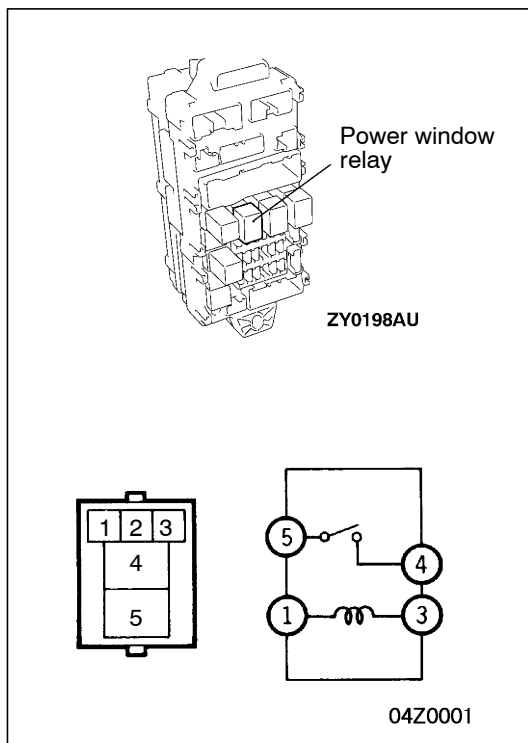
1. Install the glass to the window regulator assembly.

Caution

- (1) As fully open position which is programmed in the power window-ECU is released (initialized), the window regulator assembly should not be operated until it is installed to the glass.
 - (2) The clamping prevention function does not operate the first time that the glass is fully closed.
2. Press the power window switch to fully-open the glass, and then return the glass toward the fully-close position about 30 mm each. In the fully-close position, keep on pressing the power window switch for 0.5 second or more.

NOTE

This operation will program the power window-ECU.



INSPECTION

POWER WINDOW RELAY CONTINUITY CHECK

Battery voltage	Terminal No.			
	1	3	4	5
Not applied	○	○		
Applied	⊕	⊖	○	○

DOOR HANDLE AND LATCH

REMOVAL AND INSTALLATION

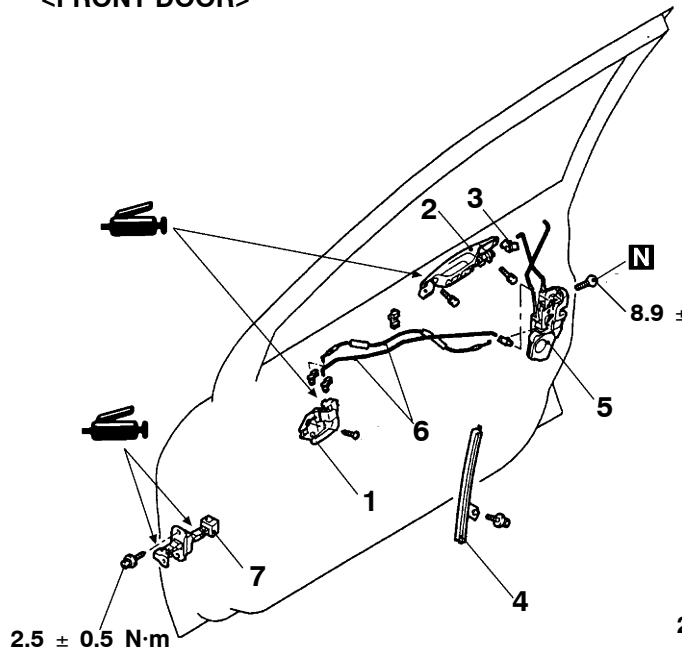
Pre-removal Operation

Door Trim Removal (Refer to P.42-27.)

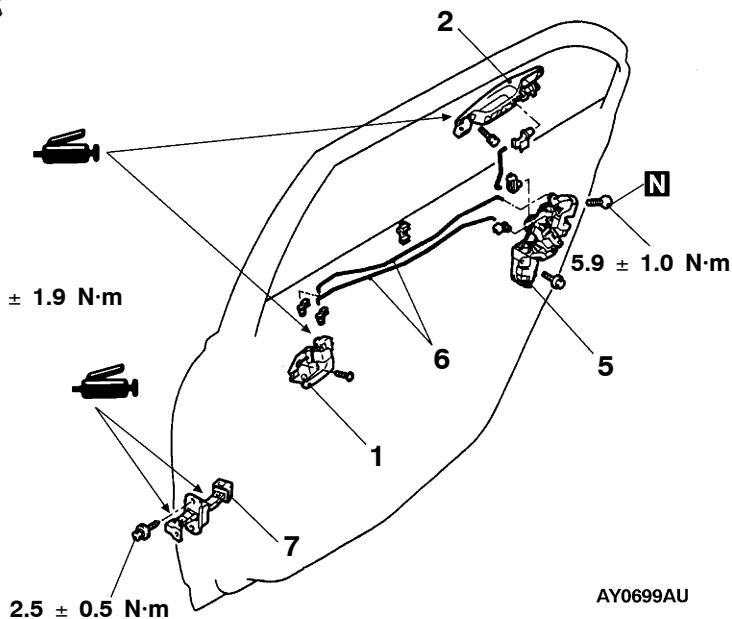
Post-installation Operation

- Door Inside Handle Looseness Check (Refer to P.42-24.)
- Door Outside Handle Looseness Check (Refer to P.42-23.)
- Door Trim Installation (Refer to P.42-27.)

<FRONT DOOR>



<REAR DOOR>



Door handle and door latch removal steps



1. Door inside handle
 - Waterproof film (Refer to P.42-27.)
 - Door window glass lower runchannel (Refer to P.42-38, 39.)
 - Door center sash (Refer to P.42-32.)

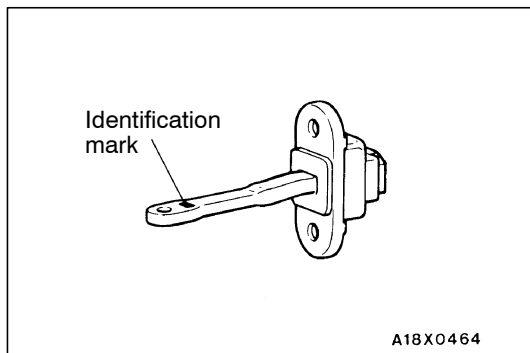


2. Door outside handle
3. Key cylinder
4. Lower sash
5. Door latch assembly
6. Link

Door check removal steps



- Waterproof film (Refer to P.42-27.)
- 7. Door check



INSTALLATION SERVICE POINTS

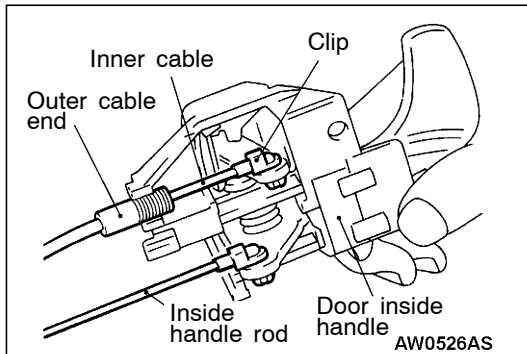
▶A◀ DOOR CHECK INSTALLATION

Install with the following identification marks upward.

Items		Identification mark
Front door	Left side	21L
	Right side	21R
Rear door	Left side	36L
	Right side	36R

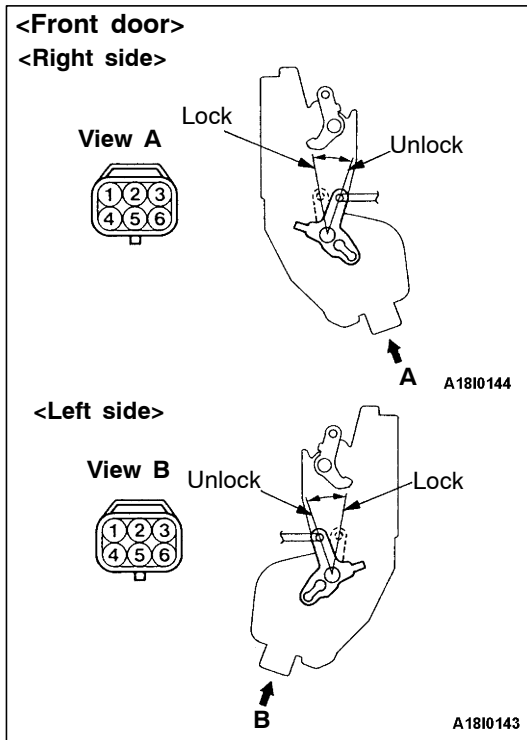
►B◄ LOWER SASH INSTALLATION

Be sure to install the lower sash to the window rear sash (at door) securely.



►C◄ DOOR INSIDE HANDLE INSTALLATION

1. Install the inside lock cable to the door inside handle as follows:
 - (1) Install the inner cable end in the inside lock cable to the clip in the door inside handle.
 - (2) Turn the inside lock knob to the door lock position.
 - (3) Install the outer cable end to the door inside handle securely.
 - (4) Install the clip to the inner cable.
2. Install the inside handle rod to the door inside handle.
3. Install the door inside handle to the door.



INSPECTION

DOOR LOCK ACTUATOR CHECK

Front door

<Left side (Driver's side)>

Rod position	Terminal No.					Rod operation
	1	2	3	4	6	
LOCK				+	-	LOCK to UNLOCK
UNLOCK				-	+	UNLOCK to LOCK
LOCK	○	—	○			
UNLOCK	○	○				

<Left side (Passenger's side)>

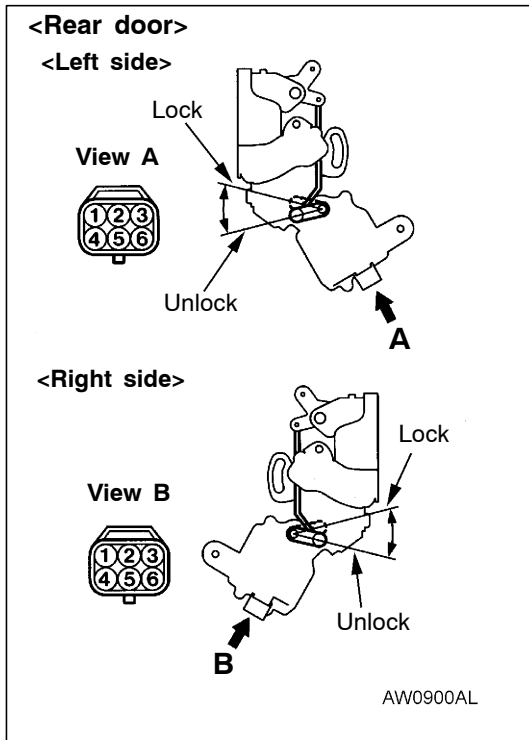
Rod position	Terminal No.		Rod operation
	4	6	
LOCK	+	-	LOCK to UNLOCK
UNLOCK	-	+	UNLOCK to LOCK

<Right side (Driver's side)>

Rod position	Terminal No.					Rod operation
	1	2	3	4	6	
LOCK				-	+	LOCK to UNLOCK
UNLOCK				+	-	UNLOCK to LOCK
LOCK	○	—	○			
UNLOCK		○	○			

<Right side (Passenger's side)>

Rod position	Terminal No.		Rod operation
	4	6	
LOCK	-	+	LOCK to UNLOCK
UNLOCK	+	-	UNLOCK to LOCK



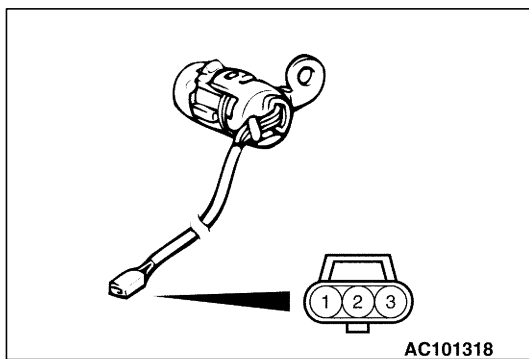
Rear door

<Left side>

Rod position	Terminal No.		Rod operation
	2	3	
LOCK	⊖	⊕	LOCK to UNLOCK
UNLOCK	⊕	⊖	UNLOCK to LOCK

<Right side>

Rod position	Terminal No.		Rod operation
	2	3	
LOCK	⊕	⊖	LOCK to UNLOCK
UNLOCK	⊖	⊕	UNLOCK to LOCK



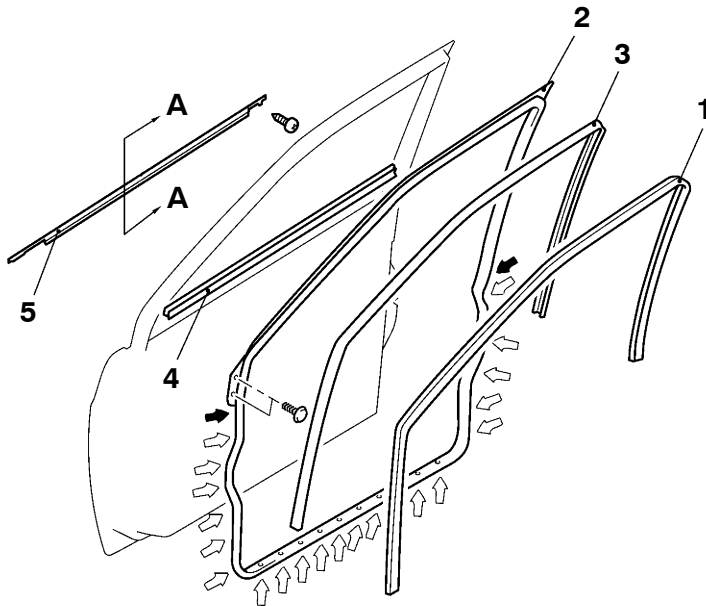
DOOR LOCK KEY CYLINDER SWITCH CONTINUITY CHECK <Vehicles with central door locking system>

Switch position	Terminal No.					
	<L.H. drive vehicles>			<R.H. drive vehicles>		
	1	2	3	1	2	3
LOCK	○	○			○	○
OFF						
UNLOCK		○	○	○	○	

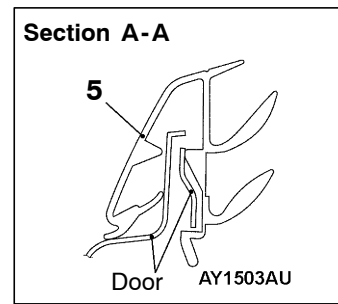
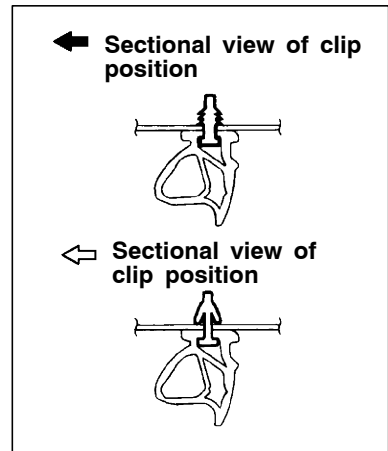
WINDOW GLASS RUNCHANNEL AND DOOR OPENING WEATHERSTRIP

REMOVAL AND INSTALLATION

<FRONT DOOR>



AY0650AU



Door inner opening weatherstrip removal steps

- Scuff plate (Refer to GROUP 52A.)
- Cowl side trim (Refer to GROUP 52A.)
- Center pillar lower trim (Refer to GROUP 52A.)

1. Door inner opening weatherstrip

Door outer opening weatherstrip removal

2. Door outer opening weatherstrip

Door window glass runchannel removal

3. Door window glass runchannel

Door beltline inner weatherstrip removal steps

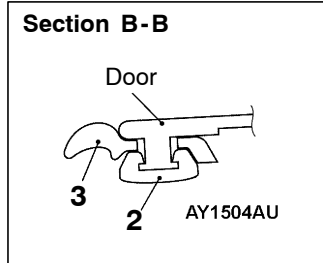
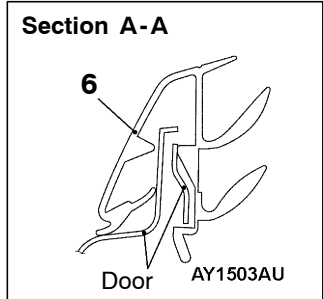
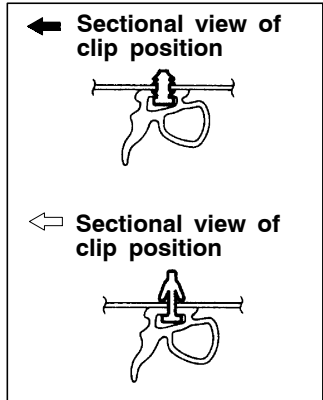
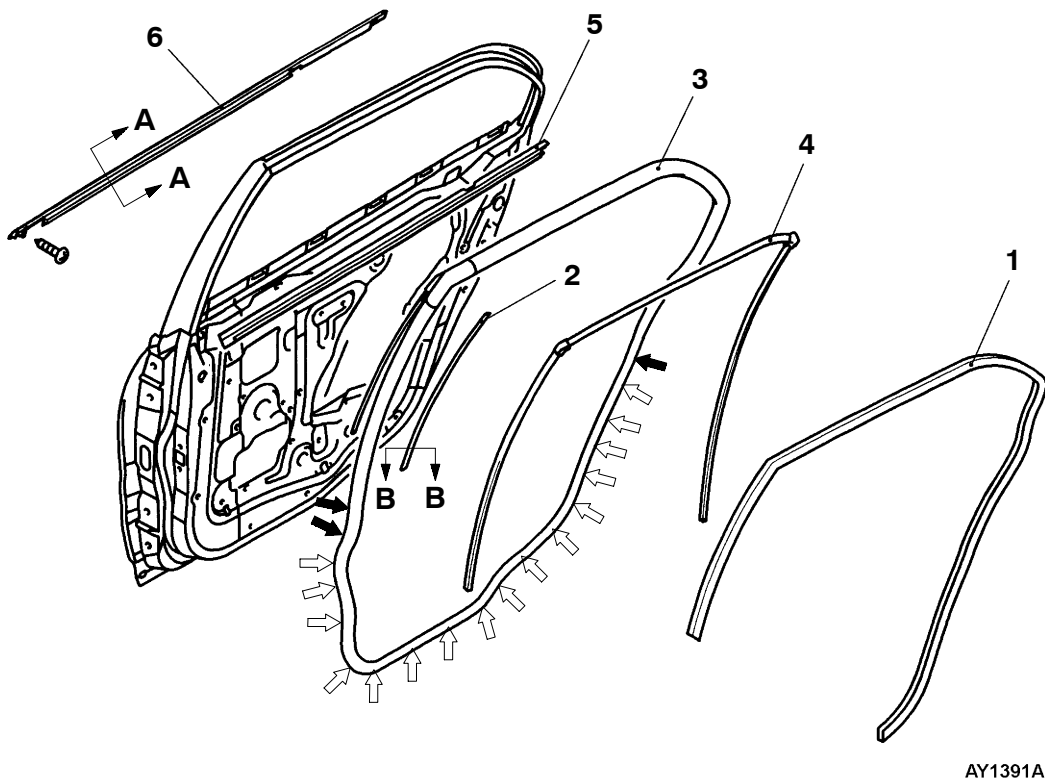
- Door trim (Refer to P.42-27.)
- 4. Door beltline inner weatherstrip

Door beltline molding removal steps

- Outside mirror (Refer to GROUP 51.)
- Door window glass (Refer to P.42-32.)
- 5. Door beltline molding



<REAR DOOR>



Door inner opening weatherstrip removal steps

- Scuff plate (Refer to GROUP 52A.)
 - Center pillar lower trim (Refer to GROUP 52A.)
1. Door inner opening weatherstrip

Door outer opening weatherstrip removal steps

2. Retainer weatherstrip
3. Door outer opening weatherstrip

Door window glass runchannel removal

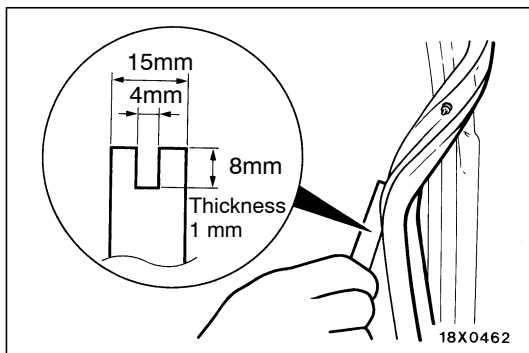
4. Door window glass runchannel

Door beltline inner weatherstrip removal steps

- Door trim (Refer to P.42-27.)
5. Door beltline inner weatherstrip

Door beltline molding removal steps

- Door window glass (Refer to P.42-32.)
 - Stationary glass (Refer to P.42-32.)
6. Door beltline molding



REMOVAL SERVICE POINT

◀A▶ DOOR OUTER OPENING WEATHERSTRIP REMOVAL

Make a tool as shown and remove the weatherstrip from the door panel.

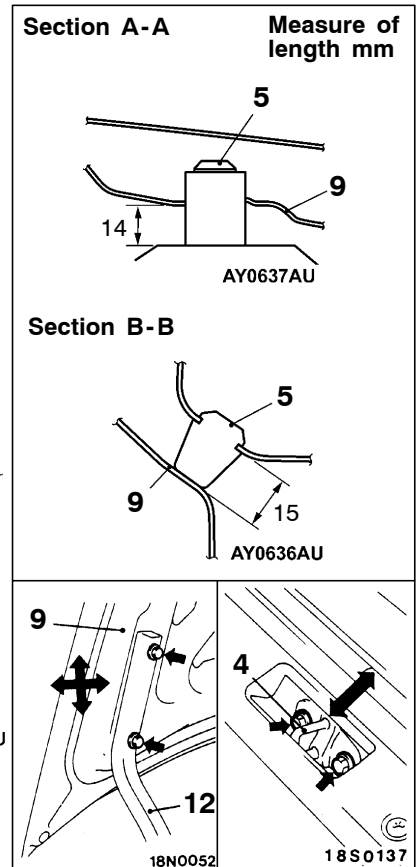
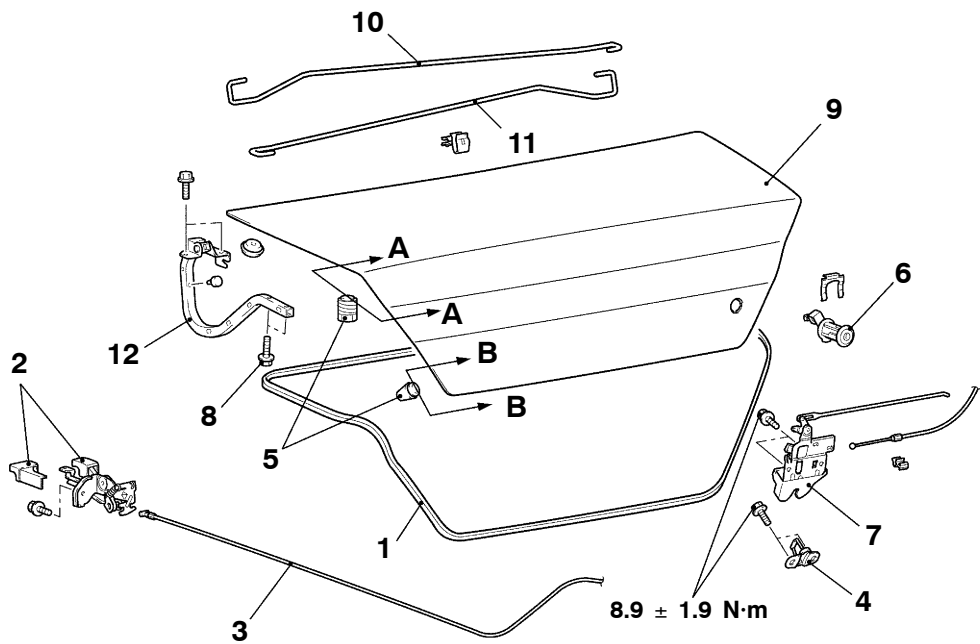
INSTALLATION SERVICE POINTS**▶A◀ DOOR OUTER OPENING WATHERSTRIP
INSTALLATION**

The clip colour identifies the left and right weatherstrips so be sure to use the colours as install correctly.

Applicable side	Identification colour
Right door	Pink
Left door	Natural (White)

TRUNK LID

REMOVAL AND INSTALLATION



Trunk lid weatherstrip removal steps



- Rear end trim <RS- > (Refer to GROUP 52A.)
1. Trunk lid weatherstrip

Trunk lid release cable and trunk lid release handle removal steps

- Trunk rear side trim (Left side) (Refer to GROUP 52A.)
 - Rear seat (Refer to GROUP 52A.)
 - Center pillar lower trim (Refer to GROUP 52A.)
 - Cowl side trim
 - Accelerator pedal stopper
2. Trunk lid release handle
 3. Trunk lid release cable

Trunk lid striker removal steps

- Rear end trim <RS- > (Refer to GROUP 52A.)

4. Trunk lid striker

Trunk lid panel removal steps

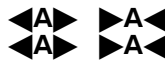
5. Trunk lid bumper
6. Trunk lid lock cylinder
7. Trunk lid latch assembly
8. Trunk lid hinge mounting bolt
9. Trunk lid panel assembly

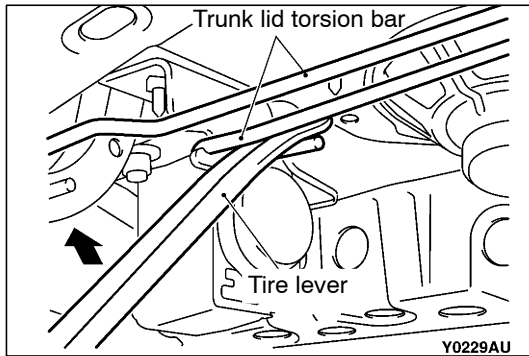
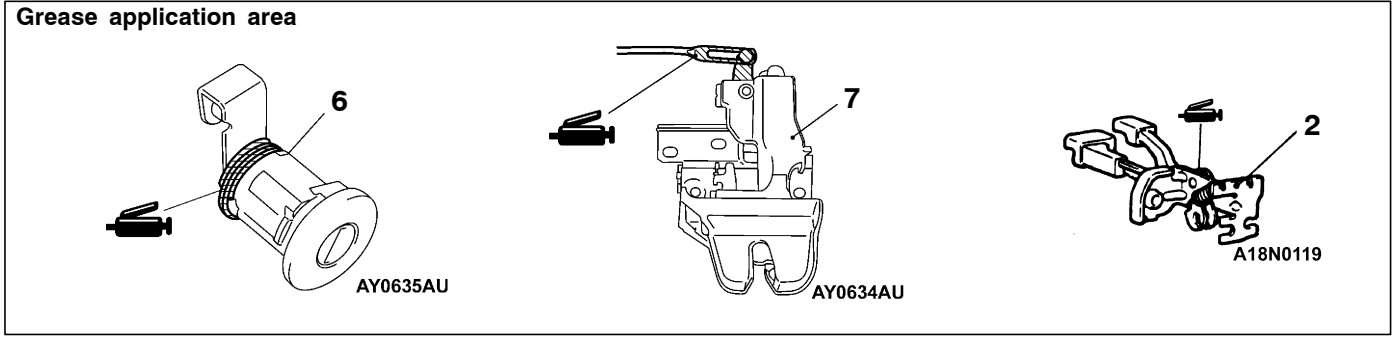
Trunk lid latch assembly removal

7. Trunk lid latch assembly

Trunk lid hinge removal steps

- Rear shelf trim
 - Rear seat (Refer to GROUP 52A.)
9. Trunk lid panel assembly
 10. Trunk lid torsion bar (Right side)
 11. Trunk lid torsion bar (Left side)
 12. Trunk lid hinge





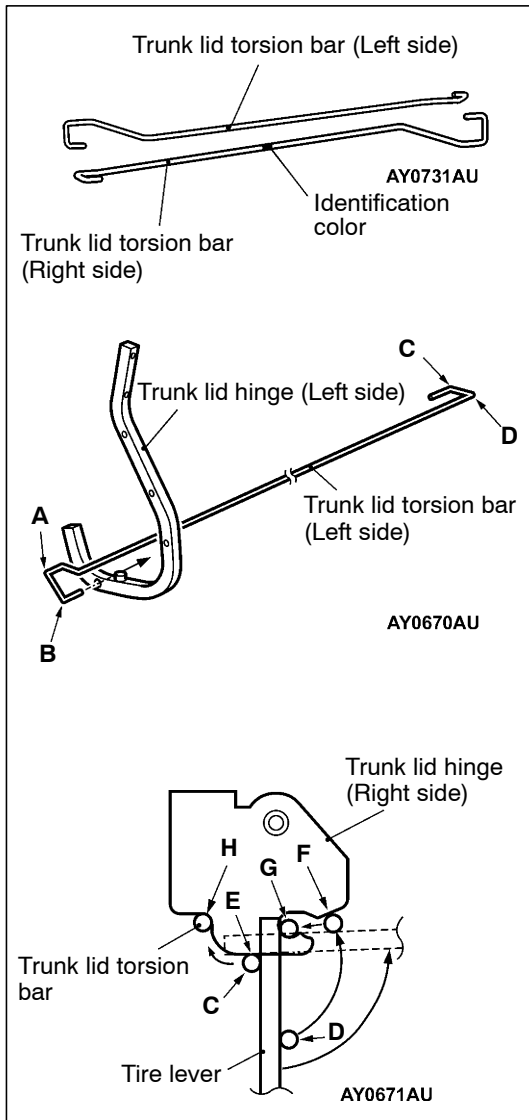
REMOVAL SERVICE POINT

◀▶ TRUNK LID TORSION BAR REMOVAL

Insert the tire lever into the torsion bar, and then pull upward the tire lever to remove the torsion bar as shown in the illustration.

NOTE

As the left and right trunk lid torsion bars are crossed at the center, first remove the front trunk lid torsion bar at the center.



INSTALLATION SERVICE POINTS

▶◀ TRUNK LID TORSION BAR INSTALLATION

Install the trunk lid torsion bar by the following procedure.

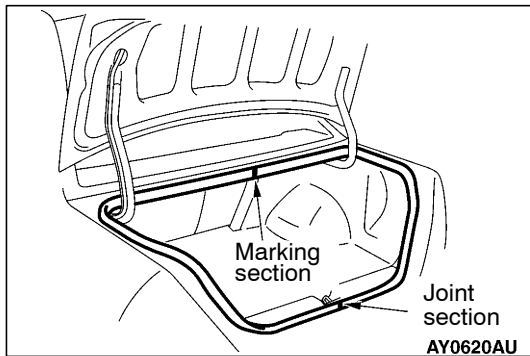
1. Ensure that there is the identification color at the center of the trunk lid torsion bar.

Trunk lid torsion bar	Identification color
Left side	-
Right side	Red

Caution

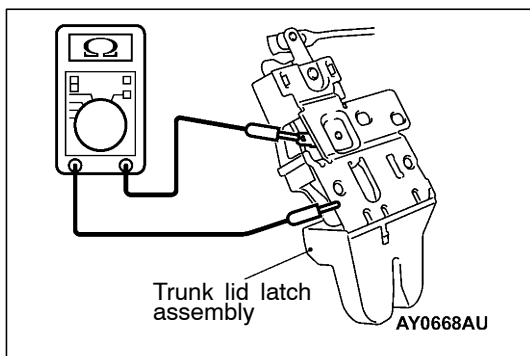
As the trunk lid torsion bar (Right side) is painted with differentiation color in the middle to differentiate between RH and LH, be careful when installing.

2. Install the trunk lid torsion bar (Left side) as follows.
 - (1) For terminal A, insert the trunk lid hinge (Left side) into the fixed hole B
 - (2) For terminal C, touch the trunk lid hinge (Right side) against portion E.
 - (3) For terminal D, insert the trunk lid hinge (Right side) into portion F until portion G while twisting with the tool such as a tire lever, etc.
 - (4) For terminal C, set the trunk lid hinge (Right side) at portion H while twisting with the tool such as a tire lever etc.
3. Install the trunk lid torsion bar (Right side) in the same way as above.



▶B◀ TRUNK LID WEATHERSTRIP INSTALLATION

aligning the trunk lid weatherstrip marking section at the body center to install.



INSPECTION

TRUNK LID LATCH SWITCH CONTINUITY CHECK

Switch position	Terminal No.	
	1	Earth
Latch open	○	○
Latch closed		

NOTES

EXTERIOR

CONTENTS

FRONT BUMPER	2	REAR SPOILER	12
ADHESIVE	2	WINDSHIELD WIPER AND WASHER .	13
FRONT BUMPER	2	SERVICE SPECIFICATIONS	13
REAR BUMPER	6	TROUBLESHOOTING	13
SIDE AIR DAM, MOLDING AND GARNISH	8	ON-VEHICLE SERVICE	13
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ADHESIVE	8	MARKS	20
SIDE AIR DAM MOLDING GARNISH	9	OUTSIDE MIRROR	23
REAR SPOILER	11	SPECIAL TOOL	23
ADHESIVE	11	OUTSIDE MIRROR	23

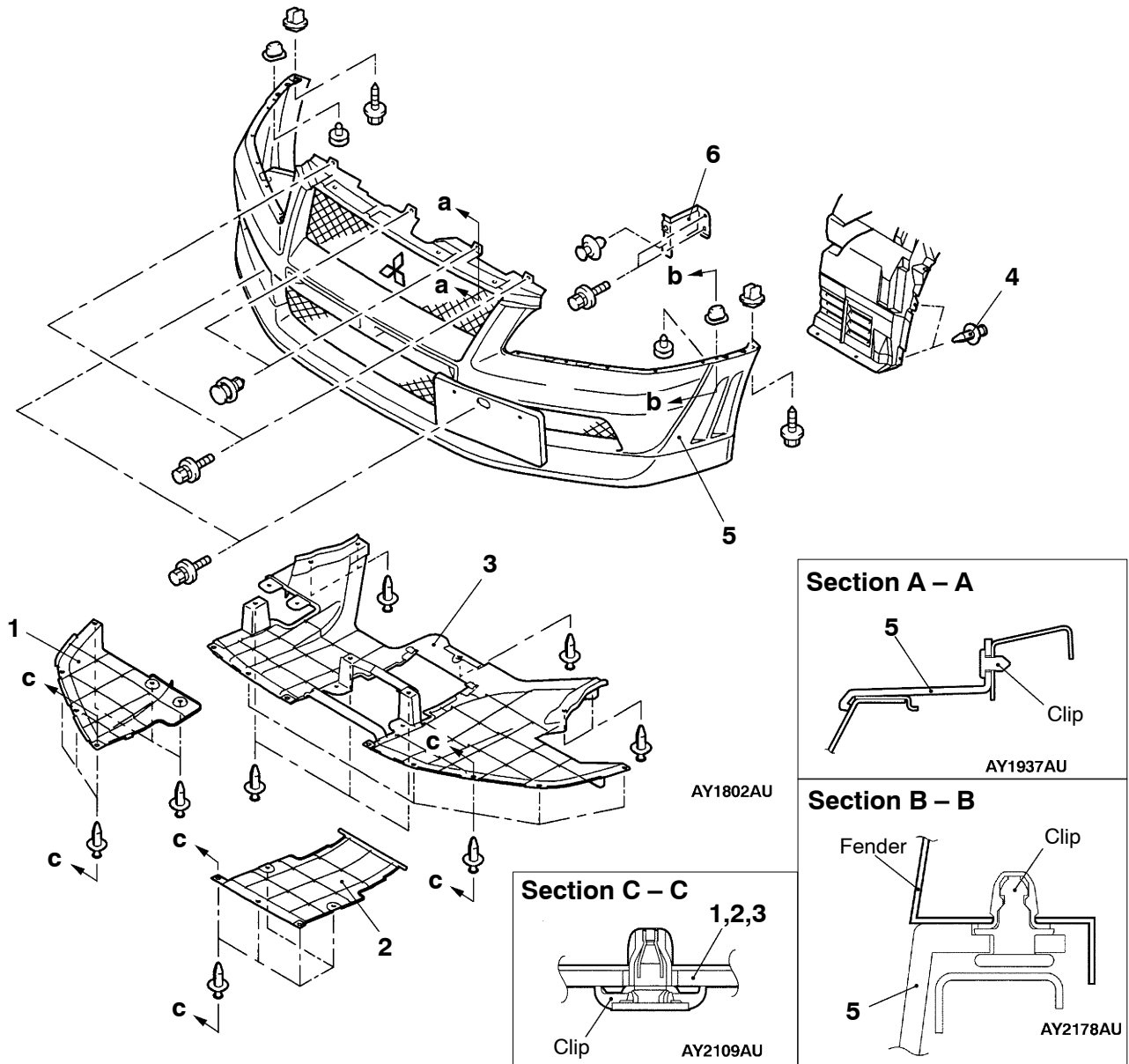
FRONT BUMPER

ADHESIVE

Application	Brand
Front air dam	Double-sided tape [10 mm width 1.2 mm thickness]

FRONT BUMPER

REMOVAL AND INSTALLATION

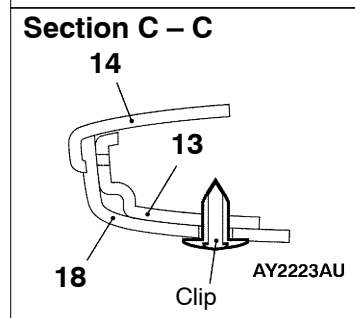
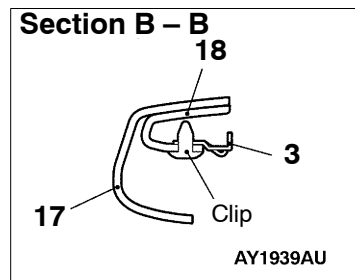
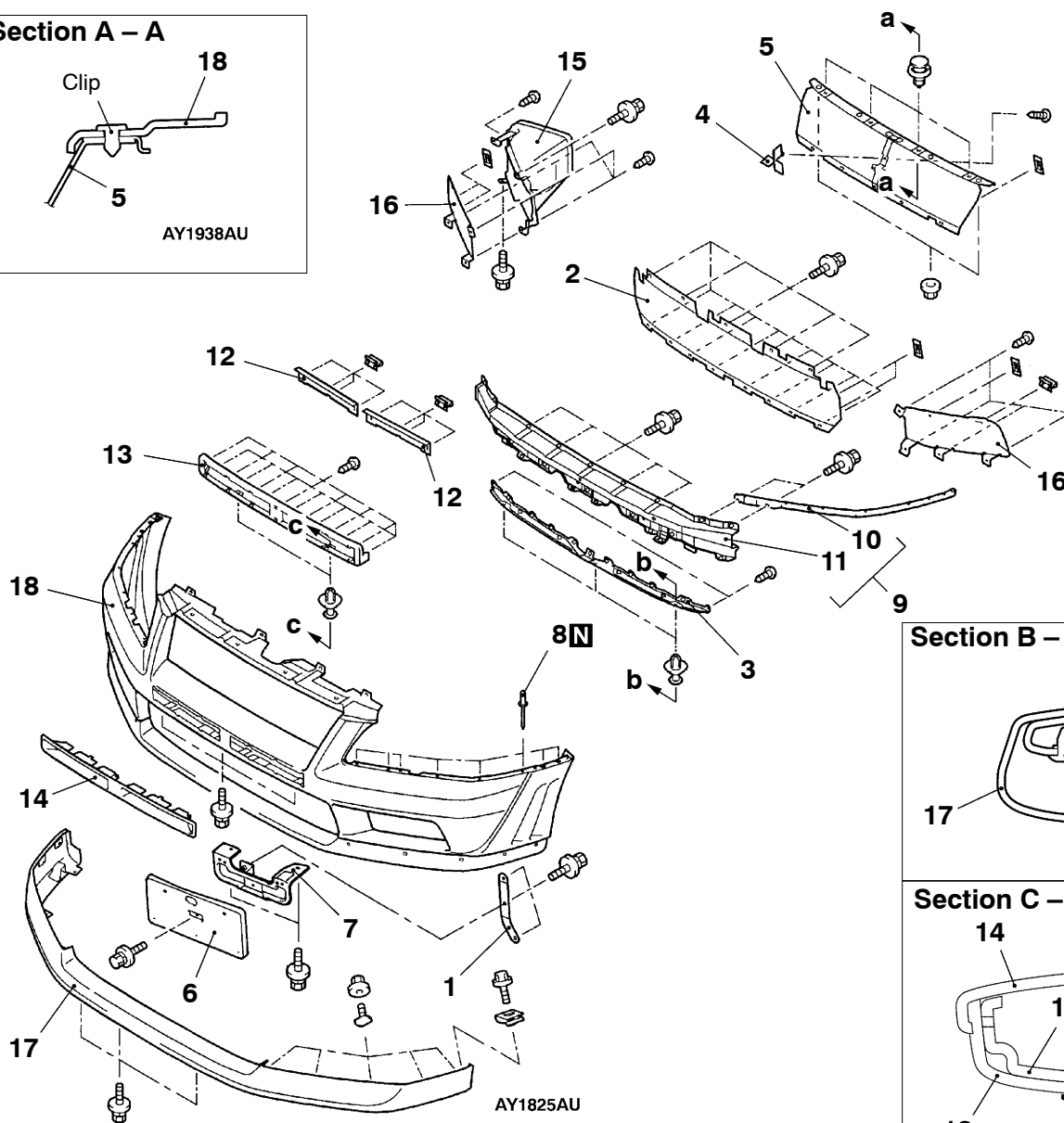
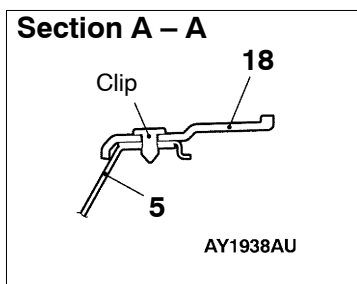


Removal steps

1. Side under cover
2. Center under cover
3. Front under cover
4. Splash shield installation clip

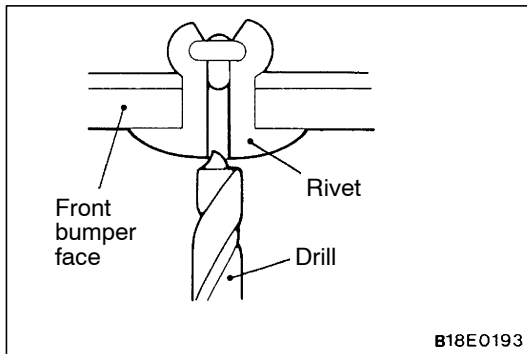
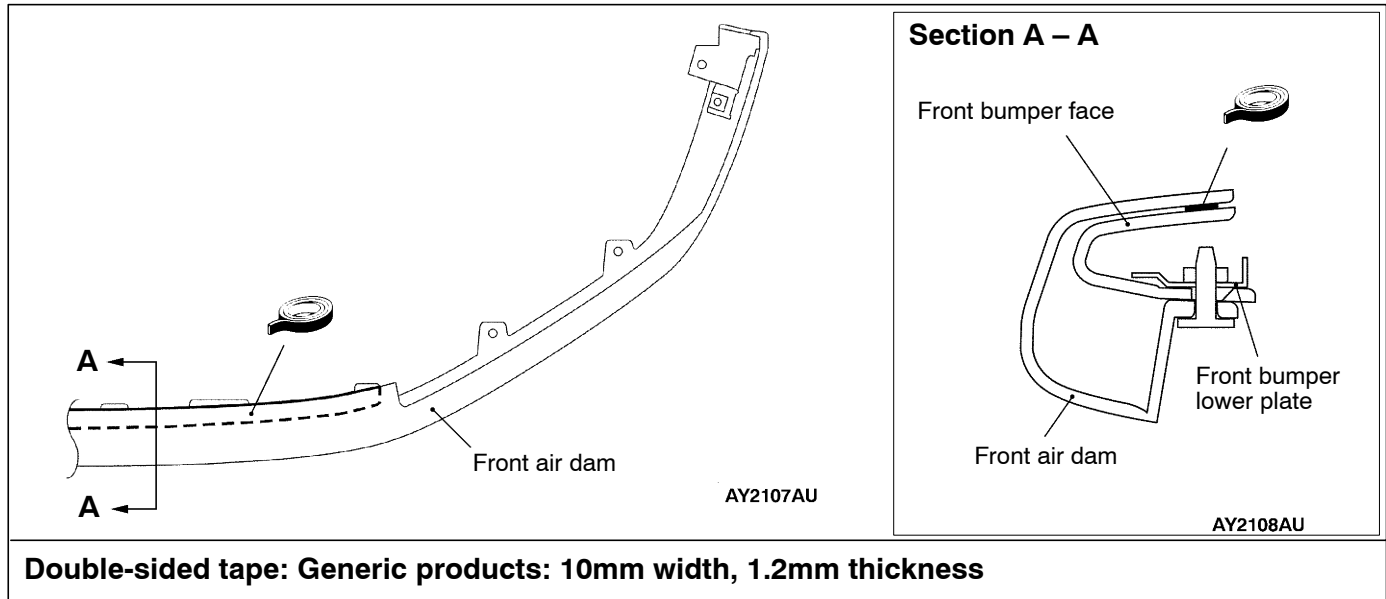
- Water spray hose connection (Refer to Group 15.)
- 5. Front bumper assembly
- 6. Front bumper stay

DISASSEMBLY AND REASSEMBLY



Disassembly steps

- | | |
|--|---|
| <p>1. Front bumper plate</p> <p>2. Front bumper center net</p> <p>3. Front bumper lower plate</p> <p>4. Three-diamond mark</p> <p>5. Front bumper upper reinforcement assembly</p> <p>6. License plate garnish</p> <p>7. License plate bracket</p> <p>8. Rivet</p> <p>9. Front bumper side blade and front center reinforcement assembly</p> | <p>10. Front bumper side blade</p> <p>11. Front bumper center reinforcement</p> <p>• Water spray hose and nozzle (Refer to GROUP 15.)</p> <p>12. Bezel net</p> <p>13. Inner bracket</p> <p>14. Front bumper bezel</p> <p>15. Oil cooler duct</p> <p>16. Front bumper side net</p> <p>17. Front air dam</p> <p>18. Front bumper face</p> |
|--|---|



DISASSEMBLY SERVICE POINTS

◀A▶ RIVET REMOVAL

Use the drill ($\varnothing 4.0$ mm) to make a hole in the rivet for removal.

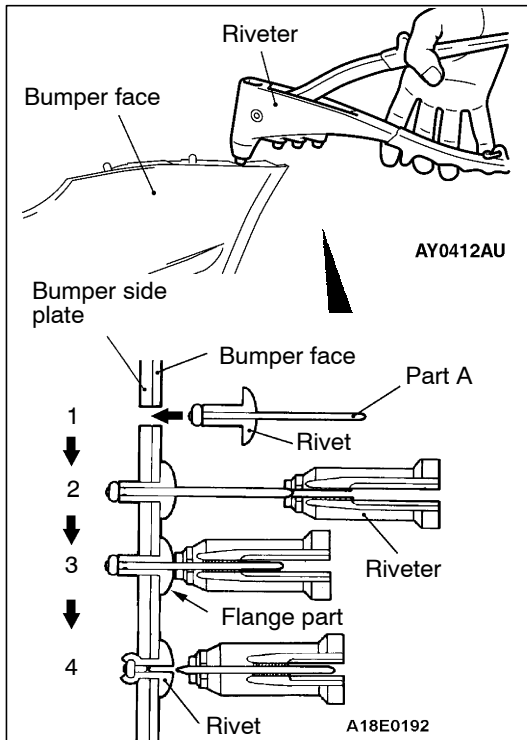
◀B▶ FRONT AIR DAM REMOVAL

The same procedures are applied as that of the removal of side air dam. (Refer to P.51-10.)

REASSEMBLY SERVICE POINTS

▶A◀ FRONT AIR DAM INSTALLATION

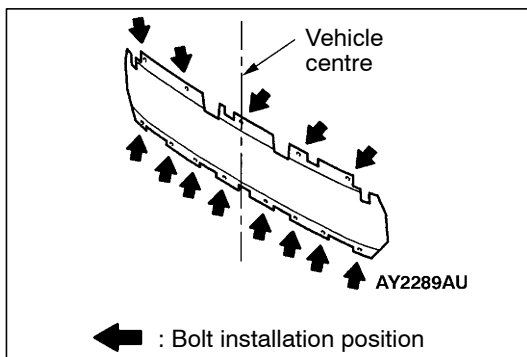
The same procedures are applied as that of the installation of side air dam. (Refer to P.51-10.)



►B◄ RIVET INSTALLATION

Use the recommended tool shown in the illustration to secure the rivet in the following procedure.

1. Insert the rivet into the main materials (front bumper face and front bumper side plate.)
2. Insert the recommended tool into Part A of the rivet.
3. Maneuver the handle of the tool pressing the flange of the rivet.
4. Particles of Part A of the rivet are cut off to be secured.



◄C► FRONT BUMPER CENTER NET REMOVAL

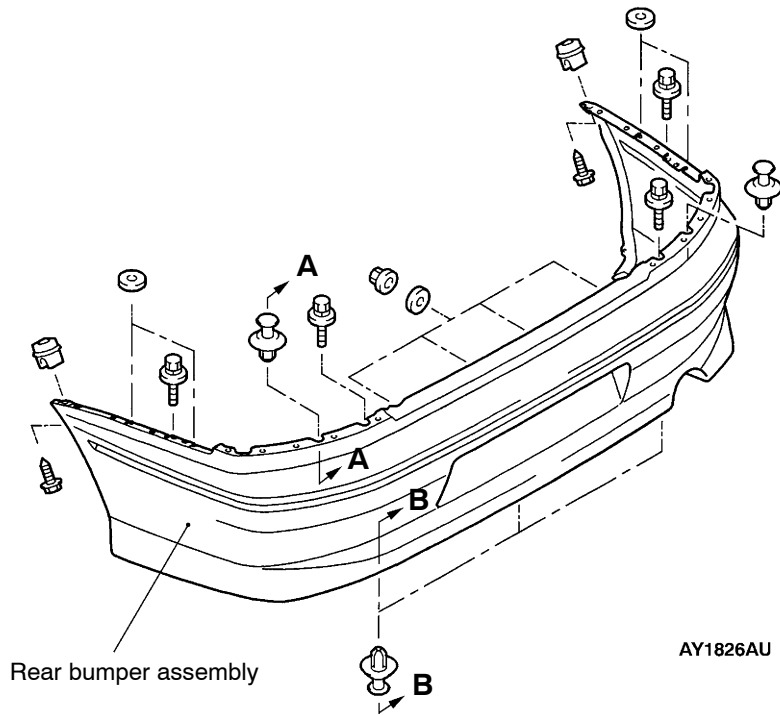
Tighten the front bumper center net mounting bolt from the vehicle centre line.

REAR BUMPER

REMOVAL AND INSTALLATION

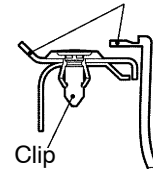
Pre-removal and post-installation operations

- Removal and installation of rear combination lamp (Refer to GROUP 54A.)
- Removal and installation of rear end trim, washer tank lid and AYC reservoir tank lid (Refer to GROUP 52A – Trim.)
- Removal and installation of rear splash shield



Section A – A

Rear bumper assembly

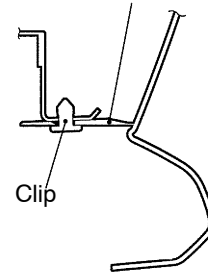


Clip

AY1940AU

Section B – B

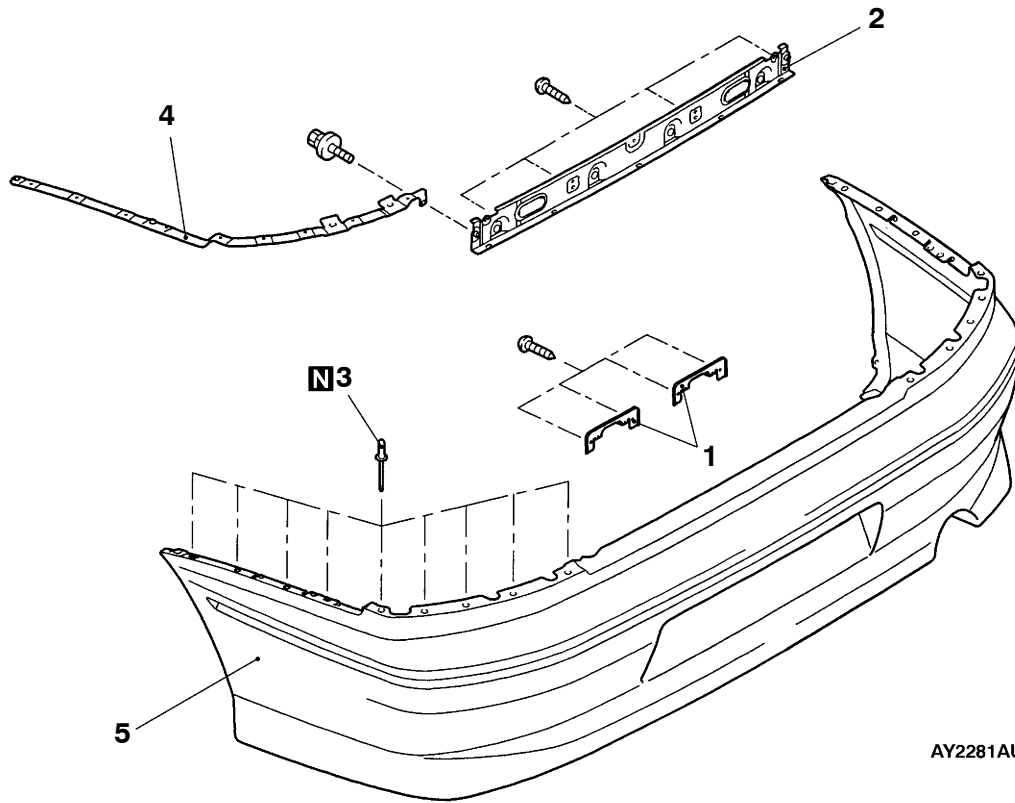
Rear bumper assembly



Clip

AY1941AU

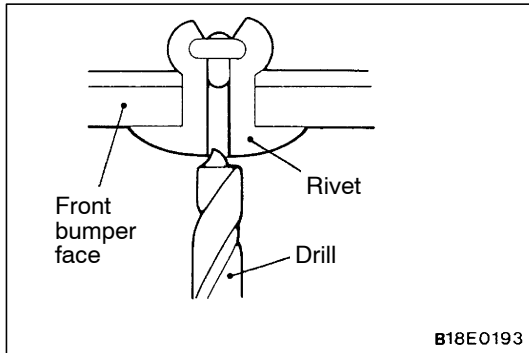
DISASSEMBLY AND REASSEMBLY



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Disassembly steps

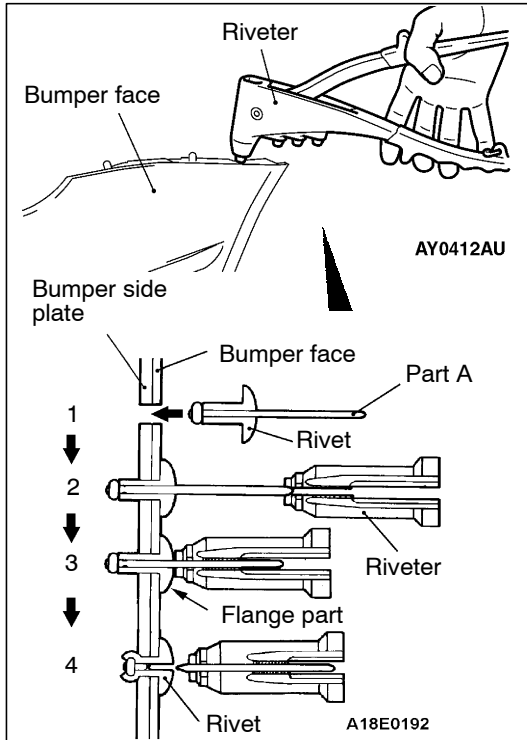
- | | |
|-------------------------------------|---------------------------|
| 1. License plate bracket | 4. Rear bumper side plate |
| 2. Rear bumper center reinforcement | 5. Rear bumper face |
| 3. Rivet | |



DISASSEMBLY SERVICE POINTS

◀A▶ RIVET REMOVAL

Use the drill (ø 4.0 mm) to make a hole in the rivet for removal.



REASSEMBLY SERVICE POINTS

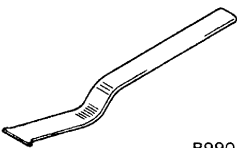
▶◀ RIVET INSTALLATION

Use the recommended tool shown in the illustration to secure the rivet in the following procedure.

1. Insert the rivet into the main materials (rear bumper face and rear bumper side plate.)
2. Insert the recommended tool into Part A of the rivet.
3. Maneuver the handle of the tool pressing the flange of the rivet.
4. Particles of Part A of the rivet are cut off to be secured.

SIDE AIR DAM, MOLDING AND GARNISH

SPECIAL TOOL

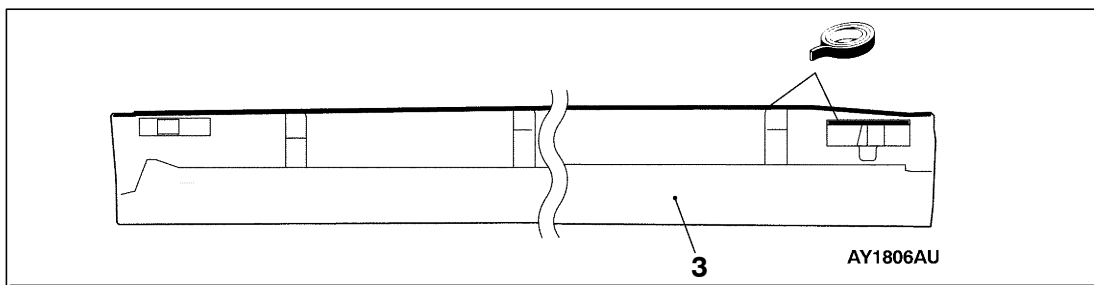
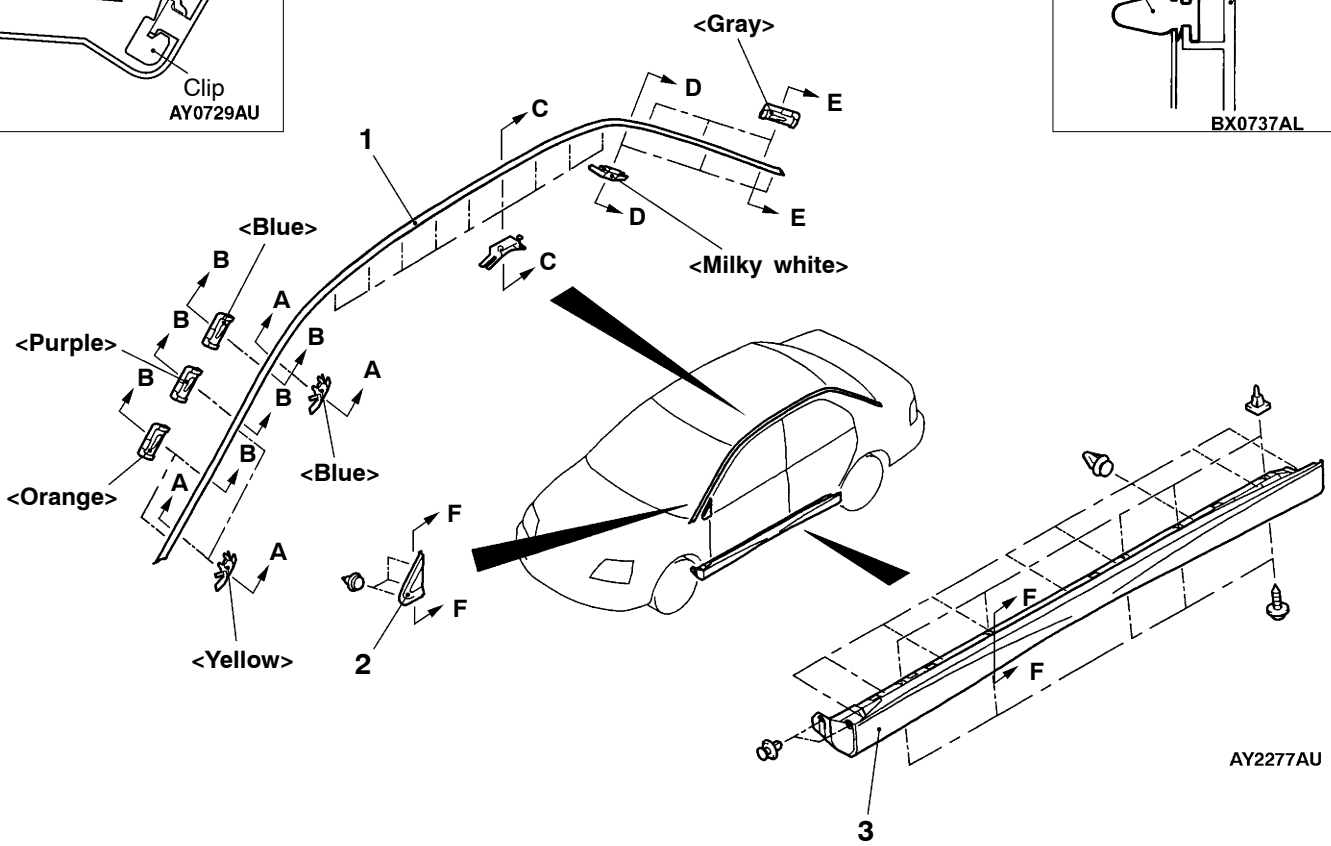
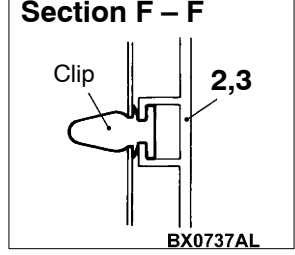
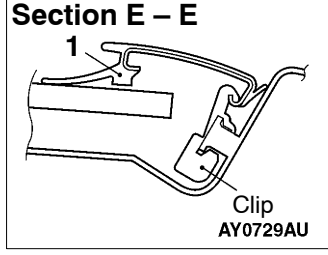
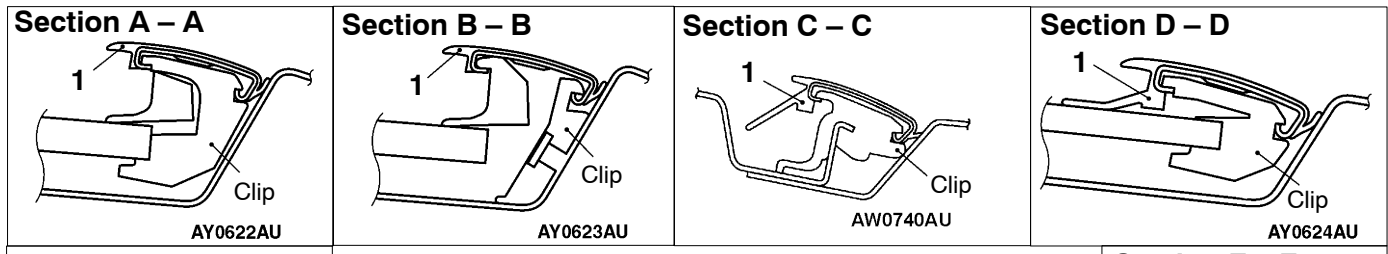
Tool	Number	Name	Application
 <p>B990449</p>	MB990449	Window molding remover	Removal of roof drip molding

ADHESIVE

Application	Brand
Side air dam	Double-sided tape [5 mm width 1.2 mm thickness]

SIDE AIR DAM, MOLDING AND GARNISH

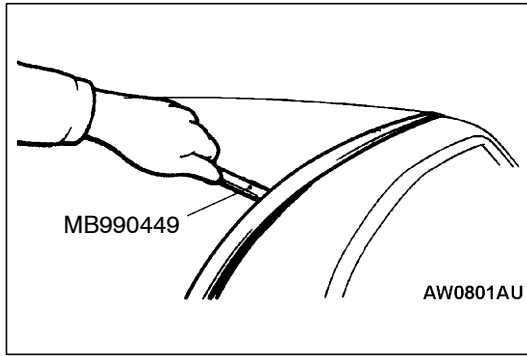
REMOVAL AND INSTALLATION



Double-sided tape: Generic products: 5mm width, 1.2mm thickness

NOTE: Refer to P.51-14 for more information regarding removal and installation of front deck garnish.

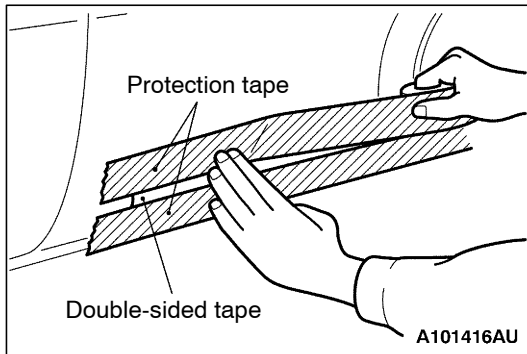
- ◀A▶ 1. Roof drip molding
- ▶B▶ ▶A◀ 2. Delta outer garnish
- ▶B▶ ▶A◀ 3. Side air dam

**REMOVAL SERVICE POINTS****◀A▶ ROOF DRIP MOLDING REMOVAL**

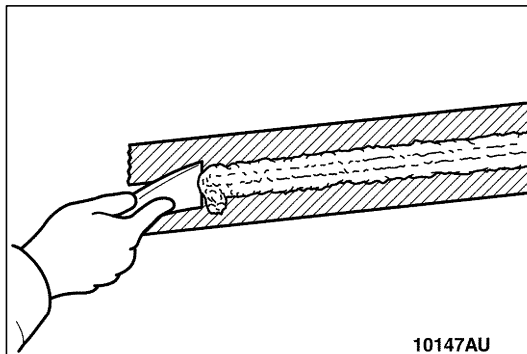
Use the special tool to pry the molding from the rear of the body for removal.

Caution

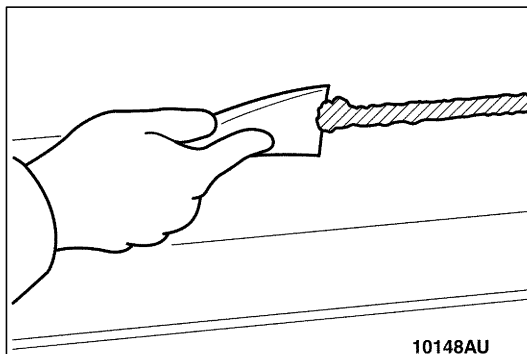
Do not use the deformed mold again.

**◀B▶ SIDE AIR DAM REMOVAL**

1. Attach protection tape all the way along the edges of the double-sided tape which is still adhering to the body.

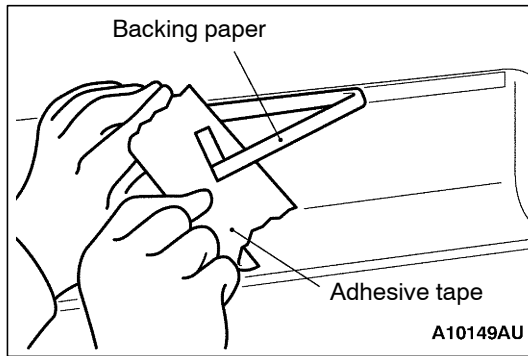


2. Use a resin spatula to scrape off the double-sided tape.
3. Peel off the protection tape.
4. Wipe the body surface and clean it with a rag moistened with isopropyl alcohol.

**INSTALLATION SERVICE POINTS****▶A◀ SIDE AIR DAM INSTALLATION**

Double-sided tape affixing to the side air dam (when reusing)

1. Scrape off the double-sided tape with a resin spatula or gasket scraper.
2. Wipe off the side air dam adhesion surface and clean it with a shop towel moistened with isopropyl alcohol.
3. Affix the specified double sided tape to the side air dam. (Refer to P.51-9.)



4. Remove strip paper from the pressure sensitive double-sided tape.

NOTE

Affix double-sided tape to the end of strip paper for ease of strip paper removal. (Refer to P.51-9.)

5. Install the side air dam.

NOTE

If it is hard to affix the double-sided tape in winter, heat the application surfaces at both the vehicle body and the side air dam.

Body 40 - 60 °C

Side air dam 20 - 30 °C

Apply pressure fully to the side air dam.

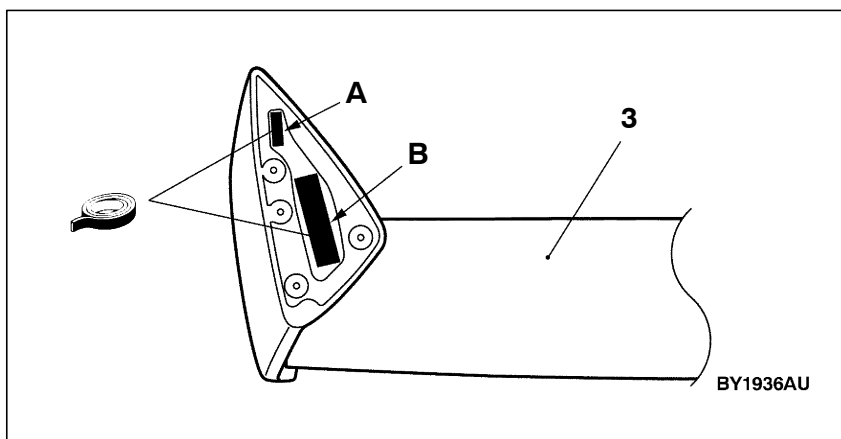
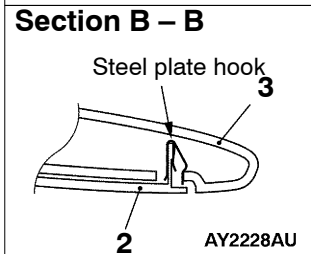
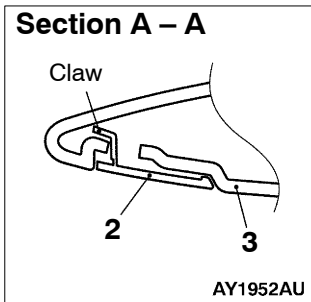
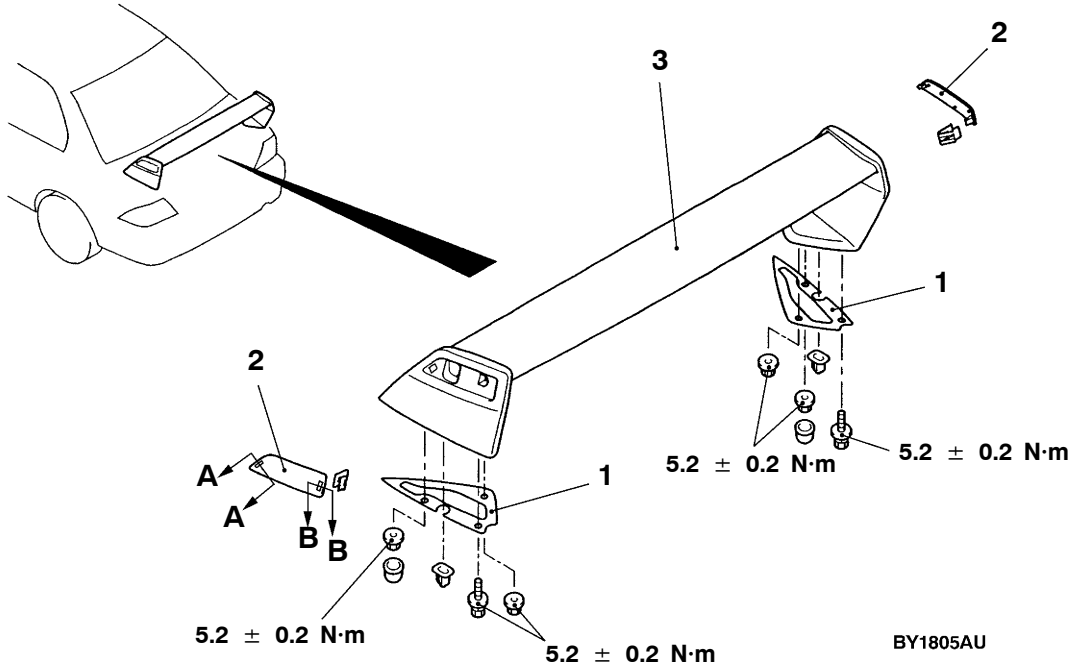
REAR SPOILER

ADHESIVE

Application	Brand
Rear spoiler	Double-sided tape [15 mm width 1.2 mm thickness, 30 mm width 1.2 mm thickness]

REAR SPOILER

REMOVAL AND INSTALLATION



Double-sided tape:
Generic products: A : 15mm width, 1.2mm thickness,
 B : 30mm width, 1.2mm thickness

Removal steps

- Trunk lid bumper (Refer to Group 42.)
- 1. Gasket
- 2. Cap
- 3. Rear spoiler

NOTE:

The removal and installation service points are the same as SIDE AIR DAM , MOLDING AND GARNISH. (Refer to P.51-10)



WINDSHIELD WIPER AND WASHER

SERVICE SPECIFICATIONS

Item	Standard value
Stop position of the windshield wiper arm/blade assembly (distance between the edge of the wiper blade and the end of the deck garnish) mm	34 ± 5

TROUBLESHOOTING

The windshield wiper-washer is controlled by the smart wiring system (SWS). Refer to Group 54B for troubleshooting.

NOTE

If ETACS-ECU is faulty, the windshield wiper can be operable in LO mode only as the fail-safe function. (Normally the windshield wiper is operable when the ignition switch is turned to the ACC position. When the fail-safe function is enabled, it is operable only when the ignition switch is turned to the ON position.)

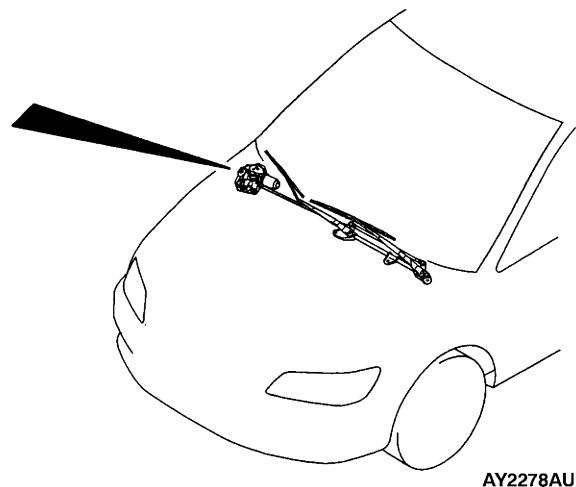
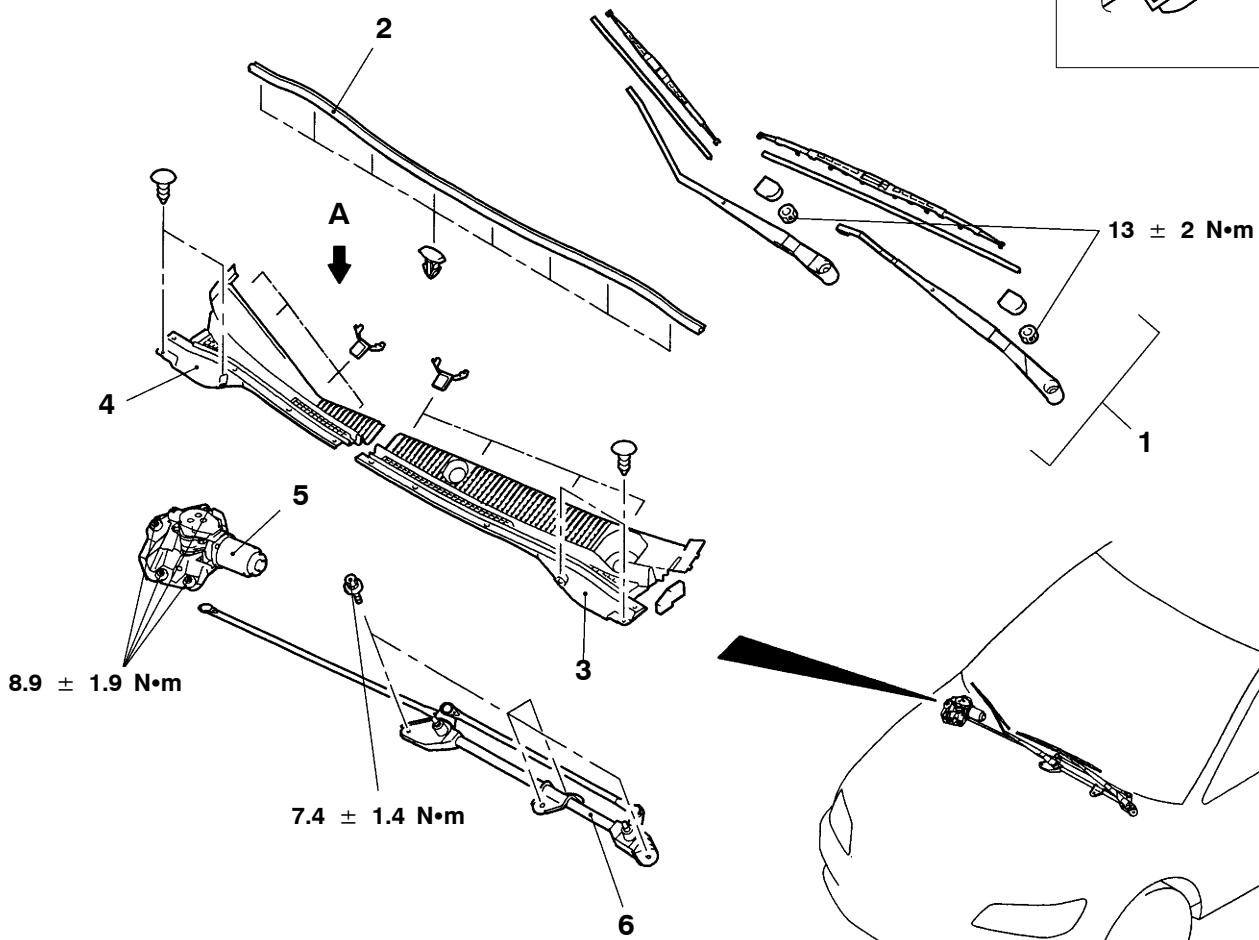
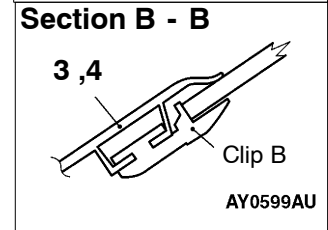
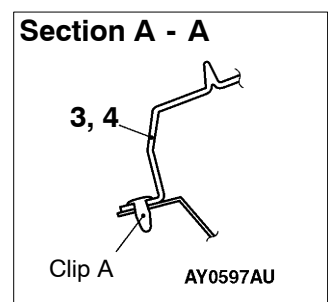
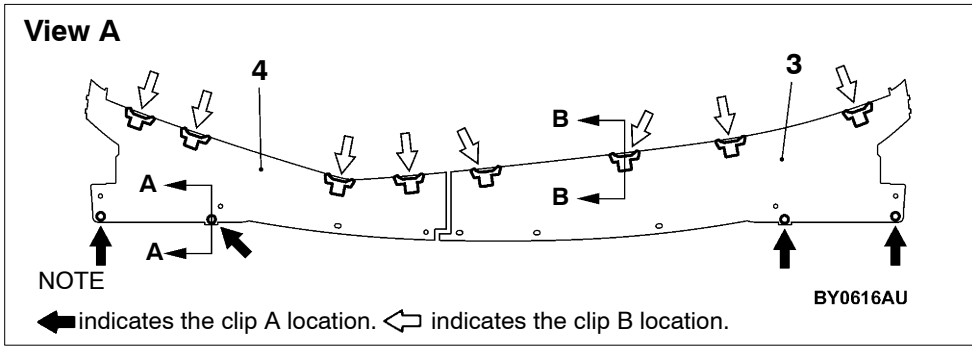
ON-VEHICLE SERVICE

WINDSHIELD INTERMITTENT WIPER INSPECTIONS

- (1) Check the change in the intermittent time of the wiper operation by using the windshield intermittent wiper volume.
- (2) Carry out troubleshooting if any of them is faulty. (Refer to Group 54B.)

WINDSHIELD WIPER AND WASHER

REMOVAL AND INSTALLATION



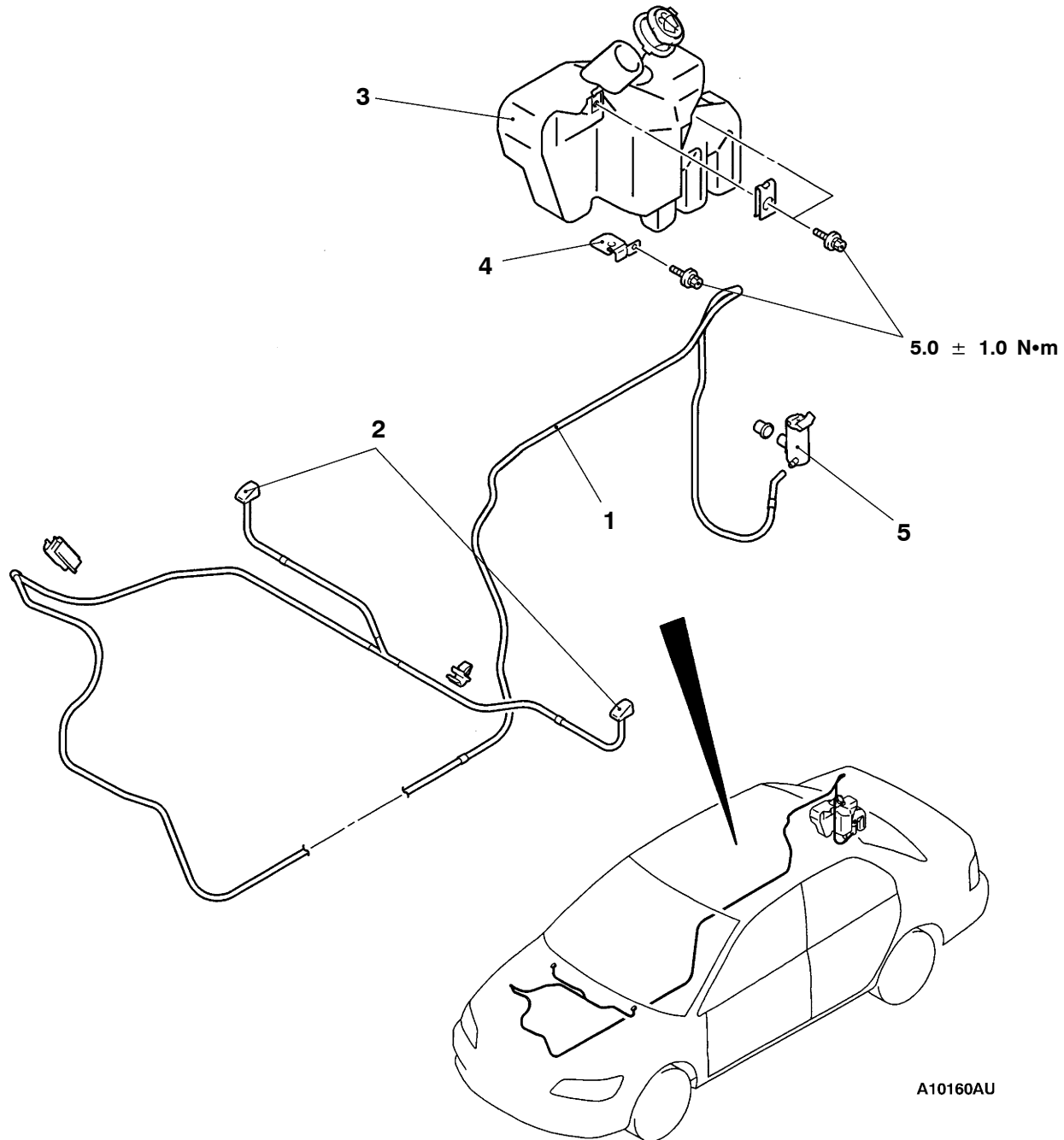
Windshield wiper motor assembly and link assembly removal steps



1. Wiper arm/blade assembly
2. Hood weather strip
3. Front deck garnish (driver's side)



4. Front deck garnish (passenger's side)
5. Windshield wiper motor assembly
6. Link assembly



NOTE: Refer to P.51-19 for more information regarding removal and installation of rear washer nozzle.

Washer hose removal steps

- Splash shield <Right side> (Refer to GROUP 42 – Fender.)
 - Cowl side trim, front scuff plate, center pillar trim, lower, rear scuff plate (Refer to GROUP 52A – Trim.)
 - Rear seat (Refer to GROUP 52A – Seat.)
1. Washer hose

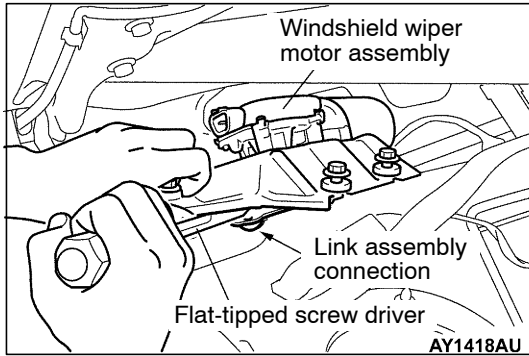
Windshield washer nozzle removal steps

- Connection of washer hose
2. Windshield washer nozzle

Washer tank and windshield washer motor assembly removal steps

- Rear end trim, trunk side trim (Refer to GROUP 52A – Trim.)
 - Connection of front washer hose
3. Washer tank assembly
 4. Washer tank bracket
 5. Washer motor

NOTE: Refer to GROUP 54A– Column Switch for removal and installation of wiper washer switch.



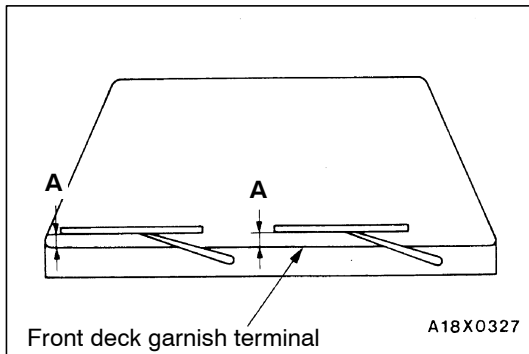
REMOVAL SERVICE POINT

◀A▶ WINDSHIELD WIPER MOTOR ASSEMBLY REMOVAL

1. Remove the windshield wiper motor assembly mounting bolt.
2. Use the flat-tipped screw driver to disengage the link between the windshield wiper motor assembly and the link assembly to remove the windshield wiper motor assembly.

Caution

Be careful not to damage the windshield glass when the windshield wiper motor assembly is removed.

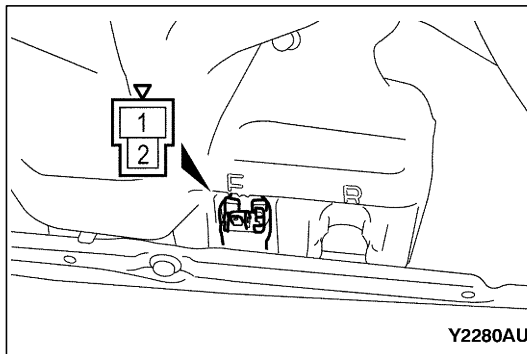
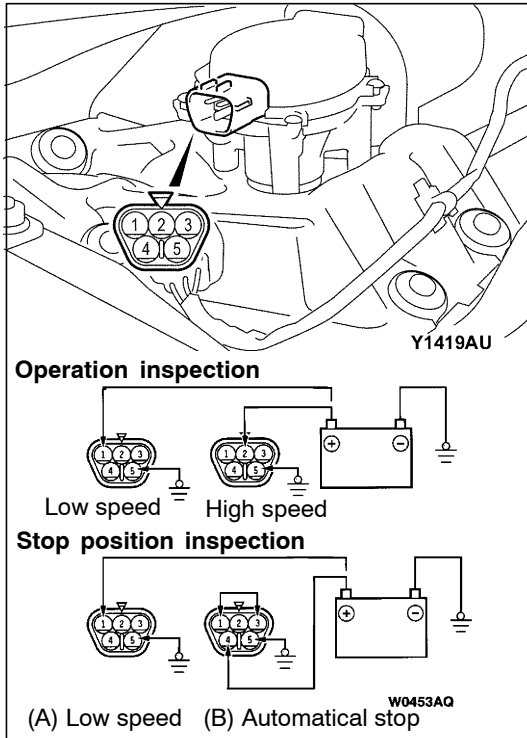


INSTALLATION SERVICE POINT

▶A◀ WIPER ARM/BLADE ASSEMBLY INSTALLATION

Assemble the parts so that the edge of the wiper blade can stop in the specified position (standard value).

Standard value:(A) 34 ± 5 mm



INSPECTIONS

WINDSHIELD WIPER MOTOR CHECK

Inspection of windshield wiper motor is conducted by removing the harness connector with the motor attached to the vehicle.

- **Operation inspection of windshield wiper motor rotation in a low or high speed**

Connect the battery to the windshield wiper motor to inspect the operation of motor rotation in a low or high speed.

- **Inspection of windshield wiper motor stop position**

(1) Connect the battery to the windshield wiper motor to rotate the motor in a low speed as shown in the illustration (A) and disconnect the battery during rotation to stop the motor.

(2) Connect between the terminals and the battery as shown in the illustration (B) and confirm whether the motor stops at the automatic stop position after rotating in a low speed.

FRONT WASHER MOTOR CHECK

(1) The inspection of front washer motor is conducted with the washer hose connected after removing the washer tank assembly and pouring water in the washer tank.

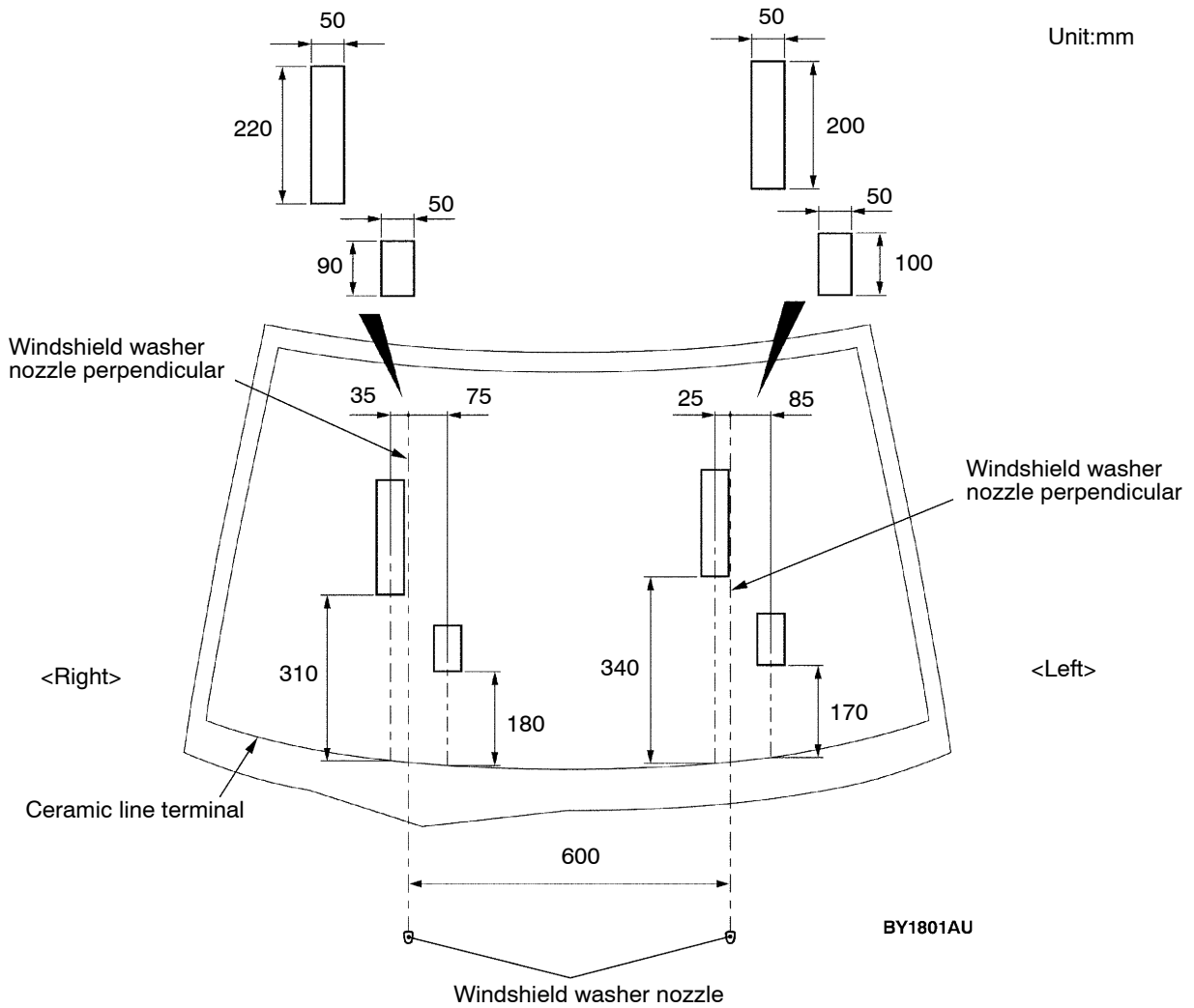
(2) Check that the water is supplied with strong pressure after energizing terminal number 2 with battery voltage and earthing terminal number 1.

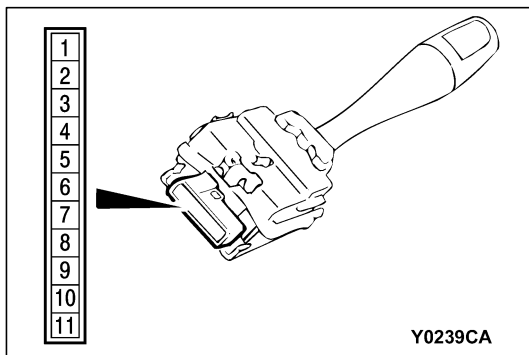
WINDSHIELD WASHER NOZZLE INJECTION POSITION CHECK

Move the nozzle to adjust the position so that the injection can be done in an area shown in the illustration.

Caution

On R.H. drive vehicles, the illustration is symmetrical.





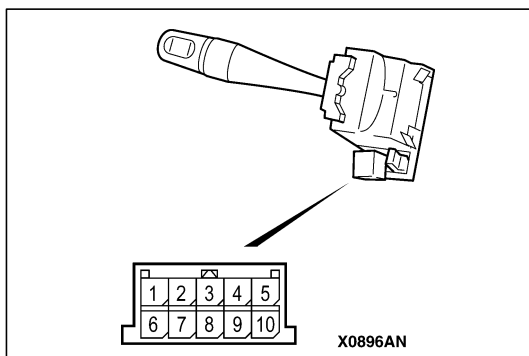
WINDSHIELD WIPER AND WINDSHIELD WASHER SWITCH AND WINDSHIELD INTERMITTENT WIPER INTERVAL ADJUSTING KNOB CHECK

<L.H.drive vehicles>

- (1) Windshield wiper and washer switch, rear wiper and washer switch.

Switch position	Terminal No.					
	6	7	8	9	10	11
OFF						
Windshield wiper mist switch ON	○					○
Windshield intermittent wiper switch ON	○				○	
Windshield low-speed wiper switch ON	○			○		
Windshield high-speed wiper switch ON	○		○			
Windshield washer switch ON	○	○				

- (2) Windshield intermittent wiper interval adjusting knob
Measure the resistance value at terminal numbers 3 and 6. The resistance value should rise smoothly from approximately 0 Ω (“FAST” position) to apporoximately 1 kΩ (“SLOW” position).



WINDSHIELD INTERMITTENT WIPER INTERVAL ADJUSTING KNOB CHECK

<R.H.drive vehicles>

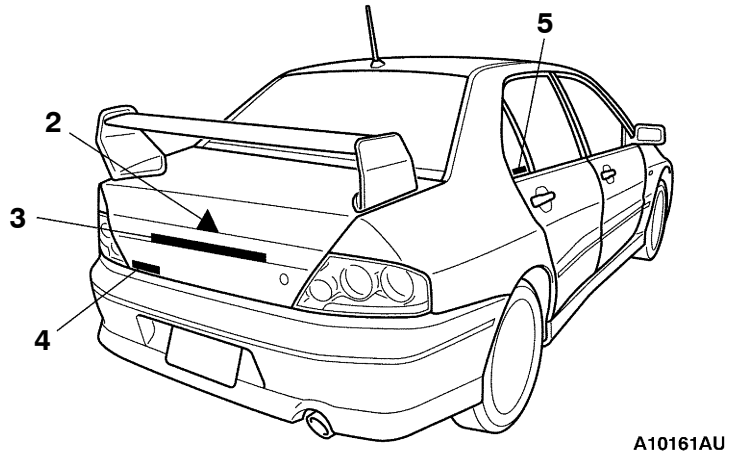
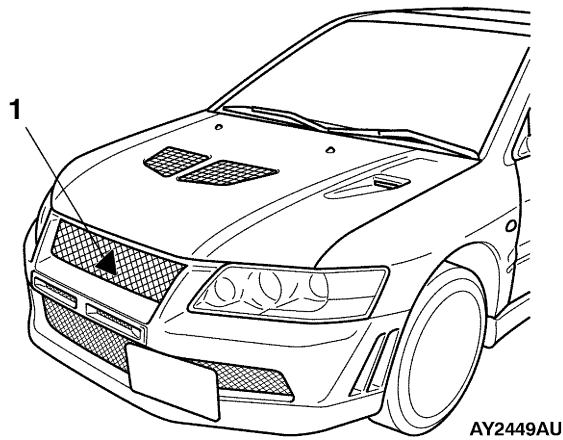
Measure the resistance value at terminal numbers 4 and 6. The resistance value should rise smoothly from approximately 0 W (“FAST” position) to approximately 1 kW (“SLOW” position).

NOTE

The windshield washer switch and windshield wiper switch is integrated in the column-ECU, so can not be checked as an individual part. However, its operation can be checked by the input signal check. (GROUP 54B - Troubleshooting.)

MARKS

REMOVAL AND INSTALLATION



- ▶A◀ 1. Three-diamond mark
 ▶A◀ 2. Three-diamond mark
 ▶A◀ 3. Evolution-VII mark

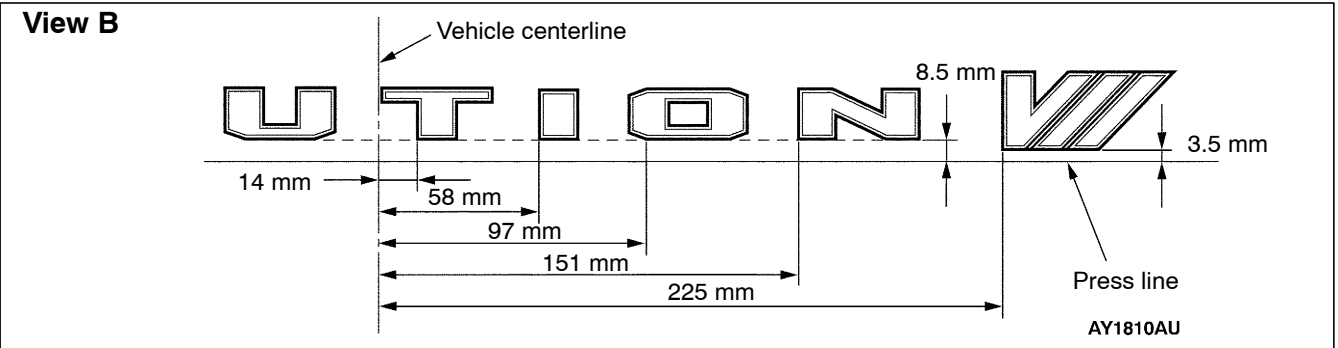
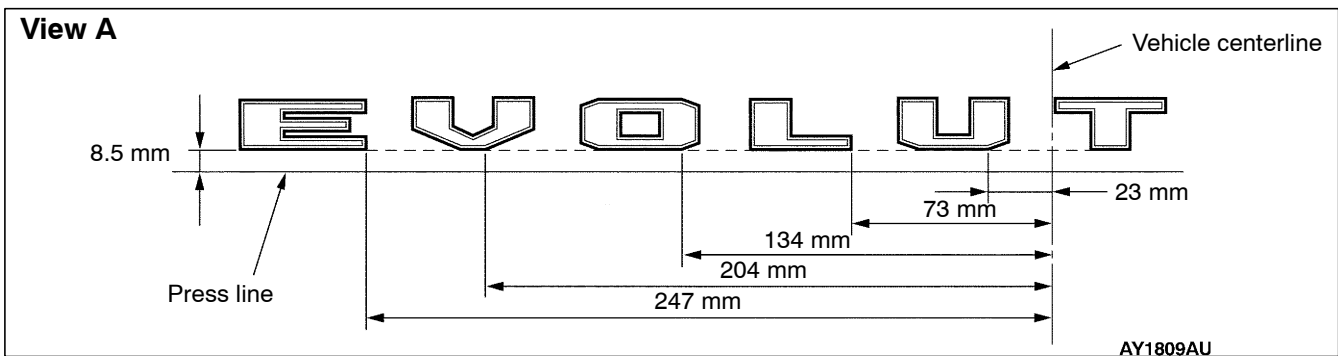
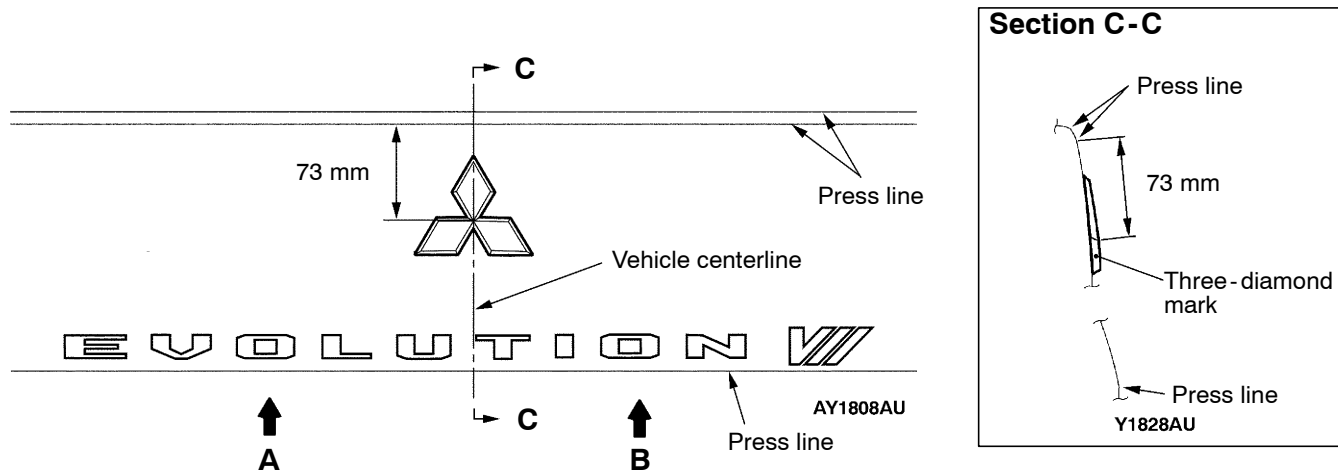
- ▶A◀ 4. LANCER mark
 ▶A◀ 5. RECARO decal <RS-II>

INSTALLATION SERVICE POINT

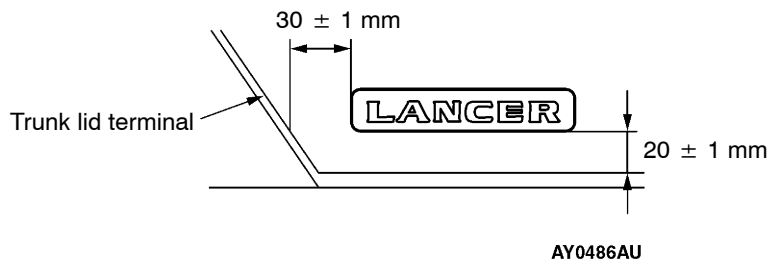
▶A◀ ATTACHMENT OF EACH MARK

1. ATTACHED POSITION

(2) Three-diamond mark, (3) Evolution-VII mark

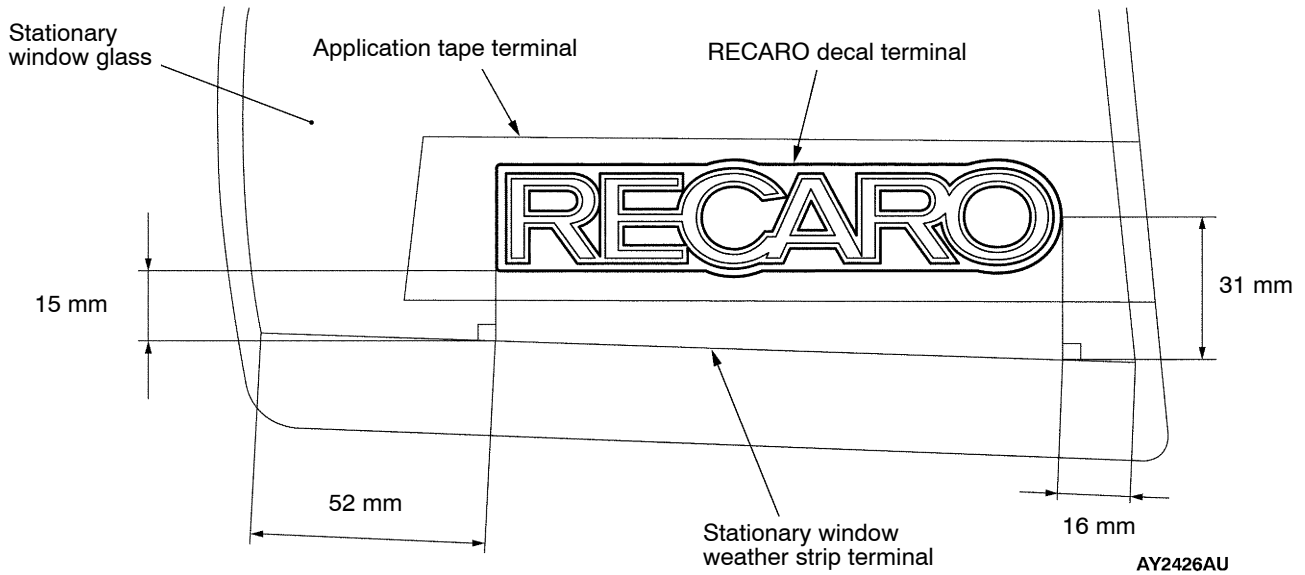


(4) Lancer mark

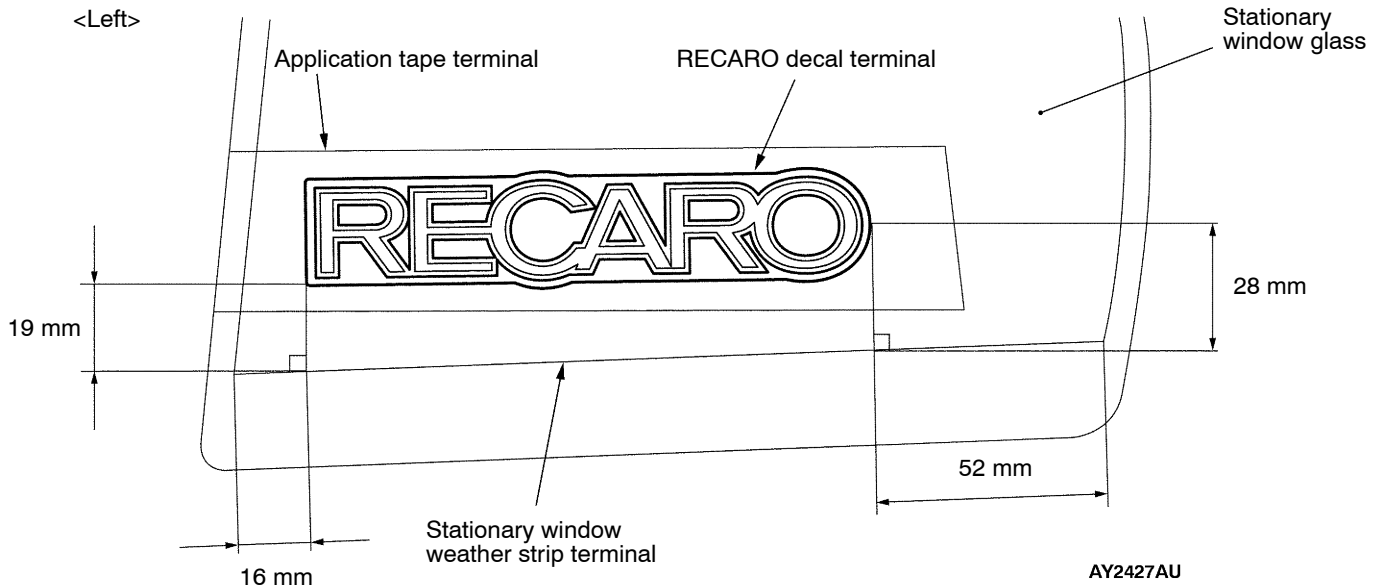


(5) RECARO decal <RS-II>

<Right>



<Left>

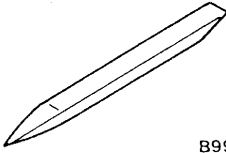
**2. Installation steps**

- (1) Remove grease on the marked surface of the body with unlead gasoline.
- (2) Peel off the protection sheet on the back of the mark to paste it on the installation position.

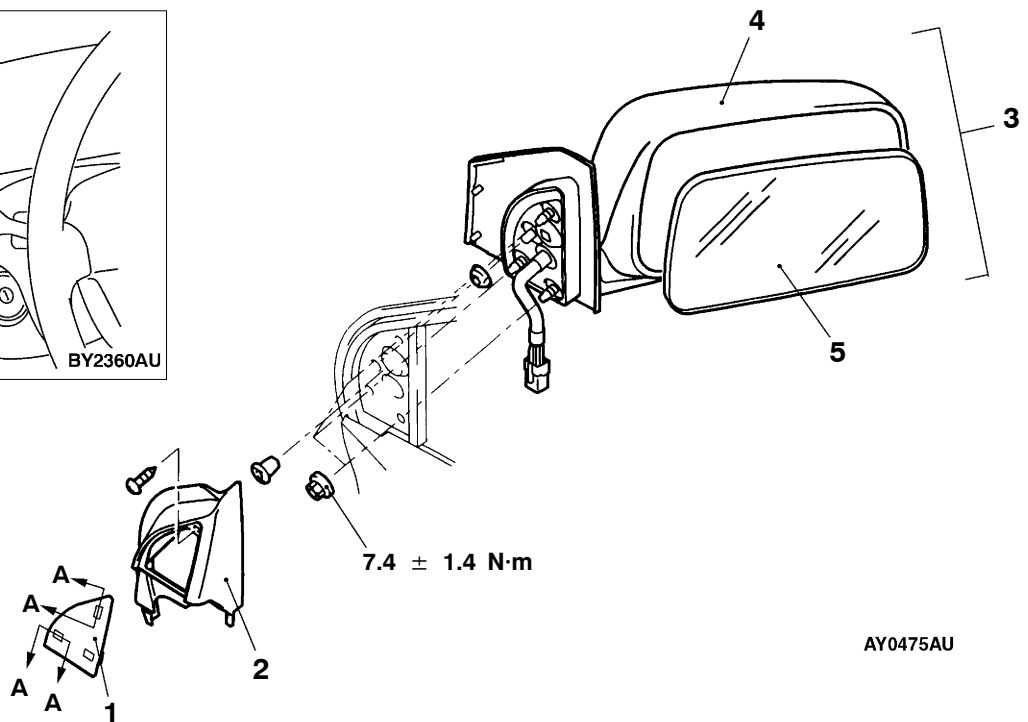
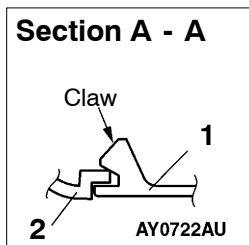
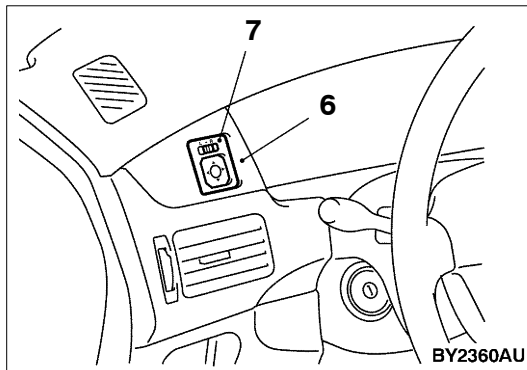
Caution

- 1) Carry out the operation in a dust-free place where the room temperature is between 20 and 38.
- 2) If the room temperature is below 20, heat the mark and the body (pasted area) between 20 and 30.
- 3) Be sure to pressure the mark immediately after the pasting is done.

OUTSIDE MIRROR SPECIAL TOOL

Tool	Number	Name	Application
 B990784	MB990784	Ornament remover	Removal of power remote control outside mirror switch

OUTSIDE MIRROR REMOVAL AND INSTALLATION



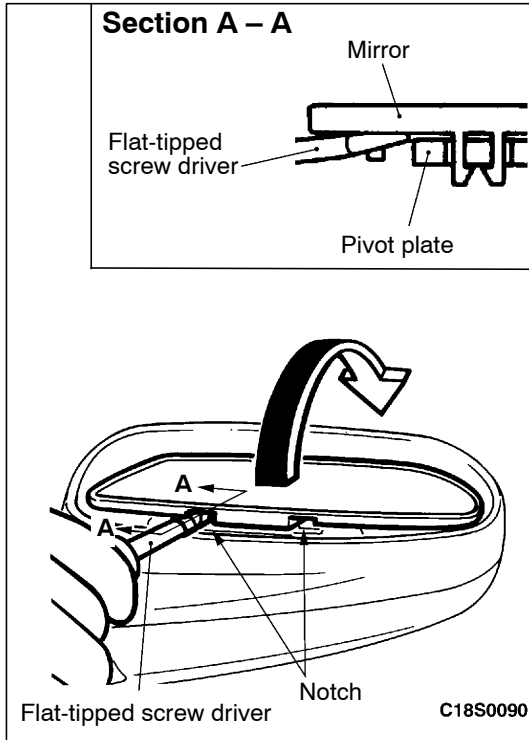
Outside mirror removal steps

1. Cover
2. Delta inner cover
3. Outside mirror assembly
4. Outside mirror
5. Mirror

Remote control outside mirror switch removal steps

6. Instrument panel ornament (Refer to GROUP 52A - Instrument Panel.)
7. Remote control mirror switch

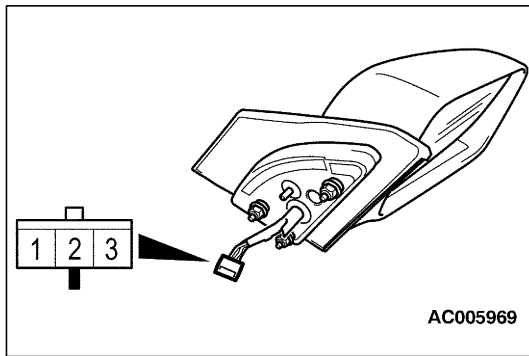




REMOVAL SERVICE POINT

◀A▶ MIRROR REMOVAL

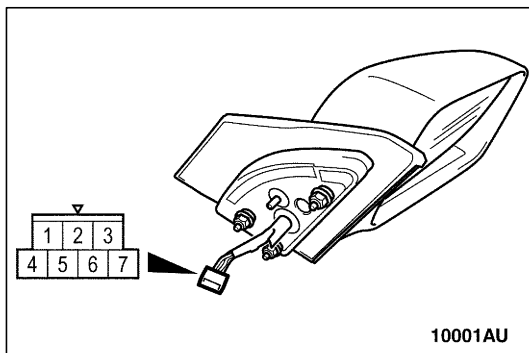
Tilt the mirror upward, insert the flat-tipped screw driver wrapped around with the protection tape between the notch located behind the mirror and pivot plate, and pry off the mirror.



INSPECTIONS

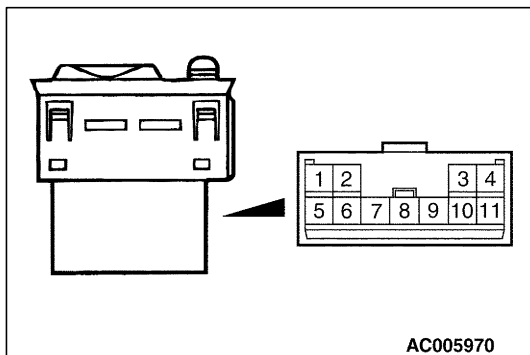
**REMOTE CONTROLLED MIRROR ASSEMBLY CHECK
<RS-II>**

Battery connection terminal			Operation of mirror
1	2	3	
⊖		⊕	Up
⊕		⊖	Down
⊖	⊕		Right
⊕	⊖		Left



THERMAL PRINTED WIRE FUNCTION CHECK

For vehicles with thermal printed wires, check that there is continuity between terminals (1) and (4).



CONTINUITY INSPECTION OF POWER REMOTE CONTROL MIRROR SWITCH<RS-II>

Switch	Switch position	Terminal number									
		Left					Right				
		1	6	9	10	11	1	2	3	6	9
Mirror adjustment switch	Up	○	○	○	○	○		○	○	○	○
	Down	○	○	○	○	○		○	○	○	○
	Left	○	○	○	○	○	○	○		○	○
	Right	○	○	○	○	○	○	○		○	○

NOTES

INTERIOR AND SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

INTERIOR	52A
SUPPLEMENTAL RESTRAINT SYSTEM (SRS)	52B



INTERIOR

CONTENTS

SPECIAL TOOL	3	SEAT	19
INSTRUMENT PANEL*	3	Front Seat	19
FRONT FLOOR CONSOLE	10	Rear Seat	22
REAR FLOOR CONSOLE	12	SEAT BELT	25
TRIMS	15	Front Seat Belt	25
HEADLINING	17	Rear Seat Belt	26

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

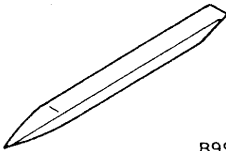
WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).


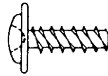


SPECIAL TOOL

Tool	Number	Name	Application
 <p>B990784</p>	MB990784	Ornament remover	Removal of switches and trims

INSTRUMENT PANEL

REMOVAL AND INSTALLATION

The following bolts and screws are used for installing the instrument panel. Bolts and screws are indicated as marks shown in the illustration in the sections of "Removal and Installation" and "Disassembly and Reassembly."

Name	Mark	Dimensions mm (screw diameter x screw length)	Color	Shape
Tapping screw	a	5 × 16	Black	 <p>19Z0004</p>
	b	5 × 16	-	
	c	5 × 12	-	 <p>19Z0022</p>
Bolt with washer	d	6 × 16	-	 <p>19Z0005</p>
	e	6 × 12	-	 <p>19Z0020</p>

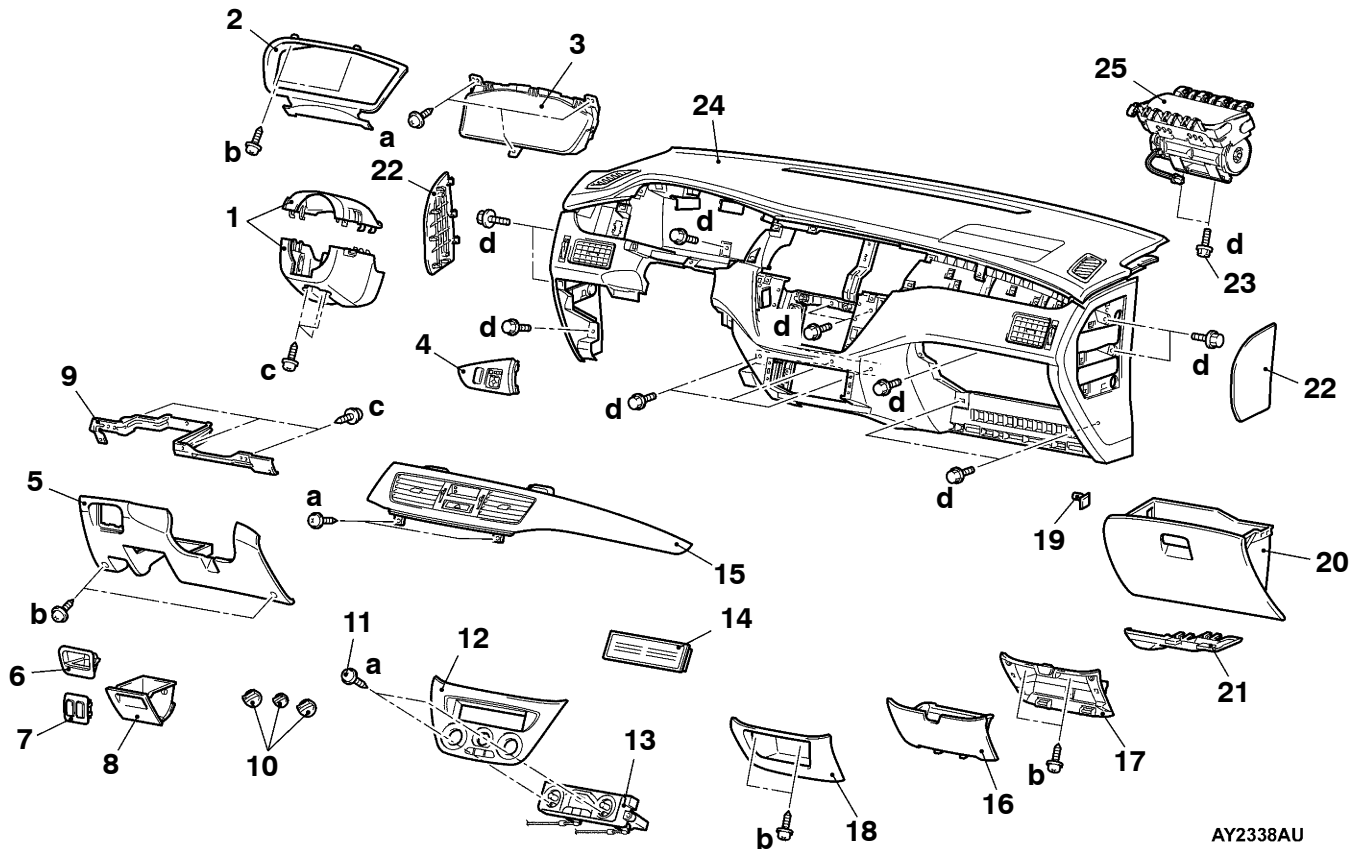
<L.H. DRIVE VEHICLE>

Caution: SRS

1. Refer to GROUP 52B-SRS Service Precautions and Air bag Module and Clock Spring before removing the passenger side air bag module.
2. Do not subject the SRS-ECU to any shocks when removing or installing the instrument panel.

Pre-removal and Post-installation Operation

- Removal and Installation of Front Pillar Trim (Refer to P.52A-15.)
- Hood Opener Lever (Refer to GROUP42.)



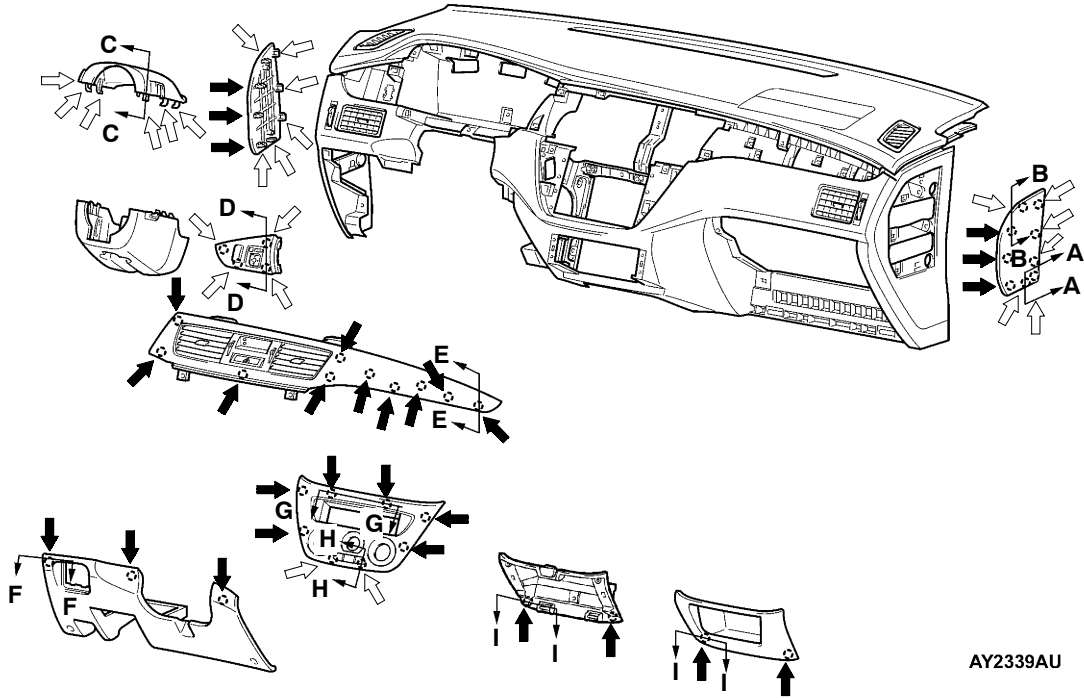
AY2338AU

Removal steps

1. Column cover
2. Meter bezel
3. Combination meter
4. Instrument panel ornament
5. Under cover
6. Box <Vehicle with box>
7. Switch panel
<Vehicle with switch panel>
8. Side box
9. Lower frame
10. Heater control knob
11. Heater control assembly mounting screw
12. Center panel
13. Heater control panel assembly
14. Radio plug
15. Center air outlet panel
16. Center lower box <RS- >
17. Center lower case <RS- >
18. Center lower box <RS>
19. Stopper
20. Glove box
21. Harness cover
22. Instrument panel side cover
23. SRS front passenger's air bag module mounting bolt
 - Steering column shaft mounting bolt (Refer to GROUP37A – Steering Wheel and Shaft.)
24. Instrument panel assembly
25. SRS front passenger's air bag module



CLIP AND CLAW POSITIONS



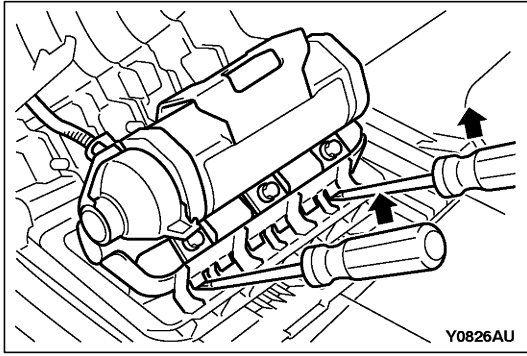
AY2339AU

NOTE

(1) : Clip positions

(2) : Claw positions

<p>Section A - A</p> <p>Claw Instrument panel</p> <p>AY1279AU</p>	<p>Section B - B</p> <p>Clip Instrument panel</p> <p>AY1280AU</p>	<p>Section C - C</p> <p>Column cover Claw</p> <p>AY1281AU</p>
<p>Section D - D</p> <p>Claw Claw Instrument panel</p> <p>AY1282AU</p>	<p>Section E - E</p> <p>Instrument panel Clip</p> <p>AY1284AU</p>	<p>Section F - F</p> <p>Clip Instrument panel</p> <p>AY1283AU</p>
<p>Section G - G</p> <p>Clip Instrument panel</p> <p>BY0282AU</p>	<p>Section H - H</p> <p>Instrument panel Claw</p> <p>AY1285AU</p>	<p>Section I - I</p> <p>Instrument panel Clip</p> <p>AY1286AU</p>



REMOVAL SERVICE POINT

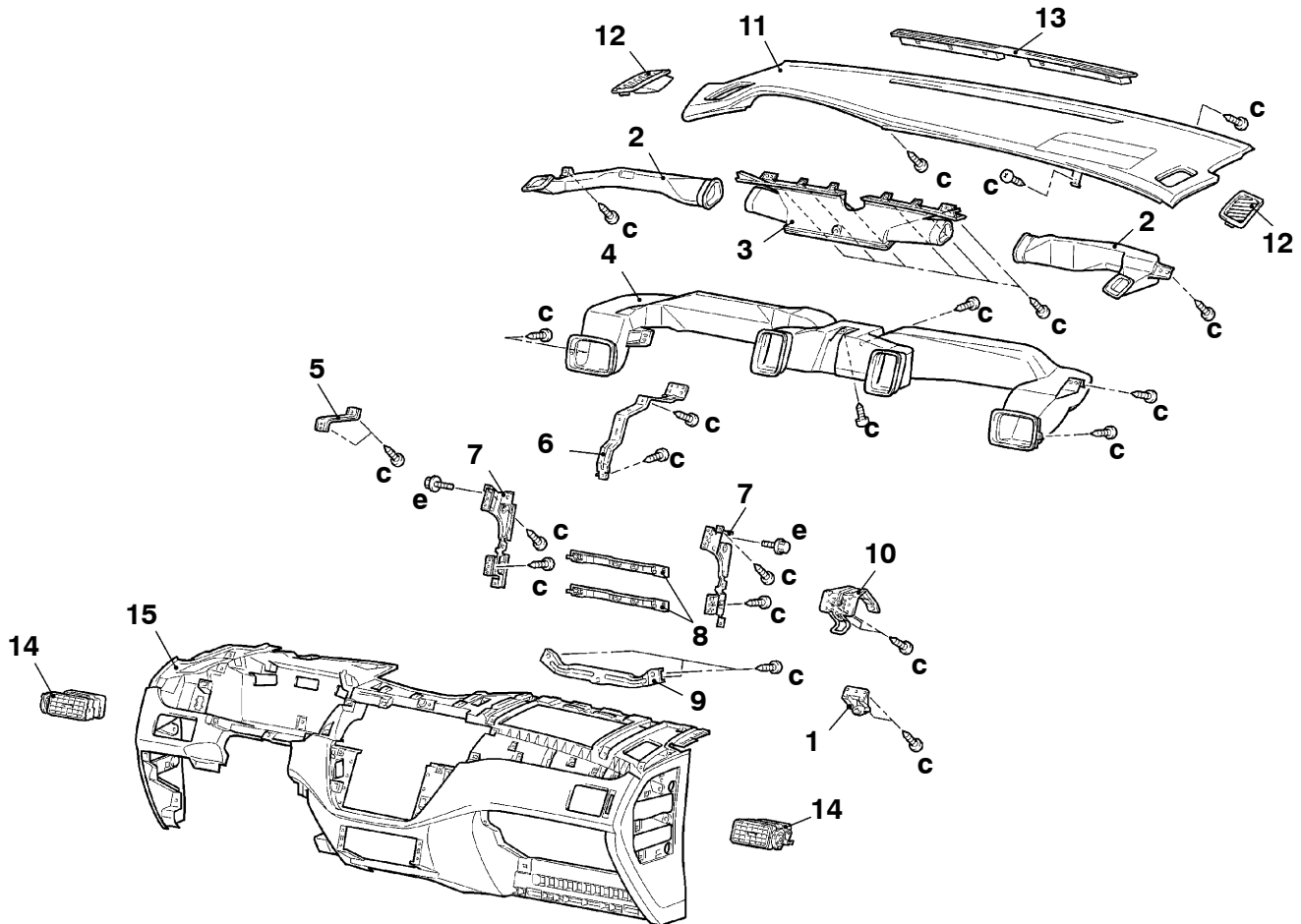
◀▶ SRS FRONT PASSENGER'S AIR BAG MODULE REMOVAL

Insert the flat tipped screw driver into the position shown in the illustration and pull up the screw driver to disengage the claws for removal of the front passenger's air bag module.

Caution

1. Do not damage the claws of the hinge when removing the front passenger's air bag module.
2. Store the removed front passenger's air bag module facing the deployed side upward in a clean and dry place.

DISASSEMBLY AND REASSEMBLY



AY1224AU

Disassembly steps

- | | |
|--|-------------------------------|
| 1. Instrument panel upper support | 9. Center lower reinforcement |
| 2. Side defroster duct | 10. Glove box striker |
| 3. Center defroster duct | 11. Instrument panel pad |
| 4. Distribution duct | 12. Side demister |
| 5. Driver side upper bracket | 13. Defroster garnish |
| 6. Center upper reinforcement | 14. Side air outlet assembly |
| 7. Instrument panel center reinforcement | 15. Instrument panel |
| 8. Bridge reinforcement | |

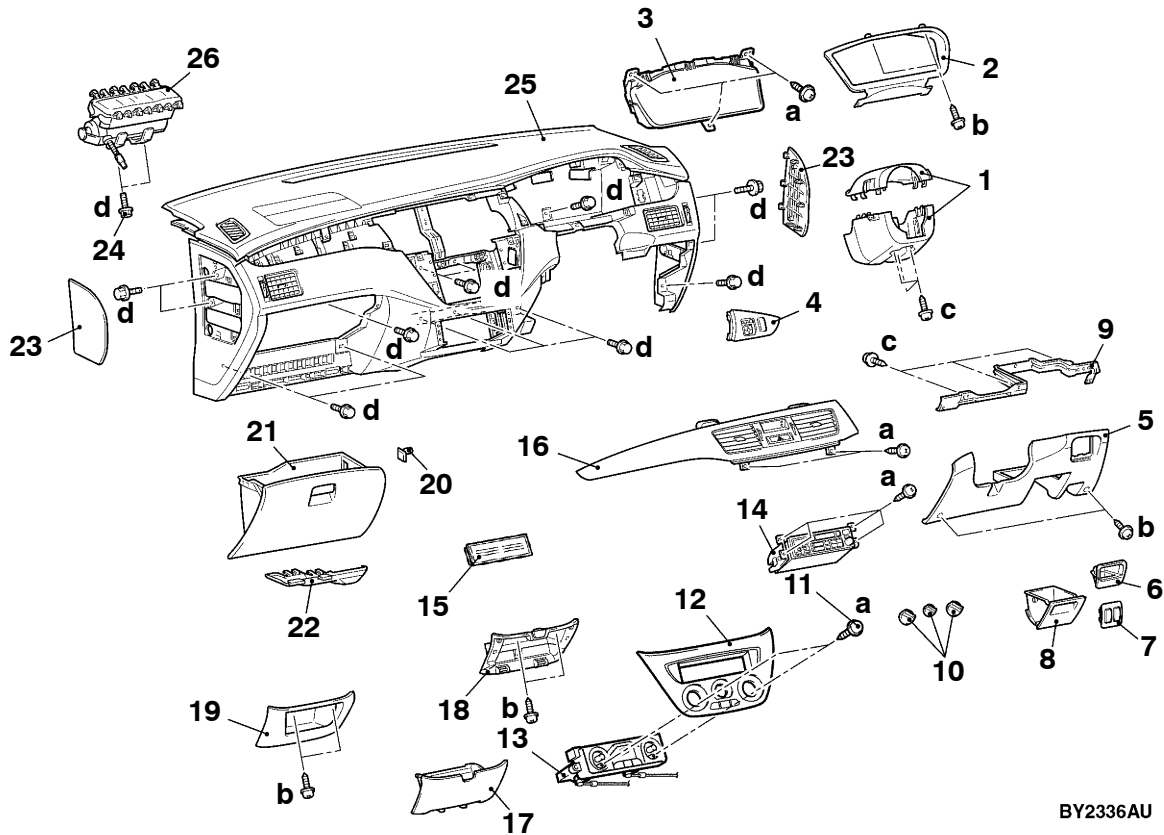
<R.H. DRIVE VEHICLE>

Caution: SRS

1. Refer to GROUP 52B-SRS Service Precautions and Air bag Module and Clock Spring before removing the passenger side air bag module.
2. Do not subject the SRS-ECU to any shocks when removing or installing the instrument panel.

Pre-removal and Post-installation Operation

- Removal and Installation of Front Pillar Trim (Refer to P.52A-15.)
- Food Opener Lever (Refer to GROUP42.)



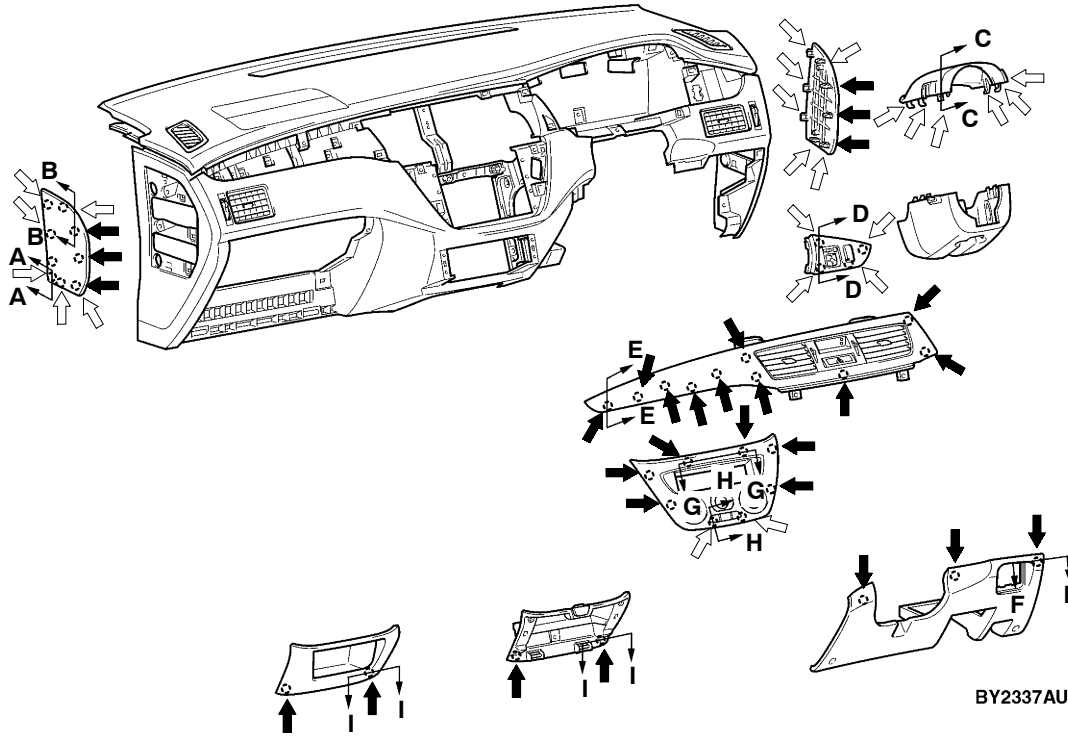
BY2336AU

Removal steps

1. Column cover
2. Meter bezel
3. Combination meter
4. Instrument panel ornament
5. Under cover
6. Box <Vehicle with box>
7. Switch panel
<Vehicle with switch panel>
8. Side box
9. Lower frame
10. Heater control knob
11. Heater control assembly mounting screw
12. Center panel
13. Heater control panel assembly
14. Radio and tape player
15. Plug <Vehicle without radio and tape player>
16. Center air outlet panel
17. Center lower box A <RS- >
18. Center lower case A <RS- >
19. Center lower box B <RS>
20. Stopper
21. Glove box
22. Harness cover
23. Instrument panel side cover
24. SRS front passenger's air bag module mounting bolt
 - Steering column shaft mounting bolt (Refer to GROUP37A – Steering Wheel and Shaft.)
25. Instrument panel assembly
26. SRS front passenger's air bag module



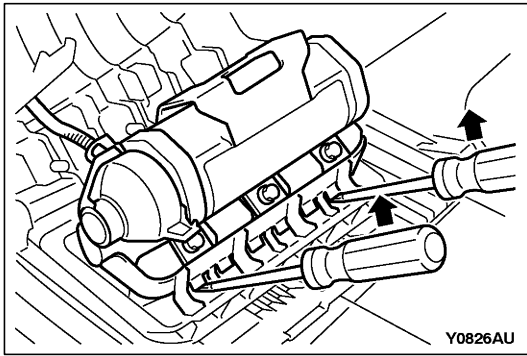
CLIP AND CLAW POSITIONS



NOTE

- (1) : Clip location
- (2) : Claw location

<p>Section A - A</p> <p>Instrument panel</p> <p>Claw</p> <p>AW0487AU</p>	<p>Section B - B</p> <p>Clip</p> <p>Instrument panel</p> <p>AW0483AU</p>	<p>Section C - C</p> <p>Column cover</p> <p>Claw</p> <p>BW0329AL</p>
<p>Section D - D</p> <p>Claw</p> <p>Claw</p> <p>Instrument panel</p> <p>AY0281AU</p>	<p>Section E - E</p> <p>Clip</p> <p>Instrument panel</p> <p>BX0635AN</p>	<p>Section F - F</p> <p>Clip</p> <p>Instrument panel</p> <p>DX0635AN</p>
<p>Section G - G</p> <p>Clip</p> <p>Instrument panel</p> <p>BY0282AU</p>	<p>Section H - H</p> <p>Claw</p> <p>Instrument panel</p> <p>AY0283AU</p>	<p>Section I - I</p> <p>Clip</p> <p>Instrument panel</p> <p>AY0284AU</p>



REMOVAL SERVICE POINT

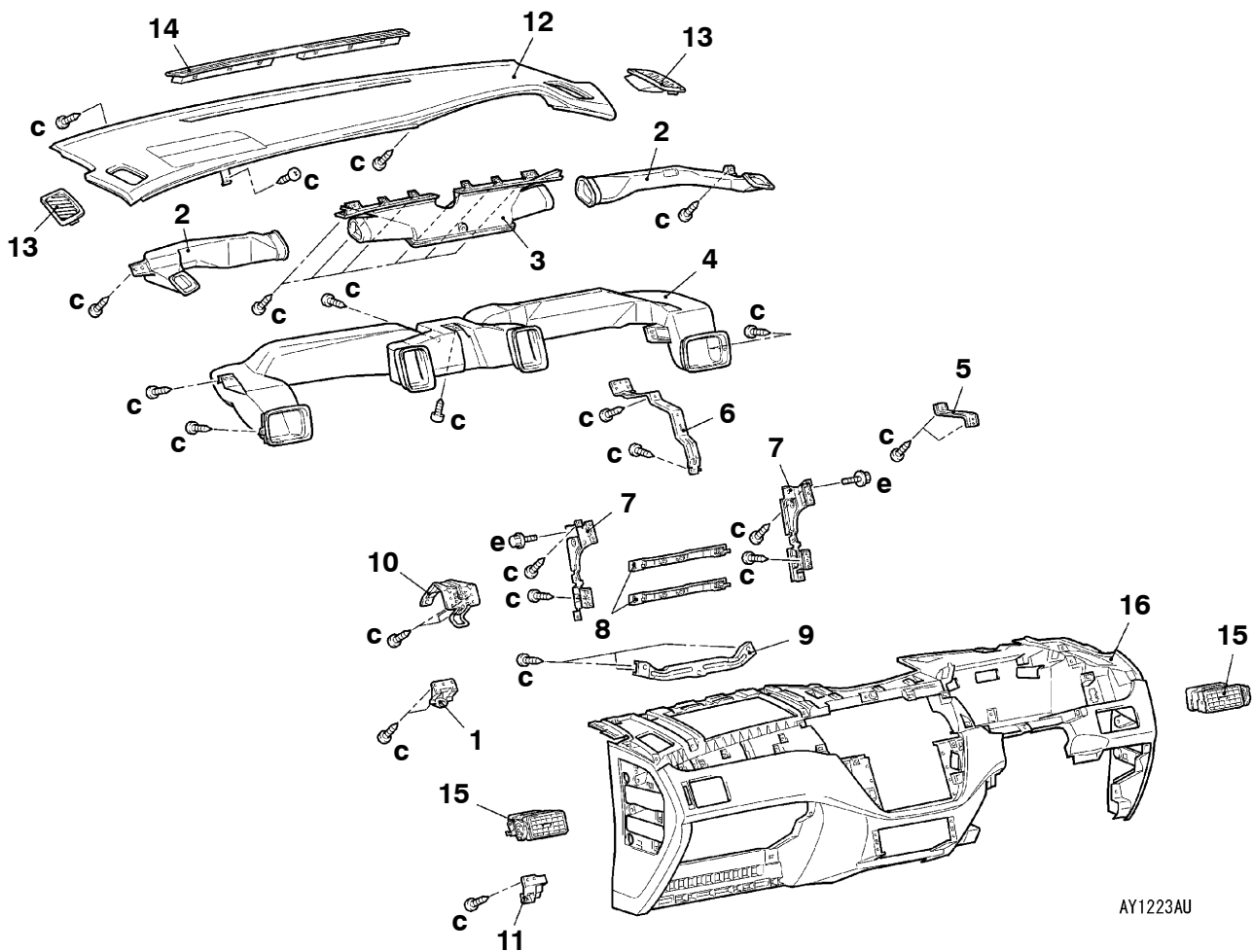
◀▶ SRS FRONT PASSENGER'S AIR BAG MODULE REMOVAL

Insert the flat tipped screw driver into the position shown in the illustration and pull up the screw driver to disengage the claws for removal of the front passenger's air bag module.

Caution

1. Do not damage the claws of the hinge when removing the front passenger's air bag module.
2. Store the removed front passenger's air bag module facing the deployed side upward in a clean and dry place.

DISASSEMBLY AND REASSEMBLY



Disassembly steps

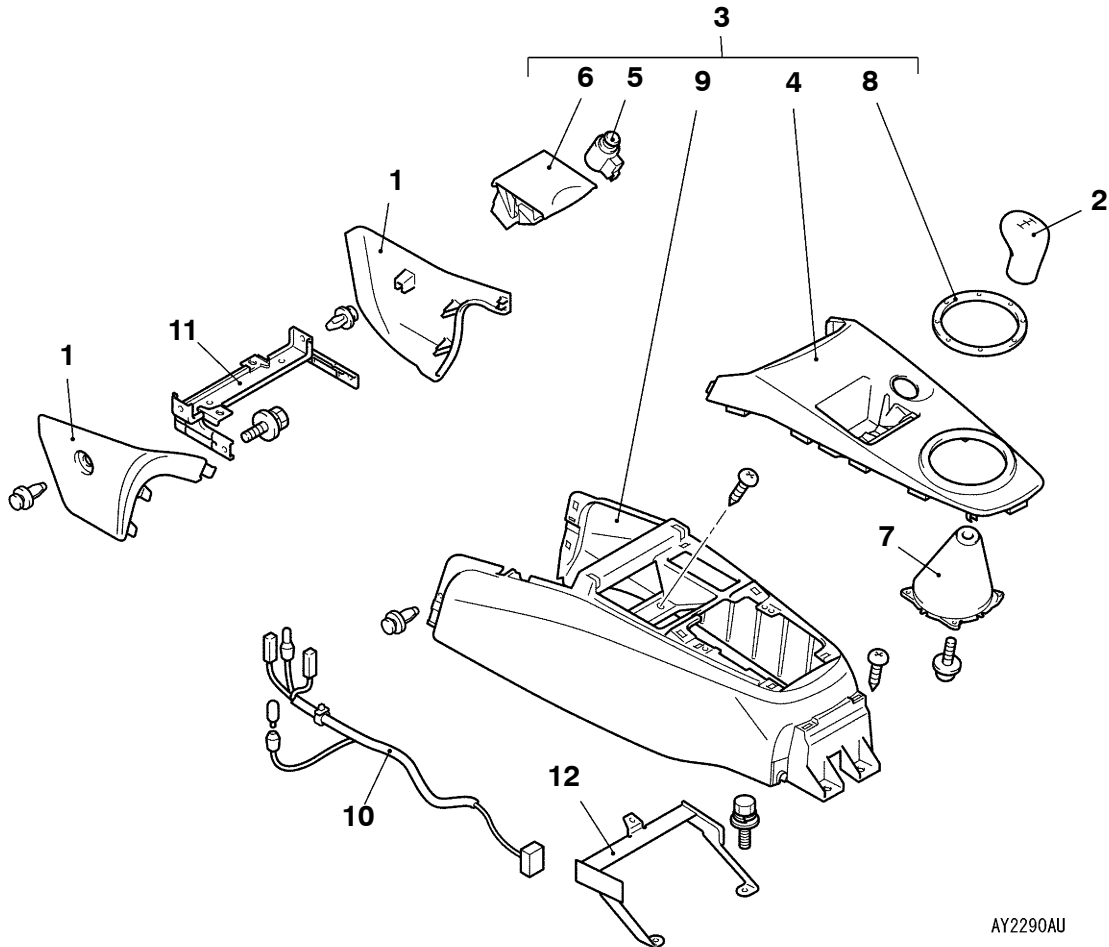
- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Instrument panel upper support 2. Side defroster duct 3. Center defroster duct 4. Distribution duct 5. Driver side upper bracket 6. Center upper reinforcement 7. Instrument panel center reinforcement 8. Bridge reinforcement | <ol style="list-style-type: none"> 9. Center lower reinforcement 10. Glove box striker 11. Glove box cover 12. Instrument panel pad 13. Side demister 14. Defroster garnish 15. Side air outlet assembly 16. Instrument panel |
|---|---|

FRONT FLOOR CONSOLE

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
 Removal and Installation of Rear Floor Console
 (Refer to P.52A-12.)

<L.H. DRIVE VEHICLE>



AY2290AJ

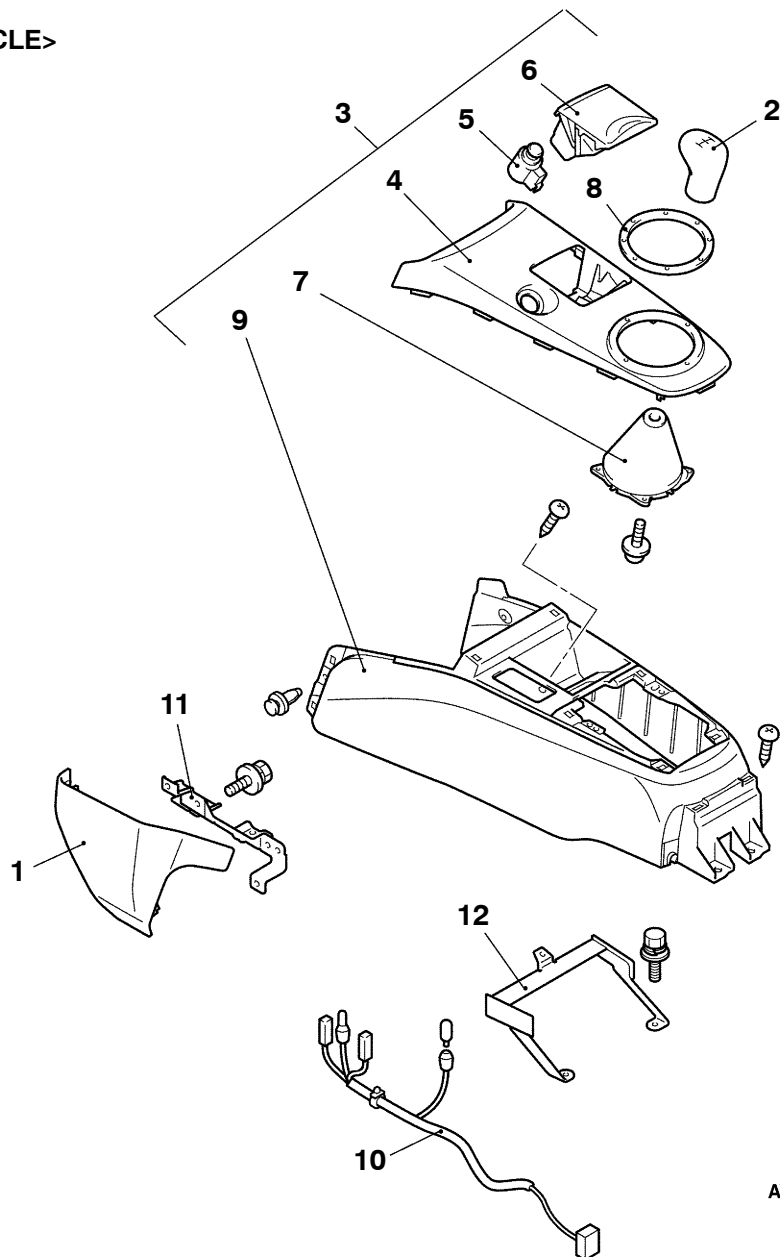
Removal steps

- | | |
|---------------------------------|---------------------------------|
| 1. Console side cover | 7. Shift lever cover |
| 2. Shift lever knob | 8. Shift lever panel garnish |
| 3. Front floor console assembly | 9. Front floor console |
| 4. Front floor console panel | 10. Harness |
| 5. Cigarette lighter | 11. Console side cover bracket |
| 6. Ashtray | 12. Front floor console bracket |

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
 Removal and Installation of Rear Floor Console
 (Refer to P.52A-12.)

<R.H. DRIVE VEHICLE>



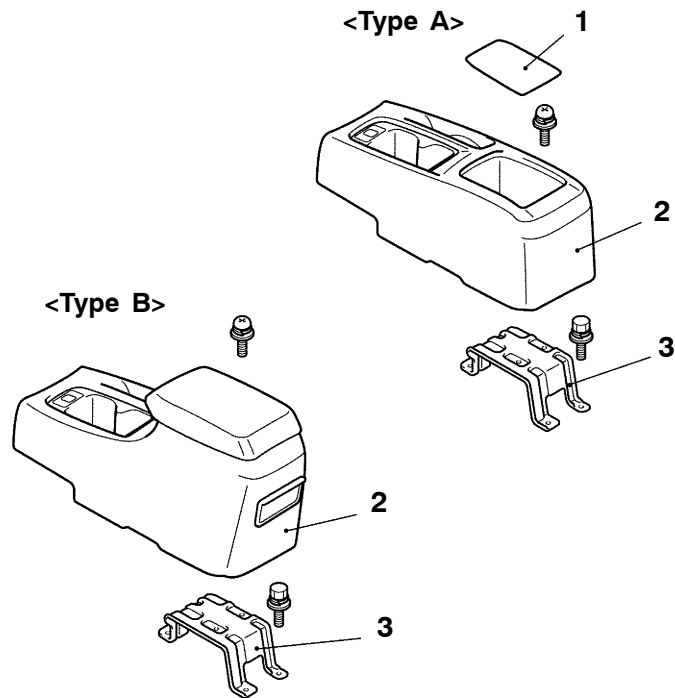
AY2018AU

Removal steps

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Console side cover 2. Shift lever knob 3. Front floor console assembly 4. Front floor console panel 5. Cigarette lighter 6. Ashtray | <ol style="list-style-type: none"> 7. Shift lever cover 8. Shift lever panel garnish 9. Front floor console 10. Harness 11. Console side cover bracket 12. Front floor console bracket |
|---|--|

REAR FLOOR CONSOLE

REMOVAL AND INSTALLATION

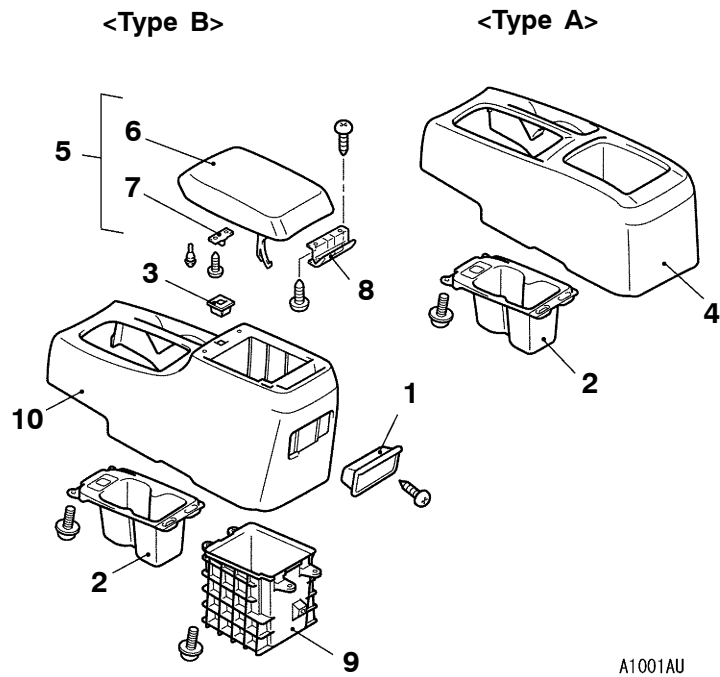


AY1002AU

Removal steps

1. Console box mat
 2. Rear console assembly
- Rear seat cushion assembly (Refer to P.52A-22.)
 - Front scuff plate (Refer to P.52A-15.)
 - Rear scuff plate (Refer to P.52A-15.)
 - Center pillar trim, lower (Refer to P.52A-15.)
 - Floor carpet
3. Rear console bracket

DISASSEMBLY AND REASSEMBLY



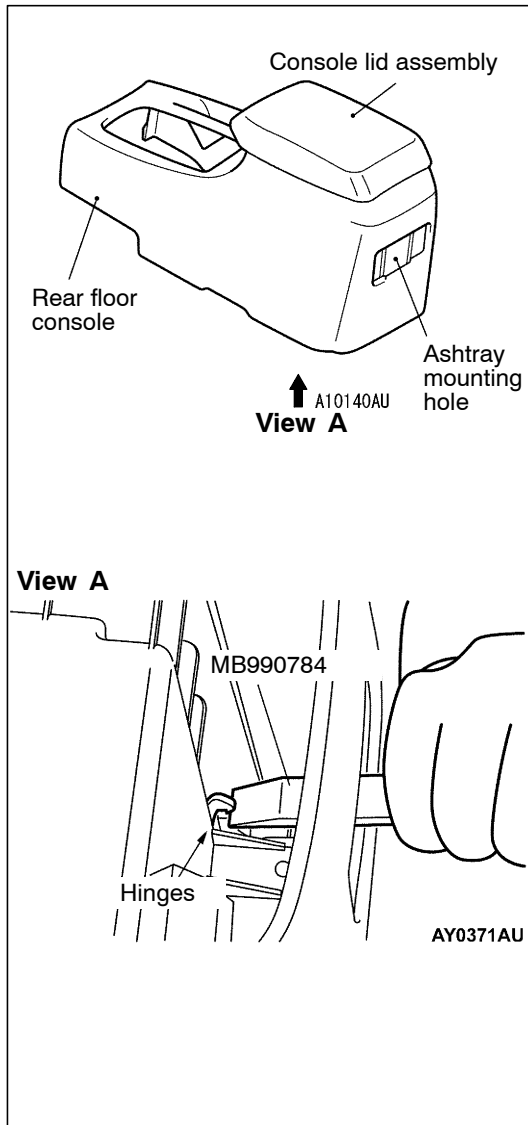
A1001AU

Disassembly steps

1. Ashtray
2. Cup holder
3. Hole lock
4. Rear floor console
5. Console lid assembly

6. Console lid
7. Lower lid striker
8. Hinge bracket
9. Box
10. Rear floor console

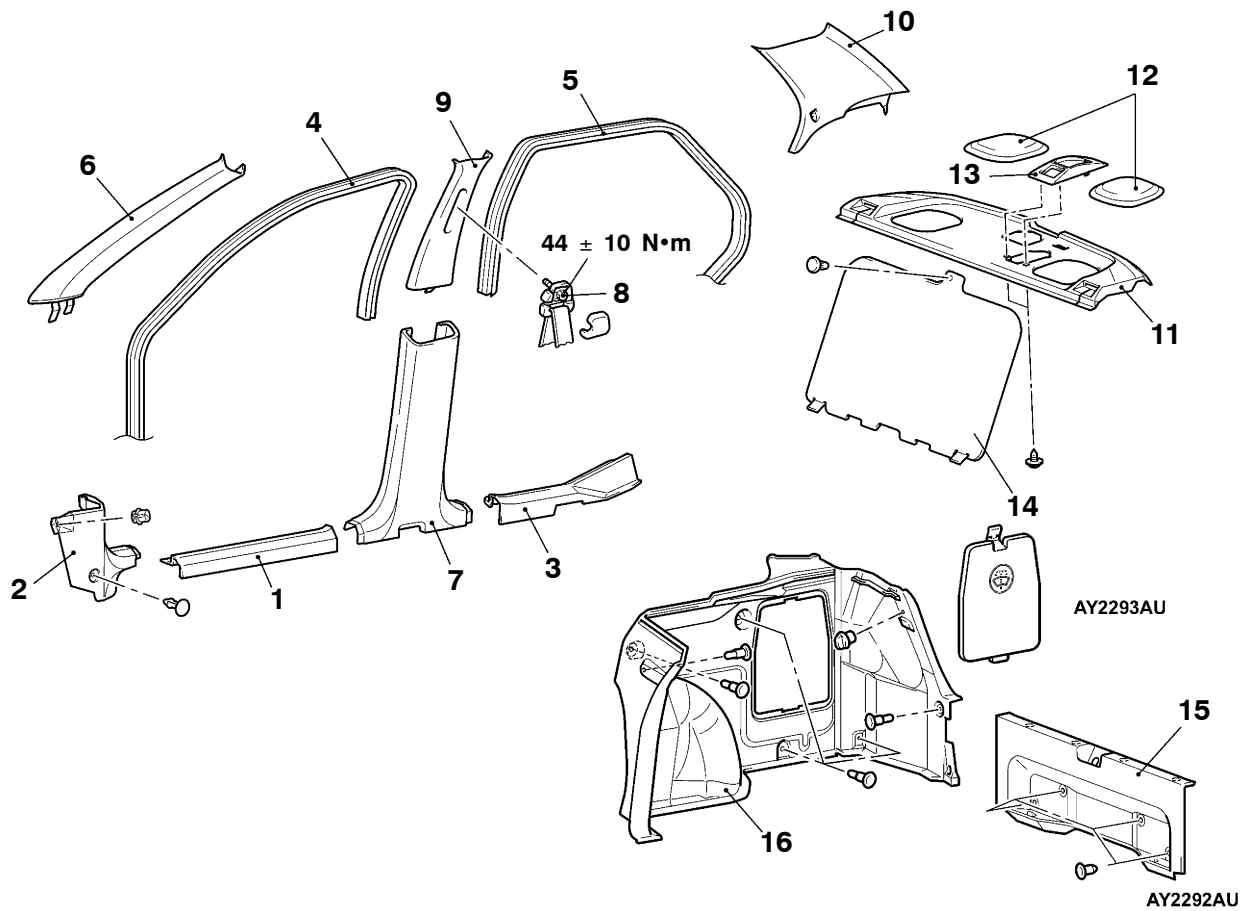


**DISASSEMBLY SERVICE POINT****◀A▶ REMOVAL OF CONSOLE LID ASSEMBLY**

Insert the special tool into the hinges of the console lid assembly and the rear floor console through the ashtray mounting hole to pry for removal.

TRIMS

REMOVAL AND INSTALLATION



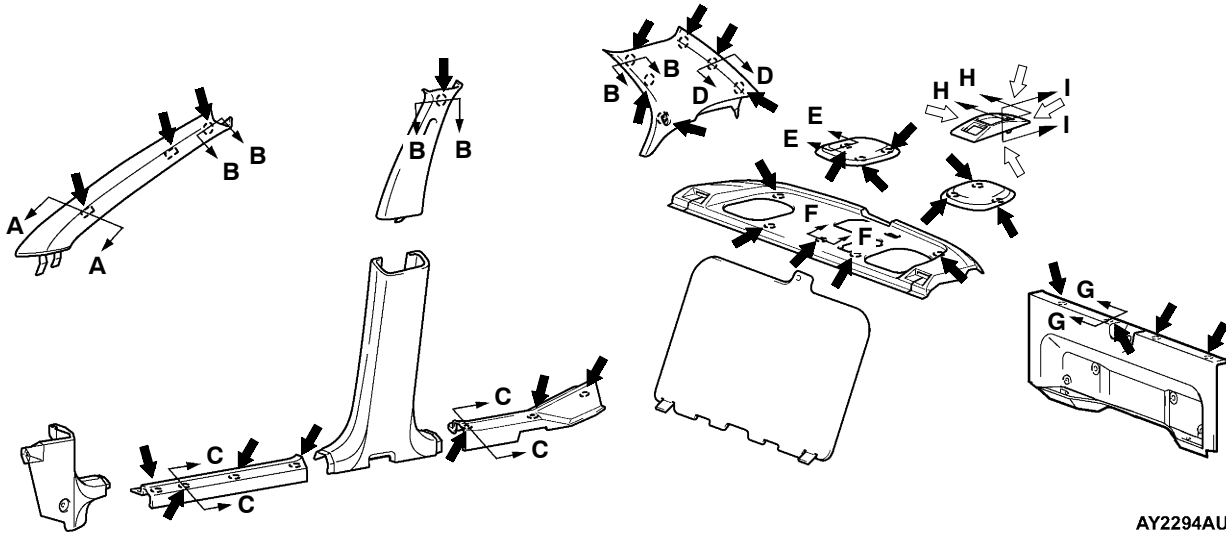
NOTE
Refer to GROUP42 for more information regarding door trim.

Removal steps

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Front scuff plate 2. Cowl side trim 3. Rear scuff plate 4. Front door opening trim 5. Rear door opening trim 6. Front pillar trim 7. Center pillar trim, lower 8. Front seat belt connection | <ol style="list-style-type: none"> 9. Center pillar trim, upper 10. Rear pillar trim 11. Rear shelf trim 12. Speaker garnish <RS- > 13. Retractor trim 14. Partition board 15. Rear end trim 16. Trunk side trim <RS- > |
|--|---|



CLIP POSITION

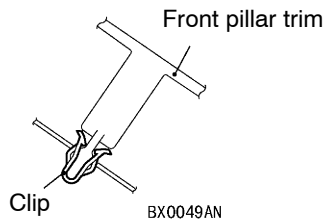


AY2294AU

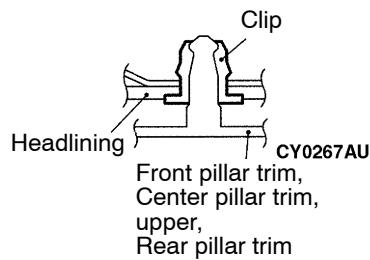
NOTE

- ➔: Clip position
- ⬅: Claw position

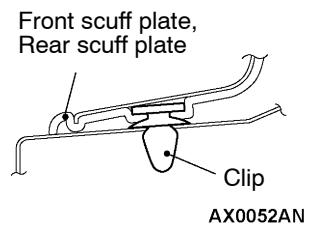
Section A - A



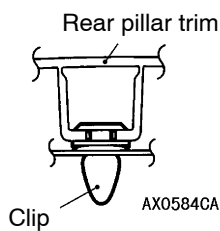
Section B - B



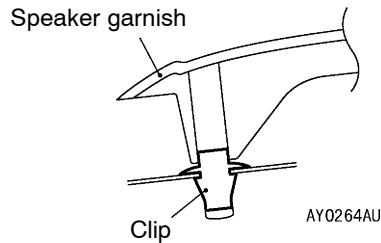
Section C - C



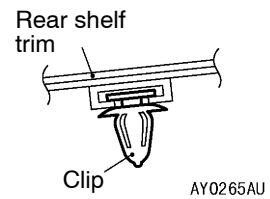
Section D - D



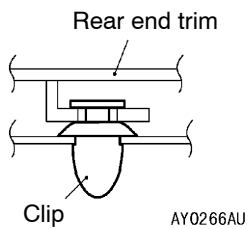
Section E - E



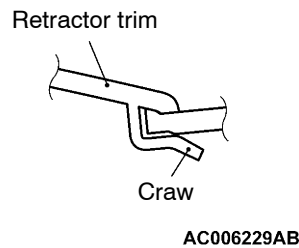
Section F - F



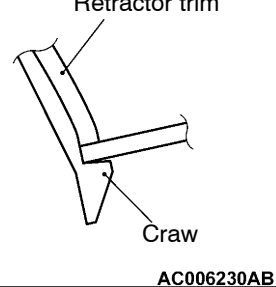
Section G - G

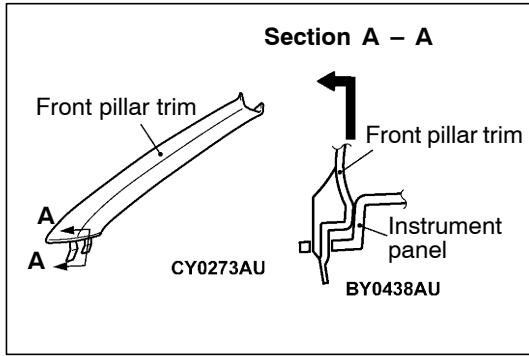


Section H - H



Section I - I





REMOVAL SERVICE POINT

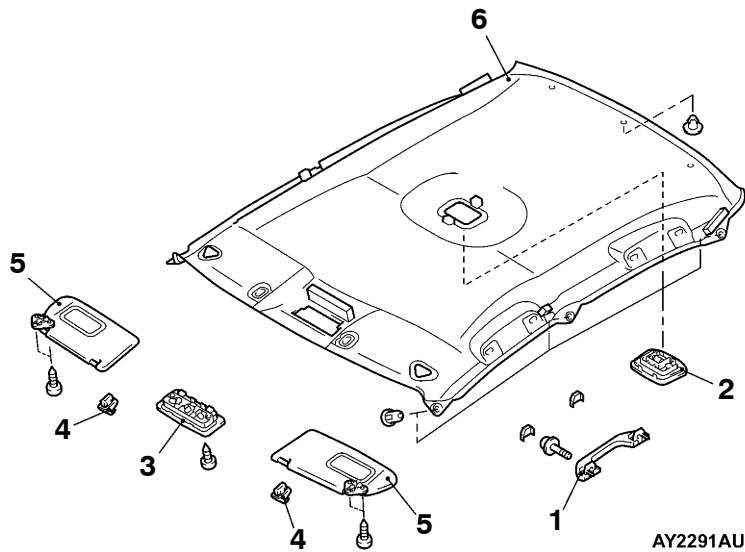
◀A▶ FRONT PILLAR TRIM REMOVAL

Release the clip to pull towards the direction shown in the illustration and remove the front pillar trim.

HEADLINING

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
 Removal and Installation of Front Pillar Trim, Center Pillar Trim, upper, Rear Pillar Trim (Refer to P.52A-15.)

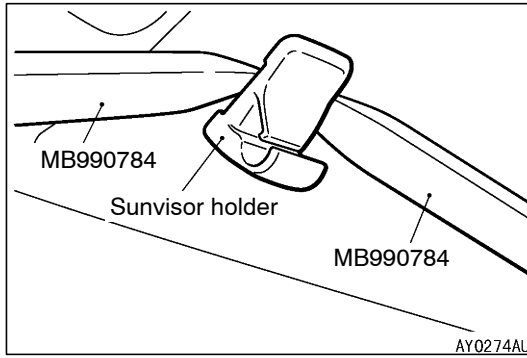


Removal steps

1. Assist grip
2. Room lamp assembly
3. Front room lamp
4. Sunvisor holder

5. Sunvisor assembly
 - Front floor console assembly (Refer to P.52A-10.)
6. Headlining



**REMOVAL SERVICE POINTS****◀A▶ SUNVISOR HOLDER REMOVAL**

Insert the special tool into sides claws of the sunvisor holder through the both sides of the sunvisor holder to remove the hinges.

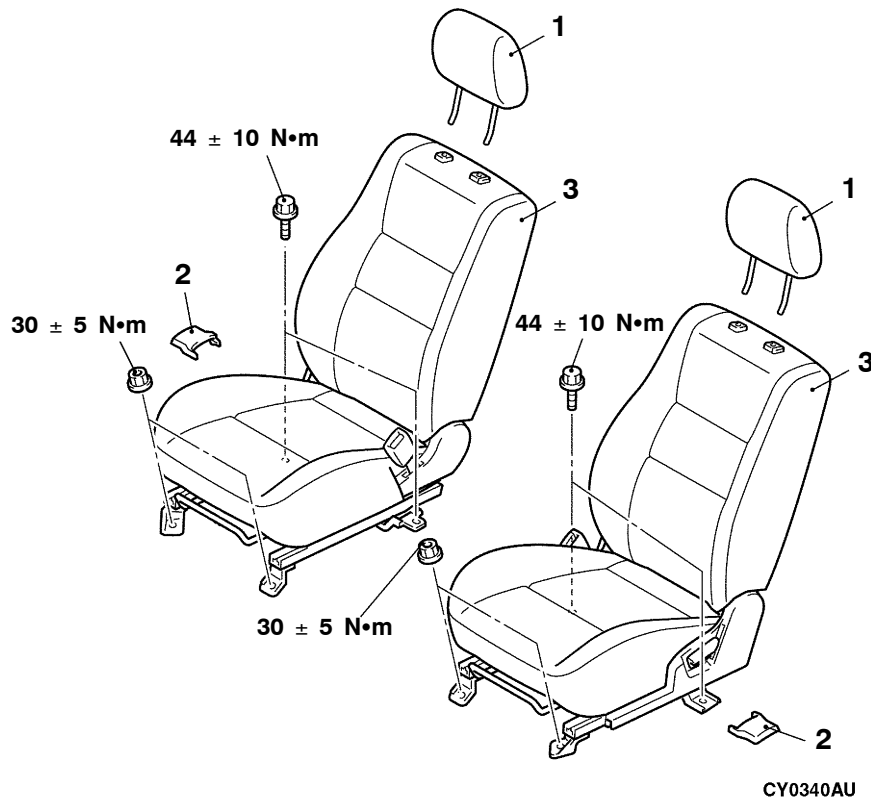
◀B▶ HEADLINING REMOVAL

Bend the headlining to remove from the front passenger's door.

SEAT

FRONT SEAT

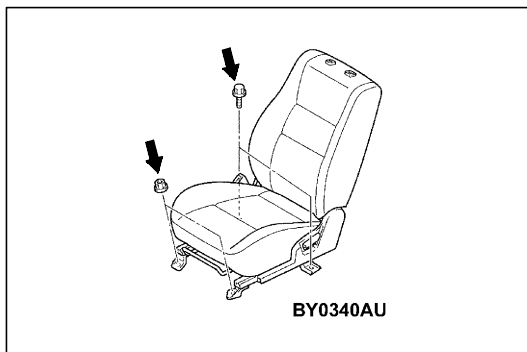
REMOVAL AND INSTALLATION



1. Headrest

Front seat assembly removal steps

- ▶A◀
2. Front seat anchor cover
 3. Front seat assembly



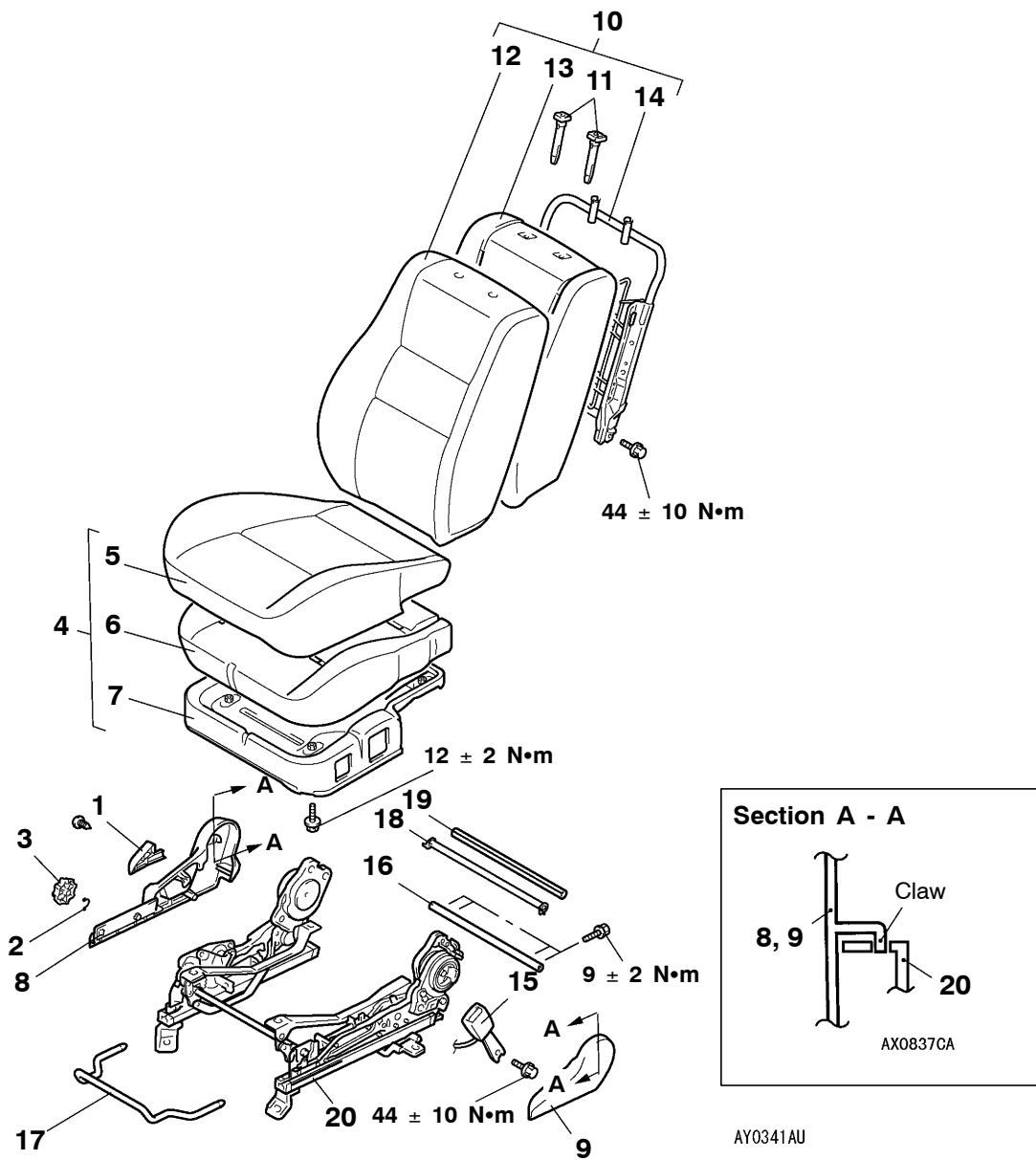
INSTALLATION SERVICE POINT

▶A◀ INSTALLATION OF FRONT SEAT ASSEMBLY

- (1) Temporarily tighten the nuts and bolts in all mounting locations shown in the illustration with no load applied to the front seat cushion and check the operation of the seat slide.
- (2) Tighten the nuts and bolts in all mounting locations to the specified torque.

DISASSEMBLY AND REASSEMBLY

HIGHT ADJUSTER SEAT



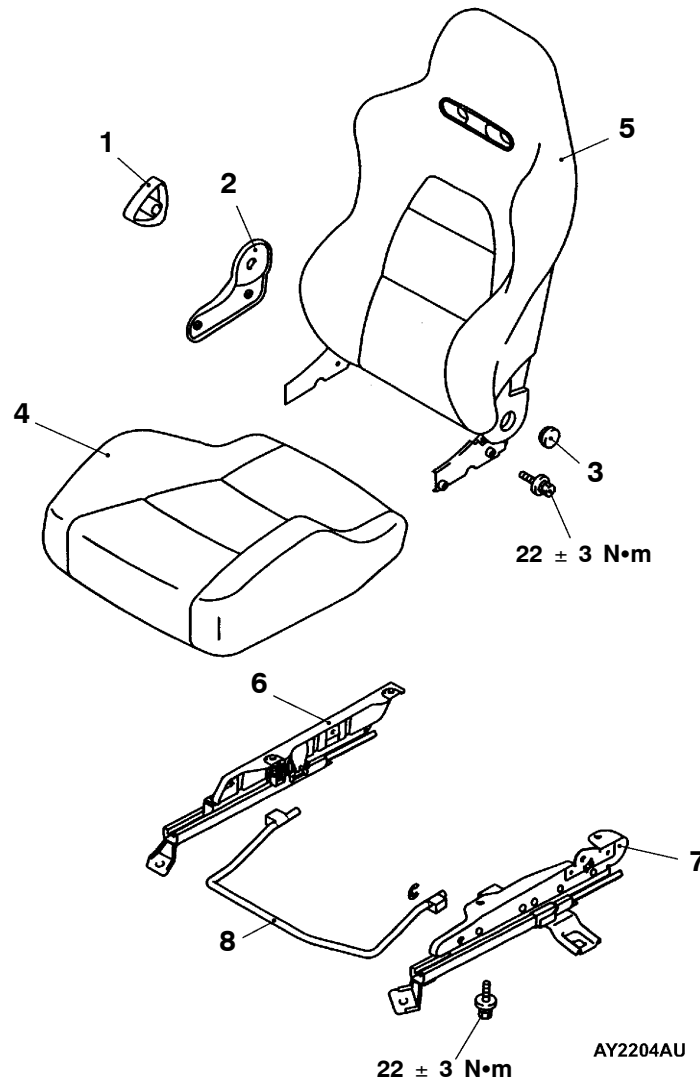
Disassembly steps

1. Reclining knob
2. Pin
3. Height adjuster knob
4. Front seat cushion assembly
5. Front seat cushion cover
6. Front seat cushion pad
7. Front seat cushion frame
8. Reclining cover
9. Shield cover
10. Front seatback assembly



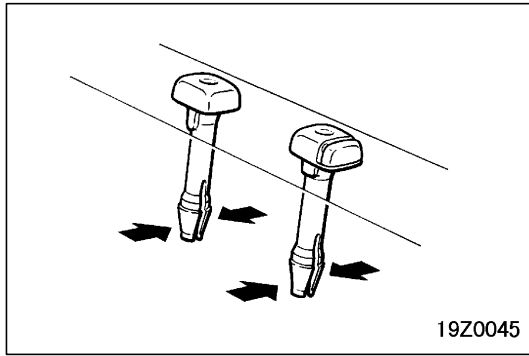
11. Headrest guide
12. Front seatback cover
13. Front seatback pad
14. Front seatback frame
15. Inner seat belt
16. Shaft
17. Seat slide handle
18. Shaft
19. Shaft protector
20. Seat slide adjuster

RECARO SEAT



Disassembly steps

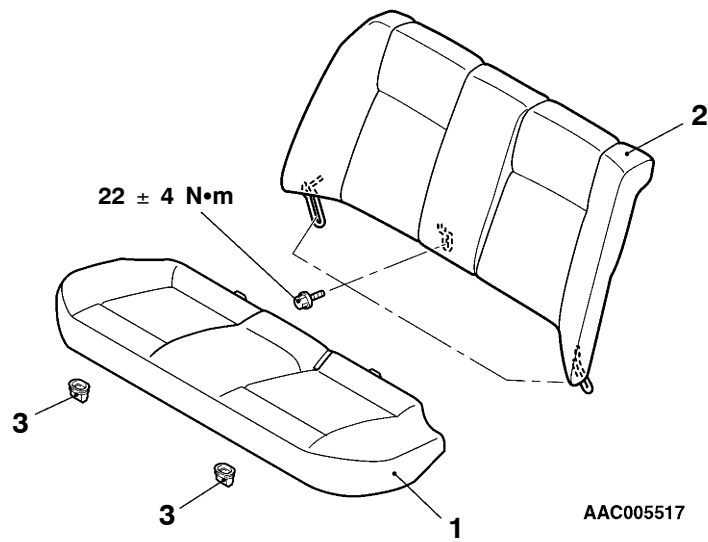
- | | |
|--------------------------------|-----------------------------|
| 1. Reclining knob | 5. Front seat back assembly |
| 2. Reclining cover | 6. Seat rail R.H. |
| 3. Cap | 7. Seat rail L.H. |
| 4. Front seat cushion assembly | 8. Seat slide lever |



REMOVAL SERVICE POINT

◀A▶ **REMOVAL OF HEADREST GUIDE**

**REAR SEAT
REMOVAL AND INSTALLATION**

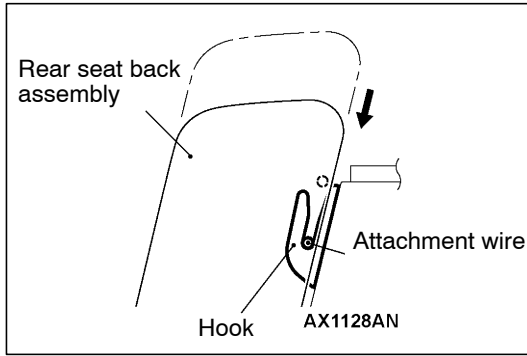


Disassembly steps



- 1. Rear seat cushion assembly
- 2. Rear seatback assembly

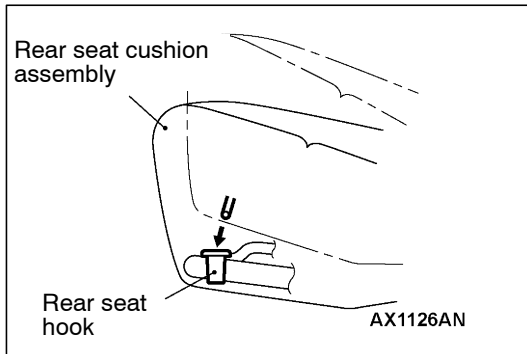
- 3. Rear seat hook



INSTALLATION SERVICE POINTS

▶A◀ INSTALLATION OF REAR SEATBACK ASSEMBLY/REAR SEATBACK SIDE ASSEMBLY L.H., R.H.

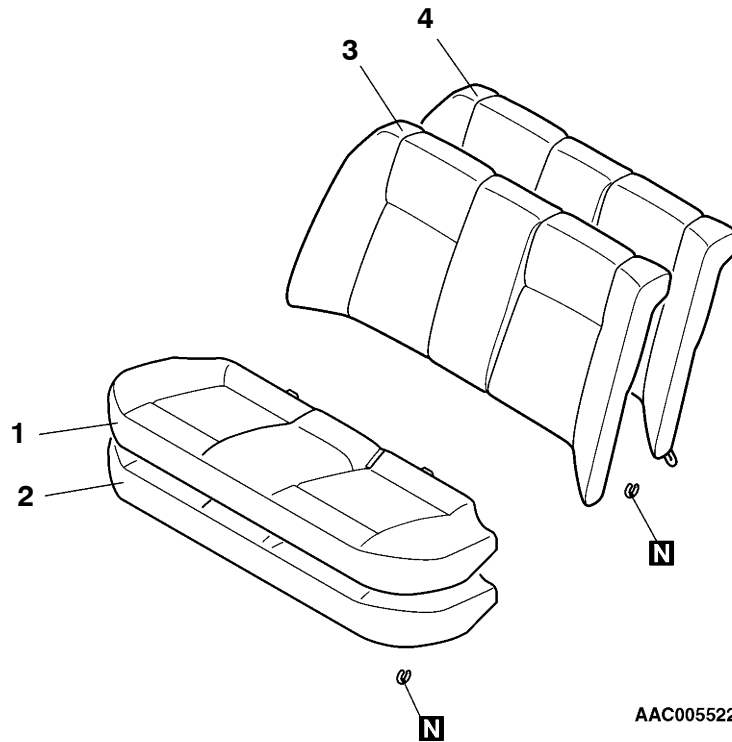
Press the rear seatback assembly in the direction shown in the illustration and fit the attachment wire into the hook securely to install the rear seatback assembly.



▶B◀ INSTALLATION OF REAR SEAT CUSHION ASSEMBLY

Fit the rear seat cushion into the rear seat hook securely.

DISASSEMBLY AND REASSEMBLY

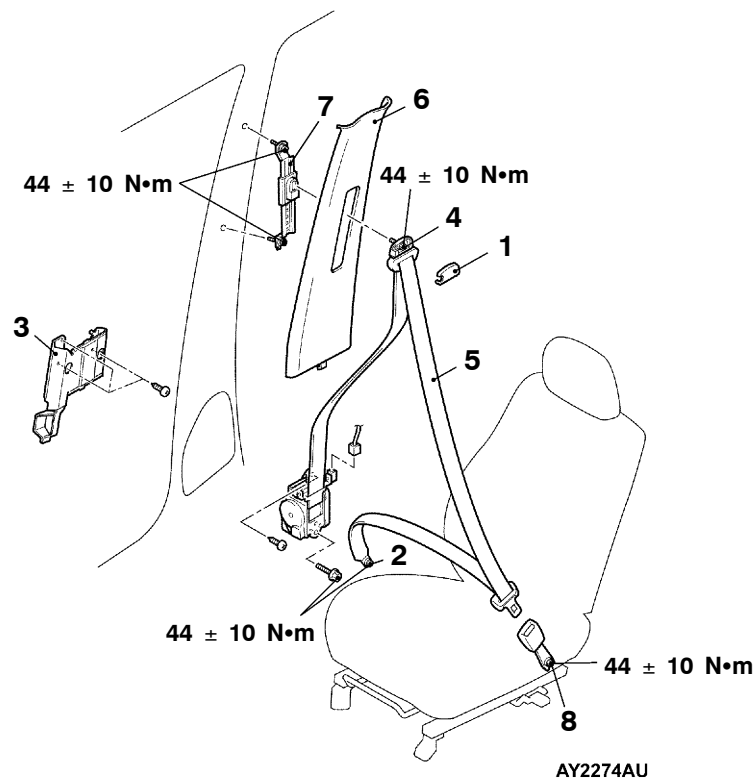


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Removal steps

1. Rear seat cushion cover
2. Rear seat cushion pad

3. Rear seatback cover
4. Rear seatback pad

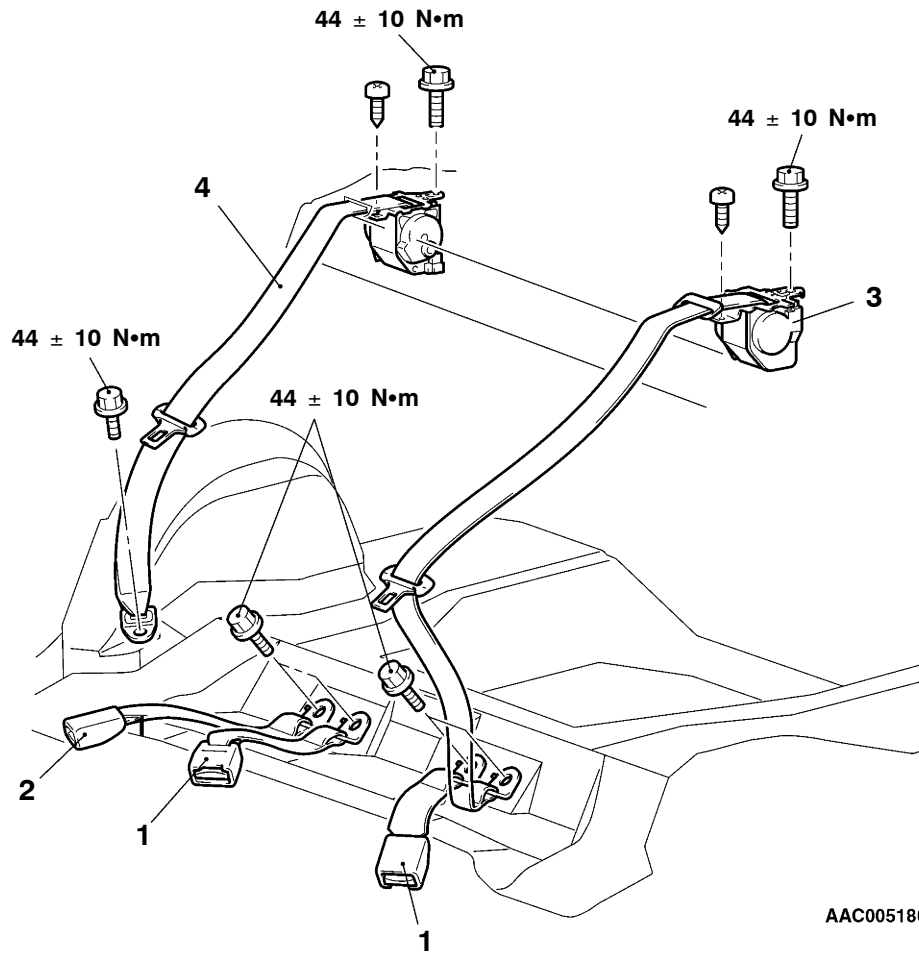
SEAT BELT**FRONT SEAT BELT****REMOVAL AND INSTALLATION****Outer seat belt removal steps**

1. Sash guide cover
2. Seat belt lower anchor bolt connection
 - Center pillar trim, lower (Refer to P.52A-15.)
3. Bracket
4. Seat belt shoulder anchor bolt connection
5. Outer seat belt with pre-tensioner
6. Center pillar trim, upper (Refer to P.52A-15.)
7. Adjustable seat belt anchor

Inner seat belt removal steps

- Shield cover (Refer to P.52A-20.)
- 8. Inner seat belt

REAR SEAT BELT REMOVAL AND INSTALLATION



Removal steps

- Rear seat cushion assembly (Refer to P.52A-22.)
- Rear seatback assembly (Refer to P.52A-22.)
- Rear shelf trim (Refer to P.52A-15.)

1. Inner seat belt
2. Center seat belt, inner
3. Center seat belt, outer
4. Outer seat belt

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

GENERAL INFORMATION	2	SRS AIR BAG CONTROL UNIT (SRS-ECU)	50
SRS SERVICE PRECAUTIONS	3	AIR BAG MODULES AND CLOCK SPRING	52
SPECIAL TOOLS	5	SEAT BELT PRE-TENSIONER	61
TEST EQUIPMENT	6	AIR BAG MODULE AND SEAT BELT PRE-TENSIONER DISPOSAL PROCEDURES	64
TROUBLESHOOTING	6	Undeployed Air Bag Module and Seat Belt Pre-tensioner Disposal	64
SRS MEINTENANCE	42	Deployed Air Bag Module and Seat Belt Pre-tensioner Disposal Procedures	75
POST-COLLISION DIAGNOSIS	45		
INDIVIDUAL COMPONENT SERVICE	49		
WARNING/CAUTION LABELS	49		

CAUTION

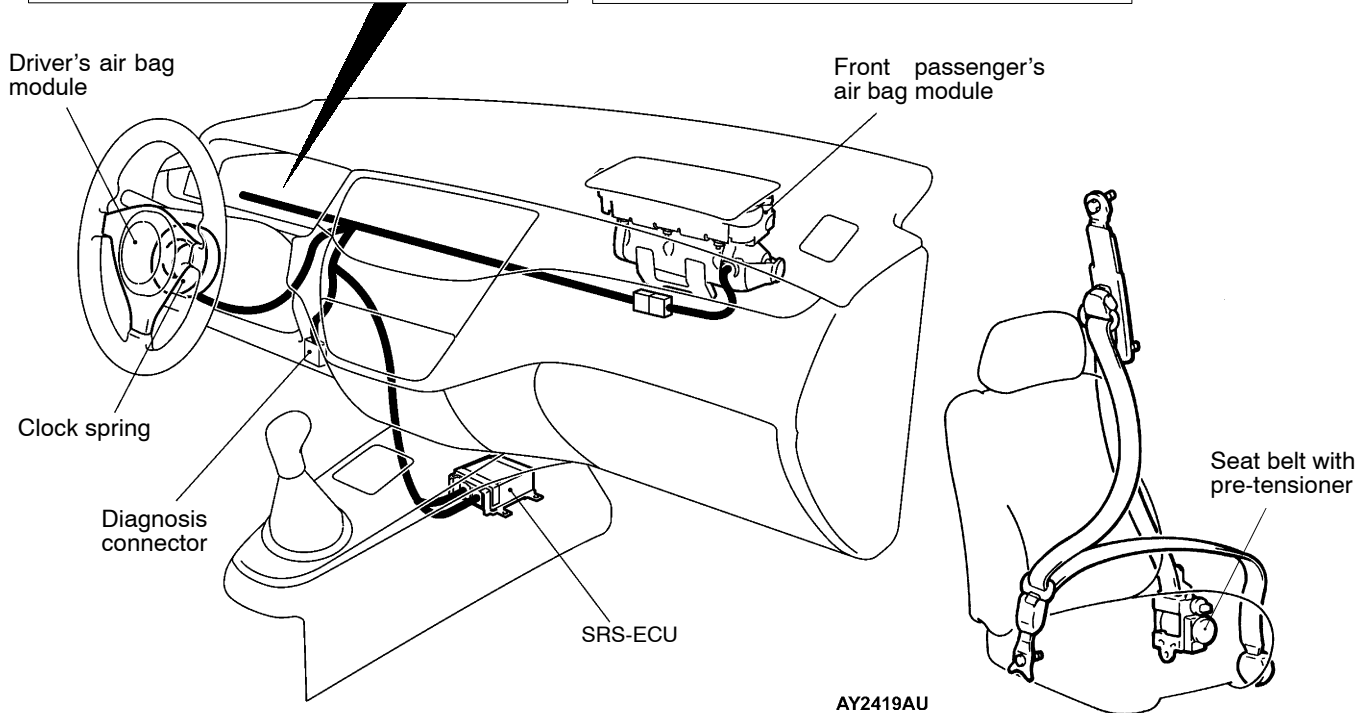
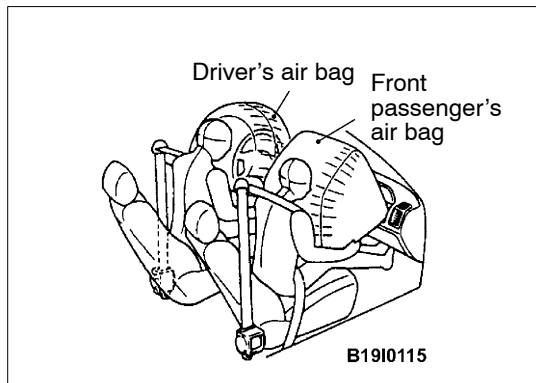
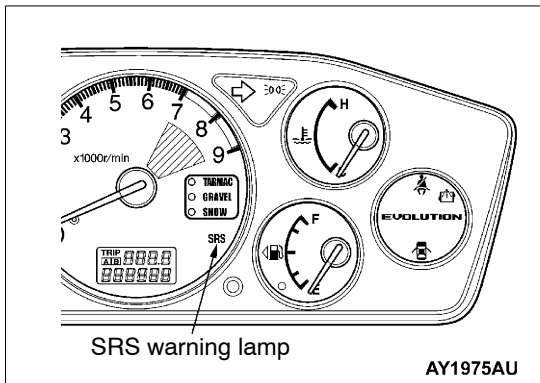
- Carefully read and observe the information in the **SERVICE PRECAUTIONS (P.52B-3.)** prior to any service.
- For information concerning troubleshooting or maintenance, always observe the procedures in the **Troubleshooting (P.52B-6.)** section.
- If any SRS components are removed or replaced in connection with any service procedures, be sure to follow the procedures in the **INDIVIDUAL COMPONENT SERVICE** section (P.52B-49.) for the components involved.
- If you have any questions about the SRS, please contact your local distributor.

GENERAL INFORMATION

To improve safety, the SRS and seat belts with pre-tensioner. These systems enhance collision safety by restraining the front passengers in case of an accident. The SRS works with the pre-tensioner simultaneously when a collision is detected.

The SRS consists of two air bag modules, SRS air bag control unit (SRS-ECU), SRS warning lamp and clock spring. The air bags are located in the center of the steering wheel, above the glove box. Each air bag has a folded air bag and an inflator unit. The SRS-ECU under the floor console monitors the system and has a safing G-sensor and an analog G-sensor. The warning lamp on the

instrument panel indicates the operational status of the SRS. The clock spring is installed in the steering column. The seat belt pre-tensioner is built into the front seat belt retractor. Only authorized service personnel should do work on or around the SRS components and seat belt with pre-tensioner. Those service personnel should read this manual carefully before starting any such work. Extreme care must be used when servicing the SRS to avoid injury to the service personnel (by inadvertent deployment of the air bags or inadvertent operation of the seat belt with pre-tensioner) or the driver (by rendering the SRS or the seat belt with pre-tensioner inoperative).



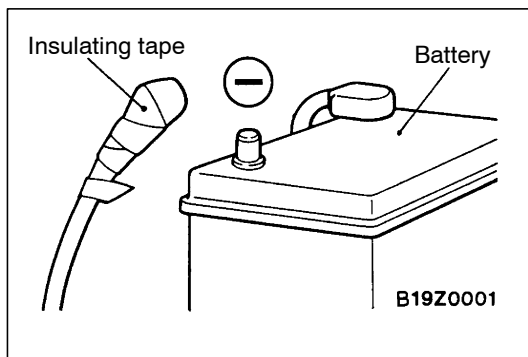
AW0403AU

SRS SERVICE PRECAUTIONS

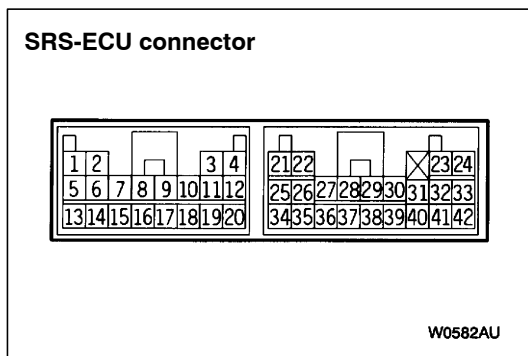
1. In order to avoid injury to yourself or others from accidental deployment of the air bag and accidental operation of the seat belt with pre-tensioner during servicing, read and carefully follow all the precautions and procedures described in this manual.
2. Do not use any electrical test equipment on or near SRS components, except those specified on P.52B-6.
3. **Never Attempt to Repair the Following Components:**
 - SRS air bag control unit (SRS-ECU)
 - Clock spring
 - Driver's and front passenger's air bag modules
 - Seat belt with pre-tensioner

NOTE

If any of these components are diagnosed as faulty, they should only be replaced, in accordance with the **INDIVIDUAL COMPONENTS SERVICE** procedures in this manual. (Refer to P.52B-49.)



4. After disconnecting the negative (-) battery cable, wait **60 seconds at least** before any service and insulate the disconnected cable with tape. The SRS retain enough voltage to deploy the air bags for a short time even after the disconnection of the battery. So, serious injury may result by accidental air bag deployment if a work is done on the SRS just after the disconnection of the battery.

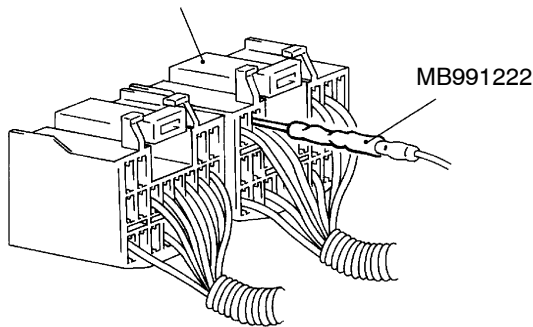


5. Do not attempt to repair the wiring harness connectors of the SRS. If the connector(s) are diagnosed as defective, replace the wiring harness(es). If the harness(es) are diagnosed as faulty, replace or repair the wiring harness(es) according to the table that follows.

SRS-ECU Terminal No.	Destination of harness	Corrective action
7	Instrument panel wiring harness → Earth	Repair or replace each wiring harness
8	Instrument panel wiring harness → Combination meter (SRS warning lamp)	
9, 10	Instrument panel wiring harness → Front passenger's air bag module	
11, 12	Instrument panel wiring harness → Clock spring → Driver's air bag module)	Repair or replace the dash wiring harness. Replace clock spring.
13	Instrument panel wiring harness → Junction block (fuse No.3)	Repair or replace each wiring harness.
16	Instrument panel wiring harness → Junction block (fuse No.2)	
20	Instrument panel wiring harness → Diagnosis connector	
29, 30	Floor wiring harness Driver's seat belt pre-tensioner	
27, 28	Floor wiring harness Front passenger's seat belt pre-tensioner	

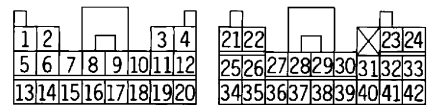
6. Inspection of the SRS-ECU harness connector should be carried out by the following procedure. Insert the special tool (probe, MB991222, in the harness set) into the connector from harness side (rear side), and connect the tester to this probe. If any tool than specified is used, damage to the harness and other components will result. Furthermore, measurement should not be carried out by touching the probe directly against the terminals from the front of the connector. The terminals are plated to increase their conductivity, so that if they are touched directly by the probe, the plating may break, which will cause drops in reliability.

SRS-ECU harness connector



V0132AE

SRS-ECU harness connector (rear view)



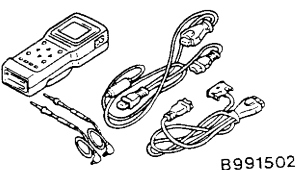
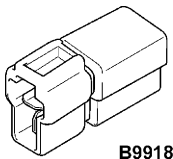
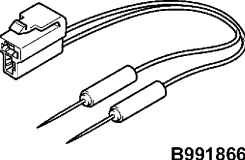
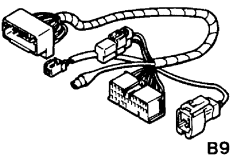
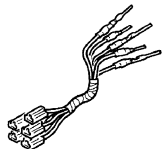
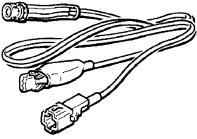
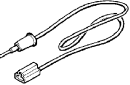

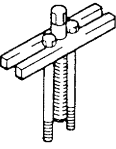
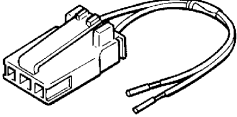
W0584AU

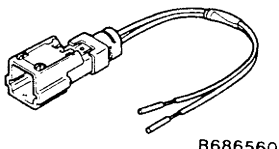
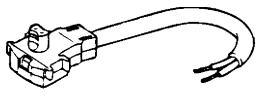
7. SRS components and seat belt with pre-tensioner should not be subjected to heat, so remove the SRS-ECU, driver's and front passenger's air bag modules, clock spring, and seat belt with pre-tensioner before drying or baking the vehicle after painting.
- SRS-ECU, air bag module, clock spring : 93 or more
 - Seat belt with pre-tensioner : 90 or more
8. Whenever you finish servicing the SRS, check warning lamp operation to make sure that the system functions properly. (Refer to P.52B-6.)
9. Make certain that the ignition switch is LOCK (OFF) position when the MUT-II is connected or disconnected.
10. If you have any questions about the SRS, please contact your local distributor.

NOTE


SERIOUS INJURY CAN RESULT FROM UNINTENDED AIR BAG DEPLOYMENT, SO USE ONLY THE PROCEDURES AND EQUIPMENT SPECIFIED IN THIS MANUAL.

SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub assembly	<ul style="list-style-type: none"> • Reading and erasing diagnosis codes • Reading trouble period • Reading erase times
 B991865	MB991865	Dummy resistor	Checking SRS air bag circuit
 B991866	MB991866	Resistor harness	
 B991613	MB991613	SRS check harness	Checking SRS electrical circuitry
A  B  C  D  C991223	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Check harness B: LED harness C: LED harness adapter D: Probe	Checking continuity and measuring voltage at SRS-ECU harness connector
 B990803	MB990803	Steering wheel puller	Removing steering wheel
 R372530	MR372530	SRS air bag adapter harness	Deploying driver's air bag module inside vehicle

Tool	Number	Name	Use
 B686560	MB686560	SRS air bag adapter harness	Deploying front passenger's air bag module inside or outside vehicle
 B628919	MR203491 or MB628919	SRS air bag adapter harness	Deploying driver's air bag module inside vehicle <RS>

TEST EQUIPMENT

Tool	Name	Use
 13R0746	Digital multi-meter	Checking SRS electrical circuitry Use multi-meter for which the maximum test current is 2 mA or less at minimum range of resistance measurement

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS FUNCTION

DIAGNOSIS CODES CHECK

Connect the MUT-II to the diagnosis connector (16-pin) under the instrument under cover, then check diagnosis codes.

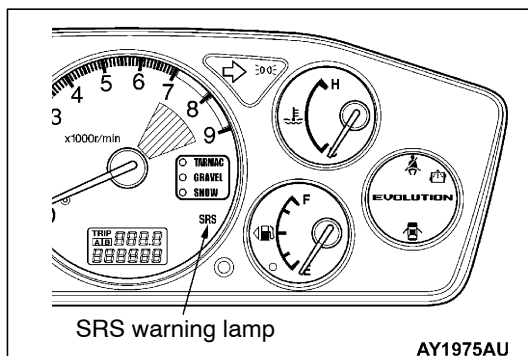
(Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)

ERASING DIAGNOSIS CODE

Connect the MUT-II to the diagnosis connector and erase the diagnosis code.

Caution

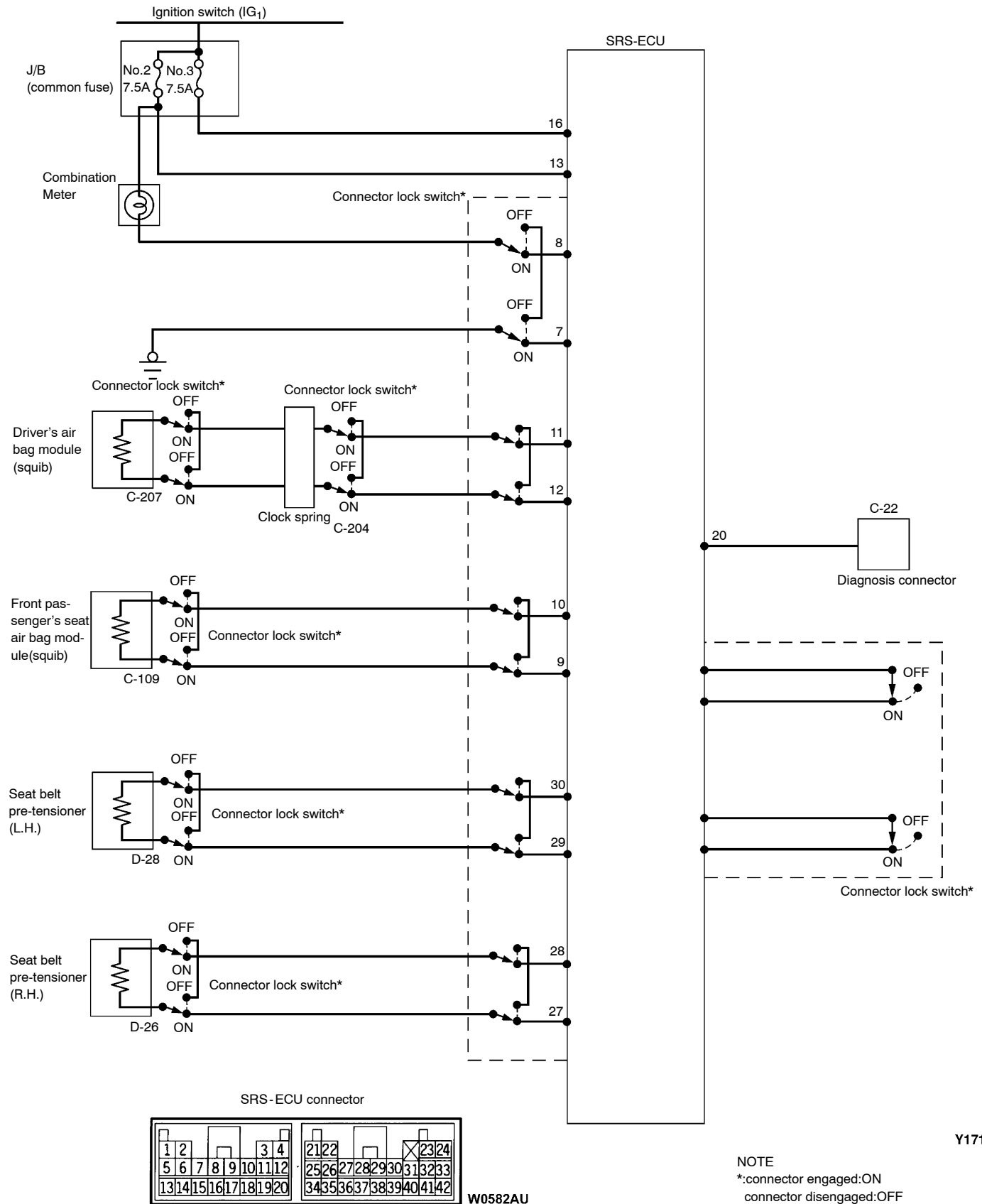
Turn off the ignition switch before connecting or disconnecting the MUT-II.



SRS WARNING LAMP CHECK

1. Check that the SRS warning lamp comes on when the ignition switch is turned ON.
2. Check that the SRS warning lamp illuminates for about 7 seconds and then goes out.
3. If this is not the cause, check the diagnosis codes.

SRS SYSTEM CIRCUIT DIAGRAM

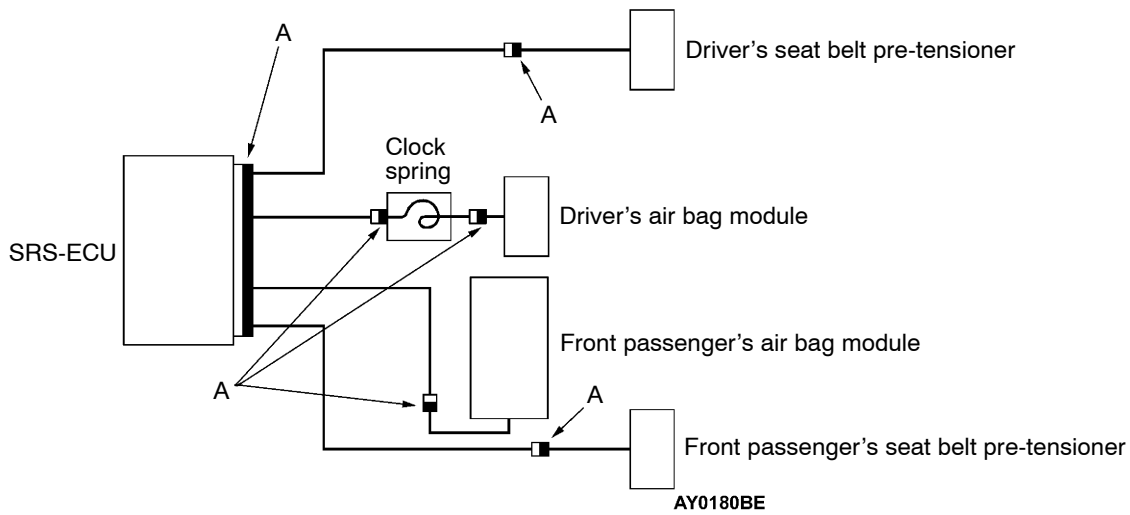


Y1717AU

CONNECTOR FOR SRS AIR BAG

The SRS air bag system connector is yellow or red.

To enhance system reliability, a connector lock switch is adopted for the SRS-ECU connector, and each air bag module and clock spring connector, each seat belt with pre-tensioner <the connector A in the following illustration (black)>).

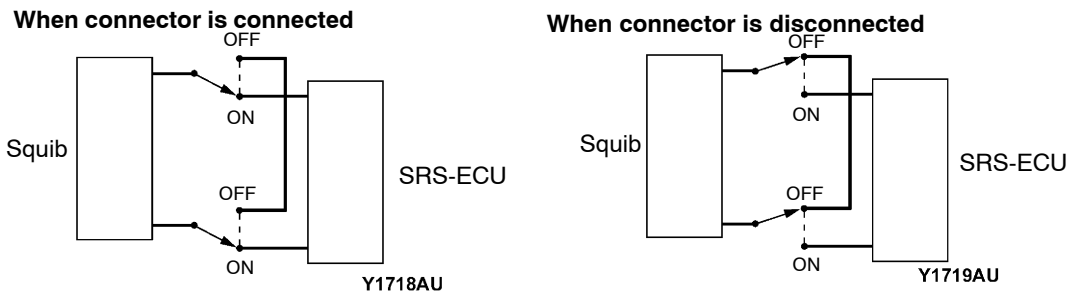


SQUIB CIRCUIT CONNECTOR LOCK SWITCH

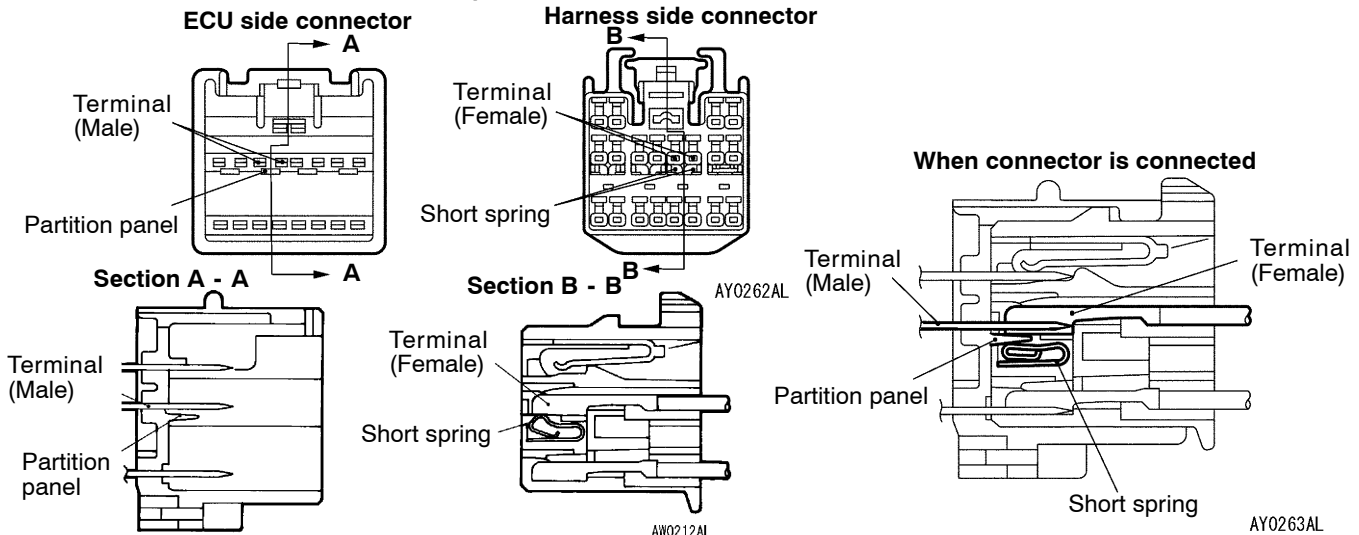
Mechanism to automatically short-circuit the power supply terminal and the earth terminal of the air bag squib circuit when the connector is disconnected. The short spring inside the connector allows to short-circuit the power supply terminal and the earth terminal of the squib (no difference in voltage occurs between the terminals) to prevent the squib from getting charged with static electricity.

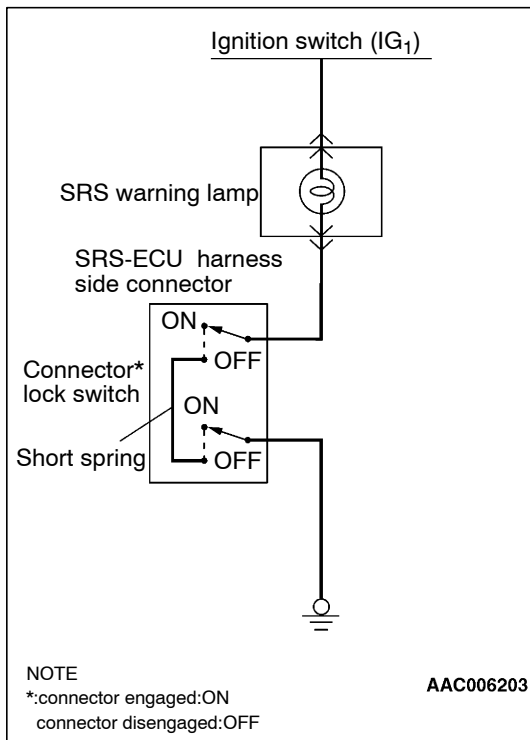
CAUTION

When the connector is disconnected, it is normal for short-circuiting to occur between the connector terminals.



<Connector lock switch structure (Example: SRS-ECU connector)>





WARNING LAMP CIRCUIT CONNECTOR LOCK SWITCH

Mechanism to automatically short-circuit the power supply terminal and the earth terminal of the warning lamp circuit when the SRS-ECU connector is disconnected. The structure is the same as that of squib circuit connector lock switch.

INSPECTION CHART FOR DIAGNOSIS CODES

Inspect according to the inspection chart that is appropriate for the malfunction code.

Code no.	Diagnostic item	Page	
14	SRS-ECU front impact analog G-sensor system	52B-11	
15	SRS-ECU front impact safing G-sensor system	Short circuit in the sensor	52B-11
16	SRS-ECU front impact safing G-sensor system	Open circuit in the sensor	
21* ¹	Driver's air bag module (squib) system	Short circuit between terminals of the squib circuit	52B-12
22* ¹	Driver's air bag module (squib) system	Open in the squib circuit	52B-16
24* ¹	Front passenger's air bag module (squib) system	Short circuit between terminals of the squib circuit	52B-20
25* ¹	Front passenger's air bag module (squib) system	Open in the squib circuit	52B-22
26* ¹	Driver's seat belt pre-tensioner (squib) system	Short circuit between terminals of the squib circuit	52B-23
27* ¹	Driver's seat belt pre-tensioner (squib) system	Open in the squib circuit	52B-25
28* ¹	Front passenger's seat belt pre-tensioner (squib) system	Short circuit between terminals of the squib circuit	52B-26
29* ¹	Front passenger's seat belt pre-tensioner (squib) system/	Open in the squib circuit	52B-28
31	SRS-ECU DC-DC converter system	Increased terminal voltage	52B-11
32	SRS-ECU DC-DC converter system	Decreased terminal voltage	

Code no.	Diagnostic item		Page
34*2	Connector lock system		52B-29
35	SRS-ECU (deployed air bag) system		52B-29
41*2	Power supply circuit system (fuse No.2 circuit)		52B-30
42*2	Power supply circuit system (fuse No.3 circuit)		52B-32
43*2	SRS warning lamp drive circuit system	Lamp does not illuminate.	52B-33
	SRS warning lamp drive circuit system	Lamp does not go out.	52B-33
44*2	SRS warning lamp drive circuit system		52B-33
45	SRS-EUC internal circuit system including non-volatile memory (EEPROM)		52B-11
51	Driver's air bag module (squib) ignition drive circuit system	Short in the ignition drive circuit	52B-11
52	Driver's air bag module (squib) ignition drive circuit system	Open in the ignition drive circuit	
54	Front passenger's air bag (squib) ignition drive circuit system	Short in the ignition drive circuit	52B-11
55	Front passenger's air bag (squib) ignition drive circuit system	Open in the ignition drive circuit	
56	Driver's seat belt pre-tensioner (squib) ignition drive circuit system	Short in the ignition drive circuit	52B-11
57	Driver's seat belt pre-tensioner (squib) ignition drive circuit system	Open in the ignition drive circuit	
58	Front passenger's seat belt pre-tensioner (squib) ignition drive circuit system	Short in the ignition drive circuit	52B-11
59	Front passenger's seat belt pre-tensioner (squib) ignition drive circuit system	Open in the ignition drive circuit	
61	Driver's air bag module (squib) system	Short-circuited to power supply	52B-34
62	Driver's air bag module (squib) system	Short-circuited to earth	
64	Front passenger's air bag module (squib) system	Short-circuited to power supply	52B-38
65	Front passenger's air bag module (squib) system	Short-circuited to earth	
66	Driver's seat belt pre-tensioner (squib) system	Short-circuited to power supply	52B-39
67	Driver's seat belt pre-tensioner (squib) system	Short-circuited to earth	
68	Front passenger's seat belt pre-tensioner (squib) system	Short-circuited to power supply	52B-40
69	Front passenger's seat belt pre-tensioner (squib) system	Short-circuited to earth	

NOTE

- (1) *1: If the trouble(s) are removed, the SRS warning lamp go out with diagnosis code history stored.
- (2) *2: If the trouble(s) are removed, the SRS warning lamp will go out with diagnosis code history automatically erased.
- (3) When the battery has been discharged, diagnosis code No.41 or 42 is stored. Check the battery when either of these is displayed.

INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

Code No.14, 15, 16, 31, 32, 45, 51, 52, 54, 55, 56, 57, 58, 59 System inside SRS-ECU	Probable cause
Malfunction is present inside SRS-ECU. See table below for what each code tells.	<ul style="list-style-type: none"> ● Malfunction of SRS-ECU

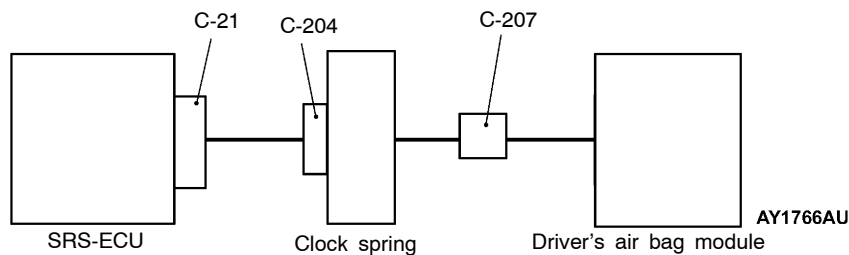
Code No.	Defective parts	Trouble
14	Front impact analog G-sensor	<ul style="list-style-type: none"> ● Not operating ● Abnormal characteristics ● Abnormal output
15	Front impact safing G-sensor	● Short in the circuit
16		● Open in the circuit
31	DC-DC converter	● Terminal voltage of the converter higher than specified for five seconds or more
32		● Terminal voltage of the converter lower than specified for 5 seconds or more (this code is not detected when code No.41 or 42, which indicates discharged battery, has been detected)
45	Non-volatile memory (EEPROM)	● Defective parts inside
51	Driver's air bag module (squib) ignition drive circuit	● Short in the circuit
52		● Open in the circuit
54	Front passenger's air bag module (squib) ignition drive circuit	● Short in the circuit
55		● Open in the circuit
56	Driver's seat belt pre-tensioner (squib) ignition drive circuit	● Short in the circuit
57		● Open in the circuit
58	Front passenger's seat belt pre-tensioner (squib) ignition drive circuit	● Short in the circuit
59		● Open in the circuit

If the above-mentioned code No. is output, replace the SRS-ECU.

Code No.21 Driver's air bag module (squib) system	Possible Cause
This code is output when short circuit occurs between terminals of the SRS-ECU driver's air bag module (squib) circuit. However, SRS warning lamp goes out when a normal operation is resumed (diagnosis code is not cleared.)	<ul style="list-style-type: none"> ● Connector engagement faulty or short bar faulty* ● Short circuit in the clock spring ● Short circuit between terminals of the driver's air bag module (squib) circuit ● Faulty connector ● SRS-ECU inoperable

NOTE:

- (1) *: The connector of the squib circuit contains a short bar (short-circuiting the positive (+) cable and the negative (-) cable to avoid an erroneous deployment caused by static electricity when a connector is not connected). Thus, when a connector is connected, the short bar may not be released due to improper engagement of the connector or faulty connector as shown in the illustration below. Disconnect the connector as shown in the illustration below, then reconnect it. Check that a diagnosis code is output again after erasing the memory. If the diagnosis code is not output, the above-mentioned code is output due to improper engagement of the connector.

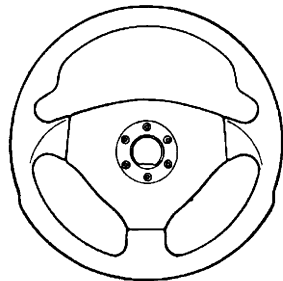


- (2) Two different types of driver's air bag modules by model are featured. Thus, two types of air bag module by model are described in the following flowchart.

RS: Steering wheel and air bag module separate type

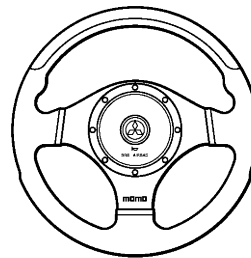
RS-II: Steering wheel and air bag module incorporate type

<RS>



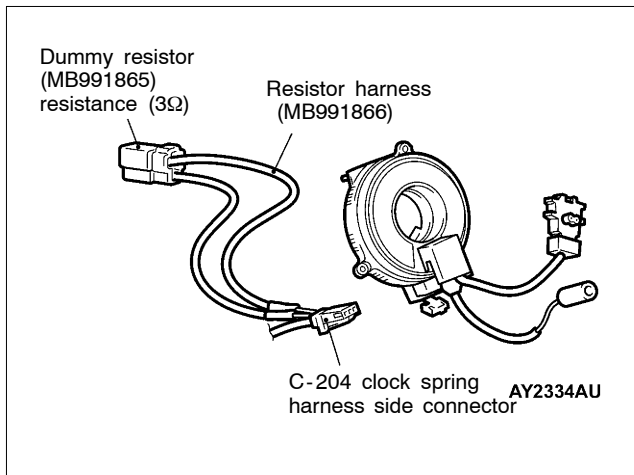
13R0025

<RS-II>



Y2058AU

<RS>



<Clock spring check>

MUT-II self-diag code

- Release the clock spring connector (2-pin) C-204.
- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Insert the resistor harness (MB991866) behind the harness side connector C-204.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory.

Is code No.21 output?

YES

NO

<Check the circuit between the SRS-ECU and clock spring>

Measure at the SRS-ECU connector C-21.

- Disconnect the SRS-ECU connector C-21.
- Release the the clock spring connector C-204.

Caution
Disconnect the connector and short-circuit the squib circuit before releasing the short bar of the SRS-ECU connector in the following operation.

- Cable bands between terminals 11, 12 and the short bar (width:3 mm, thickness:0.5 mm) between terminals 11 and 12 and the short bar, and release the short bar. (See Figure A.)

Caution
As the short bar may not be releasable if inserted insufficiently, insert more than 4 mm.

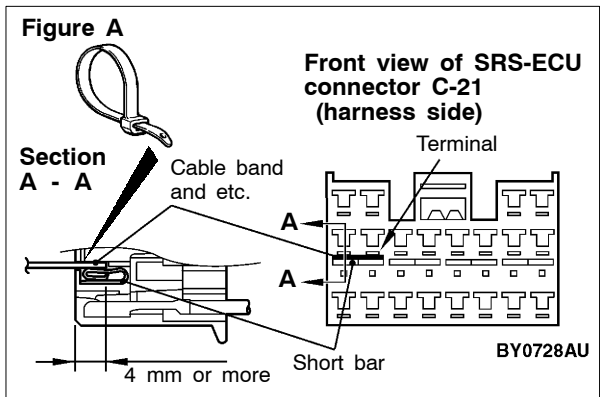
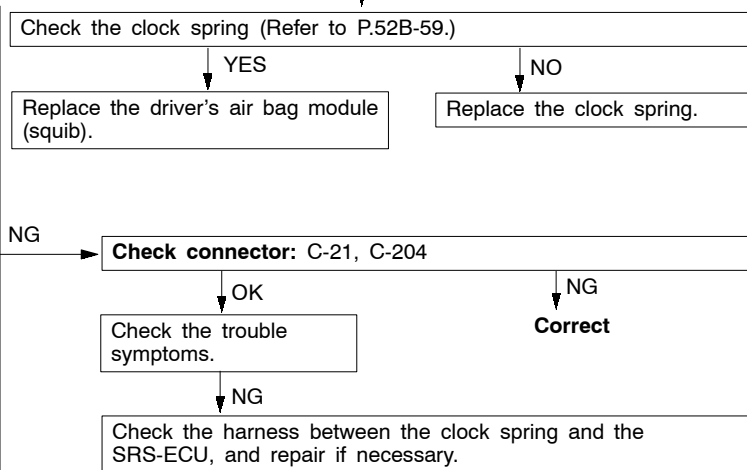
- Measure at the harness side
- Continuity check between terminals 11 and 12

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: No continuity

Connector C-21

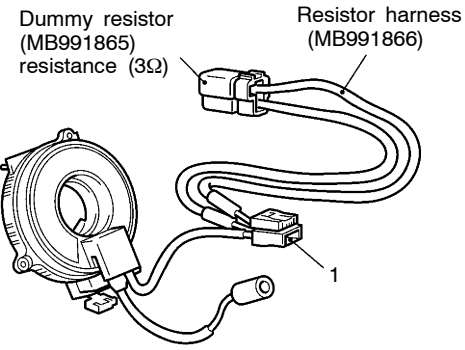
Y1720AU



OK

Replace the SRS-ECU.

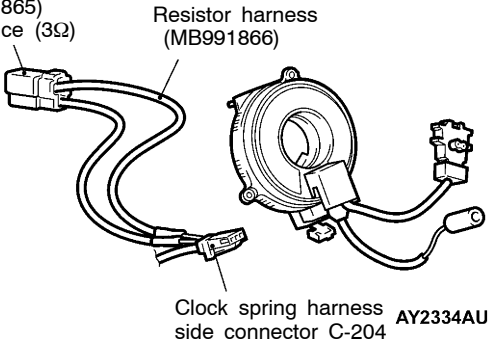
<RS-II>

 <p>Dummy resistor (MB991865) resistance (3Ω)</p> <p>Resistor harness (MB991866)</p> <p>1</p> <p>AY1728AU</p>	<p><Driver's seat air bag module (squib) check></p> <p>MUT-II self-diag code</p> <ul style="list-style-type: none"> ● Disconnect the clock spring connector No.1 (connector connected with the air bag module). ● Connect the dummy resistor (MB991865) to the resistor harness (MB991866). ● Insert the resistor harness (MB991866) behind the clock spring connector No.1. <p>Caution Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.</p> <ul style="list-style-type: none"> ● Connect the negative (-) terminal of the battery ● Check the diagnosis code again after erasing the memory. Is code No.21 output?
--	---

YES

NO

Replace the driver's air bag module (squib).

 <p>Dummy resistor (MB991865) resistance (3Ω)</p> <p>Resistor harness (MB991866)</p> <p>Clock spring harness side connector C-204 AY2334AU</p>	<p><Clock spring check></p> <p>MUT-II self-diag code</p> <ul style="list-style-type: none"> ● Release the clock spring connector (2-pin) C-204 . ● Connect the dummy resistor (MB991865) to the resistor harness. ● Insert the resistor harness (MB991866) behind the harness side connector C-204 . <p>Caution Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.</p> <ul style="list-style-type: none"> ● Connect the negative (-) terminal of the battery ● Check the diagnosis code again after erasing the memory. Is code No.21 output?
--	---

YES

NO

Go to Next Page

Replace the clock spring.

From Previous Page

YES

<Check the circuit between the SRS-ECU and clock spring>

Measure at the SRS-ECU connector C-21 .

- Disconnect the SRS-ECU connector C-21.
- Release the the clock spring connector C-204.

Caution

Disconnect the connector and short-circuit the squib circuit before releasing the short bar of the SRS-ECU connector in the following operation.

- Cable bands between terminals 11, 12 and the short bar (width:3 mm, thickness:0.5 mm) between terminals 11 and 12 and the short bar, and release the short bar. (See Figure A.)

Caution

As the short bar may not be releasable if inserted insufficiently, insert more than 4 mm.

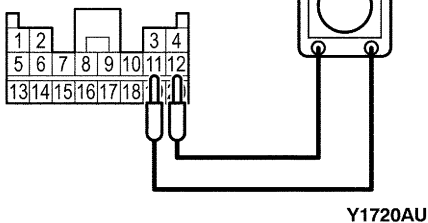
- Measure at the harness side
- Continuity check between terminals 11 and 12

Caution

Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: No continuity

Connector C-21



OK

Replace the SRS-ECU.

NG

Check connector: C-21, C-204

OK

Check the trouble symptoms.

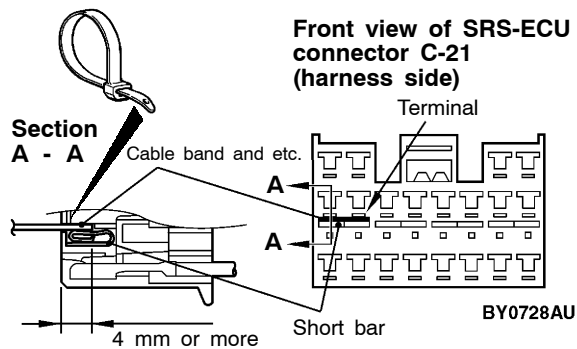
NG

Check the harness between the clock spring and the SRS-ECU, and repair if necessary.

NG

Correct

Figure A



Code No.22 Driver's air bag module (squib) system	Possible Cause
<p>This code is output when open circuit occurs in the SRS-ECU driver's air bag module (squib) circuit. However, SRS warning lamp goes out when a normal operation is resumed (diagnosis code is not cleared.)</p>	<ul style="list-style-type: none"> ● Open in the clock spring ● Half open in the circuit due to improper neutral positioning of the clock spring ● Open in the driver's air bag module (squib) circuit ● Driver's air bag module (squib) connector falling out ● Connector improper contact ● SRS-ECU inoperable

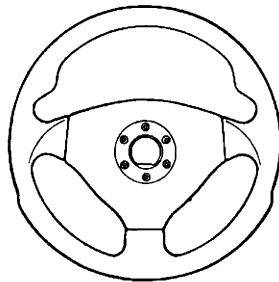
NOTE:

Two different types of driver's air bag modules by model are featured. Thus, two types of air bag module by model are described in the following flowchart.

RS: Steering wheel and air bag module separate type

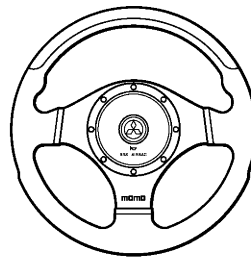
RS-II: Steering wheel and air bag module incorporate type

<RS>



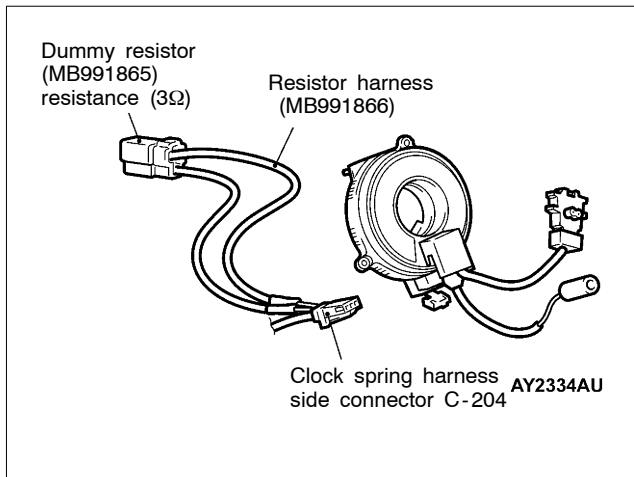
13R0025

<RS-II>



Y2058AU

<RS>



<Clock spring check>

MUT-II self-diag code

- Release the clock spring connector (2-pin) C-204.
- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Insert the resistor harness (MB991866) behind the harness side connector C-204.

Caution

Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory. Is code No.22 output?

YES

NO

<Check the circuit between the SRS-ECU and clock spring>

Measure at the SRS-ECU connector C-21 and the clock spring connector C-204.

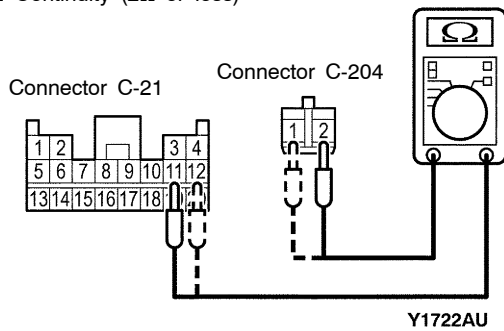
- Disconnect the SRS-ECU connector C-21 and the clock spring connector C-204 and measure at the harness side.
- Continuity check between the following terminals

Connector C-21		Connector C-204
11	-	2
12	-	1

Caution

Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: Continuity (2Ω or less)



OK

Replace the SRS-ECU.

Check the clock spring (Refer to P.52B-59.)

YES

NO

Replace the driver's air bag module (squib).

Replace the clock spring.

NG

Check connector: C-21, C-204

OK

NG

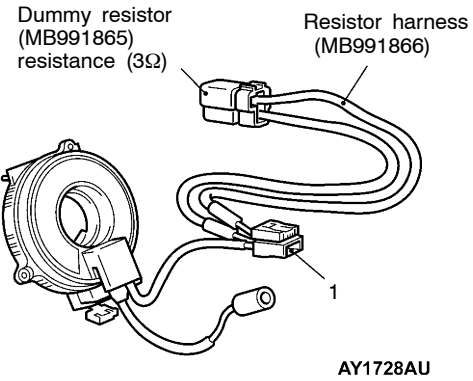
Check the trouble symptoms.

Correct

NG

Check the harness between the clock spring and the SRS-ECU, and repair if necessary.

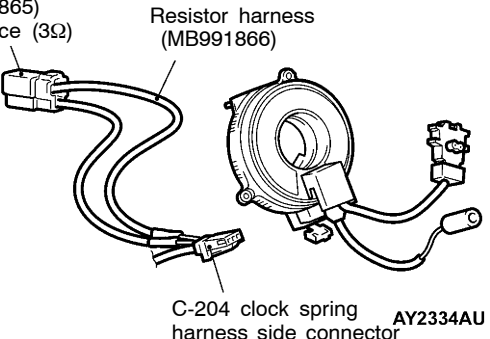
<RS-II>

 <p>Dummy resistor (MB991865) resistance (3Ω)</p> <p>Resistor harness (MB991866)</p> <p>AY1728AU</p>	<p><Driver's seat air bag module (squib) check></p> <p>MUT-II self-diag code</p> <ul style="list-style-type: none"> ● Disconnect the clock spring connector No.1 (connector connected with the air bag module). ● Connect the dummy resistor (MB991865) to the resistor harness (MB991866). ● Insert the resistor harness (MB991866) behind the clock spring connector No.1. <p>Caution Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.</p> <ul style="list-style-type: none"> ● Connect the negative (-) terminal of the battery ● Check the diagnosis code again after erasing the memory. Is code No.22 output?
---	---

YES

NO

Replace the steering wheel-driver's air bag module assembly.

 <p>Dummy resistor (MB991865) resistance (3Ω)</p> <p>Resistor harness (MB991866)</p> <p>C-204 clock spring harness side connector AY2334AU</p>	<p><Clock spring check></p> <p>MUT-II self-diag code</p> <ul style="list-style-type: none"> ● Release the clock spring connector (2-pin) C-204. ● Connect the dummy resistor (MB991865) to the resistor harness (MB991866). ● Insert the resistor harness (MB991866) behind the harness side connector C-204. <p>Caution Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.</p> <ul style="list-style-type: none"> ● Connect the negative (-) terminal of the battery ● Check the diagnosis code again after erasing the memory. Is code No.22 output?
--	--

YES

NO

Go to Next Page

Replace the clock spring.

From Previous Page

YES

<Check the circuit between the SRS-ECU and clock spring>

Measure at the C-21 SRS-ECU connector and C-204 clock spring connector.

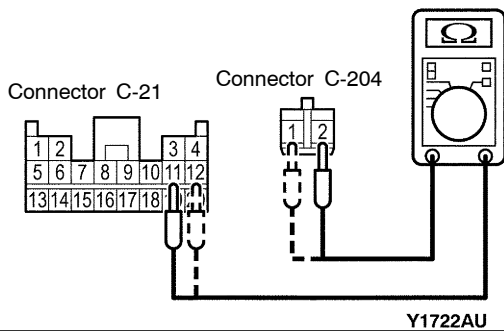
- Disconnect the SRS-ECU connector C-21 and the clock spring connector C-204 and measure at the harness side.
- Continuity check between the following terminals

C-21 connector		C-204 connector
11	-	2
12	-	1

Caution

Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: Continuity (2Ω or less)



OK

Replace the SRS-ECU.

NG

Check connector: C-21, C-204

OK

Check the trouble symptoms.

NG

Check the harness between the clock spring and the SRS-ECU, and repair if necessary.

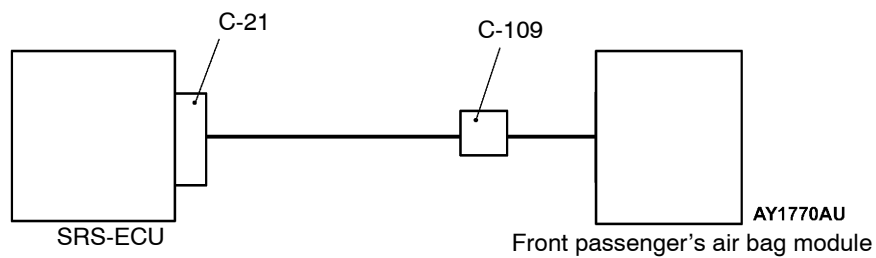
NG

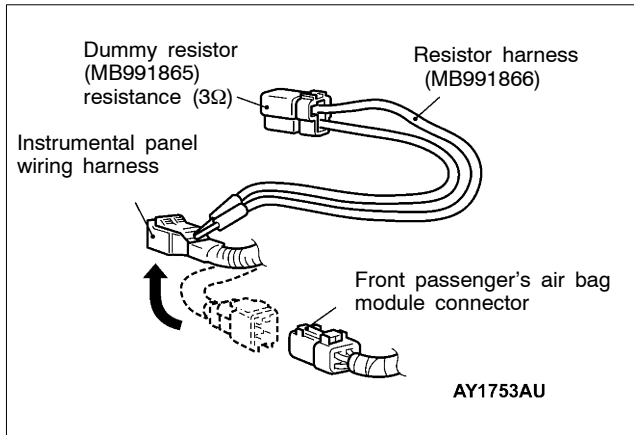
Correct

Code No.24 Front passenger's air bag module (squib) system	Possible Cause
This code is output when short circuit occurs between terminals of the SRS-ECU front passenger's air bag (squib) circuit. However, SRS warning lamp goes out when a normal operation is resumed (diagnosis code is not cleared.)	<ul style="list-style-type: none"> ● Connector engagement faulty or short bar faulty* ● Short circuit between terminals of the front passenger's air bag (squib) circuit ● Faulty connector ● SRS-ECU inoperable

NOTE:

*: The connector of the squib circuit contains a short bar (short-circuiting the positive (+) cable and the negative (-) cable to avoid an erroneous deployment caused by static electricity when a connector is not connected). Thus, when a connector is connected, the short bar may not be released due to improper engagement of the connector or faulty connector as shown in the illustration below. Disconnect the connector as shown in the illustration below, then reconnect it. Check that a diagnosis code is output again after erasing the memory. If the diagnosis code is not output, the above-mentioned code is output due to improper engagement of the connector.





<Check the front passenger's air bag module (squib)>
MUT-II self-diag code

- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Disconnect the front passenger's air bag module connector C-109 and insert the resistor harness (MB991866) behind the harness side connector.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory.

Is code No.24 output?

YES

NO

<Check the circuit between the SRS-ECU and the front passenger's air bag module>
 Measure at the C-21 SRS-ECU connector.

- Disconnect the SRS-ECU connector C-21.
- Disconnect the front passenger's air bag module connector C-109.

Caution
Disconnect the connector and short-circuit the squib circuit before releasing the short bar of the SRS-ECU connector in the following operation.

- Cable bands between terminals 9, 10 and the short bar (width:3 mm, thickness:0.5 mm) between terminals 11 and 12 and the short bar, and release the short bar. (See Figure A.)

Caution
As the short bar may not be releasable if inserted insufficiently, insert more than 4 mm.

- Measure at the harness side
- Continuity check between terminals 9 and 10

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: No continuity

Replace the front passenger's seat air bag module (squib).

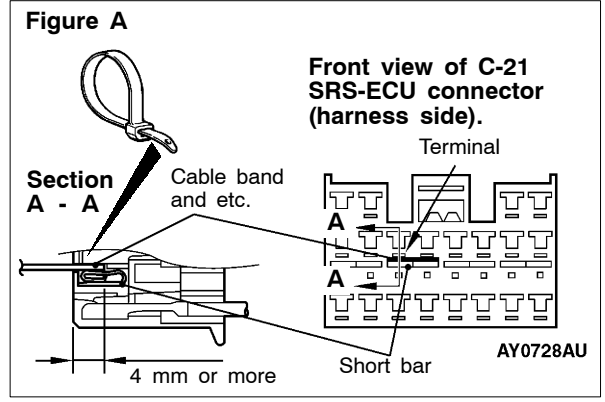
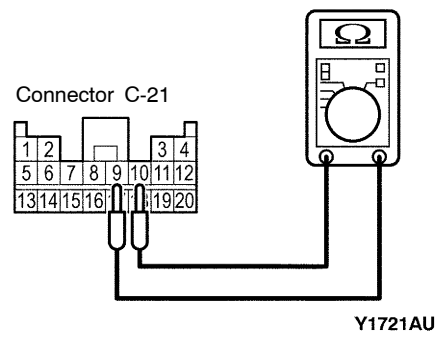
NG

Check connector: C-21, C-109

YES
 Check the trouble symptoms.

NG
 Correct

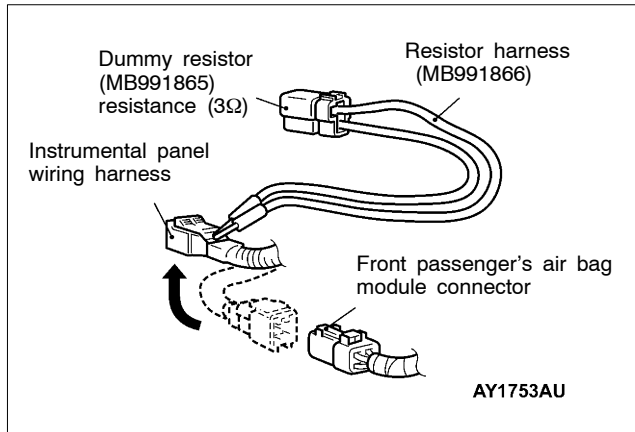
Check the harness between the front passenger's air bag module and the SRS-ECU, and repair if necessary.



OK

Replace the SRS-ECU.

Code No.25 Front passenger's air bag module (squib) system	Possible Cause
This code is output when open circuit occurs in the SRS-ECU front passenger's air bag (squib) circuit. However, SRS warning lamp goes out when a normal operation is resumed (diagnosis code is not cleared.)	<ul style="list-style-type: none"> • Open in the front passenger's air bag module (squib) circuit • Connector improper contact • SRS-ECU inoperable



<Check the front passenger's air bag module (squib)>

MUT-II self-diag code

- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Disconnect the front passenger's air bag module connector C-109 and insert the resistor harness (MB991866) behind the harness side connector.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory.

Is code No.25 output?

YES

<Check the circuit between the SRS-ECU and the front passenger's air bag module>
 Measure at the SRS-ECU connector C-21 and front passenger's air bag module connector C-109 .

- Disconnect the SRS-ECU connector C-21 and the front passenger's air bag module connector C-109 , and measure at the harness side.
- Continuity check between the following terminals

Connector C-21		Connector C-109
9	-	2
10	-	1

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

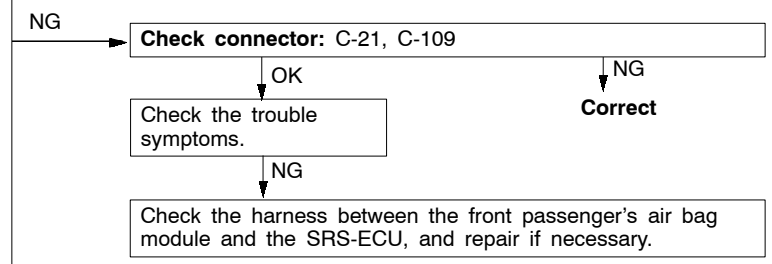
OK: Continuity (2Ω or less)

OK

Replace the SRS-ECU.

NO

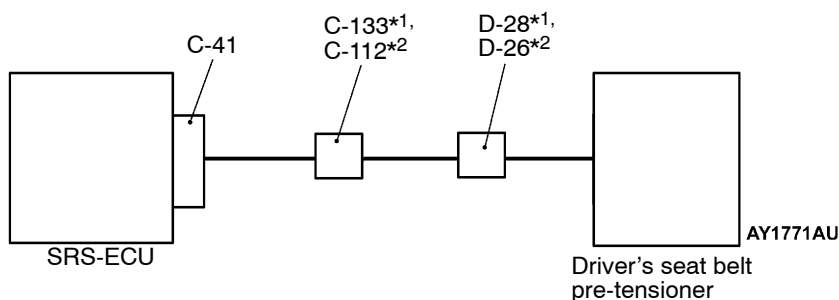
Replace the front passenger's seat air bag module (squib).



Code No.26 Driver's seat belt pre-tensioner (squib) system	Possible Cause
This code is output when short circuit occurs between terminals of the SRS-ECU driver's seat belt pre-tensioner (squib) circuit. However, SRS warning lamp goes out when a normal operation is resumed (diagnosis code is not cleared.)	<ul style="list-style-type: none"> ● Connector engagement faulty or short bar faulty* ● Short circuit between terminals of the driver's seat belt pre-tensioner (squib) circuit ● Faulty connector ● SRS-ECU inoperable

NOTE:

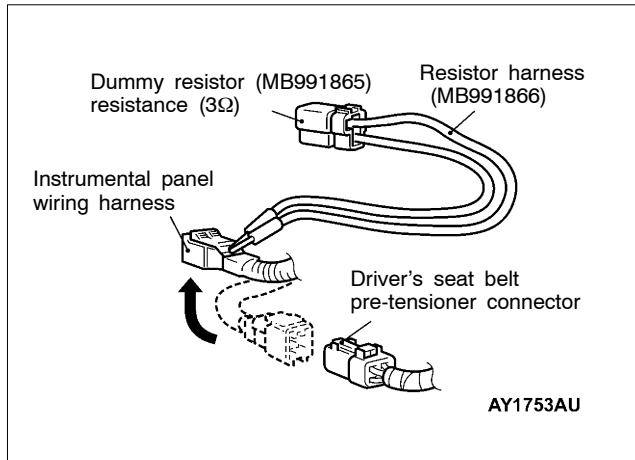
*: The connector of the squib circuit contains a short bar (short-circuiting the positive (+) cable and the negative (-) cable to avoid an erroneous deployment caused by static electricity when a connector is not connected). Thus, when a connector is connected, the short bar may not be released due to improper engagement of the connector or faulty connector as shown in the illustration below. Disconnect the connector as shown in the illustration below, then reconnect it. Check that a diagnosis code is output again after erasing the memory. If the diagnosis code is not output, the above-mentioned code is output due to improper engagement of the connector.



NOTE

*1: L.H. drive vehicles

*2: R.H. drive vehicles



<Check the driver's seat belt pre-tensioner (squib)>

MUT-II self-diag code

- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Disconnect the driver's seat belt pre-tensioner connector D-28*1 and D-26*2 and connect to the resistor harness (MB991866) behind the harness side connector.

Caution

Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory. Is code No.26 output?

YES

NO

<Check the circuit between the SRS-ECU and the driver's seat belt pretensioner>

Measure at the SRS-ECU connector C-41.

- Disconnect the SRS-ECU connector C-41.
- Disconnect the driver's seat belt pre-tensioner connector D-28*1 and D-26*2.

Caution

Disconnect the connector and short-circuit the squib circuit before releasing the short bar of the SRS-ECU connector in the following operation.

- Cable bands between terminals 29, 30 and the short bar (width:3 mm, thickness:0.5 mm) between terminals 11 and 12 and the short bar, and release the short bar. (See Figure A.)

Caution

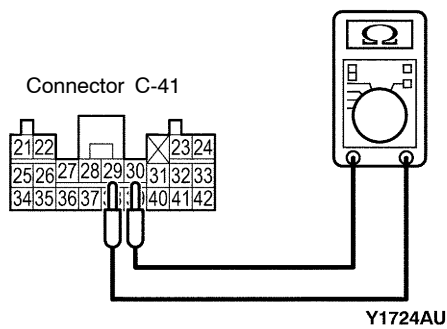
As the short bar may not be releasable if inserted insufficiently, insert more than 4 mm.

- Measure at the harness side
- Continuity check between terminals 29 and 30

Caution

Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: No continuity



OK

Replace the SRS-ECU.

Replace the driver's seat belt pre-tensioner.

NG

Check connector: D-28*1, D-26*2, C-133*1, C-112*2, C-41

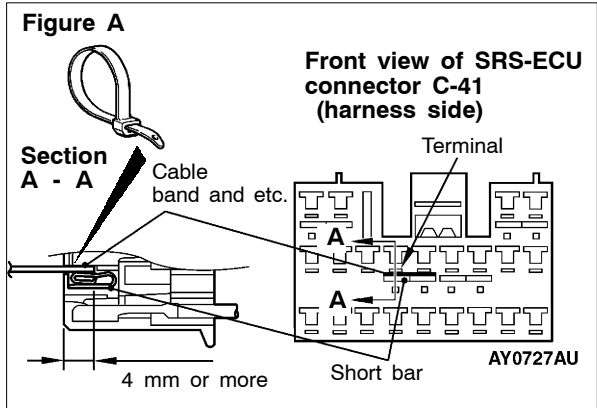
YES

Check the trouble symptoms.

NG

Check the harness between the driver's seat belt pre-tensioner and the SRS-ECU, and repair if necessary.

Correct

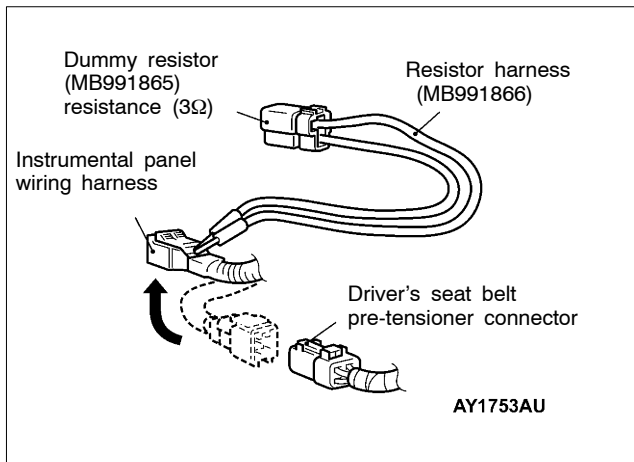


NOTE

*1: L.H. drive vehicles

*2: R.H. drive vehicles

Code No.27 Driver's seat belt pre-tensioner (squib) system	Possible Cause
This code is output when open circuit occurs in the SRS-ECU driver's seat belt pre-tensioner (squib) circuit. However, SRS warning lamp goes out when a normal operation is resumed (diagnosis code is not cleared.)	<ul style="list-style-type: none"> • Connector improper contact • Open in the driver's seat pre-tensioner (squib) circuit • SRS-ECU inoperable



<Check the driver's seat belt pre-tensioner (squib)>

MUT-II self-diag code

- Connect the dummy harness (MB991865) to the resistor harness (MB991866).
- Disconnect the driver's seat belt pre-tensioner connector D-28*1 and D-26*2 and insert the resistor harness (MB991866) behind the harness side connector.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory.

Is code No.27 output?

YES

NO

<Check the circuit between the SRS-ECU and the driver's seat belt pretensioner>

Measure at the SRS-ECU connector C-41, the driver's seat belt pre-tensioner connector D-28*1 and D-26*2.

- Disconnect the SRS-ECU connector C-41, the driver's seat belt pre-tensioner connector D-28*1 and D-26*2, and then measure at the harness side.
- Continuity check between the following terminals

Connector C-41		D-28*1, D-26*2
29	-	2
30	-	1

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: Continuity (2Ω or less)

NG

Replace the driver's seat belt pre-tensioner.

Check connector: D-28*1, D-26*2, C-133*1, C-112*2, C-124

OK → Check the trouble symptoms.

NG → **Correct**

NG → Check the harness between the driver's seat belt pre-tensioner and the SRS-ECU, and repair if necessary.

OK

Replace the SRS-ECU.

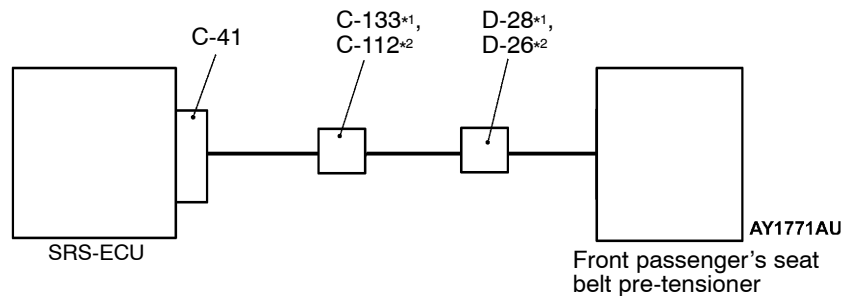
NOTE

- *1: L.H. drive vehicles
- *2: R.H. drive vehicles

Code No.28 Front passenger's seat belt pre-tensioner (squib) system	Possible Cause
This code is output when short circuit occurs between terminals of the SRS-ECU front passenger's seat belt pre-tensioner (squib) circuit. However, SRS warning lamp goes out when a normal operation is resumed (diagnosis code is not cleared.)	<ul style="list-style-type: none"> ● Connector engagement faulty or short bar faulty* ● Short circuit between terminals of the front passenger's seat belt pre-tensioner (squib) circuit ● Faulty connector ● SRS-ECU inoperable

NOTE

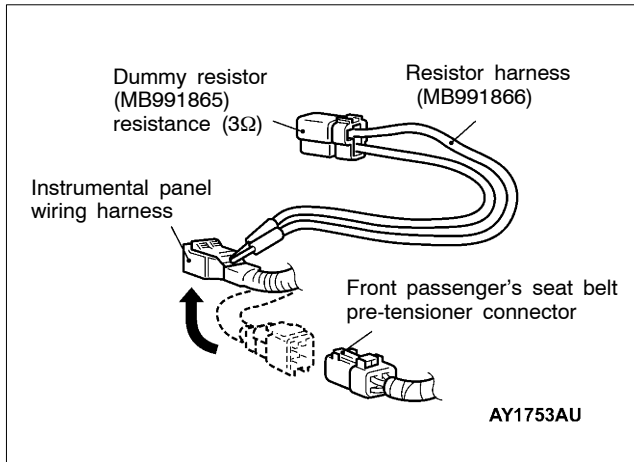
*: The connector of the squib circuit contains a short bar (short-circuiting the positive (+) cable and the negative (-) cable to avoid an erroneous deployment caused by static electricity when a connector is not connected). Thus, when a connector is connected, the short bar may not be released due to improper engagement of the connector or faulty connector as shown in the illustration below. Disconnect the connector as shown in the illustration below, then reconnect it. Check that a diagnosis code is output again after erasing the memory. If the diagnosis code is not output, the above-mentioned code is output due to improper engagement of the connector.



NOTE

*1: L.H. drive vehicles

*2: R.H. drive vehicles



<Check the front passenger's seat belt pre-tensioner (squib)>
MUT-II self-diag code

- Connect the dummy harness (MB991865) to the resistor harness (MB991866).
- Disconnect the front passenger's seat belt pre-tensioner connector D-28*1 and D-26*2 and insert the resistor harness (MB991866) behind the harness side connector.

Caution
 Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory.

Is code No.28 output?

YES

NO

<Check the circuit between the SRS-ECU and the front passenger's seat belt pre-tensioner>
 Measure at the SRS-ECU connector C-41.

- Disconnect the SRS-ECU connector C-41.
- Disconnect the front passenger's seat belt pre-tensioner connector D-28*1 and D-26*2.

Caution
 Disconnect the connector and short-circuit the squib circuit before releasing the short bar of the SRS-ECU connector in the following operation.

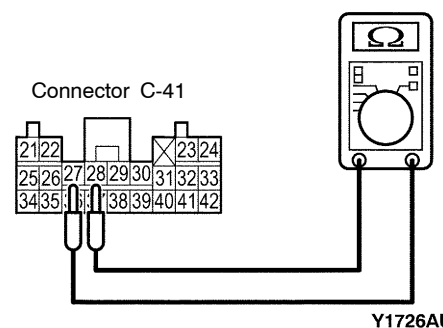
- Cable bands between terminals 27, 28 and the short bar (width:3 mm, thickness:0.5 mm) between terminals 11 and 12 and the short bar, and release the short bar. (See Figure A.)

Caution
 As the short bar may not be releasable if inserted insufficiently, insert more than 4 mm.

- Measure at the harness side
- Continuity check between terminals 27 and 28

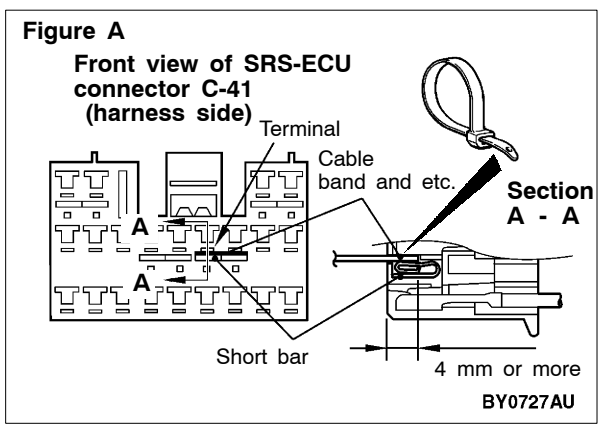
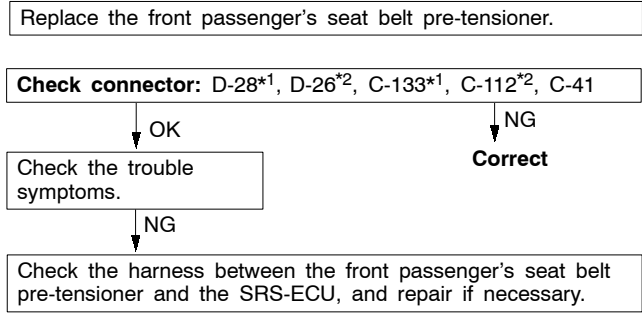
Caution
 Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: No continuity



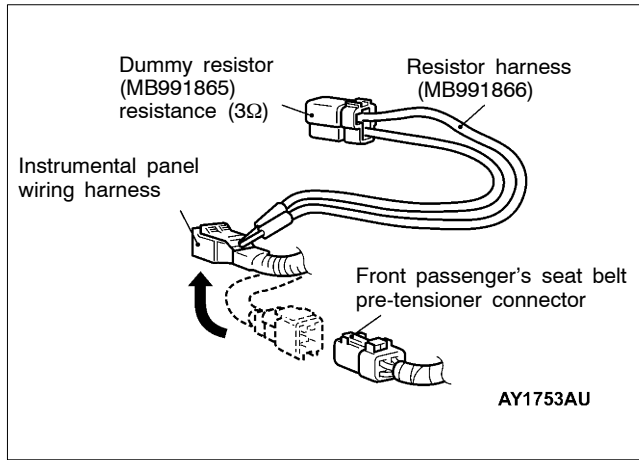
OK

Replace the SRS-ECU.



NOTE
 *1: L.H. drive vehicles
 *2: R.H. drive vehicles

Code No.29 Front passenger's seat belt pre-tensioner (squib) system	Possible Cause
This code is output when open circuit occurs in the SRS-ECU front passenger's seat belt pre-tensioner (squib) circuit. However, SRS warning lamp goes out when a normal operation is resumed (diagnosis code is not cleared.)	<ul style="list-style-type: none"> • Open in the front passenger's seat pre-tensioner (squib) circuit • Connector improper contact • SRS-ECU inoperable



<Check the front passenger's seat belt pre-tensioner (squib)>
MUT-II self-diag code

- Connect the dummy harness (MB991865) to the resistor harness (MB991866).
- Disconnect the front passenger's seat belt pre-tensioner connector D-28*1 and D-26*2 and insert the resistor harness (MB991866) behind the harness side connector.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory.

Is code No.29 output?

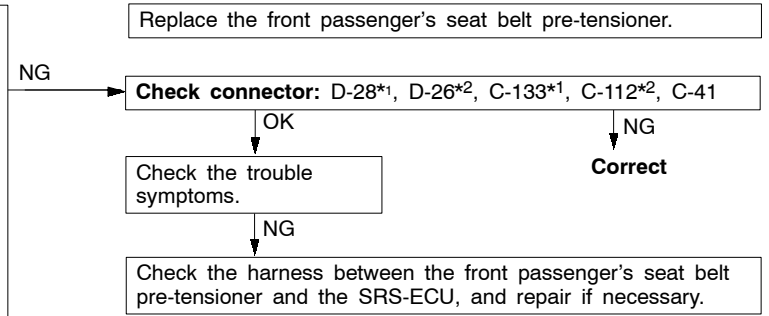
YES (left) / NO (right)

<Check the circuit between the SRS-ECU and the front passenger's seat belt pre-tensioner>
 Measure at the SRS-ECU connector C-41, the front passenger's seat belt pre-tensioner connector D-28*1 and D-26*2.

- Disconnect the SRS-ECU connector C-41, the front passenger's seat belt pre-tensioner connector D-28*1 and D-26*2, and then measure at the harness side.
- Continuity check between the following terminals

Connector C-41		D-28*1, Connector D-26*2
28	-	2
27	-	1

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.
OK: Continuity (2Ω or less)

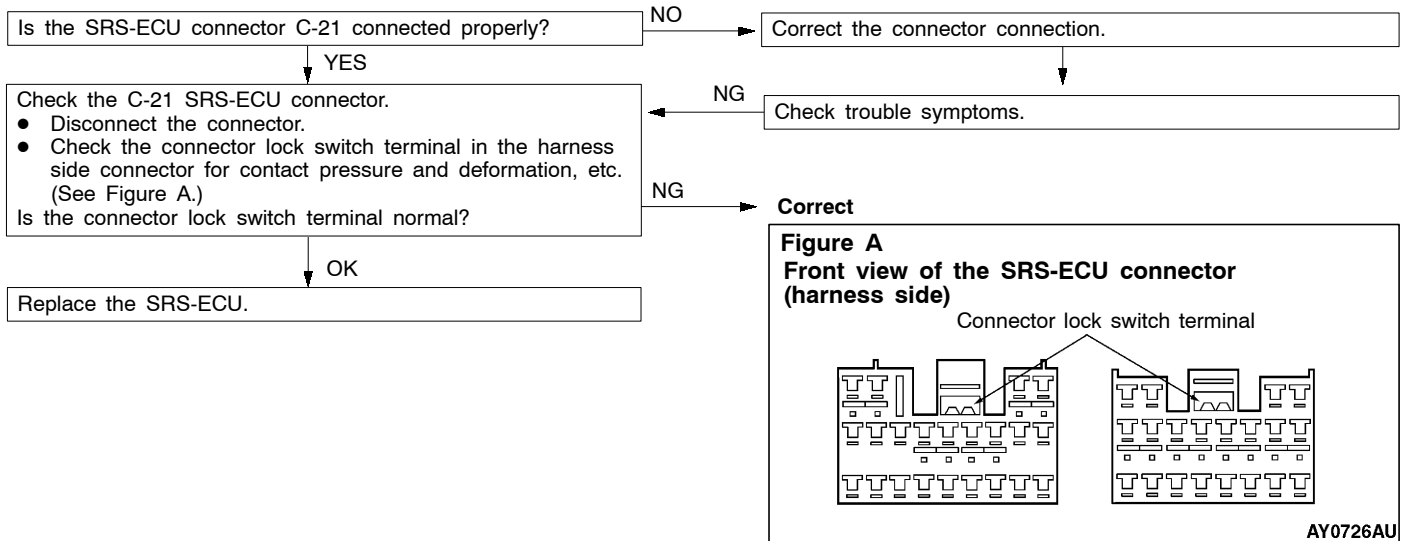


OK (left) / NG (right)

Replace the SRS-ECU.

NOTE
 *1: L.H. drive vehicles
 *2: R.H. drive vehicles

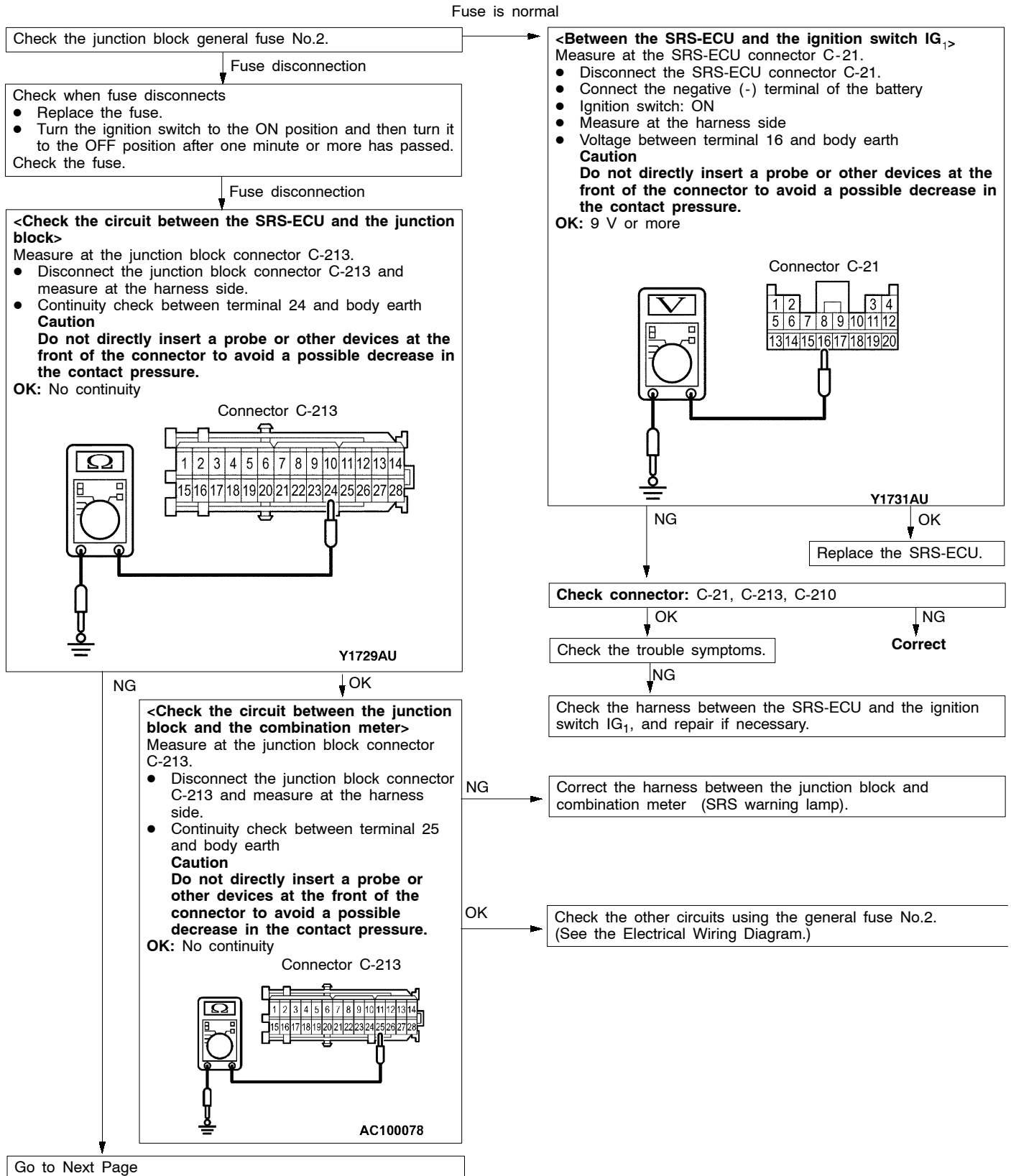
Code No.34 Connector Lock System	Probable Cause
<p>The SRS-ECU connector is mounted with a connector lock switch terminal for detecting the connected state of the connector. SRS-ECU connector is poorly connected. However, when the vehicle condition returns to normal, this code will be automatically erased, and the SRS warning lamp will go out.</p>	<ul style="list-style-type: none"> • Faulty connector • SRS-ECU inoperable



Code No.35 SRS-ECU (deployed air bag) system	Probable cause
<p>This code is displayed after deployment of air bags. If displayed before deployment, the code indicates malfunction probably present in SRS-ECU.</p>	<ul style="list-style-type: none"> • SRS-ECU inoperable

If the above-mentioned code No. is output, replace the SRS-ECU.

