
GROUP 00

GENERAL

CONTENTS

GENERAL **00**

GENERAL<ELECTRICAL> **00E**

NOTES

GROUP 00

GENERAL**CONTENTS**

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HOW TO USE THIS MANUAL

M1001000101016

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.

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).

DANGER, WARNING, AND CAUTION

DANGER, WARNING, and CAUTION call special attention to a necessary action or to an action that must be avoided. The differences among DANGER, WARNING, and CAUTION are as follows:

- If a DANGER is not followed, the result is severe bodily harm or even death.
- If a WARNING is not followed, the result could be bodily injury.
- If a CAUTION is not followed, the result could be damage to the vehicle, vehicle components or service equipment.

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.00-37](#).

MODEL INDICATIONS

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

2500:Indicates an engine with the 2,477mL <4D56> diesel engine.

3200:Indicates an engine with the 3,200mL <4M41> diesel engine.

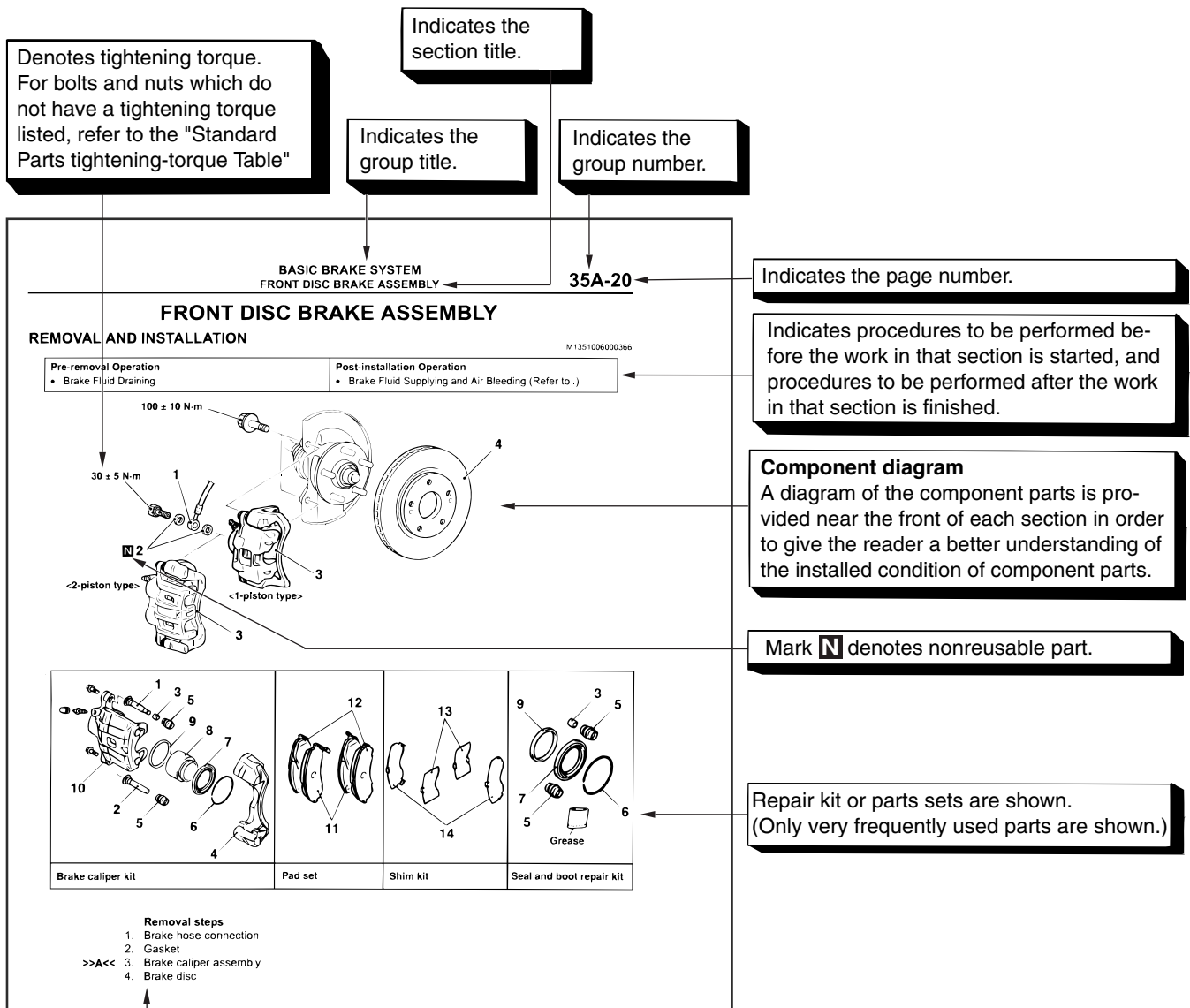
DOHC: Indicates an engine with the double overhead camshaft.

M/T:Indicates the manual transmission.

A/T:Indicates the automatic transmission.

A/C:Indicates the air conditioner.

EXPLANATION OF MANUAL CONTENTS



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 installation is impossible in reverse order of removal 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.

BASIC BRAKE SYSTEM
FRONT DISC BRAKE ASSEMBLY

35A-21

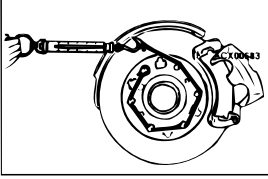
INSTALLATION SERVICE POINT ←

>>A<< **DISC BRAKE ASSEMBLY INSTALLATION**

1. To check the brake drag force after mounting the pad, measure the hub torque in the advancing direction using a spring balance with the pad is removed.

CAUTION
Do not allow any oil, grease or other contamination to contact the friction surfaces of the pads and brake discs.

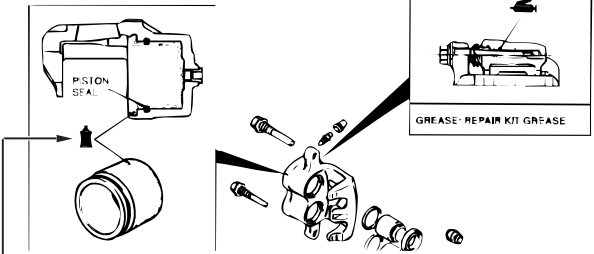
2. After re-installing the caliper support to the knuckle, install the pad clips and the pads to the caliper support.



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

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.



Indicates (by symbols) where lubrication is necessary.

Symbols for lubrication, sealants and adhesives

Symbols are used to show the locations for lubrication and for application of sealants and adhesives.

These symbols are included in the diagram of component parts or on the page following the component parts page. The symbols do not always have accompanying text to support that symbol.

- : Grease
(Multi-purpose grease unless there is a brand or type specified)
- : Sealant or adhesive
- : Brake fluid or automatic transmission fluid
- : Engine oil, gear oil or air conditioning compressor oil
- : Adhesive tape or butyl rubber tape

HOW TO USE TROUBLESHOOTING/INSPECTION SERVICE POINTS

CONTENTS OF TROUBLESHOOTING

M1001013300211

CAUTION

During diagnosis, a diagnosis code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.

WARNING

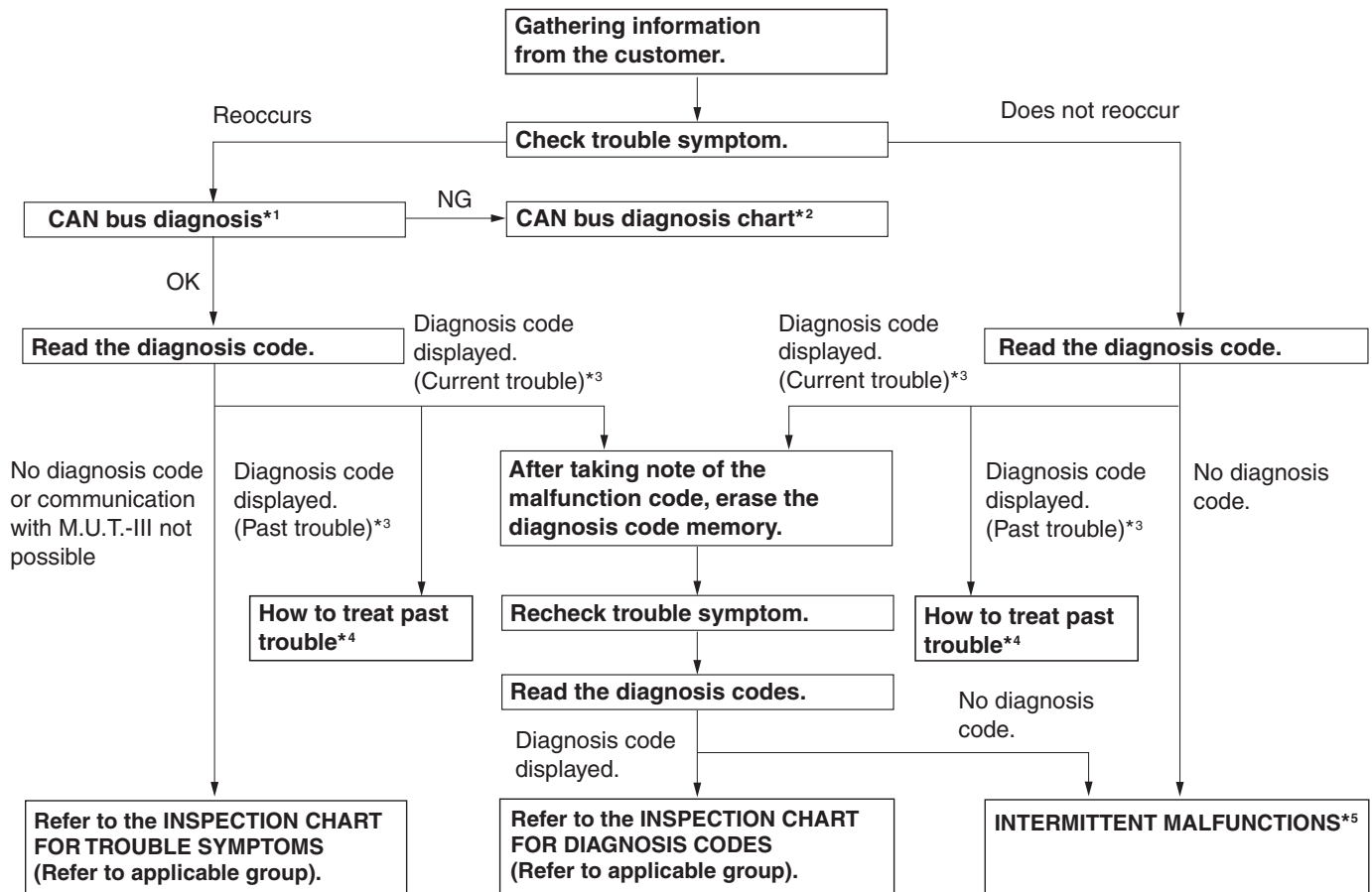
Since the radiator fan rotates during CAN bus line diagnostics, make sure that no one is servicing the engine compartment before diagnosing the CAN bus line. Since the CAN communication stops when diagnosing the CAN bus line, the ETACS-ECU detects the time-out of the engine-ECU, and activates the radiator fan to prevent overheating as fail-safe.

Troubleshooting of electronic control systems for which the M.U.T.-III can be used follows the basic outline described below. Even in systems for which the M.U.T.-III cannot be used, some of these systems still follow this outline.

1. STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

Troubleshooting sections are based on the diagnostic flow as below. If the diagnostic 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



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- *1: For how to diagnose CAN bus lines, refer to GROUP 54C .
- *2: For the CAN bus diagnosis chart, refer to GROUP 54C .
- *3: When the M.U.T.-III detects a diagnosis code, its display informs users whether a mechanical problem currently exists or whether it existed before. The message for the former state identifies it as a "Active" and the message for the latter identifies it as a "Stored".
- *4: For how to treat past trouble, refer to [P.00-13](#).
- *5: For how to cope with intermittent malfunctions, refer to [P.00-12](#).

2. SYSTEM OPERATION AND SYMPTOM VERIFICATION TESTS

If verification of the symptom(s) is difficult, procedures for checking operation and verifying symptoms are shown.

3. DIAGNOSIS FUNCTION

Details which are different from those in the "Diagnosis Function [P.00-7](#)" section are described.

4. DIAGNOSIS CODE CHART

Diagnostic trouble codes and diagnostic items are shown.

5. DIAGNOSIS CODE PROCEDURES

Indicates the inspection procedures corresponding to each diagnosis code (Refer to How to Use Inspection Procedures [P.00-8](#)).

6. TROUBLE SYMPTOM CHART

If there are trouble symptoms even though the M.U.T.-III does not find any diagnosis codes, Inspection procedures for each trouble symptom will be found by means of this chart.

7. SYMPTOM PROCEDURES

Indicates the inspection procedures corresponding to each symptoms classified in the Symptom Chart (Refer to How to Use Inspection Procedures P.00-8).

8. SERVICE DATA REFERENCE TABLE

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

9. ACTUATOR TEST TABLE

The Actuator Test item numbers, inspection items, and judgment values have been provided in this chart as reference information.

10. CHECK AT ECU TERMINALS

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

11. INSPECTION PROCEDURE BY USING AN OSCILLOSCOPE

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

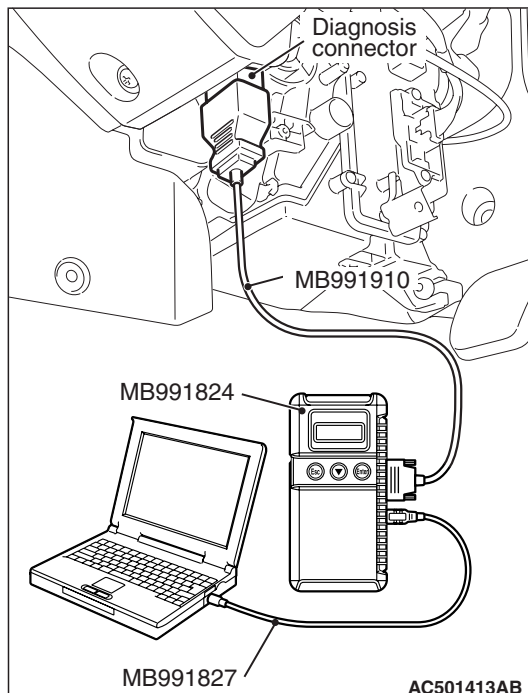
DIAGNOSIS FUNCTION

M1001013400100

HOW TO READ DIAGNOSIS CODE

⚠ CAUTION

Before connecting or disconnecting the M.U.T.-III, turn the ignition switch to the "LOCK" (OFF) position.



Connect the M.U.T.-III to the 16-pin diagnosis connector, and read the diagnosis code.

NOTE: For details on how to use the M.U.T.-III, refer to the "M.U.T.-III operation manual."

1. Ensure that the ignition switch is at the "LOCK" (OFF).
2. Start up the personal computer.
3. Connect M.U.T.-III USB cable MB991827 to special tool Vehicle Communication Interface (V.C.I.) MB991824 and the personal computer.
4. Connect M.U.T.-III main harness A MB991910 to the V.C.I.
5. Connect the M.U.T.-III main harness A to the diagnosis connector.
6. Turn the V.C.I. power switch to the "ON" position.

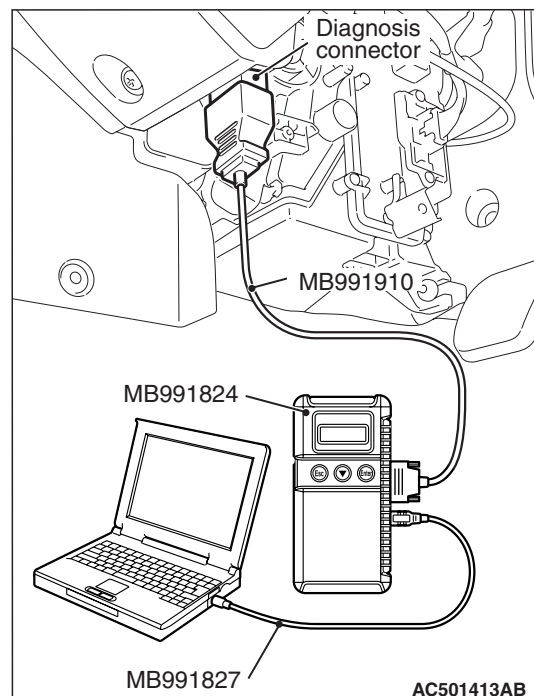
NOTE: When the V.C.I. is energized, the V.C.I. indicator lamp will be illuminated in a green colour.

7. Start the M.U.T.-III system on the personal computer and turn the ignition switch to the "ON" position.
8. Read the diagnosis code.
9. Disconnecting the M.U.T.-III is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF).

ERASING DIAGNOSIS CODE

⚠ CAUTION

Before connecting or disconnecting the M.U.T.-III, turn the ignition switch to the "LOCK" (OFF) position.

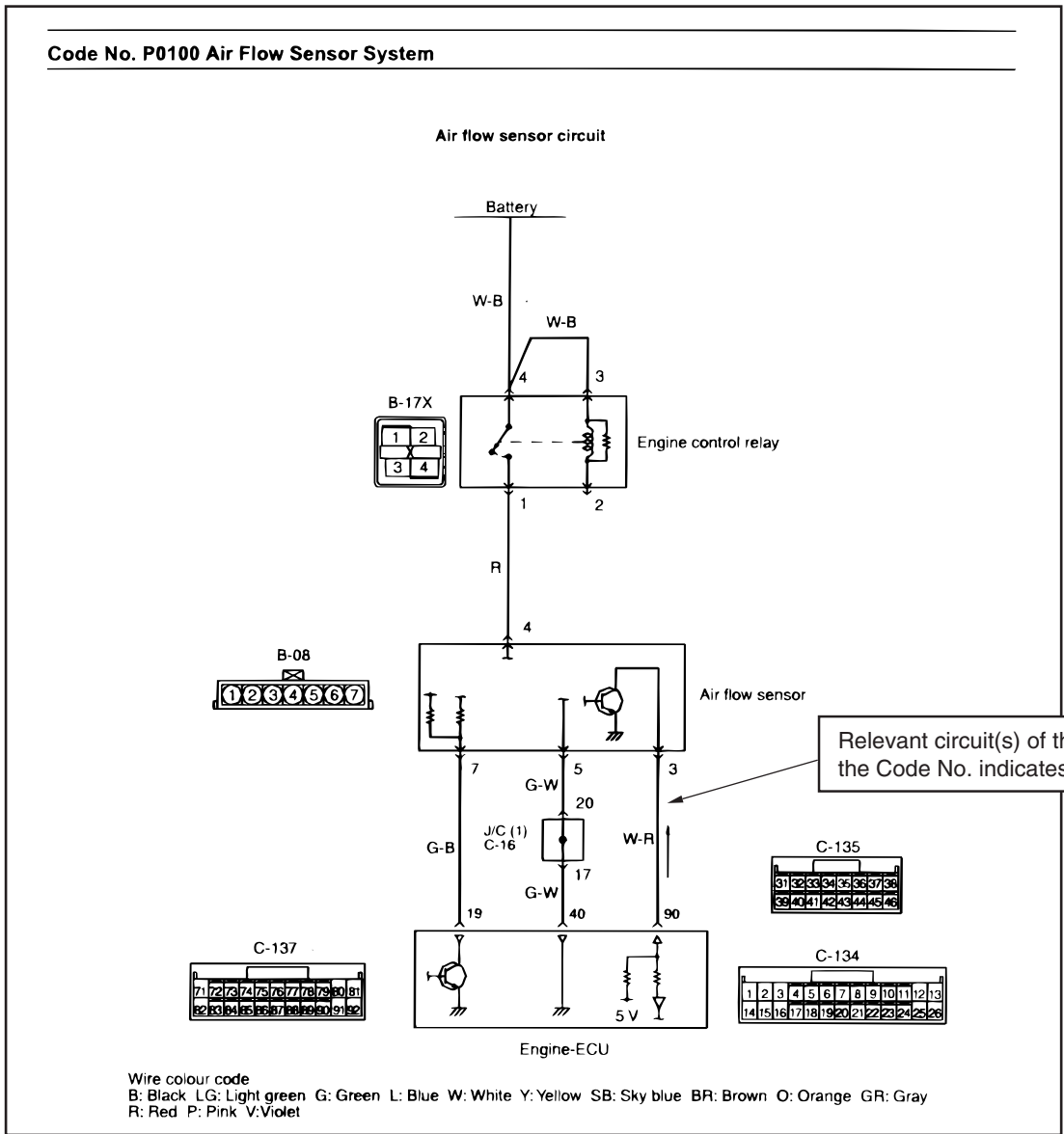


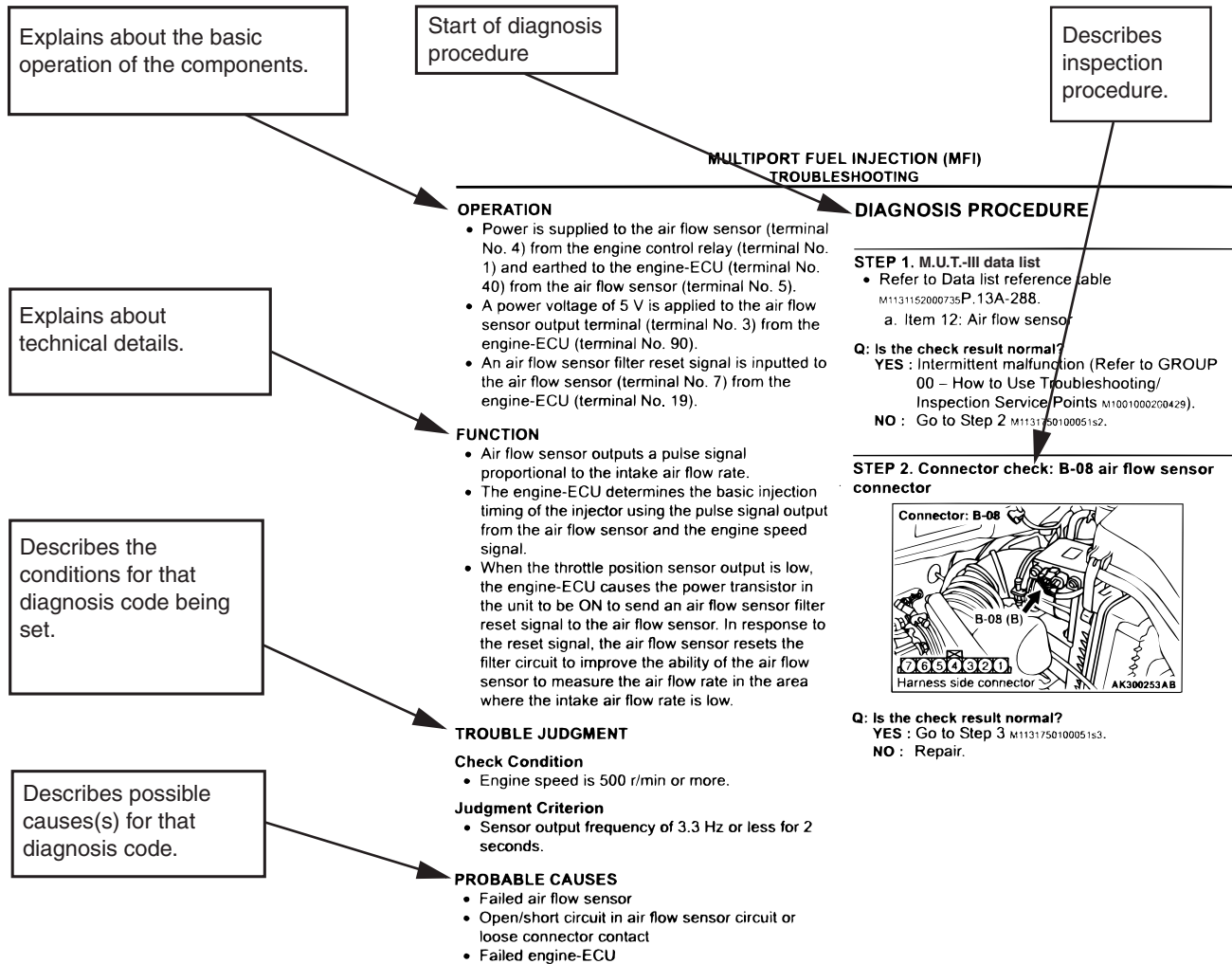
Connect the M.U.T.-III to the diagnosis connector, and erase the diagnosis code. The procedure is the same as "How to Read Diagnosis Code ."

HOW TO USE THE INSPECTION PROCEDURES

M1001013500237

The causes of many of the problems occurring in electric circuitry are generally the connectors, components, the ECU, the wiring harnesses between connectors, in that order. These inspection procedures follow this order. They first try to discover a problem with a connector or a defective component.





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CURRENT TROUBLE

Indicates that the status is "Active" and the trouble is currently present. Carry out troubleshooting as described in the applicable inspection procedure.

PAST TROUBLE

Indicates that the status is "Stored" and the trouble is historic. Since the trouble may still be present, set the vehicle to the diagnosis code detection condition and check that the status changes to "Active". If the status does not change from "Stored", observe the applicable inspection procedure with particular emphasis on connector(s) and wiring harness.

HARNESS CHECK

Check for an open or short circuit in the harness between the terminals which are faulty according to the connector measurements. Carry out this inspection while referring to the Electrical Wiring Manual. Here, "Check the wiring harness between the power supply and terminal xx" also includes checking for blown fuse. For inspection service points when there is a blown fuse, refer to "Inspection Service Points for a Blown Fuse P.00-12."

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

M1001013600223

⚠ CAUTION

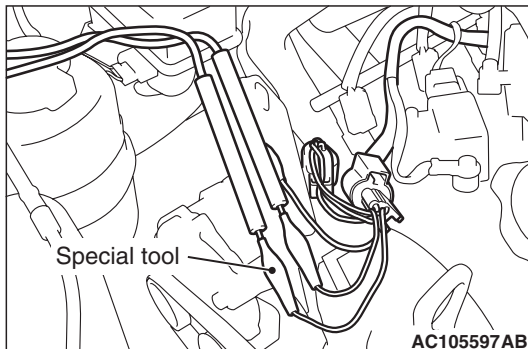
During diagnosis, a diagnosis code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.

Turn the ignition switch to the "LOCK" (OFF) position when connecting and disconnecting the connectors. Turn the ignition switch to "ON" when measuring, unless there are instructions to the contrary.

IF INSPECTING WITH THE CONNECTOR CONNECTED <WATERPROOF CONNECTORS>

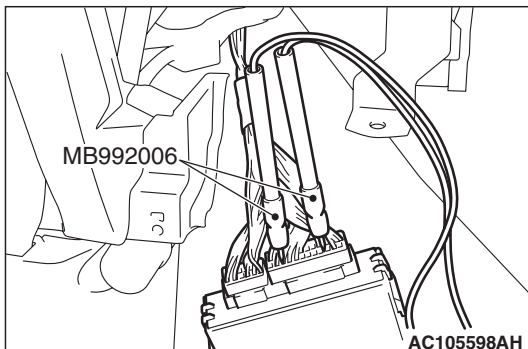
⚠ CAUTION

Never insert a test probe from the harness side, as this will reduce the waterproof performance and result in corrosion.



Use the special tools such as test harness, harness connector or check harness.

IF INSPECTING WITH THE CONNECTOR CONNECTED <ORDINARY (NON-WATERPROOF) CONNECTORS>

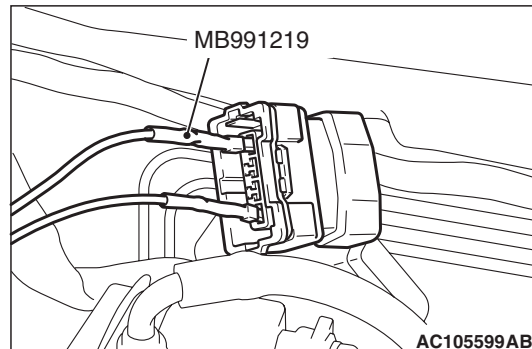


Inspect by inserting a test probe from the harness side. If the connector is too small to insert a test probe (e.g. control unit connector), do not insert it forcibly. Use special tool extra fine probe (MB992006).

IF INSPECTING WITH THE CONNECTOR DISCONNECTED <WHEN INSPECTING A FEMALE PIN>

⚠ CAUTION

- Use special tool check harness (MB991219). If the test bar is inserted forcibly, it will cause a poor contact.
- If the connector is disconnected, a diagnosis code may be stored for the system to be checked or other systems.

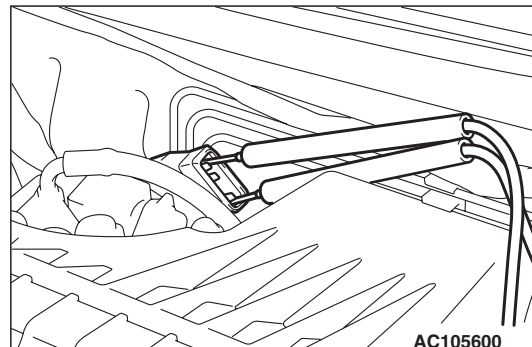


Use check harness (MB991219) of special tool harness set (MB991223).

IF INSPECTING WITH THE CONNECTOR DISCONNECTED <WHEN INSPECTING A MALE PIN>

⚠ CAUTION

- Be careful not to short the connector pins with the test bars. To do so may damage the circuits inside the ECU.
- If the connector is disconnected, a diagnosis code may be stored for the system to be checked or other systems.

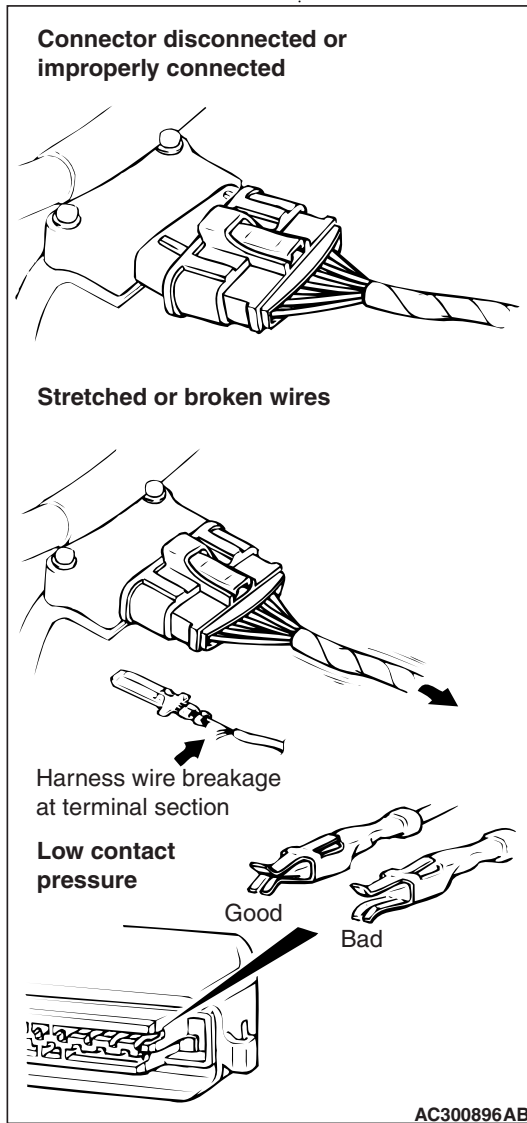


Touch the pin directly with the test bar.

CONNECTOR INSPECTION SERVICE POINTS

M1001013700189

VISUAL INSPECTION

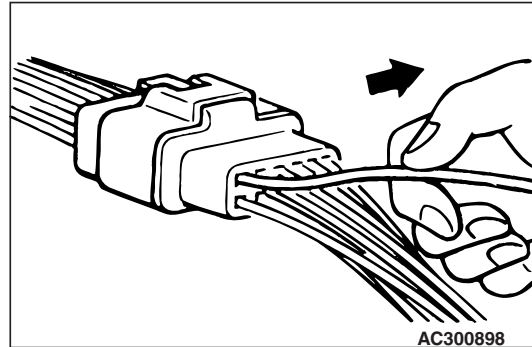


Connector is disconnected or improperly connected

- Connector pins are pulled out
- Due to harness tension at terminal section

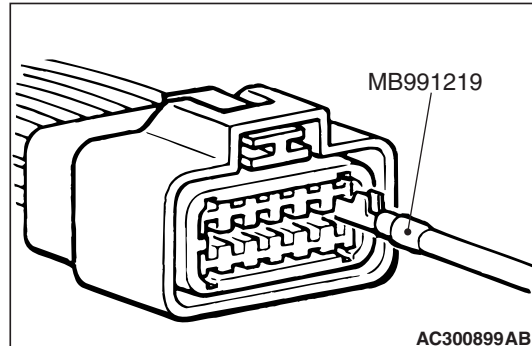
- Low contact pressure between male and female terminals
- Low connection pressure due to rusted terminals or foreign matter lodged in terminals

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



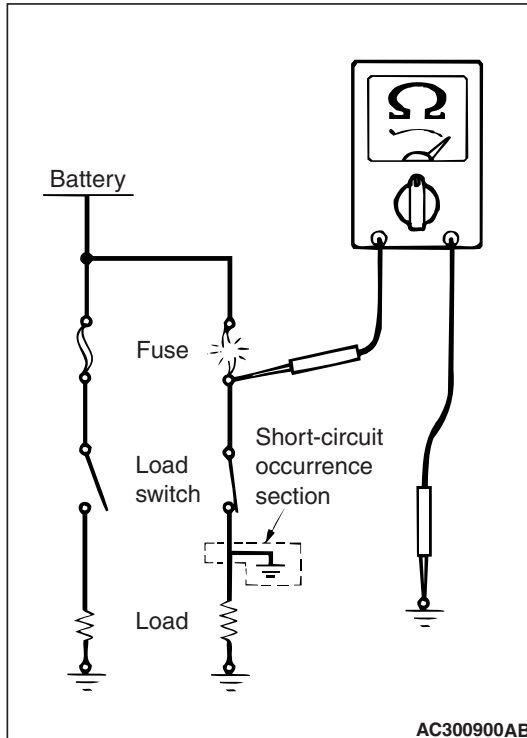
Use special tool inspection harness (MB991219) (connector pin connection pressure inspection harness of the inspection harness set) to inspect the engagement of the male pins and female pins. (Pin drawing force: 1 N or more)

INSPECTION SERVICE POINTS FOR A
BLOWN FUSE

M1001013800186

CAUTION

A diagnosis code may be stored due to a blown fuse.



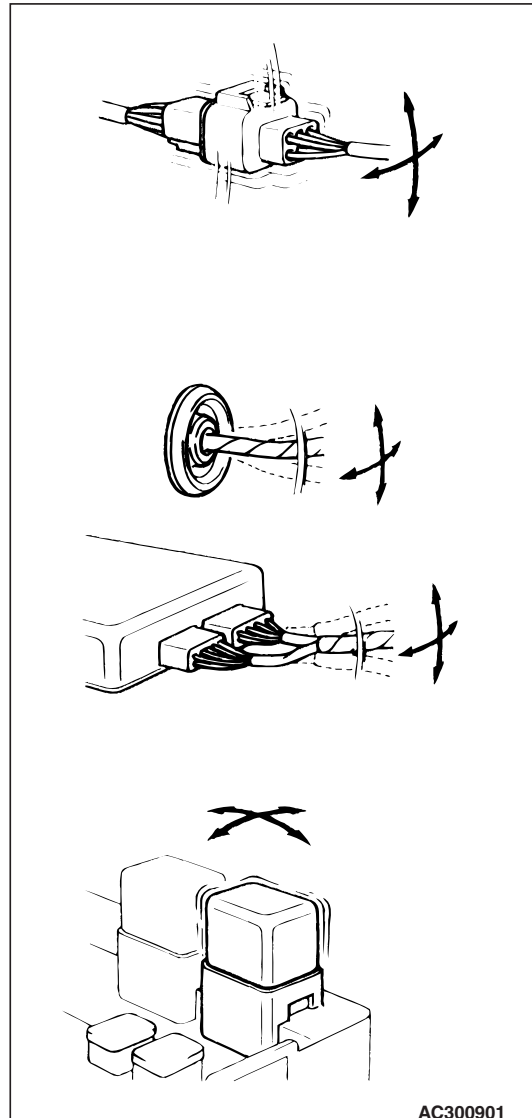
Remove the blown fuse and measure the resistance between the load side of the blown fuse and the earth. Close the switches of all circuits which are connected to this fuse. If the resistance is almost 0Ω at this time, there is a short somewhere between these switches and the load. If the resistance is not 0Ω , 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.)

HOW TO COPE WITH INTERMITTENT
MALFUNCTIONS

M1001013900183



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.
- 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 drive recorder function of the M.U.T.-III can also be used. (For details on how to use the M.U.T.-III, refer to the "M.U.T.-III operation manual").

HOW TO TREAT PAST TROUBLE

M1001014100157

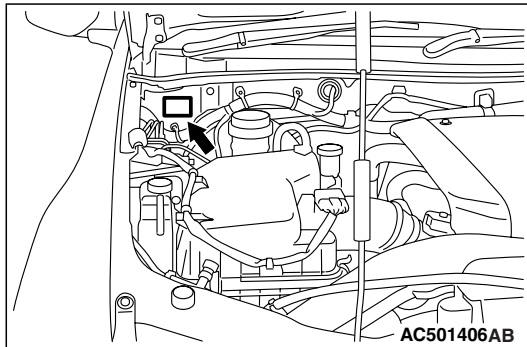
Since the trouble may still be present even the status is "Stored", set the vehicle to the diagnosis code detection condition and check that the status changes to "Active". If the status does not change from "Stored", carry out the following procedure.

1. Establish from the customer whether a fuse or connector has been replaced or disconnected.
2. If yes, erase the diagnosis code, and then check that no diagnostic code is reset. If no diagnosis code is reset, the diagnosis is complete.
3. If no, follow the applicable Diagnostic Trouble Code Chart. Then check the wiring harness and connector, and refer to "How to Cope with Intermittent Malfunction P.00-12."

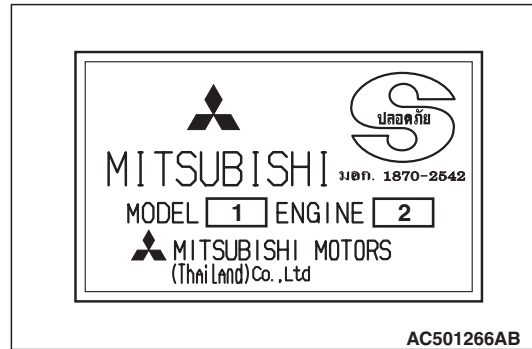
VEHICLE IDENTIFICATION

M1001000401255

VEHICLE NAME PLATE



The name plate is riveted to the cowl top outer panel in the engine compartment.



No.	Item	Content	
1	MODEL	KA4	Vehicle model
		KB4	
		KB8	
2	ENGINE	4D56	Engine model
		4M41	

MODELS

<CLUB CAB>

Model code		Engine model	Transmission model		Fuel supply system	
KA4T	NCNMFRU	4D56 IDI (Indirect Diesel Injection) SOHC engine with Turbo charger (2,477 mL)	2WD (rear axle drive)	R5M21 (5-speed manual transmission)	Electrical fuel injection (distribution type injection pump system)	
	NCNUZRU	4D56 DI-D (Direct Injection-Diesel) DOHC engine with Turbo charger (2,477 mL)		R5MB1 (5-speed manual transmission)		Electrical fuel injection (common rail engine control system)
	NCRUZRU			R4AW4 (4-speed automatic transmission)		
KB4T	GCNHZRU	4D56 DI-D (Direct Injection-Diesel) DOHC engine with Inter cooler, Turbo charger (2,477 mL)	4WD (easy select 4WD)	V5MB1 (5-speed manual transmission)		
KB8T	GCNHZRU	4M41 DI-D (Direct Injection-Diesel) engine with Inter cooler, Turbo charger (3,200 mL)				

<DOUBLE CAB>

Model code		Engine model	Transmission model		Fuel supply system
KA4T	NJNMZRU	4D56 DI-D (Direct Injection-Diesel) DOHC engine with Turbo charger (2,477 mL)	2WD (rear axle drive)	R5MB1 (5-speed manual transmission)	Electrical fuel injection (common rail engine control system)
	NJNUZRU			R4AW4 (4-speed automatic transmission)	
	NJRUZRU				
KB4T	GJNHZRU	4D56 DI-D (Direct Injection-Diesel) DOHC engine with Inter cooler, Turbo charger (2,477 mL)	4WD (easy select 4WD)	V5MB1 (5-speed manual transmission)	
KB8T	GJNHZRU	4M41 DI-D (Direct Injection-Diesel) engine with Inter cooler, Turbo charger (3,200 mL)			
	GJNXZRU		V4A5A (4-speed automatic transmission)		
	GJRXZRU				

MODEL CODE

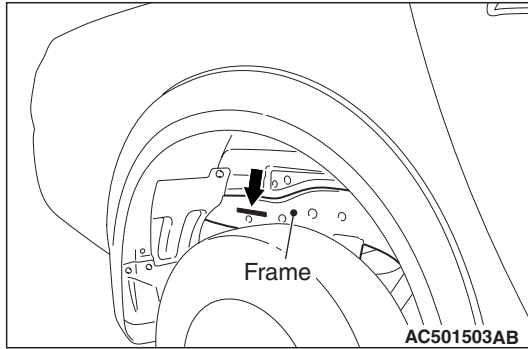
K A 4 T N J N U Z R U
 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
 1 2 3 4 5 6 7 8 9 10 11

AC407365AB

No.	Item	Content	
1	Development	K	TRITON
2	Drive system	A	2WD
		B	4WD
3	Engine type	4	2,477 mL
		8	3,200 mL
4	Sort	T	Truck
5	Vehicle width	N	Standard
		G	Wide fender
6	Body style	C	Club cab
		J	Double cab
7	Transmission type	N	5-speed manual transmission
		R	4-speed automatic transmission
8	Vehicle grade	M	GL
		U	GLX
		H	GLS
		X	GLS-S
9	Specification engine feature	F	Turbo charger
9	Specification engine feature	Z	Inter cooler, turbo charger
10	Steering wheel location	R	Right hand
11	Destination	U	For Thailand

CHASSIS NUMBER

The chassis number is stamped on the side wall of the frame near the rear wheel (RH).



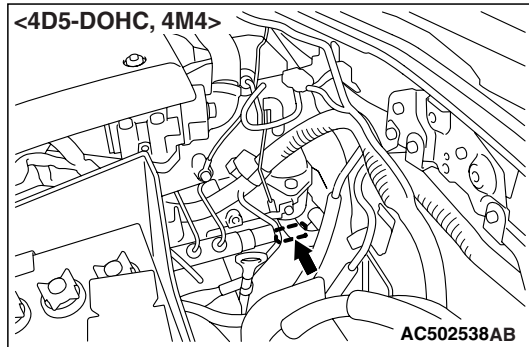
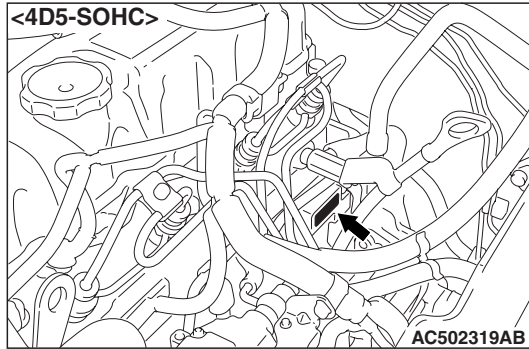
M M T J N K B 8 0 7 D 000001

1 2 3 4 5 6 7 8 9 10 11 12

AC501425AB

No.	Item	Content
1	Country of manufacture	M Asia
2	Maker (distribution channel)	M MMC Sittipol Co., Ltd. (Thailand)
3	Destination and steering wheel location	T For Thailand, right hand
4	Body style	C Club cab
		J Double cab
5	Transmission type	N 5-speed manual transmission
		R 4-speed automatic transmission
6	Vehicle line	K MITSUBISHI TRITON
7	Development order	A 2-wheel drive
		B 4-wheel drive
8	Engine type	4 2,477mL diesel engine
		8 3,200mL diesel engine
9	MSC internal purpose	0 No meaning
10	Model year	7 2006
11	Plant	D MMC Sittipol Co., Ltd.
12	Serial number	-

ENGINE MODEL STAMPING



The engine model is stamped on the cylinder block. This engine model numbers is as shown as follow.

Engine model	Engine displacement
4D56	2,477 mL
4M41	3,200 mL

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

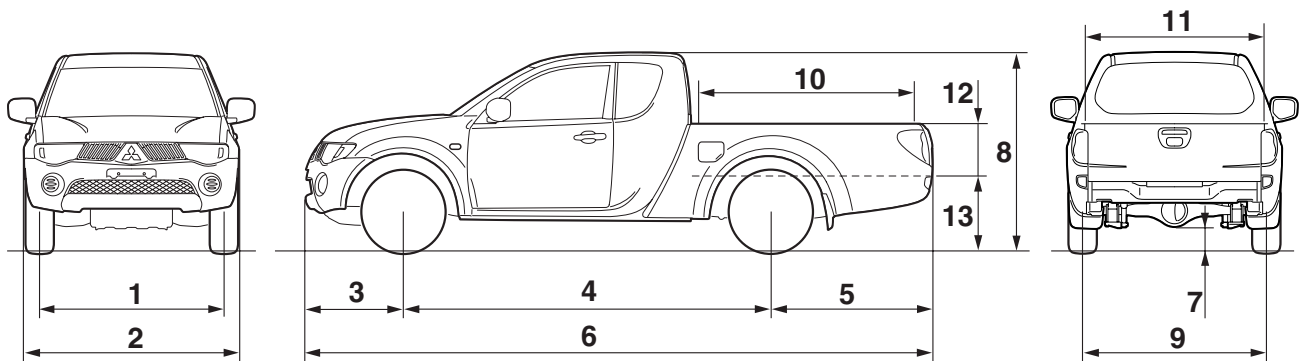
Engine serial number	AA0201 to YY9999
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GENERAL DATA AND SPECIFICATIONS

M1001000900945

CLUB CAB

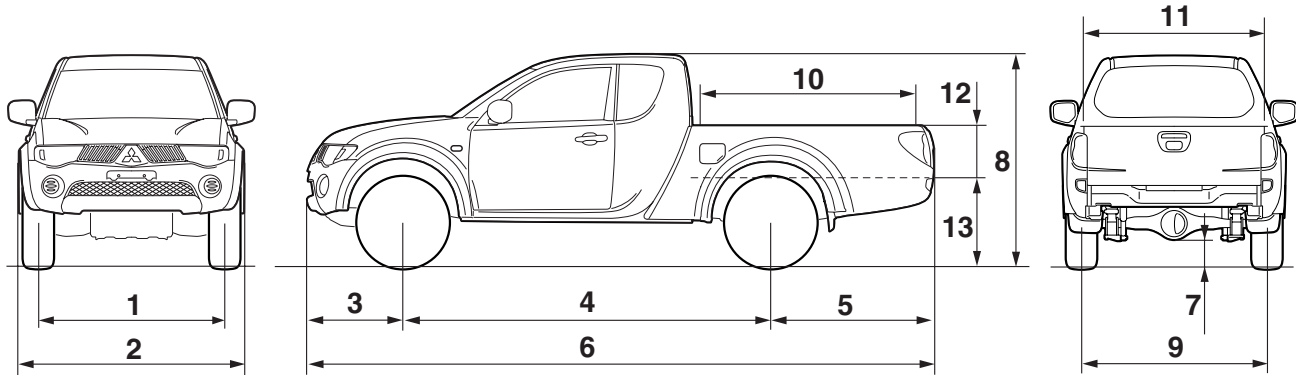
<2WD>



AC502183AB

Items			KA4T		
			NCNMFRU	NCNUZRU	NCRUZRU
Vehicle dimensions mm	Front track	1	1,505	1,505	1,505
	Overall width	2	1,750	1,750	1,750
	Front overhang	3	785	785	785
	Wheel base	4	3,000	3,000	3,000
	Rear overhang	5	1,325	1,325	1,325
	Overall length	6	5,110	5,110	5,110
	Ground clearance (unladen)	7	200	195	195
	Overall height (unladen)	8	1,660	1,655	1,655
	Rear track	9	1,500	1,500	1,500
	BED interior length	10	1,805	1,805	1,805
	BED interior width	11	1,470	1,470	1,470
	BED interior height	12	405	405	405
	Cargo floor height (unladen)	13	725	720	720
Vehicle weight kg	Kerb weight		1,565	1,600	1,600
	Max. gross vehicle weight		2,285	2,330	2,330
	Max. axle weight rating-front		1,030	1,030	1,030
	Max. axle weight rating-rear		1,500	1,500	1,500
Seating capacity			2	2	2
Engine	Model No.		4D56 IDI (Indirect Diesel Injection) engine with Turbo charger	4D56 DI-D (Direct Injection-Diesel) engine with Turbo charger	4D56 DI-D (Direct Injection-Diesel) engine with Turbo charger
	Total displacement mL		2,477	2,477	2,477
	Max. output kW (SP)/rpm		66 (90)/4,000	81 (110)/4,000	81 (110)/4,000
	Max. torque N·m/rpm		196 (20)/2,000	240 (24.5)/2,000	240 (24.5)/2,000
Transmission	Model No.		R5M21	R5MB1	R4AW4
	Type		5-speed manual	5-speed manual	4-speed automatic
Fuel system	Fuel supply system		Electrical fuel injection (distribution type injection pump system)	Electrical fuel injection (common rail engine control system)	Electrical fuel injection (common rail engine control system)
Max speed km/h			150	160	158
Turning radius m			5.7	5.7	5.7

<4WD>



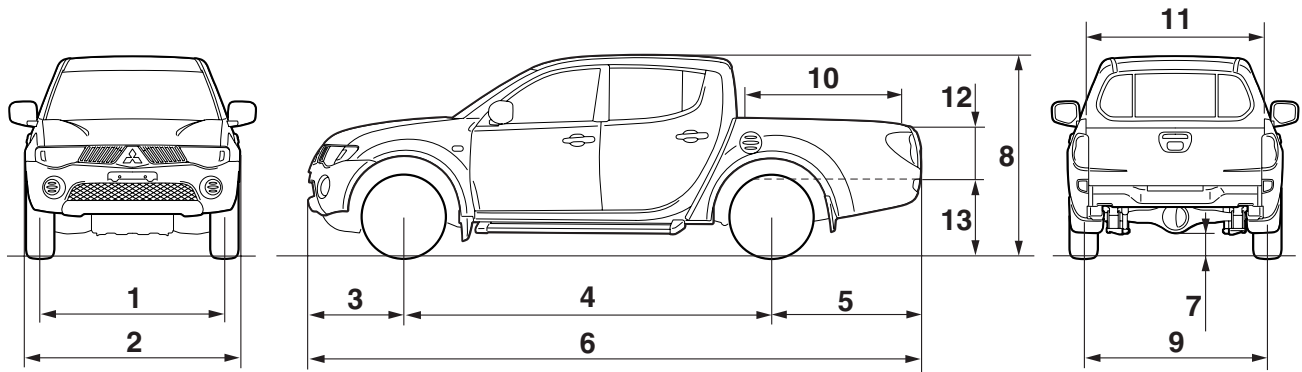
AC502184 AB

Items		KB4T	KB8T	
		GCNHZRU	GCNHZRU	
Vehicle dimensions mm	Front track	1	1,520	1,520
	Overall width	2	1,800	1,800
	Front overhang	3	785	785
	Wheel base	4	3,000	3,000
	Rear overhang	5	1,325	1,325
	Overall length	6	5,110	5,110
	Ground clearance (unladen)	7	205	205
	Overall height (unladen)	8	1,780	1,780
	Rear track	9	1,515	1,515
	BED interior length	10	1,805	1,805
	BED interior width	11	1,470	1,470
	BED interior height	12	405	405
	Cargo floor height (unladen)	13	860	860
Vehicle weight kg	Kerb weight		1,795	1,840
	Max. gross vehicle weight		2,535	2,605
	Max. axle weight rating-front		1,250	1,250
	Max. axle weight rating-rear		1,600	1,600
Seating capacity			2	2
Engine	Model No.		4D56 DI-D (Direct Injection-Diesel) engine with Inter cooler, Turbo charger	4M41 DI-D (Direct Injection-Diesel) engine with Inter cooler, Turbo charger
	Total displacement mL		2,477	3,200
	Max. output kW (PS)/rpm		100 (136)/4,000	118 (136)/3,800
	Max. torque N· m/rpm		314 (32)/2,000	343 (35)/2,000
Transmission	Model No.		V5MB1	
	Type		5-speed manual	

Items		KB4T	KB8T
		GCNHZRU	GCNHZRU
Fuel system	Fuel supply system	Electrical fuel injection (common rail engine control system)	Electrical fuel injection (common rail engine control system)
Max speed km/h		175	175
Turning radius m		5.9	5.9

DOUBLE CAB

<2WD>



AC502185AB

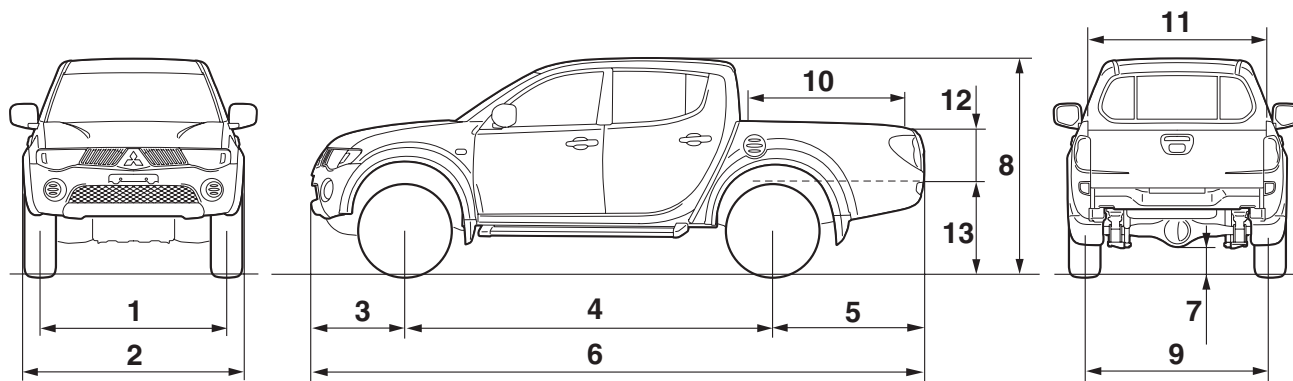
Items			KA4T		
			NJNMZRU	NJNUZRU	NJRZRU
Vehicle dimensions mm	Front track	1	1,505	1,505	1,505
	Overall width	2	1,750	1,750	1,750
	Front overhang	3	785	785	785
	Wheel base	4	3,000	3,000	3,000
	Rear overhang	5	1,210	1,210	1,210
	Overall length	6	4,995	4,995	4,995
	Ground clearance (unladen)	7	200	195	195
	Overall height (unladen)	8	1,655	1,650	1,650
	Rear track	9	1,500	1,500	1,500
	BED interior length	10	1,325	1,325	1,325
	BED interior width	11	1,470	1,470	1,470
	BED interior height	12	405	405	405
	Cargo floor height (unladen)	13	715	710	710
Vehicle weight kg	Kerb weight		1,640	1,640	1,640
	Max. gross vehicle weight		2,330	2,330	2,330
	Max. axle weight rating-front		1,030	1,030	1,030
	Max. axle weight rating-rear		1,500	1,500	1,500
Seating capacity			5	5	5

**GENERAL
GENERAL DATA AND SPECIFICATIONS**

00-21

Items		KA4T		
		NJNMZRU	NJNUZRU	NJRUZRU
Engine	Model No.	4D56 DI-D (Direct Injection-Diesel) engine with Turbo charger	4D56 DI-D (Direct Injection-Diesel) engine with Turbo charger	4D56 DI-D (Direct Injection-Diesel) engine with Turbo charger
	Total displacement mL	2,477	2,477	2,477
	Max. output kW (PS)/rpm	81 (110)/4,000	81 (110)/4,000	81 (110)/4,000
	Max. torque N· m/rpm	240 (24.5)/2,000	240 (24.5)/2,000	240 (24.5)/2,000
Transmission	Model No.	R5MB1	R5MB1	R4AW4
	Type	5-speed manual	5-speed manual	4-speed automatic
Fuel system	Fuel supply system	Electrical fuel injection (common rail engine control system)	Electrical fuel injection (common rail engine control system)	Electrical fuel injection (common rail engine control system)
Max speed km/h		160	160	158
Turning radius m		5.7	5.7	5.7

<4WD>



AC502186AB

Items		KB4T		KB8T		
			GJNHZRU	GJNHZRU	GJNXZRU	GJRXZRU
Vehicle dimensions mm	Front track	1	1,520	1,520	1,520	1,520
	Overall width	2	1,800	1,800	1,800	1,800
	Front overhang	3	785	785	785	785
	Wheel base	4	3,000	3,000	3,000	3,000
	Rear overhang	5	1,210	1,210	1,210	1,210
	Overall length	6	4,995	4,995	4,995	4,995
	Ground clearance (unladen)	7	205	205	205	205
	Overall height (unladen)	8	1,780	1,780	1,780	1,780
	Rear track	9	1,515	1,515	1,515	1,515
	BED interior length	10	1,325	1,325	1,325	1,325
	BED interior width	11	1,470	1,470	1,470	1,470
	BED interior height	12	405	405	405	405
	Cargo floor height (unladen)	13	850	850	850	850
Vehicle weight kg	Kerb weight		1,860	1,920	1,930	1,940
	Max. gross vehicle weight		2,535	2,605	2,605	2,605
	Max. axle weight rating-front		1,250	1,250	1,250	1,250
	Max. axle weight rating-rear		1,600	1,600	1,600	1,600
Seating capacity			5	5	5	5
Engine	Model No.		4D56 DI-D (Direct Injection-Diesel) engine with Inter cooler, Turbo charger	4M41 DI-D (Direct Injection-Diesel) engine with Inter cooler, Turbo charger	4M41 DI-D (Direct Injection-Diesel) engine with Inter cooler, Turbo charger	4M41 DI-D (Direct Injection-Diesel) engine with Inter cooler, Turbo charger
	Total displacement mL		2,477	3,200	3,200	3,200
	Max. output kW (PS)/rpm		100 (136)/4,000	118 (160)/3,800	118 (160)/3,800	118 (160)/3,800
	Max. torque N·m/rpm		314 (32)/2,000	343 (35)/2,000	343 (35)/2,000	343 (35)/2,000

Items		KB4T	KB8T		
		GJNHZRU	GJNHZRU	GJNXZRU	GJRXZRU
Transmission	Model No.	V5MB1	V5MB1	V5MB1	V4A5A
	Type	5-speed manual	5-speed manual	5-speed manual	4-speed automatic
Fuel system	Fuel supply system	Electrical fuel injection (common rail engine control system)	Electrical fuel injection (common rail engine control system)	Electrical fuel injection (common rail engine control system)	Electrical fuel injection (common rail engine control system)
Max speed km/h		175	175	175	175
Turning radius m		5.9	5.9	5.9	5.9

PRECAUTIONS BEFORE SERVICE

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) AND SEAT BELT WITH PRE-TENSIONER

M1001011600238

⚠ CAUTION

Items to review when servicing SRS:

1. Be sure to read GROUP 52B –Supplemental Restraint System (SRS). For safe operation, 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 can be found in the following locations.
 - SRS air bag control unit (SRS-ECU)
 - Front impact sensor
 - Clock spring
 - Driver's and front passenger's air bag modules
 - 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 and clock spring).
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).

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. If heat damage may occur during paint work, remove the SRS-ECU, the air bag module, clock spring, the front impact sensor, and the seat belt pre-tensioner.
 - SRS-ECU, air bag module, clock spring, front impact sensor: 93 °C or more
 - Seat belt pre-tensioner: 90 °C or more

WHAT THE COMMON RAIL ENGINE LEARNS

M1001012500018

After fuel-related parts are replaced, the common rail engine must register their identification codes with the engine-ECU and execute learning.

The table below shows what should be registered and learned after each type of operation.

NOTE: When the engine-ECU is replaced, collect in advance the injector identification code from the current engine-ECU. Doing it makes registration easy.

Correspondence table

Registration and learning item	Operation type		
	Injector replacement	Supply pump replacement	Engine-ECU replacement
Injector identification code registration	applicable	–	applicable
Small injection quantity learning	applicable	–	applicable
Supply pump correction learning	–	applicable	–

REGISTRATION AND LEARNING PROCEDURE**Injector identification code registration**

Refer to [P.00-24](#), INJECTOR IDENTIFICATION CODE REGISTRATION PROCEDURE.

Small injection quantity learning

Refer to [P.00-25](#), SMALL INJECTION QUANTITY LEARNING PROCEDURE.

Supply pump correction learning

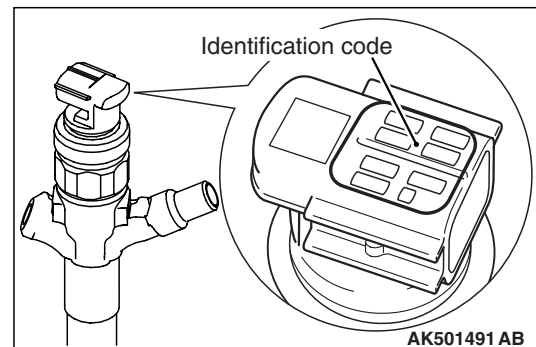
Refer to [P.00-26](#), SUPPLY PUMP CORRECTION LEARNING PROCEDURE.

INJECTOR IDENTIFICATION CODE REGISTRATION PROCEDURE

M1001012600015

CAUTION

1. If the injector identification code is not registered, the engine warning lamp goes on and diagnosis code No. P1626 is logged.
2. Failure to register the injector identification code correctly will cause rough idling, abnormal noise, and emission deterioration.

PURPOSE

Because individual injectors have different injection characteristics, the engine-ECU corrects injection time for each cylinder to improve injection accuracy. For this reason, when the injector or engine-ECU is replaced, injector correction data must be registered afterwards in the engine-ECU using the Multi Use Tester III (M.U.T.-III).

Correction data is converted into an identification code consisting of 30 alphanumeric characters and printed on the injector connector.

REGISTRATION PROCEDURE

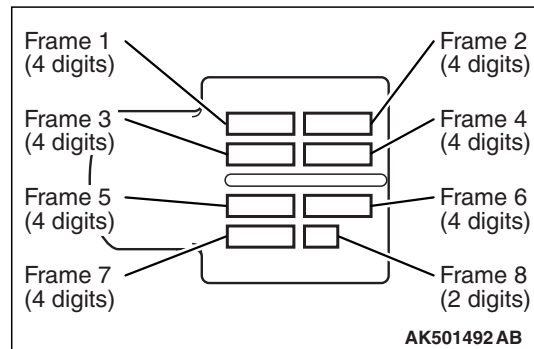
1. When replacing the engine-ECU, connect the current engine-ECU to the body harness.

NOTE: This operation is purposed to read the injector identification code stored in the engine-ECU.

Reading the identification code in this way before replacement can eliminate manual input of the identification code after replacement.

2. After the ignition switch is in "LOCK" (OFF) position, connect the M.U.T.-III to the diagnosis connector.
3. Turn the ignition switch to "ON" position.
4. Select SPECIAL FUNCTION from the function menu.
5. When the current engine-ECU is still mounted, read and register the injector identification code as follows:
 - (1) Select Read Injector ID Code (for engine-ECU replacement) from the SPECIAL FUNCTION menu.
 - (2) Select Write and Save Injector ID Code from the menu to read data from the current engine-ECU and save the data if it could be read normally.
 - (3) Mount the new engine-ECU on the vehicle.
 - (4) Select SPECIAL FUNCTION from the function menu.
 - (5) Select Write Injector ID Code (for engine-ECU replacement) from the SPECIAL FUNCTION menu.
 - (6) Select SAVED INJECTOR ID WRITING from the Write Injector ID Code menu to write the data, which was saved previously, to the engine-ECU.
6. If the injector has been replaced or data has not been read from the current engine-ECU, register the injector identification code as follows:

- (1) Select Write Injector ID Code from the SPECIAL FUNCTION menu.
- (2) If the injector was replaced, specify whether to write to every cylinder or a specific cylinder.



- (3) Select the write mode from the menu, enter the identification code printed on the injector, and execute writing.

CAUTION

Even if the number of the cylinder to be registered does not match the actual injector mounting location, registration ends normally. Specify the cylinder number correctly.

NOTE: The identification code is displayed in order of the frame numbers when it is read.

7. Makes sure that the engine warning lamp that is on changes to blinking, indicating the registration is complete.

NOTE: When the injector is replaced, executing the write operation also clears the values of small injection quantity learning.

8. Execute small injection quantity learning.
Refer to [P.00-25](#), the SMALL INJECTION QUANTITY LEARNING PROCEDURE for the learning procedure.
9. Confirm that the engine warning lamp is off.
Confirm also that the diagnosis code is not stored.

SMALL INJECTION QUANTITY LEARNING PROCEDURE

M1001014300010

CAUTION

1. **If small injection quantity learning has not been executed, the engine warning lamp blinks.**
2. **When the requirements for learning are satisfied by operation after replacement of the engine-ECU, learning is automatically executed even if no instruction is given from the M.U.T.-III. Accordingly, the malfunction indicator lamp goes off. However, the learning thus executed is tentative and limited. Be sure to complete leaning using the M.U.T.-III.**

PURPOSE

To keep emission and noise level at adequate levels, the engine-ECU must learn injector fuel injection in idle mode.

During learning, the engine-ECU calculates actual injection from each cylinder based on changes in engine speeds and corrects pilot injection control. It then keeps records of this amount of correction as a learned value.

For this reason, after the engine-ECU or injector is replaced, learning must be executed using the M.U.T.-III.

NOTE: Engine friction changes or injector deterioration over time may cause fluctuation in pilot injection. After use over time, it may prevent injection of an accurate amount of fuel according to the indication by the engine-ECU. This is why learning must be executed again periodically.

For this reason, the engine-ECU periodically leans injection according to the cumulative mileage. Note that making the M.U.T.-III learn again resets the cumulative mileage.

NOTE: The engine sound may change or idling engine speeds may increase during injection learning. These are not abnormalities.

LEARNING PROCEDURE

1. After the ignition switch is in "LOCK" (OFF) position, connect the M.U.T.-III to the diagnosis connector.
2. Put the vehicle in the following idling stable conditions:
 - Engine coolant temperature: 80 –90° C

SUPPLY PUMP CORRECTION LEARNING PROCEDURE

PURPOSE

The engine-ECU learns the relation between the suction control valve (linear solenoid valve) of the supply pump drive current and the fuel injection volume.

- Automatic transmission fluid temperature: 60° C or higher
 - Lamps, A/C condenser fan and all accessories: OFF
 - Transmission: Neutral <M/T>, "P" range <A/T>
 - Power steering: Static state
3. Select SPECIAL FUNCTION from the function menu.
 4. Select SMALL INJECTION QUANTITY LEARNING from the SPECIAL FUNCTION menu to execute learning.

CAUTION

If the vehicle conditions go out of the learning conditions during idling, learning is interrupted.

To reexecute learning, the ignition switch must once be turned off.

5. Continue idling for about 3 minutes before learning is completed.
6. Confirm that the engine warning lamp is off. If it still blinks, reexecute learning.

M1001014400017

The learning value is calculated from the suction control valve drive current and the rail pressure sensor output voltage.

When the supply pump is replaced, therefore, this learning must be executed.

Re-learning is executed when the engine is idling after the learning value in the engine-ECU has been reset by the M.U.T.-III.

LEARNING PROCEDURE FOR IDLING

After the ignition switch is in "LOCK" (OFF) position, connect the M.U.T.-III to the diagnosis connector.

1. Turn the ignition switch to "ON" position. (Do not start the engine.)
2. Select SPECIAL FUNCTION from the function menu.
3. Select SUPPLY PUMP CORRECTION LEARNING from the SPECIAL FUNCTION menu and execute the initializing of the learning value.
4. After initializing, run the engine at idle in the following conditions.
 - Accelerator pedal: OFF
 - Engine coolant temperature: 60° C or higher
 - Fuel temperature: 30° C or higher
5. Confirm that the item No. 65 High pressure pump learned status on M.U.T.-III Service Data is "2".

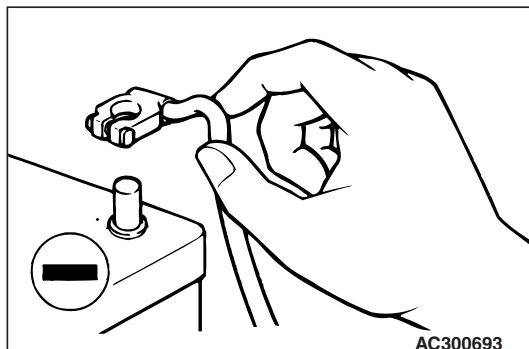
NOTE: "2" indicates that the learning has completed.

SERVICING ELECTRICAL SYSTEM

M1001011900217

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).



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.

VEHICLES WITH SEMI AUTOMATIC AIR CONDITIONER

M1001011300055

CAUTION

Never start the engine with the refrigerant system empty as it will damage the A/C compressor.

APPLICATION OF ANTI-CORROSION AGENTS AND UNDERCOATS

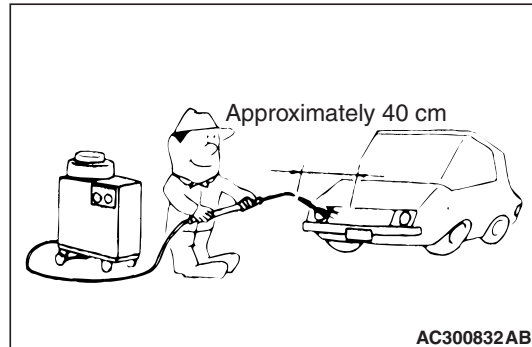
M1001014500014

M1001011000173

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.

VEHICLE WASHING

M1001012000206



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: Approximately 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.

PRE-INSPECTION CONDITION

M1001012100117

"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.

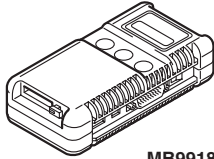
- Engine coolant temperature 80 to 90° C
- Lamps, electric cooling fan and all accessories: OFF
- M/T: Neutral
- A/T: N range

MULTI USE TESTER (M.U.T.-III) SUB ASSEMBLY

M1001012400011

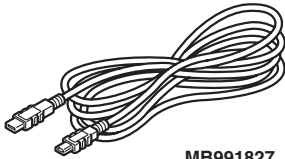
MULTI USE TESTER (M.U.T.-III) sub assembly

Vehicle communication interface (V.C.I.)



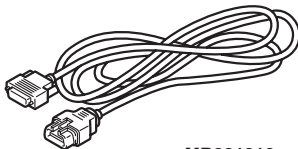
MB991824

M.U.T.-III USB cable



MB991827

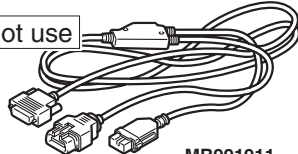
M.U.T.-III main harness A



MB991910

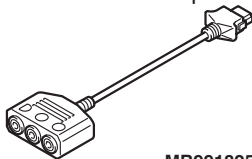
M.U.T.-III main harness B

Do not use



MB991911

M.U.T.-III measurement adapter



MB991825

M.U.T.-III trigger harness

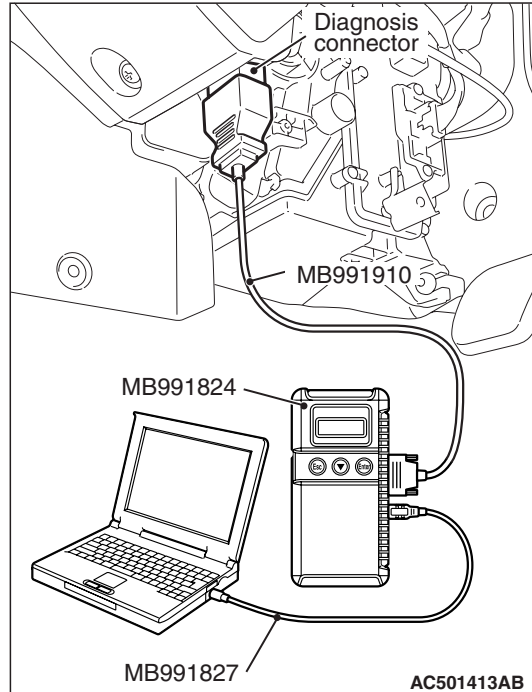


MB991826

AC305090AI

Refer to the "M.U.T.-III OPERATION MANUAL" for instructions on handling the M.U.T.-III.

CAUTION



AC501413AB

Turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting the M.U.T.-III.

Connect the M.U.T.-III to the diagnosis connector as shown in the illustration.

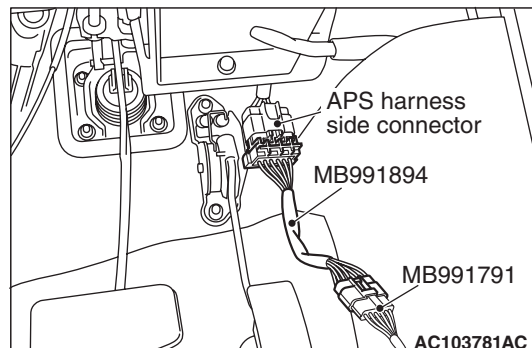
HOW TO USE THE THROTTLE CONTROLLER

M1001009300014

As for a vehicle with the electronic control throttle valve *, engine operations such as racing can not be performed from outside the vehicle. Thus, the throttle valve controller (MB991791) is provided as a special tool to enable the engine operation from outside the vehicle.

*NOTE: * : A vehicle with the accelerator pedal position sensor (APS) installed to the accelerator pedal*

THE THROTTLE CONTROLLER CONNECTION



AC103781AC

1. Disconnect the accelerator pedal position sensor (APS) connector installed to the accelerator pedal, and connect the 6-pin connector of throttle controller adaptor (MB991894) to the vehicle harness-side connector.
2. Connect the throttle controller (MB991791) to the 8-pin connector of throttle controller adaptor (MB991894).

IN ORDER TO PREVENT VEHICLES FROM FIRE

M1001011100073

"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

M1001011200081

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 under-pants, 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)

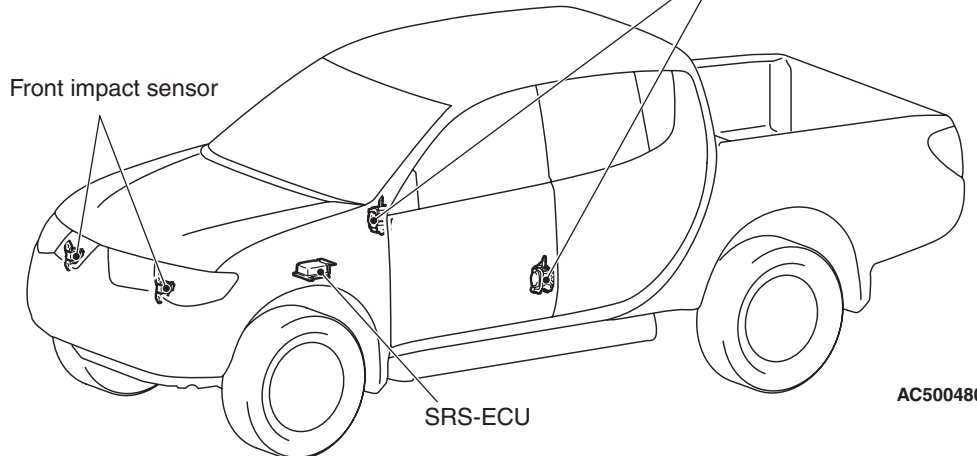
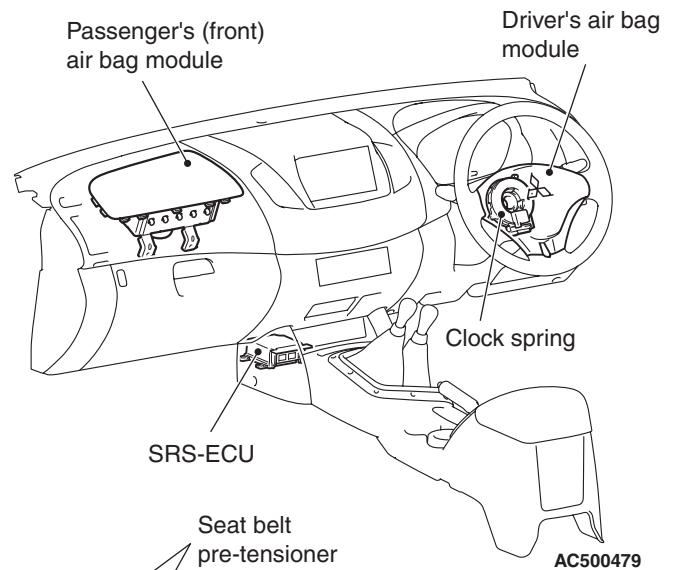
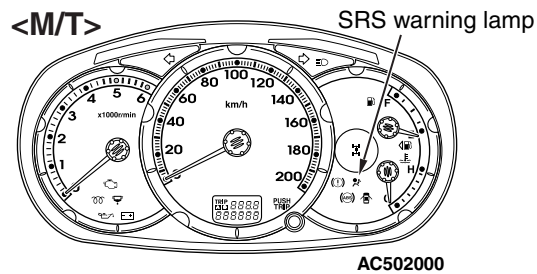
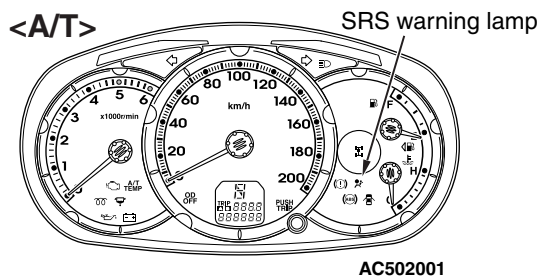
M1001009800150

The Supplemental Restraint System (SRS) and seat belt with pre-tensioner is designed to supplement the driver's and front passenger's seat belts to help reduce the risk or severity of injury to the driver and front passenger by activating and deploying both front air bags in certain frontal collisions.

The SRS consist of two air bag modules, SRS air bag control unit (SRS-ECU), front impact sensors, SRS warning lamp, clock spring and seat belt pre-tensioner. Front air bags are located in the centre of the steering wheel and above the glove box. Each air bag is made up of a folded air bag and an inflator unit. The SRS-ECU is located for front the floor con-

sole and has a front air bag safing G-sensor, front air bag analogue G-sensor The front impact sensor is installed outside of the readlamp support panel. 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 driver's and passenger's front seat belt retractor.

Only authorized service personnel should do work on or around the SRS components. Those service personnel should read this manual carefully before starting any such work.



AC501190 AB

SRS SERVICE PRECAUTIONS

M1001006000155

⚠ DANGER

In order to avoid injury to yourself or others from accidental deployment of the air bag during servicing, read and carefully follow all the precautions and procedures described in this manual.

⚠ CAUTION

Do not use any electrical test equipment on or near SRS components, except those specified on .

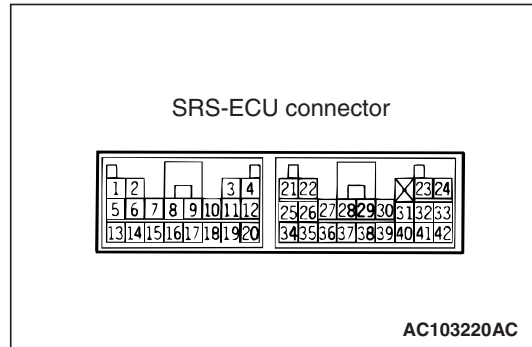
⚠ CAUTION

Never Attempt to Repair the Following Components:

- SRS air bag control unit (SRS-ECU)
- Front impact sensor
- Clock spring
- Driver's and passenger's (front) 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, starting at page .

⚠ CAUTION

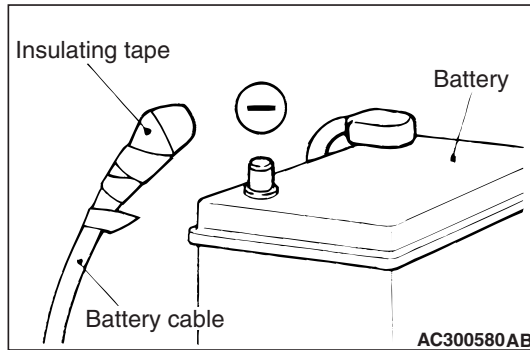


Do not attempt to repair the wiring harness connectors of the SRS. If a defective wiring harness is found, repair or replace it by referring to the table below.

SRS-ECU terminal No.	Destination of harness	Remedy
1, 2	Instrument panel wiring harness → Front wiring harness →Front impact sensor (RH)	Correct or replace each wiring harness.
3, 4	Instrument panel wiring harness → Front wiring harness →Front impact sensor (LH)	Correct or replace each wiring harness.
27, 28	Instrument panel wiring harness → Front wiring harness →Seat belt pre-tensioner (LH)	Correct or replace each wiring harness.
29, 30	Instrument panel wiring harness → Front wiring harness →Seat belt pre-tensioner (RH)	Correct or replace each wiring harness.
9, 10	Instrument panel wiring harness → passenger's (Front) side air bag module	Correct or replace the instrument panel wiring harness.
11, 12	Instrument panel wiring harness → Clock spring →Driver's side air bag module	Correct or replace instrument panel wiring harness. Replace the clock spring.
13	Instrument panel wiring harness → Junction block (fuse No.8)	Correct or replace the instrument panel wiring harness.
16	Instrument panel wiring harness → Junction block (fuse No.15)	Correct or replace the instrument panel wiring harness.

SRS-ECU terminal No.	Destination of harness	Remedy
8	Instrument panel wiring harness –SRS wiring lamp	Correct or replace the Instrument panel wiring harness.
18	Instrument panel wiring harness → Earth	Correct or replace the instrument panel wiring harness.
20	Instrument panel wiring harness → Diagnosis connector	Correct or replace the instrument panel wiring harness.

⚠ DANGER



After disconnecting the battery cable, wait 60 seconds or more before proceeding with the following work. In addition, insulate the negative battery terminal with a tape. The condenser inside the SRS-ECU is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cables are disconnected.

⚠ CAUTION

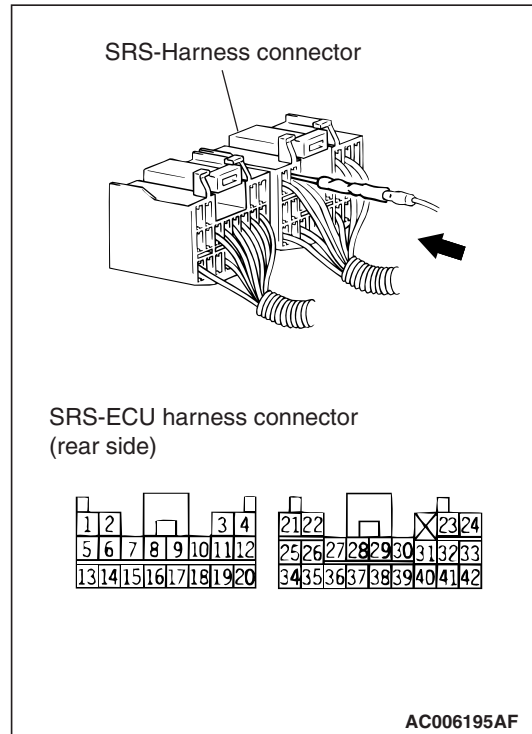
The SRS components and seat belt with pre-tensioner should not be subjected to heat, so remove the SRS-ECU, driver's and front passenger's air bag modules, clock spring, front impact sensor, seat belt pre-tensioner before drying or baking the vehicle after painting.

- Air bag modules: 93° C or more

⚠ CAUTION

Whenever you finish servicing the SRS, always erase the diagnosis code and check warning lamp operation to make sure that the system functions properly.

⚠ CAUTION



If checks are carried out by using the SRS-ECU harness connector, observe the following procedures: Insert the special tool extra fine probe (MB992006) into connector from harness side (rear side), and connect the tester to this probe. If any tool than special tool is used, damage to the harness and other components will result. Never insert the probe directly to 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.

SUPPORT LOCATIONS FOR LIFTING AND JACKING

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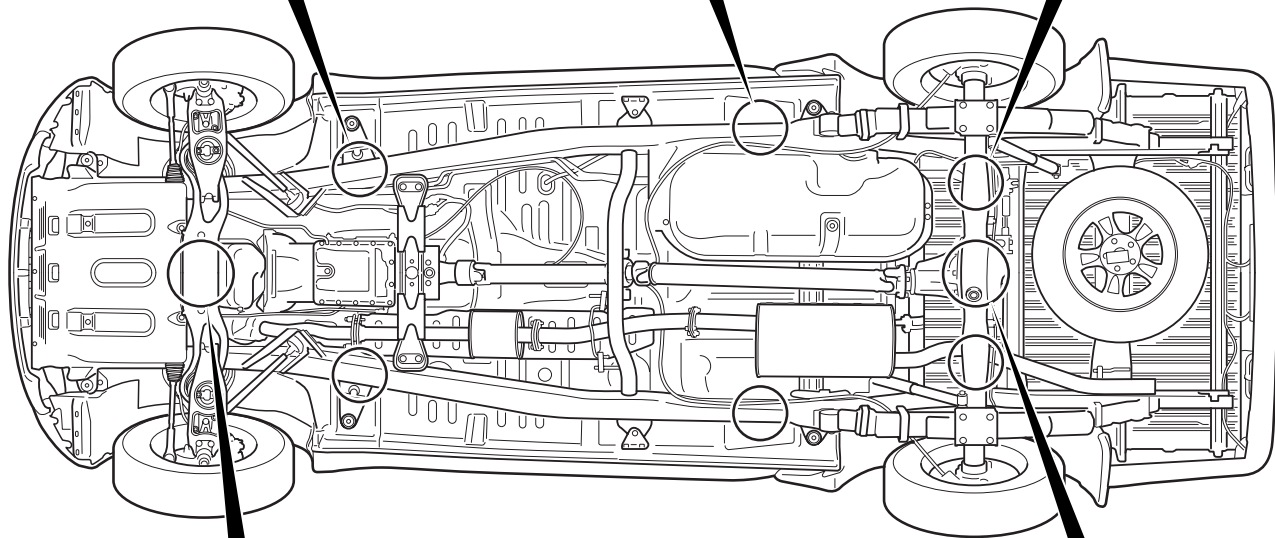
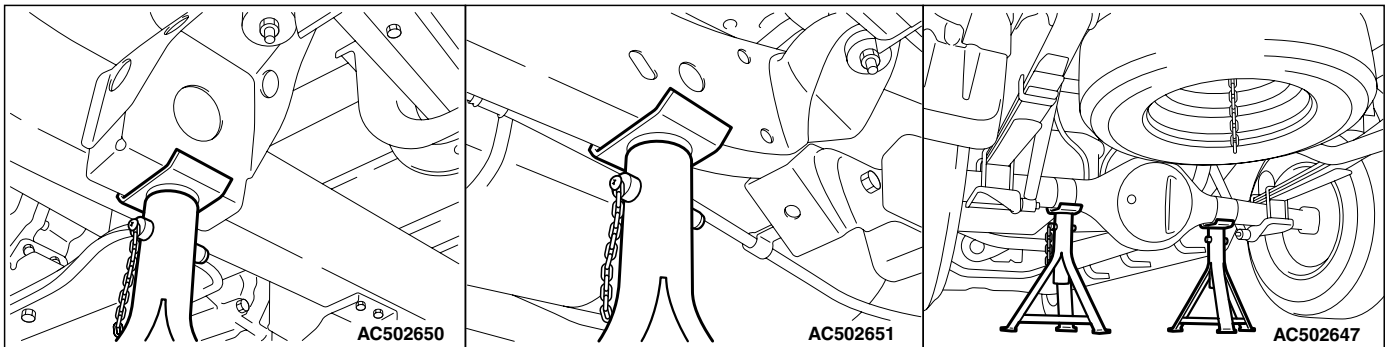
SUPPORT POSITIONS FOR A GARAGE JACK AND AXLE STANDS

⚠ CAUTION

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

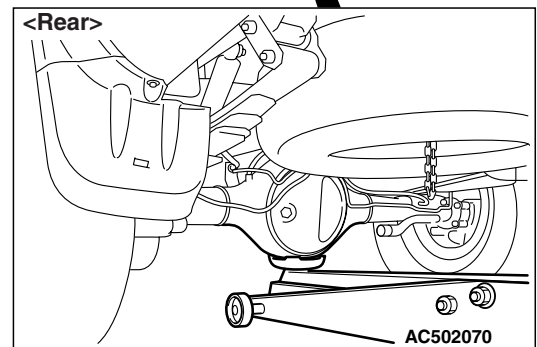
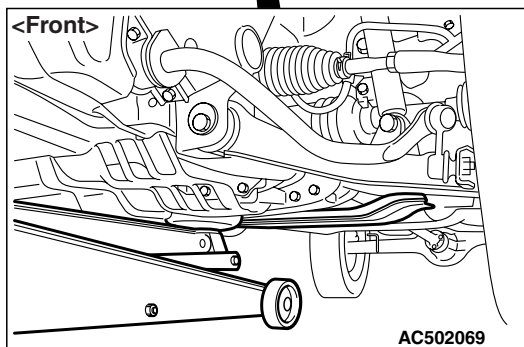
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AXLE STANDS



AC502074

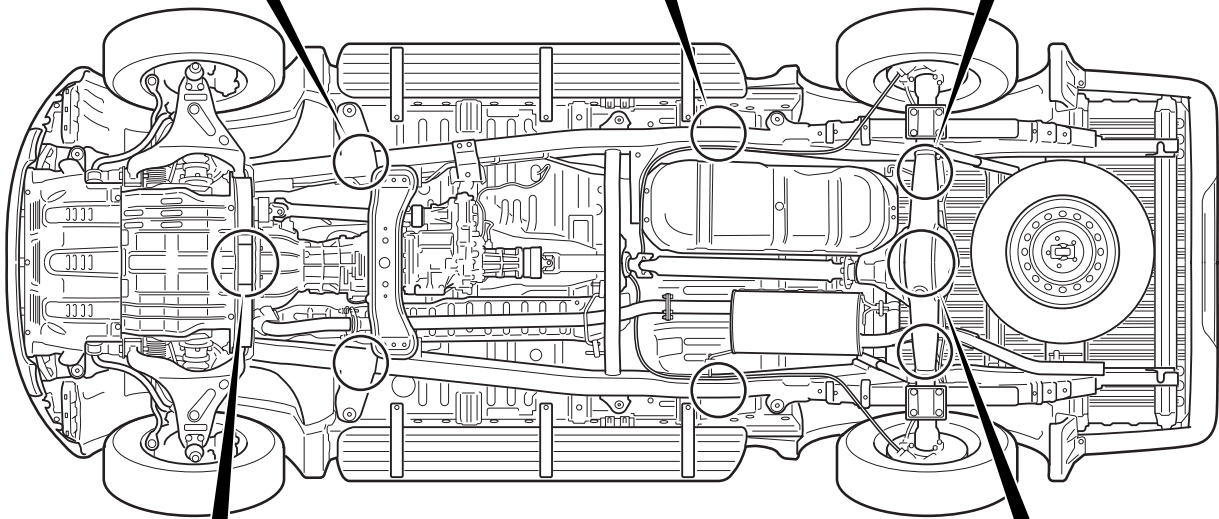
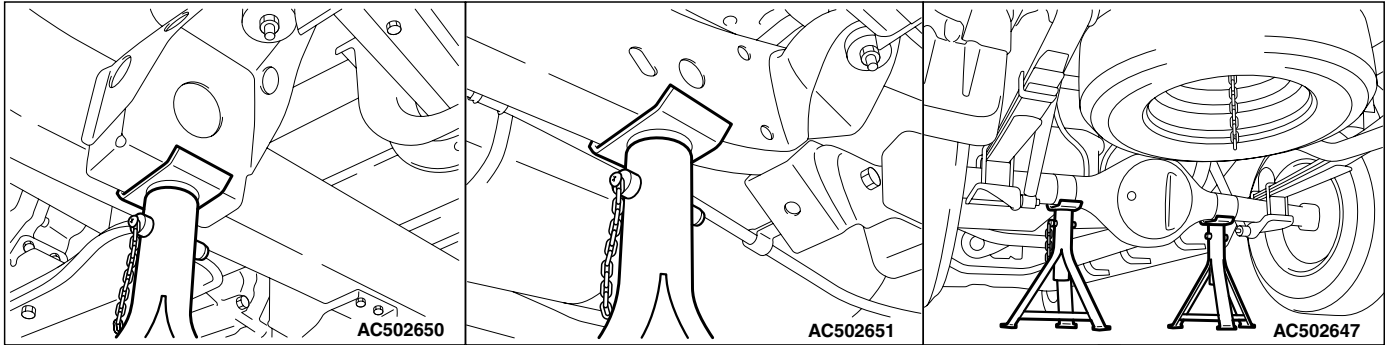
GARAGE JACK



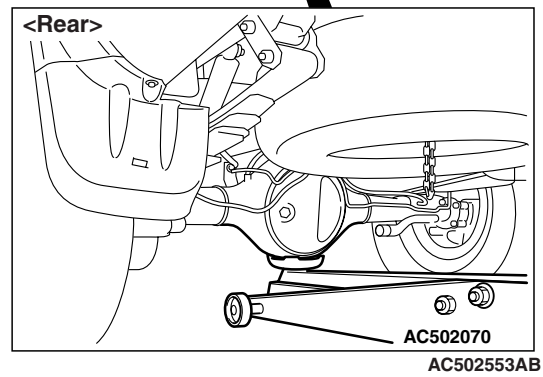
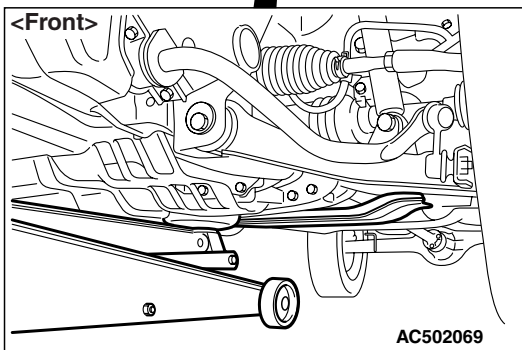
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AXLE STANDS



GARAGE JACK

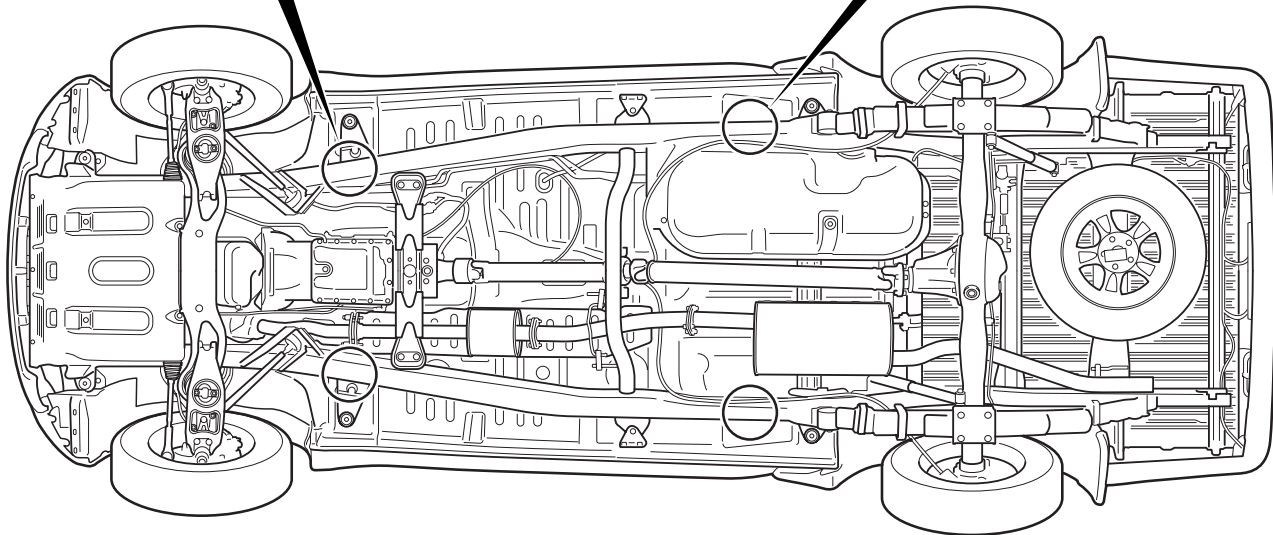
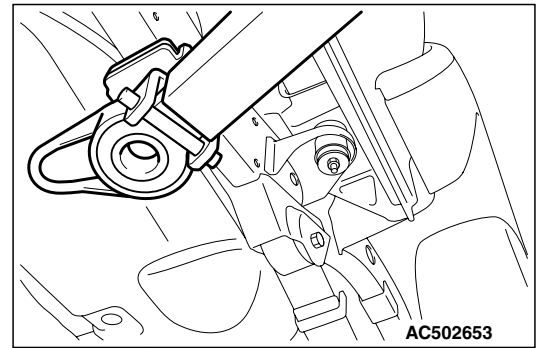
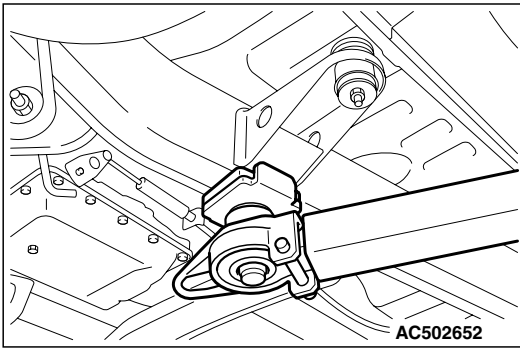


SUPPORT POSITIONS FOR A SINGLE-POST LIFT OR DOUBLE-POST LIFT

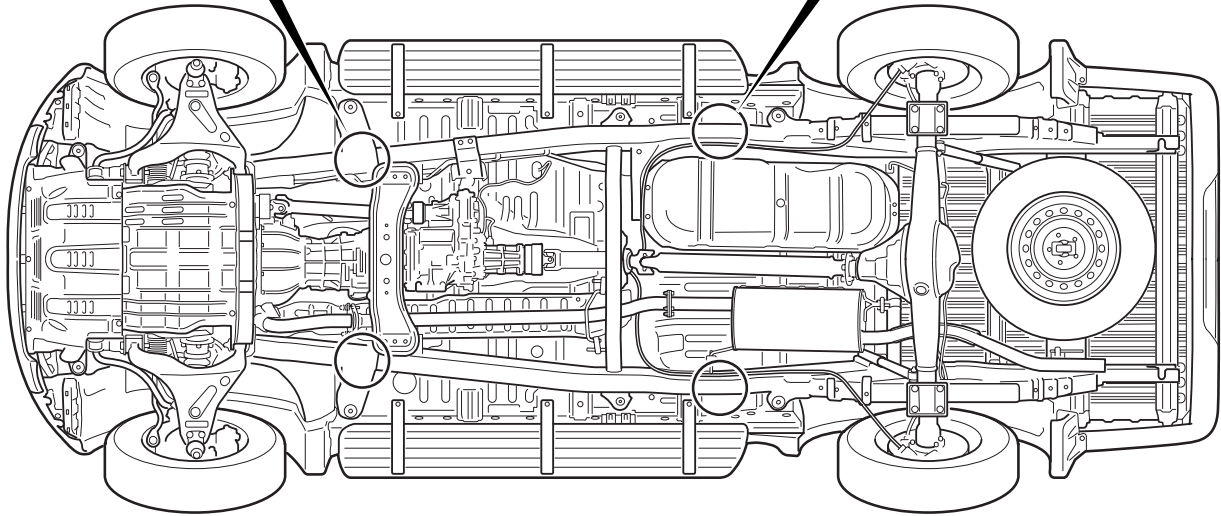
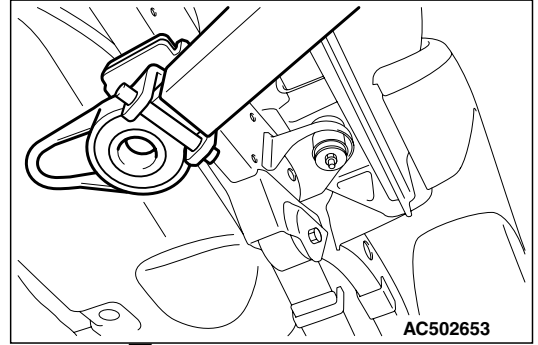
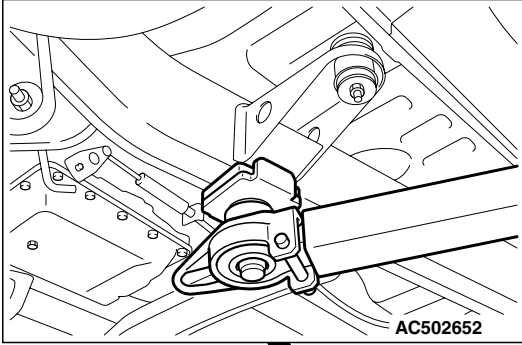
⚠ CAUTION

When service procedures require removing rear suspension, 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.

<2WD>



<4WD>



AC502572 AB

STANDARD PART/TIGHTENING-TORQUE TABLE

M1001001100715

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	8.5 ± 1.5	10 ± 2
M8	1.25	11 ± 2	20 ± 4	24 ± 4
M10	1.25	23 ± 4	42 ± 8	53 ± 7
M12	1.25	42 ± 8	80 ± 10	93 ± 12
M14	1.5	70 ± 10	130 ± 20	150 ± 20
M16	1.5	105 ± 15	195 ± 25	230 ± 30
M18	1.5	150 ± 20	290 ± 40	335 ± 45
M20	1.5	210 ± 30	400 ± 60	465 ± 65
M22	1.5	290 ± 40	540 ± 80	630 ± 90
M24	1.5	375 ± 55	705 ± 105	820 ± 120

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	28 ± 5
M10	1.25	26 ± 5	50 ± 5	58 ± 7
M10	1.5	25 ± 4	46 ± 8	55 ± 5
M12	1.25	47 ± 9	93 ± 12	105 ± 15
M12	1.75	43 ± 8	83 ± 12	98 ± 12

NOTE:

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

NOTES

GROUP 11

ENGINE

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ENGINE MECHANICAL <4M4> 11E

ENGINE OVERHAUL <4M4> 11F

NOTES

GROUP 11A

ENGINE MECHANICAL <4D5-SOHC>

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GENERAL INFORMATION

M1111000100839

Item		4D56	
Total displacement mL		2,477	
Bore × Stroke mm		91.1 × 95.0	
Compression ratio		21	
Combustion chamber		Vortex chamber type	
Camshaft arrangement		SOHC	
Number of valve	Intake	4	
	Exhaust	4	
Valve timing	Intake	Opening	BTDC 20°
		Closing	ABDC 49°
	Exhaust	Opening	BBDC 55°
		Closing	ATDC 22°
Fuel system		Distribution type injection pump	
Rocker arm		Double roller type	
Adjusting screw		Elephant foot type	

SERVICE SPECIFICATIONS

M1111000300899

Items		Standard value	Limit
Alternator drive belt (When checked)	Tension N	245 –441	–
	Deflection mm (Reference)	12.0 –17.0	–
Alternator drive belt (When adjusted)	Tension N	294 –392	–
	Deflection mm (Reference)	13.0 –16.0	–
Alternator drive belt (When replaced)	Tension N	392 –588	–
	Deflection mm (Reference)	10.0 –13.0	–
Power steering oil pump drive belt tension (When checked)	Tension N	294 –490	–
	Deflection mm (Reference)	8.0 –12.0	–
Power steering oil pump drive belt tension (When adjusted)	Tension N	343 –441	–
	Deflection mm (Reference)	9.0 –11.5	–
Power steering oil pump drive belt tension (When replaced)	Tension N	490 –686	–
	Deflection mm (Reference)	6.0 –8.0	–
A/C compressor drive belt tension (When checked)	Tension N	338 –430	–
	Deflection mm (Reference)	7.2 –8.4	–
A/C compressor drive belt tension (When adjusted)	Tension N	338 –430	–
	Deflection mm (Reference)	7.2 –8.4	–
A/C compressor drive belt tension (When replaced)	Tension N	461 –614	–
	Deflection mm (Reference)	5.5 –6.9	–

Items	Standard value	Limit
Valve clearance (at hot) mm	0.25	–
Injection timing (Value indicated on dial gauge mm)	9° ATDC (1 ±0.03)	–
Idle speed r/min	750 ± 30	–
Compression pressure kPa (at engine speed of 280 r/min)	3,100	Min. 2,800
Compression pressure difference of all cylinder (at engine speed of 280 r/min) kPa	–	Max. 294
Timing belt tension mm	4 –5	–
Timing belt B tension mm	4 –5	–

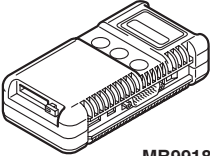
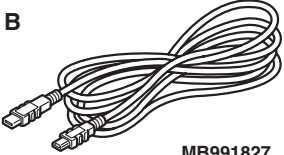
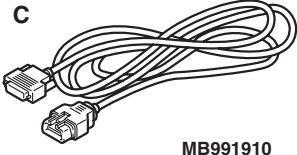
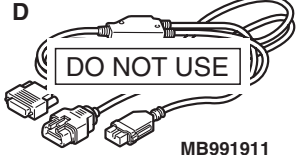
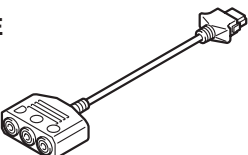
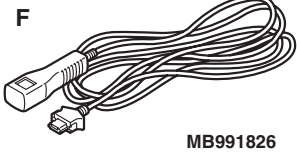
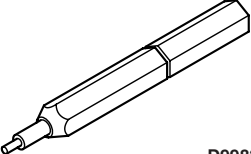
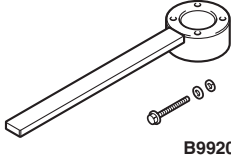
SEALANTS

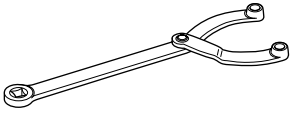
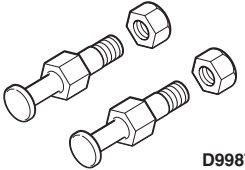
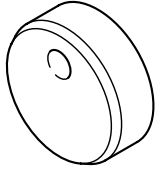
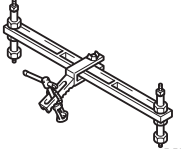
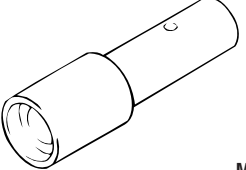
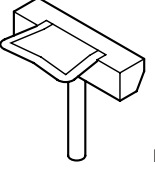
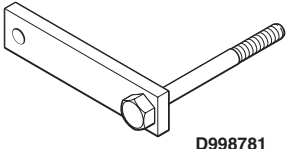
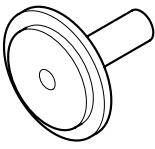
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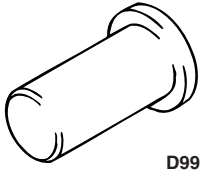
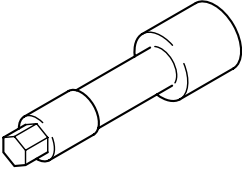
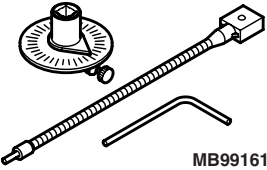
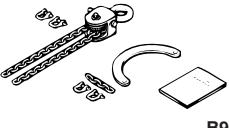
Item	Specified Sealant	Remark
Semi-circular packing	3M ATD Part No. 8660 or equivalent	Semi-drying sealant
Engine oil pan	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant

SPECIAL TOOLS

M1111000601150

Tool	Number	Name	Use
<p>A</p>  <p>MB991824</p> <p>B</p>  <p>MB991827</p> <p>C</p>  <p>MB991910</p> <p>D</p>  <p>MB991911</p> <p>E</p>  <p>MB991825</p> <p>F</p>  <p>MB991826</p> <p>MB991955</p>	<p>MB991955</p> <p>A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826</p>	<p>M.U.T.-III sub assembly</p> <p>A: Vehicle communication interface (V.C.I.)</p> <p>B: M.U.T.-III USB cable</p> <p>C: M.U.T.-III main harness A (Vehicles with CAN communication system)</p> <p>D: M.U.T.-III main harness B (Vehicles without CAN communication system)</p> <p>E: M.U.T.-III measurement adapter</p> <p>F: M.U.T.-III trigger harness</p>	<ul style="list-style-type: none"> • Checking the ignition timing • Checking the idle speed <p>CAUTION</p> <p>For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.</p>
 <p>D998384</p>	<p>MD998384</p>	<p>Prestroke measuring adapter</p>	<p>Adjustment of the injection timing</p>
 <p>B992040</p>	<p>MB992040</p>	<p>Crank pulley holder</p>	<p>Holding the crankshaft sprocket</p>

Tool	Number	Name	Use
 <p align="center">B990767</p>	MB990767	Front hub and flange yoke holder	Holding the camshaft sprocket
 <p align="center">D998719</p>	MD998719	Crankshaft pulley holder pin	
 <p align="center">D998381</p>	MD998381	Camshaft oil seal installer	Camshaft oil seal installation
 <p align="center">MD998772</p>	MD998772	Valve spring compressor	Compressing valve spring
 <p align="center">MD998729</p>	MD998729	Valve stem seal installer	Valve stem seal installation
 <p align="center">D998727</p>	MD998727	Oil pan FIPG cutter	Oil pan removal
 <p align="center">D998781</p>	MD998781	Flywheel stopper	Supporting the flywheel assembly
	MD998376	Crankshaft rear oil seal installer	Crankshaft rear oil seal installation

Tool	Number	Name	Use
 D998383	MD998383	Crankshaft front oil seal guide	Crankshaft front oil seal installation
 D998382	MD998382	Crankshaft front oil seal installer	
	MD998051	Cylinder head bolt wrench	Removal and installation of cylinder head bolt
 MB991614	MB991614	Angle gauge	Tightening cylinder head bolt
 B991683	MB991683	Sling chain set	Removal and installation of engine assembly

ON-VEHICLE SERVICE

DRIVE BELT TENSION CHECK AND ADJUSTMENT

M1111003100991

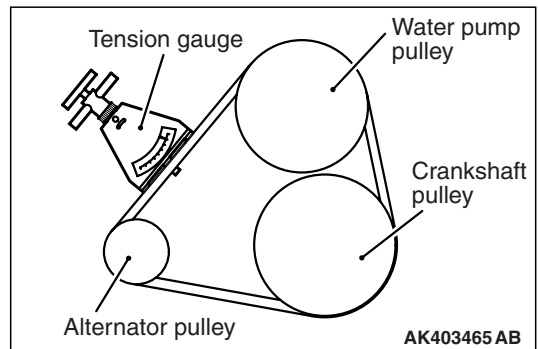
ALTERNATOR DRIVE BELT TENSION CHECK AND ADJUSTMENT

Check the drive belt tension in the following procedure.

Standard value:

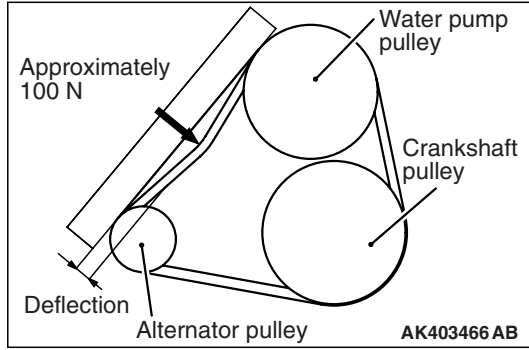
Item	When checked	When adjusted	When replaced
Tension N	245 – 441	294 – 392	392 – 588
Deflection mm (Reference)	12.0 – 17.0	13.0 – 16.0	10.0 – 13.0

<When using the tension gauge>

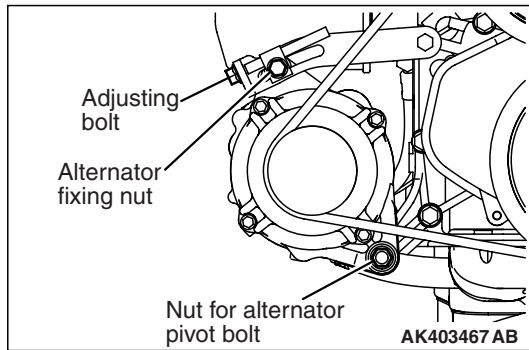


Use a belt tension gauge to check that the belt tension is within the standard value.

<Belt deflection check>



Apply approximately 100 N of force to the middle of the drive belt between the pulleys (at the place indicated by the arrow) and check that the amount of deflection is within the standard value.



If not within the standard value, adjust the belt tension by the following procedure.

1. Loosen the nut of the nut for alternator pivot bolt.
2. Loosen the alternator fixing nut.
3. Use the adjusting bolt to adjust the belt tension and belt deflection to the standard values.
4. Tighten the nut of the nut for alternator pivot bolt.

Tightening torque: 44 ± 10 N·m

5. Tighten the alternator fixing nut.

Tightening torque: 23 ± 2 N·m

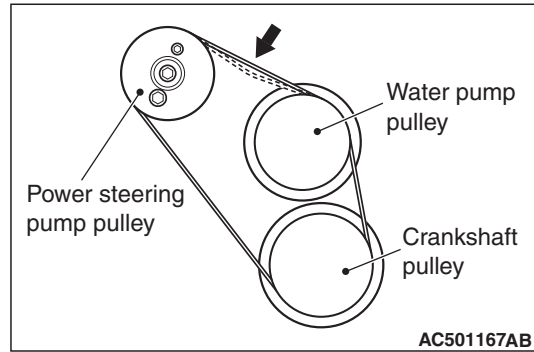
6. Tighten the adjusting bolt.

Tightening torque: 5.0 ± 1.0 N·m

CAUTION

Always replace the two V-belts together as a set, and do not apply any oil to the belts.

POWER STEERING OIL PUMP DRIVE BELT TENSION CHECK



Check the drive belt tension in the following procedure.

Standard value:

Item	When checked	When adjusted	When replaced
Tension N	294 – 490	343 – 441	490 – 686
Deflection mm (Reference)	8.0 – 12.0	9.0 – 11.5	6.0 – 8.0

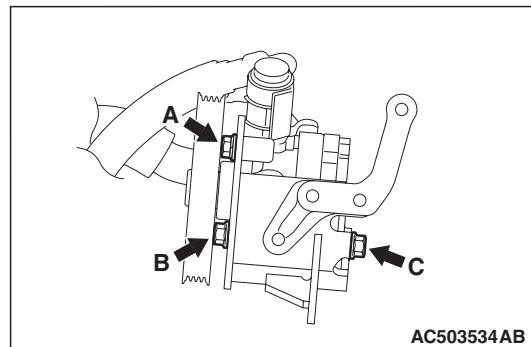
<When using the tension gauge>

Place a belt tension gauge at the centre of the belt between the pulleys (arrow), and check that the belt tension is within the standard value.

<Belt deflection check>

Apply approximately 100 N of pressure against the location between the pulleys shown by the arrow in the illustration and then measure the deflection.

If not within the standard value, adjust the belt tension by the following procedure.



1. Loosen the power steering oil pump fixing bolts A, B, and C.
2. Adjust the belt tension by placing a bar or others to the body of the power steering oil pump, giving an appropriate tension to the belt by hands.

- Tighten the fixing bolts in the order of A, B, and C to the specified torque.

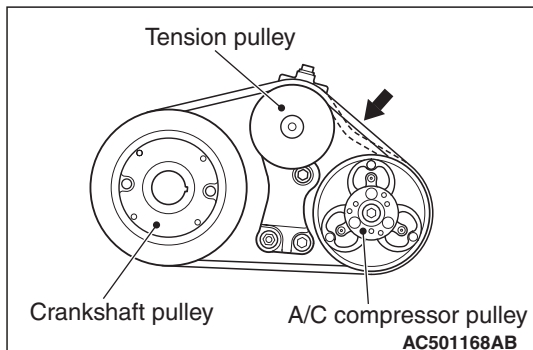
Tightening torque: 23 ± 3 N·m

CAUTION

When checking the belt tension, turn the crankshaft clockwise one turn or more.

- Check the belt tension, and readjust if necessary.

A/C COMPRESSOR DRIVE BELT TENSION CHECK AND ADJUSTMENT



Check the drive belt tension by the following procedures.

Standard value:

Item	When checked	When adjusted	When replaced
Tension N	338 -430	338 -430	461 -614
Deflection mm (Reference)	7.2 -8.4	7.2 -8.4	5.5 -6.9

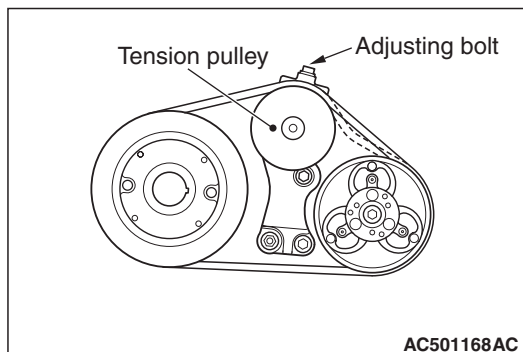
<When using the tension gauge>

Place a belt tension gauge at the centre of the belt between the pulleys (arrow), and check that the belt tension is within the standard value.

<Belt deflection check>

Apply approximately 100 N of pressure against the location between the pulleys shown by the arrow in the illustration and then measure the deflection.

If not within the standard value, adjust the belt tension by the following procedure.



- Use the adjusting bolt to adjust the belt tension. The tension will increase when turning the adjusting bolt clockwise, and decrease when turning anti-clockwise.

CAUTION

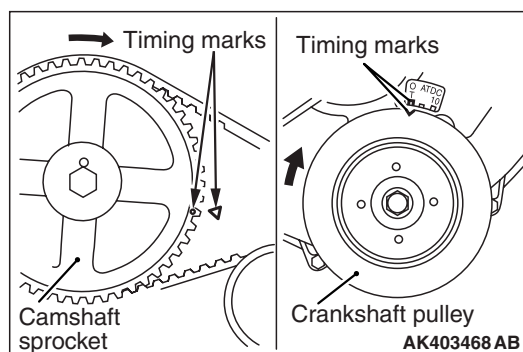
When checking the belt tension, turn the crankshaft clockwise one turn or more.

- Check the belt tension, and readjust if necessary.

VALVE CLEARANCE CHECK AND ADJUSTMENT

M1111001500380

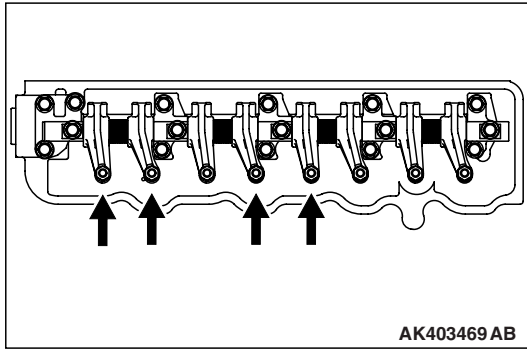
- Start the engine and allow it to warm up until the engine coolant temperature reaches 80 to 90° C
- Remove the timing belt upper cover.
- Remove the rocker cover.



- Align the camshaft sprocket timing marks and set the No. 1 cylinder at top dead centre.

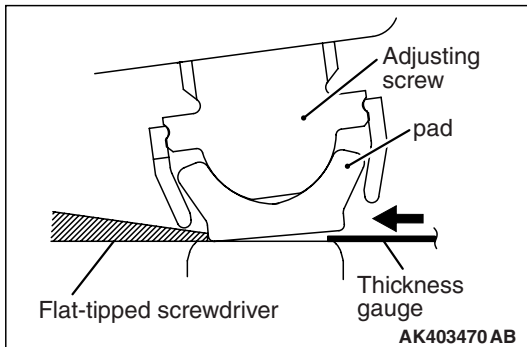
CAUTION

The crankshaft should always be turned in a clockwise direction.



5. Measure the valve clearance at the places indicated by arrows in the illustration according to the methods shown below.

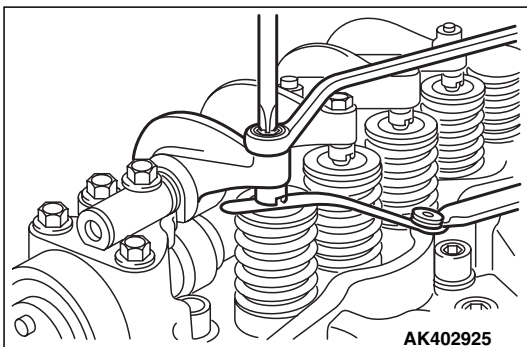
Standard value: 0.25 mm



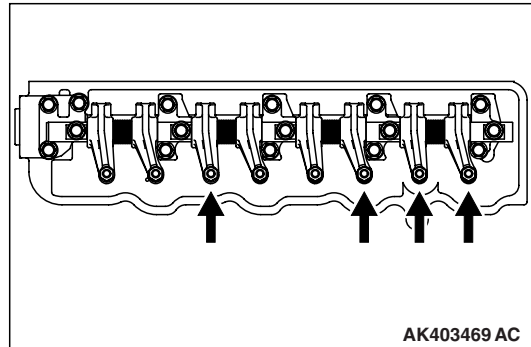
a. Give a clearance, pushing the pad by a flat-tipped screwdriver in the opposite direction of the thickness gauge insertion as shown in the illustration.

NOTE: Do not damage the pad retainer and so on when pushing the pad by a flat-tipped screwdriver.

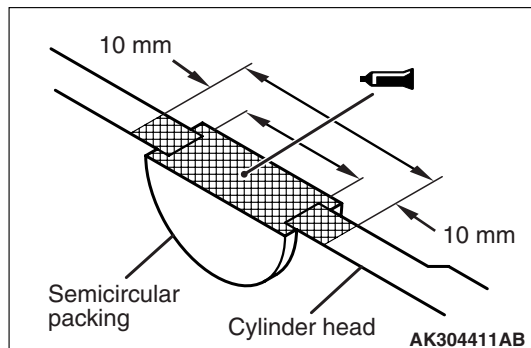
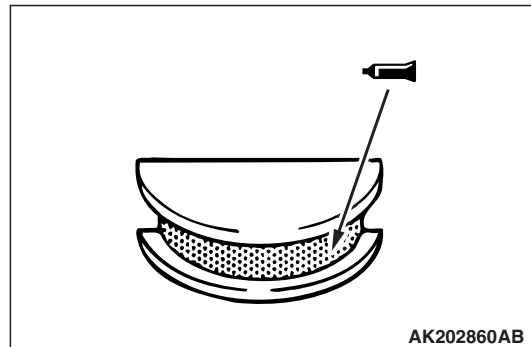
b. Insert the thickness gauge into the clearance.



6. If the clearance is outside the standard value, loosen the lock nut of the rocker arm and adjust by turning the adjusting screw while using a thickness gauge to measure the clearance.
7. Tighten the lock nut while holding the adjusting screw with a screwdriver so that it doesn't turn.
8. Turn the crankshaft 360° clockwise to bring No. 4 cylinder to the top dead centre position.



9. Measure the valve clearances at the places indicated by arrows in the illustration. If the clearance is not within the standard value, repeat steps 7 and 8 above.



10. Apply specified sealant to the section of the semi-circular packing shown in the illustration.

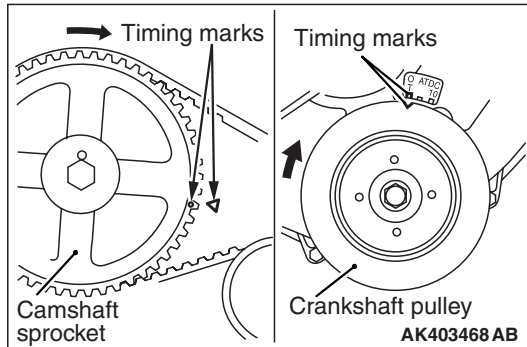
Specified sealant: 3M ATD Part No. 8660 or equivalent

11. Install the rocker cover.
12. Install the timing belt upper cover.

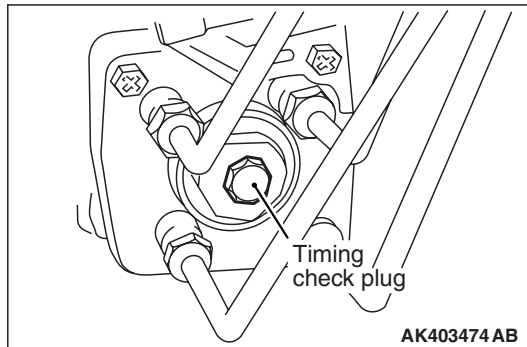
INJECTION TIMING CHECK AND ADJUSTMENT

M1111001800024

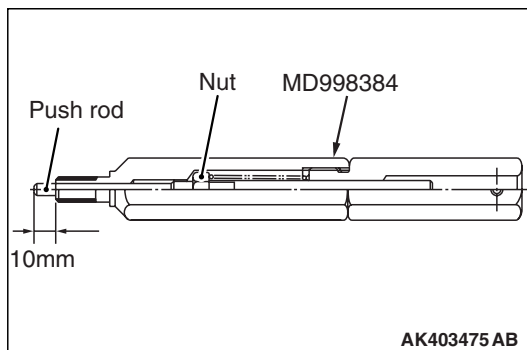
1. Remove all of the glow plugs.
2. Remove the timing belt upper cover.



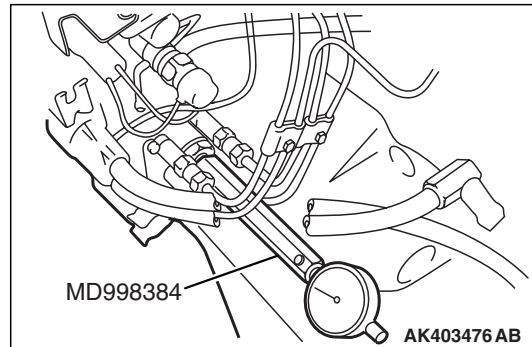
3. Align the timing marks of the camshaft sprocket and set the No. 1 cylinder to the top dead centre position.



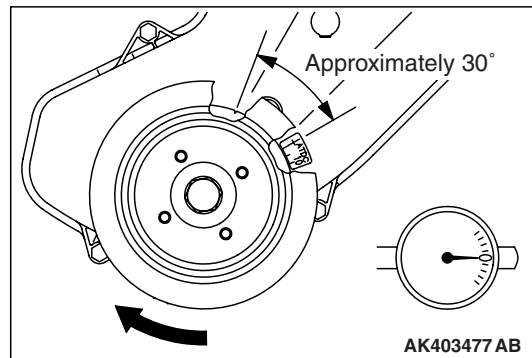
4. Remove the timing check plug at the rear of the injection pump.



5. Before installation of special tool prestroke measuring adapter (MD998384), make sure that push rod is protruding by 10 mm. Protrusion of push rod can be adjusted with an inner nut.
6. Connect the dial gauge to the special tool.



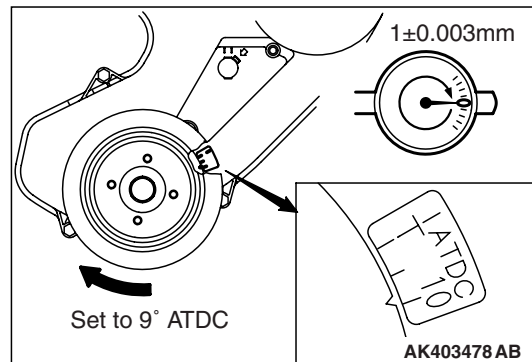
7. Install the special tool prestroke measuring adapter (MD998384) to the check plug at the rear of the injection pump.



8. Turn the crankshaft clockwise to move the No. 1 cylinder approximately 30° before compression top dead centre.
9. Set the needle of the dial gauge to 0.

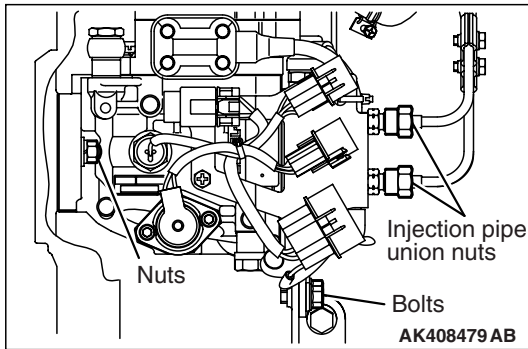
10. Check that the needle doesn't move even if the crankshaft is turned slightly (2 - 3°) in both clockwise and counterclockwise direction.

NOTE: If the needle moves, the notch is not positioned properly, so once again move the No. 1 cylinder approximately 30° before compression top dead centre.



11. Turn the crankshaft clockwise to align the No. 1 cylinder to 9° ATDC.
12. Check that the value indicated on the dial gauge is at the standard value.

Standard value: 1 ± 0.03 mm



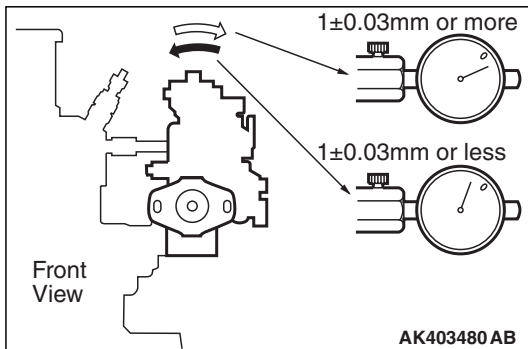
13. If the needle is outside the standard value, adjust the injection timing by the following procedure.

- (1) Loosen the injection pipe union nuts (4 places) on the injection pump. (Do not remove the union nuts.)

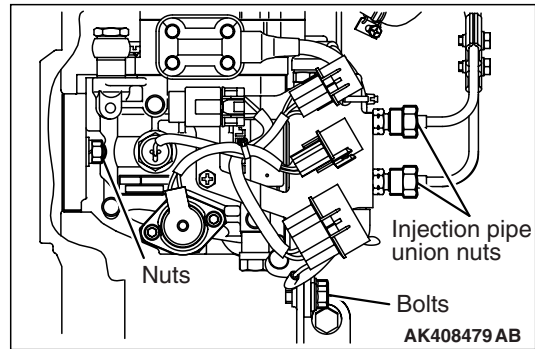
CAUTION

When loosening the nuts, hold the delivery valve holders with a spanner so that they don't turn at the same time.

- (2) Loosen the upper mounting nuts and the lower mounting bolts of the injection pump. (Do not remove the nut and bolt.)



- (3) Tilt the injection pump to the left and right and adjust the needle on the dial gauge so that the display value is uniform.
- (4) Provisionally tighten the mounting nut and bolt of the injection pump.
- (5) Repeat steps 8 –12 to check if the adjustment has been made correctly.



- (6) Tighten the mounting nuts to the specified torque.

Tightening torque: 19 ± 3 N· m

- (7) Tighten the mounting bolts to the specified torque.

Tightening torque: 24 ± 3 N· m

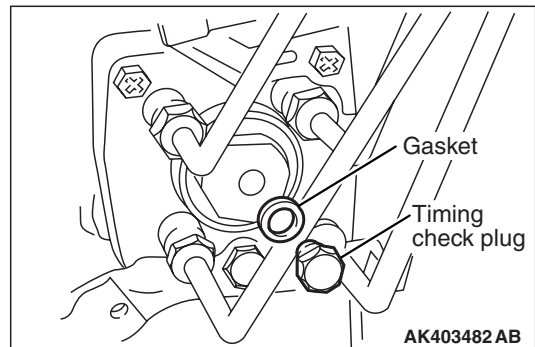
- (8) Tighten the injection pump union nuts to the specified torque.

Tightening torque: 30 ± 7 N· m

CAUTION

When tightening the nuts, hold the delivery valve holders with a spanner so that they don't turn at the same time.

14. Remove the special tool prestroke measuring adapter (MD998384).



15. Install a new gasket to the timing check plug.
16. Tighten the timing check plug to the specified torque.

Tightening torque: 17 ± 2 N· m

17. Install the timing belt upper cover.

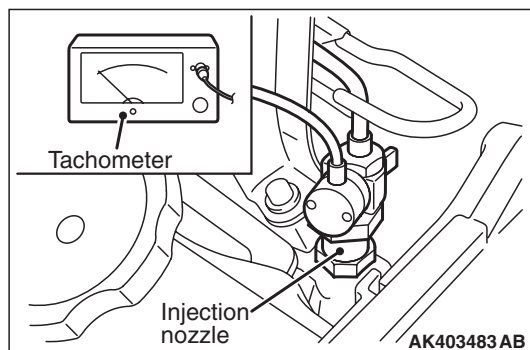
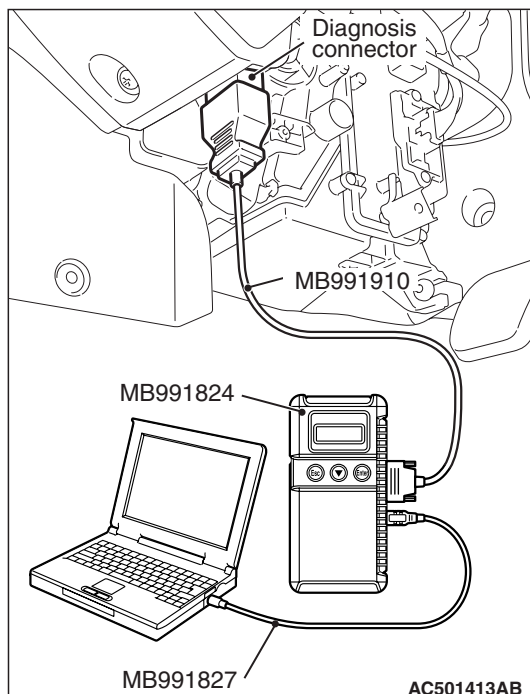
18. Install all of the glow plugs

Tightening torque: 17 ± 2 N· m

IDLE SPEED CHECK

M1111003501141

1. Set the vehicle to the pre-inspection condition.



2. Turn the ignition switch to "LOOK" (OFF) position, and connect the diagnosis connector to the M.U.T.-III.

If the M.U.T.-III is not used, connect a tachometer to the injection nozzle or the pipe.

3. Start the engine, and let it run at idle.
4. Check the idle speed.

Standard value: 750 ± 30 r/min

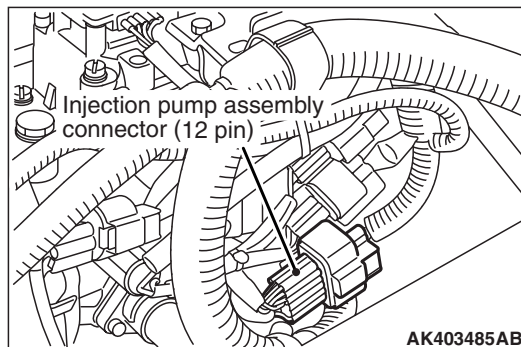
5. If the idle speed is not within the standard value, inspect the diesel system (Refer to GROUP 13A – Troubleshooting – Inspection Chart for Diagnosis Code).

COMPRESSION PRESSURE CHECK

M1111002601327

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 all of the glow plugs.



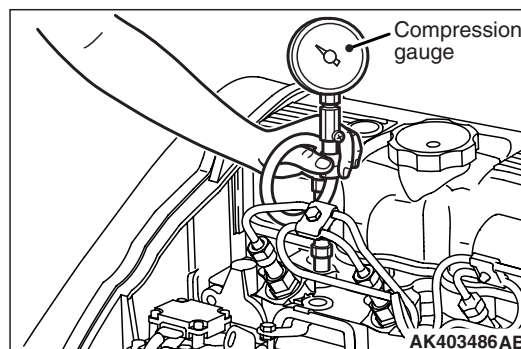
3. Disconnect the injection pump assembly connector (12 pin).

NOTE: Doing this will prevent carrying out fuel injection.

4. Cover the glow 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

- Keep away from the glow plug hole when cranking.
- 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 glow plug hole, which is dangerous.



5. Set compression gauge to one of the glow plug holes.
6. Crank the engine and measure the compression pressure.

Standard value (at engine speed of 280 r/min): 3,100 kPa

Limit (at engine speed of 280 r/min): min. 2,800 kPa

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

Limit: max 294 kPa

8. 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 glow plug hole, and repeat the operations in steps (6) and (7).

- (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.

9. Connect the injection pump assembly connector (12 pin).

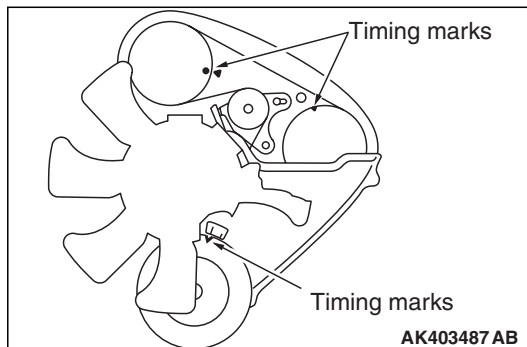
10. Install the glow plugs.

Tightening torque: 17 ± 2 N·m

TIMING BELT TENSION ADJUSTMENT

M1111002800094

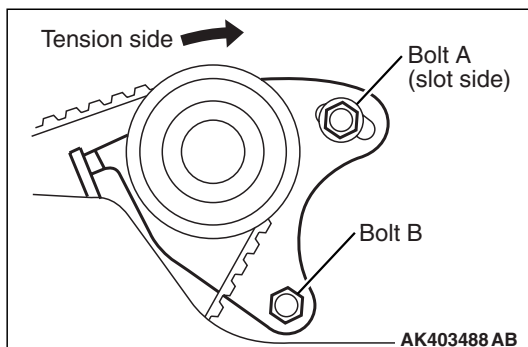
1. Remove the timing belt upper cover.
2. Turn the crankshaft in the clockwise direction and check the timing belt around its entire circumference for abnormalities.



3. Align the timing marks on the sprockets with the timing mark on the front upper case.

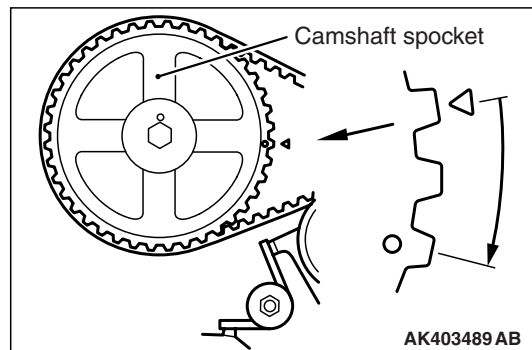
CAUTION

When aligning the timing mark, be sure not to turn the crankshaft in the counterclockwise direction as this can cause improper belt tension.



4. Loosen the two tensioner mounting bolts 1 or 2 turns.

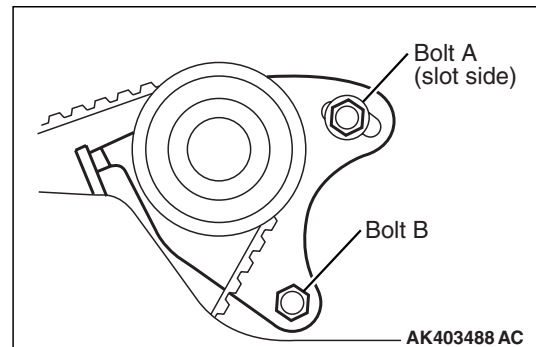
NOTE: This will allow the tensioner spring to tension the timing belt automatically.



5. Turn the crankshaft clockwise and stop at the second teeth of the camshaft sprocket.

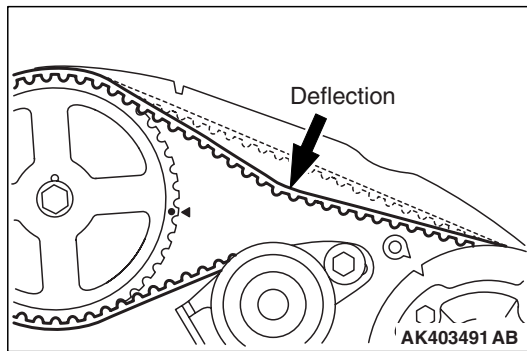
CAUTION

- This will allow the timing belt to be tensioned by a specified amount, so never overturn the crankshaft.
- Never turn the crankshaft counterclockwise.



6. To prevent the tensioner bracket from being turned together with the crankshaft, first tighten slot-side bolt A to the specified torque, and then tighten bolt B to the specified torque.

Tightening torque: 26 ± 3 N·m



- Turn the crankshaft counterclockwise to align the timing marks. Push down belt at a point halfway with a forefinger to check that deflection of belt is up to standard value.

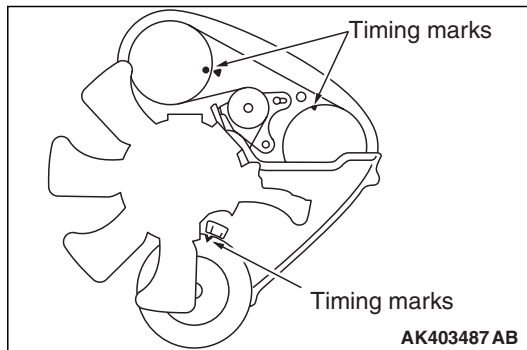
Standard value: 4.0 –5.0 mm

- Mount the timing belt upper cover.

TIMING BELT B TENSION ADJUSTMENT

M1111004900019

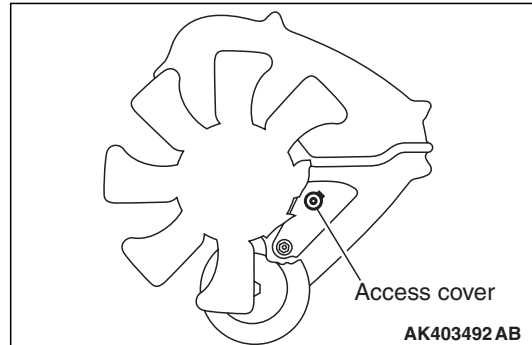
- Remove timing belt upper cover.
- Turn the crankshaft in the clockwise direction and check the timing belt around its entire circumference for abnormalities.



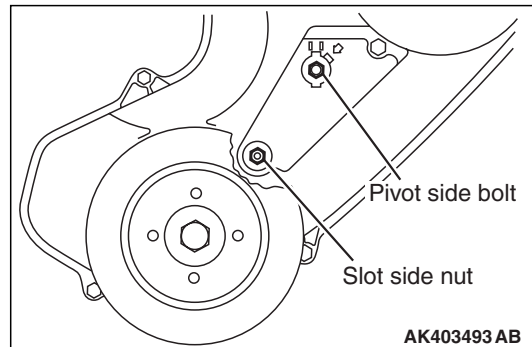
- Align the timing marks on the sprockets with the timing mark on the front upper case.

CAUTION

When aligning the timing mark, be sure not to turn the crankshaft in the counterclockwise direction as this can cause improper belt tension.



- Remove the access cover.



- Loosen the tensioner pivot side bolt 1 turn and slot side nut 1 or 2 turns.

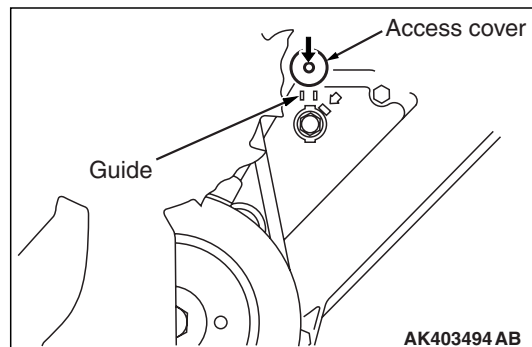
NOTE: These works will allow the tensioner spring to tension timing belt B automatically.

- First tighten tensioner slot side nut, and then tighten pivot side bolt to the specified torque.

Tightening torque:

Pivot side bolt 23 ± 3 N·m

Slot side nut 26 ± 3 N·m



- Install the access cover while sliding the front lower cover down along the two guides.
- Install the timing belt upper cover.

CRANKSHAFT PULLEY

REMOVAL AND INSTALLATION

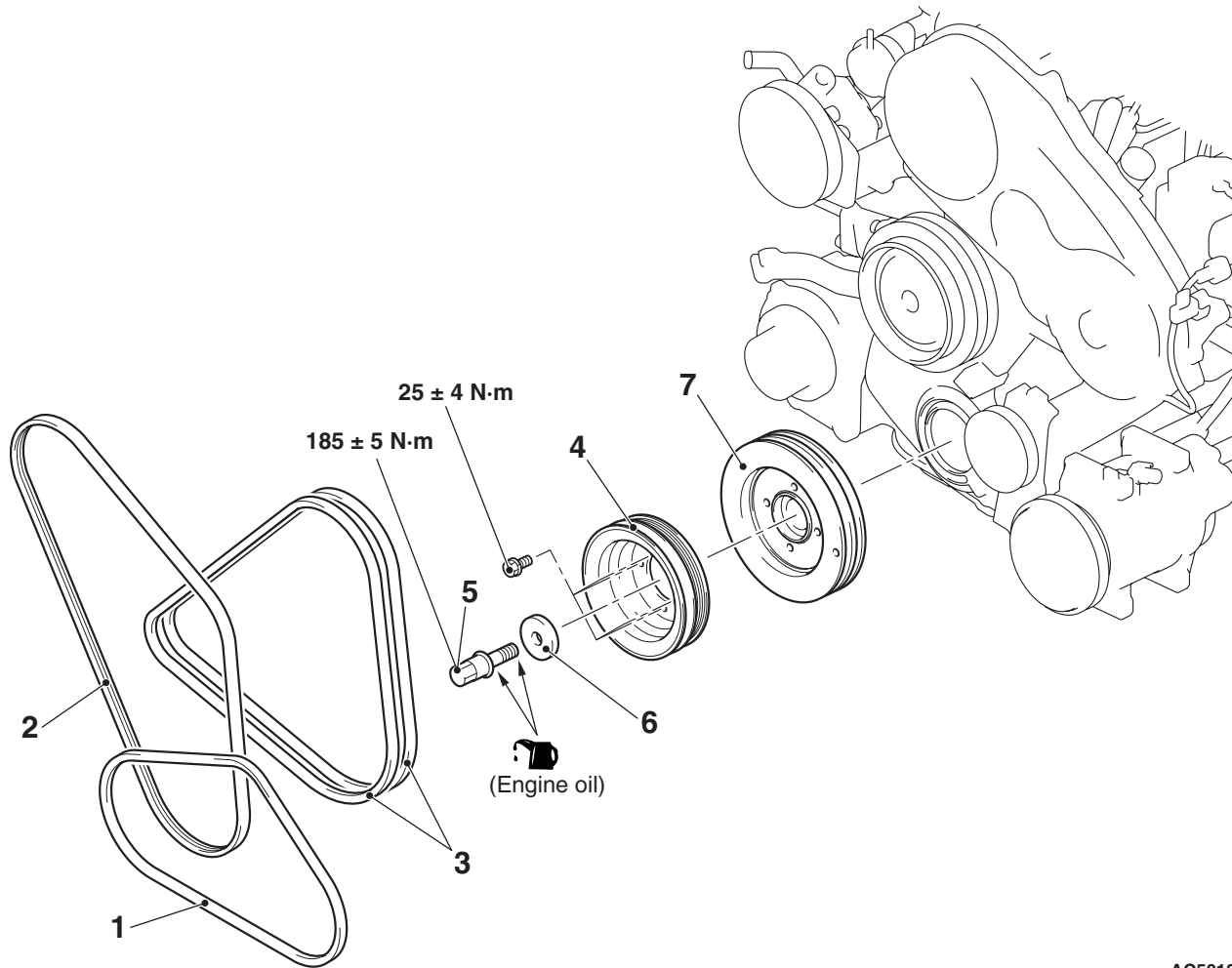
M1112001600959

Pre-removal Operation

- Engine Room Under Cover Removal (Refer to GROUP 51 –Under Cover).

Post-installation Operation

- Drive Belt Tension Check and Adjustment (Refer to P.11A-6).
- Engine Room Under Cover Installation (Refer to GROUP 51 –Under Cover).



AC501887 AB

<<A>>

<>

<<C>>

Removal steps

1. A/C compressor drive belt
2. Power steering oil pump drive belt
3. Alternator drive belts
4. Crankshaft pulley (for A/C)

<<D>>

>>A<<

>>A<<

>>A<<

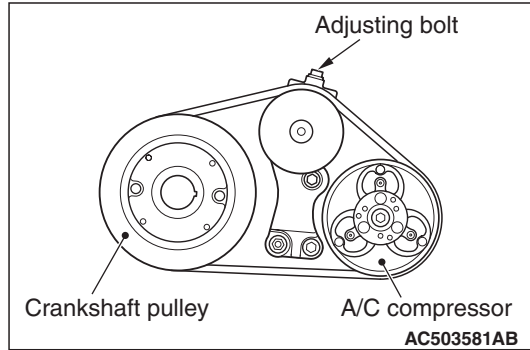
Removal steps (Continued)

5. Crankshaft pulley centre bolt
6. Special washer
7. Crankshaft pulley

REMOVAL SERVICE POINTS

<<A>> A/C COMPRESSOR DRIVE BELT
REMOVAL**⚠ CAUTION**

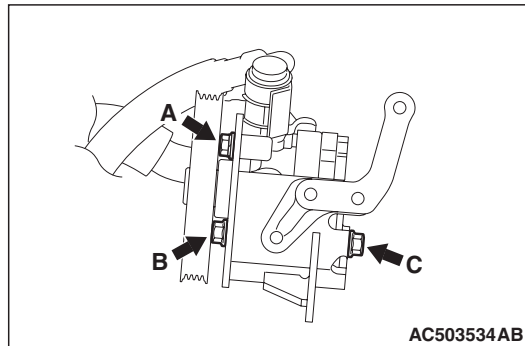
To reuse the drive belt, draw an arrow indicating the rotating direction (to the right) on the back of the belt using chalk, etc.



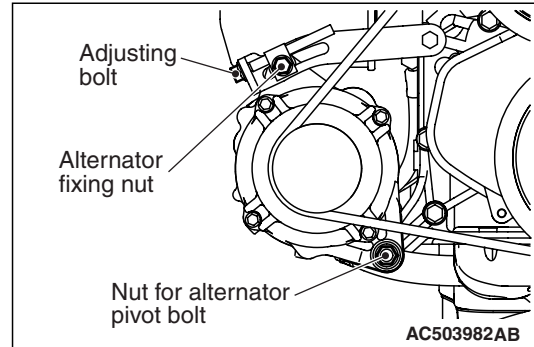
Turn the adjusting bolt anti-clockwise (in the left turn), and remove the drive belt.

<> POWER STEERING OIL PUMP
DRIVE BELT REMOVAL**⚠ CAUTION**

To reuse the drive belt, draw an arrow indicating the rotating direction (to the right) on the back of the belt using chalk, etc.



Loosen the mounting bolts shown in the figure to remove the drive belt.

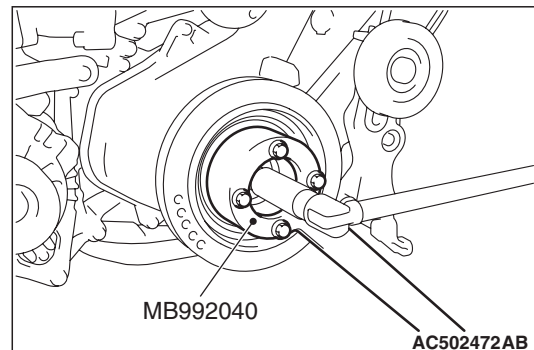
<<C>> ALTERNATOR DRIVE BELTS
REMOVAL

1. Loosen the nut for alternator pivot bolt and locking bolt.

⚠ CAUTION

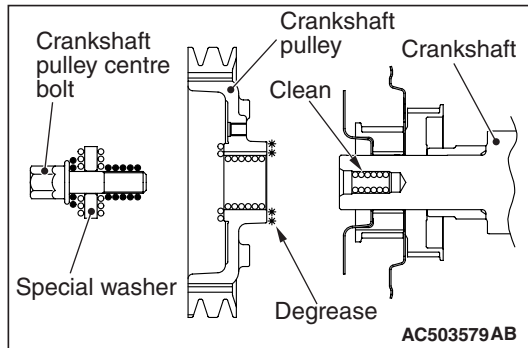
To reuse the drive belt, draw an arrow indicating the rotating direction (to the right) on the back of the belt using chalk, etc.

2. Turn the adjusting bolt anti-clockwise (in left turn), and remove the drive belt.

<<D>> CRANKSHAFT PULLEY CENTRE
BOLT REMOVAL

1. Use special tool crank pulley holder (MB992040), hold the crankshaft pulley.
2. Remove the crankshaft pulley centre bolt.

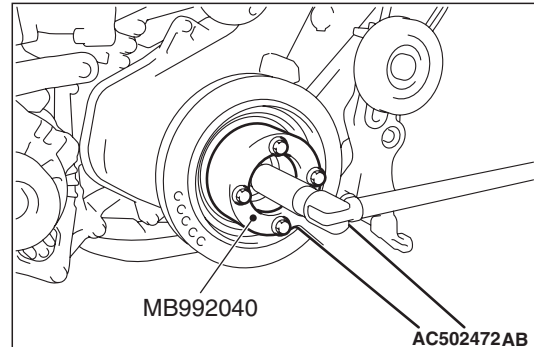
INSTALLATION SERVICE POINT >>A<< CRANKSHAFT PULLEY/SPECIAL WASHER/CRANKSHAFT PULLEY CENTRE BOLT INSTALLATION



1. Clean and then degrease the crankshaft sprocket contacting surface of the crankshaft pulley.

NOTE: Degreasing is necessary to prevent decrease in the friction between contacting surfaces.

2. Clean the bolt hole in the crankshaft, the crankshaft contacting surface and special washer contacting surface of the crankshaft pulley, and the special washer.
3. Apply an appropriately small amount of oil to the threads and seating surface of the crankshaft pulley centre bolt.



4. Use special tool crank pulley holder (MB992040) as in the removal procedure to retain crankshaft pulley, and tighten crankshaft pulley centre bolt to the specified torque.

Tightening torque: 185 ± 5 N·m

CAMSHAFT AND VALVE STEM SEAL

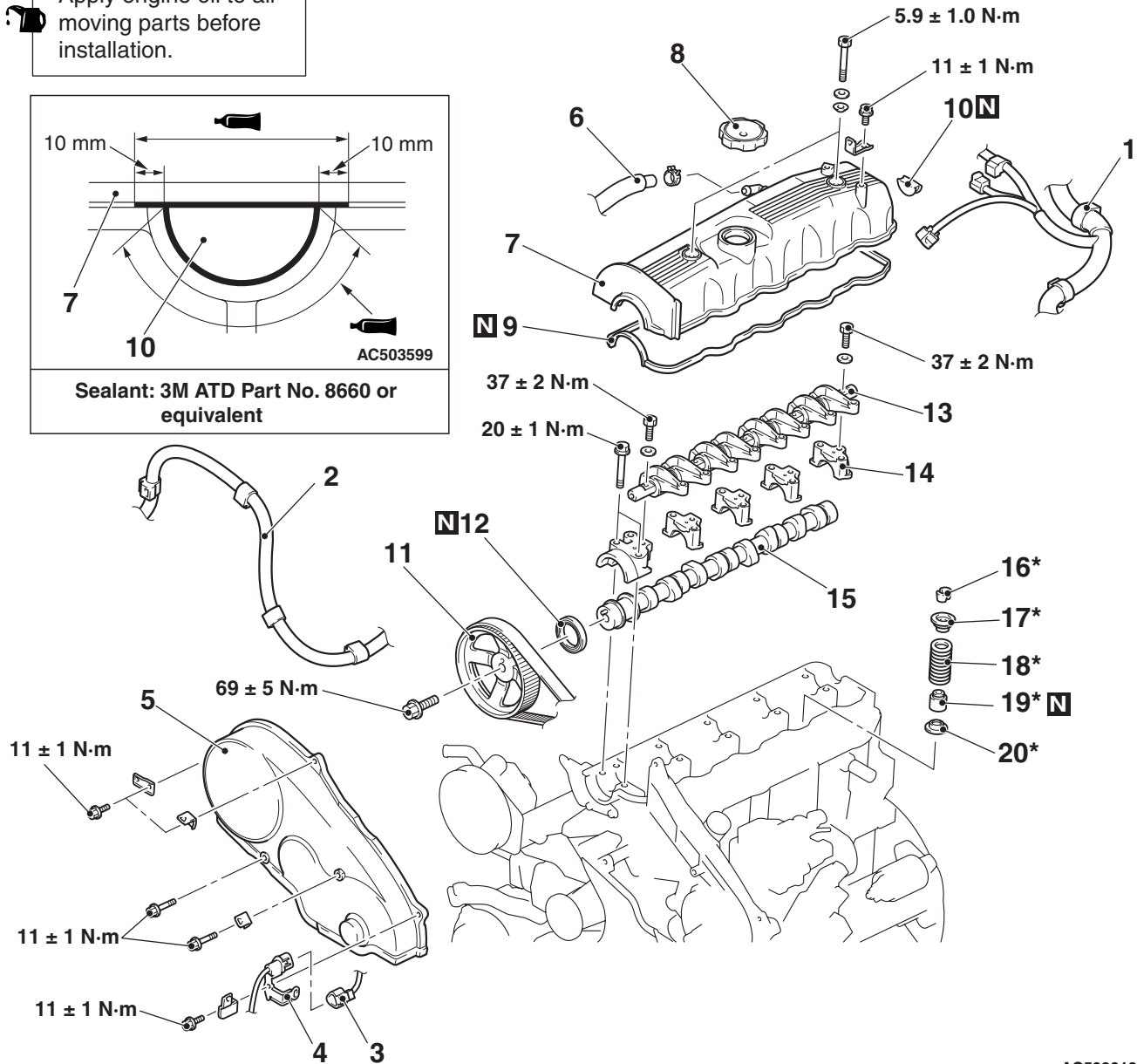
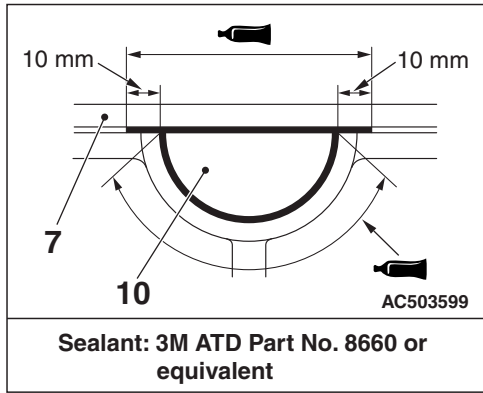
REMOVAL AND INSTALLATION

M1112006600987

CAUTION

*Remove and assemble the marked parts in each cylinder unit.

Apply engine oil to all moving parts before installation.



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Camshaft removal steps

1. Control wiring harness connector
2. Battery wiring harness connector
3. Crank angle position sensor connector
4. Crank angle position sensor connector clamp
5. Timing belt front upper cover
6. Breather hose connection
7. Rocker cover
8. Oil filler cap

>>E<<

<<A>>

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>>H<<

>>G<<

>>D<<

>>F<<

Camshaft removal steps

9. Rocker cover gasket
10. Semi-circular packing
 - Valve clearance adjustment (Refer to P.11A-8).
11. Camshaft sprocket
12. Camshaft oil seal
13. Rocker arm and shaft assembly
14. Camshaft bearing caps
15. Camshaft

Valve stem seal removal steps

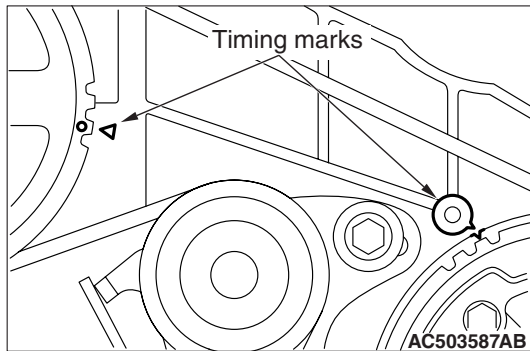
- | | | |
|-------|-------|--|
| | 1. | Control wiring harness connector |
| | 2. | Battery wiring harness connector |
| | 3. | Crank angle position sensor connector |
| | 4. | Crank angle position sensor connector clamp |
| >>E<< | 5. | Timing belt front upper cover |
| | 6. | Breather hose connection |
| | 7. | Rocker cover |
| | 9. | Rocker cover gasket |
| <> | >>D<< | 13. Rocker arm and shaft assembly |
| | | • Windshield wiper (Refer to GROUP 51 –Windshield wiper). |
| | | • Cowl top panel |
| <<C>> | >>C<< | 16. Valve spring retainer locks |
| | | 17. Valve spring retainers |
| | >>B<< | 18. Valve springs |
| | >>A<< | 19. Valve stem seals |
| | 20. | Valve spring seats |

REMOVAL SERVICE POINTS

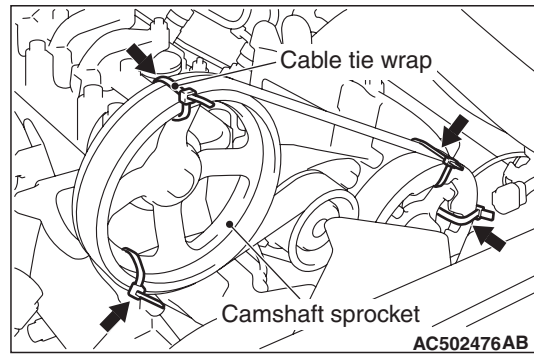
**<<A>> CAMSHAFT SPROCKET
REMOVAL**

⚠ CAUTION

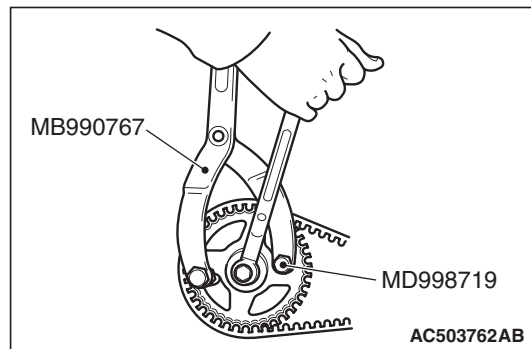
Always turn the crankshaft in the forward direction (clockwise).



1. Turn the crankshaft in the forward direction (clockwise) to align the timing mark so that No.1 cylinder is at the compression TDC (Top Dead Centre) position.



2. Secure the camshaft sprocket and the valve timing belt with cable bands to prevent deviation from the relative positions between the camshaft sprocket and the valve timing belt.



3. Use the following special tools to stop the camshaft sprocket from turning.
 - Front hub and flange yoke holder (MB990767)
 - Crankshaft pulley holder pin (MD998719)

⚠ CAUTION

Do not turn the crankshaft after the camshaft sprocket is removed.

4. Remove the camshaft sprocket with the valve timing belt attached.

**<> ROCKER ARM AND SHAFT
ASSEMBLY REMOVAL**

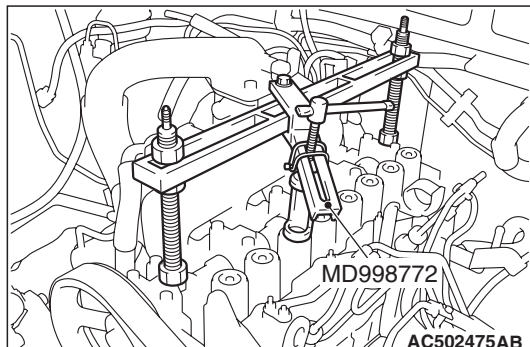
⚠ CAUTION

Never disassemble the rocker arm and shaft assembly.

Loosen the rocker arm and shaft assembly mounting bolt, and then remove the rocker arm and shaft assembly with the bolt still attached.

<<C>> VALVE SPRING RETAINER LOCKS
REMOVAL**CAUTION**

When removing valve spring retainer lock, leave the piston of each cylinder in the TDC position. The valve may fall into the cylinder if the piston is not properly in the TDC position.

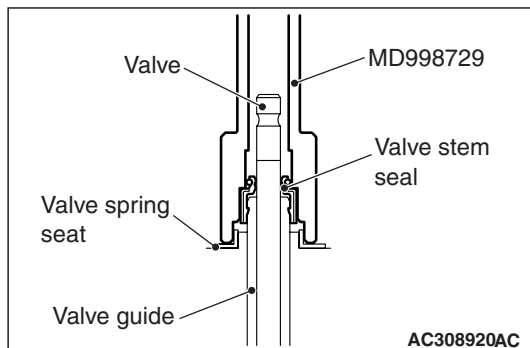


Use special tool valve spring compressor (MD998772) to compress the valve spring, remove the valve spring retainer lock.

INSTALLATION SERVICE POINTS

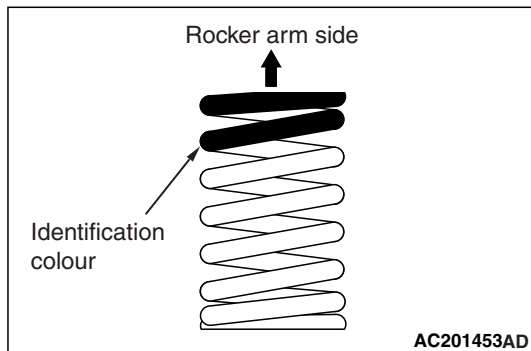
>>A<< VALVE STEM SEALS INSTALLATION

1. Apply a small amount of engine oil to the valve stem seal.

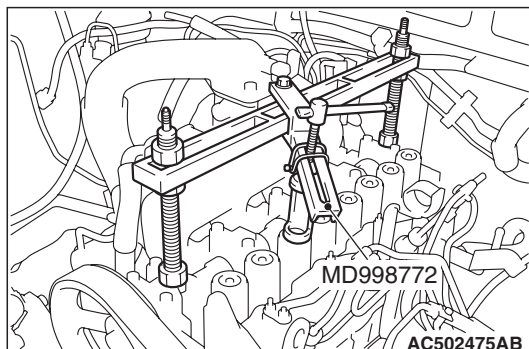
CAUTION

- Valve stem seal cannot be reused.
 - Special tool valve stem seal installer (MD998729) must be used to install the valve stem seal. Improper installation could result in oil leaking past the valve guide.
2. Use special tool to fill a new valve stem seal in the valve guide using the valve stem area as a guide.

>>B<< VALVE SPRINGS INSTALLATION



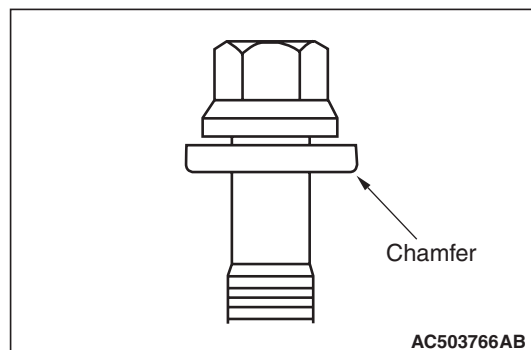
Install the valve spring with its identification colour painted end facing the rocker arm.

>>C<< VALVE SPRING RETAINER LOCKS
INSTALLATION

Use special tool valve spring compressor (MD998772) to compress the valve spring in the same manner as removal, and install the valve spring retainer lock.

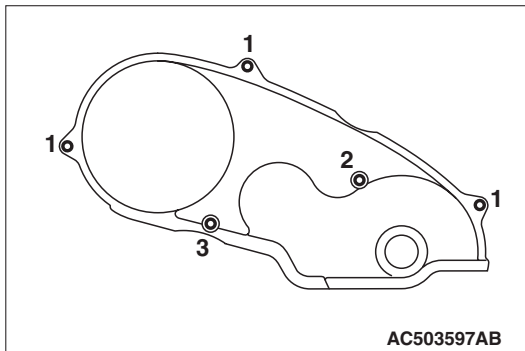
>>D<< ROCKER ARM AND SHAFT
ASSEMBLY INSTALLATION

1. Install the rocker arm and shaft assembly to the bearing caps.



2. Set the washer so that it faces in the direction shown in the illustration, and then install the bolt.

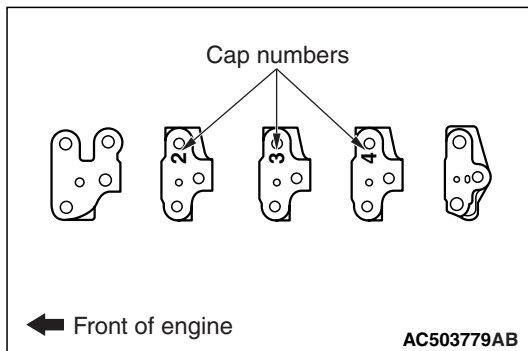
>>E<< TIMING BELT FRONT UPPER COVER INSTALLATION



Install the bolts to the timing belt front upper cover at the shown position.

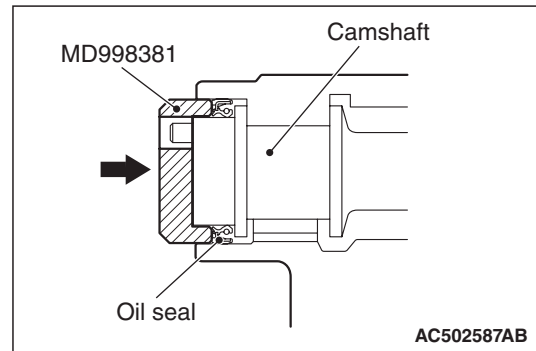
No.	Bolt diameter × length mm
1	6 × 22
2	6 × 50
3	6 × 60

>>F<< CAMSHAFT BEARING CAPS INSTALLATION



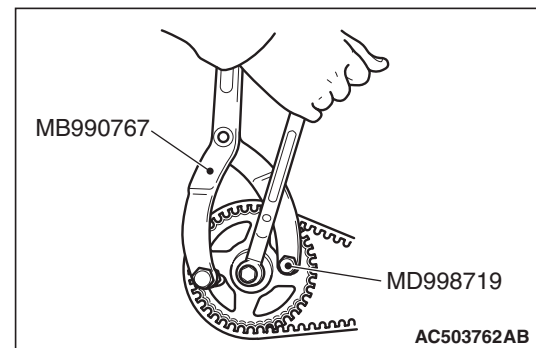
The cap numbers are embossed on the top surface of the bearing caps, so install in the order of the numbers. However, no numbers are embossed on bearing caps 1 and 5.

>>G<< CAMSHAFT OIL SEAL INSTALLATION



1. Apply new engine oil to the camshaft oil seal lip.
2. Use special tool camshaft oil seal installer (MD998381) to press-fit the camshaft oil seal.

>>H<< CAMSHAFT SPROCKET INSTALLATION



1. Use the following special tools to stop the camshaft sprocket from turning in the same way as was done during removal.
 - Front hub and flange yoke holder (MB990767)
 - Crankshaft pulley holder pin (MD998719)
2. Tighten the timing belt train bolt to the specified torque.

Tightening torque: 69 ± 5 N·m

OIL PAN AND OIL SCREEN

REMOVAL AND INSTALLATION

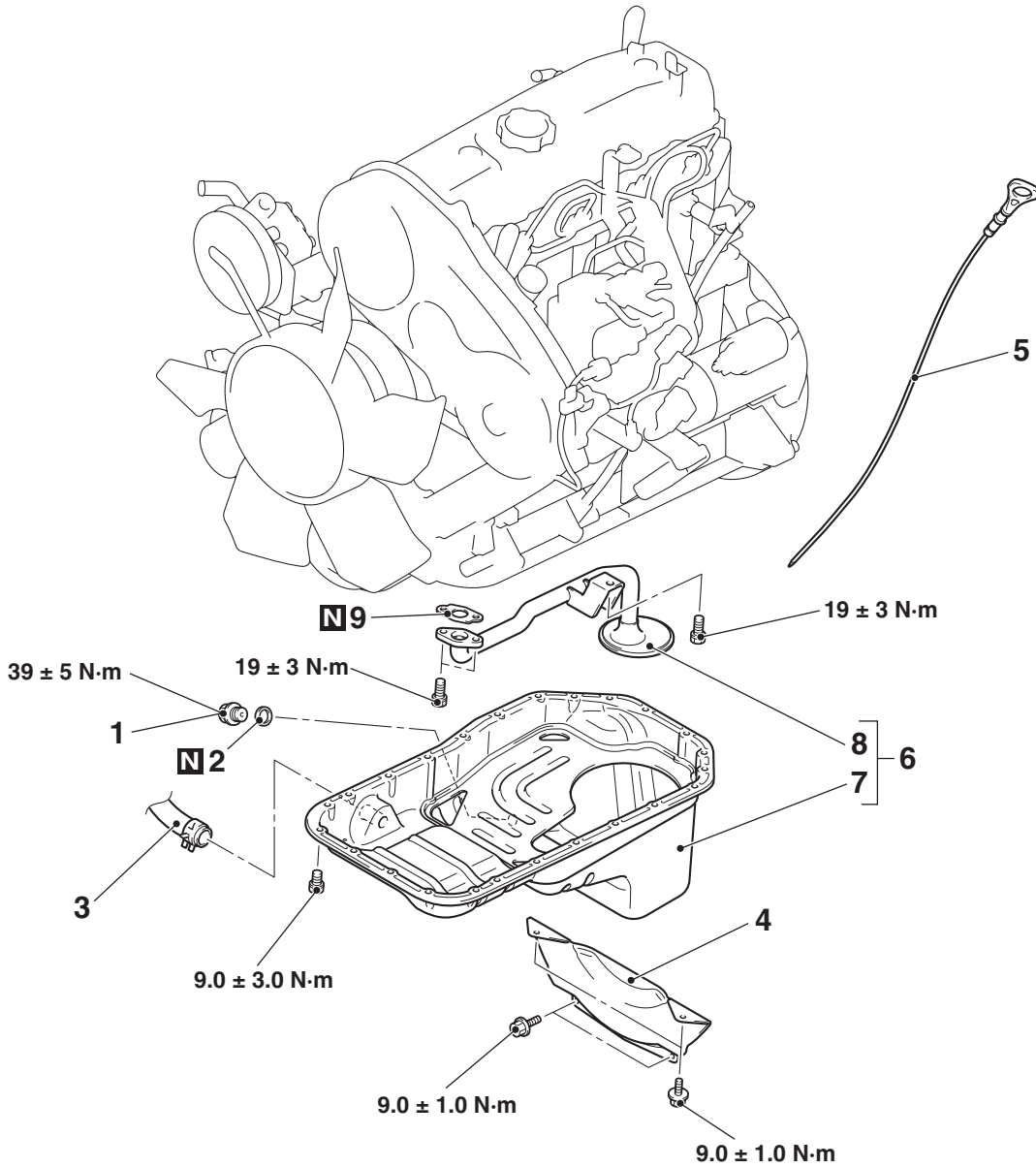
M1112002500319

Pre-removal Operation

- Engine Room Under Cover Removal (Refer to GROUP 51 –Under Cover).
- Engine Oil Draining (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement).