Code No.41 Power supply circuit system (fuse No.2 circuit)	Possible Cause
This codes output when the voltage between terminal IG ₁ (SRS-ECU, terminal No.16) and earth has been below the standard value for 5 seconds. However, code No.41 is automatically erased and SRS warning lamp goes out when a normal operation is resumed. If code No.41 and 42 are output at the same time, check the battery first since the battery voltage may have decreased.	<ul style="list-style-type: none"> • Harness or connector fault • SRS-ECU inoperable



Go to Next Page

From Previous Page

NG

<Check the circuit between the SRS-ECU and the junction block>

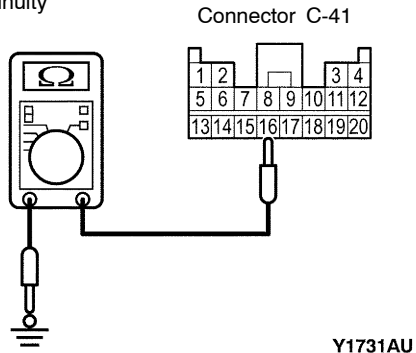
Measure at the SRS-ECU connector C-21.

- Disconnect the SRS-ECU connector C-21 and measure at the harness side.
- Continuity check between terminal 16 and body earth

Caution

Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: No continuity



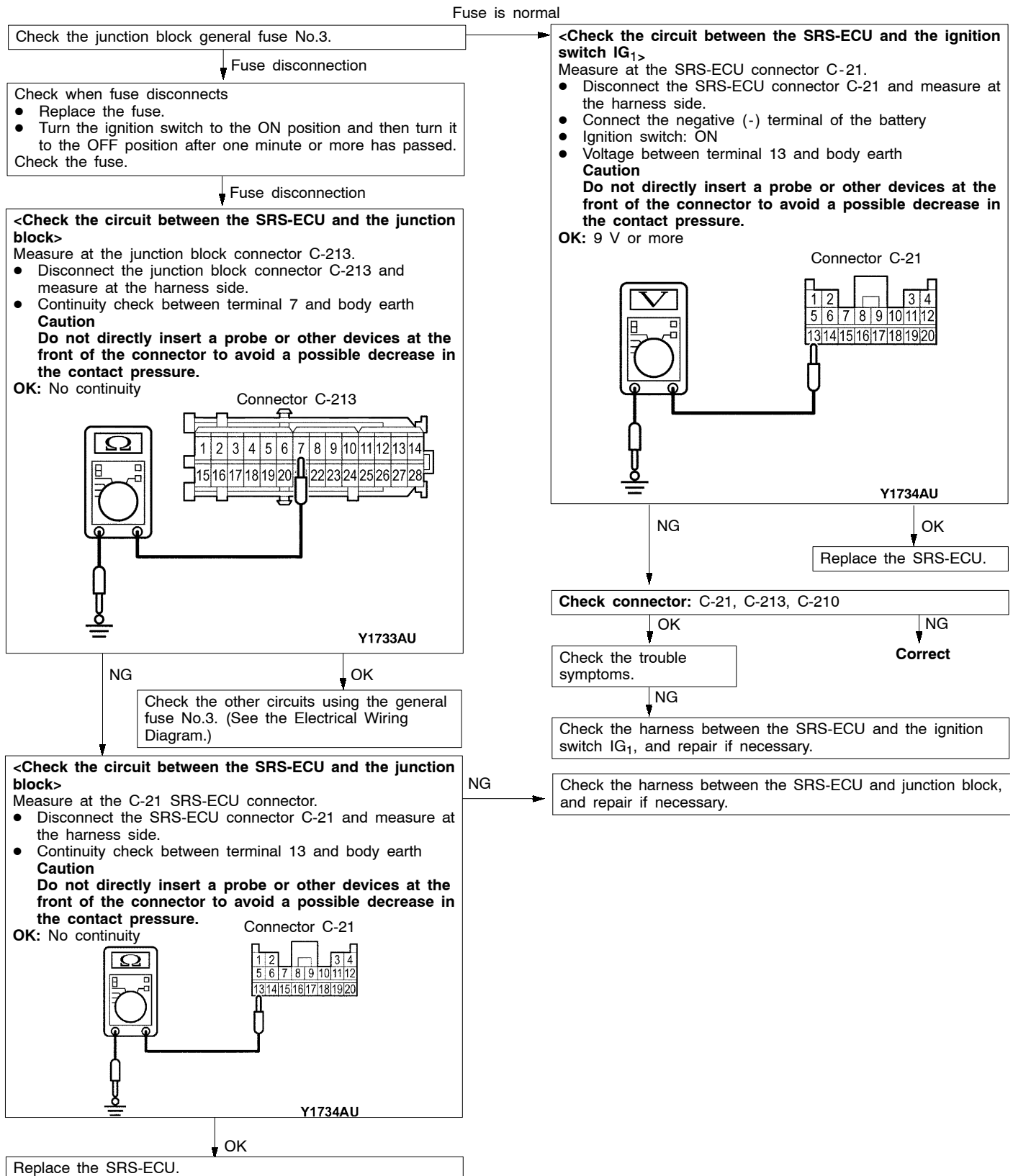
NG

Check the harness between the SRS-ECU and junction block, and repair if necessary.

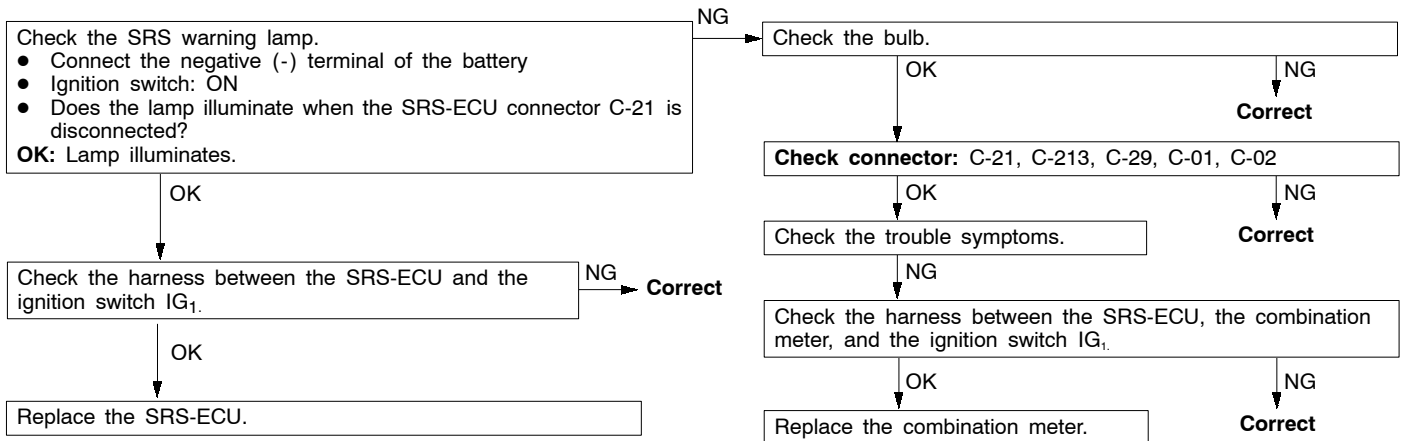
OK

Replace the SRS-ECU.

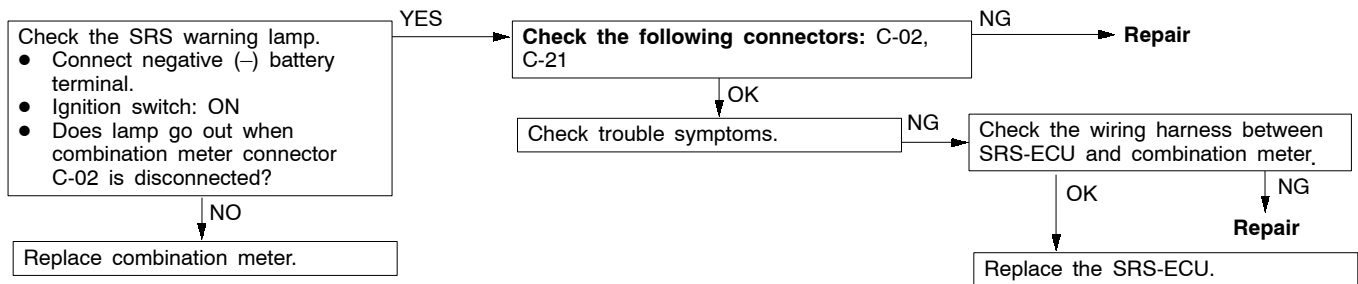
Code No.42 Power supply circuit system (fuse No.3 circuit)	Possible Cause
<p>This code is output when the voltage between terminal IG₁ (SRS-ECU, terminal No.13) and earth has been below the standard value for 5 seconds. However, code No.42 is automatically erased and SRS warning lamp goes out when a normal operation is resumed. If code No.41 and 42 are output at the same time, check the battery first since the battery voltage may have decreased.</p>	<ul style="list-style-type: none"> • Harness or connector fault • SRS-ECU inoperable



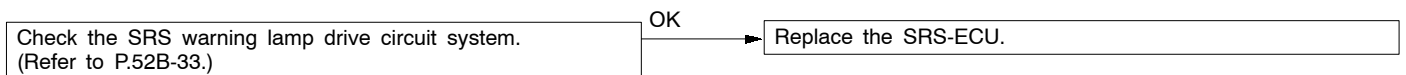
Code No.43 SRS warning lamp drive circuit system (lamp does not illuminate)	Possible Cause
This code is output when open circuit has occurred in the SRS warning lamp drive circuit for 5 seconds or more. However, if the code is output due to open circuit faulty, code No.43 is automatically erased and the SRS warning lamp functions normally as soon as a normal operation is resumed.	<ul style="list-style-type: none"> • Harness or connector fault • Bulb fault • SRS-ECU inoperable • Combination meter fault



Code No.43 SRS warning lamp drive circuit system (Lamp does not go out)	Probable cause
Harness between SRS warning lamp and SRS-ECU is being shorted to earth. However, once trouble is extinguished, this code will be automatically erased, and SRS warning lamp will go out.	<ul style="list-style-type: none"> • Harnesses or connector fault • SRS-ECU inoperable • Combination meter fault



Code No.44 SRS warning lamp drive circuit system	Probable cause
Short is present in SRS warning lamp drive circuit, or output transistor in SRS-ECU is defective. However, once trouble is extinguished, this code will be automatically erased, and SRS warning lamp will go out.	<ul style="list-style-type: none"> • Harnesses or connector fault • SRS-ECU inoperable



Code No.61 Driver's air bag module (squib) system (short-circuited to power supply)	Possible Cause
Code No.62 Driver's air bag module (squib) system (short-circuited to earth)	
This code is output when the input terminal of the SRS-ECU driver's air bag module (squib) is short-circuited to power supply (code No.61) or short-circuited to earth (code No.62).	<ul style="list-style-type: none"> ● Clock spring fault ● Harness or connector fault ● The harness of the driver's air bag module (squib) is short-circuited to power supply (code No.61) or short-circuited to earth (code No.62) ● SRS-ECU inoperable

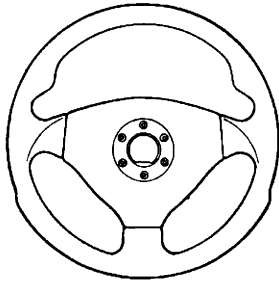
NOTE

Two different types of driver's air bag modules by model are featured. Thus, two types of air bag module by model are described in the following flowchart.

RS: Steering wheel and air bag module separate type

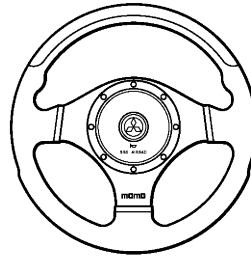
RS-II: Steering wheel and air bag module incorporate type

<RS>



13R0025

<RS-II>

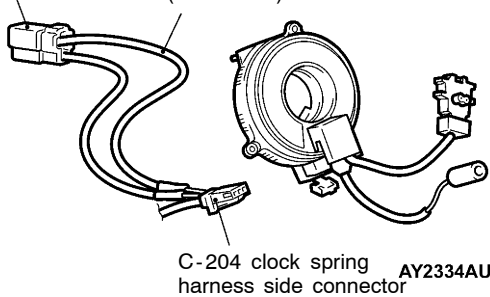


Y2058AU

<RS>

Dummy resistor (MB991865) resistance (3Ω)

Resistor harness (MB991866)



C-204 clock spring harness side connector AY2334AU

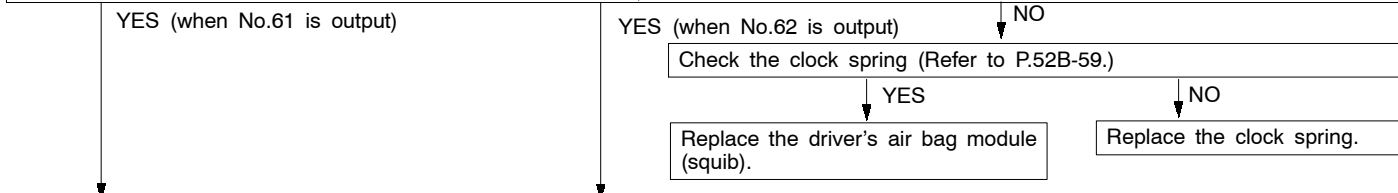
<Check the clock spring and the driver's air bag module (squib)>

MUT-II self-diag code

- Release the clock spring connector (2-pin) C-204.
- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Insert the resistor harness (MB991866) behind the harness side connector C-204.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory. Is code No.61 or No.62 output?



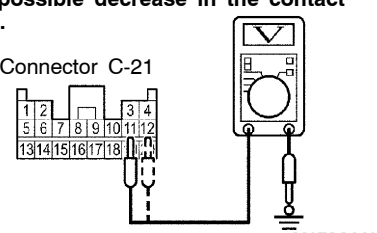
<Check the circuit between the SRS-ECU and clock spring>

Measure at the SRS-ECU connector C-21.

- Disconnect the SRS-ECU connector C-21.
- Disconnect the the clock spring connector C-204.
- Ignition switch:ON
- Measure at the harness side
- Voltage between terminal 11 or 12 and body earth

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: 0 V



Connector C-21

Y1736AU

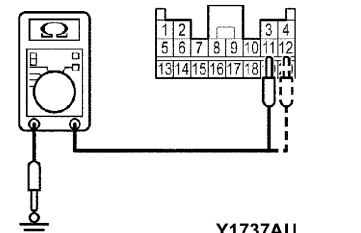
<Check the circuit between the SRS-ECU and clock spring>

Measure at the SRS-ECU connector C-21.

- Disconnect the SRS-ECU connector C-21.
- Disconnect the clock spring connector C-204 .
- Measure at the harness side
- Continuity between terminal 11 or 12 and body earth

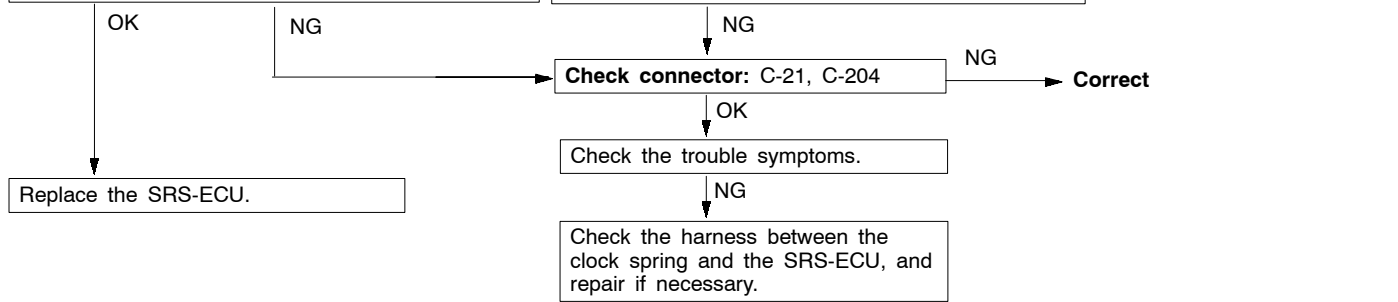
Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: No continuity

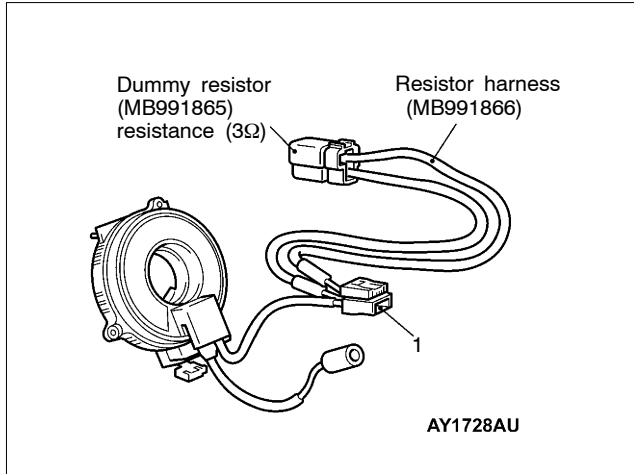


Connector C-21

Y1737AU



<RS-II>



<Driver's air bag module (squib) check>

MUT-II self-diag code

- Disconnect the clock spring connector No.1 (connector connected with the air bag module).
- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Insert the resistor harness (MB991866) behind the clock spring connector No.1.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

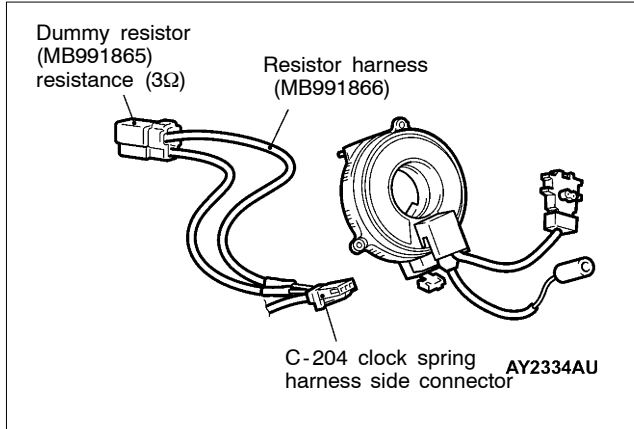
- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory.

Is code No.61 or No.62 output?

YES

NO

Replace the driver's air bag module (squib).



<Clock spring check>

MUT-II self-diag code

- Release the clock spring connector (2-pin) C-204 .
- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Insert the resistor harness (MB991866) behind the harness side connector C-204.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory.

Is code No.61 or No.62 output?

YES (when No.61 is output)

YES (when No.62 is output)

NO

Go to Next Page

Replace the clock spring.

From Previous Page

YES (when No.61 is output)

YES (when No.62 is output)

<Check the circuit between the SRS-ECU and clock spring>

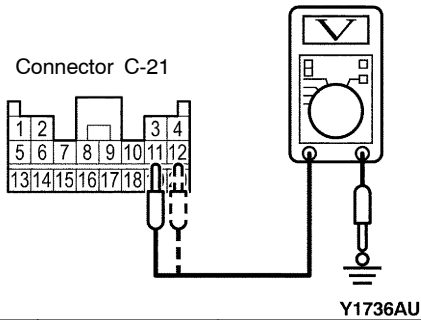
Measure at the SRS-ECU connector C-21.

- Disconnect the SRS-ECU connector C-21.
- Disconnect the the clock spring connector C-204.
- Ignition switch:ON
- Measure at the harness side
- Voltage between terminal 11 or 12 and body earth

Caution

Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: 0 V



OK

NG

Replace the SRS-ECU.

<Check the circuit between the SRS-ECU and clock spring>

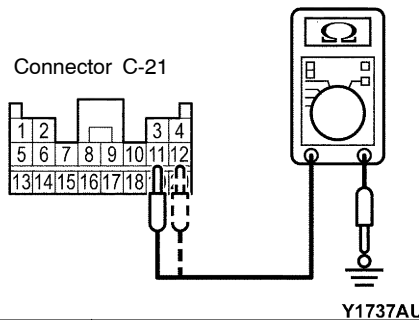
Measure at the SRS-ECU connector C-21.

- Disconnect the SRS-ECU connector C-21.
- Disconnect the clock spring connector C-204 .
- Measure at the harness side
- Continuity between terminal 11 or 12 and body earth

Caution

Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: No continuity



NG

OK

Replace the SRS-ECU.

Check connector: C-21, C-204

NG

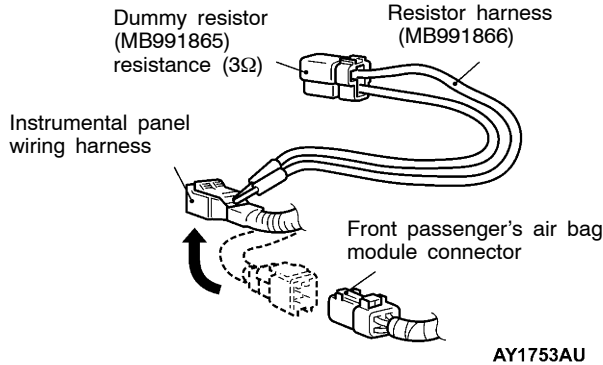
Correct

Check the trouble symptoms.

NG

Check the harness between the clock spring and the SRS-ECU, and repair if necessary.

Code No.64 Front passenger's air bag module (squib) system (short-circuited to power supply)	Possible Cause
Code No.65 Front passenger's air bag module (squib) system (short-circuited to earth)	
This code is output when the input terminal of the SRS-ECU front passenger's air bag module (squib) is short-circuited to power supply (code No.64) or short-circuited to earth (code No.65).	<ul style="list-style-type: none"> • Harness or connector fault • The harness of the front passenger's air bag module (squib) is short-circuited to power supply (code No.64) or short-circuited to earth (code No.65). • SRS-ECU inoperable

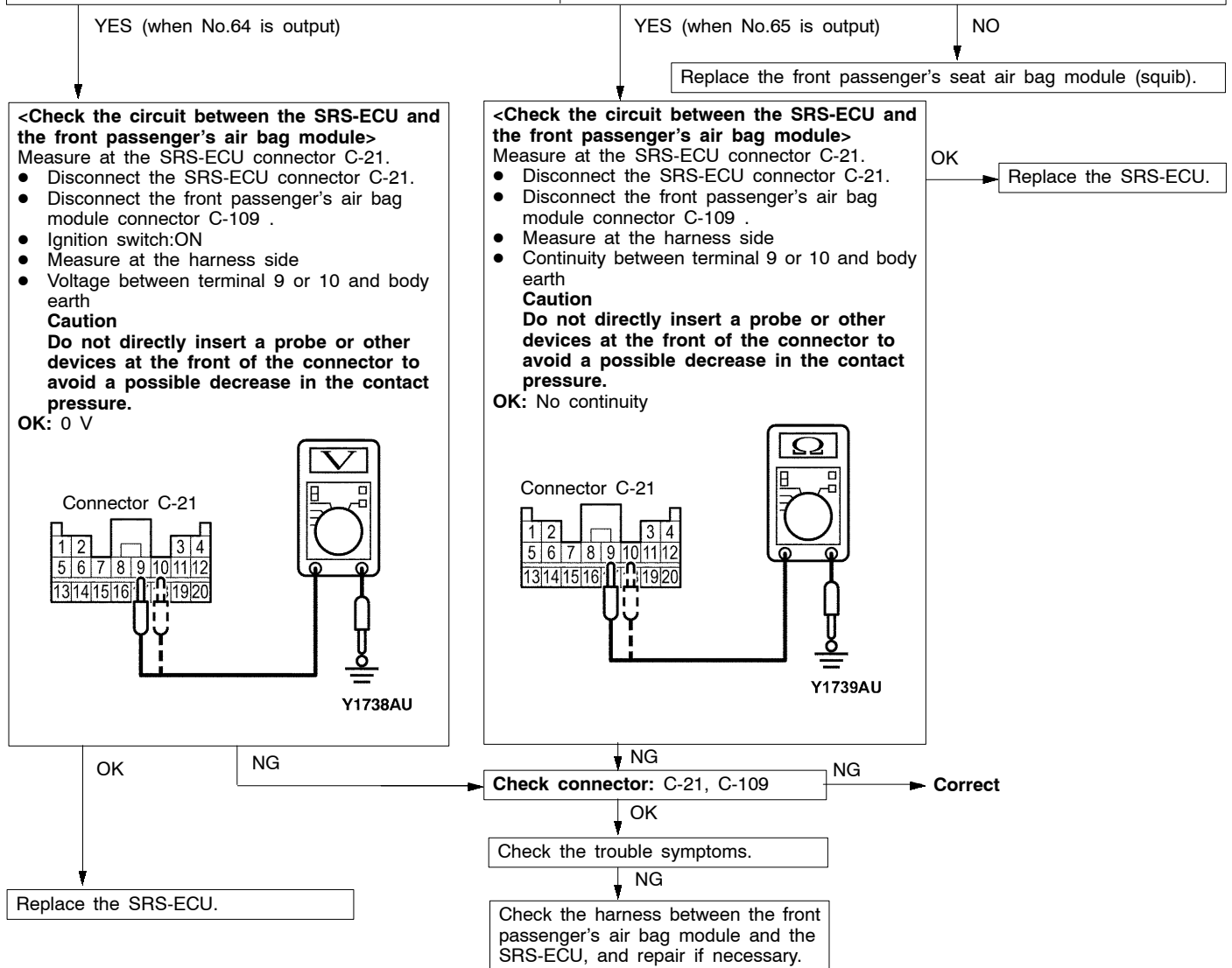


<Check the front passenger's air bag module (squib)>
MUT-II self-diag code

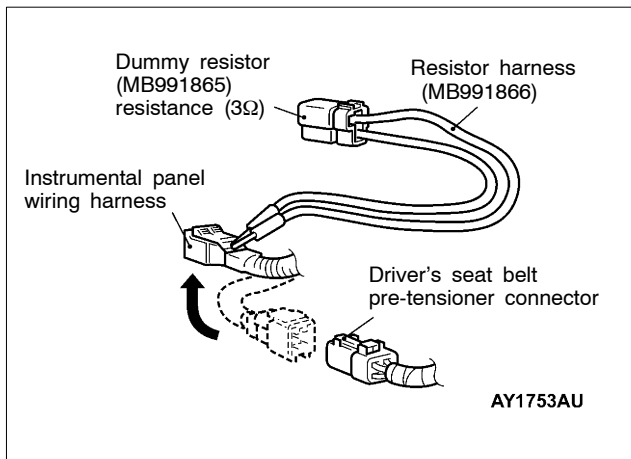
- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Disconnect the front passenger's air bag module connector C-109 and insert the resistor harness (MB991866) behind the harness side connector.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory. Is code No.64 or No.65 output?



<p>Code No.66 Driver's seat belt pre-tensioner (squib) system (short-circuited to power supply)</p>	<p>Possible Cause</p>
<p>Code No.67 Driver's seat belt pre-tensioner (squib) system (short-circuited to earth)</p>	
<p>This code is output when the input terminal of the SRS-ECU driver's seat belt pre-tensioner (squib) is short-circuited to power supply (code No.66) or short-circuited to earth (code No.67).</p>	<ul style="list-style-type: none"> • Harness or connector fault • The harness of the driver's seat belt pre-tensioner (squib) is short-circuited to power supply (code No.66) or short-circuited to earth (code No.67). • SRS-ECU inoperable



<Check the driver's seat belt pre-tensioner (squib)>
MUT-II self-diag code

- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Disconnect the driver's seat belt pre-tensioner connector D-28*1 and D-26*2 and insert the resistor harness (MB991866) behind the harness side connector.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory. Is code No.66 or No.67 output?

YES (when No.66 is output)

YES (when No.67 is output)

NO

Replace the driver's seat belt pre-tensioner.

<Check the circuit between the SRS-ECU and the driver's seat belt pre-tensioner>
 Measure at the SRS-ECU connector C-41 .

- Disconnect the SRS-ECU connector C-41.
- Disconnect the driver's seat belt pre-tensioner D-28*1 and D-26*2.
- Ignition switch:ON
- Measure at the harness side
- Voltage between terminal 29 or 30 and body earth

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: 0 V

<Check the circuit between the SRS-ECU and the driver's seat belt pre-tensioner>
 Measure at the SRS-ECU connector C-41 .

- Disconnect the SRS-ECU connector C-41.
- Disconnect the driver's seat belt pre-tensioner D-28*1 and D-26*2.
- Measure at the harness side
- Continuity between terminal 29 or 30 and body earth

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: No continuity

OK

Replace the SRS-ECU.

OK

NG

NG

Check connector: D-28*1, D-26*2, C-133*1, C-112*2, C-41

OK

Check the trouble symptoms.

NG

Check the harness between the driver's seat belt pre-tensioner and the SRS-ECU, and repair if necessary.

NOTE

- *1: L.H. drive vehicles
- *2: R.H. drive vehicles

Replace the SRS-ECU.

<p>Code No.68 Front passenger's seat belt pre-tensioner (squib) system (short-circuited to power supply)</p>	<p>Possible Cause</p>
<p>Code No.69 Front passenger's seat belt pre-tensioner (squib) system (short-circuited to earth)</p>	
<p>This code is output when the input terminal of the SRS-ECU front passenger's seat belt pre-tensioner (squib) is short-circuited to power supply (code No.68) or short-circuited to earth (code No.69).</p>	
<ul style="list-style-type: none"> • Harness or connector fault • The harness of the front passenger's seat belt pre-tensioner (squib) is short-circuited to power supply (code No.68) or short-circuited to earth (code No.69). • SRS-ECU inoperable 	

<Check the front passenger's seat belt pre-tensioner (squib)> MUT-II self-diag code

- Connect the dummy resistor (MB991865) to the resistor harness (MB991866).
- Disconnect the front passenger's seat belt pre-tensioner connector D-28*1 and D-26*2 and insert the resistor harness (MB991866) behind the harness side connector.

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

- Connect the negative (-) terminal of the battery
- Check the diagnosis code again after erasing the memory.

Is code No.68 or No.69 output?

YES (when No.68 is output)

<Check the circuit between the SRS-ECU and the front passenger's seat belt pre-tensioner>
Measure at the SRS-ECU connector C-41 .

- Disconnect the SRS-ECU connector C-41.
- Disconnect the front passenger's seat belt pre-tensioner connector D-28*1 and D-26*2 .
- Ignition switch:ON
- Measure at the harness side
- Voltage between terminal 27 or 28 and body earth

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: 0 V

OK → Replace the SRS-ECU.

NG → Check connector: D-28*1, D-26*2, C-133*1, C-112*2, C-41

YES (when No.69 is output)

Replace the front passenger's seat belt pre-tensioner.

<Check the circuit between the SRS-ECU and the front passenger's seat belt pre-tensioner>
Measure at the SRS-ECU connector C-41 .

- Disconnect the SRS-ECU connector C-41.
- Disconnect the front passenger's seat belt pre-tensioner connector D-28*1 and D-26*2 .
- Measure at the harness side
- Continuity between terminal 27 or 28 and body earth

Caution
Do not directly insert a probe or other devices at the front of the connector to avoid a possible decrease in the contact pressure.

OK: No continuity

OK → Replace the SRS-ECU.

NG → Check connector: D-28*1, D-26*2, C-133*1, C-112*2, C-41

NG → Correct

OK → Check the trouble symptoms.

NG → Check the harness between the front passenger's seat belt pre-tensioner and the SRS-ECU, and repair if necessary.

NOTE
*1: L.H. drive vehicles
*2: R.H. drive vehicles

INSPECTION CHART FOR TROUBLE SYMPTOMS

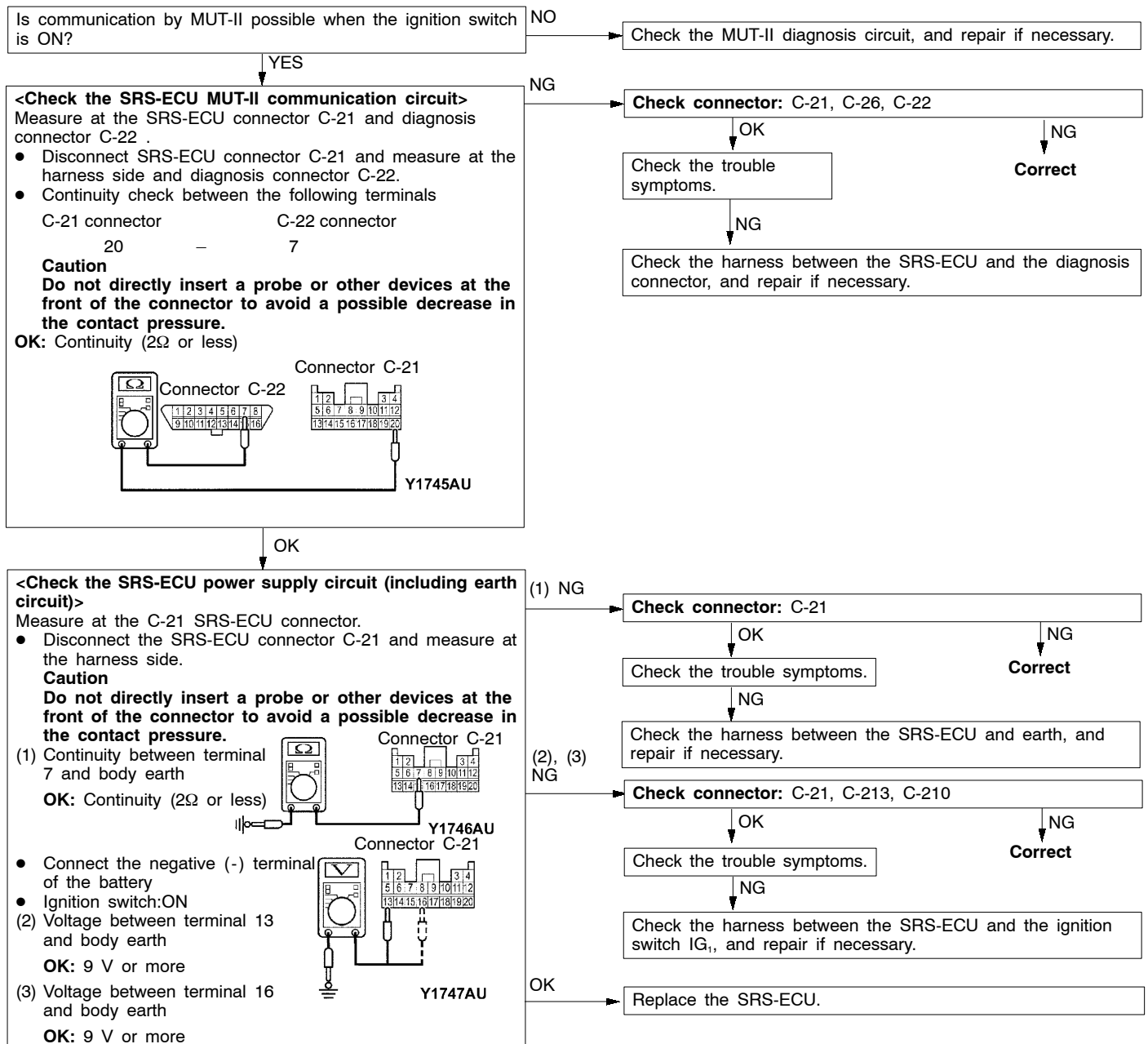
Study the trouble symptoms and check according to the inspection procedure chart.

Trouble	Inspection procedure No(s).	Reference page
Communication with MUT-II is impossible.	1	52B-41
SRS warning lamp does not illuminate.	See diagnosis code No.43.	52B-33
SRS warning lamp does not go out.	See diagnosis code No.43, 44.	52B-33

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

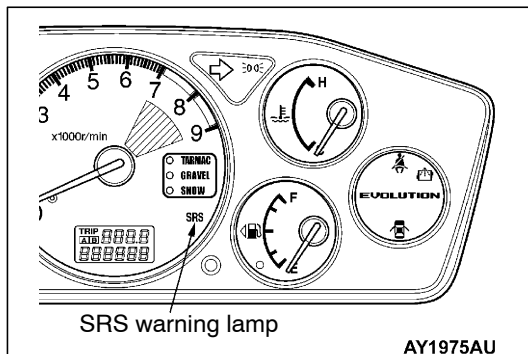
Inspection Procedure 1

Communication with MUT-II is impossible.	Probable cause
When communication with all systems is impossible, diagnosis circuit is suspected as faulty. When only communication with SRS air bags is impossible, open in diagnosis output circuit or power supply circuit including earth circuit may be present.	<ul style="list-style-type: none"> • Harness, connector malfunction • SRS-ECU malfunction • MUT ROM pack unmatching



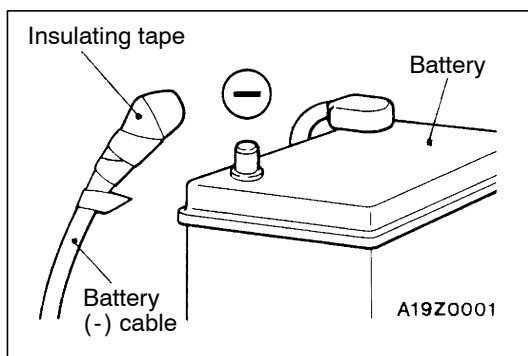
SRS MAINTENANCE

The SRS must be inspected by an authorized dealer 10 years after the date of vehicle registration.



SRS WARNING LAMP CHECK

Turn the ignition switch to the ON position. Does the SRS warning lamp illuminate for about 7 seconds, and then go out? If yes, SRS system is functioning properly. If no, refer to page 52B-6.

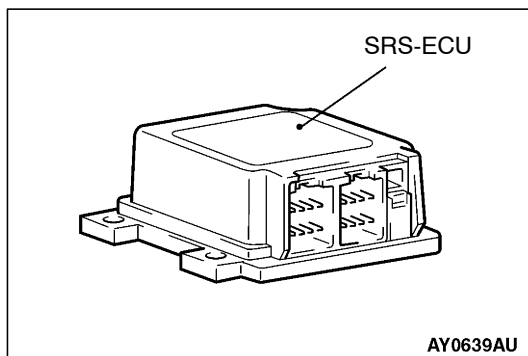


SRS COMPONENT VISUAL CHECK

Turn the ignition key to LOCK (OFF) position, disconnect the negative (-) battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-3.)



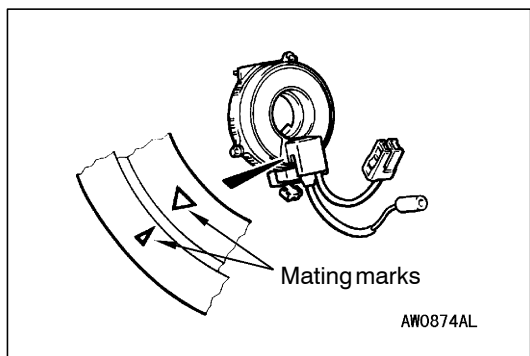
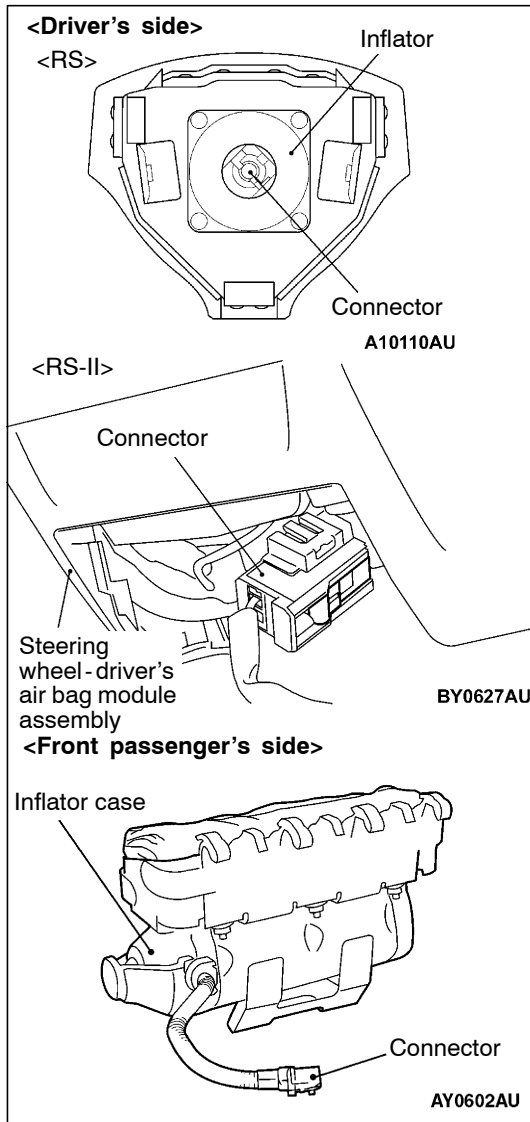
SRS CONTROL UNIT (SRS-ECU)

1. Check SRS-ECU case and brackets for dents, cracks, deformation or rust.

Caution

The SRS may not activate if the SRS-ECU is not installed properly, which could result in serious injury or death to the vehicle's driver or front passenger.

2. Check connector for damage, and terminals for deformation or rust.
Replace SRS-ECU if it fails visual check.
(Refer to P.52B-50.)



AIR BAG MODULES, STEERING WHEEL AND CLOCK SPRING AND SEAT BELT WITH PRE-TENSIONER

1. Remove the air bag modules, steering wheel and clock spring. (Refer to P.52B-52.)

Caution

The removed air bag modules should be stored in a clean, dry place with the cover face up.

2. Check cover for dents, cracks or deformation.
3. Check connector for damage, terminals deformities, and harness for binds.
4. Check air bag inflator case for dents, cracks or deformities.
5. Check harness and connectors for damage, and terminals for deformation.

6. Check clock spring connectors and protective tube for damage, and terminals for deformation.
7. Visually check the clock spring case for damage.
8. Align the mating marks of the clock spring and, after turning the vehicle's front wheels to straight-ahead position, install the clock spring to the column switch.

Mating Mark Alignment

Turn the clock spring clockwise fully, and then turn back it approx. 3 times counterclockwise to align the mating marks.

Caution

If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver or front passenger.

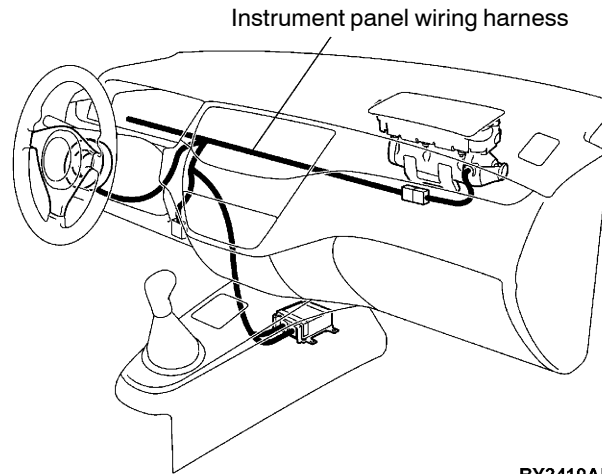
9. Install the steering column covers, steering wheel and the air bag module.
10. Check steering wheel for noise, binds or difficult operation.
11. Check steering wheel for excessive free play.

REPLACE ANY VISUALLY INSPECTED PART IF IT FAILS THAT INSPECTION. (Refer to P.52B-52.)

Caution

The SRS may not activate if any of the above components is not installed properly, which could result in serious injury or death to the vehicle's driver or front passenger.

INSTRUMENT PANEL WIRING HARNESS

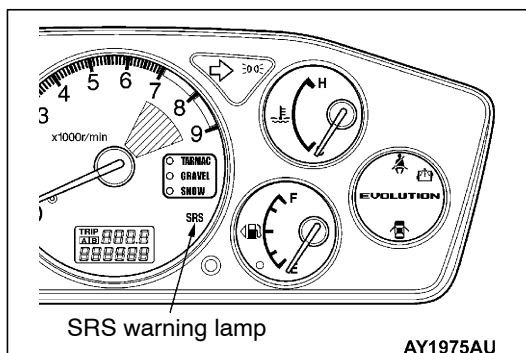


BY2419AU

1. Check connector for poor connection.
2. Check harnesses for binds, connectors for damage, and terminals for deformation.
REPLACE ANY CONNECTORS OR HARNESS THAT FAIL THE VISUAL INSPECTION. (Refer to P.52B-3.)

Caution

The SRS may not activate if SRS harnesses or connectors are damaged or improperly connected, which could result in serious injury or death to the vehicle's driver or front passenger.



SRS warning lamp

AY1975AU

POST-INSTALLATION INSPECTION

Reconnect the negative battery terminal. Turn the ignition switch to the ON position. Does the SRS warning lamp illuminate for about 7 seconds, and then go out? If yes, SRS system is functioning properly. If no, consult page 52B-6.

POST-COLLISION DIAGNOSIS

Whether or not the air bags have deployed, check and service the vehicle after collision as follows:

SRS-ECU MEMORY CHECK

1. Connect the MUT-II to the diagnosis connector. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)

Caution

Refer to that the ignition switch is LOCK(OFF) when connecting or disconnecting MUT-II.

2. Read (and write down) all displayed diagnosis codes. (Refer to P.52B-9.)

NOTE

If battery power supply has been shut down by the collision, the MUT-II cannot communicate with the SRS-ECU. Check and, repair if necessary, the instrument panel wiring harness before the next job.

3. Use the the MUT-II to read the data list (how long trouble(s) have continued and how often memory have been erased).

Data list

No	Service Data Item	Applicability
92	Number indication how often the memory is cleared.	Maximum time to be stored: 250
93	How long problem have lasted (How long it takes from the occurrence of the problem till the first air bag squib igniting signal)	Maximum time to be stored: 9999 minutes (approximately 7 days)
94	How long problem(s) have lasted (How long it takes from the first air bag squib igniting signal till now.)	

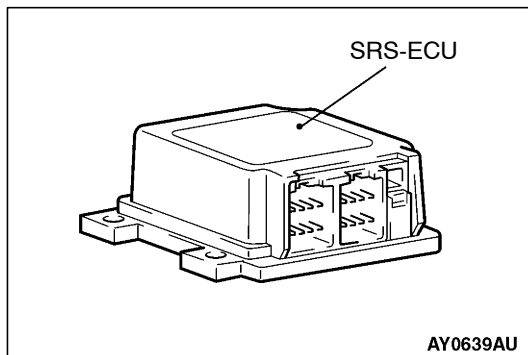
4. Erase the diagnosis codes and after waiting 5 seconds or more read (and write down) all displayed diagnosis codes. (Refer to P.52B-9.)

REPAIR PROCEDURE**DEPLOYED DRIVER'S AND FRONT PASSENGER'S AIR BAGS OR OPERATED SEAT BELT PRE-TENSIONER.**

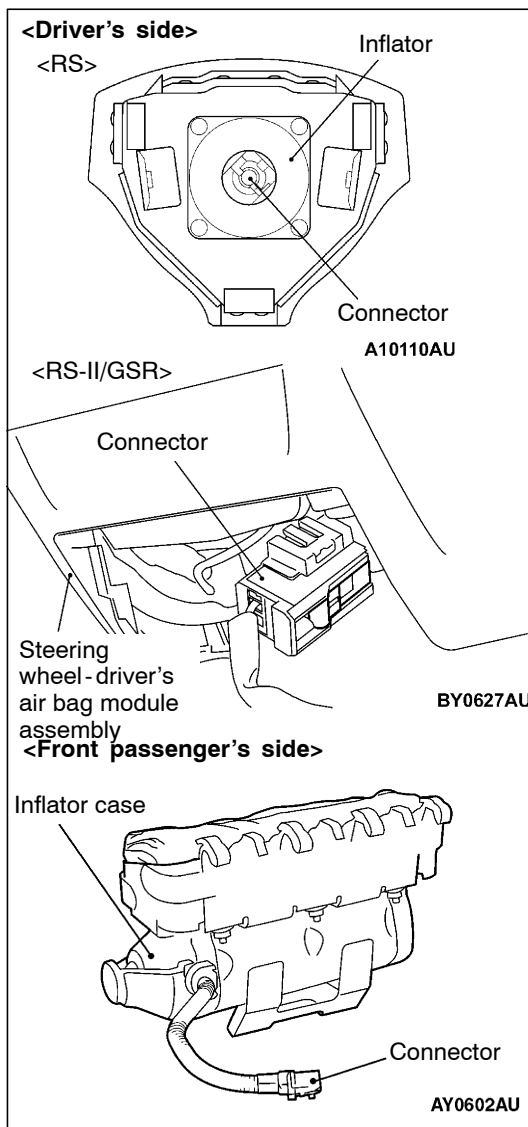
1. Replace the following parts with new ones.
 - SRS-ECU (Refer to P.52B-50.)
 - Driver's air bag module (Refer to P.52B-52.)
 - Front passenger's air bag module (Refer to P.52B-52.)
 - Seat belt with pre-tensioner (Refer to P.52B-61.)
2. Check the following parts and replace if malfunction is found:
 - Clock spring (Refer to P.52B-52.)
 - Steering wheel, steering column and intermediate joint
 - (1) Check the wiring harness (built into steering wheel) and connectors for damage, and terminals for deformation.
 - (2) Check the driver's air bag module for proper installation to the steering wheel.<RS>
 - (3) Check the steering wheel for noise, binds or difficult operation and excessive free play.
3. Check the harness for binding, connectors for damage, poor connections, and terminals for deformation. (Refer to P.52B-44.)

UNDEPLOYED AIR BAGS OR UNOPERATED SEAT BELT WITH PRE-TENSIONER IN LOW-SPEED COLLISION

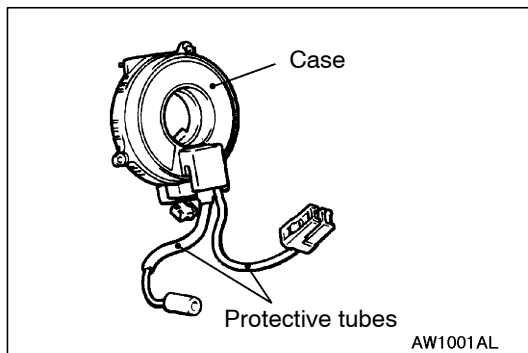
Check the SRS components and seat belt with pre-tensioner. If visible damage such as dents, cracks, or deformation are found on the SRS components and seat belt with pre-tensioner, replace them with new ones. Concerning parts removed for inspection, replacement with new parts and cautions in working, refer to INDIVIDUAL COMPONENT SERVICE, P.52B-49.

**SRS-ECU**

1. Check the SRS-ECU case and bracket for dents, cracks or deformation.
2. Check the connector for damage, and terminals for deformation.
3. Check the SRS-ECU and bracket for proper installation.

**Driver's and passenger's air bag modules**

1. Check the covers for dents, cracks or deformation.
2. Check the connectors for damage, the terminals deformities, and the harness for binds.
3. Check the air bag inflator cases for dents, cracks or deformities.
4. Check the air bag modules for proper installation.

**Clock spring**

1. Check the clock spring connectors and protective tubes for damage, and terminals for deformation.
2. Visually check the case for damage.

Steering wheel, steering column and intermediate joint

1. Check the driver's air bag module for proper installation to the steering wheel.
2. Check the steering wheel for noise, binds or difficult operation and excessive free play.

Harness connector (Instrument panel wiring harness, Floor wiring harness)

Check the harness for binds, the connector for damage and the terminals for deformation. (Refer to P.52B-44.)

Seat belt with pre-tensioner

1. Check the seat belt for damage or deformation.
2. Check the pre-tensioner for cracks or deformation.
3. Check the harness or the connector for damage, and the terminal for deformation.
4. Check that the unit is installed correctly to the vehicle body.

INDIVIDUAL COMPONENT SERVICE

If the SRS components and seat belt with pre-tensioner are to be removed or replaced as a result of maintenance, troubleshooting etc., follow the service procedures that follow.

Caution

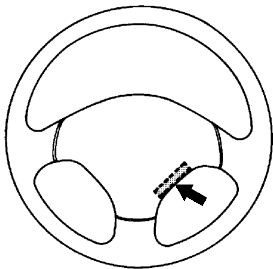
1. SRS components and seat belt with pre-tensioner should not be subjected to heat, so remove the SRS-ECU, driver's air bag module<RS>, steering wheel-air bag module<RS- >, front passenger's air bag module, clock spring, and seat belt with pre-tensioner before drying or baking the vehicle after painting.
 - Front impact sensor, SRS-ECU, Air bag module, clock spring: 93°C or more
 - Seat belt with pre-tensioner: 90°C or more
 Recheck SRS system operability after re-installing them.
2. If the SRS components and seat belt with pre-tensioner are removed for the purpose of check, sheet metal repair, painting, etc., they should be stored in a clean, dry place until they are reinstalled.

WARNING/CAUTION LABELS

Caution labels on the SRS are attached in the vehicle as shown. Follow label instructions when

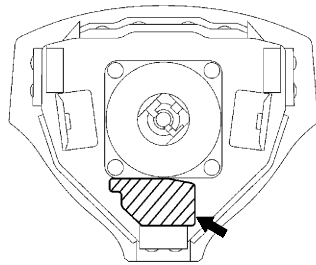
servicing the SRS. If the label(s) are dirty or damaged, replace with new one(s).

Steering wheel<RS>



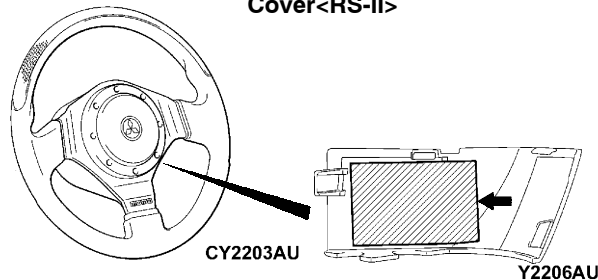
19M0026

Driver's air bag module<RS>



A10109AU

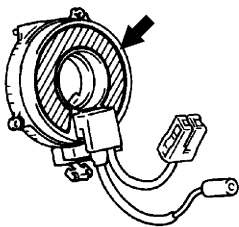
Cover<RS-II>



CY2203AU

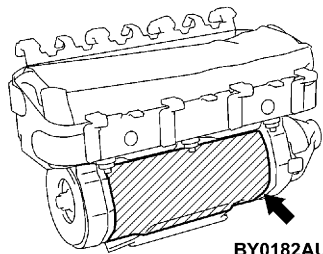
Y2206AU

Clock spring



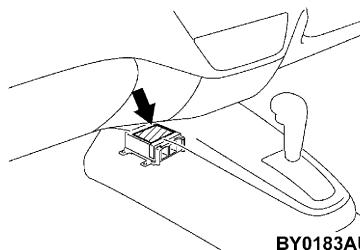
AW0963AL

Front passenger's
air bag module



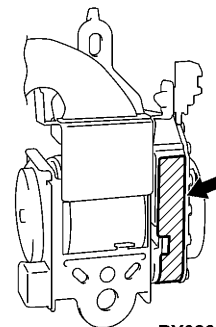
BY0182AU

SRS-ECU



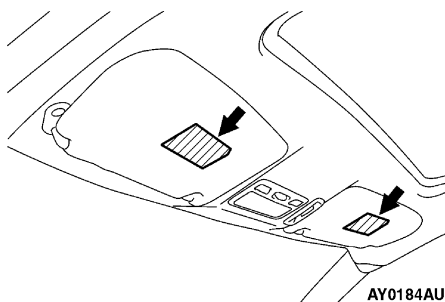
BY0183AU

Seat belt with pre-tensioner



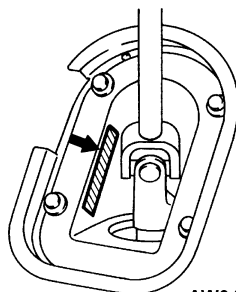
BY0269AU

Sun visor



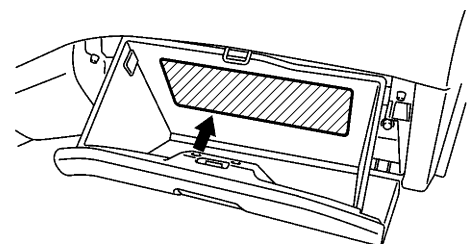
AY0184AU

Steering joint cover



AW0402AU

Glove box



AY1270AU

SRS AIR BAG CONTROL UNIT (SRS-ECU)

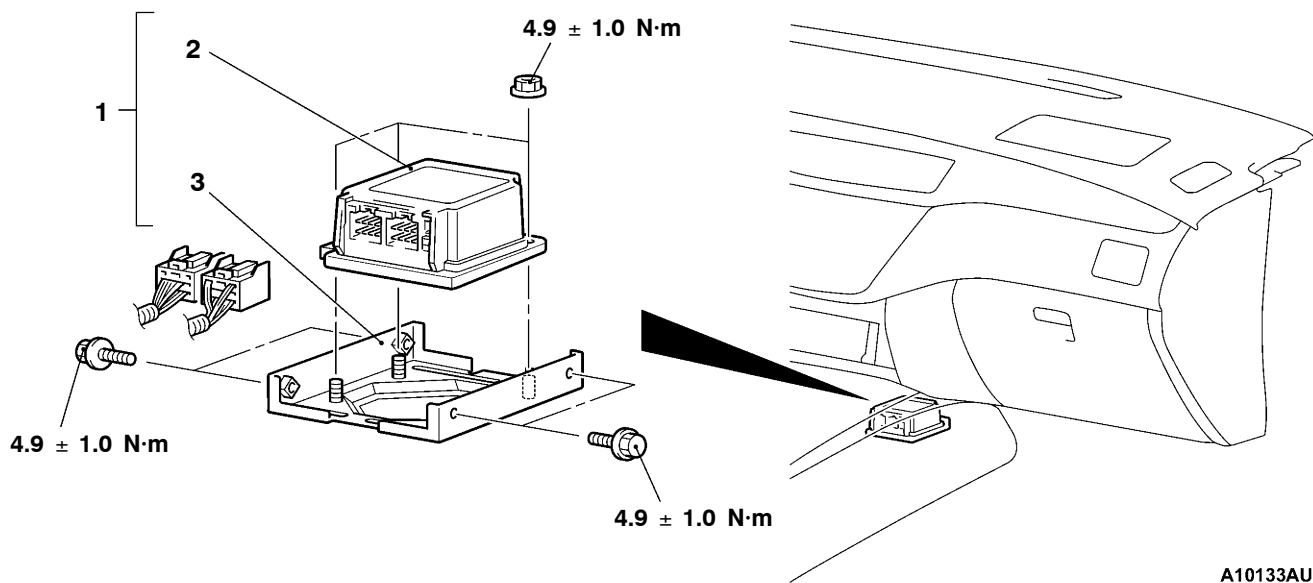
Caution

1. Disconnect the negative (-) battery terminal and wait for 60 seconds or more before starting work. Also, the disconnected battery terminal should be insulated with tape. (Refer to P.52B-3.)
2. Never attempt to disassemble or repair the SRS-ECU. If faulty, just replace with a new one.
3. Do not drop or subject the SRS-ECU to impact or vibration. If denting, cracking, deformation, or rust are found in the SRS-ECU, replace it with a new one. Discard the old one.
4. After deployment of the air bags, replace the SRS-ECU with a new one.
5. Never use an ohmmeter on or near the SRS-ECU, and use only the special test equipment described on P.52B-6.

REMOVAL AND INSTALLATION

Pre-removal Operation

- Turn Ignition Key to LOCK (OFF) Position.
- Disconnect the Negative (-) Battery Terminal.



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Removal steps

- Front floor console (Refer to GROUP 52A - Front floor console.)
 - Rear heater duct B <Vehicles with rear heater duct>
1. SRS-ECU and SRS-ECU bracket assembly
 2. SRS-ECU
 3. SRS-ECU bracket

Installation steps

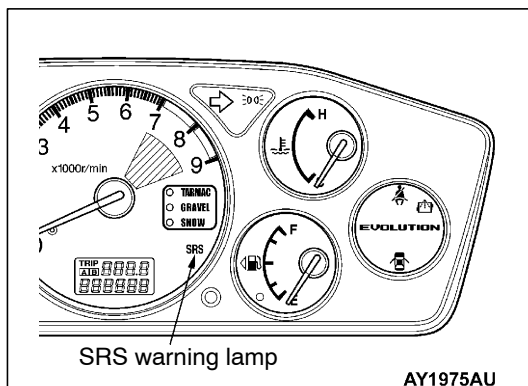
- ▶A◀ 3. SRS-ECU bracket
 2. SRS-ECU
 1. SRS-ECU and SRS-ECU bracket assembly
- Rear heater duct B <Vehicles with rear heater duct>
 - Front floor console (Refer to GROUP 52A - Front floor console.)
 - Negative (-) battery terminal connection
- ▶B◀ • Post-installation inspection

INSTALLATION SERVICE POINTS

▶A◀ SRS-ECU INSTALLATION

Caution

Be sure to install the SRS-ECU properly. Otherwise, the SRS air bags do not activate, which results in serious injury or death of vehicle's occupants.



▶B◀ POST-INSTALLATION CHECK

1. Turn the ignition switch to ON.
2. Does the SRS warning lamp illuminate for about 7 seconds and then go out.
Yes: The SRS warning lamp is working properly
No: Go to Troubleshooting. (Refer to P.52B-6.)

INSPECTION

1. Check the SRS-ECU and brackets for dents, cracks or deformation.
2. Check connector for damage, and terminals for deformation.

Caution

If a dent, crack, deformation or rust are present, replace the SRS-ECU with a new one.

NOTE

To check the SRS-ECU in other items than described above, go to Troubleshooting. (Refer to P.52B-6.)

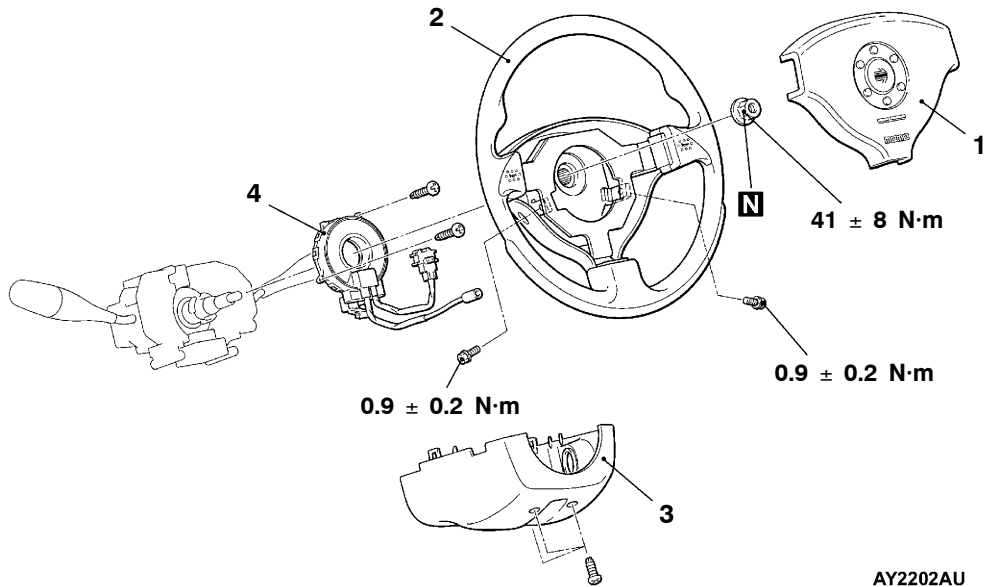
AIR BAG MODULES AND CLOCK SPRING

Caution

1. Disconnect the negative (-) battery terminal and wait for 60 seconds or more before starting work. Also, the disconnected battery terminal should be insulated with tape. (Refer to P.52B-3.)
2. Never attempt to disassemble or repair the air bag modules and clock spring. If faulty, just replace with new one(s).
3. Do not drop the air bag modules or clock spring or allow contact with water, grease or oil.
Replace if a dent, crack, deformation or rust are present.
4. Store the air bag modules on a flat surface with the deployment surface facing up. Do not place anything on top of them.
5. Do not store the air bag modules in a place more than 93°C.
6. When the driver's and front passenger's air bags have been deployed, replace the driver's and passenger's air bag modules with new ones.
7. Put on gloves and safety glasses when handling deployed air bags.
8. When discarding the undeployed air bag module(s), be sure to deploy the air bag(s) in advance as specified in the service procedure. (Refer to to P.52B-64.)

REMOVAL AND INSTALLATION**<Driver's air bag module, clock spring>****Pre-removal Operation**

Disconnect the Negative (-) Battery Terminal.

<RS: Steering wheel and air bag module separate type>

AY2202AU

Driver's air bag module removal steps

1. Driver's air bag module

Clock spring removal steps

1. Driver's air bag module
2. Steering wheel
3. Lower column cover
4. Clock spring

**Driver's air bag module installation steps**

- Pre-installation inspection
- 1. Driver's air bag module
- Negative (-) terminal of the battery connection



- Post-installation inspection

Clock spring installation steps

- Pre-installation inspection



4. Clock spring
3. Lower Column Cover

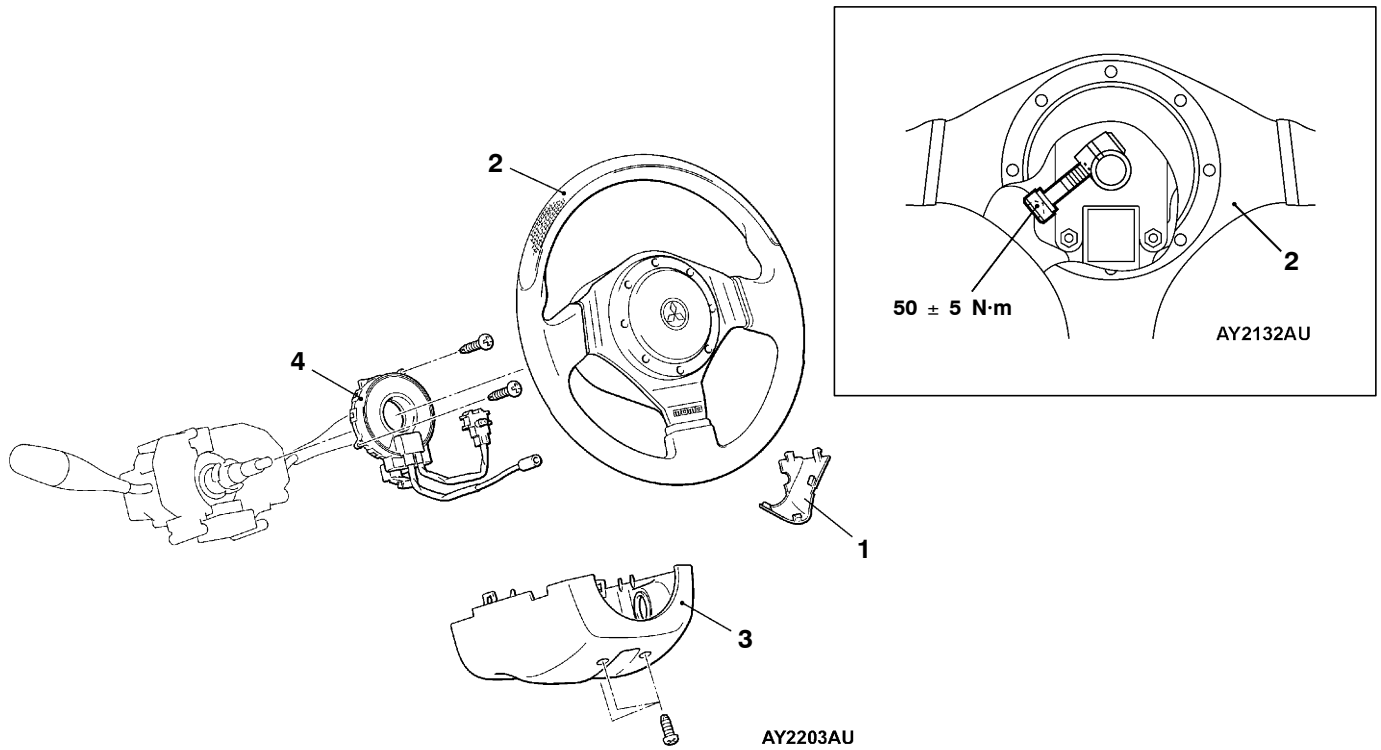


2. Steering wheel
1. Driver's air bag module
- Negative (-) terminal of the battery connection



- Post-installation inspection

<RS-II: Steering wheel and air bag module incorporate type>



Steering wheel-driver's air bag module assembly removal steps



1. Cover
2. Steering wheel-driver's air bag module assembly

Steering wheel-driver's air bag module assembly installation steps



- Pre-installation inspection
- 2. Steering wheel-driver's air bag module assembly

1. Cover
 - Negative (-) terminal of the battery connection



- Post-installation inspection

Clock spring removal steps



1. Cover
2. Steering wheel-driver's air bag module assembly
3. Lower Column Cover
4. Clock spring

Clock spring installation steps



- Pre-installation inspection
- 4. Clock spring



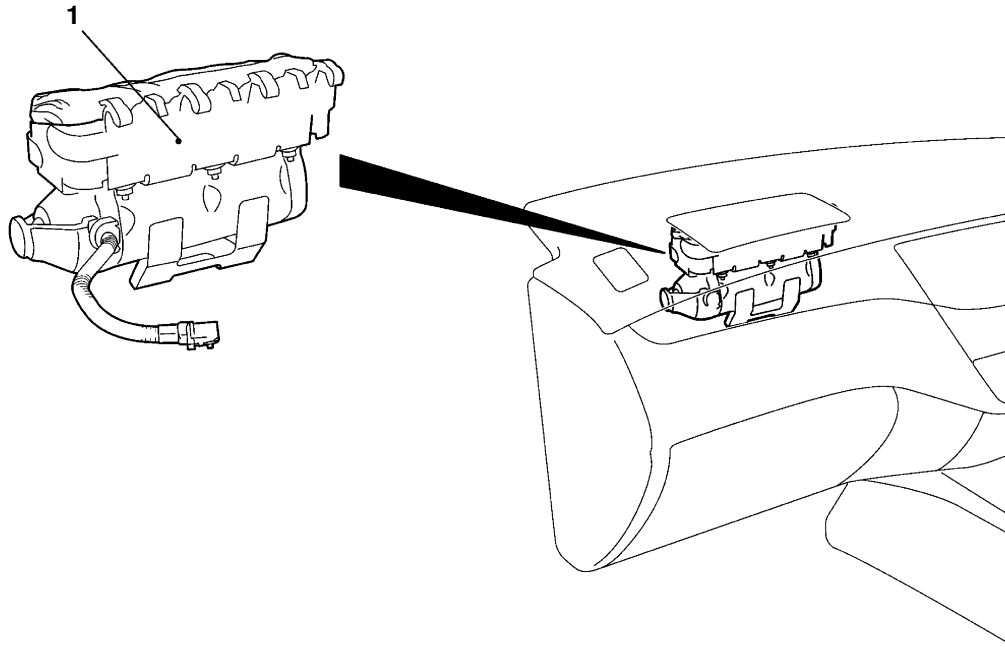
3. Lower Column Cover
2. Steering wheel-driver's air bag module assembly

1. Cover
 - Negative (-) terminal of the battery connection



- Post-installation inspection

<Front passenger's air bag module>



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Removal steps

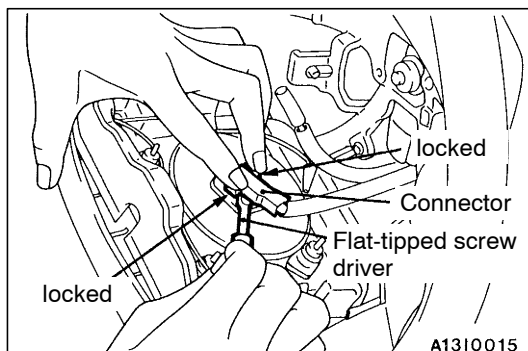
- Instrument panel assembly (Refer to GROUP 52A - Instrument panel.)
1. Passenger's air bag module

**Installation steps**

- Pre-installation inspection
1. Passenger's air bag module
- Instrument panel assembly (Refer to GROUP 52A - Instrument panel.)
 - Negative (-) battery cable connection
1. Post-installation inspection

**REMOVAL SERVICE POINTS****◀▶ DRIVER'S AIR BAG MODULE REMOVAL**

1. Remove the air bag module mounting screw (torque screw) from the steering wheel side.

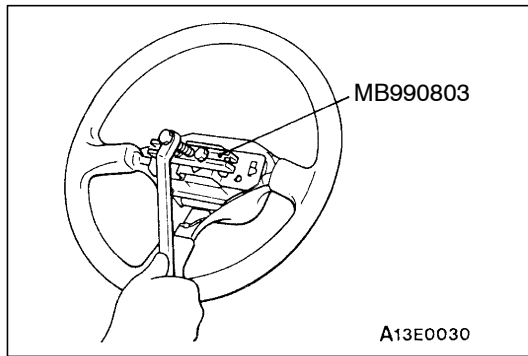


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2. Spread the lock outward to remove the connector by prying with a flat-tipped screw driver as shown in the illustration at left.

Caution

- (1) Be careful not to remove the connector forcibly.
- (2) Keep the removed driver's air bag module facing the pad surface upward in a clean and dry place.

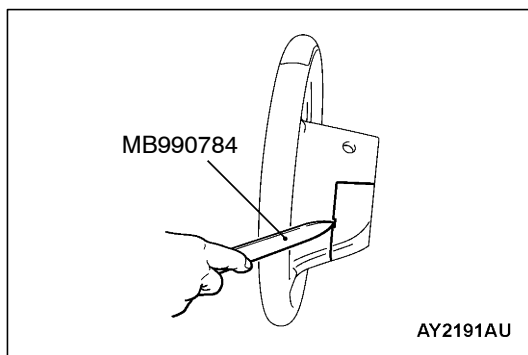


◀B▶ STEERING WHEEL REMOVAL

◀C▶ CLOCK SPRING REMOVAL

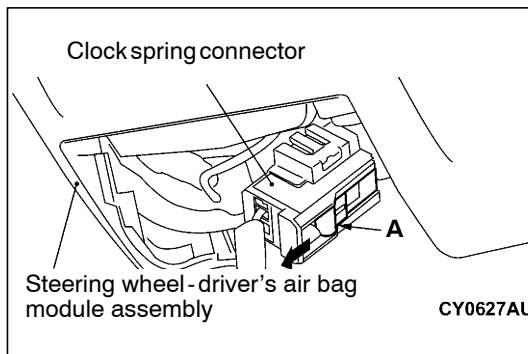
Caution

Keep the removed clock spring in a clean and dry place.



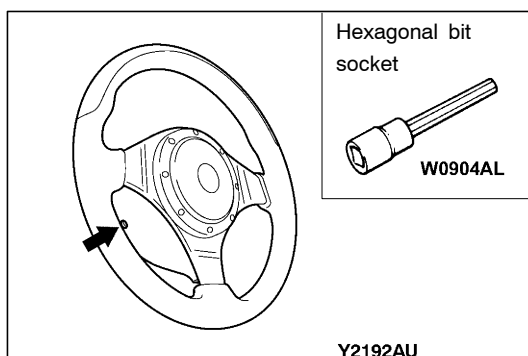
◀D▶ COVER REMOVAL

Use the special tool to insert into the notch as shown in the illustration and remove the cover.



◀E▶ STEERING WHEEL-DRIVER'S AIR BAG MODULE ASSEMBLY REMOVAL

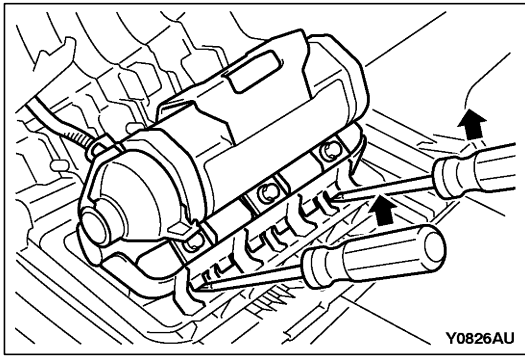
1. By sliding the A section (in the figure) of the clock spring connector in the arrow direction, disconnect the connector.



2. Insert the hexagonal bit socket into the arrow section in the figure. Completely loosen the bolt, and then remove the steering wheel-driver's air bag module assembly.

NOTE

Use a hexagonal bit socket or a hexagonal wrench having an effective length of 75 mm or more in the hexagonal section and the diameter of 8 mm or more.



◀F▶ PASSENGER'S AIR BAG MODULE REMOVAL

Insert the screwdriver (-) into the position specified in the figure and lift the screwdriver upward to release the pawls engaged, and then remove the passenger's air bag module.

Caution

1. When the passenger's air bag module is removed, do not damage the engagement of the pawls.
2. The removed passenger's air bag module should be stored in a clean, dry place with facing the deployment surface facing up.

INSTALLATION SERVICE POINTS

▶A◀ PRE-INSTALLATION INSPECTION

1. Pre-installation inspection is carried out even if installing a new air bag module or clock spring. (Refer to P.52B-59.)

Caution

A used air bag module must be discarded after deployment according to the specified procedure. (Refer to P.52B-64.)

2. Connect the negative (-) terminal of the battery.
3. Connect the MUT-II to the diagnosis connector (16 pin).

Caution

Connection and disconnection of the MUT-II must be carried out after turning the ignition switch to the LOCK (OFF) position.

4. Turn the ignition switch to ON.
5. Check that there is no abnormality except for open circuit in the air bag module after reading diagnostic codes.
6. Turn the ignition switch to LOCK (OFF) position.
7. Release the negative (-) terminal cable of the battery and wrap a tape around it for insulation.

Caution

Wait for at least 60 seconds after disconnecting the negative (-) battery cable before starting any operation. (Refer to P.52B-3.)

▶B◀ CLOCK SPRING INSTALLATION

1. Check that the steering wheel is positioned in the forward direction.

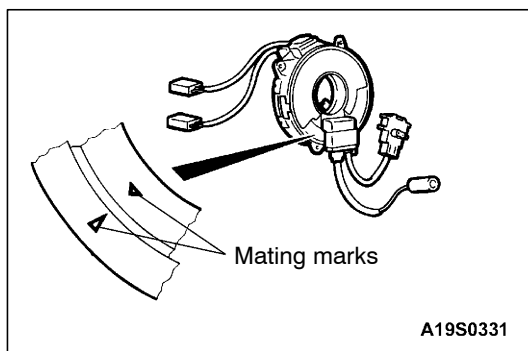
2. Install the column switch to the clock spring after centering of the clock spring is carried out as follows.

Centering of the clock spring

After turning the clock spring clockwise fully, turning approximately 3 rounds in the opposite direction, and align mating marks.

Caution

If centering of the clock spring is not properly done, the SRS air bag system does not function normally due to possible malfunctions that the steering wheel may not turn in the way or cables in the clock spring may be torn.



►C◄ STEERING WHEEL/STEERING WHEEL-AIR BAG MODULE ASSEMBLY INSTALLATION

1. After checking that centering of the clock spring has been done, install the steering wheel or the steering wheel-air bag module assembly.

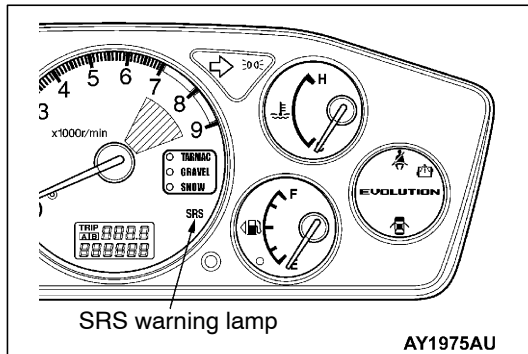
Caution

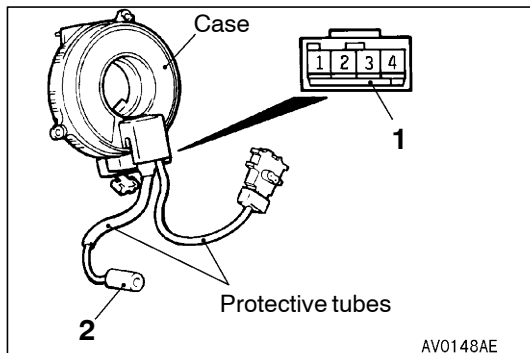
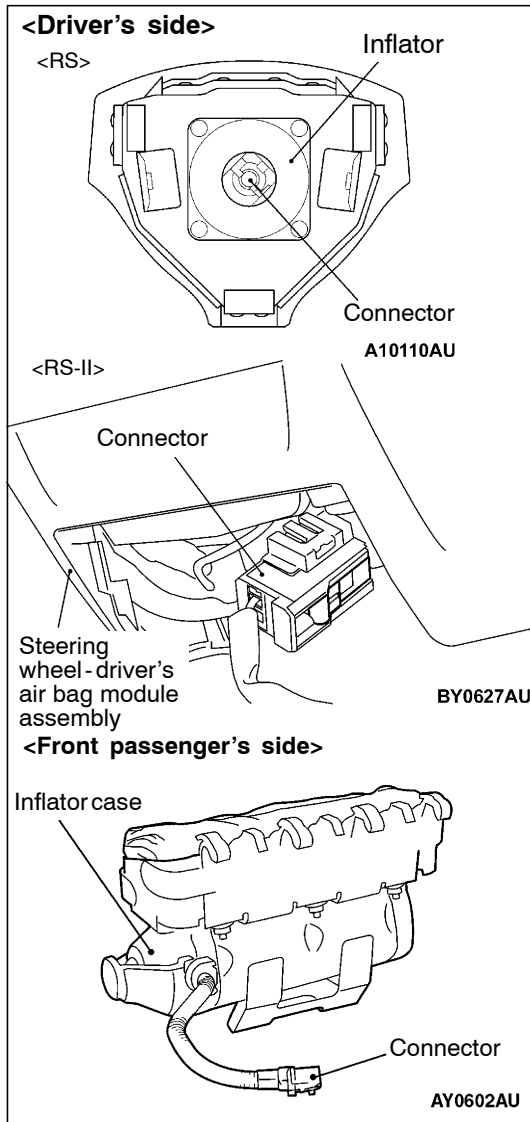
Do not engage the harness of the clock spring when installing the steering wheel or the steering wheel-air bag module assembly.

2. After installation, check that no abnormalities occur when the steering wheel is fully turned to the left or the right.

►D◄ POST-INSTALLATION INSPECTION

1. Check that no abnormal noise or improper operation can be caused by rotating the steering wheel in left and right directions slightly.
(driver's air bag module, clock spring)
2. Turn the ignition switch to the ON position.
3. Check that the SRS warning lamp illuminates for 6 to 8 seconds and goes out.
4. Carry out troubleshooting if the lamp does not go out.
(Refer to P.52-6.)





INSPECTION

DRIVER'S AND PASSENGER'S AIR BAG MODULE INSPECTION

If any malfunction is found in the following inspection, replace the air bag module(s) with new one(s).

Discard the old one(s) after deployment as specified in the service procedure. (Refer to P.52B-64.)

Caution

Never measure circuit resistance in the air bag modules (squib) even with the specified tester. Measuring the circuit resistance with a tester causes accidental air bag deployment due to current that flows or static, resulting in serious personal injury.

1. Check the cover for dents, cracks or deformation.
2. Check the connectors for damage, terminals for deformation, and harness for binds.
3. Check the air bag inflator cases for dents, cracks or deformation.
4. With air bag module installed

Caution

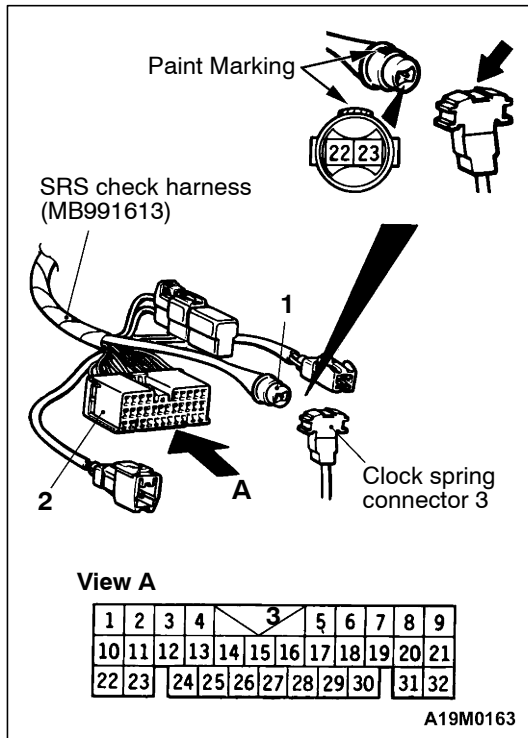
If dents, cracks, deformation, or rust are present in the air bag module(s), replace with new one(s). Discard the old one(s) as specified in the service procedure. (Refer to P.52B-64.)

CLOCK SPRING CHECK

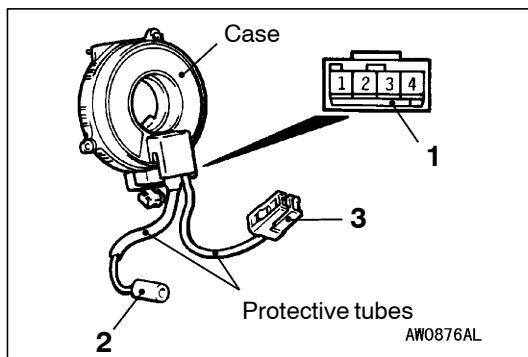
If any malfunction is found in the following inspections, replace the clock spring with a new one.

<RS>

1. Check the connectors and protective tubes for damage, and terminals for deformation.
2. Visually check the case for damage.
3. Refer to that the clock spring has continuity between connector No.2 and terminal No.4 of connector No.1.

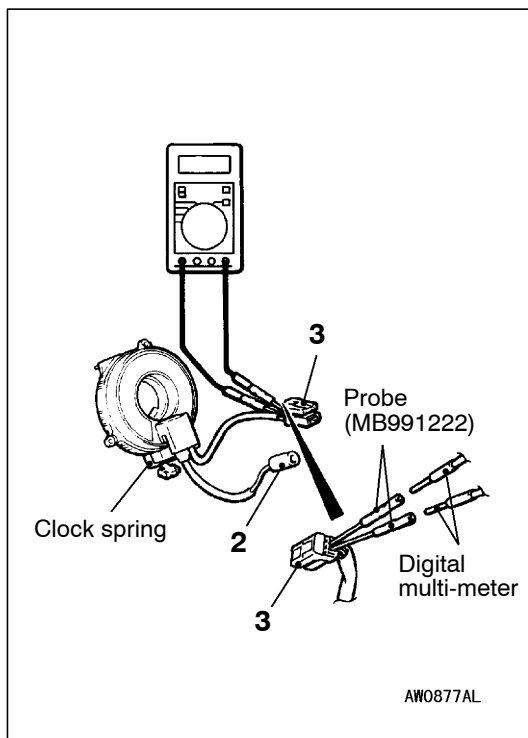


- Align the paint mark on the connector No.1 of the SRS check harness (MB991606 or MB991613) with the mark indicated by an arrow on the connector No.3 of the clock spring for connector connection.
- Check that there is continuity between the terminals 22 and 23 of the SRS check harness connector No.2.



<RS-II>

- Check the connectors and protective tubes for damage, and terminals for deformation.
- Visually check the case for damage.
- Refer to that the clock spring has continuity between connector No.2 and terminal No.4 of connector No.1.



- Insert the probe (MB991222) from the rear of connector No.3 of the clock spring.

Caution

The probe must not be inserted directly to the terminals from the front of the connector.

- Connect a digital multi-meter to the probe (MB991222), as shown, to check that conductivity is present between the terminals.

SEAT BELT WITH PRE-TENSIONER

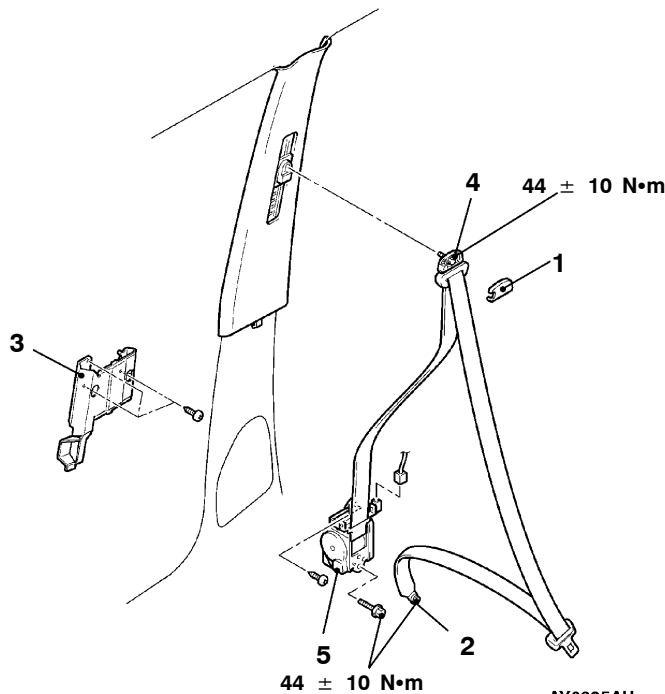
Caution:

1. Wait for at least 60 seconds after disconnecting the negative (-) terminal of the battery before starting any operation. The removed negative (-) terminal must be protected by wrapping the tape. (Refer to P.52B-3.)
2. Never disassemble or repair the seat belt with pre-tensioner. Replace the part with a new one when it malfunctions.
3. Take an extra care to deal with the seat belt with pre-tensioner by avoiding dropping or wetting it with water or oil. If any dent, crack, or deformation is found, be sure to replace the seat belt with pre-tensioner with a new part.
4. Do not place a heavy object on top of the seat belt pre-tensioner.
5. Never keep the seat belt with pre-tensioner in a place where the temperature can exceed over 90°C.
6. Replace the seat belt with pre-tensioner with a new one after operating the seat belt pre-tensioner.
7. Wear gloves or protective glasses when handling the seat belt with pre-tensioner after operation.
8. If the seat belt with pre-tensioner before operation needs to be discarded, be sure to do so after operating the seat belt pre-tensioner. (Refer to P.52B-64.)

REMOVAL AND INSTALLATION

Pre-removal operation

- Turn the ignition key to the LOCK(OFF) position.
- Disconnect the negative (-) terminal of the battery.



Removal steps

1. Sash cover guide
2. Seat belt lower anchor bolt
3. Bracket
4. Seat belt shoulder anchor bolt
 - Center pillar lower trim
(Refer to GROUP 52A - Trim.)
5. Seat belt pre-tensioner

Installation steps

- A◄
- Pre-installation inspection
 - 5. Seat belt pre-tensioner
 - 4. Seat belt shoulder anchor bolt
 - 3. Bracket
 - 2. Seat belt lower anchor bolt
 - Center pillar lower trim
(Refer to GROUP 52A - Trim.)
 - 1. Sash cover guide
 - Negative (-) terminal of the battery connection
- B◄
- Post-installation inspection

INSTALLATION SERVICE POINTS

▶A◀ PRE-INSTALLATION INSPECTION

1. Pre-installation inspection must be carried out even when installing a new seat belt with pre-tensioner. (Refer to Inspections.)

Caution

If the seat belt with pre-tensioner is discarded, discard it after operating the seat belt pre-tensioner according to the specified procedure. (Refer to P.52B-64.)

2. Connect the negative (-) terminal of the battery.
3. Connect the MUT-II to the diagnosis connector (16 pin).

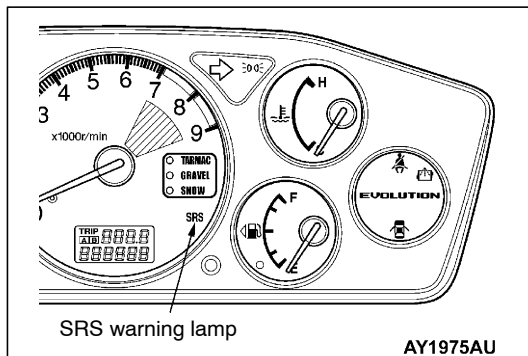
Caution

Connection and disconnection of the MUT-II must be carried out after turning the ignition switch to the LOCK (OFF) position.

4. Turn the ignition switch to ON position.
5. Check that there is no abnormality except for open circuit in the seat belt pre-tensioner after reading diagnostic codes.
6. Turn the ignition key to LOCK (OFF) position.
7. Release the negative (-) terminal cable of the battery and wrap a tape around it for insulation.

Caution

Wait for at least 60 seconds after disconnecting the negative (-) battery cable before starting any operation. (Refer to P.52B-3.)



▶B◀ POST-INSTALLATION INSPECTION

1. Turn the ignition switch to the ON position.
2. Check that the SRS warning lamp illuminates for 6 to 8 seconds and goes out.
3. Carry out troubleshooting if the lamp does not go out. (Refer to P.52B-6.)

INSPECTION**SEAT BELT PRE-TENSIONER**

If any faulty is discovered by the following inspections, replace the seat belt with pre-tensioner with a new one.

Discard the old parts according to the specified procedure after operating the seat belt pre-tensioner.(Refer to P.52B-64.)

Caution

Do not measure the circuit resistance of the seat belt pre-tensioner even if it is done with a specified tester.

If a tester is used to measure the circuit resistance, squib charged with current or erroneous activation by static may cause critical damage.

1. Seat belt pre-tensioner for dent, crack, or deformation
2. Harness or connector for damage and terminal for deformation

AIR BAG MODULE AND SEAT BELT PRE-TENSIONER DISPOSAL PROCEDURES

Carry out the following procedure of air bag deployment and seat belt pre-tensioner operation before disposing the air bag module and seat belt

with pre-tensioner or the vehicle with SRS air bag and seat belt with pre-tensioner.

DISPOSAL OF AIR BAG MODULE BEFORE DEPLOYMENT OR SEAT BELT WITH PRE-TENSIONER BEFORE OPERATION

Caution

1. Carry out deployment of all the air bag modules and operation of all seat belt pre-tensioners before disposing the vehicle with SRS air bag and seat belt with pre-tensioner inside the vehicle.
2. Carry out deployment of the used air bag or operation of the used seat belt pre-tensioner outside the vehicle when replacing the air bag module or the seat belt with pre-tensioner.
3. Carry out deployment of air bag or operation of seat belt pre-tensioner in a well ventilated place since a lot of smoke is generated .Do not carry out operation near a smoke detector.
4. Avoid carrying out operation in a residential area as much as possible and give a warning when any person is near by since air bag deployment or seat belt pre-tensioner operation causes loud operation sound.
5. Prepare ear plugs for those are engaged in air bag deployment or seat belt pre-tensioner operation or for those who are near by.

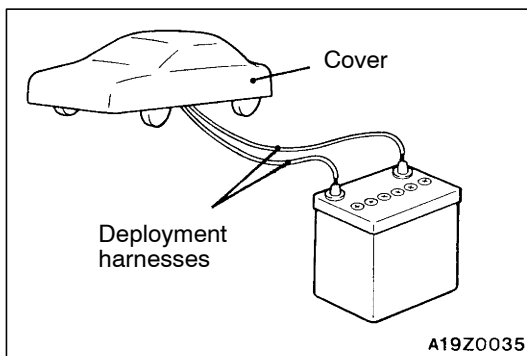
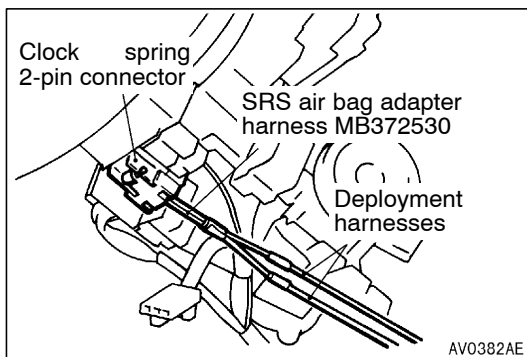
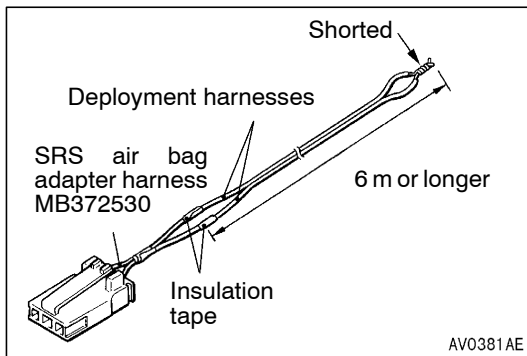
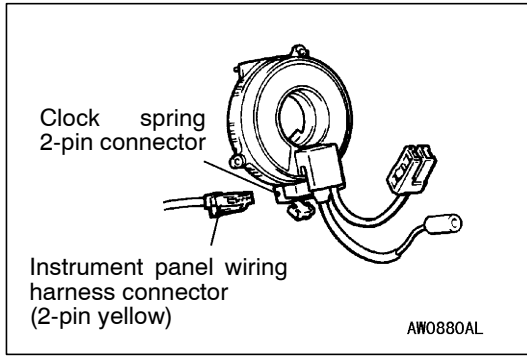
DEPLOYMENT OR OPERATION INSIDE THE VEHICLE

1. Move the vehicle to flat and isolated spot.
2. Disconnect the negative (-) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution

Wait at least 60 seconds after the disconnection of the battery cables before any further job. (Refer to P.52B-3.)

3. Carry out deployment of the air bag module and operation of the seat belt pre-tensioner according to the following procedure.



Driver's air bag module

- (1) Remove the steering column cover, lower. (Refer to GROUP 52A – Instrument Panel.)
- (2) Disconnect the clock spring 2-pin connector and instrument panel wiring harness connector (2-pin, yellow).

NOTE

Once disconnected from the instrument panel wiring harness, both electrodes of the clock spring connector short automatically. This prevents the driver's air bag from accidental deployment caused by static, etc.

- (3) Connect deployment harnesses longer than 6 m to each SRS air bag adapter harness and insulate the connections with plastic tape. Also, connect the deployment harnesses in the other ends to short, thereby preventing the driver's air bag from accidental deployment caused by static etc.

- (4) Connect the SRS air bag adapter harness to the clock spring 2-pin connector and route the deployment harnesses out of the vehicle.

- (5) Close all the doors with the windows fully closed and put a cover over the vehicle to minimize report.

Caution

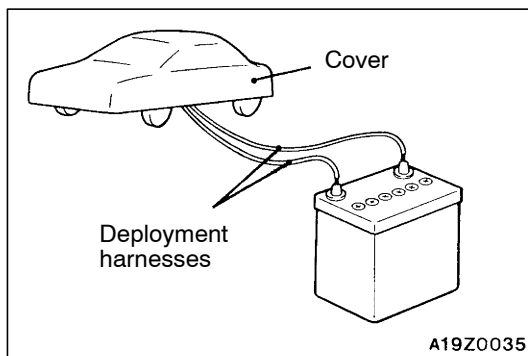
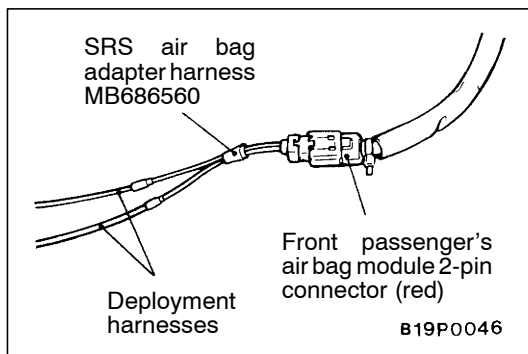
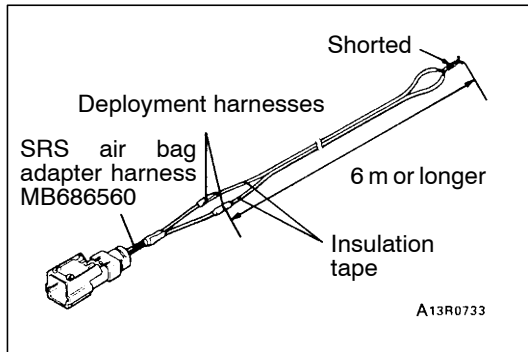
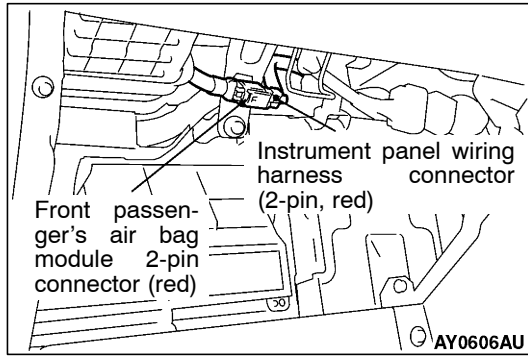
The cover is required as the glass, if already damaged, may break.

- (6) Separate the deployment harnesses as far from the vehicle as possible and connect to the terminals of the battery removed from the vehicle. Then deploy.

Caution

- 1) **Before deploying the air bag, see that no one is in and near the vehicle. Also, put on safety glasses.**
- 2) **The deployment makes the inflator of the driver's air bag very hot. Before handling the inflator, wait more than 30 minutes for cooling.**
- 3) **If the driver's air bag module fails to deploy although the procedure is respected, do not go near the module. Contact your local distributor.**

- (7) Discard the deployed air bag module according to Deployed Air Bag Module Disposal Procedures. (Refer to P.52B-75.)



Front passenger's air bag module

- (1) Remove the glove box.
(Refer to GROUP 52A – Instrument Panel.)
- (2) Disconnect the front passenger's air bag module 2-pin connector (red) and instrument panel wiring harness connector (2-pin, red).

NOTE

Once disconnected from the instrument panel wiring harness, both electrodes of the front passenger's air bag module short automatically. This prevents the front passenger air bag from accidental deployment caused by static, etc.

- (3) Connect deployment harnesses longer than 6 m to each SRS air bag adapter harness and insulate the connections with plastic tape.
Also, connect the deployment harnesses in the other ends to short, thereby preventing the front passenger's air bag from accidental deployment caused by static etc.

- (4) Connect the SRS air bag adapter harness to the front passenger's air bag module 2-pin connector (red) and route the deployment harnesses out of the vehicle.

- (5) Close all the doors with the windows fully closed and put a cover over the vehicle to minimize report.

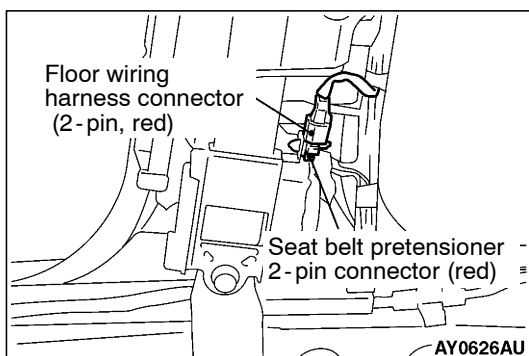
Caution

The cover is required as the glass, if already damaged, may break.

- (6) Separate the deployment harnesses as far from the vehicle as possible and connect to the terminals of the battery removed from the vehicle. Then deploy.

Caution

- 1) **Before deploying the air bag, see that no one is in and near the vehicle. Also, put on safety glasses.**
 - 2) **The deployment makes the inflator of the front passenger's air bag very hot. Before handling the inflator, wait more than 30 minutes for cooling.**
 - 3) **If the front passenger's air bag module fails to deploy although the procedure is respected, do not go near the module. Contact your local distributor.**
- (7) Discard the deployed air bag module according to Deployed Air Bag Module Disposal Procedures. (Refer to P.52B-75.)

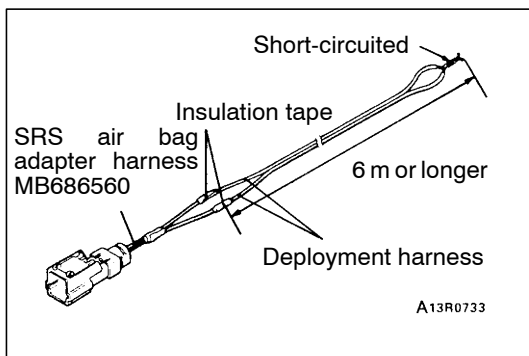


Seat belt pre-tensioner

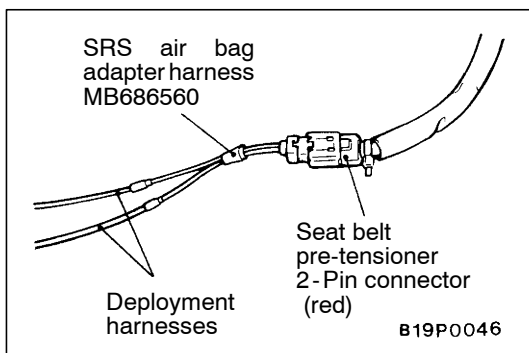
- (1) Remove the center pillar lower trim. (Refer to GROUP 52A - Instrument Panel.)
- (2) Disconnect the seat belt pre-tensioner 2-pin connector (red) from the floor wiring harness connector (2-pin, red).

NOTE

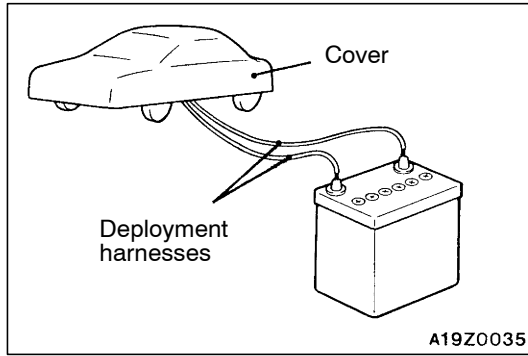
Once disconnected from the floor wiring harness, both electrodes of the seat belt pre-tensioner connector short-circuit automatically. This prevents the seat belt pre-tensioner from accidental deployment caused by static, and etc.



- (3) Connect deployment harnesses longer than 6 m to each SRS air bag adapter harness and insulate the connections with plastic tape. Also, connect the deployment harnesses in the other ends to short, thereby preventing the seat belt pre-tensioner from accidental deployment caused by static etc.



- (4) Connect the SRS air bag adapter harness to the seat belt pre-tensioner 2-pin connector (red) and pull out the operation harness.



- (5) Close all the doors with the windows fully closed and put a cover over the vehicle to minimize report.

Caution

The cover is required as the glass, if already damaged, may break.

- (6) Separate the deployment harnesses as far from the vehicle as possible and connect to the terminals of the battery removed from the vehicle. Then deploy.

Caution

- 1) Before operating the seat belt pre-tensioner, see that no one is in or near the vehicle.
- 2) The operation makes the insulator of the seat belt pre-tensioner very hot. Before handling the inflator, wait more than 30 minutes for cooling.
- 3) If the seat belt pre-tensioner fails to operate although the procedure is respected, do not go near the seat belt pre-tensioner. Contact your local distributor.

- (7) Discard the operated seat belt pre-tensioner according to Disposal Procedure. (Refer to P.52B-75.)

DEPLOYMENT OUTSIDE THE VEHICLE

Caution

1. Carry out air bag deployment or seat belt pre-tensioner operation on large flat place at least 6 m away from any object or person.
 2. Avoid a strong wind weather when carrying out deployment or operation outside the vehicle. Ignite the air bag at a place upwind from the air bag module and the seat belt pre-tensioner even in a breeze weather.
1. Disconnect the negative (-) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution

Wait at least 60 seconds before any further job after the disconnection of the battery cables. (Refer to P.52B-3.)

2. Carry out deployment of the air bag module and operation of the seat belt pre-tensioner according to the following procedure.

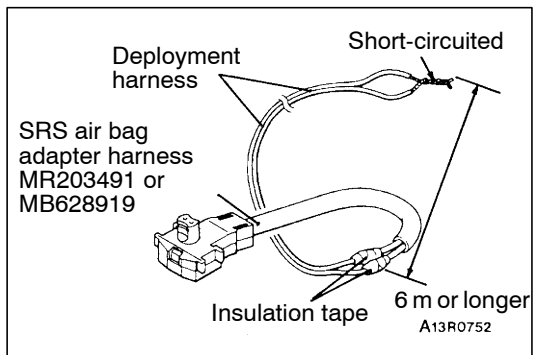
Driver's side air bag module

<RS: steering wheel and air bag module separate type>

- (1) Remove the driver's air bag module from the vehicle. (Refer to P.52B-52.)

Caution

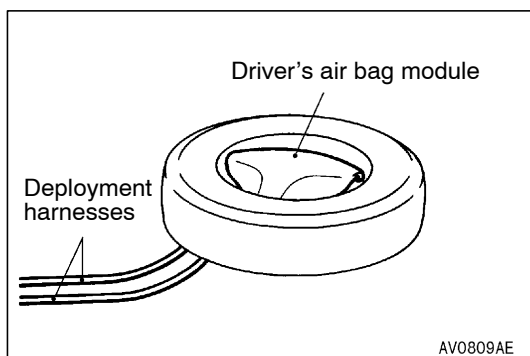
Once disconnected, both electrodes of the driver's air bag module connector short automatically to prevent accidental deployment caused by static etc. Still, in consideration of the accidental deployment, store the air bag module on flat place with deployment surface facing up. Also, do not put anything on it.



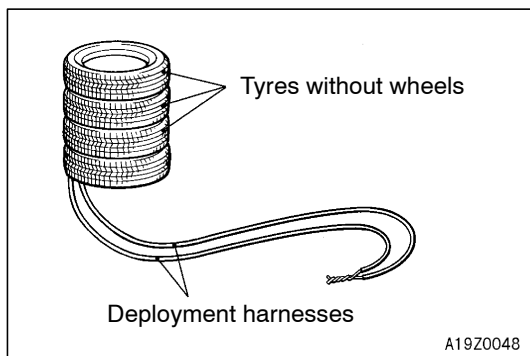
- (2) Connect deployment harnesses longer than 6 m to each SRS air bag adapter harness and insulate the connections with plastic tape. Also, connect the deployment harness in the other ends to connect (short-circuit). This prevents the driver's air bag module from accidental deployment caused by static and etc.
- (3) Touch the vehicle's body with bare hands to discharge static in you.

Caution

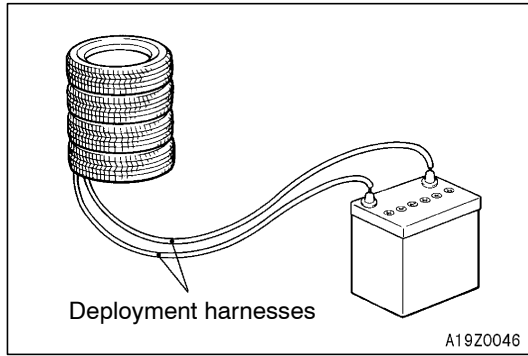
Never fail to do Step (3) in order to prevent accidental deployment caused by static.



- (4) Install a nut to the bolt behind the driver's air bag module and tie thick wire there for securing.
- (5) Route the deployment harnesses connected to the driver's air bag module beneath an old tyre and wheel assembly. Then, using the wire tied to the bolt, secure the driver's air bag module to the tyre and wheel assembly with the deployment surface facing up.



- (6) Place three old tyres without wheels on the tyre secured with the driver's air bag module.



- (7) Separate the deployment harnesses as far from the driver's side air bag module as possible and connect to the terminals of the battery removed from the vehicle. Then deploy.

Caution

- 1) Before the deployment, see that no one is near around the driver's air bag module.
 - 2) The deployment makes the inflator of the driver's air bag very hot. Before handling the inflator, wait more than 30 minutes for cooling.
 - 3) If the driver's air bag module fails to deploy although the procedure is respected, do not go near the module. Contact your local distributor.
- (8) Discard the deployed air bag module as specified in Deployed Air Bag Module Disposal Procedures. (Refer to P.52B-75.)

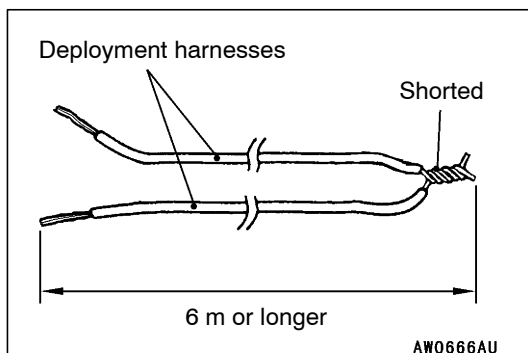
Driver's side air bag module

<RS-II: steering wheel and air bag module incorporate type>

- (1) Remove the steering wheel - air bag module assembly from the vehicle. (Refer to P.52B-52.)

Caution

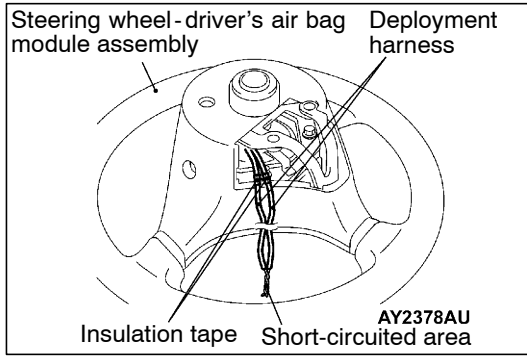
Once disconnected, both electrodes of the driver's air bag module connector short automatically to prevent accidental deployment caused by static etc. Still, in consideration of the accidental deployment, store the air bag module on flat place with deployment surface facing up. Also, do not put anything on it.



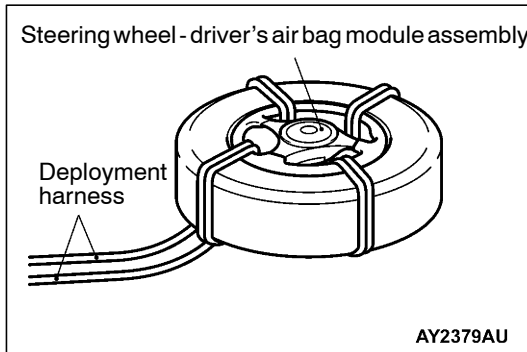
- (2) Prepare two deployment harnesses longer than 6 m for deployment and connect the terminals in one end to short-circuit. This is to prevent accidental deployment caused by static etc.
- (3) Touch the vehicle's body with bare hands to discharge static in you.

Caution

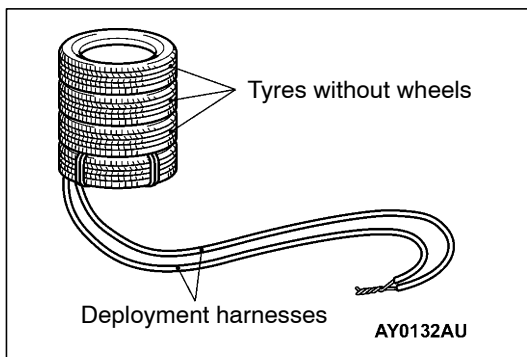
Never fail to do Step (3) in order to prevent accidental deployment caused by static.



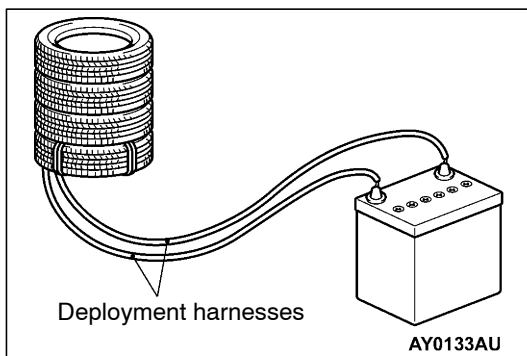
- (4) Release the secured connector of the steering wheel-driver's air bag module assembly to cut off the connector from the harness with a nipper and etc. Connect deployment harnesses to each of two separated harnesses and cover the area with insulation tape.



- (5) Use a rope to tie the steering wheel-driver's air bag module assembly to secure old tyres with wheels.
- (6) Route the deployment harness connected to driver's air bag module beneath old tyres with wheels. Then, secure the steering wheel-driver's air bag module assembly with the deployment surface facing up.



- (7) Place three old tyres without wheels on the tyre secured with the driver's air bag module.



- (8) Separate the deployment harnesses as far from the driver's side air bag module as possible and connect to the terminals of the battery removed from the vehicle. Then deploy.

Caution

- 1) Before the deployment, see that no one is near around the driver's air bag module.
- 2) The deployment makes the inflator of the driver's air bag very hot. Before handling the inflator, wait more than 30 minutes for cooling.
- 3) If the driver's air bag module fails to deploy although the procedure is respected, do not go near the module. Contact your local distributor.

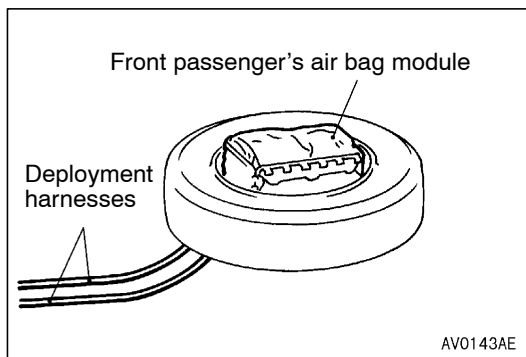
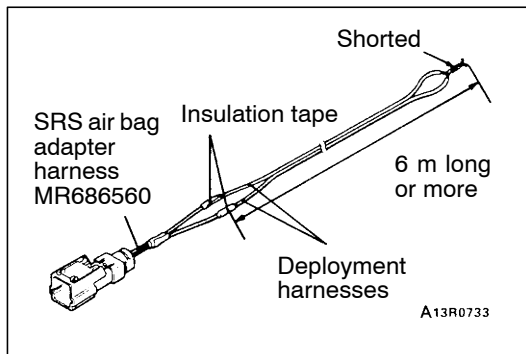
- (9) Discard the deployed air bag module as specified in Deployed Air Bag Module Disposal Procedures. (Refer to P.52B-75.)

Front passenger's air bag module

- (1) Remove the front passenger's air bag module from the vehicle. (Refer to P.52B-52.)

Caution

Once disconnected, both electrodes of the front passenger's air bag module connector short automatically to prevent accidental deployment caused by static etc. Still, in consideration of the accidental deployment, store the air bag module on flat place with deployment surface facing up. Also, do not put anything on it.

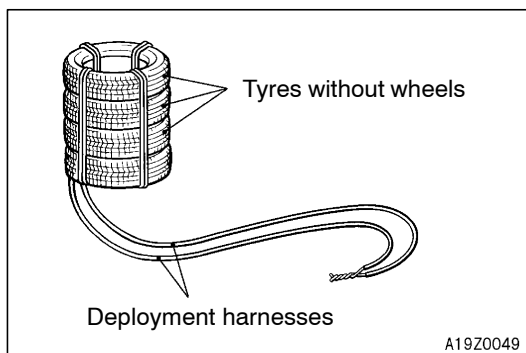


- (2) Connect deployment harness 6 m or longer with the SRS air bag adapter harness respectively. Insulate the connection with tape. Also, connect the other ends of the deployment harness each other to short, thereby preventing the front passenger's air bag from accidental deployment caused by static etc.

- (3) Route the SRS air bag adapter harness with the deployment harnesses beneath an old tyre and wheel assembly. Then, connect the harnesses to the front passenger's air bag module.
- (4) Route a thick wire through the holes in the front passenger's air bag module bracket. With the deployment surface facing up, secure the front passenger's air bag module to the old tyre and wheel assembly.

Caution

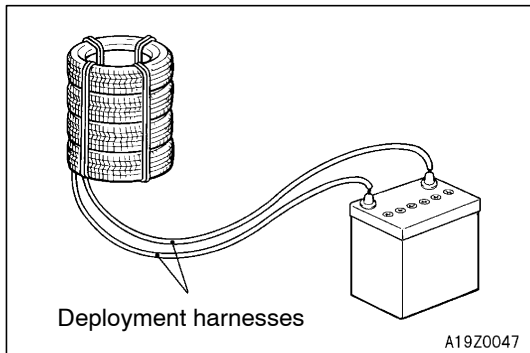
- 1) The adapter harness below the wheel should be loose. If it is too tight, the reaction when the air bag deploys could damage the adapter harness.
- 2) Place the connector of the SRS air bag adapter harness so that it is not clamped by the tyre at deployment.



- (5) Put three old tyres without wheels on the tyre secured to the front passenger's air bag module. Secure all the tyres with ropes (4 locations).

NOTE

The tyres must be bound because the passenger's air bag inflates more than the driver's air bag.



- (6) Disconnect the deployment harnesses as far from the front passenger's air bag module as possible and connect the harnesses to the battery removed from the vehicle.

Caution

- 1) Before the deployment, see that no one is near the front passenger's air bag module.
- 2) The deployment makes the inflator of the front passenger's air bag very hot. Before handling the inflator, wait more than 30 minutes for cooling.
- 3) If the front passenger's air bag module fails to deploy although the procedure is respected, do not go near the module. Contact your local distributor.

- (7) Discard the deployed air bag module as specified in Deployed Air Bag Module Disposal Procedures. (Refer to P.52B-75.)

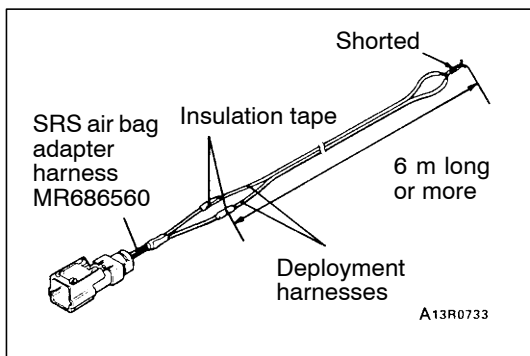
Seat belt pre-tensioner

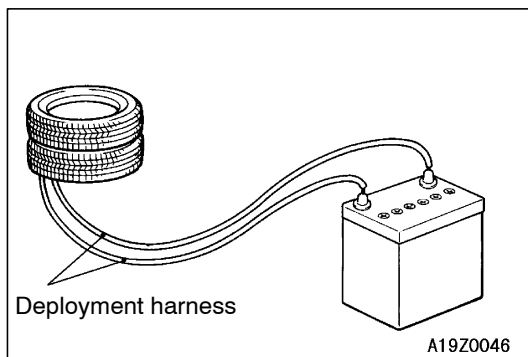
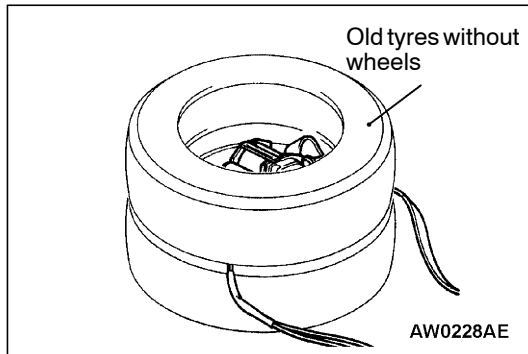
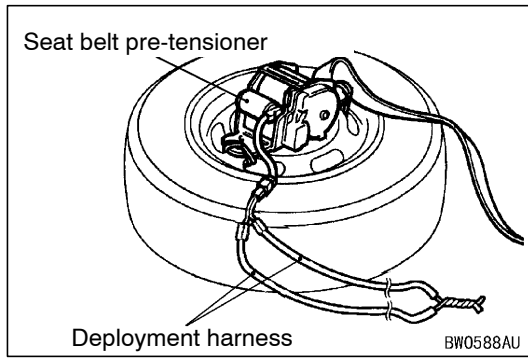
- (1) Remove the seat belt with pre-tensioner from the vehicle. (Refer to P.52B-61.)

Caution

Once disconnected, both electrodes of the seat belt pre-tensioner are short-circuited automatically to prevent accidental deployment caused by static etc. Still, in consideration of the accidental deployment, store the air bag module on flat place with deployment surface facing up. Also, do not put anything on it.

- (2) Connect deployment harness 6 m or longer with the SRS air bag adapter harness respectively. Insulate the connection with tape. Moreover, the ends of the operation harness should be connected (short-circuited) to each other. Thus, it prevents the seat belt pre-tensioner from accidental deployment caused by static and etc.





- (3) Route a thick wire through the holes in the seat belt retractor bracket to secure at the top of the wheel (convex part). (two locations)
- (4) Connect the seat belt pre-tensioner connector to the the SRS air bag adapter harness with the operation harness attached.
- (5) Pull out the seat belt outside the tyre.

Caution

Place the connector of the SRS air bag adapter harness so that it is not clamped by the tyres at deployment.

- (6) Place an old tyre (without a wheel) on the tyre, which the seat belt with pre-tensioner is secured on.

- (7) Disconnect the deployment harness as far from the seat belt pre-tensioner as possible and connect the both terminals of the battery removed from the vehicle. Then deploy.

Caution

- 1) **Before the deployment, see that no one is near the seat belt pre-tensioner.**
- 2) **Before handling the insulator, wait for a while for cooling.**
- 3) **If the seat belt pre-tensioner fails to operate although the procedure is respected, do not go near the seat belt pre-tensioner. Contact your local distributor.**

- (8) Discard the operated seat belt pre-tensioner according to Disposal Procedure.(Refer to P.52B-75.)

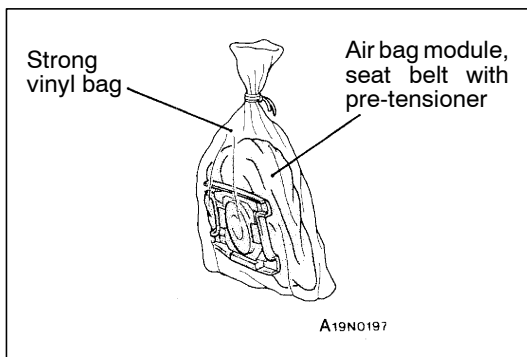
DEPLOYED AIR BAG MODULE OR OPERATED SEAT BELT PRE-TENSIONER DISPOSAL PROCEDURES

Discard the deployed air bag module or the operated seat belt with pre-tensioner paying attention to the following items.

1. The deployment makes the inflator of the air bag or the operation of the seat belt pre-tensioner very hot. Wait for more than 30 minutes for cooling before handling the inflator.
2. Do not apply any water or oil onto the deployed air bag module or the operated seat belt pre-tensioner.
3. Wear gloves and protective glasses before handling the deployed air bag module or the operated seat belt pre-tensioner since materials on those parts may cause irritation to eyes or skin.

Caution

If after following these precautions, any material does get into the eyes or on the skin, immediately rinse the affected area with a large amount of clean water. If any irritation develops, seek medical attention.



4. Discard the air bag module and the seat belt with pre-tensioner after placing them into a strong vinyl bag for sealing.
5. Be sure to always wash your hands after completing this operation.

NOTES

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CHASSIS ELECTRICAL

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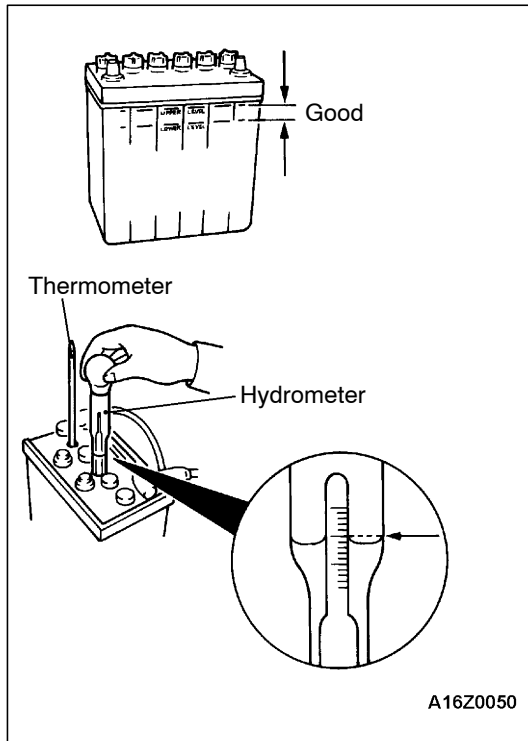
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BATTERY

SERVICE SPECIFICATION

Item	Specification
Specific gravity of the battery fluid	1.220 - 1.290 [20°C]



ON-VEHICLE SERVICE

FLUID LEVEL AND SPECIFIC GRAVITY CHECK

1. Inspect whether or not the battery fluid is between the UPPER LEVEL and LOWER LEVEL marks.

Caution

- (1) If the battery fluid is below the LOWER LEVEL, the battery could explode in using.
- (2) If the battery fluid is over the UPPER LEVEL, leakage could result.

2. Use a hydrometer and thermometer to check the specific gravity of the battery fluid.

Standard value: 1.220 - 1.290 [20°C]

The specific gravity of the battery fluid varies with the temperature, so use the following formula to calculate the specific gravity for 20°C. Use the calculated value to determine whether or not the specific gravity is satisfactory.

$$D20 = (t - 20) \times 0.0007 + Dt$$

D20: Specific gravity of the battery fluid calculated for 20°C.

Dt: Actually measured specific gravity

t: Actually measured temperature

CHARGING

1. Remove the battery from the vehicle.
2. The normal charging current is a value in amperes which is 1/10th of the battery capacity. If the battery needs to be charged rapidly because of reasons such as time limitations, the maximum charging current for rapid charging is the battery capacity expressed as an ampere value.

Battery type	Capacity (5-hour rate)	Normal charging current	Rapid charging current
44B20	34 A	3.4 A	34 A

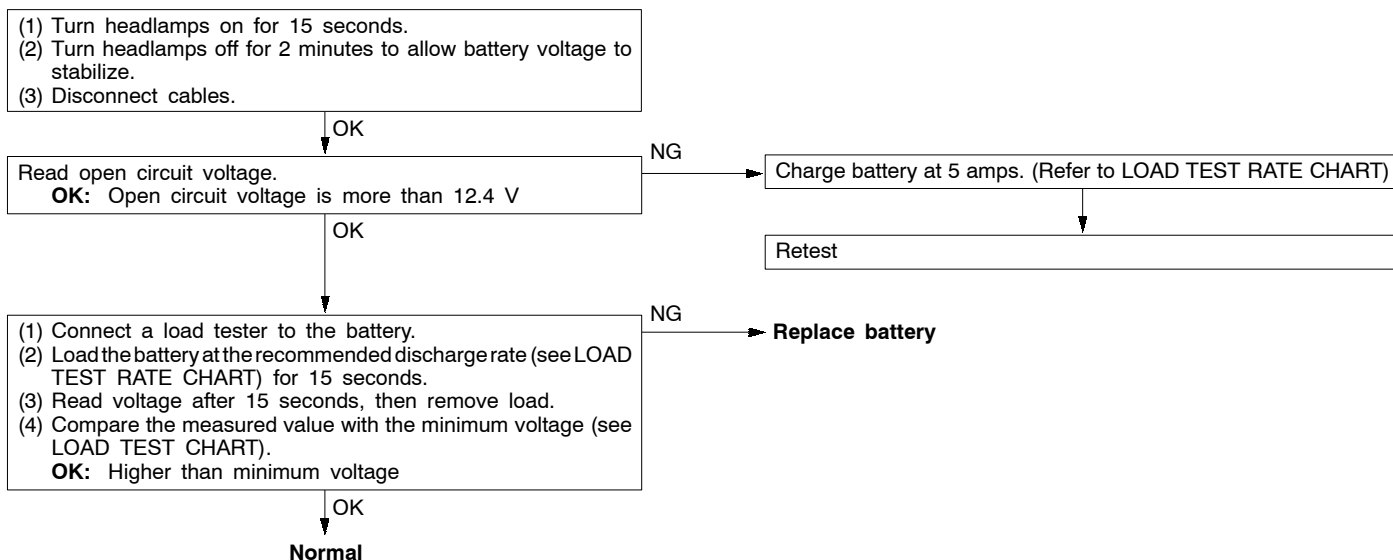
3. Determine when charging is finished.
 - When the specific gravity of the battery electrolyte is constantly within 1.250 - 1.290 for a continuous period of one hour or more
 - When the voltage per cell during charging is 2.5 - 2.8 V constantly for a continuous period of one hour or more

Caution

1. The battery plugs should be removed during charging.
2. The battery electrolyte level may rise and overflow from the battery during charging.
3. Explosions may occur if the battery is brought close to naked flames during charging.
4. Be careful to avoid tasks that might produce sparks or other danger while the battery is charging.
5. After charging is complete, replace the battery plugs, pour water over the battery to rinse away any sulphuric acid, and let the battery stand to dry.
6. Charge the battery in a well-ventilated location.
7. Do not let the battery electrolyte temperature rise above approximately 45°C (approximately 55°C during rapid charging).

BATTERY TESTING PROCEDURE

TEST STEP



ROAD TEST RATE CHART

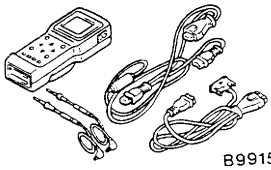
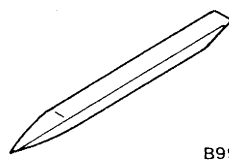
Battery type	44B20L
Charging time when fully discharged h [5-amp. rated current charging]	6.8
Load test (Amps)	150

ROAD TEST CHART

Temperature °C	21 and above	16 – 20	10 – 15	4 – 9	-1 – 3	-7 – -2	-12 – 8	-18 – -13
Minimum voltage V	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.5

IGNITION SWITCH AND IMMOBILIZER SYSTEM

SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II Sub assembly	Checking the immobilizer system
 B990784	MB990784	Ornament remover	Instrument panel under cover and column cover removal

TROUBLESHOOTING

IGNITION SWITCH

The ignition switch is controlled by the Smart Wiring System (SWS). For troubleshooting procedures, refer to GROUP 54B.

IMMOBILIZER

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS FUNCTION

READING DIAGNOSIS CODES

The diagnosis codes can be read using the MUT-II or by using the Simple Check Diagnosis mode. (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)

NOTE

Connect the MUT-II to the 16-pin diagnosis connector (black).

DIAGNOSIS CODE MEMORY ERASING PROCEDURE

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

INSPECTION USING SIMPLE CHECK DIAGNOSIS MODE

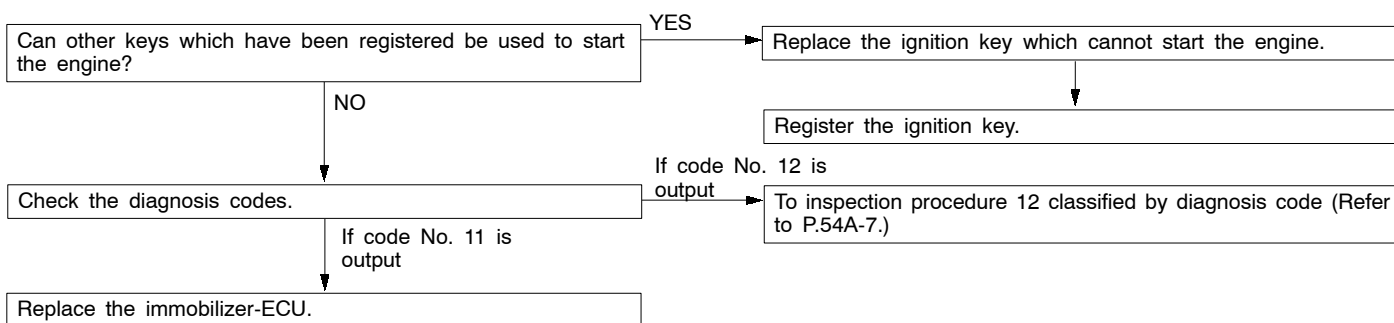
1. Change to Simple Check Diagnosis mode and activate switch diagnosis mode. (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)
2. In this condition, the input signals for the following switches can be checked.

CHART CLASSIFIED BY DIAGNOSIS CODES

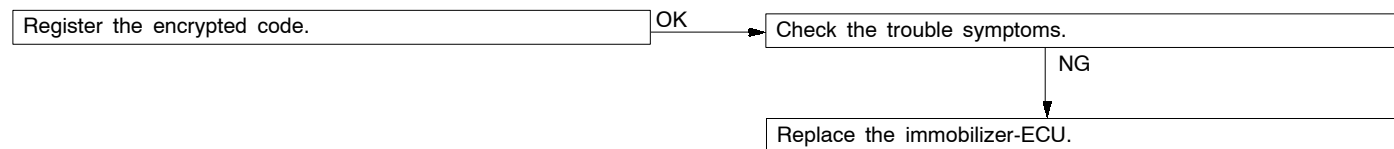
Code No.	Diagnosis contents	Reference page
11	Problem related to communication with the ignition key	54A-7
12	Ignition key is not registered, or encrypted code from ignition key does not match.	54A-7

INSPECTION PROCEDURES FOR EACH DIAGNOSIS CODE

Code No. 11 Problem related to communication with the ignition key	Probable cause
When the ignition switch is at the ON position, the encrypted codes are not transmitted from the ignition key to the immobilizer-ECU.	<ul style="list-style-type: none"> • Malfunction of ignition key • Malfunction of immobilizer-ECU



Code No. 12 Ignition key is not registered, or encrypted code from ignition key does not match.	Probable cause
The ignition key has not been registered with the immobilizer-ECU.	<ul style="list-style-type: none"> • The ignition key has not been registered with the immobilizer-ECU. • Malfunction of immobilizer-ECU



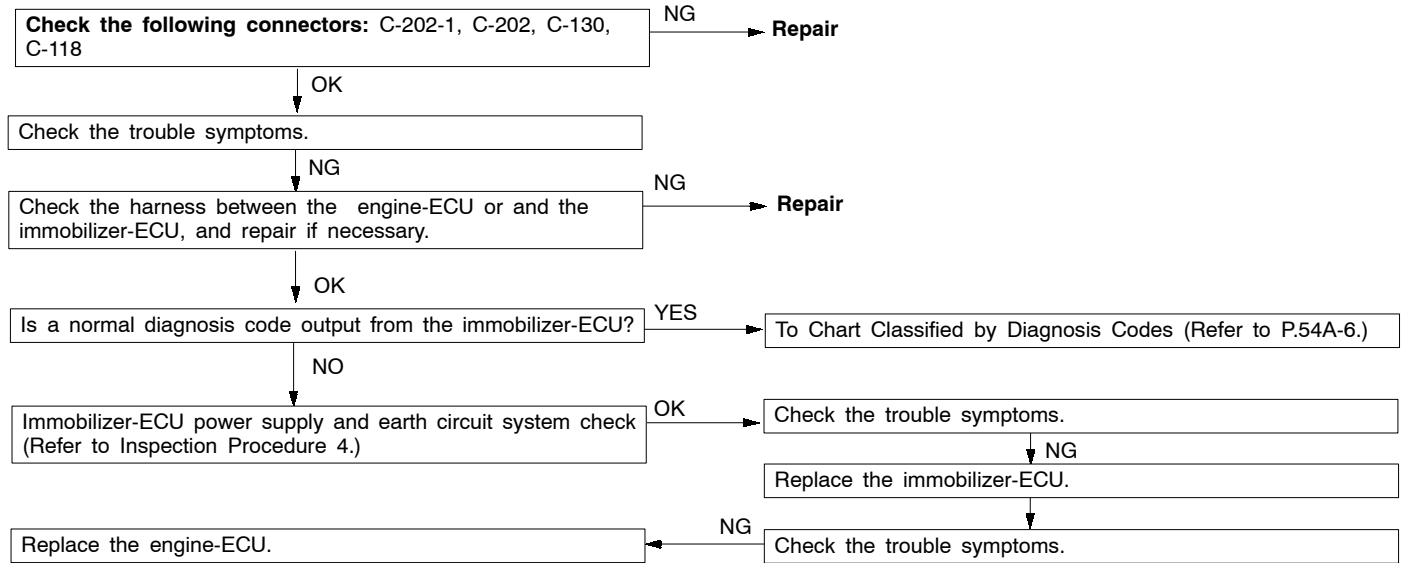
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	—	GROUP 13A - Troubleshooting
Diagnosis code No. P1610 is generated by the engine-ECU.	1	54A-8
The ignition keys cannot be registered using the MUT-II.	2	54A-9
The engine does not start.(The engine cranks but does not fire.)	3	54A-9
Immobilizer-ECU power supply and earth circuit system check	4	54A-10

INSPECTION PROCEDURES FOR TROUBLE SYMPTOMS

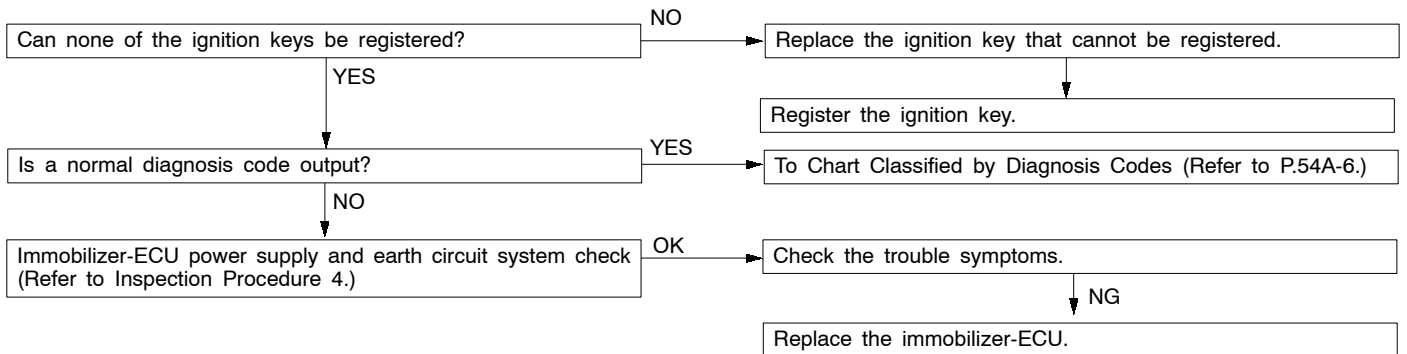
Inspection procedure 1

Diagnosis code No.1610 is generated by the engine-ECU.	Probable cause
The cause is probably a problem with communication between the engine-ECU and the immobilizer-ECU.	<ul style="list-style-type: none"> ● Malfunction of harness or connector ● Malfunction of engine-ECU ● Malfunction of immobilizer-ECU ● Malfunction of ignition key ● The ignition key has not been registered with the immobilizer-ECU.



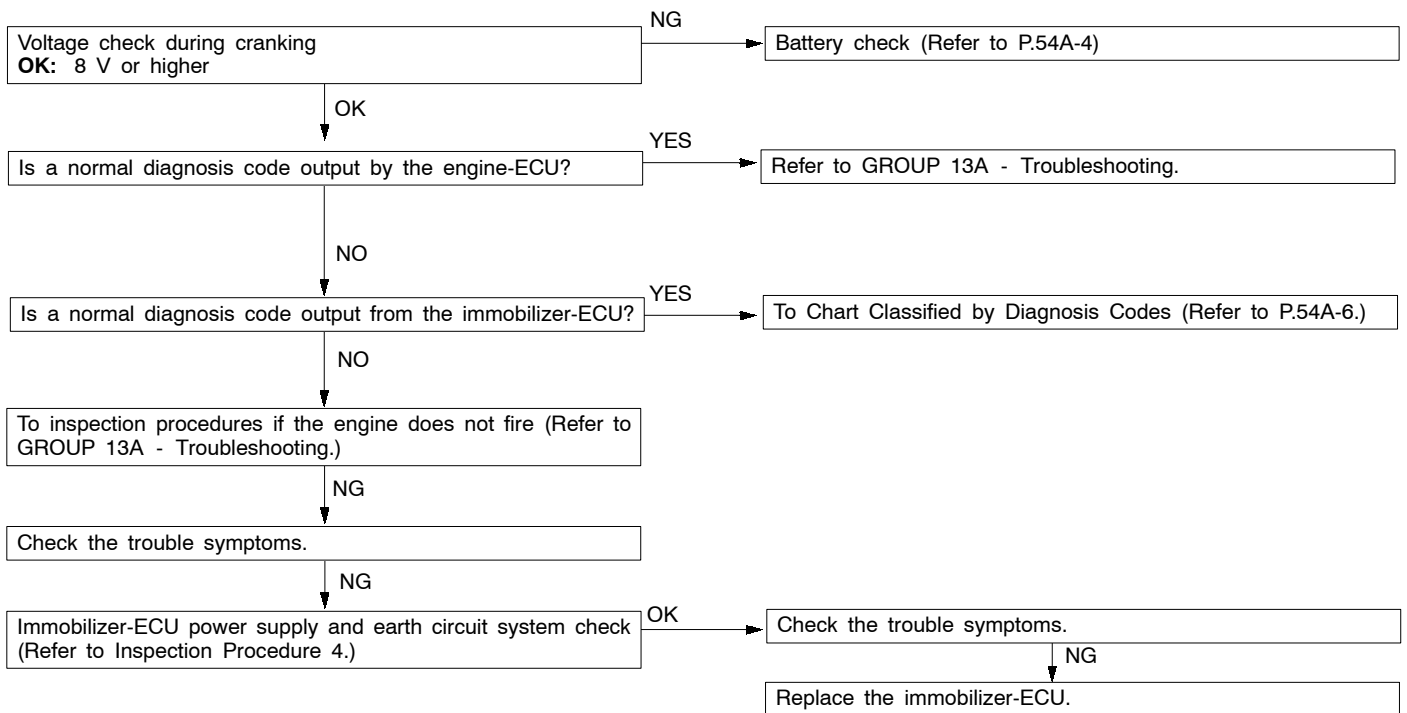
Inspection procedure 2

The ignition keys cannot be registered using the MUT-II.	Probable cause
The ignition key has not been registered with the immobilizer-ECU. Or that there is a problem with the immobilizer-ECU.	<ul style="list-style-type: none"> ● Malfunction of ignition key ● Malfunction of harness or connector ● Malfunction of immobilizer-ECU



Inspection procedure 3

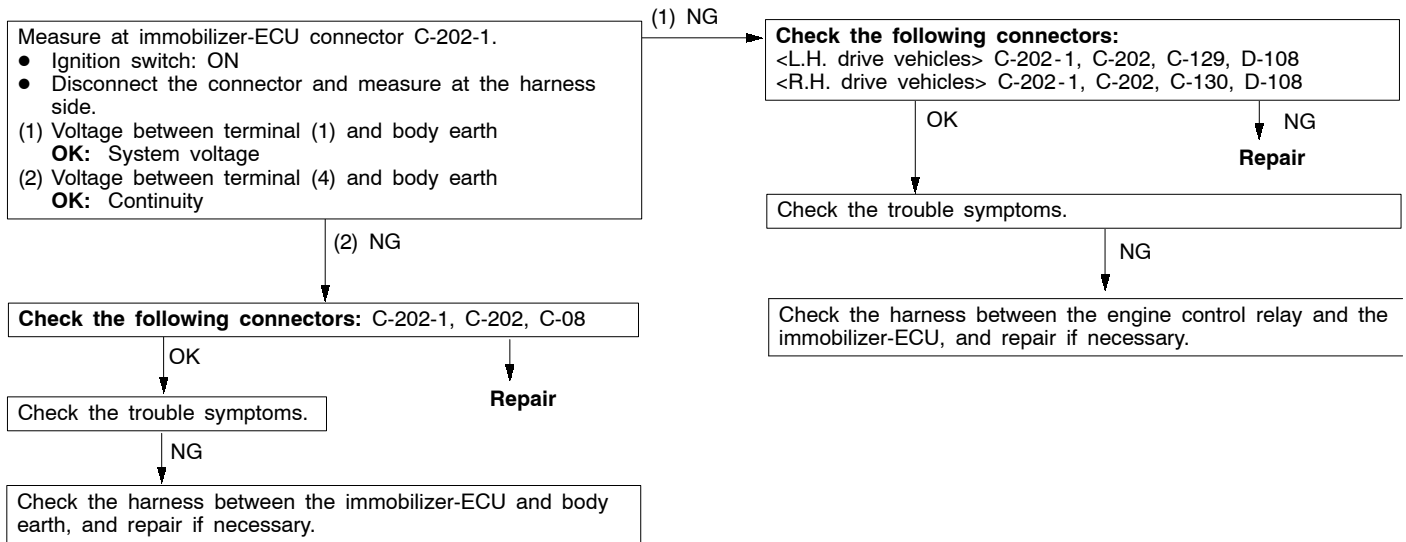
The engine does not start. (The engine cranks but does not fire.)	Probable cause
If the fuel injection does not operate, the cause is probably a problem with the immobilizer-ECU, or it could also be a problem with the MPI system. If an attempt has been made to start the engine with a key that has not been properly registered, the above symptom is a sign of normal operation.	<ul style="list-style-type: none"> ● Malfunction of MPI system. ● Malfunction of immobilizer-ECU



54A-10 CHASSIS ELECTRICAL - Ignition Switch and Immobilizer System

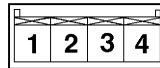
Inspection procedure 4

Immobilizer-ECU power supply and earth circuit system check



IMMOBILIZER-ECU CHECK

TERMINAL VOLTAGE CHECK TABLE

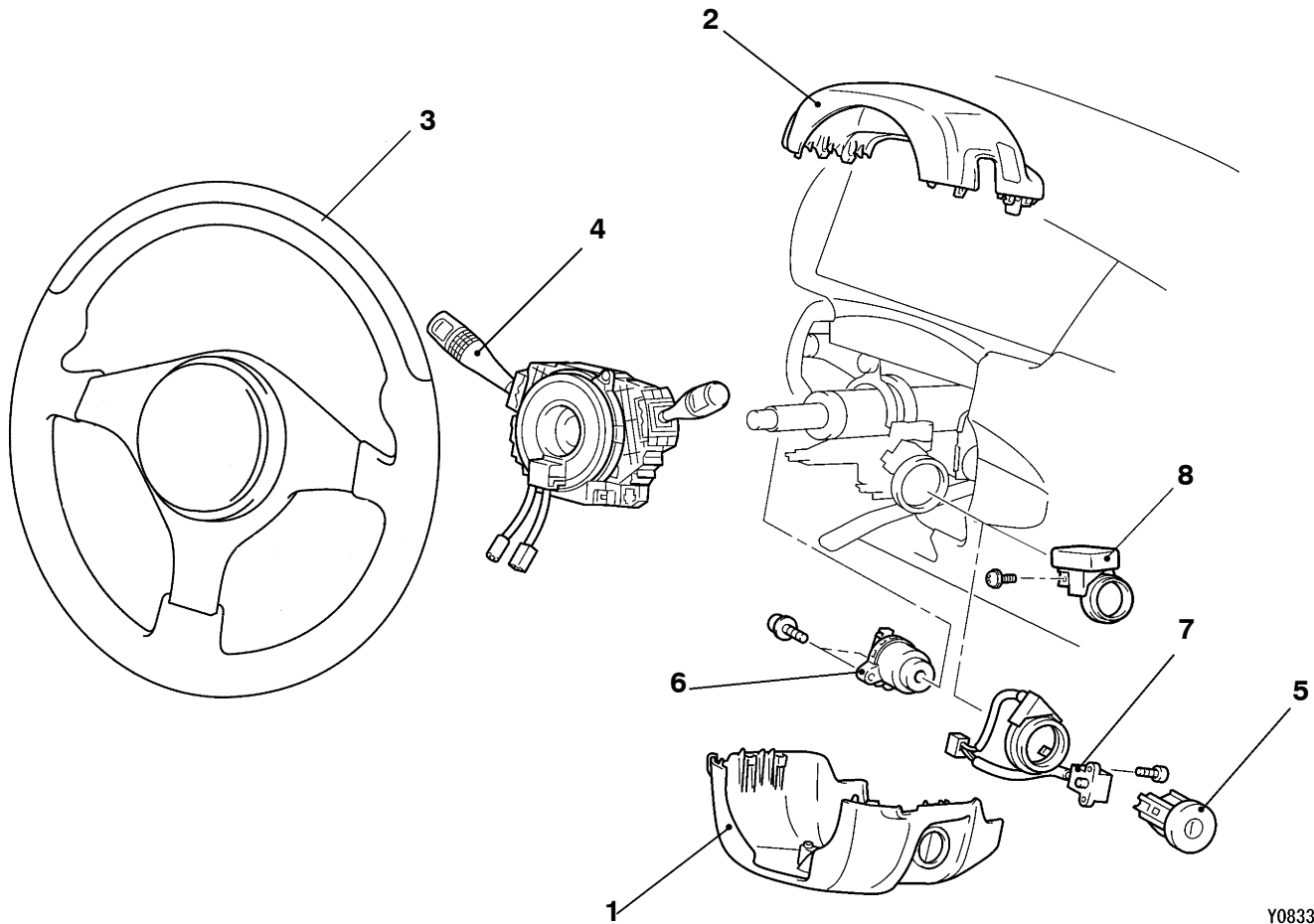


X1185CA

Terminal No.	Signal	Inspection conditions	Terminal voltage
1	Immobilizer-ECU power supply	Ignition switch: ON	System voltage
2	-	-	-
3	Engine-ECU	-	-
4	Immobilizer-ECU earth	At all times	0V

IGNITION SWITCH

REMOVAL AND INSTALLATION



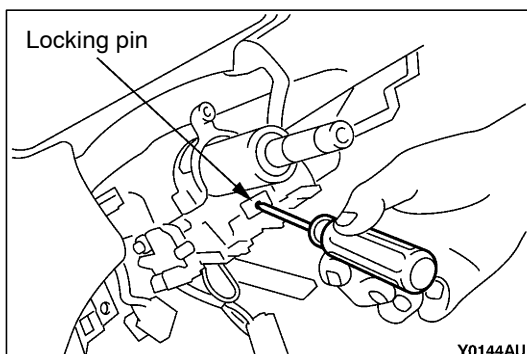
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Removal steps

1. Lower column cover (Refer to GROUP 52A - Instrument Panel.)
2. Upper column cover (Refer to GROUP 52A - Instrument Panel.)
3. Steering Wheel (Refer to GROUP 37A.)
4. Clock spring column switch assembly (Refer to GROUP 37A - Steering Shaft.)



5. Steering lock cylinder
6. Ignition switch
7. Key reminder switch
8. Immobilizer-ECU

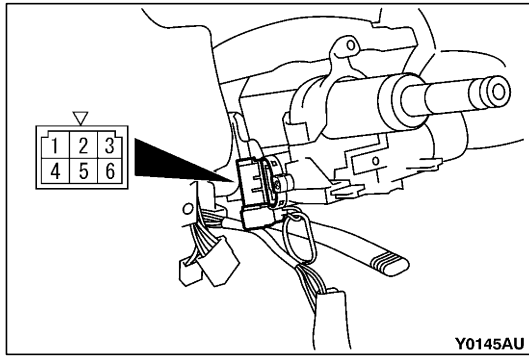


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REMOVAL SERVICE POINT

◀▶ STEERING LOCK CYLINDER REMOVAL

1. Insert key into steering lock cylinder to turn ignition key to "ACC" position.
2. Insert locking pin with small plus screwdriver, etc., and remove steering lock cylinder.

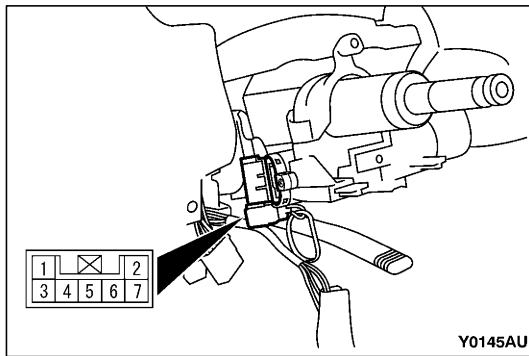


INSPECTION

IGNITION SWITCH CONTINUITY CHECK

With ignition switch installed on the vehicle, disconnect ignition switch connector for inspection.

Ignition key position	Terminal No.				
	1	2	4	5	6
LOCK					
ACC		○			○
ON		○	○	○	○
START		○	○	○	



KEY REMINDER SWITCH CONTINUITY CHECK

With key reminder switch installed on the vehicle, disconnect key reminder switch connector for inspection.

Ignition key status	Terminal No.	
	4	6
Remove	○	○
Insert		

ENCRYPTED CODE REGISTRATION METHOD AND RESETTING THE CODE TO THE FACTORY SETTING

Register the encrypted code in the immobilizer-ECU and then reset the code to the factory setting after parts have been replaced.

Replacement part	Encrypted code
Ignition key	Necessary
Immobilizer-ECU	Necessary
Engine-ECU*	Necessary

NOTE

*: If the engine-ECU is replaced, the immobilizer-ECU should be replaced. Each engine-ECU has an individual information for immobilizer-ECU, and the individual information is registered in the immobilizer-ECU.

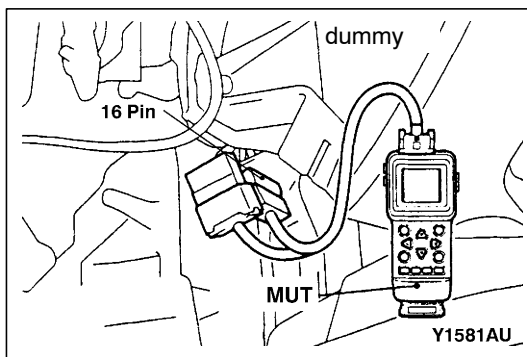
ENCRYPTED CODE REGISTRATION METHOD

If using an ignition key that has just been newly purchased, or if the immobilizer-ECU has been replaced, you will need to register the encrypted codes for each ignition key being used into the immobilizer-ECU. (A maximum of eight different encrypted codes can be registered.)

Moreover, when the immobilizer-ECU has been replaced, you will need to use the MUT-II to register the password that the user specifies into the immobilizer-ECU. (Refer to the MUT-II instruction manual for instructions on using the MUT-II.)

Caution

Because registering of the encrypted codes is carried out after all previously-registered codes have been erased, you should have ready all of the ignition keys that have already been registered.



1. Connect the MUT-II to the diagnosis connector.

Caution

Turn the ignition switch to LOCK (OFF) position before connecting or disconnecting the MUT-II.

2. Check that diagnosis code No. P1160 is not being generated by the each engine-ECU. If it is being generated check according to the Troubleshooting Procedures. (Refer to GROUP 13A - Troubleshooting.)
3. Use the ignition key that is to be registered to turn on the ignition switch.
4. Use the MUT-II to register the encrypted code. If you are registering two or more codes, use the next key to the registered to turn on the ignition switch without disconnecting the MUT-II.
5. Turn off the ignition switch.
6. Check that the engine can be started with each of the ignition keys.
7. Check the diagnosis output from the each engine-ECU, and erase code No. P1160 if it appears. (Refer to GROUP 13A - Troubleshooting.)
8. Disconnect the MUT-II. This completes the registration operation.

COMBINATION METER

Caution

Never remove pointer of combination meter. This may cause damage of combination meter.

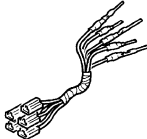
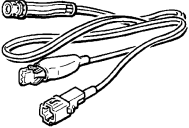
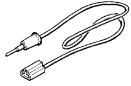

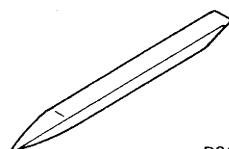
SERVICE SPECIFICATIONS

Item		Standard value	Limit value
Indication range of speedometer km/h	At 40 km/h	37 - 45	—
	At 80 km/h	75 - 88	—
	At 120 km/h	113 - 132	—
	At 160 km/h	150 - 176	—
Deflection of speedometer pointer (Vehicle speed: 35 km/h or more)		—	±3
Indication allowance of tachometer rpm	Engine Speed: 700 rpm	±70	—
	Engine Speed: 2,000 rpm	-100 +150	—
	Engine Speed: 3,000 rpm	-100 +225	—
	Engine Speed: 4,000 rpm	-125 +275	—
	Engine Speed: 5,000 rpm	-125 +325	—
	Engine Speed: 6,000 rpm	-125 +375	—
	Engine Speed: 7,000 rpm	-100 +400	—
	Engine Speed: 8,000 rpm	+400	—
Basic resistance of fuel gauge unit Main (SUB) Ω	Position F	2 ± 1 (2 ± 1)	—
	Position E	41 ± 1 (69 ± 1)	—
Float height of fuel gauge unit Main (SUB) mm	Position F	33.3 (10.7)	—
	Position E	121.9 (138.6)	—
Basic resistance of water temperature gauge unit Ω	70°C	104 ± 13.5	—
Internal resistance of combination meter Ω	Terminal No. 1 - 50	233 ± 3	—
	Terminal No. 1 - 51	181 ± 2	—

SEALANT

Item	Specified sealant	Remark
Water temperature gauge unit	3M ATD Part No.1215 or equivalent	Semi-drying sealant

SPECIAL TOOLS

Tools	Number	Name	Use
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>C991223</p>	<p>MB991223</p> <p>A: MB991219</p> <p>B: MB991220</p> <p>C: MB991221</p> <p>D: MB991222</p>	<p>Harness set</p> <p>A: Inspection harness</p> <p>B: LED Harness</p> <p>C: LED Harness Adapter</p> <p>D: Probe</p>	<p>Brief test for fuel gauge and water temperature gauge</p> <p>A: For inspection of connector pin contact pressure</p> <p>B: For inspection of power circuit</p> <p>C: For inspection of power circuit</p> <p>D: For connecting commercially available tester</p>
 <p>B990784</p>	<p>MB990784</p>	<p>Ornament remover</p>	<p>Meter bezel removal</p>

TROUBLESHOOTING**DIAGNOSIS FUNCTION****INPUT SIGNAL INSPECTION PROCEDURE**

Connect MUT-II or voltmeter to diagnostic connector to perform input inspection. (Refer to GROUP 00 - How to Use Troubleshooting and Inspection Procedure.)

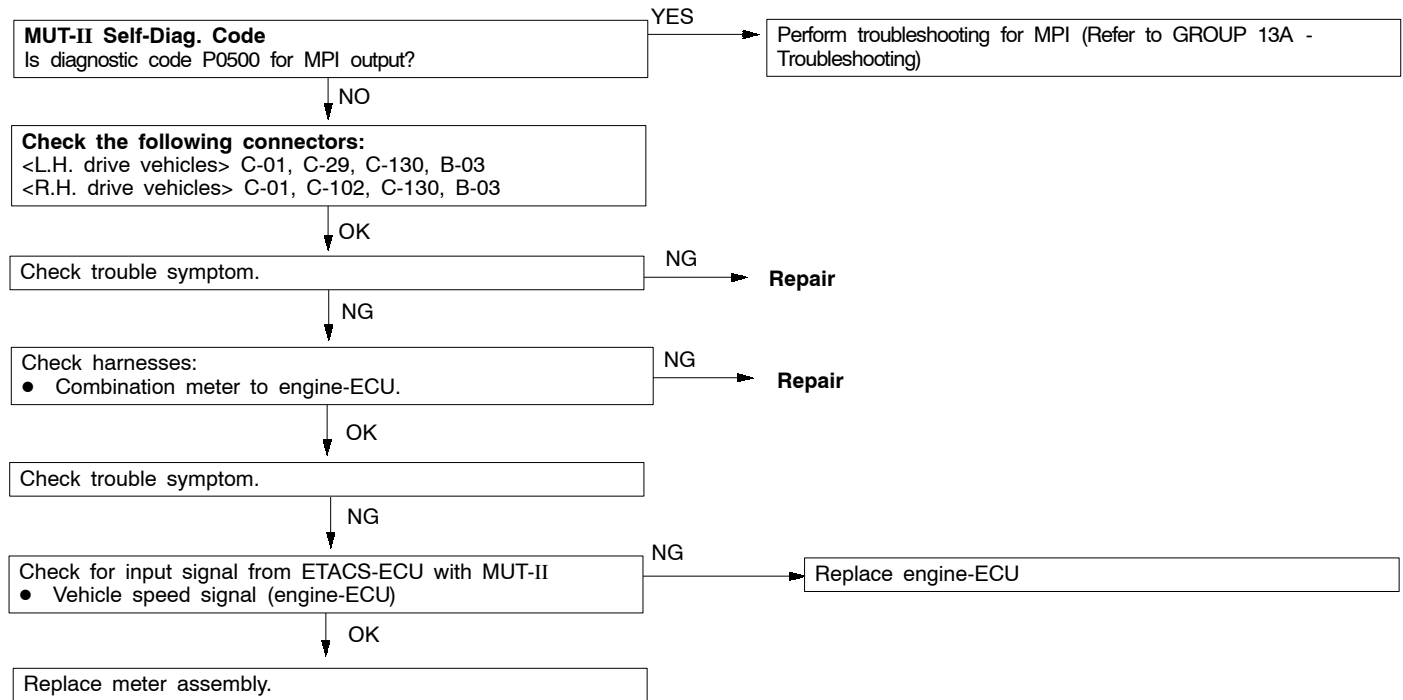
INSPECTION CHART FOR DIAGNOSIS CODES

Trouble symptom	Inspection procedure No.	Reference page
Speedometer inoperative (other meters are operated)	1	54A-16
Tachometer inoperative (other meters are operated)	2	54A-16
Fuel gauge inoperative (other meters are operated)	3	54A-17
Water temperature gauge inoperative (other meters are operated)	4	54A-18
All meters inoperative	5	54A-19

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection procedure 1

Speedometer inoperative (other meters are operated)	Probable cause
Failure may occur on engine-ECU system, harnesses, connectors, meter assembly.	<ul style="list-style-type: none"> • Engine-ECU fault • Harness or connector fault • Meter assembly fault

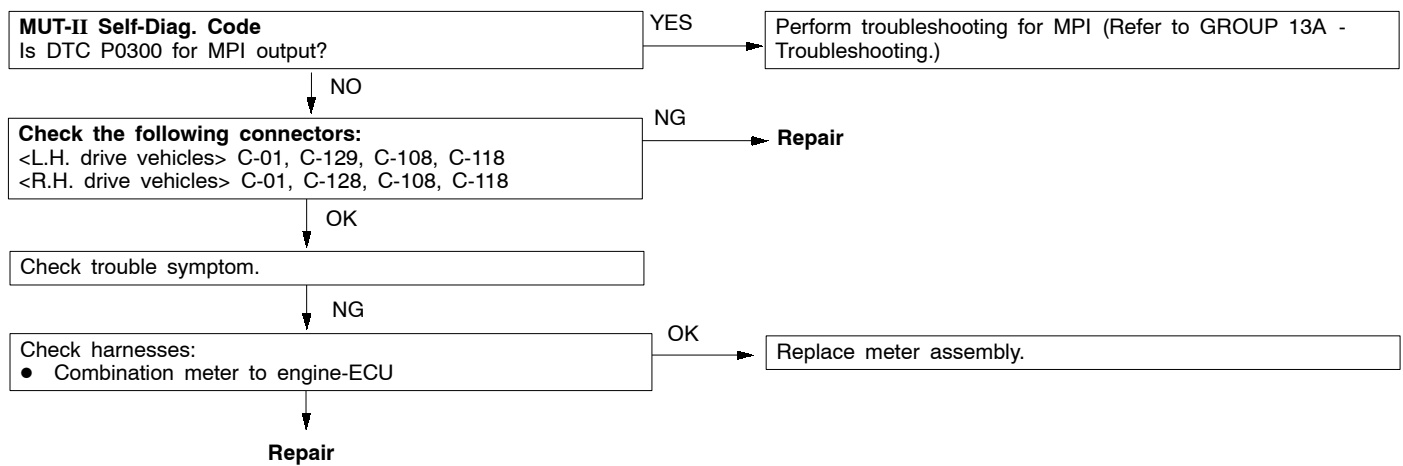


NOTE

When vehicle speed signal is checked with MUT-II in the ETACS-ECU input signal test, drive the vehicle with MUT-II connected to diagnostic connector. When the buzzer sounds, this test is evaluated OK.

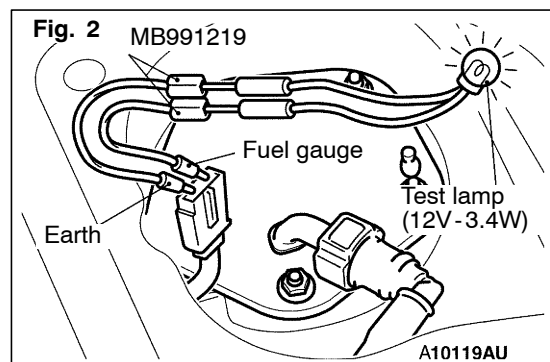
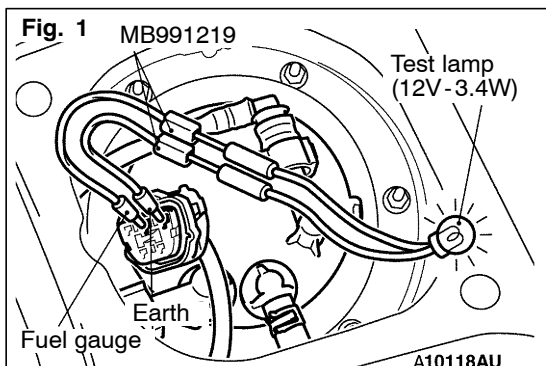
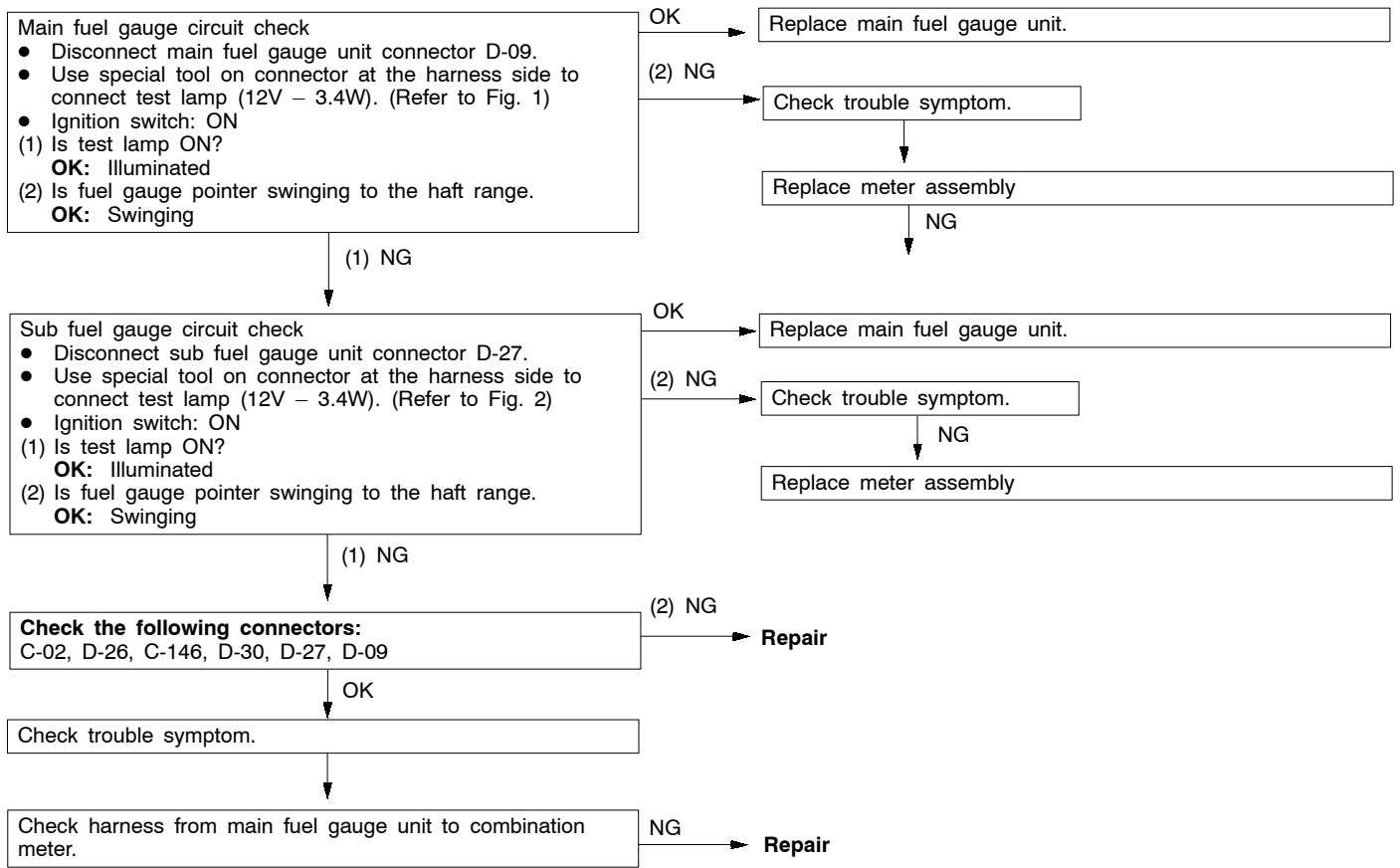
Inspection procedure 2

Tachometer inoperative (other meters are operated)	Probable cause
No input of ignition signal from engine, or failure may occur on power and earth circuits of meter.	<ul style="list-style-type: none"> • Harness or connector fault • Meter assembly fault



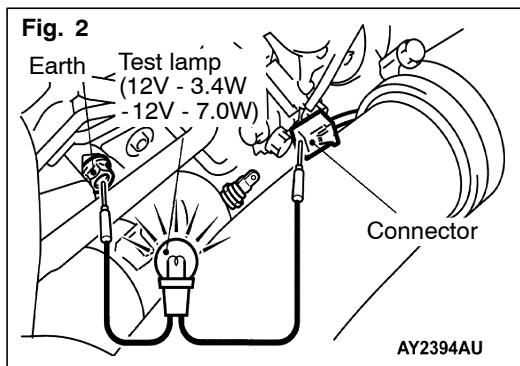
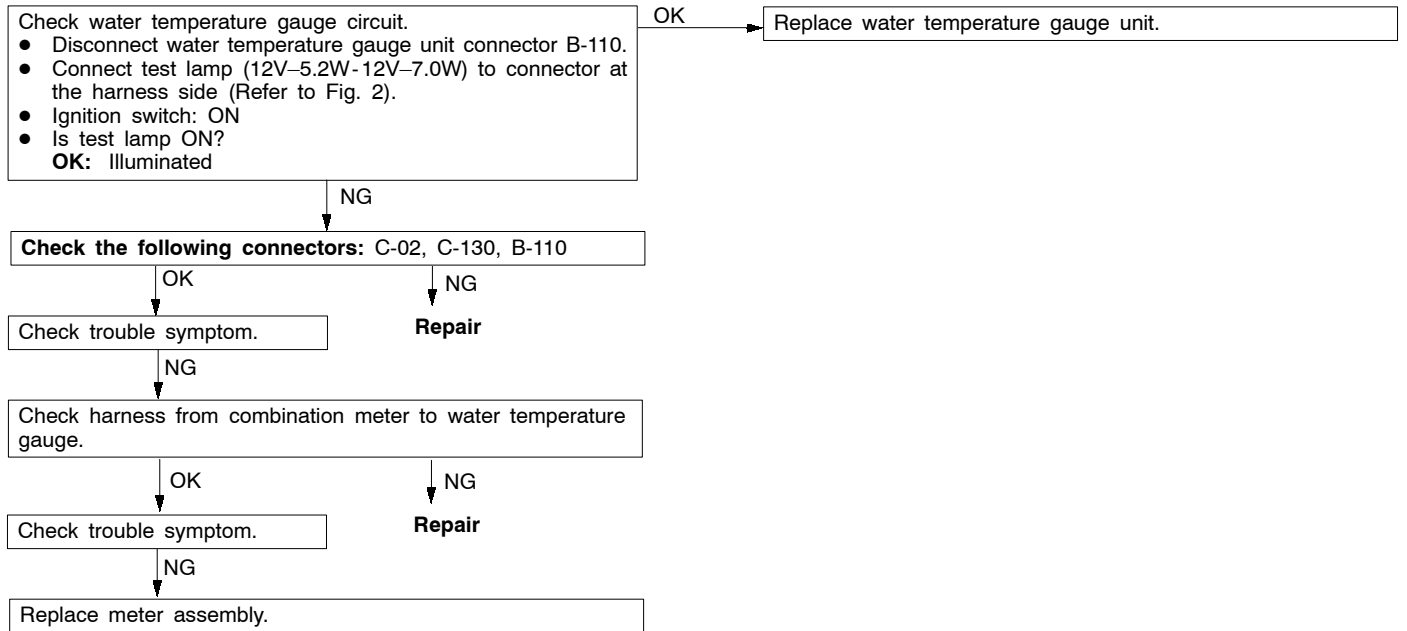
Inspection procedure 3

Fuel gauge inoperative (other meters are operated)	Probable cause
When speedometer and tachometer are properly operated, harness from power source to combination meter is normal.	<ul style="list-style-type: none"> ● Fuel gauge unit fault ● Harness or connector fault ● Meter assembly fault



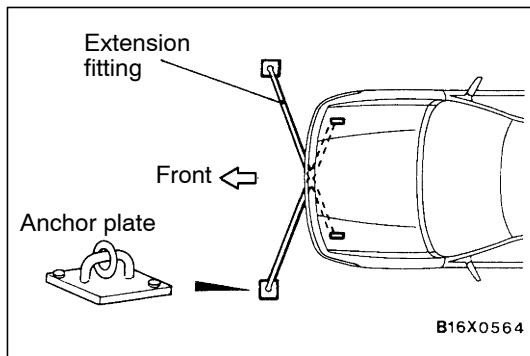
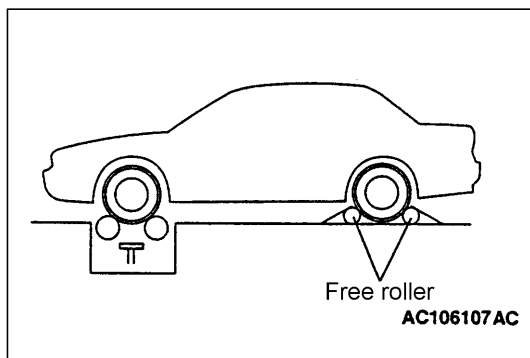
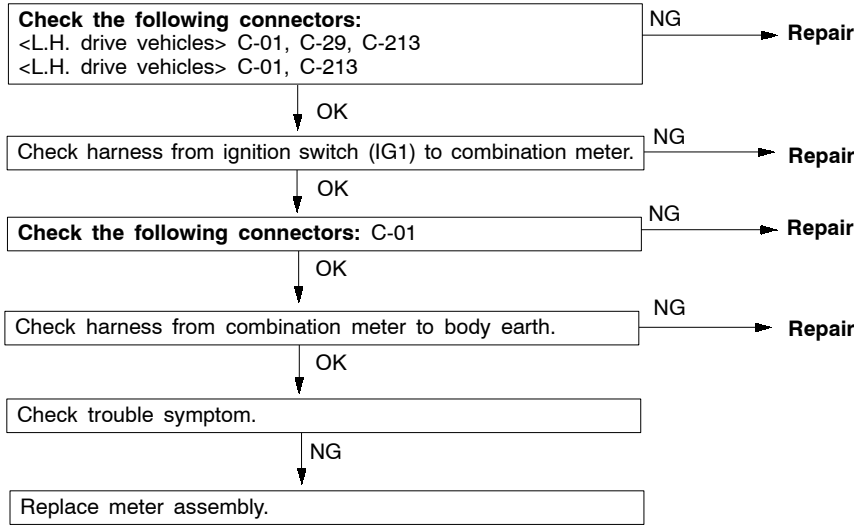
Inspection procedure 4

Water temperature gauge inoperative (other meters are operated)	Probable cause
When speedometer and tachometer are properly operated, harness from power source to combination meter is normal.	<ul style="list-style-type: none"> ● Water temperature gauge unit fault ● Harness or connector fault ● Meter assembly fault



Inspection procedure 5

All meters inoperative	Probable cause
When individual indicators and warning lamps are properly operated, harness from power source (IG1) to combination meter is normal.	<ul style="list-style-type: none"> • Meter assembly fault • Harness or connector fault



ON-VEHICLE SERVICE

SPEEDOMETER CHECK

- (1) Ensure that tire pressure indicates the value of tire pressure label.
- (2) Place the vehicle on speedometer tester.
- (3) Set the free rollers securely under rear wheels.
- (4) For prevention of front wheel lateral runout, install extension fittings on front towing eye and tie down hook, and install both ends on anchor plate.
- (5) For prevention of vehicle from starting out, install chain or wire (the other end of which is tightly fixed on rear towing eye) on the vehicle.
- (6) Ensure that speedometer indication range is within standard value, or pointer deflection is within limit value.

Caution

During operation, avoid excessive acceleration and deceleration.

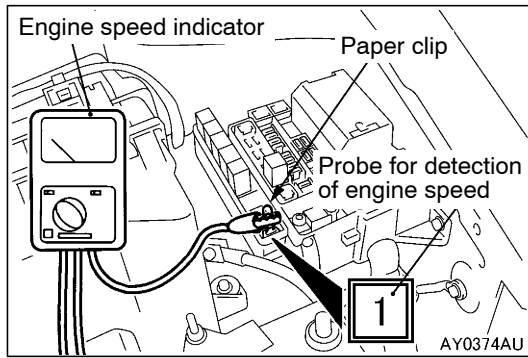
Standard value:

Vehicle speed km/h	40	80	120	160
Indication range of speedometer km/h	37 - 45	75 - 88	113 - 132	150 - 176

Limit:

Pointer deflection

(vehicle speed: 35 km/h or more): ±3 km/h

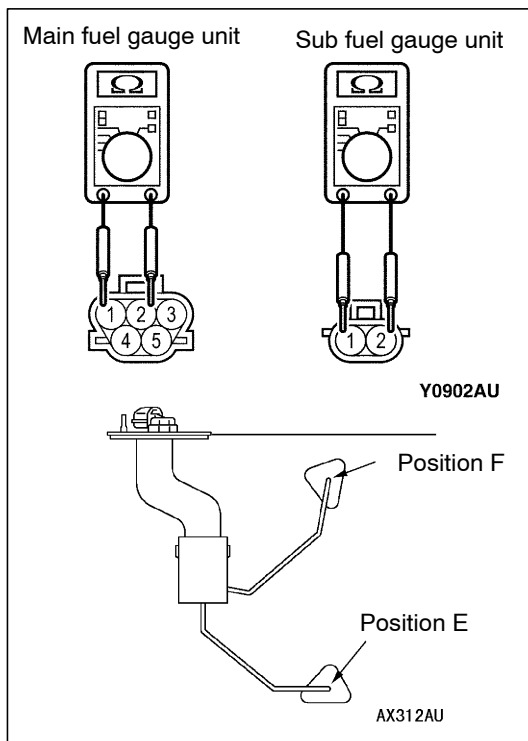


TACHOMETER CHECK

1. Insert paper clip (Zem clip) from harness side of the probe for detection of engine speed to connect engine speed indicator.
2. Compare measured values of individual engine speed with tachometer values, and ensure that indication allowance is within standard value.

Standard value:

Engine speed (rpm)	Indication allowance of tachometer rpm
700	± 70
2,000	-100 +150
3,000	-100 +225
4,000	-125 +275
5,000	-125 +325
6,000	-125 +375
7,000	-100 +400
8,000	+400



FUEL GAUGE UNIT CHECK

Remove fuel gauge unit from fuel tank.

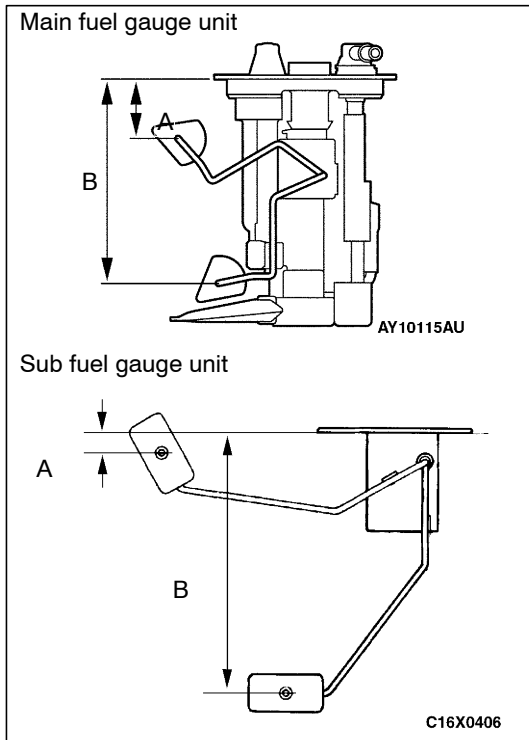
BASIC RESISTANCE OF FUEL GAUGE UNIT

1. When float of fuel gauge unit is in Position F and E, ensure that resistance between fuel gauge unit terminal and earth terminal is within standard value.

Standard Value:

Float Position	Main fuel gauge unit	Sub fuel gauge unit
Position F	$2 \pm 1 \Omega$	$2 \pm 1 \Omega$
Position E	$41 \pm 1 \Omega$	$69 \pm 1 \Omega$

2. When float is moved slowly between Position F and E, also ensure that resistance is smoothly changing.

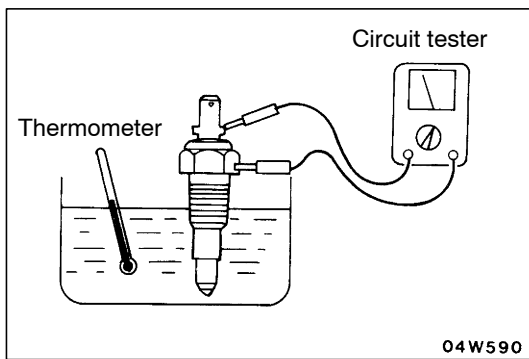


FLOAT HEIGHT OF FUEL GAUGE UNIT

When float is moved to contact float arm on stopper, ensure that Position F (A) and E (B) are within standard value.

Standard Value:

Float Position	Main fuel gauge unit	Sub fuel gauge unit
Position F (A)	33.3 mm	10.7 mm
Position E (B)	121.9 mm	138.6 mm



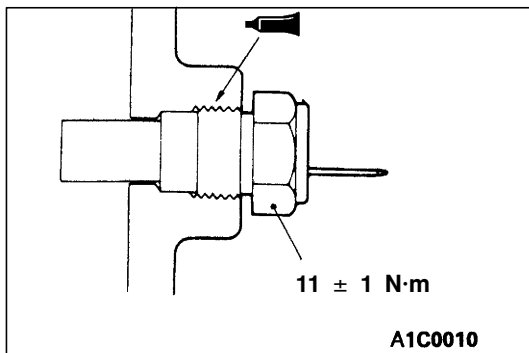
ENGINE COOLANT TEMPERATURE GAUGE UNIT CHECK

1. Drain coolant. (Refer to GROUP 14 - On-vehicle Service)
2. Remove water temperature gauge unit.
3. Put water temperature gauge unit into the hot water in specified temperature, and ensure that basic resistance is within standard value.

Standard value: 70°C 104 ± 13.5 Ω

Reference value:

Temperature	Resistance Ω
50°C	230
60°C	155
80°C	73



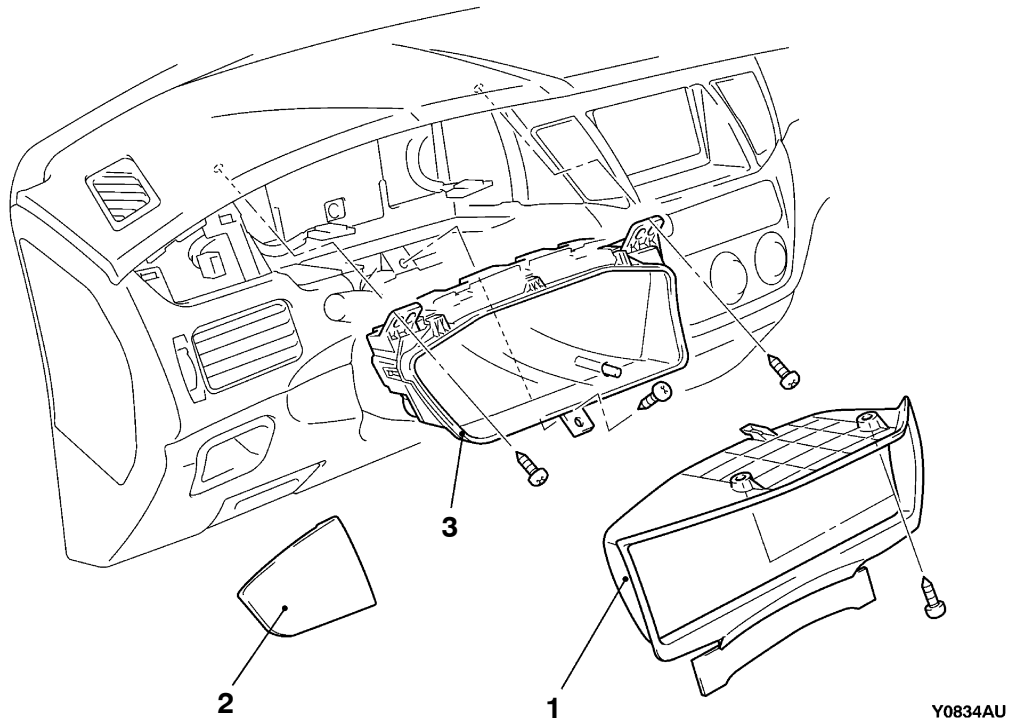
4. After inspection, apply specified sealant at threads of water temperature gauge unit, and tighten to the specified torque.

Semi-drying sealant: 3M ATD Part No.1215 or equivalent

5. Refill coolant. (Refer to GROUP 14 - On-vehicle Service.)

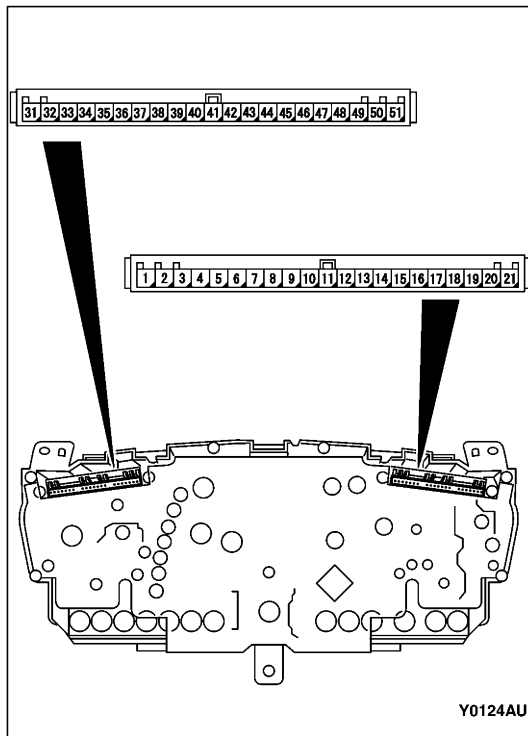
COMBINATION METER

REMOVAL AND INSTALLATION



Removal steps

1. Meter bezel
2. Instrument panel ornament
3. Combination meter



INSPECTION

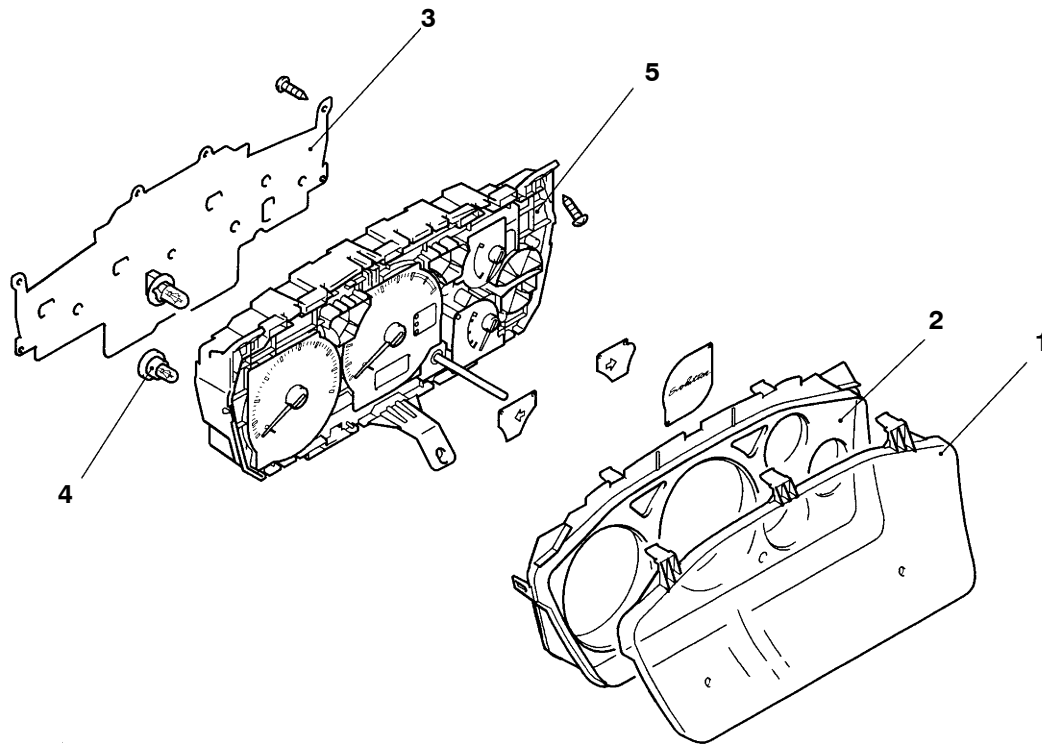
COMBINATION METER INTERNAL RESISTANCE CHECK

Use circuit tester to measure combination meter internal resistance.

Standard Value:

Measuring terminal No.	Terminal name	Standard value Ω
1-50	Water temperature gauge to earth	233 ± 3
1-51	Fuel gauge to earth	181 ± 2

DISASSEMBLY AND REASSEMBLY



AY2106AU

Disassembly step

1. Glass
2. Window plate
3. Circuit board cover

4. Bulb
5. Meter assembly

HEADLAMP ASSEMBLY

SERVICE SPECIFICATIONS

Item			Standard value	Limit
Headlamp aiming	Low beam	Vertical direction	120mm (0.69°) below horizontal line (H)	$\pm 0.29^\circ$
		Horizontal direction	Position at which the startup point of 15° is crossed with vertical line (V)	$\pm 0.5^\circ$
	High beam	Vertical direction	The center of high intensity zone is on the point of intersection of line (H) and line (V).	$- 0.5^\circ$ of the point of intersection of line (H)
		Horizontal direction	The center of high intensity zone is on the point of intersection of line (V).	$\pm 0.5^\circ$ of the center of line (V)
Measurement of headlamp illuminous intensity (at high beam)			—	30,000 cd or more per one headlamp

NOTES ON HEADLAMP ASSEMBLY:

Plastic outer lens are equipped with headlamp assembly. For handling, care should be taken for the following items:

- Headlamps should not be illuminated for more than 3 minutes with scratch preventive protectors, etc. covered on them.
- Masking such as taping should not be attached on outer lens.
- Outer lens surface should not be rubbed with a sharp-edged tool, etc.
- Specified wax remover should be used for insistently washing.
- Authorized Mitsubishi Genuine bulbs should be used.

TROUBLESHOOTING

Headlamps are controlled smart wiring system (SWS). For troubleshooting, refer to GROUP 54B.

NOTE

When ETACS-ECU is defective, headlamps can be illuminated only in a low beam mode as fail-safe function.

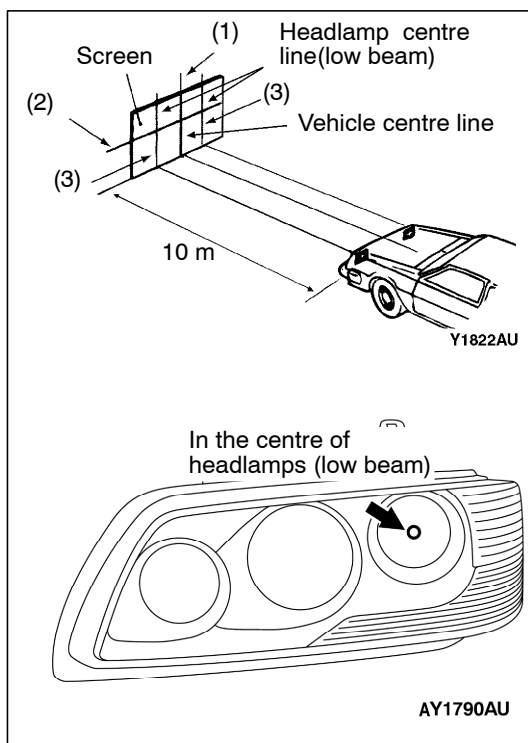
ON-VEHICLE SERVICE

HEADLAMP AIMING

PRE-AIMING INSTRUCTION

1. Inspect for badly rusted or faulty headlamp assemblies.
2. These conditions must be corrected before a satisfactory adjustment can be made.
3. Inspect tyres inflation, and adjust if necessary.

4. If the fuel tank is not full, place a weight in luggage room of vehicle to simulate weight of a full tank 0.8 kg per litre.
5. There should be no other load in the vehicle other than driver or substituted weight of approximately 75 kg placed in driver's position.
6. Thoroughly clean headlamp lenses.
7. Place the vehicle on a level floor, perpendicular to a flat screen 10m away from the bulb center-marks on the headlamp lens.
8. Rock vehicle sideways to allow vehicle to assume its normal position.
9. Bounce the front suspension through three (3) oscillations by applying the body weight to hood or bumper.

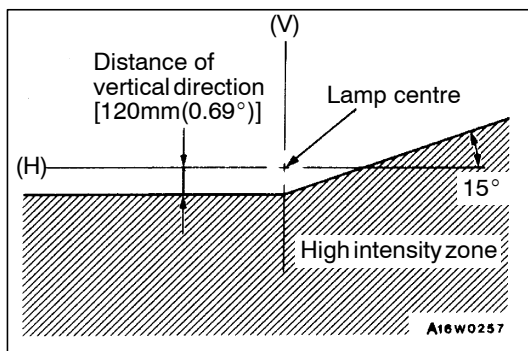


HEADLAMP ADJUSTMENT

<USING A SCREEN>

Low Beam Adjustment

1. Four lines of adhesive tape (or equivalent markings) are required on screen or wall:
 - (1) Position a vertical tape or mark so that it is aligned with the vehicle centre line.
 - (2) Measure the distance from the centre-marks on the low beam headlamp lens to the floor. Transfer the measurement to the screen. Horizontal tape or mark on the screen is for reference of vertical adjustment.
 - (3) Measure the distance from the centre line of the vehicle to the centre of each low beam headlamp. Transfer the measurement to the screen. Vertical tape or mark on the screen with reference to the centre line of each low beam headlamp bulb.



2. Check if the low beam shining onto the screen is at the standard value.

Standard value:

(Vertical direction)

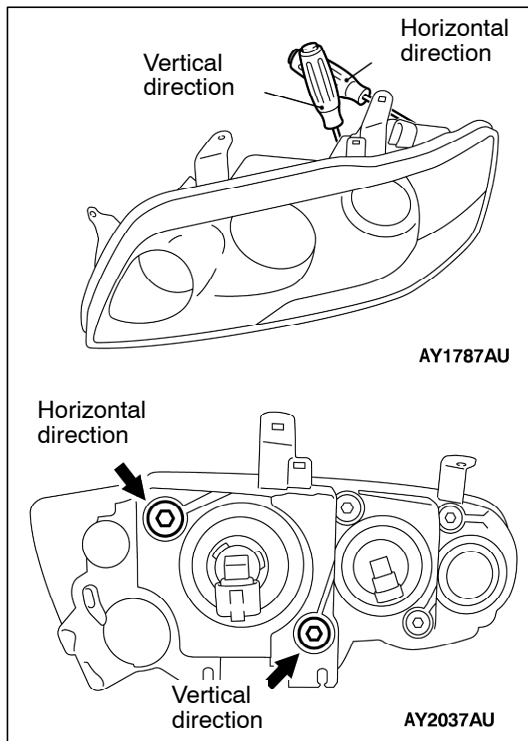
120 mm (0.69°) below horizontal line (H)

(Horizontal direction)

Position at which the startup point of 15° is crossed with vertical line (V)

Limit:**(Vertical direction) $\pm 0.29^\circ$** **(Horizontal direction) $\pm 0.5^\circ$** **NOTE**

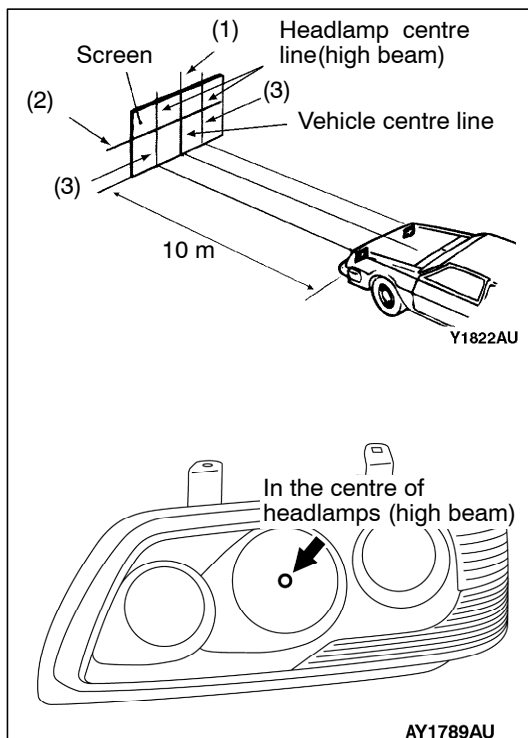
The illustration shows L.H. drive vehicles. For R.H. drive vehicles, it is symmetrical.



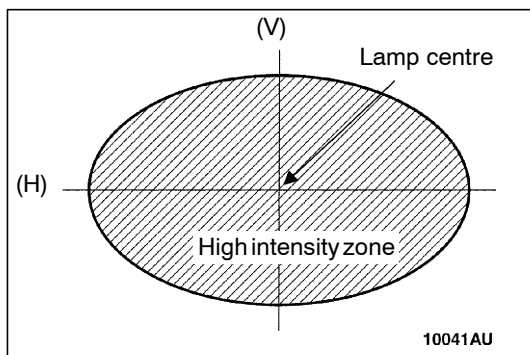
- Alternately turn the adjusting screw to adjust the headlamp low beam aiming.

Caution

Be sure to adjust the aiming adjustment screw in the tightening direction.

**High Beam Adjustment**

- Four lines of adhesive tape (or equivalent markings) are required on screen or wall:
 - Position a vertical tape or mark so that it is aligned with the vehicle centre line.
 - Measure the distance from the centre-marks on the high beam headlamp lens to the floor. Transfer the measurement to the screen. Horizontal tape or mark on the screen is for reference of vertical adjustment.
 - Measure the distance from the centre line of the vehicle to the centre of each high beam headlamp. Transfer the measurement to the screen. Vertical tape or mark on the screen with reference to the centre line of each high beam headlamp bulb.



2. Check if the high beam shining onto the screen is at the standard value.

Standard value:

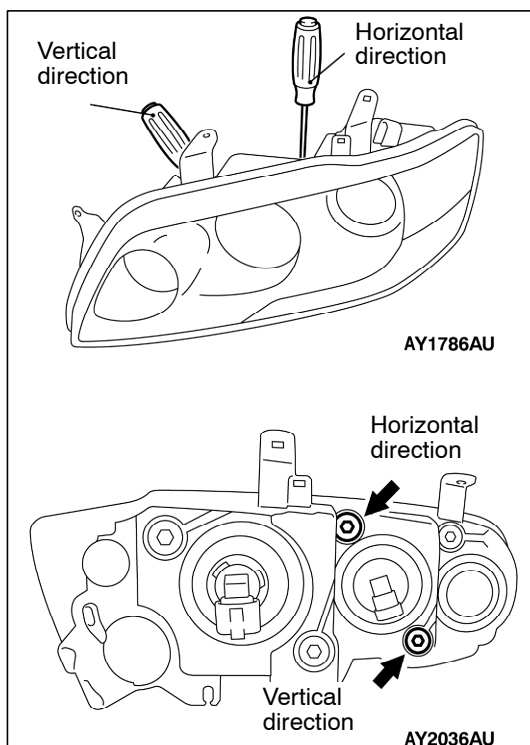
(Vertical and horizontal direction)

The center of high intensity zone is on the point of intersection of line (H) and line (V).

Limit:

(Vertical direction) -0.5° of the point of intersection of line (H)

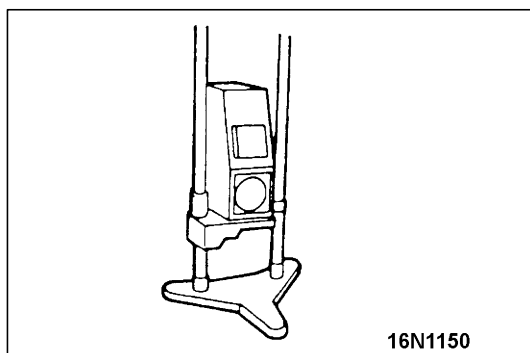
(Horizontal direction) $\pm 0.5^\circ$ of the center of line (V)



3. Alternately turn the adjusting screw to adjust the headlamp high beam aiming.

Caution

Be sure to adjust the aiming adjustment screw in the tightening direction.



<USING A BEAM SETTING EQUIPMENT>

1. The headlamps should be aimed with the proper beam setting equipment, and in accordance with the equipment manufacture's instructions.

NOTE

If there are any regulations pertinent to the aiming of headlamps in the area where the vehicle is to be used, adjust so as to meet those requirements.

2. Alternately turn the adjusting screw to adjust the headlamp aiming. (Refer to P.54A-24.)

HEADLAMP INTENSITY MEASUREMENT

1. Using a photometer, and following its manufacture's instruction manual.
2. Maintain an engine speed of 2,000 r/min., with the battery in the charging condition
3. Set the headlamps to high beam
4. Measure the headlamp centre intensity (a point of H line and V line) and check to be sure that the limit value is satisfied.

Limit:

High beam 30,000 cd or more per one headlamp

NOTE

1. There may be special local regulations pertaining to headlamp intensity, be sure to make any adjustments necessary to satisfy such regulations.
2. If an illuminometer is used to make the measurements, convert its values to photometer values by using the following formula.

$I = Er^2$ Where:

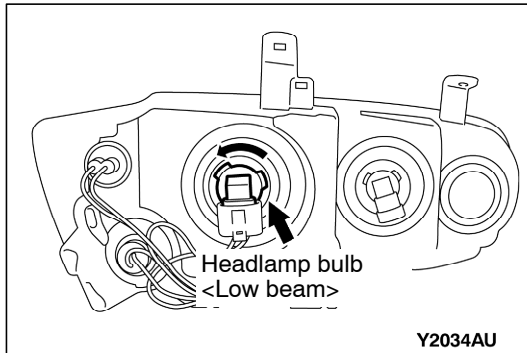
I=intensity (cd)

E=illuminometer (lux)

r=distance (m) from headlamps to illuminometer

Caution

1. **On the headlamp not yet adjusted, perform aiming with connector removed and the lamps switched off, if applicable. In addition, care should be taken to prevent a change of optical axis when connector is reconnected.**
2. **Plastic outer lens are equipped with headlamps. When lens surface is covered with materials for not penetrating light, headlamp operation time should be within 3 minutes. In addition, masking such as taping should not be performed.**

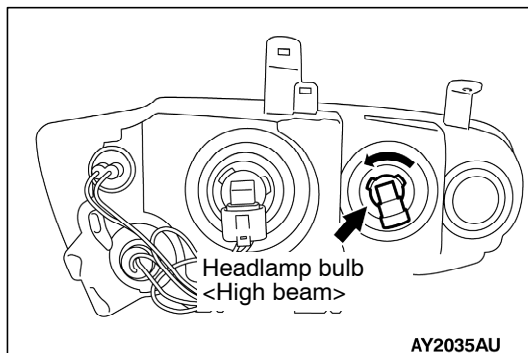


HEADLAMP BULB (LOW BEAM) REPLACEMENT

- (1) Disconnect battery.
- (2) Disconnect connector.
- (3) Screw out socket to pull out bulb.
- (4) After bulb is replaced, properly reconnect connector.

Caution

Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

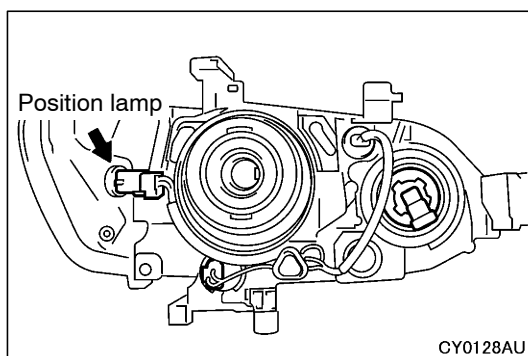


HEADLAMP BULB (HIGH BEAM) REPLACEMENT

- (1) Disconnect battery.
- (2) Disconnect connector.
- (3) Screw out socket to pull out bulb.
- (4) After bulb is replaced, properly reconnect connector.

Caution

Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

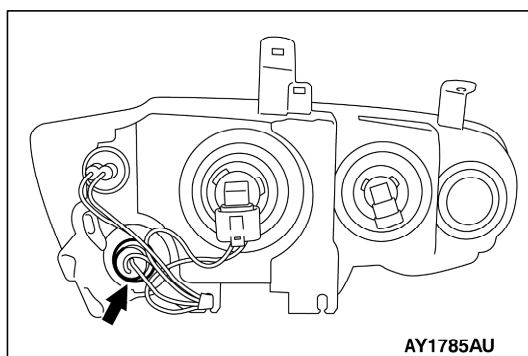


POSITION LAMP BULB REPLACEMENT

1. Remove the splash shield.
2. Disconnect the connector and remove the socket of the position lamp by turning to left.

Caution

Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.



FRONT TURN-SIGNAL LAMP BULB REPLACEMENT

1. Remove the splash shield.
2. Disconnect the connector and remove the socket of the front turn signal lamp by turning to left.

Caution

Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

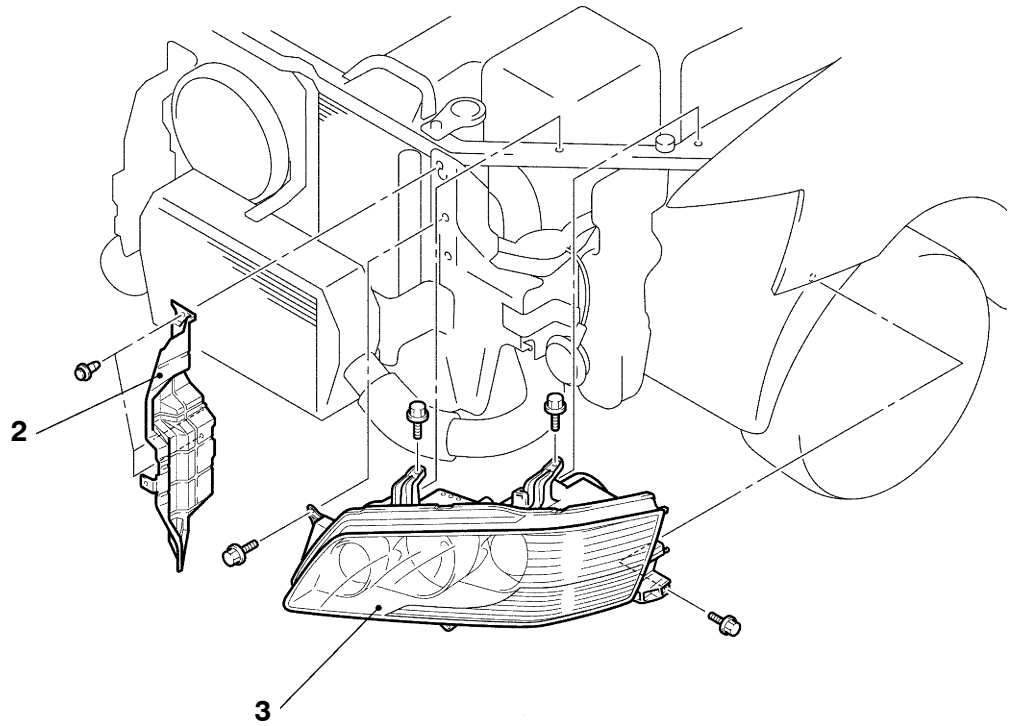
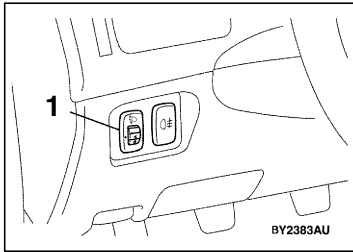
HEADLAMP AUTO CUT ADJUSTMENT PROCEDURE

Headlamps are controlled smart wiring system (SWS). For adjustment procedure of headlamp auto lamp and headlamp auto cut, refer to GROUP 54B.

HEADLAMP AUTO CUT FUNCTION CHECK

When lighting switch is turned ON (to HEAD position) with ignition switch removed from ignition key cylinder and driver's door is opened, ensure that headlamps are switched off after one second. When headlamps are inoperative, perform troubleshooting. (Refer to GROUP 54B.)

HEADLAMP ASSEMBLY REMOVAL AND INSTALLATION



AY2103AU

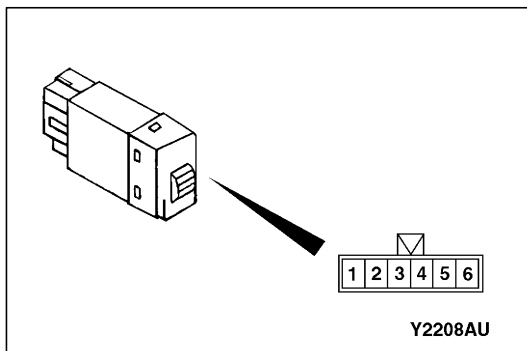
1. Headlamp leveling switch

2. Air guide panel

Headlamp removal steps

3. Headlamp assembly

- Front bumper (Refer to GROUP 51)



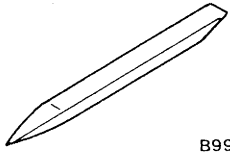
INSPECTION

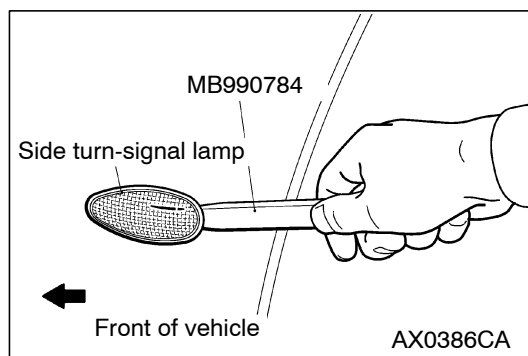
HEADLAMP LEVELING SWITCH CONTINUITY CHECK

Switch Position	Resistance between the terminal 4 and 5 (Ω)
0	120
1	300
2	620
3	1.1 k
4	2 k

SIDE TURN-SIGNAL LAMP

SPECIAL TOOL

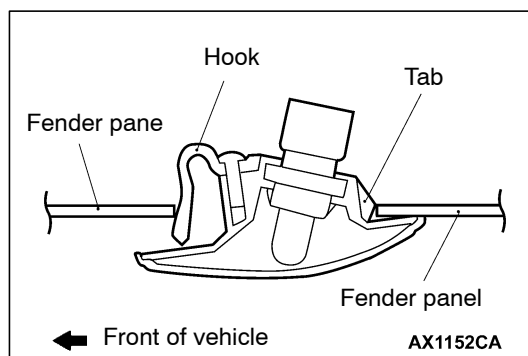
Tools	Number	Name	Use
 B990784	MB990784	Ornament remover	Side turn-signal lamp removal



SIDE TURN-SIGNAL LAMP

REMOVAL SERVICE POINT

Use special tool, etc. to press and deflect hook to vehicle front from fender, and unhook the pawls to remove side turn-signal lamp.



INSTALLATION SERVICE POINT

Insert pawls into fender panel and install side turn-signal lamp.

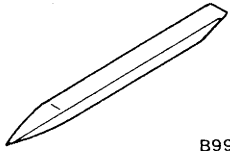
ROOM LAMP

TROUBLESHOOTING

For troubleshooting of room lamp, refer to GROUP 54B.

REAR COMBINATION LAMP

SPECIAL TOOL

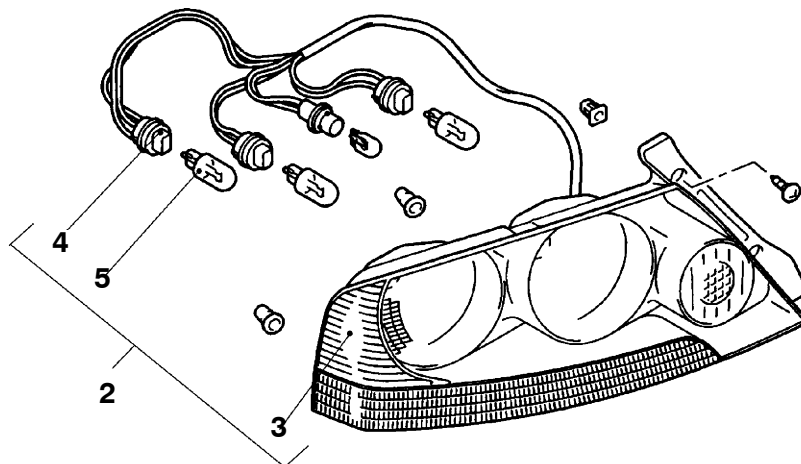
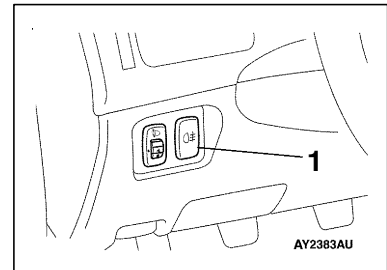
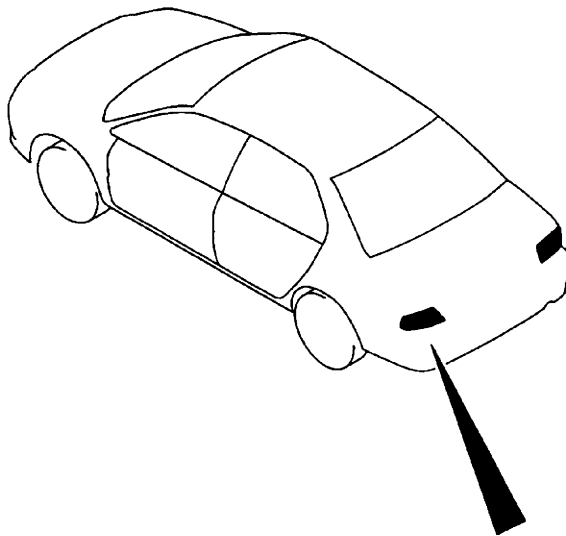
Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Rear combination lamp removal

TROUBLESHOOTING

For troubleshooting on rear combination lamps, refer to GROUP 54B.

REAR COMBINATION LAMP

REMOVAL AND INSTALLATION



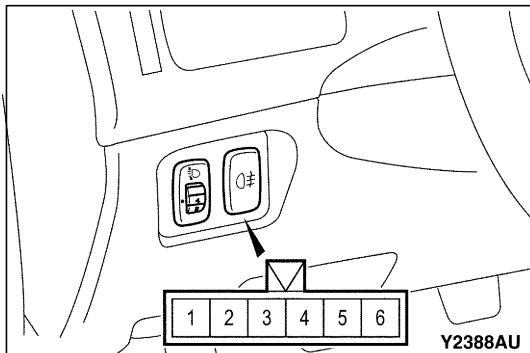
AY2156AU

1. Rear fog lamp switch

Removal steps

2. Rear combination lamp assembly
3. Rear combination lamp body

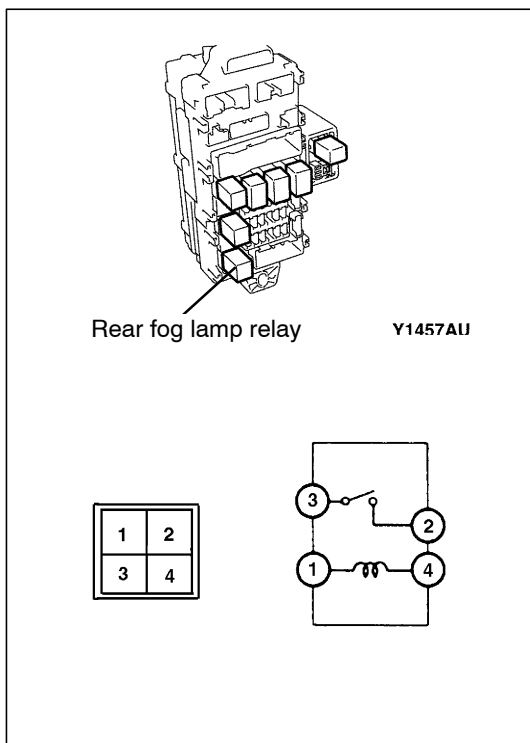
4. Socket assembly
5. Bulb



INSPECTION

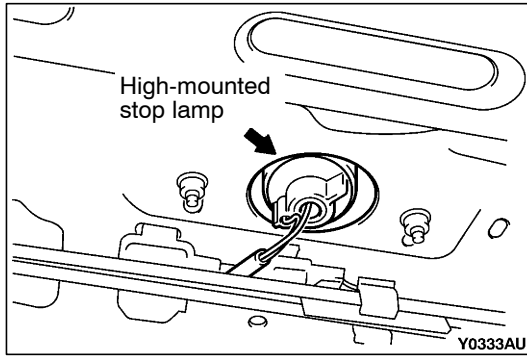
REAR FOG LAMP SWITCH CONTINUITY CHECK

Switch position	Terminal No.						
	1	2	3		4	5	6
ON			○	ILL	○	○	○
OFF			○	ILL	○		



REAR FOG LAMP RELAY CONTINUITY CHECK

Battery Voltage	Terminal No.			
	1	4	2	3
De-energized	○	○		
Energized	⊕	⊖	○	○



HIGH-MOUNTED STOP LAMP

ON-VEHICLE SERVICE

HIGH-MOUNTED STOP LAMP BULB REPLACEMENT

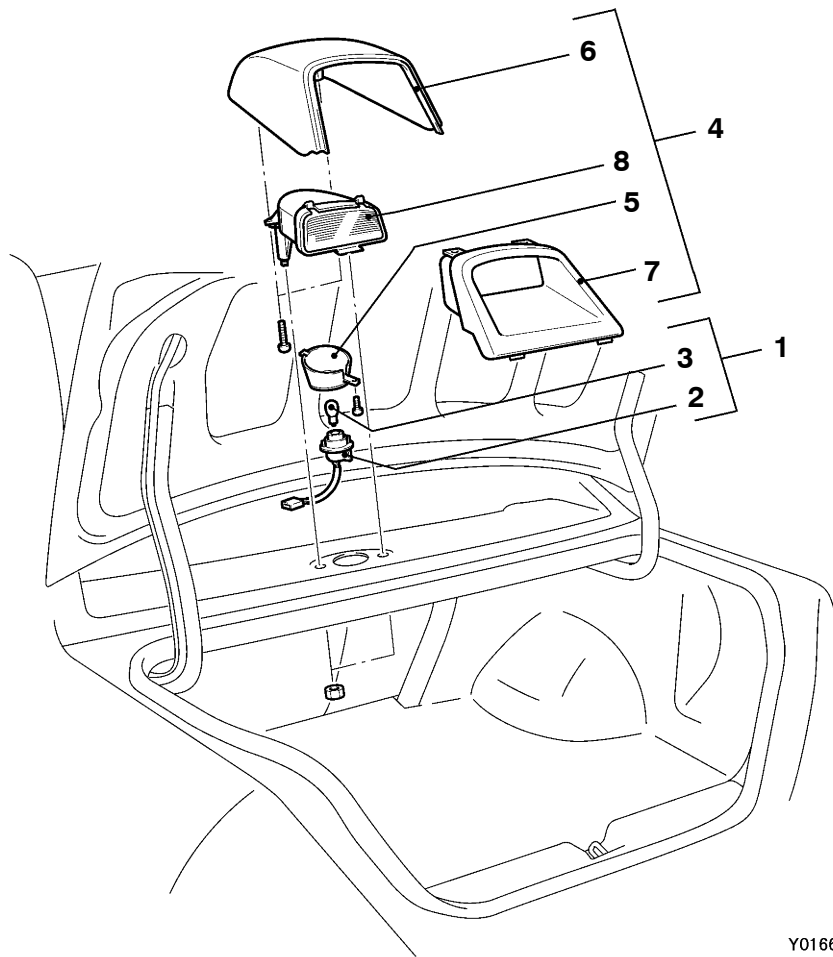
Remove socket from trunk compartment, and replace bulb.

Caution

Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

HIGH-MOUNTED STOP LAMP

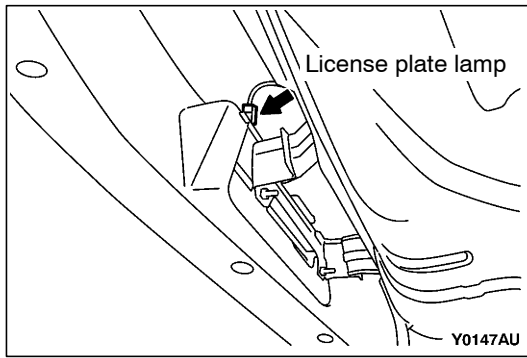
REMOVAL AND INSTALLATION



Y0166AU

Removal steps

- | | |
|------------------------------------|---|
| 1. Socket assembly | 5. Socket holder |
| 2. Socket | 6. High-mounted stop lamp cover (front) |
| 3. Bulb | 7. High-mounted stop lamp cover (rear) |
| 4. High-mounted stop lamp assembly | 8. High-mounted stop lamp body |



LICENSE PLATE LAMP

ON-VEHICLE SERVICE

LICENSE PLATE LAMP REPLACEMENT

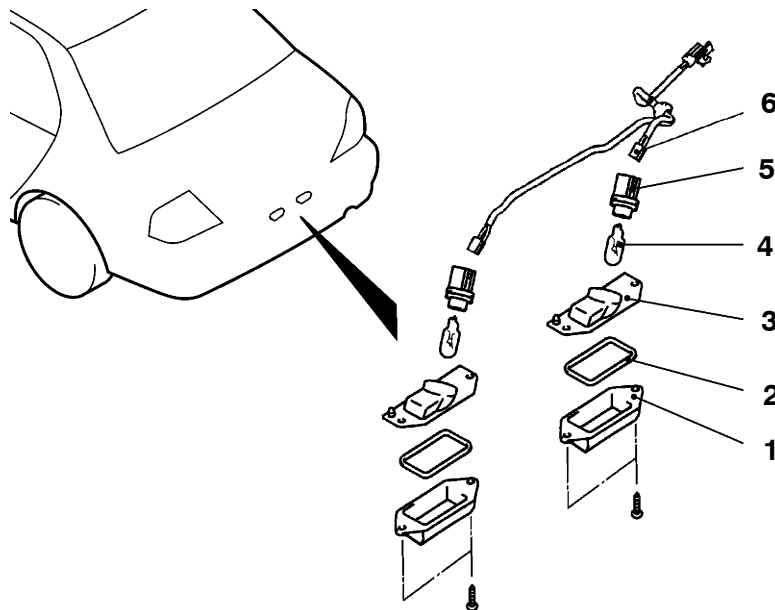
Remove socket between rear bumper and body, and remove bulb.

Caution

Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

LICENSE PLATE LAMP

REMOVAL AND INSTALLATION



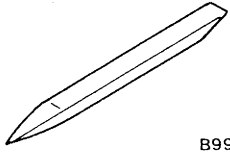
X0261AU

Removal steps

1. License plate lamp lens
2. Packing
3. License plate lamp body
4. Bulb
5. Socket
6. Harness

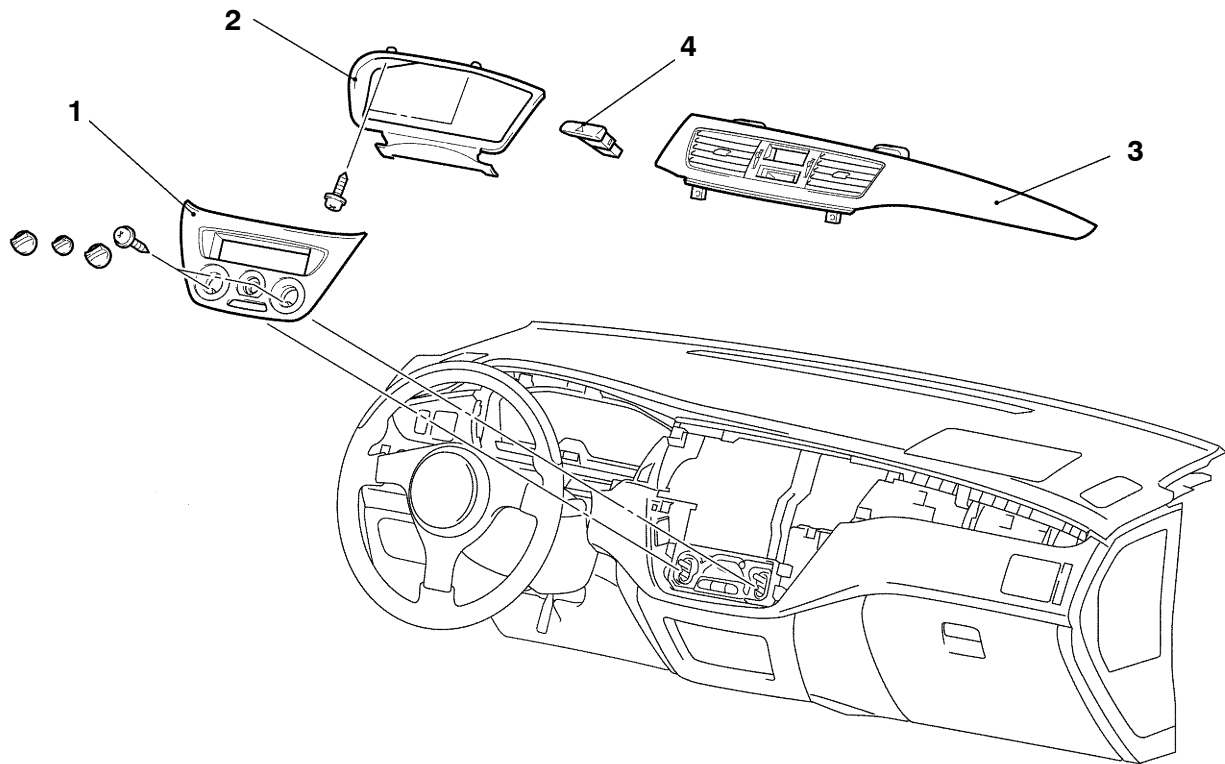
HAZARD WARNING LAMP SWITCH

SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Center panel assembly removal

HAZARD WARNING LAMP SWITCH

REMOVAL AND INSTALLATION

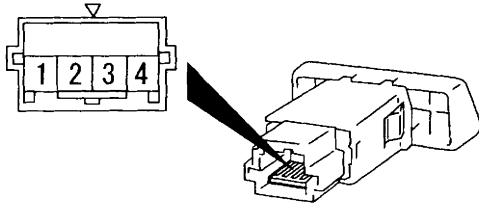


AY2381AU

Removal steps

1. Center panel assembly (Refer to GROUP 52A - Instrument Panel.)
2. Meter bezel (Refer to P.54A-22.)
3. Center air outlet panel (Refer to GROUP 52A - Instrument Panel.)
4. Hazard warning lamp switch

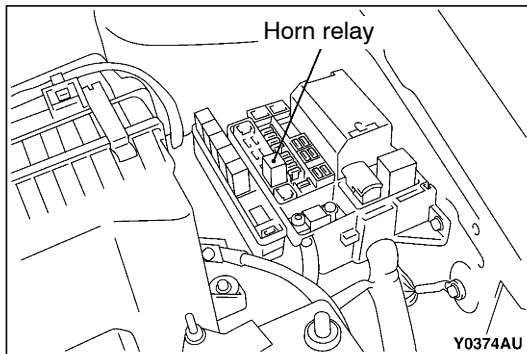
<Except Japan-spec. models>



INSPECTION

HAZARD WARNING LAMP SWITCH CONTINUITY CHECK

Switch Position	Terminal No.			
	1	2	3	4
OFF			○ — ○	ILL — ○
ON	○ — ○		○ — ○	ILL — ○

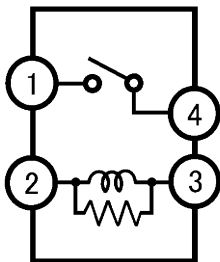
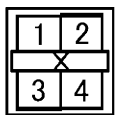


HORN

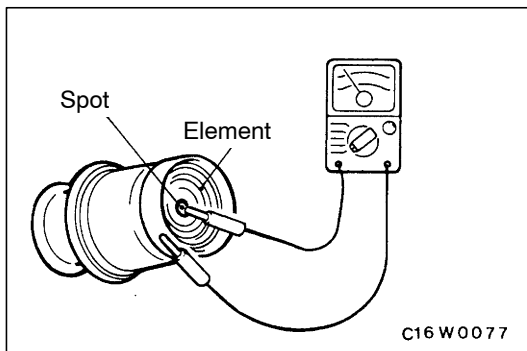
INSPECTION

HORN RELAY CONTINUITY CHECK

Switch Position	Terminal No.			
	1	4	3	2
De-energized			○ — ○	○ — ○
Energized	○ — ○	○ — ○	⊕ — ⊖	⊕ — ⊖



Y0818AU



CIGARETTE LIGHTER

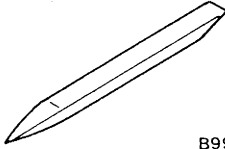
INSPECTION

- Remove plug and check for wear on spot.
- Check for residual cigarette or foreign object on element.
- With circuit tester, check for element continuity.

C16 W0077

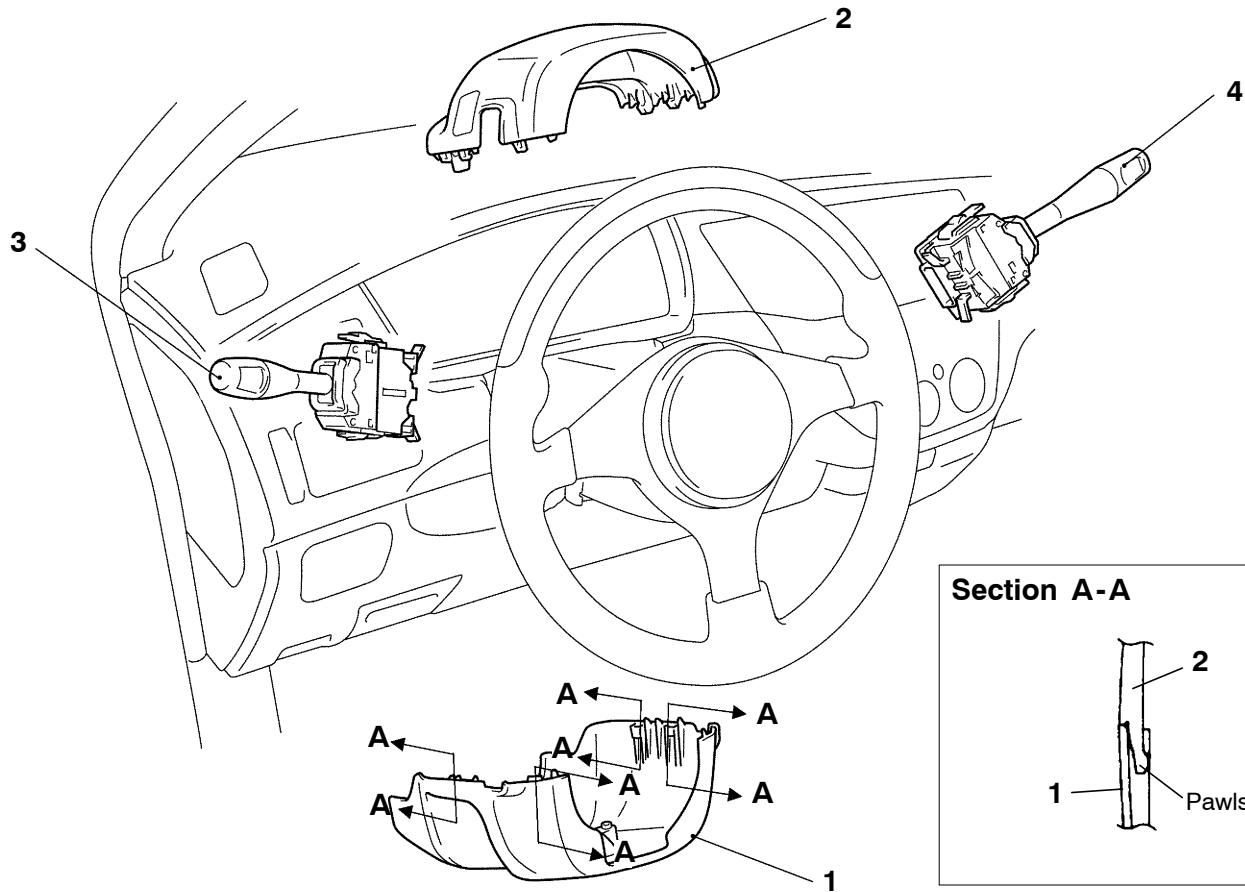
COLUMN SWITCH

SPECIAL TOOL

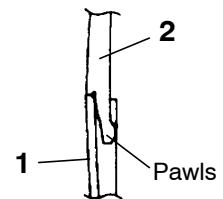
Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Column cover removal

COLUMN SWITCH

REMOVAL AND INSTALLATION



Section A-A



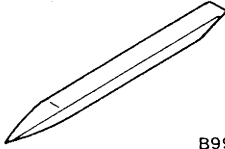
AY2382AU

Removal steps

1. Lower column cover
2. Upper column cover
3. Lighting switch
4. Wiper/Washer switch

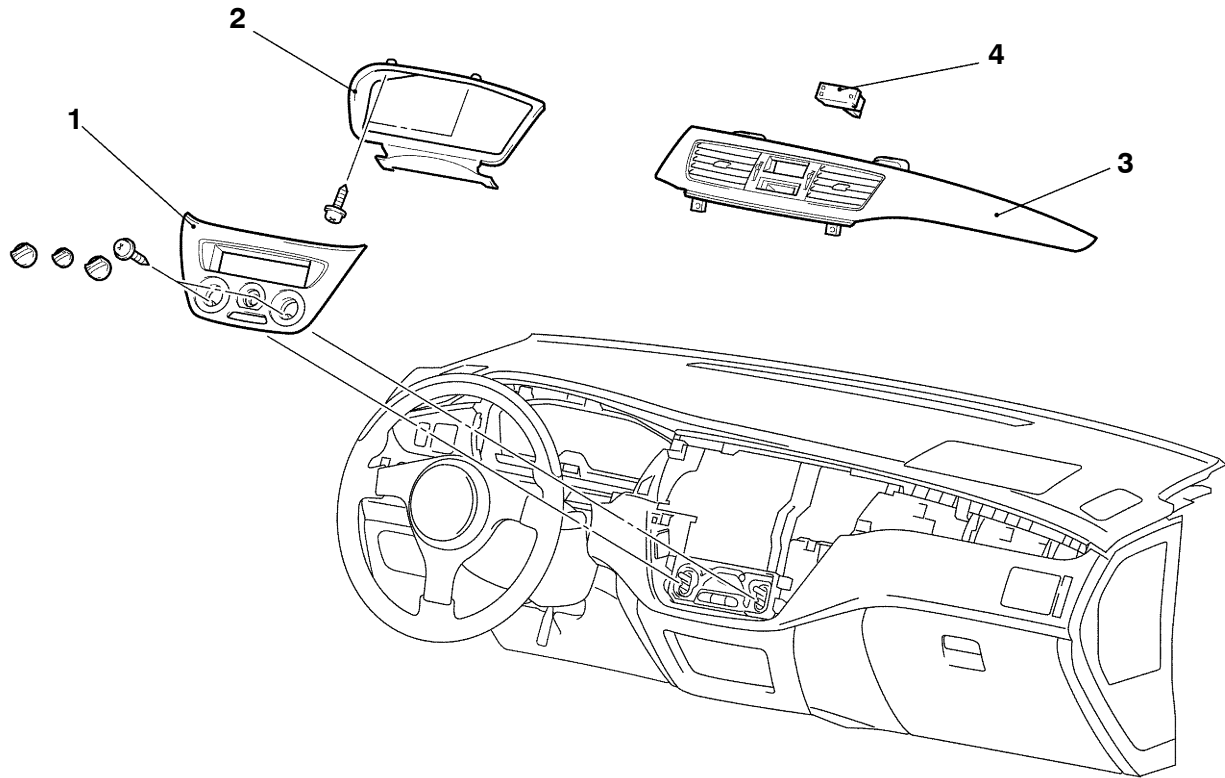
CLOCK

SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Center panel assembly and center air outlet panel removal

CLOCK

REMOVAL AND INSTALLATION



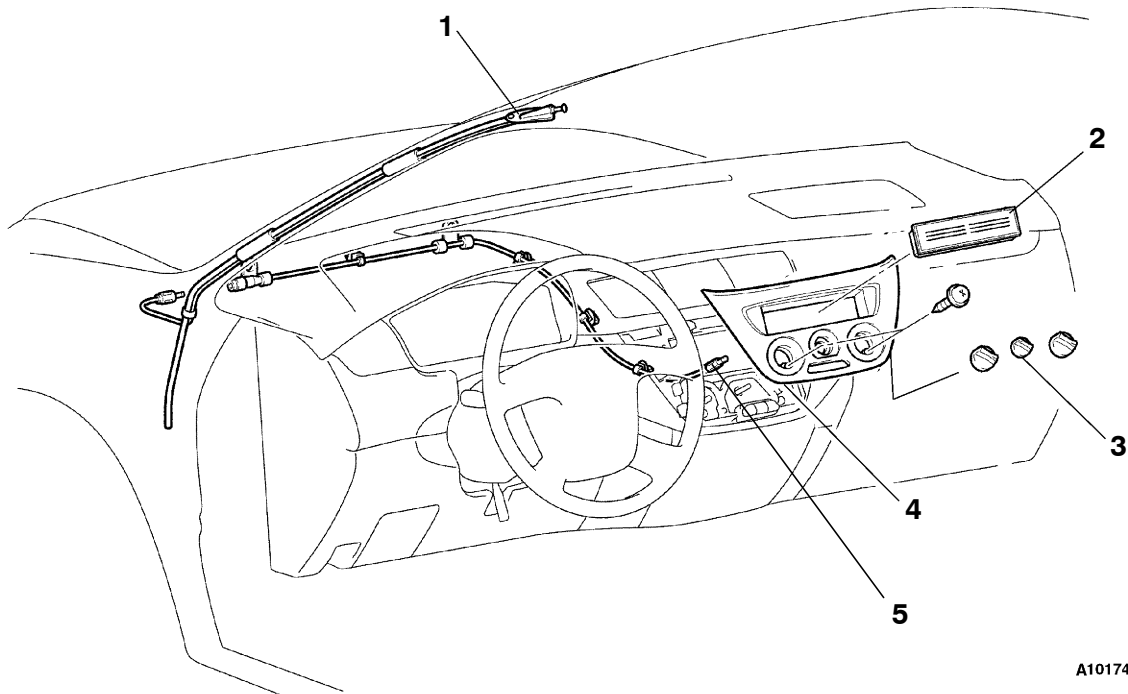
AY2381AU

Removal steps

1. Center panel assembly (Refer to GROUP 52A - Instrument Panel.)
2. Meter bezel (Refer to P.54A-22.)
3. Center air outlet panel (Refer to GROUP 52A - Instrument Panel.)
4. Clock

POLE ANTENNA

REMOVAL AND INSTALLATION



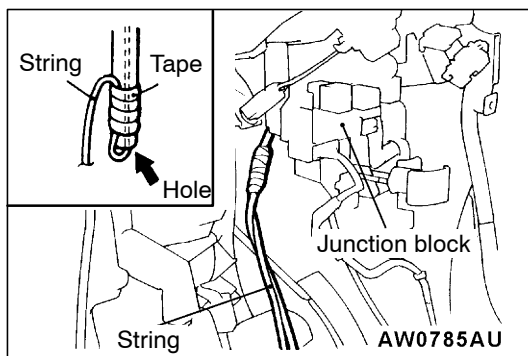
A10174AU

Removal steps



1. Antenna base
2. Radio plug
3. Knob assembly
4. Center panel assembly (Refer to GROUP 52A - Instrument Panel.)

- Instrument under cover (Refer to GROUP 52A - Instrument Panel.)
- Instrument panel (Refer to GROUP 52A.)
- 5. Antenna feeder cable



REMOVAL SERVICE POINT

◀A▶ ANTENNA BASE REMOVAL

Use the following steps to easily route antenna feeder cable in the event of installation:

1. Tie string at the top end of feeder cable.
2. Pull out feeder cable until pipe end of antenna base is visible.
3. Insert string into the hole at pipe end of antenna base, and wrap vinyl tape on the string.

Caution

Tape should be wrapped so that the string cannot be removed.

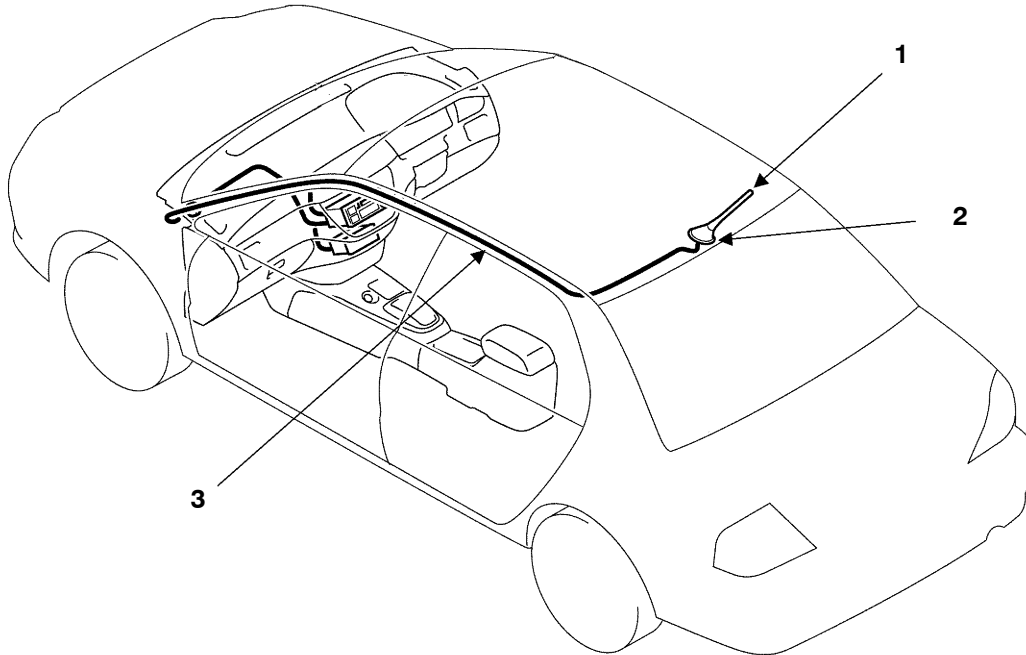
4. Gradually pull out remove antenna base.

ROOF ANTENNA

REMOVAL AND INSTALLATION

pre-removal and Post-installation Operations

- Front Pillar trim, Rear Pillar Trim and Lower/Upper Center Pillar Trim Removal and Installation (Refer to GROUP 52A - Trims.)
- Assist Step Removal and Installation (Refer to GROUP 52A - Head Lining.)
- Front Room Lamp and Rear Room Lamp Removal and Installation
- Head Lining Removal and Installation (Refer to GROUP 52A - Head Lining.)



AY2415AU

Removal steps

1. Antenna pole
 2. Roof antenna base
- Instrument panel (Refer to GROUP 52A - Instrument Panel.)

3. Antenna feeder cable

DEFOGGER

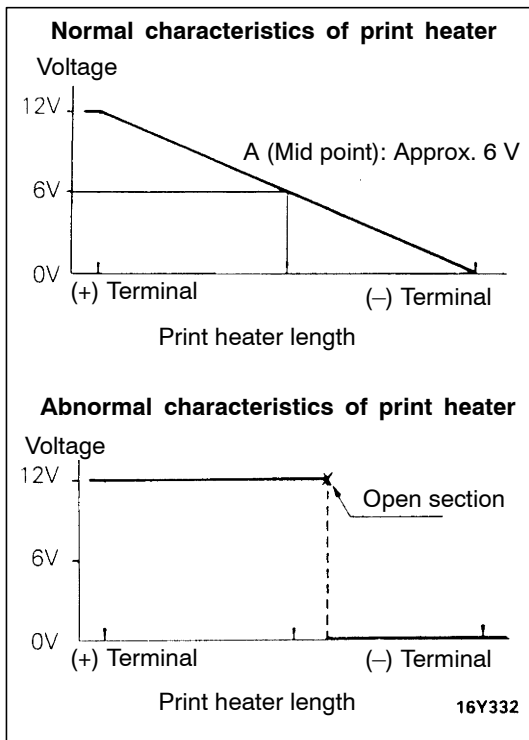
TROUBLESHOOTING

Refer to GROUP 55.

ON-VEHICLE SERVICE

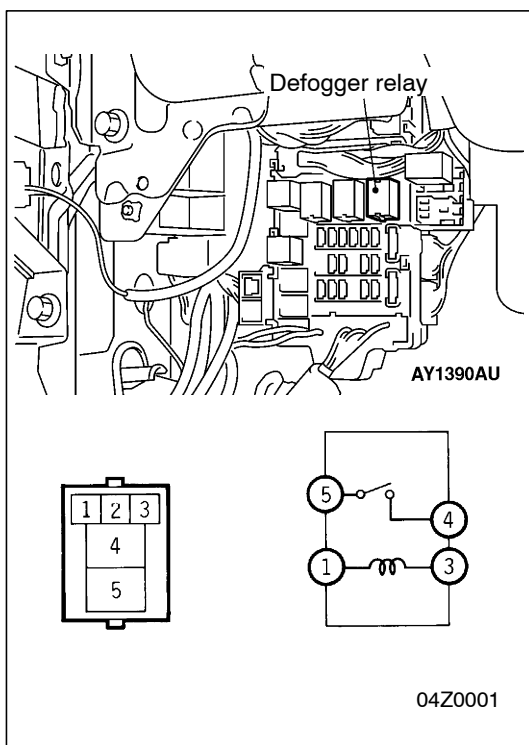
PRINTED HEATER CHECK

- (1) With engine running at 2,000 rpm and battery in charging mode, check print heater for normal operation.
- (2) With defogger switch in "ON" position, use circuit tester to measure voltage of individual print heaters at the center point A of rear window glass. When the tester indicates approx. 6V, the print heater is evaluated normal.
- (3) When the measured value at Position A is 12V, open circuit occurs between Position A and minus terminal. In this case, carefully move test bar to minus terminal side to detect a rapid voltage drop point (0V). This voltage drop point indicates open circuit section.
- (4) When voltage at Position A is 0V, open circuit occurs between Position A and plus terminal. According to the previous step, detect a rapid voltage increase point (12V).



DEFOGGER RELAY CONTINUITY CHECK

Battery voltage	Terminal No.			
	1	3	4	5
De-energized	○	○		
Energized	⊕	⊖	○	○



DEFOGGER SWITCH

REMOVAL, INSTALLATION AND CHECK

Refer to GROUP 55 - Heater Control Assembly, A/C Switch and Fresh/Recirculated Air Switch.

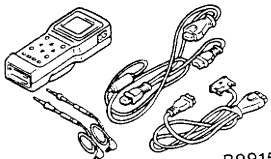
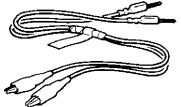
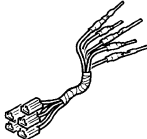
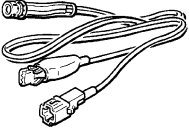
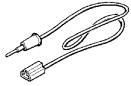

NOTES

SMART WIRING SYSTEM (SWS)

CONTENTS

SPECIAL TOOLS	2	Diagnosis Code Chart	3
TROUBLESHOOTING	2	Diagnosis Code Inspection Procedures	4
Before Commencing Troubleshooting	2	Trouble Symptom Chart	7
Standard Flow of Diagnostic Troubleshooting ...	2	Inspection Procedures for Trouble Symptoms ..	10
Diagnostic Functions	2	Check at ECU Terminals	34

SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II subassembly	For SWS inspections (diagnosis code display and input signal check by MUT-II)
	MB991529	Diagnosis code check harness	For checking input signals by voltmeter
A  B  C  D  C991223	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	For checking voltage (continuity and value) at harnesses and connectors A: For checking connector pin contact voltage B: For checking power supply circuits C: For checking power supply circuits D: For connection to commercially available testers

TROUBLESHOOTING

BEFORE COMMENCING TROUBLESHOOTING

Before starting troubleshooting, check the following two points to ensure there are no defects.

- Check the state of the connector couplings to the ETACS-ECU and junction box.
- Check that the fuses and fusible links relating to all systems are not fused.

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

DIAGNOSTIC FUNCTIONS

READING DIAGNOSIS CODES

Read the diagnosis codes using MUT-II. (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)

NOTE

1. Connect MUT-II to the 16-pin diagnosis connector (black).
2. The diagnosis code cannot be read when there is an ETACS-ECU fault or when the power is first turned ON (voltage rising). In this case, refer to "No Communication with MUT-II" (P. 54B-10) on Fault Symptom Inspection Procedure, and perform troubleshooting.

INPUT SIGNAL CHECK

1. Check the inputs using MUT-II or a voltmeter. (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)
2. The following input signals can be checked using MUT-II or a voltmeter connected to the diagnosis connector.

NOTE

When fault is detected during input signal inspection, refer to Trouble Symptom Chart to perform troubleshooting. (Refer to P.54B-7).

Input Signal Check Function

Input signal		Buzzer operation condition
Ignition switch (ACC)		When ignition switch turned from "LOCK" (OFF) to ACC.
Ignition switch (IG1)		When ignition switch turned from "ACC" to "ON".
Hazard warning lamp switch		When switch turned from OFF to ON.
Rear fog lamp switch		
Driver's door switch		When driver's door opened from closed
All door switches		When any door opened when all doors were closed.
Driver's door lock actuator		When the driver's side key cylinder or inside lock knob is moved from the locked to unlocked position or vice versa.
Vehicle speed signal		Vehicle speed changes from less than 10 km/h to 10 km/h or more.
Column switches	Tail lamp switch	When lighting switch turned from automatic lighting to tail lamp position.
	Headlamp switch	
	Dimmer switch	
	Passing switch	
	Left-hand turn signal lamp switch	
	Right-hand turn signal lamp switch	
	Windshield mist wiper switch	
	Windshield wiper intermittent timing switch	
	Windshield wiper LO speed switch	
	Windshield wiper HI speed switch	
	Windshield washer switch	When switch turned from OFF to ON.
Power window main switch	All switches	When switch turned from OFF to ON.

DIAGNOSIS CODE CHART

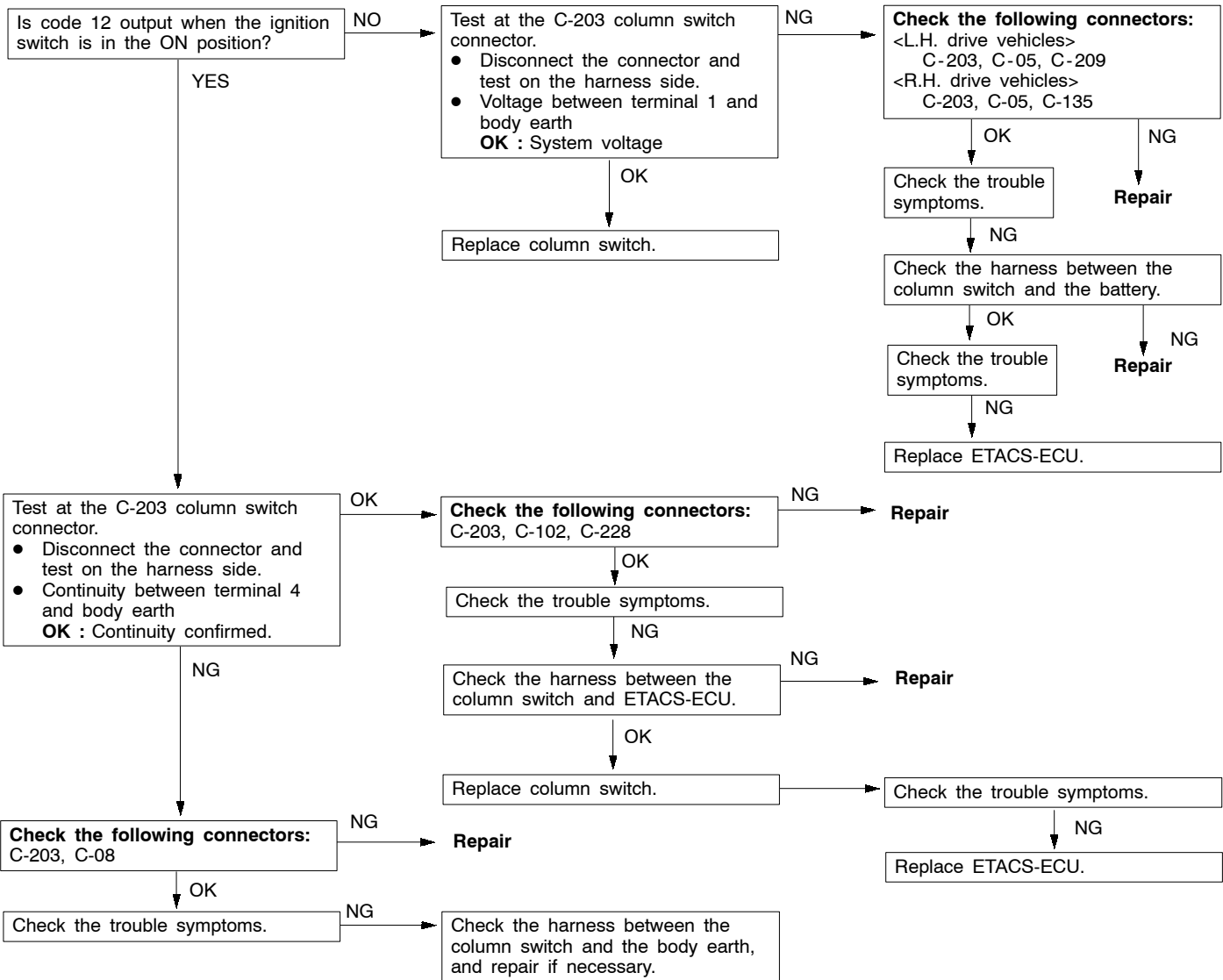
Code No.	Diagnosis item	Reference page
11	ETACS-ECU-related failure	54B-4
12	Column switch-related failure or fault in connecting to ETACS-ECU	54B-4
13	Front-ECU-related failure or fault in connecting to ETACS-ECU	54B-5
21	Short circuit in communication lines	54B-6

DIAGNOSIS CODE INSPECTION PROCEDURES

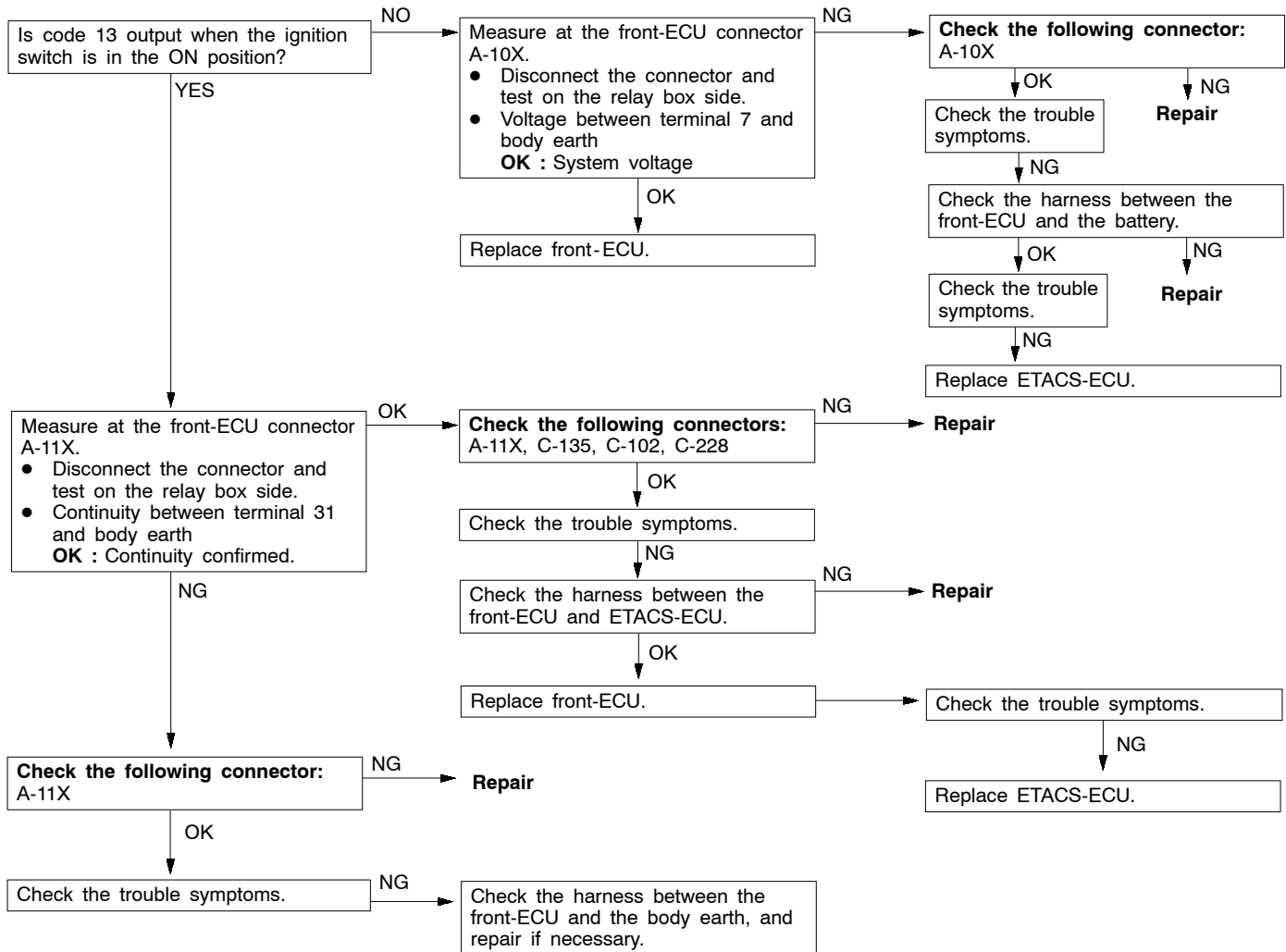
Code No. 11 ETACS-ECU-related failure	Probable cause
The ETACS-ECU monitors its own communication data, outputting this diagnosis code when data error occurs 15 consecutive times (for 0.6 seconds). The diagnosis code output stops when the ETACS-ECU confirms that its data was transmitted normally 15 consecutive times (for 0.6 seconds).	<ul style="list-style-type: none"> ETACS-ECU fault

Replace ETACS-ECU.

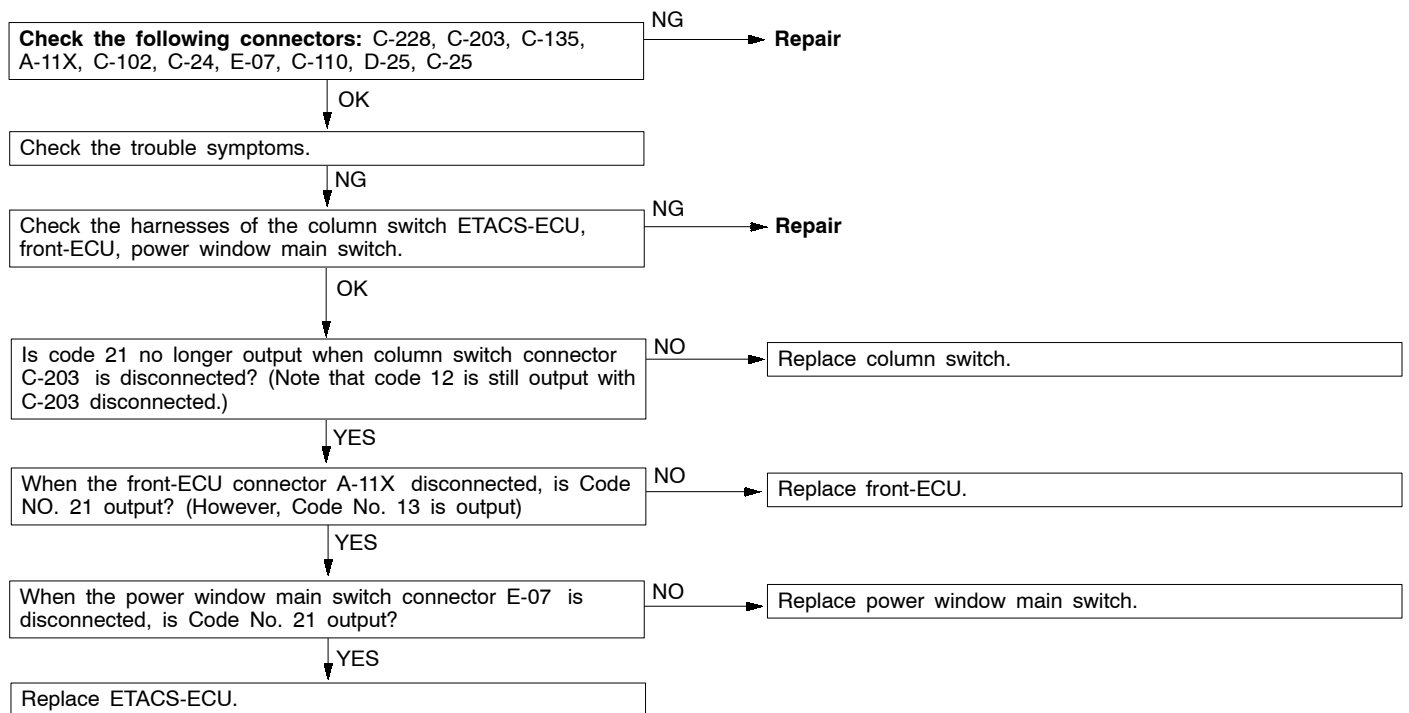
Code No. 12 Column switch-related fault or fault in connecting to ETACS-ECU	Probable cause
This diagnosis code is output when a column switch outputs a signal (at least three times a second) that is not in accordance with the transmission request signal from ETACS-ECU. The diagnosis code output stops when the column switch continuously outputs for one second a signal that accords with the transmission request signal from ETACS-ECU.	<ul style="list-style-type: none"> Column switch fault ETACS-ECU fault Harness or connector fault



Code No. 13 Front-ECU-related fault or fault in connecting to ETACS-ECU	Probable cause
This diagnosis code is output when the signal output from the front-ECU to ETACS-ECU contains an error for 15 consecutive communication cycles (0.6 seconds). The diagnosis code output stops when the signal output from the front-ECU to ETACS-ECU is normal for 15 consecutive communication cycles (0.6 seconds).	<ul style="list-style-type: none"> ● front-ECU fault ● ETACS-ECU fault ● Harness or connector fault



Code No. 21 Short circuit in communication lines.	Probable cause
This diagnostic code is output when the voltage on an SWS communication line goes LOW for 0.3 seconds. The diagnosis code output stops when the ETACS-ECU data line voltage goes HIGH for 0.3 seconds, or when the ETACS-ECU receives a normal signal from another ECU or switch. During the output of this code, other codes are suppressed.	<ul style="list-style-type: none"> ● Column switch fault ● front-ECU fault ● Power window main switch fault ● ETACS-ECU fault ● Harness or connector fault



TROUBLE SYMPTOM CHART

Trouble symptom		Inspection procedure	Reference page
No communication with MUT-II		A-1	54B-10
Buzzers	Lights left ON reminder warning function not working normally.	B-1	54B-10
Central locking	Central door locking system not working at all.	C-1	54B-11
	Some doors not locking or unlocking.	C-2	54B-11
Power window	Power windows not working at all.	D-1	54B-12
	Power windows are not operated with the power window main switch.		
	Driver's power window not responding to power window main switch.	D-2	54B-13
	Windows not responding to passenger or rear power window switches.	D-3	54B-14
	Passenger or rear power windows not responding to power window main switch.	D-4	54B-15
	Power window timer function not working normally.	D-5	54B-15
	While the window is winding up, it suddenly starts coming down again.	D-6	54B-16
	Safety mechanism (to prevent jamming of fingers, etc.) not working.	D-7	54B-16
Windshield wipers and washer	The windshield wipers do not work at all.	E-1	54B-17
	The windshield wipers only operate at LO speed (though the wipers and washer can be switched OFF).	E-2	54B-17
	The windshield wipers do not respond to any switch position.	E-3	54B-18
	The windshield wipers do not stop in the normal predetermined position.	E-4	54B-18
	The windshield washer does not work at all.	E-5	54B-19
	Windshield wipers are not operated with the switch in INT, WASHER and MIST positions, and operated in a low mode with the switch in Lo and Hi positions.	E-6	54B-19
Headlamps, tail lamps	Except for lighting switch "OFF," the headlamps only respond to the "low-beam" position.	F-1	54B-20
	The tail lamps do not work.	F-2	54B-20
	The headlamps (low-beam) do not light.	F-3	54B-21
	The headlamps (high-beam) do not light.	F-4	54B-21
	The headlamps (low or high-beam) do not work when the passing switch is ON.	F-5	54B-22
	The headlamp automatic cut-off function is not working normally.	F-6	54B-22
Rear fog lamp	Rear fog lamp is not properly illuminated.	G-1	54B-23
Flasher timer	The turn signal lamps do not light.	H-1	54B-24
	The hazard warning lamps do not light up.	H-2	54B-24
Room lamps	The room lamps do not come ON or OFF normally.	I-1	54B-25

DEFECTS FOUND BY INPUT SIGNAL CHECK

When a fault is identified in an input signal check, use the following table to investigate the fault.

Trouble symptom		Inspection procedure	Reference page
No ignition switch (ACC) signal input to ETACS-ECU.		J-1	54B-26
No ignition switch (IG1) signal input to ETACS-ECU.		J-2	54B-26
No hazard warning lamp switch signal input to ETACS-ECU.		J-3	54B-27
No rear fog lamp switch signal input to ETACS-ECU.		J-4	54B-28
No driver's door switch signal input to ETACS-ECU.		J-5	54B-29
No door switch signals input to ETACS-ECU.			
No driver's door lock actuator signal input to ETACS-ECU.		J-6	54B-30
Column switches	No tail lamp switch signal input to ETACS-ECU.	J-7	54B-31
	No headlamp switch signal input to ETACS-ECU.		
	No dimmer switch signal input to ETACS-ECU.		
	No passing switch signal input to ETACS-ECU.		
	No turn signal lamp left-hand switch signal input to ETACS-ECU.		
	No turn signal lamp right-hand switch signal input to ETACS-ECU.		
Column switches	No windshield mist wiper switch signal input to ETACS-ECU.	J-8	54B-31
	No windshield wiper intermittent switch signal input to ETACS-ECU.		
	No windshield low-speed wiper switch signal input to ETACS-ECU.		
	No windshield high-speed wiper switch signal input to ETACS-ECU.		
	No windshield washer switch signal input to ETACS-ECU.		
Power window main switch	No power window main switch signal input to ETACS-ECU.	J-9	54B-32
When the ignition switch is in the LOCK (OFF) position, no functions work normally.		K-1	54B-33
ETACS-ECU battery power supply circuit control check.			

NOTE

A diagnosis code is output for front-ECU and column switch battery power supply circuit control abnormalities. Apply the diagnosis code inspection procedures to address these abnormalities.

Input Signal Inspection Procedure Nos. by Function

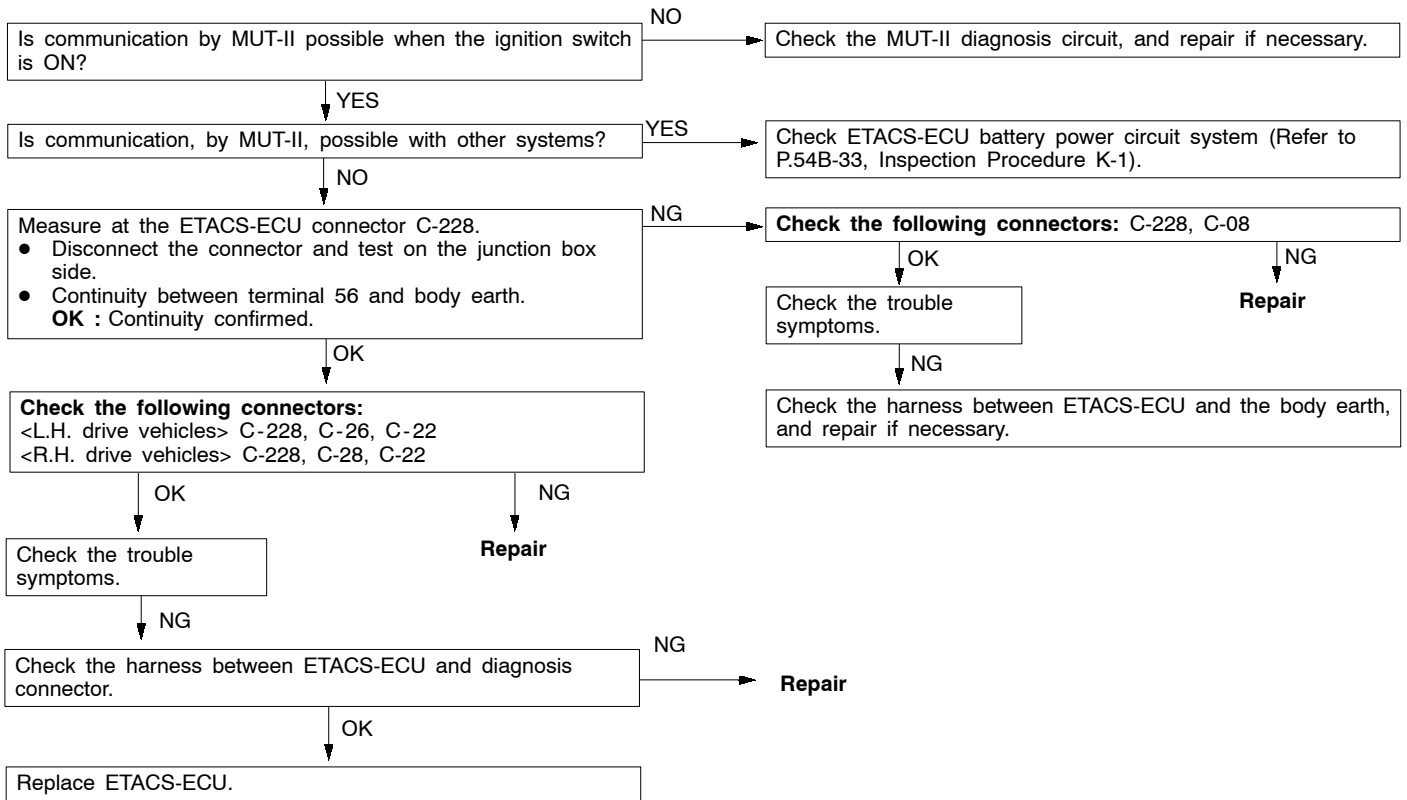
When more than one SWS function fails at the same time, run checks based on the following table. (The table lists only input signals and functions in which multiple faults can occur.)