Post-installation Operation

- Engine Oil Refilling (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement).
- Engine Room Under Cover Installation (Refer to GROUP 51 –Under Cover).



AC501853AB

Removal steps

- >B<<
- | | | |
|----|---|-------|
| 1. | Engine oil pan drain plug | <<A>> |
| 2. | Engine oil pan drain plug gasket | <> |
| 3. | Alternator vacuum pump oil return hose connection | <> |
| 4. | Flywheel housing front lower cover | <> |
| 5. | Engine oil level gauge | <<C>> |

Removal steps (Continued)

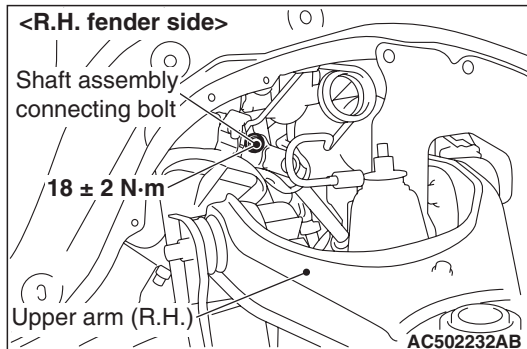
- | | | |
|----|---|-------|
| • | Steering column shaft assembly and shaft assembly connecting bolt | >>A<< |
| • | Power steering gear box connecting bolts | |
| • | Return tube clamp | |
| • | Pressure tube clamp | |
| 6. | Engine oil pan and engine oil pan strainer assembly | |

Removal steps (Continued)

7. Engine oil pan
8. Engine oil pan strainer
9. Engine oil pan strainer gasket

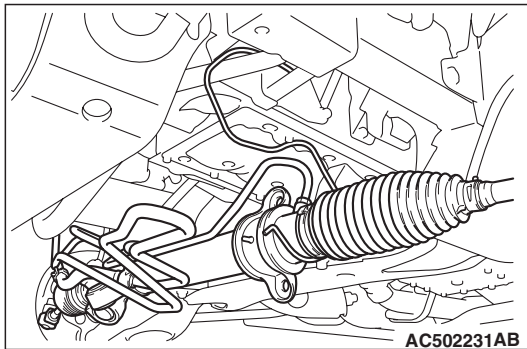
REMOVAL SERVICE POINTS

<<A>> STEERING COLUMN SHAFT ASSEMBLY AND SHAFT ASSEMBLY CONNECTING BOLT DISCONNECTION



Disconnect the steering column shaft and the shaft assembly.

<> POWER STEERING GEAR BOX CONNECTING BOLTS/RETURN TUBE CLAMP/PRESSURE TUBE CLAMP REMOVAL

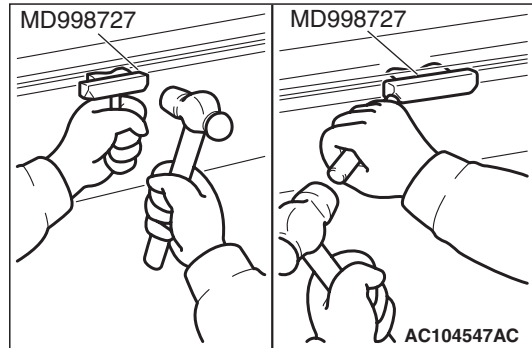
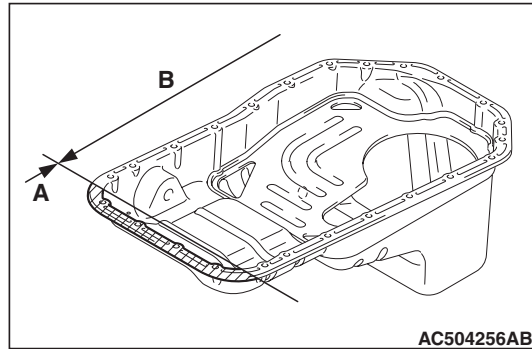


Remove the mounting bolts of the power steering gear box and of the tube clamp, and hung the power steering gear box using a wire or other similar material.

<<C>> ENGINE OIL PAN AND ENGINE OIL PAN STRAINER ASSEMBLY REMOVAL

1. Remove the engine oil pan mounting bolts.

CAUTION



Do not use special tool oil pan FIPG cutter (MD998727) in area A of the oil pan. Using the special tool in area A may cause deformation of the front case because the front case is made of aluminium.

2. Tap special tool MD998727 into the range (B) between the cylinder block and the oil pan, and then slide the tool sideways.

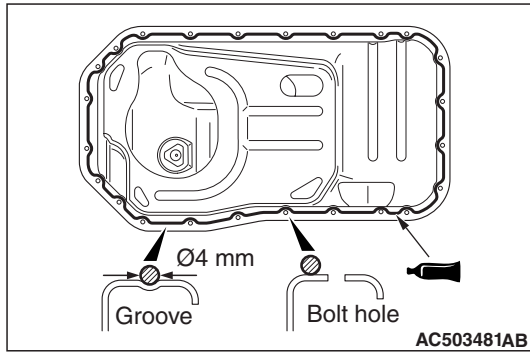
NOTE: If any sounding parts interfere with the removal, there is no need to use special tool MD998727.

3. With the oil pan separated from the cylinder block, remove the oil screen assembly mounting bolts, and then remove the oil pan together with the oil screen assembly.

INSTALLATION SERVICE POINTS

>>A<< ENGINE OIL PAN AND ENGINE OIL PAN STRAINER ASSEMBLY INSTALLATION

1. Remove sealant from the engine oil pan and cylinder block surfaces.



2. Apply a bead of the sealant to the cylinder block mating surface of the engine oil pan as shown.

Specified sealant: MITSUBISHI GENUINE PART MD970389 or equivalent

NOTE: Install the engine oil pan within 15 minutes after applying sealant.

3. Assemble the engine oil pan to the cylinder block.

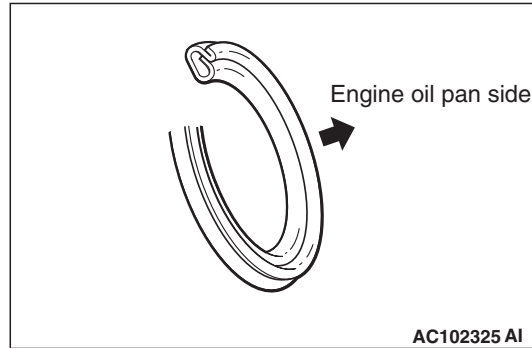
CAUTION

Then wait at least one hour. Never start the engine or let engine oil or coolant touch the sealant surface during that time.

4. Tighten the engine oil pan bolts to the specified torque.

Tightening torque: 9.0 ± 3.0 N·m

>>B<< ENGINE OIL PAN DRAIN PLUG GASKET INSTALLATION

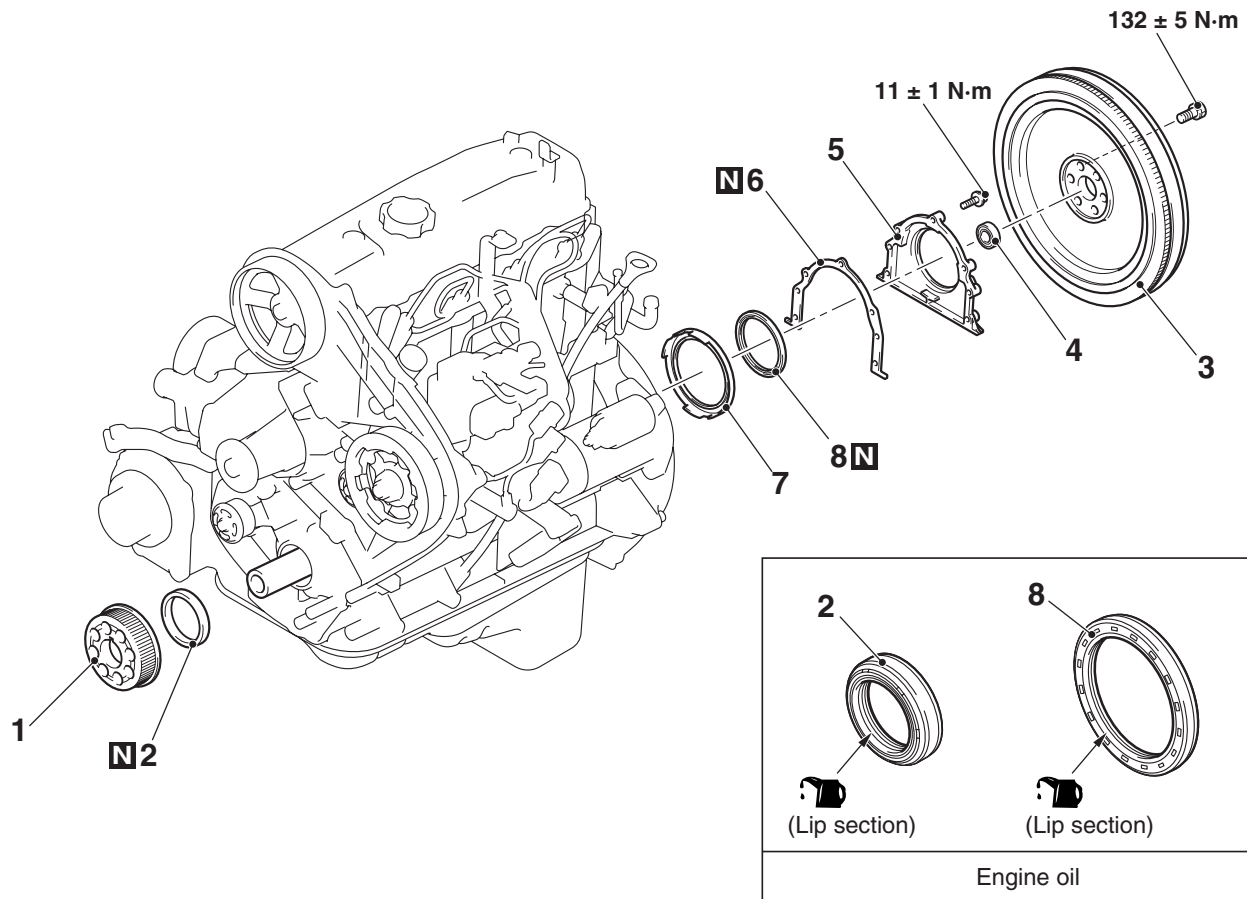


Replace the gasket with a new gasket. Install the new gasket in the direction shown in the illustration.

CRANKSHAFT OIL SEAL

REMOVAL AND INSTALLATION

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AC502585AB

Crankshaft front oil removal steps

- Timing belt B (Refer to P.11A-34). <<A>> >>C<<

>>D<<

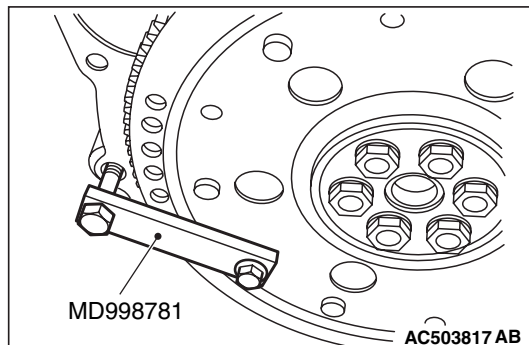
1. Crankshaft sprocket B
2. Crankshaft front oil seal

Crankshaft rear oil seal removal steps

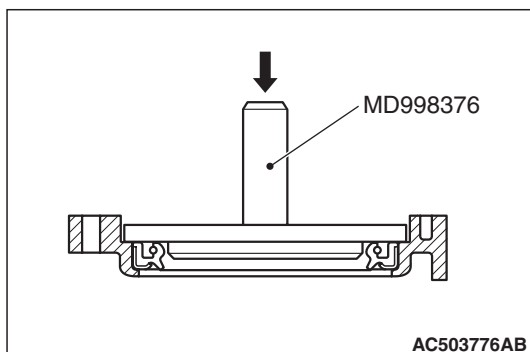
- Transmission assembly (Refer to GROUP 22A –Transmission assembly).

Crankshaft rear oil seal removal steps (Continued)

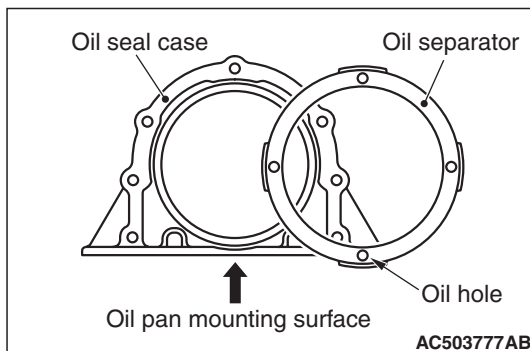
3. Flywheel assembly
4. Ball bearing
5. Oil seal case
6. Gasket
7. Oil separator
8. Crankshaft rear oil seal

REMOVAL SERVICE POINT
<<A>> FLYWHEEL ASSEMBLY
REMOVAL

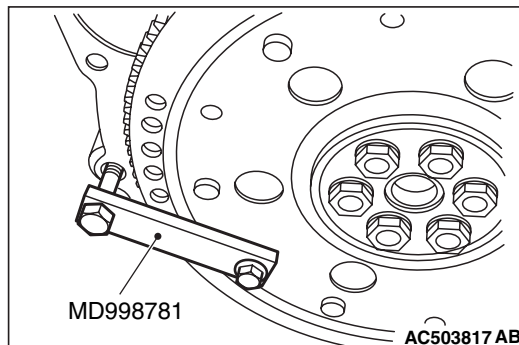
1. Use the special tool flywheel stopper (MD998781), hold the flywheel.
2. Remove the flywheel assembly.

INSTALLATION SERVICE POINTS
>>A<< CRANKSHAFT REAR OIL SEAL
INSTALLATION

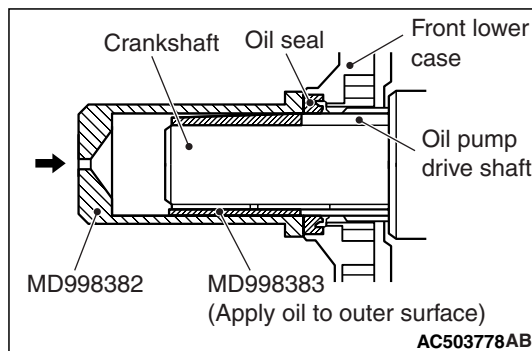
Use the special tool crankshaft rear oil seal installer (MD998376), press-fit the rear oil seal in the oil seal case.

>>B<< OIL SEPARATOR INSTALLATION

Push the oil separator into the oil seal case, with its oil hole at the case bottom (indicated by an arrow in illustration).

>>C<< FLYWHEEL ASSEMBLY
INSTALLATION

1. Use special tool flywheel stopper (MD998781) to secure the flywheel assembly in the same manner as removal.
2. Tighten the flywheel bolts to the specified torque.
Tightening torque: 132 ± 5 N·m

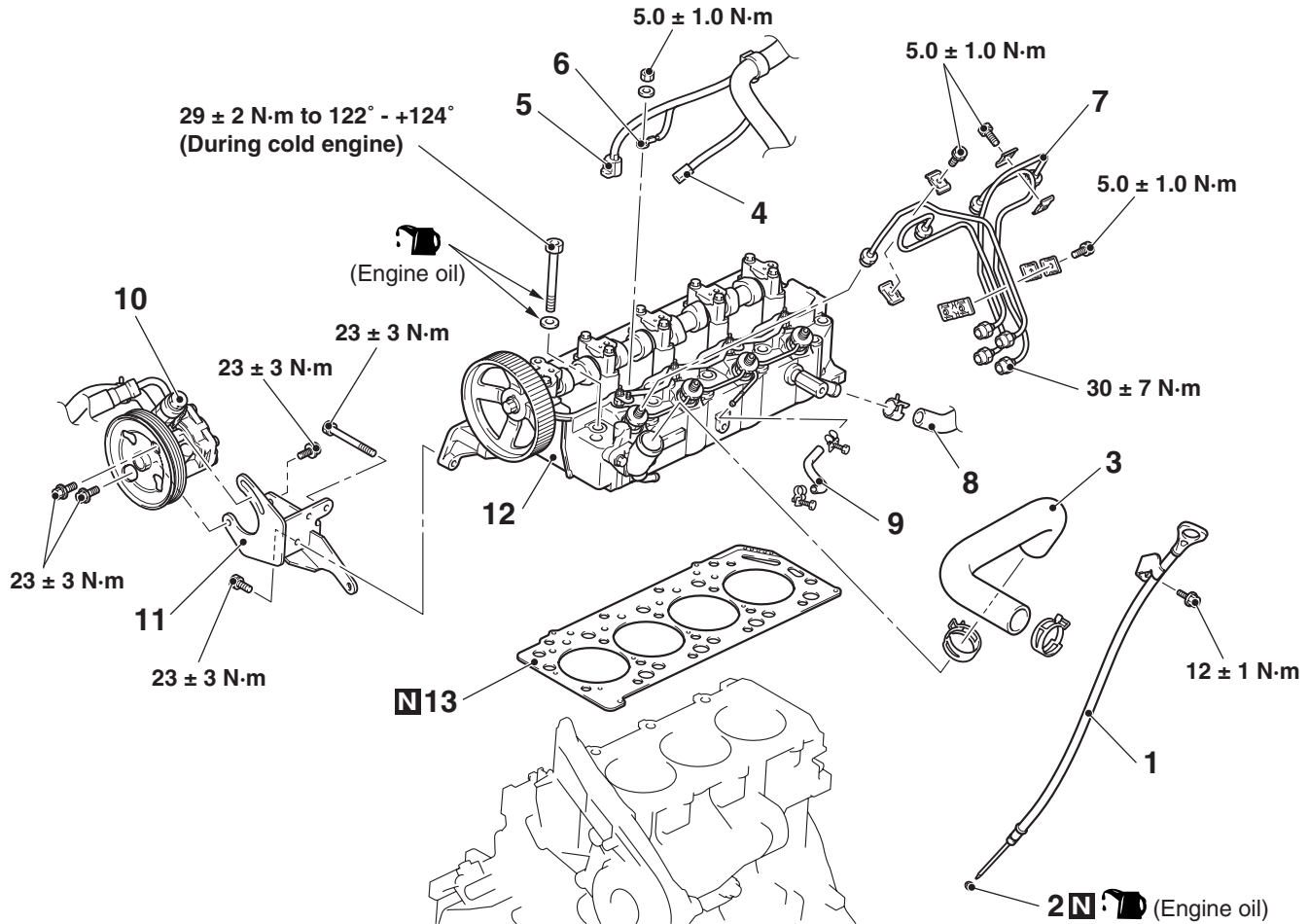
>>D<< CRANKSHAFT FRONT OIL SEAL
INSTALLATION

1. Attach special tool crankshaft front oil seal guide (MD998383) to the crankshaft and apply engine oil to the outer surface of the tool.
2. Using special tool crankshaft front oil seal installer (MD998382), press-fit the front oil seal into the front lower case.

CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

M1112004001692



AC502586AB

Removal steps

1. Oil level gauge and guide assembly
2. O-ring
3. Radiator upper hose
 - Rocker cover (Refer to P.11A-18).
4. Engine coolant temperature gauge unit connector
5. Engine coolant temperature sensor connector
6. Glow plug terminal

<<A>> >>D<<

<> >>C<<

<<C>>

<<D>> >>B<<
>>A<<

Removal steps (Continued)

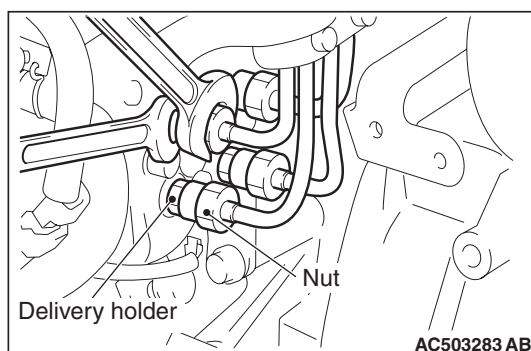
7. Fuel injection pipes
8. By-pass hose connection
9. Fuel hose
 - Water pipe C (Refer to GROUP 14 –Water hose and water pipe).
10. Power steering oil pump assembly
11. Power steering oil pump bracket
12. Cylinder head assembly
13. Cylinder head gasket

REMOVAL SERVICE POINTS**<<A>> RADIATOR UPPER HOSE DISCONNECTION**

After making mating marks on the radiator upper hose and the hose clamp, disconnect the radiator upper hose.

<> FUEL INJECTION PIPES REMOVAL**⚠ CAUTION**

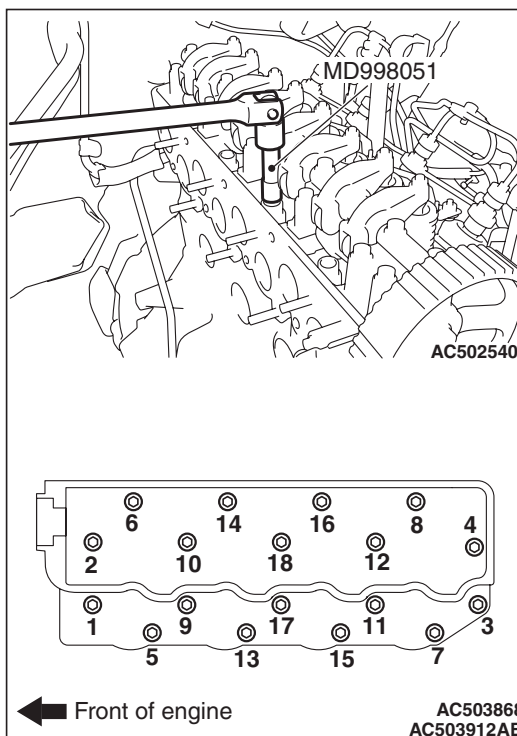
After disconnecting the injection pipe, plug the opening so that no foreign particles get inside the pump or into the injection nozzle.



When loosening nuts at both ends of injection pipe, hold the delivery holder (for pump side) and the injection nozzle assembly (for nozzle side) with wrench and loosen nut.

<<C>> POWER STEERING OIL PUMP ASSEMBLY REMOVAL

1. Remove the power steering oil pump assembly from the bracket with the hose attached.
2. Place the removed power steering oil pump assembly in a place where it will not be a hindrance when removing and installing the engine assembly, and tie it with cord.

<<D>> CYLINDER HEAD ASSEMBLY REMOVAL

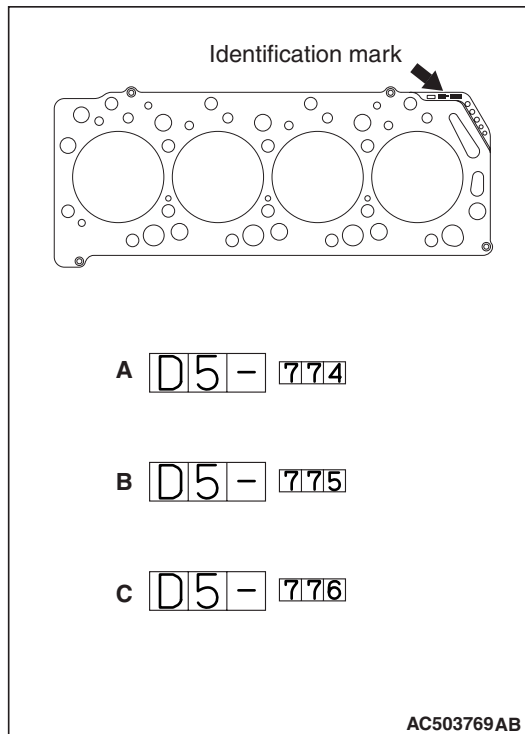
Using special tool cylinder head bolt wrench (MD998051), loosen the cylinder head bolts in two or three steps in the order of the numbers shown in the illustration.

INSTALLATION SERVICE POINTS

>>A<< CYLINDER HEAD GASKET INSTALLATION

⚠ CAUTION

The thickness of the original cylinder head gasket is selected according to the protrusion amount of the piston. Therefore, if the piston or the connecting rod is replaced, the protrusion amount may be changed. Always select a correct gasket by measuring the protrusion amount. (Refer to GROUP 11B> –Cylinder Head and Valves).



When replacing the cylinder head gasket only, confirm the gasket identification mark, and then select a replacement part according to the following table.

Spec	Identification mark (size)	Part number
A	D5-774 (fitted thickness 1.45 ± 0.04)	MD377774
B	D5-774 (fitted thickness 1.50 ± 0.04)	MD377775
C	D5-774 (fitted thickness 1.55 ± 0.04)	MD377776

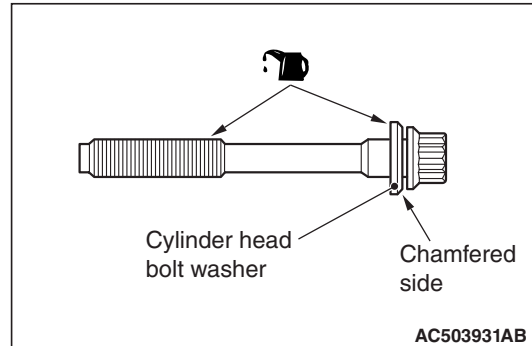
>>B<< CYLINDER HEAD ASSEMBLY INSTALLATION

1. Select a cylinder head gasket of correct specification.

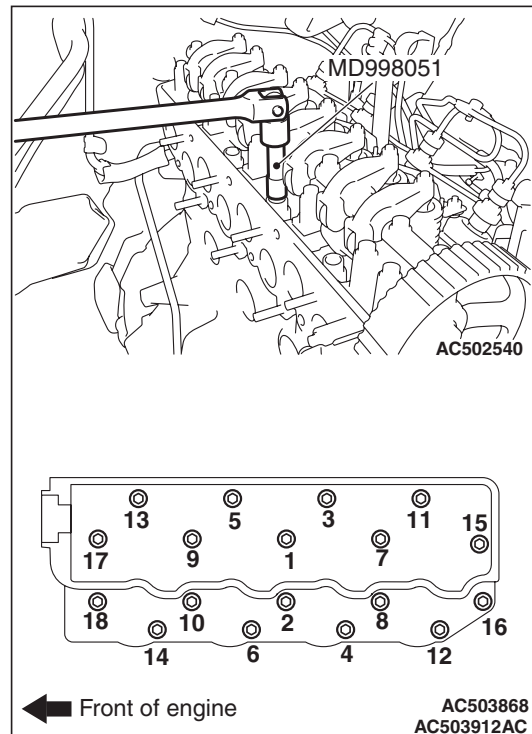
⚠ CAUTION

Do not allow foreign material to enter the engine coolant or oil passages and the cylinder.

2. Clean the cylinder head assembly and the cylinder block mating surfaces with a scraper or a wire brush.



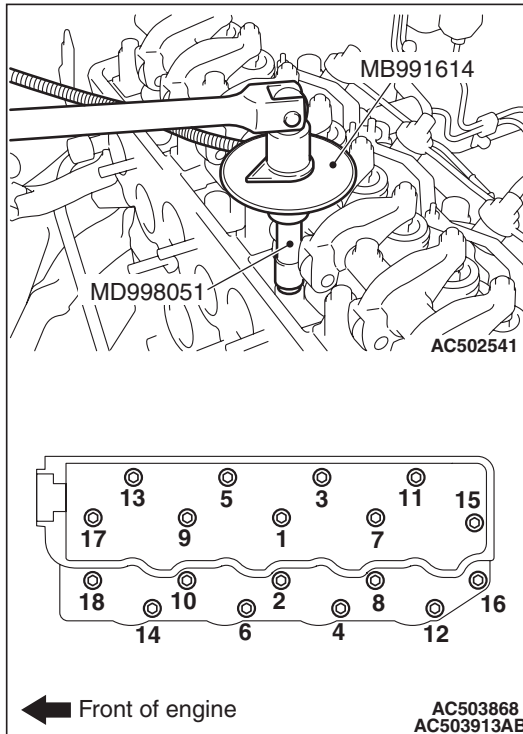
3. Install the cylinder head bolt washer to the cylinder head bolt so that the washer chamfered side faces as shown.
4. Apply a small amount of engine oil to the cylinder head bolt thread and the washer.



5. Tighten the cylinder head bolts according to the following procedure (angle-tightening procedure).
 - (1) Use special tool cylinder head bolt wrench (MD998051) to tighten the cylinder head bolts in the order of illustrated numbers to 29 ± 2 N·m.

CAUTION

- If the cylinder head bolt is tightened less than the specified lower limit of 120 degree angle, the bolt may become loose. Be sure to tighten correctly.
- If the cylinder head bolt is tightened in excess of the specified upper limit of 124 degree angle, loosen the bolt completely and repeat the entire procedures.

**>>C<< FUEL INJECTION PIPES
INSTALLATION**

When tightening the nuts at both ends of the fuel injection pipe, hold the delivery holder (for pump side) and the injection nozzle assembly (for nozzle side) with a wrench, and tighten the nuts to the specified torque.

Tightening torque: 30 ± 7 N·m

**>>D<< RADIATOR UPPER HOSE
CONNECTION**

To reuse the radiator upper hose, align the mating marks that were made during removal, and then install the hose clamp.

- (2) Using special tool angle gauge (MB991614), tighten the cylinder head bolts in the illustrated sequence by a further 120 to 124 degree angle.

TIMING BELT

REMOVAL AND INSTALLATION

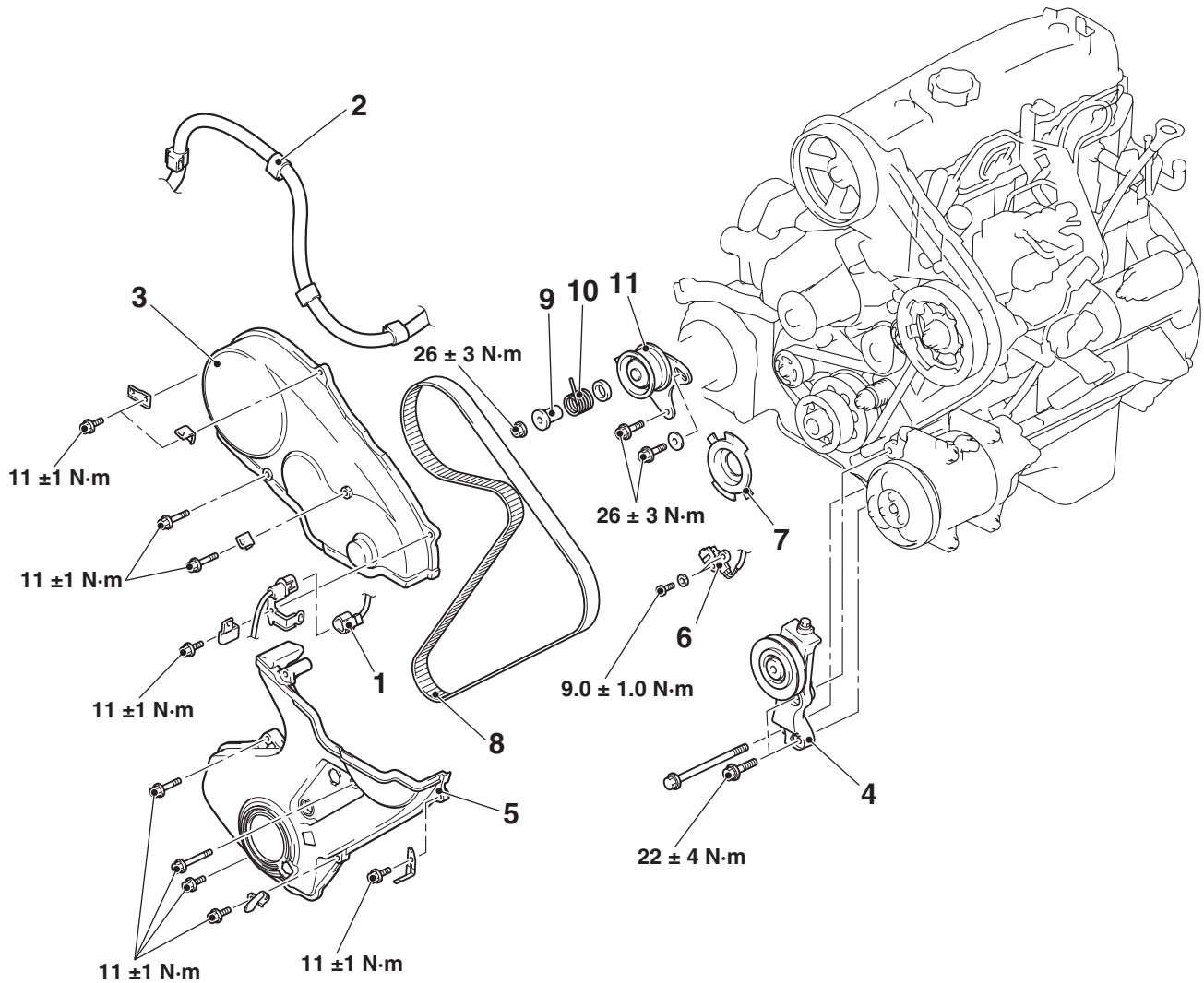
M1112004301358

Pre-removal Operation

- Cooling Fan Removal (Refer to GROUP 14 –Radiator Fan).

Post-installation Operation

- Cooling Fan Installation (Refer to GROUP 14 –Radiator Fan).
- Drive Belt Tension Check and Adjustment (Refer to P.11A-6).



AC502129AB

Removal steps

1. Crank angle sensor connector
2. Battery wiring harness connector
3. Timing belt front upper cover
4. Tension pulley and tension pulley bracket assembly
5. Timing belt front lower cover

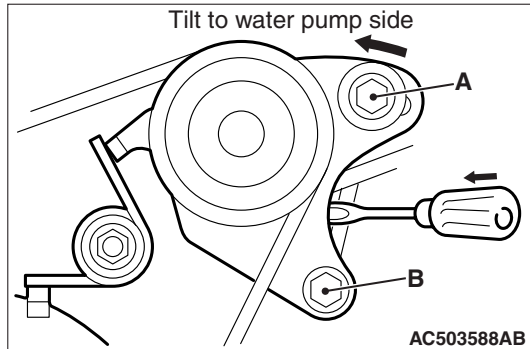
Removal steps (Continued)

6. Crank angle sensor
7. Crankshaft sensing blade
8. Timing belt
9. Tensioner spacer
10. Tensioner spring
11. Timing belt tensioner

REMOVAL SERVICE POINT

<<A>> TIMING BELT REMOVAL

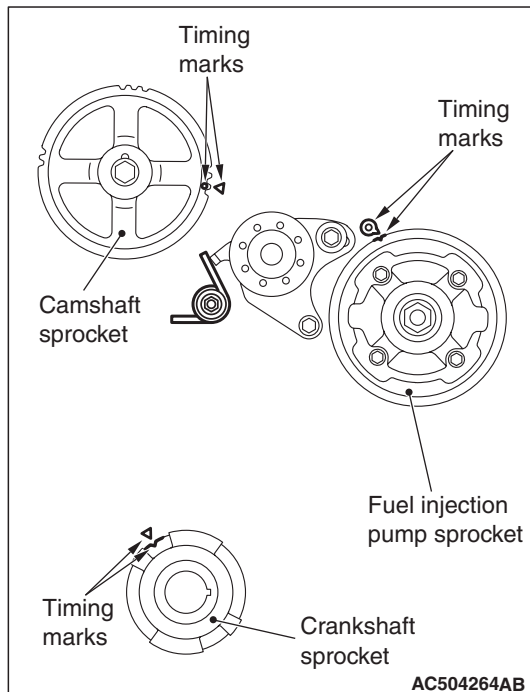
1. When reinstalling timing belt, mark an arrow at the belt to show rotation direction.



2. Loosen the timing belt tensioner mounting bolt A and B.
3. Push timing belt tensioner to water pump side and tighten the timing belt tensioner mounting bolt A and B. Secure so that timing tensioner will not move back.

INSTALLATION SERVICE POINTS

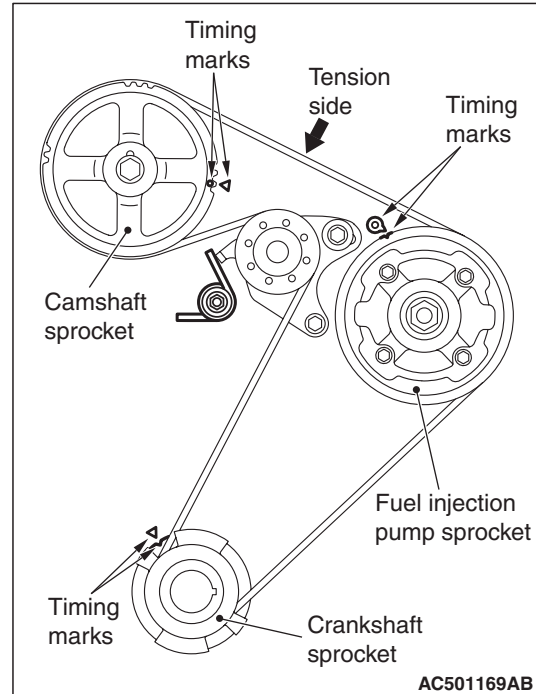
>>A<< TIMING BELT INSTALLATION



1. Align the timing marks of the 3 sprocket.
2. When reusing timing belt, make sure the arrow mark is pointing in the same direction as when the belt was removed.

CAUTION

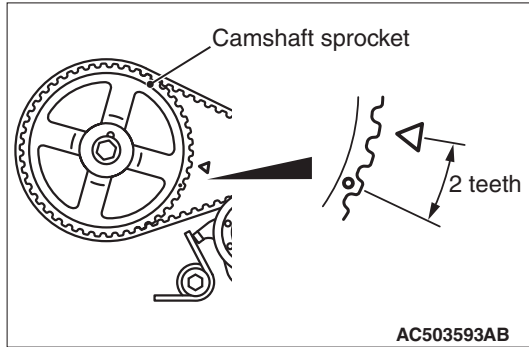
1. Engage the belt on the various sprockets while maintaining tension on the belt of tension side.
2. Align the injection pump sprocket with the timing mark, hold the sprocket so that it does not turn and engage the belt.



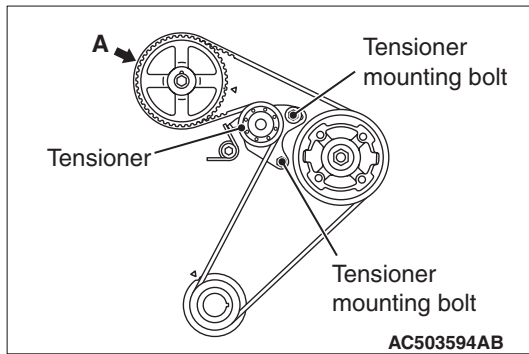
3. Install the timing belt to the crankshaft sprocket, to injection pump sprocket, to tensioner and to camshaft sprocket in that order. Being careful not to allow deflection on the tension side of the timing belt.
4. Loosen the tensioner mounting bolts and apply tension with the spring.

CAUTION

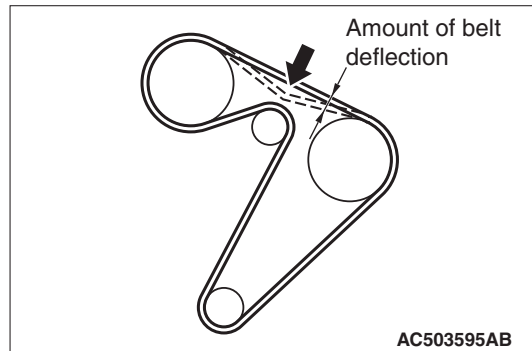
1. When turning the crankshaft in step 5, strictly observe the specified amount of rotation (2 teeth on the camshaft sprocket) in order to apply a constant force to the tension side of the belt.
2. Do not turn the crankshaft anti-clockwise.
3. Do not touch the belt during adjustment.



5. Turn the crankshaft clockwise and stop at the second lobe of the camshaft sprocket.



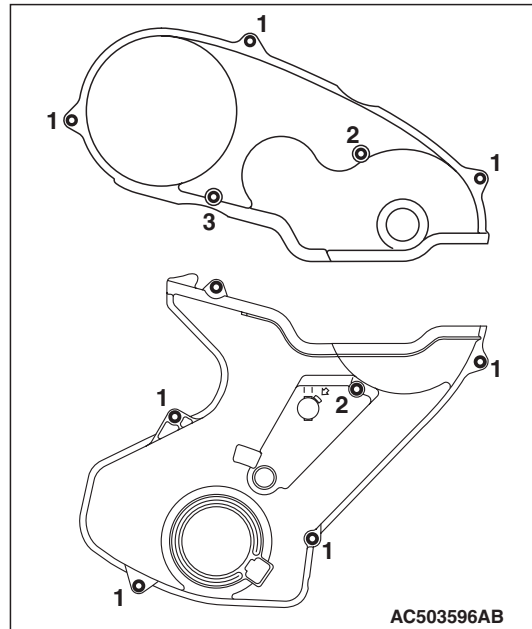
6. Make sure that the part indicated by arrow A does not float upward.
7. Tighten the tensioner mounting bolts, starting with the bolt in the elongated hole. If the lower bolt is tightened first, belt tension will become too tight.
8. Turn the crankshaft anti-clockwise and align the timing mark. Next, make sure that the timing marks of all sprockets are aligned.



9. Press on the centre of the bolt with an index finger to check the amount of deflection.

Standard value: 4 – 5 mm

>>B<< TIMING BELT FRONT LOWER COVER/TIMING BELT FRONT UPPER COVER INSTALLATION



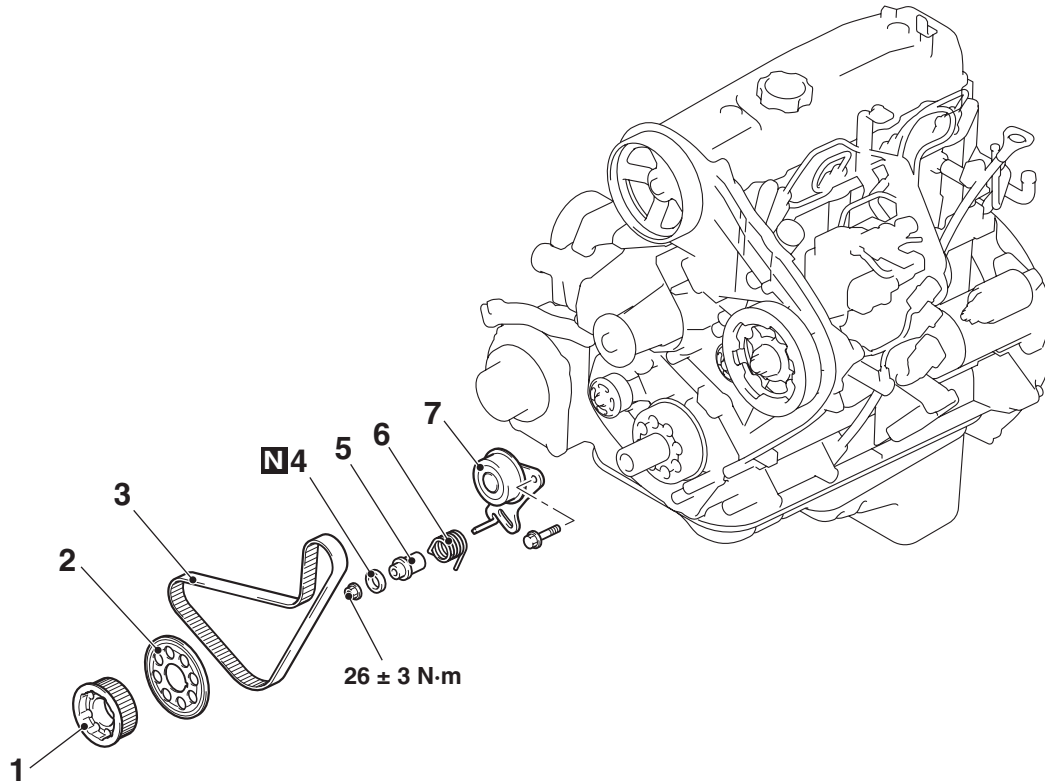
Install the bolts to the timing belt front lower cover and timing belt front upper cover at the shown position.

No.	Bolt diameter × length mm
1	6 × 22
2	6 × 50
3	6 × 60

TIMING BELT B

REMOVAL AND INSTALLATION

M1112004600185



AC502130AB

Removal steps

- Timing belt (Refer to P.11A-31).
- 1. Crankshaft sprocket
- 2. Flange
- 3. Timing belt B

<<A>> >>A<<

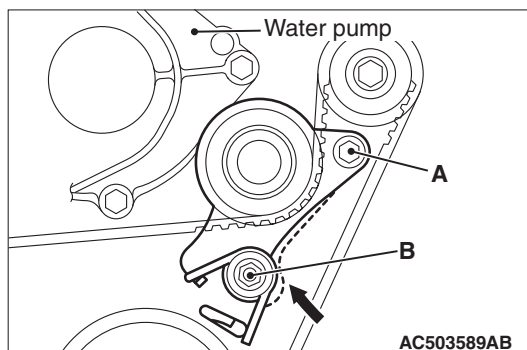
Removal steps (Continued)

- 4. Gasket
- 5. Tensioner spacer B
- 6. Tensioner spring B
- 7. Timing belt tensioner B

REMOVAL SERVICE POINT

<<A>> TIMING BELT B REMOVAL

1. When reinstalling timing belt B, mark an arrow at the belt to show rotation direction.

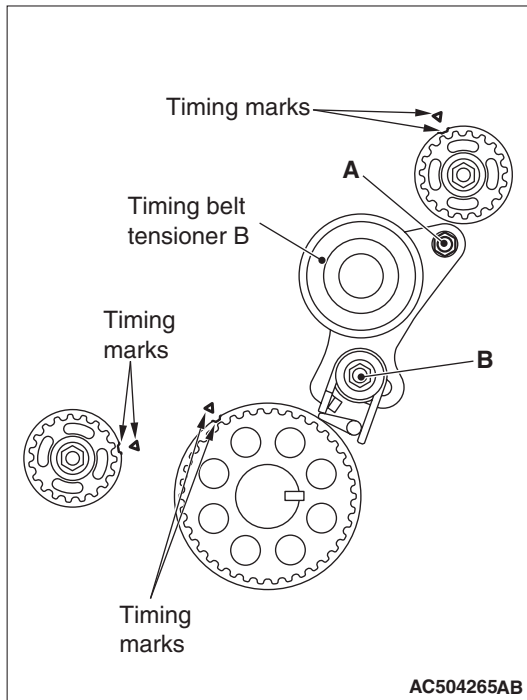


2. Loosen the timing belt tensioner mounting bolt A and nut B.

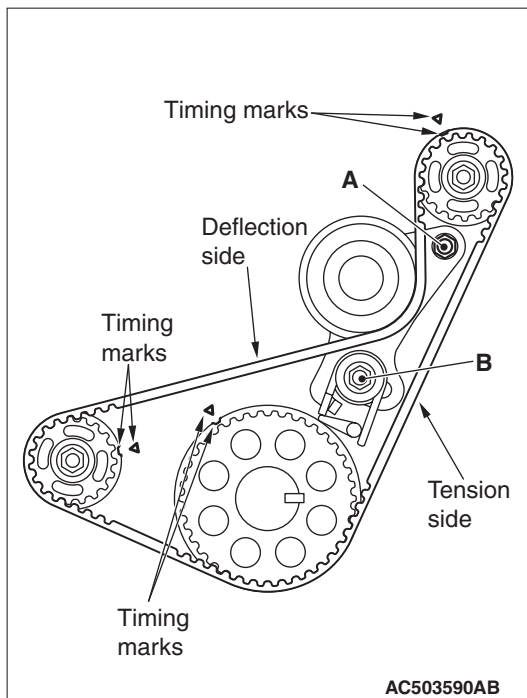
3. Push timing belt tensioner to water pump side and tighten the timing belt tensioner mounting bolt A and nut B. Secure so that timing belt tensioner will not move back.

INSTALLATION SERVICE POINT

>>A<< TIMING BELT B INSTALLATION

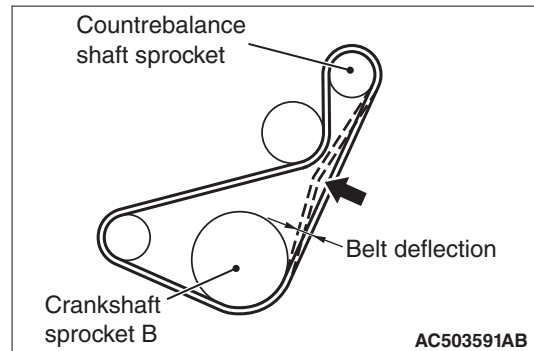


1. Align the timing marks of the 3 sprocket.
2. When reusing timing belt B, make sure the arrow mark is pointing in the same direction as when the belt was removed.



3. Install timing belt B and make sure there is no deflection on the tension side.
4. Press the deflection side of timing belt B with the hand and fully stretch the tensioner side.
5. Make sure that the timing marks are aligned.
6. Loosen the tensioner mounting bolt and nut so that only the pressure of the spring is applied to timing belt B.
7. Tighten the tensioner mounting bolt A and nut B, tightening the nut first. If the bolt is tightened first, the tensioner will move and tension the belt.

Tightening torque: $26 \pm 3 \text{ N} \cdot \text{m}$



8. Press in the direction of the arrow in the figure with the index finger to check the amount of deflection.

Standard value: 4 –5 mm

ENGINE ASSEMBLY

REMOVAL AND INSTALLATION

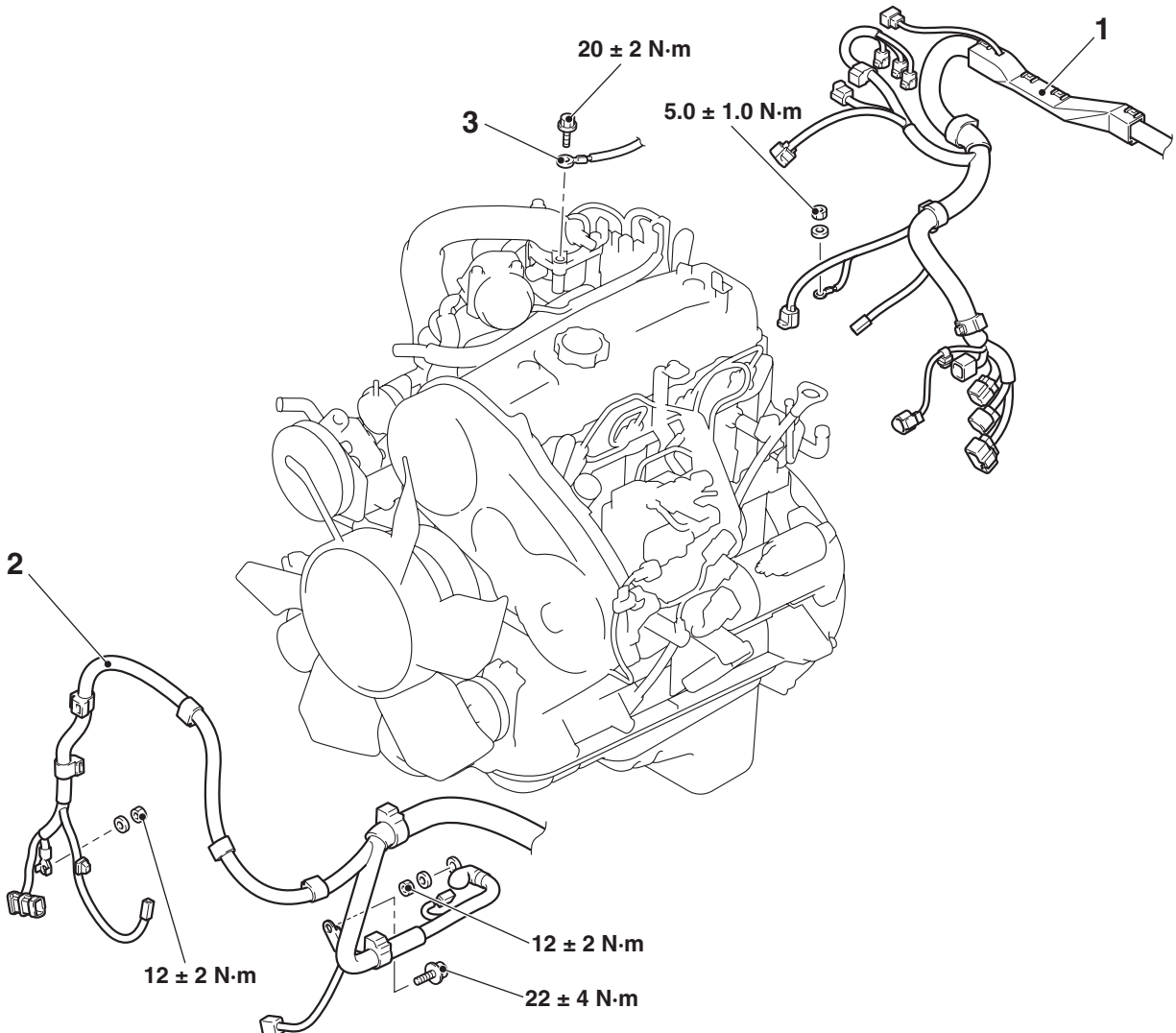
M1112001002221

Pre-removal Operation

- Engine Oil Draining (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement).
- Engine Coolant Draining (Refer to GROUP 14 - On-vehicle Service, Engine Coolant Replacement).
- Engine Room Under Cover Removal (Refer to GROUP 51 – Under Cover).
- Hood Removal (Refer to GROUP 42 –Hood).
- Air Cleaner Removal (Refer to GROUP 15 –Air Cleaner).
- Battery and Battery Tray Removal
- Radiator Removal (Refer to GROUP 14 –Radiator).
- Windshield Wiper assembly Removal (Refer to GROUP 51 – Windshield Wiper).
- Cowl Top Panel Front Removal
- Front Exhaust Pipe Removal (Refer to GROUP 15 –Exhaust Pipe, Main Muffler and Catalytic Converter).

Post-installation Operation

- Front Exhaust Pipe Installation (Refer to GROUP 15 –Exhaust Pipe, Main Muffler and Catalytic Converter).
- Cowl Top Panel Front Installation
- Windshield Wiper assembly Installation (Refer to GROUP 51 – Windshield Wiper).
- Radiator Installation (Refer to GROUP 14 –Radiator).
- Battery and Battery Tray Installation
- Air Cleaner Installation (Refer to GROUP 15 –Air Cleaner).
- Hood Installation (Refer to GROUP 42 –Hood).
- Engine Coolant Refilling (Refer to GROUP 14 - On-vehicle Service, Engine Coolant Replacement).
- Engine Oil Refilling (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement).
- Engine Room Under Cover Installation (Refer to GROUP 51 – Under Cover).
- Fuel Line Air-bleeding (Refer to GROUP 13A –On-vehicle Service, Evacuation of Water from Fuel Filter).
- Drive Belt Tension Check and Adjustment (Refer to [P.11A-6](#)).



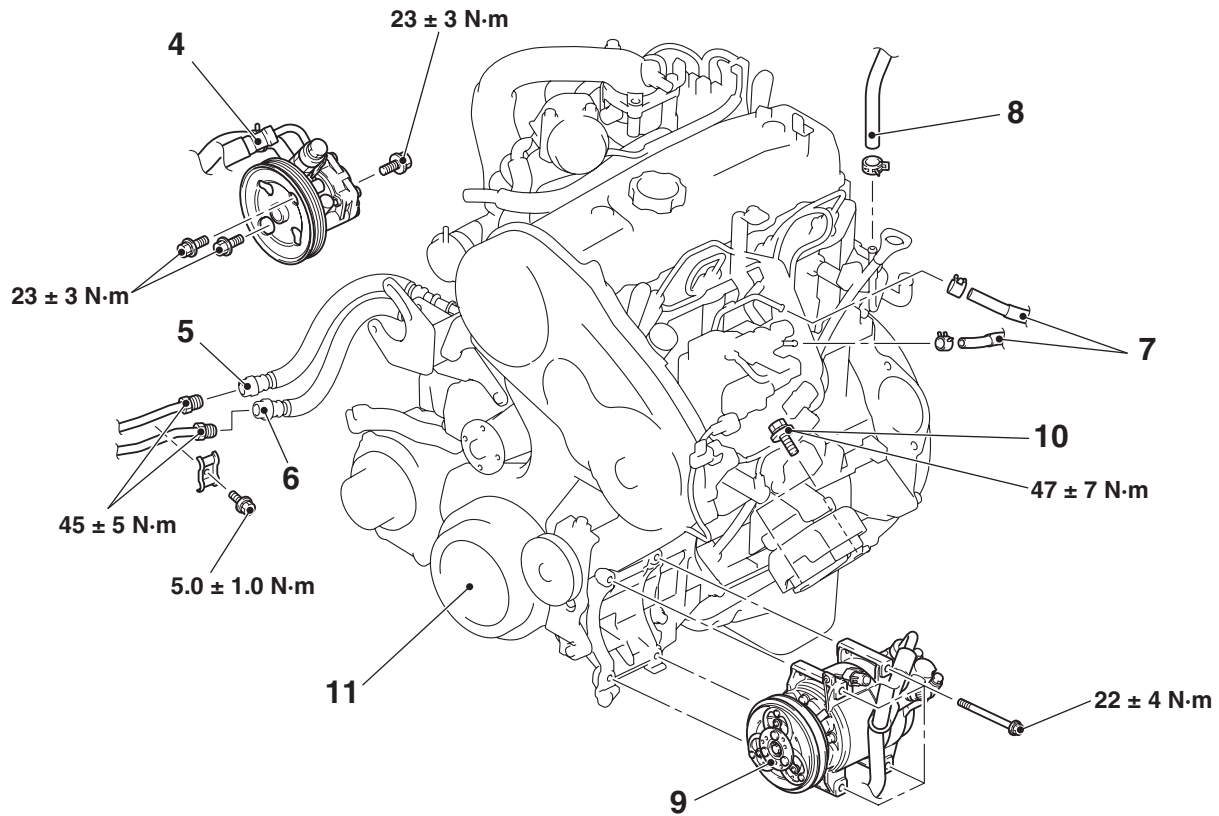
AC501848AB

Removal steps

1. Control wiring harness connection

Removal steps (Continued)

2. Battery wiring harness connection
3. Earth cable connection



AC502602AB

<<A>>

- Cooling fan (Refer to GROUP 14 – Radiator fan).
- 4. Power steering oil pump assembly
- 5. Engine oil cooler feed hose connection
- 6. Engine oil cooler return hose connection
- 7. Fuel hoses connection

<>

<<C>>

>>A<<

- 8. Brake booster vacuum hose connection
- 9. A/C compressor assembly
 - Transmission assembly (Refer to GROUP 22A –Transmission assembly).
 - Starter motor (Refer to GROUP 16 –Starter motor).
- 10. Engine mounting bolts
- 11. Engine assembly

REMOVAL SERVICE POINTS**<<A>> POWER STEERING OIL PUMP ASSEMBLY REMOVAL**

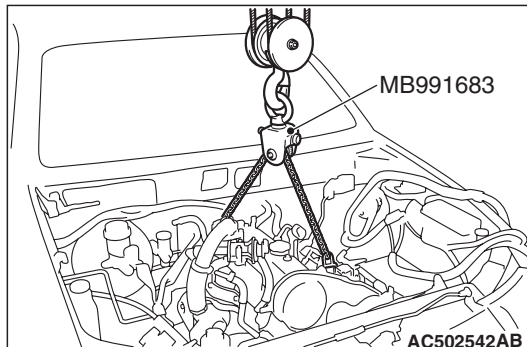
1. With the hose installed, remove the power steering oil pump assembly from the engine assembly.
2. After removing the power steering oil pump assembly, secure it with a cord in the location where the removal and installation of the engine assembly cannot be hindered.

<> A/C COMPRESSOR ASSEMBLY REMOVAL

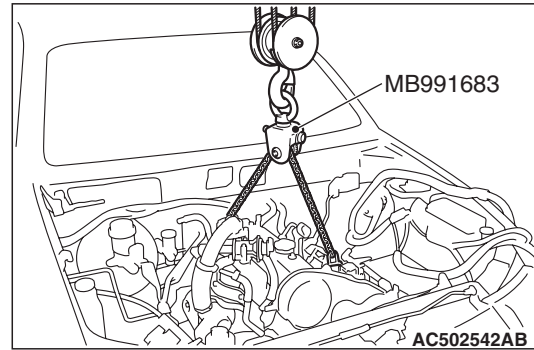
1. With the hose installed, remove the A/C compressor assembly from the bracket.
2. After removing the A/C compressor assembly, secure it with a cord in the location where the removal and installation of the engine assembly cannot be hindered.

<<C>> ENGINE ASSEMBLY REMOVAL

1. Check that all cables, hoses and wiring harness connectors are disconnected from the engine



2. Lift special tool sling chain set (MB991683) and chain block slowly to remove the engine assembly upwards from the engine compartment.

INSTALLATION SERVICE POINT**>>A<< ENGINE ASSEMBLY INSTALLATION**

1. Use special tool sling chain set (MB991683) and chain block to lift the engine assembly in the same manner as removal.
2. Install the engine assembly, being careful not to pinch the cables, hoses or wiring harness connectors.

GROUP 12

**ENGINE
LUBRICATION**

CONTENTS

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SEALANTS	12-2	ENGINE OIL FILTER REPLACEMENT.....	12-4
LUBRICANTS	12-3	OIL PRESSURE CHECK	12-6
SPECIAL TOOLS	12-3	ENGINE OIL COOLER	12-7
ON-VEHICLE SERVICE	12-3	REMOVAL AND INSTALLATION	
		<4D5-SOHC>	12-7
		REMOVAL AND INSTALLATION	
		<4D5-DOHC>	12-8
		REMOVAL AND INSTALLATION <4M4> ..	12-9

GENERAL INFORMATION

M1121000100625

The lubrication method is a fully force-fed, full-flow filtration type.

- Air-cooled engine oil cooler have been adopted, and installed forward of the radiator. <4D5-SOHC>
- Water-cooled oil cooler have been adopted, and which is built into the oil filter bracket has been adopted. <4D5-DOHC>
- Water-cooled oil cooler have been adopted, and which is built into the crankcase has been adopted. <4M4>

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 under-pants, 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 SPECIFICATION

M1121000300328

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

SEALANTS

M1121000500366

Item	Specified sealant	Remark
Oil pressure switch	3M ATD Part No. 8660 or equivalent	Semi-drying sealant
Engine oil cooler taper plug	3M Nut Locking Part No.4171 or equivalent	Drying sealant
Engine oil filter bracket taper plug		

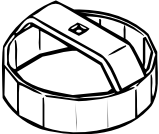
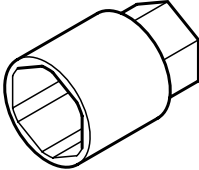
LUBRICANTS

M1121000400842

Item	4D5-SOHC	4D5-DOHC	4M4
Engine oil ACEA classification	B1, B2, B3 or B4		
Engine oil API classification	CD or higher		
Engine oil quantity L	Oil pan	6.5	7.0
	Oil filter	0.8	1.0
	Oil cooler	0.3	1.3
	Total	7.6	9.3

SPECIAL TOOLS

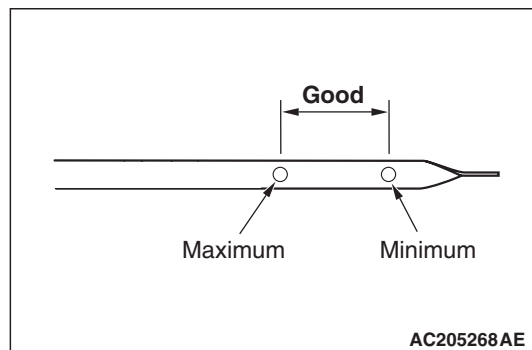
M1121000600578

Tool	Number	Name	Use
 MH061590	MH061590	Oil filter wrench	Removal and installation of engine oil filter [When using the oil filter of MD069782 <4D5-SOHC>, MD326489 <4D5-SOHC> or 1230A045 <4D5-DOHC>]
	MD998012	Oil pressure switch wrench	Removal and installation of oil pressure switch

ON-VEHICLE SERVICE

ENGINE OIL CHECK

M1121000900579



AC205268AE

1. Pull out the engine oil 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

M1121001000847

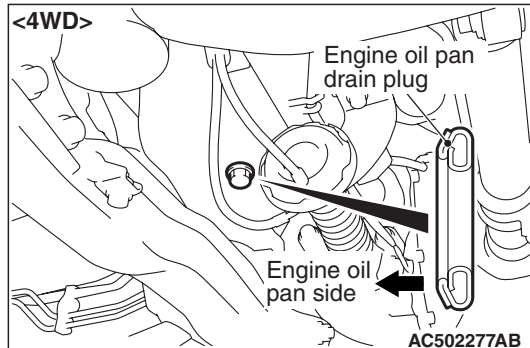
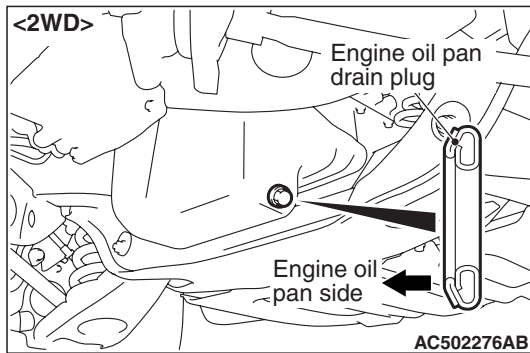
1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80 °C to 90 °C.

2. Remove the engine oil filler cap.

CAUTION

Use care as oil could be hot.

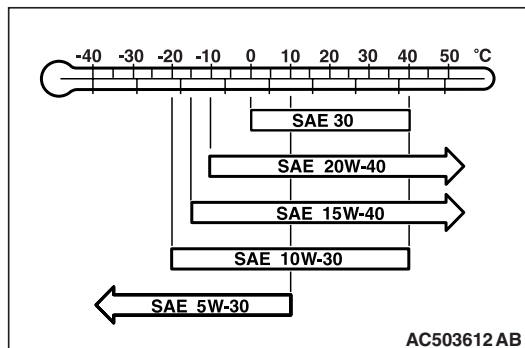
3. Remove the drain plug to drain oil.



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: $39 \pm 5 \text{ N} \cdot \text{m}$

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): ACEA B1, B2, B3 or B4/API CD or higher

Total quantity (Includes volume inside oil filter and oil cooler):

- <4D5-SOHC> 7.6 L
- <4D5-DOHC> 7.4 L
- <4M4> 9.3 L

6. Install the engine oil filler cap.

7. Check oil level.

ENGINE OIL FILTER REPLACEMENT

M1121001100640

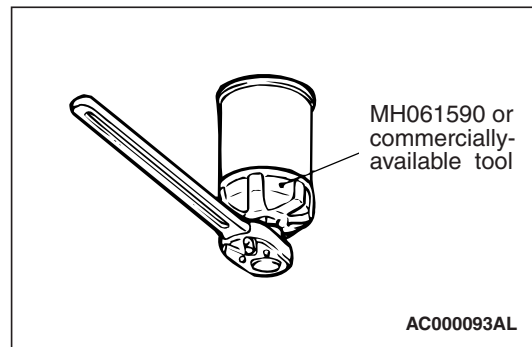
1. Start the engine and allow it to warm up until the temperature of the coolant reaches $80 \text{ }^\circ\text{C}$ to $90 \text{ }^\circ\text{C}$.

2. Remove the engine oil filler cap.

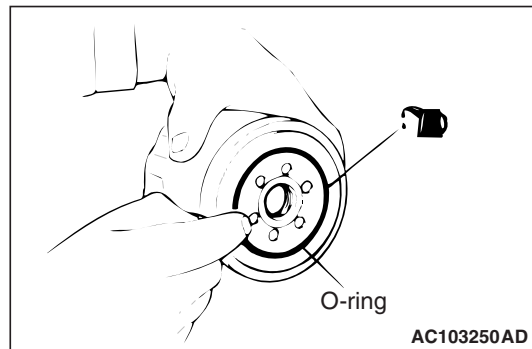
CAUTION

Use care as oil could be hot.

3. Remove the drain plug to drain oil.
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.



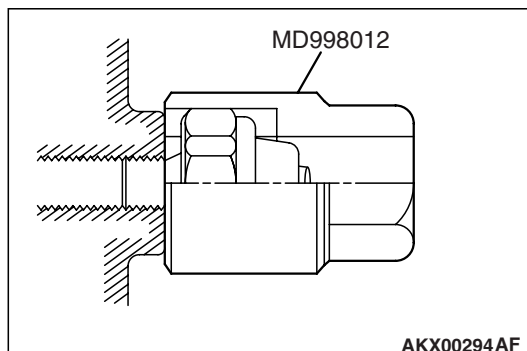
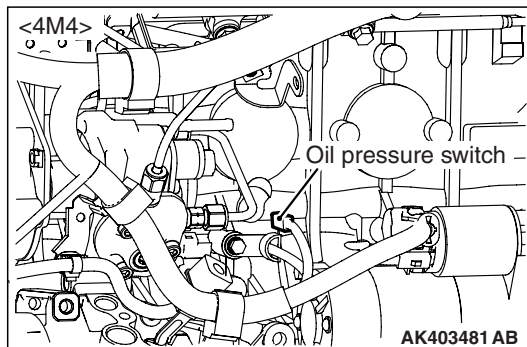
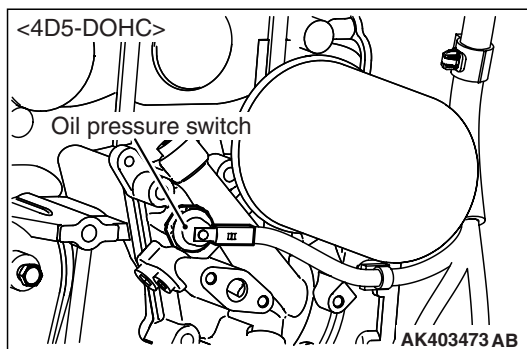
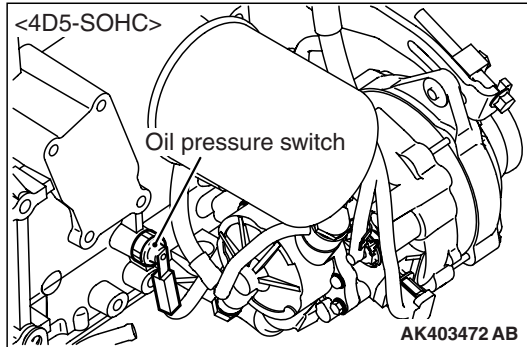
7. Apply a small amount of engine oil to the O-ring of the new oil filter.
8. Once the O-ring of the oil filter is touching the flange, use the respective tool in the following table to tighten to the specified torque.
9. Install the drain plug and refill the engine oil (Refer to P.12-3).
10. Race the engine 2-3 times, and check to be sure that no engine oil leaks from installation section of the oil filter.

Engine model	Oil filter number	Special tool	Tightening torque
4D5-SOHC	MD069782	Oil filter wrench (MH061590) or equivalent	Approximately 5/8 turn (20 ± 2 N· m)
	MD326489	Oil filter wrench (MH061590) or equivalent	Approximately 3/4 turn (22 ± 2 N· m)
4D5-DOHC	1230A045	Oil filter wrench (MH061590) or equivalent	Approximately 3/4 turn (22 ± 2 N· m)
4M4	1230A046	Commercially available tool	Approximately 3/4 turn (22 ± 2 N· m)

OIL PRESSURE CHECK

M1121002300711

1. Check engine oil quantity.

CAUTION

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

2. Use the special tool Oil pressure switch wrench (MD998012) to remove the oil pressure switch.

NOTE: Remove the terminal of oil pressure switch where the special tool Oil pressure switch wrench (MD998012) is not fitted.

3. Install the oil pressure gauge.

NOTE: Use an adapter of PT 1/8 thread.

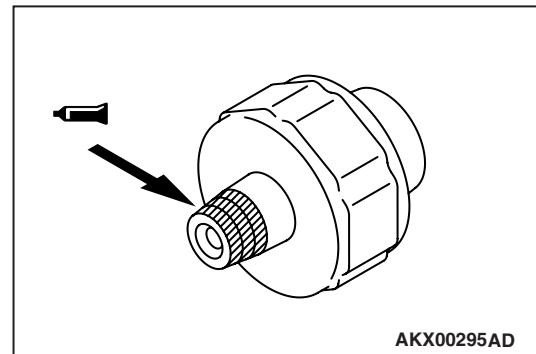
4. Run the engine to warm it.
5. After the engine has been warmed up, check that oil pressure is within the standard value.

Standard value:

At idle: 29 kPa or more

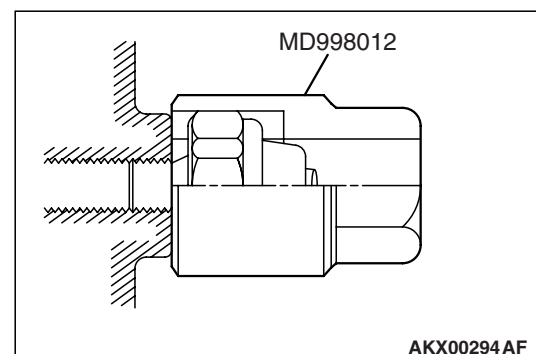
At 3,500 r/min: 294 –686 kPa

6. Remove the oil pressure gauge.



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

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

CAUTION

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

8. Use the special tool Oil pressure switch wrench (MD998012) to tighten the oil pressure switch to the specified torque.

<4D5> Tightening torque: 10 ± 2 N·m

<4M4> Tightening torque: 19 ± 3 N·m

ENGINE OIL COOLER

REMOVAL AND INSTALLATION <4D5-SOHC>

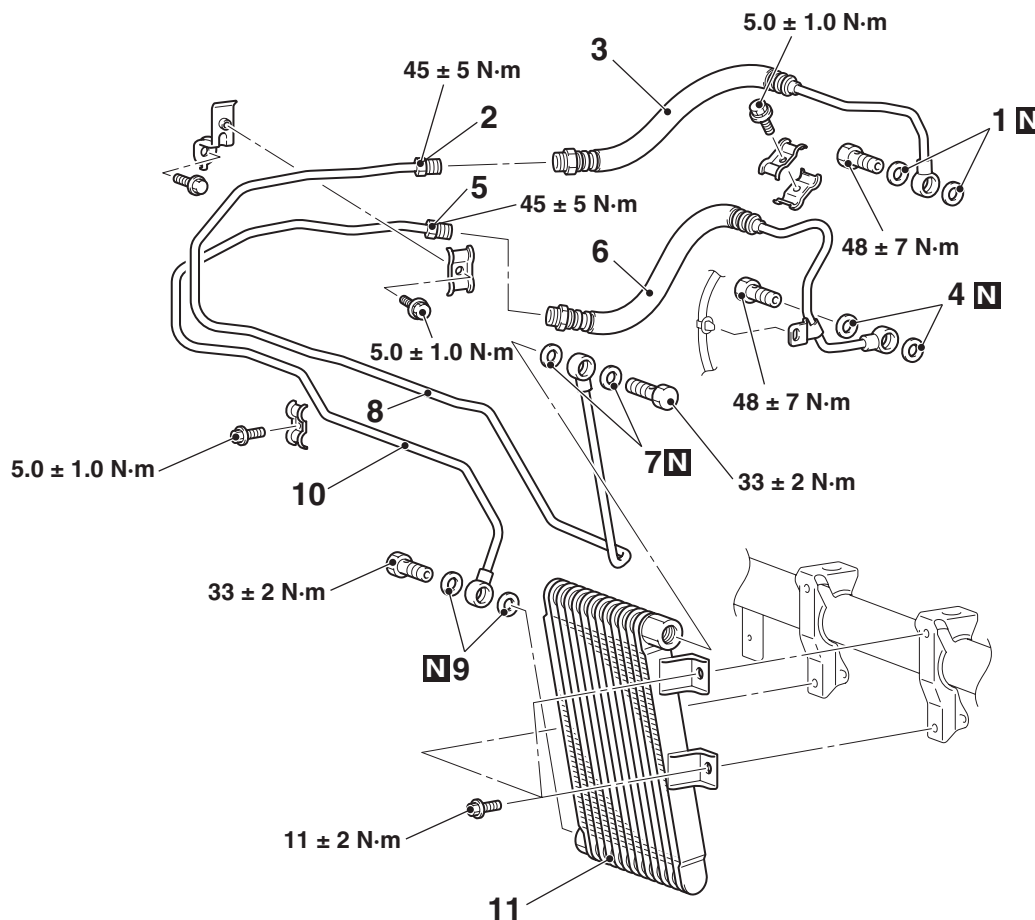
M1121001300246

Pre-removal Operation

- Engine Oil Draining (Refer to P.12-3).
- Engine Room Under Cover Removal (Refer to GROUP 51 -Under Cover).

Post-installation Operation

- Engine Room Under Cover Installation (Refer to GROUP 51 -Under Cover).
- Engine Oil Refilling (Refer to P.12-3).



AC501401AB

Removal steps

1. Engine oil cooler hose gaskets
2. Engine oil cooler feed tube connection
3. Engine oil cooler feed hose
4. Engine oil cooler hose gaskets
5. Engine oil cooler return tube connection

Removal steps (Continued)

6. Engine oil cooler return hose
7. Engine oil cooler tube gaskets
8. Engine oil cooler feed tube
9. Engine oil cooler tube gaskets
10. Engine oil cooler return tube
11. Engine oil cooler

REMOVAL AND INSTALLATION <4D5-DOHC>

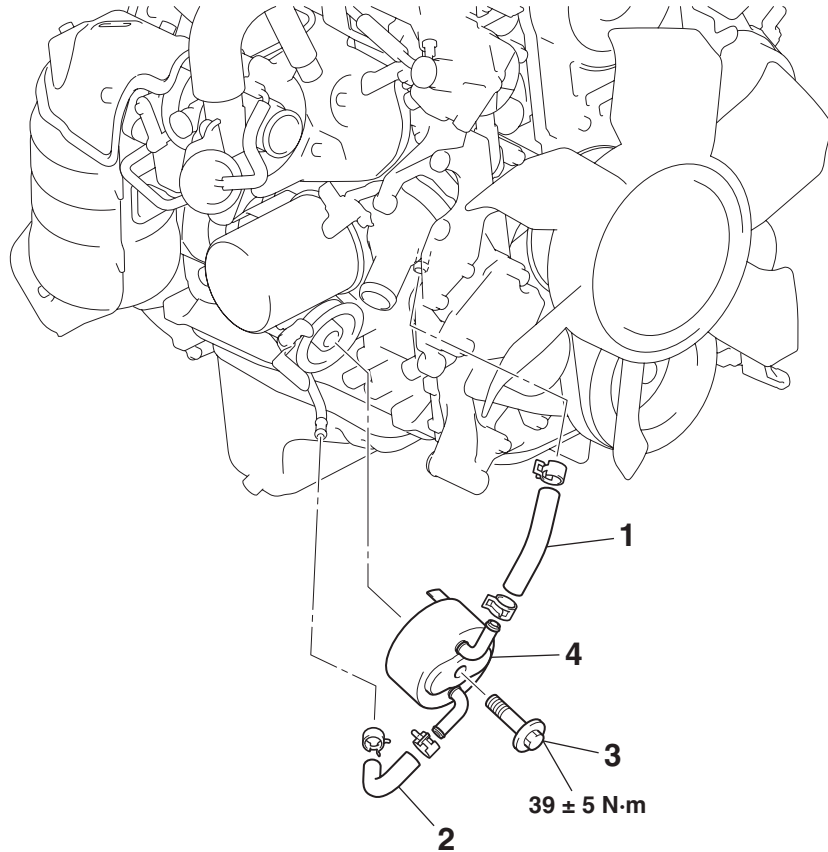
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Pre-removal Operation

- Engine Room Under Cover Removal (Refer to GROUP 51 –Under Cover) <2WD>.
- Under Skid Plate and Engine Room Under Cover Removal (Refer to GROUP 51 –Under Cover) <4WD>.
- Engine Coolant Draining (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Engine Oil Draining (Refer to P.12-3).
- Alternator Removal (Refer to GROUP 16 –Alternator).

Post-installation Operation

- Alternator Installation (Refer to GROUP 16 –Alternator).
- Engine Coolant Refilling (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Engine Oil Refilling (Refer to P.12-3).
- Engine Room Under Cover Installation (Refer to GROUP 51 –Under Cover) <2WD>.
- Under Skid Plate and Engine Room Under Cover Installation (Refer to GROUP 51 –Under Cover) <4WD>.



AC502934AB

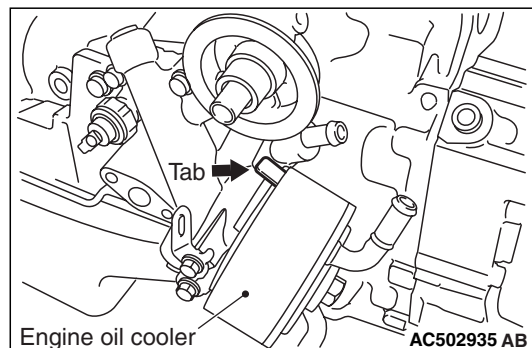
Removal steps

1. Water hose
2. Water hose
3. Engine oil cooler bolt
4. Engine oil cooler

>>A<<

INSTALLATION SERVICE POINT

>>A<< ENGINE OIL COOLER INSTALLATION



Position the tab as shown in the illustration.

REMOVAL AND INSTALLATION <4M4>

M1121001300213

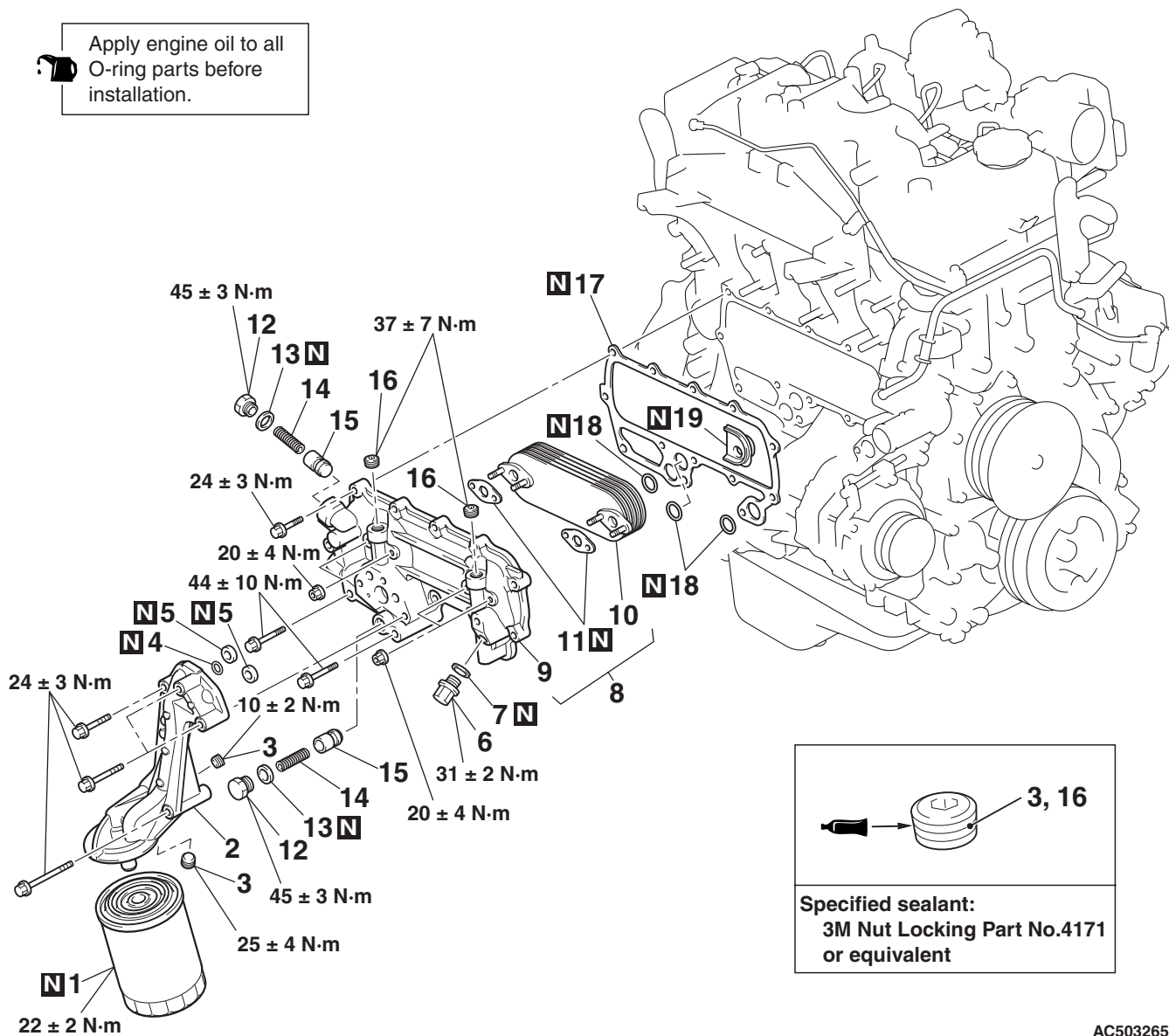
Pre-removal Operation

- Under Skid Plate and Engine Room Under Cover Removal (Refer to GROUP 51 –Under Cover).
- Engine Oil Draining (Refer to P.12-3).
- Exhaust Manifold Removal (Refer to GROUP 15 – Exhaust Manifold and Turbocharger).

Post-installation Operation

- Exhaust Manifold Installation (Refer to GROUP 15 – Exhaust Manifold and Turbocharger).
- Engine Oil Refilling (Refer to P.12-3).
- Under Skid Plate and Engine Room Under Cover Installation (Refer to GROUP 51 –Under Cover).

Apply engine oil to all O-ring parts before installation.



Specified sealant:
3M Nut Locking Part No.4171
or equivalent

Removal steps

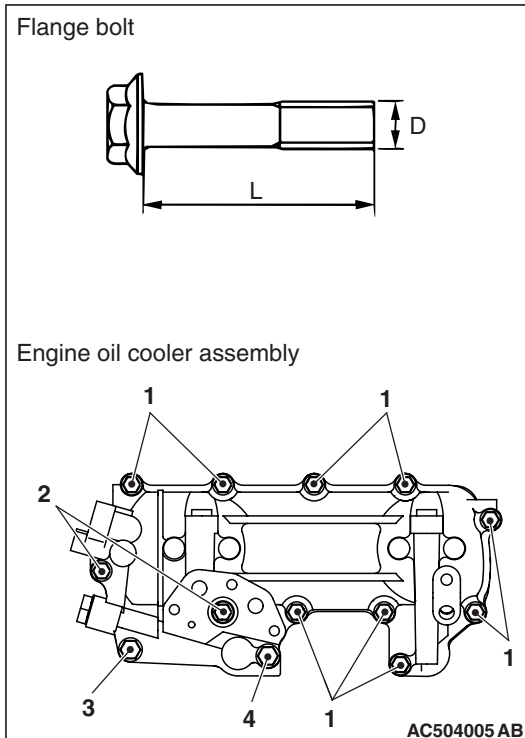
1. Engine oil filter assembly
- >>B<< 2. Engine oil filter bracket assembly
3. Engine oil filter bracket taper plugs
4. O-ring
5. Engine oil cooler gaskets
6. Engine oil cooler water drain plug
7. Engine oil cooler water drain gasket
- >>A<< 8. Engine oil cooler assembly
9. Engine oil cooler cover
10. Engine oil cooler core

Removal steps (Continued)

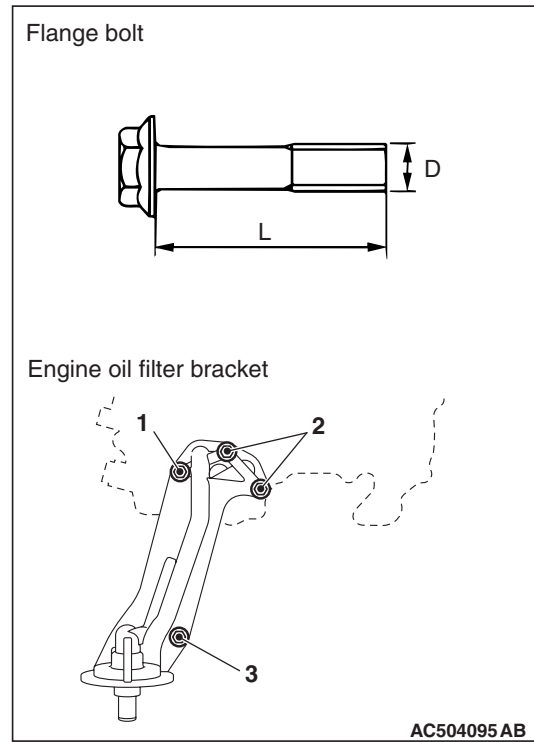
11. Engine oil cooler gaskets
12. Engine oil cooler plugs
13. Engine oil cooler gaskets
14. Engine oil cooler relief springs
15. Engine oil cooler relief plungers
16. Engine oil cooler taper plugs
17. Engine oil cooler gasket
18. O-rings
19. Engine oil cooler water separate lip

AC503265 AB

INSTALLATION SERVICE POINTS
>>A<< ENGINE OIL COOLER ASSEMBLY
INSTALLATION



>>B<< ENGINE OIL FILTER BRACKET
ASSEMBLY INSTALLATION



Symbol No.	Part name (head mark)	D×L mm	Tightening torque N· m
1	Flange bolt (7T)	8 × 32	24 ± 3
2	Flange bolt (7T)	8 × 55	24 ± 3
3	Flange bolt (7T)	10 × 55	44 ± 10
4	Flange bolt (7T)	10 × 80	44 ± 10

Symbol No.	Part name (head mark)	D×L mm	Tightening torque N· m
1	Flange bolt (7T)	8 × 40	24 ± 3
2	Flange bolt (7T)	8 × 55	24 ± 3
3	Flange bolt (7T)	8 × 75	24 ± 3

GROUP 15

INTAKE AND EXHAUST

CONTENTS

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ON-VEHICLE SERVICE	15-4	EXHAUST MANIFOLD AND TURBOCHARGER	15-14
TURBOCHARGER SUPERCHARGING PRESSURE CHECK	15-4	REMOVAL AND INSTALLATION <4D5-DOHC>	15-14
WASTE GATE ACTUATOR CHECK	15-5	REMOVAL AND INSTALLATION <4M4>	15-16
AIR CLEANER	15-6	TURBOCHARGER ASSEMBLY <4D5-SOHC>	15-18
REMOVAL AND INSTALLATION <4D5-SOHC>	15-6	REMOVAL AND INSTALLATION <4D5-SOHC>	15-18
REMOVAL AND INSTALLATION <4D5-DOHC, 4M4>	15-7	EXHAUST PIPE, MAIN MUFFLER AND CATALYTIC CONVERTER <4D5-SOHC>	15-19
INTERCOOLER <4D5-DOHC,4M4>	15-8	REMOVAL AND INSTALLATION <4D5-SOHC>	15-19
REMOVAL AND INSTALLATION	15-8	EXHAUST PIPE AND MAIN MUFFLER <4D5-DOHC, 4M4>	15-20
INLET AND EXHAUST MANIFOLDS <4D5-SOHC>	15-9	REMOVAL AND INSTALLATION	15-20
REMOVAL AND INSTALLATION <4D5-SOHC>	15-9		
INLET MANIFOLD	15-11		

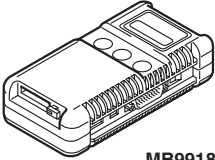
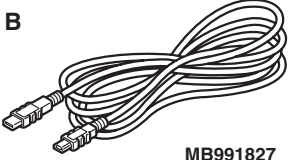
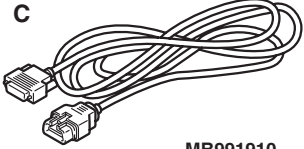
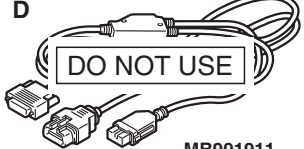
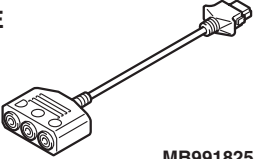
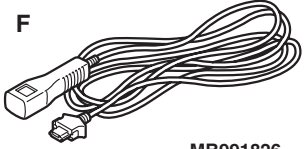
SERVICE SPECIFICATIONS

M1151000300677

Item		Standard value	Limit
Turbocharger supercharging pressure (waste gate solenoid valve not operating) kPa	4D5-SOHC	144.3 –174.9	–
	4D5-DOHC-2 WD	181.6 –215.0	–
	4D5-DOHC-4 WD	178.9 –215.0	–
	4M4	178.9 –188.2	–
Initial activation pressure of waste gate actuator (at the stroke of approximately 1 mm) kPa	4D5-SOHC	90 –94	–
	4D5-DOHC	125.3 –135.7	–
	4M4	126.0 –131.4	–

SPECIAL TOOL

M1151000600582

Tool	Number	Name	Use
<p>A</p>  <p>MB991824</p>	<p>MB991955 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826</p>	<p>M.U.T.-III sub assembly</p>	<p>Measurement of turbocharger supercharging pressure</p>
<p>B</p>  <p>MB991827</p>		<p>A: Vehicle communication interface (V.C.I.)</p>	<p>CAUTION For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.</p>
<p>C</p>  <p>MB991910</p>		<p>B: M.U.T.-III USB cable</p>	
<p>D</p>  <p>MB991911</p>		<p>C: M.U.T.-III main harness A (Vehicles with CAN communication system)</p>	
<p>E</p>  <p>MB991825</p>		<p>D: M.U.T.-III main harness B (Vehicles without CAN communication system)</p>	
<p>F</p>  <p>MB991826</p> <p>MB991955</p>		<p>E: M.U.T.-III measurement adapter</p> <p>F: M.U.T.-III trigger harness</p>	

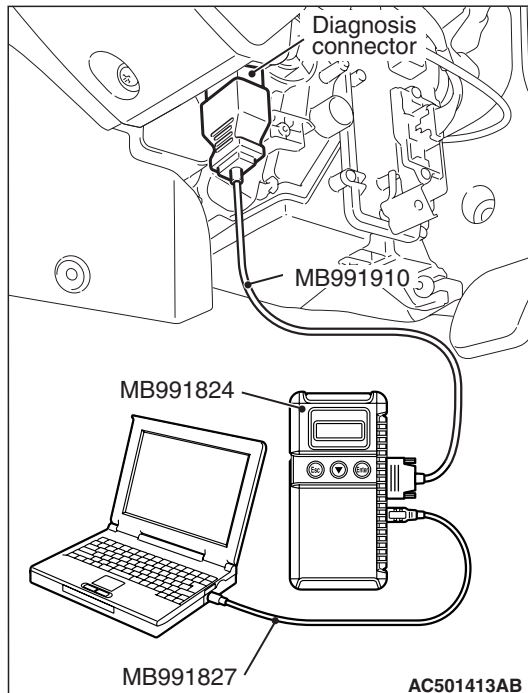
ON-VEHICLE SERVICE**TURBOCHARGER SUPERCHARGING
PRESSURE CHECK**

M1151001000260

CAUTION

Conduct the driving test in a location where driving at full acceleration can be done with safety. Two person should be in the vehicle when the test is conducted; the person in the passenger seat should read the indications shown by the M.U.T.-III.

1. Set the vehicle to the pre-inspection condition.



2. Turn the ignition switch to "LOOK" (OFF) position, and connect the diagnosis connector to the M.U.T.-III.

3. Use the data list function named "Item No. 6" boost pressure sensor of the M.U.T.-III to check the supercharging pressure when the engine speed increases to approximately 3,000 r/min or more by driving at full acceleration in 2nd.

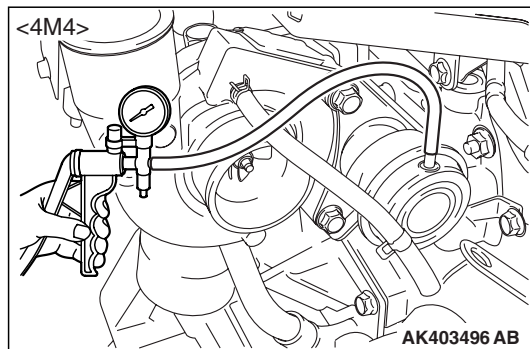
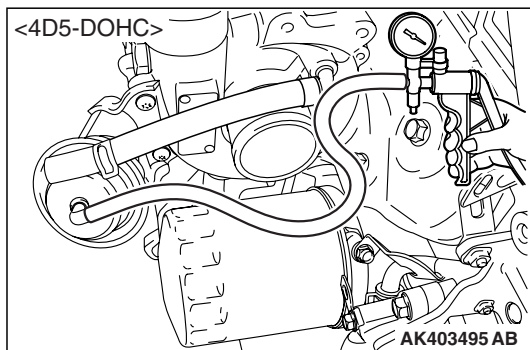
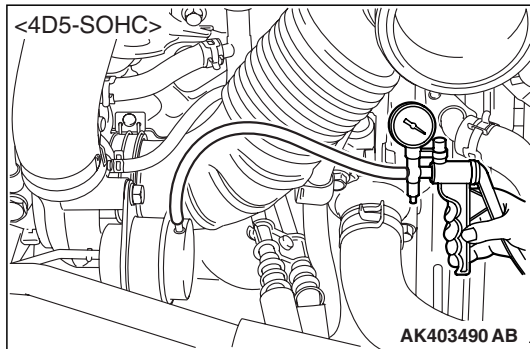
Standard value:

**144.3 –174.9 kPa <4D5-SOHC>,
181.6 –215.0 kPa <4D5-DOHC-2WD>,
178.9 –215.0 kPa <4D5-DOHC-4WD>,
178.9 –188.2 kPa <4M4>**

4. If the supercharging pressure deviates from the standard value, check the following items for possible cause.
- Malfunction of the waste gate actuator
 - Malfunction of the boost pressure sensor
 - Leakage of supercharging pressure
 - Malfunction of the turbocharger
5. When the indicated supercharging is more than standard value, supercharging control may be faulty, therefore check the followings.
- Disconnection or cracks of the waste gate actuator rubber hose
 - Malfunction of the waste gate actuator
 - Malfunction of the waste gate valve
 - Malfunction of the manifold absolute pressure sensor

WASTE GATE ACTUATOR CHECK

M1151001200220



2. While gradually applying pressure, check the pressure that begins to activate (approximately 1 mm stroke) the waste gate actuator rod.

Standard value:

- 90 –94 kPa <4D5-SOHC>**
- 125.3 –135.7 kPa <4D5-DOHC>**
- 126.0 –131.4 kPa <4M4>**

3. 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.

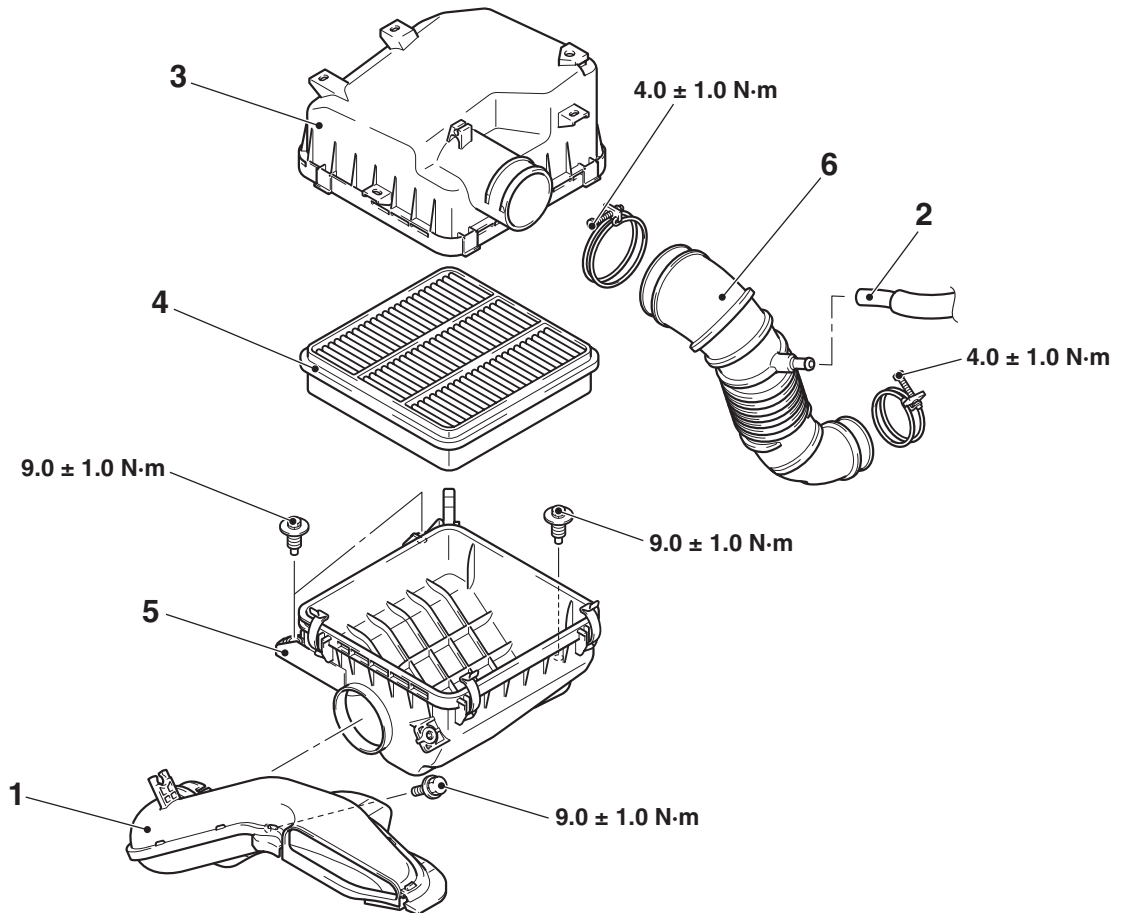
1. Connect a manual pump (pressure-application type) to nipple.

⚠ CAUTION

In order to avoid damage to the diaphragm, do not apply a pressure of 109 kPa <4D5-SOHC>, 159 kPa <4D5-DOHC>, 153 kPa <4M4> or higher.

AIR CLEANER**REMOVAL AND INSTALLATION <4D5-SOHC>**

M1151002101036



AC501353AB

Removal steps

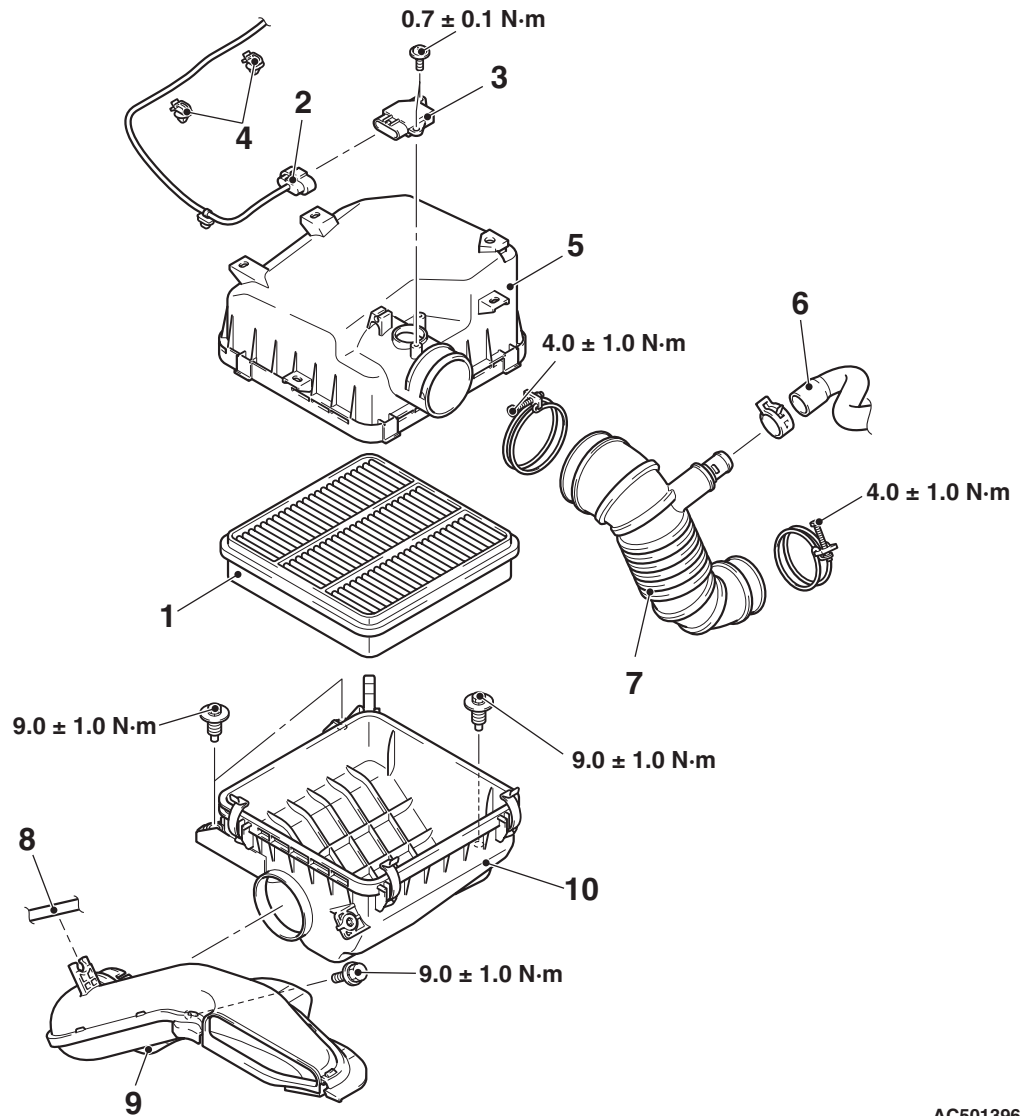
1. Air duct
2. Breather hose connection
3. Air cleaner cover

Removal steps (Continued)

4. Air cleaner element
5. Air cleaner body
6. Air intake hose

REMOVAL AND INSTALLATION <4D5-DOHC, 4M4>

M1151002100947



AC501396AB

Removal steps

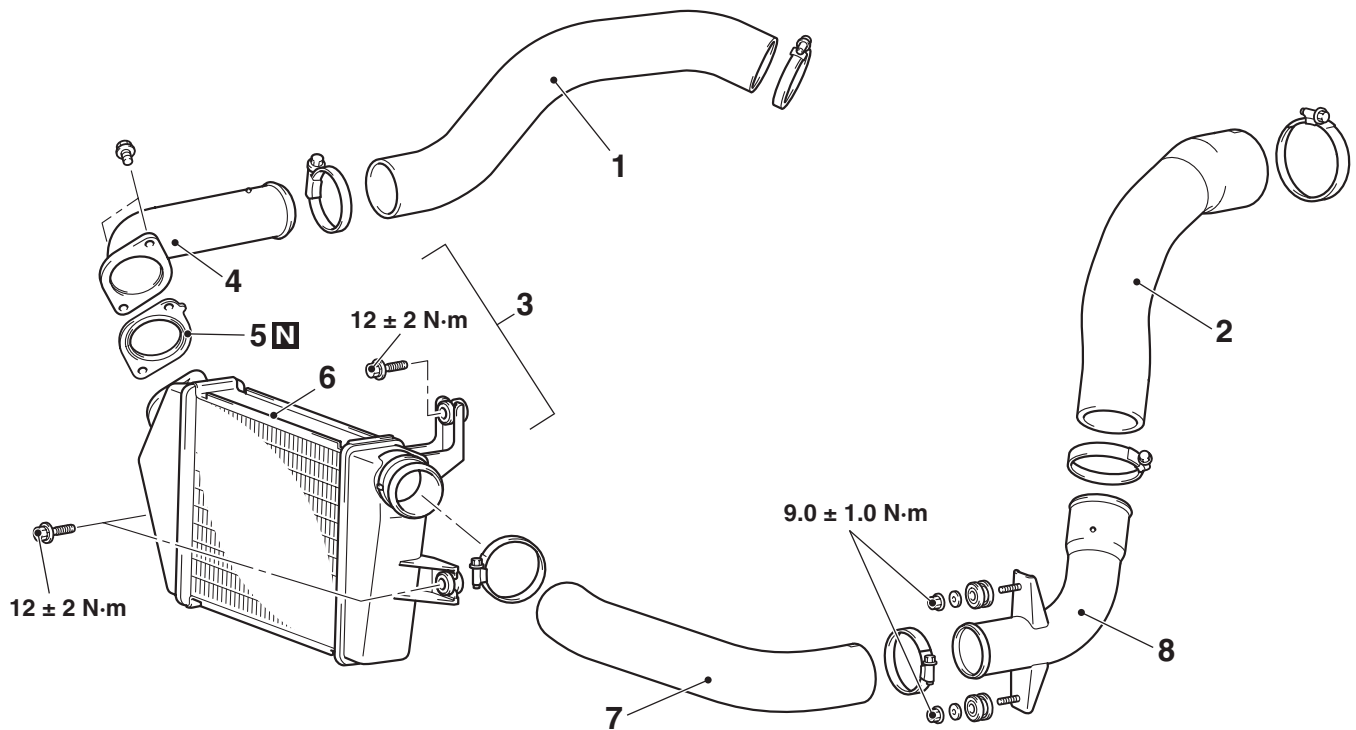
1. Air cleaner element
2. Intake air flow sensor connector
3. Intake air flow sensor
4. Harness clamp
5. Air cleaner cover
6. Breather hose connection

Removal steps (Continued)

7. Air intake hose
8. Radiator condenser tank hose connection
9. Air duct
10. Air cleaner body

INTERCOOLER <4D5-DOHC,4M4>**REMOVAL AND INSTALLATION**

M1151002400131

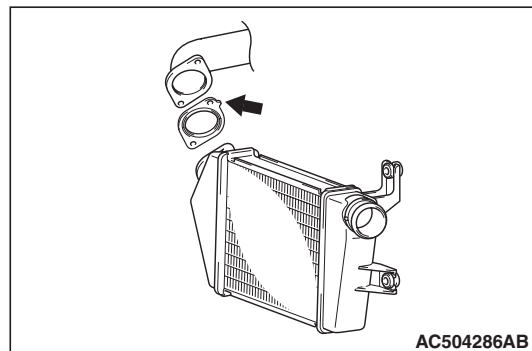


AC501310AB

Removal steps

- Air Duct (Refer to P.15-7).
- 1. Air A1 hose
- 2. Air B2 hose
- 3. Intercooler assembly, intercooler gasket, intercooler pipe
- Front bumper assembly (Refer to GROUP 51 –Front Bumper Assembly).
- 4. Intercooler pipe
- 5. Intercooler gasket
- 6. Intercooler assembly
- 7. Air B1 hose
- Oil reservoir bolt (Refer to GROUP 37 –Power Steering Hose). <4M4>
- 8. Air B1 pipe

>>A<<

INSTALLATION SERVICE POINT**>>A<< INTERCOOLER GASKET INSTALLATION**

The tab on the intercooler gasket should be position as shown.

INLET AND EXHAUST MANIFOLDS <4D5-SOHC>

REMOVAL AND INSTALLATION <4D5-SOHC>

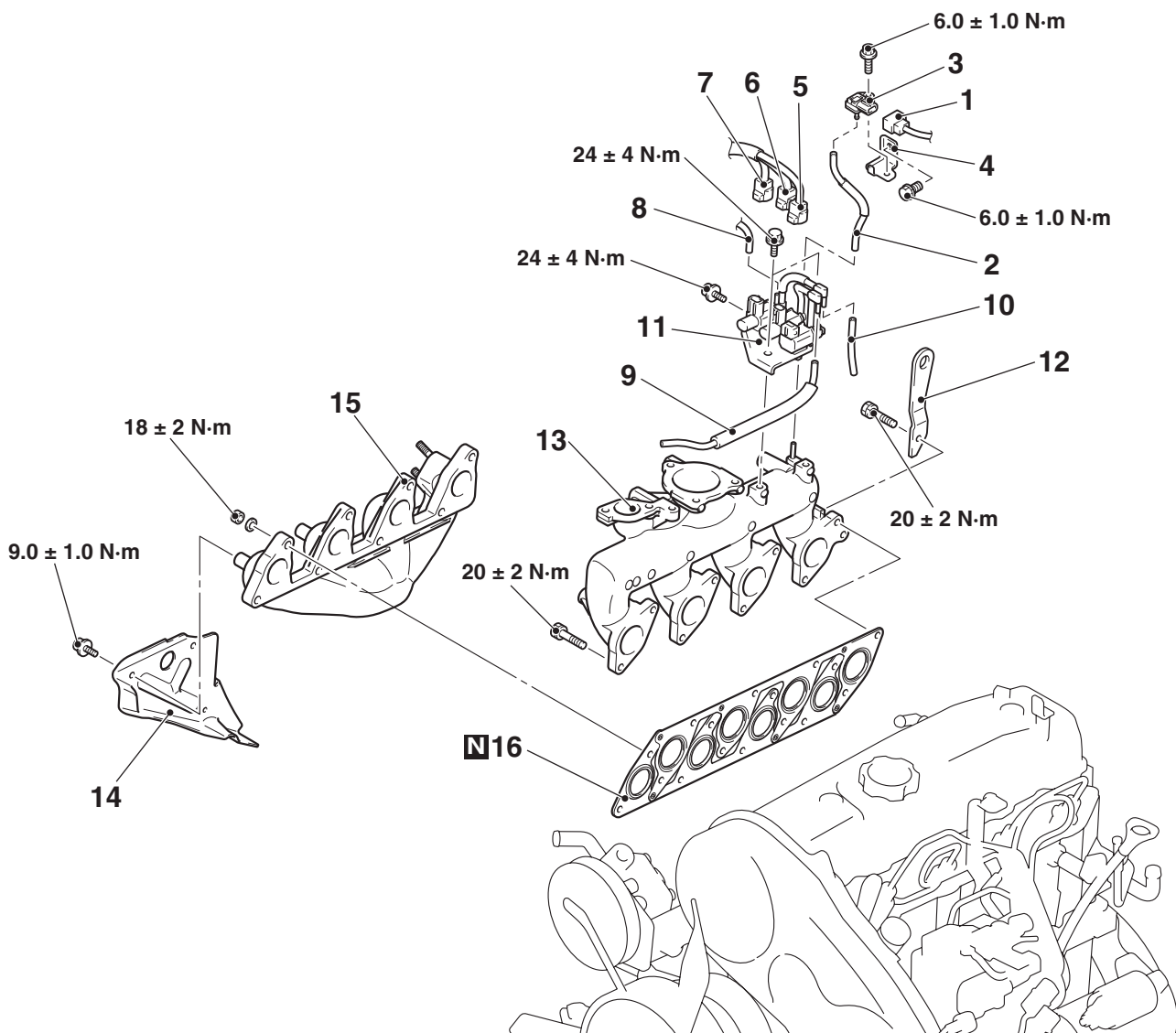
M1151003600031

Pre-removal Operation

- Engine Oil Draining (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement).
- Engine Coolant Draining (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Engine Room Under Cover Removal (Refer to GROUP 51 –Under Cover).
- Air Cleaner Removal (Refer to P.15-6).
- Throttle Body Removal (Refer to GROUP 13A –Throttle Body).
- EGR Cooler Removal (Refer to GROUP 17 –EGR Valve and EGR Cooler).

Post-installation Operation

- EGR Cooler Installation (Refer to GROUP 17 –EGR Valve and EGR Cooler).
- Throttle Body Installation (Refer to GROUP 13A –Throttle Body).
- Air Cleaner Installation (Refer to P.15-6).
- Engine Coolant Refilling (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Engine Oil Refilling (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement).
- Engine Room Under Cover Installation (Refer to GROUP 51 –Under Cover).



AC501902AB

Removal steps

1. Manifold absolute pressure sensor connector
2. Vacuum hose assembly
3. Manifold absolute pressure sensor

Removal steps (Continued)

4. Manifold absolute pressure sensor bracket
5. EGR solenoid valve No.1 connector

Removal steps (Continued)

6. EGR solenoid valve No.2 connector
7. Throttle solenoid valve connector
8. Vacuum hose connection
9. Vacuum hose assembly
10. Vacuum hose connection
11. Solenoid valve assembly
12. Engine hanger
13. Inlet manifold
 - Turbocharger assembly (Refer to [P.15-18](#)).
14. Exhaust manifold heat protector
15. Exhaust manifold
16. Inlet and Exhaust manifold gasket

INLET MANIFOLD

REMOVAL AND INSTALLATION <4D5-DOHC>

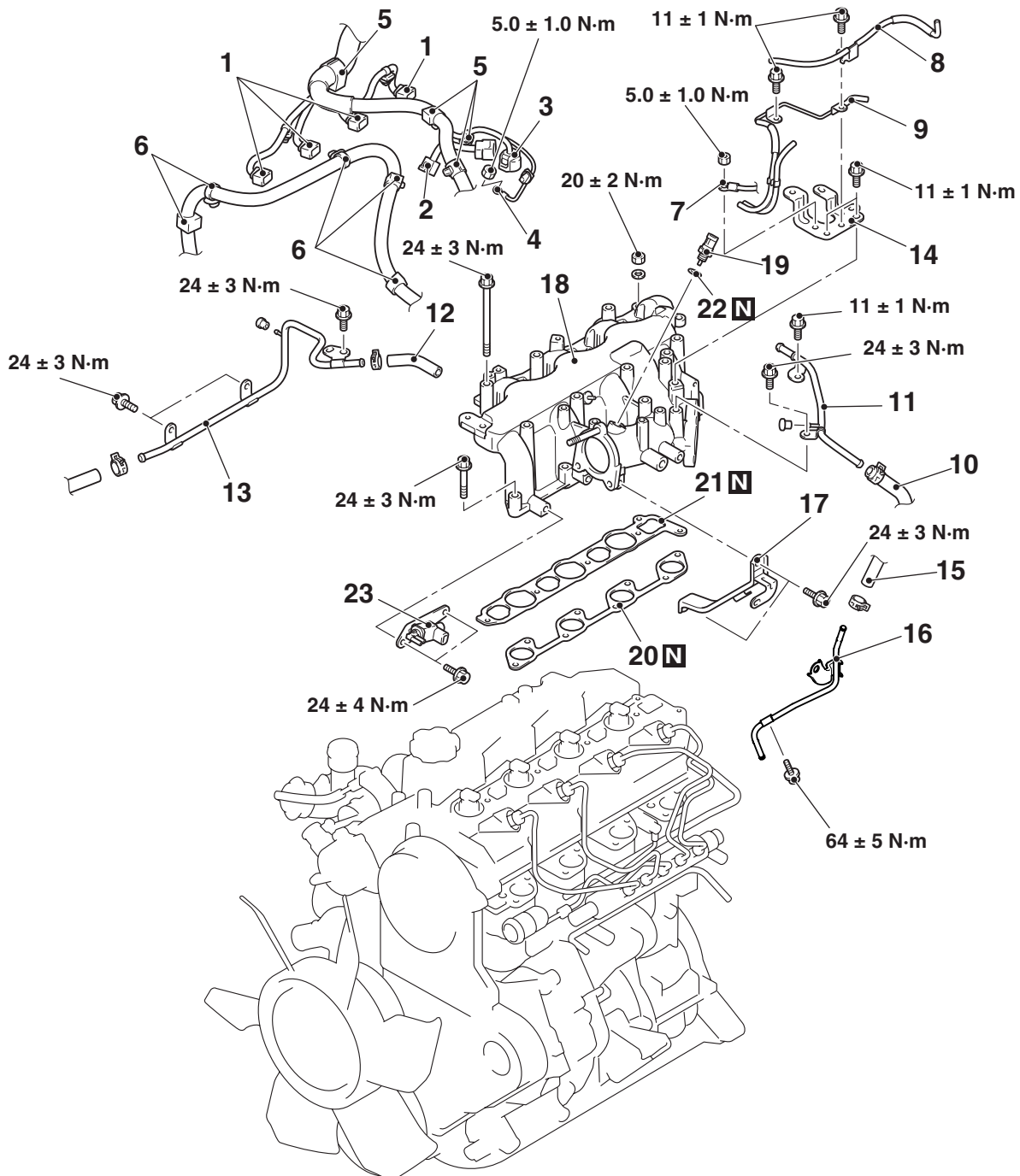
M1151003001548

Pre-removal Operation

- Engine Coolant Draining (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Throttle Body Removal (Refer to GROUP 13B –Throttle Body) <2WD>.
- Throttle Body Removal (Refer to GROUP 13B –Throttle Body) <4WD>.
- EGR Valve and EGR Pipe Removal (Refer to GROUP 17 –EGR Valve and EGR Cooler).
- Windshield Wiper Removal (Refer to GROUP 51 –Windshield Wiper).
- Cowl Top Panel Front Remova

Post-installation Operation

- Cowl Top Panel Front Installation
- Windshield Wiper Installation (Refer to GROUP 51 –Windshield Wiper).
- EGR Valve and EGR Pipe Installation (Refer to GROUP 17 –EGR Valve and EGR Cooler).
- Throttle Body Installation (Refer to GROUP 13B –Throttle Body) <2WD>.
- Throttle Body Installation (Refer to GROUP 13B –Throttle Body) <4WD>.
- Engine Coolant Refilling (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Air Bleeding from Fuel Line (Refer to GROUP 13B –On-vehicle Service, Evacuation of Water from Fuel Filter).



Removal steps

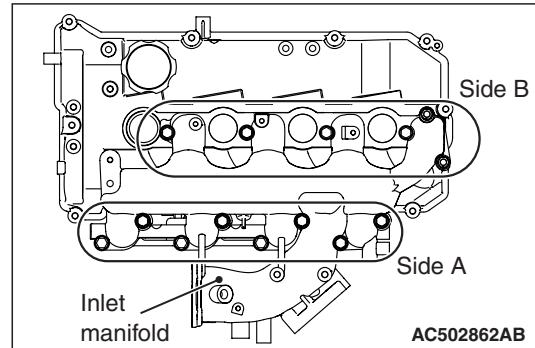
1. Fuel injector connector
2. Air temperature sensor connector
3. Fuel pressure sensor harness connector
4. Glow plug connector
5. Control wiring harness clamp
6. Battery cable clamp
7. Earth cable connection
8. Vacuum hose and pipe assembly
9. Vacuum hose and pipe assembly
10. Brake booster vacuum hose connection
11. Vacuum pipe B
12. Vacuum hose
13. Vacuum pipe A
14. Engine cover stay A
15. Fuel hose D connection
16. Fuel inlet pipe
17. Inlet manifold stay
18. Inlet manifold assembly
19. Inlet manifold herical gasket
20. Inlet manifold tangential gasket
21. Air temperature sensor
22. Gasket
23. Solenoid valve assembly <2WD>

<<A>>

>>A<<

REMOVAL SERVICE POINT**<<A>> FUEL HOSE D DISCONNECTION****⚠ CAUTION**

When disconnecting the fuel hose D, the fuel pressure in the fuel line is high. Thus, wait for 3 minutes or longer after the engine is stopped, and cover the fuel hose D with a rag or similar materials to prevent the fuel splash, and then disconnect the fuel hose D.

INSTALLATION SERVICE POINT**>>A<< INLET MANIFOLD ASSEMBLY
INSTALLATION**

1. As shown in the illustration, temporarily tighten to $6.0 \pm 1.0 \text{ N} \cdot \text{m}$ the bolts located at side A.
2. As shown in the illustration, tighten the bolts and nuts located at side B to the specified torque.

Tightening torque: **$24 \pm 3 \text{ N} \cdot \text{m}$ <Bolts>** **$20 \pm 2 \text{ N} \cdot \text{m}$ <Nuts>**

3. As shown in the illustration, tighten the bolts located at side A to the specified torque.

Tightening torque: $24 \pm 3 \text{ N} \cdot \text{m}$

REMOVAL AND INSTALLATION <4M4>

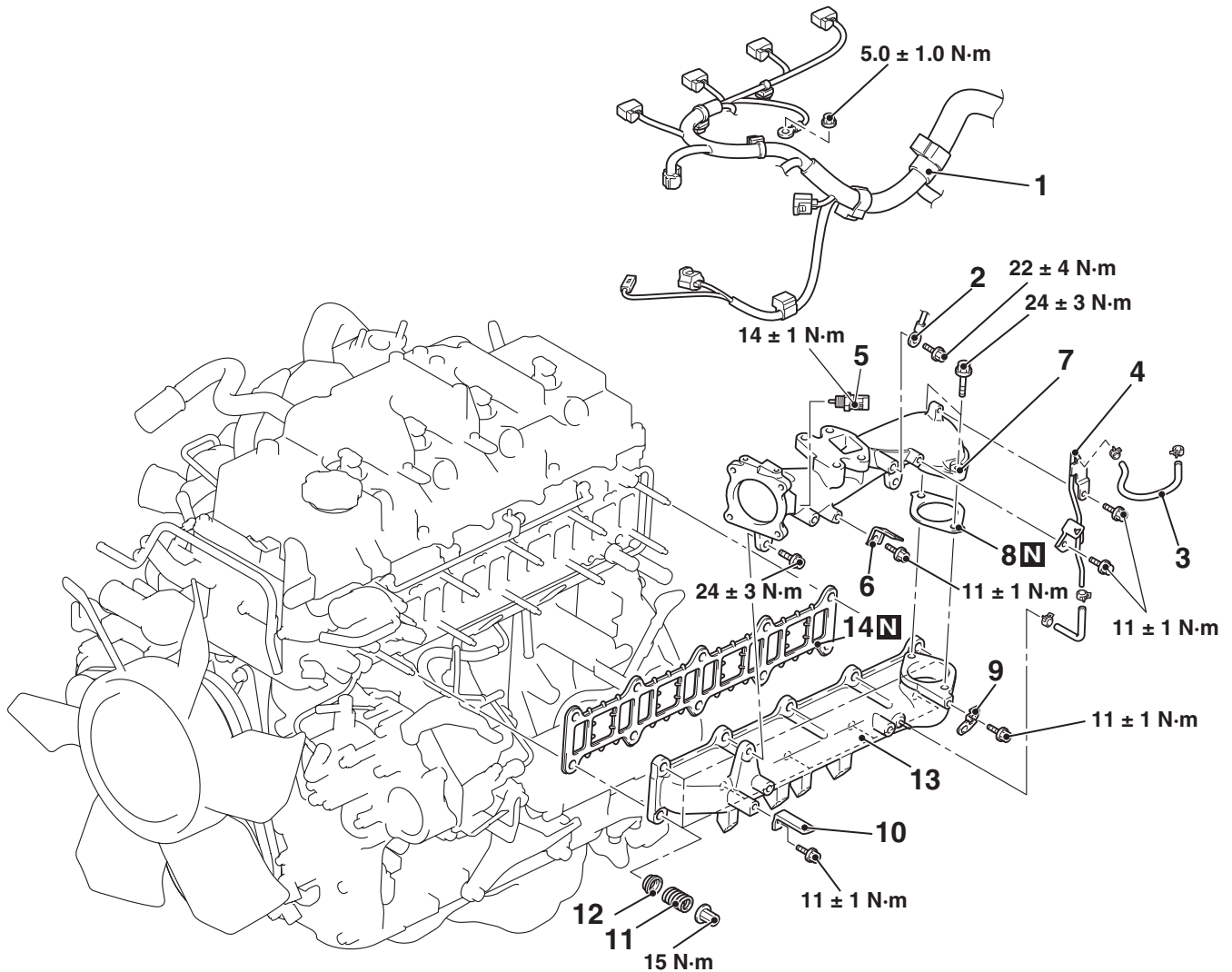
M1151003001485

Pre-removal Operation

- Engine Cover Removal (Refer to GROUP 11E –Engine Assembly).
- Throttle Body Removal (Refer to GROUP 13C –Throttle Body).
- EGR Valve and EGR Pipe Removal (Refer to GROUP 17 –EGR Valve and EGR Cooler).

Post-installation Operation

- EGR Valve and EGR Pipe Installation (Refer to GROUP 17 –EGR Valve and EGR Cooler).
- Throttle Body Installation (Refer to GROUP 13C –Throttle Body).
- Engine Cover Installation (Refer to GROUP 11E –Engine Assembly).



AC501903AB

Removal steps

1. Control wiring harness onnection
2. Earth terminal connection
3. Vacuum hose
4. Vacuum pipe assembly
5. Intake air temperature sensor No.2
6. Harness clamp
7. Air inlet pipe
8. Gasket
9. Harness clamp
10. Harness clamp

Removal steps (Continued)

- Fuel supply pump pipe assembly, Fuel injection pipe assembly, Common rail assembly, Fuel pipe bracket (Refer to GROUP 13C – Fuel Injector and Common Rail).
11. Spring
 12. Retainer
 13. Inlet manifold assembly
 14. Inlet manifold gasket

EXHAUST MANIFOLD AND TURBOCHARGER

REMOVAL AND INSTALLATION <4D5-DOHC>

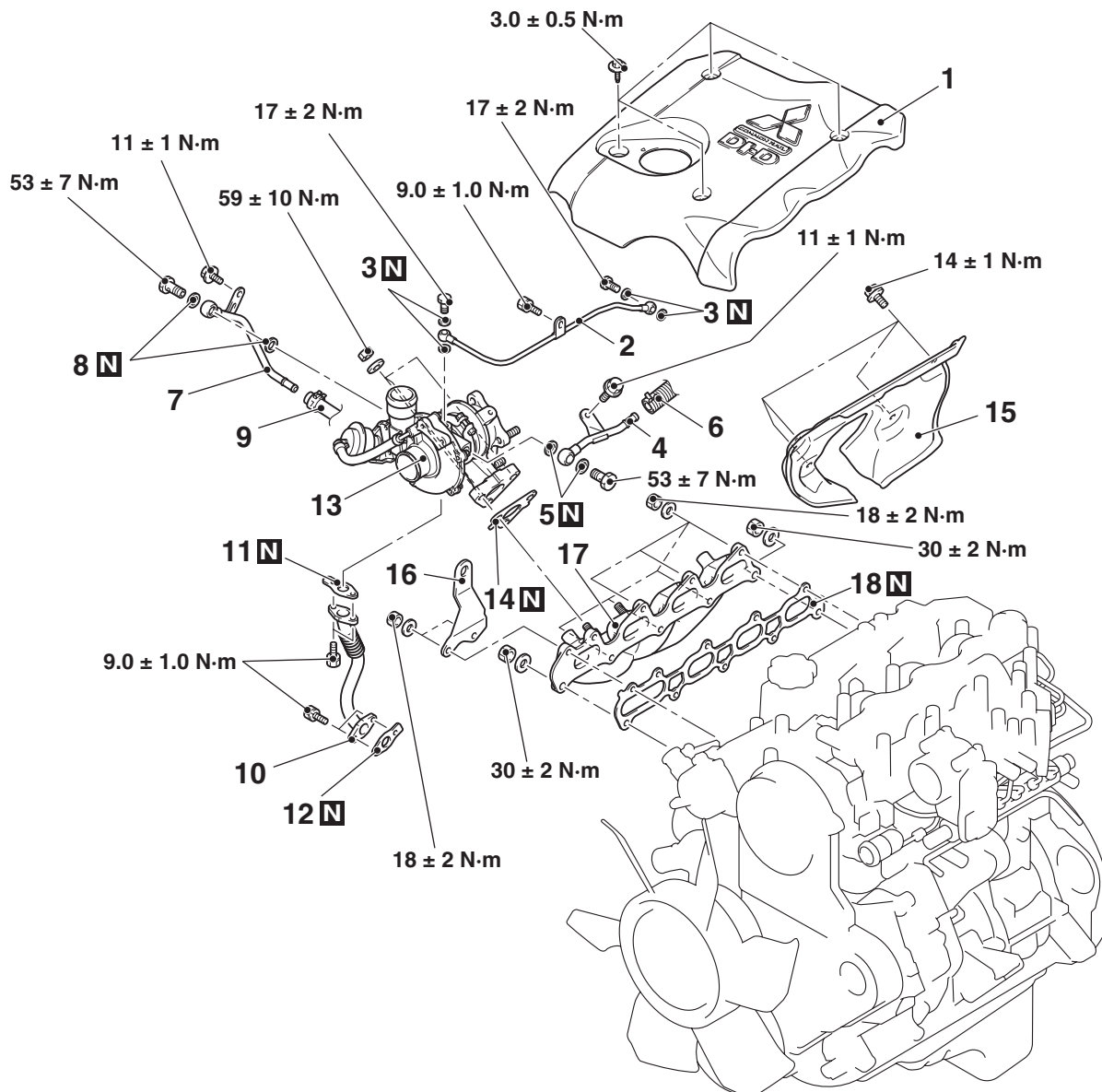
M1151008900242

Pre-removal Operation

- Engine Room Under Cover Removal (Refer to GROUP 51 –Under Cover) <2WD>.
- Under Skid Plate and Engine Room Under Cover Removal (Refer to GROUP 51 –Under Cover) <4WD>.
- Engine Coolant Draining (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Air Cleaner Assembly Removal (Refer to P.15-7).
- Engine Air Intake Hose and Engine Air Intake Pipe Removal (Refer to GROUP 13B –Throttle Body) <2WD>.
- Intercooler Air Hose A1 Removal (Refer to P.15-8) <4WD>.
- Catalytic Converter Removal (Refer to GROUP 17 –Catalytic Converter).

Post-installation Operation

- Catalytic Converter Installation (Refer to GROUP 17 –Catalytic Converter).
- Engine Air Intake Hose and Engine Air Intake Pipe Installation (Refer to GROUP 13B –Throttle Body) <2WD>.
- Intercooler Air Hose A1 Installation (Refer to P.15-8) <4WD>.
- Air Cleaner Assembly Installation (Refer to P.15-7).
- Engine Room Under Cover Installation (Refer to GROUP 51 –Under Cover) <2WD>.
- Under Skid Plate and Engine Room Under Cover Installation (Refer to GROUP 51 –Under Cover) <4WD>.
- Engine Coolant Refilling (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).



Removal steps

1. Engine cover
2. Oil pipe

Removal steps (Continued)

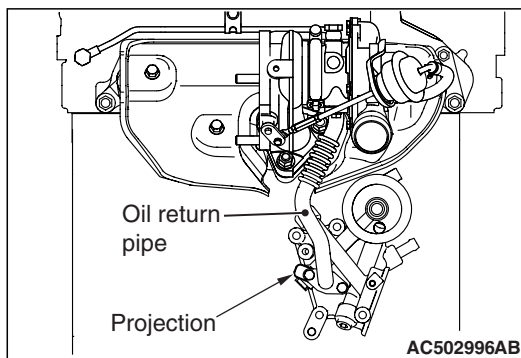
3. Gasket
4. Water pipe B

AC502994 AB

Removal steps (Continued)

5. Gasket
6. Water hose
7. Water pipe C
8. Gasket
9. Water hose
10. Oil return pipe
11. Oil return pipe gasket
- >>B<< 12. Oil return pipe gasket
13. Turbocharger assembly
- >>A<< 14. Turbocharger gasket
15. Exhaust manifold heat protector
16. Engine hanger
17. Exhaust manifold
18. Exhaust manifold gasket

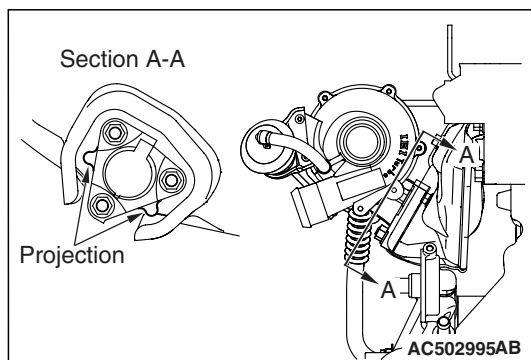
>>B<< OIL RETURN PIPE GASKET
INSTALLATION



Position the projection as shown in the illustration.

INSTALLATION SERVICE POINTS

>>A<< TURBOCHARGER GASKET
INSTALLATION



Position the projection as shown in the illustration.

REMOVAL AND INSTALLATION <4M4>

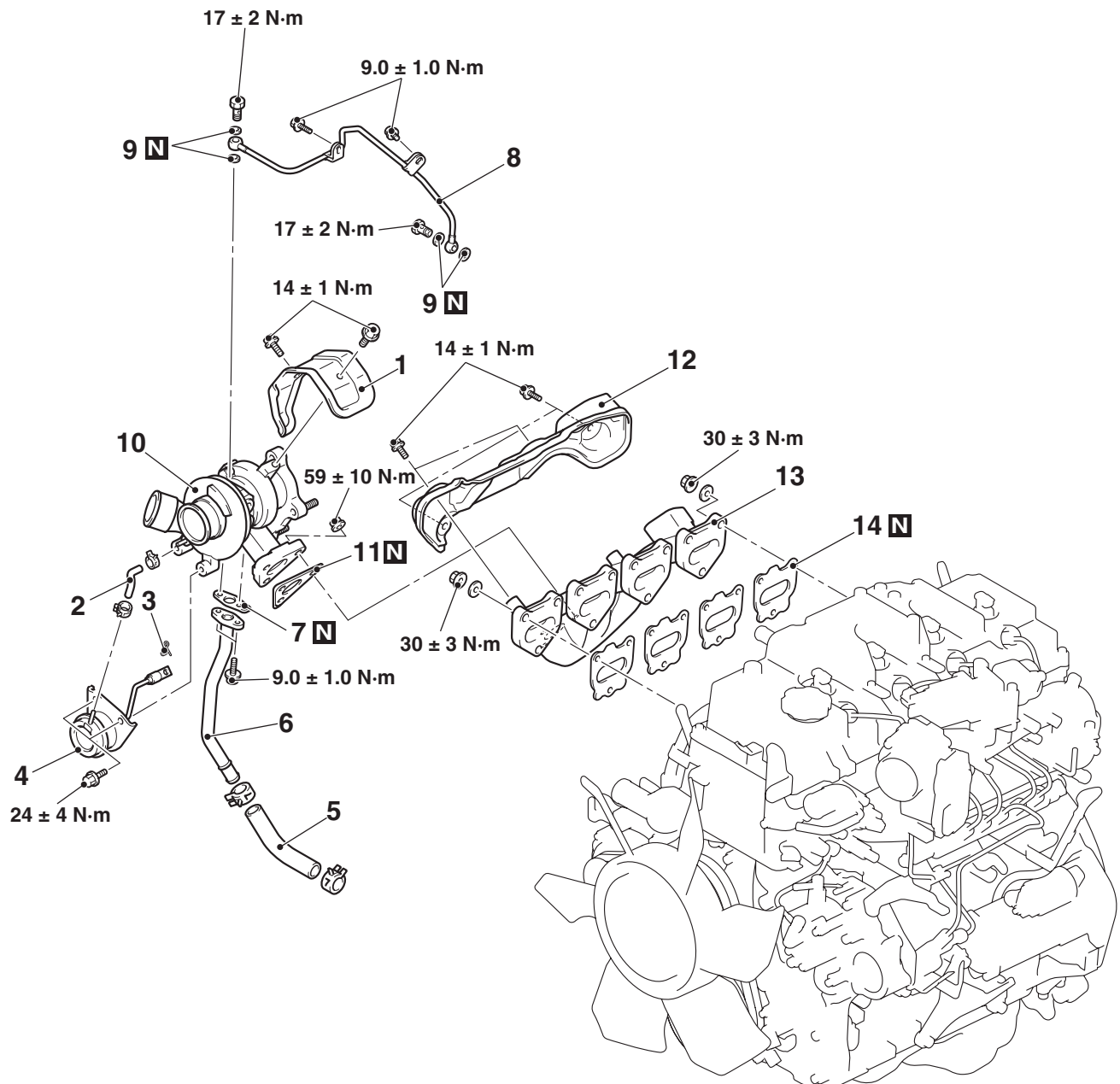
M1151008900253

Pre-removal Operation

- Engine Cover Removal (Refer to GROUP 11E –Engine Assembly)
- Engine Coolant Draining (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Engine Oil Draining (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement).
- Air Cleaner Assembly Removal (Refer to P.15-7).
- EGR Pipe B Assembly, EGR Cooler Assembly Removal (Refer to GROUP 17 –EGR Valve and EGR Cooler).
- Catalytic Front Converter Removal (Refer to GROUP 17 –Catalytic Converter).
- Turbocharger Water Inlet Pipe, Turbocharger Water Outlet Pipe Removal (Refer to GROUP 14 –Water Hose and Water Pipe).

Post-installation Operation

- Turbocharger Water Inlet Pipe, Turbocharger Water Outlet Pipe Installation (Refer to GROUP 14 –Water Hose and Water Pipe).
- Catalytic Front Converter Installation (Refer to GROUP 17 –Catalytic Converter).
- EGR Pipe B Assembly, EGR Cooler Assembly Installation (Refer to GROUP 17 –EGR Valve and EGR Cooler).
- Air Cleaner Assembly Installation (Refer to P.15-7).
- Engine Oil Refilling (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement).
- Engine Coolant Refilling (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Engine Cover Installation (Refer to GROUP 11E –Engine Assembly).

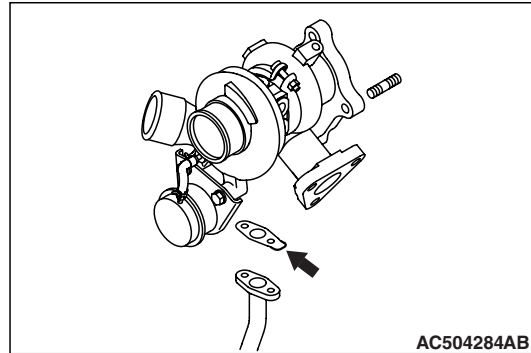


Removal steps

1. Turbocharger heat protector
2. Vacuum hose
3. Snap ring
4. Waste gate actuator
5. Oil return hose
6. Oil return pipe
- >>B<< 7. Gasket
8. Oil pipe assembly
- >>A<< 9. Gasket
10. Turbocharger assembly
11. Gasket
12. Exhaust manifold heat protector
13. Exhaust manifold assembly
14. Exhaust manifold assembly gasket

2. If deposits of carbon are accumulated on the turbocharger oil passage, remove them and clean using the compressed air.
3. Add clean engine oil through the oil feed pipe port on the turbocharger.

>>B<< GASKET INSTALLATION



The tab on the oil return pipe gasket should be positioned as shown.

INSTALLATION SERVICE POINTS

**>>A<< TURBOCHARGER ASSEMBLY
INSTALLATION**

1. Check the internal surface, the eye bolt and the mating surface of the oil pipe and water pipe for clogging, and clean if necessary.

⚠ CAUTION

Be careful not to allow foreign material to enter the turbocharger.

TURBOCHARGER ASSEMBLY <4D5-SOHC>

REMOVAL AND INSTALLATION <4D5-SOHC>

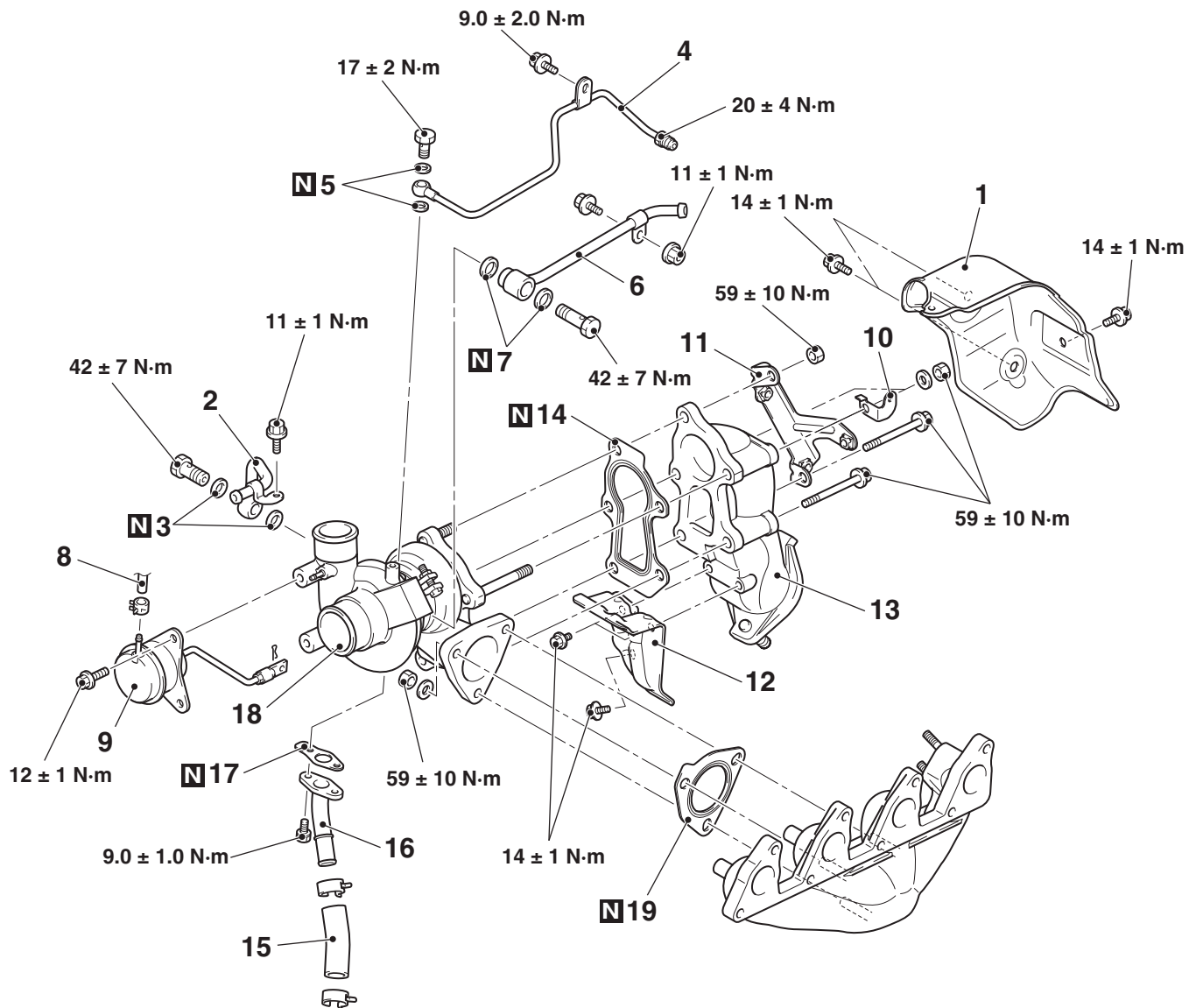
M1151004500037

Pre-removal Operation

- Engine Oil Draining (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement).
- Engine Coolant Draining (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Engine Room Under Cover Removal (Refer to GROUP 51 –Under Cover).
- Air Cleaner Removal (Refer to P.15-6).
- Throttle Body Removal (Refer to GROUP 13A –Throttle Body).
- EGR Cooler Removal (Refer to GROUP 17 –EGR Valve and EGR Cooler).

Post-installation Operation

- EGR Cooler Installation (Refer to GROUP 17 –EGR Valve and EGR Cooler).
- Throttle Body Installation (Refer to GROUP 13A –Throttle Body).
- Air Cleaner Installation (Refer to P.15-6).
- Engine Coolant Refilling (Refer to GROUP 14 –On-vehicle Service, Engine Coolant Replacement).
- Engine Oil Refilling (Refer to GROUP 12 –On-vehicle Service, Engine Oil Replacement).
- Engine Room Under Cover Installation (Refer to GROUP 51 –Under Cover).



AC501678AB

Removal steps

1. Exhaust fitting upper cover
2. Water pipe A
3. Gasket
4. Oil pipe assembly

Removal steps (Continued)

5. Gasket
6. Water pipe B
7. Gasket
8. Vacuum hose connection

Removal steps (Continued)

9. VG actuator
10. Harness bracket
11. Exhaust fitting upper cover bracket
12. Heat protector C
 - Front exhaust pipe (Refer to P.15-19).
13. Exhaust fitting
14. Exhaust fitting gasket
15. Oil return hose
16. Oil return pipe
17. Oil return pipe gasket
18. Turbocharger assembly
19. Turbocharger gasket

>>A<<

INSTALLATION SERVICE POINT

>>A<< TURBOCHARGER ASSEMBLY INSTALLATION

1. Check the internal surface, the eye bolt and the mating surface of the oil pipe and water pipe for clogging, and clean if necessary.

⚠ CAUTION

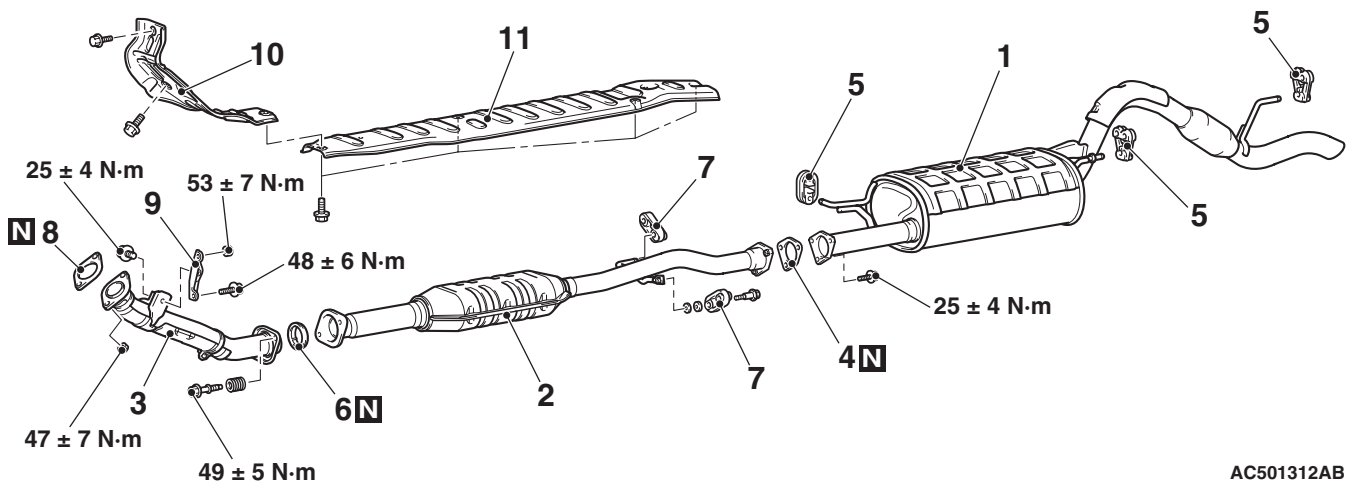
Be careful not to allow foreign material to enter the turbocharger.

2. If deposits of carbon are accumulated on the turbocharger oil passage, remove them and clean using the compressed air.
3. Add clean engine oil through the oil feed pipe port on the turbocharger.

EXHAUST PIPE, MAIN MUFFLER AND CATALYTIC CONVERTER <4D5-SOHC>

REMOVAL AND INSTALLATION <4D5-SOHC>

M1151005400420



AC501312AB

Exhaust main muffler removal steps

1. Exhaust main muffler
4. Exhaust pipe gasket
5. Exhaust muffler hanger

Catalytic converter removal steps

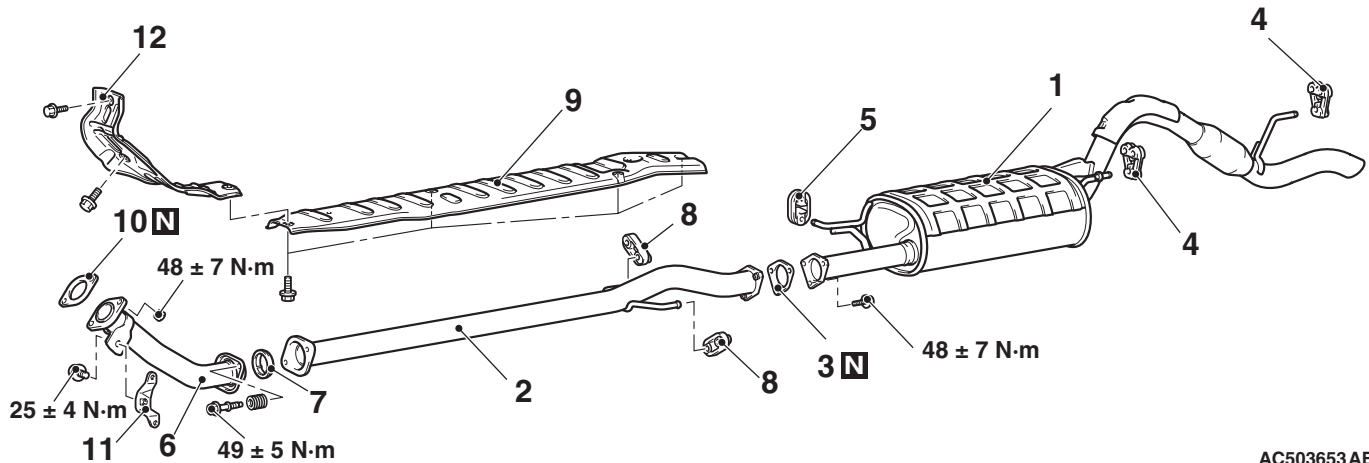
2. Catalytic converter
4. Exhaust pipe gasket
6. Seal ring
7. Exhaust muffler hanger

Front exhaust pipe removal steps

3. Front exhaust pipe
6. Seal ring
8. Exhaust pipe gasket
9. Front exhaust pipe bracket
10. Front under floor heat protector
11. Center under floor heat protector

**EXHAUST PIPE AND MAIN MUFFLER <4D5-DOHC, 4M4>
REMOVAL AND INSTALLATION**

M1151008600230



AC503653 AB

Exhaust main muffler removal steps

1. Main muffler
3. Gasket
4. Rubber hanger
5. Hanger

Centre exhaust pipe removal steps

- Engine room under cover (Refer to GROUP 51 –Under Cover) <2WD>.
 - Under skid plate and engine room under cover (Refer to GROUP 51 – Under Cover) <4WD>.
2. Exhaust centre pipe
 3. Gasket
 7. Seal ring

Centre exhaust pipe removal steps (Continued)

8. Hanger
 9. Heat protector
- Front exhaust pipe removal steps**
- Engine room under cover (Refer to GROUP 51 –Under Cover) <2WD>.
 - Under skid plate and engine room under cover (Refer to GROUP 51 – Under Cover) <4WD>.
6. Exhaust front pipe
 7. Seal ring
 10. Gasket
 11. Exhaust front pipe bracket
 12. Heat protector

GROUP 31

WHEEL AND TYRE

CONTENTS

GENERAL INFORMATION	31-2	TYRE INFLATION PRESSURE CHECK...	31-8
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GENERAL INFORMATION

M1311000100305

The wheels and tyres of the following specifications have been established.

SPECIFICATIONS

Item		2WD		4WD
		GL	GLX, GLS, GLS-S	
Wheel	Type	Steel type	Aluminium type or Steel type*	Aluminium type or Steel type*
	Size	15 × 6.0JJ	15 × 6JJ	16 × 7JJ
	Amount of wheel offset mm	46	46	38
	PCD mm	114.3	114.3	139.7
Tyre	Size	195R15C 8PR 106/104R	215/70R15C 6PR 106/104S	245/70R16 111S

NOTE: The * mark indicates spare tyre.

NOTE: PCD (Pitch Circle Diameter) indicates the pitch circle diameter of the wheel installation holes.

SERVICE SPECIFICATIONS


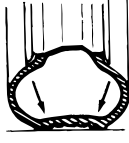
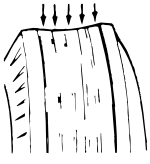
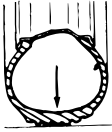

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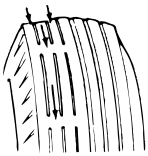
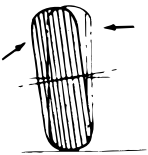
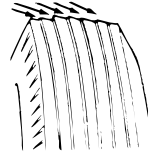
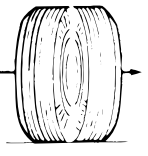

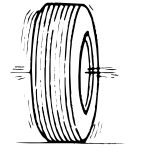

Item		Limit
Tread depth of tyre mm		Minimum 1.6
Wheel runout <Steel wheel>	Radial runout mm	1.2 or less
	Lateral runout mm	1.2 or less
Wheel runout <Aluminium wheel>	Radial runout mm	1.0 or less
	Lateral runout mm	1.0 or less

TROUBLESHOOTING

DIAGNOSIS

M1311000700697

Symptom		Probable cause		Remedy	Reference page
Rapid wear at shoulders	 <p>ACX00923AB</p>	Under-inflation or lack of rotation	 <p>ACX00924AE</p>	Adjust the tyre pressure.	For tyre inflation pressure, refer to the label on the driver's side centre pillar.
Rapid wear at centre	 <p>ACX00925AE</p>	Over-inflation or lack of rotation	 <p>ACX00926AI</p>		
Cracked treads	 <p>ACX00927AB</p>	Under-inflation		Adjust the tyre pressure.	

Symptom		Probable cause		Remedy	Reference page
Wear on one side	 ACX00928 AB	Excessive camber	 ACX00929 AE	Check the camber.	Refer to GROUP 33, On-vehicle service –Front wheel alignment check and adjustment <2WD> , <4WD> .
Feathered edge	 ACX00930 AB	Incorrect toe-in	 ACX00931 AE	Adjust the toe-in.	
Bald spots	 ACX00932 AB	Unbalanced wheel	 ACX00933 AB	Balance the wheel.	Refer to P.31-4.
Scalloped wear	 ACX00934	Lack of rotation of tyre or worn or out-of-alignment suspension		Rotate the tyre, and check the front suspension alignment.	Refer to GROUP 33, On-vehicle service –Front wheel alignment check and adjustment <2WD> , <4WD> .

WHEEL BALANCE ACCURACY

M1311001700537

PURPOSE

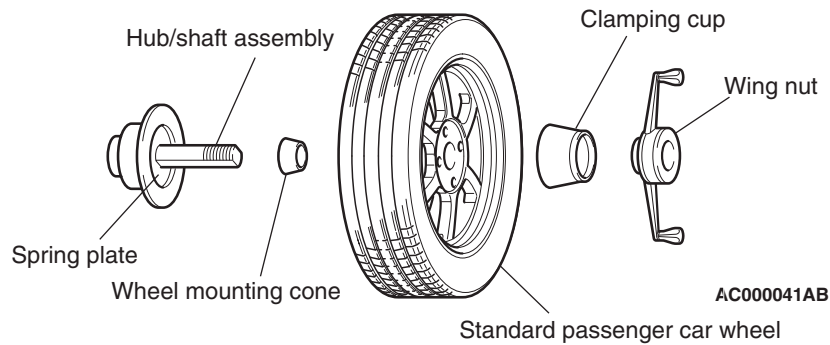
This section contains tips and procedures for achieving accurate wheel balance. Steering wheel vibration and/or body shake can result if any of these procedures are not carefully observed.

1. Wheels and tyres must be properly mounted on a balancer in order to achieve correct balance. Centring 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 tyres, 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).

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 centre hole on the hub side has a chamfered edge. Use a back-mounting cone on your wheel balancer to centre the wheel on the balancer shaft.
3. Install a wheel mounting cone. The appropriate size cone for this vehicle is 56.0 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 re-tighten 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 tyre 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 centred 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>>

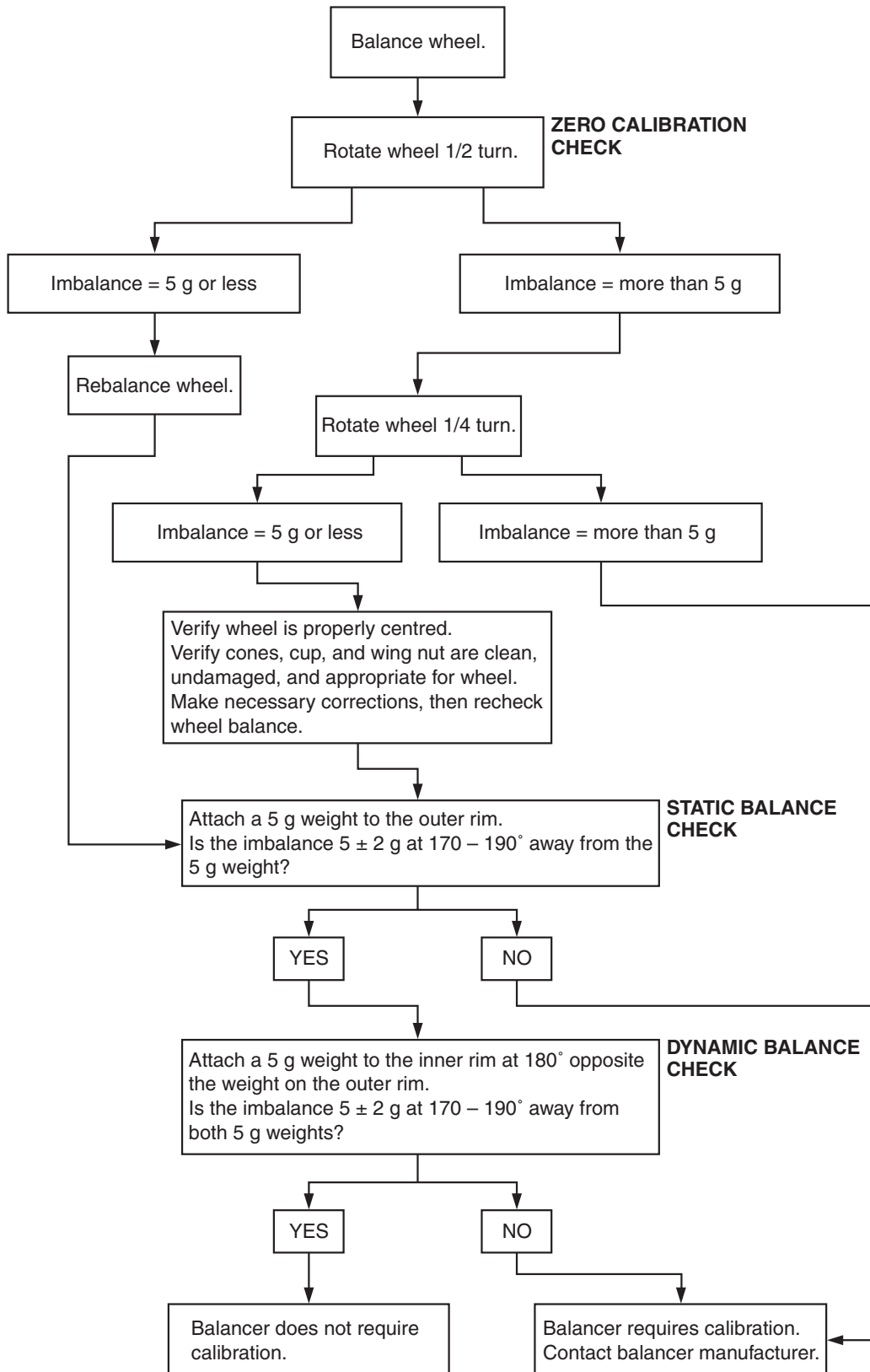
Attach a 5 g weight to the outer rim. Recheck the balancer. The balancer should detect 5 ± 2 g of imbalance 170 to 190° away from the 5 g weight.

 - 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**

M1311000900516

NOTE: For information on tyre inflation pressure, refer to the label attached to the centre pillar on the driver's side.

TYRE WEAR CHECK

M1311001000594

Measure the tread depth of the tyres.

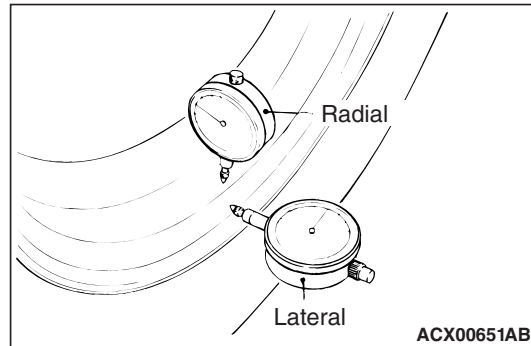
Minimum limit: 1.6 mm

If the remaining tread depth is less than the minimum limit, replace the tyre.

NOTE: When the tread depth of the tyres is reduced to 1.6 mm or less, wear indicators will appear.

WHEEL RUNOUT CHECK

M1311001100609



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 or less	1.0 or less
Lateral runout mm	1.2 or less	1.0 or less

If wheel runout exceeds the limit, replace the wheel.

WHEEL AND TYRE**INSTALLATION SERVICE POINT**

M1311001300476

Tighten the wheel nuts to the specified torque.

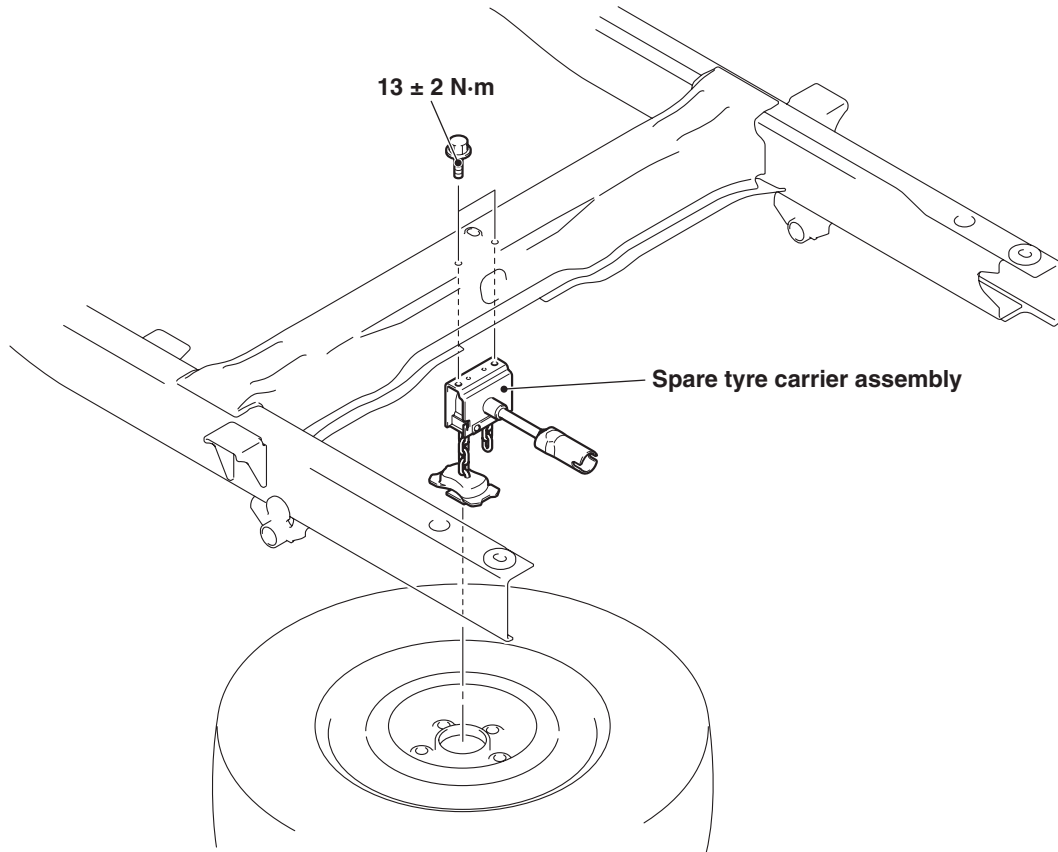
Tightening torque: 147 ± 10 N·m <Steel wheel>

Tightening torque: 128 ± 9 N·m <Aluminium wheel>

SPARE TYRE CARRIER

REMOVAL AND INSTALLATION

M1311006700071



AC501849AB

NOTES

GROUP 33

FRONT SUSPENSION

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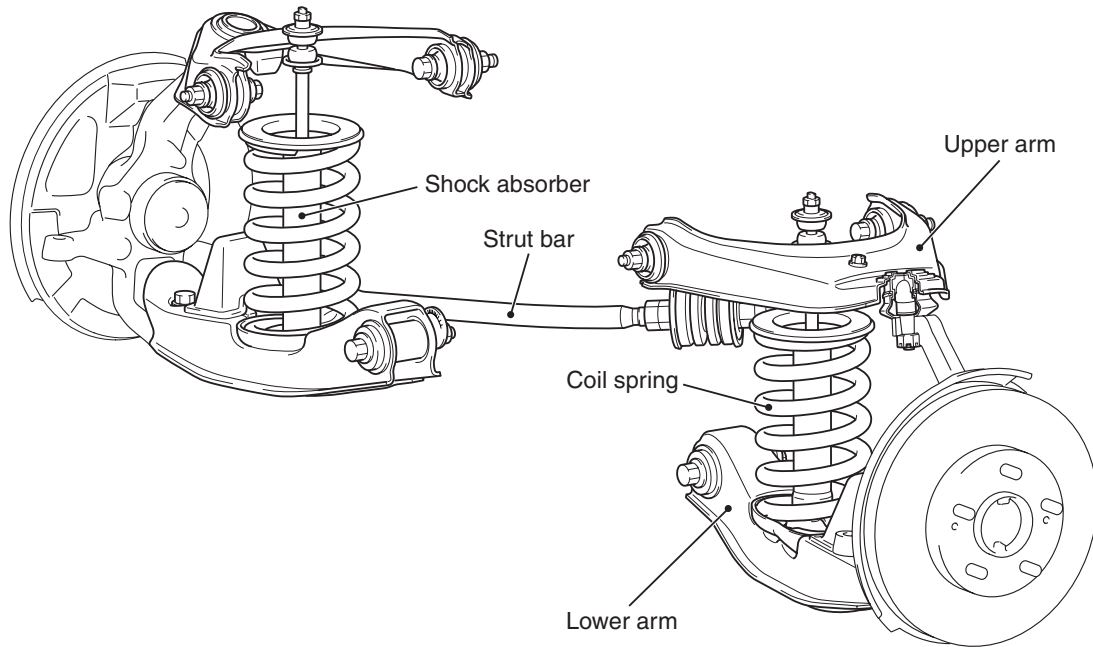
GENERAL INFORMATION

M1332000100496

Newly developed Independent-wishbone, coil springs has been adopted.

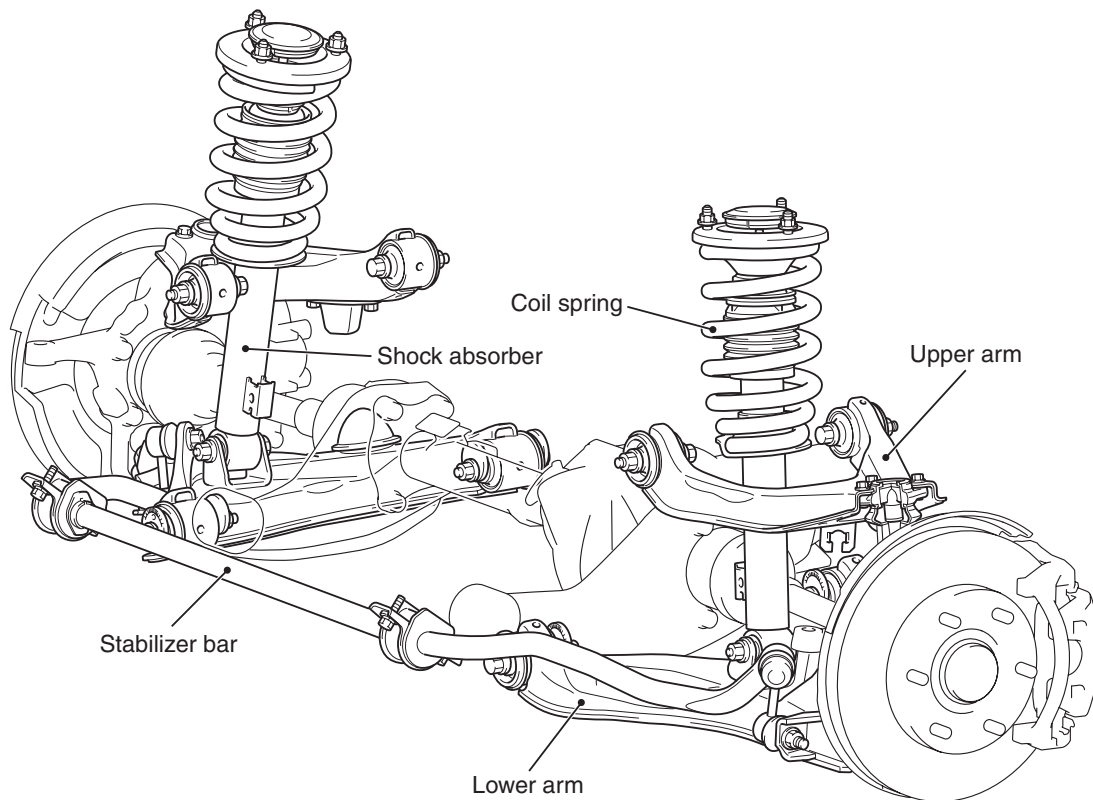
CONSTRUCTION DIAGRAM

<2WD>



AC501759AB

<4WD>



AC501760AB

**SPECIFICATIONS
COIL SPRING**

Item	2WD		4WD	
	2500-SOHC	2500-DOHC	2500-DOHC	3200
Wire diameter mm	16	16	17	17
Average outside diameter mm	101	101	80 –110	80 –110
Free length mm	303	307	308	312

SERVICE SPECIFICATIONS

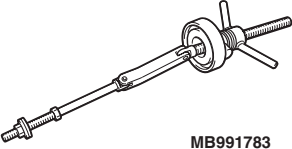
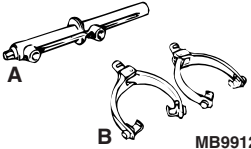
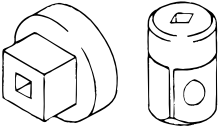
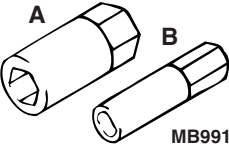
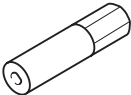
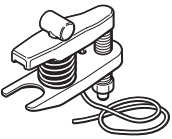
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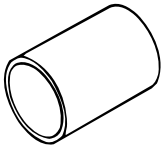
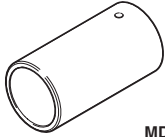
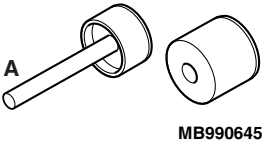

Item			Standard value
Toe-in	At the centre of tyre tread (mm)		0 –5
	Toe-angle (per wheel)		0° 00' –0° 06'
Steering angle	Inner wheel	2WD	39° 10' ± 2° 00'
		4WD	36° 50' ± 2° 00'
	Outer wheel <reference>	2WD	34° 10'
		4WD	32° 40'
Camber			0° 00' ± 0° 30**
Caster	2WD	2500-SOHC	3° 54' ± 1° 00**
		2500-DOHC	3° 48' ± 1° 00**
	4WD		3° 48' ± 1° 00**
Kingpin inclination	2WD		15° 24' ± 0° 30'
	4WD		12° 45' ± 0° 30'
Upper arm ball joint starting torque N· m			1.0 –5.6
Protruding length of shock absorber thread part mm			2 –3
Lower arm ball joint starting torque N· m			3.0 –6.9
Strut bar installation dimension mm			99.5
Stabilizer link ball joint turning torque N· m			0.2 –3.5

*NOTE: *: difference between right and left wheels
must be less than 30'*

SPECIAL TOOLS

M1332000600468

Tool	Number	Name	Use
 <p>MB991783</p>	MB991783	Coil spring compressor	Compression of front suspension coil spring <2WD>
 <p>A B MB991237</p>	A: MB991237 B: MB991238	A: Spring compressor body B: Arm set, large	Compression of front suspension coil spring <4WD>
 <p>MB990326</p>	MB990326	Preload socket	Ball joint starting torque check
 <p>A B MB991680</p>	MB991680 A: MB991681	Wrench and socket set A: Wrench	Shock absorber assembly disassembly and reassembly
 <p>MB992047</p>	MB992047	Socket	
 <p>MB992011</p>	MB992011	Ball joint remover	Upper arm and lower arm ball joint disconnection

Tool	Number	Name	Use
	MB991172	Inner shaft installer	Lower arm bushing removal and press-fitting <2WD>
 MD998911	MD998911	Bearing installer	
 MB990645	MB990645 A: MB990647	Installer and remover control arm bushing A: Bar	Lower arm bushing removal and press-fitting <4WD>
 MB991015	MB991015	Knuckle oil seal installer	

ON-VEHICLE SERVICE

FRONT WHEEL ALIGNMENT CHECK AND ADJUSTMENT <2WD>

M1331000900790

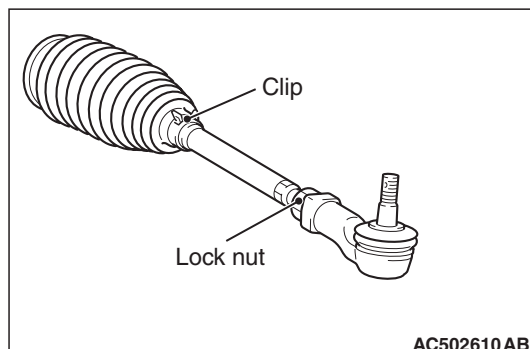
Measure wheel alignment with alignment equipment on a level surface. The front suspension, steering system, wheels, and tyres should be serviced to normal condition before measuring wheel alignment.

TOE-IN

Standard value:

at the centre of tyre tread: 0 –5 mm

Toe angle (per wheel): 0° 00' –0° 06'



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: 93 ± 15 N·m

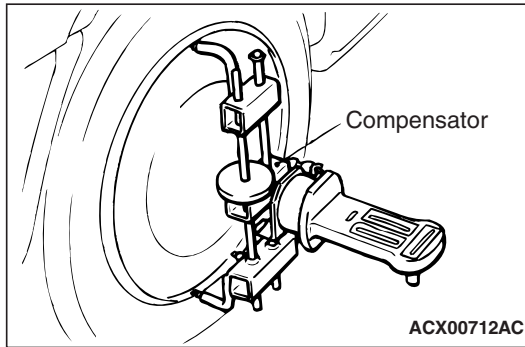
3. Confirm that the toe-in is at the standard value.
4. Use a turning radius gauge to check that the steering angle is at the standard value.

STEERING ANGLE

Standard value:

Inner wheels	39° 10' ± 2° 00'
Outer wheels (reference)	34° 10'

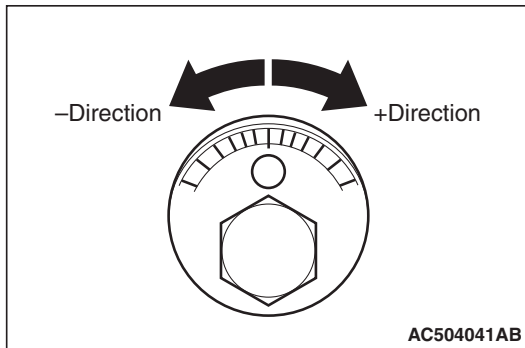
CAMBER, CASTER AND KINGPIN INCLINATION



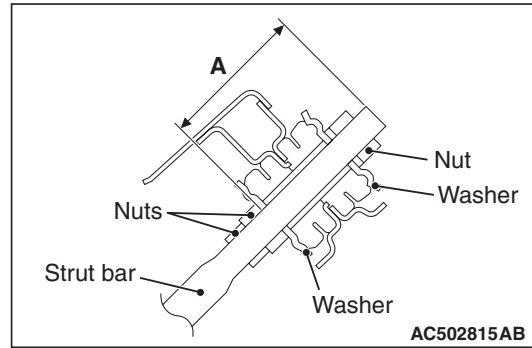
Standard value:

Item	Standard value	
	2500-SOHC	2500-DOHC
Camber	0° 00' ± 0° 30'*	0° 00' ± 0° 30'*
Caster	3° 54' ± 1° 00'*	3° 48' ± 1° 00'*
Kingpin inclination	15° 24' ± 0° 30'	15° 24' ± 0° 30'

NOTE: *: Difference between right and left wheels must be less than 30'



1. Adjust the camber and caster until they meet the standard value by turning the lower arm camber adjusting bolt according to the camber and caster reference table (Refer to).
2. After adjusting the camber, the toe should be adjusted.



3. If the caster is not within the standard value, adjust by turning the nut on the strut bar bushing.

Relation of variation:

Dimension (A)	+1.0 mm
Caster angle	+0° 13'

NOTE: Turning the nut on the strut bar one turn clockwise will increase the dimension by 1.5 mm (A).

4. Measure the camber again to confirm that its value is within the standard value. If the value is not within the standard value, repeat the adjustment.

CAMBER AND CASTER REFERENCE TABLE

RELATION OF VARIATION

Bolt scale	-4	-3	-2	-1	0	+1	+2	+3	+4
Camber angle	+0° 56'	+0° 41'	+0° 28'	+0° 15'	0°	-0° 15'	-0° 28'	-0° 40'	-0° 54'
Caster angle	+1° 11'	+0° 53'	+0° 36'	+0° 20'	0°	-0° 20'	-0° 36'	-0° 53'	-1° 11'

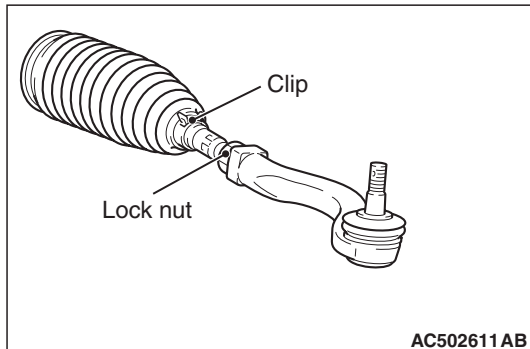
FRONT WHEEL ALIGNMENT CHECK AND ADJUSTMENT <4WD>

M1331000900808

Measure wheel alignment with alignment equipment on a level surface. The front suspension, steering system, wheels, and tyres should be serviced to normal condition before measuring wheel alignment.

TOE-IN

Standard value:
at the centre of tyre tread: 0 –5 mm
Toe angle (per wheel): 0° 00' –0° 06'



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: 93 ± 15 N· m

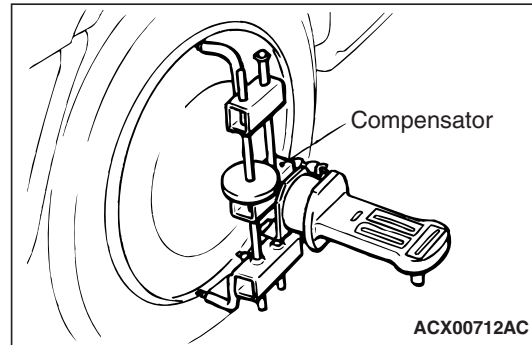
3. Confirm that the toe-in is at the standard value.
4. Use a turning radius gauge to check that the steering angle is at the standard value.

STEERING ANGLE

Standard value:

Inner wheels	36° 50' ± 2° 00'
Outer wheels (reference)	32° 40'

CAMBER, CASTER AND KINGPIN INCLINATION



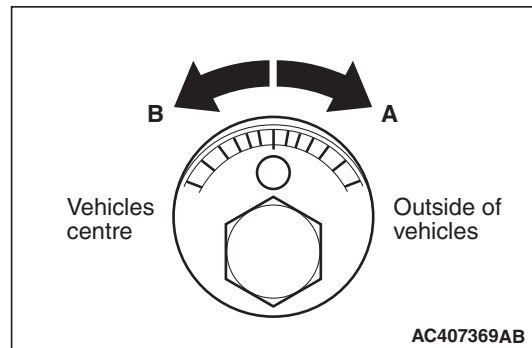
Standard value:

Item	Standard value
Camber	0° 00' ± 0° 30'*
Caster	3° 48' ± 1° 00'*
Kingpin inclination	12° 45' ± 0° 30'

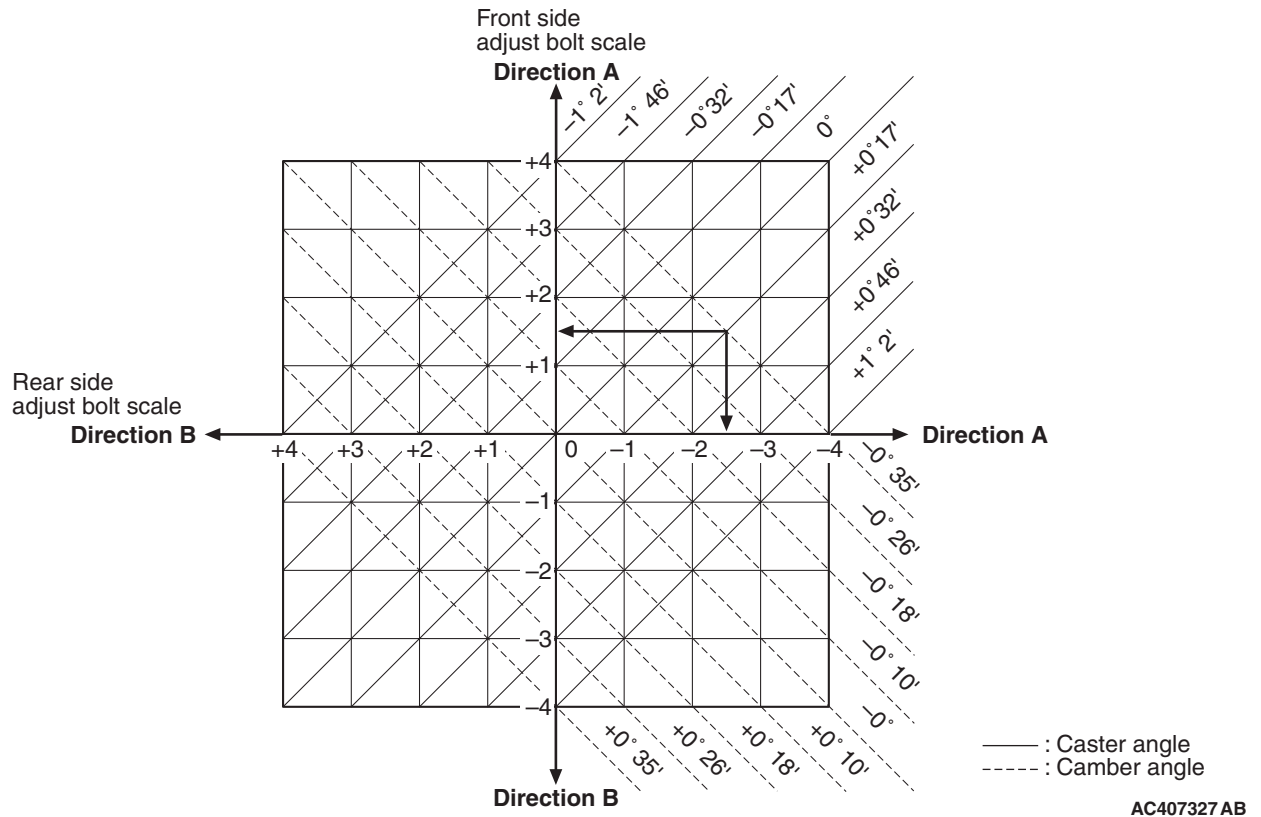
*NOTE: *: Difference between right and left wheels must be less than 30'*

CAMBER AND CASTER REFERENCE TABLE

HOW TO READ THIS TABLE (EXAMPLE)



If the camber difference -0° 35' and the caster difference is 0° 17' by comparing the measurement value with the standard value, rotate the front adjusting cam by 1.5 graduations and the rear adjusting cam by 2.5 graduations to the opposite direction against the "A" direction.



NOTE: Solid lines show caster, broken lines show camber.

LOWER ARM BALL JOINT AXIAL PLAY CHECK

M1332011300160

1. Raise the vehicle.
2. Remove the stabilizer link from the lower arm.
3. Move the lower arm up and down with your hands to check for an excessive play in the axial direction of the ball joint. If there is an excessive play, replace the lower arm assembly.

LOWER ARM BALL JOINT COVER CHECK

M1332008600473

1. Press the lower arm ball joint cover with your finger to check that there are no cracks or damage in the lower arm ball joint cover.
2. If the lower arm ball joint cover is cracked or damaged, replace the lower arm assembly.

NOTE: If the lower arm ball joint cover is cracked or damaged, it is possible that there may also be damage to the ball joint.

UPPER ARM ASSEMBLY

REMOVAL AND INSTALLATION <2WD>

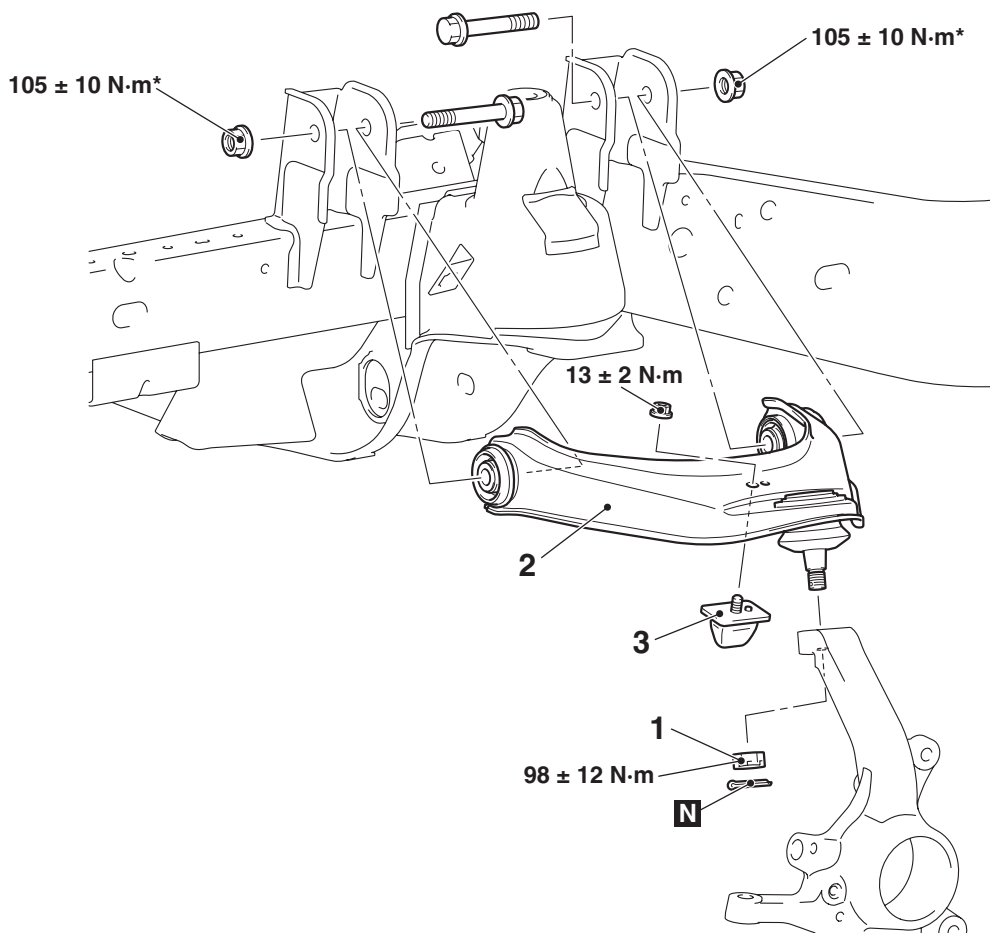
M1332004300102

CAUTION

*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the earth in an unladen condition.

Post-installation Operation

- Check the dust cover for cracks or damage by pushing it with your finger.
- Wheel Alignment Check and Adjustment (Refer to P.33-5).



AC502846AB

<<A>>

Removal steps

1. Upper arm ball joint and knuckle connection

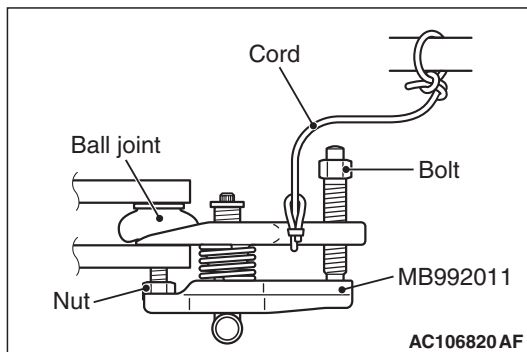
Removal steps (Continued)

2. Upper arm assembly
3. Rebound stopper

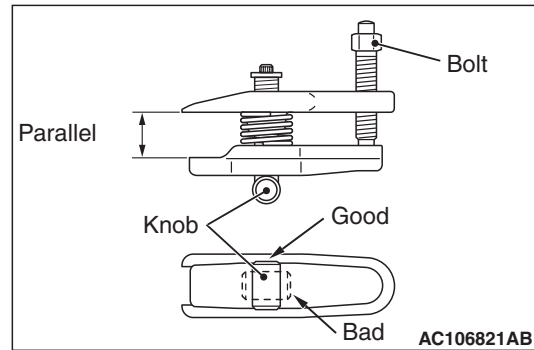
REMOVAL SERVICE POINT

<<A>> UPPER ARM BALL JOINT AND
KNUCKLE DISCONNECTION**CAUTION**

- Do not remove the nut from ball joint. Loosen it and use special tool to avoid possible damage to ball joint threads.
- Hang special tool with a cord to prevent it from falling.
- Because it is very dangerous when the ball joint comes off, raise the lower arm using a jack or similar device, making sure that the rebound stopper is free from any reaction force.



1. Install special tool ball joint remover (MB992011) as shown in the figure.



2. Turn the bolt and knob as necessary to make the jaws of special tool parallel, tighten the bolt by hand and confirm that the jaws are still parallel.
NOTE: When adjusting the jaws in parallel, make sure the knob is in the position shown in the figure.
3. Tighten the bolt with a wrench to disconnect the ball joint.

REMOVAL AND INSTALLATION <4WD>

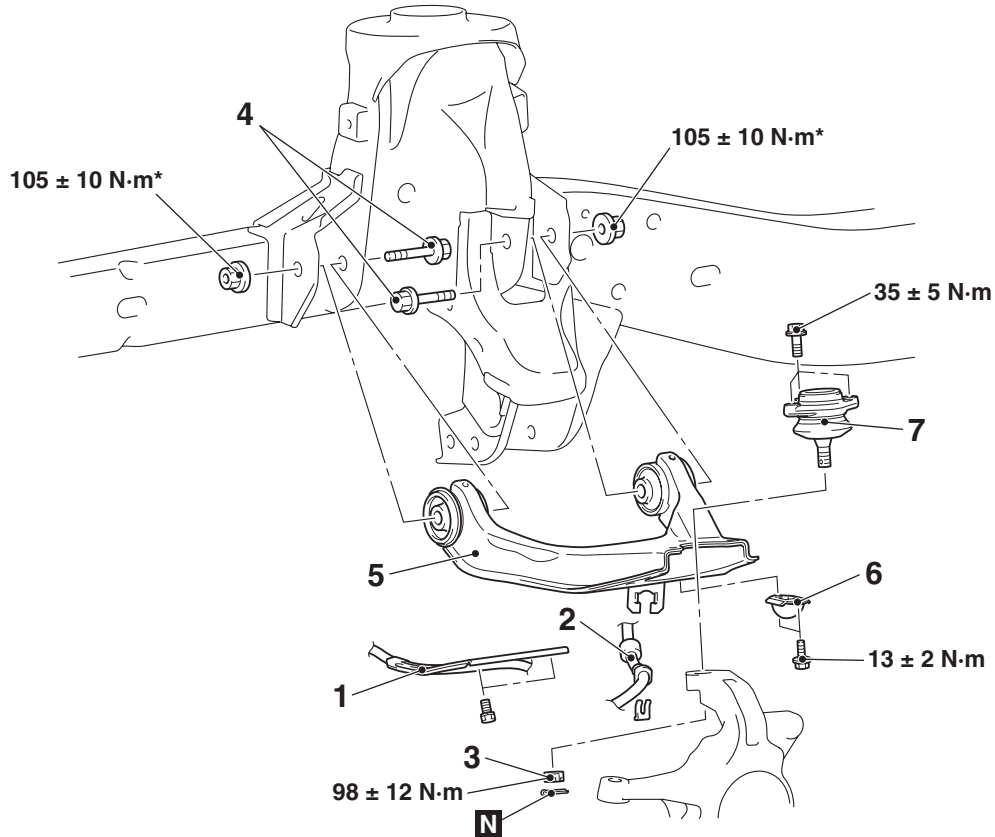
M1332004300113

CAUTION

*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the earth in an unladen condition.

Post-installation Operation

- Check the dust cover for cracks or damage by pushing it with your finger.
- Wheel Alignment Check and Adjustment (Refer to P.33-6).



AC501886AB

Removal steps

1. Front wheel speed sensor bracket mounting bolt
2. Brake hose
3. Upper arm ball joint and knuckle connection

<<A>>

<>

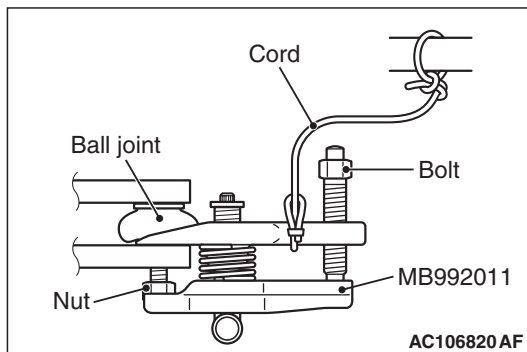
Removal steps (Continued)

4. Upper arm assembly and front frame connection
5. Upper arm assembly
6. Rebound stopper
7. Upper arm ball joint assembly

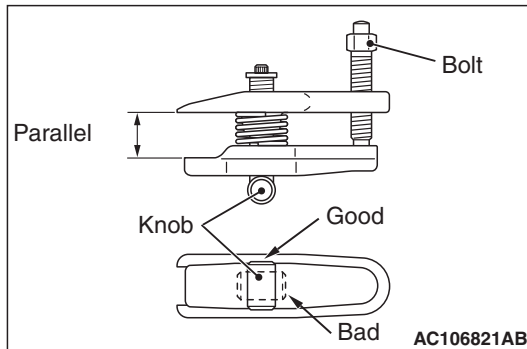
>>A<<

REMOVAL SERVICE POINT**<<A>> UPPER ARM BALL JOINT AND KNUCKLE DISCONNECTION****⚠ CAUTION**

- Do not remove the nut from ball joint. Loosen it and use special tool to avoid possible damage to ball joint threads.
- Hang special tool with a cord to prevent it from falling.
- Because it is very dangerous when the ball joint comes off, raise the lower arm using a jack or similar device, making sure that the rebound stopper is free from any reaction force.



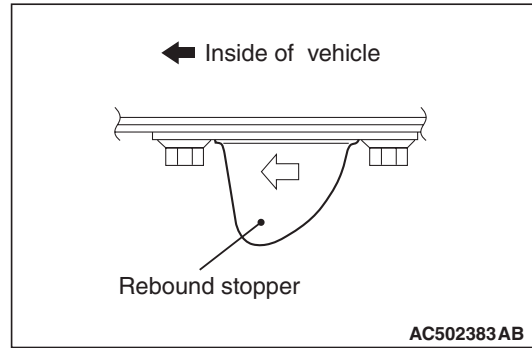
1. Install special tool ball joint remover (MB992011) as shown in the figure.



2. Turn the bolt and knob as necessary to make the jaws of special tool parallel, tighten the bolt by hand and confirm that the jaws are still parallel.
NOTE: When adjusting the jaws in parallel, make sure the knob is in the position shown in the figure.
3. Tighten the bolt with a wrench to disconnect the ball joint.

<> UPPER ARM ASSEMBLY AND FRONT FRAME CONNECTION REMOVAL

Remove the mounting bolts and nuts from the shock absorber assembly, and secure a working space.

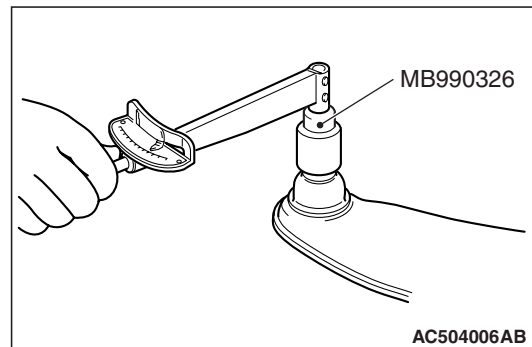
INSTALLATION SERVICE POINT**>>A<< REBOUND STOPPER INSTALLATION**

Install the rebound stopper with its arrow mark pointing toward inside the vehicle.

INSPECTION

M1332004400079

- Check the bushing for wear and deterioration.
- Check the upper arm for bend or breakage.
- Check all bolts for condition and straightness.

UPPER ARM BALL JOINT TURNING TORQUE CHECK

1. After shaking the ball joint stud several times, install the nut to the stud and use special tool preload socket (MB990326) to measure the turning torque of the ball joint.

NOTE: Rotation starting torque measurement should be carried out with parts temperature above 0°C.

Standard value: 1.0 –5.6 N·m

2. If the measured value exceeds the standard value, replace the upper arm ball joint assembly.
3. If the measured value is lower than the standard value, check that the upper arm ball joint turns smoothly without excessive play. If so, it is possible to use that ball joint.

UPPER ARM BALL JOINT DUST COVER CHECK

1. Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.

2. If the dust cover is cracked or damaged, replace the upper arm ball joint assembly.

NOTE: If the dust cover is cracked or damaged, it is possible that there may also be damage to the ball joint.

SHOCK ABSORBER AND COIL SPRING

REMOVAL AND INSTALLATION

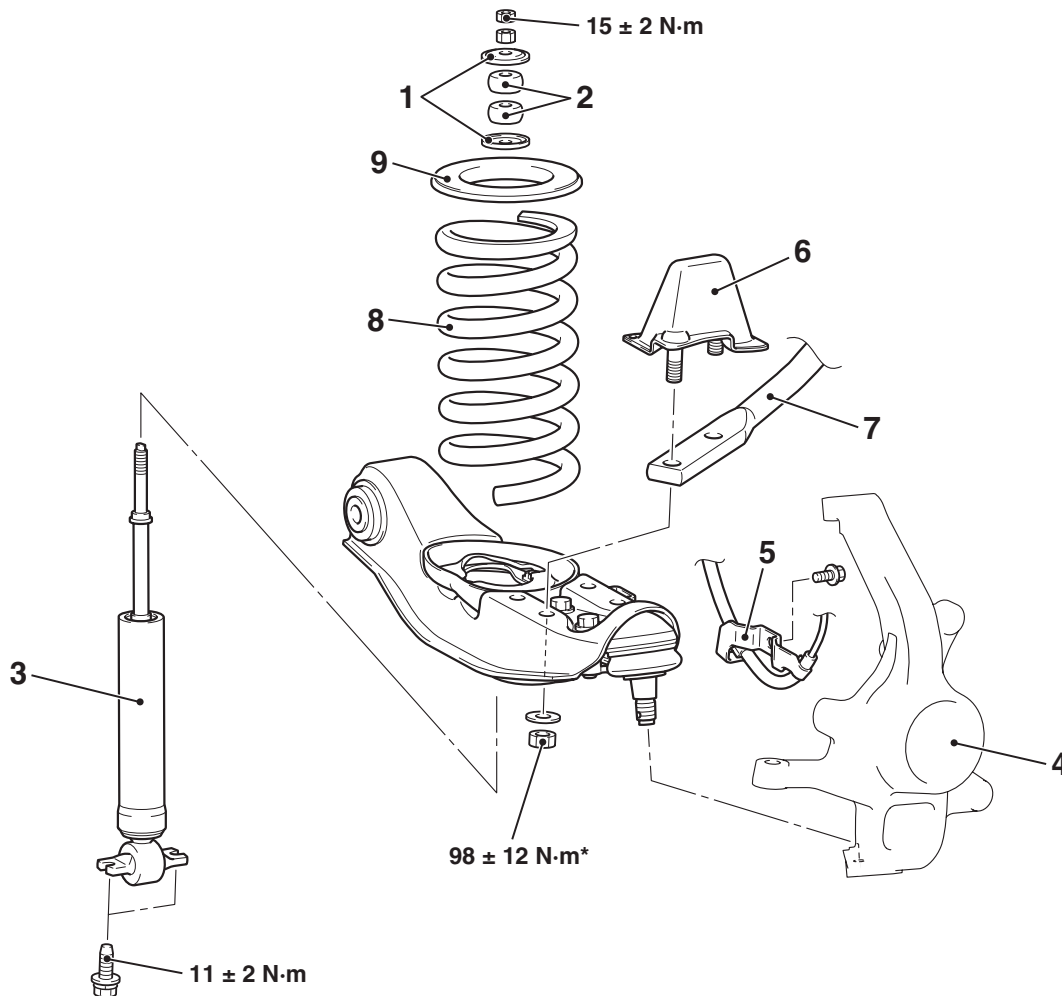
M1332012200014

CAUTION

*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the earth in an unladen condition.

Post-installation Operation

- Front wheel alignment check and adjustment (Refer to P.33-5).



AC501937AB

Removal steps

1. Washer
2. Shock absorber bushing
- >>B<< 3. Shock absorber

Removal steps (Continued)

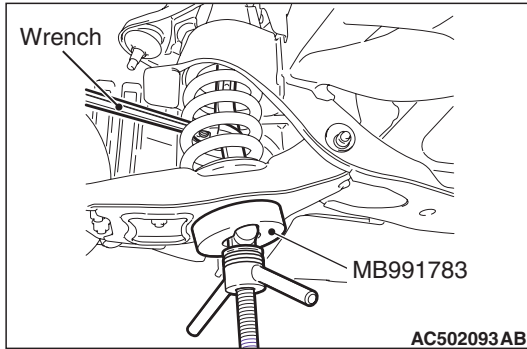
4. Hub and knuckle assembly (Refer to GROUP 26, Hub and knuckle assembly .)
5. Front wheel speed sensor bracket
6. Bump stopper

Removal steps (Continued)

- 7. Strut bar
- <<A>> >>A<< 8. Coil spring
- 9. Spring pad

REMOVAL SERVICE POINT

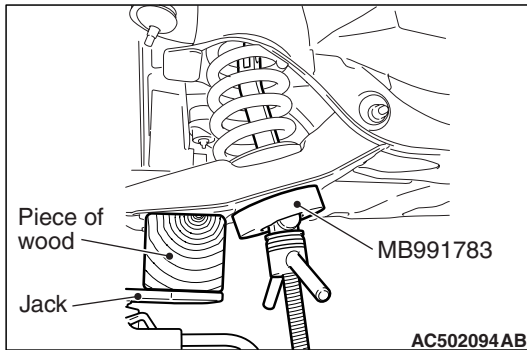
<<A>> COIL SPRING REMOVAL



Install as shown in the figure. Then, use a wrench to hold the special tool Coil spring compressor (MB991783), and remove the coil spring.

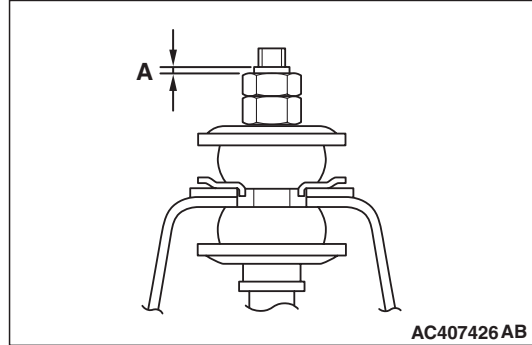
INSTALLATION SERVICE POINT

>>A<< COIL SPRING INSTALLATION



Support the lower arm by the special tool Coil spring compressor (MB991783), and install the coil spring by compressing it using a jack.

>>B<< SHOCK ABSORBER INSTALLATION



Tighten the nuts until its protruding length meets the standard value (A).

Standard value (A): 2 –3 mm

INSPECTION

M1332012300011

- Check for oil leaks from the shock absorber assembly.
- Check the shock absorber assembly for damage or deformation.

SHOCK ABSORBER ASSEMBLY

REMOVAL AND INSTALLATION <4WD>

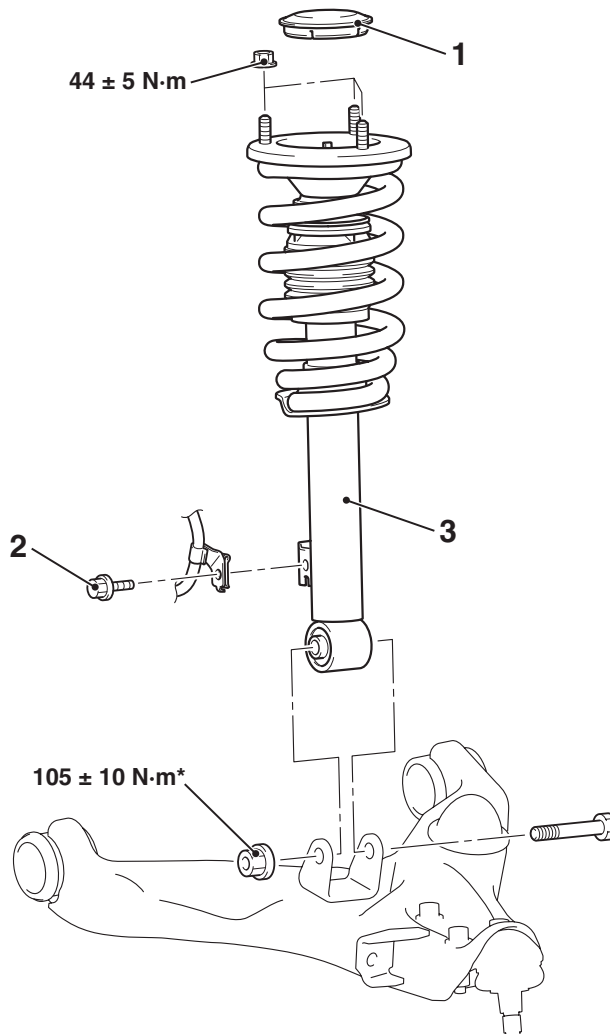
M1332004600062

⚠ CAUTION

*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the earth in an unladen condition.

Post-installation Operation

- Upper arm assembly (Refer to P.33-11).
- Front wheel alignment check and adjustment (Refer to P.33-6).



Removal steps

1. Cap
2. Front wheel speed sensor harness clamp
3. Shock absorber assembly

INSPECTION

- Check for oil leaks from the shock absorber assembly.
- Check the shock absorber assembly for damage or deformation.

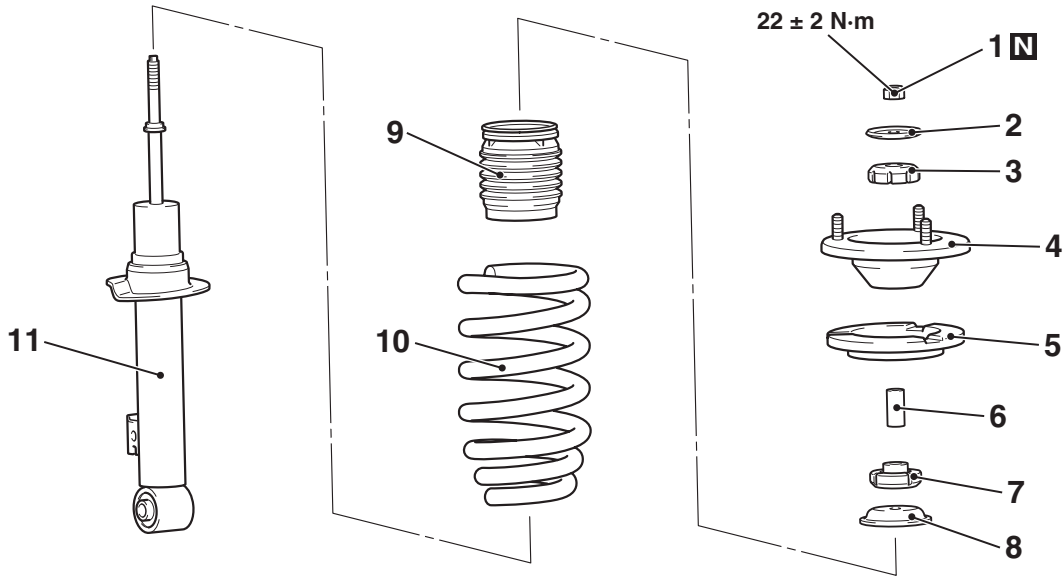
AC502982 AB

M1332004700025

DISASSEMBLY AND REASSEMBLY

<4WD>

M1332004800077



AC502848AB

Disassembly steps

- <<A>>>C<<1. Self-locking nut
2. Seat
3. Upper bushing
>>B<<4. Spring bracket assembly
5. Spring upper pad
6. Collar

Disassembly steps (Continued)

7. Upper bushing
8. Cup
9. Dust cover
>>A<<10. Coil spring
<> 11. Shock absorber

DISASSEMBLY SERVICE POINTS

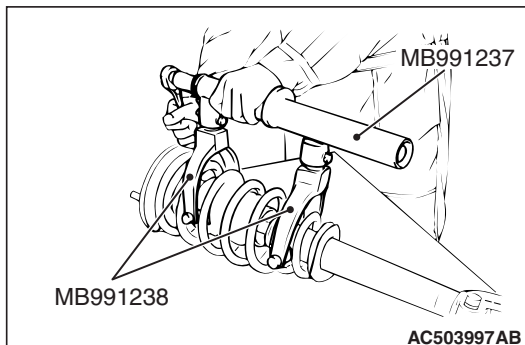
<<A>> SELF-LOCKING NUT REMOVAL

CAUTION

- Install special tool arm set (MB991238) evenly, and so that the maximum length will be attained within the installation range.
- Do not use an impact wrench to tighten the bolt of special tool spring compressor body (MB991237), otherwise the special tool will break.

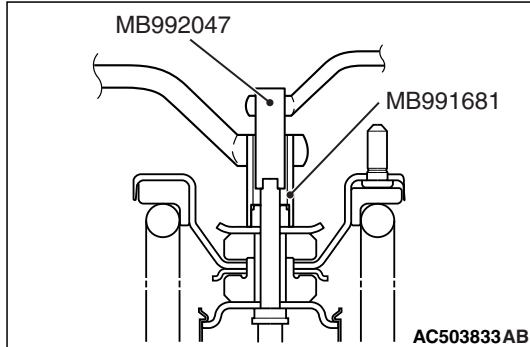
1. Use following special tools to compress the coil spring.

- Spring Compressor Body (MB991237)
- Arm Set (MB991238)



⚠ WARNING

Do not use an impact wrench to remove the self-locking nut. Vibration of the impact wrench will cause special tools (MB991237 and MB991238) to slip and cause personal injury.



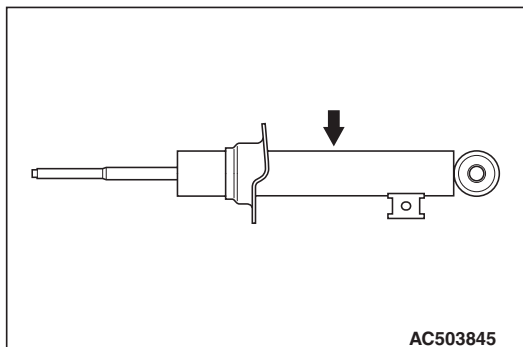
2. Use following special tools to secure the strut, and then remove the self-locking nut.

- Wrench (MB991681)
- Socket (MB992047)

<> SHOCK ABSORBER DISPOSAL

⚠ WARNING

Wear goggles when drilling to protect your eyes from flying metal debris.



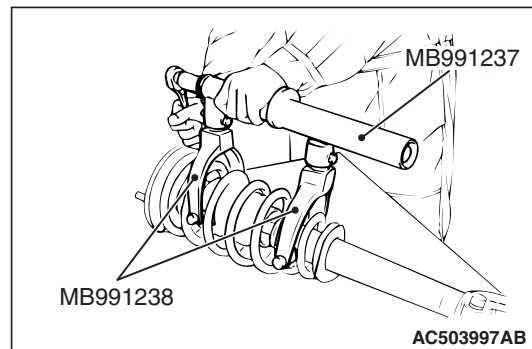
The gas must be discharged from the strut before discarding it. Place the strut horizontally with its piston rod extended. Then drill a hole of approximately 3 mm in diameter at the location shown in the illustration and discharge the gas.

REASSEMBLY SERVICE POINTS

>>A<< COIL SPRING INSTALLATION

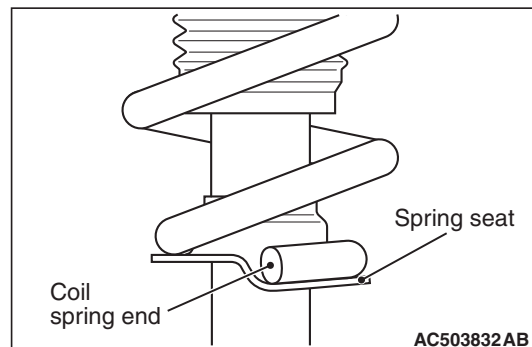
⚠ CAUTION

- Do not tighten the special tool bolt too tight. The tool will be broken if the bolt is tightened over the allowable torque 74 N·m.
- Install the special tools evenly, and so that the maximum length will be attained within the installation range.
- Do not use an impact wrench, as it will cause the bolt of the special tool to be seized.

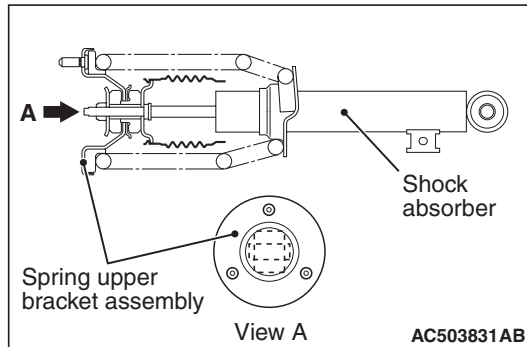


1. Install the special tools same as its removal and compress the coil spring to install to the shock absorber.

- Spring Compressor Body (MB991237)
- Arm Set (MB991238)



2. Align the coil spring lower end with the shock absorber spring seat stepped part.

**>>B<< SPRING BRACKET ASSEMBLY
INSTALLATION**

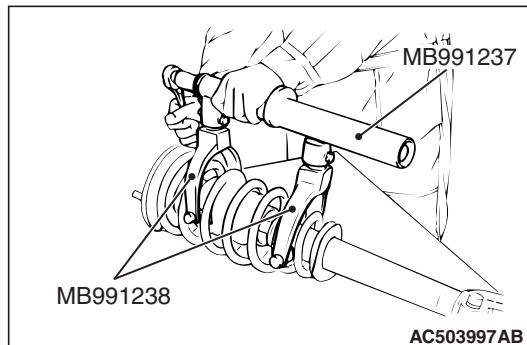
install the spring bracket assembly which faces the shock absorber as shown in the illustration.

**>>C<< SELF-LOCKING NUT
INSTALLATION**

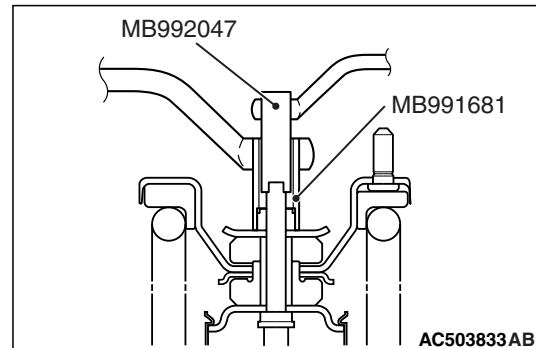
1. Tighten the self-locking nut loosely.

⚠ CAUTION

Do not use an impact wrench, as it will cause the bolt of the special tool to be seized.



2. Install the special tools same as its removal and compress the coil spring to install to the shock absorber.
 - Spring Compressor Body (MB991237)
 - Arm Set (MB991238)



3. Using following special tools tighten the self-locking nut 22 ± 2 N·m.
 - Wrench (MB991681)
 - Socket (MB992047)

INSPECTION

M1332004900029

- Check the rubber parts for damage or deterioration.
- Check the coil spring for deformation, deterioration or damage.
- Check the shock absorber assembly for deformation.

LOWER ARM

REMOVAL AND INSTALLATION <2WD>

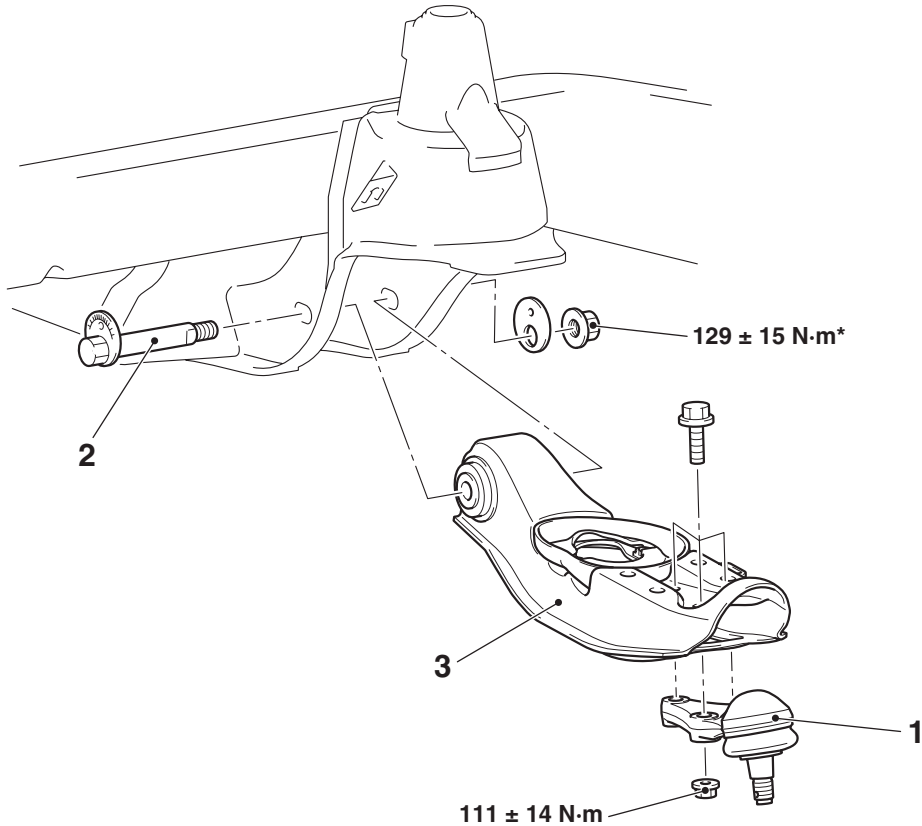
M1332001600665

CAUTION

*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the earth in an unladen condition.

Post-installation Operation

- Check the dust cover for cracks or damage by pushing it with finger.
- Front wheel alignment check and adjustment (Refer to P.33-5).



AC502908AB

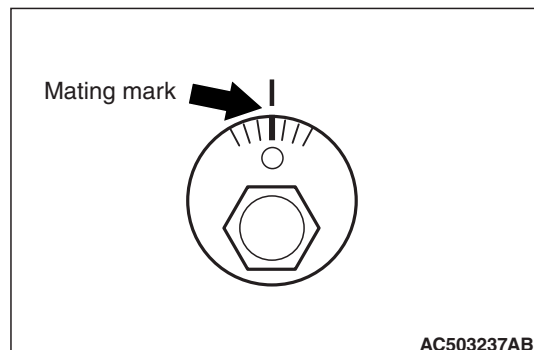
Removal steps

- Coil spring (Refer to P.33-13).
1. Lower arm ball joint
 2. Lower arm mounting bolt
 3. Lower arm assembly

<<A>>

REMOVAL SERVICE POINT

<<A>> LOWER ARM MOUNTING BOLT REMOVAL



AC503237AB

After making a mating mark on the adjusting bolt, remove the lower arm mounting bolt.

REMOVAL AND INSTALLATION <4WD>

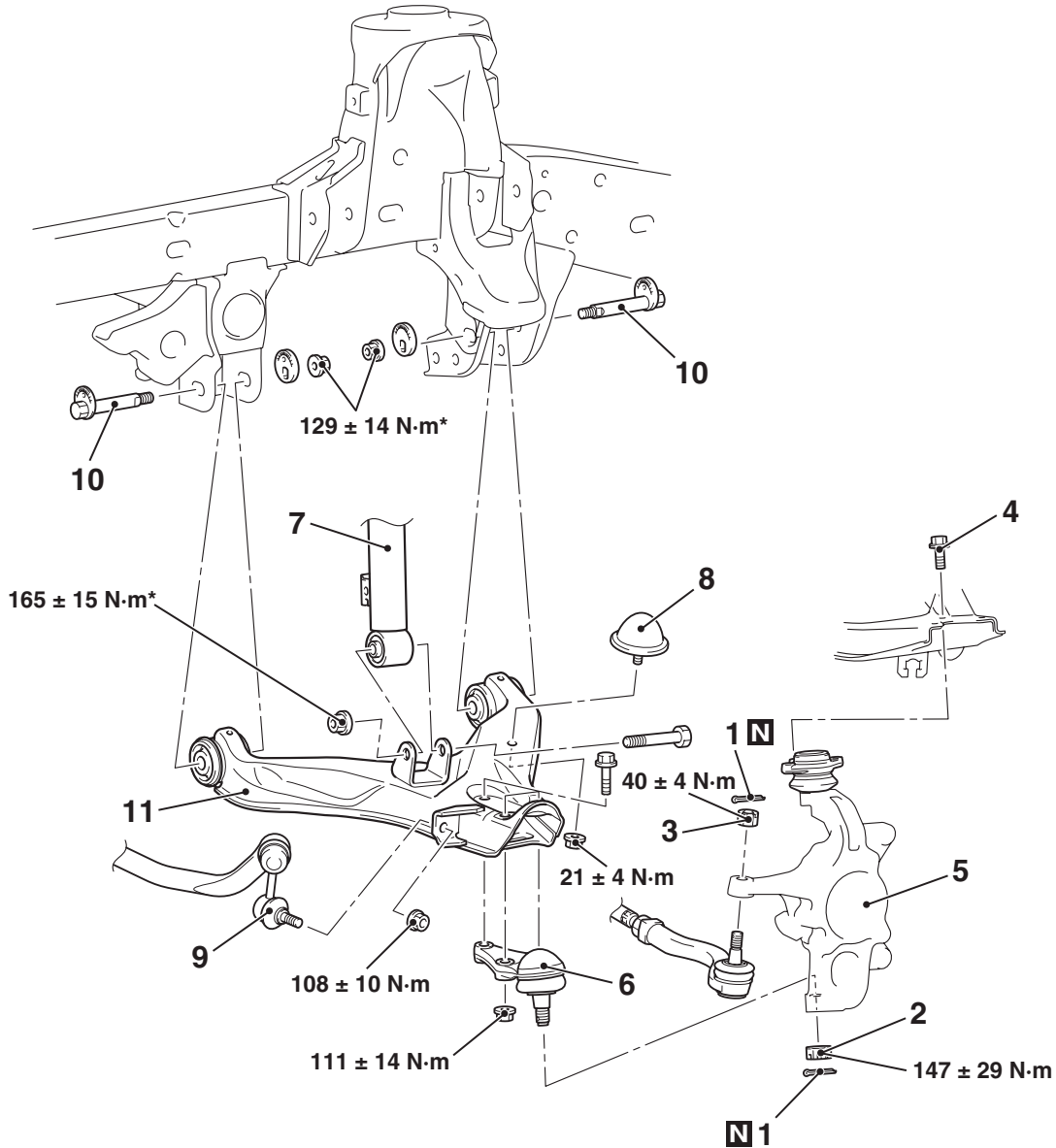
M1332001600676

CAUTION

*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the earth in an unladen condition.

Post-installation Operation

- Check the dust cover for cracks or damage by pushing it with finger.
- Front wheel alignment check and adjustment (Refer to P.33-6).



AC502946AB

Removal steps

<<A>>

<<A>>

1. Split pin
2. Lower arm ball joint and knuckle assembly connection
3. Tie rod end and knuckle assembly connection
4. Upper arm and upper arm ball joint connection

Removal steps (Continued)

5. Hub and knuckle assembly (Refer to GROUP 26, Knuckle .)
6. Lower arm ball joint
7. Shock absorber and lower arm assembly connection
8. Bump stopper

Removal steps (Continued)

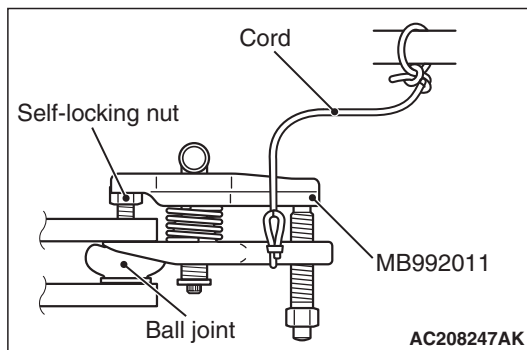
9. Lower arm assembly and stabilizer link connection
- <> 10. Lower arm mounting bolt
11. Lower arm assembly

REMOVAL SERVICE POINT

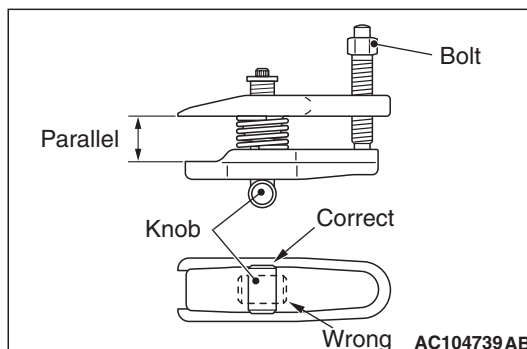
<<A>> SELF-LOCKING NUT REMOVAL (LOWER ARM BALL JOINT DISCONNECTION)

⚠ CAUTION

- The self-locking nut must be only loosened but not removed from the ball joint. Be sure to use the special tool.
- To prevent the special tool from dropping off, suspend it with a cord.

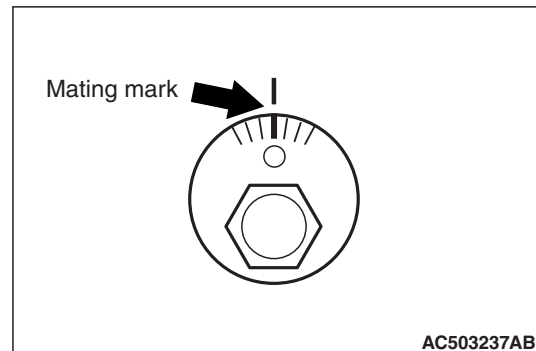


1. Install special tool ball joint remover (MB992011) as shown in the figure.



2. Turn the bolt and knob to make the special tool insert horizontal, then hand-tighten the bolt. After tightening, verify that the insert is still horizontal.
NOTE: When adjusting the special tool wedge horizontally, position the knob as shown.
3. Turn the bolt to disengage the lower arm ball joint from the knuckle.

<> LOWER ARM MOUNTING BOLT REMOVAL



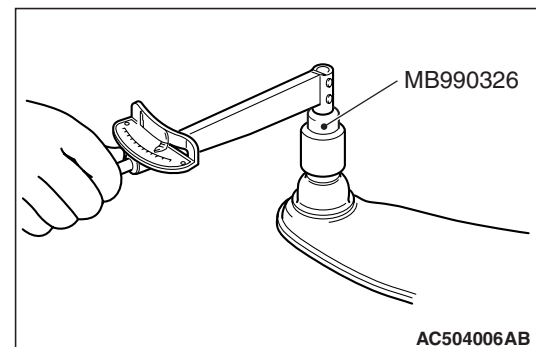
After making a mating mark on the adjusting bolt, remove the lower arm mounting bolt.

INSPECTION

M1332001700479

- Check the lower arm bushing for wear and deterioration.
- Check the lower arm assembly for bend or breakage.
- Check all bolts for condition and straightness.

LOWER ARM BALL JOINT ROTATION STARTING TORQUE CHECK



1. After shaking the ball joint stud several times, use special tool preload socket (MB990326) to measure the rotation starting torque of the ball joint.

NOTE: Rotation starting torque measurement should be carried out with parts temperature above 0°C.

Standard value: 3.0 –6.9 N·m

2. If the measured value is not within the standard value, or if the ball joint is difficult to turn or does not turn smoothly, replace the lower arm assembly.

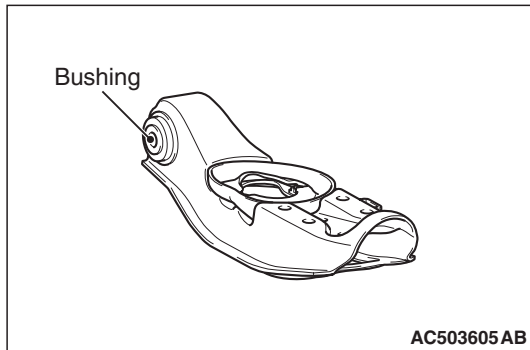
LOWER ARM BALL JOINT DUST COVER CHECK

1. Check the lower arm ball joint dust cover for cracks or damage by pushing it with your finger.
2. If the lower arm ball joint dust cover is cracked or damaged, replace the lower arm assembly.

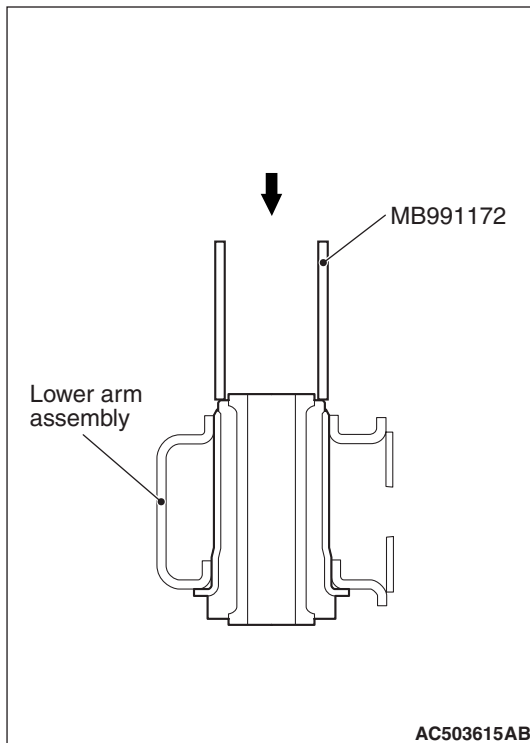
NOTE: If the dust cover is cracked or damaged, it is possible that there may also be damage to the ball joint.

LOWER ARM BUSHING REPLACEMENT <2WD>

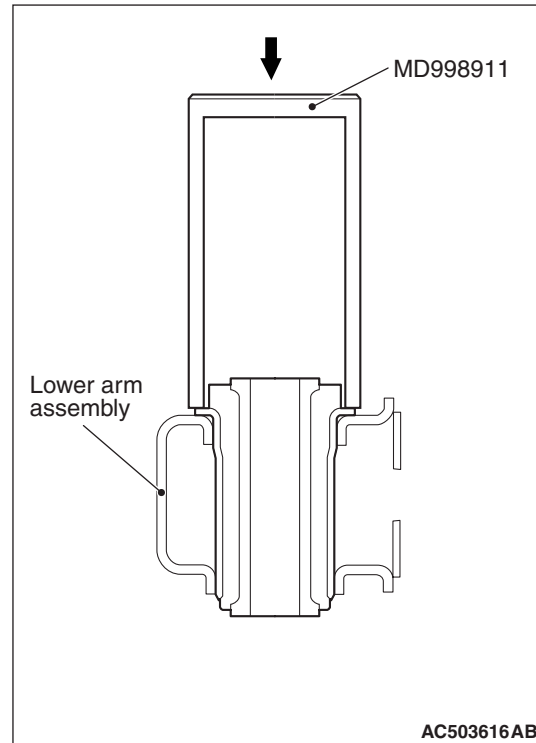
M1332008100542



Replace the bushing as follows:



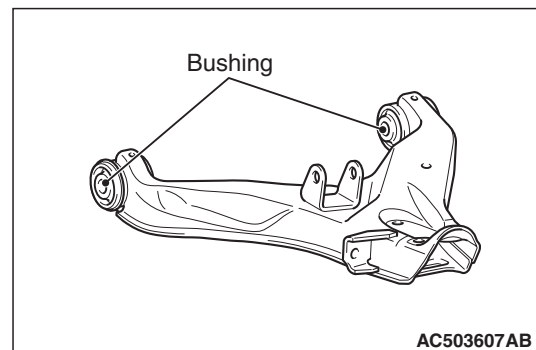
1. Use the special tool inner shaft installer base (MB991172) to drive out the bushing.



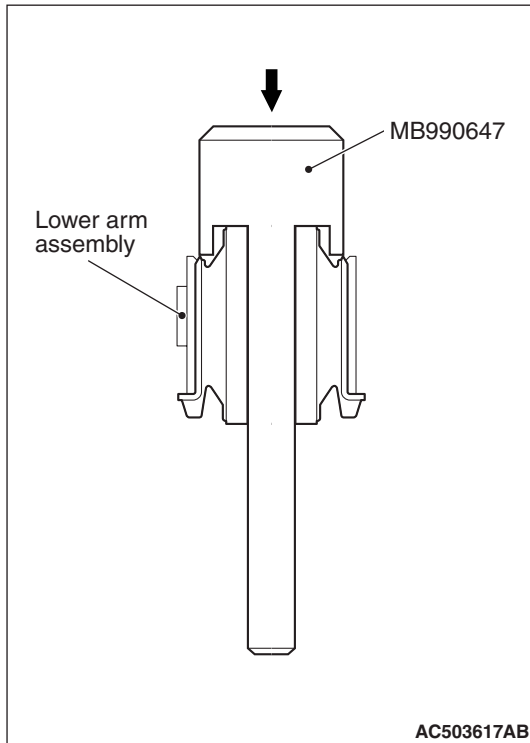
2. Use the special tool bearing installer (MD998911) to press in the bushing.

LOWER ARM BUSHING REPLACEMENT <4WD>

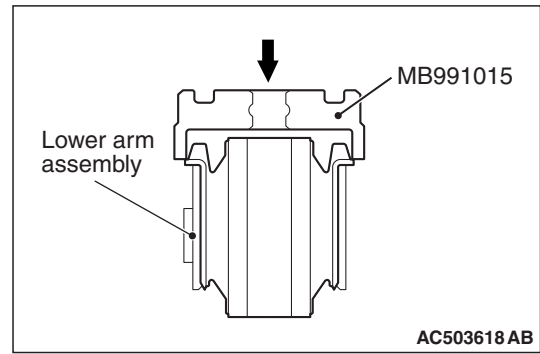
M1332008100553



Replace the bushing as follows:



1. Use the special tool bar (MB990647) to drive out the bushing.



2. Use the special tool knuckle oil seal installer (MB991015) to press in the bushing.

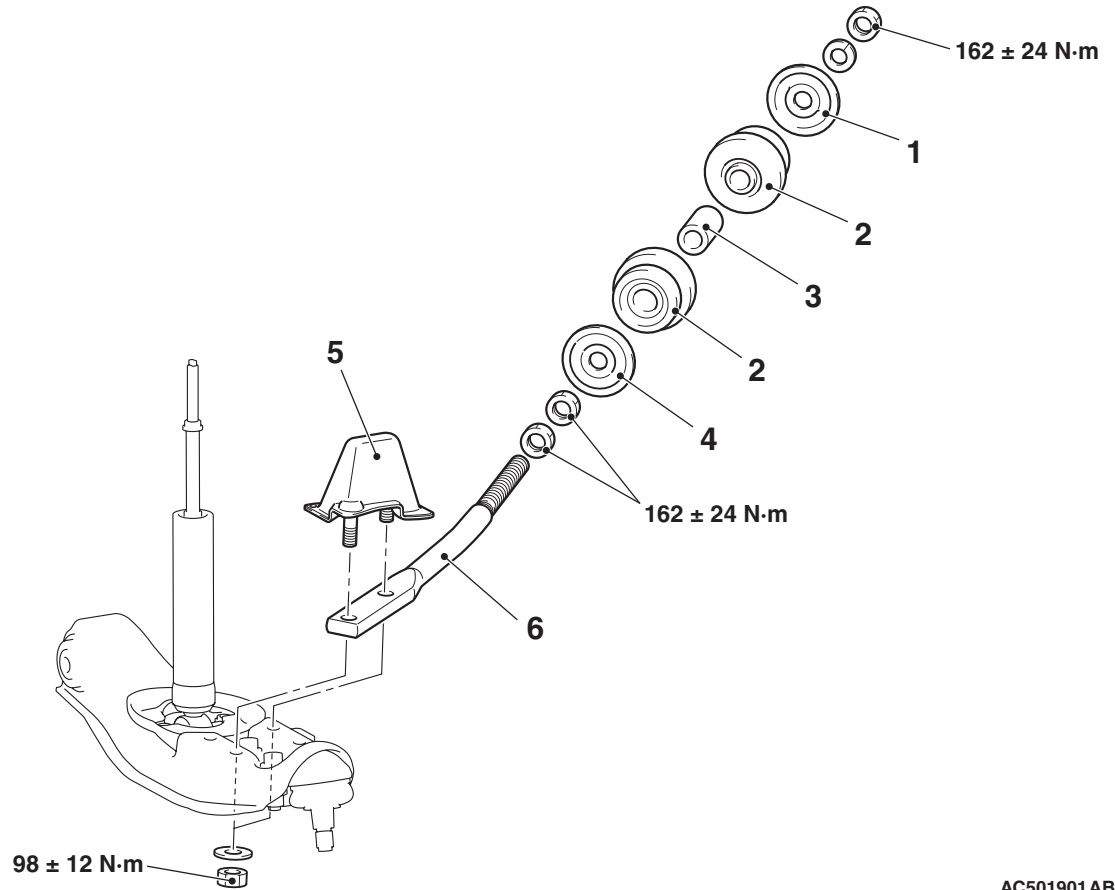
STRUT BAR <2WD>

REMOVAL AND INSTALLATION

M1332011900010

Post-installation Operation

- Front wheel alignment check and adjustment (Refer to P.33-5).



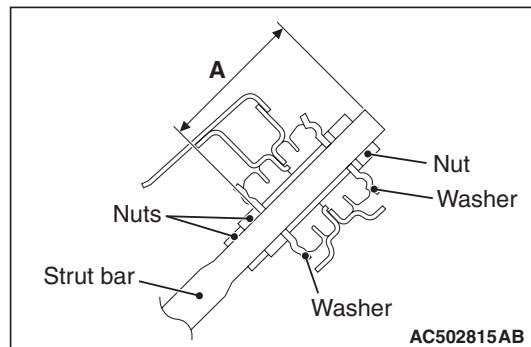
AC501901AB

Removal steps

- >>A<< 1. Washer
- >>A<< 2. Strut bar bushing
- 3. Collar
- >>A<< 4. Washer
- 5. Bump stopper
- 6. Strut bar

INSTALLATION SERVICE POINT

>>A<< WASHER/STRUT BAR BUSHING INSTALLATION



AC502815AB

1. Install the washer and strut bar bushing to the direction as shown in the figure.
2. Install so that the dimension (A) shown in the figure will meet the standard value.

Standard value (A): 99.5 mm

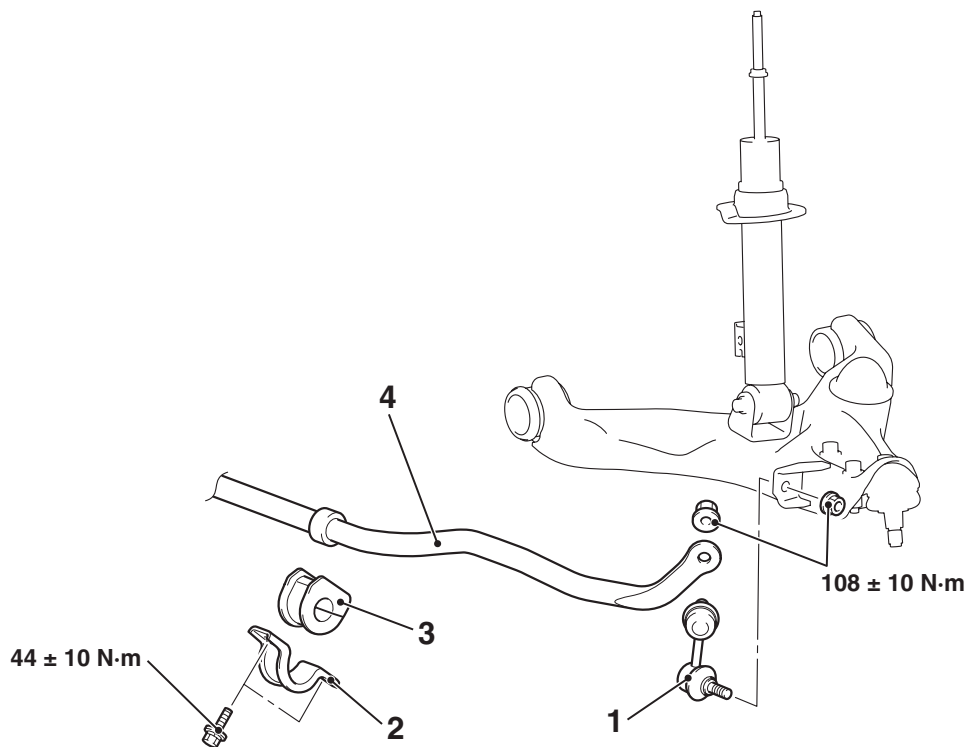
STABILIZER BAR <4WD>

REMOVAL AND INSTALLATION

M1332004000640

Pre-removal and Post-installation Operation

- Engine Room Under Cover Removal (Refer to GROUP 51, Under Cover).



AC502730 AB

Install the bushing with its cut line located as shown in the figure.

Removal steps

1. Stabilizer link assembly
2. Stabilizer clamp
- >>A<< 3. Stabilizer bushing
4. Stabilizer bar

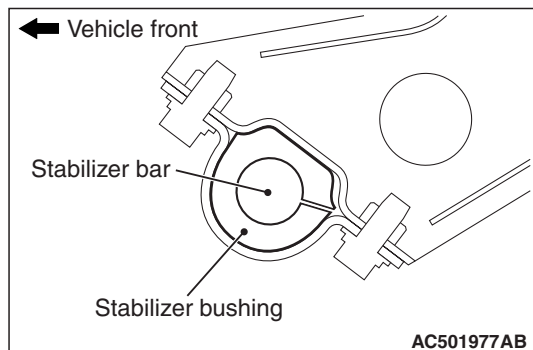
INSPECTION

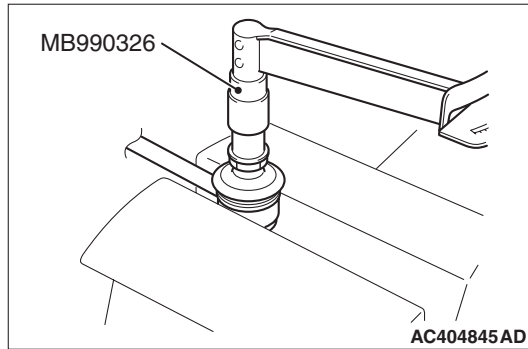
M1332002000439

- Check the stabilizer rubbers and stabilizer bushings for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check all bolts for condition and straightness.

INSTALLATION SERVICE POINTS

>>A<< STABILIZER BUSHING INSTALLATION



STABILIZER LINK BALL JOINT TURNING TORQUE CHECK

1. After shaking the ball joint stud several times, install the nut to the stud and use special tool preload socket (MB990326) to measure the turning torque of the ball joint.

Standard value: 0.2 –3.5 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 re-use that ball joint.

STABILIZER LINK BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with your finger.
2. If the dust cover is cracked or damaged, replace the stabilizer link.

GROUP 34

REAR SUSPENSION

CONTENTS

GENERAL INFORMATION	34-2	REMOVAL AND INSTALLATION	34-4
SHOCK ABSORBER ASSEMBLY ..	34-4	INSPECTION.....	34-6

GENERAL INFORMATION

M1341000100654

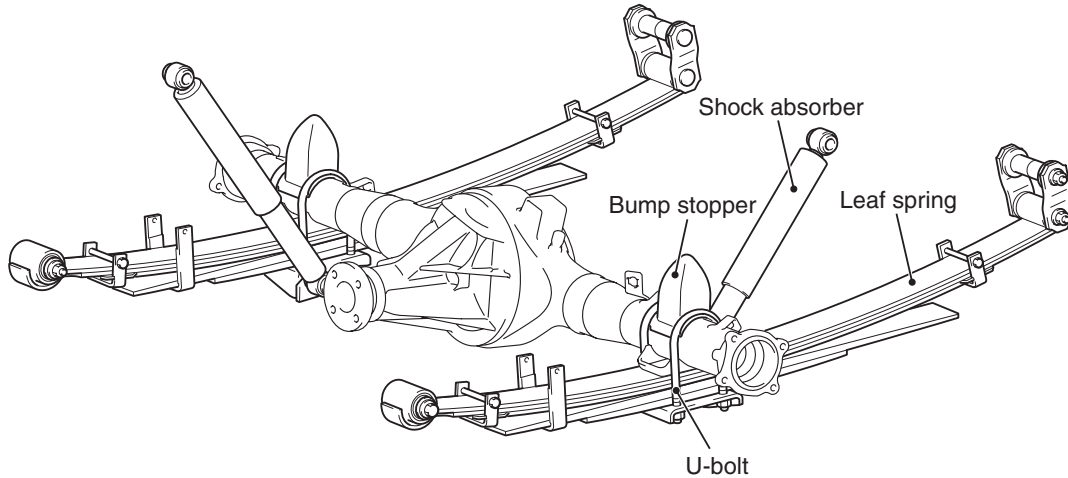
The leaf spring type rear suspension featuring the simple structure and outstanding strength has been adopted.

- The spring is fixed at the top to increase ground clearance.<4WD>

- The suspension geometry has been optimised to assure stability under loaded condition and to improve adhesion under unladen condition, and the SUV-like steering stability has been achieved.<4WD>

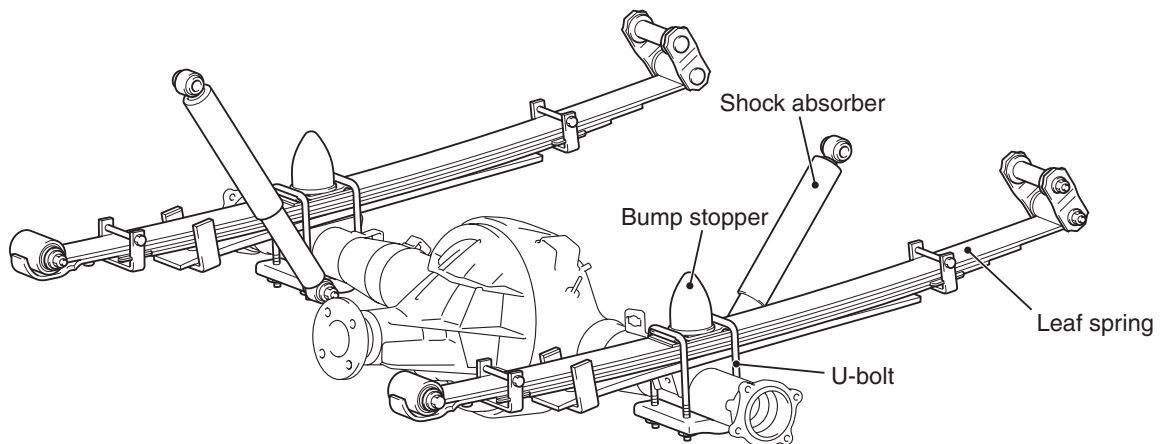
CONSTRUCTION DIAGRAM

<2WD>



AC501757AB

<4WD>



AC501758AB

SPECIFICATIONS

LEAF SPRING

<2WD>

Item	Club cab	Double cab
Number of leaf springs	5	5
Straight span mm	1,200	1,200
Free camber mm	155	148

<4WD>

Item	Club cab	Double cab	
	KB4TGCNHZRU, KB8TGCNHZRU	KB4TGJNHZRU	KB8TGJNXZRU, KB8TGJRXZRU, KB8TGJNHZRU
Number of leaf springs	5	5	5
Straight span mm	1,200	1,200	1,200
Free camber mm	127	127	139

SHOCK ABSORBER ASSEMBLY

REMOVAL AND INSTALLATION

M1341001000252

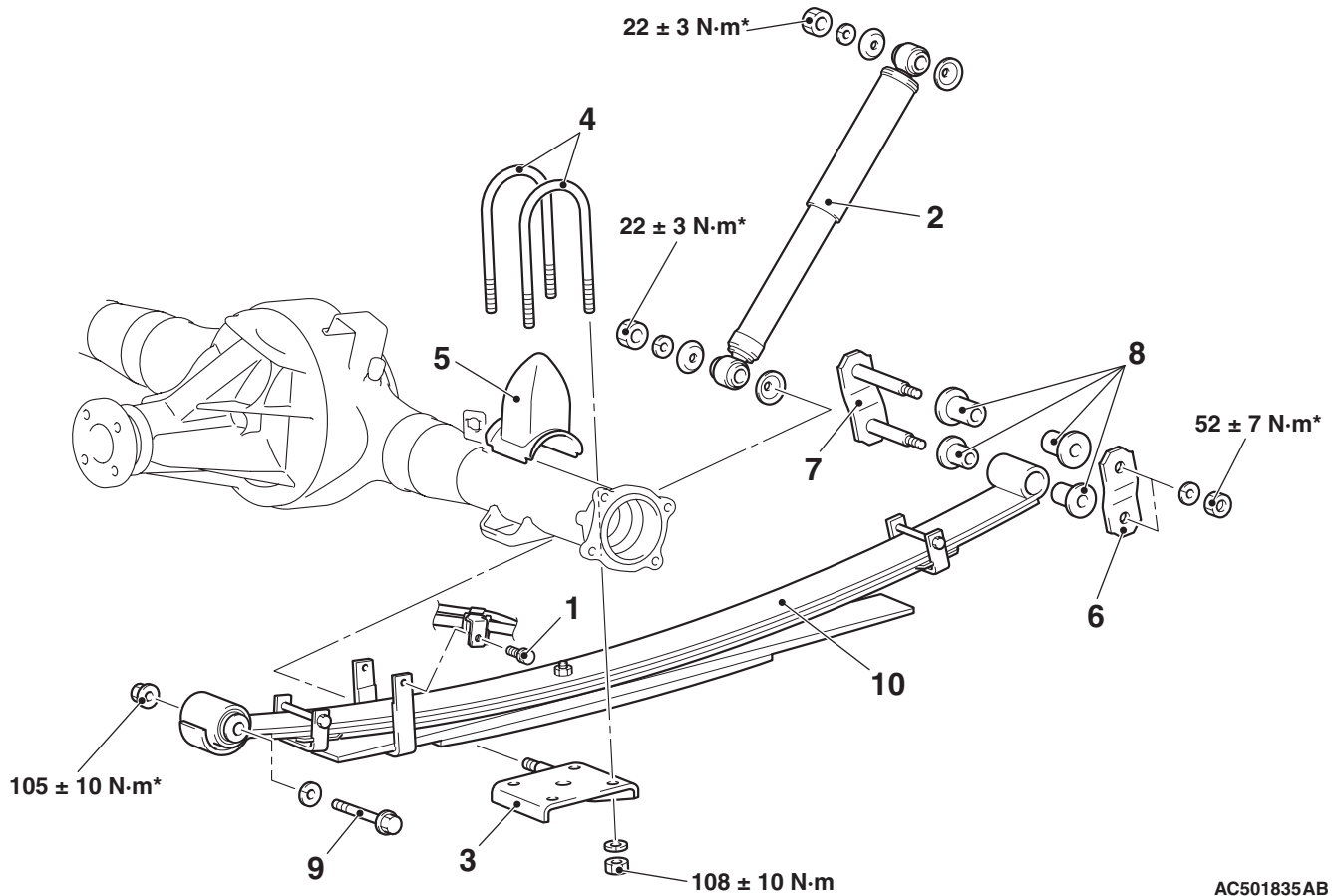
CAUTION

*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Pre-installation Operation

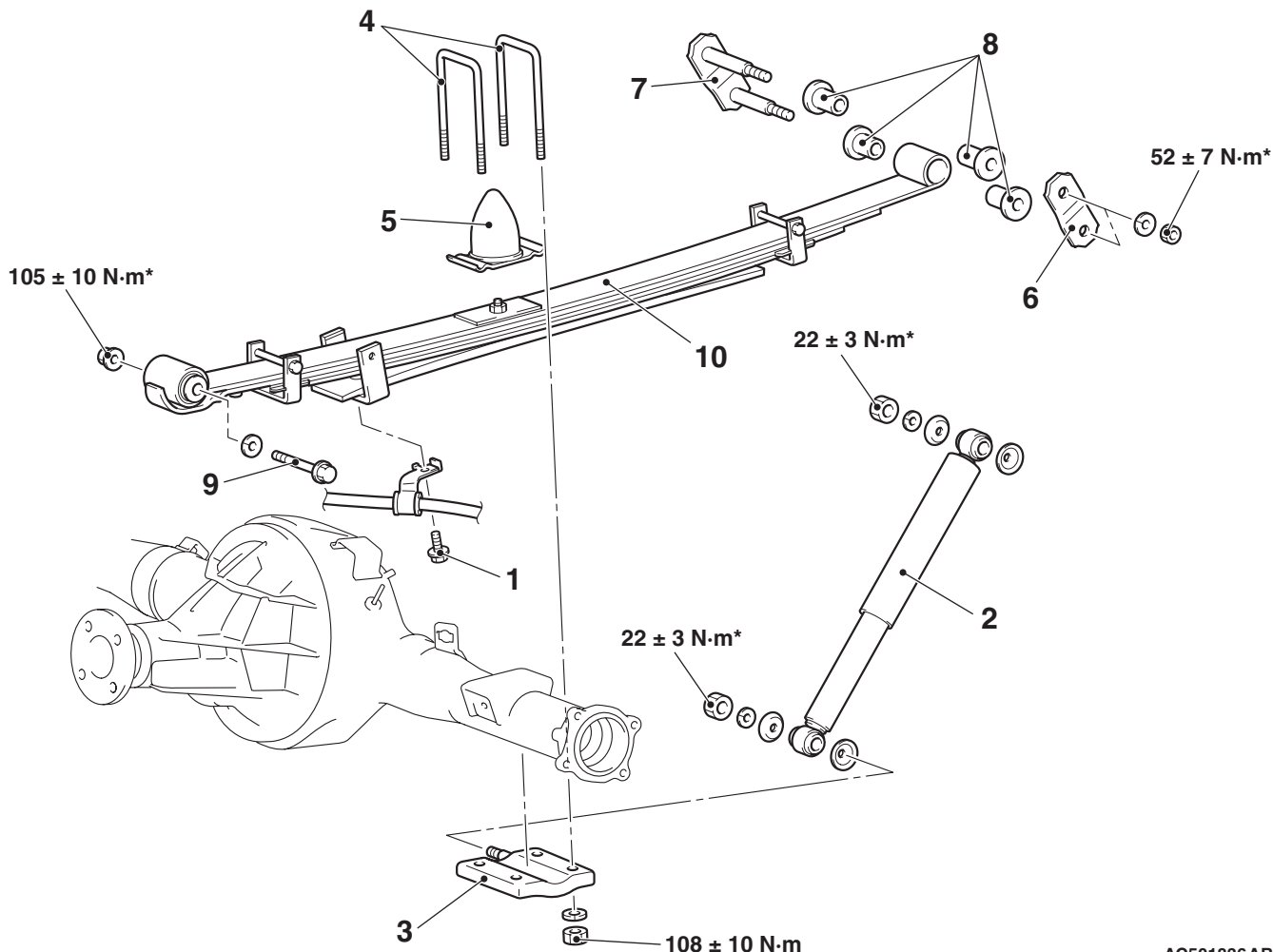
- Support the axle housing with a garage jack etc..

<2WD>



AC501835AB

<4WD>



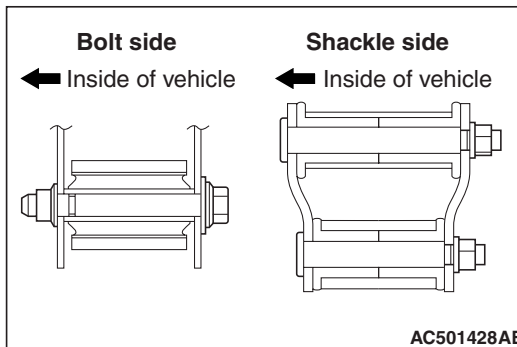
AC501836AB

Removal steps

1. Parking brake cable attaching bolt
2. Shock absorber
3. U-bolt seat
4. U-bolts
5. Bump stopper
 - Spare tyre (LH only)
- >>A<< 6. Shackle plate
- >>A<< 7. Shackle assembly
- >>A<< 8. Rubber bushings
- >>A<< 9. Bolt
10. Rear spring

INSTALLATION SERVICE POINT

>>A<< BOLT/SHACKLE ASSEMBLY INSTALLATION



AC501428AB

1. Install the bolt from the outside toward the inside of vehicle.
2. Install the shackle assembly from the inside toward the outside of vehicle.

INSPECTION

M1341015500175

- Check the rubber parts for cracks and wear.
- Check the shock absorber for malfunction, oil leakage, or abnormal noise.
- Check the leaf springs for damage or deterioration.
- Check the U-bolt for cracks or bends.

GROUP 42

BODY

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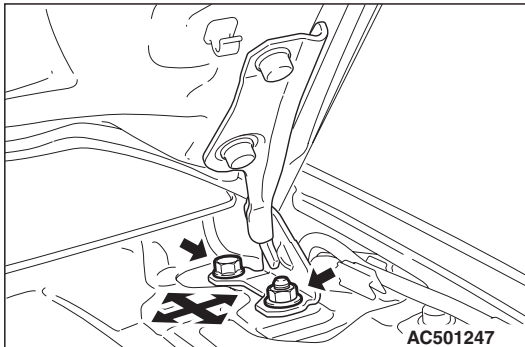
HOOD

ON-VEHICLE SERVICE

ADJUSTMENT OF CLEARANCE AROUND HOOD

M1421007200260

1. Remove the front deck garnish (Refer to GROUP 51, Windshield Wiper).

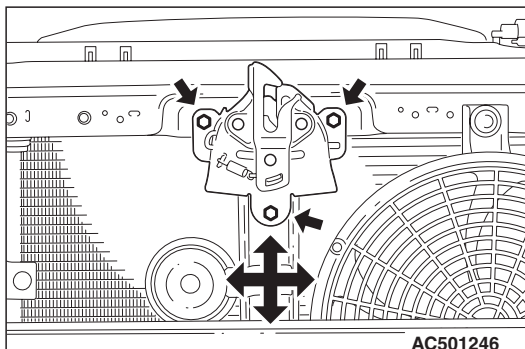


2. Loosen the hood hinge mounting bolt and nut but do not remove them. Then move the hood front/rear and left/right to align the hood level and adjust the hood around clearance.
3. After the adjustment, tighten the hood latch mounting bolt and nut.
4. Install the front deck garnish (Refer to GROUP 51, Windshield Wiper).

ADJUSTMENT OF ALIGNMENT OF HOOD STEPPED PORTION AND HOOD STRIKER

M1421007300256

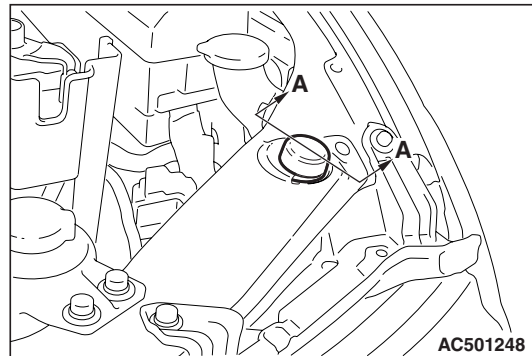
1. Remove the front bumper assembly (Refer to GROUP 51, Front Bumper Assembly).



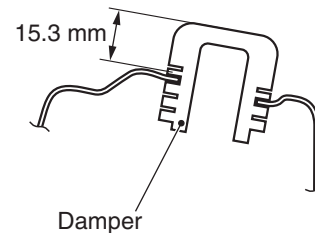
2. Loosen the hood latch mounting bolts but do not remove them. Then move the hood latch up/down and left/right to align the hood level and adjust the hood striker engagement.
3. After the adjustment, tighten the hood latch mounting bolts.
4. Install the front bumper assembly (Refer to GROUP 51, Front Bumper Assembly).

ADJUSTMENT OF HOOD HEIGHT

M1421007400305



Section A - A



AC502498
AC502955 AB

Turn the damper to the shown dimension to adjust the hood height. If the hood height is still not even, turn the damper again until the height is even. The damper height is altered by roughly 3 mm when the damper is rotated once.

NOTE: If a rattling noise is heard due to the vibration of the hood when the vehicle is being driven, adjust the damper height until the damper is seated on the hood.

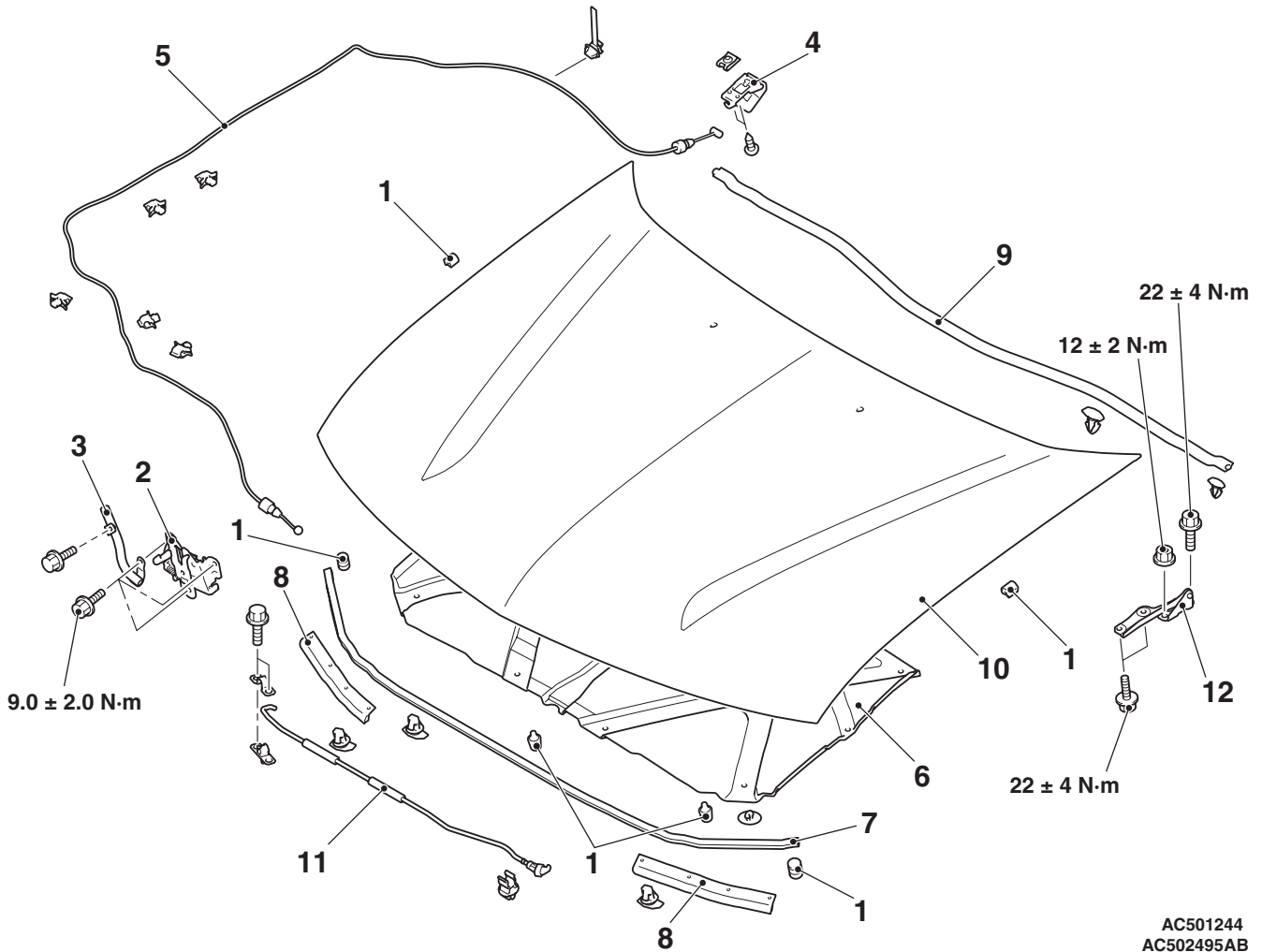
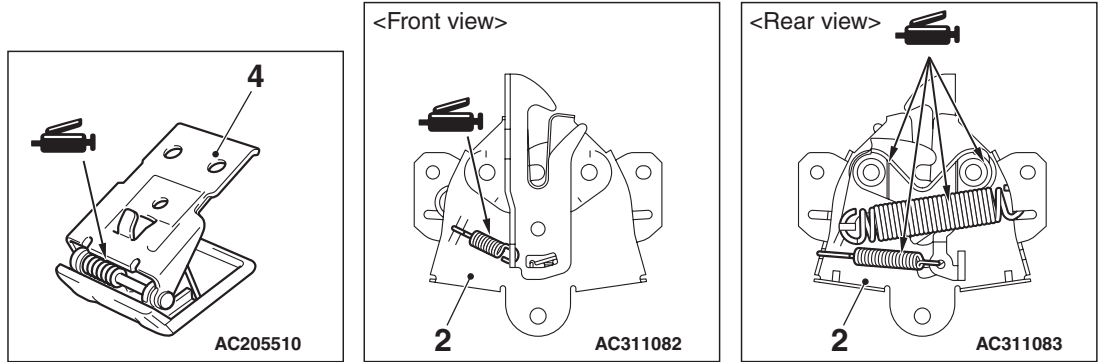
HOOD

REMOVAL AND INSTALLATION

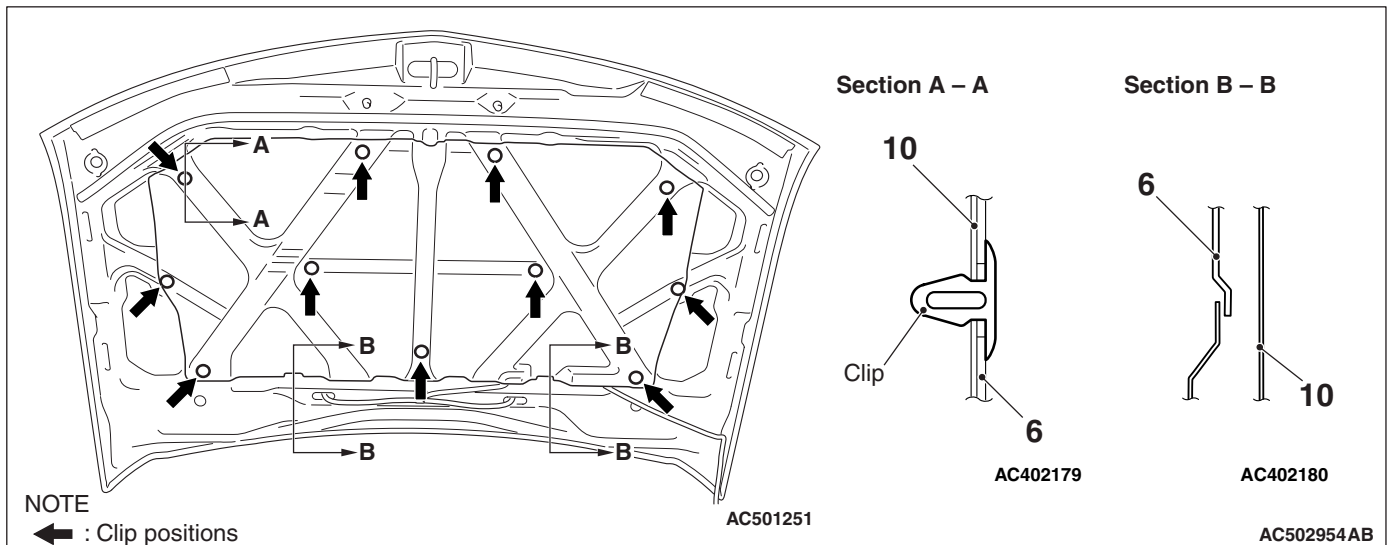
M1421001600709

Post-installation Operation

- Adjustment of Clearance Around Hood (Refer to P.42-3).
- Adjustment of Alignment of Hood Stepped Portion and Hood Striker (Refer to P.42-3).
- Adjustment of Hood Height (Refer to P.42-3).



AC501244
AC502495AB



Damper removal

1. Damper

Hood latch and hood lock release cable removal steps

- Front bumper assembly (Refer to GROUP 51, Front Bumper Assembly .)
2. Hood latch
 3. Hood latch cover
 4. Hood lock release handle
 - Front splash shield (Refer to P.42-10.)
 5. Hood lock release cable

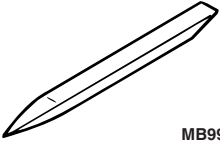
Hood removal steps

6. Hood insulator
7. Hood weatherstrip
8. Hood weatherstrip front
9. Hood weatherstrip rear
- Washer hose, Washer nozzle (Refer to GROUP 51, Windshield Washer .)
10. Hood
11. Hood support rod
- Front deck garnish (Refer to GROUP 51, Windshield Wiper .)
12. Hood hinge

FENDER

SPECIAL TOOL

M1421000600438

Tool	Number	Name	Use
 MB990784	MB990784	Ornament remover	Side turn-signal lamp removal

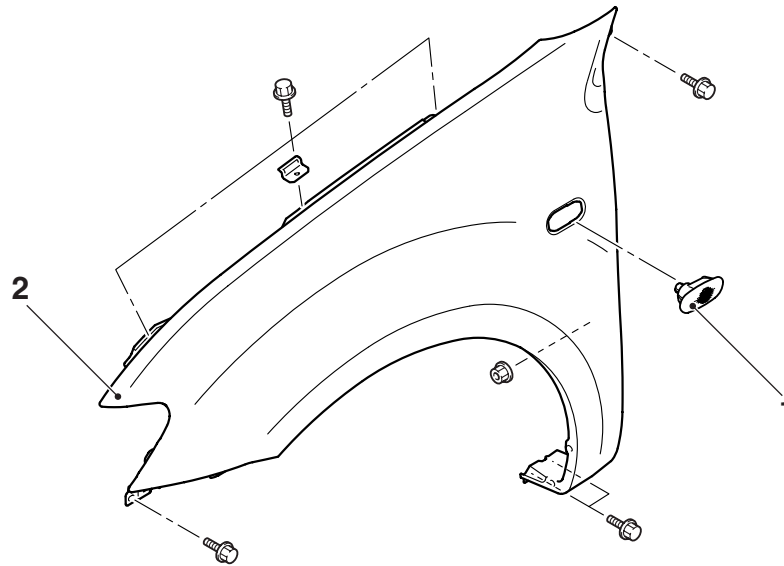
FENDER

REMOVAL AND INSTALLATION

M1421001900711

Pre-removal and Post-installation Operation

- Front Splash Shield Removal and Installation (Refer to P.42-10).
- Front Deck Garnish Removal and Installation (Refer to GROUP 51, Windshield Wiper).
- Headlamp Assembly Removal and Installation (Refer to GROUP 54A, Headlamp).
- Front Bumper Support Bracket Removal and Installation (Refer to GROUP 51, Front Bumper Assembly).

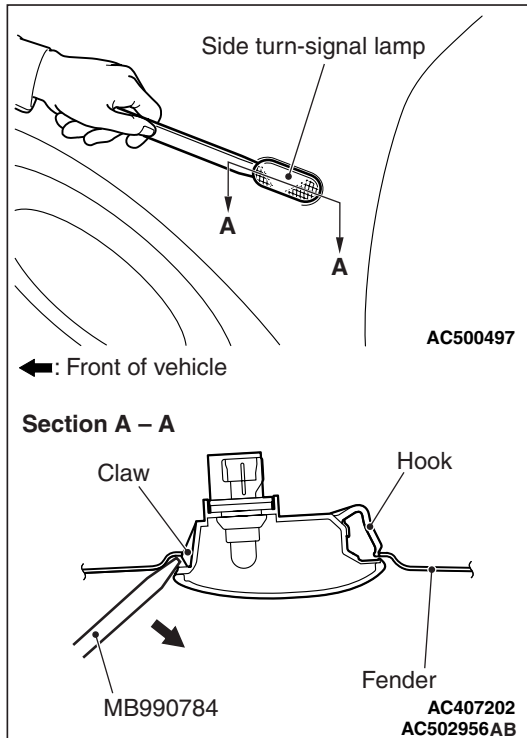


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Removal steps

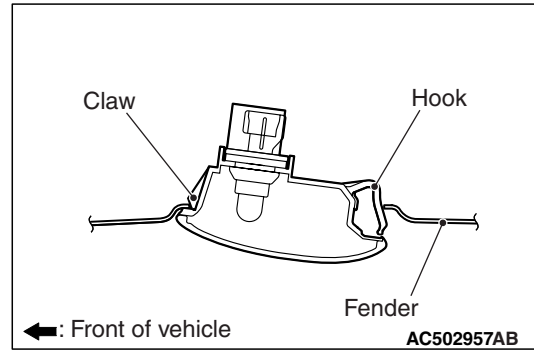
- <<A>> >>A<< 1. Side turn-signal lamp
2. Fender

REMOVAL SERVICE POINT
<<A>> SIDE TURN-SIGNAL LAMP
REMOVAL



Insert the special tool ornament remover (MB990784) as shown to compress the hook and then disengage the claw. Then remove the side turn-signal lamp.

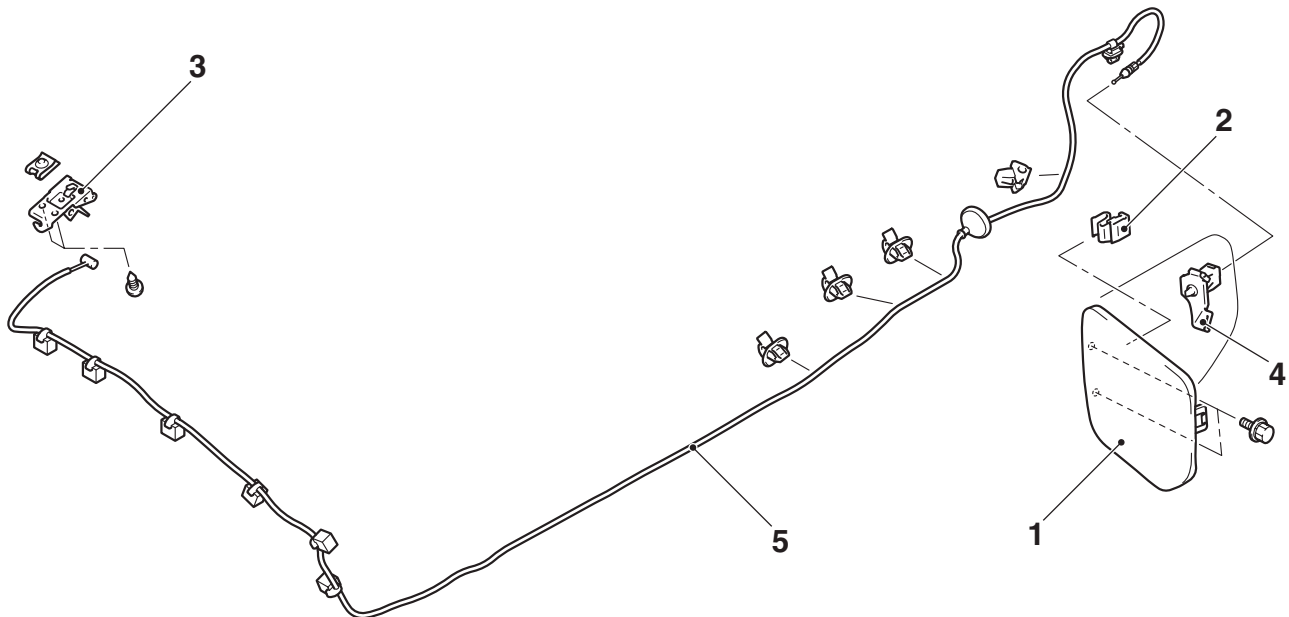
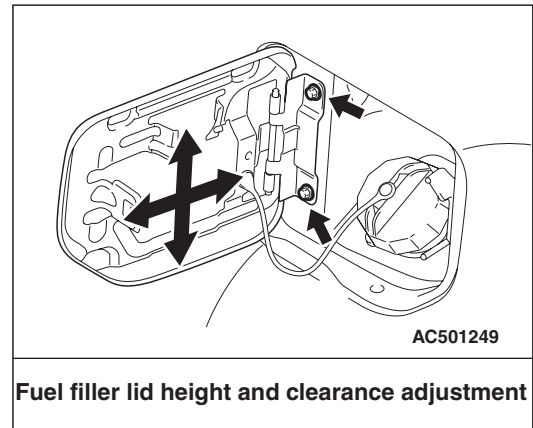
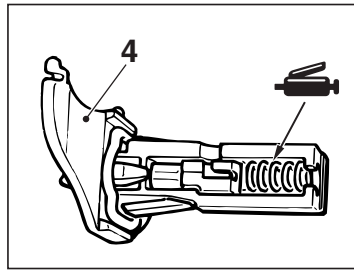
INSTALLATION SERVICE POINT
>>A<< SIDE TURN-SIGNAL LAMP
INSTALLATION



Engage the claw and then the hook into the fender to install the side turn-signal lamp.

FUEL FILLER LID**REMOVAL AND INSTALLATION <CLUB CAB>**

M1421002500501

AC501242
AC502952AB**Fuel filler lid removal steps**

1. Fuel filler lid assembly
2. Fuel filler lid locking clip

Fuel filler lid lock release handle removal

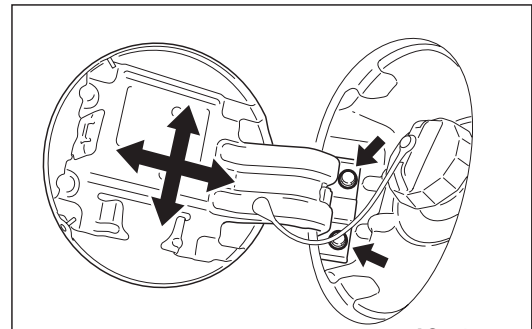
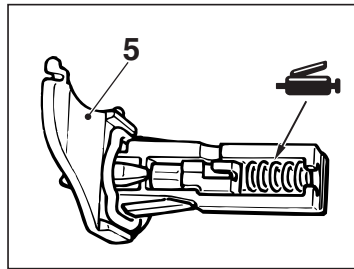
3. Fuel filler lid lock release handle

Fuel filler lid lock release cable removal steps

- Rear splash shield (Refer to P.42-10.)
- 4. Fuel filler lid hook
- Front scuff plate, Quarter trim lower (Refer to GROUP 52A, Interior Trim .)
- A/C cooling unit (Refer to GROUP 55, Heater Unit and Cooling Unit .)
- 5. Fuel filler lid lock release cable

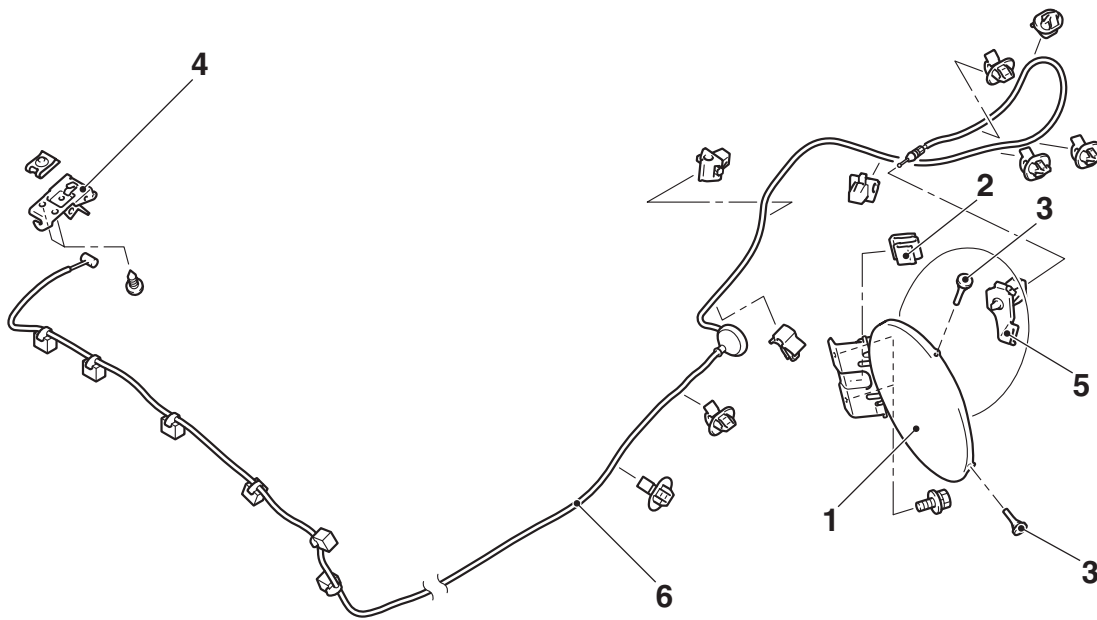
REMOVAL AND INSTALLATION <DOUBLE CAB>

M1421002500523



AC501250

Fuel filler lid height and clearance adjustment



AC501243
AC502953 AB

Fuel filler lid removal steps

1. Fuel filler lid assembly
2. Fuel filler lid locking clip
3. Damper

Fuel filler lid lock release handle removal

4. Fuel filler lid lock release handle

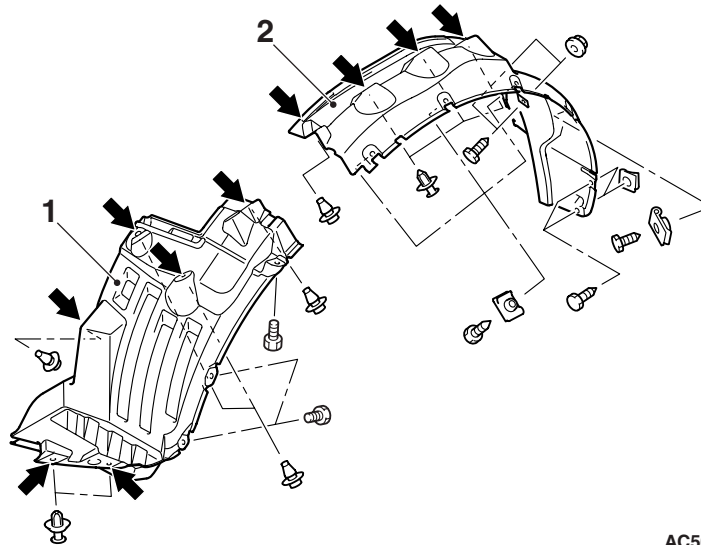
Fuel filler lid lock release cable removal steps

- Rear splash shield (Refer to P.42-10.)
- 5. Fuel filler lid hook
- Front scuff plate, Rear scuff plate, Centre pillar lower trim, Rear pillar lower trim (Refer to GROUP 52A, Interior Trim .)
- A/C cooling unit (Refer to GROUP 55, Heater Unit and Cooling Unit .)
- 6. Fuel filler lid lock release cable

SPLASH SHIELD

REMOVAL AND INSTALLATION

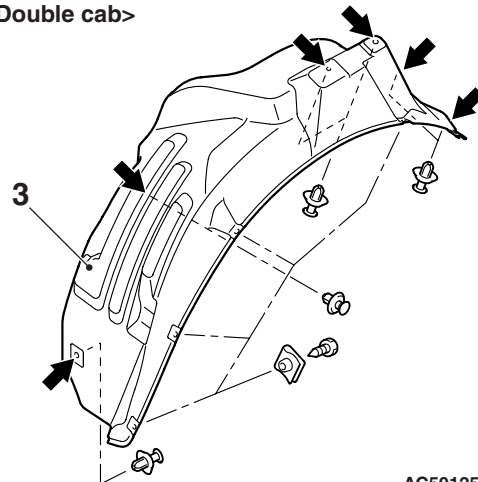
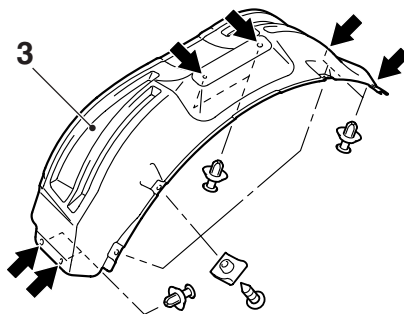
M1421009700012



<Club cab>

<Double cab>

AC501253



AC501253

AC501254

Note

← : Clip positions

AC502958 AB

Front splash shield removal steps

- Front overfender <4WD> (Refer to GROUP 51, Overfender .)
 - Front mud guard (Refer to GROUP 51, Mud Guard .)
1. Front splash shield (Front bumper side)
 2. Front splash shield (Fender side)

Rear splash shield removal steps

- Rear overfender <4WD> (Refer to GROUP 51, Overfender .)
3. Rear splash shield

WINDOW GLASS

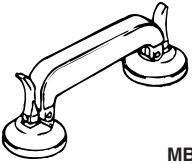
ADHESIVE

M1422000500218

Item	Specified adhesive
Windshield	<ul style="list-style-type: none"> • 3M ATD Part No.8609 Super Fast Urethane Auto Glass Sealant or equivalent • 3M ATD Part No.8608 Super Fast Urethane Primer or equivalent
Moulding	
Hinge	
Rear window glass	

SPECIAL TOOL

M1422000600378

Tool	Number	Name	Use
 <p align="center">MB990480</p>	MB990480	Window glass holder	Window glass removal and installation

GENERAL

ITEMS

M1422000100599

The windshield, side window glass and rear window glass are attached by an urethane-base adhesive to the window frame. This adhesive provides improved glass holding and sealing, and also gives body openings a greater structural strength.

Name	Remark
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	For cutting adhesive (Dia. × length. 0.6mm × 1m)
Glass adhesive knife	For cutting adhesive
Adhesive gun	For pressing-out adhesive

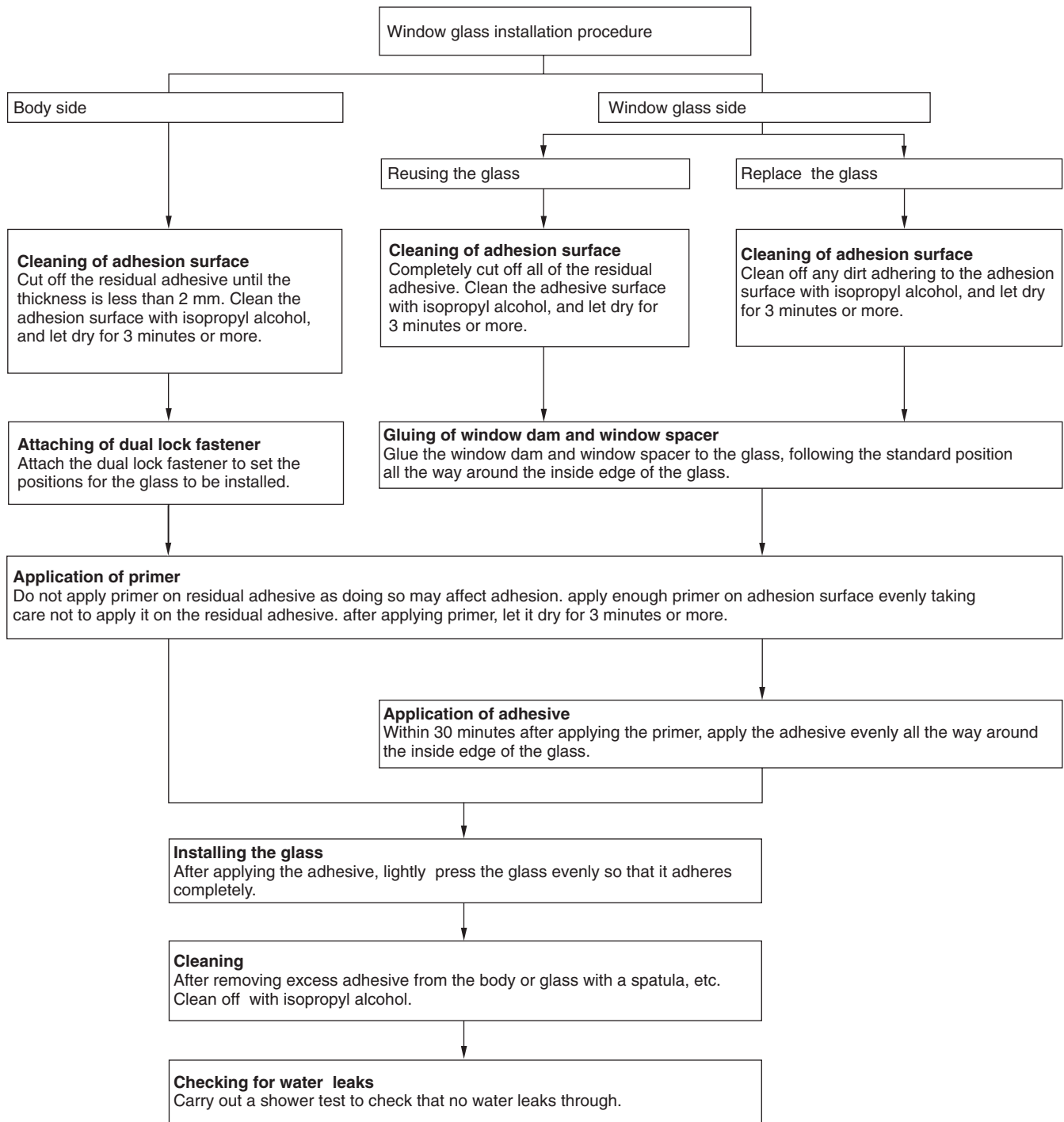
HANDLING OF AUTO WINDOW SEALER

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.

WINDOW GLASS INSTALLATION



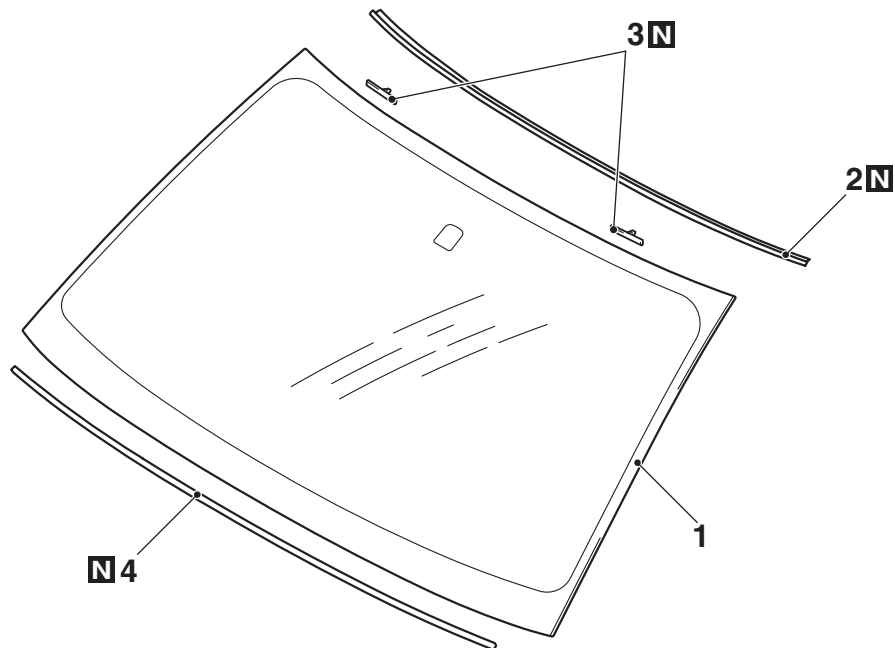
WINDSHIELD

REMOVAL AND INSTALLATION

M1422001000614

Pre-removal and Post-installation Operation

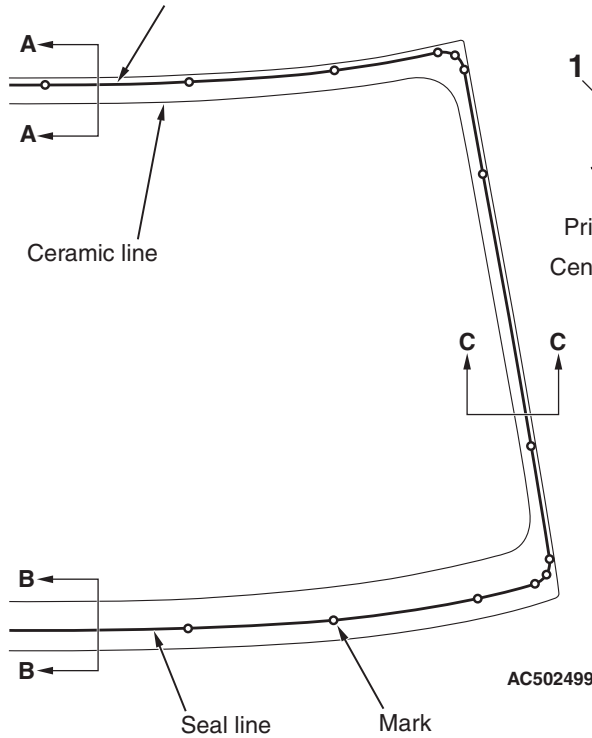
- Front Deck Garnish Removal and Installation (Refer to GROUP 51, Windshield Wiper).
- Roof Drip Moulding Removal and Installation (Refer to GROUP 51, Moulding).
- Front Pillar Trim Removal and Installation (Refer to GROUP 52A, Interior Trim <Club Cab> or <Double Cab>).
- Inside Rear View Mirror Removal and Installation (Refer to GROUP 52A, Inside Rear View Mirror).



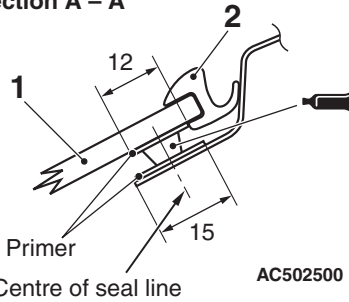
AC501239AB

Units: mm

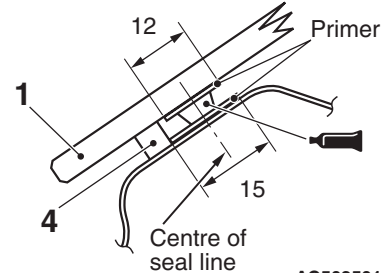
Apply the primer and adhesive along the fictitious lines (seal line) between each of the marks.



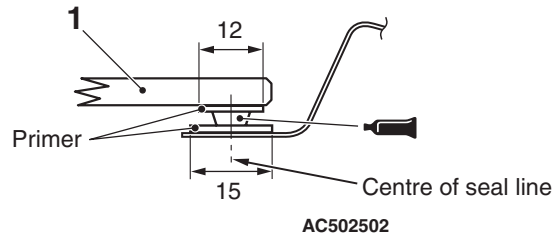
Section A - A



Section B - B



Section C - C



Adhesive: 3M ATD Part No. 8609 Super Fast Urethane Auto Glass Sealant or equivalent and 3M ATD Part No. 8608 Super Fast Urethane Primer or equivalent

AC502959AB

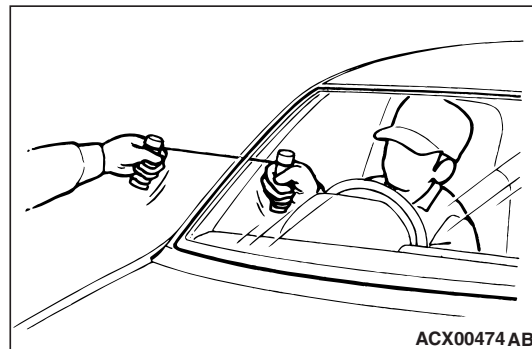
Removal steps

- <<A>> >>B<< 1. Windshield
2. Windshield moulding
>>A<< 3. Glass stopper
>>A<< 4. Windshield spacer

REMOVAL SERVICE POINT

<<A>> WINDSHIELD REMOVAL

1. To protect the body (paint surface), apply cloth tape to all body areas around the installed windshield.
2. Using piano wire.
 - (1) Use a knife to cut away the moulding.
 - (2) Using a sharp-point drill, make a hole in the windshield adhesive.
 - (3) Pass the piano wire from the inside of the vehicle through the hole.

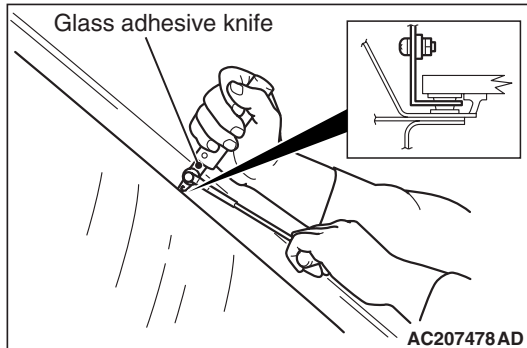
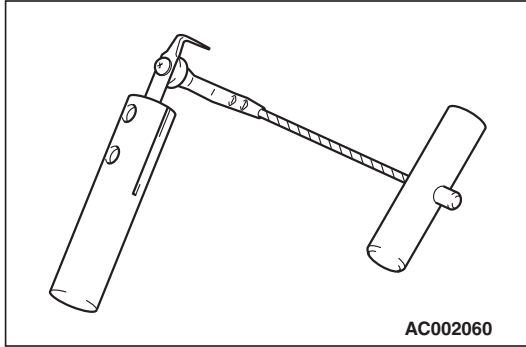


CAUTION

Do not let the piano wire touch the edge of the windshield.

- (4) Pull the piano wire alternately from the inside and outside along the windshield to cut the adhesive.

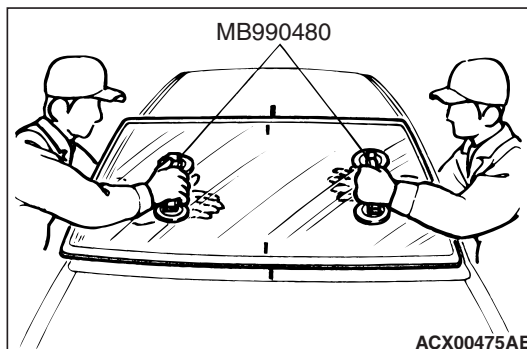
CAUTION



Inserting the glass adhesive knife too deeply into windshield adhesive may damage windshield.

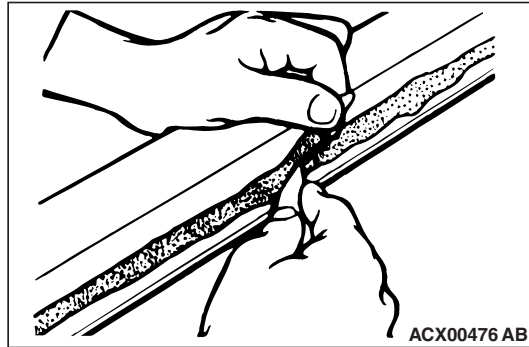
3. Using glass adhesive knife

Keep glass adhesive knife at right angles with the windshield edge, and put the blade at windshield edge and surface. Then cut away adhesive along the windshield edge.



- Use special tool window glass holder (MB990480) to remove the windshield.

CAUTION



- Be careful not to remove more adhesive than is necessary.
 - 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.
- Use a knife to cut away the remaining adhesive so that the thickness is within 2 mm around the entire circumference of the body flange.
 - Finish the flange surfaces so that they are smooth.
 - If the windshield is reused, scrape away all traces of old adhesive from the windshield.

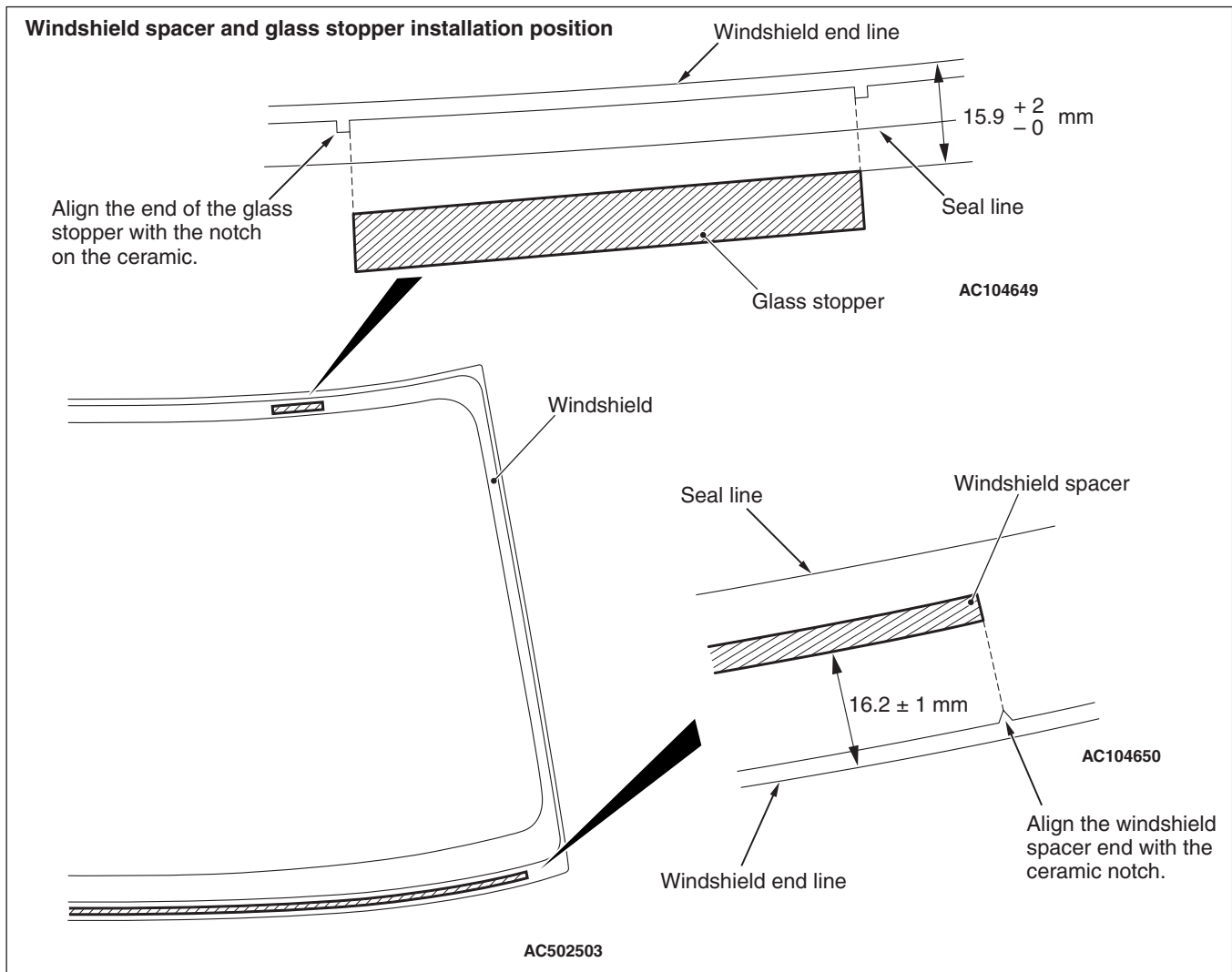
INSTALLATION SERVICE POINTS

>>A<< WINDSHIELD SPACER/GLASS STOPPER INSTALLATION

CAUTION

Leave the degreased parts for 3 or more minutes to dry well, before starting on the next step. Do not touch the degreased parts.

- Use isopropyl alcohol to degrease the inside and outside of the windshield and the body flanges.



AC502960AB

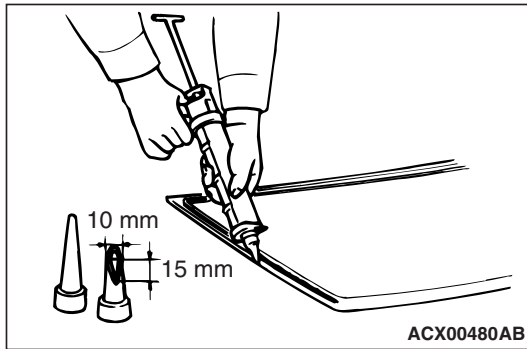
2. Position the windshield spacer, ensuring that there are no bends or warpages inside the windshield.
3. Secure the glass stoppers to the specified positions on the windshield.

>>B<< WINDSHIELD INSTALLATION

1. Install the windshield moulding to the windshield.
2. When replacing the windshield, temporarily set the windshield against the body, and place a mating mark on the windshield and body.

CAUTION

- The primer strengthens the adhesive, so be sure to apply it evenly around the entire circumference. However, a too thick application will weaken the adhesive.
 - Do not touch the coated surface.
 - Do not apply the primer on the remaining adhesive because of weakening the adhesive.
3. Soak a sponge in the primer, and apply evenly to the windshield and the body in the specified places. If the old adhesive does not remain on the body flange because of the body panel or others, also apply the primer to the specified body side.
 4. Allow the windshield to dry for at least three minutes after applying primer.



5. Fill a sealant gun with adhesive. Then apply the adhesive evenly around the windshield within 30 minutes after applying the primer.

NOTE: Cut the tip of the sealant gun nozzle into a V shape to simplify adhesive application.

6. Align the mating marks on the windshield and the body, and lightly press the windshield evenly so that it adheres completely.
7. Use spatula or the like to remove any excessive adhesive. Then clean the surface with isopropyl alcohol.

⚠ CAUTION

- Do not move the vehicle unless absolutely necessary.
 - When testing for water leakage, do not pinch the end of the hose to spray the water.
8. Wait 30 minutes or more, and then test for water leakage.

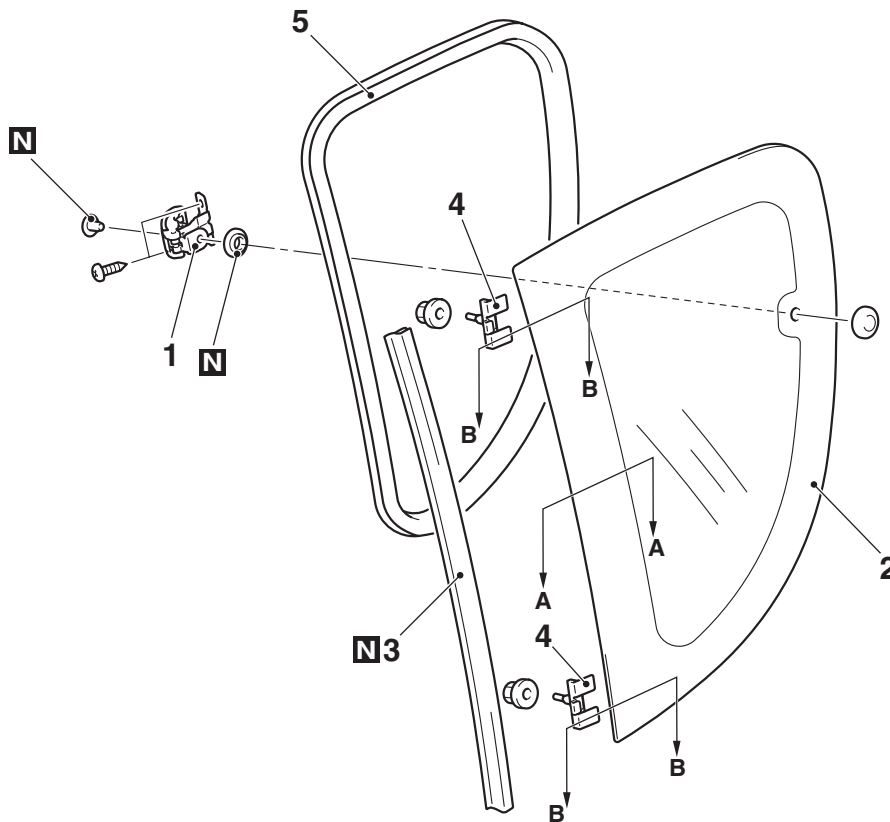
SIDE WINDOW GLASS <CLUB CAB>

REMOVAL AND INSTALLATION

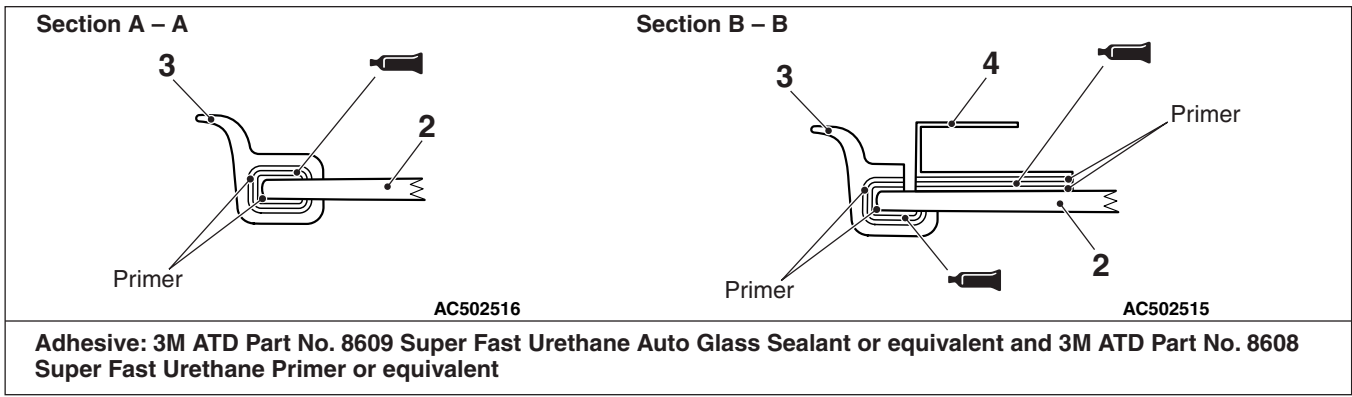
M1422002200020

Pre-removal and Post-installation Operation

- Quarter Trim Upper Removal and Installation (Refer to GROUP 52A, Interior Trim).



AC501240AB



AC503692AB

Removal steps

1. Link
2. Side window glass
- <<A>> >>A<< 3. Moulding
- <<A>> >>A<< 4. Hinge
5. Weatherstrip

REMOVAL SERVICE POINT

<<A>> MOULDING/HINGE REMOVAL

⚠ CAUTION

Prying with a knife may damage the side window glass.

1. Using a knife, remove the moulding and hinge.
2. When reusing the side window glass, remove the adhesive still adhering to the side window glass, and clean with isopropyl alcohol.

INSTALLATION SERVICE POINT

>>A<<HINGE/MOULDING INSTALLATION

⚠ CAUTION

Leave the degreased parts for 3 or more minutes to dry well, before starting on the next step. Do not touch the degreased parts.

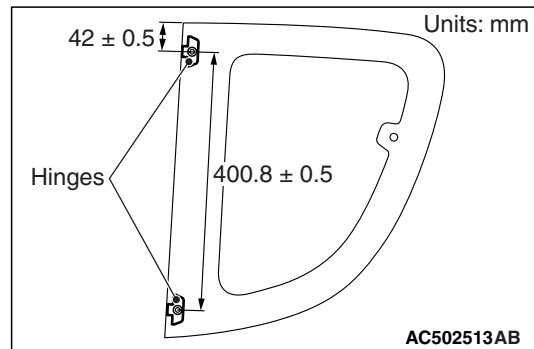
1. Use isopropyl alcohol to degrease the inside and outside of the side window glass.

⚠ CAUTION

- The primer strengthens the adhesive, so be sure to apply it evenly around the entire circumference. However, a too thick application will weaken the adhesive.
- Do not touch the coated surface.
- Do not apply the primer on the remaining adhesive because of weakening the adhesive.

2. Soak a sponge in the primer, and apply evenly to the hinge, moulding and side window glass in the specified places. If the old adhesive does not remain on the side window glass because of the side window glass or others, also apply the primer to the specified side window glass side.
3. Allow the hinge, moulding and side window glass to dry for at least three minutes after applying primer.
4. Fill a sealant gun with adhesive. Then apply the adhesive evenly around the hinge and moulding within 30 minutes after applying the primer.

NOTE: Cut the tip of the sealant gun nozzle into a V shape to simplify adhesive application.



7. Use spatula or the like to remove any excessive adhesive. Then clean the surface with isopropyl

5. Install the hinges to the specified position of the side window glass.
 6. Install the moulding to the specified position of the side window glass.
- alcohol.

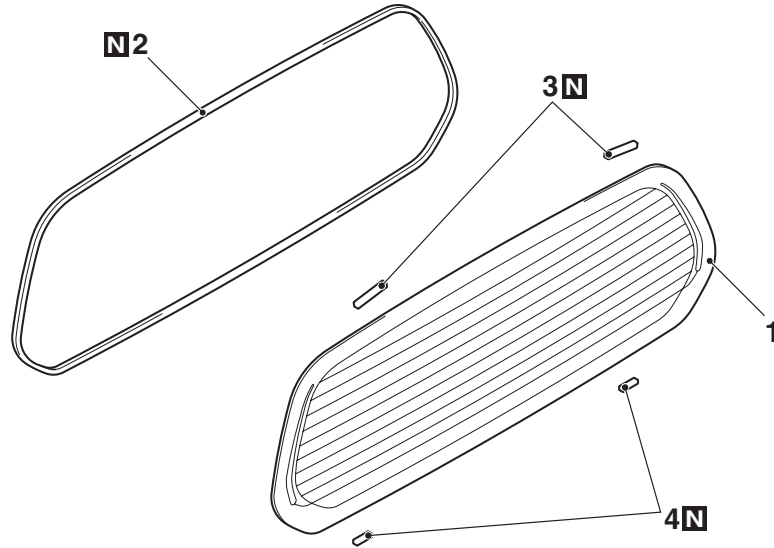
REAR WINDOW GLASS <Vehicles without rear panel power window>

REMOVAL AND INSTALLATION

M1422001600177

Pre-removal and Post-installation Operation

- Roof Drip Moulding Removal and Installation (Refer to GROUP 51, Moulding).
- Quarter Upper Trim and Cab Rear End Trim Removal and Installation (Refer to GROUP 52A, Interior Trim <Club Cab>).
- Rear Pillar Upper Trim Removal and Installation (Refer to GROUP 52A, Interior Trim <Double Cab>).



AC501241AB

Apply the primer and adhesive along the fictitious lines (seal line) between each of the marks.

Section A - A
Centre of seal line
15
12
Primer
AC502505

Section B - B
Centre of seal line
Primer
15
12
AC502506

Section C - C
12
15
Primer
Centre of seal line
AC502507

Units: mm

Adhesive: 3M ATD Part No. 8609 Super Fast Urethane Auto Glass Sealant or equivalent and 3M ATD Part No. 8608 Super Fast Urethane Primer or equivalent

AC502950AB

- Removal steps**
- <<A>> >>B<< 1. Rear window glass
>>A<< 2. Window dam

- Removal steps (Continued)**
- >>A<< 3. Glass stopper
>>A<< 4. Fastener

REMOVAL SERVICE POINT

<<A>> REAR WINDOW GLASS REMOVAL

Removal the rear window glass using the same procedure as for the windshield (Refer to P.42-13).

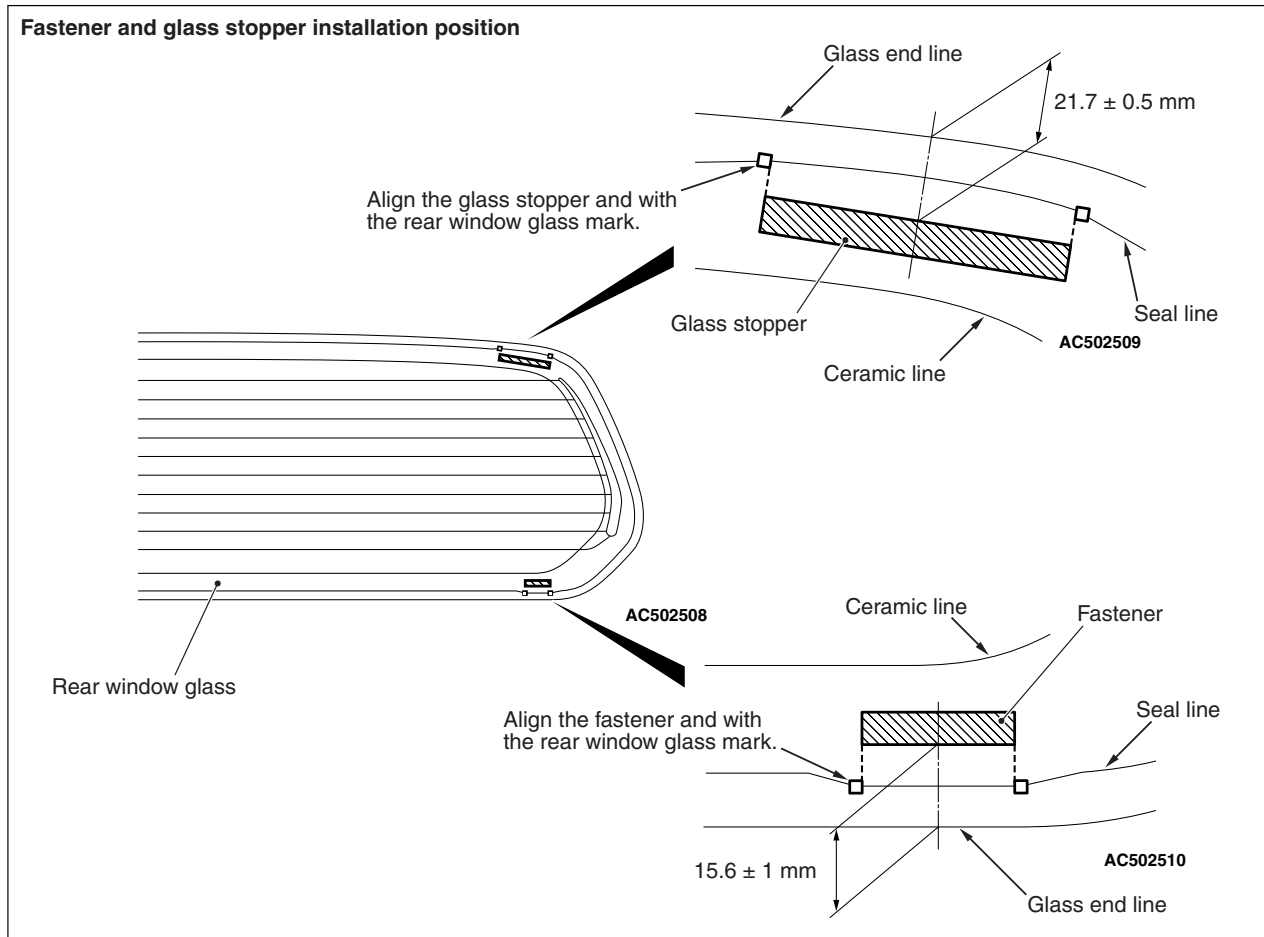
INSTALLATION SERVICE POINTS

>>A<< FASTENER/GLASS STOPPER/WINDOW DAM INSTALLATION

CAUTION

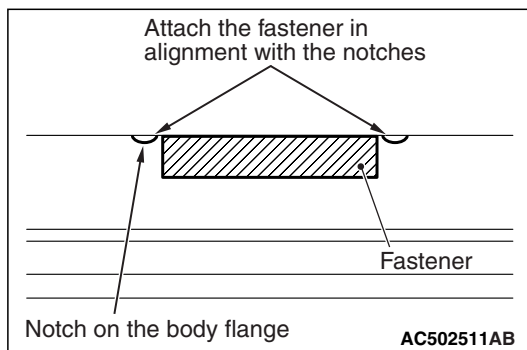
Leave the degreased parts for 3 or more minutes to dry well, before starting on the next step. Do not touch the degreased parts.

1. Use isopropyl alcohol to degrease the inside and outside edges of the rear window glass and the surface of the body flange.



AC502951AB

2. Assemble the fastener and glass stopper to the rear window glass location shown.



3. Assemble the fastener according to the standard location of the body flange.
4. Install the window dam.

>>B<< REAR WINDOW GLASS INSTALLATION

Install the rear window glass in the same way as for the windshield installation (Refer to P.42-13).

REAR PANEL POWER WINDOW <Vehicles with rear panel power window>

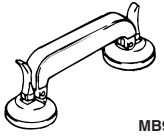
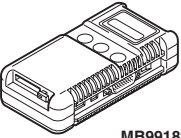
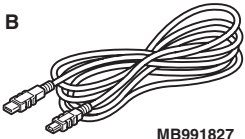
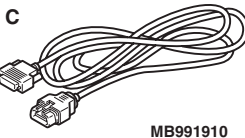

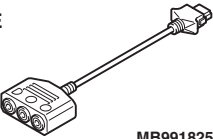
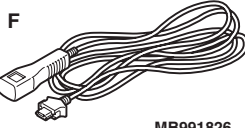
SEALANT

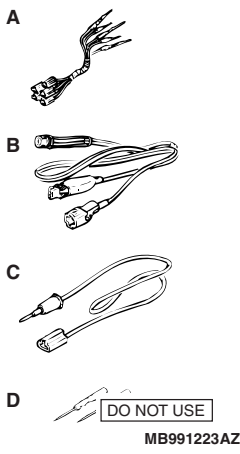
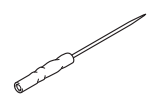
M1429000500026

Item	Specified sealant
Waterproof film	3M ATD Part No.8633 or equivalent

SPECIAL TOOLS

M1429000600023

Tool	Number	Name	Use
 <p>MB990480</p>	MB990480	Window glass holder	Removal of rear panel window regulator
<p>A</p>  <p>MB991824</p> <p>B</p>  <p>MB991827</p> <p>C</p>  <p>MB991910</p> <p>D</p>  <p>MB991911</p> <p>E</p>  <p>MB991825</p> <p>F</p>  <p>MB991826</p> <p>MB991955</p>	<p>MB991955</p> <p>A: MB991824</p> <p>B: MB991827</p> <p>C: MB991910</p> <p>D: MB991911</p> <p>E: MB991825</p> <p>F: MB991826</p>	<p>M.U.T.-III sub-assembly</p> <p>A: Vehicle Communication Interface (V.C.I.)</p> <p>B: M.U.T.-III USB cable</p> <p>C: M.U.T.-III main harness A (Vehicles with CAN communication system)</p> <p>D: M.U.T.-III main harness B (Vehicles without CAN communication system)</p> <p>E: M.U.T.-III measure adapter</p> <p>F: M.U.T.-III trigger harness</p>	<p>Communication line check (service data and diagnosis codes)</p> <p>CAUTION</p> <p>For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.</p>

Tool	Number	Name	Use
 <p>A B C D</p> <p>DO NOT USE MB991223AZ</p>	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	Terminal voltage measurement A: For checking connector pin contact pressure B: For checking power supply circuit C: For checking power supply circuit D: For connecting a locally sourced tester
 <p>MB992006</p>	MB992006	Extra fine probe	Continuity check and voltage measurement at harness wire or connector

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

M1429002700189

Refer to GROUP 00, Contents of Troubleshooting .

DIAGNOSIS CODE CHART

M1429006000018

Code No.	Symptom	Reference page
5001	P/W (RP) SW pulse1 fail	P.42-24
5002	P/W (RP) SW pulse2 fail	
5003	P/W (RP) position error	P.42-25
5004	P/W (RP) sensor fail	P.42-26
5005	P/W (RP) 3 times jumm-protection	P.42-27
5006	P/W (RP) communication error (LIN)	P.42-28
5008	P/W (RP) parameter read fail	P.42-30
5009	P/W (RP) position read fail	

NOTE:

- P/W: Power window
- RP: Rear panel
- SW: Switch
- LIN: Local interconnect network

TROUBLE SYMPTOM CHART

M1429002800250

Symptom	Inspection procedure number	Reference page
Rear panel power window do not work at all.	1	P.42-31
Any of the rear panel power window switch positions is defective.	2	P.42-37
Rear panel power window anti-trap function does not work normally.	3	P.42-38
Rear panel power window-ECU cannot communicate with ETACS-ECU.	4	P.42-39
Rear panel power window timer function does not work normally	5	P.42-42

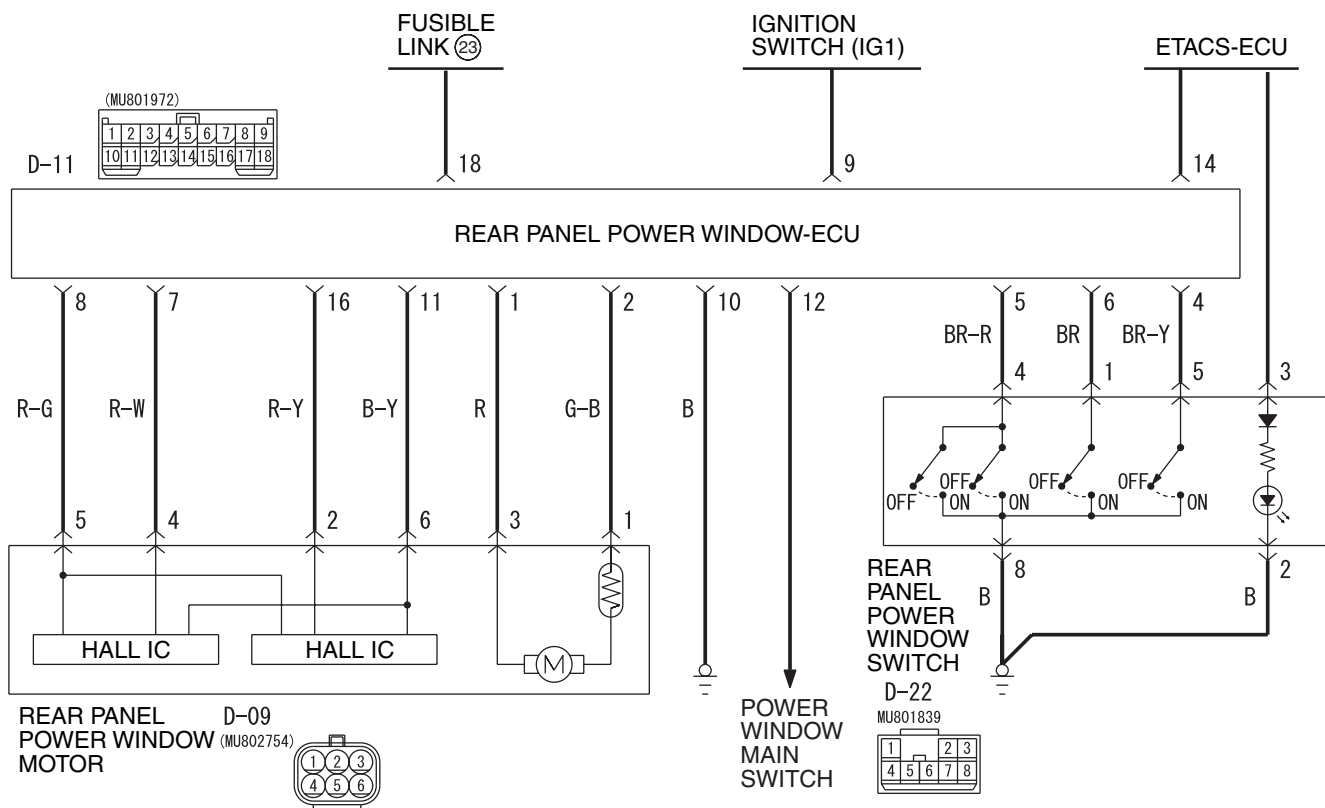
DIAGNOSTIC TROUBLE CODE PROCEDURES

Code No.5001: P/W (RP) SW pulse1 fail,
Code No.5002: P/W (RP) SW pulse2 fail

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Rear Panel Power Window Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

AC504199 AB

COMMENTS ON TROUBLE SYMPTOM

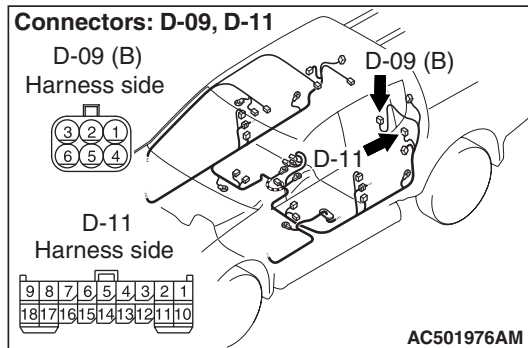
- During the rear panel power window motor operation, if only the power window position sensor signal is detected successively 20 times, ETACS-ECU stores the diagnosis code No. 5001.
- During the rear panel power window motor operation, if only the anti-trap sensor signal is detected successively 20 times, ETACS-ECU stores the diagnosis code No. 5002.

PROBABLE CAUSES

- Malfunction of the rear panel power window motor
- Malfunction of the rear panel power window-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Connector check: D-11 rear panel power window-ECU connector and D-09 rear panel power window motor connector

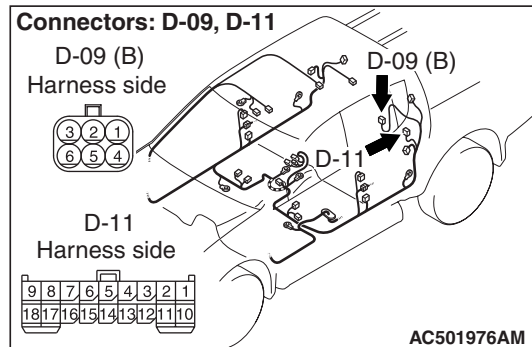


Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the connector.

STEP 2. Check the wiring harness between D-11 rear panel power window-ECU connector terminal Nos.7, 8, 11 and 16 to D-09 rear panel power window motor connector terminal 2, 4, 5 and 6.



- Check the input and output lines for open or short circuit.

Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair the wiring harness.

STEP 3. Check whether the diagnosis code is reset.

- (1) Replace the rear panel power window motor.
- (2) Check that diagnosis code is not reset.

Q: Is diagnosis code set?

YES : Replace the rear panel power window-ECU.

NO : The procedure is complete.

Code No.5003: P/W (RP) SW position error

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

COMMENTS ON TROUBLE SYMPTOM

If the rear panel window glass travels further in the close direction exceeding the fully-closed position, ETACS-ECU stores the diagnosis code No. 5003.

PROBABLE CAUSES

- Malfunction of the rear panel power window motor
- Malfunction of the rear panel power window-ECU

DIAGNOSIS PROCEDURE

STEP 1. Confirm the rear panel power window learning function.

- (1) Check that the rear panel power window switch

has learned the fully closed position of the window (Refer to P.42-43).

- (2) On completion, check that diagnosis code No.5003 is not reset.

Q: Is the check result normal?

YES : The procedure is complete.

NO : Go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

- (1) Replace the rear panel power window motor.
- (2) Check that diagnosis code is not reset.

Q: Is diagnosis code set?

YES : Replace the rear panel power window-ECU.

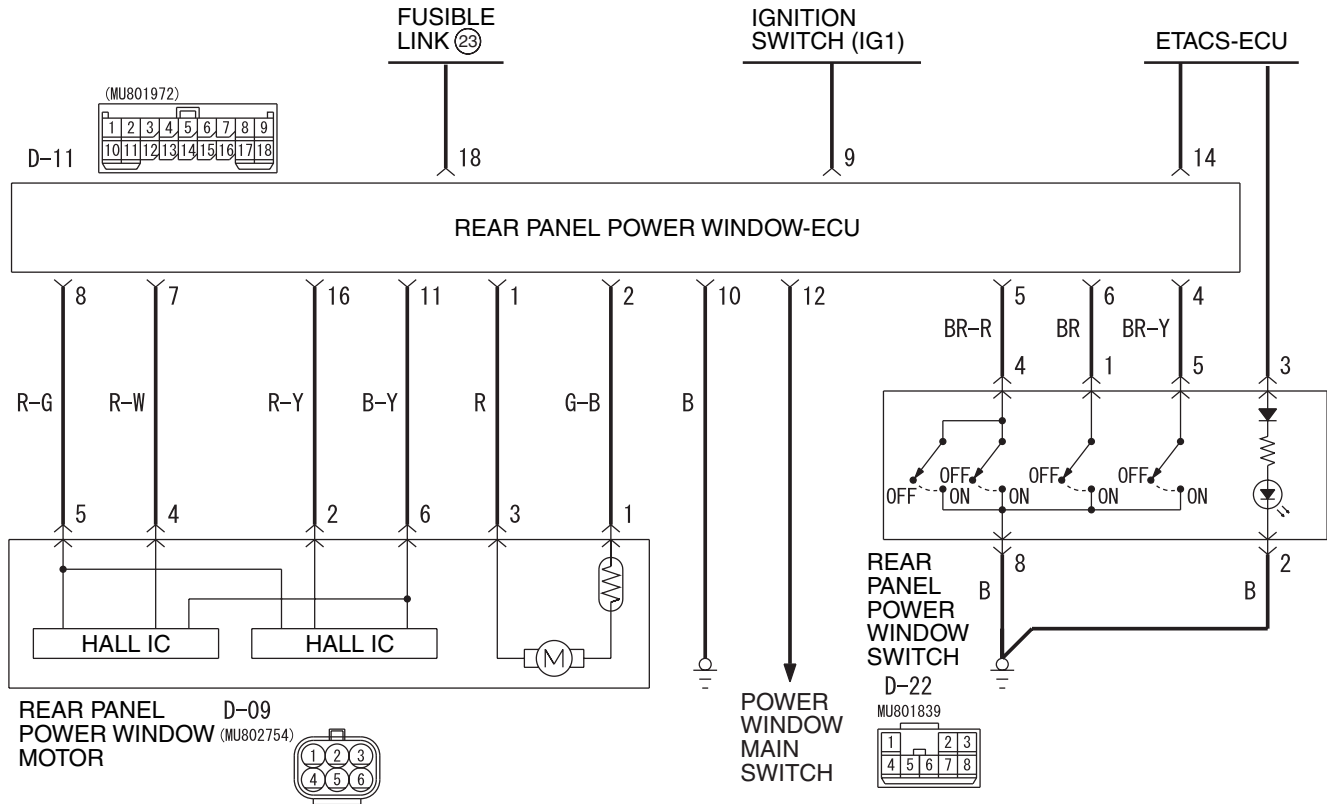
NO : The procedure is complete.

Code No.5004: P/W (RP) sensor fail

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Rear Panel Power Window Circuit



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

AC504199 AB

COMMENTS ON TROUBLE SYMPTOM

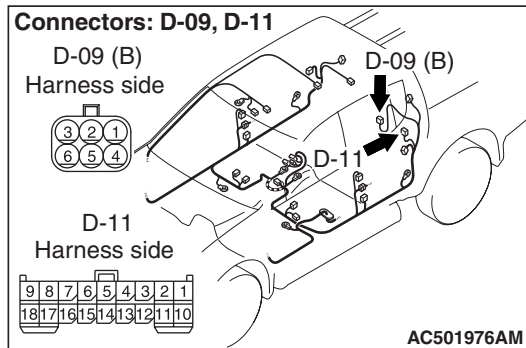
If the rear panel power window motor is driven during the short-to-earth detection of the sensor power supply for rear panel power window motor, ETACS-ECU stores the diagnosis code No. 5004.

PROBABLE CAUSES

- Malfunction of the rear panel power window motor
- Malfunction of the rear panel power window-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Connector check: D-11 rear panel power window-ECU connector and D-09 rear panel power window motor connector

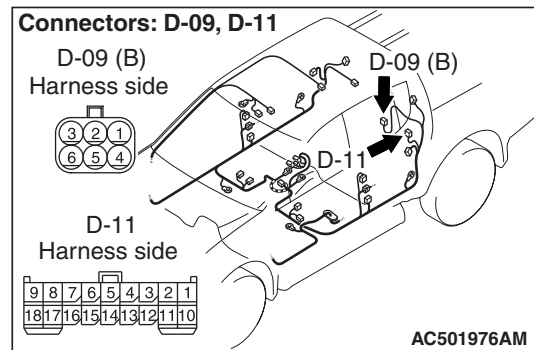


Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the connector.

STEP 2. Check the wiring harness between D-11 rear panel power window-ECU connector terminal No. 8 to D-09 rear panel power window motor connector terminal 5.



- Check the input and output lines for open or short circuit.

Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair the wiring harness.

STEP 3. Check whether the diagnosis code is reset.

- (1) Replace the rear panel power window motor.
- (2) Check that diagnosis code is not reset.

Q: Is diagnosis code set?

YES : Replace the rear panel power window-ECU.

NO : The procedure is complete.

Code No.5005: P/W (RP) 3 times jumm-protection

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

COMMENTS ON TROUBLE SYMPTOM

If the anti-trap function is activated successively 3 times, ETACS-ECU stores the diagnosis code No. 5005.

PROBABLE CAUSES

- Malfunction of the rear panel power window motor
- Malfunction of the rear panel power window-ECU

DIAGNOSIS PROCEDURE

STEP 1. Confirm the rear panel power window learning function.

- (1) Check that the rear panel power window switch

has learned the fully closed position of the window (Refer to P.42-43).

- (2) On completion, check that diagnosis code No.5005 is not reset.

Q: Is the check result normal?

YES : The procedure is complete.

NO : Go to Step 2.

STEP 2. Check whether the diagnosis code is reset.

- (1) Replace the rear panel power window motor.
- (2) Check that diagnosis code is not reset.

Q: Is diagnosis code set?

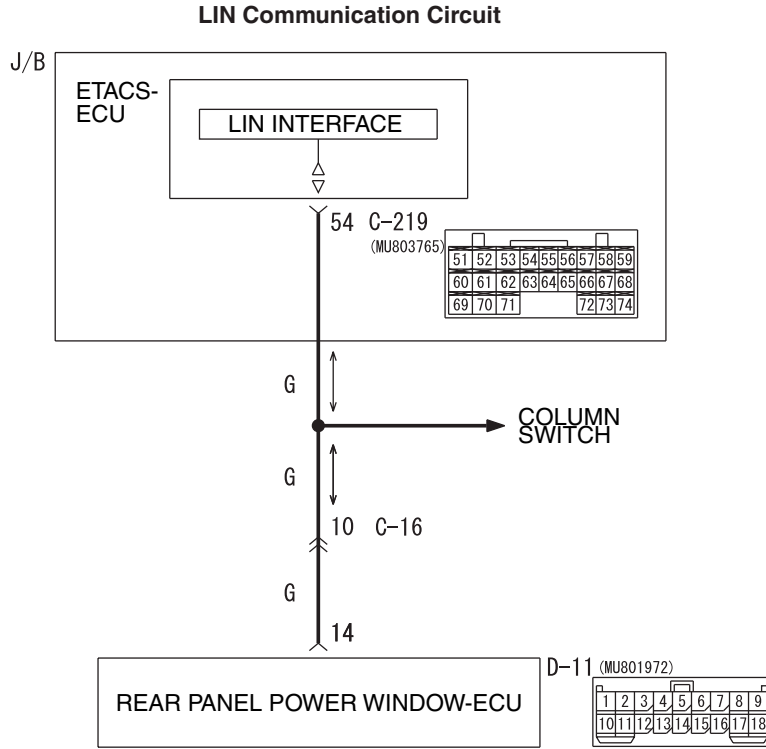
YES : Replace the rear panel power window-ECU.

NO : The procedure is complete.

Code No.5006: P/W (RP) communication error (LIN)

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

AC504200 AB

COMMENTS ON TROUBLE SYMPTOM

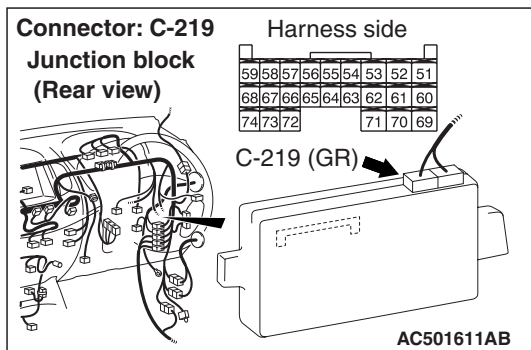
ETACS-ECU communicates with the rear panel power window-ECU. If there is a communication abnormality with the rear panel power window-ECU, the diagnosis code No. 5006 is stored.

PROBABLE CAUSES

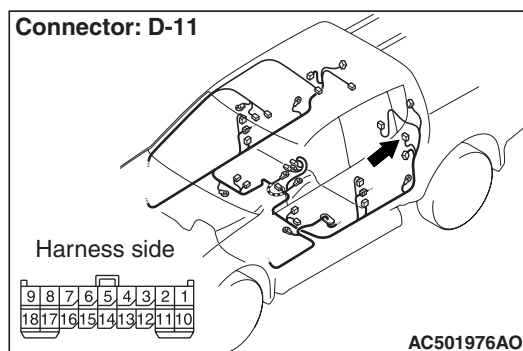
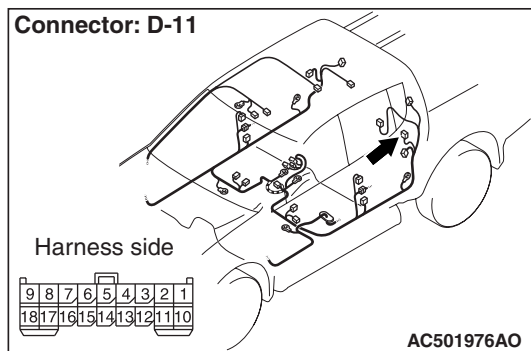
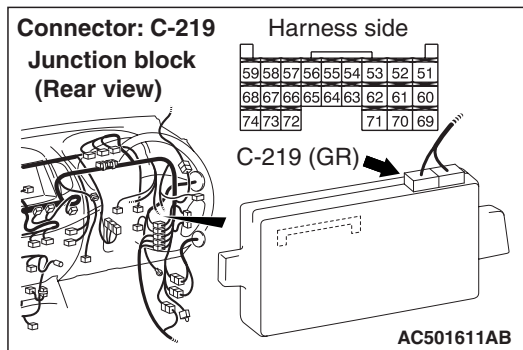
- Malfunction of the rear panel power window-ECU
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-219 ETACS-ECU connector and D-11 rear panel power window-ECU connector

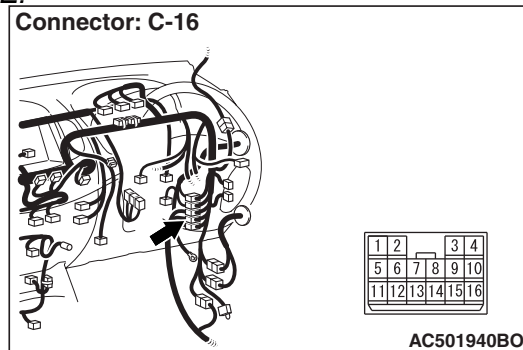


STEP 2. Check the wiring harness between C-219 ETACS-ECU connector terminal No.54 to D-11 rear panel power window-ECU connector terminal No.14.



Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the connector.

NOTE:



Prior to the wiring harness inspection, check intermediate connector C-16, and repair if necessary.

- Check the communication line for open circuit.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the wiring harness.

STEP 3. Check whether the diagnosis code is reset.

- (1) Replace the rear panel power window motor.
- (2) Check that diagnosis code is not reset.

Q: Is diagnosis code set?
YES : Replace the rear panel power window-ECU.
NO : The procedure is complete.

Code No.5008: P/W (RP) parameter read fail,
Code No.5009: P/W (RP) position read fail

⚠ CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

COMMENTS ON TROUBLE SYMPTOM

- At the engine startup, if a signal reception of the rear panel power window-ECU information fails, ETACS-ECU stores the diagnosis code No. 5008.
- At the engine startup, if a signal reception of the rear panel window glass position information fails, ETACS-ECU stores the diagnosis code No. 5009.

PROBABLE CAUSES

- Malfunction of the rear panel power window-ECU

DIAGNOSIS PROCEDURE

Check whether the diagnosis code is reset.

Check that the diagnosis code is not reset.

Q: Is diagnosis code set?

YES : Replace the rear panel power window-ECU.

NO : The procedure is complete.