Function	J-1	J-2	J-3	J-5		J-6	J-7	J-8
				Driver's door	All doors			
Central locking control						●		
Power window control		●						
Power window timer		●		●				
Windshield wiper and washer control	●							●
Rear wiper and washer control	●							●
Headlamp control							●	
Rear fog lamp control							●	
Tail lamp control							●	
Headlamp automatic turn-off		●		●			●	
Turn signal lamp control		●					●	
Hazard warning lamp control			●					
Room lamp control		●			●	●		

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure A-1

No communication with MUT-II	Probable cause
Either the ETACS-ECU power supply circuit system or the harness or connector between the diagnosis connector and ETACS-ECU may be defective.	<ul style="list-style-type: none"> ● Harness or connector fault ● ETACS-ECU fault

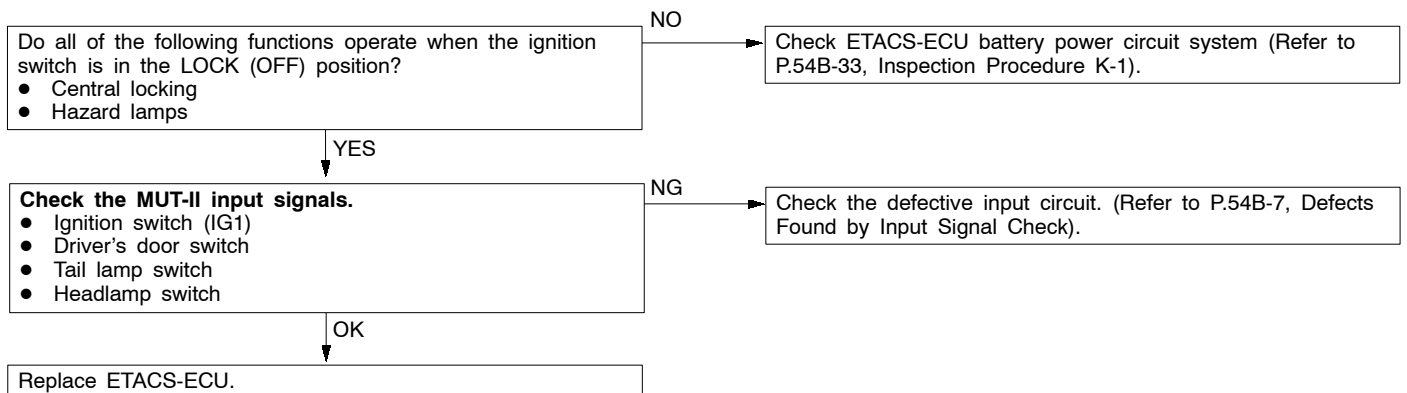


NOTE:

When failure is detected on the harness between ETACS-ECU and the body earth, check No. 3 terminal (C-226) of ETACS-ECU as well. Repair, if required.

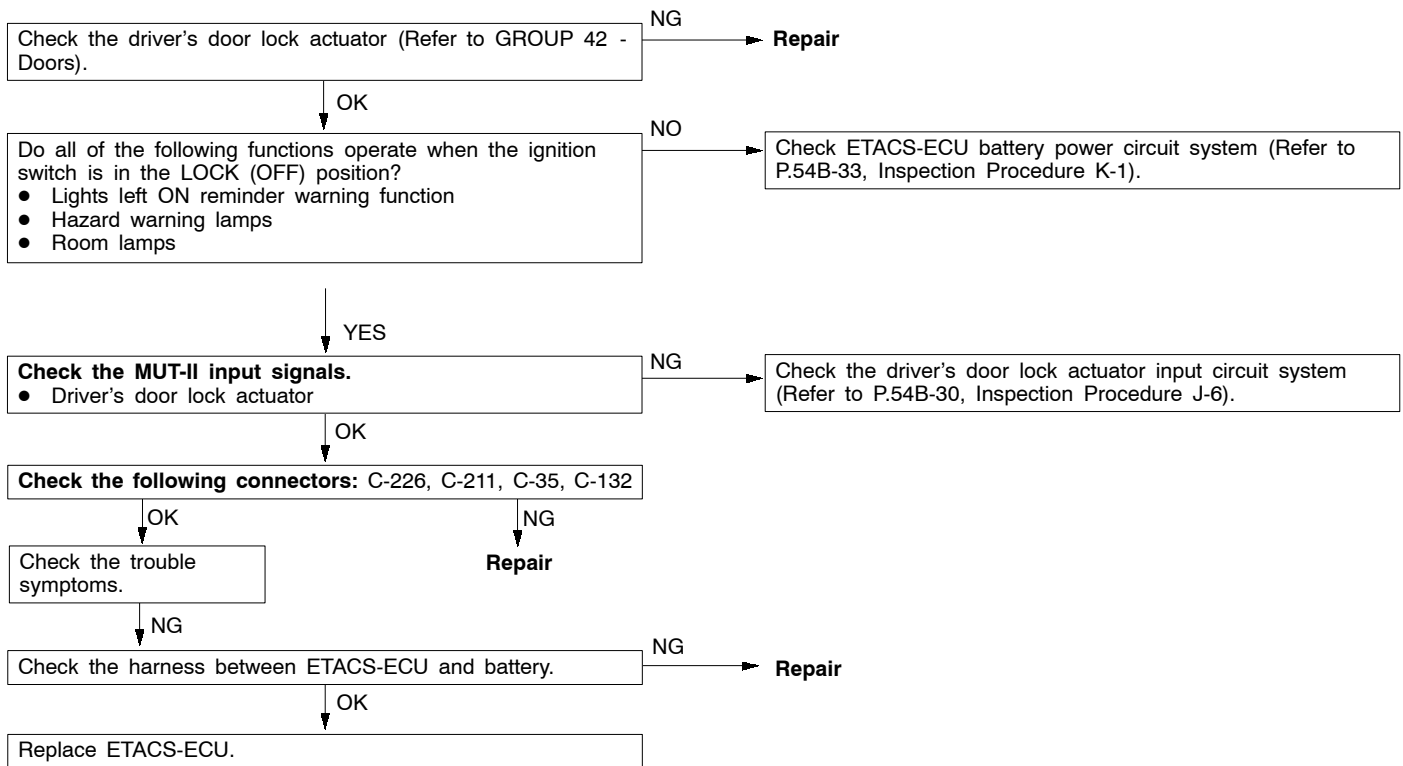
Inspection Procedure B-1

Lights left ON reminder warning function not working normally.	Probable cause
The ETACS-ECU controls the headlamp automatic cut-off function based on input signals from the following switches. <ul style="list-style-type: none"> ● Ignition switch (IG1) ● Driver's door switch ● Tail lamp switch ● Headlamp switch 	<ul style="list-style-type: none"> ● Driver's door switch fault ● Column switch fault ● ETACS-ECU fault ● Harness or connector fault



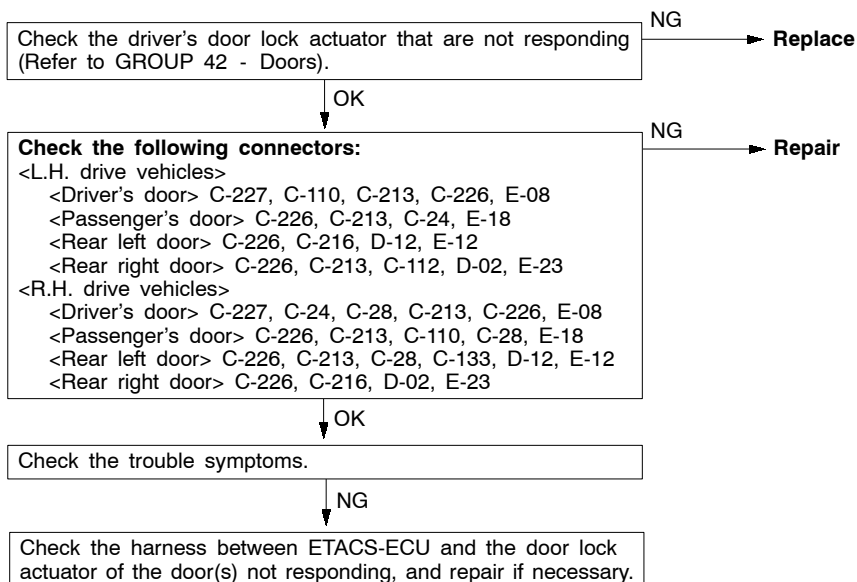
Inspection Procedure C-1

Central door locking system not working at all.	Probable cause
A change in the input signal from the driver's door lock actuator activates all the door lock actuators, causing the ETACS-ECU to lock or unlock all the doors. If the central locking is not working normally, the driver's door lock actuator or the ETACS-ECU may be defective.	<ul style="list-style-type: none"> • Driver's door lock actuator fault • ETACS-ECU fault • Harness or connector fault



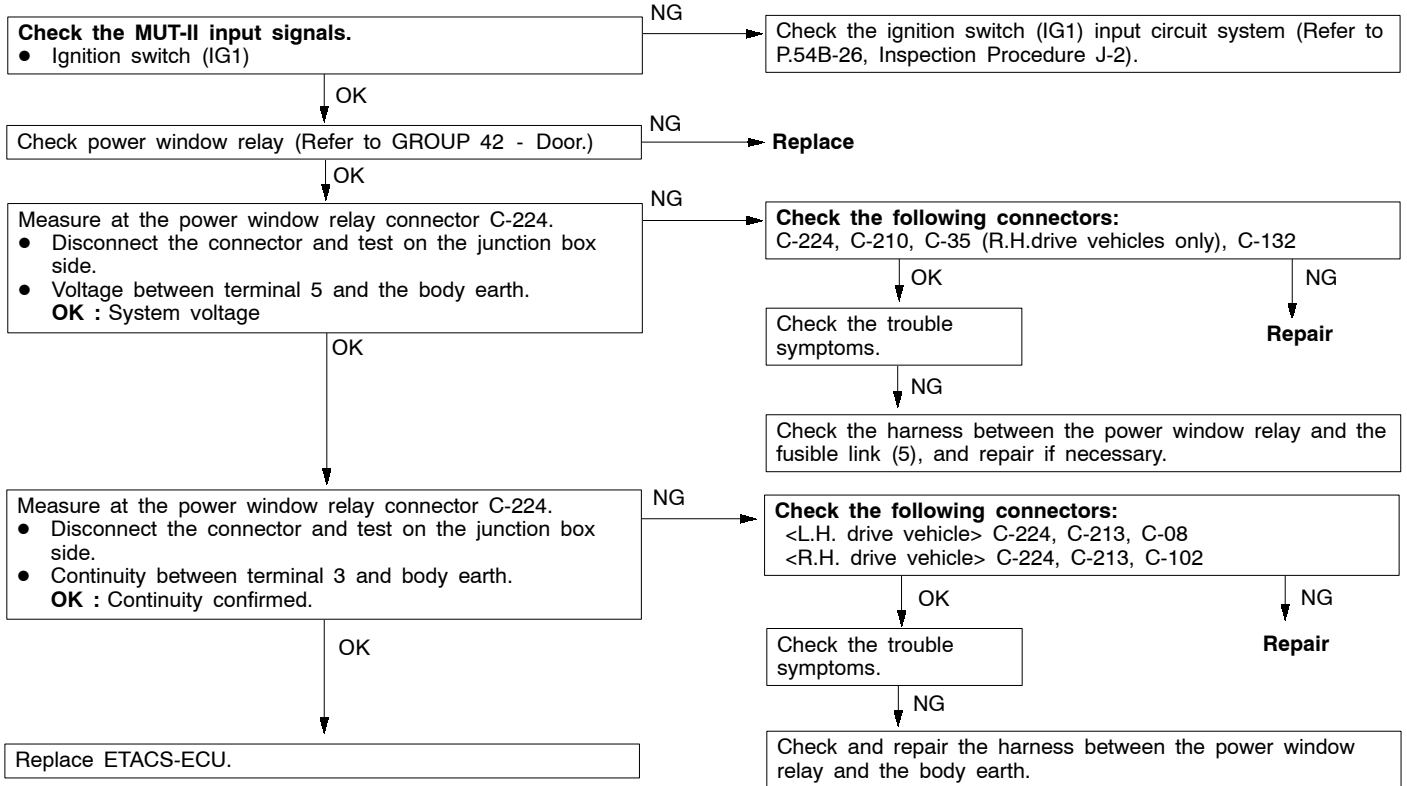
Inspection Procedure C-2

Some doors not locking or unlocking.	Probable cause
The door lock actuator of the door(s) that are not responding may be defective.	<ul style="list-style-type: none"> • Door lock actuator fault • Harness or connector fault



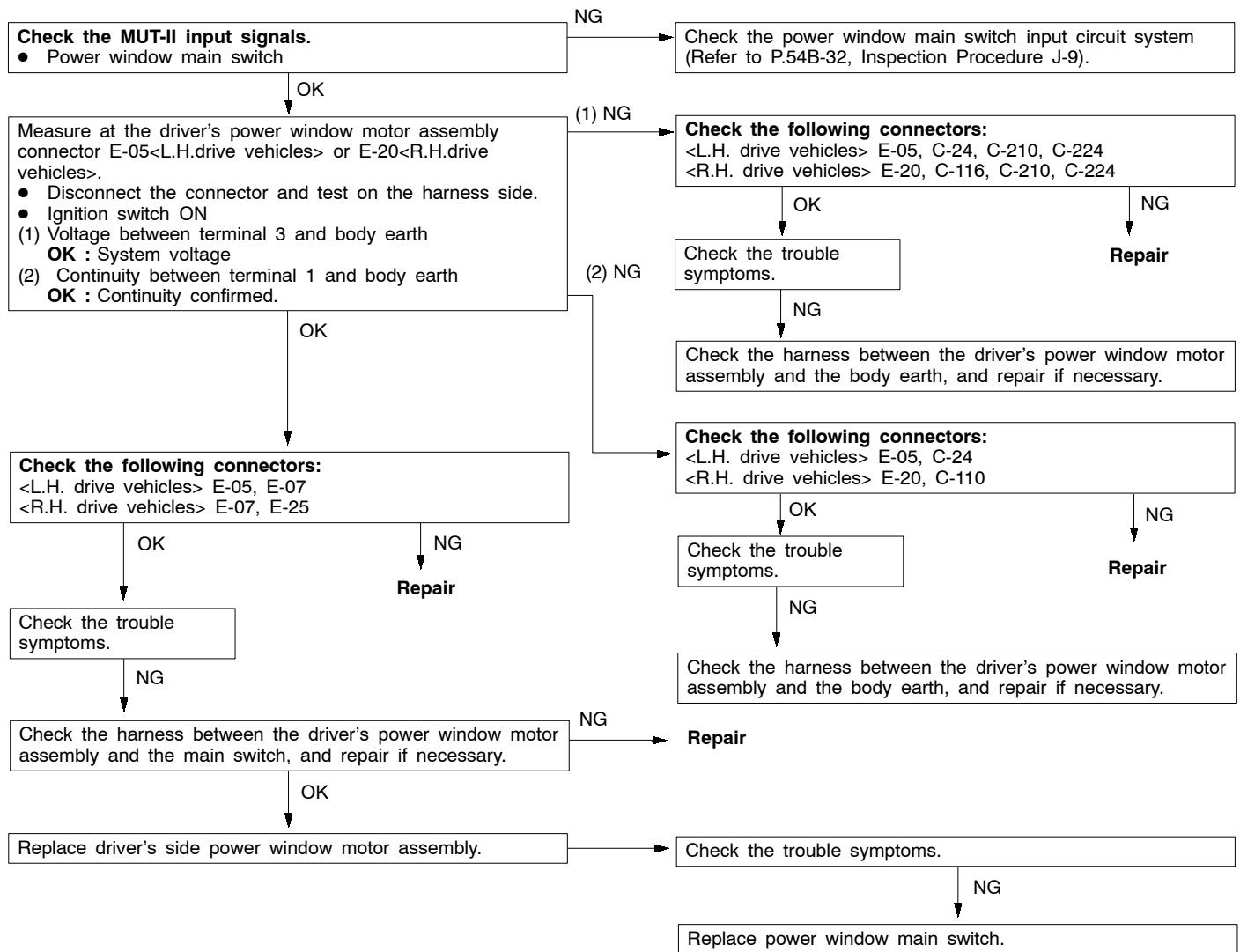
Inspection Procedure D-1

<p>Power windows not working at all. Power windows are not operated with the power window main switch.</p>	<p>Probable cause</p>
<p>The power window relay or the ETACS-ECU may be defective.</p>	<ul style="list-style-type: none"> ● Power window relay fault ● ETACS-ECU fault ● Harness or connector fault



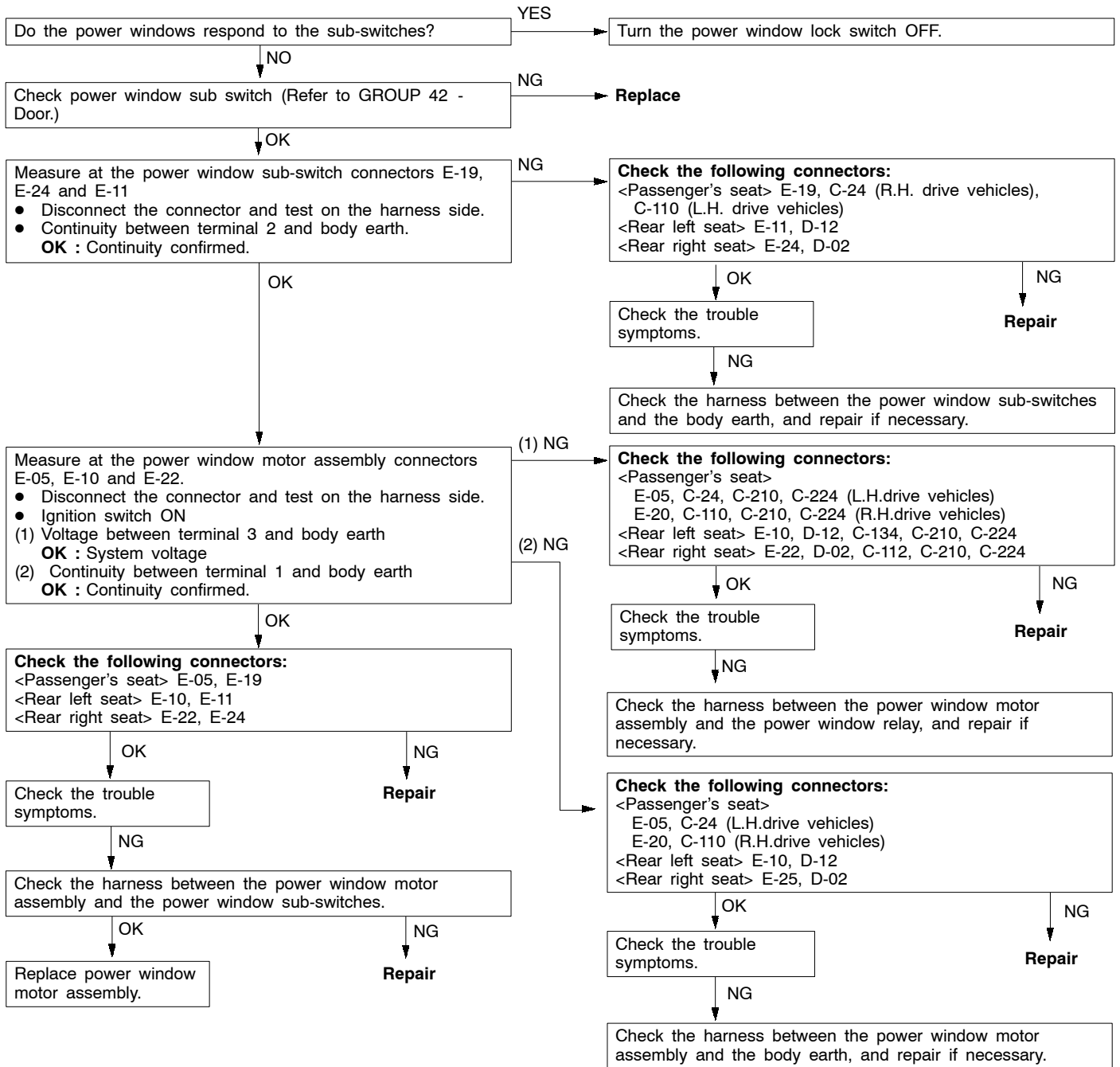
Inspection Procedure D-2

Driver's power window not responding to power window main switch.	Probable cause
Either the power window main switch or the driver's side power window motor assembly may be defective. The power window lock switch could be ON.	<ul style="list-style-type: none"> ● Power window main switch fault ● Driver's side power window motor assembly fault ● Harness or connector fault



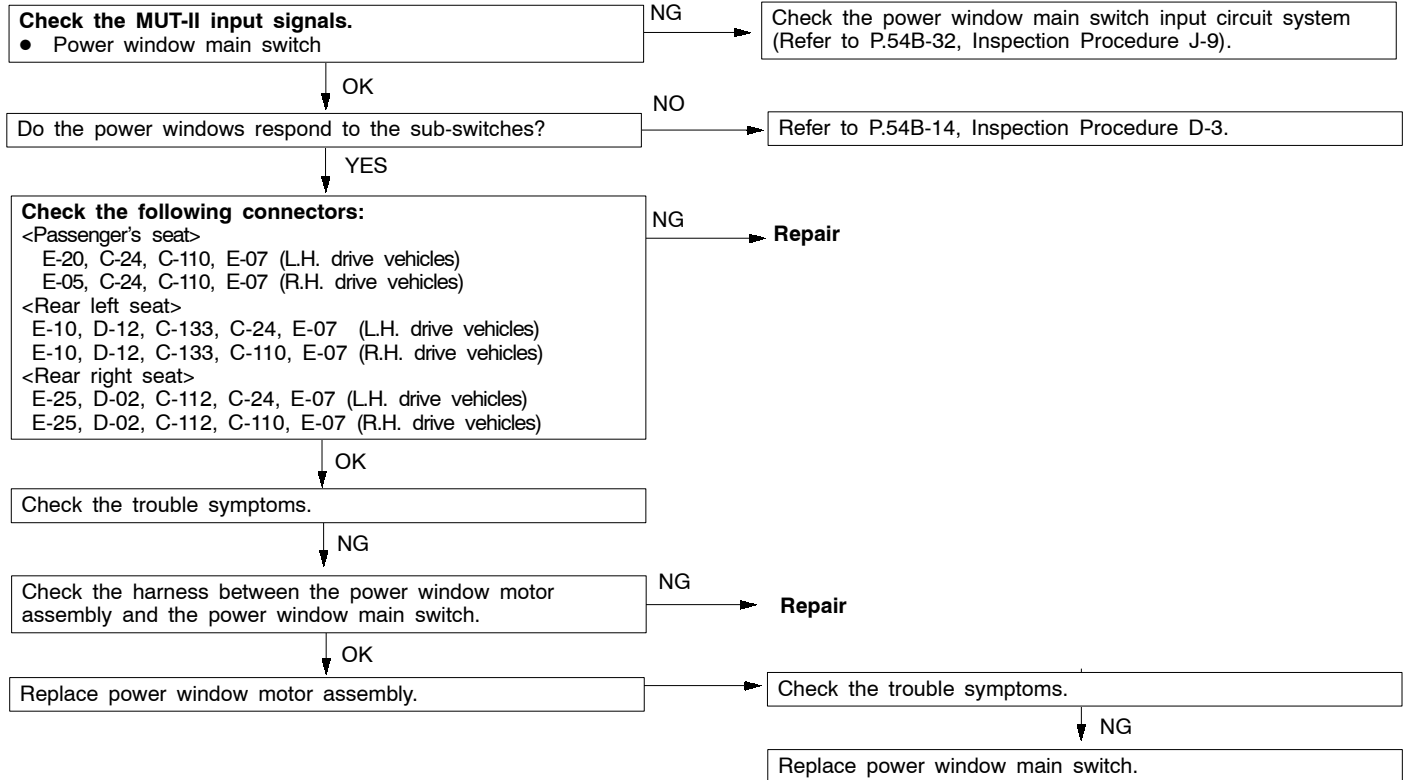
Inspection Procedure D-3

Windows not responding to passenger or rear power window switches.	Probable cause
Either the power window sub-switches or the passenger's or rear power window motor assembly may be defective.	<ul style="list-style-type: none"> • Power window sub-switch fault • Passenger's or rear power window motor assembly fault • Harness or connector fault



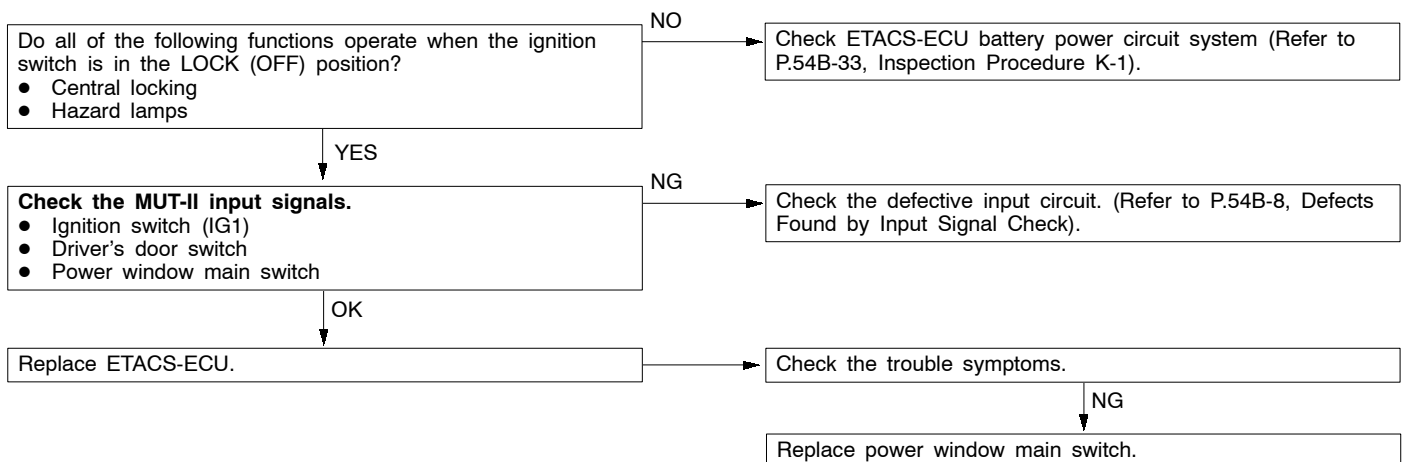
Inspection Procedure D-4

Passenger or rear power windows not responding to power window main switch.	Probable cause
Either the power window main switch or the passenger's or rear power window motor assembly may be defective.	<ul style="list-style-type: none"> ● Power window main switch fault ● Passenger's or rear power window motor assembly fault ● Harness or connector fault



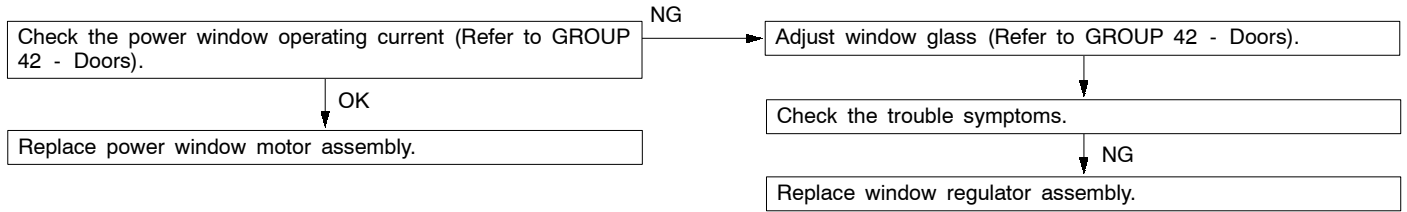
Inspection Procedure D-5

Power window timer function not working normally.	Probable cause
<p>The ETACS-ECU controls the headlamp automatic cut-off function based on input signals from the following switches.</p> <ul style="list-style-type: none"> ● Ignition switch (IG1) ● Driver's door switch <p>If the power window timer function does not operate normally, one of the above input circuit systems, the power window main switch, or the ETACS-ECU may be defective.</p>	<ul style="list-style-type: none"> ● Driver's door switch fault ● Power window main switch fault ● ETACS-ECU fault ● Harness or connector fault



Inspection Procedure D-6

<p>While the window is winding up, it suddenly starts coming down again.</p>	<p>Probable cause</p>
<p>If the sliding resistance is too great when the window is being raised or if the glass encounters an object, the window will return about 150 mm.</p>	<ul style="list-style-type: none"> ● The window glass is not properly adjusted. ● The glass slider is incorrectly installed or warped. ● Power window motor assembly fault ● Window regulator assembly fault



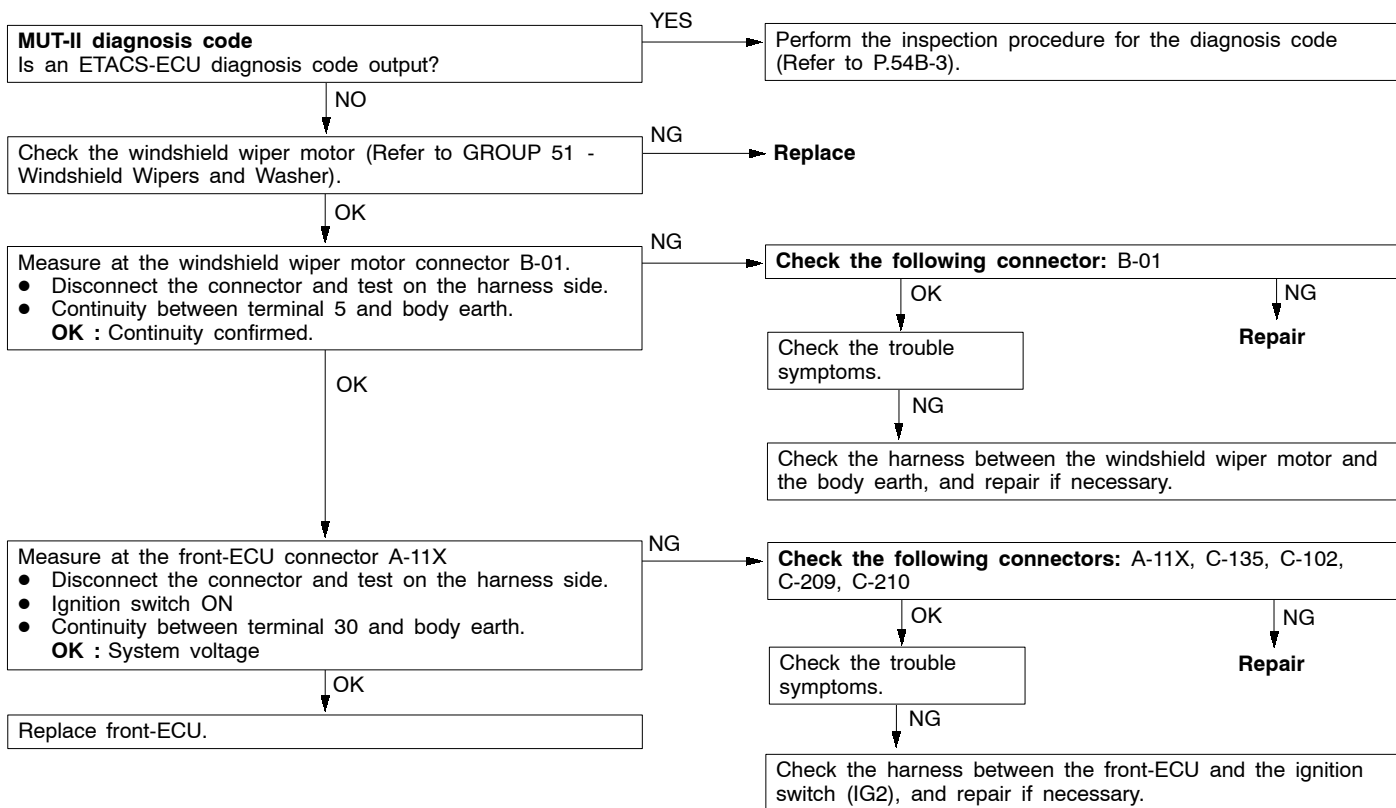
Inspection Procedure D-7

<p>The power window safety mechanism is not working.</p>	<p>Probable cause</p>
<p>The revolution detection sensor in the power window motor assembly is defective.</p>	<ul style="list-style-type: none"> ● Power window motor assembly fault

Replace power window motor assembly.

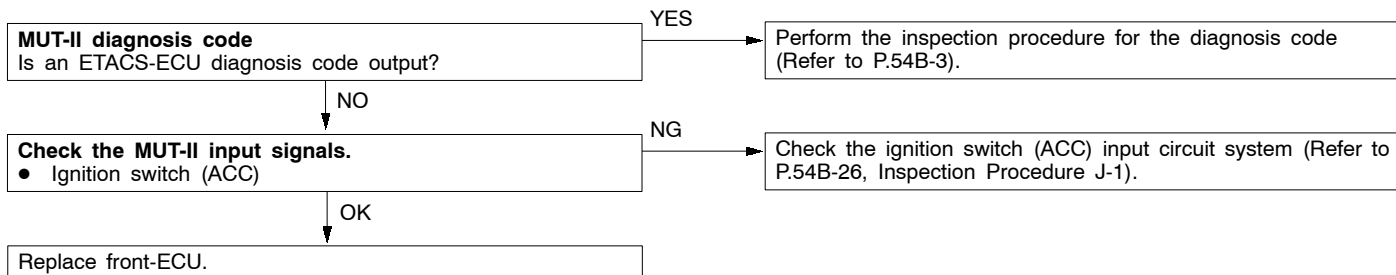
Inspection Procedure E-1

The windshield wipers do not work at all.	Probable cause
Either the windshield wiper motor, the column switch, or the front-ECU may be defective.	<ul style="list-style-type: none"> ● Windshield wiper motor fault ● Column switch fault ● front-ECU fault ● Harness or connector fault



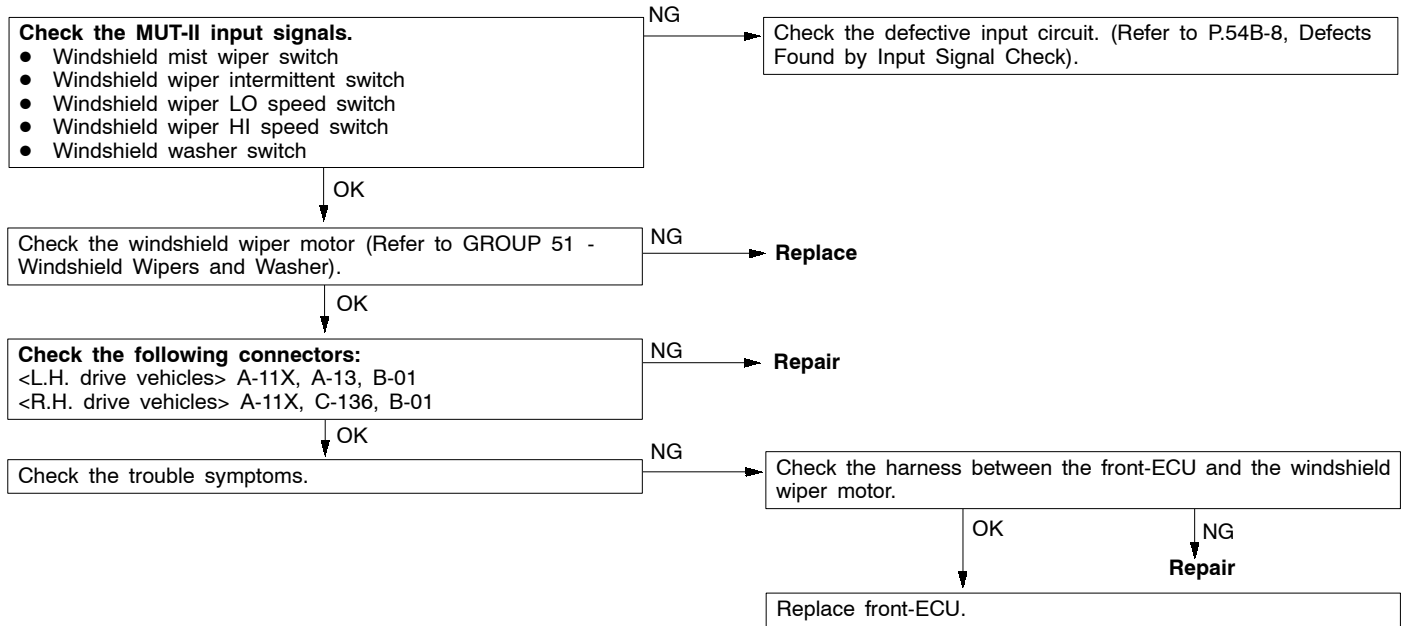
Inspection Procedure E-2

The windshield wipers only operate at LO speed (though the wipers and washer can be switched OFF).	Probable cause
If the windshield wipers only operate at LO speed regardless of the switch position, the windshield wiper fail-safe function is probably activated. Or the ETACS-ECU ignition switch (ACC) signal may be controlling the wiper operation.	<ul style="list-style-type: none"> ● Column switch fault ● front-ECU fault ● Harness or connector fault



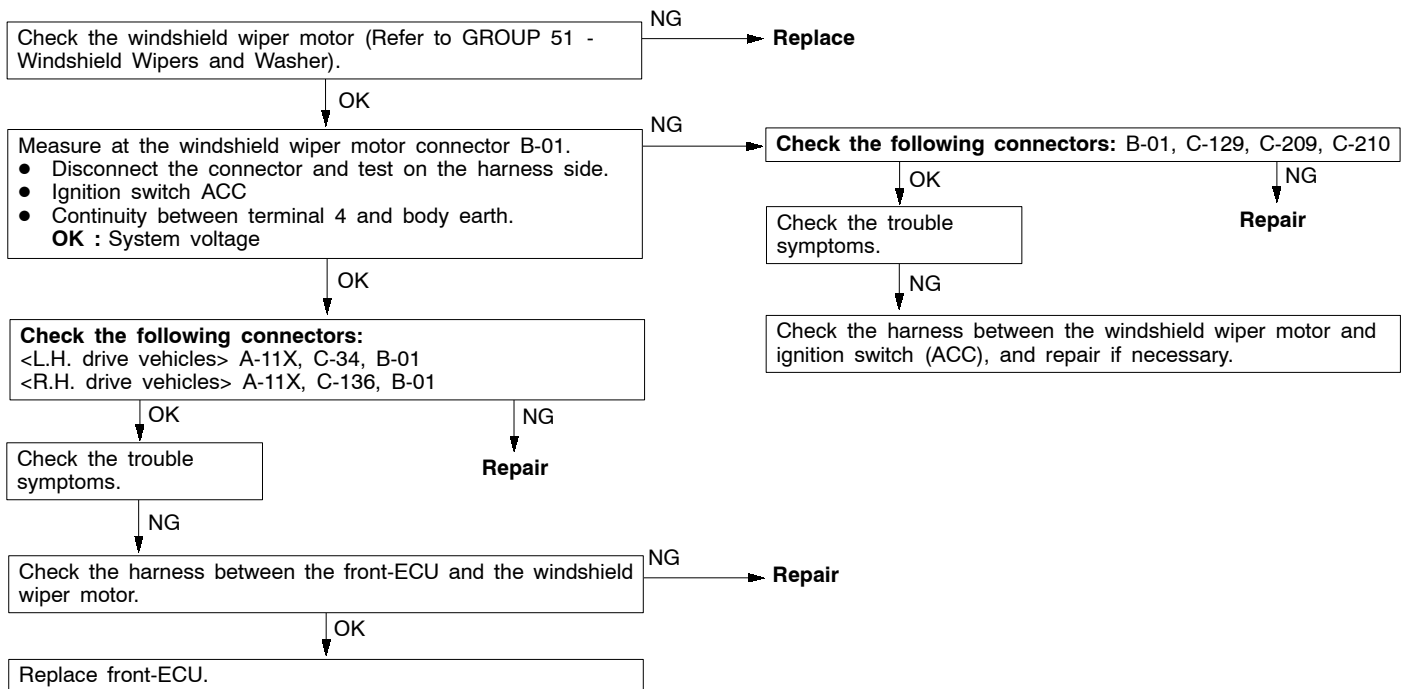
Inspection Procedure E-3

The windshield wipers do not respond to any switch position.	Probable cause
Either the windshield wiper motor, the column switch, or the front-ECU may be defective.	<ul style="list-style-type: none"> ● Windshield wiper motor fault ● Column switch fault ● front-ECU fault ● Harness or connector fault



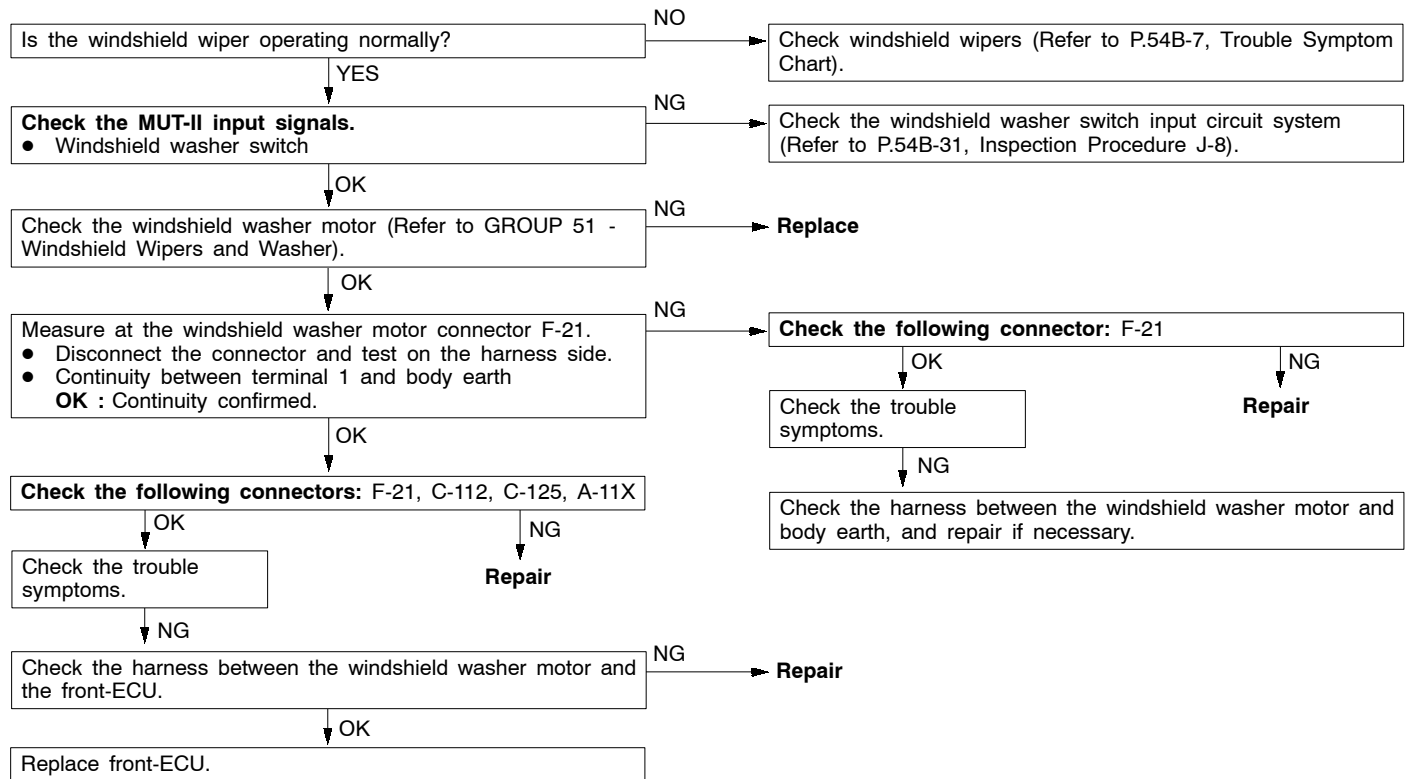
Inspection Procedure E-4

The windshield wipers do not stop in the normal predetermined position.	Probable cause
Either the windshield wiper motor or the front-ECU may be defective.	<ul style="list-style-type: none"> ● Windshield wiper motor fault ● front-ECU fault ● Harness or connector fault



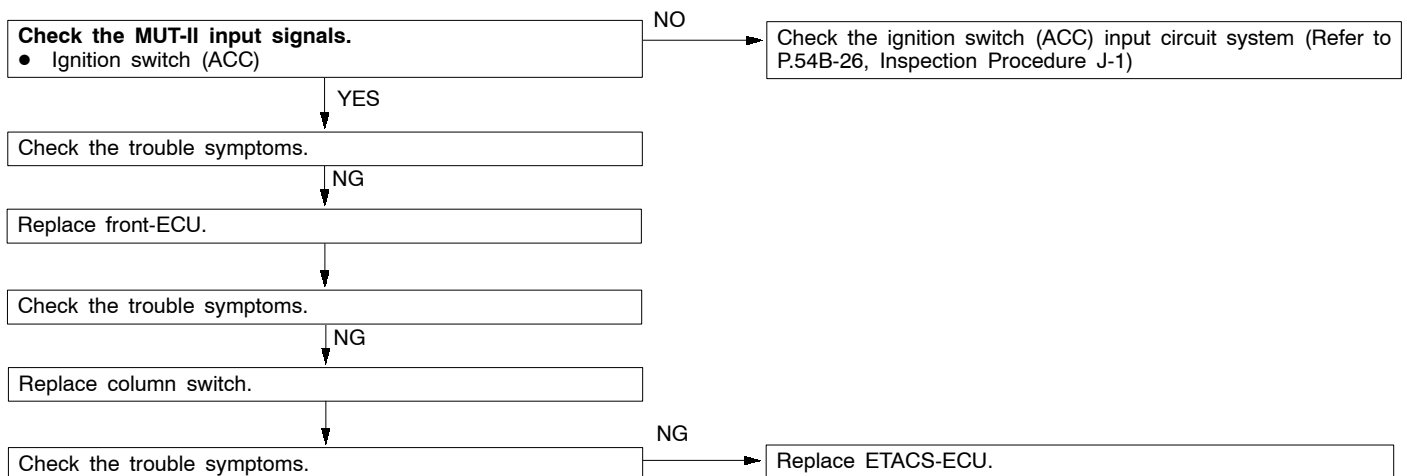
Inspection Procedure E-5

The windshield washer does not work at all.	Probable cause
Either the windshield washer switch input circuit system, the windshield washer motor, or the front-ECU may be defective.	<ul style="list-style-type: none"> ● Windshield washer motor fault ● Column switch fault ● front-ECU fault ● Harness or connector fault



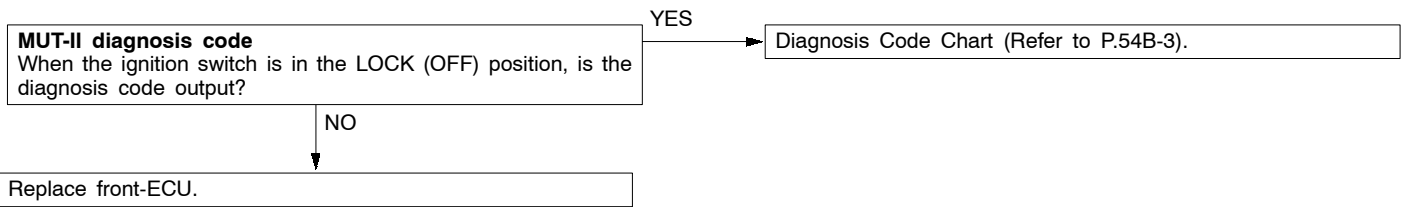
Inspection Procedure E-6

Windshield wipers are not operated with the switch in INT, WASHER and MIST positions, and operated in a low mode with the switch in Lo and Hi positions.	Probable cause
Fail-safe function may be operated due to the fault on SWS communication line. Fail-safe function is activated with the ignition switch in ACC position when the ignition switch ACC signal is not input due to the open circuit, etc.	<ul style="list-style-type: none"> ● Column switch fault ● front-ECU fault ● ETACS-ECU fault ● Harness or connector fault



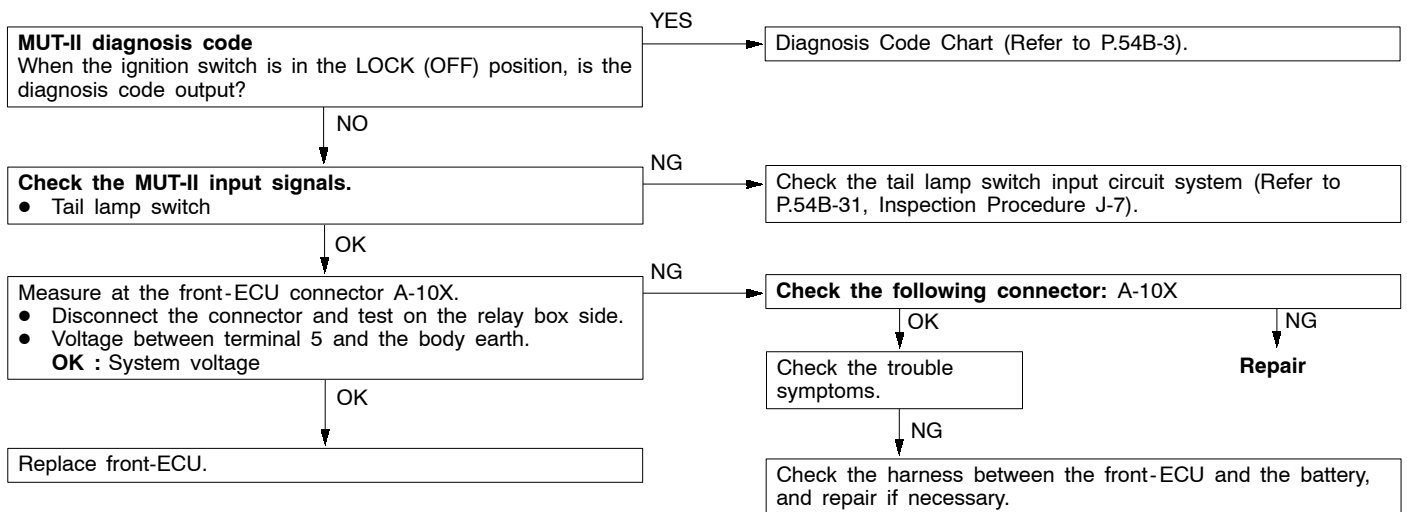
Inspection Procedure F-1

Except for lighting switch “OFF” the headlamps only respond to the “low-beam” position.	Probable cause
If the headlamps only go onto low-beam regardless of the switch position, the headlamp fail-safe function is probably activated.	<ul style="list-style-type: none"> ● Column switch fault ● front-ECU fault ● Harness or connector fault



Inspection Procedure F-2

The tail lamps do not work.	Probable cause
If none of the tail lamps light up, either the tail lamp switch input circuit system or the front-ECU may be defective.	<ul style="list-style-type: none"> ● Column switch fault ● front-ECU fault ● Harness or connector fault

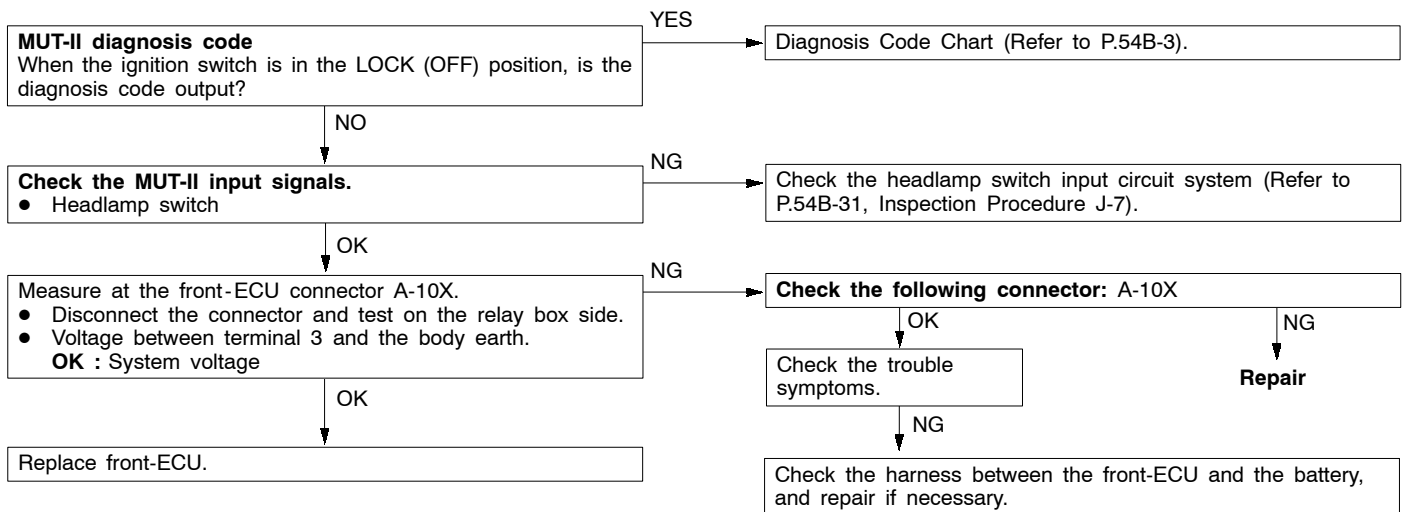


NOTE

If only one of the tail lamps fails to light up, check the bulb and the harness between the front-ECU and the lamp, and between the lamp and body earth.

Inspection Procedure F-3

The headlamps (low-beam) do not light.	Probable cause
If the (low-beam) headlamp on neither side lights up, either the headlamp switch input circuit system or the front-ECU may be defective.	<ul style="list-style-type: none"> Column switch fault front-ECU fault Harness or connector fault

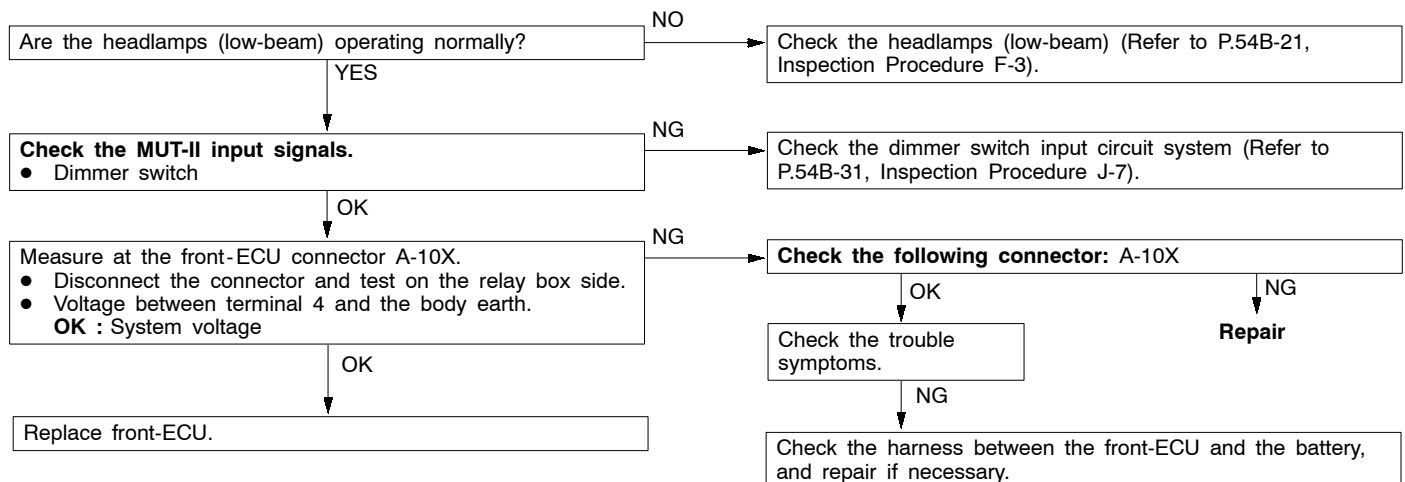


NOTES:

- If only one of the headlamps fails to light up, check the headlamp bulb and the harness between the front-ECU and the headlamps, and between the headlamps and body earth.
- When failure is detected on the harness from the front-ECU to the battery, check and repair the front-ECU No. 4 terminal (A-10X) as well.

Inspection Procedure F-4

The headlamps (high-beam) do not light.	Probable cause
If the (high-beam) headlamp on neither side lights up, either the dimmer switch input circuit system or the front-ECU may be defective.	<ul style="list-style-type: none"> Column switch fault front-ECU fault Harness or connector fault

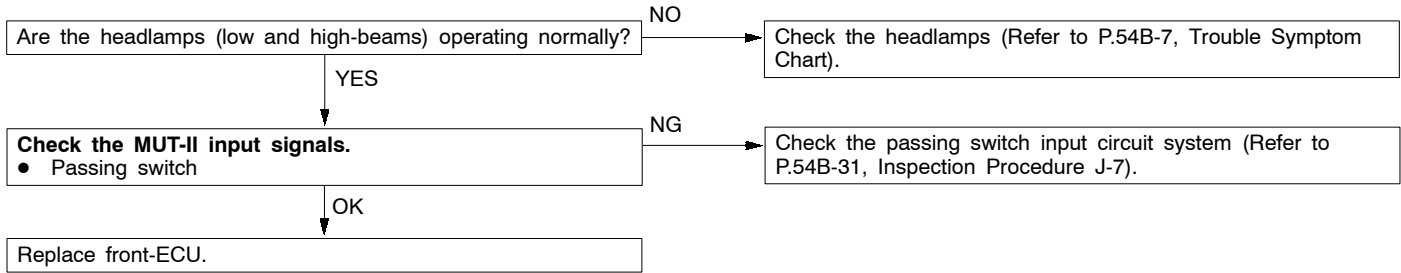


NOTE

- If only one of the headlamps fails to light up, check the headlamp bulb and the harness between the front-ECU and the headlamps, and between the headlamps and body earth.
- When failure is detected on the harness from the front-ECU to the battery, check and repair the front-ECU No. 3 terminal (A-10X) as well.

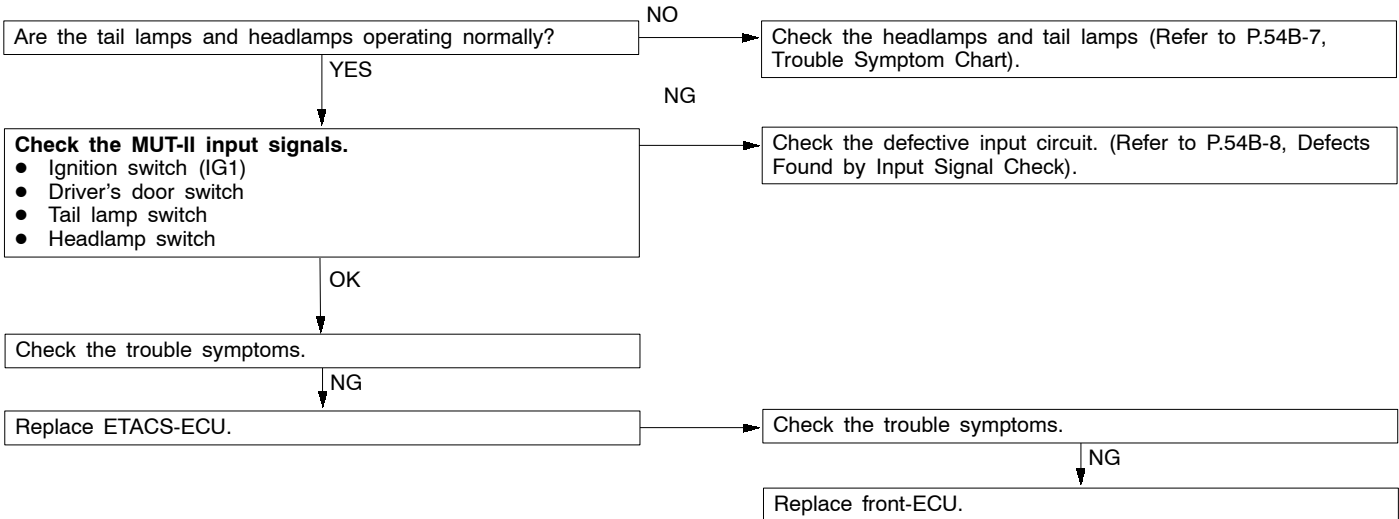
Inspection Procedure F-5

The headlamps (low or high-beam) do not work when the passing switch is ON.	Probable cause
If the headlamps (low and high-beams) are normal, either the passing switch input circuit system or the front-ECU may be defective.	<ul style="list-style-type: none"> ● Column switch fault ● front-ECU fault ● Harness or connector fault



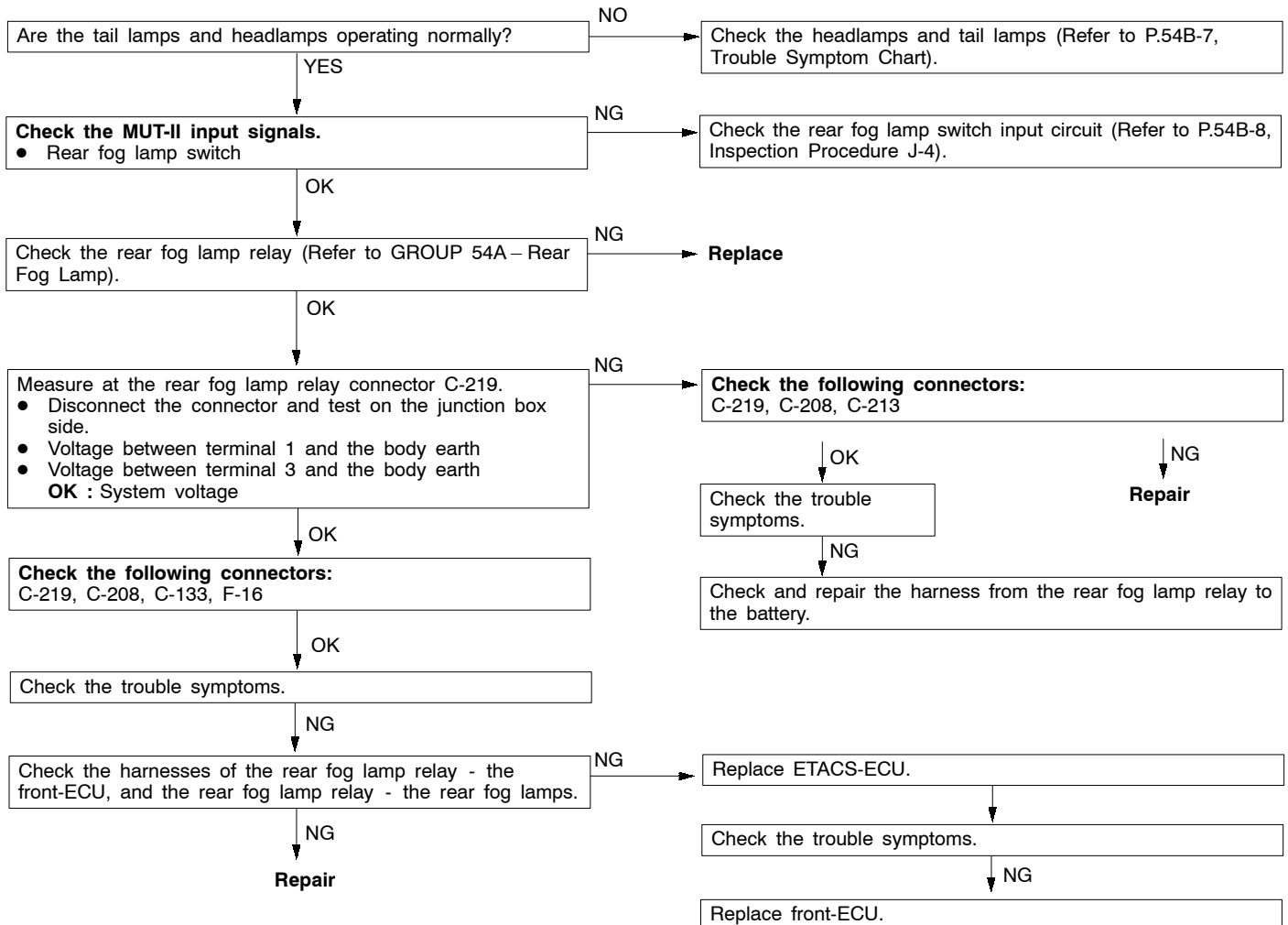
Inspection Procedure F-6

The headlamp automatic cut-off function is not working normally.	Probable cause
The ETACS-ECU controls the headlamp automatic cut-off function based on input signals from the following switches. <ul style="list-style-type: none"> ● Ignition switch (IG1) ● Driver's door switch ● Tail lamp switch ● Headlamp switch If the headlamp automatic cut-off function is not operating normally, either one of the above input circuit systems, the front-ECU, or the ETACS-ECU may be defective.	<ul style="list-style-type: none"> ● Driver's door switch fault ● Column switch fault ● front-ECU fault ● ETACS-ECU fault ● Harness or connector fault



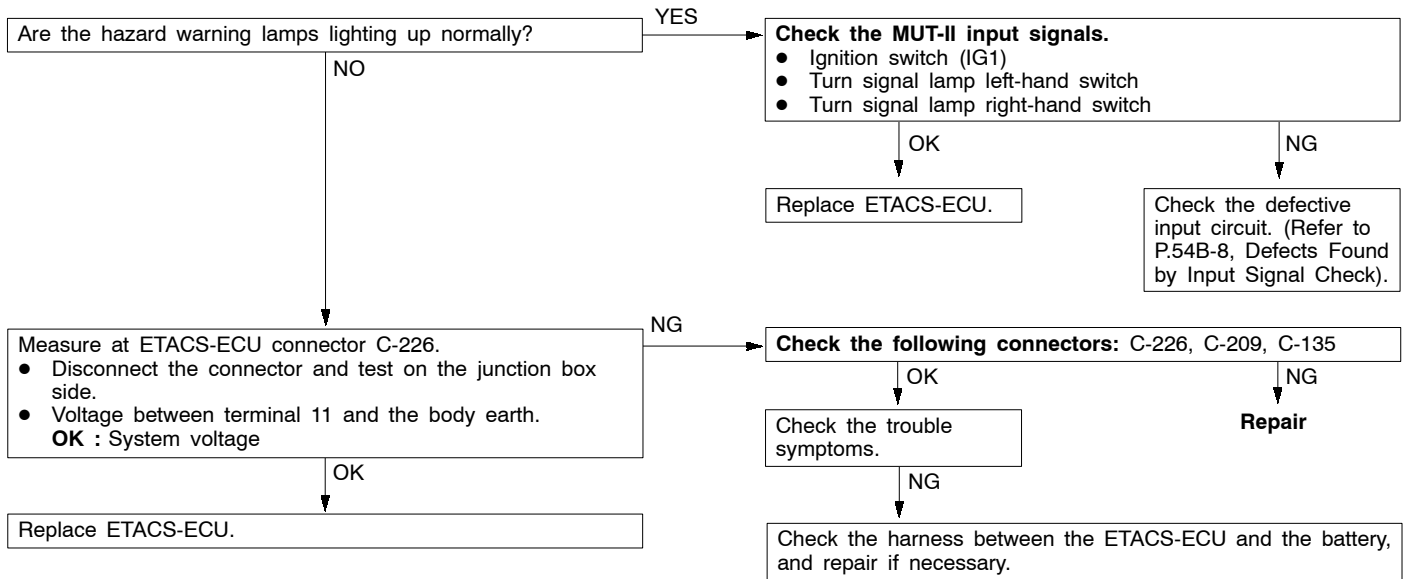
Inspection Procedure L-1

Rear fog lamp is not properly illuminated.	Probable cause
If the tail lamps and the headlamps are normal when the rear fog lamps are not illuminated, failure may occur on the rear fog lamp switch input circuit, the rear fog lamp relay, and the front-ECU or ETACS-ECU.	<ul style="list-style-type: none"> ● Fog fog lamp switch inoperative ● Rear fog lamp relay inoperative ● front-ECU fault ● ETACS-ECU fault ● Harness or connector fault



Inspection Procedure H-1

The turn signal lamp do not light.	Probable cause
<p>The ETACS-ECU controls the turn signal lamps based on input signals from the following switches.</p> <ul style="list-style-type: none"> ● Ignition switch (IG1) ● Turn signal lamp left-hand switch ● Turn signal lamp right-hand switch <p>If none of the turn signal lamps are operating normally, either one of the above input circuit systems or the ETACS-ECU may be defective.</p>	<ul style="list-style-type: none"> ● Column switch fault ● ETACS-ECU fault ● Harness or connector fault

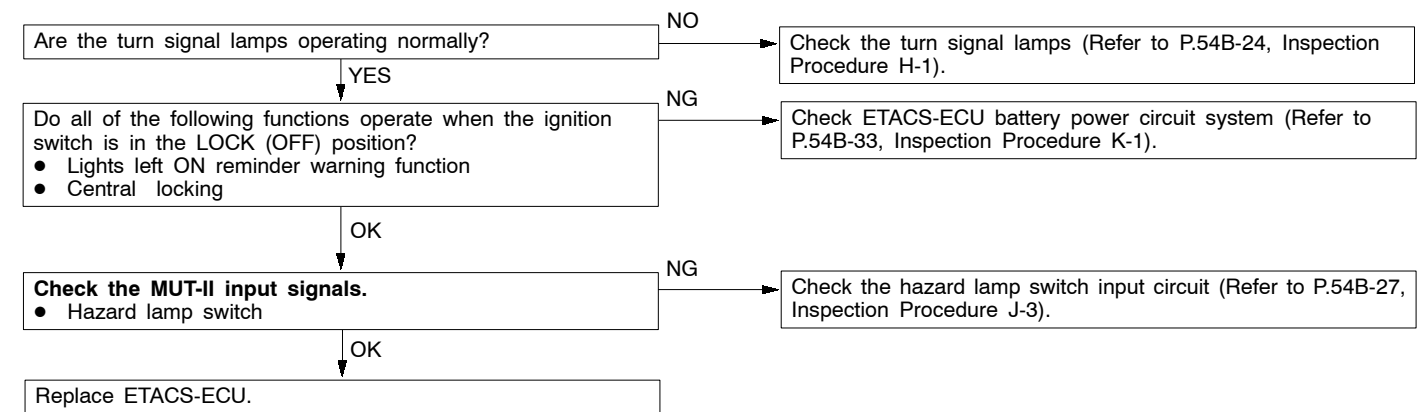


NOTE

If only one of the turn signal lamps is not lighting, check the bulb and the harness between the ETACS-ECU and the lamp, and between the lamp and the body earth.

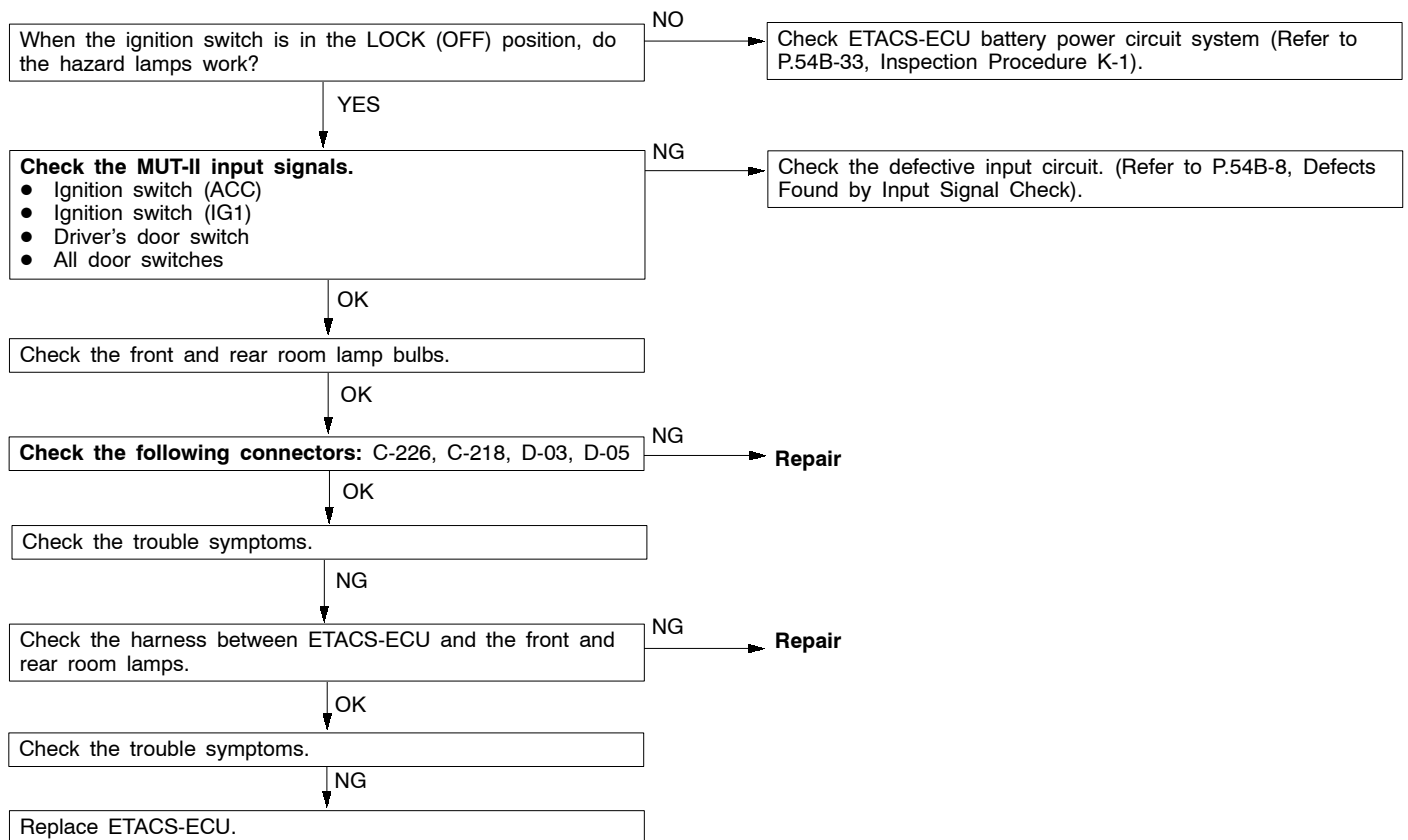
Inspection Procedure H-2

The hazard warning lamps do not light up.	Probable cause
<p>The ETACS-ECU controls the hazard warning lamps based on input signals from the hazard warning lamp switch.</p> <p>If the hazard warning lamps are not operating normally, either the hazard warning lamp switch input circuit system or the ETACS-ECU may be defective.</p>	<ul style="list-style-type: none"> ● Hazard warning lamp switch fault ● ETACS-ECU fault ● Harness or connector fault



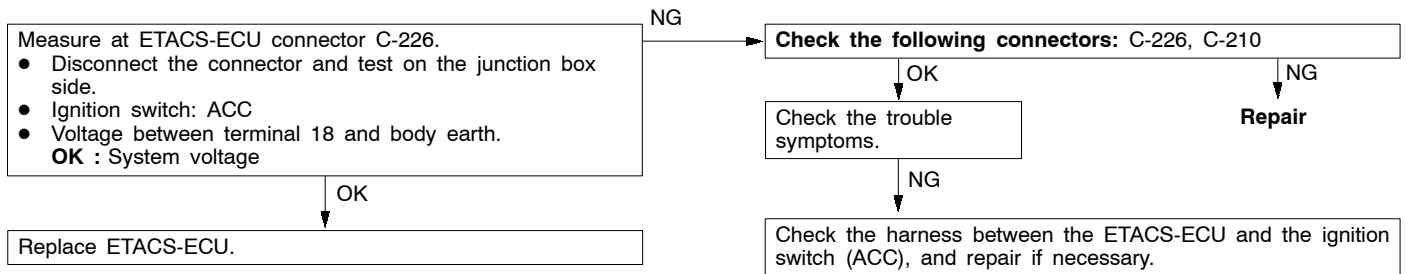
Inspection Procedure I-1

The room lamps do not come ON or OFF normally.	Probable cause
<p>The ETACS-ECU controls the room lamp ON/OFF operation based on input signals from the following.</p> <ul style="list-style-type: none"> ● Ignition switch (ACC) ● Ignition switch (IG1) ● Driver's door switch ● All door switches ● Driver's door lock actuator <p>If the room lamp ON/OFF operation is defective, either one of the above input circuit systems or the ETACS-ECU may be defective.</p>	<ul style="list-style-type: none"> ● Door switch fault ● Driver's door lock actuator fault ● ETACS-ECU fault ● Harness or connector fault



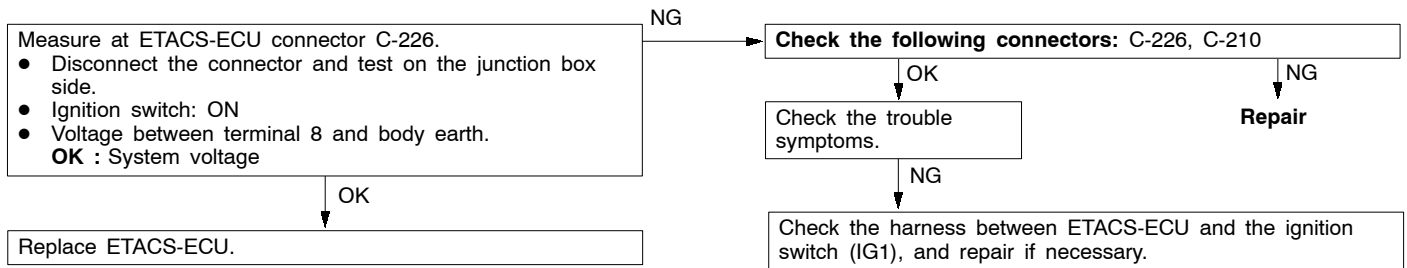
Inspection Procedure J-1

No ignition switch (ACC) signal input to ETACS-ECU.	Probable cause
As the ignition switch (ACC) input signal is used to control the operation of the following functions, any abnormality in this signal prevents these functions operating normally. <ul style="list-style-type: none"> ● Windshield wiper and washer 	<ul style="list-style-type: none"> ● ETACS-ECU fault ● Harness or connector fault



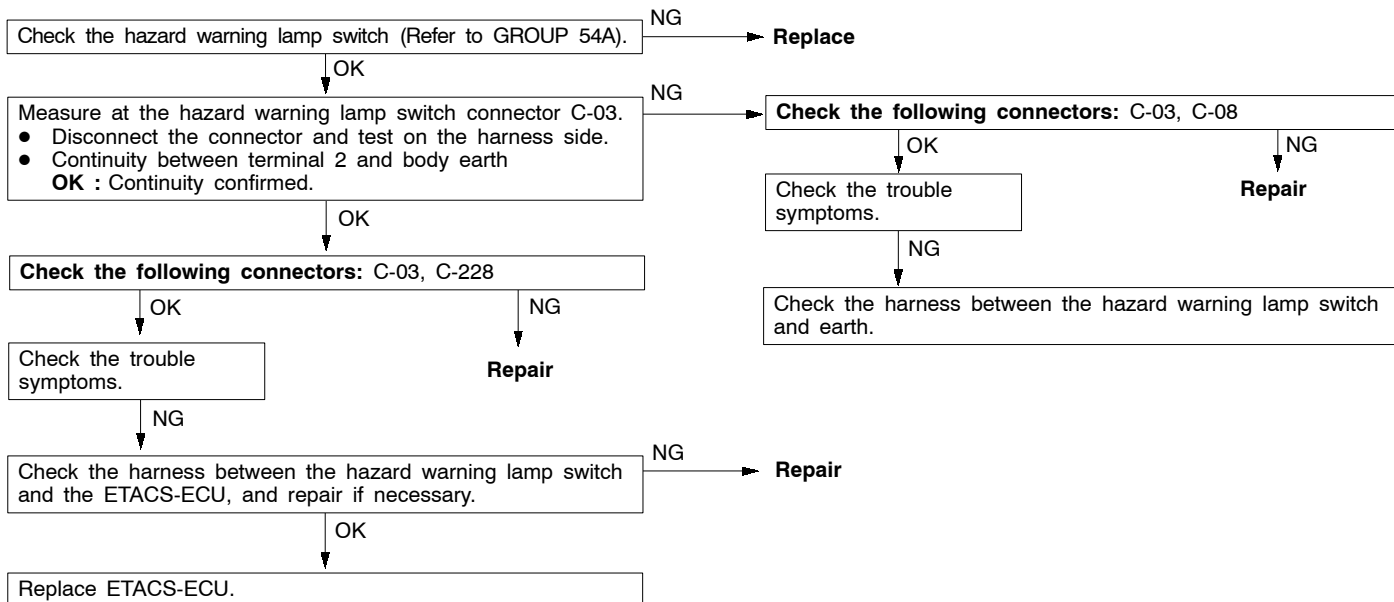
Inspection Procedure J-2

No ignition switch (IG1) signal input to ETACS-ECU.	Probable cause
As the ignition switch (IG1) input signal is used to control the operation of the following functions, any abnormality in this signal prevents these functions operating normally. <ul style="list-style-type: none"> ● Lights left ON reminder warning function ● Power window timer function ● Headlamp automatic cut-off function ● Turn signal lamps ● Room lamps 	<ul style="list-style-type: none"> ● ETACS-ECU fault ● Harness or connector fault



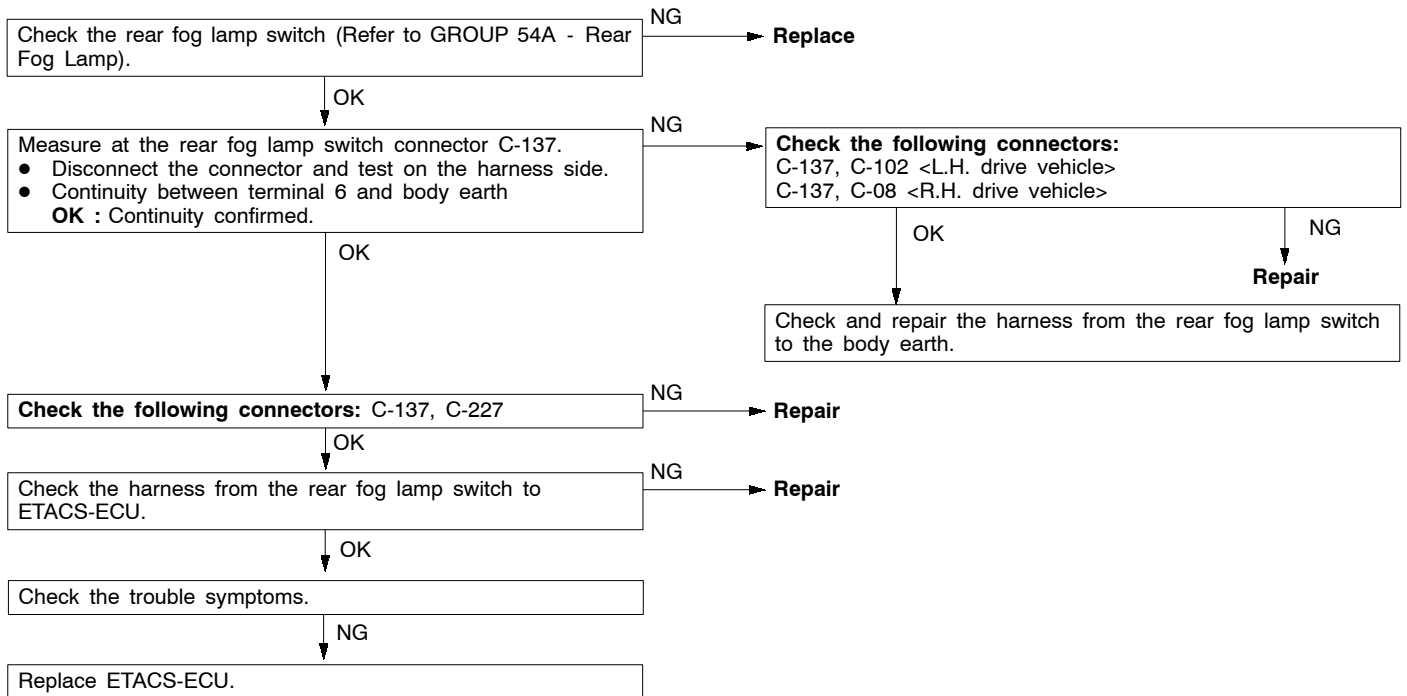
Inspection Procedure J-3

No hazard warning lamp switch signal input to ETACS-ECU.	Probable cause
As the hazard warning lamp switch input signal is used to control the operation of the following functions, any abnormality in this signal prevents these functions operating normally. <ul style="list-style-type: none"> ● Hazard warning lamps 	<ul style="list-style-type: none"> ● Hazard warning lamp switch fault ● ETACS-ECU fault ● Harness or connector fault



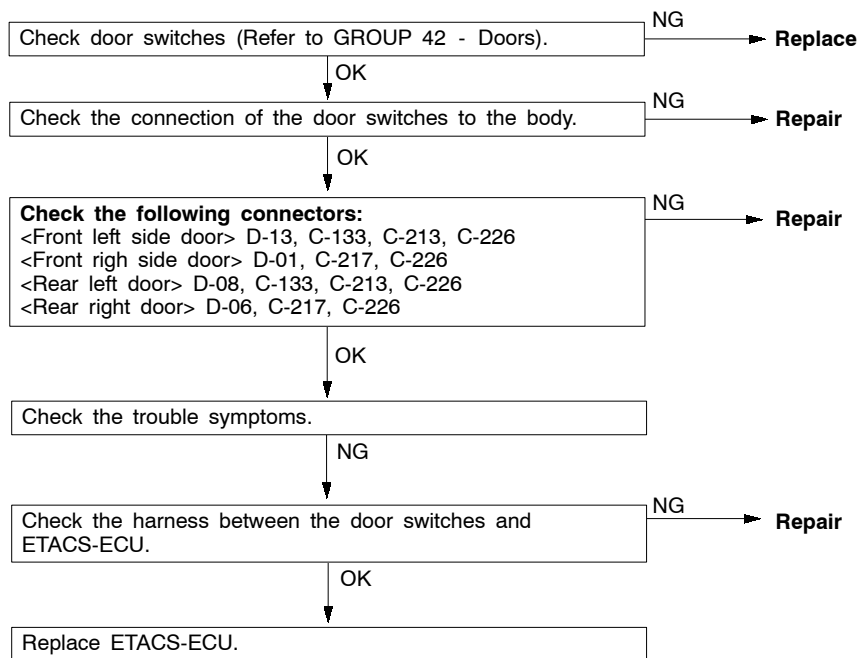
Inspection Procedure J-4

No fog lamp switch signal input to ETACS-ECU.	Probable cause
When the rear fog lamp switch input signal fault occurs, the rear fog lamp switch signal is not transmitted to the SWS communication line.	<ul style="list-style-type: none"> ● Rear fog lamp switch inoperative ● ETACS-ECU fault ● Harness or connector fault



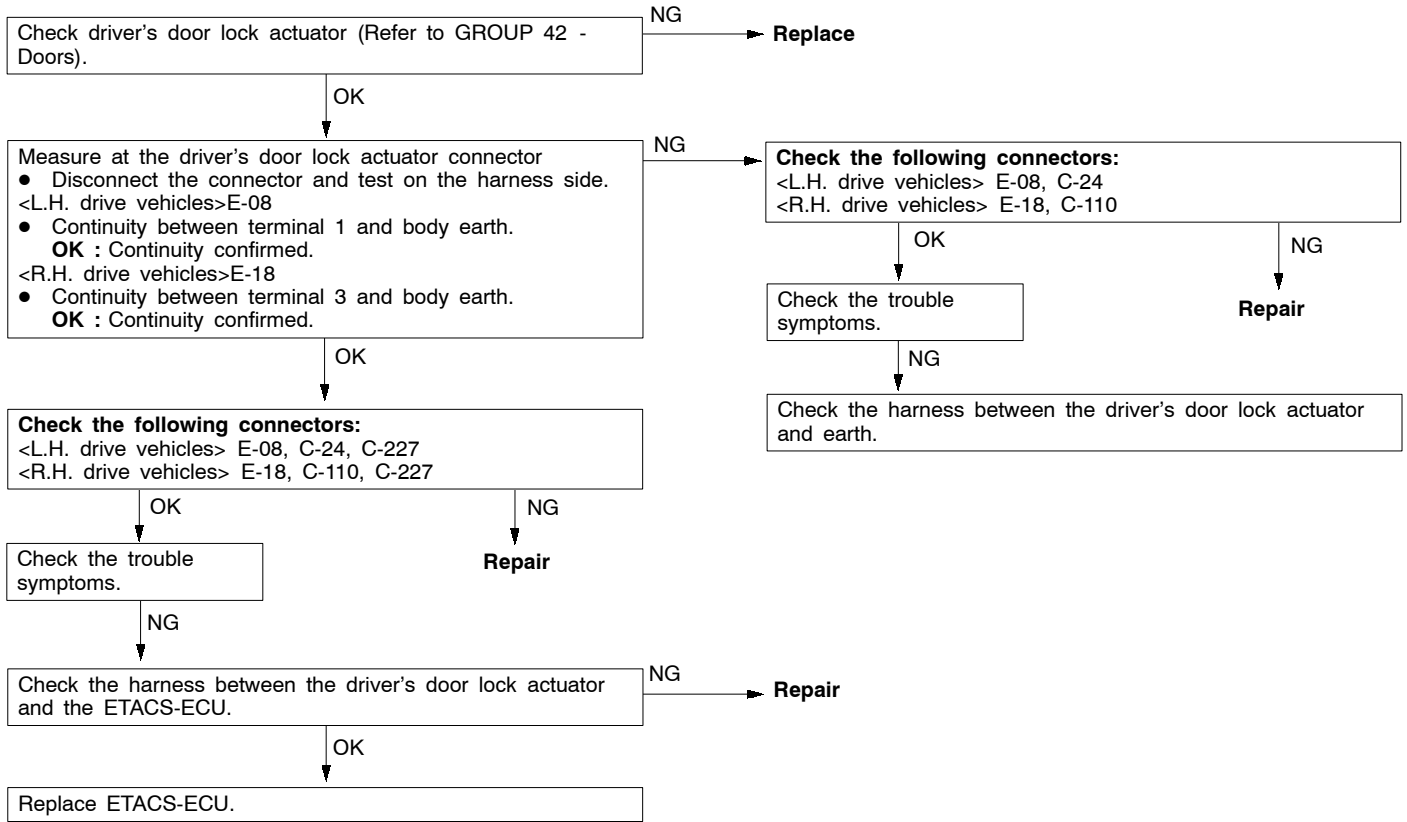
Inspection Procedure J-5

No driver's door switch signal input to ETACS-ECU.	Probable cause
<p>No door switch signals input to ETACS-ECU.</p> <p>Driver's door switch As the driver's door switch input signal is used to control the operation of the following functions, any abnormality in this signal prevents these functions operating normally.</p> <ul style="list-style-type: none"> • Lights left ON reminder warning function • Power window timer function • Headlamp automatic cut-off function • Room lamps <p>Door switches As the door switch input signals are used to control the operation of the following functions, any abnormality in these signals prevents the functions operating normally.</p> <ul style="list-style-type: none"> • Room lamps 	<ul style="list-style-type: none"> • Door switch fault • ETACS-ECU fault • Harness or connector fault



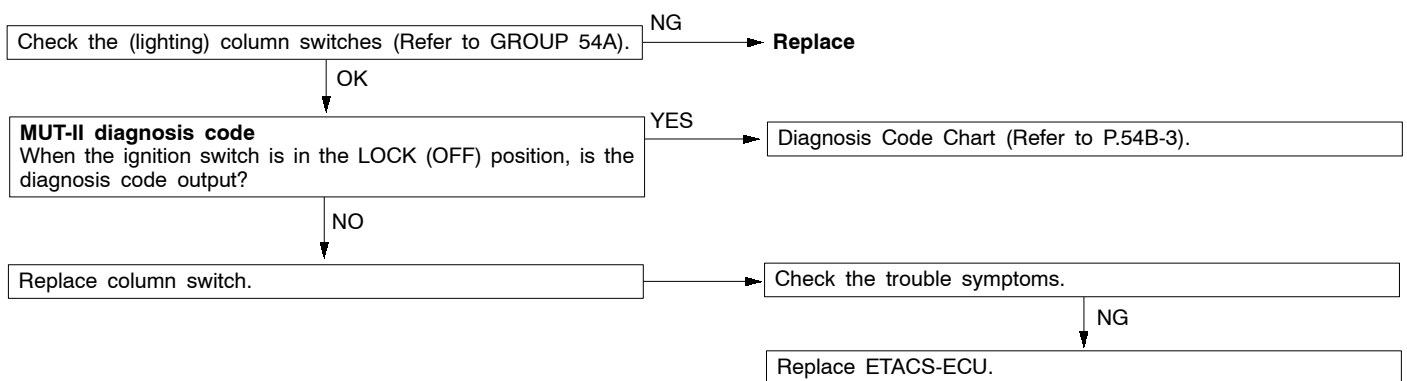
Inspection Procedure J-6

No driver's door lock actuator signal input to ETACS-ECU.	Probable cause
As the driver's door lock actuator input signal is used to control the operation of the following functions, any abnormality in this signal prevents these functions operating normally. <ul style="list-style-type: none"> • Central locking 	<ul style="list-style-type: none"> • Driver's door lock actuator fault • ETACS-ECU fault • Harness or connector fault



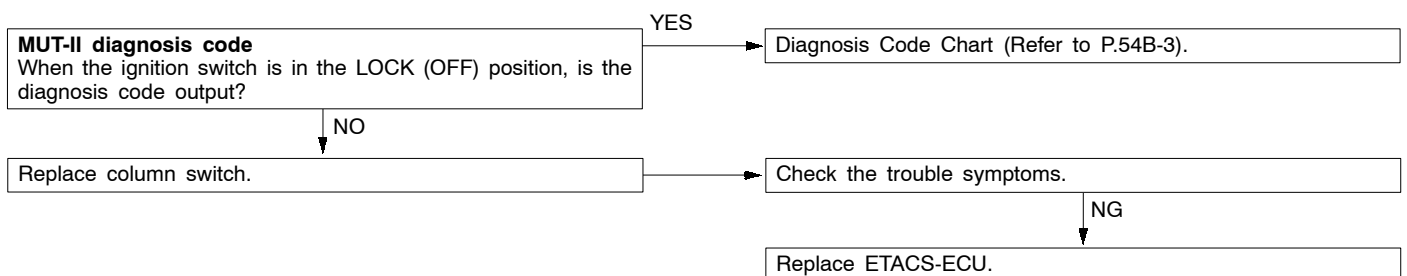
Inspection Procedure J-7

<p>Column switches:</p> <ul style="list-style-type: none"> ● No tail lamp switch signal input to ETACS-ECU. ● No headlamp switch signal input to ETACS-ECU. ● No dimmer switch signal input to ETACS-ECU. ● No passing switch signal input to ETACS-ECU. ● No turn signal lamp left-hand switch signal input to ETACS-ECU. ● No turn signal lamp right-hand switch signal input to ETACS-ECU. 	<p>Probable cause</p>
<p>As the (lighting) column switch input signals control the operation of the following functions, any abnormality in the signals prevents these functions operating normally.</p> <ul style="list-style-type: none"> ● Lights left ON reminder warning function ● Headlamps, tail lamps ● Turn signal lamps 	<ul style="list-style-type: none"> ● Column switch fault ● ETACS-ECU fault ● Harness or connector fault



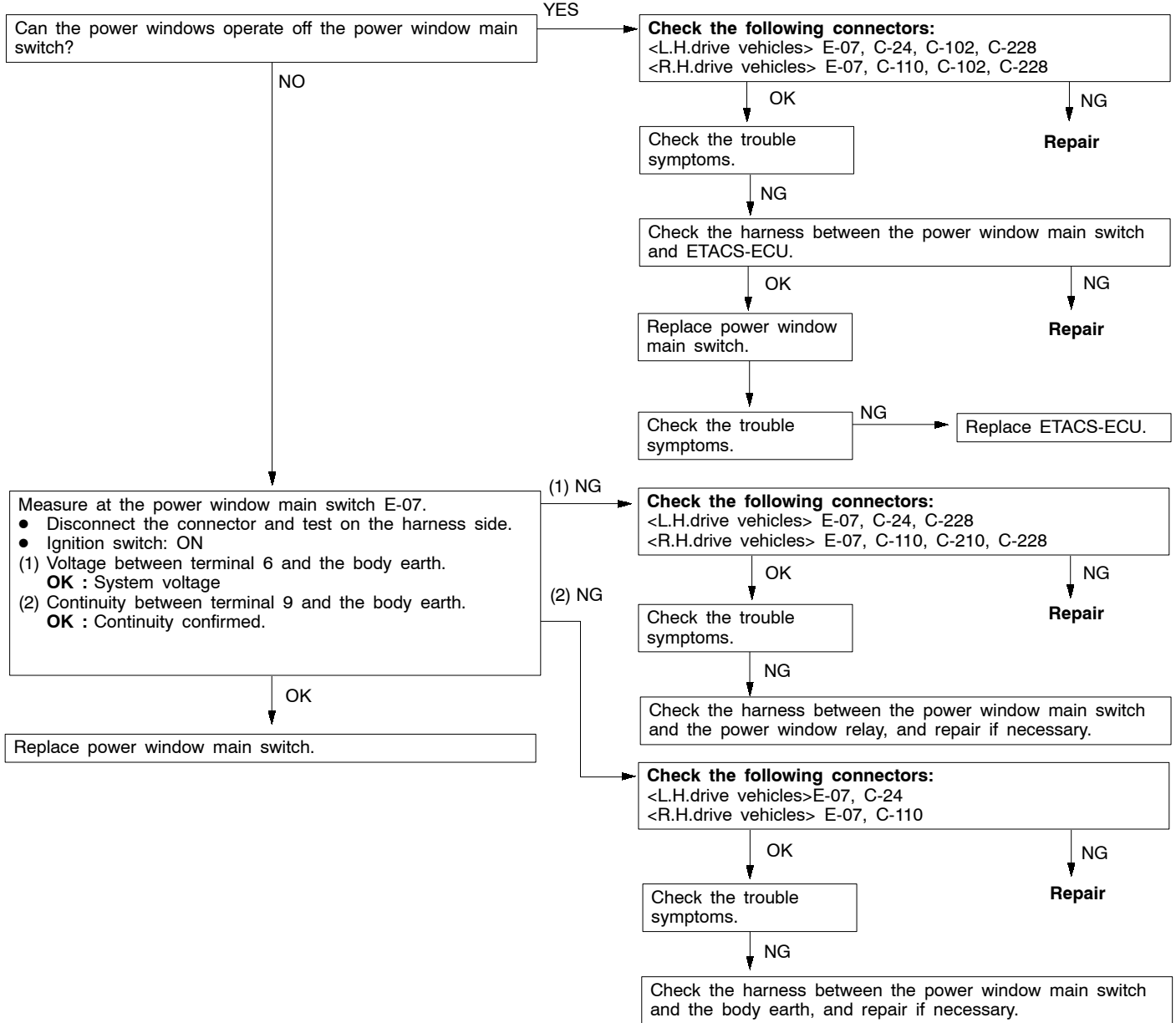
Inspection Procedure J-8

<p>Column switches:</p> <ul style="list-style-type: none"> ● No windshield mist wiper switch signal input to ETACS-ECU. ● No windshield wiper intermittent switch signal input to ETACS-ECU. ● No windshield low-speed wiper switch signal input to ETACS-ECU. ● No windshield high-speed wiper switch input to ETACS-ECU. ● No windshield washer switch signal input to ETACS-ECU. 	<p>Probable cause</p>
<p>As the column switch (wiper/washer switch) input signal is used to control the following functions, any failure prevents these functions from operating properly.</p> <ul style="list-style-type: none"> ● Windshield wiper and washer 	<ul style="list-style-type: none"> ● Column switch fault ● ETACS-ECU fault ● Harness or connector fault



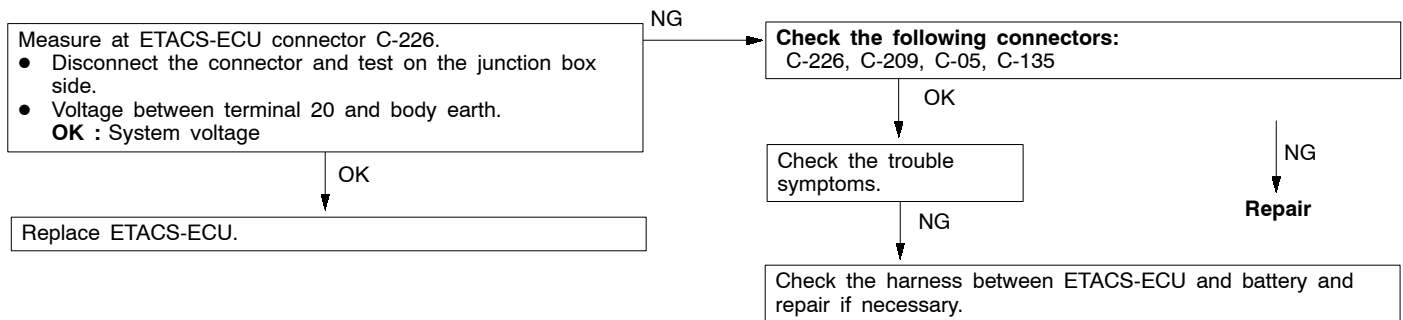
Inspection Procedure J-9

No power window main switch signal input to ETACS-ECU.	Probable cause
The power window main switch input signal is generated to check the individual switch position of the power window main switch, and the communication status for ETACS-ECU. Any communication line abnormality stops the following functions operating normally. <ul style="list-style-type: none"> • Power windows 	<ul style="list-style-type: none"> • Power window main switch fault • ETACS-ECU fault • Harness or connector fault



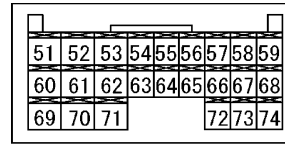
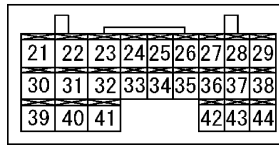
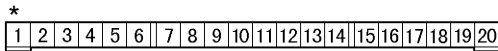
Inspection Procedure K-1

<p>When the ignition switch is in the LOCK (OFF) position, no functions work normally.</p>	<p>Probable cause</p>
<p>Checking of the ETACS-ECU battery power supply circuit system.</p>	<p>Probable cause</p>
<p>As a fault in this circuit disables ETACS-ECU functions when the ignition switch is in the LOCK (OFF) position, any abnormality in this signal prevents the following functions operating.</p> <ul style="list-style-type: none"> ● Lights left ON reminder warning function ● Power window timer function ● Headlamp automatic cut-off function <p>Or, the following functions operate when the ignition switch is in the ON position only.</p> <ul style="list-style-type: none"> ● Diagnosis code reading and input signal check by MUT-II. ● Central locking ● Headlamps, tail lamps ● Hazard lamps ● Room lamps 	<ul style="list-style-type: none"> ● ETACS-ECU fault ● Harness or connector fault



CHECKS AT ECU TERMINALS

ETACS-ECU



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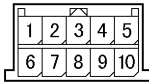
NOTE

*See the list below for data on the ETACS-ECU terminal 1 - 20 connectors. As the ETACS-ECU connects directly onto the junction box, the voltages cannot be measured.

Terminal No.	Check items	Checking requirements	Normal condition
1	Power window relay output	When power windows operating normally	System voltage
2	Battery power supply (for central locking)	Any time	System voltage
3	Earth (for ECU)	Any time	0 V
4	Ignition switch (ACC)	Ignition switch: ACC	System voltage
5	Room lamp output	When room lamps ON	2 V or below
6	-	-	-
7	Door switch input	When any one door switch ON (door open)	0 V
8	Ignition switch (IG1) power supply	Ignition switch: ON	System voltage
9	Right-hand turn signal lamp output	When right-hand turn signal lamp ON	System voltage
10	Driver's door switch input	When driver's door switch ON (door open)	0 V
11	Battery power supply (for hazard lamps)	Any time	System voltage
12	Central locking (lock) output	When door lock actuator operating (locking operation)	System voltage
13	Central locking (unlock) output (NOT driver's door)	When door lock actuator operating (unlocking)	System voltage
14	Left-hand turn signal lamp output	When left-hand turn signal lamp ON	System voltage
15 - 17	-	-	-
18	Ignition switch (ACC) power supply	Ignition switch: ACC	System voltage
19	Battery power supply for interior lamp	When interior lamp ON	System voltage
20	Battery power supply (for ECU)	Any time	System voltage
21	Rear fog lamp switch input	When the rear fog lamp switch ON	0 V
22	Central locking (unlock) output (for driver's door)	When door lock actuator operating (unlocking)	System voltage
23	-	-	-
24 - 32	-	-	-
33	Door lock key cylinder switch input (unlock switch)	When driver's door lock unlocked	0 V
34	Door lock key cylinder switch input (lock switch)	When driver's door lock locked	0 V

Terminal No.	Check items	Checking requirements	Normal condition
35	Driver's door lock actuator (locking switch) input	When driver's door lock locked	0 V
36	Driver's door lock actuator (unlocking switch) input	When driver's door lock unlocked	0 V
37, 38	-	-	-
39	Back-up lamp switch input	When shift lever in reverse position	System voltage
40	-	-	-
51	Diagnosis output/input check signal output	During diagnosis output (when MUT-II connected or diagnosis connector No. 1 grounded on the body.)	0 - 12 V (pulse signal)
		When an input check is output	0, 12 V (at input signal change)
52	Ignition switch (ACC) power supply	Ignition switch: ACC	System voltage
53, 54	-	-	-
55	Hazard warning lamp switch input	Hazard warning lamp switch: ON	0 V
56	Earth (for sensors)	Any time	0 V
57, 58	-	-	-
59	SWS communication line	Any time	0 - 12 V (pulse signal)
60	-	-	-
61	Battery power supply	Any time	System voltage
62	-	-	-
63	Vehicle speed signal input	When vehicle driven	0 - 12 V (pulse signal)
64 - 66	-	-	-
67	Diagnosis control input	When MUT-II connected	0 V
68	SWS request signal output	Any time	0 - 12 V (pulse signal)
69	Ignition key cylinder illumination lamp output	When ignition key cylinder illumination lamp ON	2 V or below
70	-	-	-
71 - 73	-	-	-
74	Rear fog lamp output <Europe and General Export-spec. models>	When rear fog lamps ON	System voltage

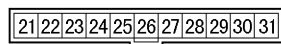
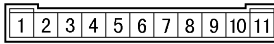
COLUMN SWITCHES



X1209CA

Terminal No.	Check item	Checking requirements	Normal condition
1	Battery power supply	Any time	System voltage
2	SWS request signal input	Any time	0 - 12 V (pulse signal)
3	SWS communication line	Any time	0 - 12 V (pulse signal)
4	Earth	Any time	0 V
5 - 7	-	-	-
8	Windshield wiper switch backup output	Windshield wiper low or high-speed switch: ON	0 V
9	Ignition switch (IG1) power supply	Ignition switch: ON	System voltage
10	Headlamp switch backup output	Headlamp switch: ON	0 V

FRONT-ECU



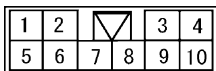
X1210CA

NOTE

See the list below for data on the front-ECU terminals. As the front-ECU connects directly onto the relay box, the voltages cannot be measured.

Terminal No.	Check item	Checking requirements	Normal condition
1	-	-	-
2	Headlamp (high-beam) output	When headlamp (high-beam) ON	System voltage
3, 4	Battery power supply (for headlamps)	Any time	System voltage
5	Battery power supply (for tail lamps)	Any time	System voltage
6	Headlamp (low-beam) output	When headlamp (low-beam) ON	System voltage
7	Battery power supply (for ECU)	Any time	System voltage
8	Tail lamp output	When tail lamps ON	System voltage
9 - 11	-	-	-
21	Windshield washer output	When windshield washer operating	System voltage
22	SWS communication line	Any time	0 - 12 V (pulse signal)
23	Windshield wiper automatic STOP signal input	When windshield wiper operating	System voltage
24	Ignition switch (ACC) power supply	Ignition switch: ACC	System voltage
25	Headlamp switch backup input	Headlamp switch: ON	0 V
26	Windshield wiper switch backup input	Windshield wiper low or high-speed switch: ON	0 V
27	Windshield wiper (low-speed) output	When windshield wiper operating (at low-speed)	System voltage
28	Windshield wiper (high-speed) output	When windshield wiper operating (at high-speed)	System voltage

Terminal No.	Check item	Checking requirements	Normal condition
30	Ignition switch (IG2) power supply	Ignition switch: ON	System voltage
31	Earth	Any time	0 V

POWER WINDOW MAIN SWITCH

Y0794AU

Terminal No.	Check item	Checking requirements	Normal condition
1	-	-	-
2	SWS communication line (with power window motor assembly)	Power window relay: ON	0 - 12 V (pulse signal)
3 - 5	-	-	-
6	Power supply	Power window relay: ON	System voltage
7	-	-	-
8	SWS communication line (with ETACS-ECU)	Any time	0 - 12 V (pulse signal)
9	Earth	Any time	0 V
10	-	-	-

POWER WINDOW MOTOR ASSEMBLY

X1213CA

Terminal No.	Check item	Checking requirements	Normal condition
1	Earth	Any time	0 V
2	Power window sub-switch (DOWN) input (passenger's and rear doors only)	Power window sub-switch: DOWN	0 V
3	Power supply	Power window relay: ON	System voltage
4	Power window sub-switch (UP) input (passenger's and rear doors only)	Power window sub-switch: UP	0 V
6	SWS communication line	Power window relay: ON	0 - 12 V (pulse signal)

NOTES

HEATER, AIR CONDITIONER AND VENTILATION

CONTENTS

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SERVICE SPECIFICATIONS

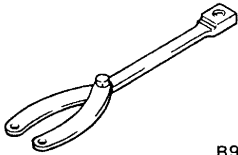
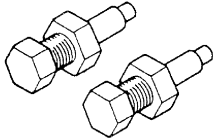
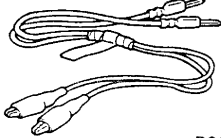
Item		Standard value
Idling speed (rpm): N or P range		850 ± 50
Idle-up speed (rpm): N or P range		850 ± 50
Register resistance (for blower motor) Ω	HI - LO (between terminals 1 and 3)	2.54
	HI - ML (between terminals 1 and 6)	1.24
	HI - MH (between terminals 1 and 4)	0.6
Air conditioner compressor air gap mm		0.3 – 0.5
Refrigerant temperature switch operating temperature (°C)	Continuity	Slightly below 150
	No continuity	150 or higher (until temperature falls to 120 when OFF)

NOTE* : When disconnected the compressor connector at A/C ON

LUBRICANTS

Items	Specified lubricants	Quantity
Compressor oil mL	SUN PAG 56	130 ± 10
Pipe coupling	SUN PAG 56	As required
Refrigerant (g)	R134a (HFC-134a)	550 ± 20

SPECIAL TOOLS

Tool	Number	Name	Use
 <p>B991367</p>	MB991367	Special spanner	For use on the air conditioner compressor armature locknut
 <p>B991386</p>	MB991386	Pin	
 <p>B991529</p>	MB991529	Diagnosis code check harness	For inspecting the air conditioner using a voltmeter

TROUBLESHOOTING

BASIC FLOW OF TROUBLESHOOTING

Refer to Group 00 – How to Use Troubleshooting/Inspection Service Points.

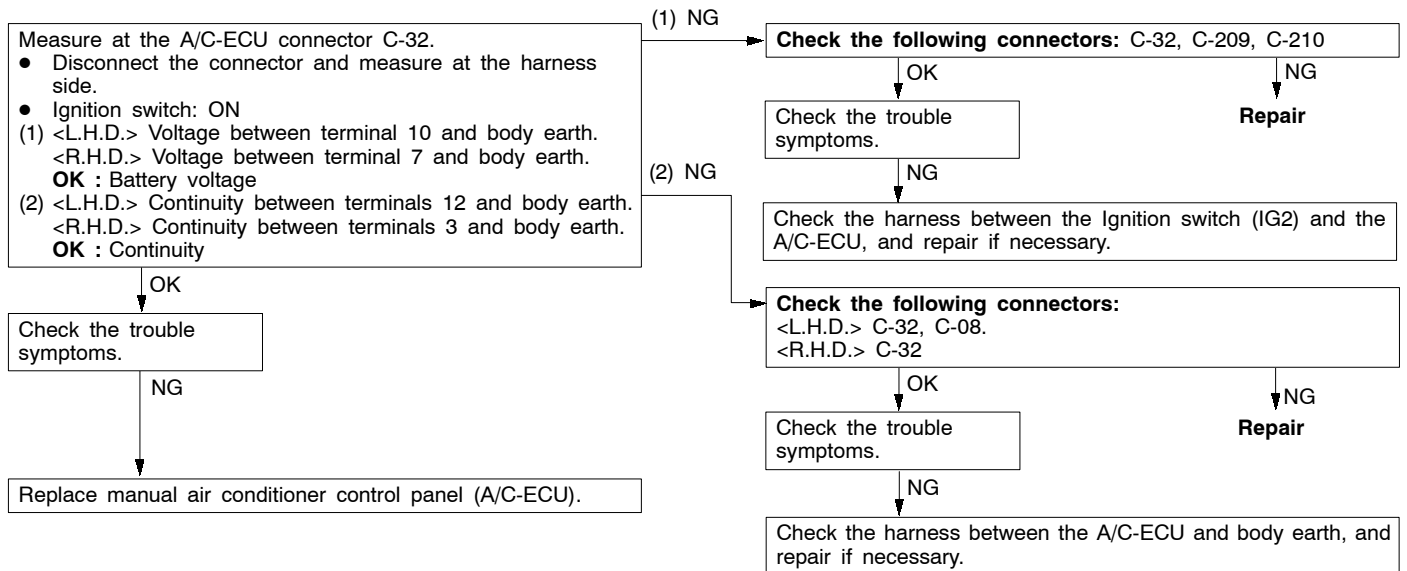
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure	Reference page
Air conditioner not working at all	1	55-3
Blower motor not working	2	55-4
Air cannot be switched between inside and outside	3	55-5
Rear defogger not working	4	55-6
Cold air not coming out from the air outlet	5	55-7
Magnet clutch not working normally	6	55-8
Condenser fan not working at all	7	55-9
Condenser fan not working only for LO	8	55-10
Condenser fan not working only for HI	9	55-11

INSPECTION PROCEDURE FOR TROUBLE SYMPTOM

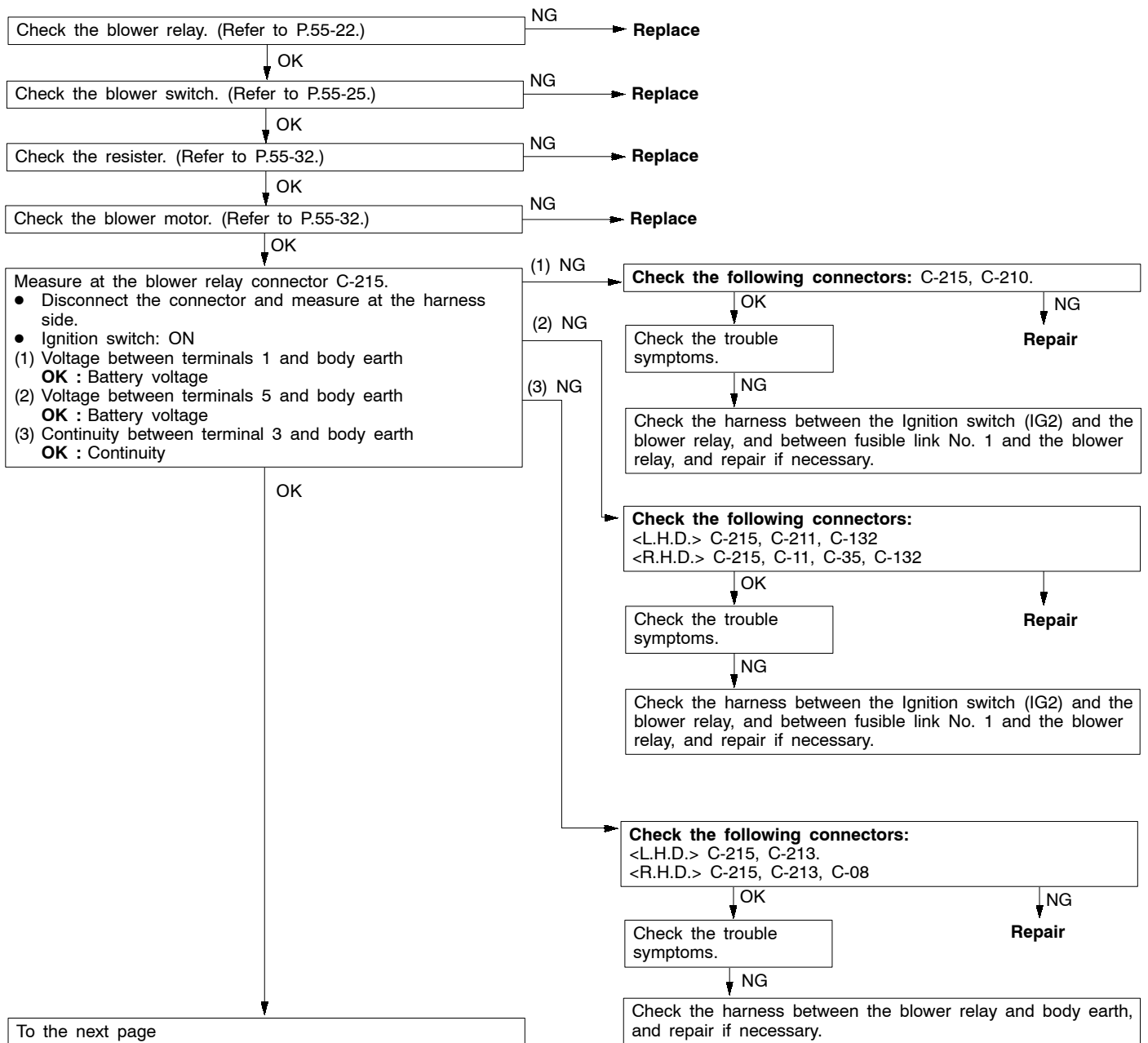
Inspection procedure 1

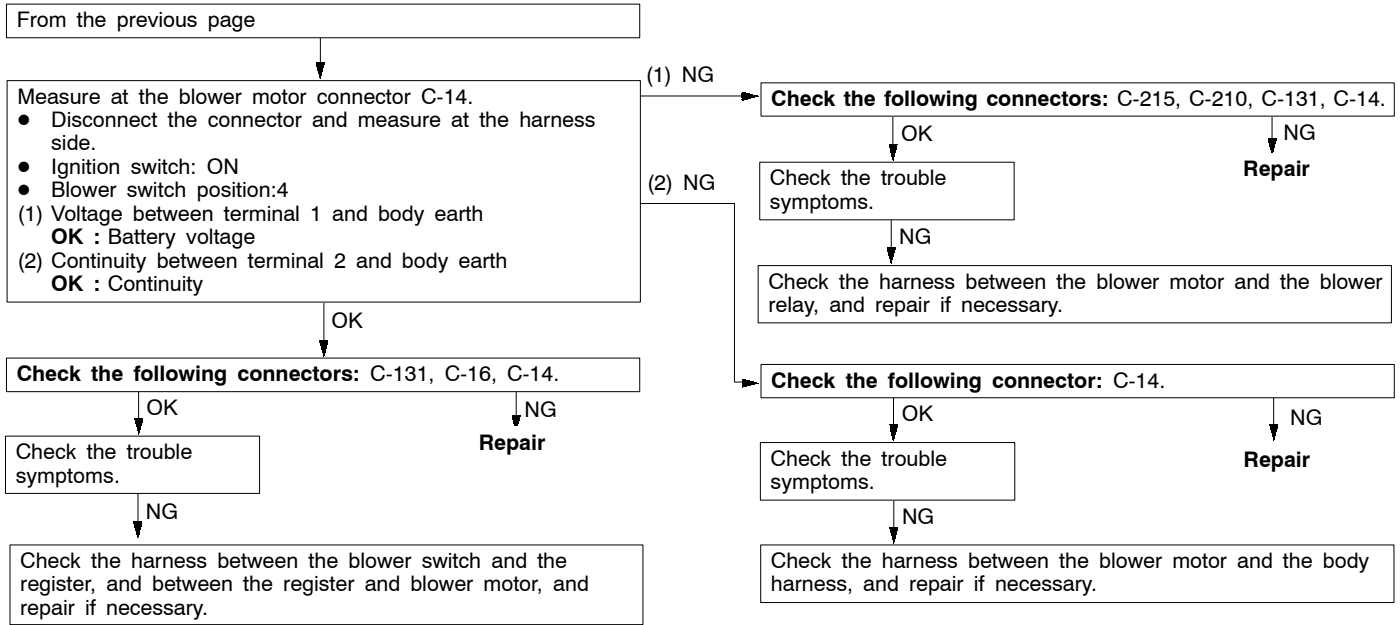
Air conditioner not working at all	Probable cause
The A/C-ECU power supply system (including earth) may be defective.	<ul style="list-style-type: none"> ● Harness or connector fault ● A/C-ECU fault



Inspection procedure 2

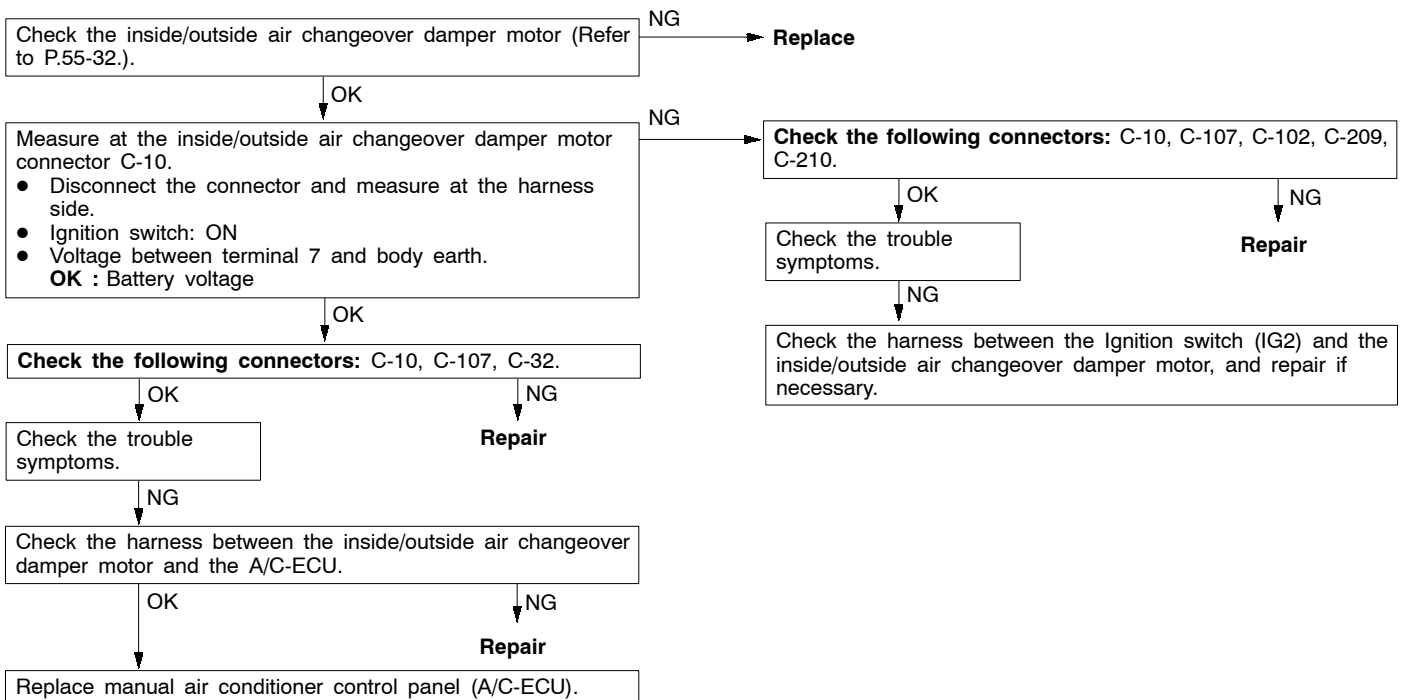
Blower motor not working	Probable cause
If the blower motor does not work, the blower motor circuit system may be defective.	<ul style="list-style-type: none"> ● Blower motor fault ● Harness or connector fault ● A/C-ECU fault





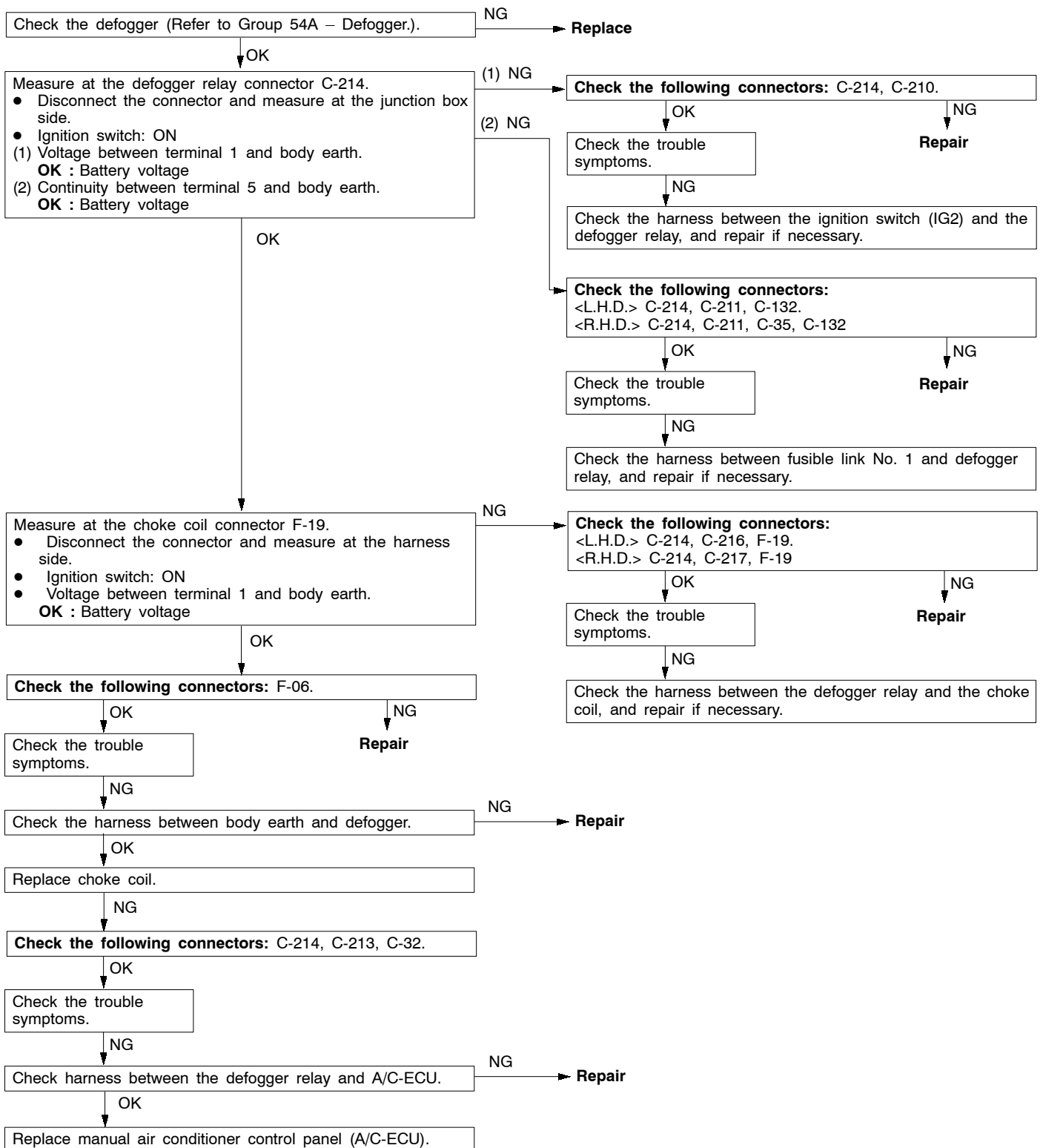
Inspection procedure 3

Air cannot be switched between inside and outside.	Probable cause
If the air cannot be switched between the inside and outside even though the inside/outside switch is ON, the inside/outside changeover damper motor system may be defective.	<ul style="list-style-type: none"> • Inside/outside air changeover damper motor fault • Harness or connector fault • A/C-ECU fault



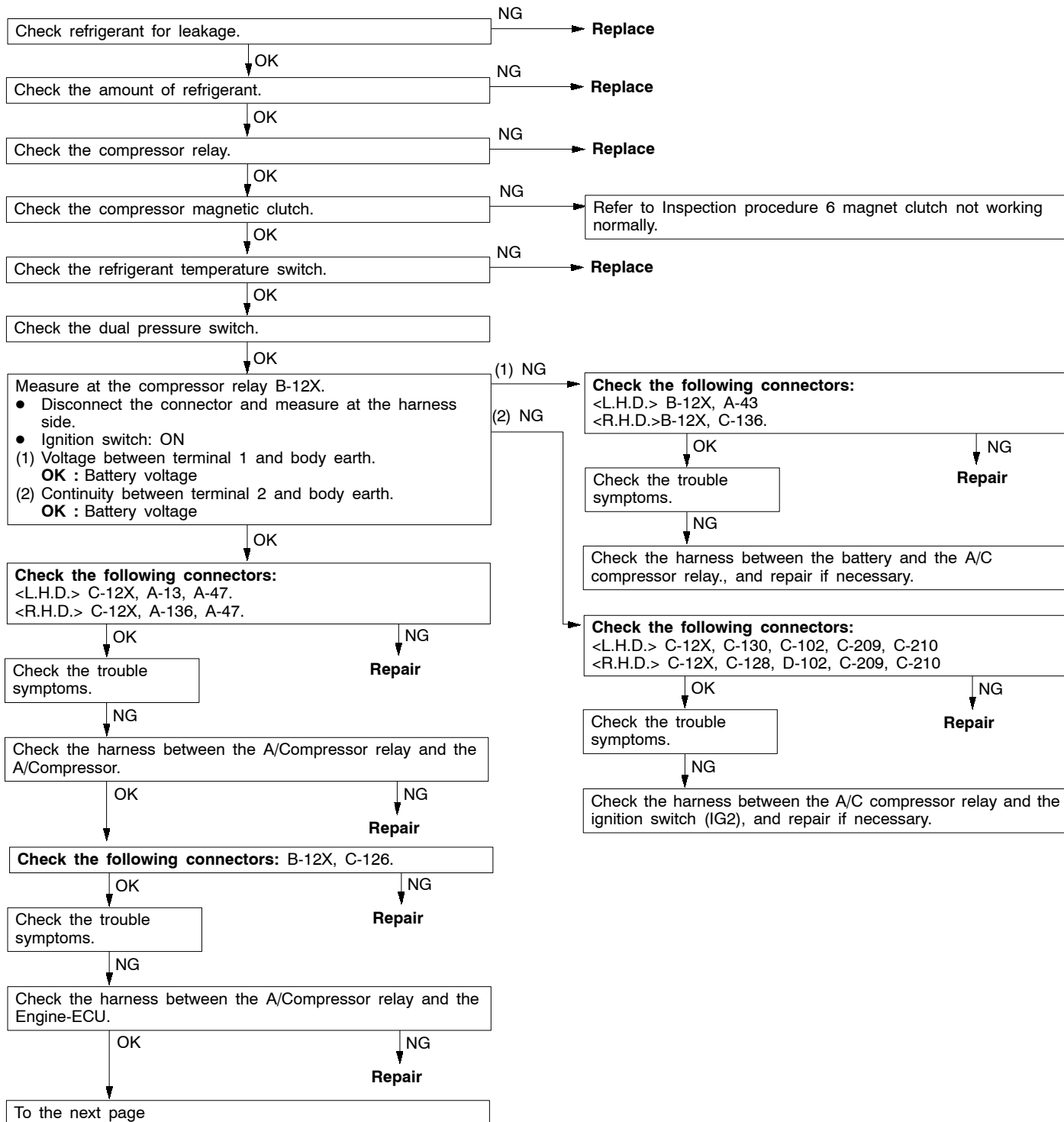
Inspection procedure 4

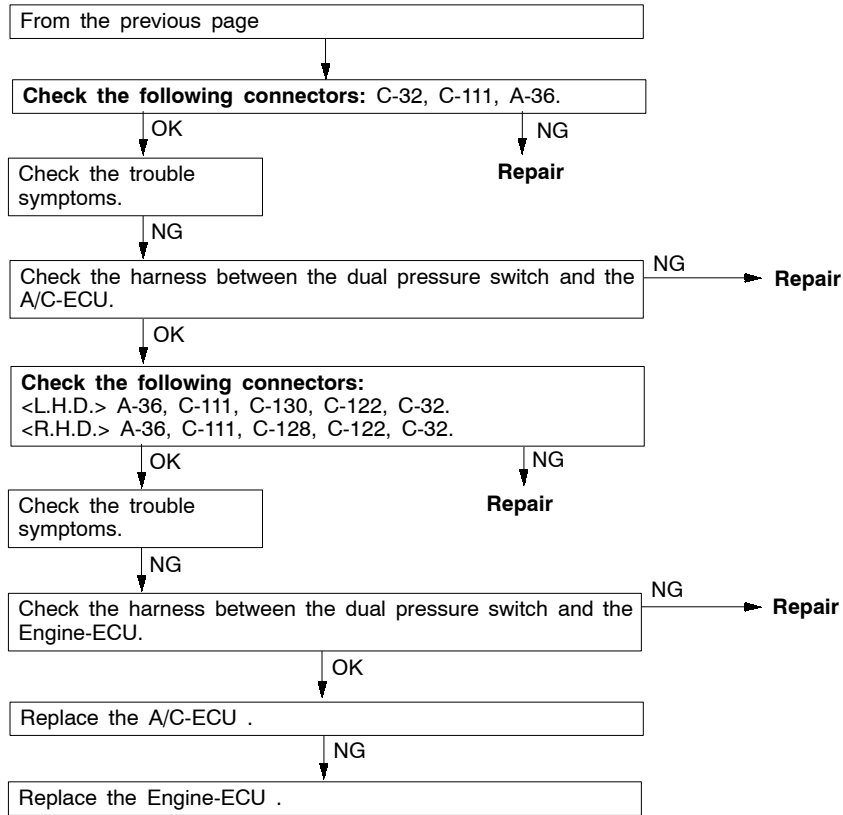
Rear defogger not working	Probable cause
If the rear window defogger does not work even though the rear defogger switch is ON (a 20-minute timer operates), the defogger relay system may be defective.	<ul style="list-style-type: none"> ● Defogger relay fault ● Harness or connector fault ● A/C-ECU fault



Inspection procedure 5

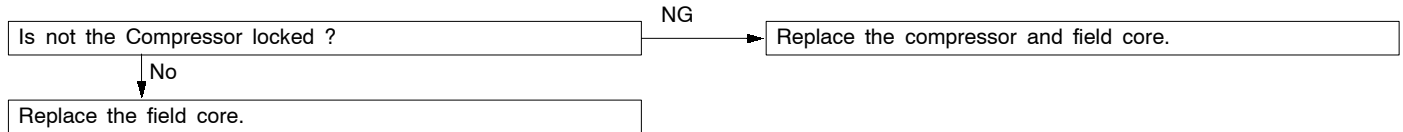
Cold air not coming out from the air outlet	Probable cause
If cold air does not come out from the air outlet, the amount of refrigerant may be inappropriate or the compressor circuit system may be defective.	<ul style="list-style-type: none"> ● Refrigerant line fault ● Amount of refrigerant fault ● Compressor fault ● Compressor relay fault ● Dual pressure switch fault ● Engine-ECU fault ● A/C-ECU fault





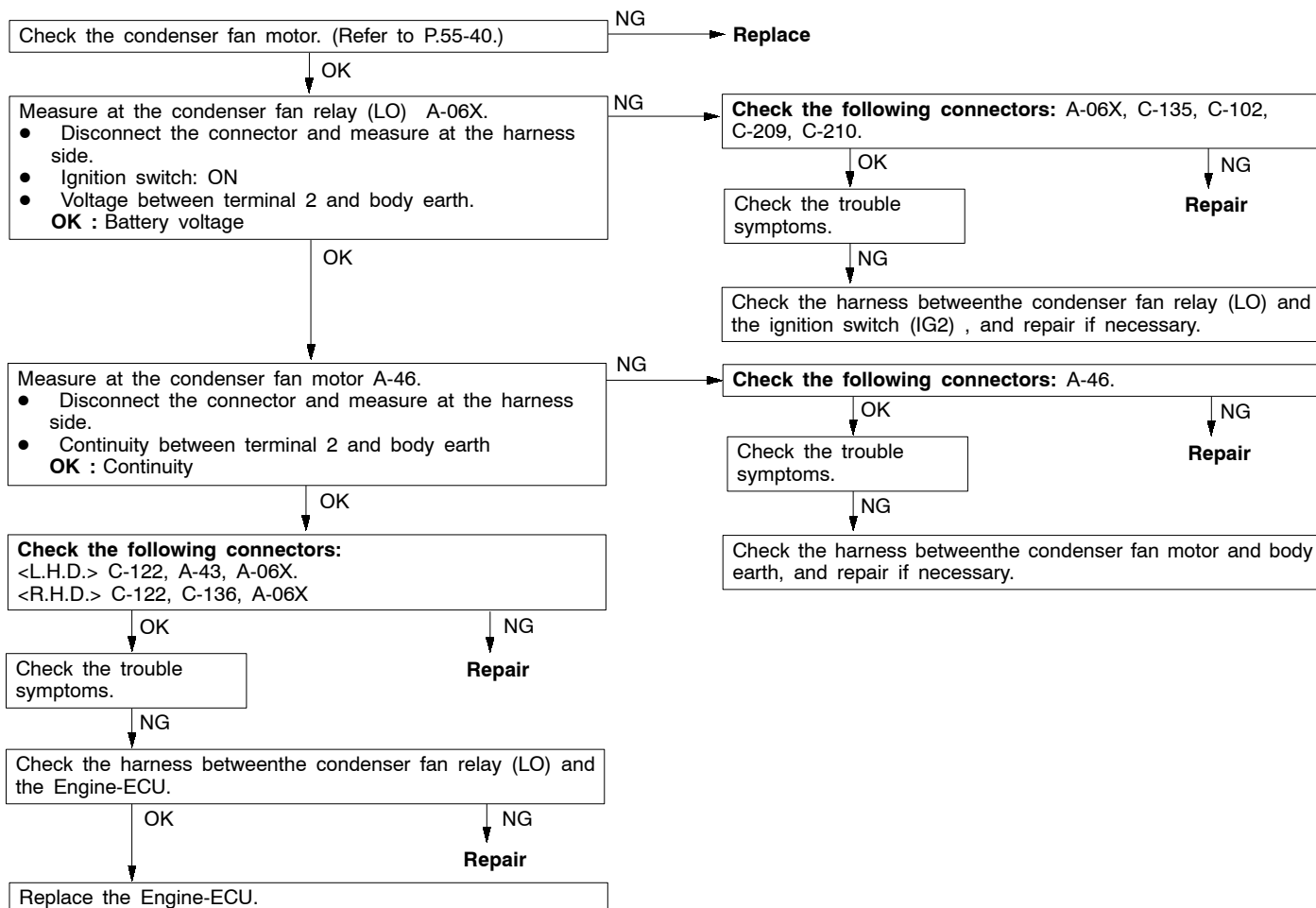
Inspection procedure 6

Magnet clutch not working normally	Probable cause
If the magnet clutch does not work normally, the field core or the compressor may be defective.	<ul style="list-style-type: none"> ● Compressor fault ● Field core fault



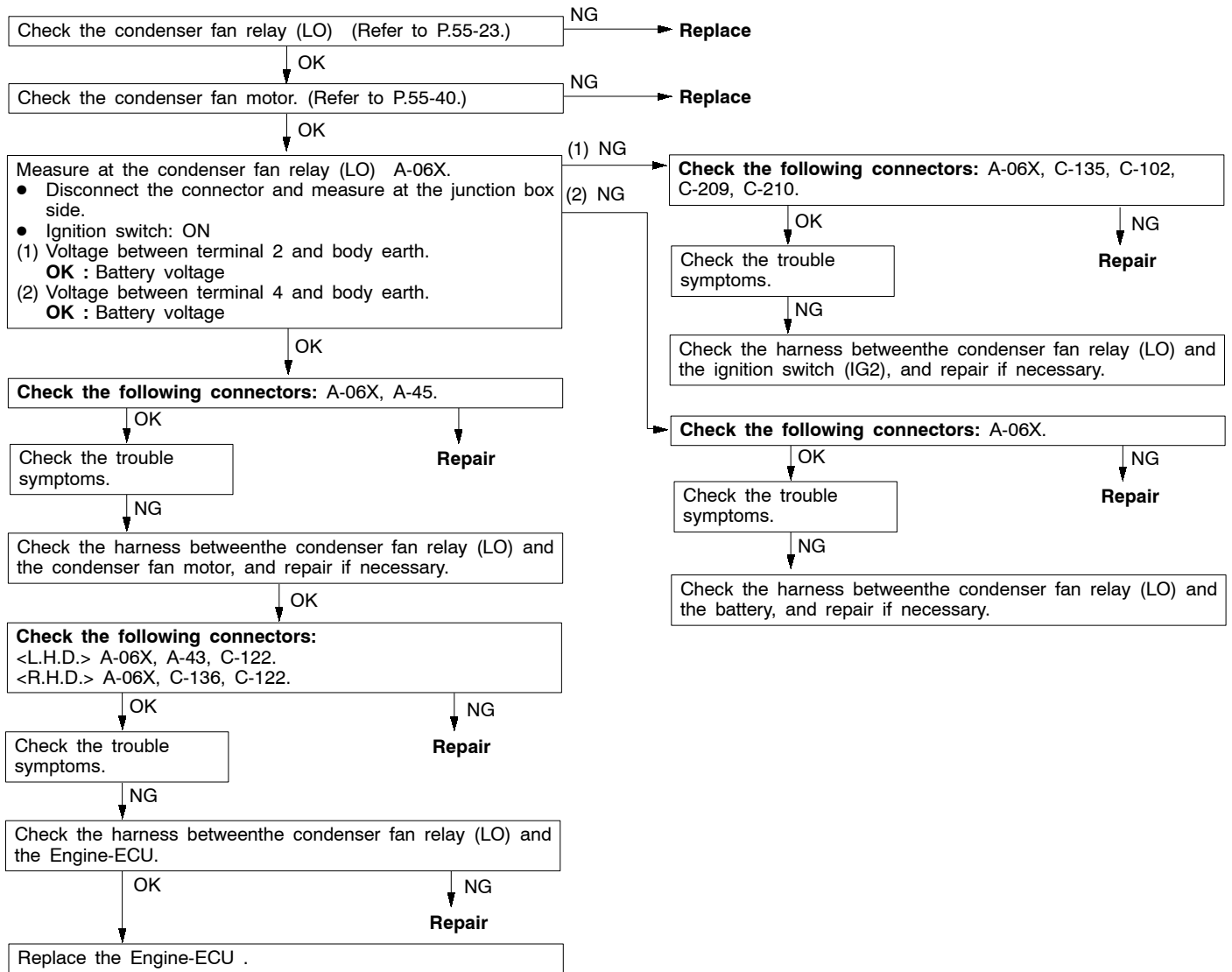
Inspection procedure 7

Condenser fan not working at all	Probable cause
If the condenser fan does not work at all, the condenser fan circuit system may be defective.	<ul style="list-style-type: none"> ● Condenser fan motor fault ● Harness or connector fault ● Engine-ECU fault



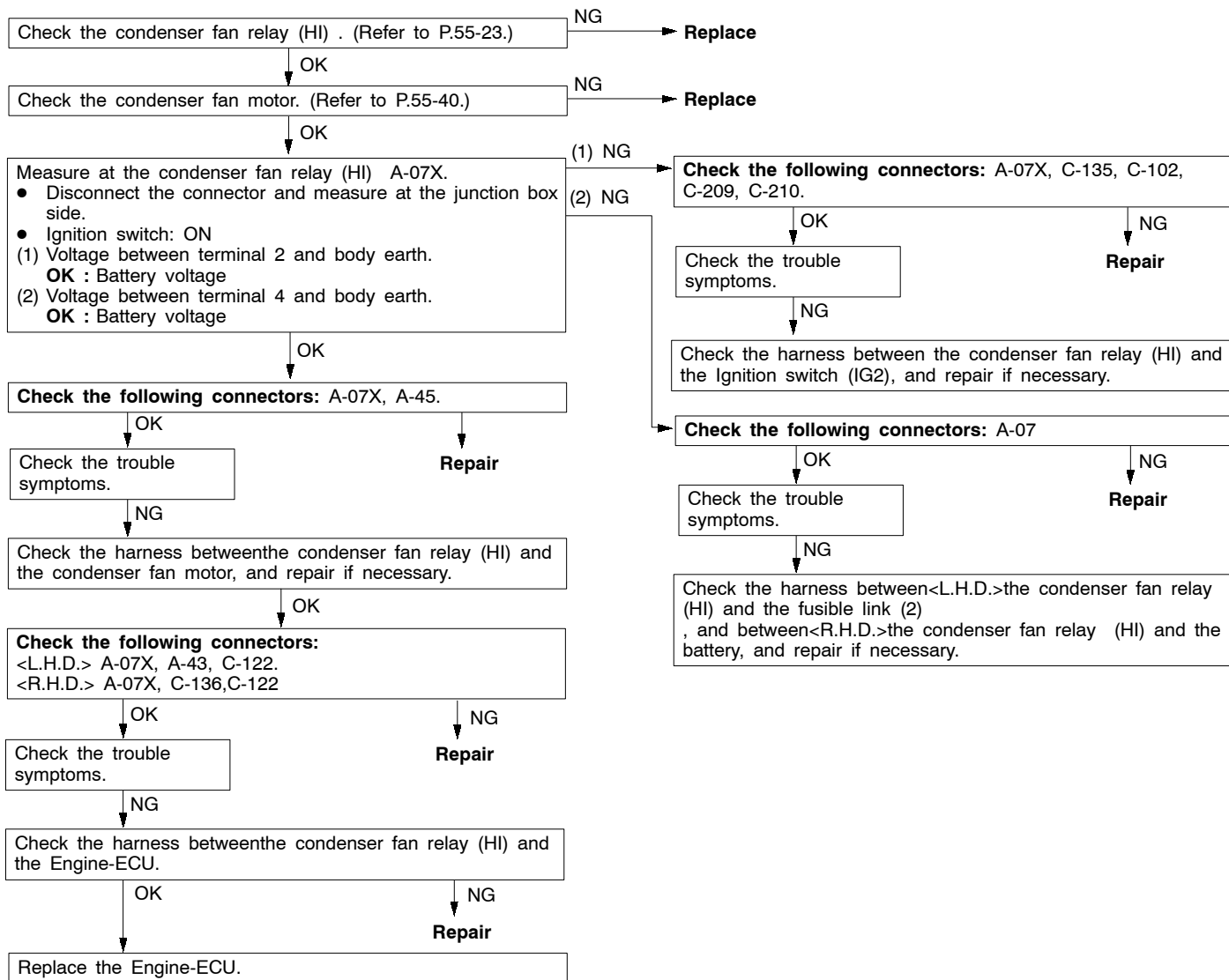
Inspection procedure 8

Condenser fan not working only for LO	Probable cause
If the condenser fan does not work only for LO, the condenser fan circuit system or the condenser fan relay (LO) circuit system may be defective.	<ul style="list-style-type: none"> ● Condenser fan motor fault ● Condenser fan relay (LO) fault ● Harness or connector fault ● Engine-ECU fault



Inspection procedure 9

Condenser fan not working only for HI	Probable cause
If the condenser fan does not work only for HI, the condenser fan circuit system or the condenser fan relay (HI) circuit system may be defective.	<ul style="list-style-type: none"> ● Condenser fan motor fault ● Condenser fan relay (HI) fault ● Harness or connector fault ● Engine-ECU fault



CHECK AT THE ENGINE-ECU TERMINAL

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

31	32	33	34	35	36	37	38
39	40	41	42	43	44	45	46

51	52	53	54	55	56
57	58	59	60	61	62

71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

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Terminal no.	Check item	Check when	Normal state
21	Fan controller output	Radiator fan: ON	0 - 0.3 V
		Radiator fan: OFF	0.7 V or more
22	A/C compressor output	A/C compressor relay: OFF	0 V
		A/C compressor relay: ON	Battery voltage or temporarily 6V or more → 1V or less
24	A/C-ECU input (A/C2)	At A/C low load	Battery voltage
32	Condenser fan motor relay (HI)	Fan: OFF (engine coolant temperature: 90°C or lower)	Battery voltage
		Fan: ON (engine coolant temperature: 105°C or lower)	1V or more
34	Condenser fan motor relay (LOW)	Fan: OFF (engine coolant temperature: 90°C or lower)	Battery voltage
		Fan: ON (engine coolant temperature: 105°C or lower)	1V or more
45	A/C-ECU input (A/C1)	A/C ON (When dual pressure switch is ON)	Battery voltage

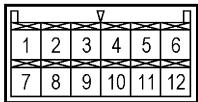
CHECK AT THE A/C-ECU TERMINAL <L.H.drive vehicles>

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

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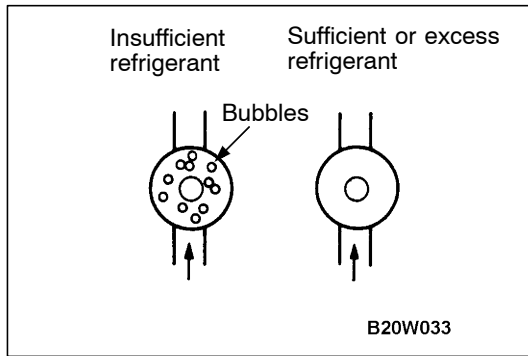
Terminal no.	Check item	Check when	Normal state
1	Rear defogger switch	Defogger switch: ON	0 V
		Defogger switch: OFF	Battery voltage
2	Inside/outside air changeover damper motor (outside air)	When damper moved to inside circulation position	0 V
		When damper moved to outside air induction position	Battery voltage
3	Inside/outside air changeover damper motor (inside air)	When damper moved to inside circulation position	Battery voltage
		When damper moved to outside air induction position	0 V
4	Engine-ECU output (A/C1)	When A/C OFF	0 V
		A/C switch: ON, blower: ON (room temperature)	Battery voltage
5	Engine-ECU output (A/C2)	At A/C low load	Battery voltage
		At A/C high load	0 V
6	Illumination power supply	Lighting switches: ON	Battery voltage
7	-	-	-
8	Blower switch (LO)	Blower switch: LO	Battery voltage

Terminal no.	Check item	Check when	Normal state
9	-	-	-
10	Ignition switch (IG2) power supply	Ignition switch: ON	Battery voltage
11	Illumination earth	Any time	0 V
12	Earth	Any time	0 V
13	Air thermo sensor	When temperature around sensor 25°C (1.5kΩ)	2.2 V
14	-	-	-
15	-	-	-
16	Air thermo sensor earth	Any time	0 V

CHECK AT THE A/C-ECU TERMINAL <R.H.drive vehicles>

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Terminal no.	Check item	Check when	Normal state
1	Engine-ECU output (A/C1)	When A/C OFF	0 V
		A/C switch: ON, blower: ON (room temperature)	Battery voltage
2	Engine-ECU output (A/C2)	At A/C low load	Battery voltage
		At A/C high load	0 V
3	Earth	Any time	0 V
4	Air thermo sensor earth	Any time	0 V
5	Illumination power supply	Lighting switches: ON	Battery voltage
6	Air thermo sensor	When temperature around sensor 25°C (1.5kΩ)	2.2 V
7	Ignition switch (IG2) power supply	Ignition switch: ON	Battery voltage
8	Blower switch (LO)	Blower switch: LO	Battery voltage
9	Rear defogger switch	Defogger switch: ON	0 V
		Defogger switch: OFF	Battery voltage
10	Inside/outside air changeover damper motor (outside air)	When damper moved to inside circulation position	0 V
		When damper moved to outside air induction position	Battery voltage
11	Inside/outside air changeover damper motor (inside air)	When damper moved to inside circulation position	Battery voltage
		When damper moved to outside air induction position	0 V
12	Illumination earth	Any time	0 V



ON-VEHICLE SERVICE

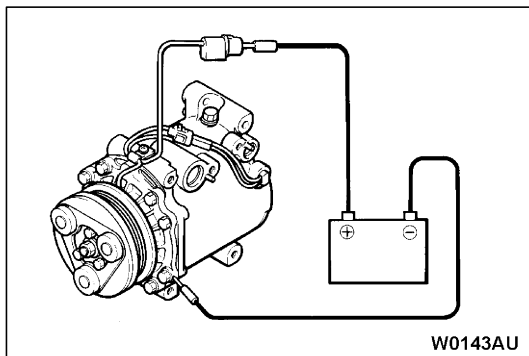
REFRIGERANT LEVEL TEST THROUGH PERFORMANCE TEST

1. Start the engine.
2. Turn on the A/C switch, and set the A/C control to MAX. COOL.
3. Adjust the engine speed to 1,500 r/min.
4. Check the refrigerant level (bubble state) through the sight glass.

Item	State
Insufficient refrigerant	Many bubbles are seen. If refrigerant is extremely low, it appears white.
Sufficient or excess refrigerant	No bubbles are seen

NOTE

1. If insufficient, replenish the refrigerant as follows.
 - a) Replenish until bubbles disappear from the sight glass.
 - b) After the bubbles disappear from the sight glass, replenish 100g of refrigerant.
2. If excessive, replenish the refrigerant as follows.
 - a) Drain the refrigerant until bubbles can be seen through the sight glass.
 - b) Replenish until bubbles disappear from the sight glass.
 - c) After the bubbles disappear from the sight glass, replenish 100g of refrigerant.



MAGNETIC CLUTCH TEST

1. Disconnect the connector to the magnetic clutch.
2. Connect battery (+) voltage directly to the connector for the magnetic clutch.
3. If the magnetic clutch is normal, there will be "click". If the pulley and armature do not make contact ('click'), there is a malfunction.

RECEIVER DRIER TEST

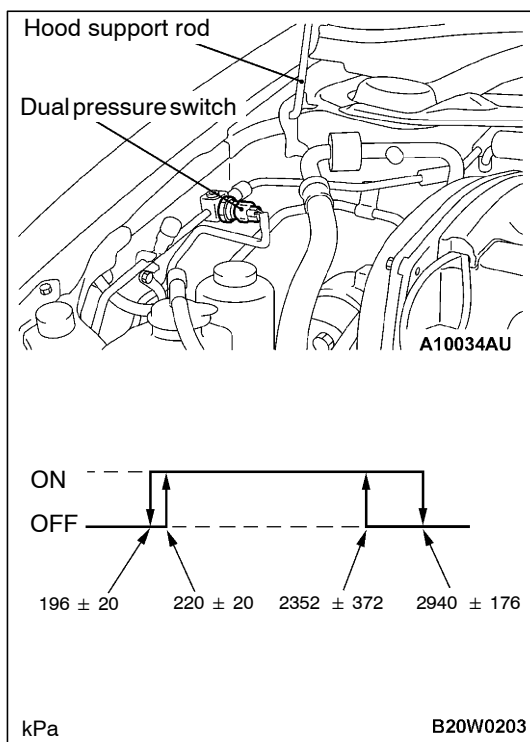
Operate the unit and check the piping temperature by touching the receiver drier outlet and inlet.

If there is a difference in the temperatures, the receiver drier is restricted.

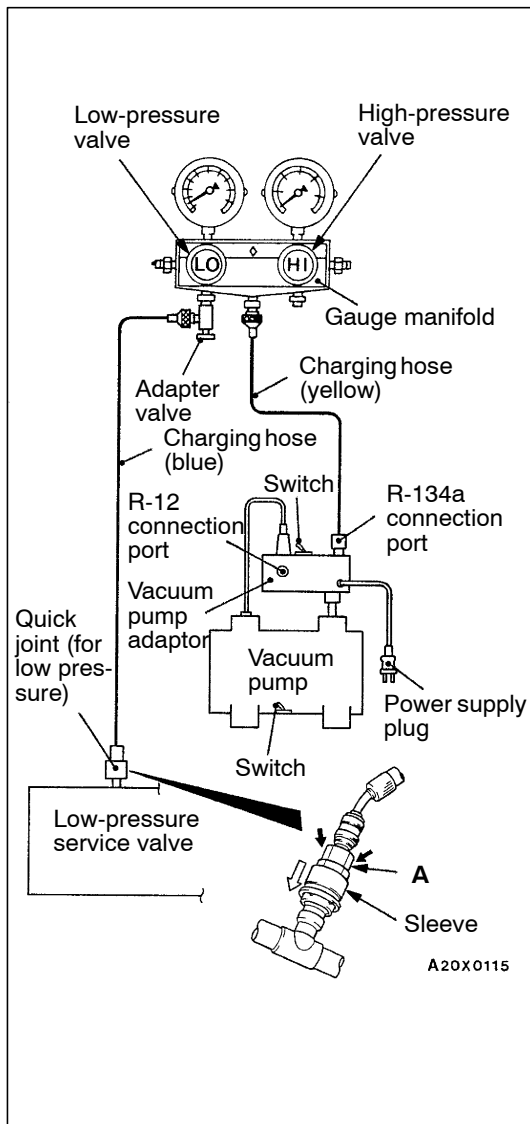
Replace the receiver drier.

COMPRESSOR DRIVE BELT ADJUSTMENT

Refer to GROUP 11 - On-vehicle Service.

**DUAL PRESSURE SWITCH CHECK**

1. Remove the dual pressure switch connector and connect the high/low pressure side terminals located on the harness side as shown in the illustration.
2. Install a gauge manifold to the high-pressure side service valve of the refrigerant line. (Refer to 55-42.)
3. When the high/low pressure sides of the dual pressure switch are at operation pressure (ON) and there is continuity between the respective terminals, then the condition is normal. If there is no continuity, replace the switch.



CHARGING

1. With the handles turned back all the way (valve closed), install the adaptor valve to the low-pressure side of the gauge manifold.
2. Connect the charging hose (blue) to the adaptor valve.
3. Connect the quick joint (for low-pressure) to the charging hose (blue).
4. Connect the quick joint (for low-pressure) to the low-pressure service valve.

NOTE

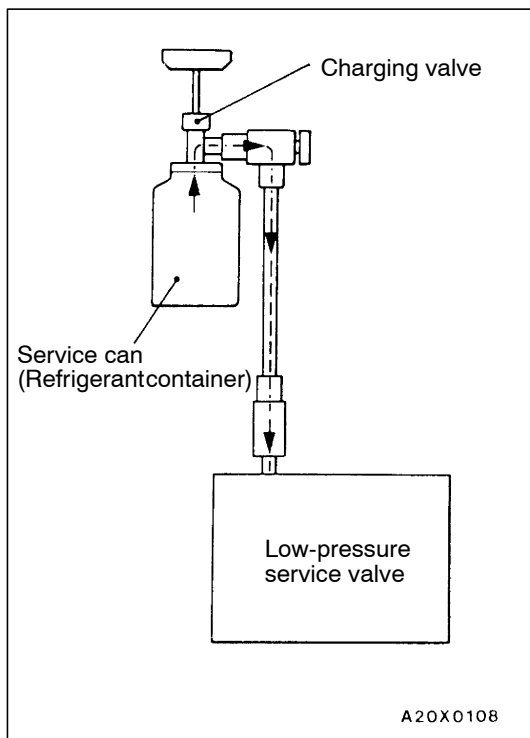
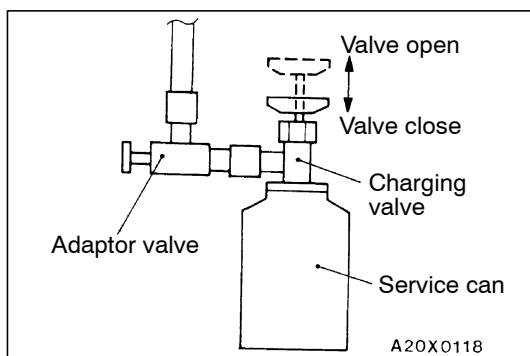
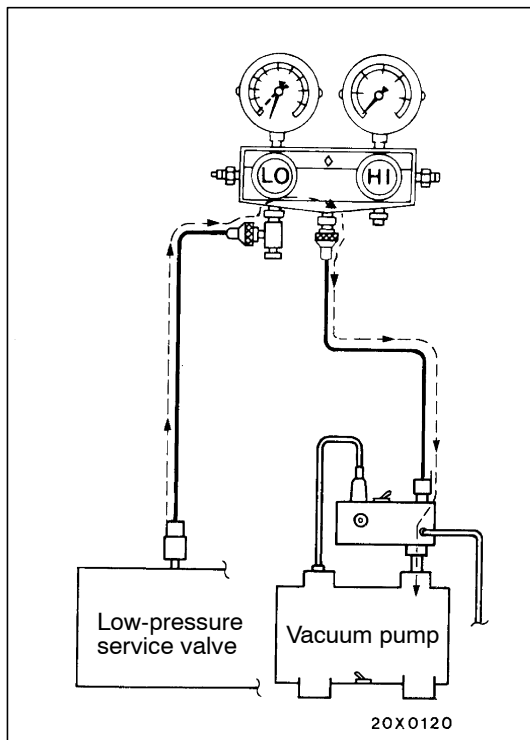
The low-pressure service valve should be connected to the suction hose.

Caution

- (1) Use tools that are suited to R134a.
 - (2) To install the quick joint, press section "A" firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.
5. Close the high and low-pressure valves of the gauge manifold.
 6. Install the vacuum pump adaptor to the vacuum pump.
 7. Connect the vacuum pump plug to the vacuum pump adaptor.
 8. Connect the charging hose (yellow) to the R-134a connection port of the vacuum pump adaptor.
 9. Tighten the adaptor valve handle (valve open).
 10. Open the low-pressure valve of the gauge manifold.
 11. Turn the power switch of the vacuum pump to the ON position.

NOTE

Even if the vacuum pump power switch is turned ON, the vacuum pump will not operate because of the power supply connection in step (7).



12. Turn the vacuum pump adaptor switch to the R134a side to start the vacuum pump.

Caution

Do not operate the compressor for evacuation.

13. Evacuate to a vacuum reading of 100 kPa or higher (takes approx. 10 minutes).
14. Turn the vacuum pump adaptor switch OFF and allow to stand it for 5 minutes.

Caution

Do not operate the compressor in the vacuum condition; damage may occur.

15. Carry out a leak test. (Good if the negative pressure does not drop.)

Caution

If the negative pressure drops, increase the tightness of the connections, and then repeat the evacuation procedure from step (12).

16. With the handle turned back all the way (valve open), install the charging valve to the service can.
17. Turn the handle of the adaptor valve back all the way (valve closed), remove it from the gauge manifold and install the service can.
18. Tighten the handle of the charging valve (valve closed) to puncture the service can.

19. Turn the handle of the charging valve back (valve open) and tighten the handle of the adaptor valve (valve open) to charge the system with refrigerant.

Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

20. If the refrigerant is not drawn in, turn the handle of the adaptor valve back all the way (valve closed).
21. Check for gas leaks using a leak detector. If a gas leak is detected, re-tighten the connections, and then repeat the charging procedure from evacuation in step (12).

Caution

The leak detector for R-134a should be used.

22. Start the engine.
23. Operate the A/C and set to the lowest temperature (MAX. COOL).

24. Fix the engine speed at 1,500 r/min.
25. Tighten the handle of the adaptor valve (valve open) to charge the required volume of refrigerant.

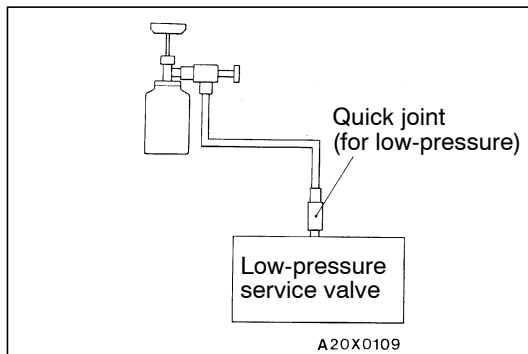
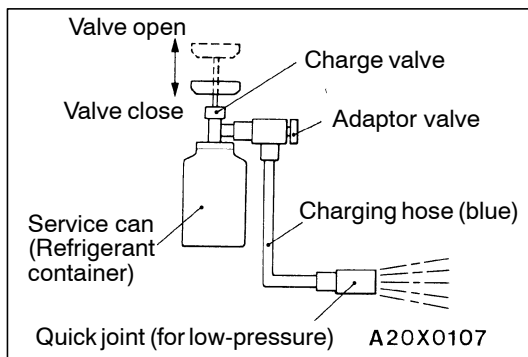
Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

26. After charging with refrigerant, turn the handle of the adaptor valve back all the way (valve closed).
27. Tighten the charging valve handle (valve closed).
Remove the quick joint (for low-pressure) from the low-pressure service valve.

NOTE

If the service can is not emptied completely, keep the handles of the charging valve and adaptor valve closed for the next charging.

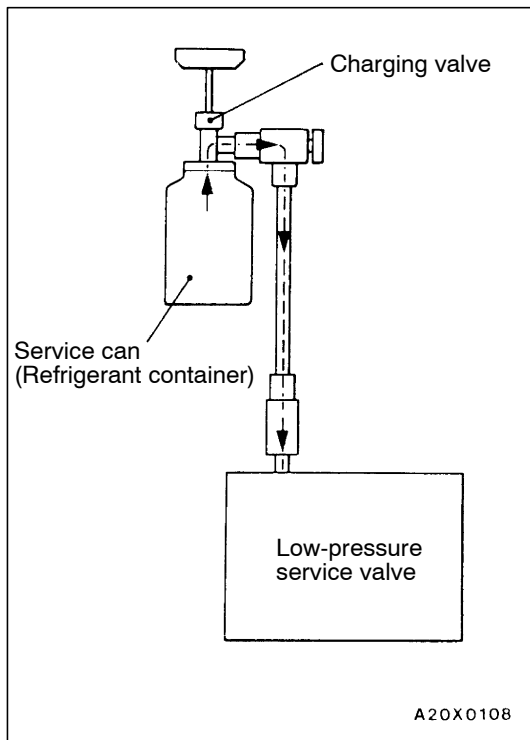


CORRECTING LOW REFRIGERANT LEVEL IN CASE THE SERVICE CAN IS USED

1. Install the charge valve with the handle turned all the way back (valve open) to the service can.
2. Install the adaptor valve with the handle turned all the way back (valve close) to the charging valve.
3. Connect the charging hose (blue) to the adaptor valve.
4. Connect the charging hose (blue) to the quick joint (for low-pressure).
5. Tighten the handle of the charge valve (valve close), and pierce the service can.
6. Turn the handle of the adaptor valve to bleed the air.
7. Install the quick joint (for low-pressure) to the low-pressure service valve.

NOTE

The low-pressure service valve should be connected to the suction hose.



8. Start the engine.
9. Operate the air conditioner and set at the lowest temperature (MAX. COOL).
10. Fix the engine speed at 1,500 r/min.
11. Tighten the handle of the adaptor valve (valve open), and replenish refrigerant while checking the quantity through the sight glass.

Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is changed in gas state.

12. After replenishing is completed, turn the handle of the adaptor valve all the way back (valve close), and remove the quick joint.

NOTE

When there is remainder of refrigerant in the service can, keep it for next use with the charge valve and the valve of the adaptor valve being closed.

DISCHARGING SYSTEM

Use the refrigerant recovery unit to discharge refrigerant gas from the system.

NOTE : Refer to the Refrigerant Recovery and Recycling Unit Instruction Manual for operation of the unit.

REFILLING OF OIL IN THE A/C SYSTEM

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.

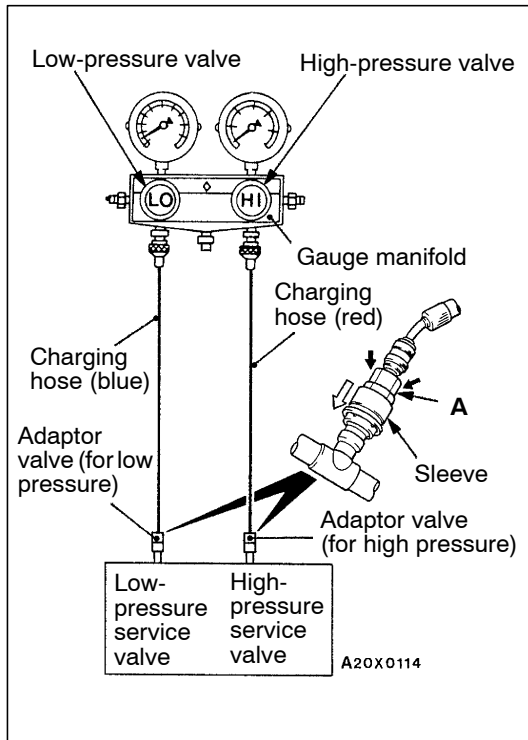
When a compressor is installed at the factory, it contains 130 cm³ of refrigerant oil. While the A/C system is in operation, the oil is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in various parts of the system.

When the following system components are changed, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor oil: SUN PAG 56

Quantity

Condenser: 180 cm³



PERFORMANCE TEST

1. The vehicles to be tested should be in a place that is not in direct sunlight.
2. Close the high and low-pressure valve of the gauge manifold.
3. Connect the charging hose (blue) to the low-pressure valve and connect the charging hose (red) to the high-pressure valve of the gauge manifold.
4. Install the quick joint (for low-pressure) to the charging hose (blue), and connect the quick joint (for high-pressure) to the charging hose (red).
5. Connect the quick joint (for low-pressure) to the low-pressure service valve and connect the quick joint (for high-pressure) to the high-pressure service valve.

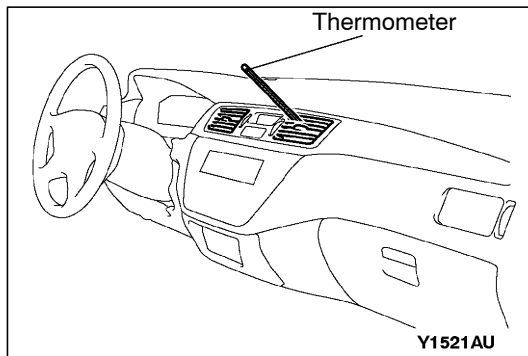
NOTE

The high-pressure service valve is on liquid pipe A and the low-pressure service valve is on the suction hose.

Caution

To connect the quick joint, press section “A” firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

6. Start the engine.
7. Set the controls to the A/C as follows:
 - A/C switch: A/C - ON position
 - Mode selection: Face position
 - Temperature control: Max. cooling position
 - Air selection: Recirculation position
 - Blower switch: HI (Fast) position
8. Keep engine speed to idling speed with A/C clutch engaged.
9. Engine should be warmed up with doors and all windows opened.



10. Insert a thermometer in the center A/C outlet and operate the engine for 20 minutes.
11. Note the discharge air temperature.

NOTE

If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

Garage ambient temperature °C	20	25	30	35
Discharge air temperature °C	8 - 11	12 - 16	17 - 21	22.5 - 27.5
Compressor high-pressure kPa	740 - 840	950 - 1,050	1,160 - 1,300	1,360 - 1,550
Compressor low-pressure kPa	150 - 190	190 - 240	240 - 300	300 - 375

REFRIGERANT LEAK REPAIR

LOST CHARGE

If the system has lost all charge due to a leak:

1. Evacuate the system. (See procedure.)
2. Charge the system with approximately one pound of refrigerant.
3. Check for leaks.
4. Discharge the system.
5. Repair leaks.
6. Replace receiver drier.

Caution

Replacement filter-drier units must be sealed while in storage. The drier used in these units will saturate water quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick reassembly to avoid keeping the system open any longer than necessary.

7. Evacuate and charge system.

LOW CHARGE

If the system has not lost all of its refrigerant charge; locate and repair all leaks. If it is necessary to increase the system pressure to find the leak (because of an especially low charge) add refrigerant. If it is possible to repair the leak without discharging the refrigerant system, use the procedure for correcting low refrigerant level.

COMPRESSOR NOISE

You must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, in gear or neutral, engine temperature or any other special conditions.

Noises that develop during A/C operation can often be misleading. For example: what sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly. Verify accessory drive belt tension (power steering or alternator).

Improper accessory drive belt tension can cause a misleading noise when the compressor is engaged and little or no noise when the compressor is disengaged.

Drive belts are speed-sensitive. That is, at different engine speeds, and depending upon belt tension, belts can develop unusual noises that are often mistaken for mechanical problems within the compressor.

HANDLING TUBING AND FITTINGS

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed. The system must be completely discharged before opening any fitting of connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly.

Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing. A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose.

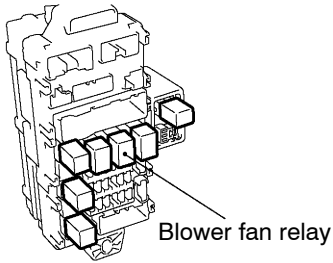
Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 80 mm from the exhaust manifold. It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.

Unified plumbing connections with O-rings, these O-rings are not reusable.

ADJUSTMENT

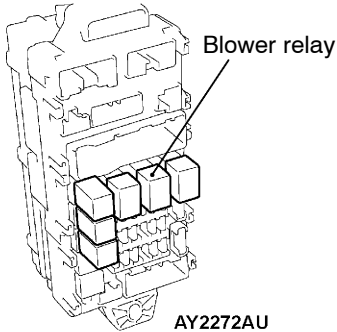
1. Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise. To duplicate high ambient conditions (high head pressure), restrict air flow through condenser. Install manifold gauge set to make sure discharge pressure doesn't exceed 2,070 kPa.
2. Tighten all compressor mounting bolts, clutch mounting bolt, and compressor drive belt. Check to assure clutch coil is tight (no rotation or wobble).
3. Check refrigerant hoses for rubbing or interference that can cause unusual noises.
4. Check refrigerant charge. (See "Charging System".)
5. Recheck compressor noise as in Step 1.
6. If noise still exists, loosen compressor mounting bolts and retorque. Repeat Step 1.
7. If noise continues, replace compressor and repeat Step 1.

<L.H. drive vehicle>

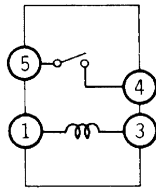
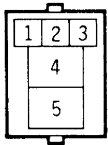


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<R.H. drive vehicle>



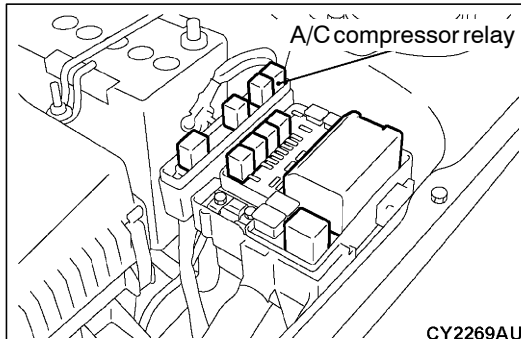
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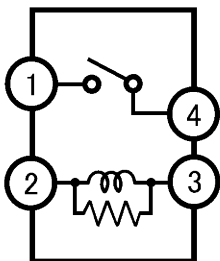
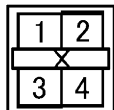
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BLOWER RELAY CONTINUITY CHECK

System voltage	Terminal No.			
	1	3	4	5
When current is not supplied	○	○		
When current is supplied	⊕	⊖	○	○



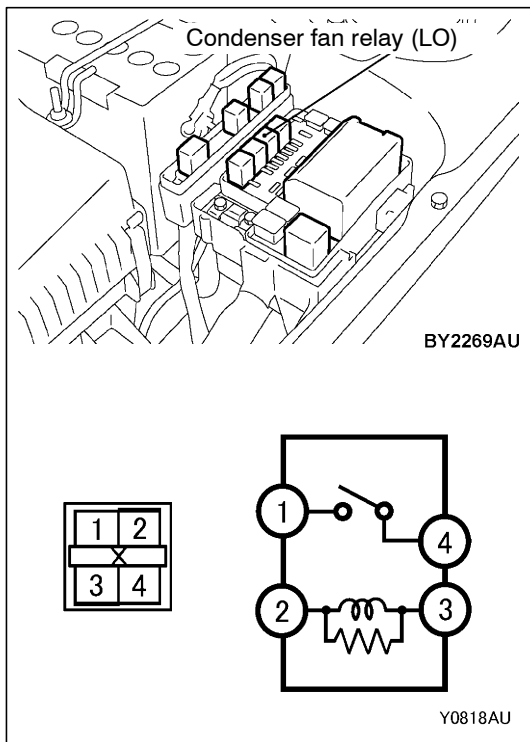
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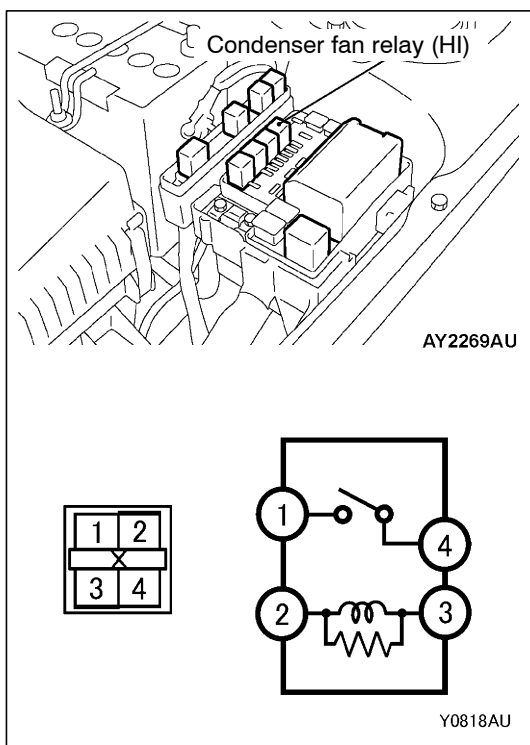
A/C COMPRESSOR RELAY CONTINUITY CHECK

System voltage	Terminal No.			
	3	2	1	4
When current is not supplied	○	○		
When current is supplied	⊕	⊖	○	○



CONDENSER FAN RELAY (LO) CHECK

System voltage	Terminal No.			
	2	3	1	4
When current is not supplied	○	○		
When current is supplied	⊕	⊖	○	○



CONDENSER FAN RELAY (HI) CHECK

System voltage	Terminal No.			
	2	3	1	4
When current is not supplied	○	○		
When current is supplied	⊕	⊖	○	○

IDLE-UP OPERATION CHECK

1. Set the vehicle in the pre-inspection condition:
Engine coolant temperature: 80 – 90 °C
Lamps, electric cooling fan and all accessories: OFF
2. Check that the idle speed is within the standard value.

Standard value: 850 ± 50 r/min

NOTE

The idle speed is controlled by the ISC system and should not be adjusted.

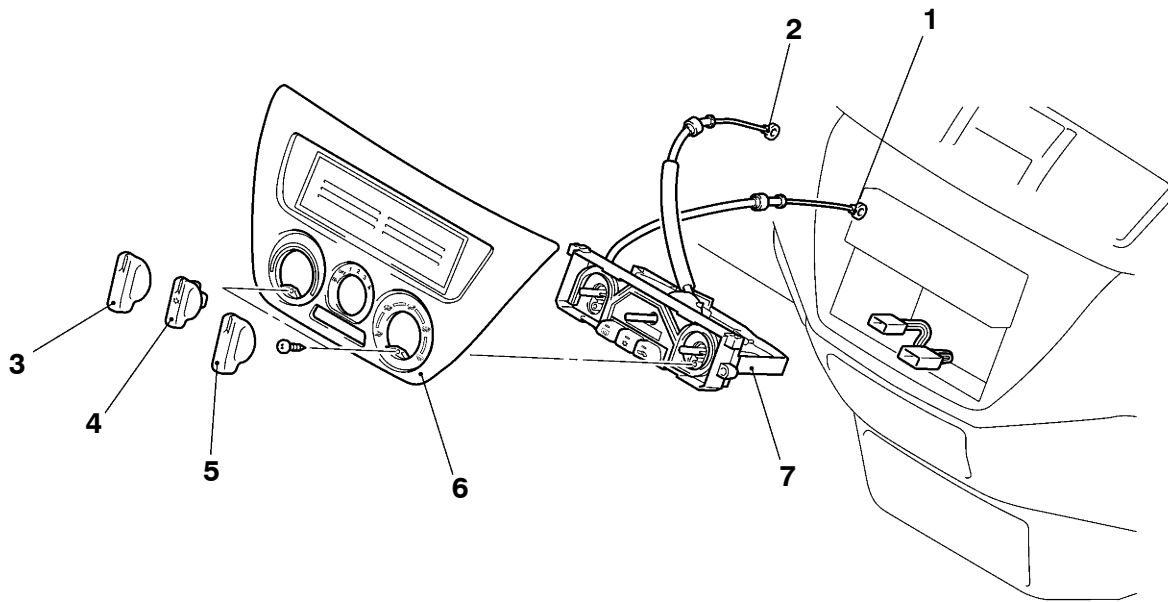
3. The idle speed should be within the standard value when the A/C switch is turned on and the A/C is operating.

Standard value:

850 ± 50 r/min

HEATER CONTROL ASSEMBLY (A/C-ECU) AND A/C SWITCH

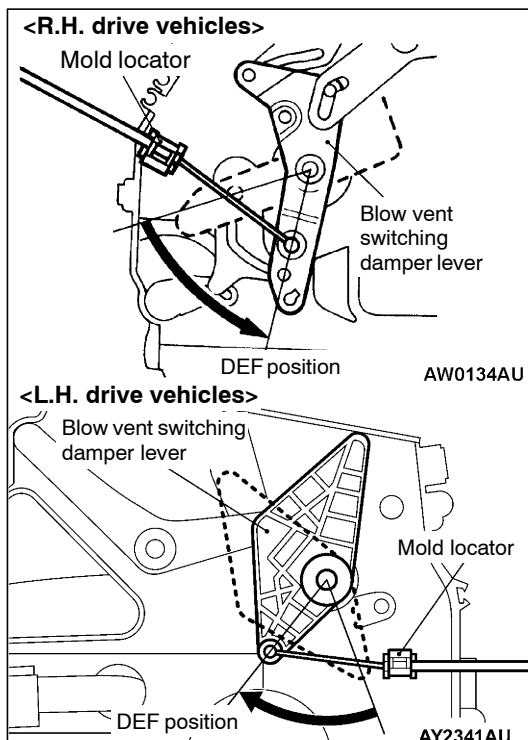
REMOVAL AND INSTALLATION



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Removal steps

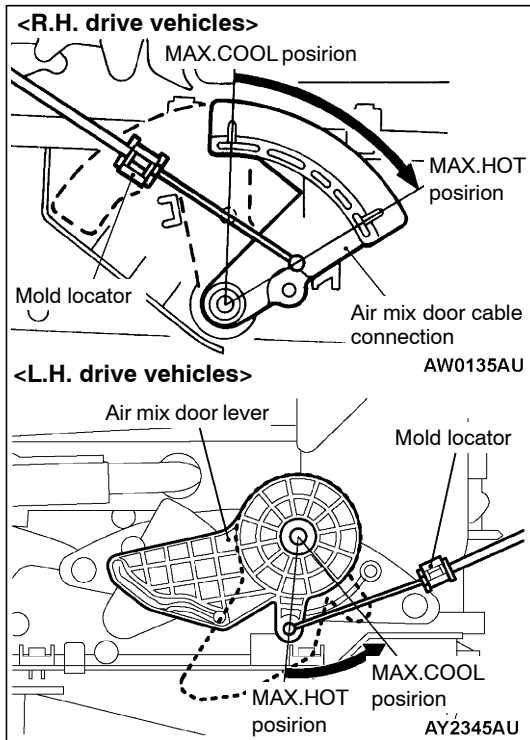
- | | | |
|-----|--|-------------------------------|
| ▶B◀ | 1. Air mix door cable connection | 4. Air volume adjustment knob |
| ▶A◀ | 2. Blow vent switching damper cable connection | 5. Blow vent switching knob |
| | 3. Temperature adjustment knob | 6. Center panel |
| | | 7. Control panel assembly |



INSTALLATION SERVICE POINTS

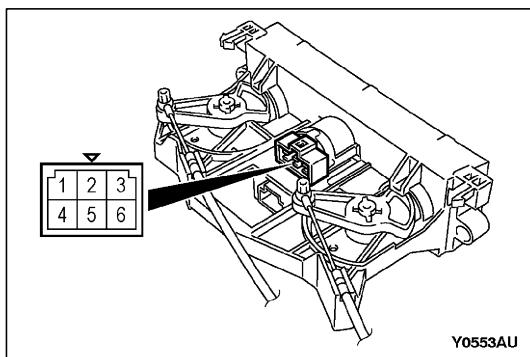
▶A◀ BLOW VENT SWITCHING DAMPER CABLE CONNECTION

1. Set the heater control assembly's blow vent switching knob to the DEF position.
2. Set the heater unit's blow vent switching damper lever to the DEF position (turn the damper lever as the left sketch.) and install the cable.
3. Set the I type position of cable to the heater unit case and secure with a clip.



►B◄ AIR MIX DOOR CABLE CONNECTION

1. Turn the heater control assembly's temperature adjustment knob all the way to the HOT side.
2. Set the heater unit's air mix door lever to the MAX HOT position (turn the damper lever as the left sketch.) and attach the cable.
3. Set the I type position of cable to the heater unit case and secure with a clip.

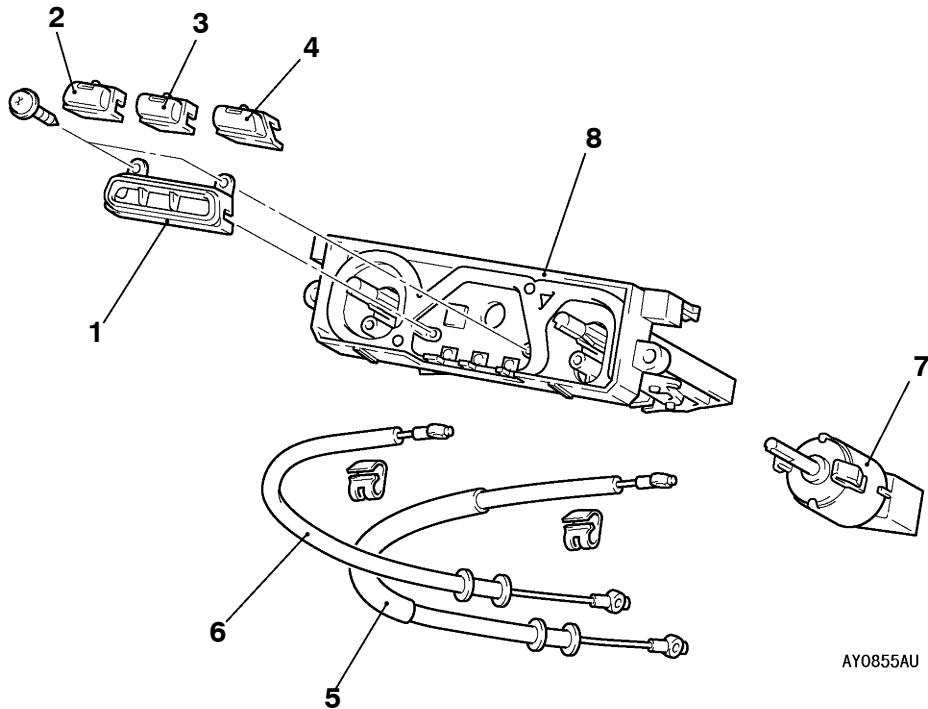


INSPECTION

Blower switch continuity check

Switch position	Terminal no.				
	1	2	4	5	6
0 (OFF)					
1	○—○				
2		○—○			
3		○—○		○	
4		○—○			○

DISASSEMBLY AND REASSEMBLY

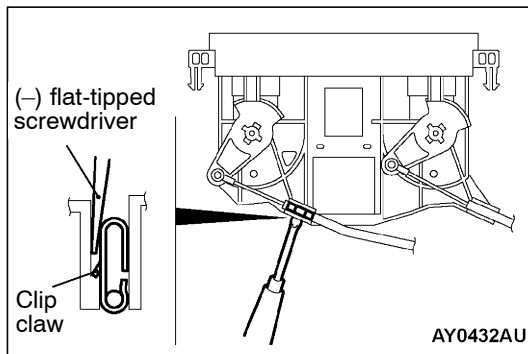


Disassembly steps

1. Switch panel
2. Rear window defogger switch
3. Air conditioner switch
4. Inside/outside air changeover switch
5. Blow vent changeover damper cable



6. Air mix damper cable
7. Blower switch assembly
8. Manual air conditioner control panel (A/C-ECU)



ASSEMBLY SERVICE POINTS

◀▶ BLOW VENT CHANGEOVER DAMPER CABLE AND AIR MIX DAMPER CABLE REMOVAL

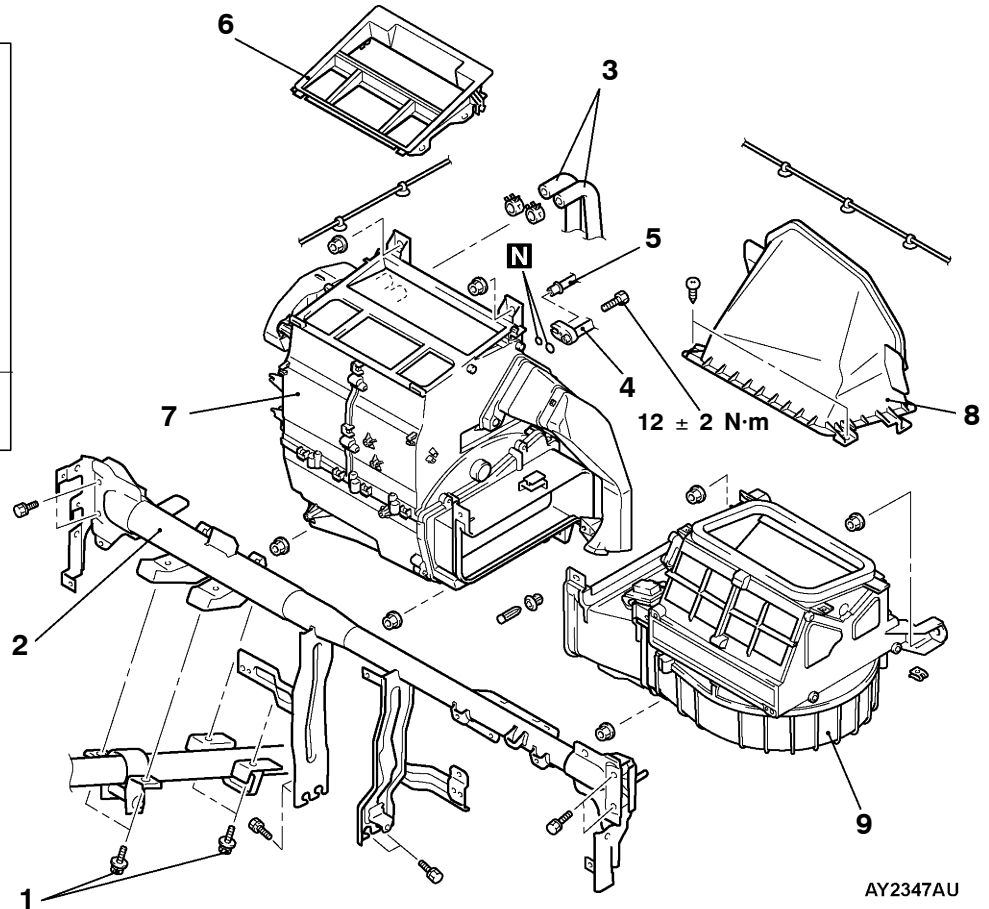
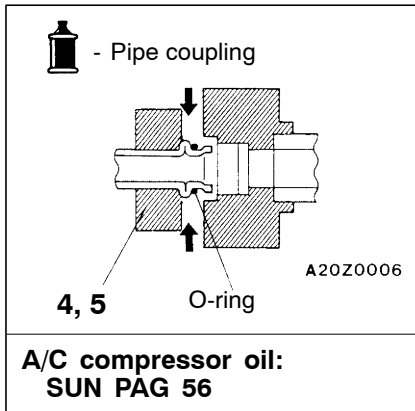
Insert a flat-tipped screwdriver into the clip through the inside of the control base and prise out the clip claw to disconnect the cables.

HEATER UNIT AND BLOWER ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations

- Refrigerant Draining and Refilling (Refer to P.55-16, 19.)
- Coolant Draining and Refilling (Refer to GROUP 14 – On-vehicle Service.)
- Instrument Panel Removal and Installation (Refer to GROUP 52A – Instrument Panel.)
- Front Seat Removal and Installation (Refer to GROUP 52A – Front Seat.)
- Floor Console Removal and Installation (Refer to GROUP 52A – Floor Console.)
- Floor Carpet Removal and Installation



Heater unit and blower assembly removal steps

1. Steering shaft attachment bolt
2. Front deck crossmember
3. Heater hose connection
4. Suction pipe connection



5. Liquid pipe B connection
6. Center duct
7. Heater unit
8. Intake duct
9. Blower assembly

REMOVAL SERVICE POINTS

◀▶ SUCTION PIPE AND LIQUID PIPE B DISCONNECTION

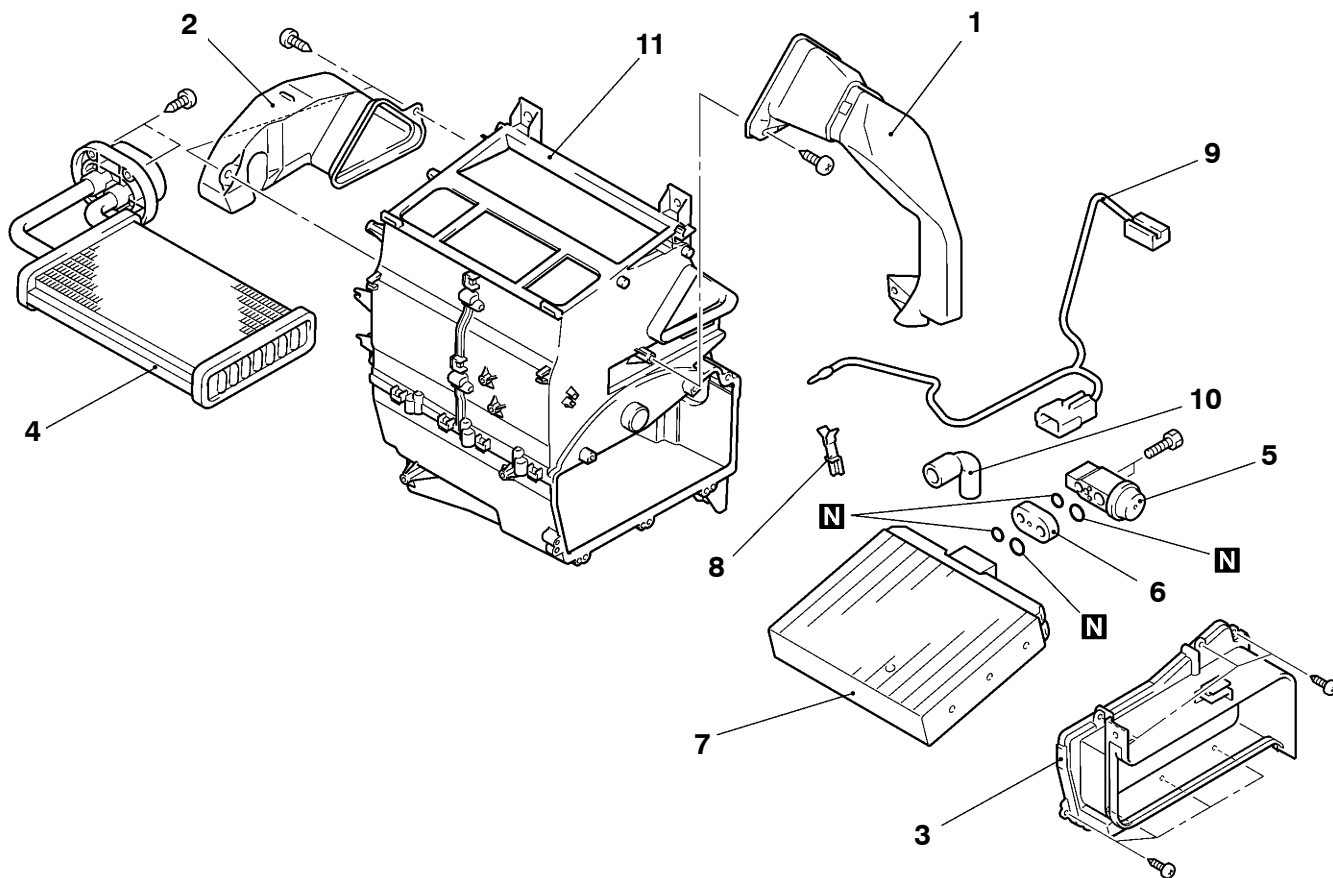
To prevent the entry of dust or other foreign bodies, plug the dismantled hose and the nipples of the expansion valves.

Caution

As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hose and nipples.

DISASSEMBLY AND REASSEMBLY

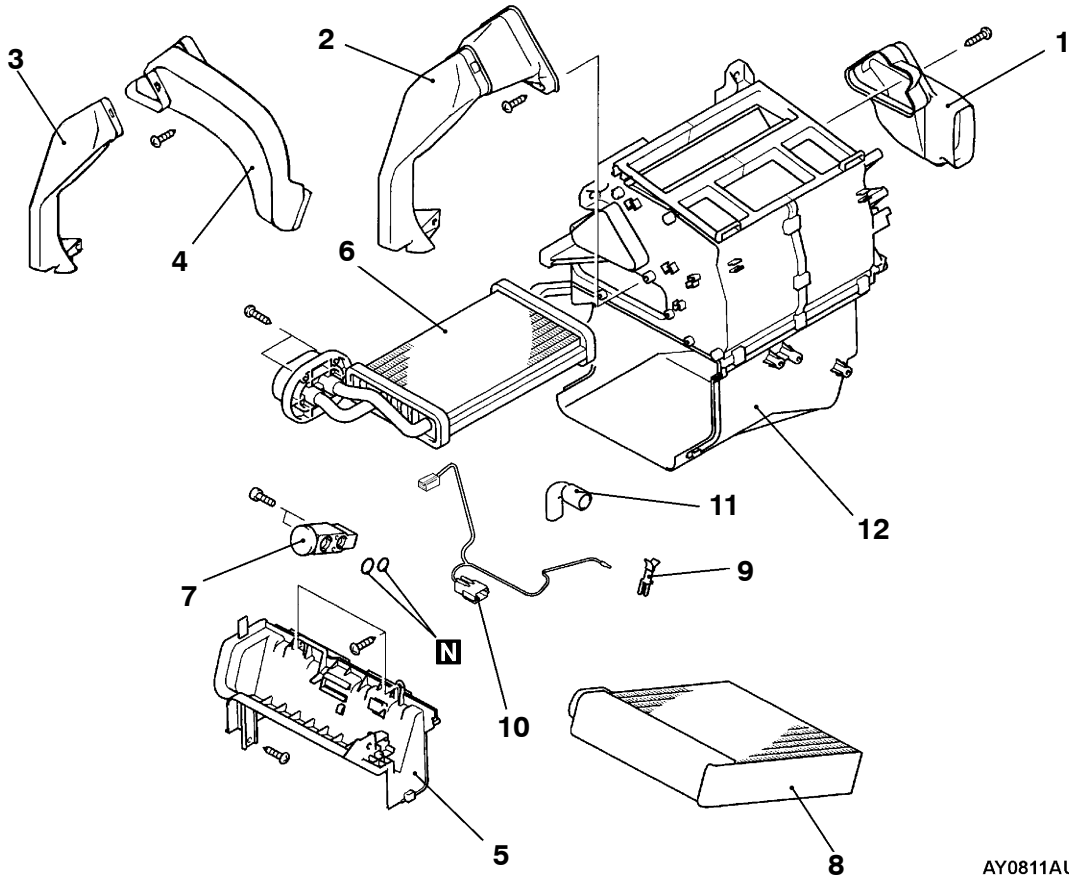
<L.H. DRIVE VEHICLES>

**Disassembly steps**

1. Right-hand foot duct
2. Left-hand foot duct
3. Evaporator cover
4. Heater core
5. Expansion valve
6. Expansion valve adapter

7. Evaporator
8. Air thermo sensor clip
9. Air thermo sensor
10. Drain plug
11. Heater case

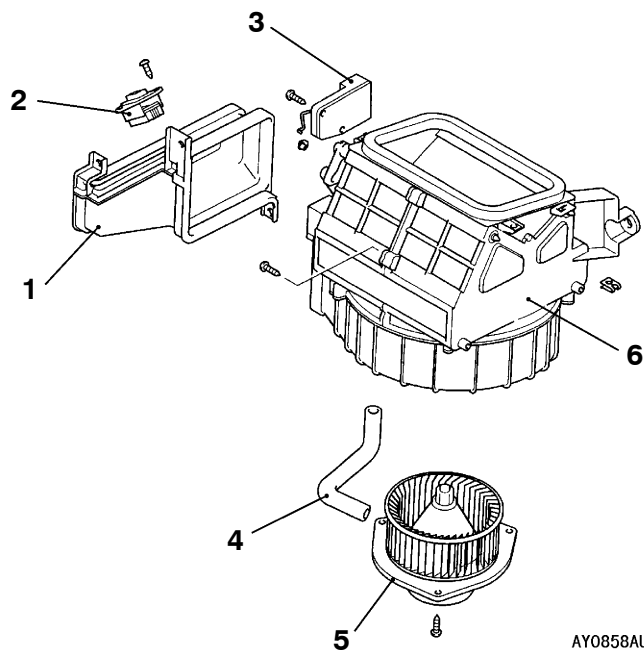
<R.H. DRIVE VEHICLES>



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Disassembly steps

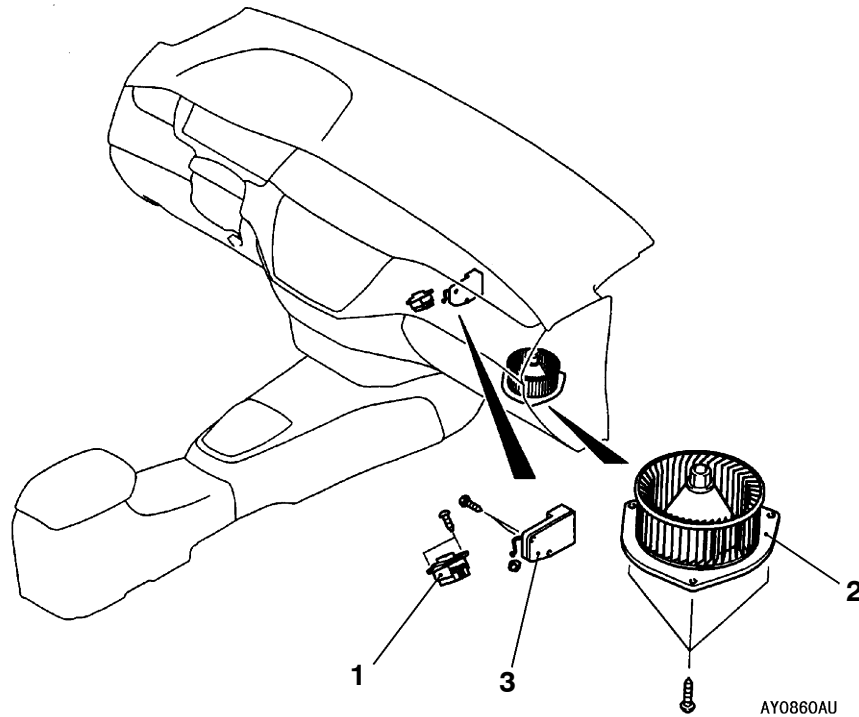
- | | |
|--------------------------------|---------------------------|
| 1. Right-hand foot duct | 6. Heater core |
| 2. Left-hand foot duct | 7. Expansion valve |
| 3. Left-hand foot duct | 8. Evaporator |
| <Rear duct mounted vehicle> | 9. Air thermo sensor clip |
| 4. Rear heater duct A upper LH | 10. Air thermo sensor |
| <Rear duct mounted vehicle> | 11. Drain plug |
| 5. Evaporator cover | 12. Heater case |

DISASSEMBLY AND REASSEMBLY**Disassembly steps**

1. Joint duct
2. Resister
3. Inside/outside air changeover damper motor
4. Hose
5. Blower motor
6. Blower case

RESISTER, BLOWER MOTOR AND INSIDE/OUTSIDE AIR CHANGE OVER DAMPER MOTOR

REMOVAL AND INSTALLATION



Resister removal steps

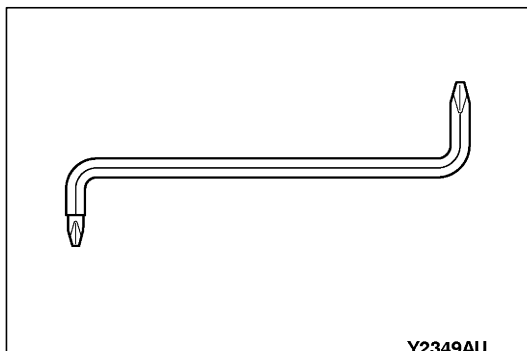
- Glove box (Refer to GROUP 52A – Instrument Panel.)
 - Engine-ECU (Refer to GROUP 14.)
1. Resister

Blower motor removal steps

2. Blower motor

Inside/outside air changeover damper motor removal steps

- Glove box (Refer to GROUP 52A – Instrument Panel.)
 - Engine-ECU (Refer to GROUP 14.)
3. Inside/outside air changeover damper motor



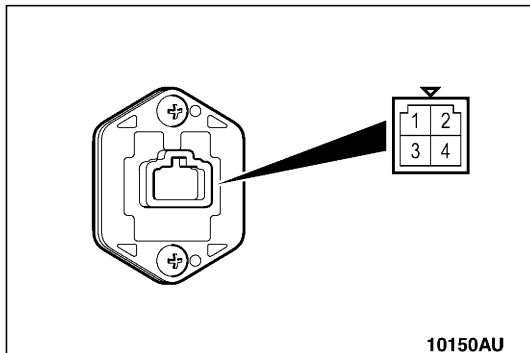
Y2349AU

REMOVAL SERVICE POINTS

◀A▶ BLOWER MOTOR REMOVAL

NOTE

Use of commercially available offset screw driver is recommended.

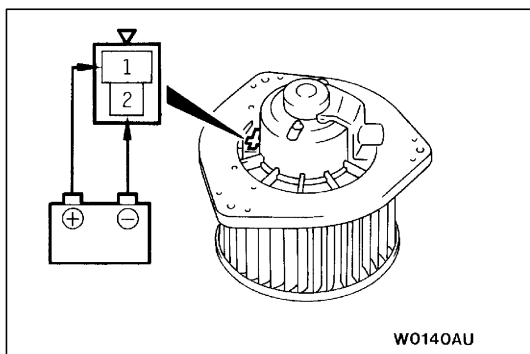


INSPECTION

Resister Check

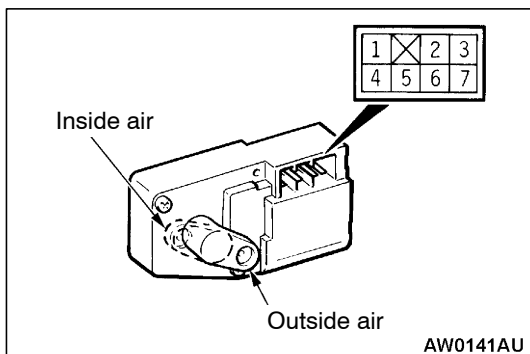
Standard values:

Test terminals	Standard value (Ω)
HI - LO (between terminals 2 and 4)	2.54
HI - ML (between terminals 2 and 1)	1.24
HI - MH (between terminals 2 and 3)	0.6



Blower Motor Check

Check that the motor is running when the battery voltage is applied between the terminals. Check that the motor is not producing any abnormal noise at that time.



Inside/Outside Air Changeover Damper Motor Check

<L.H. DRIVE VEHICLES>

Battery connection terminal lever operation			Operating the lever
4	6	7	
	-	+	Turn to cabin air side
-		+	Turn to outside air side

<R.H. DRIVE VEHICLES>

Battery connection terminal lever operation			Operating the lever
4	6	7	
	-	+	Turn to outside air side
-		+	Turn to cabin air side

Caution

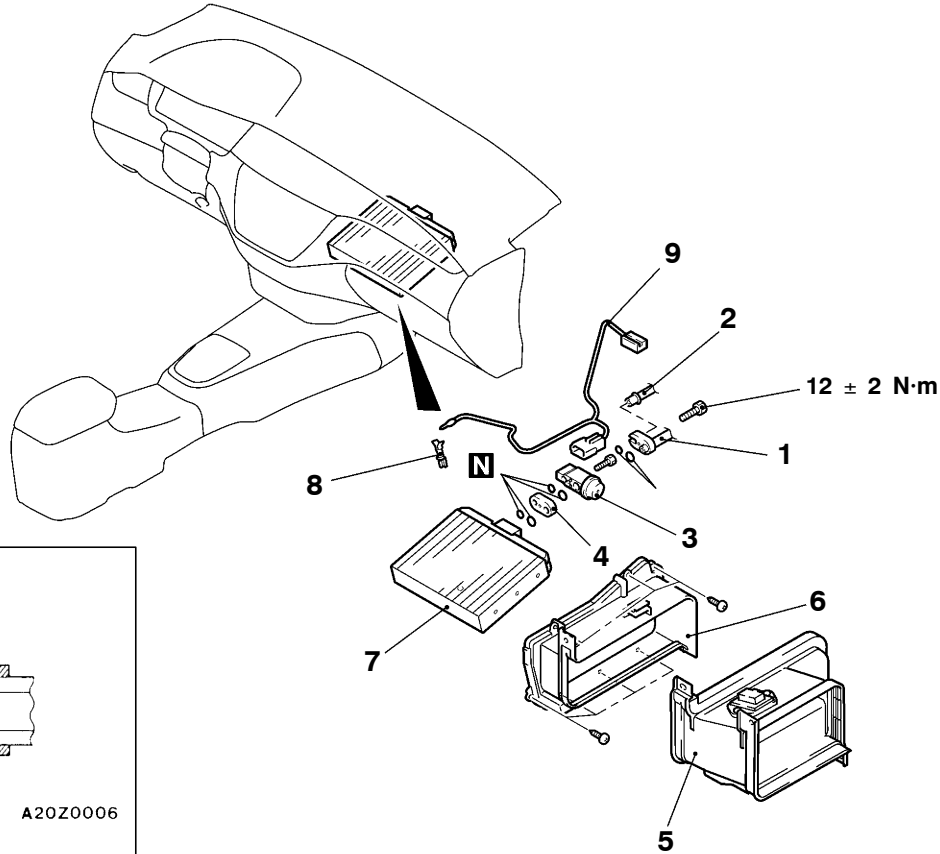
When the lever is in the OFF position, no power is supplied.

EVAPORATOR AND AIR THERMO SENSOR

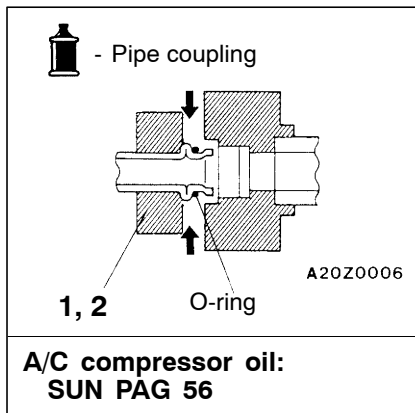
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations

- Refrigerant Draining and Refilling (Refer to P.55-16, 19.)



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Disassembly steps

- Glove box (Refer to GROUP 52A – Instrument Panel.)
 - Engine-ECU (Refer to GROUP 14.)
1. Suction pipe connection
 2. Liquid pipe B connection
 3. Expansion valve



4. Expansion valve adapter
5. Joint duct
6. Evaporator cover
7. Evaporator
8. Air thermo sensor clip
9. Air thermo sensor

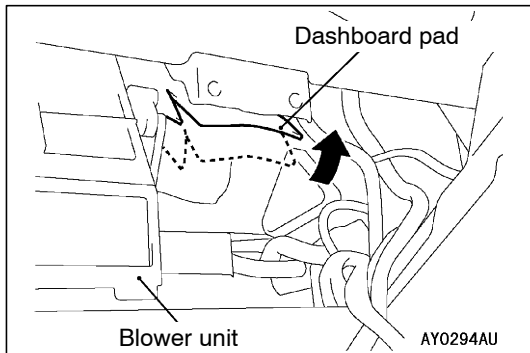
REMOVAL SERVICE POINTS

◀A▶ WHEN DISCONNECTING THE SUCTION PIPE, LIQUID PIPE B, AND THE EXPANSION VALVE

To prevent the entry of dust or other foreign bodies, plug the dismantled hose and the nipples of the expansion valves.

Caution

As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hose and nipples.



**◀B▶ EVAPORATOR REMOVAL
<R.H. DRIVE VEHICLE>**

1. When removing the evaporator, cut and fold back the dashboard pad as in the diagram. (The thickness of the pad interferes with the removal of the evaporator.)
2. Remove the evaporator.

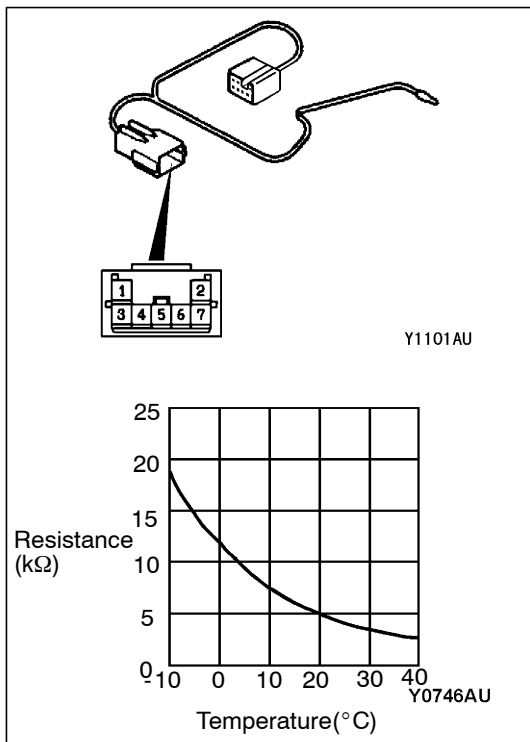
Caution:

Do not cut the upper side of the pad.

INSTALLATION SERVICE POINTS

▶A◀ EVAPORATOR INSTALLATION

After installing the evaporator, glue the cut dashboard panel pad with an adhesive agent.



INSPECTION

Air thermo sensor inspection

Measure the resistance between connector terminals 4 and 5 under at least two different temperatures. The resistance values should generally match those in the graph.

NOTE

The temperature at the check should not exceed the range in the graph.

COMPRESSOR

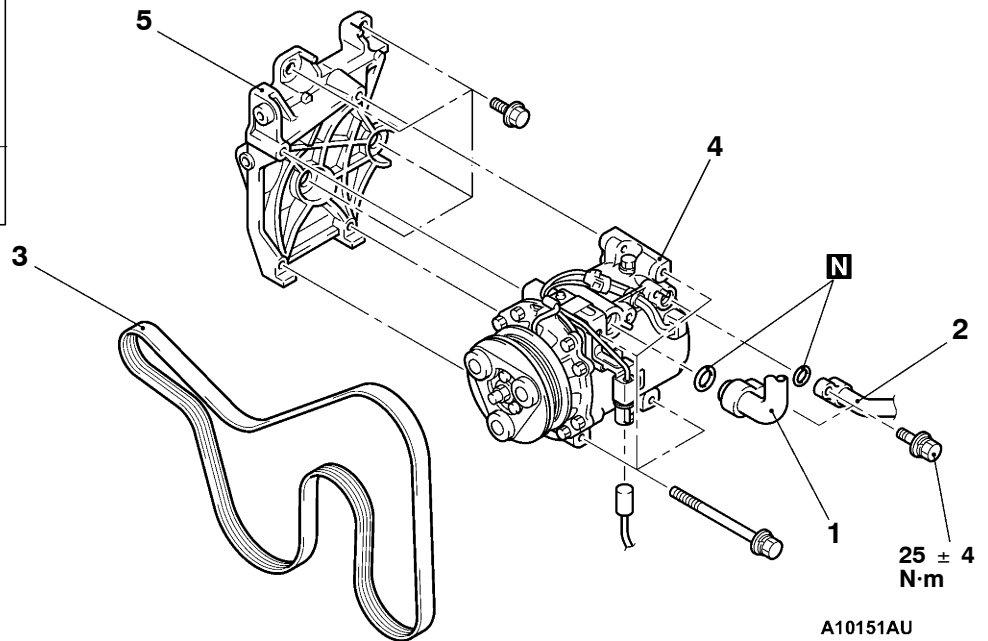
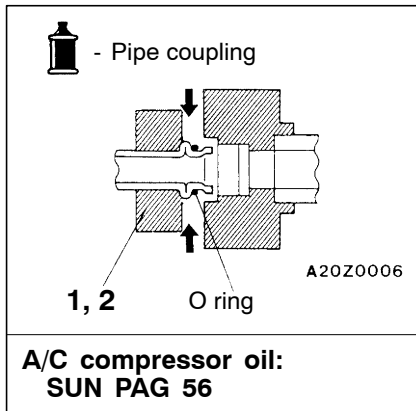
REMOVAL AND INSTALLATION

Before Removal

Refrigerant Draining (Refer to P.55-19.)

After Removal

- Refrigerant Replenishing (Refer to P.55-16.)
- Drive Belt Tension Check (Refer to GROUP 11A – Engine Adjustment.)



Removal steps



1. Flexible suction hose connection
2. Flexible discharge hose connection
3. Drive belt



4. Compressor
5. Compressor bracket

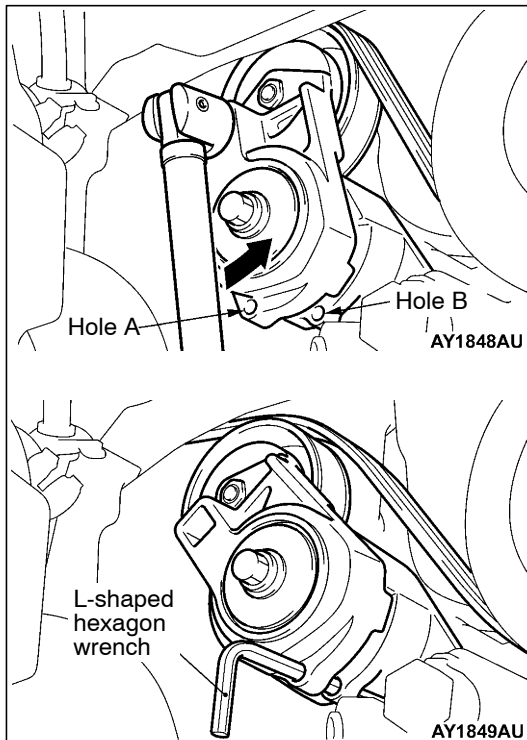
REMOVAL SERVICE POINTS

◀A▶ DISCONNECTION OF FLEXIBLE SUCTION HOSE AND FLEXIBLE DISCHARGE HOSE

To prevent the entry of dust or other foreign bodies, plug the dismantled hoses and compressor nipples.

Caution

As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hose and nipples.



◀B▶ DRIVE BELT REMOVAL

Due to the adoption of the Serpentine drive system with the automatic tensioner, the following operation is required for removing the drive belt:

1. Insert the 12.7sq. spinner handle into the tool hole of the automatic tensioner and rotate it counterclockwise until the automatic tensioner reaches to the stopper.
2. Align hole A with hole B for fixing by inserting the L-shaped hexagon wrench, then remove the drive belt.

Caution

When the drive belt is reused, use a chalk to indicate an arrow of rotation direction on the back of the belt so that it can be re-assembled in the same direction as before.

◀C▶ COMPRESSOR REMOVAL

Take care not to spill any compressor oil when removing the compressor.

INSTALLATION SERVICE POINTS

▶A◀ COMPRESSOR INSTALLATION

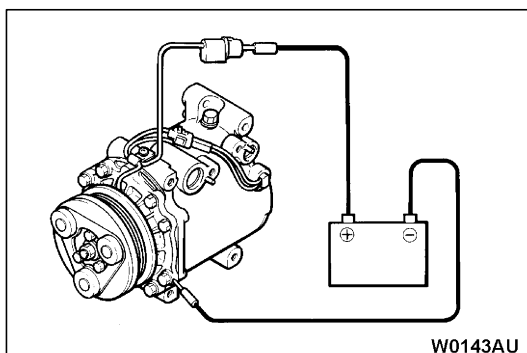
When installing a new compressor, first adjust the oil level as follows.

1. Measure the oil in the compressor you removed.
(X cm³)
2. Drain the amount of oil calculated by the following formula from the new compressor. Now install the compressor.

$$130 \text{ cm}^3 - X \text{ cm}^3 = Y \text{ cm}^3$$

NOTE

- (1) 130 cm³ indicates the amount of oil sealed in the new compressor at the factory.
- (2) Y cm³ indicates the amount of oil in the refrigerant line, compressor, and cooling unit.

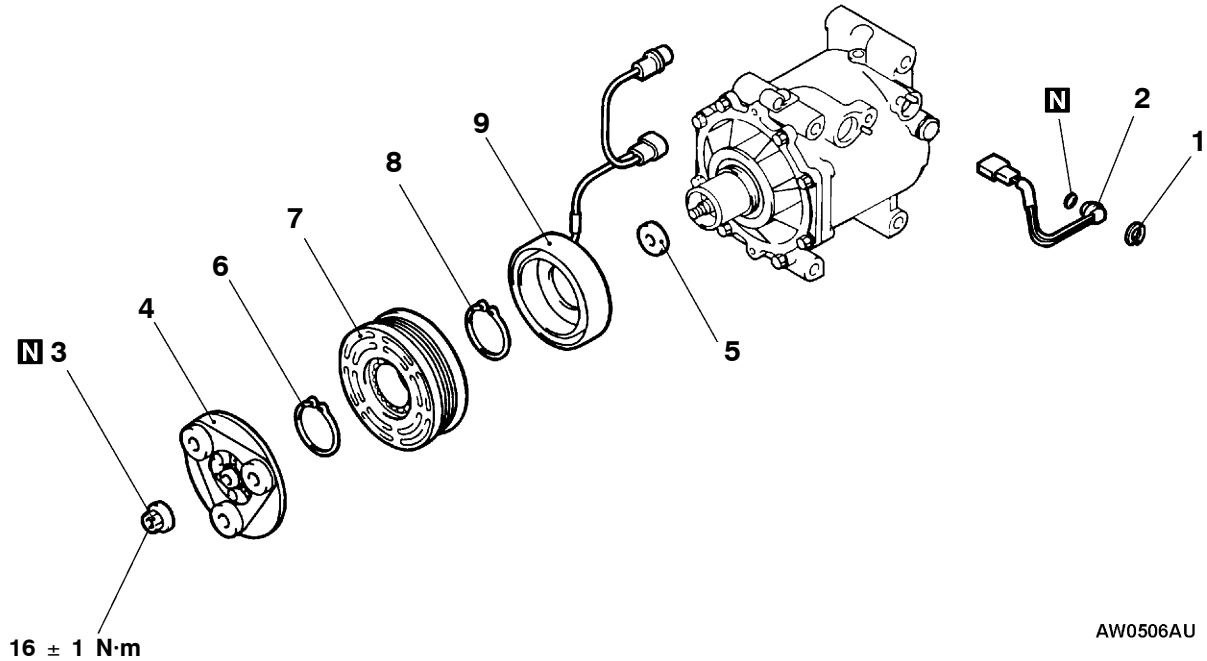


INSPECTION

Compressor Magnetic Clutch Operation Check

Connect the compressor connector terminal to the battery positive (+) terminal and ground the battery's negative (-) terminal to the compressor unit. At that time, the magnetic clutch should make a definite operating sound.

DISASSEMBLY AND REASSEMBLY



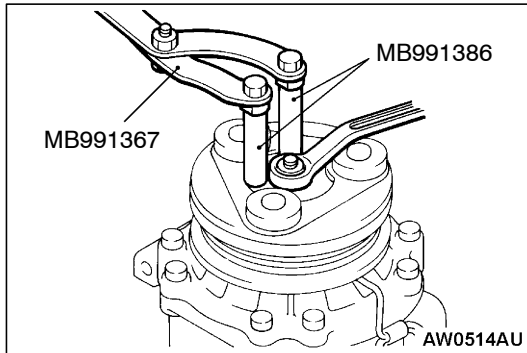
Cooling temperature switch dismantling steps

1. Snap ring
2. Cooling temperature switch

Magnetic clutch dismantling procedure

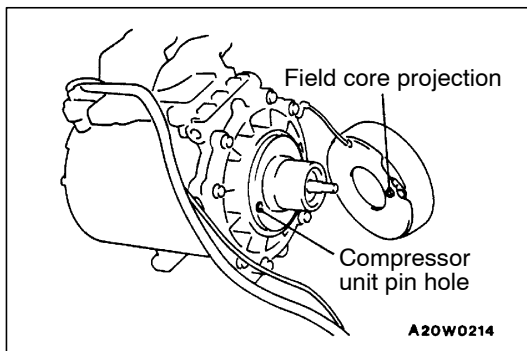
- ▶D◀ • Air gap adjustment

- ◀A▶ ▶C◀ 3. Self-locking nut
- 4. Armature
- ▶B◀ 5. Shim
- 6. Snap ring
- 7. Rotor
- ▶A◀ 8. Snap ring
- 9. Field core



ASSEMBLY SERVICE POINT

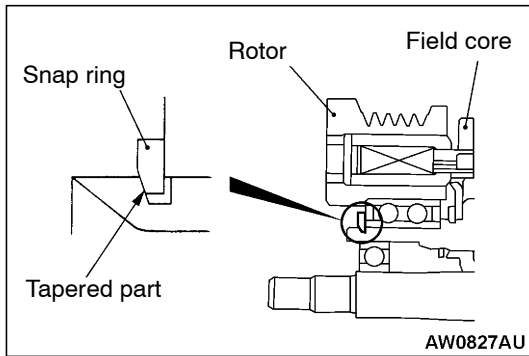
◀A▶ **DISMANTLING OF SELF-LOCKING NUT**



ASSEMBLY SERVICE POINTS

▶A◀ **FIELD CORE ATTACHMENT**

Line up the pin hole on the compressor unit with the field core projection and attach.

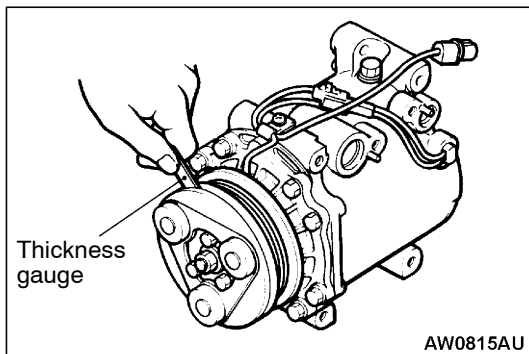


▶B◀ **SNAP RING INSTALLATION**

Using snap ring pliers, fit the snap ring so that the snap ring's tapered part is on the outside.

▶C◀ **SELF-LOCKING NUT INSTALLATION**

Using a special tool, as when removing the nut, secure the armature and tighten the self-locking nut.



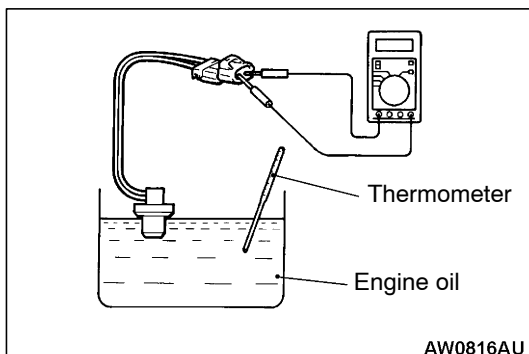
▶D◀ **AIR GAP ADJUSTMENT**

Apply voltage from the battery to the magnetic clutch and check that the clutch air gap is inside the type. value. If outside the type. value, use a shim to adjust the gap.

Standard value: 0.3 – 0.5 mm

NOTE

The shims are available in 0.05 mm steps across the thickness range 0.35 - 0.70 mm, and in 0.1 mm steps of thickness.



INSPECTION

Cooling temperature switch

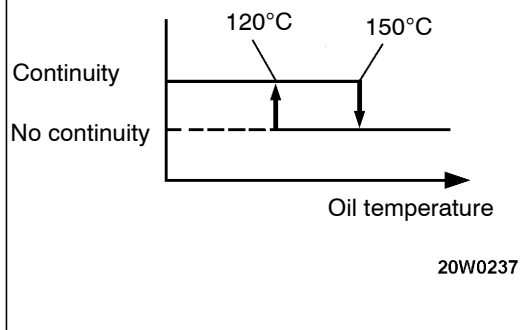
1. Dip the metal part of the cooling temperature switch into engine oil and increase the oil temperature using a gas burner or similar.

Caution

Do not heat more than necessary.

2. When the oil temperature reaches the type. value, check that voltage is supplied between the terminals.

Standard value:



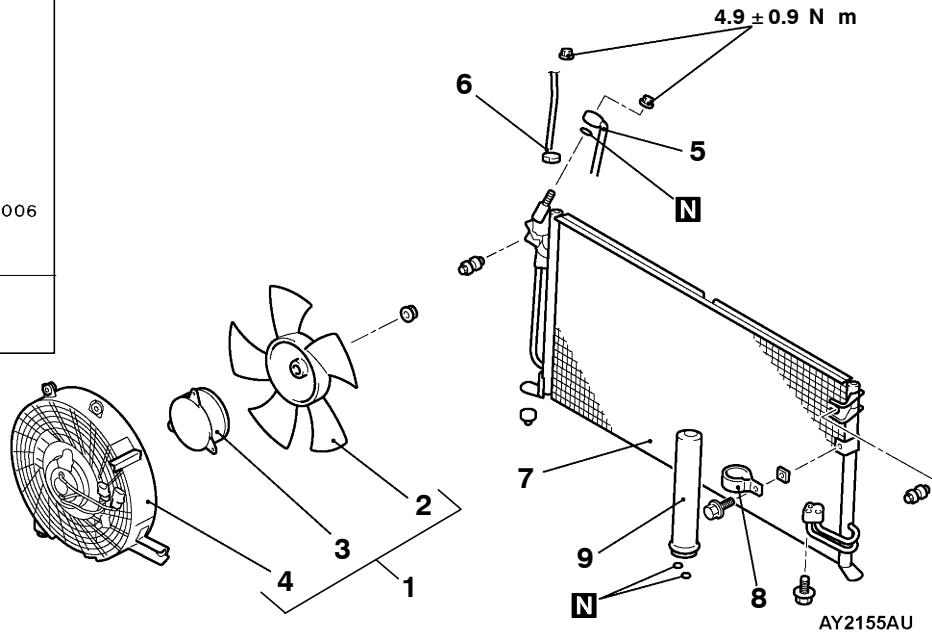
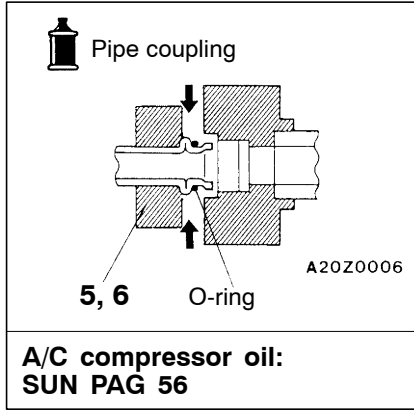
Item	Temperature
Continuity	Slightly below 150°C
No continuity	150°C or higher (until temperature falls to 120°C when OFF)

CONDENSER ASSEMBLY AND CONDENSER FAN ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Refrigerant Draining and Refilling (Refer to P.55-16, 19.)
- Front Bumper Removal and Installation (Refer to GROUP 51.)



Fan motor assembly removal steps



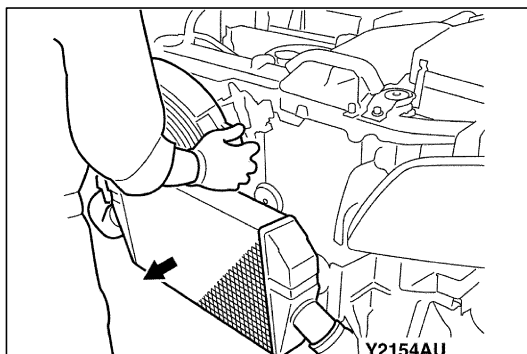
1. Fan motor and shroud assembly
2. Fan
3. Motor assembly
4. Fan shroud



Condenser assembly removal steps

- Air cleaner (Refer to GROUP 15.)

- Refrigerant draining and refilling (Refer to P55A-16,19.)
- 5. Flexible discharge hose connection
- 6. Liquid pipe A connection
- 7. Condenser assembly
- 8. Clamp
- 9. Receiver



REMOVAL SERVICE POINTS

◀A▶ FAN MOTOR AND SHROUD ASSEMBLY REMOVAL

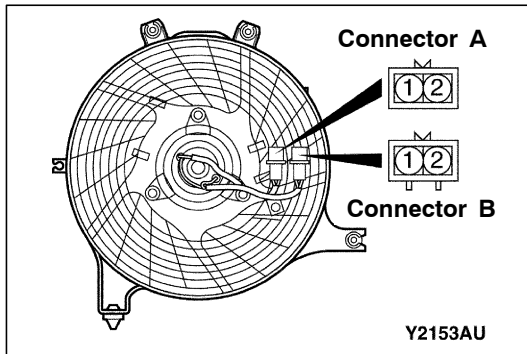
1. Remove the intercooler mounting bolts/nuts and pull the intercooler forward.
2. Move the fan motor/shroud assembly upward for removal.

◀B▶ FLEXIBLE DISCHARGE HOSE AND LIQUID PIPE A DISCONNECTION

To prevent the entry of dust or other foreign objects, plug the dismantled hose and condenser assembly nipples.

Caution

As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hose and nipples.



INSPECTION

CONDENSER FAN CHECK

Battery connection terminal				Condenser fan
Connector A		Connector B		
1	2	1	2	
	⊖		⊕	LO rotation
	⊖	⊕		HI rotation

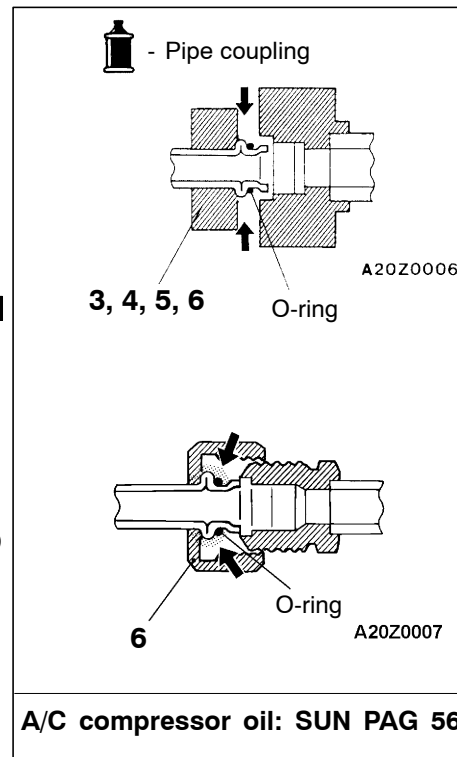
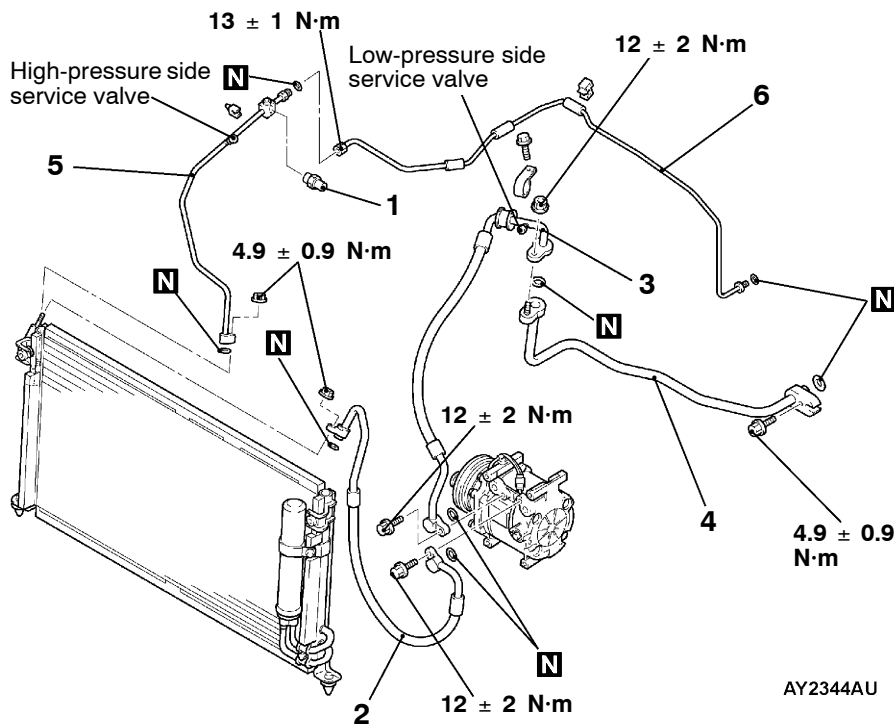
REFRIGERANT LINES

REMOVAL AND INSTALLATION

<L.H. DRIVE VEHICLES>

Pre-removal and Post-installation Operations

- Refrigerant Draining and Refilling (Refer to P.55-16, 19.)
- Radiator Grille Removal and Installation (Refer to GROUP 51.)
- Air Cleaner Removal and Installation (Refer to GROUP 15.)



Removal steps



1. Dual pressure switch
2. Flexible discharge hose
3. Flexible suction hose



4. Suction pipe
5. Liquid pipe A
6. Liquid pipe B

REMOVAL SERVICE POINTS

◀A▶ REMOVAL OF HOSES AND PIPES

To prevent the entry of dust or other foreign bodies, plug the condenser, compressor, and expansion valve nipples.

Caution

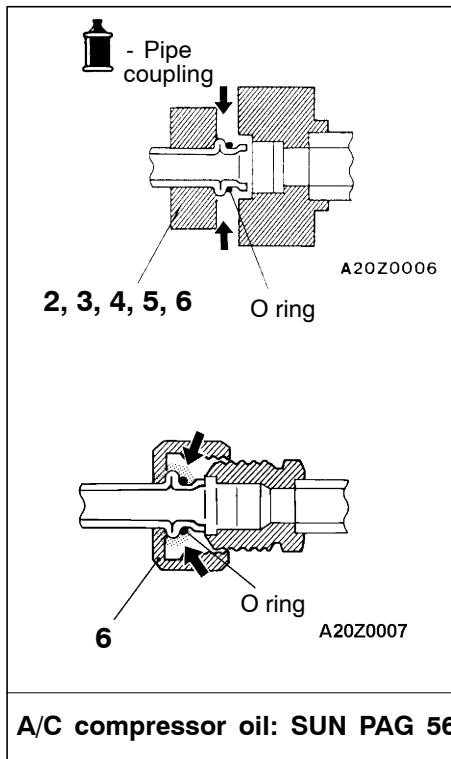
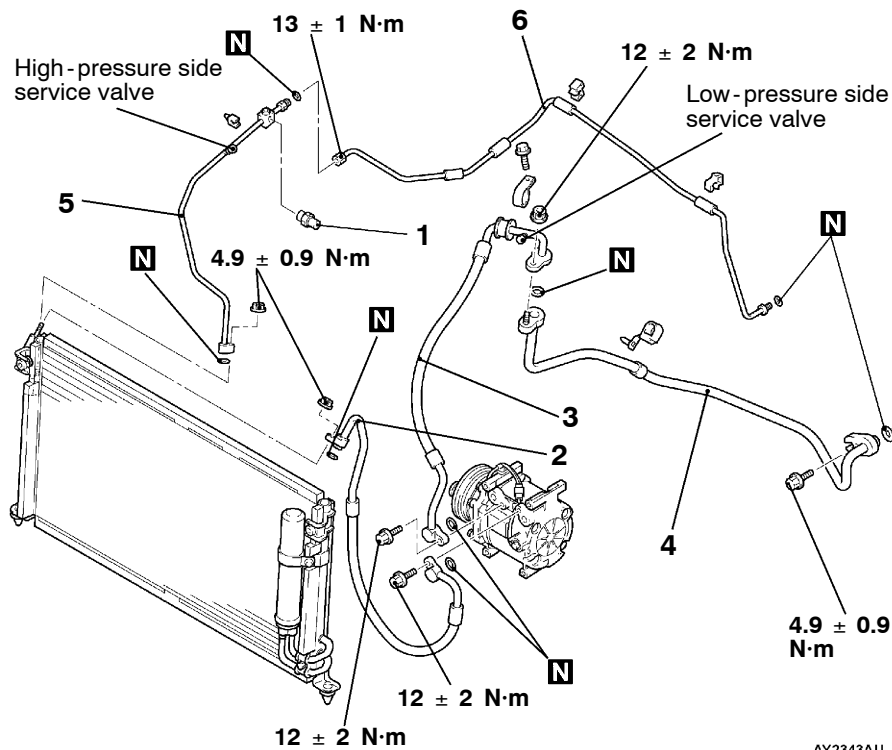
As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hose and nipples.

REMOVAL AND INSTALLATION

<R.H. DRIVE VEHICLES>

Pre-removal and Post-installation Operations

- Refrigerant Draining and Refilling (Refer to P.55-16, 19.)
- Radiator Grille Removal and Installation (Refer to GROUP 51.)
- Air Cleaner Removal and Installation (Refer to GROUP 15.)



Removal steps

- 1. Dual pressure switch
- 2. Flexible discharge hose
- 3. Flexible suction hose

- 4. Suction pipe
- 5. Liquid pipe A
- 6. Liquid pipe B

REMOVAL SERVICE POINTS

◀A▶ REMOVAL OF HOSES AND PIPES

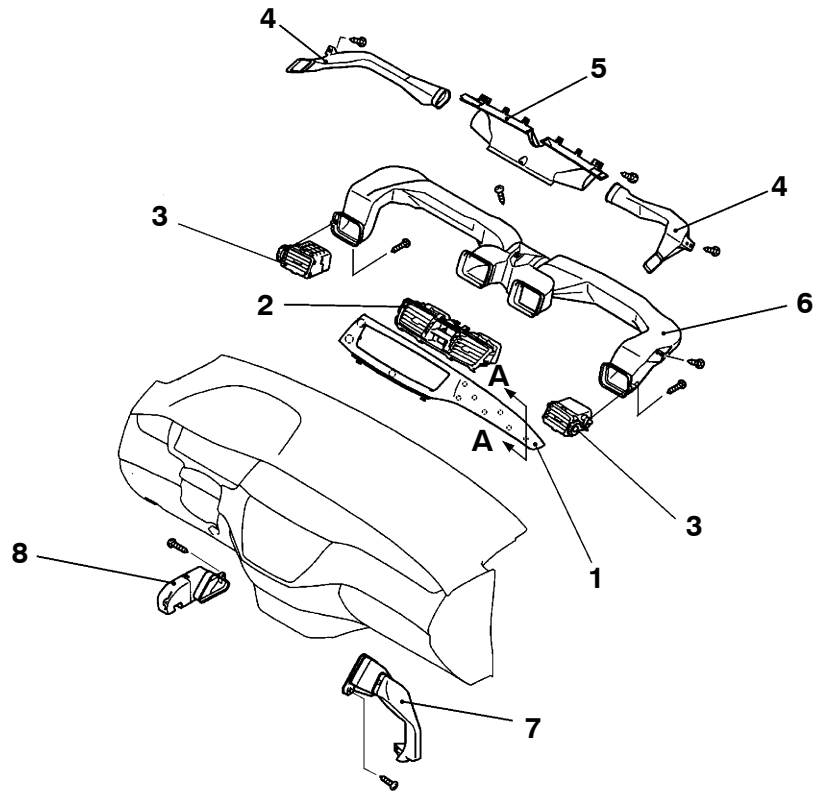
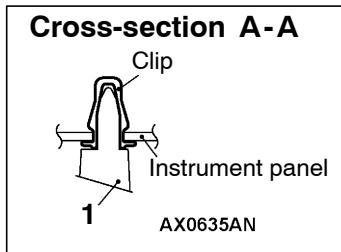
To prevent the entry of dust or other foreign bodies, plug the condenser, compressor, and expansion valve nipples.

Caution

As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hose and nipples.

DUCTS

REMOVAL AND INSTALLATION



AY2340AU

Air outlet removal steps

1. Center air outlet panel
2. Center air outlet
3. Side air outlet

Defroster nozzle and distribution duct removal steps

- Instrument panel (Refer to GROUP 52A.)
- 4. Side defroster duct

5. Defroster nozzle
6. Distribution duct

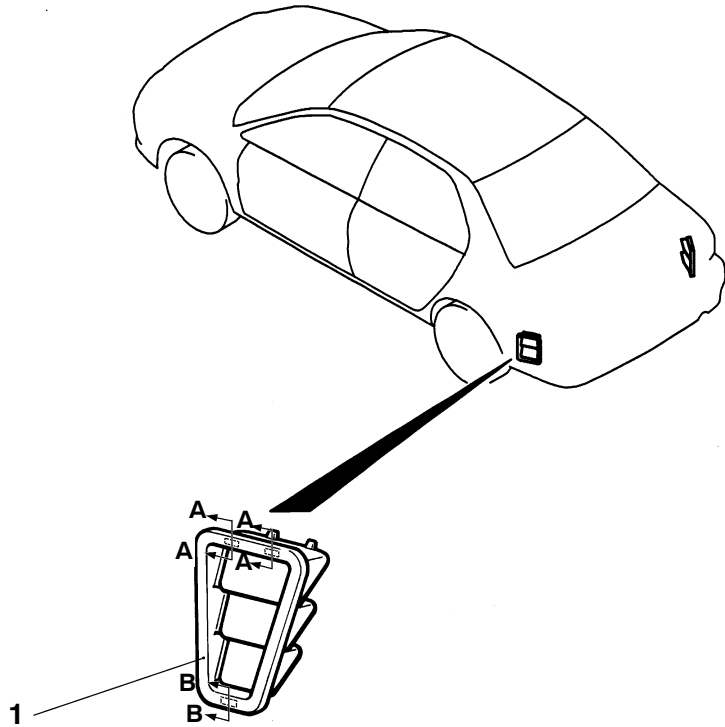
Foot duct removal step

- Console cover and glove box (Refer to GROUP 52A – Instrument Panel.)
- 7. Right-hand foot duct
- Under cover (Refer to GROUP 52A – Instrument Panel.)
- 8. Left-hand foot duct

VENTILATION

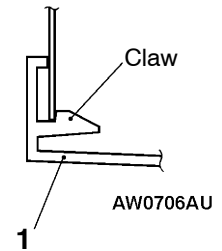
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations
 Rear Bumper Removal and Installation (Refer to GROUP 51.)

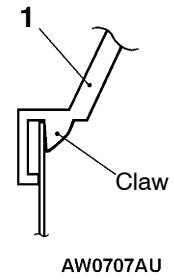


1. Rear ventilation duct

Cross-section A-A



Cross-section B-B



NOTES

ELECTRICAL WIRING

CONTENTS

HOW TO READ THE WIRING DIAGRAMS	A
ELECTRICAL WIRING	B
INDEX	C



NOTES

HOW TO READ THE WIRING DIAGRAMS

CONTENTS

COMPOSITION AND CONTENTS OF WIRING DIAGRAMS	2	MARKING FOR CONNECTOR EARTHING ...	6
HOW TO READ CONFIGURATION DIAGRAMS	3	WIRE COLOUR CODES	9
HOW TO READ CIRCUIT DIAGRAMS	4	ABBREVIATION SYMBOLS	10

COMPOSITION AND CONTENTS OF WIRING DIAGRAMS

- (1) This manual consists of wiring harness diagrams, installation locations of individual parts, circuits diagrams and index.
- (2) In each section, all specifications are listed, including optional specifications. Accordingly, some specifications may not be applicable for individual vehicles.

Section	Basic contents
Wiring harness configuration diagrams	Connector locations and harness wiring configurations on actual vehicles are illustrated.
Single part installation position	Locations are shown for each point of relays, electronic control units, sensors, solenoids, solenoid valves, diodes, inspection connectors, spare connectors, fusible links, fuses, etc. In the part's lists, parts are listed in alphabetical order.
Circuit diagrams	<p>Circuits from power supply to earth are shown completely, classified according to system. There is a main division into power circuits, and circuits classified by system. The circuits classified by system also include operation and troubleshooting hints.</p> <ul style="list-style-type: none">● Junction block The entire circuit for the junction block is described, because only the part of the junction block needed is normally shown in each circuit diagram.● Joint connectors The internal circuits for all joint connectors are described, because only the part needed is shown in each circuit diagram.● Power supply circuits Circuits from the battery to fusible link, dedicated fuses, ignition switch, general purpose fuses, etc.● Circuits classified by system For each system, the circuits are shown from fuse to earth, excluding the power supply sections.● Operation The standard operation of each system is briefly described, following the route of current flow.● Troubleshooting hints This is a brief explanation of the inspection points that serve as hints when troubleshooting. Explanations of the circuits controlled by the electronic control unit are omitted. Refer to the related publications as required.
Index	All components used are listed by connector number and component name.

HOW TO READ CONFIGURATION DIAGRAMS

The wiring harness diagrams clearly show the connector locations and harness routings at each site on actual vehicles.

Denotes connector No.
The same connector No. is used throughout the circuit diagrams to facilitate connector location searches.
The first alphabetical symbol indicates the location site of the connector and a number that follows is the unique number. Numbers are assigned to parts in clockwise order on the diagram.

Example: A-12

Number specific to connector (serial number)

Connector location site symbol

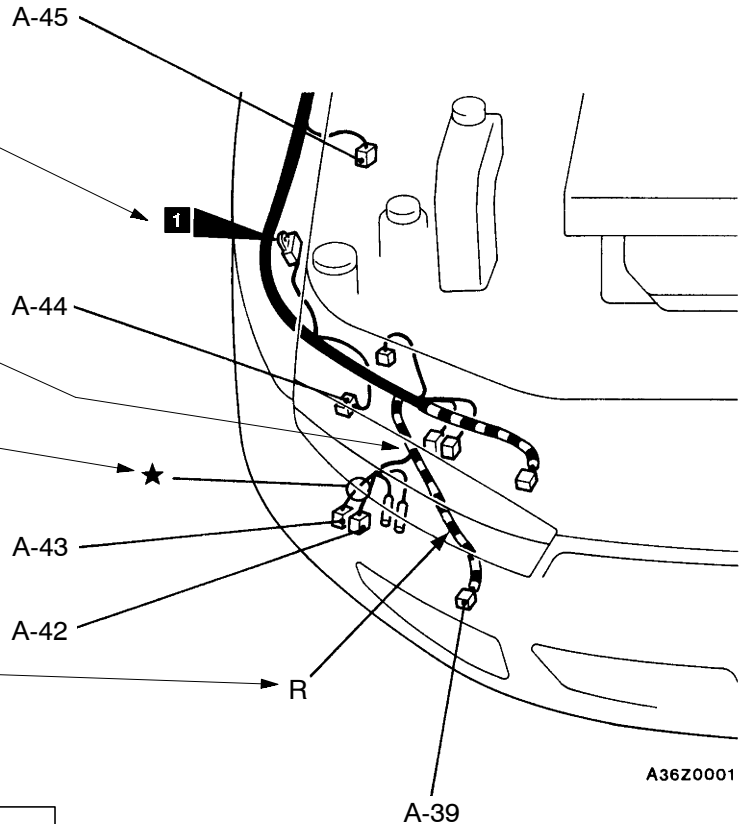
- | | |
|-------------------------------------|------------------------|
| A: Engine compartment | D: Floor and roof |
| B: Engine and transmission assembly | E: Door |
| C: Dash panel | F: Luggage compartment |

Denotes earth point.
Same earth number is used throughout circuit diagrams to facilitate search of earth point. Refer to SINGLE PART INSTALLATION POSITION - EARTH MOUNTING LOCATIONS for details of earth points.

Denotes a section covered by a corrugated tube.

The mark ★ shows the standard mounting position of wiring harness.

Denotes the colour of corrugated tube or vinyl tube. (If not specified, it is black.)
R: Red
Y: Yellow



The number of connector pins and the connector colour (except milk white)* are shown for ease of retrieval.

Example: (2-B)

Connector colour (milk white if no colour is indicated)
Number of connector pins

*: Typical connector colours

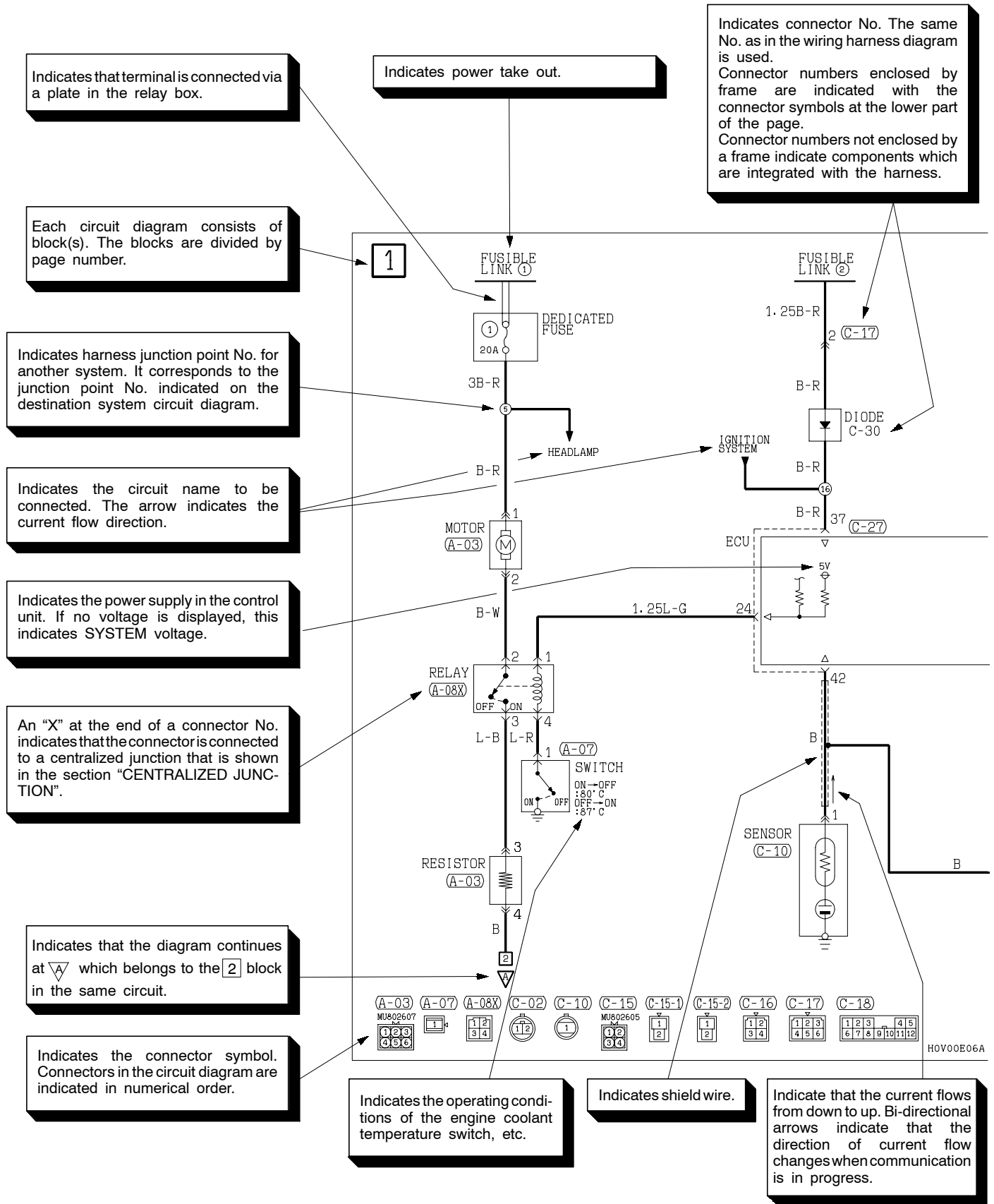
- | | |
|-----------|------------------|
| B: Black | BR: Brown |
| Y: Yellow | V: Violet |
| L: Blue | O: Orange |
| G: Green | GR: Gray |
| R: Red | None: Milk white |

- | | |
|------------|-------------------------|
| A-39 (2-B) | Headlamp (LO: RH) |
| A-40 (1) | Horn (LO) |
| A-41 (1) | Horn (HI) |
| A-42 (2-B) | Windshield washer motor |

Indicates the device to which the connector is to be connected.

HOW TO READ CIRCUIT DIAGRAMS

The circuit of each system from fuse (or fusible link) to earth is shown. The power supply is shown at the top and the earth at the bottom to facilitate understanding of the current flow.



Indicates input/output to/from control unit (current flow direction).

Input Output Input/output

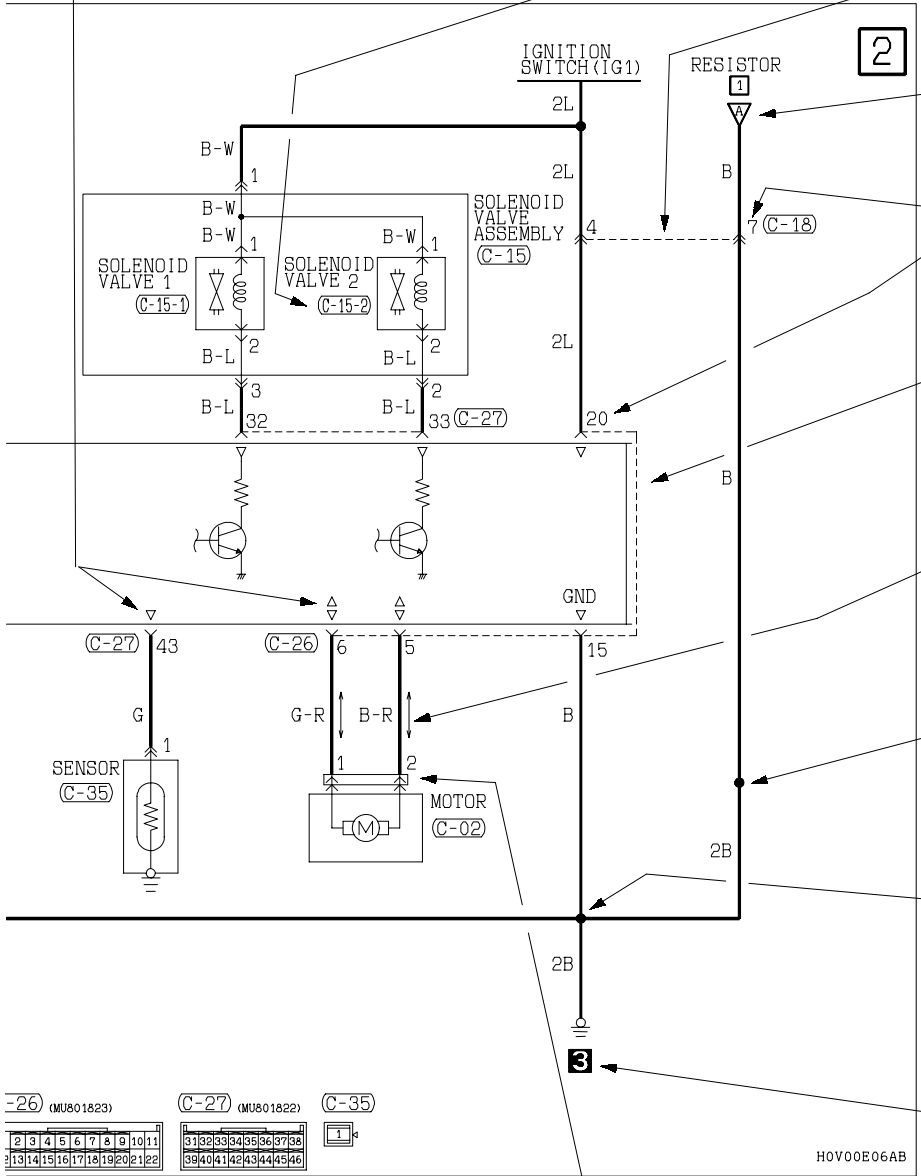
Indicates a wiring connector which is inside the equipment and which is not shown in the wiring harness configuration diagram.

Example C-15-2

Indicates a connector which is inside the equipment, numbered in order starting from 1.

Indicates the connector number shown in the wiring harness configuration diagram.

A broken line indicates that these connectors are the same intermediate connectors.



Indicates that the diagram comes from [1] which belongs to the [1] block in the same circuit.

Indicates terminal No.

In case two or more connectors are connected to the same device, markings indicating the same connectors are connected by a broken line.

Indicates current flow downward or upward as controlled by the control unit.

Indicates harness junction where wire diameter or colour changes.

Indicates intersections at which the lead wire are not connected.

Indicates intersections at which the lead wires are connected.

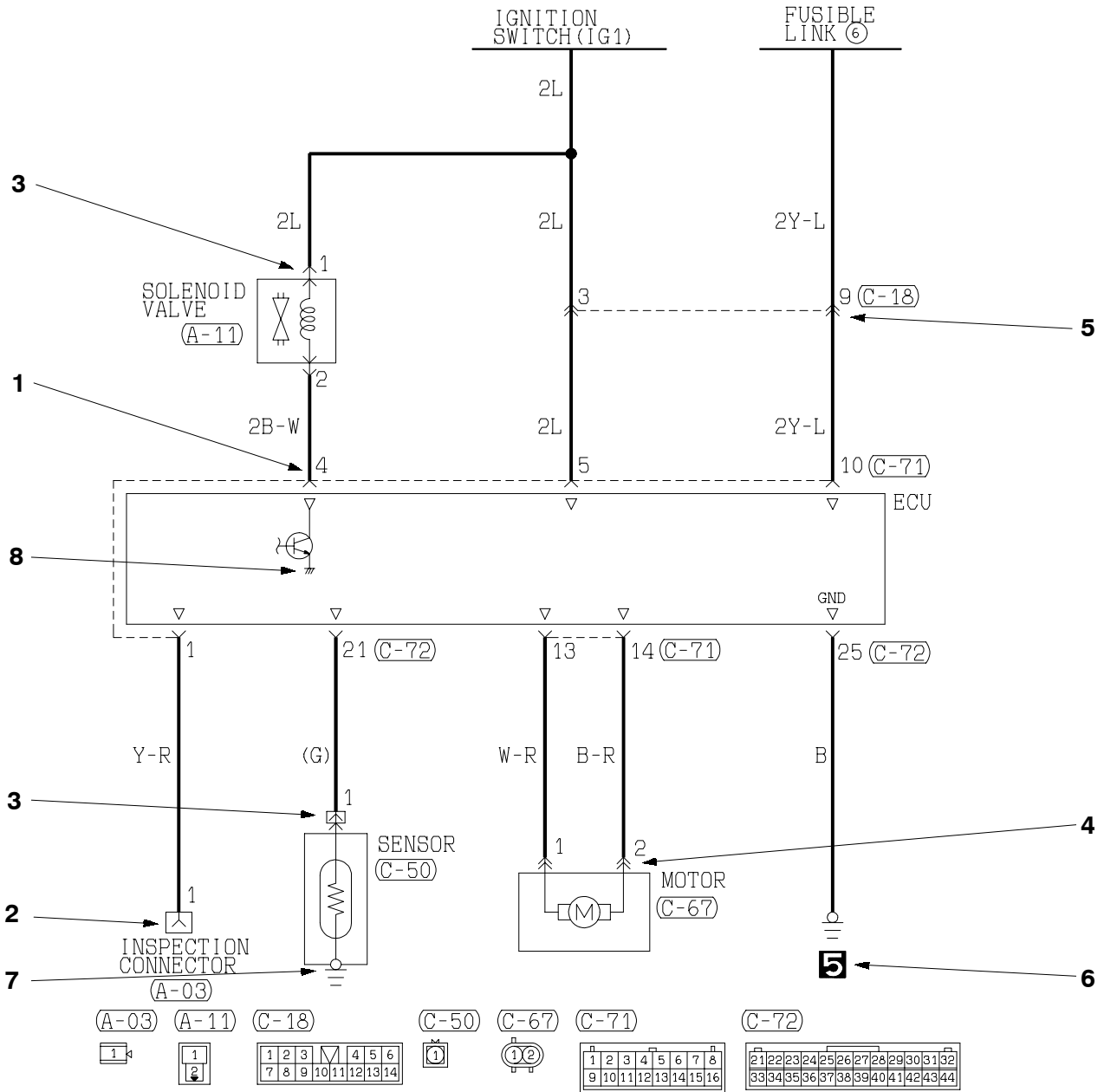
Indicates representative vehicle body earth point. (Same No. as that of earth point in wiring harness diagram and installation locations of individual parts.)

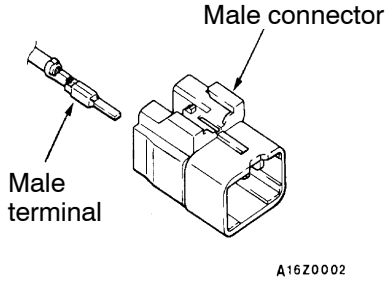

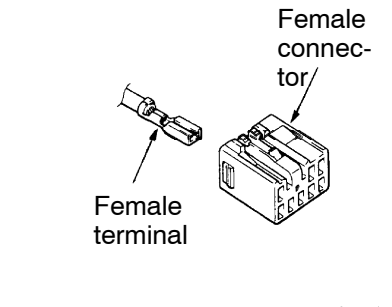

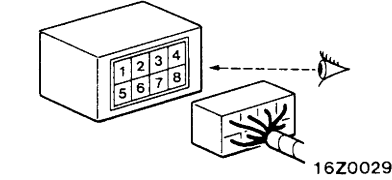
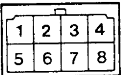
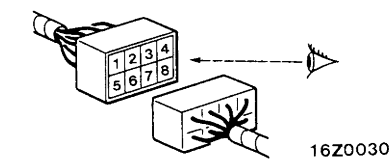
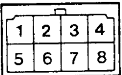
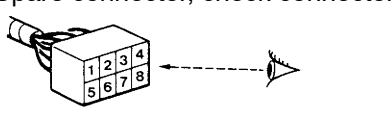
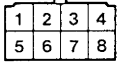
C-26 (MU801823)											C-27 (MU801822)											C-35										
2	3	4	5	6	7	8	9	10	11		31	32	33	34	35	36	37	38			1											
13	14	15	16	17	18	19	20	21	22		39	40	41	42	43	44	45	46														

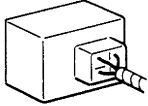
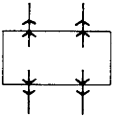
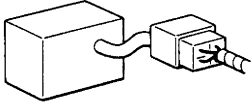
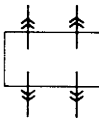
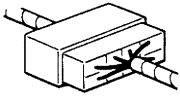

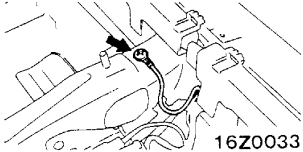

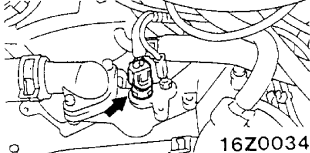

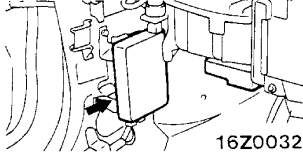

HOV00E06AB

Indicates that the terminal is a spare one if the device (sensors in this case) is not provided.

MARKINGS FOR CONNECTOR EARTHING



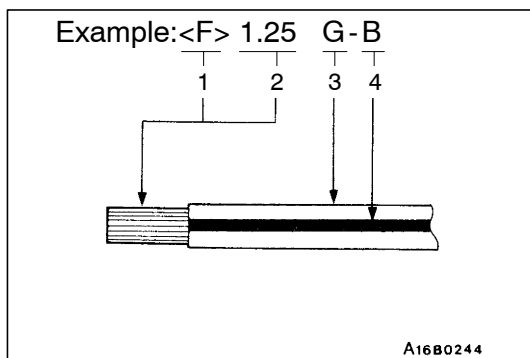
Item	No.	Connector/Earthing	Symbol	Contents
Connector and terminal marking	1		<p>Male terminal</p>  16Z0021	<p>The male and female terminals are indicated as shown. The connector with male terminal(s) is called as male connector and indicated by double connector contour lines, while the connector with female terminal(s) is called as female connector and indicated by single connector contour line.</p>
	-		<p>Female terminal</p>  16Z0022	
Connector symbol marking	2	<p>Device</p> 	 16Z0016	<p>The symbol indicates the vehicle connector as viewed from the illustrated direction. At the connection with a device, the connector symbol on the device side is shown, and for an intermediate connector, a male connector symbol is shown. For spare connectors and check connectors, no device is connected, and so the harness-side connector symbol is shown for these connectors. The details for the diagnosis connector differ from the above description. For details, refer to the "MUT-II operation instructions".</p>
	<p>Intermediate connector</p> 	 16Z0016		
	<p>Spare connector, check connector</p> 	 16Z0017		

Item	No.	Connector/Earthing	Symbol	Contents
Connector connection marking	3	Direct connection type  16Z0026	 16Z0023	A connection between a device and connector on the harness side is either by direct insertion in the device (direct connection type) or by connection with a harness connector on the device side furnished (harness connection type). The two types are indicated as illustrated.
	4	Harness connection type  16Z0027	 16Z0024	
	5	Intermediate connector  16Z0028	 16Z0025	
Earth markings	6	Body earth  16Z0033	 16Z0018	Earth is either by body earth, device earth or control unit interior earth. These are indicated as illustrated.
	7	Device earth  16Z0034	 16Z0019	
	8	Earth in control unit  16Z0032	 16Z0020	

WIRE COLOUR CODES

Wire colours are identified by the follow colour codes.

Code	Wire colour	Code	Wire colour
B	Black	P	Pink
BR	Brown	R	Red
G	Green	SB	Sky blue
GR	Gray	SI	Silver
L	Blue	V	Violet
LG	Light green	W	White
O	Orange	Y	Yellow



If a cable has two colours, the first of the two colour code characters indicates the basic colour (colour of the cable coating) and the second indicates the marking colour.

No.	Meaning
1	<F>:Flexible wire
	<T>:Twisted wire
2	Wire size(mm ²)*
3	Basic colour (colour of the cable coating)
4	Marking colour

NOTE

- *: No code indicates 0.5 mm².
Cable colour code in parentheses indicates 0.3 mm².

ABBREVIATION SYMBOLS

The abbreviation symbols used in wiring diagrams are defined below.