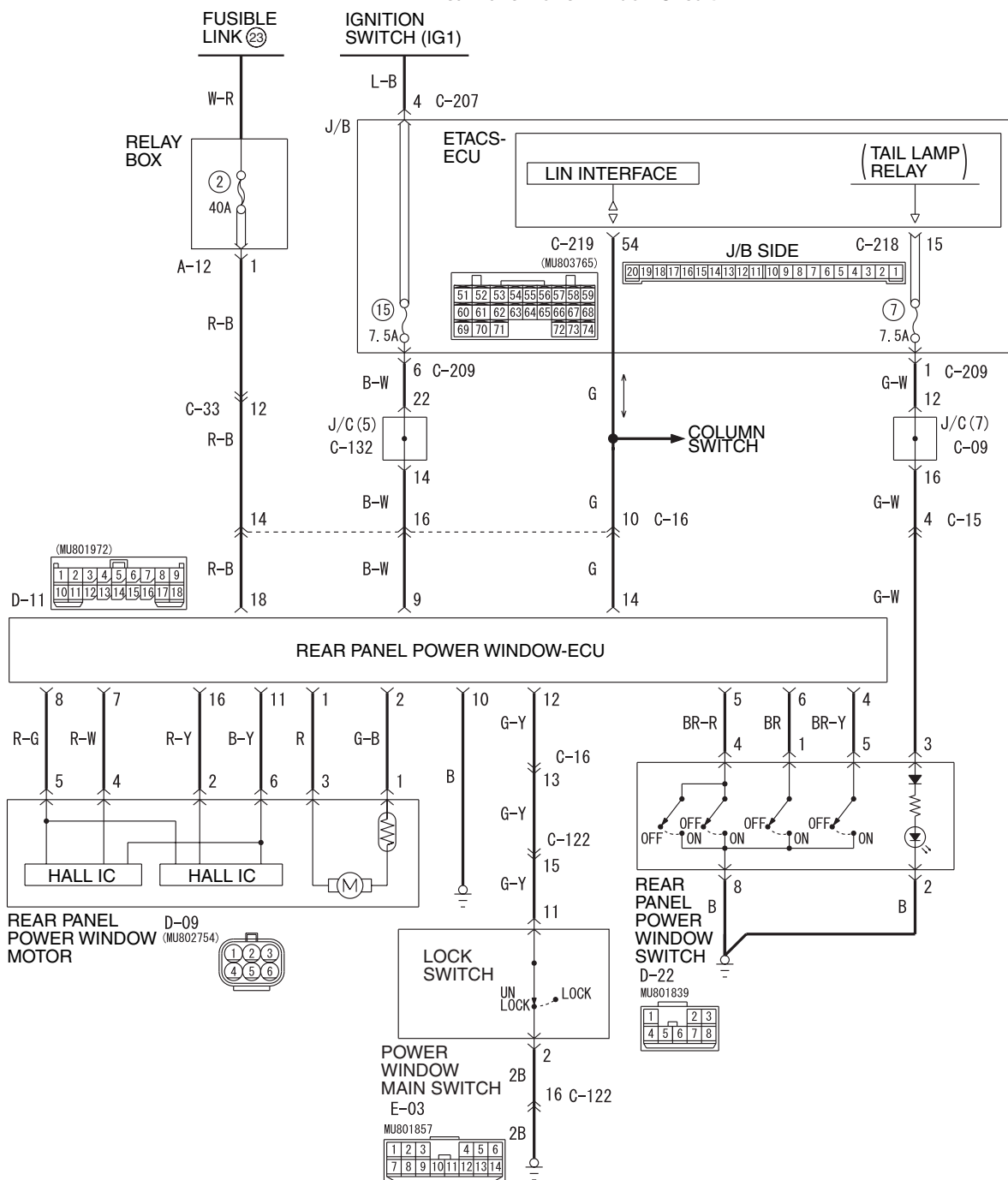
SYMPTOM PROCEDURES

Inspection Procedure 1: Rear Panel Power Window do not Work at All.

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Rear Panel Power Window Circuit



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

COMMENTS ON TROUBLE SYMPTOM

If the rear panel power window do not work at all, the rear panel power window switch, the rear panel power window motor or the rear panel power window-ECU may be defective.

PROBABLE CAUSES

- Malfunction of the rear panel power window switch
- Malfunction of the rear panel power window motor
- Malfunction of the rear panel power window-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III diagnosis code.**

When the ignition switch is turned to the "ON" position, check that the ETACS-ECU does not set the diagnosis code.

Q: Is the diagnosis code set?

YES : Refer to [P.42-22](#).

NO : Go to Step 2.

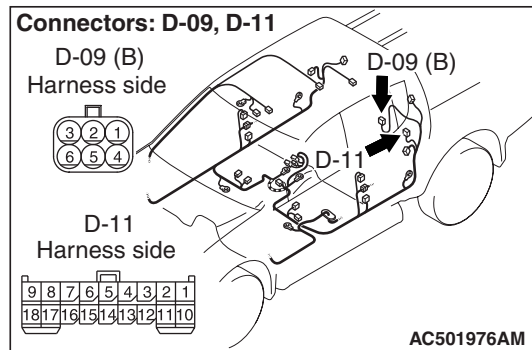
STEP 2. Check the power window sub switch.

Check that each power window works by means of the respective power window sub switch when the power window lock switch is turned off.

Q: Is the check result normal?

YES : Go to Step 3.

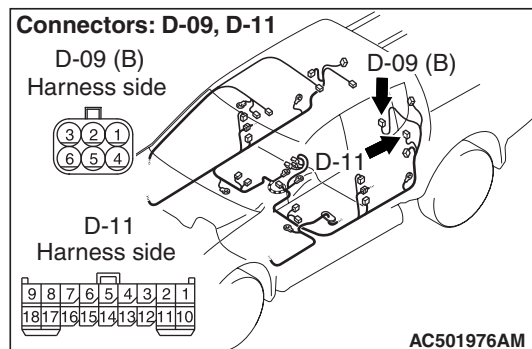
NO : Refer to [P.42-52](#).

STEP 3. Connector check: D-11 rear panel power window-ECU connector and D-09 rear panel power window motor connector

Q: Is the check result normal?

YES : Go to Step 4.

NO : Repair the connector.

STEP 4. Check the wiring harness between D-11 rear panel power window-ECU connector terminal No.1, 2, 8 and 11 to D-09 rear panel power window motor connector terminal No.3, 1, 5 and 6.

- Check the input and output lines for open or short circuit.

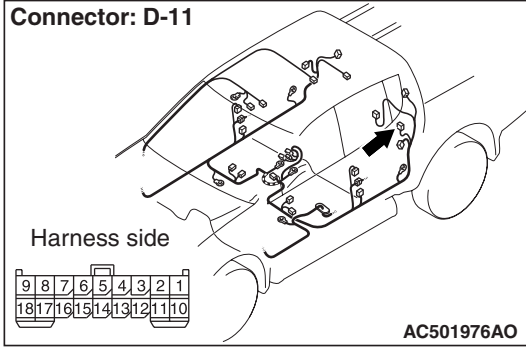
Q: Is the check result normal?

YES : Go to Step 5.

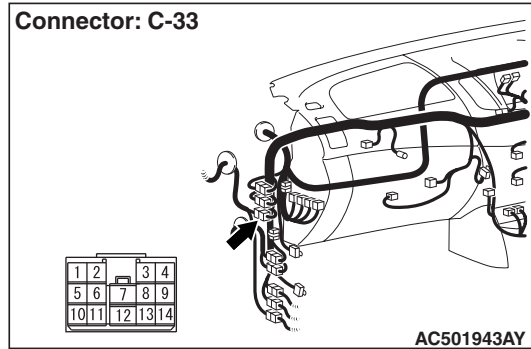
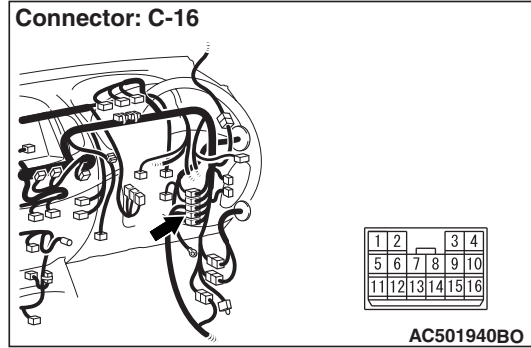
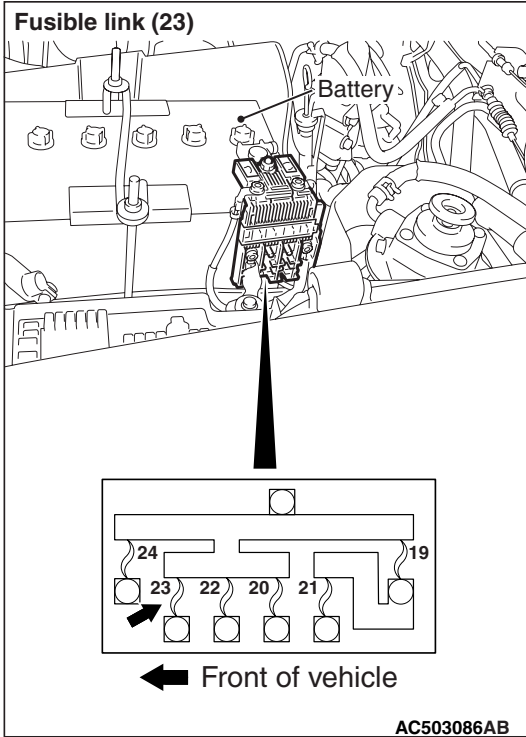
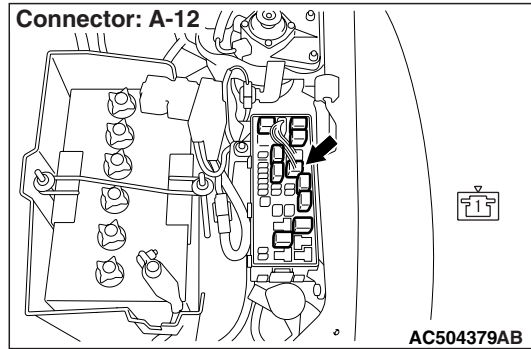
NO : Repair the wiring harness.

STEP 5. Check the wiring harness between D-11 rear panel power window-ECU connector terminal No.18 to fusible link (23).

REAR PANEL POWER WINDOW <Vehicles with rear panel power window>



NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-16, C-33 and relay box connector A-12, and repair if necessary.

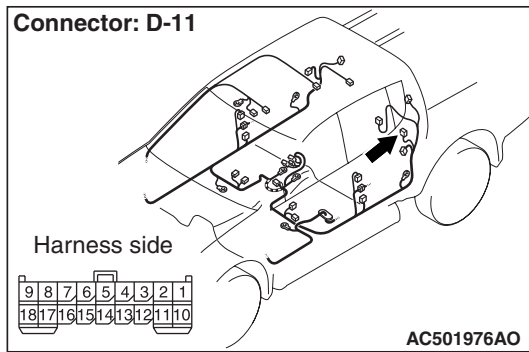
- Check the power supply line for open circuit.

Q: Is the check result normal?

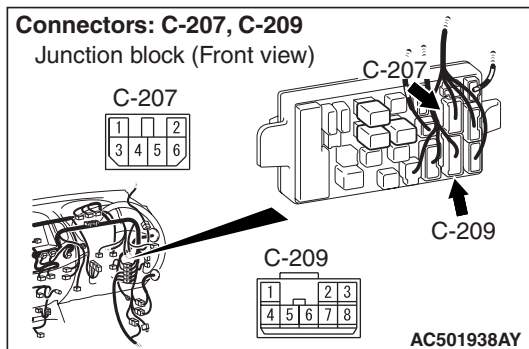
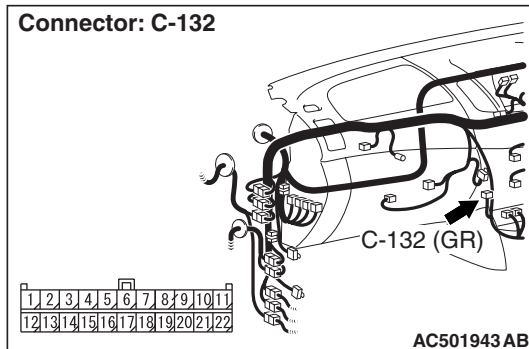
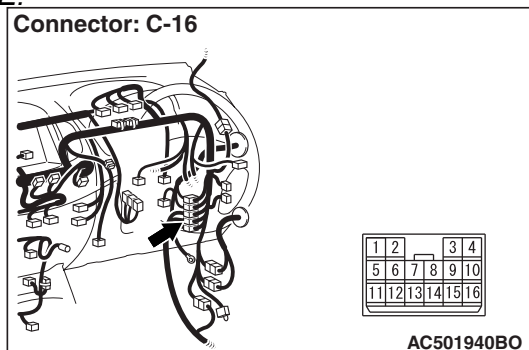
YES : Go to Step 6.

NO : Repair the wiring harness.

STEP 6. Check the wiring harness between D-11 rear panel power window-ECU connector terminal No.9 to ignition switch (IG1).



NOTE:



Prior to the wiring harness inspection, check intermediate connector C-16, joint connector C-132 and junction block connectors C-207, C-209, and repair if necessary.

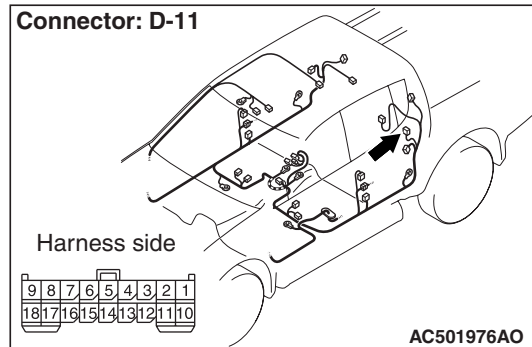
- Check the power supply line for open circuit.

Q: Is the check result normal?

YES : Go to Step 7.

NO : Repair the wiring harness.

STEP 7. Check the wiring harness between D-11 rear panel power window-ECU connector terminal No.10 to body earth.



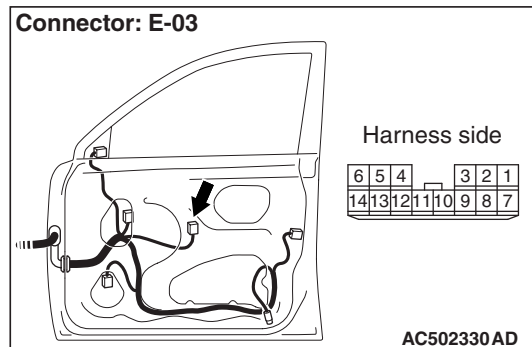
- Check the earth wires for open circuit.

Q: Is the check result normal?

YES : Go to Step 8.

NO : Repair the wiring harness.

STEP 8. Connector check: E-03 power window main switch connector

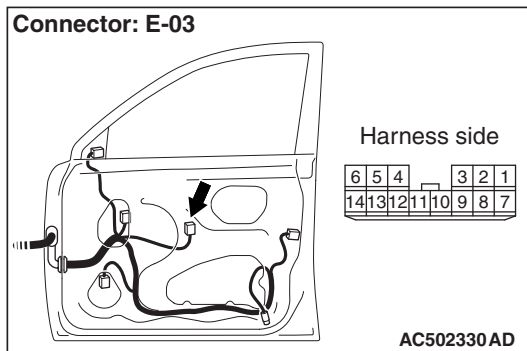
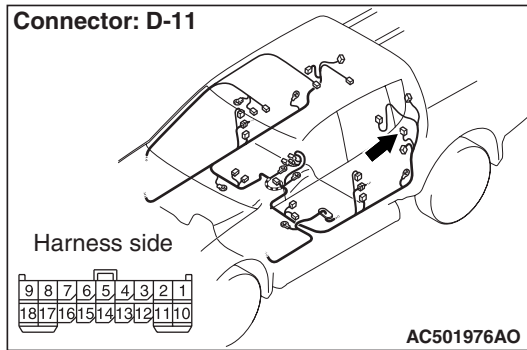


Q: Is the check result normal?

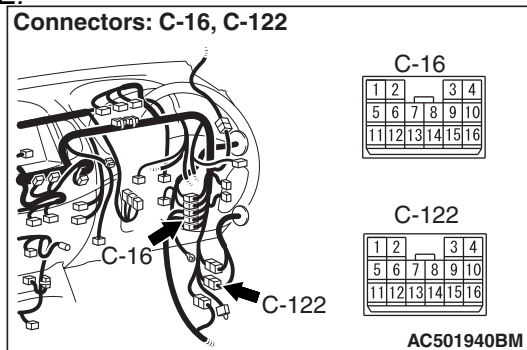
YES : Go to Step 9.

NO : Repair the connector.

STEP 9. Check the wiring harness between D-11 rear panel power window-ECU connector terminal No.12 to E-03 power window main switch connector terminal No.11.



NOTE:

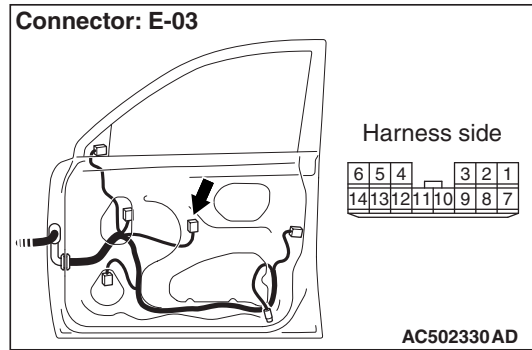


Prior to the wiring harness inspection, check intermediate connectors C-16 and C-122, and repair if necessary.

- Check the input and output lines for open or short circuit.

Q: Is the check result normal?
YES : Go to Step 10.
NO : Repair the wiring harness.

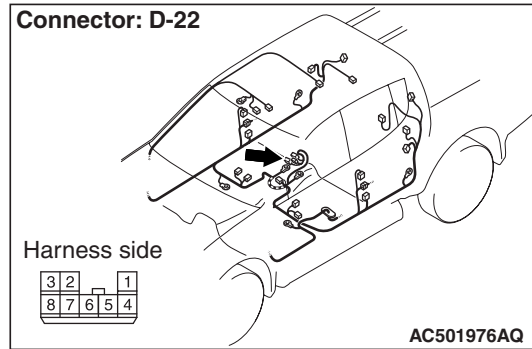
STEP 10. Check the wiring harness between E-03 power window main switch connector terminal No.2 and body earth.



- Check the earth wires for open circuit.

Q: Is the check result normal?
YES : Go to Step 11.
NO : Repair the wiring harness.

STEP 11. Connector check: D-22 rear panel power window switch connector



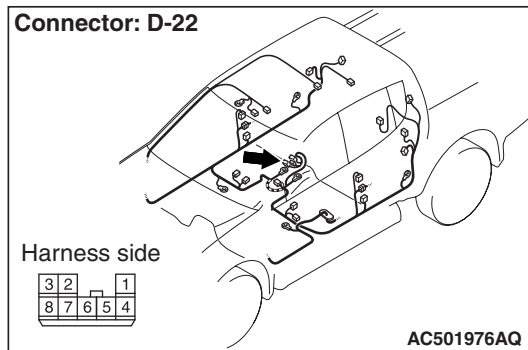
Q: Is the check result normal?
YES : Go to Step 12.
NO : Repair the connector.

STEP 12. Check the rear panel power window switch.

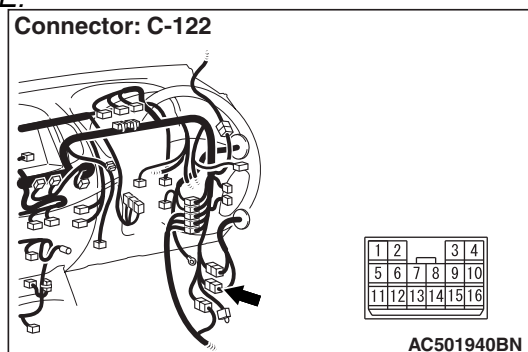
Refer to [P.42-48](#).

Q: Is the check result normal?
YES : Go to Step 13.
NO : Replace the rear panel power window switch.

STEP 13. Check the wiring harness between D-22 rear panel power window switch connector terminal No.2 and body earth.



NOTE:



Prior to the wiring harness inspection, check intermediate connector C-122, and repair if necessary.

- Check the earth wires for open circuit.

Q: Is the check result normal?

YES : Go to Step 14.

NO : Repair the wiring harness.

STEP 14. Retest the system.

After the rear panel power window motor is replaced, check that the rear panel power window work.

- (1) Replace the rear panel power window motor.
- (2) Check that the rear panel power window work.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

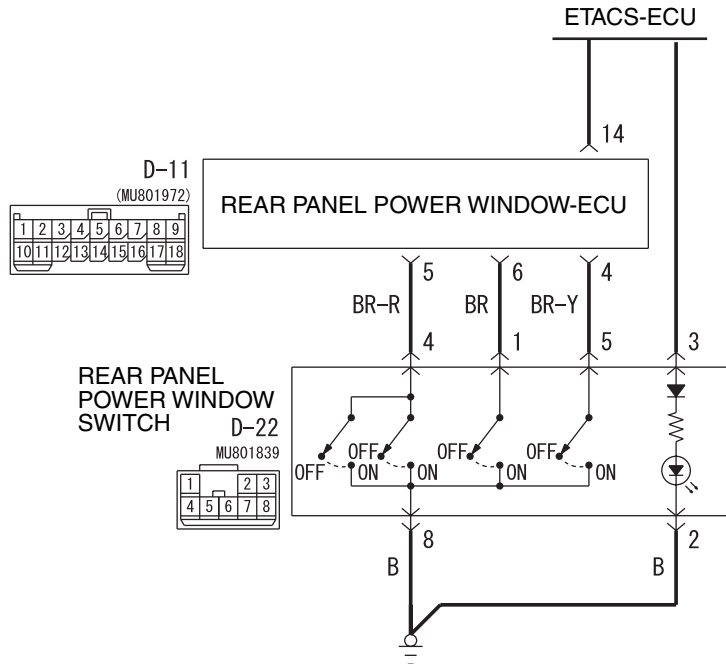
NO : Replace the rear panel power window-ECU.

Inspection Procedure 2: Any of The Rear Panel Power Window Switch Position is defective.

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Rear Panel Power Window Switch Circuit



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

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COMMENTS ON TROUBLE SYMPTOM

If the rear panel power window do not work at all, the rear panel power window switch, the rear panel power window motor or the rear panel power window-ECU may be defective.

PROBABLE CAUSES

- Malfunction of the rear panel power window switch
- Malfunction of the rear panel power window motor
- Malfunction of the rear panel power window-ECU

- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code.

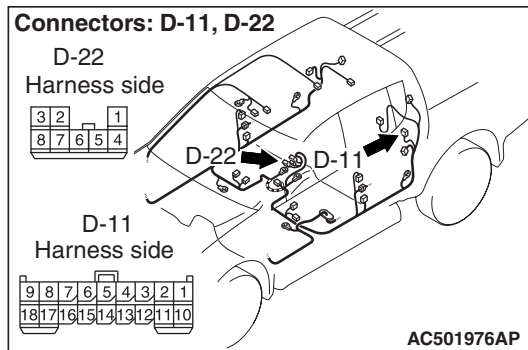
When the ignition switch is turned to the "ON" position, check that the ETACS-ECU does not set the diagnosis code.

Q: Is the diagnosis code set?

YES : Refer to [P.42-22](#).

NO : Go to Step 2.

STEP 2. Connector check: D-11 rear panel power window-ECU connector and D-22 rear panel power window switch connector



Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair the connector.

STEP 3. Check the rear panel power window switch.

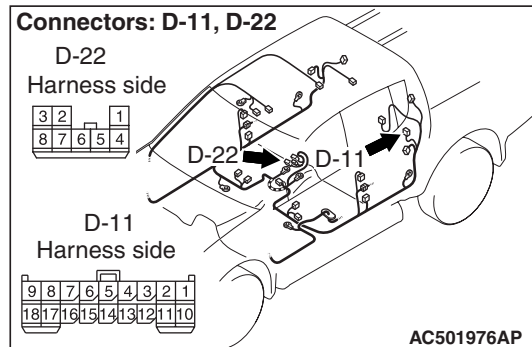
Refer to [P.42-48](#).

Q: Is the check result normal?

YES : Go to Step 4.

NO : Replace the rear panel power window switch.

STEP 4. Check the wiring harness between D-11 rear panel power window-ECU connector terminal Nos.4, 5 and 6 to D-22 rear panel power window switch connector terminal Nos.5, 4 and 1.



- Check the input and output lines for open or short circuit.

Q: Is the check result normal?

YES : Go to Step 5.

NO : Repair the wiring harness.

STEP 5. Retest the system.

After the rear panel power window motor is replaced, check that the rear panel power window work.

- (1) Replace the rear panel power window motor.
- (2) Check that the rear panel power window work.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the rear panel power window-ECU.

Inspection Procedure 3: Rear Panel Power Window Anti-trap Function does not Work Normally.

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

COMMENTS ON TROUBLE SYMPTOM

If the rear panel power window anti-trap function does not work, the rear panel power window motor and the rear panel power window-ECU may be defective.

PROBABLE CAUSES

- Malfunction of the rear panel power window motor

- Malfunction of the rear panel power window-ECU

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code.

When the ignition switch is turned to the "ON" position, check that the ETACS-ECU does not set the diagnosis code.

Q: Is the diagnosis code set?

YES : Refer to [P.42-22](#).

NO : Go to Step 2.

REAR PANEL POWER WINDOW <Vehicles with rear panel power window>

STEP 2. Confirm the rear panel power window learning function.

Check that the rear panel power window-ECU has learned the fully closed position of the window (Refer to P.42-43).

Q: Is the check result normal?

YES : Go to Step 3.

NO : Refer to P.42-43.

STEP 3. Retest the system.

After the rear panel power window motor is replaced, check that the rear panel power window anti-trap function work.

- (1) Replace the rear panel power window motor.
- (2) Check that the rear panel power window anti-trap function work.

Q: Is the check result normal?

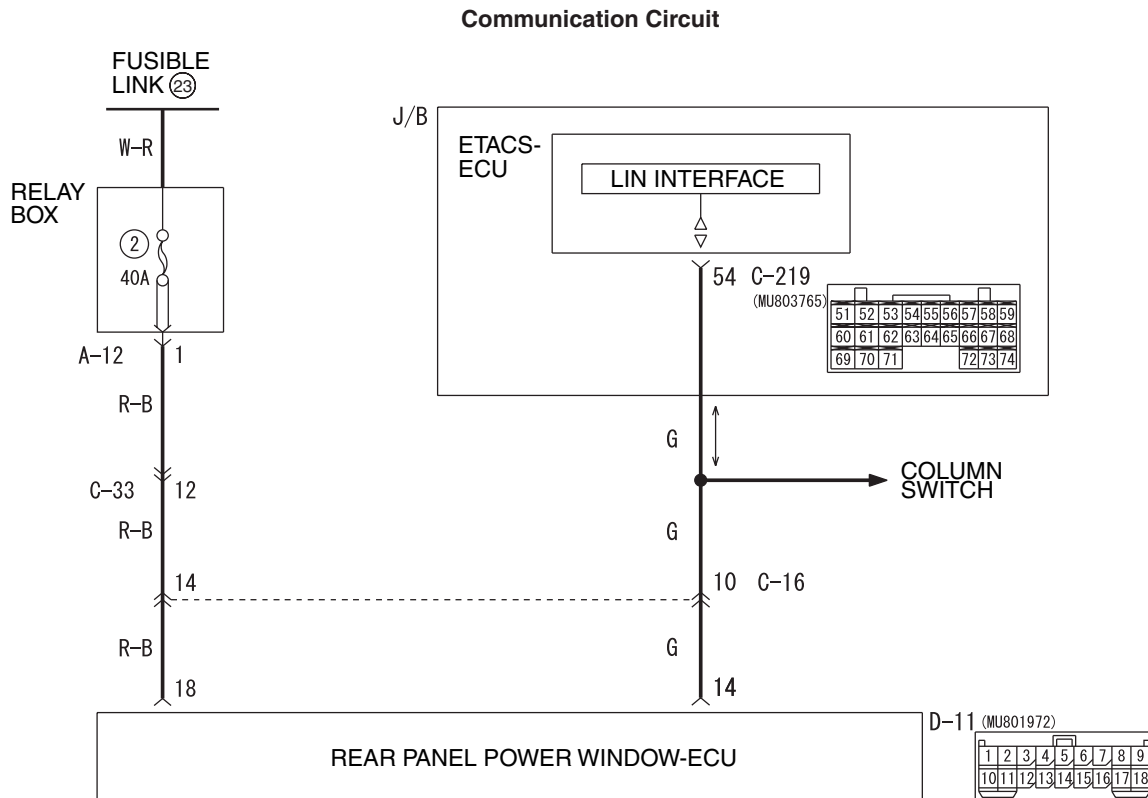
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the rear panel power window-ECU.

Inspection Procedure 4: Rear Panel Power Window-ECU cannot Communicate with ETACS-ECU.

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

COMMENTS ON TROUBLE SYMPTOM

The power supply circuit of rear panel power window-ECU may have a trouble. Also, check the battery power supply circuit harness of rear panel power window-ECU, and repair if necessary.

PROBABLE CAUSES

- Malfunction of the rear panel power window-ECU
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code.

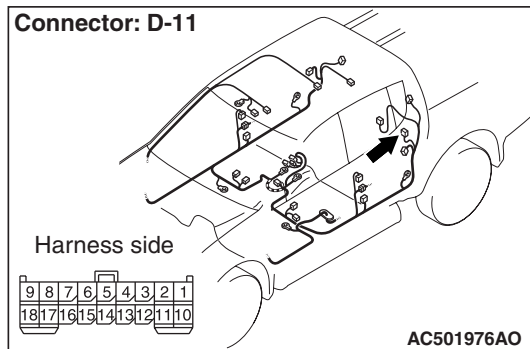
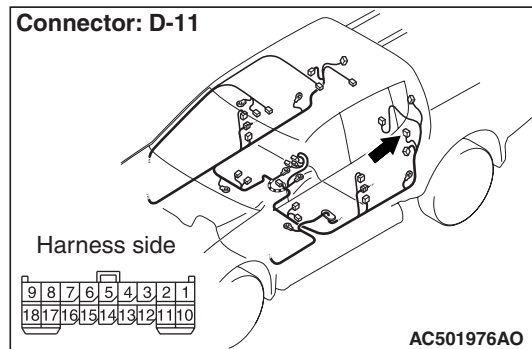
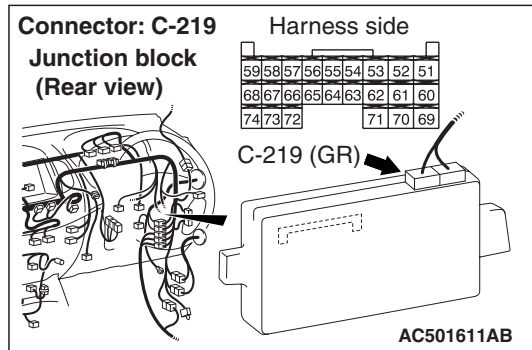
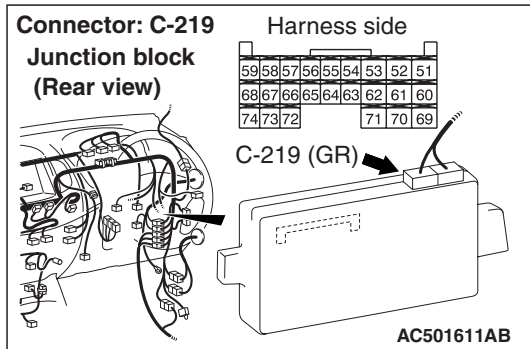
When the ignition switch is turned to the "ON" position, check that the ETACS-ECU does not set the diagnosis code.

Q: Is the diagnosis code set?

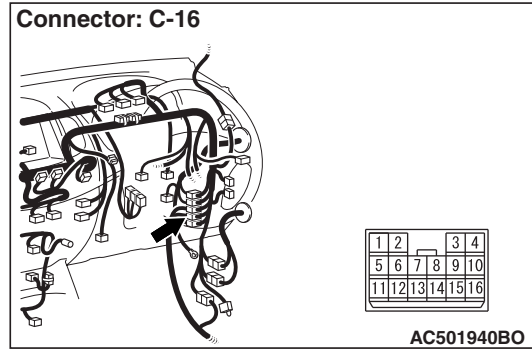
- YES :** Refer to P.42-22.
- NO :** Go to Step 2.

STEP 2. Connector check: C-219 ETACS-ECU connector and D-11 rear panel power window-ECU connector

STEP 3. Check the wiring harness between C-219 ETACS-ECU connector terminal No.54 to D-11 rear panel power window-ECU connector terminal No.14.



NOTE:



Prior to the wiring harness inspection, check intermediate connector C-16, and repair if necessary.

- Check the communication line for open circuit.

Q: Is the check result normal?

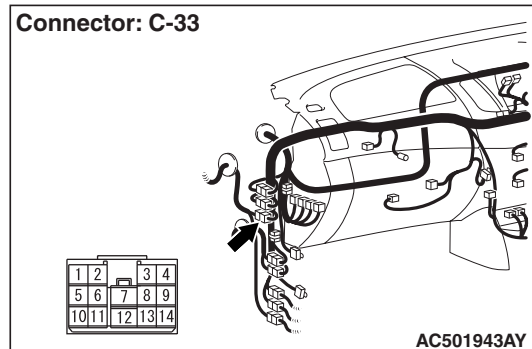
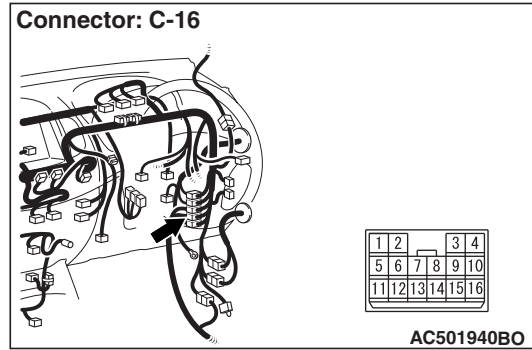
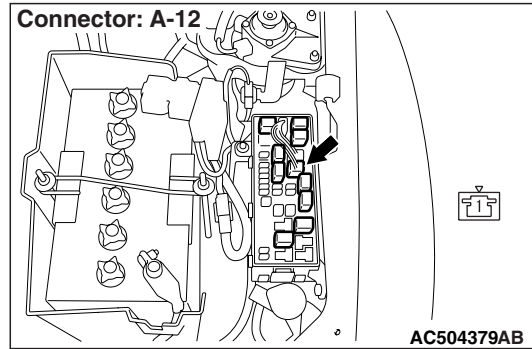
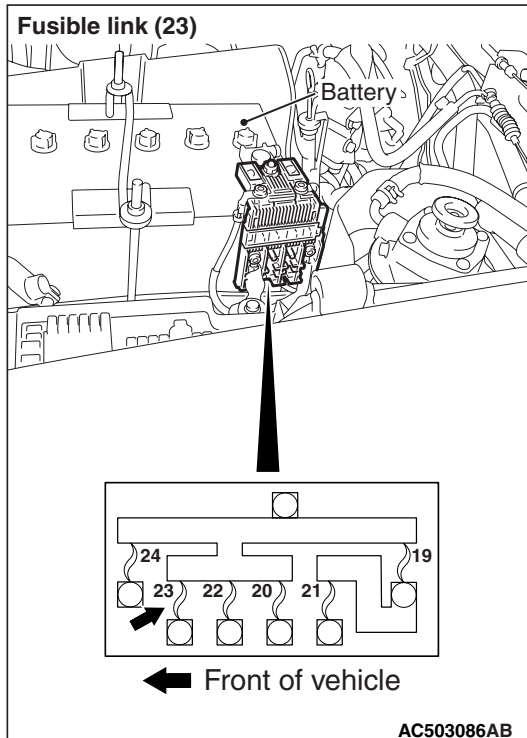
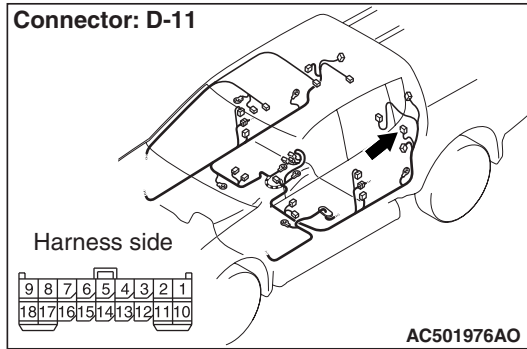
- YES :** Go to Step 4.
- NO :** Repair the wiring harness.

Q: Is the check result normal?

- YES :** Go to Step 3.
- NO :** Repair the connector.

STEP 4. Check the wiring harness between D-11 rear panel power window-ECU connector terminal No.18 to fusible link (23).

NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-16, C-33 and relay box connector A-12, and repair if necessary.

- Check the power supply line for open circuit.

Q: Is the check result normal?

YES : Go to Step 5.

NO : Repair the wiring harness.

STEP 5. Retest the system.

After the rear panel power window-ECU is replaced, check that the rear panel power window work.

- (1) Replace the rear panel power window-ECU.
- (2) Check that the rear panel power window work.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the ETACS-ECU.

Inspection Procedure 5: Rear Pnael Power Window Timer Function does not Work Normally.**CAUTION**

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

COMMENTS ON TROUBLE SYMPTOM

If the rear panel power window timer function does not work, the input circuit from the ignition switch (IG1) or the driver's door switch, the communication lines between the ETACS-ECU and the rear panel power window-ECU, the rear panel power window-ECU or the ETACS-ECU may be defective.

PROBABLE CAUSES

- Malfunction of ETACS-ECU
- Malfunction of the rear panel power window-ECU
- Malfunction of the power window main switch
- Malfunction of the rear panel power window switch
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III diagnosis code.**

When the ignition switch is turned to the "ON" position, check that the ETACS-ECU does not set the diagnosis code.

Q: Is the diagnosis code set?

YES : Refer to [P.42-22](#).

NO : Go to Step 2.

STEP 2. Check the rear panel power window.

Check that the rear panel power window can operate by means of the rear panel power window switch.

Q: Is the check result normal?

YES : Go to Step 3.

NO : Refer to [P.42-23](#).

STEP 3. Check the power window timer function.

Check that the power window timer function works normally.

Q: Is the check result normal?

YES : Go to Step 4.

NO : Refer to [P.42-52](#).

STEP 4. Retest the system.

Check that the rear panel power window timer function work normally.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

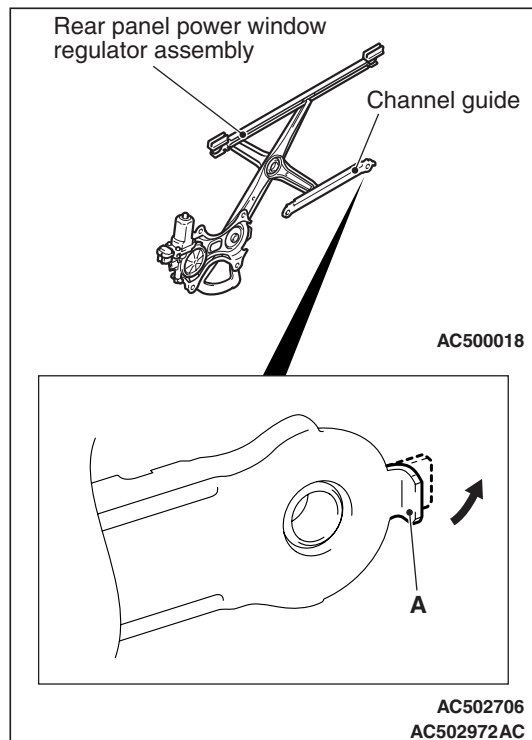
NO : Replace the rear panel power window-ECU.

ON-VEHICLE SERVICE**REAR SLIDE WINDOW GLASS ADJUSTMENT**

M1429007400019

Check that the window glass operates smoothly and moves along the rear slide window glass runchannel when the rear slide window glass is fully raised and fully lowered. If there is a problem, adjust by the following procedure.

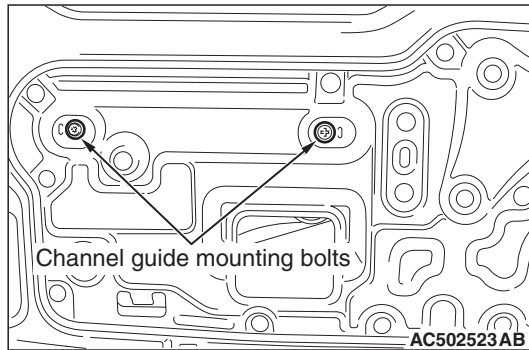
1. Remove the cab rear end lower trim (Refer to GROUP 52A, Interior trim).
2. Remove the waterproof film and rear panel power window regulator assembly (Refer to [P.42-45](#)).



3. Stretch the both bends ("A" shown in the figure) of channel guide on the rear panel window regulator assembly.

NOTE: The bend of "A" shown in the figure is used for positioning the rear panel window regulator assembly. However, stretching the part "A" enables the adjustment of rear slide window glass. In addition, keep the part "A" stretched.

4. Install the rear panel power window regulator assembly (Refer to P.42-45).
5. Activate the anti-trap function successively 3 times, and then deactivate the anti-trap function.



6. Raise the rear slide window glass and loosen the channel guide mounting bolts to adjust the window glass slants appropriately.
7. Set the anti-trap function. (Refer to P.42-43.)

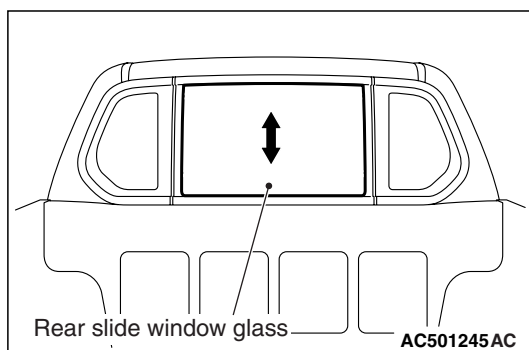
GLASS SLIDING MECHANISM CHECK AND ADJUSTMENT

M1429000900284

If the window glass automatically starts moving downwards at the wrong time while it is being raised, carry out the following adjustment or replacement procedures.

1. Remove the cab rear end lower trim (Refer to GROUP 52A, Interior trim).
2. Remove the waterproof film (Refer to P.42-45).
3. Remove the window regulator assembly from the rear slide window glass, and then raise and lower the rear slide window glass by hand to check the operation force.

NOTE: Insert a cushion or similar object to prevent damage to the glass if it should happen to fall down.



4. If the rear slide window glass does not move up and down smoothly, check or repair the following points.
 - Check the installation condition of the runchannel.
 - Check the installation condition of the rear slide window sash side and the rear slide window sash upper.
5. If repair or adjustment is not possible, replace the rear slide window sash side and the rear slide window sash upper.

REAR PANEL POWER WINDOW ANTI-TRAP FUNCTION INSPECTION

M1429007500016

1. Place a wooden board about 10 mm thickness. Then, raise the rear slide window glass.
2. Check that the window lowers by fully open position when the window clamps the board. If this doesn't happen, carry out troubleshooting. Refer to P.42-23.

NOTE: If the anti-trap function (safety mechanism) is activated consecutively three times or more, make the rear panel power window-ECU learn the fully closed position of the rear panel power window (Refer to P.42-43).

REAR PANEL POWER WINDOW INITIAL SET

M1429007600013

HOW TO MAKE THE REAR PANEL POWER WINDOW-ECU LEARN THE FULLY CLOSED POSITION OF THE REAR PANEL POWER WINDOW

HOW TO MAKE THE REAR PANEL POWER WINDOW-ECU LEARN THE FULLY CLOSED POSITION WHEN THE REAR PANEL POWER WINDOW-ECU IS REMOVED, OR THE REAR PANEL POWER WINDOW REGULATOR ASSEMBLY IS REMOVED OR REPLACED

1. If the anti-trap function (safety mechanism) is activated consecutively three times or more, the fully closed position that the rear panel power window-ECU has learned will be erased (initialised).
2. Operate the rear panel power window switch and fully open the rear slide window glass.

⚠ CAUTION

The anti-trap function does not work until the rear panel power window-ECU completes learning the fully closed position (It is because the anti-trap function is reset).

3. Operate the rear panel power window switch and fully close the rear slide window glass. The rear panel power window activates for 0.7 second and stops automatically when the rear panel power window switch is pressed once. Repeat this operation until the rear slide window glass fully closes and release the rear panel power window switch once. Then, hold the rear panel power window switch to the fully closed side again for one second so that the rear panel power window switch completes learning the fully closed position.

NOTE: If the rear panel power window switch is operated to open the rear slide window glass while the rear panel power window-ECU is learning, learning will be cancelled. If this happens, return to step 2.

HOW TO MAKE THE REAR PANEL POWER WINDOW-ECU LEARN THE FULLY CLOSED POSITION WHEN THE REAR PANEL POWER WINDOW-ECU IS REPLACED WITH A NEW ONE**⚠ CAUTION**

The anti-trap function does not work until the rear panel power window-ECU completes learning the fully closed position (It is because the anti-trap function is reset).

Operate the rear panel power window switch to fully close the rear slide window glass by one-shot up action so that the rear panel power window-ECU will complete learning (Initialisation is not needed).

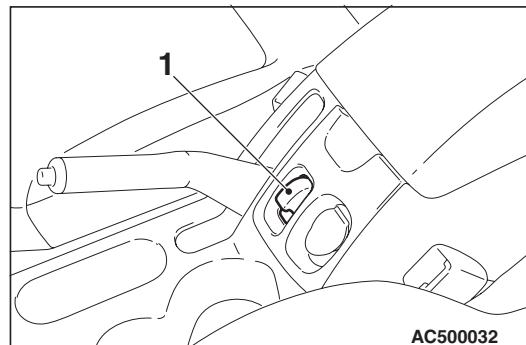
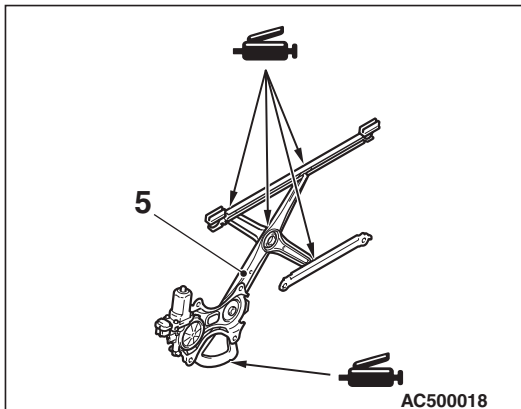
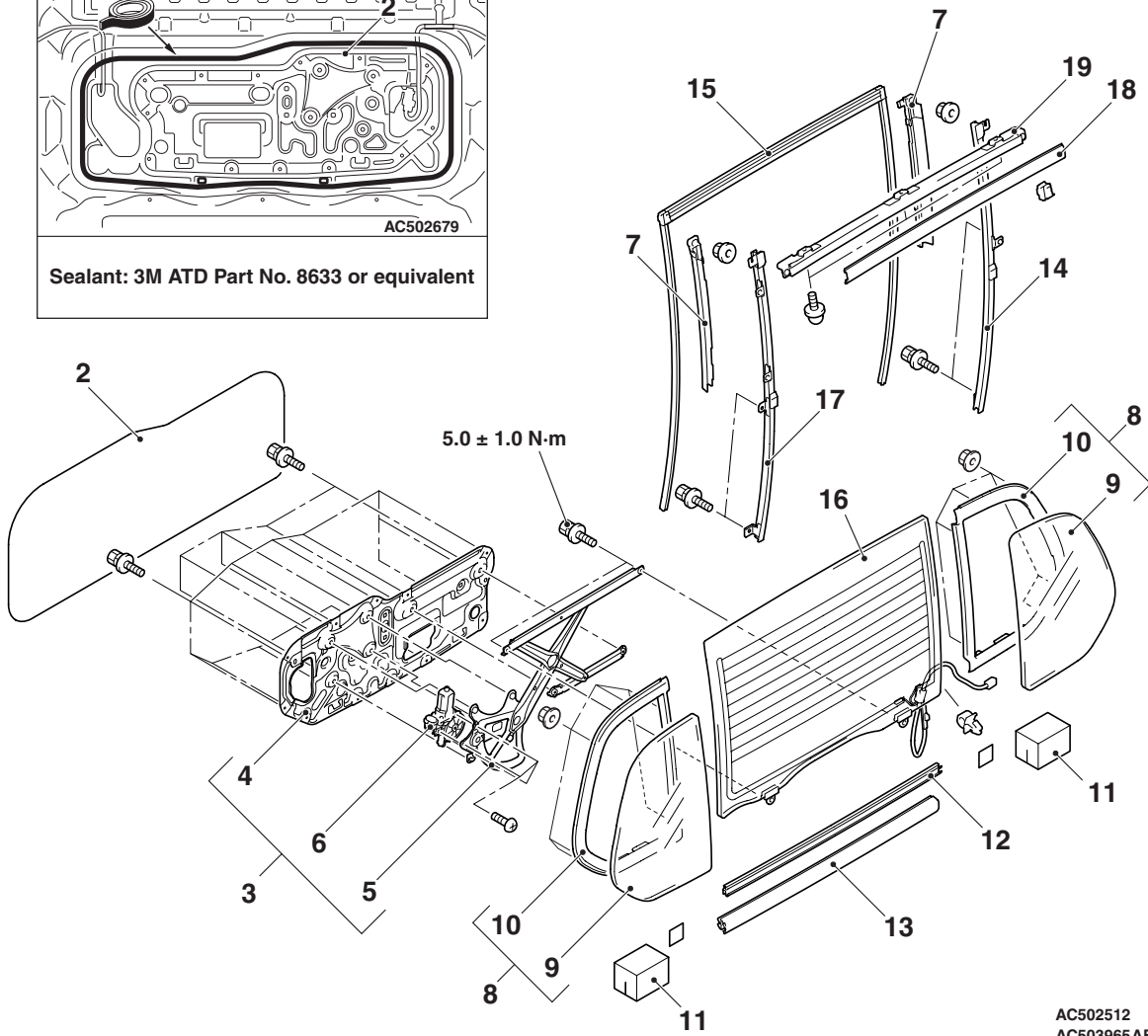
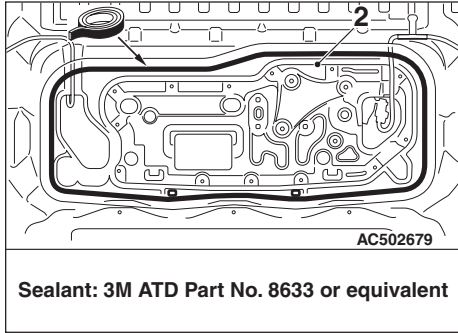
REAR PANEL WINDOW REGULATOR

REMOVAL AND INSTALLATION

M1429005800011

Post-installation Operation

- Rear Panel Power Window Glass Adjustment (Refer to [P.42-42](#)).
- Rear Panel Power Window Initial Set (Refer to [P.42-43](#)).



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Rear panel power window switch removal

1. Rear panel power window switch (Refer to GROUP 52A, Rear Floor Console Assembly .)

Rear panel power window regulator assembly removal steps

- Cab rear end lower trim (Refer to GROUP 52A, Interior Trim .)
2. Waterproof film
 3. Rear window panel assembly
 4. Rear window panel
 5. Rear panel power window regulator
 6. Rear panel power window motor

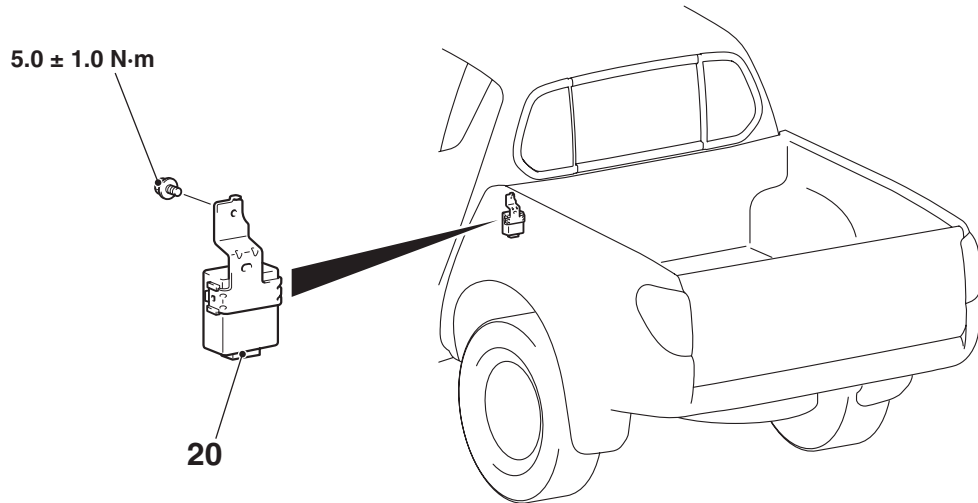
Rear slide window glass and rear side window glass removal steps

- Headlining (Refer to GROUP 52A, Headlining .)
- Cab rear end lower trim (Refer to GROUP 52A, Interior Trim .)

2. Waterproof film
7. Rear window side moulding
8. Rear side window glass assembly
9. Rear side window glass
10. Rear side window glass weatherstrip
11. Rear body cushion
12. Cab rear window weatherstrip
13. Rear window moulding lower
14. Rear slide window sash side (R.H. side)
15. Rear slide window glass runchannel
16. Rear slide window glass
17. Rear slide window sash side (L.H. side)
18. Rear slide window sash upper
19. Rear window moulding upper

Post-installation Operation

- Rear Panel Power Window Initial Set (Refer to P.42-43).



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Rear panel power window-ECU removal steps

- Rear pillar trim (Refer to GROUP 52A, Interior Trim .)
20. Rear panel power window-ECU

2. Lower the rear slide window glass until the rear slide window glass mounting bolts are seen.
3. Remove the rear slide window glass installation bolts.

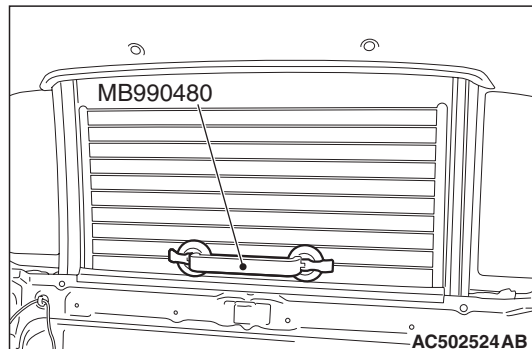
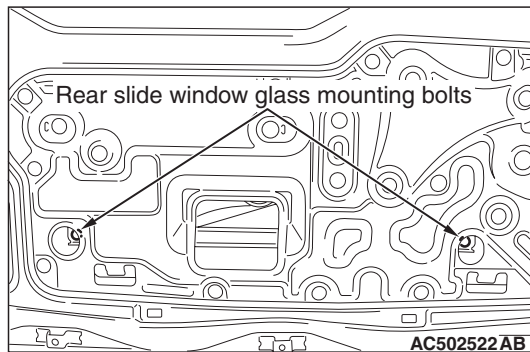
CAUTION

If tinting film is adhered to the rear slide window glass, attach special tool window glass holder (MB990480) to the outside of the glass to prevent the film from peeling off.

REMOVAL SERVICE POINT

<<A>> REAR WINDOW PANEL ASSEMBLY REMOVAL

1. Activate the anti-trap function successively 3 times, and then deactivate the anti-trapping function.

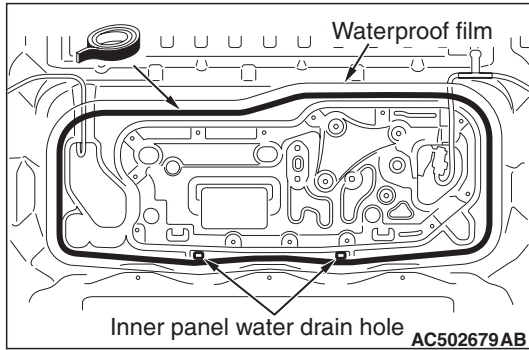


4. Lift the rear slide window glass, and attach special tool window glass holder (MB990480) to the glass as shown to prevent the glass from falling.
5. Remove the rear window panel assembly.

INSTALLATION SERVICE POINT

>>A<< WATERPROOF FILM INSTALLATION

⚠ CAUTION



When sticking the waterproof film, ensure that the sealant is applied under the inner panel water drain hole.

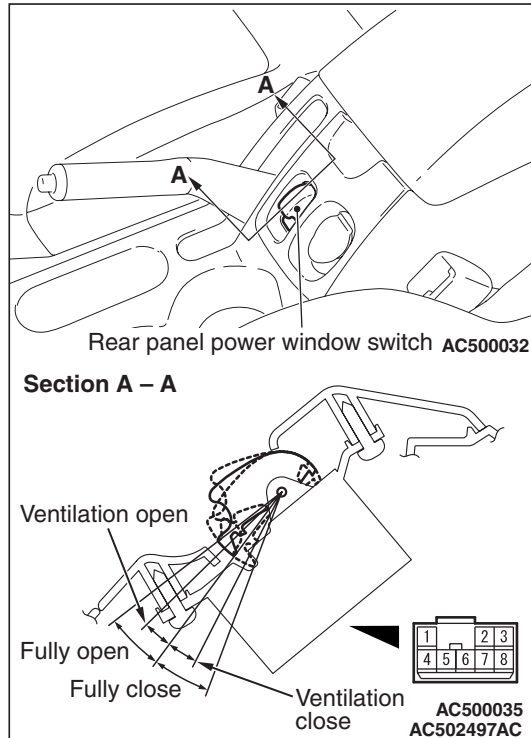
Apply the specified adhesive to the waterproof film as shown and stick the film.

Specified sealant: 3M ATD Part No.8633 or equivalent

INSPECTION

M1429005900018

REAR PANEL POWER WINDOW SWITCH CONTINUITY CHECK

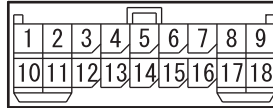


Remove the rear panel power window switch (Refer to GROUP 52A, Rear Floor Console Assembly).

Switch position	Tester connection	Specified condition
Ventilation open	5 -8	Less than 2 ohms
Ventilation close	1 -8	
OFF	1 -8, 4 -8, 5 -8	Open circuit
Fully open/Fully close	4 -8	Less than 2 ohms

REAR PANEL POWER WINDOW-ECU TERMINAL INSPECTION

D-11



AC503693 AB

Terminal No.	Check item	Check condition	Normal condition
1	Output to rear panel power window motor	–	–
2	Output to rear panel power window motor	–	–
3	–	–	–
4	Output to rear panel power window switch	Rear panel power window switch (Ventilation open): ON	12 V
5	Output to rear panel power window switch	Rear panel power window switch (Fully open/Fully close): ON	12 V
6	Output to rear panel power window switch	Rear panel power window switch (Ventilation close): ON	12 V
7	Input from rear panel power window motor (pulse sensor signal)	When the rear panel power window are operating	0 to 5 V (pulse signal)
8	Input from rear panel power window motor (power supply to pulse sensor)	When the rear panel power window are operating	5 V
9	Power supply from ignition switch (IG1)	Ignition switch: ON	Battery voltage
10	Earth	Always	0 V
11	Input from rear panel power window motor (pulse sensor earth)	–	0 V
12	Output to power window main switch (lock switch)	Lock switch: ON	12 V
13	–	–	–
14	LIN communication line	Always	0 to 12 V (pulse signal)
15	–	–	–
16	Input from rear panel power window motor (pulse sensor signal)	When the rear panel power window are operating	0 to 5 V (pulse signal)
17	–	–	–
18	Battery power supply	Always	Battery voltage

DOOR**SERVICE SPECIFICATIONS**

M1423000300251

Item		Standard value
Power window operation current (Power supply voltage 14.5 ± 0.5 V, at 25°C) A		5 ± 1
Door outside handle play mm	Front door	0.1 –5.9 (target value: 2.5)
	Rear door	0.1 –5.9 (target value: 2.6)
Door inside handle play mm		5.2 –19.6 (target value: 10.9)
Door inside handle lock knob stroke mm	Front door	14.5 –16 (target value: 15)
	Rear door	15 ± 0.5

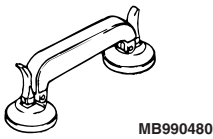
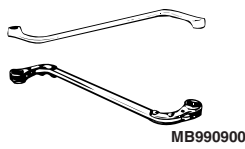
SEALANT

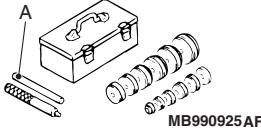
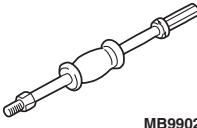

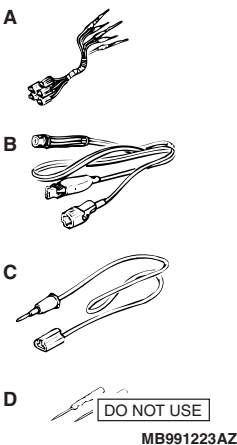

M1423000500192

Item	Specified sealant
Door waterproof film	3M ATD Part No.8633 or equivalent

SPECIAL TOOLS

M1423000600542

Tool	Number	Name	Use
 MB990480	MB990480	Window glass holder	Removal of window regulator assembly
 MB990900	MB990900 or MB991164	Door hinge adjusting wrench	Door alignment

Tool	Number	Name	Use
 <p>MB990925 AF</p>	<p>MB990925 A: MB990939</p>	<p>Bearing and oil seal installer set A: Remover bar</p>	<p>Door striker adjustment</p>
 <p>MB990211</p>	<p>MB990211</p>	<p>Sliding hammer</p>	
 <p>MB990241 AE</p>	<p>MB990241 A: MB990243</p>	<p>Axle shaft puller A: Body puller</p>	
 <p>MB991223 AZ</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: For checking connector pin contact pressure B: For checking power supply circuit C: For checking power supply circuit D: For connecting a locally sourced tester</p>
 <p>MB992006</p>	<p>MB992006</p>	<p>Extra fine probe</p>	<p>Continuity check and voltage measurement at harness wire or connector</p>

TROUBLESHOOTING**DIAGNOSIS TROUBLESHOOTING FLOW**

M1423006700309

Refer to GROUP 00, Contents of Troubleshooting .

TROUBLE SYMPTOM CHART <CENTRAL DOOR LOCKING SYSTEM>

M1427001800091

Symptom	Inspection procedure number	Reference page
Central door locking system does not work.	A-1	P.42-53
A door cannot be locked or unlocked by the central door locking system.	A-2	P.42-56
Selector "P" position-linked door unlock function does not operate normally. <Vehicles with automatic transmission with keyless entry system>	A-3	P.42-56

TROUBLE SYMPTOM CHART <POWER WINDOWS>

M1429002800249

Symptom	Inspection procedure number	Reference page
Power windows do not work at all.	B-1	P.42-64
Driver's power window does not work by means of the power window main switch.	B-2	P.42-71
Relevant power window do not work by means of the front passenger's power window sub switch.	B-3	P.42-73
Front passenger's power window do not work by means of the power window main switch.	B-4	P.42-83
Power window timer function does not work normally.	B-5	P.42-88
The window glass lowers automatically while it is rising.	B-6	P.42-89

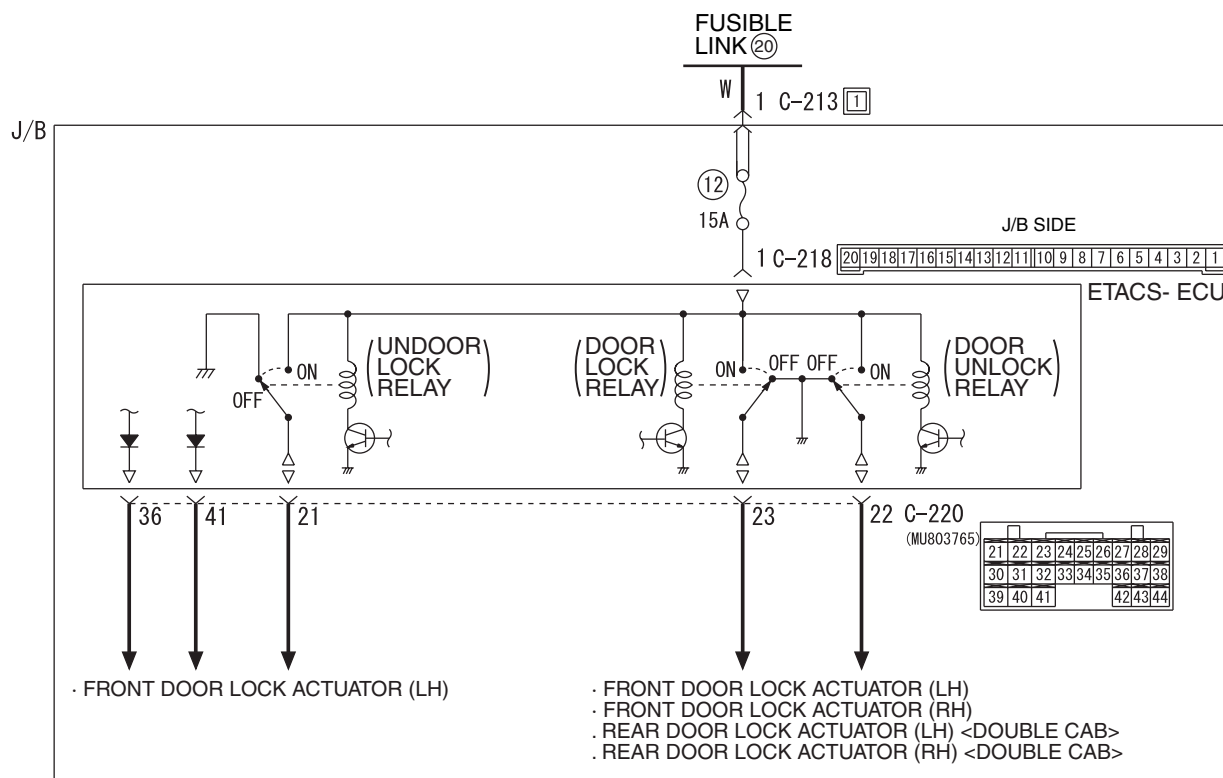
SYMPTOM PROCEDURES <CENTRAL DOOR LOCKING SYSTEM>

Inspection Procedure A-1: Central Door Locking System does not Work.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Central Door Lock Power Supply Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

AC503704AB

COMMENT ON TROUBLE SYMPTOM

If the central door locking system does not work at all, the ETACS-ECU may be defective.

PROBABLE CAUSES

- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the power supply circuit.

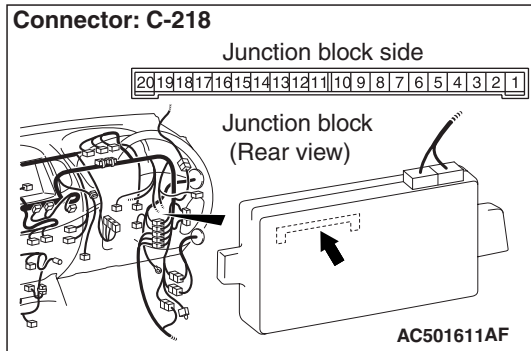
When the ignition switch is turned to the LOCK (OFF) position, check if the hazard warning lamps illuminate.

Q: Is the check result normal?

YES : Go to Step 2.

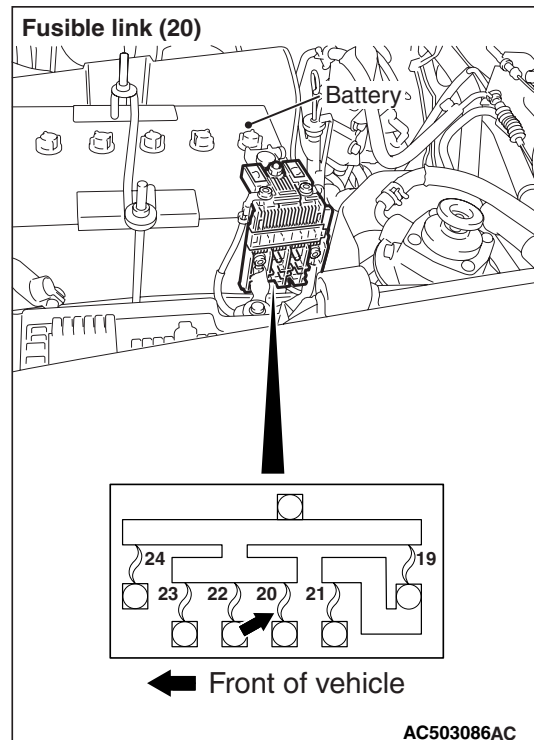
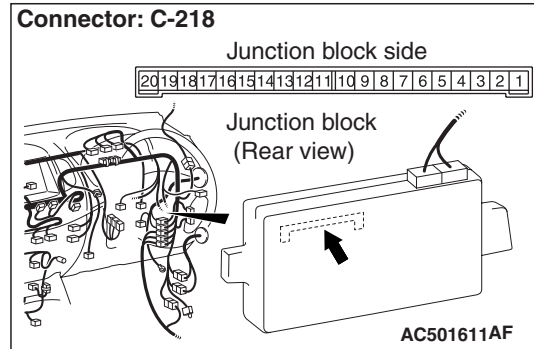
NO : Refer to GROUP 54B, Inspection Procedure A-1 "Check the battery power supply circuit to the ETACS-ECU" .

STEP 2. Connector check: C-218 ETACS-ECU connector

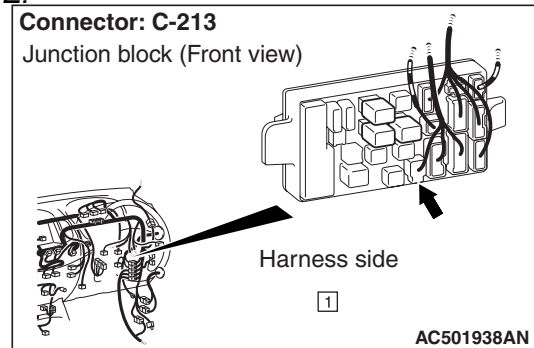


Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the defective connector.

STEP 3. Check the wiring harness between C-218 ETACS-ECU connector terminal No.1 and fusible link (20).



NOTE:



Prior to the wiring harness inspection, check junction block connector C-213, and repair if necessary.

- Check the power supply line for open or short circuit.

Q: Is the check result normal?

YES : Go to Step 4.

NO : Repair the wiring harness.

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the ETACS-ECU.

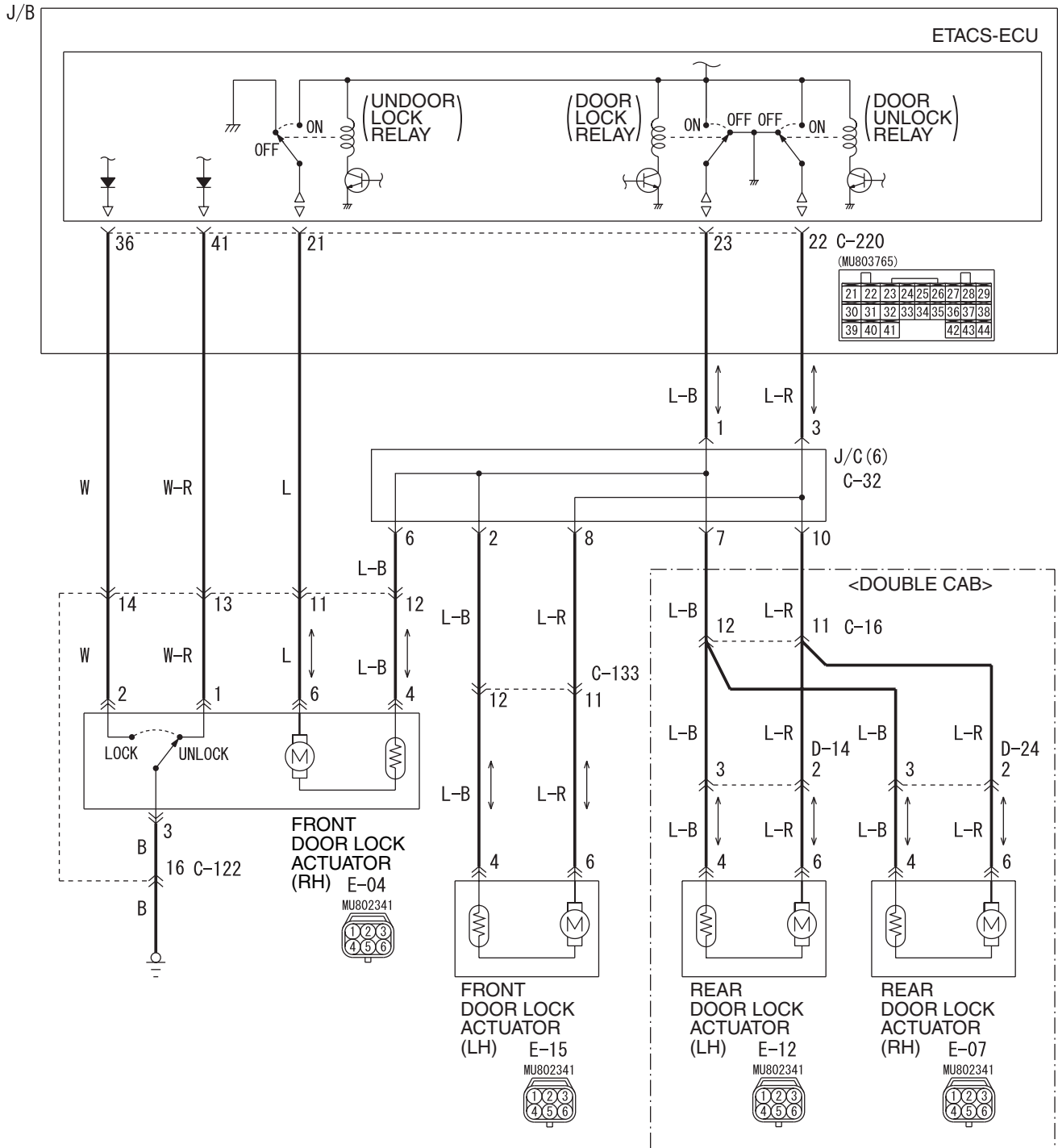
STEP 4. Retest the system.

Check that the central door locking system works normally.

Q: Is the check result normal?

Inspection Procedure A-2: A Door cannot be Locked or Unlocked by the Central Door Locking System.

Central Door Lock Circuit



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

COMMENT ON TROUBLE SYMPTOM

If a door cannot be locked or unlocked by the central door locking system, the door lock actuator may be defective.

PROBABLE CAUSES

- Malfunction of the door lock actuator
- Damaged harness wires and connectors

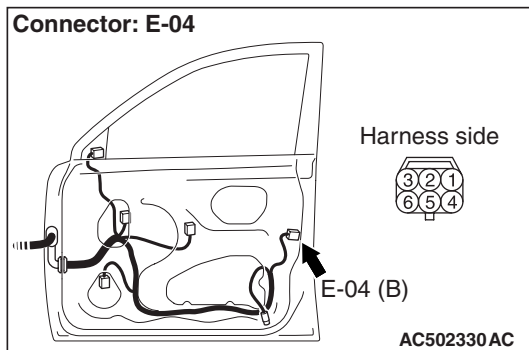
DIAGNOSIS PROCEDURE

STEP 1. Confirm which door lock actuator is defective.

Q: Which door fails to lock correctly?

- Driver's door : Go to Step 2.
- Front passenger's door : Go to Step 6.
- Rear right door <Double cab> : Go to Step 10.
- Rear left door <Double cab> : Go to Step 14.

STEP 2. Connector check: E-04 front door lock actuator (RH) connector



Q: Is the check result normal?

- YES :** Go to Step 3.
- NO :** Repair the defective connector.

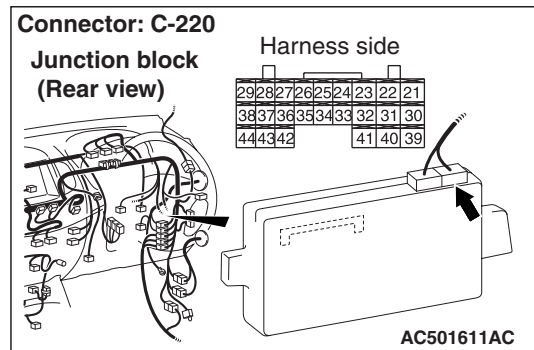
STEP 3. Check the front door lock actuator (RH)

Check that the front door lock actuator (RH) works normally. Refer to P.42-109.

Q: Is the check result normal?

- YES :** Go to Step 4.
- NO :** Replace the front door lock actuator (RH).

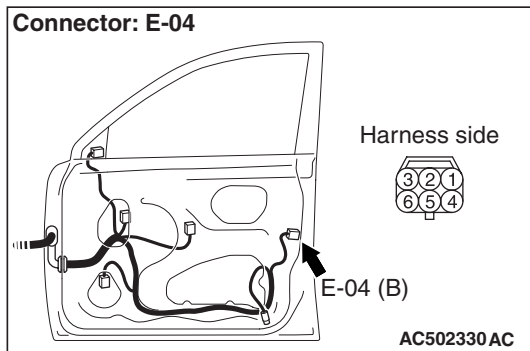
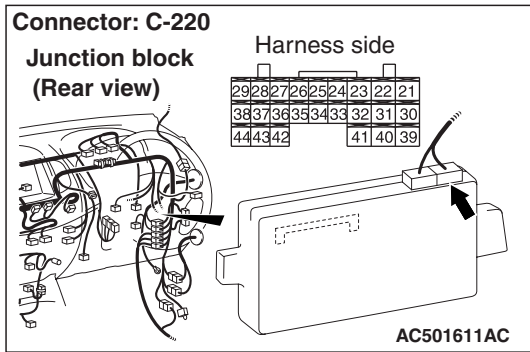
STEP 4. Connector check: C-220 ETACS-ECU connector



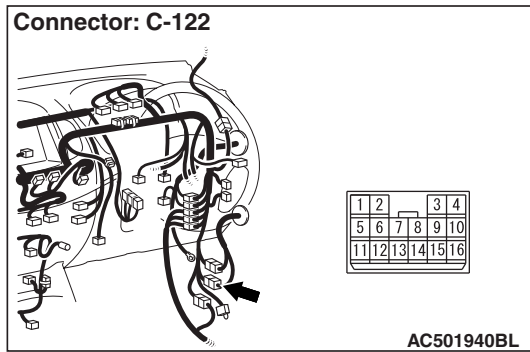
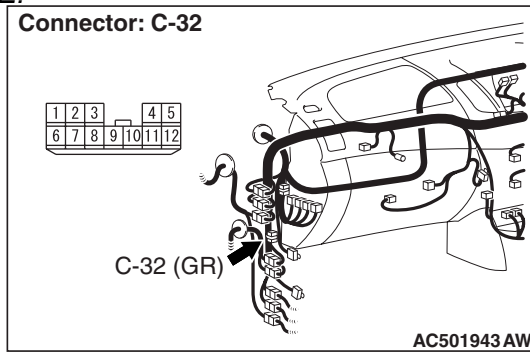
Q: Is the check result normal?

- YES :** Go to Step 5.
- NO :** Repair the defective connector.

STEP 5. Check the wiring harness from C-220 ETACS-ECU connector terminal Nos. 21 and 23 to E-04 front door lock actuator (RH) connector terminal Nos. 6 and 4.



NOTE:



Prior to the wiring harness inspection, check intermediate connector C-122 and junction block connector C-32, and repair if necessary.

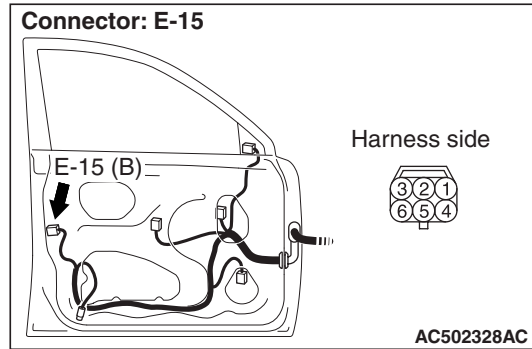
- Check the input and output lines for open circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 6. Connector check: E-15 front door lock actuator (LH) connector



Q: Is the check result normal?

YES : Go to Step 7.

NO : Repair the defective connector.

STEP 7. Check the front door lock actuator (LH).

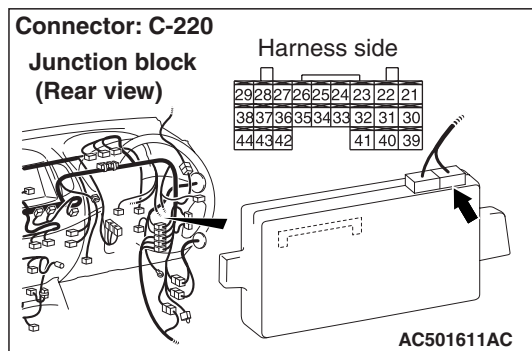
Check that the front door lock actuator (LH) works normally. Refer to P.42-109.

Q: Is the check result normal?

YES : Go to Step 8.

NO : Replace the front door lock actuator (LH).

STEP 8. Connector check: C-220 ETACS-ECU connector

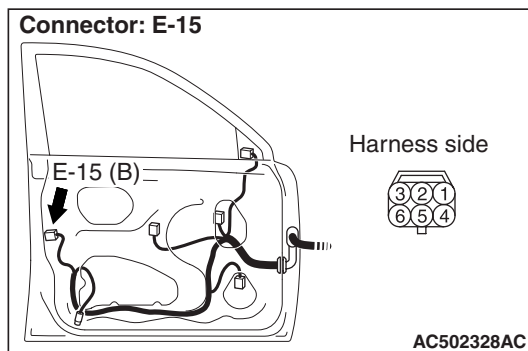
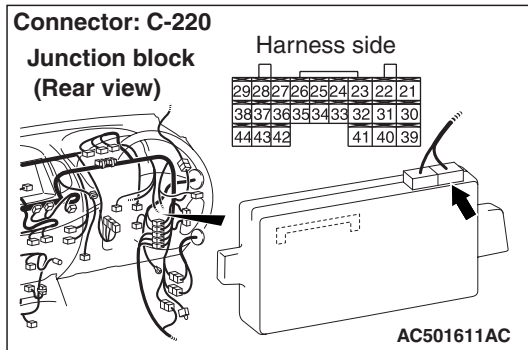


Q: Is the check result normal?

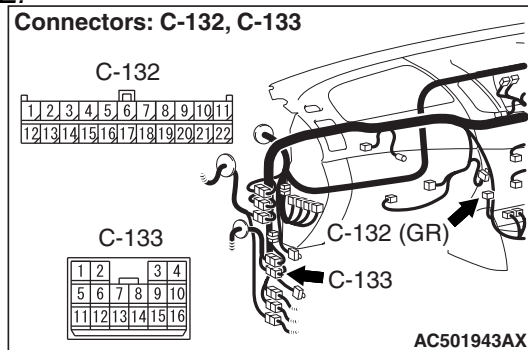
YES : Go to Step 9.

NO : Repair the defective connector.

STEP 9. Check the wiring harness from C-220 ETACS-ECU connector terminal Nos. 22 and 23 to E-15 front door lock actuator (LH) connector terminal Nos. 6 and 4.



NOTE:



Prior to the wiring harness inspection, check intermediate connector C-133 and junction block connector C-32, and repair if necessary.

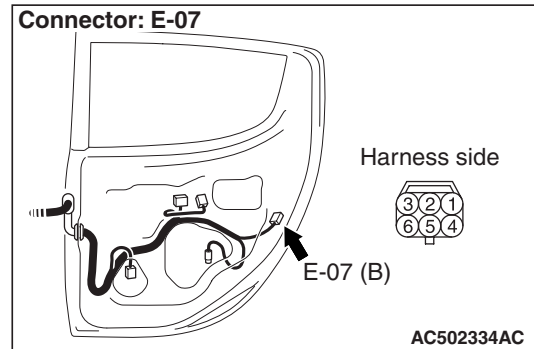
- Check the input and output lines for open circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 10. Connector check: E-07 rear door lock actuator (RH) connector



Q: Is the check result normal?

YES : Go to Step 11.

NO : Repair the defective connector.

STEP 11. Check the rear door lock actuator (RH).

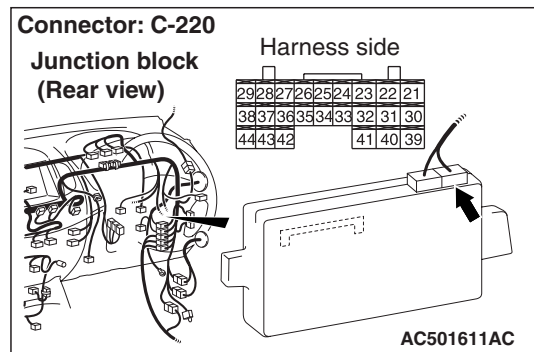
Check that the rear door lock actuator (RH) is in good condition. Refer to P.42-109.

Q: Is the check result normal?

YES : Go to Step 12.

NO : Replace the tailgate lock actuator.

STEP 12. Connector check: C-220 ETACS-ECU connector

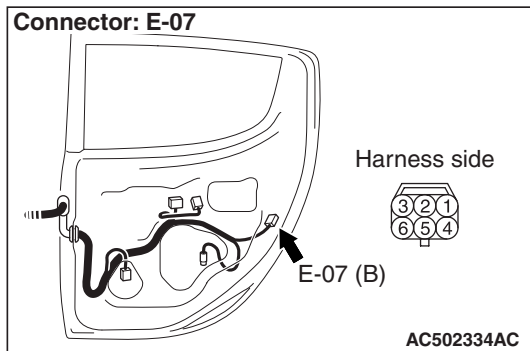
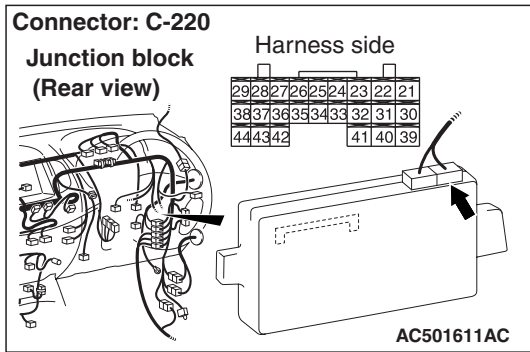


Q: Is the check result normal?

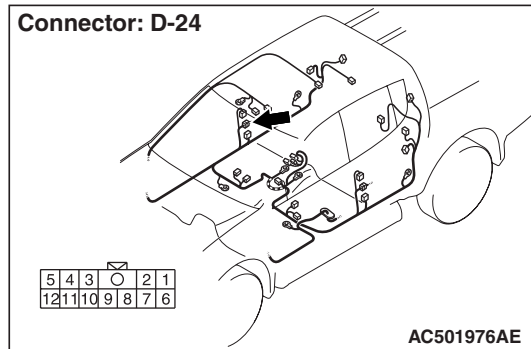
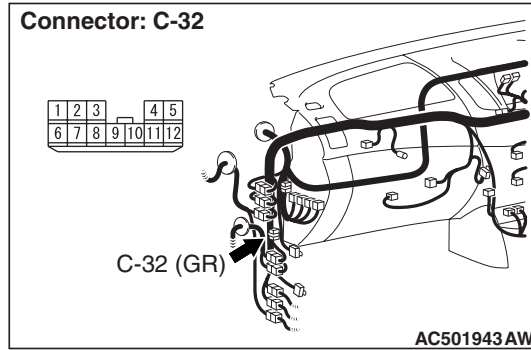
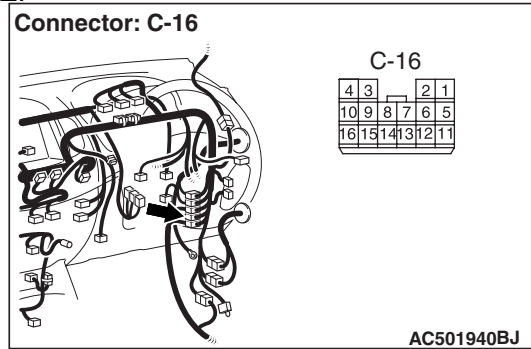
YES : Go to Step 13.

NO : Repair the defective connector.

STEP 13. Check the wiring harness from C-220 ETACS-ECU connector terminal Nos. 22 and 23 to E-07 rear door lock actuator (RH) connector terminal Nos. 6 and 4.



NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-16, D-24 and junction block connector C-32, and repair if necessary.

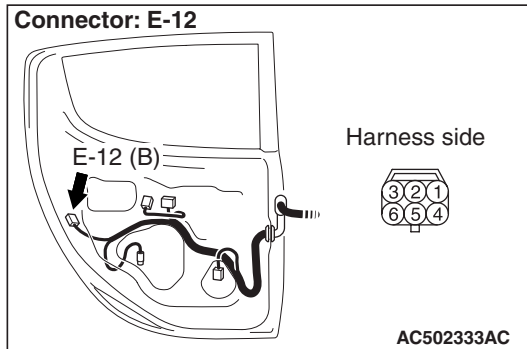
- Check the input and output lines for open circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 14. Connector check: E-12 rear door lock actuator (LH) connector

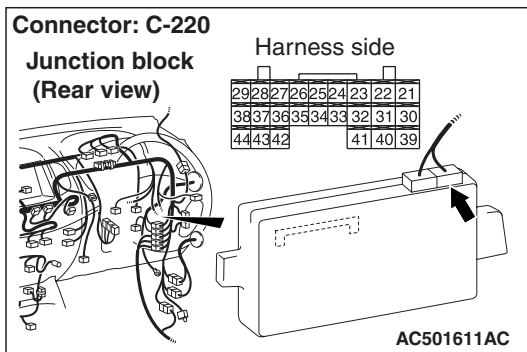


Q: Is the check result normal?
YES : Go to Step 15.
NO : Repair the defective connector.

STEP 15. Check the rear door lock actuator (LH).
 Check that the rear door lock actuator (LH) is in good condition. Refer to P.42-109.

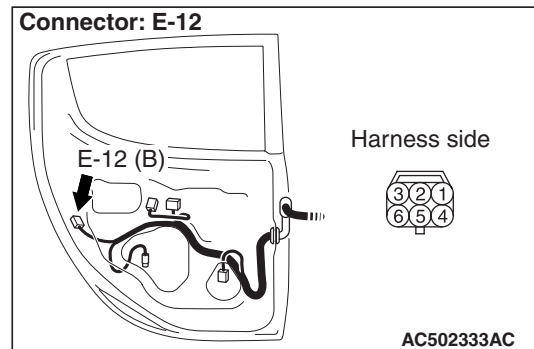
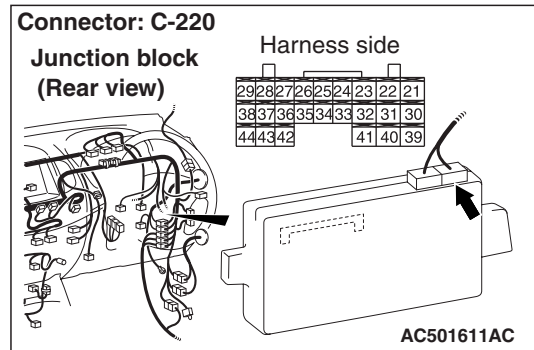
Q: Is the check result normal?
YES : Go to Step 16.
NO : Replace the tailgate lock actuator.

STEP 16. Connector check: C-220 ETACS-ECU connector

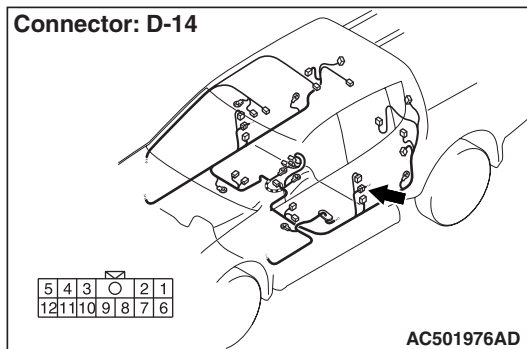
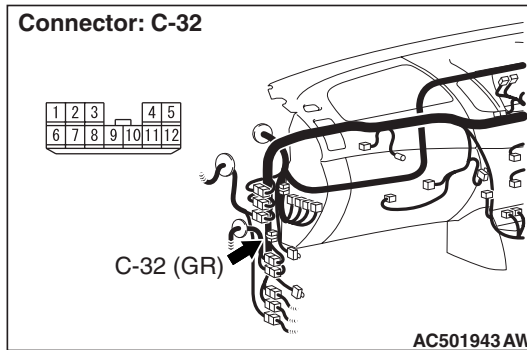
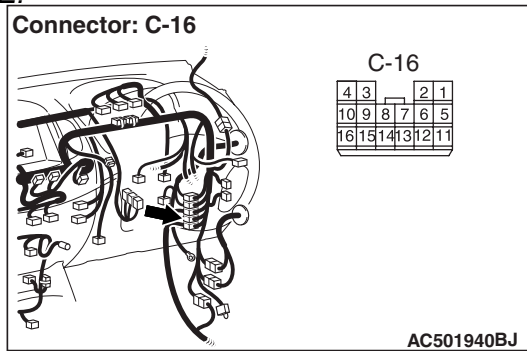


Q: Is the check result normal?
YES : Go to Step 17.
NO : Repair the defective connector.

STEP 17. Check the wiring harness from C-220 ETACS-ECU connector terminal Nos. 22 and 23 to E-12 rear door lock actuator (LH) connector terminal Nos. 6 and 4.



NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-16, D-14 and junction block connector C-32, and repair if necessary.

- Check the input and output lines for open circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

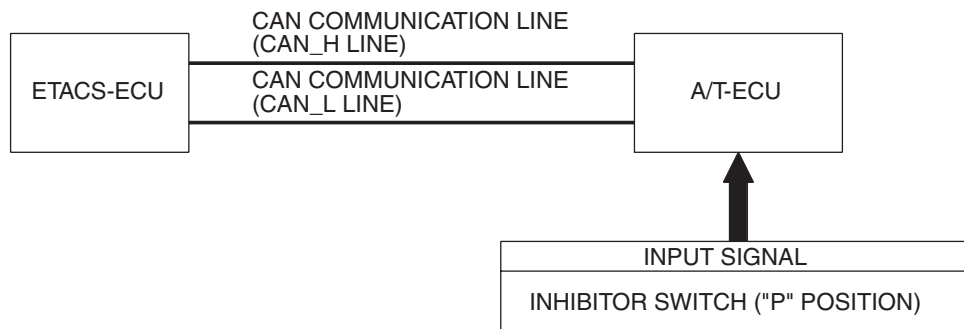
NO : Repair the wiring harness.

Inspection Procedure A-3: Selector "P" position-linked door unlock function does not operate normally. <Vehicles with automatic transmission with keyless entry system>

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Selector "P" Position-linked Door Unlock Function



AC503706AB

COMMENT ON TROUBLE SYMPTOM

If the doors are not unlocked when the selector lever is shifted to the "P" position, the shift position signal input circuit(s) or the ETACS-ECU may be defective. Also, the function to interlock the shift P position with door unlocking may have been disabled with a customisation function.

POSSIBLE CAUSES

- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Checking central door unlocking operation

Check that the central door locking system works normally.

Q: Is the check result normal?

- YES :** Go to Step 2.
- NO :** Refer to [P.42-52](#).

STEP 2. Customize function by using the M.U.T.-III

Use the M.U.T.-III customisation function to confirm that "Inhibit" is set other than to "Operation".

- Inhibit (Initial setting)
- Operation

Q: Is the check result normal?

YES : Go to Step 3.

NO : Use the M.U.T.-III customisation function to set "Operation" (Refer to GROUP 54B, Customisation function).

STEP 3. M.U.T.-III CAN bus diagnostics

Using the M.U.T.-III, diagnose the CAN bus lines.

Q: Is the CAN bus normal?

- YES :** Go to Step 4.
- NO :** Correct the CAN bus line. (Refer to GROUP 54C, Troubleshooting .)

STEP 4. M.U.T.-III other system diagnosis code

Check whether the A/T-ECU-related diagnosis code is set.

Q: Is the diagnosis code set?

- YES :** Diagnose the A/T (Refer to GROUP 23A, Troubleshooting).
- NO :** Go to Step 5.

STEP 5. Retest the system.

Check that shifting the selector lever to the P position unlocks the doors.

Q: Is the check result normal?

- YES :** The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).
- NO :** Replace the ETACS-ECU.

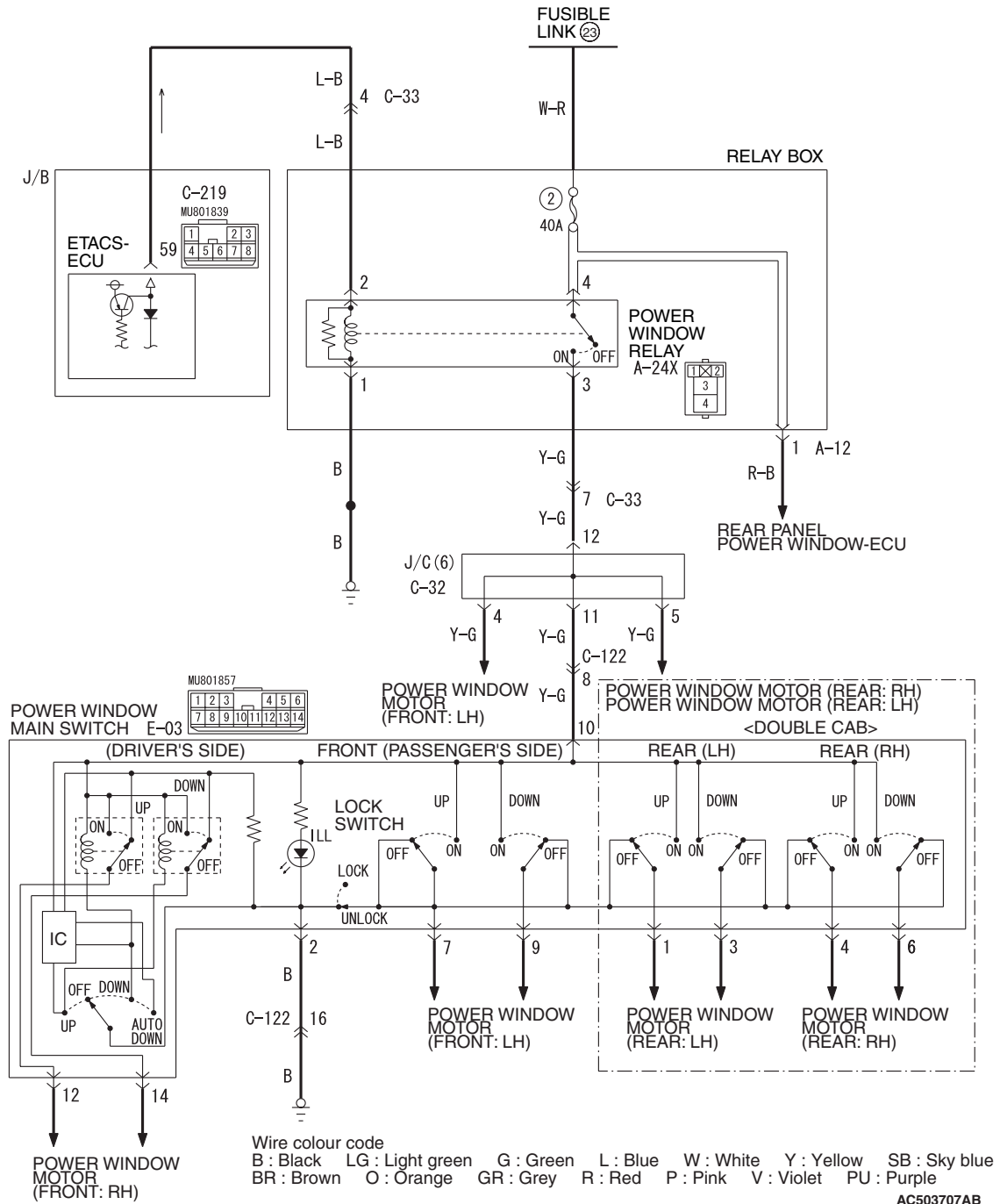
**SYMPTOM PROCEDURES <POWER
WINDOWS>**

Inspection Procedure B-1: Power Windows do not Work at All.

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Power Window Relay Circuit



COMMENTS ON TROUBLE SYMPTOM

If the power windows do not work at all, the power window relay, the power window main switch or the ETACS-ECU may be defective.

PROBABLE CAUSES

- Malfunction of the power window relay
- Malfunction of the power window main switch
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

Check the input signal from the ignition switch (IG1).

- Ignition switch: ON

Item No.	Item name	Normal condition
30	Ignition switch (IG1)	ON

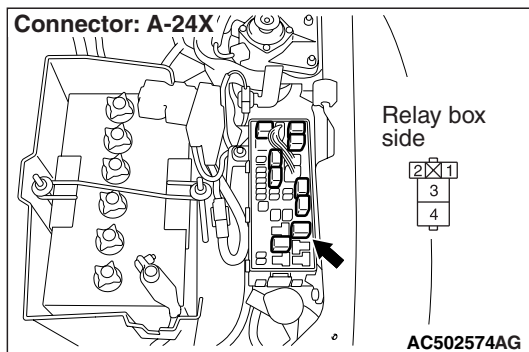
OK: Normal condition is displayed.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Refer to GROUP 54B, Inspection Procedure F-3 "The ignition switch (IG1) signal is not received ."

STEP 2. Connector check: A-24X power window relay connector



Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair the connector.

STEP 3. Check the power window relay.

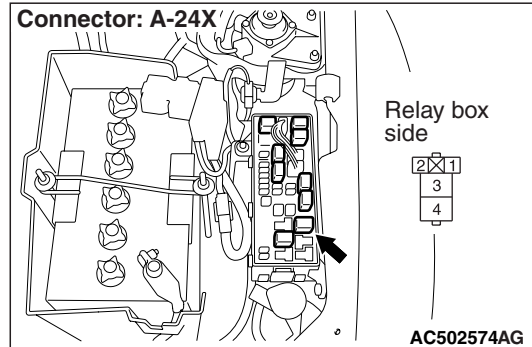
Refer to P.42-92.

Q: Is the check result normal?

YES : Go to Step 4.

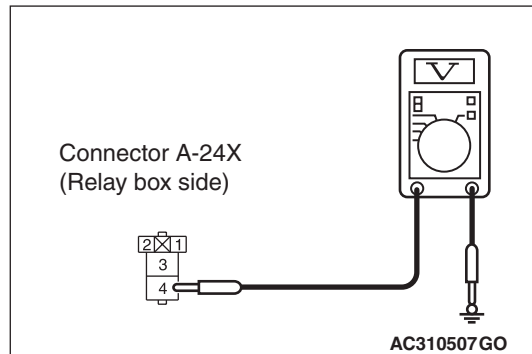
NO : Replace the power window relay.

STEP 4. Voltage measurement at the A-24X power window relay connector.



(1) Disconnect the connector, and measure at the wiring harness side.

(2) Turn the ignition switch to the ON position.



(3) Check the voltage between the A-24X power window relay connector terminal No.4 and body earth.

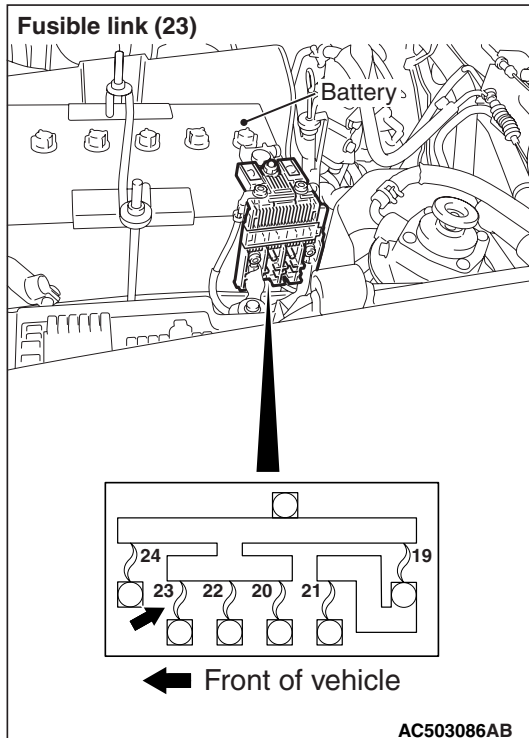
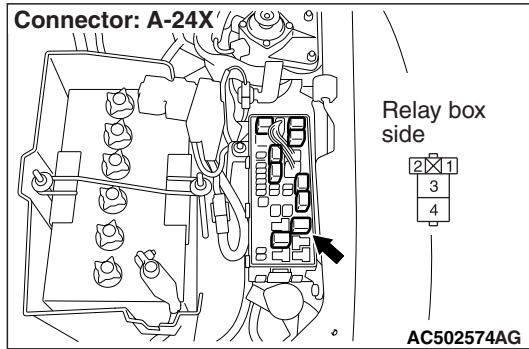
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Check the wiring harness between A-24X power window relay connector terminal No.4 and fusible link (23).



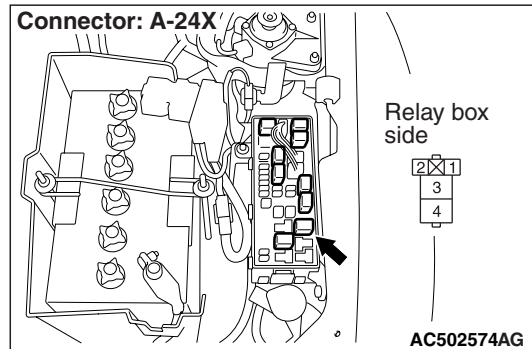
- Check the power supply line for open circuit.

Q: Is the check result normal?

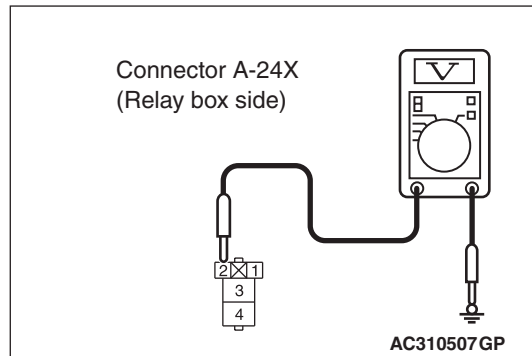
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 6. Voltage measurement at the A-24X power window relay connector.



- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Turn the ignition switch to the ON position.



- (3) Check the voltage between the A-24X power window relay connector terminal No.2 and body earth.

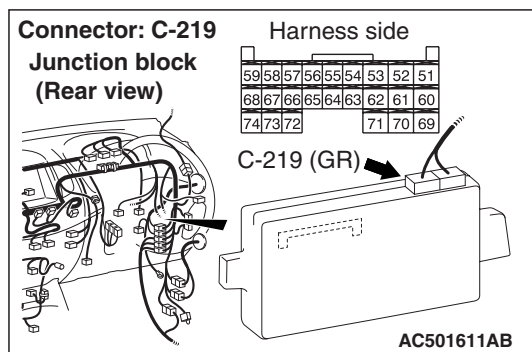
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 9.

NO : Go to Step 7.

STEP 7. Connector check: C-219 ETACS-ECU connector

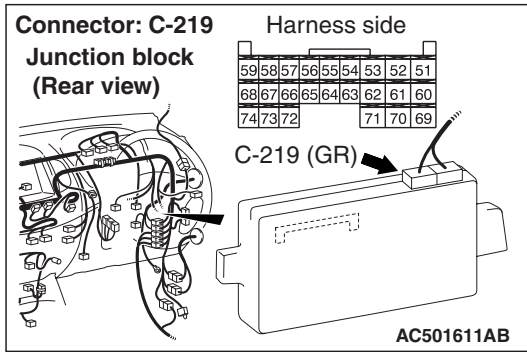
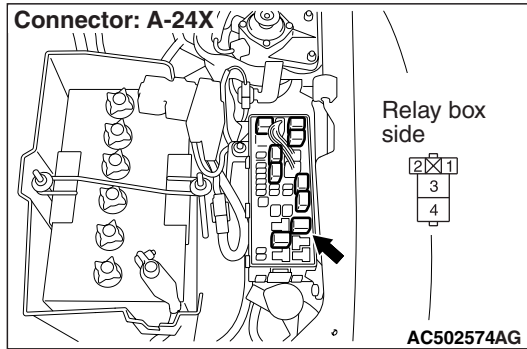


Q: Is the check result normal?

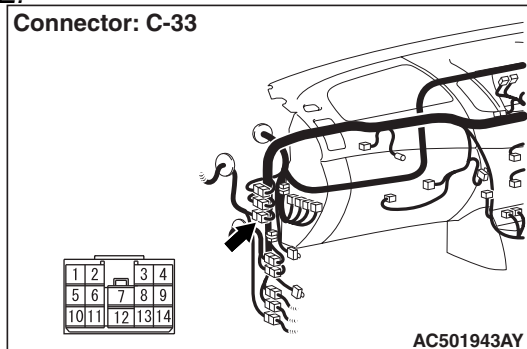
YES : Go to Step 8.

NO : Repair the connector.

STEP 8. Check the wiring harness between C-219 ETACS-ECU connector terminal No.59 and A-24X power window relay connector terminal No.2.



NOTE:



Prior to the wiring harness inspection, check intermediate connector C-33, and repair if necessary.

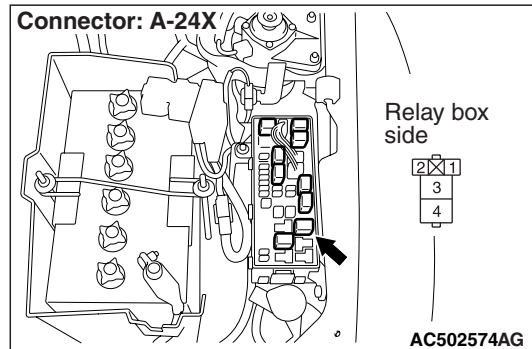
- Check the power supply line for open circuit.

Q: Is the check result normal?

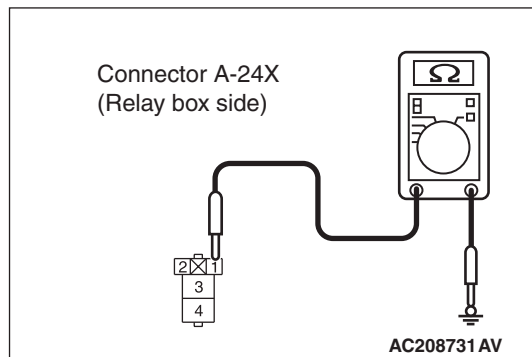
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 9. Resistance measurement at the A-24X power window relay connector.



(1) Disconnect the connector, and measure at the wiring harness side.



(2) Continuity between A-24X power window relay connector terminal No.1 and body earth

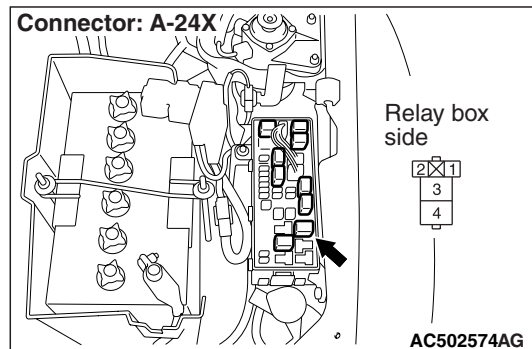
OK: 2Ω or less

Q: Is the check result normal?

YES : Go to Step 11.

NO : Go to Step 10.

STEP 10. Check the wiring harness between A-24X power window relay connector terminal No.1 and body earth.



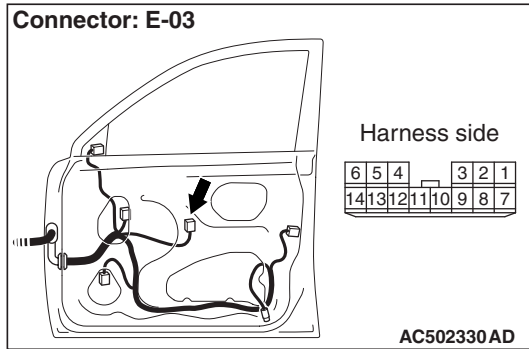
- Check the earth wires for open circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 11. Connector check: E-03 power window main switch connector

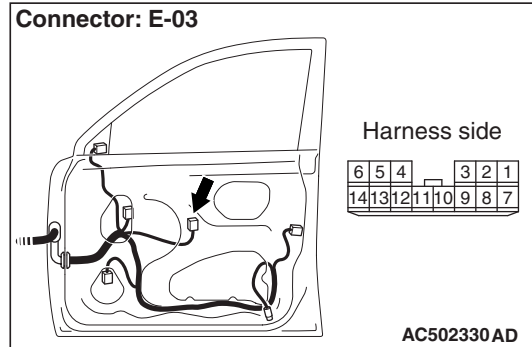


Q: Is the check result normal?

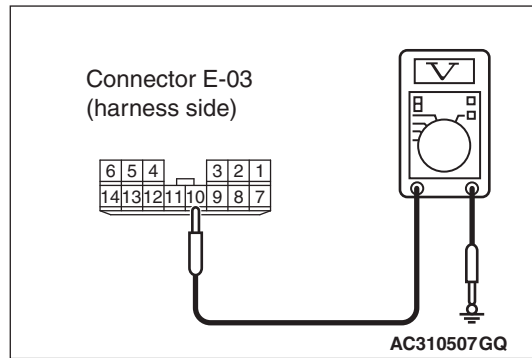
YES : Go to Step 12.

NO : Repair the connector.

STEP 12. Voltage measurement at the E-03 power window main switch connector.



- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Turn the ignition switch to the ON position.



- (3) Check the voltage between the E-03 power window relay connector terminal No.10 and body earth.

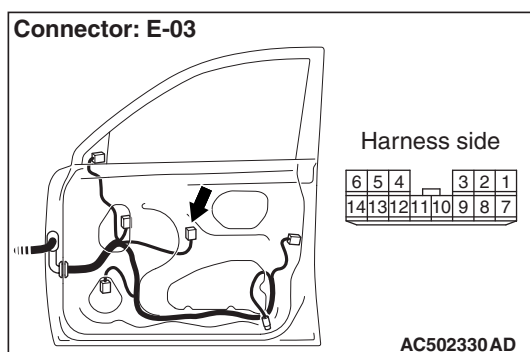
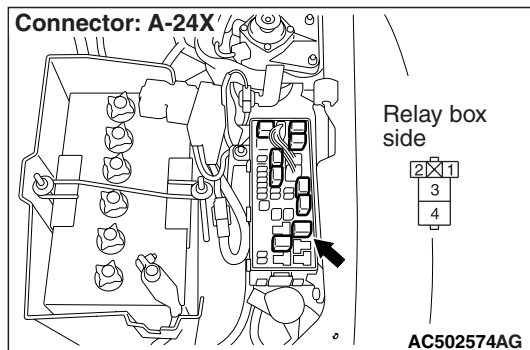
OK: System voltage

Q: Is the check result normal?

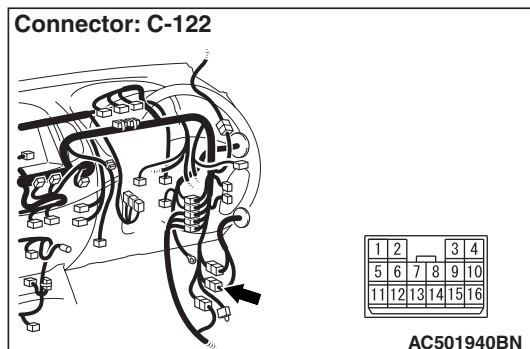
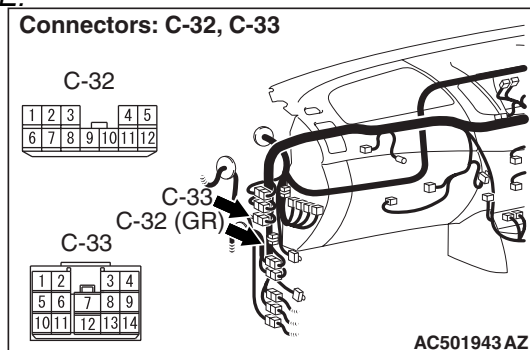
YES : Go to Step 14.

NO : Go to Step 13.

STEP 13. Check the wiring harness between A-24X power window relay connector terminal No.3 and E-03 power window main switch connector terminal No.10.



NOTE:



Prior to the wiring harness inspection, check intermediate connector C-33, C-122 and joint connector C-32, and repair if necessary.

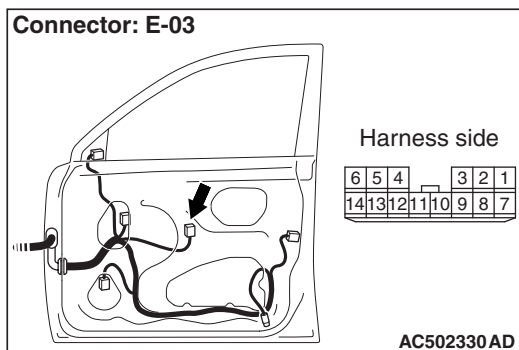
- Check the power supply line for open circuit.

Q: Is the check result normal?

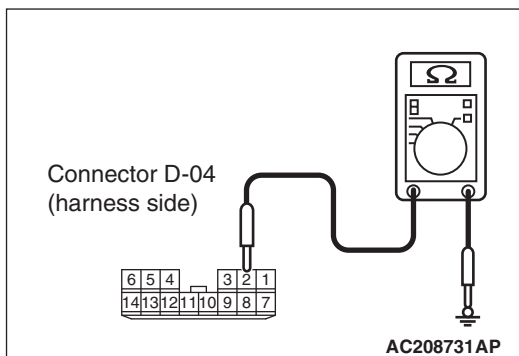
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the harness wire.

STEP 14. Resistance measurement at the E-03 power window main switch connector.



- (1) Disconnect the connector, and measure at the wiring harness side.



- (2) Check the resistance between E-03 power window main switch connector terminal No.2 and body earth.

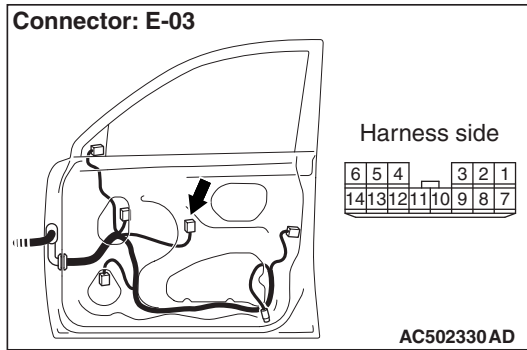
OK: 2Ω or less

Q: Is the check result normal?

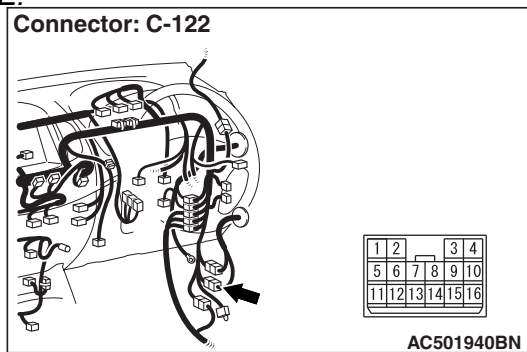
YES : Go to Step 16.

NO : Go to Step 15.

STEP 15. Check the wiring harness between E-03 power window main switch connector terminal No.2 and body earth.



NOTE:



Prior to the wiring harness inspection, check intermediate connector C-122, and repair if necessary.

- Check the earth wires for open circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 16. Retest the system.

After the power window main switch is replaced, check that all the power windows work.

- (1) Replace the power window main switch.
- (2) Check that the all the power windows work.

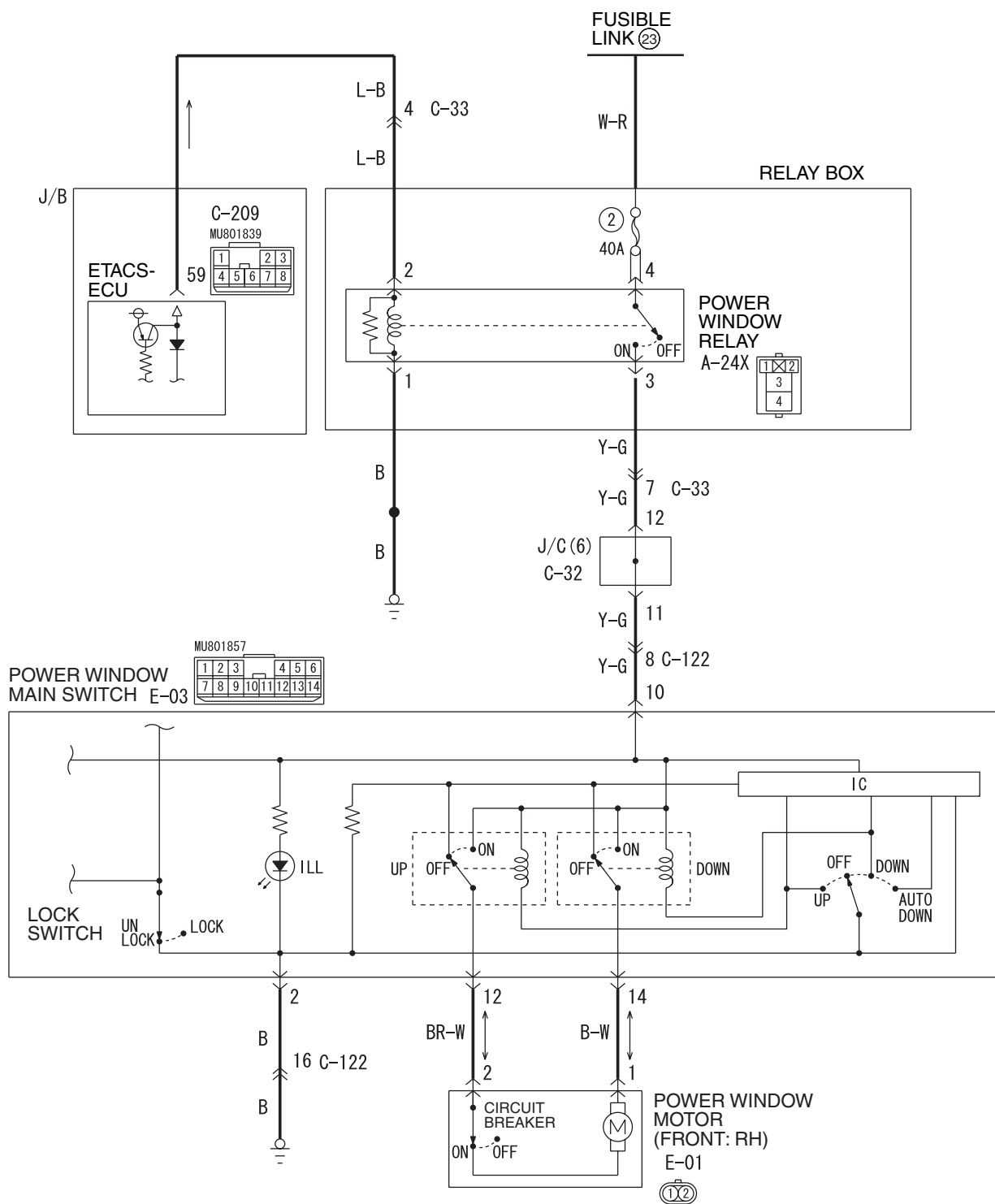
Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the ETACS-ECU.

Inspection Procedure B-2: Driver's Power Window does not Work by means of the Power Window Main Switch.

Power Window (RH) Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

COMMENTS ON TROUBLE SYMPTOM

If the driver's door power window does not work by means of the power window main switch, the power window main switch or the driver's door power window motor may be defective.

PROBABLE CAUSES

- Malfunction of the power window main switch
- Malfunction of the power window motor (front: RH)
- Damaged harness wires and connectors

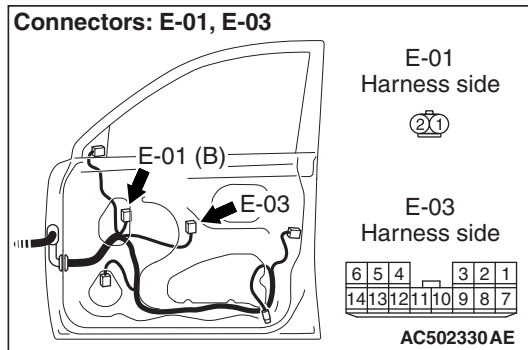
DIAGNOSIS PROCEDURE**STEP 1. Check the power window main switch.**

Check that all of the front passenger's power window can operate by means of the power window main switch.

Q: Is the check result normal?

YES : Go to Step 2.

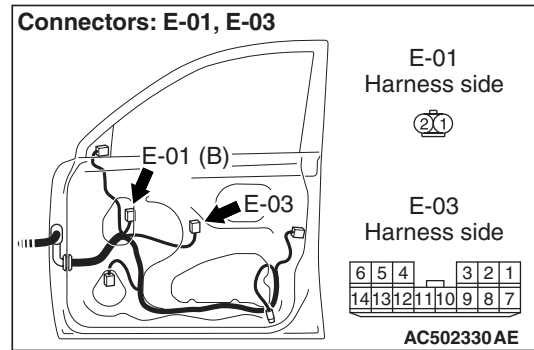
NO : Refer to P.42-103.

STEP 2. Connector check: Connector check: E-03 power window main switch connector and E-01 power window motor (front: RH) connector

Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair the connector.

STEP 3. Check the wiring harness from E-03 power window main switch connector terminal Nos. 12 and 14 to E-01 power window motor (front: RH) connector terminal Nos. 2 and 1.

- Check the input and output lines for open or short circuit.

Q: Is the check result normal?

YES : Go to Step 4.

NO : Repair the wiring harness.

STEP 4. Retest the system.

After the power window main switch is replaced, check that the driver's door power window can be operated by the power window main switch.

- (1) Replace the power window main switch.
- (2) Check that the driver's power window works by means of the power window main switch.

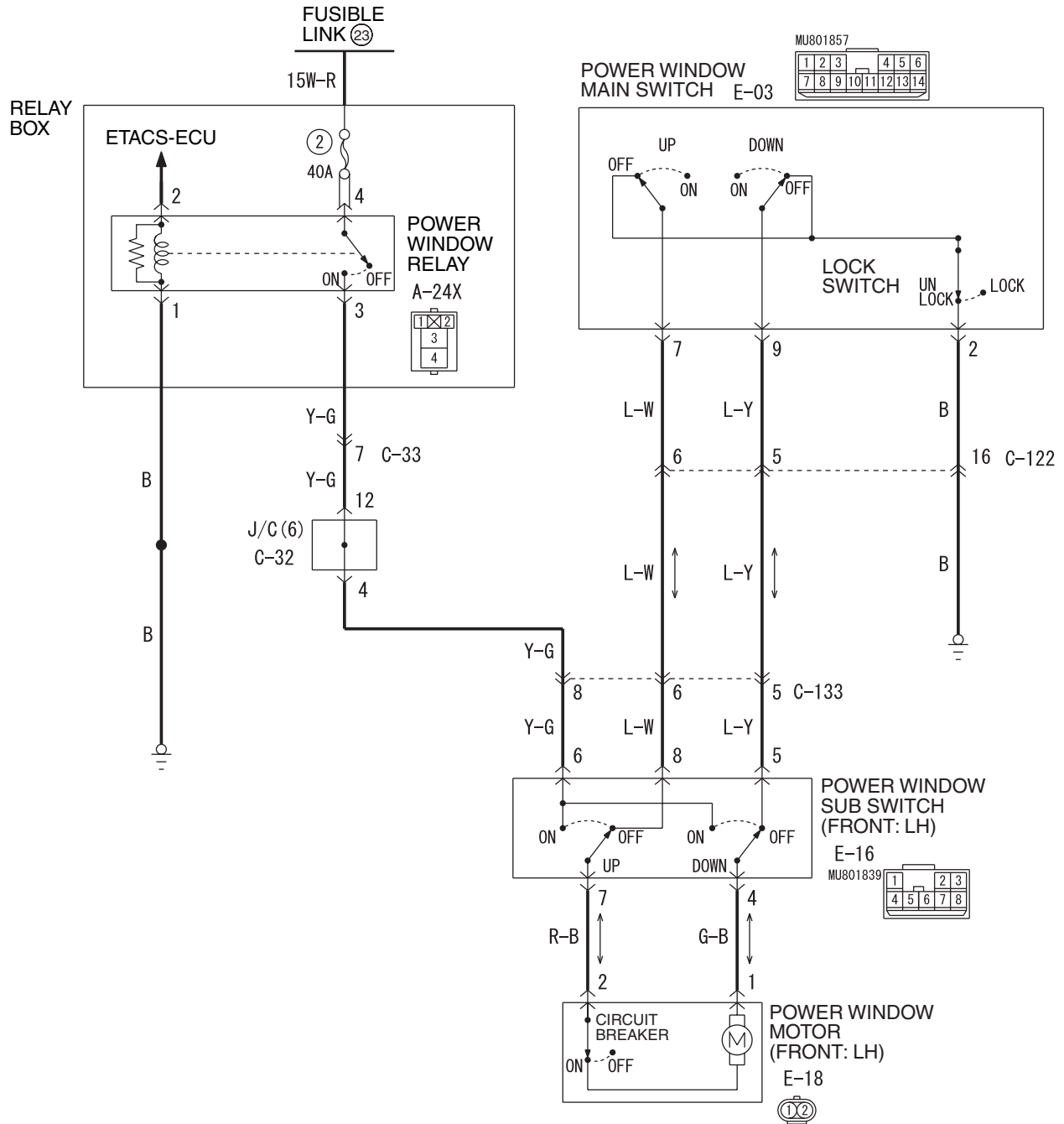
Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the power window motor (front: RH).

Inspection Procedure B-3: Relevant Power Window(s) do not Work by means of the Front Passenger's Power Window Sub Switch and Rear Power Window Sub Switches.

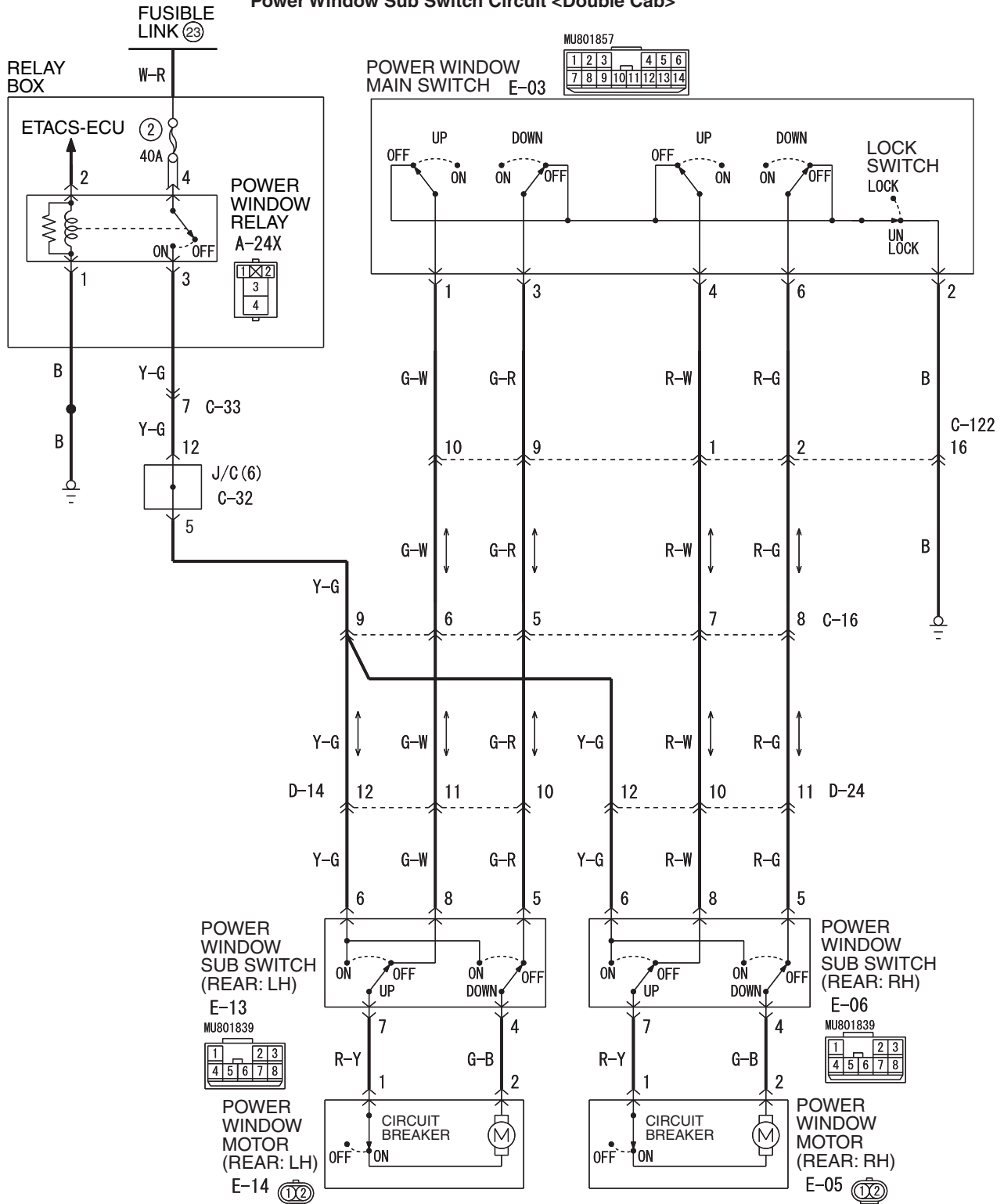
Power Window Sub Switch Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

Power Window Sub Switch Circuit <Double Cab>



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

COMMENTS ON TROUBLE SYMPTOM

If the front passenger's or rear power window does not work by means of the respective power window sub switch, the power window sub switch or the power window motor may be defective.

PROBABLE CAUSES

- Malfunction of the power window sub switch (front: LH), power window sub switch (rear: RH) or power window sub switch (rear: LH)
- Malfunction of the power window motor (front: LH), power window motor (rear: RH) or power window motor (rear: LH)
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the power window main switch.

Check that the power window lock switch is turned off.

Q: Is the check result normal?

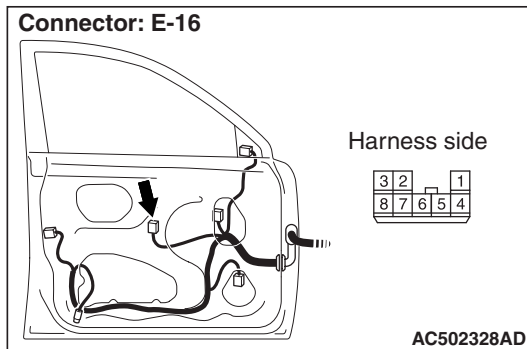
- YES :** Go to Step 2.
- NO :** Turn off the power window lock switch.

STEP 2. Determine a trouble spot.

Q: Which power window does not work?

- Front passenger's door :** Go to Step 3.
- Rear right door <Double cab> :** Go to Step 12.
- Rear left door <Double cab> :** Go to Step 21.

STEP 3. Connector check: E-16 power window sub switch (front: LH) connector



Q: Is the check result normal?

- YES :** Go to Step 4.
- NO :** Repair the connector.

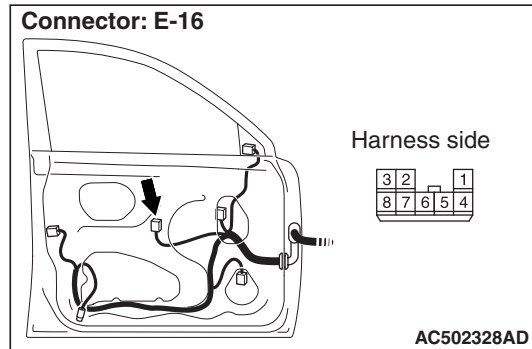
STEP 4. Check the power window sub switch (front: LH)

Check that the power window sub switch (front: LH) works normally. Refer to P.42-103.

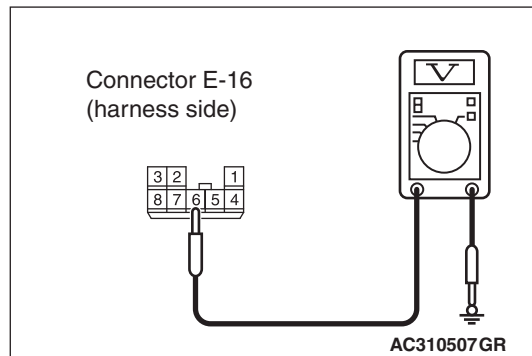
Q: Is the check result normal?

- YES :** Go to Step 5.
- NO :** Replace the power window sub switch (front: LH).

STEP 5. Voltage measurement at the E-16 power window sub switch (front: LH) connector.



- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Turn the ignition switch to the ON position.



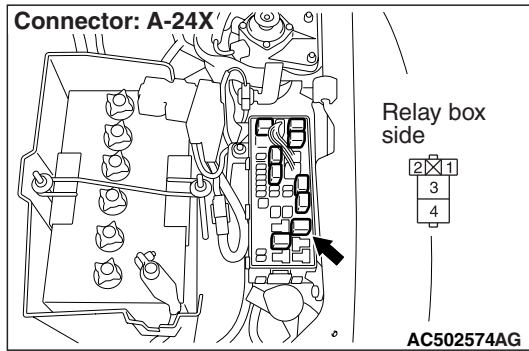
- (3) Check the voltage between the E-16 power window sub switch (front: LH) connector terminal No.6 and body earth.

OK: System voltage

Q: Is the check result normal?

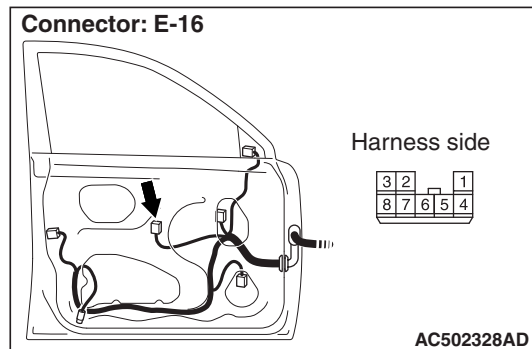
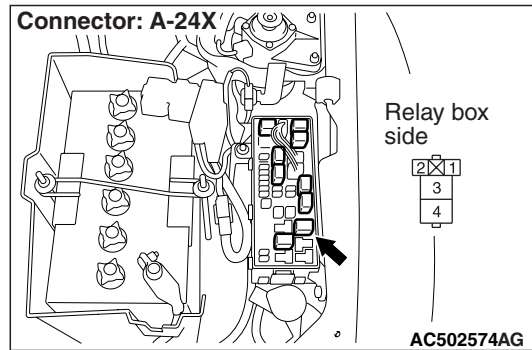
- YES :** Go to Step 8.
- NO :** Go to Step 6.

STEP 6. Connector check: A-24X power window relay connector

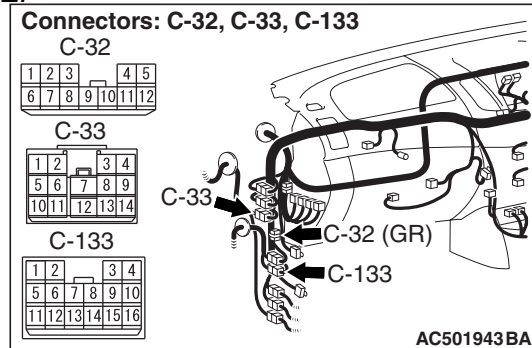


Q: Is the check result normal?
YES : Go to Step 7.
NO : Repair the connector.

STEP 7. Check the wiring harness from E-16 power window sub switch (front: LH) connector terminal No.6 to A-24X power window relay connector terminal No.3.



NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-33, C-133 and joint connector C-32, and repair if necessary.

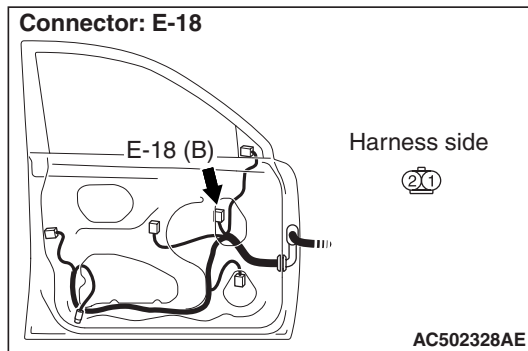
- Check the power supply line for open circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 8. Connector check: E-18 power window motor (front: LH) connector



Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair the connector.

STEP 9. Check the power window motor (front: LH)

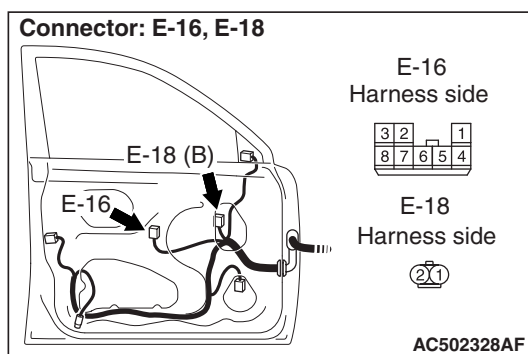
Check that the power window motor (front: LH) works normally. Refer to [P.42-103](#).

Q: Is the check result normal?

YES : Go to Step 10.

NO : Replace the power window motor (front: LH).

STEP 10. Check the wiring harness from E-18 power window motor (front: LH) connector terminal Nos. 1 and 2 to E-16 power window sub switch (front: LH) connector terminal Nos. 4 and 7.



- Check the input and output lines for open or short circuit.

Q: Is the check result normal?

YES : Go to Step 11.

NO : Repair the wiring harness.

STEP 11. Retest the system.

After the power window sub switch (front: LH) is replaced, check that the front passenger's door power window can be operated by the power window sub switch (front: LH).

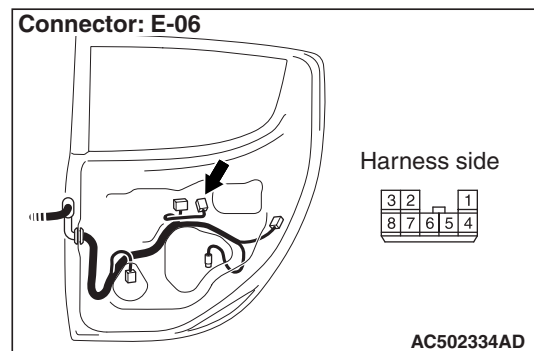
- (1) Replace the power window sub switch (front: LH).
- (2) Check that the front passenger's door power window can be operated by the power window sub switch (front: LH).

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the power window motor (front: LH).

STEP 12. Connector check: E-06 power window sub switch (rear: RH) connector



Q: Is the check result normal?

YES : Go to Step 13.

NO : Repair the connector.

STEP 13. Check the power window sub switch (rear: RH)

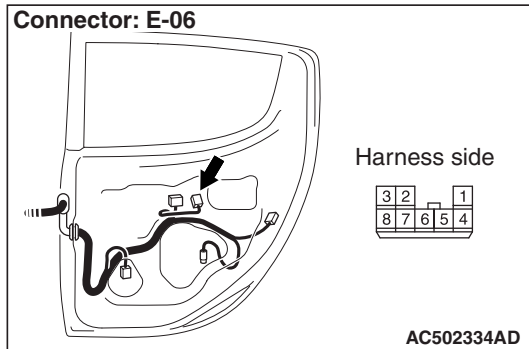
Check that the power window sub switch (rear: RH) works normally. Refer to [P.42-103](#).

Q: Is the check result normal?

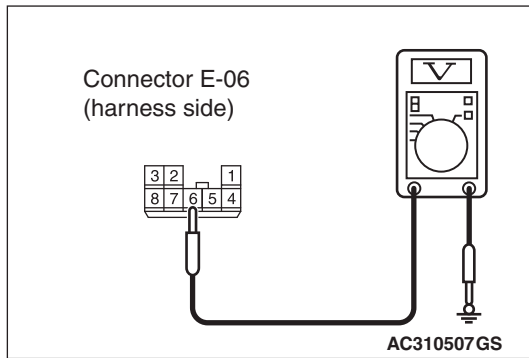
YES : Go to Step 14.

NO : Replace the power window sub switch (rear: RH).

STEP 14. Voltage measurement at the E-06 power window sub switch (rear: RH) connector.



- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Turn the ignition switch to the ON position.

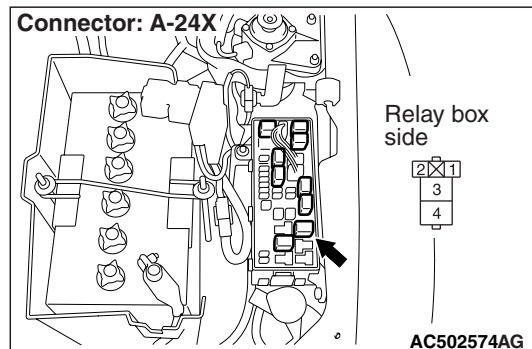


- (3) Check the voltage between the E-06 power window sub switch (rear: RH) connector terminal No.6 and body earth.

OK: System voltage

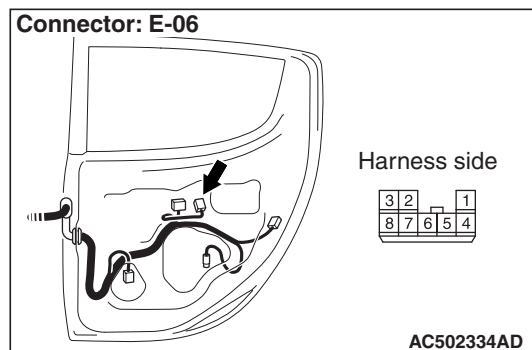
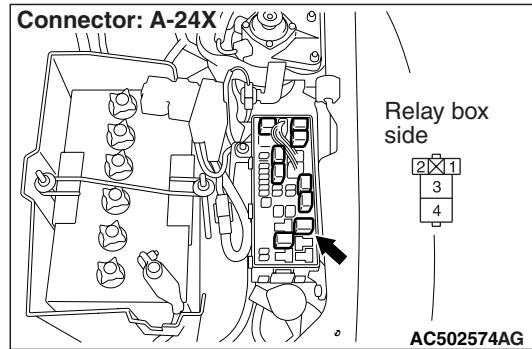
- Q: Is the check result normal?**
- YES :** Go to Step 17.
- NO :** Go to Step 15.

STEP 15. Connector check: A-24X power window relay connector

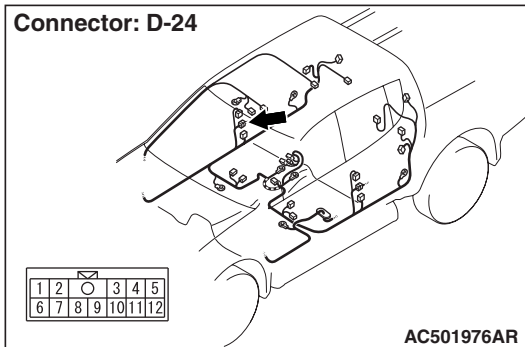
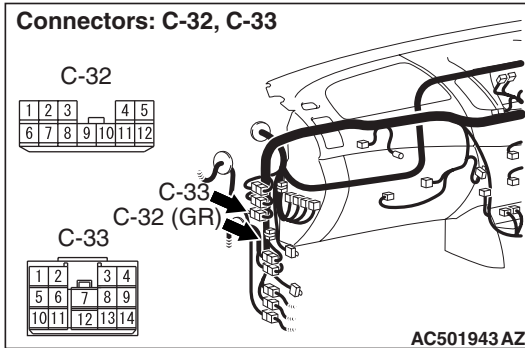
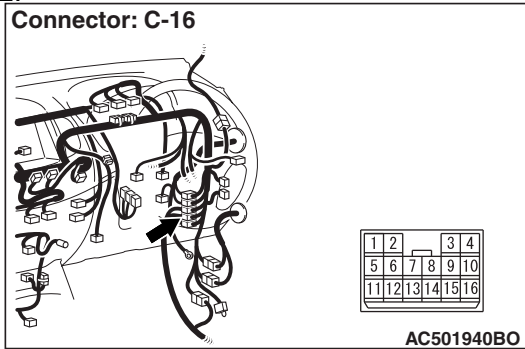


- Q: Is the check result normal?**
- YES :** Go to Step 16.
- NO :** Repair the connector.

STEP 16. Check the wiring harness from E-06 power window sub switch (rear: RH) connector terminal No.6 to A-24X power window relay connector terminal No.3.



NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-16, C-33, D-24 and joint connector C-32, and repair if necessary.

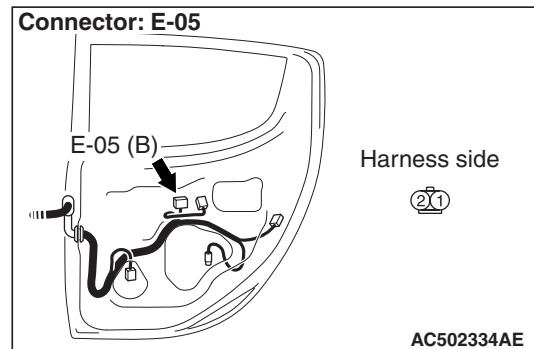
- Check the power supply line for open circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 17. Connector check: E-05 power window motor (rear: RH) connector



Q: Is the check result normal?

YES : Go to Step 18.

NO : Repair the connector.

STEP 18. Check the power window motor (rear: RH)

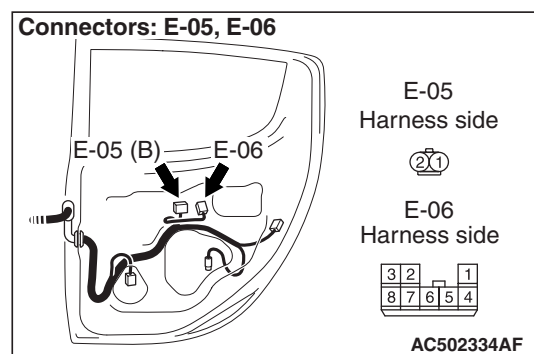
Check that the power window motor (rear: RH) works normally. Refer to P.42-103.

Q: Is the check result normal?

YES : Go to Step 19.

NO : Replace the power window motor (rear: RH).

STEP 19. Check the wiring harness from E-05 power window motor (rear: RH) connector terminal Nos. 1 and 2 to E-06 power window sub switch (rear: RH) connector terminal Nos. 7 and 4.



- Check the input and output lines for open or short circuit.

Q: Is the check result normal?

YES : Go to Step 20.

NO : Repair the wiring harness.

STEP 20. Retest the system.

After the power window sub switch (rear: RH) is replaced, check that the rear door power window can be operated by the power window sub switch (rear: RH).

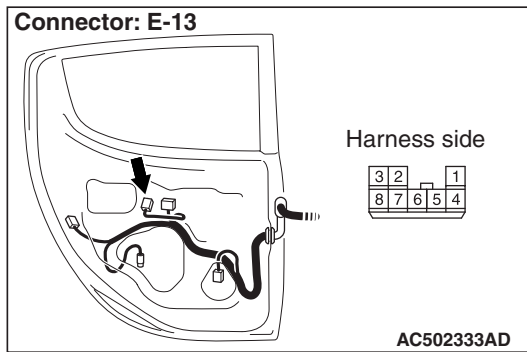
- (1) Replace the power window sub switch (rear: RH).
- (2) Check that the rear door power window can be operated by the power window sub switch (rear: RH).

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the power window motor (rear: RH).

STEP 21. Connector check: E-13 power window sub switch (rear: LH) connector



Q: Is the check result normal?

YES : Go to Step 22.

NO : Repair the connector.

STEP 22. Check the power window sub switch (rear: LH)

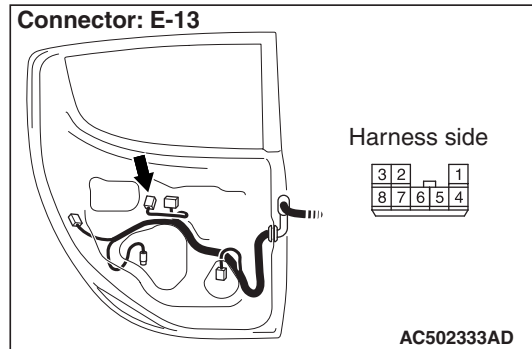
Check that the power window sub switch (rear: LH) works normally. Refer to [P.42-103](#).

Q: Is the check result normal?

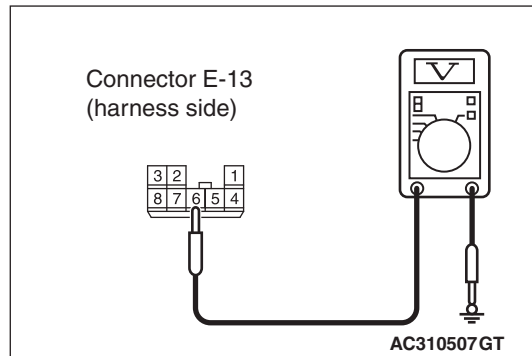
YES : Go to Step 23.

NO : Replace the power window sub switch (rear: LH).

STEP 23. Voltage measurement at the E-13 power window sub switch (rear: LH) connector.



- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Turn the ignition switch to the ON position.



- (3) Check the voltage between the E-13 power window sub switch (rear: LH) connector terminal No.6 and body earth.

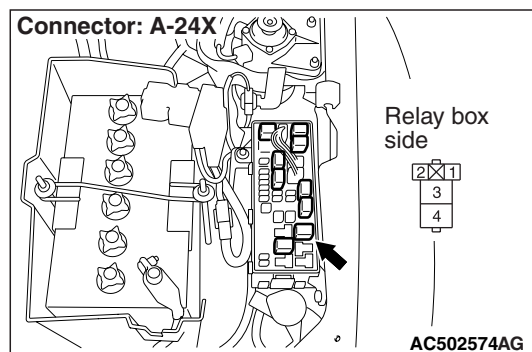
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 26.

NO : Go to Step 24.

STEP 24. Connector check: A-24X power window relay connector



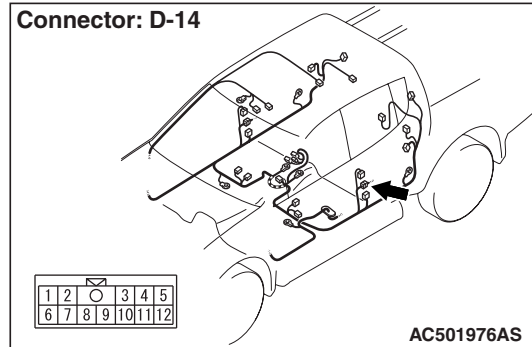
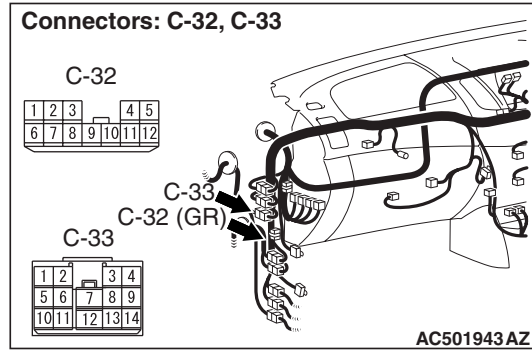
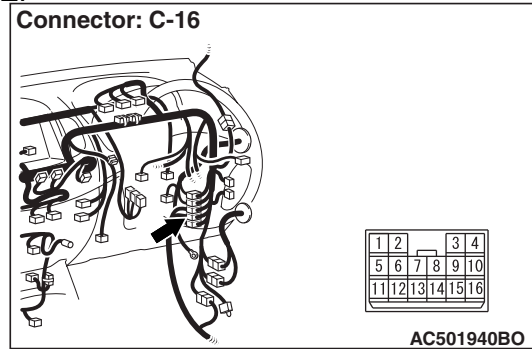
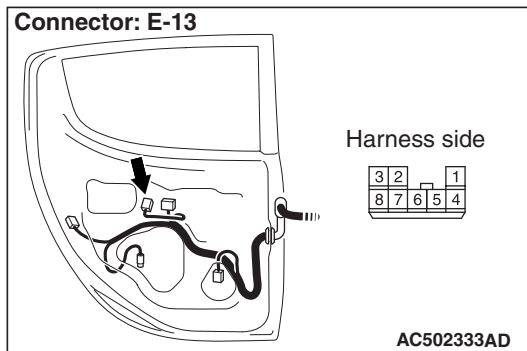
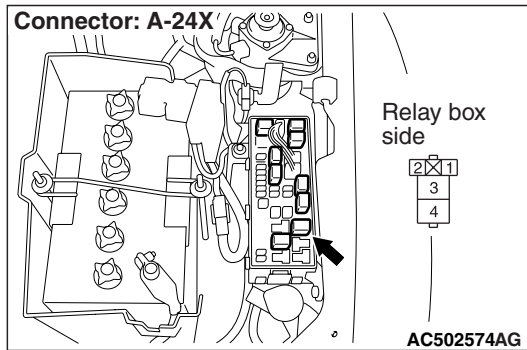
Q: Is the check result normal?

YES : Go to Step 25.

NO : Repair the connector.

STEP 25. Check the wiring harness from E-13 power window sub switch (rear: LH) connector terminal No.6 to A-24X power window relay connector terminal No.3.

NOTE:



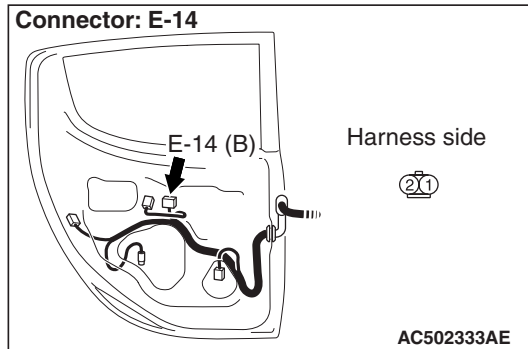
Prior to the wiring harness inspection, check intermediate connectors C-16, C-33, D-14 and joint connector C-32, and repair if necessary.

- Check the power supply line for open circuit.

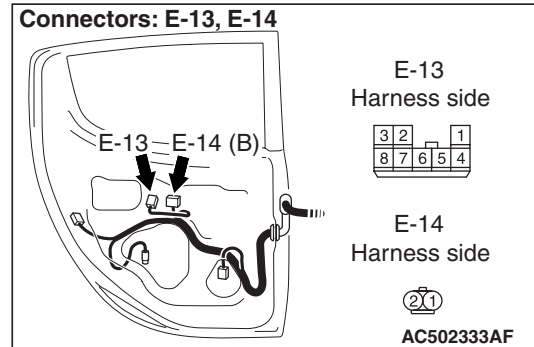
Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 26. Connector check: E-14 power window motor (rear: LH) connector**Q: Is the check result normal?****YES :** Go to Step 27.**NO :** Repair the connector.**STEP 27. Check the power window motor (rear: LH)**

Check that the power window motor (rear: LH) works normally. Refer to [P.42-103](#).

Q: Is the check result normal?**YES :** Go to Step 28.**NO :** Replace the power window motor (rear: LH).**STEP 28. Check the wiring harness from E-14 power window motor (rear: RH) connector terminal Nos. 1 and 2 to E-13 power window sub switch (rear: LH) connector terminal Nos. 7 and 4.**

- Check the input and output lines for open or short circuit.

Q: Is the check result normal?**YES :** Go to Step 29.**NO :** Repair the wiring harness.**STEP 29. Retest the system.**

After the power window sub switch (rear: LH) is replaced, check that the rear door power window can be operated by the power window sub switch (rear: LH).

- (1) Replace the power window sub switch (rear: LH).
- (2) Check that the rear door power window can be operated by the power window sub switch (rear: LH).

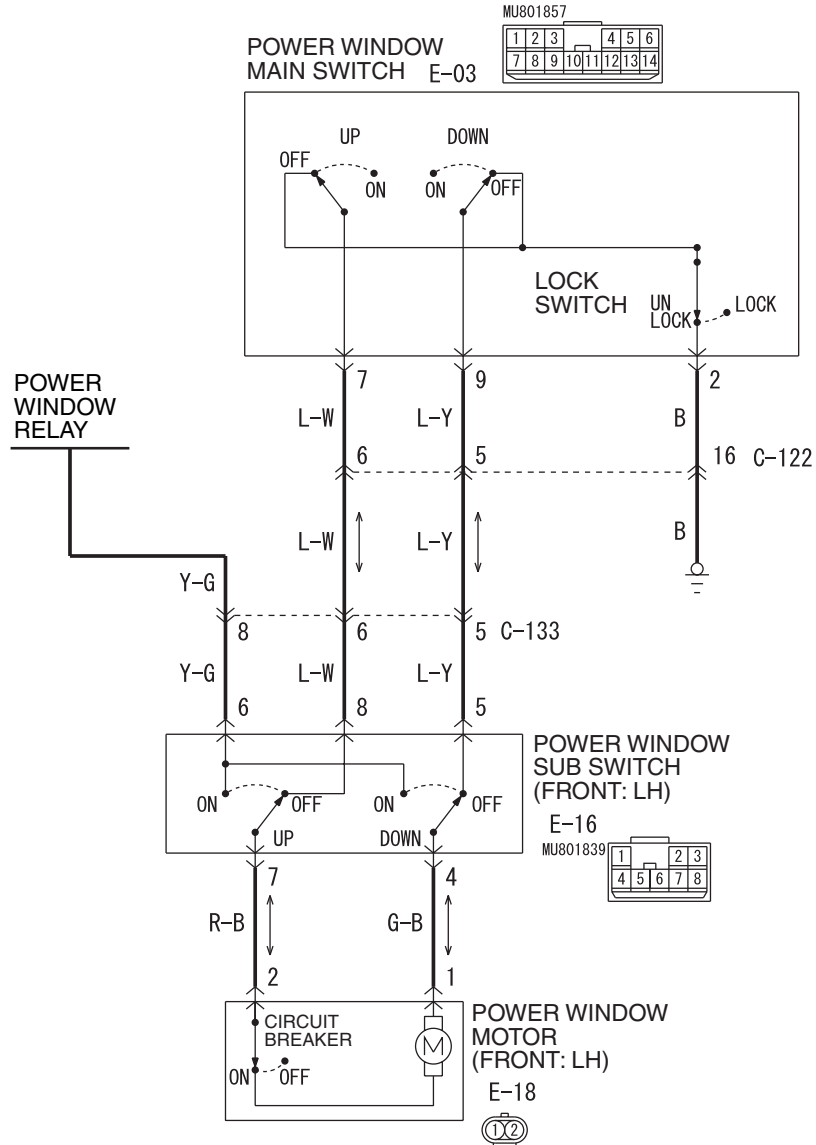
Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the power window motor (rear: LH).

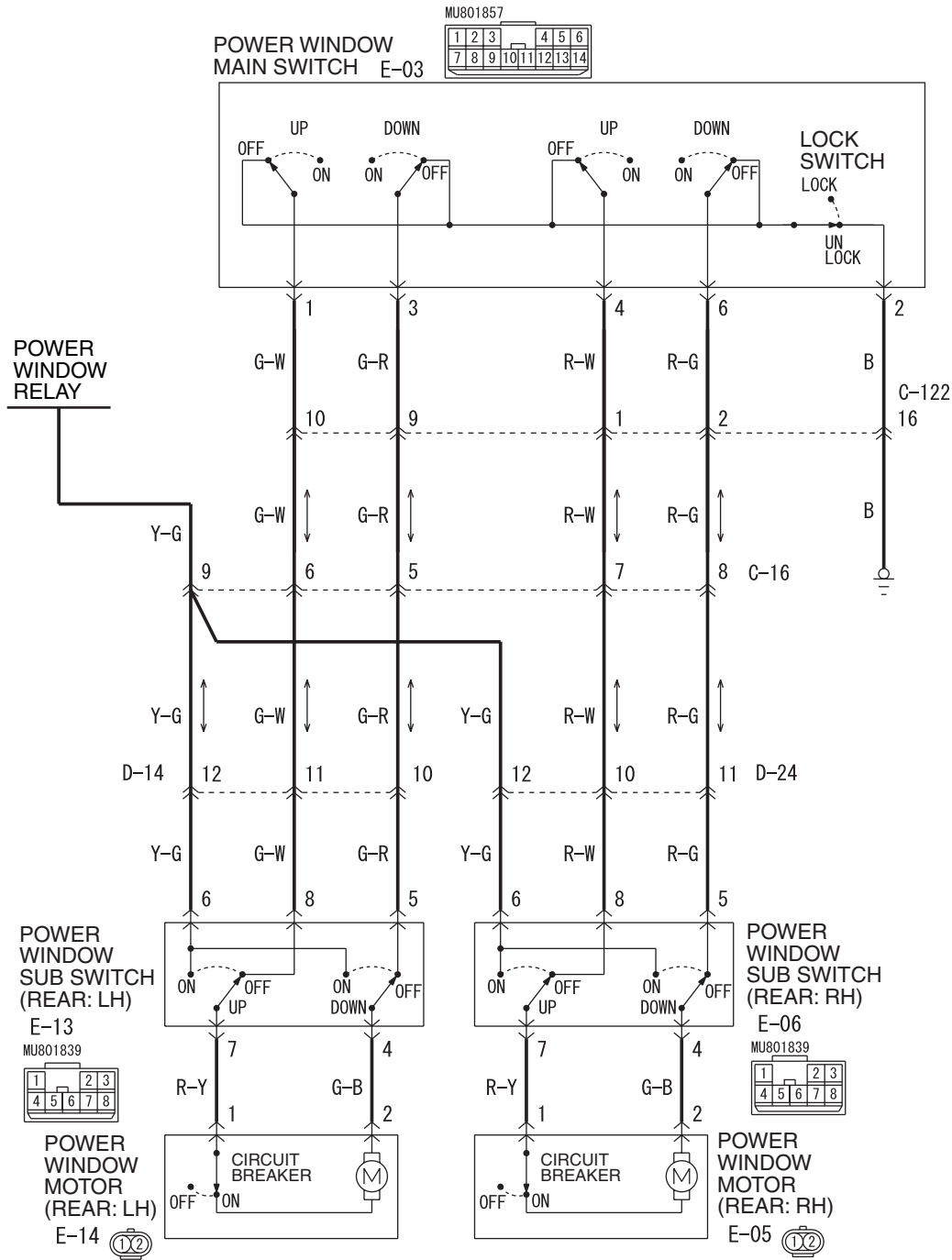
Inspection Procedure B-4: Front Passenger's Power Window do not Work by means of the Power Window Main Switch.

Power Window (Front: LH) Circuit



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

Power Window (Rear) Circuit <Double Cab>



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

AC504198 AB

COMMENTS ON TROUBLE SYMPTOM

If the passenger's and/or rear power window does not work by means of the power window main switch, the power window main switch or the respective power window sub switch(es) may be defective.

PROBABLE CAUSES

- Malfunction of the power window main switch
- Malfunction of the power window sub switch (front: LH), power window sub switch (rear: RH) or power window sub switch (rear: LH)
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the power window main switch.

Check that the driver's power window works by means of the power window main switch.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Refer to P.42-52.

STEP 2. Check the power window sub switch.

Check that each power window works by means of the respective power window sub switch when the power window lock switch is turned off.

Q: Is the check result normal?

YES : Go to Step 3.

NO : Refer to P.42-52.

STEP 3. Determine a trouble spot.

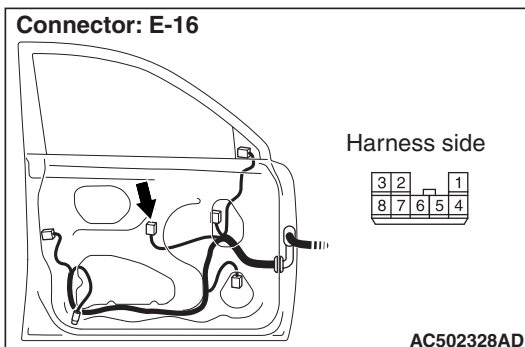
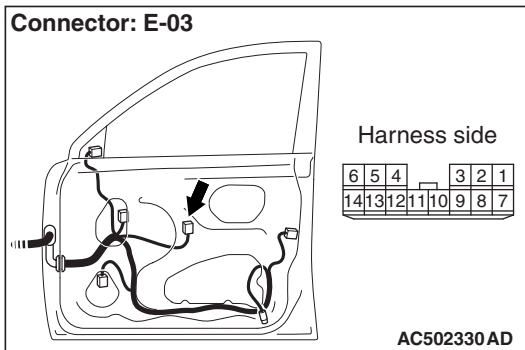
Q: Which power window does not work when the power window main switch is operated?

Front passenger's door : Go to Step 4.

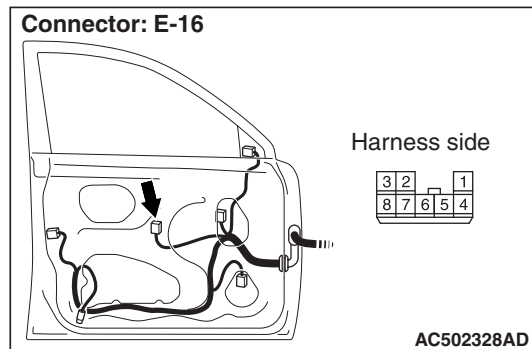
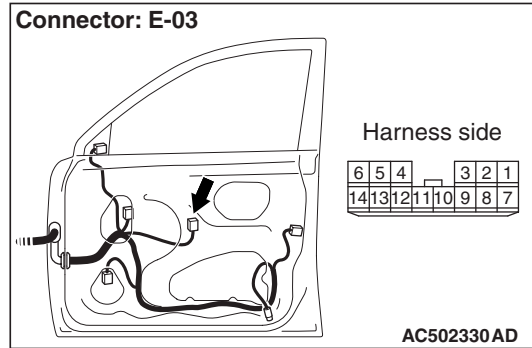
Rear right door <Double cab> : Go to Step 7.

Rear left door <Double cab> : Go to Step 10.

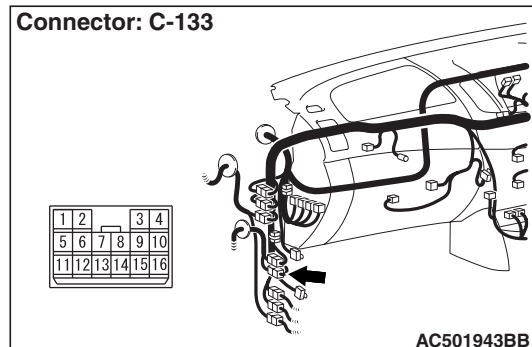
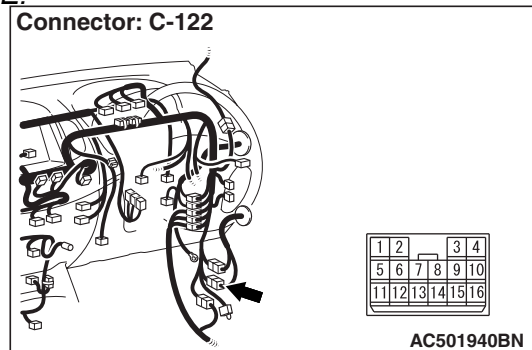
STEP 4. Connector check: E-03 power window main switch connector and E-16 power window sub switch (front: LH) connector



STEP 5. Check the wiring harness between E-03 power window main switch connector terminal Nos.7 and 9 to E-16 power window sub switch (front: LH) connector terminal Nos.8 and 5.



NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-122 and C-133, and repair if necessary.

- Check the communication lines for open circuit.

Q: Is the check result normal?

YES : Go to Step 5.

NO : Repair the connector.

Q: Is the check result normal?

YES : Go to Step 6.

NO : Repair the wiring harness.

STEP 6. Retest the system.

After the power window sub switch (front: LH) is replaced, check that the front passenger's door power window can be operated by the power window sub switch (front: LH).

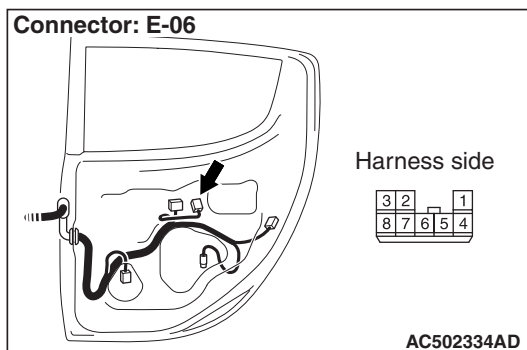
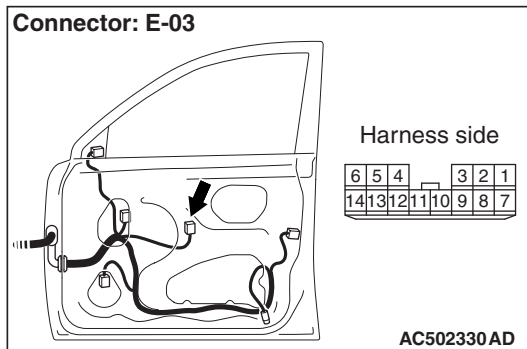
- (1) Replace the power window sub switch (front: LH).
- (2) Check that the front passenger's power window works by means of the power window main switch.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the power window main switch.

STEP 7. Connector check: E-03 power window main switch connector and E-06 power window sub switch (rear: RH) connector

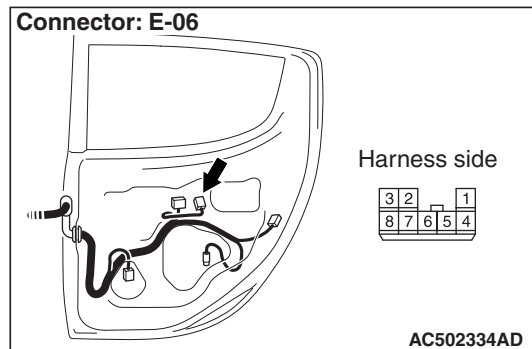
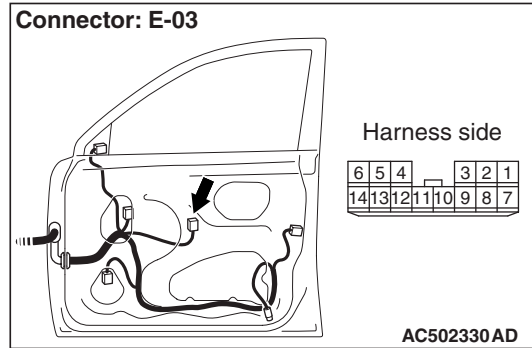


Q: Is the check result normal?

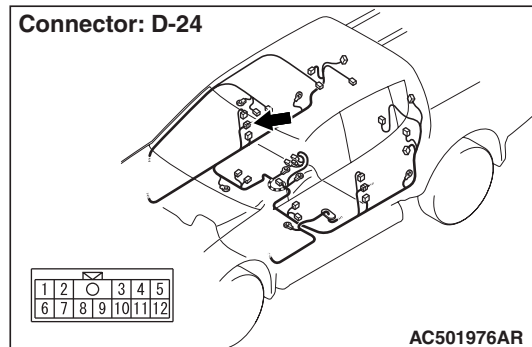
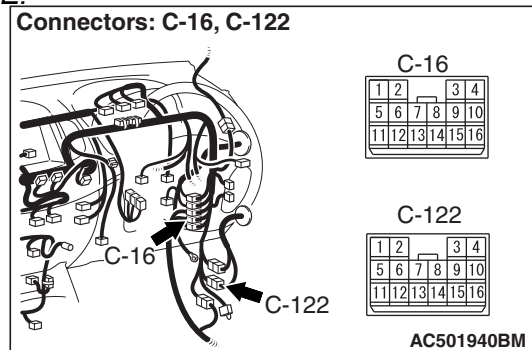
YES : Go to Step 8.

NO : Repair the connector.

STEP 8. Check the wiring harness between E-03 power window main switch connector terminal Nos.4 and 6 to E-06 power window sub switch (rear: RH) connector terminal Nos.8 and 5.



NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-16, C-122 and D-24, and repair if necessary.

- Check the communication lines for open circuit.

Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair the wiring harness.

STEP 9. Retest the system.

After the power window sub switch (rear: RH) is replaced, check that the rear door power window (RH) can be operated by the power window sub switch (rear: RH).

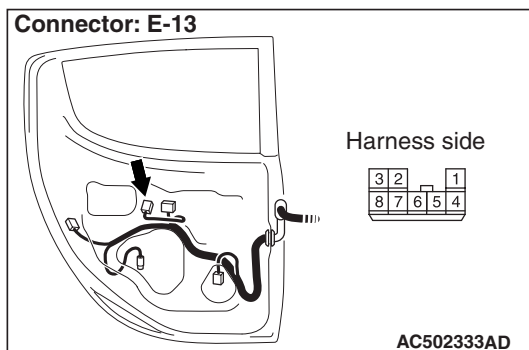
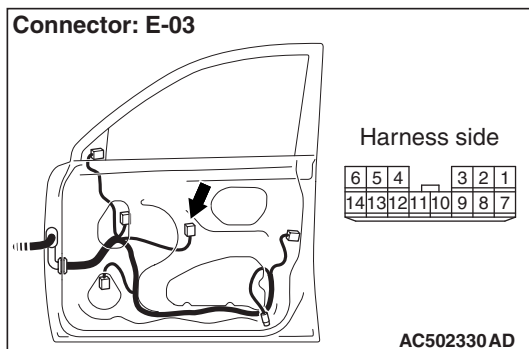
- (1) Replace the power window sub switch (rear: RH).
- (2) Check that the rear door power window (RH) works by means of the power window main switch.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the power window main switch.

STEP 10. Connector check: E-03 power window main switch connector and E-13 power window sub switch (rear: LH) connector

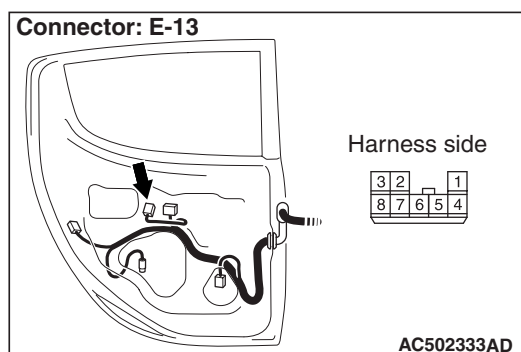
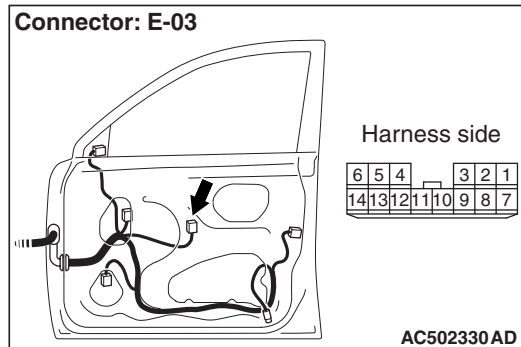


Q: Is the check result normal?

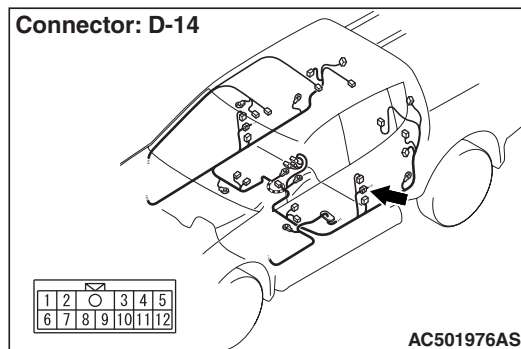
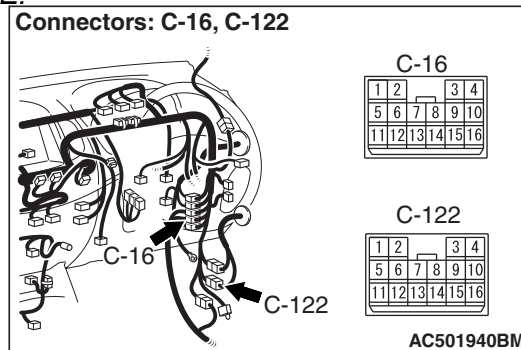
YES : Go to Step 11.

NO : Repair the connector.

STEP 11. Check the wiring harness between E-03 power window main switch connector terminal Nos.1 and 3 to E-13 power window sub switch (rear: LH) connector terminal Nos.8 and 5.



NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-16, C-122 and D-14, and repair if necessary.

- Check the communication lines for open circuit.

Q: Is the check result normal?**YES** : Go to Step 12.**NO** : Repair the wiring harness.**STEP 12. Retest the system.**

After the power window sub switch (rear: LH) is replaced, check that the rear door power window (LH) can be operated by the power window sub switch (rear: LH).

(1) Replace the power window sub switch (rear: LH).

(2) Check that the rear door power window (LH) works by means of the power window main switch.

Q: Is the check result normal?**YES** : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).**NO** : Replace the power window main switch.**Inspection procedure B-5: Power Window Timer Function does not Work Normally.****⚠ CAUTION**

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

COMMENTS ON TROUBLE SYMPTOM

If the power window timer function does not work, the input circuit from the ignition switch (IG1) or the driver's door switch, the communication lines between the ETACS-ECU and the power window main switch, the power window main switch or the ETACS-ECU may be defective.

PROBABLE CAUSES

- Malfunction of ETACS-ECU
- Malfunction of the power window main switch
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE**STEP 1. Check the power window main switch.**

Check that all of the front passenger's and rear door <Double cab> power windows can operate by means of the power window main switch.

Q: Is the check result normal?**YES** : Go to Step 2.**NO** : Refer to P.42-52."**STEP 2. Check the power supply circuit.**

When the ignition switch is turned to the LOCK (OFF) position, check if the hazard warning lamps illuminate.

Q: Is the check result normal?**YES** : Go to Step 3.**NO** : Refer to inspection procedure A-1 "Check the battery power supply circuit to the ETACS-ECU ."**STEP 3. M.U.T.-III data list**

Check the input signals below, which are related to the power window timer function.

- Ignition switch: OFF
- Drive's door: Open

Item No.	Item name	Normal condition
19	Driver's door switch	ON
30	Ignition switch (IG1)	OFF

OK: Normal conditions are displayed for all the items.

Q: Is the check result normal?**All the signals are received normally.** : Go to Step 4.**The driver's door switch signal is not received.** :

Refer to GROUP 54B, Inspection Procedure F-5 "One of the switch signals is not received ."

The ignition switch (IG1) signal is not received. :

Refer to GROUP 54B, Inspection Procedure F-3 "The ignition switch (IG1) signal is not received ."

STEP 4. Retest the system.

Check that the power window timer function work normally.

Q: Is the check result normal?**YES** : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).**NO** : Replace the power window main switch.

Inspection Procedure B-6: The Window Glass Lowers Automatically while it is Rising.

COMMENTS ON TROUBLE SYMPTOM

If the sliding resistance is too great when the window is being raised or the window glass encounters an object, the window glass will lower by approximately 150 mm.

PROBABLE CAUSES

- Improper adjusted door window glass
- Incorrectly installed or warped glass slider
- Malfunction of the power window motor
- Malfunction of the window regulator

DIAGNOSIS PROCEDURE

STEP 1. Check the power window operating current.

Check that the power window operating current is normal (Refer to P.42-92).

Q: Is the check result normal?

YES : Go to Step 2.

NO : Replace the defective power window motor assembly which operating current are abnormal.

STEP 2. Check that the door window glasses are installed correctly.

Check that the door window glasses are installed correctly (Refer to P.42-90).

Q: Is the check result normal?

YES : Go to Step 3.

NO : Adjust the door window glass (Refer to P.42-90).

STEP 3. Retest the system.

Check that the power window does not lower automatically while it is being raised.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the power window motor assembly of the defective window.

ON-VEHICLE SERVICE

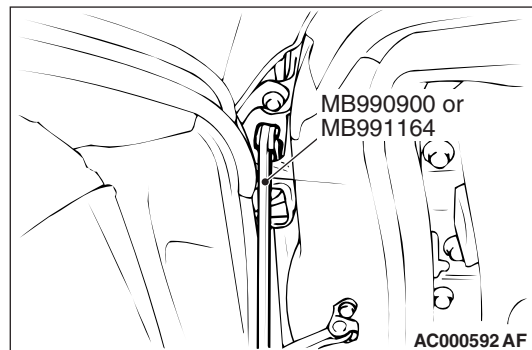
DOOR FIT ADJUSTMENT

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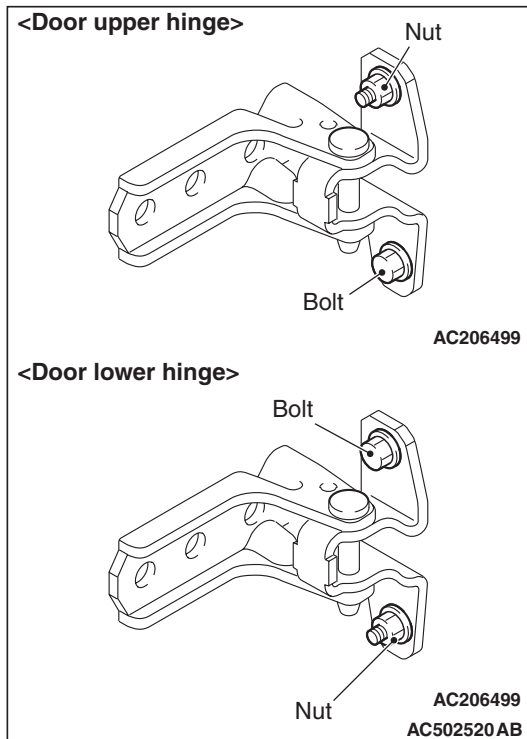
CAUTION

- Attach protection tape to the fender and door edges where the hinge is installed.
- Do not rotate special tool door hinge adjusting wrench MB991164 with a torque of over 98 N·m.

1. When the clearance between the front door and the body is uneven.
 - (1) Apply a protective tape to the fender and front door edge around the hinge mounting area.

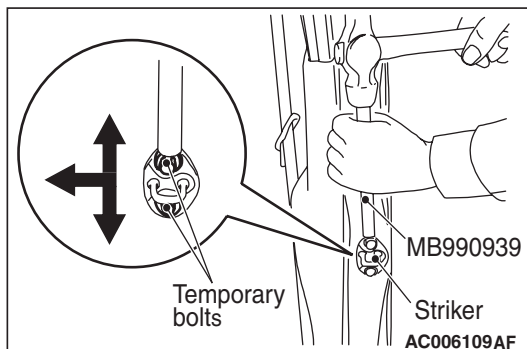


- (2) Use the special tool door hinge adjusting wrench (MB990900 or MB991164) to loosen the body-side door hinge mounting bolts.
- (3) Move the front door to adjust until the clearance around the front door is even.
2. When the clearance between the rear door and the body is uneven <Double cab>.
 - (1) Remove the centre pillar trim lower (Refer to GROUP 52A, Interior trim).
 - (2) Apply a protective tape to the body and rear door edge around the hinge mounting area.
 - (3) Loosen the body-side door hinge mounting nuts and bolts.
 - (4) Move the rear door to adjust until the clearance around the rear door is even.
3. When the door is not flush with the vehicle body surface.

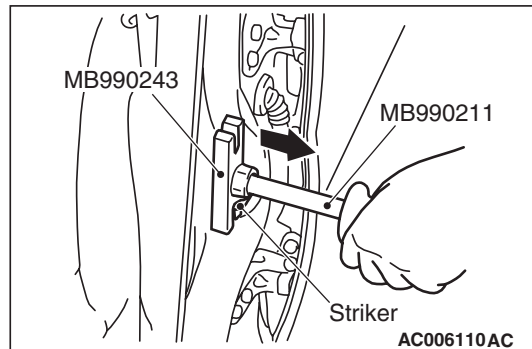


- (1) Loosen the door-side hinge mounting bolts and nuts.
- (2) Move the door to adjust until the door is flush with the vehicle body.

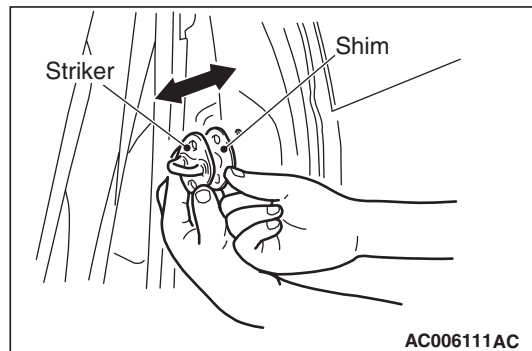
4. When the door is stiff to lock and unlock:



- (1) Adjustment by using the striker (toward the inside of the vehicle and vertical direction)
Install an temporary bolts instead of the striker mounting bolt, and use special tool remover bar (MB990939) and a hammer to tap the bolts to the desired direction.



- (2) Adjustment by using the striker (toward the outside of the vehicle)
Use special tools sliding hammer (MB990211) and body puller (MB990243) to pull the striker toward the outside of the vehicle.



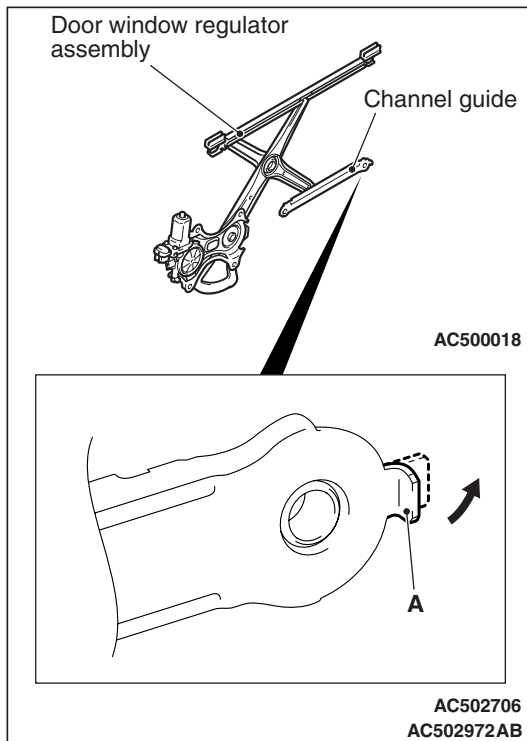
- (3) Adjustment by using shims (forward and rearward)
Increase or decrease the number of shims so that the striker engages with the door latch properly.

FRONT DOOR WINDOW GLASS ADJUSTMENT

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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.

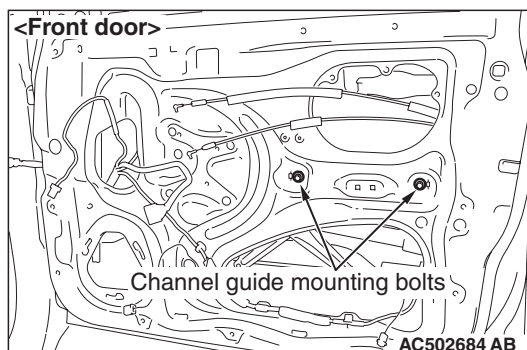
1. Remove the door trim assembly (Refer to GROUP 52A, Door trim <Club cab>, <Double cab>).
2. Remove the waterproof film (Refer to P.42-111 <Club cab>, P.42-113 <Double cab>).
3. Remove the door window regulator assembly (Refer to P.42-98 <Club cab>, P.42-100 <Double cab>).



- Stretch the both bends ("A" shown in the figure) of channel guide on the door window regulator assembly.

NOTE: The bend of "A" shown in the figure is used for positioning the door window regulator assembly. However, stretching the A section enables the adjustment of door window glass. In addition, keep the part "A" stretched.

- Install the door window regulator assembly (Refer to P.42-98 <Club cab>, P.42-100 <Double cab>).



- Raise the door window glass and loosen the channel guide mounting bolts to adjust the window glass slants appropriately.

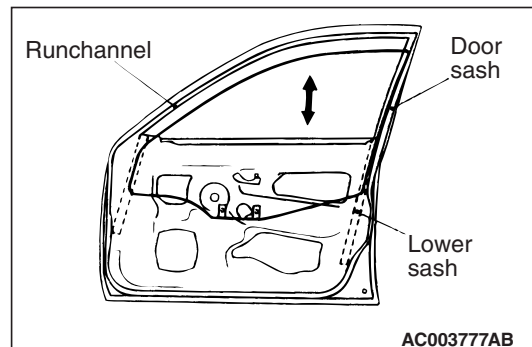
GLASS SLIDING MECHANISM CHECK AND ADJUSTMENT

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If the window glass automatically starts moving downwards at the wrong time while it is being raised, carry out the following adjustment or replacement procedures.

- Remove the door trim assembly. (Refer to GROUP 52A, Door trim <Club cab>, <Double cab>).
- Remove the waterproof film. (Refer to P.42-111 <Club cab>, P.42-113 <Double cab>).
- Remove the window regulator assembly from the door window glass, and then raise and lower the door window glass by hand to check the operation force.

NOTE: Insert a cushion or similar object to prevent damage to the glass if it should happen to fall down.



- If the door window glass does not move up and down smoothly, check or repair the following points.
 - Check the installation condition of the runchannel.
 - Repair any twisting in the door sash.
 - Check the installation condition of the lower sash.
- If repair or adjustment is not possible, replace the door assembly.

POWER WINDOW TIMER FUNCTION CHECK

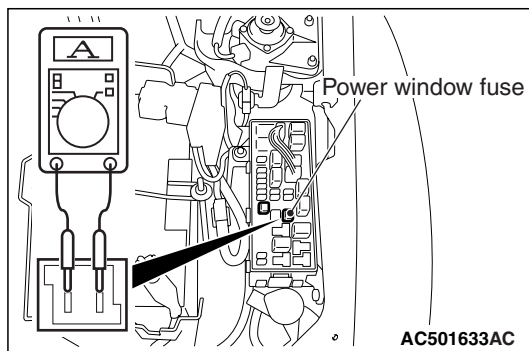
M1429004300336

Check the system as described below. If the system does not work, carry out troubleshooting. Refer to [P.42-52](#).

- Close the door and turn the ignition switch to the LOCK (OFF) position, and then check that the power windows operate for 30 seconds.
- The timer activates by closing the doors and turning the ignition switch to the LOCK (OFF) position. Check if the power windows operates within 30 seconds after the driver's door is opened while the timer is being activated. The timer period will be extended if the driver's door is opened, but the timer will be cancelled if the driver's door is closed while the timer is being activated.

POWER WINDOW OPERATING CURRENT CHECK

M1429001100441



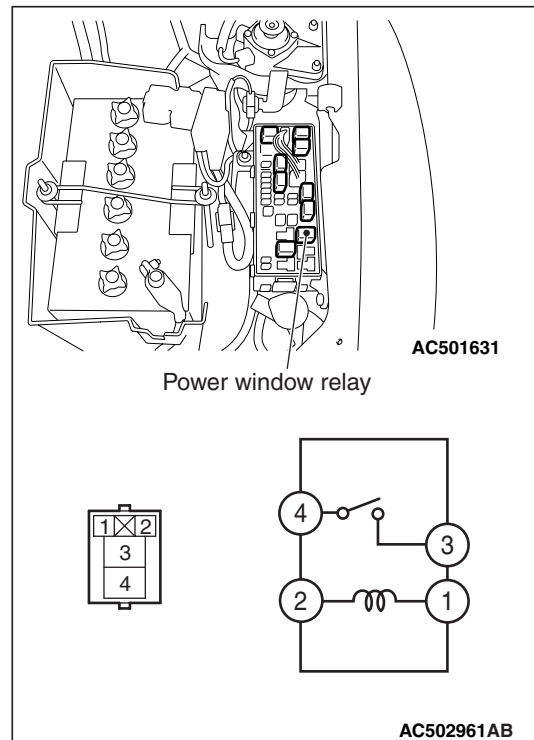
1. Remove the power window fuse and connect an ammeter as shown in the illustration.
2. When the power window switch is pressed to the "UP" position, a large amount of current flows at the time the window starts to close and when it is fully closed, so measure the operation current in the interval between these two points.

Standard value: $5 \pm 1\text{A}$ (Power supply voltage $14.5 \pm 0.5\text{V}$, 25°C)

3. If the operation current is outside the standard value, refer to [P.42-91](#).

POWER WINDOW RELAY CHECK

M1429001800354



Battery voltage	Tester connection	Specified condition
Not applied	3 - 4	Open circuit
<ul style="list-style-type: none"> • Connect terminal No.2 and the positive battery terminal. • Connect terminal No.1 and the negative battery terminal. 	3 - 4	Less than 2 ohms

POWER WINDOW CHECK

M1429004400463

Check the system as described below. If the system does not work, carry out troubleshooting. Refer to [P.42-52](#).

- Operate the power window switch of each seat to check that the power window works.
- Turn on the power window lock switch of the power window main switch, and operate the front and rear passenger's power window sub switches to check that the power windows do not work.
- Turn on the power window lock switch of the power window main switch, and operate the power window main switch to check that each power window operates.

CENTRAL DOOR LOCKING SYSTEM INSPECTION

M1427001100401

Check the system as described below. If the system does not work, carry out troubleshooting. Refer to [P.42-52](#).

- Check that the central door locking system works by operating the driver's door key cylinder and the inside lock knob.

NOTE: When the inside lock knob is operated with the driver's door opened, the driver's door is not locked.

- Check whether the driver's door is opened when the driver's door inside handle is pulled with all the doors locked. Also check whether all the doors are unlocked simultaneously.

CHECK OF KEY LOCK PREVENTION FUNCTION

M1427003300188

Check that the driver's door is not locked when the driver's door inside lock knob is operated with the driver's door opened. If it is locked, replace the door latch. Refer to [P.42-105](#) <Club cab>, [P.42-107](#) <Double cab>.

SHIFT "P" INTERLINK DOOR UNLOCK FUNCTION CHECK

M1427003400099

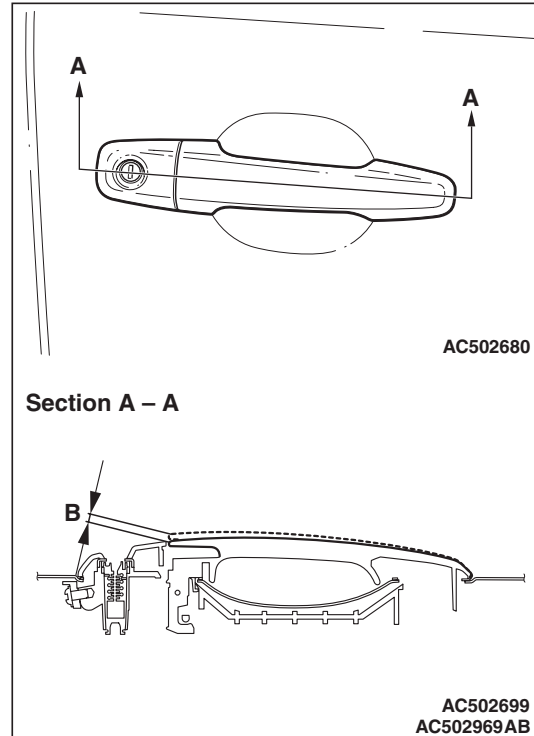
When the selector is moved to the P (parking) position with the ignition switch on, all the doors and the tailgate will be unlocked.

Carry out troubleshooting if the doors are not unlocked. Refer to [P.42-52](#).

NOTE: The adjustment function allows you to change the selector "P" position-linked door unlocking's setting from disabled (initial setting) to "enabled only with the power window lock switch off" or "enabled". Prior to the check, confirm which setting is activated.

DOOR OUTSIDE HANDLE PLAY CHECK

M1423001600471



1. Check that the door outside handle play is within the standard value range.

Standard value (B):

Front door: 0.1 –5.9 mm (target value: 2.5 mm)

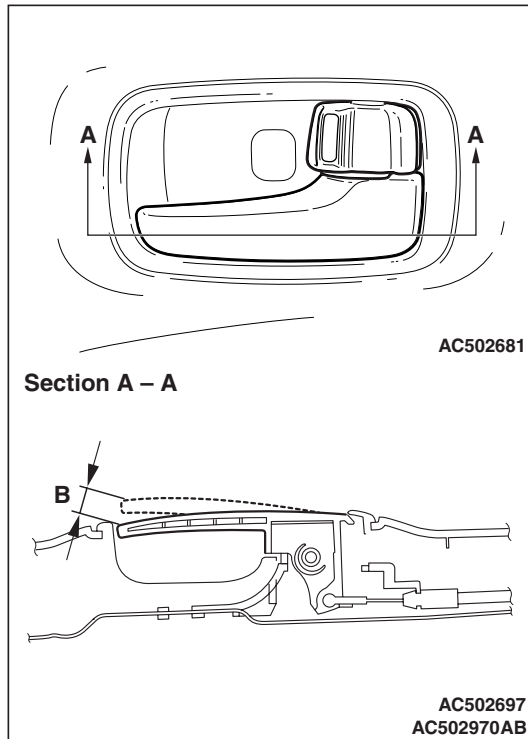
Rear door: 0.1 –5.9 mm (target value: 2.6 mm)

2. If the door outside handle play is not within the standard value range, check the door outside handle or the door latch assembly. Replace if necessary.

DOOR INSIDE HANDLE PLAY ADJUSTMENT

M1423001500504

DOOR INSIDE HANDLE KNOB PLAY CHECK



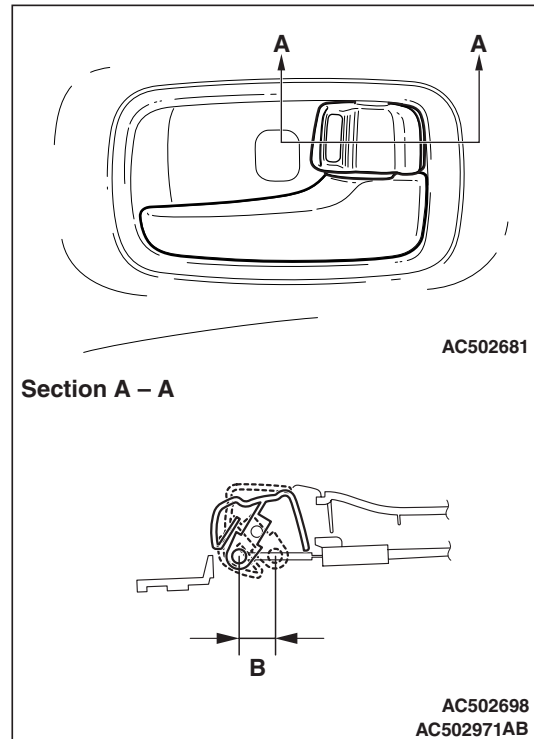
1. Check that the door inside handle play is within the standard value range.

Standard value (B): 5.2 –19.6 mm (target value: 10.9 mm)

2. Check the door inside handle and door latch assembly, and replace them if they are out of the standard value.

DOOR INSIDE HANDLE LOCK KNOB STROKE CHECK

1. Remove the door trim assembly. Refer to GROUP 52A, Door Trim <Club cab>, <Double cab>.

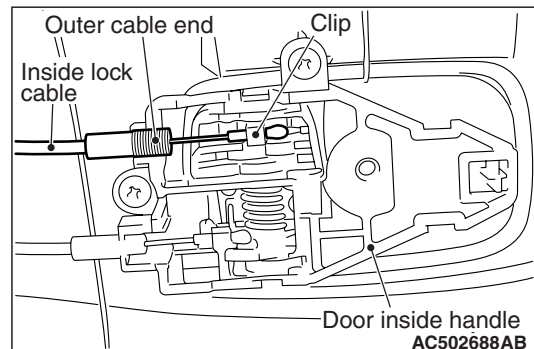


2. Check that the stroke of the door inside handle lock knob satisfies the standard value.

Standard value (B):

Front door: 14.5 –16 mm (target value: 15 mm)

Rear door: 15 ±0.5 mm



3. If it is outside the standard value, adjust the stroke of the inside handle lock knob by using the outer cable end, which connects the inside handle lock knob to the inside lock cable.

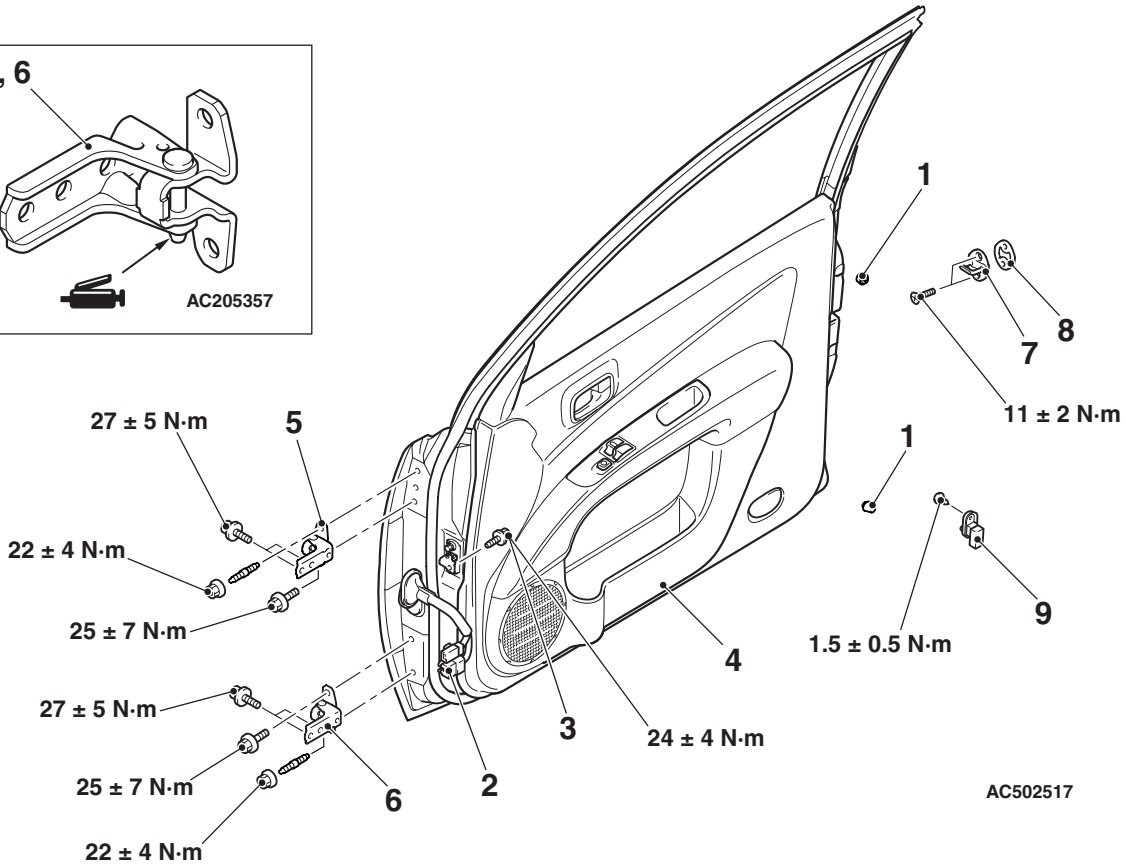
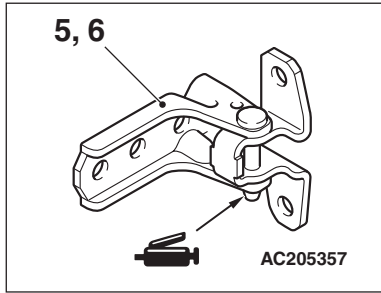
DOOR ASSEMBLY

REMOVAL AND INSTALLATION <CLUB CAB>

M1423002200487

Post-installation Operation

- Door Fit Adjustment (Refer to P.42-89).



Damper removal

1. Damper

Door assembly removal steps

- Front Scuff Plate and Cowl Side Trim (Refer to GROUP 52A, Interior Trim .)
2. Wiring harness connector connection
 3. Door check connecting bolt
 4. Door assembly
 5. Door upper hinge
 6. Door lower hinge

Striker removal steps

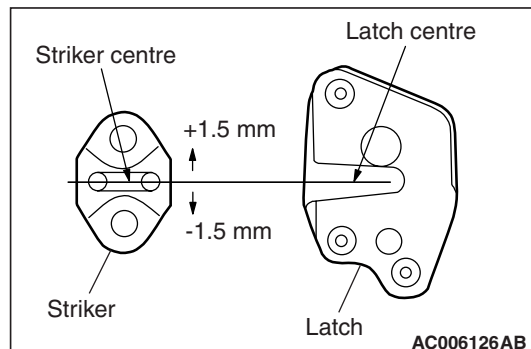
>>A<<

7. Striker
8. Striker shim

Door switch removal

9. Door switch

**INSTALLATION SERVICE POINT
>>A<< STRIKER INSTALLATION**



Align the centre of the striker and latch within ± 1.5 mm, and install.

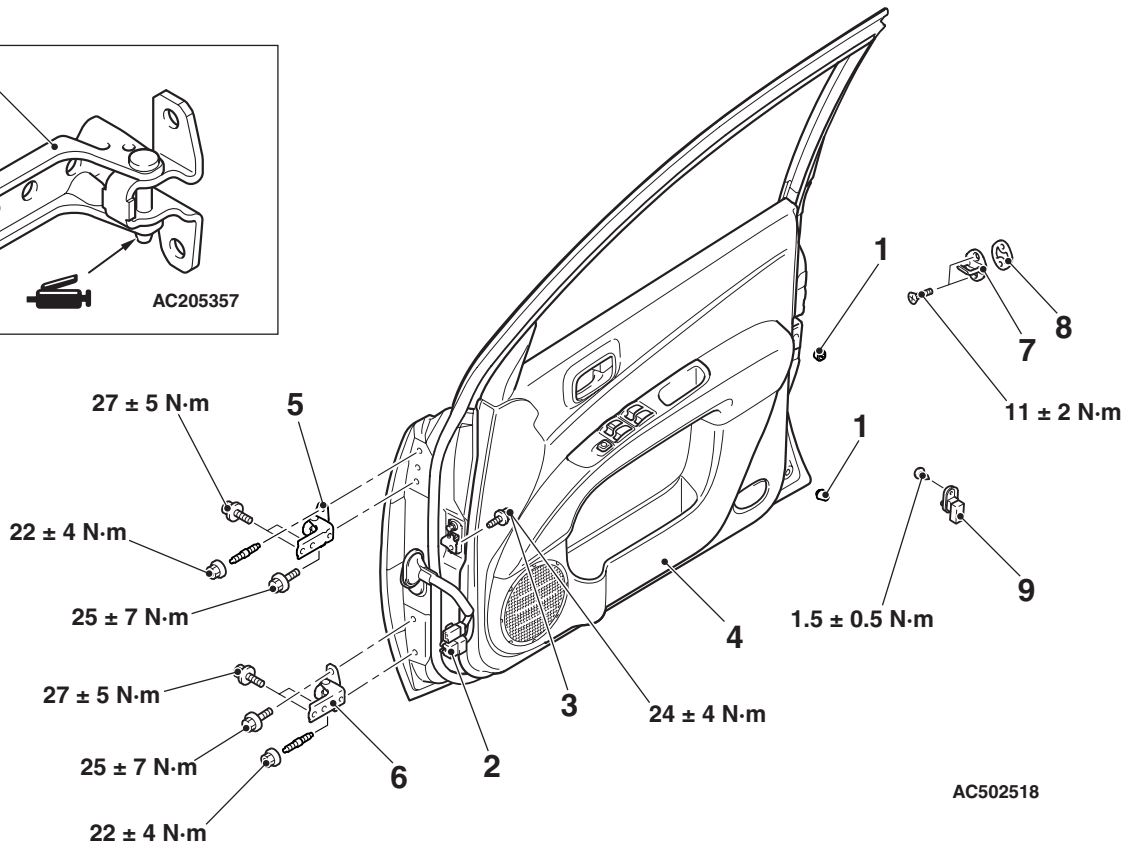
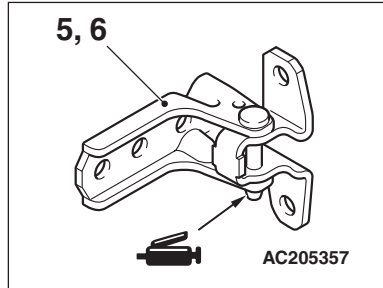
REMOVAL AND INSTALLATION <DOUBLE CAB>

M1423002200539

Post-installation Operation

- Door Fit Adjustment (Refer to P.42-89).

<Front door>



AC502975 AB

Damper removal

1. Damper

Door assembly removal steps

- Front Scuff Plate and Cowl Side Trim (Refer to GROUP 52A, Interior Trim .)
2. Wiring harness connector connection
 3. Door check connecting bolt
 4. Door assembly

Door assembly removal steps

5. Door upper hinge
6. Door lower hinge

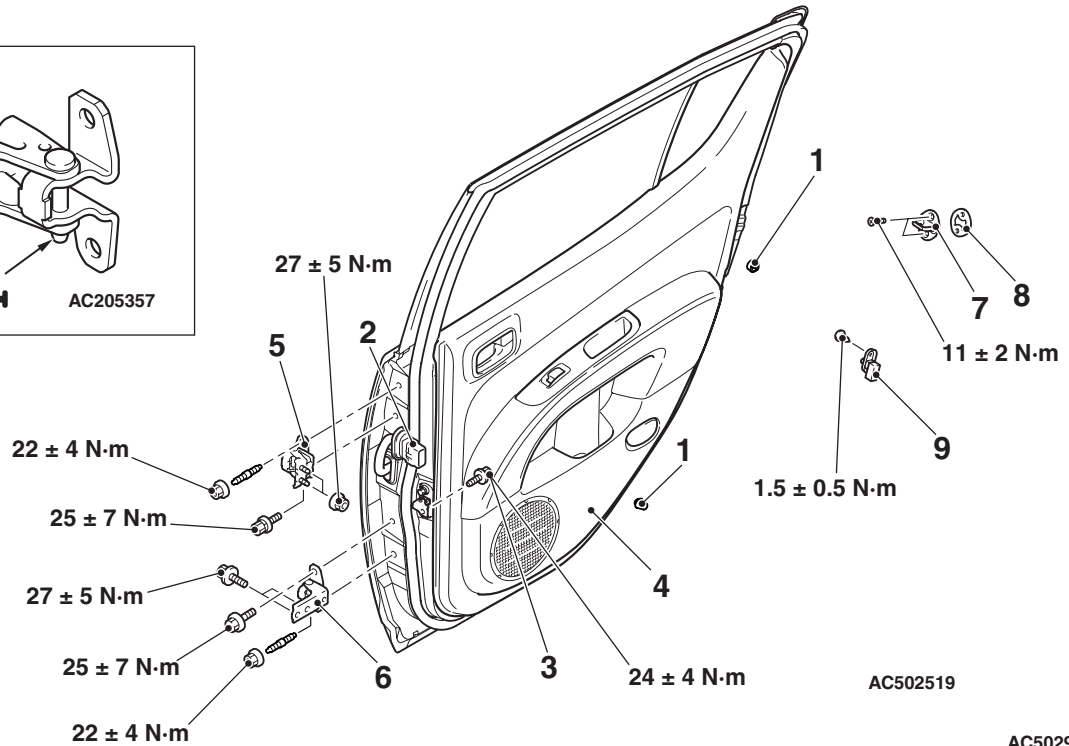
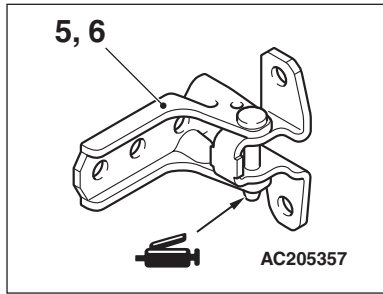
Striker removal steps

- >>A<<
7. Striker
 8. Striker shim

Door switch removal

9. Door switch

<Rear door>



AC502976 AB

Damper removal

1. Damper

Door assembly removal steps

2. Wiring harness connector connection
3. Door check connecting bolt
4. Door assembly
- Centre pillar trim lower (Refer to GROUP 52A, Interior Trim .)
5. Door upper hinge
6. Door lower hinge

Striker removal steps

- >>A<<
7. Striker
 8. Striker shim

Door switch removal

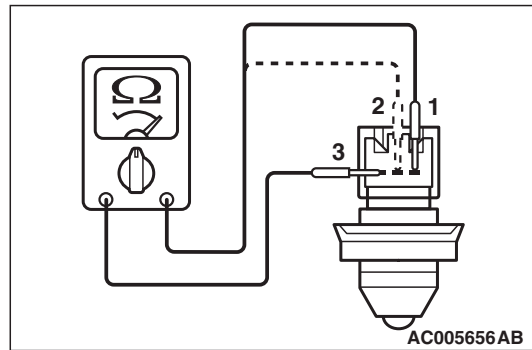
9. Door switch

Align the centre of the striker and latch within ±1.5 mm, and install.

INSPECTION

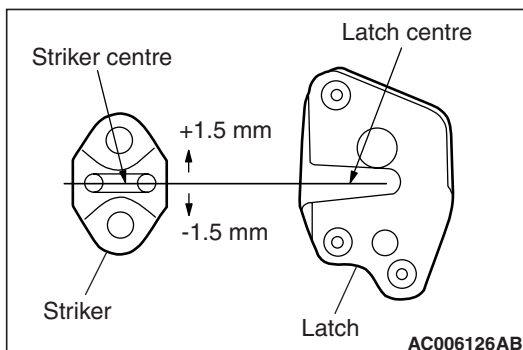
M1423006000504

DOOR SWITCH CHECK



INSTALLATION SERVICE POINT

>>A<< STRIKER INSTALLATION



Switch position	Tester connection	Specified condition
Released (ON)	1 -3, 2 -3	Less than 2 ohms
Depressed (OFF)		Open circuit

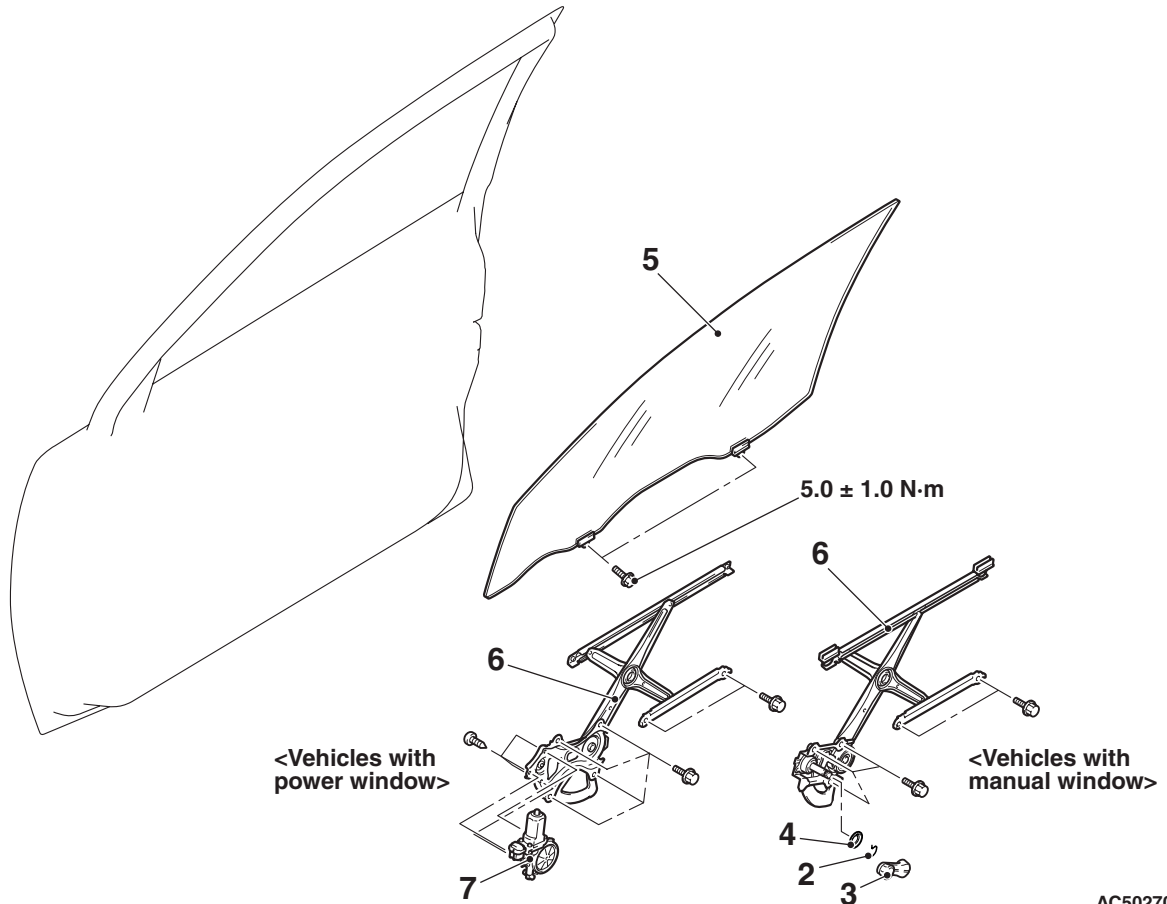
DOOR GLASS AND REGULATOR

REMOVAL AND INSTALLATION <CLUB CAB>

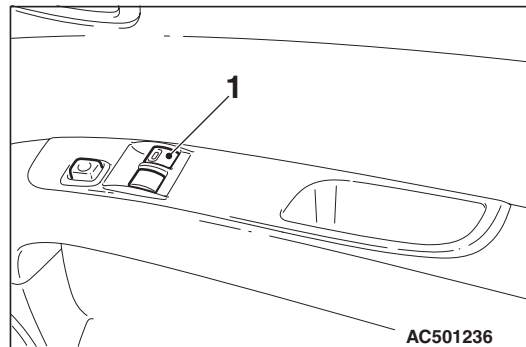
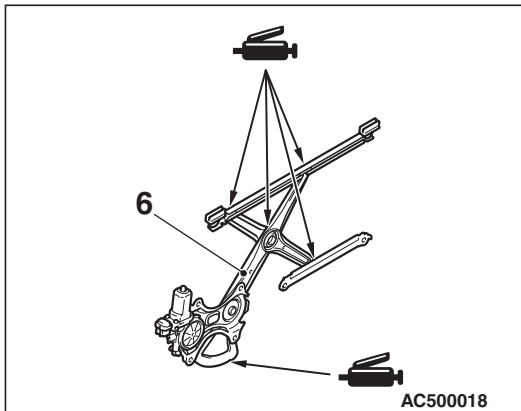
M1429001300650

Post-installation Operation

- Door Window Glass Adjustment (Refer to P.42-90).



AC502703AB



AC503683AB

Power window switch <Vehicles with power window> removal

1. Power window main switch (driver's side), power window sub switch (passenger's side) (Refer to GROUP 52A, Door Trim .)

<<A>>

- >>A<<
- >>A<<
- >>A<<

Regulator handle <Vehicles manual window> removal steps

2. Clip
3. Regulator handle
4. Escutcheon

Door window glass assembly removal steps

- Beltline moulding, beltline weatherstrip inner (Refer to P.42-111.)
- Waterproof film (Refer to P.42-111.)

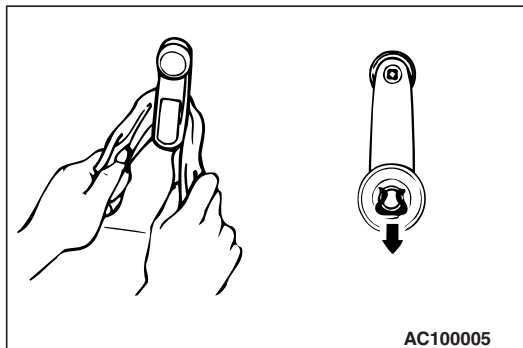
5. Door window glass assembly
Door window regulator removal steps

- Rear lower sash (Refer to P.42-111.)
- 6. Door window regulator assembly
- 7. Power window motor <Vehicles with power window>

<>

REMOVAL SERVICE POINTS

<<A>> CLIP REMOVAL

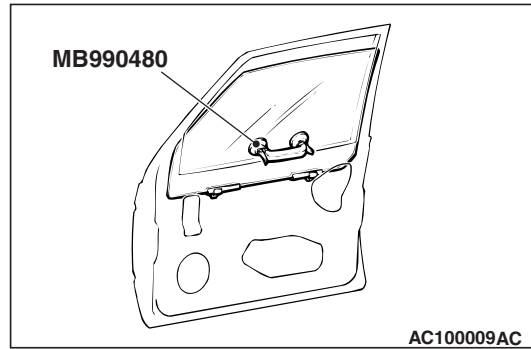


Use cloth to remove the clip as shown in the illustration.

<> DOOR WINDOW REGULATOR ASSEMBLY REMOVAL

1. Remove the door window glass installation bolts.

CAUTION

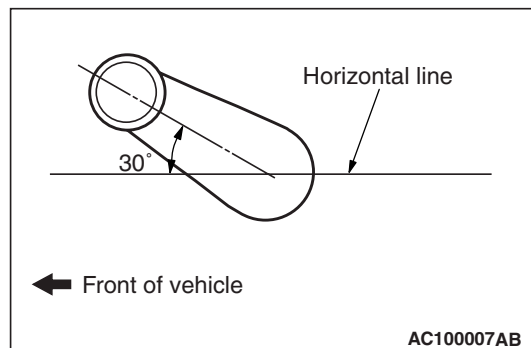


If tinting film is adhered to the door window glass, attach special tool window glass holder (MB990480) to the outside of the glass to prevent the film from peeling off.

2. Lift the door window glass, and attach special tool window glass holder (MB990480) to the glass as shown to prevent the glass from falling.
3. Remove the door window regulator assembly.

INSTALLATION SERVICE POINT

>>A<< ESCUTCHEON/REGULATOR HANDLE/CLIP INSTALLATION



1. Install escutcheon and regulator handle to the clip.
2. Close the door window glass fully, and then install the regulator handle as shown in the illustration.

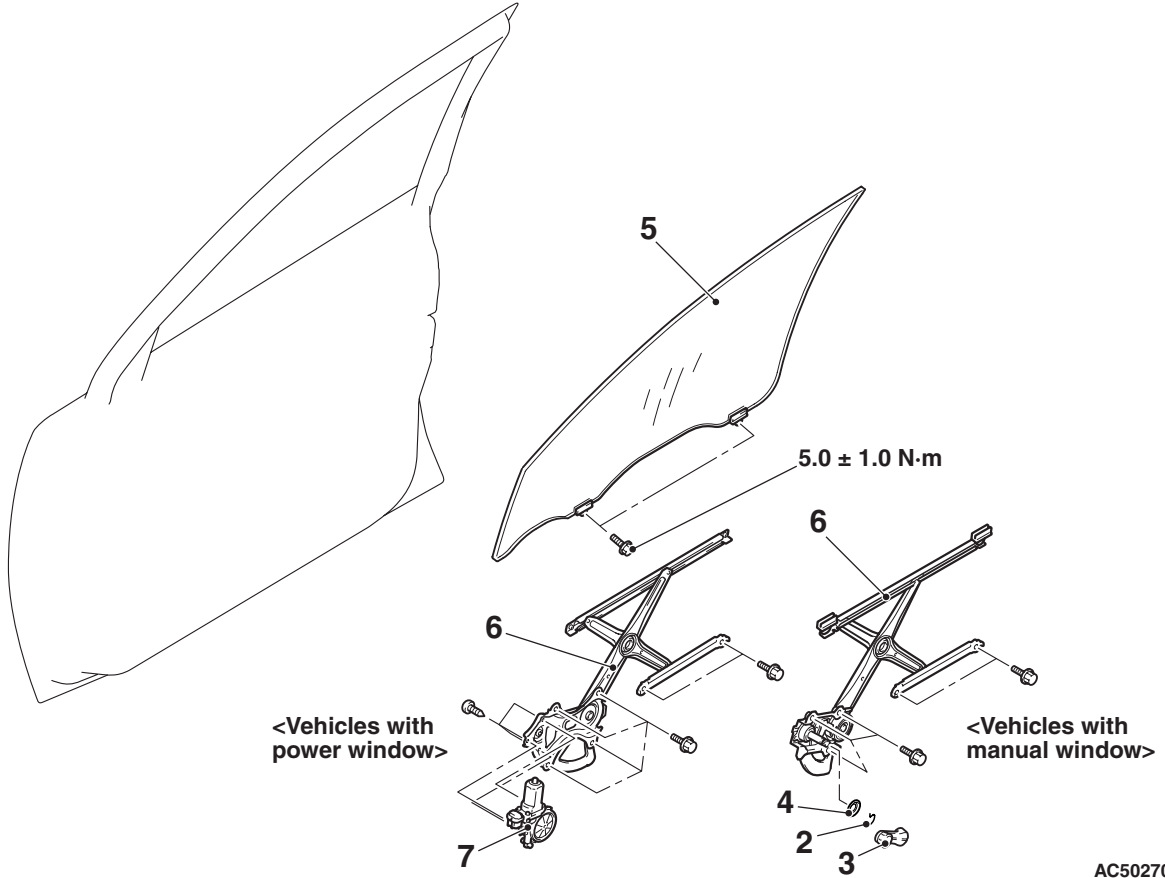
REMOVAL AND INSTALLATION <DOUBLE CAB>

M1429001300672

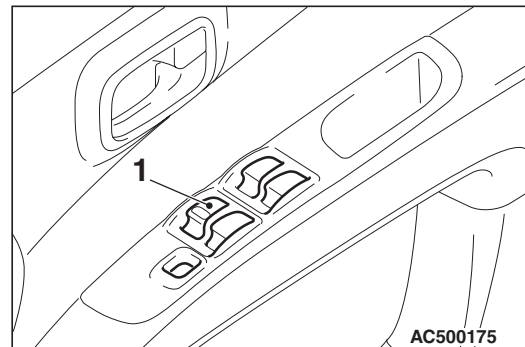
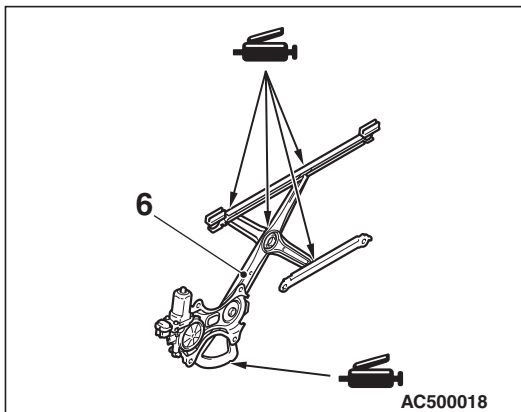
Post-installation Operation

- Door Window Glass Adjustment (Refer to P.42-90).

<Front door>



AC502704AB



AC503684AB

Power window switch <Vehicles with power window> removal

1. Power window main switch (driver's side), power window sub switch (passenger's side) (Refer to GROUP 52A, Door Trim).

<<A>>

>>A<<

>>A<<

>>A<<

Regulator handle <Vehicles with manual window> removal steps

2. Clip
3. Regulator handle
4. Escutcheon

**Door window glass assembly
removal steps**

- Waterproof film (Refer to P.42-113).
- Beltline moulding, beltline weatherstrip inner (Refer to P.42-113).

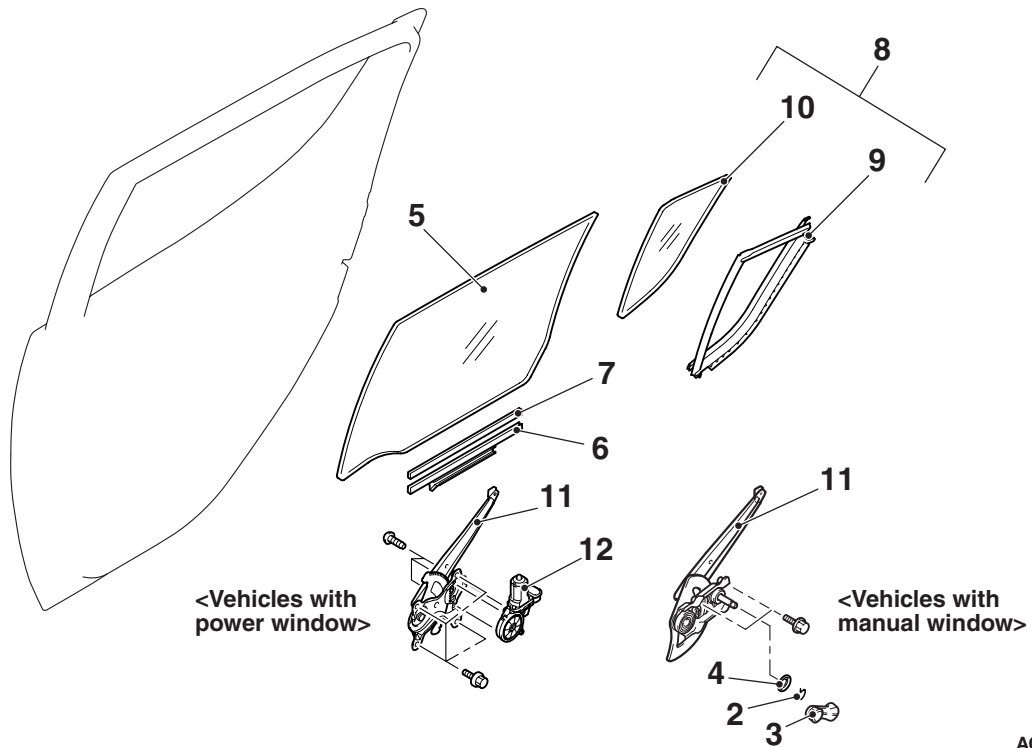
4. Door window glass assembly

**Door window regulator assembly
removal steps**

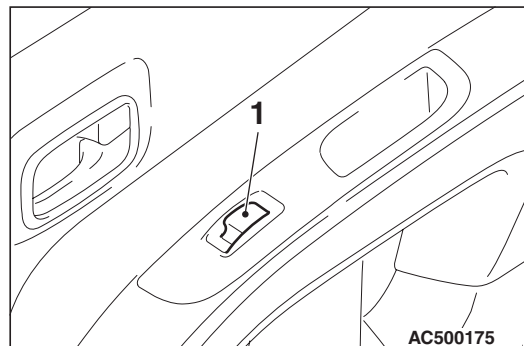
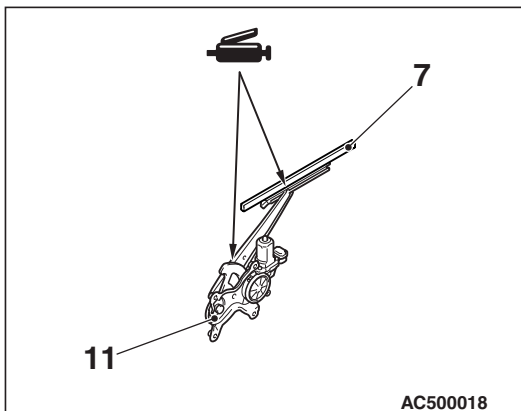
- Waterproof film (Refer to P.42-113).
5. Door window regulator assembly
 6. Power window motor <Vehicles with power window>

<>

<Rear door>



AC502705 AB



AC503685 AB

**Power window sub switch
<Vehicles with power window>
removal**

1. Power window sub switch (Refer to GROUP 52A, Door Trim .)

Regulator handle <Vehicles with manual window> removal steps

<<A>> >>A<<
>>A<<
>>A<<

2. Clip
3. Regulator handle
4. Escutcheon

Door window glass assembly and stationary window glass removal steps

- Beltline moulding, beltline weatherstrip inner (Refer to P.42-113.)
 - Waterproof film (Refer to P.42-113.)
5. Door window glass assembly
 6. Door window glass holder
 7. Door window glass pad
- Centre sash (Refer to P.42-113.)
8. stationary window glass assembly
 9. stationary window weatherstrip
 10. stationary window glass

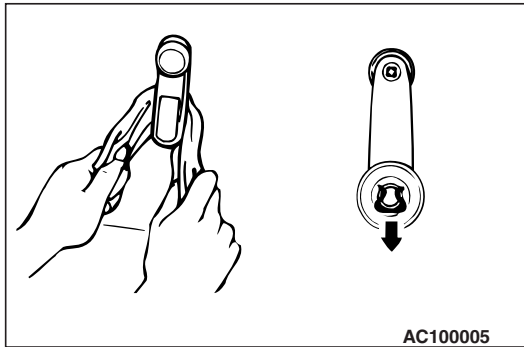
Door window regulator assembly removal steps

- Waterproof film (Refer to P.42-113.)
11. Door window regulator assembly
 12. Power window motor <Vehicles with power window>

<>

REMOVAL SERVICE POINTS

<<A>> CLIP REMOVAL

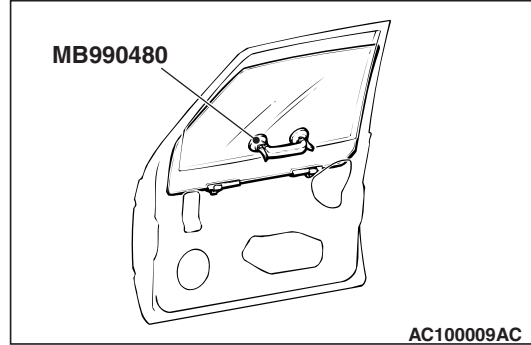


Use cloth to remove the clip as shown in the illustration.

<> DOOR WINDOW REGULATOR ASSEMBLY REMOVAL

1. Remove the door window glass assembly installation bolts.

CAUTION

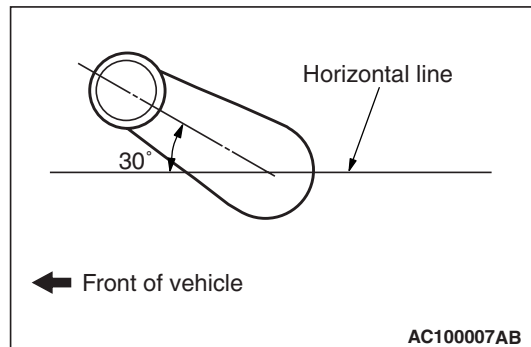


If tinting film is adhered to the door window glass, attach special tool window glass holder (MB990480) to the outside of the glass to prevent the film from peeling off.

2. Lift the door window glass, and attach special tool window glass holder (MB990480) to the glass as shown to prevent the glass from falling.
3. Remove the door window regulator assembly.

INSTALLATION SERVICE POINT

>>A<< RESCUTCHEON/REGULATOR HANDLE/CLIP INSTALLATION



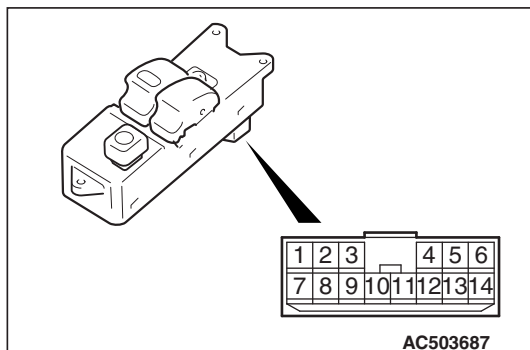
1. Install escutcheon and regulator handle to the clip.
2. Close the door window glass fully, and then install the regulator handle as shown in the illustration.

INSPECTION

M1429001400497

POWER WINDOW SWITCH CONTINUITY CHECK

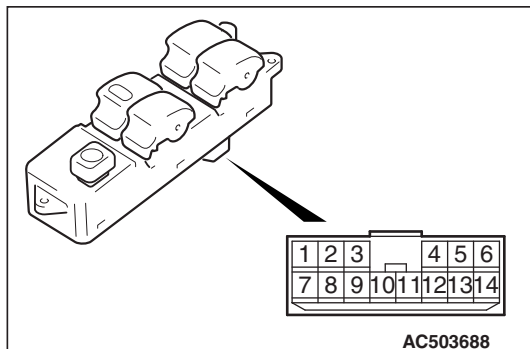
Remove the power window switch (Refer to GROUP 52A, Door Trim <Club cab> or <Double cab>).



MAIN SWITCH <CLUB CAB>

Switch position		Tester connection	Specified condition
LH	UP	7 -10, 2* -9	Less than 2 ohms
	OFF	2* -7, 2* -9	
	DOWN	9 -10, 2* -7	
RH	UP	10 -12, 2 -14	
	OFF	2 -12, 2-14	
	DOWN	10 -14, 2 -12	

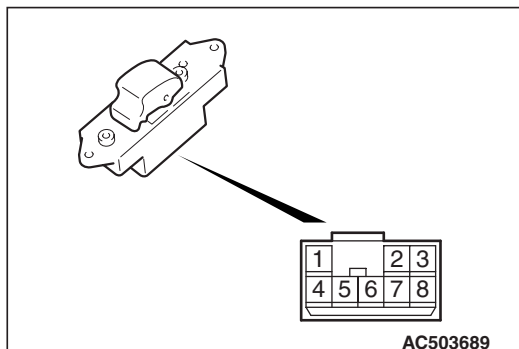
*NOTE: *: Set the window lock switch to UNLOCK position.*



MAIN SWITCH <DOUBLE CAB>

Switch position		Tester connection	Specified condition
FRONT (LH)	UP	7 -10, 2* -9	Less than 2 ohms
	OFF	2* -7, 2* -9	
	DOWN	9 -10, 2* -7	
FRONT (RH)	UP	10 -12, 2 -14	
	OFF	2 -12, 2-14	
	DOWN	10 -14, 2 -12	
REAR (LH)	UP	1 -10, 2* -3	
	OFF	1 -2*, 2* -3	
	DOWN	3 -10, 1 -2*	
REAR (RH)	UP	4 -10, 2* -6	
	OFF	2* -4, 2* -6	
	DOWN	6 -10, 2* -4	

*NOTE: *: Set the window lock switch to UNLOCK position.*

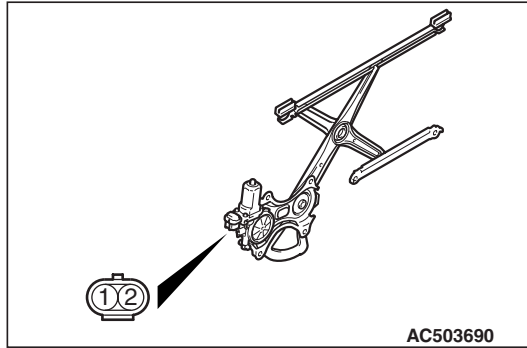


SUB SWITCH <DOUBLE CAB>

Switch position	Tester connection	Specified condition
UP	6 -7, 4 -5	Less than 2 ohms
OFF	7 -8, 4 -5	
DOWN	4 -6, 7 -8	

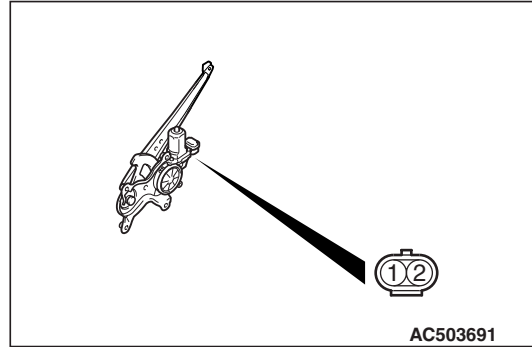
POWER WINDOW MOTOR CONTINUITY CHECK

FRONT DOOR



Tester connection	Slider position
<ul style="list-style-type: none"> • Connect terminal No.1 and the negative battery terminal. • Connect terminal No.2 and the positive battery terminal. 	UP
<ul style="list-style-type: none"> • Connect terminal No.2 and the negative battery terminal. • Connect terminal No.1 and the positive battery terminal. 	DOWN

REAR DOOR <DOUBLE CAB>



Tester connection	Slider position
<ul style="list-style-type: none"> • Connect terminal No.1 and the negative battery terminal. • Connect terminal No.2 and the positive battery terminal. 	UP
<ul style="list-style-type: none"> • Connect terminal No.2 and the negative battery terminal. • Connect terminal No.1 and the positive battery terminal. 	DOWN

POWER WINDOW MOTOR CHECK

1. Connect a battery directly to the motor terminals and check that the motor runs smoothly.
2. Check that the motor runs in the opposite direction when the battery is connected with the polarity reversed.
3. If defect is found, replace the window regulator as an assembly.

DOOR HANDLE AND LATCH

REMOVAL AND INSTALLATION <CLUB CAB>

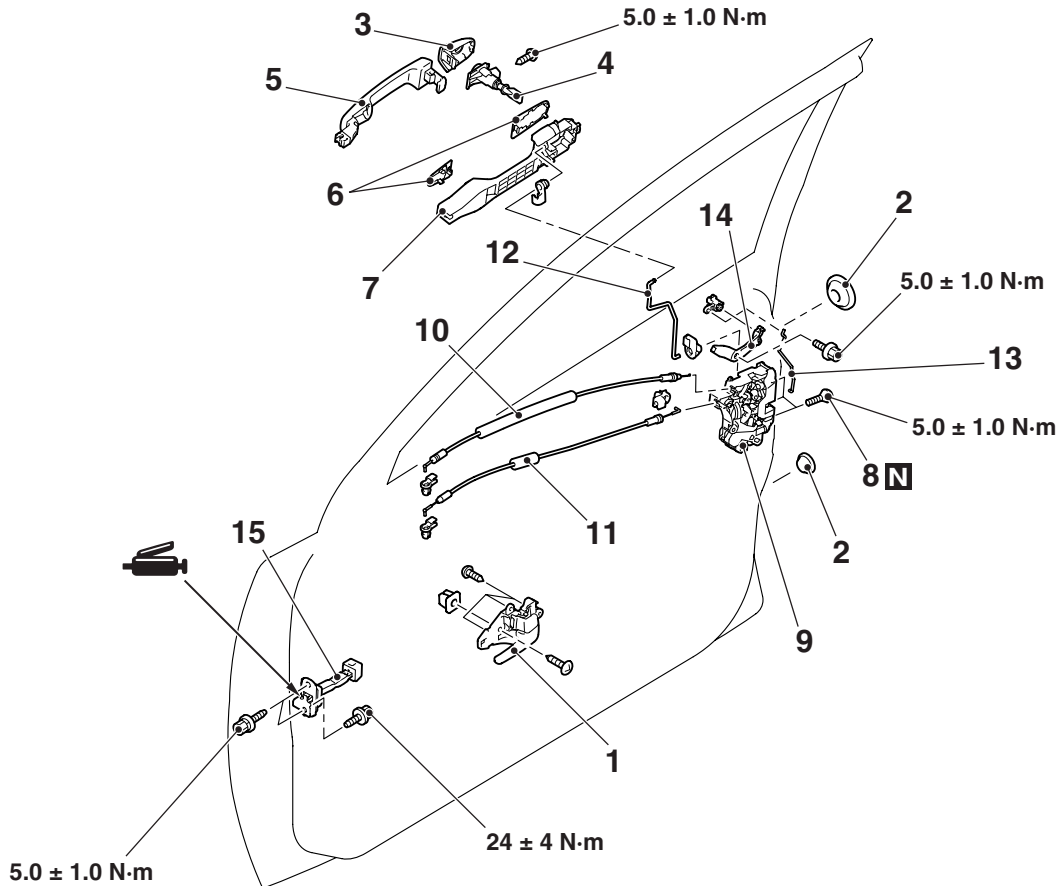
M1423004600663

Pre-removal Operation

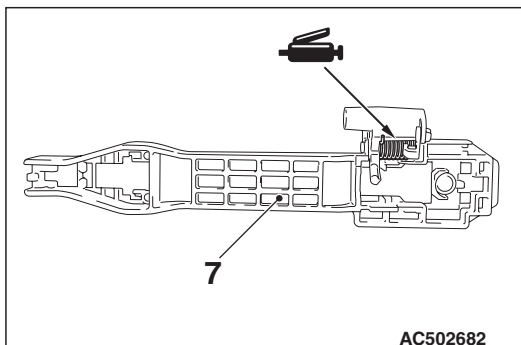
- Door Trim Assembly Removal (Refer to GROUP 52A, Door Trim).

Post-installation Operation

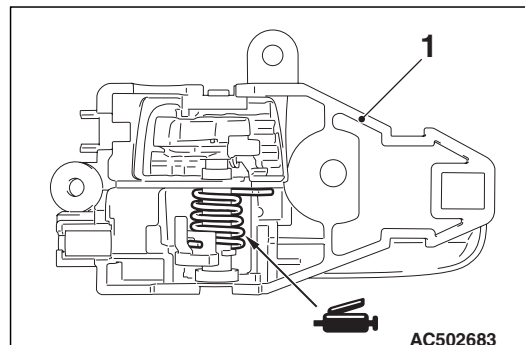
- Door Inside Handle Play Check (Refer to P.42-94).
- Door Outside Handle Play Check (Refer to P.42-93).
- Door Trim Assembly Installation (Refer to GROUP 52A, Door Trim).



AC501260AB



AC502682



AC502683

AC503681AB

- >>B<<
- Door inside handle removal**
1. Door inside handle
- Door lock key cylinder and door outside handle removal steps**
- Waterproof film and rear lower sash (Refer to P.42-111.)
2. Plug

Door lock key cylinder and door outside handle removal steps

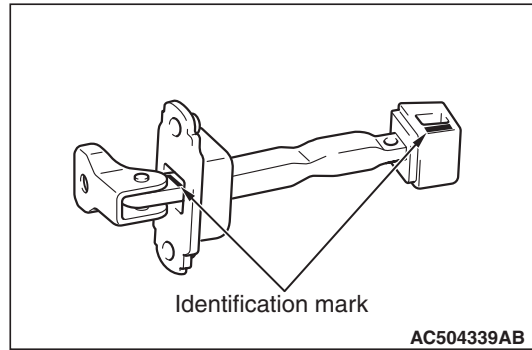
3. Door outside handle cover
4. Door lock key cylinder
5. Door outside handle
6. Door outside handle gasket
7. Door outside handle base

Door latch assembly removal steps

- Waterproof film and rear lower sash (Refer to P.42-111.)
- 8. Screw
- 9. Door latch assembly
- 10. Door inside lock cable
- 11. Door inside handle cable
- 12. Door outside handle rod
- 13. Door outside lock rod
- 14. Door panel bracket

Door check removal steps

- Waterproof film (Refer to P.42-111.)
- >>A<< 15. Door check

INSTALLATION SERVICE POINTS**>>A<< DOOR CHECK INSTALLATION**

Install the door check with the following identification marks facing upward.

Application locations	Identification mark
Left side	57L
Right side	57R

>>B<< DOOR INSIDE HANDLE INSTALLATION

When connecting the inside cable to the door inside handle, ensure that the door latch and the inside handle are unlocked.

REMOVAL AND INSTALLATION <DOUBLE CAB>

M1423004600737

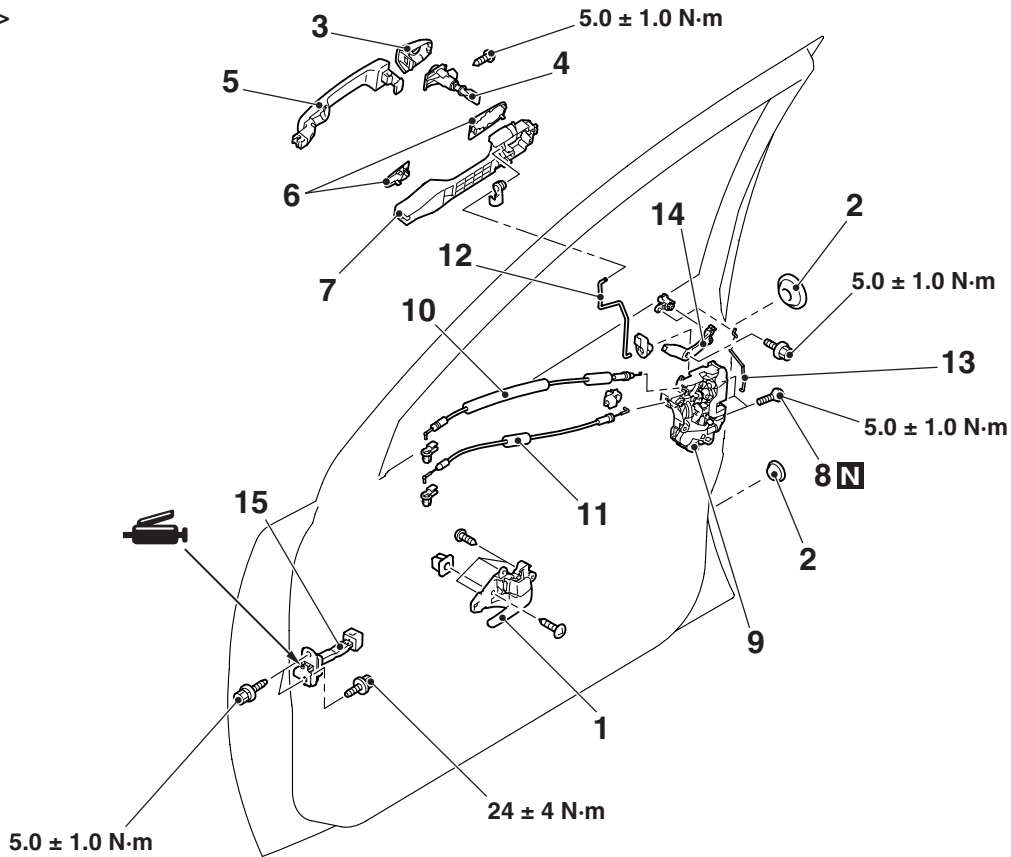
Pre-removal Operation

- Door Trim Assembly Removal (Refer to GROUP 52A, Door Trim).

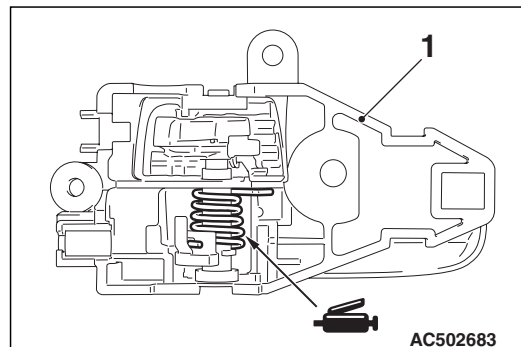
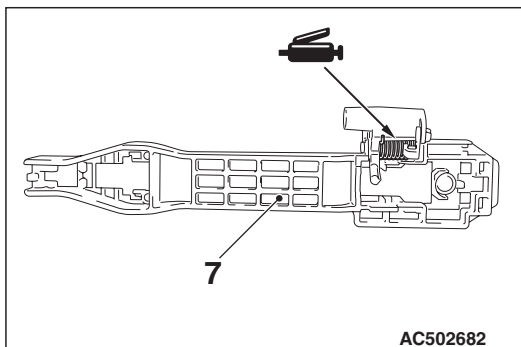
Post-installation Operation

- Door Inside Handle Play Check (Refer to P.42-94).
- Door Outside Handle Play Check (Refer to P.42-93).
- Door Trim Assembly Installation (Refer to GROUP 52A, Door Trim).

<Front door>



AC501261AB



AC503681AB

- >>B<<
- Door inside handle removal**
1. Door inside handle
- Door lock key cylinder and door outside handle removal steps**
- Waterproof film and rear lower sash (Refer to P.42-113.)
2. Plug
 3. Door outside handle cover
 4. Door lock key cylinder
 5. Door outside handle

- Door lock key cylinder and door outside handle removal steps**
6. Door outside handle gasket
 7. Door outside handle base
- Door latch assembly removal steps**
- Waterproof film and rear lower sash (Refer to P.42-113.)
8. Screw
 9. Door latch assembly
 10. Door inside lock cable

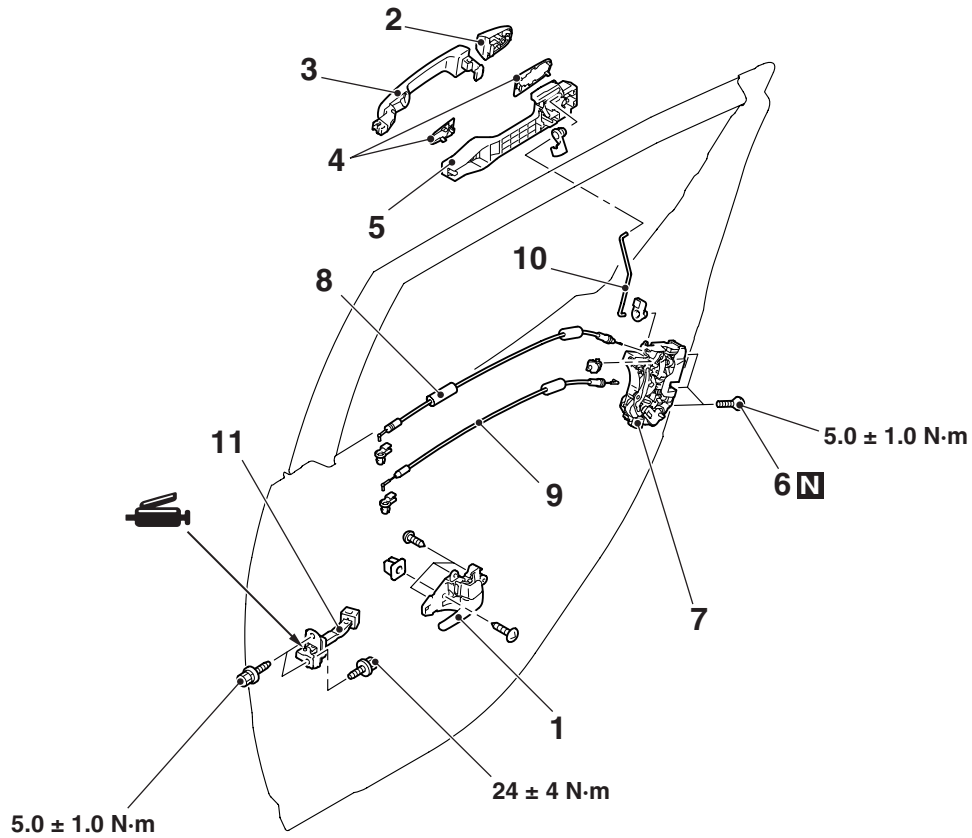
Door latch assembly removal steps (Continued)

- 11. Door inside handle cable
- 12. Door outside handle rod
- 13. Door outside lock rod
- 14. Door panel bracket

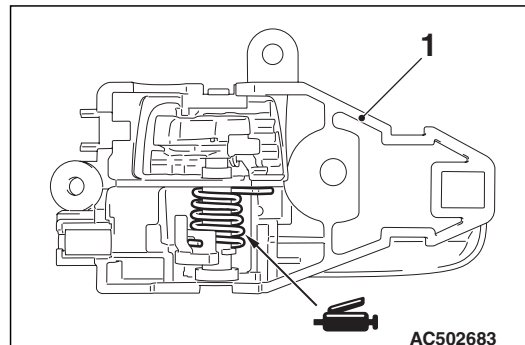
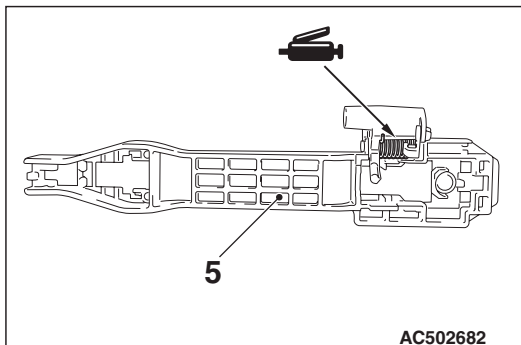
Door check removal steps

- Waterproof film (Refer to P.42-113.)
- >>A<< 15. Door check

<Rear door>



AC501262AB



AC503681AC

- >>B<<
- Door inside handle removal**
- 1. Door inside handle
- Door outside handle removal steps**
- Waterproof film and centre sash (Refer to P.42-113.)
 - 2. Door outside handle cover
 - 3. Door outside handle

- Door outside handle removal steps (Continued)**
- 4. Door outside handle gasket
 - 5. Door outside handle base

Door latch assembly removal steps

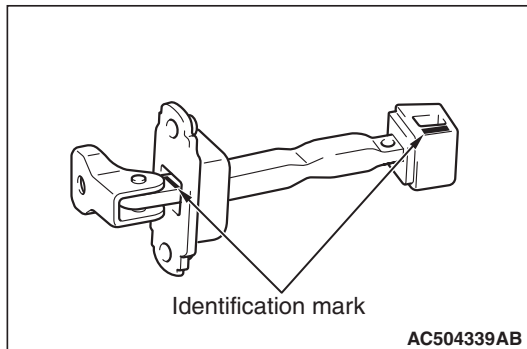
- Waterproof film and centre sash (Refer to P.42-113.)
- 6. Screw
- 7. Door latch assembly
- 8. Door inside lock cable
- 9. Door inside handle cable
- 10. Door outside handle rod

Door check removal steps

- Waterproof film (Refer to P.42-113.)
- >>A<< 11. Door check

INSTALLATION SERVICE POINT

>>A<< DOOR CHECK INSTALLATION



Install the door check with the following identification marks facing upward.

Application locations		Identification mark
Front door	Left side	57L
	Right side	57R
Rear door	Left side	56L
	Right side	56R

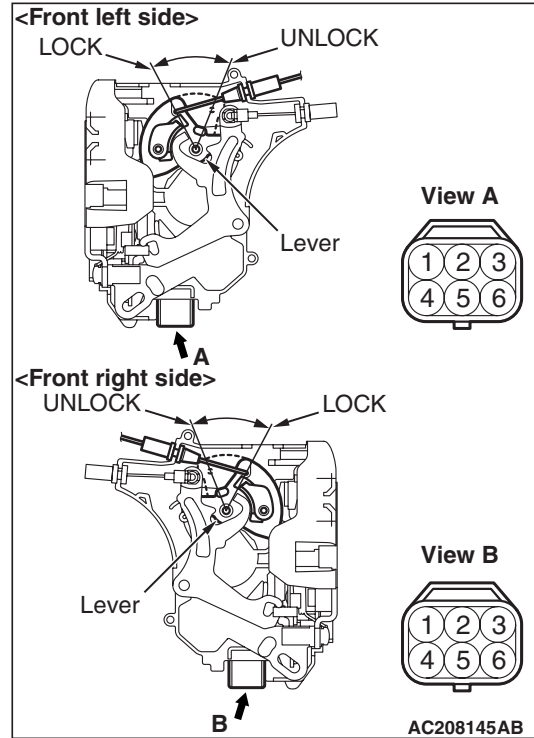
>>B<< DOOR INSIDE HANDLE INSTALLATION

When connecting the inside cable to the door inside handle, ensure that the door latch and the inside handle are unlocked.

INSPECTION

M1423004700723

FRONT DOOR LOCK ACTUATOR CHECK



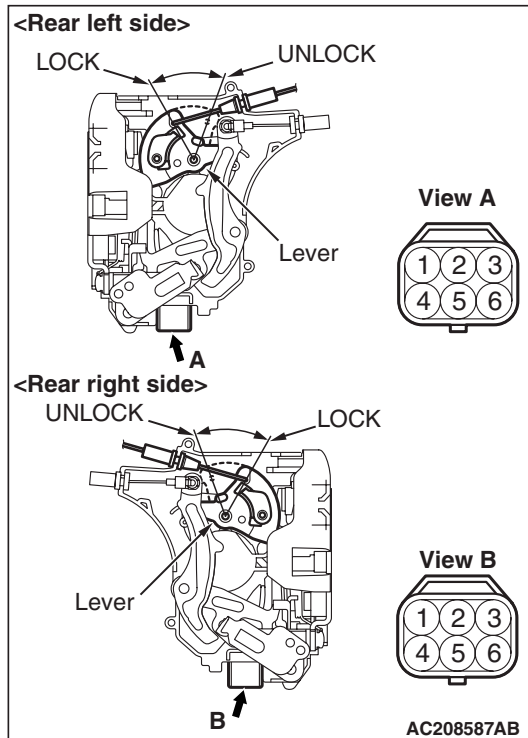
ACTUATOR OPERATION CHECK

Lever position	Battery connection	Lever operation
At the "LOCK" position	<ul style="list-style-type: none"> • Connect terminal No.4 and the negative battery terminal. • Connect terminal No.6 and the positive battery terminal. 	The lever moves from the "LOCK" position to the "UNLOCK" position.
At the "UNLOCK" position	<ul style="list-style-type: none"> • Connect terminal No.6 and the negative battery terminal. • Connect terminal No.4 and the positive battery terminal. 	The lever moves from the "UNLOCK" position to the "LOCK" position.

ACTUATOR SWITCH CHECK <DRIVER'S SIDE>

Lever position	Tester connection	Specified condition
At the "LOCK" position	2 -3	Less than 2 ohms
At the "UNLOCK" position	1 -3	

REAR DOOR LOCK ACTUATOR CHECK



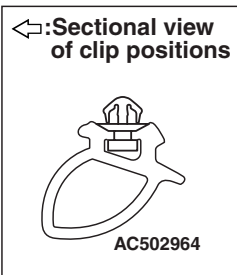
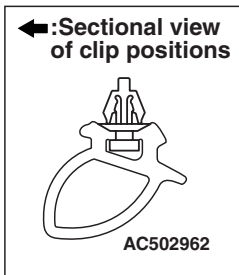
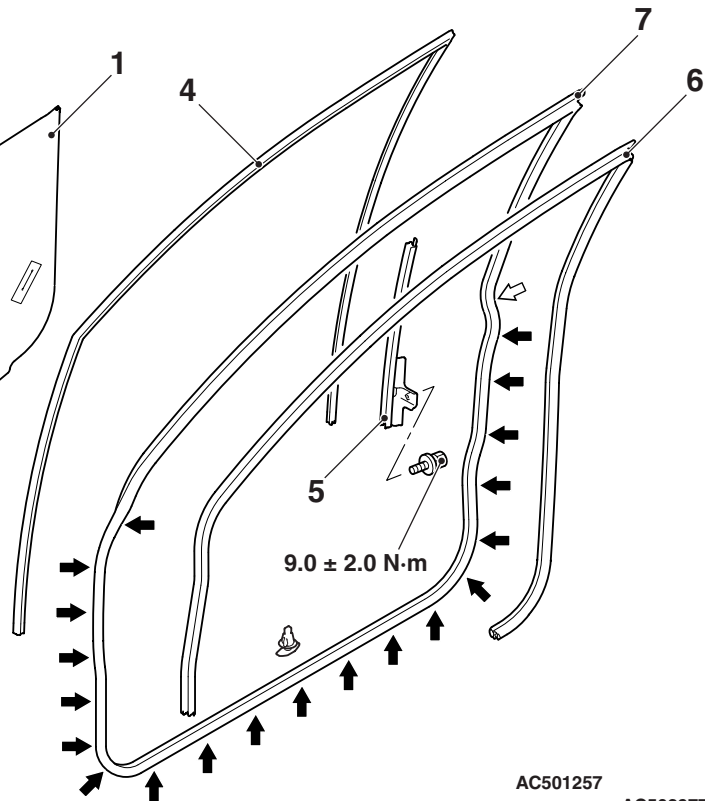
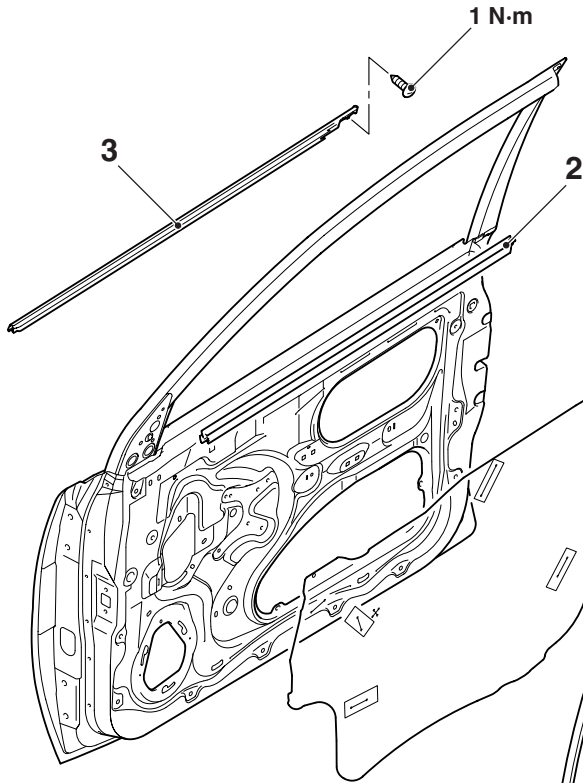
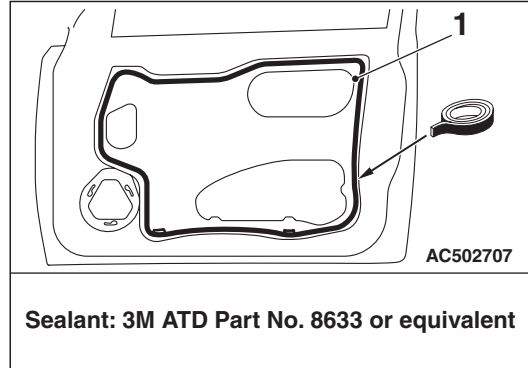
ACTUATOR OPERATION CHECK

Lever position	Battery connection	Lever operation
At the "LOCK" position	<ul style="list-style-type: none"> Connect terminal No.4 and the negative battery terminal. Connect terminal No.6 and the positive battery terminal. 	The lever moves from the "LOCK" position to the "UNLOCK" position.
At the "UNLOCK" position	<ul style="list-style-type: none"> Connect terminal No.6 and the negative battery terminal. Connect terminal No.4 and the positive battery terminal. 	The lever moves from the "UNLOCK" position to the "LOCK" position.

**WINDOW GLASS RUNCHANNEL AND
DOOR OPENING WEATHERSTRIP**

REMOVAL AND INSTALLATION <CLUB CAB>

M1423003100687



**Door window glass runchannel
removal steps**

- Pull handle bracket (Refer to GROUP 52A, Door Trim .)
- >>B<<
1. Waterproof film
 2. Door beltline weatherstrip inner
 3. Door beltline moulding
 4. Door window glass runchannel

**Door beltline weatherstrip inner
removal steps**

- Door trim assembly (Refer to GROUP 52A, Door Trim .)
- 2. Door beltline weatherstrip inner

**Door beltline moulding removal
steps**

- Door trim assembly (Refer to GROUP 52A, Door Trim .)
- 3. Door beltline moulding

Rear lower sash removal steps

- Pull handle bracket (Refer to GROUP 52A, Door Trim .)
- >>B<<
- >>A<<
1. Waterproof film
 5. Rear lower sash

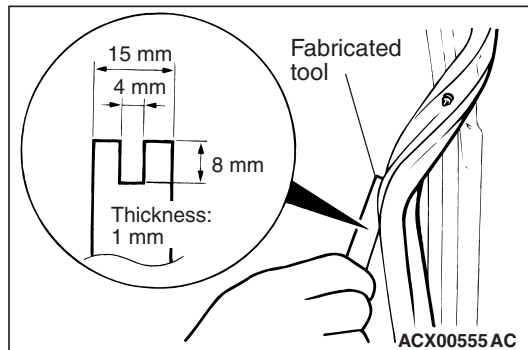
Door opening weatherstrip inner removal steps

- Cowl side trim, front scuff plate and quarter upper trim (Refer to GROUP 52A, Interior Trim .)
- 6. Door opening weatherstrip inner

Door opening weatherstrip outer removal

<<A>>

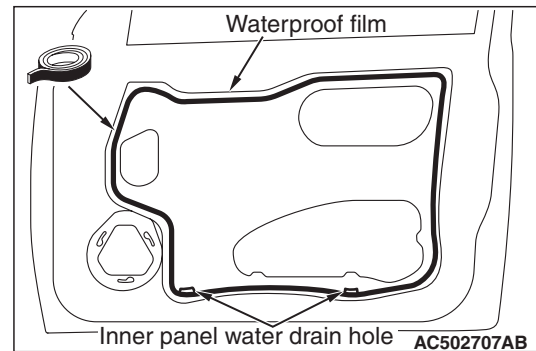
- 7. Door opening weatherstrip outer

REMOVAL SERVICE POINT**<<A>> DOOR OPENING WEATHERSTRIP OUTER REMOVAL**

Make a fabricated tool as shown in the illustration to remove the door opening weatherstrip outer.

INSTALLATION SERVICE POINTS**>>A<< REAR LOWER SASH INSTALLATION**

Engage the rear lower sash with the window sash (door) securely.

>>B<< WATERPROOF FILM INSTALLATION**⚠ CAUTION**

When sticking the waterproof film, ensure that the sealant is applied under the inner panel water drain hole.

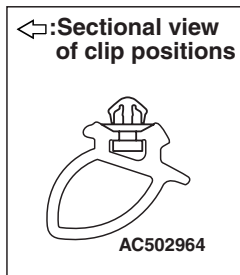
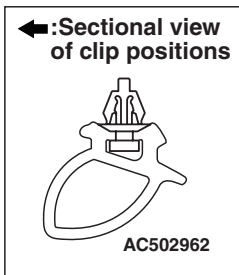
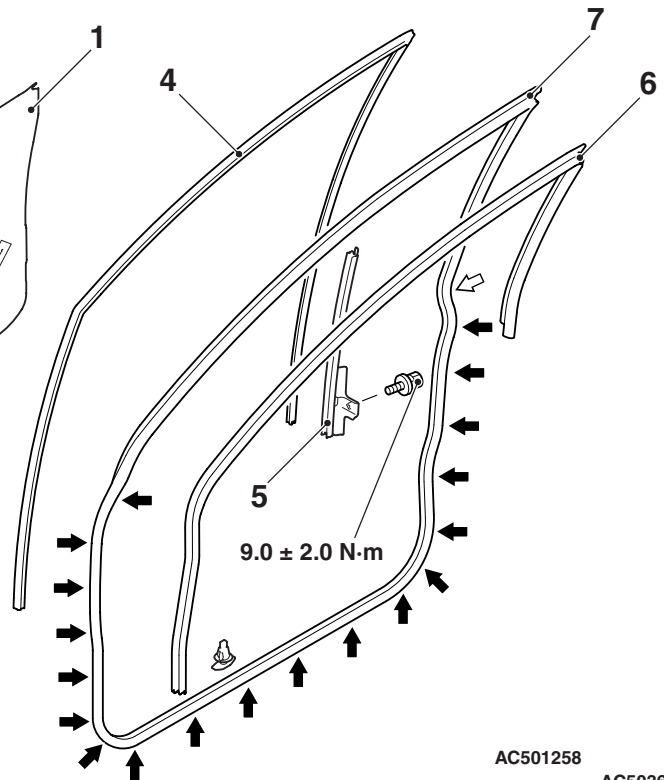
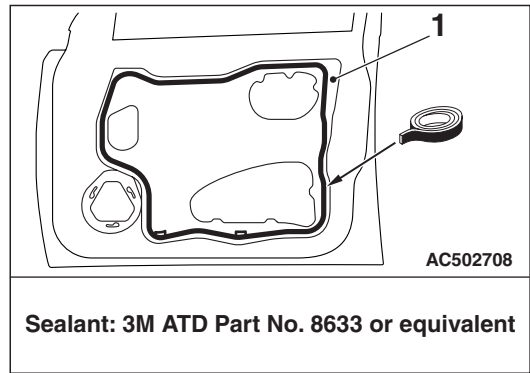
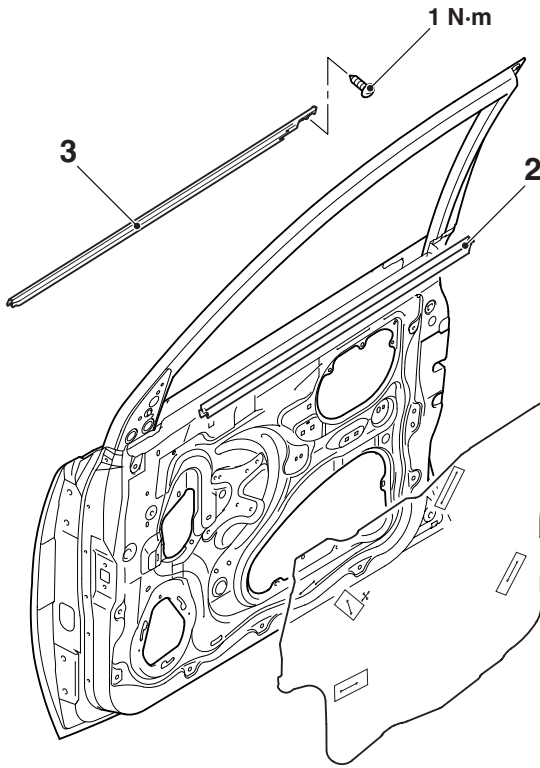
Apply the specified adhesive to the waterproof film as shown and stick the film.

Specified sealant: 3M ATD Part No.8633 or equivalent

REMOVAL AND INSTALLATION <DOUBLE CAB>

M1423003100706

<Front door>



AC501258

AC503678AB

Door window glass runchannel removal steps

- Pull handle bracket (Refer to GROUP 52A, Door Trim .)

>>B<<

1. Waterproof film
2. Door beltline weatherstrip inner
3. Door beltline moulding
4. Door window glass runchannel

Door beltline weatherstrip inner removal steps

- Door trim assembly (Refer to GROUP 52A, Door Trim .)

2. Door beltline weatherstrip inner

Door beltline moulding removal steps

- Door trim assembly (Refer to GROUP 52A, Door Trim .)

3. Door beltline moulding

<>

Rear lower sash removal steps

- Pull handle bracket (Refer to GROUP 52A, Door Trim .)

>>B<<

1. Waterproof film
5. Rear lower sash

>>A<<

Door opening weatherstrip inner removal steps

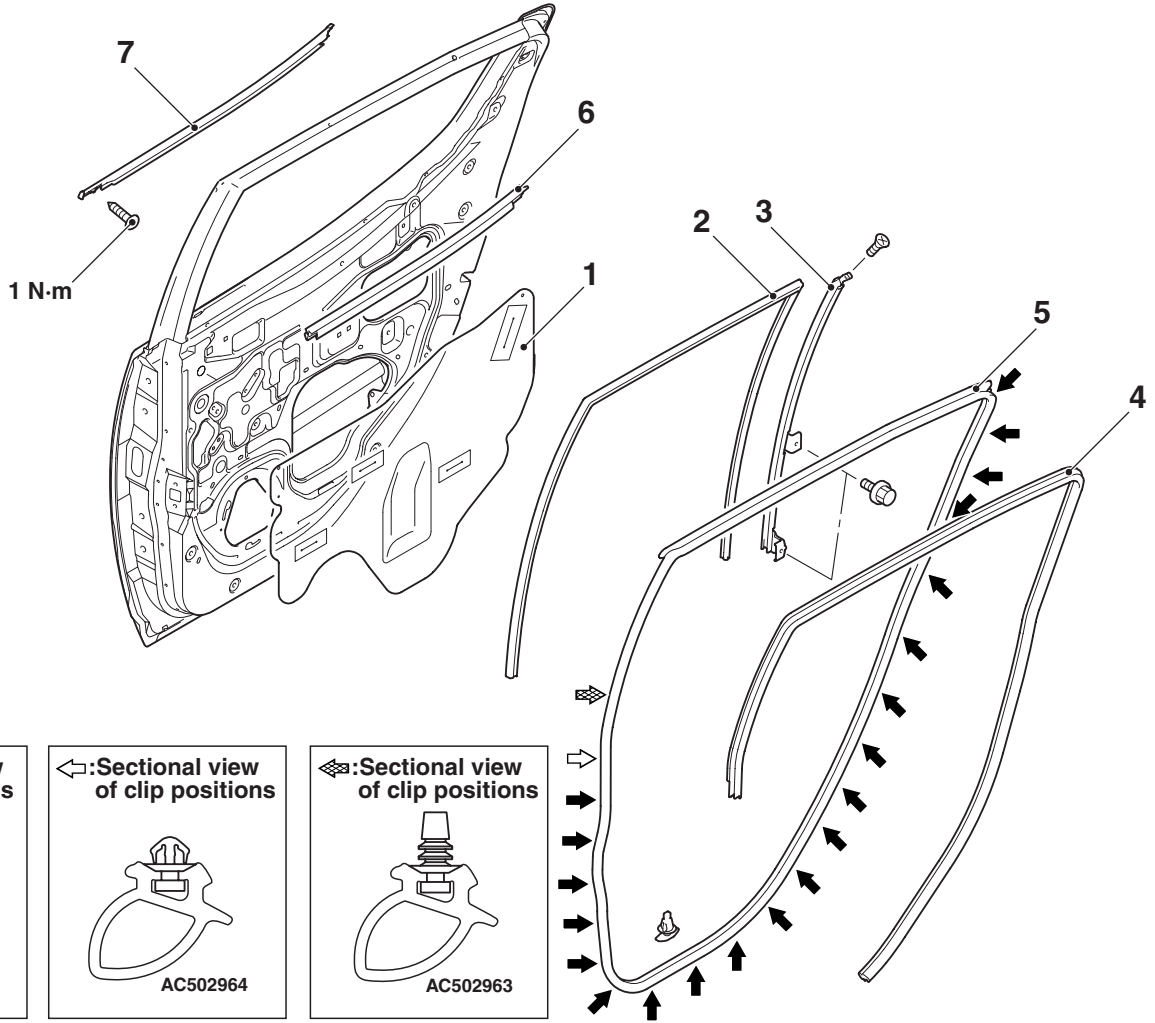
- Cowl side trim and centre pillar upper trim (Refer to GROUP 52A, Interior Trim .)

6. Door opening weatherstrip inner

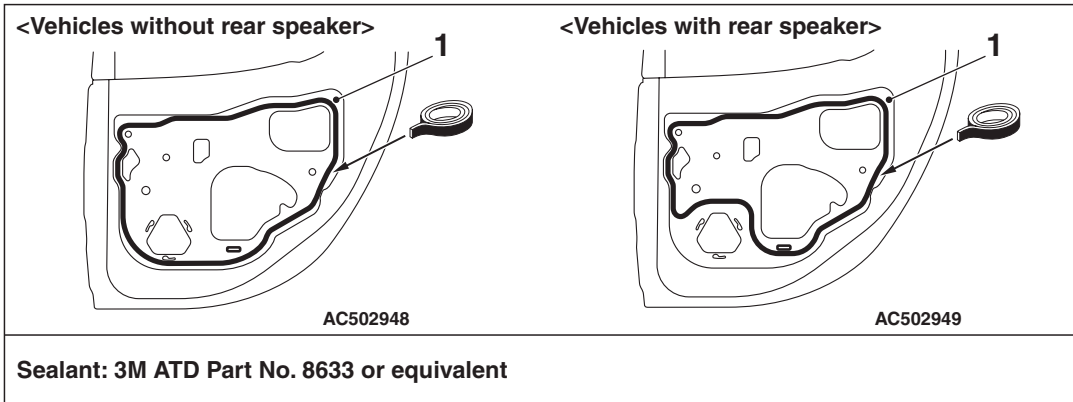
Door opening weatherstrip outer removal

7. Door opening weatherstrip outer

<Rear door>



AC501259AB



Sealant: 3M ATD Part No. 8633 or equivalent

AC503680 AB

Door window glass runchannel and centre sash removal steps

- >>B<<
- Pull handle bracket (Refer to GROUP 52A, Door Trim .)
 - 1. Waterproof film
 - 2. Door beltline weatherstrip inner
 - 3. Door beltline moulding
 - Door window regulator assembly (Refer to P.42-100.)

<<A>>

Door window glass runchannel and centre sash removal steps

- 4. Door window glass runchannel
 - 5. Centre sash
- Door beltline weatherstrip inner removal steps**
- Door trim assembly (Refer to GROUP 52A, Door Trim .)
 - 2. Door beltline weatherstrip inner

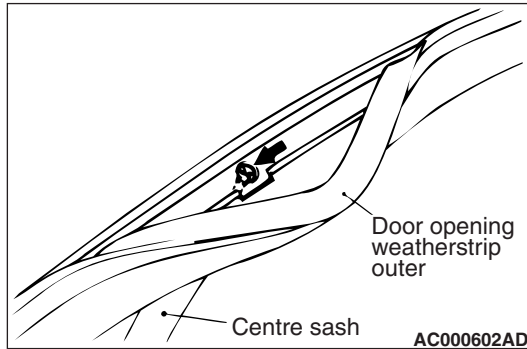
Door beltline moulding removal steps

- Door trim assembly (Refer to GROUP 52A, Door Trim .)
- 3. Door beltline moulding
- Door opening weatherstrip inner removal steps**
- Rear scuff plate, centre pillar upper trim and rear pillar upper trim (Refer to GROUP 52A, Interior Trim .)
- 6. Door opening weatherstrip inner
- Door opening weatherstrip outer removal**
- 7. Door opening weatherstrip outer

<>

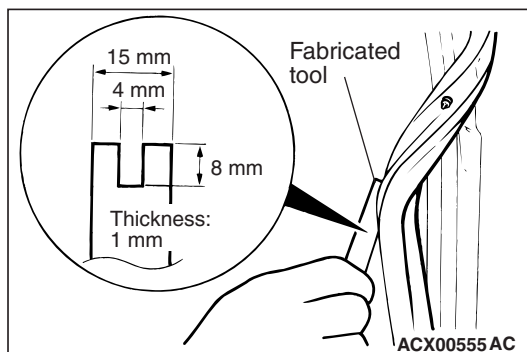
REMOVAL SERVICE POINTS

<<A>> CENTRE SASH REMOVAL



1. Remove the door opening weatherstrip outer from the centre sash only.
2. Remove the centre sash mounting screws, and then remove the centre sash from the door panel.

<> DOOR OPENING WEATHERSTRIP OUTER REMOVAL



Make a fabricated tool as shown in the illustration to remove the door opening weatherstrip outer.

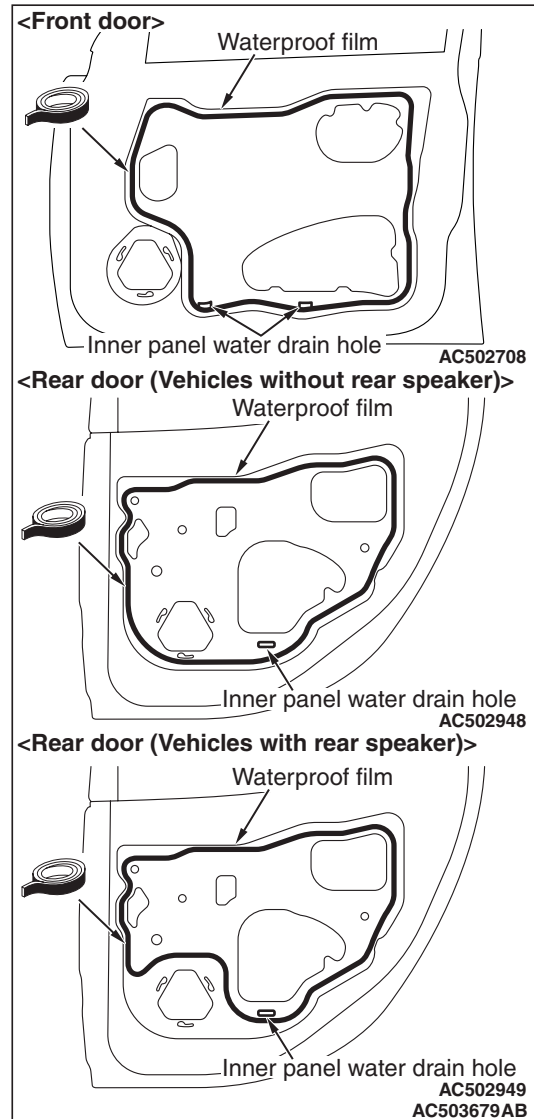
INSTALLATION SERVICE POINTS

>>A<< REAR LOWER SASH INSTALLATION

Engage the rear lower sash with the window sash (door) securely.

>>B<< WATERPROOF FILM INSTALLATION

⚠ CAUTION



When sticking the waterproof film, ensure that the sealant is applied under the inner panel water drain hole.

Apply the specified adhesive to the waterproof film as shown and stick the film.

Specified sealant: 3M ATD Part No.8633 or equivalent

KEYLESS ENTRY SYSTEM

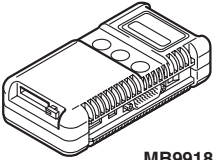
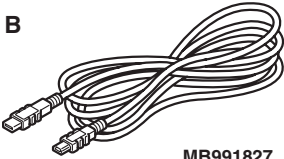
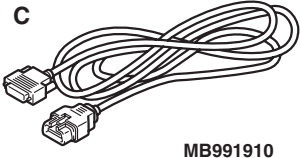
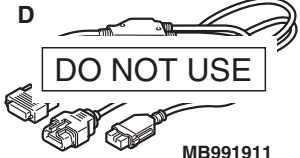
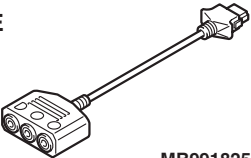
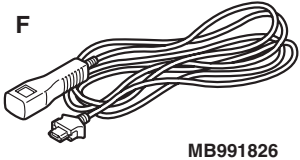
SERVICE SPECIFICATIONS

M1428000300096

Item	Standard value
Voltage of transmitter battery V	2.5 -3.2

SPECIAL TOOL

M1428000600633

Tool	Number	Name	Use
<p>A</p>  <p>MB991824</p>	<p>MB991955</p> <p>A: MB991824</p> <p>B: MB991827</p> <p>C: MB991910</p> <p>D: MB991911</p> <p>E: MB991825</p> <p>F: MB991826</p>	<p>M.U.T.-III sub-assembly</p> <p>A: Vehicle communication interface (V.C.I.)</p> <p>B: M.U.T.-III USB cable</p> <p>C: M.U.T.-III main harness A (Vehicles with CAN communication system)</p> <p>D: M.U.T.-III main harness B (Vehicles without CAN communication system)</p> <p>E: M.U.T.-III measurement adapter</p> <p>F: M.U.T.-III trigger harness</p>	<p>Encrypted code registration</p> <p>⚠ CAUTION</p> <p>For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.</p>
<p>B</p>  <p>MB991827</p>			
<p>C</p>  <p>MB991910</p>			
<p>D</p>  <p>DO NOT USE</p> <p>MB991911</p>			
<p>E</p>  <p>MB991825</p>			
<p>F</p>  <p>MB991826</p> <p>MB991955A</p>			

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

M1428001500071

Refer to GROUP 00, Contents of Troubleshooting .

TROUBLE SYMPTOM CHART

M1428001800094

Symptom	Inspection procedure number	Reference page
Keyless entry system does not work.	1	P.42-118
Keyless entry hazard lamp answerback function or the room lamp answerback function does not work normally.	2	P.42-119
Encrypted code cannot be registered.	3	P.42-121
The timer lock function does not work after the doors have been unlocked by the keyless entry system.	4	P.42-122

INPUT SIGNAL CHART

M1428004800037

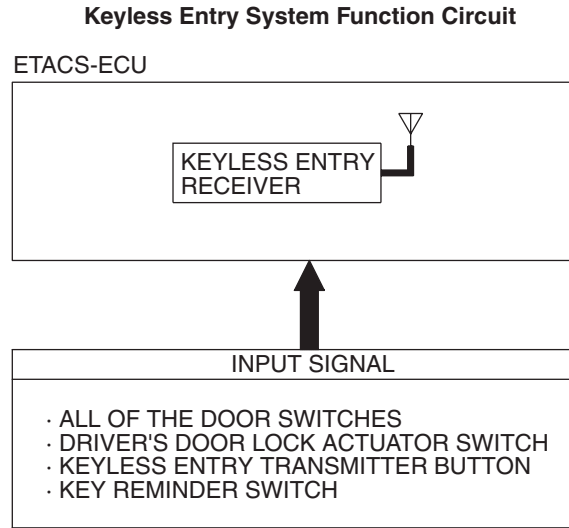
Symptom	Inspection procedure number	Reference page
Each button signal of the keyless entry transmitter is not received.	5	P.42-123
The key reminder switch signal is not received.	6	P.42-124

SYMPTOM PROCEDURES

Inspection Procedure 1: Keyless Entry System does not Work.

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.



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AC312995AB

COMMENTS ON TROUBLE SYMPTOM

If the keyless entry system does not work normally, the input signal circuits to the components below or the ETACS-ECU may be defective.

- Key reminder switch
- All of the door switches
- Transmitter
- Driver's door lock actuator

PROBABLE CAUSES

- Malfunction of the key reminder switch
- Malfunction of the door switches
- Malfunction of the transmitter
- Malfunction of the driver's door lock actuator
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE**STEP 1. Check the operation of the central door locking system.**

Check that the central door locking system works normally.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Refer to [P.42-52](#).

STEP 2. Check the power supply circuit.

When the ignition switch is turned to the LOCK (OFF) position, check if the hazard warning lamp illuminate.

Q: Is the check result normal?

YES : Go to Step 3.

NO : Refer to GROUP 54B, Inspection Procedure A-1 "Check the battery power supply circuit to the ETACS-ECU ."

STEP 3. M.U.T.-III data list

Check the input signals from the driver's door switch, the passenger's switch and the rear door switch <Double cab>.

- Driver's door: Close
- Passenger's door: Close
- Rear door <Double cab>: Close

Item No.	Item name	Normal condition
19	Driver's door switch	OFF
48	Passenger's door switch	OFF
49	Rear door switch	OFF

OK: Normal conditions are displayed for all the items.

Q: Are the check result normal?

YES : Go to Step 4.

The door switches signal are not received. : Refer to GROUP 54B, Inspection Procedure F-5 "One of the switch signals is not received ."

STEP 4. Pulse check

Check the input signals below which are related to the encrypted code of the keyless entry transmitter.

System switch	Check condition
Transmitter button	When the button is turned from off to on
Key reminder switch	When the inserted ignition key is pulled out

OK: The M.U.T.-III sounds or the voltmeter needle fluctuates.

Q: Are the check result normal?

YES : Go to Step 5.

The keyless entry transmitter button signal is not received. : Refer to P.42-123.

The key reminder switch signal is not received. : Refer to P.42-124.

STEP 5. Retest the system.

Check the keyless entry system works normally.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the ETACS-ECU.

Inspection Procedure 2: Keyless Entry Hazard Lamp Answerback Function or the Room Lamp Answerback Function does not Work Normally.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

COMMENTS ON TROUBLE SYMPTOM

If the hazard warning lamp and the room lamp work normally, the ETACS-ECU may be defective. Alternatively, it is possible that the keyless entry hazard lamp answerback function was disabled by the customize function.

PROBABLE CAUSES

- Defective hazard warning lamp
- Malfunction of the room lamp
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the operation of the hazard warning lamp.

Check that the hazard warning lamp illuminate normally.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Refer to GROUP 54B, Inspection Procedure E-5 "The hazard warning lamp do not illuminate ".

STEP 2. Check the operation of the room lamp.

Check that the room lamp illuminate normally.

Q: Is the check result normal?

YES : Go to Step 3.

NO : Refer to GROUP 54A, Inspection Procedure "The Room Lamp does not illuminate Normally ."

STEP 3. Check the operation of the keyless entry system.

If the keyless entry system is operated, check that the doors can be locked and unlocked normally.

Q: Is the check result normal?

YES : Go to Step 4.

NO : Refer to [P.42-117](#).

STEP 4. Check the customize function.

Using the customize function, check that the number of flashings of hazard warning lamp is set to any of the followings other than "LOCK: 0/UNLOCK: 0."

- LOCK:1/UNLOCK:2
- LOCK:1/UNLOCK:0
- LOCK:0/UNLOCK:2
- LOCK:2/UNLOCK:1
- LOCK:2/UNLOCK:0
- LOCK:0/UNLOCK:1

Q: Is the check result normal?

YES : Go to Step 5.

NO : Enable the keyless entry hazard lamp answerback function by using the customize function (Refer to GROUP 54B, Customisation function).

STEP 5. Check the power supply circuit.

When the ignition switch is turned to the LOCK (OFF) position, check if the hazard warning lamp illuminate.

Q: Is the check result normal?

YES : Go to Step 6.

NO : Refer to GROUP 54B, Inspection Procedure A-1 "Check The Battery Power Supply Circuit to The ETACS-ECU ."

STEP 6. Retest the system.

Check that the keyless entry hazard lamp answerback function or the room lamp answerback function work normally.

Q: Is the check result normal?

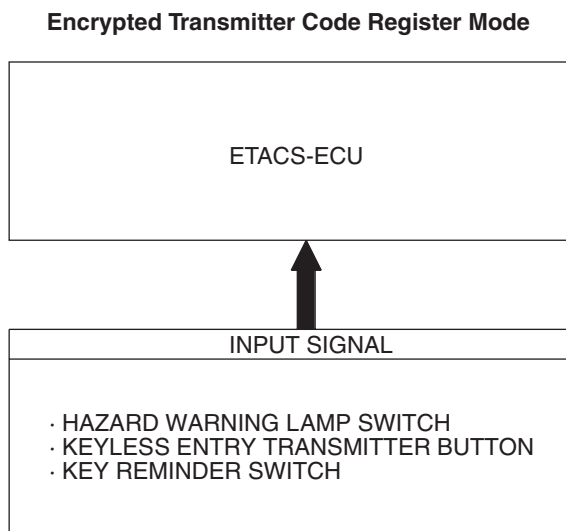
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the ETACS-ECU.

Inspection Procedure 3: Encrypted Code cannot be Registered.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.



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AC313069AB

COMMENTS ON TROUBLE SYMPTOM

If the encrypted code registration mode is not entered, the key reminder switch, the hazard warning lamp switch or the ETACS-ECU may be defective. If the registration is not possible although the registration mode is entered, the keyless entry transmitter or the ETACS-ECU may be defective.

POSSIBLE CAUSES

- Malfunction of the keyless entry transmitter
- Malfunction of the key reminder switch
- Malfunction of the hazard warning lamp switch
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the encrypted code registration mode.

Check that the encrypted code registration mode is entered.

Q: Is the check result normal?

- YES :** Go to Step 4.
NO : Go to Step 2.

STEP 2. M.U.T.-III data list

Check the input signal from the hazard warning lamp switch.

- Hazard warning lamp switch: from OFF to ON

Item No.	Item name	Normal condition
26	Hazard warning lamp switch	OFF to ON (only when switch is operated)

OK: Normal condition is displayed.

Q: Is the check result normal?

- YES :** Go to Step 3.
NO : Refer to GROUP 54B, Inspection Procedure F-4 "The Hazard Warning Lamp Switch Signal is not Received ."

STEP 3. Pulse check

Check the input signals below which are related to the encrypted code of the keyless entry transmitter.

System switch	Check condition
Transmitter button	When the button is turned from off to on
Key reminder switch	When the inserted ignition key is pulled out

OK: The M.U.T.-III sounds or the voltmeter needle fluctuates.

Q: Is the check result normal?

YES : Go to Step 4.

The keyless entry transmitter button signal is not received. : Refer to [P.42-123](#).

The key reminder switch signal is not received. : Refer to [P.42-124](#).

STEP 4. Retest the system.

Check that the encrypted code can be registered.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the ETACS-ECU.

Inspection Procedure 4: The Timer Lock Function does not Work after the Doors have been Unlocked by the Keyless Entry System.

 **CAUTION**

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

COMMENT ON TROUBLE SYMPTOM

If the keyless entry timer lock does not work normally, the input signal circuit(s) to the keyless entry transmitter or the ETACS-ECU may be defective.

PROBABLE CAUSES

- Malfunction of the keyless entry transmitter
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE**STEP 1. Check the operation of the keyless entry system.**

Check that the keyless entry system works normally.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Refer to [P.42-117](#).

STEP 2. Check the customize function.

Using the customize function, check that the timer lock function time is set to any of the followings.

- 30s
- 60s
- 120s
- 180s

Q: Is the check result normal?

YES : Go to Step 3.

NO : Enable the keyless entry timer lock function by using the customize function (Refer to GROUP 54B, Customisation function).

STEP 3. Retest the system.

Check that the timer lock works normally.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the ETACS-ECU.

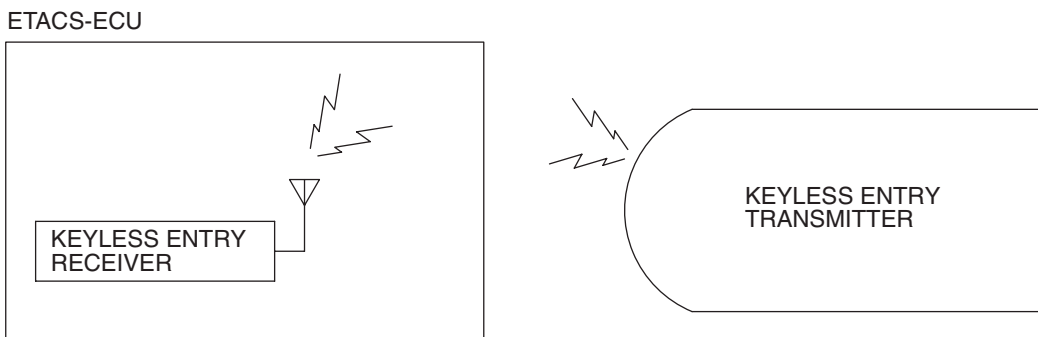
INPUT SIGNAL PROCEDURES

Inspection Procedure 5: Each Button Signal of the Keyless Entry Transmitter is not Received.

CAUTION

Whenever the ECU is replaced, ensure that the input signal circuit is normal.

Transmitter Input Circuit



W3Z10E39AA

COMMENTS ON TROUBLE SYMPTOM

Input signal from the keyless entry transmitter is used to operate the keyless entry system. If the signal is abnormal, the keyless entry system will not work normally.

PROBABLE CAUSES

- Malfunction of the keyless entry transmitter
- Defective battery of the keyless entry transmitter
- Malfunction of the ETACS-ECU

DIAGNOSIS PROCEDURE

STEP 1. Pulse check

Check the input signals below which are related to the encrypted code of the keyless entry transmitter.

System switch	Check condition
Transmitter button	When the button is turned from off to on

OK: The M.U.T.-III sounds or the voltmeter needle fluctuates.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Go to Step 4.

STEP 2. Check the transmitter battery.

Refer to P.42-130.

Q: Is the check result normal?

YES : Go to Step 3.

NO : Replace the keyless entry transmitter battery.

STEP 3. Register the encrypted code, and then retest the system.

(1) Register the keyless entry transmitter again.

(2) Check that each signal is received from the keyless entry transmitter.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the keyless entry transmitter.

STEP 4. Retest the system.

Check that each signal is received from the keyless entry transmitter.

Q: Is the check result normal?

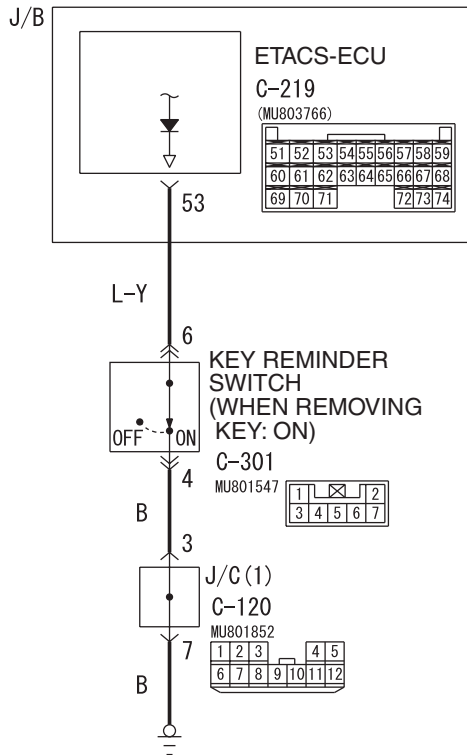
- YES :** The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).
- NO :** Replace the ETACS-ECU.

Inspection Procedure 6: The Key Reminder Switch Signal is not Received.

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Key Reminder Switch Input Circuit



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

AC502966 AB

COMMENTS ON TROUBLE SYMPTOM

Input signal from the key reminder switch is used to operate the functions below. If the signal is abnormal, these functions will not work normally.

- Ignition key reminder buzzer
- Keyless entry system
- Ignition key cylinder illumination lamp

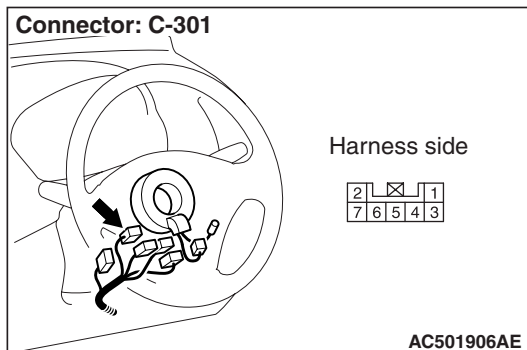
- Room lamp
- Security alarm

PROBABLE CAUSES

- Malfunction of the key reminder switch
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-301 key reminder switch connector



Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector.

STEP 2. Check the key reminder switch.

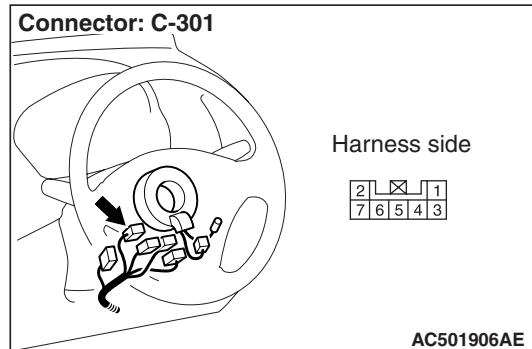
Refer to GROUP 54A, Ignition switch .

Q: Is the check result normal?

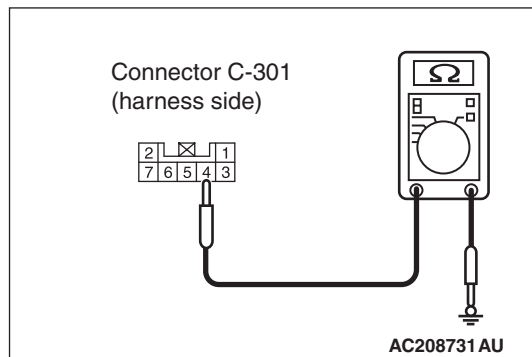
YES : Go to Step 3.

NO : Replace the key reminder switch.

STEP 3. Resistance measurement at the C-301 key reminder switch connector.



(1) Disconnect the connector, and measure at the wiring harness side.



(2) Continuity between C-301 key reminder switch connector terminal No.4 and body earth

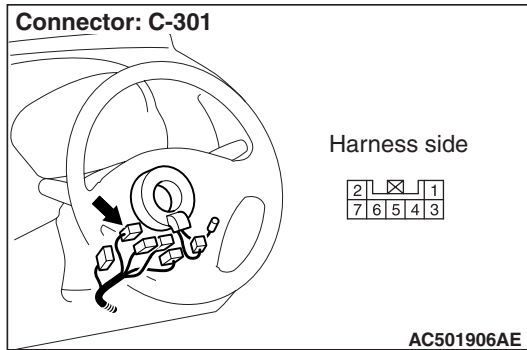
OK: 2 Ω or less

Q: Is the check result normal?

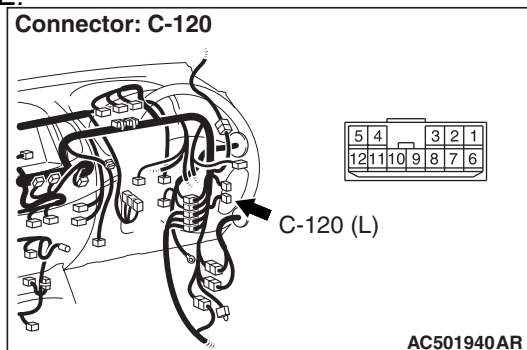
YES : Go to Step 5.

NO : Go to Step 4.

STEP 4. Check the wiring harness between C-301 key reminder switch connector terminal No.4 and the body earth.



NOTE:



Prior to the wiring harness inspection, check junction block connector C-120, and repair if necessary.

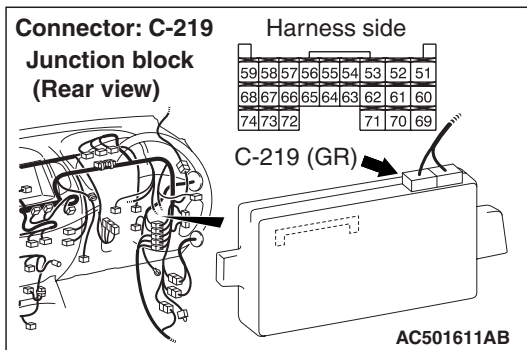
- Check the earth wires for open circuit.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 5. Connector check: C-219 ETACS-ECU connector

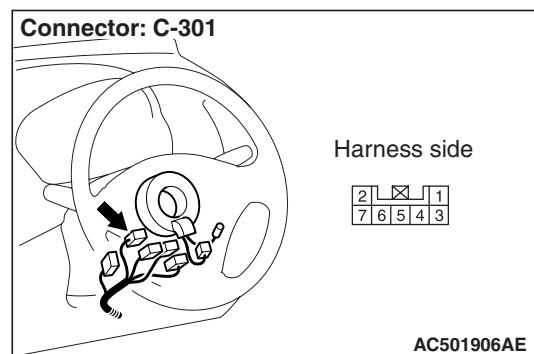
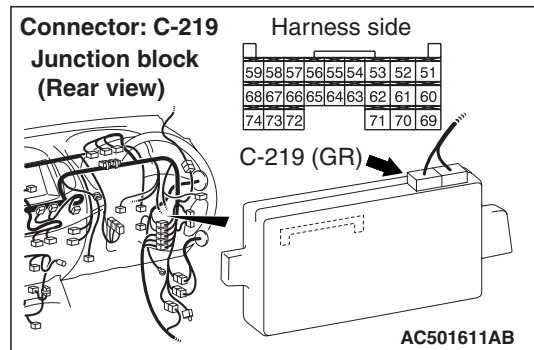


Q: Is the check result normal?

YES : Go to Step 6.

NO : Repair the defective connector.

STEP 6. Check the wiring harness between C-219 ETACS-ECU connector terminal No.53 and C-301 key reminder switch connector terminal No.6.



- Check the input line for open circuit.

Q: Is the check result normal?

YES : Go to Step 7.

NO : Repair the wiring harness.

STEP 7. Retest the system.

Check the keyless entry system works normally.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the ETACS-ECU.

ON-VEHICLE SERVICE

KEYLESS ENTRY SYSTEM INSPECTION

M1428001400278

Check the system as described below. If the system does not work, carry out troubleshooting. Refer to [P.42-117](#).

- Operate the transmitter to check that the doors can be locked and unlocked.
- Operate the transmitter to check when the door locking or unlocking operation is performed that the hazard warning lamp [lock: flash once, unlock: flash twice (default setting)] and room lamp [lock: flash once, unlock: illuminates for 15 seconds (default setting)] answer back operates. Refer to GROUP 54B, Customisation Function .

NOTE:

- *The customisation function allows you to change the answerback setting as follows. Prior to that check, confirm which setting is activated.*
 - *The hazard warning lamp flash once when locked and twice when unlocked (default setting).*
 - *The hazard warning lamp flash once when locked and do not flash when unlocked.*
 - *The hazard warning lamp do flash when locked and flash twice when unlocked.*
 - *The hazard warning lamp do not flash when both locked and unlocked.*
 - *The hazard warning lamp flash twice when locked and once when unlocked.*
 - *The hazard warning lamp flash twice when locked and do not flash when unlocked.*
 - *The hazard warning lamp do flash when locked and flash once when unlocked.*

KEYLESS ENTRY SYSTEM TIMER LOCK FUNCTION INSPECTION

M1428004000310

Attempt to unlock the doors by using the transmitter. If the doors are not locked within 30 seconds, carry out troubleshooting. Note that the doors will not be locked if the ignition key is inserted within the 30-second period, one of the doors is opened, or the keyless entry function is triggered. Refer to [P.42-117](#).

NOTE: *The customisation function allows you to change the keyless entry system timer lock period from 30 seconds (default setting) to 60, 120 or 180 seconds. Prior to the check, confirm which setting is activated. Refer to GROUP 54B, Customisation Function .*

HOW TO REGISTER SECRET CODE

M1428001000731

Each individual secret code is registered inside the transmitter, and so it is necessary to resister these codes with the EEPROM inside the receiver in the following cases.

- When the transmitter or ETACS-ECU is replaced
- If more transmitters are to be used
- If it appears that a problem is occurring because of faulty registration of a code.

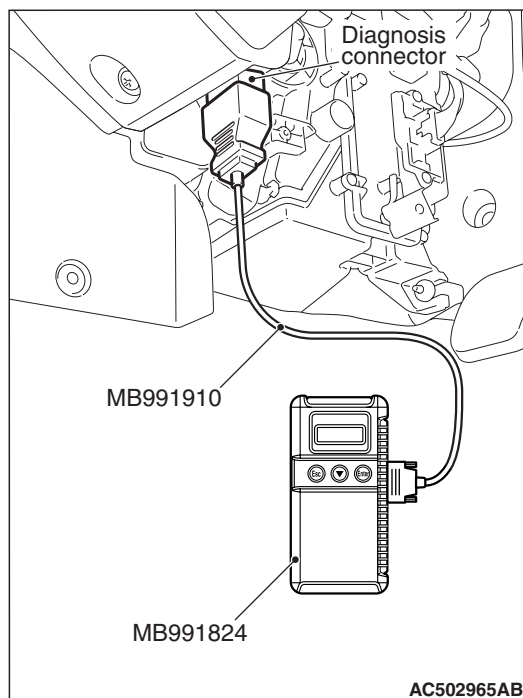
A maximum of four different codes can be stored in the EEPROM memory (four different transmitters can be used). When the code for the first transmitter is registered, the previously registered codes for all transmitters are cleared. Therefore, if you are using four transmitters or are adding more transmitters, the codes for all transmitters must be registered at the same time.

WHEN THE SPECIAL TOOL V.C.I. (MB991824) IS USED

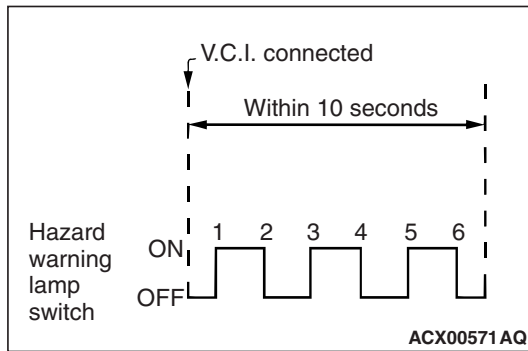
1. Check that the doors lock normally when the key is used.
2. Insert the ignition key.

⚠ CAUTION

Before connecting or disconnecting the V.C.I., turn the ignition switch to the "LOCK" (OFF) position.



3. Connect the V.C.I. to the diagnosis connector.



4. Press the hazard warning lamp switch six times within 10 seconds.

NOTE: Once the process is completed six times, then it will operate with all doors lock and unlock operations once and then go to the save mode.

NOTE: The hazard warning lamp switch is turned on and off alternately whenever it is pushed.

5. Press the transmitter switch, and then press it two times within 10 seconds of the first press. This will register the code.
6. Once the program is saved, it will operate once with the all doors lock and unlock operations.

7. If you are using two or more transmitters or have added a second transmitter, the next transmitter should be registered within one minute after registering the code for the previous transmitter. The registration procedure is common for all the transmitter.
8. Registration mode will be cancelled under the following conditions:
 - When the secret code for four transmitters has been registered;
 - When passing one minute after finishing the registration of all transmitter;
 - When no secret codes have been registered for more than one minute after the registration mode is entered;
 - When the V.C.I. is disconnected from the diagnosis connector;
 - When the key is removed from the key cylinder;
9. After the registration is completed, remove the ignition key and close all the doors, and then check that the keyless entry system operates normally.

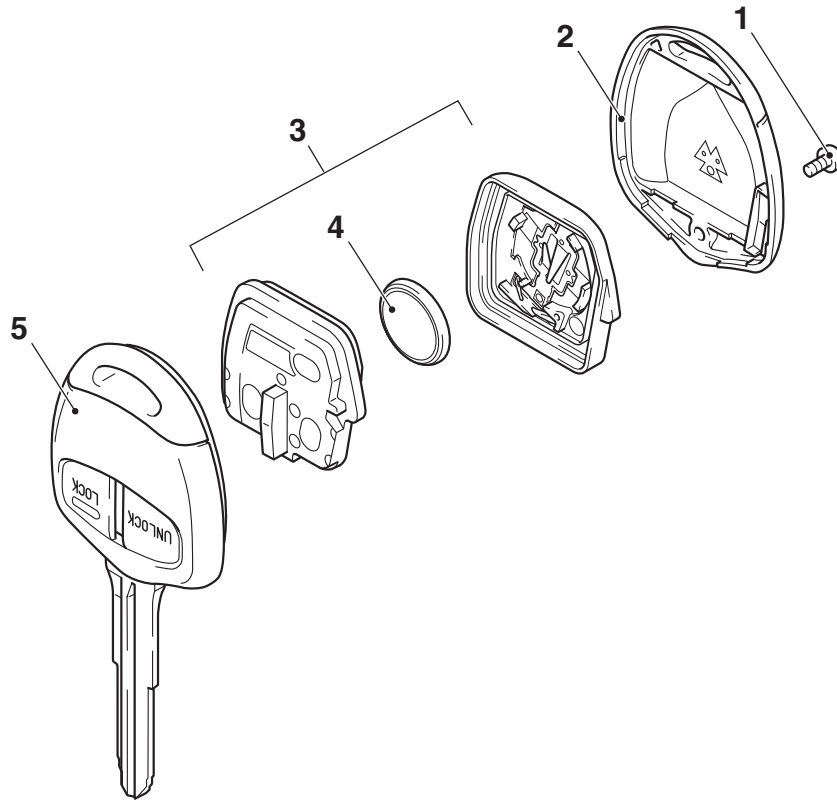
TRANSMITTER

DISASSEMBLY AND REASSEMBLY

M1428002800310

Post-reassembly operation

- Transmitter operation check



AC310838AE

Disassembly steps

1. Screw
2. Upper cover
3. Transmitter assembly
4. Battery
5. Master key

<<A>> >>A<<

DISASSEMBLY SERVICE POINT

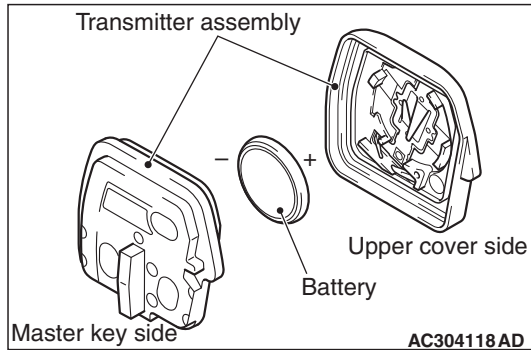
<<A>> BATTERY REMOVAL

CAUTION

Do not allow water or dust to enter the inside of the transmitter assembly when it is open. Also, do not touch the precision electronic device.

REASSEMBLY SERVICE POINT
>>A<< BATTERY INSTALLATION**⚠ CAUTION**

Do not allow water or dust to enter the inside of the transmitter assembly when it is open. Also, do not touch the precision electronic device.

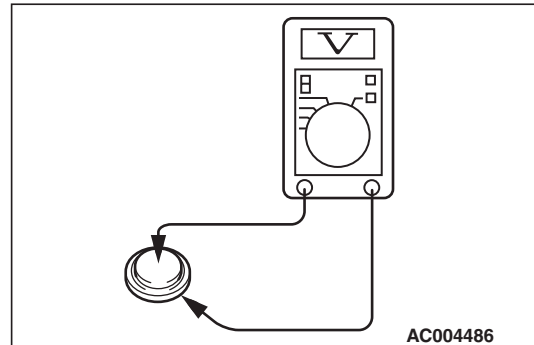


Install a new battery to the transmitter assembly with its (+) side facing towards the upper cover side.

Battery required for replacement: Coin type battery CR1616

INSPECTION

M1428003800120

TRANSMITTER BATTERY CHECK

Measure the voltage of the battery. If the voltage of the battery is not within the standard value, replace the battery.

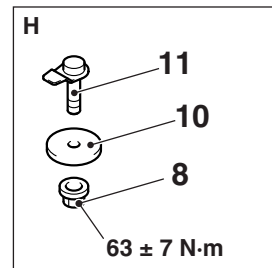
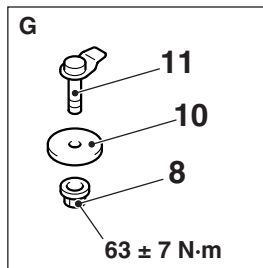
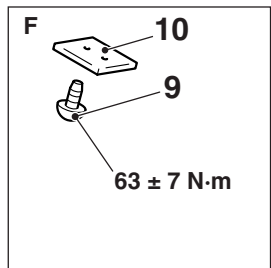
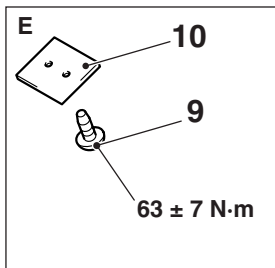
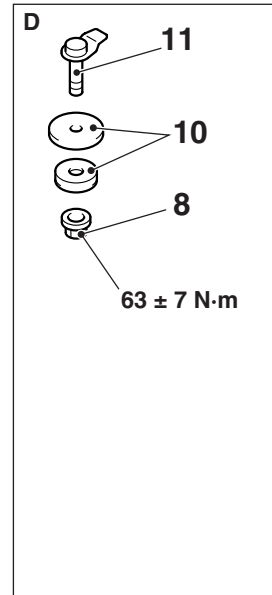
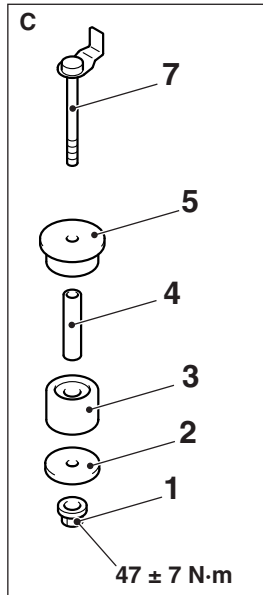
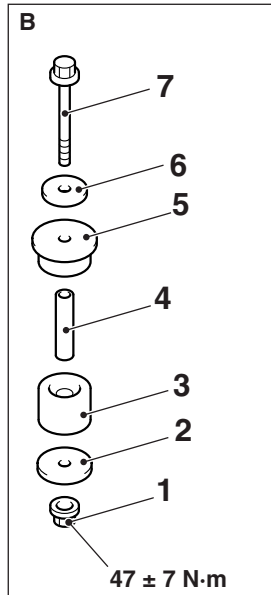
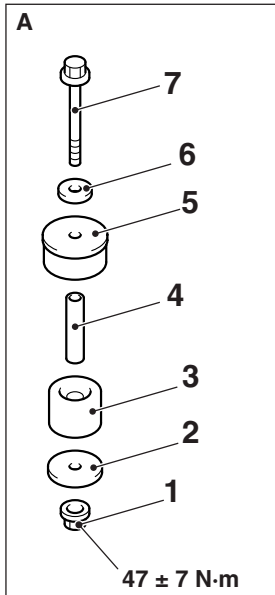
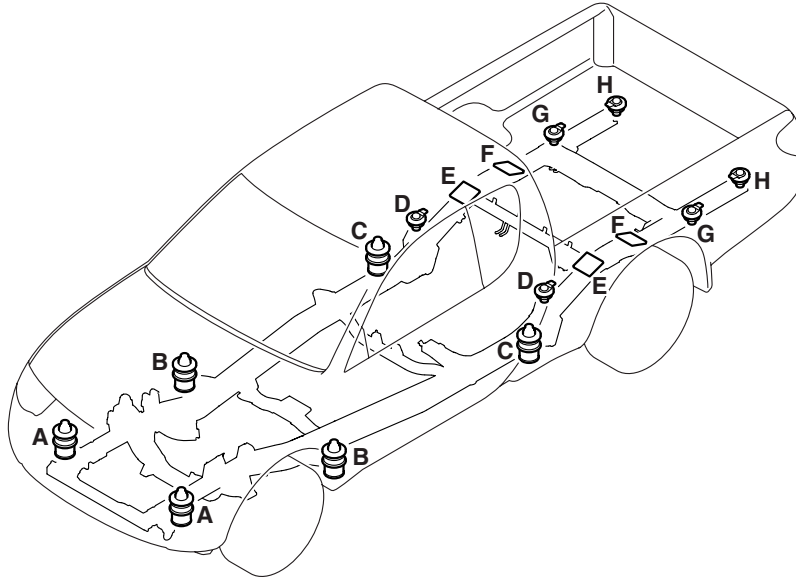
Standard value: 2.5 –3.2 V

BODY MOUNTING

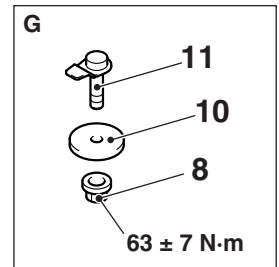
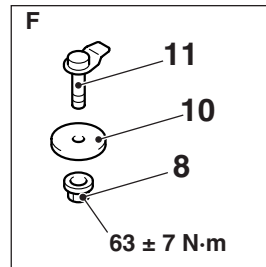
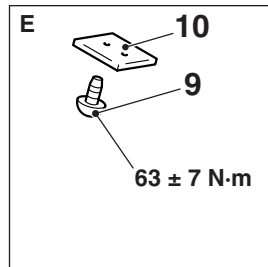
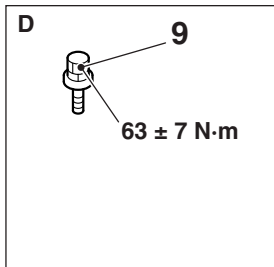
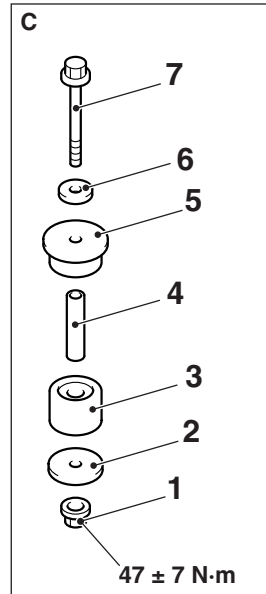
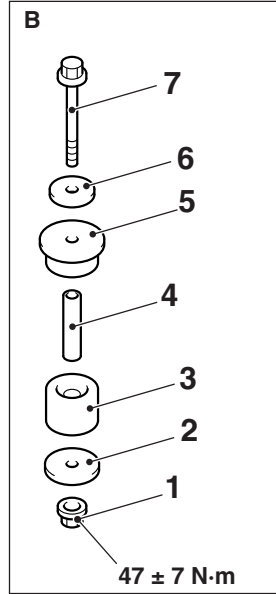
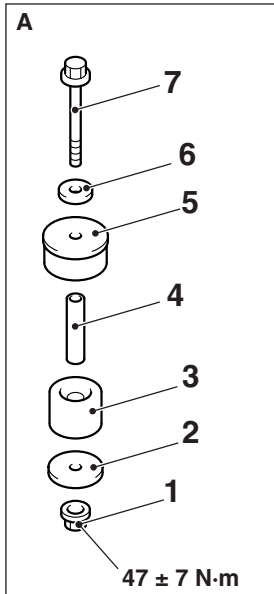
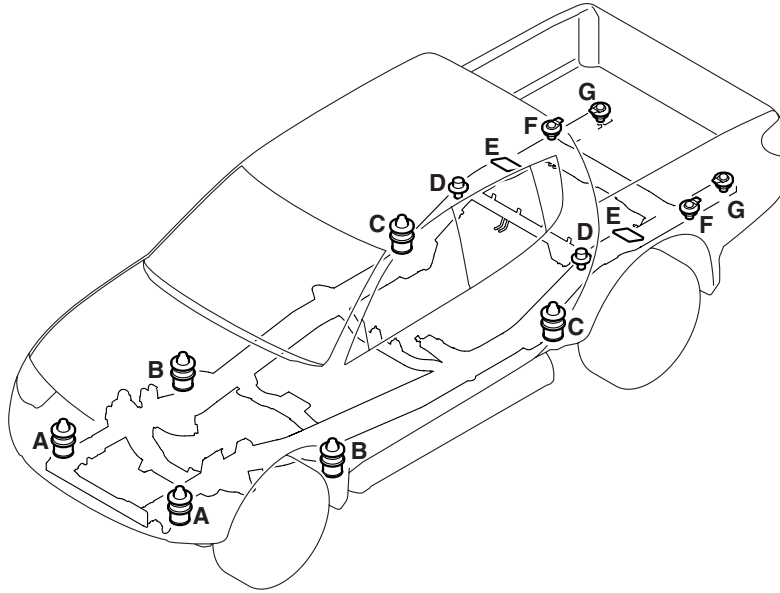
REMOVAL AND INSTALLATION

M1421003700070

<Club cab>



<Double cab>



AC501256AB

Cab body mounting removal steps

1. Cab body mounting nut
2. Cab body mounting washer
3. Cab body mounting cushion
4. Cab body mounting spacer
5. Cab body mounting cushion
6. Cab body mounting washer

<<A>>

Cab body mounting removal steps

7. Cab body mounting bolt
- Cab body

Rear body mounting removal steps

8. Rear body mounting nut
9. Rear body mounting screw or bolt
10. Rear body mounting shim

**Rear body mounting removal steps
(Continued)**

- <> 11. Rear body mounting bolt
- Rear body

- Idle up vacuum hose
- Engine harness
- A/C harness
- Frame harness
- Ground strap
- Engine earth
- Door opening weatherstrip inner
- Floor carpet
- Cab body mounting bolt

REMOVAL SERVICE POINTS

<<A>> CAB BODY REMOVAL

1. Removal or disconnect the following part.
 - Hood
 - Radiator grille
 - Headlamp
 - Front bumper assembly
 - Oil cooler hose <Vehicles with oil cooler>
 - Radiator assembly
 - Air cleaner duct
 - Steering shaft joint
 - Heater hose
 - Power steering reservoir tank
 - Brake booster vacuum hose
 - Accelerator cable
 - Fuel hose
 - Brake pipe
 - A/C piping
 - Clutch release cylinder <Vehicles with manual transmission>
 - Speedometer cable
 - Parking brake cable
 - Shift lever knob <Vehicles with manual transmission>
 - Select lever knob <Vehicles with automatic transmission>

 CAUTION

Before lifting, check to be sure that all the connections between cab body, frame and engine are separated. Connect sling wires to suitable bar or frame, fitting protection covers as necessary.

2. After removing the cab body mounting bolts and the cab body washers, insert wooden blocks to the cab body gently lift with a crane.

<> REAR BODY REMOVAL

1. Removal or disconnect the following part.
 - Fuel filler neck
 - Rear body harness
 - Rear body mounting bolts and screws

 CAUTION

Make sure that the rear body does not hit the cab body while it is being raised.

2. Hook wires onto the rope hocks on the rear body, and then use a crane to raise the rear body.

REAR GATE

SERVICE SPECIFICATIONS

M1425000300020

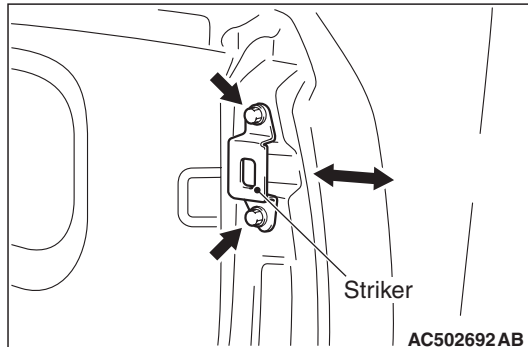
Item		Standard value
Rear gate outside handle play mm	Vehicles without high-mounted stop lamp	0.3 –1.2 (target value: 0.7)
	Vehicles with high-mounted stop lamp	0.1 –5.9 (target value: 2.6)

ON-VEHICLE SERVICE

REAR GATE PANEL FIT ADJUSTMENT

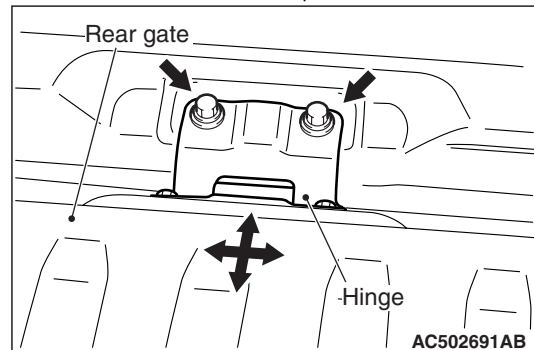
M1425001000022

ALIGNMENT OF REAR GATE LATCH AND STRIKER

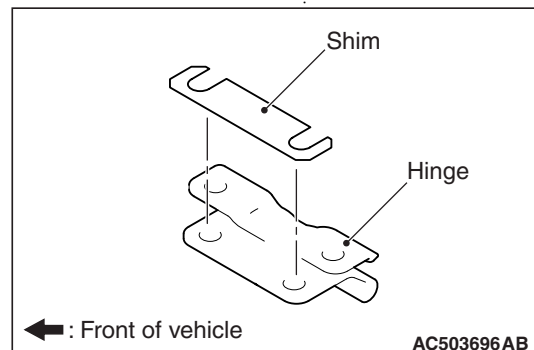


Loosen the striker mounting bolts to adjust the striker.

ADJUSTMENT OF CLEARANCE AROUND REAR GATE



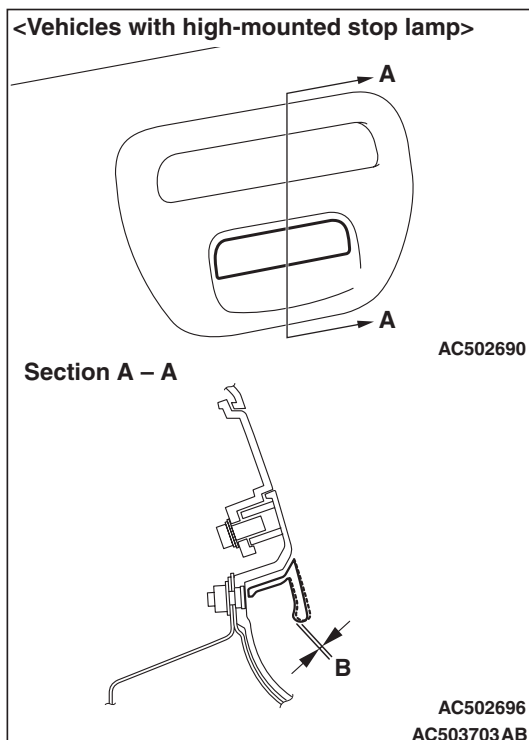
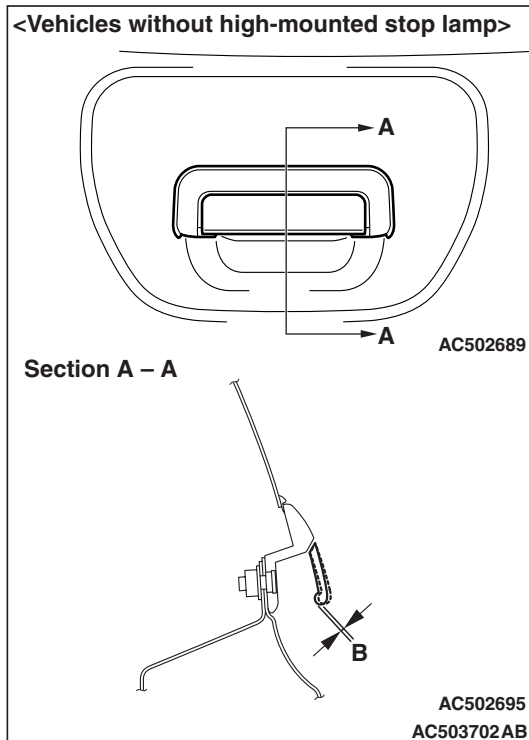
If the clearance between the rear gate and rear body is uneven, loosen the mounting bolts on the body of the rear gate hinge, and then adjust the rear gate assembly.



If the height of the rear gate and rear body is uneven, attach the shims to the rear body and hinge mounting section to adjust the height.

REAR GATE OUTSIDE HANDLE ADJUSTMENT

M1425000900022



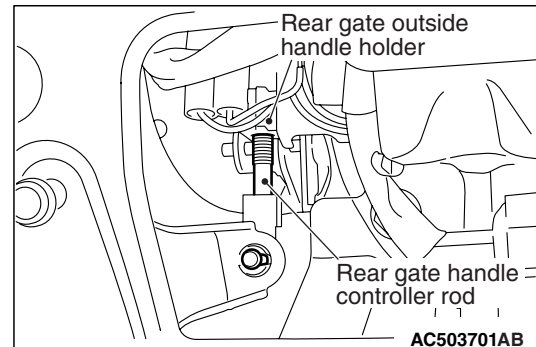
1. Check that the rear gate outside handle play is within the standard value range.

Standard value (B):

Vehicles without high-mounted stop lamp:
0.3 – 1.2 mm (target value: 0.7 mm)

Vehicles with high-mounted stop lamp: 0.1 – 5.9 mm (target value: 2.6 mm)

2. If it deviates from the standard value, remove the rear gate cover (Refer to P.42-137).



3. Remove the rear gate outside handle holder. Then adjust the play by changing the connecting point between the rear gate handle controller rod and the rear gate outside handle.

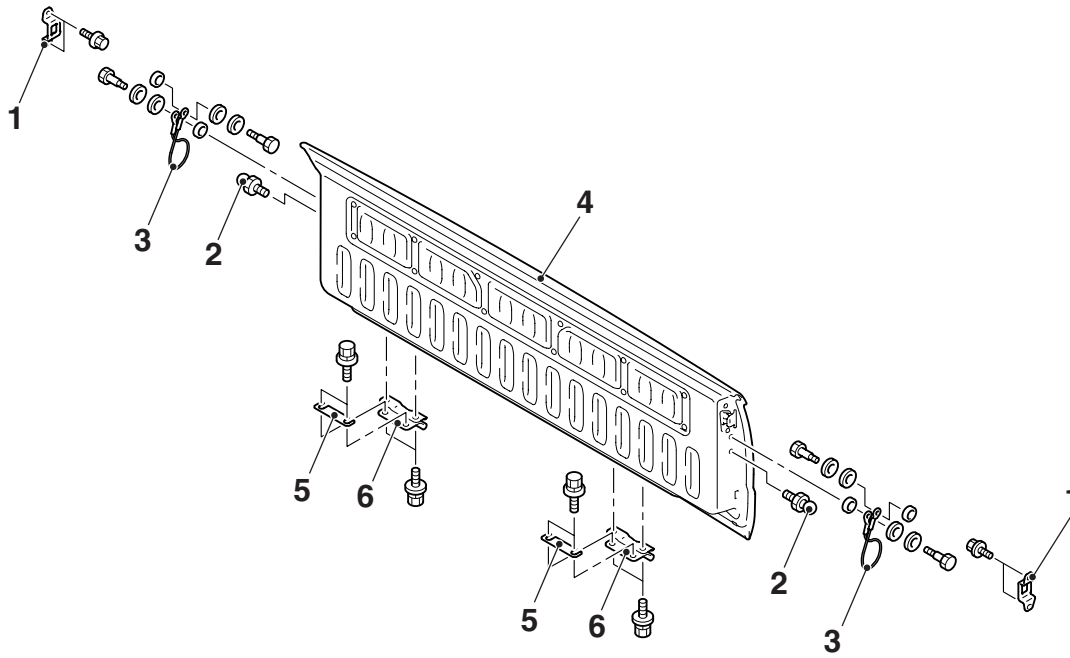
REAR GATE

REMOVAL AND INSTALLATION

M1425001700021

Post-installation Operation

- Rear Gate Fit Adjustment (Refer to P.42-134).



AC502687AB

Striker removal

1. Striker

Rear gate removal steps

- Wiring harness connector connection
2. Middle joint

Rear gate removal steps

3. Rear body gate wire
4. Rear gate assembly

Hinge removal steps

5. Shim (0 –several pieces)
6. Hinge

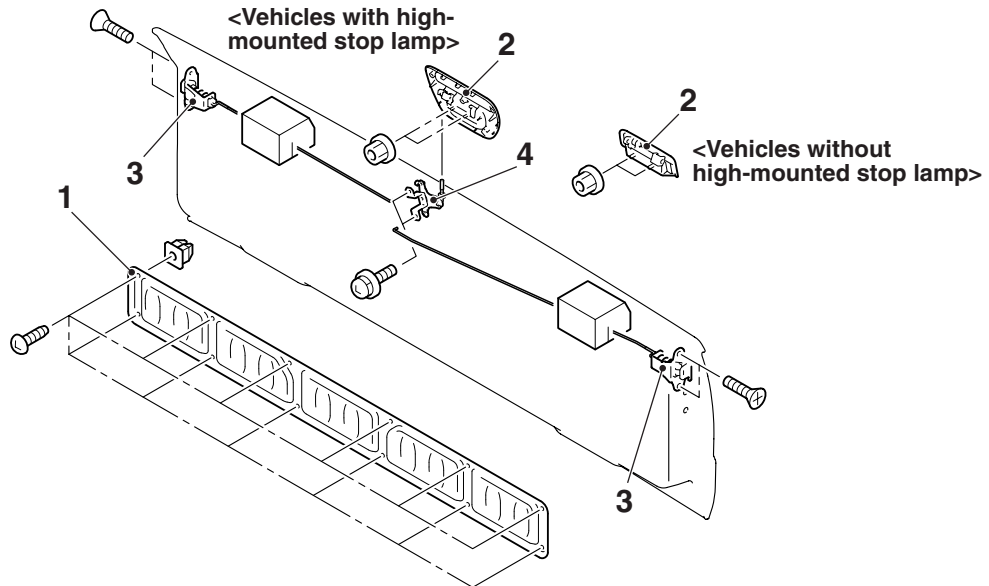
REAR GATE LATCH ASSEMBLY

REMOVAL AND INSTALLATION

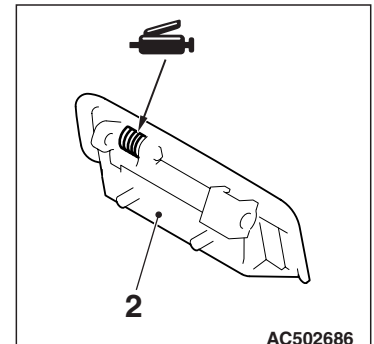
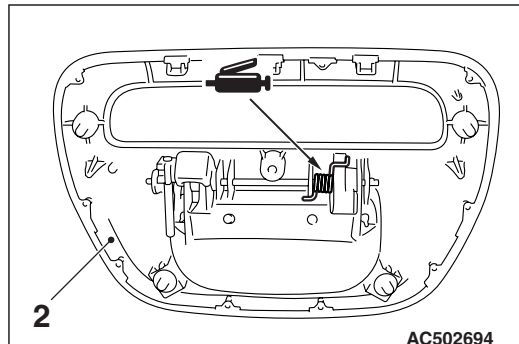
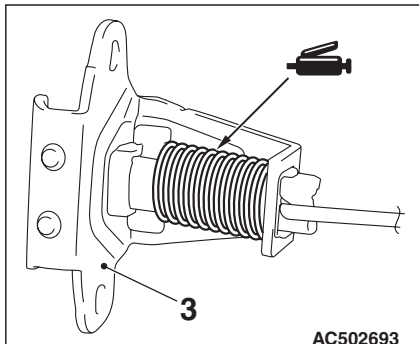
M1425003400026

Post-installation Operation

- Rear Gate Fit Adjustment (Refer to P.42-134).
- Rear Gate Outside Handle Adjustment (Refer to P.42-135).



AC502686AB



Rear gate outside handle removal steps

1. Rear gate cover
2. Rear gate outside handle

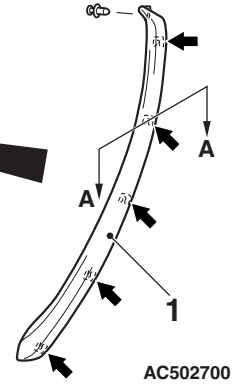
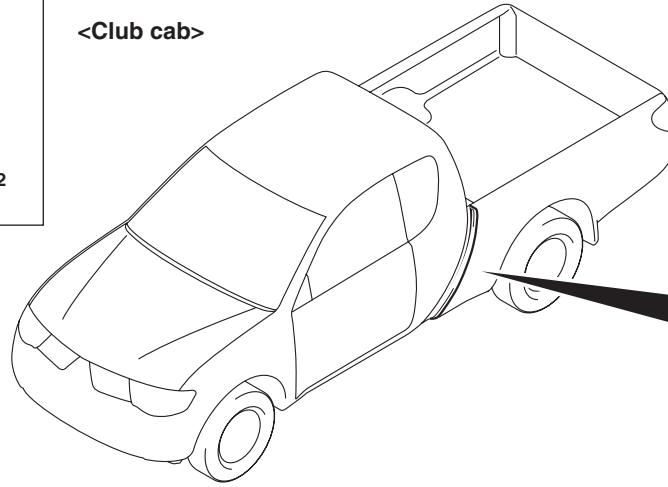
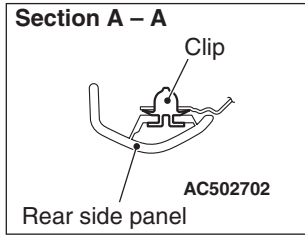
Rear gate latch removal steps

1. Rear gate cover
3. Rear gate latch
4. Rear gate handle controller

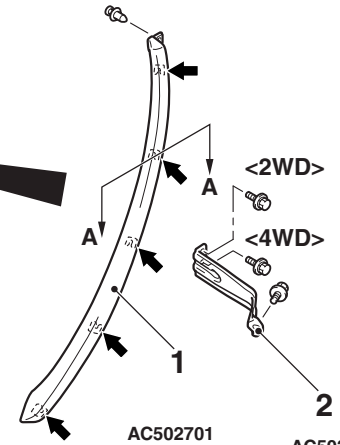
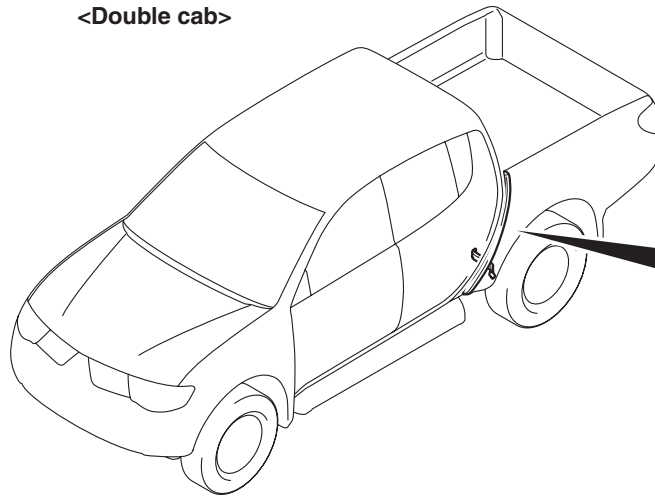
REAR SIDE PANEL

REMOVAL AND INSTALLATION

M1425003700027



AC503698AB



Note

← : Clip positions

Removal steps

1. Rear side panel
2. Rear wheel house stay

GROUP 52

**INTERIOR AND
SUPPLEMENTAL
RESTRAINT
SYSTEM(SRS)**

CONTENTS

INTERIOR 52A

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) 52B

NOTES

GROUP 52A

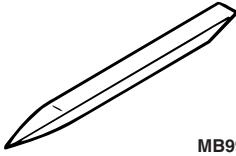
INTERIOR

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SPECIAL TOOL

M1521000600446

Tool	Tool number	Name	Use
 MB990784	MB990784	Ornament remover	Removal of switch, trim, etc.

INSTRUMENT PANEL ASSEMBLY

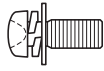

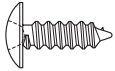

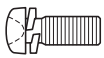

REMOVAL AND INSTALLATION

M1521001700844

⚠ WARNING

For removal and installation of the passenger's (front) air bag module, always observe the service procedures described in GROUP 52B, Driver's, Front Passenger's Air Bag Module(s) and Clock Spring (Refer to).

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."

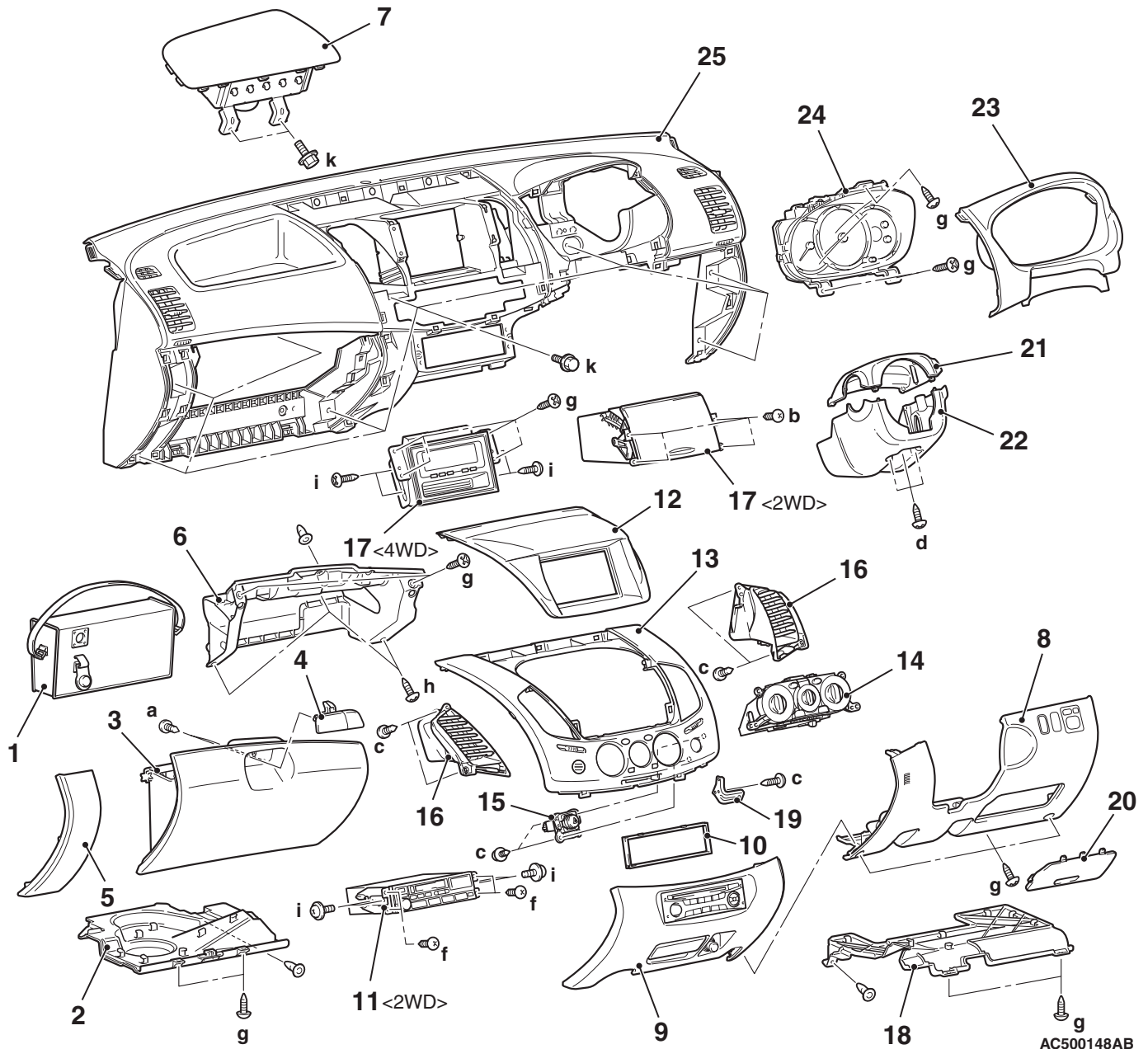
Name	Symbol	Size (D × L) mm	Colour	Shape
Tapping screw	a	4 × 12	-	 AC104423
	b	4 × 12	-	 AC104436
	c	5 × 12	-	
	d	5 × 16	-	
	e	5 × 10	-	 AC104450
	f	5 × 12	-	
	g	5 × 16	-	
	h		Green	
Machine flange screw	i	5 × 8	-	 AC104322
Washer assembly screw	j	5 × 12	-	 AC104422
Washer assembly bolt	k	6 × 16	-	 AC104417

CAUTION

- Refer to GROUP 52B, Service Precautions (Refer to) and Driver's, Front Passenger's Air bag Module(s) and Clock Spring (Refer to) before removing the passenger's (front) air bag module.
- 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-10).
- Removal and Installation of Hood Lock Release Handle (Refer to GROUP 42, Hood).
- Removal and Installation of Fuel filler lid lock release handle (Refer to GROUP 42, Fuel filler lid <Club Cab> or <Double Cab>).