1. Abbreviation symbols used for system name

Abbreviation symbols	Meaning	Abbreviation symbols	Meaning
A/C	Air conditioner	EGR	Exhaust gas recirculation
ABS	Anti-skid braking system	ETACS	Electronic time alarm control system
ACD	Active center differential	SRS	Supplemental restraint system
AYC	Active yaw control		

2. Abbreviation symbols used for combination meters

Abbreviation symbols	Meaning	Abbreviation symbols	Meaning
ABS	Anti-skid braking system warning lamp	SNOW	Active center differential mode indicator lamp
BEAM	High beam indicator lamp	SPEED	Speedmeter
BRAKE	Brake warning lamp	SRS	Supplemental restraint system warning lamp
CHECK ENGINE	Check engine warning lamp	TARMAC	Active center differential mode indicator lamp
CHG	Charging warning lamp	T/GA	Engine coolant temperature gauge
DOOR	Door-ajar warning lamp	TACHO	Tachometer
F/GA	Fuel gauge	TAIL	Tail, position and licence plate indicator lamp
FRONT FOG	Front fog indicator lamp		
FUEL	Low fuel warning lamp	TRIP	Tripmeter
GRAVEL	Active center differential mode indicator lamp	TURN (LH)	Turn signal indicator lamp (LH)
ODO	Odometer	TURN (RH)	Turn signal indicator lamp (RH)
OIL	Oil pressure warning lamp	WATER SPRAY	Intercooler water spray indicator lamp
REAR FOG	Rear fog indicator lamp		

3. Abbreviation symbols used for switched and relay

Name of switches and relays	Abbreviation symbols	Operation
Blower switch	LO	Blower operates at low speed
	ML	Blower operates at medium low speed
	MH	Blower operates at medium high speed
	HI	Blower operates at high speed

Name of switches and relays	Abbreviation symbols	Operation
Dimmer passing switch	LO	Low beams ON
	HI	High beams ON
	PASS	
Door lock actuator	LOCK	Door lock
	UNLOCK	Door unlock
Headlamp leveling switch	1	Low beam light axis drops by one step
	2	Low beam light axis drops by two step
	3	Low beam light axis drops by three step
	4	Low beam light axis drops by four step
Ignition switch	ACC	When turned to the ACC (ACCESSORY) or ON position, the power circuit will start
	IG1	Even when at the ST (START) position, the power circuit will start
	IG2	When at the ST (START) position, the power circuit will not start functioning
Intercooler water spray switch	MANUAL	Water is sprayed while the switch is being pressed
	AUTO	Water is sprayed automatically according to driving conditions
Lighting switch	TAIL	Position, tail, licence plate and illumination lamps ON
	HEAD	Headlamps ON
Others	OFF	Switched OFF
	ON	Switched ON
Power window switch	UP	Window closes
	DOWN	Window opens
	AUTO UP	Window is easily closed with one action
	AUTO DOWN	Window is easily opened with one action
	LOCK	Prevents all switches other than the main switch from operating the power windows
Remote controlled mirror switch	LH	L.H. mirror operates
	RH	R.H. mirror operates
Room lamp switch	DOOR	Room lamp ON when a door is open
Turn signal switch	LH	L.H. signal lamps ON
	RH	R.H. signal lamps ON

A-12 HOW TO READ THE WIRING DIAGRAMS - Abbreviation Symbols

Name of switches and relays	Abbreviation symbols	Operation
Windshield wiper switch	MIST	Wiper operates once
	INT	Wiper operates intermittently
	LO	Wiper operates at low speed
	HI	Wiper operates at high speed

4. Other abbreviation symbols

Abbreviation symbols	Meaning	Abbreviation symbols	Meaning
ECU	Electronic control unit	LCD	Liquid crystal display
GND	Earth	LH	Left hand
ILL	Illumination lamp	LHD	L.H. drive vehicles
IND	Indicator lamp	RH	Right hand
J/B	Junction block	RHD	R.H. drive vehicles
J/C	Joint connector		

ELECTRICAL WIRING

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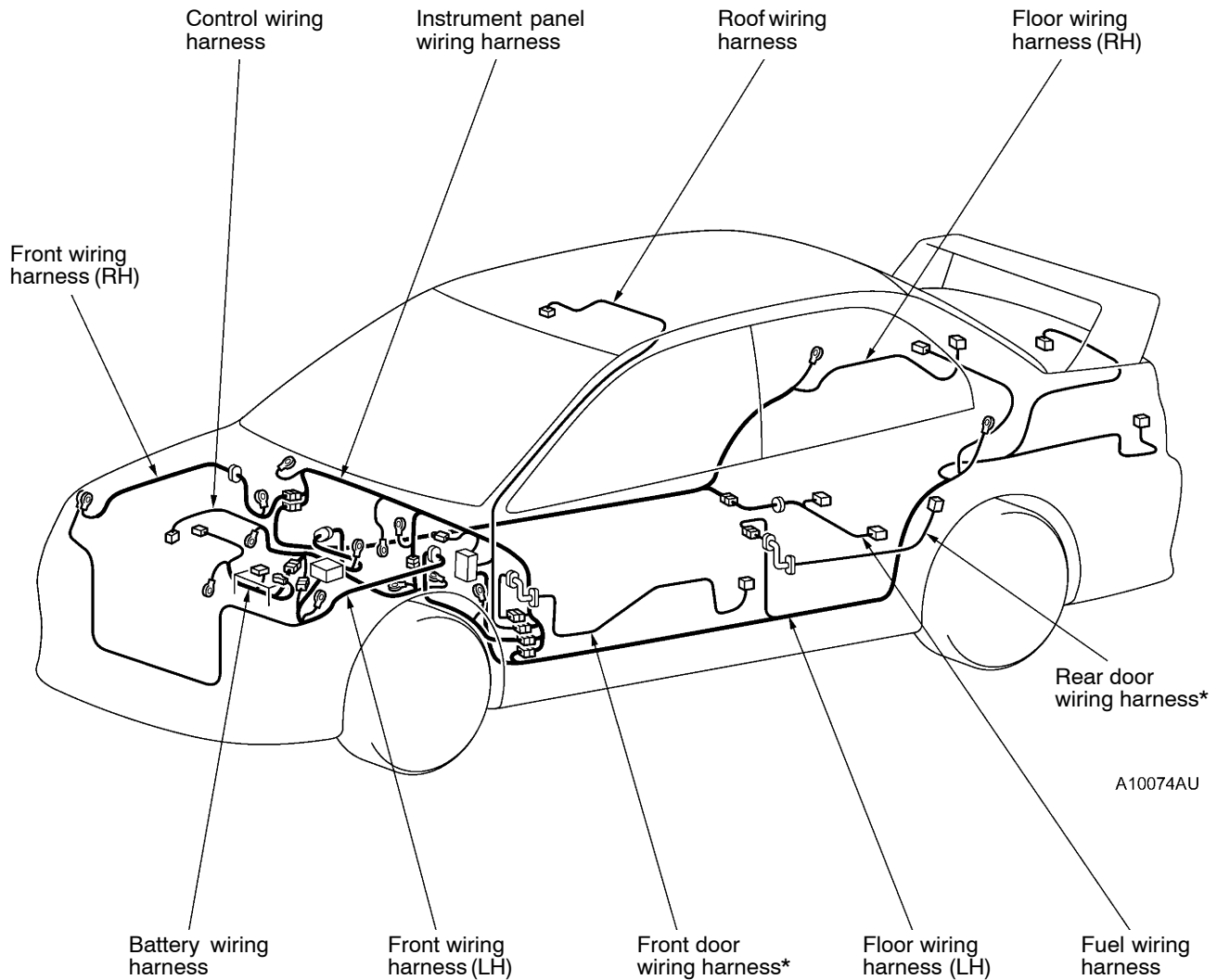
**SPARE CONNECTOR
(FOR FRONT FOG LAMP) 258**



WIRING HARNESS CONFIGURATION DIAGRAMS

OVERALL WIRING DIAGRAM

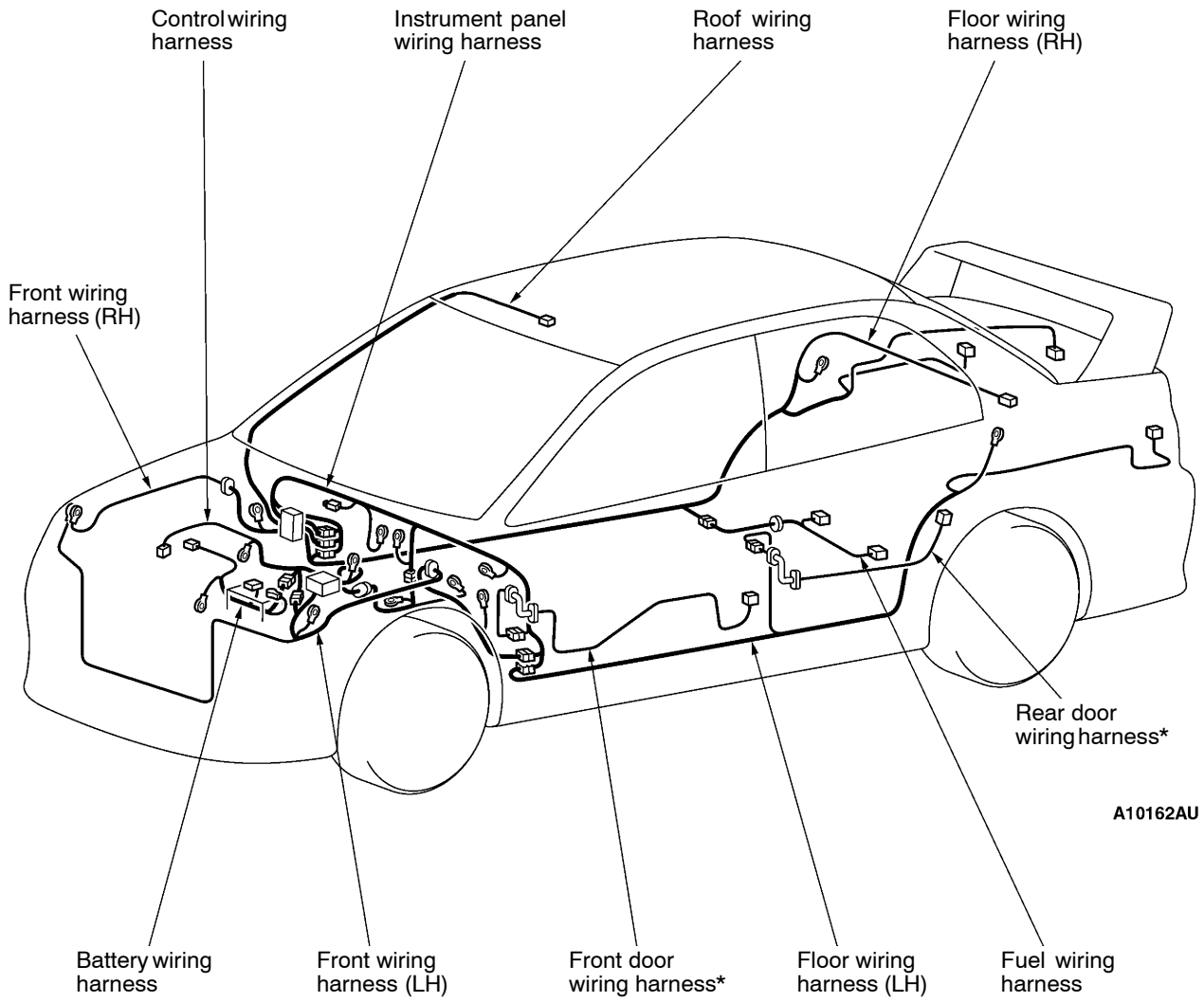
L.H. drive vehicles



NOTE

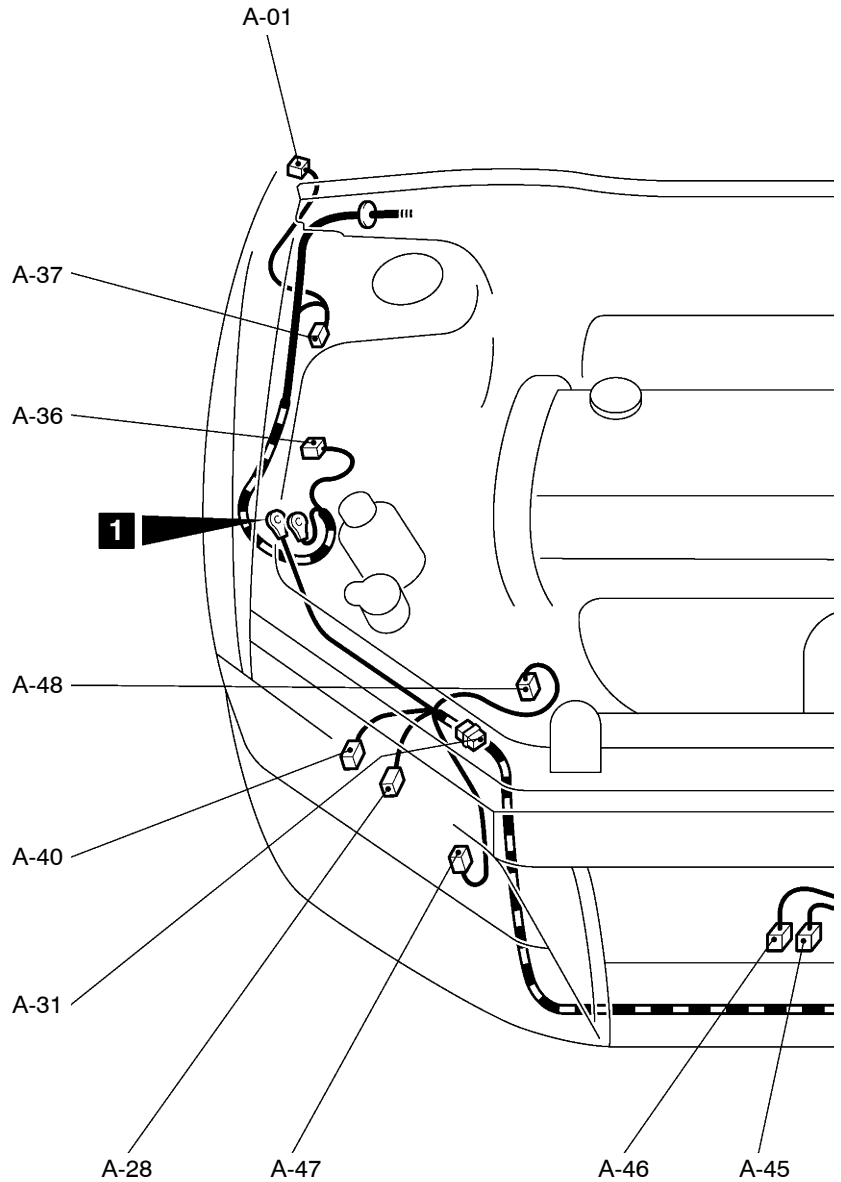
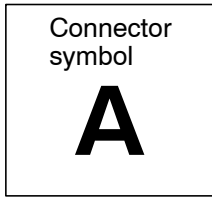
- (1) This illustration shows only major wiring harness.
- (2) *: also equipped at the right side.

R.H. drive vehicles



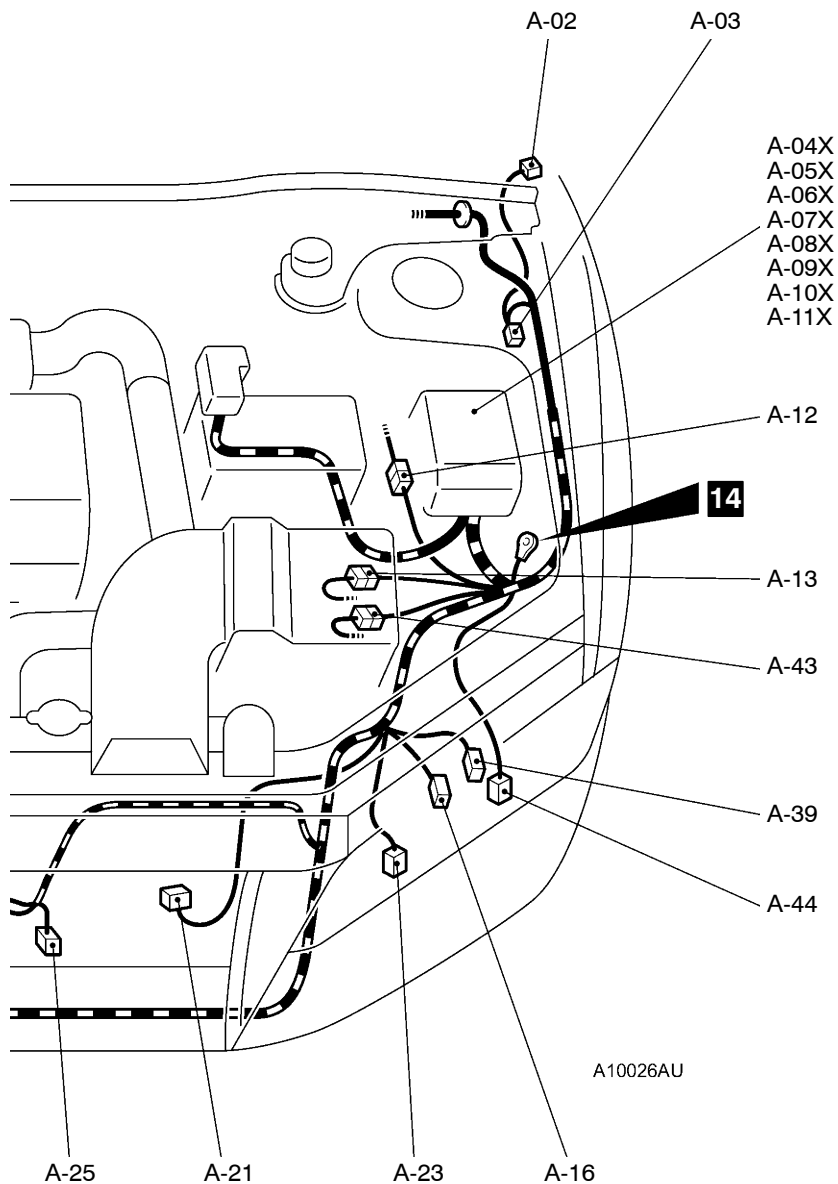
ENGINE COMPARTMENT

L.H. drive vehicles



Connector colour code
 B:Black
 Y:Yellow
 L:Blue
 G:Green
 R:Red
 BR:Brown
 V:Violet
 O:Orange
 GR:Gray
 None: Milk white

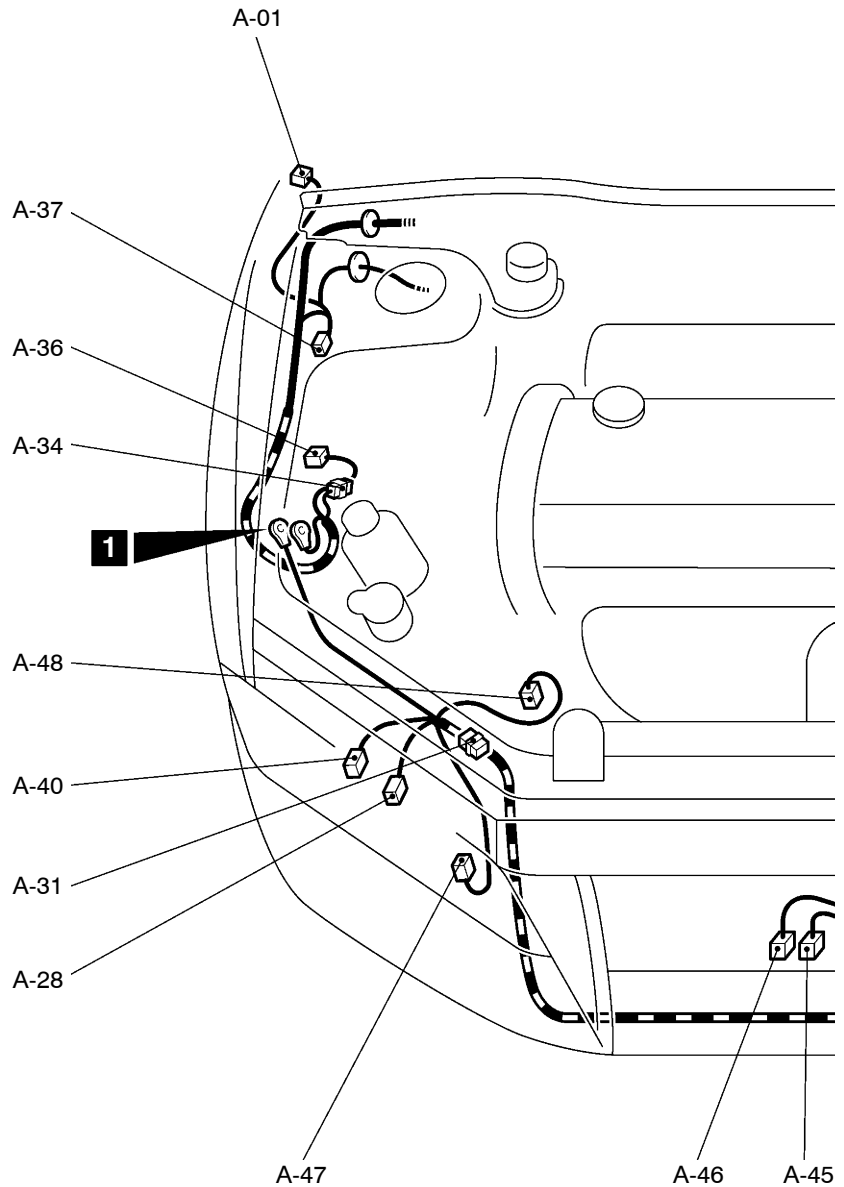
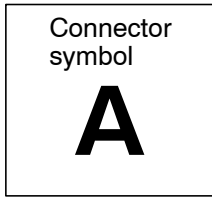
A-01 (2-GR)	Side turn signal lamp (RH)	A-09X (4)	Radiator fan relay
A-02 (2-GR)	Side turn signal lamp (LH)	A-10X (11)	Front-ECU
A-03 (2-B)	Wheel speed sensor (Front: LH)	A-11X (11)	Front-ECU
A-04X (4)	Spare connector (for front fog lamp relay)	A-12 (2-B)	Front wiring harness (LH) and control wiring harness combination <ABS>
A-05X (4)	Horn relay	A-13 (8-B)	Front wiring harness (LH) and control wiring harness combination
A-06X (4)	Condenser fan relay (LO)	A-16 (2-B)	Headlamp (HI: LH)
A-07X (4)	Condenser fan relay (HI)		
A-08X (4)	No connection		



- | | | | |
|-------------|--------------------------------------|-------------|--|
| A-21 (3-GR) | Fan controller | A-40 (8-B) | Front combination lamp (RH) |
| A-23 (1-B) | Horn (HI) | A-43 (8-B) | Front wiring harness (LH) and control wiring harness combination |
| A-25 (1-B) | Horn (LO) | A-44 (2) | Intercooler water spray motor |
| A-28 (2-B) | Headlamp (HI: RH) | A-45 (2-B) | Condenser fan motor |
| A-31 (1) | Spare connector (for front fog lamp) | A-46 (2-GR) | Condenser fan motor |
| A-36 (2-BR) | Dual pressure switch | A-47 (1-B) | A/C compressor |
| A-37 (2-B) | Wheel speed sensor (Front: RH) | A-48 (1-B) | Power steering oil pressure switch |
| A-39 (8-B) | Front combination lamp (LH) | | |

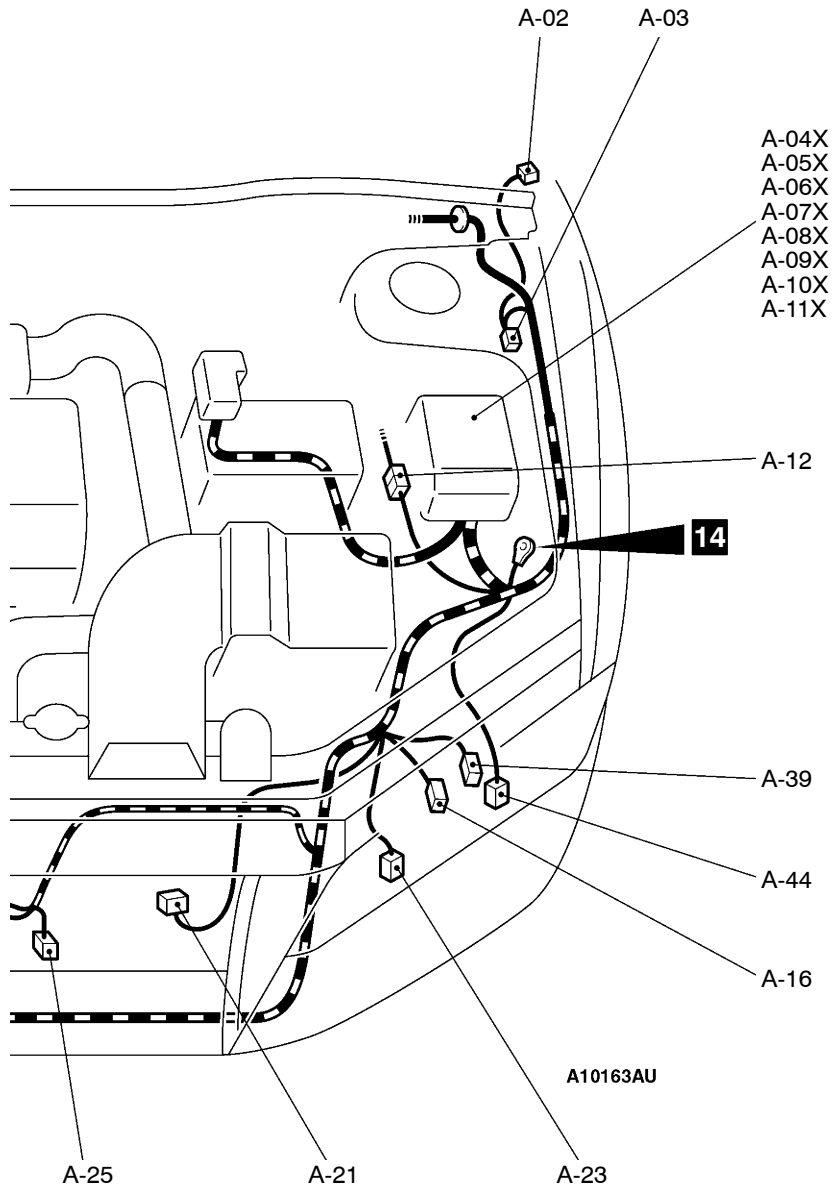
ENGINE COMPARTMENT

R.H. drive vehicles



Connector colour code
 B:Black
 Y:Yellow
 L:Blue
 G:Green
 R:Red
 BR:Brown
 V:Violet
 O:Orange
 GR:Gray
 None: Milk white

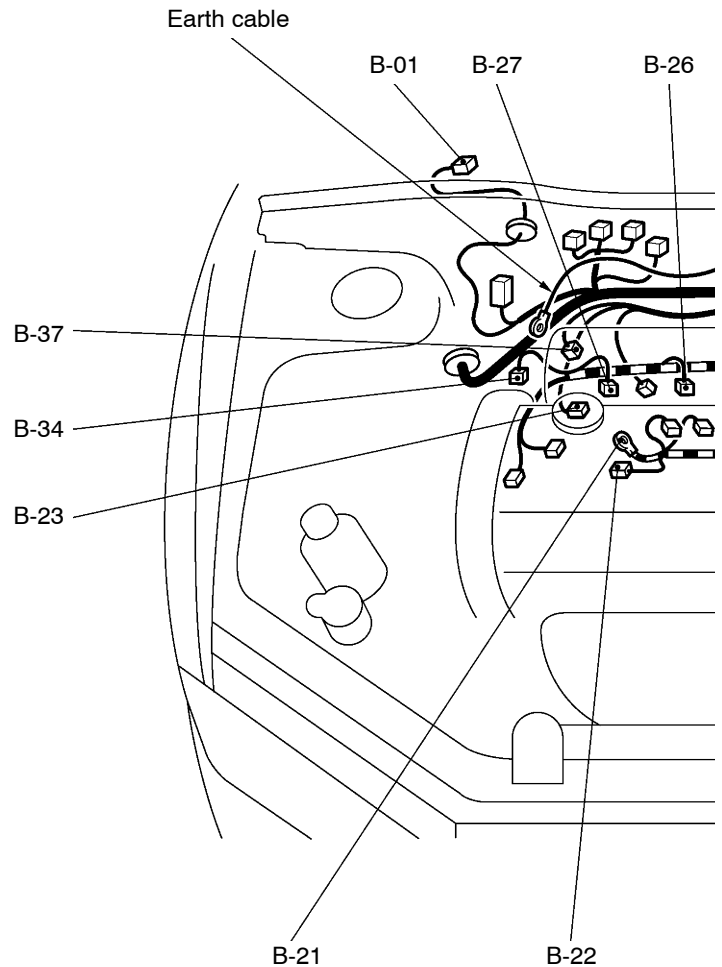
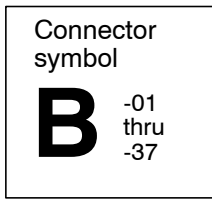
A-01 (2-GR)	Side turn signal lamp (RH)	A-09X (4)	Radiator fan relay
A-02 (2-GR)	Side turn signal lamp (LH)	A-10X (11)	Front-ECU
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A-06X (4)	Condenser fan relay (LO)	A-21 (3-GR)	Fan controller
A-07X (4)	Condenser fan relay (HI)		
A-08X (4)	No connection		



A-23 (1-B)	Horn (HI)	A-40 (8-B)	Front combination lamp (RH)
A-25 (1-B)	Horn (LO)	A-44 (2)	Intercooler water spray motor
A-28 (2-B)	Headlamp (HI: RH)	A-45 (2-B)	Condenser fan motor
A-31 (1)	Spare connector (for front fog lamp)	A-46 (2-GR)	Condenser fan motor
A-34 (2)	No connection	A-47 (1-B)	A/C compressor
A-36 (2-BR)	Dual pressure switch	A-48 (1-B)	Power steering oil pressure switch
A-37 (2-B)	Wheel speed sensor (Front: RH)		
A-39 (8-B)	Front combination lamp (LH)		

ENGINE AND TRANSMISSION

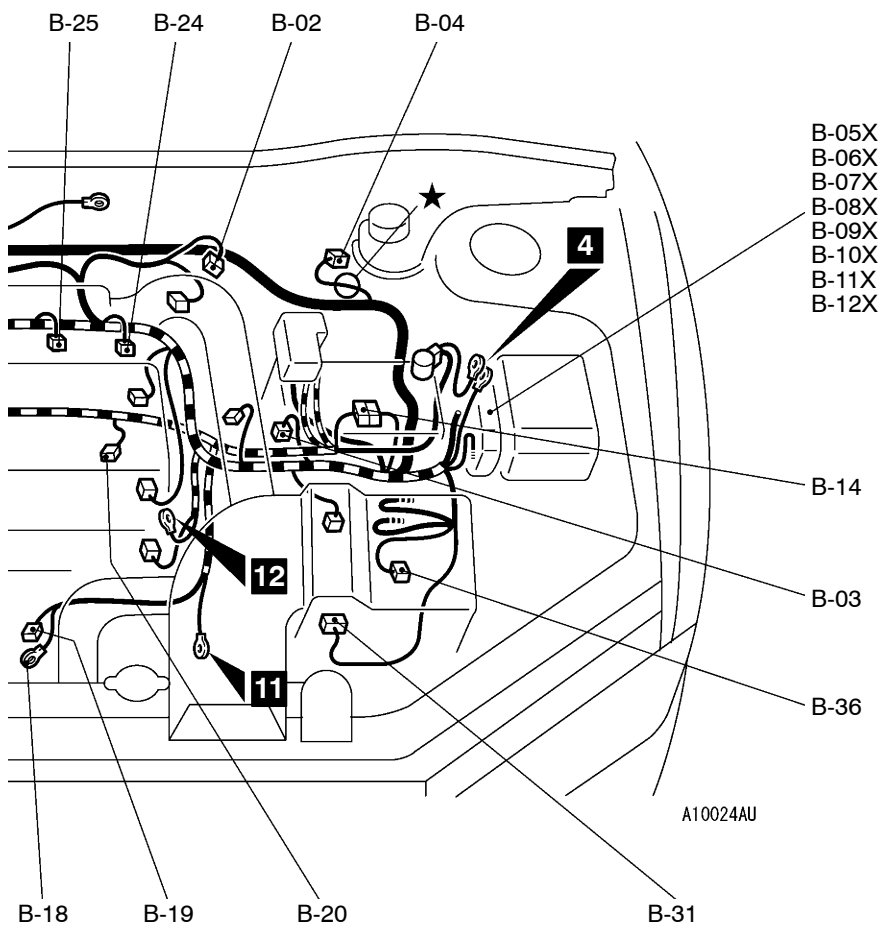
L.H. drive vehicles



Connector colour code

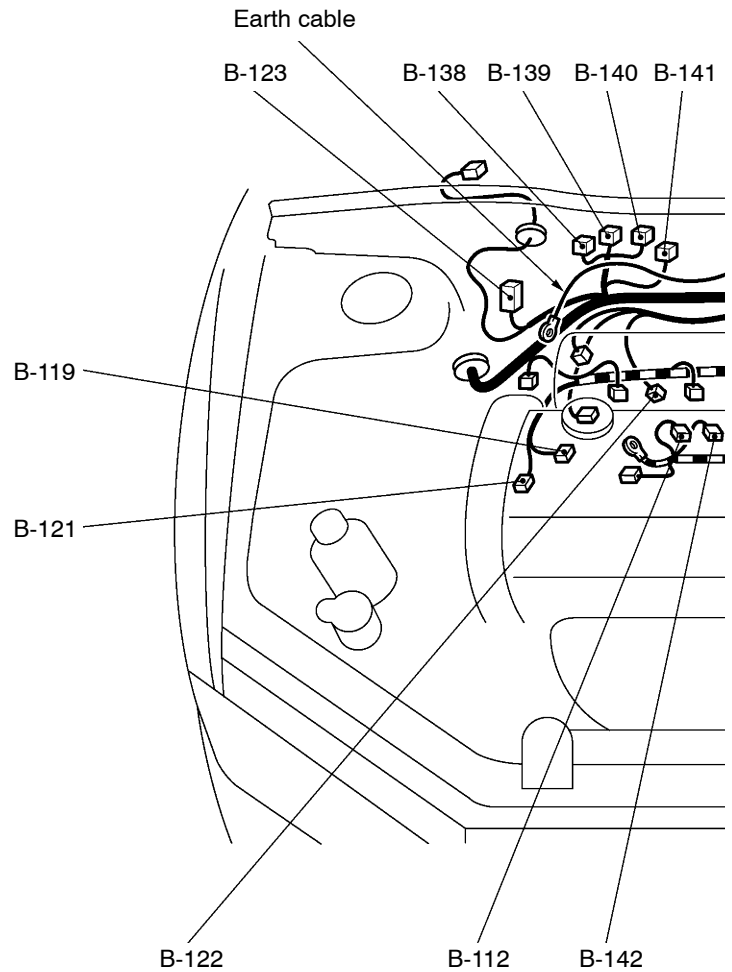
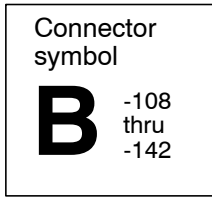
- B:Black
- Y:Yellow
- L:Blue
- G:Green
- R:Red
- BR:Brown
- V:Violet
- O:Orange
- GR:Gray
- None: Milk white

B-01 (5-GR)	Windshield wiper motor	B-08X (4)	No connection
B-02 (4-B)	Throttle position sensor	B-09X (4)	No connection
B-03 (3-B)	Vehicle speed sensor	B-10X (4)	No connection
B-04 (2-GR)	Brake fluid level switch	B-11X (4)	Engine control relay
B-05X (1)	Engine speed detection connector	B-12X (4)	A/C compressor relay
B-06X (5)	No connection	B-14 (10-B)	Control wiring harness and battery wiring harness combination
B-07X (4)	No connection		



- | | | | |
|-------------|------------------------------|-------------|------------------------------|
| B-18 (1) | Starter | B-25 (2-B) | Injector 3 |
| B-19 (1-B) | Starter | B-26 (2-B) | Injector 2 |
| B-20 (1-B) | Oil pressure switch | B-27 (2-B) | Injector 1 |
| B-21 (1) | Alternator | B-31 (7-B) | Air flow sensor |
| B-22 (4-GR) | Alternator | B-34 (4-B) | Oxygen sensor |
| B-23 (2-B) | Purge control solenoid valve | B-36 (2-GR) | Waste gate solenoid valve |
| B-24 (2-B) | Injector 4 | B-37 (2-B) | Fuel pressure solenoid valve |

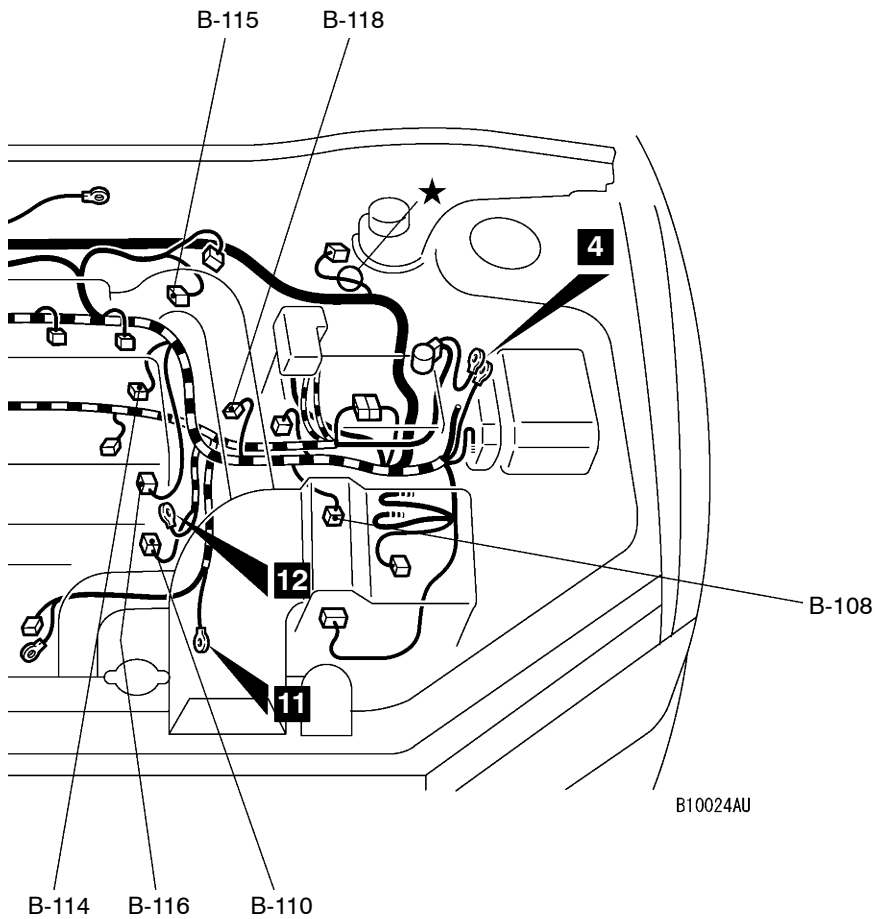
L.H. drive vehicles



Connector colour code
 B:Black
 Y:Yellow
 L:Blue
 G:Green
 R:Red
 BR:Brown
 V:Violet
 O:Orange
 GR:Gray
 None: Milk white

- B-108 (2-B) Back-up lamp switch
- B-110 (1-B) Engine coolant temperature gauge unit
- B-112 (2-BR) EGR solenoid valve
- B-114 (3-GR) Ignition coil 1

- B-115 (6-B) Idle speed control servo
- B-116 (3-B) Camshaft position sensor
- B-118 (2-B) Engine coolant temperature sensor
- B-119 (3-GR) Ignition coil 2

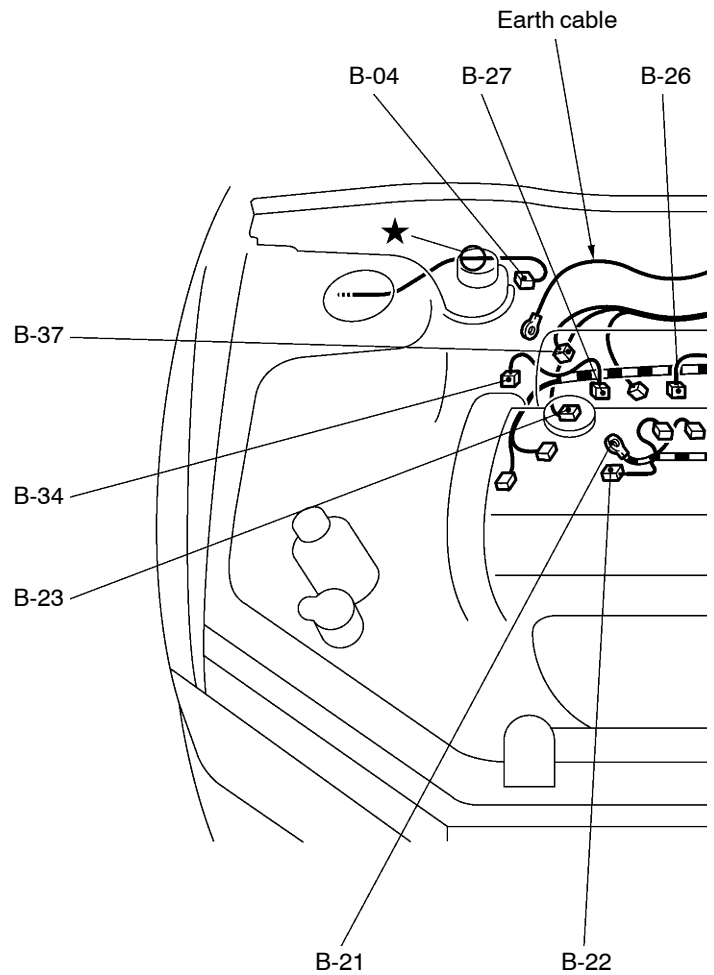
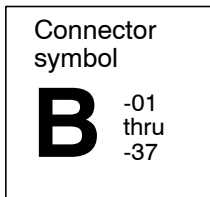


B-121 (3-B) Crank angle sensor
 B-122 (2-GR) Detonation sensor
 B-123 (34-B) ABS-ECU
 B-138 (6-B) Resistor

B-139 (5-B) Electric pump relay <ACD>
 B-140 (4) Fuel pump relay 3
 B-141 (2-B) Fuel pump resistor
 B-142 (2-B) Secondary air control solenoid valve

ENGINE AND TRANSMISSION

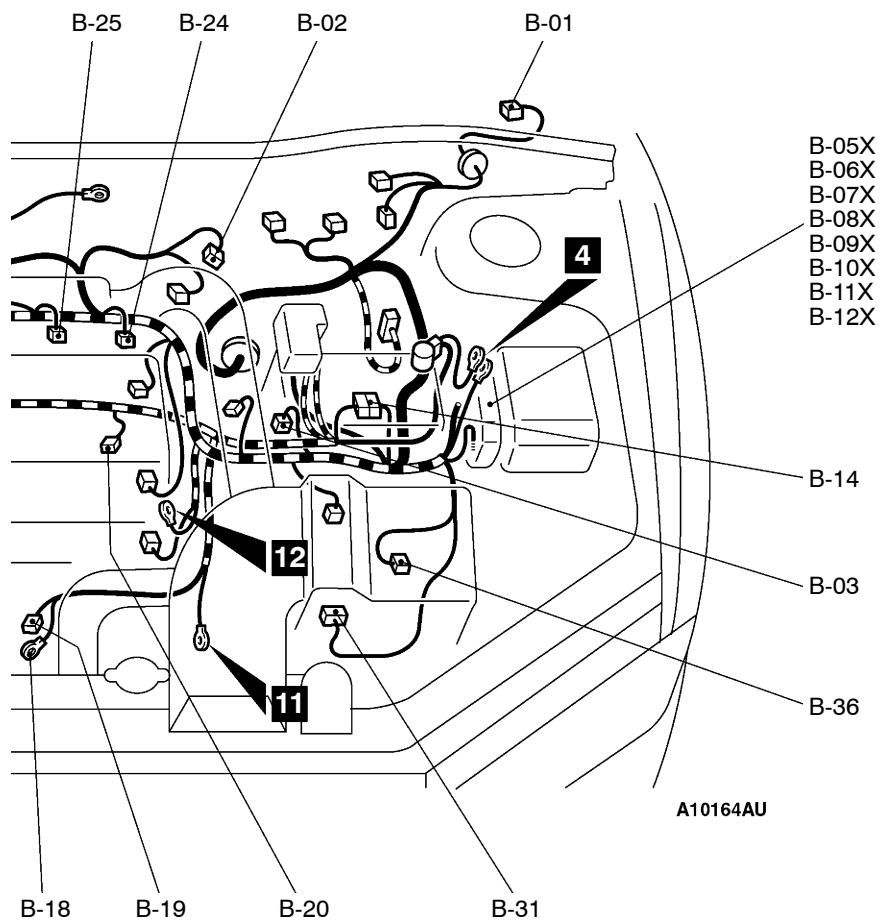
R.H. drive vehicles



Connector colour code

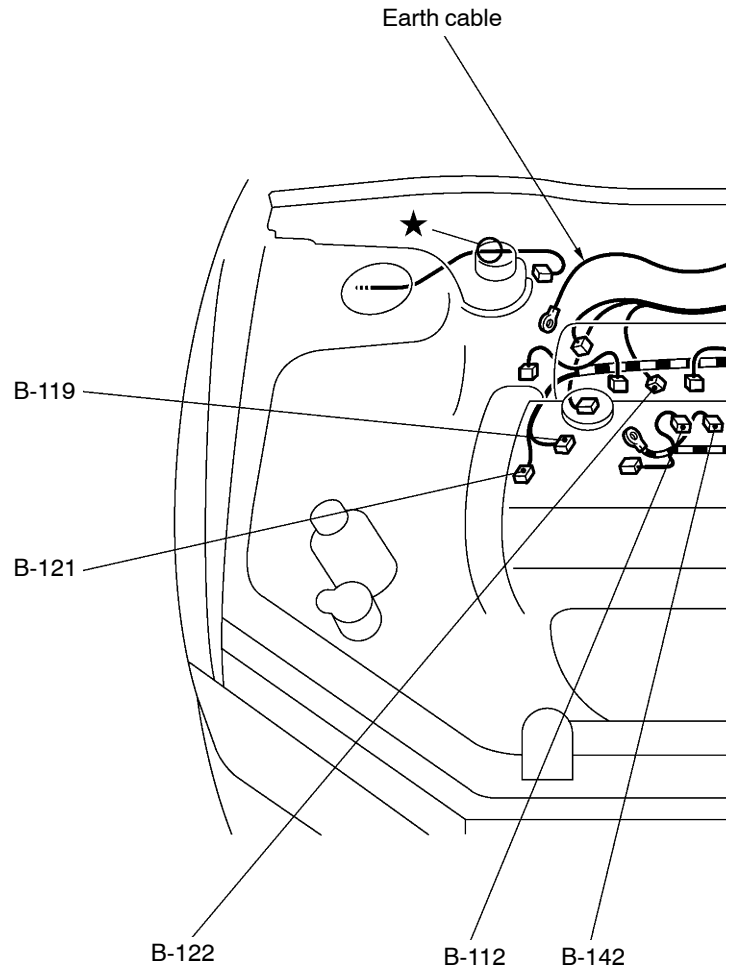
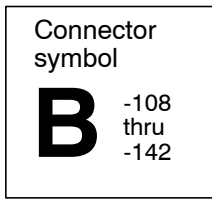
- B:Black
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- G:Green
- R:Red
- BR:Brown
- V:Violet
- O:Orange
- GR:Gray
- None: Milk white

B-01 (5-GR)	Windshield wiper motor	B-08X (4)	No connection
B-02 (4-B)	Throttle position sensor	B-09X (4)	Ignition coil relay
B-03 (3-B)	Vehicle speed sensor	B-10X (4)	No connection
B-04 (2-GR)	Brake fluid level switch	B-11X (4)	Engine control relay
B-05X (1)	Engine speed detection connector	B-12X (4)	A/C compressor relay
B-06X (5)	No connection	B-14 (10-B)	Control wiring harness and battery wiring harness combination
B-07X (4)	No connection		



- | | | | |
|-------------|------------------------------|-------------|------------------------------|
| B-18 (1) | Starter | B-25 (2-B) | Injector 3 |
| B-19 (1-B) | Starter | B-26 (2-B) | Injector 2 |
| B-20 (1-B) | Oil pressure switch | B-27 (2-B) | Injector 1 |
| B-21 (1) | Alternator | B-31 (7-B) | Air flow sensor |
| B-22 (4-GR) | Alternator | B-34 (4-B) | Oxygen sensor |
| B-23 (2-B) | Purge control solenoid valve | B-36 (2-GR) | Waste gate solenoid valve |
| B-24 (2-B) | Injector 4 | B-37 (2-B) | Fuel pressure solenoid valve |

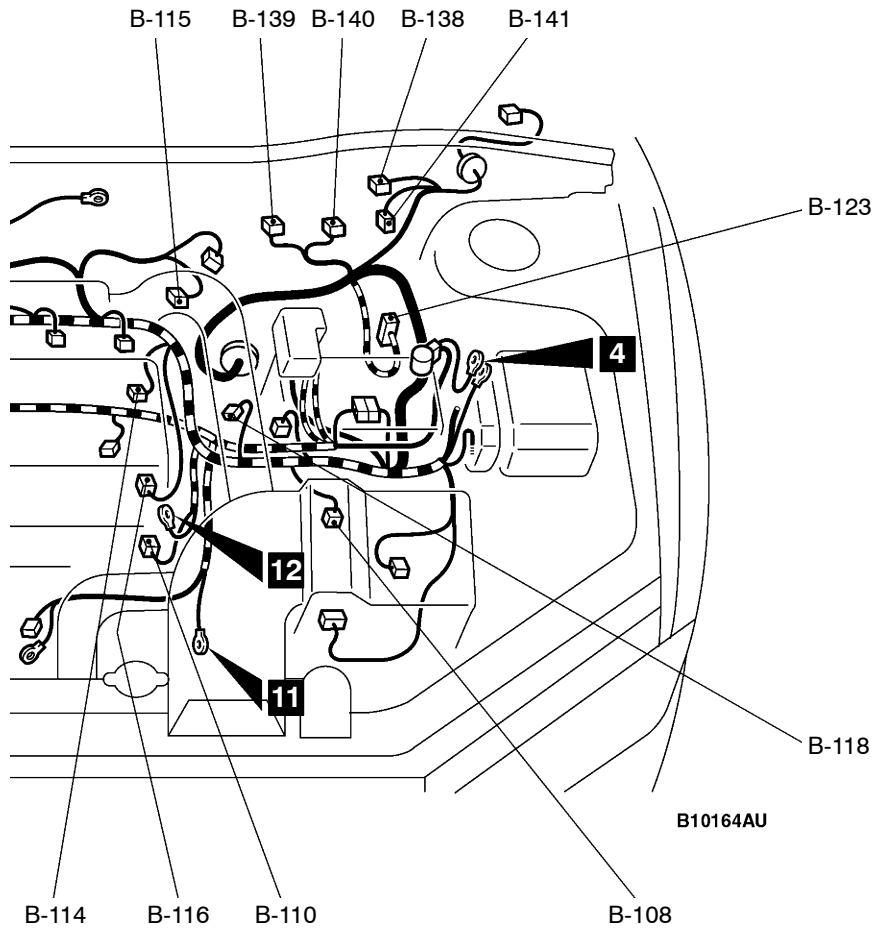
R.H. drive vehicles



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 - None: Milk white

- B-108 (2-B) Back-up lamp switch
- B-110 (1-B) Engine coolant temperature gauge unit
- B-112 (2-BR) EGR solenoid valve
- B-114 (3-GR) Ignition coil 1

- B-115 (6-B) Idle speed control servo
- B-116 (3-B) Camshaft position sensor
- B-118 (2-B) Engine coolant temperature sensor
- B-119 (3-GR) Ignition coil 2

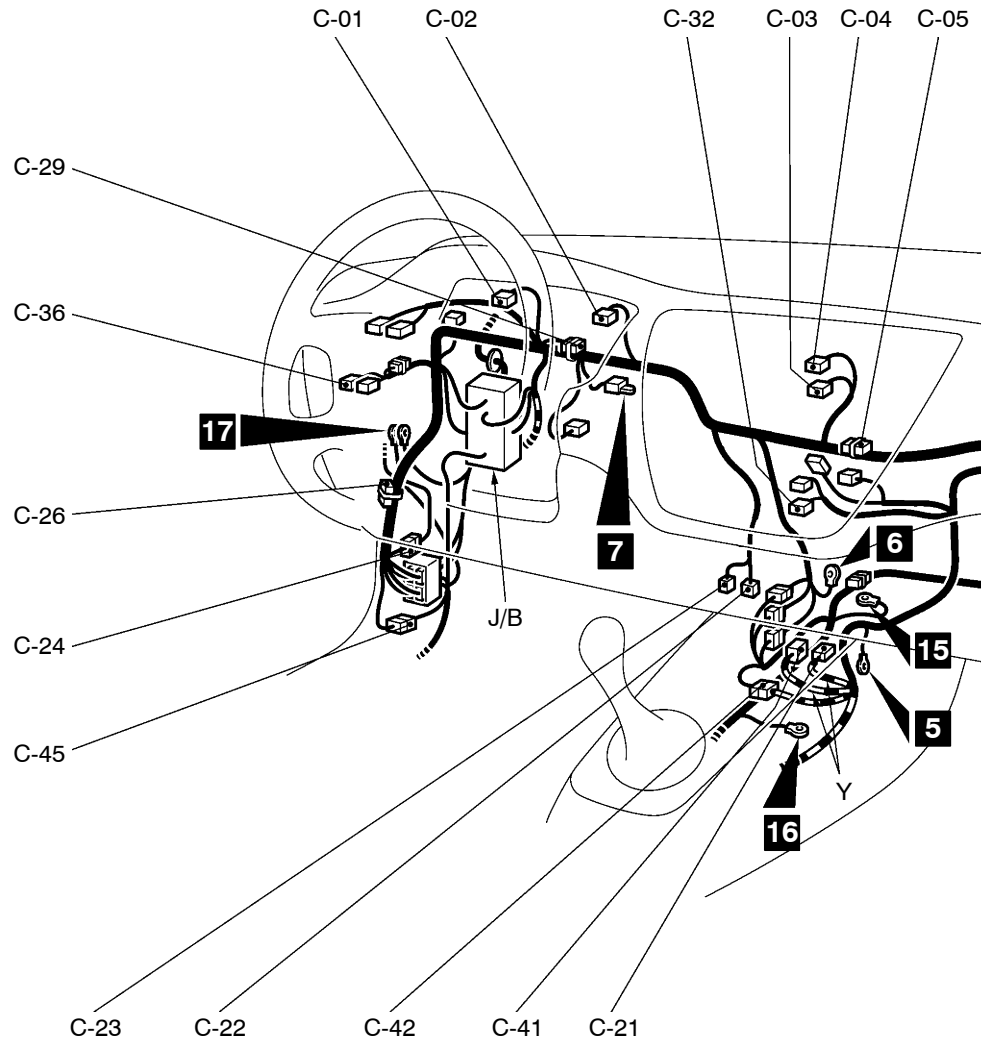
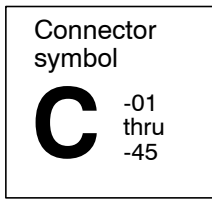


B-121 (3-B) Crank angle sensor
 B-122 (2-GR) Detonation sensor
 B-123 (34-B) ABS-ECU
 B-138 (6-B) Resistor

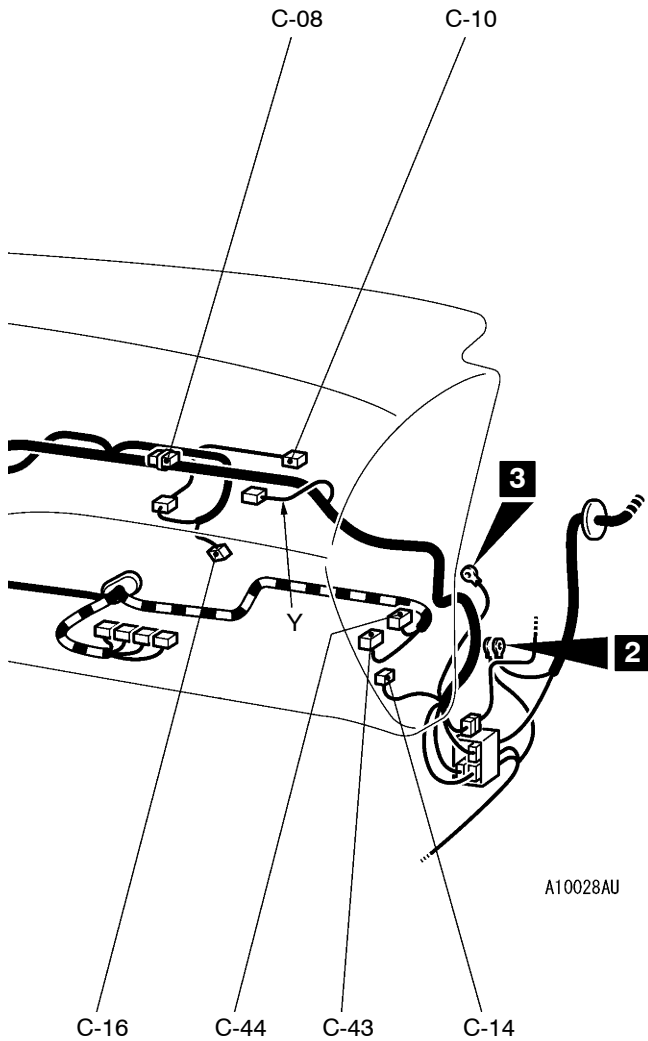
B-139 (5-B) Electric pump relay <ACD>
 B-140 (4) Fuel pump relay 3
 B-141 (2-B) Fuel pump resistor
 B-142 (2-B) Secondary air control solenoid valve

DASH PANEL

L.H. drive vehicles



- | | | | |
|--------------|---|-------------|--|
| C-01 (21) | Combination meter | C-14 (2) | Blower motor |
| C-02 (21-L) | Combination meter | C-16 (4) | Resistor |
| C-03 (4) | Hazard warning switch | C-21 (20-Y) | SRS-ECU |
| C-04 (4) | Clock | C-22 (16-B) | Diagnosis connector |
| C-05 (22-GR) | J/C (1) | C-23 (12) | Diagnosis connector |
| C-08 (22-GR) | J/C (3) | C-24 (20) | Instrument panel wiring harness and front door wiring harness (LH) combination |
| C-10 (7) | Outside/Inside air selection damper control motor and potentiometer | | |

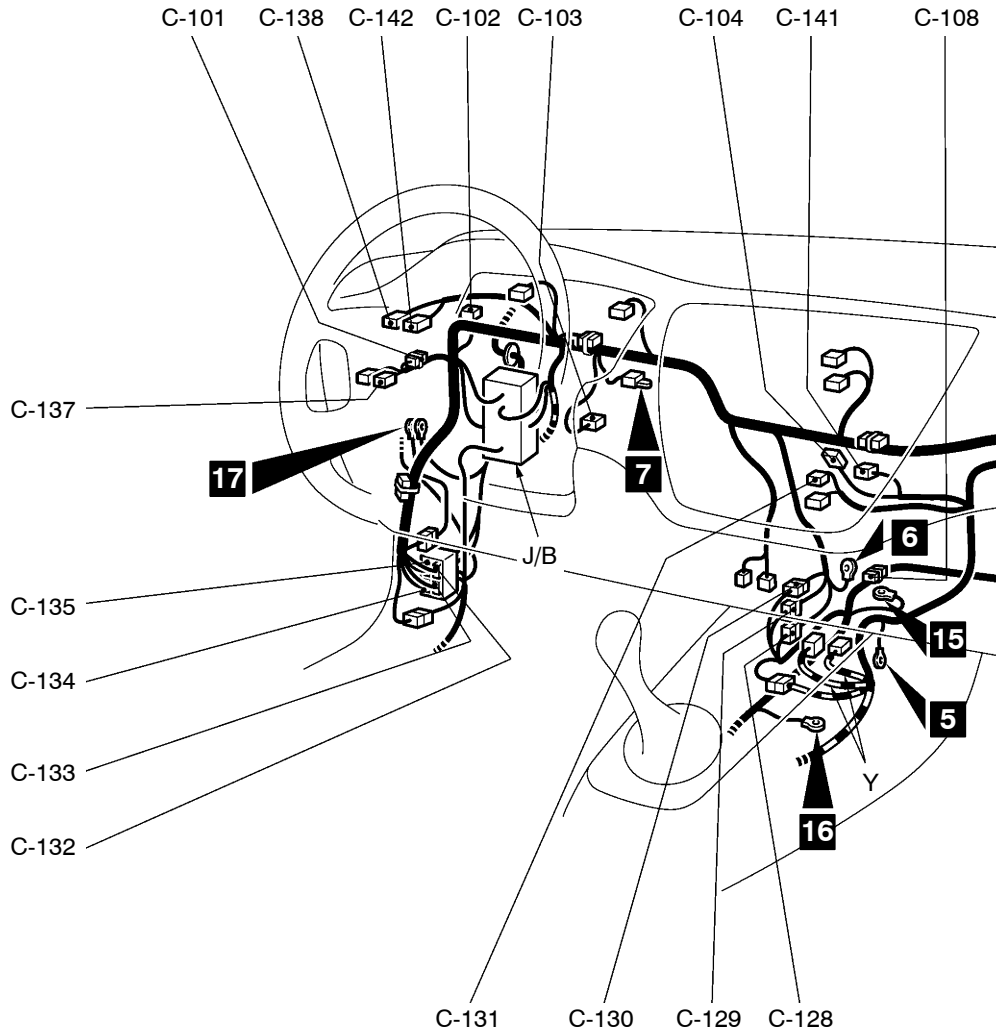
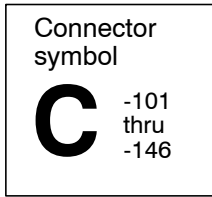


Connector colour code
 B:Black
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 L:Blue
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 R:Red
 BR:Brown
 V:Violet
 O:Orange
 GR:Gray
 None: Milk white

C-26 (22-B) J/C (4)
 C-29 (22-B) J/C (5)
 C-32 (16-B) A/C-ECU or heater control unit
 C-36 (6-GR) Headlamp leveling switch
 C-41 (22-Y) SRS-ECU
 C-42 (1) Instrument panel wiring harness and control wiring harness combination <ACD>

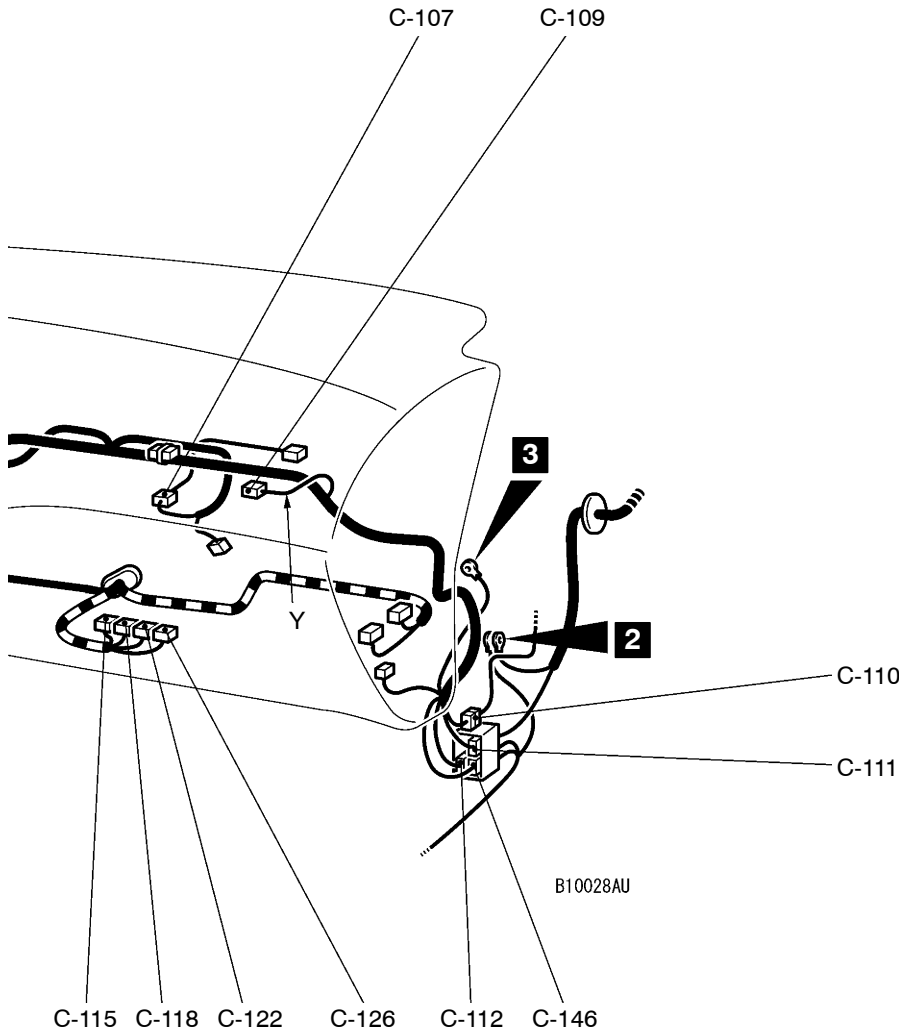
C-43 (22-Y) 4WD-ECU <ACD>
 C-44 (26-Y) 4WD-ECU <ACD>
 C-45 (1) Instrument panel wiring harness and floor wiring harness (LH) combination

L.H. drive vehicles



- C-101 (1) Spare connector (for front fog lamp switch)
- C-102 (22-L) J/C (2)
- C-103 (4) Stop lamp switch
- C-104 (14) Spare connector (for radio)
- C-107 (7) Instrument panel wiring harness and A/C wiring harness combination
- C-108 (33) J/C (6)
- C-109 (2-R) Air bag module (squib) <Passenger's side>

- C-110 (16) Instrument panel wiring harness and front door wiring harness (RH) combination
- C-111 (25) Front wiring harness (RH) and instrument panel wiring harness combination
- C-112 (13) Instrument panel wiring harness and floor wiring harness (RH) combination
- C-115 (22-Y) Engine-ECU
- C-118 (12-Y) Engine-ECU
- C-122 (16-Y) Engine-ECU
- C-126 (26-Y) Engine-ECU

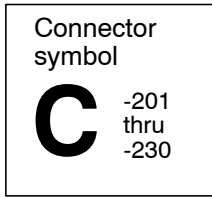


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 GR:Gray
 None: Milk white

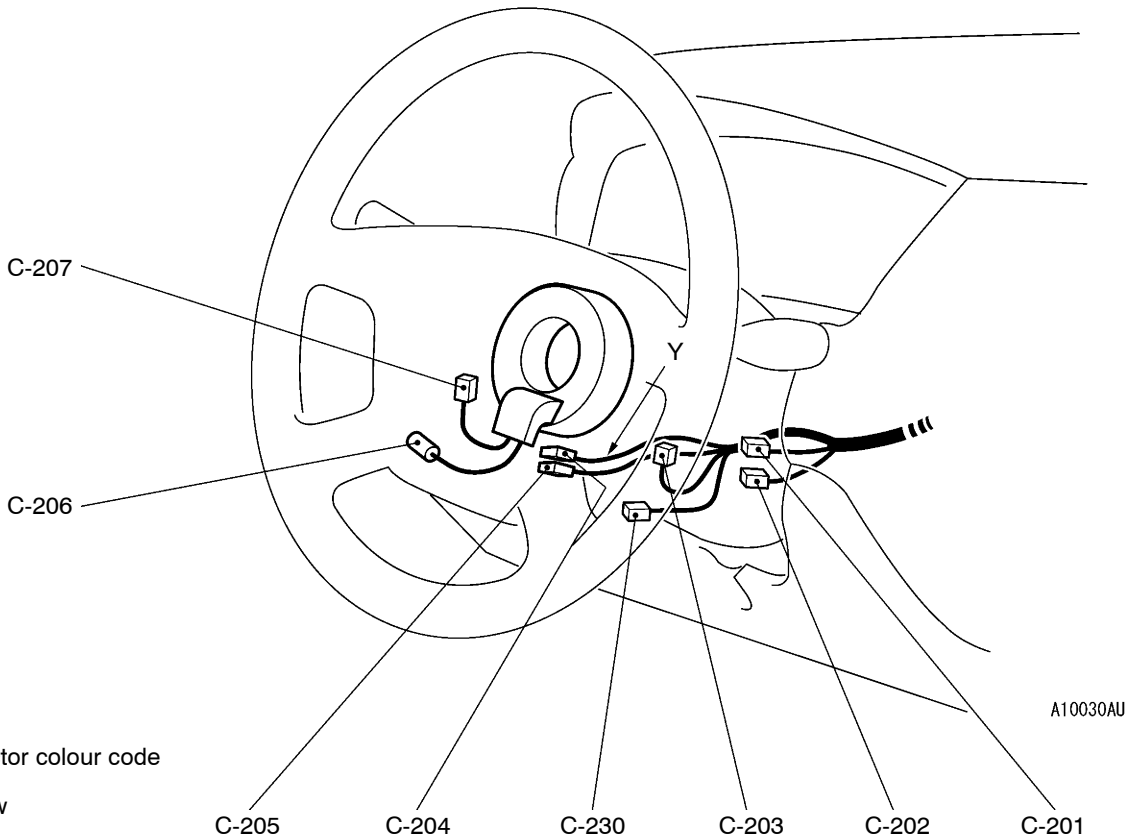
- C-128 (22-L) Instrument panel wiring harness and control wiring harness combination
- C-129 (10-GR) Instrument panel wiring harness and control wiring harness combination
- C-130 (25) Instrument panel wiring harness and control wiring harness combination
- C-131 (6) Blower switch
- C-132 (3) Front wiring harness (LH) and instrument panel wiring harness combination
- C-133 (13) Instrument panel wiring harness and floor wiring harness (LH) combination

- C-134 (11-GR) Instrument panel wiring harness and floor wiring harness (LH) combination
- C-135 (25) Front wiring harness (LH) and instrument panel wiring harness combination
- C-137 (6) Fog lamp switch
- C-138 (11-GR) Remote controlled mirror switch
- C-141 (1) Roof antenna
- C-142 (6) ACD mode changeover switch
- C-146 (9-GR) Instrument panel wiring harness and floor wiring harness (RH) combination

L.H. drive vehicles



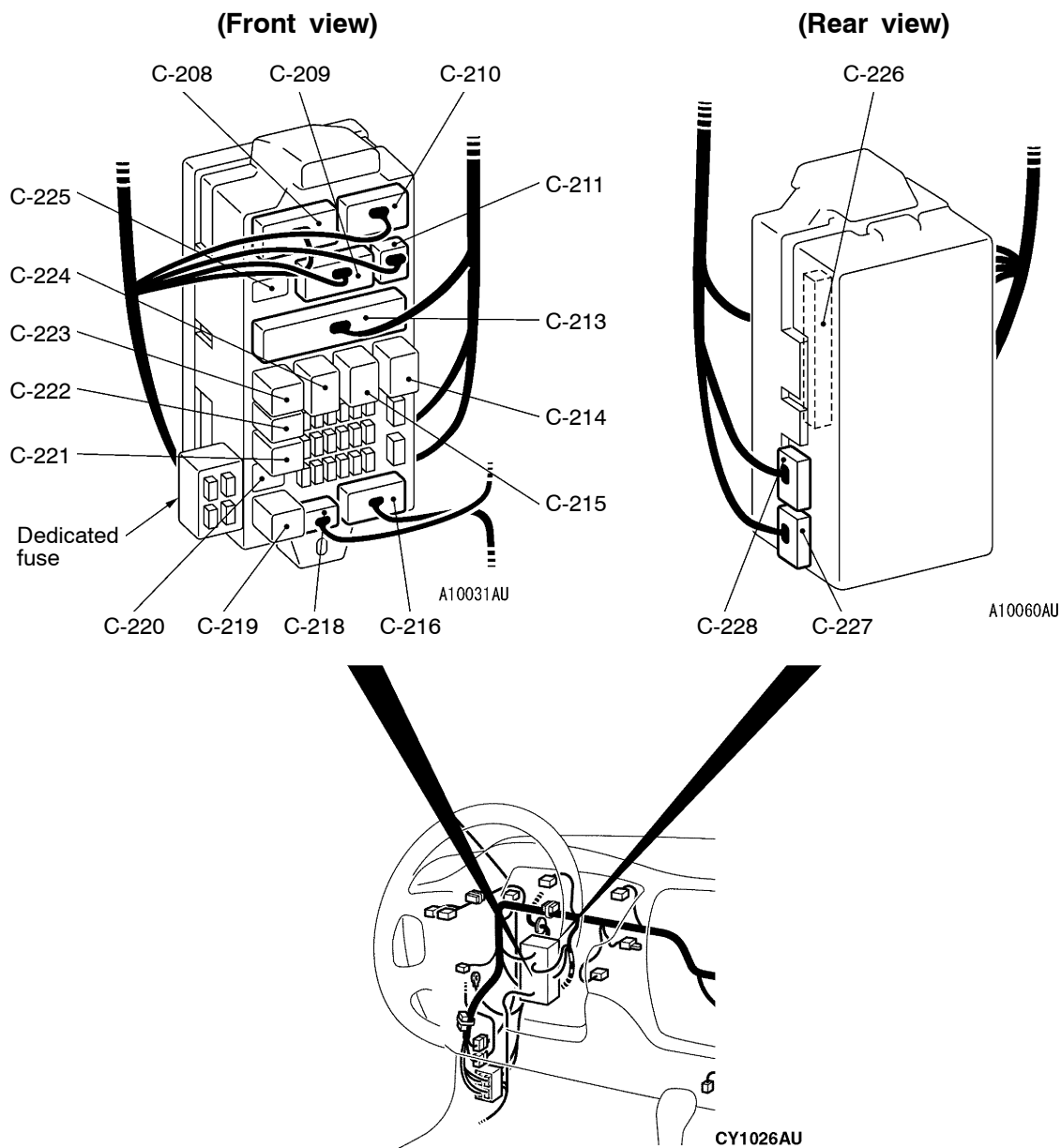
STEERING COLUMN



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 - G:Green
 - R:Red
 - BR:Brown
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 - O:Orange
 - GR:Gray
 - None: Milk white

C-201 (6)	Ignition switch	C-209 (14)	Instrument panel wiring harness and J/B combination
C-202 (7)	Key reminder switch	C-210 (6)	Instrument panel wiring harness and J/B combination
C-203 (10)	Column switch	C-211 (1-B)	Instrument panel wiring harness and J/B combination
C-204 (2-Y)	Clock spring <SRS>	C-213 (28)	Instrument panel wiring harness and J/B combination
C-205 (4)	Clock spring <SRS>		
C-206 (1)	Horn switch <SRS>		
C-207 (2)	Air bag module (squib) <Driver's side>		
C-208 (13)	Instrument panel wiring harness and J/B combination		

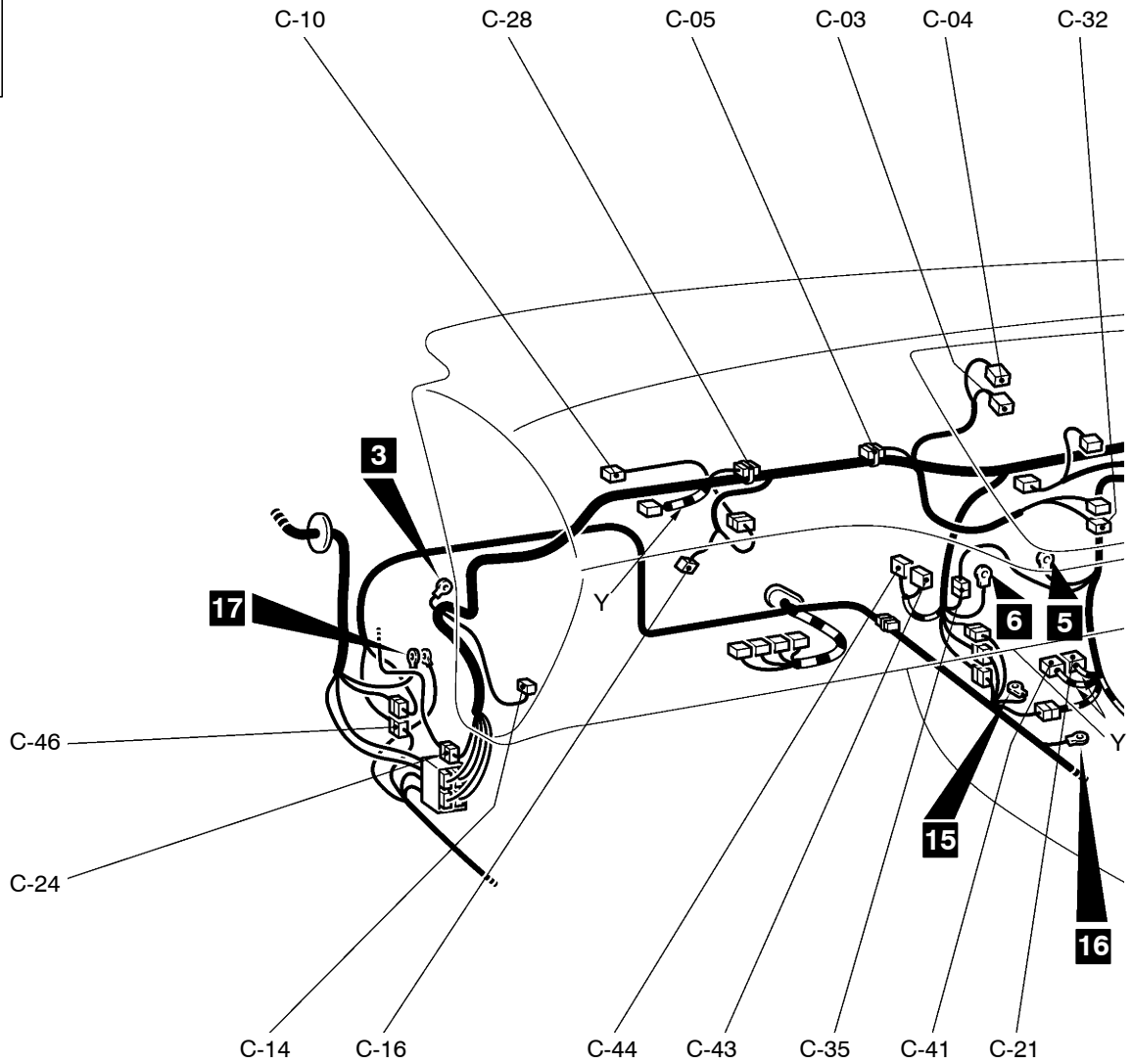
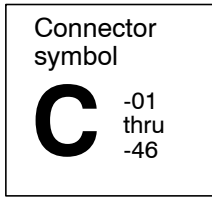
JUNCTION BLOCK



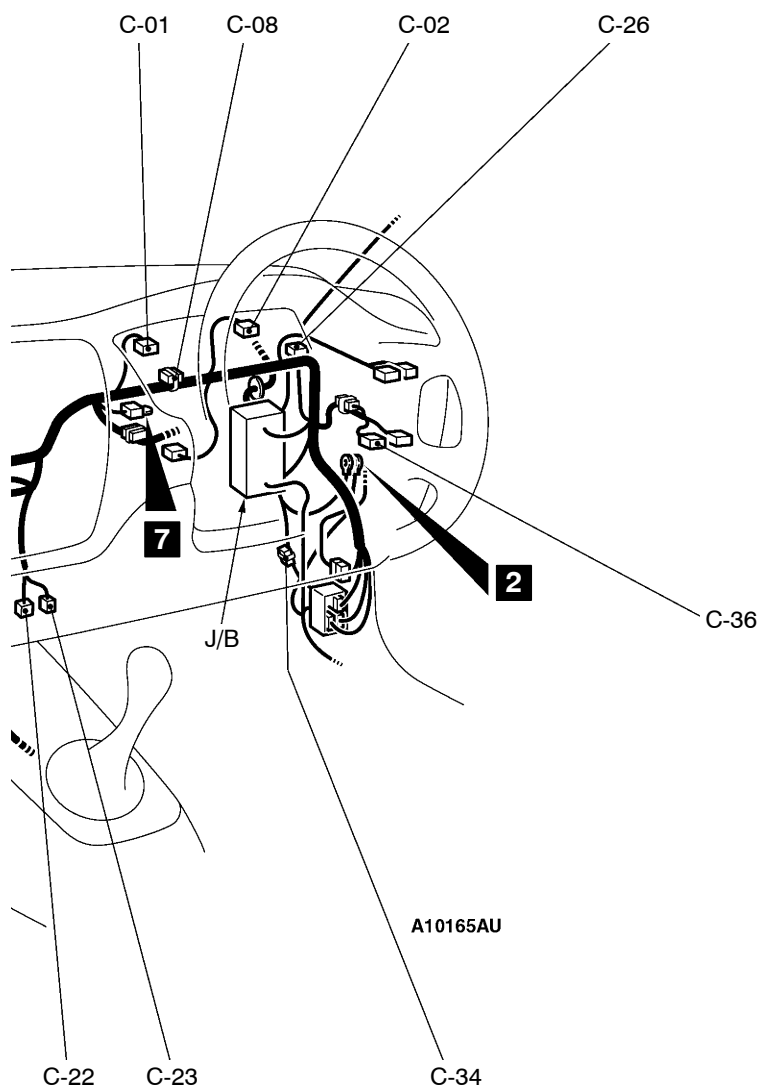
- | | | | |
|------------|---|---------------|-------------------------------|
| C-214 (5) | Defogger relay | C-222 (4) | Intercooler water spray relay |
| C-215 (5) | Blower relay | C-223 (4) | Fuel pump relay 1 |
| C-216 (15) | Floor wiring harness (LH) and J/B combination | C-224 (5) | Power window relay |
| C-218 (3) | Roof wiring harness (RH) and J/B combination | C-225 (2) | No connection |
| C-219 (4) | Rear fog lamp relay | C-226 (20) | ETACS-ECU |
| C-220 (4) | No connection | C-227 (24) | ETACS-ECU |
| C-221 (4) | Fuel pump relay 2 | C-228 (24-GR) | ETACS-ECU |
| | | C-230 (5) | Steering wheel sensor |

DASH PANEL

R.H. drive vehicles



- | | | | |
|--------------|---|-------------|--|
| C-01 (21) | Combination meter | C-14 (2) | Blower motor |
| C-02 (21-L) | Combination meter | C-16 (4) | Resistor |
| C-03 (4) | Hazard warning switch | C-21 (20-Y) | SRS-ECU |
| C-04 (4) | Clock | C-22 (16-B) | Diagnosis connector |
| C-05 (22-GR) | J/C (1) | C-23 (12) | Diagnosis connector |
| C-08 (22-GR) | J/C (3) | C-24 (16) | Instrument panel wiring harness and front door wiring harness (LH) combination |
| C-10 (7) | Outside/Inside air selection damper control motor and potentiometer | | |

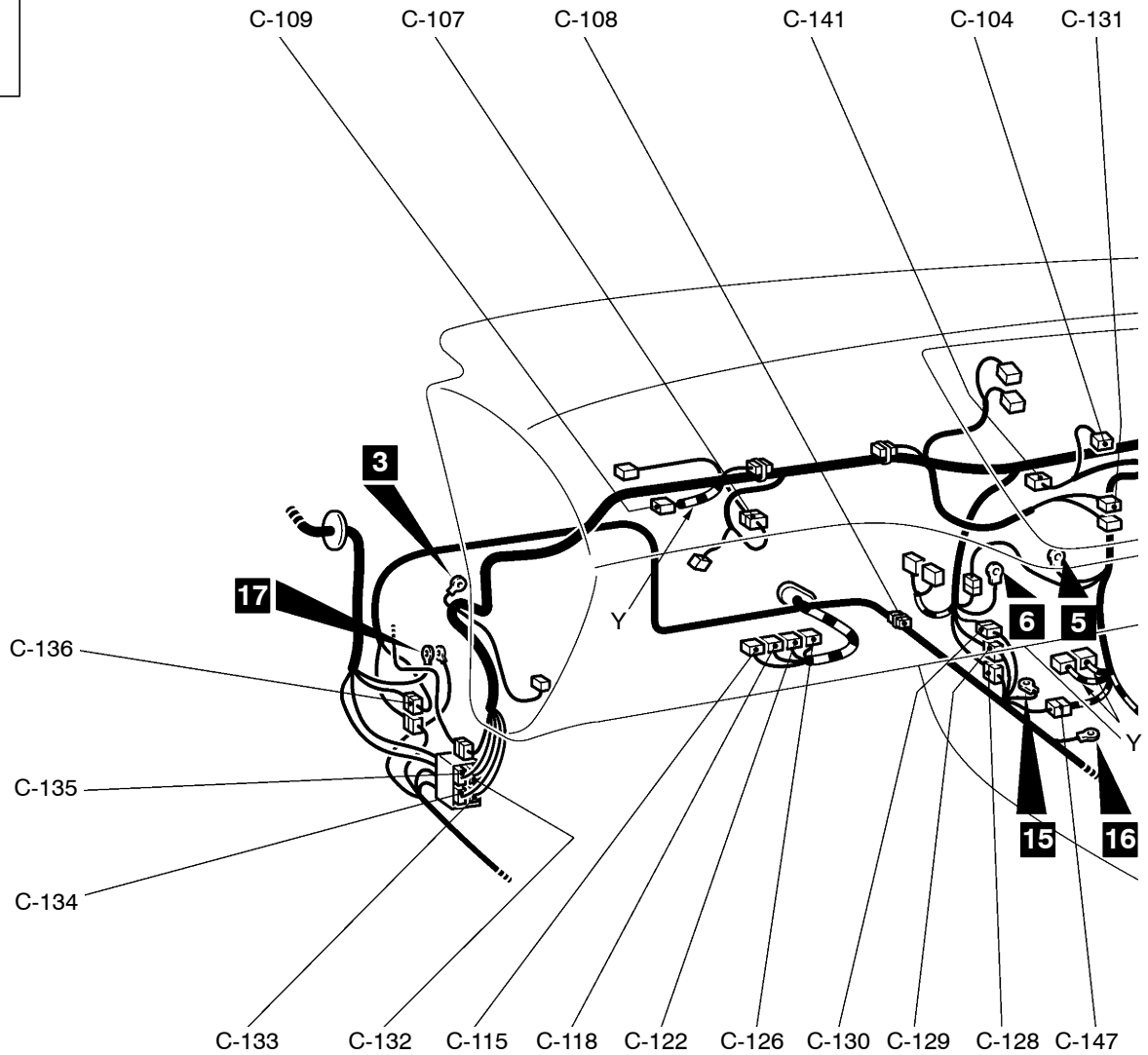
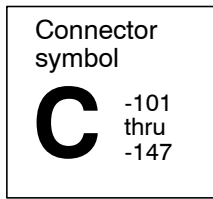


Connector colour code
 B:Black
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 R:Red
 BR:Brown
 V:Violet
 O:Orange
 GR:Gray
 None: Milk white

- C-26 (22-B) J/C (4)
- C-28 (13) J/C (5)
- C-32 (12-B) A/C-ECU or heater control unit
- C-34 (2) No connection
- C-35 (3) Instrument panel wiring harness and instrument panel wiring harness combination
- C-36 (6-GR) Headlamp leveling switch

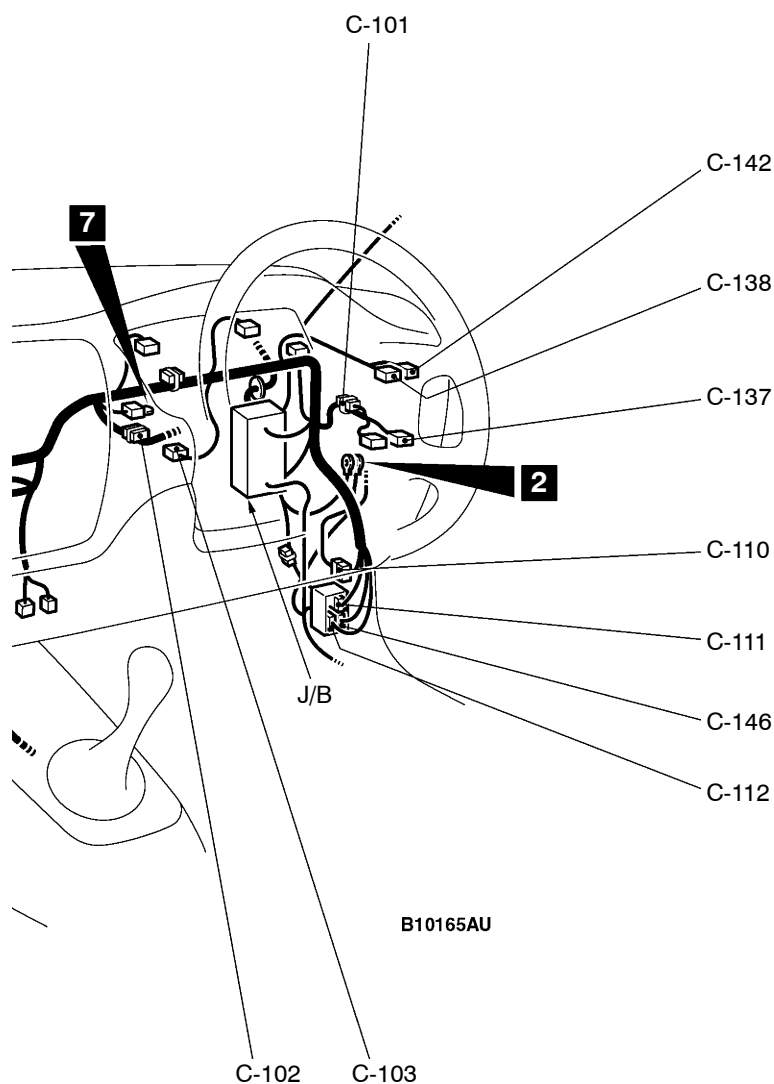
- C-41 (22-Y) SRS-ECU
- C-43 (22) 4WD-ECU <ACD>
- C-44 (26) 4WD-ECU <ACD>
- C-46 (1-GR) Control wiring harness and floor wiring harness (LH) combination <ACD>

R.H. drive vehicles



- C-101 (1) Spare connector (for front fog lamp switch)
- C-102 (22-L) J/C (2)
- C-103 (4) Stop lamp switch
- C-104 (14) Spare connector (for radio)
- C-107 (7) Instrument panel wiring harness and A/C wiring harness combination
- C-108 (33) J/C (6)
- C-109 (2-R) Air bag module (squib) <Passenger's side>
- C-110 (20) Instrument panel wiring harness and front door wiring harness (RH) combination

- C-111 (25) Front wiring harness (RH) and instrument panel wiring harness combination
- C-112 (13) Instrument panel wiring harness and floor wiring harness (RH) combination
- C-115 (22-Y) Engine-ECU
- C-118 (12-Y) Engine-ECU
- C-122 (16-Y) Engine-ECU
- C-126 (26-Y) Engine-ECU
- C-128 (22-L) Instrument panel wiring harness and control wiring harness combination
- C-129 (10-GR) Instrument panel wiring harness and control wiring harness combination

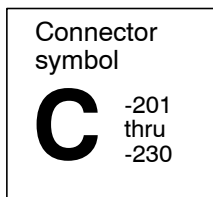


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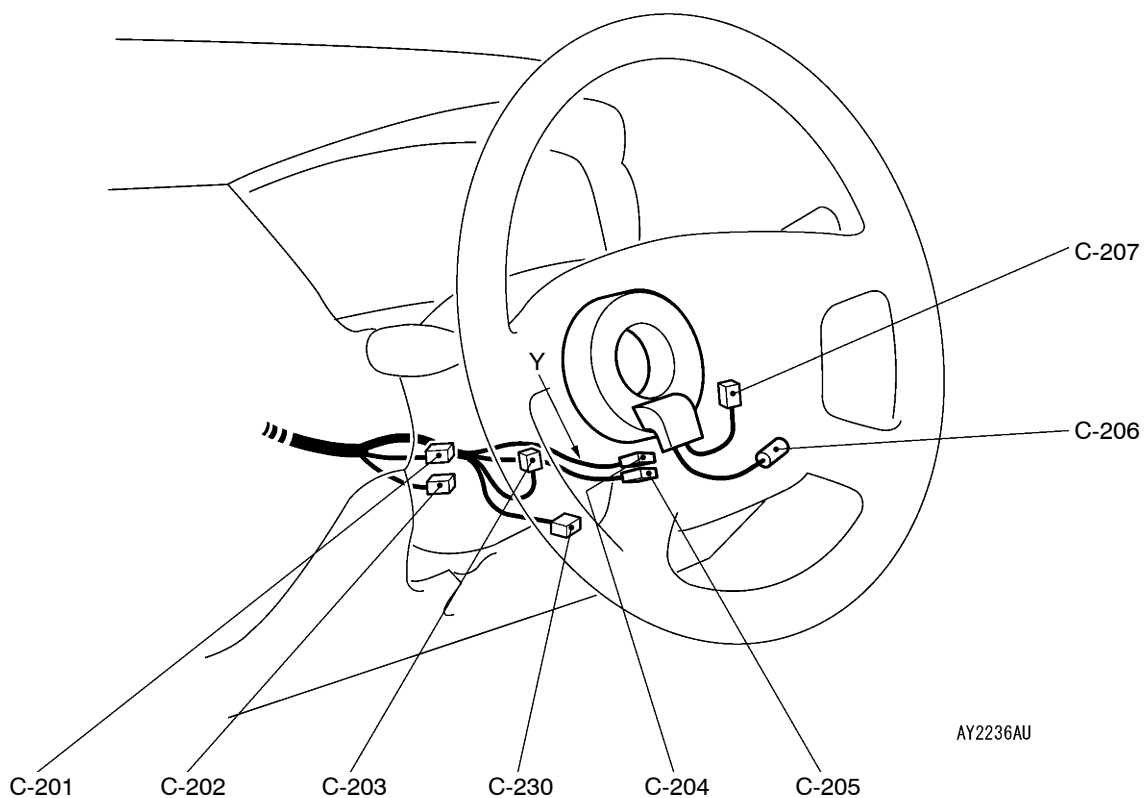
- C-130 (25) Instrument panel wiring harness and control wiring harness combination
- C-131 (6) Blower switch
- C-132 (3) Front wiring harness (LH) and instrument panel wiring harness combination
- C-133 (13) Instrument panel wiring harness and floor wiring harness (LH) combination
- C-134 (11-GR) Instrument panel wiring harness and floor wiring harness (LH) combination
- C-135 (25) Front wiring harness (LH) and instrument panel wiring harness combination

- C-136 (16) Front wiring harness (LH) and control wiring harness combination
- C-137 (6) Fog lamp switch
- C-138 (11-GR) Remote controlled mirror switch
- C-141 (1) Roof antenna
- C-142 (6) ACD mode changeover switch
- C-146 (9-GR) Instrument panel wiring harness and floor wiring harness (RH) combination
- C-147 (11) Instrument panel wiring harness and control wiring harness combination

R.H. drive vehicles



STEERING COLUMN

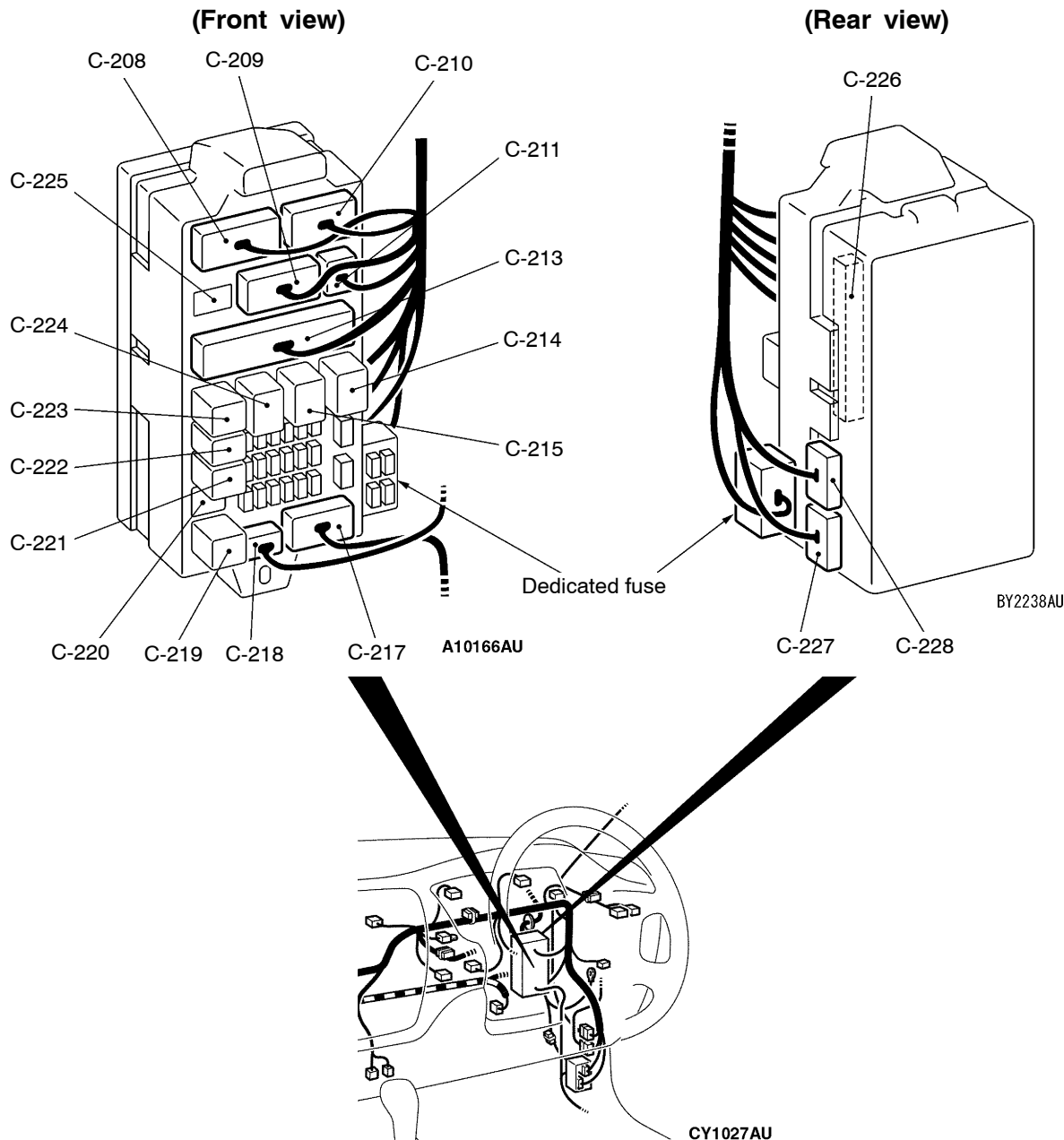


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C-201 (6)	Ignition switch	C-209 (14)	Instrument panel wiring harness and J/B combination
C-202 (7)	Key reminder switch	C-210 (6)	Instrument panel wiring harness and J/B combination
C-203 (10)	Column switch	C-211 (1-B)	Instrument panel wiring harness and J/B combination
C-204 (2-Y)	Clock spring <SRS>	C-213 (28)	Instrument panel wiring harness and J/B combination
C-205 (4)	Clock spring <SRS>		
C-206 (1)	Horn switch <SRS>		
C-207 (2)	Air bag module (squib) <Driver's side>		
C-208 (13)	Instrument panel wiring harness and J/B combination		

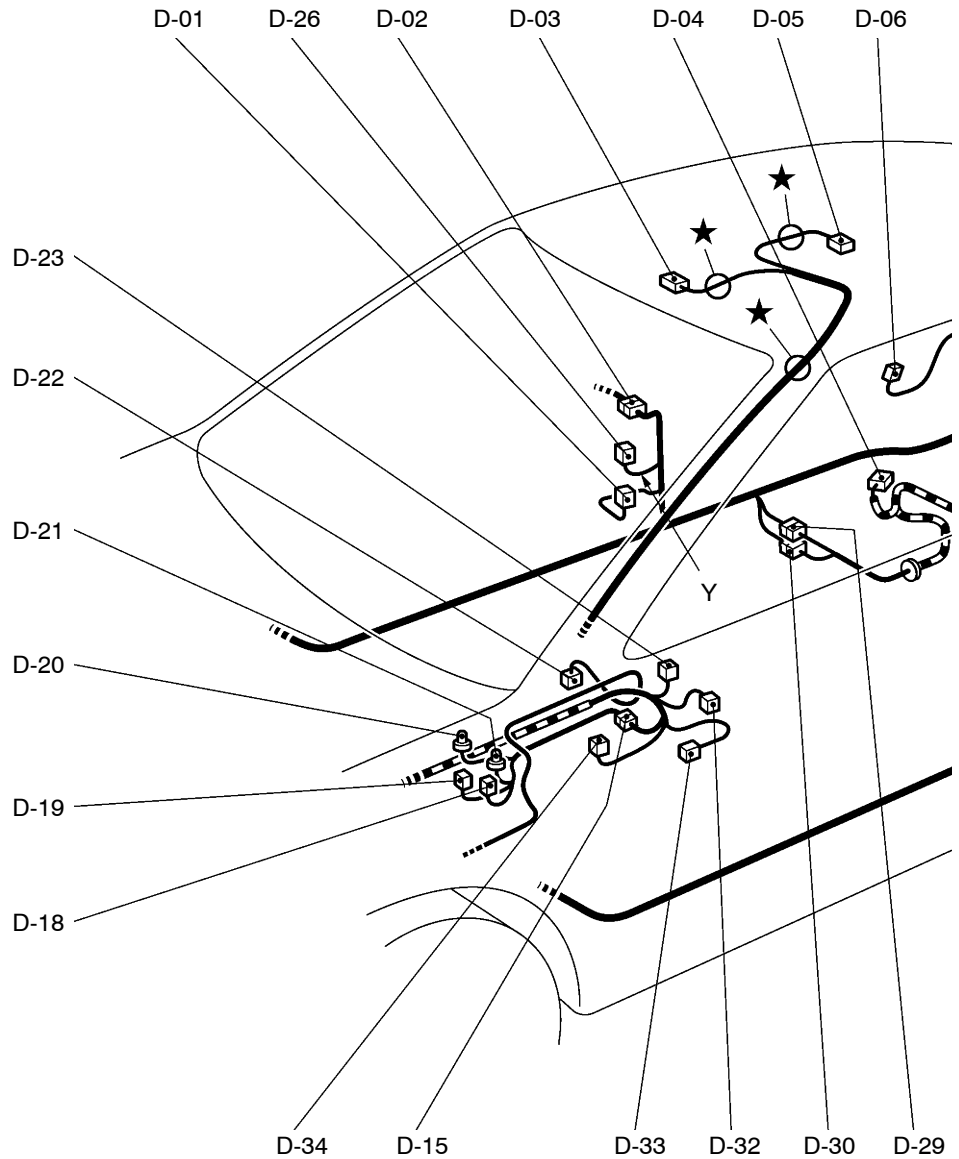
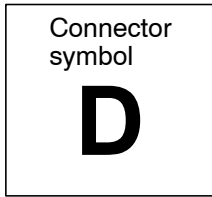
JUNCTION BLOCK



- | | | | |
|------------|---|---------------|-------------------------------|
| C-214 (5) | Defogger relay | C-222 (4) | Intercooler water spray relay |
| C-215 (5) | Blower relay | C-223 (4) | Fuel pump relay 1 |
| C-217 (15) | Floor wiring harness (RH) and J/B combination | C-224 (5) | Power window relay |
| C-218 (3) | Roof wiring harness (RH) and J/B combination | C-225 (2) | No connection |
| C-219 (4) | Rear fog lamp relay | C-226 (20) | ETACS-ECU |
| C-220 (4) | No connection | C-227 (24) | ETACS-ECU |
| C-221 (4) | Fuel pump relay 2 | C-228 (24-GR) | ETACS-ECU |
| | | C-230 (5) | Steering wheel sensor |

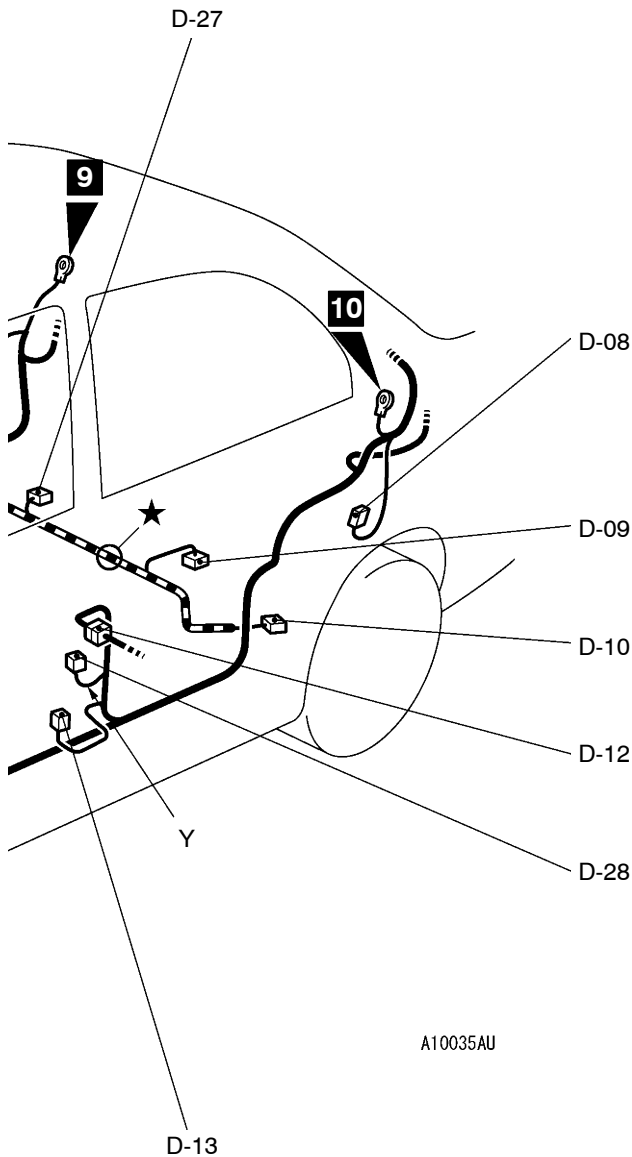
FLOOR AND ROOF

L.H. drive vehicles



- D-01 (3) Door switch (Front: RH)
- D-02 (8) Floor wiring harness (RH) and rear door wiring harness (RH) combination
- D-03 (2) Room lamp
- D-04 (2-B) Wheel speed sensor (Rear: RH) <ABS, ACD>
- D-05 (2-GR) Rear room lamp
- D-06 (3) Door switch (Rear: RH)

- D-08 (3) Door switch (Rear: LH)
- D-09 (5-GR) Fuel pump and fuel gauge unit (Main)
- D-10 (2-B) Wheel speed sensor (Rear: LH) <ABS, ACD>
- D-12 (8) Floor wiring harness (LH) and rear door wiring harness (LH) combination
- D-13 (3) Door switch (Front: LH)
- D-15 (4) Instrument panel wiring harness and console wiring harness combination



Connector colour code

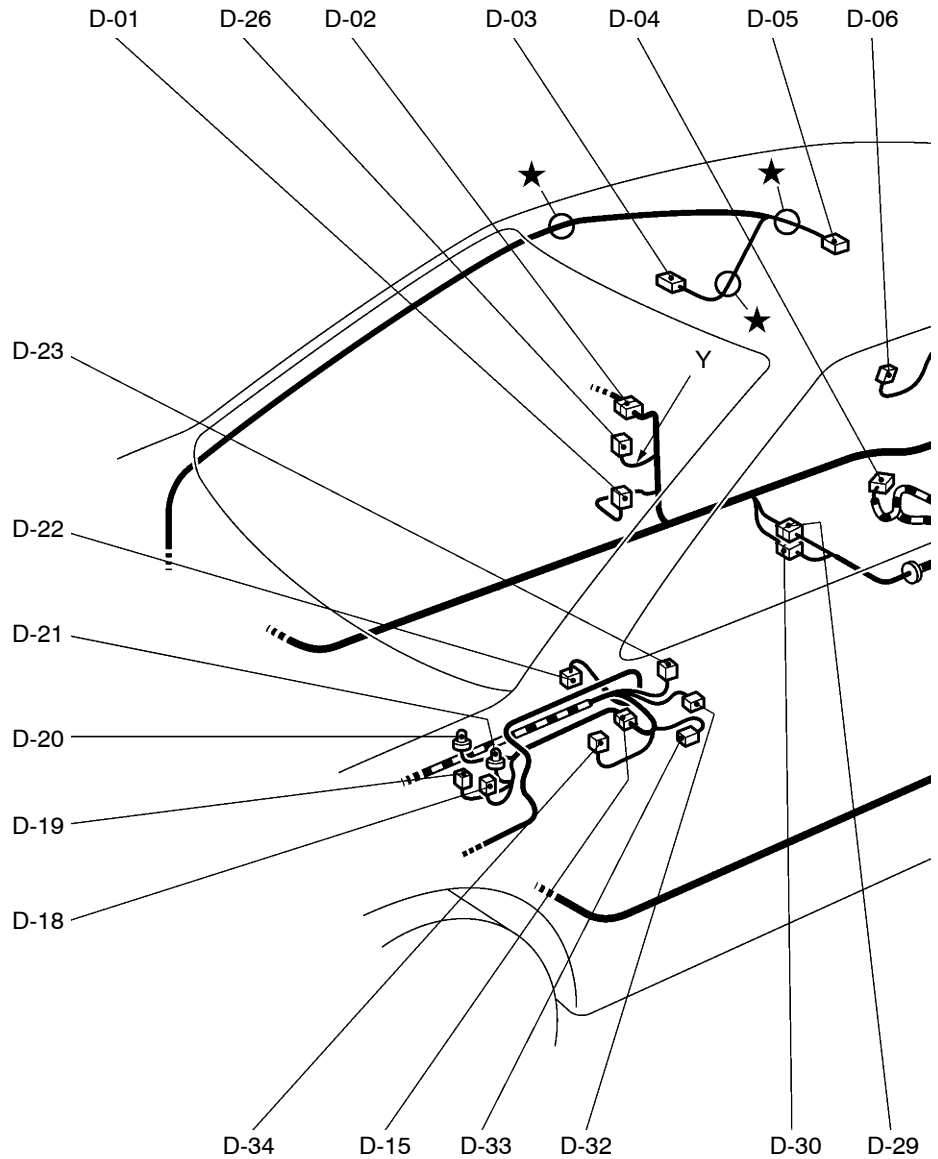
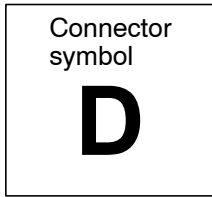
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- Y:Yellow
- L:Blue
- G:Green
- R:Red
- BR:Brown
- V:Violet
- O:Orange
- GR:Gray
- None: Milk white

- D-18 (1) Cigarette lighter
- D-19 (1-B) Cigarette lighter
- D-20 (2-B) Ashtray illumination lamp
- D-21 (2-B) Cigarette lighter illumination lamp
- D-22 (4) Oxygen sensor (Rear)
- D-23 (1-B) Parking brake switch
- D-26 (2-R) Seat belt pretensioner (RH)
- D-27 (2) Fuel gauge unit (Sub)
- D-28 (2-R) Seat belt pretensioner (LH)

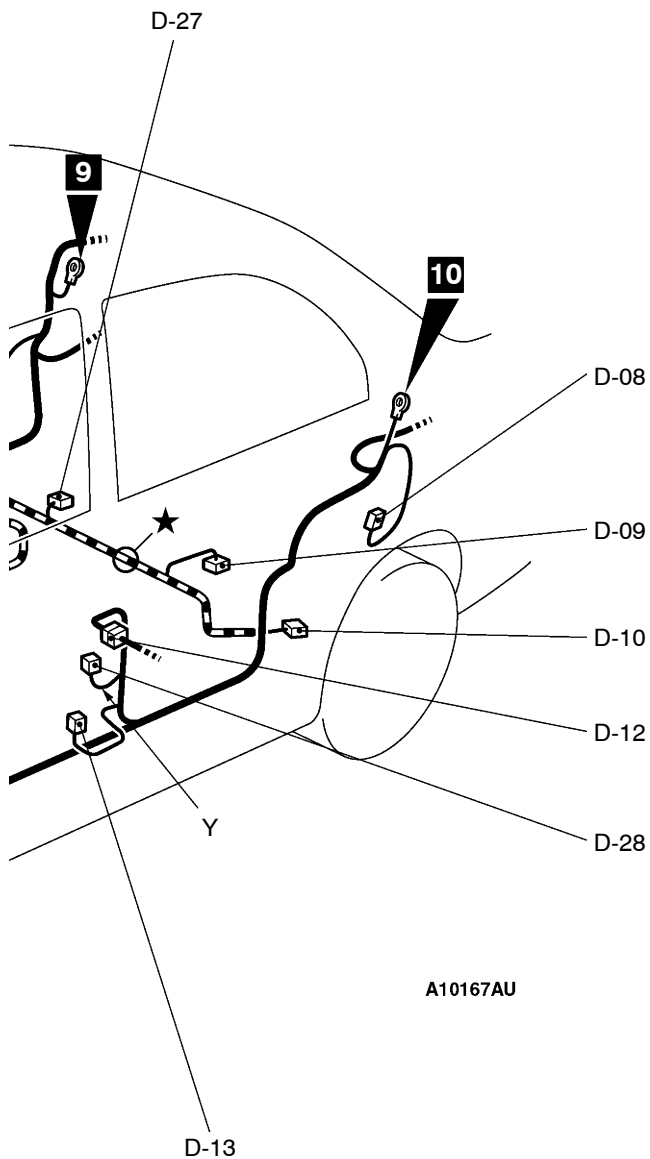
- D-29 (1) Floor wiring harness (RH) and fuel wiring harness combination
- D-30 (8) Floor wiring harness (RH) and fuel wiring harness combination
- D-32 (3-B) G sensor (Longitudinal)
- D-33 (3-B) G sensor (Lateral)
- D-34 (6) Intercooler water spray switch

FLOOR AND ROOF

R.H. drive vehicles



- | | | | |
|-------------|---|-------------|---|
| D-01 (3) | Door switch (Front: RH) | D-09 (5-GR) | Fuel pump and fuel gauge unit (Main) |
| D-02 (8) | Floor wiring harness (RH) and rear door wiring harness (RH) combination | D-10 (2-B) | Wheel speed sensor (Rear: LH)
<ABS, ACD> |
| D-03 (2) | Room lamp | D-12 (8) | Floor wiring harness (LH) and rear door wiring harness (LH) combination |
| D-04 (2-B) | Wheel speed sensor (Rear: RH)
<ABS, ACD> | D-13 (3) | Door switch (Front: LH) |
| D-05 (2-GR) | Rear room lamp | D-15 (4) | Instrument panel wiring harness and console wiring harness combination |
| D-06 (3) | Door switch (Rear: RH) | | |
| D-08 (3) | Door switch (Rear: LH) | | |



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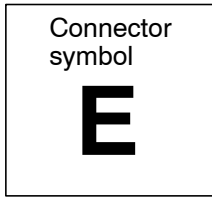
Connector colour code
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 BR:Brown
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 O:Orange
 GR:Gray
 None: Milk white

- D-18 (1) Cigarette lighter
- D-19 (1-B) Cigarette lighter
- D-20 (2-B) Ashtray illumination lamp
- D-21 (2-B) Cigarette lighter illumination lamp
- D-22 (4) Oxygen sensor (Rear)
- D-23 (1-B) Parking brake switch
- D-26 (2-R) Seat belt pretensioner (RH)
- D-27 (2) Fuel gauge unit (Sub)
- D-28 (2-R) Seat belt pretensioner (LH)

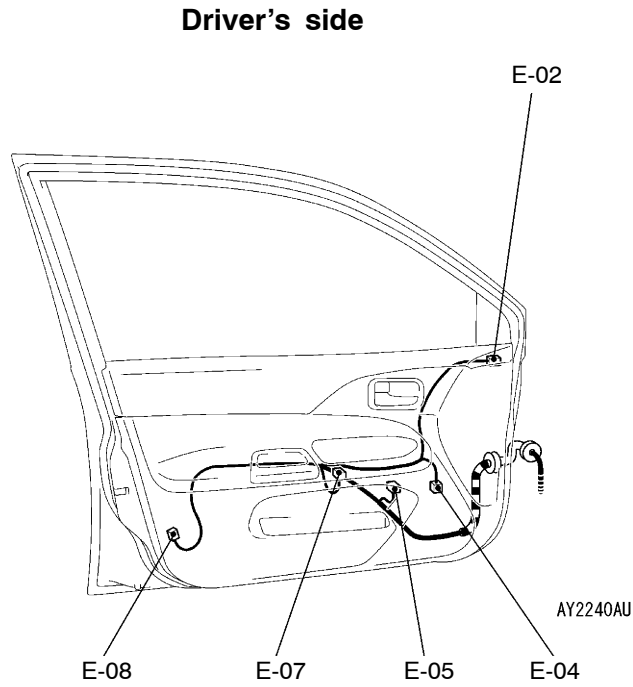
- D-29 (1) Floor wiring harness (RH) and fuel wiring harness combination
- D-30 (8) Floor wiring harness (RH) and fuel wiring harness combination
- D-32 (3-B) G sensor (Longitudinal)
- D-33 (3-B) G sensor (Lateral)
- D-34 (6) Intercooler water spray switch

DOOR

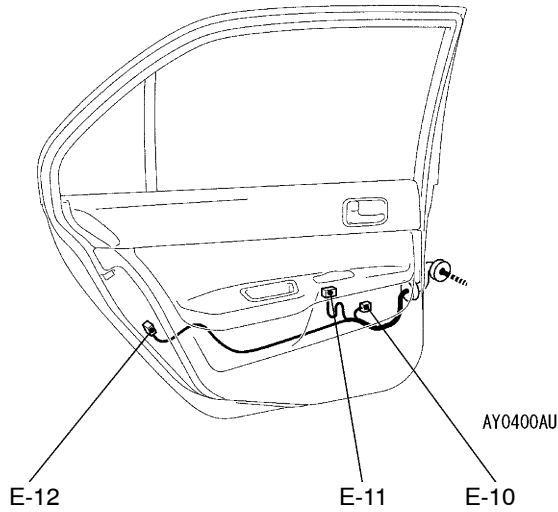
L.H. drive vehicles



Front door



Rear door

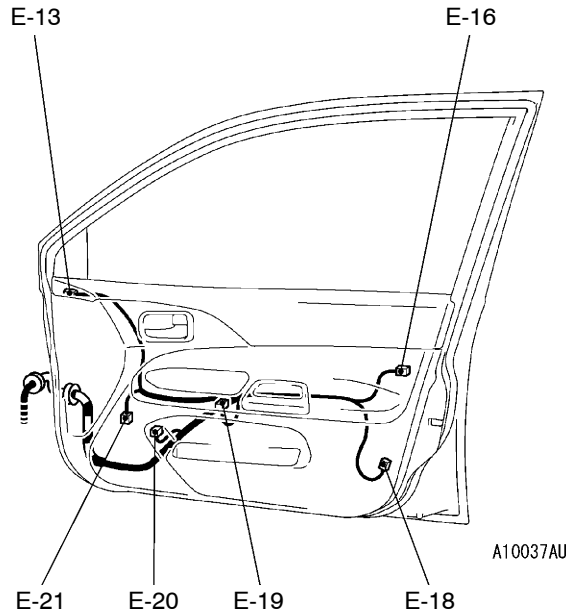


- E-02 (3) Remote controlled mirror (LH)
- E-04 (2) Spare connector <for front door speaker (LH)>
- E-05 (6-GR) Power window motor (Front: LH)
- E-07 (10) Power window main switch

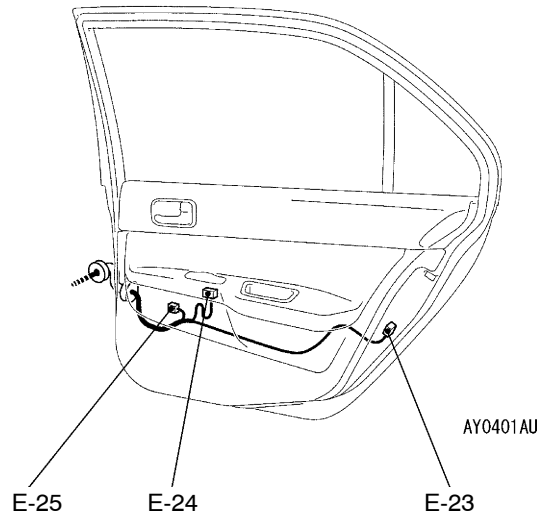
- E-08 (6-B) Door lock actuator (Front: LH)
- E-10 (6-GR) Power window motor (Rear: LH)
- E-11 (8) Power window sub switch (Rear: LH)
- E-12 (6-B) Door lock actuator (Rear: LH)
- E-13 (3) Remote controlled mirror (RH)

Passenger's side

Front door



Rear door

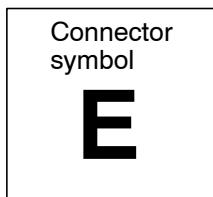


Connector colour code
 B:Black
 Y:Yellow
 L:Blue
 G:Green
 R:Red
 BR:Brown
 V:Violet
 O:Orange
 GR:Gray
 None: Milk white

E-16 (3-B)	Door lock key cylinder switch (RH)	E-21 (2)	Spare connector <for front door speaker (RH)>
E-18 (6-B)	Door lock actuator (Front: RH)	E-23 (6-B)	Door lock actuator (Rear: RH)
E-19 (8)	Power window sub switch (Passenger's side)	E-24 (8)	Power window sub switch (Rear: RH)
E-20 (6-GR)	Power window motor (Front: RH)	E-25 (6-GR)	Power window motor (Rear: RH)

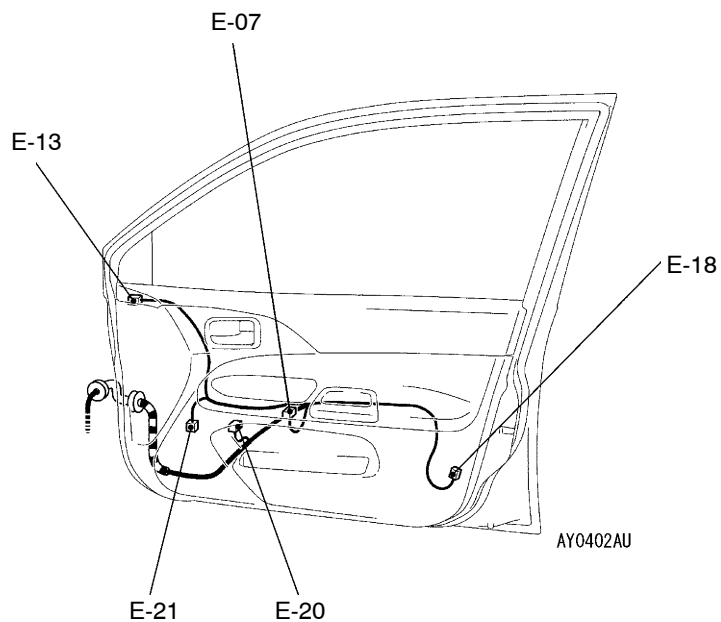
DOOR

R.H. drive vehicles

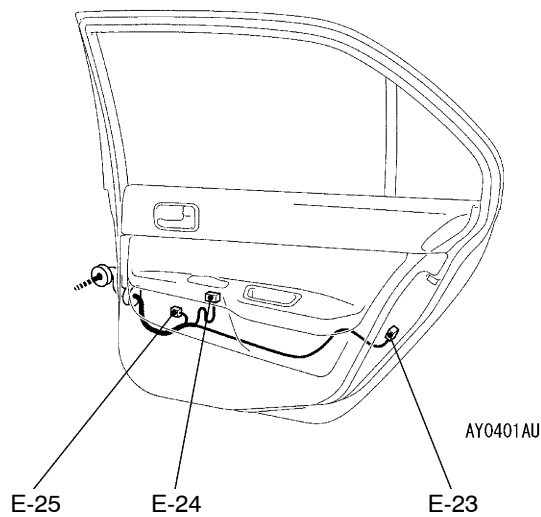


Driver's side

Front door



Rear door

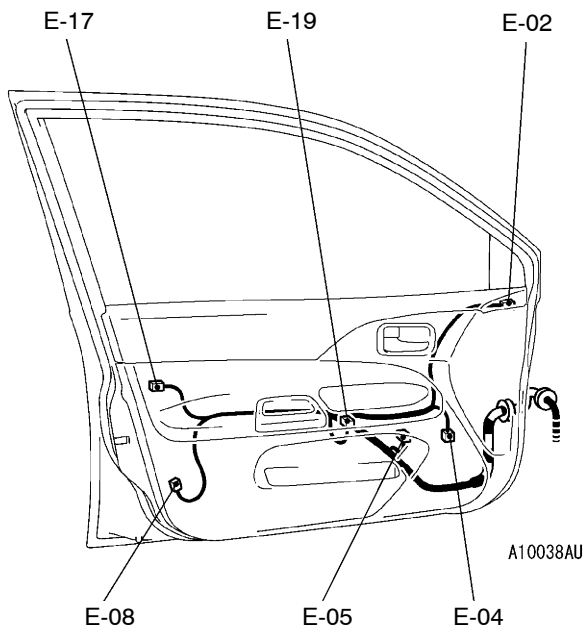


- E-02 (3) Remote controlled mirror (LH)
- E-04 (2) Spare connector <for front door speaker (LH)>
- E-05 (6-GR) Power window motor (Front: LH)
- E-07 (10) Power window main switch

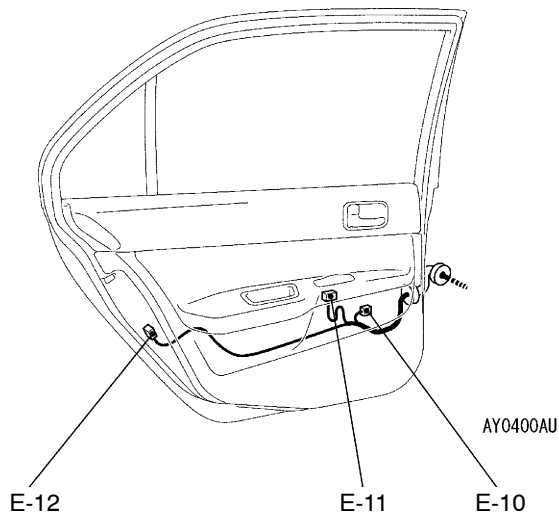
- E-08 (6-B) Door lock actuator (Front: LH)
- E-10 (6-GR) Power window motor (Rear: LH)
- E-11 (8) Power window sub switch (Rear: LH)
- E-12 (6-B) Door lock actuator (Rear: LH)

Passenger's side

Front door



Rear door

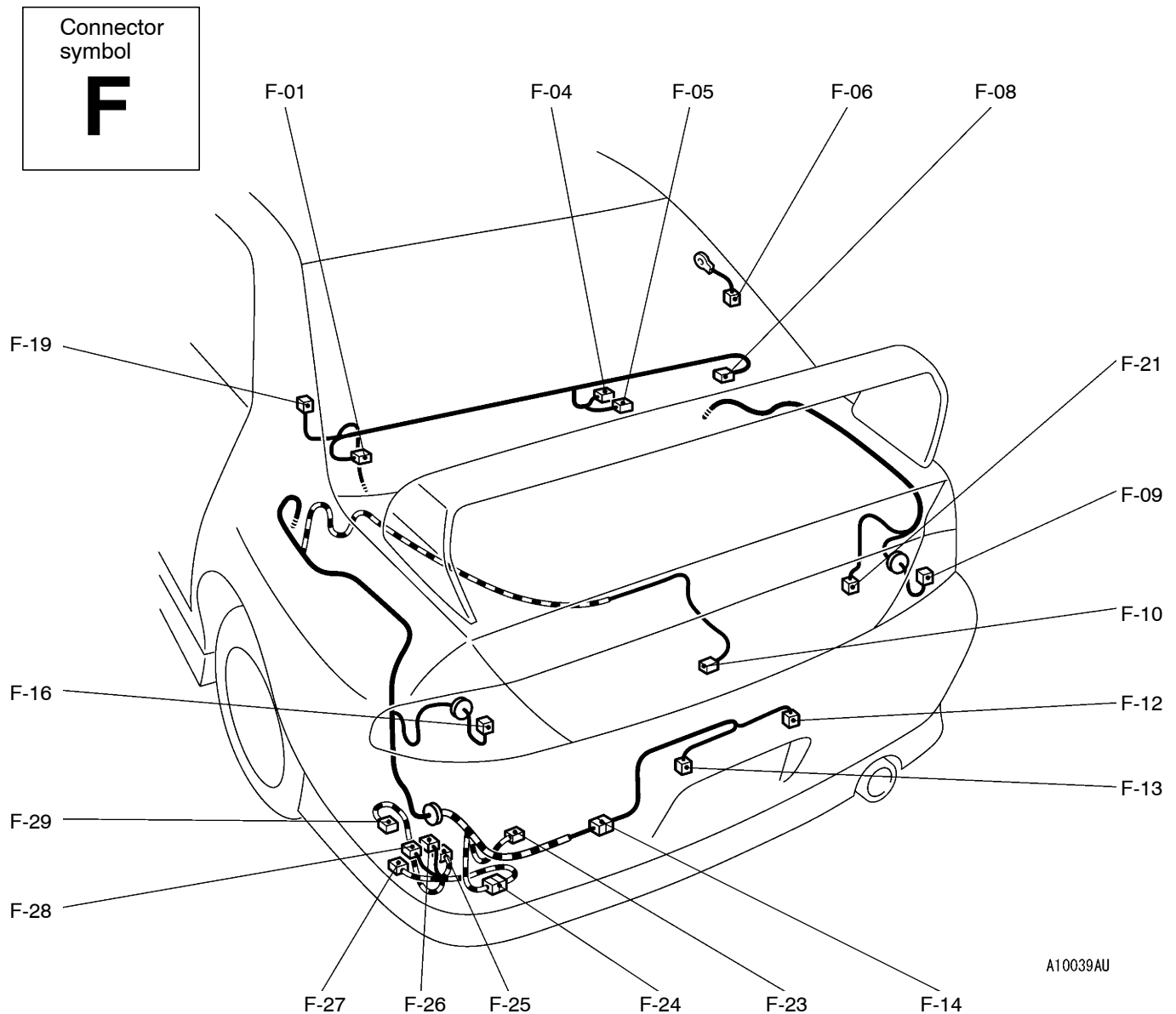


Connector colour code
 B:Black
 Y:Yellow
 L:Blue
 G:Green
 R:Red
 BR:Brown
 V:Violet
 O:Orange
 GR:Gray
 None: Milk white

- | | | | |
|-------------|--|-------------|---|
| E-13 (3) | Remote controlled mirror (RH) | E-21 (2) | Spare connector <for front door speaker (RH)> |
| E-17 (3-B) | Door lock key cylinder switch (LH) | E-23 (6-B) | Door lock actuator (Rear: RH) |
| E-18 (6-B) | Door lock actuator (Front: RH) | E-24 (8) | Power window sub switch (Rear: RH) |
| E-19 (8) | Power window sub switch (Passenger's side) | E-25 (6-GR) | Power window motor (Rear: RH) |
| E-20 (6-GR) | Power window motor (Front: RH) | | |

LUGGAGE COMPARTMENT

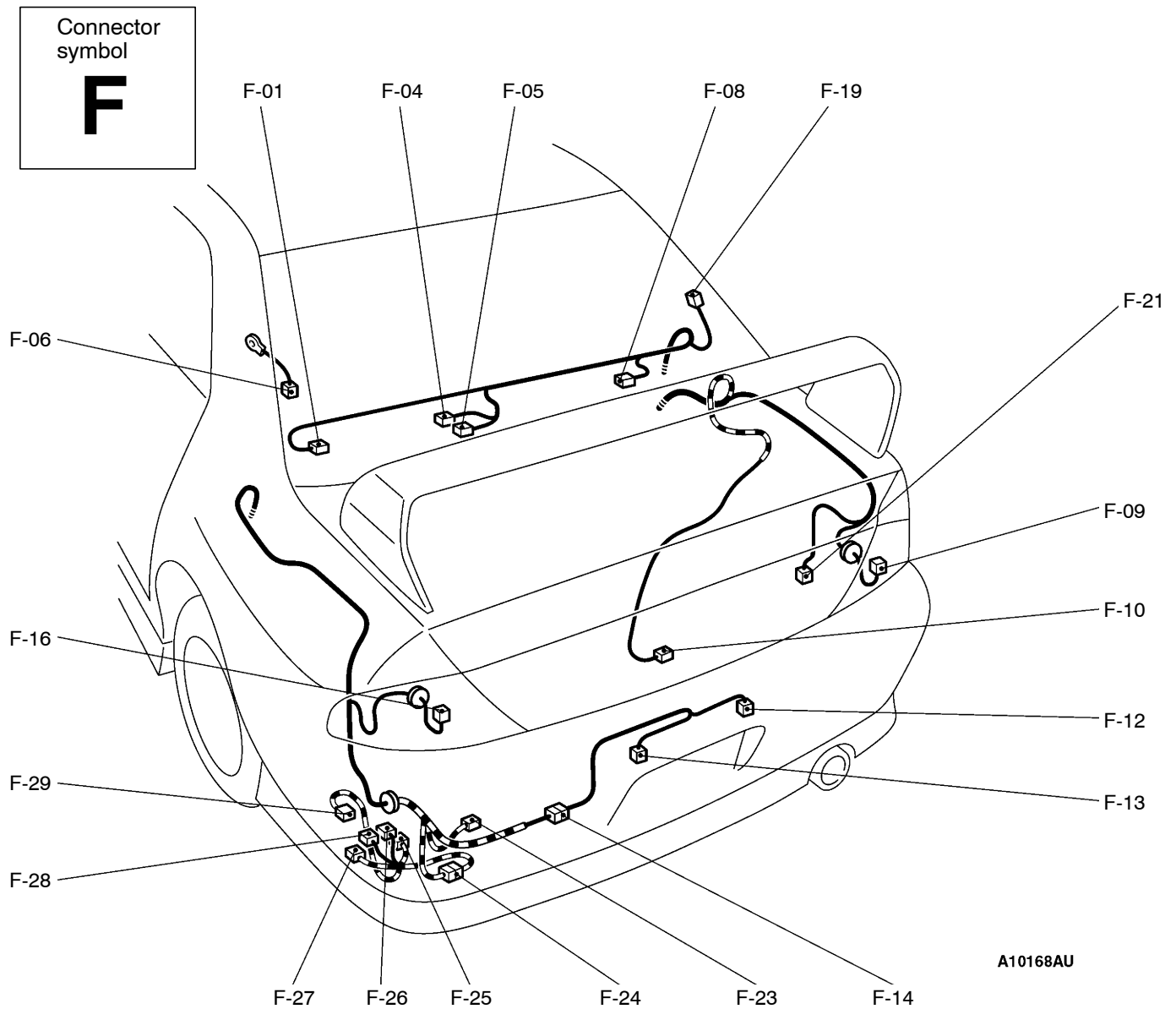
L.H. drive vehicles



F-01 (2)	Spare connector <for rear speaker (LH)>	F-16 (6-B)	Rear combination lamp (LH)
F-04 (2)	Luggage compartment lamp	F-19 (1)	Defogger (+)
F-05 (2-B)	High mounted stop lamp	F-21 (2)	Windshield washer motor
F-06 (1-B)	Defogger (-)	F-23 (2-B)	Electric pump <ACD>
F-08 (2)	Spare connector <for rear speaker (RH)>	F-24 (8-GR)	Floor wiring harness (LH) and 4WD wiring harness combination <ACD>
F-09 (6-B)	Rear combination lamp (RH)	F-25 (2-B)	Direction valve (LH) <ACD>
F-10 (1-B)	Trunk lid latch switch	F-26 (2-B)	Direction valve (RH) <ACD>
F-12 (2-GR)	Licence plate lamp (RH)	F-27 (3-B)	Proportioning valve (for ACD control)
F-13 (2-GR)	Licence plate lamp (LH)	F-28 (3-B)	Proportioning valve (for AYC control)
F-14 (2-GR)	Floor wiring harness (LH) and bumper wiring harness combination	F-29 (3-B)	Pressure sensor <ACD>

LUGGAGE COMPARTMENT

R.H. drive vehicles



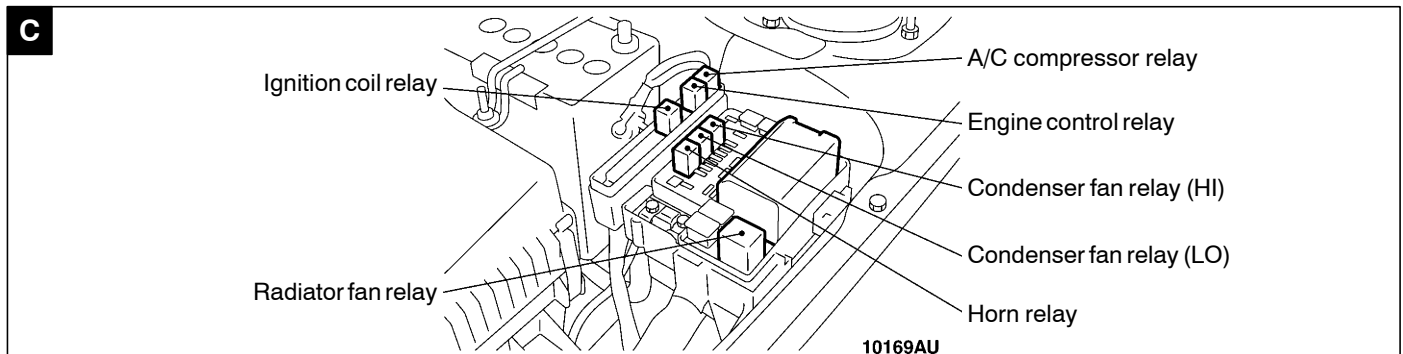
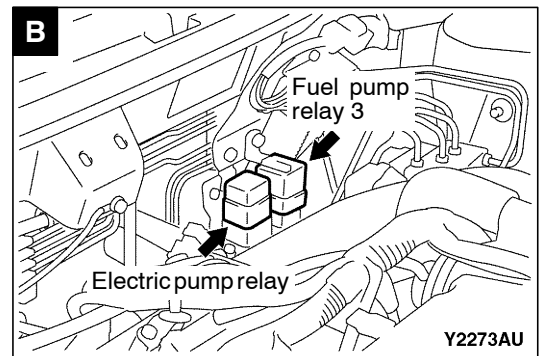
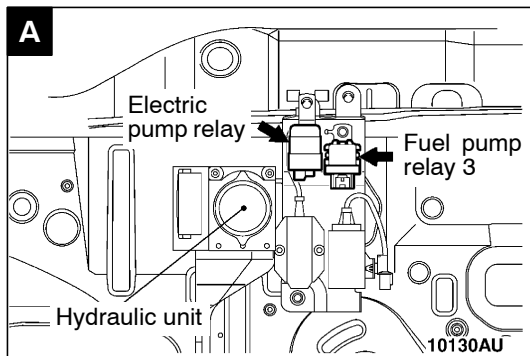
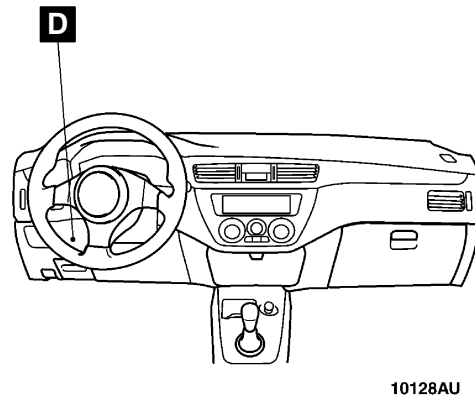
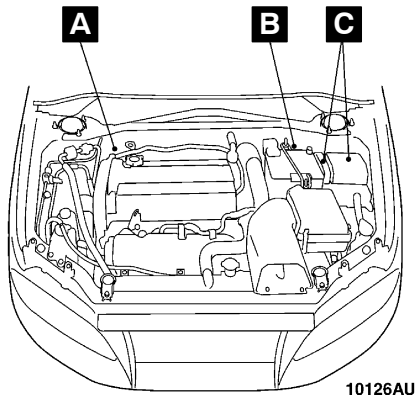
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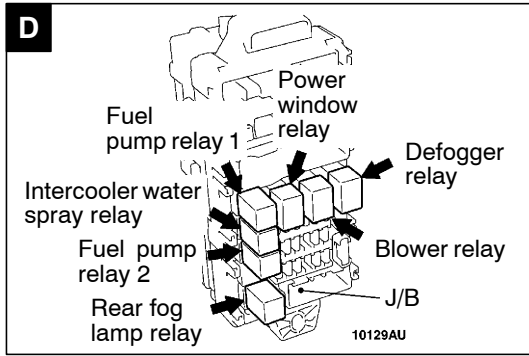
- | | | | |
|-------------|---|-------------|--|
| F-01 (2) | Spare connector <for rear speaker (LH)> | F-16 (6-B) | Rear combination lamp (LH) |
| F-04 (2) | Luggage compartment lamp | F-19 (1) | Defogger (+) |
| F-05 (2-B) | High mounted stop lamp | F-21 (2) | Windshield washer motor |
| F-06 (1-B) | Defogger (-) | F-23 (2-B) | Electric pump <ACD> |
| F-08 (2) | Spare connector <for rear speaker (RH)> | F-24 (8-GR) | Floor wiring harness (LH) and 4WD wiring harness combination <ACD> |
| F-09 (6-B) | Rear combination lamp (RH) | F-25 (2-B) | Direction valve (LH) <ACD> |
| F-10 (1) | Trunk lid latch switch | F-26 (2-B) | Direction valve (RH) <ACD> |
| F-12 (2-GR) | Licence plate lamp (RH) | F-27 (3-B) | Proportioning valve (for ACD control) |
| F-13 (2-GR) | Licence plate lamp (LH) | F-28 (3-B) | Proportioning valve (for AYC control) |
| F-14 (2-GR) | Floor wiring harness (LH) and bumper wiring harness combination | F-29 (3-B) | Pressure sensor <ACD> |

SINGLE PART INSTALLATION POSITION

RELAY

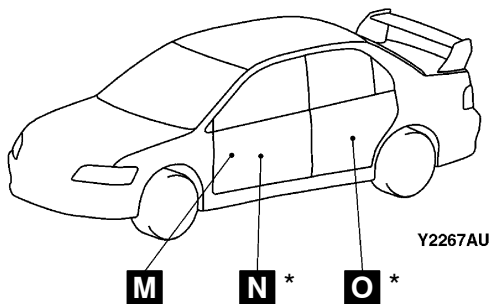
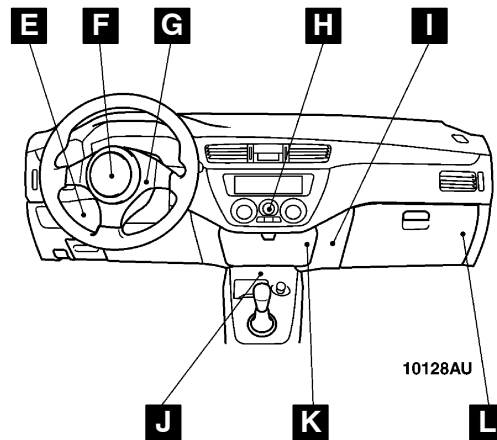
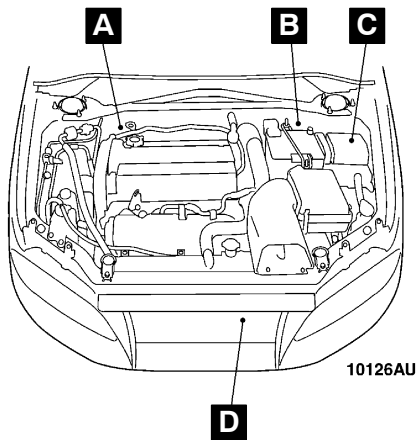
Name	Symbol	Name	Symbol	
A/C compressor relay	C	Fuel pump relay 2	D	
Blower relay	D	Fuel pump relay 3	L.H. drive vehicles	A
Condenser fan relay (HI)	C		R.H. drive vehicles	B
Condenser fan relay (LO)	C	Horn relay	C	
Defogger relay	D	Ignition coil relay <R.H. drive vehicles>	C	
Electric pump relay <ACD>	L.H. drive vehicles	Intercooler water spray relay	D	
	R.H. drive vehicles	Power window relay	D	
Engine control relay	C	Radiator fan relay	C	
Fuel pump relay 1	D	Rear fog lamp relay	D	





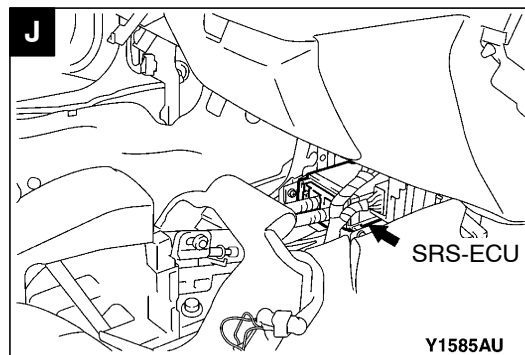
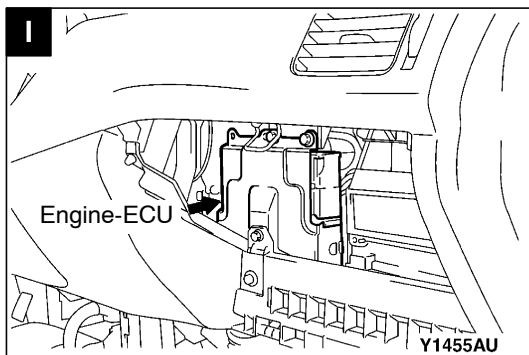
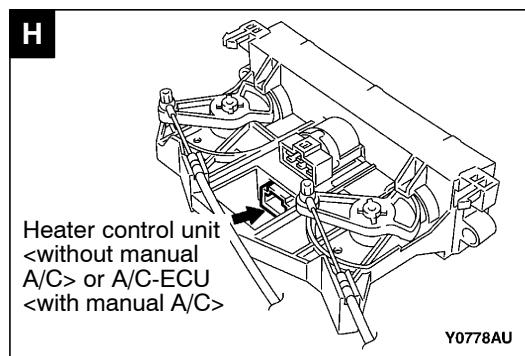
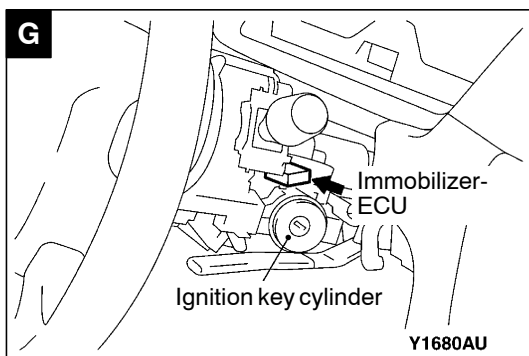
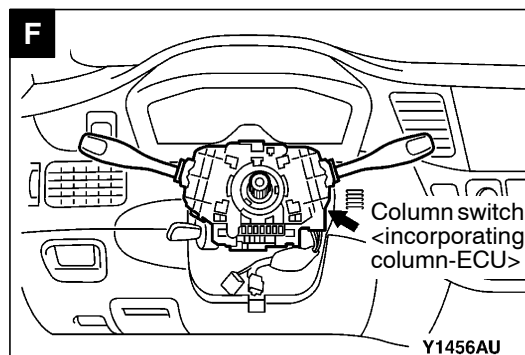
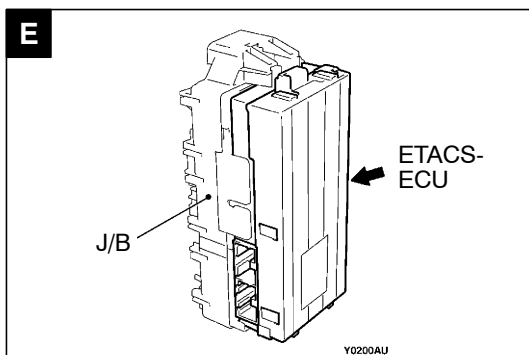
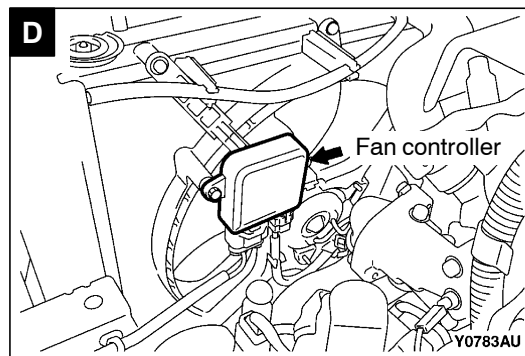
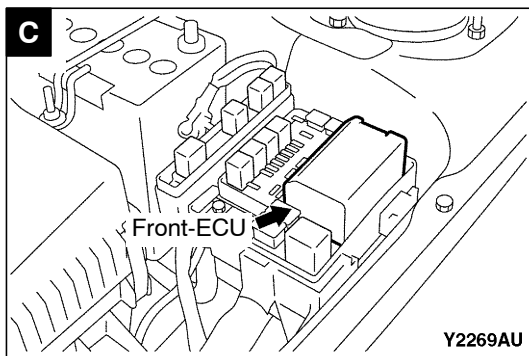
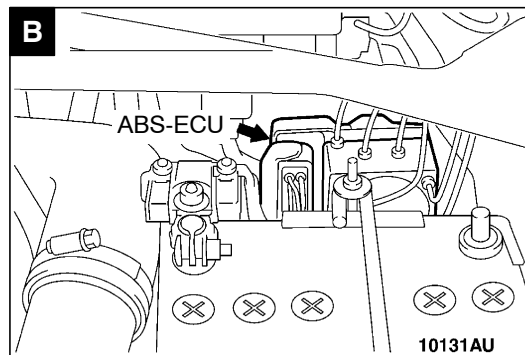
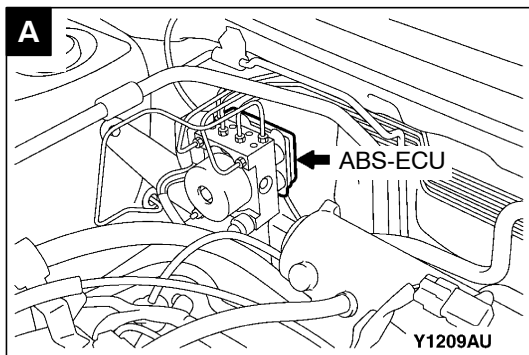
ECU

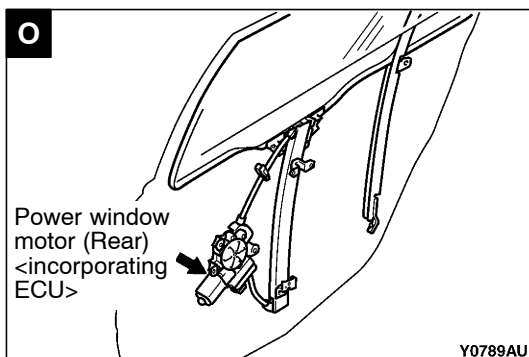
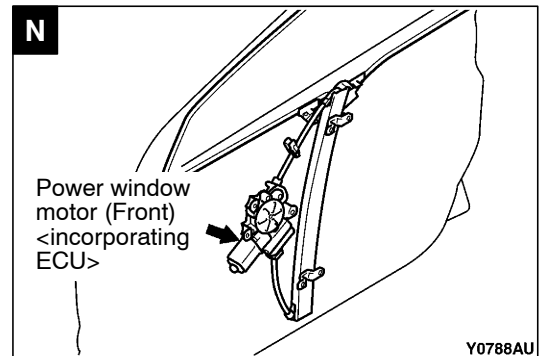
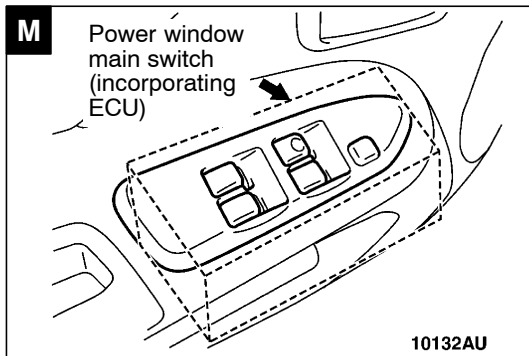
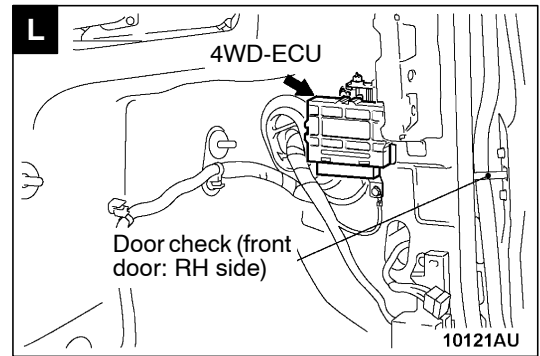
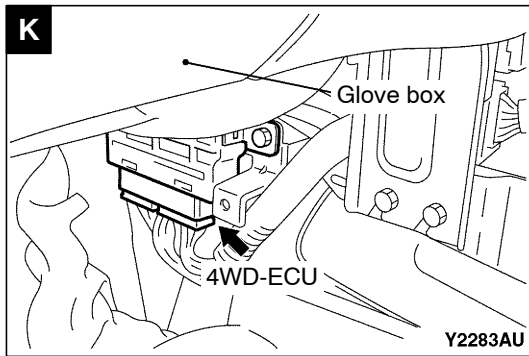
Name	Symbol	Name	Symbol	
4WD-ECU <AYC>	L.H. drive vehicles	Front-ECU	C	
	R.H. drive vehicles	Heater control unit <without manual A/C>	H	
A/C-ECU	H	Immobilizer-ECU	G	
ABS-ECU	L.H. drive vehicles	Power window main switch (incorporating ECU)	M	
	R.H. drive vehicles			B
Column switch (incorporating column-ECU)	F	Power window motor (incorporating ECU)	Front	N
ETACS-ECU	E		Rear	O
Engine-ECU	I	SRS-ECU		J
Fan controller	D			



NOTE

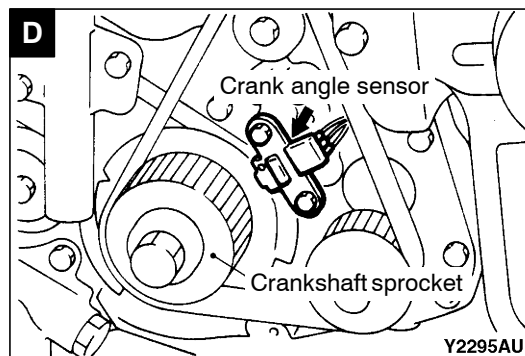
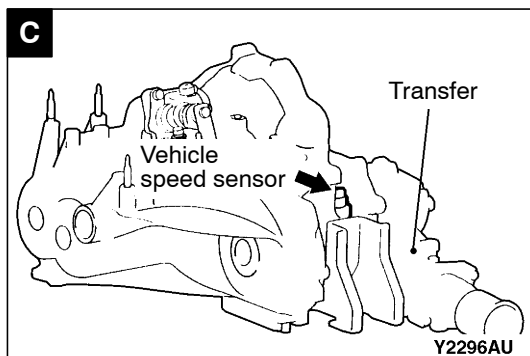
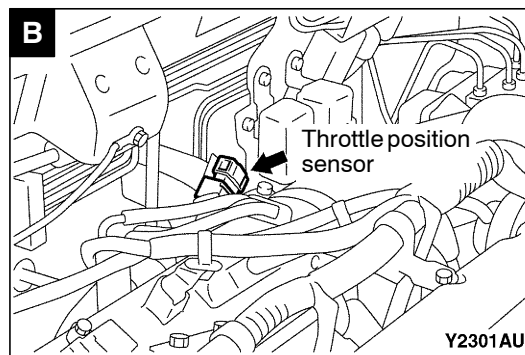
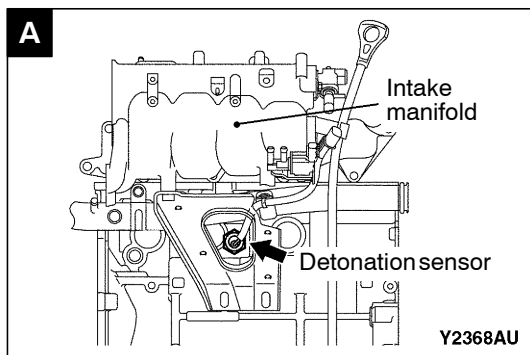
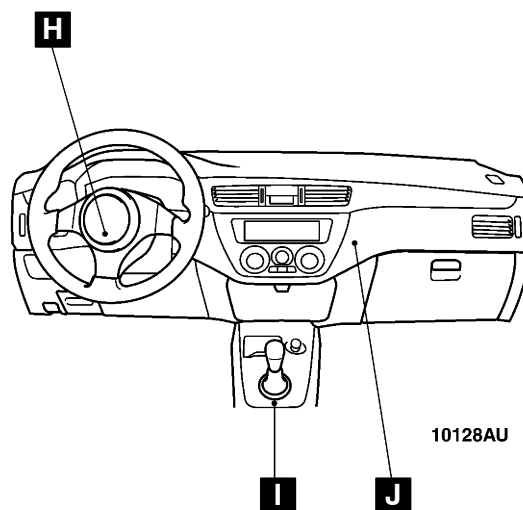
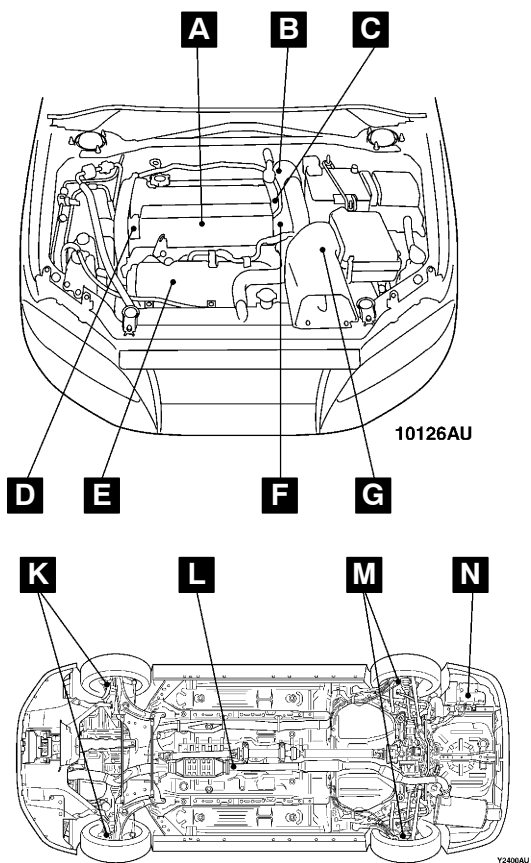
*: also equipped at the right side.

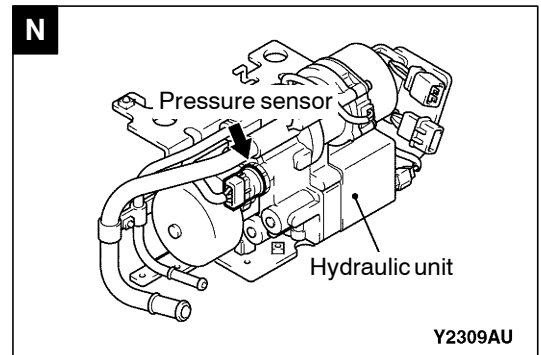
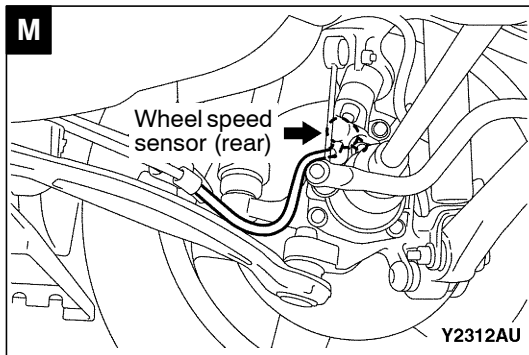
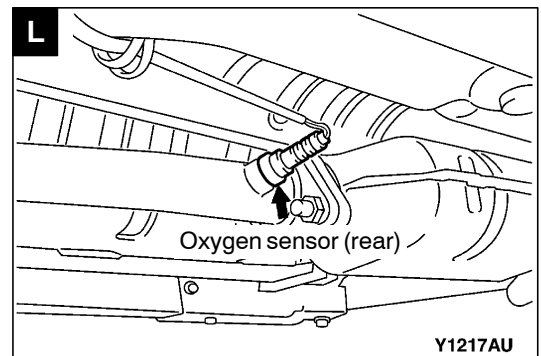
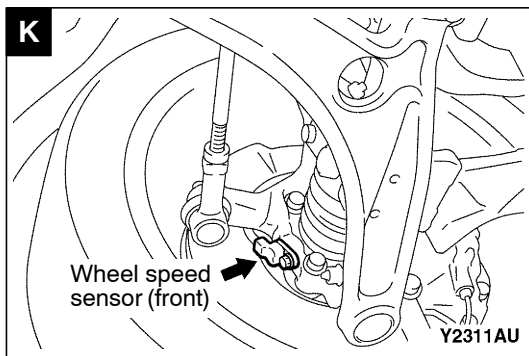
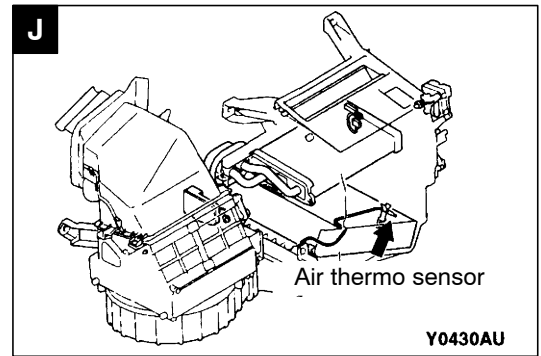
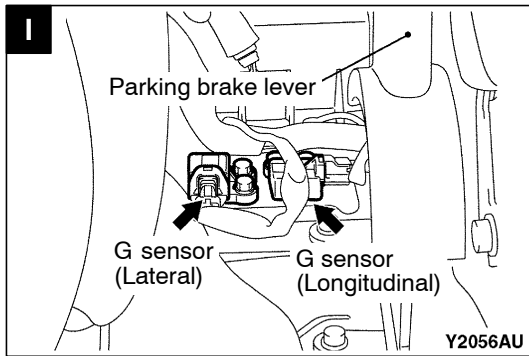
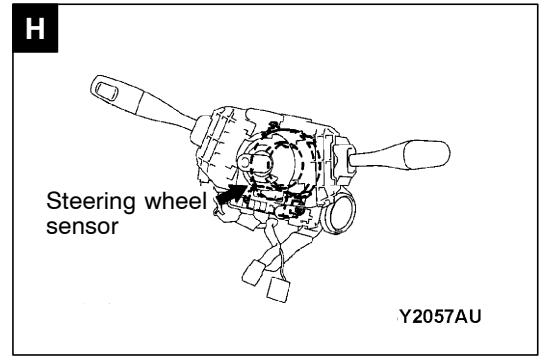
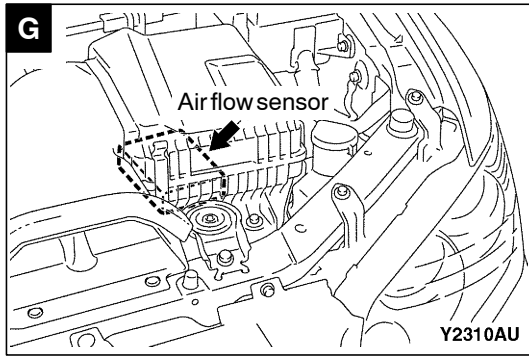
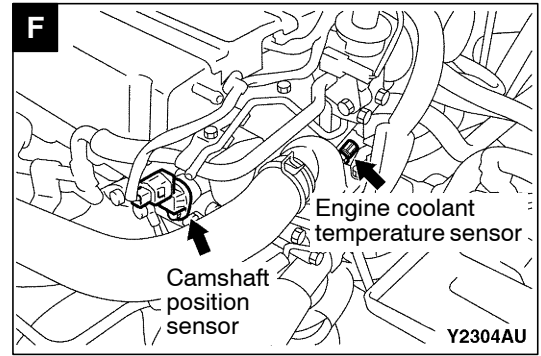
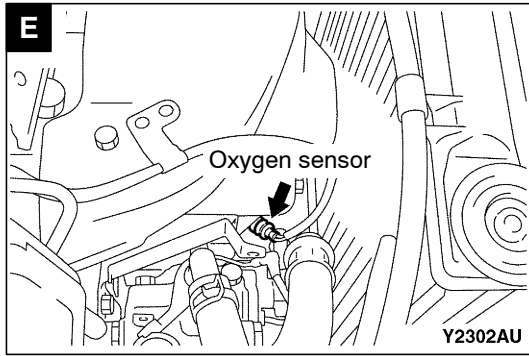




SENSOR

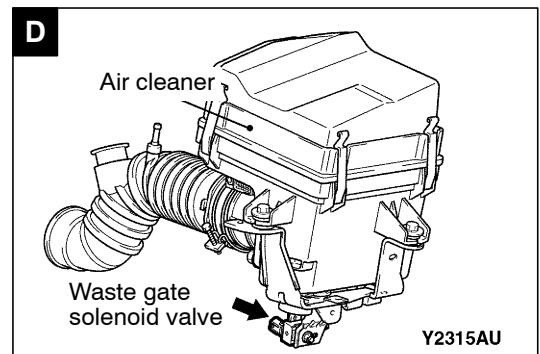
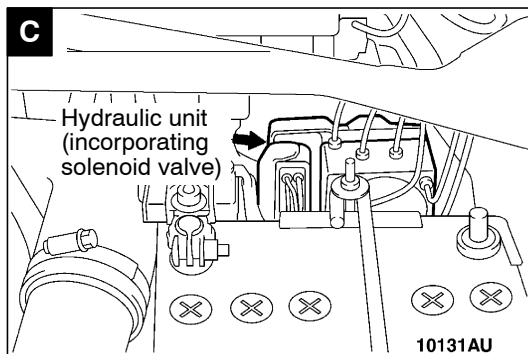
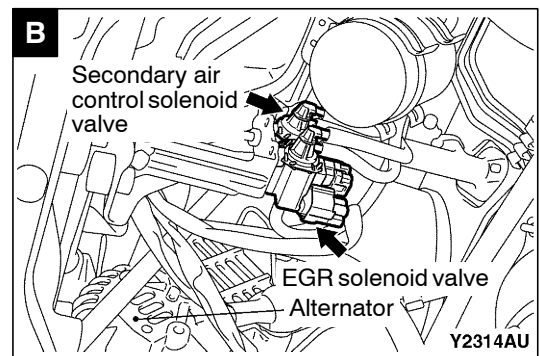
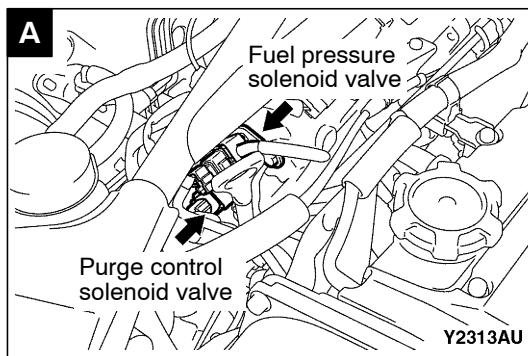
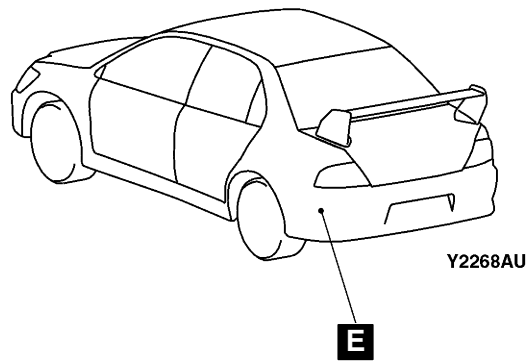
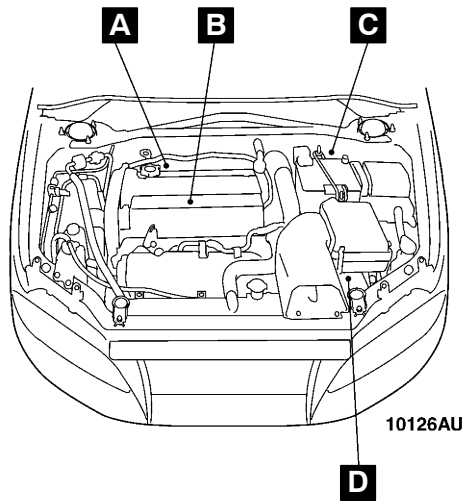
Name	Symbol	Name	Symbol
Air flow sensor	G	Oxygen sensor	E
Air thermo sensor <A/C>	J	Oxygen sensor (rear)	L
Camshaft position sensor	F	Pressure sensor <ACD>	N
Crank angle sensor	D	Steering wheel sensor <ACD>	H
Detonation sensor	A	Throttle position sensor	B
Engine coolant temperature sensor	F	Vehicle speed sensor	C
G sensor (longitudinal) <ACD>	I	Wheel speed sensor	Front K
G sensor (lateral) <ACD>	I		Rear M

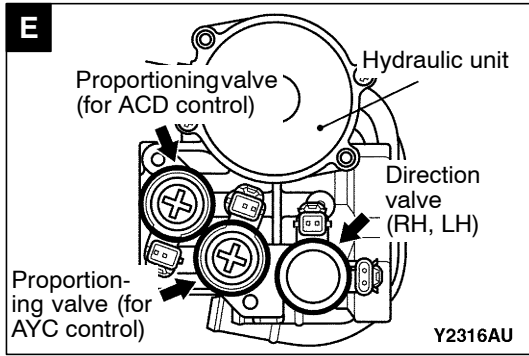




SOLENOID VALVE

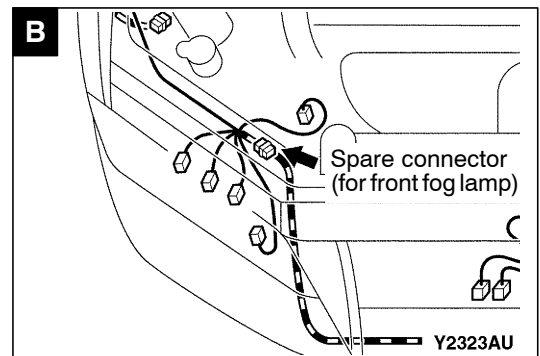
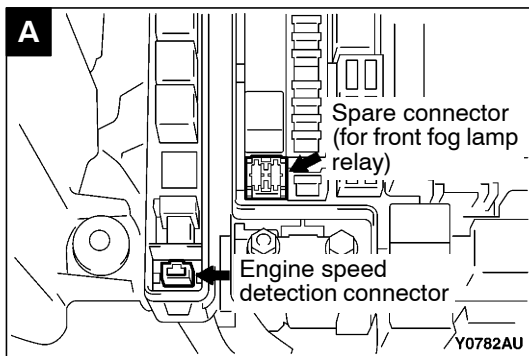
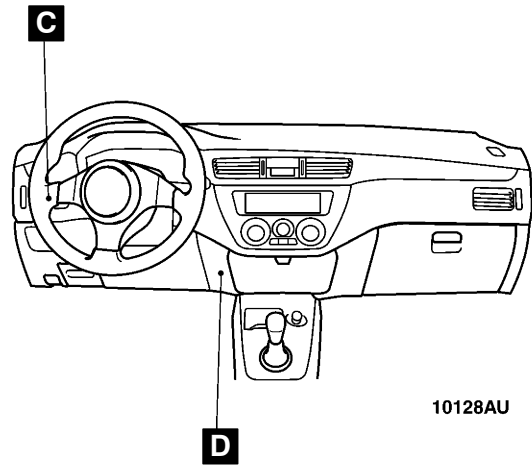
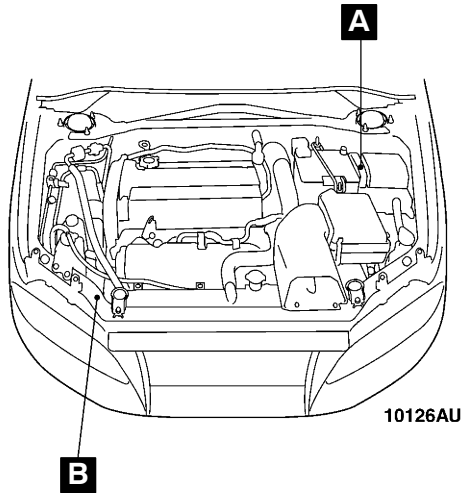
Name	Symbol	Name	Symbol
EGR solenoid valve	B	Hydraulic unit (incorporating solenoid valve) <ACD>	E
Fuel pressure solenoid valve	A		
Hydraulic unit (incorporating solenoid valve) <ABS>	C	Purge control solenoid valve	A
		Secondary air control solenoid valve	B
		Waste gate solenoid valve	D

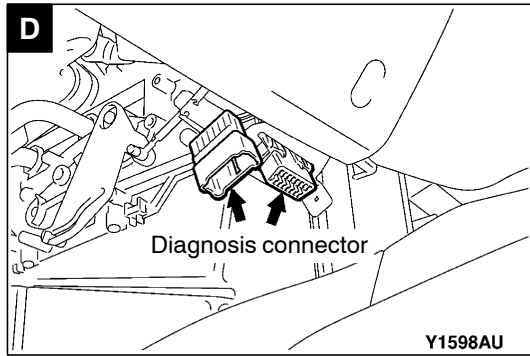
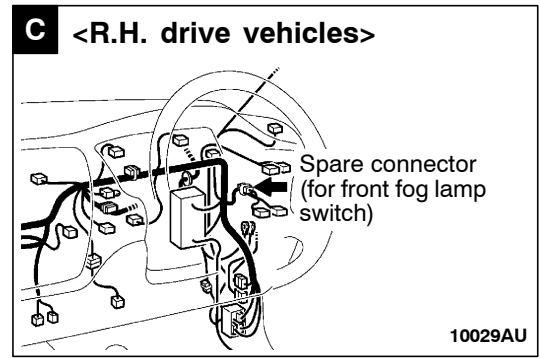
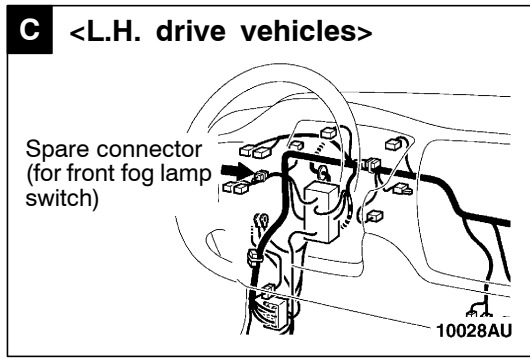




INSPECTION CONNECTOR AND SPARE CONNECTOR

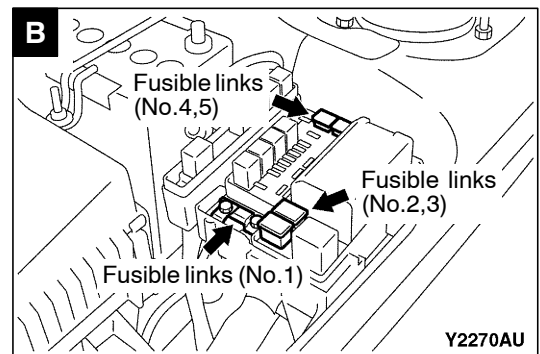
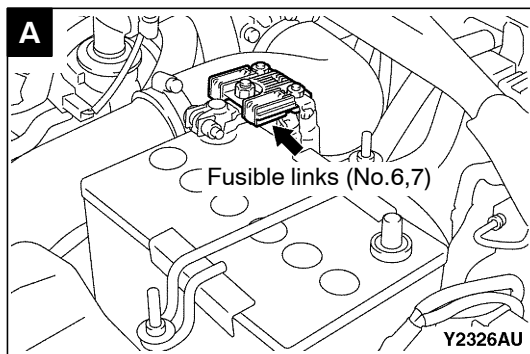
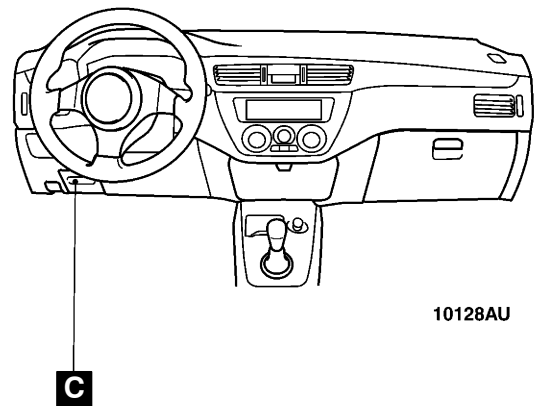
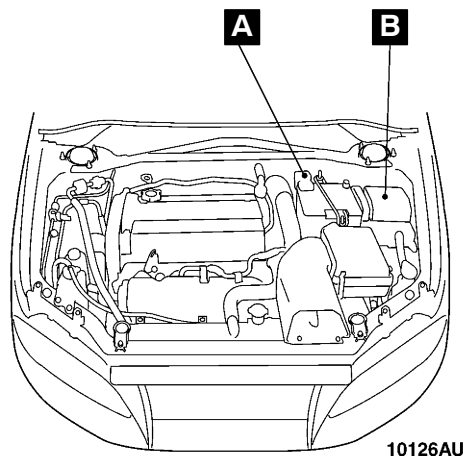
Name	Symbol	Name	Symbol
Diagnosis connector	D	Spare connector (for front fog lamp relay)	A
Engine speed detection connector	A	Spare connector (for front fog lamp switch)	C
Spare connector (for front fog lamp)	B		

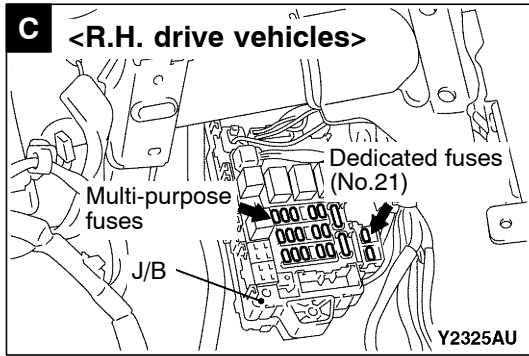
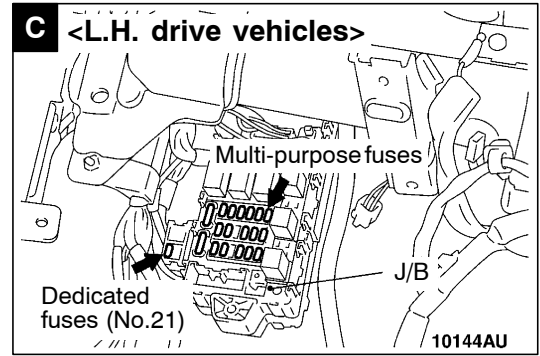
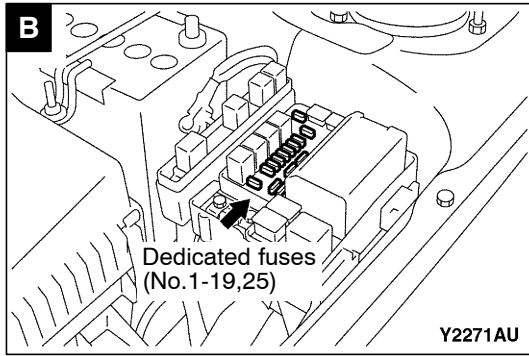




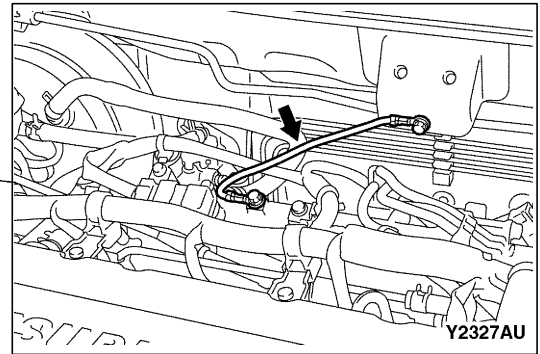
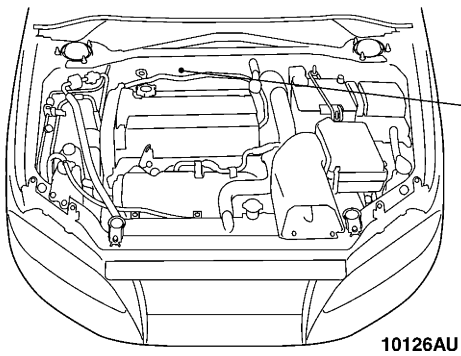
FUSIBLE LINK AND FUSE

Name	Symbol	Name	Symbol
Dedicated fuses (No.1-19,25)	B	Fusible links (No.6,7)	A
Dedicated fuses (No.21)	C	Multi-purpose fuses	C
Fusible links (No.1-5)	B		



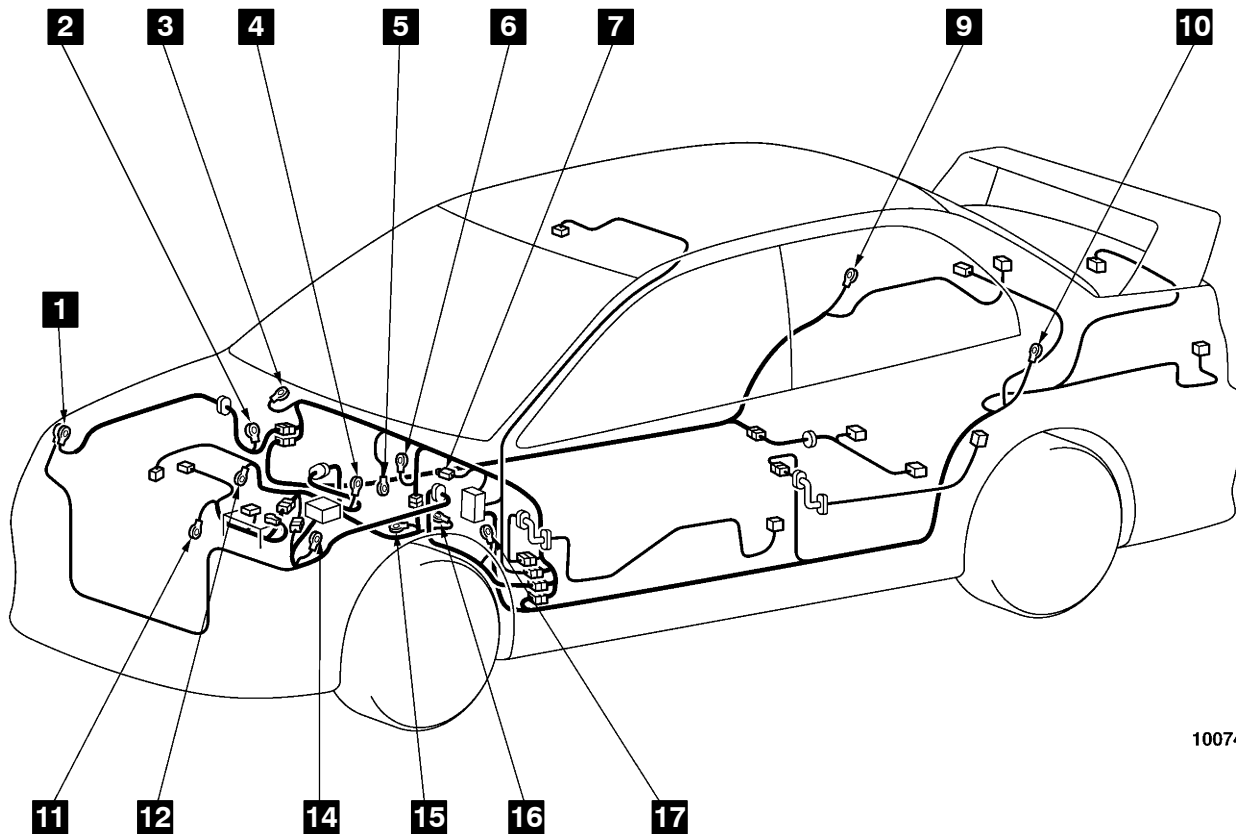


EARTH CABLE



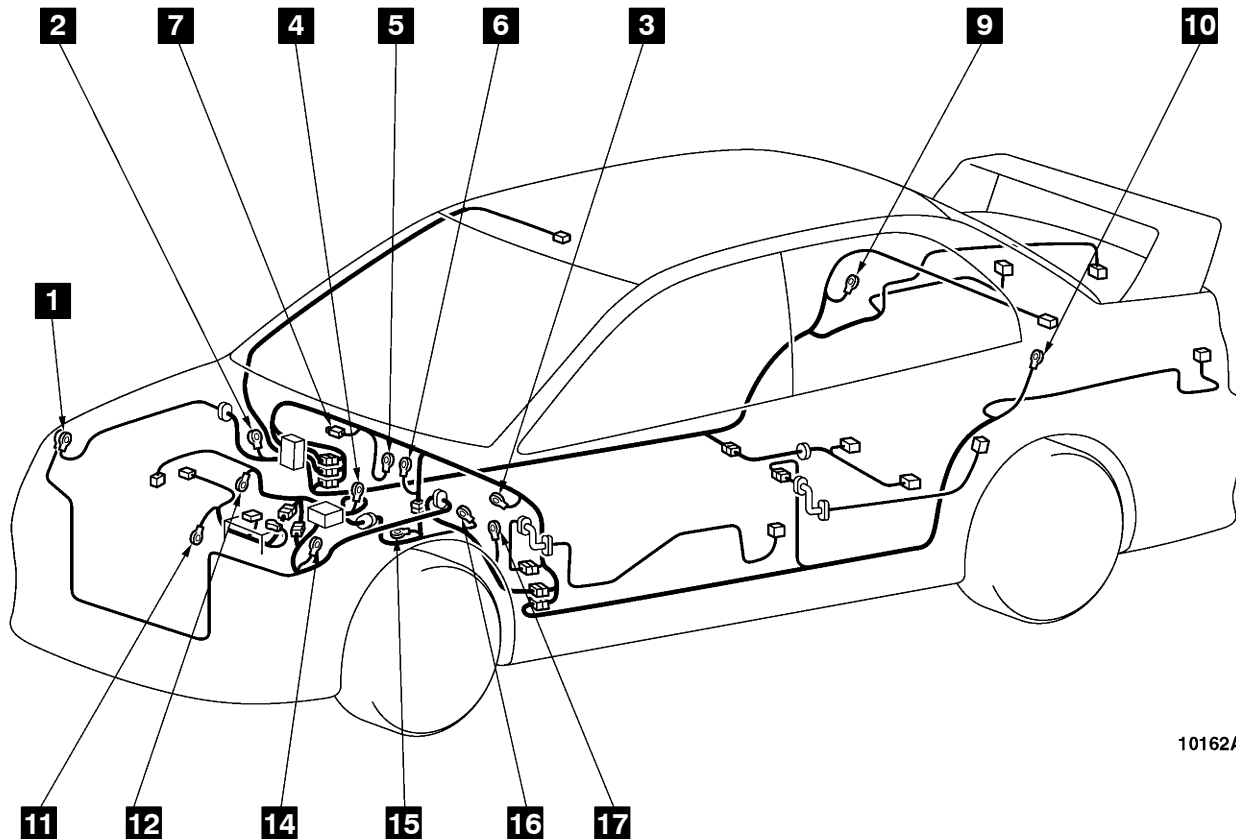
EARTH

L.H. drive vehicles



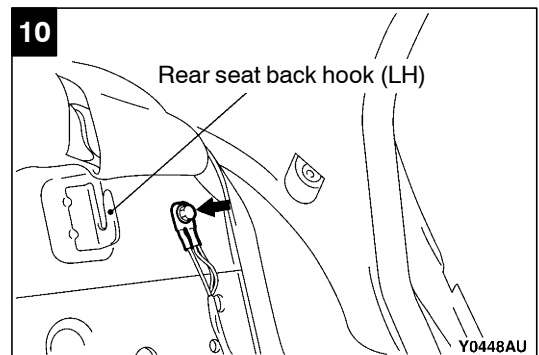
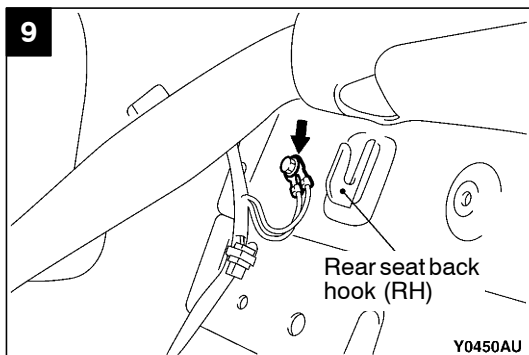
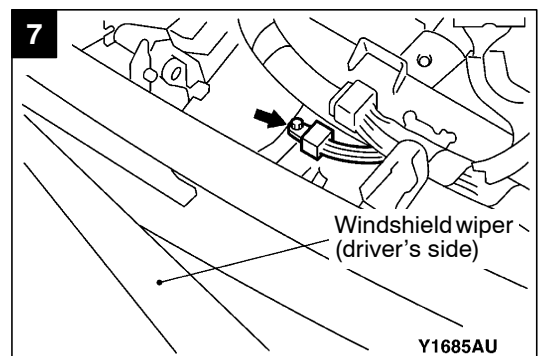
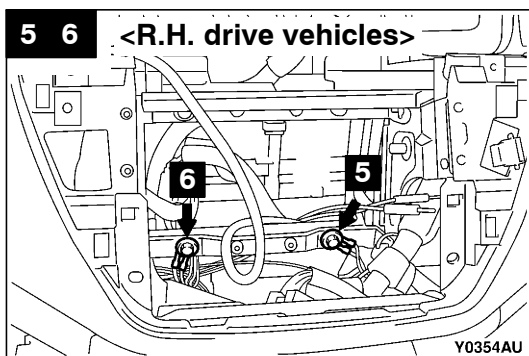
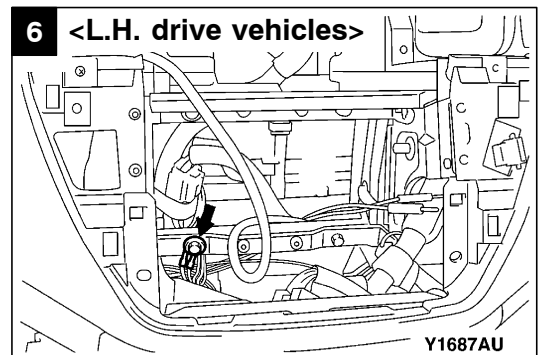
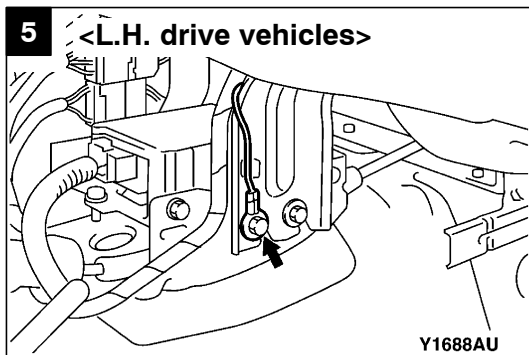
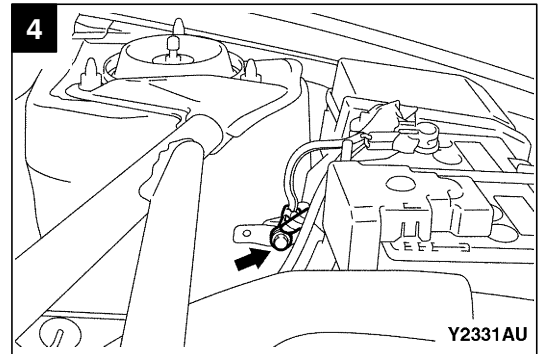
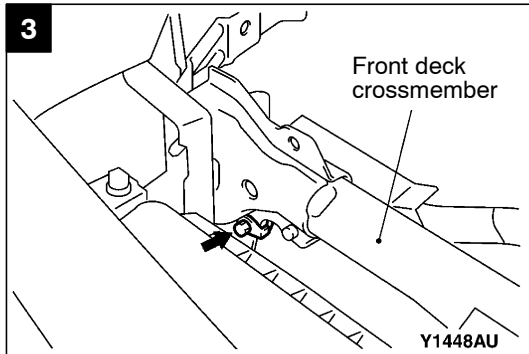
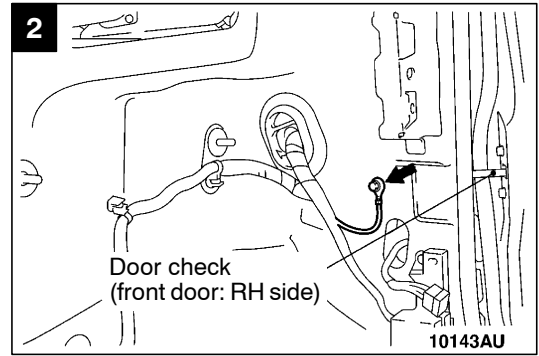
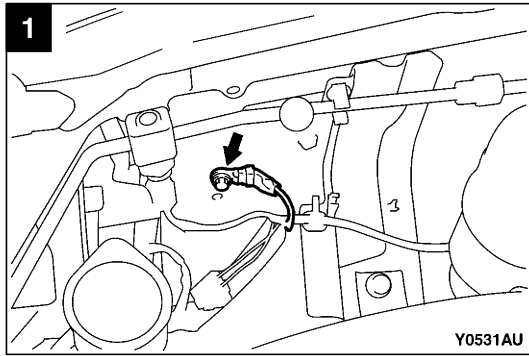
10074AU

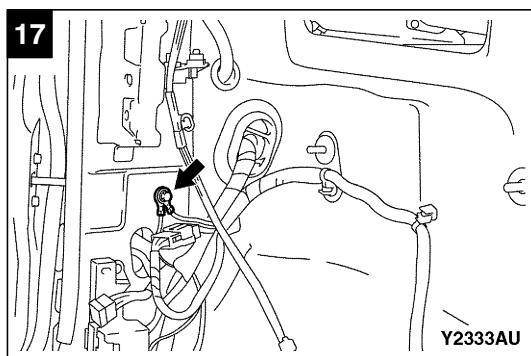
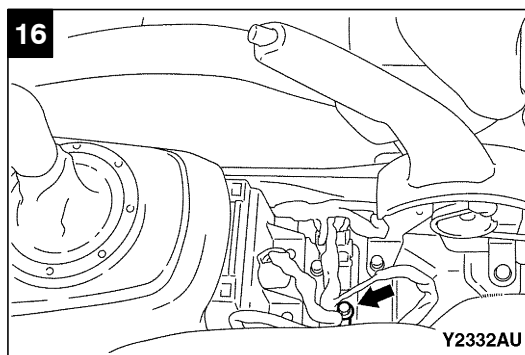
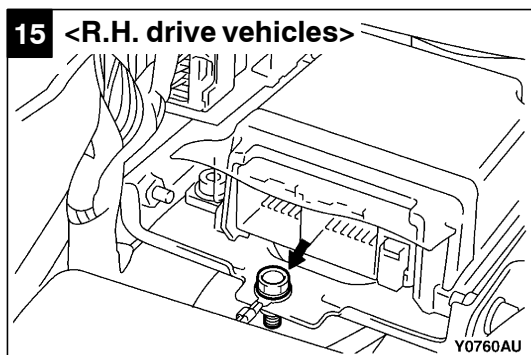
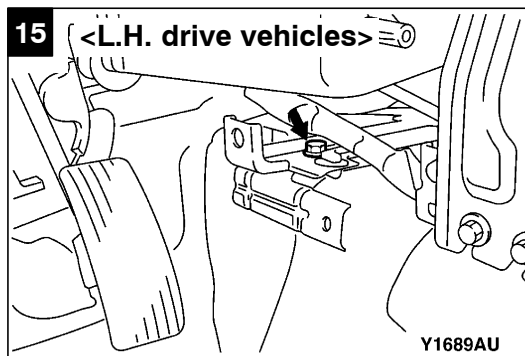
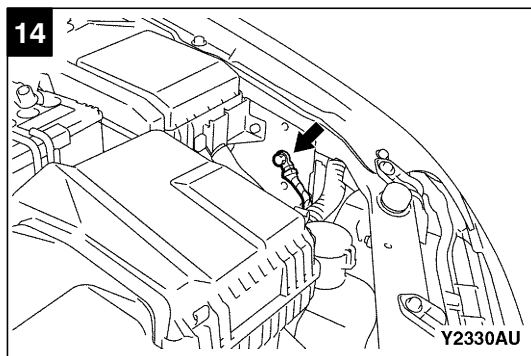
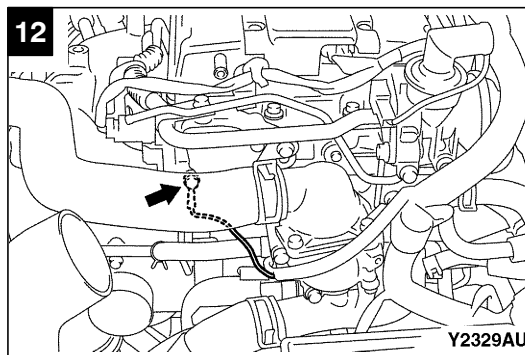
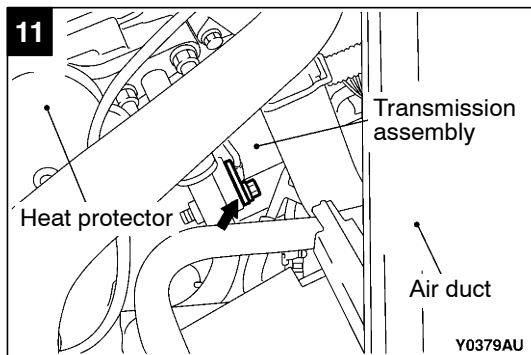
R.H. drive vehicles



10162AU

NOTE
Same earth numbers are used in the circuit diagram.

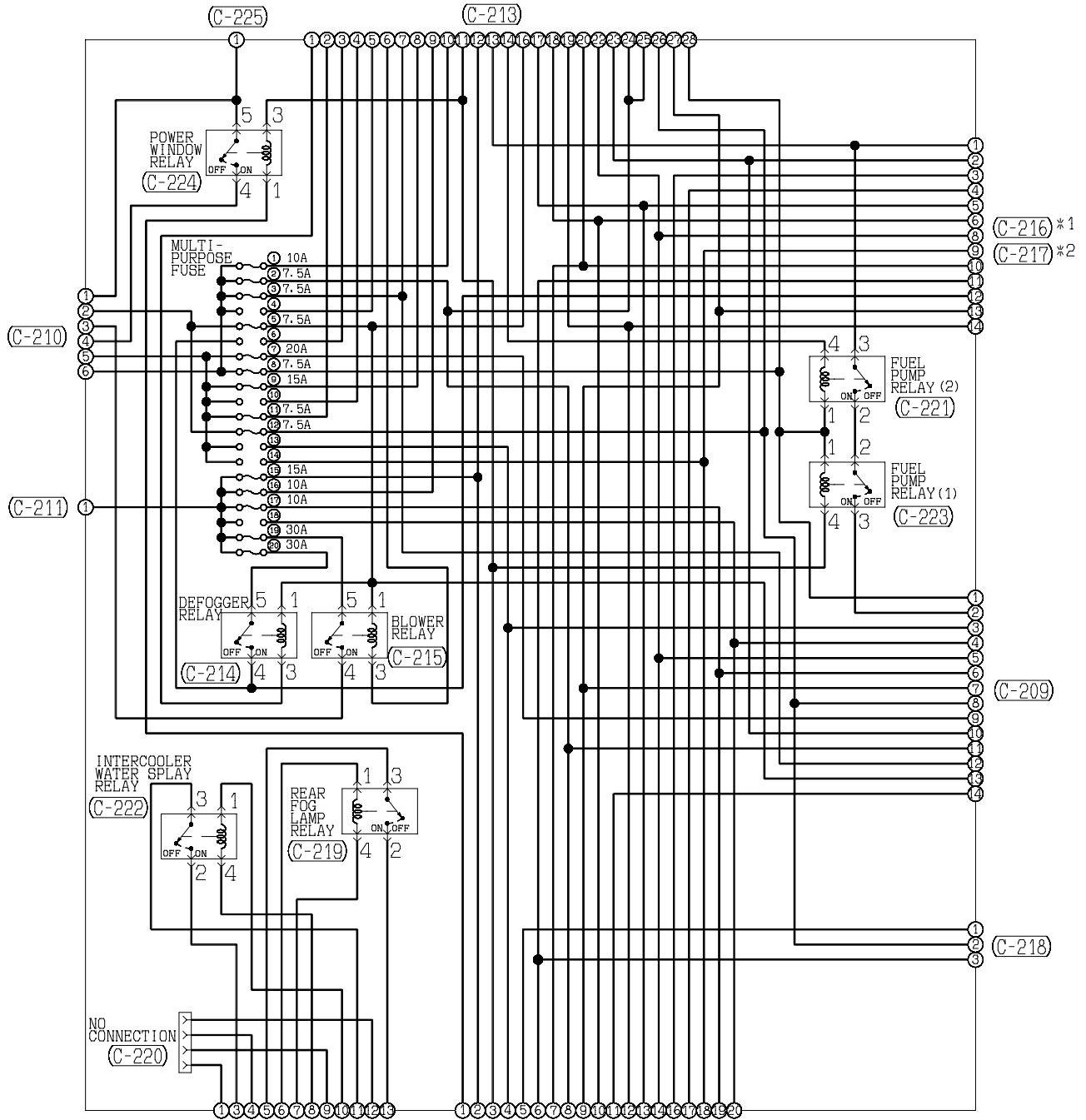




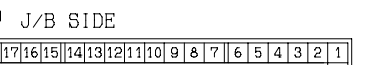
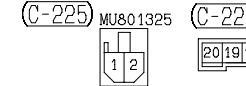
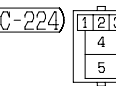
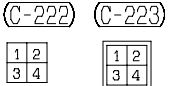
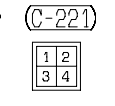
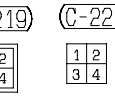
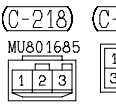
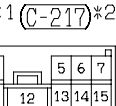
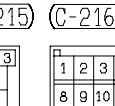
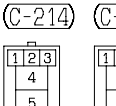
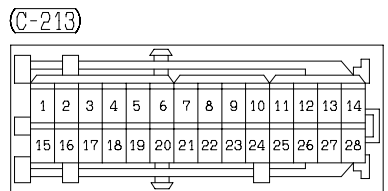
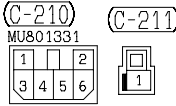
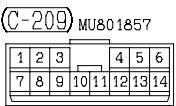
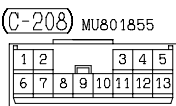
NOTES

CIRCUIT DIAGRAMS

J/B

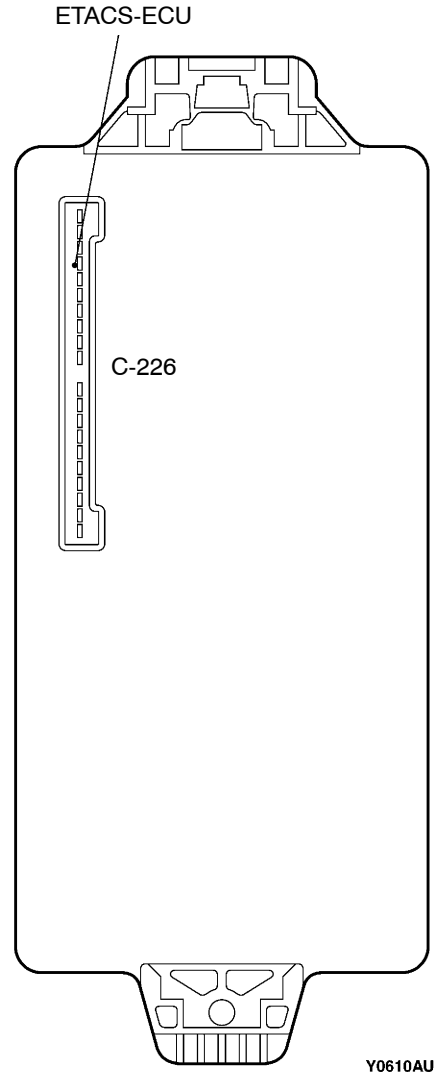
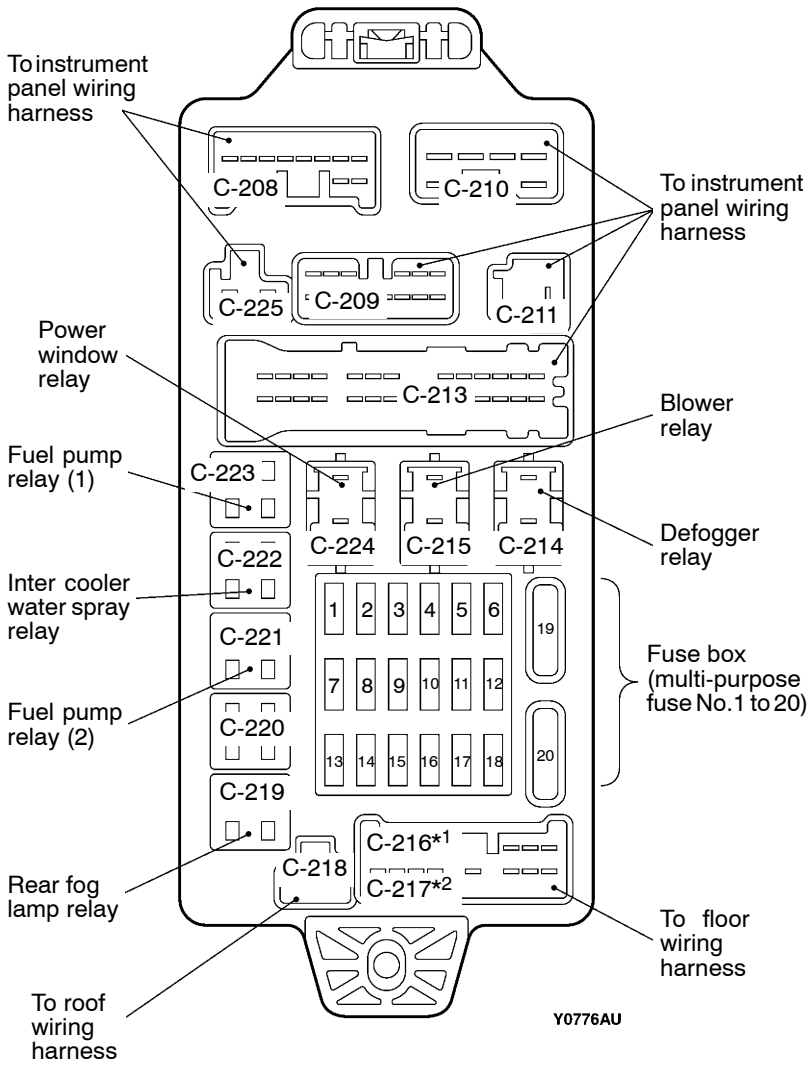


NOTE
 *1:L. H. DRIVE VEHICLES.
 *2:R. H. DRIVE VEHICLES.
 *CONNECTOR NUMBERS ARE KEYED TO THE CONFIGURATION DIAGRAM (DASH PANEL) AND EACH CIRCUIT DIAGRAM.



Front side

Rear side



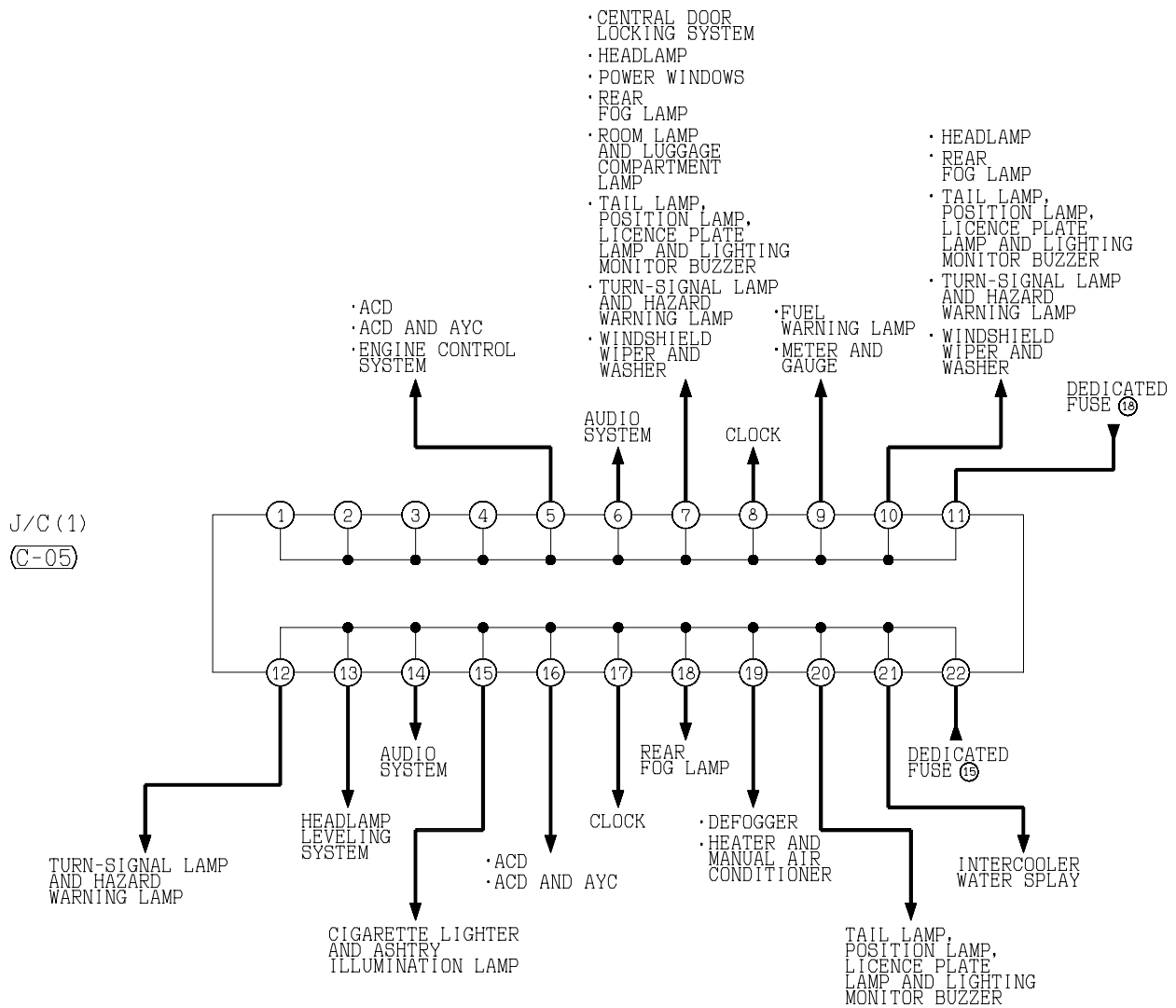
NOTE

- *1: L.H. drive vehicles
- *2: R.H. drive vehicles

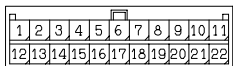
J/C

L.H. drive vehicles

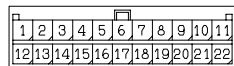
NOTE
 IN ACTUAL VEHICLES, ANY OF THE TERMINALS CONNECTED IN J/C ARE USED.
 THE TERMINALS DESCRIBED IN THE CIRCUIT DIAGRAM MAY NOT BE
 IDENTICAL TO THOSE OF THE VEHICLES.

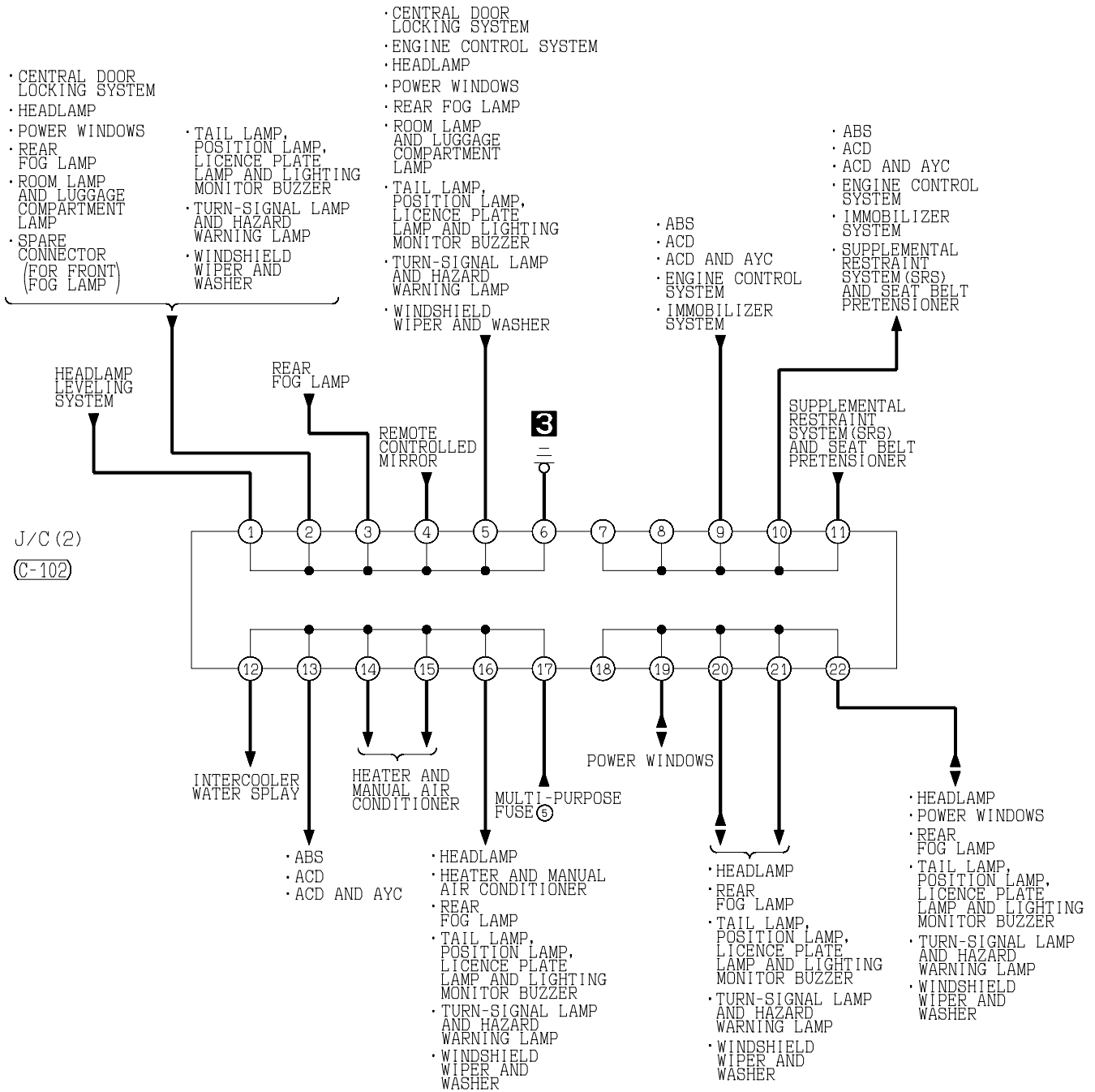


(C-05)

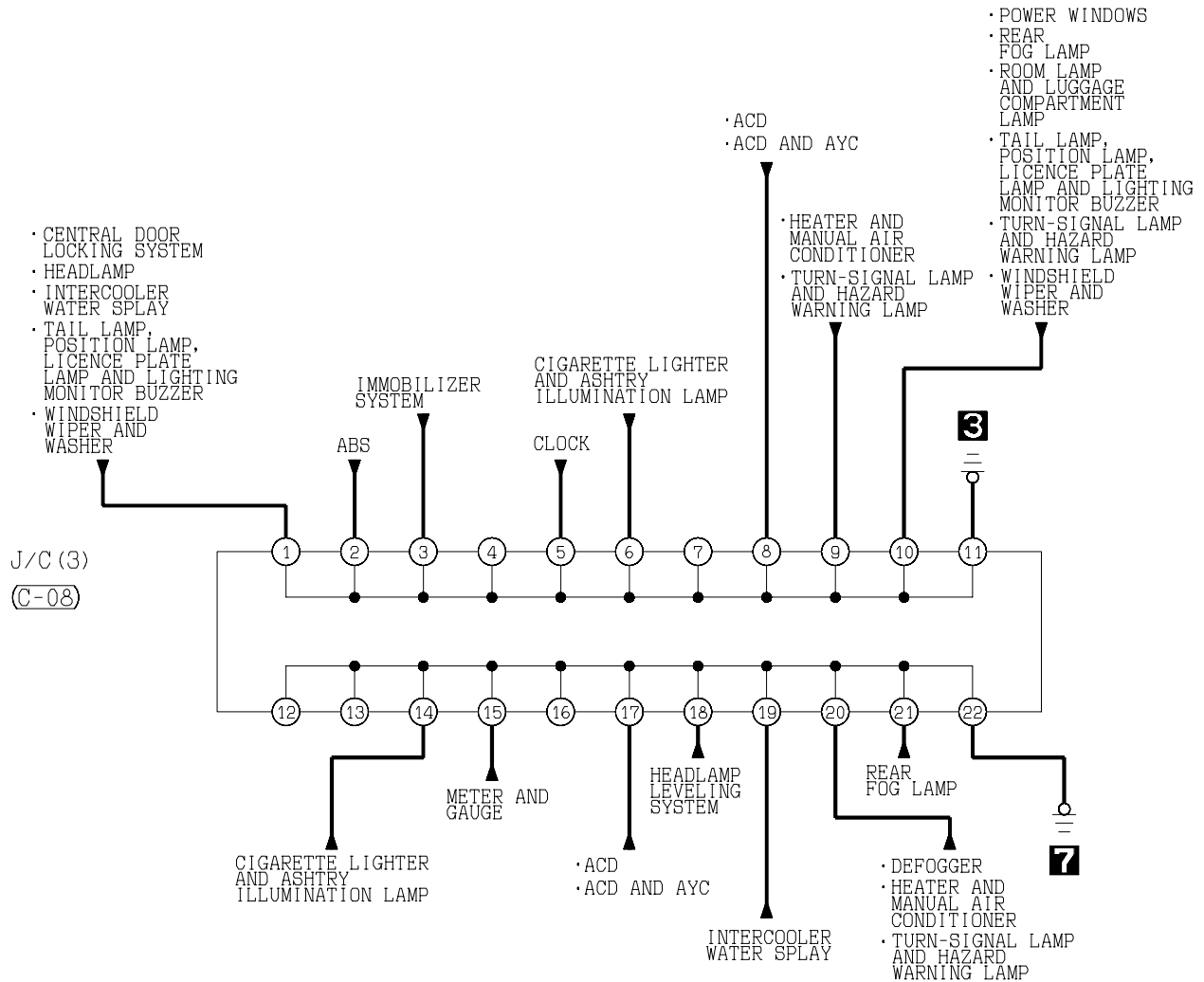


(C-102)

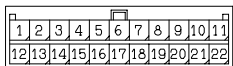




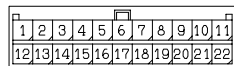
J/C <L.H. drive vehicles> (CONTINUED)

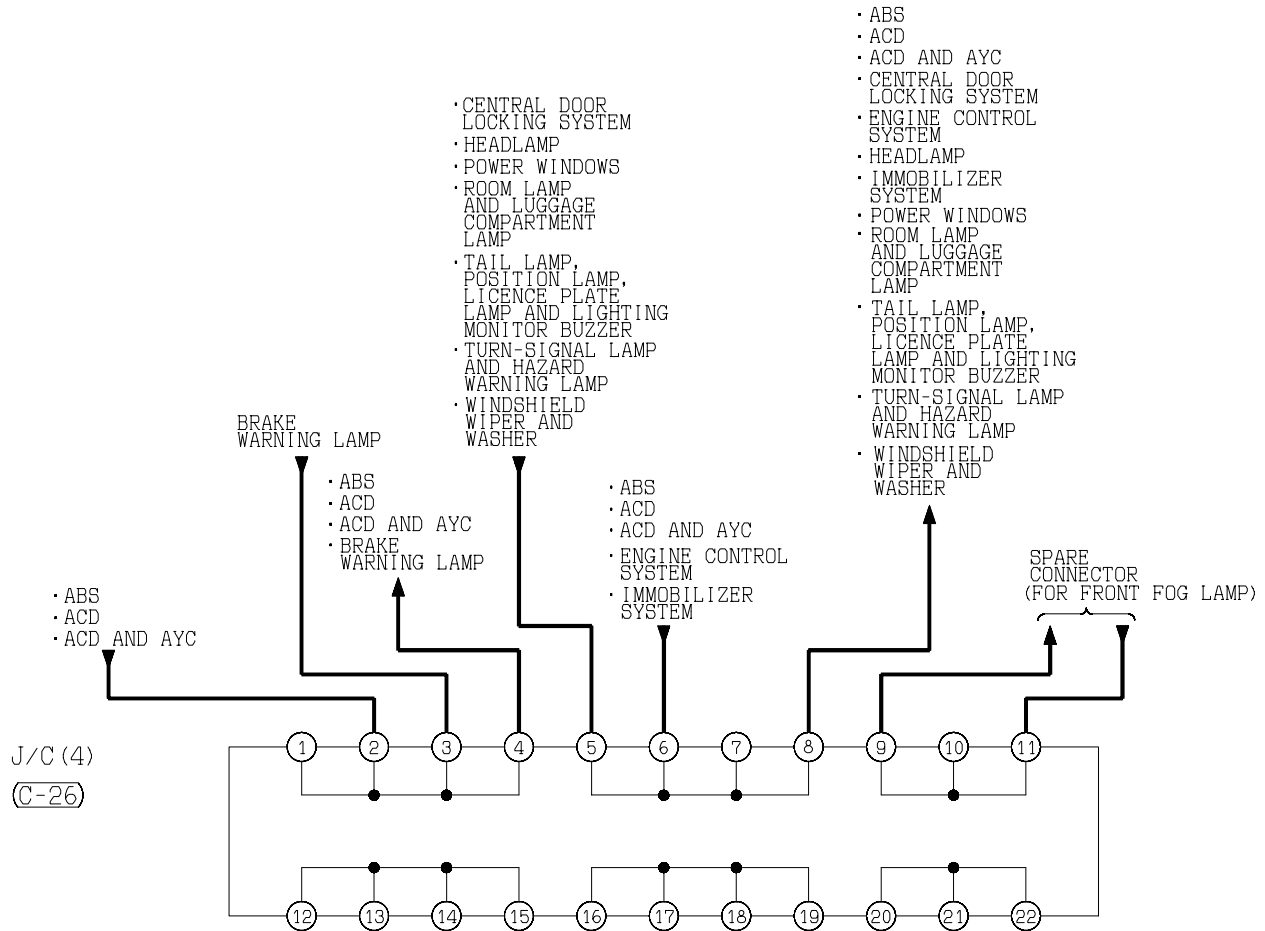


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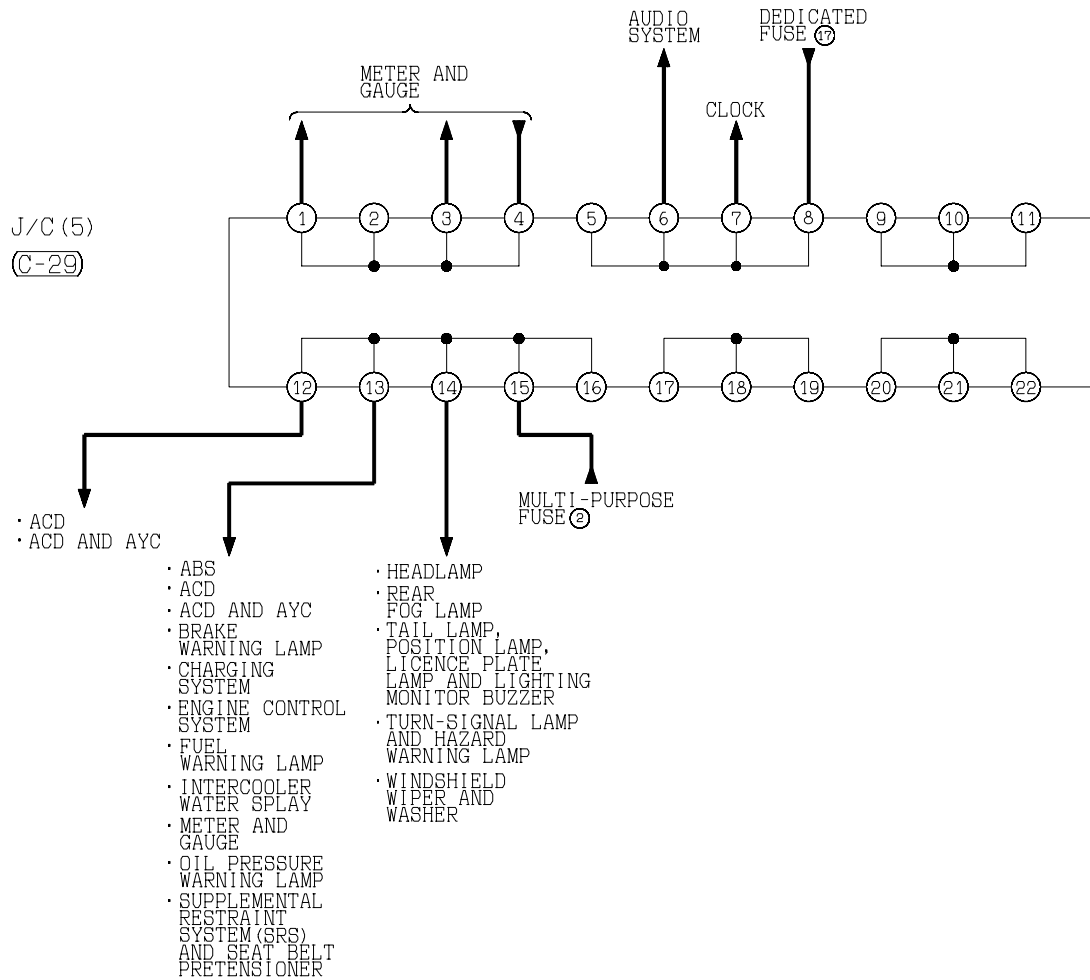


(C-26)





J/C <L.H. drive vehicles> (CONTINUED)



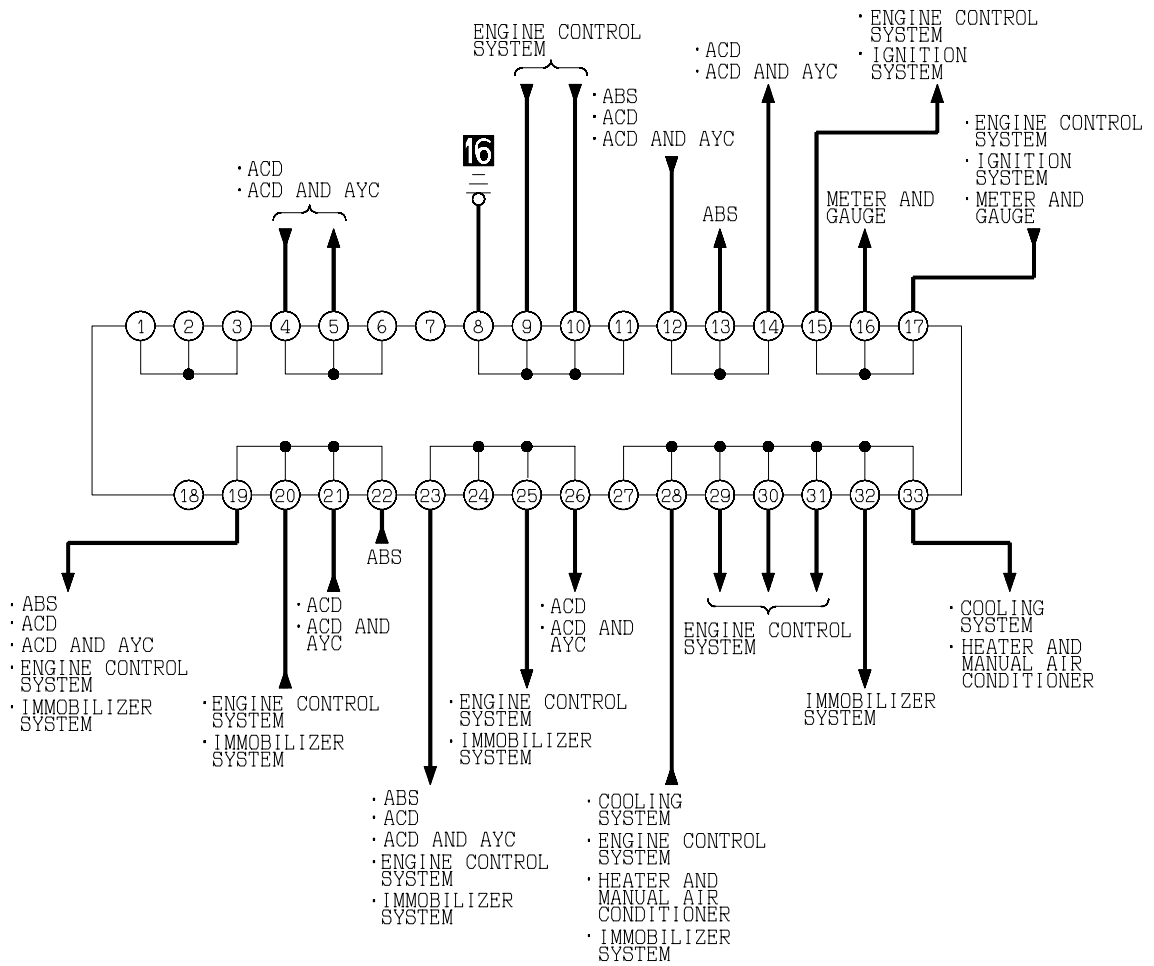
(C-29)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-108)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

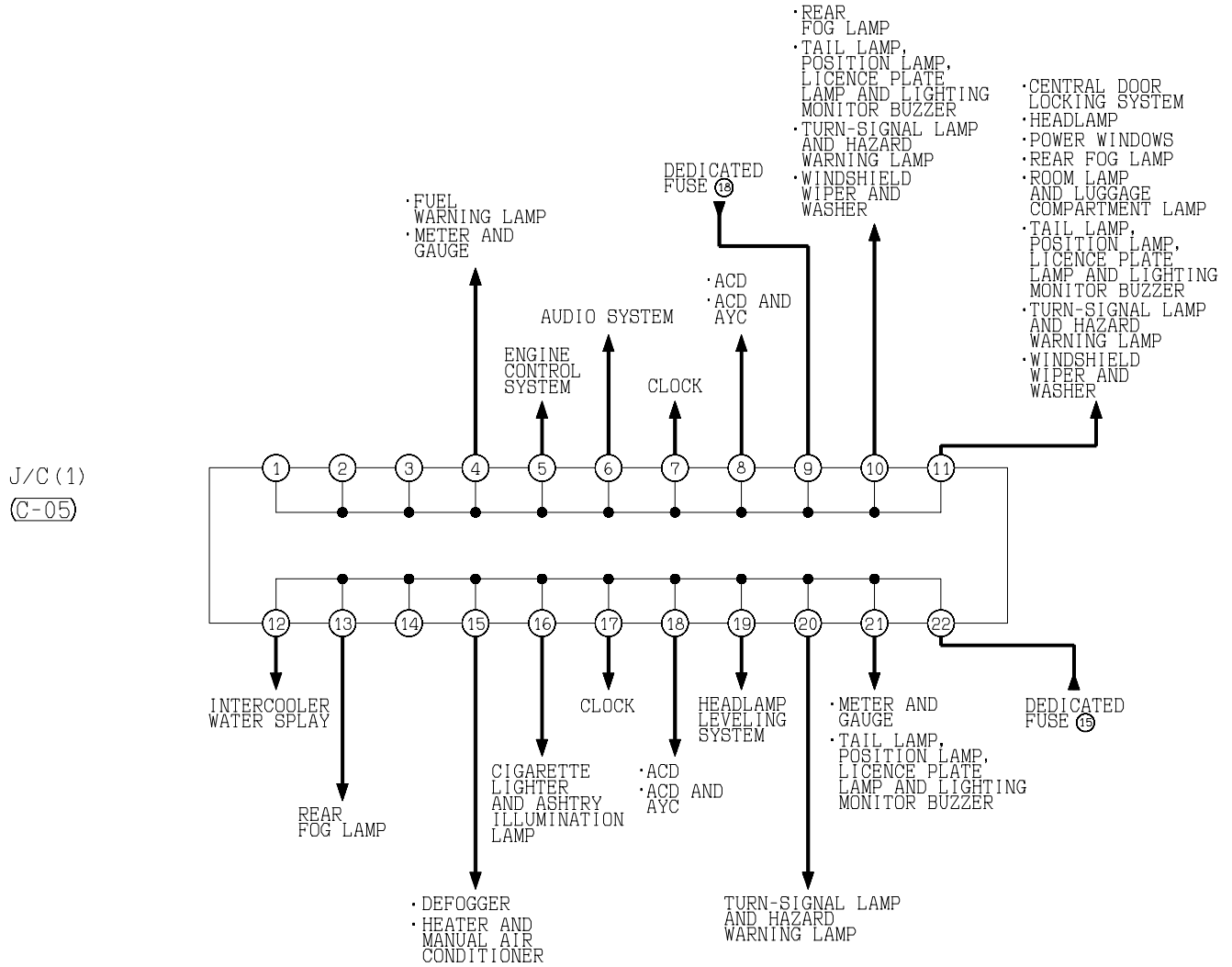
J/C (6)
(C-108)



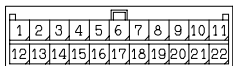
J/C

R.H. drive vehicles

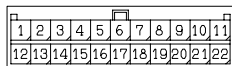
NOTE
 IN ACTUAL VEHICLES, ANY OF THE TERMINALS CONNECTED IN J/C ARE USED.
 THE TERMINALS DESCRIBED IN THE CIRCUIT DIAGRAM MAY NOT BE
 IDENTICAL TO THOSE OF THE VEHICLES.



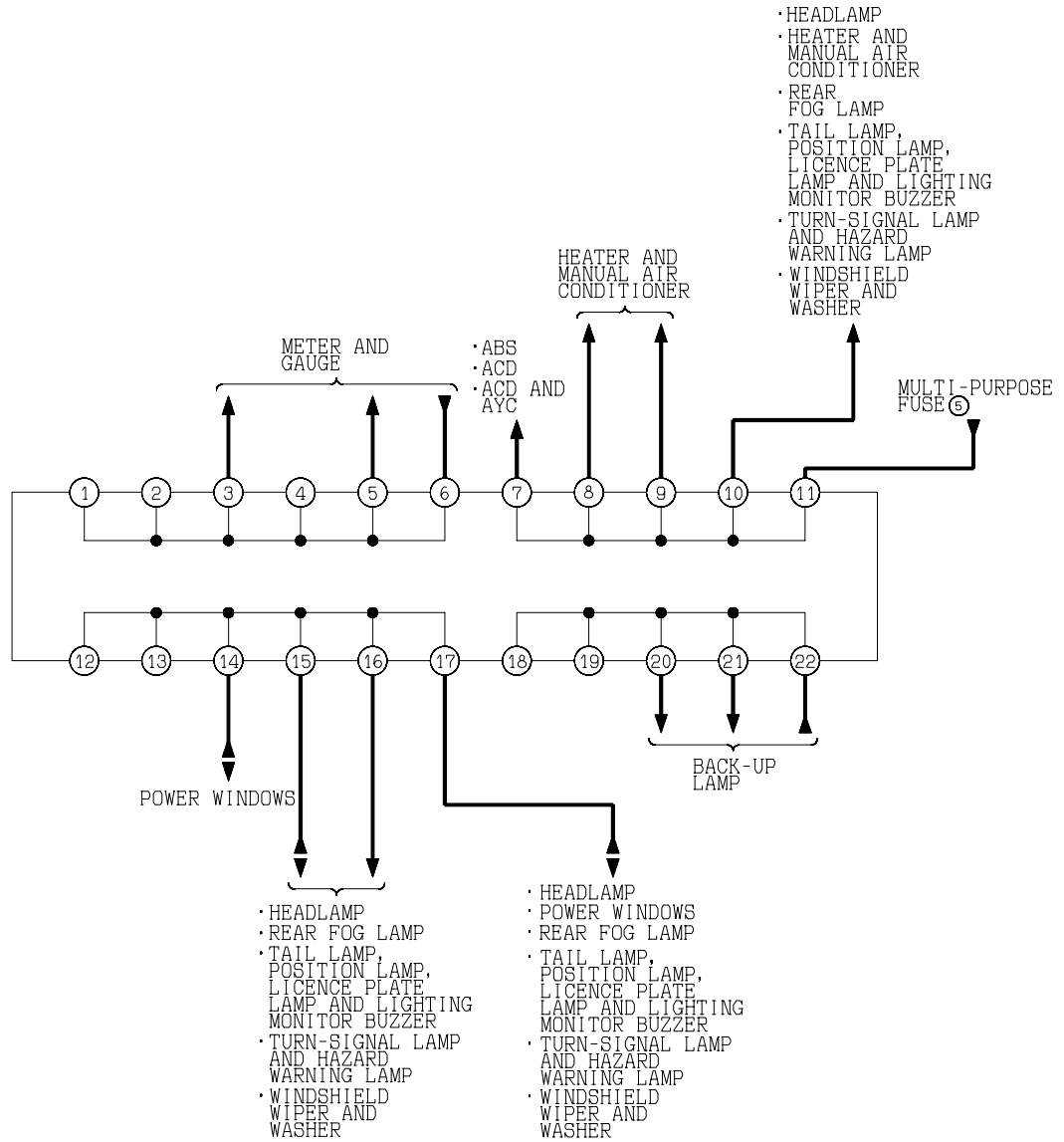
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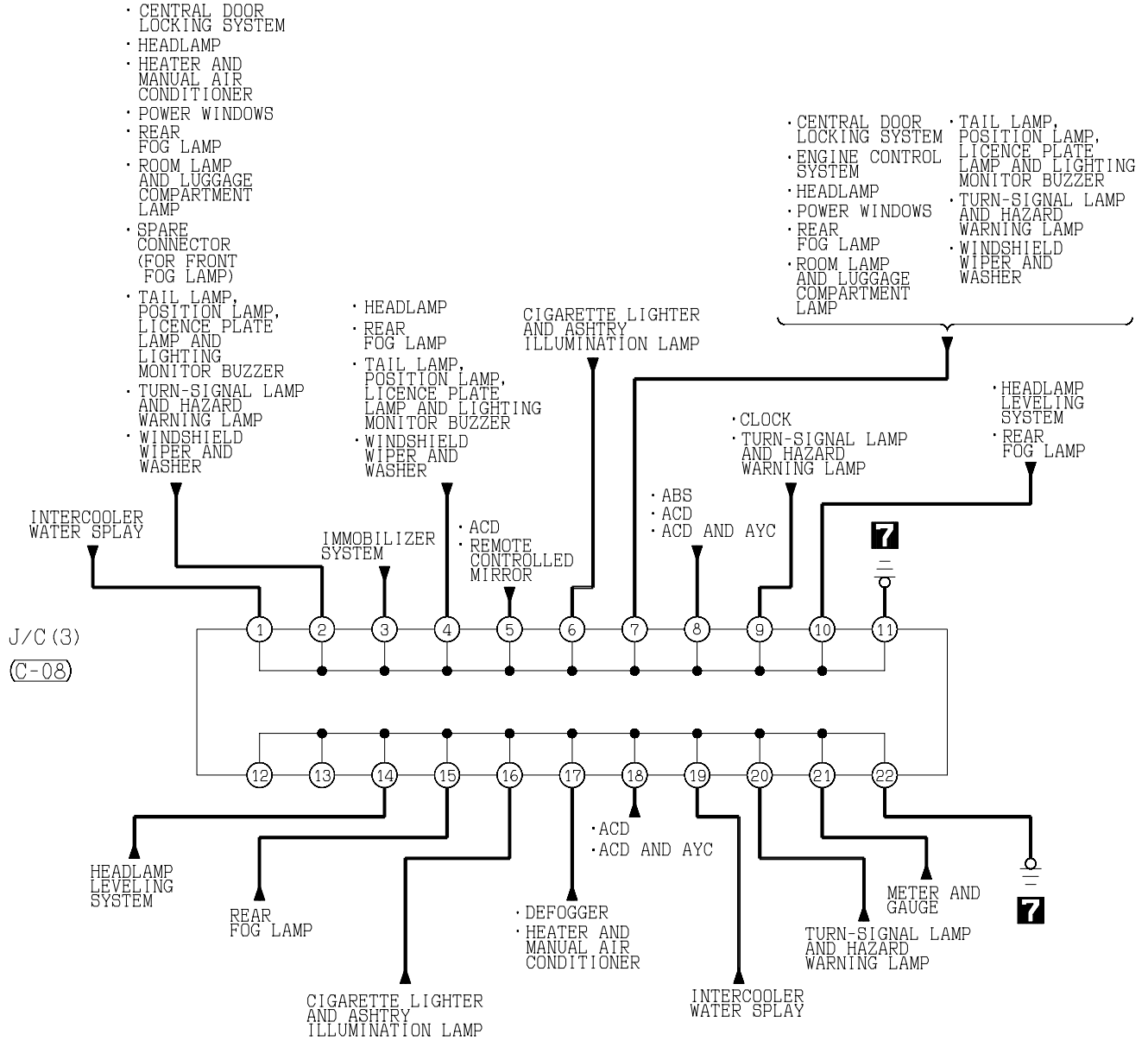
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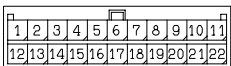
J/C (2)
(C-102)



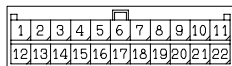
J/C <R.H. drive vehicles> (CONTINUED)

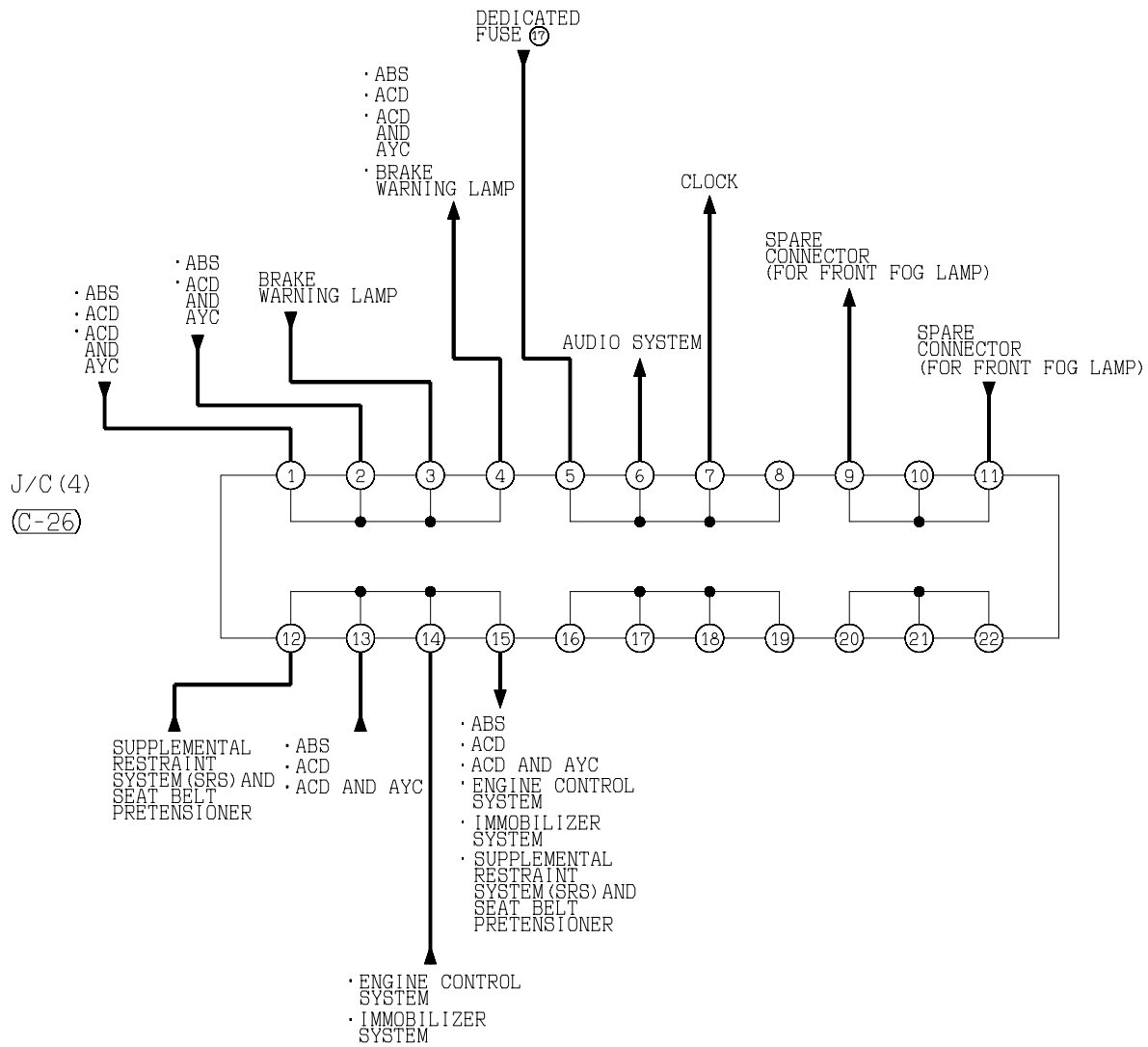


(C-08)

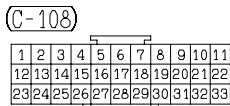
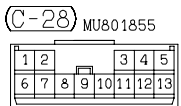
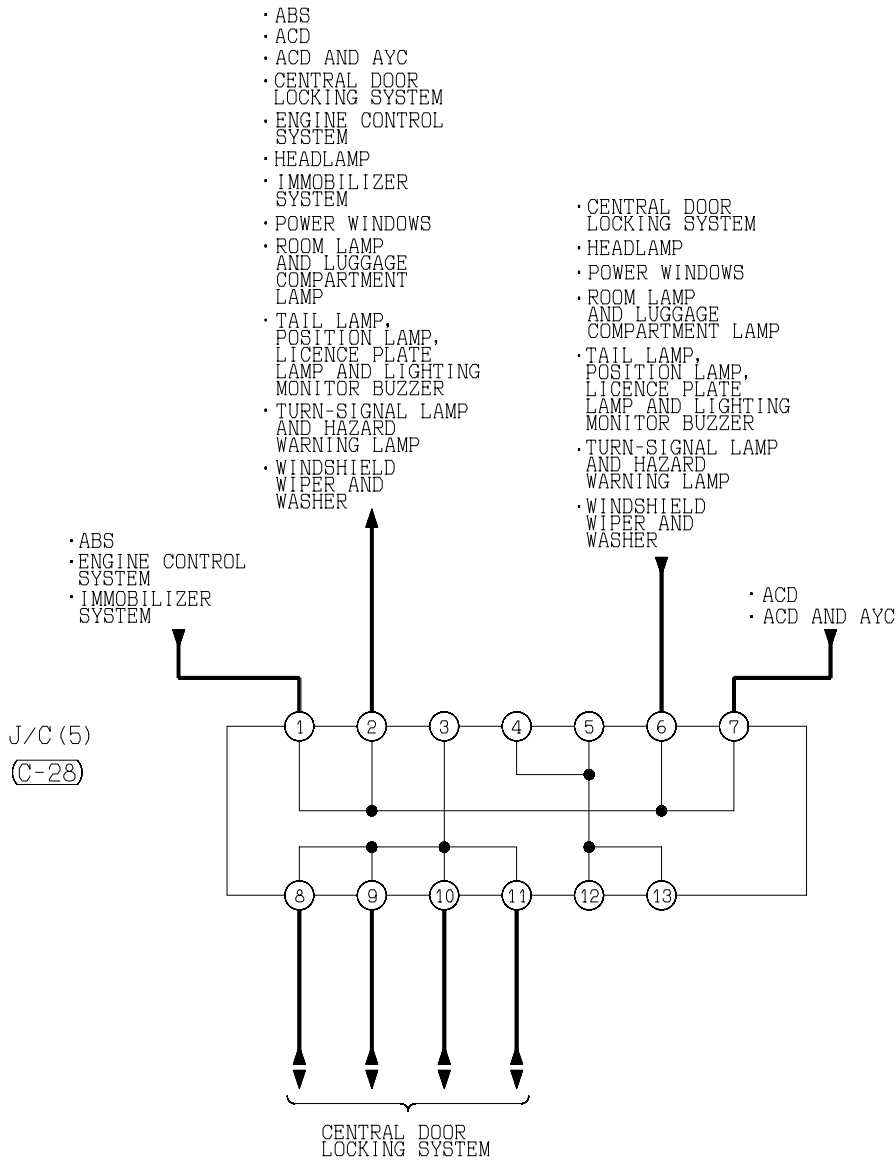


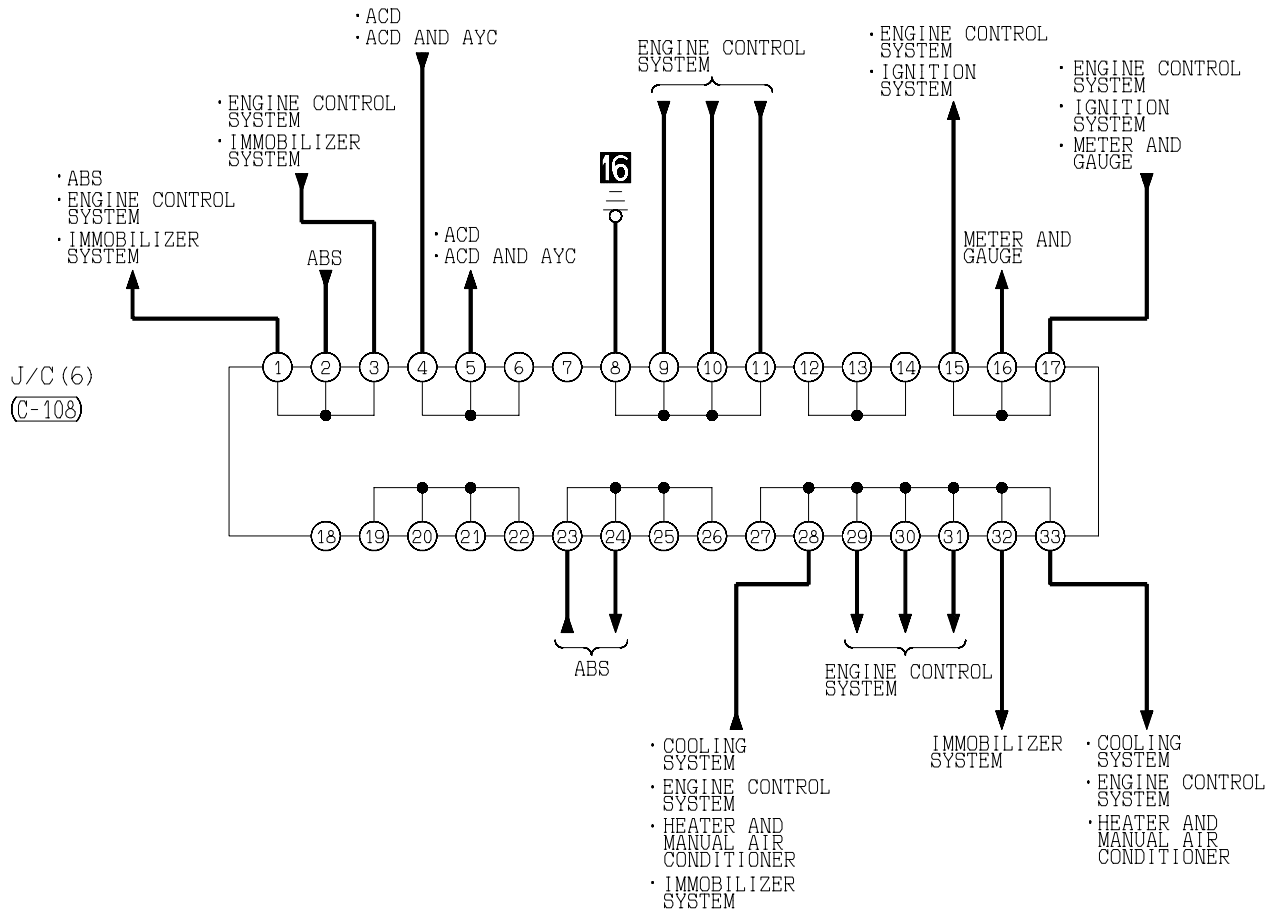
(C-26)





J/C <R.H. drive vehicles> (CONTINUED)



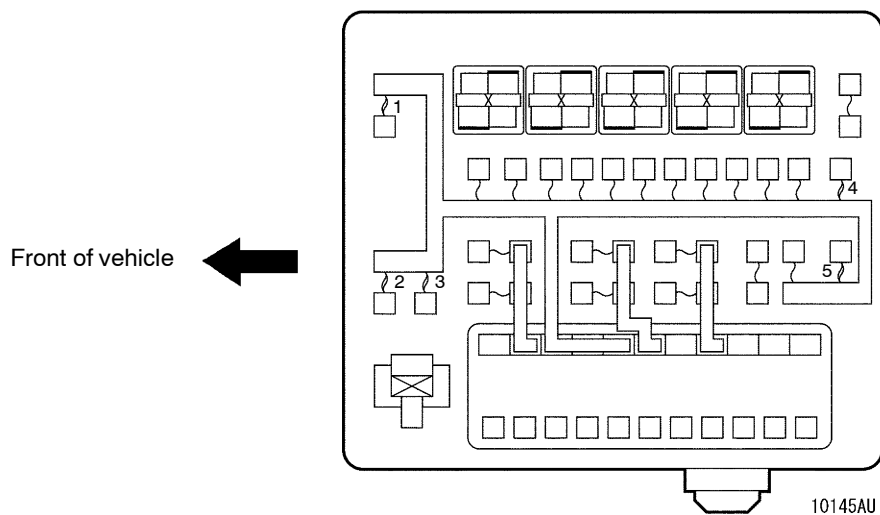


CENTRALIZED JUNCTION

FUSIBLE LINK

No.	Circuit	Type	Housing colour	Rated capacity (A)
1	Multi-purposes fuses No. 15, 16, 17, 19, 20	Screwed type	Yellow	60
2	Cooling circuit and manual air conditioner circuit	Connector type	Red	50
3	ABS circuit	Connector type	Yellow	60
4	Ignition switch	Connector type	Green	40
5	Power window circuit	Connector type	Pink	30
6	Battery, fusible links No. 1, 2, 3, 4 and 5, dedicated fuses No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 18, starting system, front-ECU	Screwed type	-	100
7	ACD	Screwed type	-	60

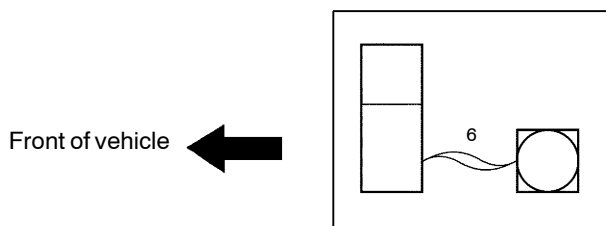
(Relay box in engine compartment)



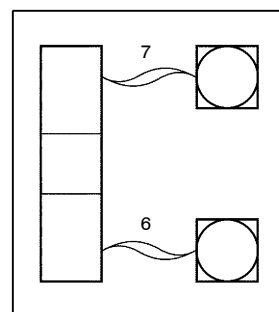
(Connected directly to battery positive (+) terminal)

<Vehicles without ACD>

<Vehicles with ACD>



Y2210AU



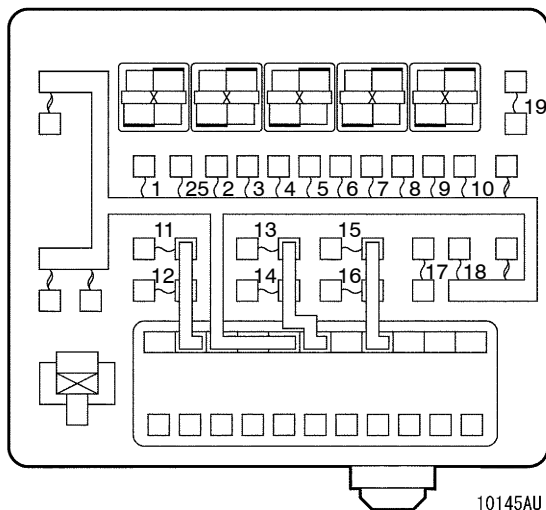
Y2211AU

DEDICATED FUSE

Power supply circuit	No.	Rated capacity (A)	Identification colour	Circuit
Battery/alternator (Fusible link No. 6)	1	15	Blue	Spare connectors
	2	10	Red	Horn relay
	3	20	Yellow	Engine control relay and ignition control relay
	4	10	Red	A/C compressor
	5	15	Blue	ABS-ECU, 4WD-ECU, high-mounted stop lamp and rear combination lamp
	6	30	Green	Condenser fan motor
	7	7.5	Brown	Alternator
	8	10	Red	ETACS-ECU
	9	-	-	-
	10	15	Blue	Fuel pump
Front-ECU (Headlamp relay: HI)	11	10	Red	Headlamp
	12	10	Red	Headlamp
Front-ECU (Headlamp relay: LO)	13	10	Red	Front combination lamp
	14	10	Red	Front combination lamp
Front-ECU (Tail lamp relay)	15	7.5	Brown	Heater control unit or A/C-ECU, clock, combination meter, fog lamp switch, hazard warning switch, radio, rear combination lamp, headlamp leveling switch, front combination lamp, cigarette lighter illumination lamp, ashtray illumination lamp, ACD mode changeover switch and inter cooler water splay switch
	16	7.5	Brown	Front combination lamp, licence plate lamp and rear combination lamp
Ignition switch (ACC)	17	10	Red	Clock
Battery/alternator (Fusible link No. 6)	18	10	Red	Engine-ECU, ETACS-ECU, front-ECU and combination meter
-	19	-	-	-
Fusible link No. 5	21	20	Yellow	Intercooler water splay
-	22	-	-	-
Ignition switch (IG2)	23	-	-	-
-	24	-	-	-
Battery/alternator (Fusible link No. 6)	25	30	Green	Condenser fan motor

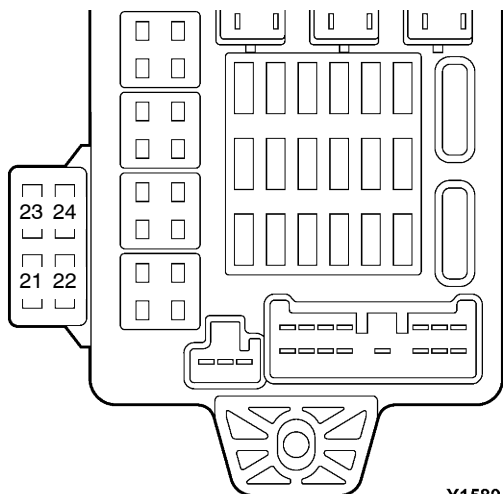
(Relay box in engine compartment)

Front of vehicles

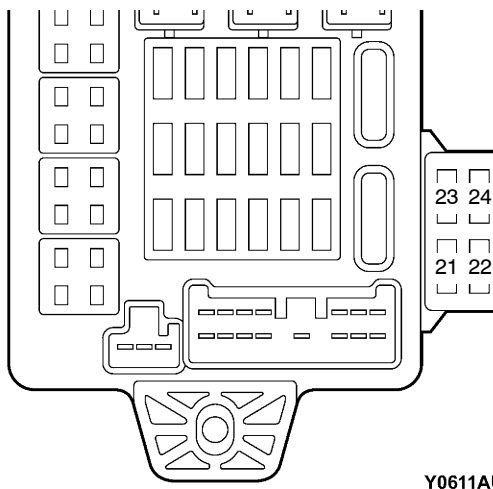


(in junction block)

<L.H. drive vehicles>

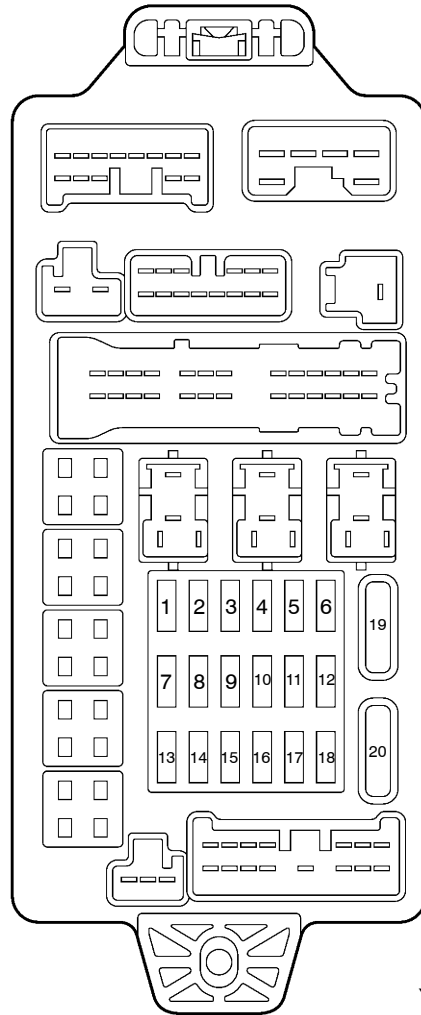


<R.H. drive vehicles>



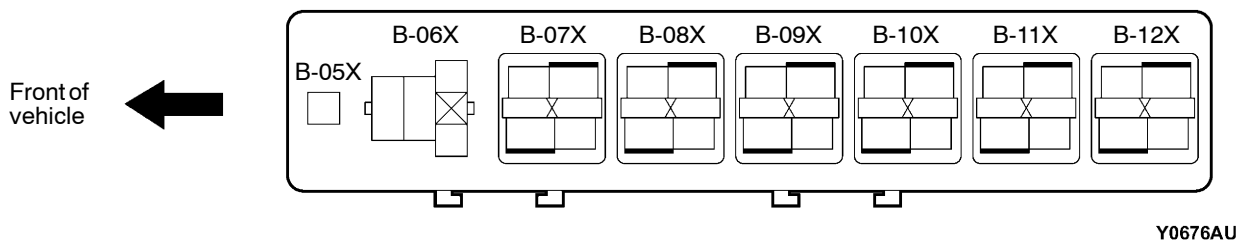
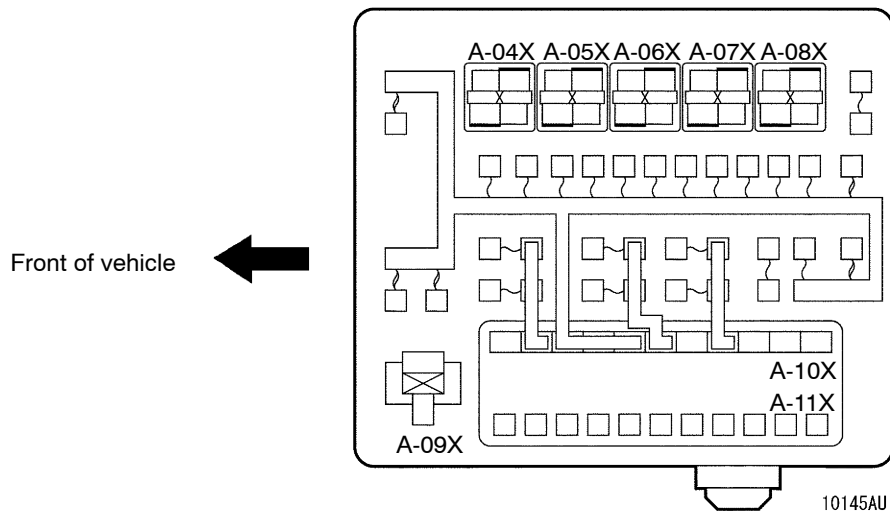
MULTI-PURPOSE FUSE (In junction block)

Power supply circuit		No.	Rated capacity (A)	Identification colour	Circuit
Ignition switch	IG1	1	10	Red	Ignition coil
		2	7.5	Brown	Column switch, combination meter, ETACS-ECU, SRS-ECU, vehicle speed sensor and ACD mode changeover switch
		3	7.5	Brown	ETACS-ECU and SRS-ECU
		4	-	-	-
	IG2	5	7.5	Brown	A/C compressor relay, A/C-ECU, blower relay, condenser fan relay, defogger relay, front-ECU, 4WD-ECU, steering wheel sensor and inter cooler water splay relay
Multi-purpose fuse No. 20 (Defogger relay)		6	-	-	-
Ignition switch	ACC	7	20	Yellow	Front-ECU and windshield wiper motor
	IG1	8	7.5	Brown	Engine-ECU and fuel pump relay (1) and fuel pump relay (2)
	ACC	9	15	Blue	Cigarette lighter
		10	-	-	-
		11	7.5	Brown	A/C-ECU and remote controlled mirror switch
	IG2	12	7.5	Brown	ABS-ECU, G-sensor (longitudinal) and G-sensor (lateral)
	ACC	13	-	-	-
		14	-	-	-
Fusible link No. 1 Battery/alternator		15	15	Blue	Diagnosis connector
		16	10	Red	Rear fog lamp relay
		17	10	Red	ETACS-ECU
		18	-	-	-
		19	30	Green	Blower motor and resistor
		20	30	Green	Defogger



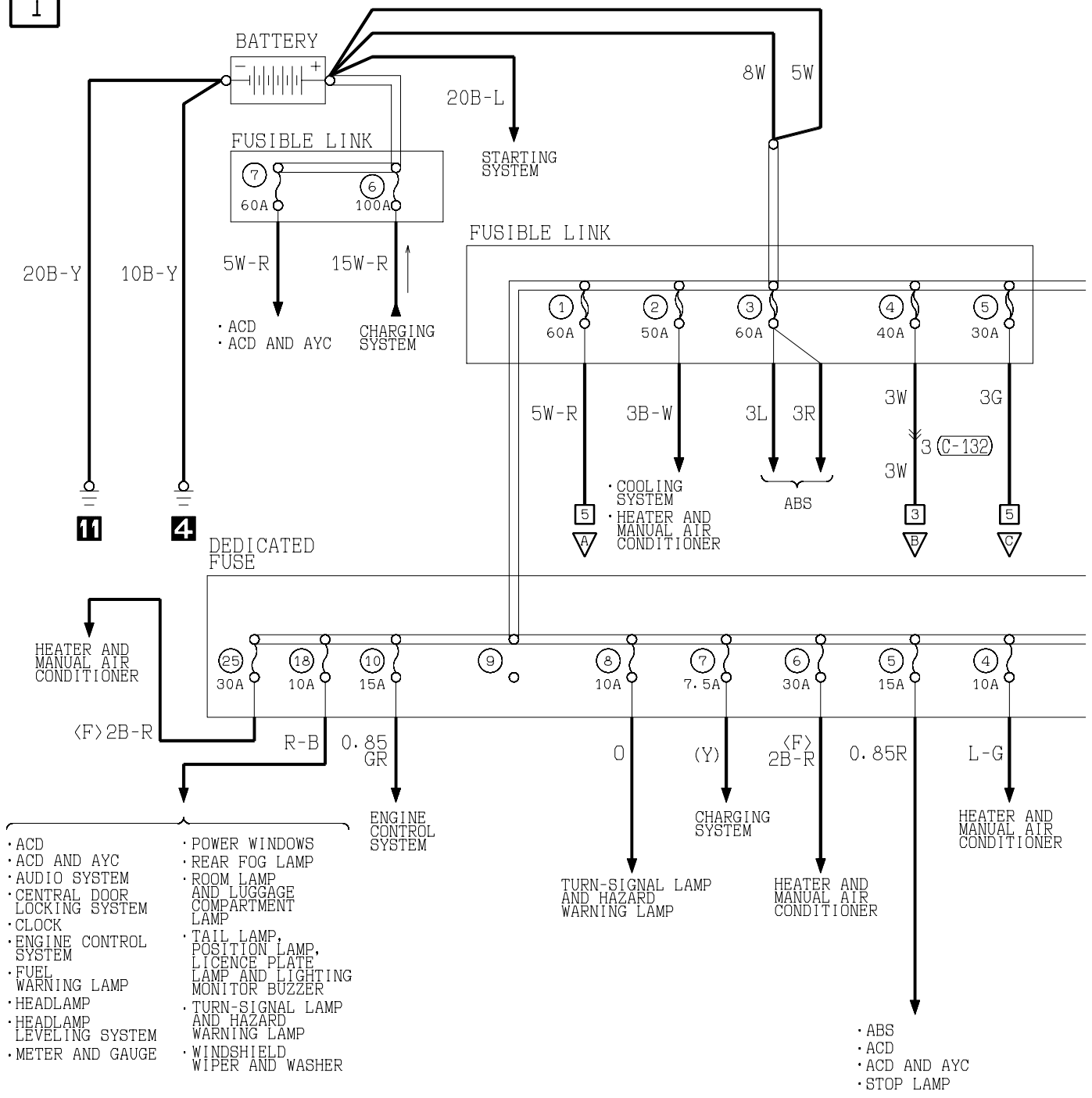
CENTRALIZED RELAY (relay box in engine compartment)

Connector No.	Name	Connector No.	Name
A-04X	Spare connector (for front fog lamp relay)	B-05X	Engine speed detection connector
A-05X	Horn relay	B-06X	-
A-06X	Condenser fan relay (LO)	B-07X	-
A-07X	Condenser fan relay (HI)	B-08X	-
A-08X	-	B-09X	Ignition control relay
A-09X	Radiator fan relay	B-10X	-
A-10X	Front-ECU	B-11X	Engine control relay
A-11X	Front-ECU	B-12X	A/C compressor relay

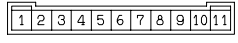


POWER DISTRIBUTION SYSTEM

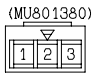
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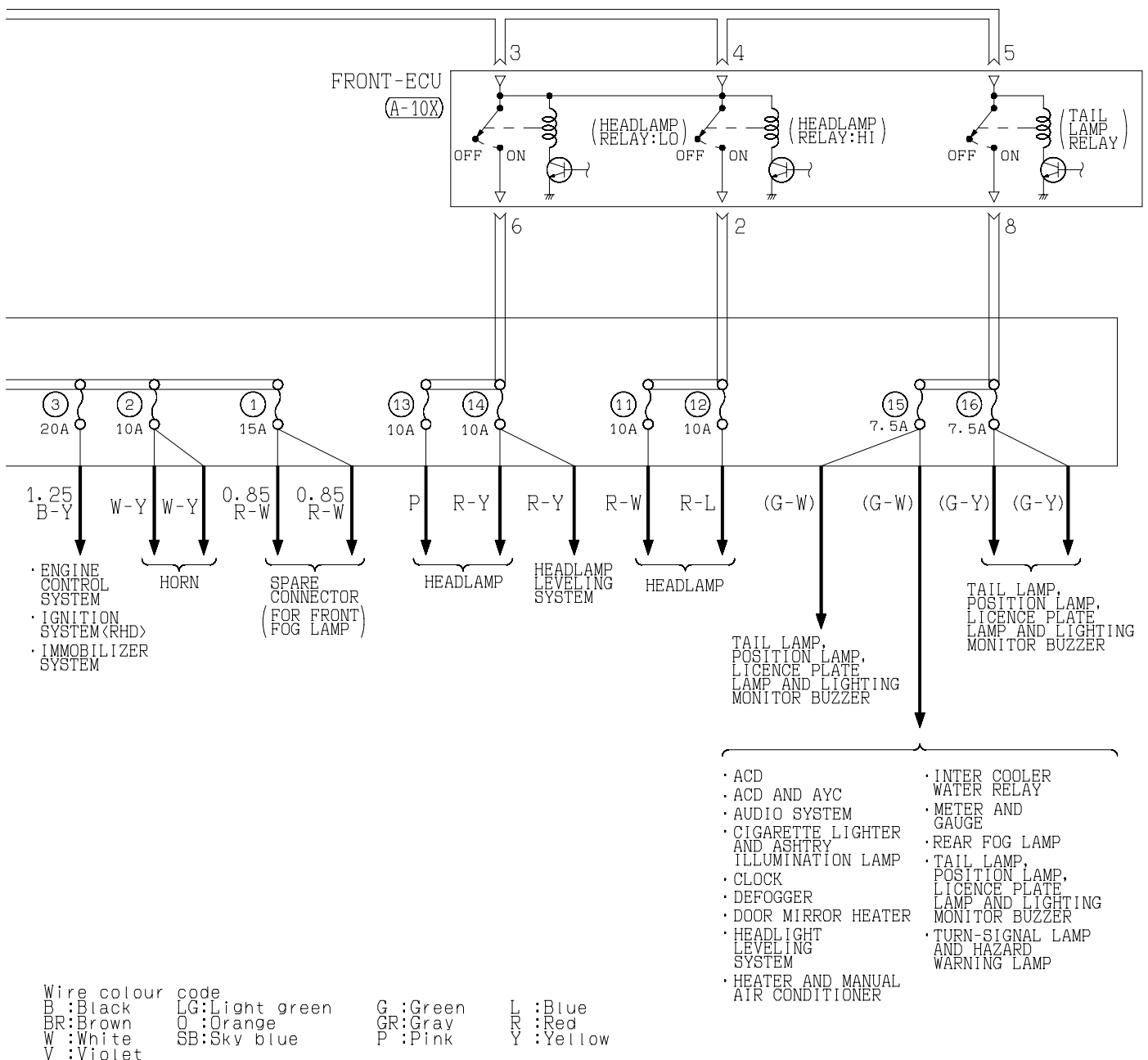


(A-10X)



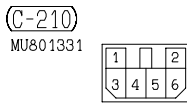
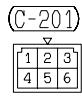
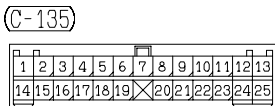
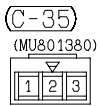
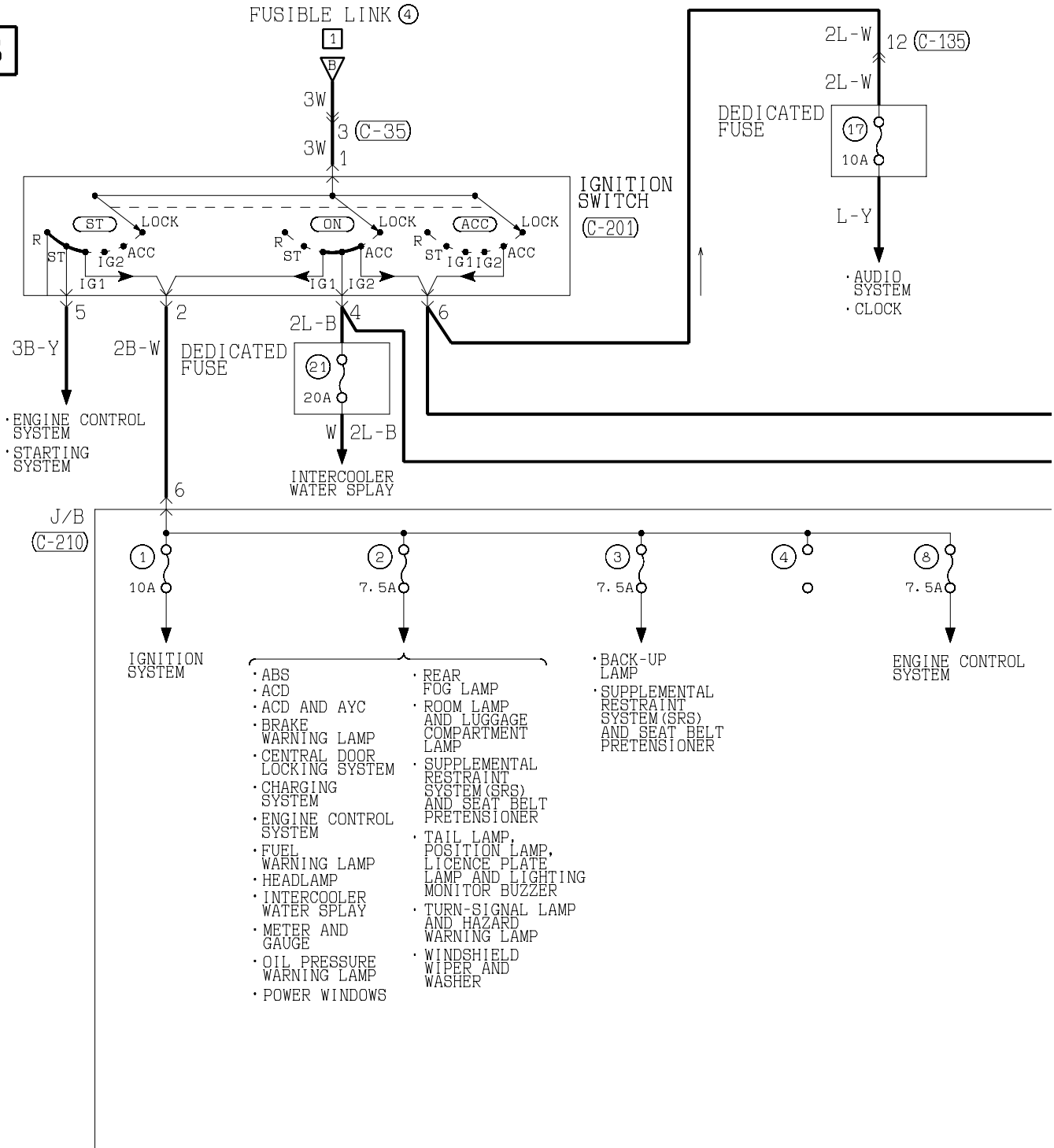
(C-132)

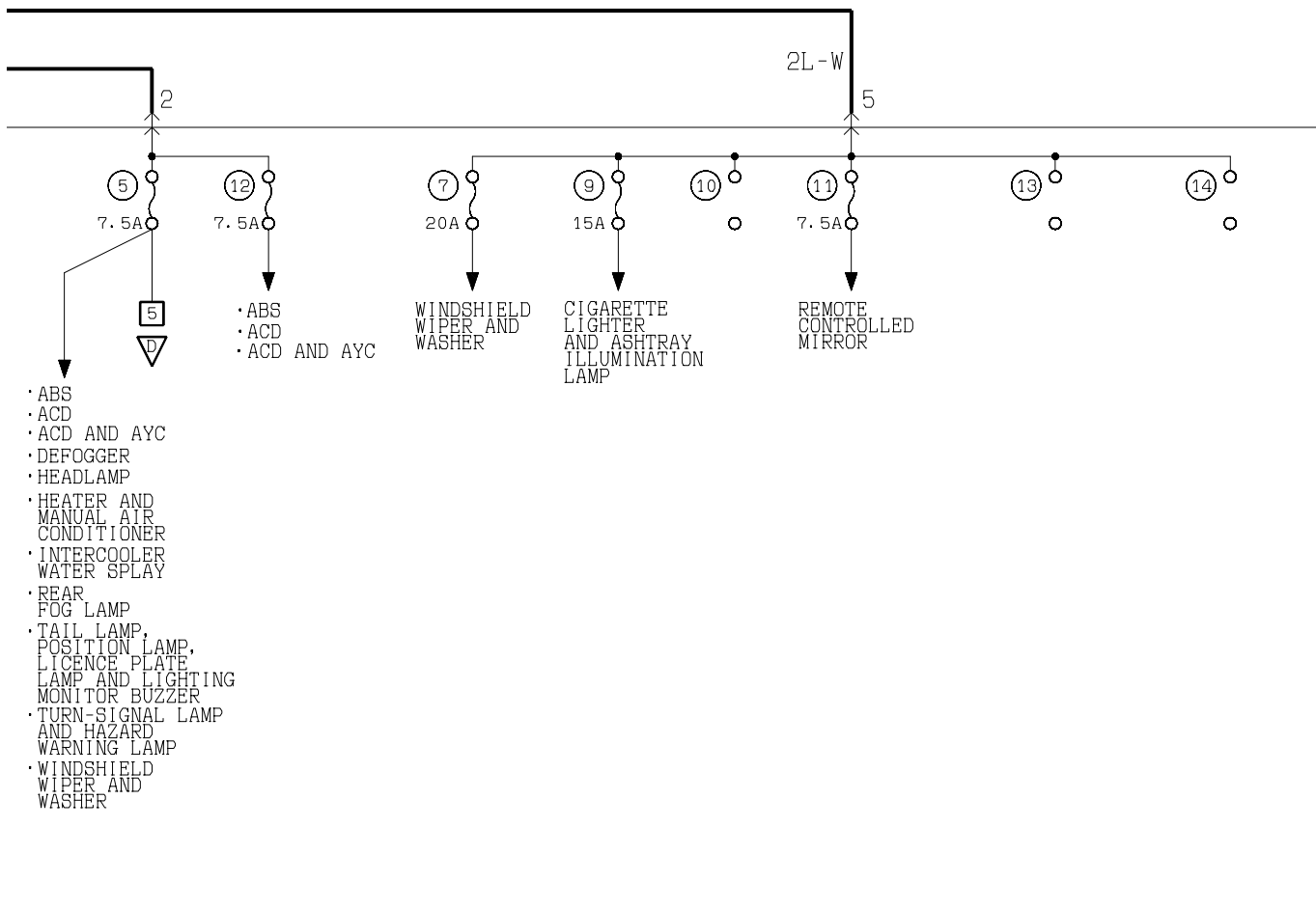




POWER DISTRIBUTION SYSTEM (CONTINUED)

3

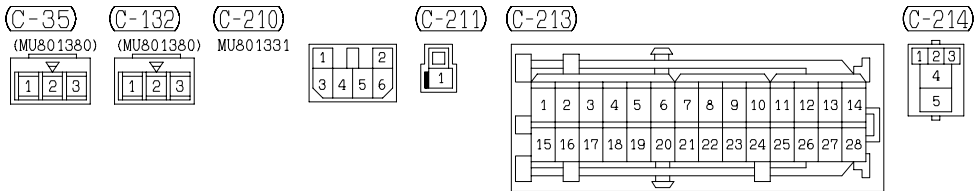
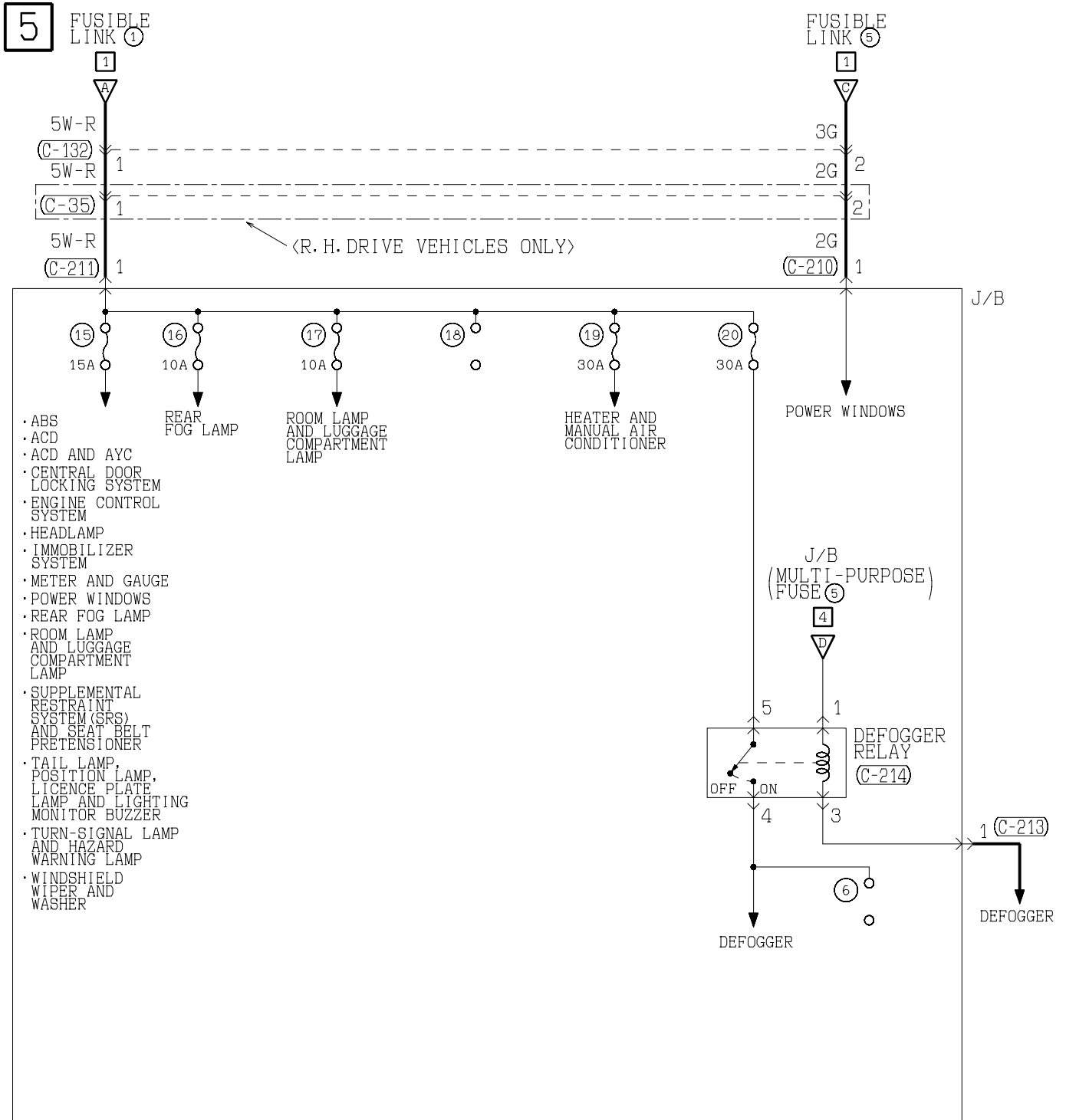




Wire colour code

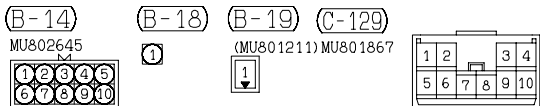
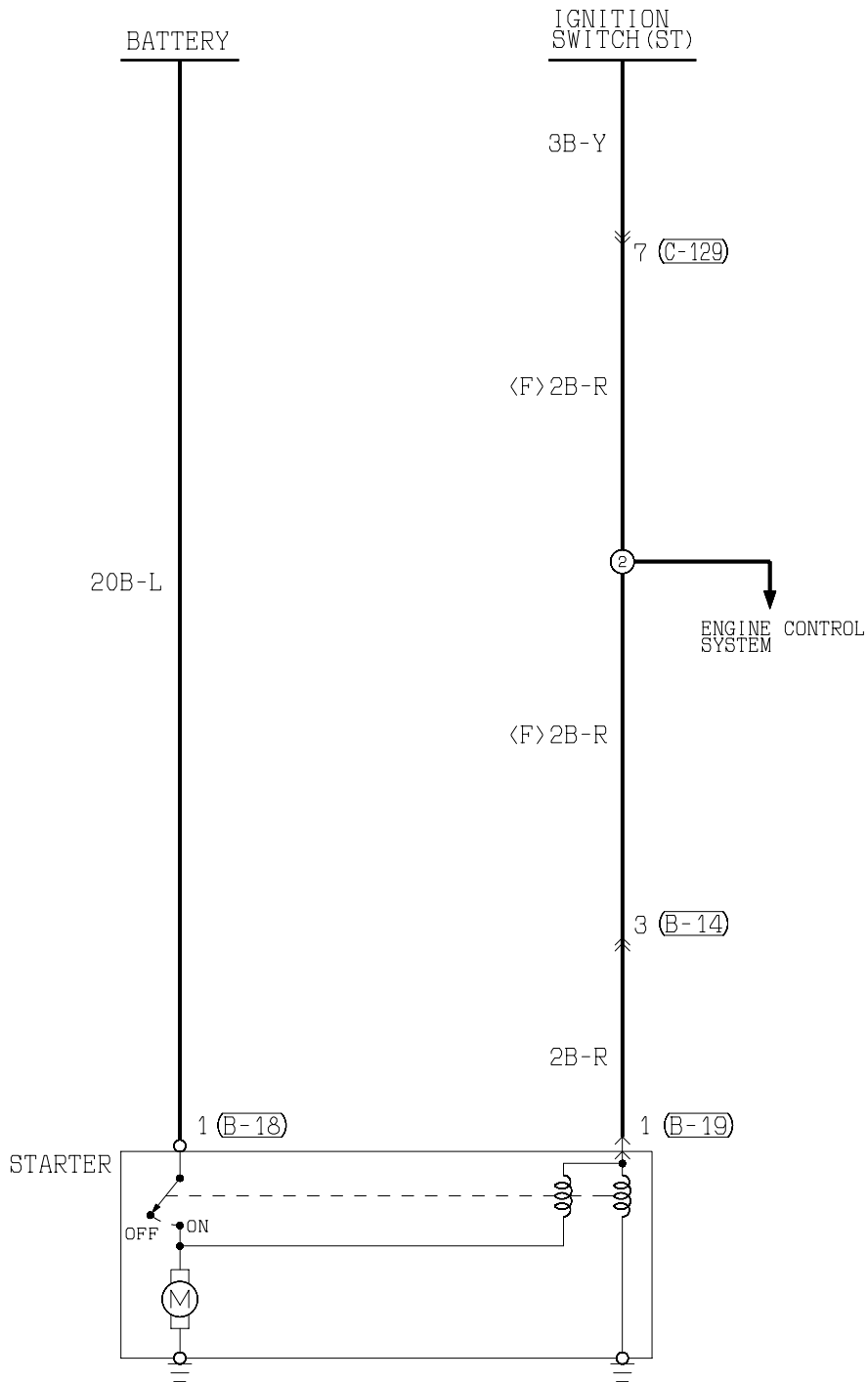
B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

POWER DISTRIBUTION SYSTEM (CONTINUED)



STARTING SYSTEM

1



Wire colour code
 B:Black LG:Light green G:Green L:Blue W:White Y:Yellow SB:Sky blue
 BR:Brown O:Orange GR:Gray R:Red P:Pink V:Violet

STARTING SYSTEM (See P.B-79.)**OPERATION**

When the ignition switch is turned to the ST position, the starter contacts (magnet switch) turns ON and the starter motor starts turning over.