AC500148AB

Removal steps

1. Cooler bag <GLS-S>
2. Passenger's side under cover <3200>

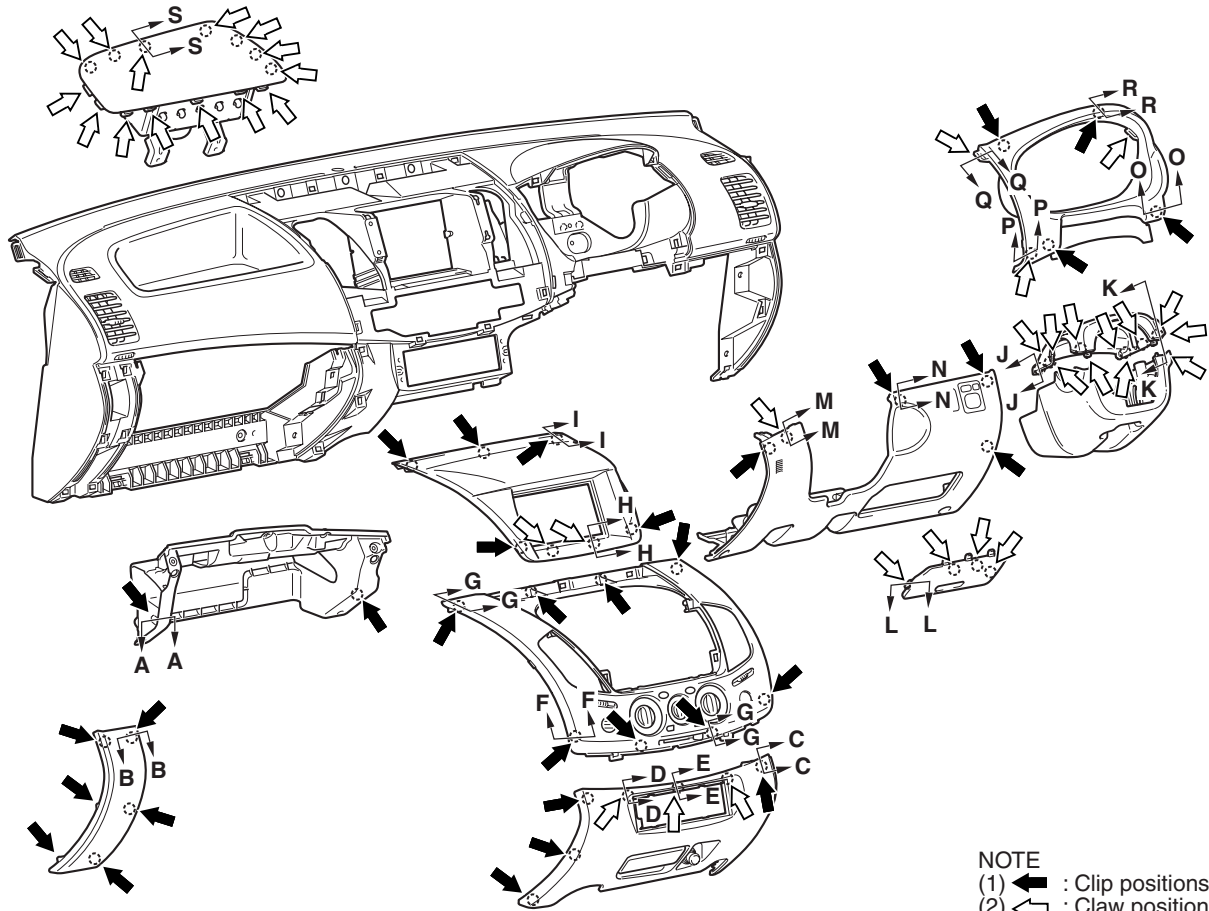
Removal steps (Continued)

3. Glove box
4. Glove box lock assembly
5. Instrument panel side cover

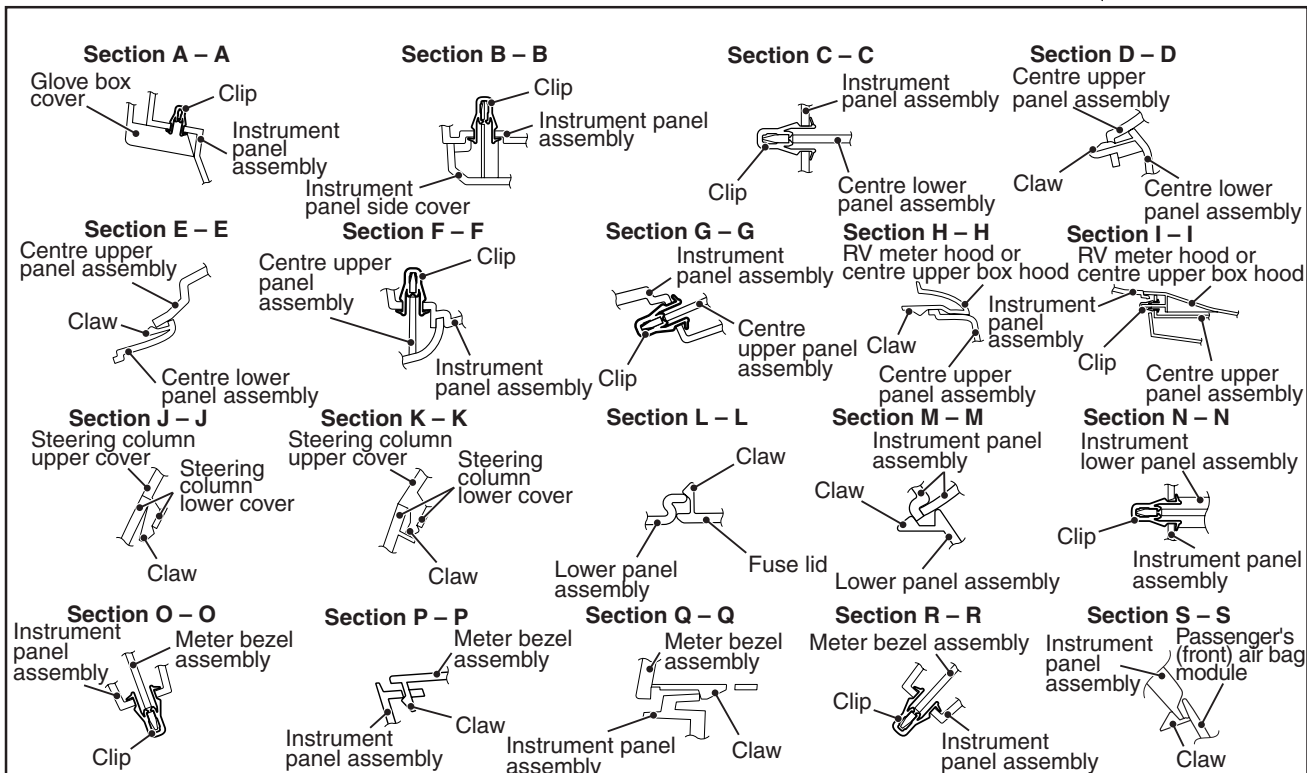
Removal steps (Continued)

- <<A>>
 - Passenger's (front) air bag module (squib) connector
- 6. Glove box cover
- 7. Passenger's (front) air bag module assembly <GLS-S> (Refer to GROUP 52B, Driver's, Front Passenger's Air bag Module(s) and Clock Spring .)
- <<A>>
 - Cigarette lighter connector
- <<A>>
 - Cigarette lighter illumination lamp connector
- 8. Lower panel assembly
- 9. Centre lower panel assembly
- 10. Spacer
- 11. Radio and tape player <2WD>
- 12. Centre upper box hood <2WD> or RV meter hood <4WD>
- 13. Centre upper panel assembly
- 14. Heater control panel assembly (Refer to GROUP 55, Heater Control Assembly and A/C switch .)
- 15. Hazard warning lamp switch (Refer to GROUP 54A, Hazard Warning Lamp Switch .)
- 16. Centre air outlet
- 17. Centre upper box <2WD> or RV meter <4WD>
- 18. Driver's side under cover <3200>
- 19. Driver's side under cover bracket <3200>
- 20. Fuse lid
- <<A>>
 - Key reminder switch connector
- <<A>>
 - Column-ECU connector
- <<A>>
 - Clock spring connector
- <<A>>
 - Ignition switch connector
- 21. Steering column upper cover
- 22. Steering column lower cover
- 23. Meter bezel assembly
- 24. Combination meter assembly
- <<A>>
 - Glove box lamp connector
 - Front pillar trim (Refer to [P.52A-10.](#))
 - Steering shaft (Refer to GROUP 37, Steering column shaft assembly .)
- 25. Instrument panel assembly

CLIP AND CRAW POSITIONS

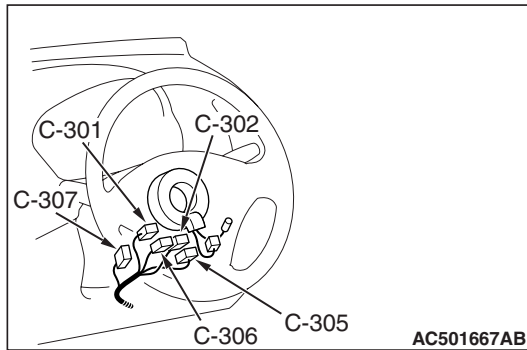
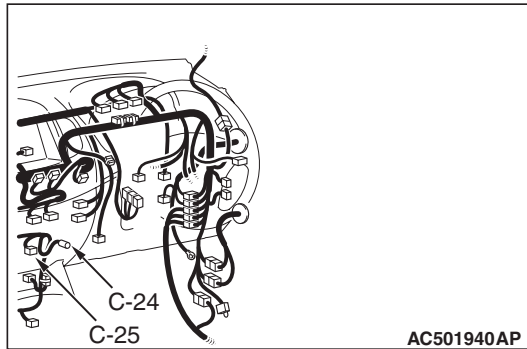
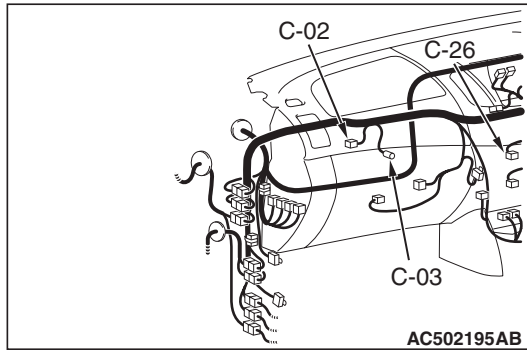


NOTE
(1) : Clip positions
(2) : Claw positions



REMOVAL SERVICE POINTS

<<A>> CONNECTOR DISCONNECTION

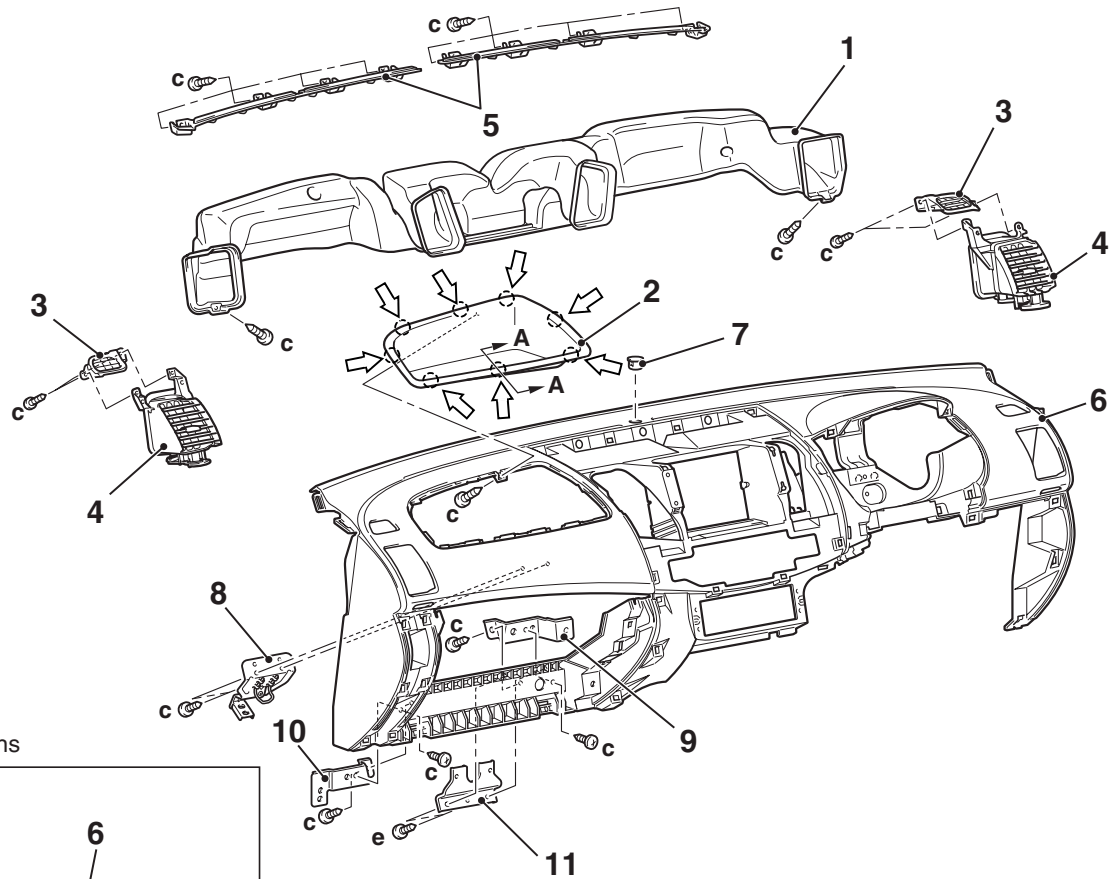


Disconnect the connectors shown in the illustration.

Connector number	Connector name
C-02 (2-R)	Passenger's (front) air bag module (squib) connector
C-03 (2)	Glove box lamp connector
C-24 (2)	Cigarette lighter illumination lamp connector
C-25 (1)	Cigarette lighter connector
C-26 (1-B)	
C-301 (7)	Key reminder switch connector
C-302 (10)	Column-ECU connector
C-305 (4-Y)	Clock spring connector
C-306 (6-B)	
C-307 (6)	Ignition switch connector

DISASSEMBLY AND REASSEMBLY

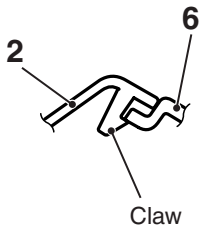
M1521001900581



NOTE

↔ : Claw positions

Section A - A



AC500730AB

Disassembly steps

1. Ventilator air distribution duct
2. Instrument panel tray <Except GLS-S>
3. Side defroster grille
4. Instrument panel side air outlet
5. Defroster garnish

Disassembly steps (Continued)

6. Instrument panel
7. Plug
8. Glove box striker
9. Bracket B
10. Bracket A
11. Heater bracket

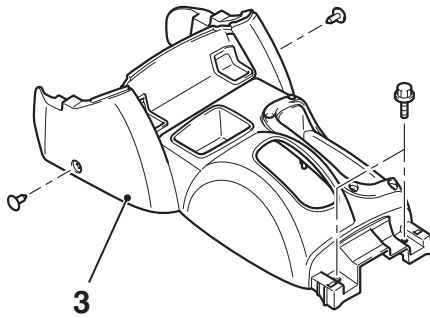
FLOOR CONSOLE ASSEMBLY

FRONT FLOOR CONSOLE ASSEMBLY

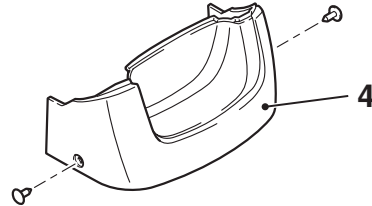
REMOVAL AND INSTALLATION

M1521005200120

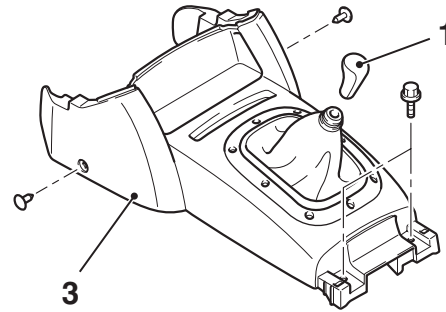
<2WD A/T>



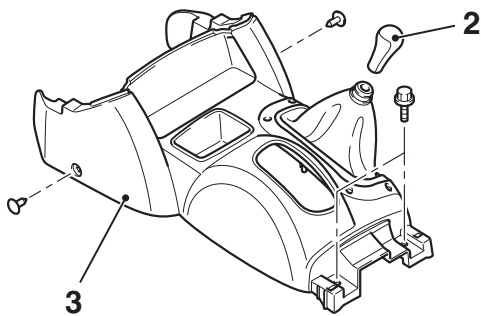
<GL>



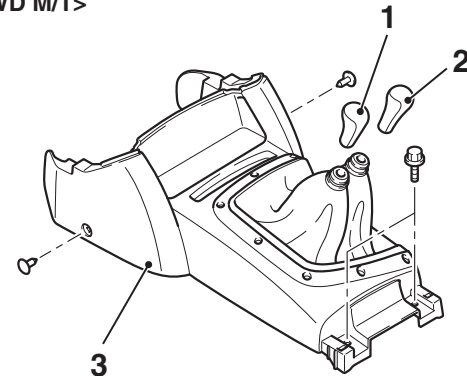
<2WD M/T>



<4WD A/T>



<4WD M/T>



AC500390AB

Front floor console assembly removal steps

- Selector lever knob <A/T> (Refer to GROUP 23A, Transmission Control .)
- 1. Shift knob <M/T>

Front floor console assembly removal steps (Continued)

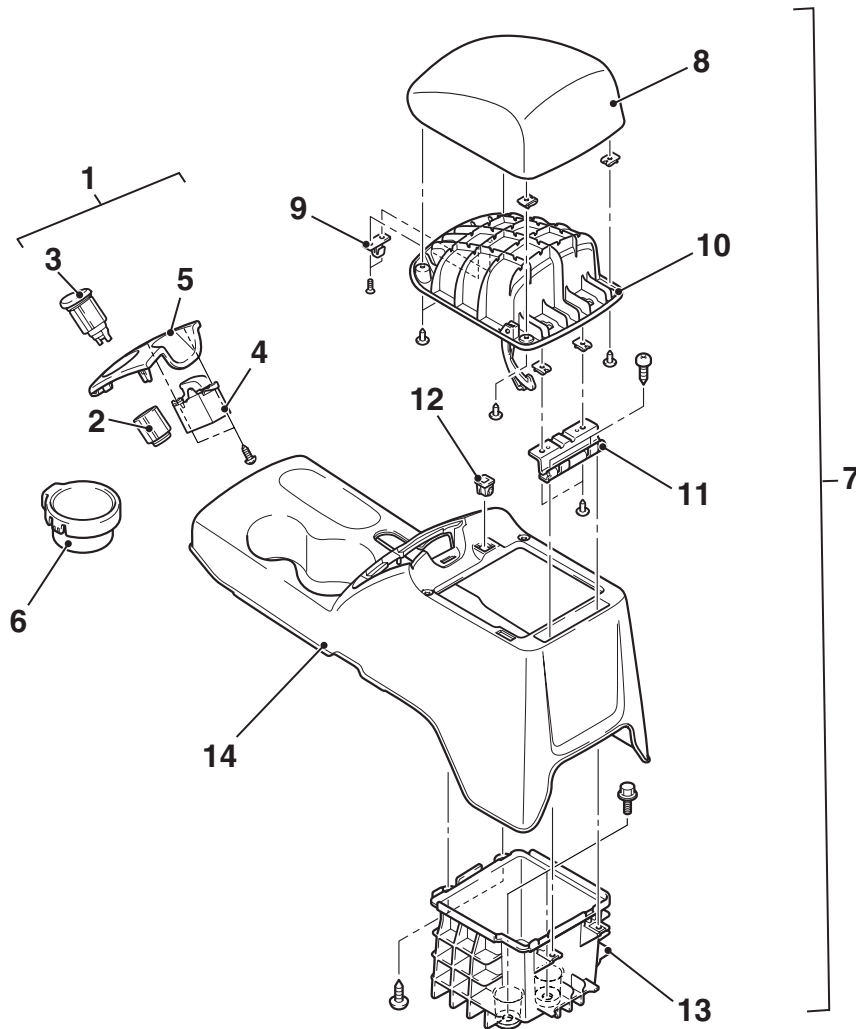
2. Transfer shift lever knob <4WD>
3. Front floor console assembly <Except GL>
- **Centre reinforce cover removal**
4. Centre reinforce cover <GL>

REAR FLOOR CONSOLE ASSEMBLY

REMOVAL AND INSTALLATION

M1521005700125

<Except GL>



AC407406AB

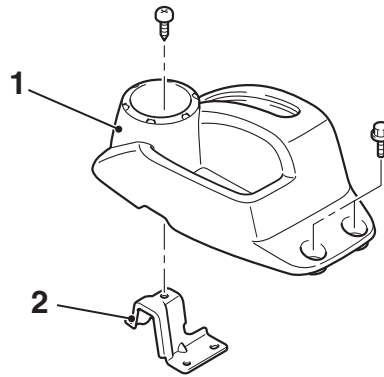
Removal steps

1. Rear floor console cover assembly
2. Accessory socket case
3. Accessory socket
4. Rear panel power window switch
<GLS-S>
5. Rear floor console cover
6. Console cup holder
7. Rear floor console assembly

Removal steps (Continued)

8. Lid outer
9. Striker
10. Lid inner
11. Lid hinge
12. Rear floor console lock
13. Box with lid
14. Rear floor console

<GL>



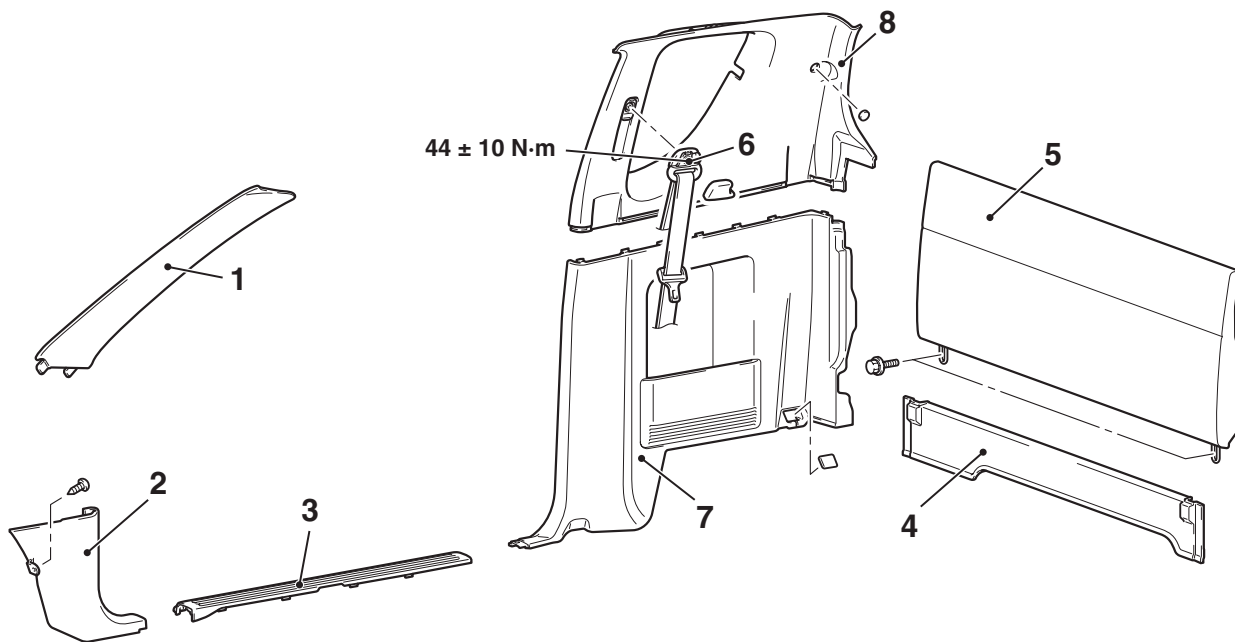
AC407407AB

Removal steps

1. Rear floor console parking brake lever cover
2. Rear floor console parking brake bracket

TRIMS**INTERIOR TRIM****REMOVAL AND INSTALLATION <CLUB CAB>**

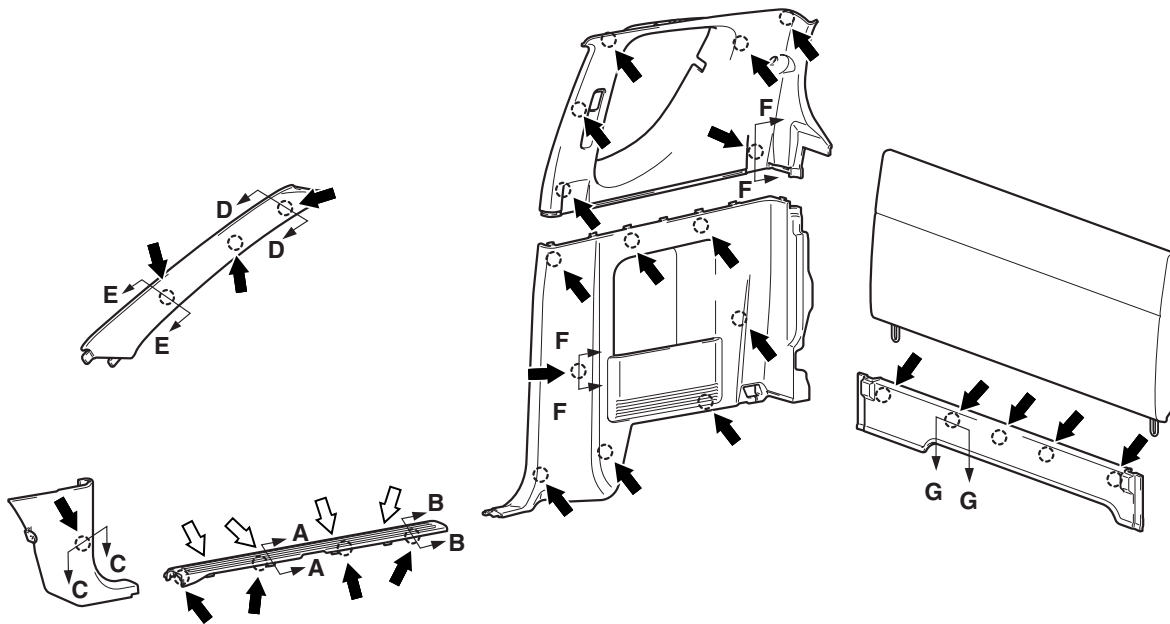
M1521001100682



AC407282 AB

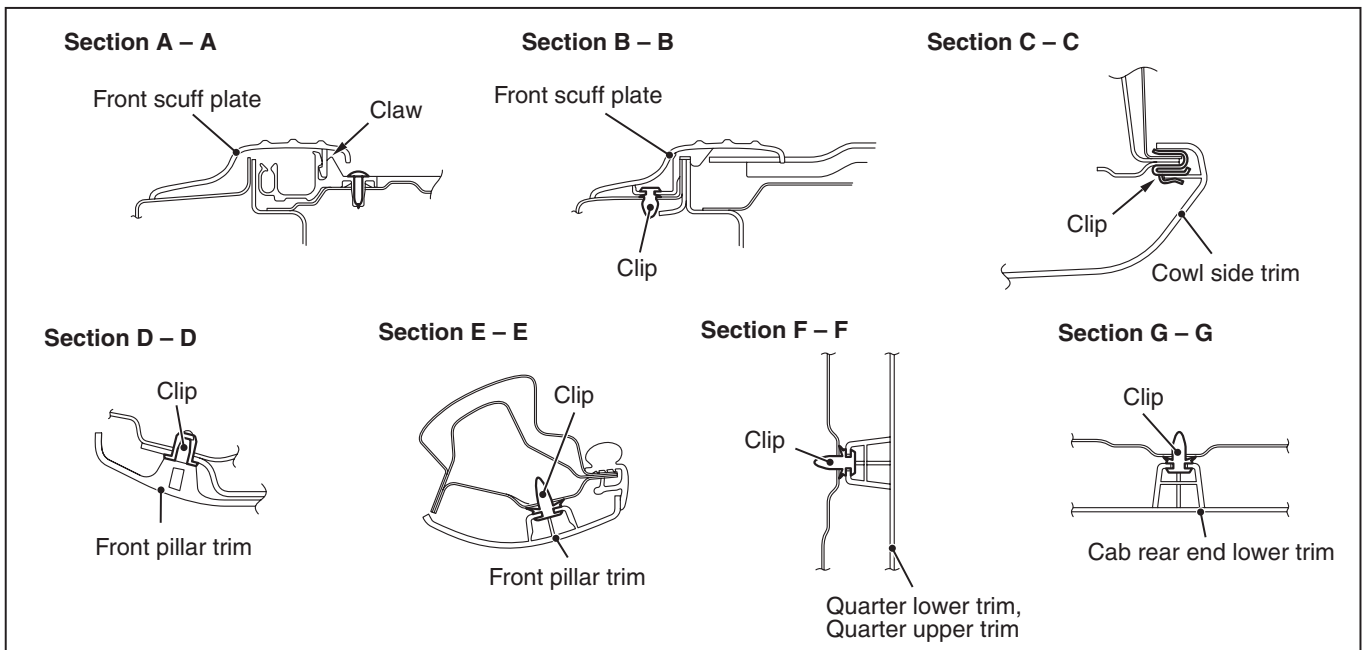
- | | |
|----------------------------|-------------------------|
| 1. Front pillar trim | 5. Cab rear end trim |
| 2. Cowl side trim | 6. Front seat belt bolt |
| 3. Front scuff plate | 7. Quarter lower trim |
| 4. Cab rear end lower trim | 8. Quarter upper trim |

CLIP AND CLAW POSITIONS



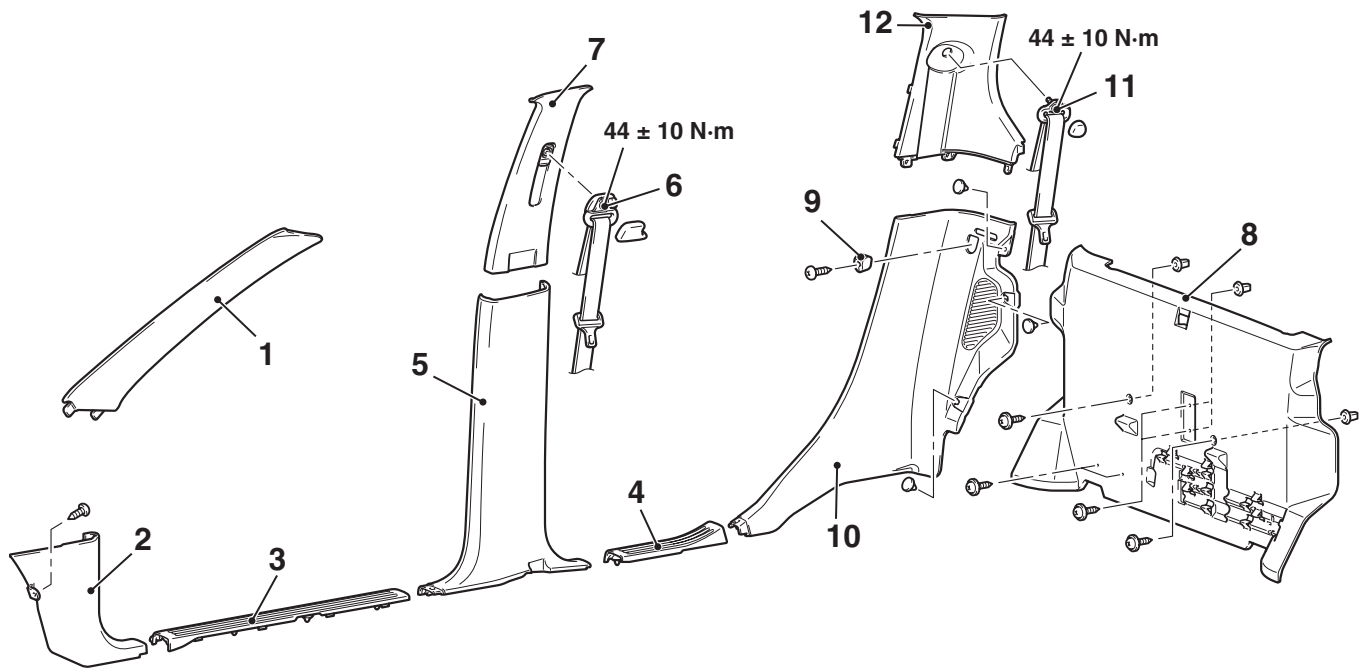
NOTE

- (1) : Clip positions
- (2) : Claw positions



REMOVAL AND INSTALLATION <DOUBLE CAB>

M1521001100723

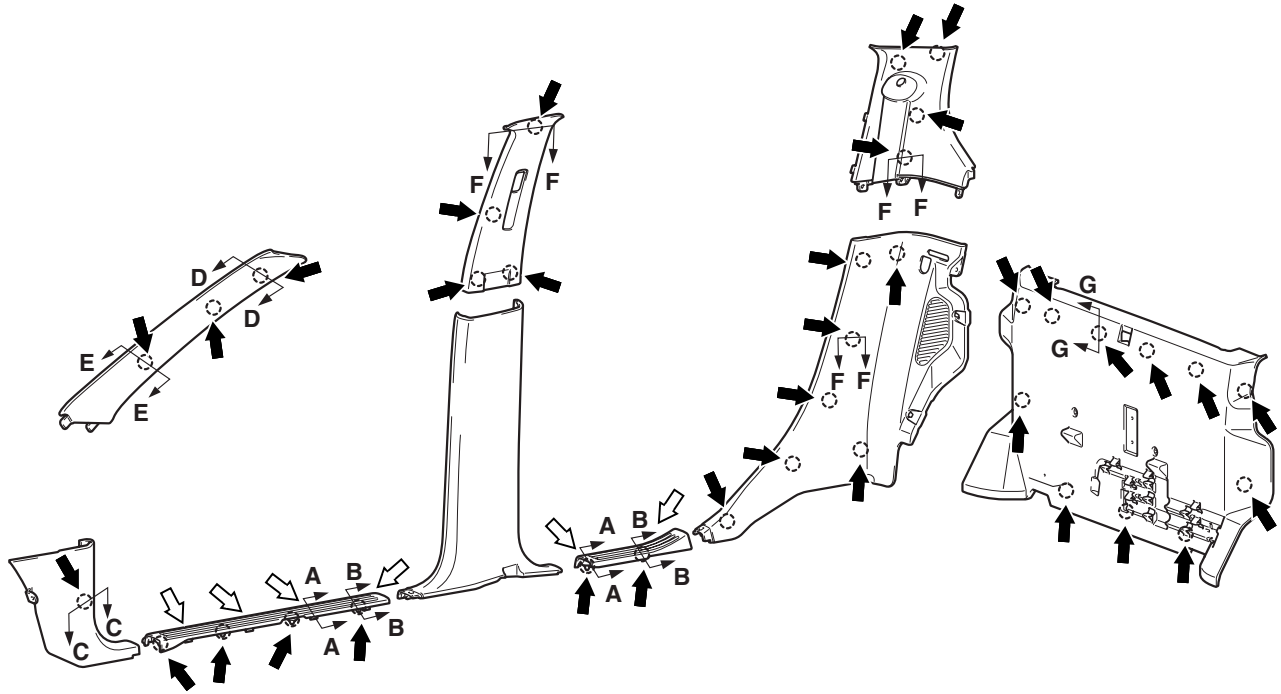


AC407283 AB

1. Front pillar trim
2. Cowl side trim
3. Front scuff plate
4. Rear scuff plate
5. Centre pillar lower trim
6. Front seat belt bolt
7. Centre pillar upper trim

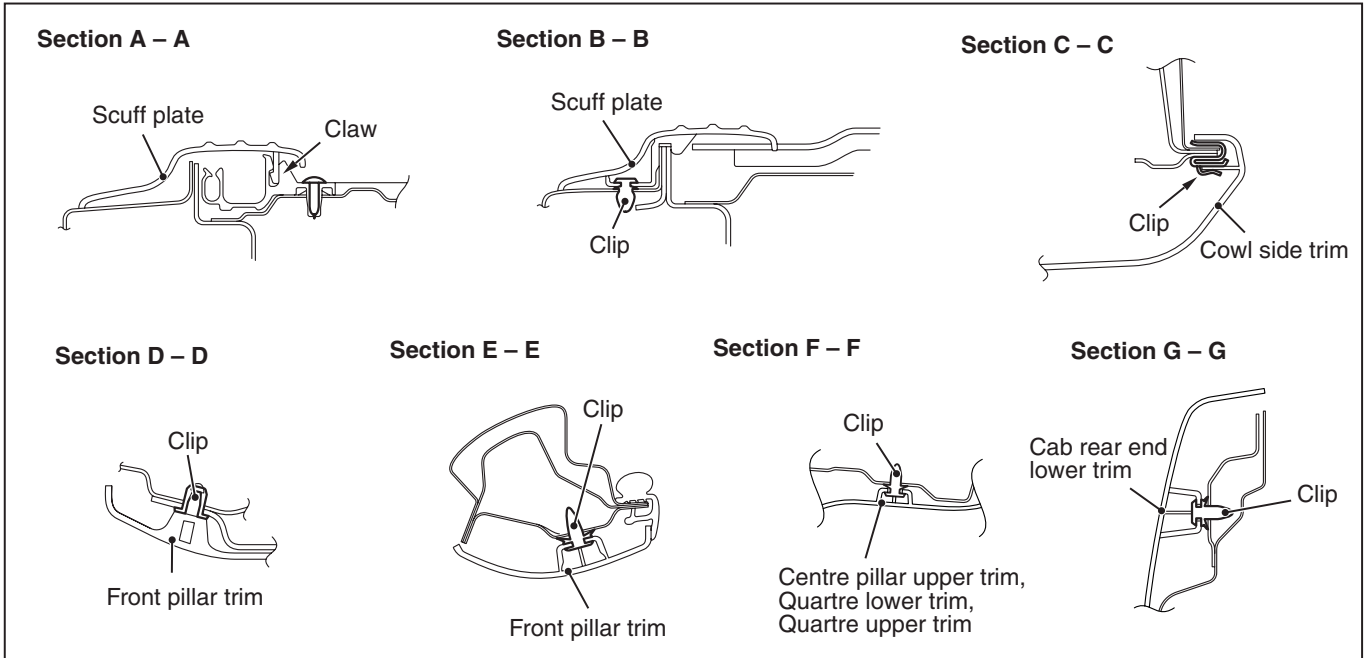
8. Cab rear end lower trim <vehicles with rear panel power window>
9. Rear seatback damper
10. Rear pillar lower trim
11. Rear seat belt bolt
12. Rear pillar upper trim

CLIP AND CLAW POSITIONS



NOTE

- (1) : Clip positions
- (2) : Claw positions

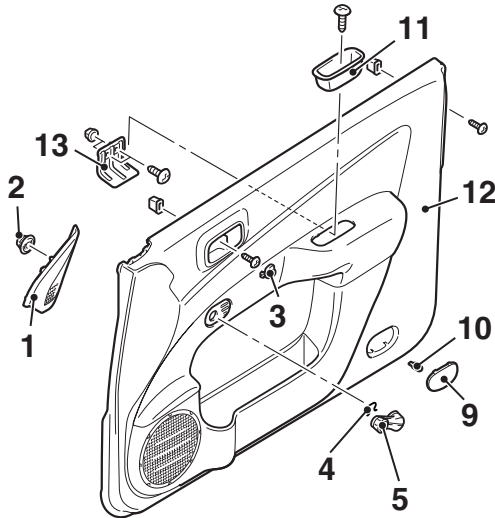


DOOR TRIM

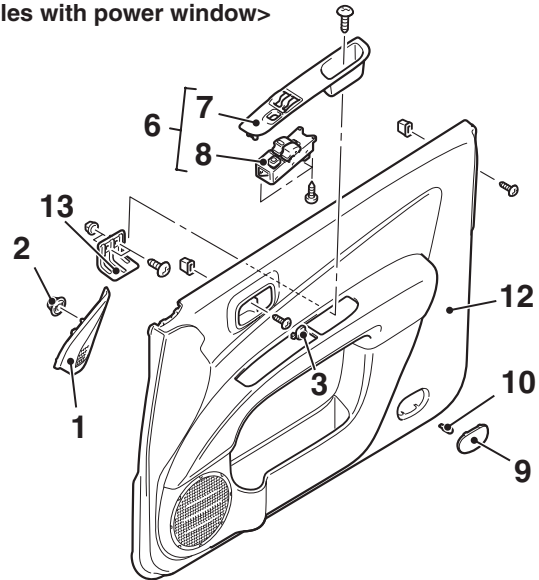
REMOVAL AND INSTALLATION <CLUB CAB>

M1521006400428

<Vehicles with manual window>



<Vehicles with power window>



<<A>>

<>

Removal steps

1. Front door sash trim
2. Front door sash trim clip
3. Front door trim screw cap
4. Regulator handle clip <Vehicles with manual window >
5. Regulator handle <Vehicles with manual window>
6. Front door power window switch assembly <Vehicles with power window>

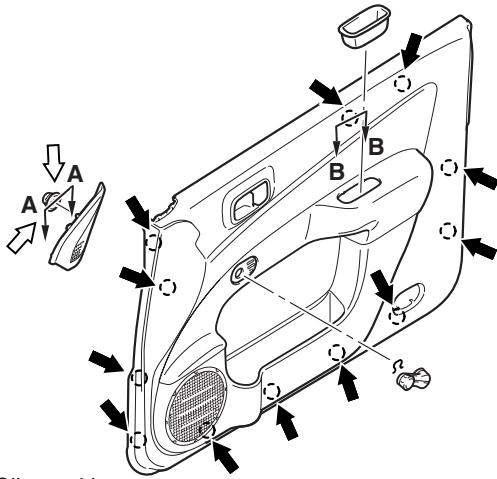
AC407287AB

Removal steps (Continued)

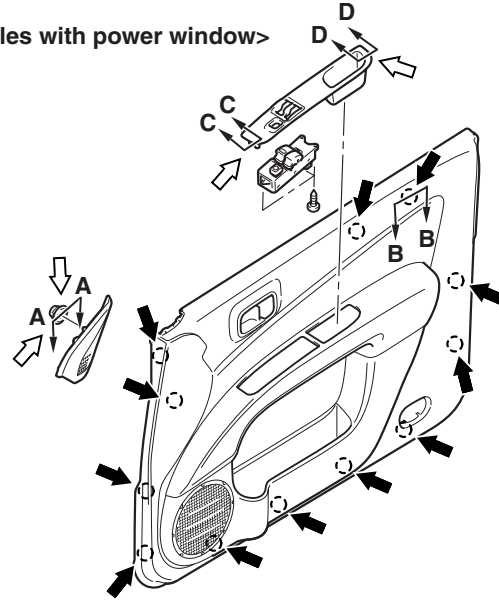
7. Front door power window switch panel <Vehicles with power window>
8. Front door power window switch <Vehicles with power window>
9. Front door lamp lens
10. Front door lamp bulb
11. Front door trim box <Vehicles with manual window>
12. Front door trim
13. Pull handle bracket

CLIP AND CLAW POSITIONS

<Vehicles with manual window>



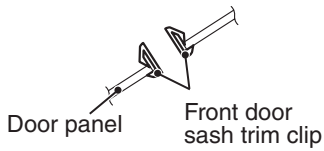
<Vehicles with power window>



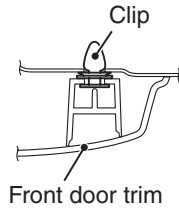
NOTE

- (1) : Clip positions
- (2) : Claw positions

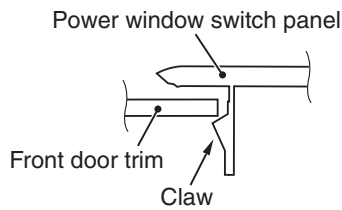
Section A - A



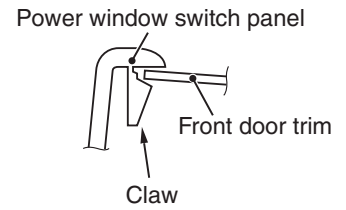
Section B - B



Section C - C



Section D - D

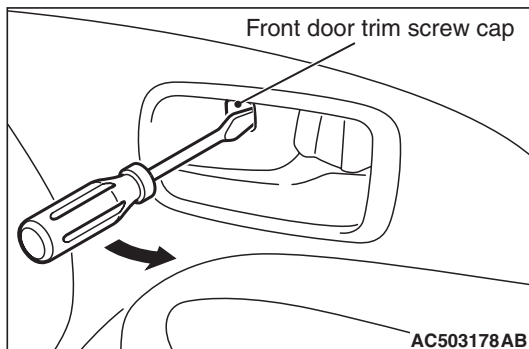


AC503058AB

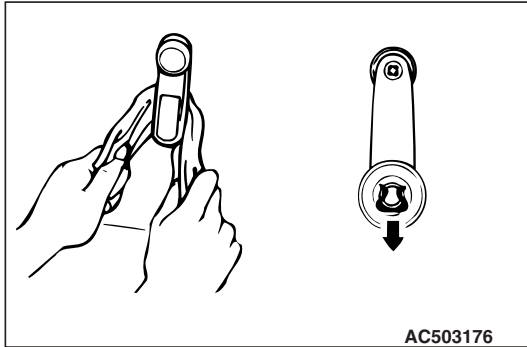
REMOVAL SERVICE POINTS

**<<A>> FRONT DOOR TRIM SCREW CAP
REMOVAL**

Insert a flat-tipped screwdriver into the rear end of the front door trim screw cap, and prize out the cap to the direction shown. Then remove the tapping screw.



<> REGULATOR HANDLE CLIP REMOVAL

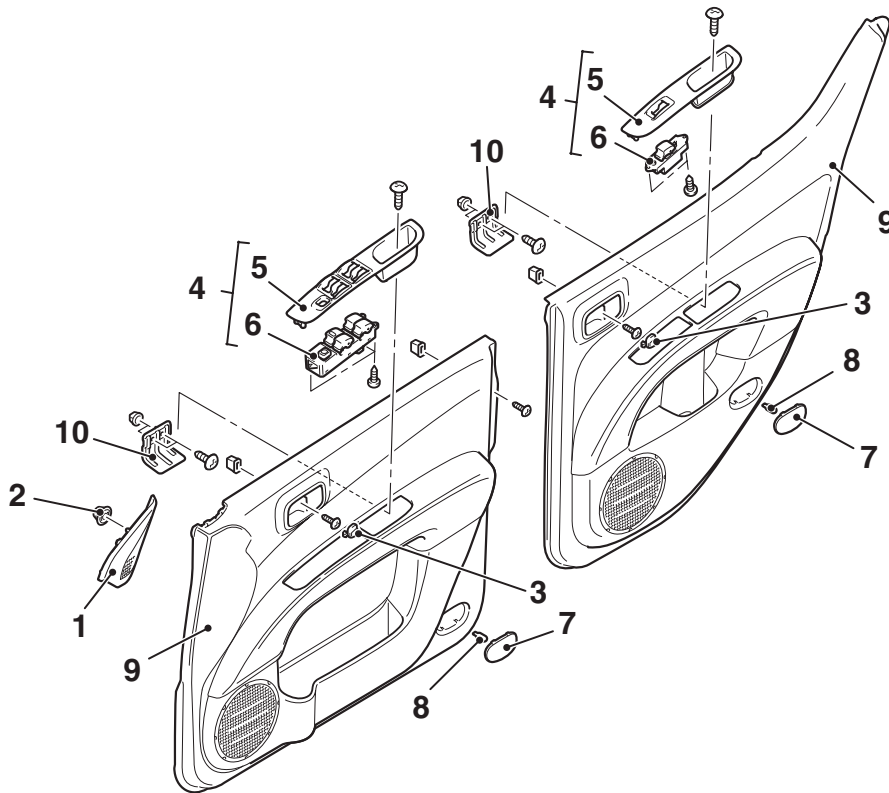


AC503176

Use cloth to remove the regulator handle clip as shown in the illustration.

REMOVAL AND INSTALLATION <DOUBLE CAB>

M1521006400462



AC407286AB

<<A>>

Front door trim removal steps

1. Front door sash trim
2. Front door sash trim clip
3. Front door trim screw cap
4. Power window switch assembly
5. Power window switch panel
6. Power window switch
7. Front door support panel
8. Interior lamp bulb
9. Front door trim
10. Front door pull handle bracket

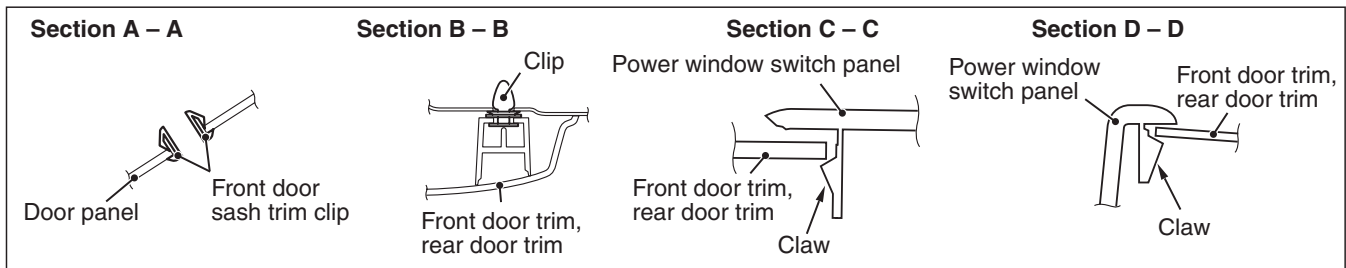
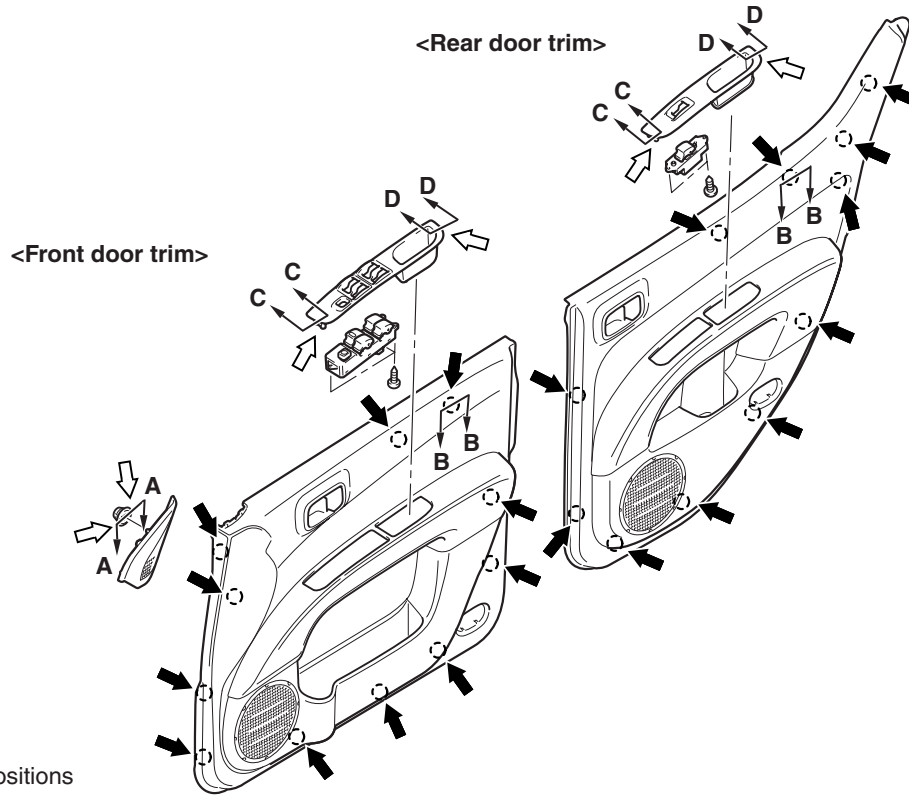
<<A>>

Rear door trim removal steps

3. Rear door trim screw cap
4. Power window switch assembly
5. Power window switch panel
6. Power window switch
7. Rear door support panel
8. Interior lamp bulb
9. Rear door trim
10. Rear door pull handle bracket

NOTE: Manual window removal and installation steps for the front and rear are the same as for the front of the club cab (Refer to P.52A-14)+

CLIP AND CLAW POSITIONS

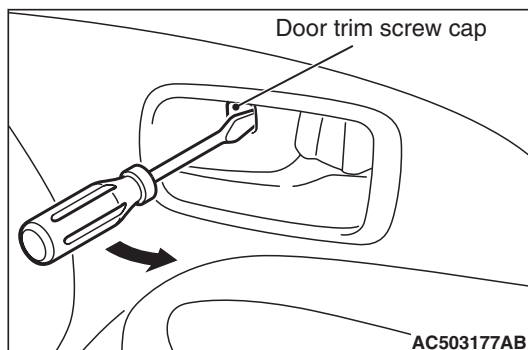


AC503057AB

REMOVAL SERVICE POINTS

<<A>> DOOR TRIM SCREW CAP
REMOVAL

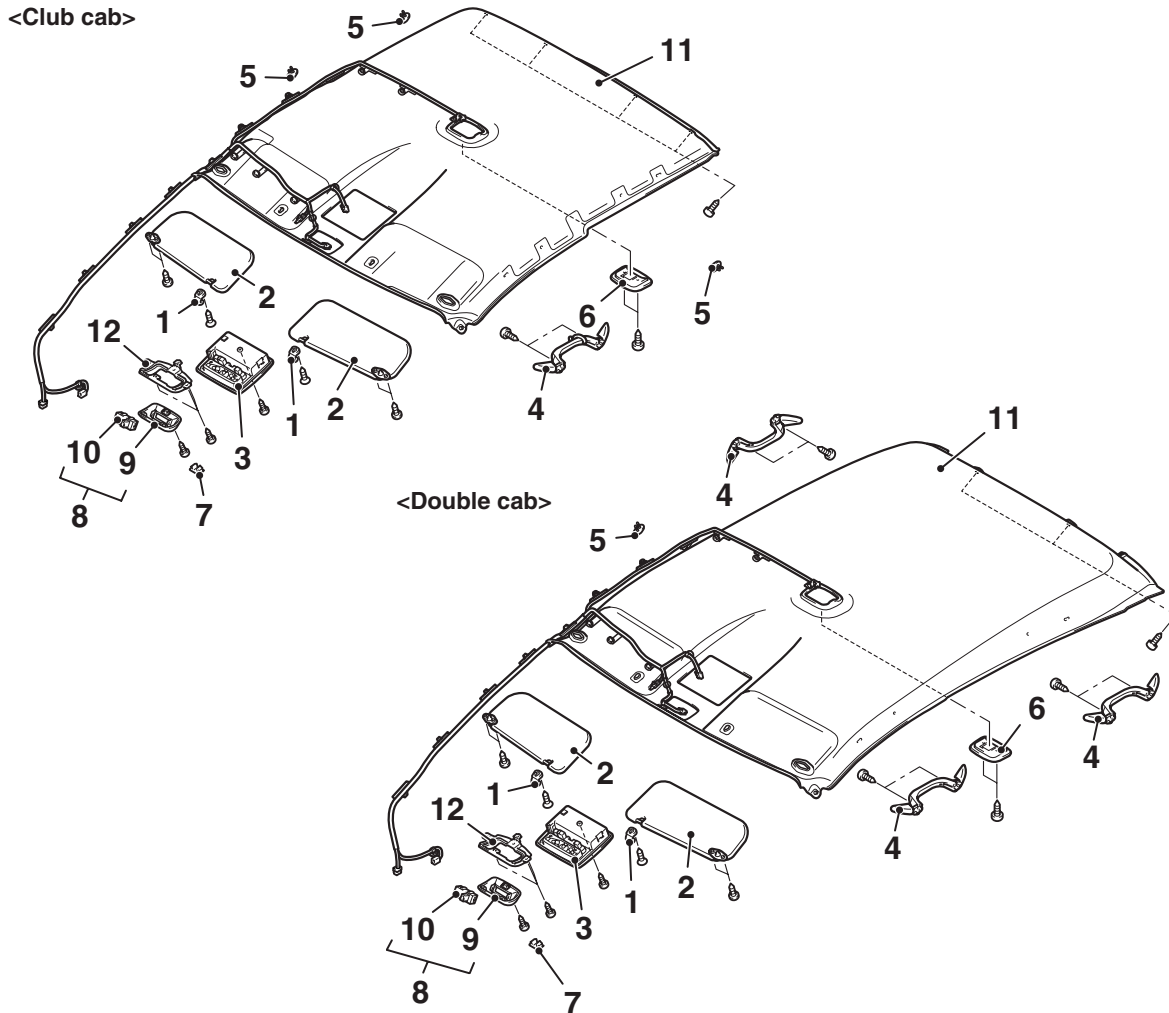
Insert a flat-tipped screwdriver into the rear end of the door trim screw cap, and prize out the cap to the direction shown. Then remove the tapping screw.



HEADLINING

REMOVAL AND INSTALLATION

M1521001400586



AC502416 AB

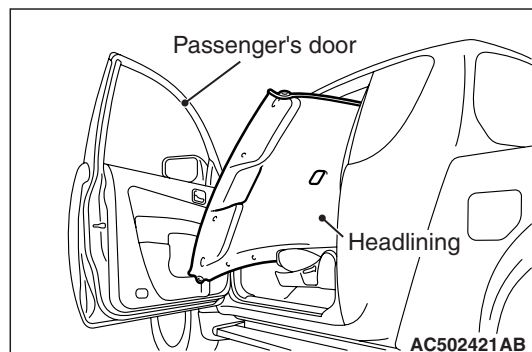
Removal steps

1. Sunvisor holder
2. Sunvisor
3. Front room lamp assembly
4. Assist grip
5. Assist grip clip
6. Rear room lamp
7. Clock hole cover
8. Clock assembly
9. Digital clock
10. Clock bracket
- Front seat passenger's side assembly <Double cab> (Refer to P.52A-20)
11. Headlining

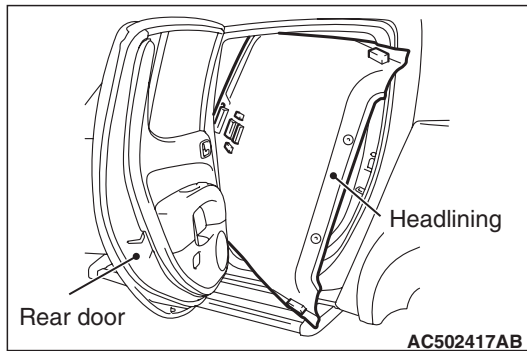
<<A>>

REMOVAL SERVICE POINT

<<A>> HEADLINING REMOVAL



To remove the headlining from the vehicle, slide the front seat forward all the way, recline the seat-back to the back completely, and remove the headlining from passenger seat as shown in the figure. <Club cab>

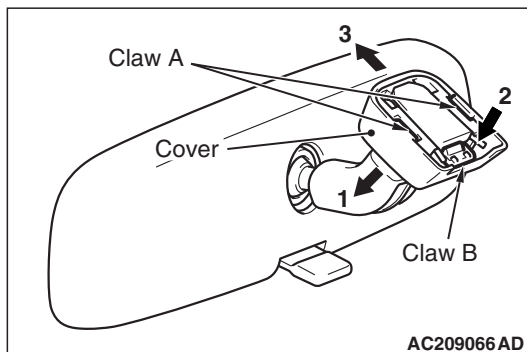


To remove the headlining from the vehicle, remove from the rear door (L.H.) as shown in the figure.
<Double cab>

INSIDE REAR VIEW MIRROR

M1521002600419

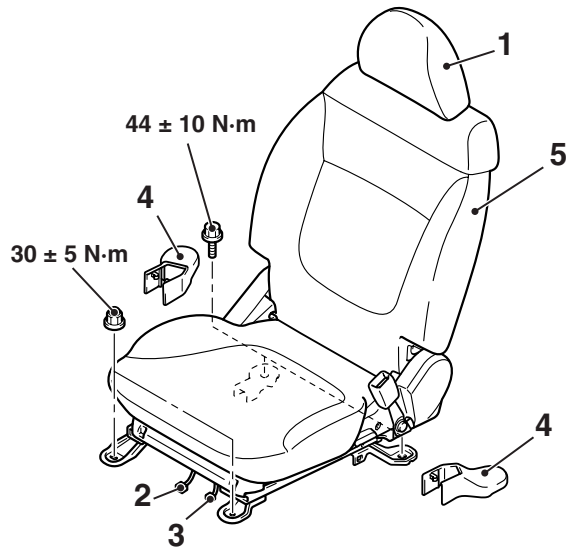
REMOVAL SERVICE POINT



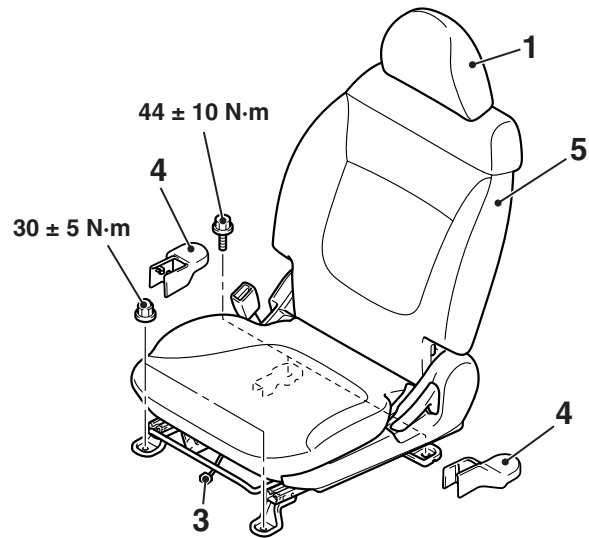
1. Disengage the claw A and lower the cover toward arrow 1 direction.
2. Push the claw B toward arrow 2 direction to unlock, and pull out the mirror toward arrow 3 direction.

FRONT SEAT ASSEMBLY**REMOVAL AND INSTALLATION**

M1522001300720



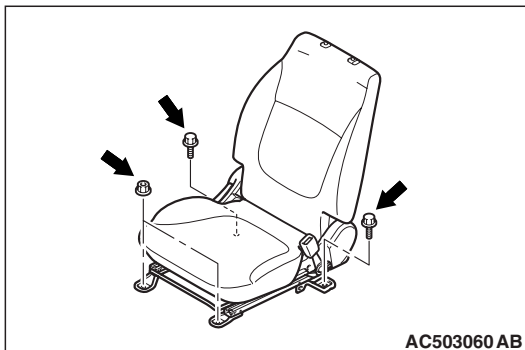
1. Headrest
- Removal steps**
2. Power seat harness connector
<Vehicles with power seat>
 3. Seat belt switch connector



AC407294 AB

Removal steps (Continued)

4. Rear anchor cover
- >>A<< 5. Front seat assembly

INSTALLATION SERVICE POINT**>>A<< FRONT SEAT ASSEMBLY INSTALLATION**

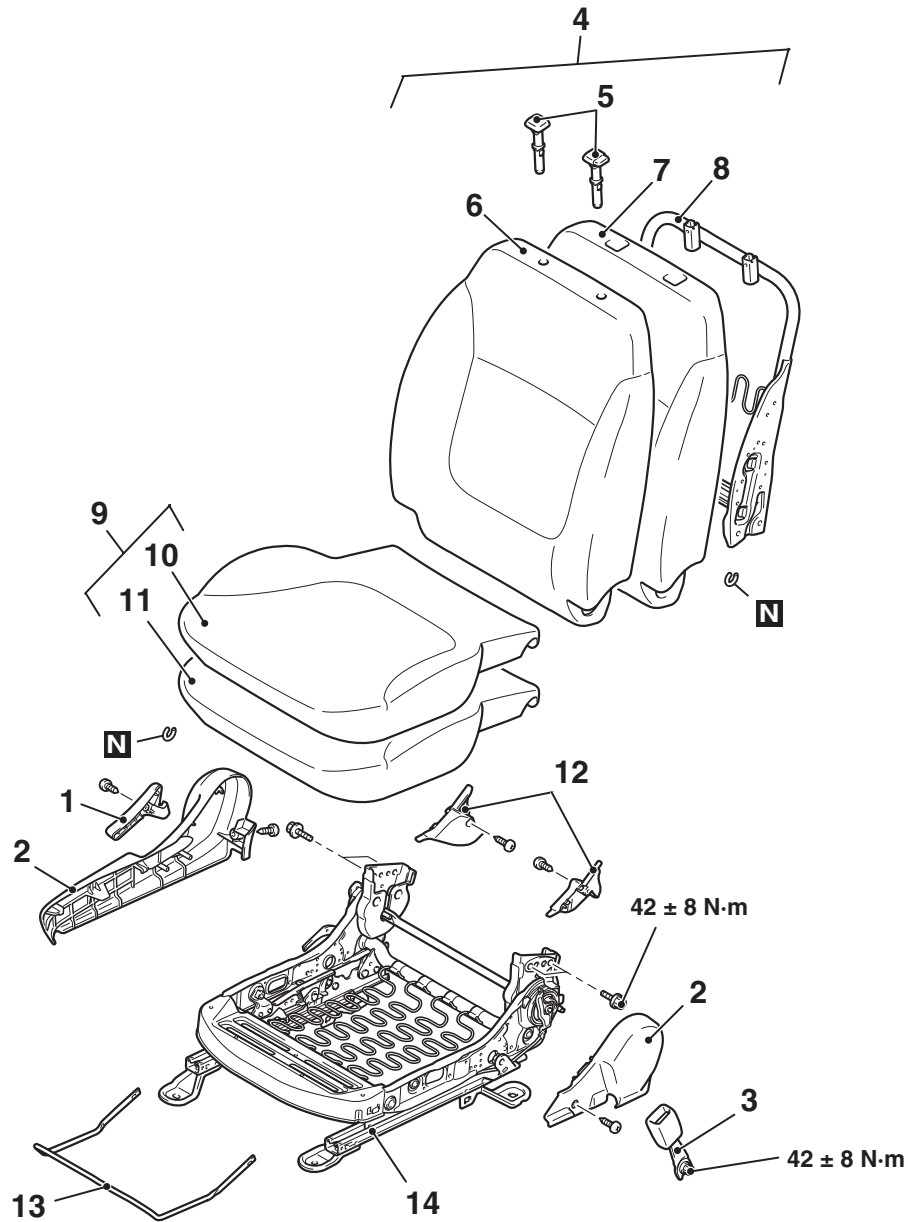
1. Confirm that the seat slide is locked. Then temporarily tighten all the nuts and bolts with no load applied to the front seat cushion.
2. Tighten all the nuts and bolts to the specified torque.

Tightening torque:**Bolt: 44 ± 10 N·m****Nut: 30 ± 5 N·m**

DISASSEMBLY AND REASSEMBLY

M1522001500746

<MANUAL SEAT>



AC503906AB

Disassembly steps

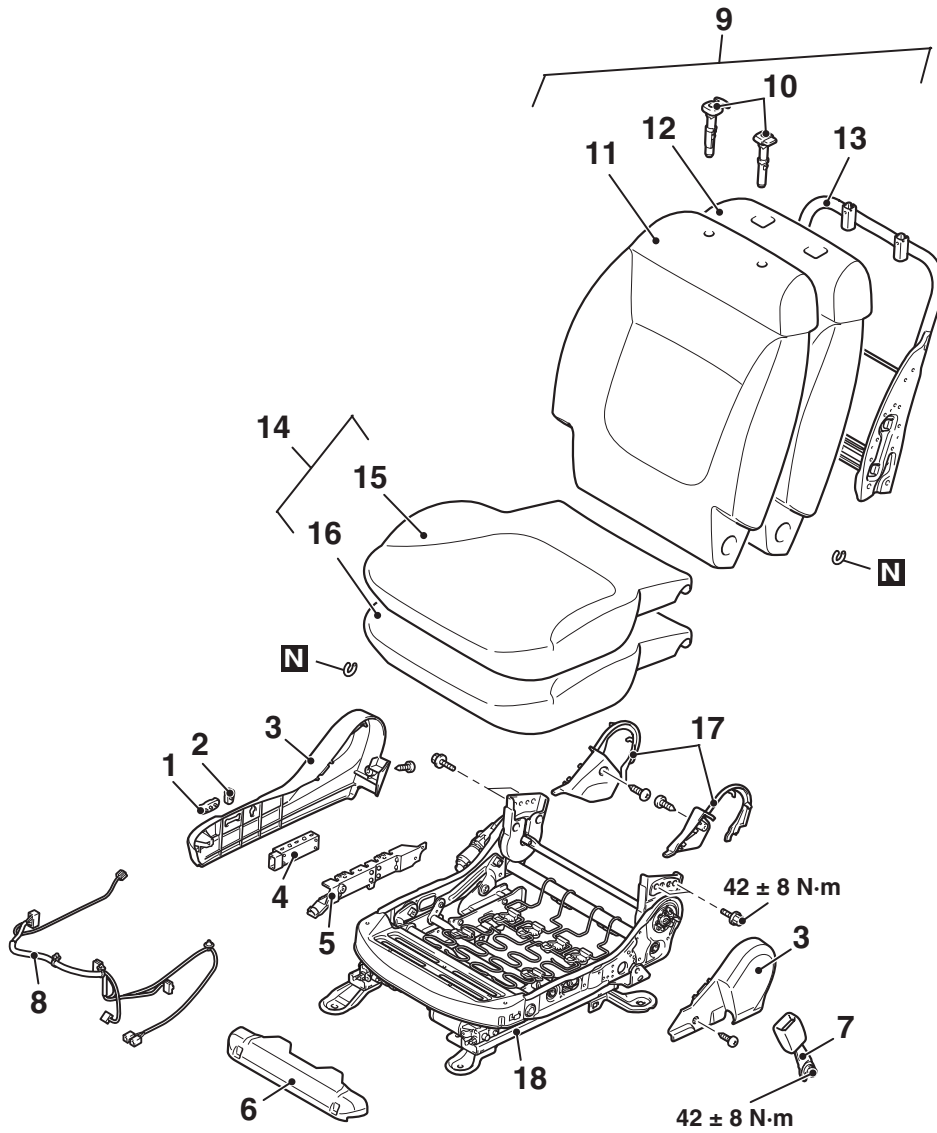
1. Front seat reclining adjuster cover
2. Front seat side shield cover
3. Inner seat belt
4. Front seatback assembly
5. Headrest guide
6. Front seatback cover
7. Front seatback pad
8. Front seatback frame

Disassembly steps (Continued)

9. Front seat cushion assembly
10. Front seat cushion cover
11. Front seat cushion pad
12. Front seat side shield inner cover
13. Slide adjuster lever
14. Seat slide adjuster

<<A>>

<POWER SEAT>



AC407311AB

Disassembly steps

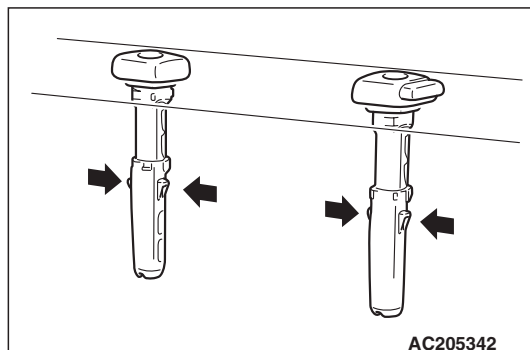
1. Front seat slide adjuster knob
2. Front seat reclining adjuster knob
3. Front seat side shield cover
4. Front power seat switch
5. Power seat switch bracket
6. Front seat motor cover
7. Inner seat belt
8. Front power seat harness
9. Front seatback assembly

<<A>>

Disassembly steps (Continued)

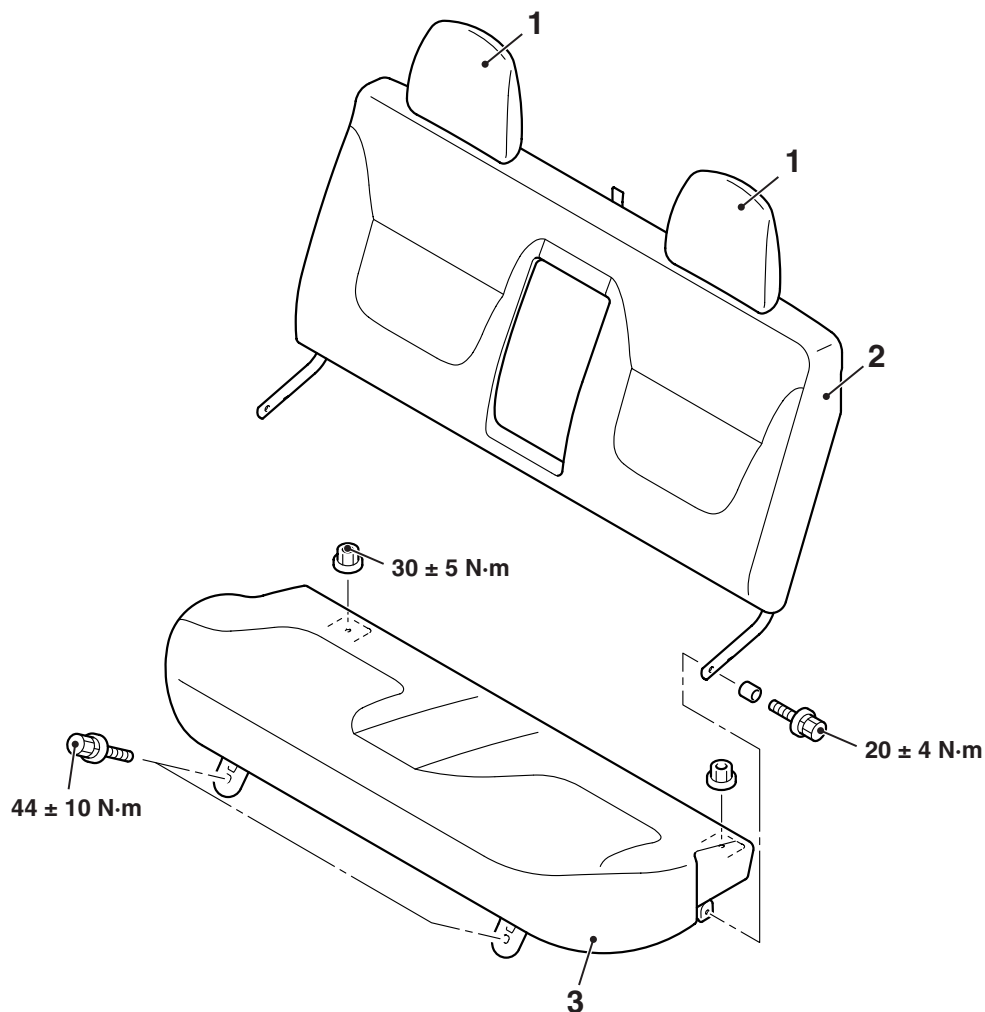
10. Headrest guide
11. Front seatback cover
12. Front seatback pad
13. Front seatback Frame
14. Front seat cushion assembly
15. Front seat cushion cover
16. Front seat cushion pad
17. Front seat side shield inner cover
18. Seat slide adjuster

DISASSEMBLY SERVICE POINT
<<A>> HEADRESTRAINT GUIDE
REMOVAL



REAR SEAT ASSEMBLY <DOUBLE CAB>
REMOVAL AND INSTALLATION

M1522001800468

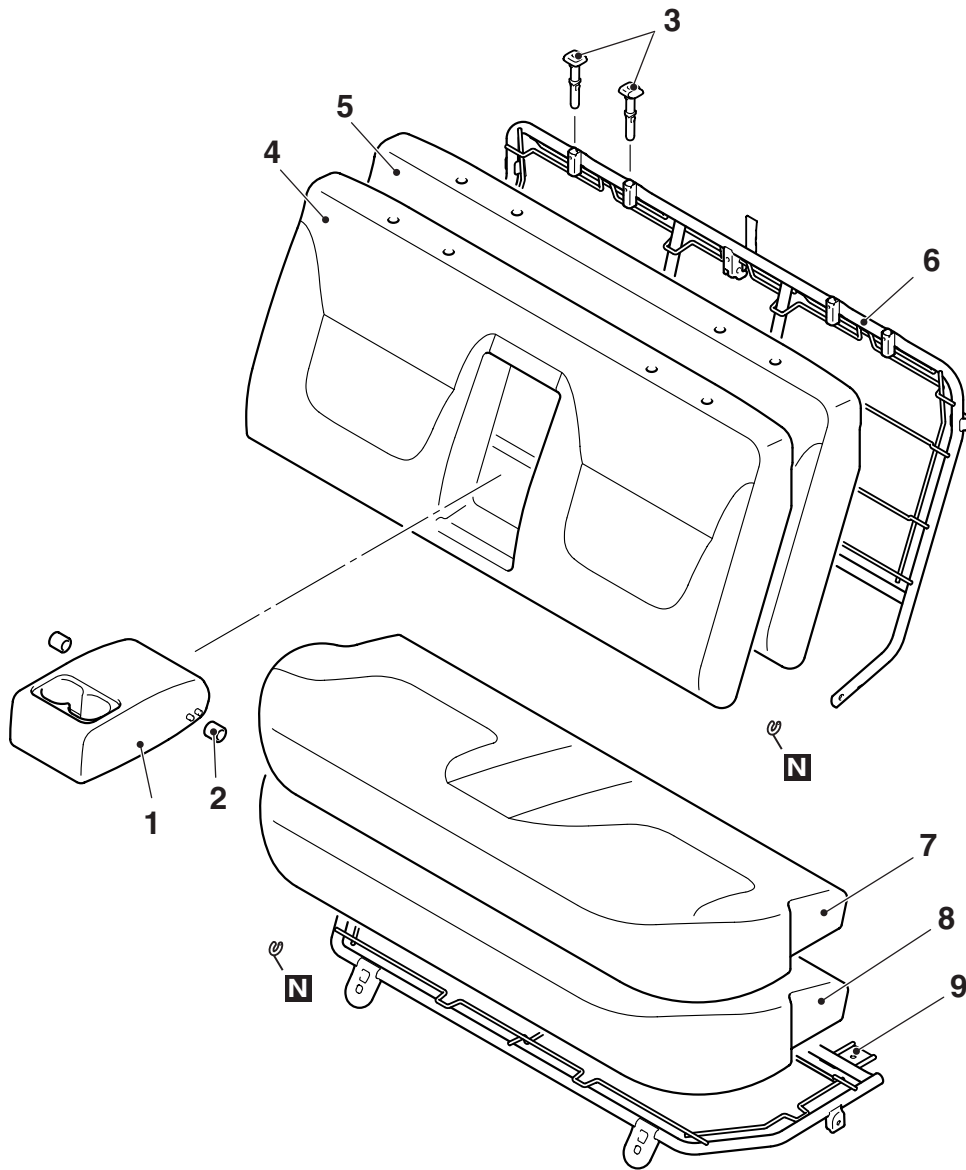


AC502415 AB

- Removal steps**
2. Rear seatback
 3. Rear seat cushion

DISASSEMBLY AND REASSEMBLY

M1522002000562



AC503059AB

Disassembly steps

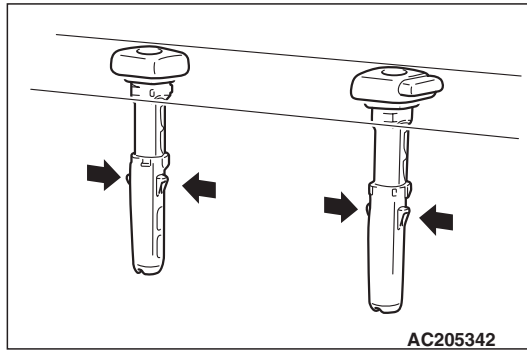
1. Rear seat armrest
2. Rear seat bushing
3. Headrest guide
4. Rear seatback cover
5. Rear seatback pad

Disassembly steps (Continued)

6. Rear seatback frame
7. Rear seat cushion cover
8. Rear seat cushion pad
9. Rear seat cushion frame

<<A>>

DISASSEMBLY SERVICE POINT
<<A>> HEADRESTRAINT GUIDE
REMOVAL



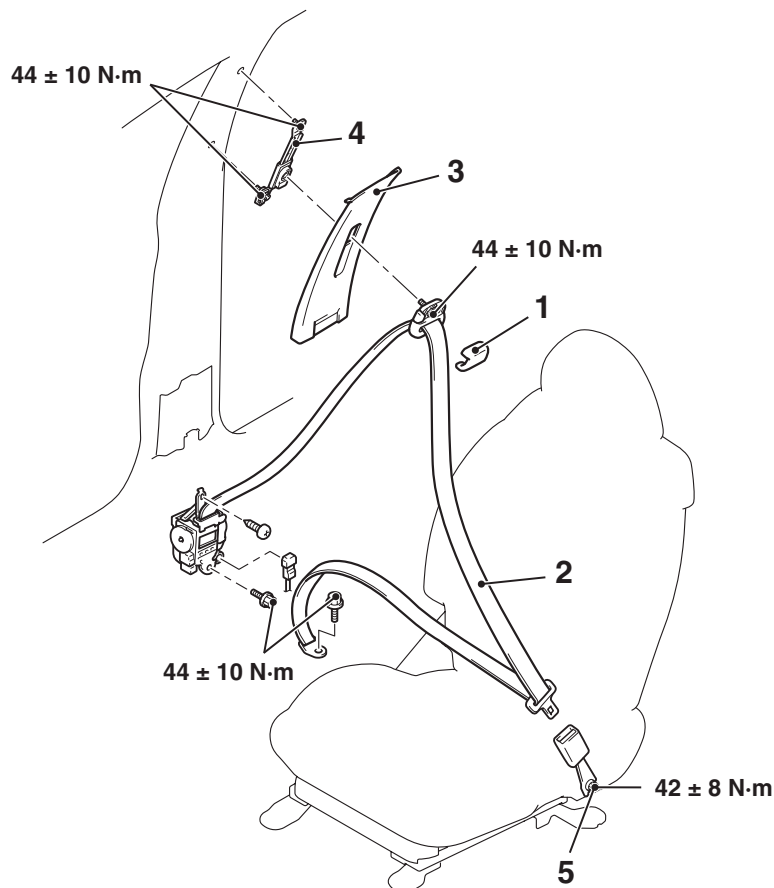
FRONT SEAT BELT

REMOVAL AND INSTALLATION

M1523001300648

CAUTION

SRS: Before removing and installing the seat belts with pre-tensioner, refer to GROUP 52B, Seat Belt with Pre-tensioner .



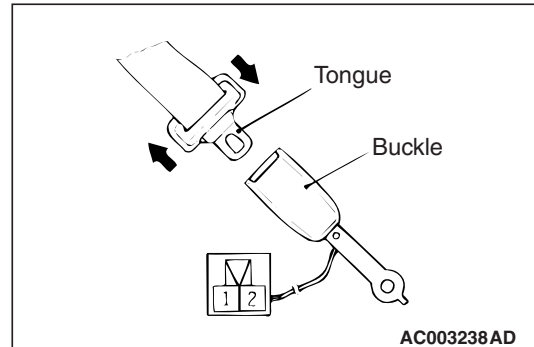
AC407291AB

Removal steps

1. Sash guide cover
- Quarter lower trim <Club cab>, Centre pillar lower trim <Double cab>(Refer to [P.52A-10](#)<Club cab>[P.52A-12](#)<Double cab>)
2. Outer seat belt (Refer to GROUP 52B, seat belt with Pre-tensioner)
- 3 Quarter upper trim <Club cab>, centre pillar upper trim <Double cab> (Refer to [P.52A-10](#)<Club cab> [P.52A-12](#)<Double cab>)
4. Adjustable seat belt anchor
5. Inner seat belt

INSPECTION

M1523004400268

SEAT BELT BUCKLE SWITCH CONTINUITY CHECK

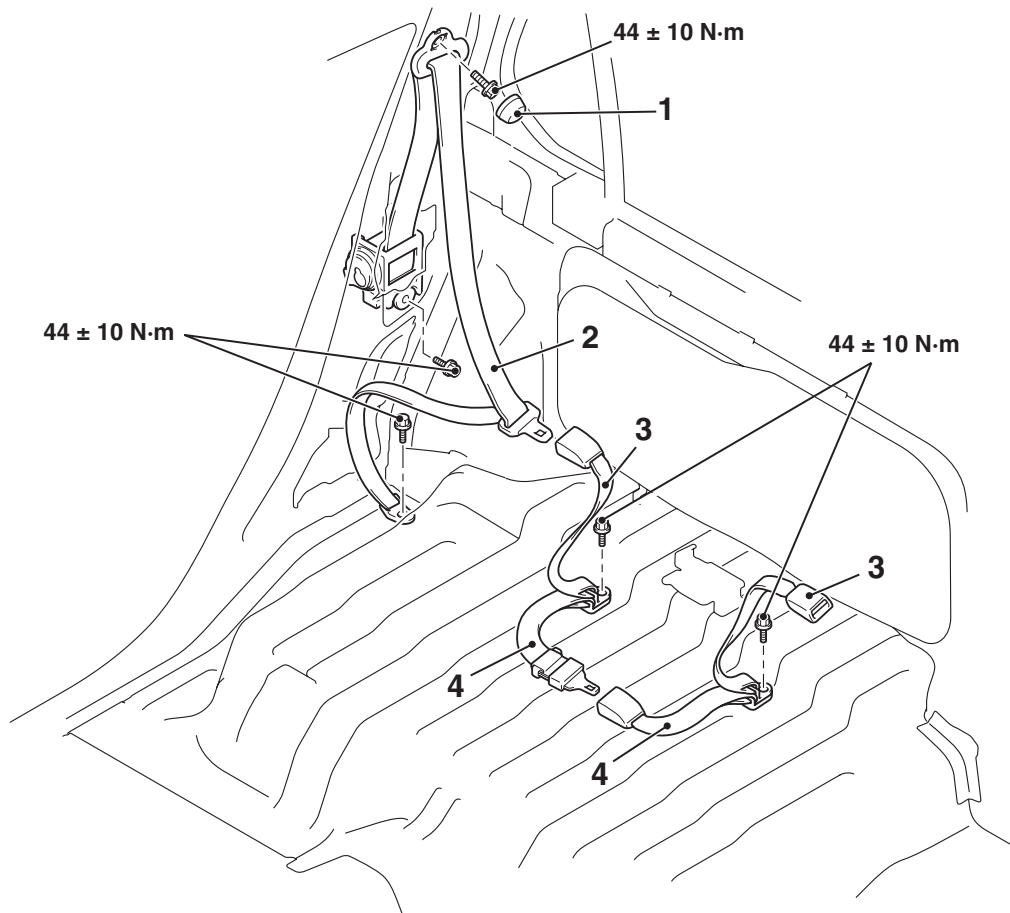
If there is no continuity, replace the seat belt.

Item	Tester connection	Specified condition
Fastened seat belt	1 -2	Open circuit
Unfastened seat belt	1 -2	Less than 2 ohms

REAR SEAT BELT <DOUBLE CAB>

REMOVAL AND INSTALLATION

M1523001600542



AC407292 AB

Removal steps

- Rear seat assembly (Refer to [P.52A-12.](#))
- Rear pillar lower trim (Refer to [P.52A-12.](#))

Removal steps (Continued)

1. Sash guide cover
2. Outer seat belt
3. Inner seat belt
4. Centre seat belt

NOTES

GROUP 54

**CHASSIS
ELECTRICAL**

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NOTES

GROUP 54A

CHASSIS ELECTRICAL

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BATTERY**GENERAL INFORMATION**

M1541000100089

⚠ CAUTION

When reconnecting the battery after the battery line is disconnected, the speedometer needle returns to the zero position. Also, when the gauge functions are lost because of a voltage drop by cranking or others, the same operation is performed as for the voltage return. However, both cases are not failures.

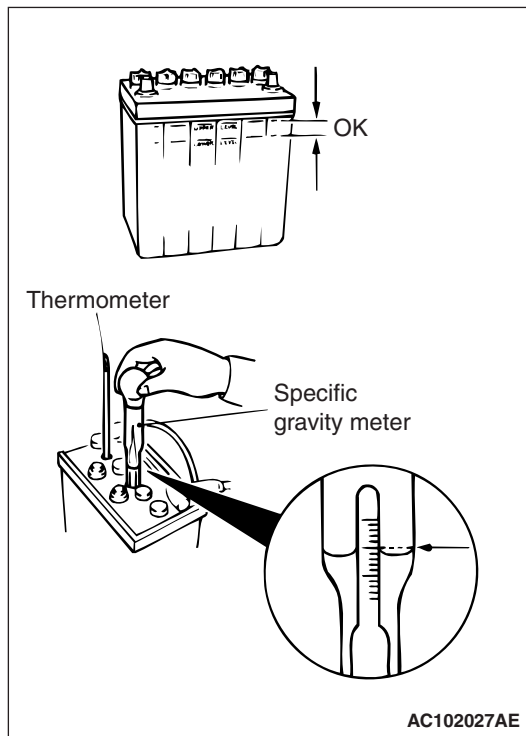
SERVICE SPECIFICATIONS

M1541000300414

Item	Specification
Specific gravity of the battery fluid	1.220 –1.290 (20° C)

ON-VEHICLE SERVICE**FLUID LEVEL AND SPECIFIC GRAVITY CHECK**

M1541000900201

⚠ CAUTION

rise above the UPPER LEVEL indication, the electrolyte may leak out, so adjust so that the electrolyte level is between the LOWER LEVEL and UPPER LEVEL indications.

1. Check that the battery electrolyte level is between the UPPER LEVEL and LOWER LEVEL indications.
2. Use a specific gravity meter and a thermometer to measure the specific gravity.
Standard value: 1.220 –1.290 (electrolyte temperature 20° C)
3. The specific gravity of the battery electrolyte changes according to the temperature, so the specific gravity when the electrolyte is at a temperature of 20° C can be calculated using the following formula. Use the converted value to judge whether the electrolyte is okay or not.

$$D_{20} = (t - 20) \times 0.0007 + Dt$$

D₂₀: Specific gravity converted to a value for electrolyte temperature of 20° C

t: Electrolyte temperature at the time of measurement

Dt: Actual specific gravity

- If the battery is used with the electrolyte level below the LOWER LEVEL indicator, there is the danger that explosions may occur, so add water to the battery until the electrolyte level is between the LOWER LEVEL and UPPER LEVEL indications.
- If too much water is added to make the level

CHARGING

M1541001100800

CAUTION

- The battery plugs should be removed during charging.
- The battery electrolyte level may rise and overflow from the battery during charging.
- Explosions may occur if the battery is brought close to naked flames during charging.
- Be careful to avoid tasks that might produce sparks or other danger while the battery is charging.
- 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.
- Charge the battery in a well-ventilated location.
- Do not let the battery electrolyte temperature rise above approximately 45° C (approximately 55° C during rapid 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
95D31L	64 A	6.4 A	64 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.

BATTERY TEST

M1541001200874

TEST STEPS

STEP 1. Battery no-load voltage check

- (1) Illuminate the headlamp for 15 seconds.
- (2) Turn off the headlamp and then leave it for about 2 minutes to stabilise the battery voltage.
- (3) Remove the battery cable.
- (4) Measure the battery no-load voltage.

OK: 12.4 V or more (Specific gravity 1.240)

Q: Does the measured voltage correspond with this range?

- YES :** Go to Step 3.
NO : Go to Step 2.

STEP 2. Battery charging

Q: Does the battery recharge?

- YES :** Recharge the battery at 5A (constant-current charging) and then go to Step 1 (Refer to Table 1).
NO : Go to Step 3.

STEP 3. Load test check

- (1) Connect the battery tester to battery.
- (2) Feed a load current through the battery (Refer to Table 1).
- (3) Measure the battery voltage after 15 seconds and then eliminate a load current.
- (4) Compare the measured voltage to the specified lowest voltage (Refer to Table 2).

Q: Is the measured voltage higher than the lowest voltage?

- YES :** The battery is normal.
NO : Replace the battery.

(TABLE 1)

Battery type	95D31L
Charging time when fully discharged [5A constant current charging] (H)	13
Load current (A)	310

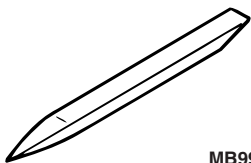
(TABLE 2)

Outside air temperature (°C)	21 or more	16 to 20	10 to 15	4 to 9	-1 to -3	-7 to -2	-12 to -8	-18 to -13
Minimum voltage (V)	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.5

IGNITION SWITCH

SPECIAL TOOL

M1543000602644

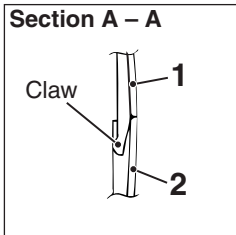
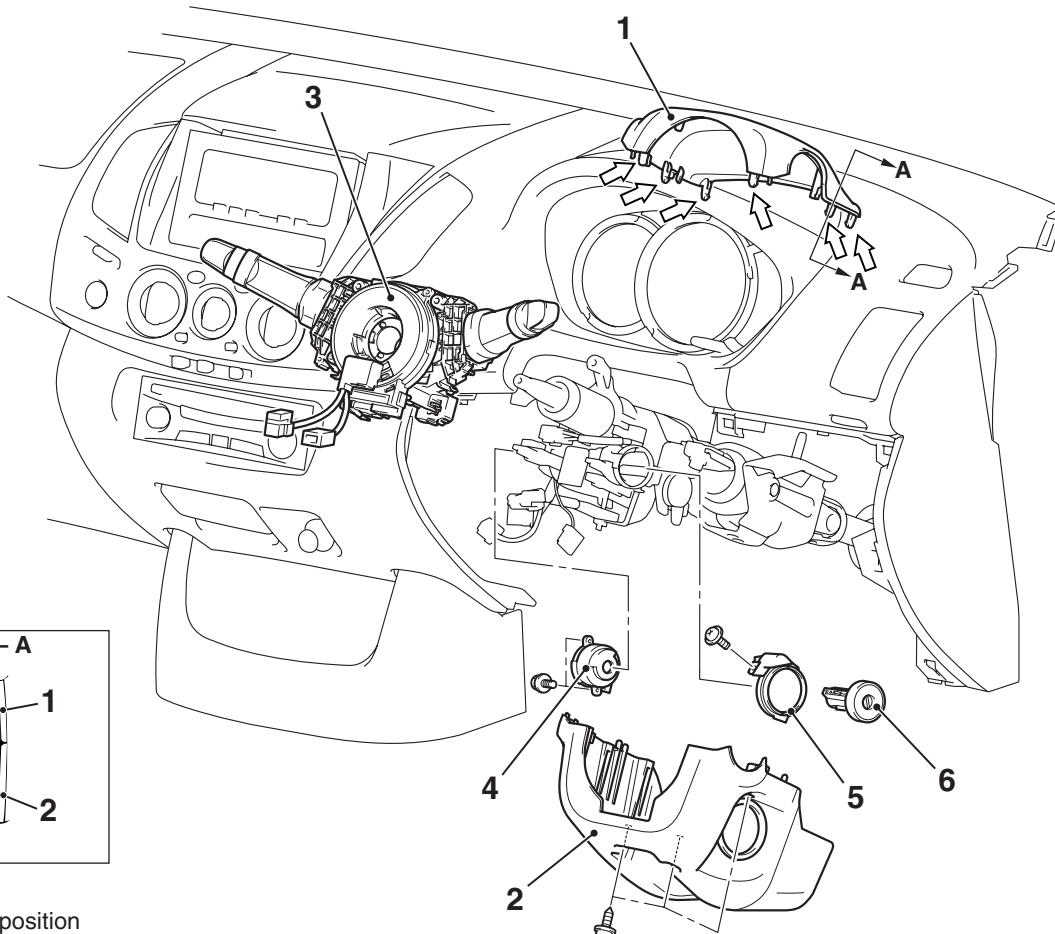
Tool	Number	Name	Use
 MB990784	MB990784	Ornament remover	Lower panel and Steering column cover removal

REMOVAL AND INSTALLATION

M1543002100898

WARNING

- Before removal of the air bag module, refer to GROUP 52B, Service Precautions () and Driver's, Front Passenger's Air Bag Module(s) and Clock Spring ().
- When removing and installing the steering wheel, do not let it bump against the air bag module.

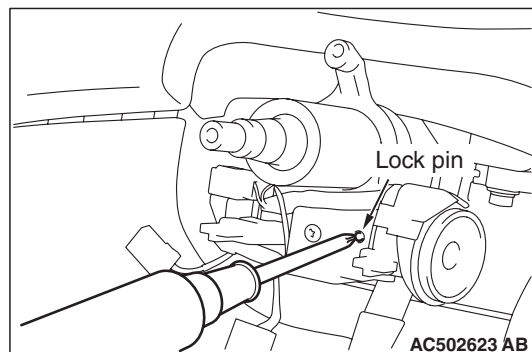


NOTE
← : Claw position

AC502626AB

Removal steps

- Lower panel (Refer to GROUP 52A, Instrument panel assembly .)
- 1. Steering column upper cover
- 2. Steering column lower cover
- Steering wheel (Refer to GROUP 37, Steering wheel .)
- 3. Column switch
- 4. Ignition switch
- 5. Key ring
- 6. Steering lock cylinder



AC502623 AB

2. Using a small Phillips head screwdriver, pull the steering lock cylinder toward you.

<<A>>

REMOVAL SERVICE POINT

<<A>> STEERING LOCK CYLINDER

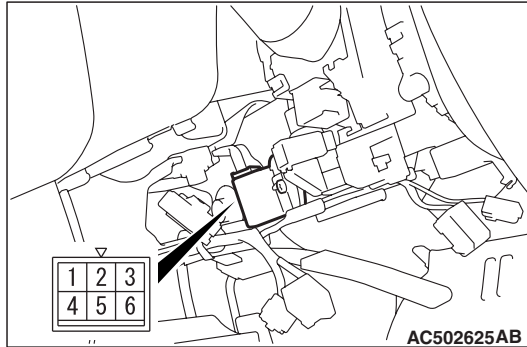
REMOVAL

1. Insert the key in the steering lock cylinder and turn it to the "ACC" position.

INSPECTION

IGNITION SWITCH CONTINUITY CHECK

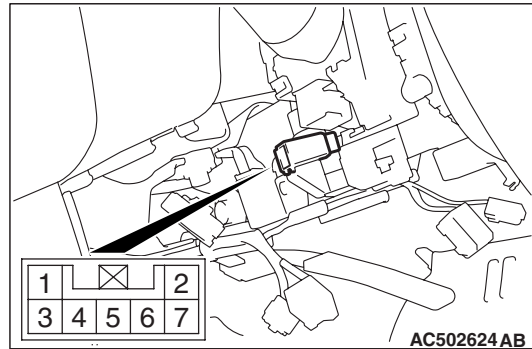
M1543019503574



Disconnect ignition switch connector without removing the ignition switch. Then check the continuity.

Switch position	Tester connection	Specified condition
"LOCK" (OFF)	1 -2, 1 -4, 1 -5, 1 -6	Open circuit
"ACC"	1 -2, 1 -4, 1 -6, 2 -4, 2 -6, 4 -6	Less than 2 ohms
"ON"	1 -2, 1 -4, 1 -6, 2 -4, 2 -6, 4 -6	Less than 2 ohms
"START"	1 -2, 1 -4, 1 -5, 1 -6, 2 -4, 2 -5, 2 -6, 4 -5, 4 -6	Less than 2 ohms

KEY REMINDER SWITCH CONTINUITY CHECK <3200>



Disconnect key reminder switch connector without removing the ignition switch and key reminder switch. Then check the continuity.

Status of ignition key	Tester connection	Specified condition
Removed	4 -6	Less than 2 ohms
Inserted	4 -6	Open circuit

COMBINATION METER

SERVICE SPECIFICATIONS

M1543000300692

Item		Standard value	Limit
Speedometer indicating tolerance km/h	20	20.0 –24.0	–
	40	40.0 –44.0	–
	80	80.5 –85.5	–
	120	121.5 –127.5	–
	160	162.5 –169.5	–
The speedometer needle fluctuation km/h (Vehicle speed is 35 km/h or more)		–	±3
Tachometer indicating tolerance r/min The value in parentheses is a reference value.	700	700 ± 100	–
	(2,000)	(2,000 ± 100)	–
	3,000	3,000 ± 150	–
	(4,000)	(4,000 ± 200)	–
	5,000	5,000 ± 250	–
Fuel gauge unit resistance Ω	Stopper position "F"	13.0 ± 1	–
	Stopper position "E"	120.0 ± 1	–
Fuel gauge unit float height mm	Stopper position "F" (highest A)	35.0 ± 3	–
	Stopper position "E" (lowest B)	254.7 ± 3	–
Engine coolant temperature gauge unit resistance Ω The value in parentheses is a reference value.	(50° C)	(230)	–
	70° C	104 ± 13.5	–
	(60° C)	(155)	–
	(80° C)	(73)	(–)

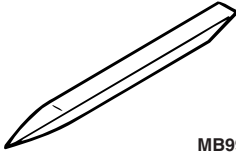
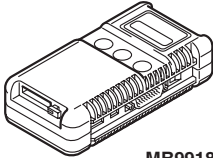
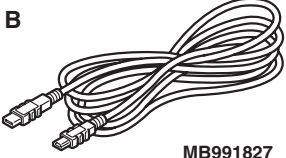
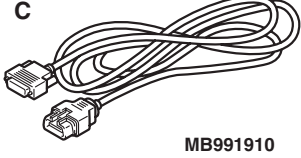
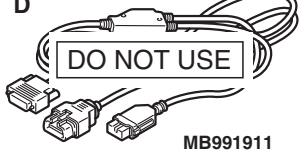
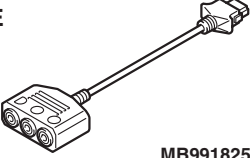
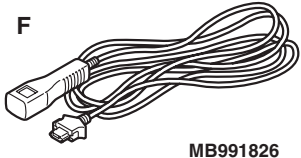
SEALANT

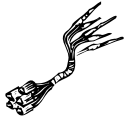
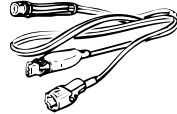
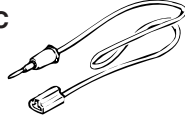

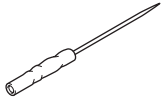
M1543000500287

Item	Specified sealant	Remark
Engine coolant temperature gauge unit	3M ATD Part No.8660 or equivalent	Semi-drying sealant

SPECIAL TOOLS

M1543000602655

Tool	Number	Name	Use
 <p>MB990784</p>	<p>MB990784</p>	<p>Ornament remover</p>	<p>Combination meter bezel removal</p>
<p>A</p>  <p>MB991824</p> <p>B</p>  <p>MB991827</p> <p>C</p>  <p>MB991910</p> <p>D</p>  <p>MB991911</p> <p>E</p>  <p>MB991825</p> <p>F</p>  <p>MB991826</p> <p>MB991955</p>	<p>MB991955 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826</p>	<p>M.U.T.-III sub-assembly A: Vehicle Communication Interface (V.C.I.) B: M.U.T.-III USB cable C: M.U.T.-III main harness A (Vehicles with CAN communication system) D: M.U.T.-III main harness B (Vehicles without CAN communication system) E: M.U.T.-III measure adapter F: M.U.T.-III trigger harness</p>	<p>Check for other system diagnosis code and other system data list</p> <p>CAUTION For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.</p>

Tool	Number	Name	Use
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>MB991223AZ</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>	<p>Making voltage and resistance measurements during troubleshooting</p> <p>A: Connect pin contact pressure inspection</p> <p>B: Power circuit inspection</p> <p>C: Power circuit inspection</p> <p>D: Commercial tester connection</p>
 <p>MB992006</p>	<p>MB992006</p>	<p>Extra fine probe</p>	<p>Continuity check and voltage measurement at harness wire or connector</p>

TROUBLESHOOTING

TROUBLE SYMPTOM CHART

M1543007201860

⚠ CAUTION

During diagnosis, a diagnosis code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.

Trouble symptom	Inspection procedure number	Reference page
Power supply circuit system check.	1	P.54A-12
Odometer and trip meter is not displayed.	2	
All the needle meters do not work.	3	
If the ignition switch is turned to the ON position, the indicator and warning lamps do not illuminate.	4	
Speedometer does not work (other meters work).	5	P.54A-17
Tachometer does not work (other meters work).	6	P.54A-19
Fuel gauge does not work (other meters work).	7	P.54A-21
Engine coolant temperature gauge does not work (other meters work).	8	P.54A-24

SYMPTOM PROCEDURES

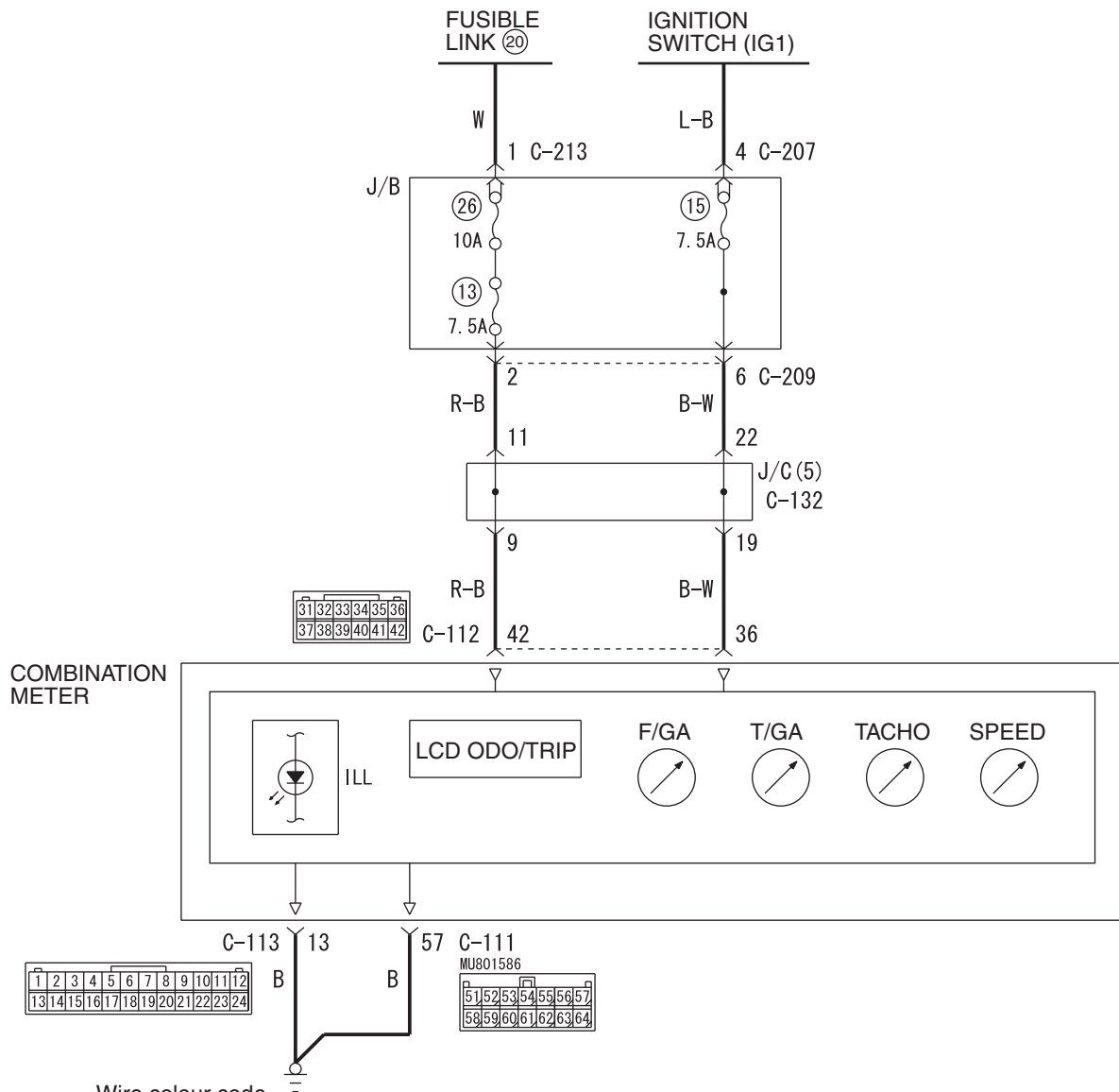
Inspection Procedure 1: Power Supply Circuit System Check.

Inspection Procedure 2: Odometer and Trip Meter is not Displayed.

Inspection Procedure 3: All the Needle Meters do not Work.

Inspection Procedure 4: If the Ignition Switch is Turned to the ON Position, the Indicator and Warning Lamps do not Illuminate.

Combination Meter Power Supply Circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue
BR: Brown O: Orange GR: Grey R: Red P: Pink V: Violet PU: Purple

COMMENTS ON TROUBLE SYMPTOM

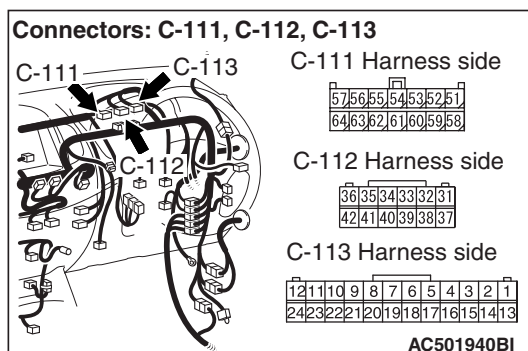
If the odometer and trip meter is not displayed or all the meter needles doesn't move, power supply to the combination meter, or the combination meter itself may be defective.

PROBABLE CAUSES

- Damaged harness wires and connectors
- Malfunction of the combination meter

DIAGNOSIS PROCEDURE

STEP 1. Connector check: Combination meter connector C-111, C-112 and C-113.

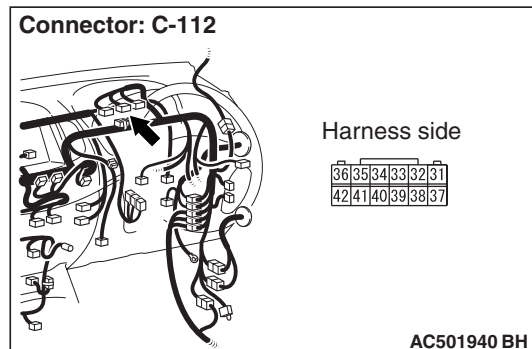


Q: Is the check result normal?

YES : Go to Step 2.

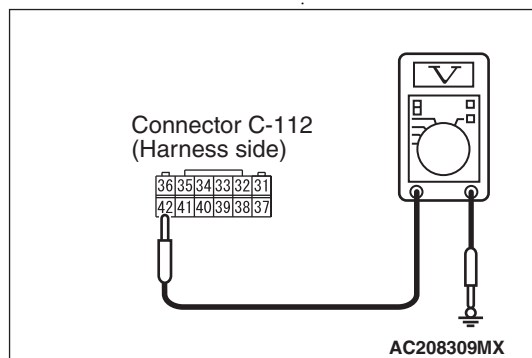
NO : Repair the defective connector.

STEP 2. Voltage measurement at combination meter connector C-112.



Disconnect the connector, and measure at the wiring harness side.

- Ignition switch: "LOCK" (OFF) position.



Voltage between combination meter connector C-112 terminal No.42 and body earth.

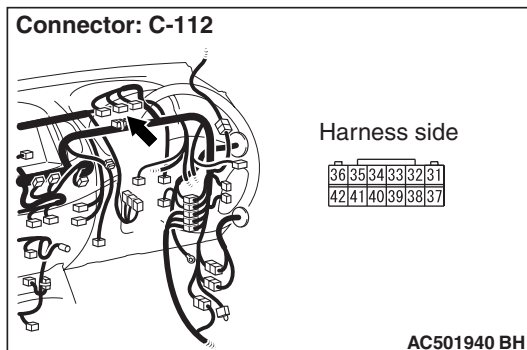
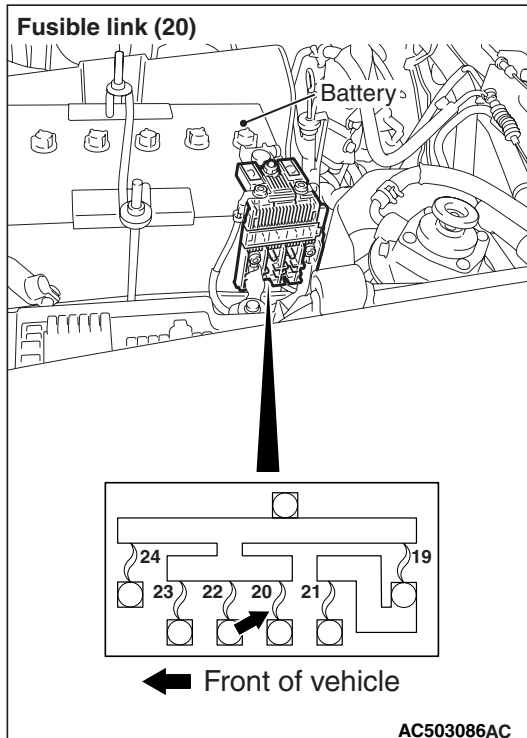
OK: System voltage

Q: Is the check result normal?

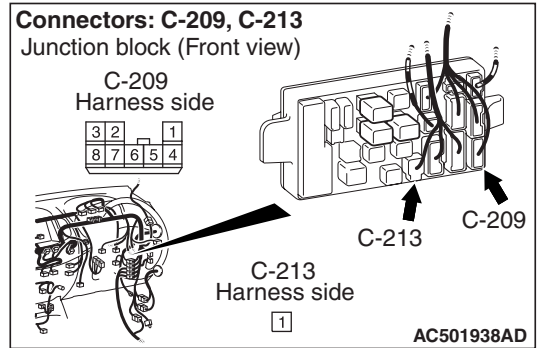
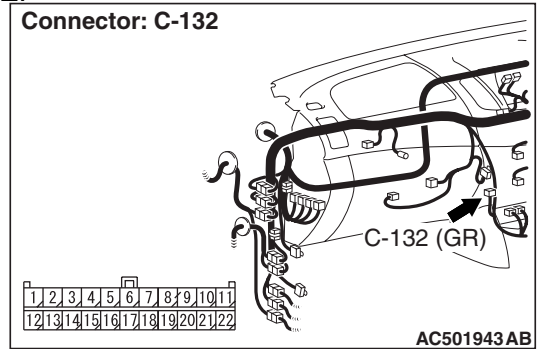
YES : Go to Step 4.

NO : Go to Step 3.

STEP 3. Check the harness wire between the battery (fusible link No.20) and combination meter connector C-112 (terminal No.42).



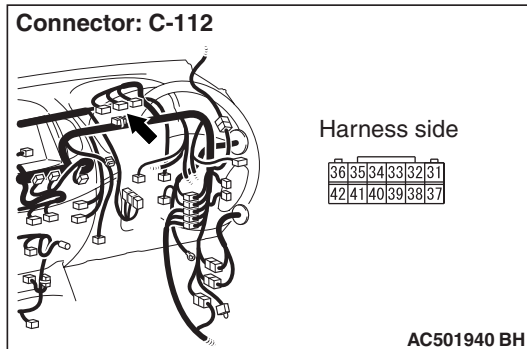
NOTE:



Prior to the wiring harness inspection, check joint connector C-132 and junction block connectors C-209 and C-213, and repair if necessary.

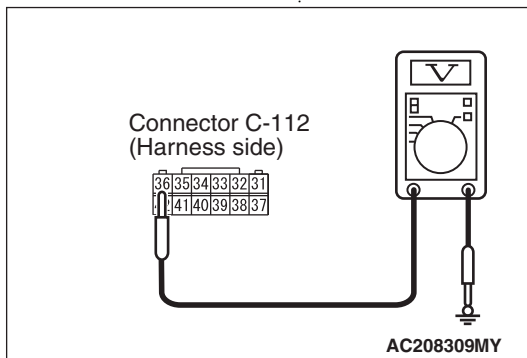
- Q: Is the wiring harness between the battery (fusible link No.20) and combination meter connector C-112 (terminal No.42) in good condition?**
YES : Retest the system.
NO : Repair the wiring harness.

STEP 4. Voltage measurement at combination meter connector C-112.



Disconnect the connector, and measure at the wiring harness side.

- Ignition switch: ON position.



Voltage between combination meter connector C-112 terminal No.36 and body earth.

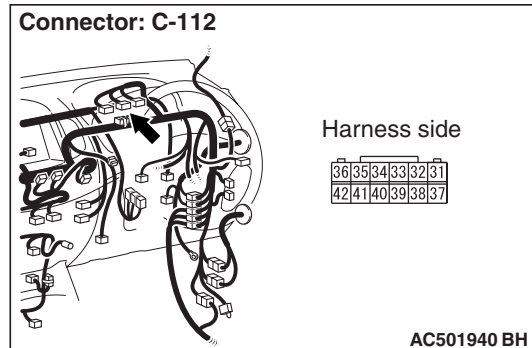
OK: System voltage

Q: Is the check result normal?

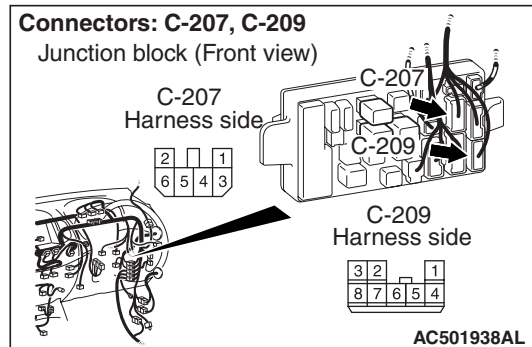
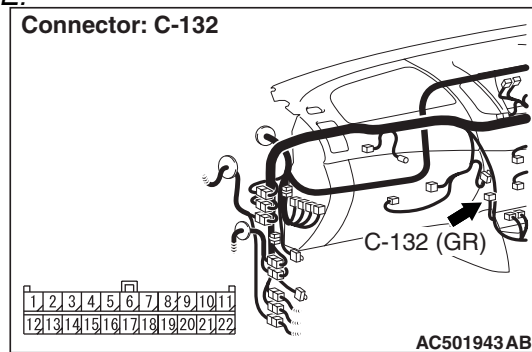
YES : Go to Step 6

NO : Go to Step 5

STEP 5. Check the harness wire between the ignition switch (IG1) and combination meter connector C-112 (terminal No.36).



NOTE:



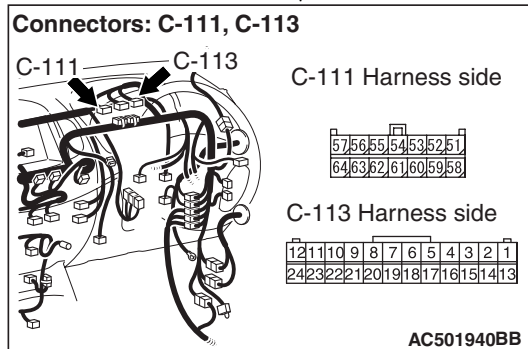
Prior to the wiring harness inspection, check joint connector C-132 and junction block connectors C-207 and C-209, and repair if necessary.

Q: Is the wiring harness between the ignition switch (IG1) and combination meter connector C-112 (terminal No.36) in good condition?

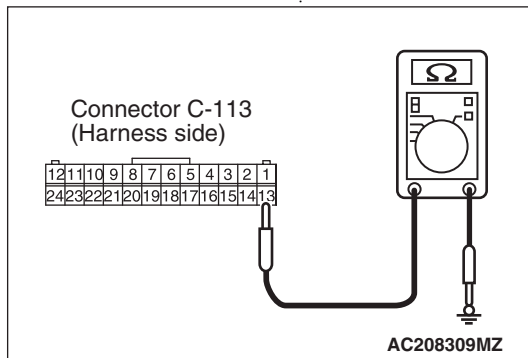
YES : Retest the system.

NO : Repair the wiring harness.

STEP 6. Resistance measurement at combination meter connector C-111 and C-113.

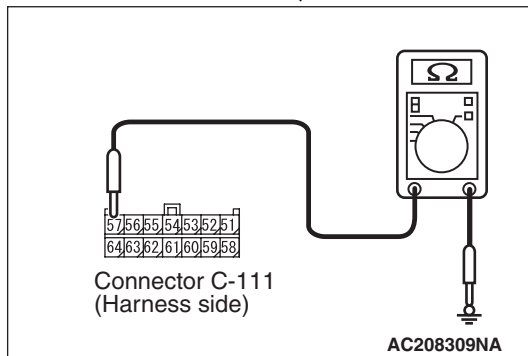


Disconnect the connector, and measure at the wiring harness side.



Resistance between combination meter connector C-113 terminal No.13 and body earth.

OK: 2 ohms or less



Resistance between combination meter connector C-111 terminal No.57 and body earth.

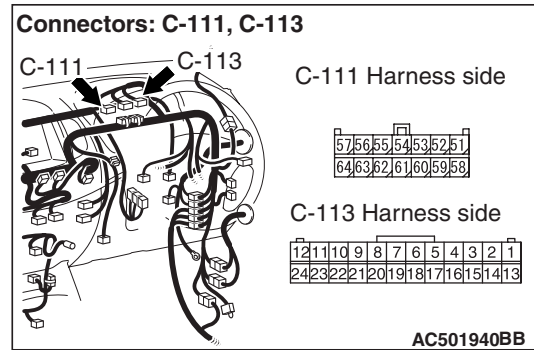
OK: 2 ohms or less

Q: Is the check result normal?

YES : Go to Step 8

NO : Go to Step 7

STEP 7. Check the harness between combination meter connector C-111 (terminal No.57), C-113 (terminal No.13) and body earth.



Q: Is the wiring harness between the combination meter connector C-111 (terminal No.57), C-113 (terminal No.13) and body earth in good condition?
YES : Retest the system.
NO : . Repair the wiring harness.

STEP 8. Retest the system.

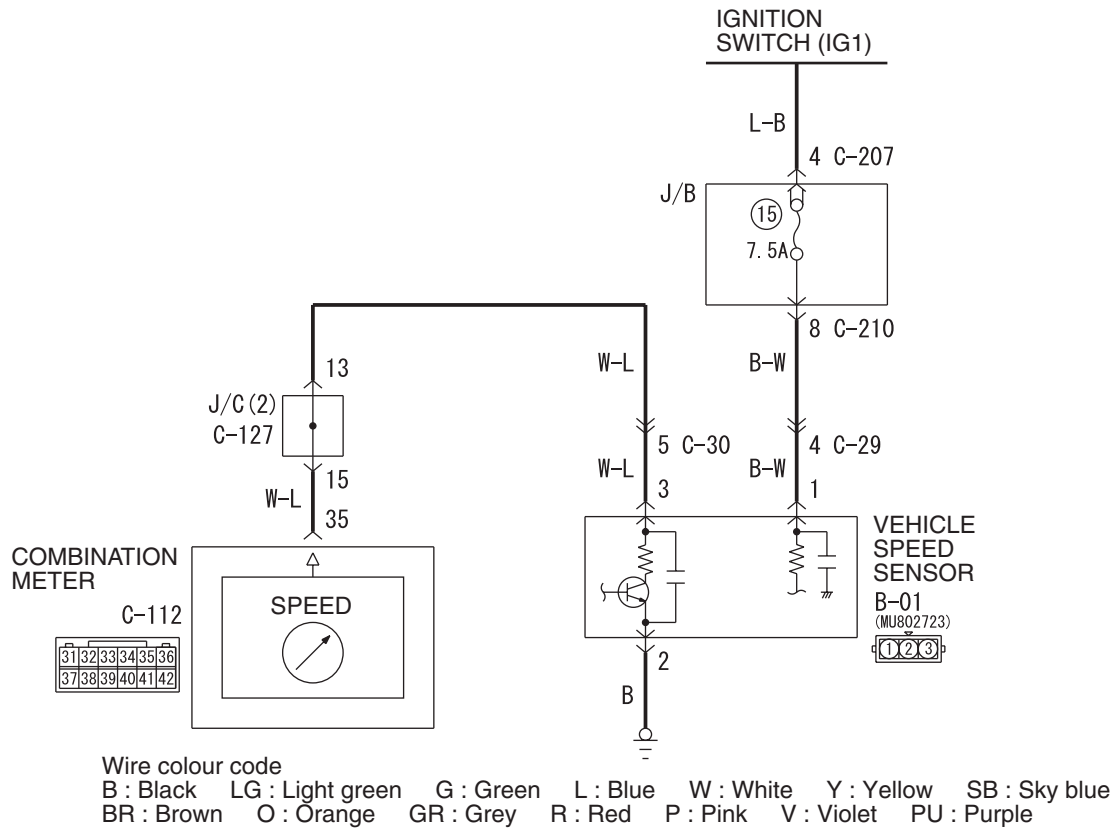
Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction).

NO : Replace the combination meter.

Inspection Procedure 5: Speedometer does not Work (other meters work).

Speedometer Circuit



W7C54X025A

COMMENTS ON TROUBLE SYMPTOM

If only the speedometer does not operate, the engine ECU system, the combination meter, the wiring harness or its connector may be defective. Furthermore, incorrect level of fuel is shown on the gauge, because the display unit can not learn the fuel gauge.

PROBABLE CAUSES

- Damaged harness wires and connectors
- Malfunction of vehicle speed sensor
- Malfunction of engine ECU
- Malfunction of combination meter

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III other system diagnosis code.

Check whether the DIESEL system-related diagnosis code is set.

Q: Is the diagnosis code set?

YES : Diagnose DIESEL system. (Refer to GROUP 13A <2500-SOHC>, Troubleshooting, GROUP 13B <2500-DOHC>, Troubleshooting or GROUP 13C <3200>, Troubleshooting.)
 After diagnosing the DIESEL system, go to Step 5.

NO : Go to Step 2.

STEP 2. M.U.T.-III other system data list

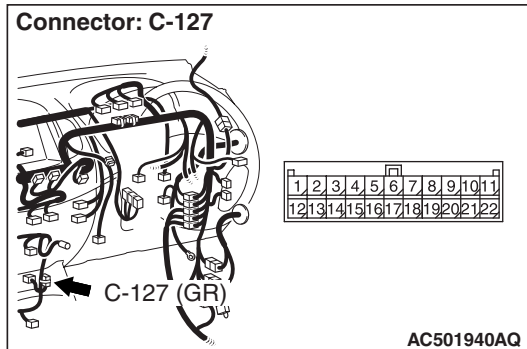
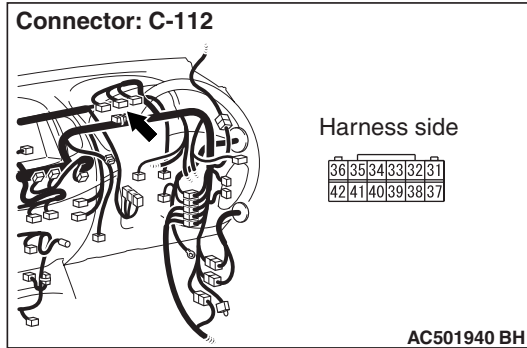
Check the vehicle speed signal data list of DIESEL system.

Q: Is the check result satisfactory?

YES : Go to Step 3.

NO : Diagnose DIESEL system. (Refer to GROUP 13A <2500-SOHC>, Troubleshooting , GROUP 13B <2500-DOHC>, Troubleshooting or GROUP 13C <3200>, Troubleshooting .) After diagnosing the DIESEL system.

STEP 3. Connector check: Joint connector C-127 and combination meter connector C-112.

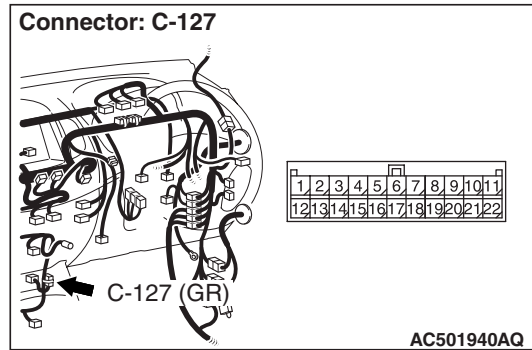
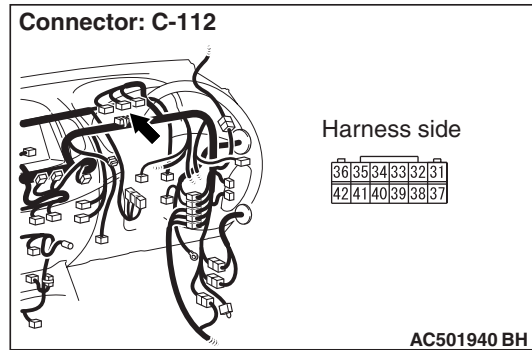


Q: Is joint connector C-127 and combination meter connector C-112 in good condition?

YES : Go to Step 4.

NO : Repair or replace the damage component(s).

STEP 4. Check the wiring harness between joint connector C-127 (terminal 15) and combination meter connector C-112 (terminal 35).



Q: Is the wiring harness between joint connector C-127 (terminal 15) and combination meter connector C-112 (terminal 35) in good condition?

YES : Go to Step 5.

NO : Repair or replace the damage component(s).

STEP 5. Retest the system.

Q: Is the speedometer normal?

YES : The procedure is complete. (If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00 / How to Cope with Intermittent Malfunction).

NO : Go to Step 6.

STEP 6. Pulse check

Use the M.U.T.-III or a voltmeter to check that the vehicle speed signal is received.

NOTE: Drive the vehicle with the M.U.T.-III connected to the diagnosis connector. The M.U.T.-III buzzer should sound.

System switch	Check conditions
Vehicle speed signal	When the vehicle speed has reached 10 km/h or more

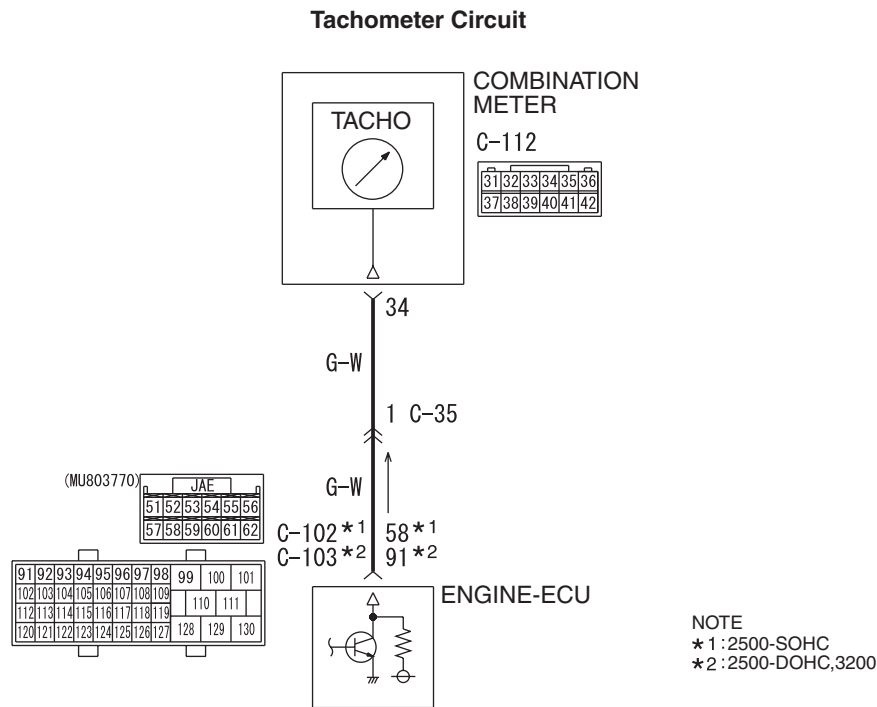
OK: The M.U.T.-III sounds or the voltmeter needle fluctuates.

Q: Is the check result normal?

YES : Replace the combination meter assembly.

NO : Replace the engine ECU.

Inspection Procedure 6: Tachometer does not Work (other meters work).



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X037A

COMMENTS ON TROUBLE SYMPTOM

If only the tachometer does not operate, the engine-ECU system may not be sending ignition signal, or the combination meter, the wiring harness or its connector may be defective.

PROBABLE CAUSES

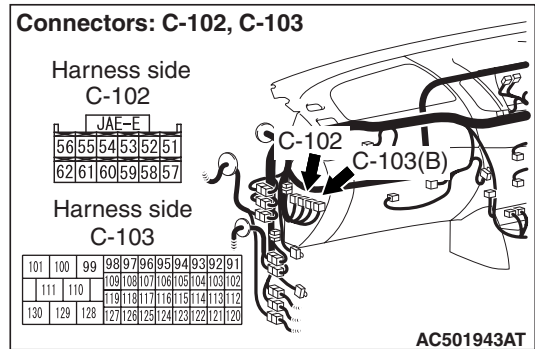
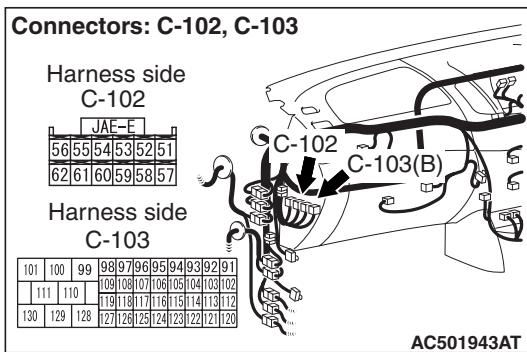
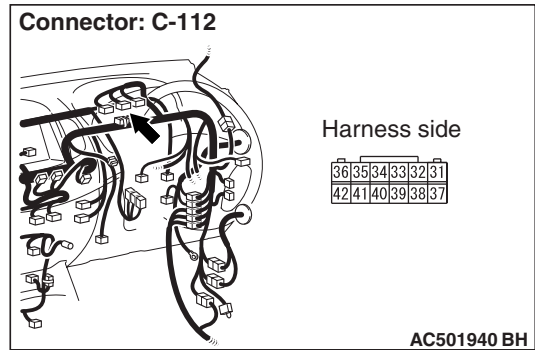
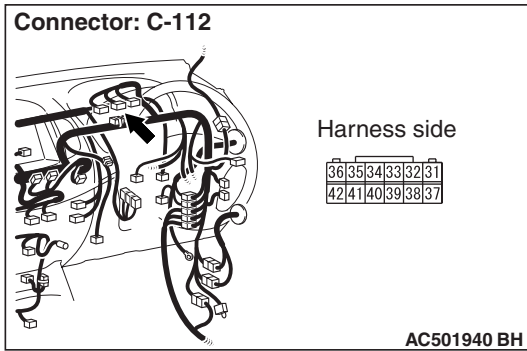
- Malfunction of combination meter
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III other system diagnosis code
Check whether the DIESEL system-related diagnosis code is set.

Q: Is the diagnosis code set?
YES : Diagnose DIESEL system. (Refer to GROUP 13A <2500-SOHC>, Troubleshooting , GROUP 13B <2500-DOHC>, Troubleshooting or GROUP 13C <3200>, Troubleshooting .)
 After diagnosing the DIESEL system, go to Step 4.
NO : Go to Step 2.

STEP 2. Connector check: Combination meter connector C-112 and engine-ECU connector C-102 <2500-SOHC>, C-103 <2500-DOHC, 3200>.



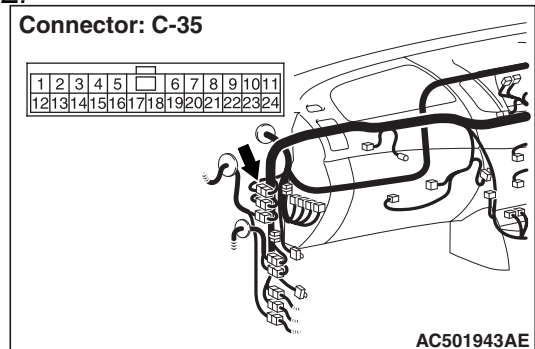
Q: Is combination meter connector C-112 and engine-ECU connector C-102 <2500-SOHC>, C-103 <2500-DOHC, 3200> in good condition?
YES : Go to Step 3.
NO : Repair or replace the damage component(s).

STEP 3. Retest the system.

Q: Is the tachometer normal?
YES : Intermittent Malfunction. Refer to GROUP 00 / How to Cope with Intermittent Malfunction).
NO : Go to Step 4.

STEP 4. Check the wiring harness between combination meter connector C-112 (terminal 34) and engine ECU connector C-102 (terminal 58) <2500-SOHC>, C-103 (terminal 91) <2500-DOHC,3200>.

NOTE:



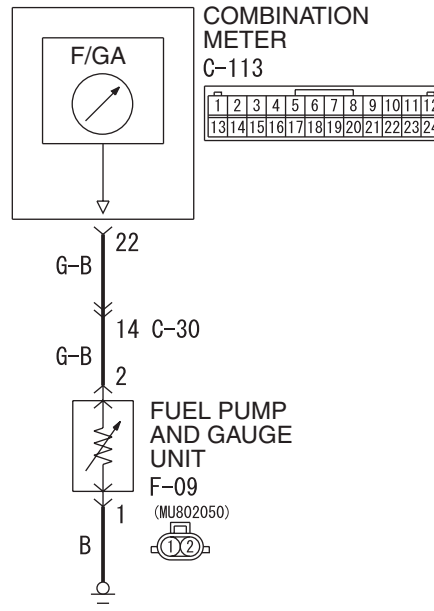
Prior to the wiring harness inspection, check intermediate connector C-35, and repair if necessary.

Q: Is the wiring harness between combination meter connector C-112 (terminal 34) and engine ECU connector C-102 (terminal 58) <2500-SOHC>, C-103 (terminal 91) <2500-DOHC,3200> in good condition?

YES : Replace the combination meter assembly.
NO : Repair or replace the damage component(s).

Inspection Procedure 7: Fuel Gauge does not Work (other meters work).

Fuel Pump and Gauge Unit Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X026A

COMMENTS ON TROUBLE SYMPTOM

If only the fuel gauge does not operate, the fuel pump and gauge unit, the combination meter, wiring harness or connector(s) may be defective.

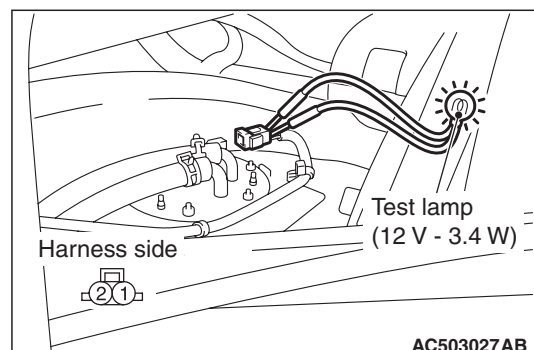
PROBABLE CAUSES

- Damaged harness wires and connectors
- Malfunction of the fuel gauge unit
- Malfunction of combination meter

DIAGNOSIS PROCEDURE

STEP 1. Check the fuel gauge circuit.

(1) Disconnect F-09 fuel pump and gauge unit connector.



(2) Connect a test lamp (12 V –3.4 W) via special tool test harness (MB991219) between the wiring harness connector terminals 1 and 2.

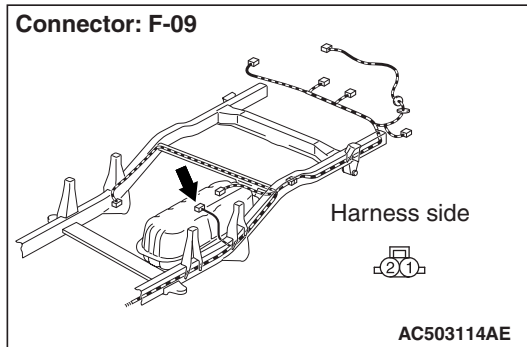
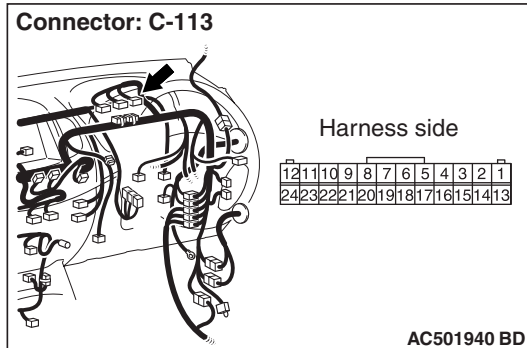
(3) Turn the ignition switch to the "ON" position.

Q: Does the test lamp illuminate?

YES : Go to Step 7.

NO : Go to Step 2.

STEP 2. Connector check: Combination meter connector C-113 and fuel pump and gauge unit connector F-09.

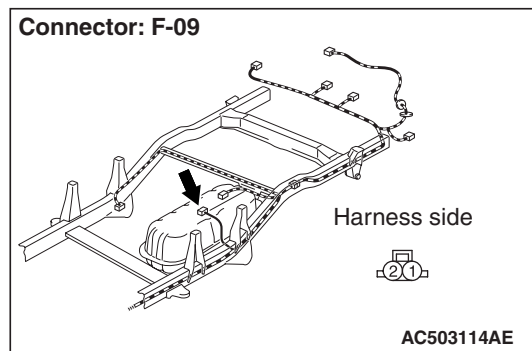
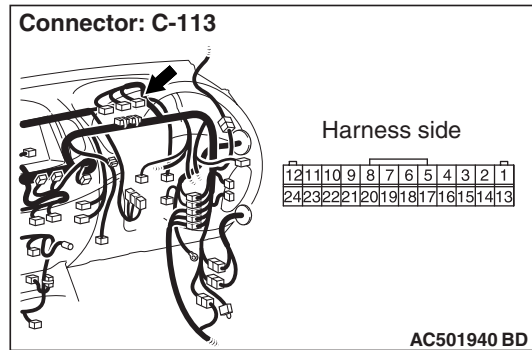


Q: Is combination meter connector C-113 and fuel pump and gauge unit connector F-09 in good condition?

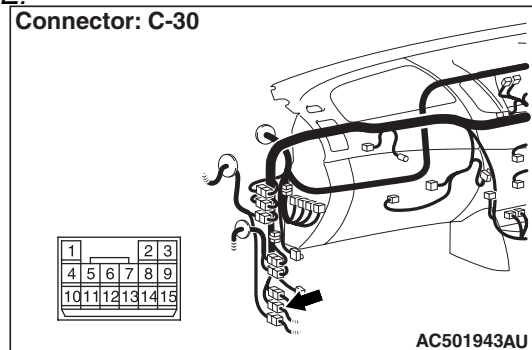
YES : Go to Step 3.

NO : Repair or replace the damaged component(s).

STEP 3. Check the wiring harness between combination meter connector C-113 (terminal 22) and fuel pump and gauge unit connector F-09 (terminal 2).



NOTE:



Prior to the wiring harness inspection, check intermediate connector C-30 and repair if necessary.

Q: Is the wiring harness between combination meter connector C-113 (terminal 22) and fuel pump and gauge unit connector F-09 (terminal 2) in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged component(s). Then go to Step 4.

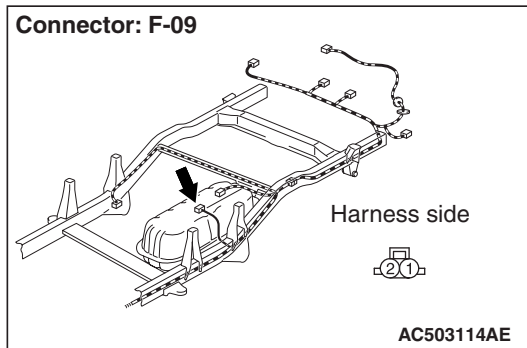
STEP 4. Retest the system.

Q: Is the fuel gauge normal?

YES : The procedure is complete. (If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00 / How to Cope with Intermittent Malfunction).

NO : Go to Step 5.

STEP 5. Check the wiring harness between fuel pump and gauge unit connector F-09 (terminal 1) and earth.



Q: Is the wiring harness between fuel pump and gauge unit connector F-09 (terminal 1) and earth in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged component(s).

STEP 6. Retest the system.

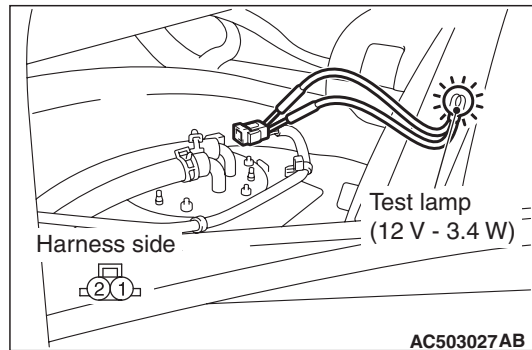
Q: Is the fuel gauge normal?

YES : The procedure is complete. (If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00 / How to Cope with Intermittent Malfunction).

NO : Carry out the troubleshooting again.

STEP 7. Check the fuel gauge circuit.

(1) Disconnect F-09 fuel pump and gauge unit connector.



(2) Connect a test lamp (12 V -3.4 W) via special tool test harness (MB991219) between the wiring harness connector terminals 1 and 2.

(3) Turn the ignition switch to the "ON" position.

Q: Does the fuel gauge in the combination meter fluctuate about half of it full scale?

YES : Replace the fuel gauge unit.

NO : Go to Step 8.

STEP 8. Retest the system.

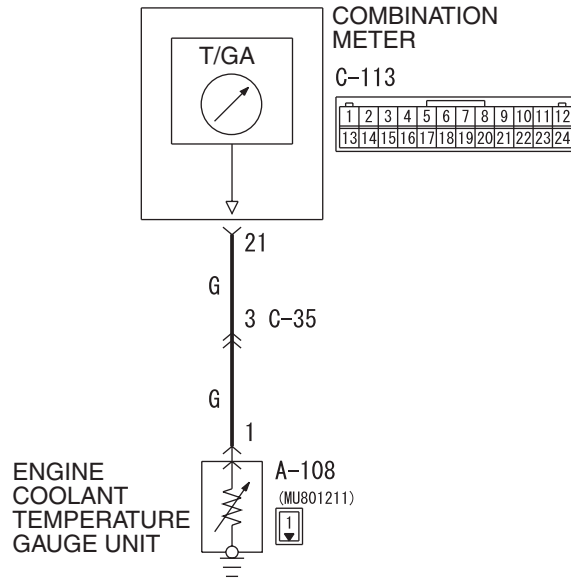
Q: Is the fuel gauge normal?

YES : The procedure is complete. (If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00 / How to Cope with Intermittent Malfunction).

NO : Replace combination meter.

Inspection Procedure 8: Engine Coolant Temperature Gauge does not Work (other meters work).

Engine Coolant Temperature Gauge Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X038A

COMMENTS ON TROUBLE SYMPTOM

If only the engine coolant temperature gauge does not operate, the engine ECU system, the combination meter, the wiring harness or its connector may be defective.

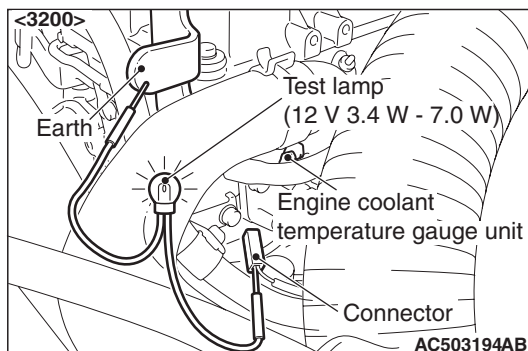
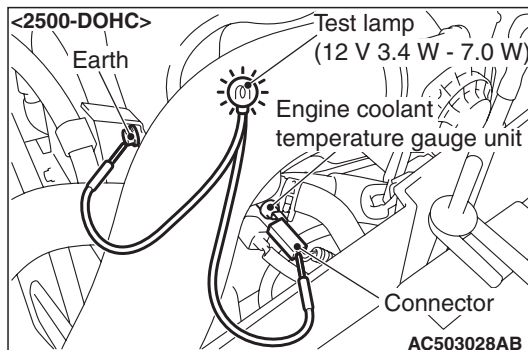
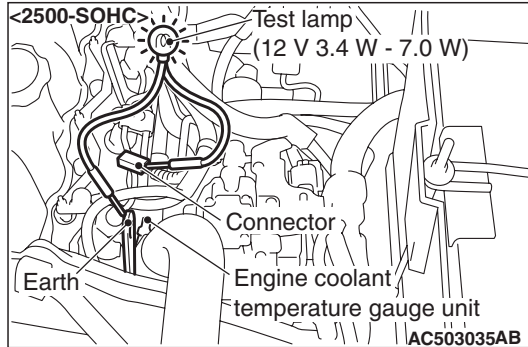
PROBABLE CAUSES

- Damaged harness wires and connectors
- Malfunction of the engine coolant temperature gauge unit
- Malfunction of combination meter

DIAGNOSIS PROCEDURE

STEP 1. Check the engine coolant temperature gauge circuit.

- (1) Disconnect the A-108 engine coolant temperature gauge unit connector.

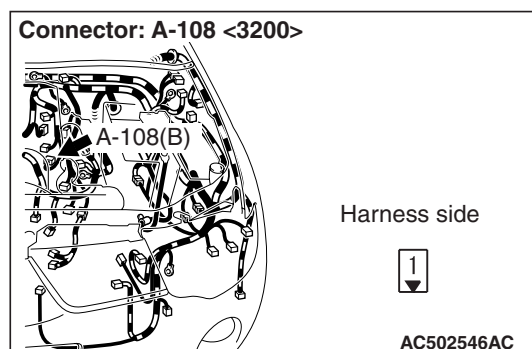
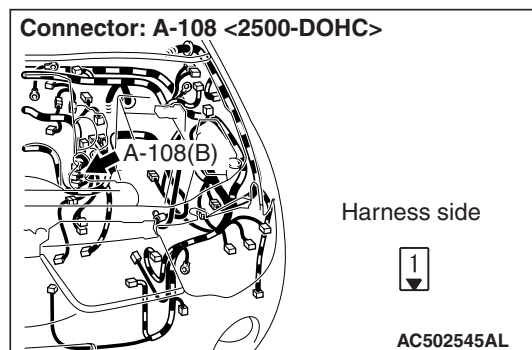
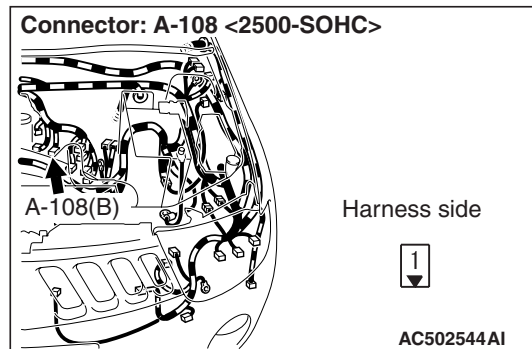
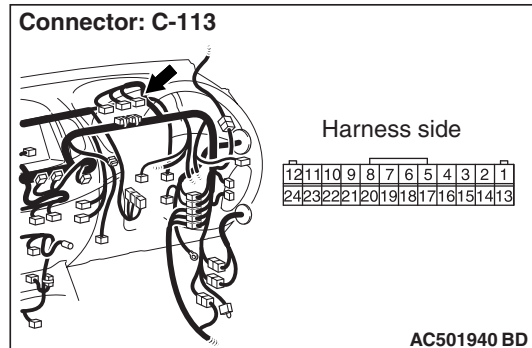


- (2) Connect a test lamp (12 V –3.4 W to 12 V –7.0 W) to the wiring harness side connector.
(3) Ignition switch: ON

Q: Does the test lamp illuminate?

- YES : Go to Step 5.
NO : Go to Step 2.

STEP 2. Connector check: Combination meter connector C-113 and engine coolant temperature gauge unit connector A-108.



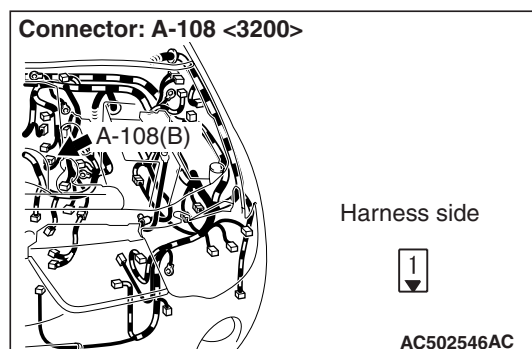
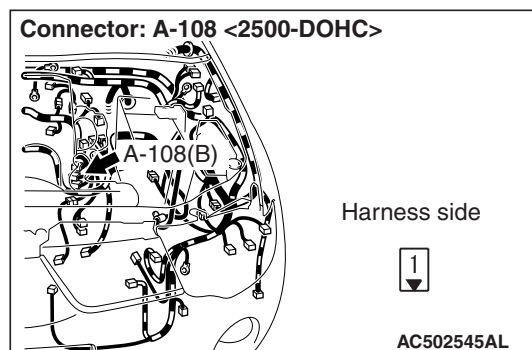
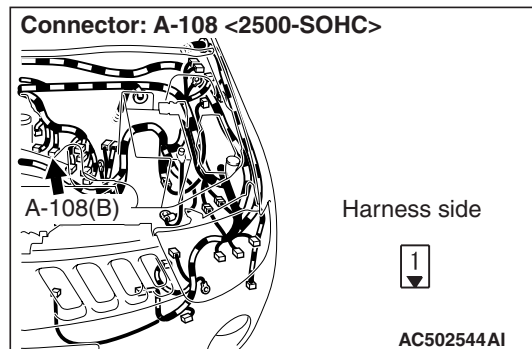
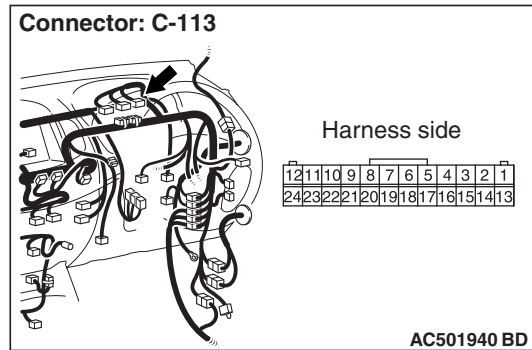
Q: Is combination meter connector C-113 and engine coolant temperature gauge unit connector A-108 in good condition?

- YES : Go to Step 3.
NO : Repair or replace the damage component(s).

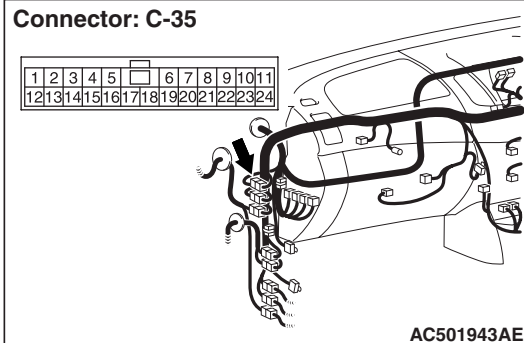
STEP 3. Retest the system.

- Q: Is the engine coolant temperature gauge normal?**
YES : The procedure is complete. (If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00 / How to Cope with Intermittent Malfunction).
NO : Go to Step 4.

STEP 4. Check the wiring harness between combination meter connector C-113 (terminal 21) and engine coolant temperature gauge unit connector A-108 (terminal 1).



NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-35, and repair if necessary.

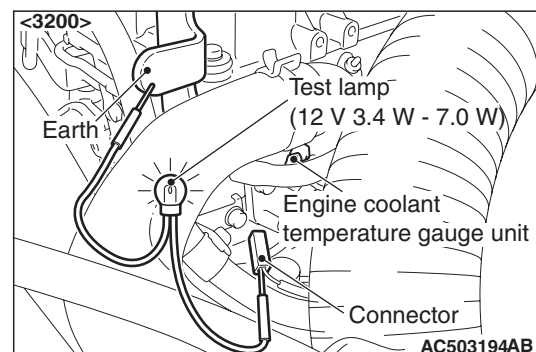
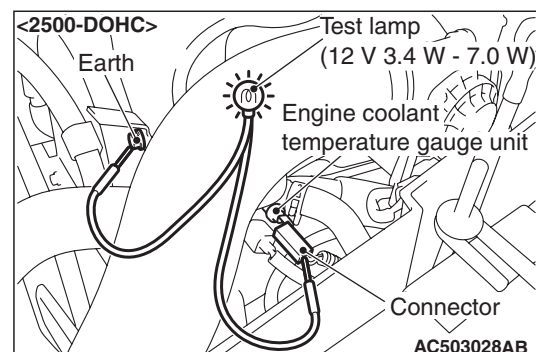
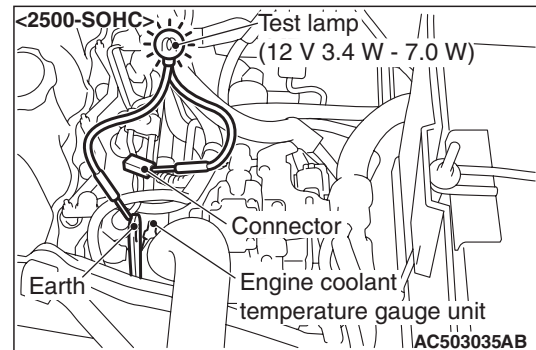
Q: Is the wiring harness between combination meter connector C-113 (terminal 21) and engine coolant temperature gauge unit connector A-108 (terminal 1) in good condition?

YES : Go to Step 6.

NO : Repair or replace the damage component(s).

STEP 5. Check the engine coolant temperature gauge circuit.

(1) Disconnect the A-108 engine coolant temperature gauge unit connector.



(2) Connect a test lamp (12 V –3.4 W to 12 V –7.0 W) to the wiring harness side connector.

(3) Ignition switch: ON

Q: Does the engine coolant temperature gauge in the combination meter fluctuate about half of its full scale?

YES : Replace the engine coolant temperature gauge unit.

NO : Go to Step 6.

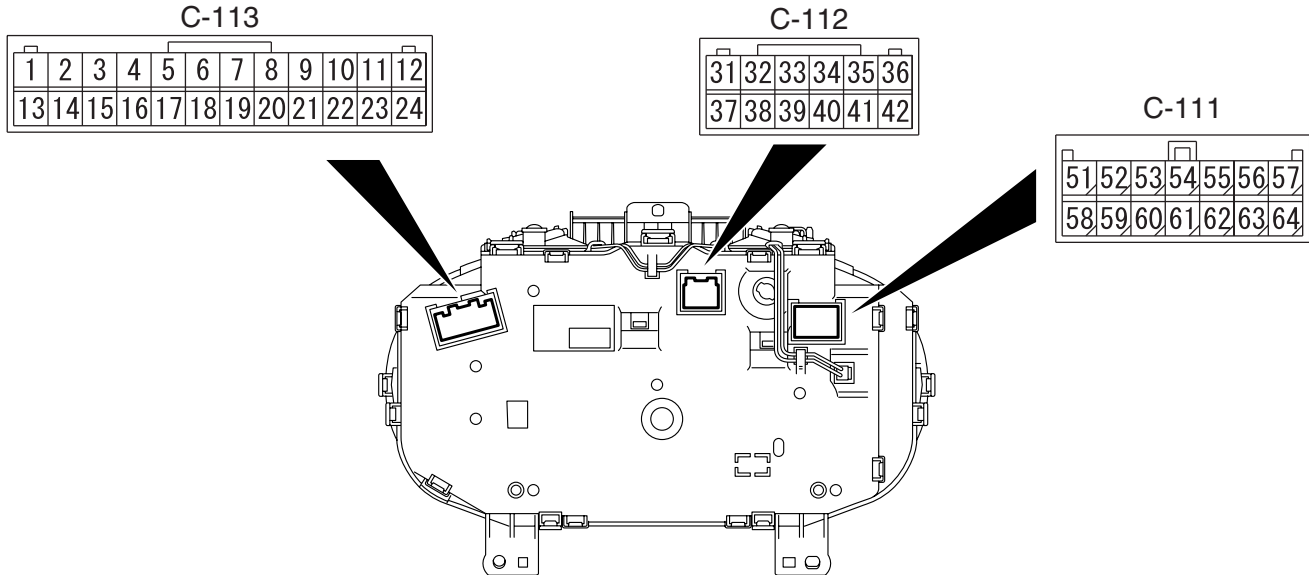
STEP 6. Retest the system

Q: Is the engine coolant temperature gauge normal?

YES : The procedure is complete. (If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00 / How to Cope with Intermittent Malfunction).
NO : Replace the combination meter.

CHECK AT ECU TERMINALS

M1543007600951



AC502672AB

Connector: C-111

Terminal No.	Check items	Check conditions	Normal conditions
51	Glow indicator lamp	Ignition switch: ON	–
52	Charge warning lamp	Ignition switch: ON and before alternator generation	0 V
53 –55	–	–	–
56	Input of turn-signal lamp LH switch	Ignition switch: ON and turn-signal lamp (LH) switch: ON	12 V
57	Earth	Always	0 V
58	–	–	–
59	Over drive off indicator	Ignition switch: ON and over drive off switch: ON	–
60	A/T fluid temperature warning lamp	Ignition switch: ON	–
61	Oil pressure switch	Ignition switch: ON and before starting the engine	0 V
62	–	–	–
63	Check engine warning lamp	Ignition switch: ON	–
64	Water separator indicator lamp	Ignition switch: ON and water level switch: ON	0 V

Connector: C-112

Terminal No.	Check items	Check conditions	Normal conditions
31	Shift indicator –L	Ignition switch: ON and shift lever is in L position	12 V
32, 33	–	–	–
34	Tachometer (engine speed)	Ignition switch: ON	–
35	Speedometer (vehicle speed)	Ignition switch: ON	–
36	Power supply from ignition switch (IG1)	Ignition switch: ON	System voltage
37	Shift indicator –2	Ignition switch: ON and shift lever is in 2 position	12 V
38	Shift indicator –D	Ignition switch: ON and shift lever is in D position	12 V
39	Shift indicator –N	Ignition switch: ON and shift lever is in N position	12 V
40	Shift indicator –R	Ignition switch: ON and shift lever is in R position	12 V
41	Shift indicator –P	Ignition switch: ON and shift lever is in P position	12 V
42	Battery power supply	Always	System voltage

Connector: C-113

Terminal No.	Check items	Check conditions	Normal conditions
1	–	–	–
2	Door ajar warning lamp	Ignition switch: ON and door is open	–
3	–	–	–
4	Wheel lock indicator lamp	–	–
5 –7	–	–	–
8	4WD indicator lamp	Ignition switch: ON	–
9 –11	–	–	–
12	Input of parking brake switch and brake fluid level switch	<ul style="list-style-type: none"> • Ignition switch: ON and parking brake switch: ON • Ignition switch: ON and brake fluid level switch: ON • Ignition switch: ON and vacuum switch: ON 	–
13	Earth	Always	0 V
14	–	–	–
15	Illumination (earth)	Always	0 V
16	Illumination (power supply)	Illumination switch: ON	System voltage
17	Brake warning lamp	Illumination switch: ON	0 V
18	SRS air bag warning lamp	Illumination switch: ON	0 V

Terminal No.	Check items	Check conditions	Normal conditions
19	ABS warning lamp	Illumination switch: ON	0 V
20	–	–	–
21	Input of engine coolant temperature gauge	Always	–
22	Input of fuel gauge	Always	–
23	Input of turn-signal lamp RH switch	Ignition switch: ON and turn-signal lamp (RH) switch: ON	12 V
24	Input of high beam switch	Ignition switch: ON and high beam switch: ON	12 V

ON-VEHICLE SERVICE

CHECK THE SPEEDOMETER

M1543000900791

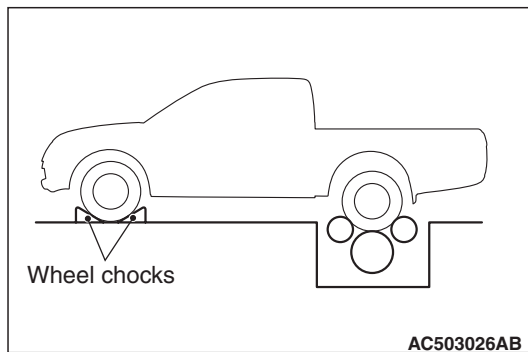
CAUTION

Since the diagnosis code may be stored in the ABS-ECU when checking the speedometer with speedometer tester, erase the diagnosis code.

CAUTION

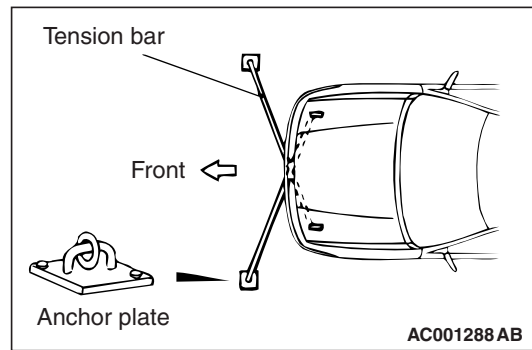
Do not accelerate or decelerate suddenly during servicing work.

1. Check that the current tyre inflation pressures meet the inflation pressure label.(Refer to GROUP 31 –On-vehicle Service .)
2. Place the vehicle onto a speedometer tester.



3. Place wheel locks on front wheels.

NOTE: Set the vehicle to 2WD.



4. For prevention of front wheel lateral runout, install extension fittings on front towing eye and tie down hook, and install both ends of 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. Check that the speedometer indicating range is within the standard value or the needle fluctuation is within the limit.

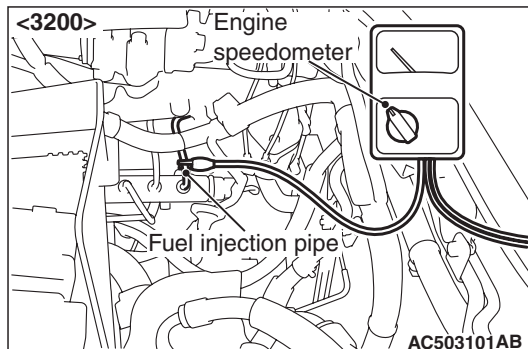
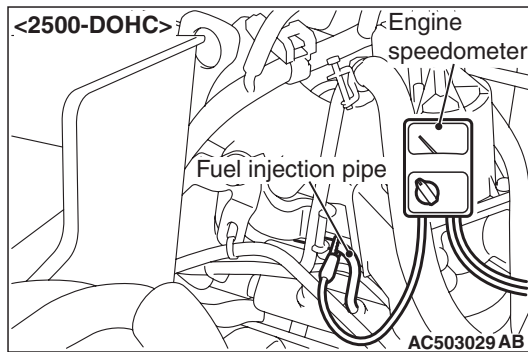
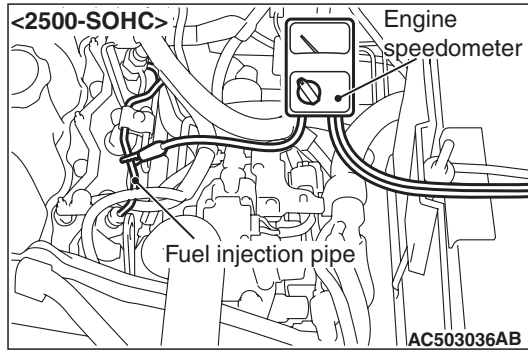
Standard value:

Speed km/h	20	40	80	120	160
Speedometer indicating	20.0 – 24.0	40.0 – 44.0	80.5 – 85.5	121.5 – 127.5	162.5 – 169.5

Limit: Needle fluctuation (Vehicle speed is 35 km/h or more) ± 3 km/h

TACHOMETER CHECK

M1543001000746



1. Connect the engine speedometer to the fuel injection pipe.
2. Compare the readings of the engine speedometer and the tachometer at every engine speed, and check if the variation are within the standard value.

Standard value:

Engine speed r/min	Tachometer indicating tolerance r/min
700	700 ± 100
(2,000)	(2,000 ± 100)
3,000	3,000 ± 150
(4,000)	(4,000 ± 200)
5,000	5,000 ± 250

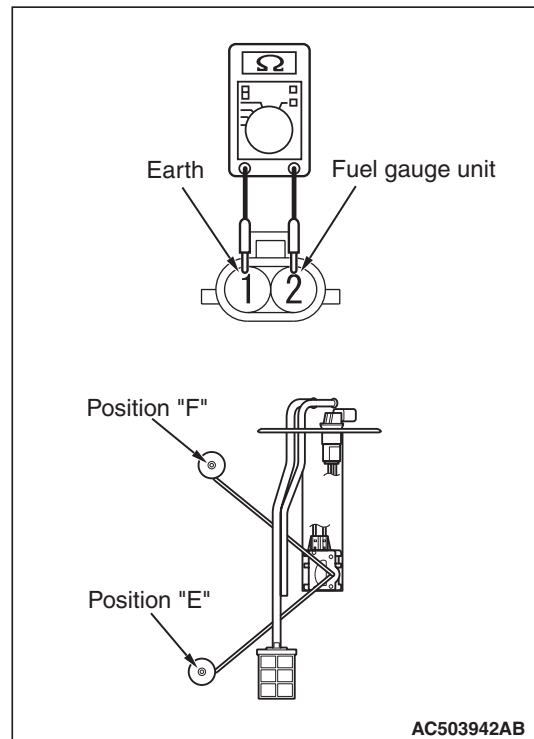
NOTE: The value in parentheses is a reference value.

FUEL TANK GAUGE UNIT CHECK

M1543001200858

Remove the fuel tank gauge unit and fuel tank pump and gauge unit assembly (Refer to GROUP 13C, Fuel Tank).

NOMINAL RESISTANCE OF THE FUEL GAUGE UNIT



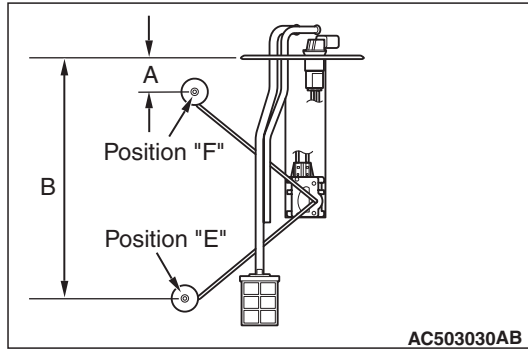
When float of the fuel gauge unit is in stopper positions "F" and "E", ensure that resistance between the fuel gauge unit terminal and earth terminal is within the standard value.

Standard value:

Float position	Gauge resistance Ω
Stopper position "F" (highest)	13.0 ± 1
Stopper position "E" (lowest)	120.0 ± 1

When the float is moved slowly between stopper positions "F" and "E", ensure that the resistance is smoothly changing.

FUEL GAUGE UNIT FLOAT HEIGHT



When float is moved to contact the float arm on the stopper, ensure that stopper positions "F" (height A) and "E" (height B) are within the standard value.

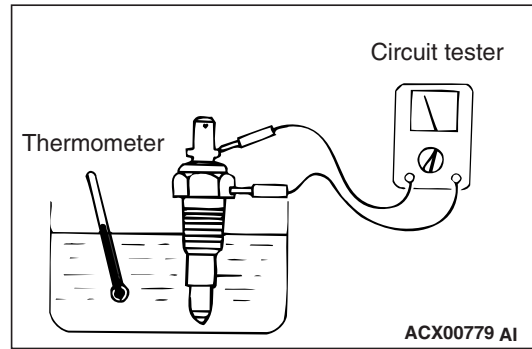
Standard value:

Float position	Float height mm
Stopper position "F" (highest A)	35.0 ± 3
Stopper position "E" (highest B)	254.7 ± 3

ENGINE COOLANT TEMPERATURE GAUGE UNIT CHECK

M1543001500558

1. Bleed the engine coolant.(Refer to GROUP 14 – On-vehicle Service .)
2. Remove the engine coolant temperature gauge unit.

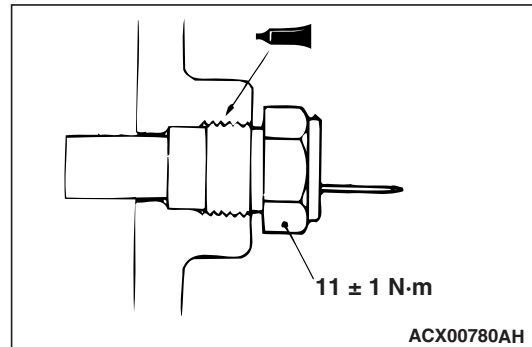


3. Immerse the unit in 70° C water to measure the resistance.

Standard value: 104 ± 13.5 Ω

Reference value

Temperature (° C)	Resistance Ω
50	230
60	155
80	73



4. After inspection, apply specified sealant at threads of water temperature gauge unit, and tighten to the specified torque.

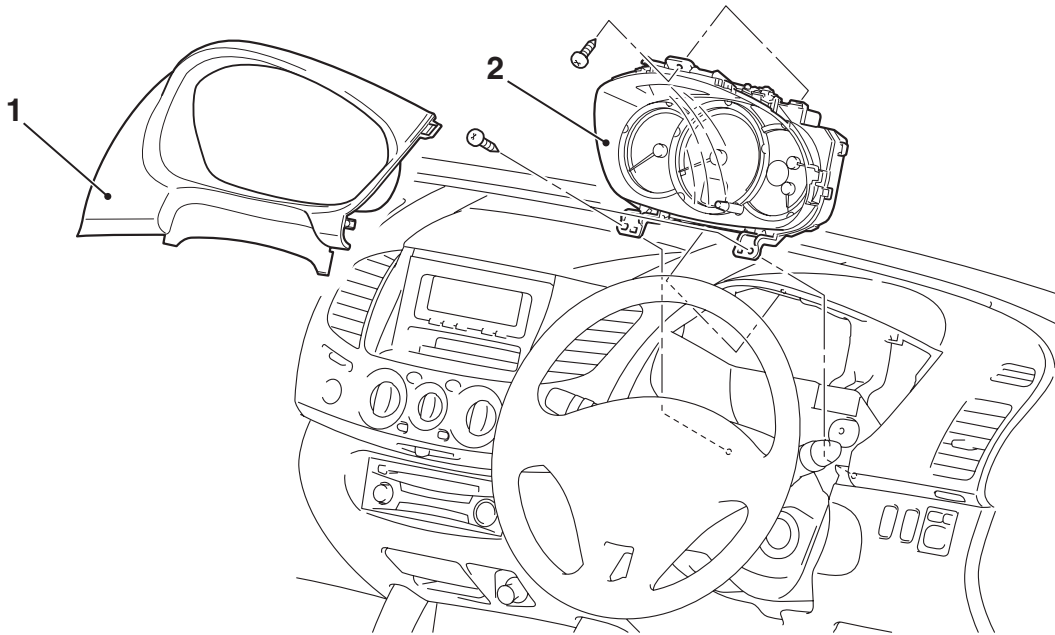
Semi-drying sealant: 3M ATD Part No.8660 or equivalent

5. Add engine coolant.(Refer to GROUP 14 – On-vehicle Service .)

COMBINATION METER ASSEMBLY

REMOVAL AND INSTALLATION

M1543021300103



AC502671AB

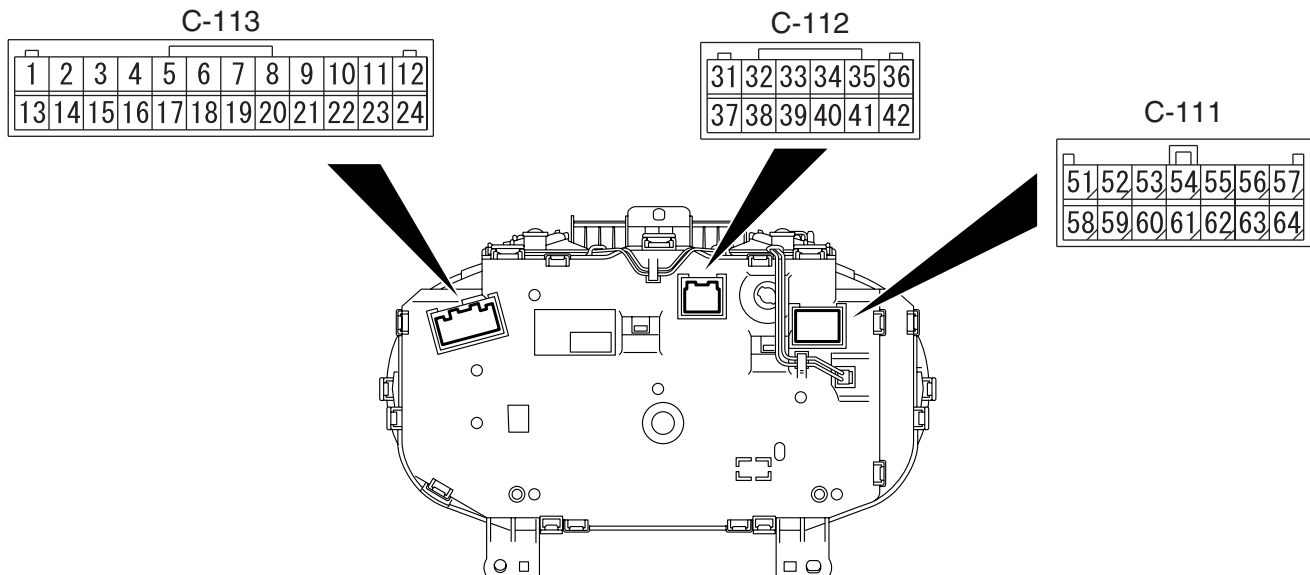
Removal steps

1. Combination meter bezel (Refer to GROUP 52A, Instrument Panel Assembly).
2. Combination meter assembly

INSPECTION

M1543033800019

CHECK OF COMBINATION METER INTERNAL RESISTANCE



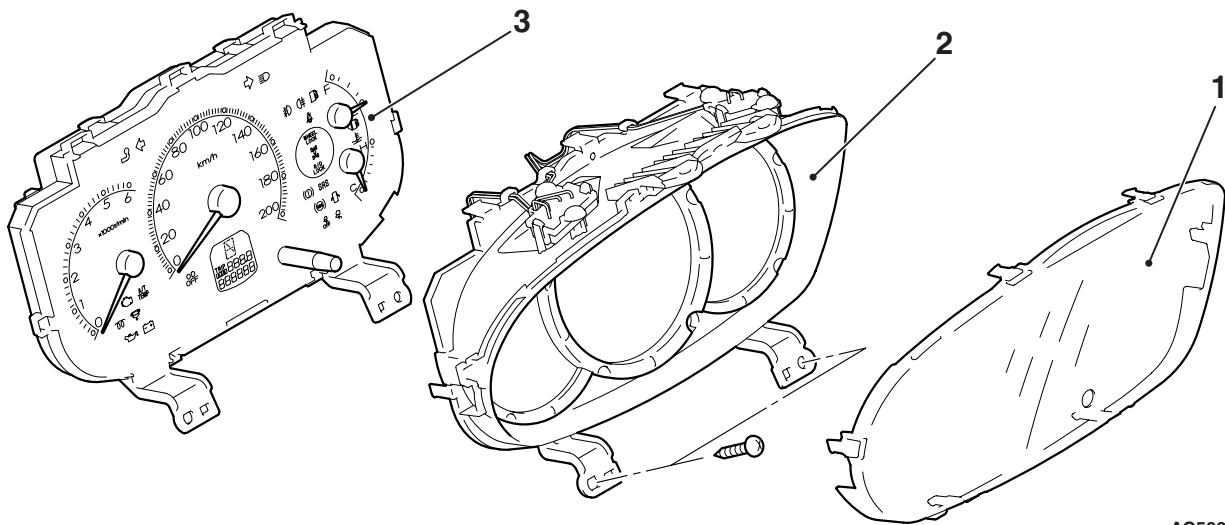
AC502672AB

Measure the resistance between terminals using an ohmmeter.

Terminal No. to measure resistance	Terminal name	Standard value
42 -13	Battery power source and ground	1 MΩ or more
42 -57	Battery power source and ground	1 MΩ or more
36 -13	IG power source and ground	1 MΩ or more
36 -57	IG power source and ground	1 MΩ or more
42 -22	Battery power source and fuel gauge	1 MΩ or more
36 -22	IG power source and fuel gauge	1 MΩ or more
22 -13	Fuel gauge and ground	180 Ω
22 -57	Fuel gauge and ground	180 Ω
42 -21	Battery power source and engine coolant temperature gauge	1 MΩ or more
36 -21	IG power source and engine coolant temperature gauge	1 MΩ or more
21 -13	Engine coolant temperature gauge and ground	210 Ω
21 -57	Engine coolant temperature gauge and ground	210 Ω

DISASSEMBLY AND REASSEMBLY

M1543003100437



AC503253 AB

- Disassembly steps**
1. Glass

- Disassembly steps (Continued)**
2. Window plate
 3. Meter sub assembly

HEADLAMP

SERVICE SPECIFICATIONS

M1542000300882

Item			Standard value	Limit
Headlamp aiming	Low beam (halogen headlamp)	Vertical direction	30 mm (0.57°) below horizontal (H)	Not within 9 mm (0.17°) below horizontal (H)
		Horizontal direction	15° sloping section intersects the vertical line (V)	±26 mm (±0.5°) from the vertical line (V)
Headlamp luminous intensity measurement cd (Corresponding to the illumination 40 m ahead of the vehicle at low beam)			–	30,000 cd or more per one headlamp

PRECAUTIONS ON HOW TO USE THE HEADLAMP ASSEMBLY

Be careful with the following items as resin lenses are used in the headlamp assembly.

- Don't illuminate the headlamp for three minutes or more when the headlamp is covered with scratch protector.
- Don't tape the outer lens.
- Don't scratch the outer lens surface with a sharp edged special tool.
- Use the specified wax remover and rinse the wax off cleanly.
- Use the specified genuine bulb.

TROUBLESHOOTING

M1542011800342

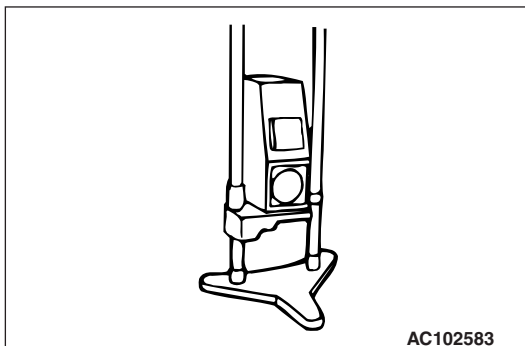
The head lamps are controlled by the ETACS-ECU. For troubleshooting, refer to GROUP 54B, Troubleshooting .

ON-VEHICLE SERVICE

HEADLAMP AIMING

M1542000900903

<USING A BEAM SETTING EQUIPMENT>

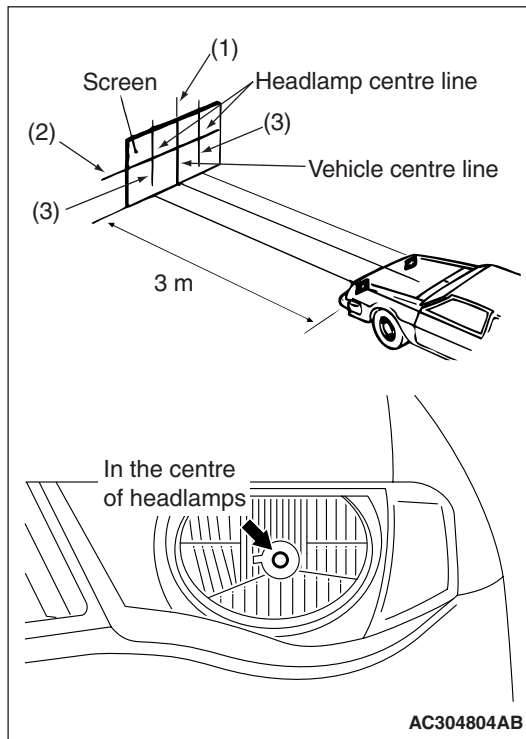


1. The headlamps should be aimed with the proper beam setting equipment, and in accordance with the equipment manufacture's instructions.
2. Alternately turn the adjusting screw to adjust the headlamp aiming.

<USING A SCREEN>

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 tyre inflation, and adjust if it is necessary.
4. If the fuel tank is not filled up, put weight in the luggage compartment to make up for the fuel shortage so that the weight will become 90% of full-state weight or heavier. (0.8 kg per litter)
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 the headlamp lenses.



7. Place the vehicle on a level floor, perpendicular to a flat screen 3 m away from the bulb centre-marks on the headlamp lens.
8. Rock vehicle sideways to allow vehicle to assume its normal position.
9. Bounce the front suspension through three oscillations by applying the body weight to hood or bumper.
10. Run the engine at a speed of 2,000 r/min to charge the battery.
11. 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 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 headlamp. Transfer the measurement to the screen. Vertical tape or mark on the screen with reference to the centre line of each headlamp bulb.

NOTE: Height from the floor to the centre of the headlamps (Reference value): 776 mm <2WD> or 887 mm <4WD>

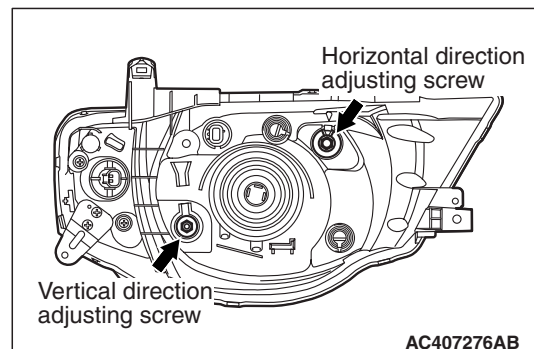
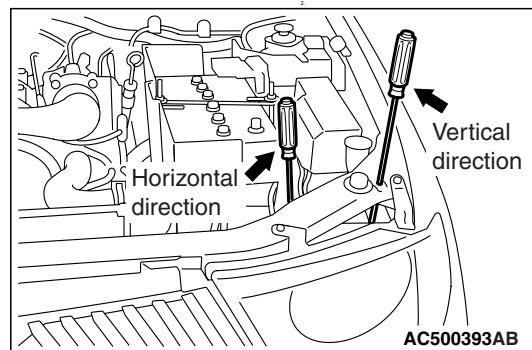
- (3) Measure the distance from the centre line of the vehicle to the centre of each headlamp. Transfer the measurement to the screen. Vertical tape or mark on the screen with reference to the centre line of each headlamp bulb.

HEADLAMP ADJUSTMENT

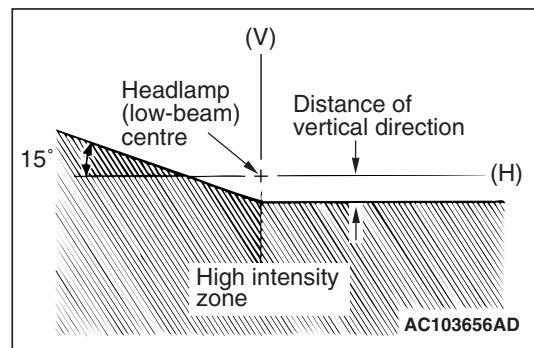
⚠ CAUTION

- Do not cover a headlamp for more than three minutes to prevent the plastic headlamp lens deformation.
- When adjusting one headlamp beam, make sure that another headlamp is off by disconnecting the connector from it. When reconnecting the connector, make sure that the headlamp beam is not disturbed accidentally.
- Be sure to adjust the aiming adjustment screw in the tightening direction.

1. The low-beam headlamp should project on the screen upper edge of the beam (cut-off).



If not the case, turn the adjusting screws to achieve the specified low-beam cut-off location on the aiming screen.



Standard value:

Vertical direction; 30 mm (0.57°) below horizontal (H)

Horizontal direction; 15° sloping section intersects the vertical line (V)

Limit:

Vertical direction; Not within 9 mm (0.17°) below horizontal (H)

Horizontal direction; ±26 mm (±0.5°) from the vertical line

HEADLAMP INTENSITY MEASUREMENT

M1542001000709

Using a photometer, and following its manufacture's instruction manual, measure the headlamp intensity and check to be sure that the limit value is satisfied.

Limit: 30,000 cd or more per one headlamp

NOTE:

1. When measuring the intensity, maintain an engine speed of 2,000 r/min, with the battery in the charging condition.
2. There may be special local regulations pertaining to headlamp intensity, be sure to make any adjustments necessary to satisfy such regulations.
3. Check that the headlamp intensity of the low beam satisfies the limit value.
4. 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 =illumination (lux)

r =distance (m) from headlamps to illuminometer

BULB REPLACEMENT

M1542001301231

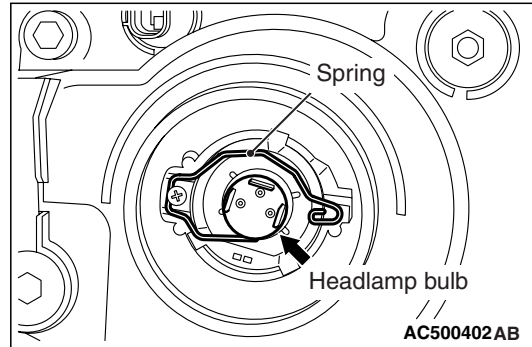
HEADLAMP BULB REPLACEMENT

⚠ CAUTION

Don't touch the bulb surface with bare hands or dirty gloves. If the bulb surface (glass part) gets dirty, clean it with alcohol or thinner immediately and dry well, and then install it.

1. Disconnect the battery.

2. Disconnect the connector.

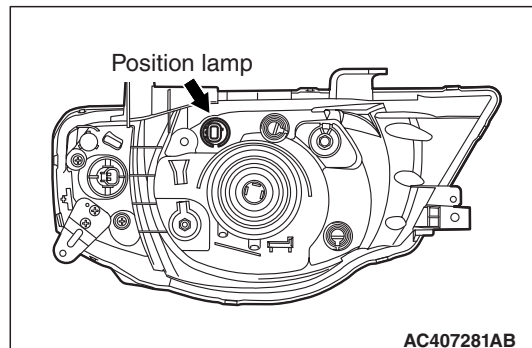


3. Remove the socket cover.
4. Remove bulb mounting spring to pull out bulb.
5. After bulb is replaced, properly reconnect connector.

POSITION LAMP BULB REPLACEMENT

⚠ CAUTION

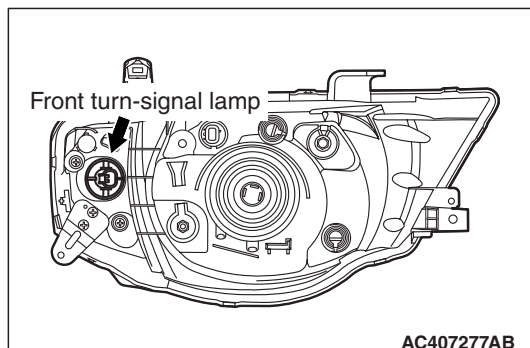
Don't touch the bulb surface with bare hands or dirty gloves. If the bulb surface (glass part) gets dirty, clean it with alcohol or thinner immediately and dry well, and then install it.



Disconnect the connector, and twist the position lamp socket to remove it.

**FRONT TURN-SIGNAL LAMP BULB
REPLACEMENT****⚠ CAUTION**

Don't touch the bulb surface with bare hands or dirty gloves. If the bulb surface (glass part) gets dirty, clean it with alcohol or thinner immediately and dry well, and then install it.



Disconnect the connector, and twist the front turn-signal lamp socket to remove it.

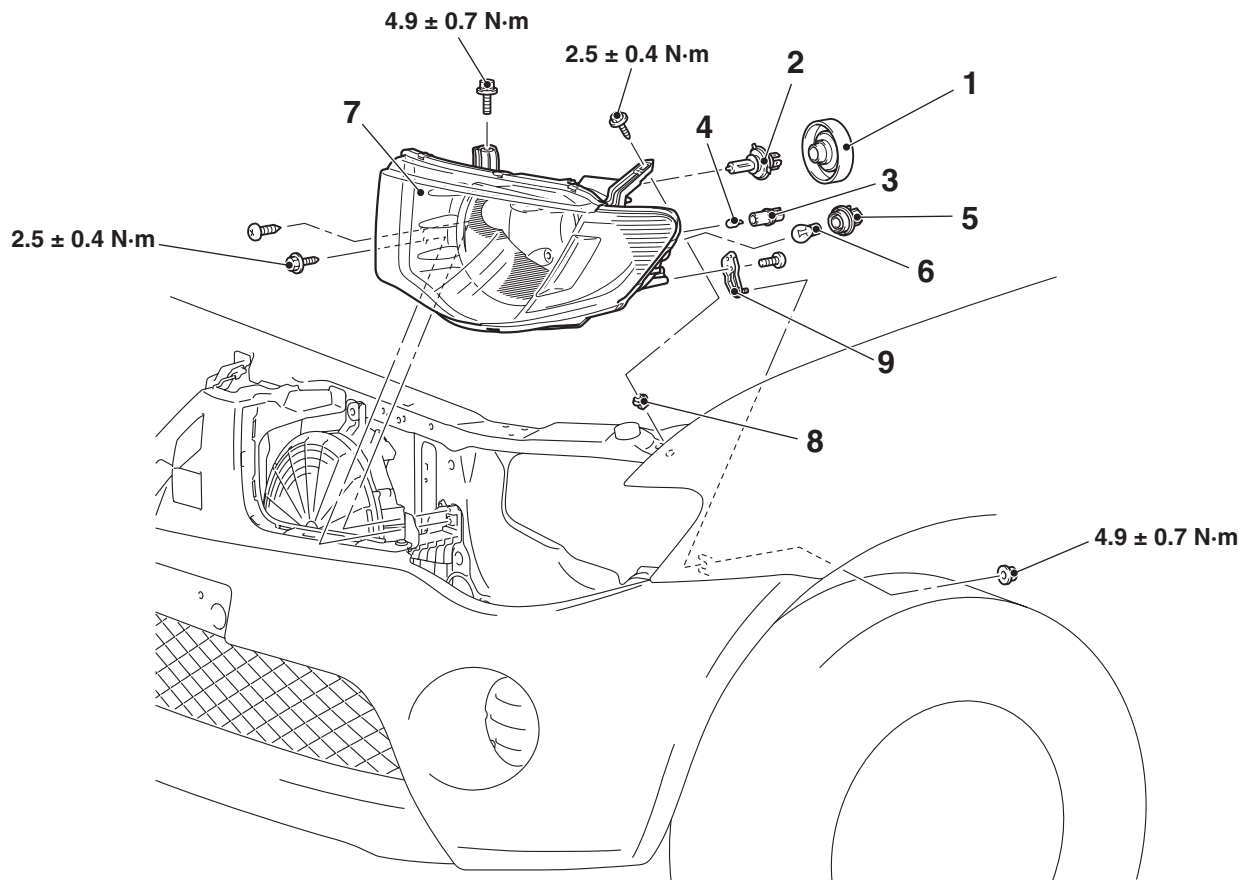
**INSPECTION OF HEADLAMP
AUTOMATIC-SHUTDOWN FUNCTION**

M1542011202023

Confirm that the headlamp turns off when the ignition switch is ON and the driver's door is opened and when the ignition key is pulled out with the lighting switch at ON (HEAD) position and the driver's door is opened. If any malfunction occurs, diagnose LIN. (Refer to GROUP 54B, Trouble symptom chart .)

REMOVAL AND INSTALLATION

M1542001800545



AC500432AB

Bulb removal step

1. Headlamp bulb socket cover
2. Headlamp bulb
3. Bulb socket
4. Position lamp bulb
5. Bulb socket
6. Front turn-signal lamp bulb

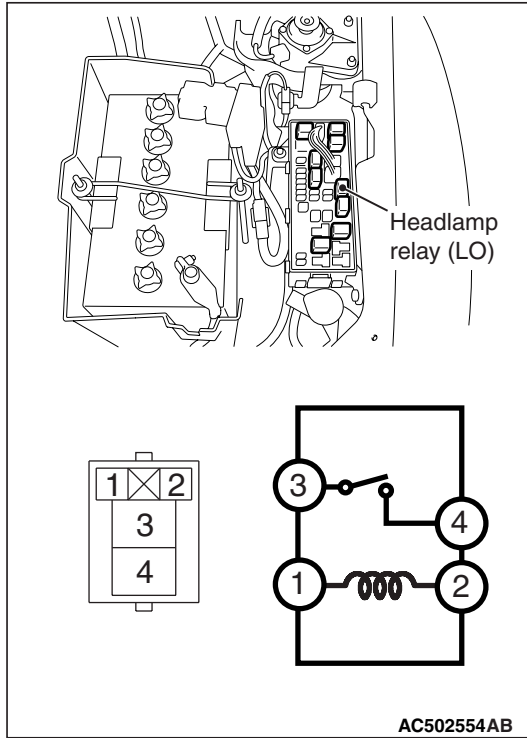
Headlamp body removal step

- Radiator grille (Refer to GROUP 51, Radiator grille .)
- Splash shield (Refer to GROUP 51, Fender .)
- 7. Headlamp body
- 8. Grommet
- 9. Headlamp bracket

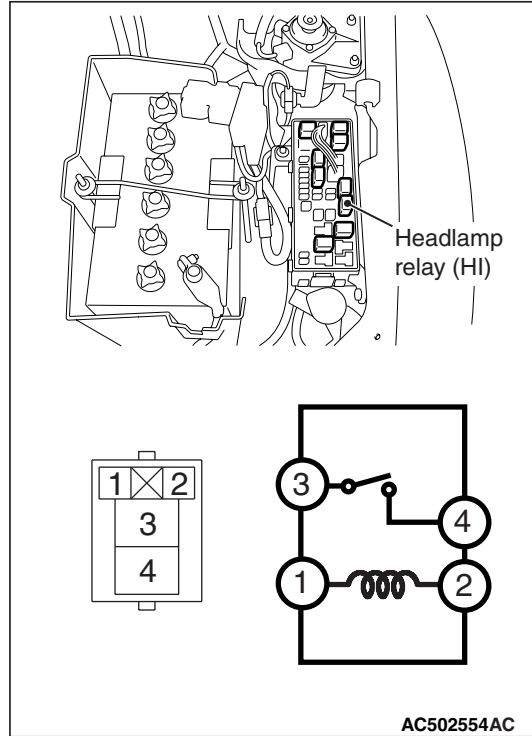
INSPECTION

HEADLAMP RELAY (LO) CHECK

M1542011202056



HEADLAMP RELAY (HI) CHECK



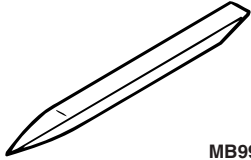
Battery voltage	Tester connection	Specified condition
Not supplied	3 -4	Open circuit
<ul style="list-style-type: none"> Connect terminal 1 to the negative battery terminal Connect terminal 2 to the positive battery terminal 	3 -4	Less than 2 ohms

Battery voltage	Tester connection	Specified condition
Not supplied	3 -4	Open circuit
<ul style="list-style-type: none"> Connect terminal 1 to the negative battery terminal Connect terminal 2 to the positive battery terminal 	3 -4	Less than 2 ohms

SIDE TURN-SIGNAL LAMP

SPECIAL TOOL

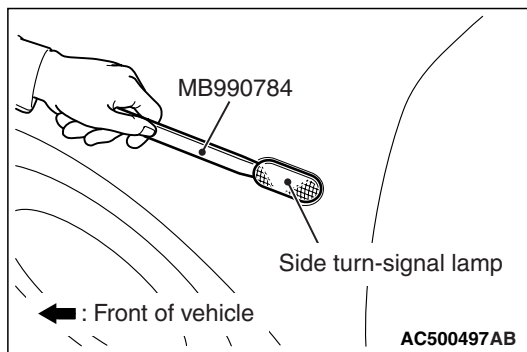
M1542000601886

Tool	Number	Name	Use
 <p>MB990784</p>	MB990784	Ornament remover	Removal of side turn-signal lamp

REMOVAL AND INSTALLATION

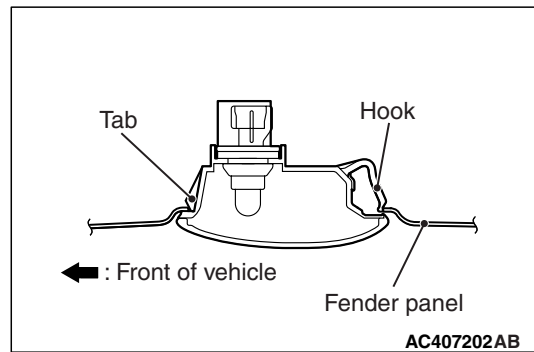
M1542012000208

REMOVAL SERVICE POINT



Use the special tool ornament remover (MB990784) to pry out the tab from the fender, and remove the side turn-signal lamp.

INSTALLATION SERVICE POINT

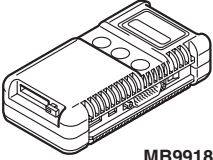
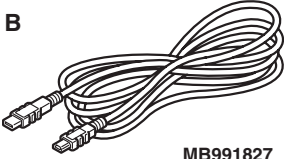
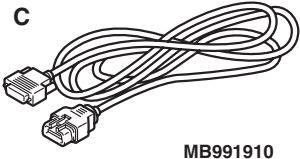
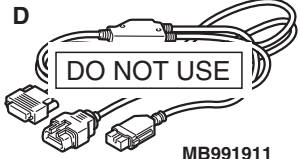
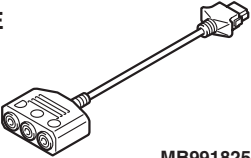
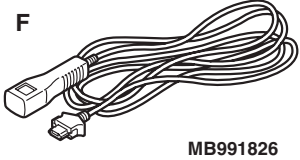


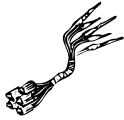
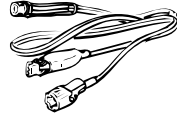
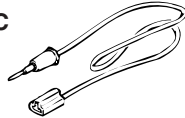

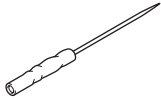
Insert pawls into fender panel and install side turn-signal lamp.

INTERIOR LAMP

SPECIAL TOOLS

M1543000602699

Tool	Number	Name	Use
<p>A</p>  <p>MB991824</p> <p>B</p>  <p>MB991827</p> <p>C</p>  <p>MB991910</p> <p>D</p>  <p>MB991911</p> <p>E</p>  <p>MB991825</p> <p>F</p>  <p>MB991826</p> <p>MB991955</p>	<p>MB991955 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826</p>	<p>M.U.T.-III sub-assembly A: Vehicle Communication Interface (V.C.I.) B: M.U.T.-III USB cable C: M.U.T.-III main harness A (Vehicles with CAN communication system) D: M.U.T.-III main harness B (Vehicles without CAN communication system) E: M.U.T.-III measure adapter F: M.U.T.-III trigger harness</p>	<p>Check for CAN bus line</p> <p>⚠ CAUTION</p> <p>For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.</p>

Tool	Number	Name	Use
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>DO NOT USE MB991223AZ</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>Making voltage and resistance measurements during troubleshooting A: Connect pin contact pressure inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection</p>
 <p>MB992006</p>	<p>MB992006</p>	<p>Extra fine probe</p>	<p>Continuity check and voltage measurement at harness wire or connector</p>

TROUBLESHOOTING

DIMMER INTERIOR LAMP CONTROL FUNCTION

The room lamp off is delayed by ETACS-ECU. The lamps off delay time vary according to the conditions. The control details are as follows. The lamp delay off Yes/NO and delay time can be set with the settings (adjustment function). for adjustment methods and adjustment details (post-adjustment operations).

- The room lamp lights up if the ignition switch is at the "LOCK" (OFF) position and either of the doors are opened (either of the door switches: ON). At this time, if all doors are closed (all door switches: OFF) then the lamp will gradually dim down to lamps off in about 7.5 seconds <Vehicles without central door locking system> or 15 seconds <Vehicles with central door locking system>.

NOTE: When the lamps are dimmed and the ignition switch is turned "ON" or if the door is locked, then the dimming operations stop and the lamps are turned OFF.

- When the ignition switch is at the "ON" position and one of the doors are opened (one of the door switches: ON) then the room lamp will light up. At this time, if all doors are closed (all door switches: OFF) then the lamps will dim out.

M1542000702024

- When the ignition key is pulled out the room lamp lights up and then will dim out in 15 seconds. The lamp will dim out if the ignition key is inserted again and the door is locked while the timer is activated <Vehicles with central door locking system>.

CHECK CHART FOR TROUBLE SYMPTOMS

M1543007201893

CAUTION

- During diagnosis, a diagnosis code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.
- When the battery cable is disconnected or the combination meter is removed, the fuel gauge learned value will be erased. To let the display unit re-learn it, enter the vehicle speed (by driving the vehicle or entering simulated vehicle speed) and then stop the vehicle.

Trouble symptom	Inspection procedure number	Reference page
The interior lamps (front room lamp, rear room lamp and ignition key cylinder illumination lamp) does not illuminate or extinguish normally.	1	P.54A-45
The front room lamp does not illuminate normally.	2	P.54A-47
The rear room lamp does not illuminate normally.	3	P.54A-50
The ignition key cylinder illumination lamp does not illuminate normally.	4	P.54A-53

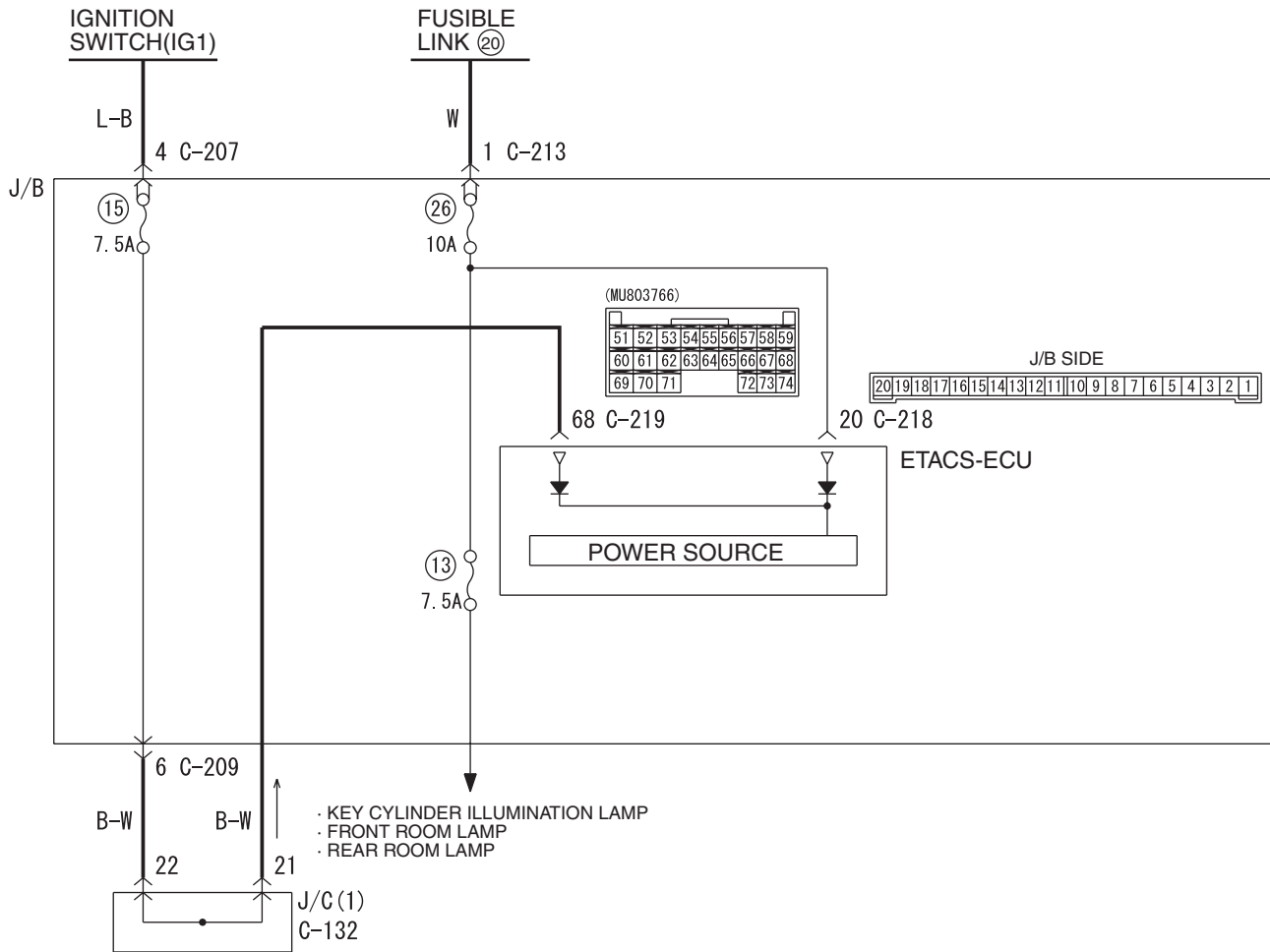
SYMPTOM PROCEDURES

Inspection Procedure 1: The Interior Lamps (front room lamp, rear room lamp and ignition key cylinder illumination lamp) does not illuminate or Extinguish Normally.

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Interior Lamp Circuit



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X007A

COMMENTS ON TROUBLE SYMPTOM

The ETACS-ECU operates the interior lamps (room lamp, rear room lamp) in accordance with the input signals below.

- Ignition switch (IG1)
- Driver's door lock actuator

- Driver's door switch
- Passenger's door switch
- Rear door switch

If this function does not work normally, these input signal circuit(s) or the ETACS-ECU may be defective.

PROBABLE CAUSES

- Malfunction of the door lock actuator (RH)
- Malfunction of the door switches
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III other system diagnosis code**

When the ignition switch is turned to the "LOCK" (OFF) position, check that the ETACS-ECU does not set the diagnosis code.

Q: Is the diagnosis code set?

YES : Refer to GROUP 54B diagnosis code chart .

NO : Go to Step 2.

STEP 2. M.U.T.-III data list

Check the input signals below, which are related to the interior lamps (front room lamp, rear room lamp and ignition key cylinder illumination lamp).

- Turn the ignition switch to the "OFF" position. (key inserted)
- Open the all of doors.
- When the driver's door is unlocked

Item No.	Item name	Normal condition
19	Driver's Door switch	ON
20	Driver's door unlock switch	ON
21	Driver's door lock switch	OFF
30	Ignition switch (IG1)	OFF
48	Passenger's Door switch	ON
49	Rear door switch	ON

OK: Normal conditions are displayed for all the items.

Q: Is the check result normal?

YES <All the signals are received normally.> : Go to Step 4.

NO <The door lock actuator (RH) signal is not received.> : Go to Step 3.

NO <The ignition switch (IG1) signal is not received.> : Refer to GROUP 54B inspection procedure J-3: The ignition switch (IG1) signal is not received ."

NO <The door switches signals are not received.> : Refer to GROUP 54B inspection procedure J-7: One of the door switch signals is not received

STEP 3. Check the door lock actuator (RH).

Check that the front door lock actuator (RH) works normally. Refer to GROUP 42 –Door .

Q: Is the check result normal?

YES : Go to Step 4.

NO : Replace the door lock actuator (RH).

STEP 4. Retest the system.

Check that the interior lamps (front room lamp, rear room lamp and ignition key cylinder illumination lamp) illuminate normally.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction).

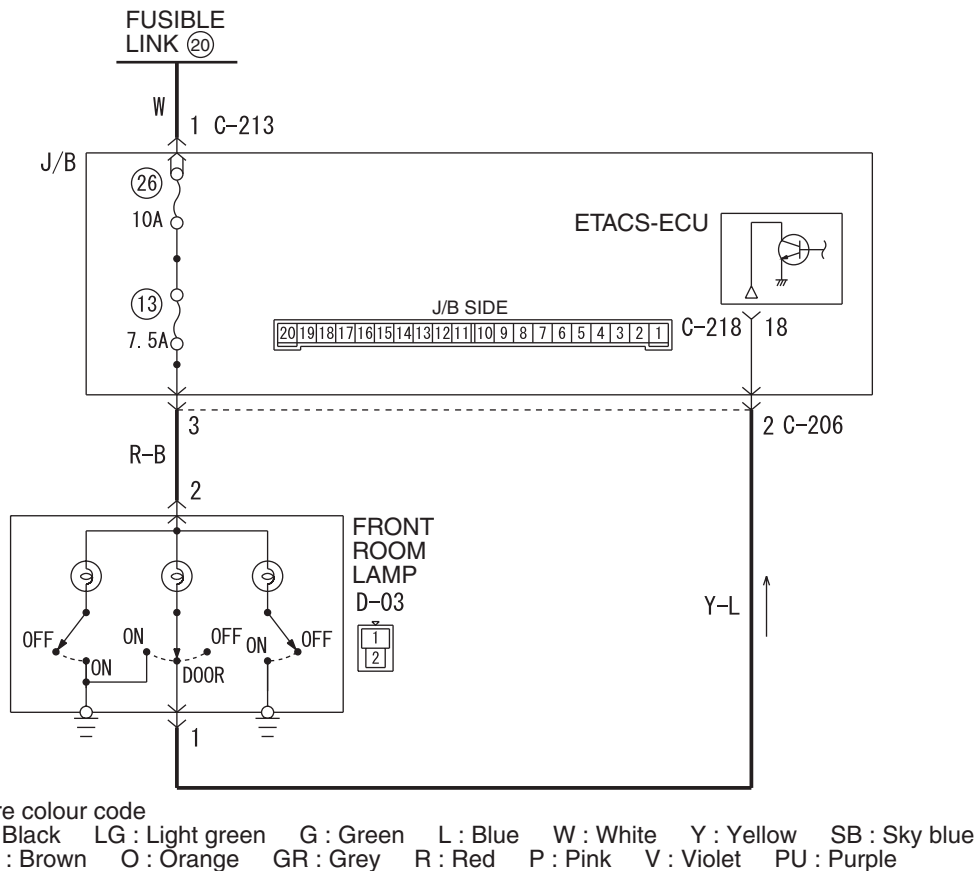
NO : Replace the ETACS-ECU.

Inspection Procedure 2: The Front Room Lamp does not Illuminate Normally.

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Front Room Lamp Circuit



W7C54X008A

COMMENTS ON TROUBLE SYMPTOM

If the front room lamp do not illuminate, the wiring harness connector(s), the bulb or the fuse may be defective or burned out.

PROBABLE CAUSES

- Malfunction of the front room lamp
- Malfunction of the front room lamp bulbs
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check that the rear room lamp and ignition key cylinder illumination lamp illuminates.

Check that the rear room lamp and ignition key cylinder illumination lamp illuminates normally.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Refer to Inspection Procedure 1 "The interior lamps (front room ramp, rear room lamp and ignition ley cylinder illumination lamp) does not illuminate or extinguish normally P.54A-45."

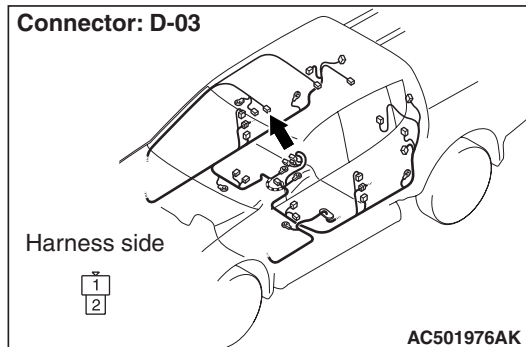
STEP 2. Retest the system.

Q: At which switch positions (DOOR or ON), the front room lamp does not illuminate?

The lamp does not illuminate at both the ON and DOOR positions. : Go to Step 3.

The lamp does not illuminate at the door position. :
Go to Step 7.

The lamp does not illuminate at the ON position. :
Replace the front room lamp.

STEP 3. Connector check: D-03 front room lamp connector

Q: Is the check result normal?

YES : Go to Step 4.

NO : Repair the defective connector.

STEP 4. Check the bulb.

Check whether the front room lamp bulb is normal.

Q: Is the check result normal?

YES : Go to Step 5.

NO : Replace the bulb(s) of the defective lamp.

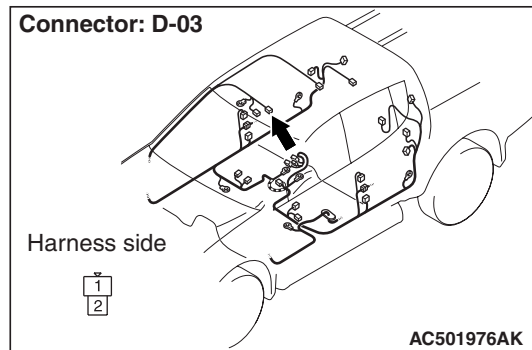
STEP 5. Check the front room lamp.

Check whether the front room lamp is normal.

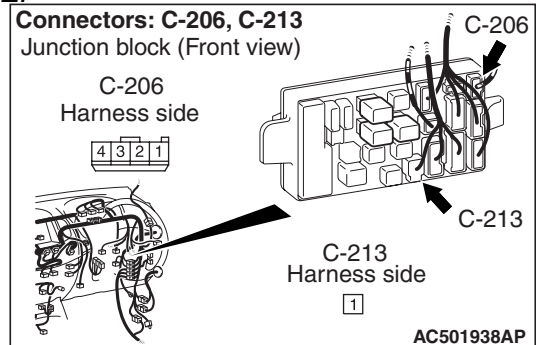
Q: Is the check result normal?

YES : Go to Step 6.

NO : Replace the front room lamp.

STEP 6. Check the wiring harness from D-03 front room lamp connector terminal No.2 to battery.

Check the power supply line for open circuit.

NOTE:

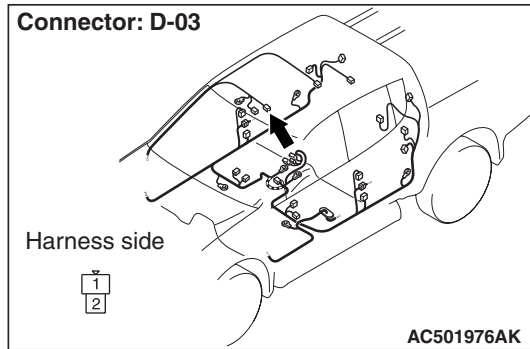
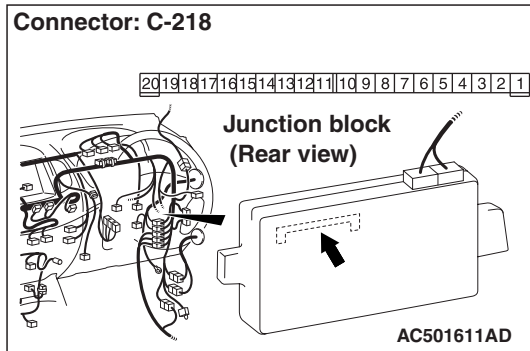
Prior to the wiring harness inspection, check junction block connectors C-206 and C-213 repair if necessary.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

NO : Repair the wiring harness.

STEP 7. Connector check: C-218 ETACS-ECU connector and D-03 front room lamp connector

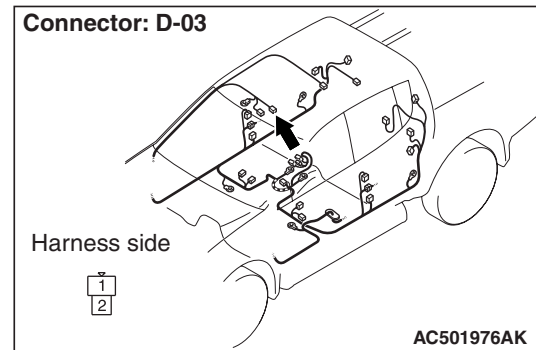
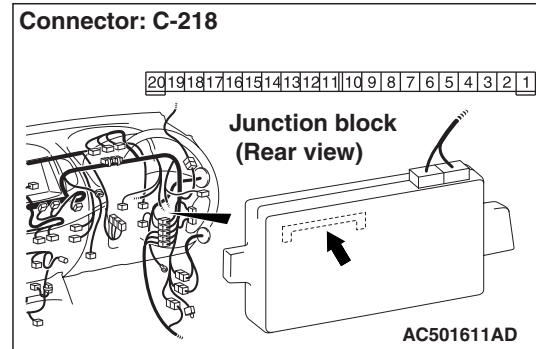


Q: Is the check result normal?

YES : Go to Step 8.

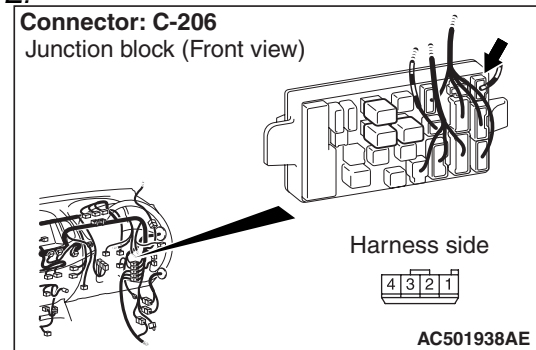
NO : Repair the defective connector.

STEP 8. Check the wiring harness from C-218 ETACS-ECU connector terminal No.18 to D-03 front room lamp connector terminal No.1



Check the input and output lines for open circuit.

NOTE:



Prior to the wiring harness inspection, check junction block connector C-206 repair if necessary.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction).

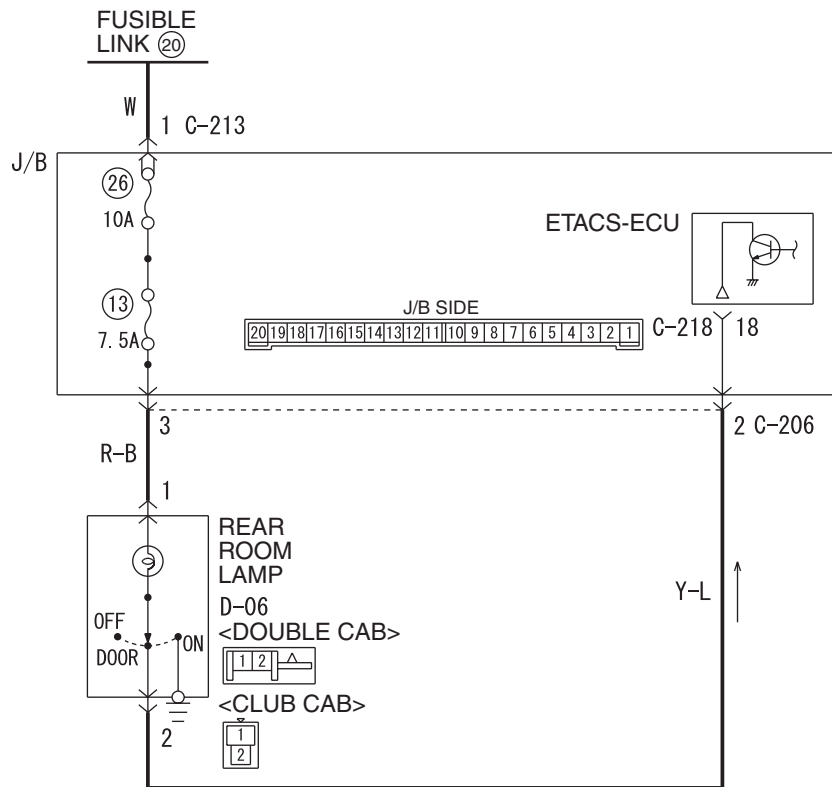
NO : Repair the wiring harness.

Inspection Procedure 3: The Rear Room Lamp does not Illuminate Normally.

CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Rear Room Lamp Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X009A

COMMENTS ON TROUBLE SYMPTOM

If the rear room lamp do not illuminate, the wiring harness connector(s), the bulb or the fuse may be defective or burned out.

PROBABLE CAUSES

- Malfunction of the rear room lamp
- Malfunction of the rear room lamp bulbs
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check if the front room lamp and ignition key cylinder illumination lamp illuminates.

Check whether the front room lamp and ignition key cylinder illumination lamp illuminates normally.

Q: Is the check result normal?

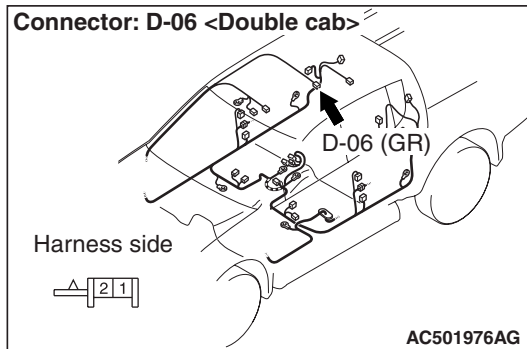
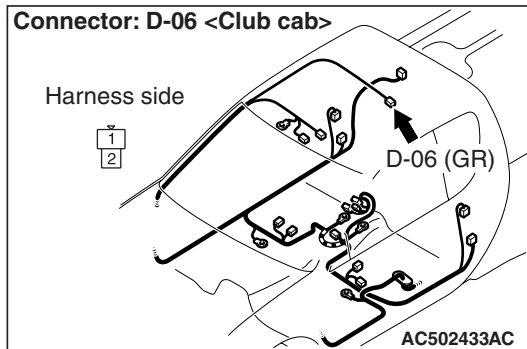
YES : Go to Step 2.

NO : Refer to Inspection Procedure 1 "The interior lamps (front room ramp, rear room lamp and ignition key cylinder illumination lamp) does not illuminate or extinguish normally [P.54A-45.](#)"

STEP 2. Retest the system.

- Q: At which switch positions (DOOR or ON), the rear room lamp does not illuminate?**
The lamp does not illuminate at both the ON and DOOR positions. : Go to Step 3.
The lamp does not illuminate at the door position. :
 Go to Step 7.
The lamp does not illuminate at the ON position. :
 Replace the rear room lamp.

STEP 3. Connector check: D-06 rear room lamp connector



- Q: Is the check result normal?**
YES : Go to Step 4.
NO : Repair the defective connector.

STEP 4. Check the bulb.

Check that the rear room lamp bulb is not blown.

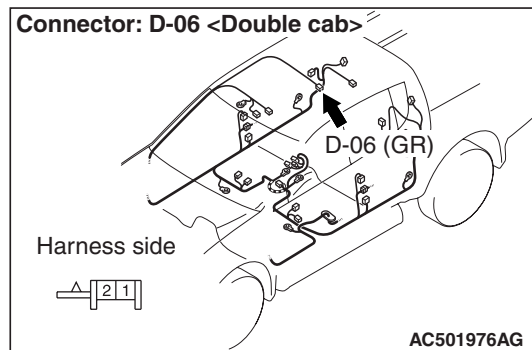
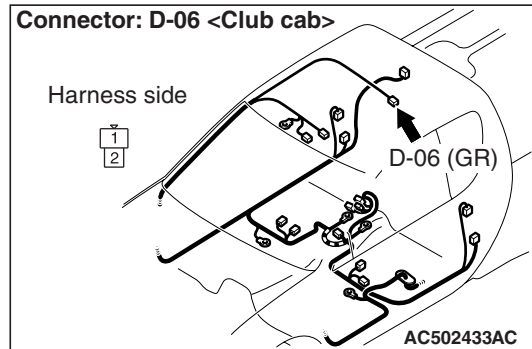
- Q: Is the check result normal?**
YES : Go to Step 5.
NO : Replace the rear room lamp bulb.

STEP 5. Check the rear room lamp.

Check whether the rear room lamp illuminates normally.

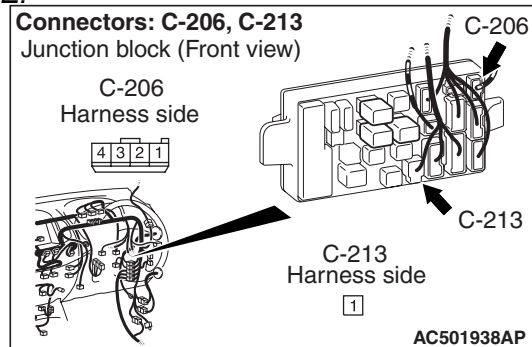
- Q: Is the check result normal?**
YES : Go to Step 6.
NO : Replace the rear room lamp.

STEP 6. Check the wiring harness from D-06 rear room lamp connector terminal No.1 to battery.



Check the power supply line for open circuit.

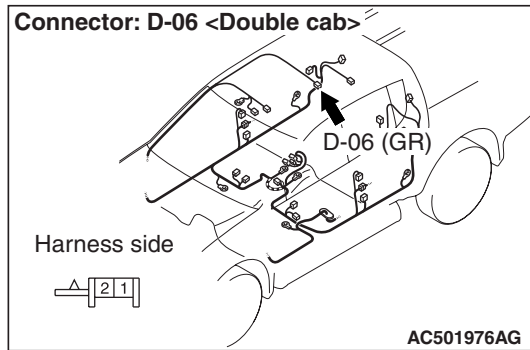
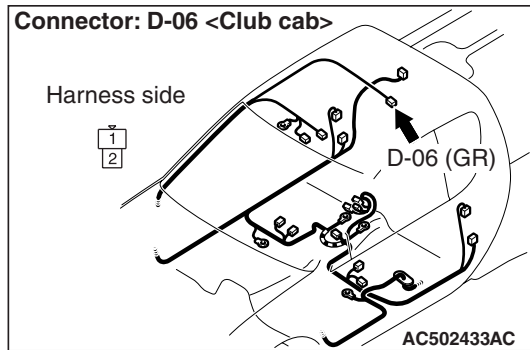
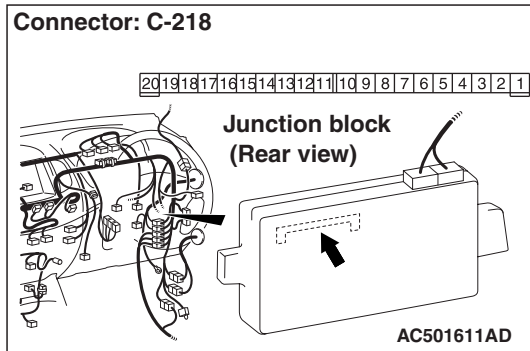
NOTE:



Prior to the wiring harness inspection, check junction block connectors C-206 and C-213 repair if necessary.

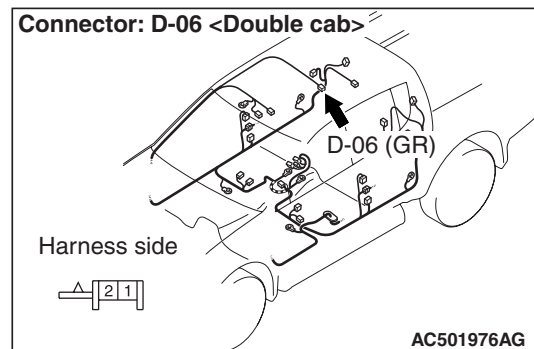
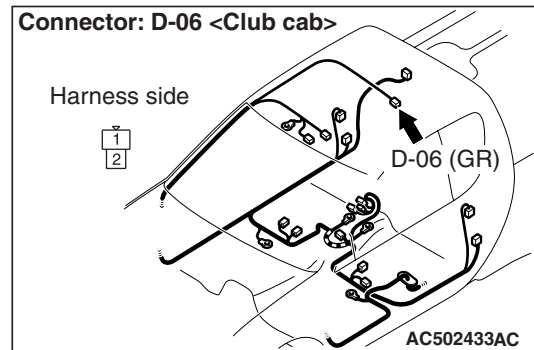
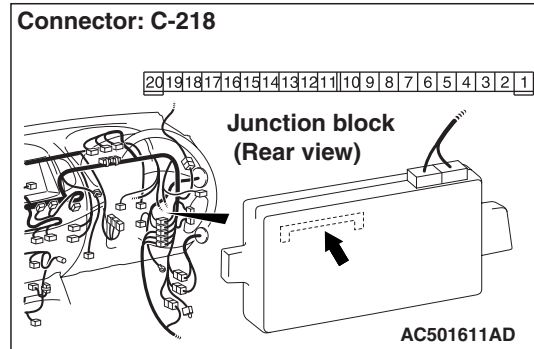
- Q: Is the check result normal?**
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction).
NO : Repair the wiring harness.

STEP 7. Connector check: C-218 ETACS-ECU connector and D-06 rear room lamp connector



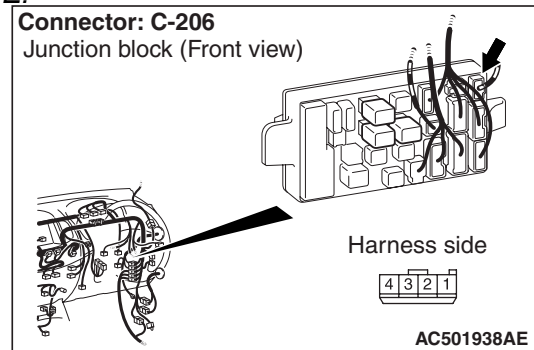
Q: Is the check result normal?
YES : Go to Step 8.
NO : Repair the defective connector.

STEP 8. Check the wiring harness from C-218 ETACS-ECU connector terminal No.18 to D-06 rear room lamp connector terminal No.2



Check the input and output lines for open circuit.

NOTE:



Prior to the wiring harness inspection, check junction block connector C-206 repair if necessary.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction).

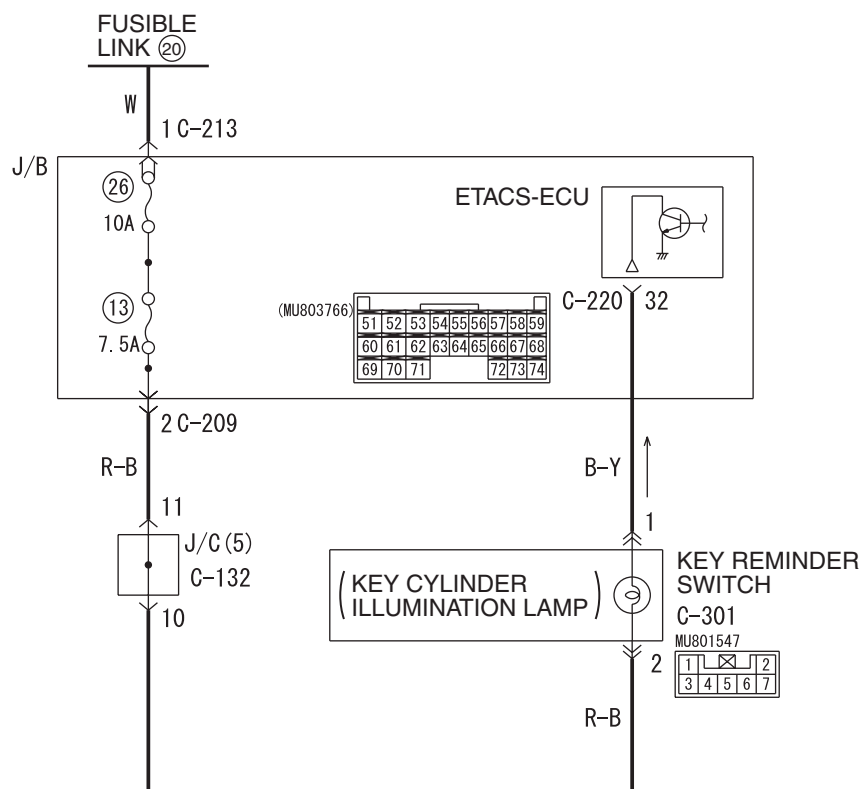
NO : Repair the wiring harness.

Inspection Procedure 4: The Ignition Key Cylinder Illumination Lamp does not Illuminate Normally.

⚠ CAUTION

Whenever the ECU is replaced, ensure that the input and output signal circuits are normal.

Ignition Key Cylinder Illumination Lamp Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X010A

COMMENTS ON TROUBLE SYMPTOM

The ETACS-ECU operates this function in accordance with the input signals below.

- Ignition switch (IG1)
- Key reminder switch
- Door switch (front: RH)

If this function does not work normally, these input signal circuit(s), the ignition key cylinder illumination lamp or the ETACS-ECU may be defective.

PROBABLE CAUSES

- Malfunction of the key reminder switch
- Malfunction of the door switch (front: RH)
- Malfunction of the ignition key cylinder illumination lamp bulb
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the operation of the front room lamp and rear room lamp.

Check that the front room lamp and rear room lamp illuminate and extinguish normally.

Q: Is the check result normal?

YES <4M41> : Go to Step 2.

YES <4D56> : Go to Step 3.

NO : Refer to inspection procedure 1 "The interior lamps (front room lamp, rear room lamp and ignition key cylinder illumination lamp) does not illuminate or extinguish normally
[P.54A-45.](#)"

STEP 2. M.U.T.-III data list

Check the input signals below, which are related to the ignition key cylinder illumination lamp.

- Turn the ignition switch to the "OFF" (OFF) position. (key inserted)

Item No.	Item name	Normal condition
28	Steering lock switch	OFF

OK: Normal condition is displayed.

Q: Is the check result normal?

YES : Go to Step 4.

NO : Go to Step 3.

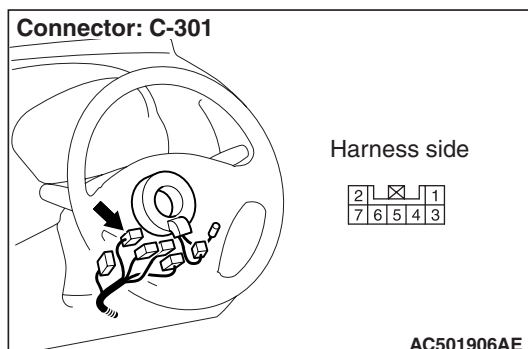
STEP 3. Check the key reminder switch

Check that the key reminder switch works normally. Refer to [P.54A-8.](#)

Q: Is the check result normal?

YES : Go to Step 4.

NO : Replace the door switch.

STEP 4. Connector check: C-301 key reminder switch connector

Q: Is the check result normal?

YES : Go to Step 5.

NO : Repair the defective connector.

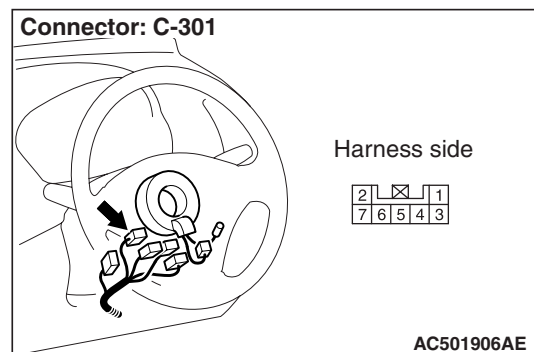
STEP 5. Check the bulb of the ignition key cylinder illumination lamp.

Check the bulb of the ignition key cylinder illumination lamp.

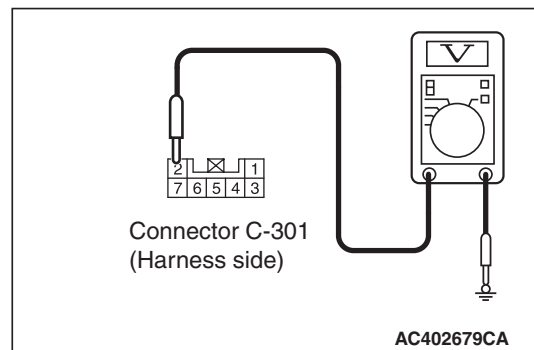
Q: Is the check result normal?

YES : Go to Step 6.

NO : Replace the bulb of the ignition key cylinder illumination lamp.

STEP 6. Voltage measurement at C-301 key reminder switch connector

- (1) Disconnect the connector, and measure at the wiring harness side.



- (2) Voltage between C-301 power window main switch connector terminal No.2 and body earth.

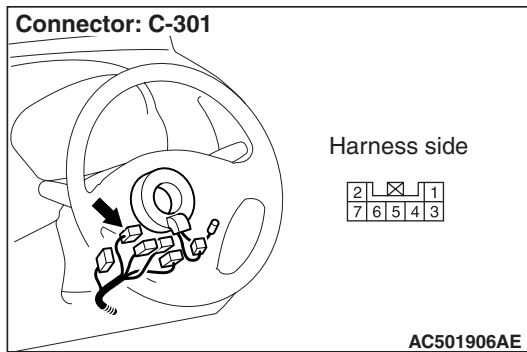
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8.

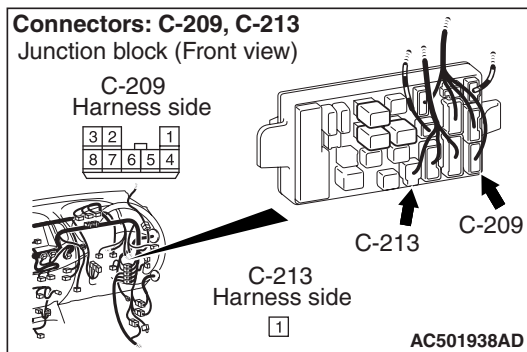
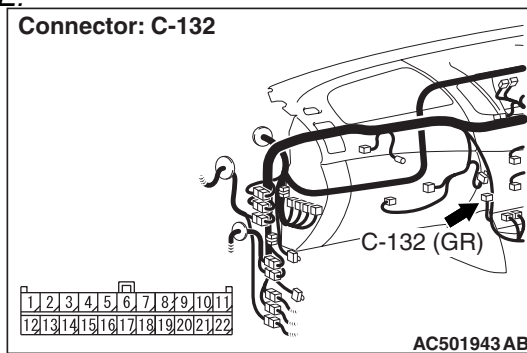
NO : Go to Step 7.

STEP 7. Check the wiring harness from C-301 key reminder switch connector terminal No.2 to battery



Check the power supply line for open circuit.

NOTE:



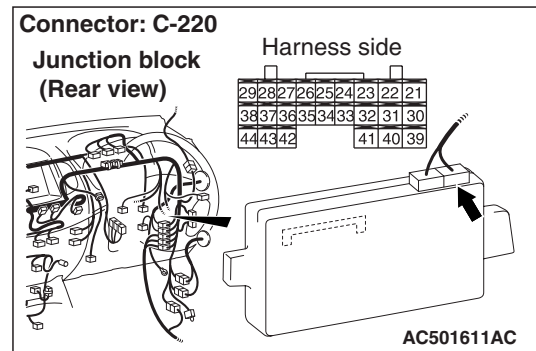
Prior to the wiring harness inspection, check joint connectors C-132, and junction block connector C-209 and C-213, and repair if necessary.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Repair the wiring harness.

STEP 8. Connector check: C-220 ETACS-ECU connector

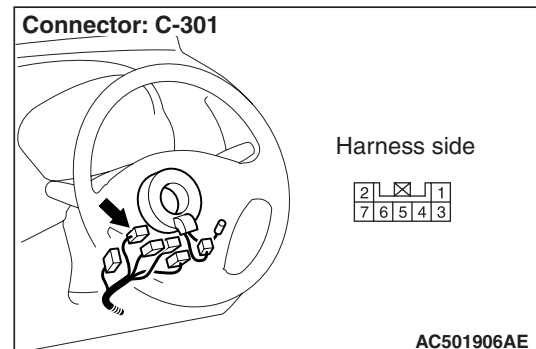
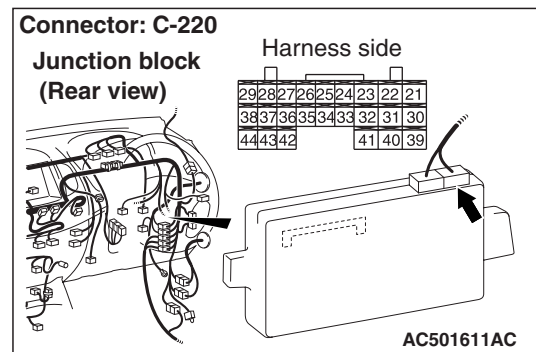


Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair the defective connector.

STEP 9. Check the wiring harness from C-220 ETACS-ECU connector terminal No.32 to C-301 key reminder switch connector terminal No.1.



Check the input line for open circuit.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Repair the wiring harness.

STEP 10. Retest the system.

Check that the ignition key cylinder illumination lamp illuminates or extinguishes normally.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction).

NO : Replace the ETACS-ECU.

ON-VEHICLE SERVICE

M1542000800713

**HOW TO ADJUST THE ROOM LAMP
DELAY-OFF TIME**

The room lamp delay-off time can be adjusted by the local interconnect network (LIN) (Refer to GROUP 54B, On-vehicle service).

REMOVAL AND INSTALLATION

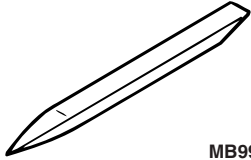
M1542006300084

For the front room lamp assembly and the rear room lamp refer to GROUP 52A, Headlining –Removal and installation .

REAR COMBINATION LAMP

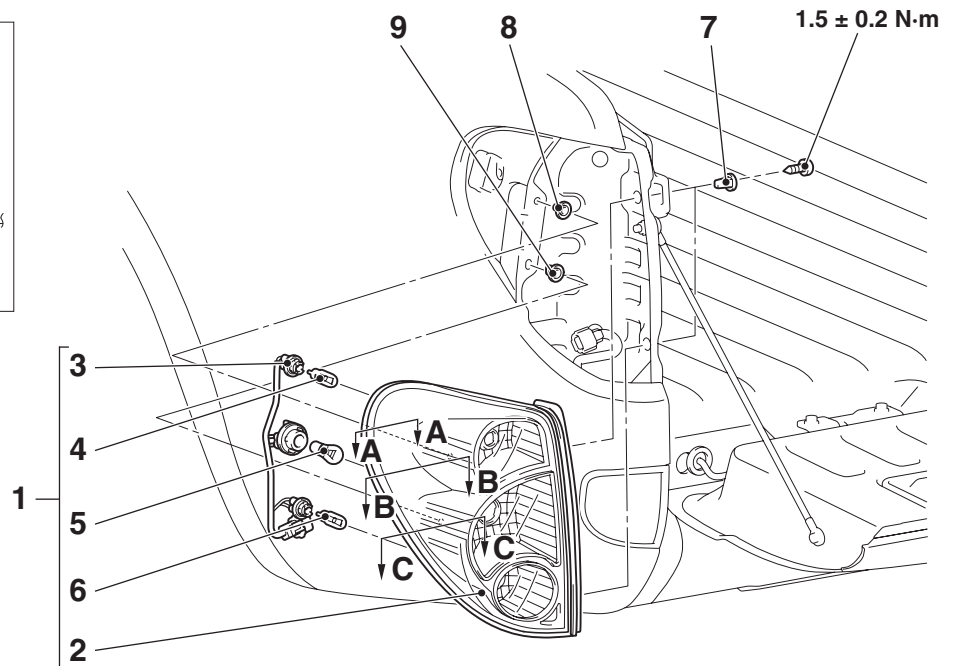
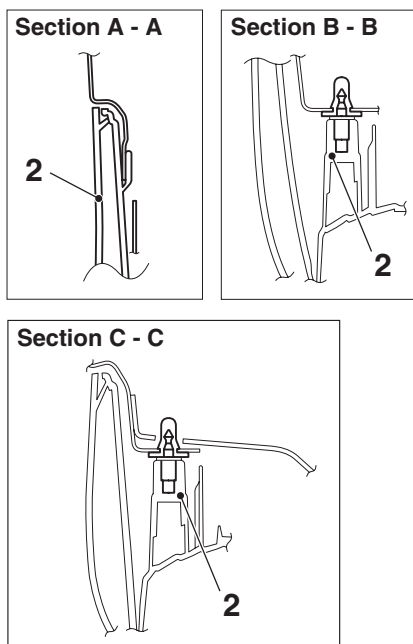
SPECIAL TOOL

M1542000601897

Tool	Number	Name	Use
 MB990784	MB990784	Ornament remover	Removal of rear combination lamp assembly

REMOVAL AND INSTALLATION

M1542003900861



AC502678AB

Removal steps

1. Rear combination lamp assembly
2. Rear combination lamp unit
3. Socket
4. Turn-signal lamp bulb
5. Tail lamp and stop lamp bulb

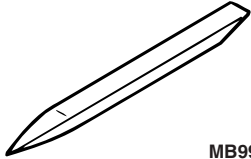
Removal steps (Continued)

6. Back-up lamp bulb
7. Grommet
8. Grommet
9. Grommet

REFLECTOR

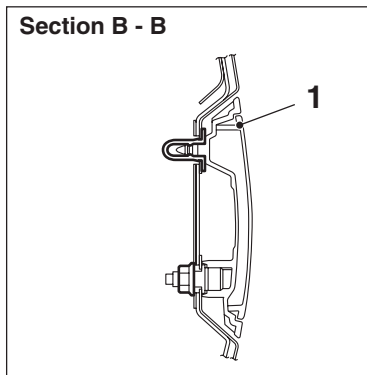
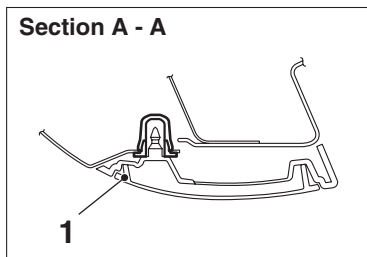
SPECIFICATIONS

M154201000064

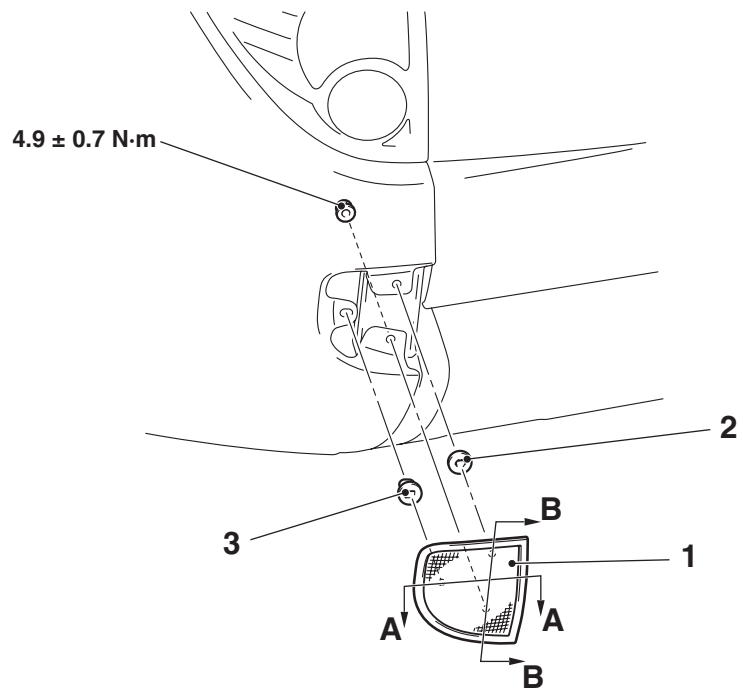
Tool	Number	Name	Use
 <p>MB990784</p>	MB990784	Ornament remover	Removal of reflector

REMOVAL AND INSTALLATION

M1542016200022



- Removal steps**
1. Reflector

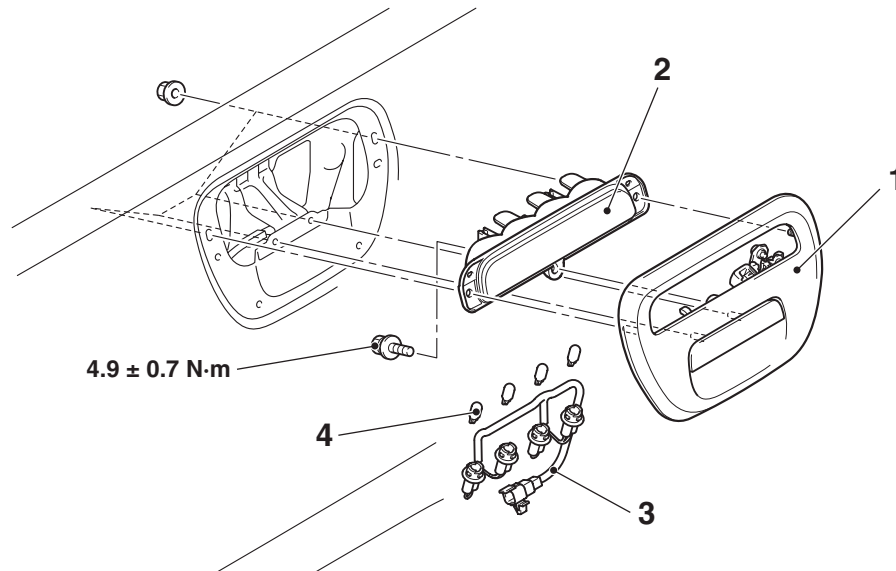


- AC502719AB
- Removal steps (Continued)**
2. Grommet
 3. Grommet

HIGH-MOUNTED STOP LAMP

REMOVAL AND INSTALLATION

M1542005100708



High-mounted stop lamp removal steps

- Rear gate cover (Refer to GROUP 42, Rear gate .)
- 1. Rear gate outside handle

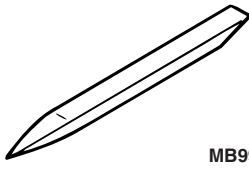
High-mounted stop lamp removal steps (Continued)

- 2. High-mounted stop lamp
- 3. Socket
- 4. Bulb

LICENCE PLATE LAMP

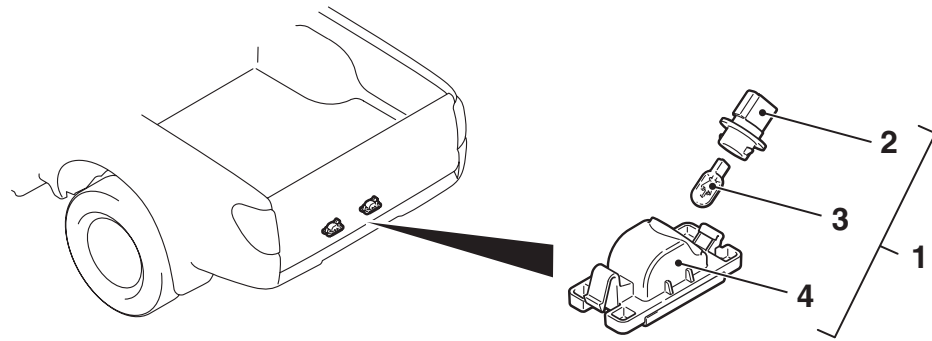
SPECIAL TOOL

M1542000601927

Tool	Number	Name	Use
 <p>MB990784</p>	MB990784	Ornament remover	Removal of licence plate lamp assembly

REMOVAL AND INSTALLATION

M1542004200423



AC502796AB

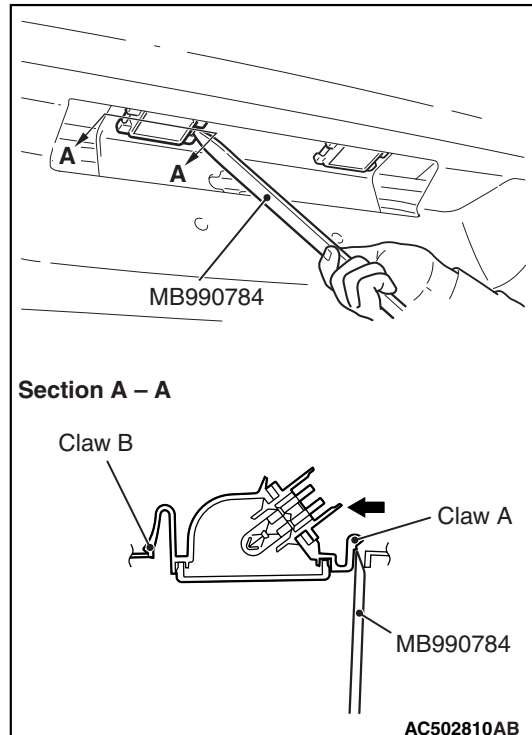
<<A>>

Removal steps

1. Licence plate lamp assembly
2. Socket
3. Bulb
4. Licence plate lamp unit

REMOVAL SERVICE POINT

<<A>> LICENCE PLATE LAMP ASSEMBLY REMOVAL



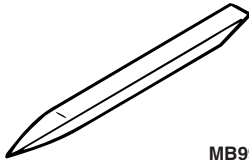
AC502810AB

Use special tool ornament remover (MB990784) to press the licence plate assembly to the direction shown (inside the vehicle), and shorten the claw B and disengage the claw A. Then remove the licence plate lamp assembly.

HAZARD WARNING LAMP SWITCH

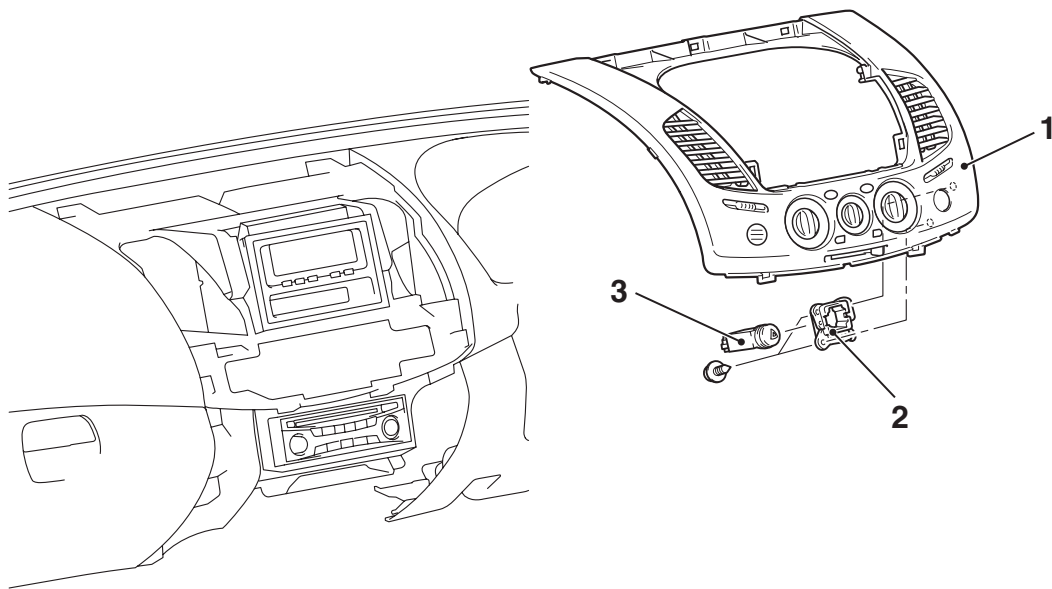
SPECIAL TOOL

M1542000601938

Tool	Number	Name	Use
 MB990784	MB990784	Ornament remover	Removal of centre upper panel assembly

REMOVAL AND INSTALLATION

M1542006600739



Removal steps

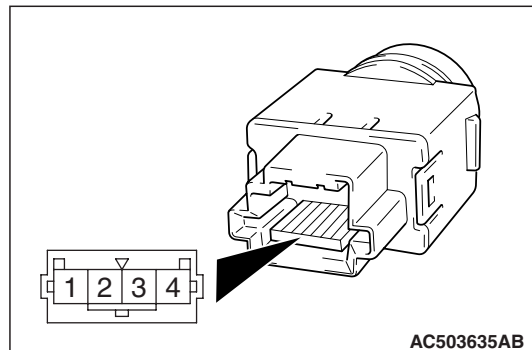
- Centre upper box hood <2WD> or RV meter hood <4WD>, lower panel assembly and centre lower panel assembly (Refer to GROUP 52A, Instrument Panel Assembly).
1. Centre upper panel assembly (Refer to GROUP 52A, Instrument Panel Assembly).
 2. Instrument panel switch holder
 3. Hazard warning lamp switch

INSPECTION

AC503004AB

M1542011202078

HAZARD WARNING LAMP SWITCH CONTINUITY CHECK



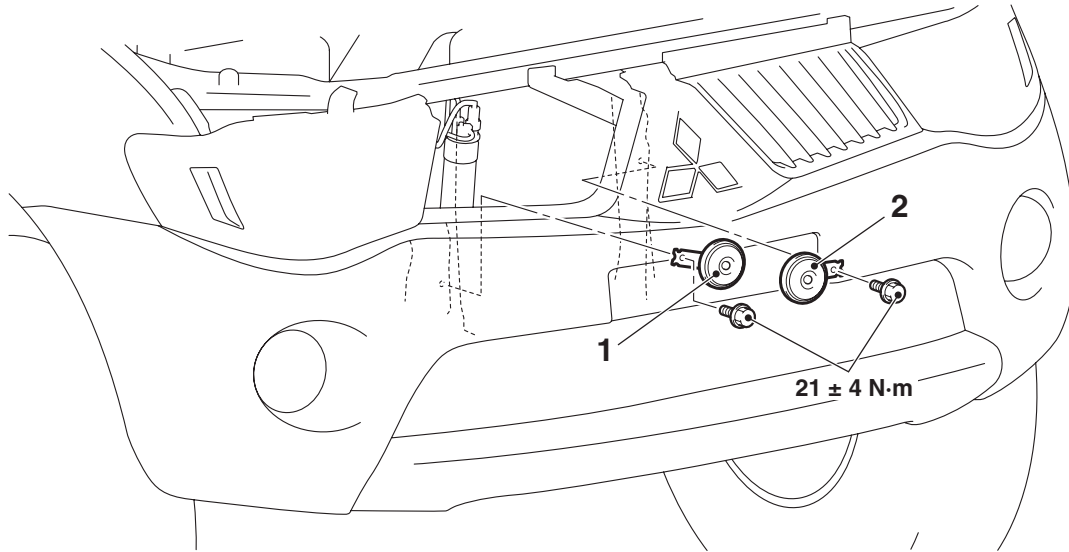
AC503635AB

Switch position	Tester connection	Specified condition
Released	1 -2	Open circuit
Pressed	1 -2	Less than 2 ohms

HORN

REMOVAL AND INSTALLATION

M1543007900543



AC502904AB

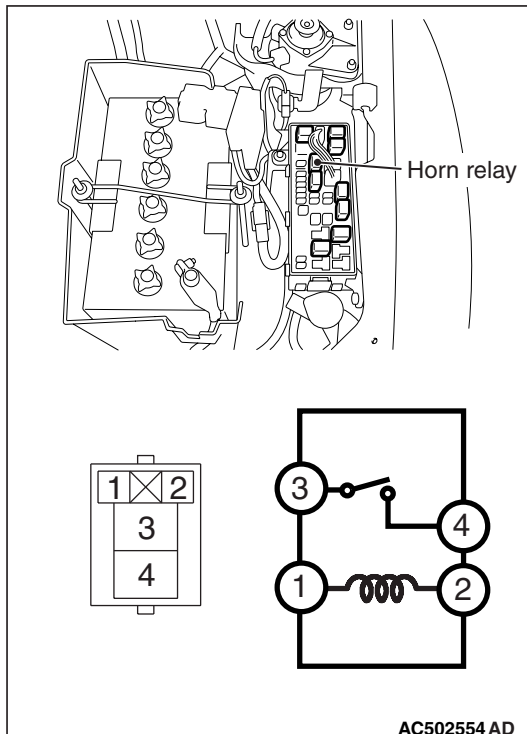
Removal Steps

- Radiator grille (Refer to GROUP 51, Radiator grille .)
- 1. Horn <LO>
- 2. Horn <HI>

INSPECTION

M1543019503585

HORN RELAY CONTINUITY CHECK



AC502554 AD

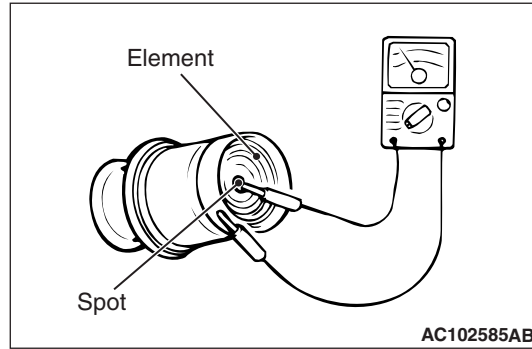
Battery voltage	Tester connection	Specified condition
Not applied	3 -4	Open circuit
<ul style="list-style-type: none"> • Connect terminal 2 to the positive battery terminal • Connect terminal 1 to the negative battery terminal 		Less than 2 ohms

CIGARETTE LIGHTER

INSPECTION

M1543019503596

- Remove the plug and check the spot for wear.
- Check that there are no tobacco stains or foreign particles on the element.



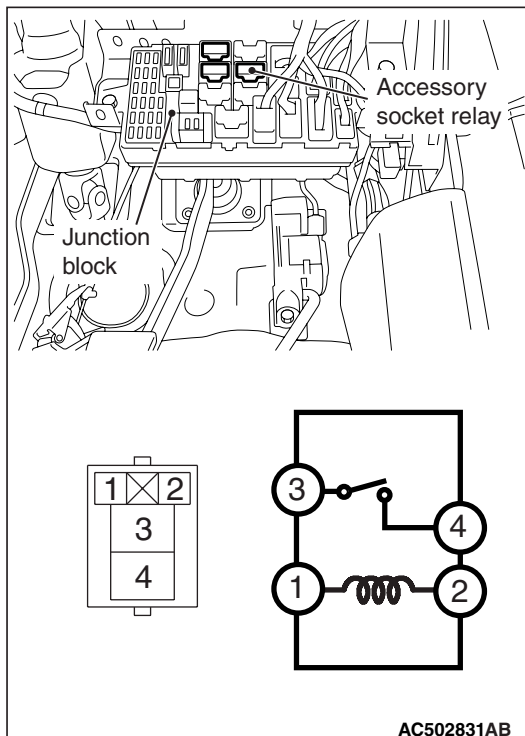
Use a multimeter to check the continuity of the element.

ACCESSORY SOCKET

INSPECTION

M1543009000267

ACCESSORY SOCKET RELAY CHECK

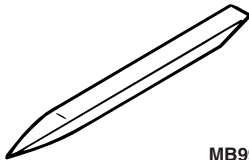


Battery voltage	Tester connection	Specified condition
Not supplied	3 - 4	Open circuit
<ul style="list-style-type: none"> • Connect terminal 2 to the negative battery terminal • Connect terminal 1 to the positive battery terminal 	3 - 4	Less than 2 ohms

COLUMN SWITCH

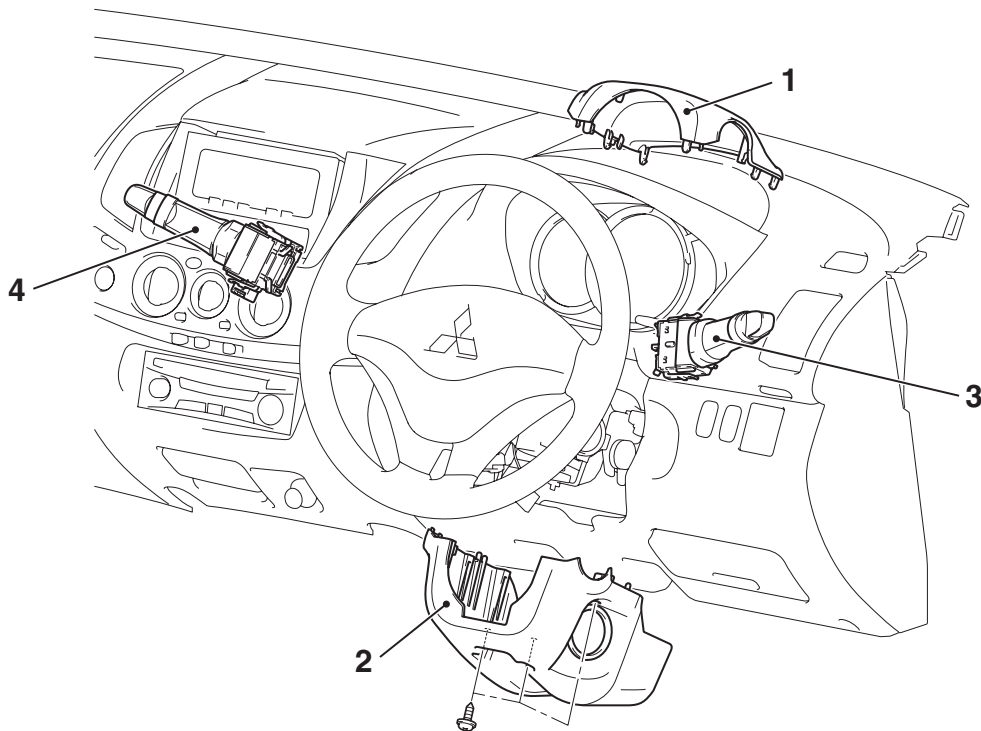
SPECIAL TOOL

M1543000602666

Tool	Number	Name	Application
 <p>MB990784</p>	MB990784	Ornament remover	Removal of column cover

REMOVAL AND INSTALLATION

M1543009100703



AC502882AB

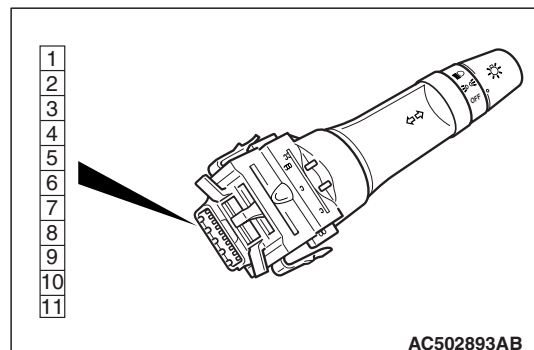
Removal steps

- Steering column upper cover (Refer to GROUP 52A, Instrument Panel Assembly).
- Steering column lower cover (Refer to GROUP 52A, Instrument Panel Assembly).
- Lighting switch
- Windshield wiper and washer switch

INSPECTION

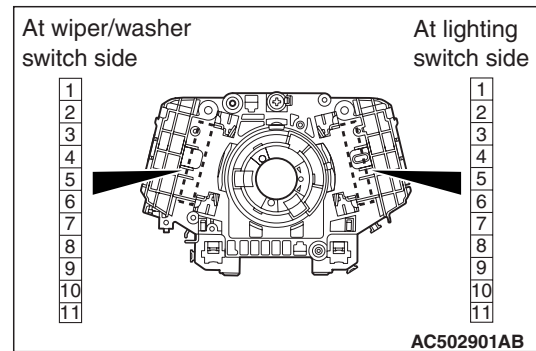
M1543019503604

LIGHTING SWITCH CONTINUITY CHECK



AC502893AB

Switch position	Tester connection	Specified condition
OFF	–	Open circuit
Headlamp switch	2 –6	Less than 2 ohms
Tail lamp switch	2 –7	Less than 2 ohms
Passing switch	2 –8	Less than 2 ohms
Dimmer switch	2 –9	Less than 2 ohms
Turn-signal lamp switch (RH)	2 –10	Less than 2 ohms
Turn-signal lamp switch (LH)	2 –11	Less than 2 ohms



AC502901AB

COLUMN SWITCH (SWITCH BODY) CONTINUITY CHECK

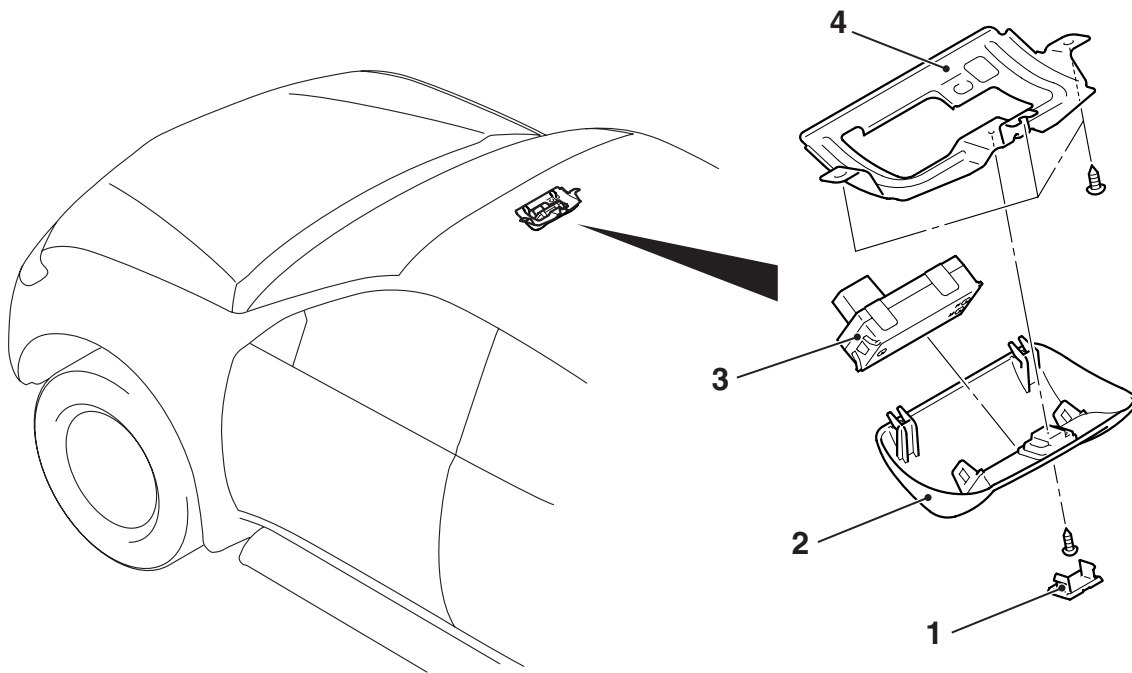
1. Remove the lighting switch, wiper and washer switch.
2. Check that there is continuity of each same terminal number (from Nos. 2 to 11) between each connectors of column switch body left in the steering column.

Column switch body	Tester connection	Specified condition
• Lighting switch side connector	2 –2	Less than 2 ohms
	3 –3	
• Wiper and washer switch side connector	4 –4	
	5 –5	
	6 –6	
	7 –7	
	8 –8	
	9 –9	
	10 –10	
	11 –11	

CLOCK <VEHICLES WITHOUT RV METER>

REMOVAL AND INSTALLATION

M1543005900332

**Removal steps**

1. Clock garnish
2. Clock hole cover
3. Digital clock

AC502936AB

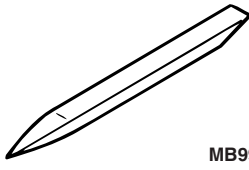
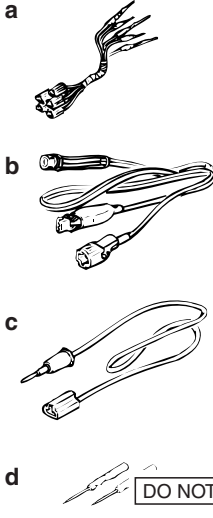
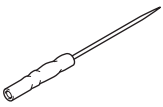
Removal steps (Continued)

- Headlining (Refer to GROUP 52A, Headlining).
4. Clock bracket

RADIO AND TAPE PLAYER OR CD PLAYER

SPECIAL TOOLS

M1542000601949

Tool	Number	Name	Application
 <p>MB990784</p>	MB990784	Ornament remover	Removal of selector panel, instrument centre panel
 <p>DO NOT USE MB991223</p>	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222	Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 <p>MB992006</p>	MB992006	Extra fine probe	Continuity check and voltage measurement at harness wire or connector

TROUBLESHOOTING

INTRODUCTION TO AUDIO SYSTEM DIAGNOSIS

M1544004700123

The diagnosis for symptoms such as noise being emitted, no sound being played, or sound coming only out of one speaker (or set of speakers) is provided.

AUDIO ERROR CODES

If the radio and CD player detects any malfunction in itself or the inserted CD, the error codes below will be shown on the RV meter.

Error codes	Cause	Cause of trouble and its solution
NO DISC	NO disc inserted	Insert disc.
E01	Focus error	If there is any problem on the CD, this error code will be shown. If no error message appears when another disc is inserted, the disc is defective. Check the items below, and take a necessary action. <ul style="list-style-type: none"> • Contamination, scratch, or deformation • Formation of moisture or grease Insert the disc again, and check that no error appears.
E02	Abnormal disc	
E03	Mechanical error	This error codes will be shown if there is any internal mechanical or electrical problem in the radio and CD player. Replace the radio and CD player, and check that no error codes are shown.
E HOT	Protection against high temperature	If the internal temperature is extremely high, this error code will be shown. Turn off the radio and CD player and wait until they cool down. Wait for a while, and then turn on the unit again. Check that the same error does not appear.

TROUBLESHOOTING

M1544000700206

Use these steps to plan your diagnostic strategy. Follow through with each step to ensure that you have exhausted all possible methods of finding an audio system fault.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.

3. Find the malfunction by following the Symptom Chart.
4. Verify that the malfunction is eliminated.

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points, Inspection Service Points for a Blown Fuse .

TROUBLE SYMPTOM CHART

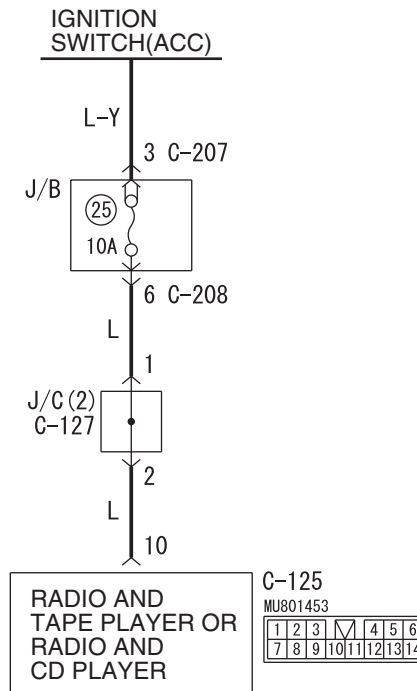
M1544004900622

Symptom		Inspection Procedure No.	Reference Page
Power of radio and tape player or CD player does not turn ON when the ignition switch is in the "ACC" position or "ON" position.		1	P.54A-70
No sound from one speaker.		2	P.54A-73
Noise	Noise appears at certain places when travelling (AM).	3	P.54A-79
	Noise is present while moving (FM).	4	P.54A-79
	Mixed with noise, only at night (AM).	5	P.54A-80
	Broadcasts can be heard but both AM and FM have a lot of noise.	6	P.54A-81
	There is more noise on either AM or FM.	7	P.54A-82
	There is noise when starting the engine.	8	P.54A-83
	Some noise appears when there is vibration or shocks during travelling.	9	P.54A-85
	Noise sometimes appears on FM during travelling.	10	P.54A-86
	Ever-present noise.	11	P.54A-86
Radio	There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.	12	P.54A-87
	Poor reception.	13	P.54A-87
	Distortion on AM or on both AM and FM.	14	P.54A-88
	Distortion on FM only.	15	P.54A-89
	Using the auto select function, too few automatic stations are selected.	16	P.54A-89
	Preset stations are erased.	17	P.54A-90
Tape player	Cassette tape can not be inserted.	18	P.54A-92
	Sound quality is poor, or sound is weak.	19	P.54A-92
	Cassette tape can not be ejected.	20	P.54A-92
	Uneven revolution. Tape speed is fast or slow.	21	P.54A-93
	Automatic search does not work.	22	P.54A-93
	Malfunction of the auto reverse.	23	P.54A-94
	Tape gets caught in mechanism.	24	P.54A-94
CD player	CD can not be inserted.	25	P.54A-95
	No sound (CD only).	26	P.54A-95
	CD sound skips.	27	P.54A-96
	Sound quality is poor.	28	P.54A-96
	CD cannot be ejected.	29	P.54A-96

SYMPTOM PROCEDURES

Inspection Procedure 1: Power of Radio and Tape Player or CD Player does not Turn ON when the Ignition Switch is in the "ACC" Position or "ON" Position.

Radio and Tape Player or Radio and CD Player Power Supply Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X011A

COMMENTS ON TROUBLE SYMPTOM

The cause is probably a faulty radio and tape player or CD player power supply circuit system.

PROBABLE CAUSES

- Damaged wiring harness or connector.
- Malfunction of radio and tape player or CD player.

DIAGNOSIS PROCEDURE

STEP 1. Check to see that the power turns ON when the power switch is turned ON.

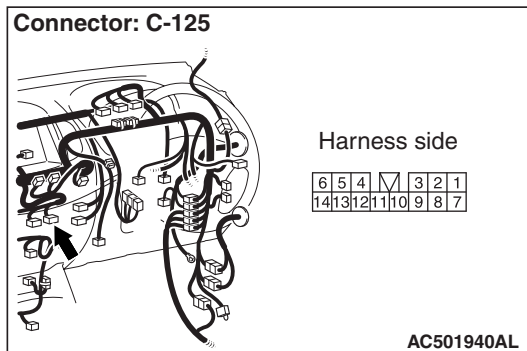
- (1) Turn the ignition switch to "ACC" position.
- (2) Turn ON the radio and tape player or CD player power switch.

Q: Is it possible to put the radio and tape player or CD player power in the "ON" position?

YES : Go to Step 2.

NO : Go to Step 5.

STEP 2. Connector check: radio and tape player or CD player connector C-125.

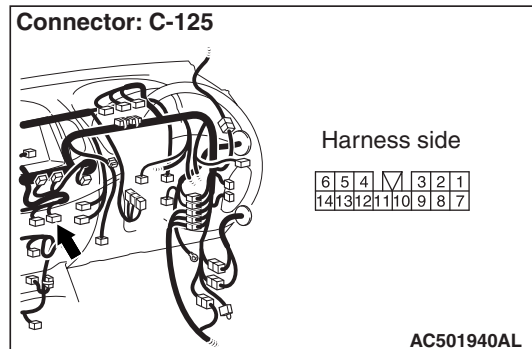


Q: Is radio and tape player or CD player connector C-125 in good condition?

YES : Go to Step 3.

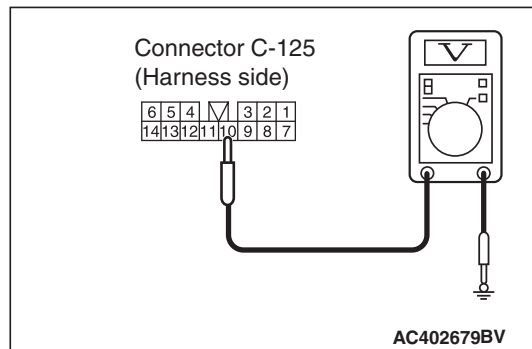
NO : Repair or replace the component(s). If the power switch is turned on, the radio and tape player or CD player should operate normally.

STEP 3. Voltage measurement at radio and tape player or CD player connector C-125 in order to check the battery circuit of power supply system to the radio and tape player or CD player (ignition switch ACC).



(1) Disconnect radio and tape player or CD player connector C-125, and measure at the wiring harness side.

(2) Turn the ignition switch to "ACC" position.



(3) Measure the voltage between terminal 10 and earth.

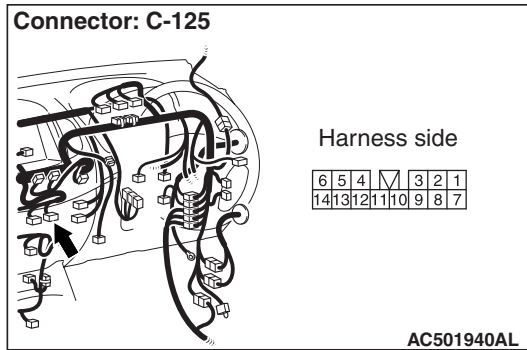
OK: System voltage

Q: Is the check result normal?

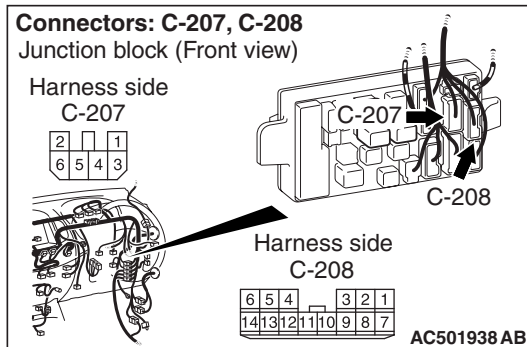
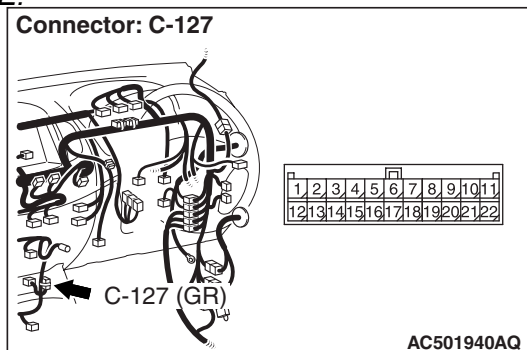
YES : Go to Step 5.

NO : Go to Step 4.

STEP 4. Check the wiring harness between radio and tape player or CD player connector C-125 (terminal 10) and ignition switch (ACC).



NOTE:



Prior to the wiring harness inspection, check joint connector C-127 and junction block connectors C-207, C-208, and repair if necessary.

- Q: Are the wiring harnesses between radio and tape player or CD player connector C-125 (terminal 10) and ignition switch (ACC) in good condition?**
YES : Go to Step 5.
NO : Repair or replace the damage component(s). If the power switch is turned on, the radio and tape player or CD player should operate normally.

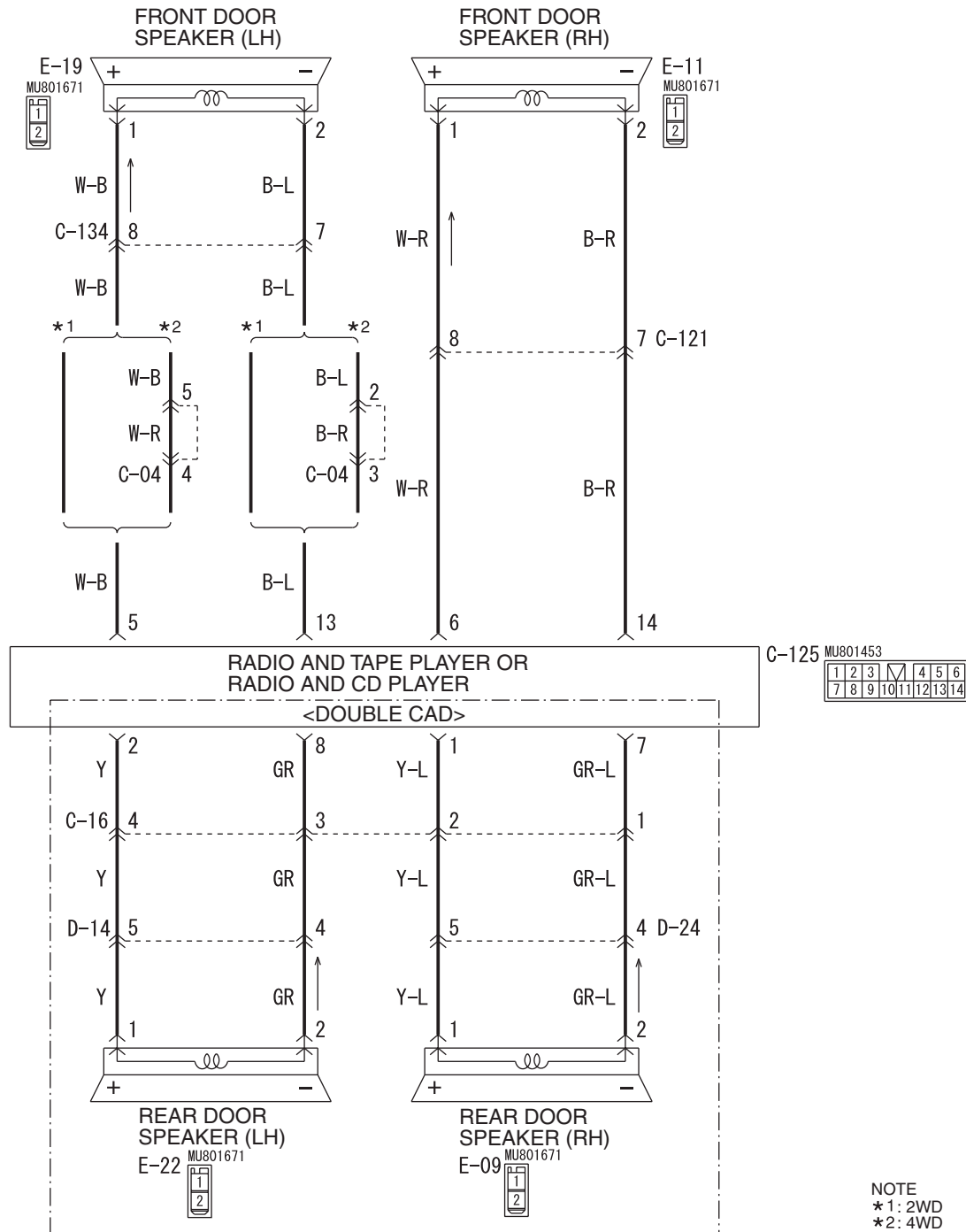
STEP 5. Check the assembling state of the radio and tape player or CD player.

NOTE: The radio and tape player or CD player is earthed to the instrument panel centre reinforcement directly.

- Q: Is the radio and tape player or CD player installed correctly?**
YES : Repair or replace the radio and tape player or CD player. If the power switch is turned on, the radio and tape player or CD player should operate normally.
NO : Install properly. If the power switch is turned on, the radio and tape player or CD player should operate normally.

Inspection Procedure 2: No Sound from One Speaker.

Speaker System Circuit



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

COMMENTS ON TROUBLE SYMPTOM

The cause is probably a faulty speaker circuit system.

PROBABLE CAUSES

- Malfunction of speaker.
- Damaged wiring harness or connector.
- Malfunction of radio and tape player or CD player.

DIAGNOSIS PROCEDURE**STEP 1. Check to see which speaker the sound is not output from.**

Use the speaker test to determine which speaker does not sound.

Q: Which speaker is not working?

Front door speaker (LH) : Go to Step 2.

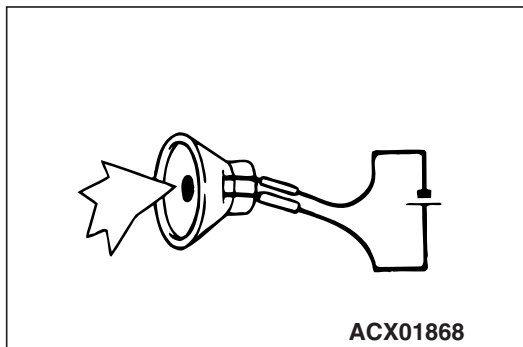
Front door speaker (RH) : Go to Step 5.

Rear door speaker (LH) <Double cab> : Go to Step 8.

Rear door speaker (RH) <Double cab> : Go to Step 11.

STEP 2. Check the front door speaker (LH).

(1) Remove the front door speaker (LH). Refer to P.54A-99.

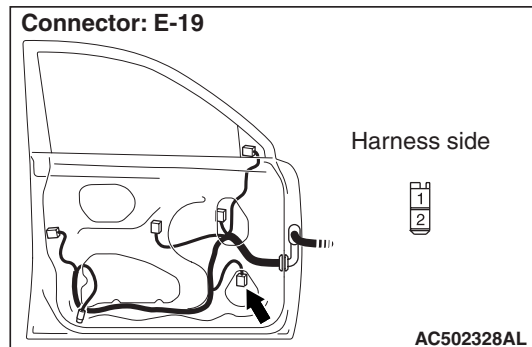
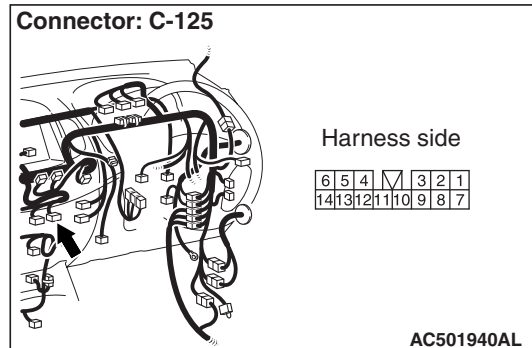


(2) Check that the front door speaker (LH) generates noise when a five-volt voltage is applied on the front door speaker (LH) terminal.

Q: Is the front door speaker (LH) generating noise?

YES : Go to Step 3.

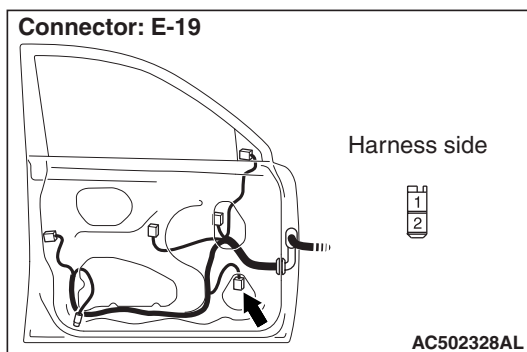
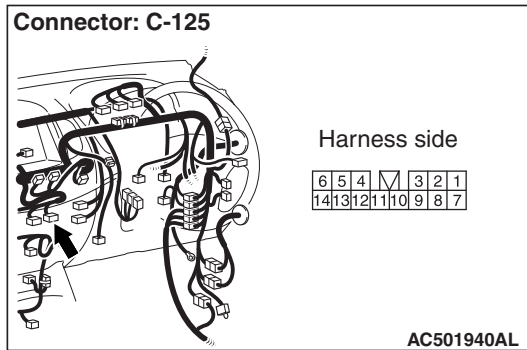
NO : Replace the front door speaker (LH). The front door speaker (LH) should sound.

STEP 3. Connector check: Front door speaker (LH) connector E-19 and radio and tape player or CD player connector C-125.**Q: Are harness connectors E-19 and C-125 in good condition?**

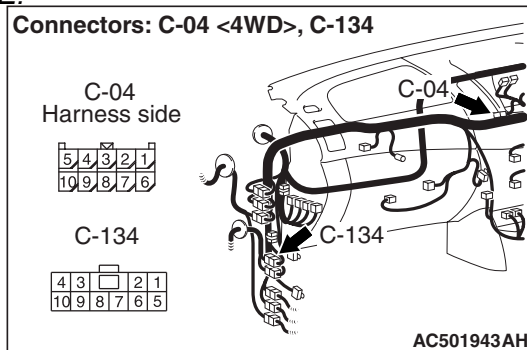
YES : Go to Step 4.

NO : Repair or replace the damage component(s). The front door speaker (LH) should sound.

STEP 4. Check the wiring harness between front door speaker (LH) connector E-19 (terminal 1 and 2) and radio and tape player or CD player connector C-125 (terminals 5 and 13).



NOTE:



Prior to the wiring harness inspection, check RV meter connector (jumper connector) C-04 <4wd>, intermediate connector C-134 and repair if necessary.

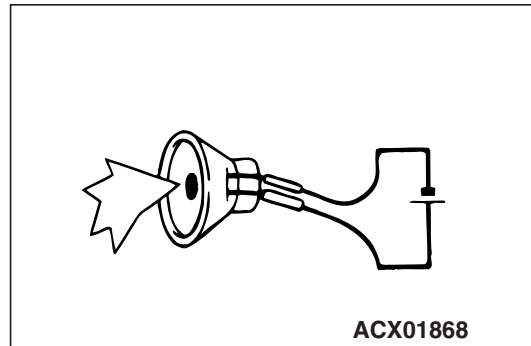
Q: Is the wiring harness between front door speaker (LH) connector E-19 (terminal 1 and 2) and radio and tape player or CD player connector C-125 (terminal 5 and 13) in good condition?

YES : Repair or replace the radio and tape player or CD player. The front door speaker (LH) should sound.

NO : Repair or replace the damage component(s). The front door speaker (LH) should sound.

STEP 5. Check the front door speaker (RH).

(1) Remove the front door speaker (RH). Refer to P.54A-99.



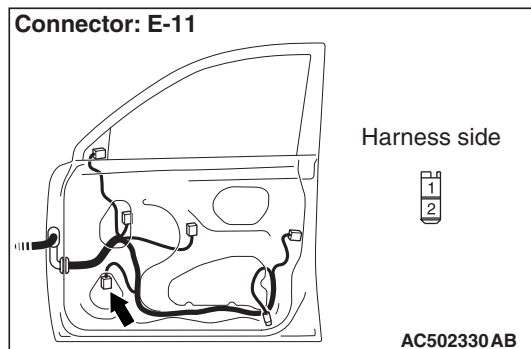
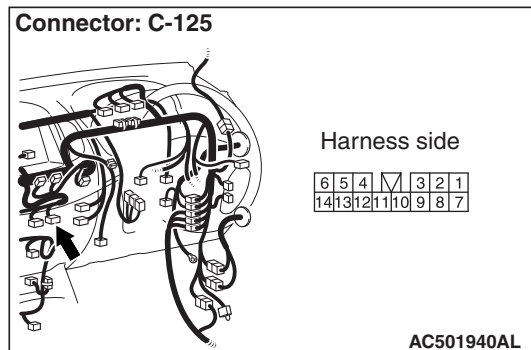
(2) Check that the front door speaker (RH) generates noise when a five-volt voltage is applied on the front door speaker (RH) terminal.

Q: Is the front door speaker (RH) generating noise?

YES : Go to Step 6.

NO : Replace the front door speaker (RH). The front door speaker (RH) should sound.

STEP 6. Connector check: Front door speaker (RH) connector E-11 and radio and tape player or CD player connector C-125.

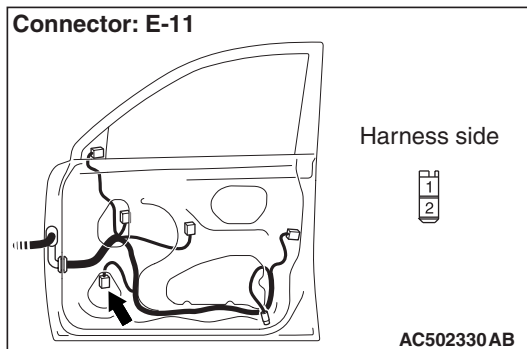
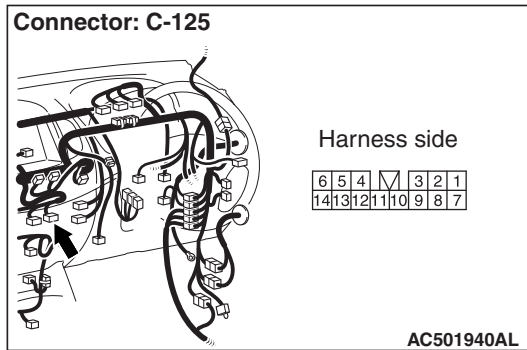


Q: Are harness connectors E-11 and C-125 in good condition?

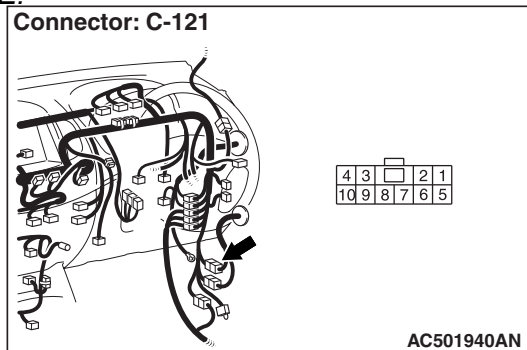
YES : Go to Step 7.

NO : Repair or replace the damage component(s). The front door speaker (RH) should sound.

STEP 7. Check the wiring harness between front door speaker (RH) connector E-11 (terminal 1 and 2) and radio and tape player or CD player connector C-125 (terminal 6 and 14).



NOTE:

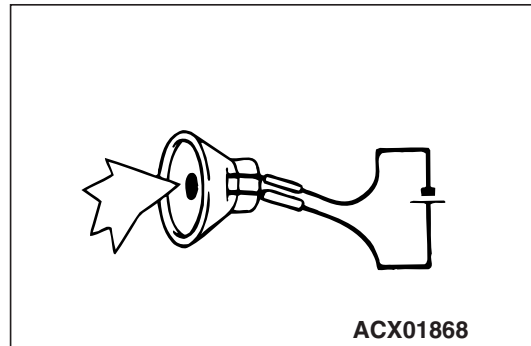


Prior to the wiring harness inspection, check intermediate connector C-121, and repair if necessary.

- Q: Is the wiring harness between front door speaker (RH) connector E-11 (terminal 1 and 2) and radio and tape player or CD player connector C-125 (terminal 6 and 14) in good condition?**
YES : Repair or replace the radio and tape player or CD player. The front door speaker (RH) should sound.
NO : Repair the wiring harness. The front door speaker (RH) should sound.

STEP 8. Check the rear door speaker (LH).

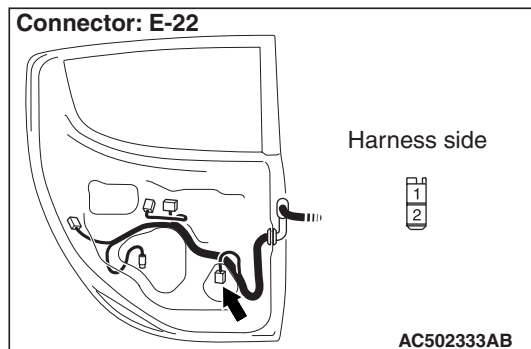
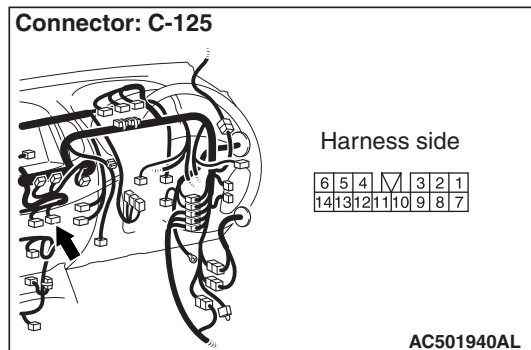
- (1) Remove the rear door speaker (LH). Refer to P.54A-99.



- (2) Check that the rear door speaker (LH) generates noise when a five-volt voltage is applied on the rear door speaker (LH) terminal.

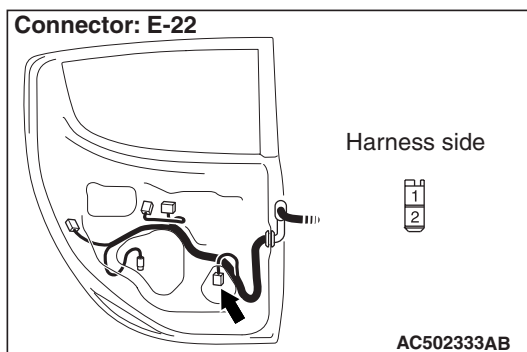
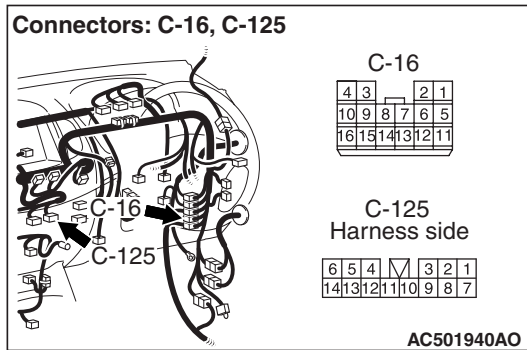
- Q: Is the rear door speaker (LH) generating noise?**
YES : Go to Step 9.
NO : Replace the rear door speaker (LH). The rear door speaker (LH) should sound.

STEP 9. Connector check: Rear door speaker (LH) connector E-22 and radio and tape player or CD player connector C-125.

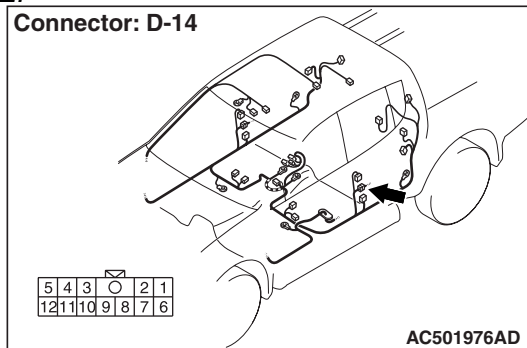


- Q: Are harness connectors E-22 and C-125 in good condition?**
YES : Go to Step 10.
NO : Repair or replace the damage component(s). The rear door speaker (LH) should sound.

STEP 10. Check the wiring harness between rear door speaker (LH) connector E-22 (terminal 1 and 2) and radio and tape player or CD player connector C-125 (terminal 2 and 8).



NOTE:

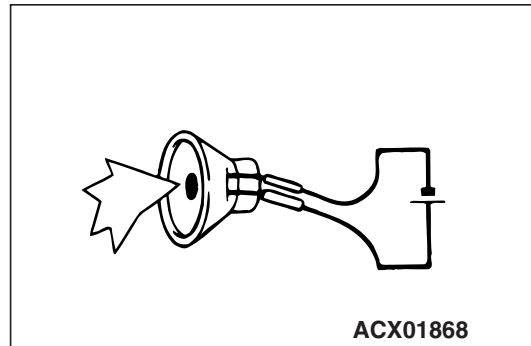


Prior to the wiring harness inspection, check intermediate connectors C-16 and D-14, and repair if necessary.

- Q: Is the wiring harness between rear door speaker (LH) connector E-22 (terminal 1 and 2) and radio and tape player or CD player connector C-125 (terminal 2 and 8) in good condition?**
- YES :** Repair or replace the radio and tape player or CD player. The rear door speaker (LH) should sound.
- NO :** Repair or replace the damage component(s). The rear door speaker (LH) should sound.

STEP 11. Check the rear door speaker (RH).

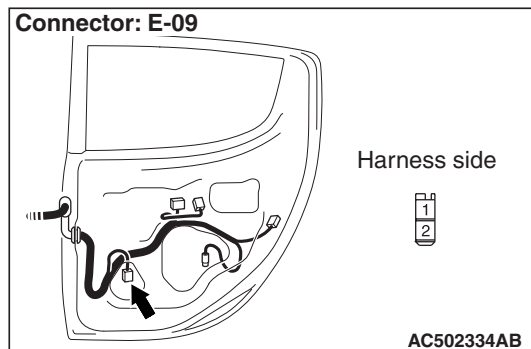
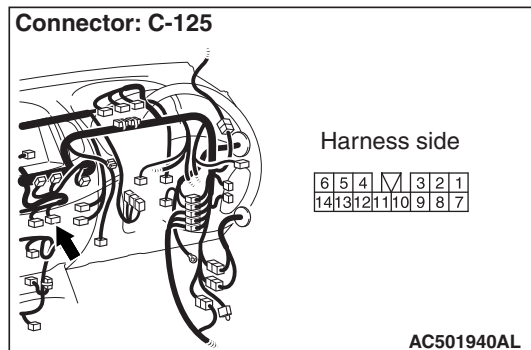
- (1) Remove the rear door speaker (RH). Refer to P.54A-99.



- (2) Check that the rear door speaker (RH) generates noise when a five-volt voltage is applied on the rear door speaker (RH) terminal.

- Q: Is the rear door speaker (RH) generating noise?**
- YES :** Go to Step 12.
- NO :** Replace the rear door speaker (RH). The rear door speaker (RH) should sound.

STEP 12. Connector check: Rear door speaker (RH) connector E-09 and radio and tape player or CD player connector C-125.



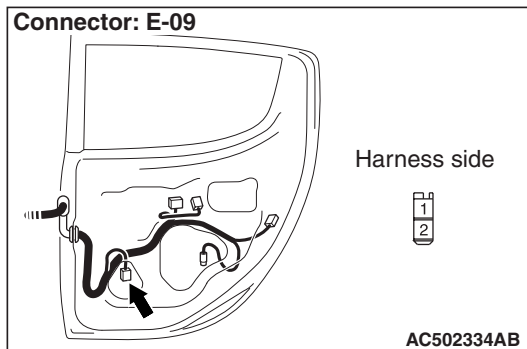
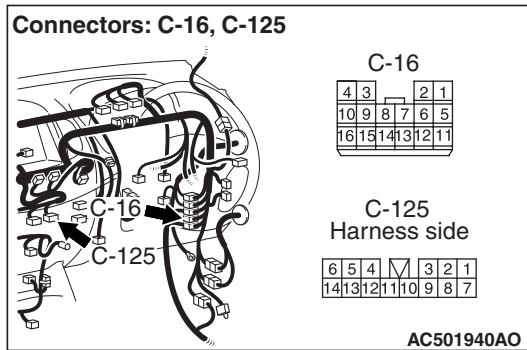
- Q: Are harness connectors E-09 and C-125 in good condition?**
- YES :** Go to Step 13.
- NO :** Repair or replace the damage component(s). The rear door speaker (RH) should sound.

STEP 13. Check the wiring harness between rear door speaker (RH) connector E-09 (terminals 1 and 2) and radio and tape player or CD player connector C-125 (terminals 1 and 7).

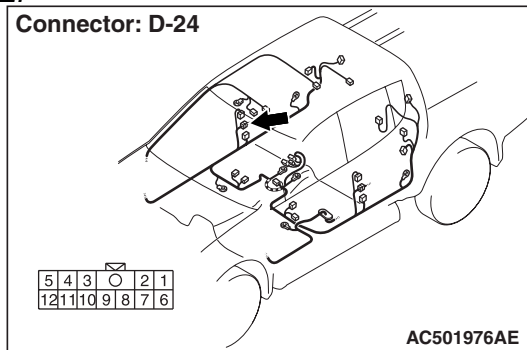
Q: Is the wiring harness between rear door speaker (RH) connector E-09 (terminal 1 and 2) and radio and tape player or CD player connector C-125 (terminal 1 and 7) in good condition?

YES : Repair or replace the radio and tape player or CD player. The rear door speaker (RH) should sound.

NO : Repair or replace the damage component(s). The rear door speaker (RH) should sound.



NOTE:



Prior to the wiring harness inspection, check intermediate connectors C-16, D-24, and repair if necessary.

Inspection Procedure 3: Noise Appears at Certain Places when Travelling (AM).

DIAGNOSIS PROCEDURE

STEP 1. Check the noise occur when entering or near a particular structure (building, tunnel, mountain, etc).

Q: Dose the noise occur when entering or near a particular structure (building, tunnel, mountain, etc).?

YES : Go to Step 3.

NO : Go to Step 2.

STEP 2. After taking the following measures to prevent the noise, check that no noise appears.

(1) Change to a different station with a stronger wave to boost resistance to interference.

(2) Suppress high tones to reduce noise.

(3) Extend antenna completely.

Q: Do the following measures eliminate the noise?

YES : The following causes can be considered.

NO : Go to Step 4.

STEP 3. Ask the owner about the state of the noise.

(1) Find out the following information from the owner.

(2) Place where the noise occurs.

(3) Locality conditions (valley, mountain, etc).

(4) Name and frequency of stations affected by noise

Q: Which is the noise, vehicle noise or external noise?

Vehicle noise : It may not be possible to prevent noise if the signal is weak.

External noise : In almost all cases, prevention on the receiver side is impossible. Weak signals especially are susceptible to interference. Go to Step 4.

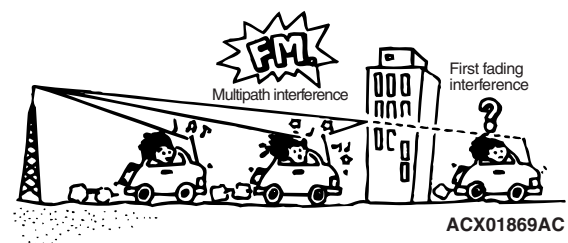
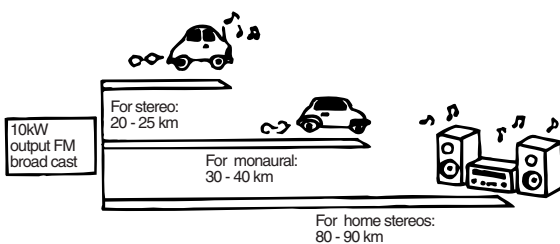
STEP 4. Check that there is no noise.

Q: Does noise still exist?

YES : If there is more noise than on radios in other vehicles, find out the noise condition and the name and frequency of the receiving stations from the owner, and consult with the radio manufacturer's service centre.

NO : Normal.

Inspection Procedure 4: Noise is Present while Moving (FM).



DIAGNOSIS PROCEDURE

NOTE: FM waves have the same properties as lamp, and can be deflected and blocked. FM signal reception is severely degraded in the shadow of obstructions such as buildings or mountains. An FM receiver will then only receive a reflected signal.

1. The signal becomes weak as the distance from the station's transmission antenna increases. The signal strength received depends on the signal strength of the transmitting station and intervening obstructions such as buildings and hills. Generally speaking, the area of good reception is approximately 20 –25 km for stereo reception, and 30 –40 km for monaural reception.

2. The signal will become weak when an area of shadow from the transmitting antenna (places where there are obstructions such as mountains or buildings between the station transmitter and the vehicle), and noise will appear. <This is called first fading, and gives a steady buzzing noise.>
3. If a direct signal hits the antenna at the same time as a signal reflected by obstructions such as mountains or buildings, interference of the two signals will generate noise. When moving, noise will appear each time the vehicle's antenna passes through this kind of obstructed area. The strength and interval of the noise varies according to the signal strength and the conditions of deflection. <This is called multipath noise, and is a repetitive buzzing.>
4. Since FM stereo transmission and reception has a weaker field than monaural, it is often accompanied by a hissing noise.

After taking measures to prevent the noise, check that no noise occurs.

5. Change to a different station with a stronger wave to boost resistance to interference.
6. Suppress high tones to reduce noise.
7. Extend antenna completely.

If there is noise, the following causes can be considered.

8. If due to vehicle noise: It may not be possible to prevent noise if the signal is weak.
9. If due to external noise: In almost all cases, prevention on the receiver side is not possible. Weak signals especially are susceptible to interference.

If there is more noise than on radios in other vehicles, find out the noise condition and the name and frequency of the receiving stations from the owner, and consult with the radio manufacturer's service centre.

Inspection Procedure 5: Mixed with Noise, Only at Night (AM).

The following factors can be considered as possible causes of noise appearing at night.

1. Factors due to signal conditions: Due to the fact that long-distance signals are more easily received at night, even stations that are received without problem during the day may experience interference in a general worsening of reception conditions. The weaker a station is the more susceptible it is to interference, and a change to different station or the appearance of a beating sound* may occur.

NOTE: Beat sound: Two signals close in frequency interfere with each other, creating a repetitive high-pitched sound. This sound is generated not only by sound signals but electrical waves as well.*

2. Factors due to vehicles noise: Alternator noise may be a cause.

YES : Go to Step 2.

NO : Go to Step 3.

STEP 2. Check that the following actions.

- (1) Tune to a station with a stronger wave.
- (2) Tune to a station with a stronger wave without completely extending the antenna (Mast antenna).

Q: Is there more noise than on radio in other vehicles?

YES : Consult the radio manufacturer's service centre.

NO : Check that there is no noise.

STEP 3. Check that the noise fades away when the vehicle harness is moved away from the radio (if the harness is not in the proper position).

Q: Does the noise fade away when the vehicle harness is moved any from the radio (if the harness is not in the proper position)?

YES : Consult the radio manufacturer's service centre.

NO : If there is more noise than other radios, consult the radio manufacturer's service centre.

DIAGNOSIS PROCEDURE

STEP 1. Check that the noise still obvious even when the lamps are off.

Q: Is the noise still obvious even when the lamps are off?

Inspection Procedure 6: Broadcasts can be Heard but Both AM and FM have a lot of Noise.

DIAGNOSIS PROCEDURE

STEP 1. Check the state of the antenna.

Q: Is the mast antenna assembled?

YES : Go to Step 2.

NO : Assemble the mast antenna. Check to see that the noise is gone.

STEP 2. Check that the noise occur when the engine is stopped or the engine is running.

Q: Does noise occur when the engine is stopped or the engine is running?

When the engine is stopped : Go to Step 3.

When the engine is running : Check the vehicle's noise suppressor (Refer to Inspection Procedure 9 [P.54A-85](#)).

STEP 3. Check that the following actions disappear the noise.

- (1) Tune to a station with a stronger wave.
- (2) Extend the antenna completely (Mast antenna).
- (3) Adjust the sound quality to suppress high tones.

Q: Is the noise eliminated?

YES : Consult the radio manufacturer's service centre.

NO : Go to Step 4.

STEP 4. Check that the radio is correctly earthed

The radio is connected to the earth with an assembling screw.

Q: Is the radio correctly earthed?

YES : Go to Step 5.

NO : Consult the radio manufacturer's service centre.

STEP 5. Check the connection of the antenna plug and radio and tape player or CD player.

Q: Is the antenna plug thoroughly connected to the radio and tape player or CD player?

YES : Go to Step 7.

NO : Go to Step 6.

STEP 6. Check that the noise is eliminated when the antenna plug is properly attached.

Q: Is the noise eliminated?

YES : Consult the radio manufacturer's service centre.

NO : Go to Step 7.

STEP 7. Check that the antenna is in good condition and is it properly mounted.

Q: Is the antenna in good condition and is it properly mounted?

YES : Consult the radio manufacturer's service centre.

NO : Either repair or replace the antenna assembly. Check to see that the noise is gone.

Inspection Procedure 7: There is More Noise on Either AM or FM.

DIAGNOSIS PROCEDURE

There is much noise only on AM. Due to differences in AM and FM systems, AM is more susceptible to noise interference.

STEP 1. Check that there is noise under the following state(s).

- A motorcycle was passing.
- Lighting was flashing.
- A vehicle passed close by, but it appeared to be a vehicle generating a particularly large amount of noise radiation.
- Passed beneath a power line.
- Passed beneath a telephone line.
- Passed close by a signal alternator.
- Passed close by some other sources of electrical noise.
- Passed under a bridge.

Q: Is there noise in the above states?

YES : Go to Step 3.

NO : Go to Step 2.

STEP 2. Continue to check for static; when static is detected, check for the conditions listed above.

Q: Is there noise in the state described in Step 1?

YES : Noise prevention on the radio side is difficult. If the problem is particularly worse than other radios, consult a service centre.

NO : Go to Step 3.

STEP 3. Check noise prevention on the radio side is difficult.

Q: Is the noise level worse than other radios?

YES : Consult a service centre. Noise encountered during FM reception only. Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lighting, etc. On the other hand, due to the characteristics of FM waves, there are sometimes cases of noise or distortion which are generated by typical noise interference (first fading and multipath). <Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to Furthermore, the amount of interference will be comparatively less for vehicles equipped with a diversity antenna system*. If there is an equivalent amount of distortion in vehicles or radios of the same type, then differences will be because of differences in antenna systems, and this should be explained to the user. a problem with the radio.> Furthermore, the amount of interference will be comparatively less for vehicles equipped with a diversity antenna system*. If there is an equivalent amount of distortion in vehicles or radios of the same type, then differences will be because of differences in antenna systems, and this should be explained to the user.

NO : If the noise level is roughly the same as other radios, there is no action to be taken.

Inspection Procedure 8: There is Noise when Starting the Engine.

DIAGNOSIS PROCEDURE

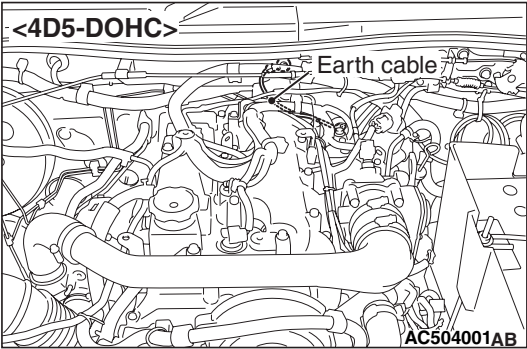
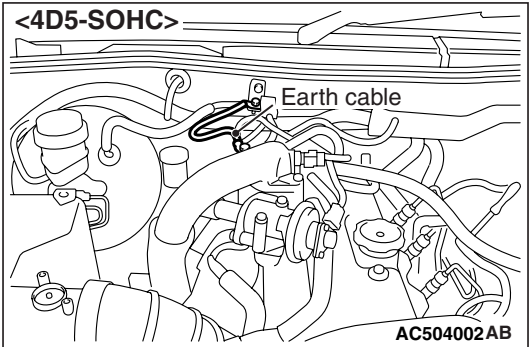
⚠ CAUTION

- Connecting a high tension cable to the noise filter may destroy the noise filter and should never be done.
- Check that there is no external noise. Since failure to do this may result in an incorrect diagnosis due to the inability to identify the noise source, this operation must be performed.
- Noise prevention should be performed by suppressing strong sources of noise step by step.

NOTE: Capacitor: The capacitor does not pass DC current, but as the number of waves increases when it passes AC current, impedance (resistance against AC) decreases, and current flow is facilitated. A noise suppressing capacitor which take advantage of this property is inserted between the power line for the noise source and the earth. This suppresses noise by earthing the noise component (AC or pulse signal) to the body of the vehicle.

NOTE: Coil: The coil passes DC current, but impedance rises as the number of waves increases relative to the AC current. A noise suppressing coil which takes advantage of this property is inserted into the power line for the noise source, and works by preventing the noise component from flowing or radiating out of the line.

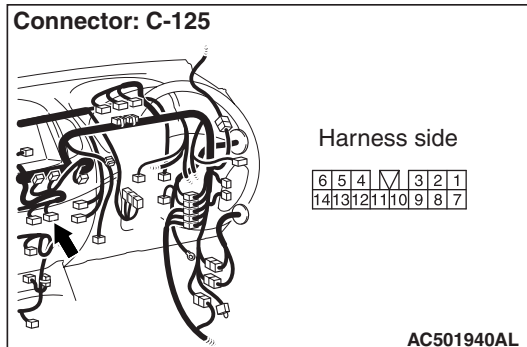
Noise type sounds are in parentheses	Conditions	Cause	Remedy
AM or FM: ignition noise (popping, snapping, cracking, buzzing)	<ul style="list-style-type: none"> • Increasing the engine speed causes the alternator whine sound to speed up and the volume to decrease • Disappears when the ignition switch turned to "ACC". 	<ul style="list-style-type: none"> • Mainly due to the spark plugs • Due to engine noise 	<ul style="list-style-type: none"> • Check or replace the earth cable. • Check or replace the noise capacitor.
Other electrical components	–	Noise may occur as the electrical components become older.	Repair or replace the electrical components.
Static electricity (cracking, crinkling)	<ul style="list-style-type: none"> • Disappears when the vehicle is completely stopped. • Severe when the clutch is engaged 	Occurs when parts or wiring move for some reason and contact metal parts of the body.	Return parts or wiring to their proper position.
Static electricity (cracking, crinkling)	<ul style="list-style-type: none"> • Various noise are produced depending on the body part of the vehicle. 	Due to removal of the front hood, bumpers, exhaust pipe and muffler, suspension, etc.	Earth parts by bonding. Cases where the problem is not eliminated by a signal response to one area are common, due to several body parts being imperfectly earthed.



Inspection Procedure 9: Some Noise Appears when there is Vibration or Shocks During Travelling.

DIAGNOSIS PROCEDURE

STEP 1. Connector check: Radio and tape player or CD player connector C-125.



Q: Is radio and tape player or CD player connector C-125 in good condition?
YES : Go to Step 2.
NO : Repair or replace the connector. Check that there is no noise.

STEP 2. Check that noise appear when the radio switch is turned on while the vehicle is stopped and the radio is tapped while tuned away from a station.

NOTE: Static electricity noise: Body static electric from the shock absorber rubber bushings used to prevent vibration, tires, etc. occurs because of separation from the earth, causing a buzzing noise. Since no measures can be taken to discharge the static electricity of the vehicle body. Check that there is no noise.

Q: Does noise appear when the radio switch is turned on while the vehicle is stopped and the radio is tapped while tuned away from a station?
YES : Go to Step 3.
NO : It may be static electricity noise.

STEP 3. Check that the radio correctly earthed.
The radio is connected to the earth with an assembling screw.

Q: Is the radio correctly earthed?
YES : Go to Step 4.
NO : Tighten the screw securely. Check that there is no noise.

STEP 4. Check by replacing the radio and tape player or CD player.

Q: Are operations normal when using another radio and tape player or CD player?
YES : Either repair or replace the radio and tape player or CD player. Check that there is no noise.
NO : Either repair or replace the antenna assembly. Check that there is no noise.

Inspection Procedure 10: Noise Sometimes Appears on FM during Travelling.**DIAGNOSIS PROCEDURE****STEP 1. Check the state of the antenna.****Q: Is the mast antenna assembled?****YES :** Go to Step 2.**NO :** Assemble the mast antenna. Check that there is no noise.**STEP 2. The check after adjusting the radio.****Q: Readjust the radio. Is the noise eliminated?****YES :** Check that there is no noise.**NO :** Go to Step 3.**STEP 3. Check with several broadcasting stations.**

NOTE: Multipath noise and fading noise: Because of the frequency of FM waves in extremely high, it is highly susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in several ways.

Multipath noise

- This describes the echo that occurs when the broadcast signal is reflected by a large obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).

Fading noise

- This is a buzzing noise that occurs when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates intricately within a narrow range.

Q: Is the abnormality in reception generated only within a certain range?**YES :** The effect of an electrical field condition (multipath noise, fading noise) could be the cause. Check that there is not noise.**NO :** Go to Step 4.**STEP 4. Check that noise appears when the radio switch is turned on while the vehicle is stopped.**

NOTE: Static electricity noise: Body static electric from the shock absorber rubber bushings used to prevent vibration, tires, etc. occurs because of separation from the earth, causing a buzzing noise. There is no measures to discharge the static electricity of the vehicle body. Check that there is no noise.

Q: Does noise appear when the radio switch is turned on while the vehicle is stopped and the radio is tapped while tuned away from a station?**YES :** Go to Step 5.**NO :** It may be static electricity noise.**STEP 5. Check that the radio is correctly earthed.**

The radio is connected to the earth with an assembling screw.

Q: Is the radio correctly earthed?**YES :** Go to Step 6.**NO :** Tighten the screw securely. Check that there is no noise.**STEP 6. Check by replacing the radio and tape player or CD player.****Q: Are operations normal when using another radio and tape player or CD player?****YES :** Either repair or replace the radio and tape player or CD player. Check that there is no noise.**NO :** Either repair or replace the antenna assembly. Check that there is no noise.**Inspection Procedure 11: Ever-Present Noise.****DIAGNOSIS PROCEDURE**

Noise is often created by the following factors, and often the radio is OK when it is checked individually.

- Travelling conditions of the vehicle
- Terrain of area travelled through
- Surrounding buildings
- Signal conditions
- Time period

For this reason, if there are still problems with noise even after the measures described in inspection procedure 4 to 10 have been taken, get information on the factors listed above as well as determining whether the problem occurs with AM or FM, the station names, frequencies, etc. and contact the radio manufacturer's service centre.

Inspection Procedure 12: There is Noise but No Reception for Both AM and FM or No Sound from AM, or No Sound from FM.

DIAGNOSIS PROCEDURE

STEP 1. Check the state of the antenna.

Q: Is the mast antenna assembled?

YES : Go to Step 2.

NO : Assemble the mast antenna. The radio should sound normally.

STEP 2. Check to see if inspections are taking place in an area exposed to special electric fields.

Q: Are inspections taking place under special electric field conditions (underground garage, inside a building, etc).?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Relocate and check.

Automatically receive in a good reception area that is not exposed to special electric fields.

Q: Is reception of the strongest radio frequency possible within the area?

YES : There is no action to be taken.

NO : Go to Step 4.

STEP 4. Tune then check.

Q: Did the sensitivity improve after tuning?

YES : There is no action to be taken.

NO : Go to Step 5.

STEP 5. Check the connection of the antenna plug and the radio and tape player or CD player.

Q: Is the antenna plug thoroughly connected to the radio and tape player or CD player?

YES : Go to Step 6.

NO : Thoroughly connect the antenna plug and the radio and tape player or CD player. The radio should sound normally.

STEP 6. Check by replacing the radio and tape player or CD player.

Q: Are operations normal when using another radio and tape player or CD player?

YES : Either repair or replace the radio and tape player or CD player. The radio should sound normally.

NO : Either repair or replace the antenna assembly. The radio should sound normally.

Inspection Procedure 13: Poor Reception.

DIAGNOSIS PROCEDURE

STEP 1. Check the state of the antenna.

Q: Is the mast antenna assembled?

YES : Go to Step 2.

NO : Assemble the mast antenna. Check that a poor reception is resolved.

STEP 2. Check to see if inspections are taking place in an area exposed to special electric fields.

Q: Are inspections taking place under special electric field conditions (underneath garage, inside a building, etc).?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 3. Relocate and check.

Automatically receive in a good reception area that is not exposed to special electric fields.

Q: Is reception of the strongest radio frequency possible within the area?

YES : Check that a poor reception is resolved.

NO : Go to Step 4.

STEP 4. Tune then check.

Q: Did the sensitivity improve after tuning?

YES : Check that a poor reception is resolved.

NO : Go to Step 5.

STEP 5. Check with several broadcasting stations.

NOTE: Multipath noise and fading noise: Because the frequency of FM waves is extremely high, it is highly susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in several ways.

Multipath noise

- This describes the echo that occurs when the broadcast signal is reflected by a large obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).

Fading noise

- This is a buzzing noise that occurs when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates intricately within a narrow range.

Q: Is the abnormality in reception generated only within a certain range?

YES : Check that a poor reception is resolved.

NO : Go to Step 6.

STEP 6. Check the connection of the antenna plug and the radio and tape player or CD player.

Q: Is the antenna plug thoroughly connected to the radio and tape player or CD player?

YES : Go to Step 7.

NO : Thoroughly connect the antenna plug and the radio and tape player or CD player. Check that a poor reception is resolved.

STEP 7. Check by replacing the radio and tape player or CD player.

Q: Does the another radio and tape player or CD player work normally?

YES : Either repair or replace the radio and tape player or CD player. Check that a poor reception is resolved.

NO : Either repair or replace the antenna assembly. Check that a poor reception is resolved.

Inspection Procedure 14: Distortion on AM or on Both AM and FM.**DIAGNOSIS PROCEDURE****STEP 1. Check the degree in which distortion is generated.**

Q: How much distortion is generated?

Occasional distortion : Go to Step 2.

Constant distortion : Go to Step 3.

STEP 2. Check by the transmission antenna.

Q: Is there distortion by the transmission antenna?

YES : The input from the antenna is too big.

NO : Go to Step 3.

STEP 3. Check how the speakers are setup.

Q: Are any cords coming in contact with the paper cones of the speakers?

YES : Move the cords so that they do not come in contact with the paper cones of the speaker. Check that a distortion is resolved.

NO : Go to Step 4.

STEP 4. Check the speakers.

1. Remove the speakers.

2. Check to see if there is any ripping of the paper cones or any foreign obstacles in the paper cone.

Q: Are the speakers normal?

YES : Go to Step 5.

NO : Repair or replace the speakers. Check that a distortion is resolved.

STEP 5. Check how the speakers are setup.

Q: Check to see if the speakers are setup in a deformed manner.

YES : Correct the way the speakers are setup so they are securely setup. Check that a distortion is resolved.

NO : Repair or replace the radio and tape player or CD player. Check that a distortion is resolved.

Inspection Procedure 15: Distortion on FM Only.

DIAGNOSIS PROCEDURE

STEP 1. Check with another broadcasting station.

Q: Is there distortion when turning to another broadcasting station?

YES : Go to Step 2.

NO : The signal from that station is too weak.

STEP 2. Relocate the reception area and check.

Q: When relocating the reception area does the distortion increase or decrease?

YES : The cause may be multipath noise.

NO : Repair or replace the radio and tape player or CD player. Check that a distortion is resolved.

Inspection Procedure 16: Using the Auto Select Function, Too Few Automatic Stations are Selected.

DIAGNOSIS PROCEDURE

STEP 1. Check the state of the antenna.

Q: Is the mast antenna assembled?

YES : Go to Step 2.

NO : Assemble the mast antenna. The auto-select function should operate normally.

YES : There is no action to be taken.

NO : Go to Step 5.

STEP 2. Check the number of radio stations.

Q: Are there sufficient numbers of radio stations within the area?

YES : Go to Step 3.

NO : Go to Step 4.

STEP 5. Check to see if inspections are taking place in an area exposed to special electric fields.

Q: Are inspections taking place under special electric field conditions (underneath garage, inside a building, etc).?

YES : Go to Step 6.

NO : Go to Step 7.

STEP 3. Check the distance from the transmission antenna.

Q: Is there a transmission antenna within a range of 2 miles?

YES : Go to Step 5.

NO : Go to Step 4.

STEP 6. Relocate and check.

Automatically receive in a good reception area that is not exposed to special electric fields.

Q: Is reception of the strongest radio frequency possible within the area?

YES : There is no action to be taken.

NO : Go to Step 7.

STEP 4. The check if there are not that many radio stations and when there is no transmission antenna in the vicinity.

Execute automatic selection and check to see that the strongest radio frequency is receivable within the area.

Q: Is reception of the strongest radio frequency possible within the area?

STEP 7. Check the connection of the antenna plug and the radio and tape player or CD player.

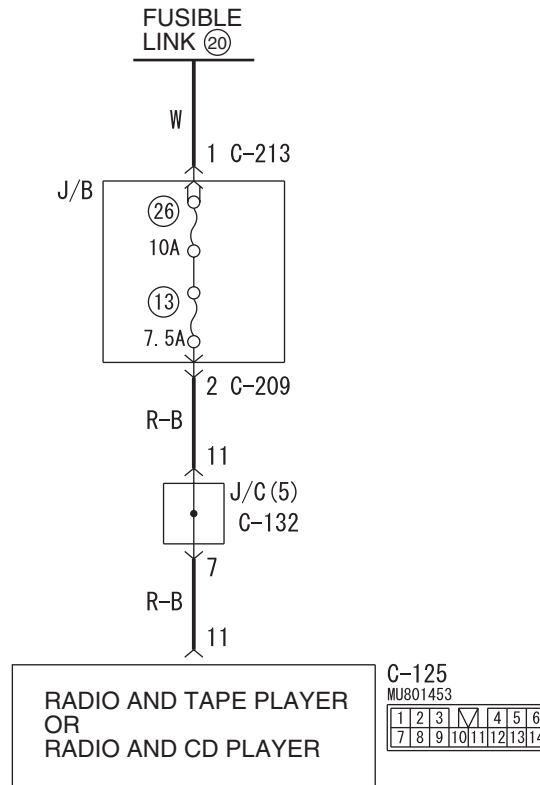
Q: Is the antenna plug thoroughly connected to the radio and tape player or CD player?

YES : Repair or replace the radio and tape player or CD player. The auto-select function should operate normally.

NO : Thoroughly connect the antenna plug and the radio and tape player or CD player. The auto-select function should operate normally.

Inspection Procedure 17: Preset Station are Erased.

Memory Backup Power Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X013A

COMMENTS ON TROUBLE SYMPTOM

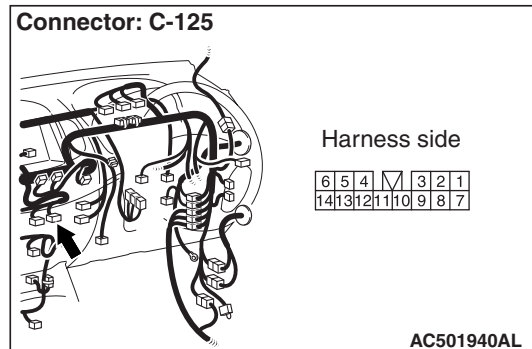
The cause is probably a faulty radio and tape player or CD player memory backup power supply circuit system.

PROBABLE CAUSES

- Damaged wiring harness or connector.
- Malfunction of the radio and tape player or CD player.

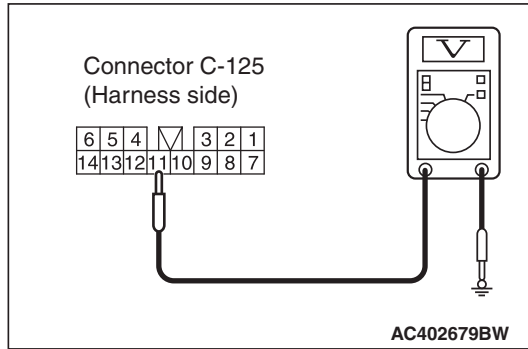
DIAGNOSIS PROCEDURE

STEP 1. Voltage measurement at radio and tape player or CD player connector C-125.



(1) Disconnect radio and tape player or CD player

connector C-125.



(2) Measure the voltage between terminal number 11 and earth.

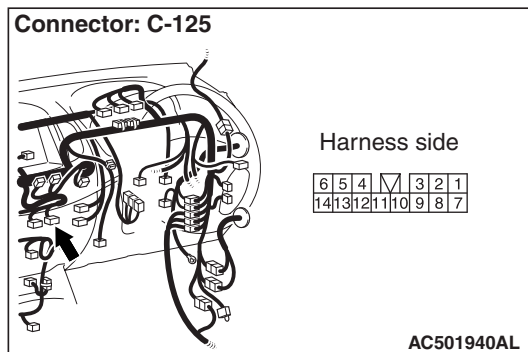
OK: System voltage

Q: Does the measured voltage correspond with this range?

When YES <radio and tape player or CD player does not execute memory save then.> : Either repair or replace the radio and tape player or CD player. Check that a memory is retained.

NO : Go to Step 2.

STEP 2. Connector check: Radio and tape player or CD player connector C-125.

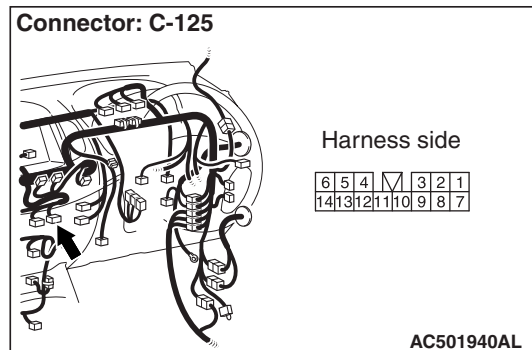


Q: Is radio and tape player or CD player connector C-125 in good condition?

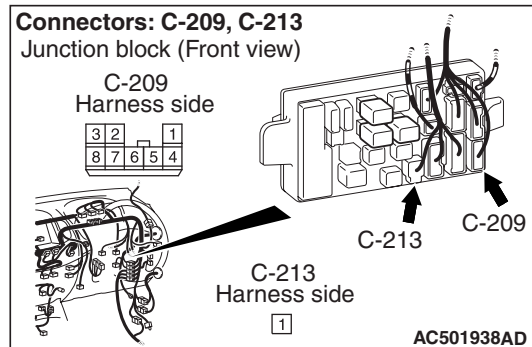
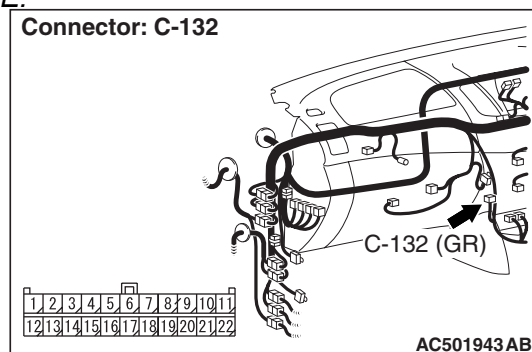
YES : Go to Step 3.

NO : Repair or replace the damage component(s). Check that a memory is retained.

STEP 3. Check the wiring harness between radio and tape player or CD player connector C-125 (terminal 11) and battery.



NOTE:



Prior to the wiring harness inspection, check junction block connector C-209, C-213 and joint connector C-132, and repair if necessary.

Q: Are the wiring harness between radio and tape player or CD player connector C-125 (terminal 11) and fusible link 20 (battery) in good condition?

YES : Repair or replace the radio and tape player or CD player. Check that a memory is retained.

NO : Repair or replace the damage component(s). Check that a memory is retained.

Inspection Procedure 18: Cassette Tape can Not be Inserted.**DIAGNOSIS PROCEDURE****STEP 1. Check that there are any foreign objects inside the cassette player.**

NOTE: Attempting to eliminate a foreign object (e.g., a coin or clip, etc.) in the cassette player may damage the mechanism. The player should be taken to a service dealer for repair.

Q: Are there any foreign objects inside the cassette player?

YES : There are any foreign objects inside the cassette player, remove the object(s). A cassette tape should be inserted normally.

NO : Go to Step 2.

STEP 2. Check that the radio with cassette player works when another tape is inserted.

NOTE: Check that the tape label is not loose, that the tape case is not deformed and that the tape is tightly wound. Also, tape with a length of C-120 or greater can often get caught in the mechanism and should not be used.

Q: Does the cassette player work if another tape is inserted?

YES : The cassette tape used is defective. A cassette tape should be inserted normally.

NO : Replace the radio with cassette player. A cassette tape should be inserted normally.

Inspection Procedure 19: Sound Quality is Poor, or Sound is Weak.**DIAGNOSIS PROCEDURE****STEP 1. Check that the player works normally if the tape is changed.**

NOTE: Check that the tape label is not loose, that the tape case is not deformed and that the tape is tightly wound. Also, tapes with a length of C-120 or greater can often get caught in the mechanism and should not be used.

Q: Does the player work normally if the tape is changed?

YES : The tape used is defective.

NO : Go to Step 2.

STEP 2. Check that the player play OK if the tape player head is cleaned.**Q: Does the player play OK if the tape player head is cleaned?**

YES : The sound quality should return to normal.

NO : Go to Step 3.

STEP 3. Check that the proper operation is obtained when the tape player is replaced.**Q: Is proper operation obtained when the tape player is replaced?**

YES : Replace the radio and tape player. The sound quality should return to normal.

NO : Repair or replace the speakers. The sound quality should return to normal.

Inspection Procedure 20: Cassette Tape can Not be Ejected.**DIAGNOSIS PROCEDURE**

The problems covered here are all the result of the use of a bad tape (deformed or not properly tightened) or of a malfunction of the cassette player itself. Malfunctions involving the tape becoming caught in the mechanism and ruining the case are also possible, and attempting to force the tape out of the player can cause damage to the mechanism. The player should be taken to a service dealer for repair.

Inspection Procedure 21: Uneven Revolution. Tape Speed is Fast or Slow.

DIAGNOSIS PROCEDURE

STEP 1. Check that the cassette player work normally when the tape is changed.

NOTE: Check that the tape label is not loose, that the tape case is not deformed and that the tape is tightly wound. Also, tape with a length of C-120 or greater can often get caught in the mechanism and should not be used.

Q: Does the player work normally if the tape is changed?

YES : The tape used is defective. The cassette tape speed should be stable.

NO : Go to Step 2.

STEP 2. Check that there are any foreign objects inside the cassette player.

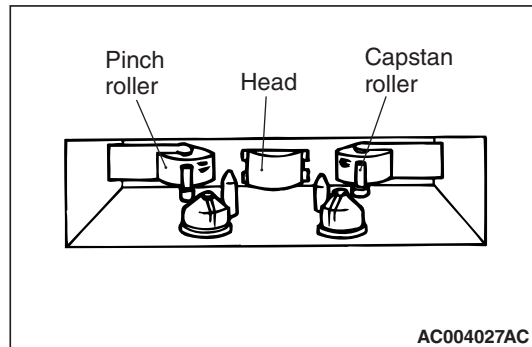
NOTE: Attempting to eliminate a foreign object (e.g., a coin or clip, etc). out of the cassette player may damage the mechanism. The player should be taken to a service dealer for repair.

Q: Are there any foreign objects inside the cassette player?

YES : The procedure is complete.

NO : Go to step 3.

STEP 3. Check that the head or capstan roller is dirty.



Q: Is the head or capstan roller dirty?

YES : Clean the head or capstan roller. The cassette tape speed should be stable.

NO : Repair or replace the tape player. The procedure is complete.

Inspection Procedure 22: Automatic Search does Not Work.

DIAGNOSIS PROCEDURE

STEP 1. Check that the "APS" (automatic search) button be depressed properly.

NOTE: When the time between songs on a tape is less than three seconds, or when there is a three second period in the middle of a song in which the volume level is extremely low, the automatic search function may not work properly.

Q: Can the "APS" (automatic search) button be depressed properly?

YES : Go to Step 2.

NO : The button is operated improperly. Repair radio and tape player.

STEP 2. Check that the player works when the tape is changed.

NOTE: Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tapes of C-120 or greater length often get caught in the mechanism and should not be used.

Q: Does the player work if the tape is changed?

YES : The tape used is defective.

NO : Replace the radio and tape player. Check that the automatic search function operates normally.

Inspection Procedure 23: Malfunction of the Auto Reverse.

DIAGNOSIS PROCEDURE

STEP 1. Check that the cassette player works normally when the tape is changed.

NOTE: Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tape of C-120 or greater length often get caught in the mechanism and should not be used.

Q: Does the tape player work normally if the tape is changed?

YES : The tape used is defective. The auto reverse function should operate normally.

NO : Go to Step 2.

STEP 2. Check that the problem only occur while the vehicle is being driven.

Q: Does the problem only occur while the vehicle is being driven?

YES : Go to Step 3.

NO : Replace the radio and cassette player. The auto reverse function should operate normally.

STEP 3. Check that the cassette player is properly installed to the vehicle.

Q: Is the tape player properly installed to the vehicle?

YES : Replace the radio and cassette player. The auto reverse function should operate normally.

NO : Repair the installation condition. The procedure is complete.

Inspection Procedure 24: Tape gets Caught in Mechanism.

NOTE: When the tape is caught in the mechanism, the tape case may not eject. When this occurs, do not try to force the tape out as this may damage the tape player mechanism. Take the cassette to a service dealer for repair.

DIAGNOSIS PROCEDURE

Check that the player works normally if tape is changed.

NOTE: Check that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tape with a length of C-120 or greater can often get caught in the mechanism and should not be used.

Q: Does the player work normally if tape is changed?

YES : The tape used is defective. The cassette player should operate normally.

NO : Replace the radio with ape player. The procedure is complete.

Inspection Procedure 25: CD can Not be Inserted.

DIAGNOSIS PROCEDURE

STEP 1. Check that a CD has been already loaded.

Q: Has a CD been already loaded?

NO : Go to Step 2.

YES : Take out the CD (If the CD can not be ejected, refer to INSPECTION PROCEDURE 29 P.54A-96). Check that a CD can be inserted.

STEP 2. Check how a CD is inserted.

- Ensure that the ignition switch is at "ACC" or "ON".

NOTE: If you try to load a CD when the ignition switch is at the positions other than "ACC" or "ON", the CD will not be inserted completely and then rejected.

Q: If you try to load the CD, does the CD stops halfway and then rejected?

YES : Refer to INSPECTION PROCEDURE 29 P.54A-96.

NO : Go to Step 3.

STEP 3. Check after the CD is loaded.

NOTE: Even though the CD is loaded, "E" (error) is sometimes displayed with the CD rejected because of vibration/shock or dew on the CD face or optical lens.

Inspection Procedure 26: No Sound. (CD only)

DIAGNOSIS PROCEDURE

STEP 1. Check again using a normal CD, which is not dirty or scratched.

Q: When you substitute another normal CD, is the CD played normally?

YES : The original CD is defective. The CD player should sound normally.

NO : Go to Step 2.

Q: Though the CD is inserted completely, is "E" (error) displayed and the CD ejected?

YES : Go to Step 4.

NO : The procedure is complete.

STEP 4. Check the CD.

Check the CD for the conditions below:

- Is the CD loaded with its label facing down?
- Is the recorded face dirty or scratched?
- Is there dew on the recorded face?

Q: Is the CD in good condition?

YES : Go to Step 5.

NO : The original CD is defective. Check that a CD can be inserted.

STEP 5. Check again using a normal CD, which is not dirty or scratched.

- Load another normal CD.
- Check that the CD player recognizes and play the CD.

Q: When you substitute another normal CD, is the CD loaded correctly?

YES : The original CD is defective. Check that a CD can be inserted.

NO : Replace the radio with CD player. The procedure is complete.

STEP 2. Check power supply to the CD player when the ignition switch is at "ACC" or "ACC".

Q: Is the radio and CD player energized when the ignition switch is turned to the "ACC" or "ON" position?

YES : Replace the radio and CD player. The procedure is complete.

NO : Check the memory backup power supply circuit. Refer to Inspection Procedure 1 P.54A-70.

Inspection Procedure 27: CD Sound Skips.**DIAGNOSIS PROCEDURE**

STEP 1. Check the state in which the sound on the CD jumps.

Q: Does the sound jump when the car is parked?

YES : Go to Step 2.

NO : Go to Step 4.

STEP 2. Check the surface of the CD.

Q: Are there any scratches or soiling on the CD?

YES : The CD is defective if there are any scratches. Clean the CD surface if it is dirty. Check that a CD sound skip is resolved.

NO : Go to Step 3.

STEP 3. Check when replacing with a CD that can be played normally without any scratches or soiling.

Q: Does the CD play normally when replaced with a CD that is not scratched or dirty and can play normally?

YES : Defective CD used. Check that a CD sound skip is resolved.

NO : Go to Step 4.

STEP 4. Check by tapping the radio and CD player.

NOTE: Check by using a proper CD which is free from scratches, dirt or any other abnormality.

Q: Does the sound jump when tapping the radio and CD player?

YES : Securely mount the radio and CD player. Check that a CD sound skip is resolved.

NO : Either repair or replace the radio and CD player. (Take the following measures if a servicing shop is closely).

1. Investigate in detail the state when the sound jumps while driving the car.
2. Describe the state to the service shop for consultation.
3. Either repair or replace the radio and CD player according to the instructions of the service shop.

Check that a CD sound skip is resolved.

Inspection Procedure 28: Sound Quality is Poor.**DIAGNOSIS PROCEDURE**

Check to see that the CD can be played normally and that it is free of any scratches or soiling.