TROUBLESHOOTING HINTS

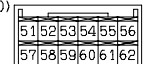
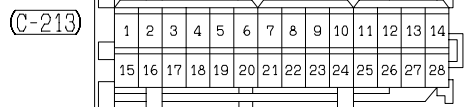
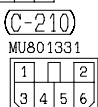
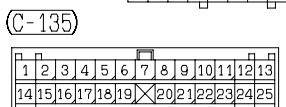
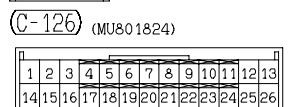
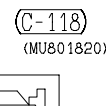
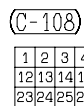
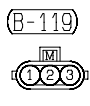
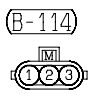
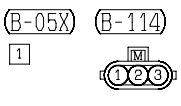
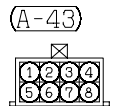
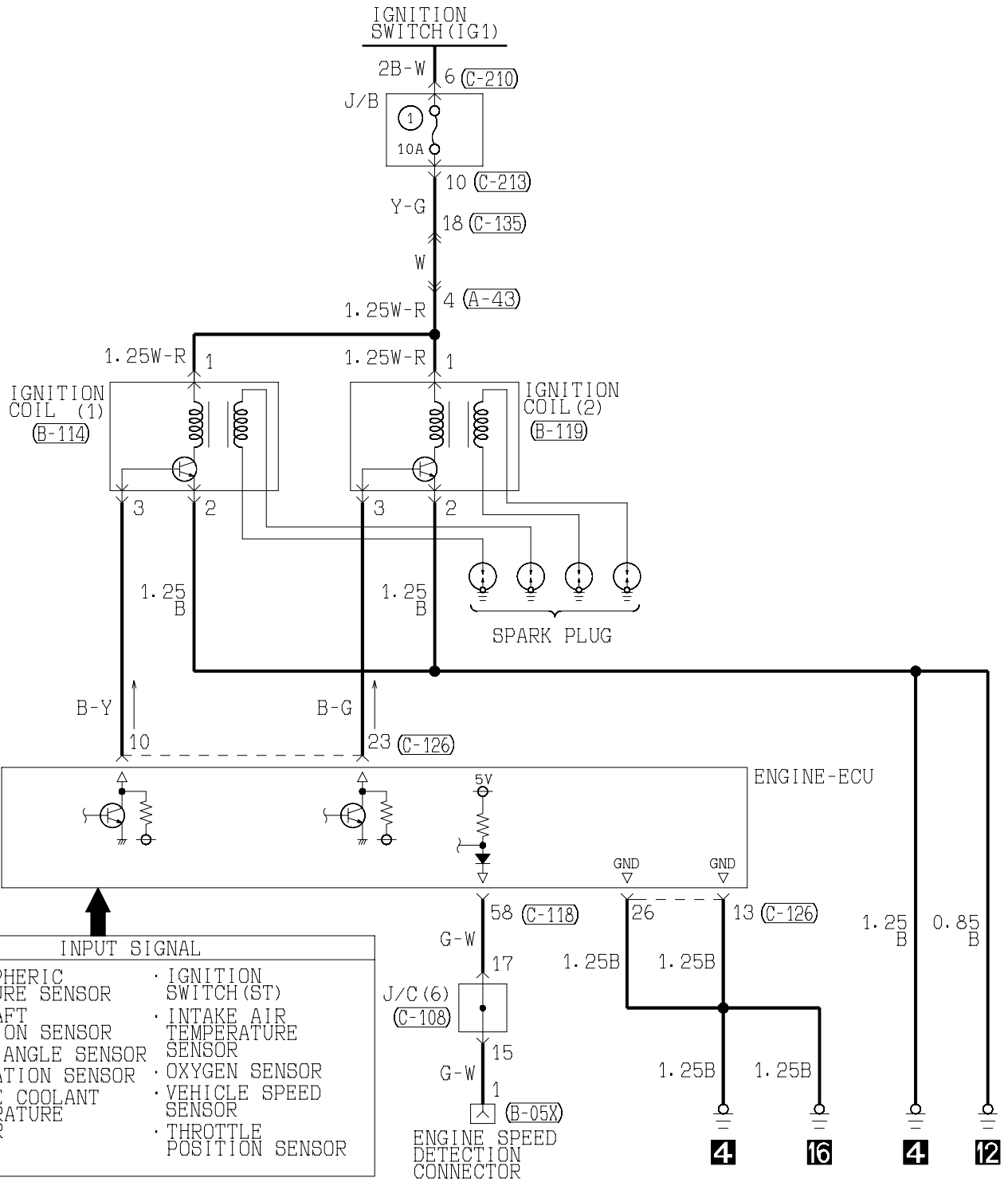
1. Starter motor does not turn over at all.
 - Check starter (coil).
 - Check battery terminals for proper contact.
2. Starter motor does not stop rotating.
 - Check starter (magnet switch).

NOTES

IGNITION SYSTEM

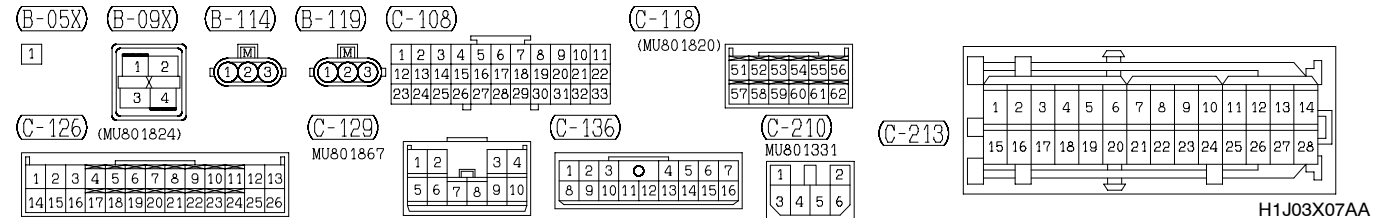
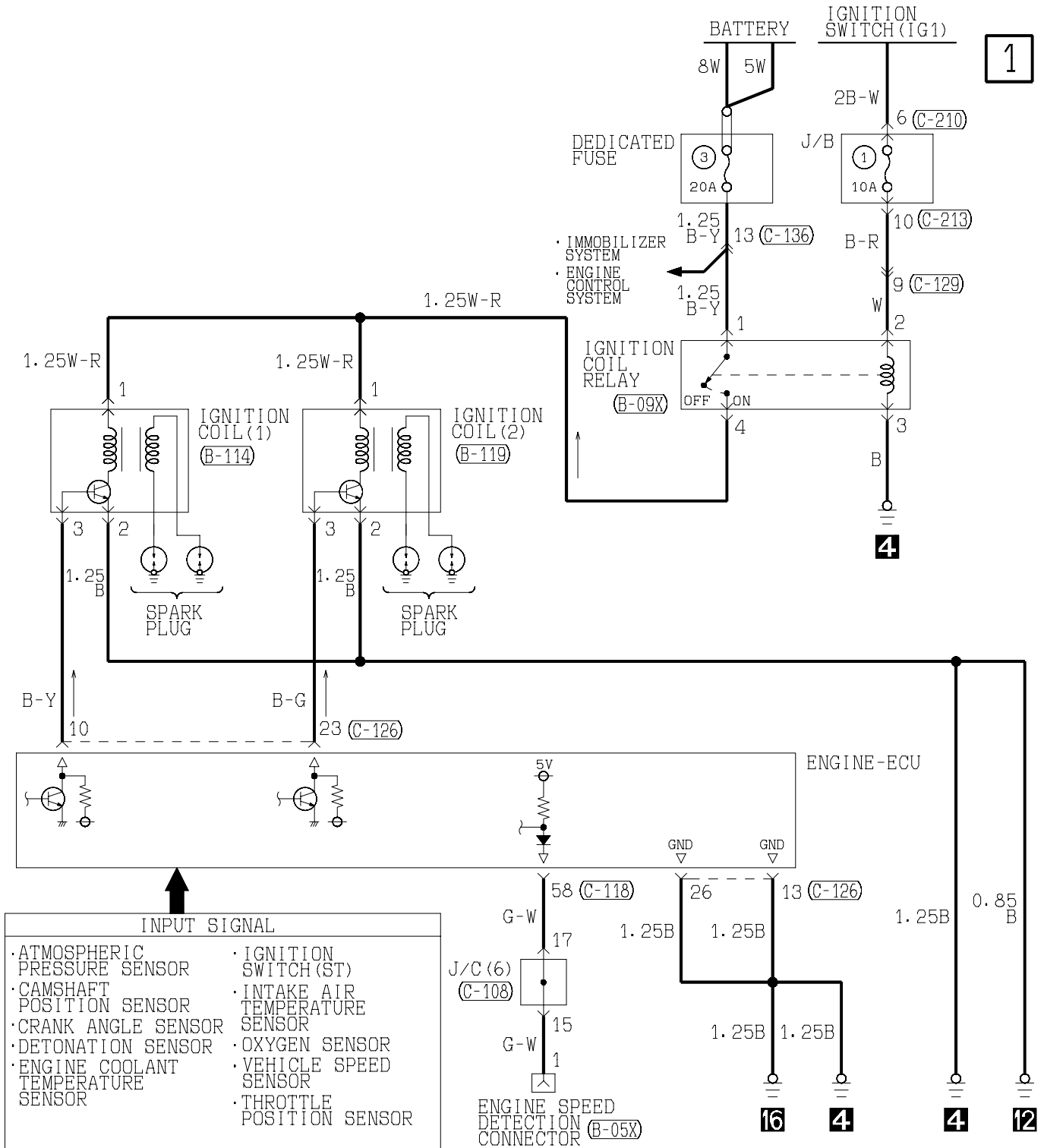
L.H. drive vehicles

1

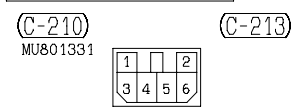
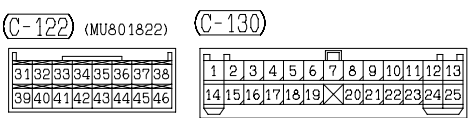
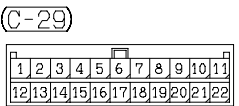
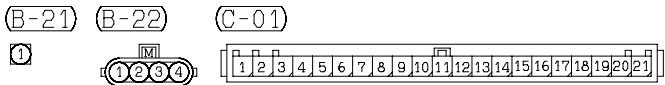
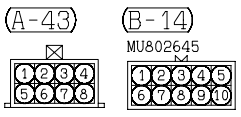
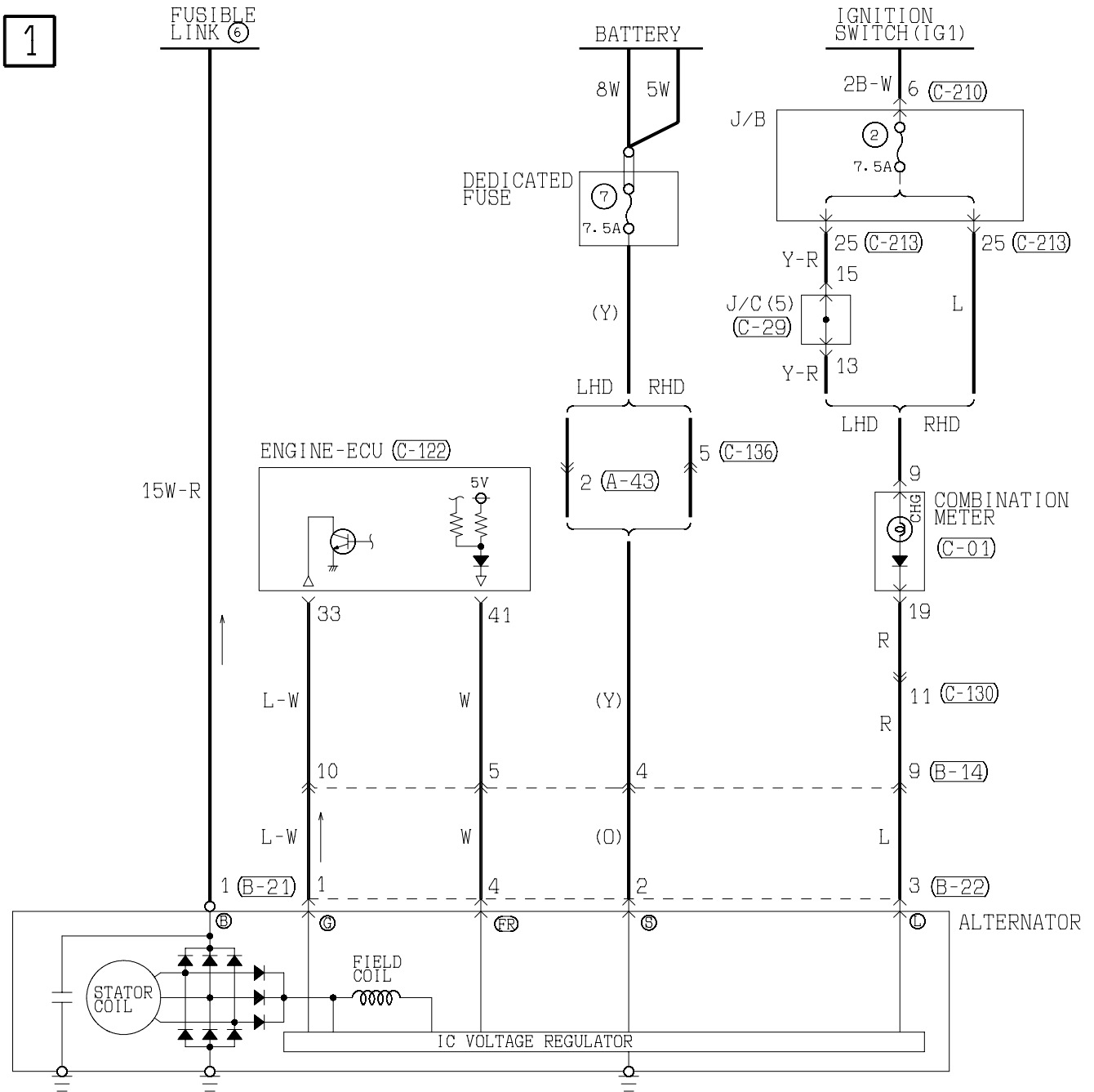


IGNITION SYSTEM

R.H. drive vehicles



CHARGING SYSTEM



CHARGING SYSTEM (See P.B-84.)**OPERATION****When engine is stationary**

- When the ignition switch is turned to the ON position, current flows the alternator L terminal and, at the same time, the charge warning lamp illuminates.

When engine is started and after engine has started

- When the engine is started, the charge warning lamp goes out because of the charging voltage begin applied to the alternator L terminal.
- The battery voltage being applied to the alternator S terminal is monitored by the voltage regulator. Therefore, the amount of electricity produced by the alternator is controlled by allowing and cutting off the current flowing to the field coil.
- The alternator B terminal supplies power to each load.

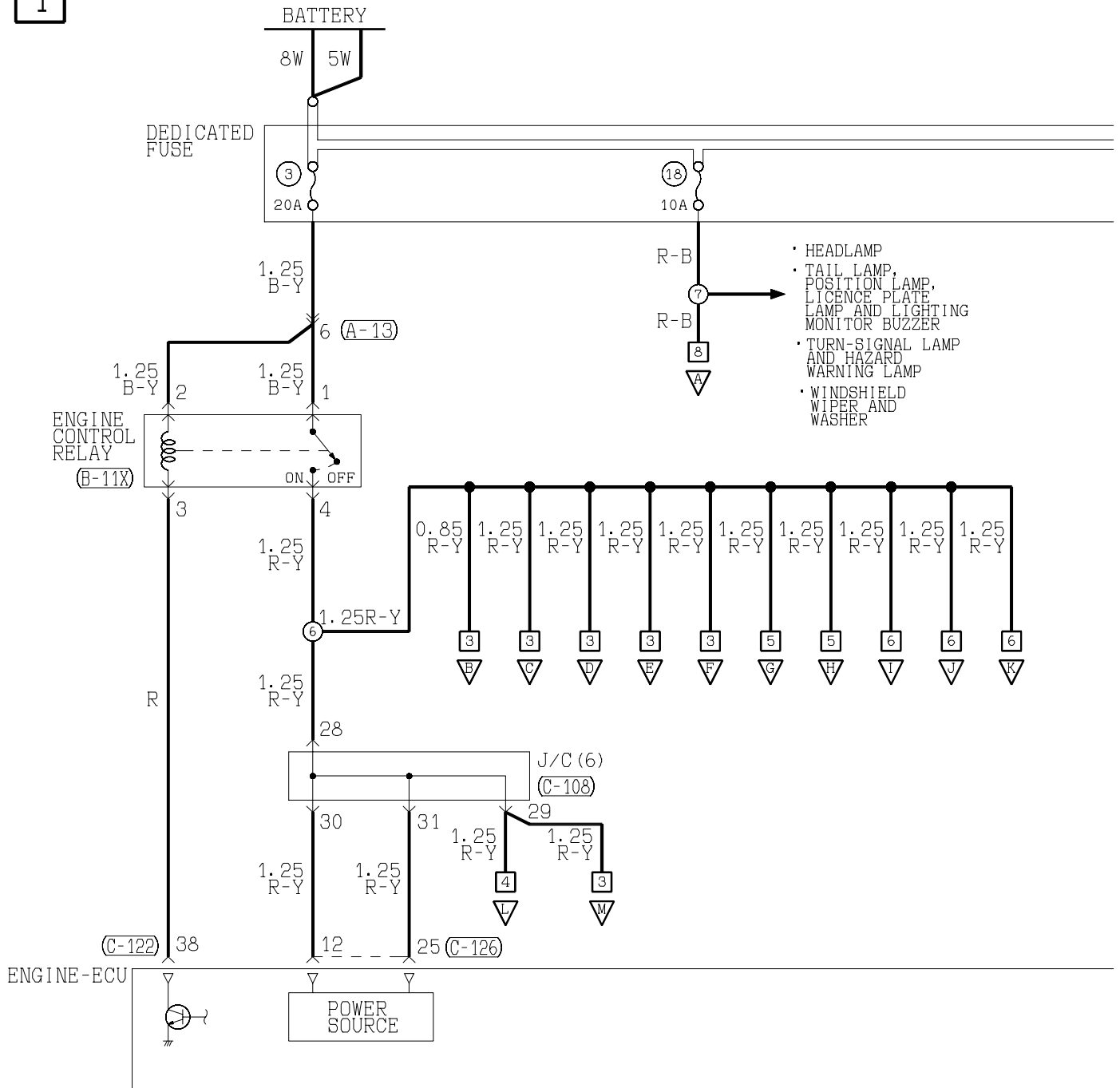
TROUBLESHOOTING HINTS

1. Charging indicator lamp does not illuminate when the ignition switch is turned to ON position, before the engine starts.
 - Check multi-purpose fuse No.(2).
 - Check the bulb.
2. Charging indicator lamp fails to switch off once the engine starts.
 - Check voltage regulator of alternator.
3. Discharged or overcharged battery.
 - Check voltage regulator of alternator.
4. Charge warning lamp illuminates dimly.
 - Check combination meter diode (for short).

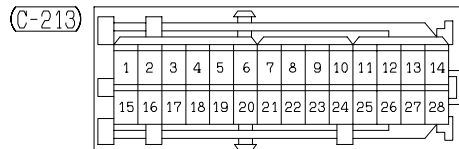
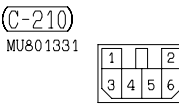
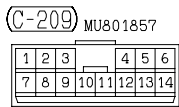
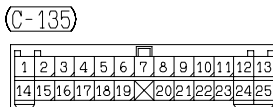
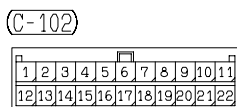
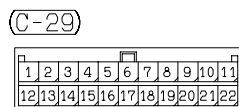
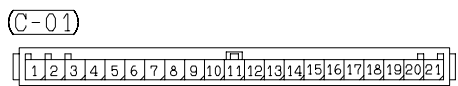
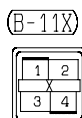
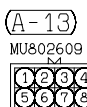
ENGINE CONTROL SYSTEM

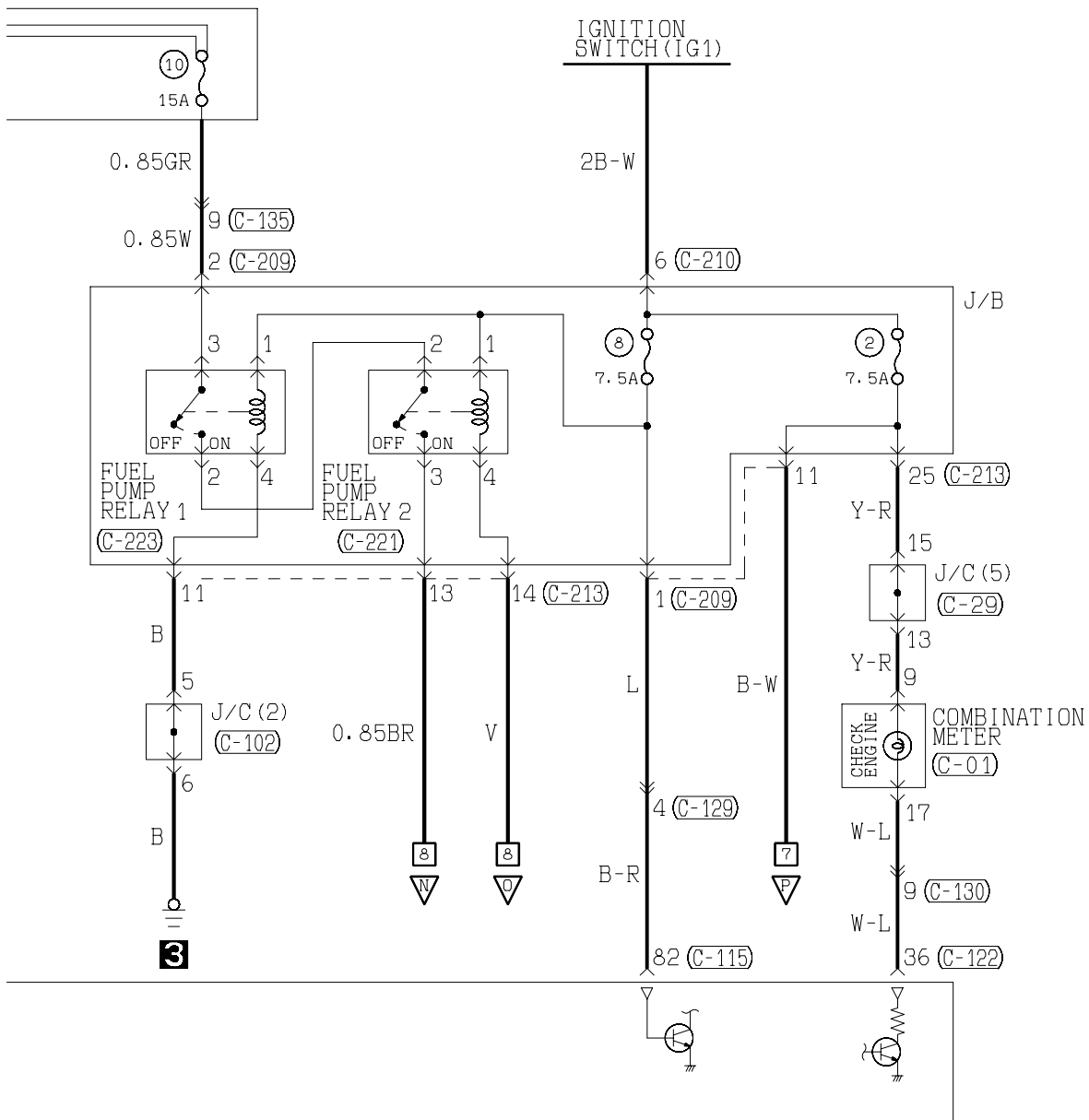
L.H. drive vehicles

1



- HEADLAMP
- TAIL LAMP, POSITION LAMP, LICENCE PLATE LAMP AND LIGHTING MONITOR BUZZER
- TURN-SIGNAL LAMP AND HAZARD WARNING LAMP
- WINDSHIELD WIPER AND WASHER





(C-108)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

(C-115) (MU801823)

71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

(C-122) (MU801822)

31	32	33	34	35	36	37	38
39	40	41	42	43	44	45	46

(C-126) (MU801824)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

(C-129)

MU801867

1	2	3	4		
5	6	7	8	9	10

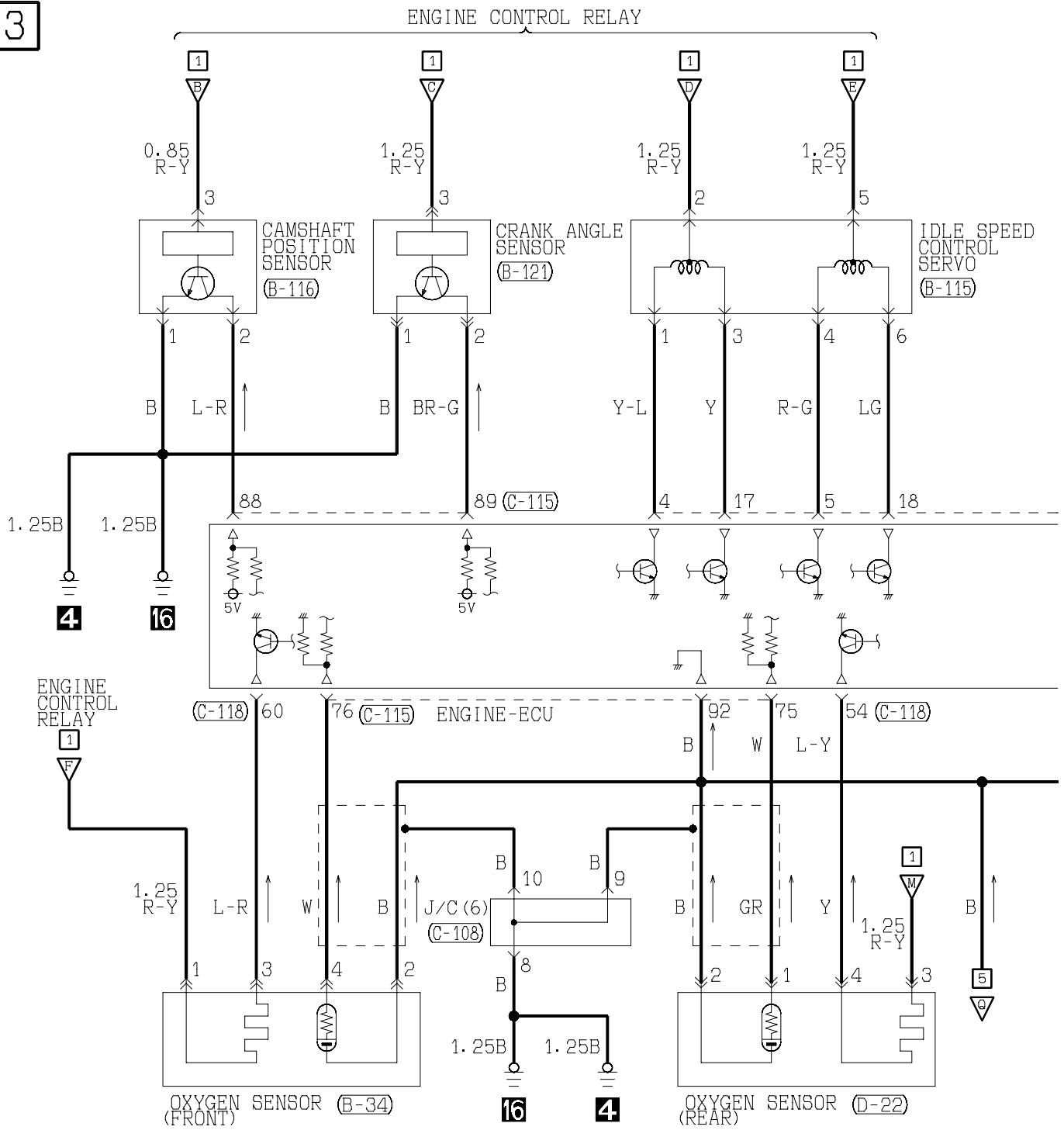
(C-130)

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14	15	16	17	18	19	20	21	22	23	24	25	

Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

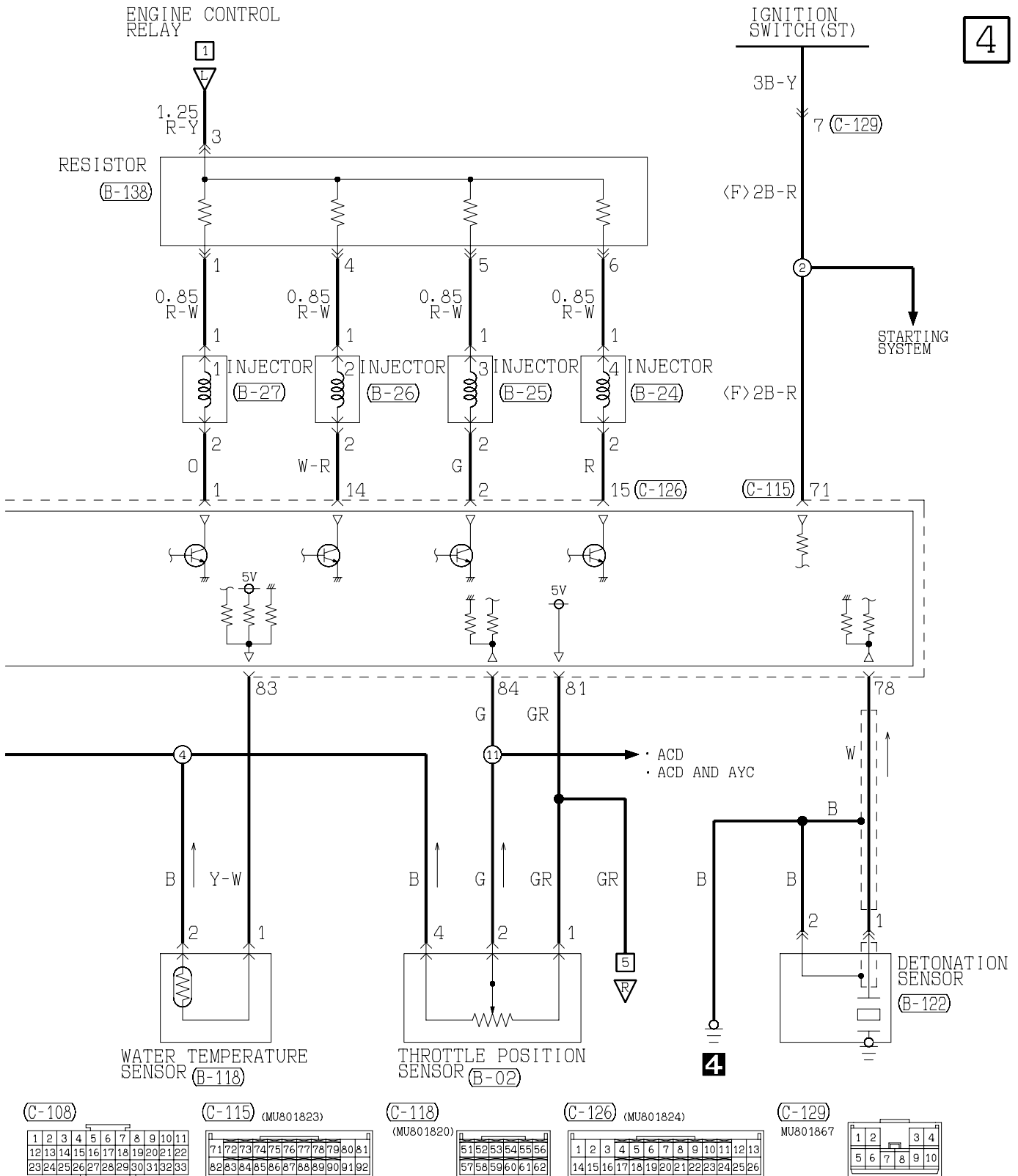
ENGINE CONTROL SYSTEM <L.H. drive vehicles> (CONTINUED)

3



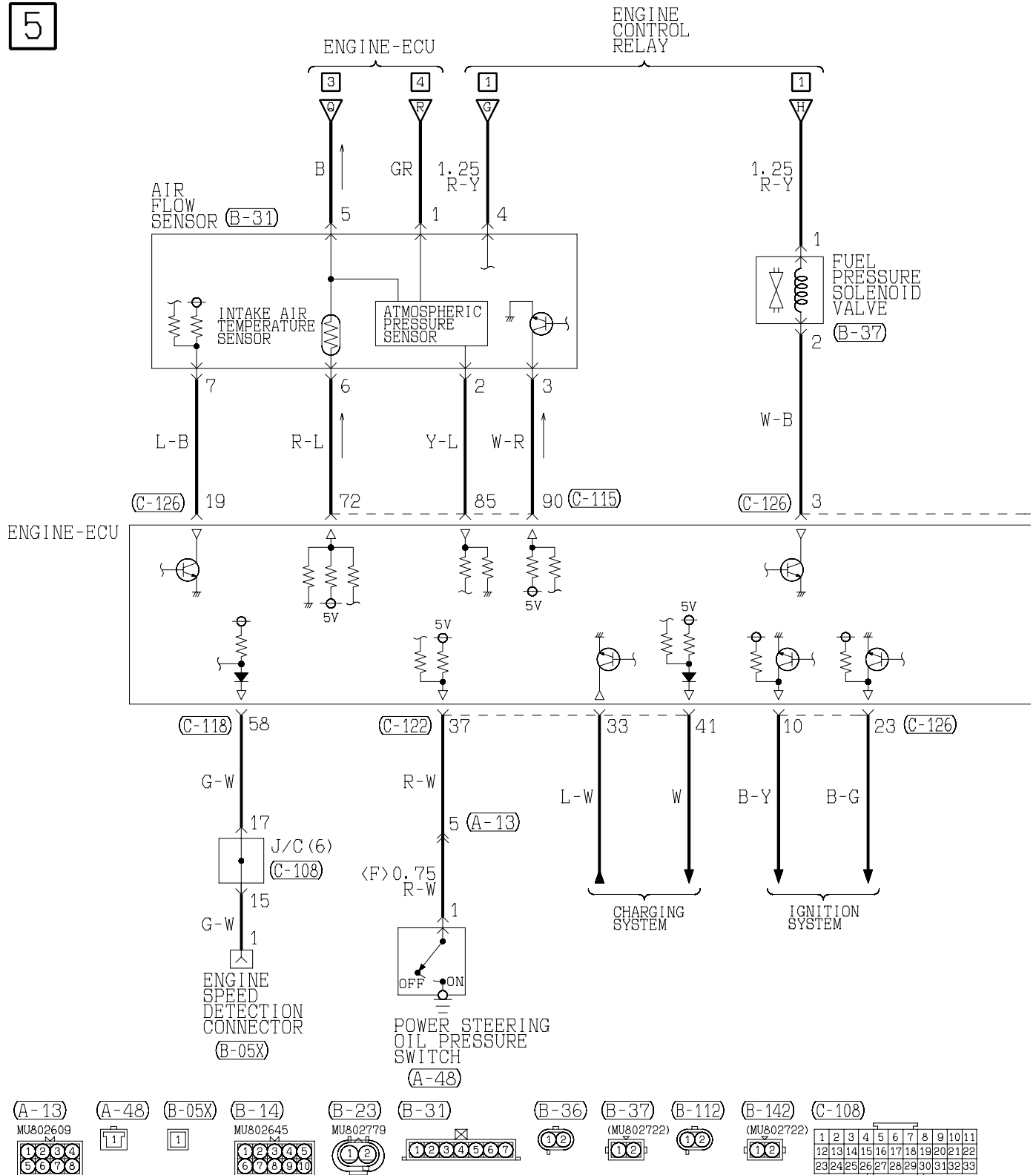
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- (B-24) (MU802722) [1 2]
- (B-25) (MU802722) [0 2]
- (B-26) (MU802722) [1 2]
- (B-27) (MU802722) [1 2]
- (B-34) (MU802605) [1 2 3 4]
- (B-115) (MU802337) [1 2 3 4 5 6]
- (B-116) (MU802337) [1 2 3]
- (B-118) (MU802406) [1 2]
- (B-121) (MU802603) [1 2]
- (B-122) (MU802661) [1 2]
- (B-138) (MU802607) [1 2 3 4 5 6]
- (D-22) (MU801446) [1 2 3 4]

4

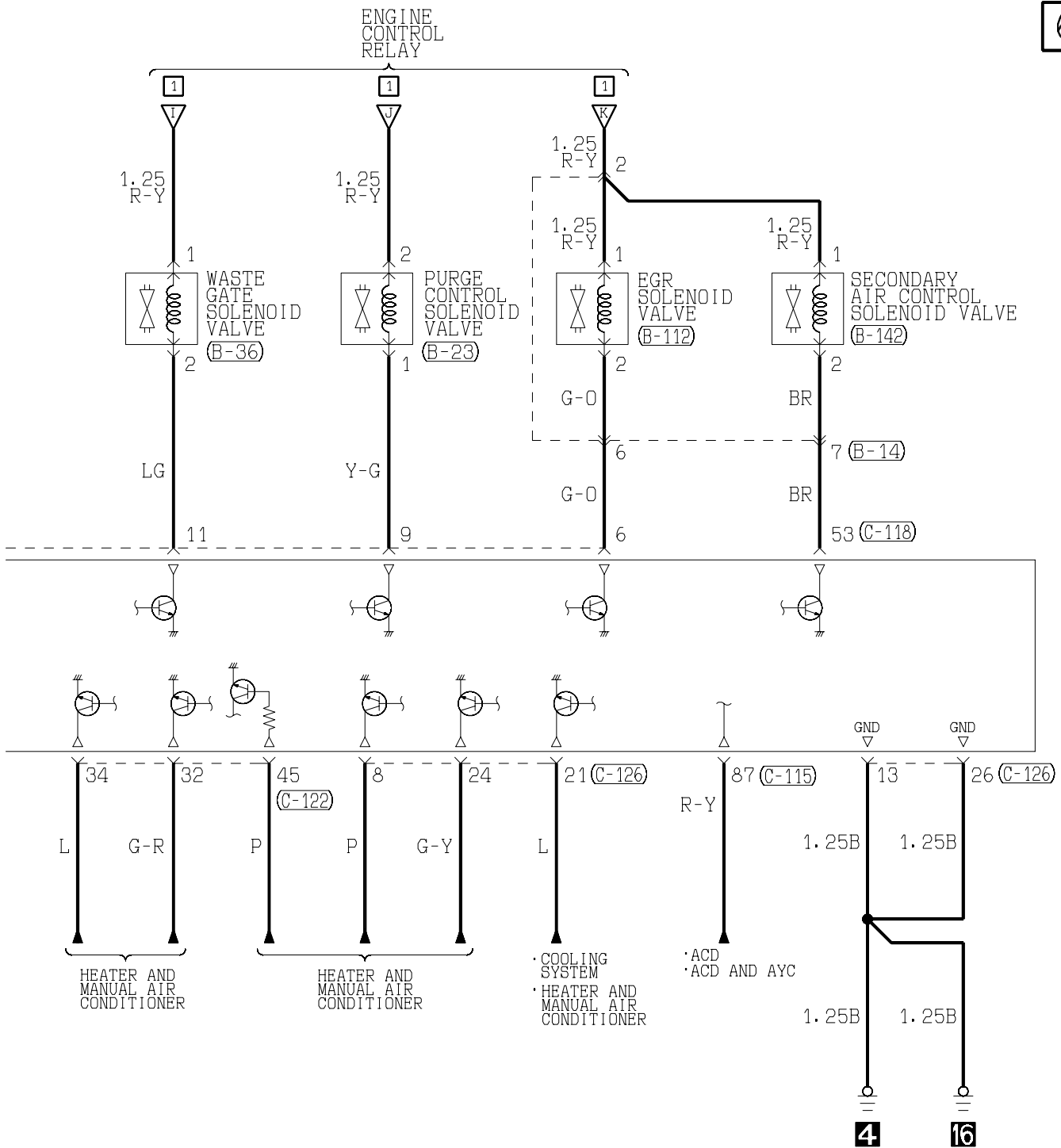


ENGINE CONTROL SYSTEM <L.H. drive vehicles> (CONTINUED)

5



6



(C-115) (MU801823)

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82	83	84	85	86	87	88	89	90	91	92

(C-118) (MU801820)

51	52	53	54	55	56
57	58	59	60	61	62

(C-122) (MU801822)

31	32	33	34	35	36	37	38
39	40	41	42	43	44	45	46

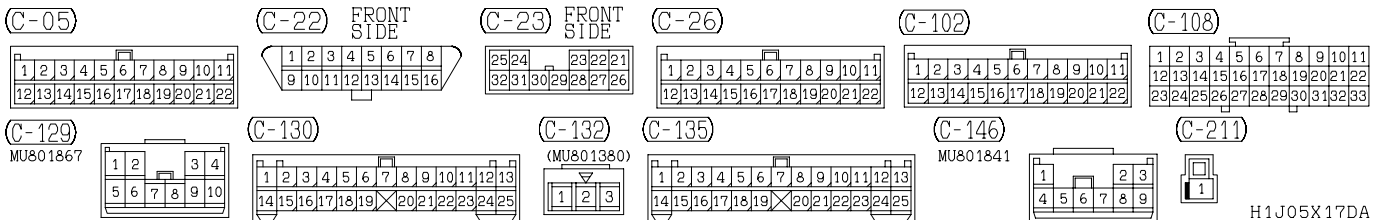
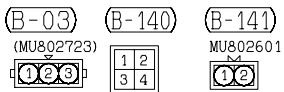
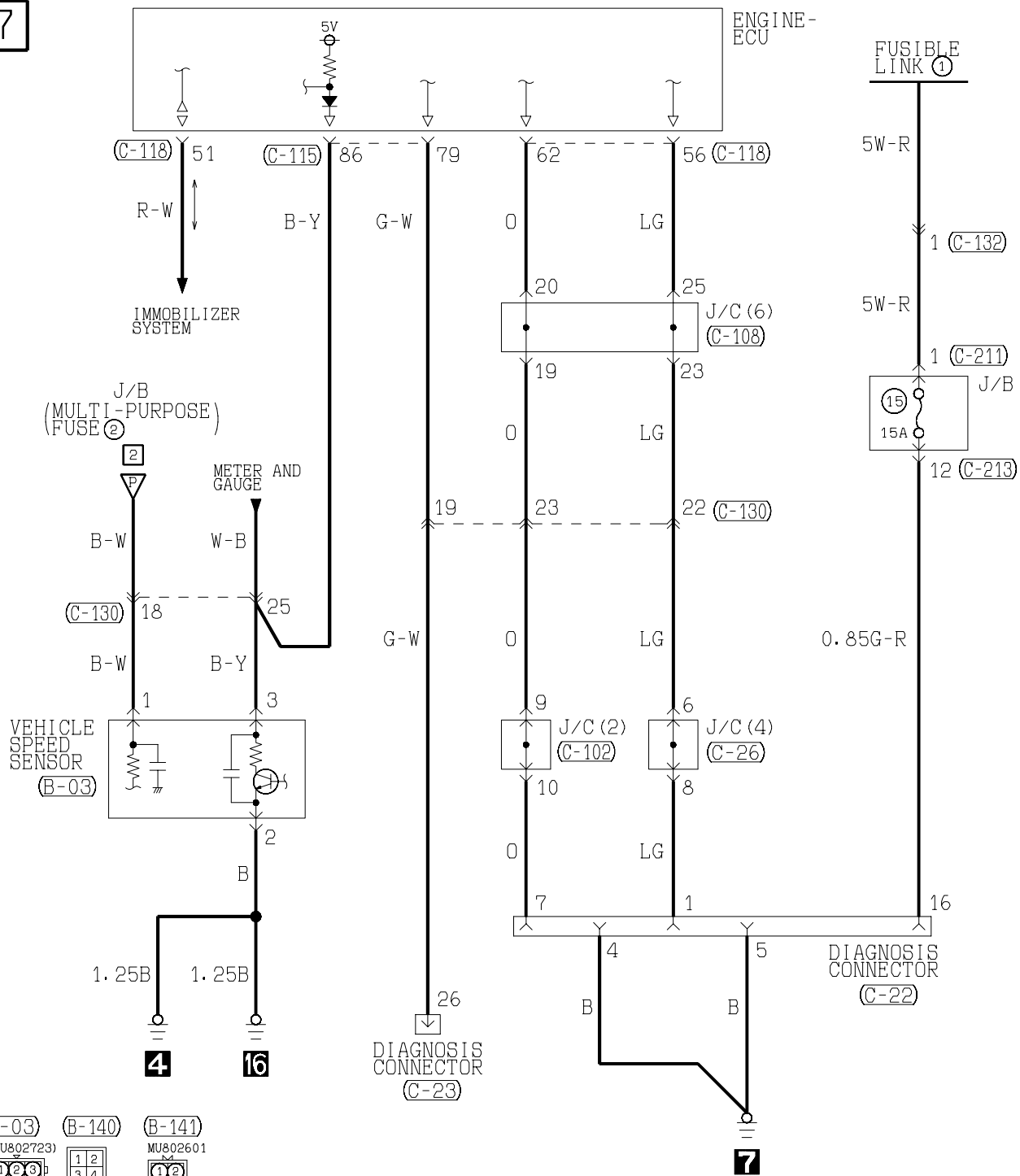
(C-126) (MU801824)

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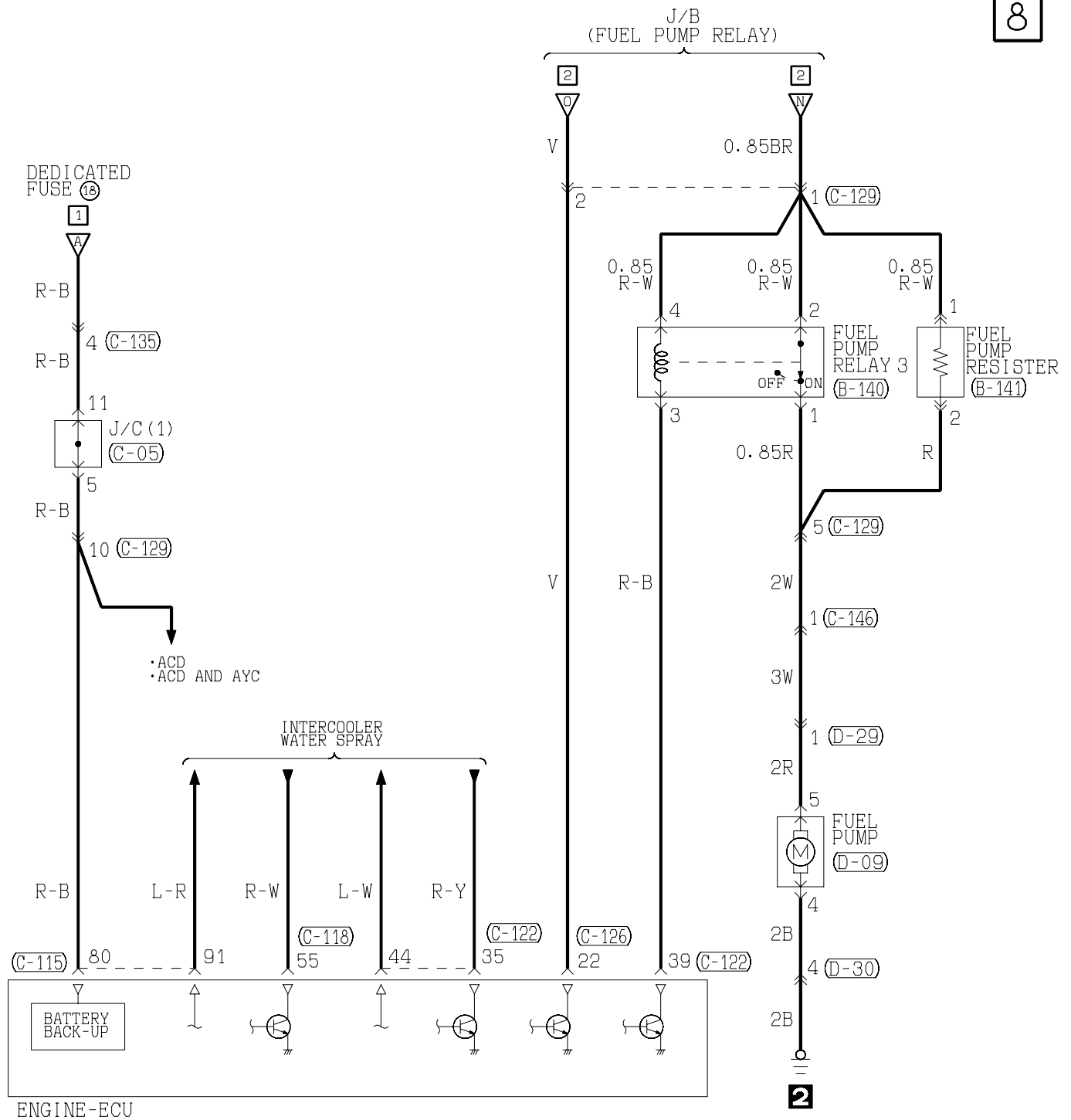
Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

ENGINE CONTROL SYSTEM <L.H. drive vehicles> (CONTINUED)

7



8



(C-115) (MU801823)

71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

(C-118) (MU801820)

51	52	53	54	55	56
57	58	59	60	61	62

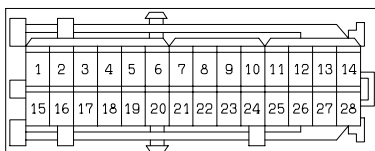
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39	40	41	42	43	44	45	46

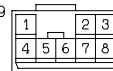
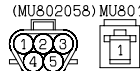
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14	15	16	17	18	19	20	21	22	23	24	25	26

(C-213)



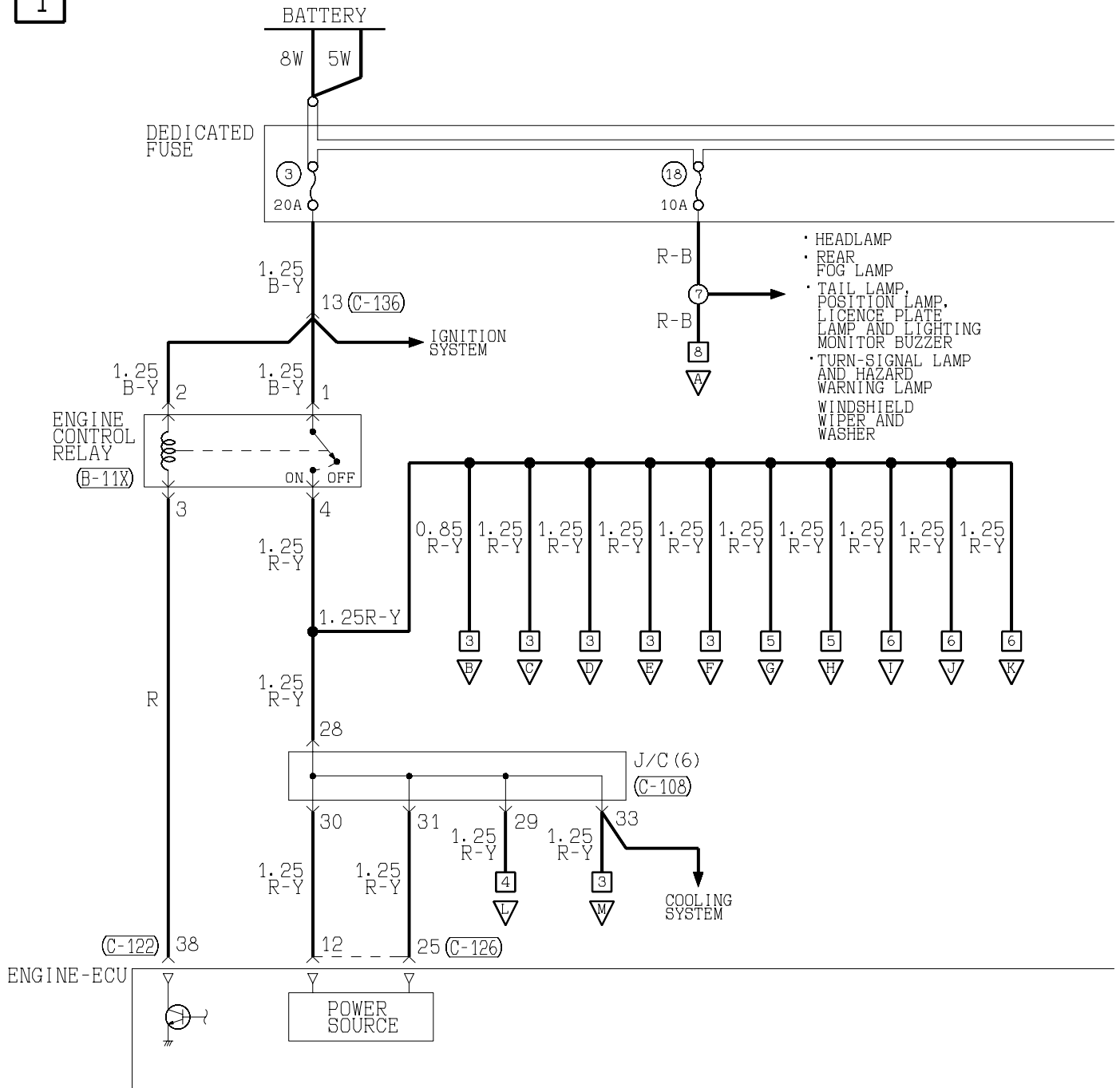
(D-09) (MU802058) (D-29) MU801361 (D-30) MU801839



ENGINE CONTROL SYSTEM

R.H. drive vehicles

1



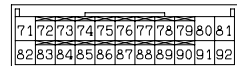
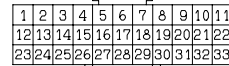
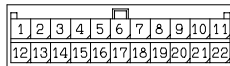
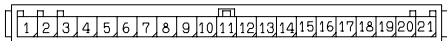
(B-11X)

(C-01)

(C-08)

(C-108)

(C-115) (MU801823)



(C-136)

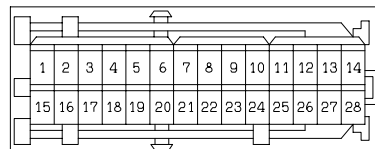
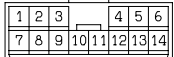
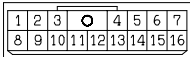
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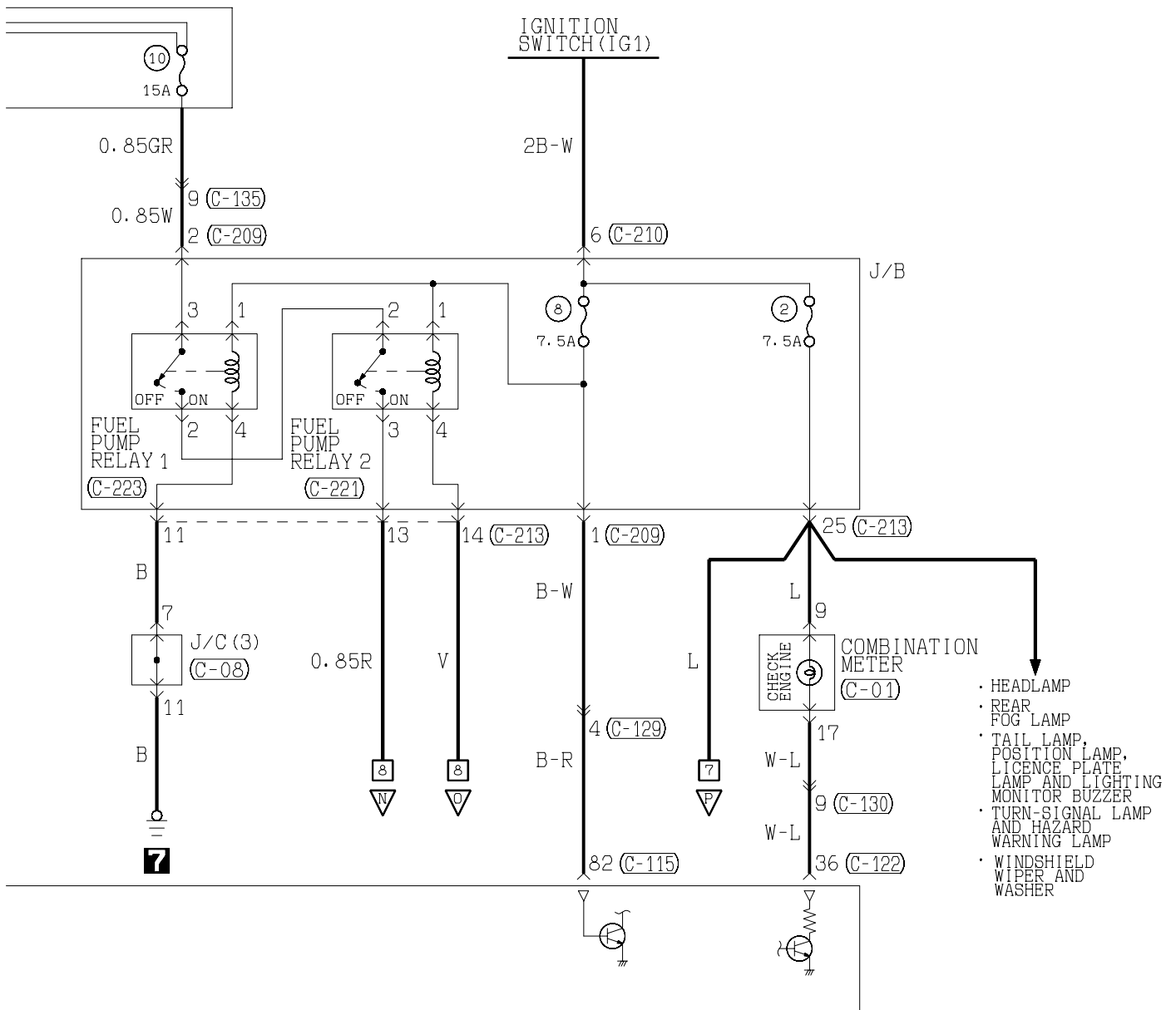
(C-210) MU801331

(C-213)

(C-221)

(C-223)





(C-122) (MU801822)

31	32	33	34	35	36	37	38
39	40	41	42	43	44	45	46

(C-126) (MU801824)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

(C-129) MU801867

1	2	3	4		
5	6	7	8	9	10

(C-130)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	X	20	21	22	23	24	25

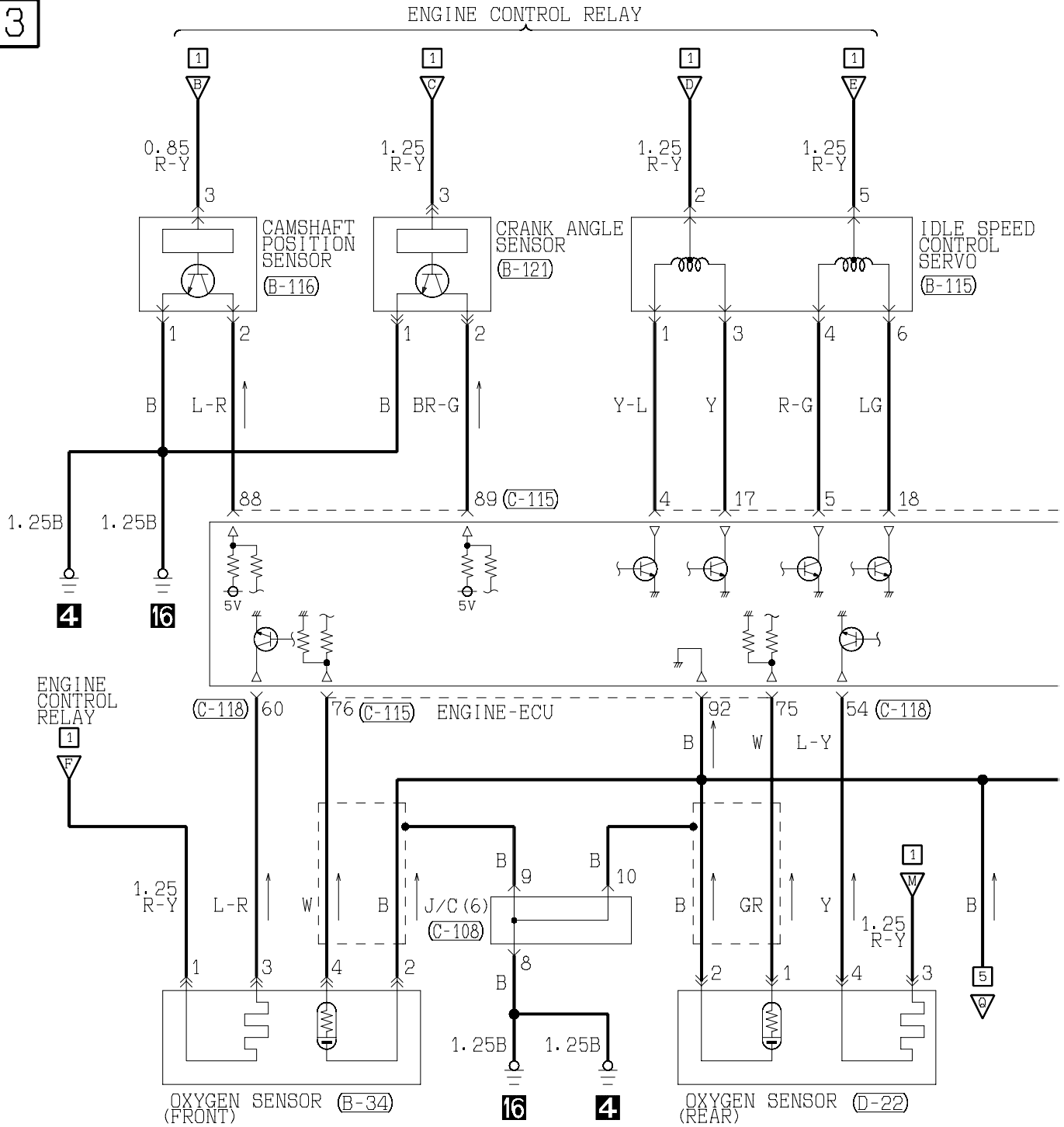
(C-135)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	X	20	21	22	23	24	25

Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

ENGINE CONTROL SYSTEM <R.H. drive vehicles> (CONTINUED)

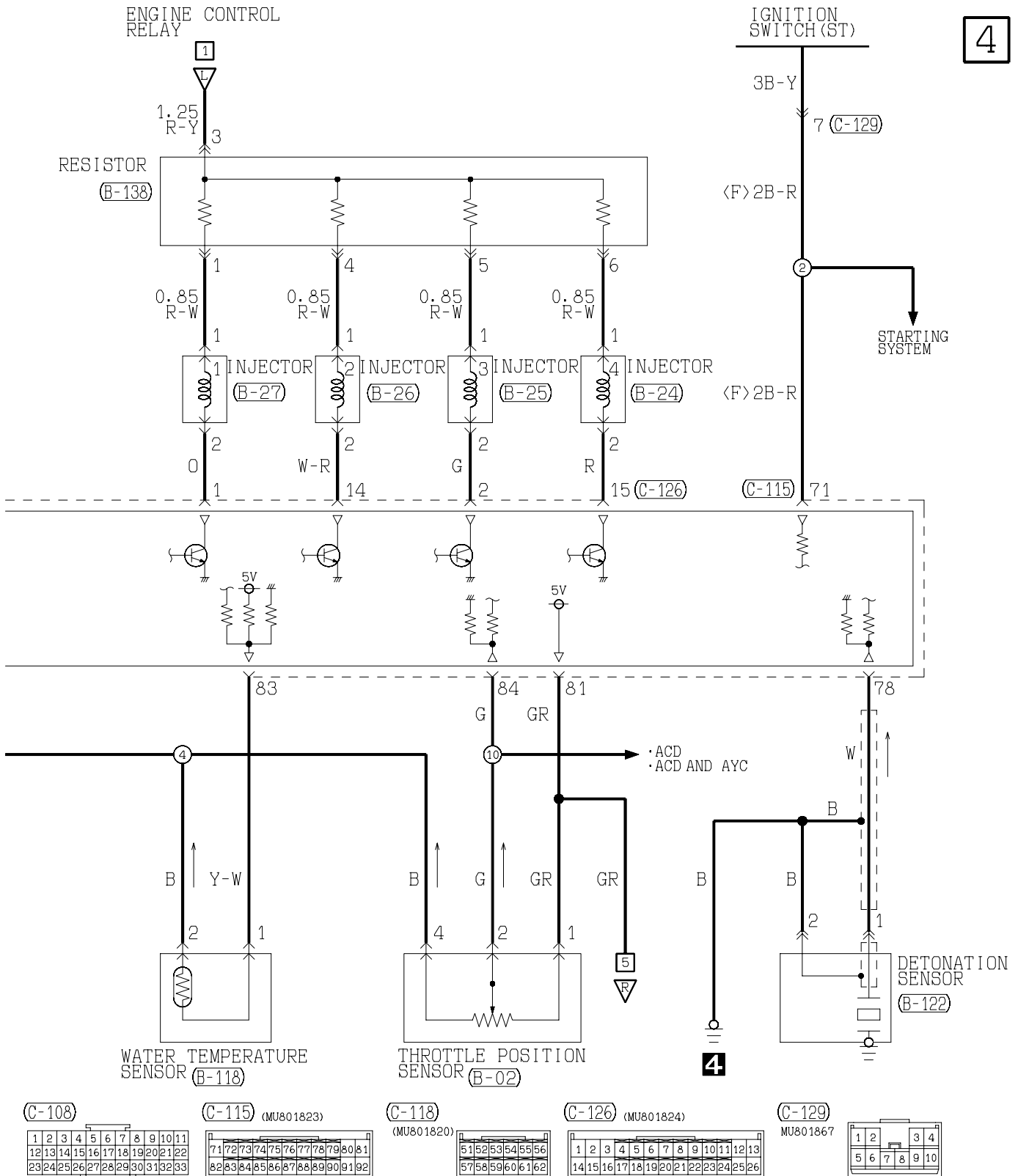
3



- (B-02)
(MU802724)
- (B-24)
(MU802722)
- (B-25)
(MU802722)
- (B-26)
(MU802722)
- (B-27)
(MU802722)
- (B-34)
MU802605
- (B-115)
- (B-116)
MU802337
- (B-118)
(MU802406)
- (B-121)
MU802603
- (B-122)
MU802661
- (B-138)
MU802607

- (D-22)
MU801446

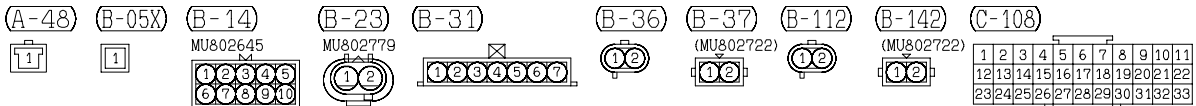
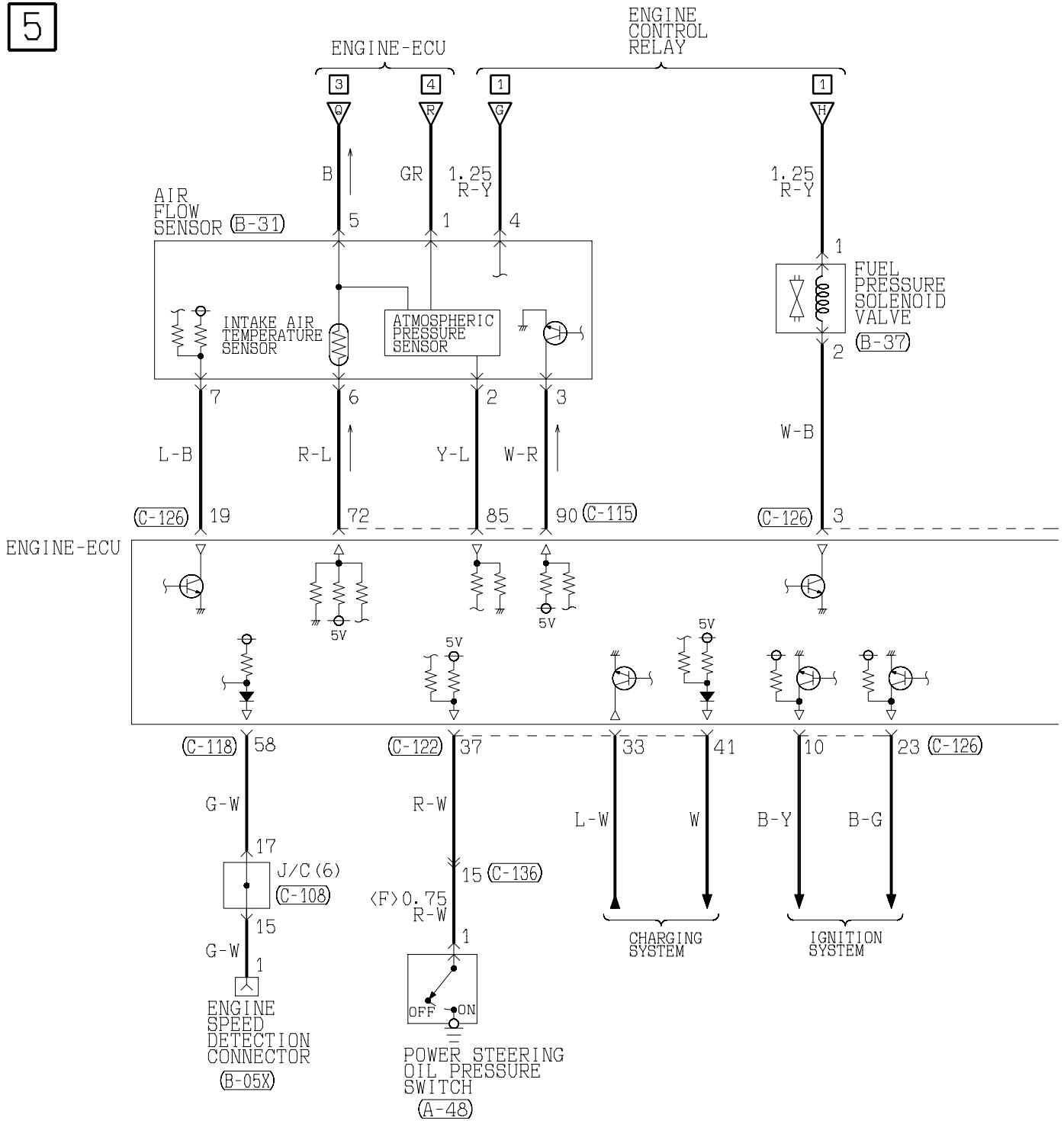
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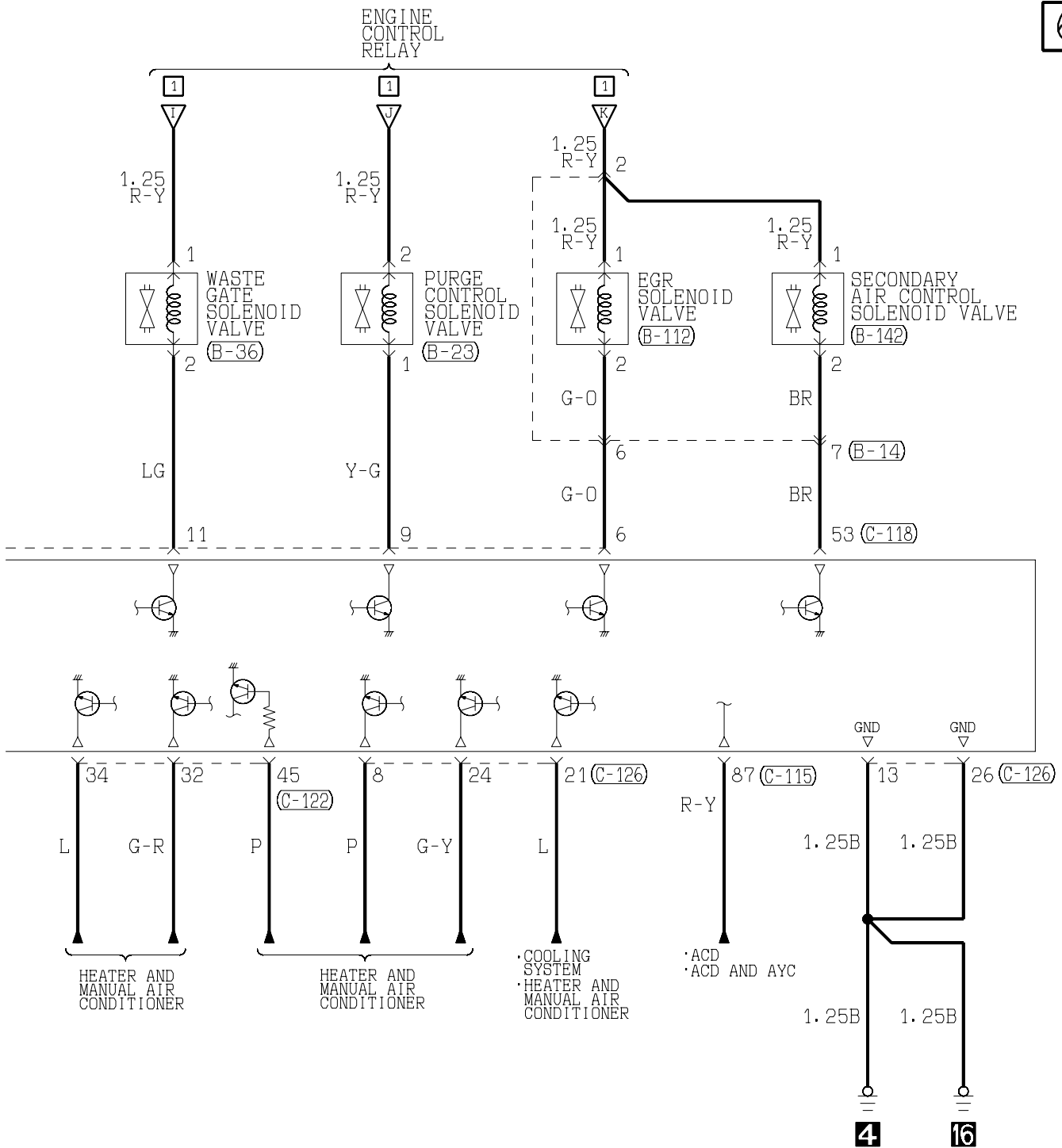
WIRE COLOR CODE
 B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
 BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET

ENGINE CONTROL SYSTEM <R.H. drive vehicles> (CONTINUED)

5



6



(C-115) (MU801823)

71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

(C-118) (MU801820)

51	52	53	54	55	56
57	58	59	60	61	62

(C-122) (MU801822)

31	32	33	34	35	36	37	38
39	40	41	42	43	44	45	46

(C-126) (MU801824)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

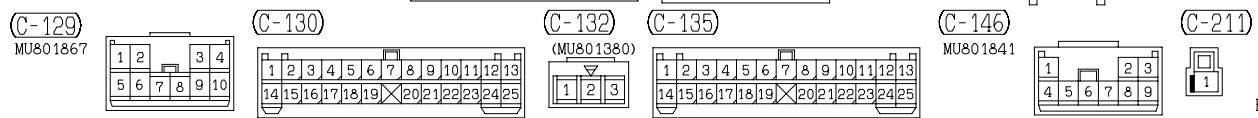
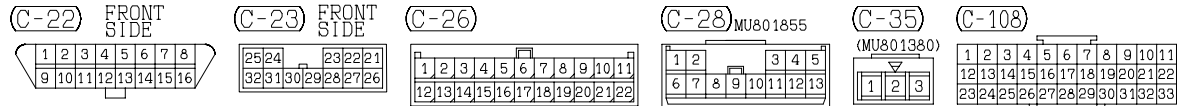
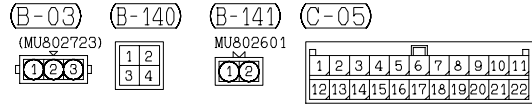
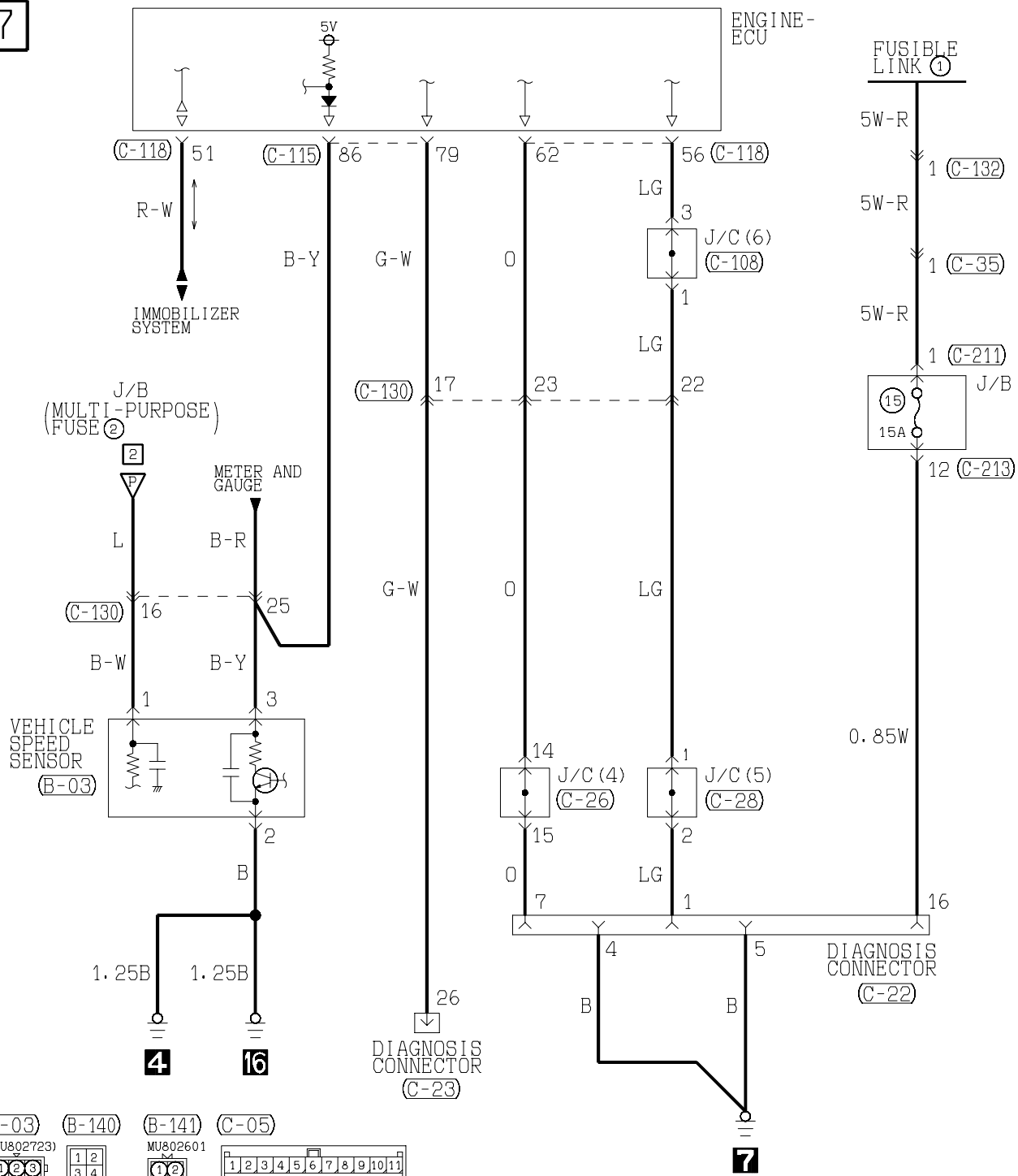
(C-136)

1	2	3	4	5	6	7		
8	9	10	11	12	13	14	15	16

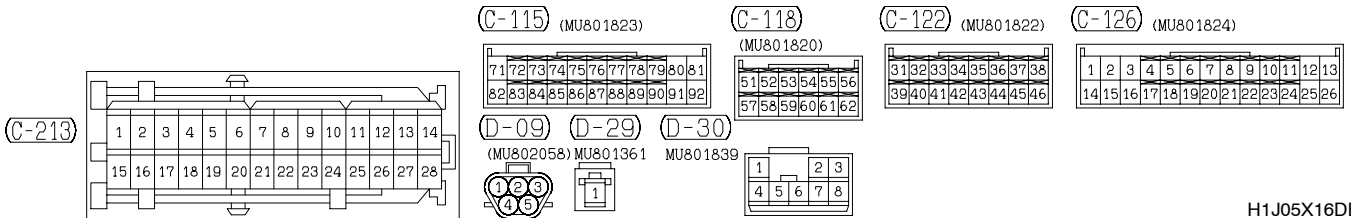
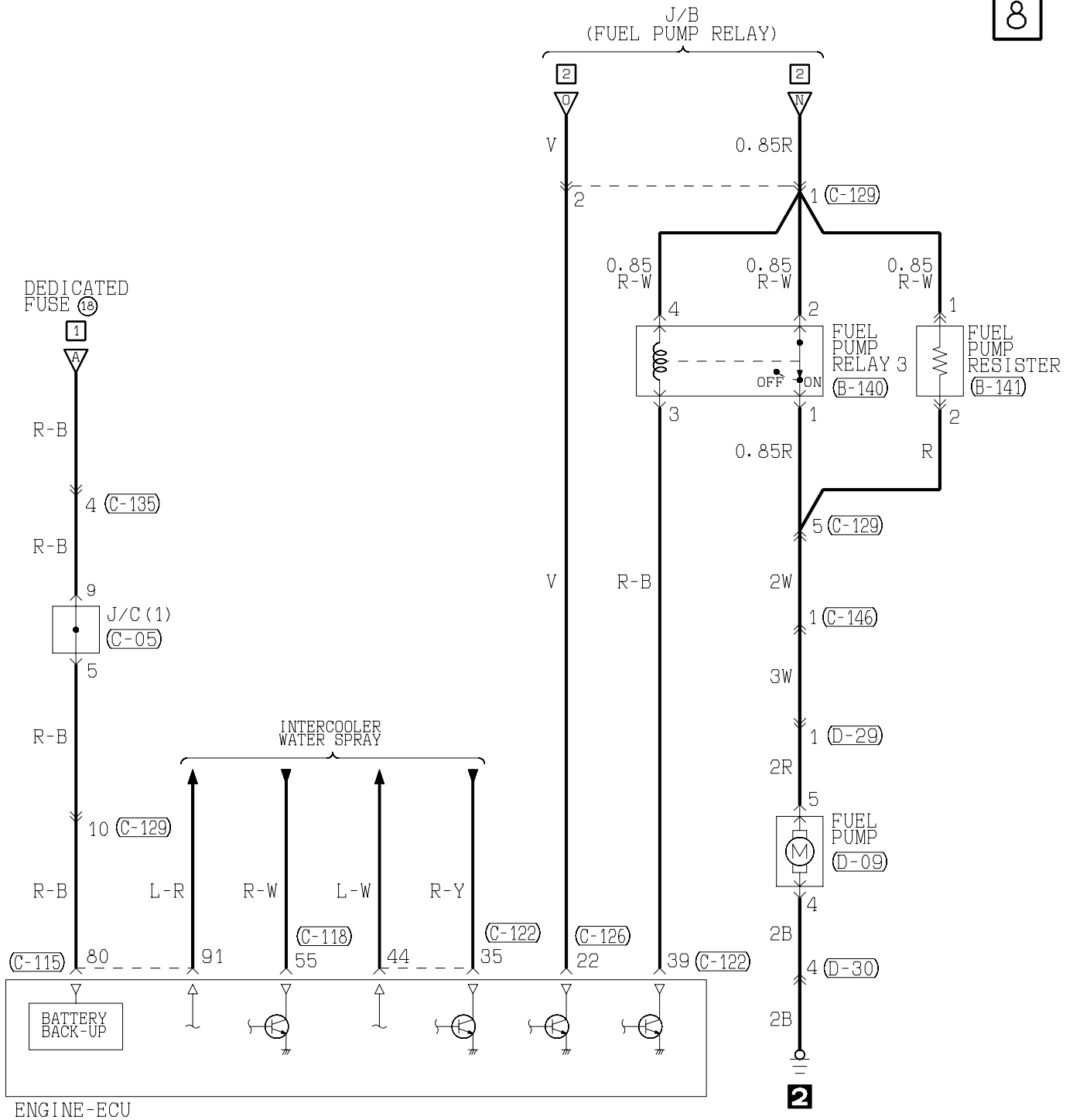
Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

ENGINE CONTROL SYSTEM <R.H. drive vehicles> (CONTINUED)

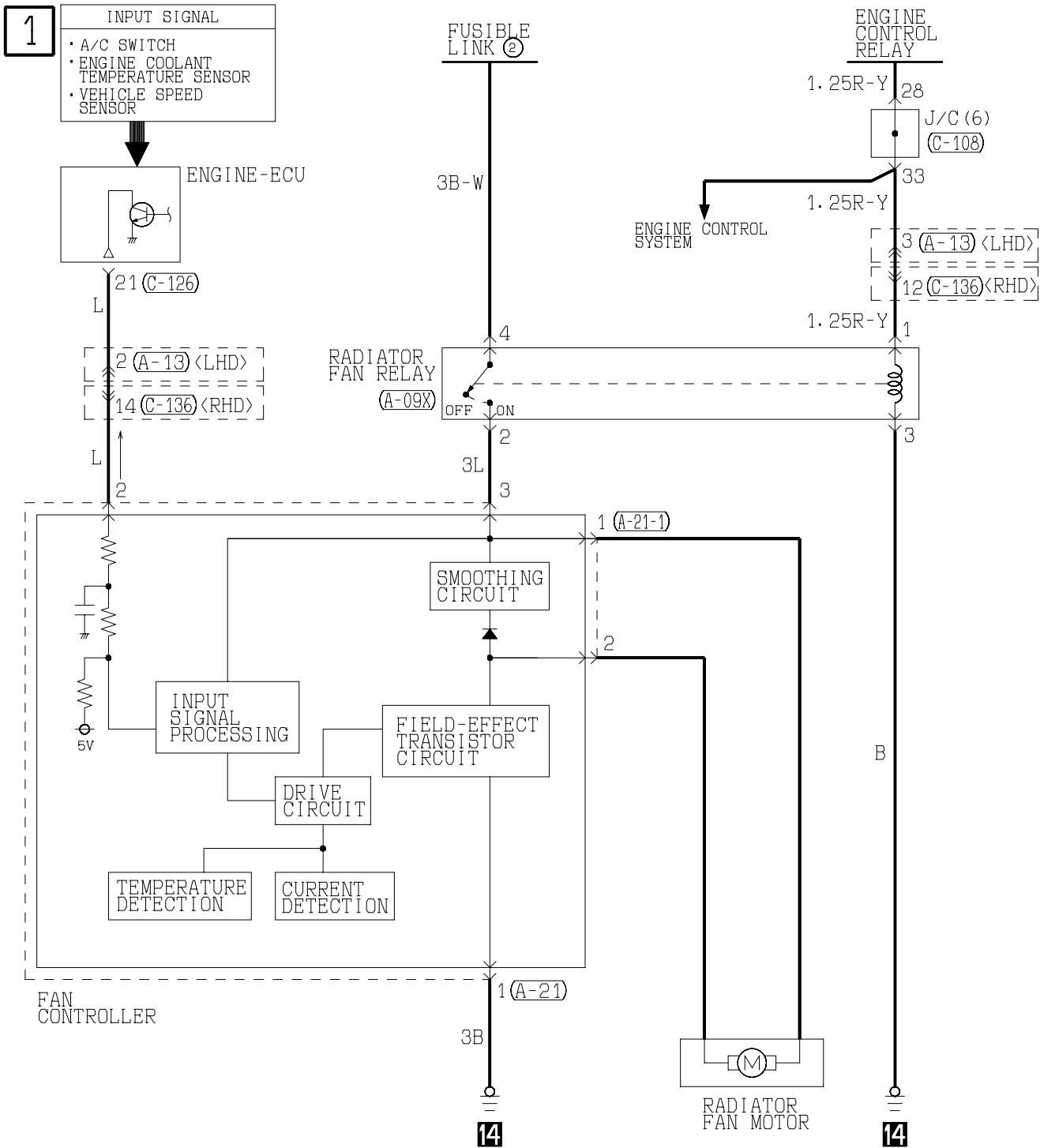
7



8



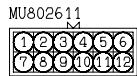
COOLING SYSTEM



(A-09X)



(A-13)



(A-21)



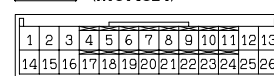
(A-21-1)



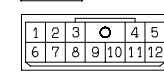
(C-108)



(C-126) (MU801824)



(C-136)



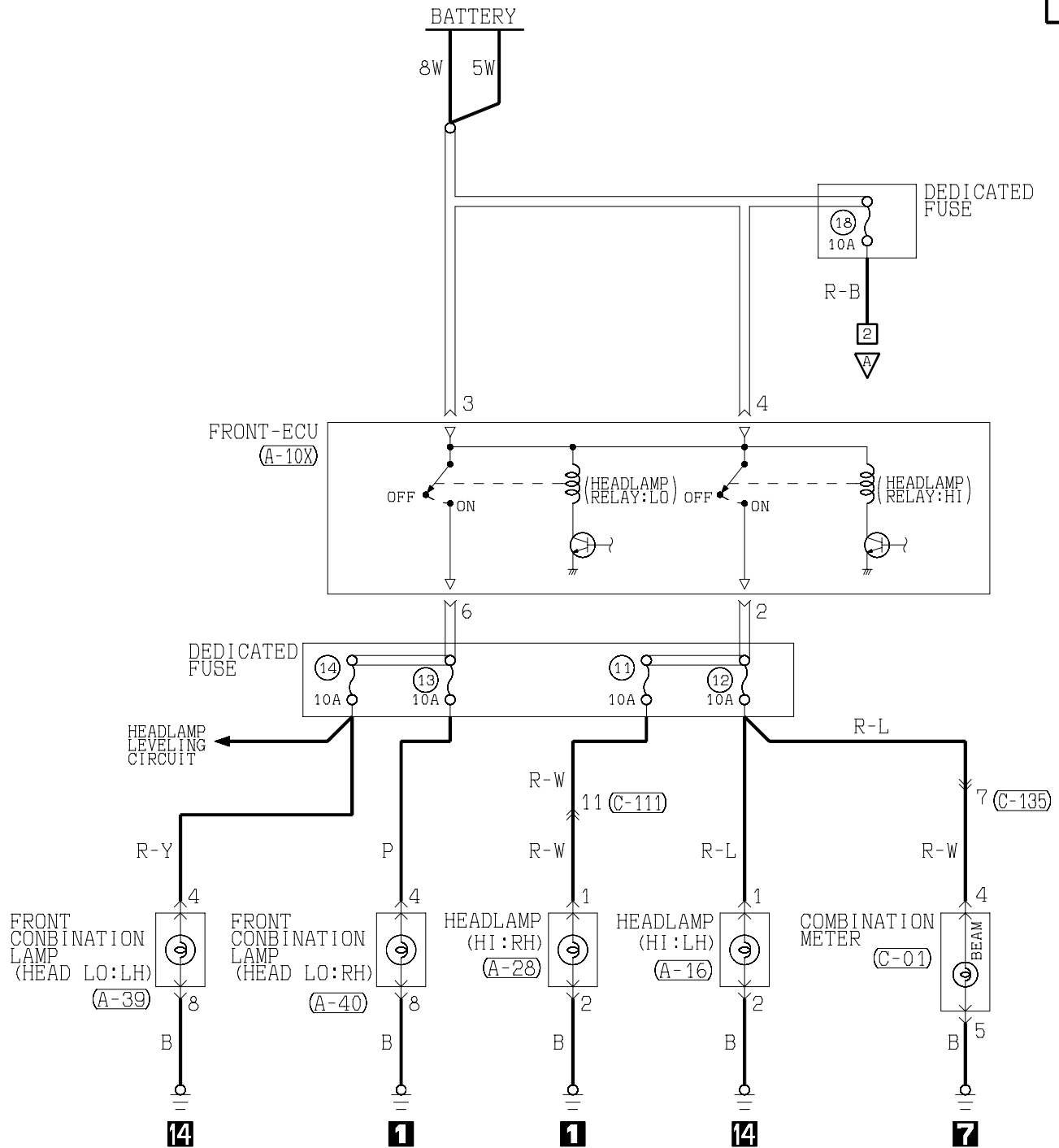
Wire colour code

B : Black LG: Light green G : Green L : Blue W : White Y : Yellow SB: Sky blue
 BR: Brown O : Orange GR: Gray R : Red P : Pink V : Violet

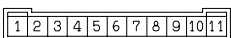
HEADLAMP

L.H. drive vehicles

1



(A-10X)



(A-16)



(A-28)



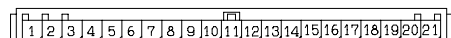
(A-39)



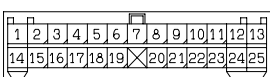
(A-40)



(C-01)

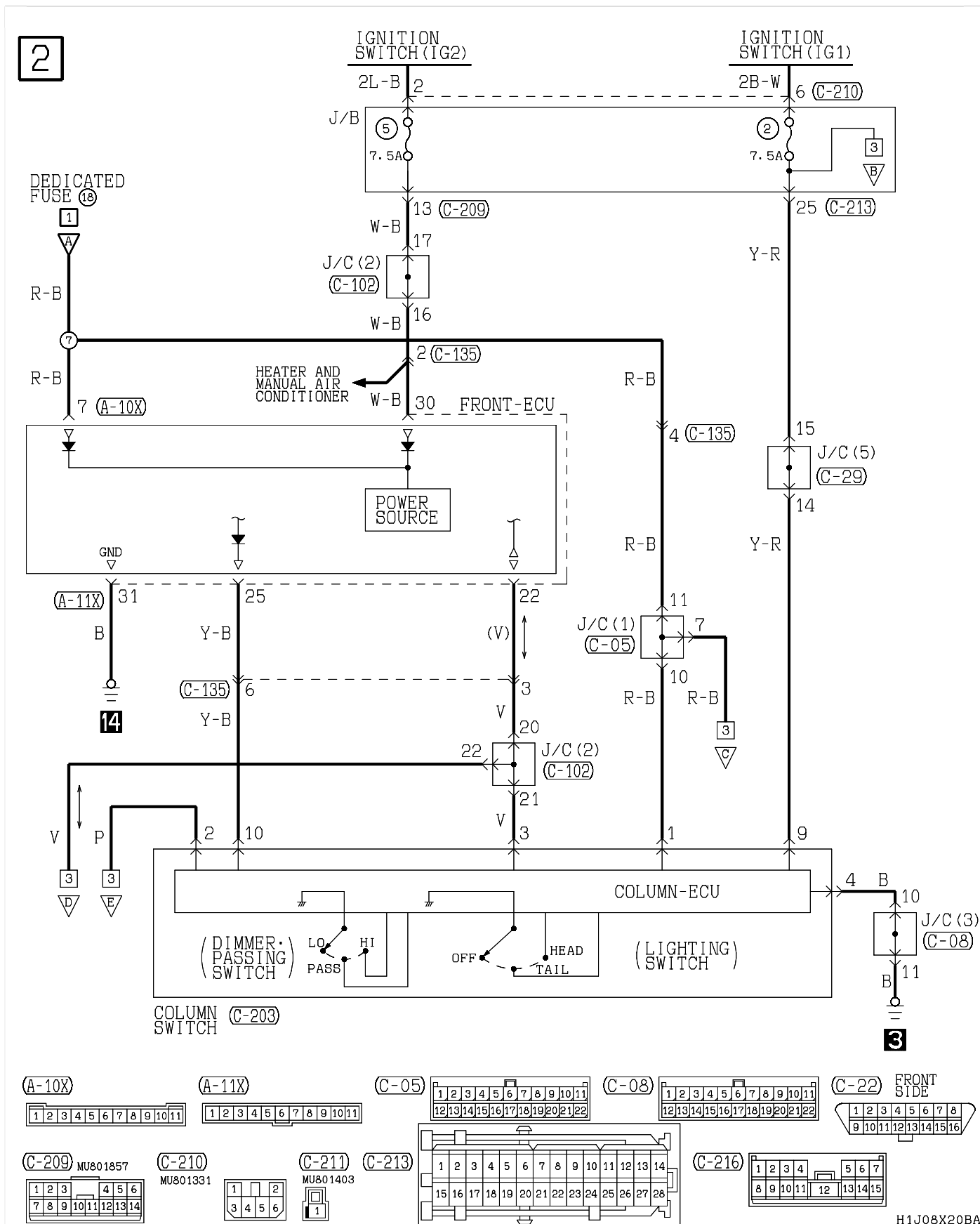


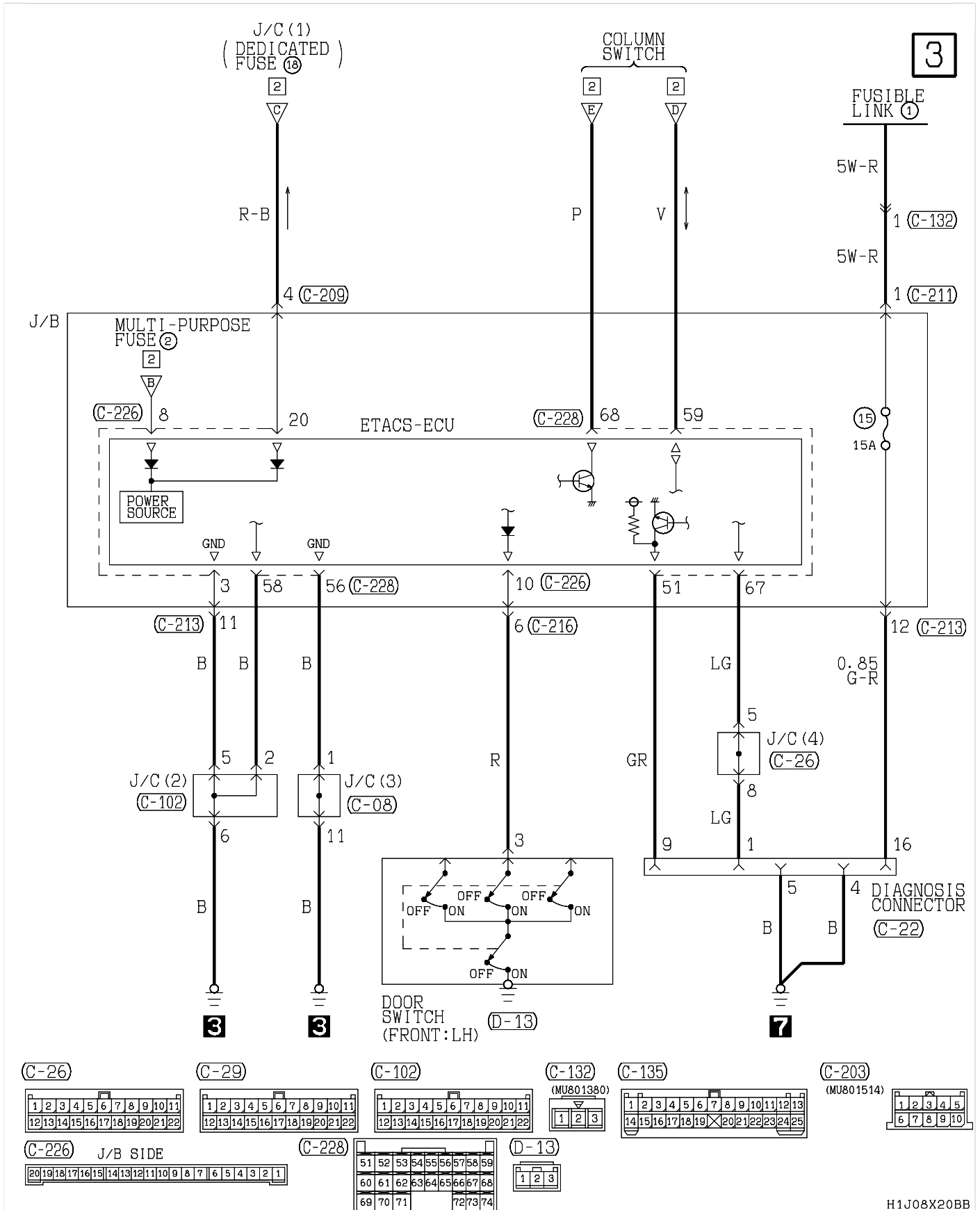
(C-135)



Wire colour code
 B : Black LG : Light green G : Green L : Blue
 BR : Brown O : Orange GR : Gray R : Red
 W : White SB : Sky blue P : Pink Y : Yellow
 V : Violet

HEADLAMP <L.H. drive vehicles> (CONTINUED)

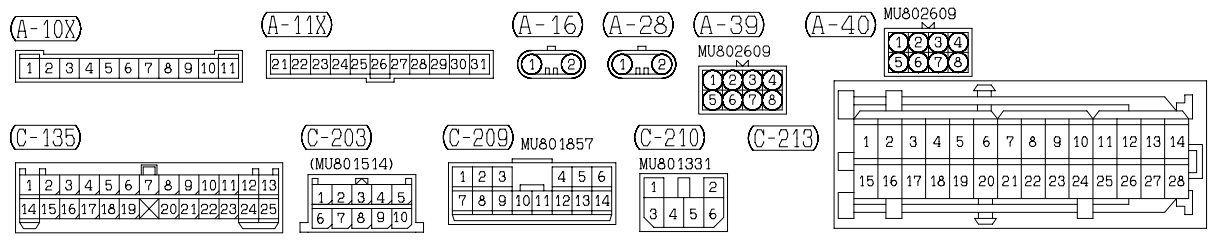
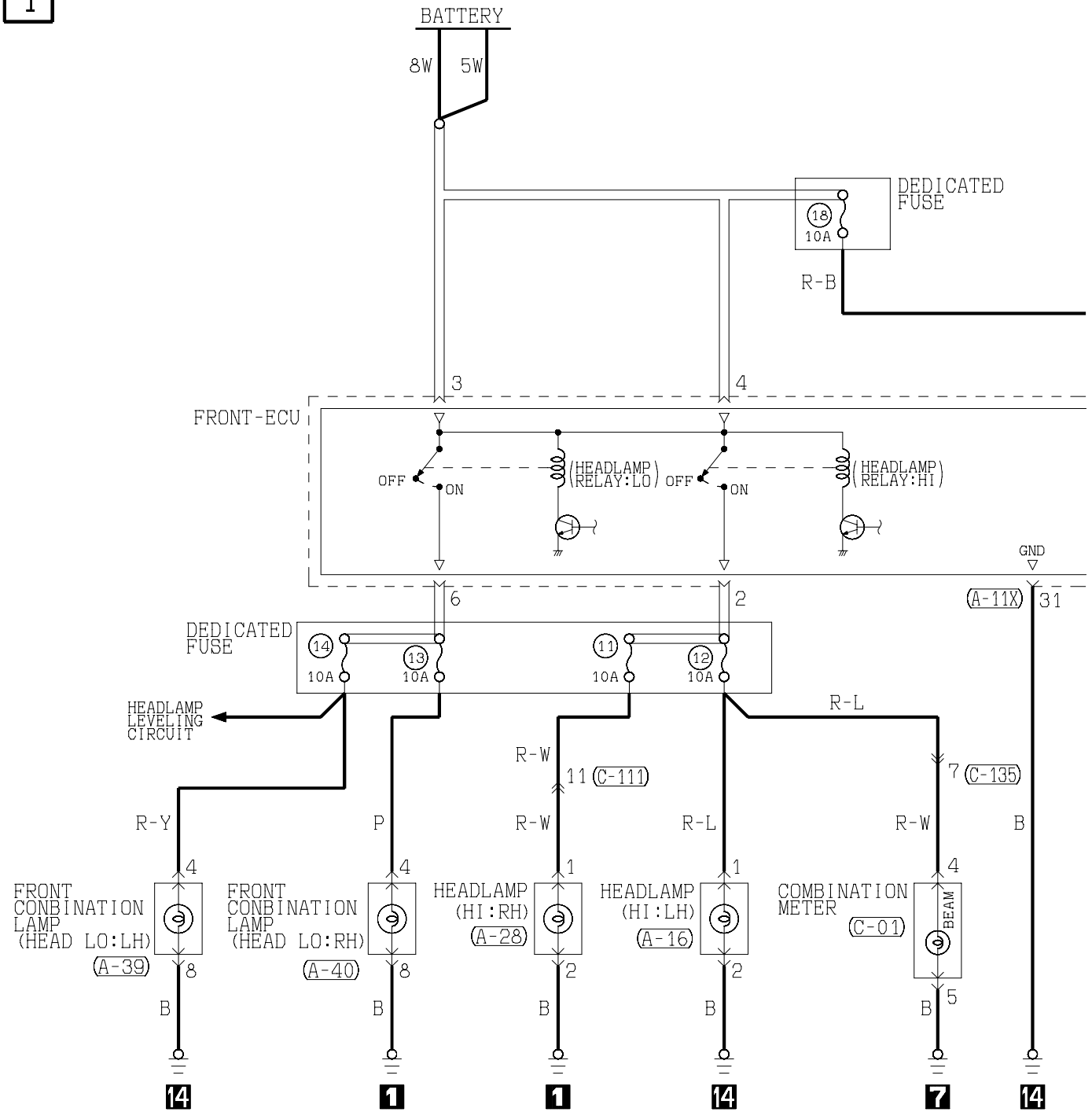




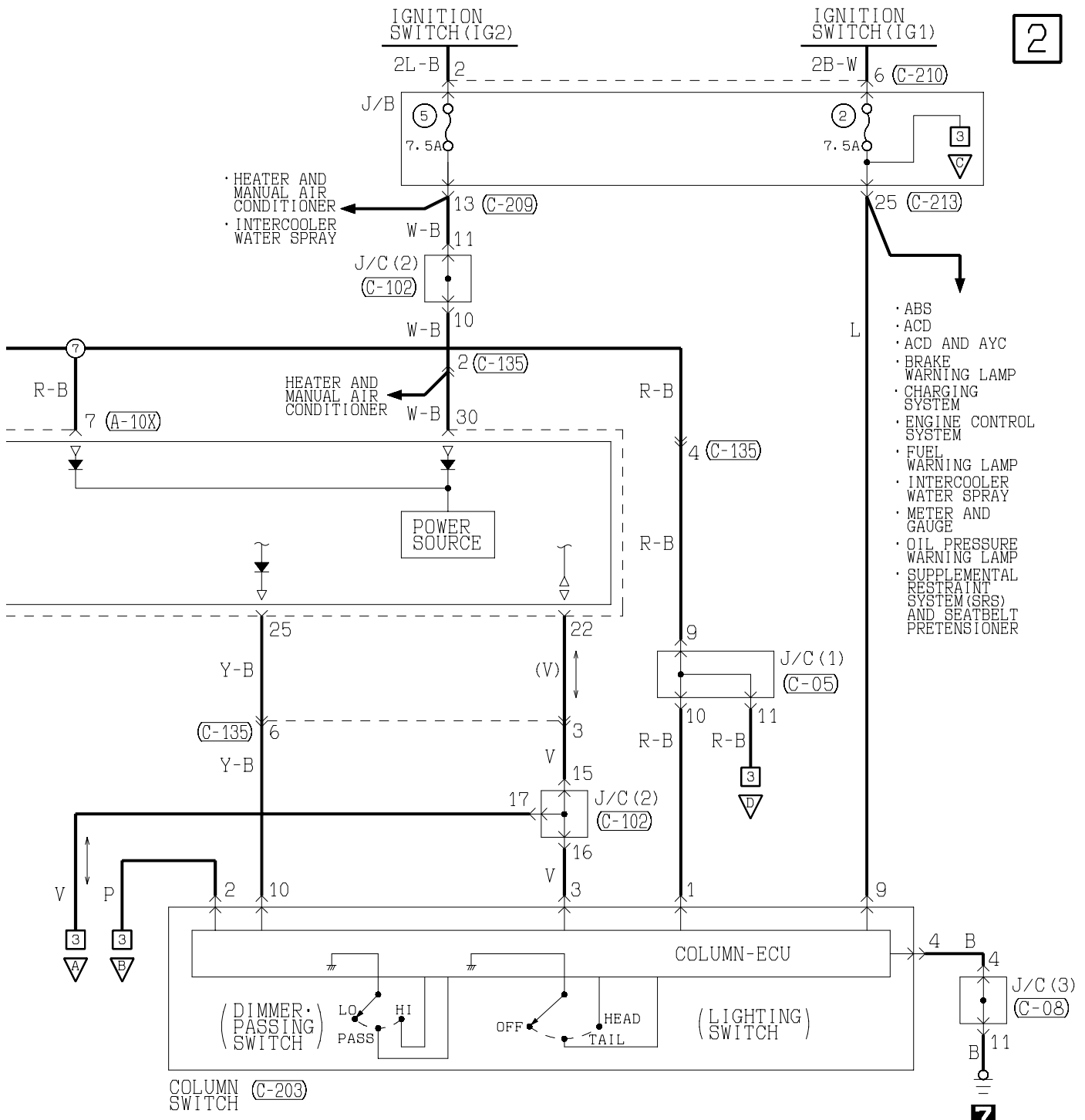
HEADLAMP

R.H. drive vehicles

1

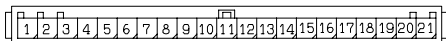


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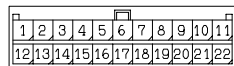


7

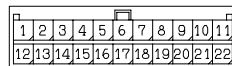
(C-01)



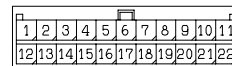
(C-05)



(C-08)



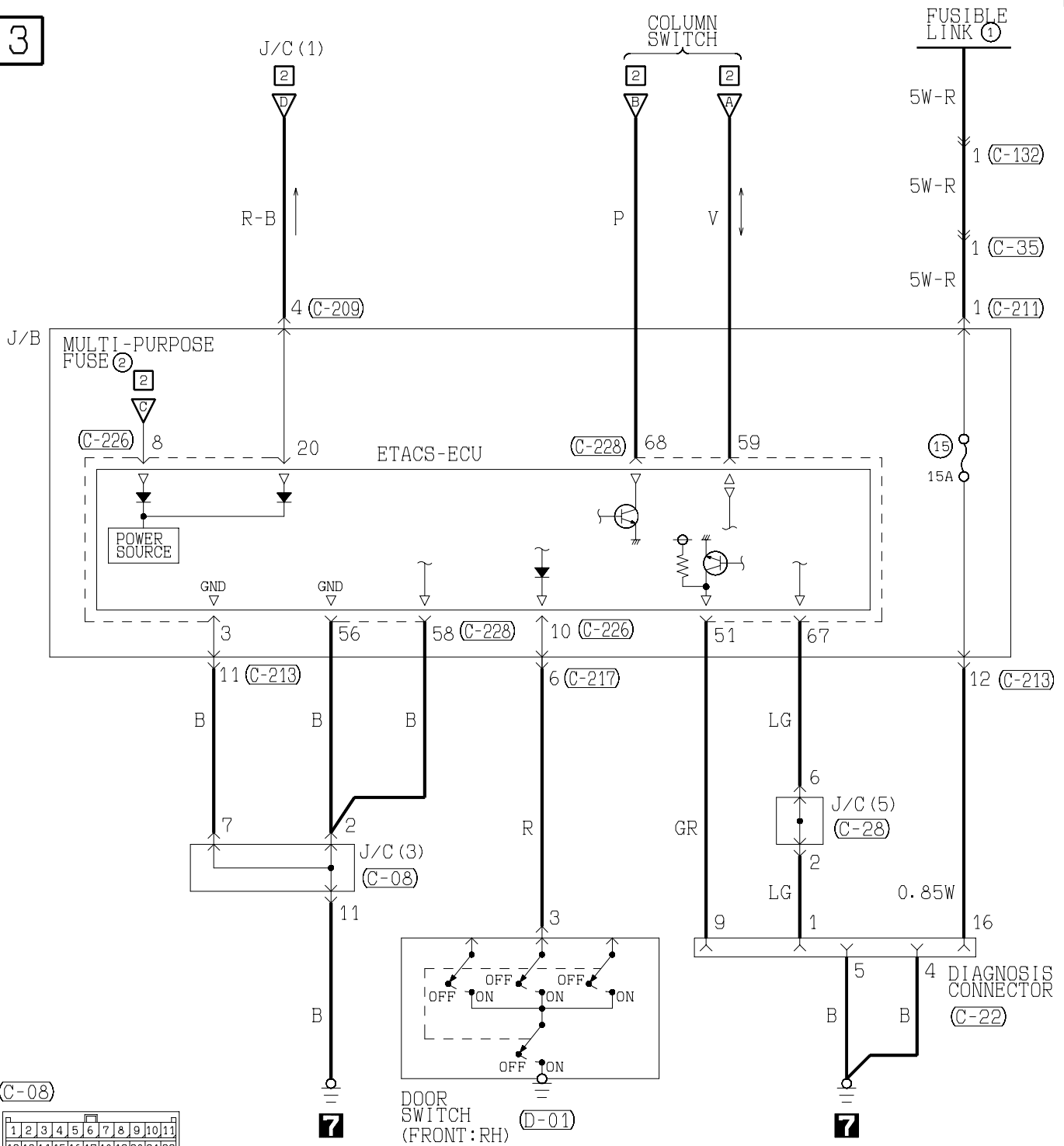
(C-102)



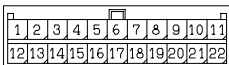
Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

HEADLAMP <R.H. drive vehicles> (CONTINUED)

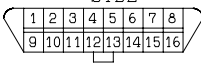
3



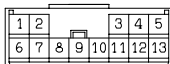
(C-08)



(C-22) FRONT SIDE



(C-28) MU801855



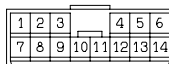
(C-35) (MU801380)



(C-132) (MU801380)



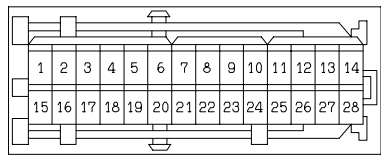
(C-209) MU801857



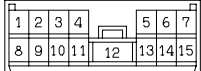
(C-211)



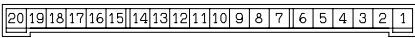
(C-213)



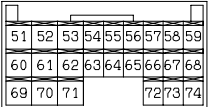
(C-217)



(C-226) J/B SIDE



(C-228)



(D-01)

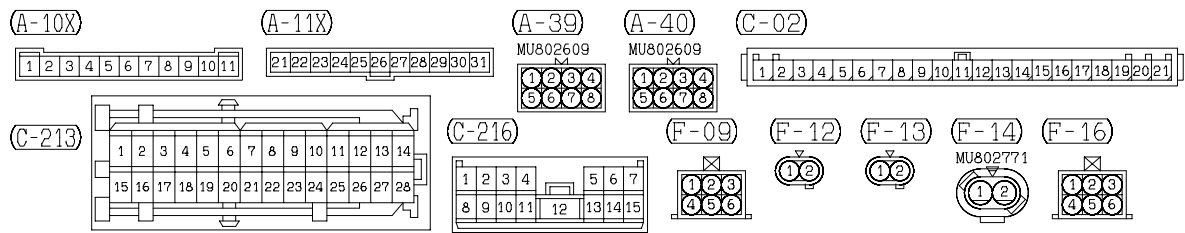
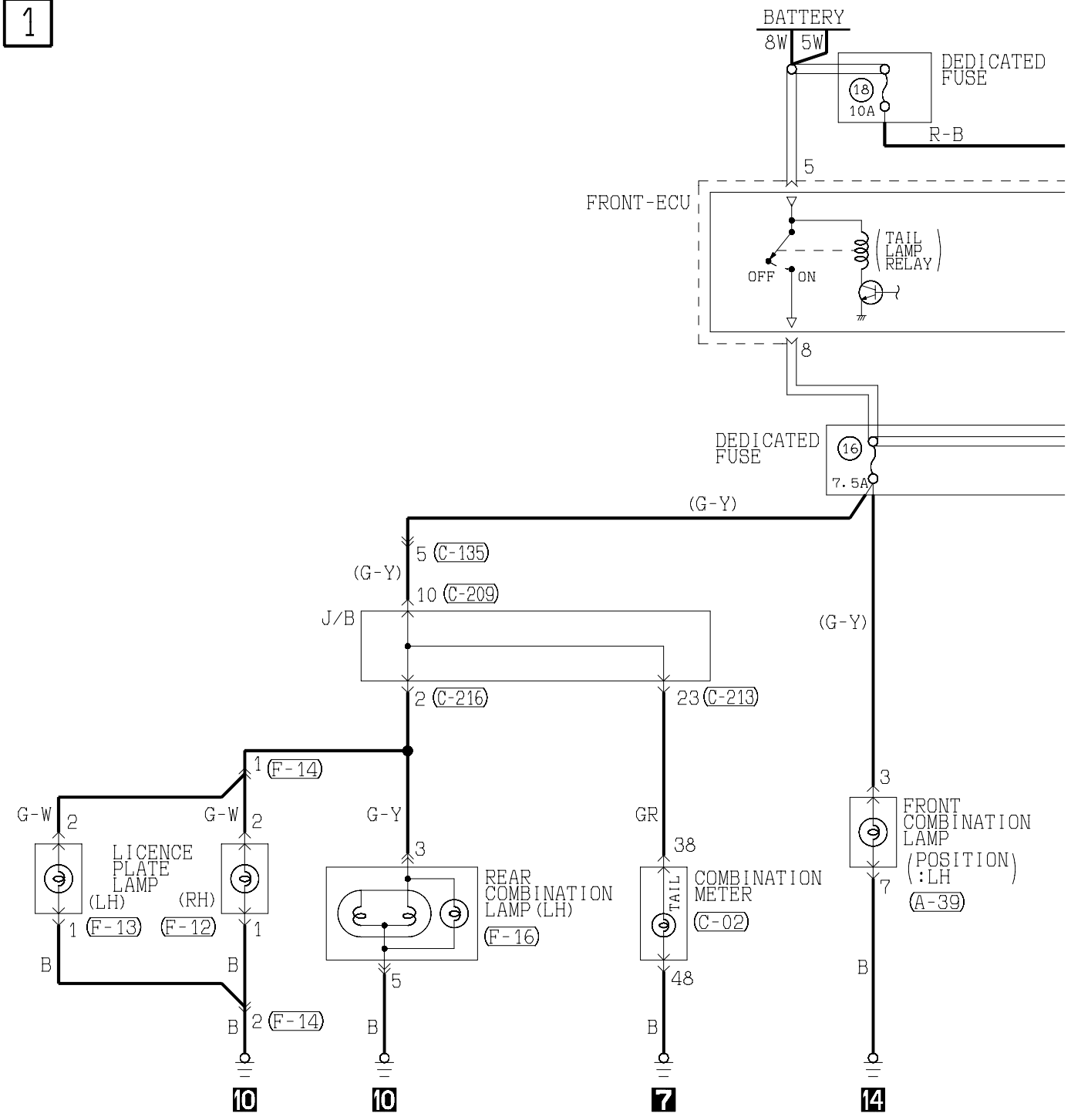


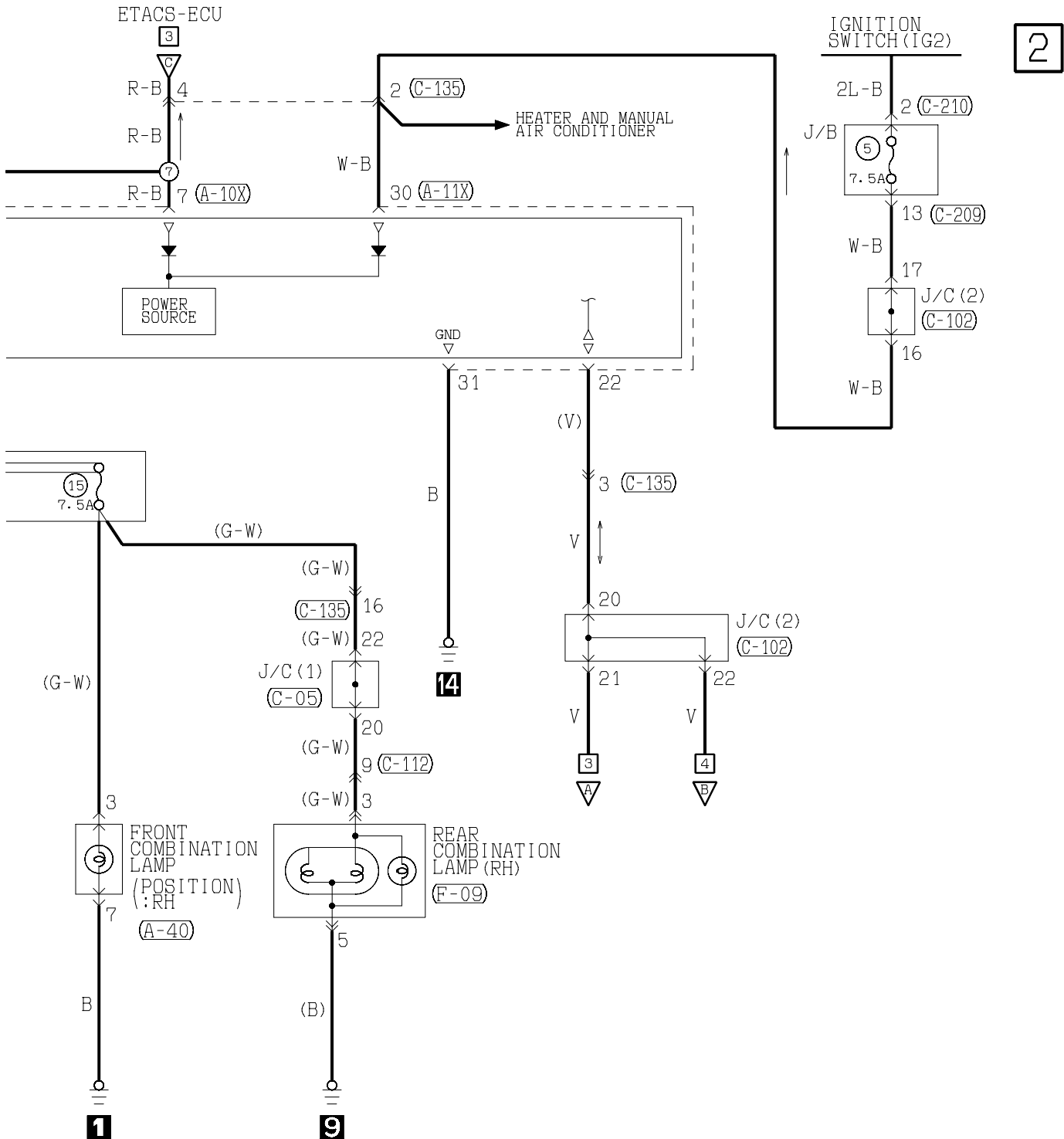
NOTES

TAIL LAMP, POSITION LAMP, LICENCE PLATE LAMP AND LIGHTING MONITOR BUZZER

L.H. drive vehicles

1





(C-05)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-102)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-112) MU801855

1	2	3	4	5
6	7	8	9	10
11	12	13		

(C-135)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

(C-209) MU801857

1	2	3	4	5	6
7	8	9	10	11	12
13	14				

(C-210) MU801331

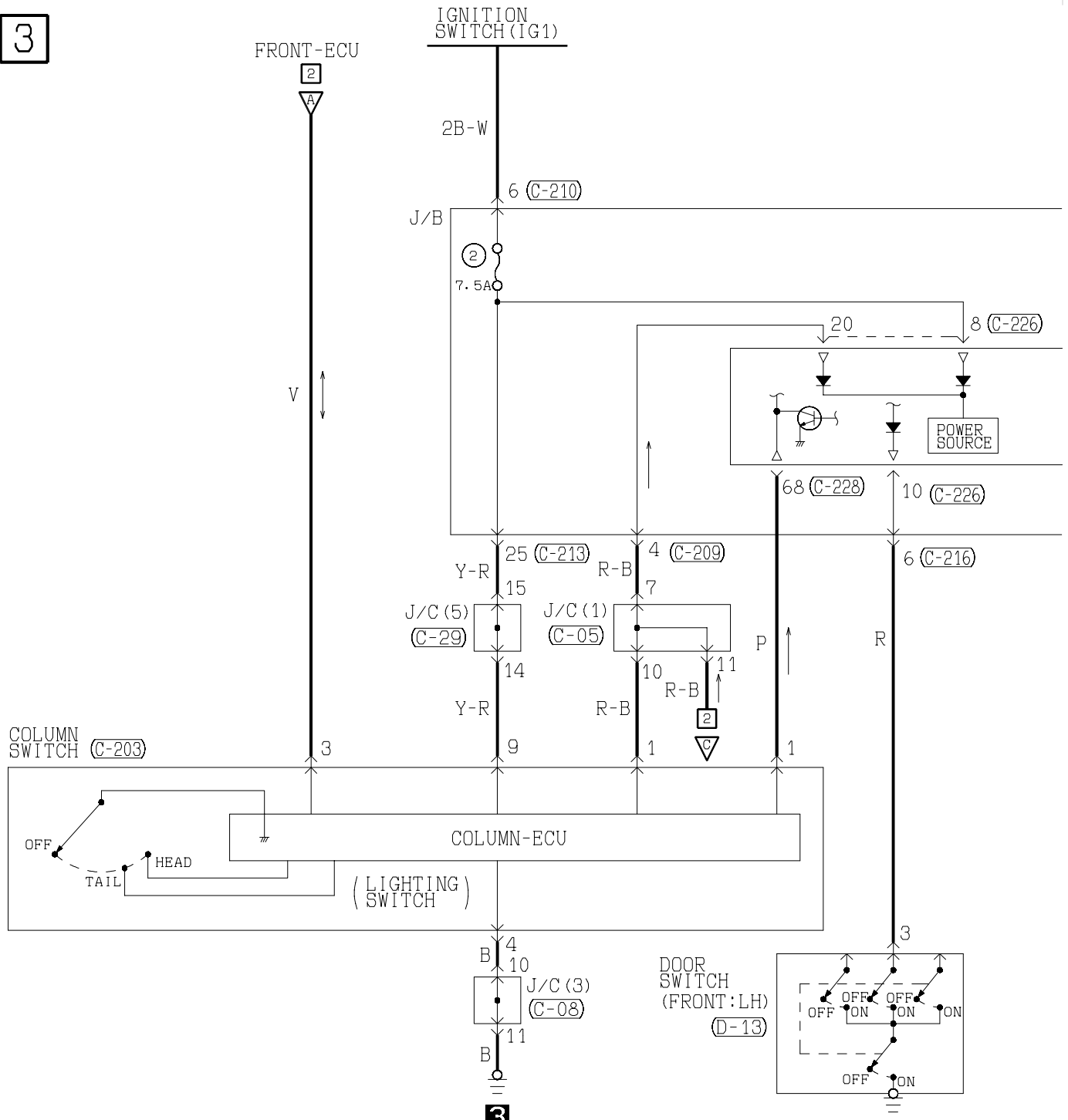
1		2
3	4	5
6		

Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

TAIL LAMP, POSITION LAMP, LICENCE PLATE LAMP AND LIGHTING MONITOR BUZZER <L.H. drive vehicles> (CONTINUED)

3



3

(C-05)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-08)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-22) FRONT SIDE

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

(C-26)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-28) MU801855

1	2	3	4	5			
6	7	8	9	10	11	12	13

(C-29)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-216)

1	2	3	4	5	6	7	
8	9	10	11	12	13	14	15

(C-226) J/B SIDE

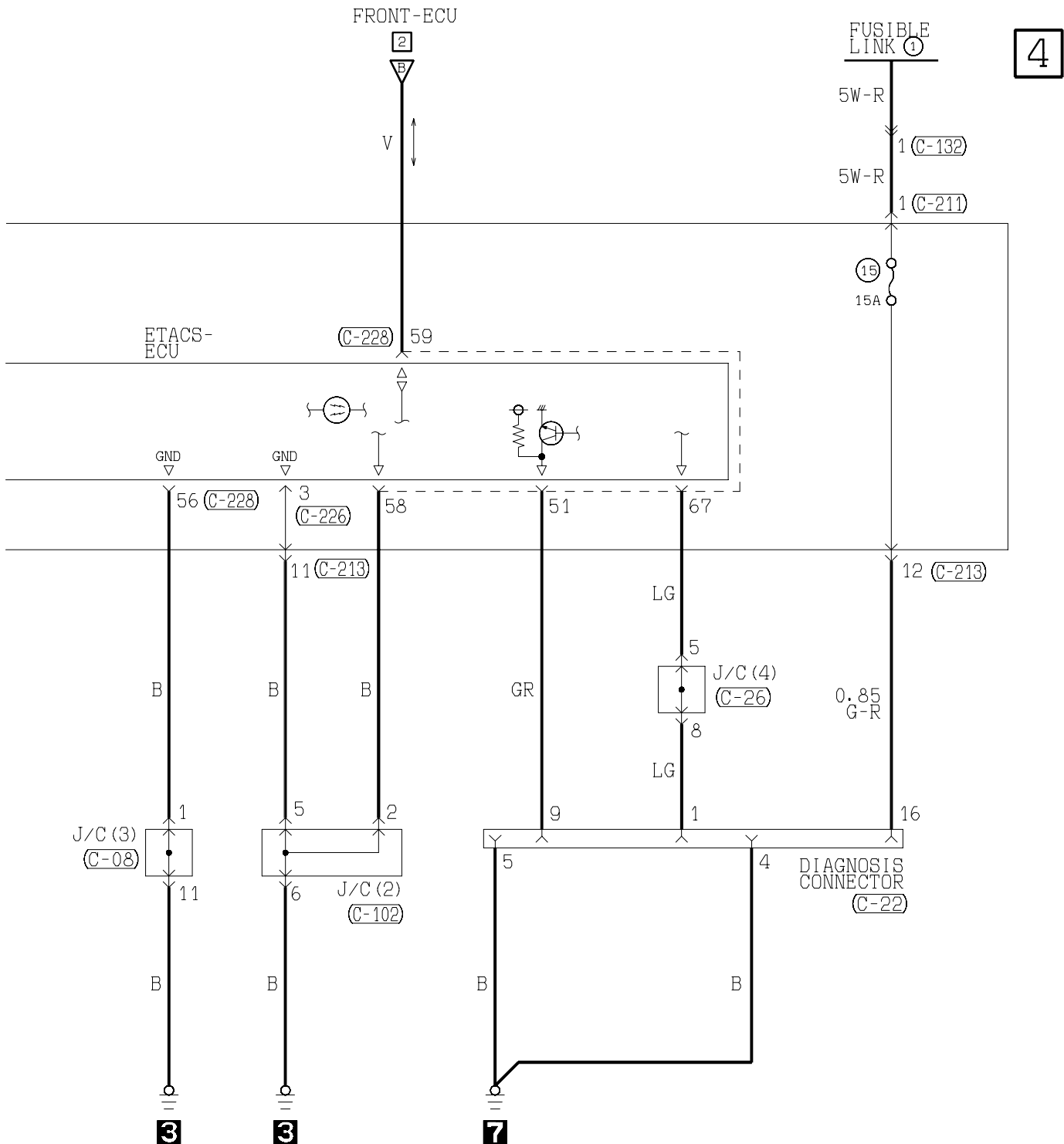
20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---

(C-228)

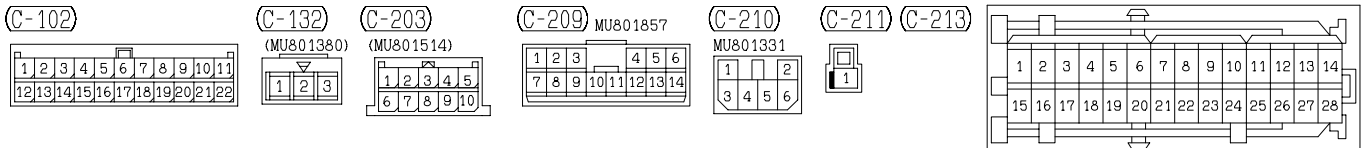
51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68
69	70	71	72	73	74			

(D-13)

1	2	3
---	---	---



4

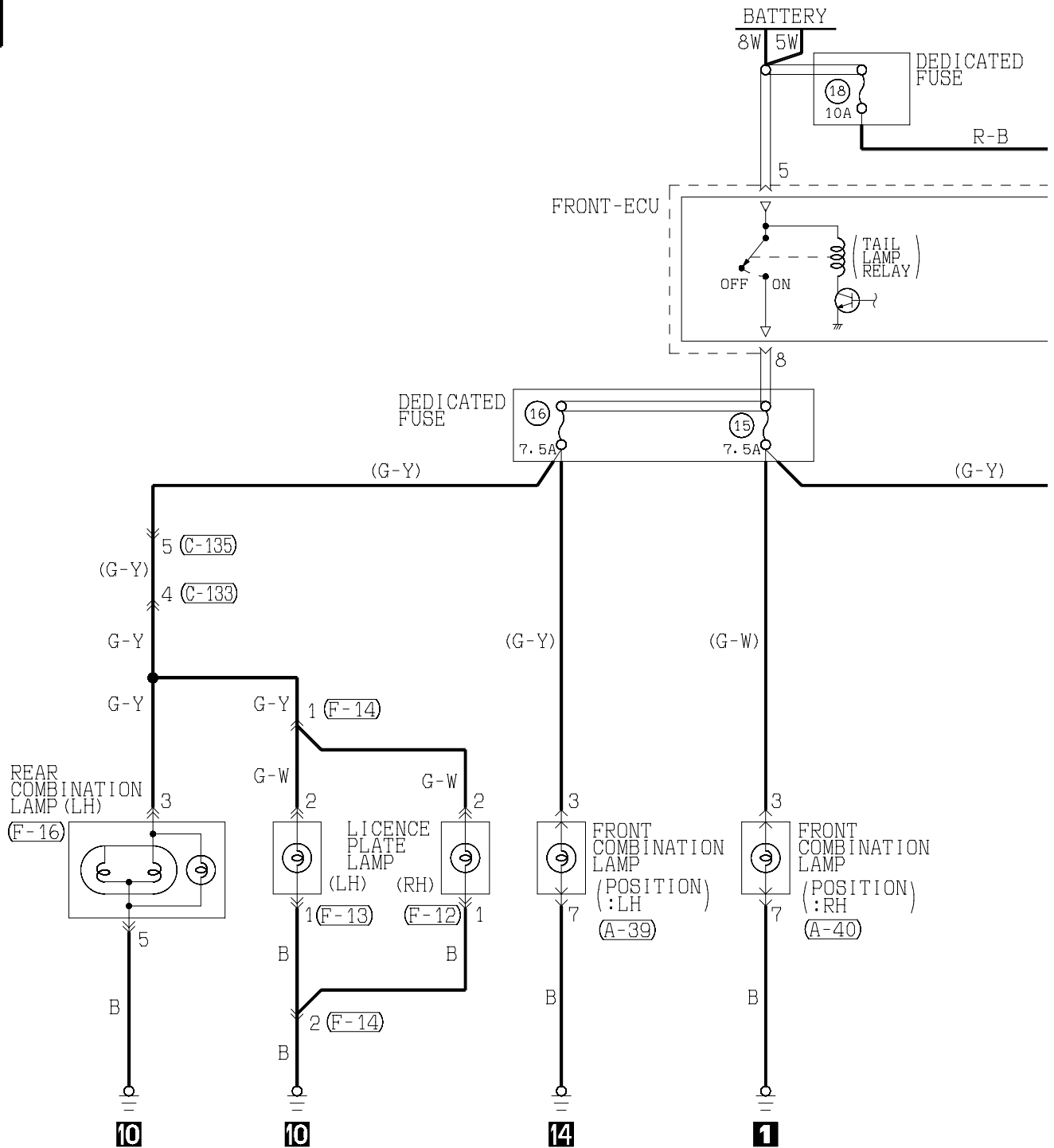


Wire colour code
 B : Black LG: Light green G : Green L : Blue W : White Y : Yellow SB: Sky blue
 BR: Brown O : Orange GR: Gray R : Red P : Pink V : Violet

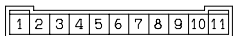
TAIL LAMP, POSITION LAMP, LICENCE PLATE LAMP AND LIGHTING MONITOR BUZZER

R.H. drive vehicles

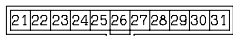
1



(A-10X)



(A-11X)



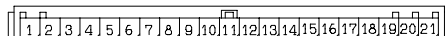
(A-39)



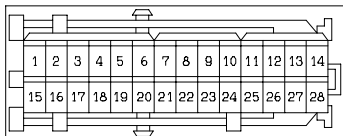
(A-40)



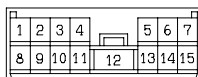
(C-02)



(C-213)



(C-217)



(F-09)



(F-12)



(F-13)

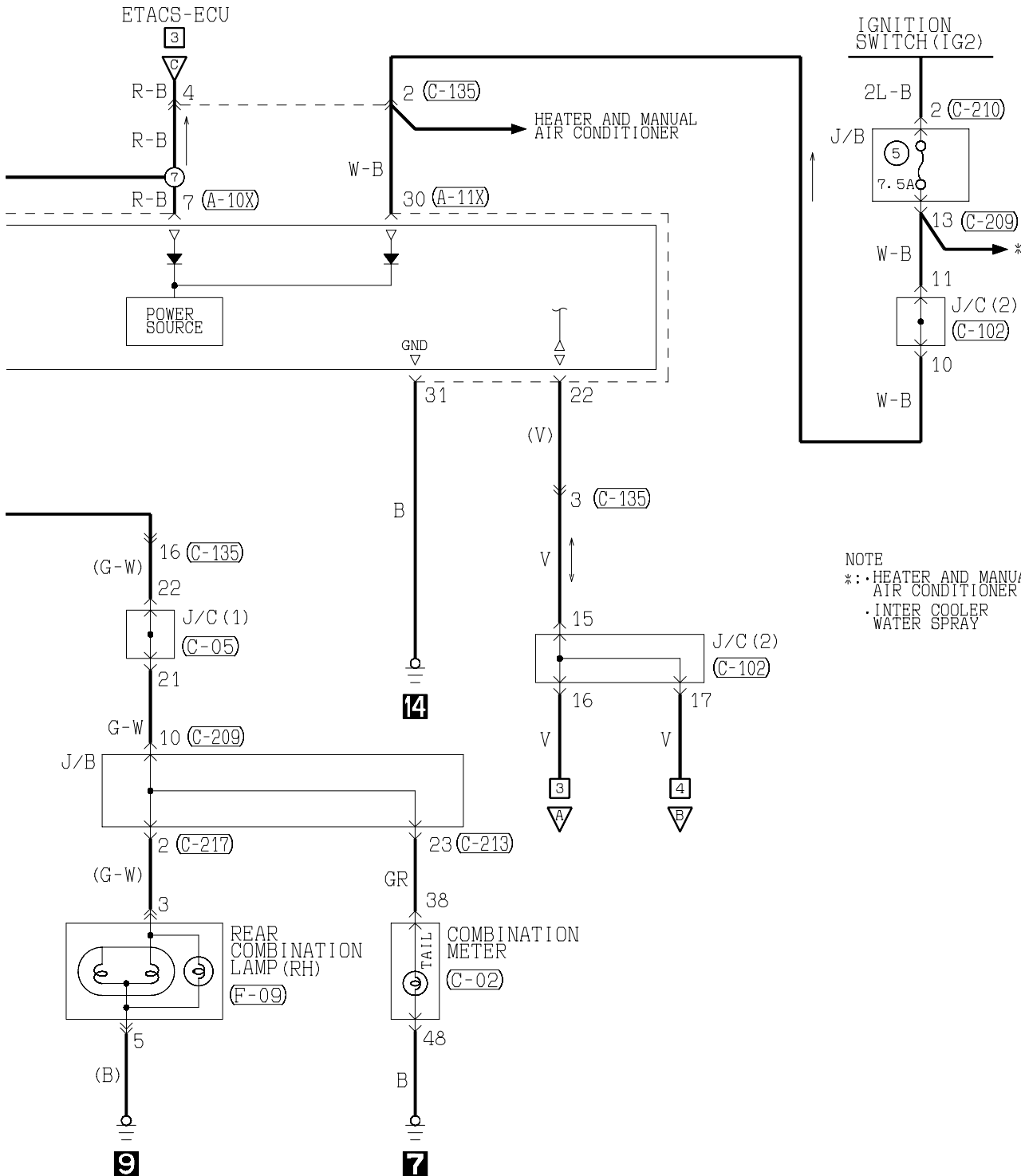


(F-14)



(F-16)





2

NOTE
 *: HEATER AND MANUAL AIR CONDITIONER
 . INTER COOLER WATER SPRAY

(C-05)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-102)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-133) MU801855

1	2	3	4	5
6	7	8	9	10
11	12	13		

(C-135)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

(C-209) MU801857

1	2	3	4	5	6
7	8	9	10	11	12
13	14				

(C-210) MU801331

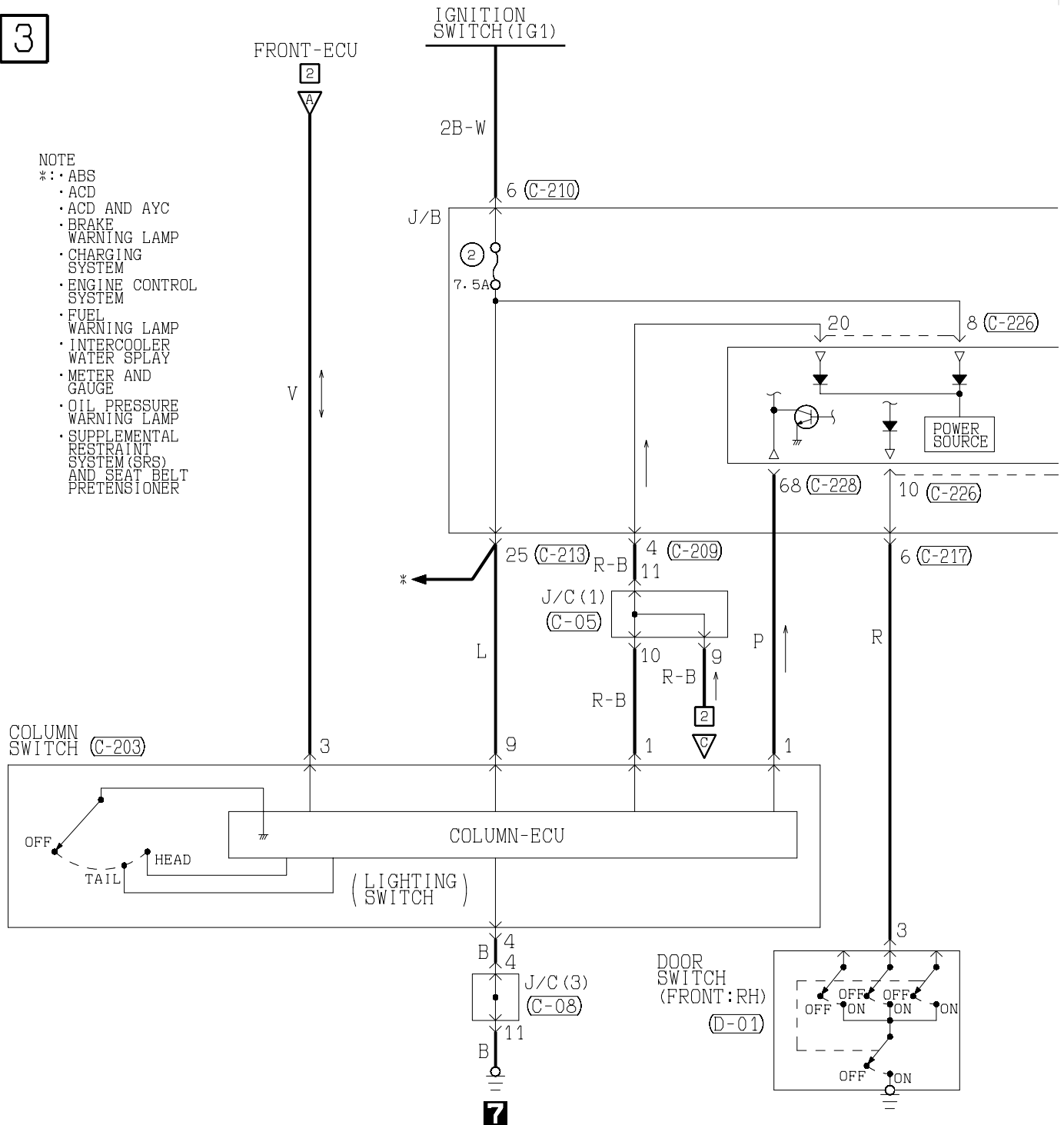
1	2		
3	4	5	6

Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

TAIL LAMP, POSITION LAMP, LICENCE PLATE LAMP AND LIGHTING MONITOR BUZZER <R.H. drive vehicles> (CONTINUED)

3

- NOTE
* : ABS
· ACD
· ACD AND AYC
· BRAKE WARNING LAMP
· CHARGING SYSTEM
· ENGINE CONTROL SYSTEM
· FUEL WARNING LAMP
· INTERCOOLER WATER SPLAY
· METER AND GAUGE
· OIL PRESSURE WARNING LAMP
· SUPPLEMENTAL RESTRAINT SYSTEM (SRS) AND SEAT BELT PRETENSIONER



(C-05)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-08)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-22) FRONT SIDE

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

(C-28) MU801855

1	2	3	4	5
6	7	8	9	10
11	12	13		

(C-35) (MU801380)

1	2	3
---	---	---

(C-132) (MU801380)

1	2	3
---	---	---

(C-203) (MU801514)

1	2	3	4	5
6	7	8	9	10

(C-226) J/B SIDE

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---

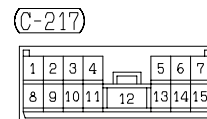
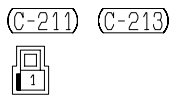
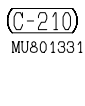
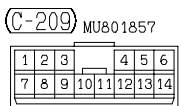
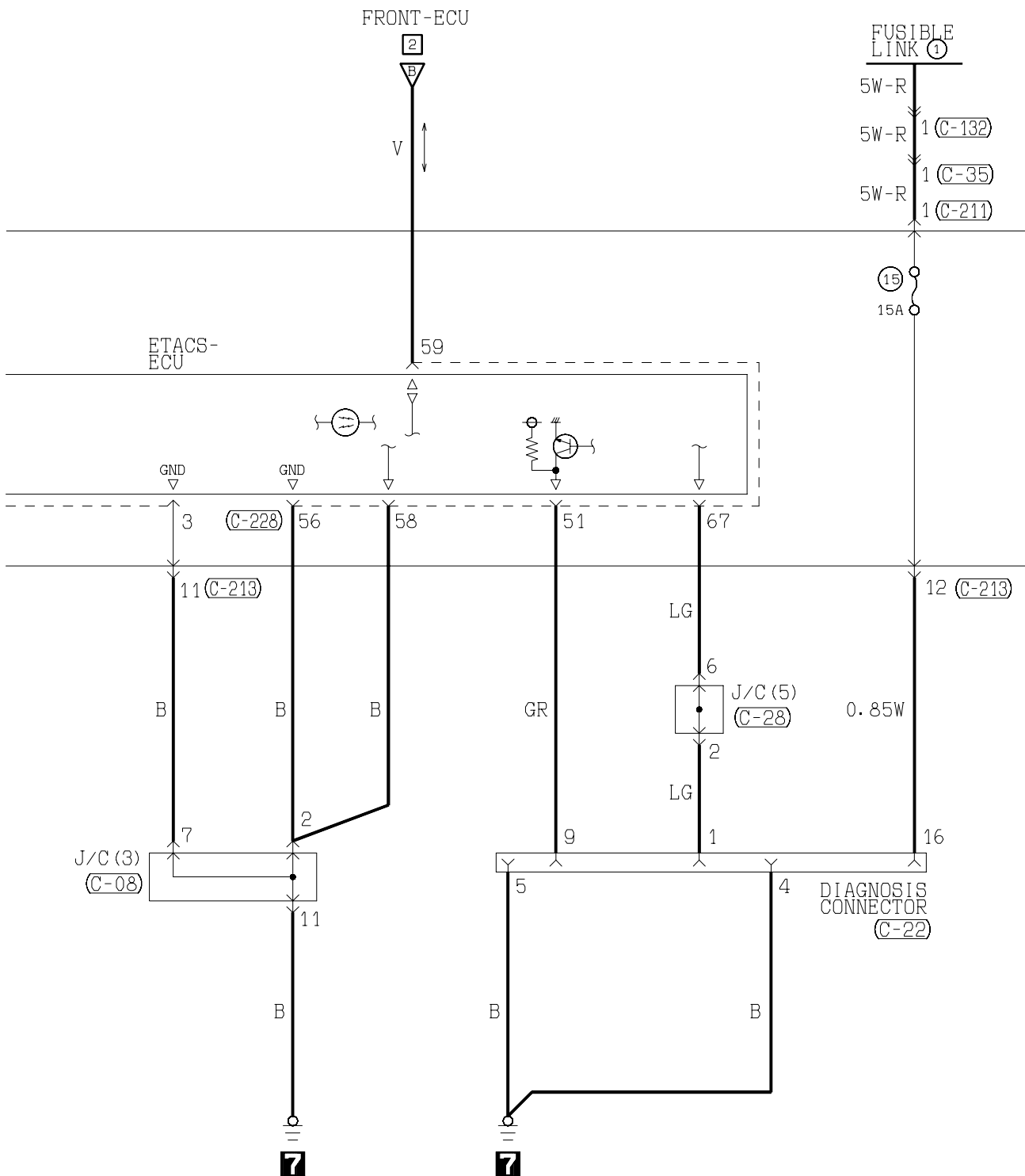
(C-228)

51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68
69	70	71		72	73	74		

(D-01)

1	2	3
---	---	---

4



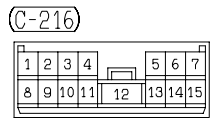
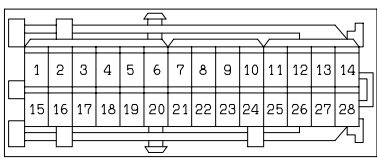
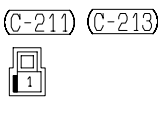
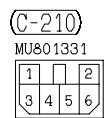
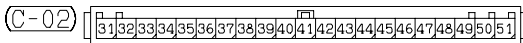
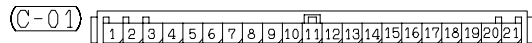
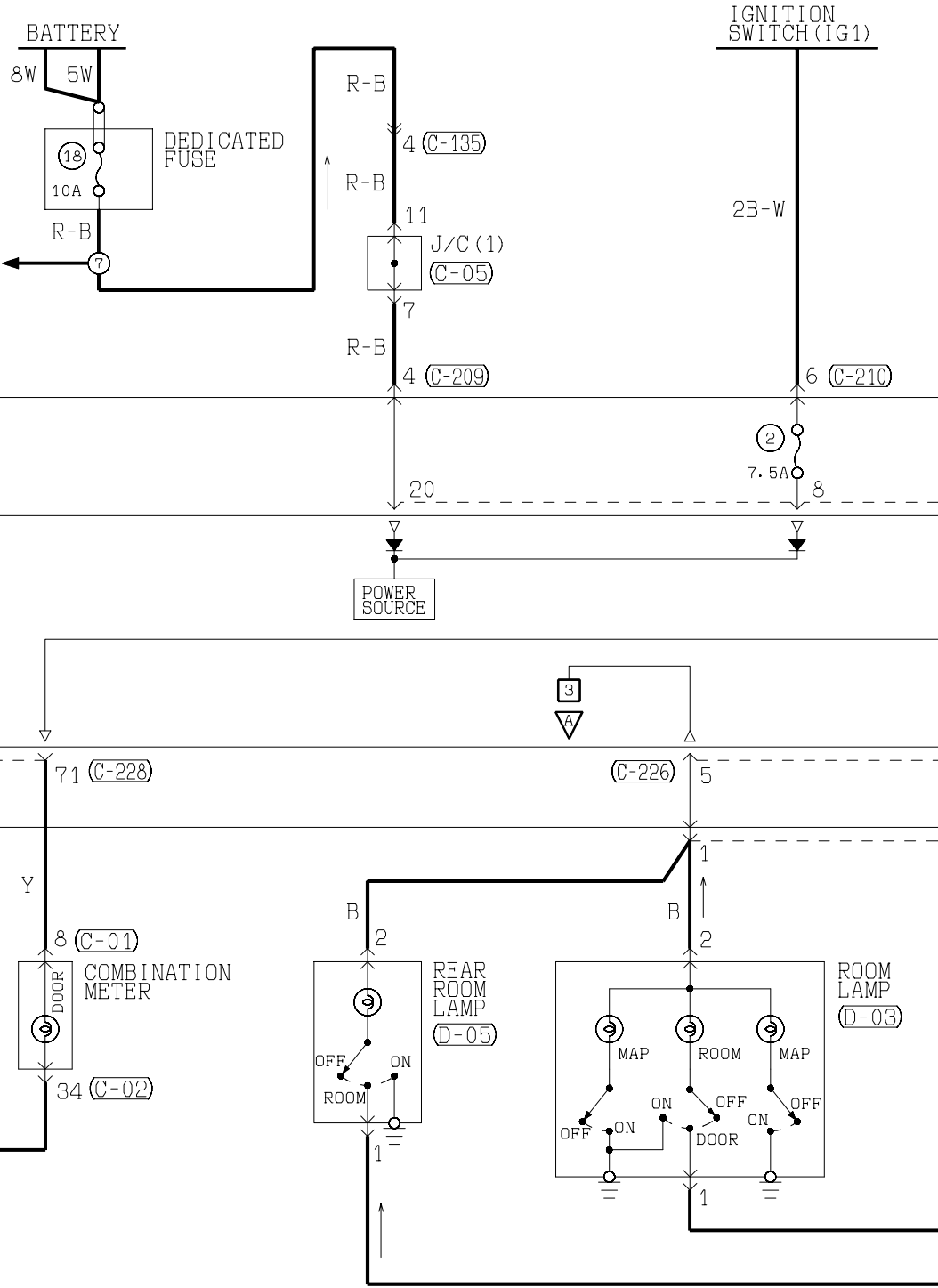
Wire colour code
 B : Black LG: Light green G : Green L : Blue W : White Y : Yellow SB: Sky blue
 BR: Brown O : Orange GR: Gray R : Red P : Pink V : Violet

ROOM LAMP AND LUGGAGE COMPARTMENT LAMP

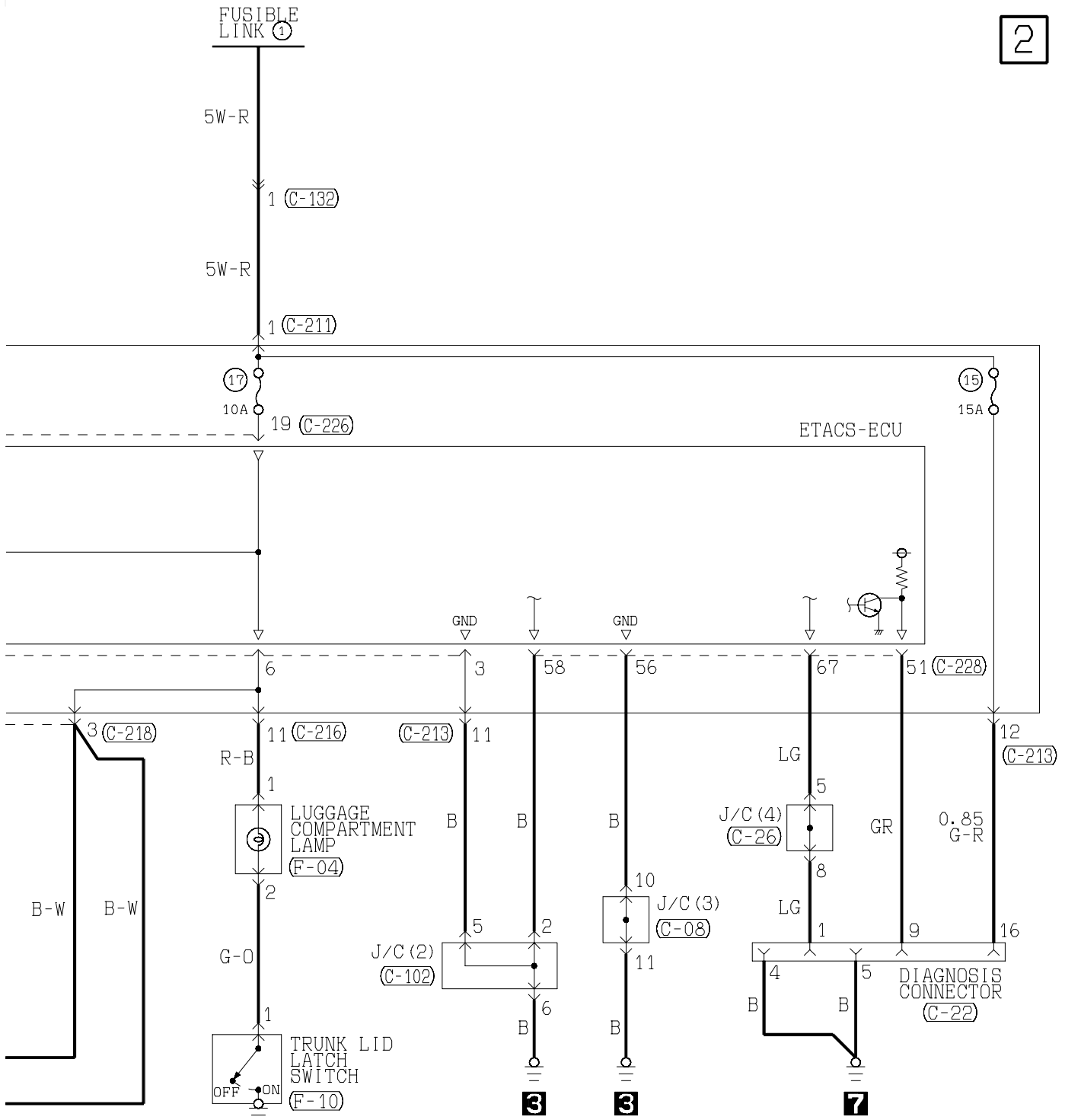
L.H. drive vehicles

1

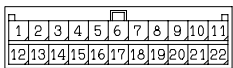
- HEADLAMP
- HEADLAMP LEVELING SYSTEM
- REAR FOG LAMP
- TAIL LAMP, POSITION LAMP, LICENCE PLATE LAMP AND LIGHTING MONITOR BUZZER
- TURN-SIGNAL LAMP AND HAZARD WARNING LAMP
- WINDSHIELD WIPER AND WASHER



2



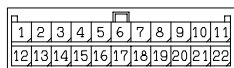
(C-08)



(C-22) FRONT SIDE



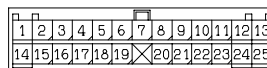
(C-102)



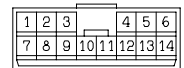
(C-132) (MU801380)



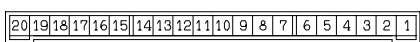
(C-135)



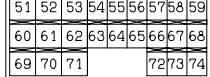
(C-209) MU801857



(C-226) J/B SIDE



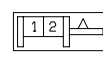
(C-228)



(D-03)



(D-05)



(F-04)

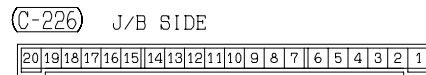
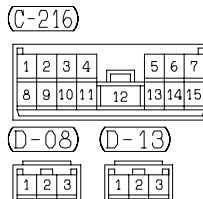
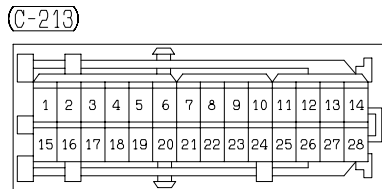
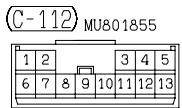
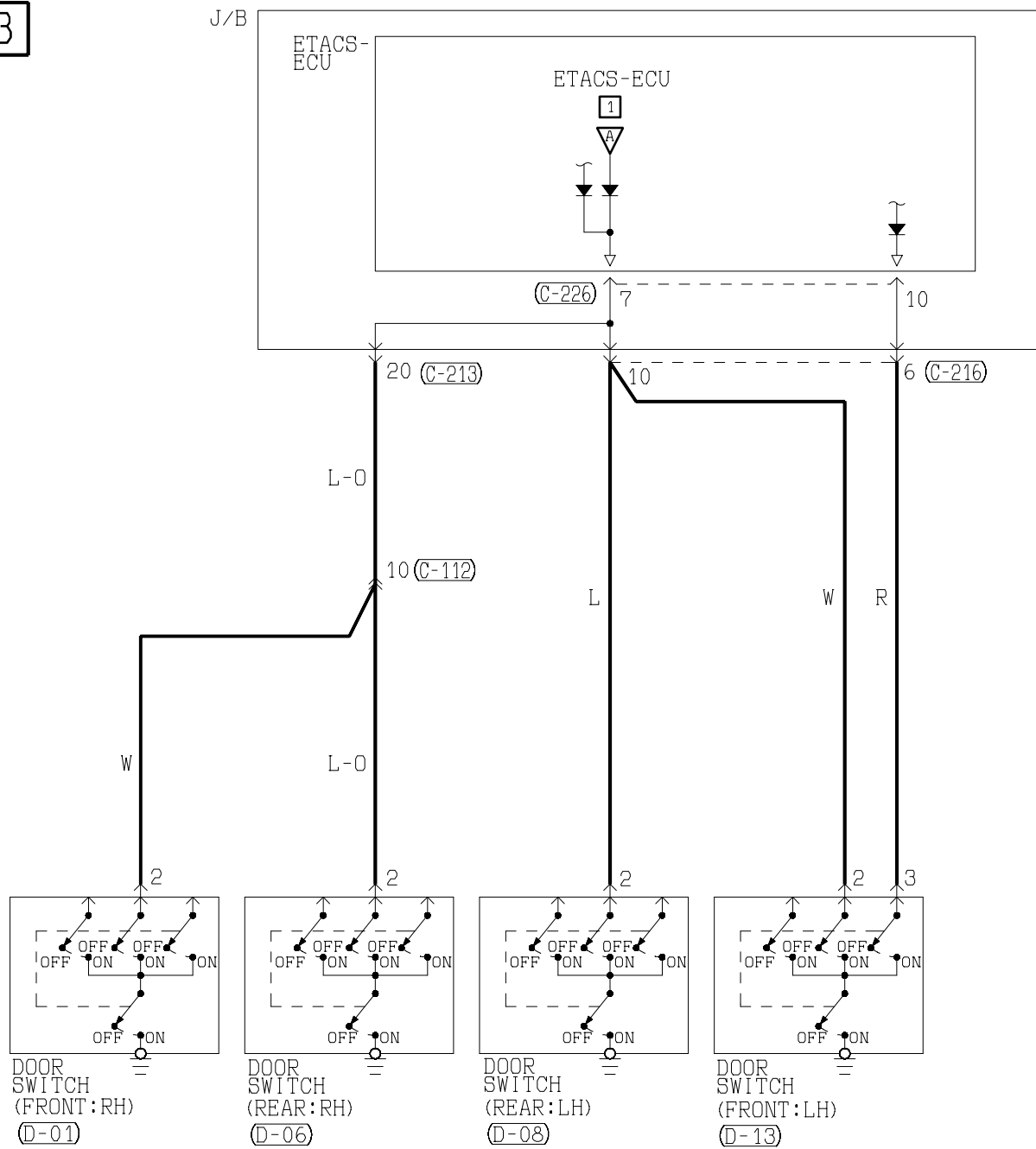


(F-10) (MU801211)



ROOM LAMP AND LUGGAGE COMPARTMENT LAMP <L.H. drive vehicles>
(CONTINUED)

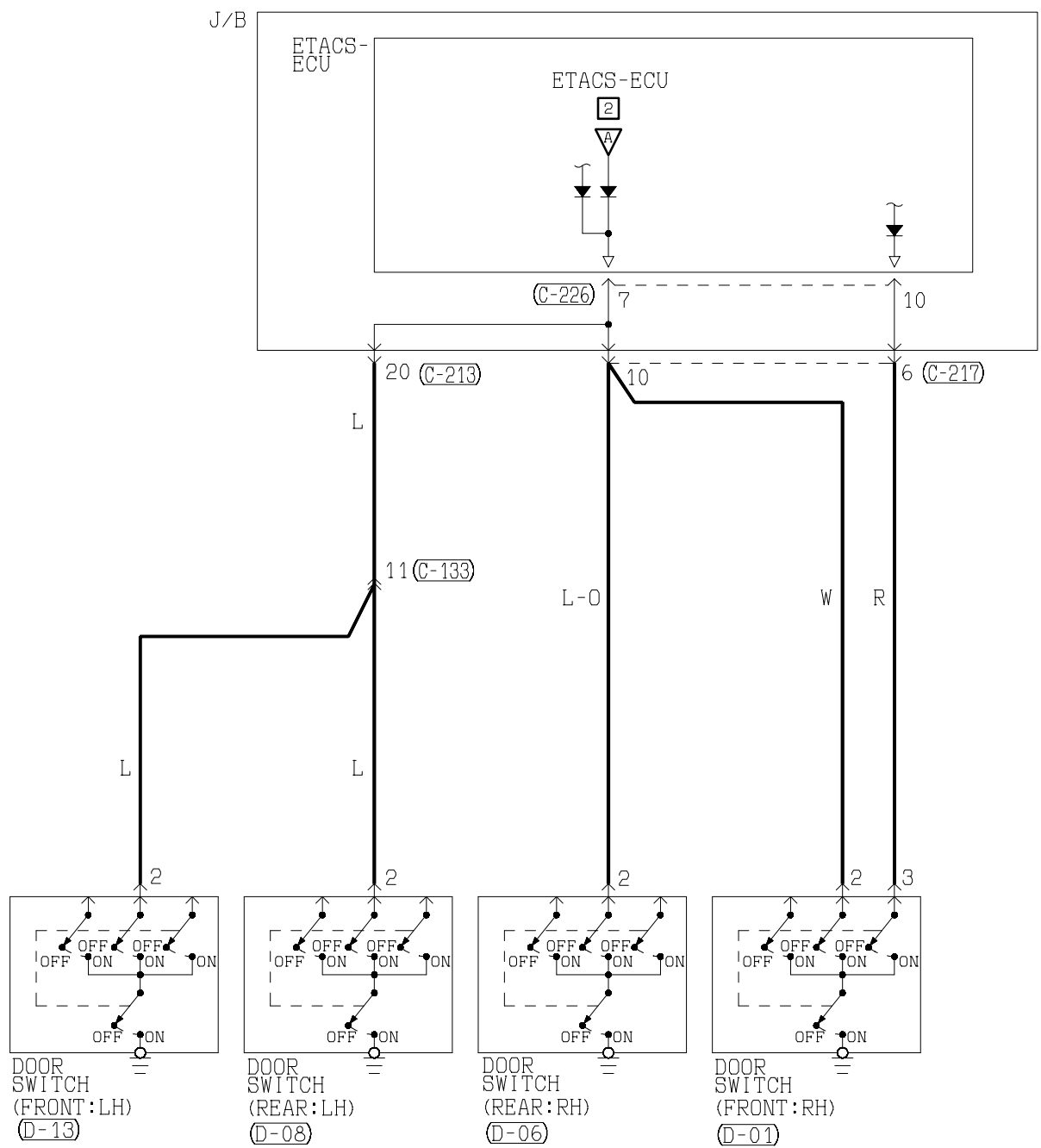
3



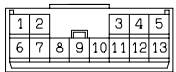
ROOM LAMP AND LUGGAGE COMPARTMENT LAMP

R.H. drive vehicles

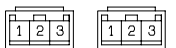
1



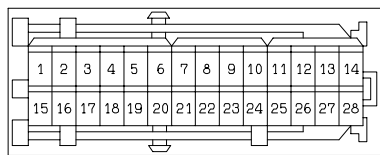
(C-133) MU801855



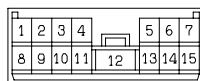
(D-01) (D-06)



(C-213)



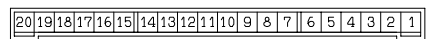
(C-217)



(D-08) (D-13)

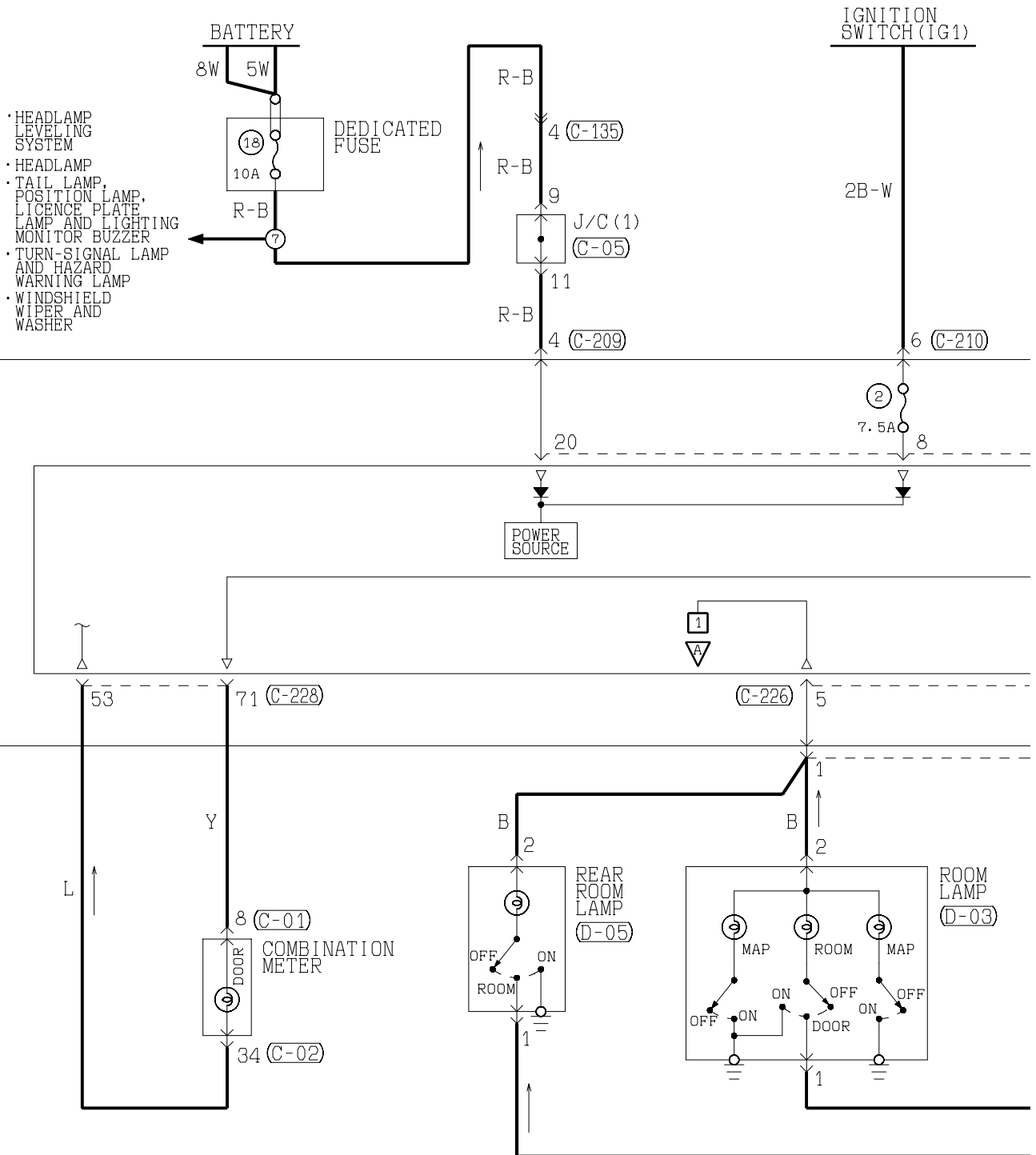


(C-226) J/B SIDE

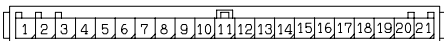


ROOM LAMP AND LUGGAGE COMPARTMENT LAMP <R.H. drive vehicles >
(CONTINUED)

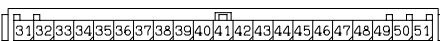
2



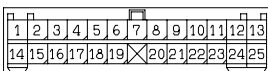
(C-01)



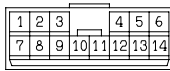
(C-02)



(C-135)



(C-209) MU801857



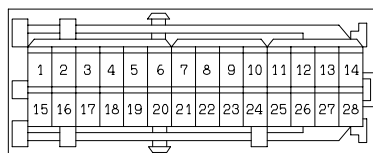
(C-210) MU801331



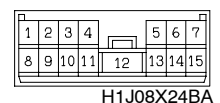
(C-211)



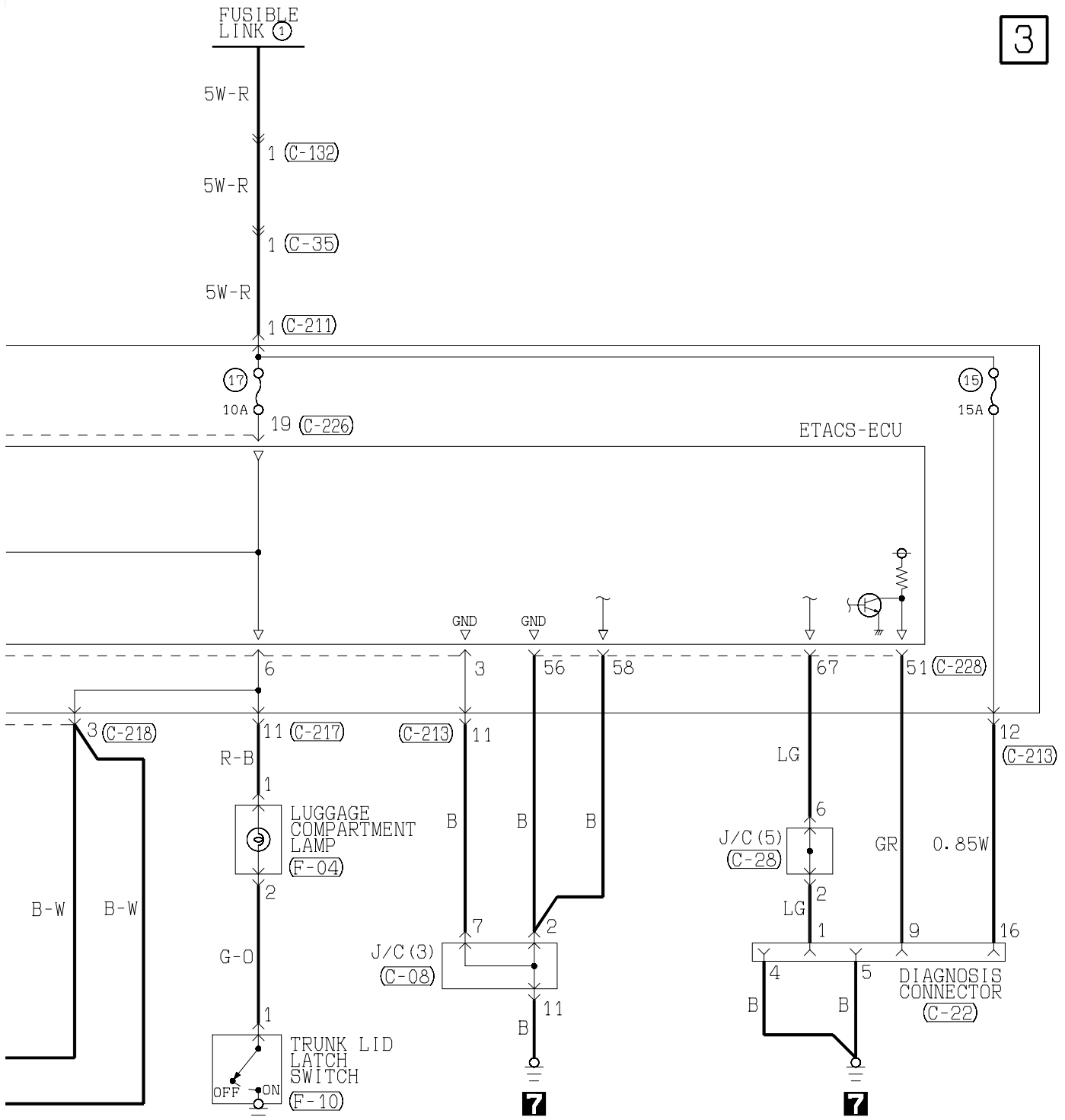
(C-213)



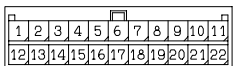
(C-217)



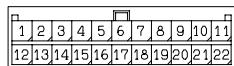
3



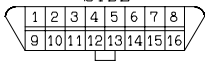
(C-05)



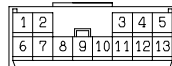
(C-08)



(C-22) FRONT SIDE



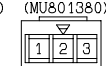
(C-28) MU801855



(C-35) (MU801380)



(C-132) (MU801380)



(C-218)

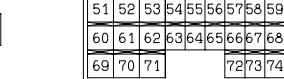


(C-226)



J/B SIDE

(C-228)



(D-03)



(D-05)



(F-04)



(F-10)

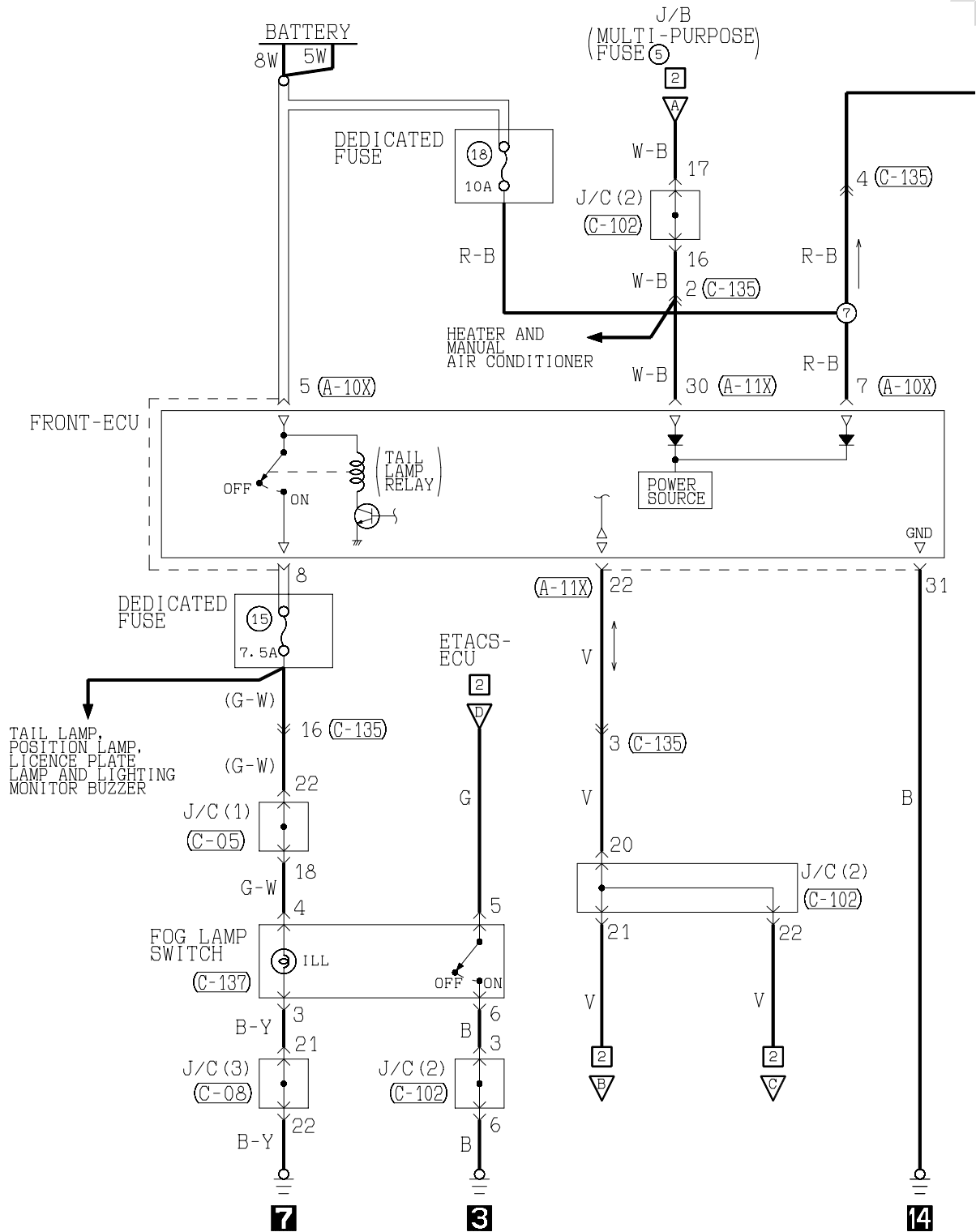


(MU801211)

REAR FOG LAMP

L.H. drive vehicles

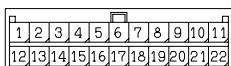
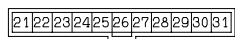
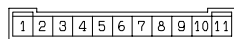
1



(A-10X)

(A-11X)

(C-05)



(C-137)

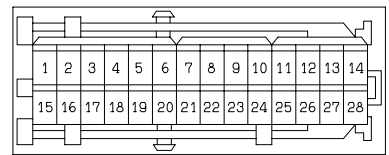
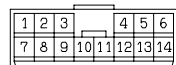
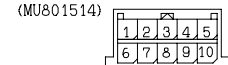
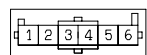
(C-203)

(C-209) MU801857

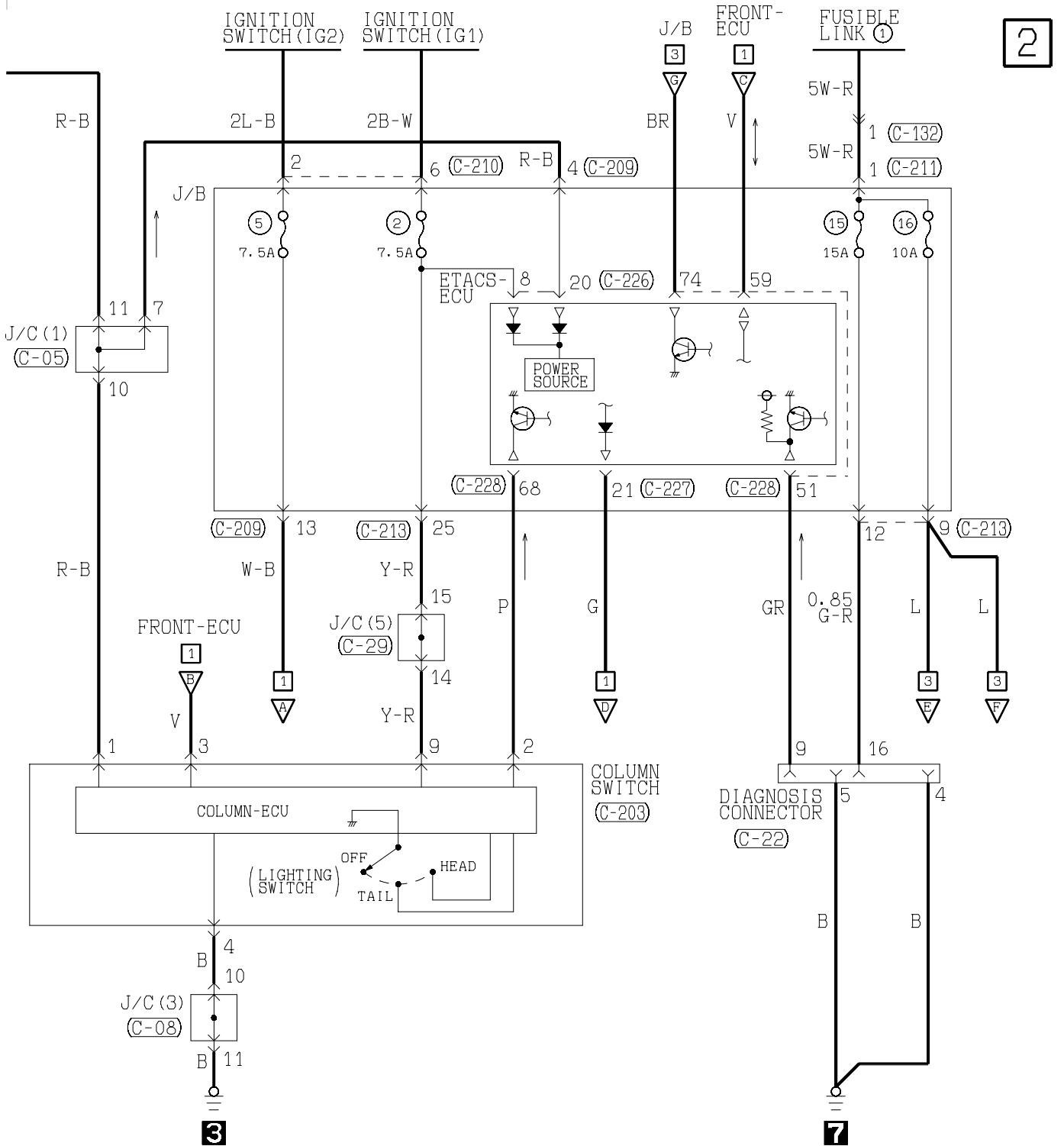
(C-210) MU801331

(C-211)

(C-213)



H1J08X28AA



2

3

7

(C-08)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-22) FRONT SIDE

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

(C-29)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-102)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-132) (MU801380)

1	2	3
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(C-135)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	X	20	21	22	23	24	25

(C-226) J/B SIDE

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
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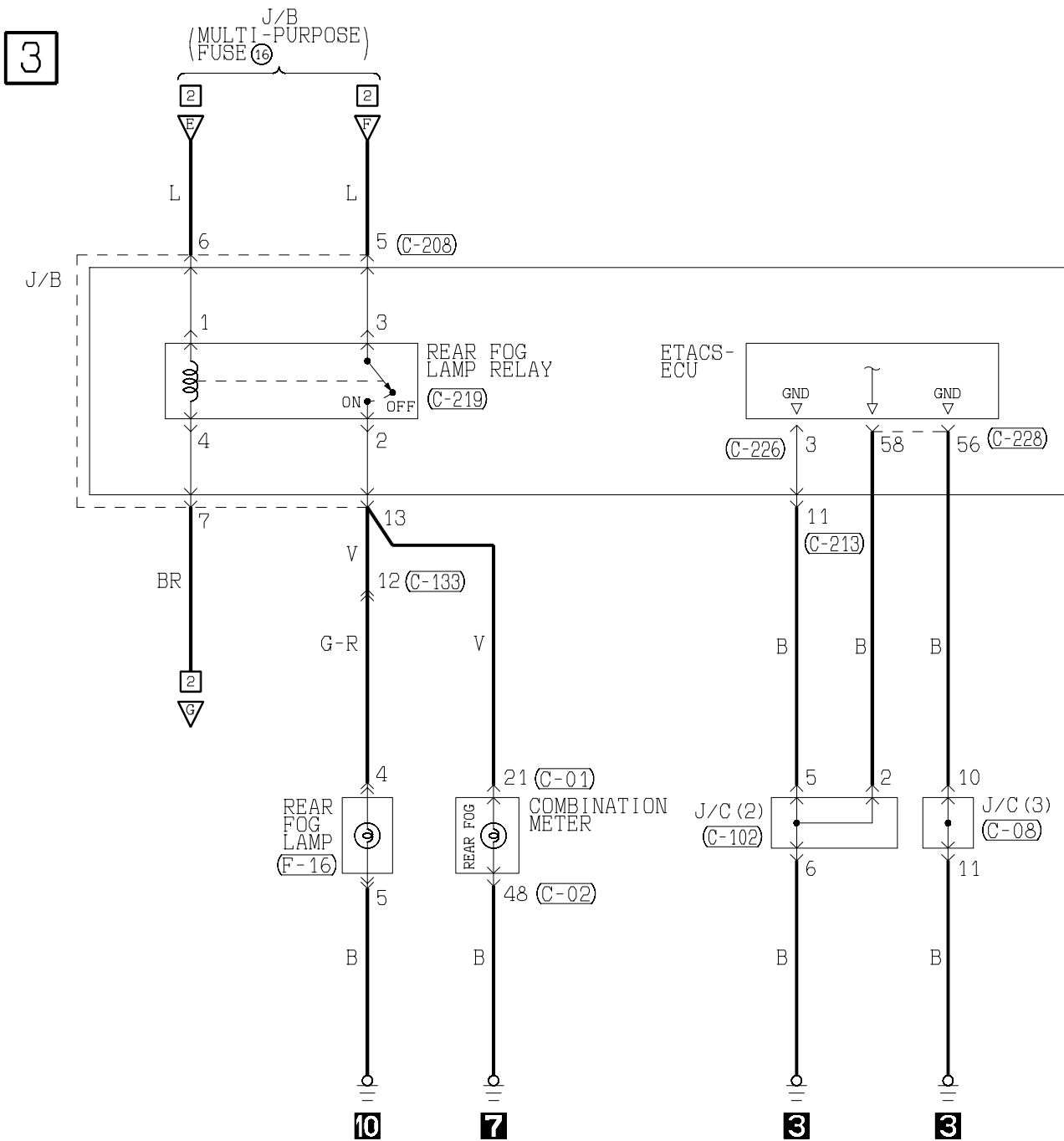
(C-227)

21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38
39	40	41		42	43	44		

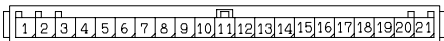
(C-228)

51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68
69	70	71		72	73	74		

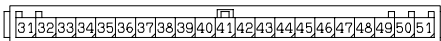
REAR FOG LAMP <L.H. drive vehicles> (CONTINUED)



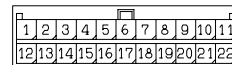
(C-01)



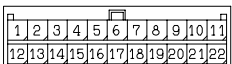
(C-02)



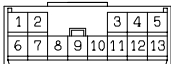
(C-08)



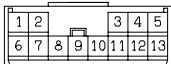
(C-102)



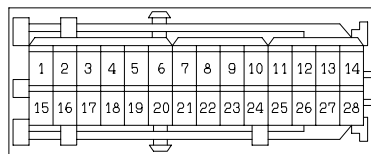
(C-133) MU801855



(C-208) MU801855



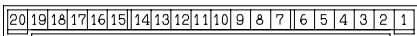
(C-213)



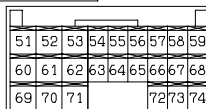
(C-219)



(C-226) J/B SIDE



(C-228)

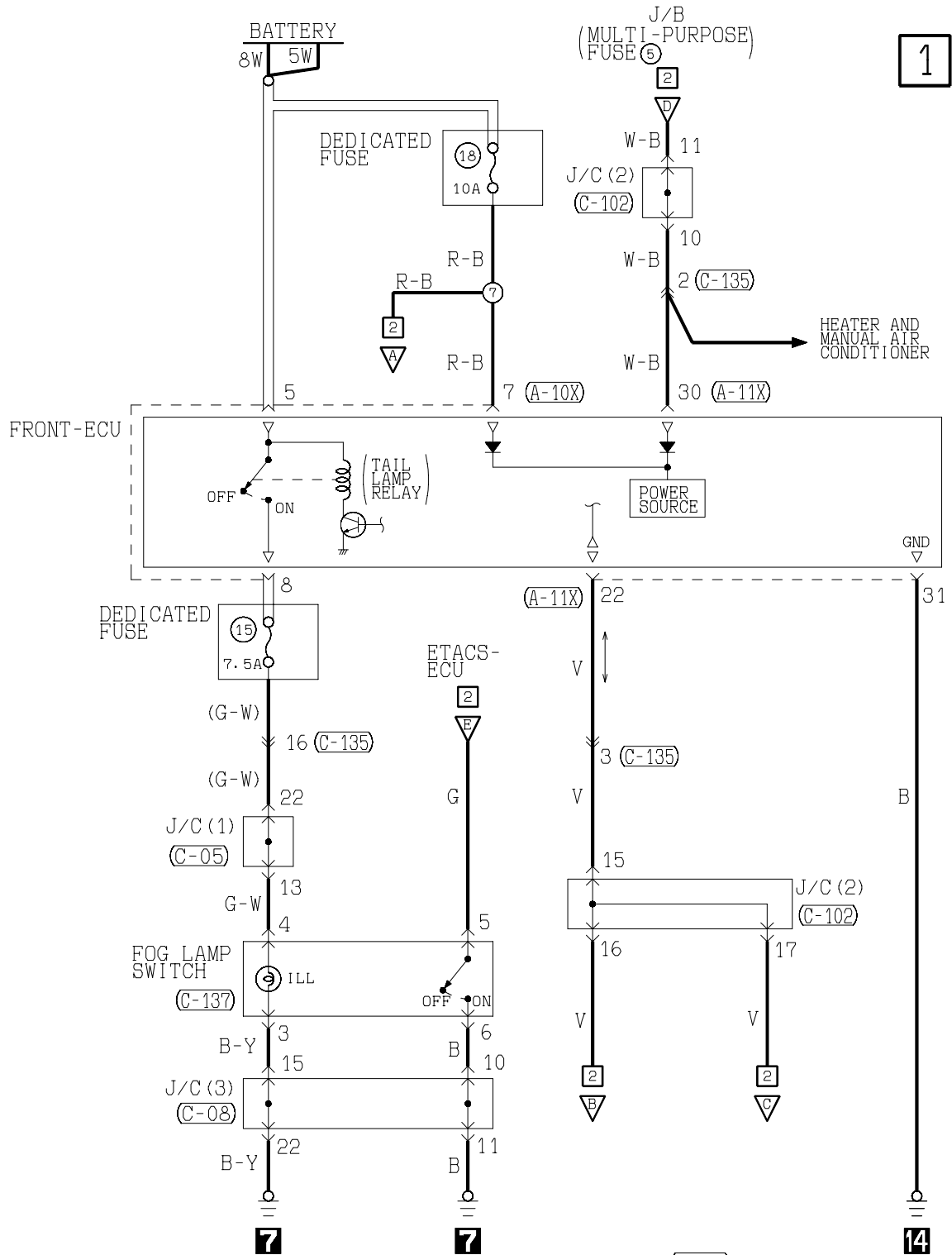


(F-16)



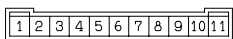
REAR FOG LAMP

R.H. drive vehicles

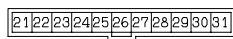


1

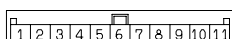
(A-10X)



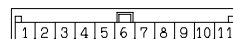
(A-11X)



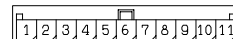
(C-05)



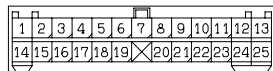
(C-08)



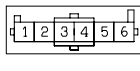
(C-102)



(C-135)



(C-137)



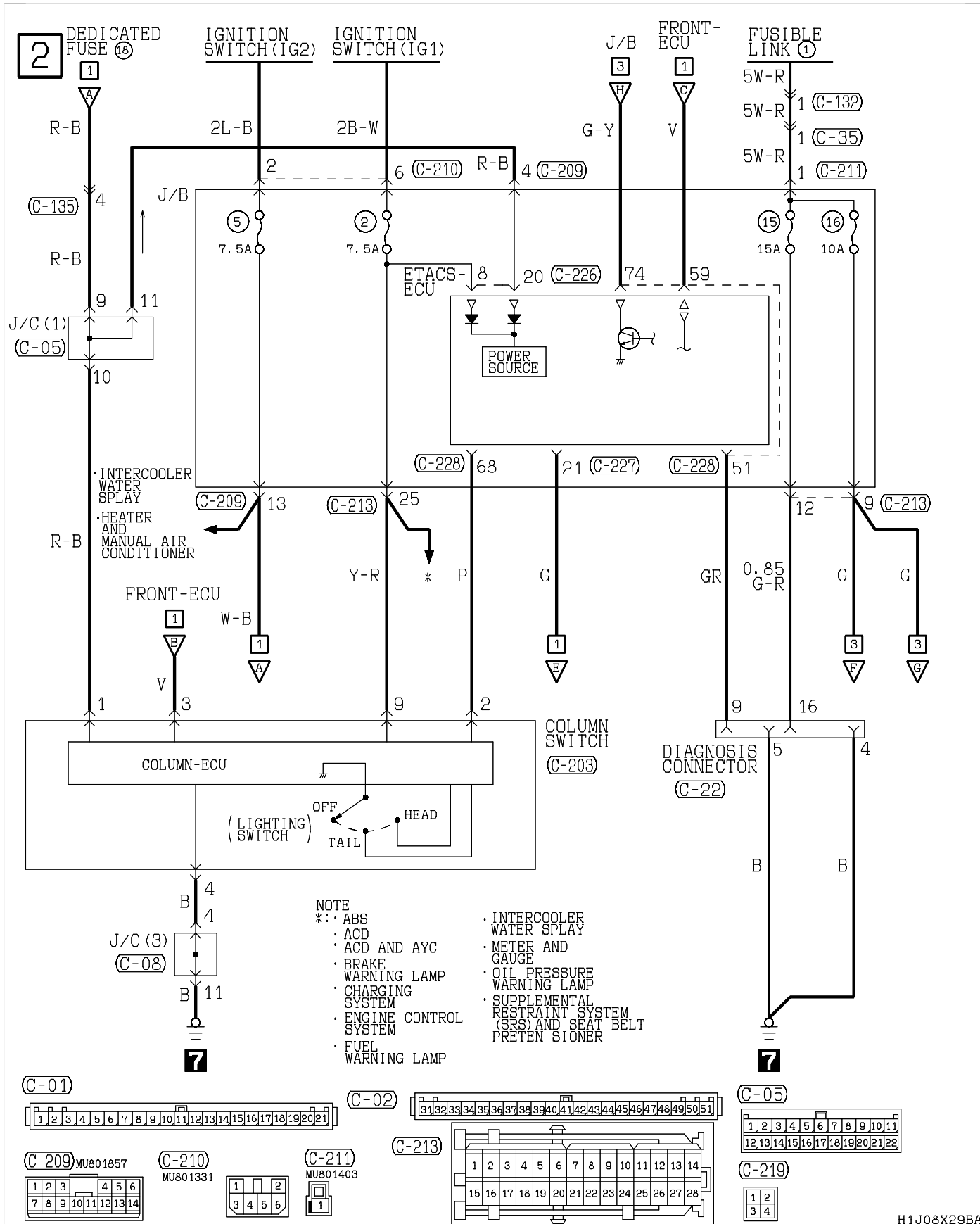
Wire colour code
 B : Black
 BR : Brown
 W : White
 V : Violet

LG : Light green
 O : Orange
 SB : Sky blue

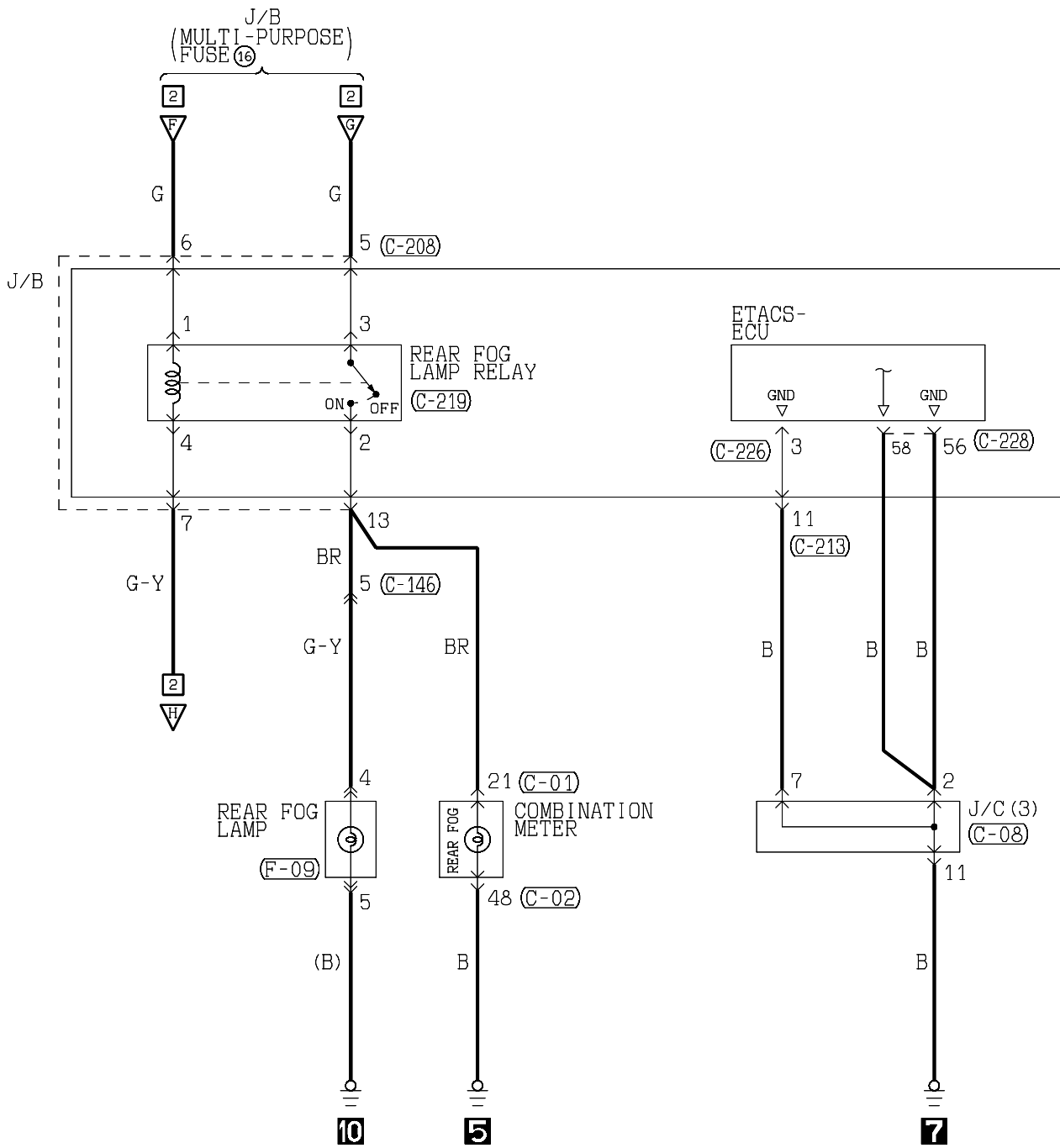
G : Green
 GR : Gray
 P : Pink

L : Blue
 R : Red
 Y : Yellow

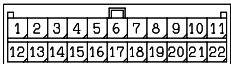
REAR FOG LAMP <R.H. drive vehicles> (CONTINUED)



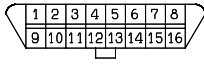
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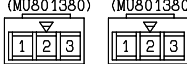
(C-08)



(C-22) FRONT SIDE



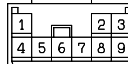
(C-35) (MU801380)



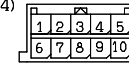
(C-132) (MU801380)



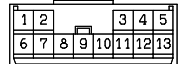
(C-146) MU801841



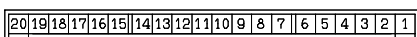
(C-203) (MU801514)



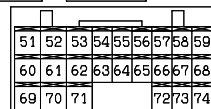
(C-208) MU801855



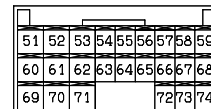
(C-226) J/B SIDE



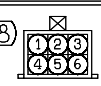
(C-227) MU803766



(C-228)



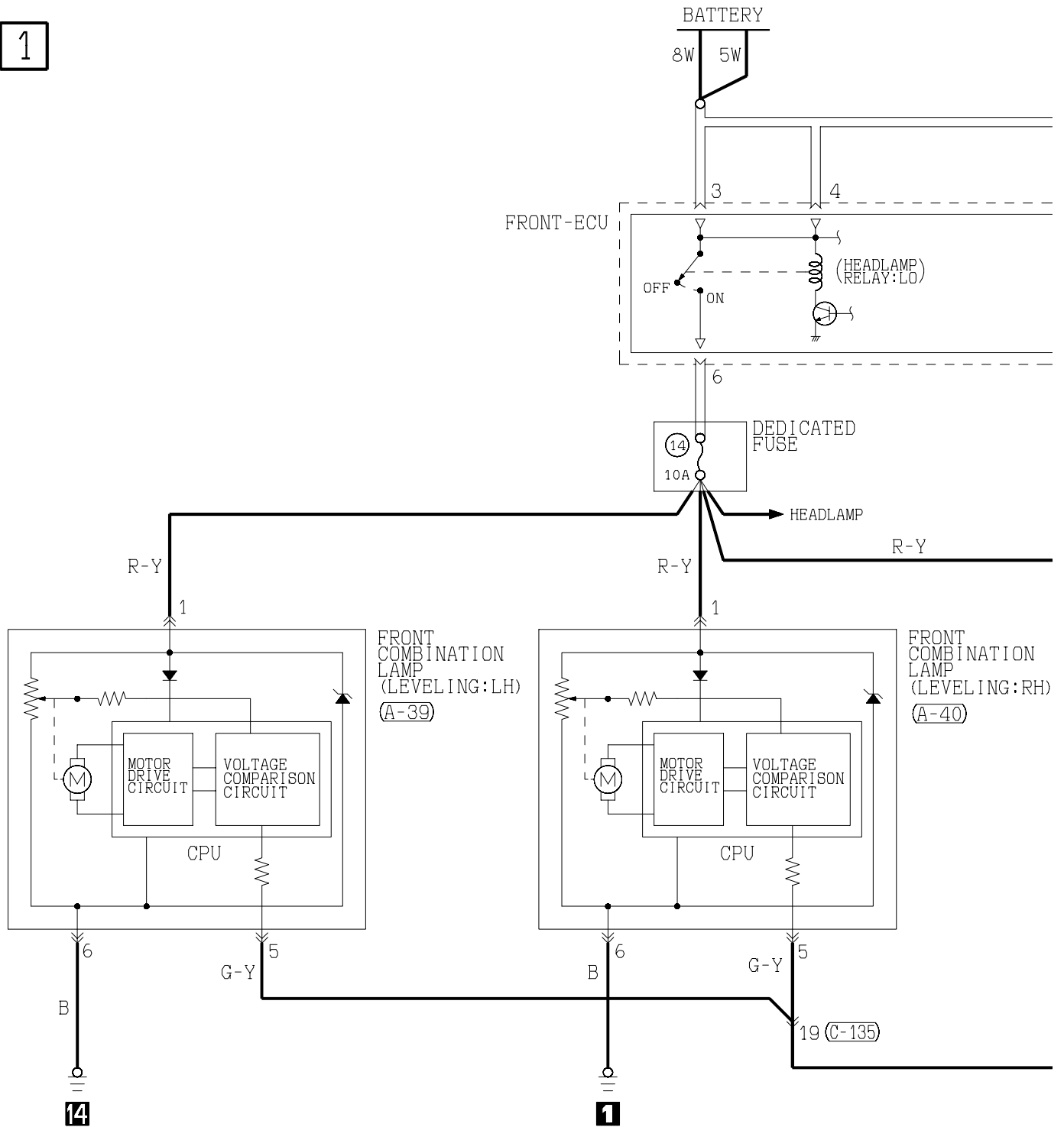
(F-08)



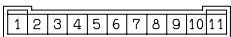
HEADLAMP LEVELING SYSTEM

L.H. drive vehicles

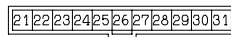
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(A-10X)



(A-11X)



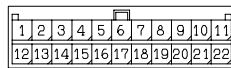
(A-39)



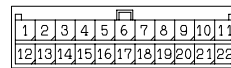
(A-40)



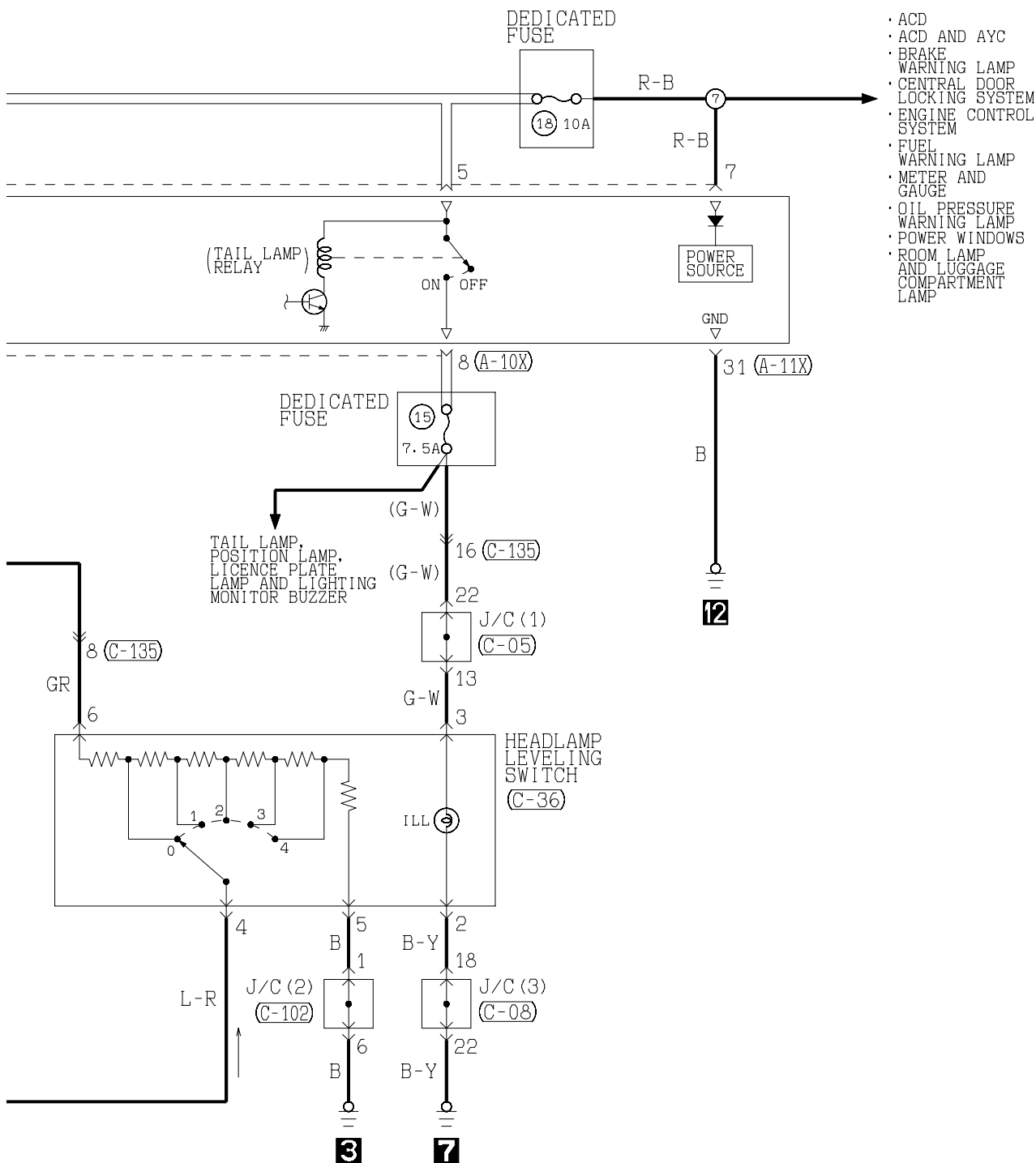
(C-05)



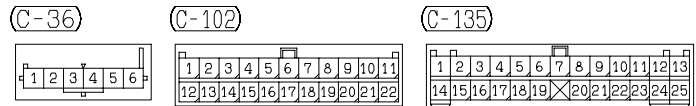
(C-08)



2



- ACD
- ACD AND AYC
- BRAKE WARNING LAMP
- CENTRAL DOOR LOCKING SYSTEM
- ENGINE CONTROL SYSTEM
- FUEL WARNING LAMP
- METER AND GAUGE
- OIL PRESSURE WARNING LAMP
- POWER WINDOWS
- ROOM LAMP AND LUGGAGE COMPARTMENT LAMP

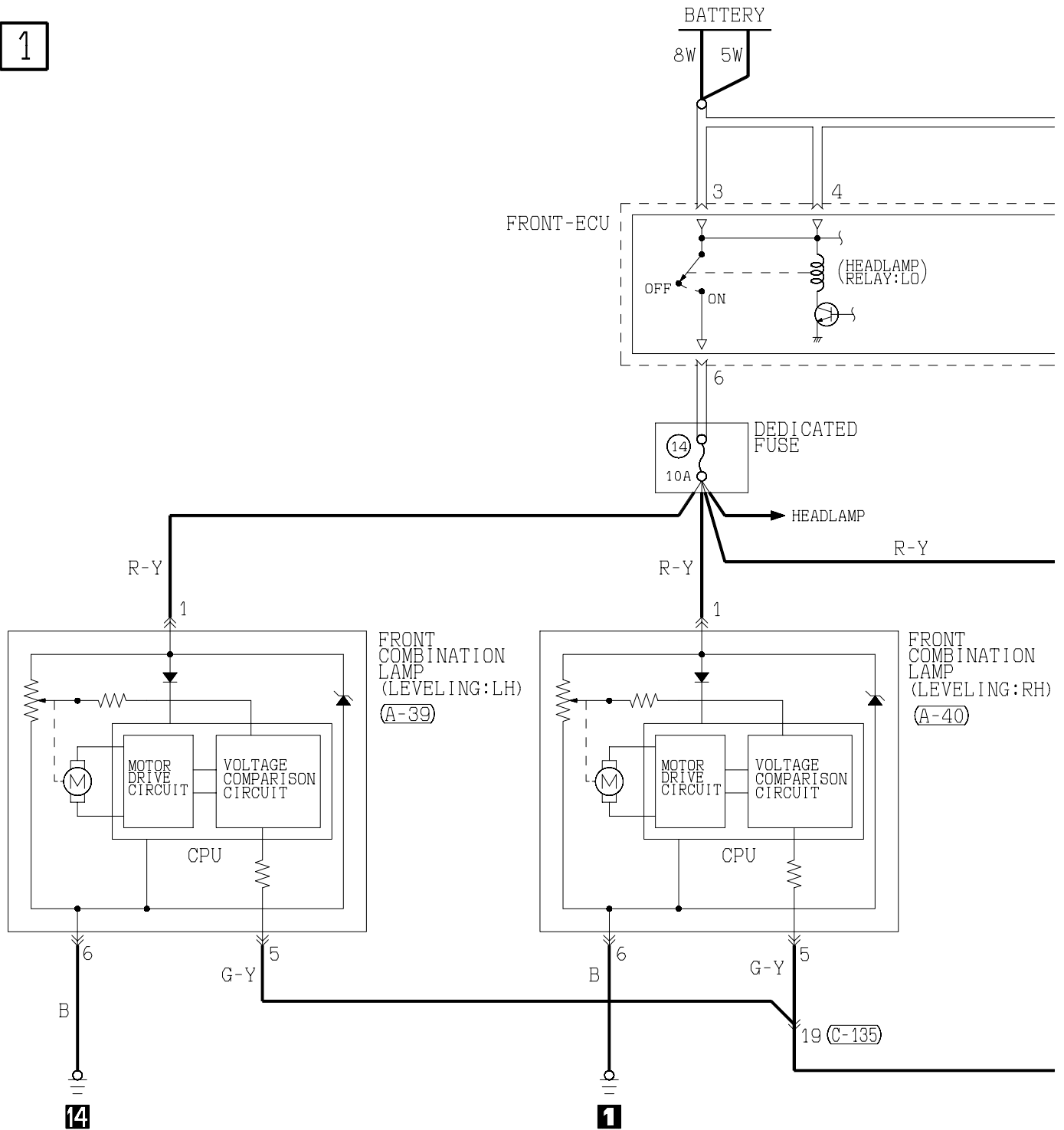


Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

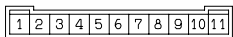
HEADLAMP LEVELING SYSTEM

R.H. drive vehicles

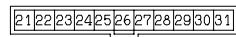
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(A-10X)



(A-11X)



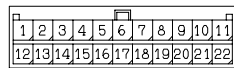
(A-39)



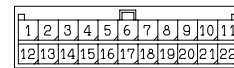
(A-40)



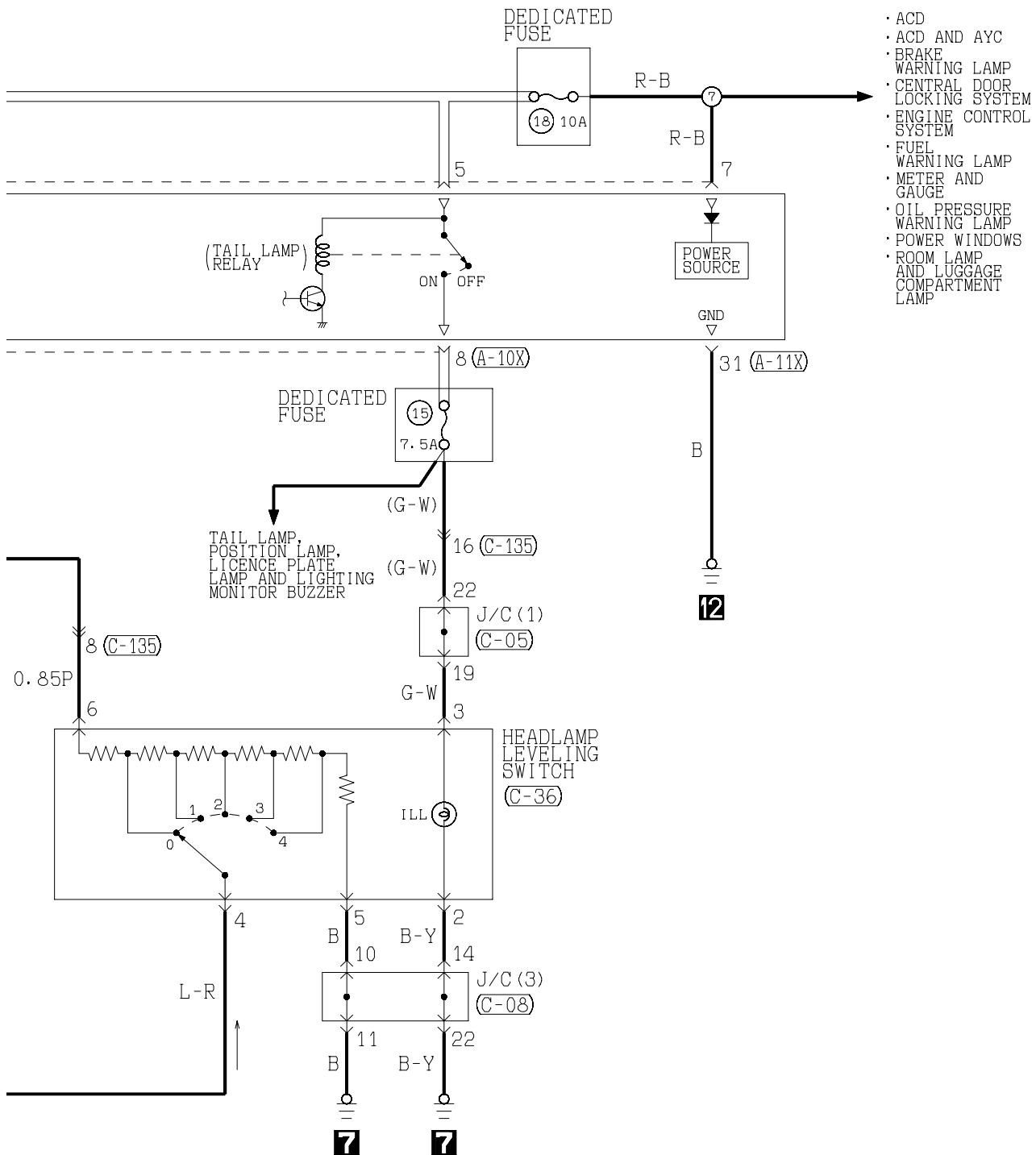
(C-05)



(C-08)

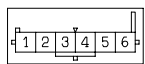


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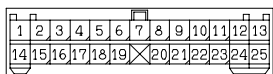


- ACD
- ACD AND AYC
- BRAKE WARNING LAMP
- CENTRAL DOOR LOCKING SYSTEM
- ENGINE CONTROL SYSTEM
- FUEL WARNING LAMP
- METER AND GAUGE
- OIL PRESSURE WARNING LAMP
- POWER WINDOWS
- ROOM LAMP AND LUGGAGE COMPARTMENT LAMP

(C-36)



(C-135)

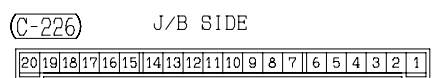
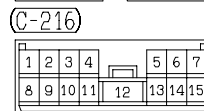
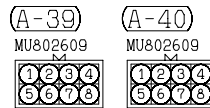
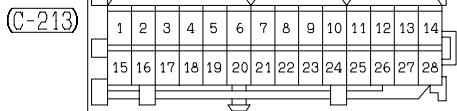
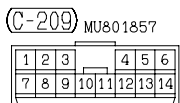
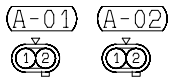
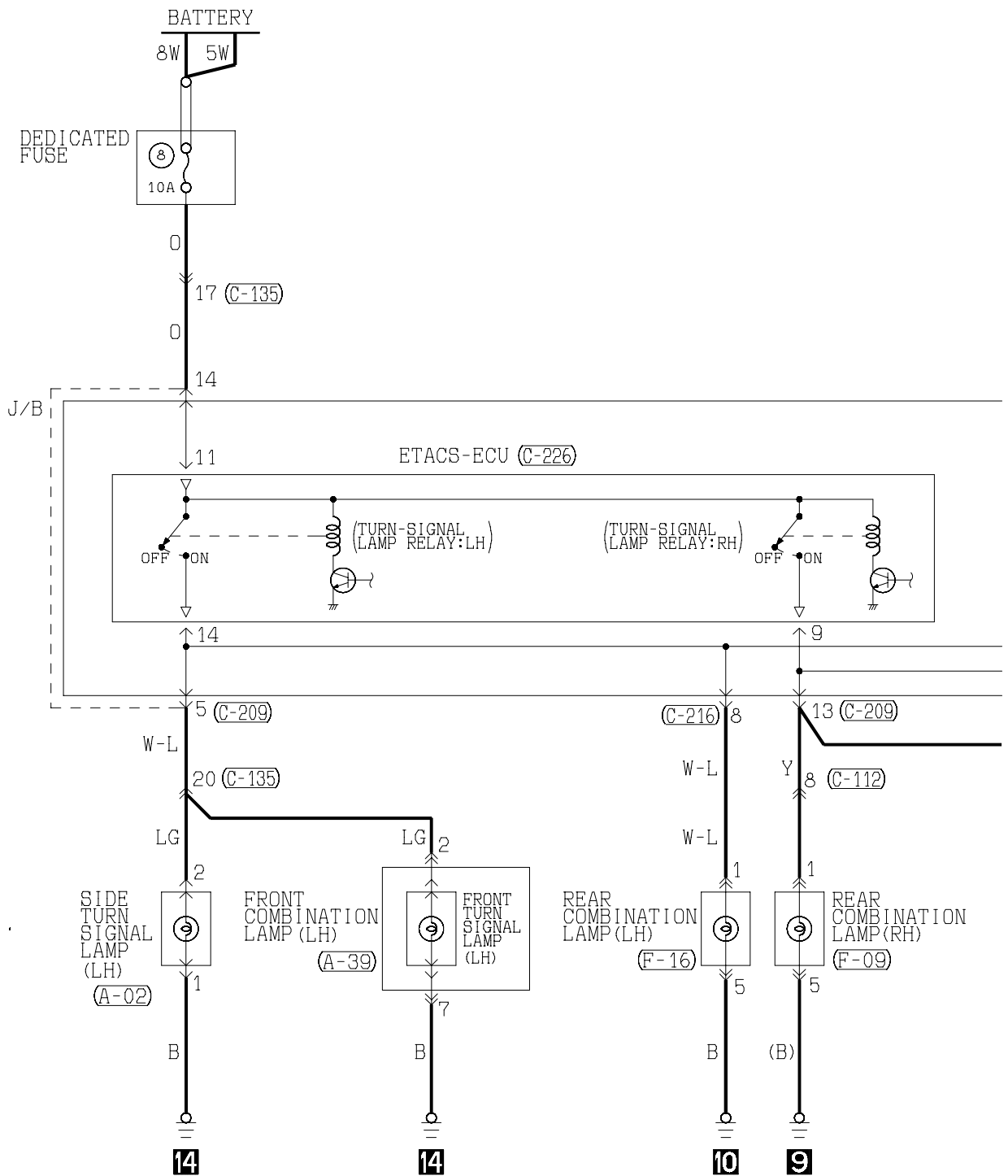


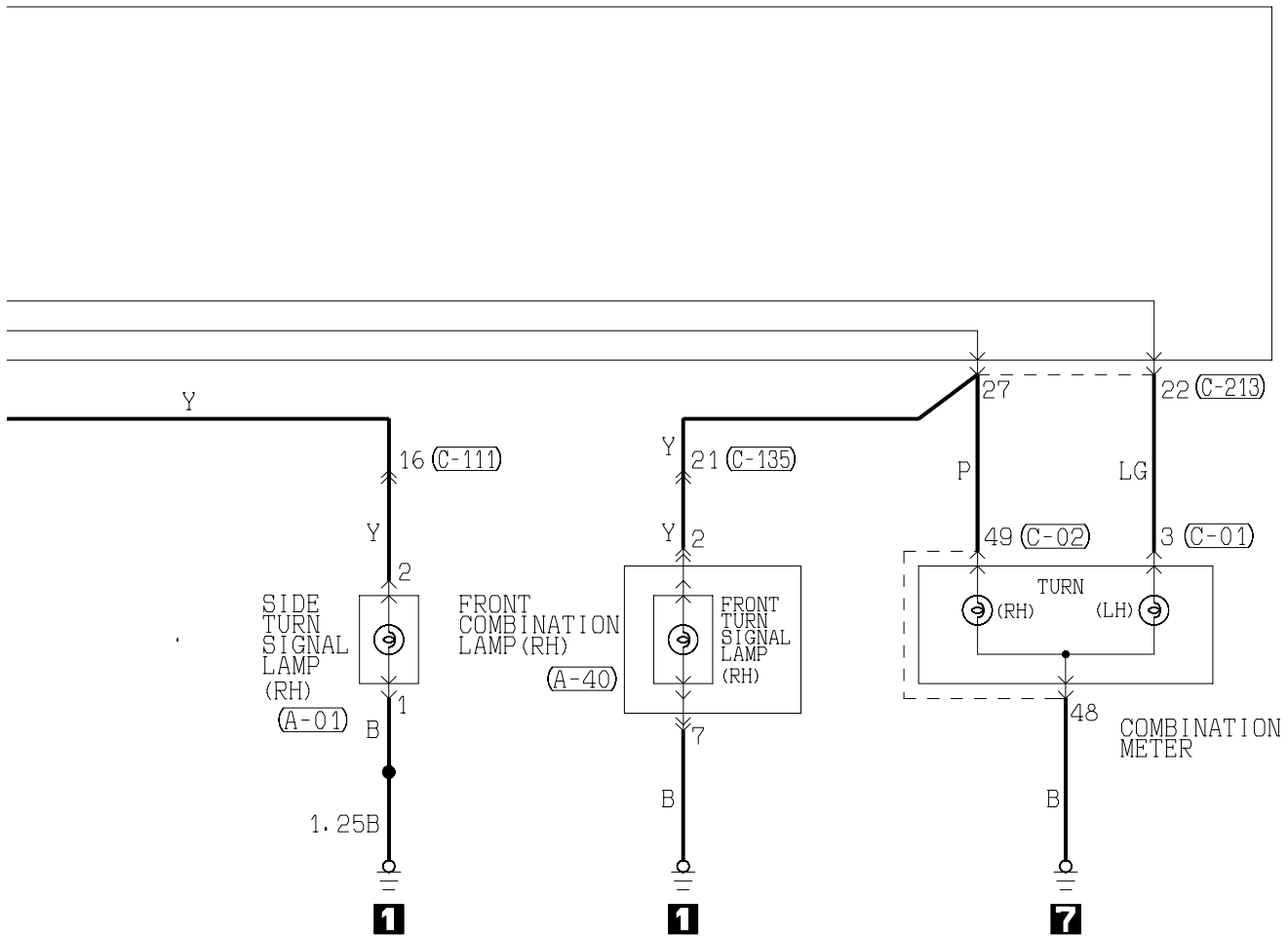
Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

TURN-SIGNAL LAMP AND HAZARD WARNING LAMP

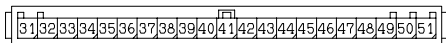
L.H. drive vehicles

1

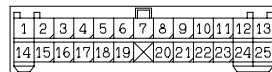




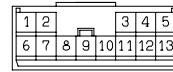
(C-02)



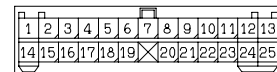
(C-111)



(C-112) MU801855



(C-135)



(F-09)



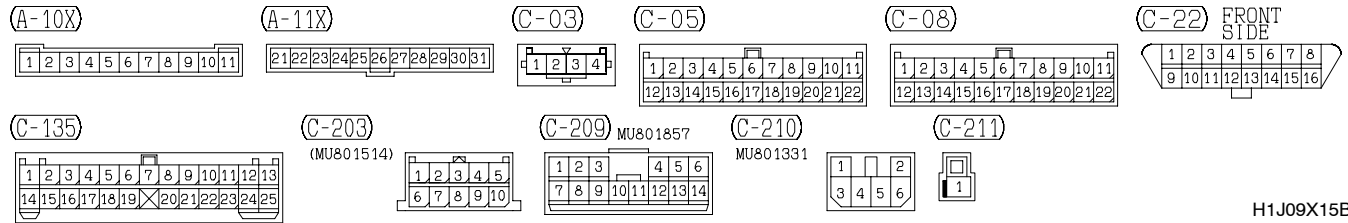
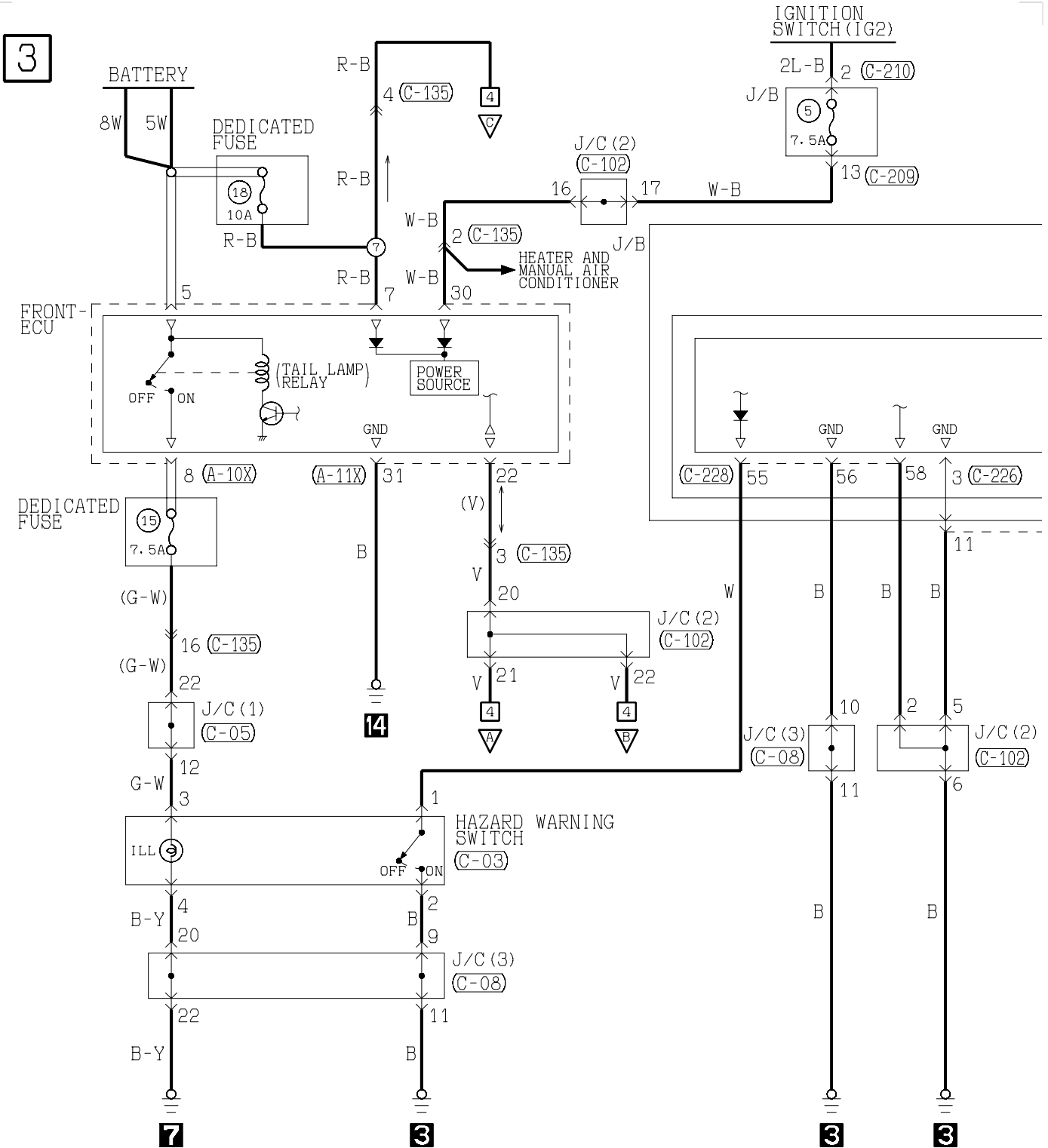
(F-16)

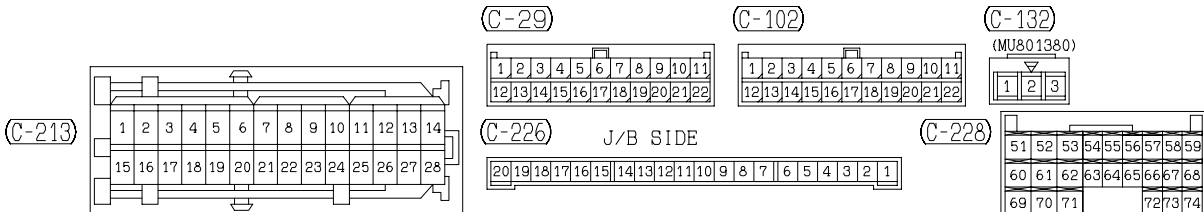
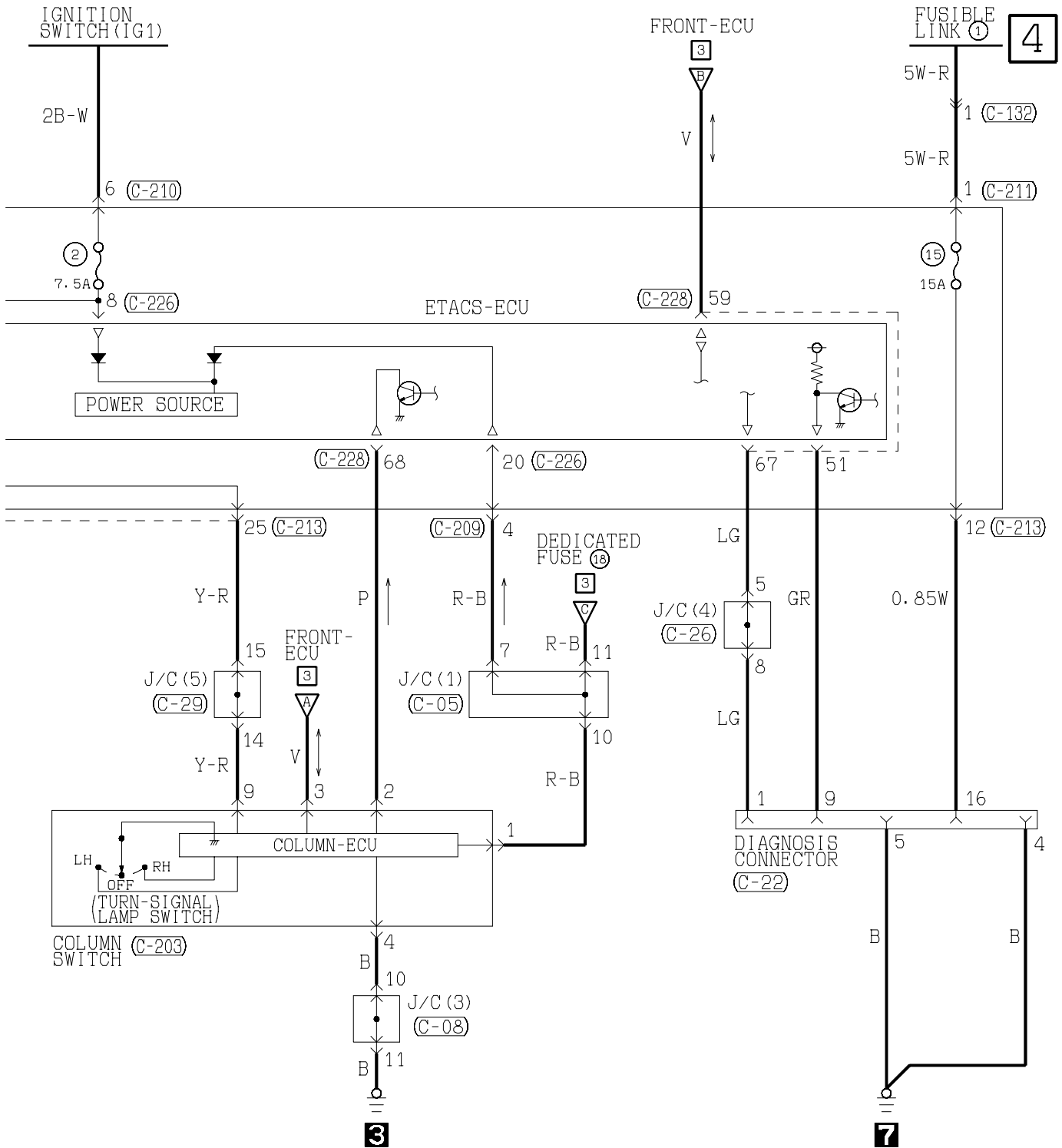


Wire colour code
 B : Black LG : Light green G : Green L : Blue
 BR : Brown O : Orange GR : Gray LGY : Red
 W : White SB : Sky blue P : Pink Y : Yellow
 V : Violet

TURN-SIGNAL LAMP AND HAZARD WARNING LAMP <L.H. drive vehicles>
(CONTINUED)

3

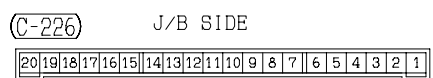
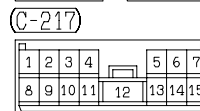
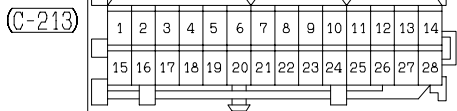
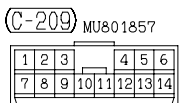
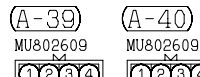
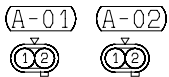
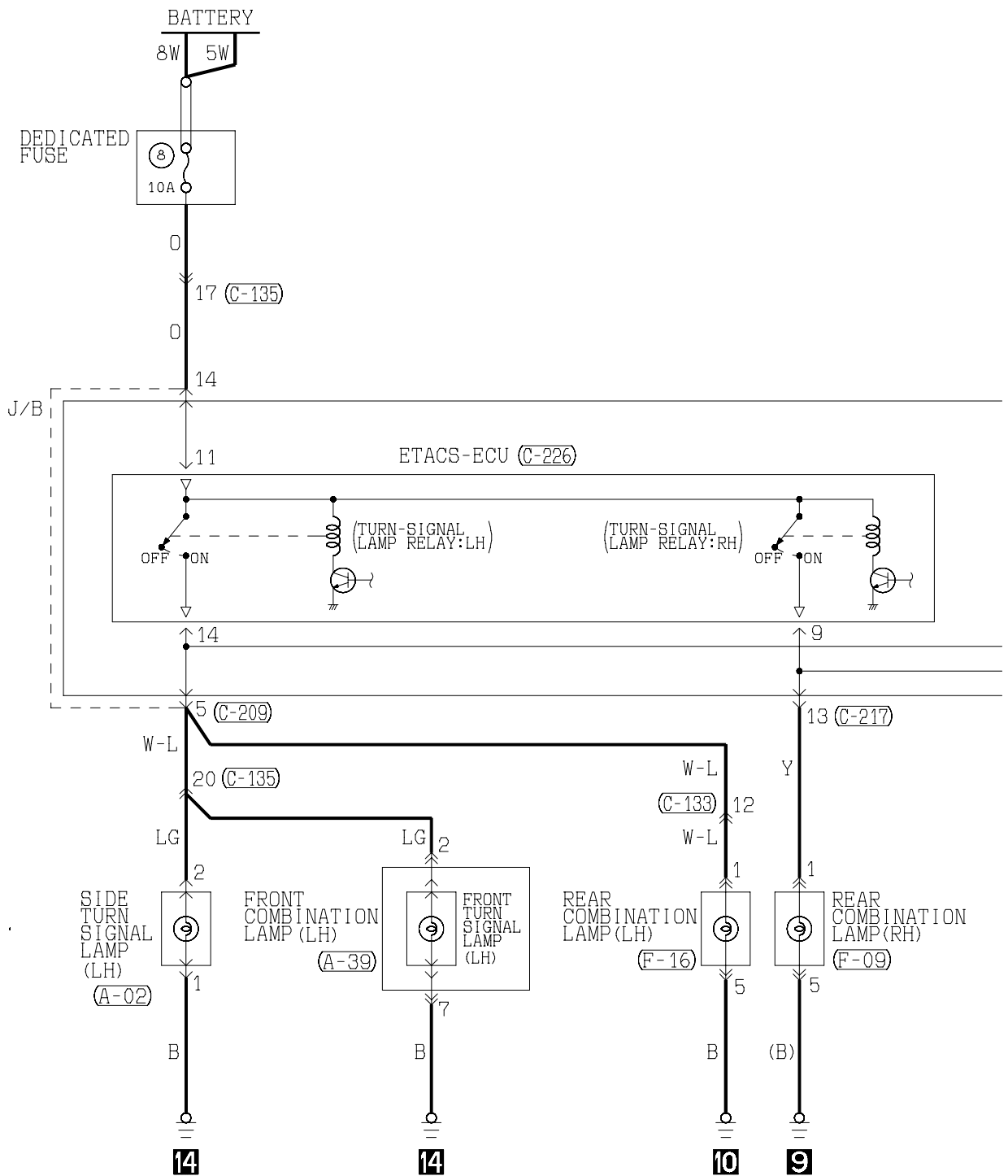




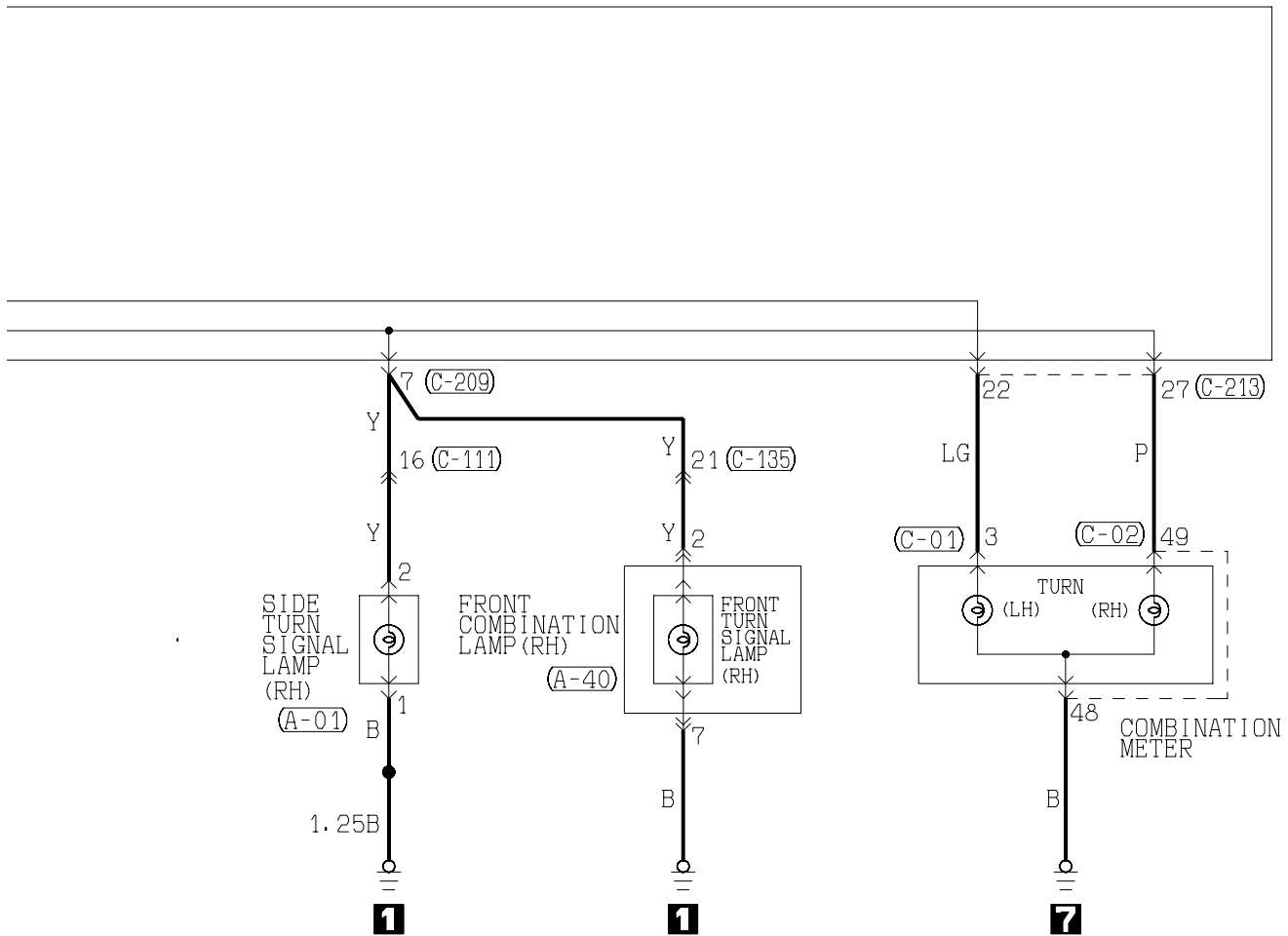
TURN-SIGNAL LAMP AND HAZARD WARNING LAMP

R.H. drive vehicles

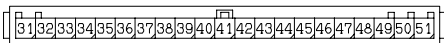
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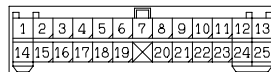
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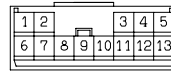
(C-02)



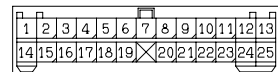
(C-111)



(C-133) MU801855



(C-135)



(F-09)



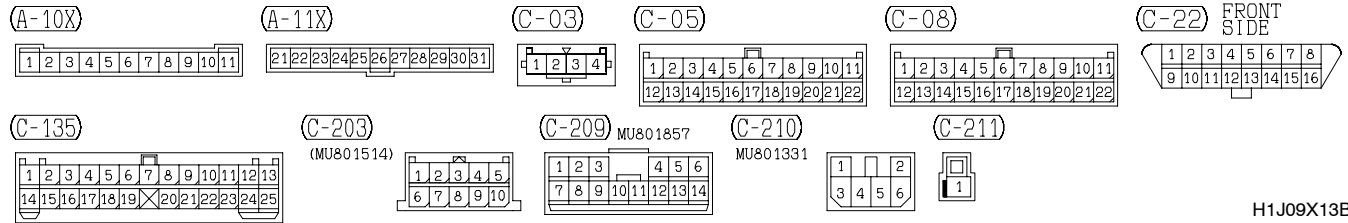
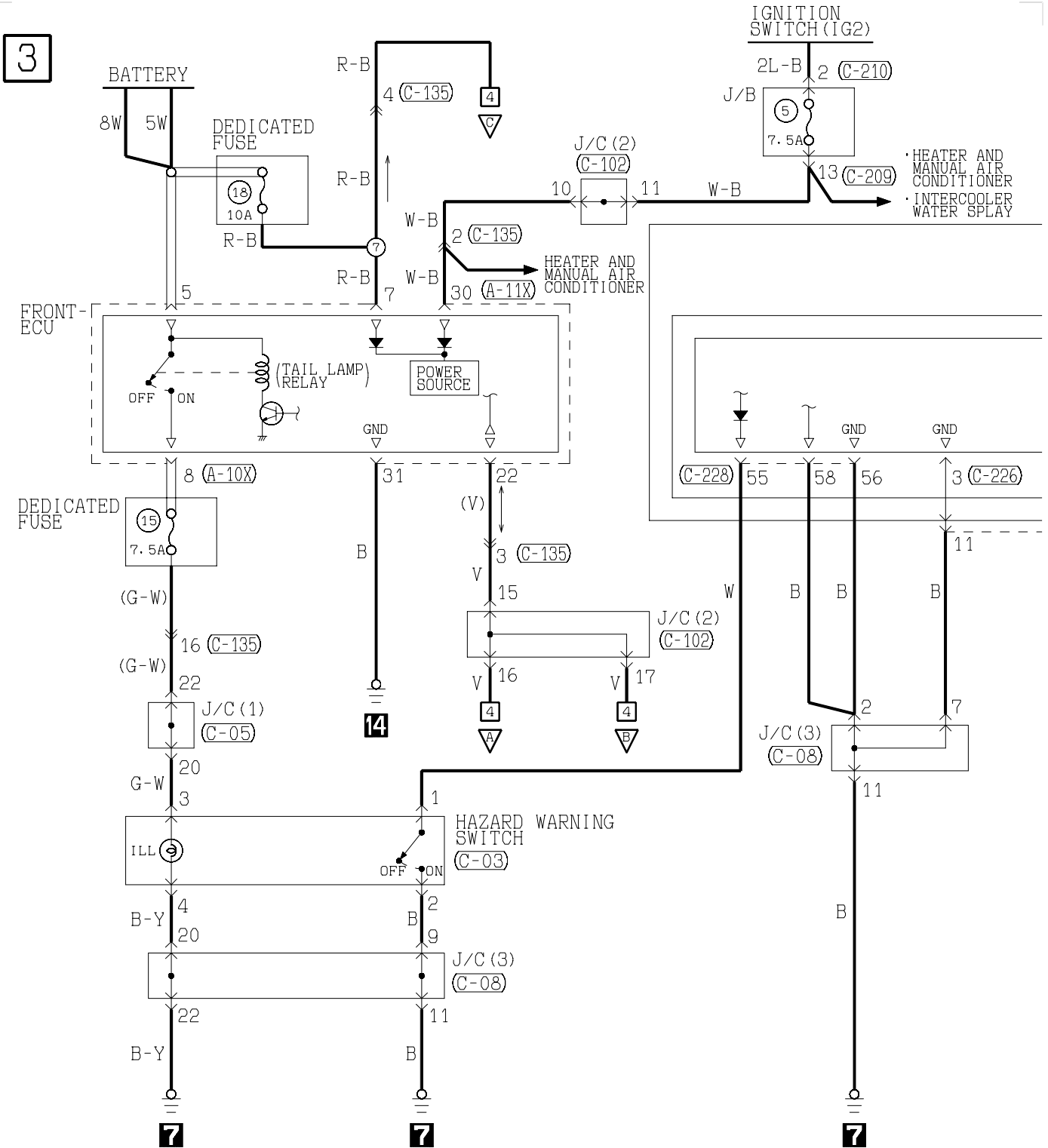
(F-16)

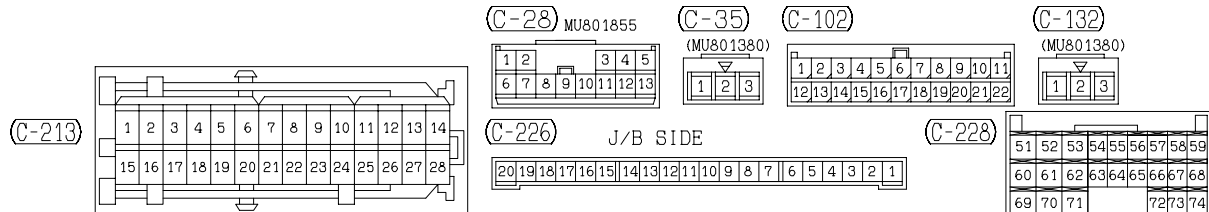
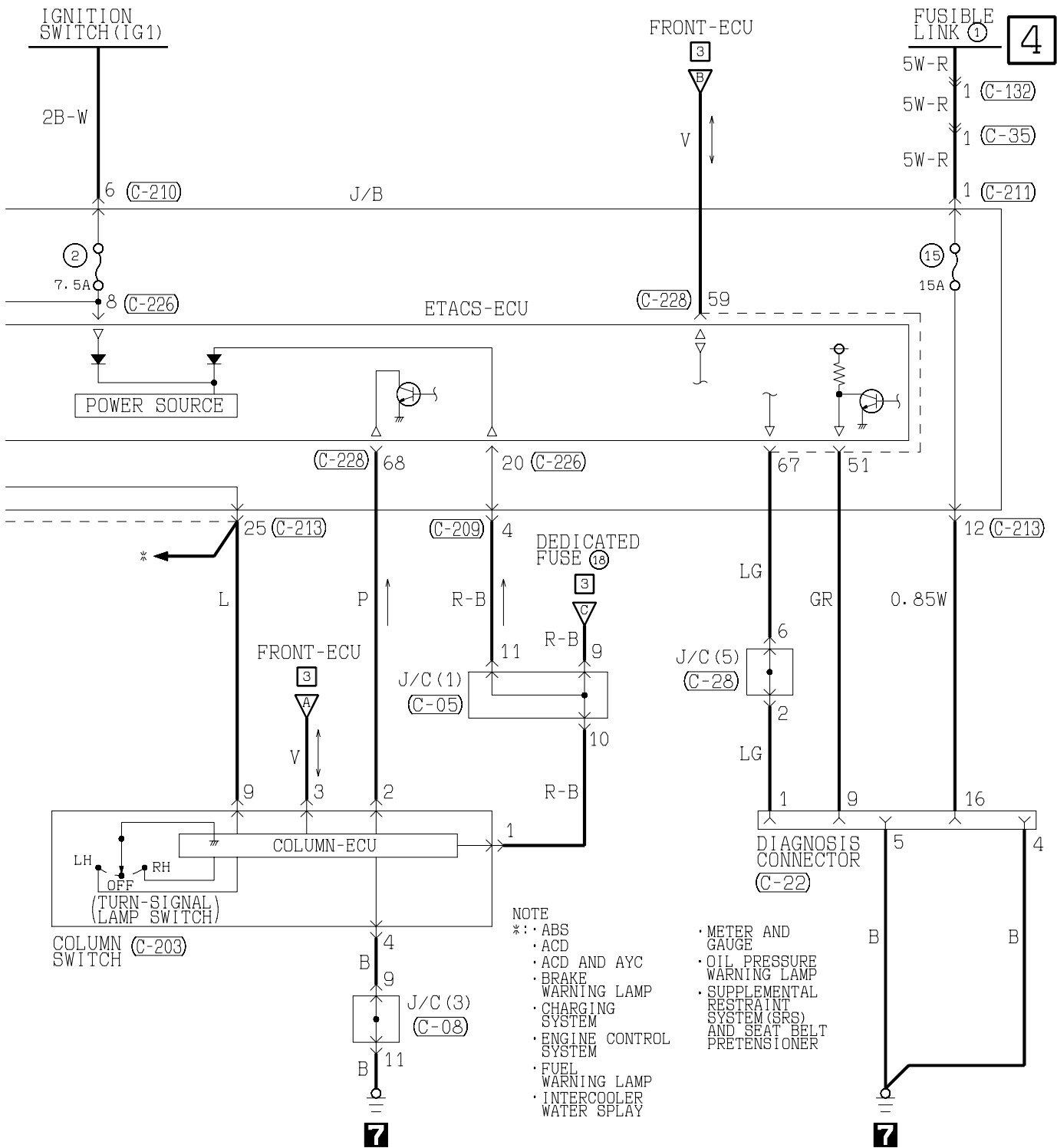


Wire colour code
 B : Black LG : Light green G : Green L : Blue
 BR : Brown O : Orange GR : Gray RD : Red
 W : White SB : Sky blue P : Pink Y : Yellow
 V : Violet

TURN-SIGNAL LAMP AND HAZARD WARNING LAMP <R.H. drive vehicles >
(CONTINUED)

3

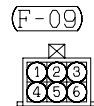
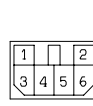
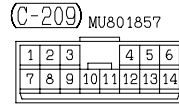
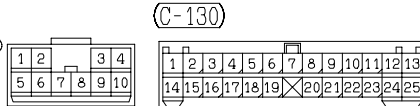
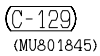
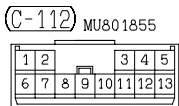
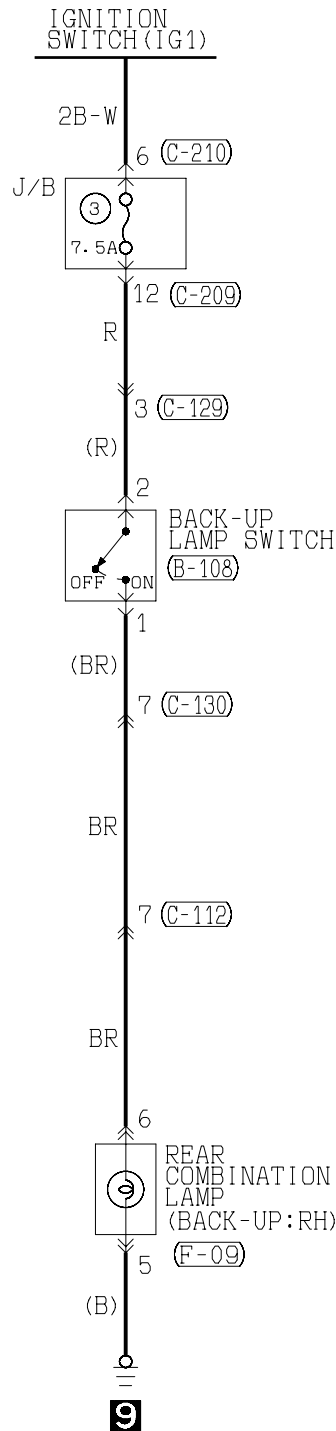




BACK-UP LAMP

L.H. drive vehicles

1

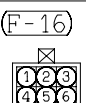
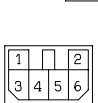
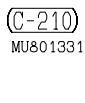
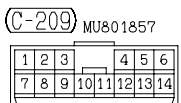
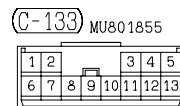
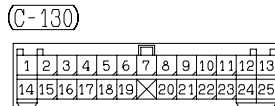
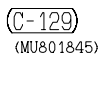
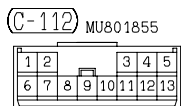
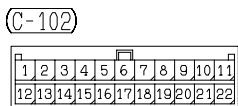
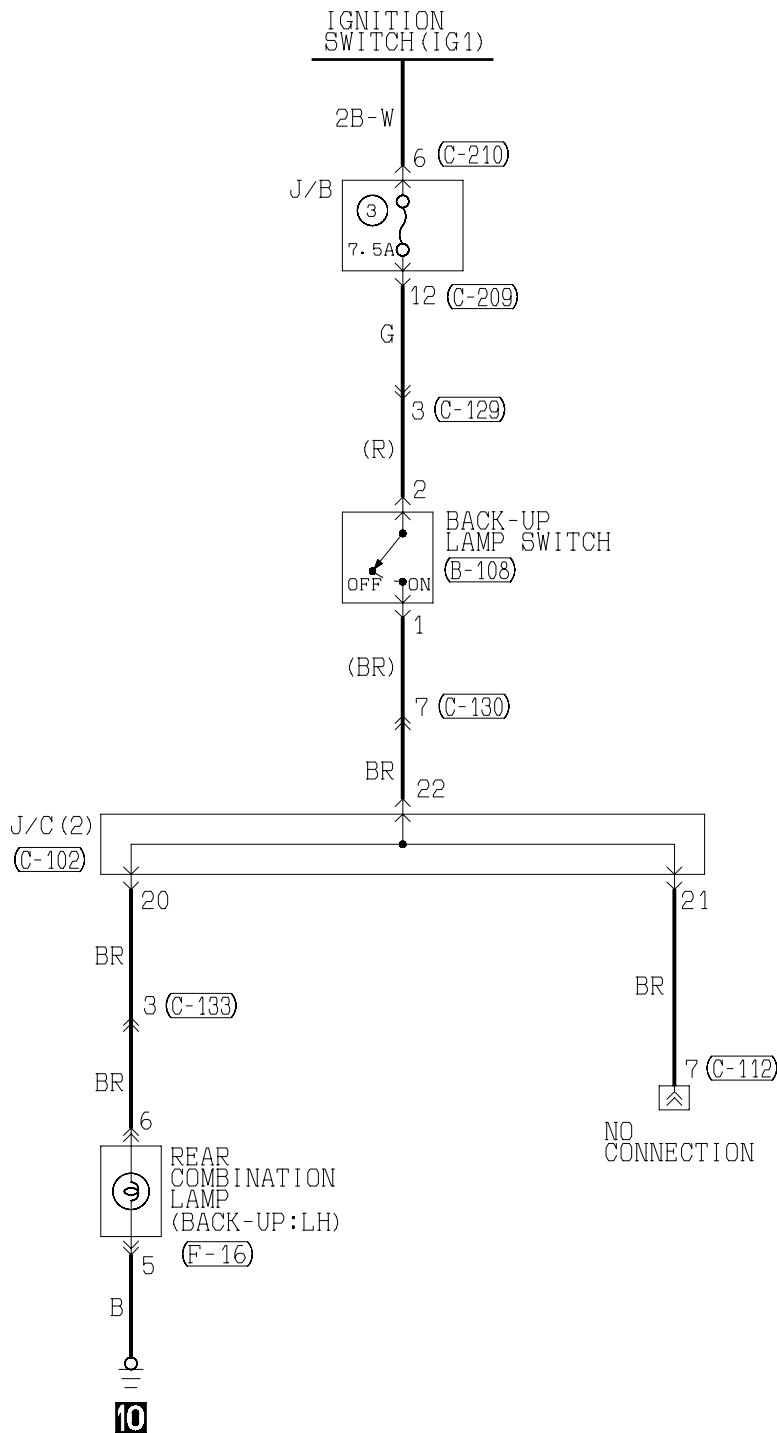


Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

BACK-UP LAMP

R.H. drive vehicles

1

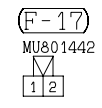
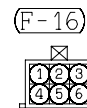
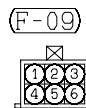
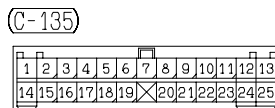
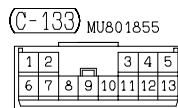
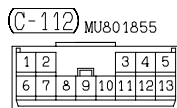
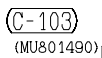
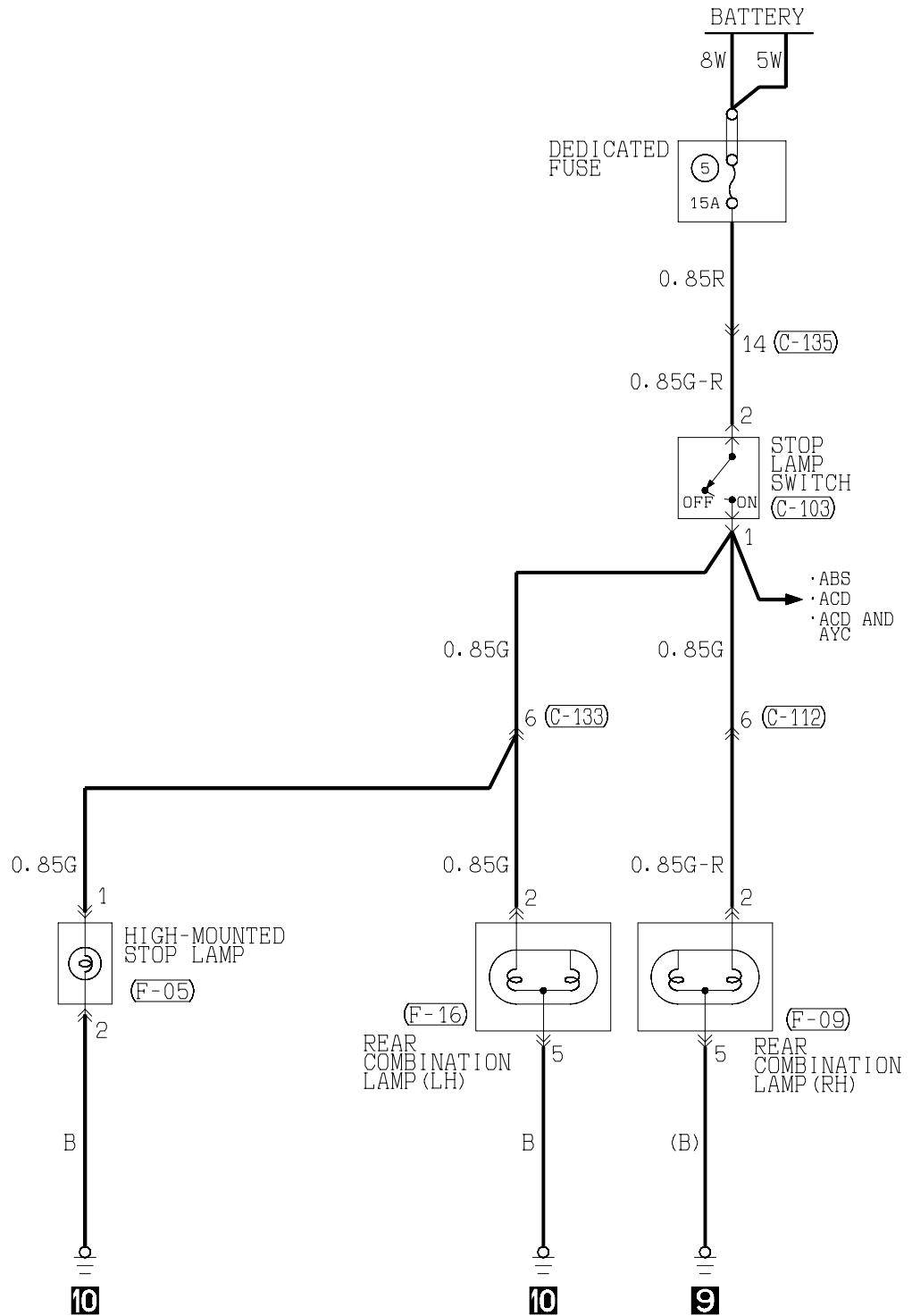


Wire colour code
 B : Black LG: Light green G : Green L : Blue
 BR: Brown O : Orange GR: Gray R : Red
 W : White SB: Sky blue P : Pink Y : Yellow
 V : Violet

STOP LAMP

L.H. drive vehicles

1

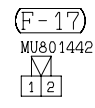
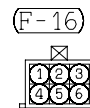
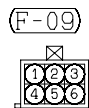
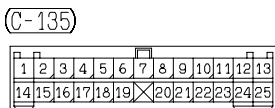
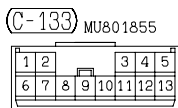
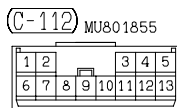
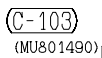
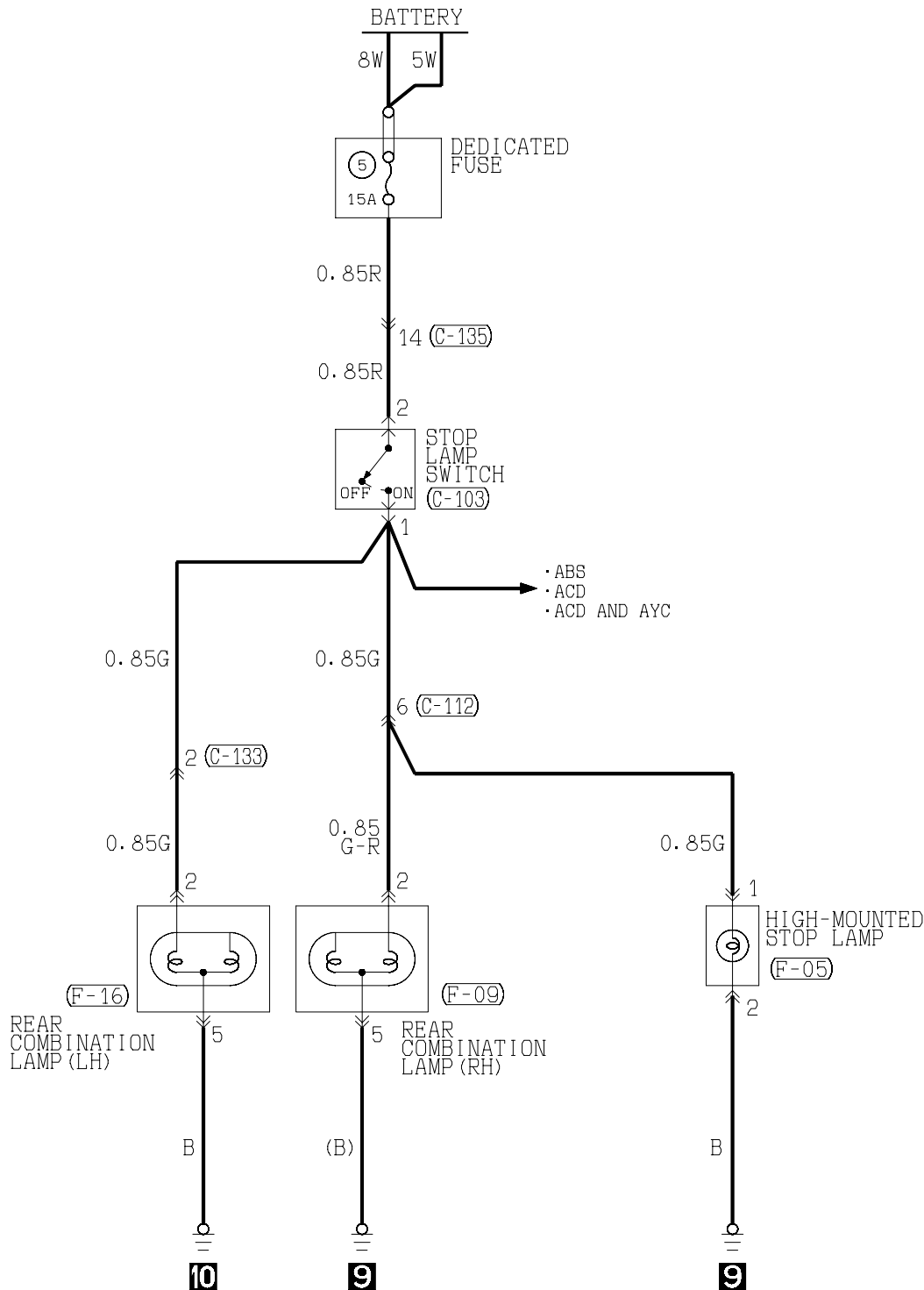


Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

STOP LAMP

R.H. drive vehicles

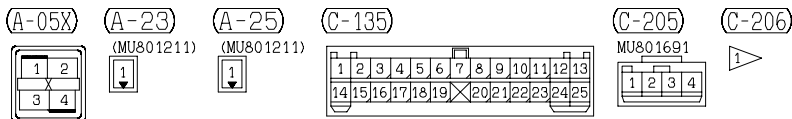
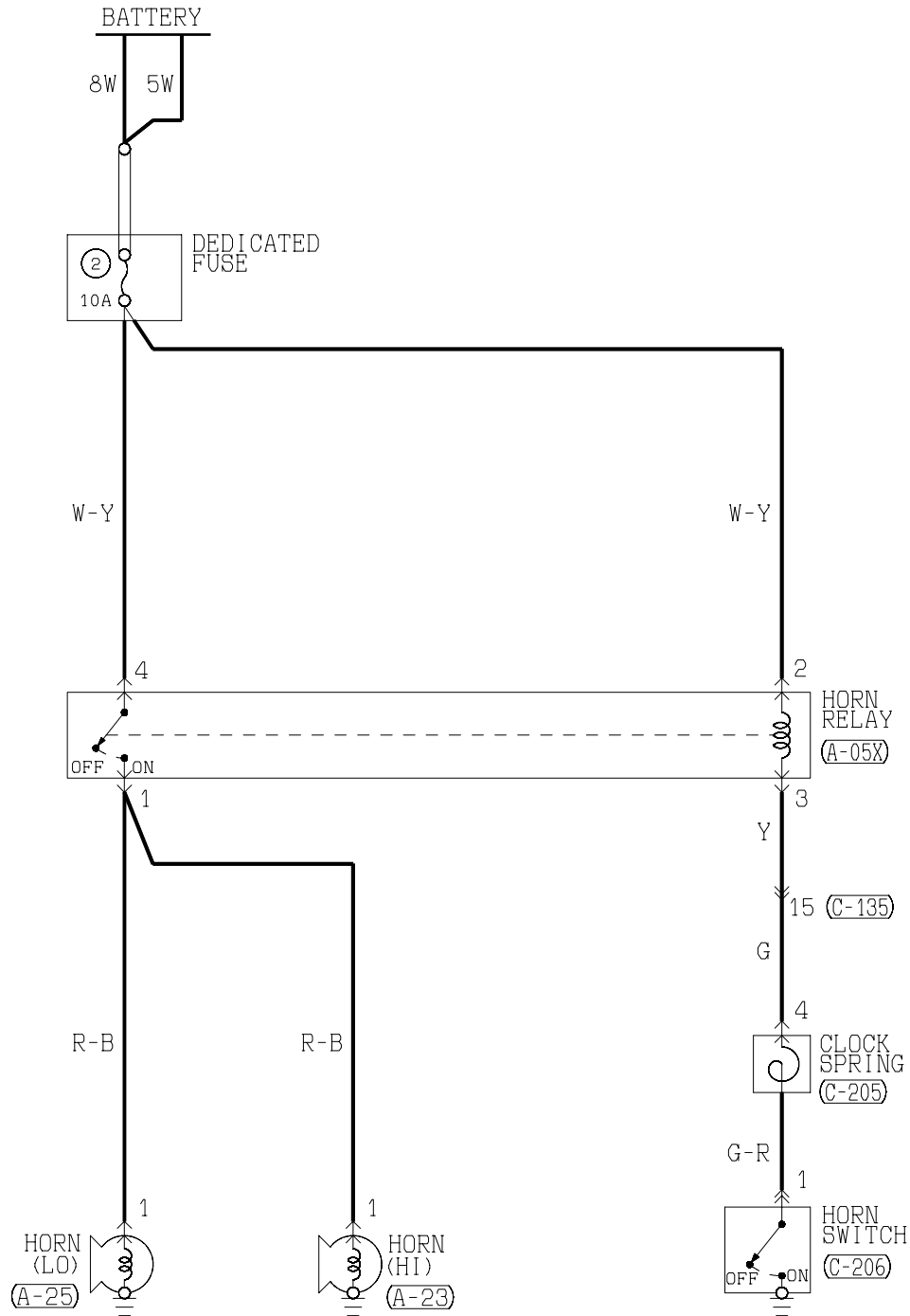
1



Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

HORN

1



Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

METER AND GAUGE (See P.B-148,152.)**OPERATION****<Fuel gauge>**

- When the ignition switch is at the “ON” position, the fuel gauge is activated.
- When there is much fuel, the unit’s resistance is small and the current flowing in the circuit is great, so the gauge’s indicator indicates in the “Full” area.
- When there is little fuel, the unit’s resistance is high and the current flowing in the circuit is small, so the gauge’s indicator indicates in the “Empty” area.

<Engine coolant temperature gauge>

- When the ignition switch is at the “ON” position, the engine coolant temperature gauge is activated.
- When the engine coolant temperature is high, the unit’s resistance is low and there is a great flow of current in the circuit, so the gauge’s indicator indicates in the “H” area.
- When the engine coolant temperature is low, the unit’s resistance is high and there is a small flow of current in the circuit, so the gauge’s indicator indicates in the “C” area.

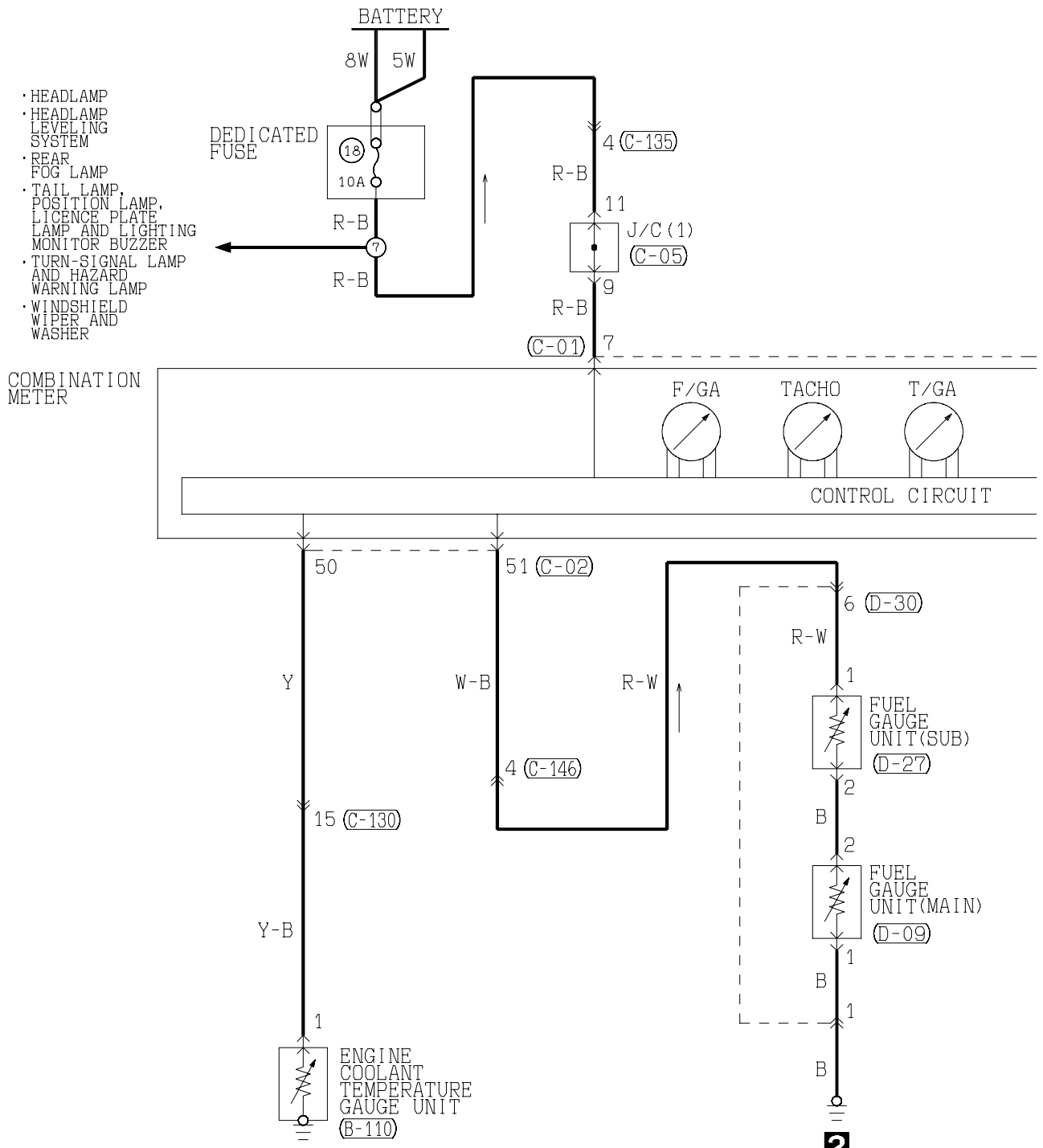
TROUBLESHOOTING HINTS

1. Fuel gauge does not operate, or registers incorrectly.
 - (1) The fuel gauge indicates “F” when the fuel gauge unit (sub) connector is disconnected and the “1” terminal is earthed.
 - Check fuel gauge.
2. Engine coolant temperature gauge does not operate, or registers incorrectly.
 - (1) When the engine coolant temperature gauge is earthed with its connector unplugged, it registers “H”.
 - Check engine coolant temperature gauge unit.

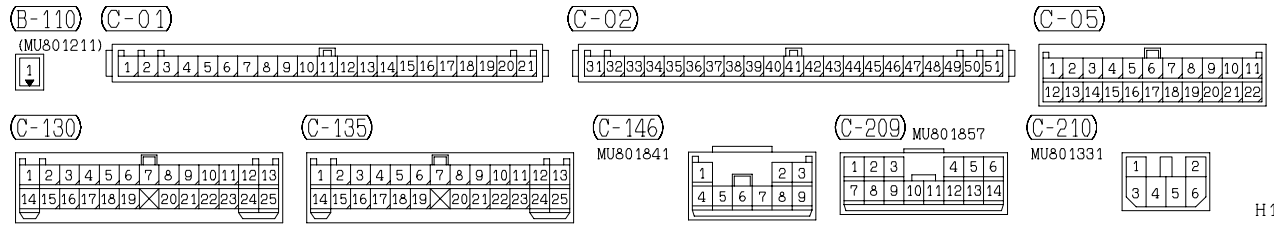
METER AND GAUGE

L.H. drive vehicles

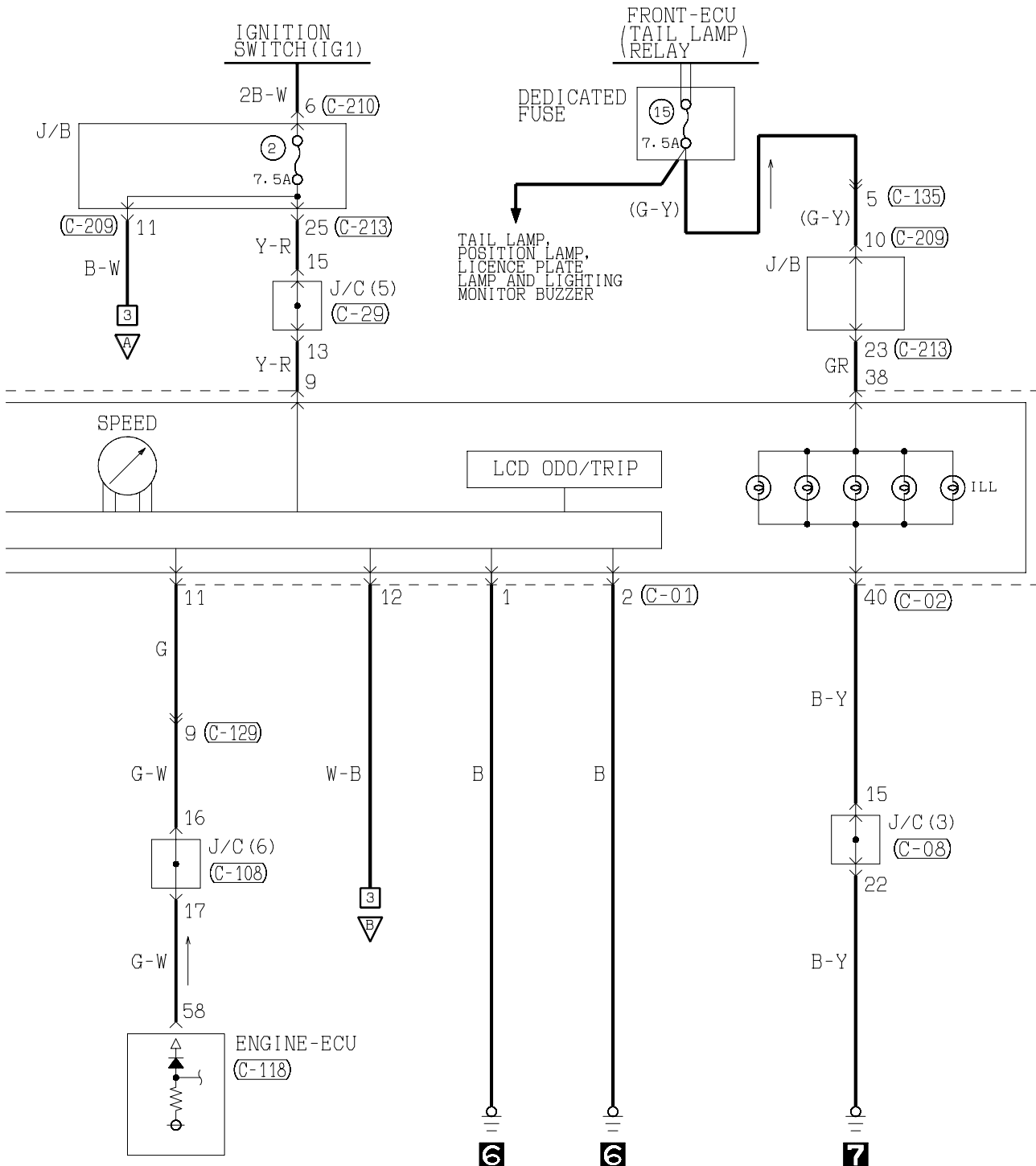
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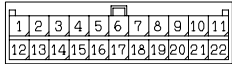
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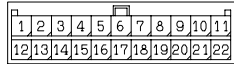
2



(C-08)



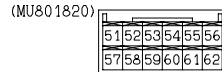
(C-29)



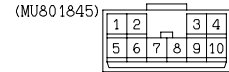
(C-108)



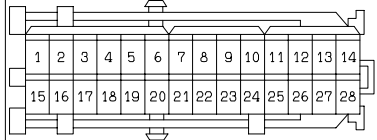
(C-118)



(C-129)



(C-213)



(D-09)



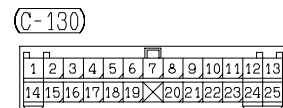
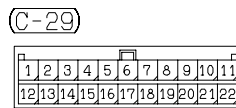
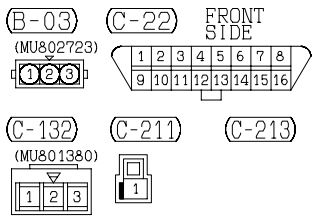
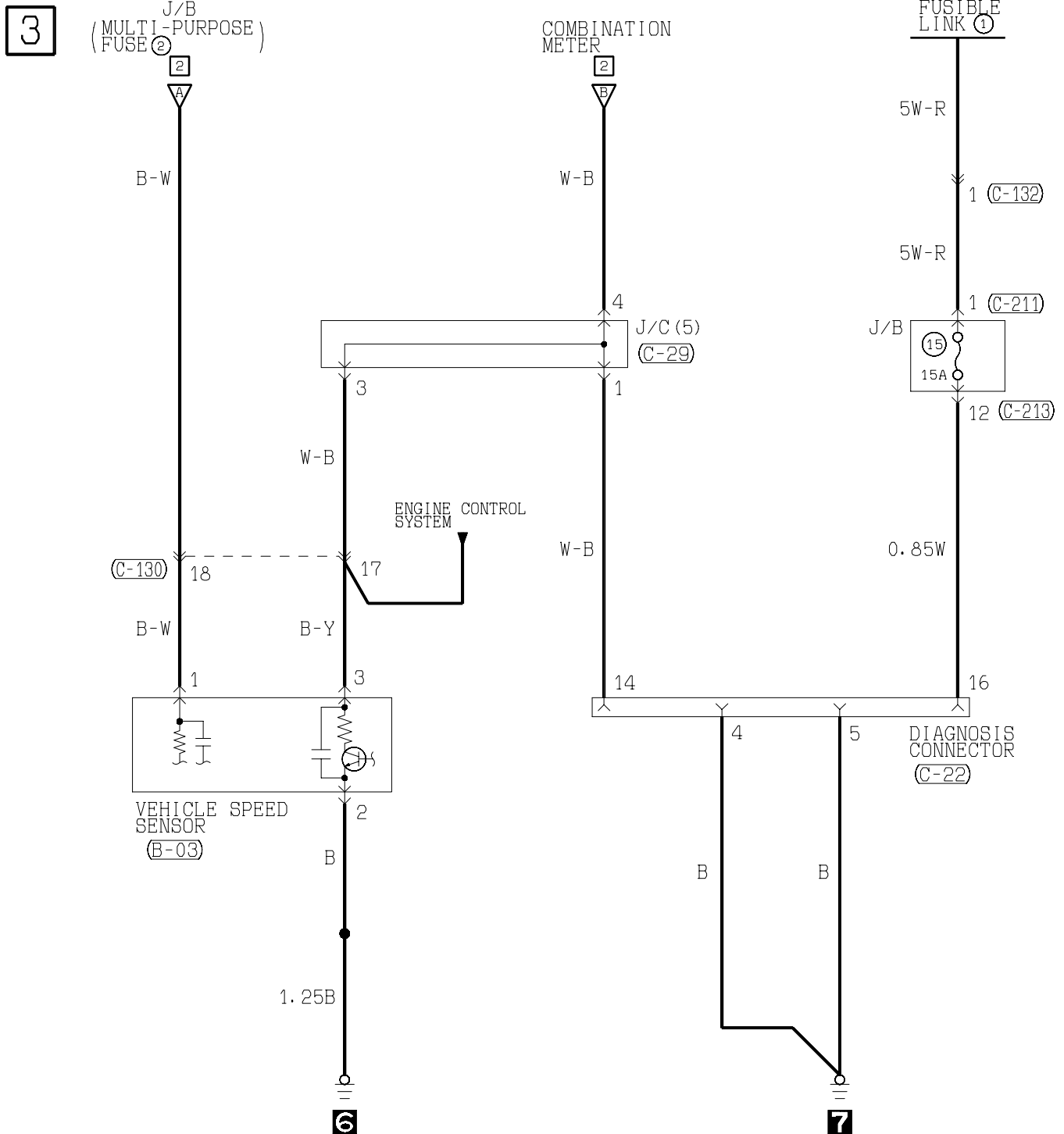
(D-27)



(D-30)



METER AND GAUGE <L.H. drive vehicles> (CONTINUED)



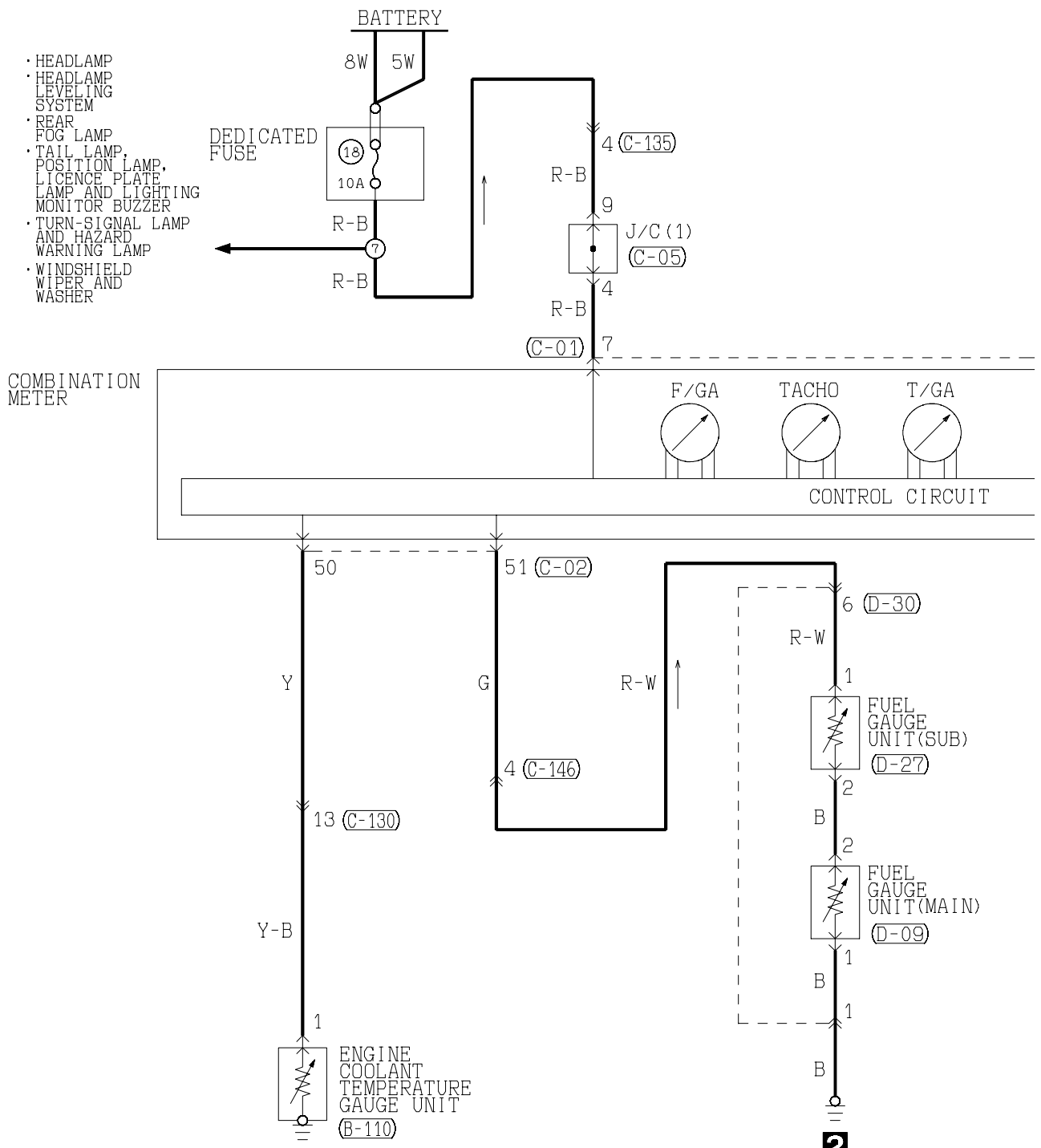
NOTES

METER AND GAUGE

R.H. drive vehicles

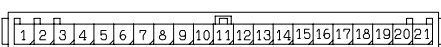
1

- HEADLAMP
- HEADLAMP LEVELING SYSTEM
- REAR FOG LAMP
- TAIL LAMP, POSITION LAMP, LICENCE PLATE LAMP AND LIGHTING MONITOR BUZZER
- TURN-SIGNAL LAMP AND HAZARD WARNING LAMP
- WINDSHIELD WIPER AND WASHER

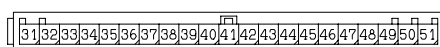


(B-110) (C-01)

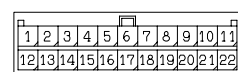
(MU801211)



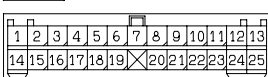
(C-02)



(C-05)

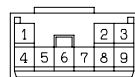


(C-135)

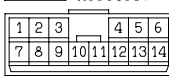


(C-146)

MU801841



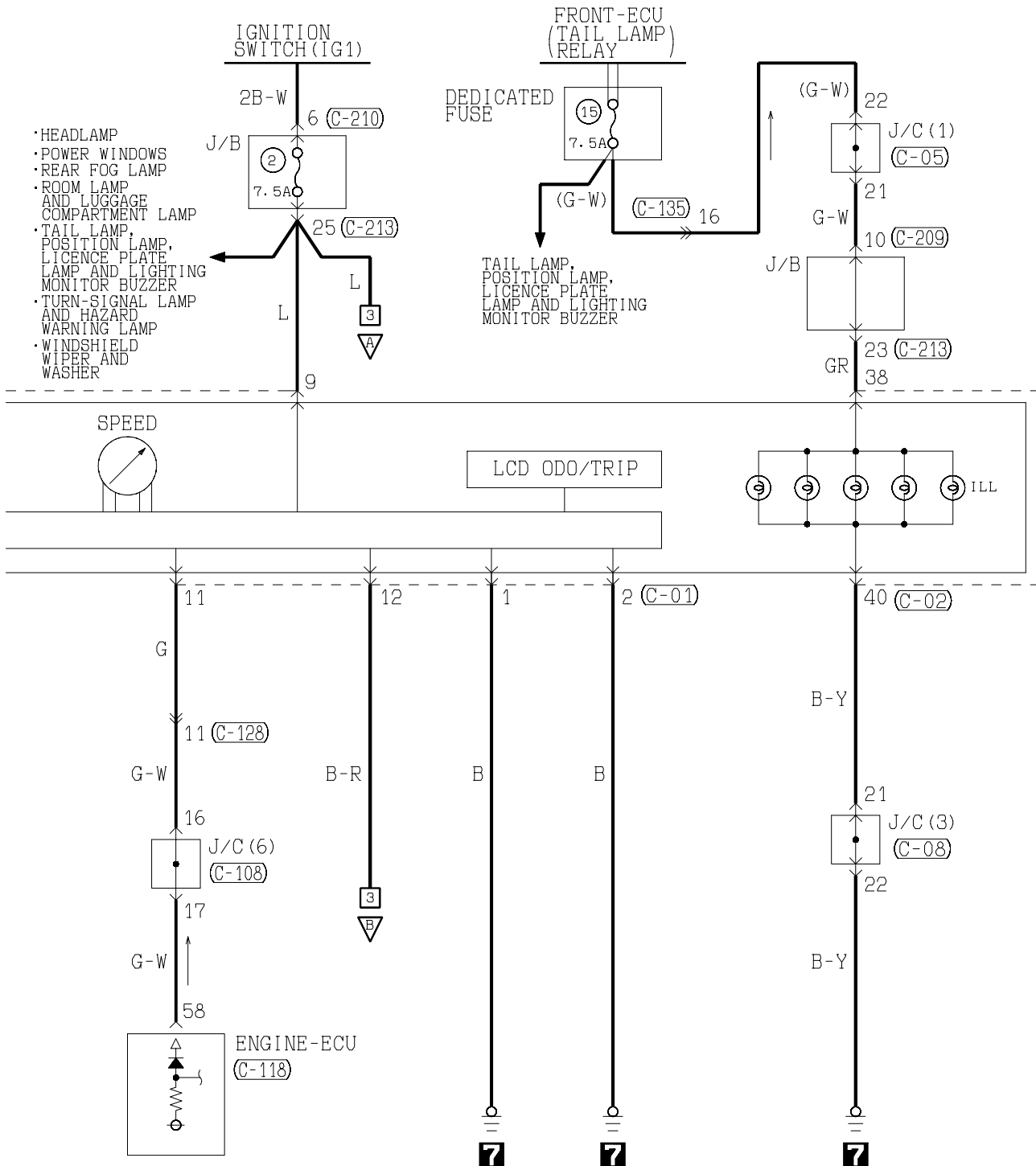
(C-209) MU801857



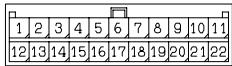
(C-210) MU801331



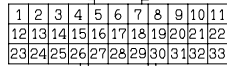
2



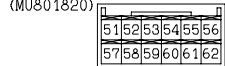
(C-08)



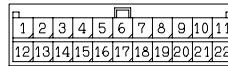
(C-108)



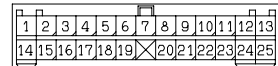
(C-118)



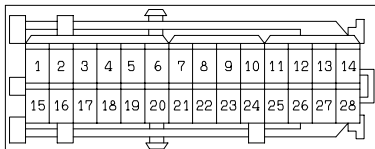
(C-128)



(C-130)



(C-213)



(D-09)



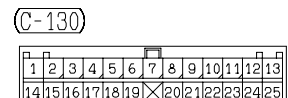
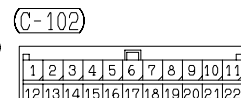
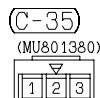
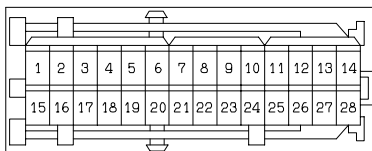
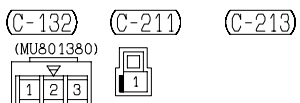
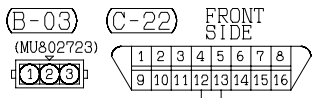
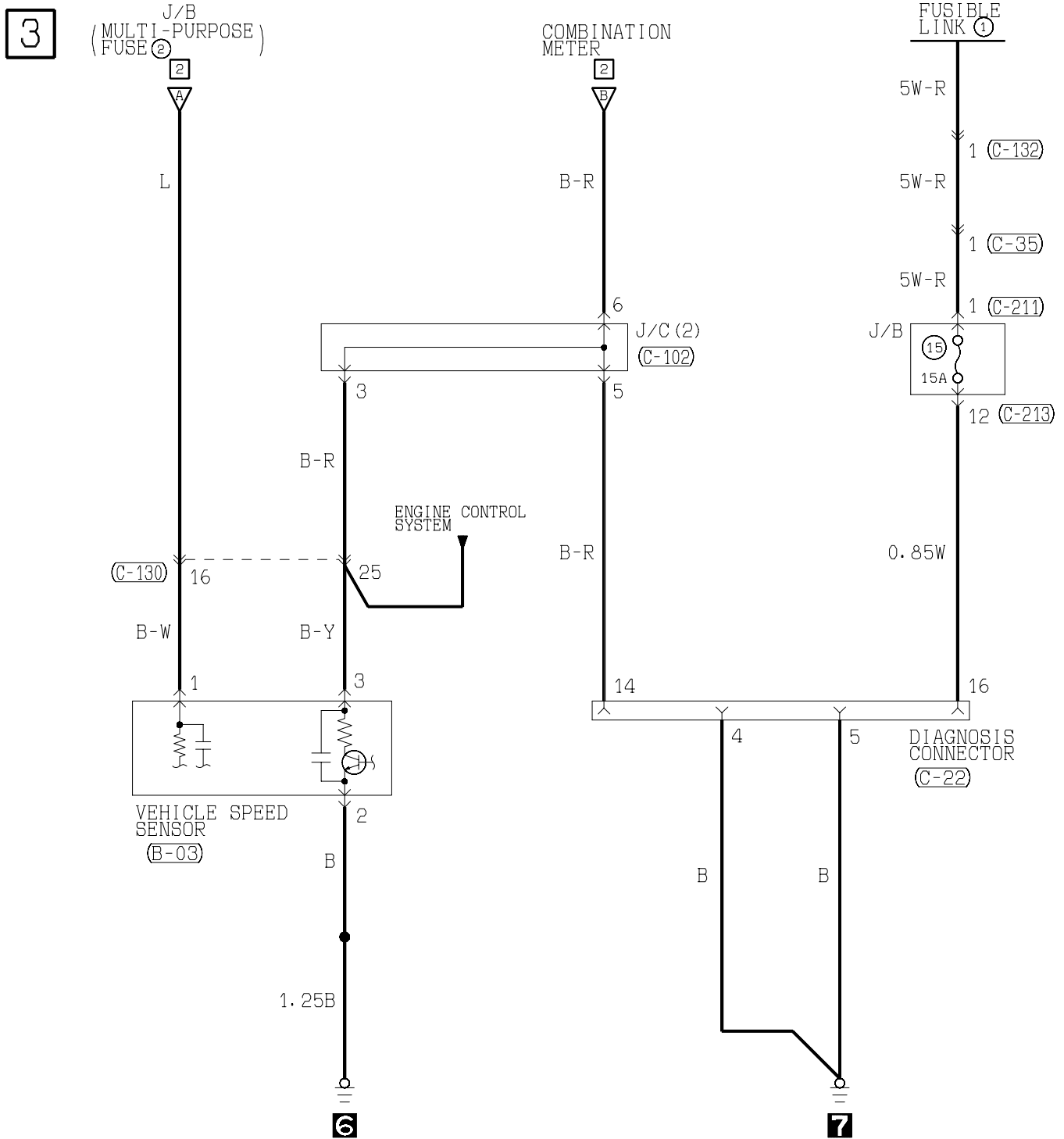
(D-27)



(D-30)



METER AND GAUGE <R.H. drive vehicles> (CONTINUED)



FUEL WARNING LAMP (See P.B-156.)**OIL PRESSURE WARNING LAMP (See P.B-157.)****BRAKE WARNING LAMP (See P.B-157.)****OPERATION****<Fuel warning lamp>**

- When the ignition switch is at the "ON" position, the fuel gauge unit resistance is small when the fuel level is high, and the fuel gauge unit resistance is large when the fuel level is low. When this resistance rises above a specified value, the fuel warning lamp illuminates to notify the driver that the fuel level is low.

<Oil pressure warning lamp>

- When the lubrication system fails after engine starting, resulting in the oil pressure failing to build up, the oil pressure switch turns on causing the oil pressure warning lamp to illuminate.

<Brake warning lamp>

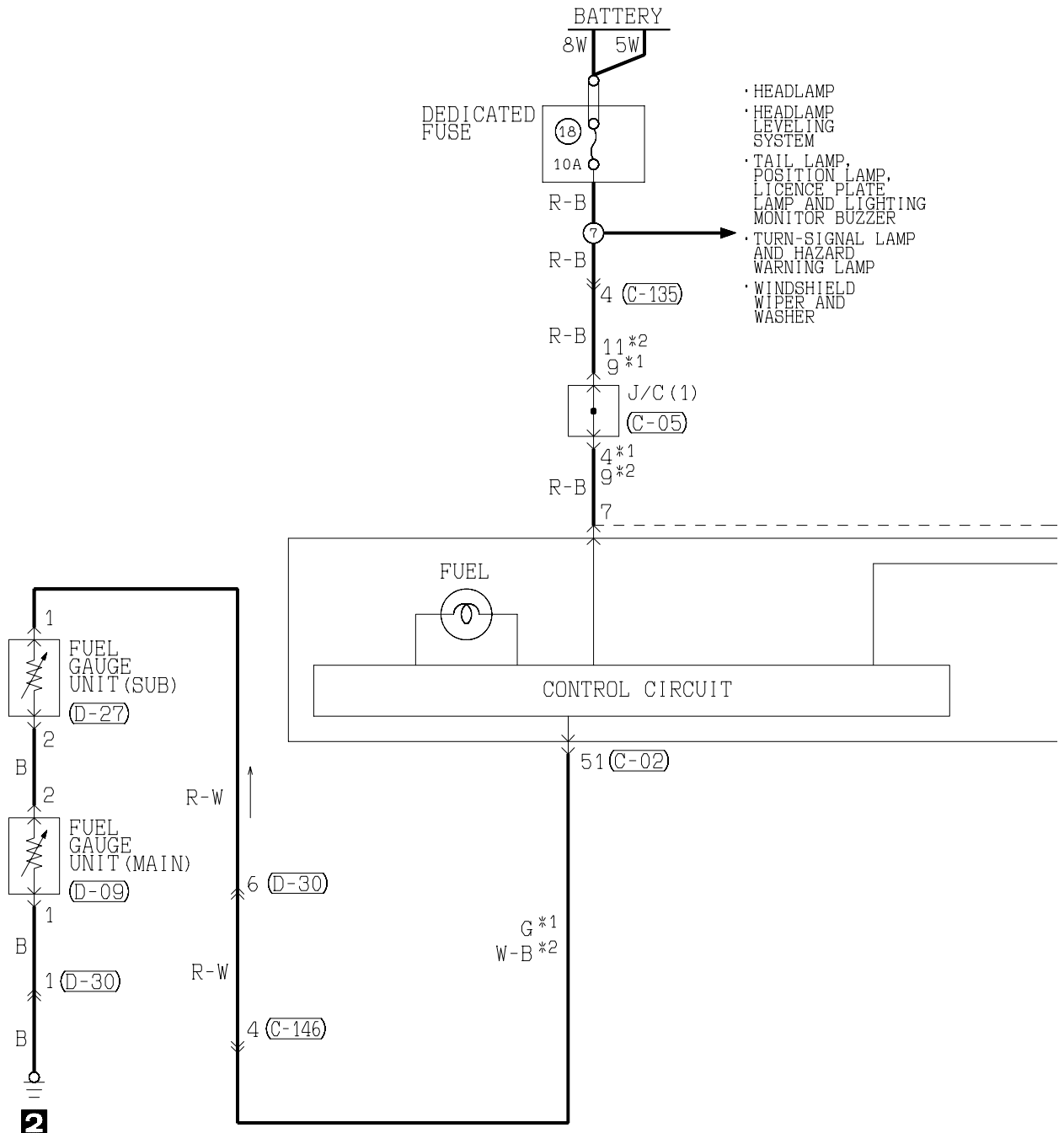
- When the brake fluid level goes down below a predetermined level with the ignition switch in the "ON" position, the brake fluid level switch is activated or the parking brake switch is turned on, causing the brake warning lamp to illuminate.

TROUBLESHOOTING HINTS

1. No warning lamps illuminate.
 - Check multi-purpose fuse No.(2).
2. Some warning lamps do not illuminate.
 - Check lamp valve.
 - Check the switches and the gauge unit.

FUEL WARNING LAMP

1

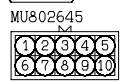


2

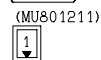
(B-04)



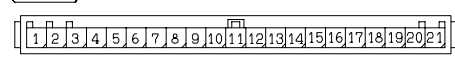
(B-14)



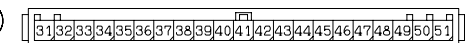
(B-20)



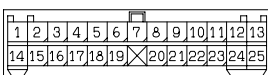
(C-01)



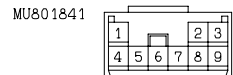
(C-02)



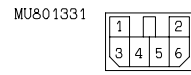
(C-135)



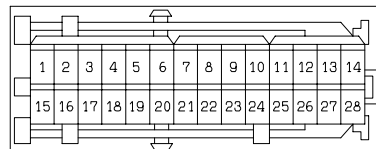
(C-146)



(C-210)

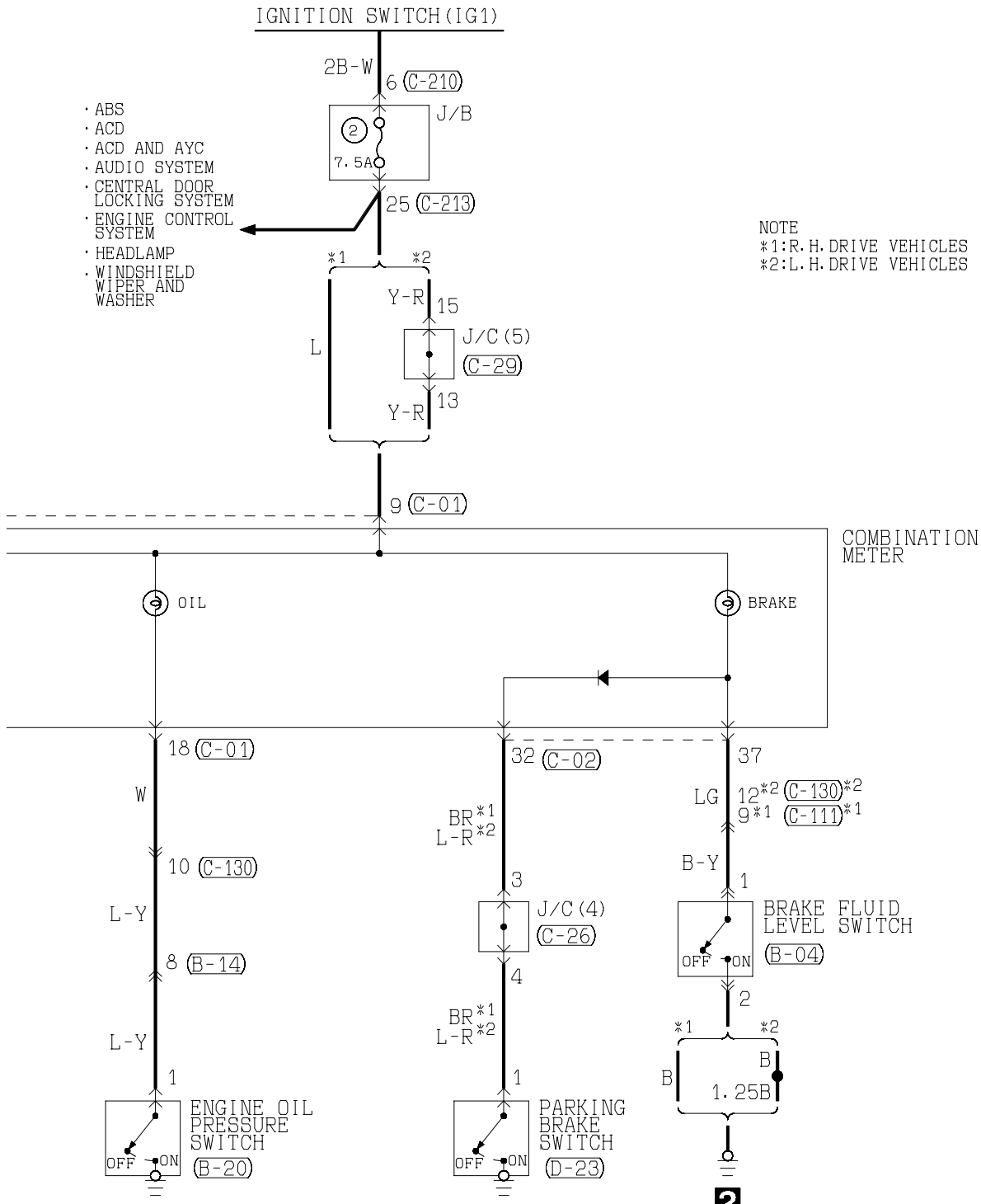


(C-213)



OIL PRESSURE WARNING LAMP BRAKE WARNING LAMP

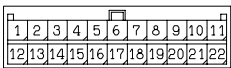
2



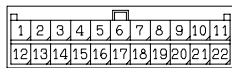
NOTE
*1: R. H. DRIVE VEHICLES
*2: L. H. DRIVE VEHICLES

2

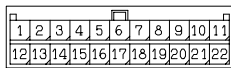
(C-05)



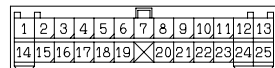
(C-26)



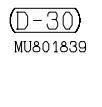
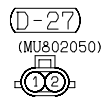
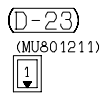
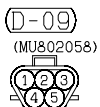
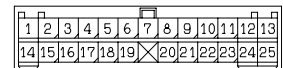
(C-29)



(C-111)



(C-130)



Wire colour code
B : Black
BR : Brown
W : White
V : Violet

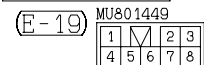
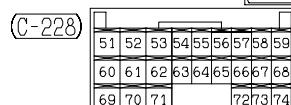
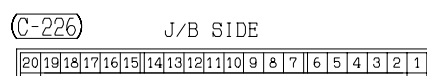
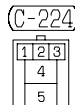
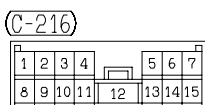
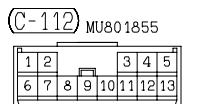
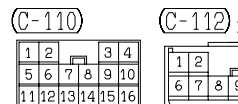
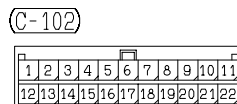
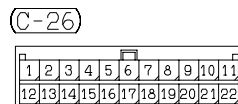
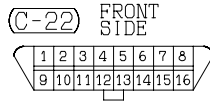
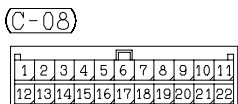
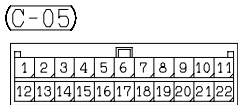
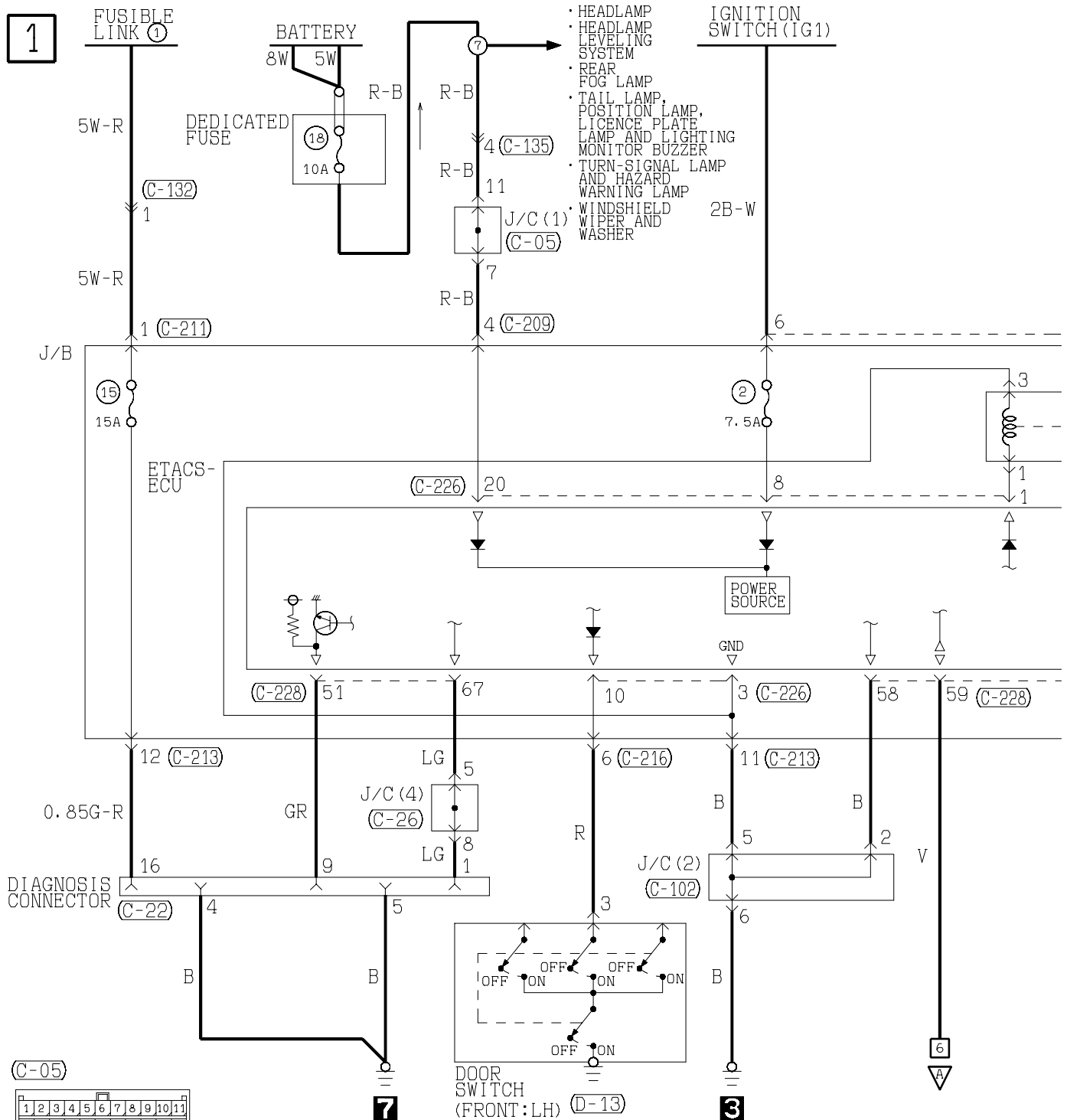
LG : Light green
O : Orange
SB : Sky blue

G : Green
GR : Gray
P : Pink

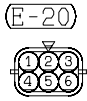
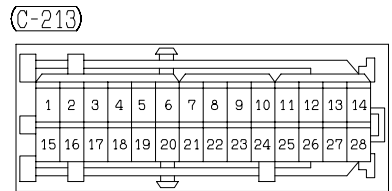
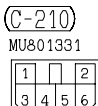
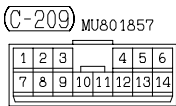
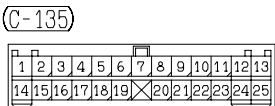
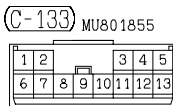
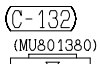
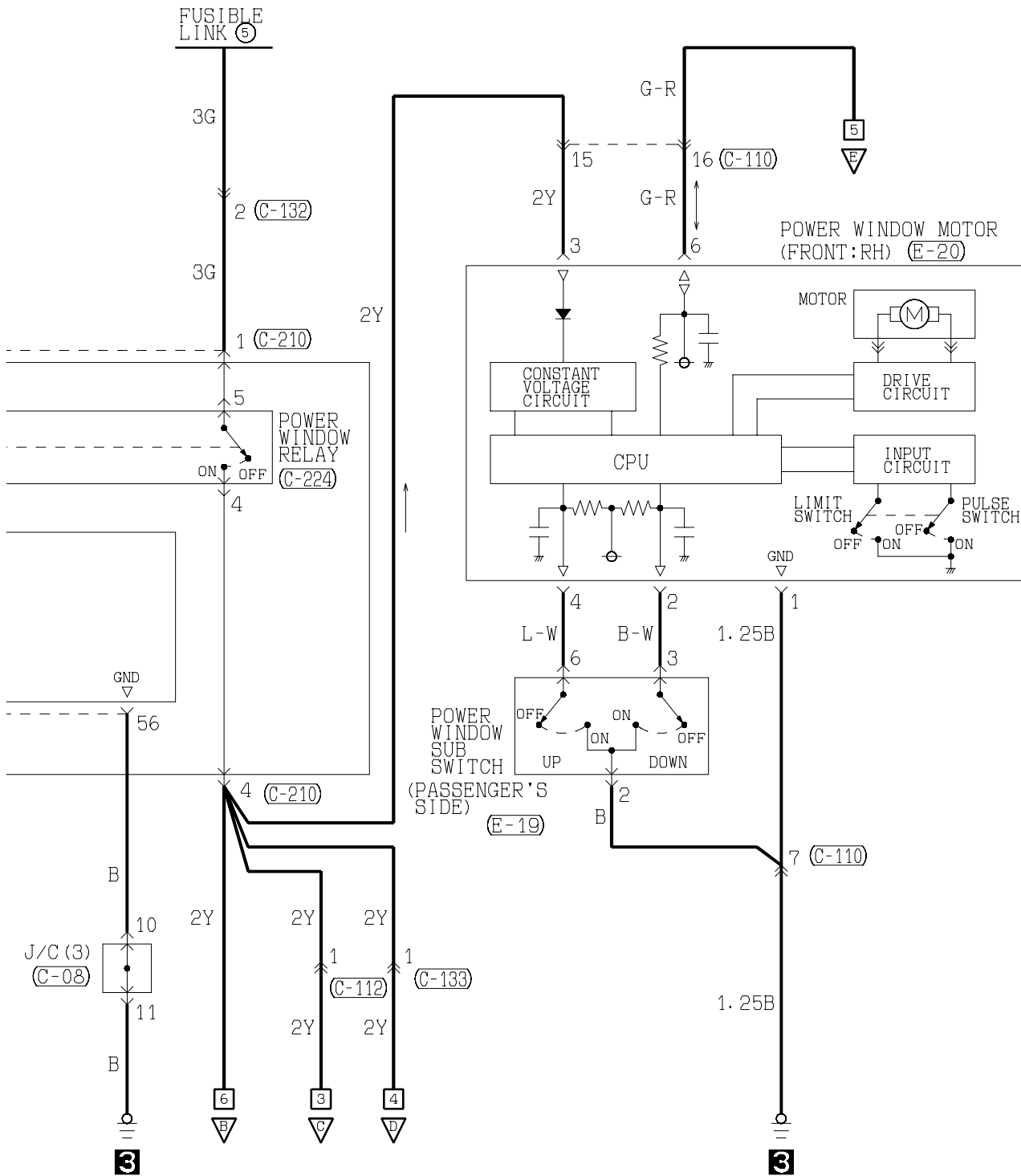
L : Blue
R : Red
Y : Yellow

POWER WINDOWS

L.H. drive vehicles



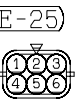
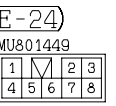
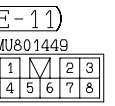
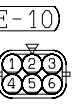
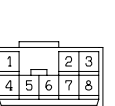
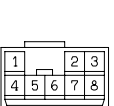
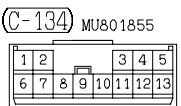
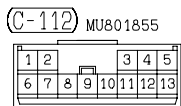
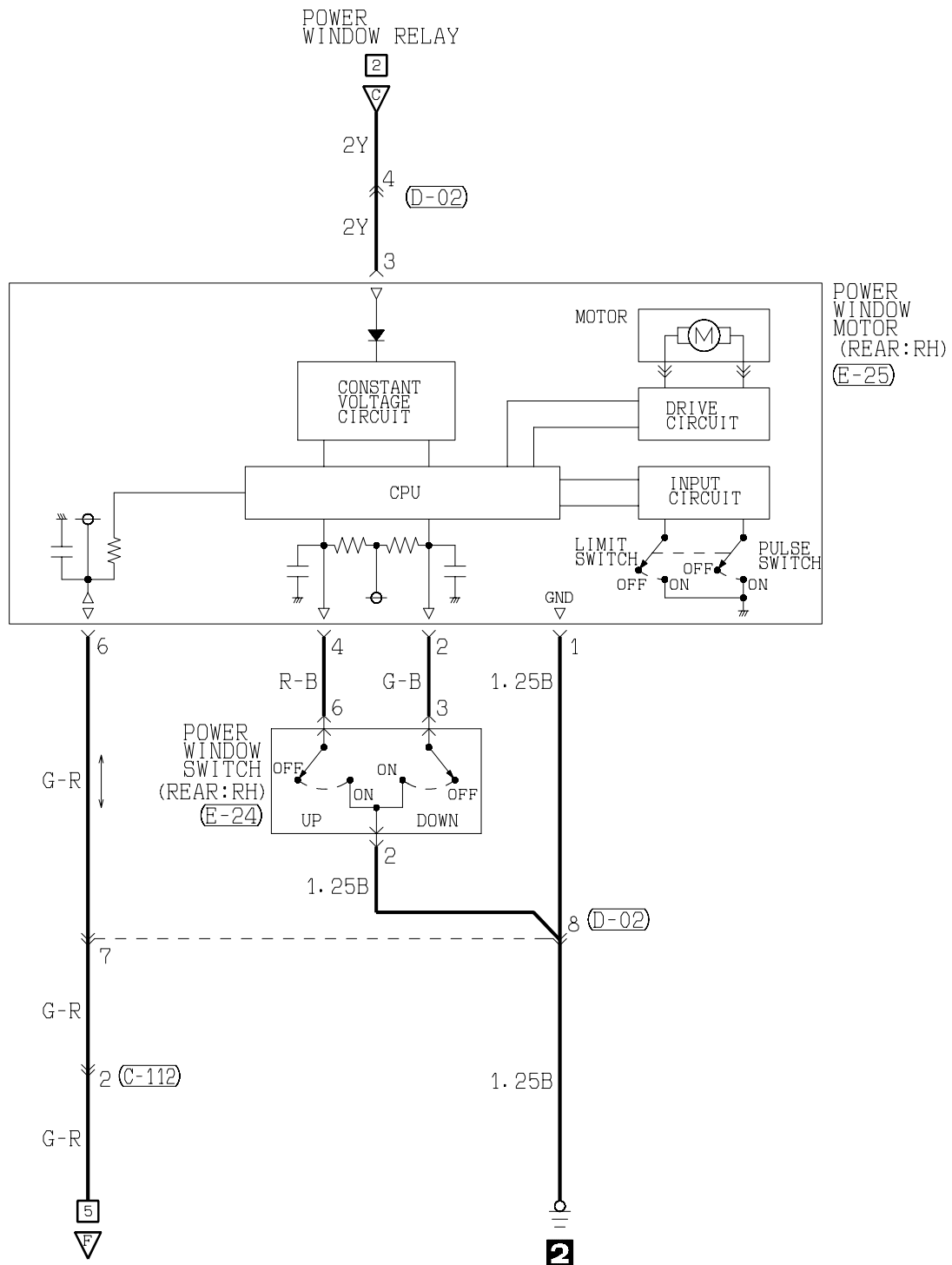
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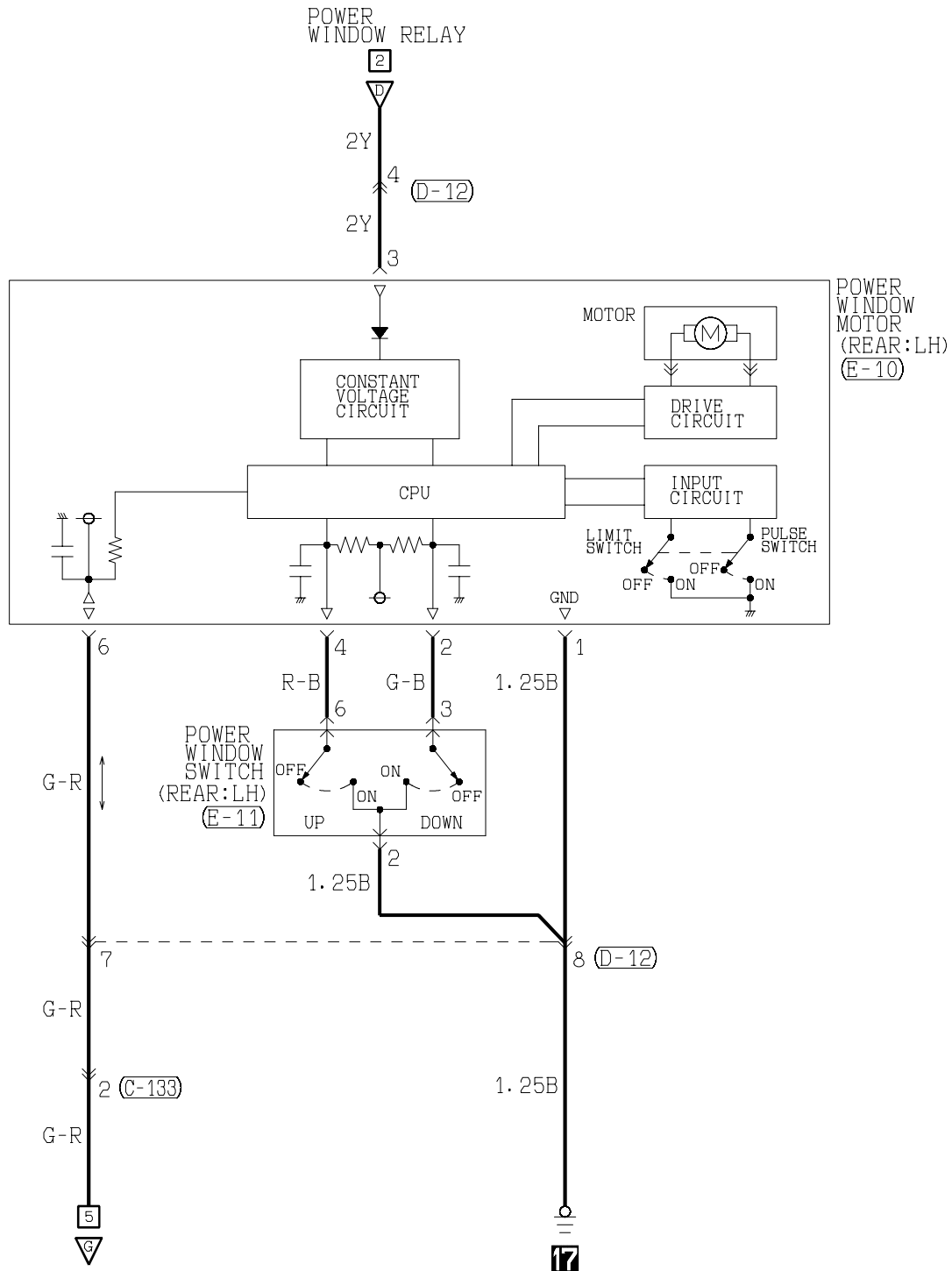
Wire colour code
 B : Black
 BR : Brown
 W : White
 V : Violet
 LG : Light green
 O : Orange
 SB : Sky blue
 G : Green
 GR : Gray
 P : Pink
 L : Blue
 LR : Red
 Y : Yellow

POWER WINDOWS <L.H. drive vehicles> (CONTINUED)

3



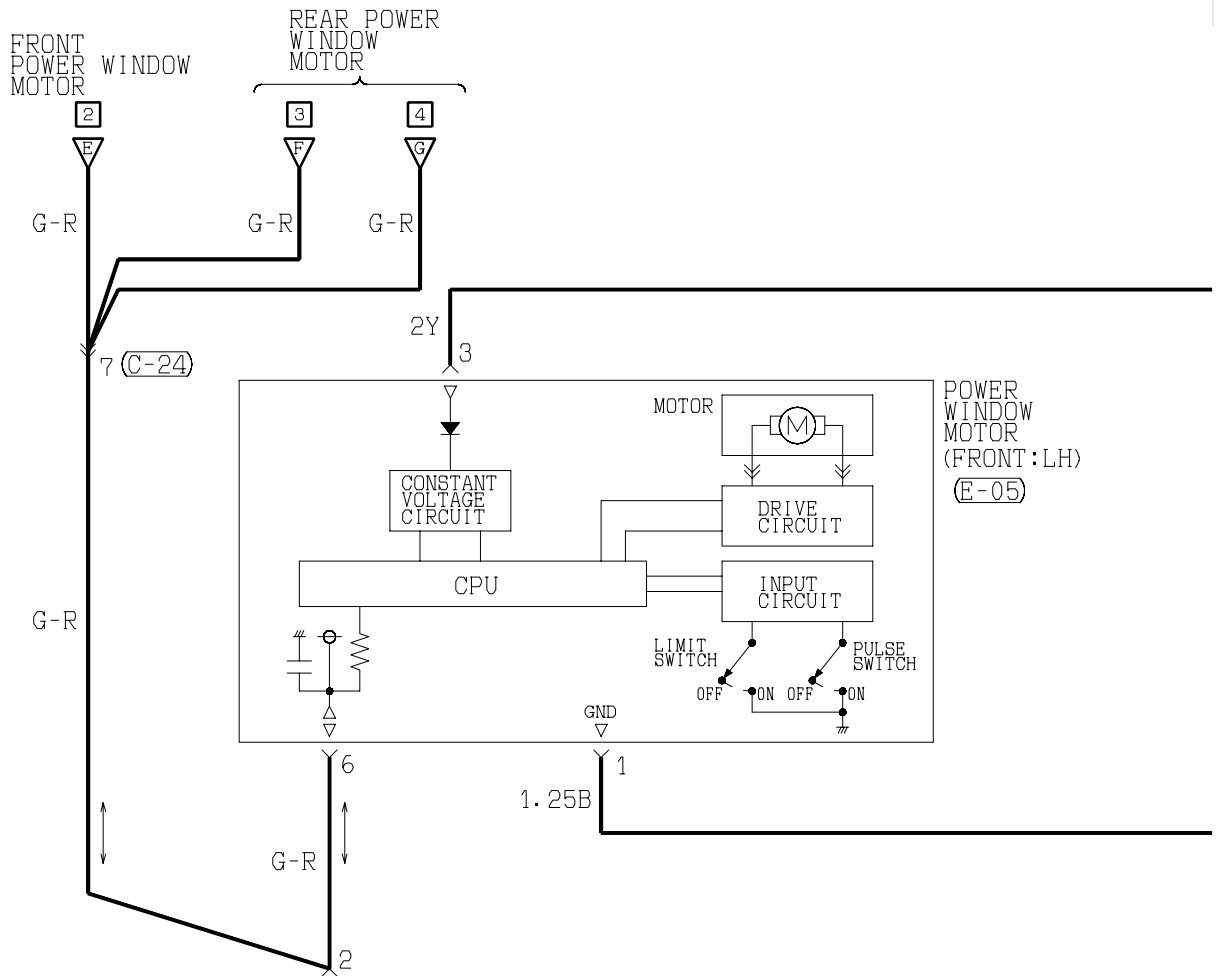
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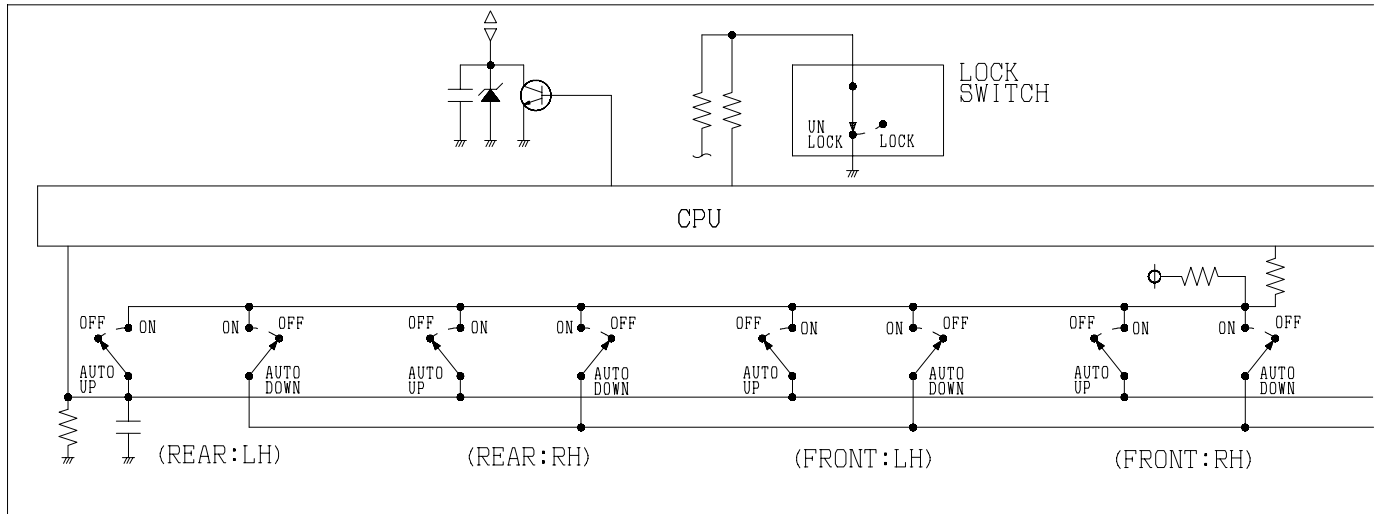
Wire colour code
 B:Black LG:Light green G:Green L:Blue W:White Y:Yellow SB:Sky blue
 BR:Brown O:Orange GR:Gray R:Red P:Pink V:Violet

POWER WINDOWS <L.H. drive vehicles> (CONTINUED)

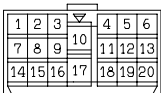
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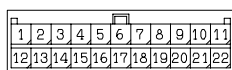
POWER WINDOW MOTOR (FRONT:LH) (E-05)



(C-24)



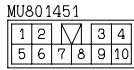
(C-102)



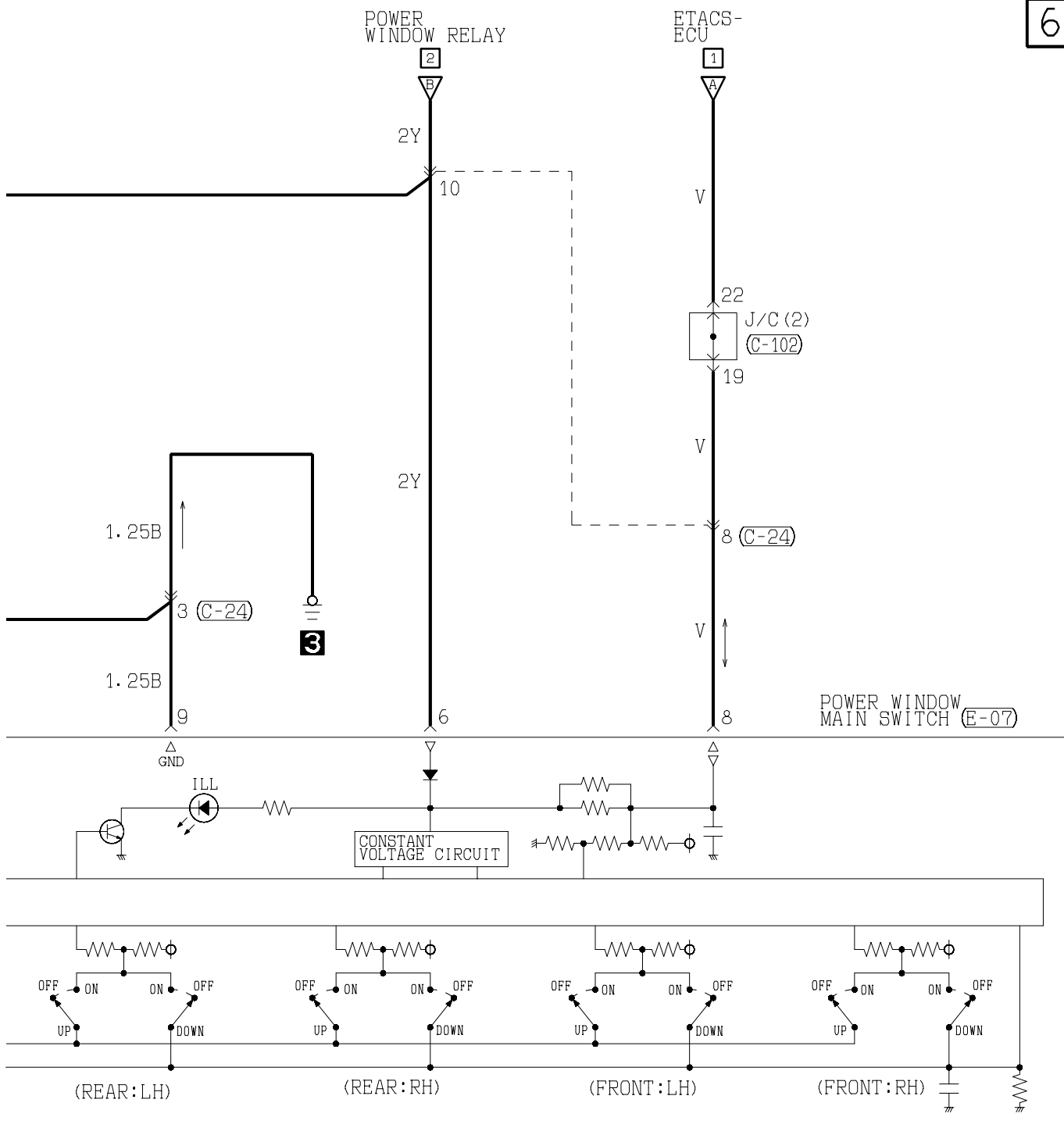
(E-05)



(E-07)



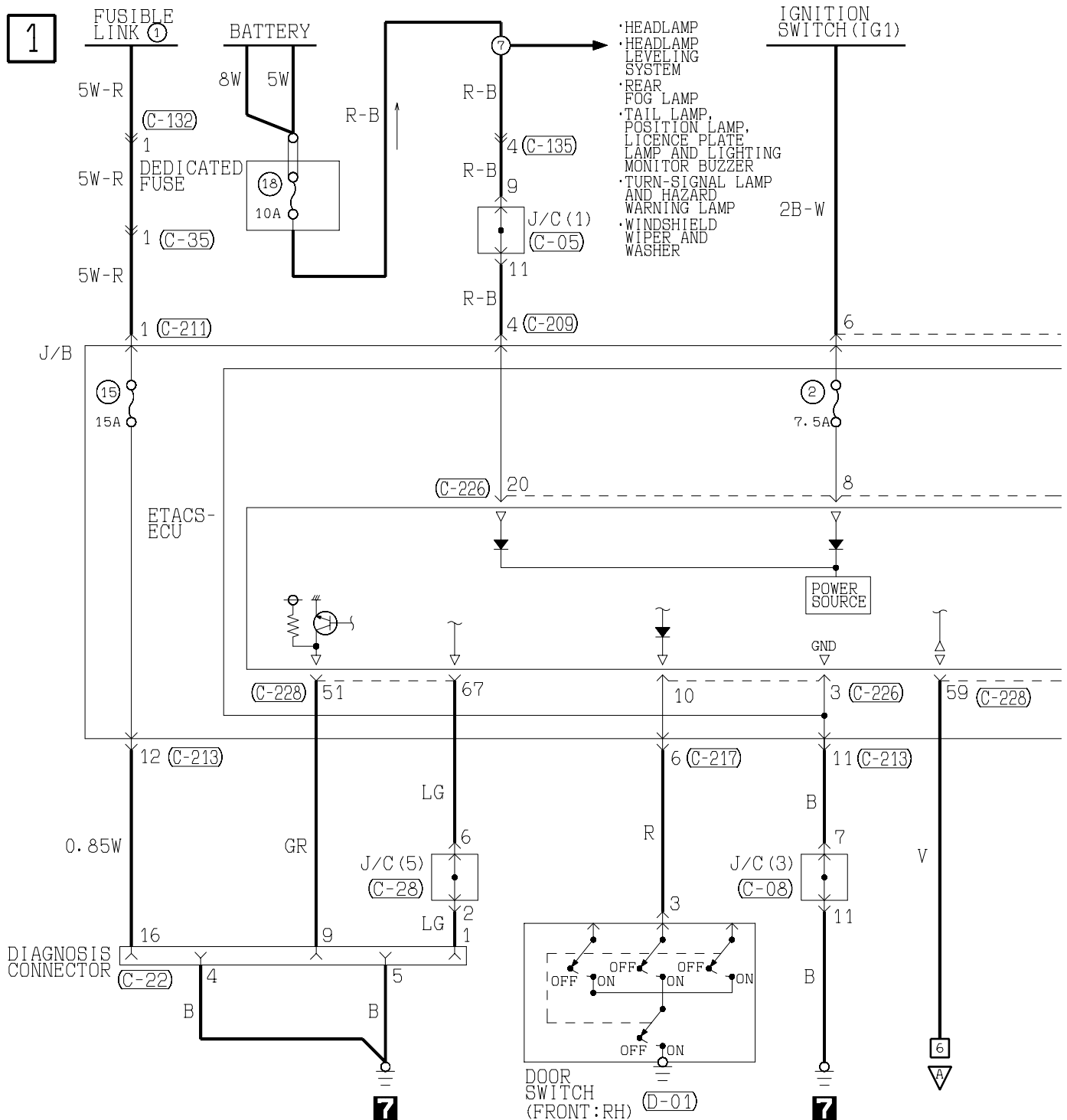
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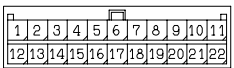
Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

POWER WINDOWS

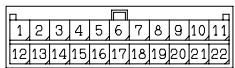
R.H. drive vehicles



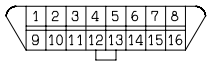
(C-05)



(C-08)



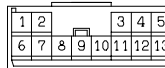
(C-22) FRONT SIDE



(C-24)



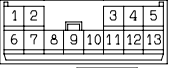
(C-28) MU801855



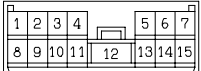
(C-35) (MU801380)



(C-112) MU801855



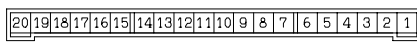
(C-217)



(C-224)

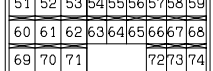


(C-226)



J/B SIDE

(C-228)



(D-01)



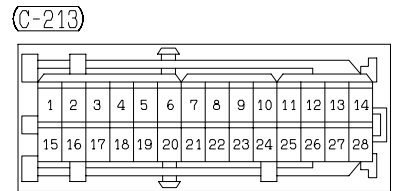
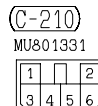
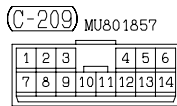
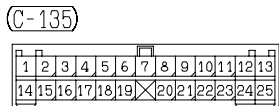
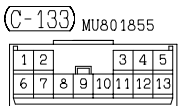
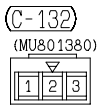
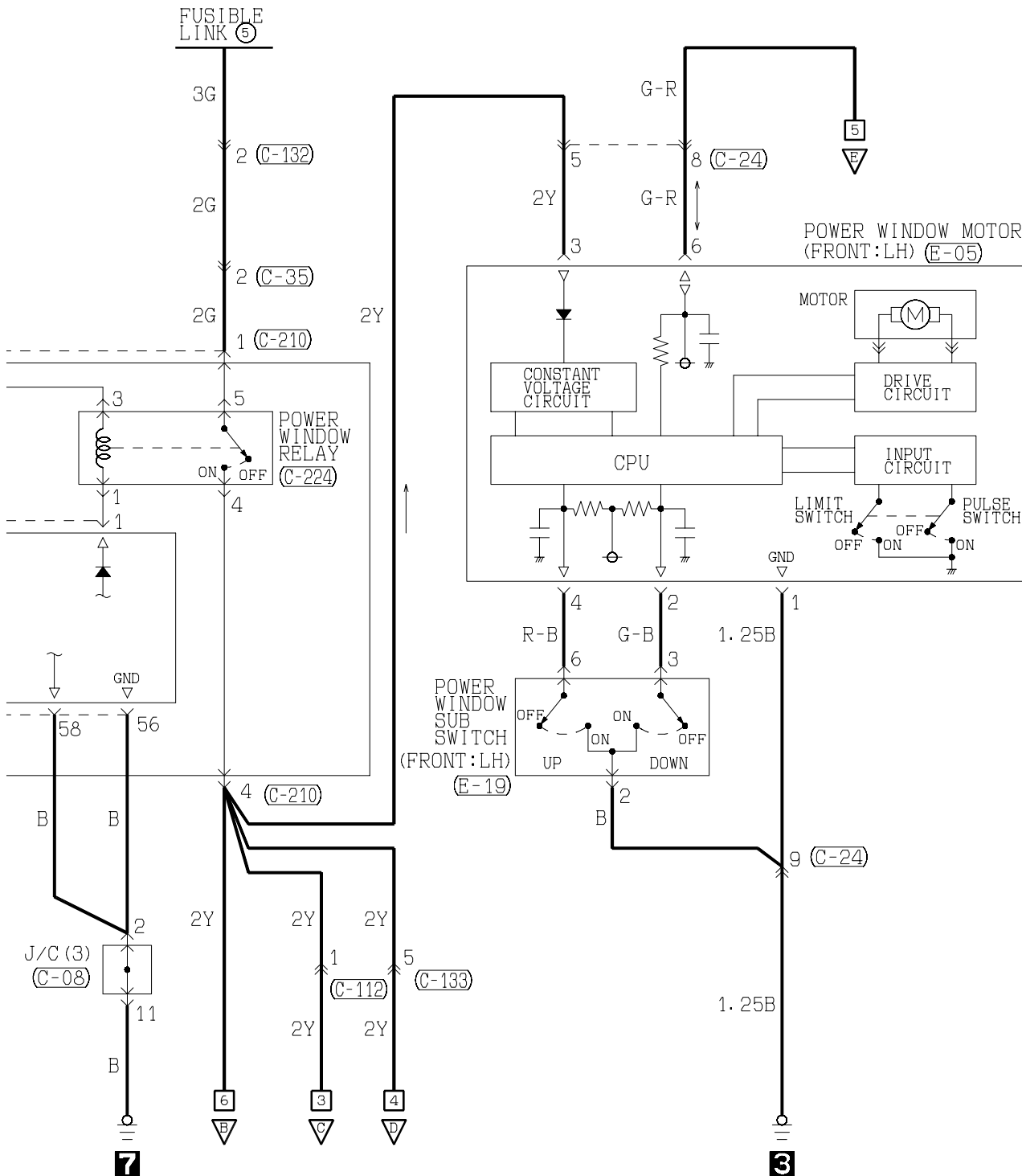
(E-05)



(E-19)



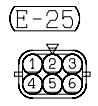
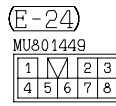
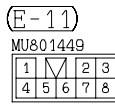
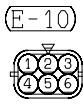
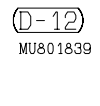
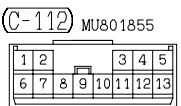
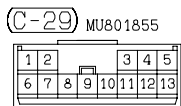
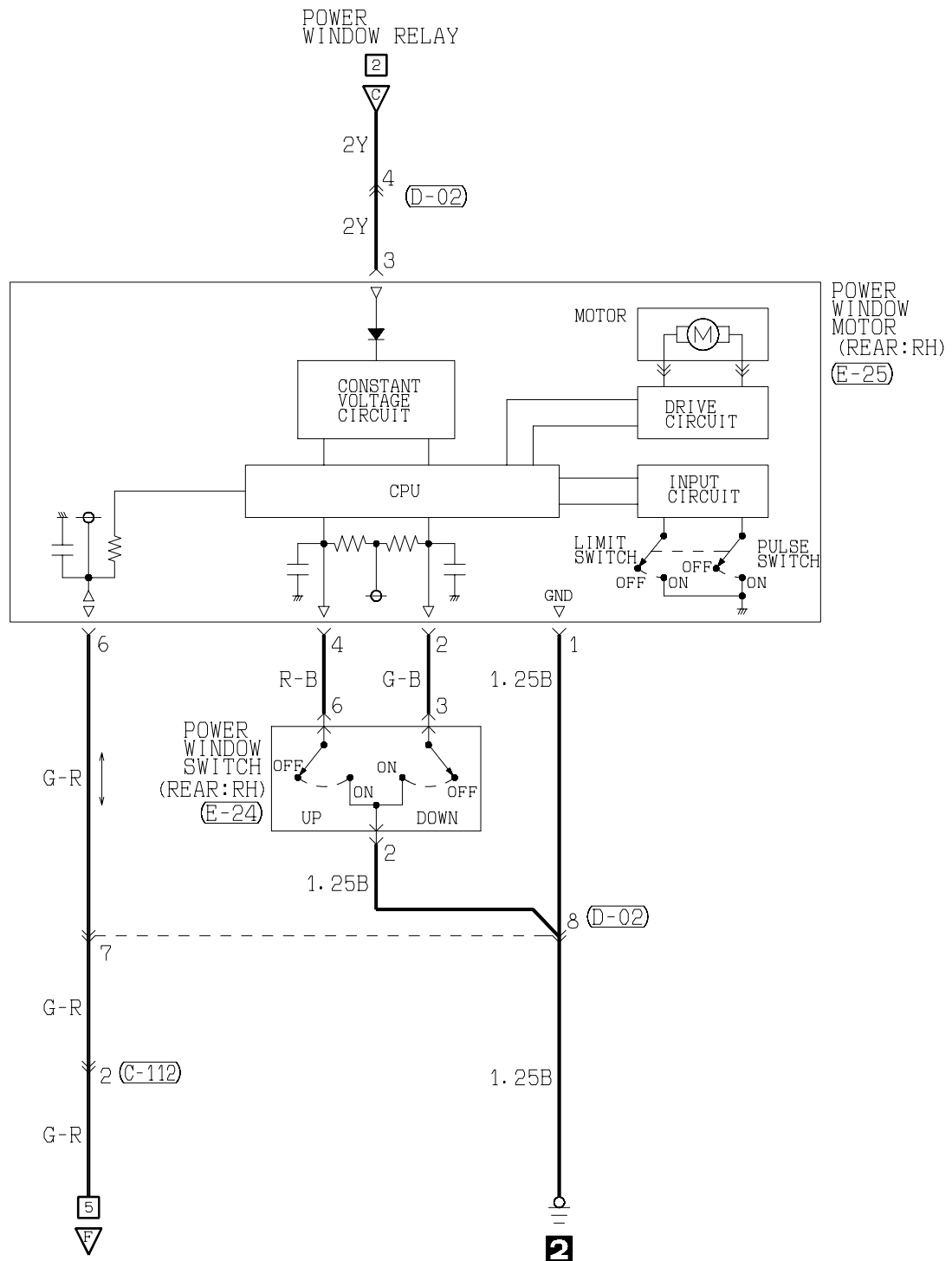
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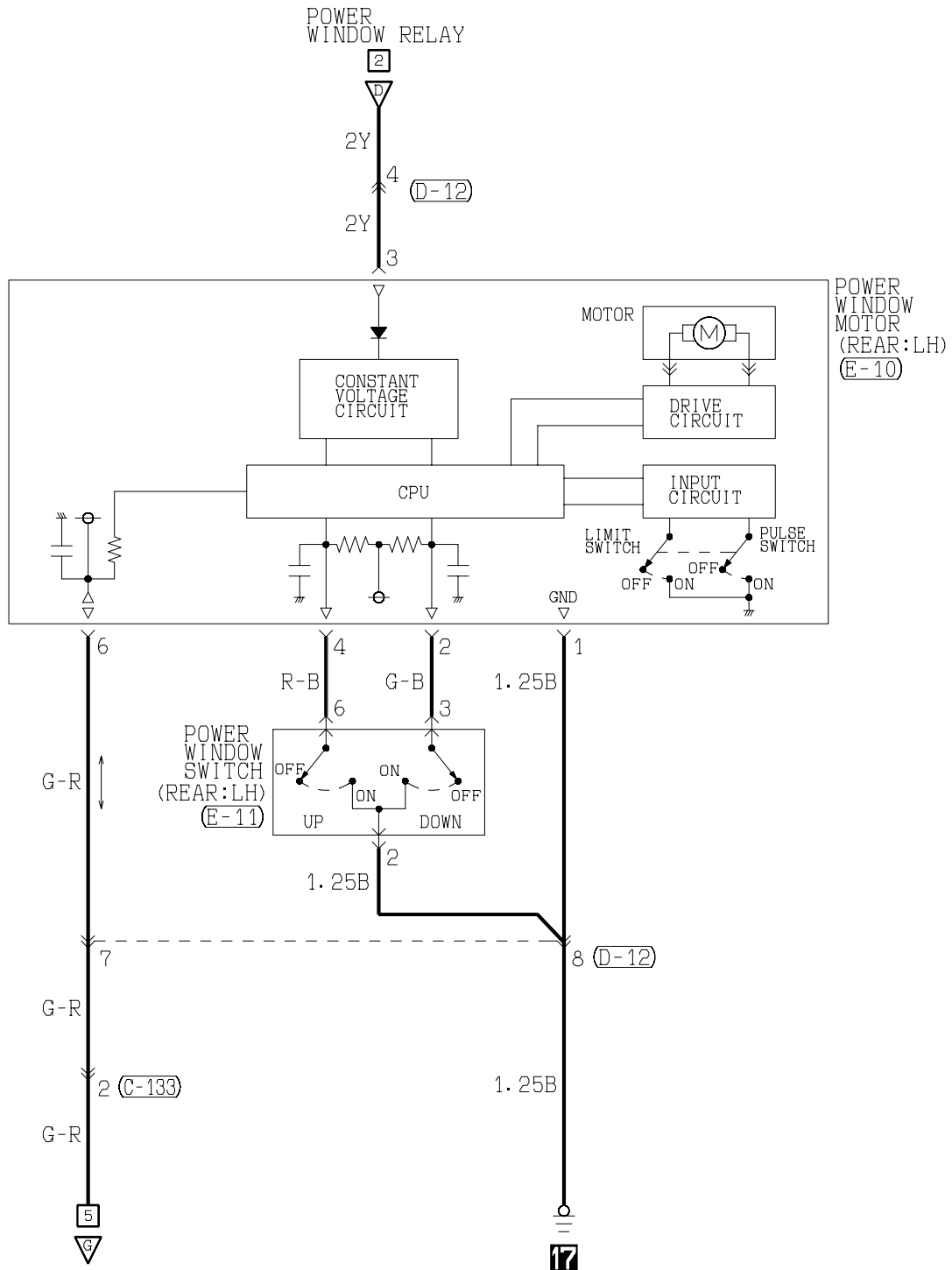
Wire colour code
 B : Black LG : Light green G : Green L : Blue
 BR : Brown O : Orange GR : Gray R : Red
 W : White SB : Sky blue P : Pink Y : Yellow
 V : Violet

POWER WINDOWS <R.H. drive vehicles> (CONTINUED)

3



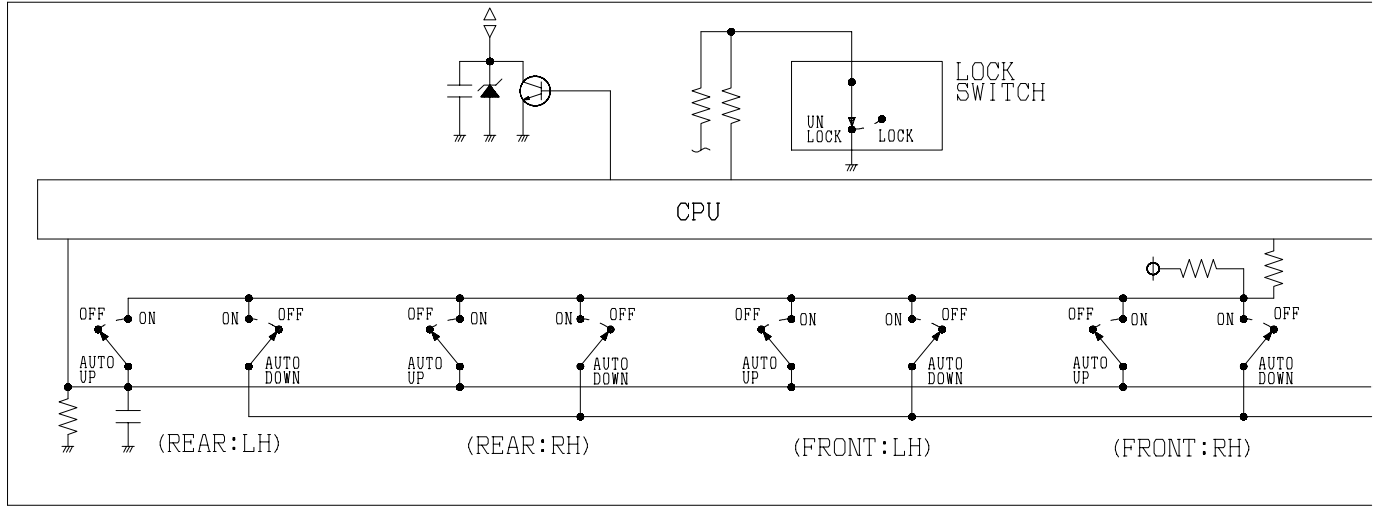
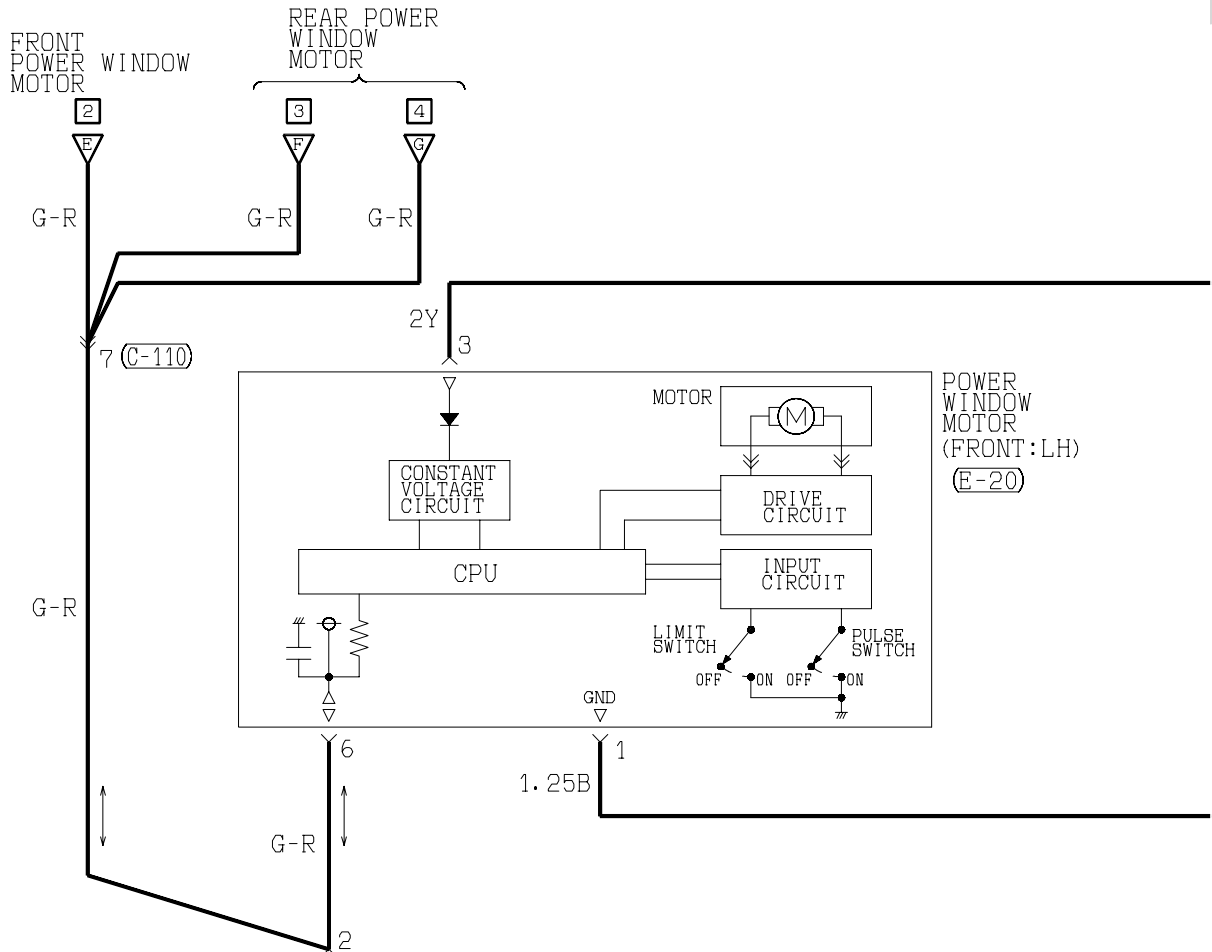
4



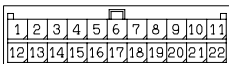
Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

POWER WINDOWS <R.H. drive vehicles> (CONTINUED)

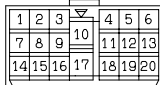
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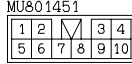
(C-102)



(C-110)



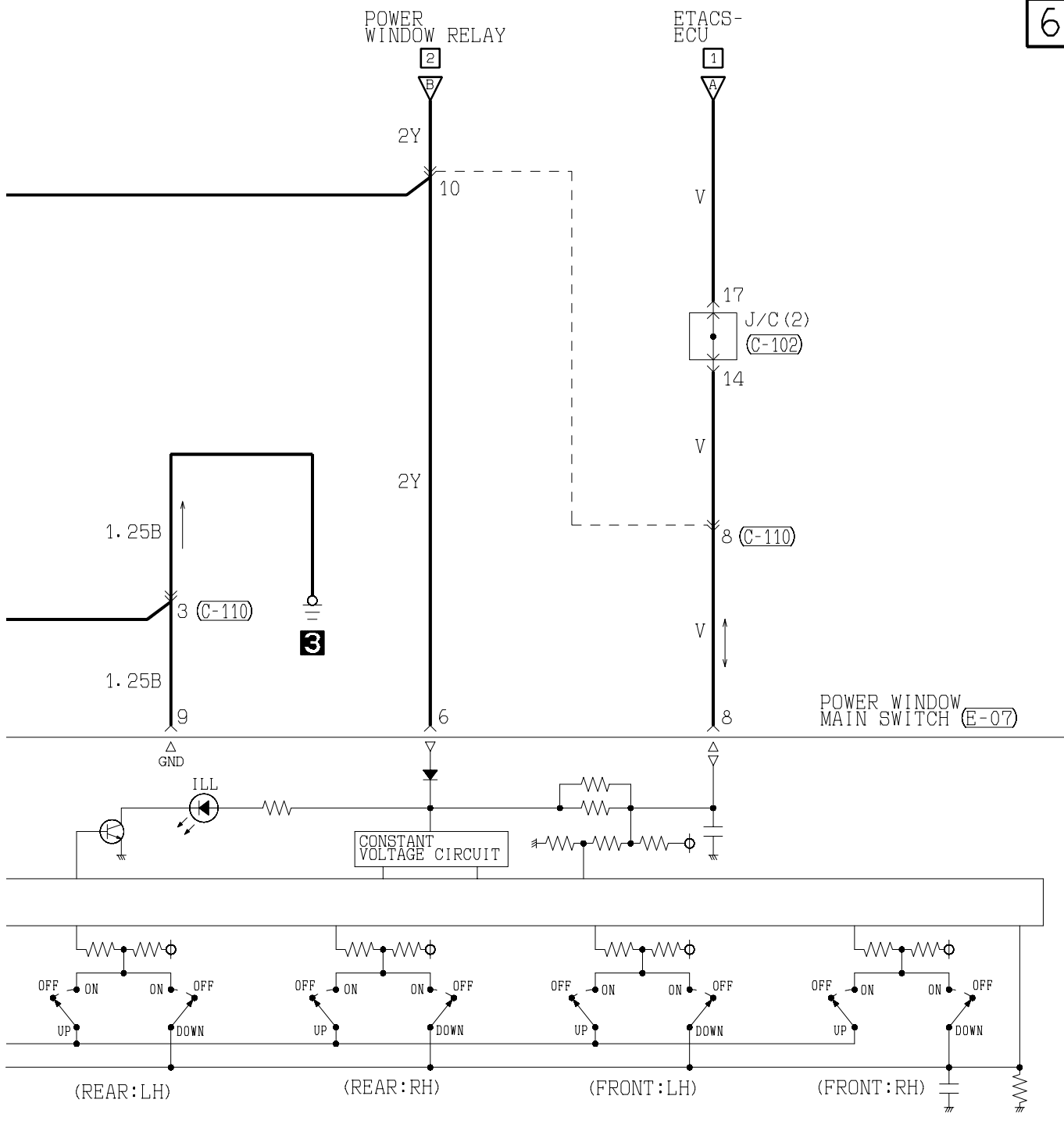
(E-07)



(E-20)



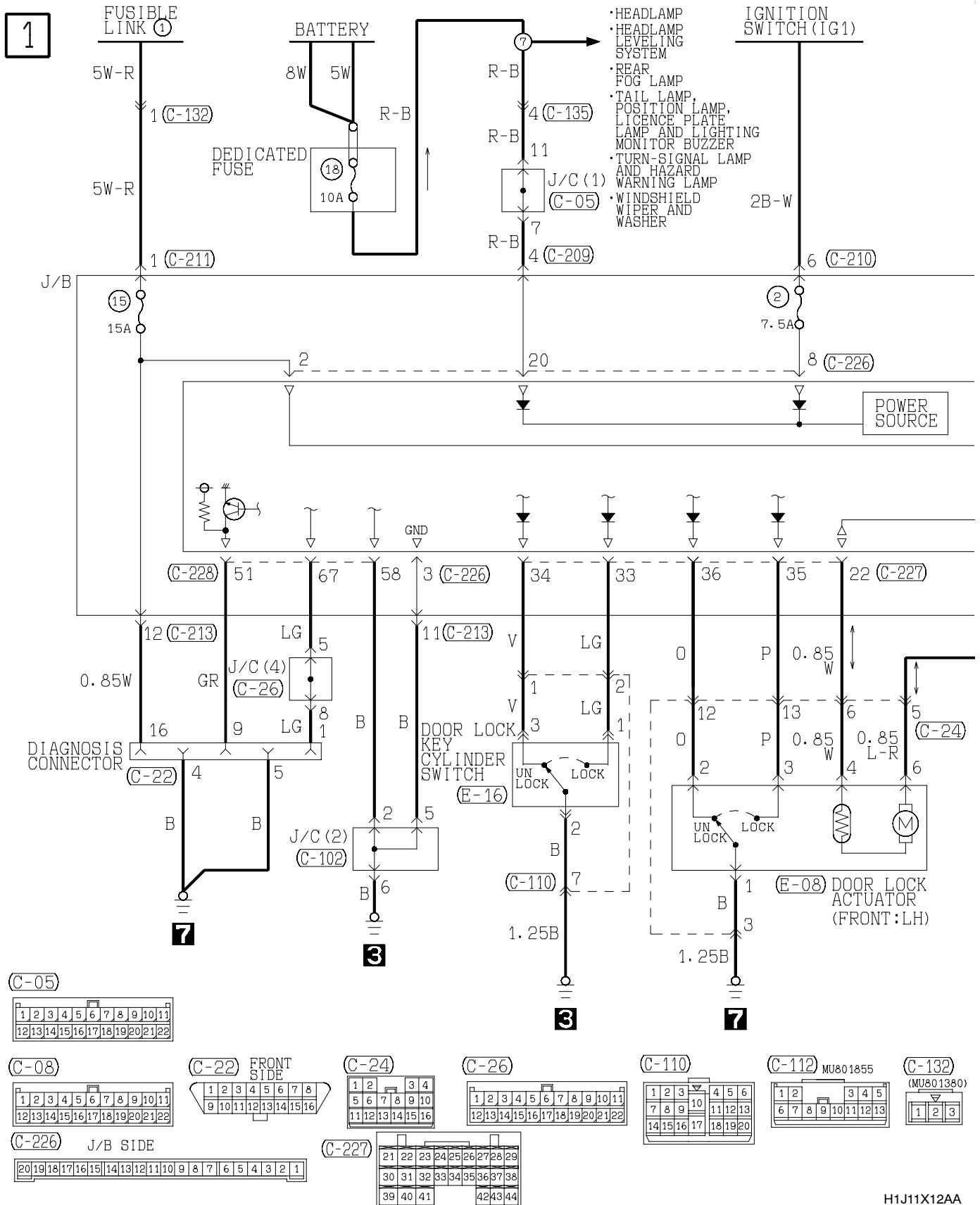
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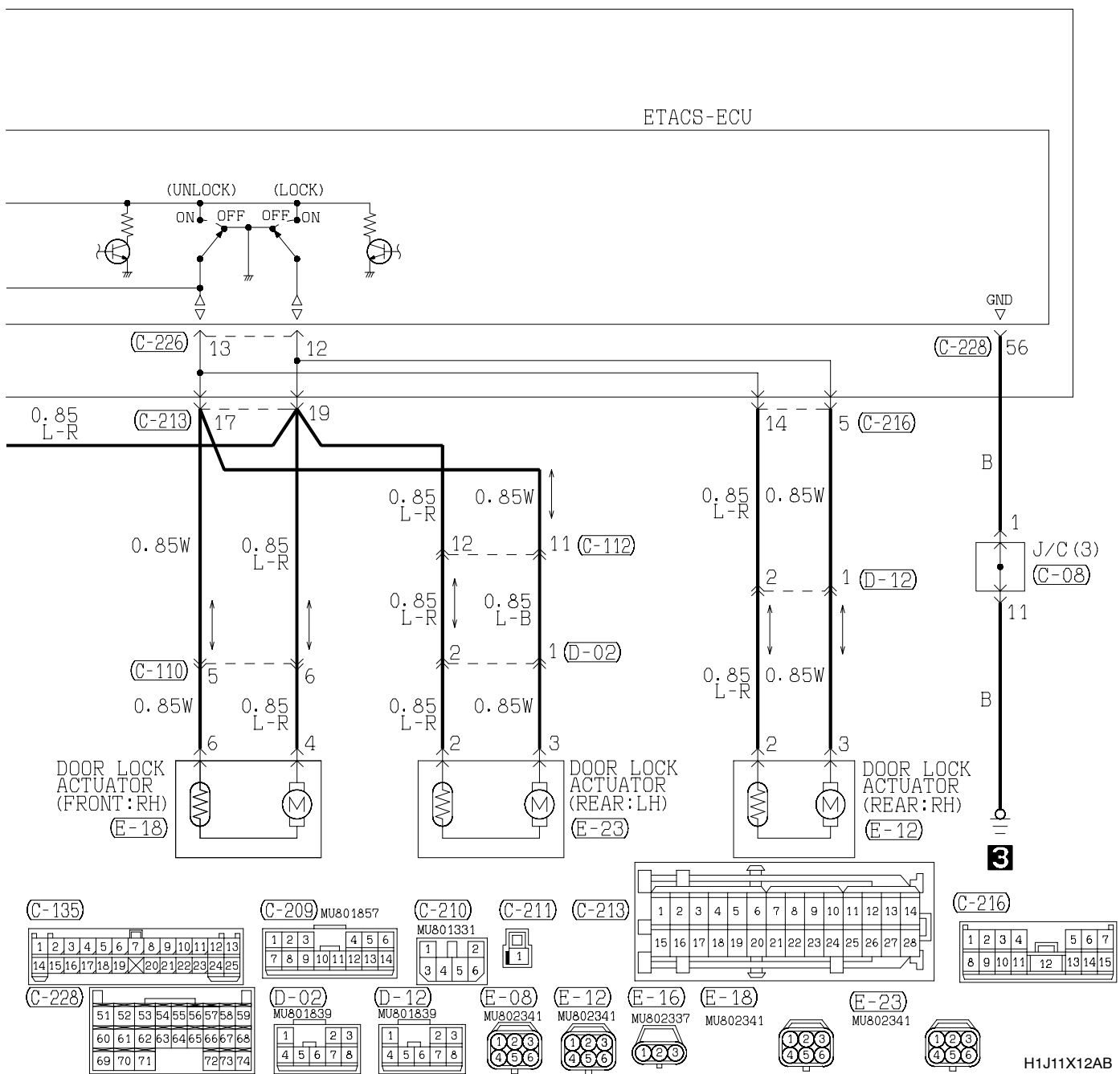
Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

CENTRAL DOOR LOCKING SYSTEM

L.H. drive vehicles

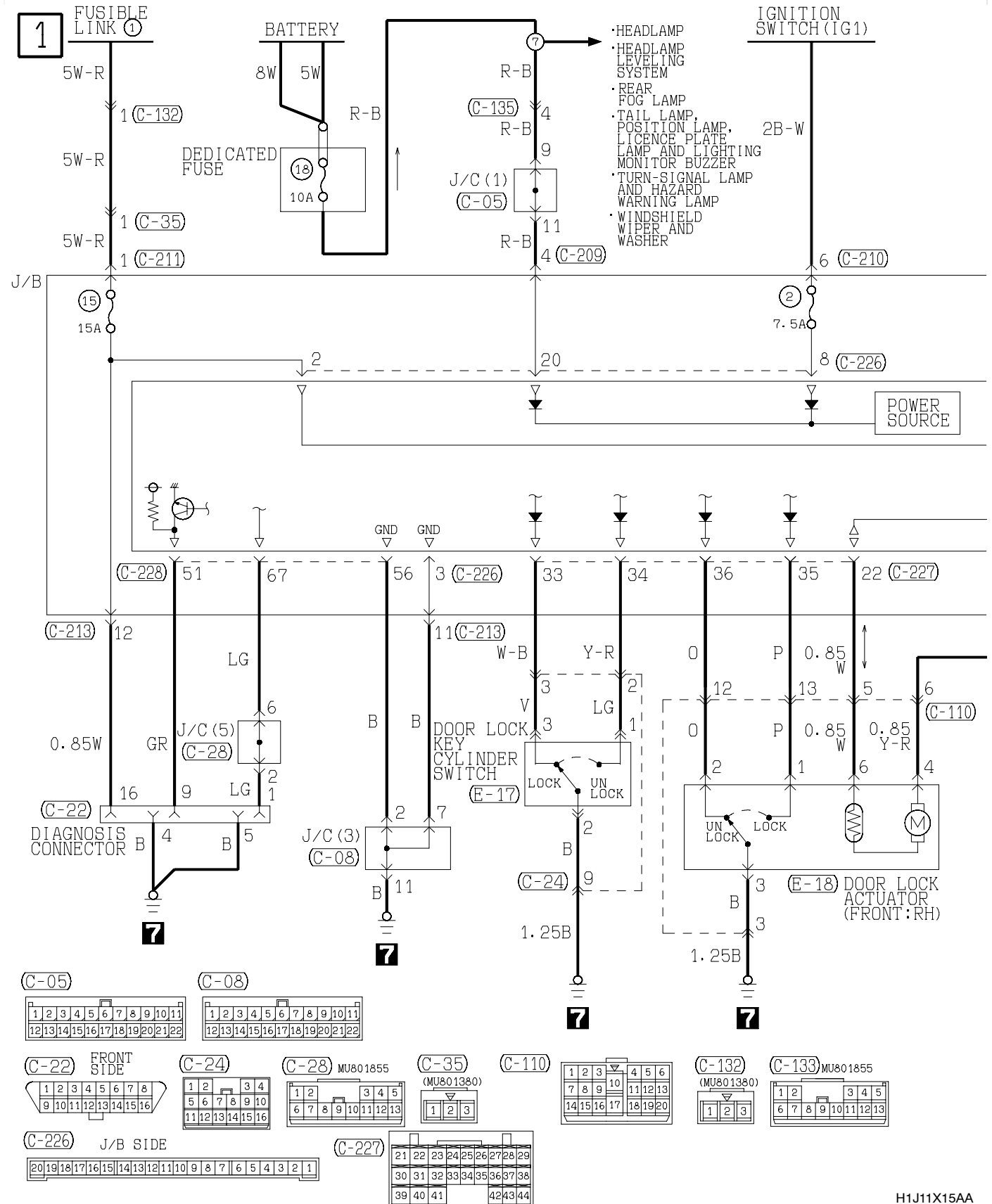


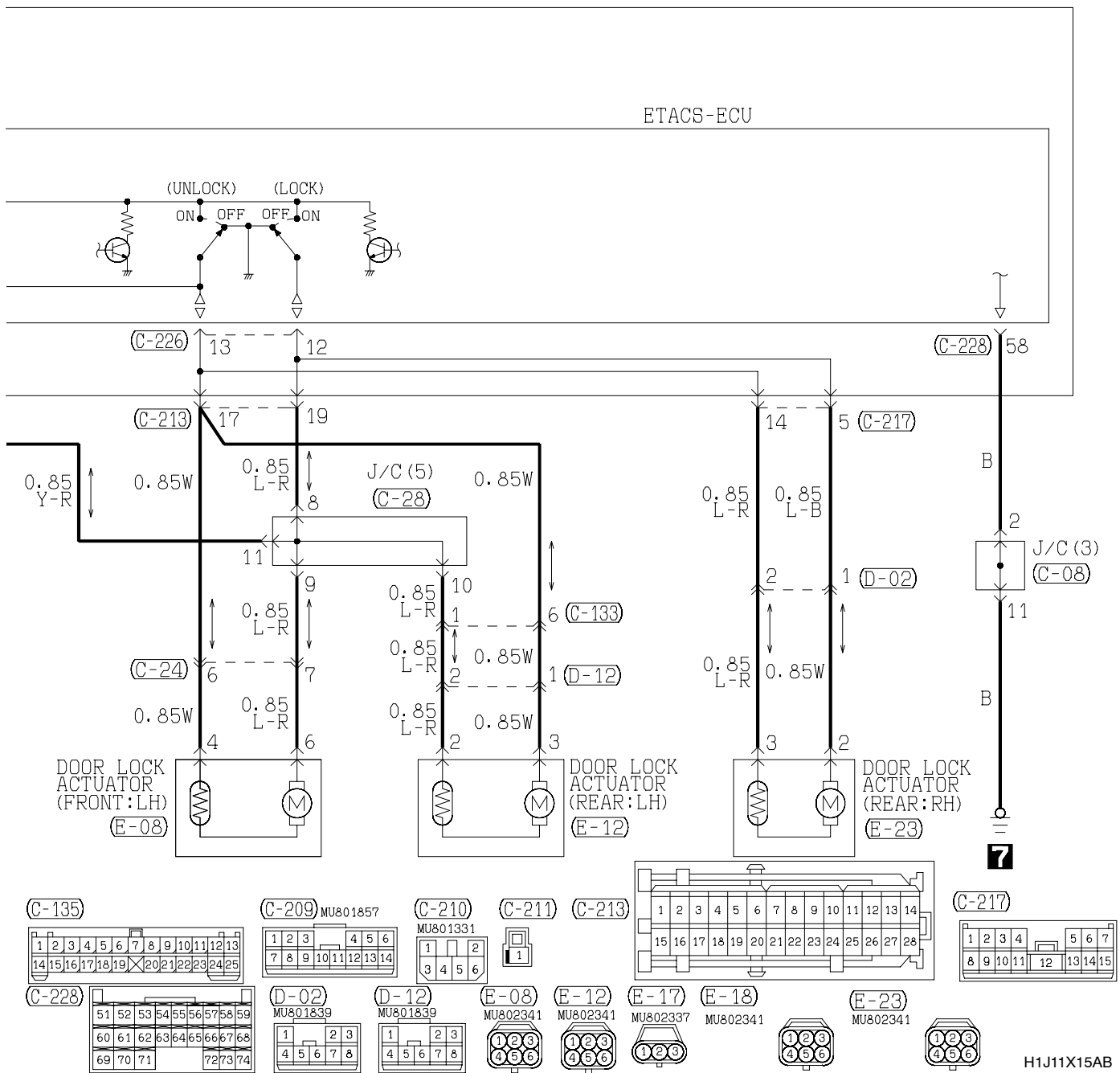
2



CENTRAL DOOR LOCKING SYSTEM

R.H. drive vehicles

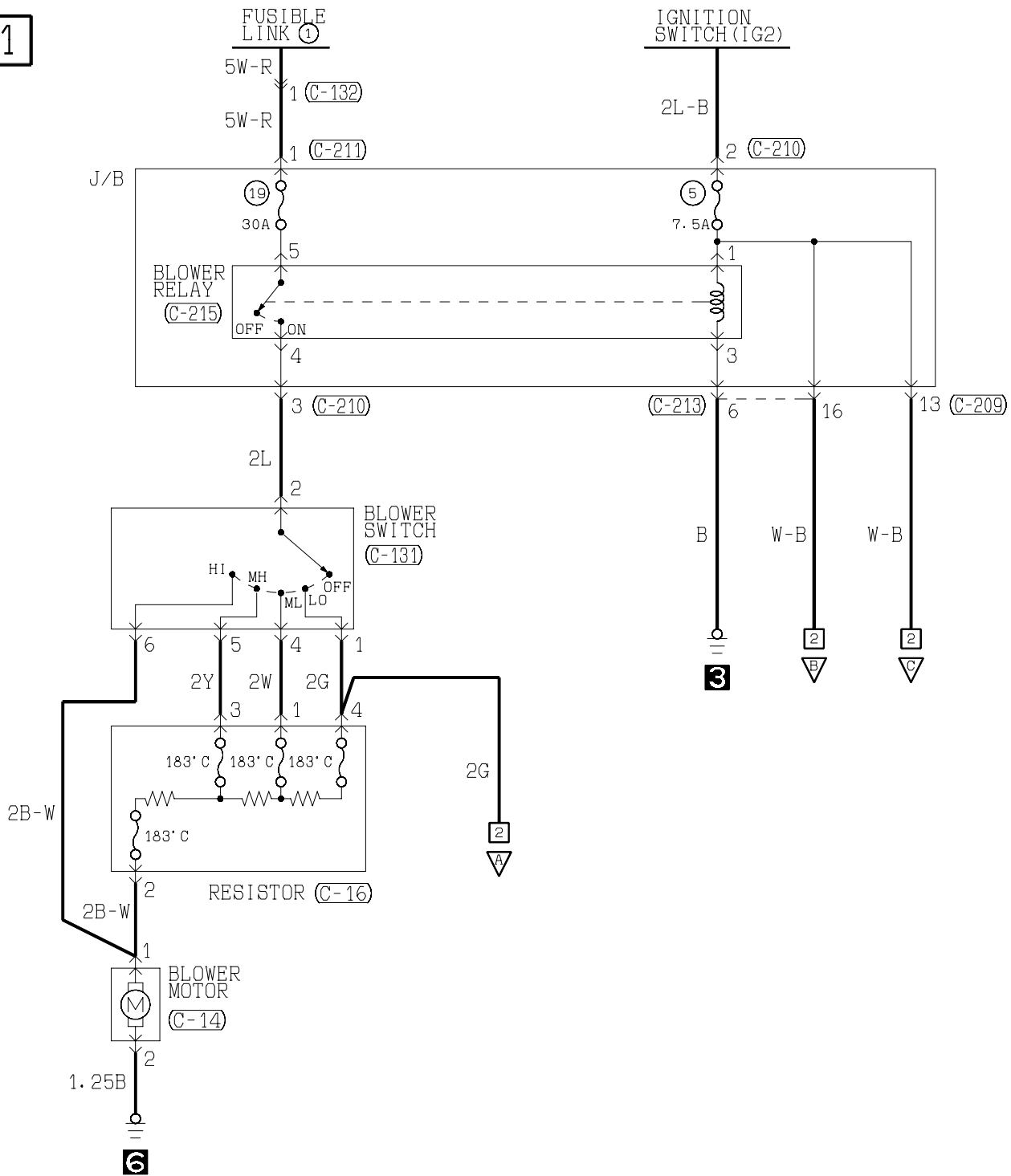




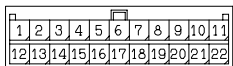
HEATER AND MANUAL AIR CONDITIONER

L.H. drive vehicles

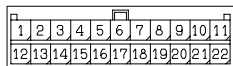
1



(C-05)



(C-08)



(C-10)



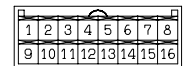
(C-14)



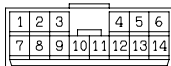
(C-16)



(C-32) (MU801584)



(C-209) MU801857



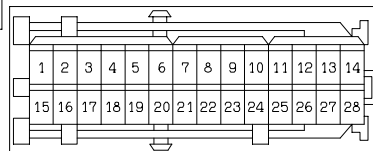
(C-210) MU801331



(C-211)



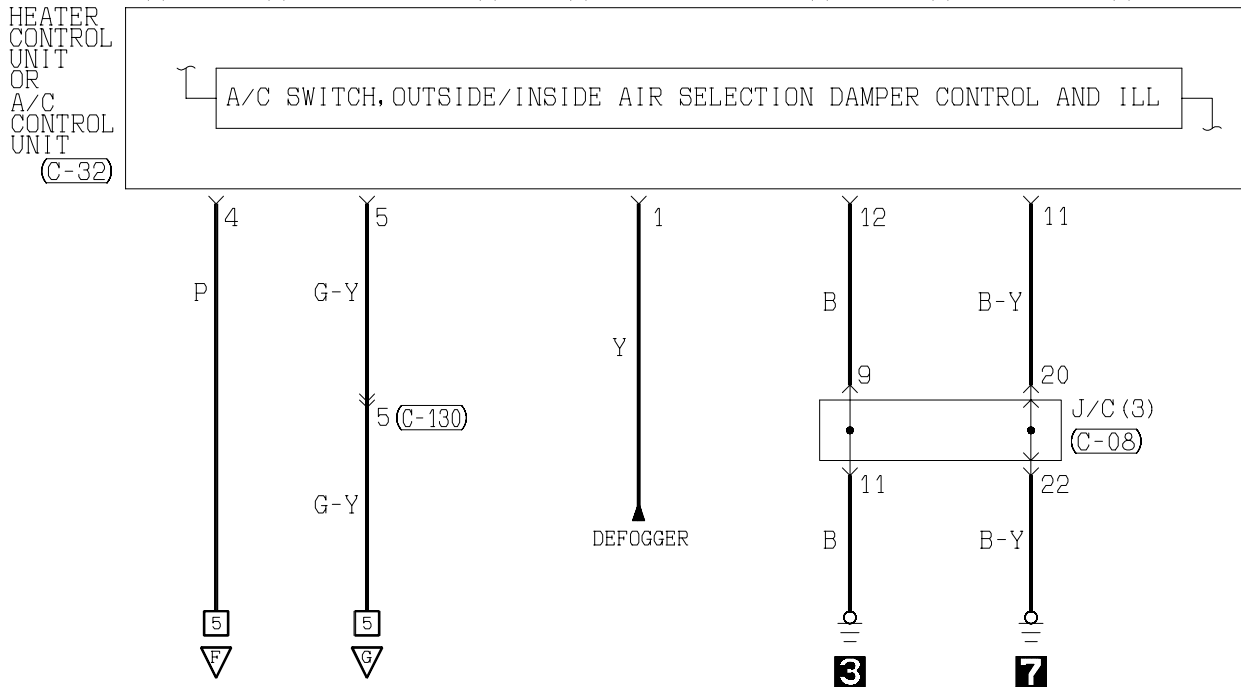
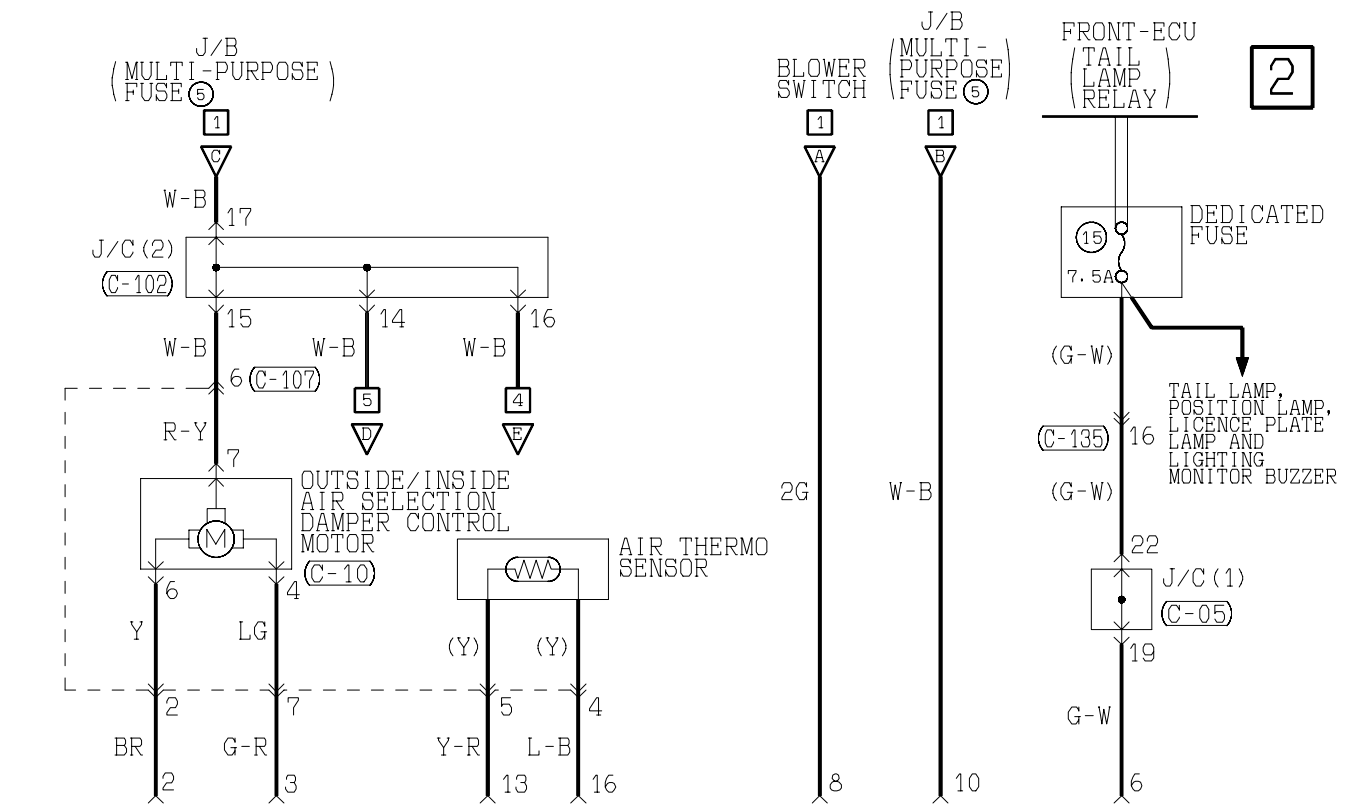
(C-213)



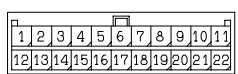
(C-215)



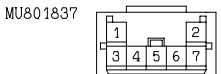
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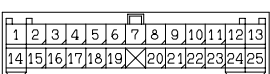
(C-102)



(C-107)



(C-130)



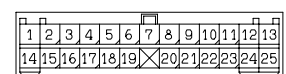
(C-131)



(C-132)



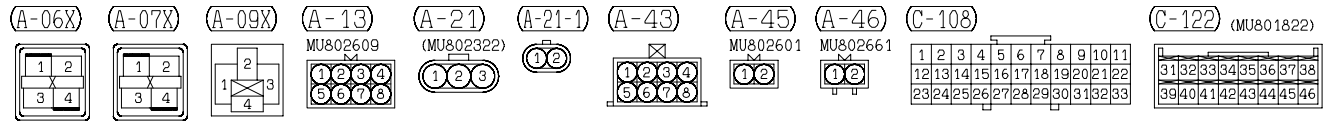
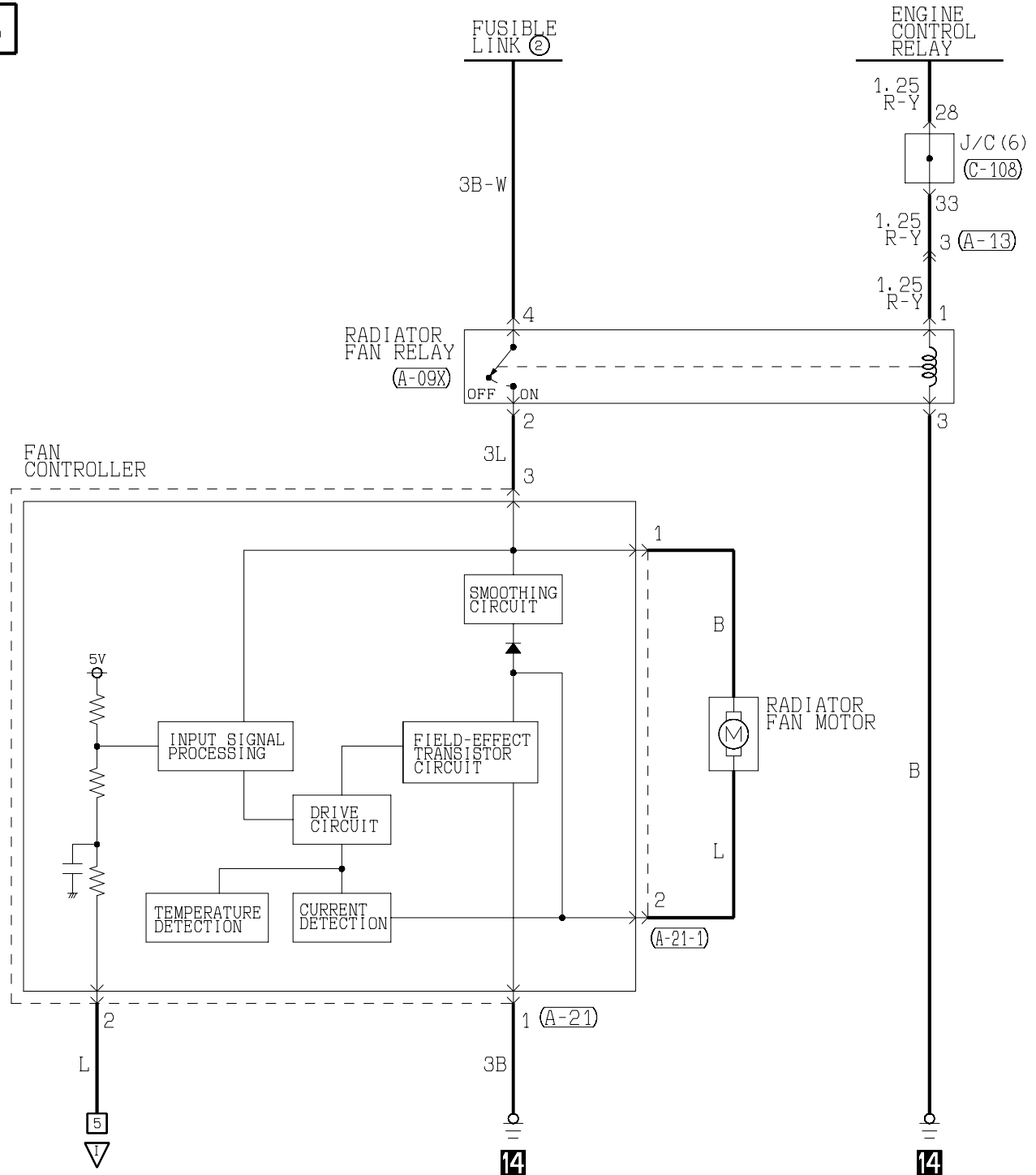
(C-135)



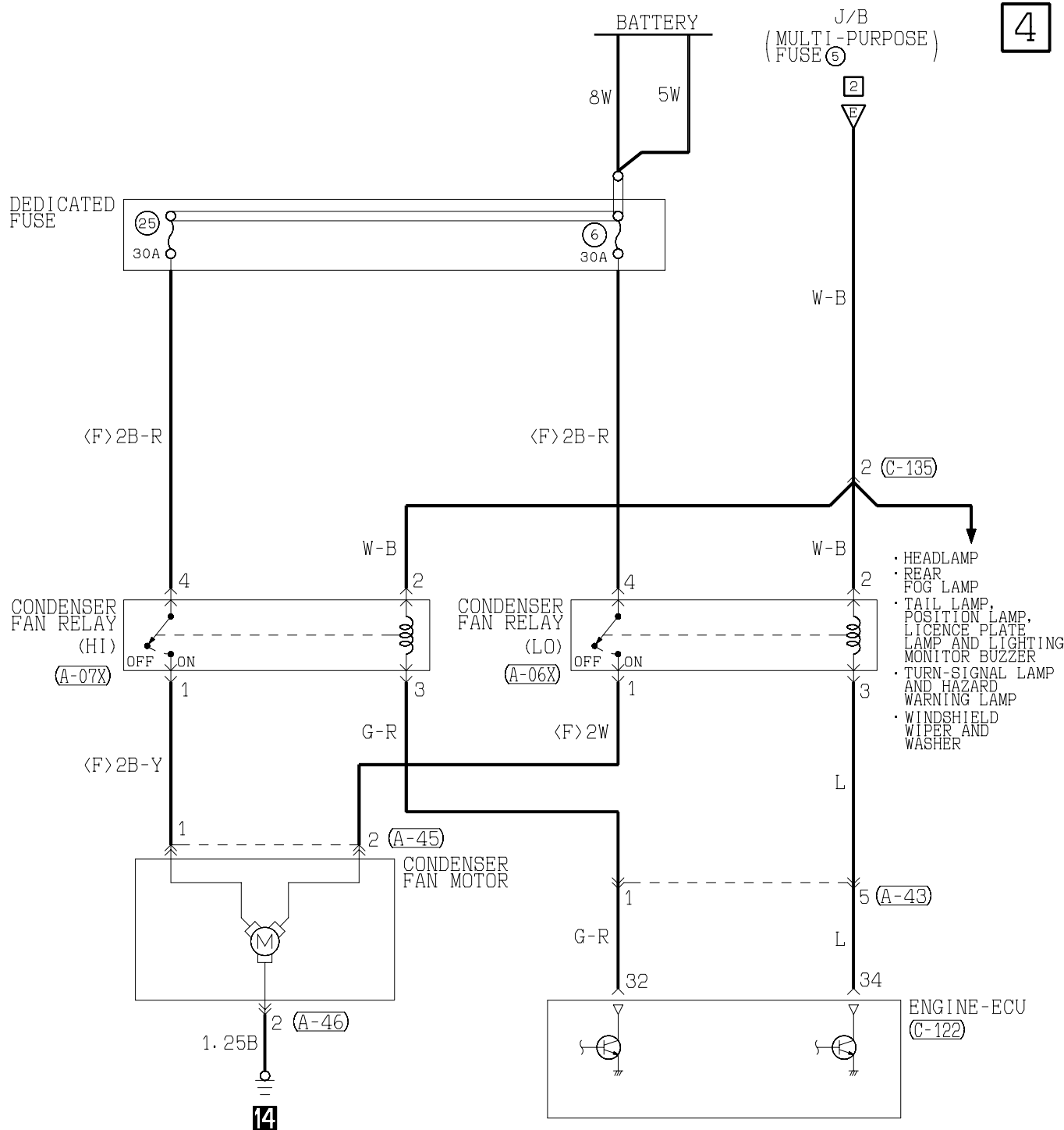
Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

HEATER AND MANUAL AIR CONDITIONER <L.H. drive vehicles> (CONTINUED)

3



4



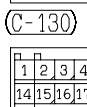
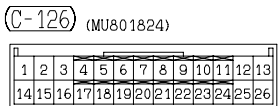
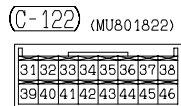
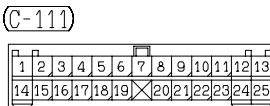
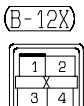
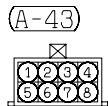
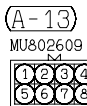
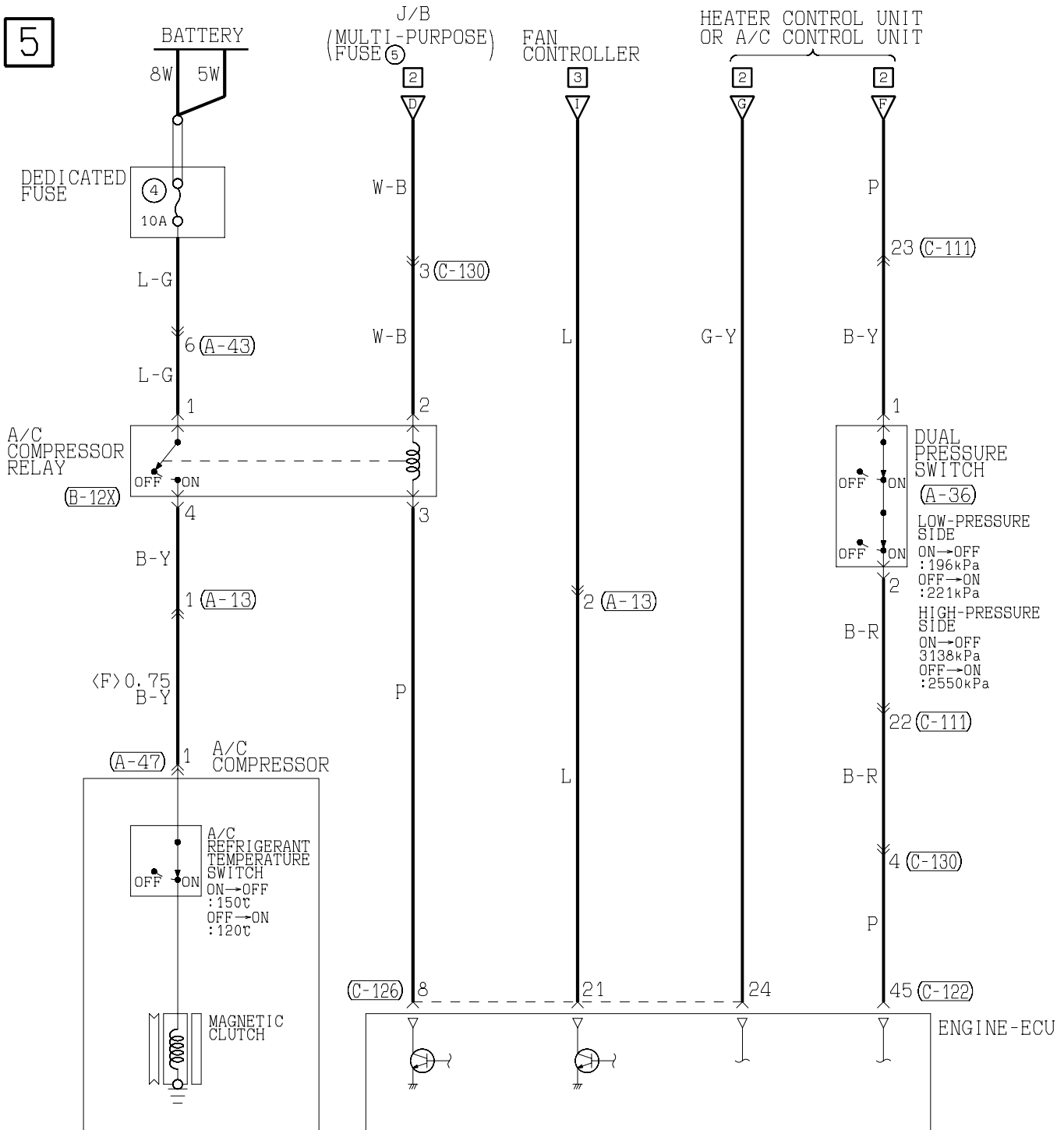
(C-135)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	X	20	21	22	23	24	25

Wire colour code
 B:Black LG:Light green G:Green L:Blue W:White Y:Yellow SB:Sky blue
 BR:Brown O:Orange GR:Gray R:Red P:Pink V:Violet

HEATER AND MANUAL AIR CONDITIONER <L.H. drive vehicles> (CONTINUED)

5



WIRE COLOR CODE
 B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE
 BR : BROWN O : ORANGE GR : GRAY R : RED
 W : WHITE SB : SKY BLUE P : PINK Y : YELLOW
 V : VIOLET

HEATER AND MANUAL AIR CONDITIONER (See P.B-174,180.)**OPERATION****<Blower motor control>**

- When the ignition switch is turned "ON", the blower relay is energized. If the blower switch is turned "ON" (LO, ML, MH, or HI position) in this condition, the blower is activated through the circuit via resistor at a speed corresponding to the blower switch position.

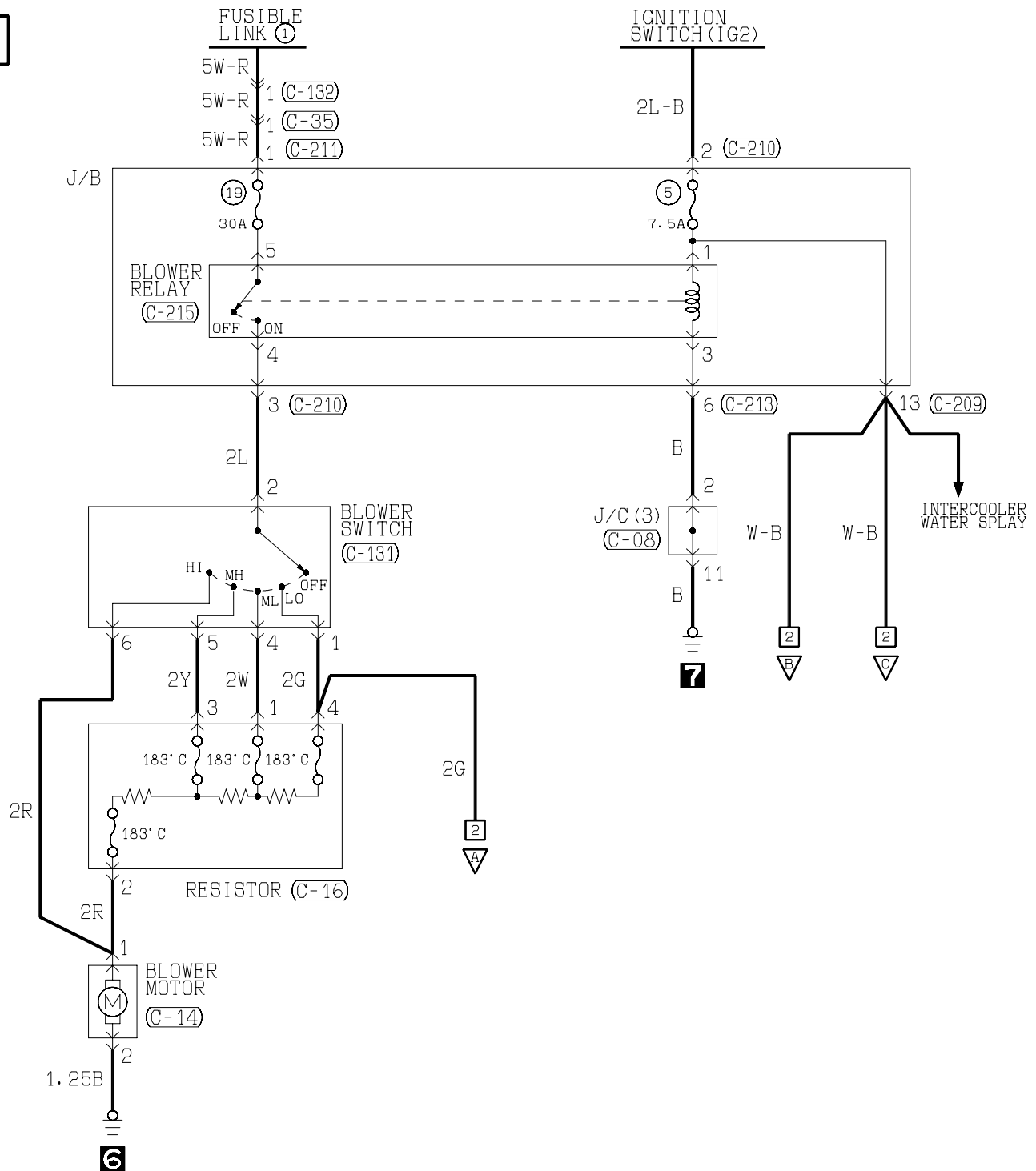
TROUBLESHOOTING HINTS**<Blower motor control>**

1. Blower motor is energized at one switch position and not energized at another.
 - Check resistor.
 - Check blower switch.
2. Blower motor is energized only when switch is positioned in HI.
 - Check resistor.

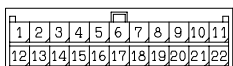
HEATER AND MANUAL AIR CONDITIONER

R.H. drive vehicles

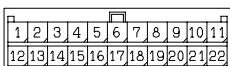
1



(C-05)



(C-08)



(C-10)



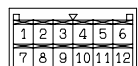
(C-14)



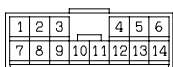
(C-16)



(C-32)



(C-209) MU801857



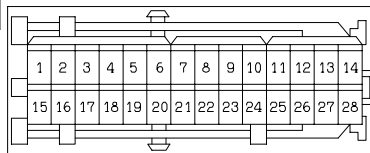
(C-210) MU801331



(C-211)



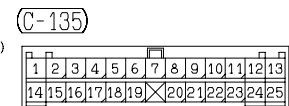
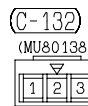
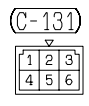
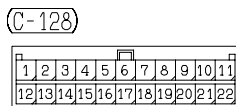
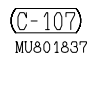
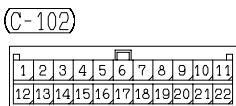
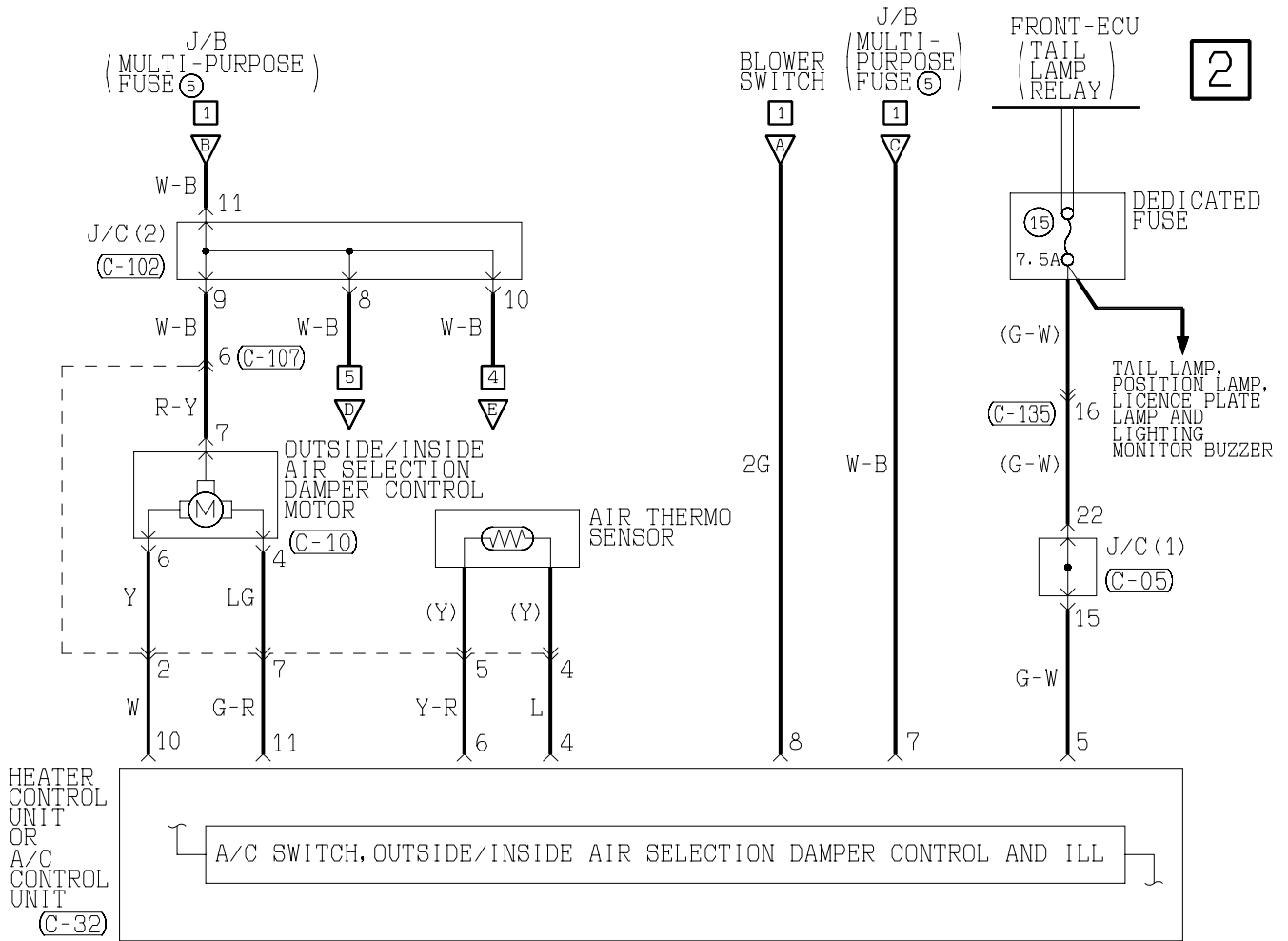
(C-213)



(C-215)



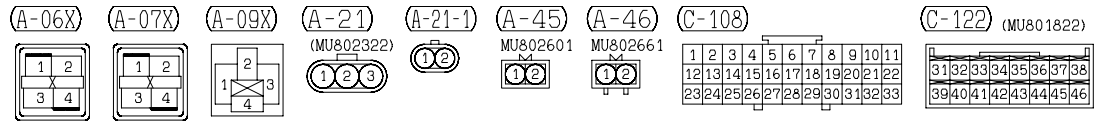
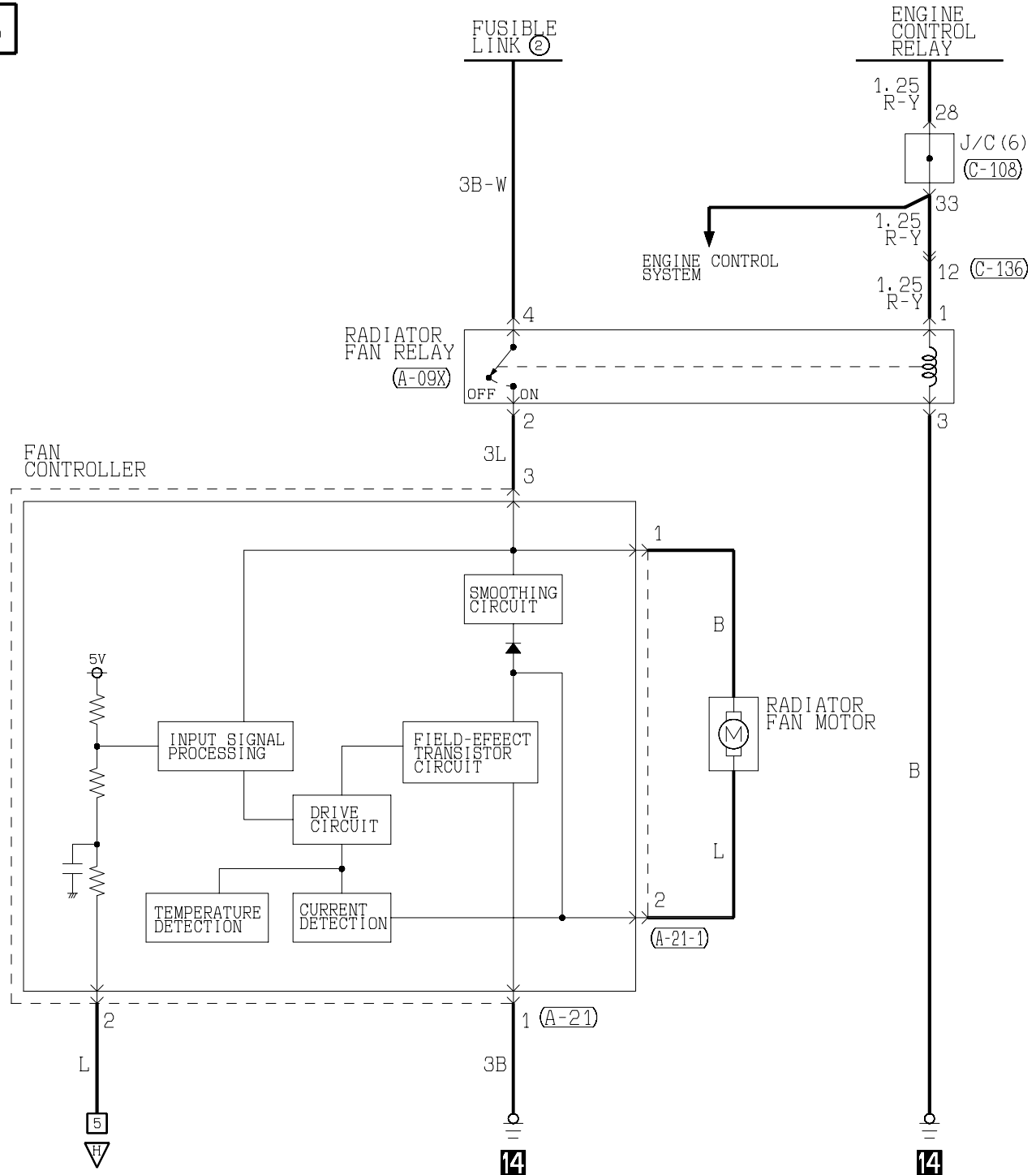
2



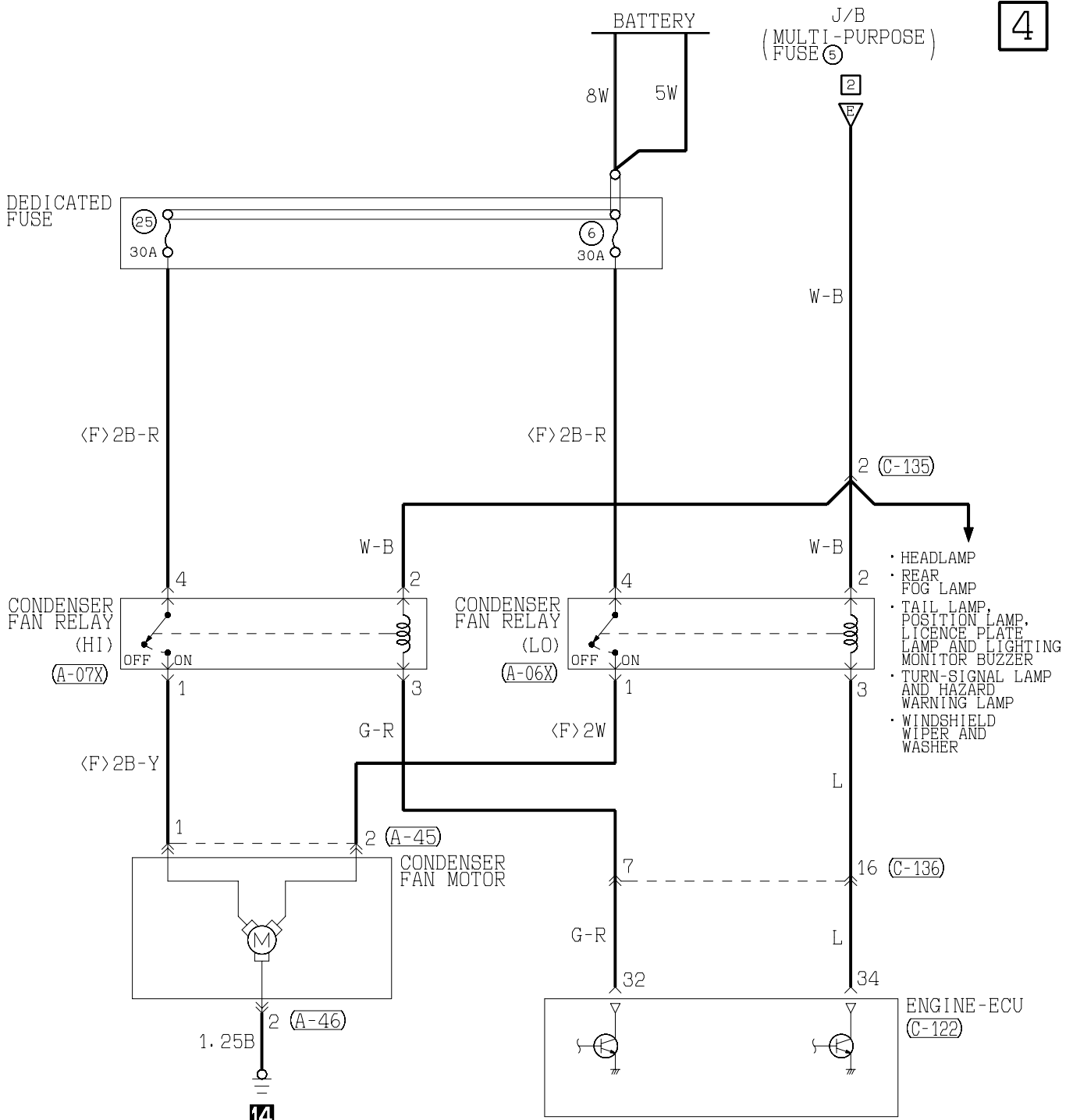
Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

HEATER AND MANUAL AIR CONDITIONER <R.H. drive vehicles> (CONTINUED)

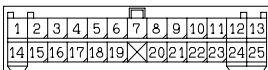
3



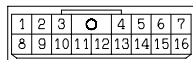
4



(C-135)



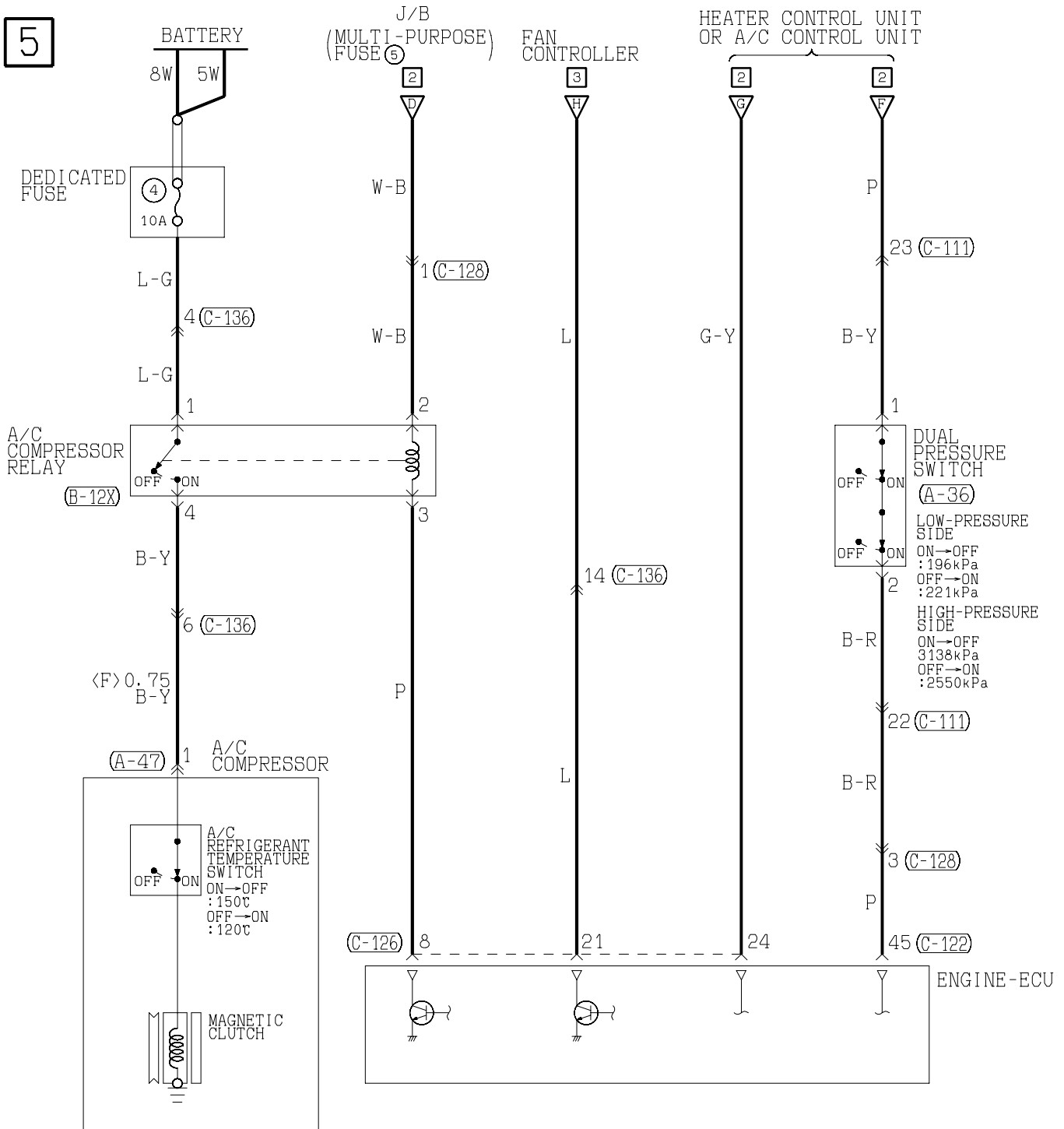
(C-136)



Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

HEATER AND MANUAL AIR CONDITIONER <R.H. drive vehicles> (CONTINUED)

5



(A-36)

(A-47) MU802653

(B-20X)

(C-111)

(C-122) (MU801822)

(C-126) (MU801824)

(C-128)

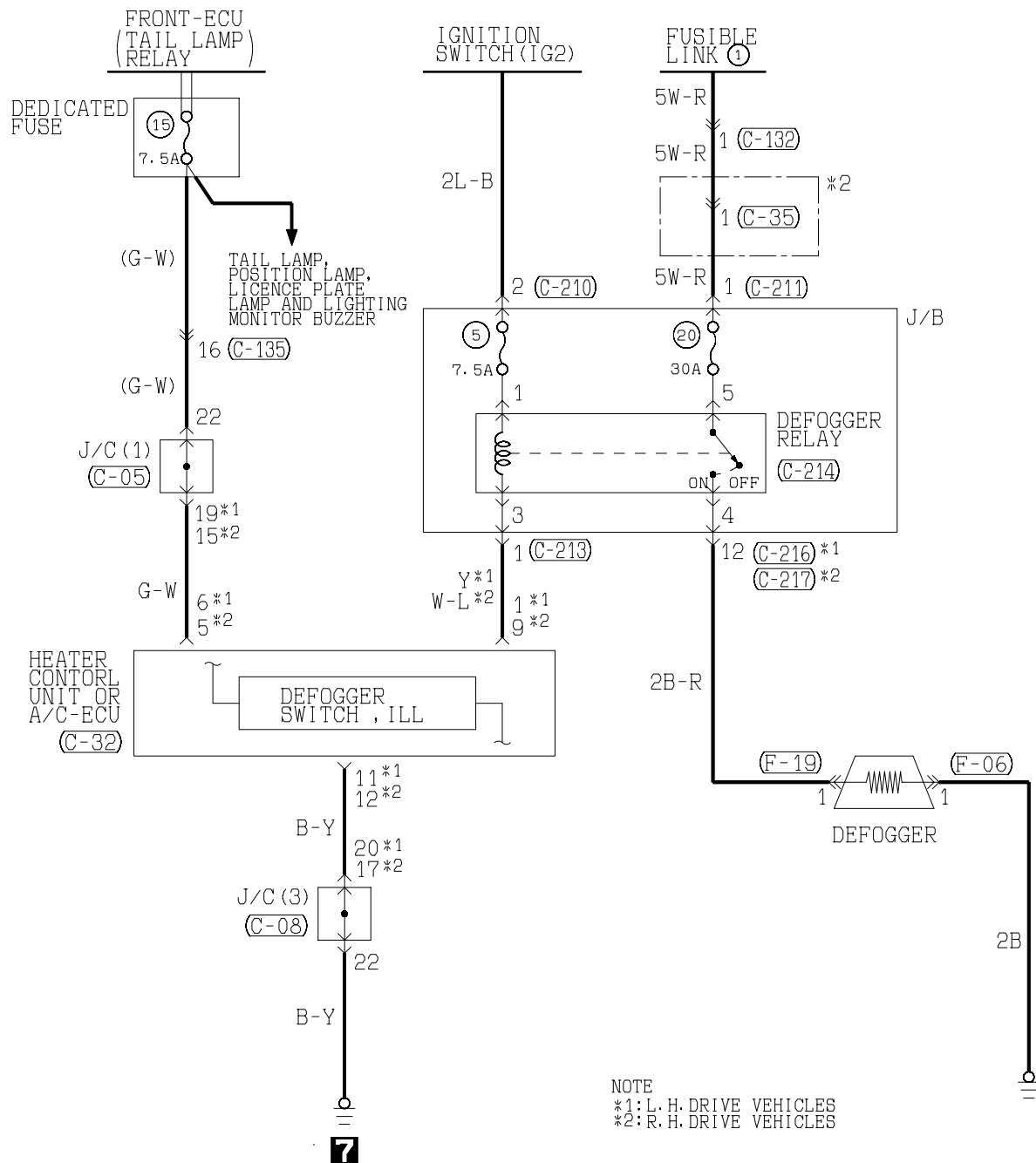
(C-136)

WIRE COLOR CODE

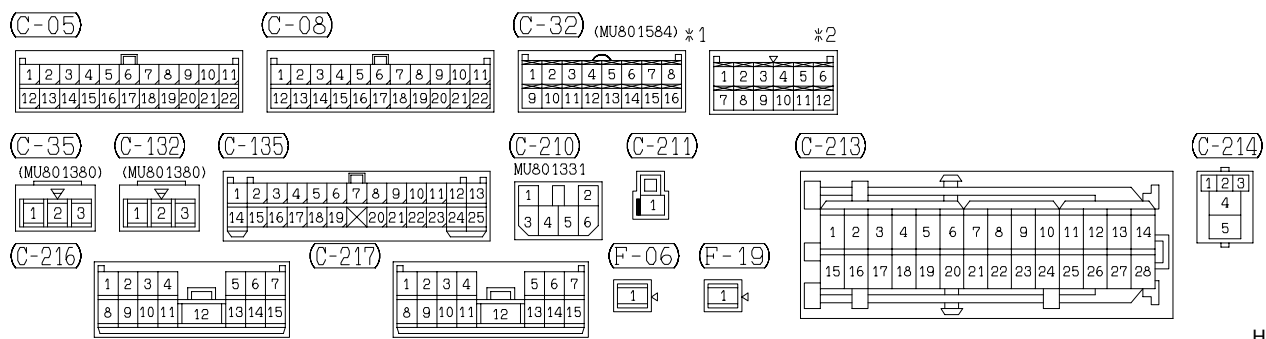
B : BLACK LG : LIGHT GREEN G : GREEN L : BLUE W : WHITE Y : YELLOW SB : SKY BLUE
 BR : BROWN O : ORANGE GR : GRAY R : RED P : PINK V : VIOLET

DEFOGGER

1



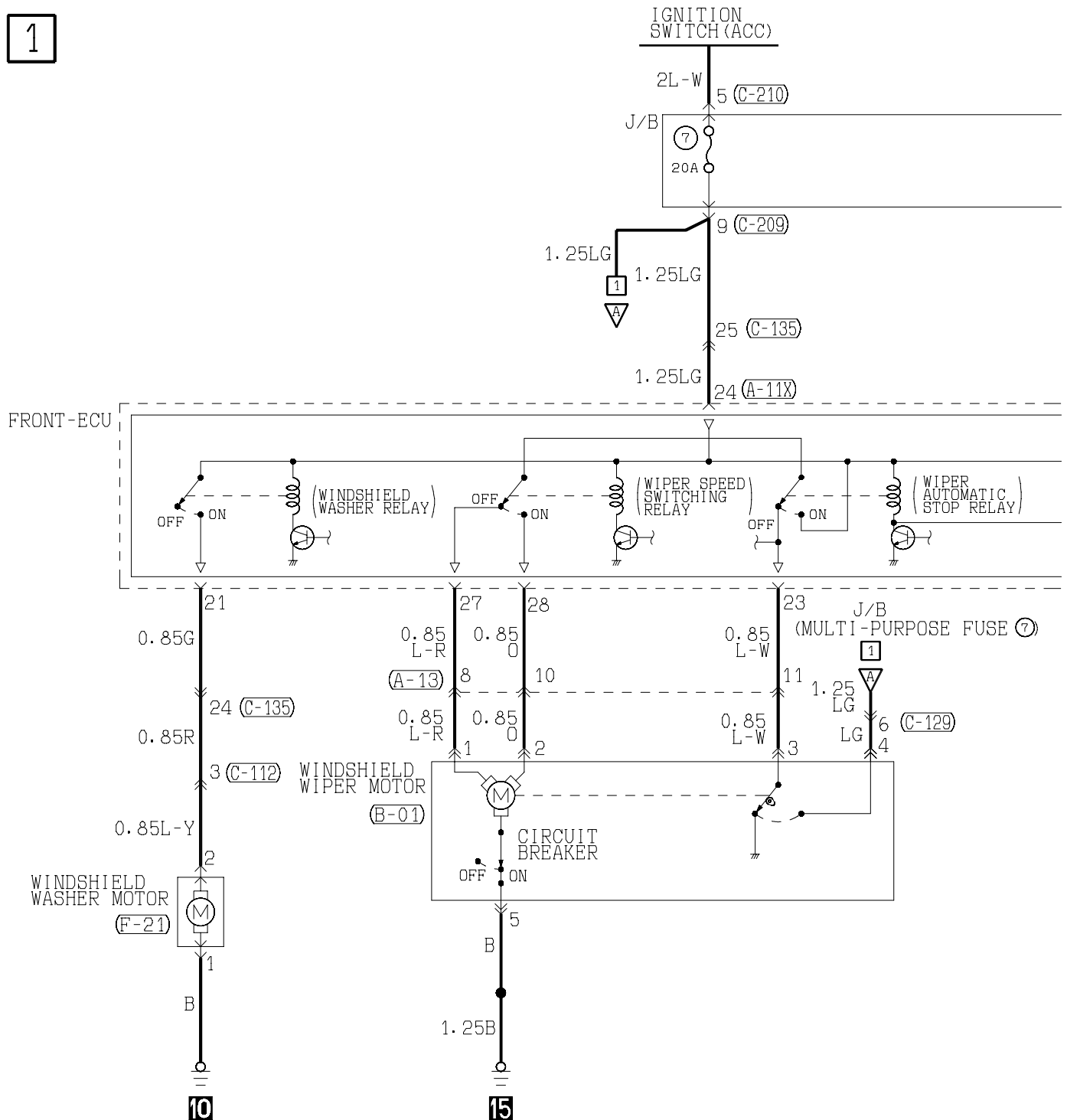
7



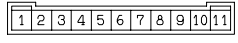
WINDSHIELD WIPER AND WASHER

L.H. drive vehicles

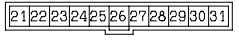
1



(A-10X)



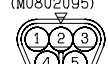
(A-11X)



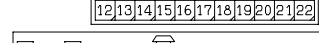
(A-13)



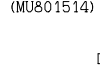
(B-01)



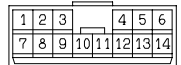
(C-05)



(C-203)



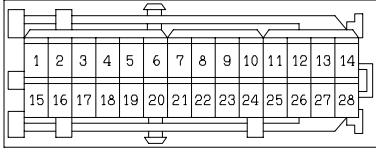
(C-209)



(C-210)



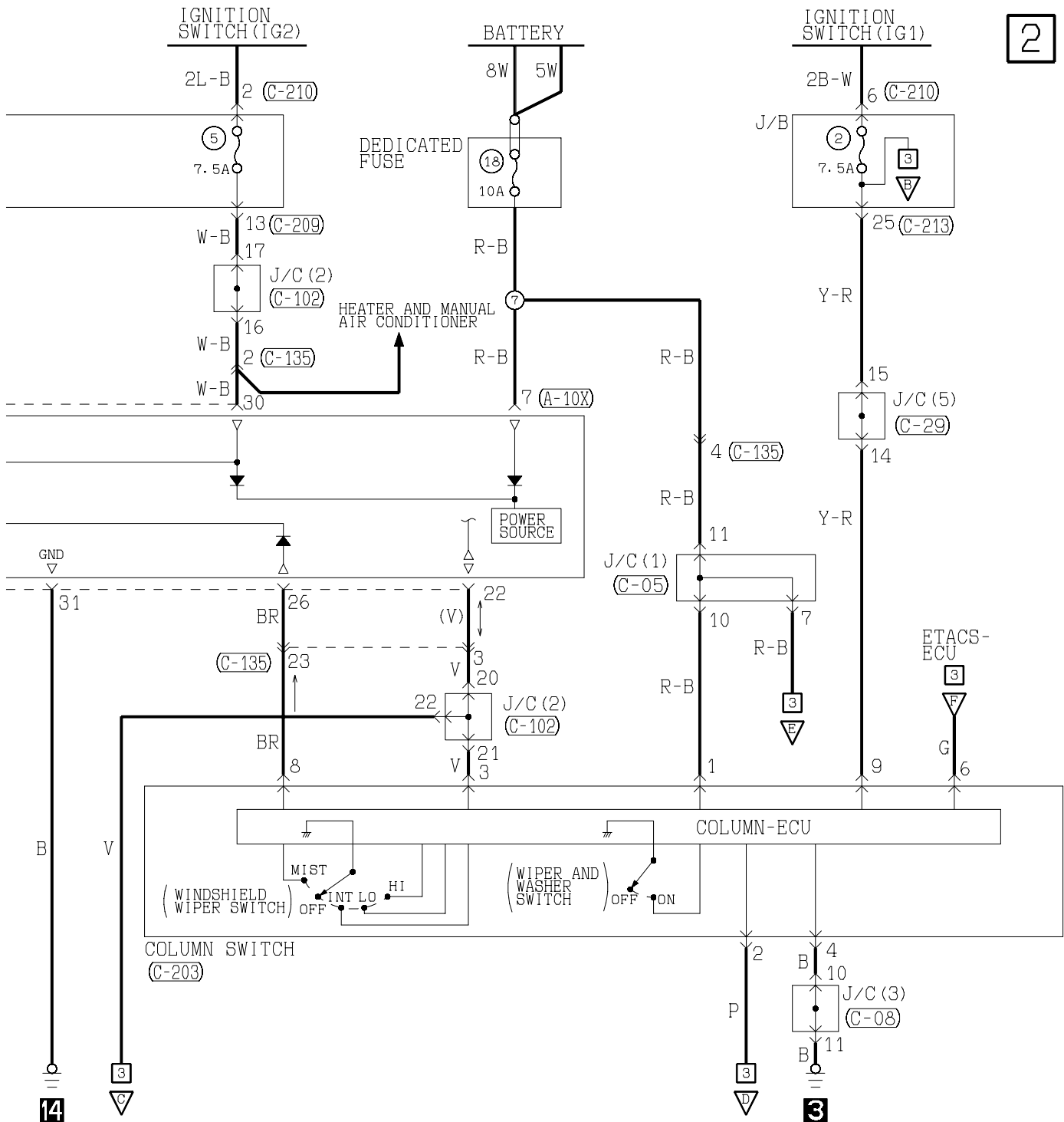
(C-213)



(F-21)



2



(C-08)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-102)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-112) MU801855

1	2	3	4	5
6	7	8	9	10
11	12	13		

(C-129) MU801867

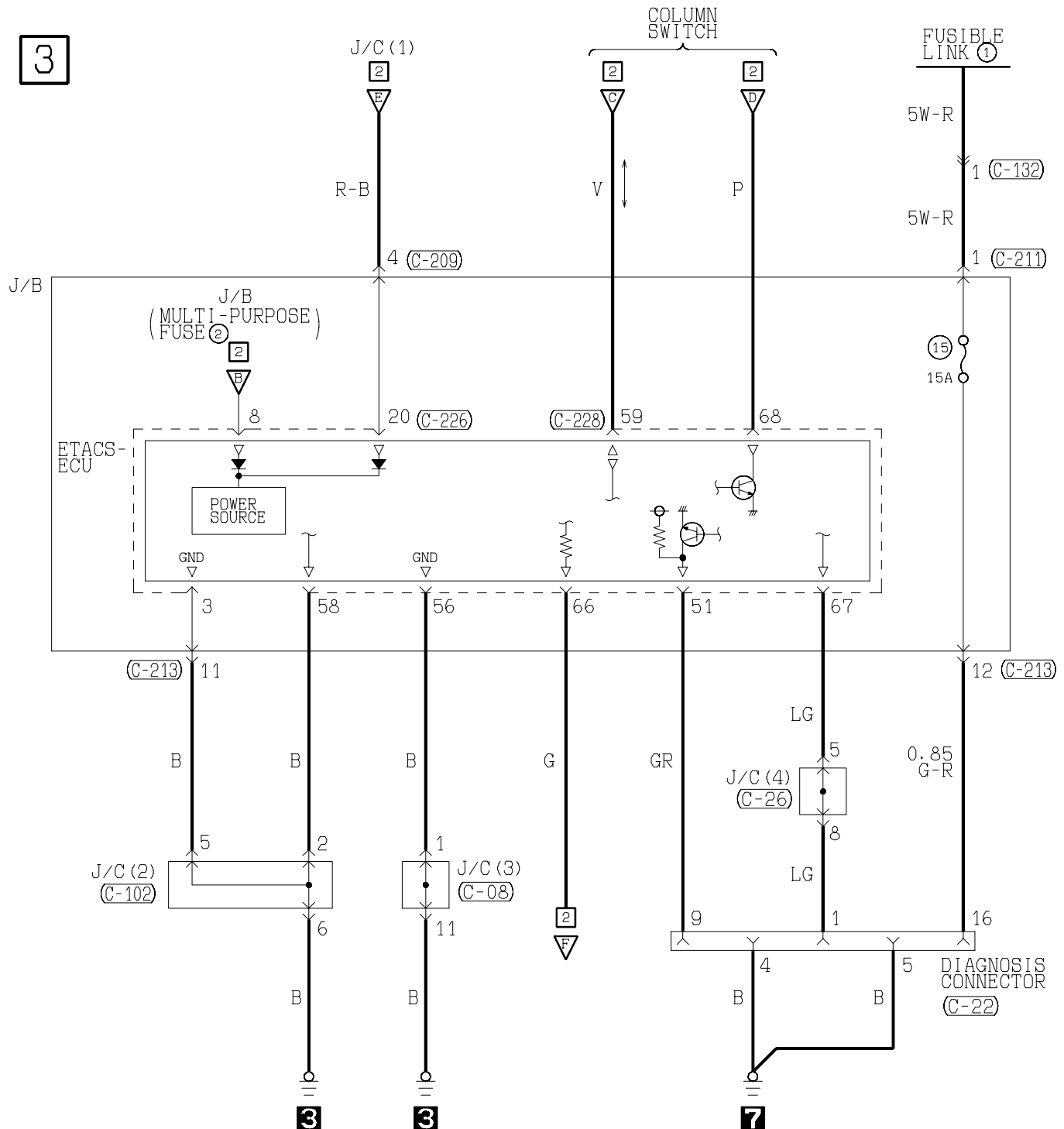
1	2	3	4
5	6	7	8
9	10		

(C-135)

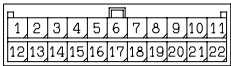
1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

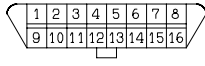
WINDSHIELD WIPER AND WASHER <L.H. drive vehicles> (CONTINUED)



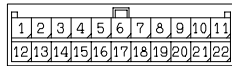
(C-08)



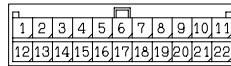
(C-22) FRONT SIDE



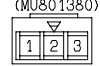
(C-26)



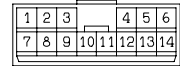
(C-102)



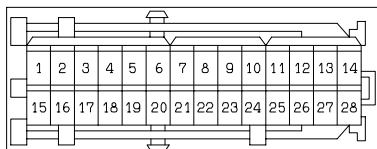
(C-132) (MU8Q1380)



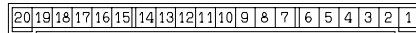
(C-209) MU801857



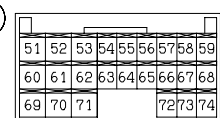
(C-211) (C-213)



(C-226) J/B SIDE

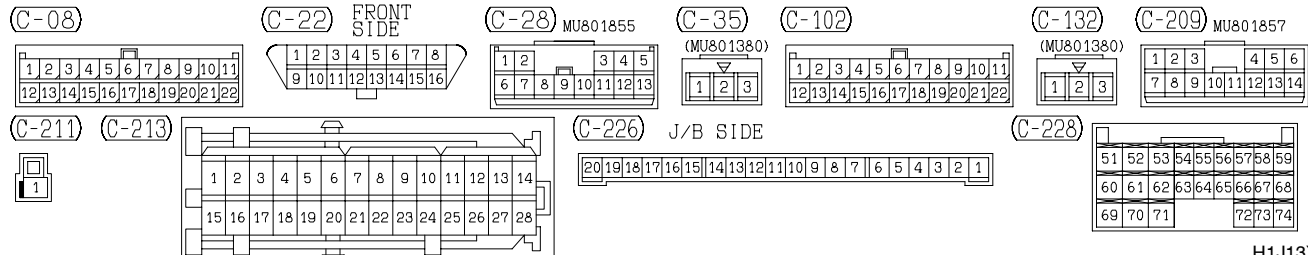
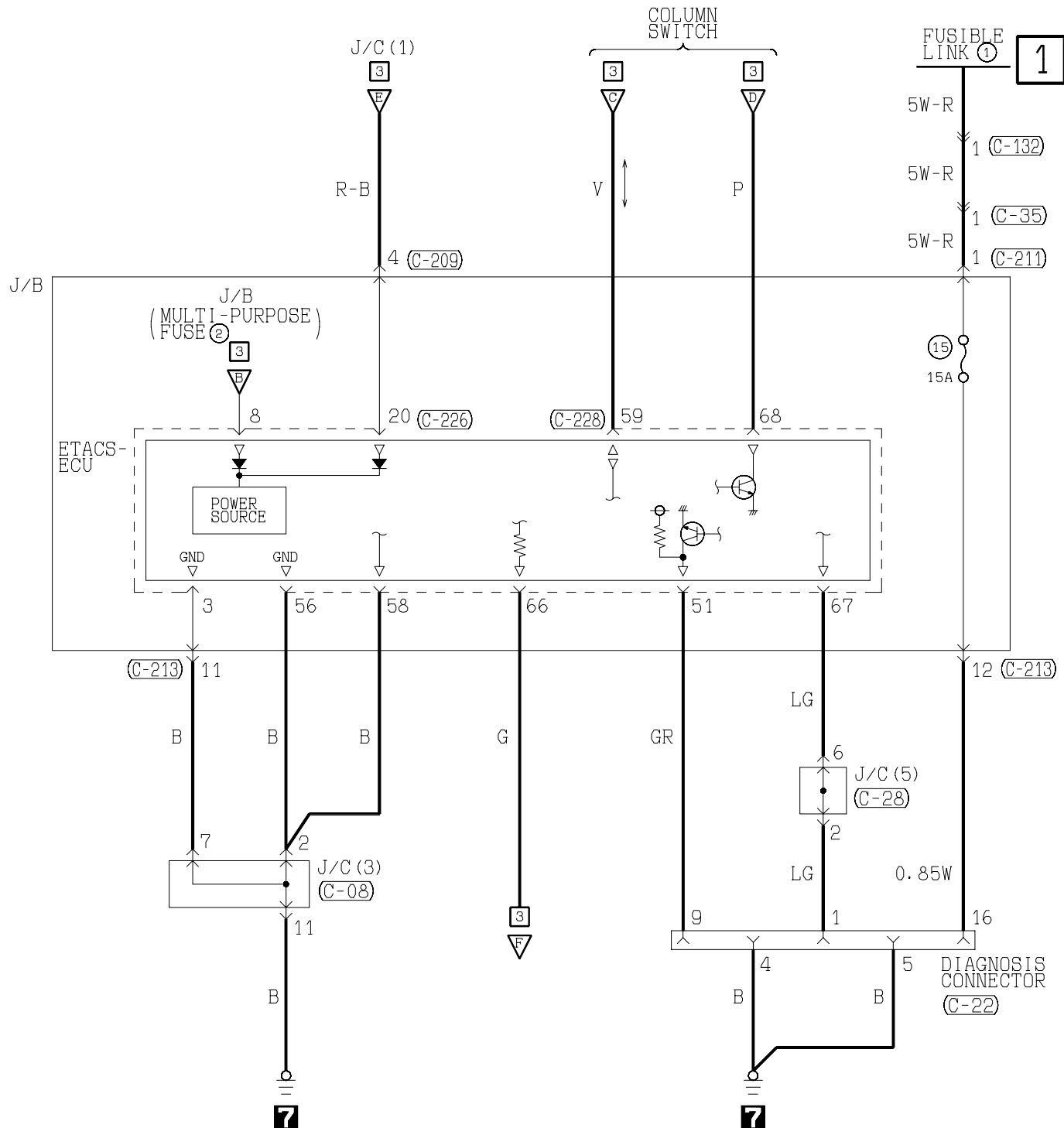


(C-228)



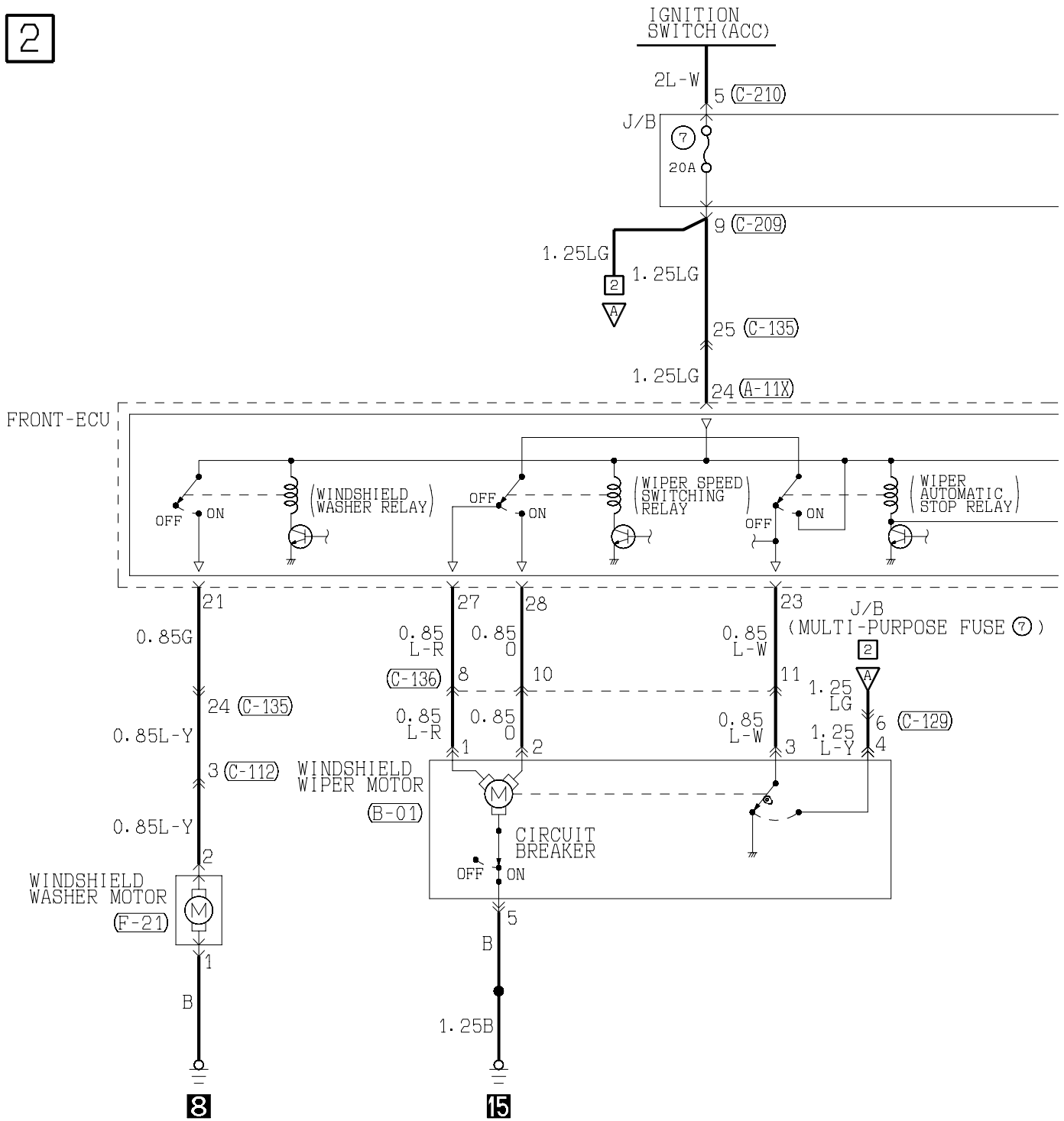
WINDSHIELD WIPER AND WASHER

R.H. drive vehicles

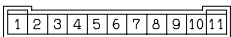


WINDSHIELD WIPER AND WASHER <R.H. drive vehicles> (CONTINUED)

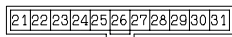
2



(A-10X)



(A-11X)

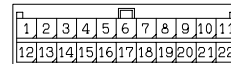


(B-01)

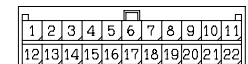
(MU802095)



(C-05)

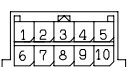


(C-08)



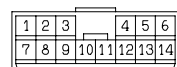
(C-203)

(MU801514)



(C-209)

MU801857

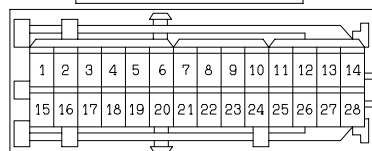


(C-210)

MU801331

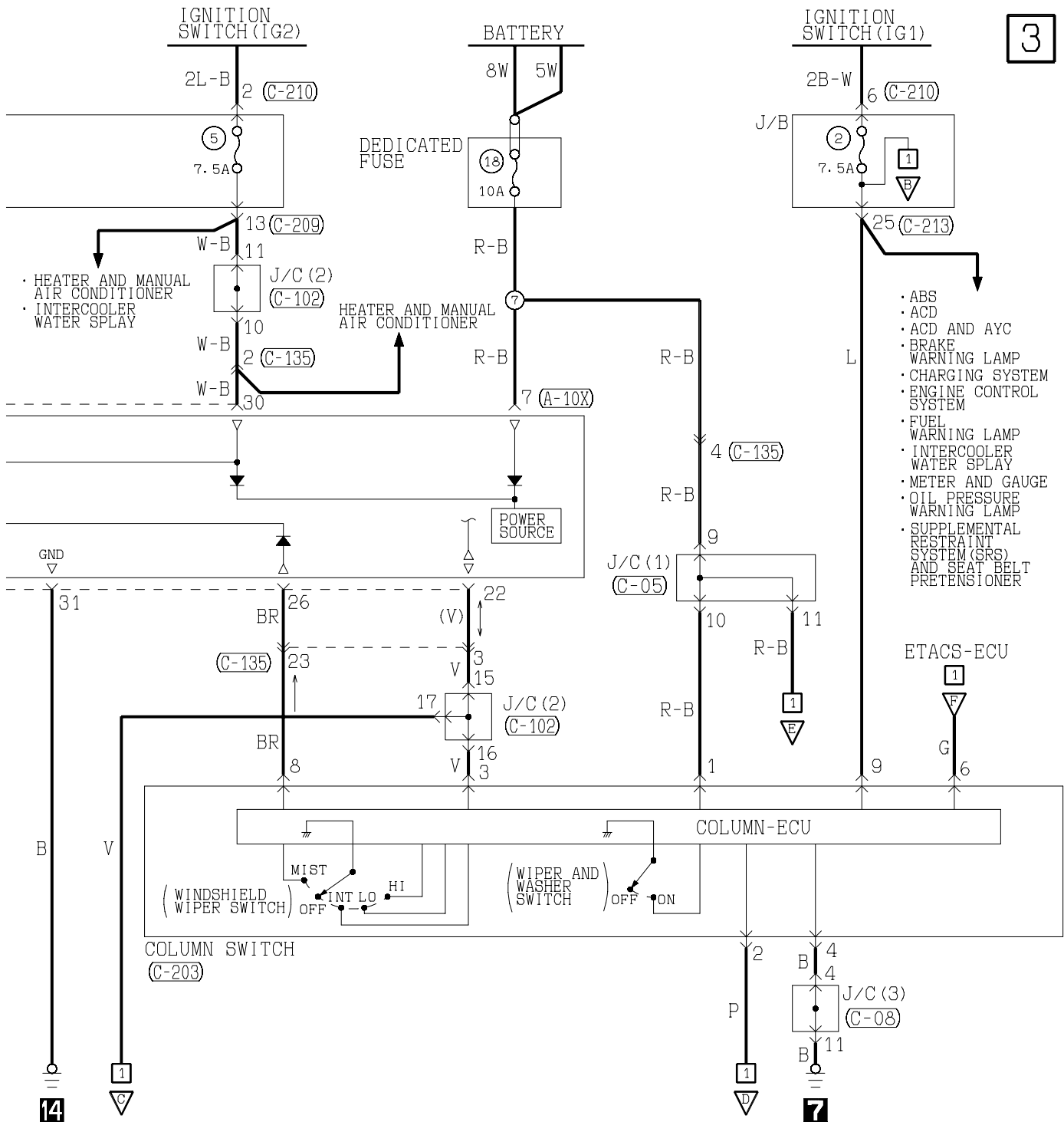


(C-213)



(F-21)





3

(C-102)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-112) MU801855

1	2	3	4	5
6	7	8	9	10
11	12	13		

(C-129) MU801867

1	2	3	4
5	6	7	8
9	10		

(C-135)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

(C-136)

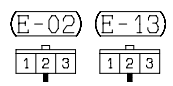
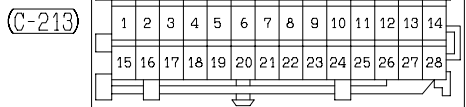
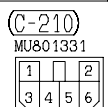
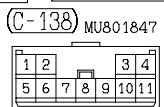
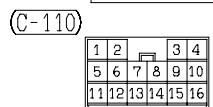
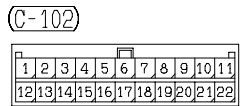
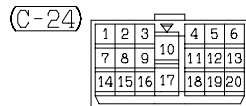
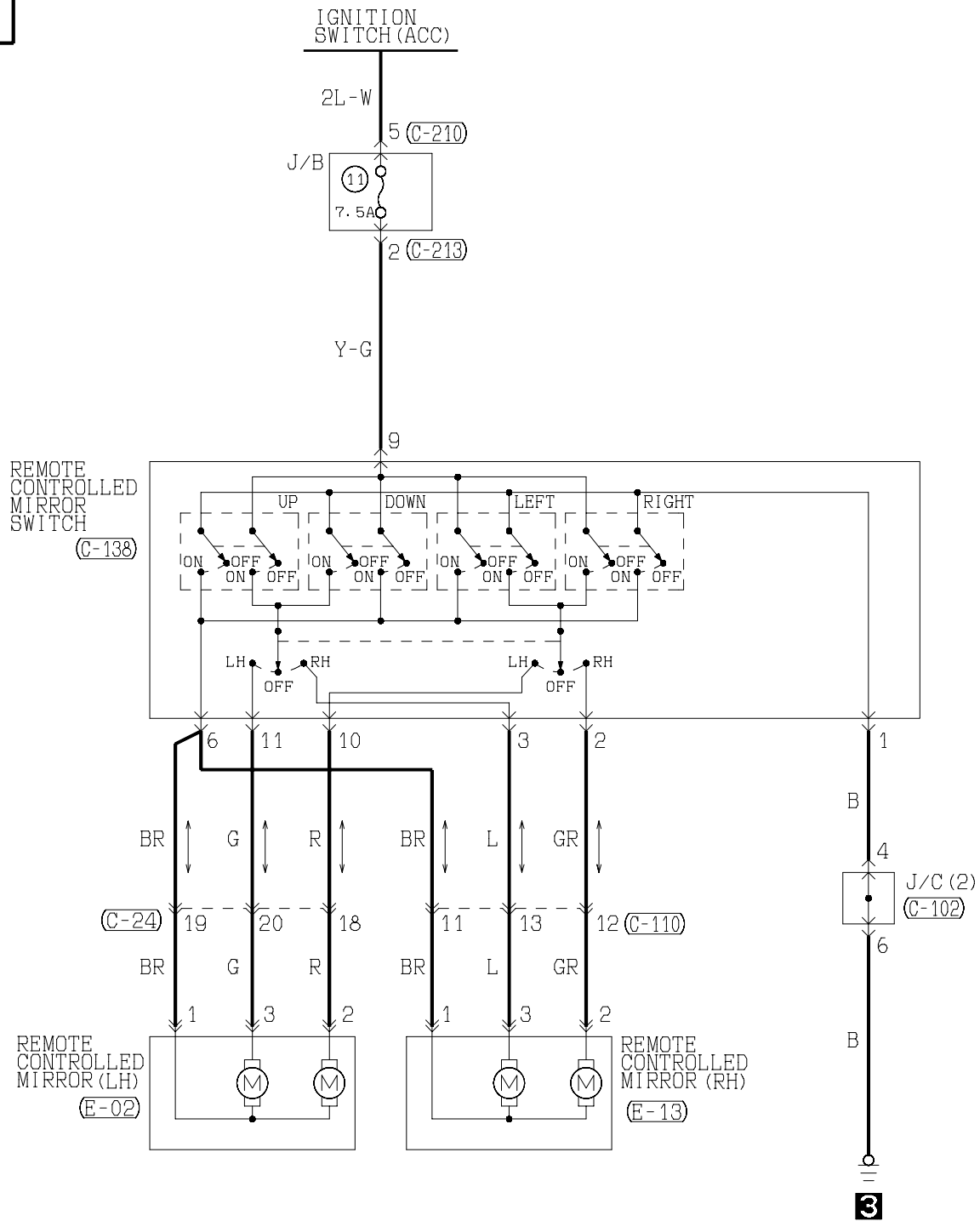
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16					

Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

REMOTE CONTROLLED MIRROR

L.H. drive vehicles

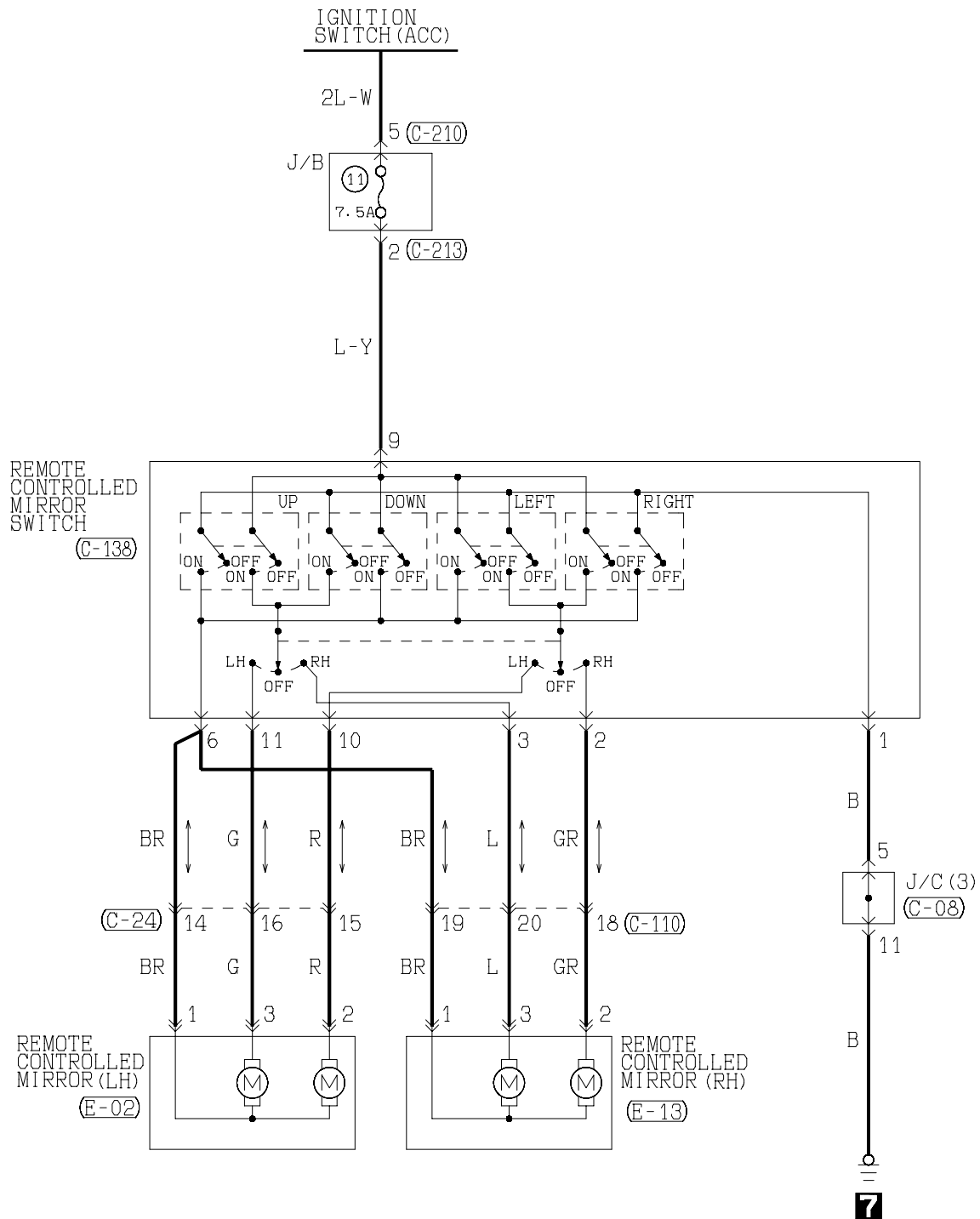
1



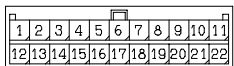
REMOTE CONTROLLED MIRROR

R.H. drive vehicles

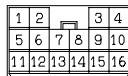
1



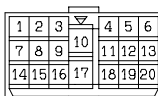
(C-08)



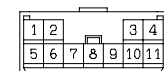
(C-24)



(C-110)



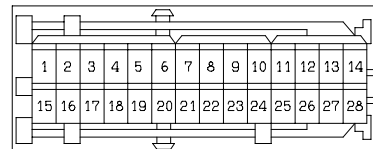
(C-138) MU801847



(C-210) MU801331



(C-213)



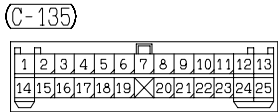
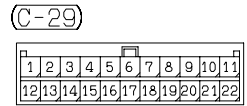
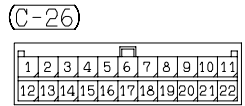
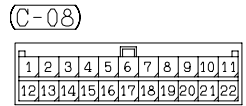
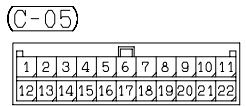
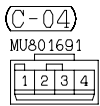
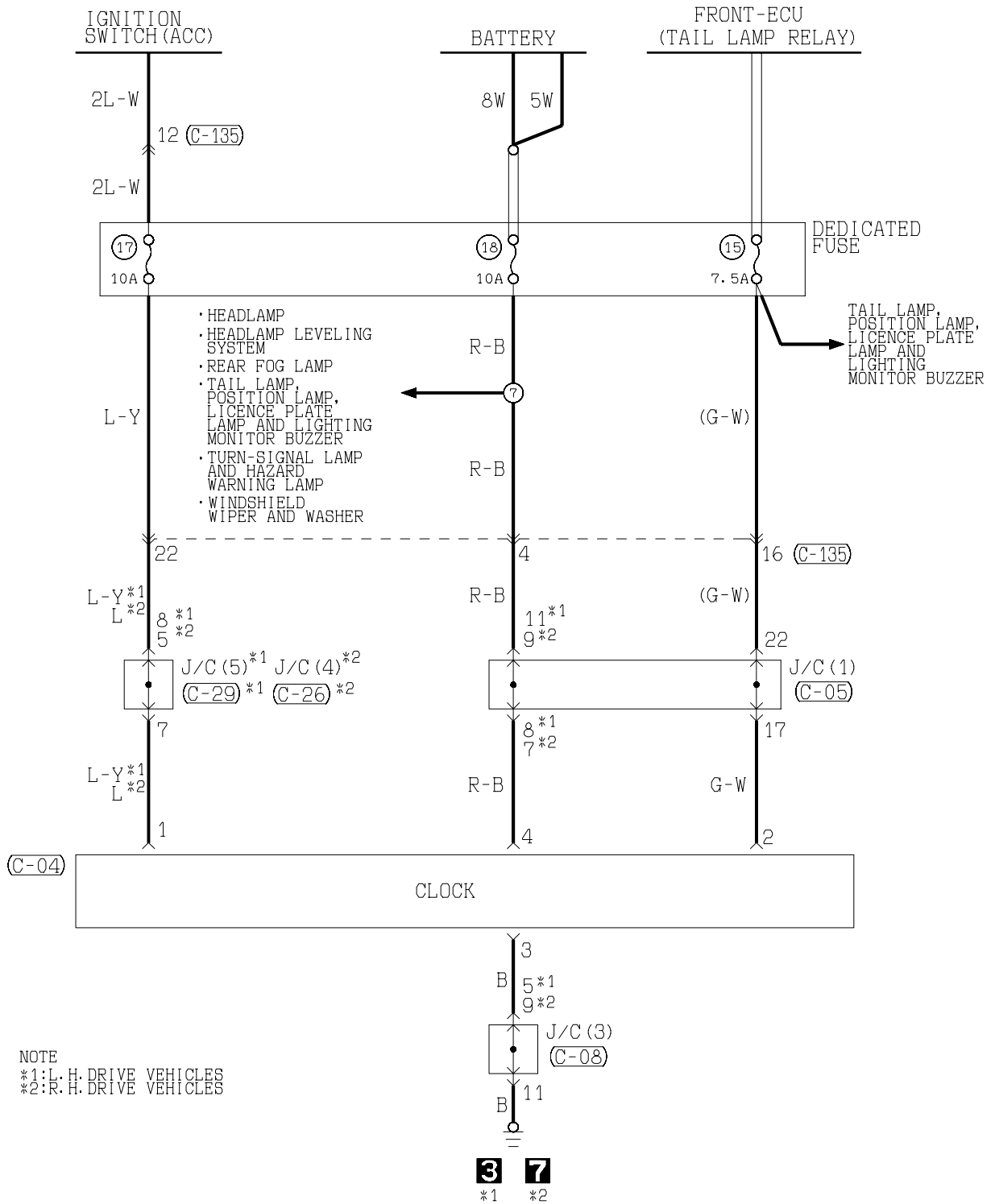
(E-02)

(E-13)



CLOCK

1



Wire colour code

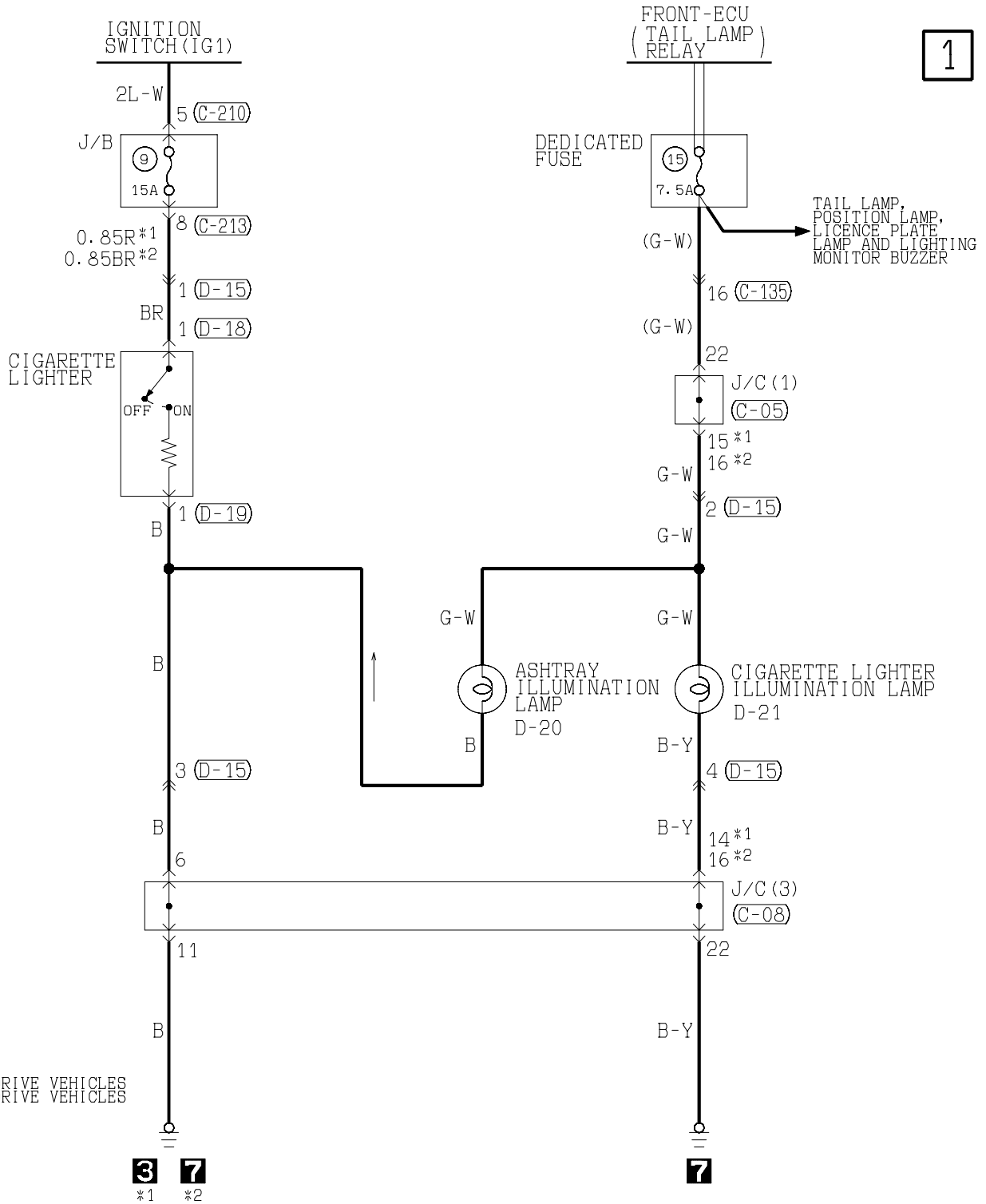
B :Black LG:Light green G :Green L :Blue

BR:Brown O :Orange GR:Gray R :Red

W :White SB:Sky blue P :Pink Y :Yellow

V :Violet

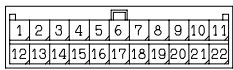
CIGARETTE LIGHTER AND ASHTRAY ILLUMINATION LAMP



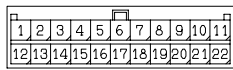
NOTE

- *1: L. H. DRIVE VEHICLES
- *2: R. H. DRIVE VEHICLES

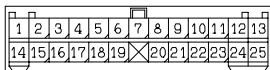
(C-05)



(C-08)



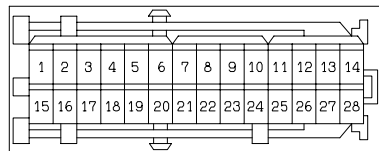
(C-135)



(C-210)



(C-213)



(D-15)

MU801687



(D-18)



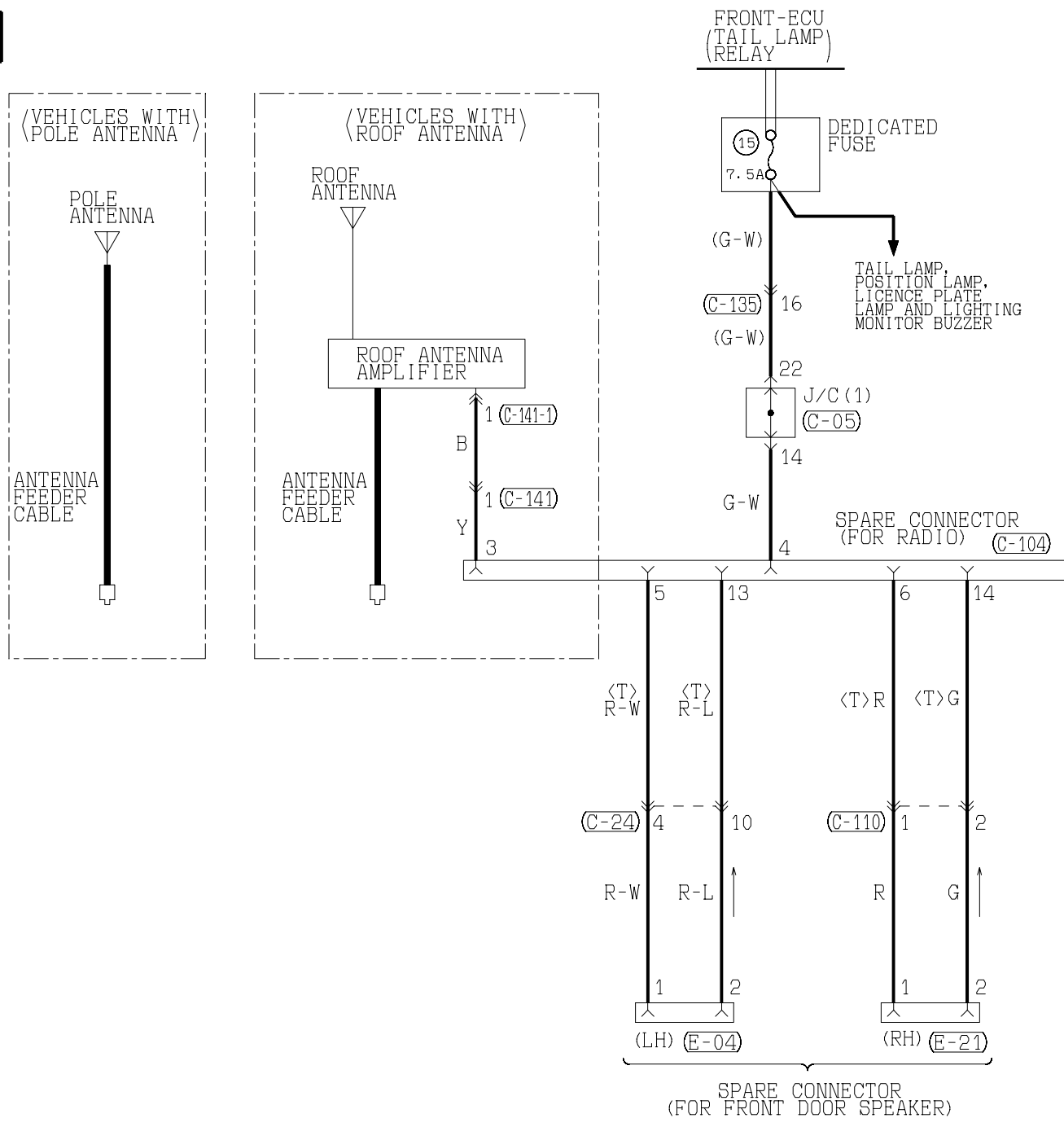
(D-19)

(MU801211)

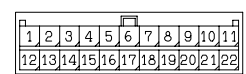


AUDIO SYSTEM

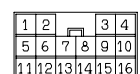
1



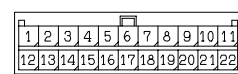
(C-05)



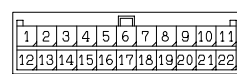
(C-24)



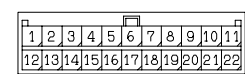
(C-26)



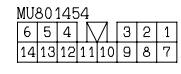
(C-29)



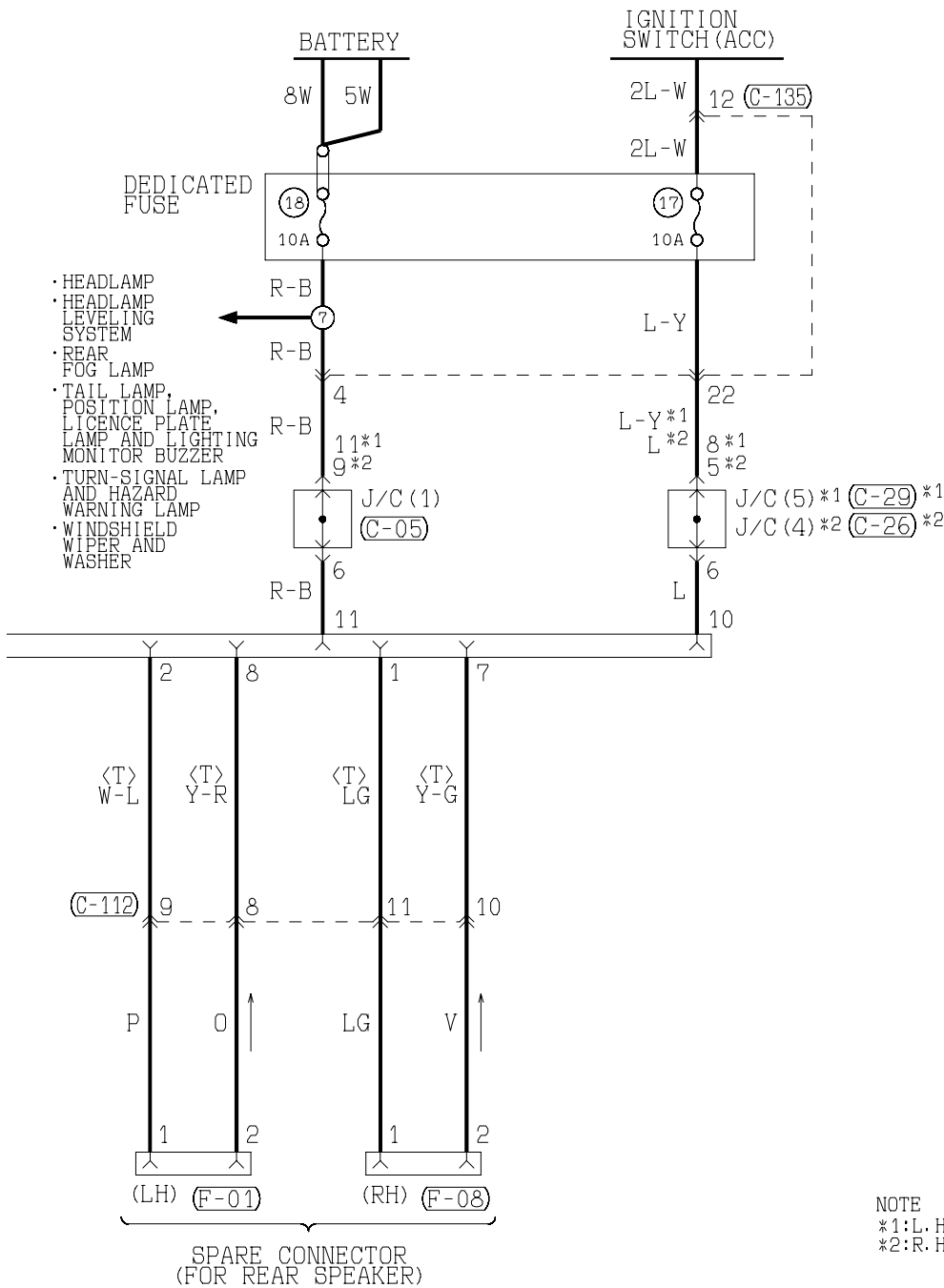
(C-102)



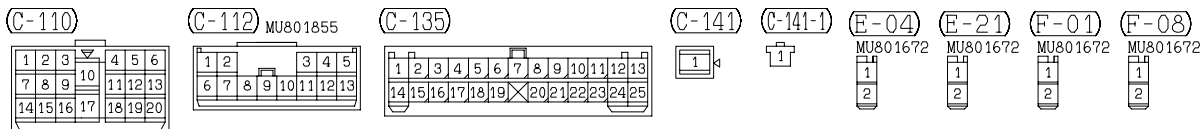
(C-104)



2



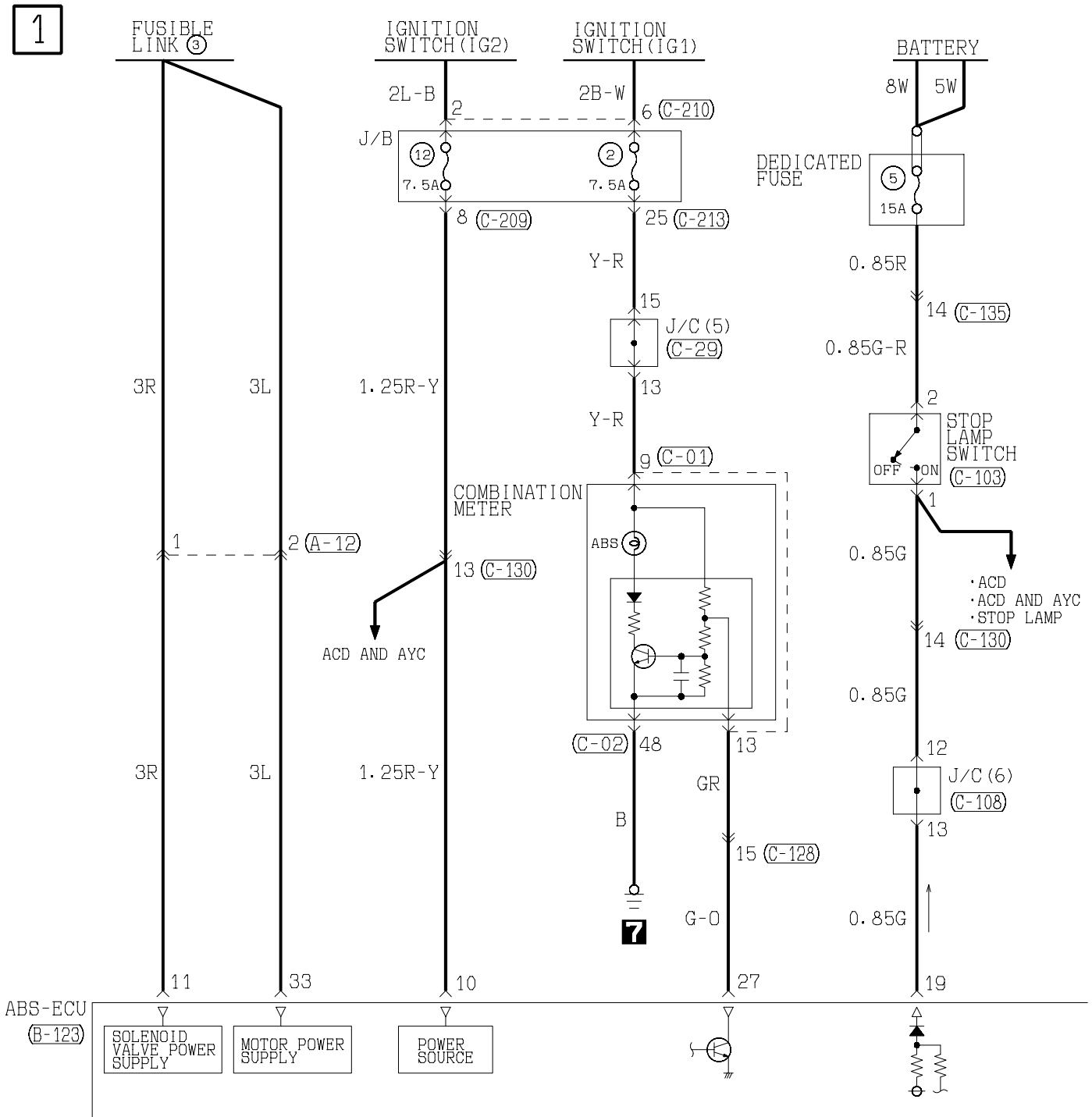
NOTE
 *1:L. H. DRIVE VEHICLES
 *2:R. H. DRIVE VEHICLES



Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

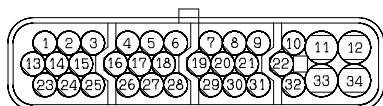
ABS

L.H. drive vehicles

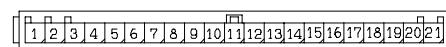


(A-12)

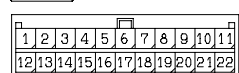
(B-123)



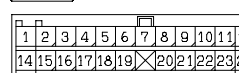
(C-01)



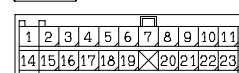
(C-128)



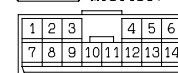
(C-130)



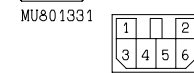
(C-135)



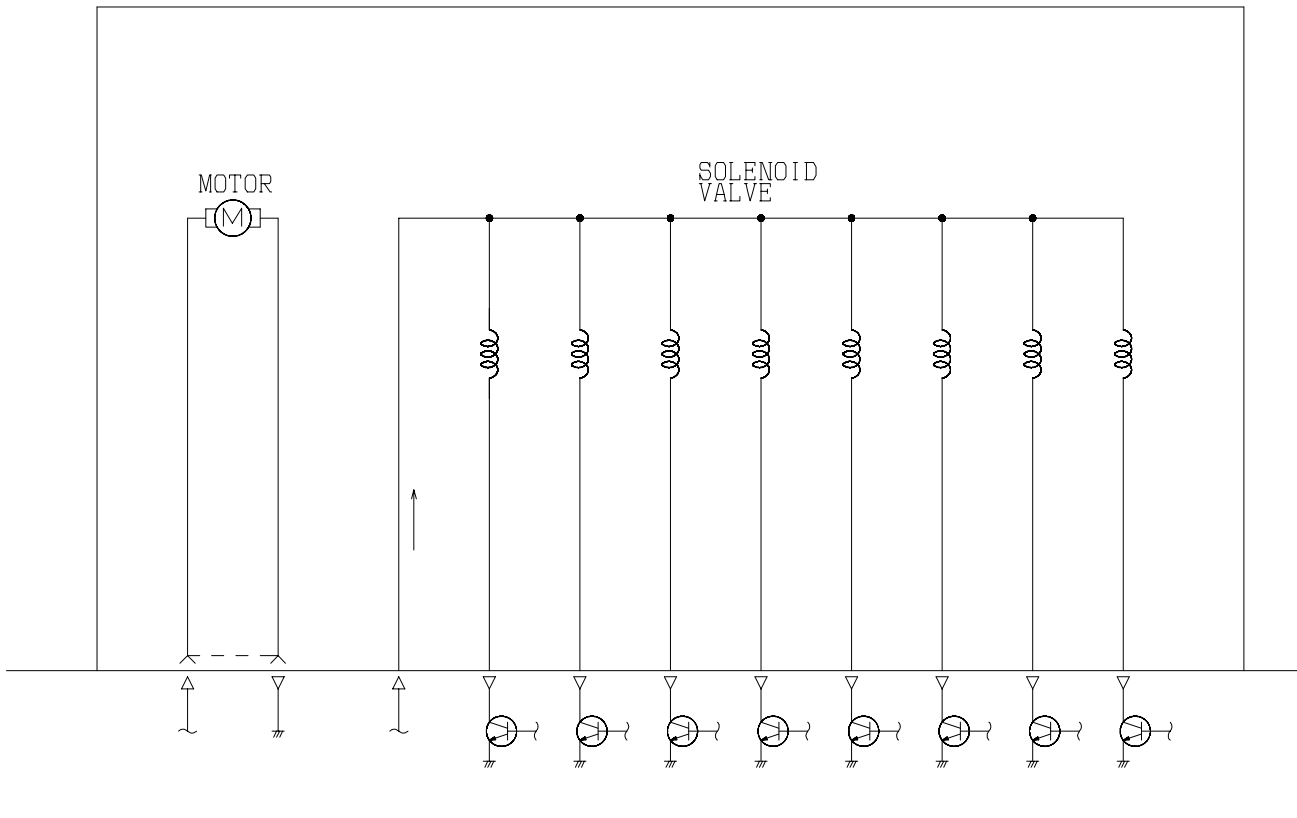
(C-209) MU801857



(C-210) MU801331



HYDRAULIC UNIT



(C-02) [31|32|33|34|35|36|37|38|39|40|41|42|43|44|45|46|47|48|49|50|51]

(C-29) [1|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21|22]

(C-103) (MU801490) [1|2|3|4]

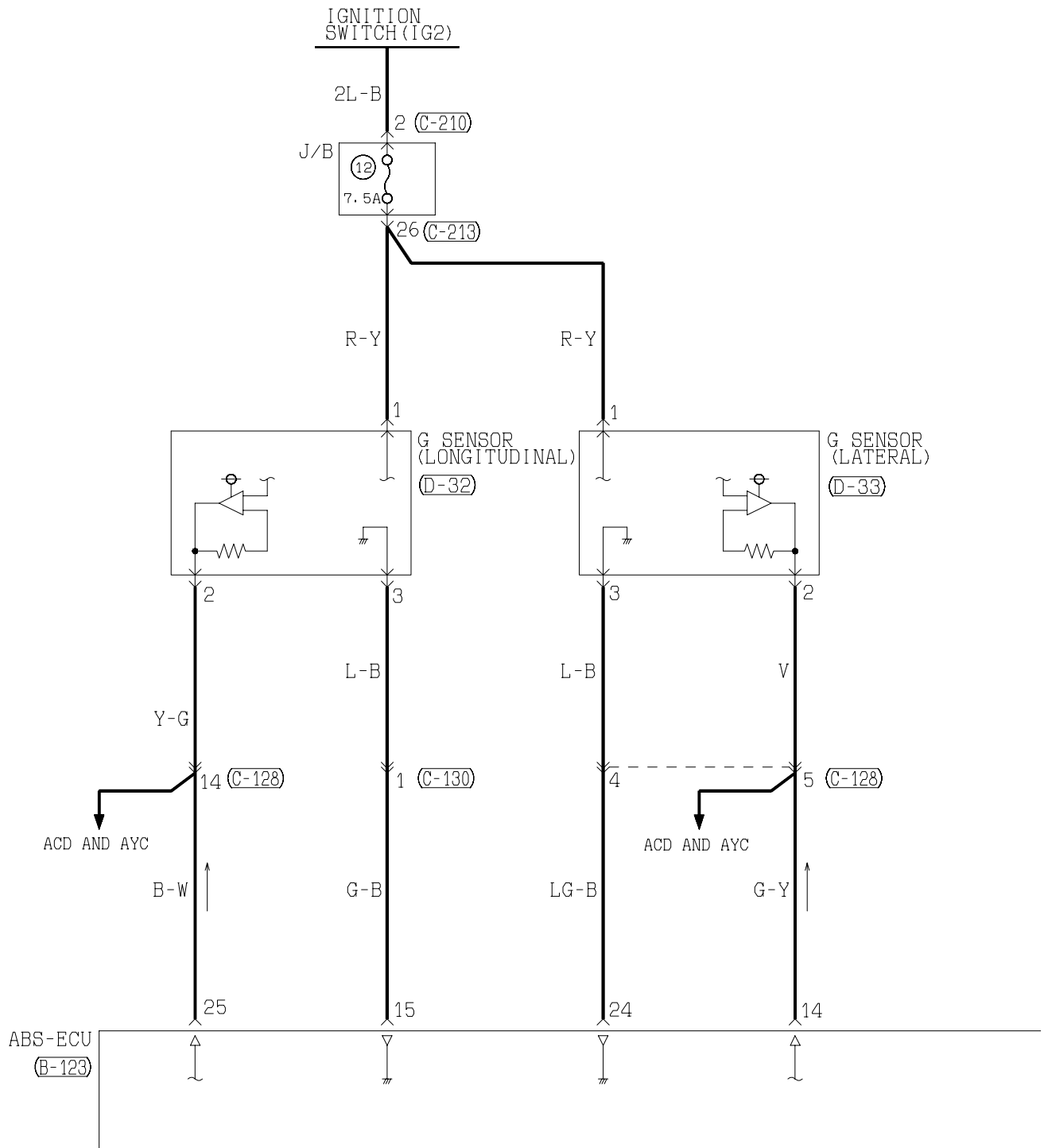
(C-108) [1|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21|22|23|24|25|26|27|28|29|30|31|32|33]

(C-213) [1|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21|22|23|24|25|26|27|28]

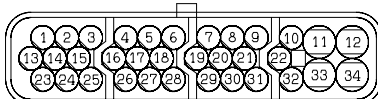
Wire colour code
 B : Black LG : Light green G : Green L : Blue
 BR : Brown O : Orange GR : Gray R : Red
 W : White SB : Sky blue P : Pink Y : Yellow
 V : Violet

ABS <L.H. drive vehicles> (CONTINUED)

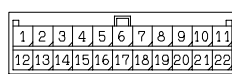
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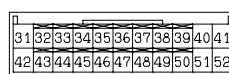
(B-123)



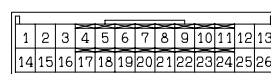
(C-26)

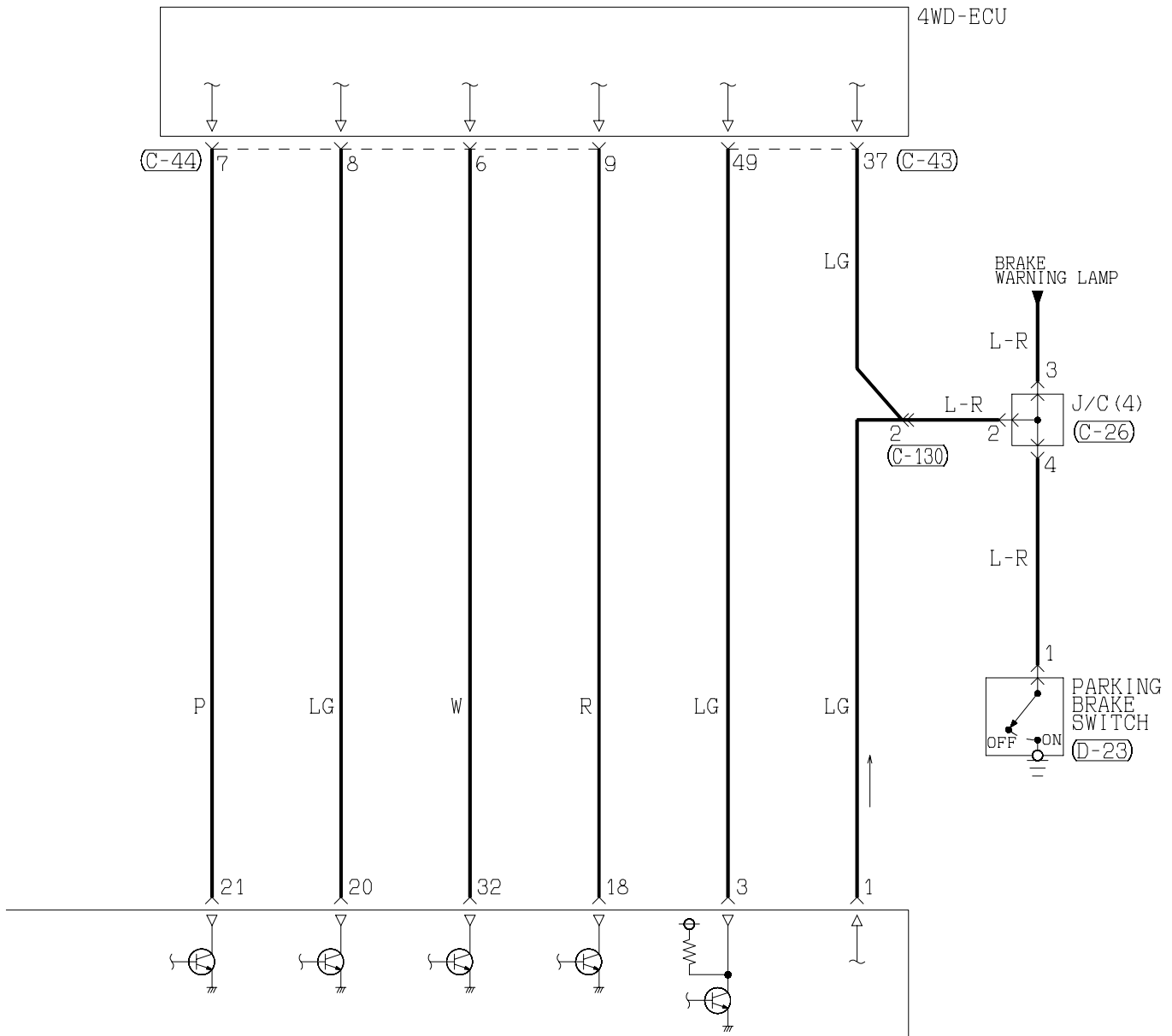


(C-43) (MU801823)

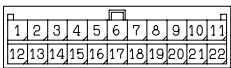


(C-44) (MU801824)

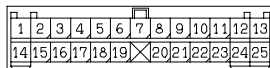




(C-128)



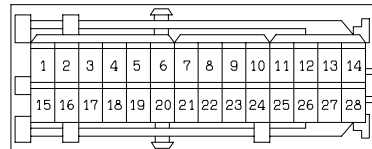
(C-130)



(C-210)



(C-213)



(D-23)



(D-32)

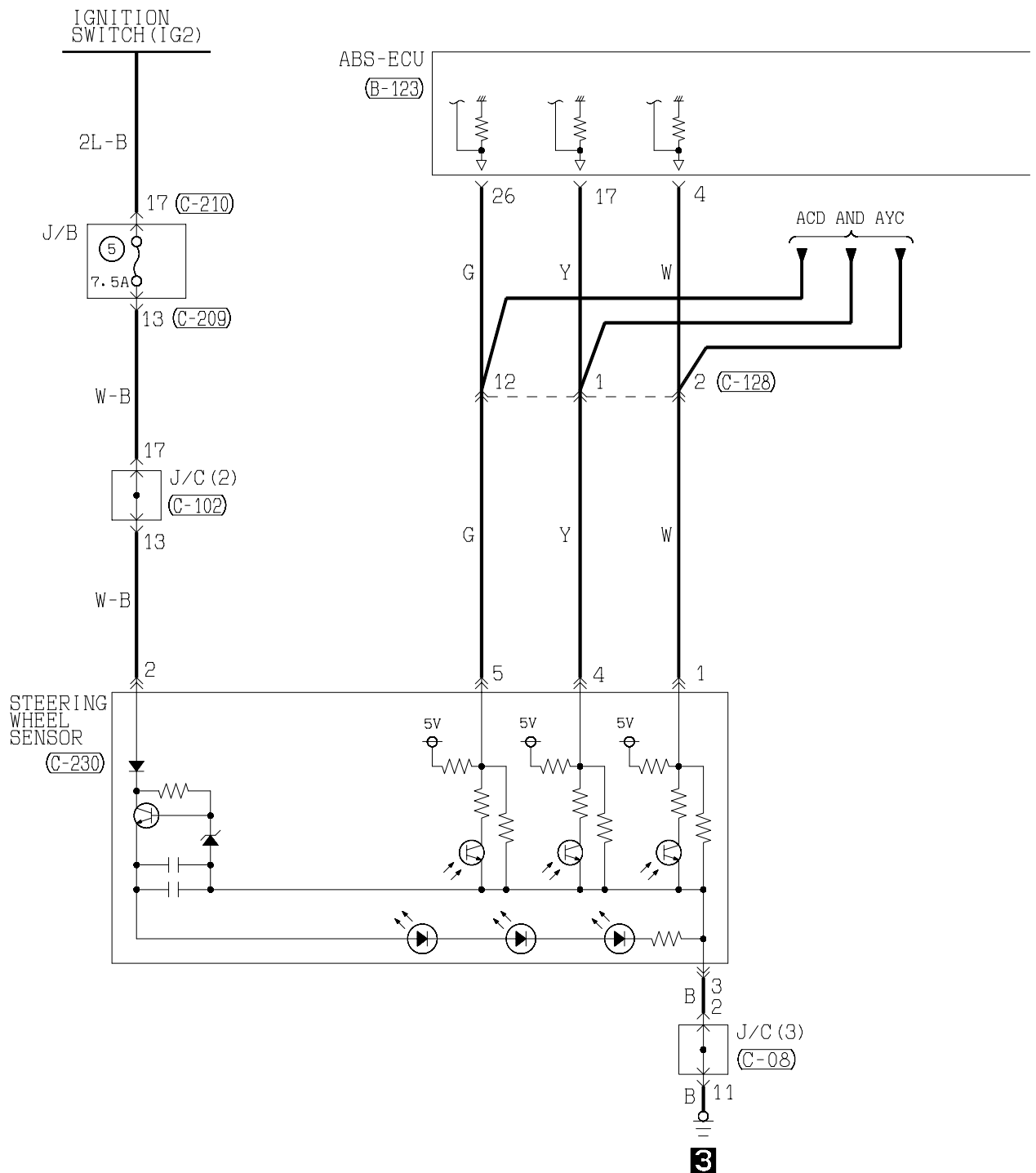


(D-33)

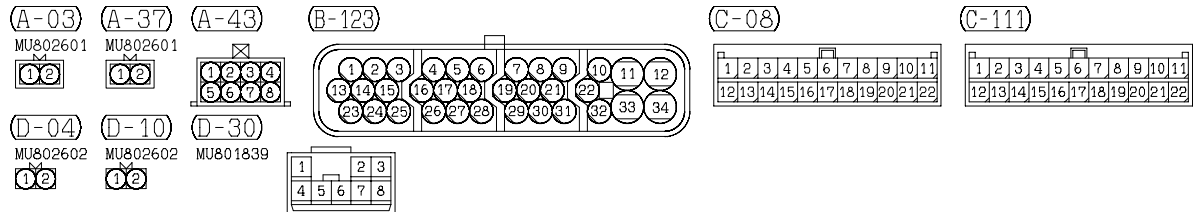


ABS <L.H. drive vehicles> (CONTINUED)

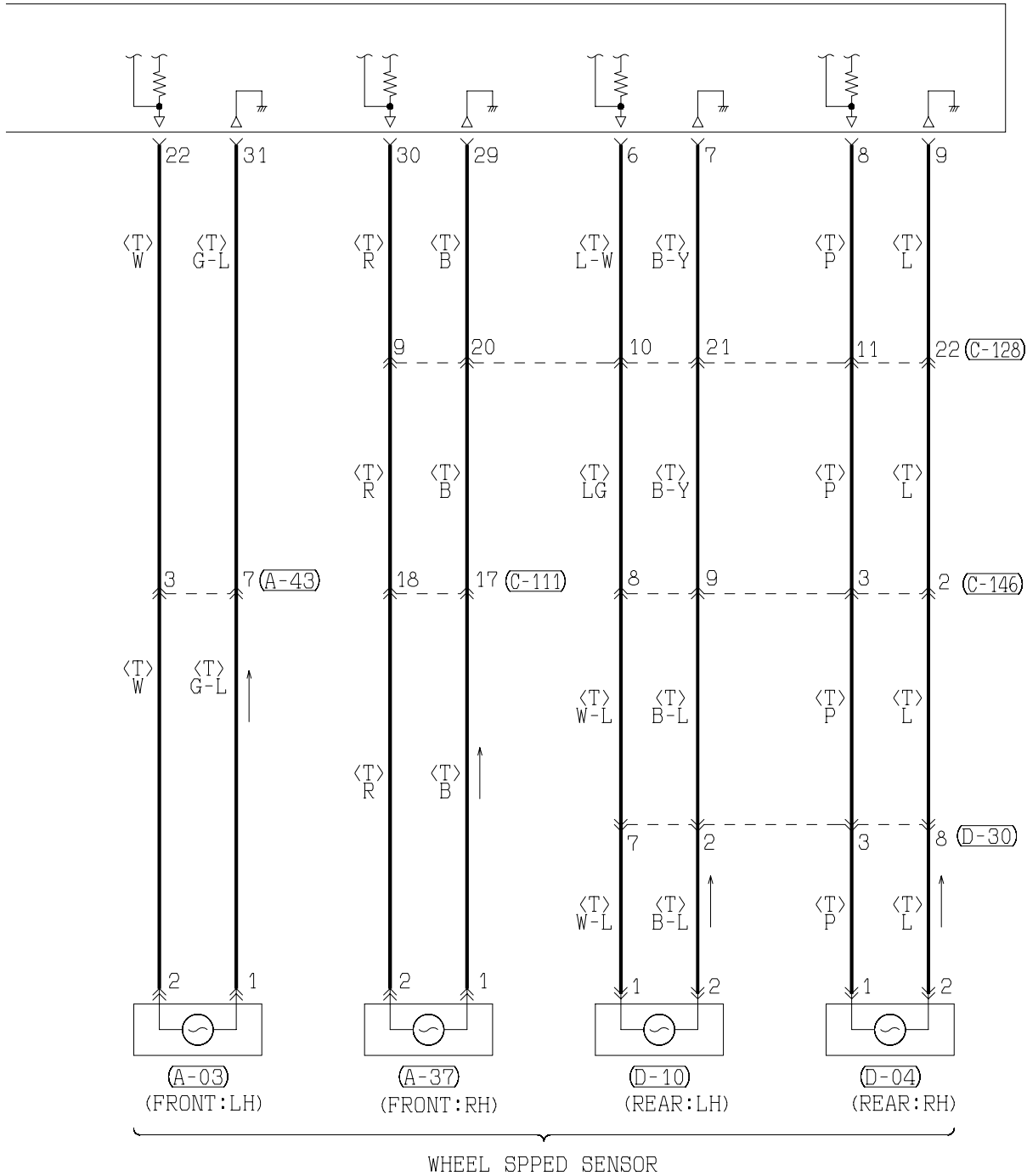
5



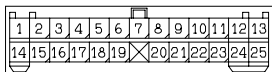
3



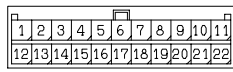
6



(C-111)

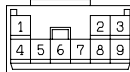


(C-128)

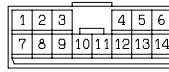


(C-146)

MU801841



(C-209) MU801857



(C-210) MU801331



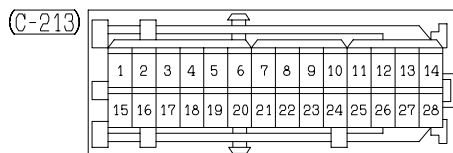
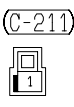
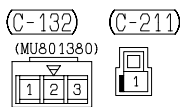
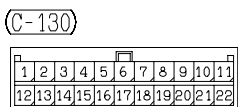
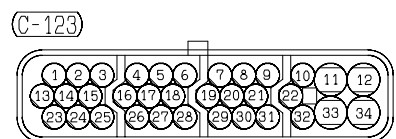
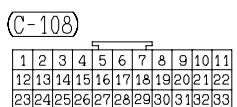
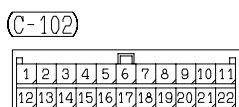
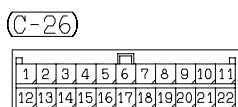
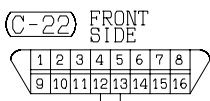
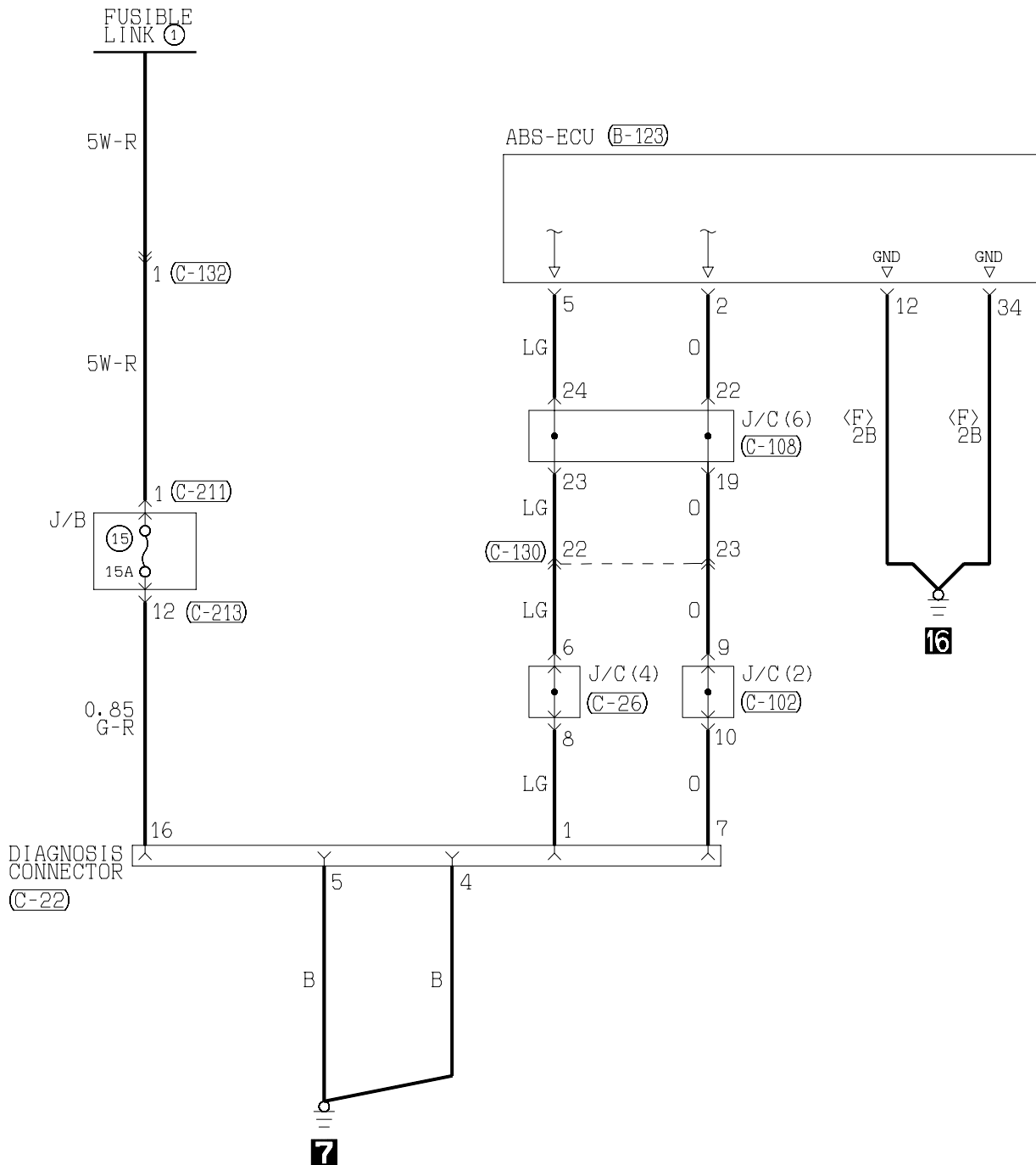
(C-230)



Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

ABS <L.H. drive vehicles> (CONTINUED)

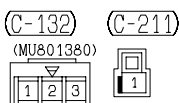
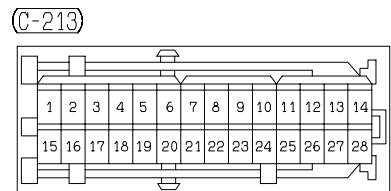
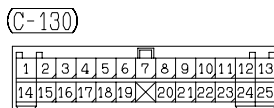
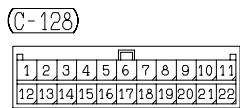
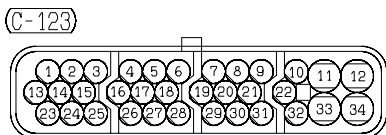
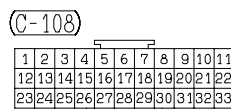
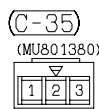
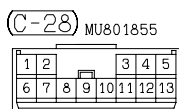
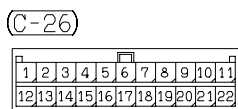
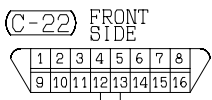
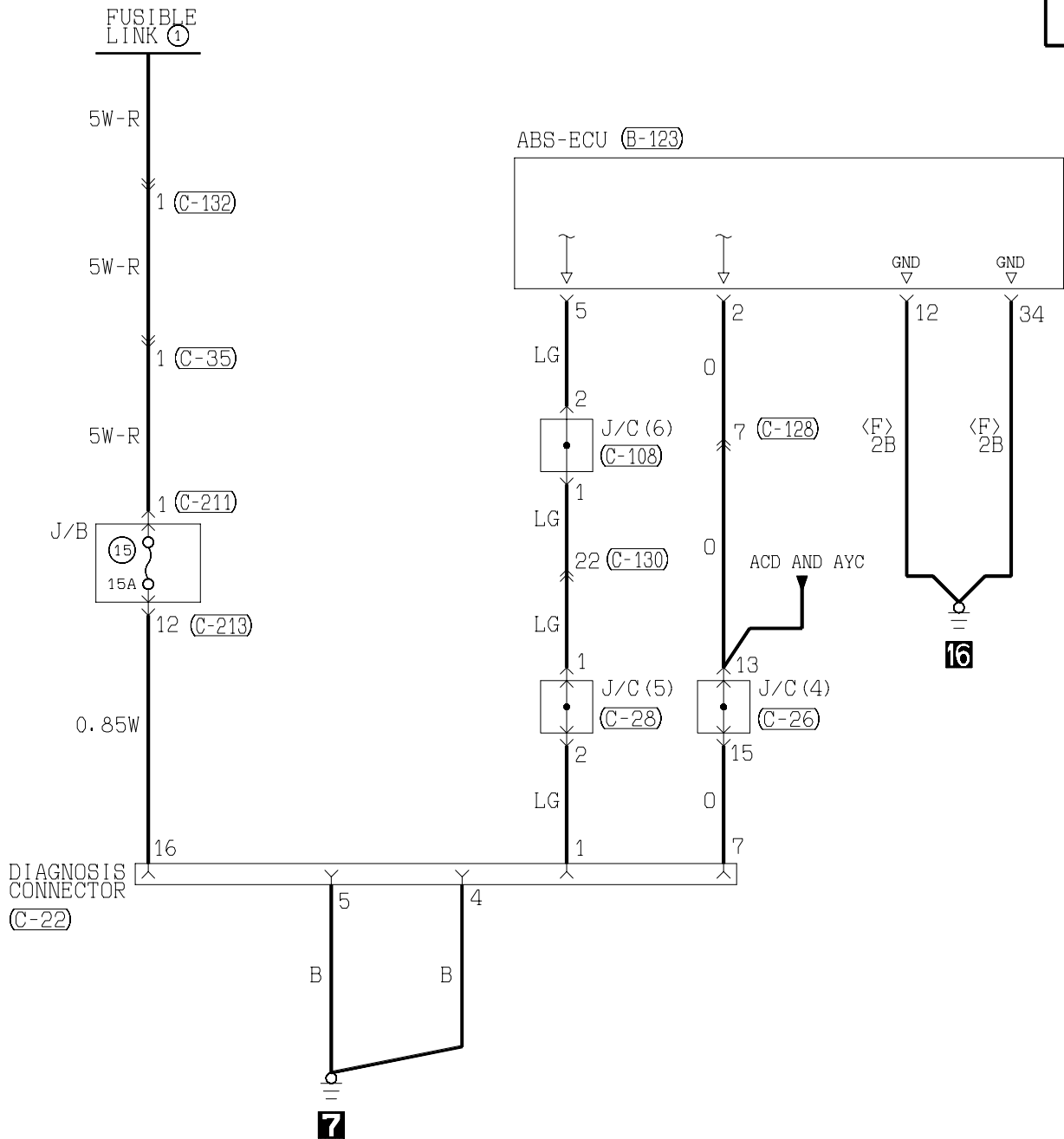
7



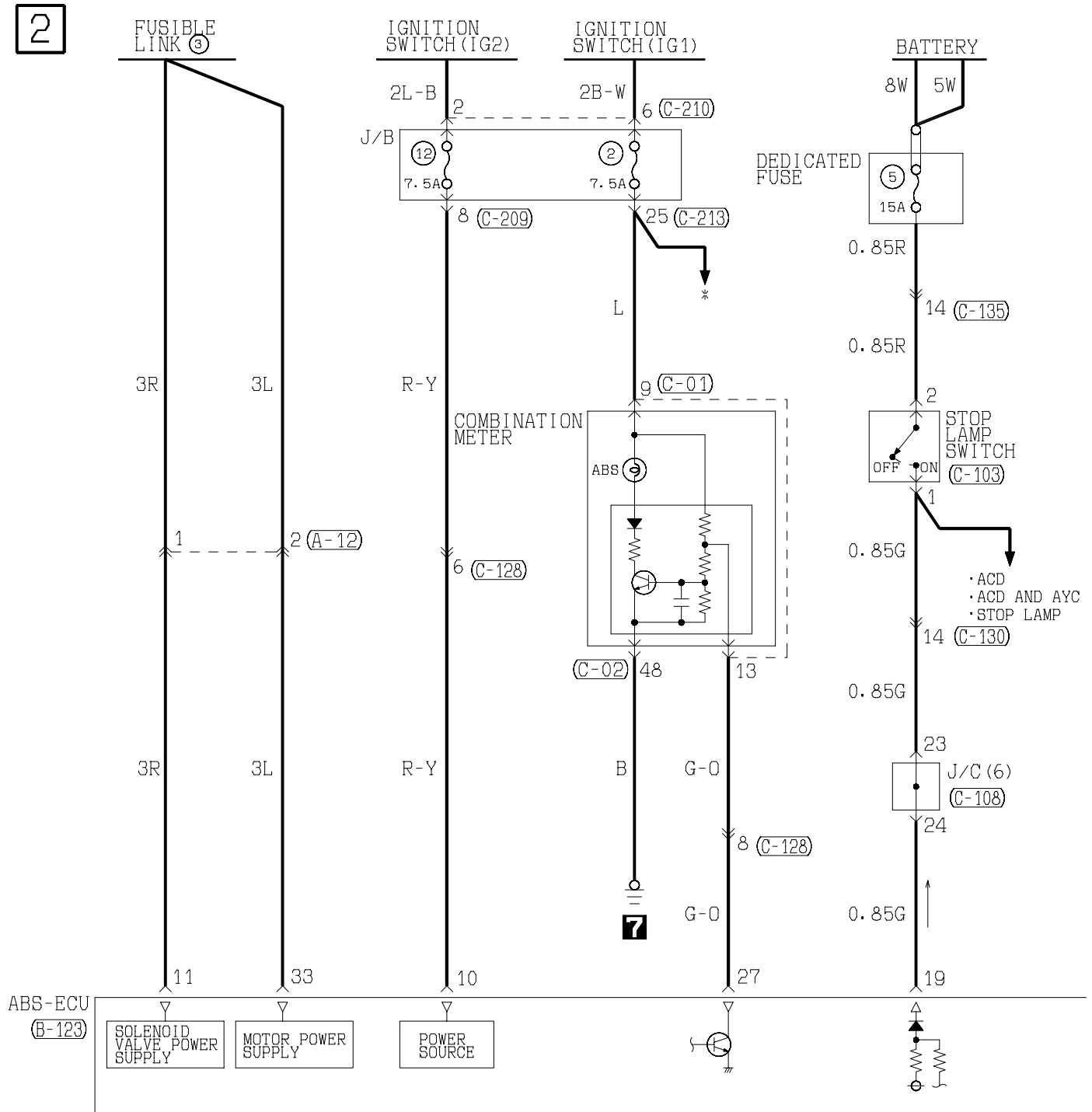
ABS

R.H. drive vehicles

1

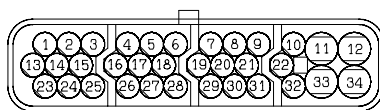


ABS <R.H. drive vehicles> (CONTINUED)

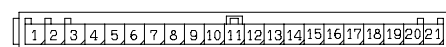


(A-12)

(B-123)



(C-01)

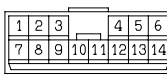
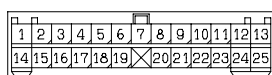
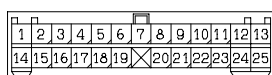


(C-130)

(C-135)

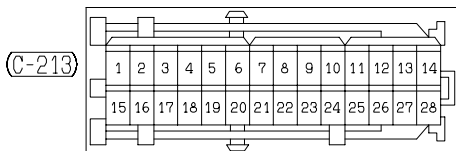
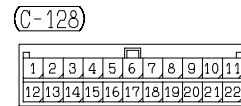
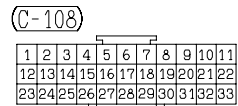
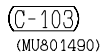
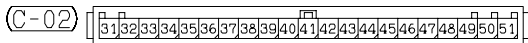
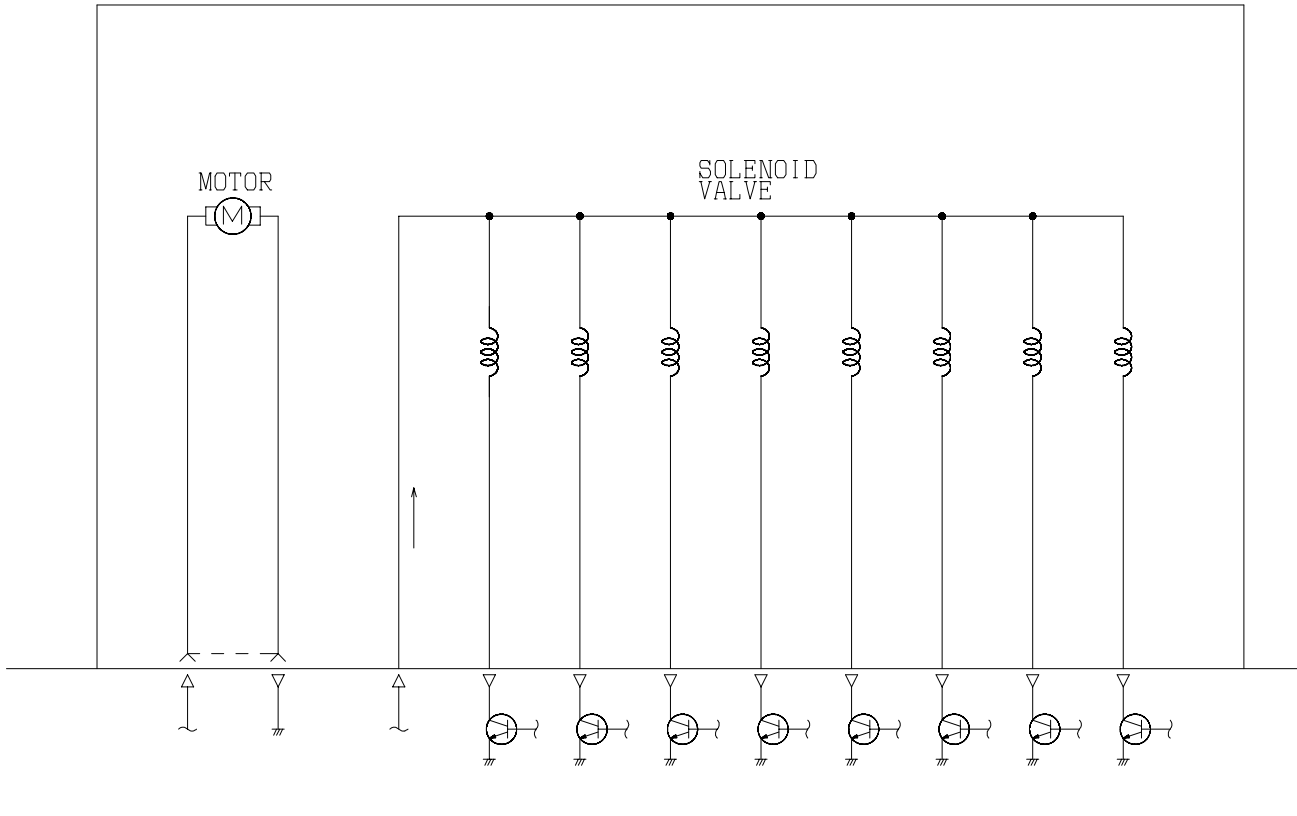
(C-209) MU801857

(C-210) MU801331



- NOTE
- *: BRAKE WARNING LAMP
 - ENGINE CONTROL SYSTEM
 - FUEL WARNING LAMP
 - HEADLAMP
 - METER AND GAUGE
 - OIL PRESSURE WARNING LAMP
 - REAR FOG LAMP
 - TAIL LAMP, POSITION LAMP, LICENCE PLATE LAMP AND LIGHTING MONITOR BUZZER
 - WINDSHIELD WIPER AND WASHER

HYDRAULIC UNIT

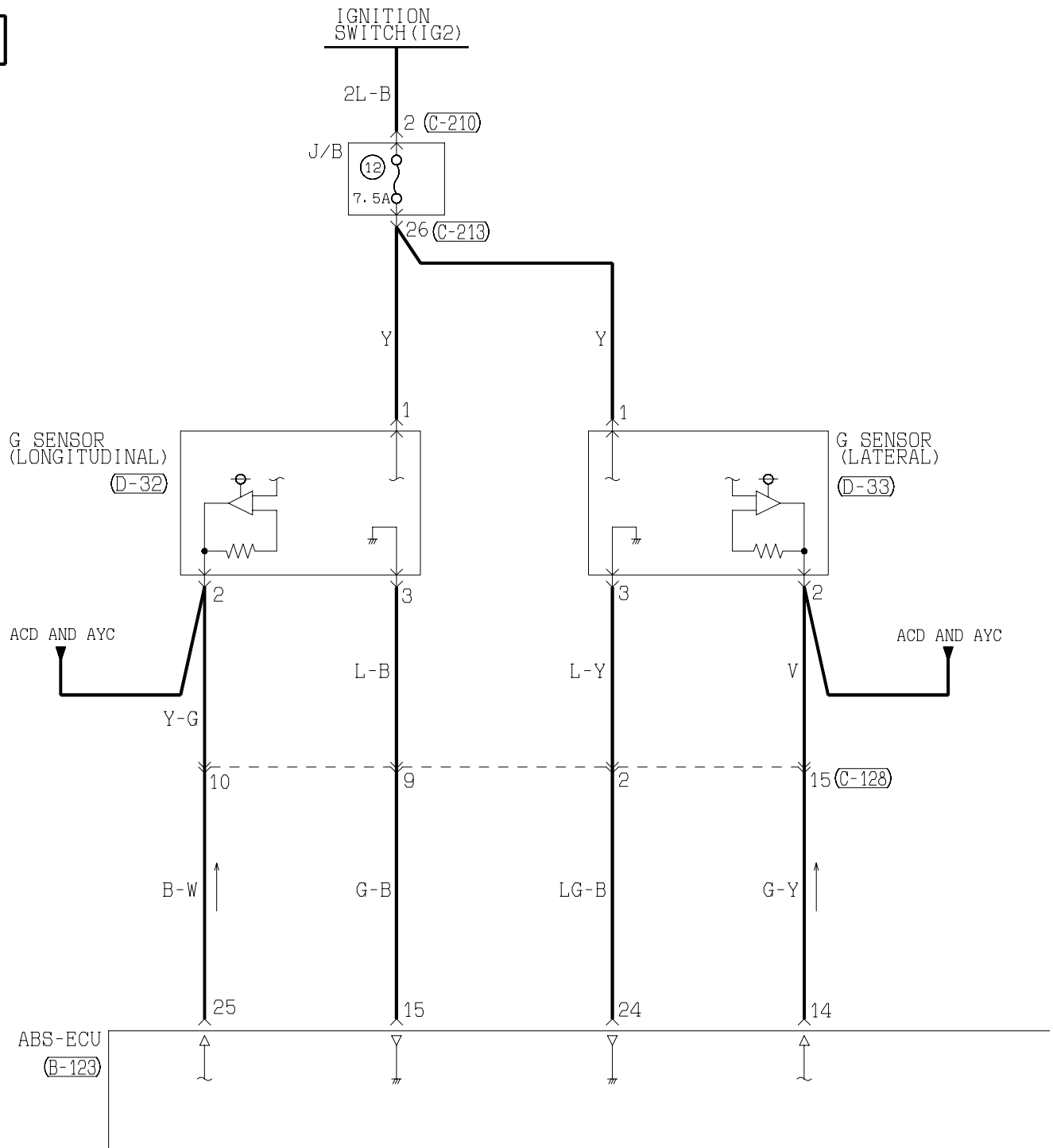


Wire colour code

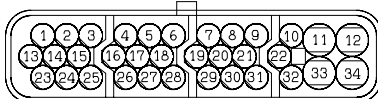
B : Black	LG : Light green	G : Green	L : Blue
BR : Brown	O : Orange	GR : Gray	R : Red
W : White	SB : Sky blue	P : Pink	Y : Yellow
V : Violet			

ABS <R.H. drive vehicles> (CONTINUED)

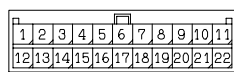
4



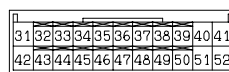
(B-123)



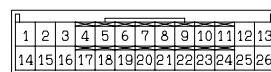
(C-26)



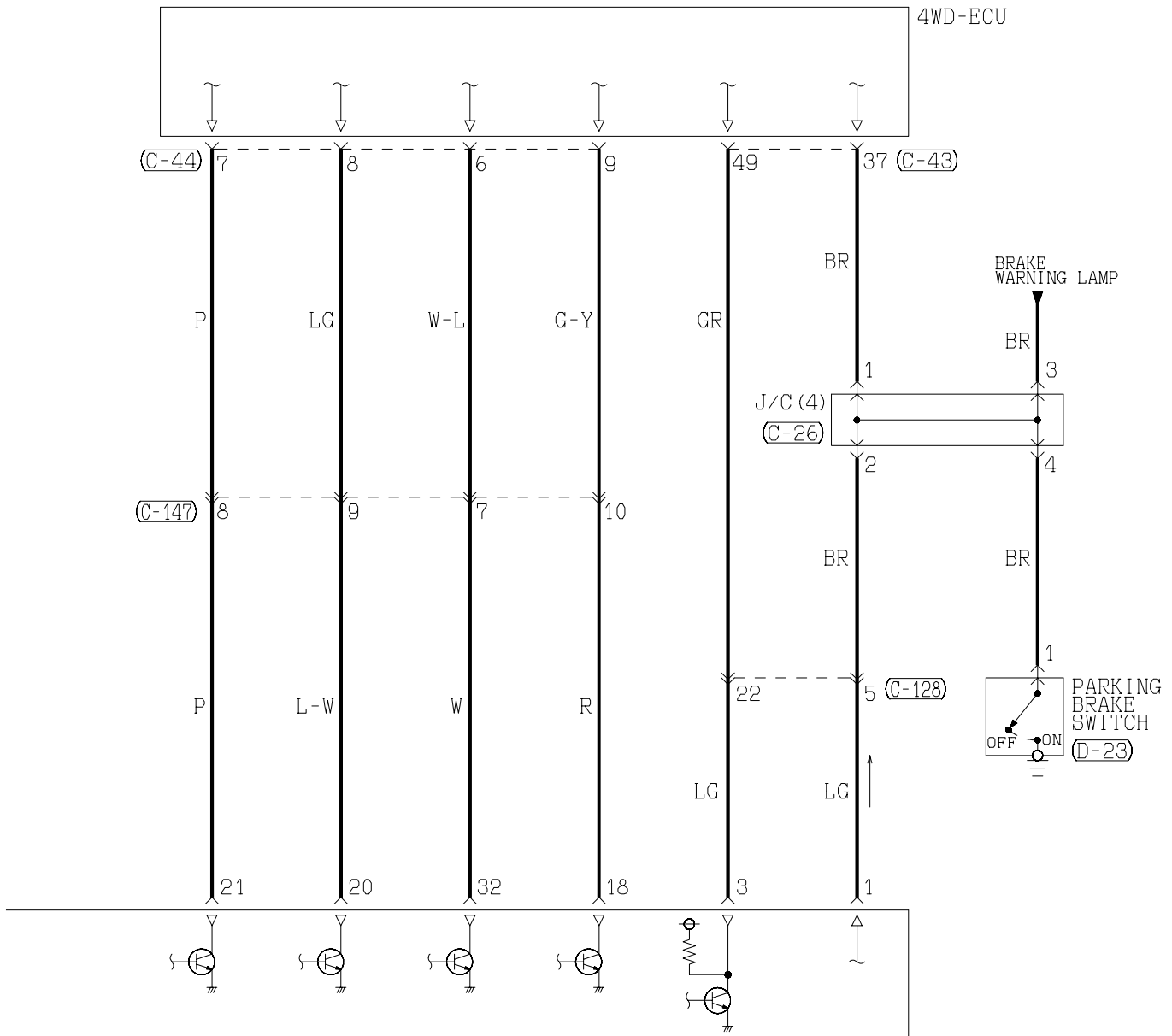
(C-43) (MU801823)



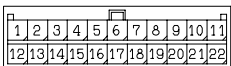
(C-44) (MU801824)



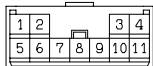
5



(C-128)



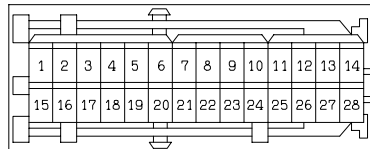
(C-147) MU801847



(C-210) MU801331



(C-213)



(D-23) (MU801211)



(D-32) MU802337

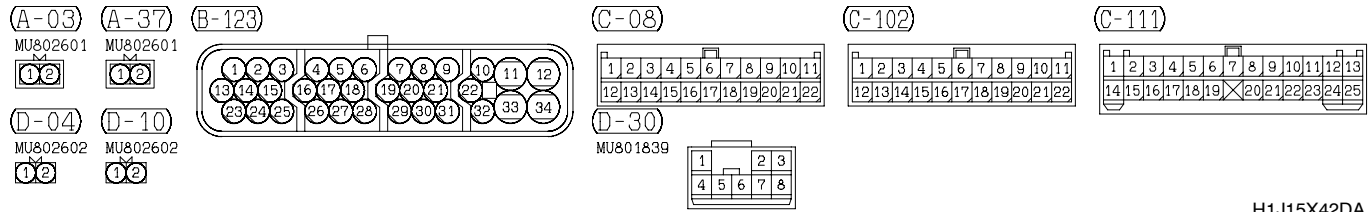
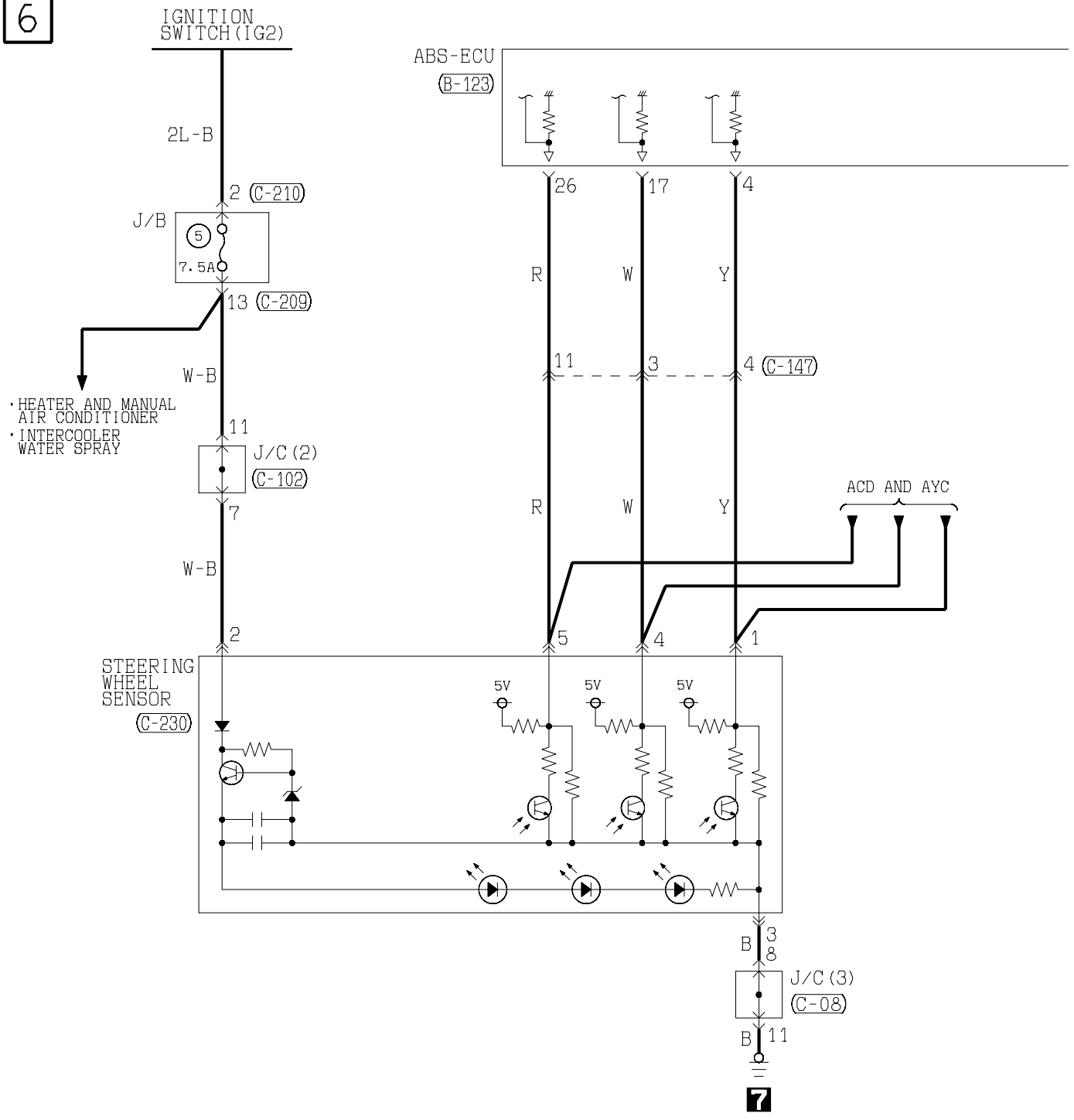


(D-33) MU802337

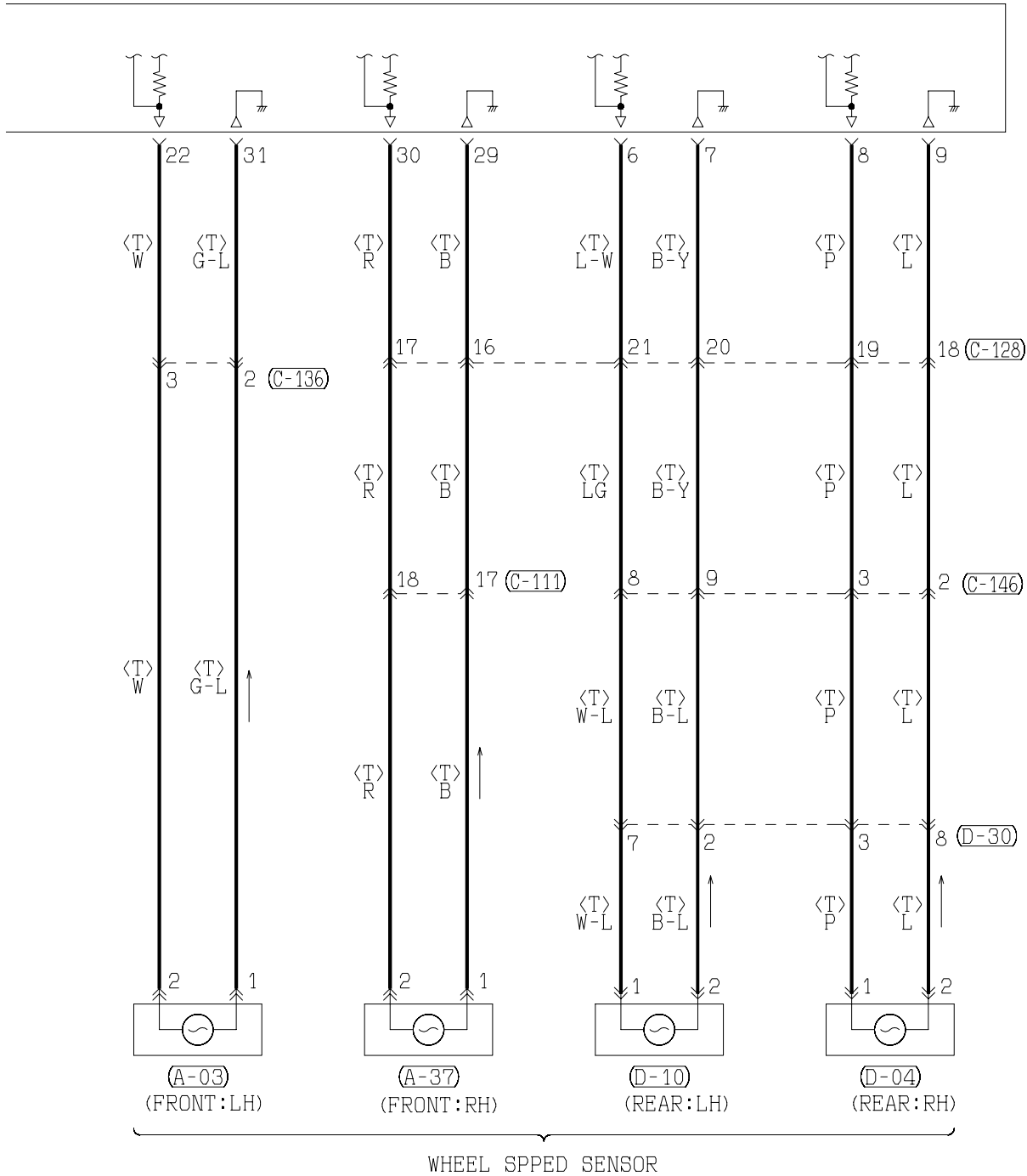


ABS <R.H. drive vehicles> (CONTINUED)

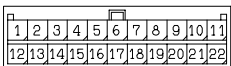
6



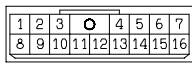
7



(C-128)

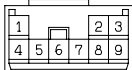


(C-136)

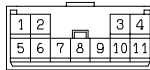


(C-146)

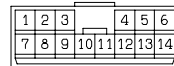
MU801841



(C-147) MU801847



(C-209) MU801857



(C-210)

MU801331



(C-230)



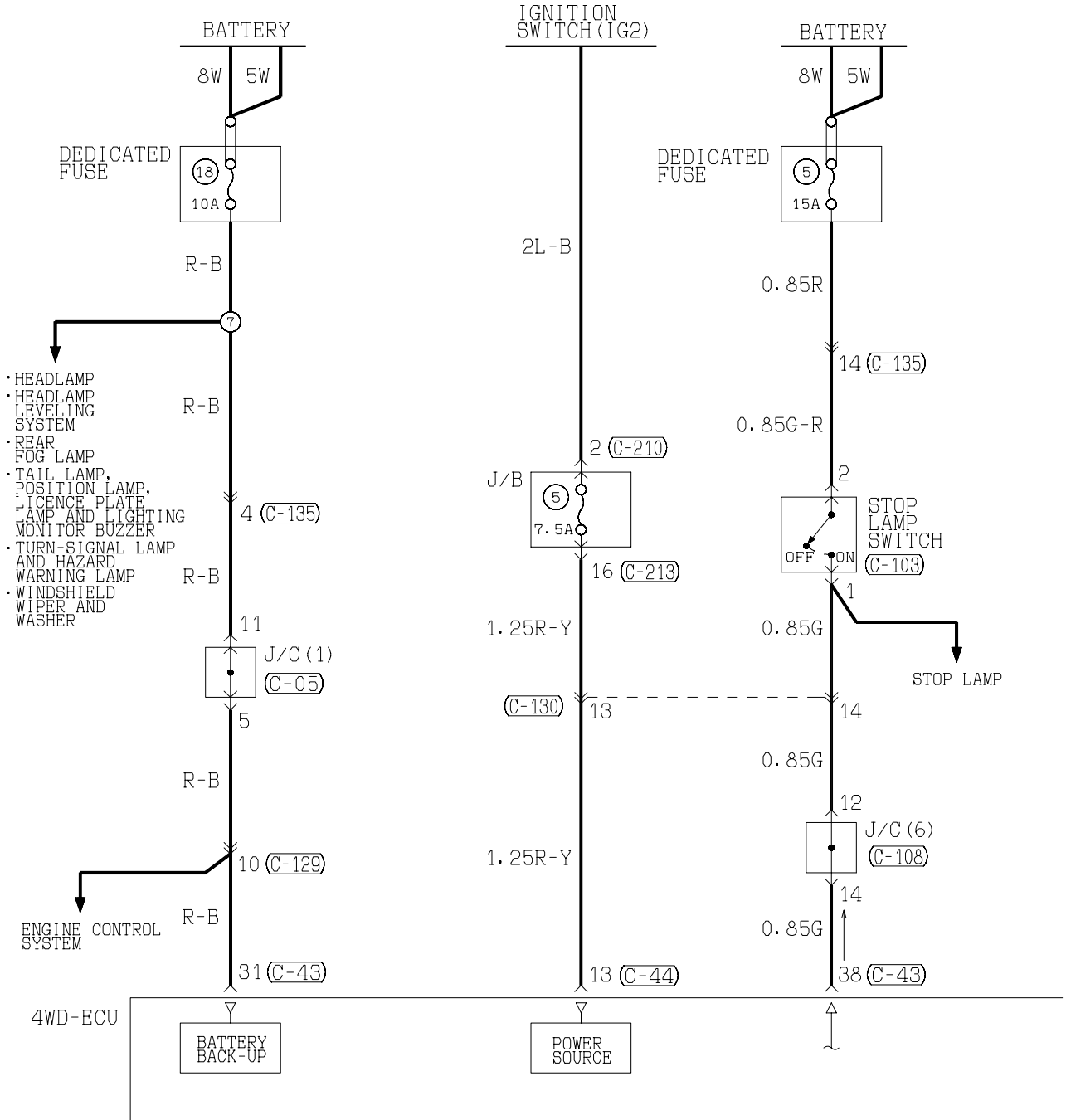
Wire colour code

B :Black LG:Light green G:Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

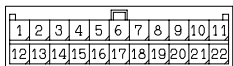
ACD

Vehicles without AYC <L.H. drive vehicles>

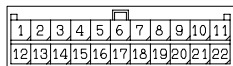
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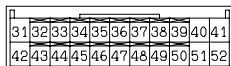
(C-05)



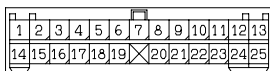
(C-26)



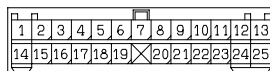
(C-43) (MU801823)



(C-130)



(C-135)

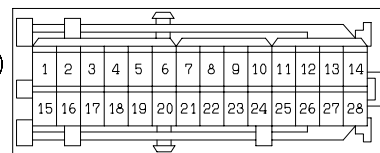


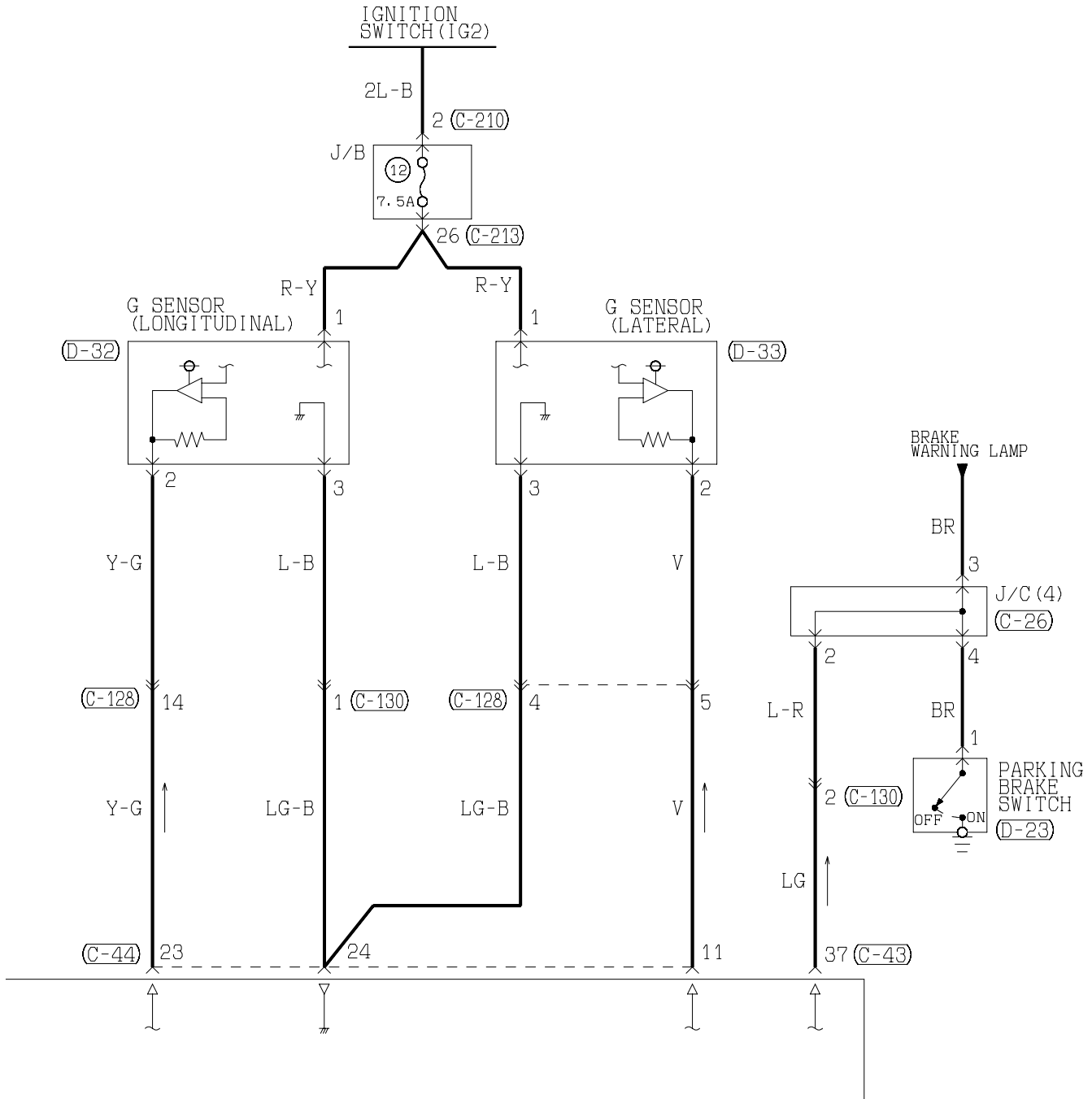
(C-210)

MU801331

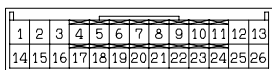


(C-213)





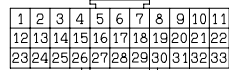
(C-44) (MU801824)



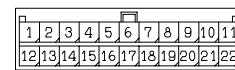
(C-103) (MU801490)



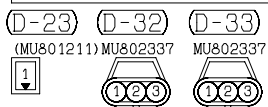
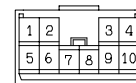
(C-108)



(C-128)



(C-129) MU801867



Wire colour code

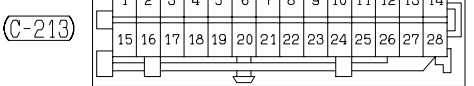
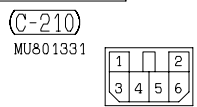
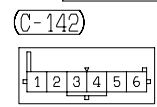
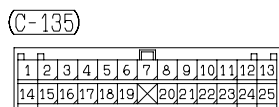
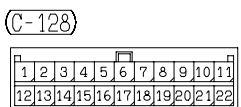
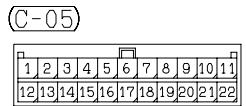
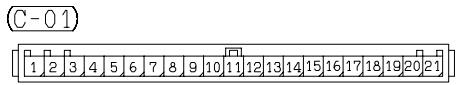
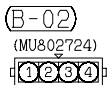
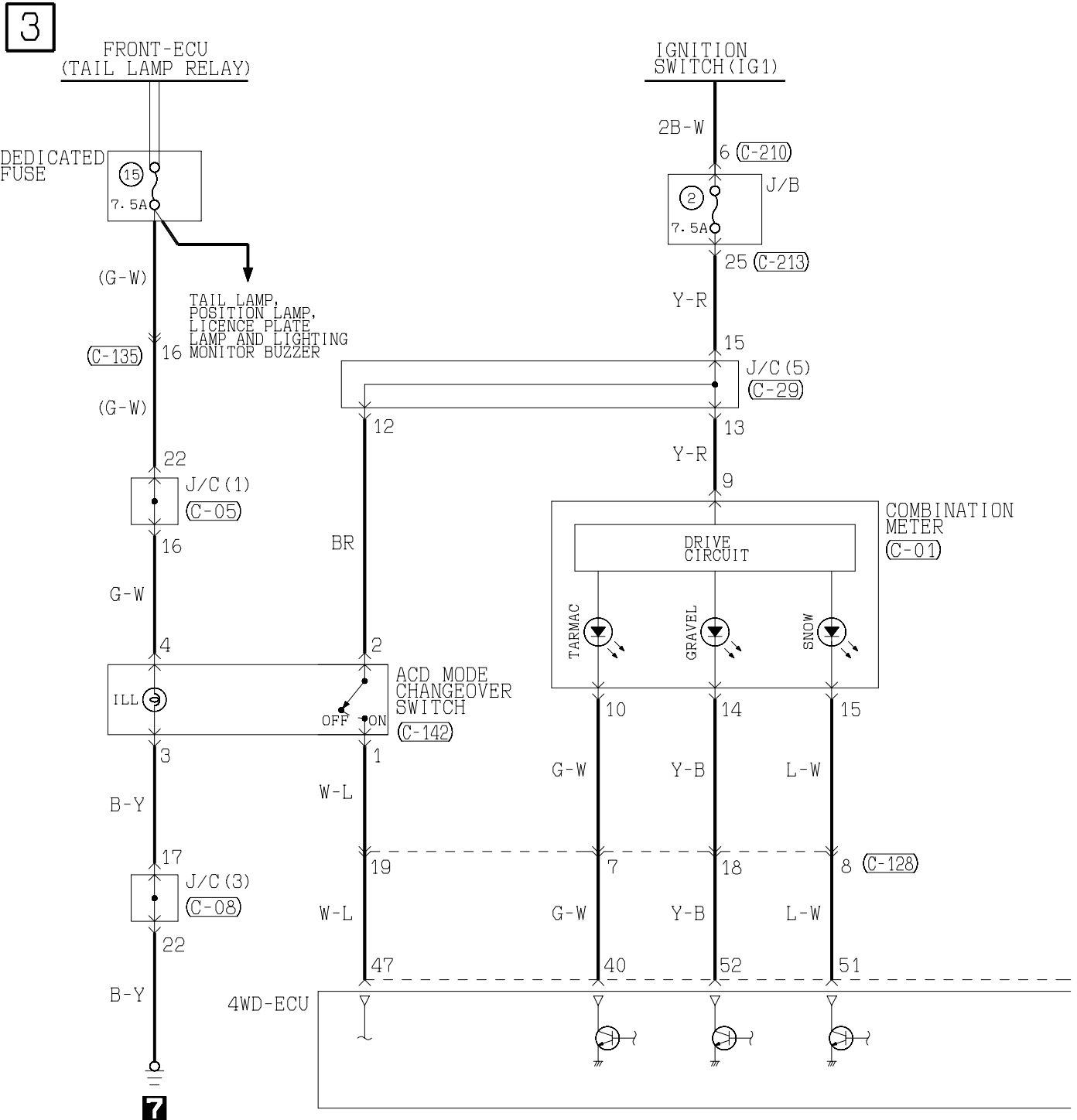
B : Black LG : Light green G : Green L : Blue

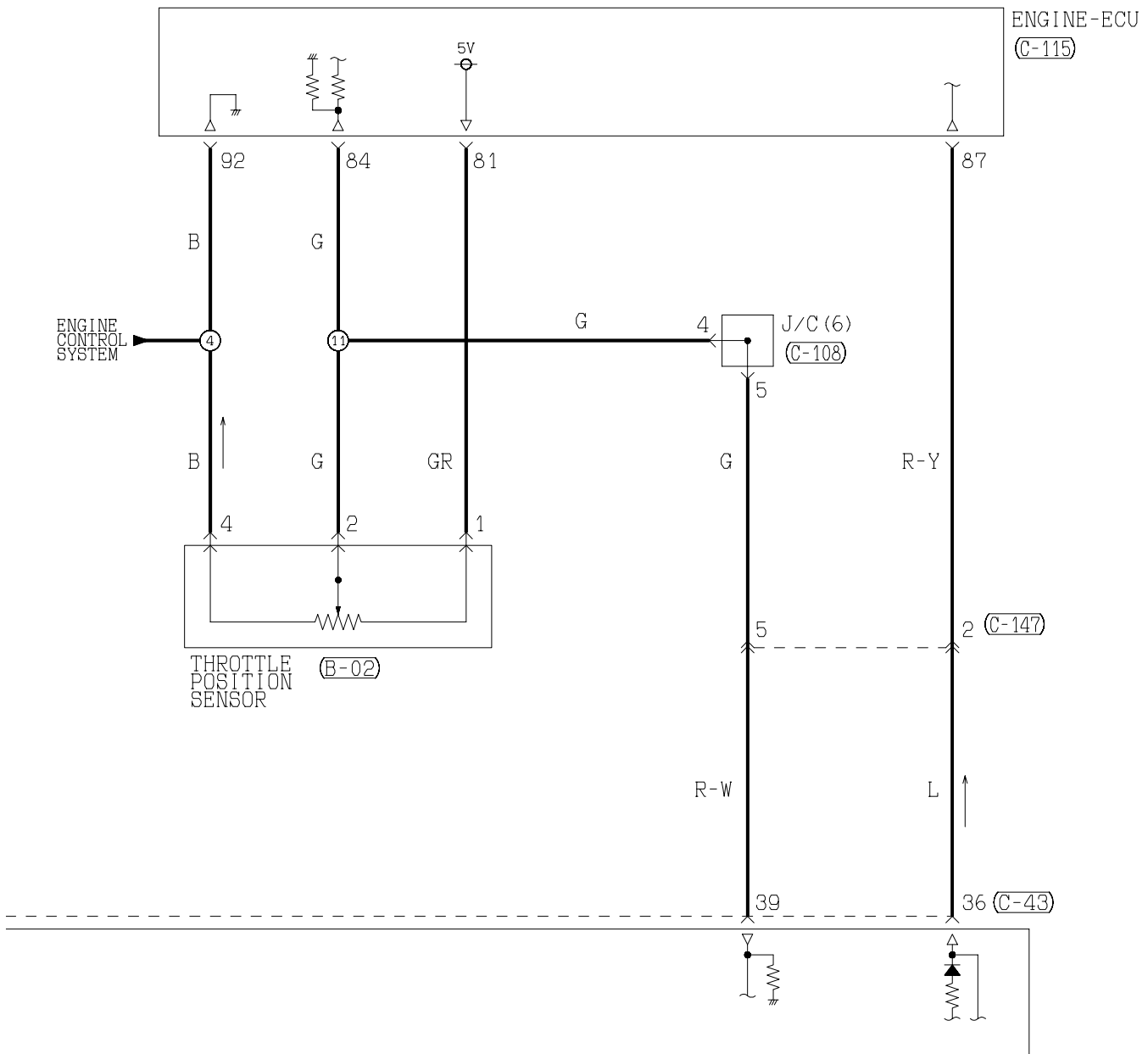
BR : Brown O : Orange GR : Gray R : Red

W : White SB : Sky blue P : Pink Y : Yellow

V : Violet

ACD <Vehicles without AYC (L.H. drive vehicles)> (CONTINUED)





(C-08)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-29)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-43) (MU801823)

31	32	33	34	35	36	37	38	39	40	41
42	43	44	45	46	47	48	49	50	51	52

(C-108)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

(C-118) (MU801823)

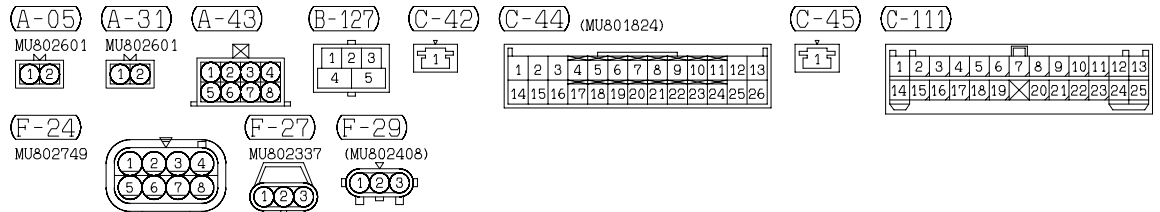
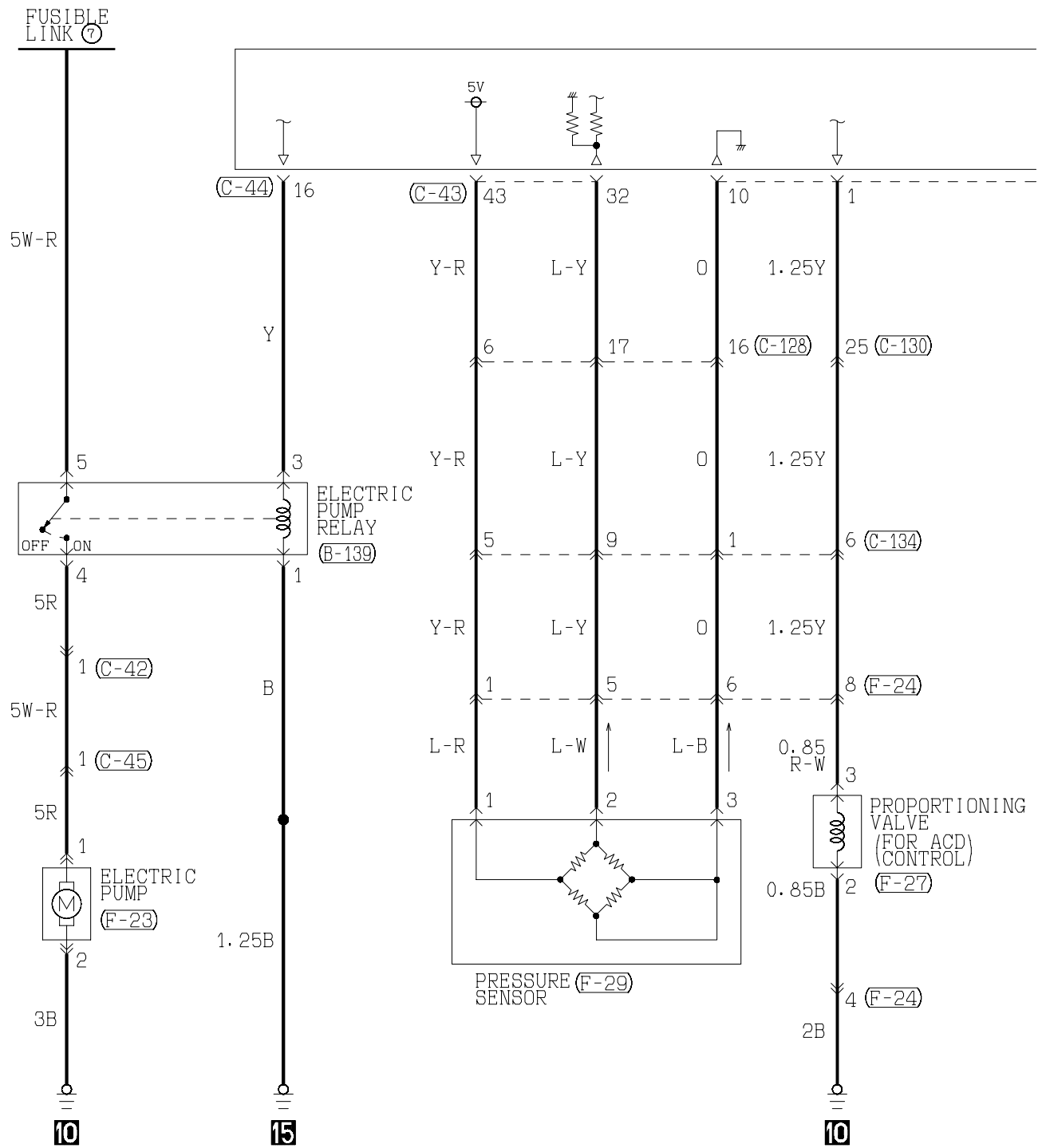
71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

Wire colour code

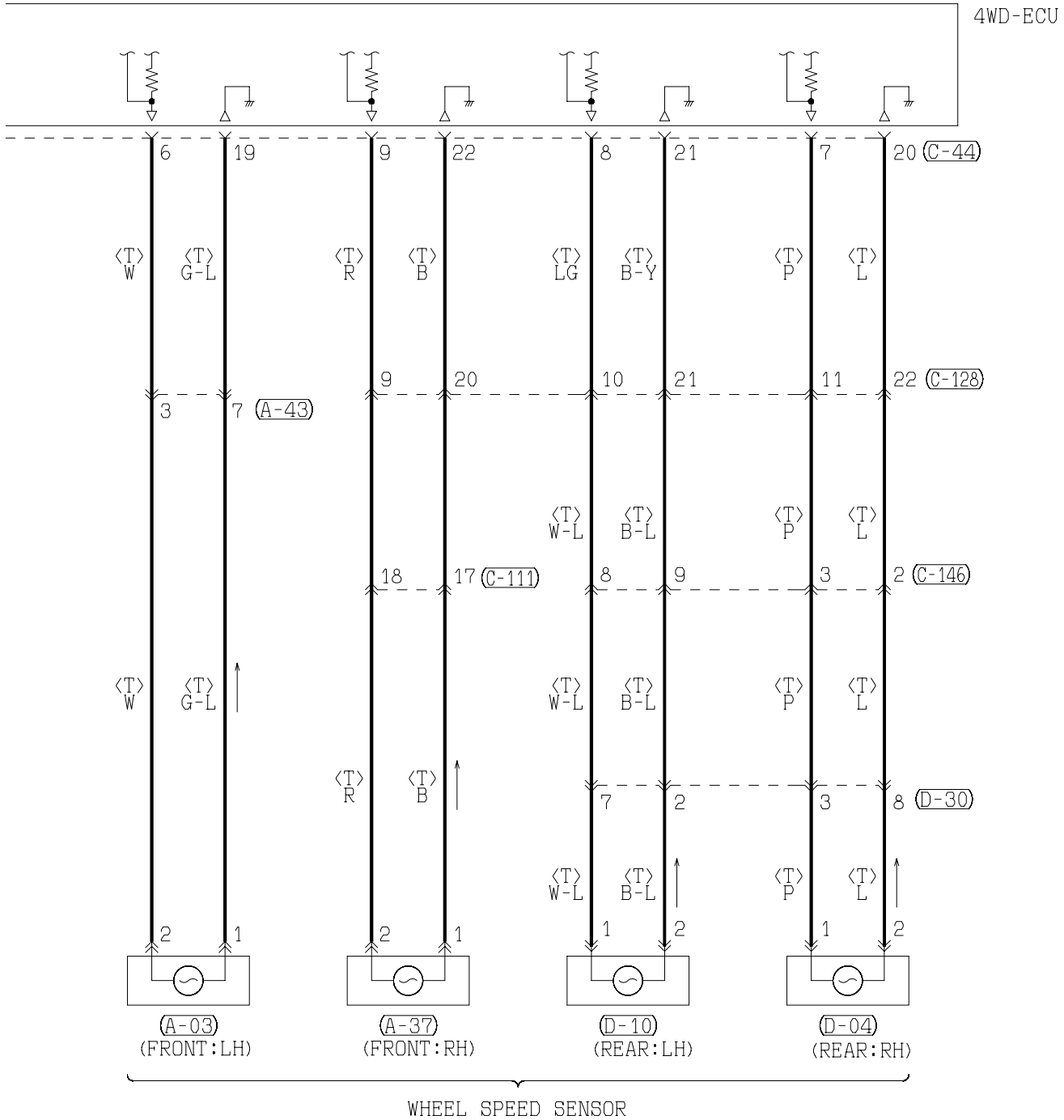
B : Black LG: Light green G : Green L : Blue W : White Y : Yellow SB: Sky blue
 BR: Brown O : Orange GR: Gray R : Red P : Pink V : Violet

ACD <Vehicles without AYC (L.H. drive vehicles)> (CONTINUED)

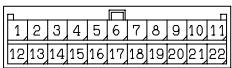
5



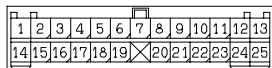
6



(C-128)

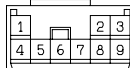


(C-130)



(C-146)

MU801841



(D-04)

MU802602



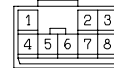
(D-10)

MU802602



(D-30)

MU801839



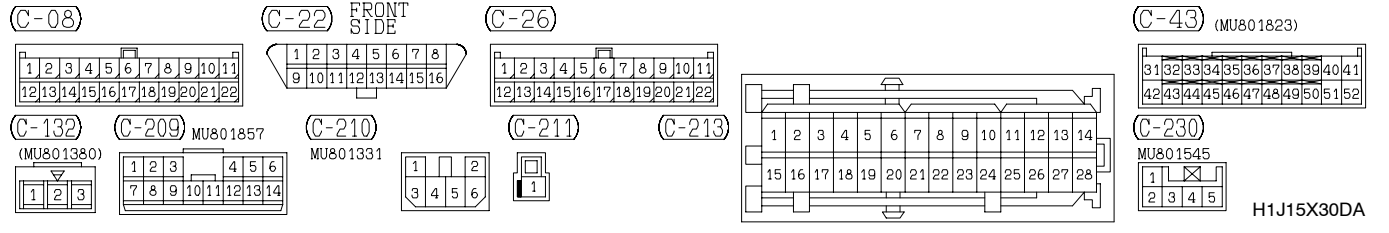
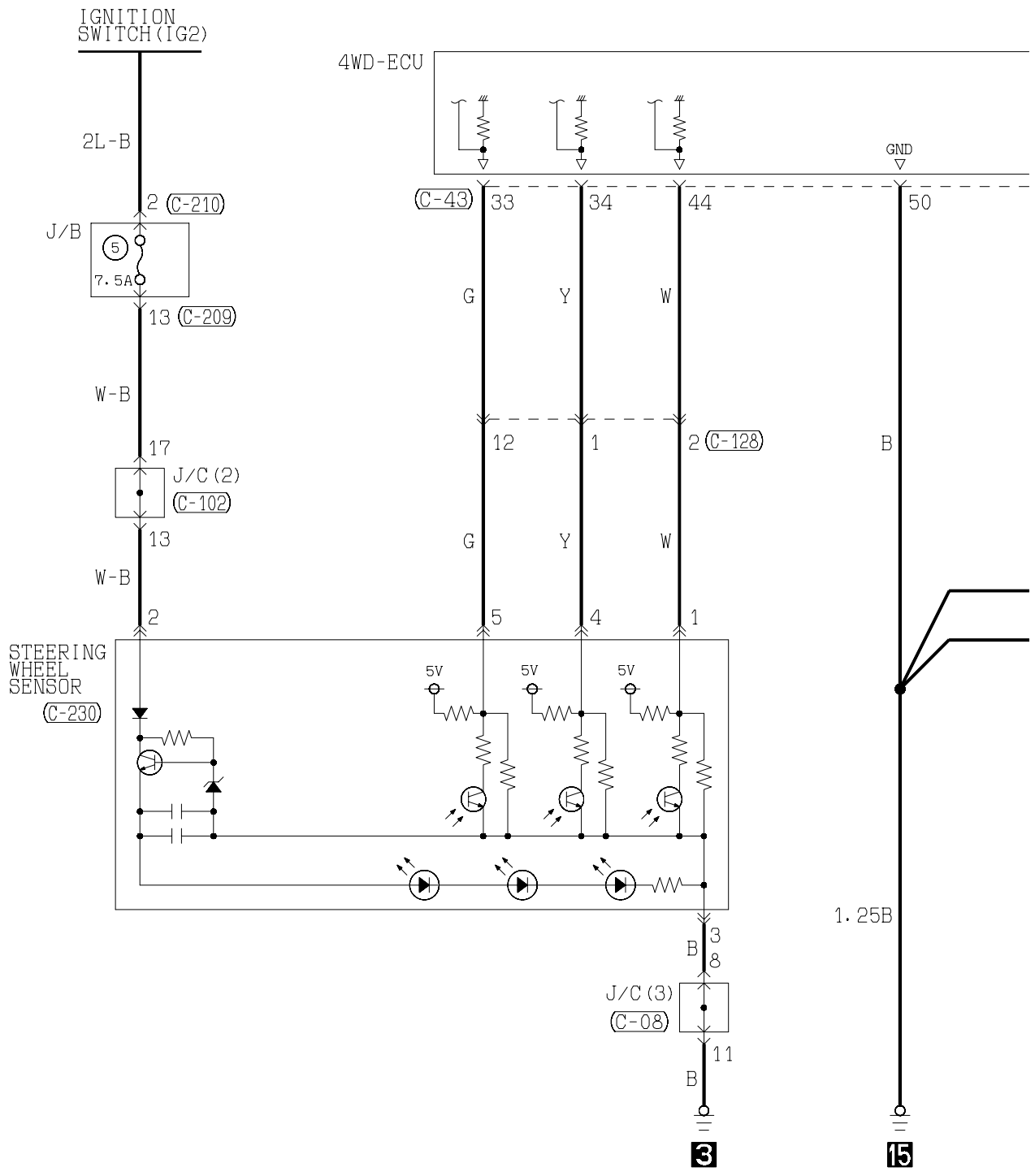
(F-23)

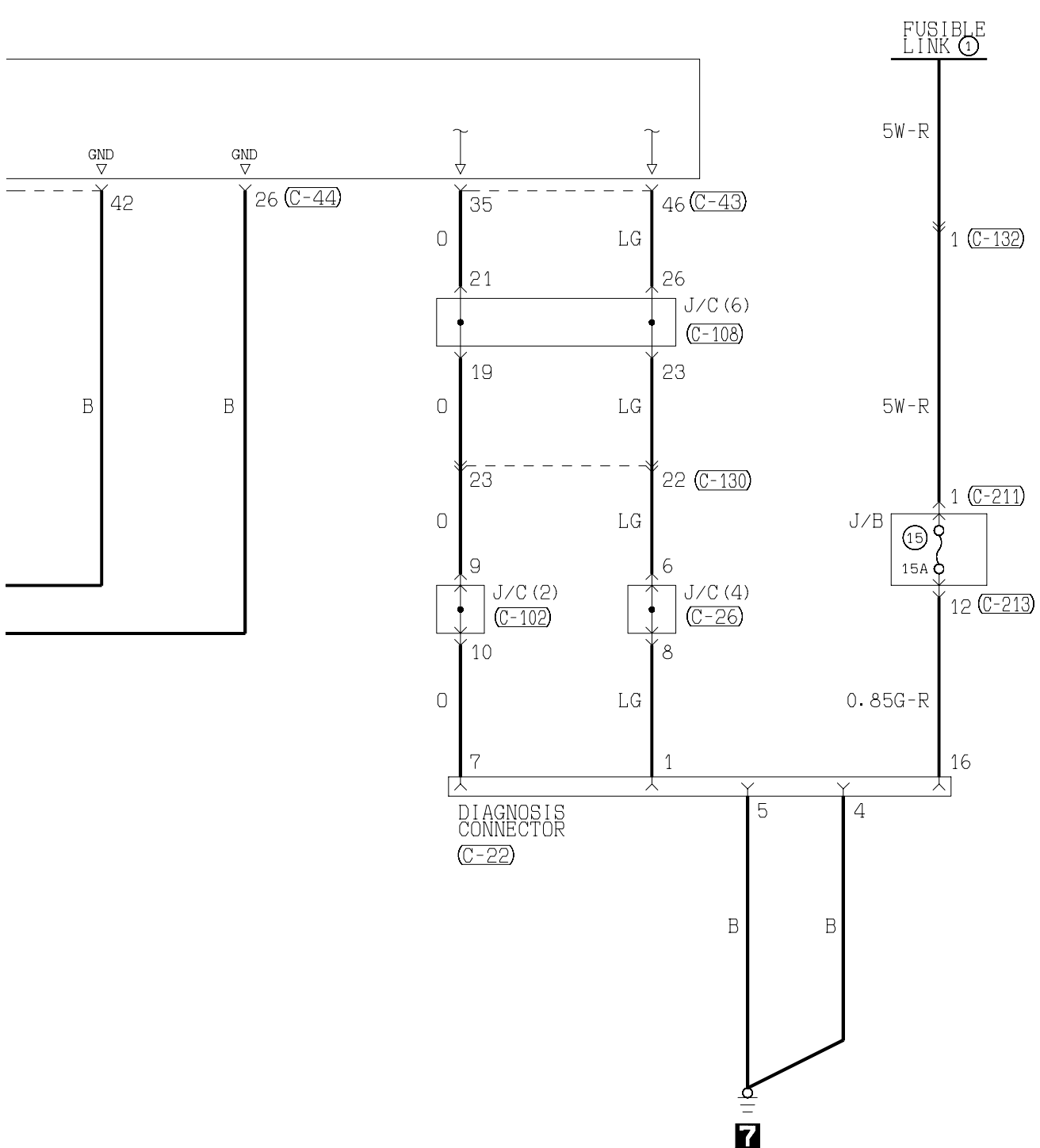


Wire colour code
 B : Black LG: Light green G : Green L : Blue W : White Y : Yellow SB: Sky blue
 BR: Brown O : Orange GR: Gray R : Red P : Pink V : Violet

ACD <Vehicles without AYC (L.H. drive vehicles)> (CONTINUED)

7





(C-44) (MU801824)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

(C-102)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-108)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

(C-128)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-130)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	X	20	21	22	23	24	25

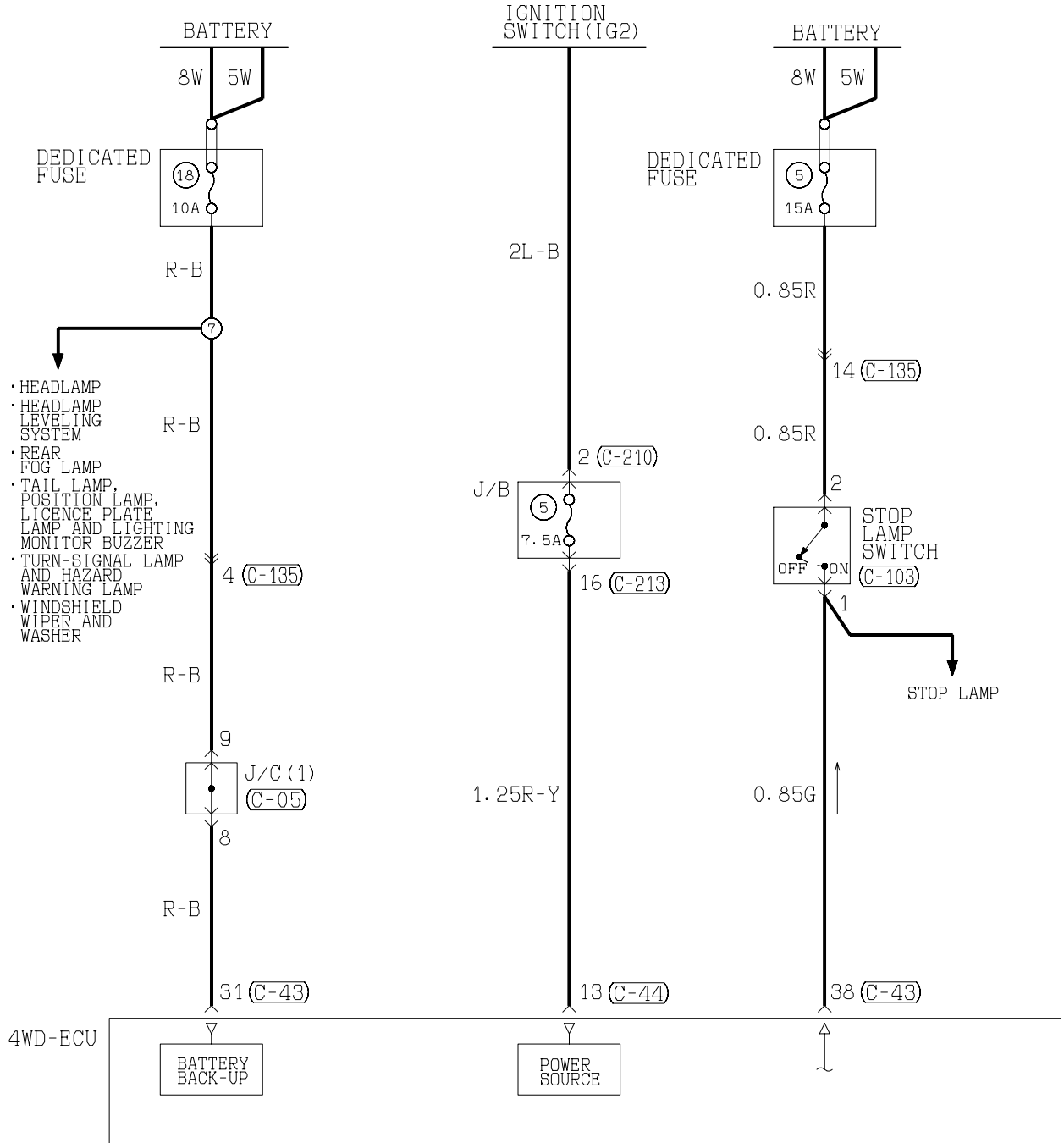
Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Gray R : Red P : Pink V : Violet

ACD

Vehicles without AYC <R.H. drive vehicles>

1



(C-05)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-26)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-43) (MU801823)

31	32	33	34	35	36	37	38	39	40	41
42	43	44	45	46	47	48	49	50	51	52

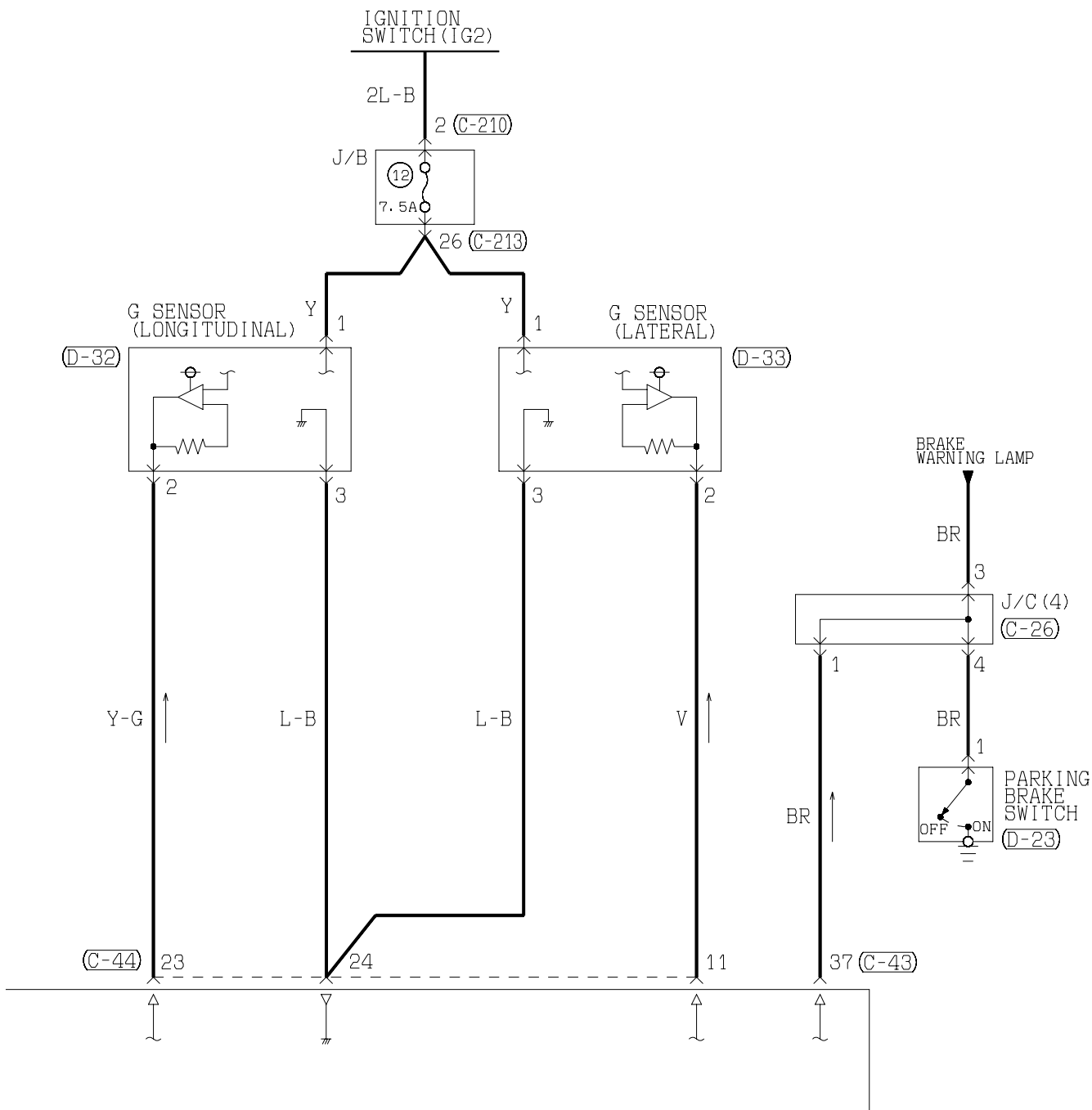
(C-44) (MU801824)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

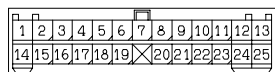
(C-103) (MU801490)

1	2
3	4

2



(C-135)

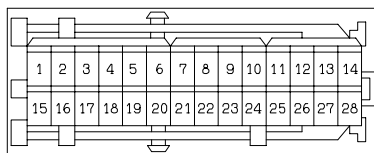


(C-210)

MU801331



(C-213)



(D-23)

(MU801211)



(D-32)

MU802337

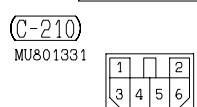
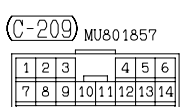
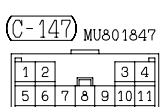
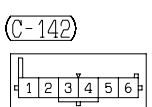
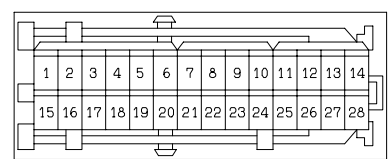
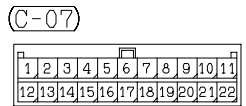
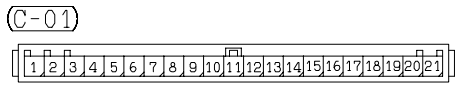
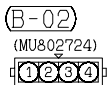
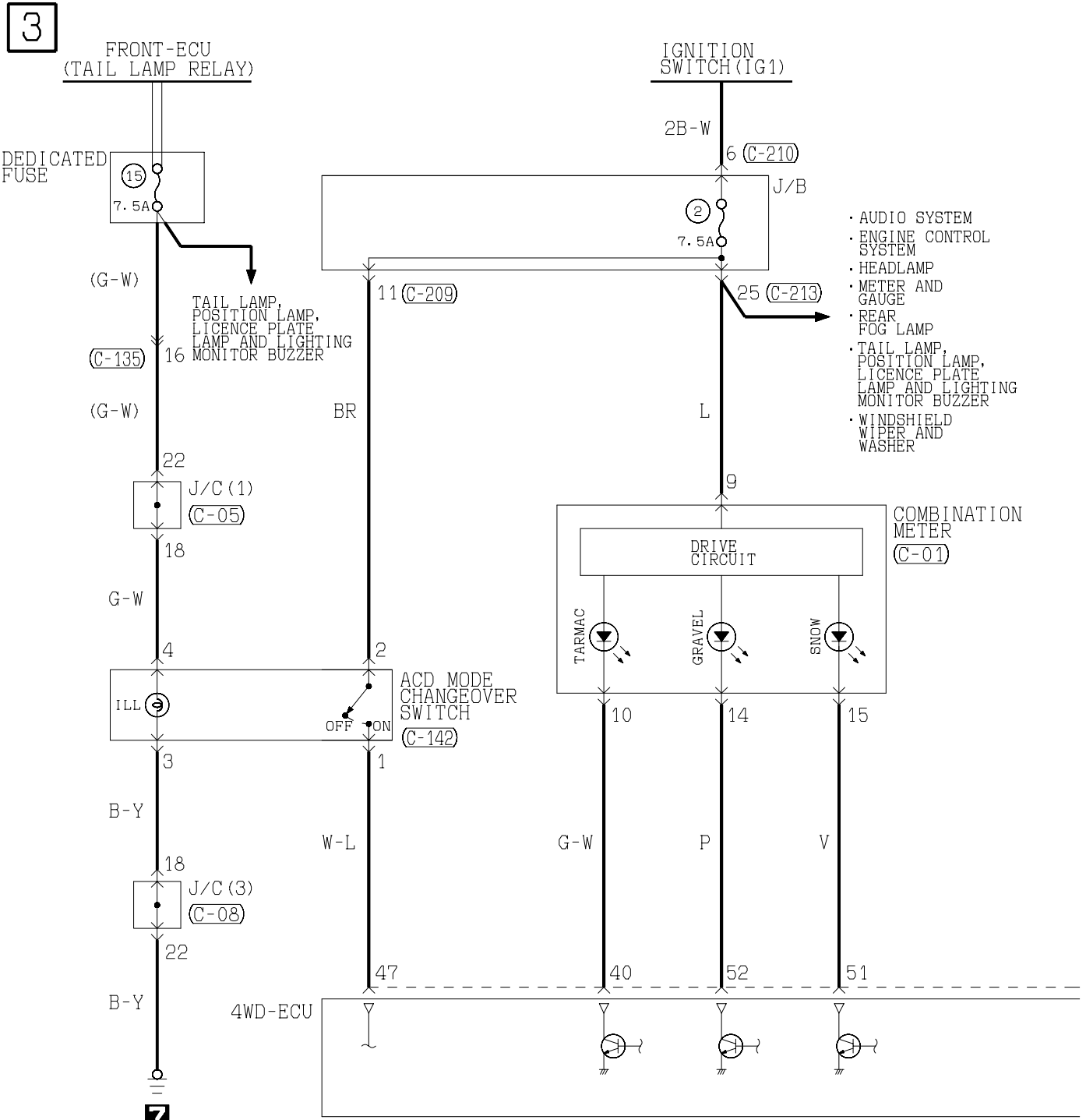


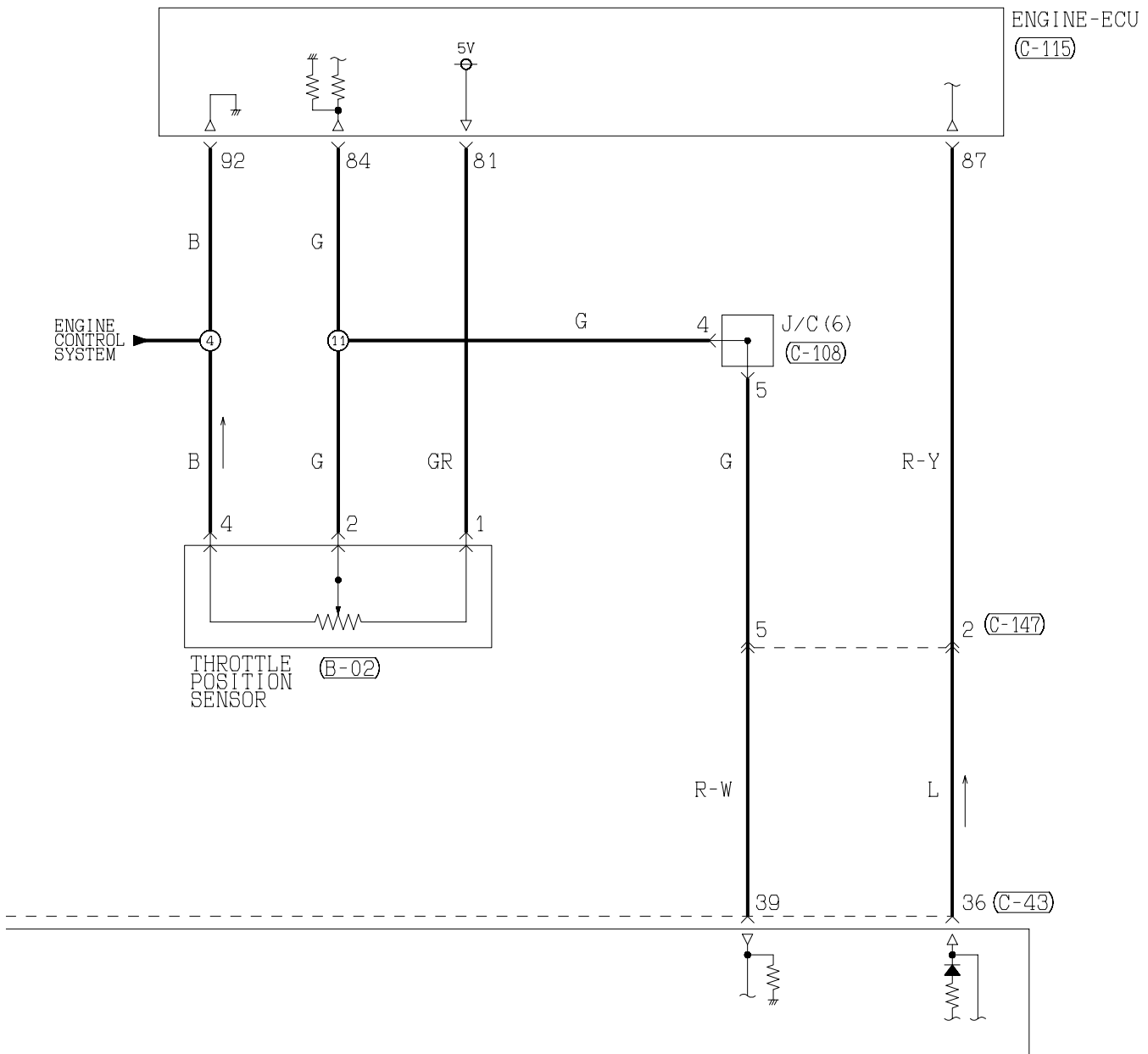
(D-33)

MU802337



ACD <Vehicles without AYC (R.H. drive vehicles)> (CONTINUED)





(C-08)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-43) (MU801823)

31	32	33	34	35	36	37	38	39	40	41
42	43	44	45	46	47	48	49	50	51	52

(C-108)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

(C-115) (MU801823)

71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

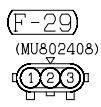
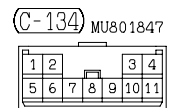
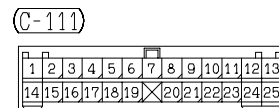
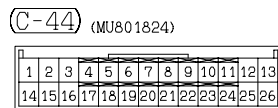
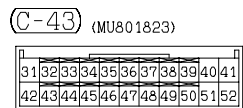
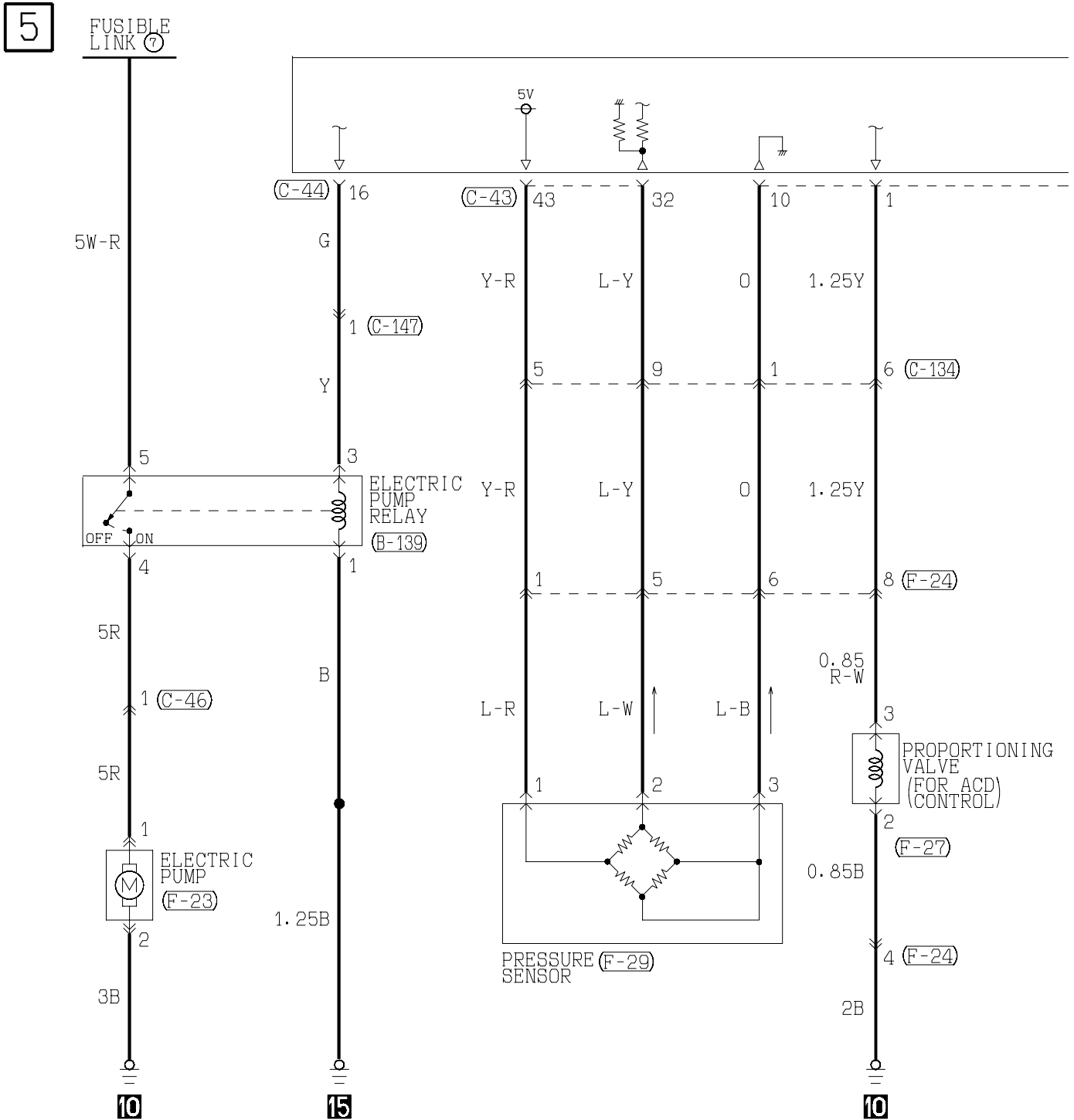
(C-135)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

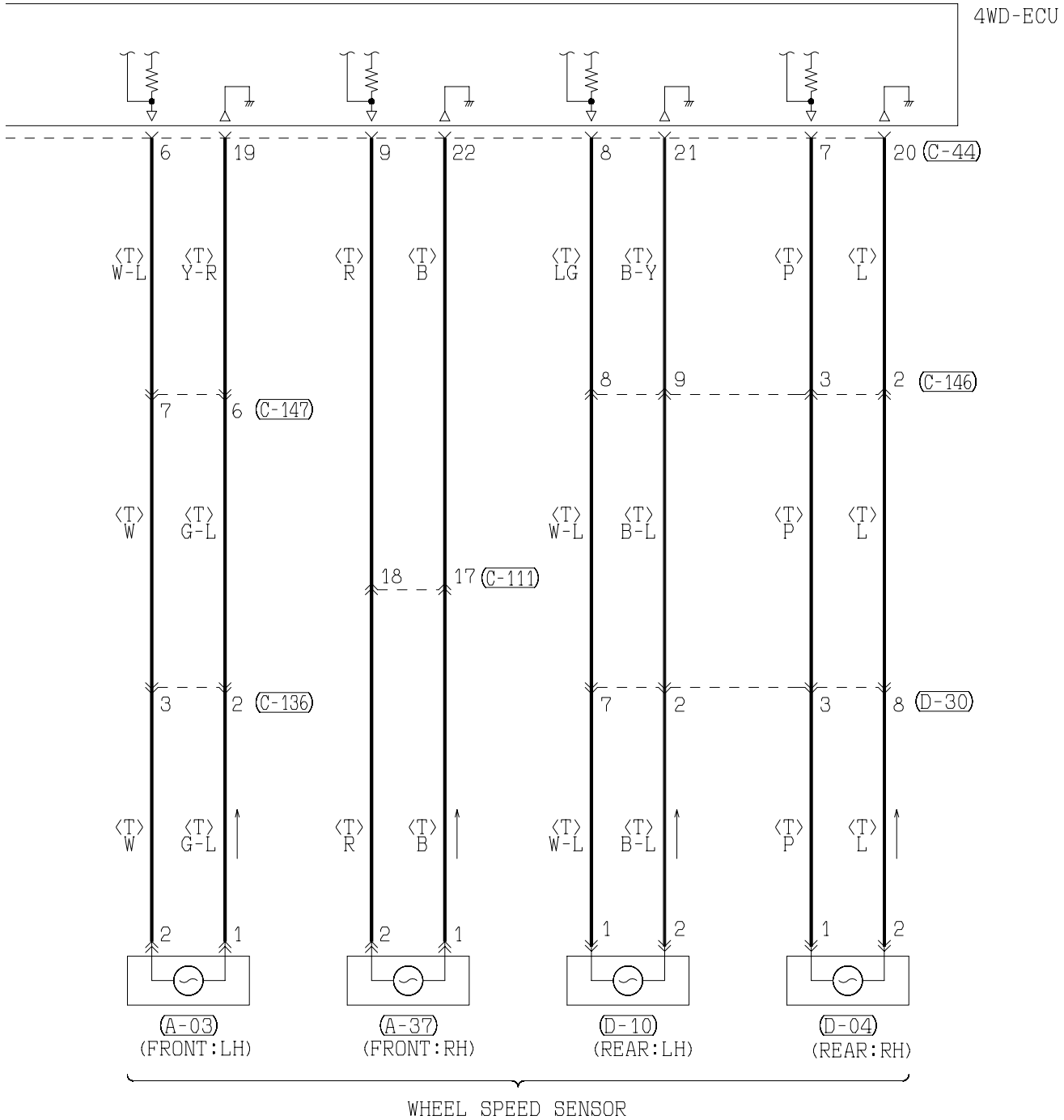
Wire colour code

B : Black LG: Light green G : Green L : Blue W : White Y : Yellow SB: Sky blue
 BR: Brown O : Orange GR: Gray R : Red P : Pink V : Violet

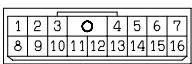
ACD <Vehicles without AYC (R.H. drive vehicles)> (CONTINUED)



6

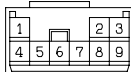


(C-136)

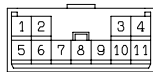


(C-146)

MU801841



(C-147) MU801847



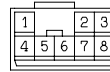
(D-04) MU802602



(D-10) MU802602



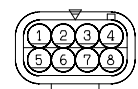
(D-30) MU801839



(F-23)



(F-24) MU802749



Wire colour code

B :Black LG:Light green
BR:Brown O :Orange

G :Green GR:Gray

L :Blue R :Red

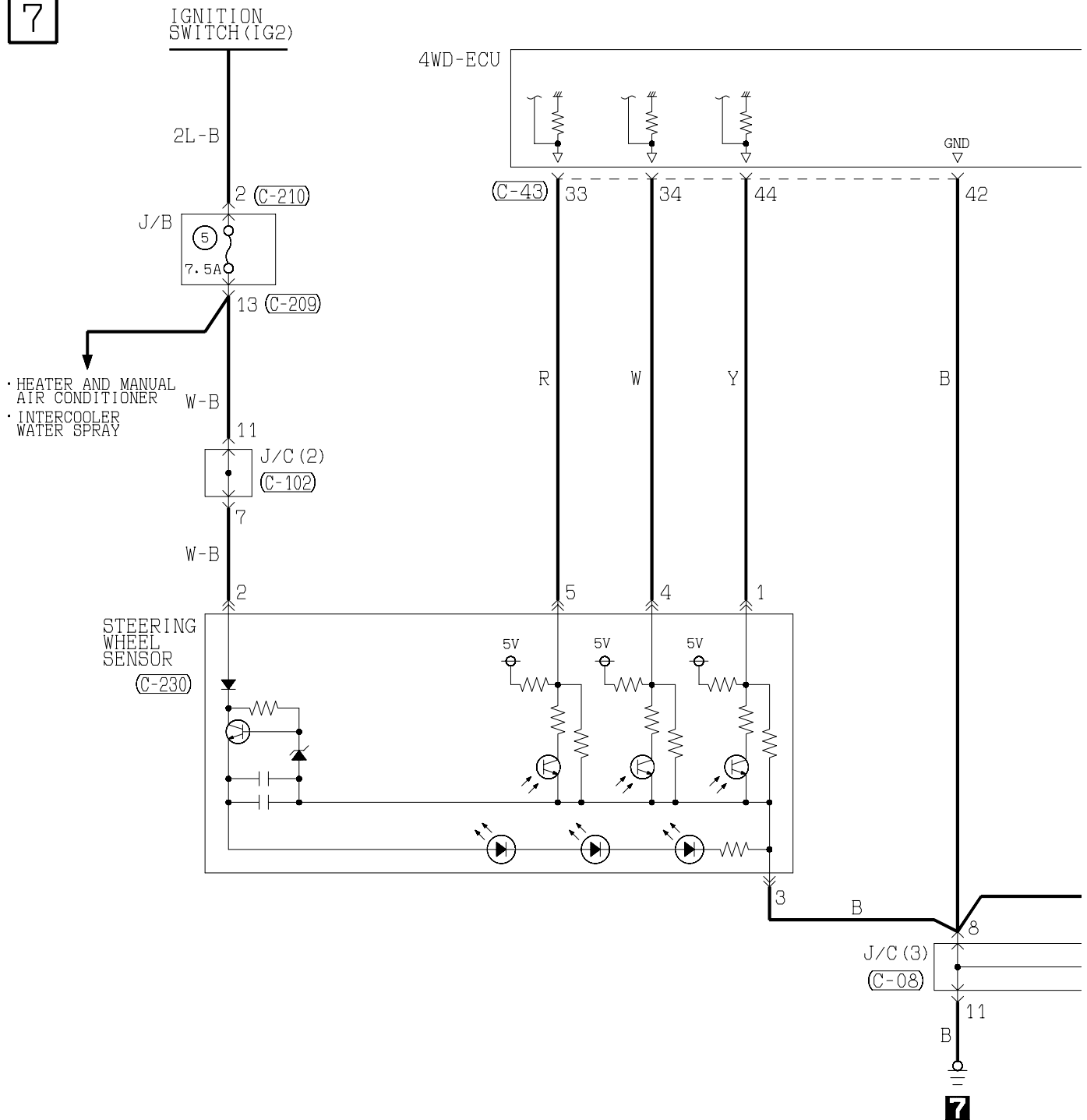
W :White P :Pink

Y :Yellow V :Violet

SB:Sky blue

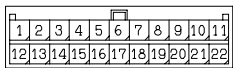
ACD <Vehicles without AYC (R.H. drive vehicles)> (CONTINUED)

7



7

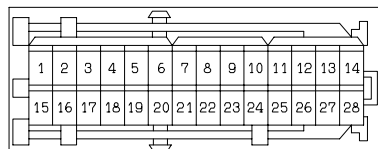
(C-08)



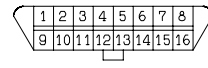
(C-211)



(C-213)



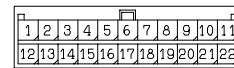
(C-22) FRONT SIDE



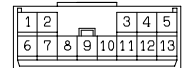
(C-230)

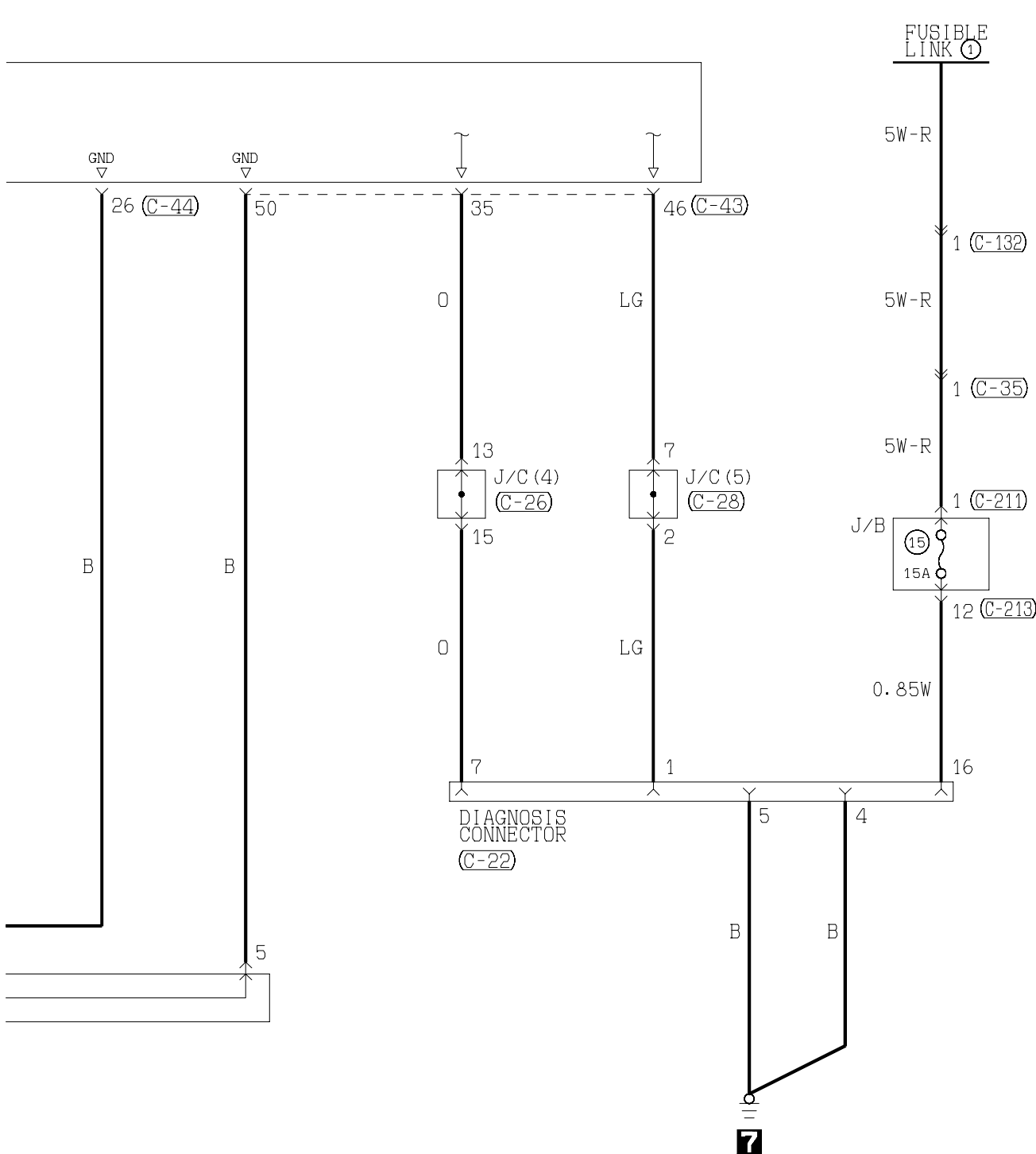


(C-26)

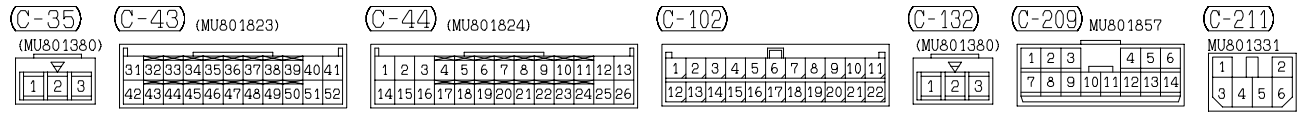


(C-28) MU801855





8

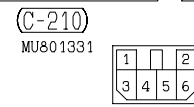
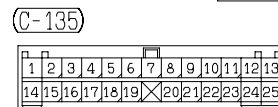
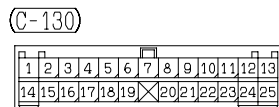
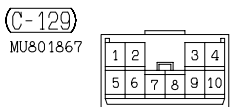
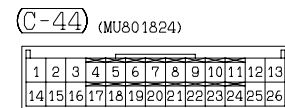
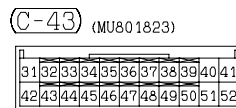
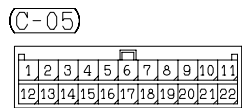
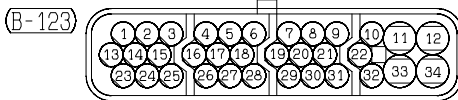
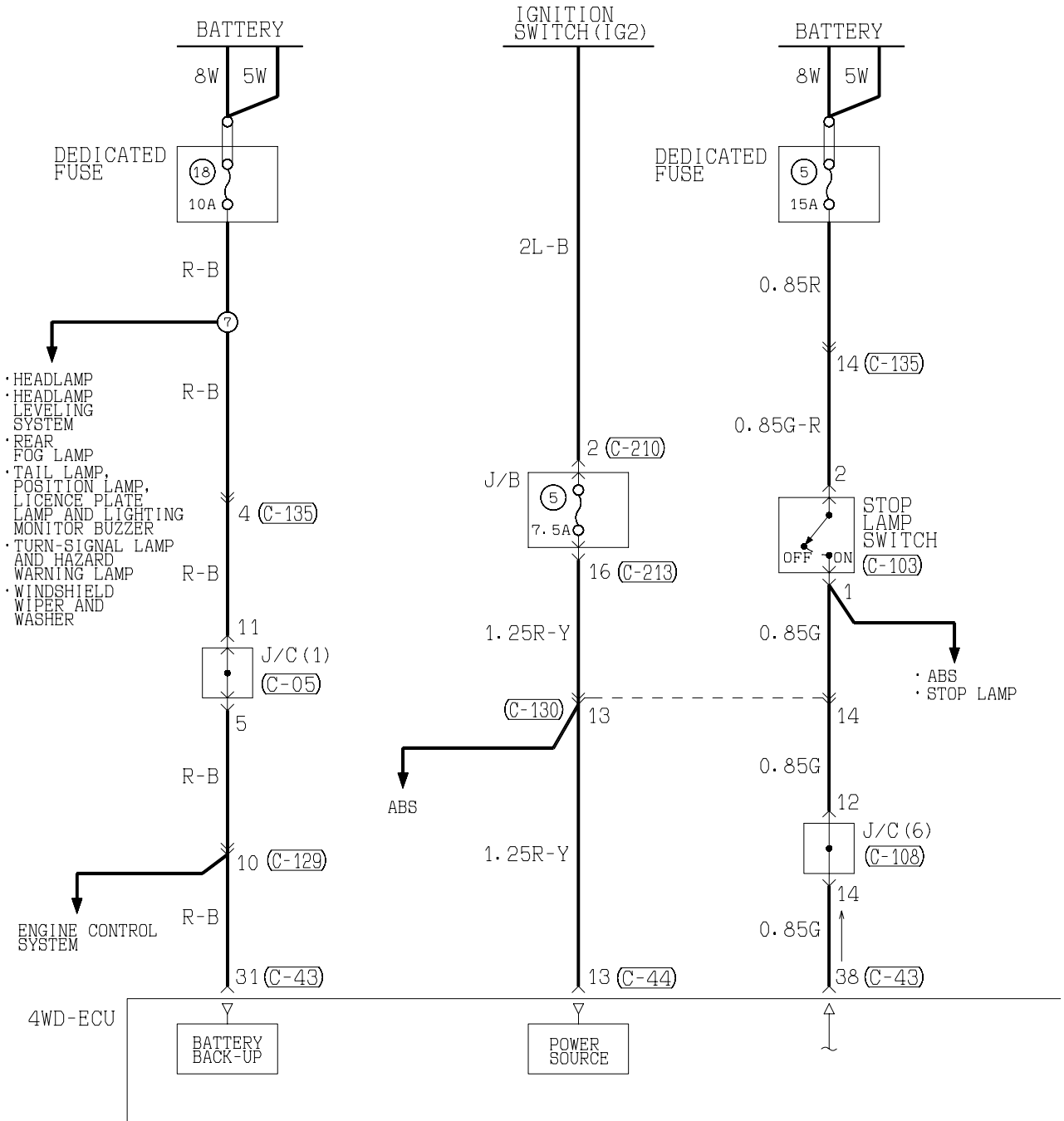


Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

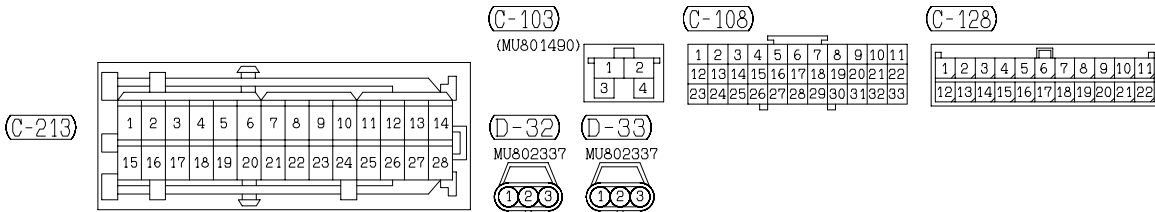
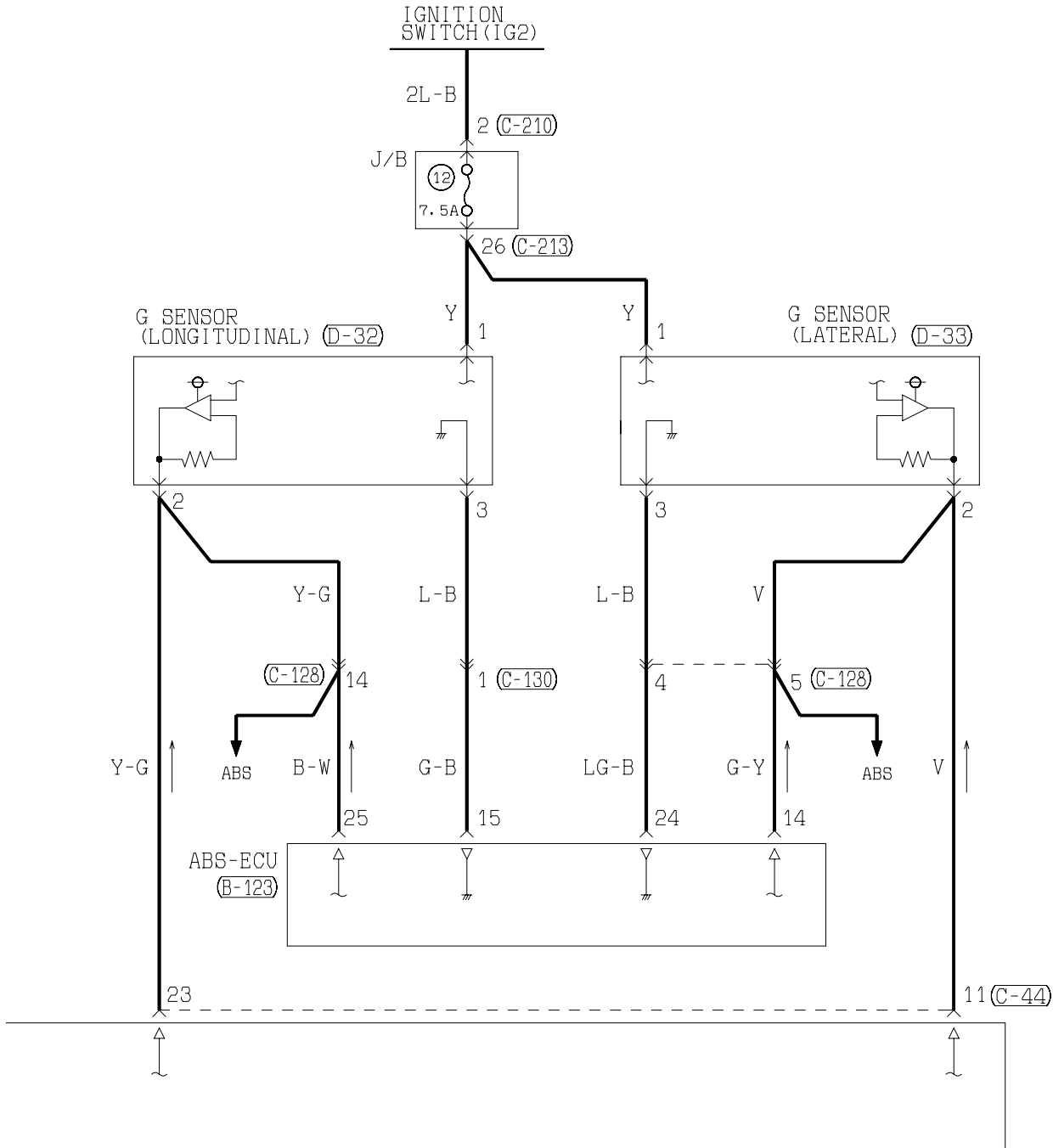
ACD AND AYC

L.H. drive vehicles

1

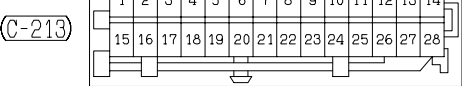
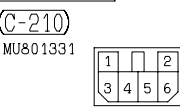
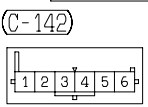
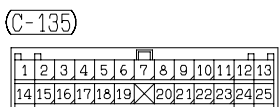
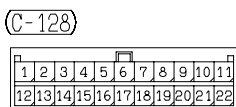
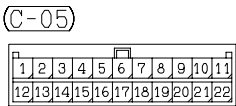
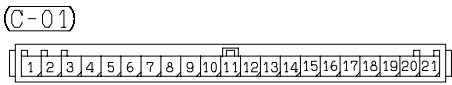
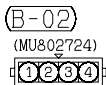
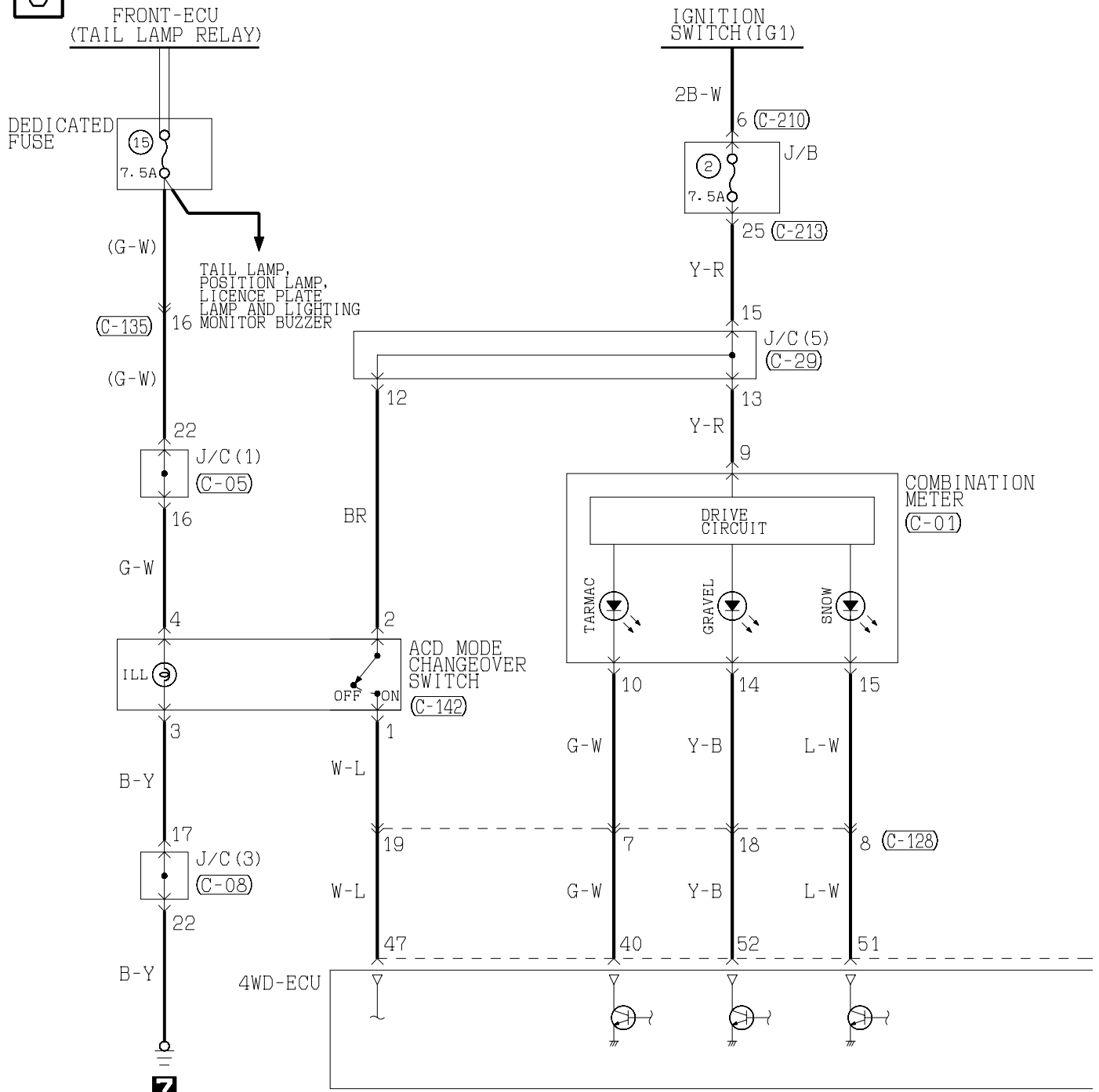


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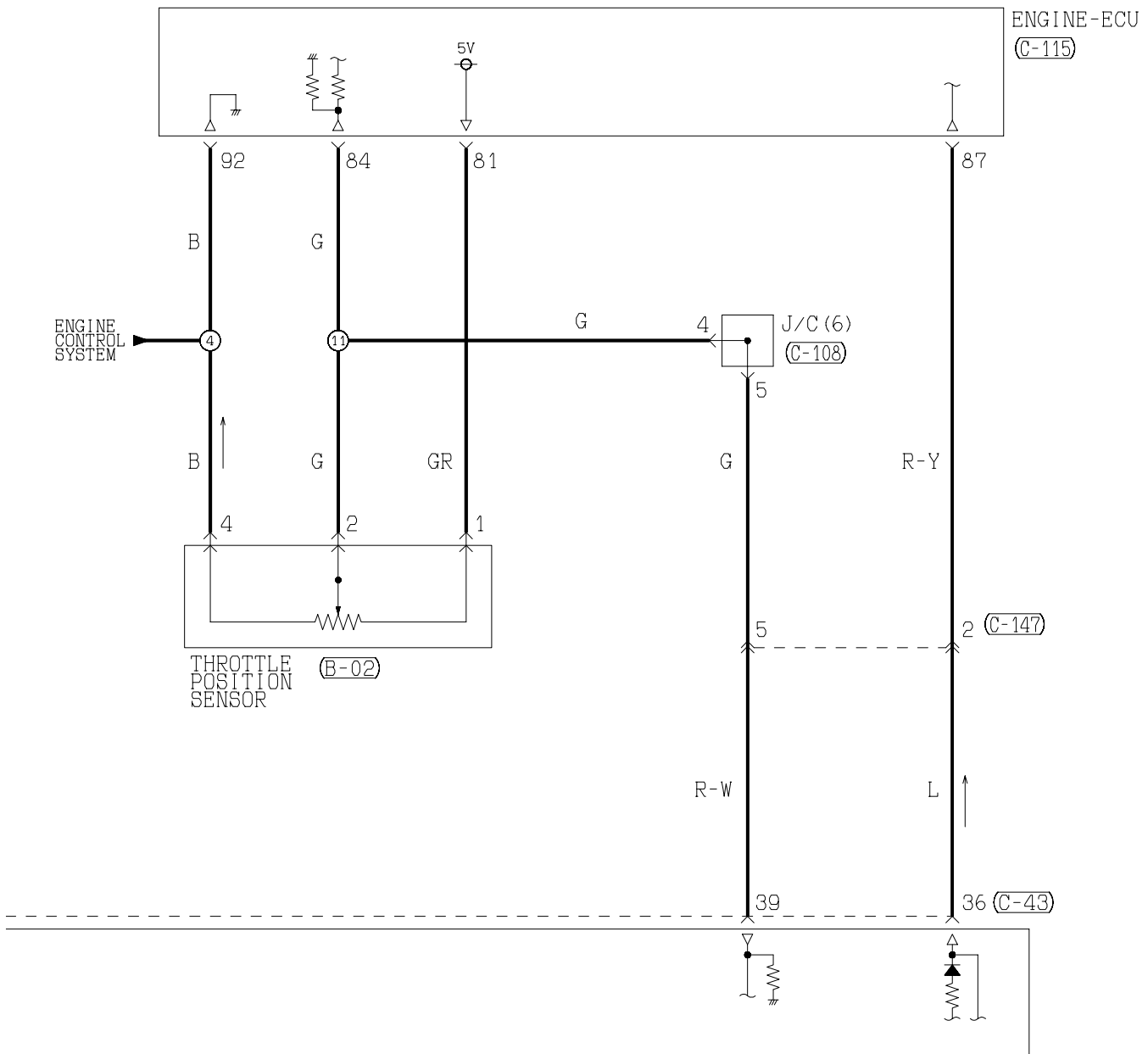


ACD AND AYC <L.H. drive vehicles> (CONTINUED)

3



4



(C-08)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-29)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-43) (MU801823)

31	32	33	34	35	36	37	38	39	40	41
42	43	44	45	46	47	48	49	50	51	52

(C-108)

1	2	3	4	5	6	7	8	9	10	11
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23	24	25	26	27	28	29	30	31	32	33

(C-115) (MU801823)

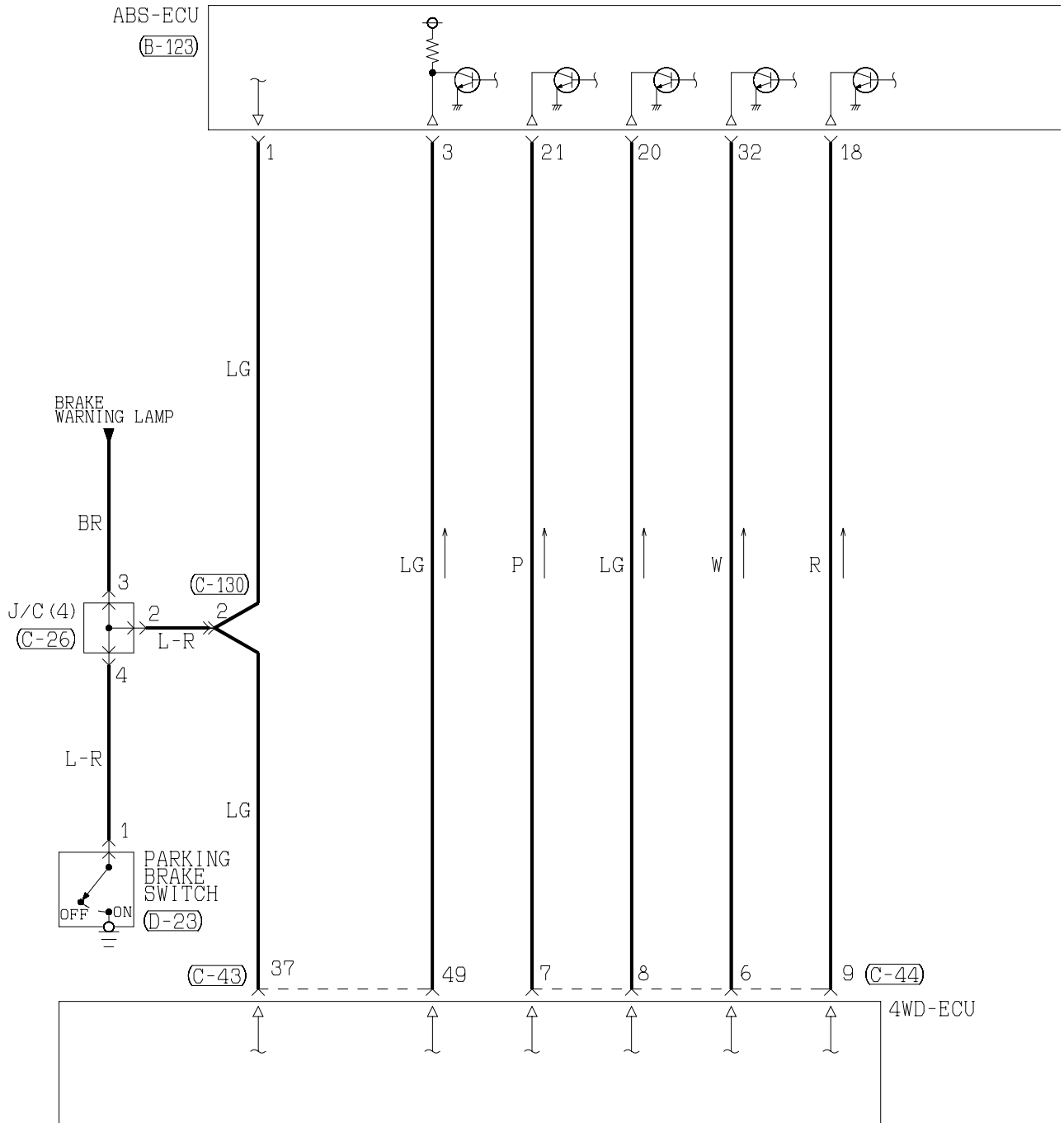
71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

Wire colour code

B : Black LG: Light green G : Green L : Blue W : White Y : Yellow SB: Sky blue
 BR: Brown O : Orange GR: Gray R : Red P : Pink V : Violet

ACD AND AYC <L.H. drive vehicles> (CONTINUED)

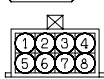
5



(A-03)



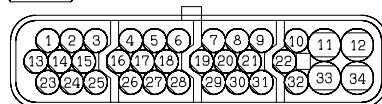
(A-23)



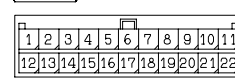
(A-37)



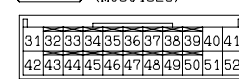
(B-123)



(C-26)



(C-43) (MU801823)



(D-04)



(D-10)

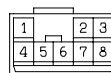


(D-23)

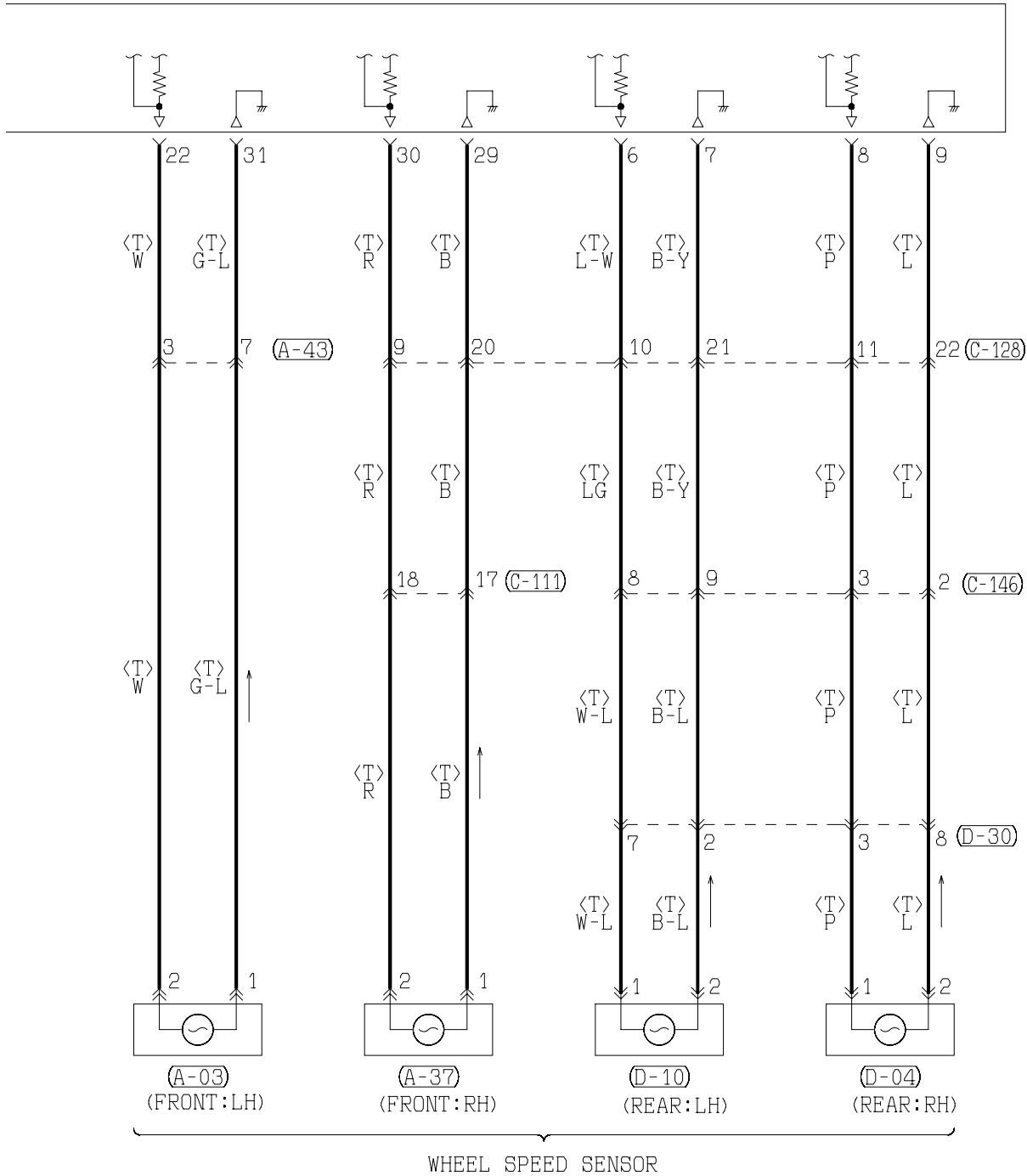


(D-30)

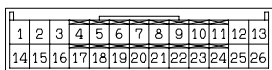
MU801839



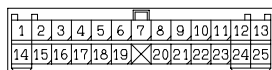
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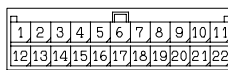
(C-44) (MU801824)



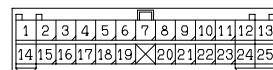
(C-111)



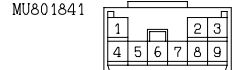
(C-128)



(C-130)



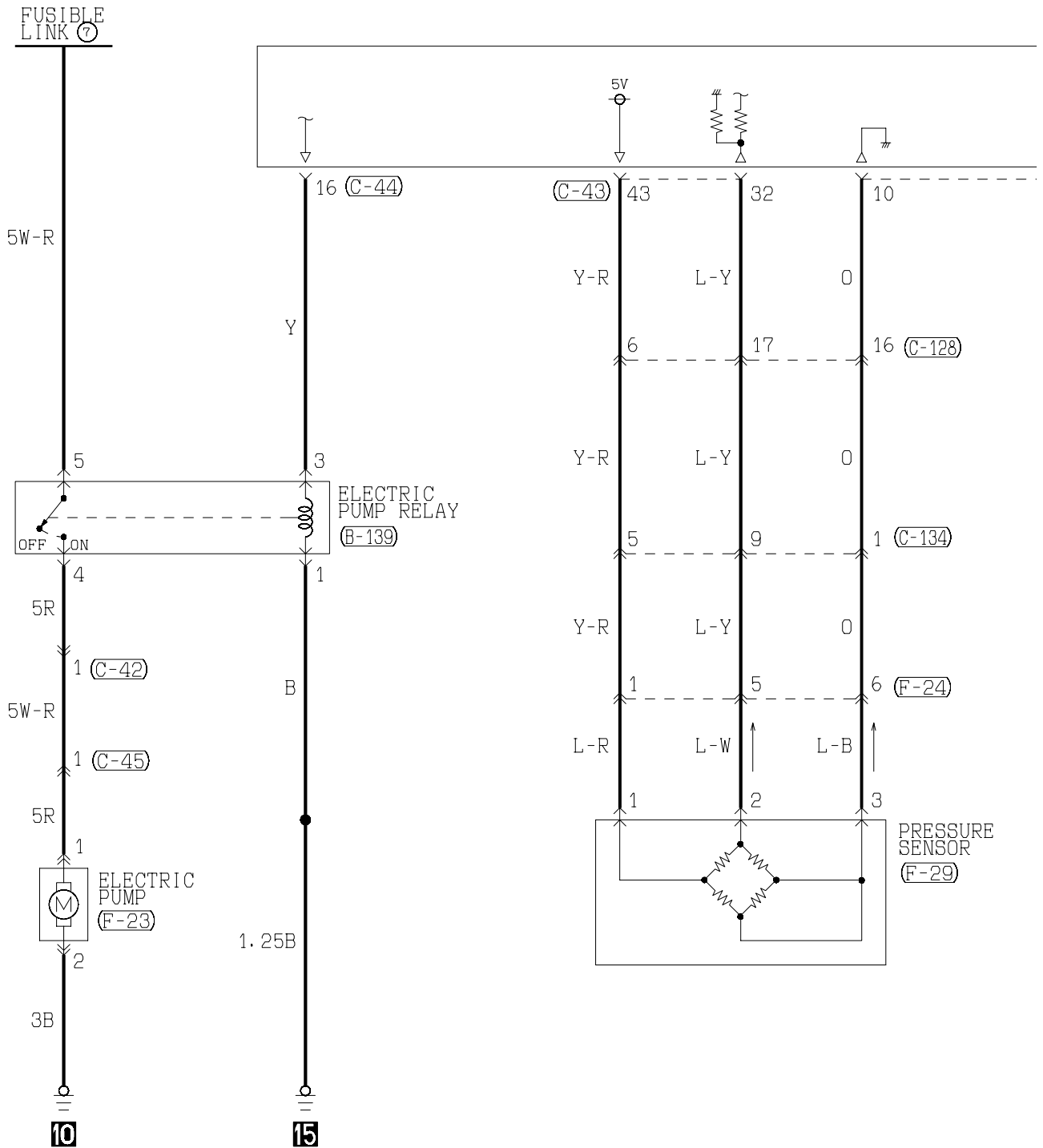
(C-146)



Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

ACD AND AYC <L.H. drive vehicles> (CONTINUED)

7



(B-139)

(C-42)

(C-43) (MU801823)

(C-44) (MU801824)

(C-45)

(C-128)

(C-134) MU801847

(F-23)

1	2	3
4	5	

1	2
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31	32	33	34	35	36	37	38	39	40	41
42	43	44	45	46	47	48	49	50	51	52

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

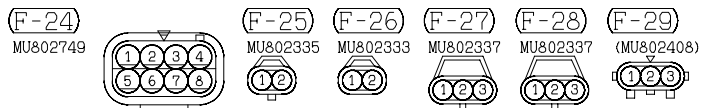
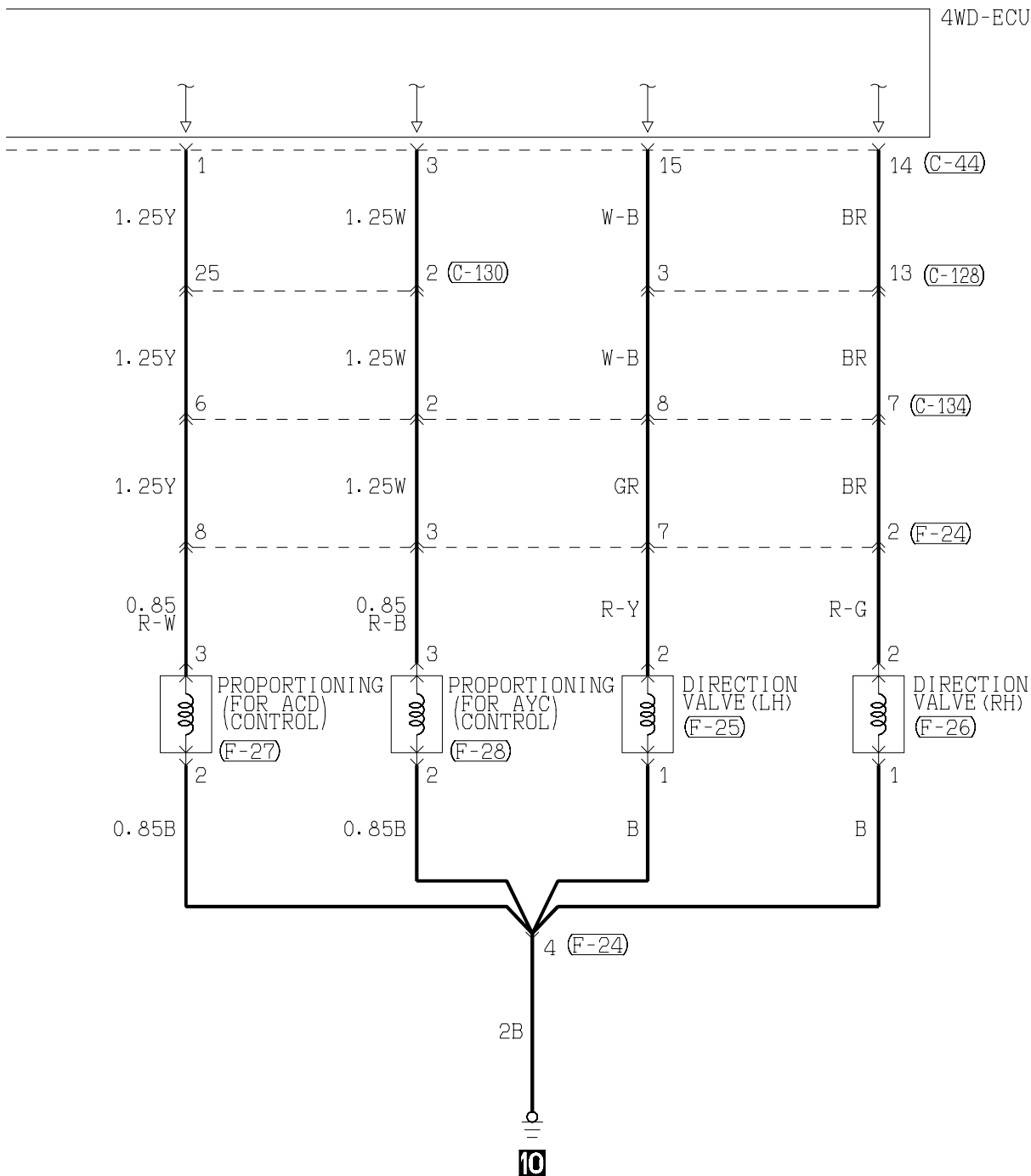
1	2
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1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

1	2	3	4
5	6	7	8
9	10	11	

1	2
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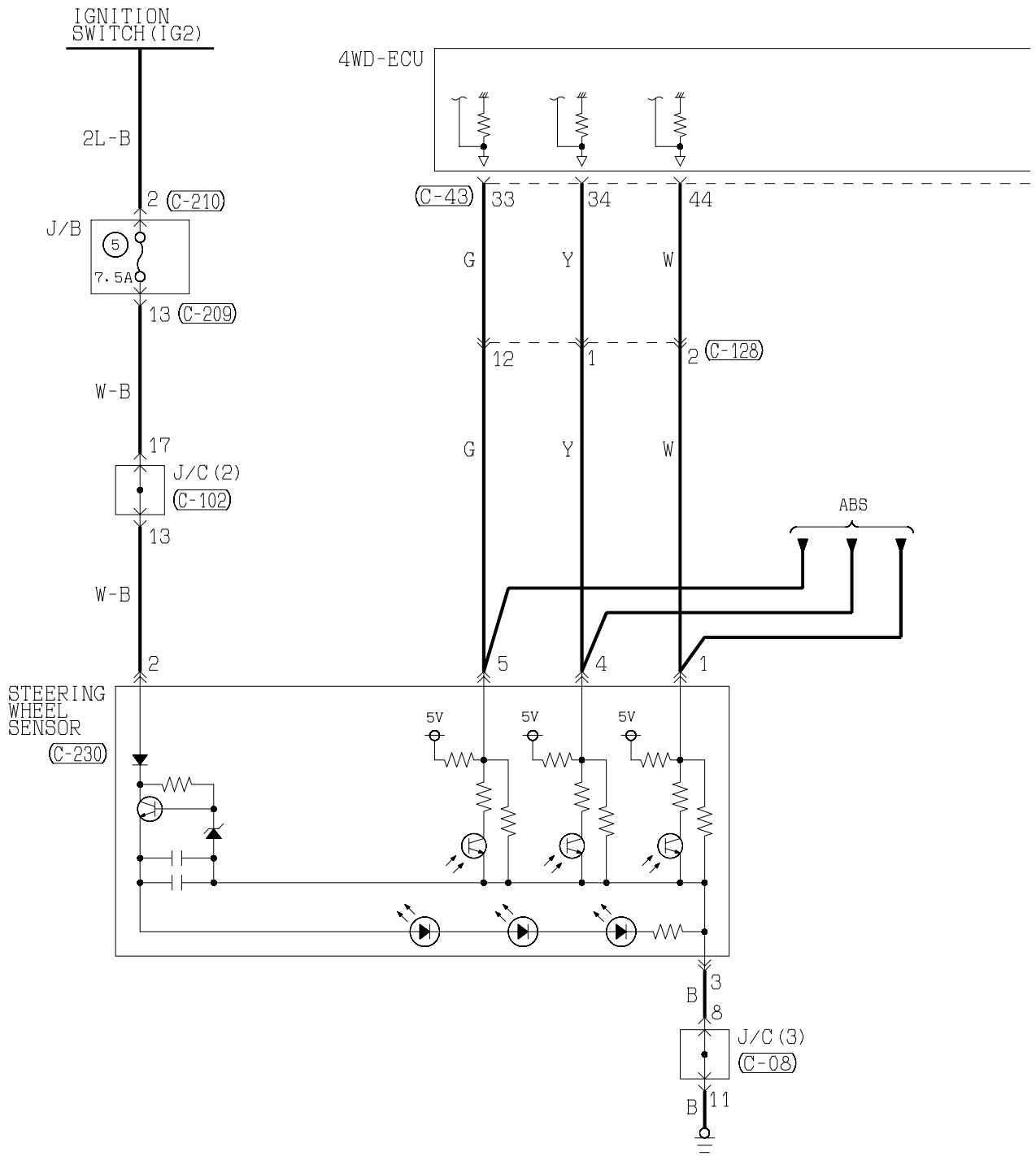
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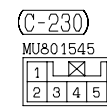
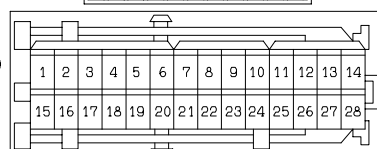
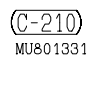
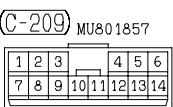
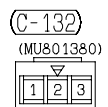
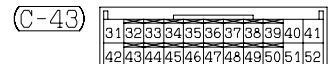
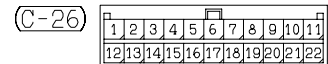
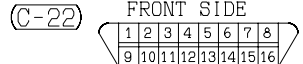
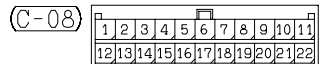
Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

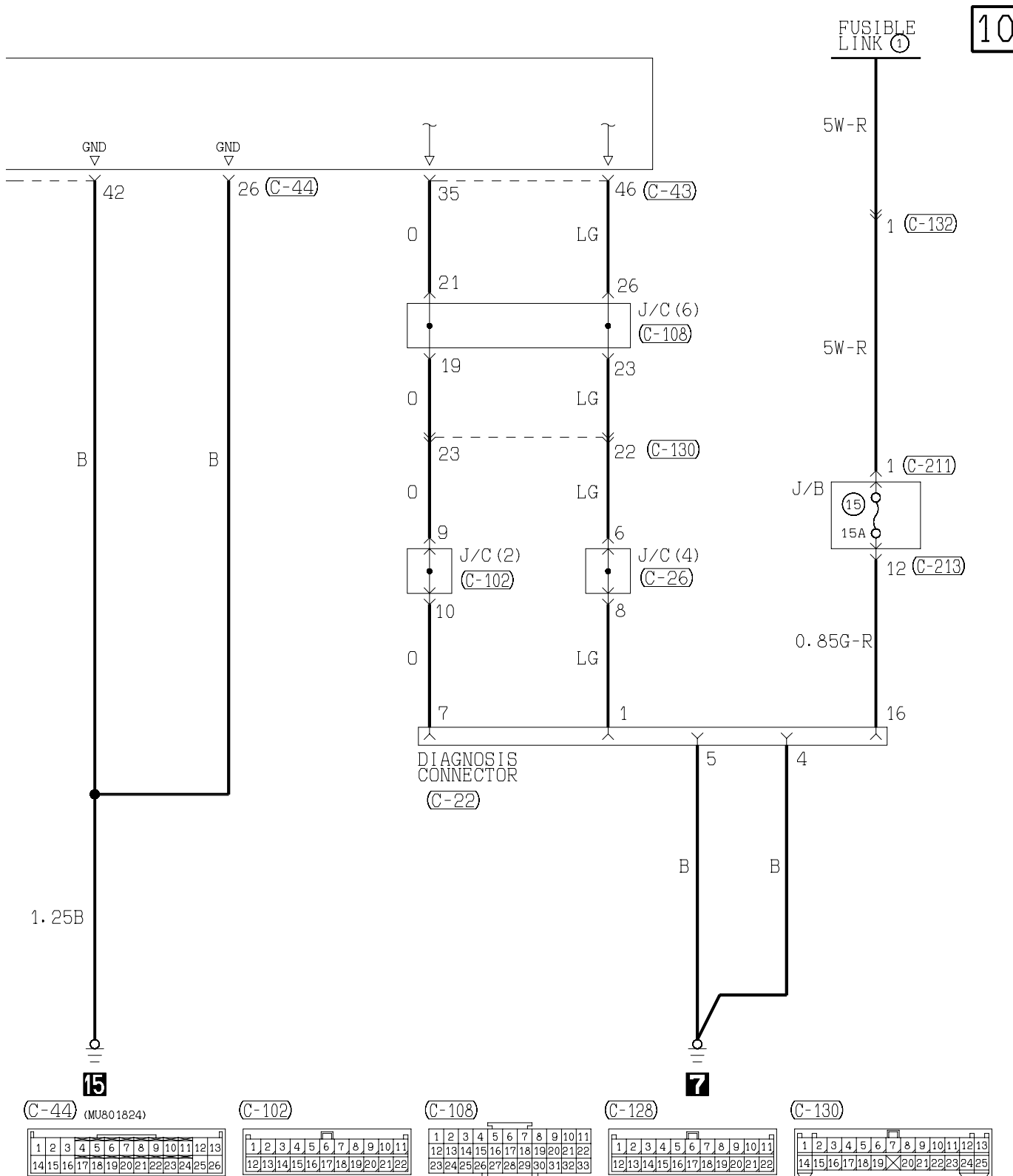
ACD AND AYC <L.H. drive vehicles> (CONTINUED)

9



3



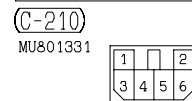
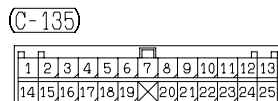
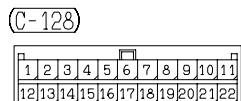
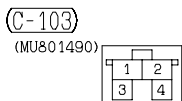
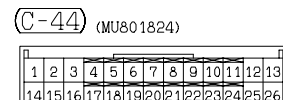
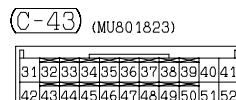
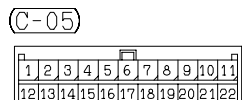
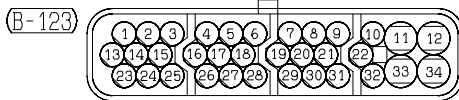
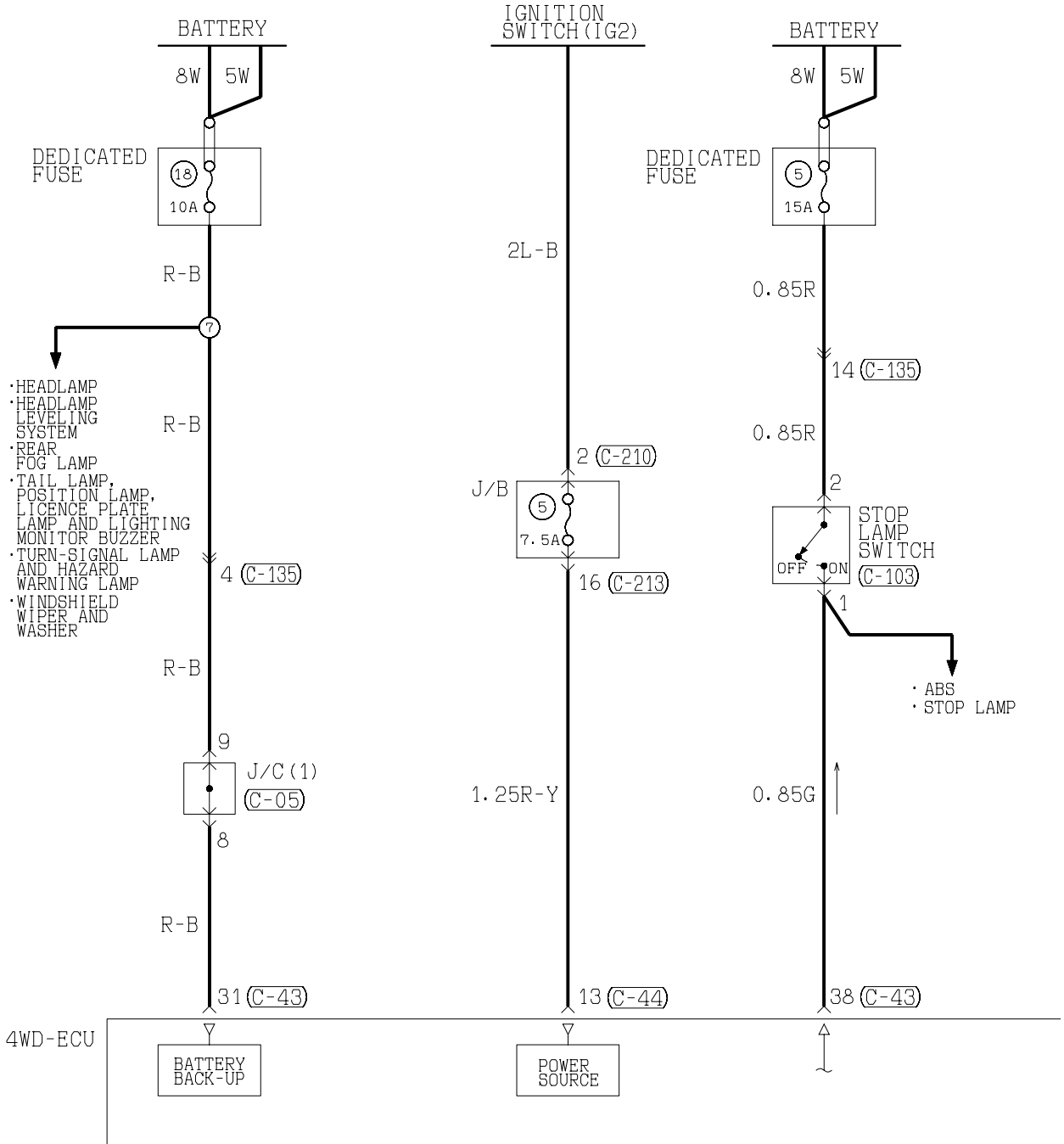


Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

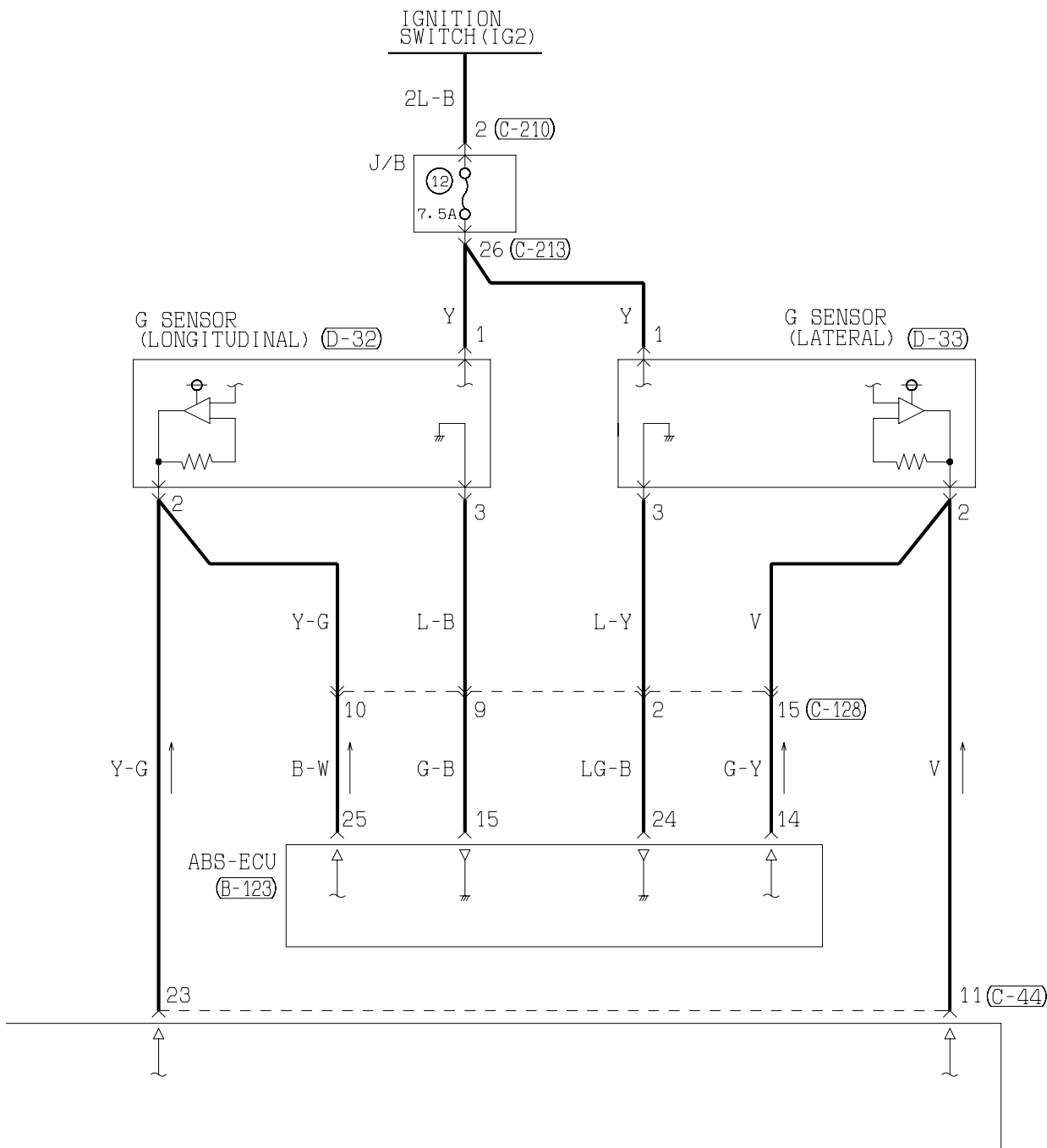
ACD AND AYC

R.H. drive vehicles

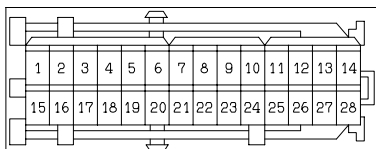
1



2



(C-213)



(D-32)



(D-33)



Wire colour code

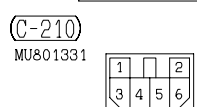
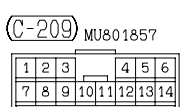
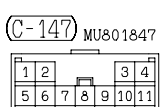
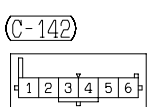
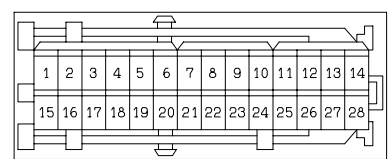
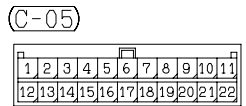
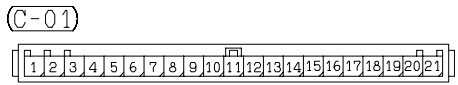
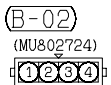
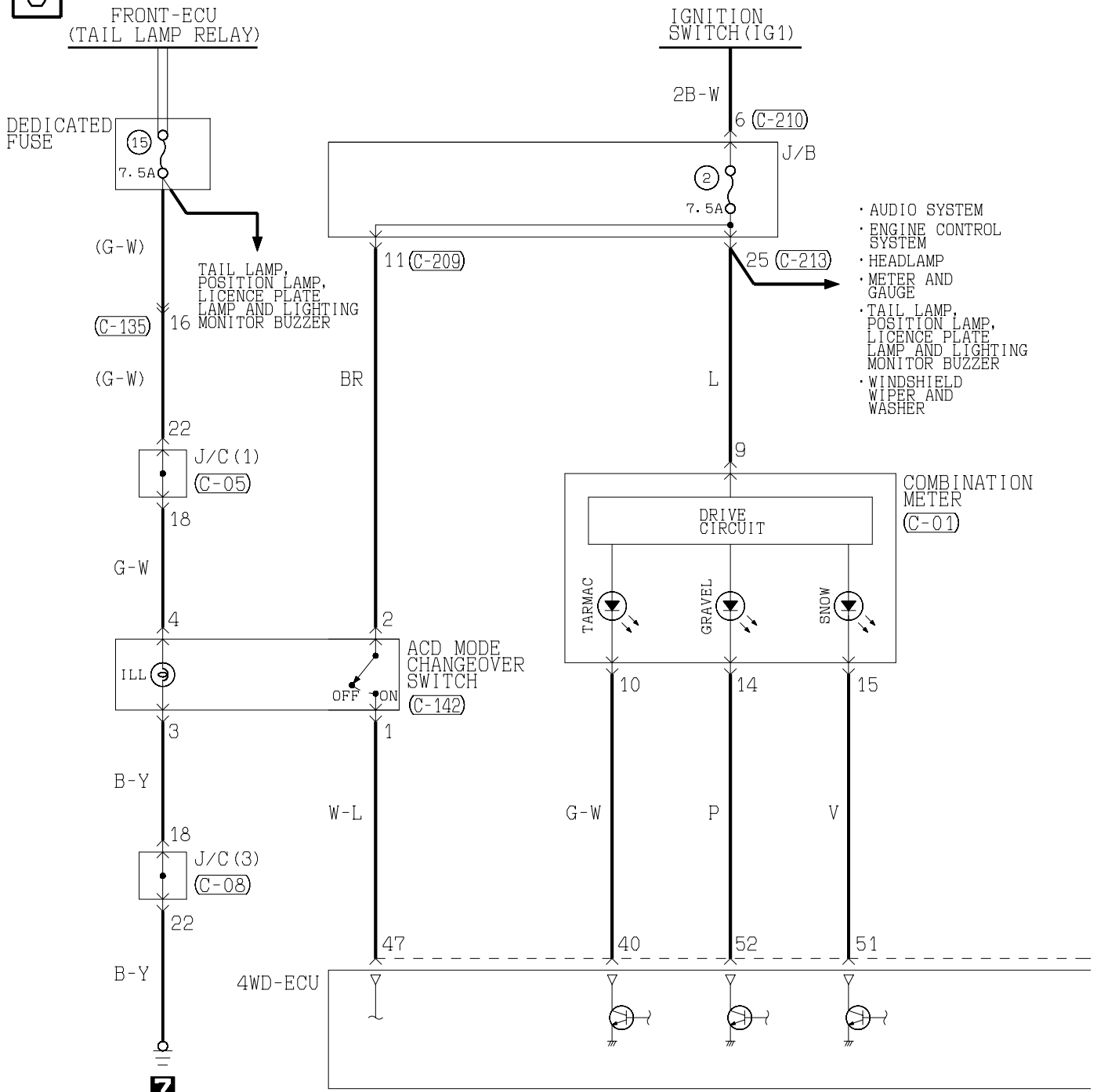
B : Black LG : Light green
 BR : Brown O : Orange
 W : White SB : Sky blue
 V : Violet

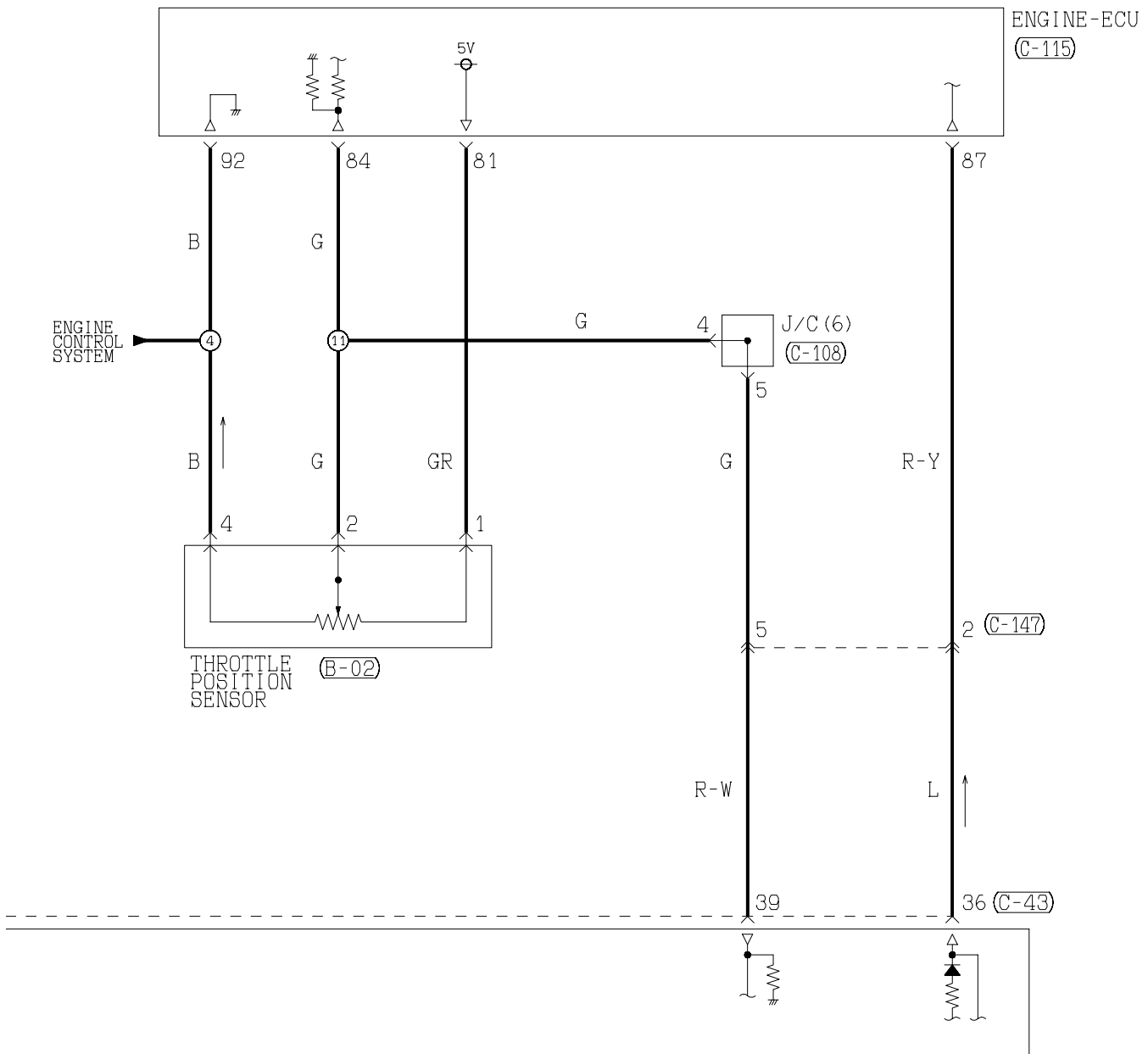
G : Green
 GR : Gray
 P : Pink

L : Blue
 R : Red
 Y : Yellow

ACD AND AYC <R.H. drive vehicles> (CONTINUED)

3





(C-08)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-43) (MU801823)

31	32	33	34	35	36	37	38	39	40	41
42	43	44	45	46	47	48	49	50	51	52

(C-108)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

(C-115) (MU801823)

71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

(C-135)

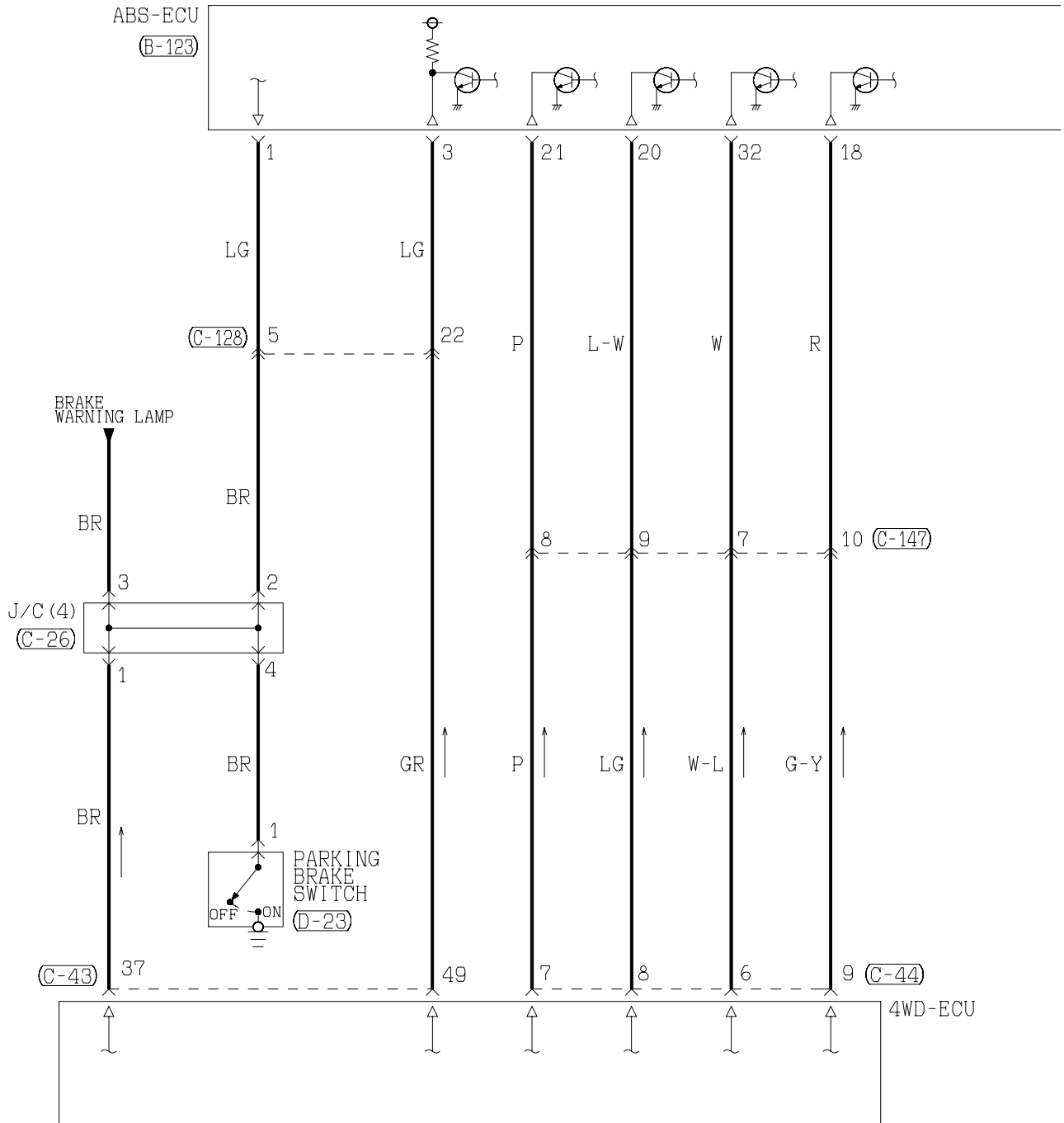
1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

Wire colour code

B : Black LG: Light green G : Green L : Blue W : White Y : Yellow SB: Sky blue
 BR: Brown O : Orange GR: Gray R : Red P : Pink V : Violet

ACD AND AYC <R.H. drive vehicles> (CONTINUED)

5



(A-03) MU802601

(A-37) MU802601

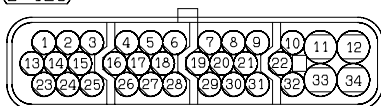
(B-123)

(C-26)

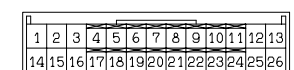
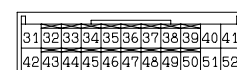
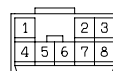
(C-43) (MU801823)

(C-44) (MU801824)

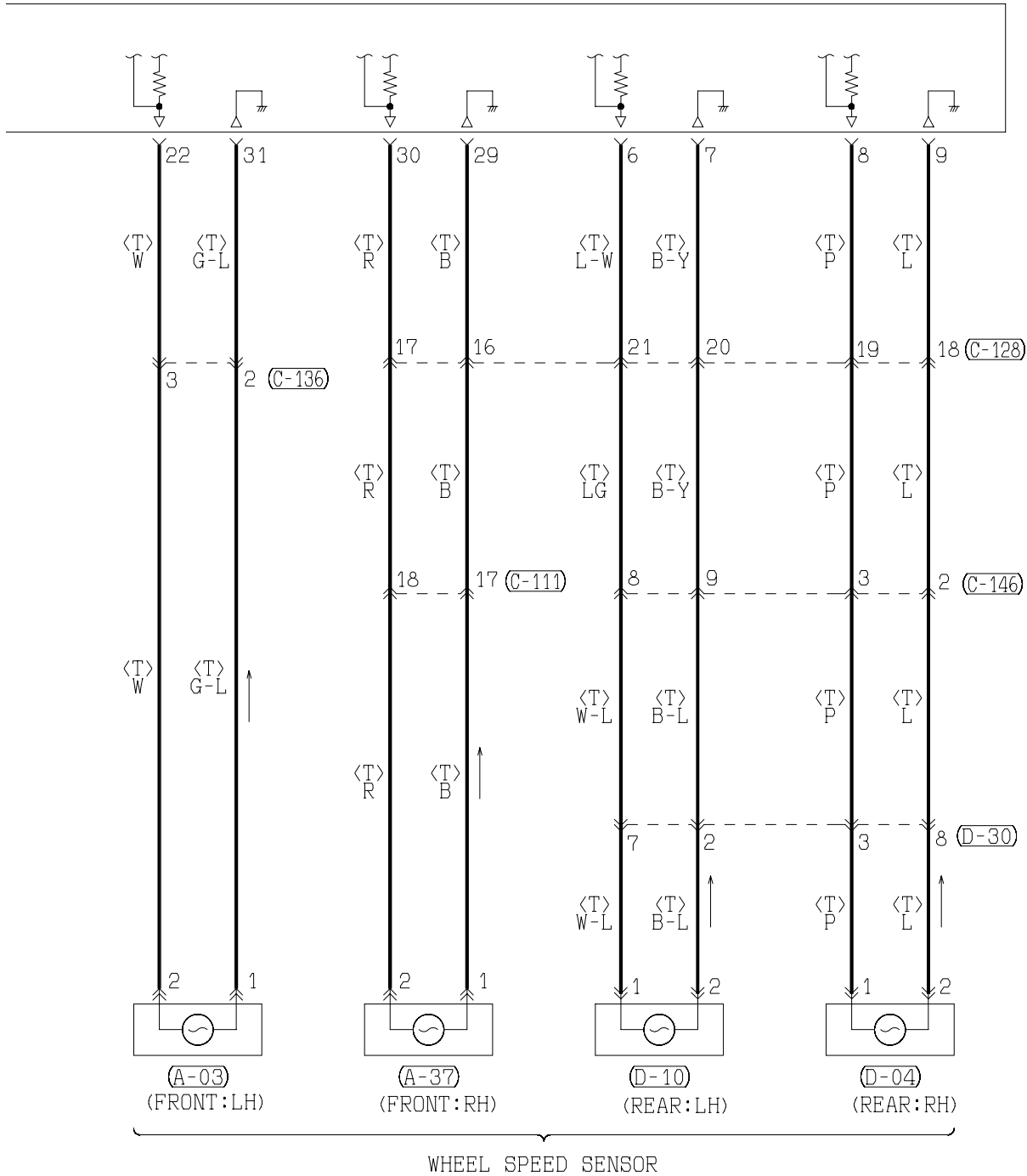
(D-23) (MU801211)



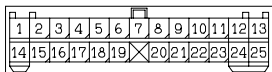
(D-30) MU801839



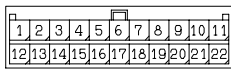
6



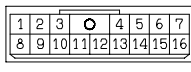
(C-111)



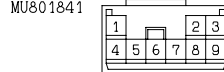
(C-128)



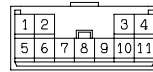
(C-136)



(C-146)



(C-147) MU801847



(D-04) MU802602



(D-10) MU802602



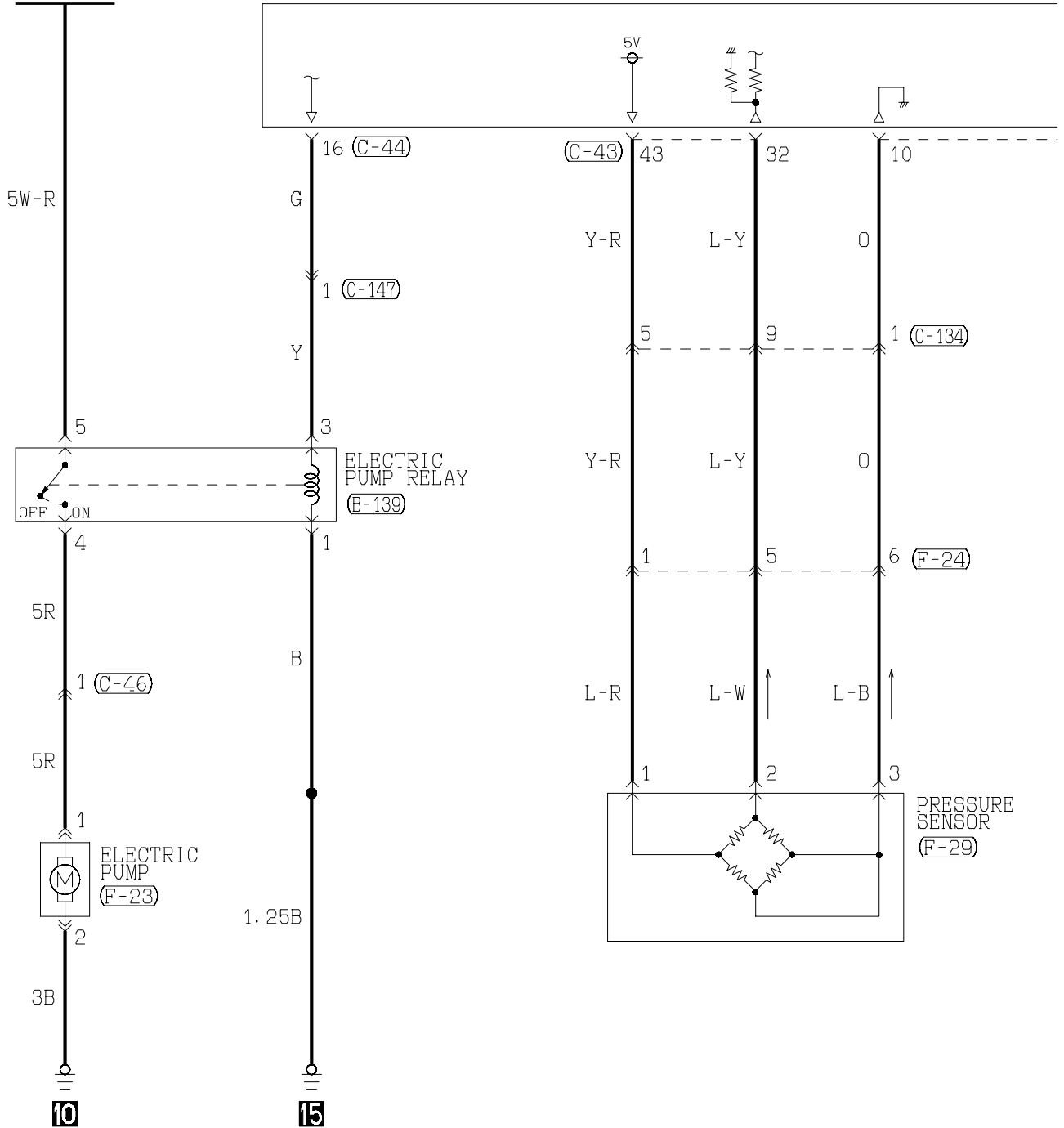
Wire colour code

B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

ACD AND AYC <R.H. drive vehicles> (CONTINUED)

7

FUSIBLE LINK ⑦



(B-139)

(C-43) (MU801823)

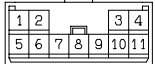
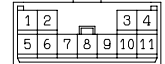
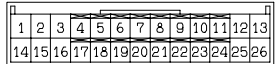
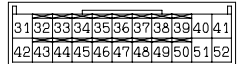
(C-44) (MU801824)

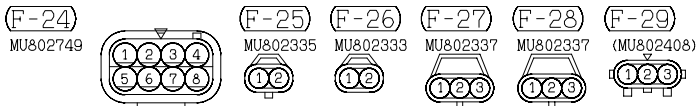
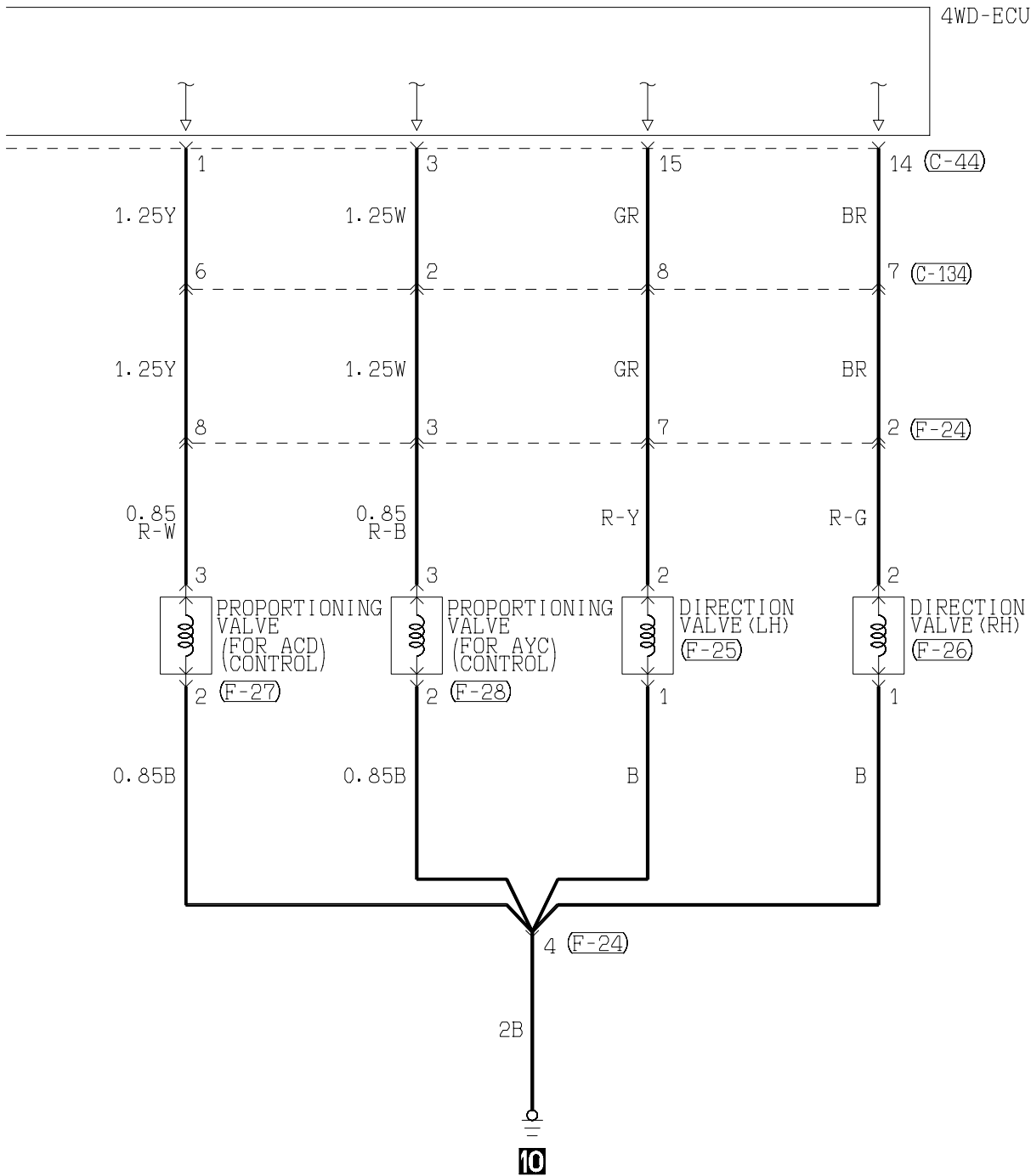
(C-46)

(C-134) MU801847

(C-147) MU801847

(F-23)

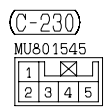
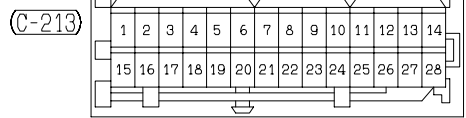
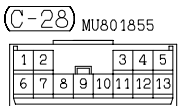
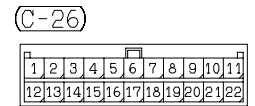
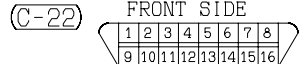
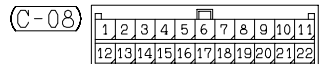
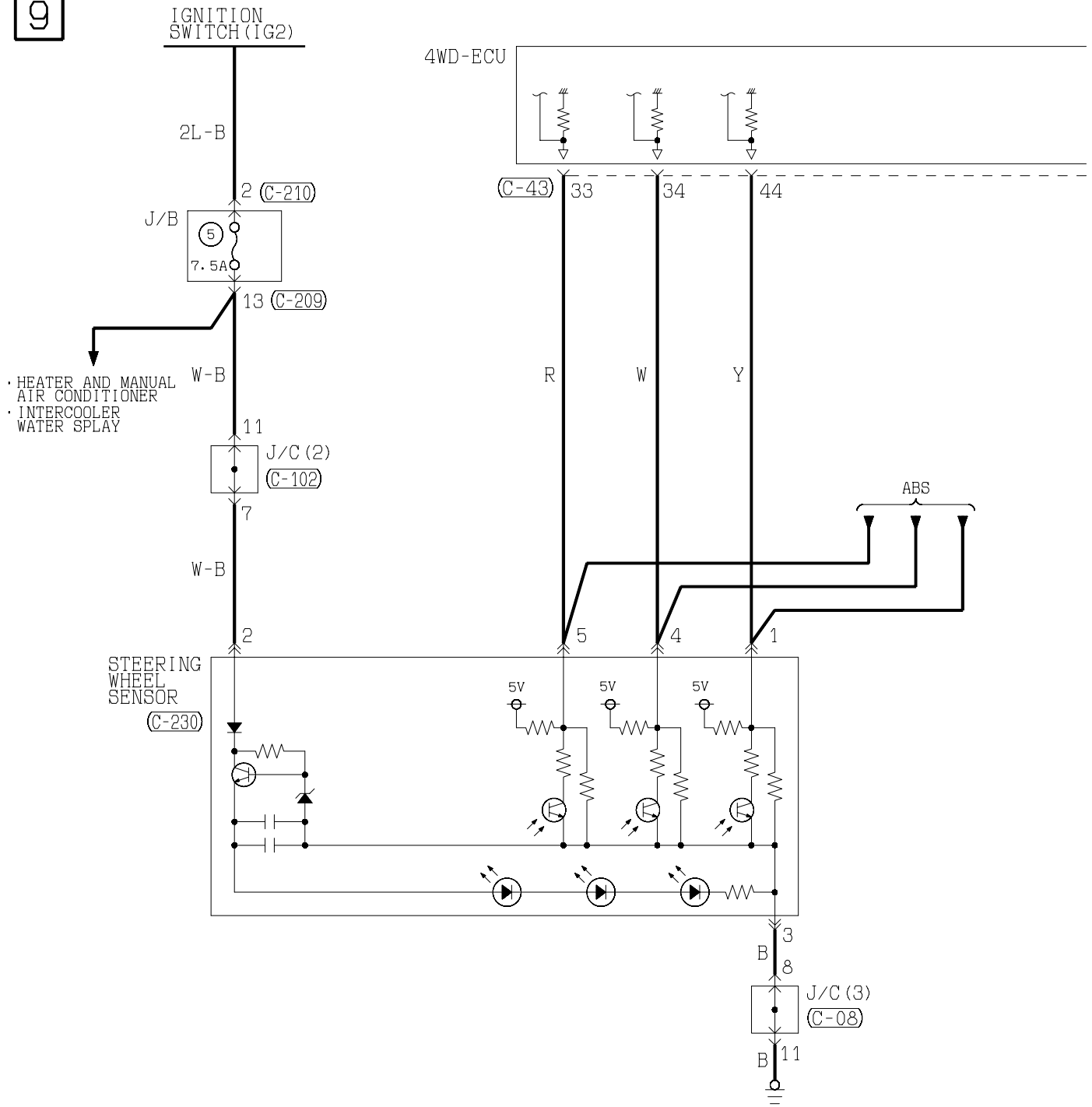


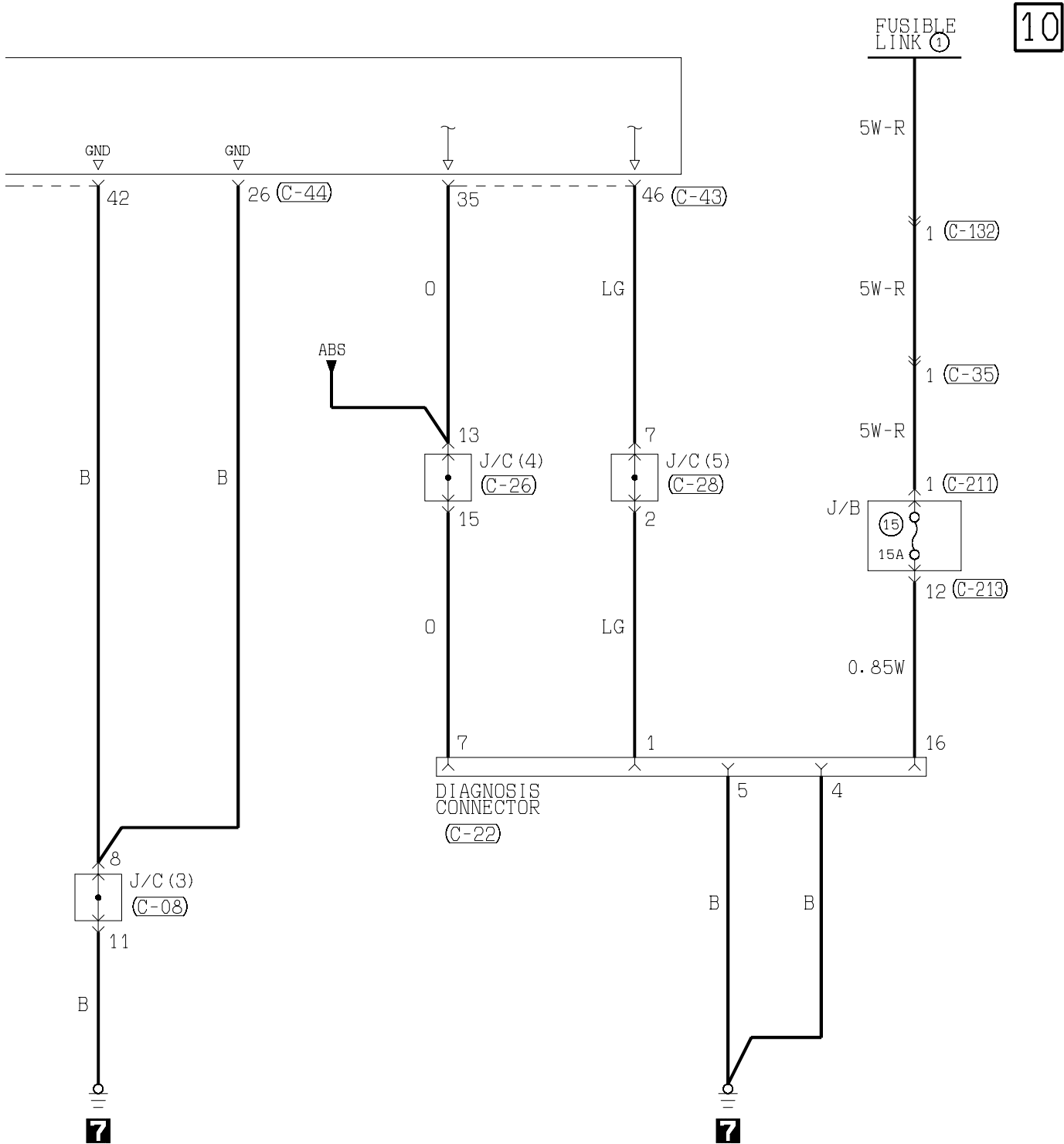


Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

ACD AND AYC <R.H. drive vehicles> (CONTINUED)

9





10

(C-43) (MU801823)

31	32	33	34	35	36	37	38	39	40	41
42	43	44	45	46	47	48	49	50	51	52

(C-44) (MU801824)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

(C-102)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-132) (MU801380)

1	2	3
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(C-209) MU801857

1	2	3	4	5	6		
7	8	9	10	11	12	13	14

(C-210) MU801331

1		2	
3	4	5	6

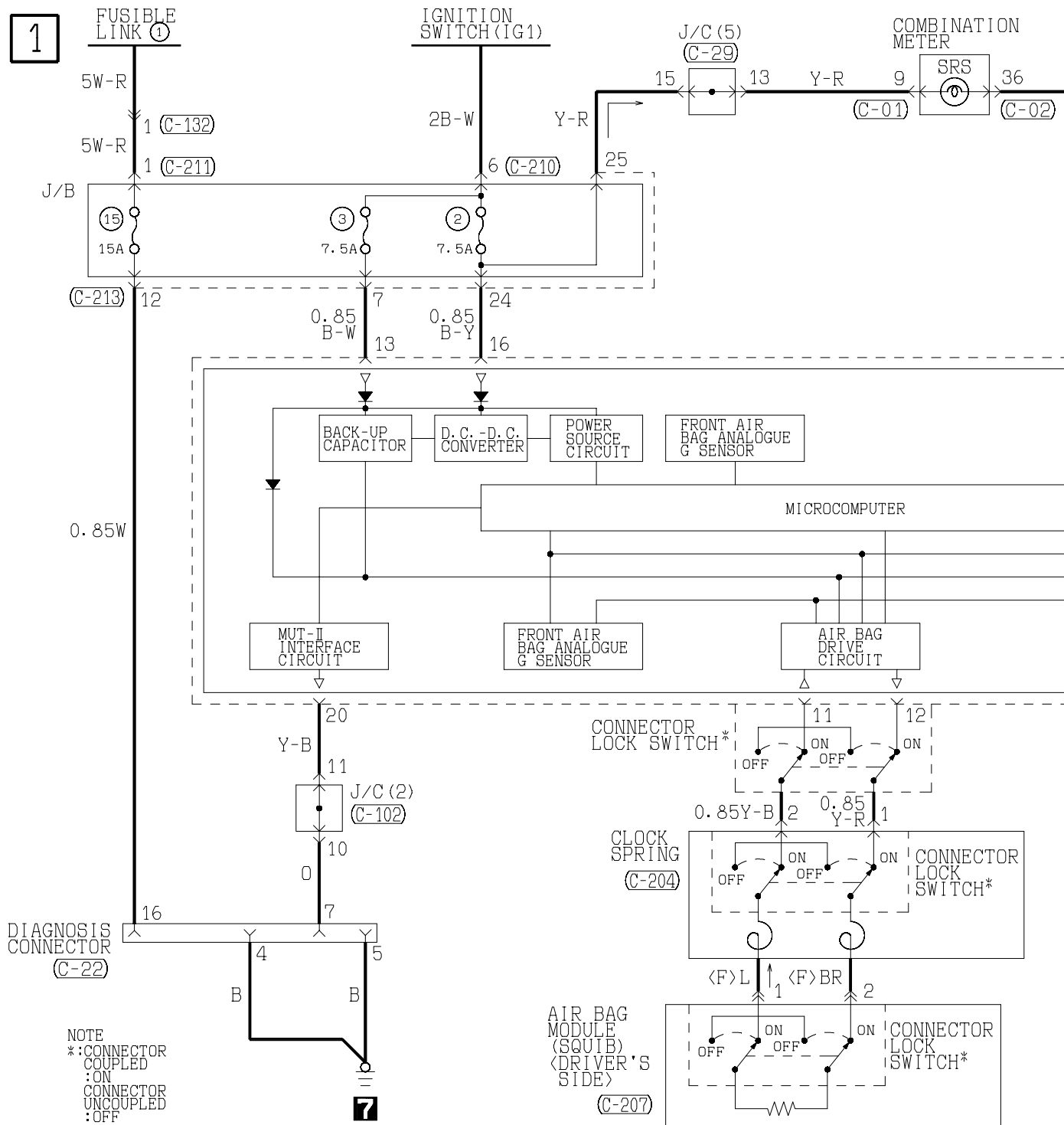
(C-211)

1

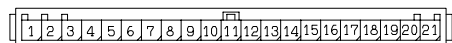
Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) AND SEAT BELT PRETENSIONER

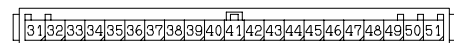
L.H. drive vehicles



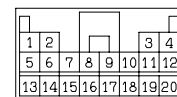
(C-01)



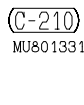
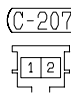
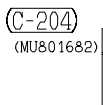
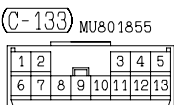
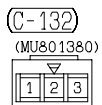
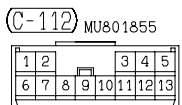
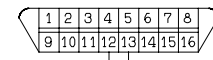
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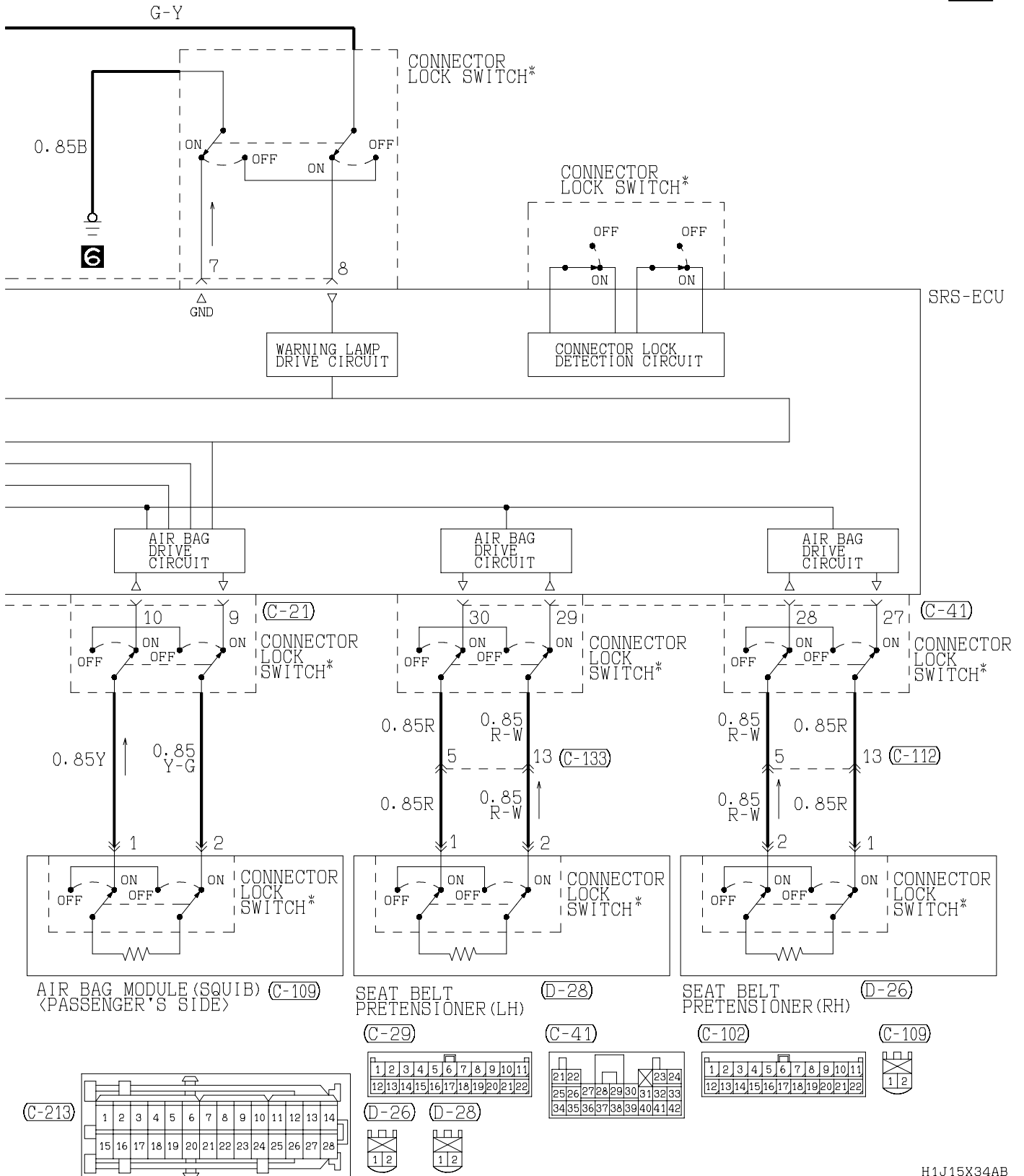
(C-21)



(C-22) FRONT SIDE

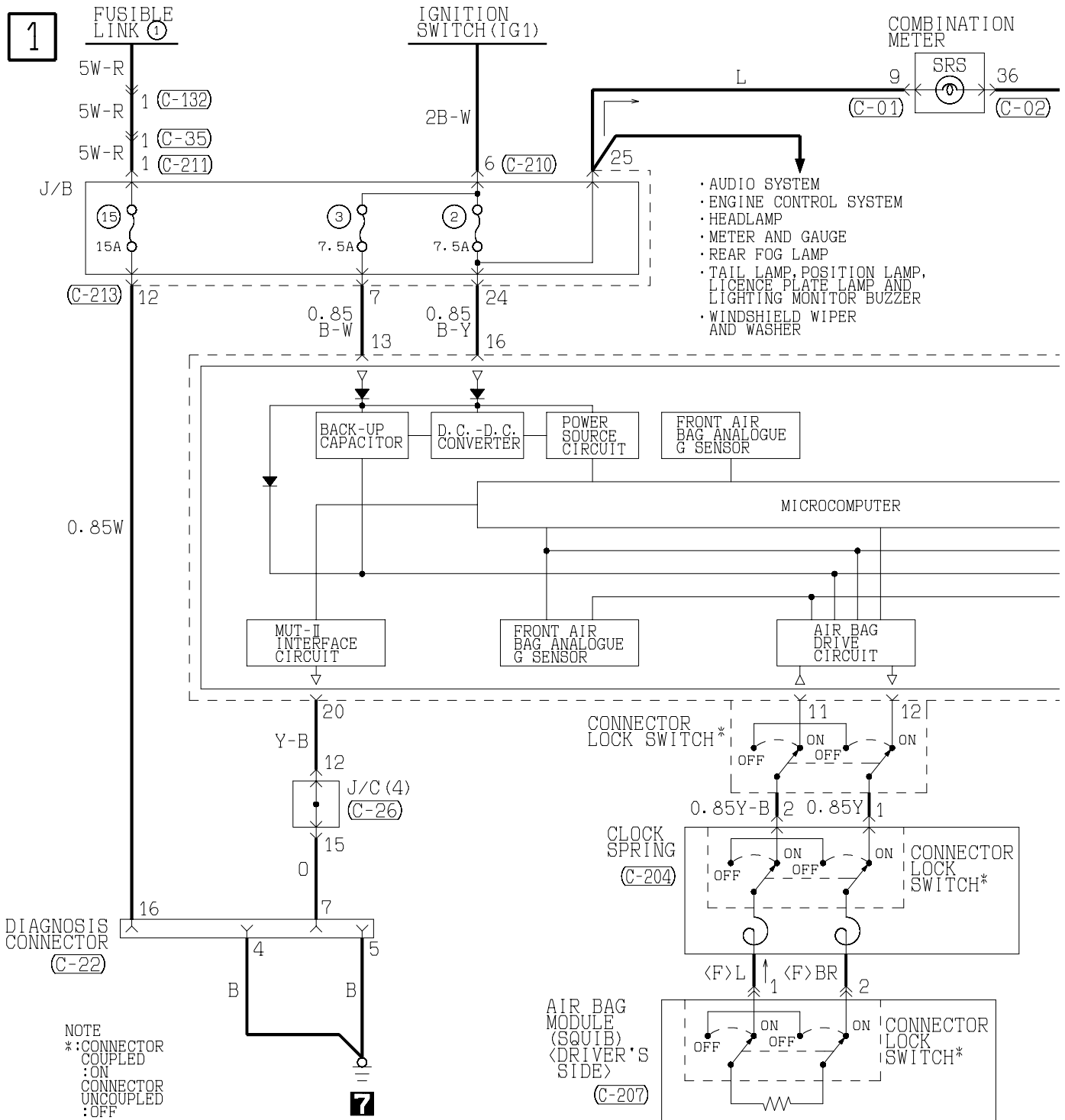


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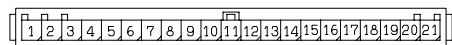


SUPPLEMENTAL RESTRAINT SYSTEM (SRS) AND SEAT BELT PRETENSIONER

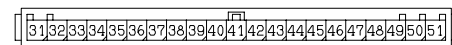
R.H. drive vehicles



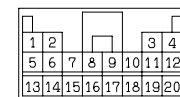
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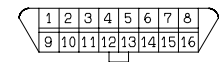
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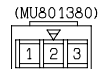
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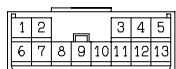
(C-22) FRONT SIDE



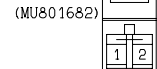
(C-132) (MU801380)



(C-133) MU801855



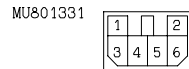
(C-204) (MU801682)



(C-207)



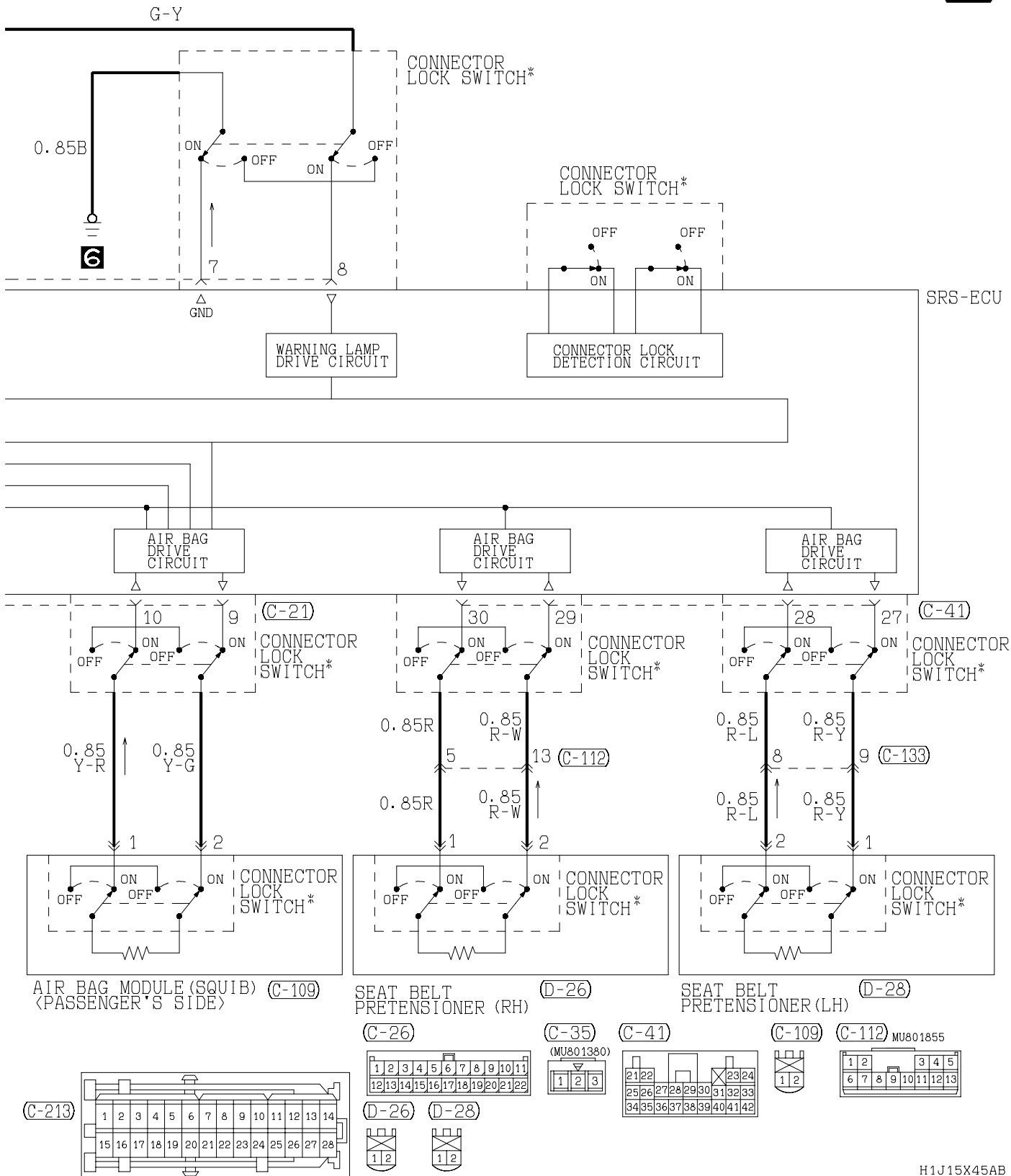
(C-210) MU801331



(C-211)

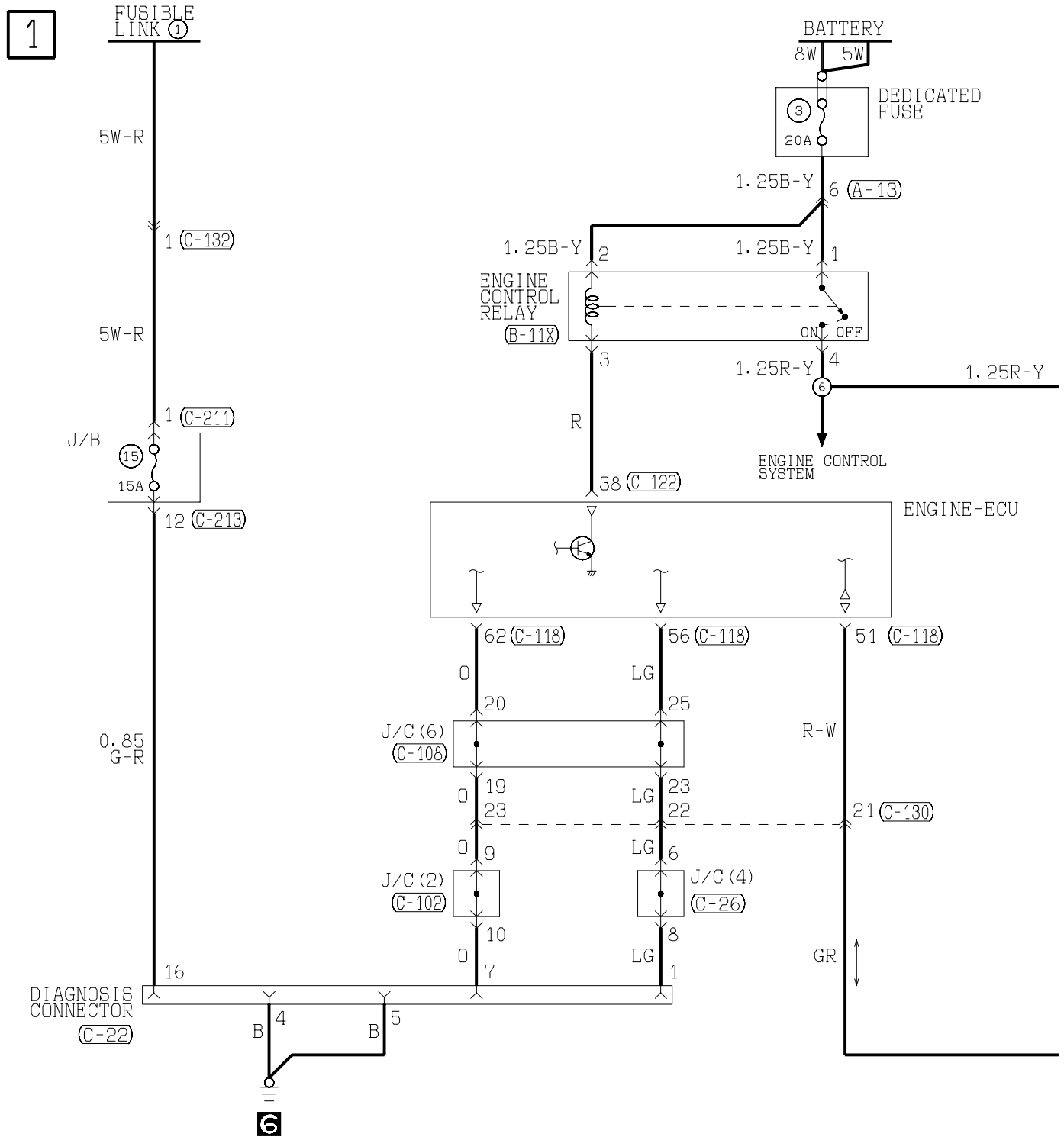


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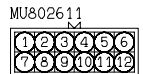


IMMOBILIZER SYSTEM

L.H. drive vehicles



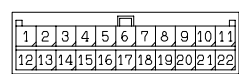
(A-13)



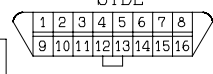
(B-11X)



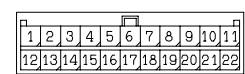
(C-08)



(C-22) FRONT SIDE



(C-26)



(C-132)



(C-202)



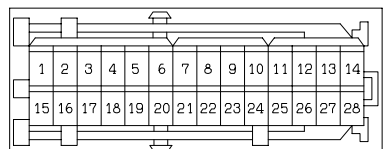
(C-202-1)



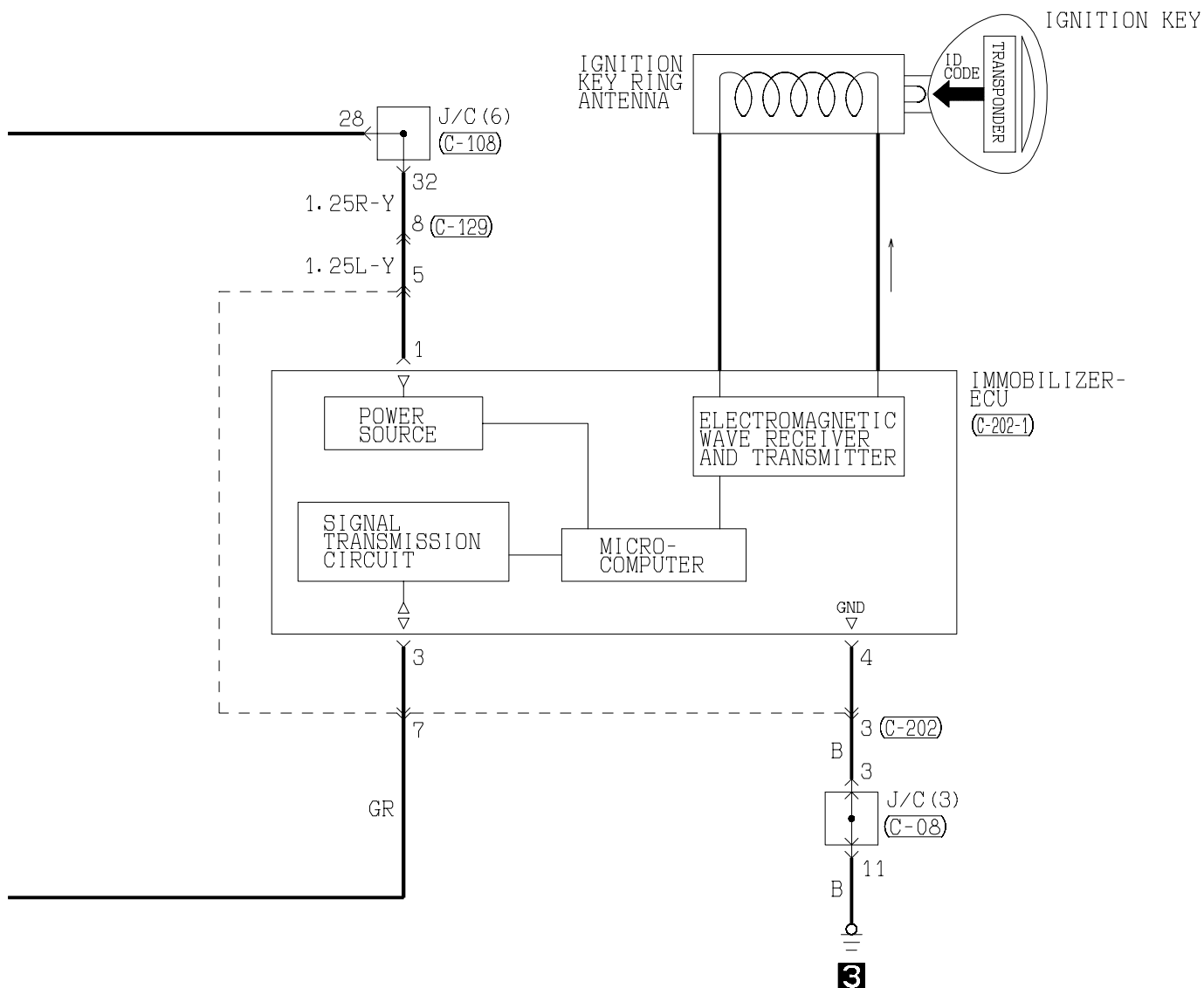
(C-211)



(C-213)



2



(C-102)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22

(C-108)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

(C-118)

(MU801820)

51	52	53	54	55	56
57	58	59	60	61	62

(C-122) (MU801822)

31	32	33	34	35	36	37	38
39	40	41	42	43	44	45	46

(C-129)

(MU801845)

1	2	3	4
5	6	7	8
9	10		

(C-130)

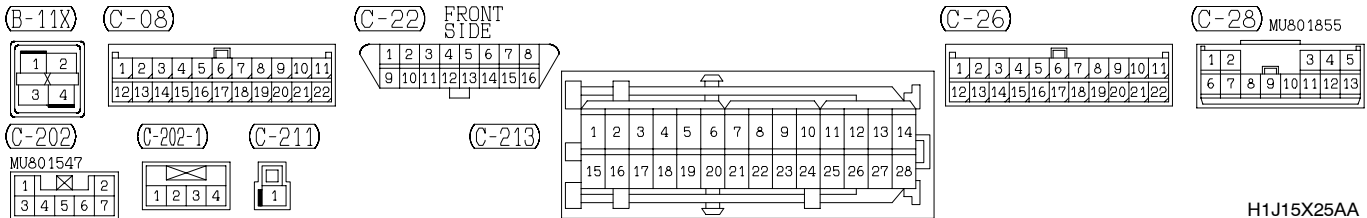
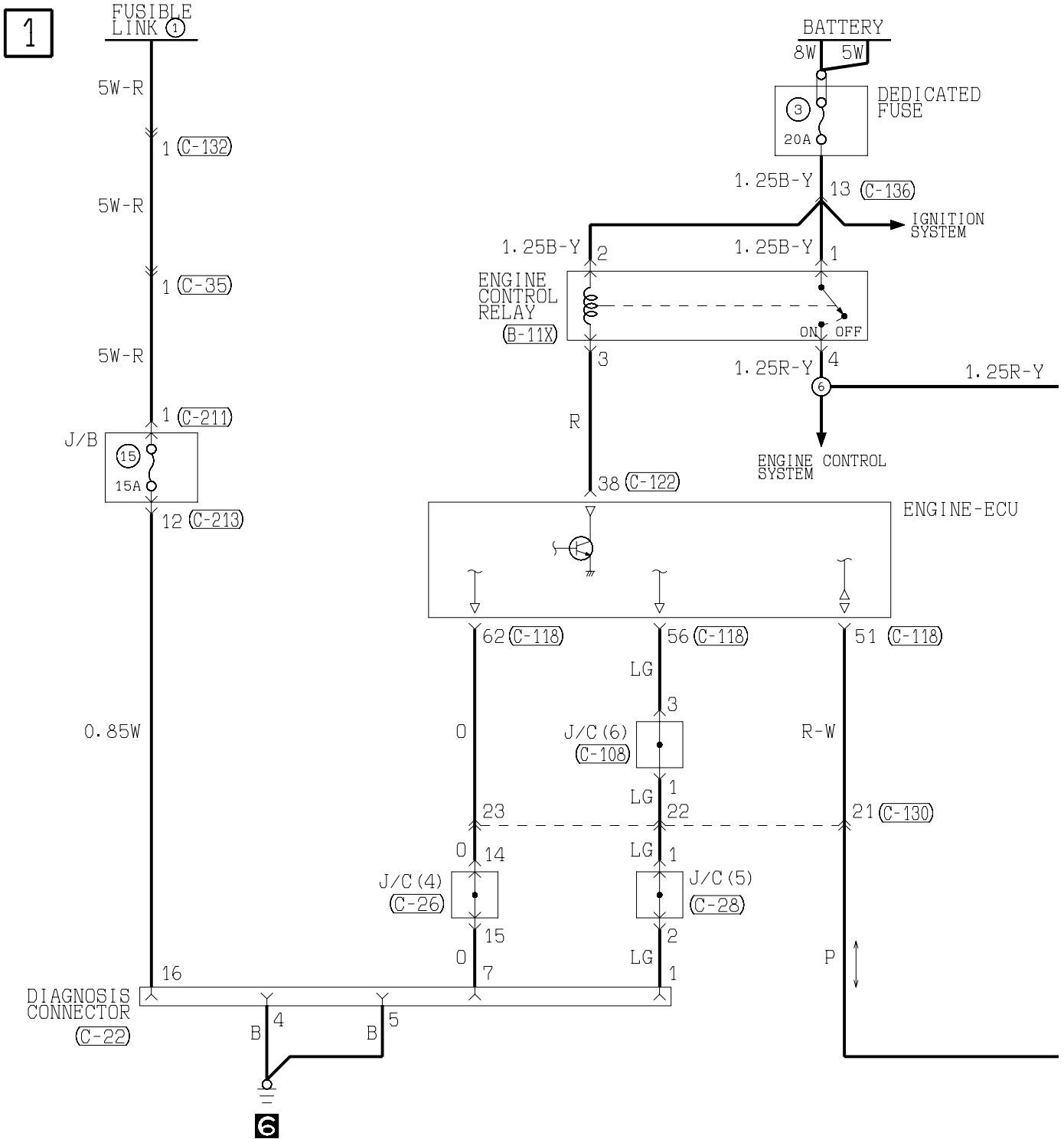
1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	X	20	21	22	23	24	25

Wire colour code

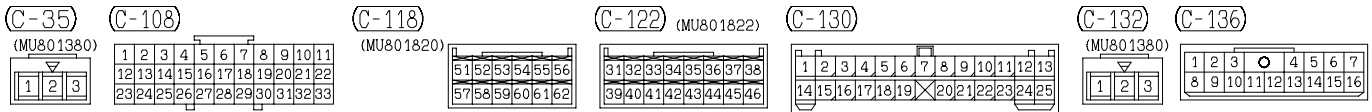
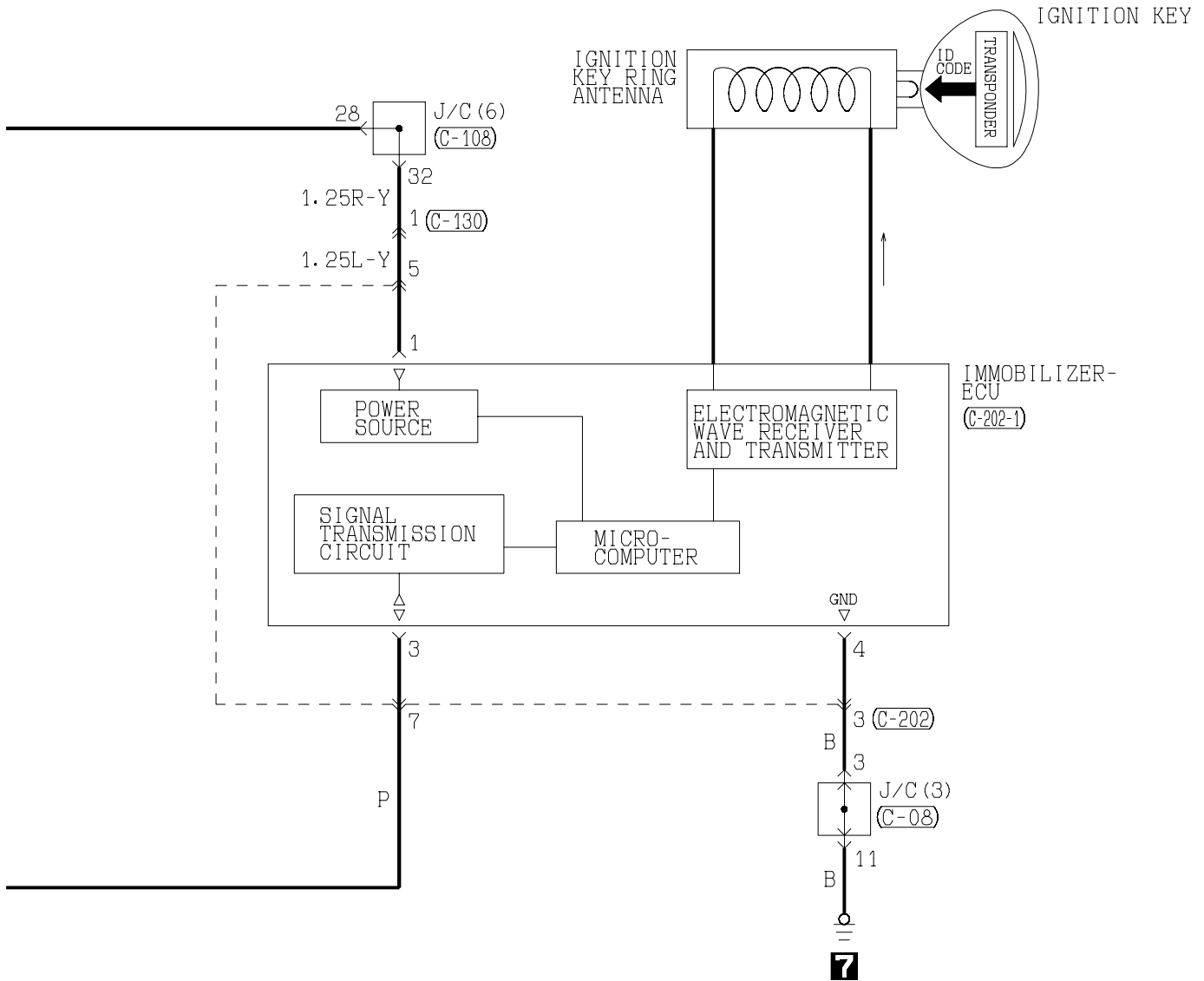
B : Black LG: Light green G : Green L : Blue W : White Y : Yellow SB: Sky blue
 BR: Brown O : Orange GR: Gray R : Red P : Pink V : Violet

IMMOBILIZER SYSTEM

R.H. drive vehicles



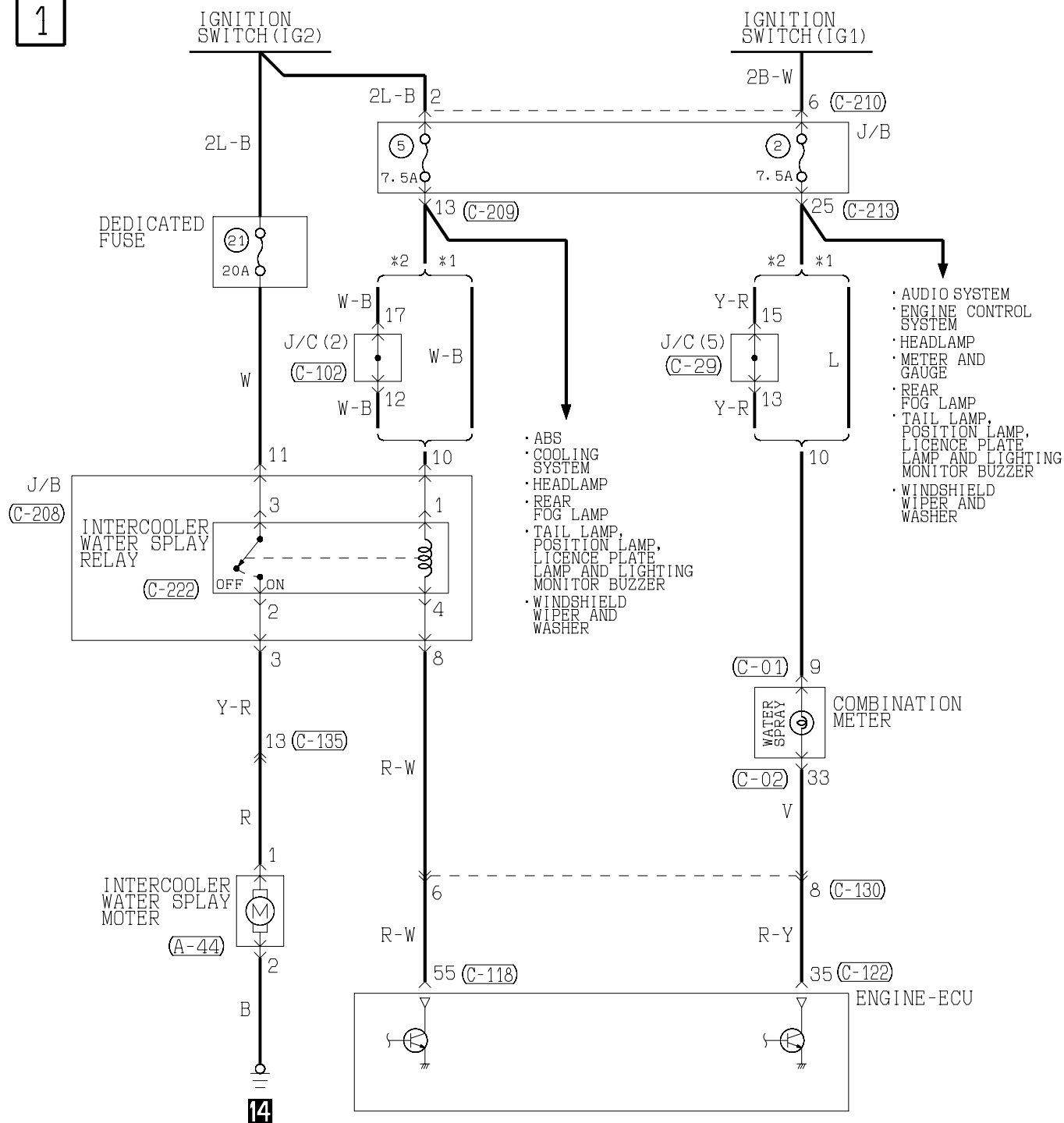
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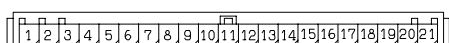
Wire colour code
 B :Black LG:Light green G :Green L :Blue W :White Y :Yellow SB:Sky blue
 BR:Brown O :Orange GR:Gray R :Red P :Pink V :Violet

INTERCOOLER WATER SPLAY

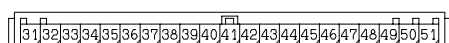
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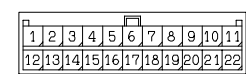
(A-44) (C-01)



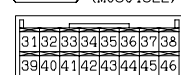
(C-02)



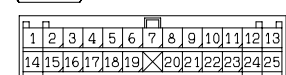
(C-05)



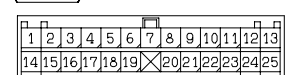
(C-122) (MU801822)



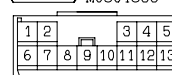
(C-130)



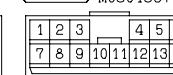
(C-135)



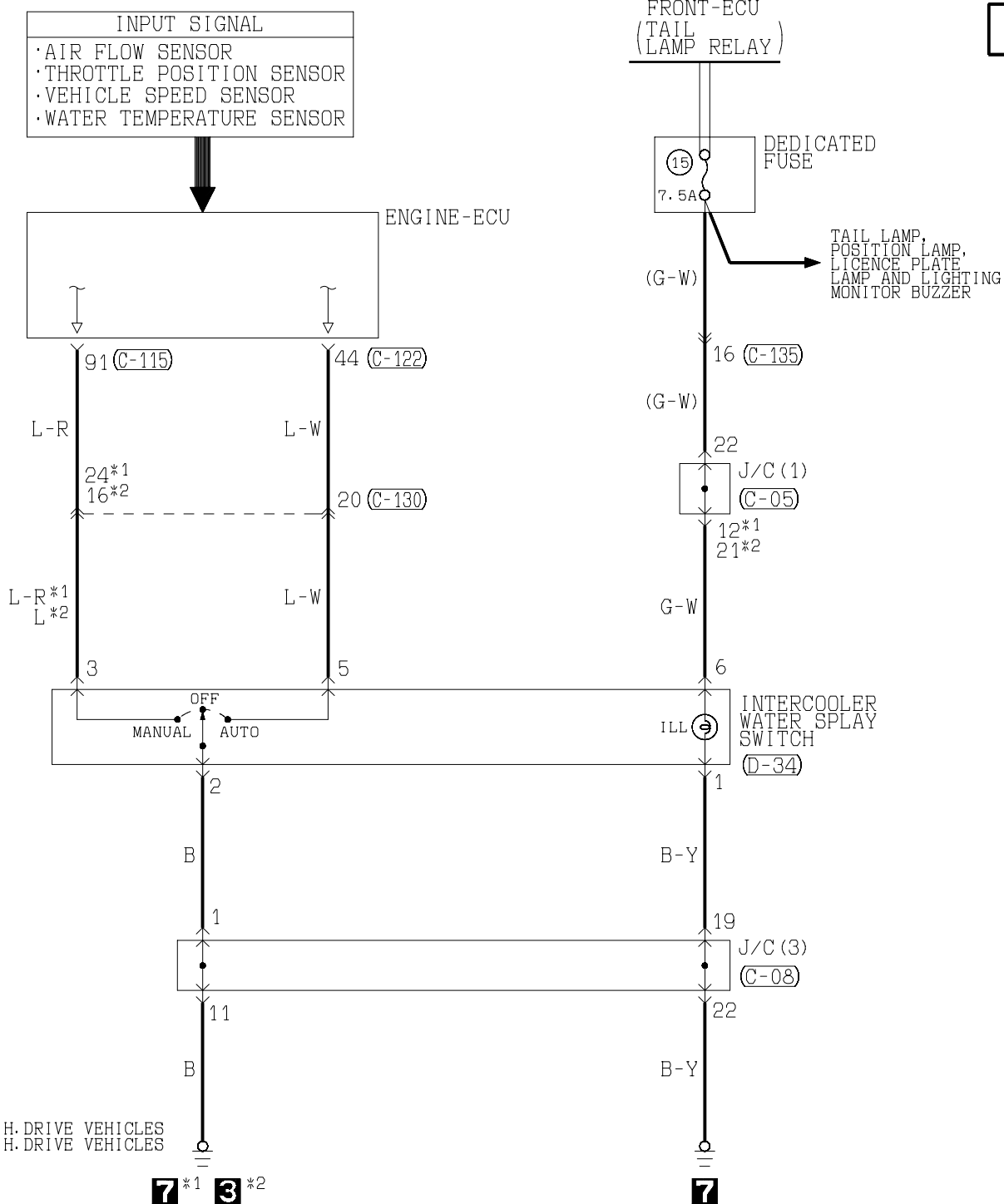
(C-208) MU801855



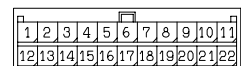
(C-209) MU801857



2



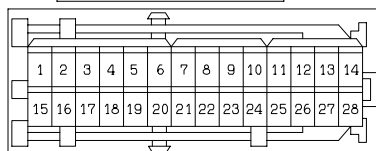
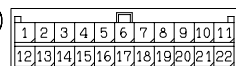
(C-08)



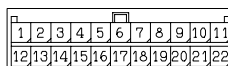
(C-210)
MU801331



(C-29)



(C-102)



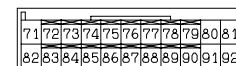
(C-222)



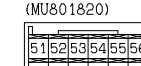
(D-34)



(C-115) (MU801823)

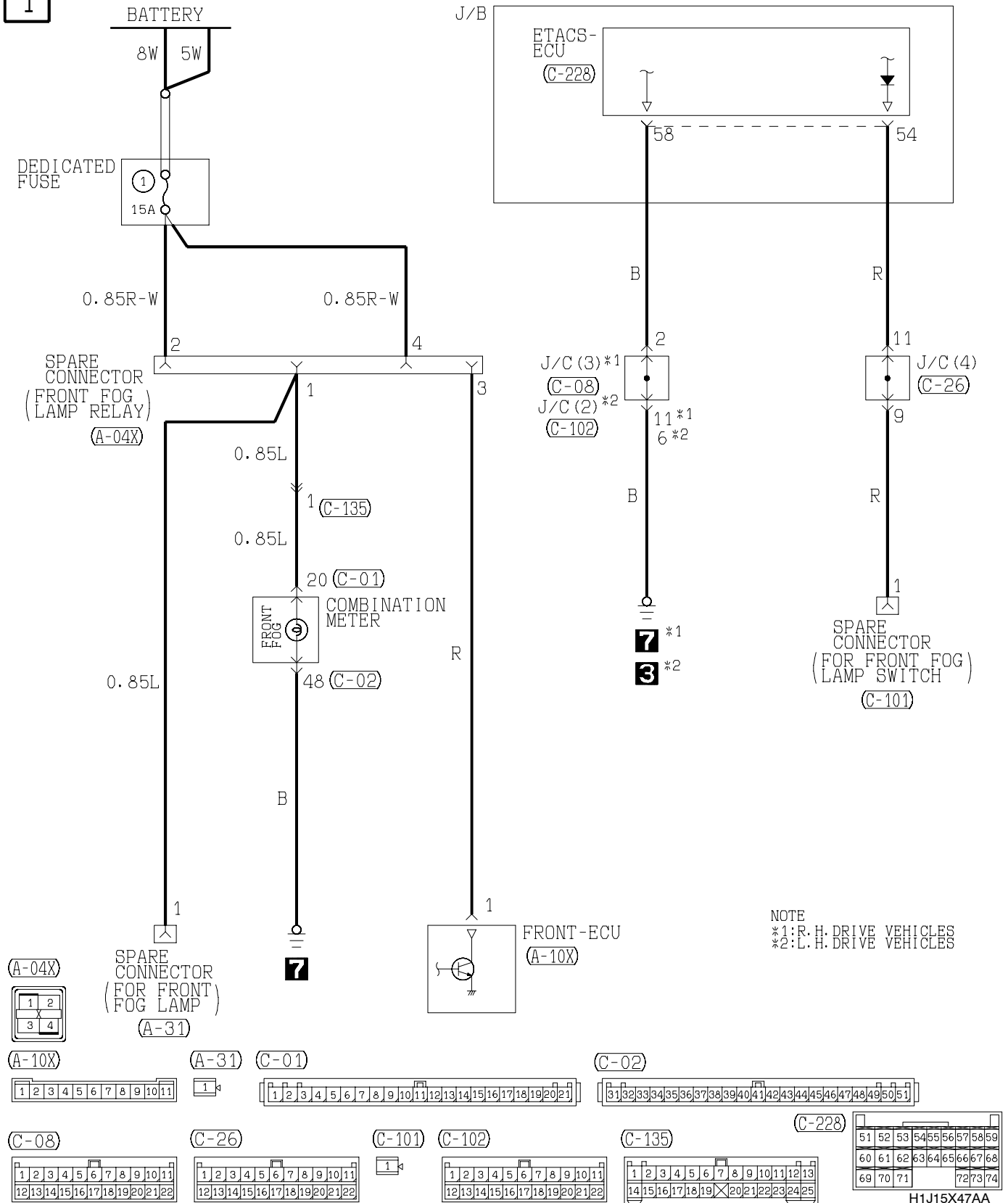


(C-118)
(MU801820)



SPARE CONNECTOR (FOR FRONT FOG LAMP)

1



INDEX

In order of connector No.

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	A-02	Side turn signal lamp (LH)	B-134,138	B-6,8
	A-03	Wheel speed sensor (Front:LH)	B-203,211,217,225,233,243	B-6,8
	A-04X	Spare connector (for front fog lamp relay)	B-73,258	B-6,8
	A-05X	Horn relay	B-73,146	B-6,8
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	A-07X	Condenser fan relay (HI)	B-73,177,183	B-6,8
	A-08X	No connection	B-73	B-6,8
	A-09X	Radiator fan relay	B-73,102,176,182	B-6,8
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	A-13	Front wiring harness (LH) and control wiring harness combination <LHD>	B-86,90,102,176,178,186,252	B-6
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	A-31	Spare connector (for front fog lamp)	B-258	B-7,9
	A-34	No connection	-	B-9
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	A-39	Front combination lamp (LH)	B-103,106,110,114,130,132,134,138	B-7,9
	A-40	Front combination lamp (RH)	B-103,106,111,114,130,132,135,139	B-7,9
	A-43	Front wiring harness (LH) and control wiring harness combination <LHD>	B-82,84,177,178,203,217,233	B-7
	A-44	Intercooler water spray motor	B-256	B-7,9

	Connector No.	Parts name	Circuit diagram page	Wiring diagram page
A	A-45	Condenser fan motor	B-177,183	B-7,9
	A-46	Condenser fan motor	B-177,183	B-7,9
	A-47	A/C compressor	B-178,184	B-7,9
	A-48	Power steering oil pressure switch	B-90,98	B-7,9
B	B-01	Windshield wiper motor	B-186,190	B-10,14
	B-02	Throttle position sensor	B-89,97,215,223,231,241	B-10,14
	B-03	Vehicle speed sensor	B-92,100,150,154,197	B-10,14
	B-04	Brake fluid level switch	B-157	B-10,14
	B-05X	Engine speed detection connector	B-73,82,83,90,98	B-10,14
	B-06X	No connection	B-73	B-10,14
	B-07X	No connection	B-73	B-10,14
	B-08X	No connection	B-73	B-10,14
	B-09X	Ignition coil relay <RHD> or no connection <LHD>	B-73,83	B-10,14
	B-10X	No connection	B-73	B-10,14
	B-11X	Engine control relay	B-73,86,94,252,254	B-10,14
	B-12X	A/C compressor relay	B-73,178,184	B-10,14
	B-14	Control wiring harness and battery wiring harness combination	B-79,84,91,99,157	B-10,14
	B-18	Starter	B-79	B-11,15
	B-19	Starter	B-79	B-11,15
	B-20	Oil pressure switch	B-157	B-11,15
	B-21	Alternator	B-84	B-11,15
	B-22	Alternator	B-84	B-11,15
	B-23	Purge control solenoid valve	B-91,99	B-11,15
	B-24	Injector 4	B-89,97	B-11,15
	B-25	Injector 3	B-89,97	B-11,15
	B-26	Injector 2	B-89,97	B-11,15
	B-27	Injector 1	B-89,97	B-11,15
B-31	Air flow sensor	B-90,98	B-11,15	
B-34	Oxygen sensor	B-88,96	B-11,15	
B-36	Waste gate solenoid valve	B-91,99	B-11,15	
B-37	Fuel pressure solenoid valve	B-90,98	B-11,15	

	Connector No.	Parts name	Circuit diagram page	Wiring diagram page
B	B-108	Back-up lamp switch	B-142,143	B-12,16
	B-110	Engine coolant temperature gauge unit	B-148,152	B-12,16
	B-112	EGR solenoid valve	B-91,99	B-12,16
	B-114	Ignition coil 1	B-82,83	B-12,16
	B-115	Idle speed control servo	B-88,96	B-12,16
	B-116	Camshaft position sensor	B-88,96	B-12,16
	B-118	Engine coolant temperature sensor	B-89,97	B-12,16
	B-119	Ignition coil 2	B-82,83	B-12,16
	B-121	Crank angle sensor	B-88,96	B-13,16
	B-122	Detonation sensor	B-89,97	B-13,17
	B-123	ABS-ECU	B-198,200,201,202,203,204,205,206,208,209,210,211,229,232,233,239,242,243	B-13,17
	B-138	Resistor	B-89,97	B-13,17
	B-139	Electric pump relay <ACD>	B-216,224,234,244	B-13,17
	B-140	Fuel pump relay 3	B-93,101	B-13,17
	B-141	Fuel pump resistor	B-93,101	B-13,17
B-142	Secondary air control solenoid valve	B-91,99	B-13,17	
C	C-01	Combination meter	B-84,87,95,103,106,118,122,126,129,135,139,148,149,152,153,156,157,198,206,214,222,230,240,248,250,256,258	B-18,24
	C-02	Combination meter	B-110,115,118,122,126,129,135,139,148,149,152,153,156,157,198,206,248,250,256,258	B-18,24
	C-03	Hazard warning switch	B-136,140	B-18,24
	C-04	Clock	B-194	B-18,24
	C-05	J/C (1)	B-56,62,93,101,104,107,111,112,115,116,118,122,124,125,127,128,131,133,136,137,140,141,148,152,153,156,158,164,170,172,175,181,185,187,191,194,195,196,197,212,214,220,222,228,230,238,240,257	B-18,24
	C-08	J/C (3)	B-58,64,95,104,105,107,108,112,113,116,117,119,123,124,125,126,127,128,129,131,133,136,137,140,141,149,153,159,164,165,171,172,173,175,180,181,185,187,188,189,191,193,194,195,202,210,214,218,222,226,227,230,236,240,246,247,253,255,257,258	B-18,24

	Connector No.	Parts name	Circuit diagram page	Wiring diagram page
C	C-10	Outside/Inside air selection damper control motor and potentiometer	B-175,181	B-18,24
	C-14	Blower motor	B-174,180	B-18,24
	C-16	Resistor	B-174,180	B-18,24
	C-21	SRS-ECU	B-248,249,250,251	B-18,24
	C-22	Diagnosis connector	B-92,100,105,108,113,117,119,123,125,128,137,141,150,154,158,164,170,172,188,189,204,205,219,227,237,247,248,250,252,254	B-18,24
	C-23	Diagnosis connector	B-92,100	B-18,24
	C-24	Instrument panel wiring harness and front door wiring harness (LH) combination	B-162,163,165,170,172,173,192,193,196	B-18,24
	C-26	J/C (4)	B-59,65,92,100,105,113,119,137,157,158,170,188,194,197,201,204,205,209,213,219,221,227,232,237,242,247,250,252,254,258	B-19,25
	C-28	J/C (5) <RHD>	B-66,100,108,117,123,141,164,172,173,189,205,227,247,254	B-25
	C-29	J/C (5) <LHD>	B-60,84,87,104,112,125,137,149,150,157,187,194,197,198,214,230,248,256	B-19
	C-32	A/C-ECU or heater control unit	B-175,181,185	B-19,25
	C-34	No connection <RHD>	-	B-25
	C-35	Instrument panel wiring harness and instrument panel wiring harness combination <RHD>	B-76,78,100,108,117,123,128,141,154,164,165,172,180,185,189,205,227,247,250,254	B-25
	C-36	Headlamp leveling switch	B-131,133	B-19,25
	C-41	SRS-ECU	B-249,251	B-19,25
	C-42	Instrument panel wiring harness and control wiring harness combination <ACD> <LHD>	B-216,234	B-19
	C-43	4WD-ECU <ACD>	B-201,209,212,213,214,215,216,218,219,220,221,222,223,224,226,227,228,230,231,232,234,236,237,238,240,241,242,244,246,247	B-19,25
	C-44	4WD-ECU <ACD>	B-201,209,212,213,216,217,219,220,221,224,225,227,228,229,232,234,235,237,238,239,242,244,245,247	B-19,25
	C-45	Instrument panel wiring harness and floor wiring harness (LH) combination <LHD>	B-216,234	B-19

	Connector No.	Parts name	Circuit diagram page	Wiring diagram page
C	C-46	Control wiring harness and floor wiring harness (LH) combination <ACD> <RHD>	B-224,244	B-25
	C-101	Spare connector (for front fog lamp switch)	B-258	B-20,26
	C-102	J/C (2)	B-57,63,87,92,104,105,107,111,113,115,119,124,126,127,131,136,140,143,154,158,163,169,170,175,181,187,188,191,192,202,204,210,218,219,226,236,237,246,248,252,256,258	B-20,26
	C-103	Stop lamp switch	B-144,145,198,206,212,220,228,238	B-20,26
	C-104	Spare connector (for radio)	B-196,197	B-20,26
	C-107	Instrument panel wiring harness and A/C wiring harness combination	B-175,181	B-20,26
	C-108	J/C (6)	B-61,67,82,83,86,88,90,92,94,96,98,100,102,149,153,176,182,198,204,205,206,212,215,219,223,228,231,237,241,252,253,254,255	B-20,26
	C-109	Air bag module (squib) <Passenger's side>	B-249,251	B-20,26
	C-110	Instrument panel wiring harness and front door wiring harness (RH) combination	B-159,168,169,170,171,172,192,193,196	B-20,26
	C-111	Front wiring harness (RH) and instrument panel wiring harness combination	B-103,106,135,139,157,178,184,203,211,217,225,233,243	B-20,26
	C-112	Instrument panel wiring harness and floor wiring harness (RH) combination	B-111,120,134,142,143,144,145,159,160,165,166,171,186,190,197,249,251	B-20,26
	C-115	Engine-ECU	B-87,88,89,90,91,92,93,95,96,97,98,99,100,101,215,223,231,241,257	B-20,26
	C-118	Engine-ECU	B-82,83,88,90,91,92,93,96,98,99,100,101,149,153,252,254,256	B-20,26
	C-122	Engine-ECU	B-84,86,87,90,91,93,94,95,98,99,101,177,178,183,184,252,254,256,257	B-20,26
	C-126	Engine-ECU	B-82,83,86,88,89,90,91,93,94,96,97,98,99,101,102,178,184	B-20,26
	C-128	Instrument panel wiring harness and control wiring harness combination	B-153,181,184,198,200,202,203,205,206,208,209,211,213,214,216,217,218,229,230,233,234,235,236,239,242,243	B-21,26
	C-129	Instrument panel wiring harness and control wiring harness combination	B-79,80,83,87,89,93,95,97,101,142,143,149,186,190,212,228,253	B-21,26

	Connector No.	Parts name	Circuit diagram page	Wiring diagram page
C	C-130	Instrument panel wiring harness and control wiring harness combination	B-84,87,92,95,100,142,143,148,150,152,154,157,175,178,198,200,201,204,205,206,212,213,216,219,228,229,232,235,237,252,254,255,256,257	B-21,27
	C-131	Blower switch	B-174,180	B-21,27
	C-132	Front wiring harness (LH) and instrument panel wiring harness combination	B-74,78,92,100,105,108,113,117,119,123,125,128,137,141,150,154,158,159,164,165,170,172,174,180,185,188,189,204,205,219,227,237,247,248,250,252,254	B-21,27
	C-133	Instrument panel wiring harness and floor wiring harness (LH) combination	B-114,121,126,138,143,144,145,159,161,165,167,173,249,251	B-21,27
	C-134	Instrument panel wiring harness and floor wiring harness (LH) combination	B-216,224,234,235,244,245	B-21,27
	C-135	Front wiring harness (LH) and instrument panel wiring harness combination	B-76,82,87,93,95,101,103,104,106,107,110,111,114,115,118,122,124,127,128,130,131,132,133,134,135,136,138,139,140,144,145,146,148,149,152,153,156,158,164,170,172,175,177,181,183,185,186,187,190,191,194,195,196,197,198,206,212,214,220,222,228,230,238,240,256,257,258	B-21,27
	C-136	Front wiring harness (LH) and control wiring harness combination <RHD>	B-83,84,94,98,102,182,183,184,190,211,225,243,254	B-27
	C-137	Fog lamp switch	B-124,127	B-21,27
	C-138	Remote controlled mirror switch	B-192,193	B-21,27
	C-141	Roof antenna	B-196	B-21,27
	C-142	ACD mode changeover switch	B-214,222,230,240	B-21,27
	C-146	Instrument panel wiring harness and floor wiring harness (RH) combination	B-93,101,129,148,152,156,203,211,217,225,233,243	B-21,27
	C-147	Instrument panel wiring harness and control wiring harness combination <RHD>	B-209,210,215,223,224,225,231,241,242,244	B-27
	C-201	Ignition switch	B-76	B-22,28
	C-202	Key reminder switch	B-253,255	B-22,28
	C-203	Column switch	B-104,107,112,116,125,128,137,141,187,191	B-22,28
	C-204	Clock spring <SRS>	B-248,250	B-22,28
	C-205	Clock spring <SRS>	B-146	B-22,28
	C-206	Horn switch <SRS>	B-146	B-22,28

	Connector No.	Parts name	Circuit diagram page	Wiring diagram page
C	C-207	Air bag module (squib) <Driver's side>	B-248,250	B-22,28
	C-208	Instrument panel wiring harness and J/B combination	B-54,55,126,129,256	B-22,28
	C-209	Instrument panel wiring harness and J/B combination	B-54,55,87,95,104,105,107,108,110,111,112,115,116,118,122,125,128,134,136,137,138,139,140,141,142,143,149,153,158,164,170,172,174,180,186,187,188,189,190,191,189,198,202,206,210,218,222,226,236,240,246,256	B-22,28
	C-210	Instrument panel wiring harness and J/B combination	B-54,55,76,77,78,82,83,84,87,95,104,107,111,112,115,116,118,122,125,128,136,137,140,141,142,143,149,153,157,158,159,164,165,170,172,174,180,185,186,187,190,191,192,193,195,198,200,202,206,208,210,212,213,214,218,220,221,222,226,228,229,230,236,238,239,240,246,248,250,256	B-22,28
	C-211	Instrument panel wiring harness and J/B combination	B-54,55,78,92,100,105,108,113,117,119,123,125,128,137,141,150,154,158,164,170,172,174,180,185,188,189,204,205,219,227,237,247,248,250,252,254	B-22,28
	C-213	Instrument panel wiring harness and J/B combination	B-54,55,78,82,83,84,87,92,95,100,104,105,107,108,110,112,113,115,116,117,119,120,121,123,125,126,128,129,135,136,137,139,140,141,149,150,153,154,157,158,164,170,171,172,173,174,180,185,187,188,189,191,192,193,195,198,200,204,205,206,208,212,213,214,219,220,221,222,227,228,229,230,237,238,239,240,247,248,250,252,254,256	B-22,28
	C-214	Defogger relay	B-54,55,78,185	B-23,29
	C-215	Blower relay	B-54,55,174,180	B-23,29
	C-216	Floor wiring harness (LH) and J/B combination <LHD>	B-54,55,105,110,112,119,120,134,158,171,185	B-23
	C-217	Floor wiring harness (RH) and J/B combination <RHD>	B-54,55,108,115,116,121,123,138,164,173,185	B-29
	C-218	Roof wiring harness (RH) and J/B combination	B-54,55,118,119,122,123	B-23,29
	C-219	Rear fog lamp relay	B-54,55,126,129	B-23,29
	C-220	No connection	B-54,55	B-23,29
	C-221	Fuel pump relay 2	B-54,55,87,95	B-23,29
	C-222	Intercooler water spray relay	B-54,55,256	B-23,29

	Connector No.	Parts name	Circuit diagram page	Wiring diagram page
C	C-223	Fuel pump relay 1	B-54,55,87,95	B-23,29
	C-224	Power window relay	B-54,55,158,159,165	B-23,29
	C-225	No connection	B-54,55,78	B-23,29
	C-226	ETACS-ECU	B-54,55,105,108,112,113,116,117,118,119,120,121,122,123,125,126,128,129,134,136,137,138,140,141,158,164,165,170,171,172,173,188,189	B-23,29
	C-227	ETACS-ECU	B-125,128,170,172	B-23,29
	C-228	ETACS-ECU	B-105,108,112,113,116,117,118,119,122,123,125,126,128,129,136,137,140,141,158,159,164,165,170,171,172,173,188,189,258	B-23,29
	C-230	Steering wheel sensor	B-202,210,218,226,236,246	B-23,29
	D	D-01	Door switch (Front:RH)	B-108,116,120,121,164
D-02		Floor wiring harness (RH) and rear door wiring harness (RH) combination	B-160,166,171,173	B-30,32
D-03		Room lamp	B-118,122	B-30,32
D-04		Wheel speed sensor (Rear:RH) <ABS,ACD>	B-203,211,217,225,233,243	B-30,32
D-05		Rear room lamp	B-118,122	B-30,32
D-06		Door switch (Rear:RH)	B-120,121	B-30,32
D-08		Door switch (Rear:LH)	B-120,121	B-30,32
D-09		Fuel pump and fuel gauge unit (Main)	B-93,101,148,152,156	B-30,32
D-10		Wheel speed sensor (Rear:LH) <ABS,ACD>	B-203,211,217,225,233,243	B-30,32
D-12		Floor wiring harness (LH) and rear door wiring harness (LH) combination	B-161,167,171,173	B-30,32
D-13		Door switch (Front:LH)	B-105,112,120,121,158	B-30,32
D-15		Instrument panel wiring harness and console wiring harness combination	B-195	B-31,32
D-18		Cigarette lighter	B-195	B-31,33
D-19		Cigarette lighter	B-195	B-31,33
D-20		Ashtray illumination lamp	B-195	B-31,33
D-21		Cigarette lighter illumination lamp	B-195	B-31,33
D-22		Oxygen sensor (Rear)	B-88,96	B-31,33
D-23		Parking brake switch	B-157,201,209,213,221,232,242	B-31,33
D-26	Seat belt pretensioner (RH)	B-249,251	B-31,33	

	Connector No.	Parts name	Circuit diagram page	Wiring diagram page	
D	D-27	Fuel gauge unit (Sub)	B-148,152,156	B-31,33	
	D-28	Seat belt pretensioner (LH)	B-249,251	B-31,33	
	D-29	Floor wiring harness (RH) and fuel wiring harness combination	B-93,101	B-31,33	
	D-30	Floor wiring harness (RH) and fuel wiring harness combination	B-93,101,148,152,156,203,211,217,225,233,243	B-31,33	
	D-32	G sensor (Longitudinal)	B-200,208,213,221,229,239	B-31,33	
	D-33	G sensor (Lateral)	B-200,208,213,221,229,239	B-31,33	
	D-34	Intercooler water spray switch	B-257	B-31,33	
E	E-02	Remote controlled mirror (LH)	B-192,193	B-34,36	
	E-04	Spare connector <for front door speaker (LH)>	B-196	B-34,36	
	E-05	Power window motor (Front:LH)	B-162,165	B-34,36	
	E-07	Power window main switch	B-162,163,168,169	B-34,36	
	E-08	Door lock actuator (Front:LH)	B-170,173	B-34,36	
	E-10	Power window motor (Rear:LH)	B-161,167	B-34,36	
	E-11	Power window sub switch (Rear:LH)	B-161,167	B-34,36	
	E-12	Door lock actuator (Rear:LH)	B-171,173	B-34,36	
	E-13	Remote controlled mirror (RH)	B-192,193	B-34,36	
	E-16	Door lock key cylinder switch (RH)	B-170	B-35	
	E-17	Door lock key cylinder switch (LH)	B-172	B-37	
	E-18	Door lock actuator (Front:RH)	B-171,172	B-35,37	
	E-19	Power window sub switch (Passenger's side)	B-159,165	B-35,37	
	E-20	Power window motor (Front:RH)	B-159,168	B-35,37	
	E-21	Spare connector <for front door speaker (RH)>	B-196	B-35,37	
	E-23	Door lock actuator (Rear:RH)	B-171,173	B-35,37	
	E-24	Power window sub switch (Rear:RH)	B-160,166	B-35,37	
	E-25	Power window motor (Rear:RH)	B-160,166	B-35,37	
	F	F-01	Spare connector <for rear speaker (LH)>	B-197	B-38,39
		F-04	Luggage compartment lamp	B-119,123	B-38,39
		F-05	High mounted stop lamp	B-144,145	B-38,39
		F-06	Defogger (-)	B-185	B-38,39

	Connector No.	Parts name	Circuit diagram page	Wiring diagram page
F	F-08	Spare connector <for rear speaker (RH)>	B-197	B-38,39
	F-09	Rear combination lamp (RH)	B-111,115,129,134,138,142,144,145	B-38,39
	F-10	Trunk lid latch switch	B-119,123	B-38,39
	F-12	Licence plate lamp (RH)	B-110,114	B-38,39
	F-13	Licence plate lamp (LH)	B-110,114	B-38,39
	F-14	Floor wiring harness (LH) and bumper wiring harness combination	B-110,114	B-38,39
	F-16	Rear combination lamp (LH)	B-110,114,126,134,138,143,144,145	B-38,39
	F-19	Defogger (+)	B-185	B-38,39
	F-21	Windshield washer motor	B-186,190	B-38,39
	F-23	Electric pump <ACD>	B-216,224,234,244	B-38,39
	F-24	Floor wiring harness (LH) and 4WD wiring harness combination <ACD>	B-216,224,234,235,244,245	B-38,39
	F-25	Direction valve (LH) <ACD>	B-235,245	B-38,39
	F-26	Direction valve (RH) <ACD>	B-235,245	B-38,39
	F-27	Proportioning valve (for ACD control)	B-216,224,235,245	B-38,39
	F-28	Proportioning valve (for AYC control)	B-235,245	B-38,39
	F-29	Pressure sensor <ACD>	B-216,224,234,244	B-38,39

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	4WD-ECU <ACD>	C-44	B-201,209,212,213,216,217,219,220,221,224,225,227,228,229,232,234,235,237,238,239,242,244,245,247	B-19,25
A	A/C compressor	A-47	B-178,184	B-7,9
	A/C compressor relay	B-12X	B-73,178,184	B-10,14
	A/C-ECU or heater control unit	C-32	B-175,181,185	B-19,25
	ABS-ECU	B-123	B-198,200,201,202,203,204,205,206,208,209,210,211,229,232,233,239,242,243	B-13,17
	ACD mode changeover switch	C-142	B-214,222,230,240	B-21,27
	Air bag module (squib) <Driver's side>	C-207	B-248,250	B-22,28
	Air bag module (squib) <Passenger's side>	C-109	B-249,251	B-20,26
	Air flow sensor	B-31	B-90,98	B-11,15
	Alternator	B-21	B-84	B-11,15
	Alternator	B-22	B-84	B-11,15
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B	Back-up lamp switch	B-108	B-142,143	B-12,16
	Blower motor	C-14	B-174,180	B-18,24
	Blower relay	C-215	B-54,55,174,180	B-23,29
	Blower switch	C-131	B-174,180	B-21,27
	Brake fluid level switch	B-04	B-157	B-10,14
C	Camshaft position sensor	B-116	B-88,96	B-12,16
	Cigarette lighter	D-18	B-195	B-31,33
	Cigarette lighter	D-19	B-195	B-31,33
	Cigarette lighter illumination lamp	D-21	B-195	B-31,33
	Clock	C-04	B-194	B-18,24
	Clock spring <SRS>	C-204	B-248,250	B-22,28
	Clock spring <SRS>	C-205	B-146	B-22,28

	Parts name	Connector No.	Circuit diagram page	Wiring diagram page
C	Column switch	C-203	B-104,107,112,116,125,128,137,141,187,191	B-22,28
	Combination meter	C-01	B-84,87,95,103,106,118,122,126,129,135,139,148,149,152,153,156,157,198,206,214,222,230,240,248,250,256,258	B-18,24
	Combination meter	C-02	B-110,115,118,122,126,129,135,139,148,149,152,153,156,157,198,206,248,250,256,258	B-18,24
	Condenser fan motor	A-45	B-177,183	B-7,9
	Condenser fan motor	A-46	B-177,183	B-7,9
	Condenser fan relay (HI)	A-07X	B-73,177,183	B-6,8
	Condenser fan relay (LO)	A-06X	B-73,177,183	B-6,8
	Control wiring harness and battery wiring harness combination	B-14	B-79,84,91,99,157	B-10,14
	Control wiring harness and floor wiring harness (LH) combination <ACD> <RHD>	C-46	B-224,244	B-25
	Crank angle sensor	B-121	B-88,96	B-13,16
D	Defogger (-)	F-06	B-185	B-38,39
	Defogger (+)	F-19	B-185	B-38,39
	Defogger relay	C-214	B-54,55,78,185	B-23,29
	Detonation sensor	B-122	B-89,97	B-13,17
	Diagnosis connector	C-22	B-92,100,105,108,113,117,119,123,125,128,137,141,150,154,158,164,170,172,188,189,204,205,219,227,237,247,248,250,252,254	B-18,24
	Diagnosis connector	C-23	B-92,100	B-18,24
	Direction valve (LH) <ACD>	F-25	B-235,245	B-38,39
	Direction valve (RH) <ACD>	F-26	B-235,245	B-38,39
	Door lock actuator (Front:LH)	E-08	B-170,173	B-34,36
	Door lock actuator (Front:RH)	E-18	B-171,172	B-35,37
	Door lock actuator (Rear:LH)	E-12	B-171,173	B-34,36
	Door lock actuator (Rear:RH)	E-23	B-171,173	B-35,37
	Door lock key cylinder switch (LH)	E-17	B-172	B-37
	Door lock key cylinder switch (RH)	E-16	B-170	B-35
	Door switch (Front:LH)	D-13	B-105,112,120,121,158	B-30,32
	Door switch (Front:RH)	D-01	B-108,116,120,121,164	B-30,32

	Parts name	Connector No.	Circuit diagram page	Wiring diagram page
D	Door switch (Rear:LH)	D-08	B-120,121	B-30,32
	Door switch (Rear:RH)	D-06	B-120,121	B-30,32
	Dual pressure switch	A-36	B-178,184	B-7,9
E	EGR solenoid valve	B-112	B-91,99	B-12,16
	Electric pump <ACD>	F-23	B-216,224,234,244	B-38,39
	Electric pump relay <ACD>	B-139	B-216,224,234,244	B-13,17
	Engine control relay	B-11X	B-73,86,94,252,254	B-10,14
	Engine coolant temperature gauge unit	B-110	B-148,152	B-12,16
	Engine coolant temperature sensor	B-118	B-89,97	B-12,16
	Engine speed detection connector	B-05X	B-73,82,83,90,98	B-10,14
	Engine-ECU	C-115	B-87,88,89,90,91,92,93,95,96,97,98,99,100,101,215,223,231,241,257	B-20,26
	Engine-ECU	C-118	B-82,83,88,90,91,92,93,96,98,99,100,101,149,153,252,254,256	B-20,26
	Engine-ECU	C-122	B-84,86,87,90,91,93,94,95,98,99,101,177,178,183,184,252,254,256,257	B-20,26
	Engine-ECU	C-126	B-82,83,86,88,89,90,91,93,94,96,97,98,99,101,102,178,184	B-20,26
	ETACS-ECU	C-226	B-54,55,105,108,112,113,116,117,118,119,120,121,122,123,125,126,128,129,134,136,137,138,140,141,158,164,165,170,171,172,173,188,189	B-23,29
	ETACS-ECU	C-227	B-125,128,170,172	B-23,29
ETACS-ECU	C-228	B-105,108,112,113,116,117,118,119,122,123,125,126,128,129,136,137,140,141,158,159,164,165,170,171,172,173,188,189,258	B-23,29	
F	Fan controller	A-21	B-102,176,182	B-7,8
	Floor wiring harness (LH) and 4WD wiring harness combination <ACD>	F-24	B-216,224,234,235,244,245	B-38,39
	Floor wiring harness (LH) and bumper wiring harness combination	F-14	B-110,114	B-38,39
	Floor wiring harness (LH) and J/B combination <LHD>	C-216	B-54,55,105,110,112,119,120,134,158,171,185	B-23
	Floor wiring harness (LH) and rear door wiring harness (LH) combination	D-12	B-161,167,171,173	B-30,32
	Floor wiring harness (RH) and fuel wiring harness combination	D-29	B-93,101	B-31,33
	Floor wiring harness (RH) and fuel wiring harness combination	D-30	B-93,101,148,152,156,203,211,217,225,233,243	B-31,33

	Parts name	Connector No.	Circuit diagram page	Wiring diagram page
F	Floor wiring harness (RH) and J/B combination <RHD>	C-217	B-54,55,108,115,116,121,123,138,164,173,185	B-29
	Floor wiring harness (RH) and rear door wiring harness (RH) combination	D-02	B-160,166,171,173	B-30,32
	Fog lamp switch	C-137	B-124,127	B-21,27
	Front combination lamp (LH)	A-39	B-103,106,110,114,130,132,134,138	B-7,9
	Front combination lamp (RH)	A-40	B-103,106,111,114,130,132,135,139	B-7,9
	Front wiring harness (LH) and control wiring harness combination <ABS>	A-12	B-198,206	B-6,8
	Front wiring harness (LH) and control wiring harness combination <LHD>	A-13	B-86,90,102,176,178,186,252	B-6
	Front wiring harness (LH) and control wiring harness combination <LHD>	A-43	B-82,84,177,178,203,217,233	B-7
	Front wiring harness (LH) and control wiring harness combination <RHD>	C-136	B-83,84,94,98,102,182,183,184,190,211,225,243,254	B-27
	Front wiring harness (LH) and instrument panel wiring harness combination	C-132	B-74,78,92,100,105,108,113,117,119,123,125,128,137,141,150,154,158,159,164,165,170,172,174,180,185,188,189,204,205,219,227,237,247,248,250,252,254	B-21,27
	Front wiring harness (LH) and instrument panel wiring harness combination	C-135	B-76,82,87,93,95,101,103,104,106,107,110,111,114,115,118,122,124,127,128,130,131,132,133,134,135,136,138,139,140,144,145,146,148,149,152,153,156,158,164,170,172,175,177,181,183,185,186,187,190,191,194,195,196,197,198,206,212,214,220,222,228,230,238,240,256,257,258	B-21,27
	Front wiring harness (RH) and instrument panel wiring harness combination	C-111	B-103,106,135,139,157,178,184,203,211,217,225,233,243	B-20,26
	Front-ECU	A-10X	B-73,75,103,104,106,107,110,111,114,115,124,127,130,131,132,133,136,140,187,191,258	B-6,8
	Front-ECU	A-11X	B-73,104,106,107,111,115,124,127,131,133,136,140,186,187,190,191	B-6,8
	Fuel gauge unit (Sub)	D-27	B-148,152,156	B-31,33
	Fuel pressure solenoid valve	B-37	B-90,98	B-11,15
	Fuel pump and fuel gauge unit (Main)	D-09	B-93,101,148,152,156	B-30,32
	Fuel pump relay 1	C-223	B-54,55,87,95	B-23,29
	Fuel pump relay 2	C-221	B-54,55,87,95	B-23,29
	Fuel pump relay 3	B-140	B-93,101	B-13,17
	Fuel pump resistor	B-141	B-93,101	B-13,17

	Parts name	Connector No.	Circuit diagram page	Wiring diagram page
G	G sensor (Lateral)	D-33	B-200,208,213,221,229,239	B-31,33
	G sensor (Longitudinal)	D-32	B-200,208,213,221,229,239	B-31,33
H	Hazard warning switch	C-03	B-136,140	B-18,24
	Headlamp (HI:LH)	A-16	B-103,106	B-6,8
	Headlamp (HI:RH)	A-28	B-103,106	B-7,9
	Headlamp leveling switch	C-36	B-131,133	B-19,25
	High mounted stop lamp	F-05	B-144,145	B-38,39
	Horn (HI)	A-23	B-146	B-7,8
	Horn (LO)	A-25	B-146	B-7,9
	Horn relay	A-05X	B-73,146	B-6,8
	Horn switch <SRS>	C-206	B-146	B-22,28
I	Idle speed control servo	B-115	B-88,96	B-12,16
	Ignition coil 1	B-114	B-82,83	B-12,16
	Ignition coil 2	B-119	B-82,83	B-12,16
	Ignition coil relay <RHD> or no connection <LHD>	B-09X	B-73,83	B-10,14
	Ignition switch	C-201	B-76	B-22,28
	Injector 1	B-27	B-89,97	B-11,15
	Injector 2	B-26	B-89,97	B-11,15
	Injector 3	B-25	B-89,97	B-11,15
	Injector 4	B-24	B-89,97	B-11,15
	Instrument panel wiring harness and A/C wiring harness combination	C-107	B-175,181	B-20,26
	Instrument panel wiring harness and console wiring harness combination	D-15	B-195	B-31,32
	Instrument panel wiring harness and control wiring harness combination	C-128	B-153,181,184,198,200,202,203,205,206,208,209,211,213,214,216,217,218,229,230,233,234,235,236,239,242,243	B-21,26
	Instrument panel wiring harness and control wiring harness combination	C-129	B-79,80,83,87,89,93,95,97,101,142,143,149,186,190,212,228,253	B-21,26
Instrument panel wiring harness and control wiring harness combination	C-130	B-84,87,92,95,100,142,143,148,150,152,154,157,175,178,198,200,201,204,205,206,212,213,216,219,228,229,232,235,237,252,254,255,256,257	B-21,27	

	Parts name	Connector No.	Circuit diagram page	Wiring diagram page
I	Instrument panel wiring harness and control wiring harness combination <ACD> <LHD>	C-42	B-216,234	B-19
	Instrument panel wiring harness and control wiring harness combination <RHD>	C-147	B-209,210,215,223,224,225,231,241,242,244	B-27
	Instrument panel wiring harness and floor wiring harness (LH) combination	C-133	B-114,121,126,138,143,144,145,159,161,165,167,173,249,251	B-21,27
	Instrument panel wiring harness and floor wiring harness (LH) combination	C-134	B-216,224,234,235,244,245	B-21,27
	Instrument panel wiring harness and floor wiring harness (LH) combination <LHD>	C-45	B-216,234	B-19
	Instrument panel wiring harness and floor wiring harness (RH) combination	C-112	B-111,120,134,142,143,144,145,159,160,165,166,171,186,190,197,249,251	B-20,26
	Instrument panel wiring harness and floor wiring harness (RH) combination	C-146	B-93,101,129,148,152,156,203,211,217,225,233,243	B-21,27
	Instrument panel wiring harness and front door wiring harness (LH) combination	C-24	B-162,163,165,170,172,173,192,193,196	B-18,24
	Instrument panel wiring harness and front door wiring harness (RH) combination	C-110	B-159,168,169,170,171,172,192,193,196	B-20,26
	Instrument panel wiring harness and instrument panel wiring harness combination <RHD>	C-35	B-76,78,100,108,117,123,128,141,154,164,165,172,180,185,189,205,227,247,250,254	B-25
	Instrument panel wiring harness and J/B combination	C-208	B-54,55,126,129,256	B-22,28
	Instrument panel wiring harness and J/B combination	C-209	B-54,55,87,95,104,105,107,108,110,111,112,115,116,118,122,125,128,134,136,137,138,139,140,141,142,143,149,153,158,164,170,172,174,180,186,187,188,189,190,191,189,198,202,206,210,218,222,226,236,240,246,256	B-22,28
	Instrument panel wiring harness and J/B combination	C-210	B-54,55,76,77,78,82,83,84,87,95,104,107,111,112,115,116,118,122,125,128,136,137,140,141,142,143,149,153,157,158,159,164,165,170,172,174,180,185,186,187,190,191,192,193,195,198,200,202,206,208,210,212,213,214,218,220,221,222,226,228,229,230,236,238,239,240,246,248,250,256	B-22,28

	Parts name	Connector No.	Circuit diagram page	Wiring diagram page
I	Instrument panel wiring harness and J/B combination	C-211	B-54,55,78,92,100,105,108,113,117,119,123,125,128,137,141,150,154,158,164,170,172,174,180,185,188,189,204,205,219,227,237,247,248,250,252,254	B-22,28
	Instrument panel wiring harness and J/B combination	C-213	B-54,55,78,82,83,84,87,92,95,100,104,105,107,108,110,112,113,115,116,117,119,120,121,123,125,126,128,129,135,136,137,139,140,141,149,150,153,154,157,158,164,170,171,172,173,174,180,185,187,188,189,191,192,193,195,198,200,204,205,206,208,212,213,214,219,220,221,222,227,228,229,230,237,238,239,240,247, 248,250,252,254,256	B-22,28
	Intercooler water spray motor	A-44	B-256	B-7,9
	Intercooler water spray relay	C-222	B-54,55,256	B-23,29
	Intercooler water spray switch	D-34	B-257	B-31,33
J	J/C (1)	C-05	B-56,62,93,101,104,107,111,112,115,116,118,122,124,125,127,128,131,133,136,137,140,141,148,152,153,156,158,164,170,172,175,181,185,187,191,194,195,196,197,212,214,220,222,228,230,238,240,257	B-18,24
	J/C (2)	C-102	B-57,63,87,92,104,105,107,111,113,115,119,124,126,127,131,136,140,143,154,158,163,169,170,175,181,187,188,191,192,202,204,210,218,219,226,236,237,246,248,252,256,258	B-20,26
	J/C (3)	C-08	B-58,64,95,104,105,107,108,112,113,116,117,119,123,124,125,126,127,128,129,131,133,136,137,140,141,149,153,159,164,165,171,172,173,175,180,181,185,187,188,189,191,193,194,195,202,210,214,218,222,226,227,230,236,240,246,247,253,255,257,258	B-18,24
	J/C (4)	C-26	B-59,65,92,100,105,113,119,137,157,158,170,188,194,197,201,204,205,209,213,219,221,227,232,237,242,247,250,252,254,258	B-19,25
	J/C (5) <LHD>	C-29	B-60,84,87,104,112,125,137,149,150,157,187,194,197,198,214,230,248,256	B-19
	J/C (5) <RHD>	C-28	B-66,100,108,117,123,141,164,172,173,189,205,227,247,254	B-25
	J/C (6)	C-108	B-61,67,82,83,86,88,90,92,94,96,98,100,102,149,153,176,182,198,204,205,206,212,215,219,223,228,231,237,241,252,253,254,255	B-20,26

	Parts name	Connector No.	Circuit diagram page	Wiring diagram page
K	Key reminder switch	C-202	B-253,255	B-22,28
L	Licence plate lamp (LH)	F-13	B-110,114	B-38,39
	Licence plate lamp (RH)	F-12	B-110,114	B-38,39
	Luggage compartment lamp	F-04	B-119,123	B-38,39
N	No connection	A-08X	B-73	B-6,8
	No connection	A-34	-	B-9
	No connection	B-07X	B-73	B-10,14
	No connection	B-08X	B-73	B-10,14
	No connection	B-10X	B-73	B-10,14
	No connection	C-220	B-54,55	B-23,29
	No connection	B-06X	B-73	B-10,14
	No connection	C-225	B-54,55,78	B-23,29
	No connection <RHD>	C-34	-	B-25
O	Oil pressure switch	B-20	B-157	B-11,15
	Outside/Inside air selection damper control motor and potentiometer	C-10	B-175,181	B-18,24
	Oxygen sensor	B-34	B-88,96	B-11,15
	Oxygen sensor (Rear)	D-22	B-88,96	B-31,33
P	Parking brake switch	D-23	B-157,201,209,213,221,232,242	B-31,33
	Power steering oil pressure switch	A-48	B-90,98	B-7,9
	Power window main switch	E-07	B-162,163,168,169	B-34,36
	Power window motor (Front:LH)	E-05	B-162,165	B-34,36
	Power window motor (Front:RH)	E-20	B-159,168	B-35,37
	Power window motor (Rear:LH)	E-10	B-161,167	B-34,36
	Power window motor (Rear:RH)	E-25	B-160,166	B-35,37
	Power window relay	C-224	B-54,55,158,159,165	B-23,29
	Power window sub switch (Passenger's side)	E-19	B-159,165	B-35,37
	Power window sub switch (Rear:LH)	E-11	B-161,167	B-34,36
	Power window sub switch (Rear:RH)	E-24	B-160,166	B-35,37
	Pressure sensor <ACD>	F-29	B-216,224,234,244	B-38,39
	Proportioning valve (for ACD control)	F-27	B-216,224,235,245	B-38,39
Proportioning valve (for AYC control)	F-28	B-235,245	B-38,39	

	Parts name	Connector No.	Circuit diagram page	Wiring diagram page
P	Purge control solenoid valve	B-23	B-91,99	B-11,15
R	Radiator fan relay	A-09X	B-73,102,176,182	B-6,8
	Rear combination lamp (LH)	F-16	B-110,114,126,134,138,143,144,145	B-38,39
	Rear combination lamp (RH)	F-09	B-111,115,129,134,138,142,144,145	B-38,39
	Rear fog lamp relay	C-219	B-54,55,126,129	B-23,29
	Rear room lamp	D-05	B-118,122	B-30,32
	Remote controlled mirror (LH)	E-02	B-192,193	B-34,36
	Remote controlled mirror (RH)	E-13	B-192,193	B-34,36
	Remote controlled mirror switch	C-138	B-192,193	B-21,27
	Resistor	B-138	B-89,97	B-13,17
	Resistor	C-16	B-174,180	B-18,24
	Roof antenna	C-141	B-196	B-21,27
	Roof wiring harness (RH) and J/B combination	C-218	B-54,55,118,119,122,123	B-23,29
	Room lamp	D-03	B-118,122	B-30,32
S	Seat belt pretensioner (LH)	D-28	B-249,251	B-31,33
	Seat belt pretensioner (RH)	D-26	B-249,251	B-31,33
	Secondary air control solenoid valve	B-142	B-91,99	B-13,17
	Side turn signal lamp (LH)	A-02	B-134,138	B-6,8
	Side turn signal lamp (RH)	A-01	B-135,139	B-6,8
	Spare connector (for front fog lamp relay)	A-04X	B-73,258	B-6,8
	Spare connector (for front fog lamp switch)	C-101	B-258	B-20,26
	Spare connector (for front fog lamp)	A-31	B-258	B-7,9
	Spare connector (for radio)	C-104	B-196,197	B-20,26
	Spare connector <for front door speaker (LH)>	E-04	B-196	B-34,36
	Spare connector <for front door speaker (RH)>	E-21	B-196	B-35,37
	Spare connector <for rear speaker (LH)>	F-01	B-197	B-38,39
	Spare connector <for rear speaker (RH)>	F-08	B-197	B-38,39
	SRS-ECU	C-21	B-248,249,250,251	B-18,24

	Parts name	Connector No.	Circuit diagram page	Wiring diagram page
S	SRS-ECU	C-41	B-249,251	B-19,25
	Starter	B-18	B-79	B-11,15
	Starter	B-19	B-79	B-11,15
	Steering wheel sensor	C-230	B-202,210,218,226,236,246	B-23,29
	Stop lamp switch	C-103	B-144,145,198,206,212,220,228,238	B-20,26
T	Throttle position sensor	B-02	B-89,97,215,223,231,241	B-10,14
	Trunk lid latch switch	F-10	B-119,123	B-38,39
V	Vehicle speed sensor	B-03	B-92,100,150,154,197	B-10,14
W	Waste gate solenoid valve	B-36	B-91,99	B-11,15
	Wheel speed sensor (Front:LH)	A-03	B-203,211,217,225,233,243	B-6,8
	Wheel speed sensor (Front:RH)	A-37	B-203,211,217,225,233,243	B-7,9
	Wheel speed sensor (Rear:LH) <ABS,ACD>	D-10	B-203,211,217,225,233,243	B-30,32
	Wheel speed sensor (Rear:RH) <ABS,ACD>	D-04	B-203,211,217,225,233,243	B-30,32
	Windshield washer motor	F-21	B-186,190	B-38,39
	Windshield wiper motor	B-01	B-186,190	B-10,14

BODY REPAIR

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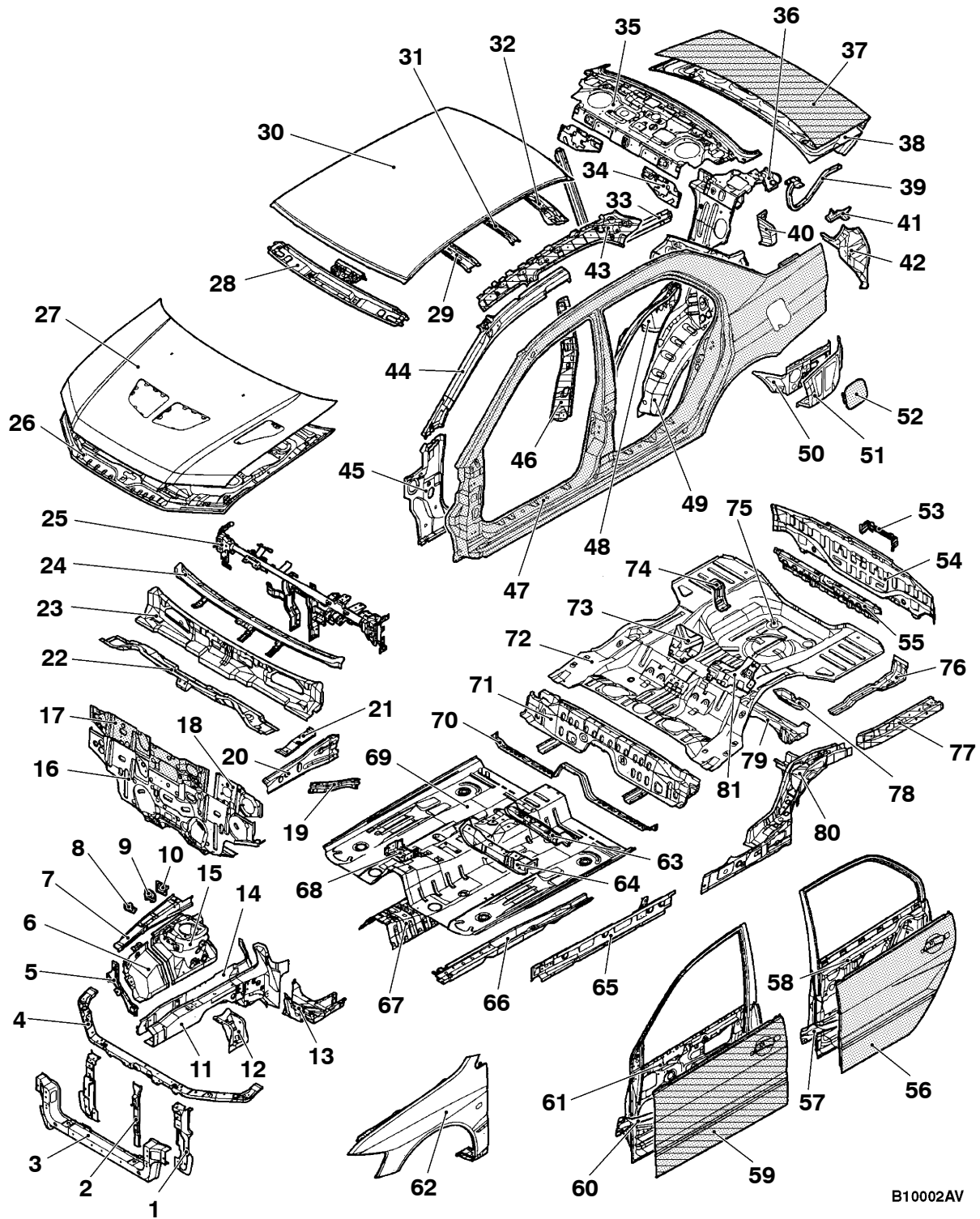
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BODY CONSTRUCTION



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REAR BODY	15		
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BODY COMPONENTS

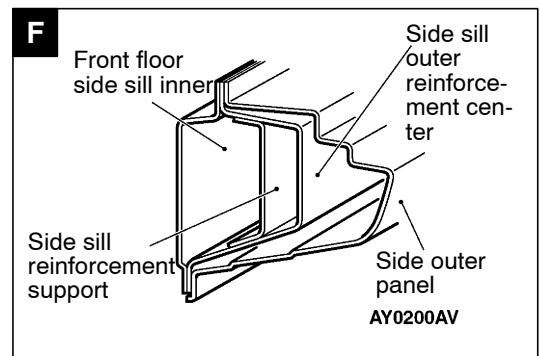
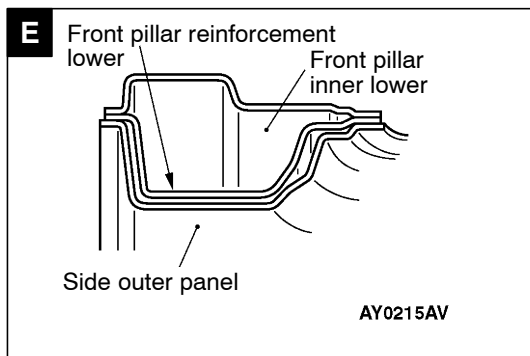
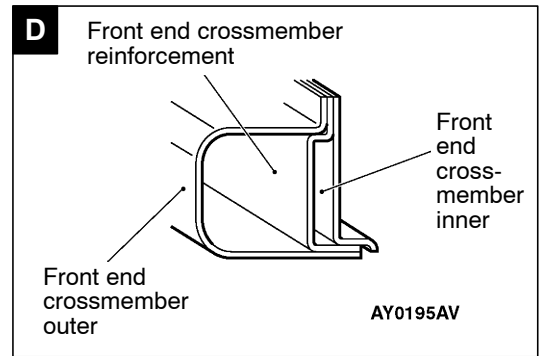
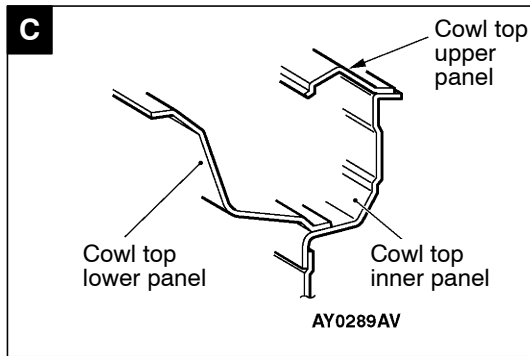
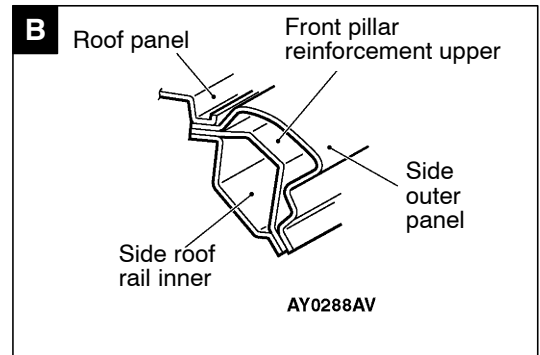
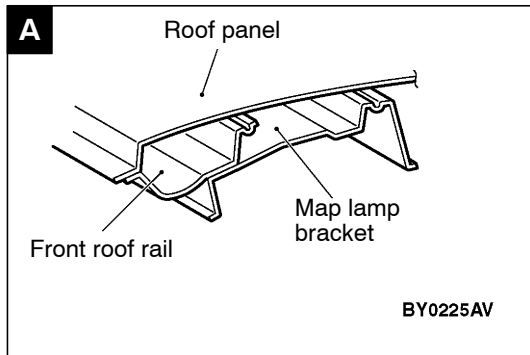
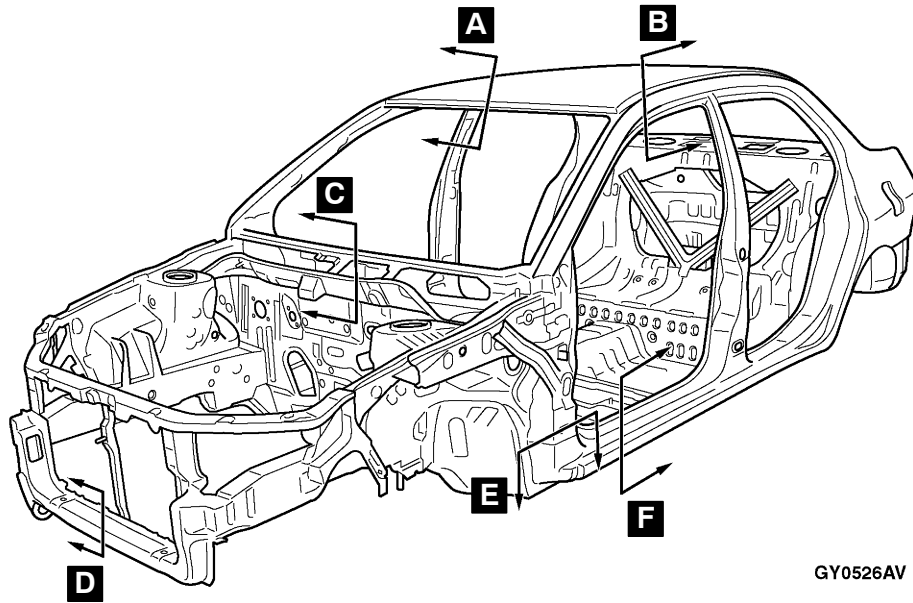


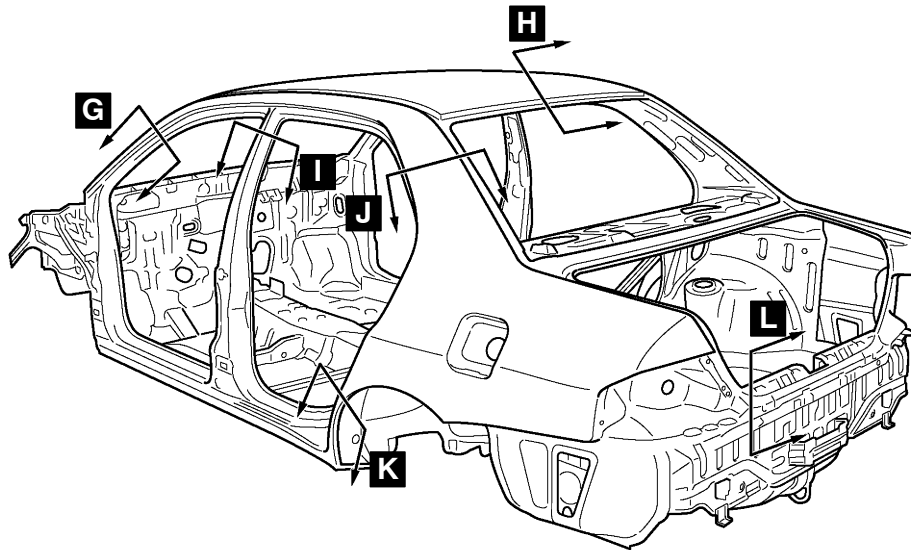
B10002AV

-  : Anticorrosion steel plates
-  : High-tensile steel panels

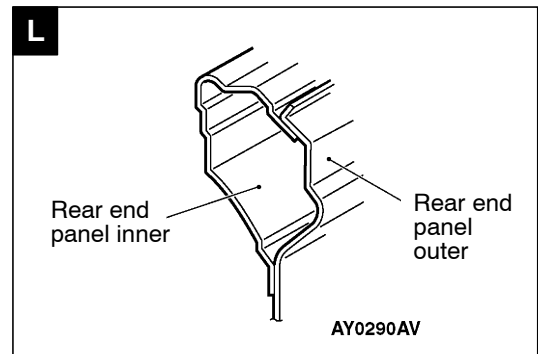
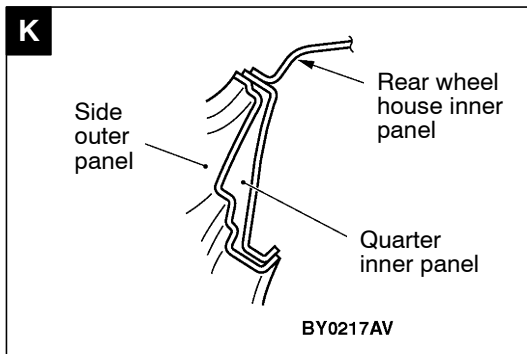
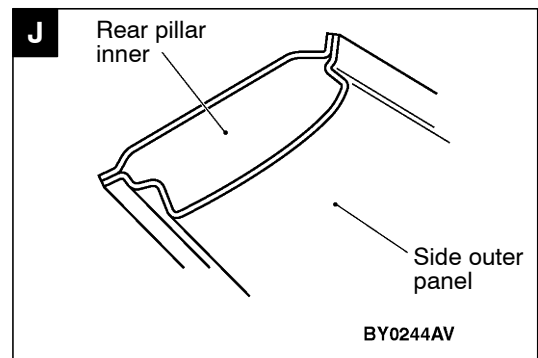
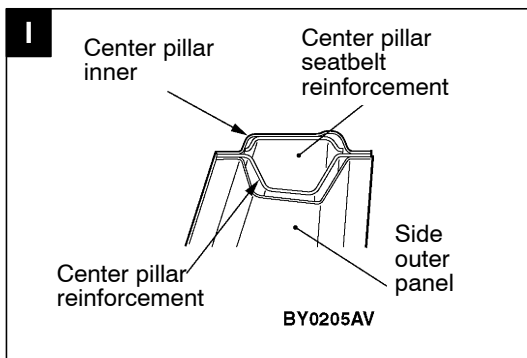
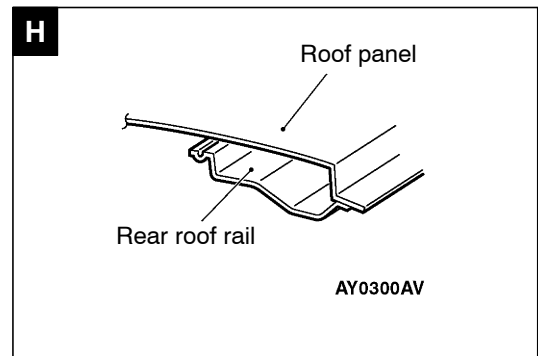
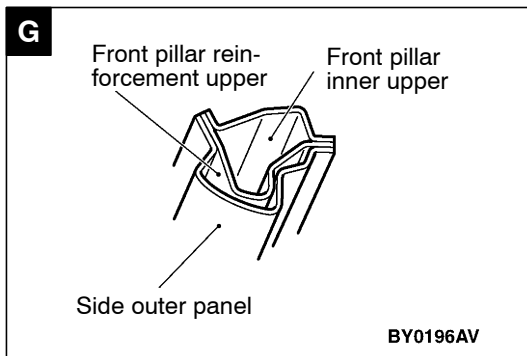
1. Headlamp support panel
2. Hood lock stay
3. Front end crossmember
4. Front end upper bar
5. Headlamp support panel side
6. Front fender shield
7. Front upper frame inner
8. Upper frame bulkhead front
9. Upper frame bulkhead
10. Upper frame bulkhead rear
11. Front sidemember inner
12. Engine mount bracket
13. Front sidemember rear
14. Front sidemember outer
15. Spring house panel
16. Dash panel
17. Dash panel silencer
18. Dash panel reinforcement
19. Upper frame to front pillar brace
20. Upper frame extension outer
21. Upper frame extension inner
22. Cowl top lower panel
23. Cowl top inner panel
24. Cowl top upper panel
25. Front deck crossmember
26. Hood inner panel
27. Hood outer panel
28. Front roof rail
29. Front roof bow
30. Roof panel
31. Rear roof bow
32. Rear roof rail
33. Seat back plate
34. Rear seat back panel
35. Rear shelf panel
36. Rear seat back brace
37. Trunk lid outer panel
38. Trunk lid inner panel
39. Trunk lid hinge
40. Quarter inner extension rear
41. Quarter corner panel
42. Rear combination lamp housing
43. Side roof rail inner
44. Front pillar inner upper
45. Front pillar inner lower
46. Center pillar inner
47. Side outer panel
48. Rear wheel house inner panel
49. Quarter inner panel
50. Rear floor side brace
51. Quarter outer extension lower
52. Fuel filler door
53. Rear license plate bracket
54. Rear end panel outer
55. Rear end panel inner
56. Rear door outer panel
57. Rear door side door beam
58. Rear door inner panel
59. Front door outer panel
60. Front door side door beam
61. Front door inner panel
62. Fender panel
63. Front floor crossmember rear
64. Front floor crossmember front
65. Front floor side sill inner
66. Front floor sidemember
67. Backbone reinforcement
68. Installment panel center bracket reinforcement
69. Front floor pan
70. Front floor extension panel rear
71. Rear floor extension
72. Rear floor pan
73. Seat back plate extension
74. Jack bracket
75. Spare tire bracket
76. Towing hook reinforcement
77. Rear floor sidemember extension
78. Crossmember center support
79. Rear floor crossmember
80. Rear floor sidemember
81. Rear seat back reinforcement

BODY MAIN CROSS-SECTIONAL VIEWS





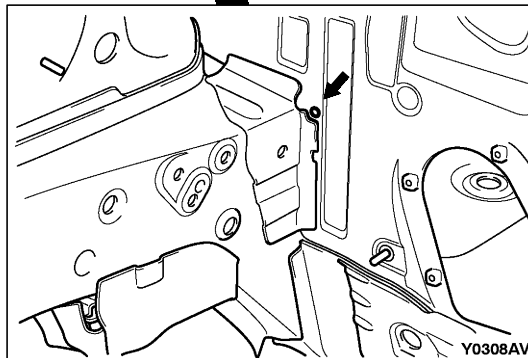
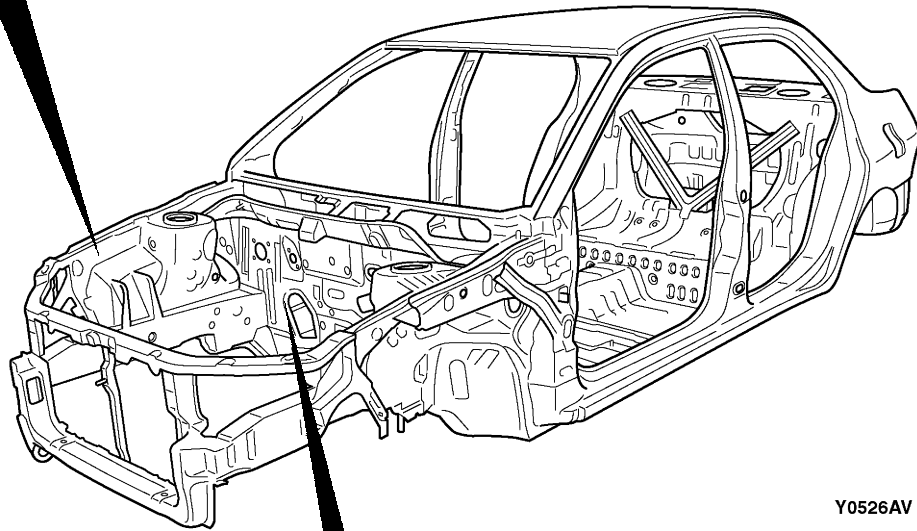
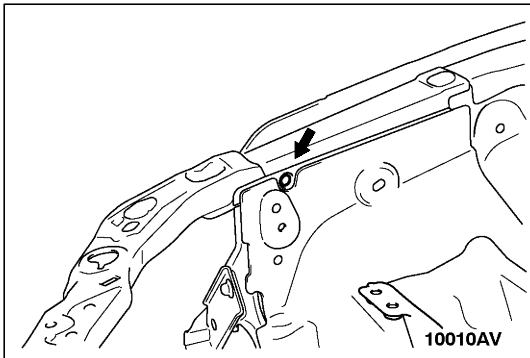
FY0527AV



MAINTENANCE, SERVICEABILITY

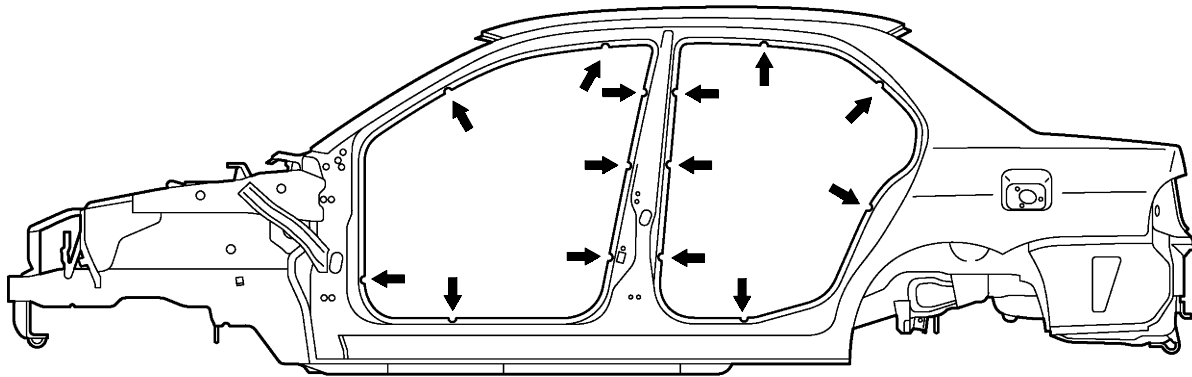
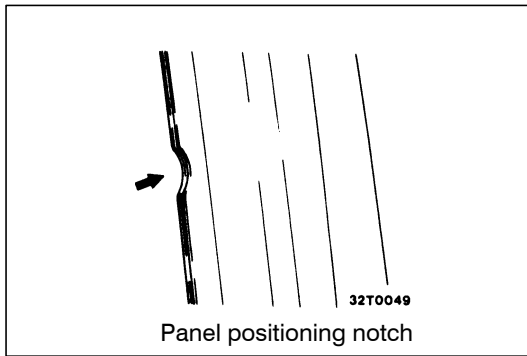
Fender Shield

Positioning holes, marks, and notches have been provided at the following overlapped areas to improve operation performance when replacing panels.



Side Structure

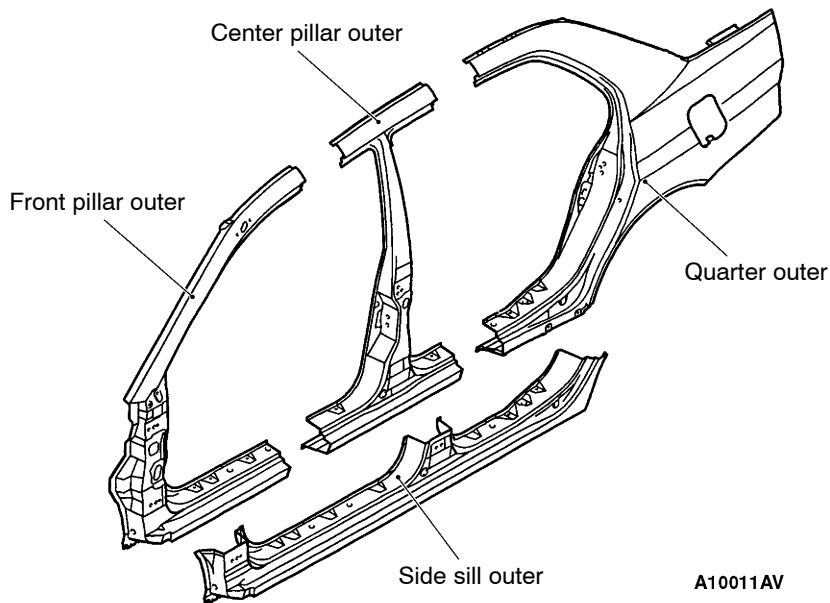
Panel positioning notches have been provided at the door opening section to improve operation performance when replacing panels.



Y0608AV

Side Outer Panel

Spare parts are provided in the following cut form with the adoption of the pillar integral type side outer panel.



BODY CONSTRUCTION CHARACTERISTICS

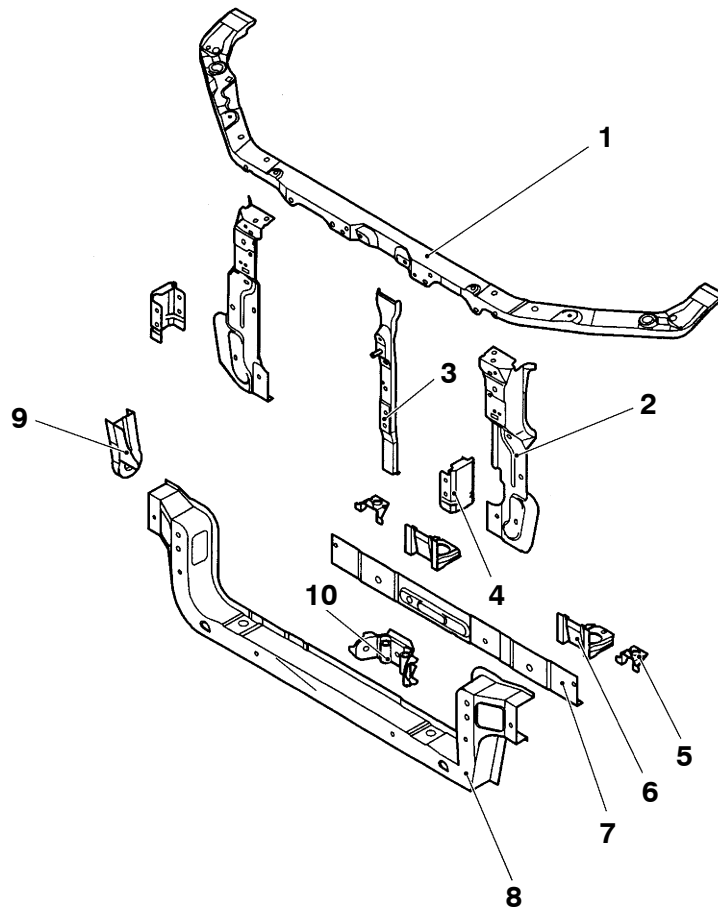
FRONT BODY

Headlamp Support

1. By adopting a steel sheet with variable thickness* for the front end crossmember outer, the steel sheet thickness on the right side of the vehicle has been increased to improve safety in collision and body rigidity.

NOTE

*: Steel sheets with different thickness welded to form one steel sheet.



BY0528AV

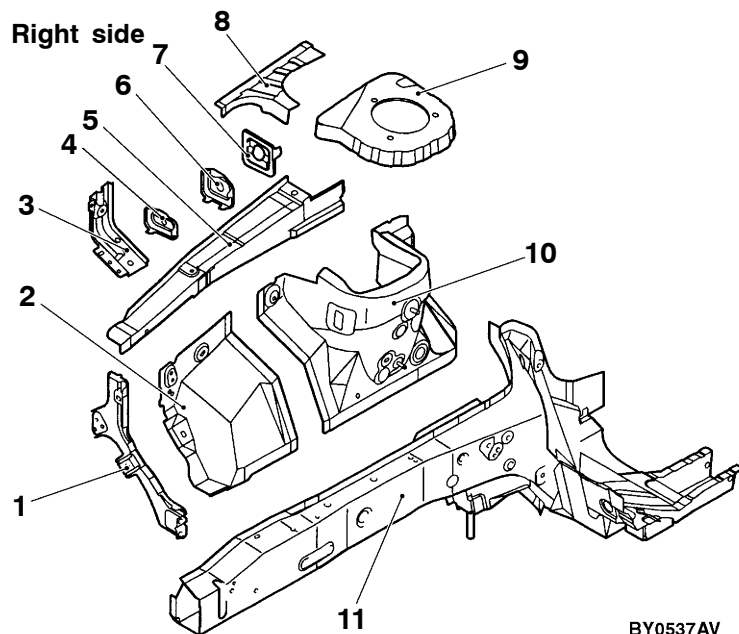
- | | |
|--|---|
| 1. Front end upper bar | 6. Radiator bracket |
| 2. Headlamp support panel | 7. Front end crossmember inner |
| 3. Hood lock stay | 8. Front end crossmember outer |
| 4. Front end crossmember inner reinforcement | 9. Shipping hook |
| 5. A/C condenser bracket | 10. Front end crossmember reinforcement |

Fender Shield

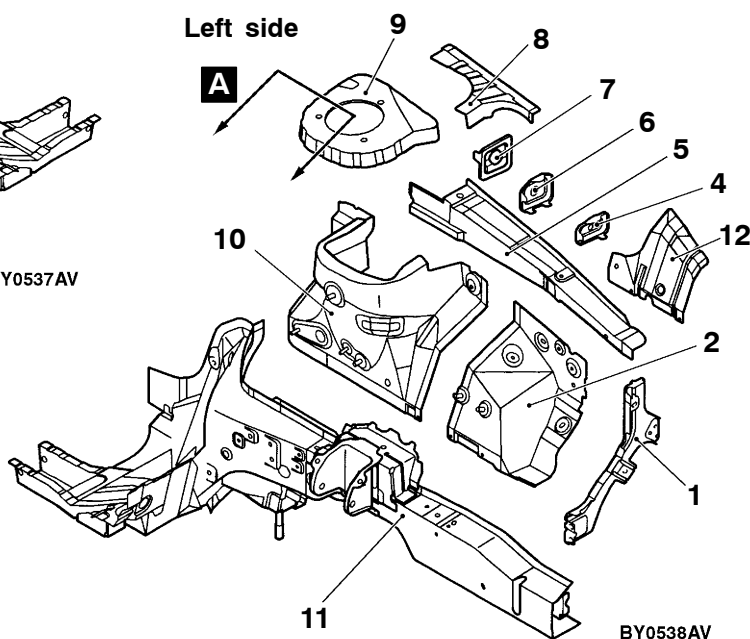
1. The cross section of the front sidemember has been increased and a steel sheet with variable thickness* has been adopted for the front sidemember inner to increase the thickness of the cabinet side in the aim to improve safety in collision, body rigidity, and realize lightweight.

NOTE

*: Steel sheets with different thickness welded to form one steel sheet.



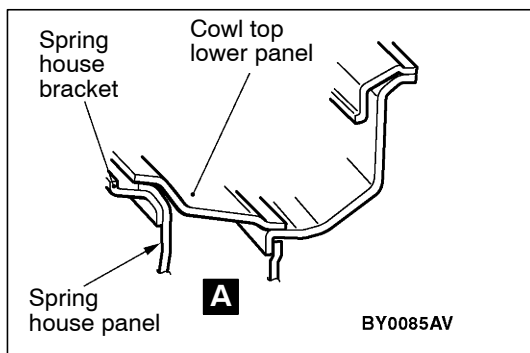
BY0537AV



BY0538AV

1. Headlamp support panel side
2. Front fender shield
3. Engine mount reinforcement
4. Upper frame bulkhead front
5. Front upper frame inner
6. Upper frame bulkhead

7. Upper frame bulkhead rear
8. Spring house bracket reinforcement
9. Spring house bracket
10. Spring house panel
11. Front sidemember
12. Transmission mount reinforcement outer

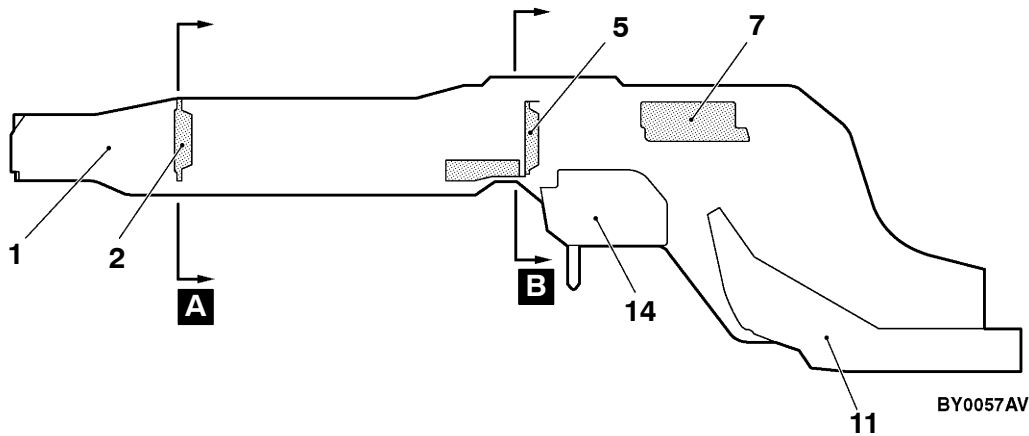
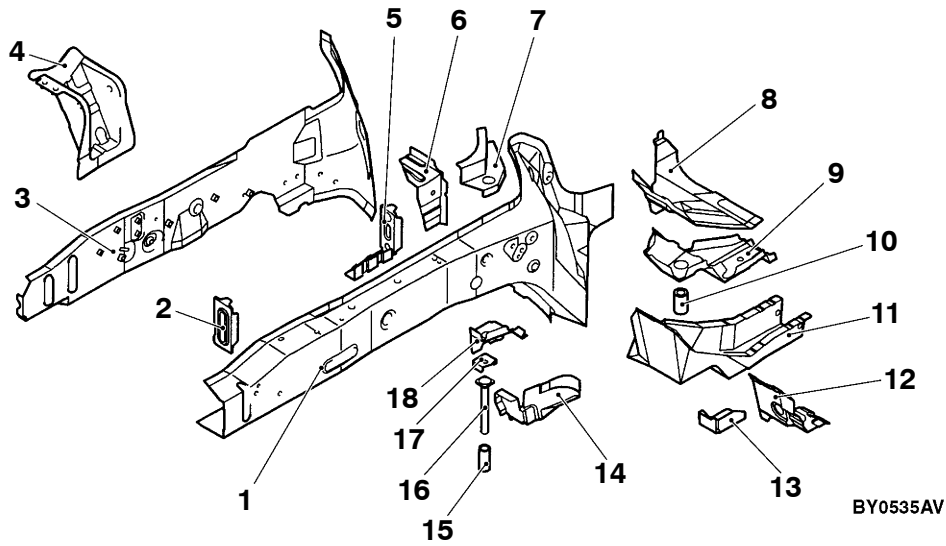


BY0085AV

2. The spring house panel has been designed to be directly installed with the cowl top lower panel, and the body rigidity of the suspension attachment holder has been increased to improve operational stability and quietness.

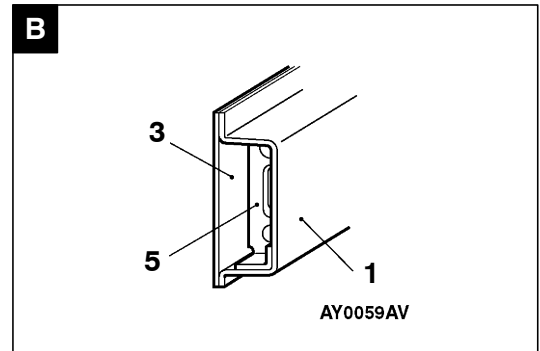
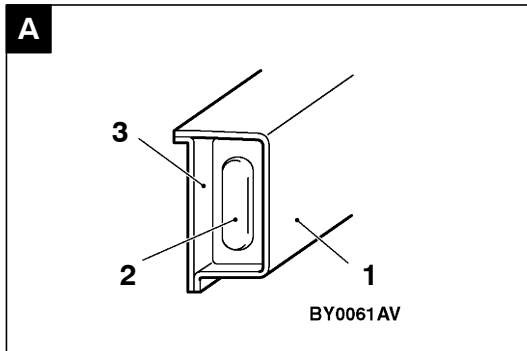
Front Sidemember Reinforcement

Right side

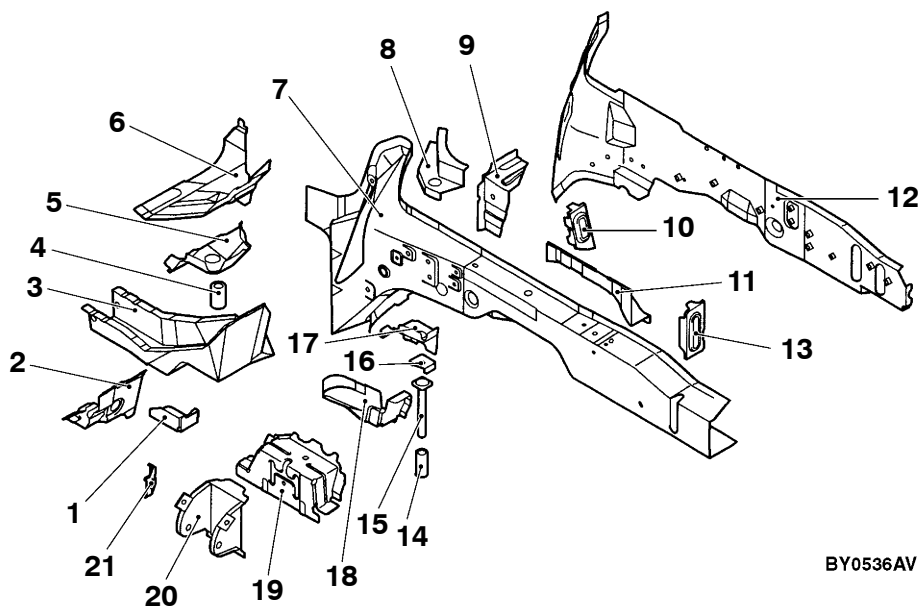


- 1. Front sidemember inner
- 2. Front sidemember bulkhead A
- 3. Front sidemember outer
- 4. Engine mount bracket
- 5. Front sidemember inner reinforcement lower
- 6. Front sidemember gusset rear
- 7. Front sidemember inner reinforcement rear
- 8. Dash panel extension
- 9. Pipe support rear

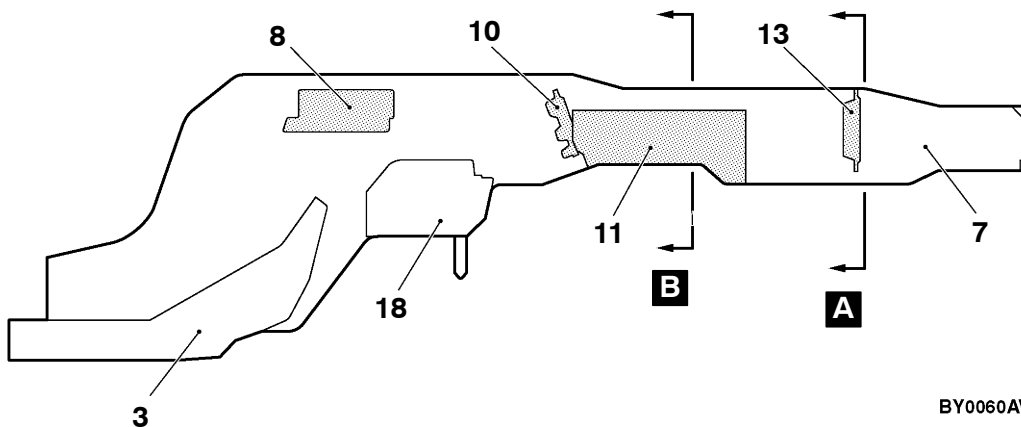
- 10. Pipe nut
- 11. Front sidemember rear
- 12. Dash crossmember extension
- 13. Suspension crossmember support bracket
- 14. Suspension crossmember bracket inner
- 15. Pipe
- 16. Square head bolt
- 17. Retainer
- 18. Pipe support front



Left side

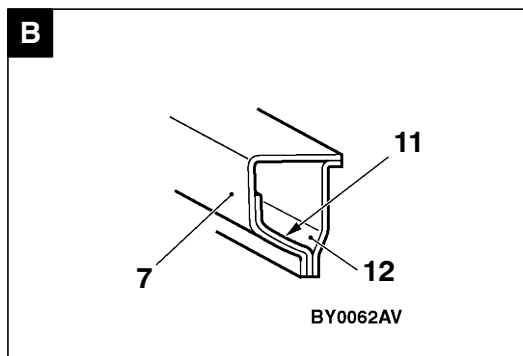
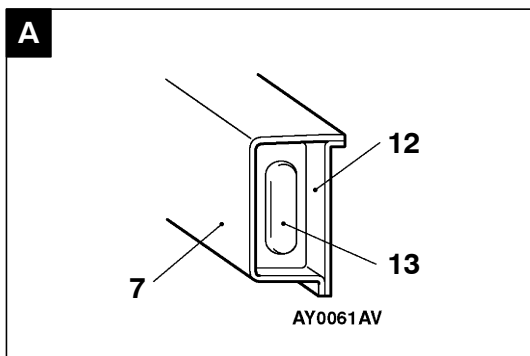


BY0536AV



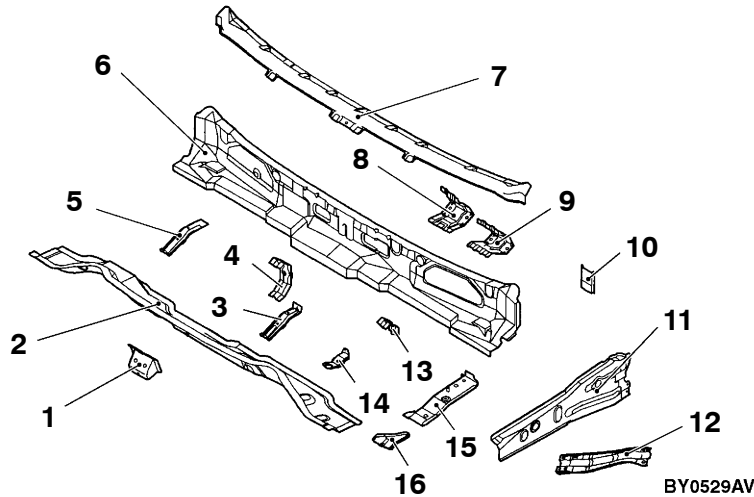
BY0060AV

- | | |
|--|---|
| 1. Suspension crossmember support bracket | 12. Front sidemember outer |
| 2. Dash crossmember extension | 13. Front sidemember bulkhead A |
| 3. Front sidemember rear | 14. Pipe |
| 4. Pipe nut | 15. Square head bolt |
| 5. Pipe support rear | 16. Retainer |
| 6. Dash panel extension | 17. Pipe support front |
| 7. Front sidemember inner | 18. Suspension crossmember bracket inner |
| 8. Front sidemember inner reinforcement rear | 19. Transmission mount reinforcement |
| 9. Front sidemember gusset rear | 20. Transmission mount bracket |
| 10. Front sidemember bulkhead rear | 21. Transmission mount reinforcement rear |
| 11. Front sidemember inner reinforcement | |



Front Deck

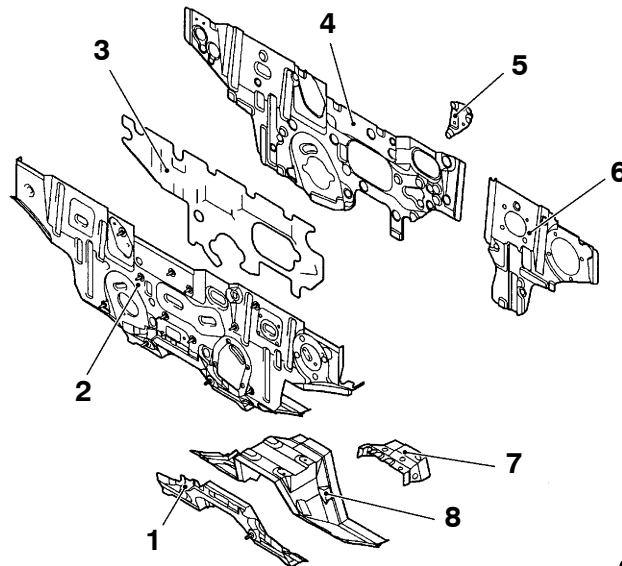
Strut house gusset and upper frame to front pillar brace have been added to improve body rigidity.



- | | |
|--|---------------------------------------|
| 1. Strut tower bar bracket | 9. Clutch pedal support bracket |
| 2. Cowl top lower panel | 10. A/C Unit bracket (RHD) |
| 3. Cowl top upper bracket center | 11. Upper frame extension outer |
| 4. Cowl top upper reinforcement center | 12. Upper frame to front pillar brace |
| 5. Cowl top upper bracket side (LHD) | 13. Cowl top upper reinforcement |
| 6. Cowl top inner panel | 14. Cowl top lower bracket |
| 7. Cowl top upper panel | 15. Upper frame extension inner |
| 8. Pedal support bracket | 16. Strut house gusset |

Dash Panel

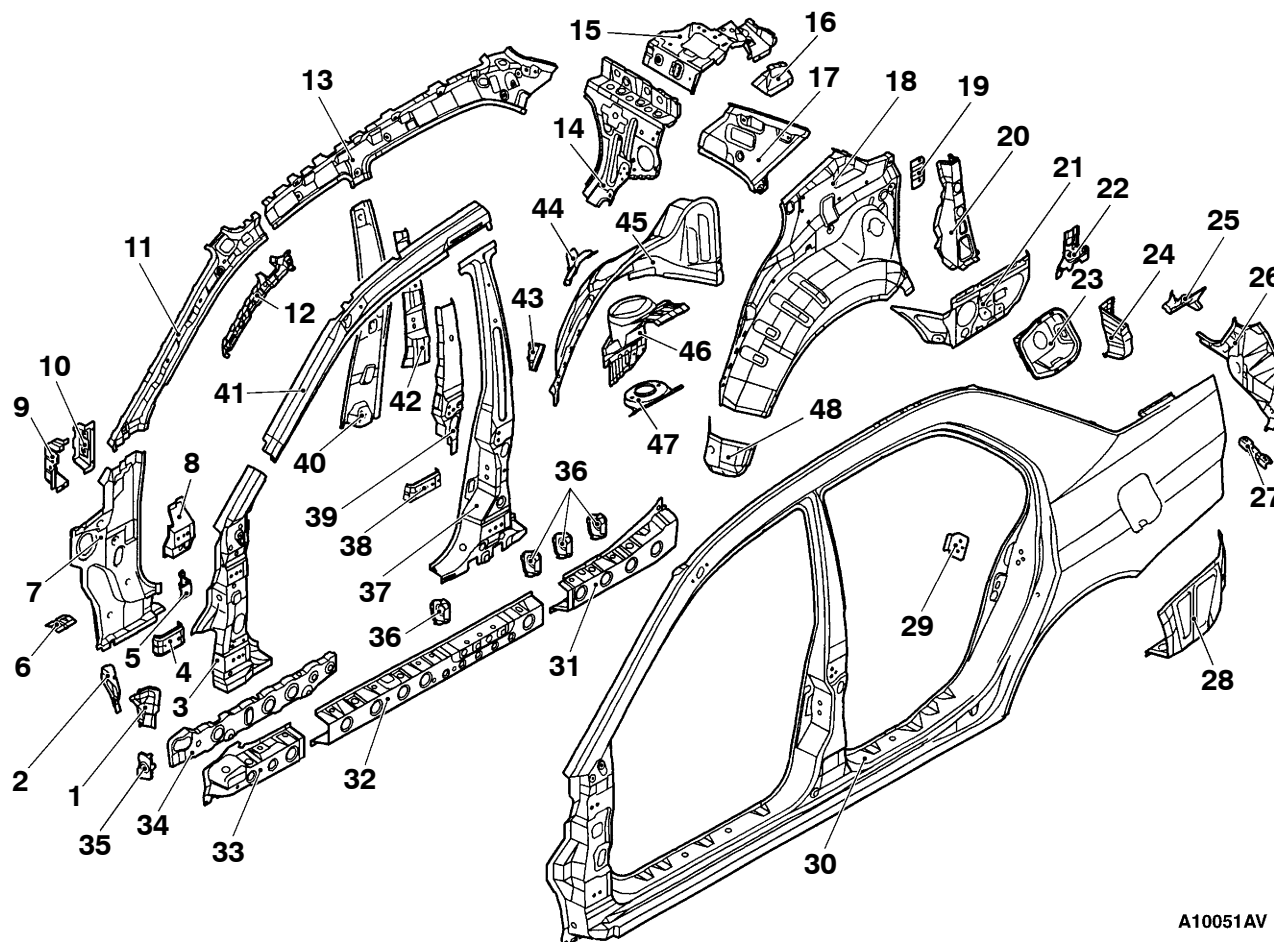
1. A dash panel crossmember has been added and the thickness of the dash panel lower has been increased to improve collision stability.
2. A silencer (steel sheet binding type vibration damping material) has been added between the dash panel and dash panel silencer to control the penetrating sound and vibration from the engine.



- | | |
|---------------------------|------------------------------------|
| 1. Dash panel crossmember | 5. Accel pedal reinforcement (LHD) |
| 2. Dash panel | 6. Dash panel reinforcement |
| 3. Dash silencer center | 7. Dash lower reinforcement (LHD) |
| 4. Dash panel silencer | 8. Dash panel lower |

SIDE BODY

Side Structure



A10051AV

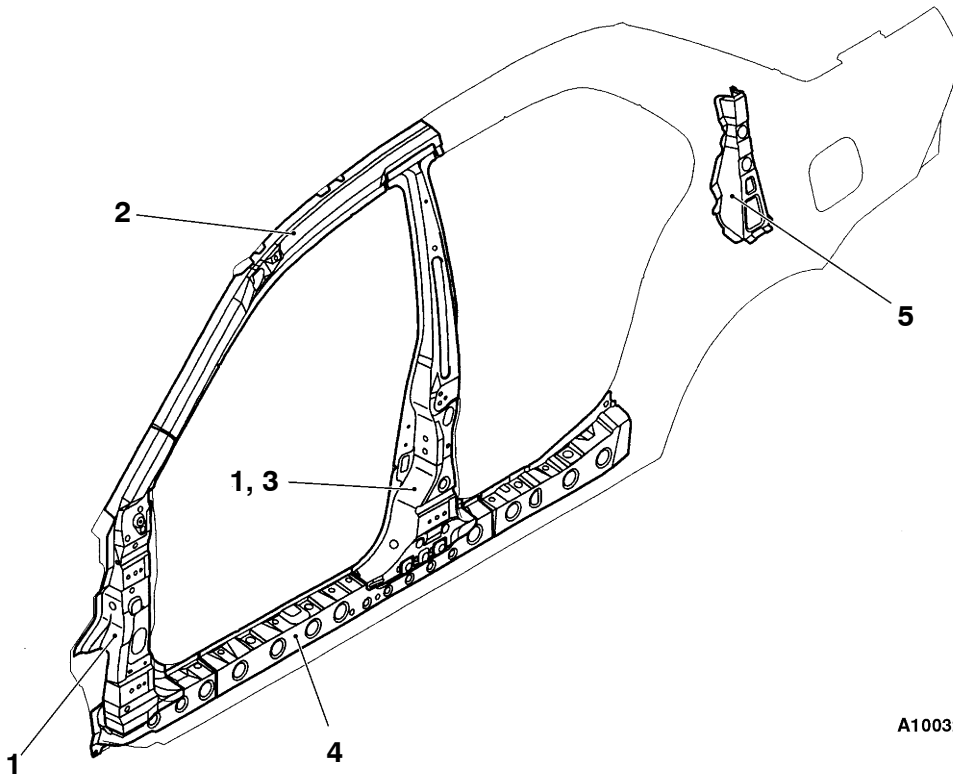
- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Front pillar reinforcement lower extension 2. Front pillar inner lower extension 3. Front pillar reinforcement lower 4. Front door hinge reinforcement lower 5. Front door check reinforcement 6. Side sill to floor plate 7. Front pillar inner lower 8. Front door hinge reinforcement upper 9. Deck crossmember bracket front 10. Deck crossmember bracket 11. Front pillar inner upper 12. Front pillar inner upper reinforcement (LHD, Left side) 13. Side roof rail inner 14. Rear seat back brace 15. Rear shelf upper brace 16. Rear shelf lower brace (Europe and General Export spec. models) 17. Rear pillar inner 18. Quarter inner panel 19. Oil tank bracket (Vehicles with ACD, Left side) 20. Rear pillar reinforcement 21. Rear floor side brace 22. Rear floor brace reinforcement (Vehicles with ACD, Left side) 23. Fuel filler neck bracket (Left side) | <ol style="list-style-type: none"> 24. Quarter inner extension rear 25. Quarter corner panel 26. Rear combination lamp housing 27. Rear bumper bracket 28. Quarter outer extension lower 29. Striker reinforcement 30. Side outer panel 31. Side sill outer reinforcement rear 32. Side sill outer reinforcement center 33. Side sill outer reinforcement front 34. Side sill reinforcement support 35. Side sill (A) bulkhead (LHD, Left side) 36. Side sill bulkhead 37. Center pillar reinforcement 38. Rear door hinge reinforcement lower 39. Rear door hinge reinforcement upper 40. Center pillar inner 41. Front pillar reinforcement upper 42. Center pillar seatbelt reinforcement 43. Rear seatbelt wheel house reinforcement 44. Spring house brace 45. Rear wheel house inner panel 46. Spring house panel 47. Spring house bracket 48. Side sill end plate |
|---|---|

Side Structure Reinforcement

1. The thickness of the reinforcements of the front pillar and center pillar has been increased to improve collision safety.
2. The front pillar reinforcement upper, side outer panel, and front roof rail have been joined to improve twisting rigidity.
3. The side sill has been made thin by employing a variable thickness steel sheet* for the center pillar reinforcement to improve safety in collision and realize lightweight.
4. The cross section of the side sill outer reinforcement has been made large to improve safety in collision and body rigidity.
5. A rear pillar reinforcement has been added, and the rear shelf and rear wheel house have been joined to improve the twisting rigidity of the suspension attaching portion.

NOTE

*: Steel sheets with different thickness welded to form one steel sheet.

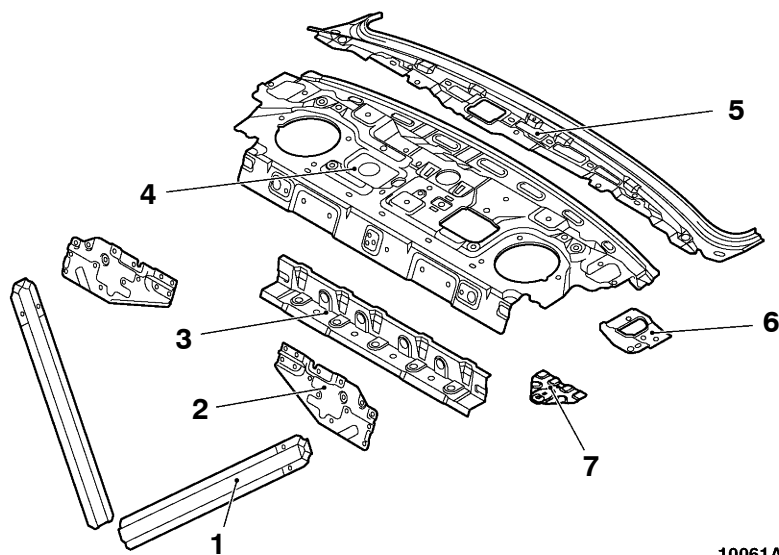


A10032AV

REAR BODY

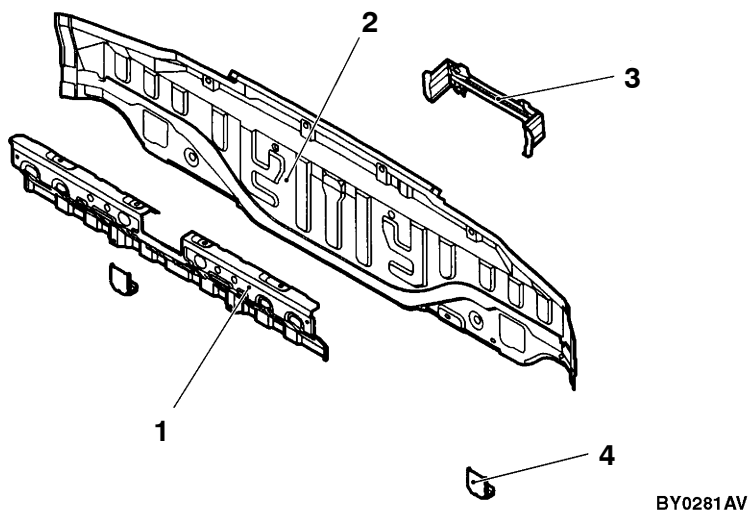
Rear Deck

A rear shelf extension has been added to form closed surface structure. Then, the rear shelf and the rear floor have been joined to improve the torsion rigidity of the seat back plate.



- | | |
|-------------------------|---|
| 1. Seat back plate | 5. Rear shelf reinforcement |
| 2. Rear seat back panel | 6. Trunk lid hinge reinforcement |
| 3. Rear shelf extension | 7. Seat belt reinforcement (Europe and General Export spec. models) |
| 4. Rear shelf panel | |

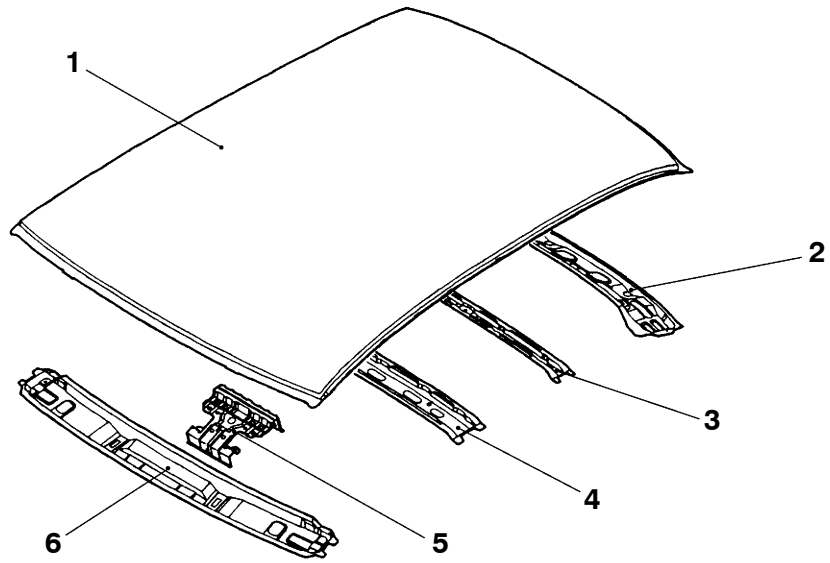
Rear end panel



- | | |
|-------------------------|-------------------------------|
| 1. Rear end panel inner | 3. Rear license plate bracket |
| 2. Rear end panel outer | 4. Bumper bracket lower |

ROOF

The cross section of the roof bow has been made large to improve safety in collision.



AY0310AV

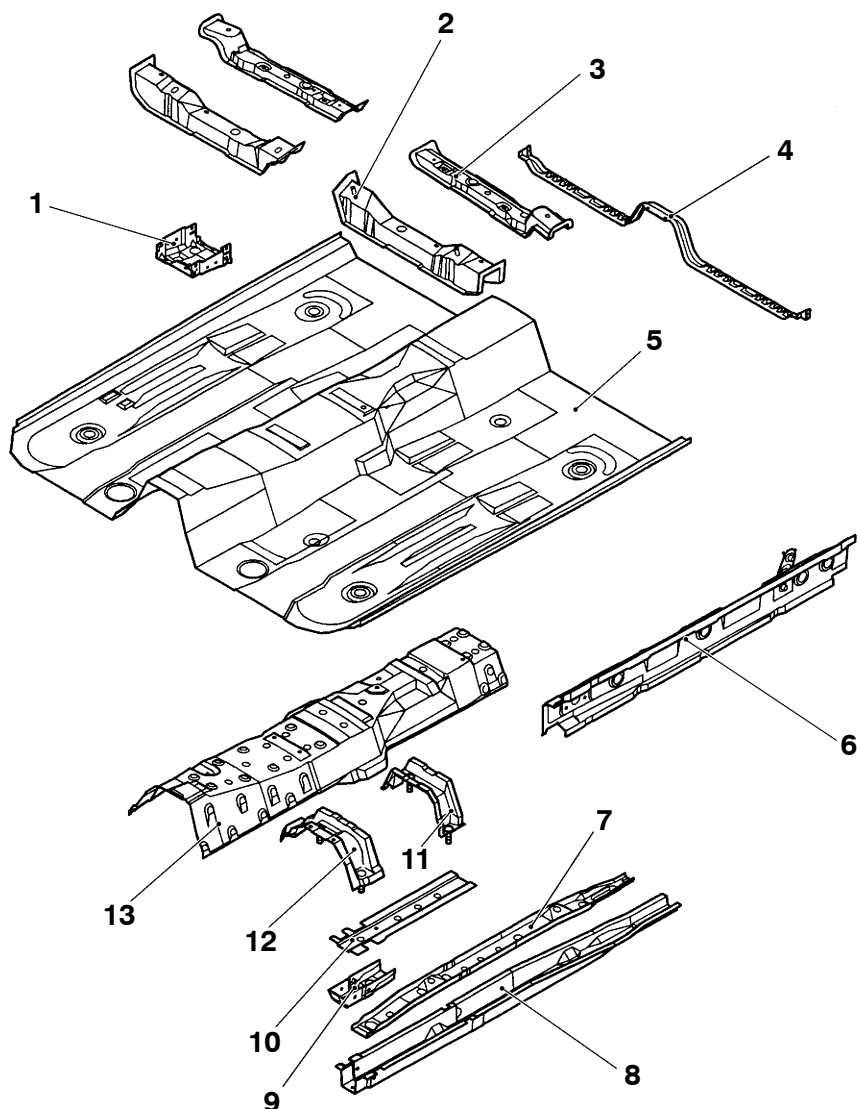
1. Roof panel
2. Rear roof rail
3. Rear roof bow

4. Front roof bow
5. Map lamp bracket
6. Front roof rail

UNDER BODY

Front Floor

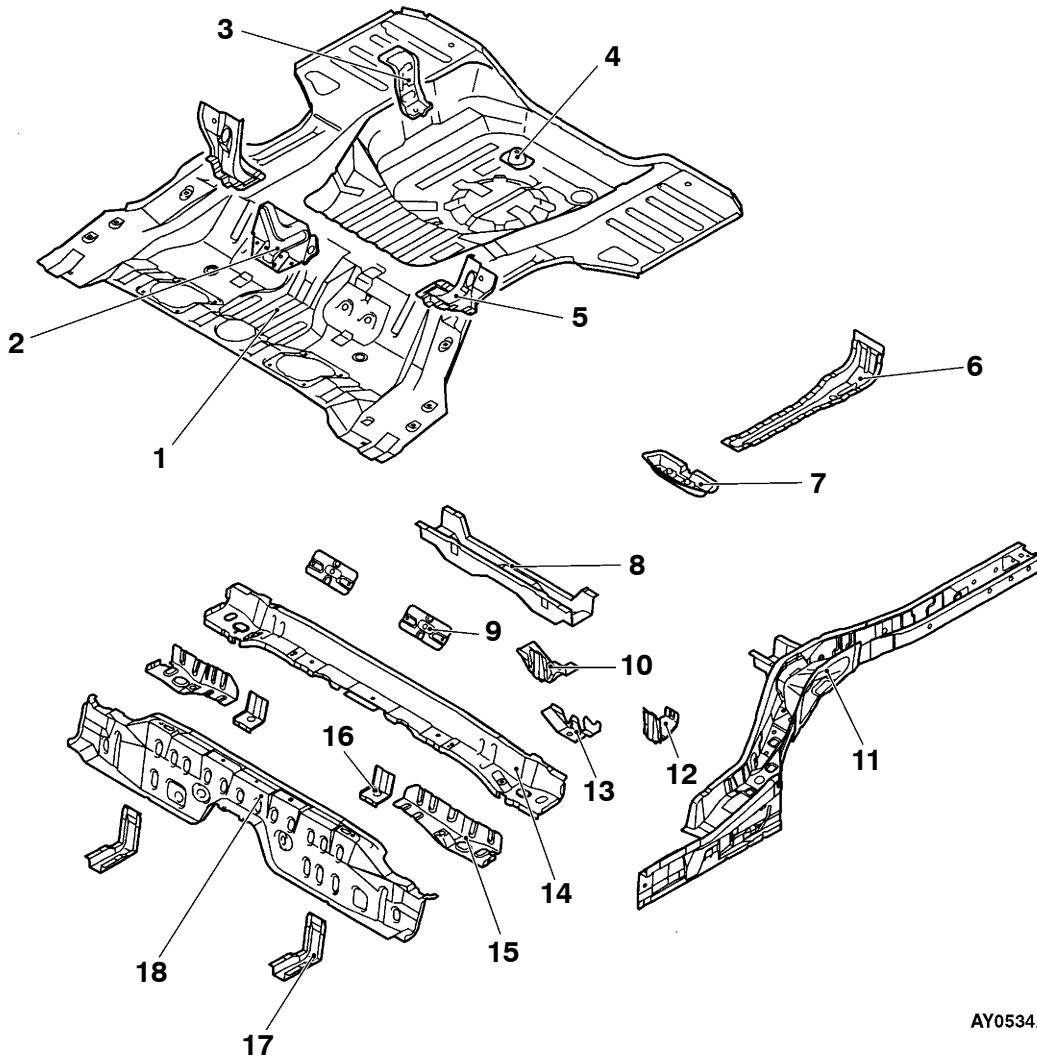
The cross section of the front floor sidemember has been made large to improve safety in collision.



A10050AV

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Installment panel center bracket reinforcement 2. Front floor crossmember front 3. Front floor crossmember rear 4. Front floor extension panel rear 5. Front floor pan 6. Front floor side sill inner 7. Front floor sidemember reinforcement rear (LHD, Left side) | <ol style="list-style-type: none"> 8. Front floor sidemember 9. Front floor sidemember reinforcement front (LHD, Left side) 10. Front floor sidemember reinforcement 11. Backbone crossmember rear 12. Backbone crossmember front 13. Backbone reinforcement |
|--|--|

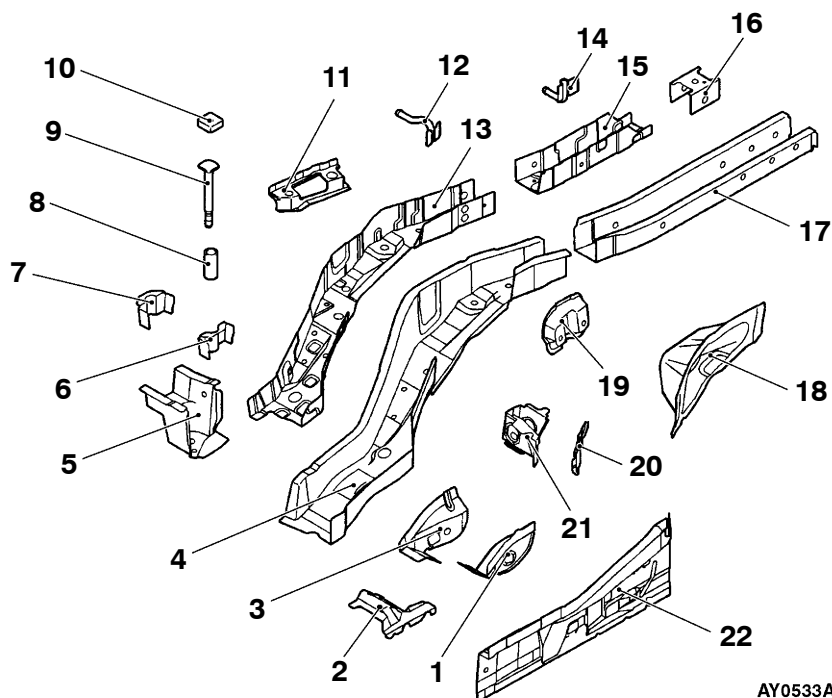
Rear Floor



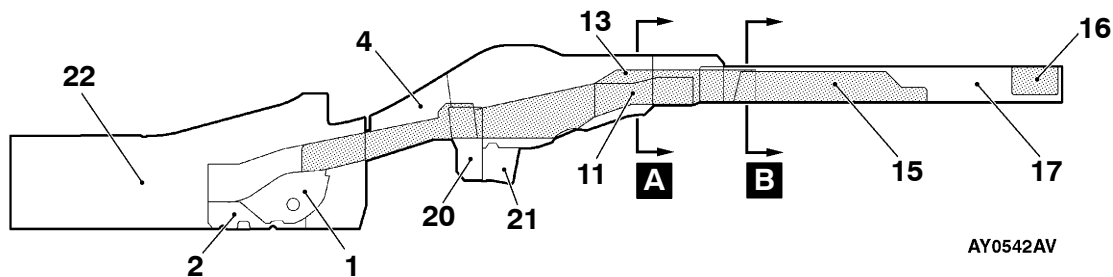
AY0534AV

- | | |
|---|--|
| 1. Rear floor pan | 11. Rear floor sidemember |
| 2. Seat back plate extension | 12. Fuel tank rear bracket (Vehicles with AYC) |
| 3. Jack bracket | 13. Differential/fuel support bracket front (Vehicles with mechanical LSD) |
| 4. Spare tire bracket | 14. Rear seat crossmember |
| 5. Rear seat back reinforcement | 15. Seat crossmember reinforcement |
| 6. Towing hook reinforcement | 16. Fuel tank front reinforcement |
| 7. Crossmember center support | 17. Front floor sidemember extension |
| 8. Rear floor crossmember | 18. Rear floor extension |
| 9. Rear floor seatbelt reinforcement | |
| 10. Differential/fuel support bracket rear (Vehicles with mechanical LSD) | |

Rear Floor Sidemember Reinforcement

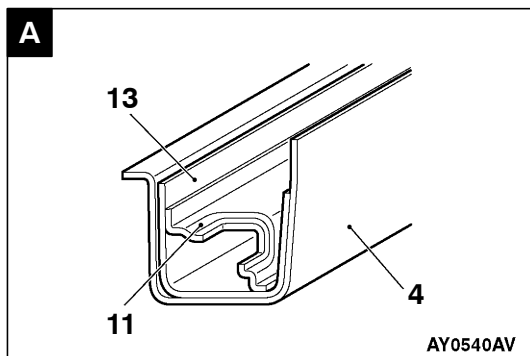


AY0533AV

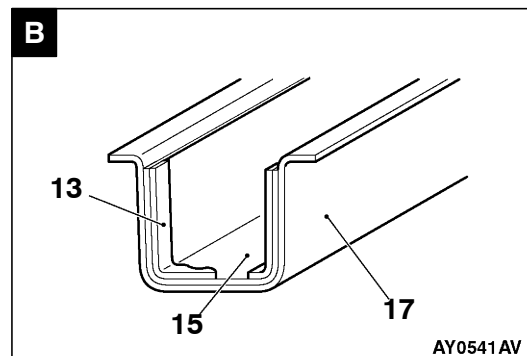


AY0542AV

- | | |
|-------------------------------------|---|
| 1. Trailing arm outer bracket | 22. Muffler hanger center |
| 2. Rear floor sidemember support | 23. Rear floor sidemember reinforcement front |
| 3. Trailing arm inner bracket | 24. Muffler hanger rear |
| 4. Rear floor sidemember | 25. Rear floor sidemember reinforcement rear |
| 5. Rear floor crossmember extension | 26. Bumper stay reinforcement (RS) |
| 6. Differential mount bulkhead | 27. Rear floor sidemember extension |
| 7. Differential mount reinforcement | 28. Rear floor sidemember reinforcement |
| 8. Pipe | 29. Upper link bracket |
| 9. Square head bolt | 30. Toe-control link side reinforcement |
| 10. Retainer | 31. Toe-control link bracket |
| 11. Rear suspension bracket | 32. Rear floor side sill |



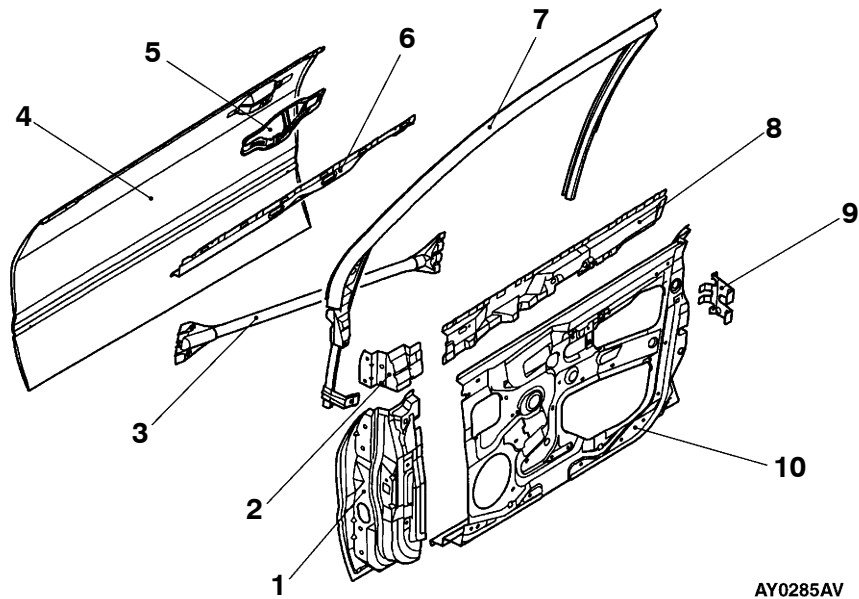
AY0540AV



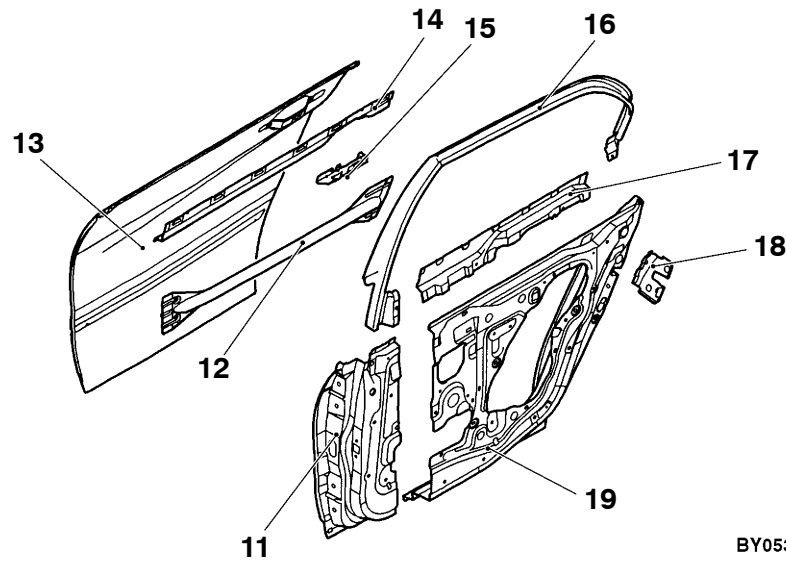
AY0541AV

DOOR

The front and back of the side door beam has been made large to cope with the force from the front and sides during collision.

Front door

AY0285AV

Rear door

BY0531AV

1. Front door hinge panel
2. Front door hinge reinforcement upper
3. Front door side door beam
4. Front door outer panel
5. Front door outside handle reinforcement
6. Front door beltline reinforcement outer
7. Front door window sash
8. Front door beltline reinforcement inner
9. Front door latch reinforcement
10. Front door inner panel

11. Rear door hinge panel
12. Rear door side door beam upper
13. Rear door outer panel
14. Rear door beltline reinforcement outer
15. Rear door beltline bracket
16. Rear door window sash
17. Rear door beltline reinforcement inner
18. Rear door latch reinforcement
19. Rear door inner panel

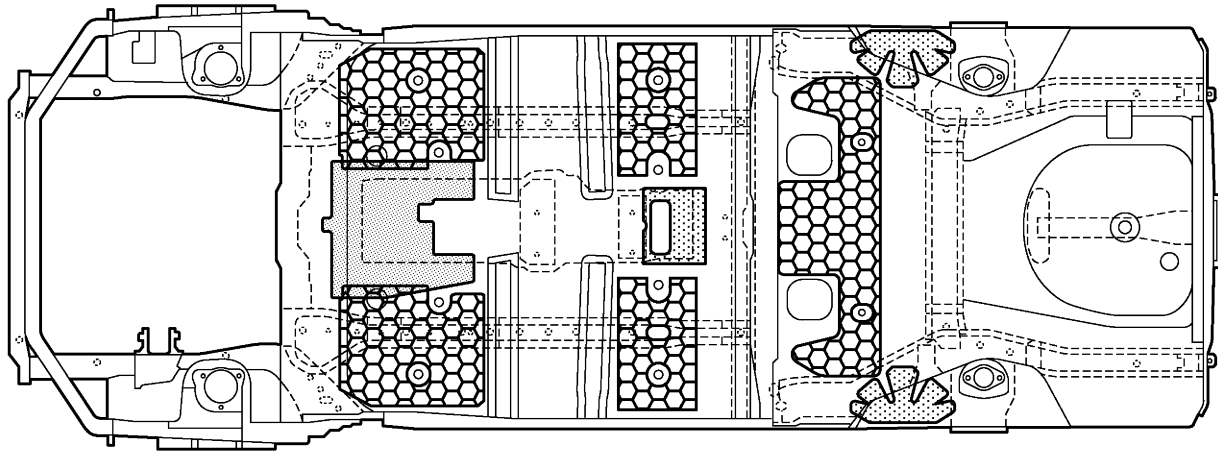
SILENCER APPLICATION LOCATIONS

Silencers (MD-12 and melting sheets) are attached to the top of the floor to reduce vibration and insulate against the heat from exhaust gas.

NOTE

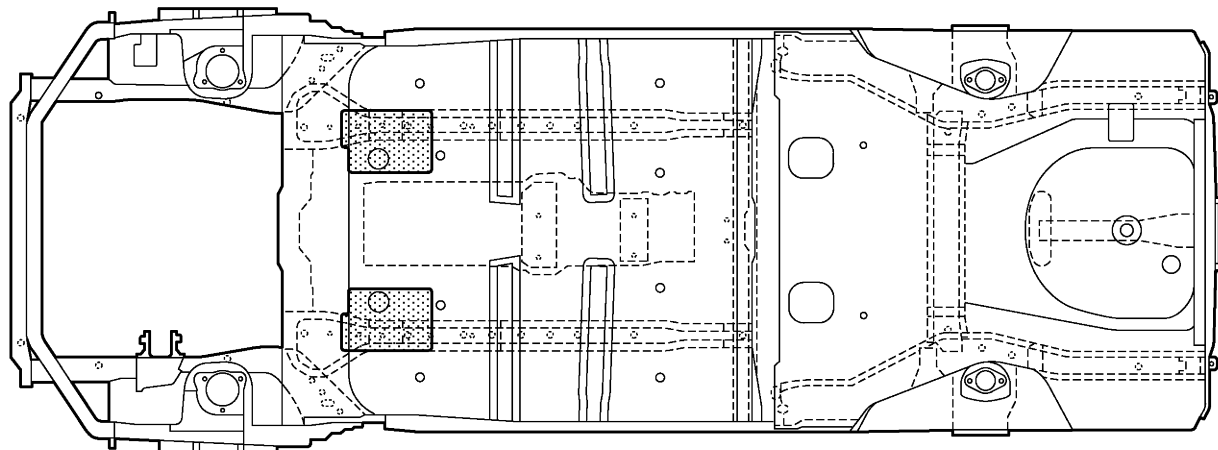
MD-12 is a high performance sheet composed of asphalt applied with mica and thermosetting resin for improving anti-vibration performance.

<RS-II>






AY0620AV

<RS>



AY0621AV

-  : 1.6 mm thick melting sheet
-  : 3.2 mm thick melting sheet (Place two 1.6 mm melting sheets one on top of another.)
-  : 4.0 mm thick MD-12 (Place three 1.6 mm melting sheets one on top of another.)

NOTE

The number in the parentheses indicates the number of melting sheet used for repair.

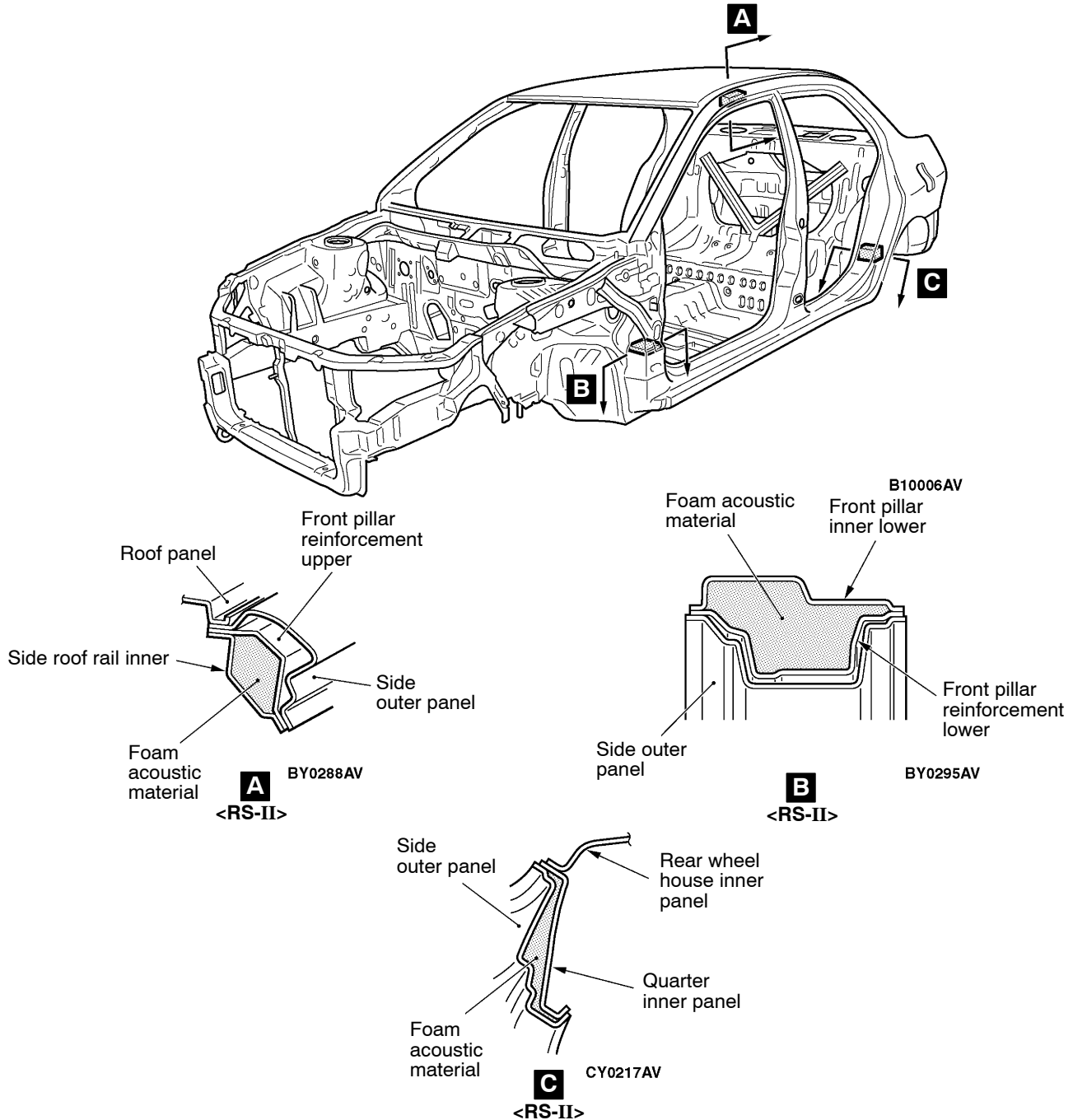
LOCATIONS USING URETHANE FOAM AND FOAM MATERIAL

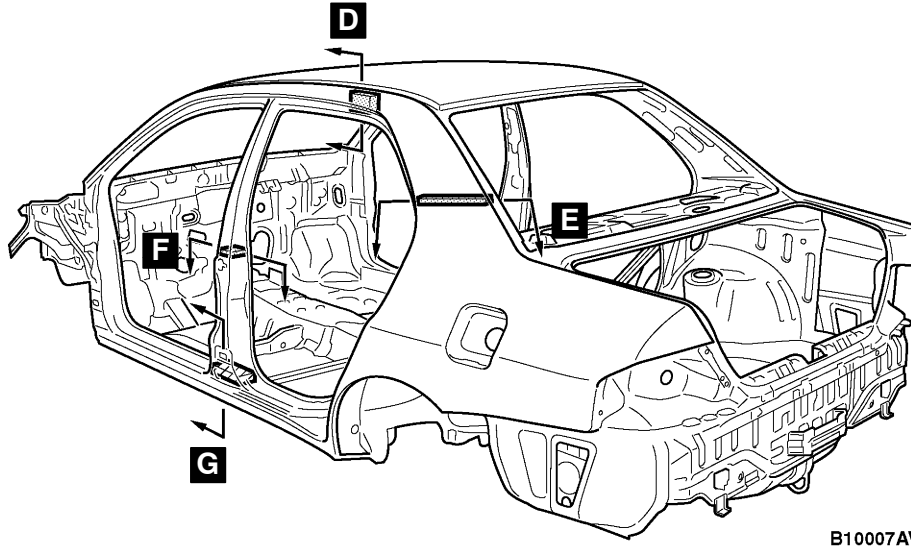
1. Urethane foam is inserted into the center pillar to prevent the penetration of noise.
2. By filling the top of the front pillar, bottom of the front pillar, center pillar, side roof rail, rear pillar and inside the wheel house arch with foam acoustic material, penetration of noise is prevented.

Precautions on performing work involving sheet metal at locations using foam material

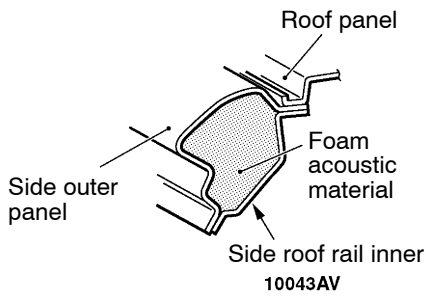
As foam may burn when heated, observe the following precautions.

1. Do not perform heating work using gas burners at locations using foam material.
2. When cutting locations using foam material, use tools (air saw, etc.) which do not generate heat.
3. If leftover foam material is present at the area to be cut (body side), remove the foam around the area to be welded before proceeding with welding.

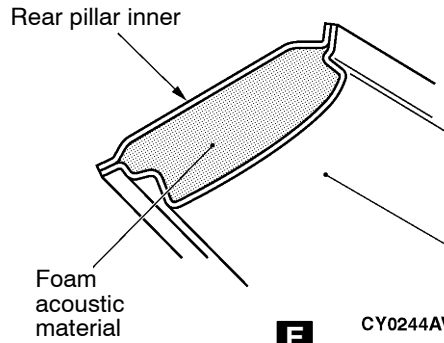




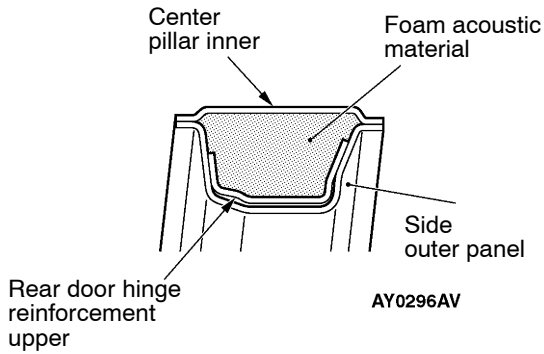
B10007AV



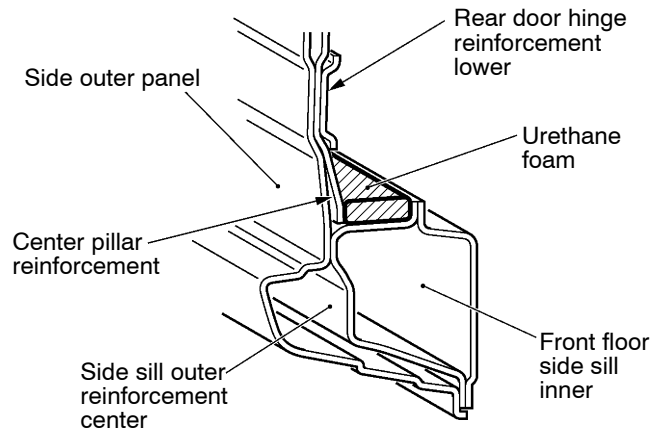
D
<RS-II>



E
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F
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G
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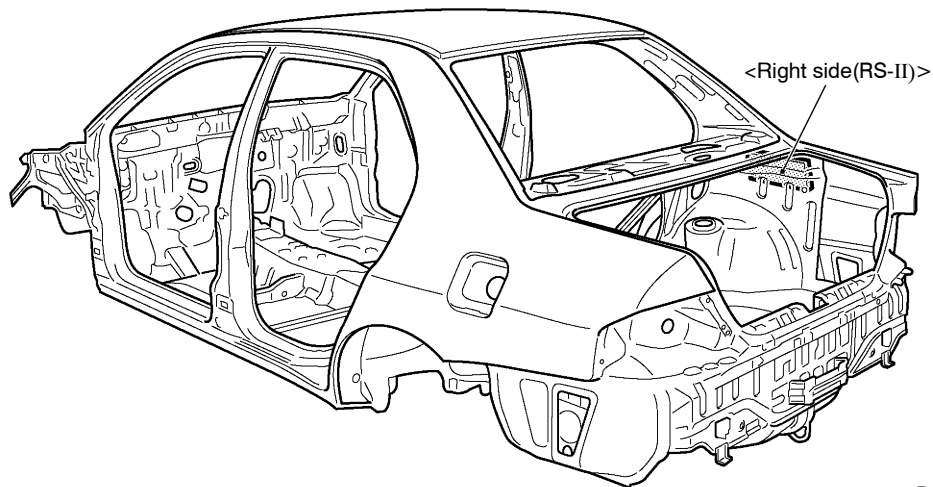
STIFFENER AND DUMP SHEET APPLICATION LOCATIONS

Stiffener is pasted to the inside of the side outer panel, and dump sheets are pasted on the inside of the front doors to increase surface rigidity, thus improving soundproof qualities with the anti-vibration effects.

NOTE

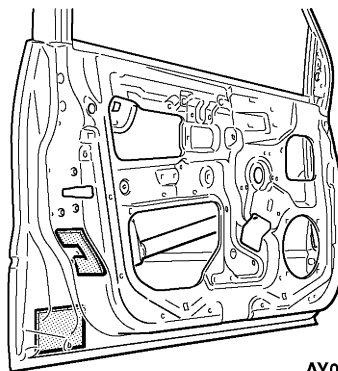
The stiffener comes in sheet form and is composed mainly of epoxy resin, glass fibers, and fillers. It hardens when heated. It is used to improve the rigidity of outer panels.

Stiffener



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Dump sheet



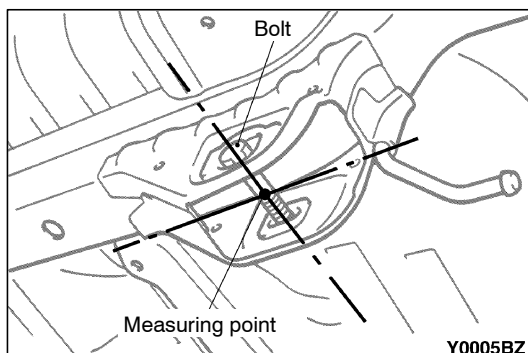
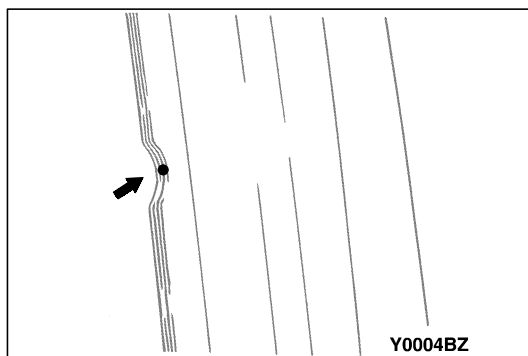
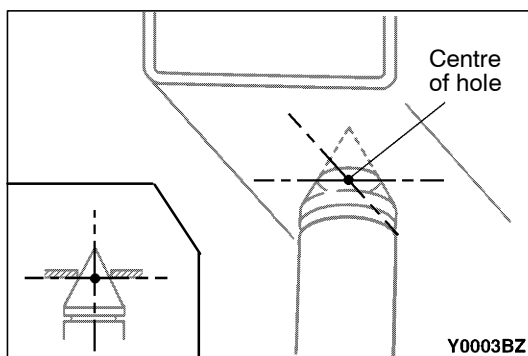
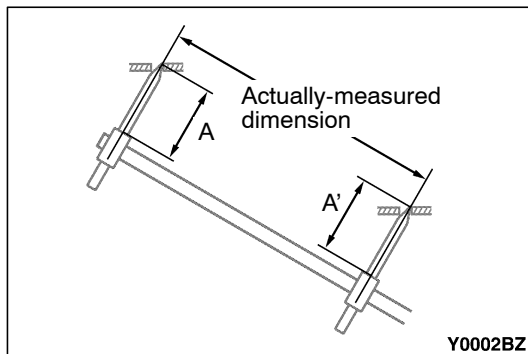
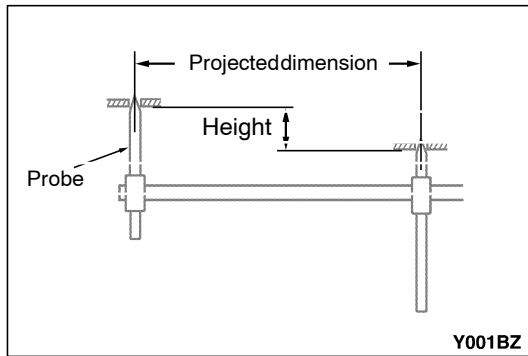
AY0299AV

BODY DIMENSIONS

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		SIDE BODY	14
		REAR BODY	15
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BODY DIMENSIONS AND MEASUREMENT METHODS

1. Type A (projected dimensions)
Indicates the dimension when a measurement location is projected onto a plane.
The difference in height of the measurement points should be taken into consideration when measuring.

2. Type B (actual-measurement dimensions)
Indicates the actual distance between the measurement points.
Measure using a tracking gauge or a measuring tape, etc.

NOTE

- Make the lengths of the tracking gauge probes the same ($A=A'$).
- Do not bend or twist the measuring tape.

3. Insert the tracking gauge probes securely into the measurement holes
4. When the standard dimensions in the illustration are enclosed by, this indicates that the symmetrical left and right positions have the same dimensions.

5. When using a notch for dimension measurement, set the measuring point at the centre of the notch.

6. When measuring the suspension mounting arm, or link mounting position, use the suspension mounting bolt, etc..
7. The body centre points are shown for the purpose of checking the position of the left and right symmetry locations.

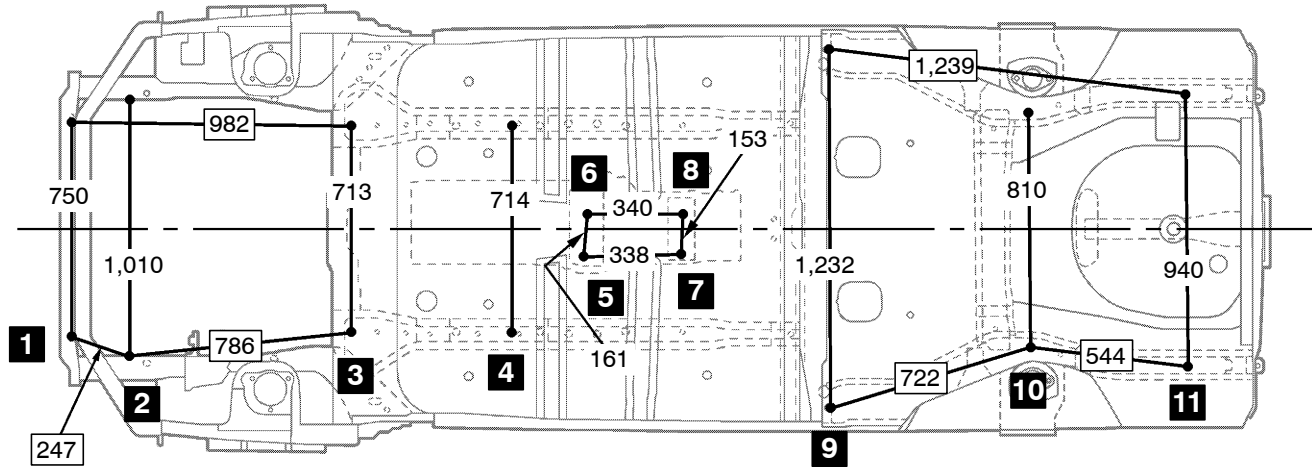
NOTES

<EVOLUTION- >

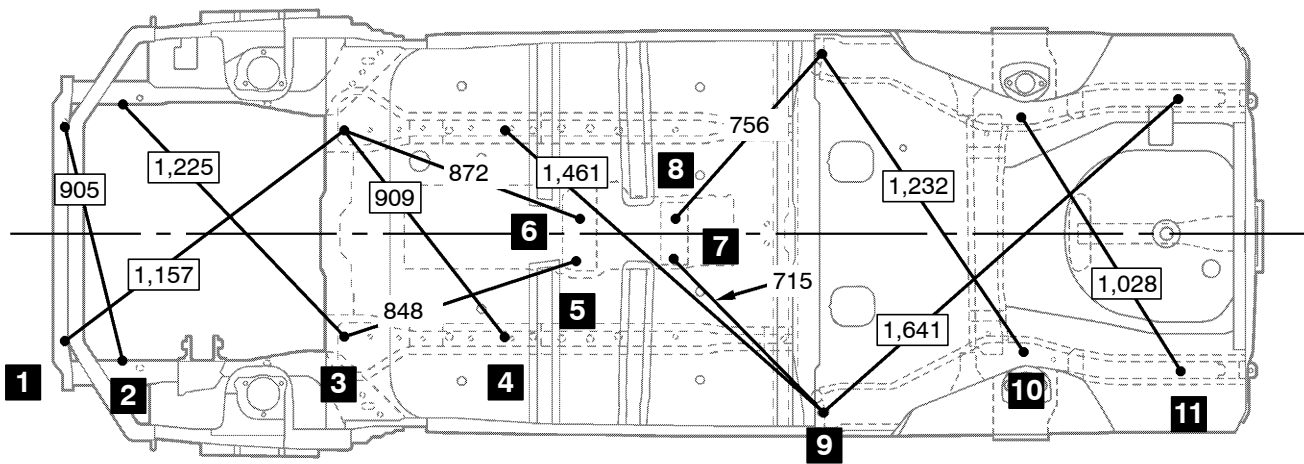
TYPE A (PROJECTED DIMENSIONS)

UNDER BODY

mm

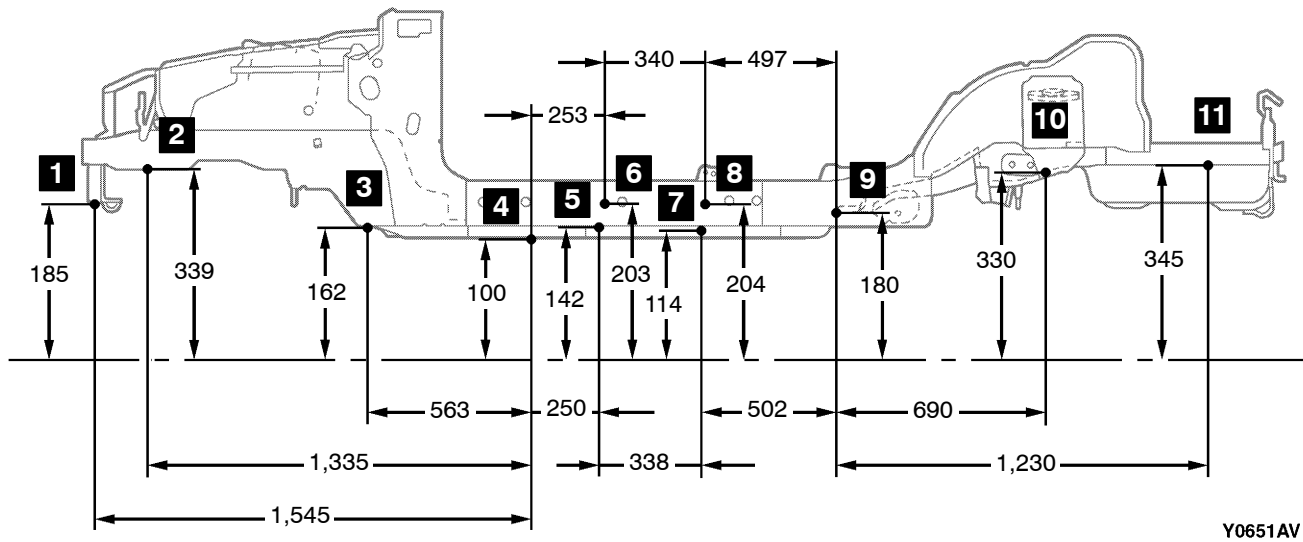


Y0641AV



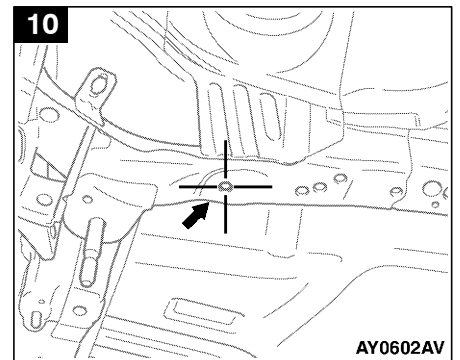
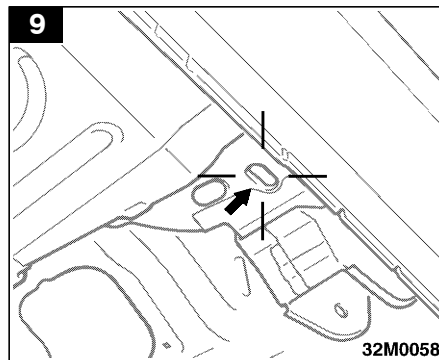
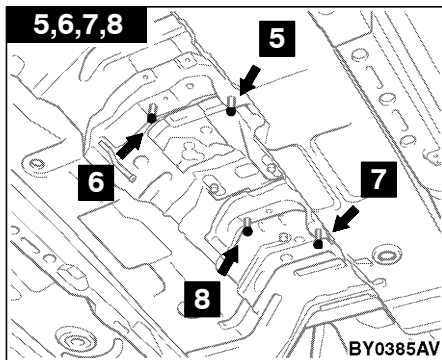
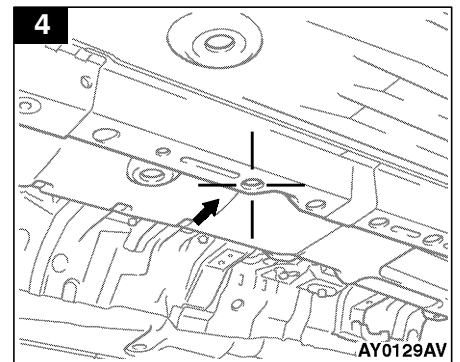
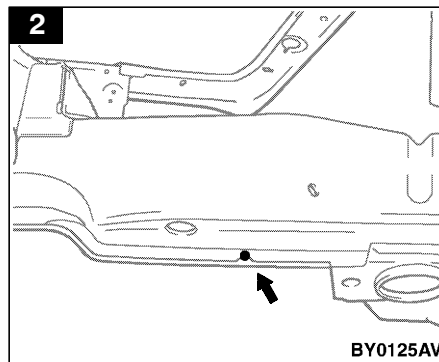
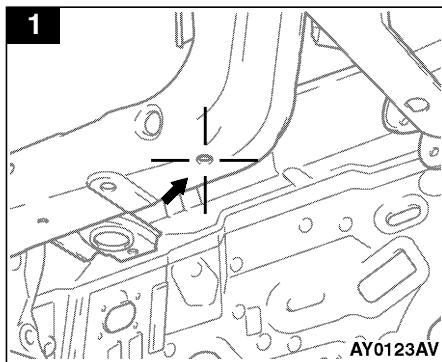
Y0642AV

mm



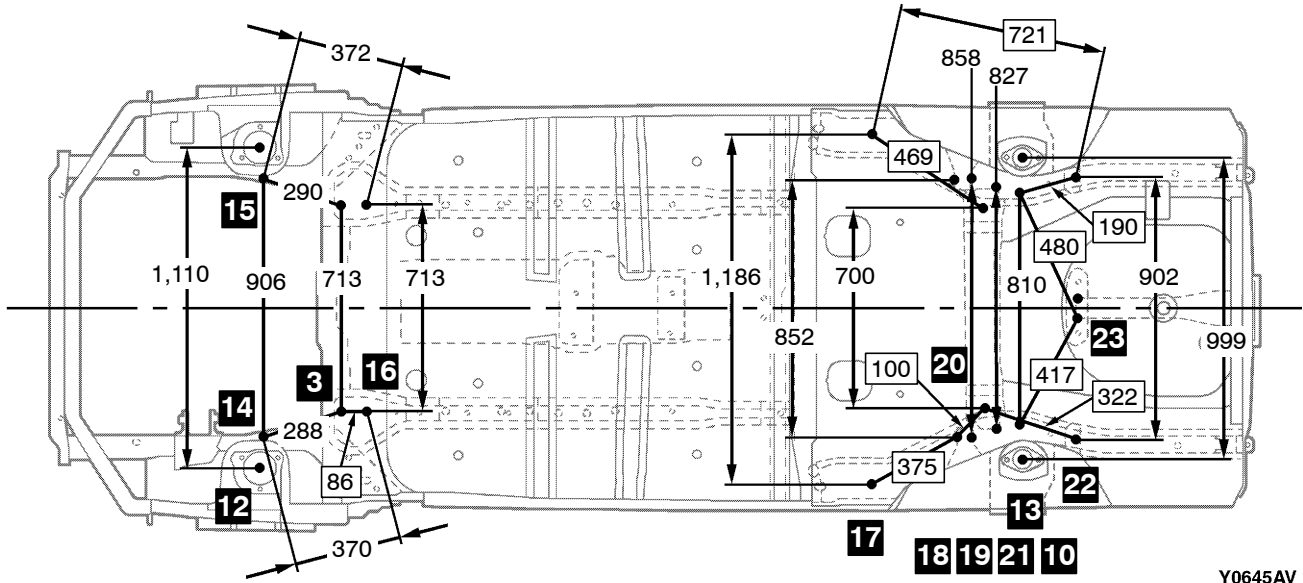
No.	Standard measurement point	Hole shape	Size mm	No.	Standard measurement point	Hole shape	Size mm
1*	Centre of under cover mounting hole	-	8	7	Front edge of center bearing mounting bolt	-	-
2	Notch of front sidemember inner	-	-	8	Front edge of center bearing mounting bolt	-	-
3*	Centre of crossmember mounting hole	-	18	9*	Centre of rear seat crossmember positioning hole	-	22 x 38
4*	Centre of front floor sidemember positioning hole	-	25	10*	Centre of crossmember mounting hole	-	14
5	Front edge of center bearing mounting bolt	-	-	11*	Centre of rear floor sidemember extension drain hole	-	20
6	Front edge of center bearing mounting bolt	-	-				

NOTE: The "*" in the No. column means the frame centre ring gauge mounting position.

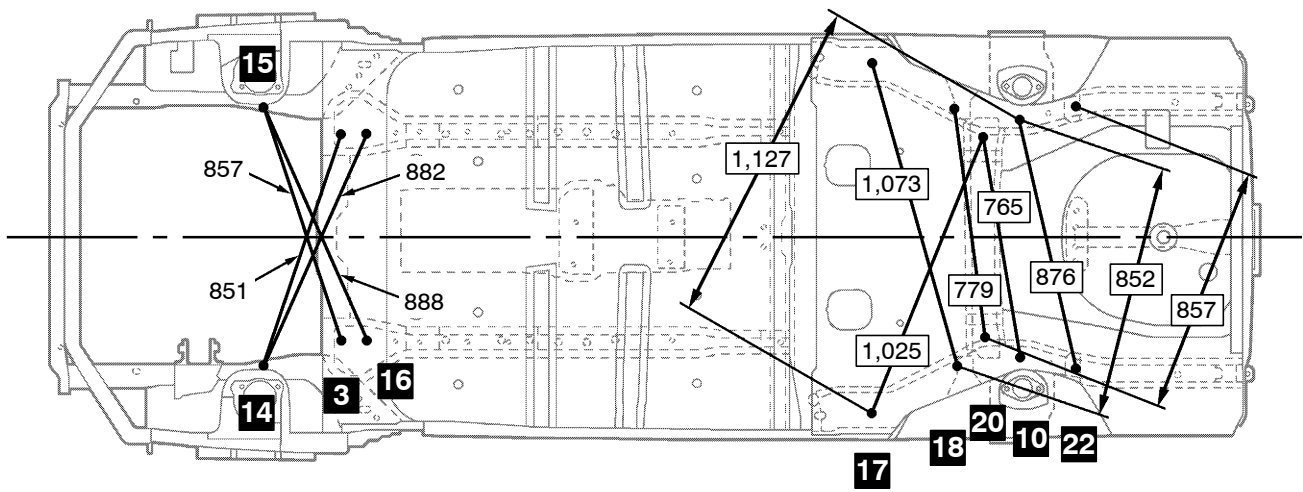


INSTALLATION OF SUSPENSION

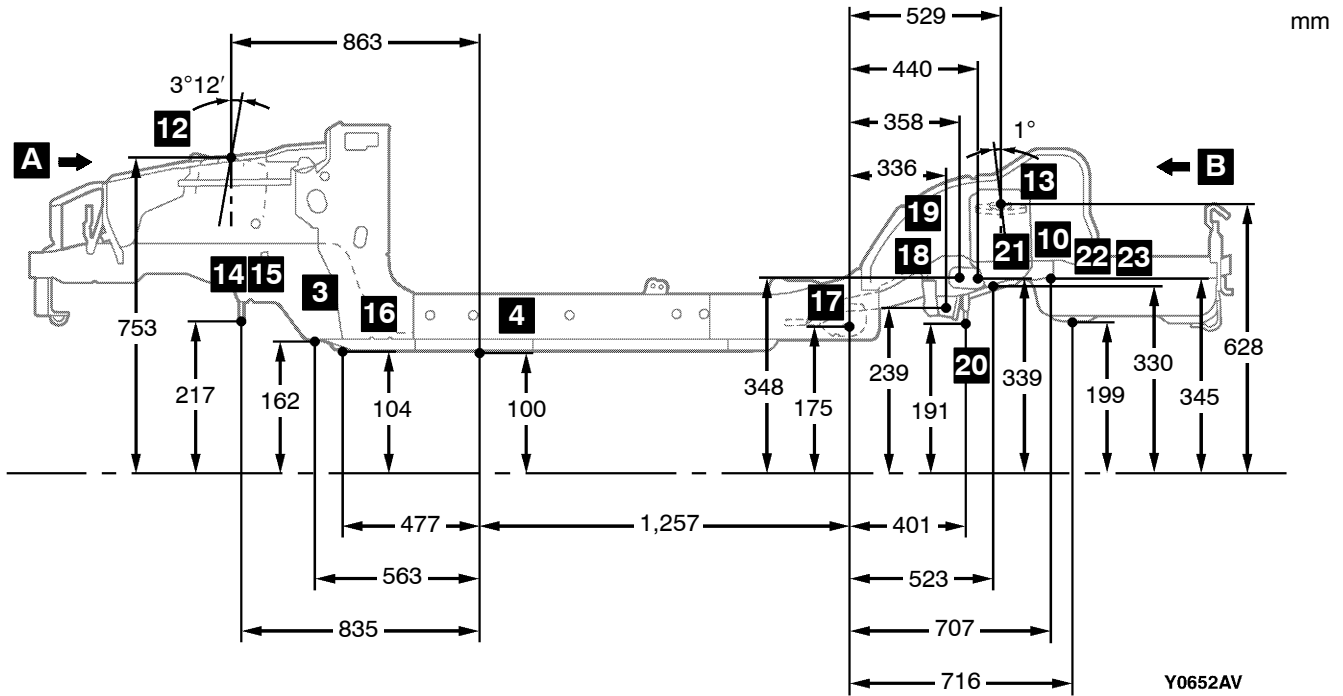
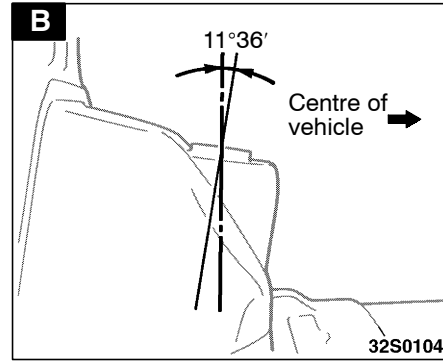
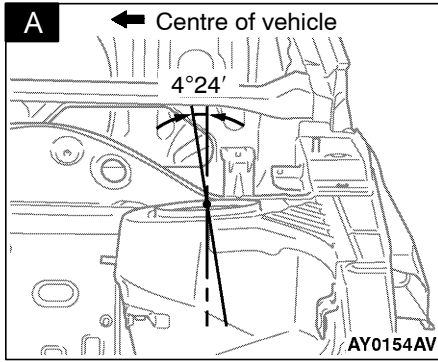
mm



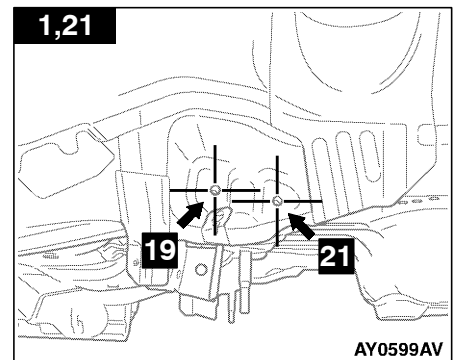
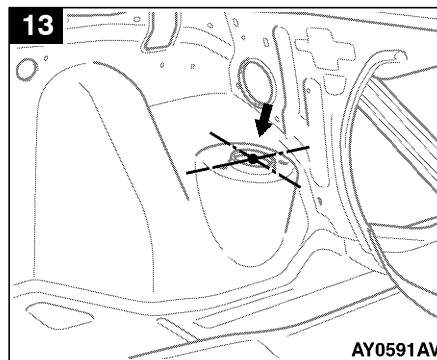
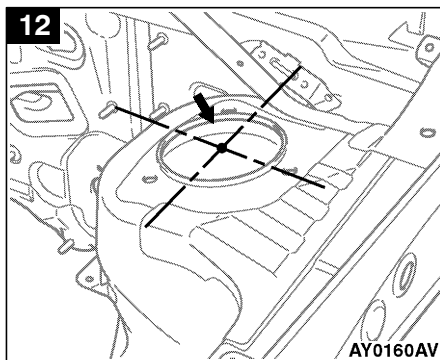
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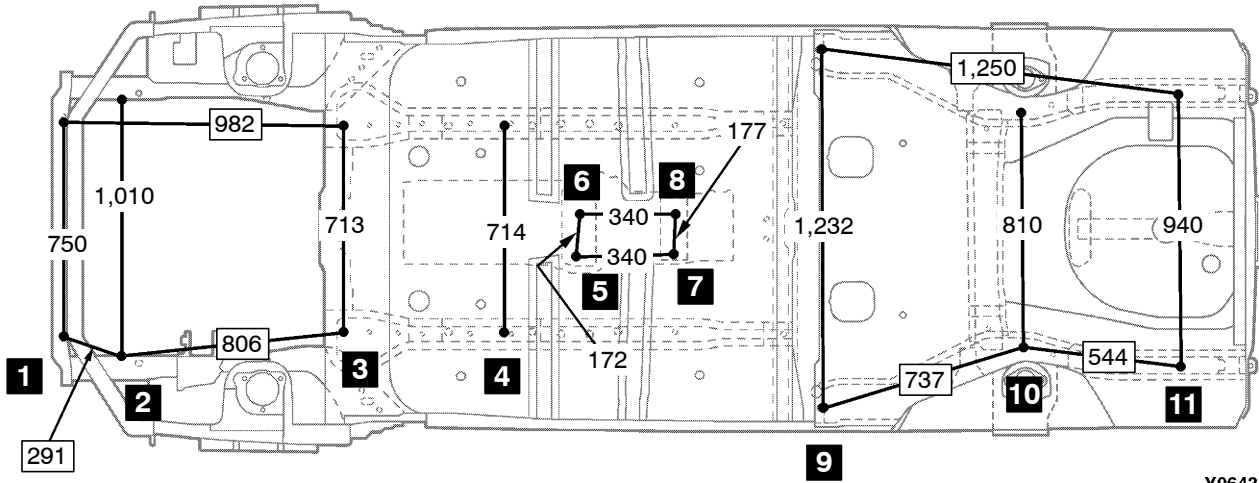
No.	Standard measurement point	Hole shape - Size mm	No.	Standard measurement point	Hole shape - Size mm
3	Centre of crossmember mounting hole	- 18	17	Trailing arm mounting position	-
4	Centre of front floor sidemember positioning hole	- 25	18	Control link mounting position	-
10	Centre of crossmember mounting hole	- 14	19	Centre of upper link mounting hole	- 14
12	Centre of strut insulator	- 110	20	Front edge of differential support mounting bolt	-
13	Centre of rear shock absorber mounting hole	- 68	21	Centre of upper link mounting hole	- 14
14	Front edge of crossmember mounting bolt (Left side)	-	22	Centre of upper arm mounting hole	- 13
15	Front edge of crossmember mounting bolt (Right side)	-	23	Centre of crossmember mounting hole	- 15
16	Centre of crossmember mounting hole	- 11			



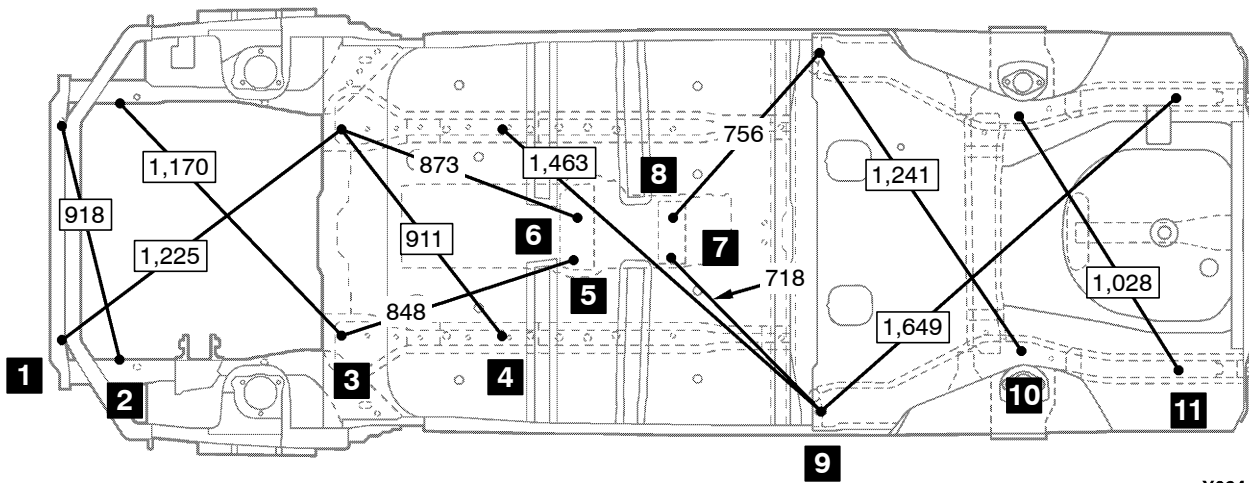
TYPE B (ACTUAL-MEASUREMENT DIMENSIONS)

UNDER BODY

mm

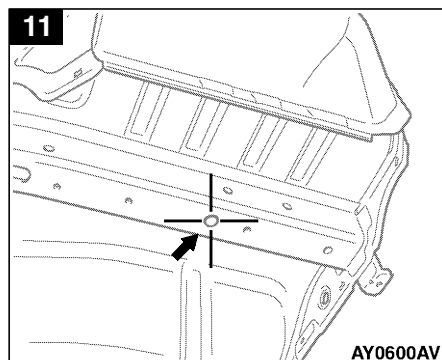
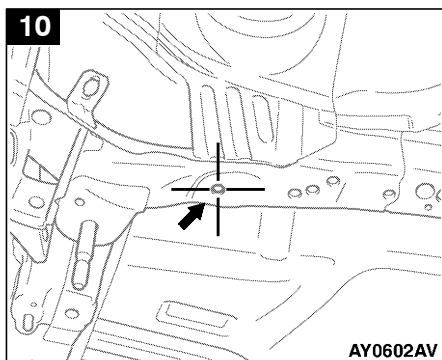
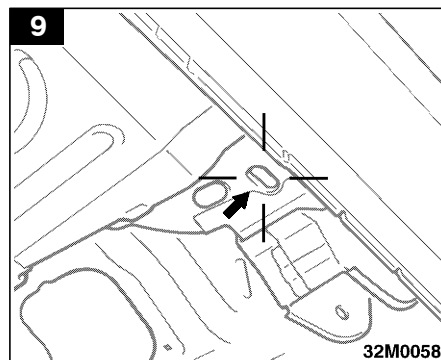
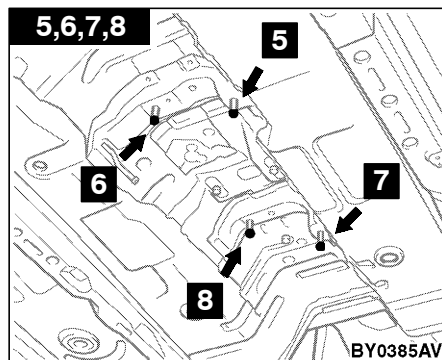
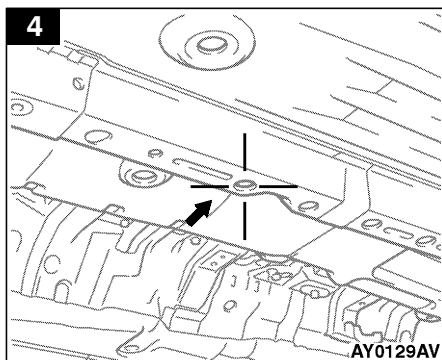
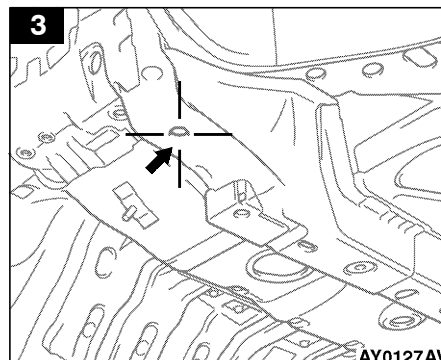
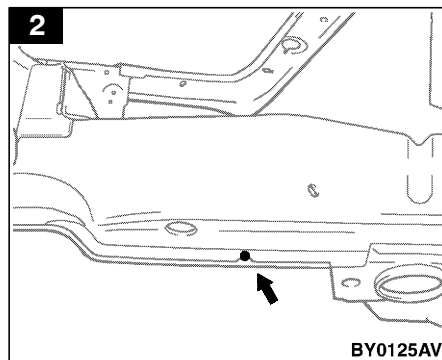
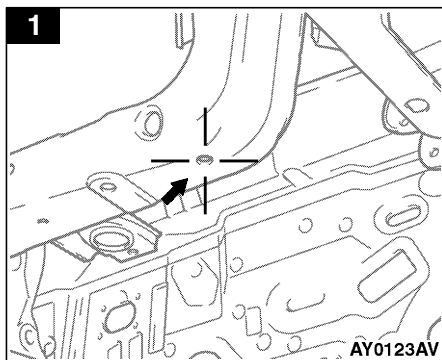


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Y0644AV

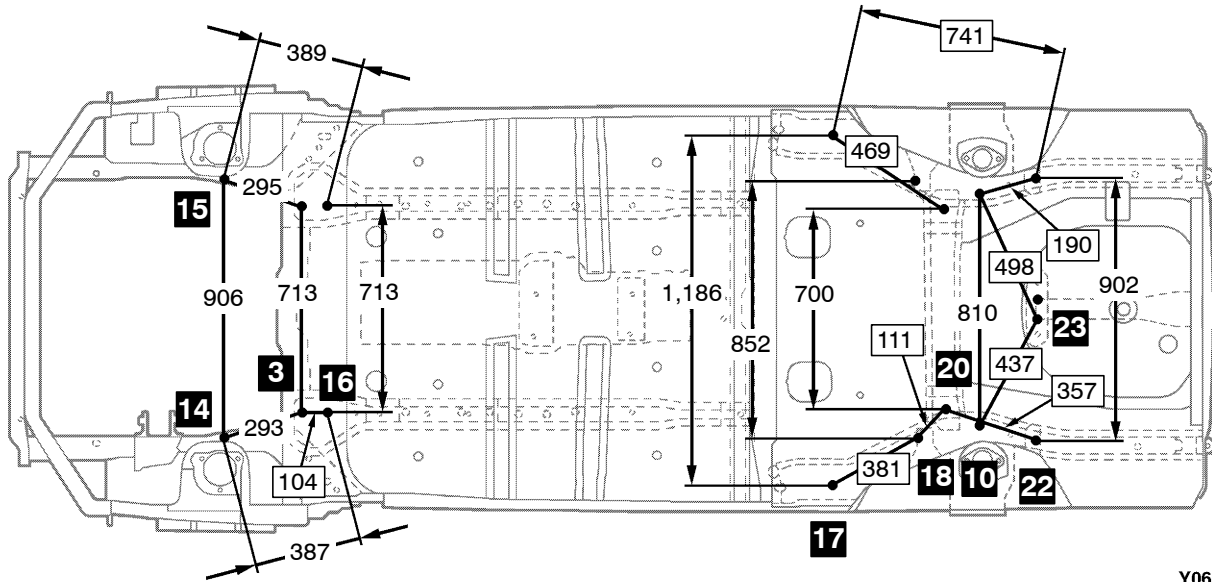
No.	Standard measurement point	Hole shape - Size mm	No.	Standard measurement point	Hole shape - Size mm
1	Centre of under cover mounting hole	-8	7	Front edge of center bearing mounting bolt	-
2	Notch of front sidemember inner	-	8	Front edge of center bearing mounting bolt	-
3	Centre of crossmember mounting hole	-18	9	Centre of rear seat crossmember positioning hole	-22 x 38
4	Centre of front floor sidemember positioning hole	-25	10	Centre of crossmember mounting hole	-14
5	Front edge of center bearing mounting bolt	-	11	Centre of rear floor sidemember extension drain hole	-20
6	Front edge of center bearing mounting bolt	-			



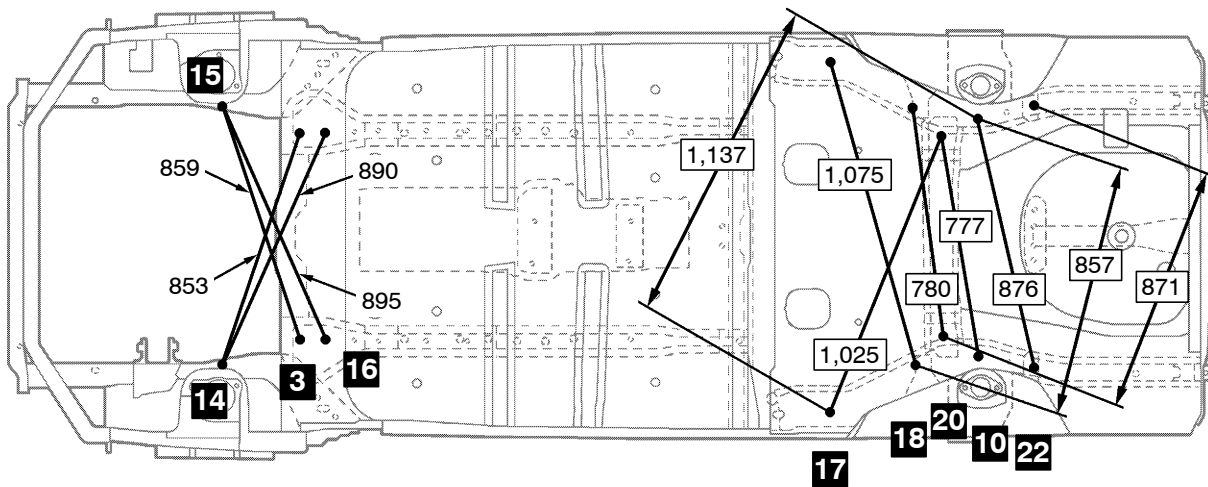
B-10 BODY DIMENSIONS - Type B (Actual-measurement Dimensions)

INSTALLATION OF SUSPENSION

mm

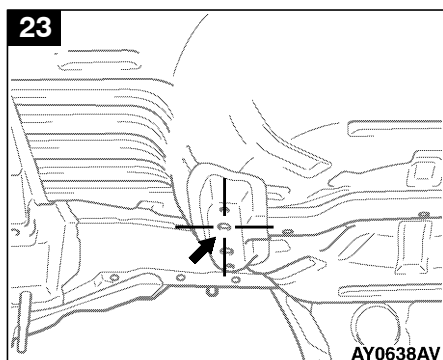
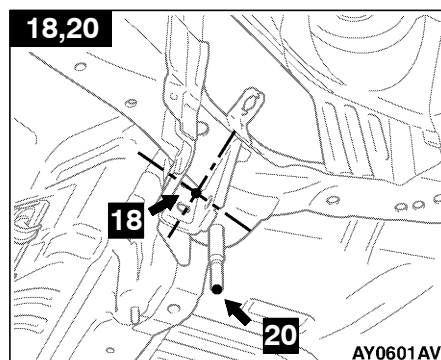
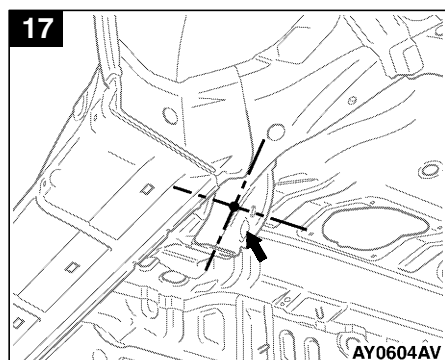
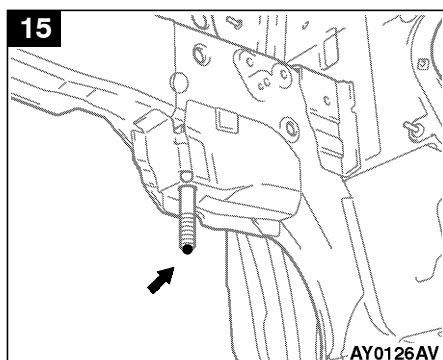
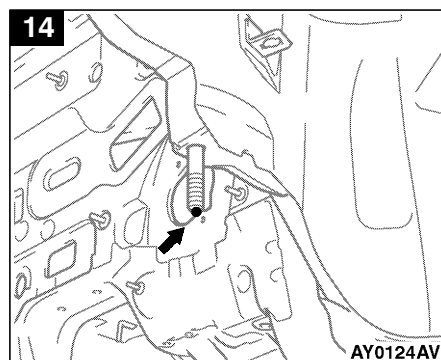
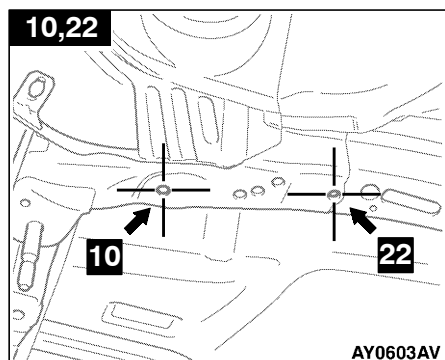
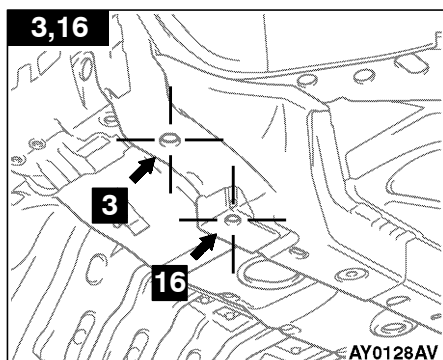


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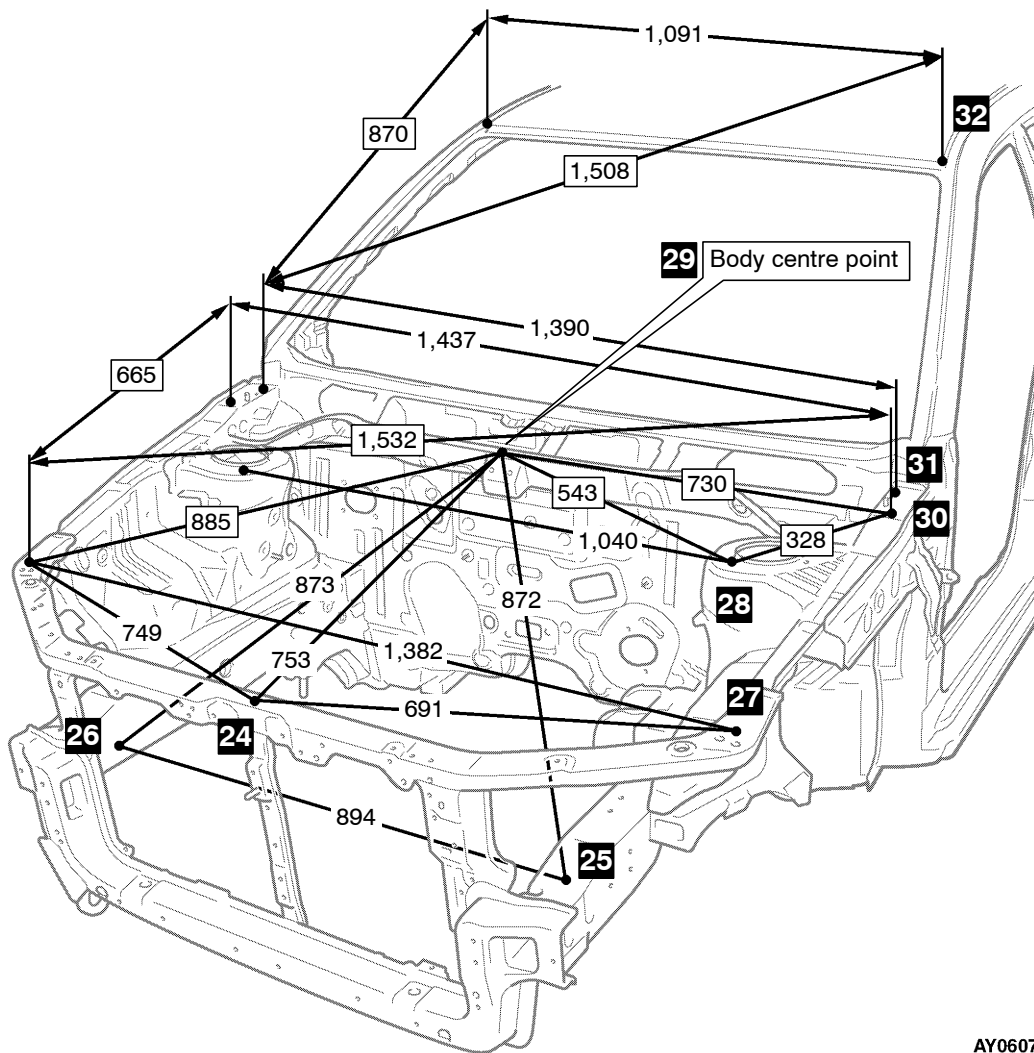
No.	Standard measurement point	Hole shape - Size mm	No.	Standard measurement point	Hole shape - Size mm
3	Centre of crossmember mounting hole	- 18	17	Trailing arm mounting position	-
10	Centre of crossmember mounting hole	- 14	18	Control link mounting position	-
14	Front edge of crossmember mounting bolt (Left side)	-	20	Front edge of differential support mounting bolt	-
15	Front edge of crossmember mounting bolt (Right side)	-	22	Centre of upper arm mounting hole	- 13
16	Centre of crossmember mounting hole	- 11	23	Centre of crossmember mounting hole	- 15



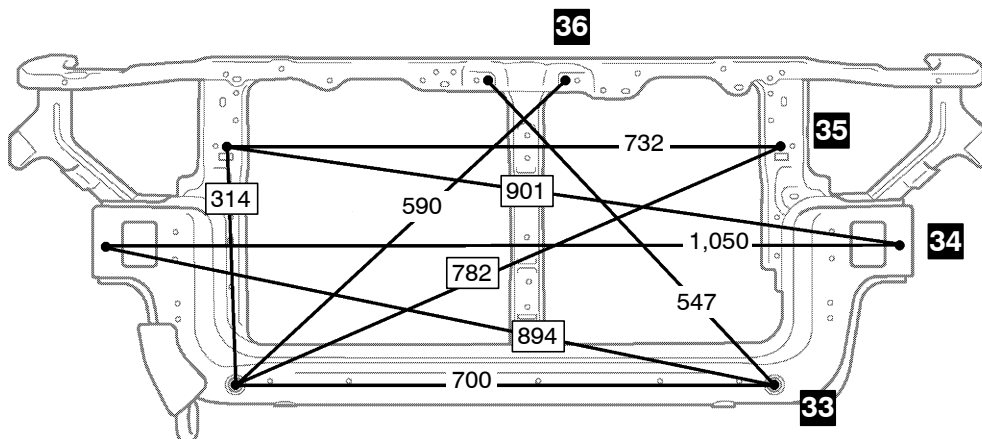
B-12 BODY DIMENSIONS - Type B (Actual-measurement Dimensions)

FRONT BODY

mm

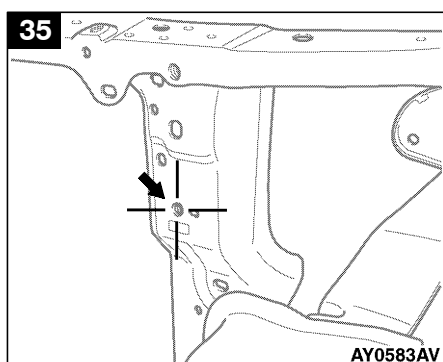
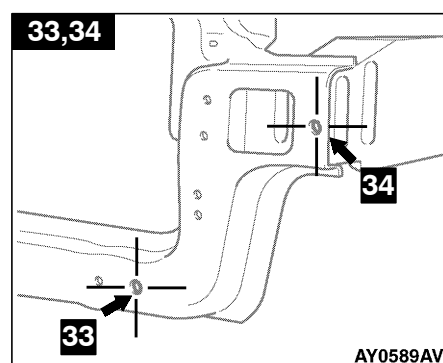
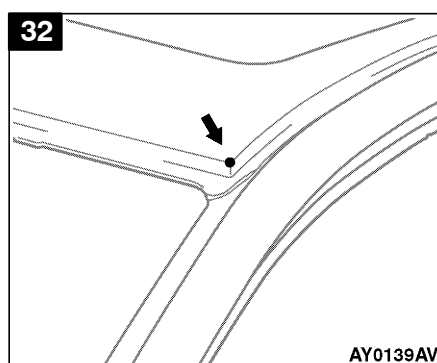
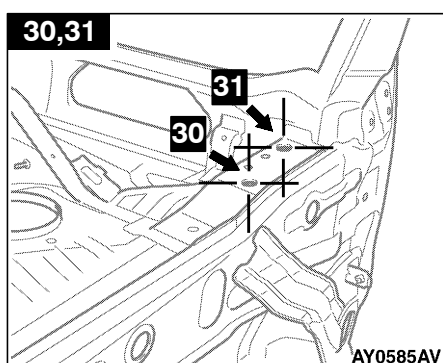
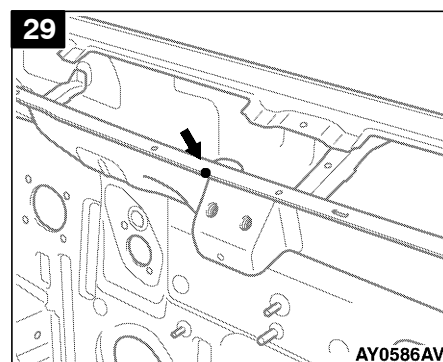
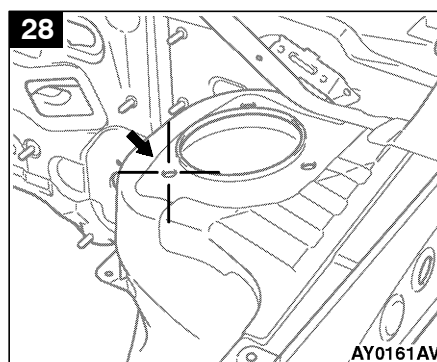
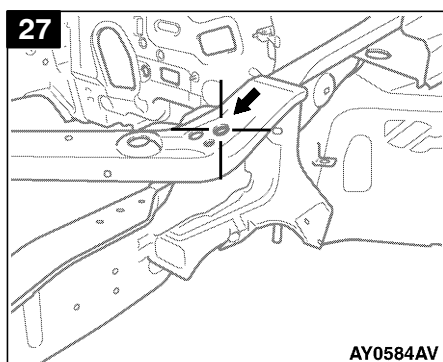
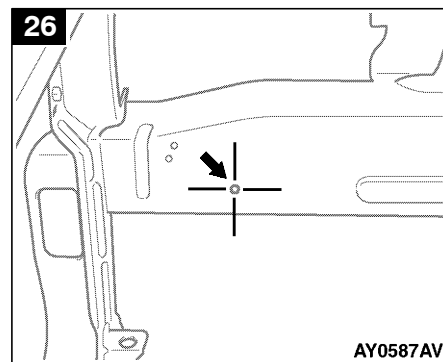
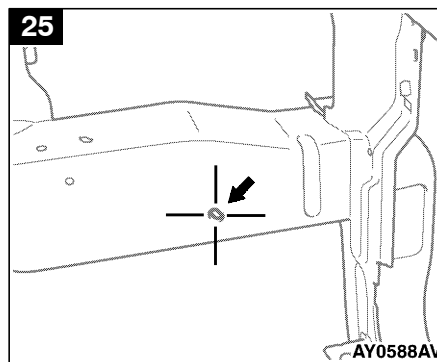
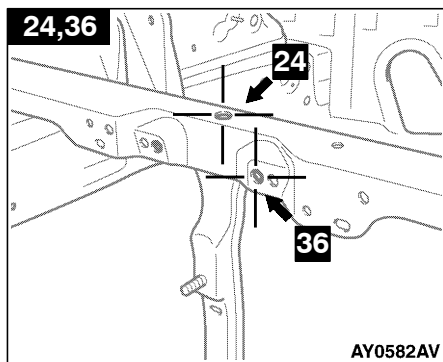


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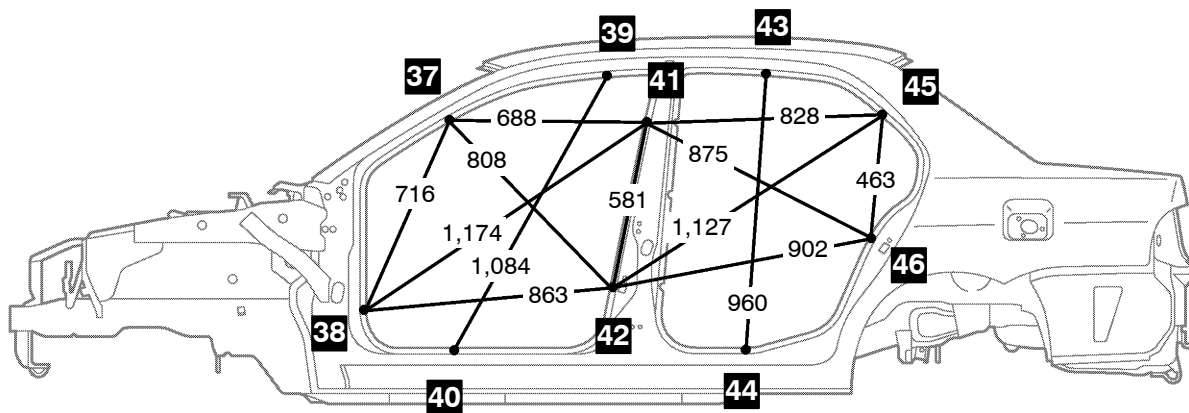
No.	Standard measurement point	Hole shape - Size mm	No.	Standard measurement point	Hole shape - Size mm
24	Centre of front end crossmember upper drain hole	-8	31	Centre of hood hinge mounting hole	-9
25	Centre of harness clip mounting hole	-7 x 12	32	Corner of roof panel	-
26	Centre of intercooler pipe mounting hole	-9	33	Centre of front end crossmember outer positioning hole	-20
27	Centre of front fender mounting hole	-6.6	34	Centre of front bumper reinforcement mounting hole	-9
28	Centre of front strut mounting hole	-11.5	35	Centre of headlamp mounting hole	-6.6
29	Notch of front deck (Body centre point)	-	36	Centre of hood latch mounting hole	-6.6
30	Centre of front fender mounting hole	-6.6			



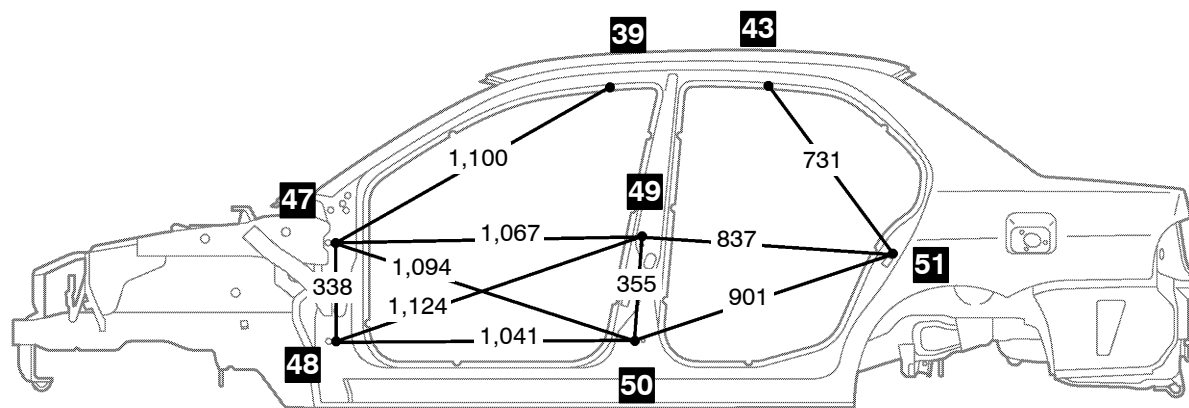
B-14 BODY DIMENSIONS - Type B (Actual-measurement Dimensions)

SIDE BODY

mm

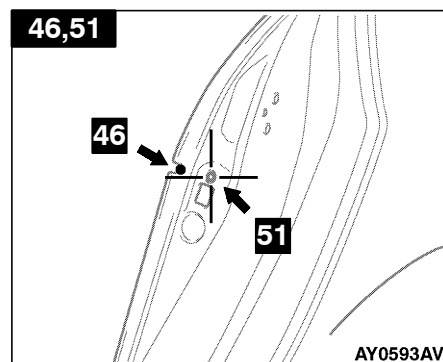
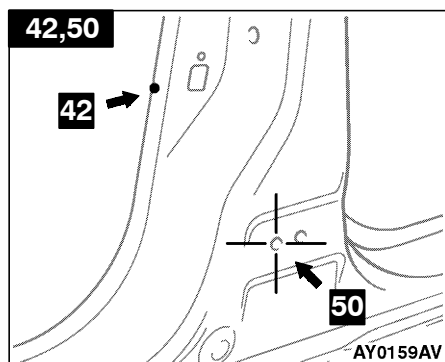
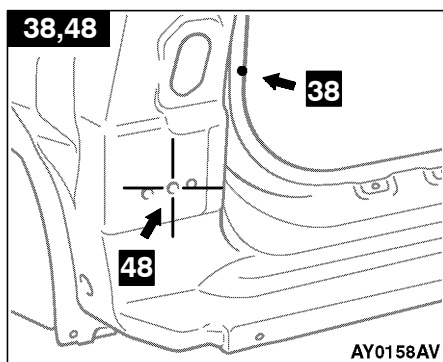


AY0608AV



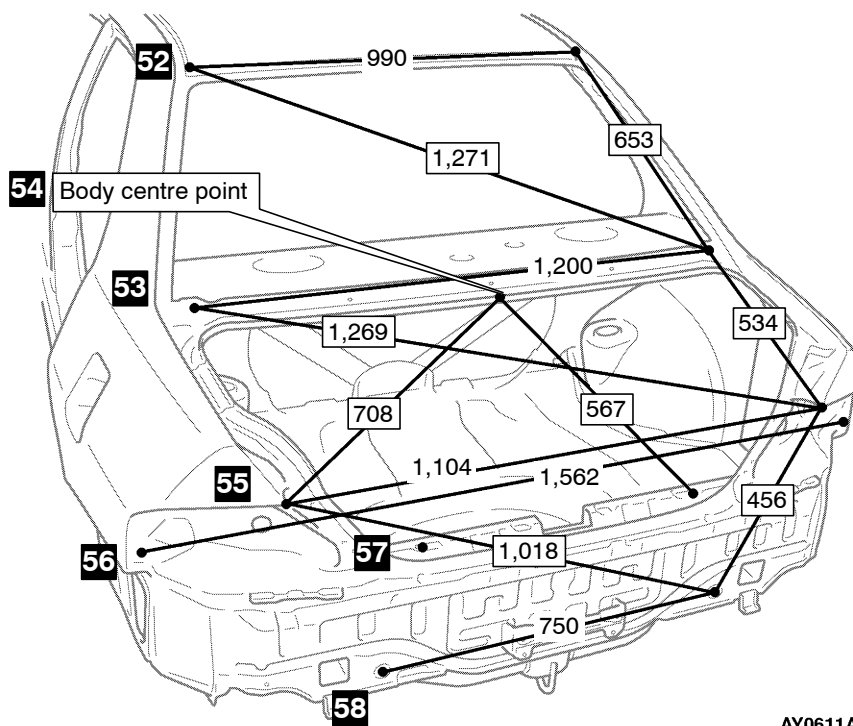
BY0608AV

No.	Standard measurement point	Hole shape	Size - mm	No.	Standard measurement point	Hole shape	Size - mm
37	Front pillar positioning notch (Upper section)	-		45	Quarter panel positioning notch (Upper section)	-	
38	Front pillar positioning notch (Lower section)	-		46	Quarter panel positioning notch (Lower section)	-	
39	Side roof rail positioning notch (Front section)	-		47	Centre of front door hinge mounting hole (Upper section)	-11	
40	Side sill positioning notch (Front section)	-		48	Centre of front door hinge mounting hole (Lower section)	-11	
41	Centre pillar positioning notch (Upper section)	-		49	Centre of rear door hinge mounting hole (Upper section)	-11	
42	Centre pillar positioning notch (Lower section)	-		50	Centre of rear door hinge mounting hole (Lower section)	-11	
43	Side roof rail positioning notch (Rear section)	-		51	Centre of rear door switch mounting hole	-5	
44	Side sill positioning notch (Rear section)	-					



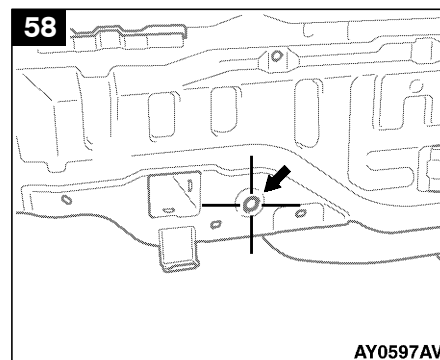
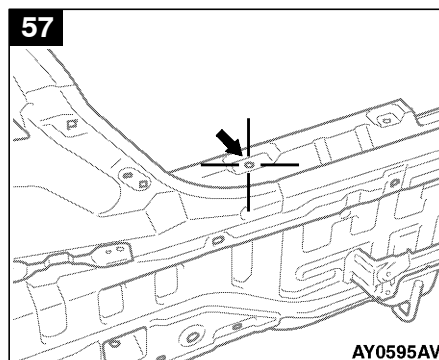
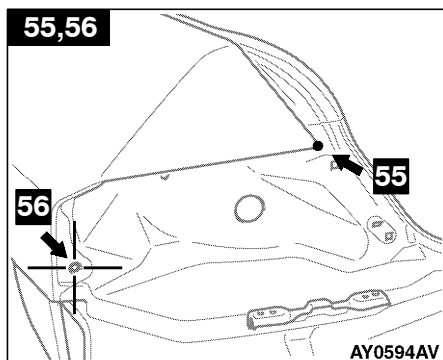
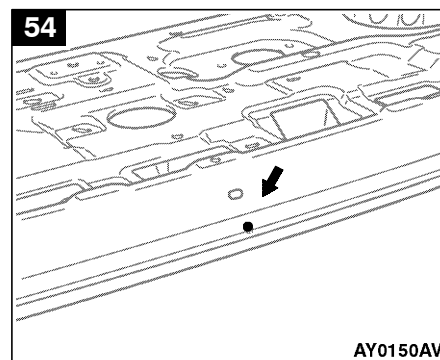
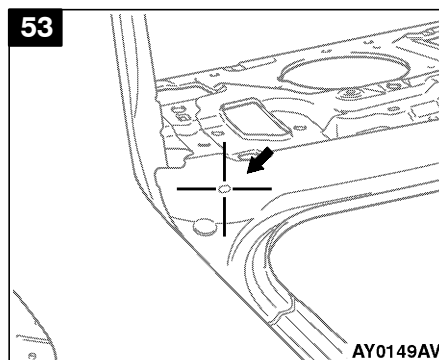
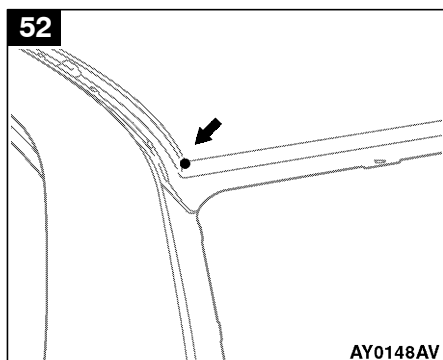
REAR BODY

mm



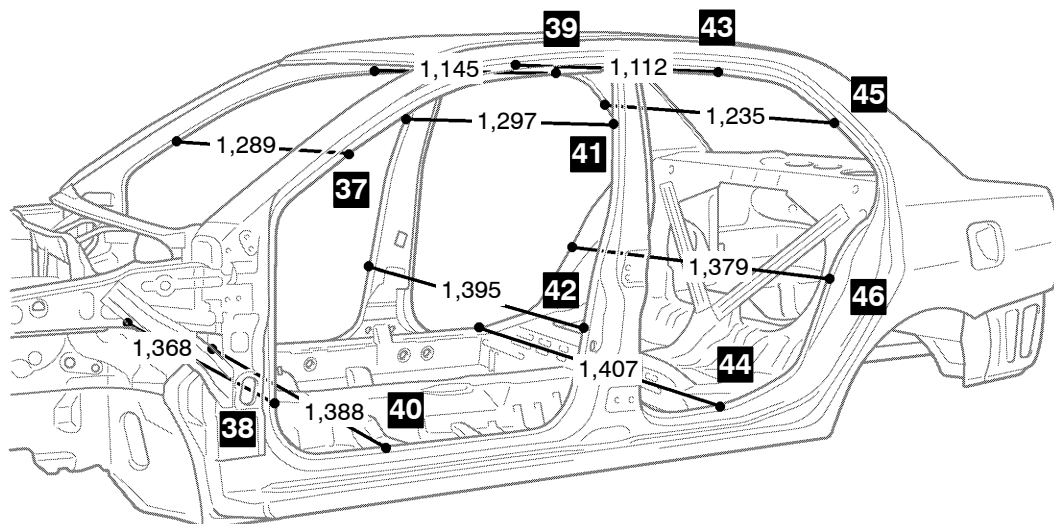
AY0611AV

No.	Standard measurement point	Hole _ Size shape _ mm	No.	Standard measurement point	Hole _ Size shape _ mm
52	Corner of roof panel	-	56	Centre of rear combination lamp mounting hole	-10
53	Centre of rear window moulding mounting hole	-7 x 11	57	Centre of rear end trim mounting hole	-8.5
54	Rear shelf body centre point	-	58	Centre of rear end outer panel positioning hole	-16
55	Corner of side outer panel	-			

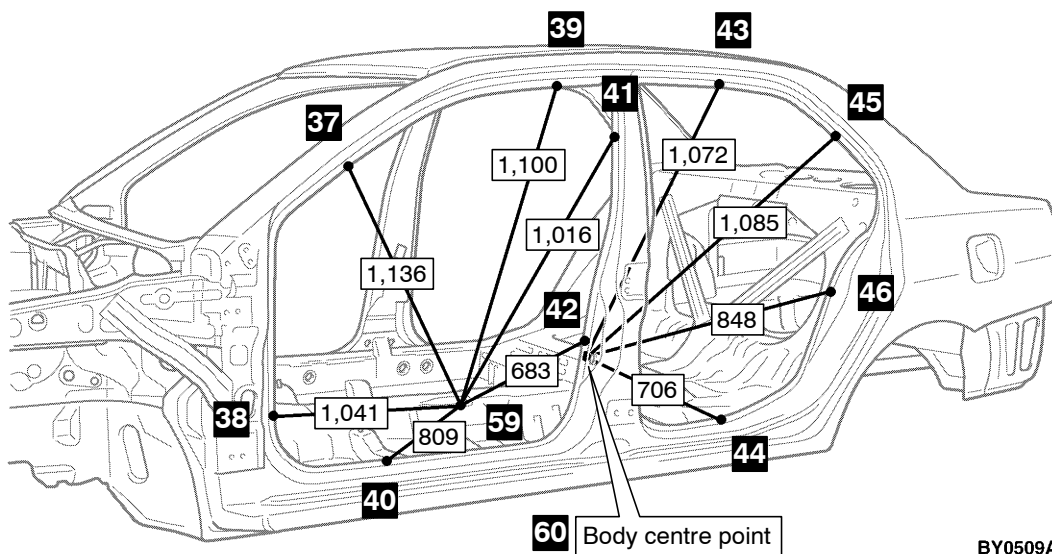


INTERIOR

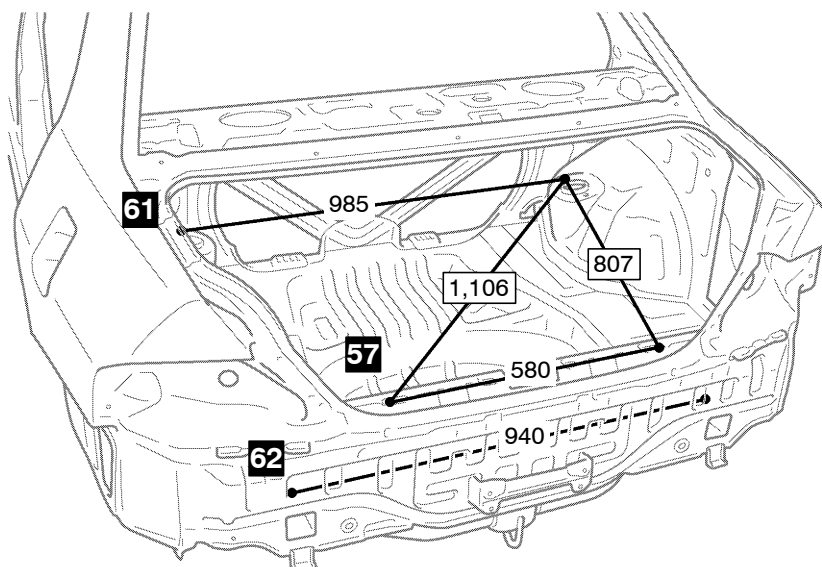
mm



AY0509AV

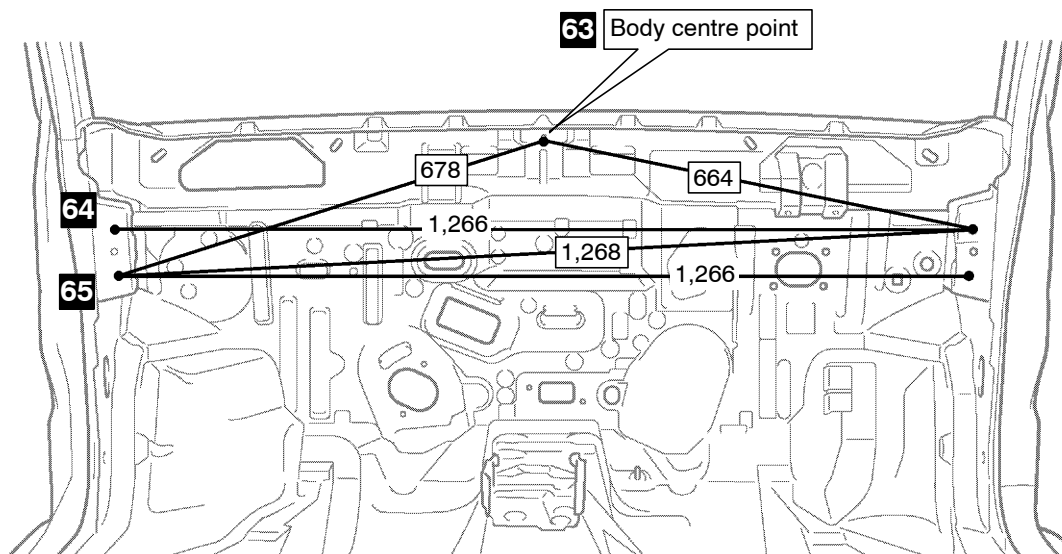


BY0509AV



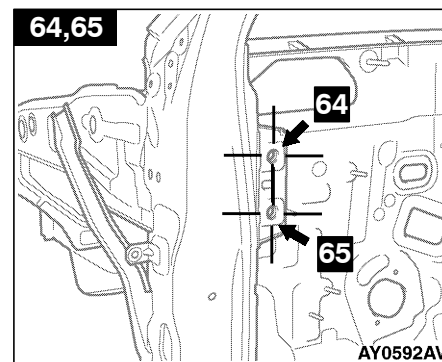
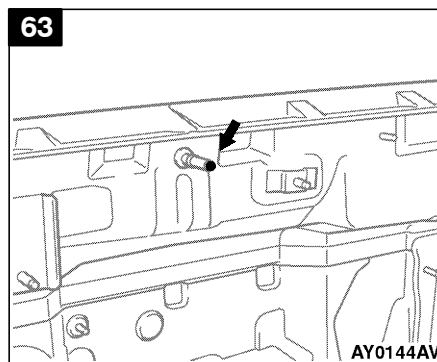
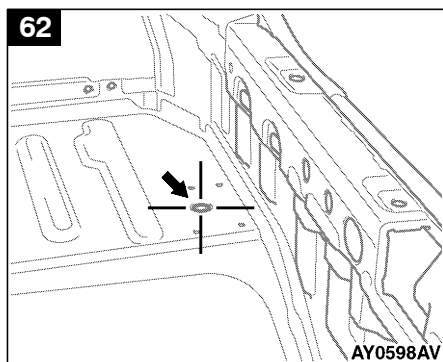
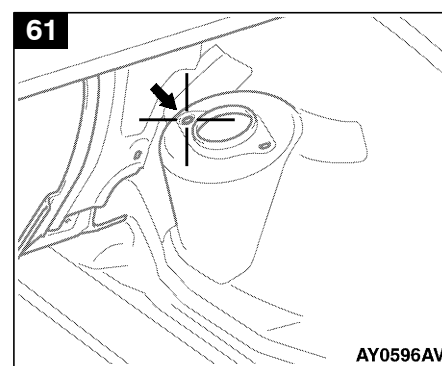
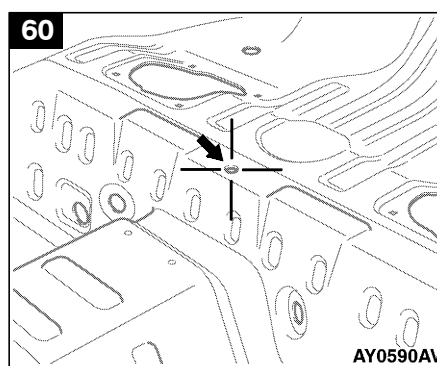
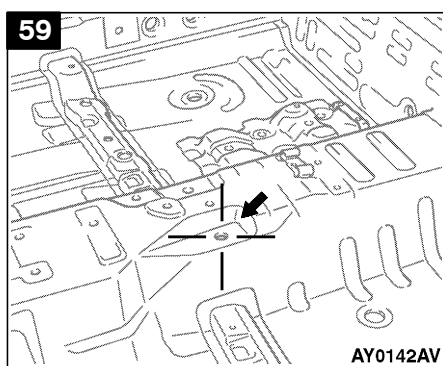
BY0644AV

mm



AY0168AV

No.	Standard measurement point	Hole shape	Size mm	No.	Standard measurement point	Hole shape	Size mm
37	Front pillar positioning notch (Upper section)	-		46	Quarter panel positioning notch (Lower section)	-	
38	Front pillar positioning notch (Lower section)	-		57	Centre of rear end trim mounting hole	-	-8.5
39	Side roof rail positioning notch (Front section)	-		59	Centre of front seat rail mounting hole	-	-14
40	Side sill positioning notch (Front section)	-		60	Centre of floor carpet mounting hole (Body centre point)	-	-6
41	Centre pillar positioning notch (Upper section)	-		61	Centre of rear shock absorber mounting hole	-	-12
42	Centre pillar positioning notch (Lower section)	-		62	Centre of rear end crossbar mounting hole	-	-16
43	Side roof rail positioning notch (Rear section)	-		63	Front of instrument panel bracket center (Body centre point)	-	
44	Side sill positioning notch (Rear section)	-		64	Centre of deck crossmember mounting hole (Upper section)	-	-11
45	Quarter panel positioning notch (Upper section)	-		65	Centre of deck crossmember mounting hole (Lower section)	-	-11



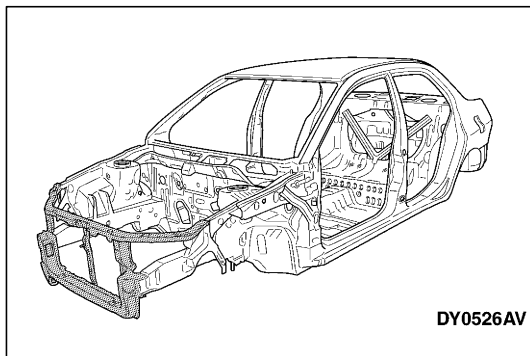
NOTES


WELDED PANEL REPLACEMENT

CONTENTS

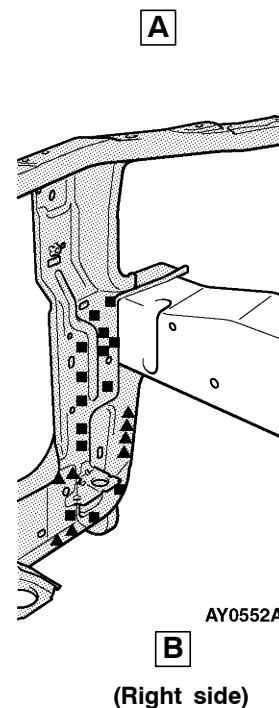
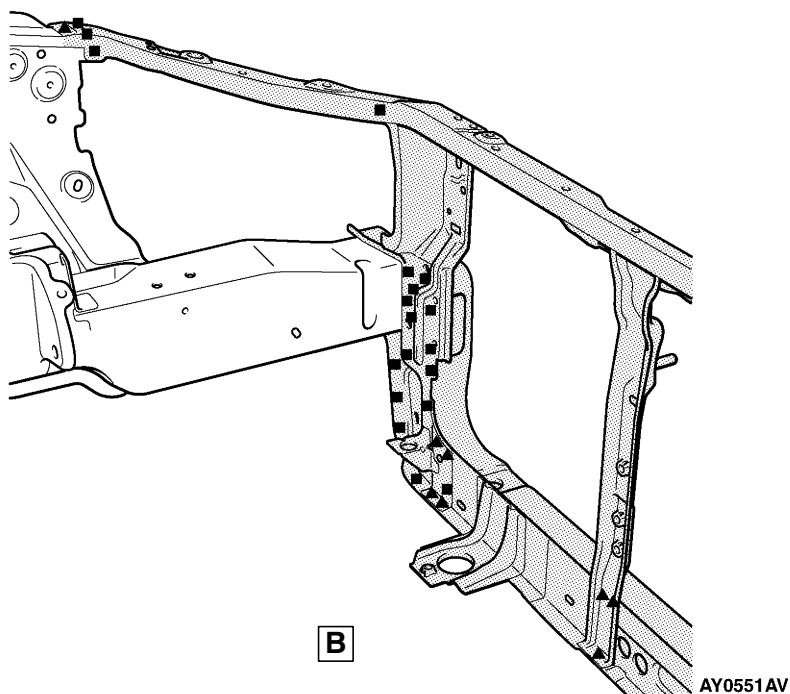
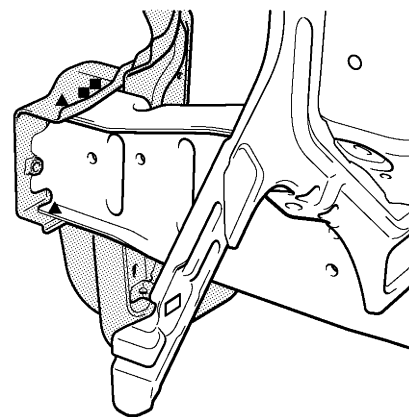
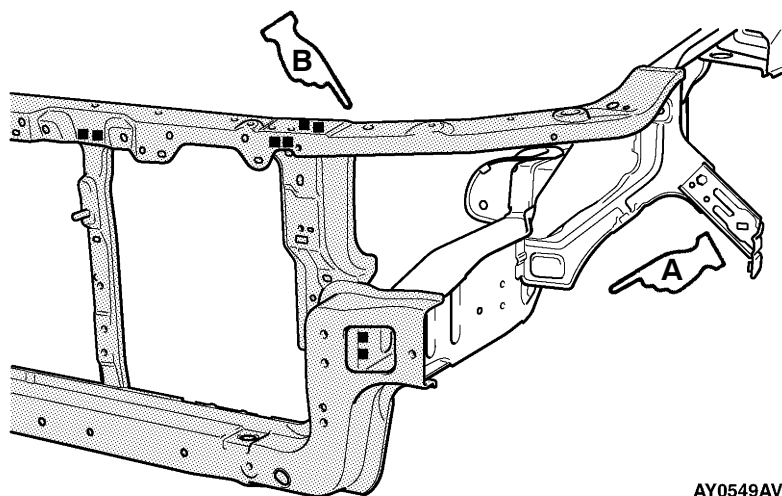
HEADLAMP SUPPORT	3	ROOF	17
FENDER SHIELD	4	REAR END PANEL	18
FRONT PILLAR	7	REAR FLOOR	19
CENTER PILLAR	9	QUARTER, INNER	21
SIDE SILL	12	FRONT DOOR OUTER PANEL	23
QUARTER, OUTER	14	REAR DOOR OUTER PANEL	24

HEADLAMP SUPPORT

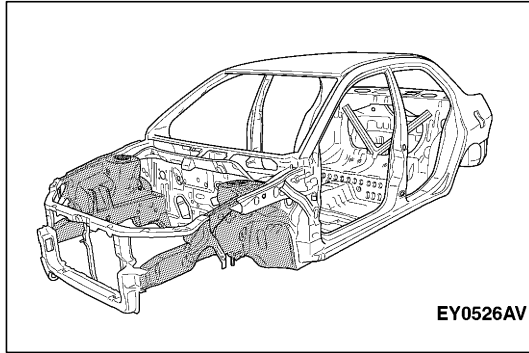



Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
○ ○ ○ ○ ○ ○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

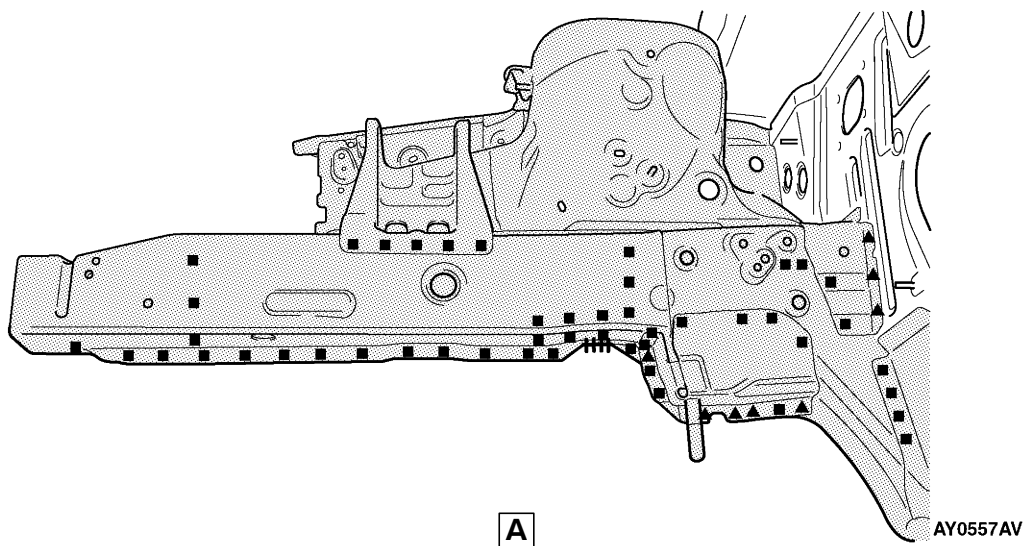
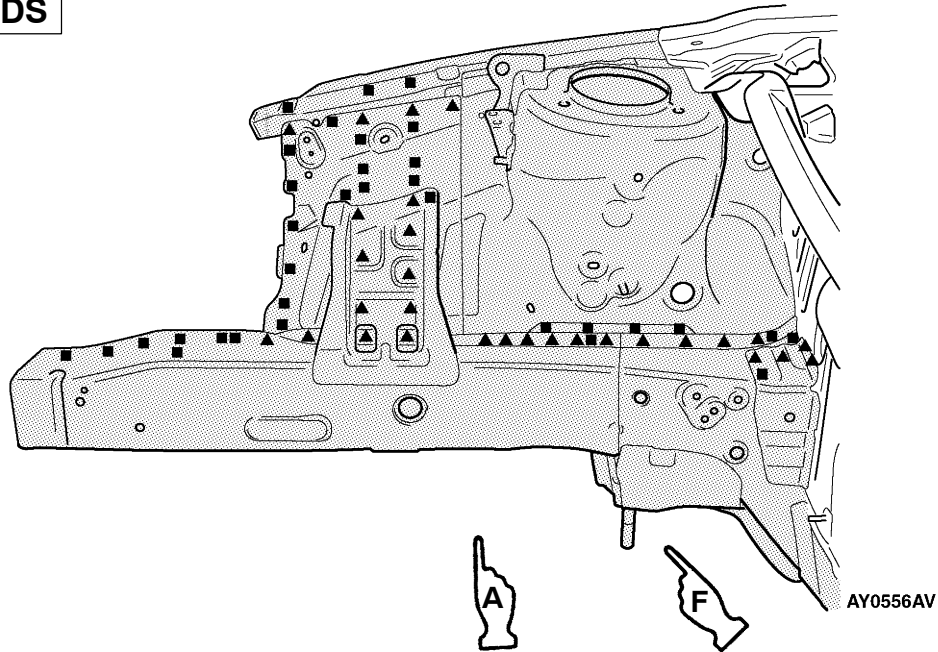


FENDER SHIELD

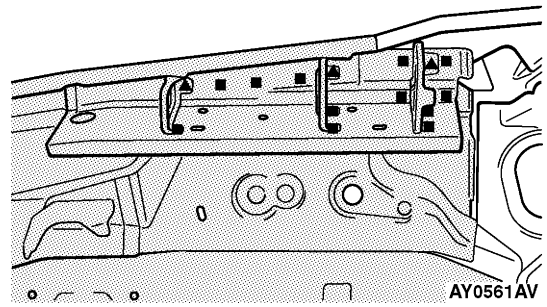
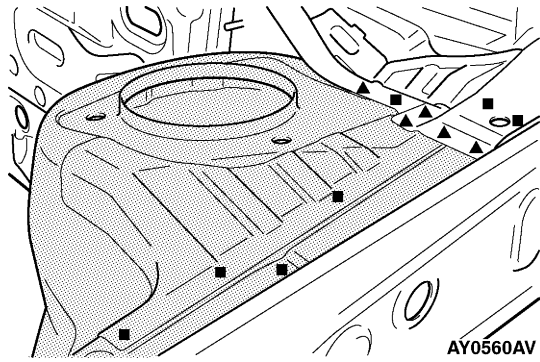


Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



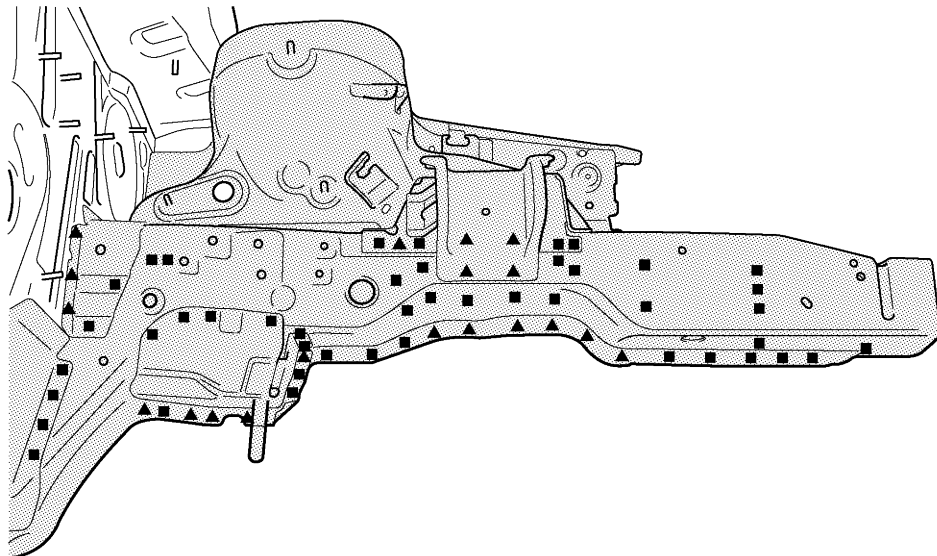
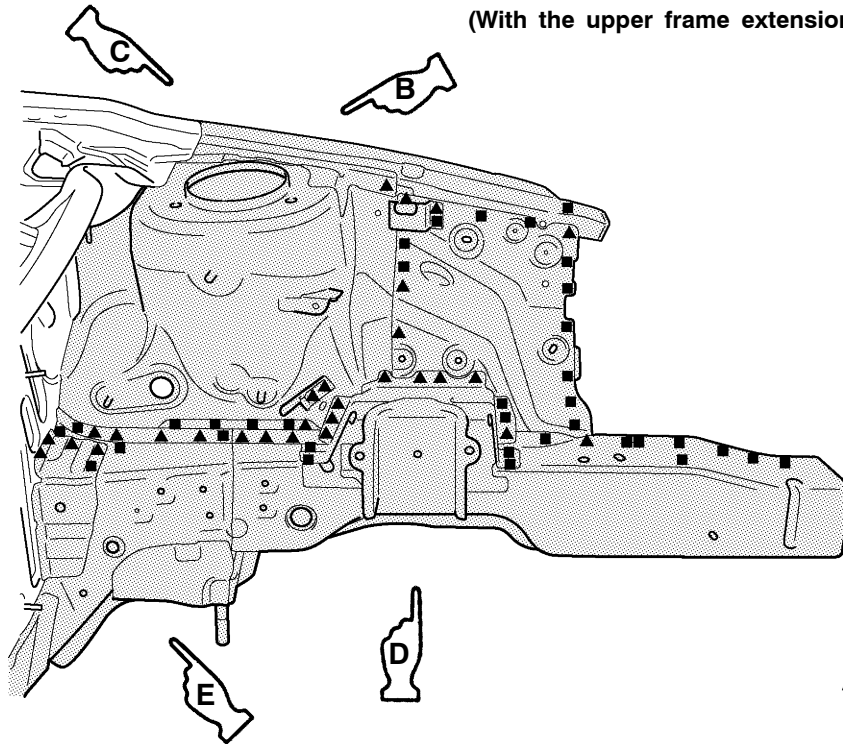
NOTE
For the weld points for the headlamp support, refer to P.C-3 Headlamp Support.



B

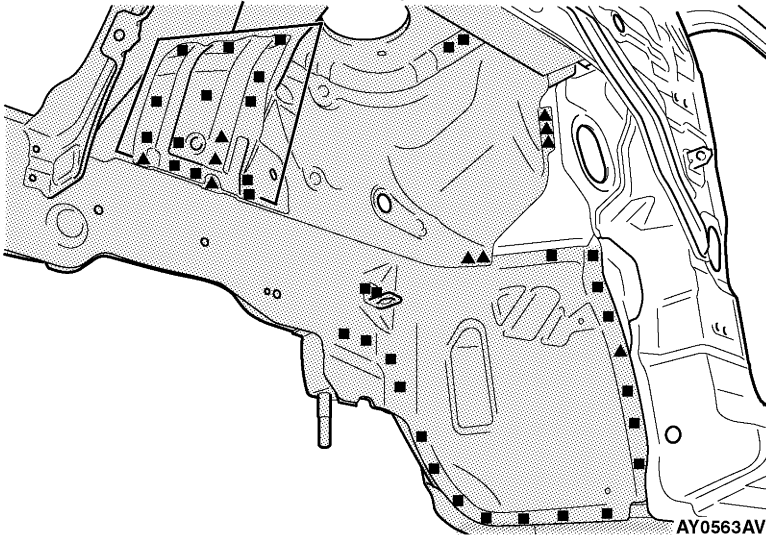
C

(With the upper frame extension outer removed)



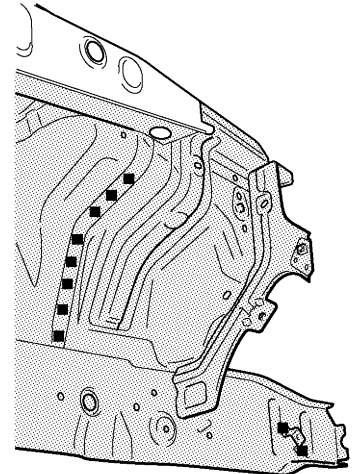
D

17 points, left side only



E

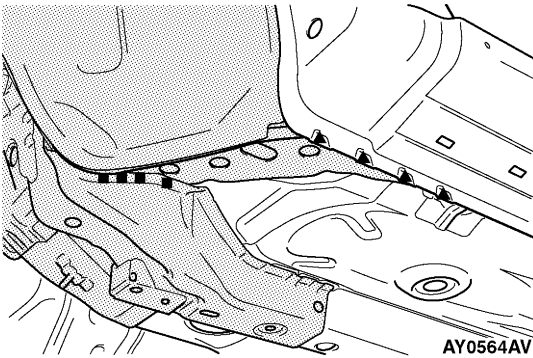
H



F

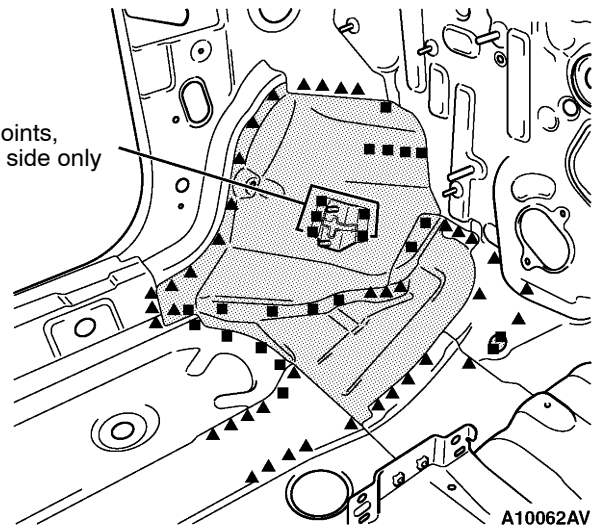
AY0562AV

G



G

5 points, left side only

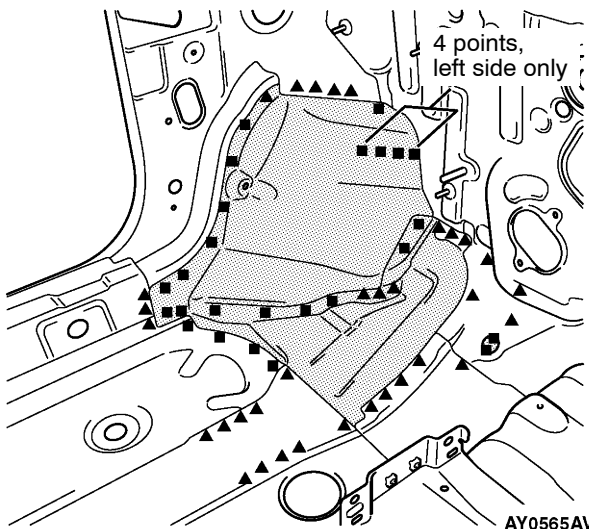


H

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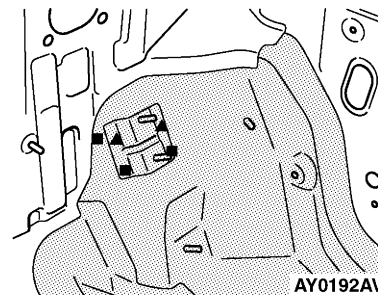
4 points, left side only



H

<RHD>

AY0565AV

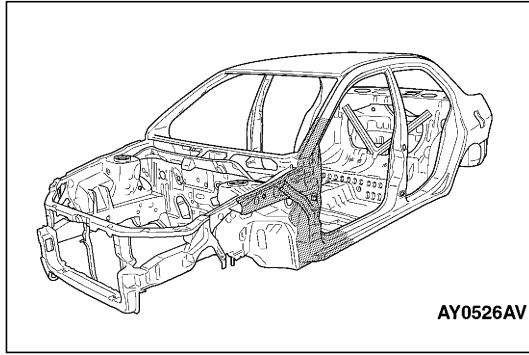



I

<RHD(Right side)>

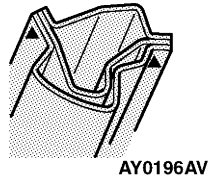
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FRONT PILLAR

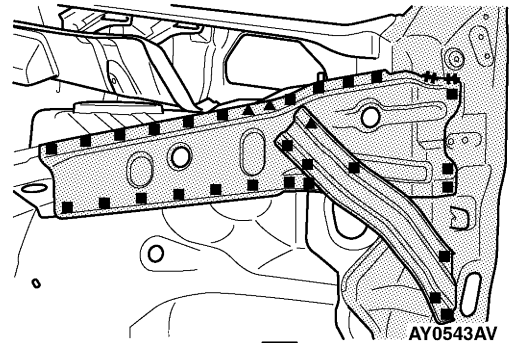


Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
○ ○ ○ ○ ○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

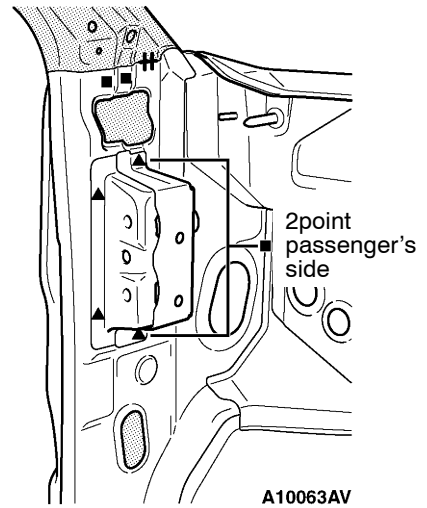
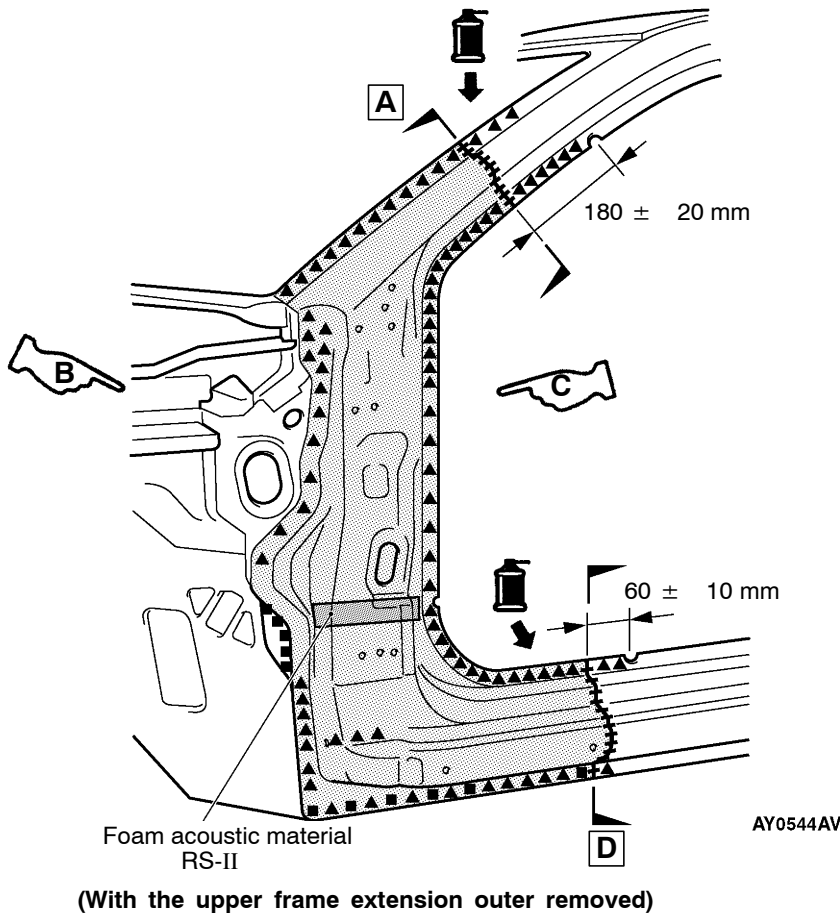
REPAIR WELDS



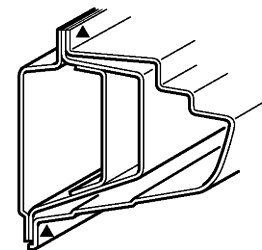
A



B



C

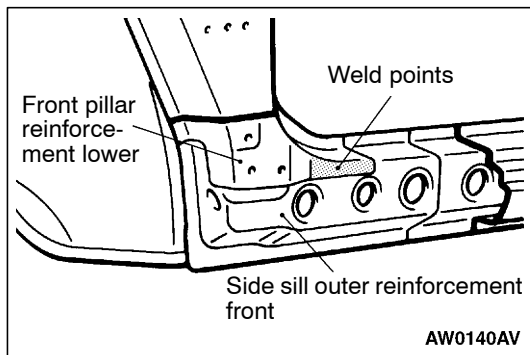


D

Y0200AV

Caution

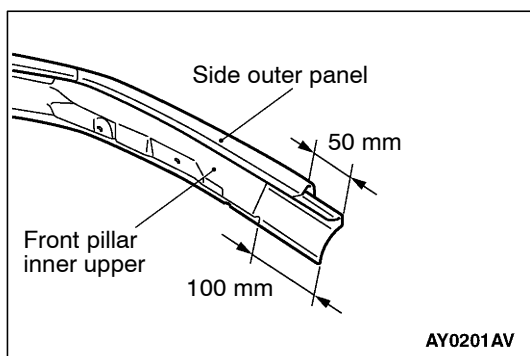
Do not use heat at areas using foam material as the foam material may burn.



NOTE ON REPAIR WORK

REMOVAL

As the front pillar reinforcement lower and side sill outer reinforcement front are welded at the side sill, cut the side outer panel at the position shown in the illustration where the weld points of the reinforcement can be seen, remove, and then remove the weld points of the front pillar reinforcement lower.

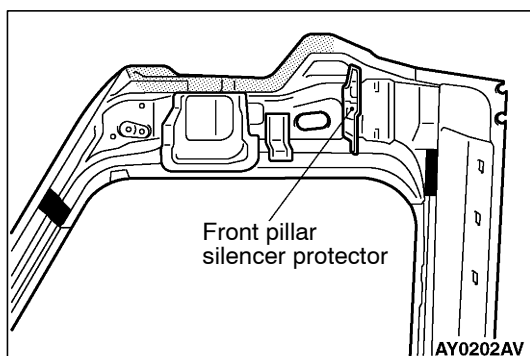


INSTALLATION

1. To ensure the strength of the cut area of the front pillar, cut the front pillar inner 100 mm above the cut area, and the side outer panel 50 mm above the cut area as shown in the illustration.

Cut the new center pillar at the same positions.

2. Attach the front pillar inner upper assembly of the new front pillar to the body.

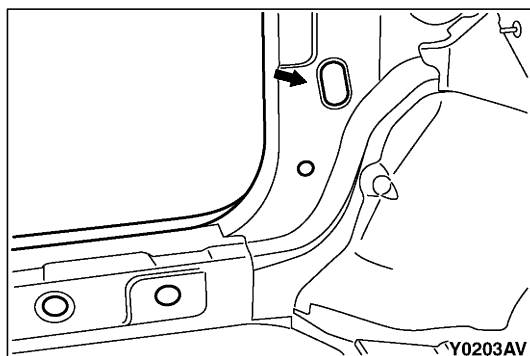


3. When installing a new front pillar outer, install a front pillar silencer protector filling up the gap with butyl tape<RS-II> and then apply body sealant and structural adhesive on the area shown in the illustration.

▨ : Body sealant

■ : Adhesive

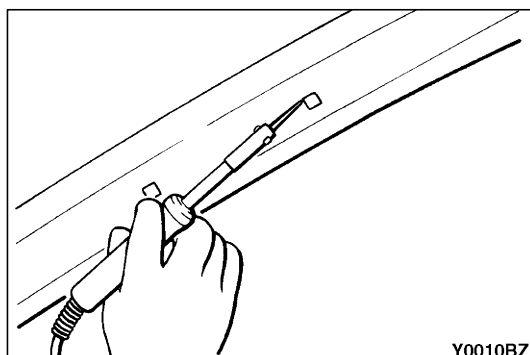
Adhesive	Type	BRAND
	Epoxyayresin adhesive	3M DP-460, 3M DP-420 or equivalent



<The following service procedures are only applied to RS-II.>

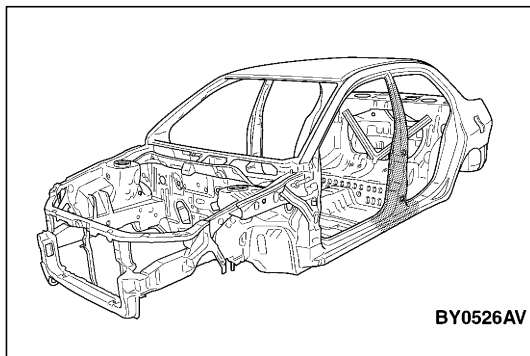
4. After attaching the front pillar outer, seal the holes and flanges with bolts and plate tape, fill the foam material through the holes as shown in the illustration.

Foam material	Type	Brand Used
Foam acoustic material	Two - part expanded urethane	3M ULTRAPRO Panel foam - Yellow



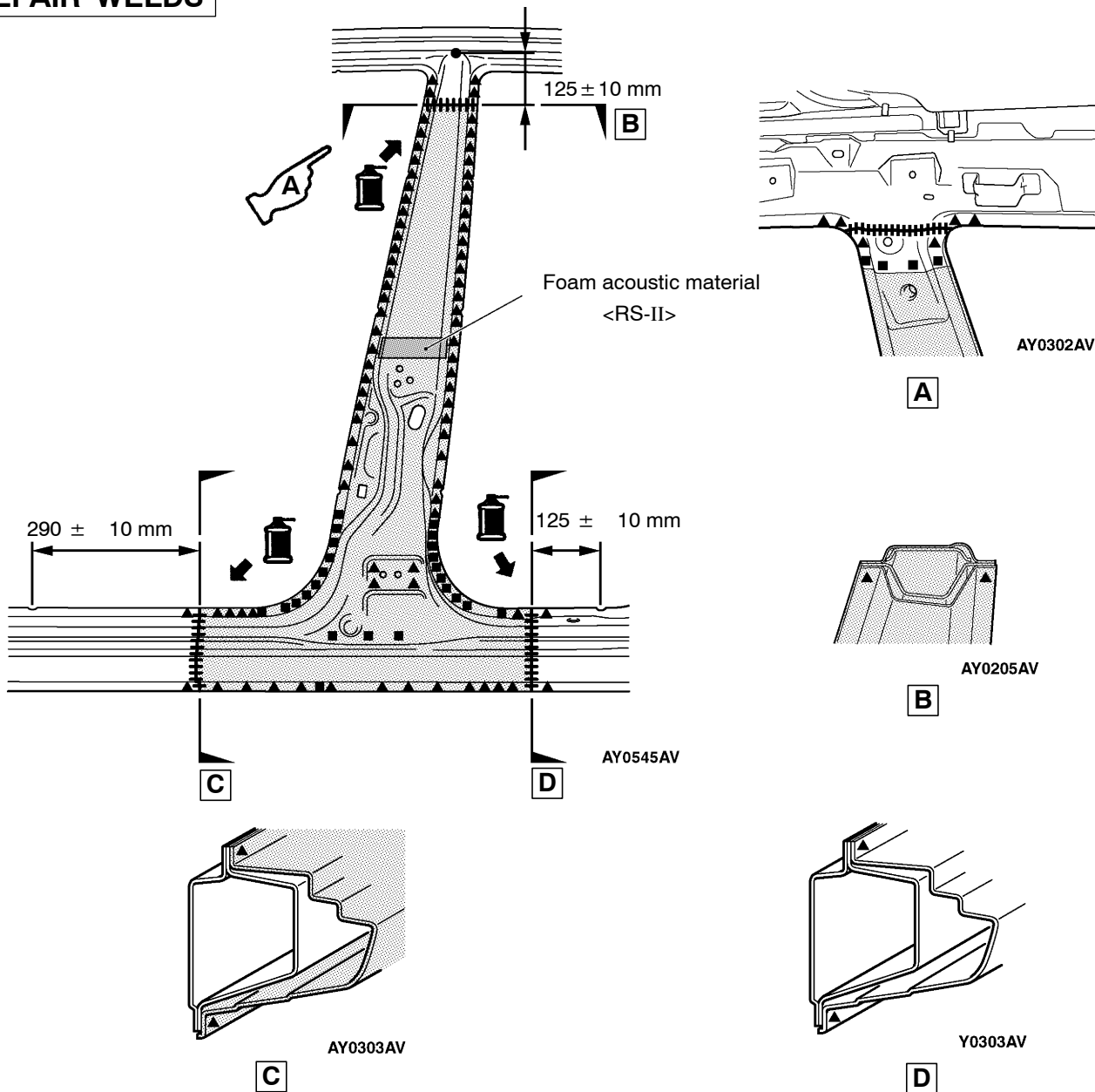
5. About two hours after filling the foam material, remove the bolts and plate tape, and solder the sealed holes until a clip, etc. can be inserted completely.

CENTER PILLAR

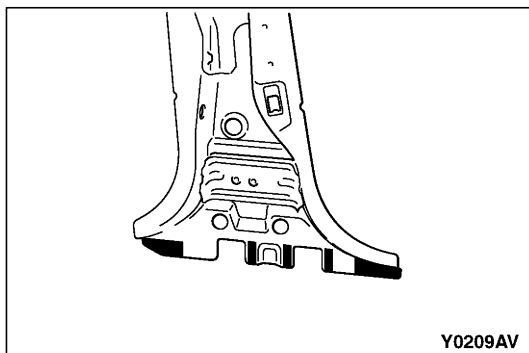
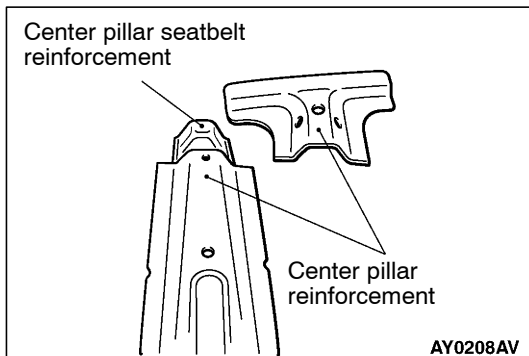
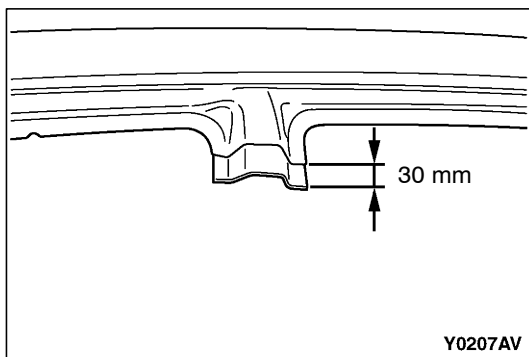
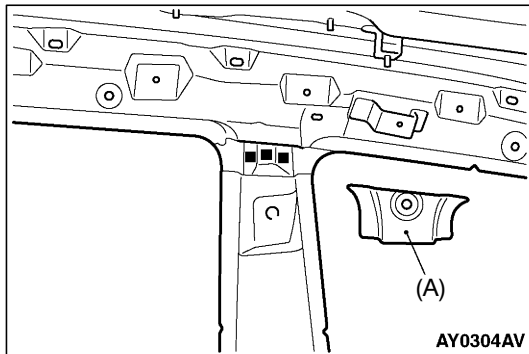
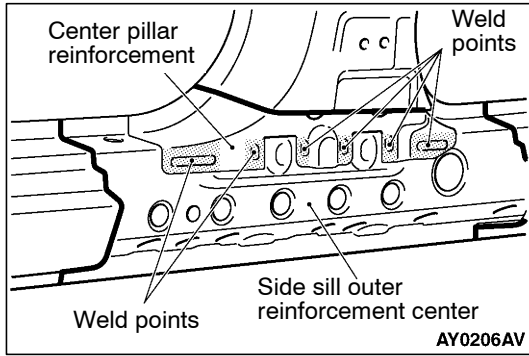


Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



Caution
Do not use heat at areas using foam material as the foam material may burn.



NOTE ON REPAIR WORK

REMOVAL

1. As the center pillar reinforcement and side sill outer reinforcement center are welded at the side sill, cut the side outer panel at the position shown in the illustration where the weld points of the reinforcement can be seen, remove, and then remove the weld points of the center pillar reinforcement.
2. To cut the weld points of the center pillar seatbelt reinforcement and center pillar reinforcement, cut at the bottom of the roof side rail inner as shown in the illustration.

NOTE

Keep the separated side roof rail inner (A) for the future use.


INSTALLATION

1. Remove the side outer panel, side sill outer reinforcement center, side sill bulkhead, and side sill reinforcement support from the new center pillar.
2. To ensure the strength of the cut area of the front pillar, cut the side outer panel 30 mm above the cut area.
Cut the new center pillar at the same positions.

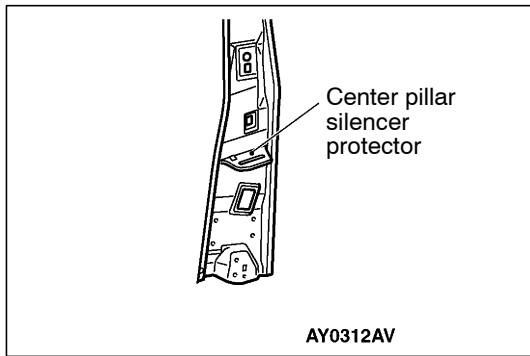
3. To prevent damage of the center pillar seatbelt reinforcement, align the new center pillar reinforcement only to the body side and cut.

Caution

If the center pillar seatbelt reinforcement has been damaged, repair by welding.

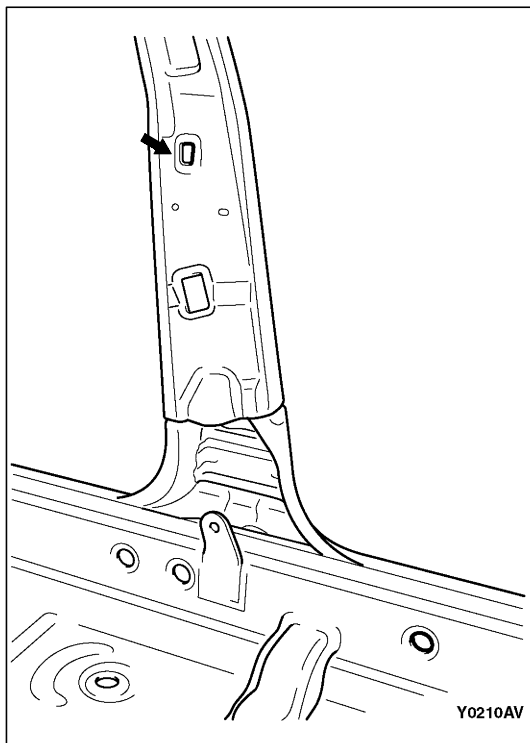
4. When attaching the center pillar reinforcement, apply adhesive to the locations indicated in the illustration.
 : Adhesive

Adhesive	Type	BRAND
	Epoxyayresin adhesive	3M DP-460, 3M DP-420 or equivalent



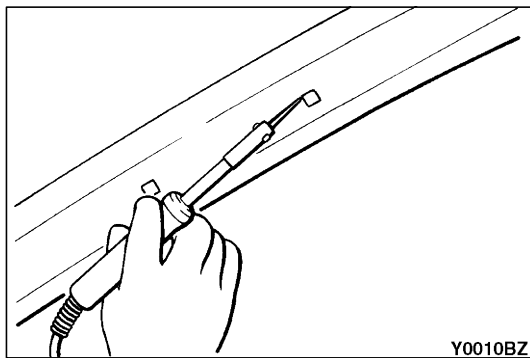
<The following service procedures are only applied to RS-II.>

- When attaching the center pillar inner, attach the center pillar silencer protector to the center pillar inner, and seal the holes of the center pillar silencer protector with butyl tape.



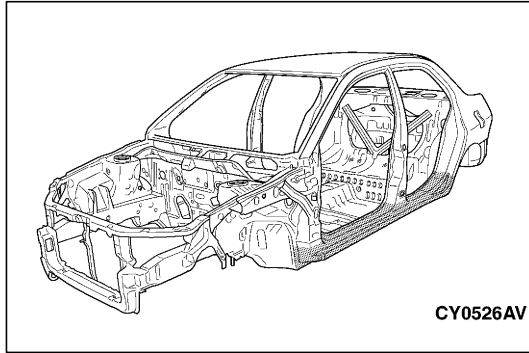
- After attaching the center pillar outer, seal the holes and flanges with bolts and plate tape, fill the foam material through the holes as shown in the illustration.

Foam material	Type	Brand Used
Foam acoustic material	Two - part expanded urethane	3M ULTRAPRO Panel foam - Yellow



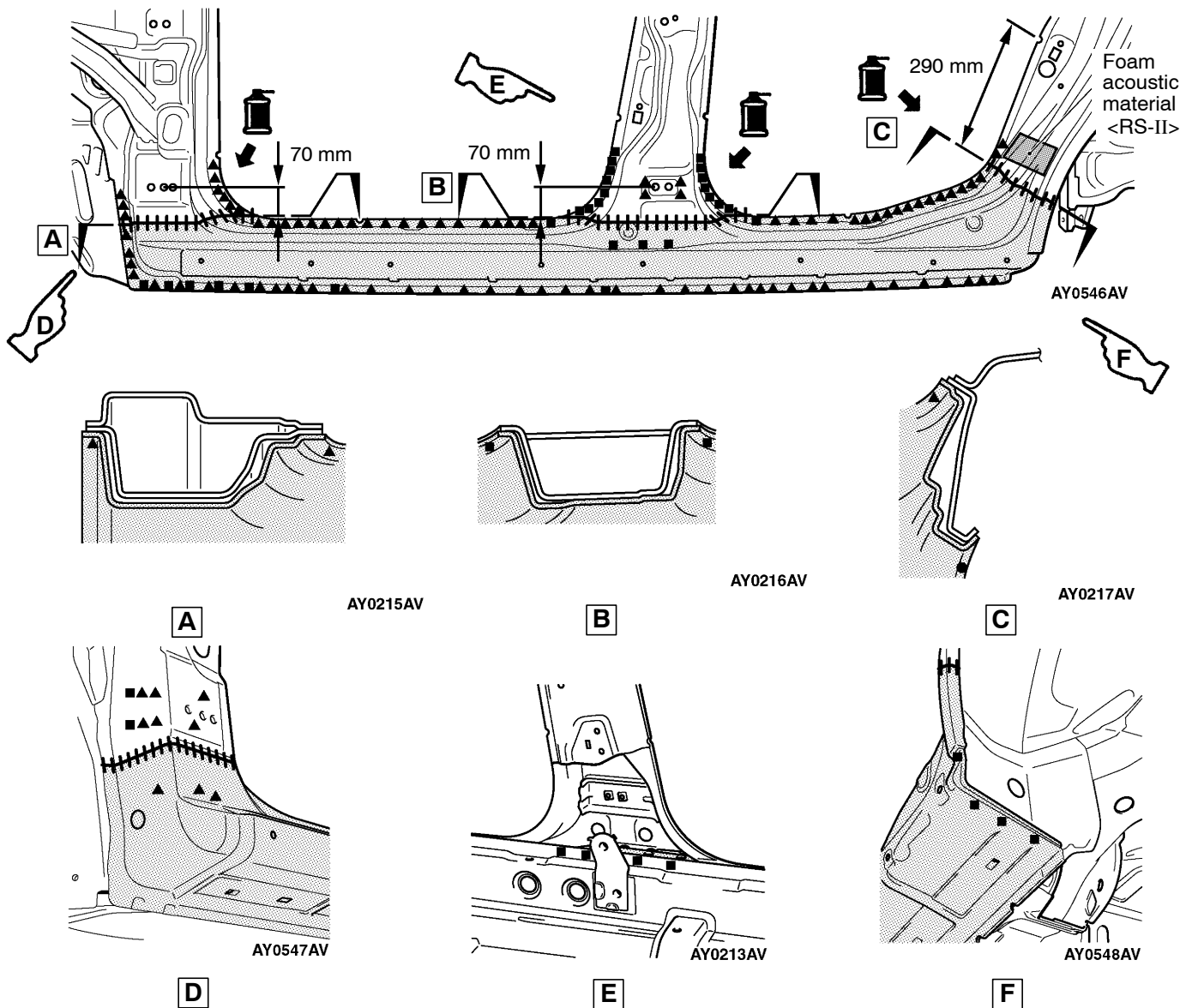
- About two hours after filling the foam material, remove the bolts and plate tape, and solder the sealed holes until a clip, etc. can be inserted completely.

SIDE SILL



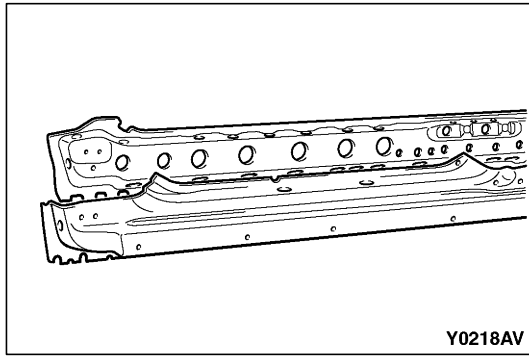
Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



Caution

Do not use heat at areas using foam material as the foam material may burn.

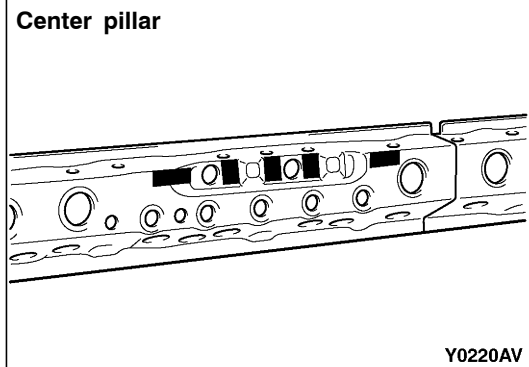
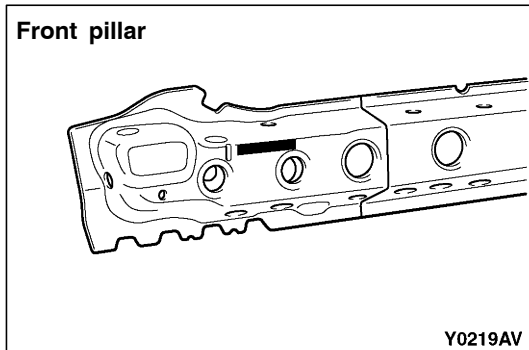


**NOTE ON REPAIR WORK
INSTALLATION**

1. Release the side outer panel from the new parts and remove unnecessary front pillar reinforcement lower, front pillar reinforcement lower extension, and center pillar reinforcement from the side sill outer reinforcement.
2. When attaching the side sill outer reinforcement, apply adhesive to the areas indicated in the illustration.

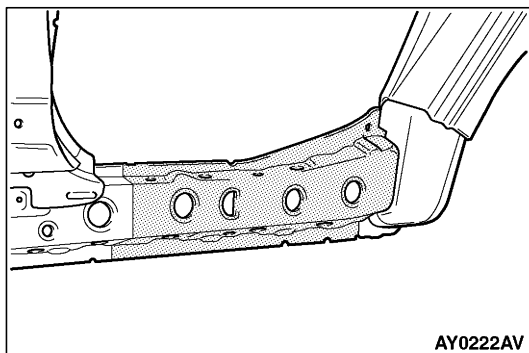
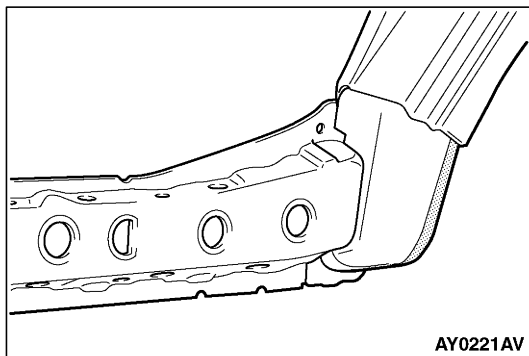
■: Adhesive

Adhesive	Type	BRAND
	Epoxyayresin adhesive	3M DP-460, 3M DP-420 or equivalent



3. When attaching the side outer panel, apply body sealant to the areas indicated in the illustration.

▨: Body sealant



Reference

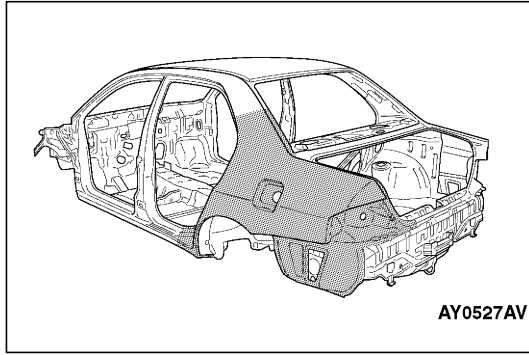
Depending on the damaged range, it is advisable to replace the side outer panel and side sill outer reinforcement parts.

▨: Cuttable range

Caution

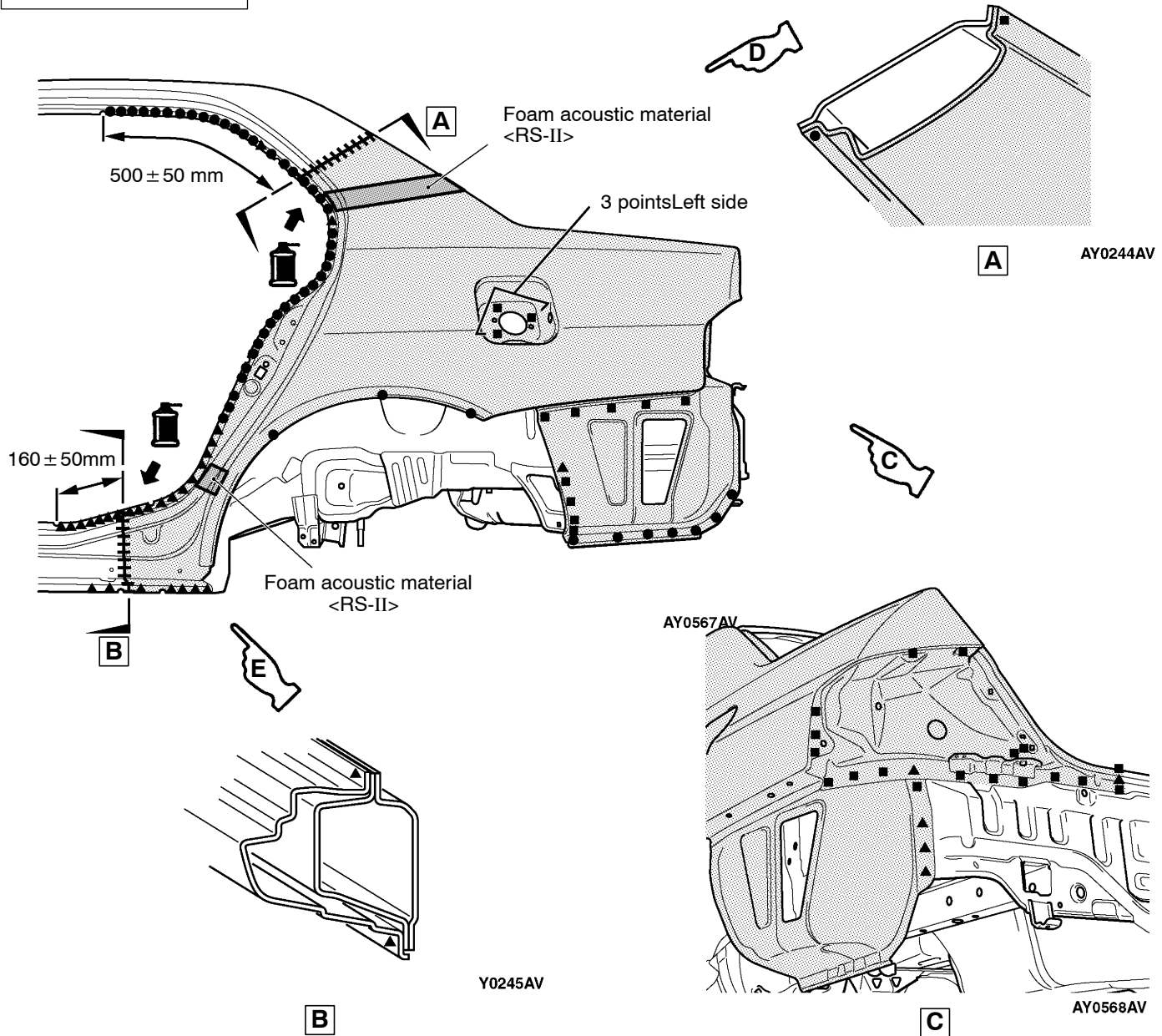
Cut the side sill outer reinforcement 50 mm away from the cut area of the side outer panel.

QUARTER, OUTER



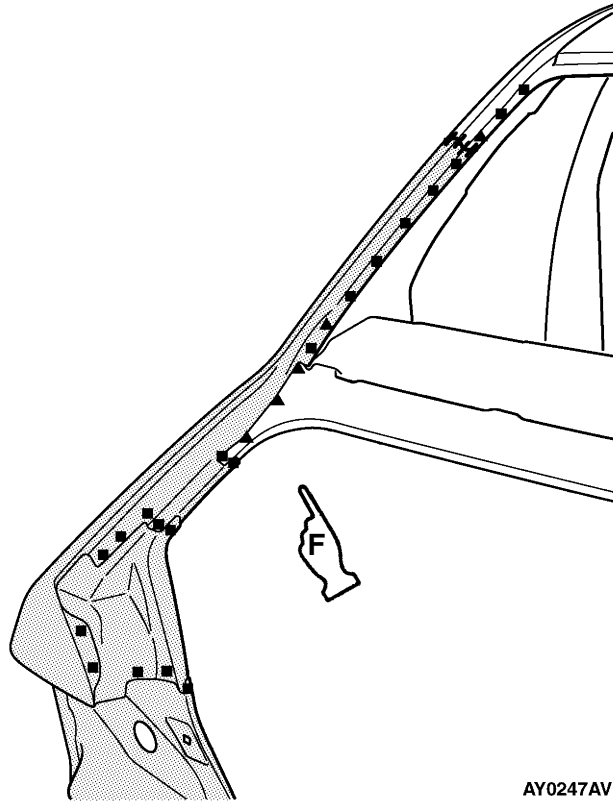
Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
○ ○ ○ ○ ○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



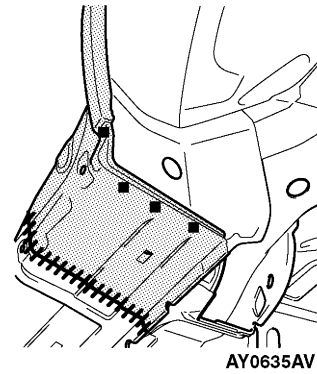
Caution

Do not use heat at areas using foam material as the foam material may burn.



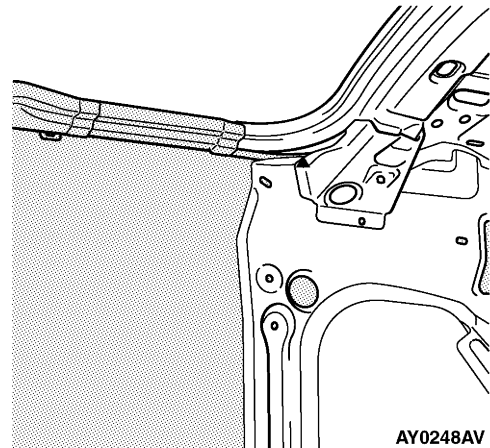
D

AY0247AV



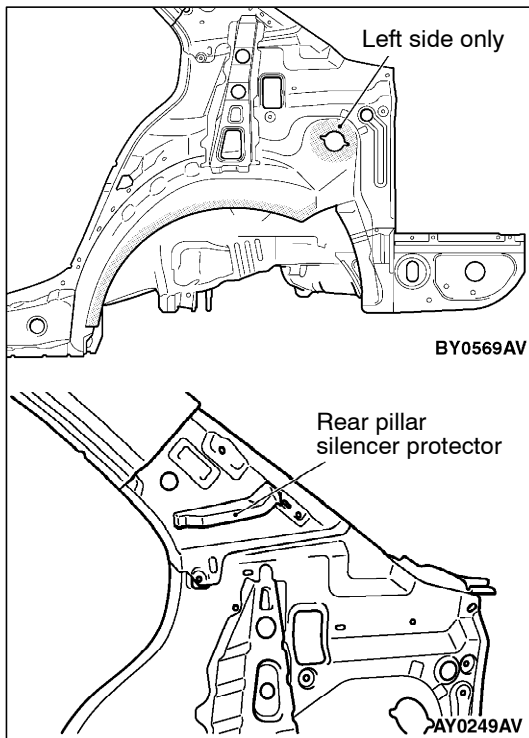
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AY0635AV

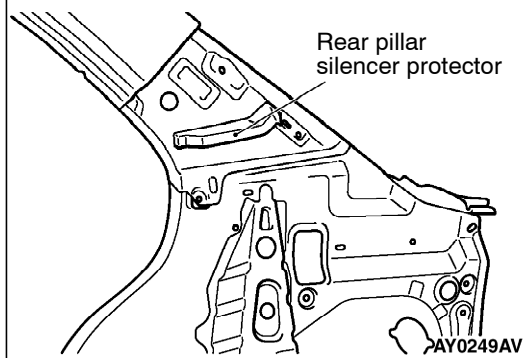


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AY0248AV



BY0569AV

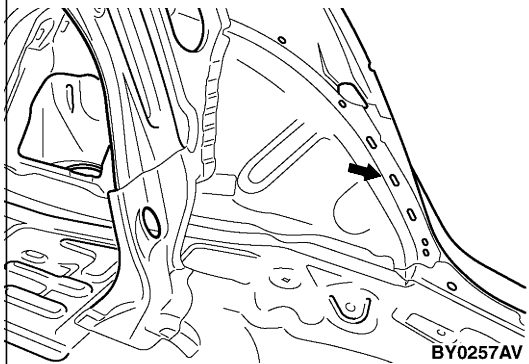
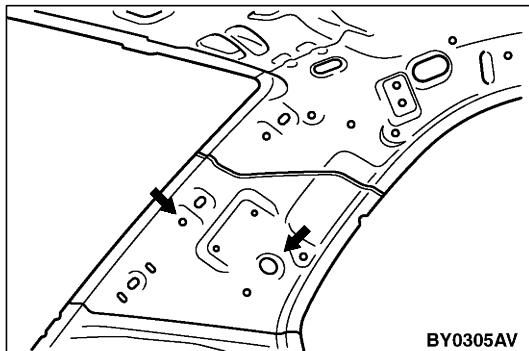


AY0249AV

**NOTE ON REPAIR WORK
INSTALLATION**

1. When attaching the quarter outer, apply sealant to the areas indicated in the illustration. For RS-II, attach the rear pillar silencer protector, and fill the gaps with butly tape.

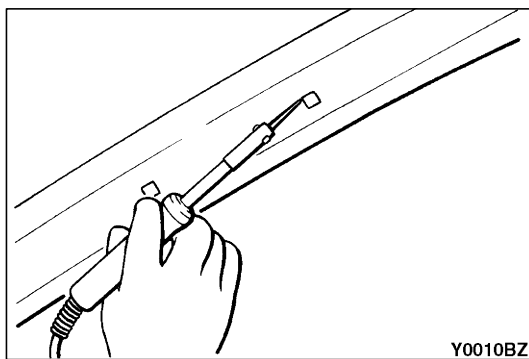
■ : Body sealant



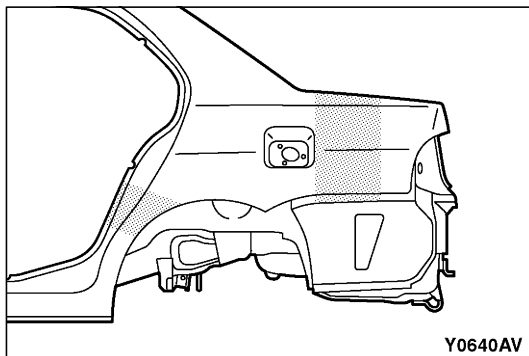
<The following service procedures are only applied to RS-II.>

2. After attaching the quarter outer, seal the holes and flanges with bolts and plate tape, and fill foam material from hole shown in the illustration.

Foam material	Type	Brand Used
Foam acoustic material	Two-part expanded urethane	3M ULTRAPRO Panel foam - Yellow



3. After two hours after filling the foam material, remove the bolts and plate tape, and solder the sealed holes until a clip, etc. can be inserted completely.

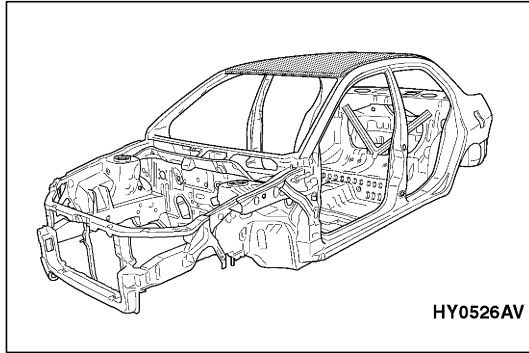



Reference
Parts replacement is advised. depending on the damaged range.

▨ : Cuttable range

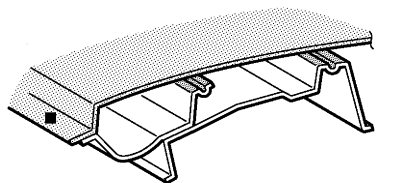
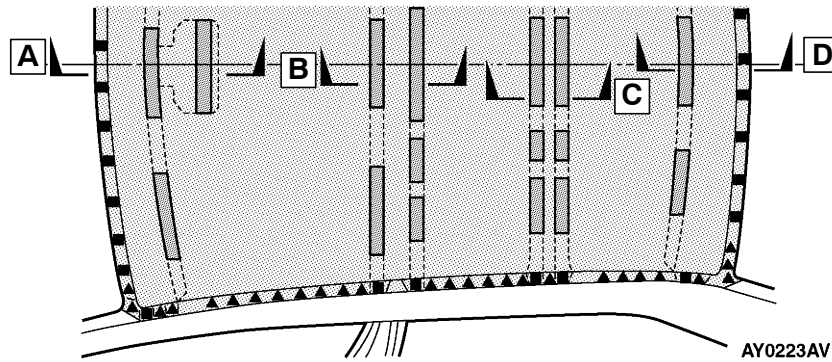
Caution
Avoid the fuel filler bracket (left side).

ROOF



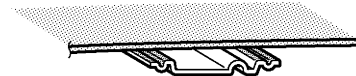
Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



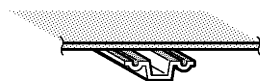
AY0225AV

A



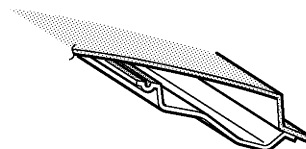
AY0226AV

B



AY0227AV

C



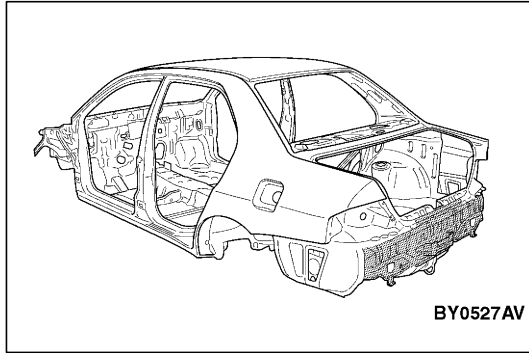
AY0228AV


D

 : Adhesive

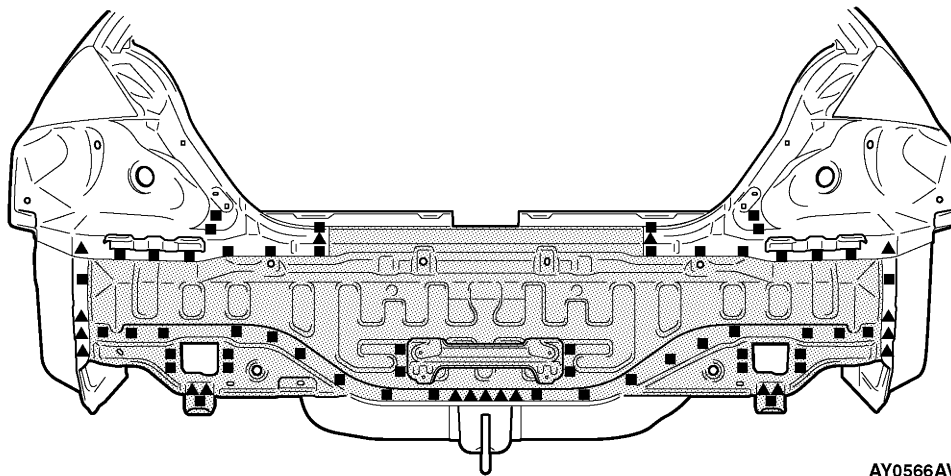
Adhesive	Type
	Chloroprene-base drying sealant

REAR END PANEL

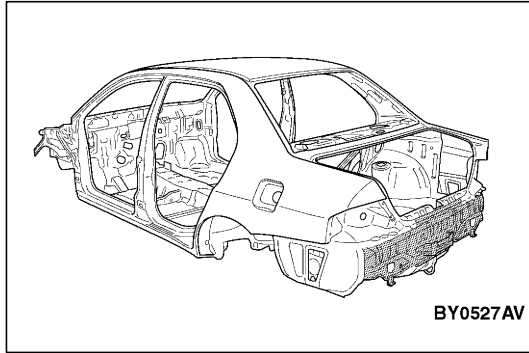



Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
#####	MIG arc welding (continuous)
○○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

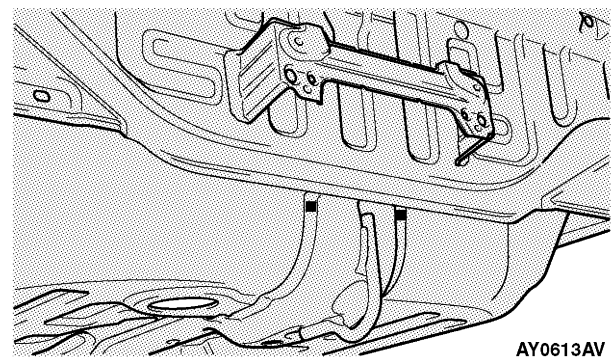
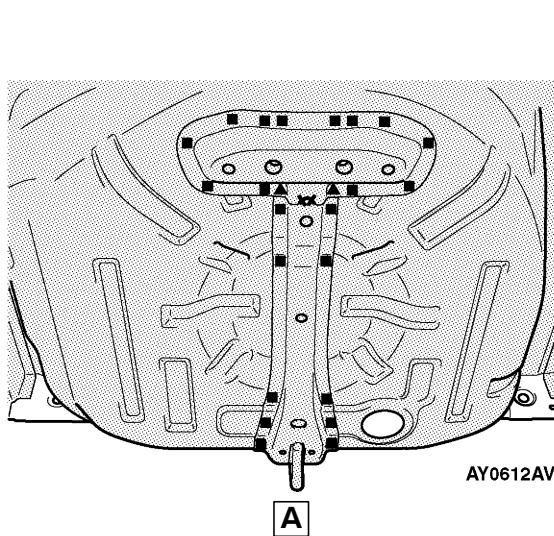
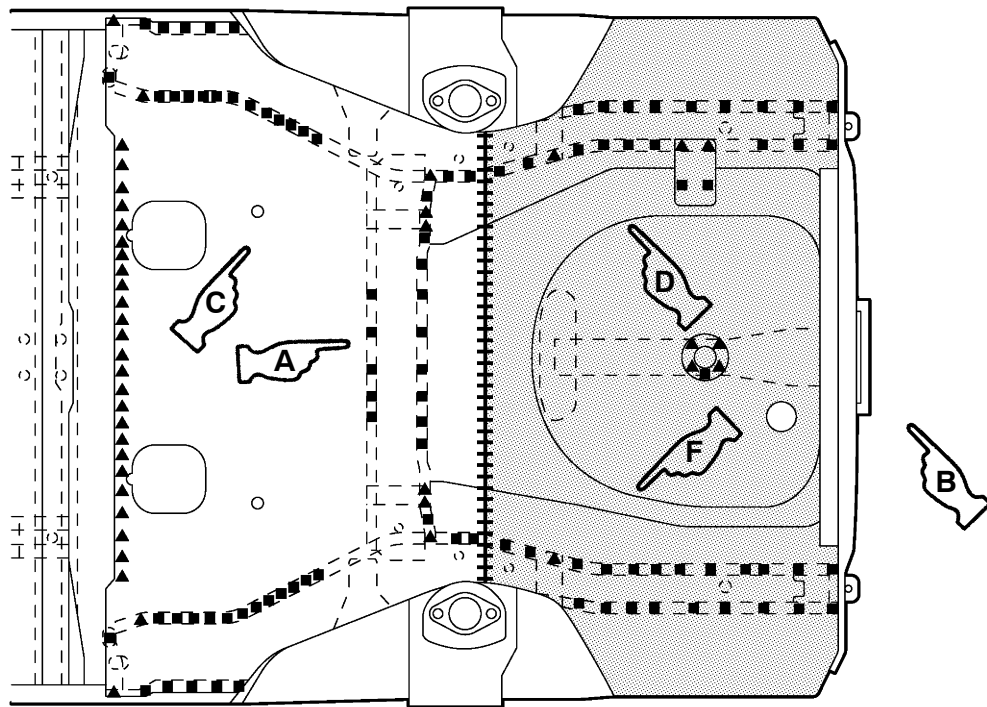


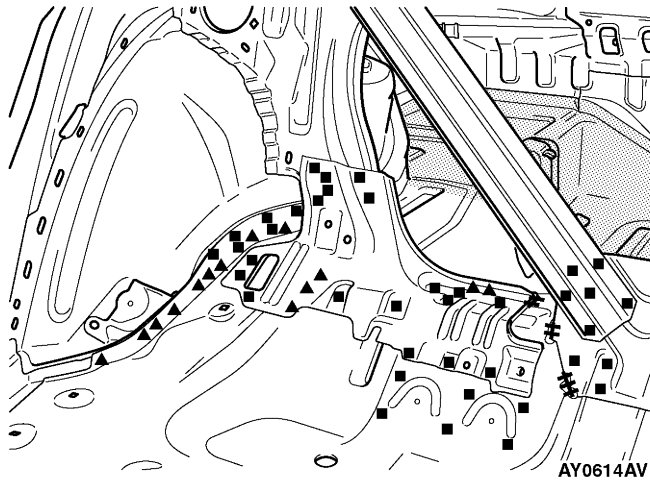
REAR FLOOR



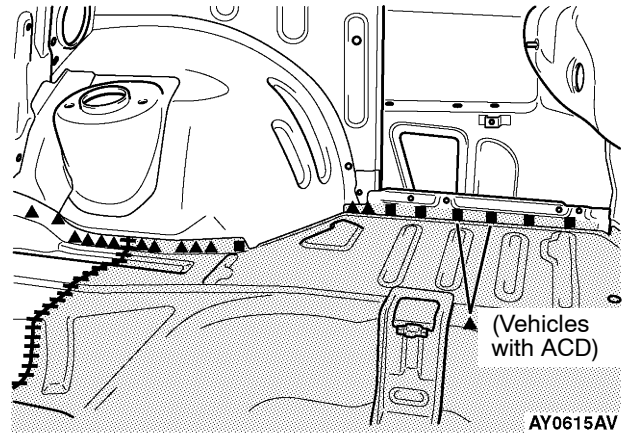
Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
○ ○ ○ ○ ○ ○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS

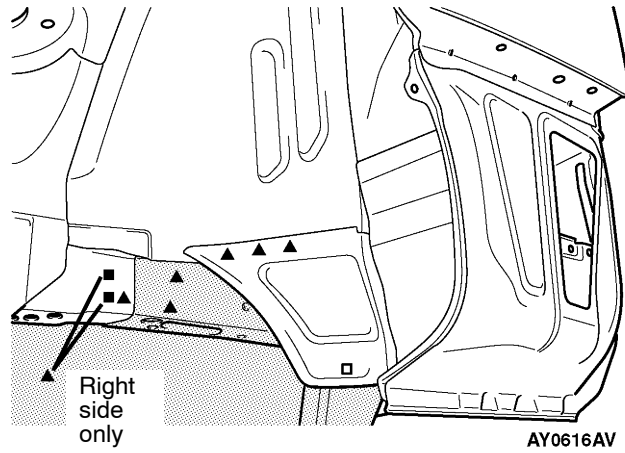




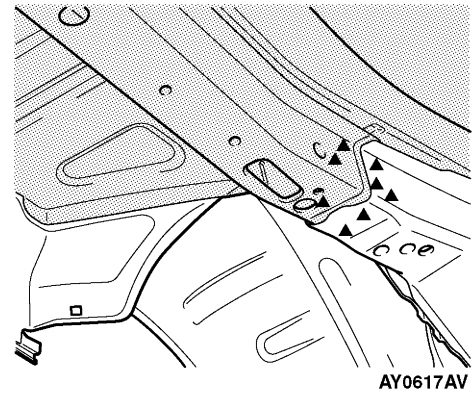
C



D



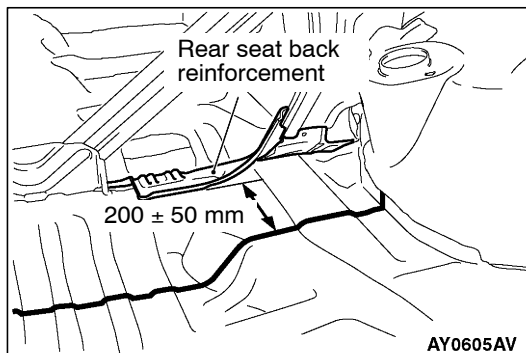
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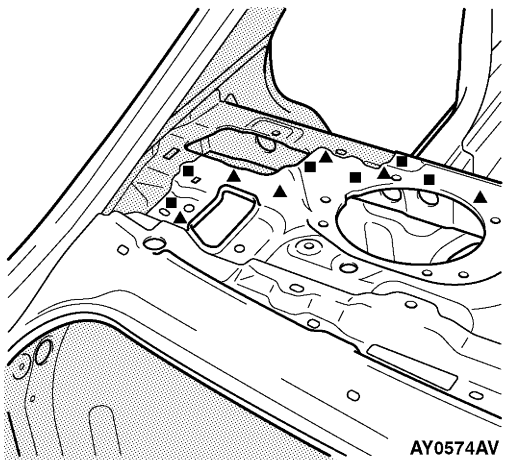
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NOTE

For details on the weld points with the rear end panel refer to REAR END PANEL on P.C-18.

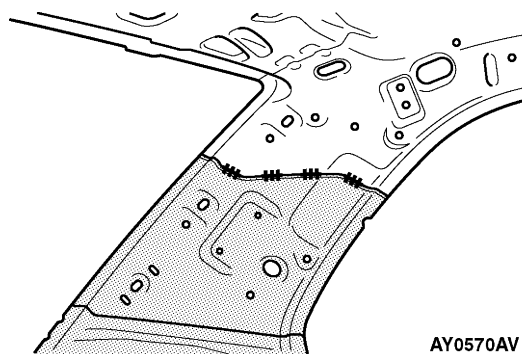
**NOTE ON REPAIR WORK
REMOVAL**

1. Cut the rear floor panel 320 ± 10 mm from the back of the rear seat back reinforcement.
Cut the rear floor pan 200 ± 50 mm from the back of the rear seat back reinforcement as shown in the illustration.



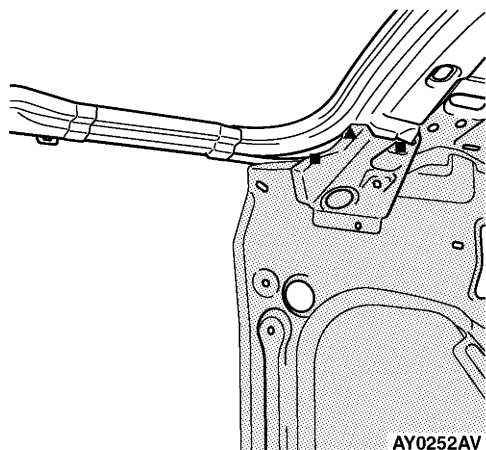
C

AY0574AV



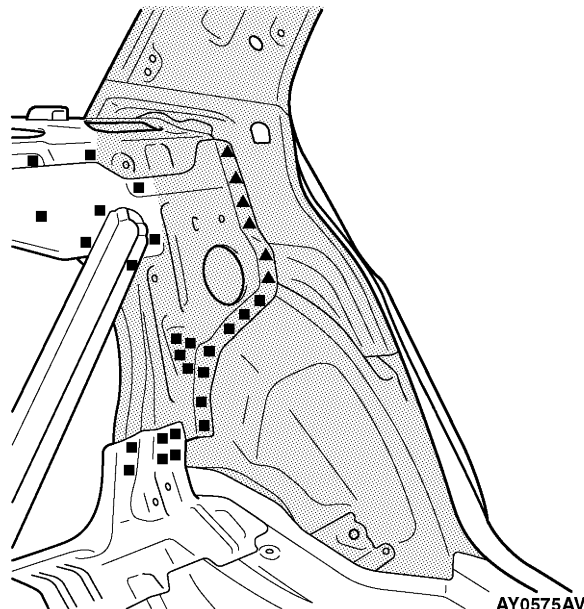
AY0570AV

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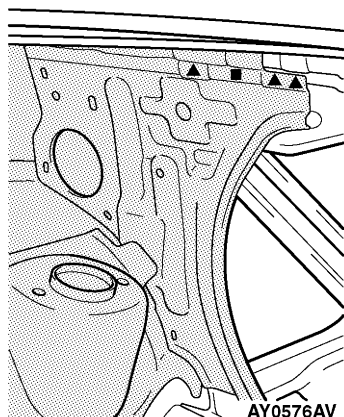
AY0252AV

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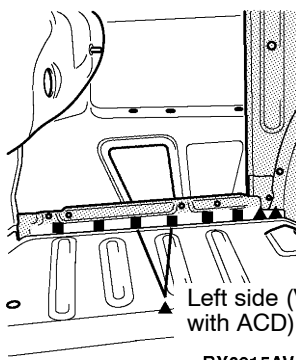
AY0575AV

F



AY0576AV

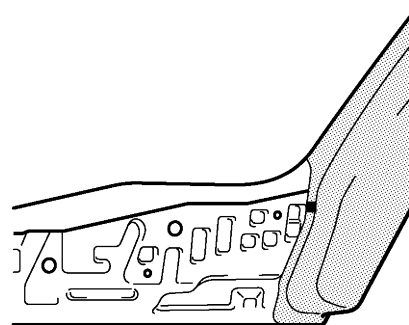
G



Left side (Vehicles with ACD)

BY0615AV

H

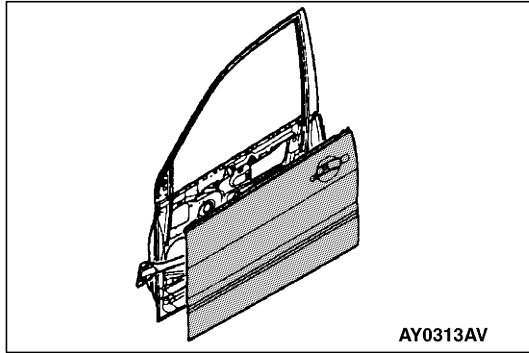



AX0125AV

I

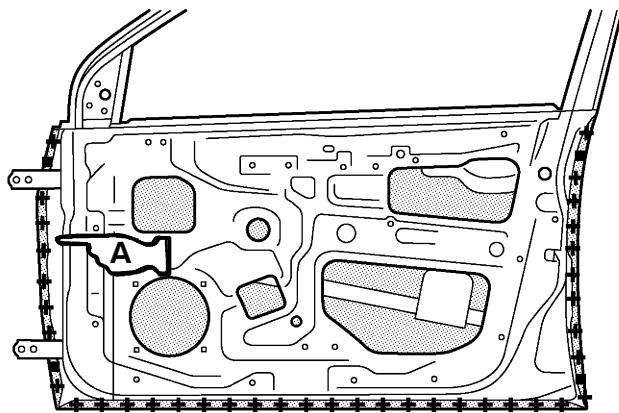
(With the side sill outer reinforcement rear removed.)

FRONT DOOR OUTER PANEL

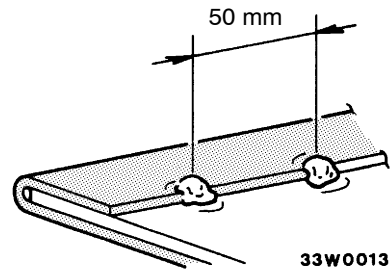


Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

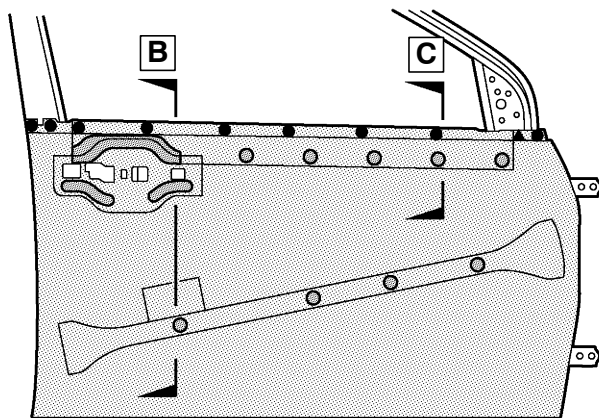
REPAIR WELDS



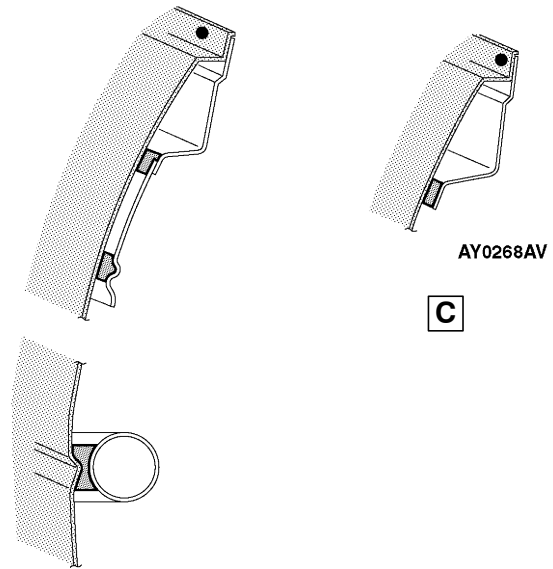
AY0265AV



A



AY0266AV



B

C

AY0267AV

AY0268AV

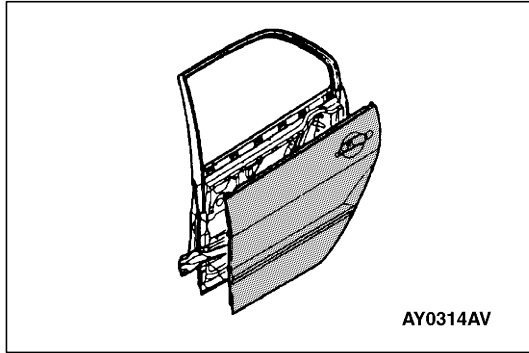
 : Adhesive


Adhesive	Type
	Chloroprene-base drying sealant

NOTE

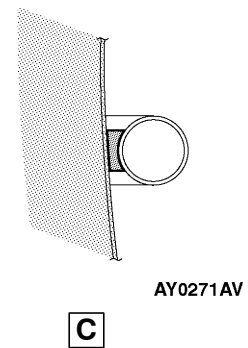
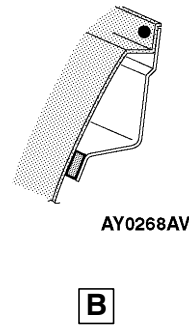
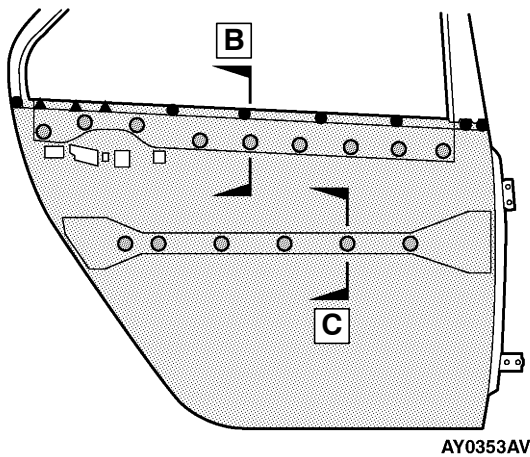
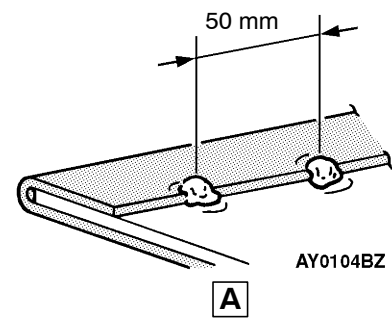
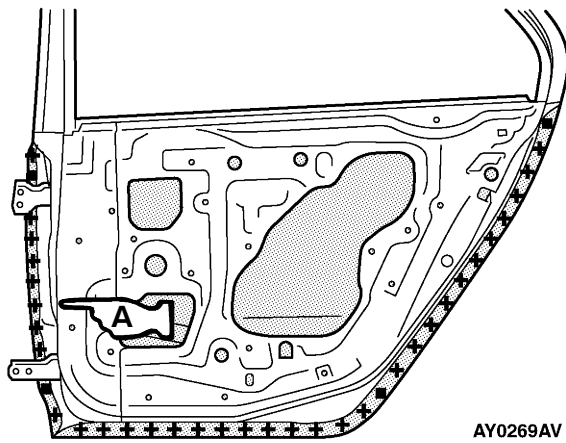
After hemming the door outer panel, MIG spot weld the flange overlap section at a pitch of approx. 50 mm.

REAR DOOR OUTER PANEL



Symbol	Operation description
● ● ● ●	Spot welding
■ ■ ▲ ▲	MIG plug welding (■: indicates two panels to be welded ▲: indicates three panels to be welded)
+ + + +	MIG spot welding
	MIG arc welding (continuous)
○○○○○	Braze welding
	Anti-corrosion agent application locations (Use access holes to apply liberally to butt-welded joints.)

REPAIR WELDS



 : Adhesive

Adhesive	Type
	Chloroprene-base drying sealant

NOTE

After hemming the rear door outer panel, MIG spot weld the flange overlap section at a pitch of 50 mm.

CORROSION PROTECTION

CONTENTS

BODY SEALING LOCATIONS	2	UNDERCOAT APPLICATION LOCATIONS ...	5
FLOOR	2		
UPPER BODY	2		
SIDE BODY	2		

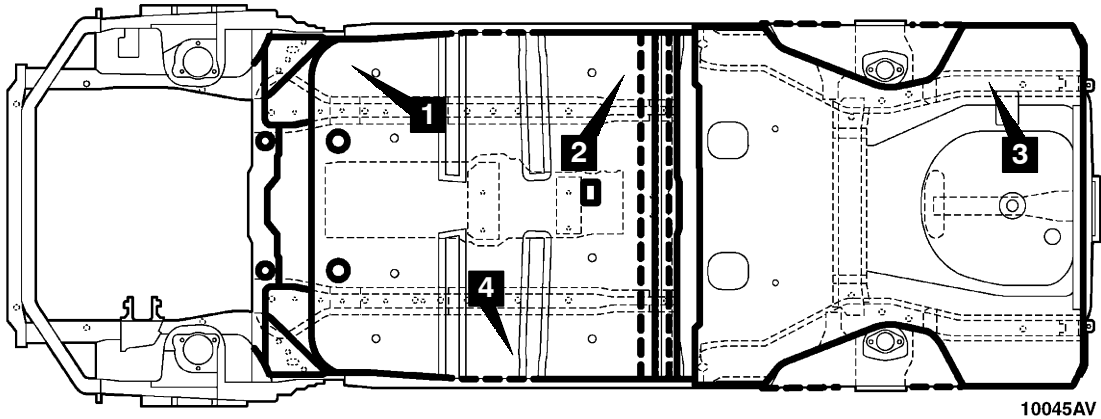


BODY SEALING LOCATIONS

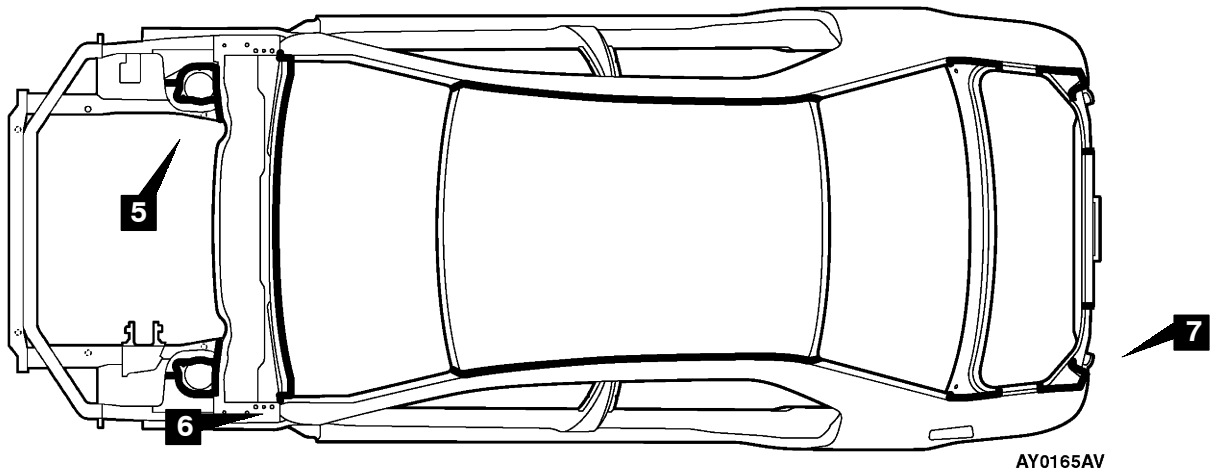
NOTES REGARDING REPAIR WORK

In places where the sealant can be directly seen on surfaces such as the drip rails, pillars, or clinch, and where the appearance of the paint surface is important, apply sealant or wipe away sealant after application to make the amount of sealant even. Be careful not to cover the drain hole. ■■■ (bold dotted line) indicates the application location at the back.

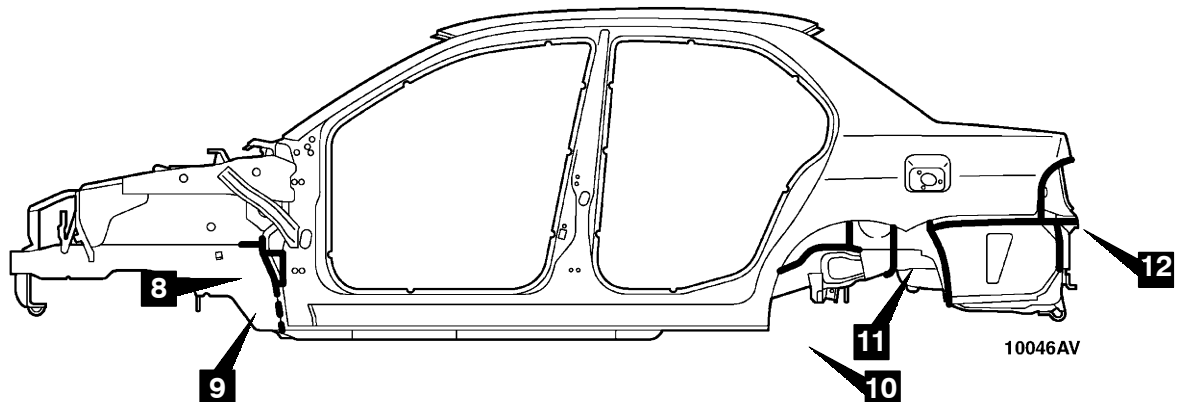
FLOOR

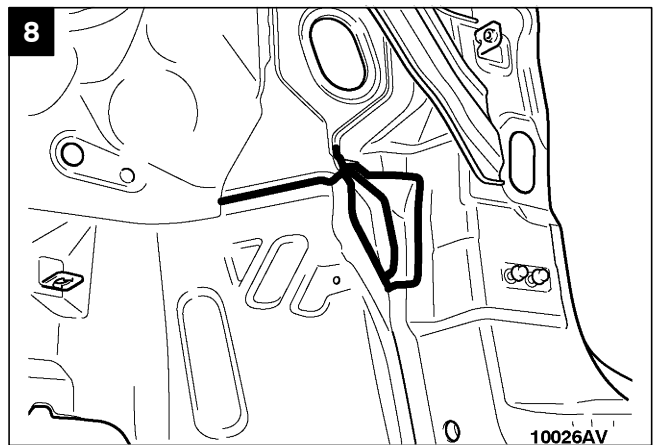
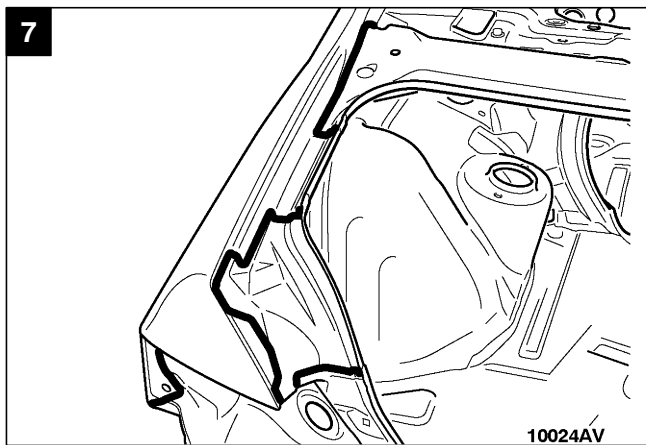
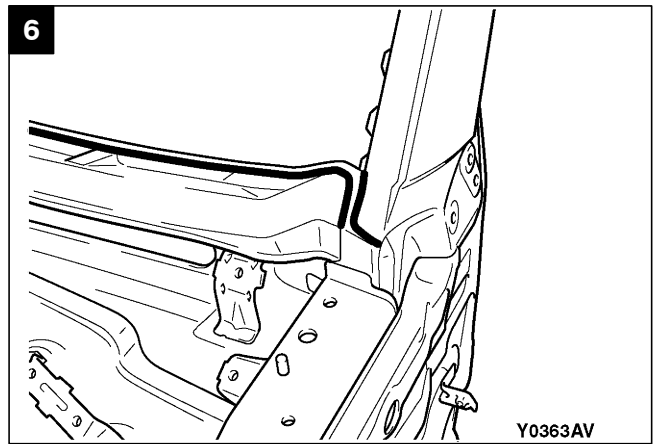
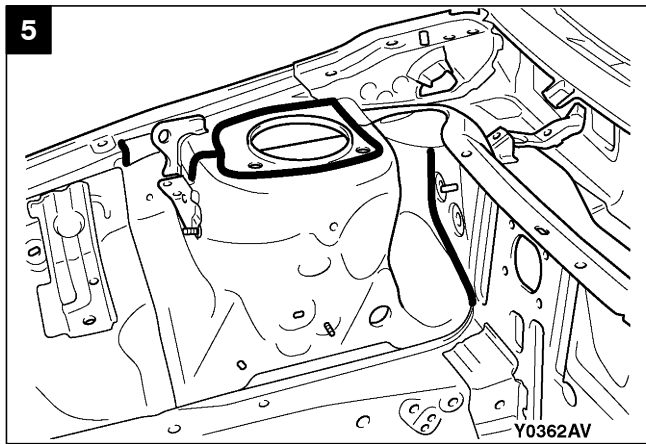
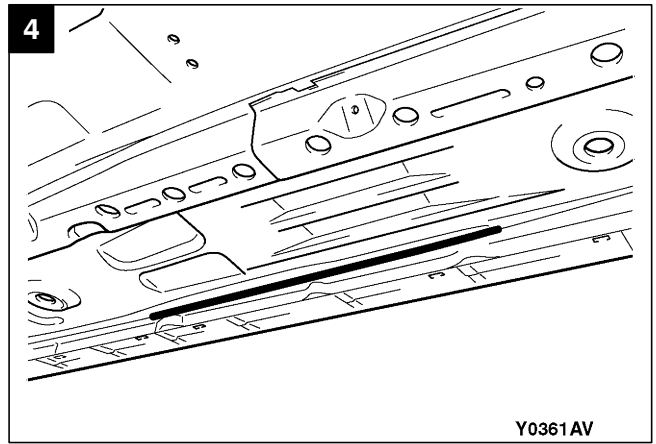
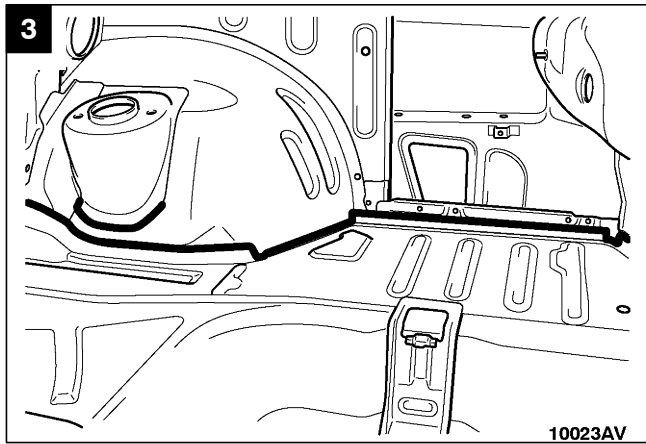
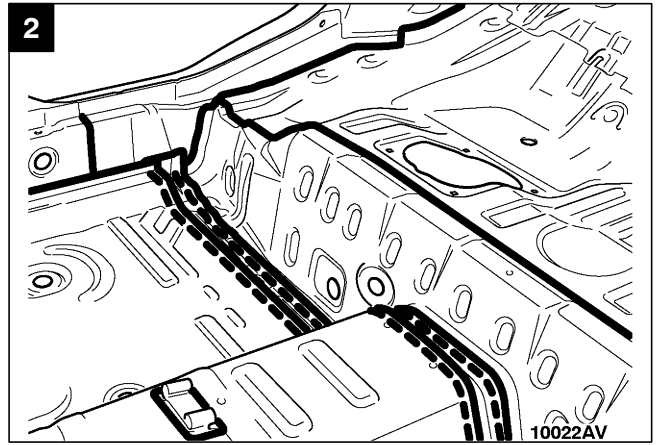
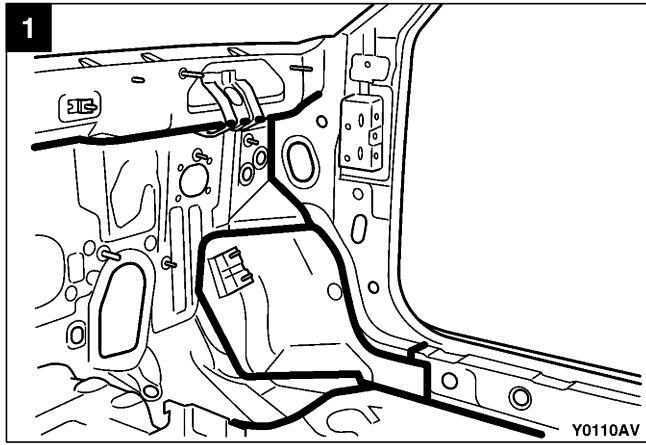


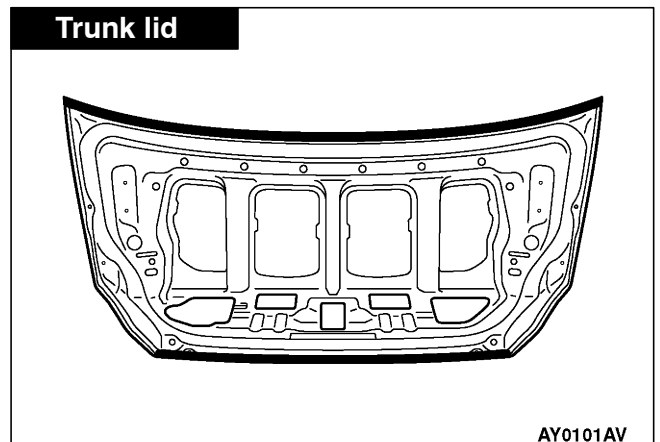
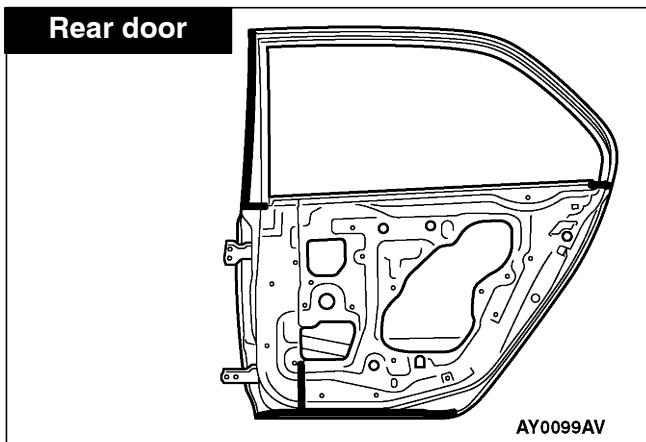
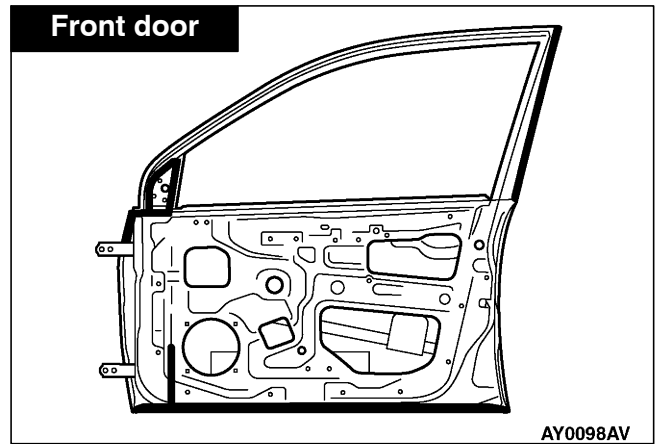
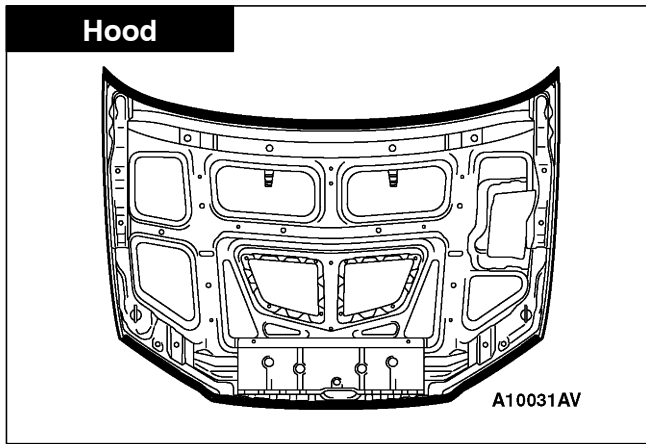
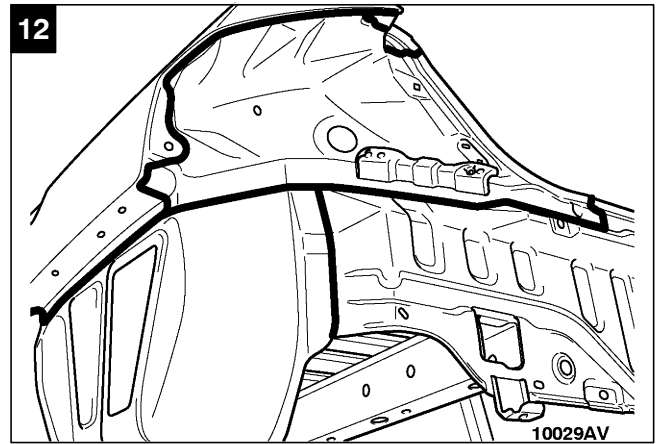
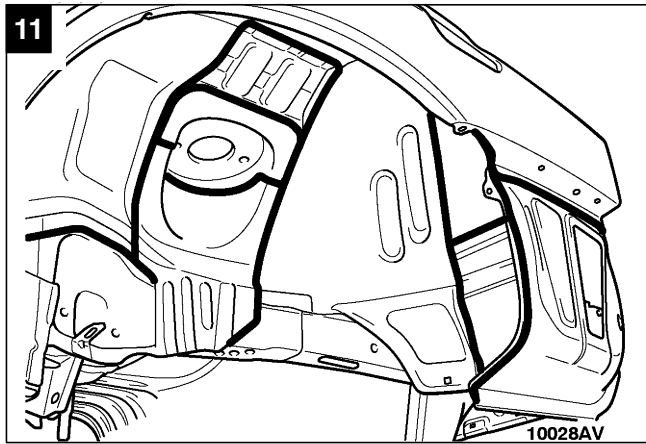
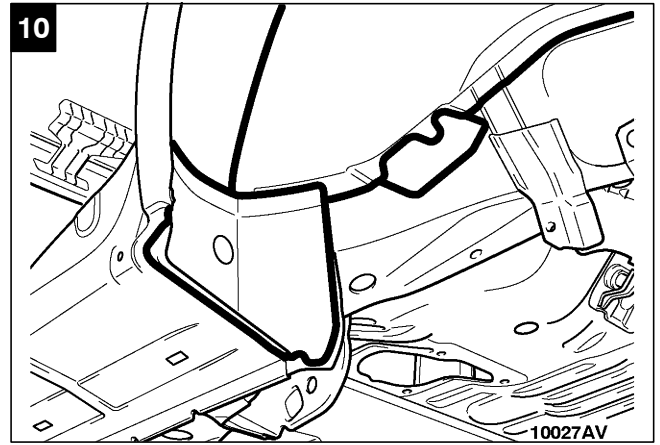
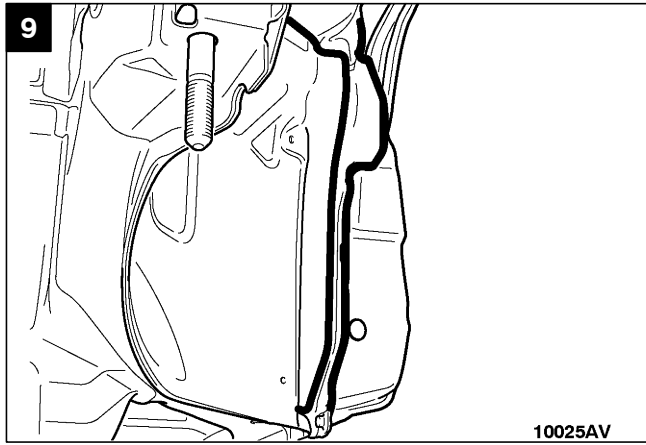
UPPER BODY



SIDE BODY





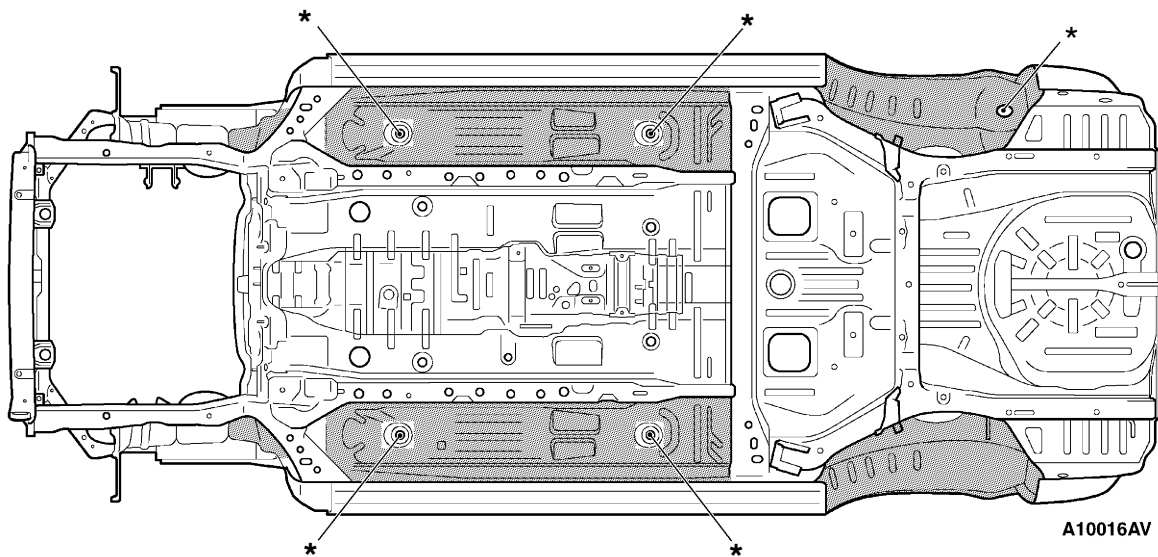


UNDERCOAT APPLICATION LOCATIONS

In order to provide resistance to rust, corrosion, chipping, and vibration, an undercoat is applied to certain areas of the underbody.

After completing body repairs, restore this undercoat if necessary.

* Mark the areas indicated with asterisks to make sure no undercoat adheres to these areas.



 : Undercoat (Film thickness of at least 0.5 mm)

NOTES

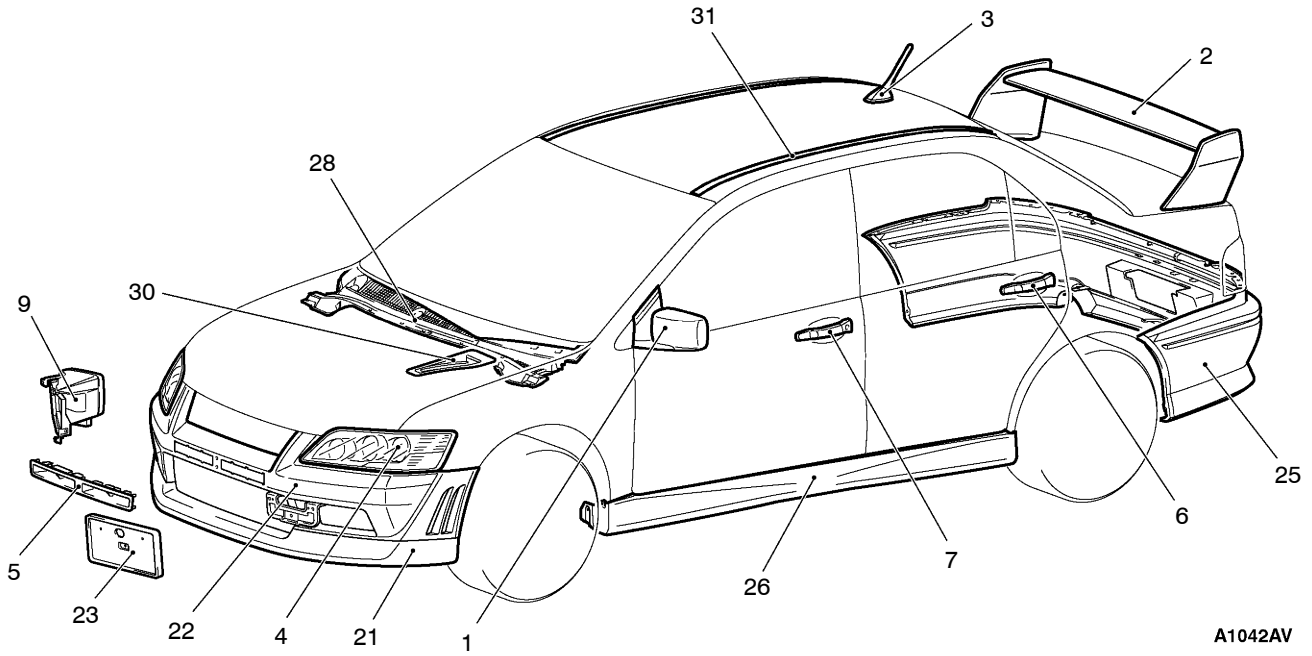
SYNTHETIC-RESIN PARTS

CONTENTS

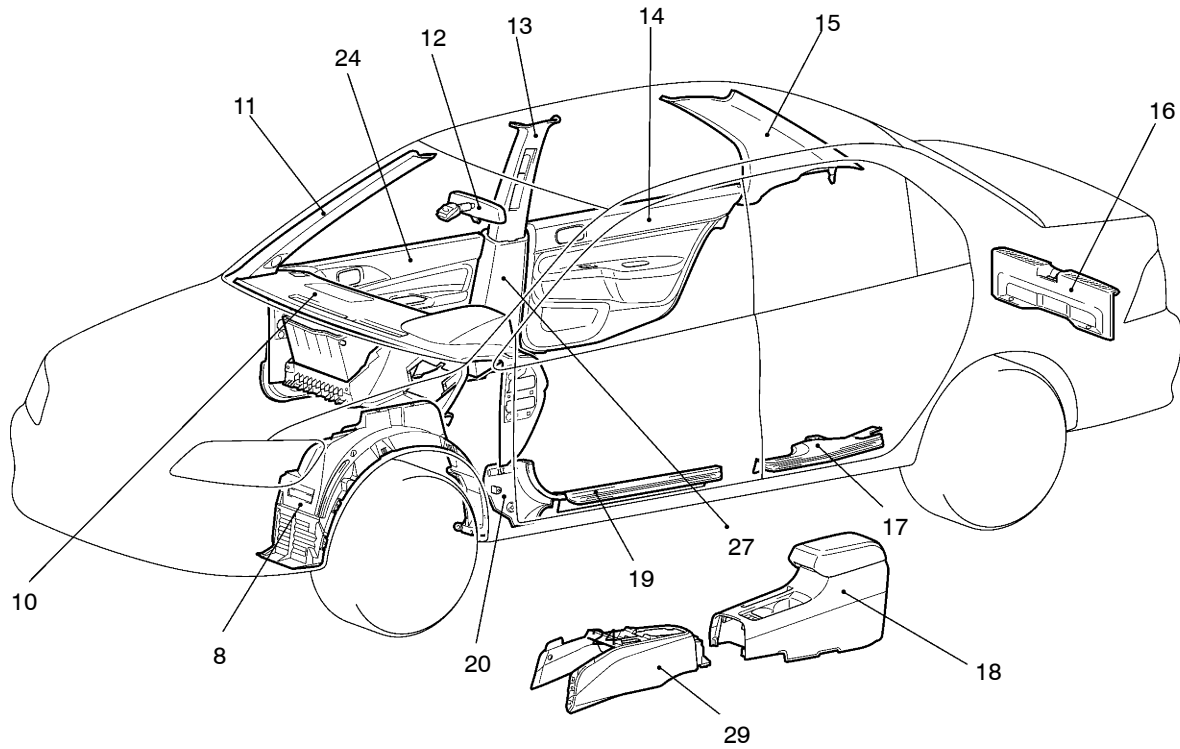
LOCATION OF SYNTHETIC-RESIN PARTS . . 2

LOCATION OF SYNTHETIC-RESIN PARTS

The following shows the main locations of synthetic-resin parts.



A1042AV



Y0343AV

No.	Part number	Material	Abbreviation of material	Heat-resistant temperature (°C)
1	Outside mirror	Acrylonitrile	ABS	80
2	Rear spoiler	Butadiene styrene		
3	Roof antenna	Acrylonitrile Ethylene butadiene	AES	90
4	Headlamp	Polycarbonate	PC	120
5	Front bumper bezel	Polycarbonate +	PC + ABS	125 - 135
6	Rear door outside handle	Acrylonitrile butadiene styrene		
7	Front door outside handle			
8	Splash shield	Polyethylene	PE	100
9	Oil cooler duct	Polypropylene	PP	80
10	Instrument panel			
11	Front pillar trim			
12	Inside rear view mirror			
13	Centre pillar trim			
14	Rear pillar trim			
15	Rear door trim			
16	Rear end trim			
17	Rear scuff plate			
18	Rear console box			
19	Front scuff plate			
20	Cowl side trim			
21	Front bumper extension	Rubber denatured polypropylene	PP + E/P	80
22	Front bumper face			
23	License plate garnish			
24	Front door trim			
25	Rear bumper face	With talc added rubber denatured polypropylene	PP + E/P- TD (HMPP)	80 - 100
26	Side sill extension	With 20% talc added rubber denatured polypropylene	PP + E/P- TD20 (HMPP)	110
27	Center pillar trim lower	With 10 % talc added polypropylene	PP - TD10 (PPF)	110 - 120
28	Front deck garnish	With 20 % talc added polypropylene	PP - TD20 (PPF)	120 - 130
29	Floor console			
30	Hood inlet upper garnish	Polyphenylene ether + Polyamide	PPE+PA (PA/PPO)	185
31	Roof drip molding	Polyvinyl chloride	PVC	80

NOTE

1. If the new material symbols designated by the ISO differ from the old symbols, both are given, with the old symbols enclosed in brackets.
ISO: (International Standardization Organization)
2. A slash (/) in the material symbol indicates that two different materials compose a 2-layer construction. A plus sign (+) indicates that the two different materials are mixed.
3. The material symbols for synthetic-resin parts are embossed on parts in hidden places.

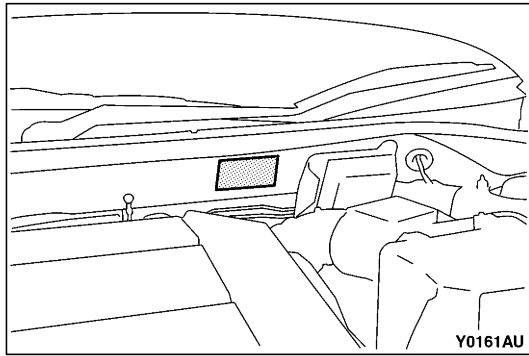
NOTES

BODY COLOUR

CONTENTS

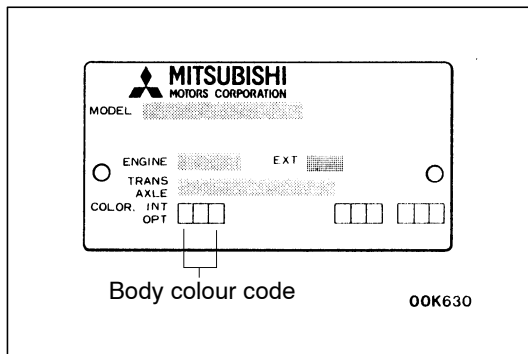
BODY COLOUR CODE	2	BODY COLOURING	3
BODY COLOUR CHARTS	2	BUMPER	3
NEW COLOUR NUMBERS	3	BLACK PAINT	3





BODY COLOUR CODE

1. The body colour code is imprinted on the plate, which is mounted on the front deck.
2. The body colour code is imprinted at the areas indicated in the illustration.



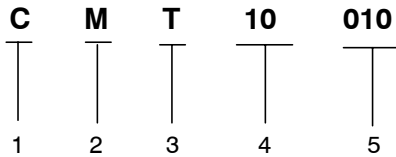
BODY COLOUR CHARTS

Check the vehicle's body colour code, and then use this body colour chart to determine the refinishing paint supplier from which the colour be purchased.

Colour	Body colour code	Colour number	Body colour name	Composition of film	Engine compartment and luggage compartment colour	
					Colour number	Colour name
SILVER	A69	AC11169	Satellite Silver	Metallic	AC10595	GRAY
BRIGHT BLUE	T10	CMT10010	French Blue	Solid	CMB17004	BRIGHT BLUE
BLACK	X42	AC11342	Amethyst Black	Interference Pearl	AC10903	BLACK
WHITE	W83	AC10983	Scotia White	Solid	AC10863	WHITE
RED	P85	AC11185	Palma Red	Solid	AC10795	RED
YELLOW	Y01	CMY10001	Dandelion Yellow	Solid	AC10911	YELLOW

NEW COLOUR NUMBERS

Example



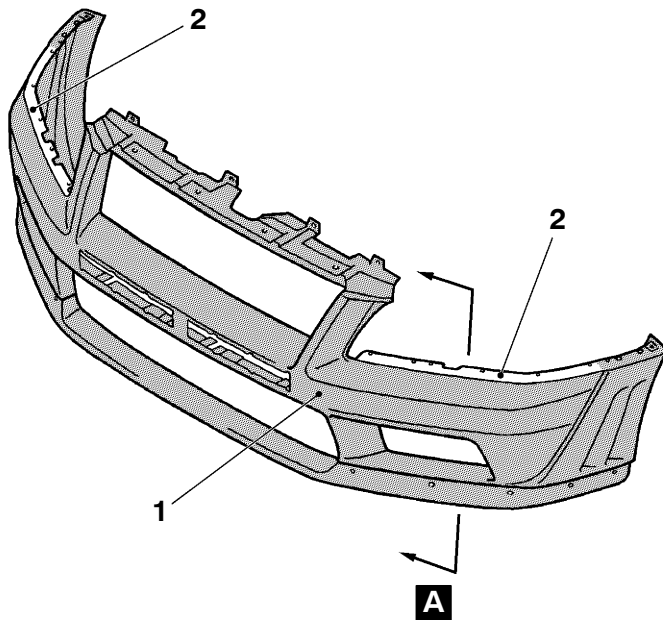
(Body colour code T10)

No.	Item	Content
1	Identification code	C: The colour number is indicated.
2	Manufacture center code	M: Japan (Automobile Engineering Center) T: Japan (Truck and Bus Engineering Center)
3	System colour code	W (N): White H (A, U): Silver/Gray X (J): Black R (P): Red Y (C, S, E, M, K): Brown/Yellow (including Orange, Maroon, and Gold) G (F, L): Green/Olive B (T, D): Blue V: Purple () Codes within the parenthesis can be also used.
4	Colour classification code	From 10 to 16: The body colour is indicated. 17: The body inner panel colour is indicated.
5	Specific number	Serial number numbering management

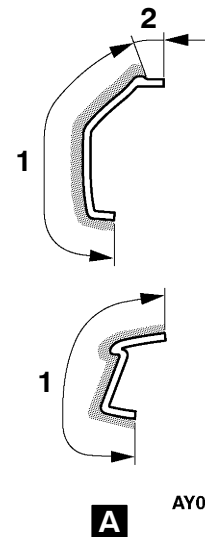
BODY COLOURING

BUMPER

Front bumper



YA0633AV

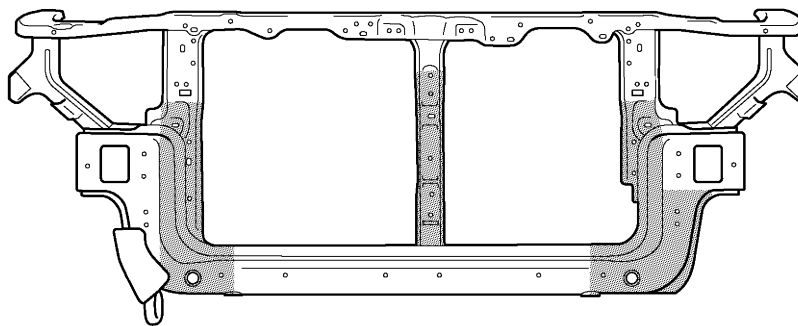



AY0634AV

1	Body colour
2	Material colour

BLACK PAINT

Headlamp support

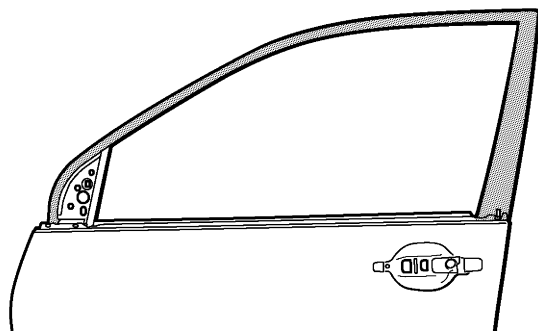


 : Black (AC10657)

BY0610AV

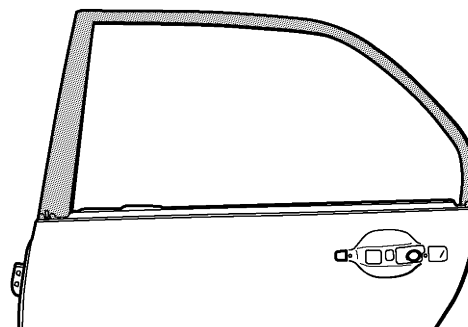
Door sash

Front door




AY0403AV

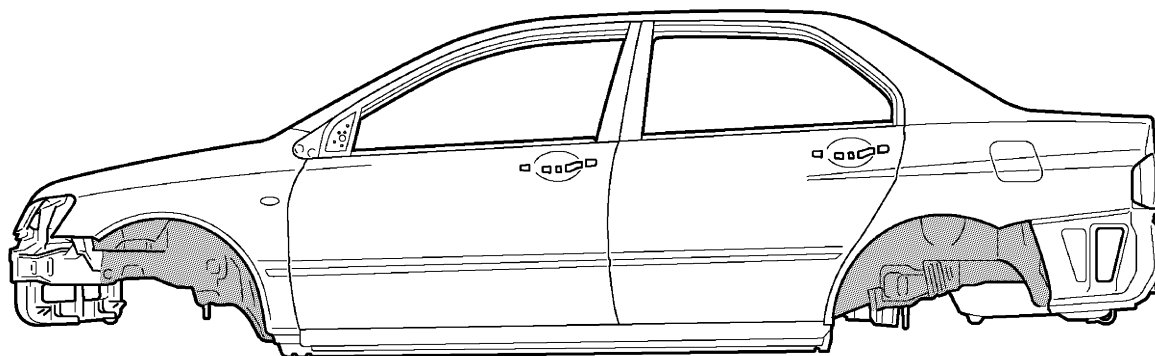
Rear door




AY0194AV

 : Black (AC10790)

Wheel house



A10033AV

 : Black (AC10657)

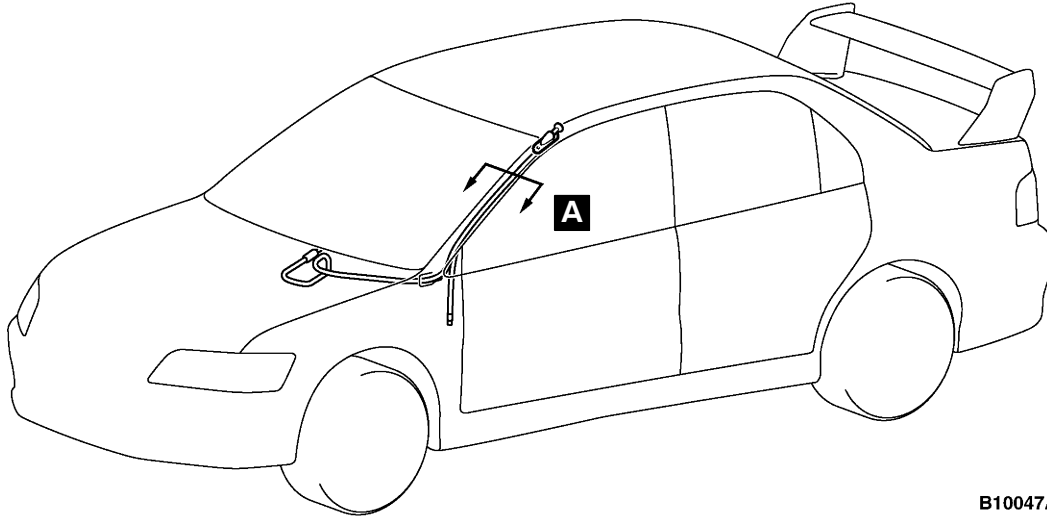
WIRING AND PIPING DIAGRAM

CONTENTS

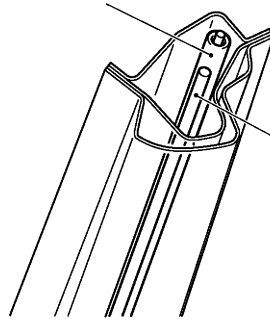
WIRING AND PIPING DIAGRAM 2

WIRING AND PIPING DIAGRAM

Pole antennas are routed in some parts of closed-section structures of the body construction. These pole antennas must be removed before body panels in these areas can be replaced.



Pole antenna
(Vehicles with pole antennas)



Antenna feeder-line
(Vehicles with pole antennas)

BY0106AV