Replace with better sound quality CD.

Q: Is the sound quality better replacing the CD with a clean CD without any scratches that can be played?

YES : Defective CD used. The sound quality should return to normal.

NO : Either repair or replace the radio and CD player. The sound quality should return to normal.

Inspection Procedure 29: CD can not be ejected.**DIAGNOSIS PROCEDURE**

Check the power of ignition switch "ACC".

Q: Does the radio and CD player power turn ON when the ignition switch is in the "ACC" or "ON" position?

YES : Replace the radio and CD player. Check that a CD can be ejected normally.

NO : Check the power supply circuit. Refer to Inspection Procedure 1 [P.54A-70](#).

ON-VEHICLE SERVICE

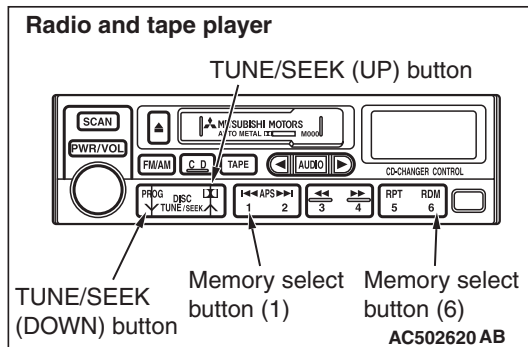
SPEAKER TEST

M1544005400460

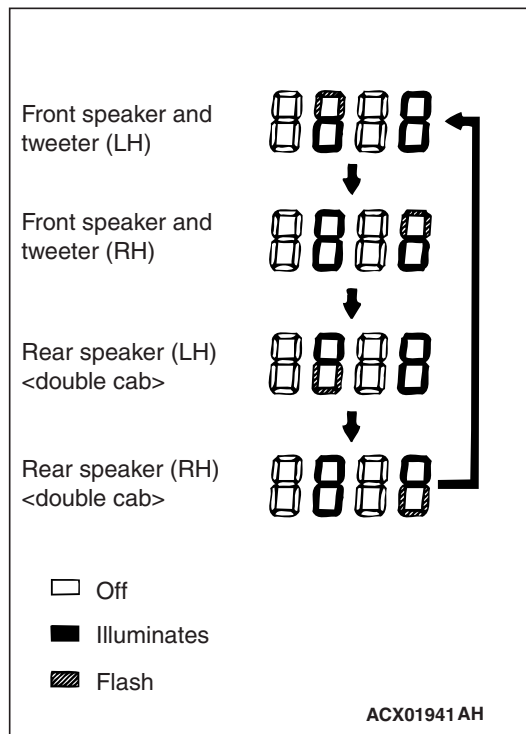
RADIO AND TAPE PLAYER SPEAKER TEST

Enter the speaker test mode according to the following steps:

1. Turn the Ignition switch to the "ACC" or "ON" position and switch off the radio and tape player.



2. Press the following buttons in that order within sixty seconds from step (1).
 - (1) Memory select "1" button
 - (2) "TUNE/SEEK (DOWN)" button
 - (3) "TUNE/SEEK (UP)" button
 - (4) Memory select "6" button

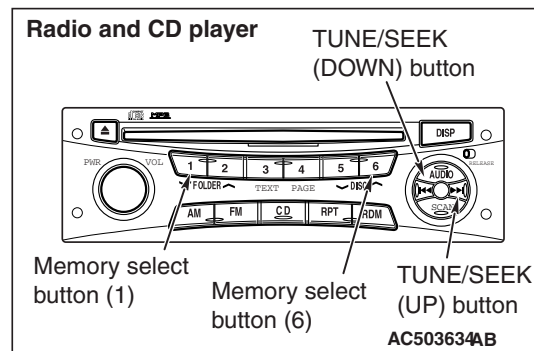


3. Check that the speaker, which is displayed on the radio panel display, sounds (If the memory select "6" button is pressed, the speaker will be changed).
4. If a button other than the memory select "6" button and "EJECT" button (tape) is pressed, or the ignition switch is turned to "LOCK" (OFF) position, you will exit from the speaker test mode.

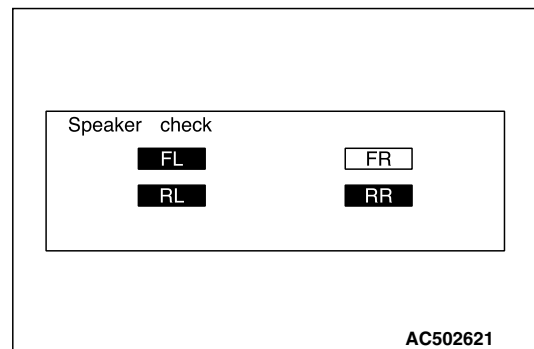
RADIO AND CD PLAYER SPEAKER TEST

Enter the speaker test mode according to the following steps:

1. Turn the Ignition switch to the "ACC" or "ON" position and switch off the radio and CD player.



2. Press the following buttons in that order within sixty seconds from step (1).
 - (1) Memory select "1" button
 - (2) "TUNE/SEEK (DOWN)" button
 - (3) "TUNE/SEEK (UP)" button
 - (4) Memory select "6" button

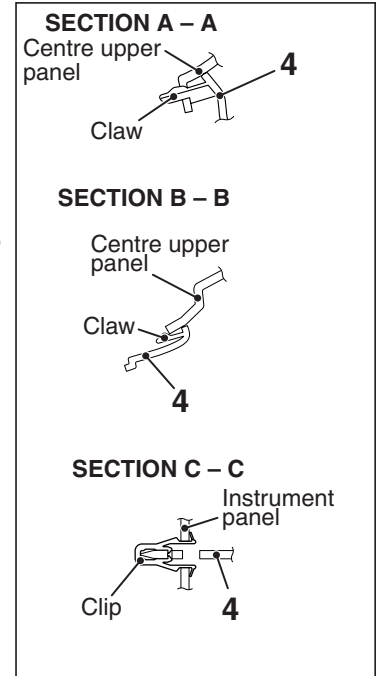
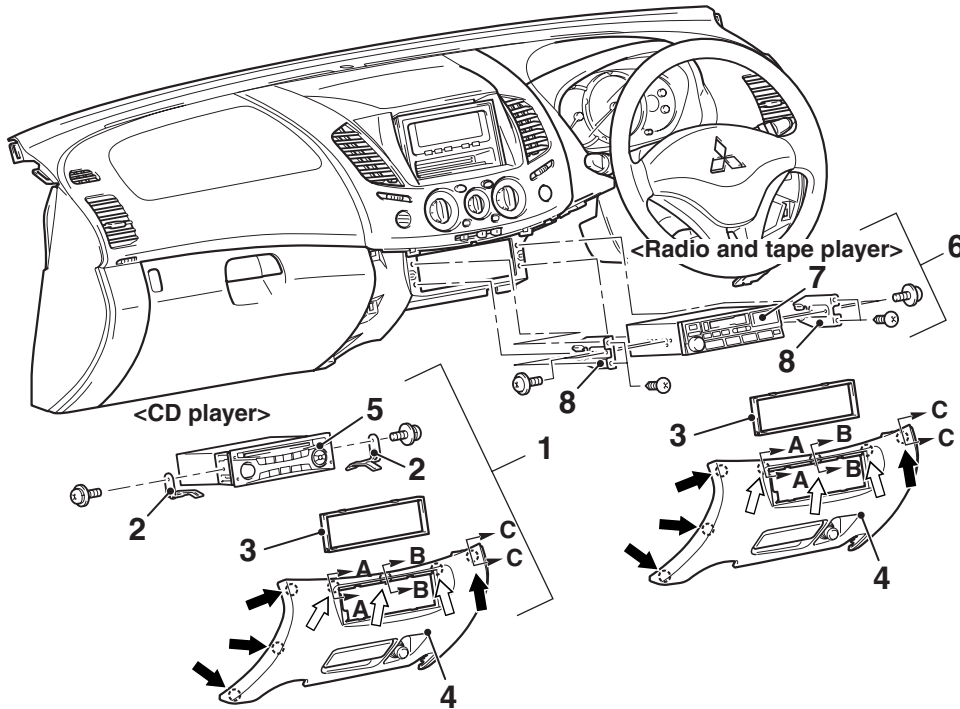


3. Check that the speaker, which is displayed on the RV meter, sounds (If the memory select "6" button is pressed, the speaker will be changed).
4. If a button other than the memory select "6" button and "EJECT" button (CD) is pressed, or the ignition switch is turned to "LOCK" (OFF) position, you will exit from the speaker test mode.

RADIO AND TAPE PLAYER OR CD
PLAYER

REMOVAL AND INSTALLATION

M1544011500035



AC503131AB

CD player Removal steps

- Lower panel assembly (Refer to GROUP 52A, Instrument Panel Assembly).
1. Centre lower panel assembly
 2. CD player bracket
 3. Spacer
 4. Centre lower panel
 5. CD player

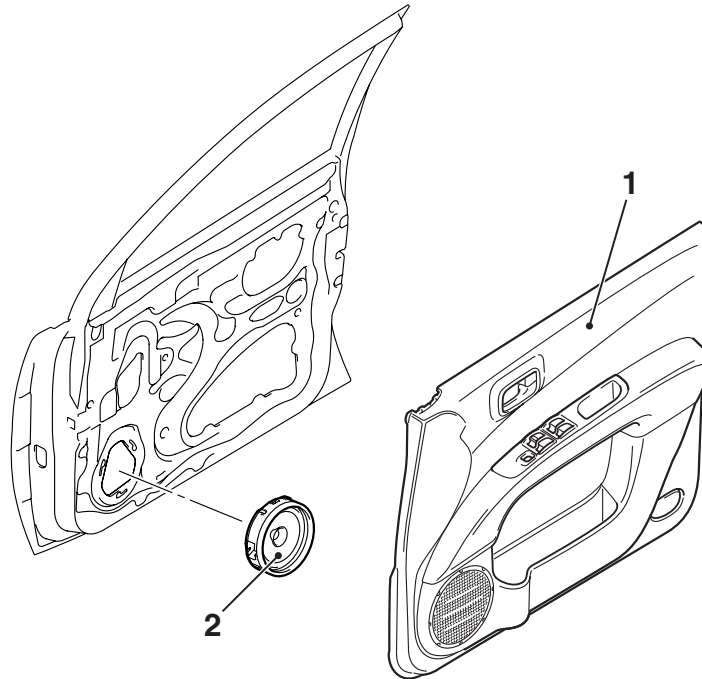
Radio and tape player Removal steps

- Lower panel assembly (Refer to GROUP 52A, Instrument Panel Assembly).
4. Centre lower panel
 3. Spacer
 6. Radio and tape player and bracket assembly
 7. Radio and tape player
 8. Bracket

SPEAKER

REMOVAL AND INSTALLATION

M1544002600733



AC502927AB

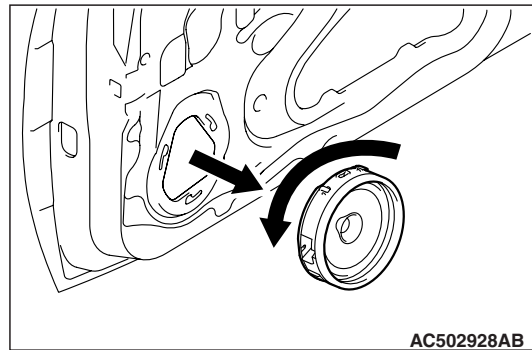
Front speaker removal steps

1. Door trim (Refer to GROUP 52A, Door Trim <Club cab> or Door Trim <Double cab> .)
2. Speaker

<<A>>

REMOVAL SERVICE POINTS

<<A>> SPEAKER REMOVAL



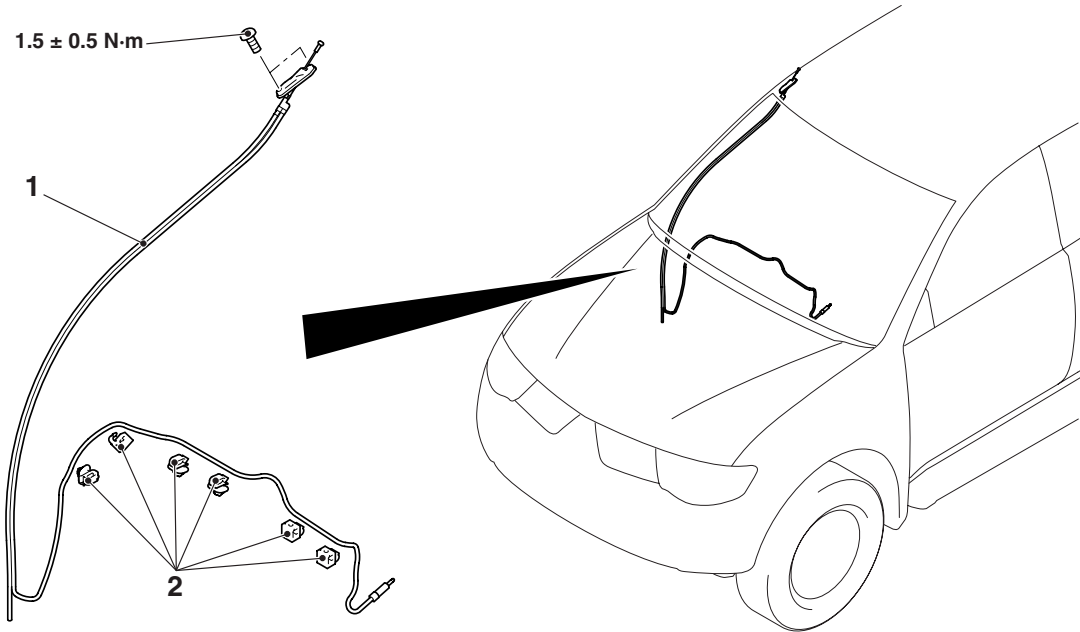
AC502928AB

1. Disconnect the connector from the speaker.
2. Remove by turning the speaker to the left.

ANTENNA

REMOVAL AND INSTALLATION

M1544002900789



Removal steps

- Centre upper box hood <2WD> or RV meter hood <4WD>, lower panel assembly centre upper panel assembly and centre lower panel assembly (Refer to GROUP 52A, Instrument Panel Assembly).
- Radio and tape player or CD player (Refer to P.54A-98).
- Cowl side trim (Refer to GROUP 52A, Interior Trim <Club cab> or Interior Trim <Double cab>).

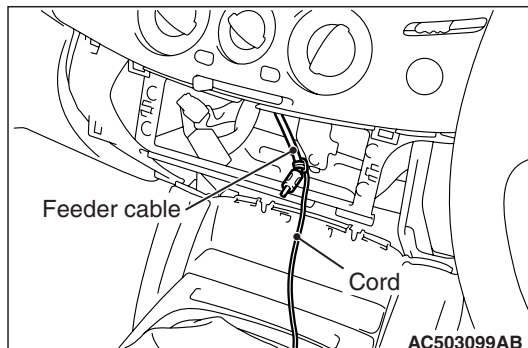
<<A>>

1. Antenna assembly
2. Clip

REMOVAL SERVICE POINT

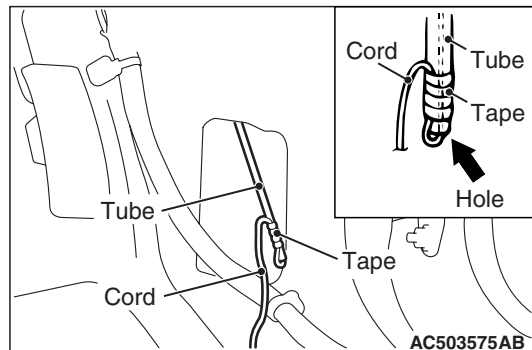
<<A>> ANTENNA ASSEMBLY REMOVAL

Observe the following steps to make the feeder cable of the antenna to be routed easily during reinstallation.



AC502937AB

1. Secure a cord to the end of the feeder cable.



2. Pull out the feeder cable slightly until the tube end of the antenna can be seen.

⚠ CAUTION

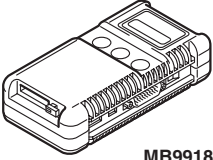
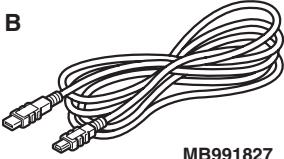
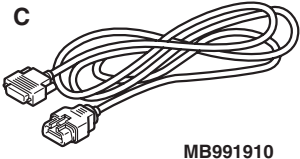

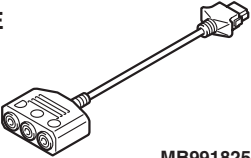
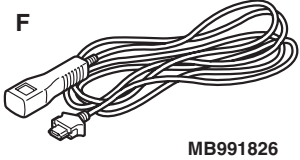
Make sure that the cord is not loosened.

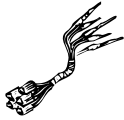
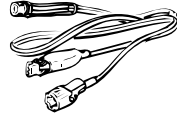
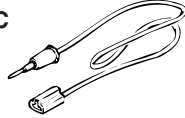

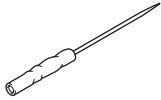
3. Insert a cord into the tube end, and secure the cord with plastic tape as shown.
4. Remove the antenna assembly by pulling it gradually.

RV METER

SPECIAL TOOLS

M1543000602826

Tool	Number	Name	Use
<p>A</p>  <p>MB991824</p> <p>B</p>  <p>MB991827</p> <p>C</p>  <p>MB991910</p> <p>D</p>  <p>MB991911</p> <p>E</p>  <p>MB991825</p> <p>F</p>  <p>MB991826</p> <p>MB991955</p>	<p>MB991955 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826</p>	<p>M.U.T.-III sub-assembly A: Vehicle Communication Interface (V.C.I.) B: M.U.T.-III USB cable C: M.U.T.-III main harness A (Vehicles with CAN communication system) D: M.U.T.-III main harness B (Vehicles without CAN communication system) E: M.U.T.-III measure adapter F: M.U.T.-III trigger harness</p>	<p>Check for other system diagnosis code and other system data list</p> <p>⚠ CAUTION</p> <p>For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.</p>

Tool	Number	Name	Use
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>DO NOT USE MB991223AZ</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: Check harness</p> <p>B: LED harness</p> <p>C: LED harness adapter</p> <p>D: Probe</p>	<p>Continuity check and voltage measurement at harness wire or connector</p> <p>A: For checking connector pin contact pressure</p> <p>B: For checking power supply circuit</p> <p>C: For checking power supply circuit</p> <p>D: For connecting a locally sourced tester</p>
 <p>MB992006</p>	<p>MB992006</p>	<p>Extra fine probe</p>	<p>Continuity check and voltage measurement at harness wire or connector</p>

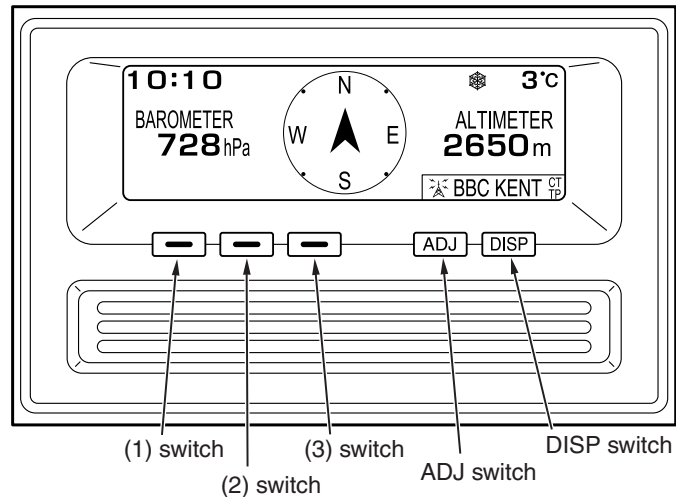
TROUBLESHOOTING

TROUBLE DIAGNOSIS SERVICE FUNCTIONS

M1543033400011

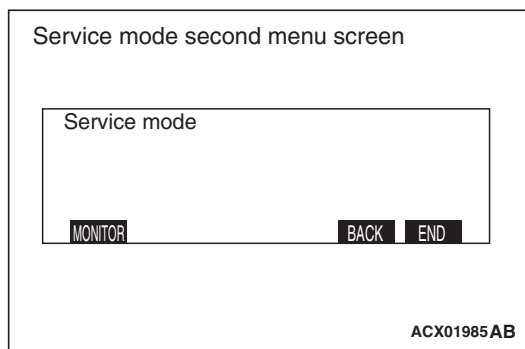
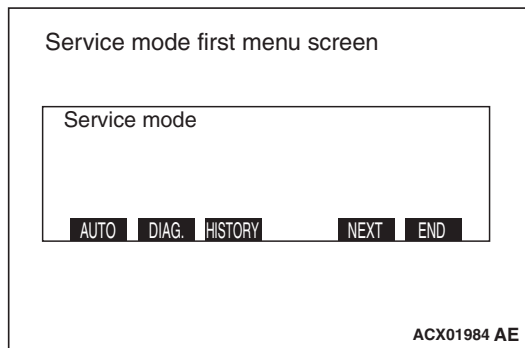
The RV meter is equipped with the following functions for the failure diagnosis service.

Function		Contents
Service function	Automatic check mode	Performs communication check and connection check in succession.
	Diagnosis mode	Performs version check of each unit, vehicle signal check and communication and connection check
	History mode	Displays the number of errors as the result of communication and connection checks
	Monitor check mode	Display check mode
Geomagnetic sensor check mode		Checks whether the geomagnetism sensor are working normally.



AC503023AB

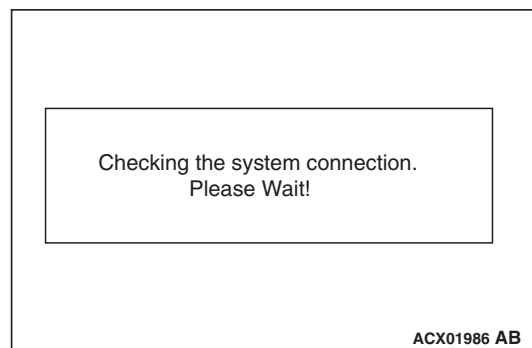
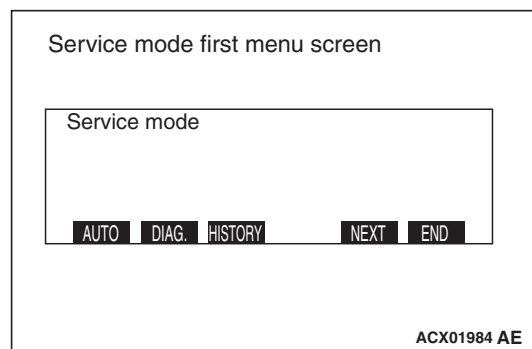
SERVICE FUNCTION STARTING



1. Turn the ignition switch to the LOCK (OFF) position, and then while pressing and holding the "ADJ" switch, turn the ignition switch to the ACC position. After the "ADJ" switch has been pressed continuously for 5 seconds or longer, the reception signal sound (beep) will sound, and at the same time the service function will start up and the first menu of the service mode screen will be displayed

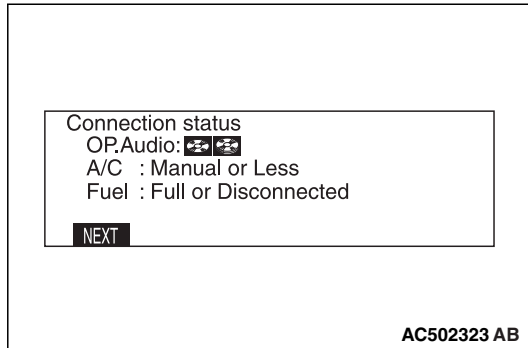
2. When function switch 1(AUTO) is pressed at the 1st menu of the service mode screen, the mode is switched to the automatic mode. When function switch 2 (DIAG) is pressed, the mode is switched to diagnosis mode. When function switch 3 (HISTORY) is pressed, the mode is switched to history mode. Moreover, when "ADJ" switch,

AUTOMATIC MODE



1. When function switch 1 (AUTO) is pressed at the 1st menu of the service mode screen, the mode is switched to automatic checking mode. At this time, a display will appear to prompt you to turn the ignition switch to the ON position

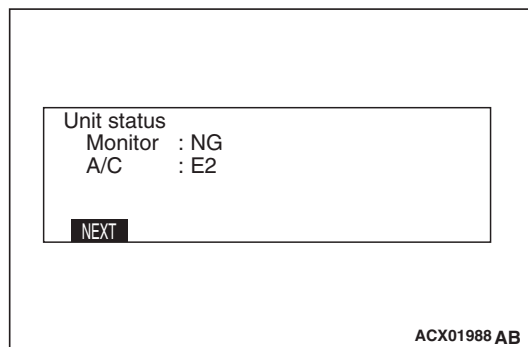
2. When the ignition switch is turned to the ON position, communication and wiring check is carried out



3. When the communication check is completed, the communication and wiring check results are displayed on the screen.

Item	Display example	Contents or condition
OP. Audio	Audio communicating with RV meter	—
A/C	AUTO	—
	Manual or Less	Communication error
Fuel	OK	—
	Full or Disconnected	Communication error

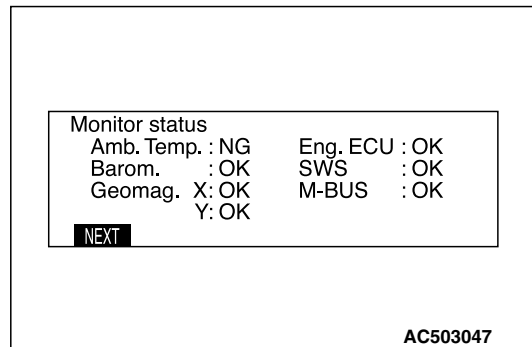
NOTE: "Manual or Less" is normally displayed for A/C.(meaning that it is not connected)



4. When function switch 1 (NEXT) is displayed at the previous screen, the status of unit is displayed

Item	Display example	Contents or condition
Monitor	OK	—
A/C	NG	—
	E1	Communication error
	E2	Open circuit or disconnected

NOTE: ""E2" is normally displayed for A/C.(meaning that it is not connected)

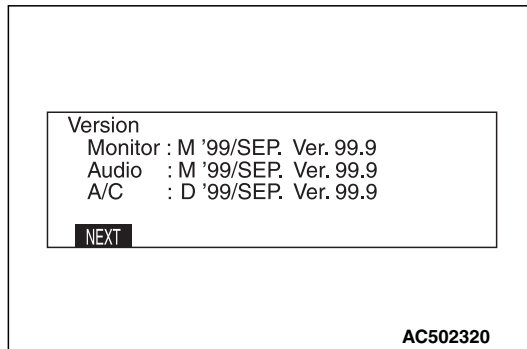


5. When function switch 1 (NEXT) is pressed at the previous screen, a list of monitor check items and results is displayed.

Item	Display example	Contents or condition
Amb. Temp. (Outside air)	OK	—
Barom. (Barometric pressure)	OK	—
Geomag. X, Y	OK	—
Eng. ECU, SWS, ABS, M-BUS	E1	Communication error
	E2	Open circuit or disconnected

NOTE:

- "E2" is normally displayed for Eng.ECU.(meaning that it is not connected)
- For vehicles without ABS, E2 is normally displayed for ABS.(meaning that it is not connected)



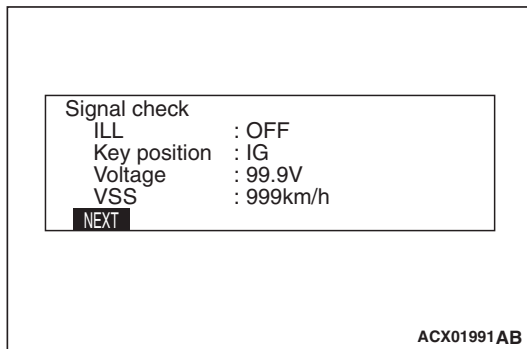
6. When function switch 1 (NEXT) is pressed at the previous screen, the version of monitor and air conditioner is displayed.

For vehicles without air conditioner or with a manual air conditioner, the version is not displayed.

NOTE:

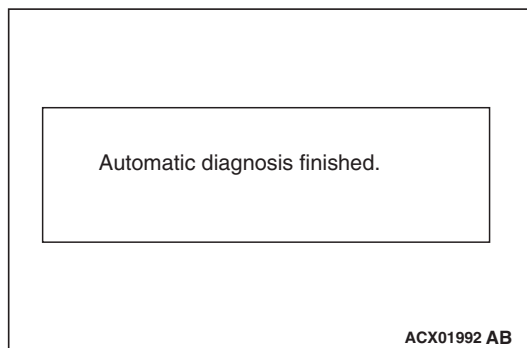
M: Mitsubishi Electric

D: Denso



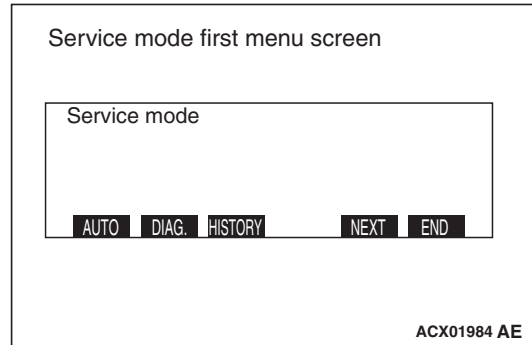
7. When function switch 1 (NEXT) is pressed at the previous screen, the status of vehicle signal is displayed.

- ILL: ON or OFF
- Key position: "ACC" or "IG"
- Voltage: Battery voltage
- VSS: Vehicle speed

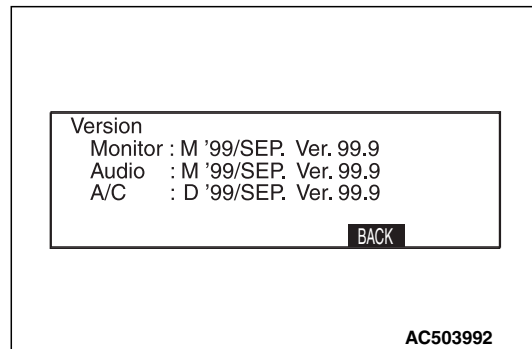
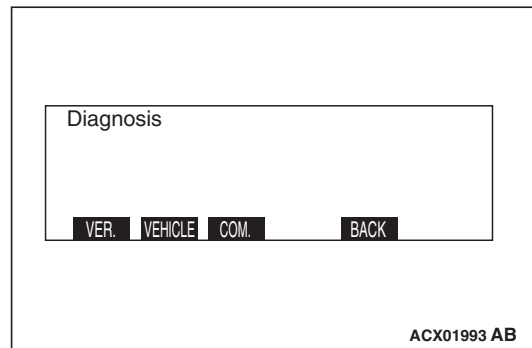


8. When function switch 1 (NEXT) is pressed at the previous screen, the mode is switched to the previous mode screen of the service mode screen approximately 7 seconds after displaying the message, "Automatic diagnosis finished."

DIAGNOSIS MODE



1. From the 1st menu of the service mode screen, press function switch 2 (DIAG) to display diagnosis mode.

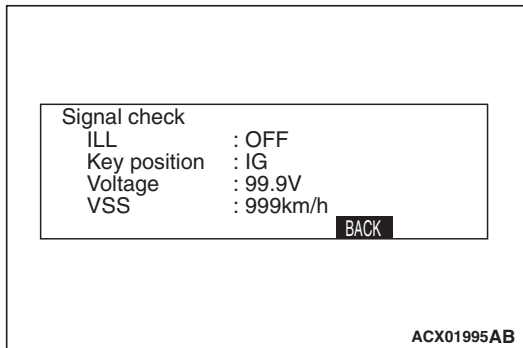
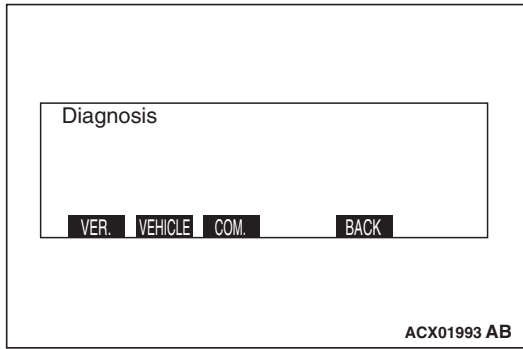


2. When function switch 1 (VER) is pressed, the version of monitor and air conditioner is displayed

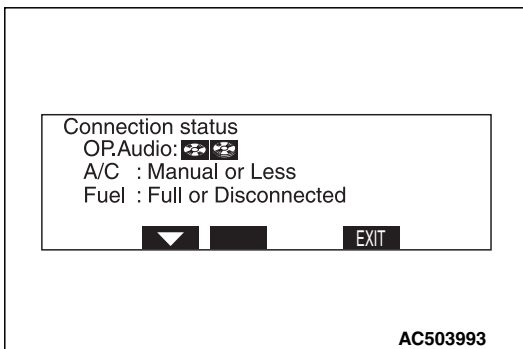
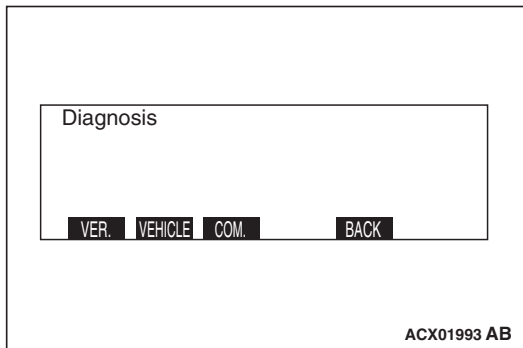
NOTE:

M: Mitsubishi Electric

D: Denso



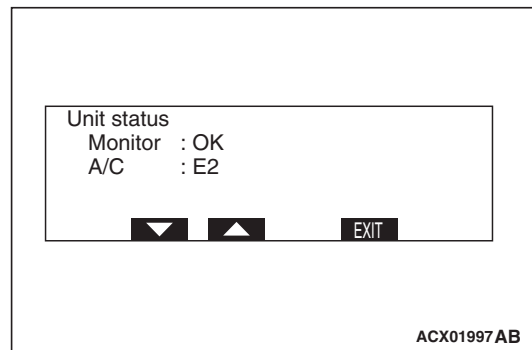
3. When function switch 2 (VEHICLE) is pressed, the vehicle signal condition is displayed.
- ILL: ON or OFF
 - Key position: "ACC" or "IG"
 - Voltage: Battery voltage
 - VSS: Vehicle speed



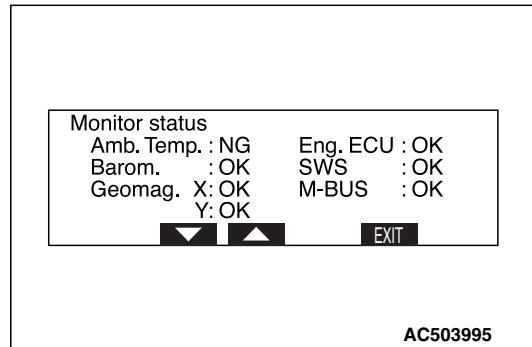
4. When function switch 3 (COM) is pressed, the results are displayed after communication and wiring check is carried out.

Item	Display example	Contents or condition
OP. Audio	Audio communicating with RV meter	—
A/C	AUTO	—
	Manual or Less	Communication error
Fuel	OK	—
	Full or Disconnected	Communication error

NOTE: "Manual or Less" is normally displayed for A/C.(meaning that it is not connected)



5. When function switch 2 (↓) at the previous screen, the status of unit is displayed.



6. When function switch 2 (↓) at the previous screen, the status of monitor is displayed

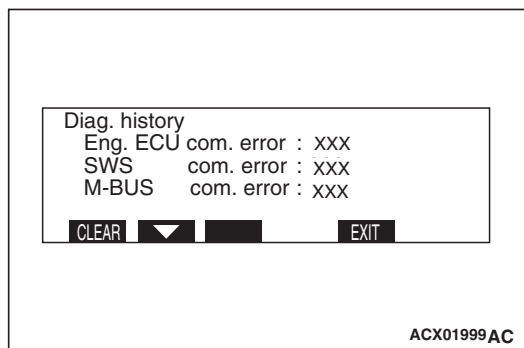
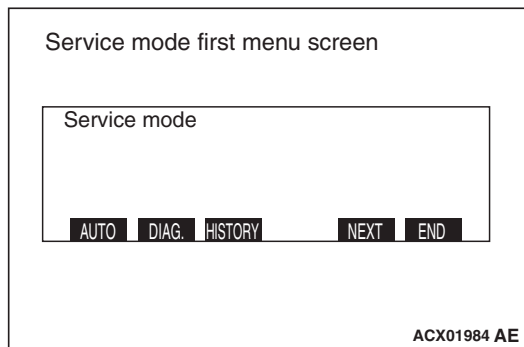
Item	Display example	Contents or condition
Amb. Temp. (Outside air)	OK	—
Barom. (Barometric pressure)	OK	—

Item	Display example	Contents or condition
Geomag. X, Y	OK	—
Eng. ECU, SWS, ABS, M-BUS	E1	Communication error
	E2	Open circuit or disconnected

NOTE:

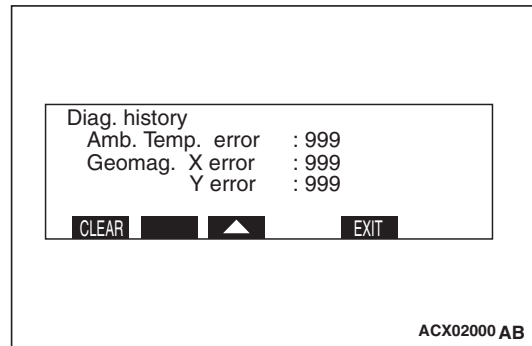
1. "E2" is normally displayed for Eng.ECU.(meaning that it is not connected)
2. For vehicles without ABS, E2 is normally displayed for ABS.(meaning that it is not connected)

HISTORY MODE



1. From the 1st menu of the service mode screen, press function switch 3 (HISTORY) to display history mode.
2. When function switch 1 (CLEAR) is pressed, the number of errors is erased. When the function switch 2 (↓) is pressed, the mode is switched to the 2nd menu of history mode.

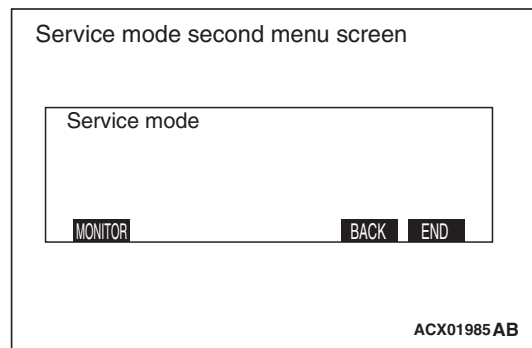
Item	Display example	Contents or condition
Engine-ECU (Powertrain control module) SWS M-BUS	000	Number of communication errors



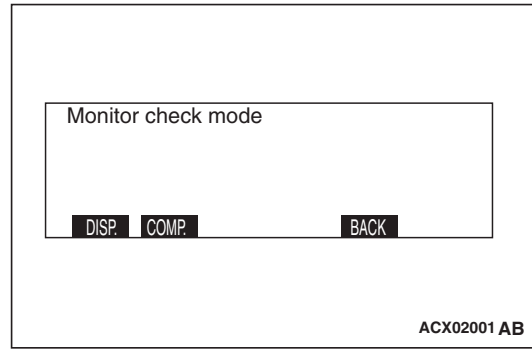
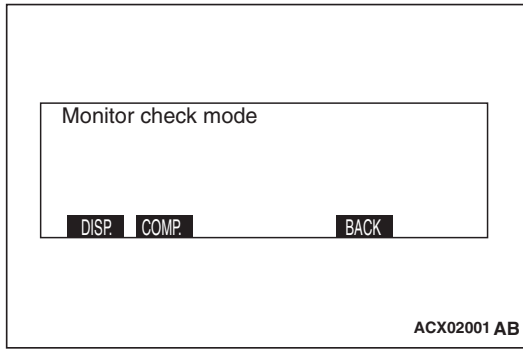
3. When function switch 1 (CLEAR) is pressed, the number of errors is erased. When the function switch 3 (↑) is pressed, the mode is switched to the 1nd menu of history mode.

Item	Display example	Contents or condition
Amb. Temp Barom. Geomag. X, Y	000	Number of connection errors

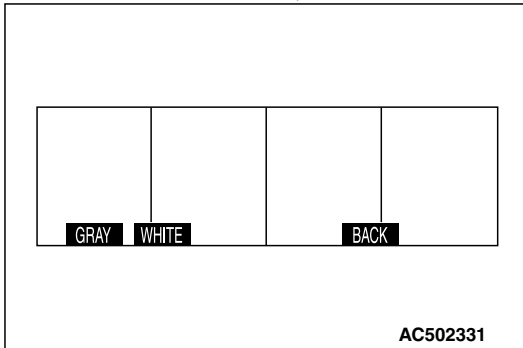
MONITOR CHECK MODE



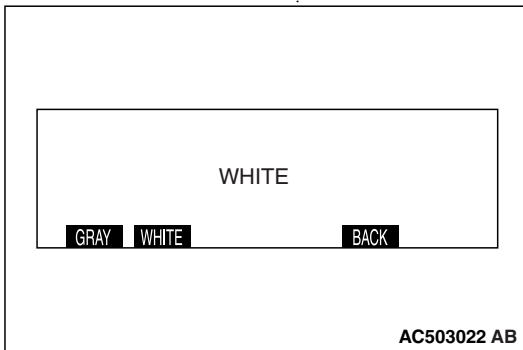
1. When function switch 1 (MONITOR) is pressed at the 2nd menu of the service mode screen, the mode is switched to monitor check mode. The following displays appear when the various function switches are pressed.



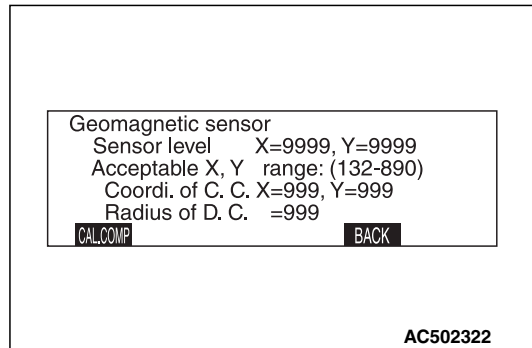
2. When function switch 1 (DISP) is pressed, the mode will be switched to display check mode.



When function switch 2 (GRAY) is pressed, the grey scale screen is displayed.

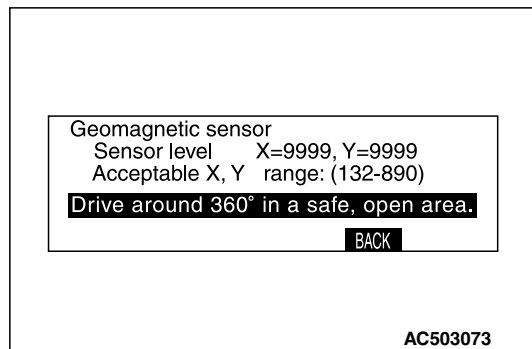
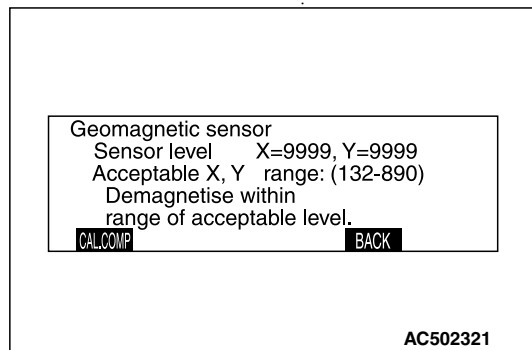


When function switch 3 (WHITE) is pressed, the white screen is displayed.

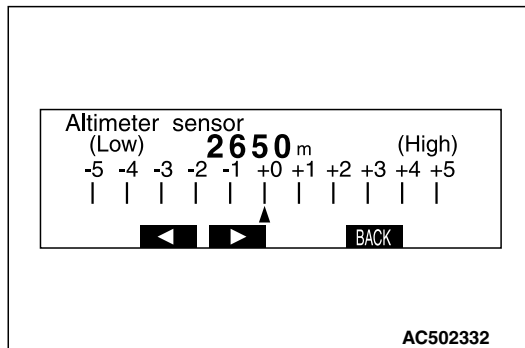
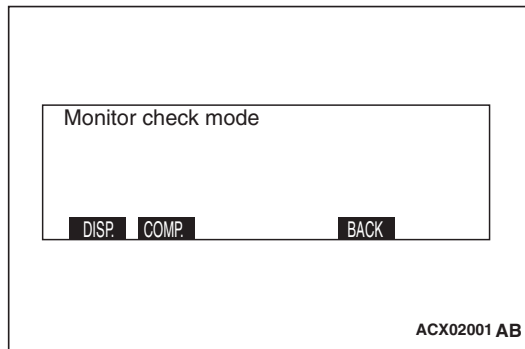


3. When function switch 2 (COMP) is pressed at the previous screen, the mode is switched to geomagnetic sensor mode.

- At geomagnetic sensor mode, outputs in X- and Y-axes of the geomagnetic sensor, the circular bearing coordinate, and the radius are displayed.

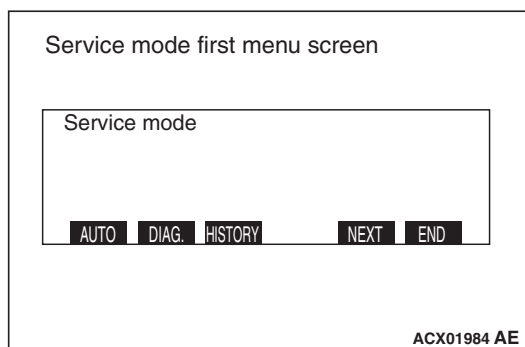


When function switch1 (CAL.COMP) is pressed at the previous screen, the message shown in the illustration is displayed, and then when calibration has been completed, the circular bearing coordinate screen is displayed.



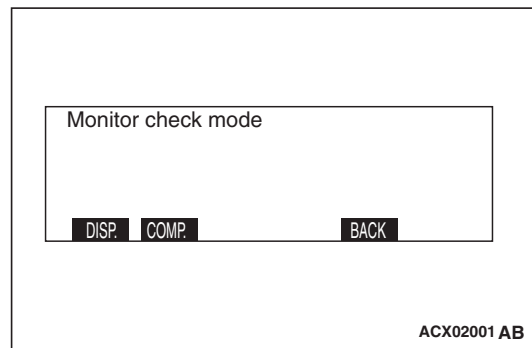
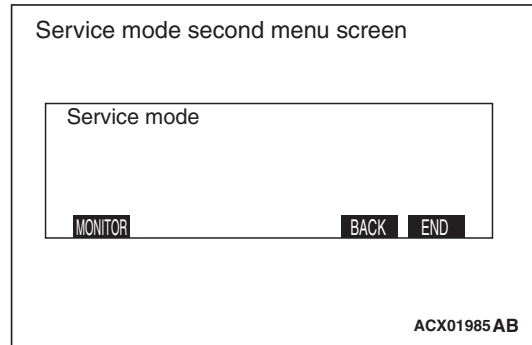
4. When function switch3 (ALTI) is pressed, the mode is switched to altitude correction mode
 - When function switch 2 (←) is pressed, the altitude is corrected downwards, and after approximately 5 seconds, the correction results are displayed in the altitude correction column.
 - When function switch 3 (→) is pressed, the altitude is corrected upwards, and after approximately 5 seconds, the correction results are displayed in the altitude correction column
 - When "ADJ" switch (BACK) is pressed, the mode is switched to monitor check mode screen.

GEOMAGNETIC SENSOR CHECK MODE

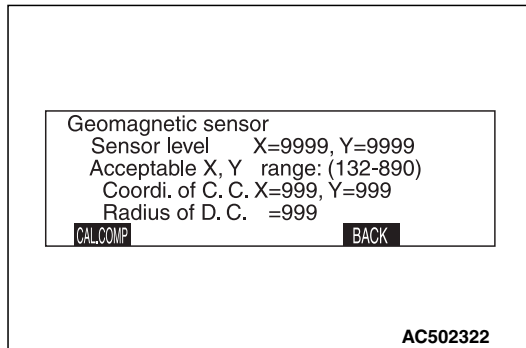
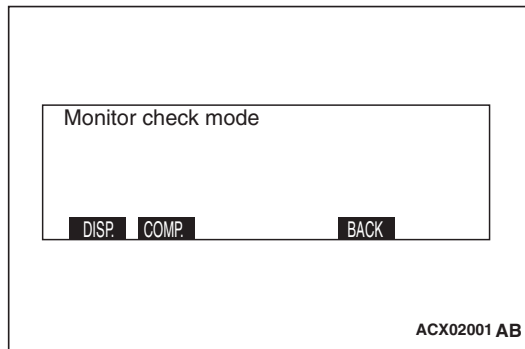


1. Press the "ADJ" switch with the ignition switch at "LOCK" (OFF) position, and while keeping on pressing, turn the ignition switch to the "ACC" or "ON" position. When the "ADJ" switch is pressed continuously for more than five seconds, the service function is activated at the same time with the reception signal (pip sound) and the first menu screen of the service mode is displayed.
2. Press the "ADJ" switch (next).

The screen changes to the service mode second menu screen.



3. Press the function switch 1 (MONITOR) on the service mode second menu screen.
The screen is switched to the monitor check mode.

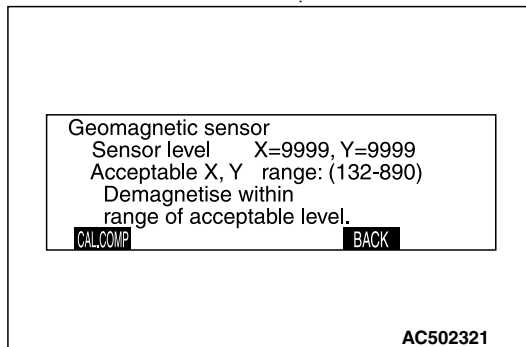


4. Press the function switch 2 (COMP.).

- <Normal case that the body is not magnetized>

The geomagnetic sensor mode screen is displayed.

Each of X- and Y-outputs of the geomagnetic sensor, center coordinates, and radius of the direction circle are displayed. For degeomagnetization, refer to [P.54A-145](#).



<Case that the body is magnetized>

If the sensor value is outside the range between 450 and 580, it is meant that the body is magnetized. The screen that calls upon to demagnetize the body stating "Demagnetize within range of acceptable level" is displayed. In this case, it is necessary to demagnetize the body and to correct the geomagnetic sensor. Refer to on-vehicle service-vehicle magnetic compensation [P.54A-145](#).

- When function switch 1 [CAL.COMP] is pressed at the previous screen, a message of urging rotation compensation is displayed. For the method of magnetization compensation by rotation, refer to [P.54A-145](#).

RELEASE OF SERVICE MODE

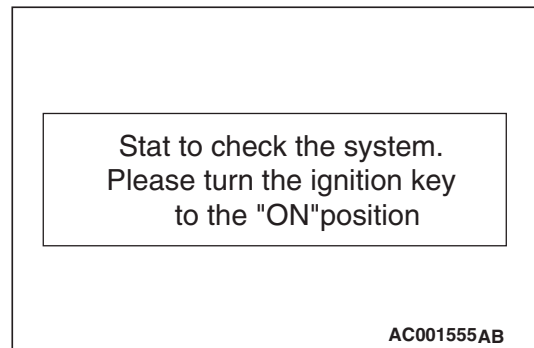
The service mode is released by pressing the "DISP" switch (END) is pressed on the service mode first screen or the service mode second screen, or by turning the ignition switch to the "LOCK" (OFF) position.

BATTERY DISCONNECTION

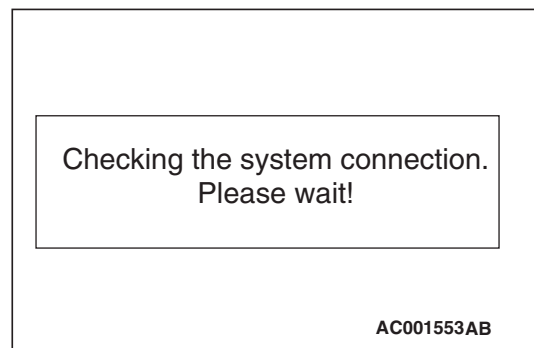
When the battery cable is disconnected, the stored data may disappear. In that case, the system connection should be checked using the procedure described below

Checking connection of system

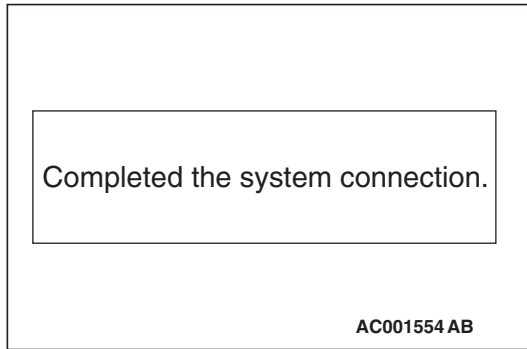
When the connection data has disappeared, turning the ignition key to "ACC" position will make the following message appear.



1. Start the engine (or turn the ignition key to "ON" position).



2. When the engine is started or when the ignition key is in the "ON" position, the monitor will display the message.



- After a short while the system will beep. When the connection is completed, the message will be displayed.

DIAGNOSTIC FUNCTION

M1543007000959

HOW TO READ DIAGNOSIS CODE

Use the M.U.T.-III to read diagnosis code (Refer to GROUP 00 –Diagnosis Function).

NOTE: Connect the M.U.T.-III to the 16-pin diagnosis connector (black).

HOW TO ERASING DIAGNOSIS CODE

Use the M.U.T.-III to erasing diagnosis code (Refer to GROUP 00 –Diagnosis Function).

NOTE: Connect the M.U.T.-III to the 16-pin diagnosis connector (black).

DIAGNOSIS CODE CHART

M1543007100990

Code No.	Diagnosis item	Reference page
24	Open circuit in the SWS	P.54A-111
25	Open circuit in the K-LINE	P.54A-114

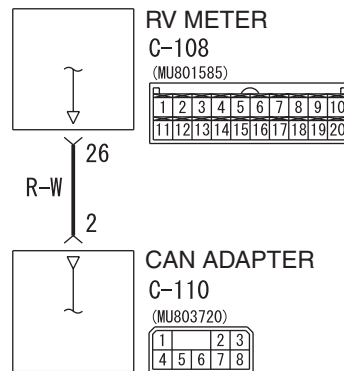
DIAGNOSTIC TROUBLE CODE PROCEDURES

Code No. 24: Open circuit in the SWS

CAUTION

- If diagnosis code No.24 is set in the CAN adapter, diagnose the CAN main bus line.
- Whenever the ECU is replaced, ensure that the communication circuit is normal.

CAN Adapter Communication Line Circuit (SWS)



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

TROUBLE JUDGMENT

If the RV meter communication signal (IG ON signal from column ECU, buzzer request signal from RV meter) is not communicated from the CAN adapter, the diagnosis code No. 24 is set.

COMMENT ON TROUBLE SYMPTOM

The M.U.T.-III shows a diagnosis code status as active.

- The harness or connector between the RV meter and CAN adapter may be faulty.

The M.U.T.-III shows a diagnosis code status as stored.

- Diagnosis code No. 24 is stored as a past trouble, carry out the diagnosis with a particular emphasis on problems to harness and connector between the RV meter and CAN adapter. For diagnosis procedures, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Treat Past Trouble .

NOTE: For a past trouble, you cannot find it by the M.U.T.-III CAN bus diagnostics even if there is any failure in CAN bus lines. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions and check the CAN bus lines. You can narrow down the probable cause of the trouble by referring to the diagnosis code, which is set regarding the CAN communication-linked ECUs (Refer to GROUP 54C –CAN Bus Line Diagnostic Flow).

PROBABLE CAUSES

- Malfunction of the CAN adapter
- Damaged harness wires and connectors
- Malfunction of the CAN bus

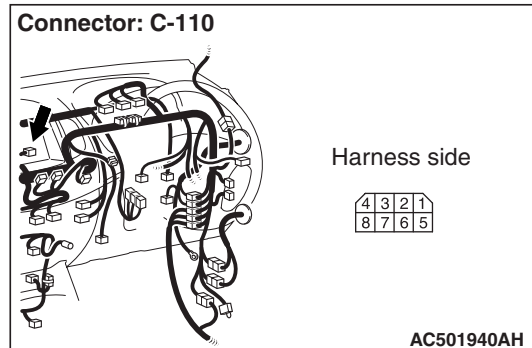
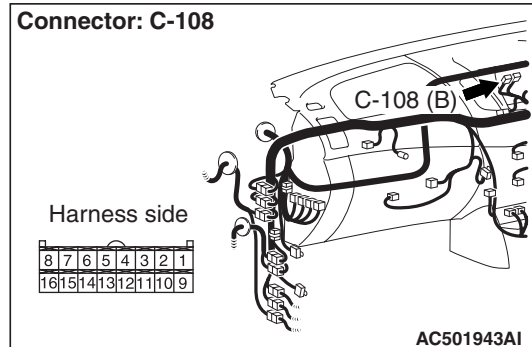
DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III CAN bus diagnostics**

Use the M.U.T.-III to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the CAN bus line (Refer to GROUP 54C –Troubleshooting). On completion, go to Step 2.

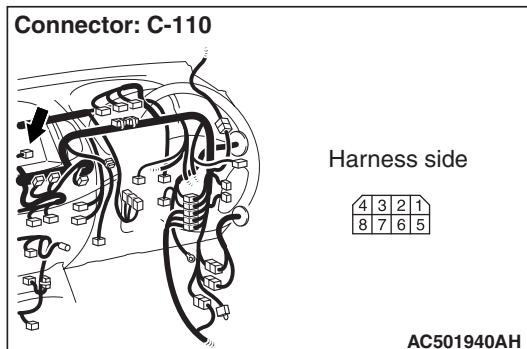
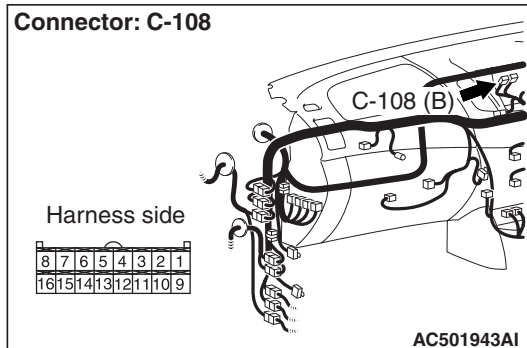
STEP 2. Connector check: RV meter connector C-108 and CAN adapter connector C-110

Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair the defective connector.

STEP 3. Check the harness wires between RV meter connector C-108 (terminal 26) and CAN adapter connector C-110 (terminal 2).



Q: Is the check result normal?

YES : Go to Step 4.

NO : Repair the wiring harness.

STEP 4. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set.

- (1) Erase the diagnosis code.
- (2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
- (3) On completion, check that the diagnosis code is not reset.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the CAN adapter, go to Step 5.

STEP 5. Check whether the diagnosis code is reset.

Recheck if the diagnosis code is set.

- (1) Erase the diagnosis code.
- (2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
- (3) On completion, check that the diagnosis code is not reset.

Q: Is the check result normal?

YES : The procedure is complete.

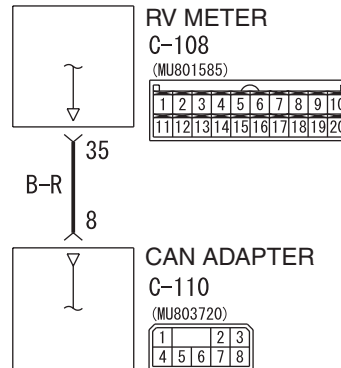
NO : Return to Step 1.

Code No. 25: Open circuit in the K-LINE

CAUTION

- If diagnosis code No.25 is set in the CAN adapter, diagnose the CAN main bus line.
- Whenever the ECU is replaced, ensure that the communication circuit is normal.

CAN Adapter Communication Line Circuit (K-Line)



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X051A

TROUBLE JUDGMENT

If the vehicle driving information signal from the engine-ECU is not sent from the CAN adapter to RV meter, the diagnosis code No. 25 is set.

COMMENT ON TROUBLE SYMPTOM

The M.U.T.-III shows a diagnosis code status as **active**.

- The harness or connector between the RV meter and CAN adapter may be faulty.

The M.U.T.-III shows a diagnosis code status as **stored**.

- Diagnosis code No. 25 is stored as a past trouble, carry out the diagnosis with a particular emphasis on problems to harness and connector between the RV meter and CAN adapter. For diagnosis procedures, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Treat Past Trouble .

NOTE: For a past trouble, you cannot find it by the M.U.T.-III CAN bus diagnostics even if there is any failure in CAN bus lines. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermitt-

tent Malfunctions and check the CAN bus lines. You can narrow down the probable cause of the trouble by referring to the diagnosis code, which is set regarding the CAN communication-linked ECUs (Refer to GROUP 54C –CAN Bus Line Diagnostic Flow).

PROBABLE CAUSES

- Malfunction of the CAN adapter
- Damaged harness wires and connectors
- Malfunction of the CAN bus

DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III CAN bus diagnostics**

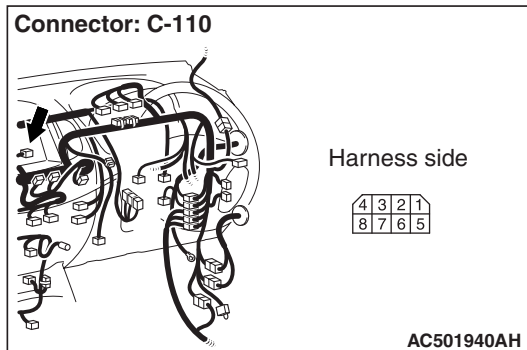
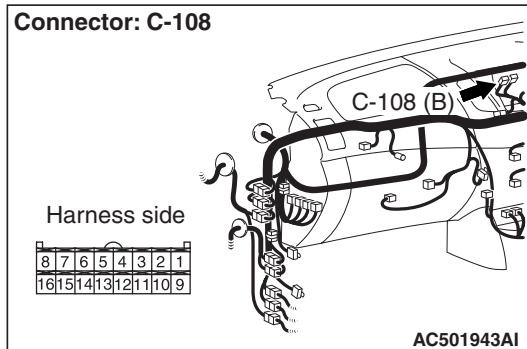
Use the M.U.T.-III to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the CAN bus line (Refer to GROUP 54C –Troubleshooting). On completion, go to Step 2.

STEP 2. Connector check: RV meter connector C-108 and CAN adapter connector C-110

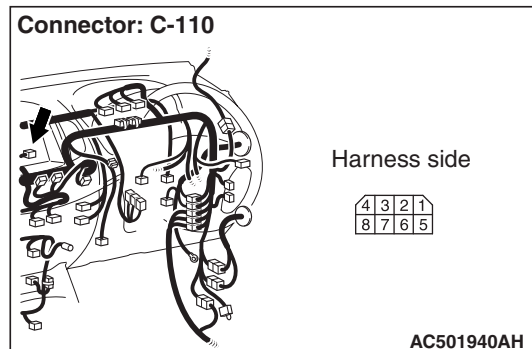
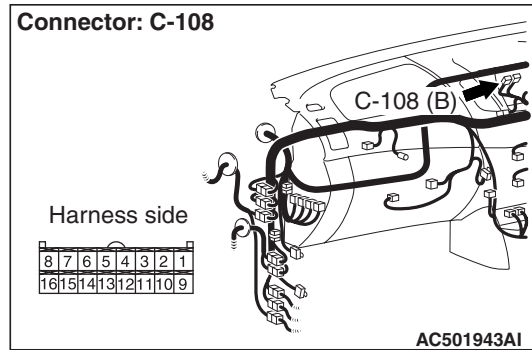


Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair the defective connector.

STEP 3. Check the harness wires between RV meter connector C-108 (terminal 35) and CAN adapter connector C-110 (terminal 8).



Q: Is the check result normal?

YES : Go to Step 4.

NO : Repair the wiring harness.

STEP 4. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set.

- (1) Erase the diagnosis code.
- (2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
- (3) On completion, check that the diagnosis code is not reset.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Replace the CAN adapter, go to Step 5.

STEP 5. Check whether the diagnosis code is reset.

Recheck if the diagnosis code is set.

- (1) Erase the diagnosis code.
- (2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.

- (3) On completion, check that the diagnosis code is not reset.

Q: Is the check result normal?

YES : The procedure is complete.

NO : Return to Step 1.

SYMPTOM CHART

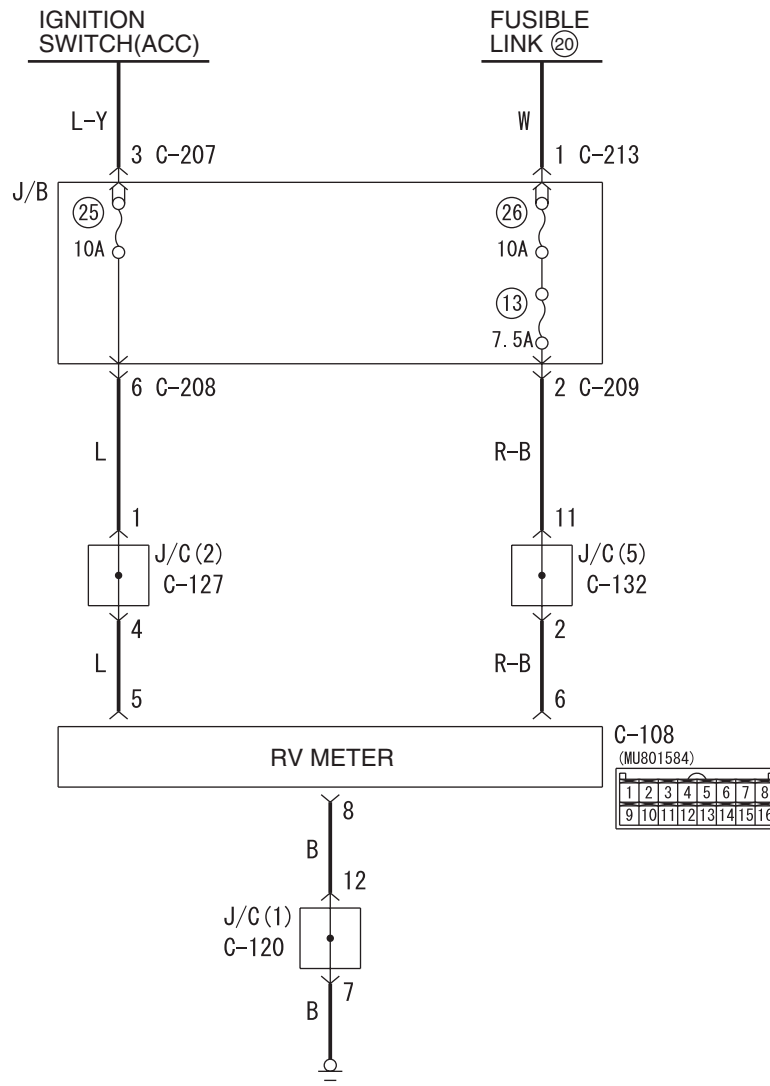
M1543007201235

SYMPTOM	Inspection procedure	Reference page
The RV meter does not show any information.	1	P.54A-117
"Please turn the ignition key to the ON position." is continuously displayed.	2	P.54A-121
The low battery warning screen is displayed.	3	P.54A-125
The drive information is not displayed normal.	4	P.54A-127
The ambient air temperature is not displayed normal.	5	P.54A-130
Icy road surface warning function does not work normally.	6	P.54A-135
The compass does not indicate normally.	7	P.54A-136
The radio and CD player information is not displayed normal.	8	P.54A-137
Button illumination of RV meter does not illuminate.	9	P.54A-139

SYMPTOM PROCEDURES

Inspection Procedure 1: The RV Meter does not Show Any Information.

RV Meter Power Supply Circuit



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X015A

CIRCUIT OPERATION

The RV meter is energized by the battery through the ignition switch (ACC) and (IG1).

PROBABLE CAUSES

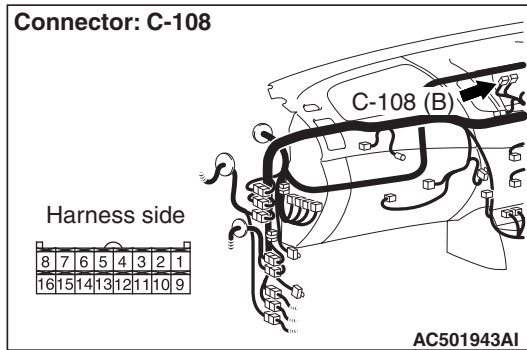
- Malfunction of the RV meter
- Damaged harness wires and connectors

COMMENTS ON TROUBLE SYMPTOM

The ground circuit, the battery circuit, the ignition switch (ACC) circuit or the ignition switch (IG1) circuit is suspected to be open or defective.

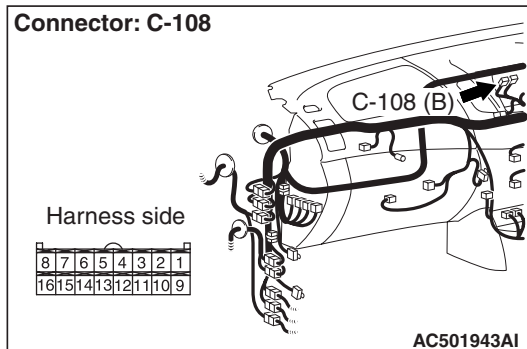
DIAGNOSIS PROCEDURE

STEP 1. Check the following connector: C-108 RV meter connector

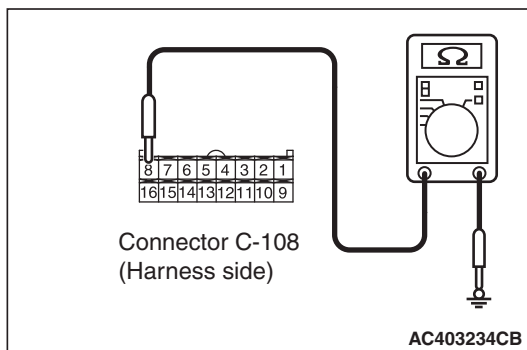


Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the defective connector.

STEP 2. Measure the resistance at C-108 RV meter connector.



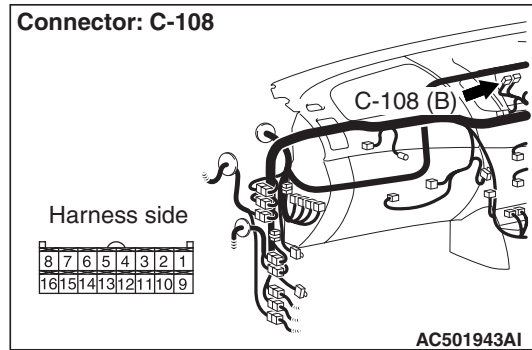
(1) Disconnect the connector, and measure at the wiring harness side.



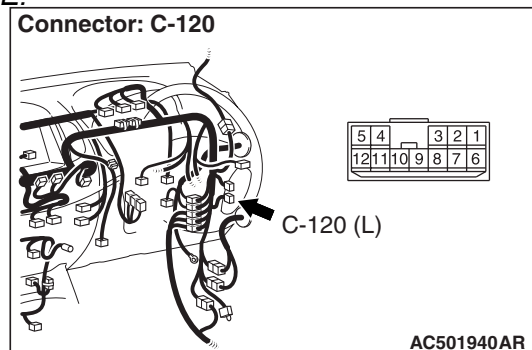
(2) Resistance between C-108 RV meter connector terminal No.8 and body earth
OK: 2 Ω or less

Q: Is the check result normal?
YES : Go to Step 4.
NO : Go to Step 3.

STEP 3. Check the harness wire between C-108 RV meter connector terminal No.8 and body earth.



NOTE:

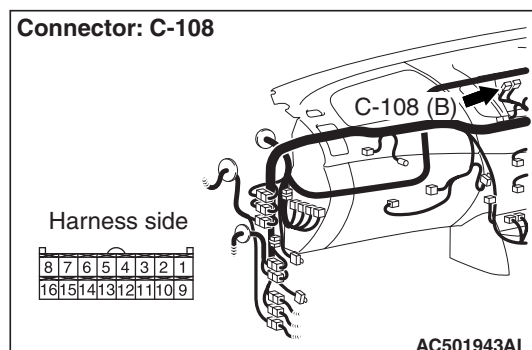


Prior to the wiring harness inspection, check joint connector C-120 and repair if necessary.

- Check the earth wires for open circuit.

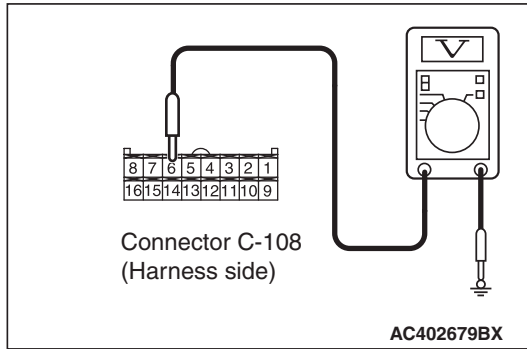
Q: Is the check result normal?
YES : Retest the system.
NO : Repair the wiring harness.

STEP 4. Measure the voltage at C-108 RV meter connector.



(1) Disconnect the connector, and measure at the wiring harness side.

(2) Ignition switch: LOCK (OFF) position



(3) Voltage between C-108 RV meter connector terminal No.6 and body earth

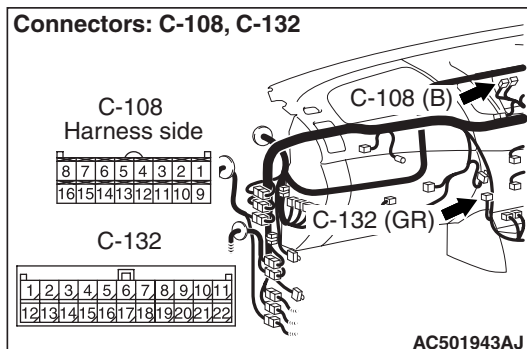
OK: System voltage

Q: Is the check result normal?

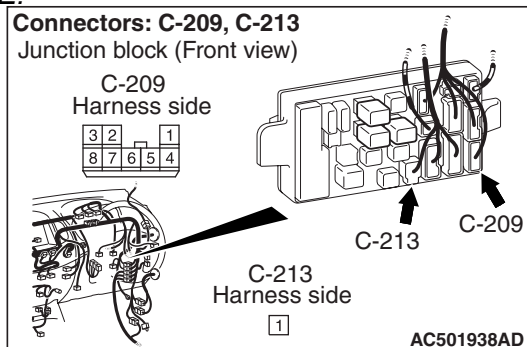
YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Check the harness wire between battery (fusible link No.20) and C-108 RV meter connector terminal No.6.



NOTE:



Prior to the wiring harness inspection, check joint connector C-132 or junction block connector C-209 or C-213, and repair if necessary.

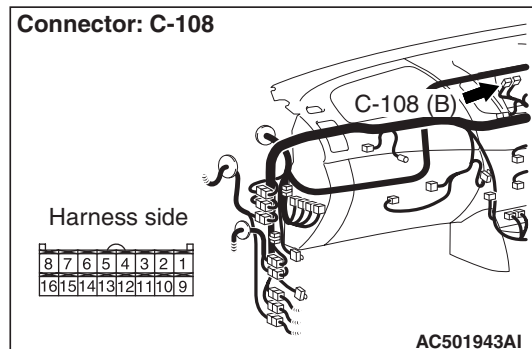
- Check the battery power supply open circuit.

Q: Is the check result normal?

YES : Retest the system.

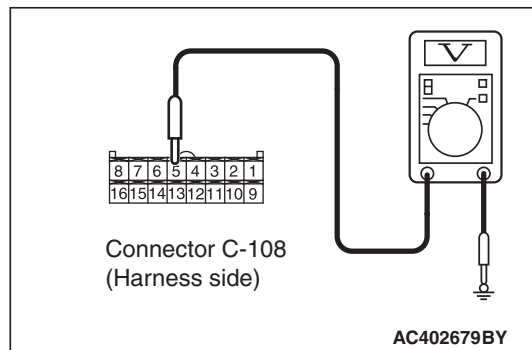
NO : Repair the wiring harness.

STEP 6. Measure the voltage at C-108 RV meter connector.



(1) Disconnect the connector, and measure at the wiring harness side.

(2) Ignition switch: ON



(3) Voltage between C-108 RV meter connector terminal No.5 and body earth

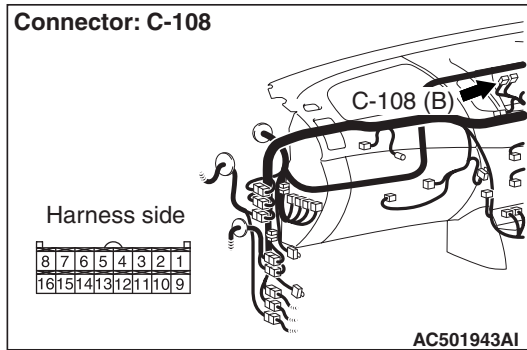
OK: System voltage

Q: Is the check result normal?

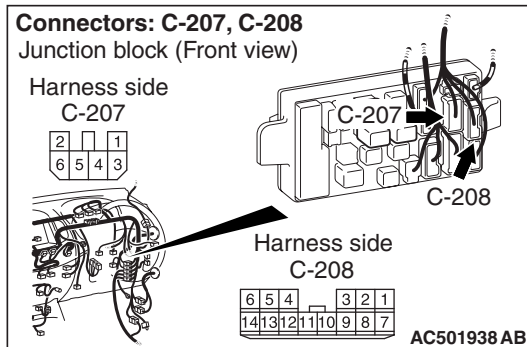
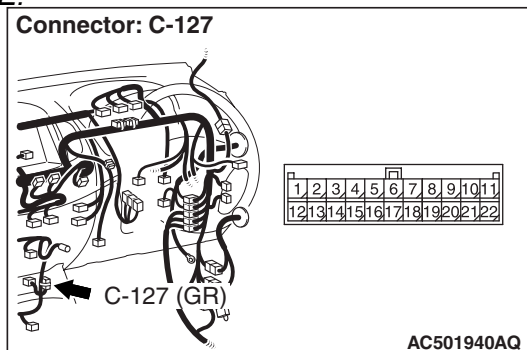
YES : Go to Step 8.

NO : Go to Step 7.

STEP 7. Check the harness wire between ignition switch (ACC) and C-108 RV meter connector terminal No.5.



NOTE:



Prior to the wiring harness inspection, check joint connector C-127, junction block connector C-207 and C-208, and repair if necessary.

- Check the IG (ACC) power supply open circuit.

Q: Is the check result normal?

YES : Retest the system.

NO : Repair the wiring harness.

STEP 8. Replace the RV meter temporarily and retest the system.

Check that the RV meter correctly when the RV meter is replaced temporarily.

Q: Is the check result normal?

YES : Replace the RV meter.

NO : Go to Step 9.

STEP 9. Retest the system.

Check that the RV meter correctly.

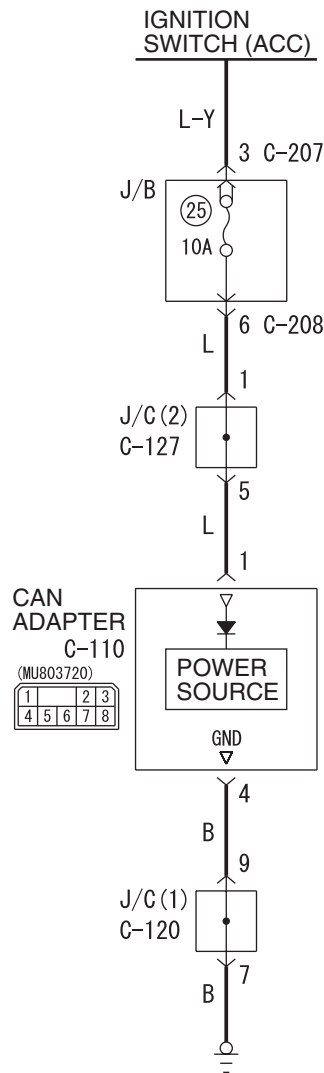
Q: Is the check result normal?

YES : The procedure is complete.

NO : Return to Step 1.

Inspection Procedure 2: "Please Turn the Ignition Key to the ON Position." is continuously displayed.

CAN Adapter Power Supply Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X054A

CIRCUIT OPERATION

If the RV meter operates when the ignition switch is in other than the ON position, or if the RV meter operates when there is an abnormality to the CAN adapter power supply or earth, "Please turn the ignition key to the ON position" is displayed.

COMMENTS ON TROUBLE SYMPTOM

Ignition switch ON signal, CAN adapter power supply, earth, RV meter, or CAN adapter may be faulty.

PROBABLE CAUSES

- Malfunction of the RV meter
- Malfunction of the CAN adapter
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the communication and connection (ignition switch (IG1)) of the service function.

Using the signal check of the automatic mode in the service function, check the key position status. (Refer to P.54A-102.)

Item name	Normal condition
Key position	IG

OK: Normal condition is displayed.

Q: Is the check result normal?

- YES :** Go to Step 5.
- NO :** Go to Step 2.

STEP 2. M.U.T.-III CAN bus diagnostics

Use the M.U.T.-III to diagnose the CAN bus lines.

Q: Is the check result satisfactory?

- YES :** Go to Step 3
- NO :** Repair the CAN bus lines (Refer to GROUP 54C, Diagnosis - Can Bus Diagnostics Table). After diagnosing the CAN bus lines, go to Step 3.

STEP 3. M.U.T.-III other system diagnosis code.

Check whether the ETACS-ECU diagnosis code is set.

Q: Is the diagnosis code set?

- YES :** Diagnose ETACS-ECU (Refer to GROUP 54B, Diagnosis - diagnosis code chart).
- NO :** Go to Step 4.

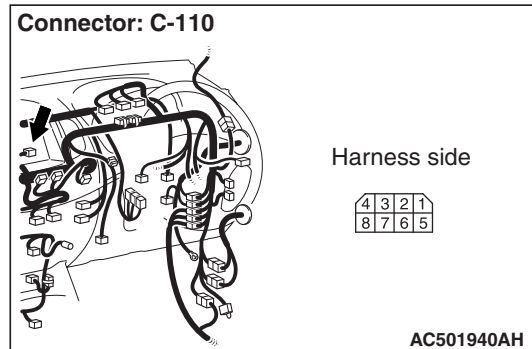
STEP 4. M.U.T.-III diagnosis code.

When the ignition switch is turned to the "LOCK" (OFF) position, check that the CAN adapter does not set the diagnosis code.

Q: Is the diagnosis code set?

- YES :** Refer to diagnosis code chart P.54A-111.
- NO :** Go to Step 10.

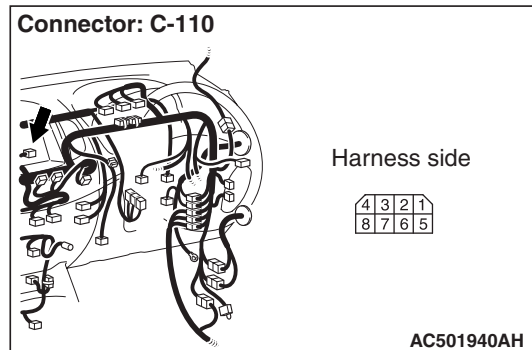
STEP 5. Check the following connector: C-110 CAN adapter connector



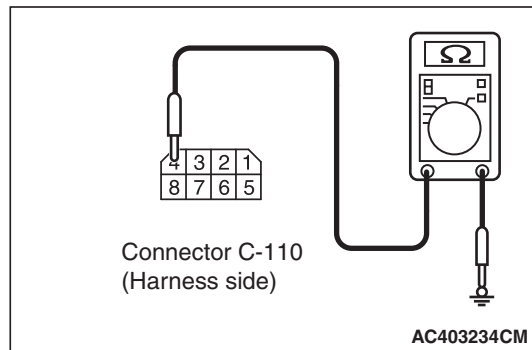
Q: Is the check result normal?

- YES :** Go to Step 6.
- NO :** Repair the defective connector.

STEP 6. Measure the resistance at C-110 CAN adapter connector.



(1) Disconnect the connector, and measure at the wiring harness side.



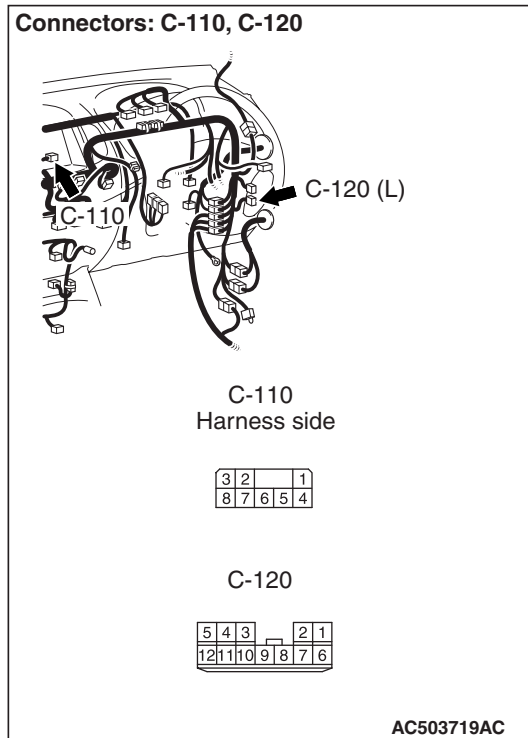
(2) Resistance between C-110 fuel pump and gauge unit connector terminal No.4 and body earth

OK: 2 Ω or less

Q: Is the check result normal?

- YES :** Go to Step 8.
- NO :** Go to Step 7.

STEP 7. Check the harness wire between C-110 CAN adapter connector terminal No.4 and body earth.



NOTE: Prior to the wiring harness inspection, check joint connector C-120, and repair if necessary.

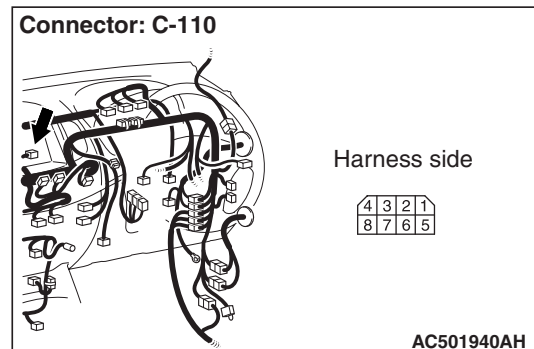
- Check the earth circuit.

Q: Is the check result normal?

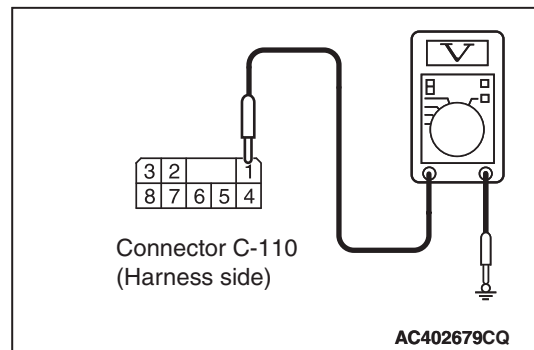
YES : Go to Step 8.

NO : Repair the wiring harness.

STEP 8. Measure the voltage at C-110 CAN adapter connector.



- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Ignition switch: ON



- (3) Voltage between C-110 CAN adapter connector terminal No.1 and body earth

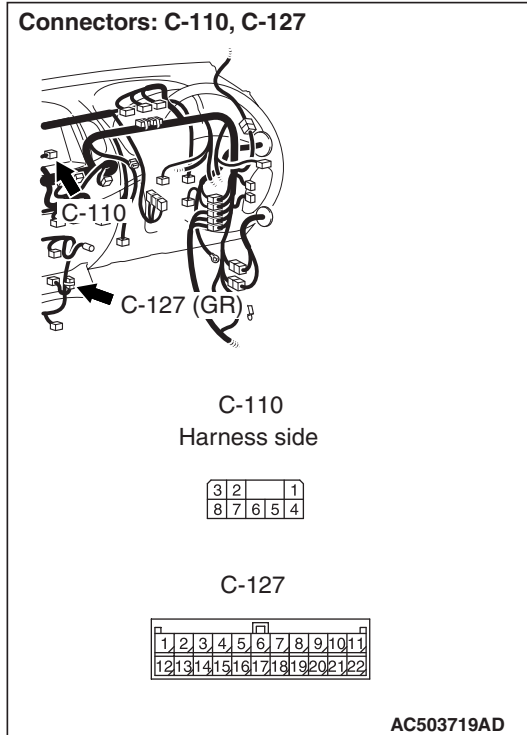
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 10.

NO : Go to Step 9.

STEP 9. Check the harness wire between ignition switch (ACC) and C-110 CAN adapter connector terminal No.1.



STEP 10. Replace the RV meter temporarily and retest the system.

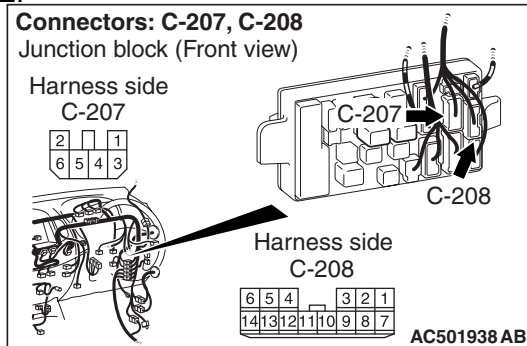
Check that the CAN adapter correctly when the RV meter is replaced temporarily.

Q: Is the check result normal?

YES : If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00,How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction .

NO : Replace the RV meter.

NOTE:



Prior to the wiring harness inspection, check joint connector C-127, junction block connector C-207 and C-208, and repair if necessary.

- Check the IG (ACC) power supply open circuit.

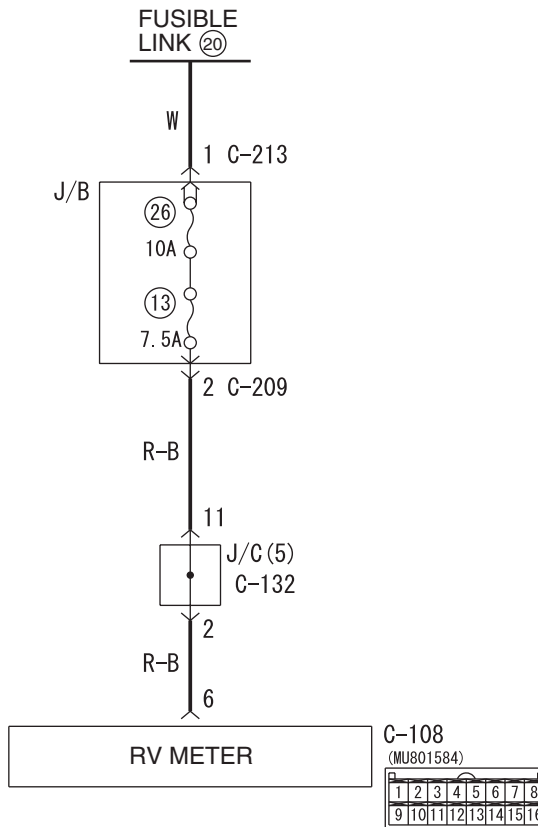
Q: Is the check result normal?

YES : Retest the system.

NO : Repair the wiring harness.

Inspection Procedure 3: The Low Battery Warning Screen is Displayed.

RV Meter Power Supply Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X040A

CIRCUIT OPERATION

The RV meter is energized by the battery.

COMMENTS ON TROUBLE SYMPTOM

the battery circuit is suspected to be open or defective.

PROBABLE CAUSES

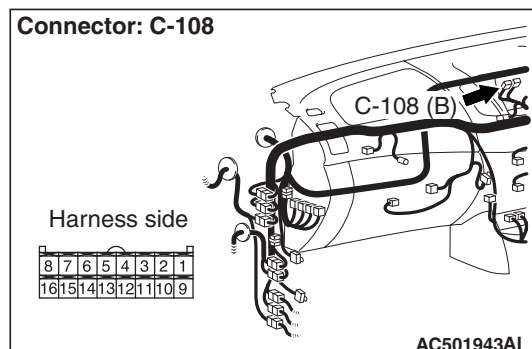
- Malfunction of the battery
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the RV meter power supply.

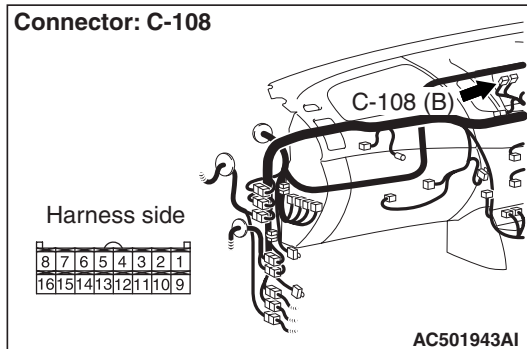
- Q: Is the abnormal voltage screen displayed immediately after the ignition switch is turned to the ACC position?**
YES : Go to Step 2.
NO : There is no action to be taken.

STEP 2. Check the following connector: C-108 RV meter connector

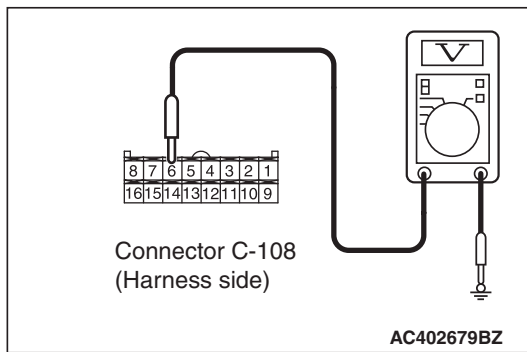


- Q: Is the check result normal?**
YES : Go to Step 3.
NO : Repair the defective connector.

STEP 3. Measure the voltage at C-108 RV meter connector.



- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Ignition switch: LOCK (OFF) position



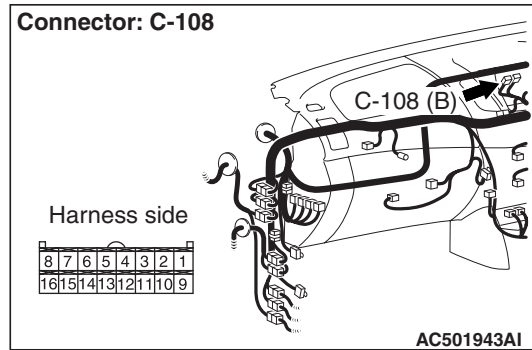
- (3) Voltage between C-108 RV meter connector terminal No.6 and body earth

OK: System voltage

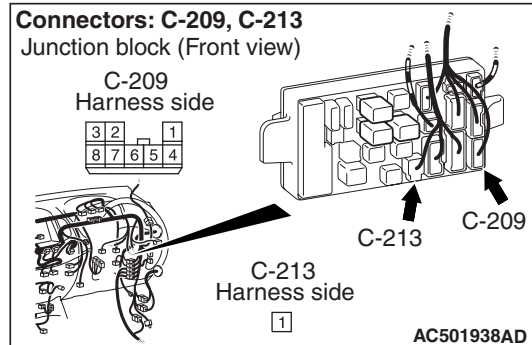
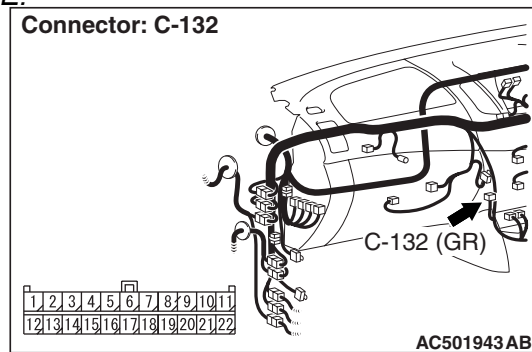
Q: Is the check result normal?

- YES :** Go to Step 5.
- NO :** Go to Step 4.

STEP 4. Check the harness wire between battery (fusible link No.20) and C-108 RV meter connector terminal No.6.



NOTE:



Prior to the wiring harness inspection, check joint connector C-132 or junction block connector C-209 and C-213, and repair if necessary.

- Check the battery power supply open circuit.

Q: Is the check result normal?

- YES :** Retest the system.
- NO :** Repair the wiring harness.

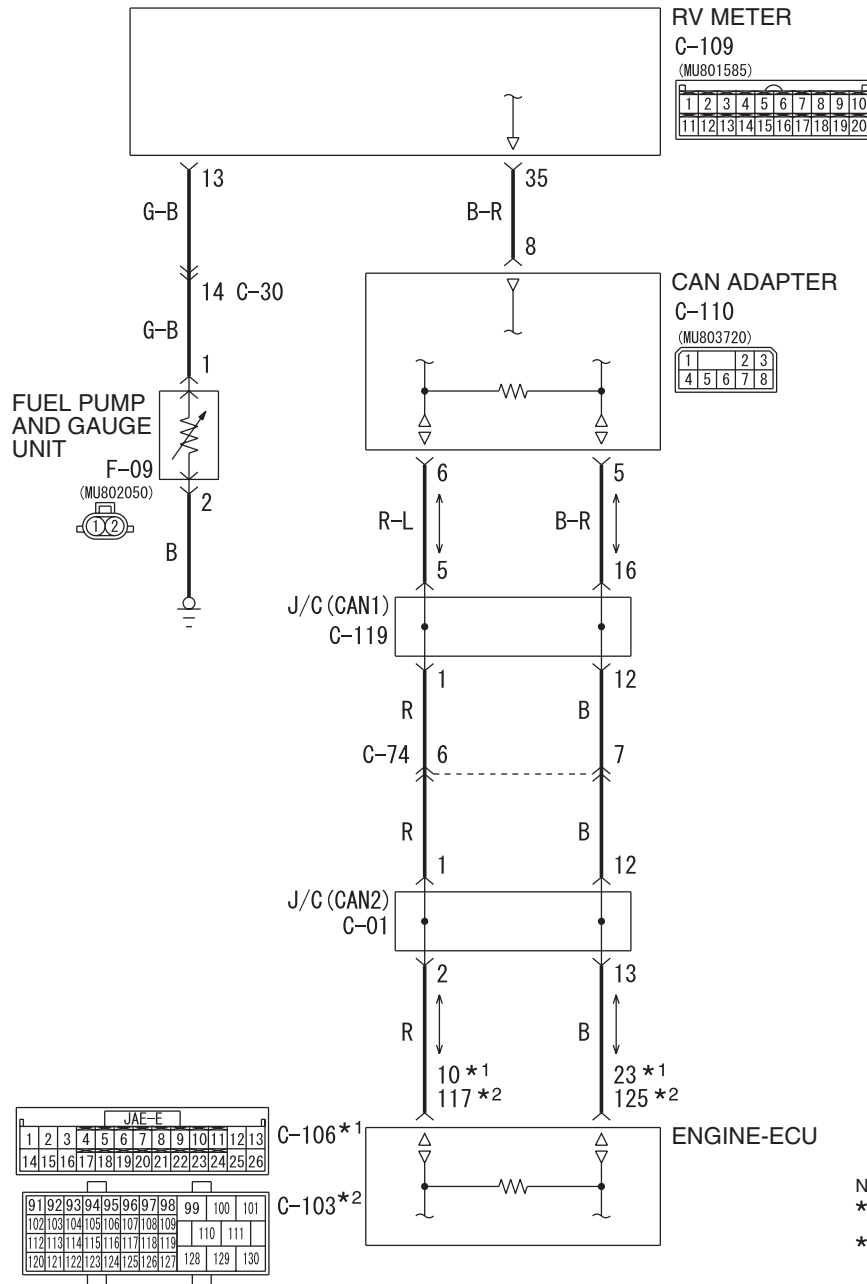
STEP 5. Recheck for malfunction.

Q: Is a malfunction eliminated?

- YES :** If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00,How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction .
- NO :** Replace the RV meter.

Inspection Procedure 4: The Drive Information is not Displayed Normal.

RV Meter Drive Information Circuit



NOTE
*1: VEHICLES WITHOUT COMONRAIL
*2: VEHICLES WITH COMONRAIL

W7C54X014A

CIRCUIT OPERATION

RV meter receives the vehicle speed signal and average injected fuel amount signal from the engine-ECU and from the fuel pump and unit. Then, RV meter displays the average vehicle speed, average fuel consumption, and possible cruising distance.

COMMENTS ON TROUBLE SYMPTOM

Harness between RV meter and engine-ECU, harness between RV meter and fuel pump and unit, RV meter, engine-ECU, or fuel pump and gauge unit may be faulty.

PROBABLE CAUSES

- Malfunction of the RV meter
- Malfunction of the Engine- ECU
- Malfunction of the fuel pump and gauge unit
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III CAN bus diagnostics**

Use the M.U.T.-III to diagnose the CAN bus lines.

Q: Is the check result satisfactory?

YES : Go to Step 2

NO : Repair the CAN bus lines (Refer to GROUP 54C, Diagnosis - Can Bus Diagnostics Table). After diagnosing the CAN bus lines, go to Step 3.

STEP 2. M.U.T.-III other system diagnosis code.

Check whether the DIESEL system-related diagnosis code is set.

Q: Is the diagnosis code set?

YES : Diagnose DIESEL system. (Refer to GROUP 13A <2500-SOHC>, Troubleshooting , GROUP 13B <2500-DOHC>, Troubleshooting or GROUP 13C <3200>, Troubleshooting .) After diagnosing the DIESEL system, go to Step 3.

NO : Go to Step 3.

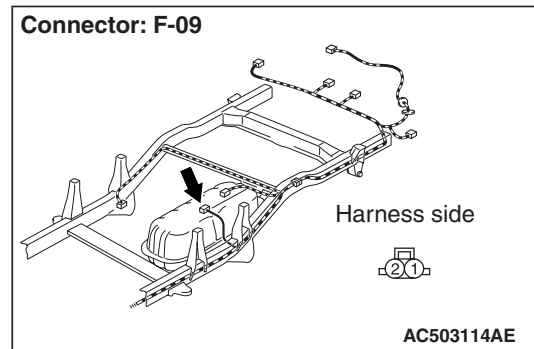
STEP 3. M.U.T.-III diagnosis code.

When the ignition switch is turned to the "LOCK" (OFF) position, check that the CAN adapter does not set the diagnosis code.

Q: Is the diagnosis code set?

YES : Refer to diagnosis code chart [P.54A-111](#).

NO : Go to Step 4.

STEP 4. Connector check: Fuel pump and gauge unit connector F-09**Q: Is the check result normal?**

YES : Go to Step 5.

NO : Repair the defective connector.

STEP 5. Check the Fuel pump and gauge unit.

Check the fuel pump and gauge unit [P.54A-31](#).

Q: Is the check result normal?

YES : Go to Step 6.

NO : Replace the fuel pump and gauge unit.

STEP 6. Check the communication and connection (the fuel pump and gauge unit) of the service function.

Using the connection status of the automatic mode in the service function, check the status of fuel pump and gauge unit. (Refer to [P.54A-102](#).)

NOTE: If the fuel is full, "Full or Disconnected" of abnormal condition is displayed. Therefore, check that the fuel is not full, and then check the status display of service function for the fuel pump and gauge unit.

Item name	Normal condition
Fuel.	OK

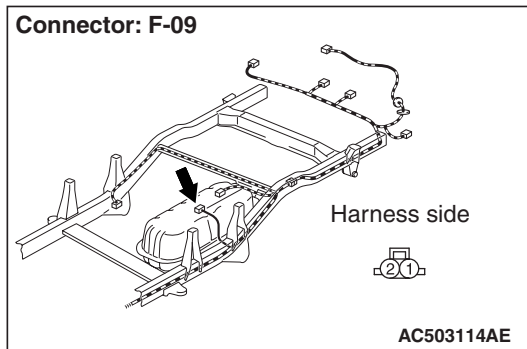
OK: Normal condition is displayed.

Q: Is the check result normal?

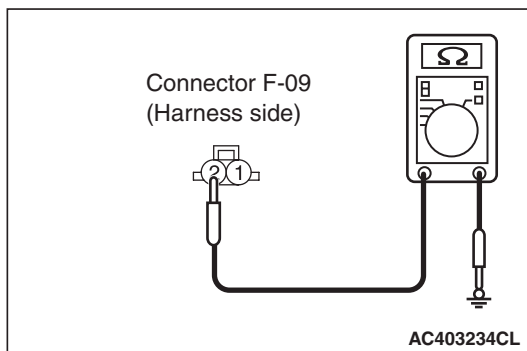
YES : Go to Step 11.

NO : Go to Step 7.

STEP 7. Measure the resistance at F-09 fuel pump and gauge unit connector.



(1) Disconnect the connector, and measure at the wiring harness side.



(2) Resistance between F-09 fuel pump and gauge unit connector terminal No.2 and body earth

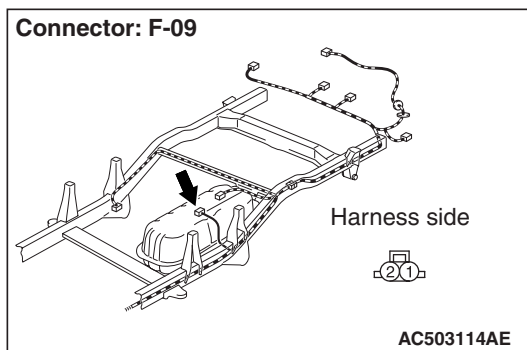
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 9.

NO : Go to Step 8.

STEP 8. Check the harness wire between F-09 fuel pump and gauge unit connector terminal No.2 and body earth.



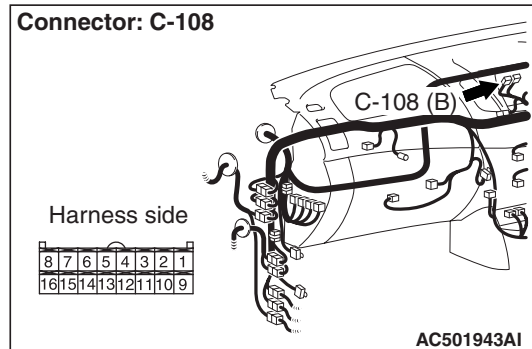
- Check the earth wires for open circuit.

Q: Is the check result normal?

YES : Retest the system.

NO : Repair the wiring harness.

STEP 9. Connector check: RV meter connector C-108

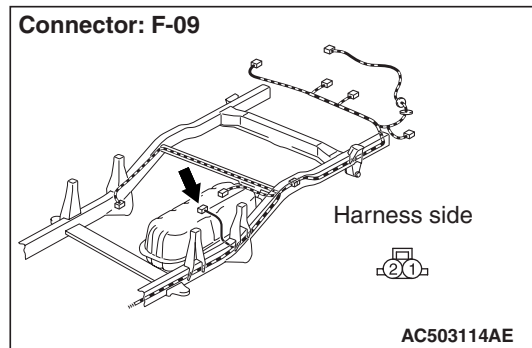
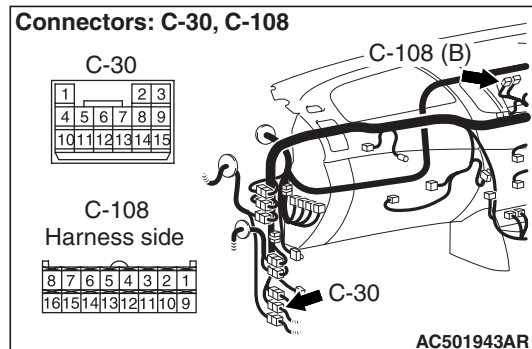


Q: Is the check result normal?

YES : Go to Step 10.

NO : Repair the defective connector.

STEP 10. Check the wiring harness between C-108 RV meter connector terminal No.13 and F-09 fuel pump and gauge unit connector terminal No.1.



NOTE: Prior to the wiring harness inspection, check the intermediate connector C-30, and repair if necessary.

- Check the input line circuit.

Q: Is the check result normal?

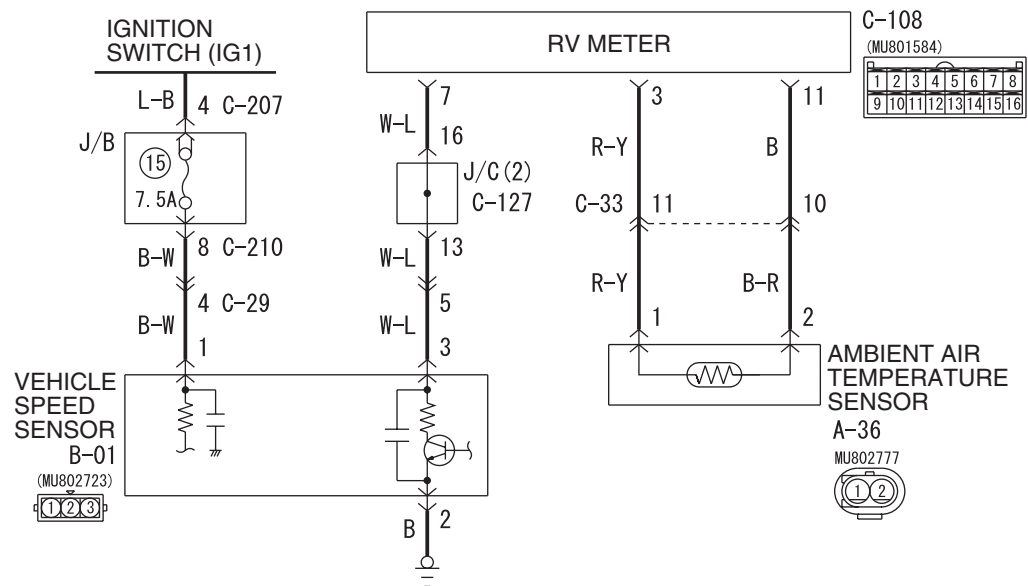
YES : Go to Step 11.

NO : Repair the wiring harness.

STEP 11. Recheck for malfunction.**Q: Is a malfunction eliminated?**

YES : If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction .

NO : Replace the RV meter.

Inspection Procedure 5: The Ambient Air Temperature is not Displayed Normal.**Ambient Air Temperature Display Circuit**

Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X044A

CIRCUIT OPERATION

RV meter displays the ambient temperature read from the ambient temperature sensor. The ambient temperature on RV meter display is calibrated in accordance with the vehicle speed state.

NOTE: When the vehicle is parked with the ignition switch at the ACC position and when the vehicle speed is 20 km/h or below with the ignition switch at the ON position, the downward calibration of displayed ambient temperature is performed, but upward calibration is not performed. With the ignition

switch at the ON position, when the vehicle speed continues to be 21 km/h or higher for 30 seconds or more, the downward calibration and upward calibration of displayed ambient temperature are performed.

COMMENTS ON TROUBLE SYMPTOM

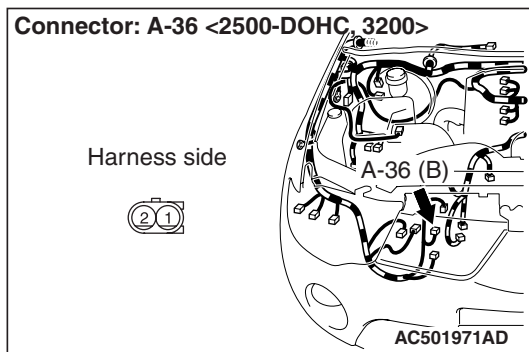
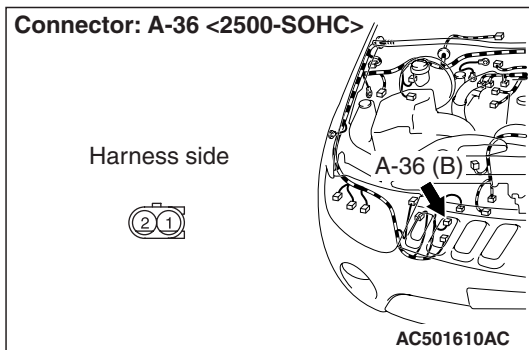
When other indications are normal, the malfunction of ambient air temperature sensor is considered.

PROBABLE CAUSES

- Malfunction of the ambient air temperature sensor
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the following connector: A-36 ambient air temperature sensor



Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the defective connector.

STEP 2. Check the ambient air temperature sensor.

Check the ambient air temperature sensor [P.54A-149](#).

Q: Is the check result normal?
YES : Go to Step 3.
NO : Replace the ambient air temperature sensor.

STEP 3. Check the communication and connection (the ambient air temperature sensor) of the service function.

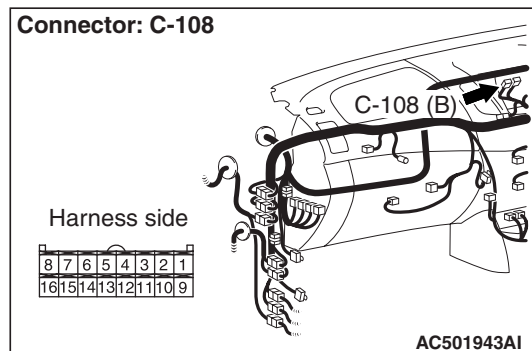
Using the monitor status of the automatic mode in the service function, check the ambient temperature sensor status. (Refer to [P.54A-102](#).)

Item name	Normal condition
Amb. Temp.	ON

OK: Normal condition is displayed.

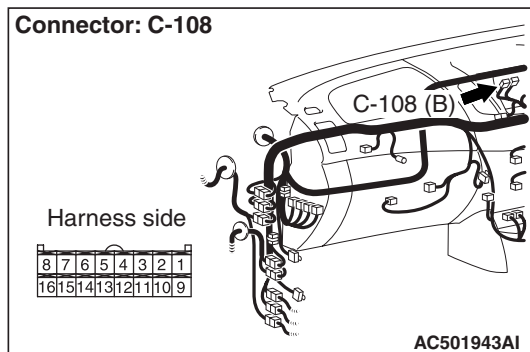
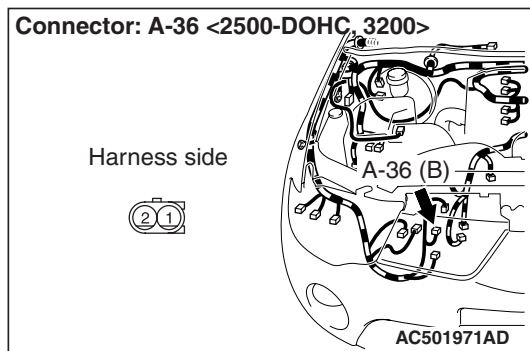
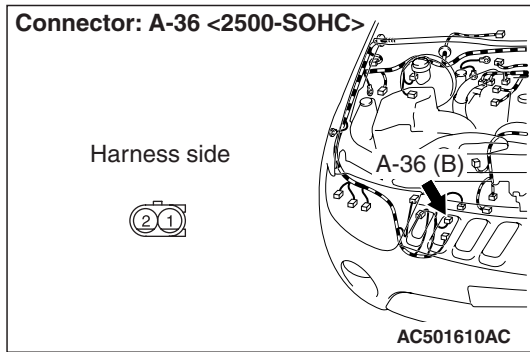
Q: Is the check result normal?
YES : Go to Step 6.
NO : Go to Step 4.

STEP 4. Check the following connector: C-108 RV meter connector

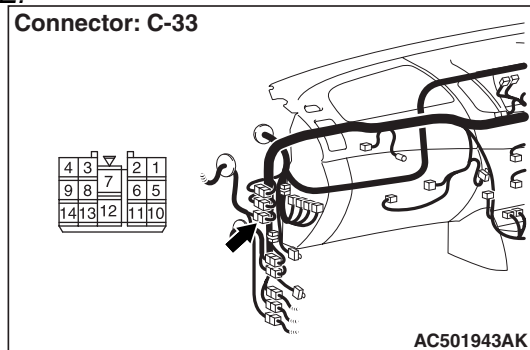


Q: Is the check result normal?
YES : Go to Step 5.
NO : Repair the defective connector.

STEP 5. Check the harness wire between C-108 RV meter connector terminals No.3, 11 and A-36 ambient air temperature sensor connector terminals No.1, 2.



NOTE:



Prior to the wiring harness inspection, check intermediate connector C-33, and repair if necessary.

- Check the output lines for open circuit.

Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair the wiring harness.

STEP 6. M.U.T-III other system data list

Check the vehicle speed signal data list of DIESEL system.

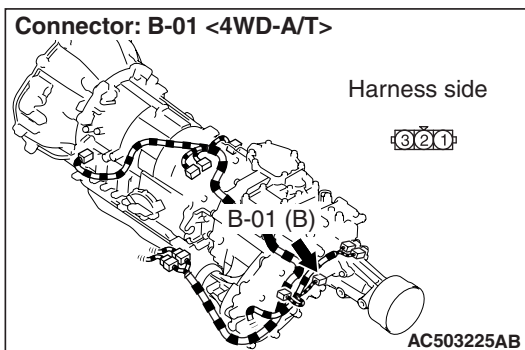
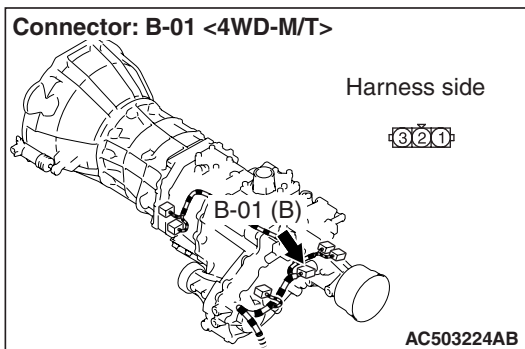
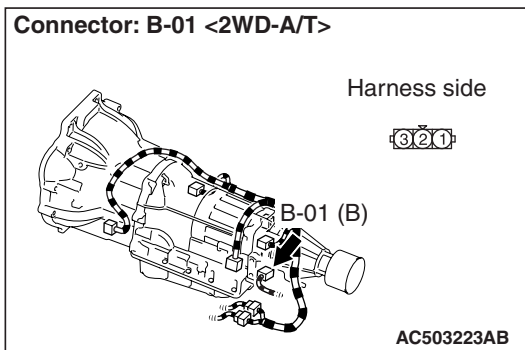
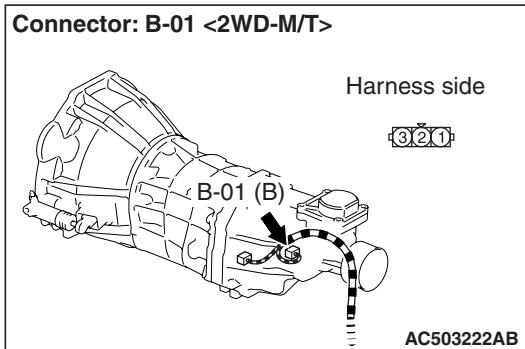
Item No.4: Vehicle speed sensor (Refer to GROUP 13A <2500-SOHC>, Data list reference table , GROUP 13B <2500-DOHC>, Data list reference table or GROUP 13C <3200>, Data list reference table .)

Q: Is the check result satisfactory?

YES : Go to Step 7.

NO : Diagnose DIESEL system (Refer to GROUP 13A <2500-SOHC>, Troubleshooting , GROUP 13B <2500-DOHC>, Troubleshooting or GROUP 13C <3200>, Troubleshooting). After diagnosing the DIESEL system.

**STEP 7. Check the following connector: B-01
vehicle speed sensor connector**

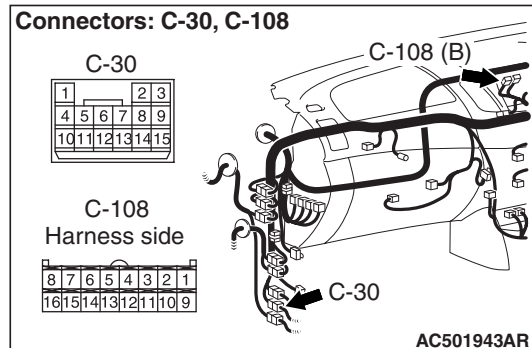
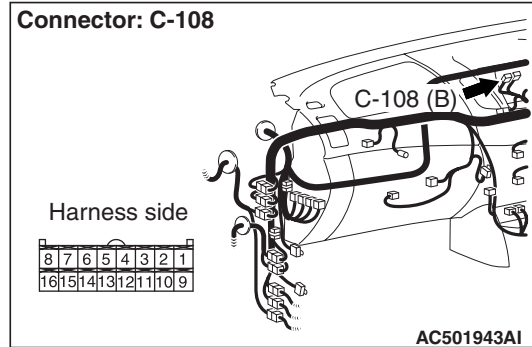
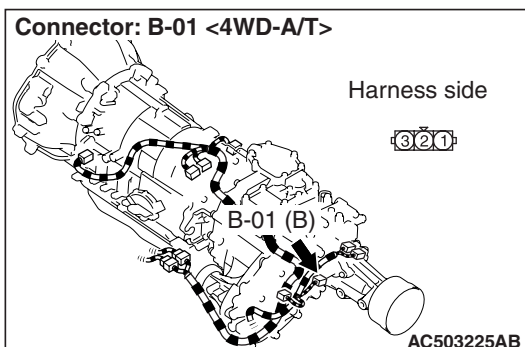
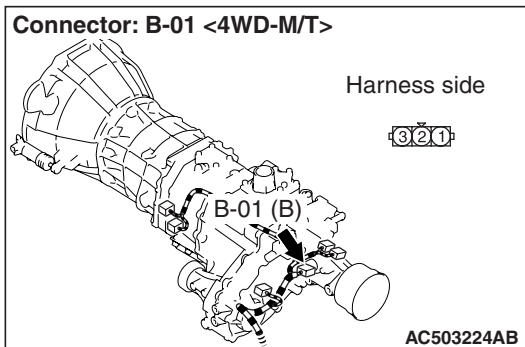
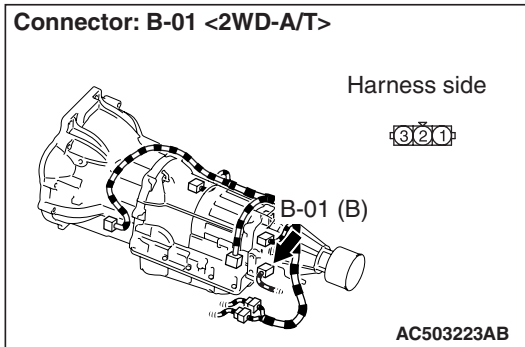
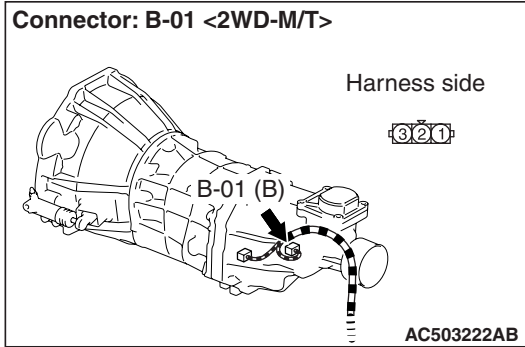


Q: Is the check result normal?

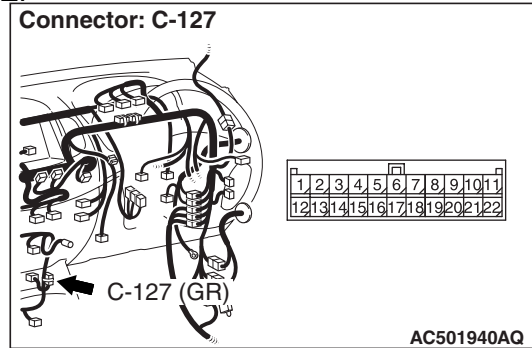
YES : Go to Step 8.

NO : Repair the defective connector.

STEP 8. Check the wiring harness between B-01 vehicle speed sensor connector terminal No.3 and C-108 RV meter connector terminal No.7.



NOTE:



Prior to the wiring harness inspection, check the joint connector C-127 and intermediate connector C-30, and repair if necessary.

- Check the input line circuit.

Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair the wiring harness.

STEP 9. Recheck for malfunction.

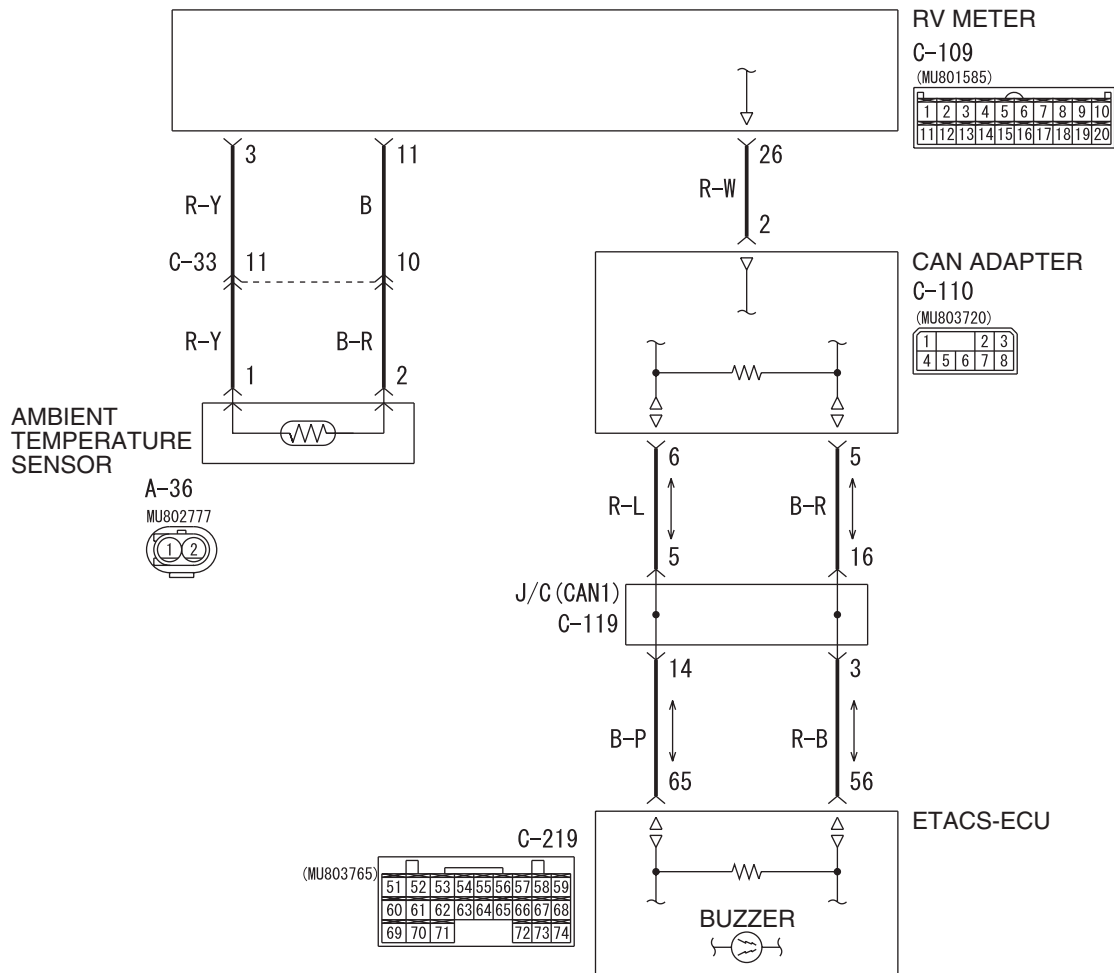
Q: Is a malfunction eliminated?

YES : If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction .

NO : Replace the RV meter.

Inspection Procedure 6: Icy road surface warning function does not work normally.

RV Meter Freeze-Alarm Function Circuit



W7C54X043A

CIRCUIT OPERATION

If the ambient temperature of RV meter becomes 3°C or lower when the ignition switch is turned ON, the freeze mark flashes for 10 seconds on the RV meter and the ETACS-ECU buzzer sounds at the same time.

NOTE: Once the icy road surface warning is given, if the ambient temperature drops to 3°C or lower after the ambient temperature rises to 6°C or higher, the freeze mark of RV meter only flashes for 10 seconds. Also, once the ambient temperature rises to 4 to 5°C after an icy road surface warning is given, when the temperature drops to 3°C or lower again, the icy road surface warning is not given.

COMMENTS ON TROUBLE SYMPTOM

When other indications are normal, the malfunction of RV meter or ETACS-ECU is considered.

PROBABLE CAUSES

- Malfunction of the RV meter
- Malfunction of the ETACS-ECU
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III CAN bus diagnostics**

Use the M.U.T.-III to diagnose the CAN bus lines.

Q: Is the check result satisfactory?

YES : Go to Step 2

NO : Repair the CAN bus lines (Refer to GROUP 54C, Diagnosis - Can Bus Diagnostics Table). After diagnosing the CAN bus lines, go to Step 2.

STEP 2. M.U.T.-III other system diagnosis code.

Check that the ETACS-ECU does not set the diagnosis code.

Q: Is the diagnosis code set?

YES : Diagnose ETACS-ECU (Refer to GROUP 54B, Diagnosis - diagnosis code chart).

NO : Go to Step 3.

STEP 3. M.U.T.-III diagnosis code.

When the ignition switch is turned to the "LOCK" (OFF) position, check that the CAN adapter does not set the diagnosis code.

Q: Is the diagnosis code set?

YES : Refer to diagnosis code chart [P.54A-111](#).

NO : Go to Step 4.

Step 4. Recheck for malfunction.**Q: Is a malfunction eliminated?**

YES : If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction .

NO : Replace the RV meter.

Inspection Procedure 7: The Compass does not Indicate Normally.**COMMENTS ON TROUBLE SYMPTOM**

The geomagnetism sensor integrated in the RV meter is abnormal, or it is seemed that the indication is affected by some nearby magnetized matter.

PROBABLE CAUSES

Malfunction of the RV meter

DIAGNOSIS PROCEDURE**STEP 1. Check the geomagnetism sensor mode in service mode.**

- (1) When the adjusting switch is continuously pressed for more than five seconds, the reception sound (pip sound) is heard and at the same time the service function is activated to display the service mode screen.
- (2) Press the adjusting switch with the ignition switch at the "LOCK" (OFF) position. Then while keeping the switch on the pressed condition, turn the ignition switch to "ACC" position.
- (3) Check the geomagnetism sensor at the geomagnetism sensor mode (Refer to [P.54A-145](#)).

Q: Isn't there any abnormality on the geomagnetism sensor?

YES : There is no action to be taken.

NO : Go to Step 2.

STEP 2. Check of own vehicle position.**Q: Is the geomagnetism stable at the place?**

YES : Go to Step 4.

NO : Go to Step 3.

STEP 3. Move the vehicle to the geomagnetically stable location to re-check the geomagnetism.**Q: Isn't there any abnormality at the geomagnetism sensor mode?**

YES : There is no action to be taken.

NO : Go to Step 4.

STEP 4. Check of RV meter for magnetization.**Q: Does the indication return to normal when the carrier antenna that is mounted on the body by a magnet, a magnet or metal existing nearby the RV meter is removed?**

YES : There is no action to be taken.

NO : Replace the RV meter, then go to step 5.

STEP 5. Recheck for malfunction.

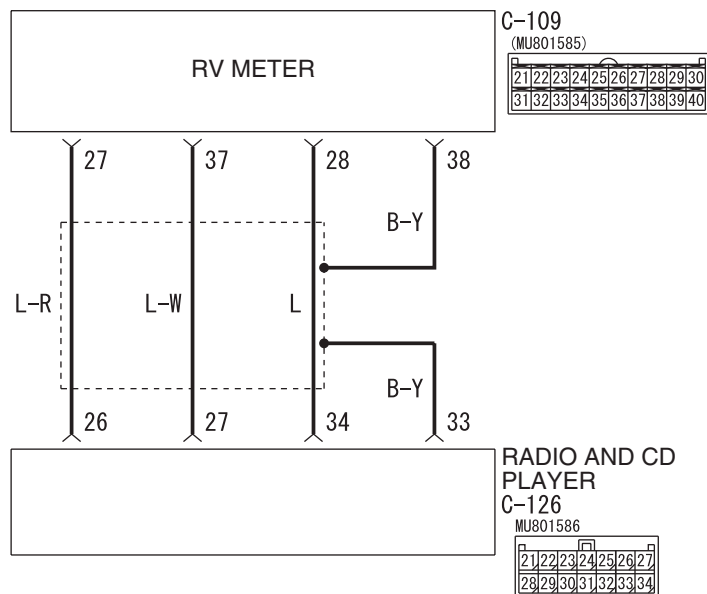
Q: Is a malfunction eliminated?

YES : If no malfunctions are not found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00,How to Use Troubleshooting/Inspection Service Points-How to Cope with Intermittent Malfunction .

NO : Replace the RV meter

Inspection Procedure 8: The Radio and CD Player Information is not Displayed Normal.

Radio and CD Player Information Line Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X053A

COMMENTS ON TROUBLE SYMPTOM

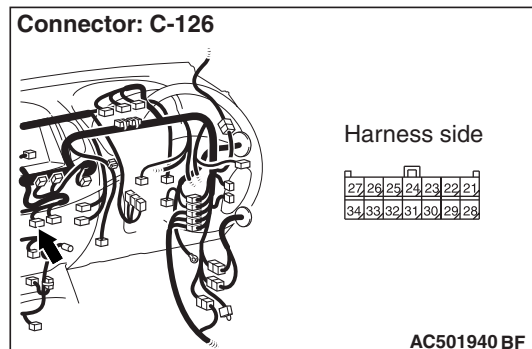
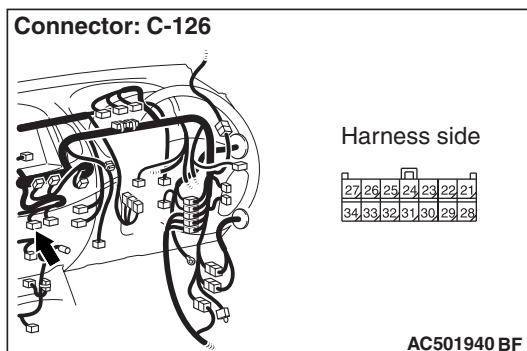
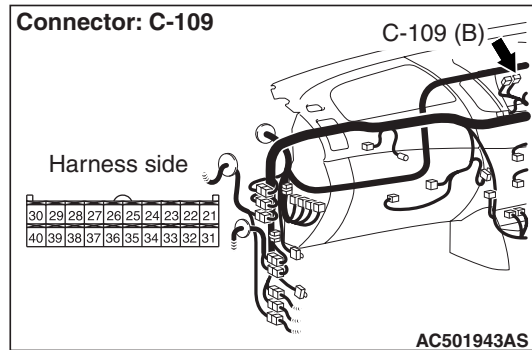
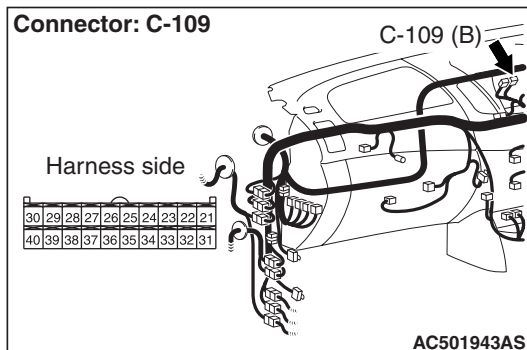
The radio and CD player operation screen will be frozen if the RV meter have received abnormal data from the radio and CD player and via M-bus communication.

PROBABLE CAUSES

- Malfunction of radio and CD player
- Damaged wiring harness and connectors

DIAGNOSIS PROCEDURE

STEP 1. Connector check: Radio and CD player connector C-126 and RV meter connector C-109.



Q: Is radio and CD player connector C-126 and RV meter connector C-126 in good condition?
YES : Go to Step 2.
NO : Repair the defective connector.

Q: Is the wiring harness between radio and CD player connector C-126 (terminal 26, 27 and 34) and centre display unit connector C-109 (terminal 27, 37 and 28) in good condition?
YES : Go to Step 3.
NO : Repair the wiring harness.

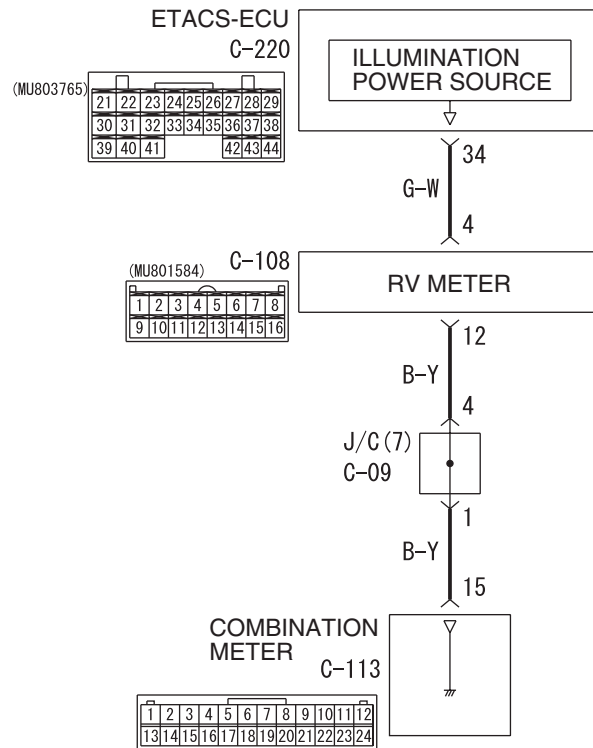
STEP 3. Retest the system

Confirm that the radio and CD player operation screen is displayed normally.

Q: Is the check result satisfactory?
YES : The procedure is complete.
NO : Go to step 1.

Inspection Procedure 9: Button illumination of RV meter does not illuminate.

RV Meter Button Illumination Circuit



Wire colour code

B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W7C54X055A

CIRCUIT OPERATION

When the ignition switch is turned to the ACC position, the button illuminations of RV meter illuminate.

COMMENTS ON TROUBLE SYMPTOM

Power supply wire of button illumination (wire from ETACS-ECU to RV meter) or earth wire of button illumination (from RV meter to combination meter), RV meter, ETACS-ECU, or combination meter may be faulty.

PROBABLE CAUSES

- Malfunction of the battery
- Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Check the RV meter power supply.

Q: Is the abnormal voltage screen displayed immediately after the ignition switch is turned to the ACC position?

YES : Go to Step 2.

NO : There is no action to be taken.

STEP 2. M.U.T-III other system diagnosis code.

Check whether the ETACS-ECU diagnosis code is set.

Q: Is the diagnosis code set?

YES : Diagnose ETACS-ECU (Refer to GROUP 54B, Diagnosis - diagnosis code chart).

NO : Go to Step 3.

STEP 3. Check of combination meter trouble symptom

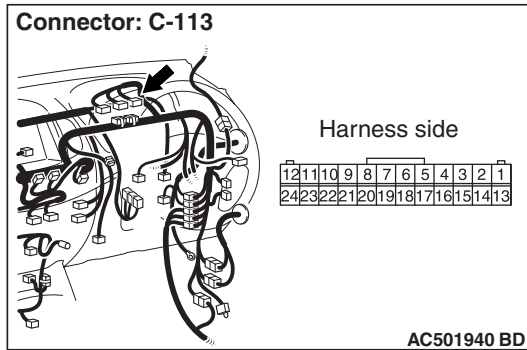
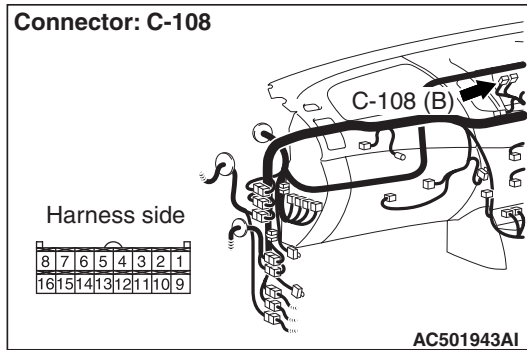
Check whether the combination meter trouble symptom is present. (Refer to P.54A-11.)

Q: Is a trouble symptom present?

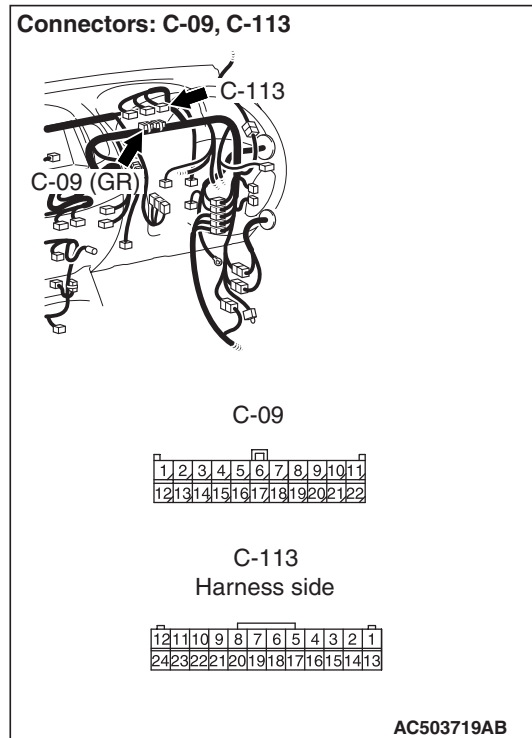
YES : Diagnose the combination meter. (Refer to P.54A-11.)

NO : Go to Step 4.

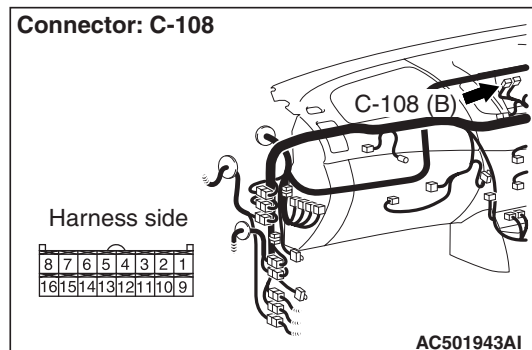
STEP 4. Check the following connector: C-108 RV meter connector, C-113 combination meter connector



STEP 5. Check the harness wire between C-108 RV meter connector terminal No.12 and C-113 combination meter connector terminal No.15.



Q: Is the check result normal?
YES : Go to Step 5.
NO : Repair the defective connector.

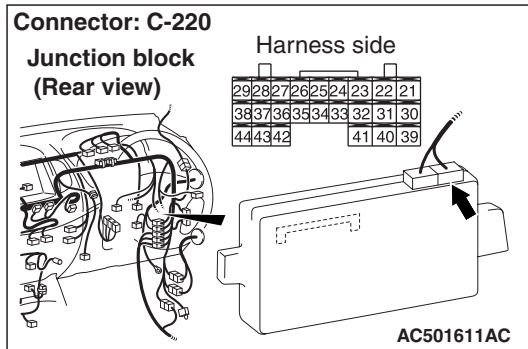


NOTE: Prior to the wiring harness inspection, check joint connector C-09, and repair if necessary.

- Check the earth circuit.

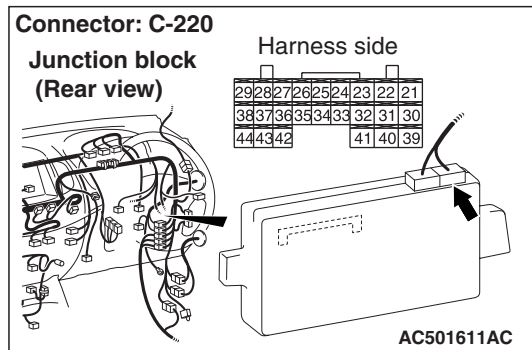
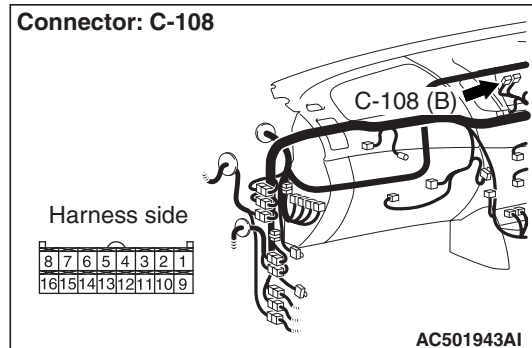
Q: Is the check result normal?
YES : Go to Step 6.
NO : Repair the wiring harness.

**STEP 6. Check the following connector C-220
ETACS-ECU connector**



Q: Is the check result normal?
YES : Go to Step 7.
NO : Repair the defective connector.

**STEP 7. Check the harness wire between C-108
RV meter connector terminal No.4 and C-220
ETACS-ECU connector terminal No.34.**



- Check the earth circuit.

Q: Is the check result normal?
YES : Go to Step 8.
NO : Repair the wiring harness.

STEP 8. Recheck for malfunction.

Q: Is a malfunction eliminated?
YES : If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction .
NO : Replace the RV meter.

CHECK AT ECU TERMINAL

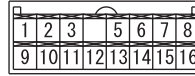
M1543007600241

RV METER

C-109



C-108



AC503528AB

Terminal No.	Input/Output	Signal symbol	Terminal voltage (V)	Harness discrepancy		Failure symptom due to harness discrepancy
1-2	-	-	-	-	-	-
3	Input	EX-TEMP (ambient temperature sensor signal)	5	Open circuit	Short circuit	Ambient temperature is not displayed.
4	Input	ILL + (button illumination signal)	5 or less	Open circuit	Short circuit	Button illumination is not lighted.
5	Input	ACC (ACC power supply)	System voltage	Open circuit	-	Screen is not displayed. All operations are not possible.
				-	Short circuit	Multi-use fuse is blown.
6	Input	+B	System voltage	Open circuit	-	Screen is not displayed. All operations are not possible.
				-	Short circuit	Multi-use fuse is blown.
7	Input	VSS (Vehicle speed pulse signal)	0-5	Open circuit	Short circuit	Ambient temperature and compass display are not updated.
8	-	GND (earth)	-	Open circuit	-	Screen is not displayed.
9-10	-	-	-	-	-	-
11	-	GND -TEMP	-	Open circuit	Short circuit	Ambient temperature is not displayed.
12	-	ILL GND (button illumination signal)	0-5	Open circuit	Short circuit	Button illumination is not lighted.
13	Input	FUEL GAUGE	0-5	Open circuit	Short circuit	"-" is displayed on the possible cruising distance display.
14-16	-	-	-	-	-	-
21-25	-	-	-	-	-	-

Terminal No.	Input/Output	Signal symbol	Terminal voltage (V)	Harness discrepancy		Failure symptom due to harness discrepancy
26	Input/output	DATA (ETACS SWS data signal)	0 –12	Open circuit	Short circuit	<ul style="list-style-type: none"> •Nighttime dimming of button illumination is not performed. •Ambient temperature display is not updated to rise. •Compass display is not updated. •Drive information display is not updated.
27	Input/output	M-DATA (Audio) (M-BUS data signal)	0 –5	Open circuit	Short circuit	Audio information is not displayed.
28	Input/output	M-CLOCK (Audio) (M-BUS clock signal)	0 –5	Open circuit	Short circuit	Audio information is not displayed.
29 –34	–	–	–	–	–	–
35	Input/output	K (engine K-line signal)	0 –12	Open circuit	Short circuit	Drive information display is not updated.
36	–	–	–	–	–	–
37	Input/output	M-BUSY (Audio)	0 –5	Open circuit	Short circuit	Audio information is not displayed.
38	–	SHIELD-GND (Audio)	–	–	–	–
39 –40	–	–	–	–	–	–

CAN ADAPTER

C-110

1		2	3
4	5	6	7 8

AC503529AB

Terminal No.	Input/Output	Signal symbol	Terminal voltage (V)	Harness discrepancy		Failure symptom due to harness discrepancy
				Open circuit	Short circuit	
1	Input	ACC (ACC power supply)	System voltage	Open circuit	Short circuit	<ul style="list-style-type: none"> •Nighttime dimming of button illumination is not performed. •Ambient temperature display is not updated to rise. •Compass display is not updated. •Drive information display is not updated.
2	Input/output	DATA (ETACS SWS data signal)	0 –12	Open circuit	Short circuit	<ul style="list-style-type: none"> •Nighttime dimming of button illumination cannot be performed. •Ambient temperature display is not updated to rise. •Compass display is not updated. •Drive information display is not updated.
3	–	–	–	–	–	–
4	–	GND (earth)	–	Open circuit	–	<ul style="list-style-type: none"> •Nighttime dimming of button illumination cannot be performed. •Ambient temperature display is not updated to rise. •Compass display is not updated. •Drive information display is not updated.
5	–	CAN L	–	–	–	–

Terminal No.	Input/Output	Signal symbol	Terminal voltage (V)	Harness discrepancy		Failure symptom due to harness discrepancy
6	–	CAN H	–	–	–	–
7	–	–	–	–	–	–
8	Input/output	K (engine K-line signal)	0 –12	Open circuit	Short circuit	<ul style="list-style-type: none"> •Nighttime dimming of button illumination cannot be performed. •Ambient temperature display is not updated to rise. •Compass display is not updated. •Drive information display is not updated.

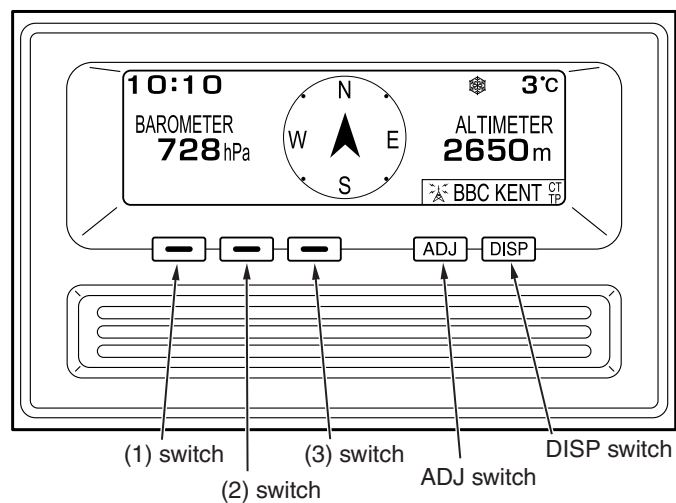
ON-VEHICLE SERVICE

VEHICLE MAGNETIC COMPENSATION

M1543009700222

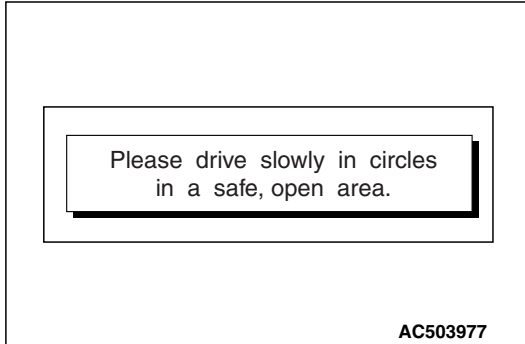
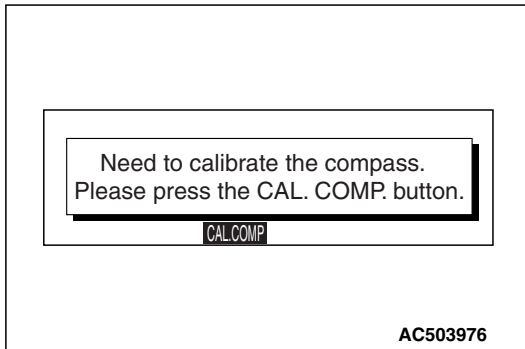
Confirmation of magnetization and demagnetization

The RV meter automatically conducts geomagnetization calibration by sampling direction data while the vehicle is normally driving. The calibration can be done manually at any time.

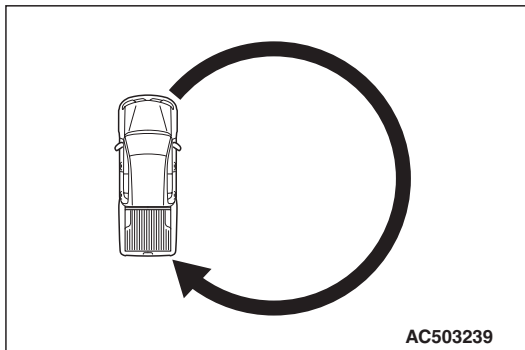


AC503023AB

1. Press function switch 3 for three seconds or more during the environment information screen to call up the screen as shown in the illustration.

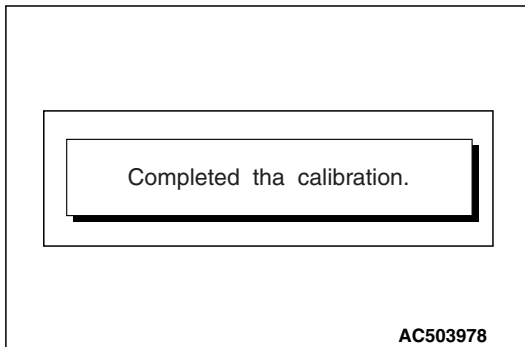


2. When function switch 3 (CAL.COMP) is pressed, a message of urging geomagnetization calibration is displayed.



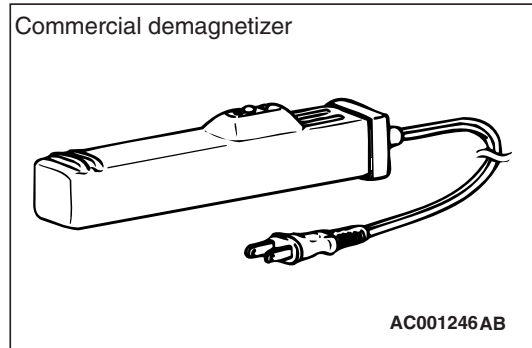
3. Drive around the vehicle.

NOTE: When driving around the vehicle to correct the sensor, select a safe and open area where there are no structures exist such as the high-tension line and the iron bridge that affect the geomagnetic sensor in circumference.

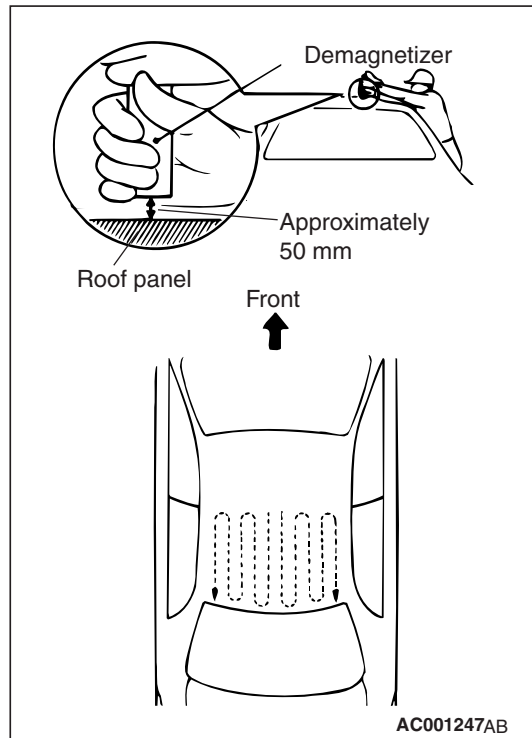


4. A message of completing geomagnetization calibration is displayed.
- When pressing "DISP" and "ADJ" switches
 - When pressing function switch 3 (CANCEL)
 - When turning the ignition switch to the "OFF" (LOCK) position

Demagnetization and correction method



1. Demagnetize the body using a commercial demagnetizer.



2. While keeping the distance between the tip of demagnetizer and the roof panel to approximately 50 mm, move the demagnetizer slowly with a sweeping manner on the rear-half surface of roof panel.

 **CAUTION**

If the tip of demagnetizer touches the roof panel, the magnetizing condition of body becomes worse to the contrary. Absolutely avoid this.

3. Slowly draw the demagnetizer apart from the body. Turn OFF the switch of demagnetizer when it is apart from the body more than 50 mm.

 **CAUTION**

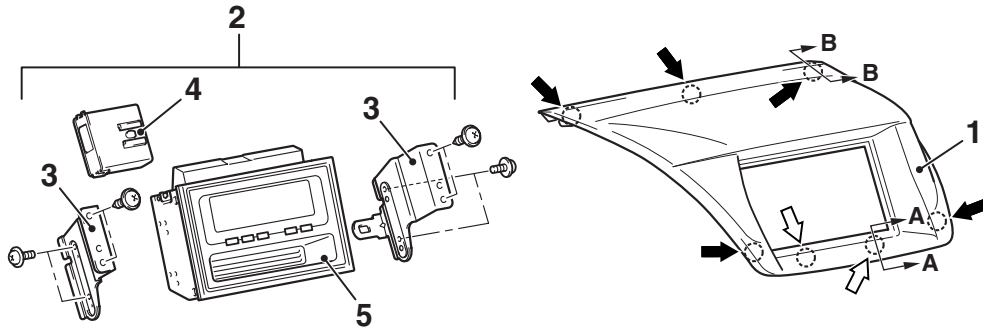
If the demagnetizer is turned OFF near the body or it is suddenly separated from the body, the magnetizing condition of body becomes worse to the contrary. Absolutely avoid these.

4. After degeomagnetization, geomagnetization calibration is carried out.

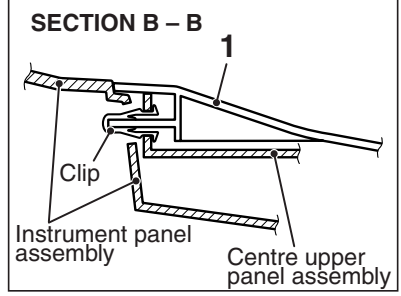
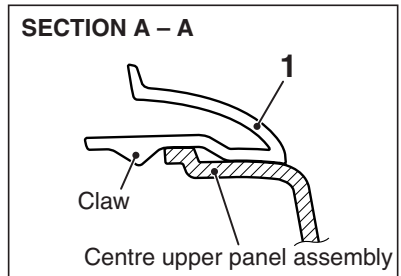
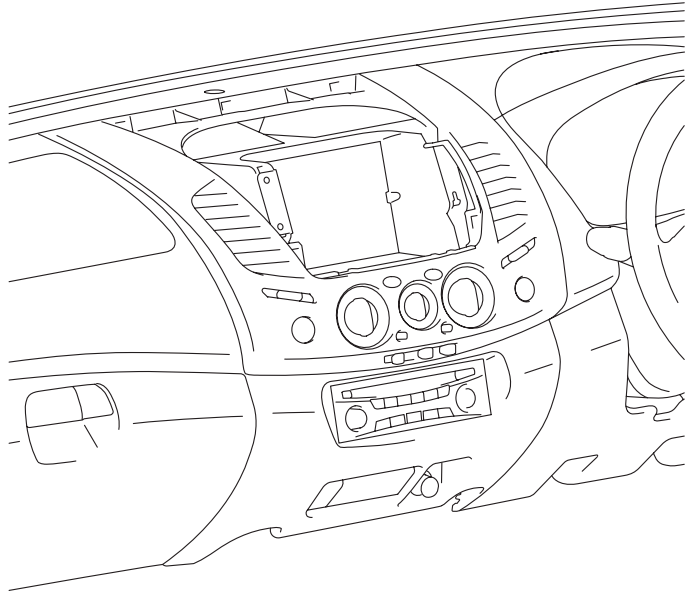
RV METER

REMOVAL AND INSTALLATION

M1543014100044



NOTE
(1) : Clip positions
(2) : Claw positions



AC503123AB

Removal steps

1. RV meter hood
2. RV meter assembly
3. RV meter bracket

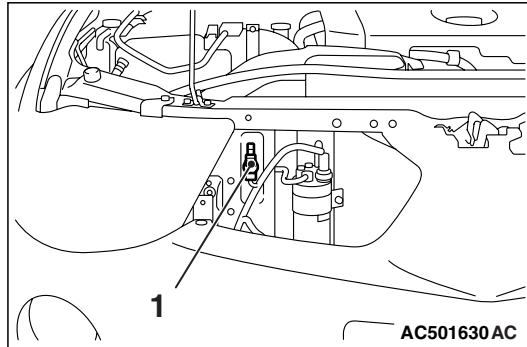
Removal steps (Continued)

4. CAN adapter
5. RV meter

AMBIENT AIR TEMPERATURE SENSOR

REMOVAL AND INSTALLATION

M1543032700020

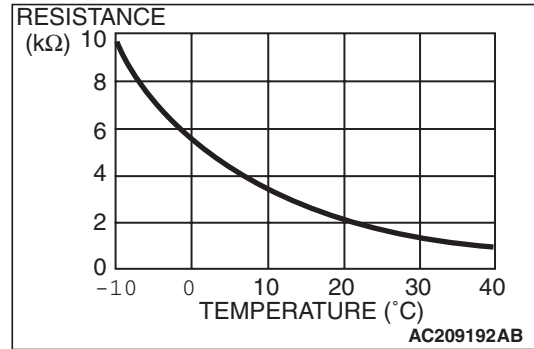


Removal steps

- radiator grille (RH) (GROUP 51, Radiator grille .)
1. Ambient air temperature sensor

INSPECTION

M1543033500018



Check to see that the resistance shown in the graph is almost satisfied when measuring the resistance between the sensor terminals under two or more different temperature conditions.

DEFOGGER

TROUBLESHOOTING

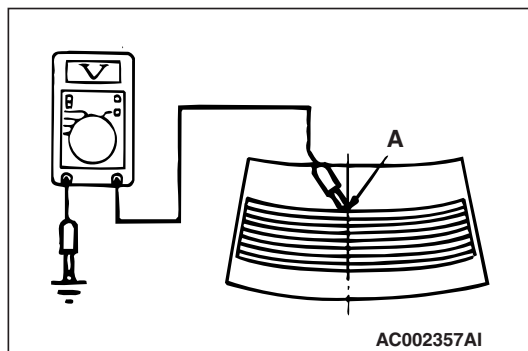
M1543019600312

Refer to GROUP 55A, Troubleshooting .

ON-VEHICLE SERVICE

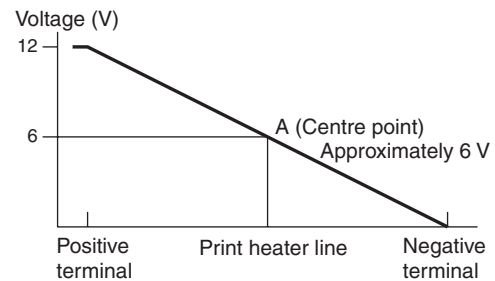
PRINTED HEATER LINES CHECK

M1543019503615

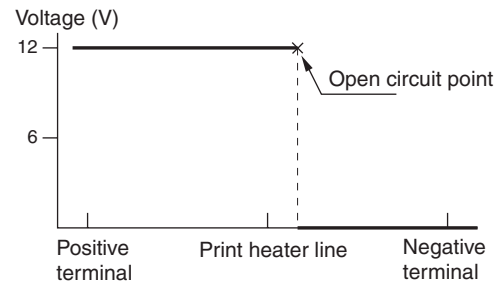


1. Run engine at 2,000 r/min. Check heater element with battery at full.
2. Turn "ON" rear window demister switch. Measure heater element voltage with circuit tester at rear window glass centre A. Condition is good if it indicates about six volts.

Normal characteristic curve



Abnormal characteristic curve

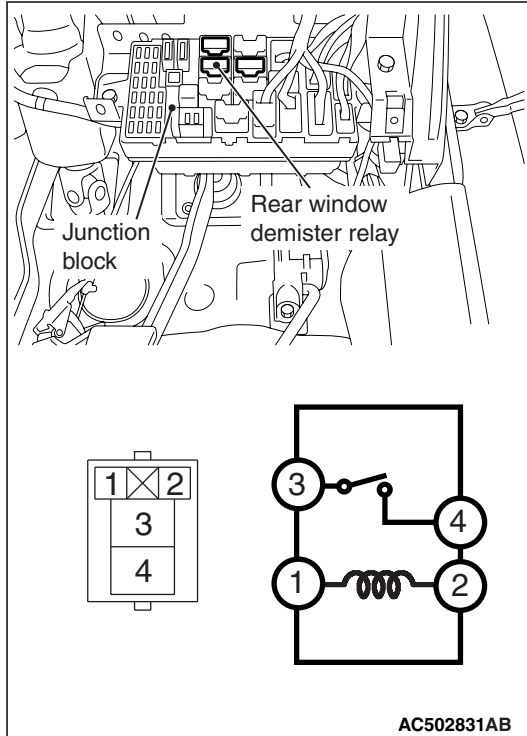


3. If 12 volts is indicated at A, there is a break in the negative terminals from A. Move test bar slowly to negative terminal to detect where voltage changes suddenly (0 volts).

AC407247AC

4. If 0 volts is indicated at A, there is a break in the positive terminals from A. Defect where the voltage changes suddenly (12 volts) in the same method described above.

REAR WINDOW DEMISTER RELAY CHECK



Battery voltage	Tester connection	Specified condition
Not supplied	3 -4	Open circuit
<ul style="list-style-type: none"> Connect terminal 1 to the positive battery terminal Connect terminal 2 to the negative battery terminal 	3 -4	Less than 2 ohms

DEFOGGER SWITCH

REMOVAL AND INSTALLATION

M1543030800043

Refer to GROUP 55, Heater control assembly and A/C switch .

GROUP 54C

CONTROLLER AREA NETWORK (CAN)

CONTENTS

GENERAL INFORMATION	54C-2	EXPLANATION ABOUT THE MUT-III CAN BUS DIAGNOSTICS	54C-7
SPECIAL TOOL	54C-3	TROUBLESHOOTING	54C-14
TEST EQUIPMENT	54C-4	CAN BUS DIAGNOSTICS TABLE	54C-14
SERVICE PRECAUTIONS.....	54C-5	CAN BUS DIAGNOSIS	54C-18
PRECAUTIONS ON HOW TO REPAIR THE CAN BUS LINES	54C-6	CAN COMMUNICATION SIGNAL TABLE.....	54C-85
		CAN COMMUNICATION-RELATED DIAGNOSIS CODE (U CODE) TABLE	54C-86

GENERAL INFORMATION

M1548310000115

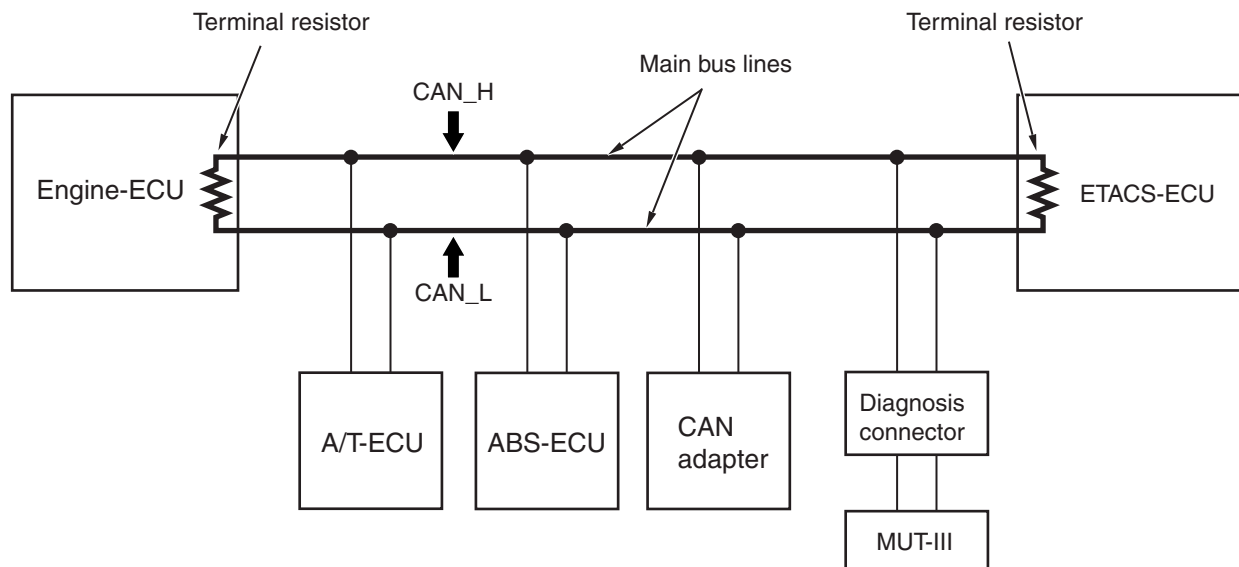
CAN, an abbreviation for Controller Area Network, is an ISO-certified international standard for a serial multiplex communication protocol*. A communication circuit employing the CAN protocol connects each ECU, and sensor data can be shared among, which enables more reduction in wiring.

*NOTE: *: The regulations have been decided in detail, from software matters such as the necessary transmission rate for communication, the system, data format, and communication timing control method to hardware matters such as the harness type and length and the resistance values.*

CAN offers the following advantages.

- Transmission rates are much faster than those in conventional communication (up to 1 Mbps), allowing much more data to be sent.
- It is exceptionally immune to noise, and the data obtained from each error detection device is more reliable.
- Each ECU connected via the CAN communicates independently, therefore if the ECU enters damaged mode, communications can be continued in some cases.

STRUCTURE



— : Shows main bus line.

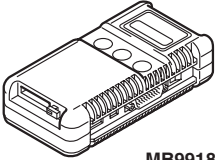
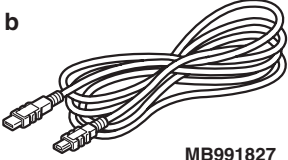
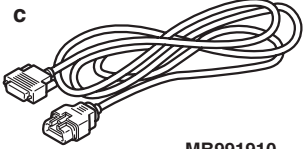
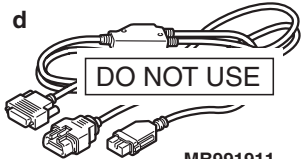
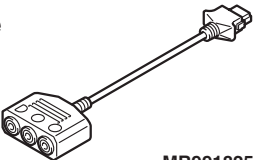
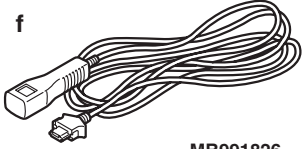
— : Shows sub bus line.


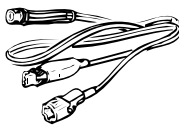
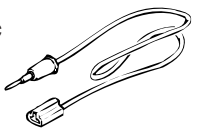

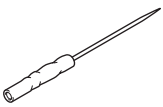
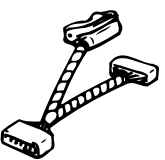
AC204755AC

- The CAN bus line consists of two lines, CAN_L and CAN_H (CAN Low and CAN High, respectively), as well as two terminal resistors (A twisted-pair cable, highly resistant to noise, is used for the communications line).
- The CAN bus line connecting the two terminal resistors is the main bus line, and the CAN bus line connecting each ECU is the sub-bus line.
- The terminal resistors are installed in the engine-ECU and ETACS-ECU to stabilize communication signals (The terminal resistance is set at approximately 120 Ω).
- ECUs are connected in the CAN bus line as follows.
 - Engine-ECU
 - A/T-ECU <A/T>
 - ABS-ECU <Vehicles with ABS>
 - CAN adapter <Vehicles with RV meter>
 - ETACS-ECU

SPECIAL TOOL


M1548304200239

Tool	Number	Name	Use
<p>a</p>  <p>MB991824</p> <p>b</p>  <p>MB991827</p> <p>c</p>  <p>MB991910</p> <p>d</p>  <p>MB991911</p> <p>e</p>  <p>MB991825</p> <p>f</p>  <p>MB991826</p> <p>MB991955</p>	<p>MB991955</p> <p>a. MB991824</p> <p>b. MB991827</p> <p>c. MB991910</p> <p>d. MB991911</p> <p>e. MB991825</p> <p>f. MB991826</p>	<p>MUT-III sub-assembly</p> <p>a. Vehicle Communication Interface (V. C. I.)</p> <p>b. MUT-III USB cable</p> <p>c. MUT-III main harness A (Vehicles with CAN communication system)</p> <p>d. MUT-III main harness B (Vehicles without CAN communication system)</p> <p>e. MUT-III measure adapter</p> <p>f. MUT-III trigger harness</p>	<p>CAN bus diagnosis</p> <p>CAUTION</p> <p>For vehicles with CAN communication, use MUT-III main harness A to send simulated vehicle speed. If you connect MUT-III main harness B instead, the CAN communication does not function correctly.</p>

Tool	Number	Name	Use
<p>a</p>  <p>b</p>  <p>c</p>  <p>d</p> 	<p>MB991223</p> <p>a. MB991219 b. MB991220 c. MB991221 d. MB991222</p>	<p>Harness set</p> <p>a. Check harness b. LED harness c. LED harness adapter d. Probe</p>	<p>Continuity check and voltage measurement at harness wire or connector</p> <p>a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester</p>
 <p>MB992006</p>	<p>MB992006</p>	<p>Extra fine probe</p>	<p>Continuity check and voltage measurement at harness wire or connector</p>
 <p>MB991952</p>	<p>MB991952</p>	<p>ABS check harness</p>	<p>Checking continuity and measuring voltage at ABS-ECU harness-side connector</p>

TEST EQUIPMENT

M1548304300195

Test equipment	Name	Use
 <p>AC000019</p>	<p>Digital multimeter</p>	<p>Checking CAN bus circuit (for resistance and voltage measurements)</p>

SERVICE PRECAUTIONS

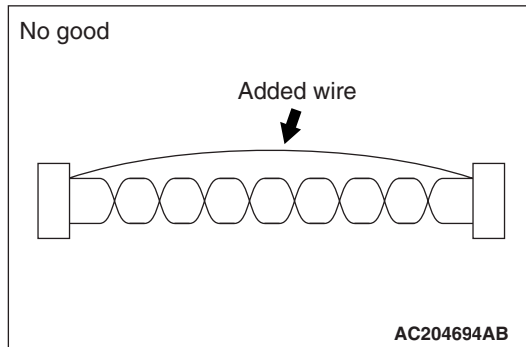
M1548302100184

Warnings in diagnosis section	Details regarding warning
<p>⚠ CAUTION When servicing an CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.</p>	<p>—</p>
<p>⚠ CAUTION A digital multimeter should be used.</p>	<p>When measuring resistance value or voltage in CAN bus lines, use a digital multimeter. If not using a digital multimeter, the equipments, which are connected through the CAN communication lines, may be damaged.</p>
<p>⚠ CAUTION When measuring the resistance, disconnect the negative battery terminal.</p>	<p>Disconnect the negative battery terminal when measuring the resistance value in the CAN bus line. If you fail to do so, the equipments, which are connected through the CAN communication lines, may be damaged.</p>
<p>⚠ CAUTION The test wiring harness should be used.</p>	<p>Always use the test harness when measuring the voltage or resistance value at the female connector. If you fail to do so, connectors may be damaged.</p>
<p>⚠ CAUTION The strand end of the twist wire should be within 10 cm from the connector.</p>	<div> </div> <p>If you repair the wire due to a defective connector or its terminal or harness wire, you should cut the wire so that the strand end of the twist wire should be within 10 cm from the connector as shown. If it exceeds 10 cm, twist the wiring harness just like the original twisted wire. If the strand end exceeds 10 cm, a communication error may be caused.</p>
<p>⚠ CAUTION Strictly observe the specified wiring harness repair procedure.</p>	<p>When you repair a CAN bus line, observe the precautions on how to repair the CAN bus line strictly. Refer to P.54C-6. If a new wire is added or a splice point is modified for the CAN_L or CAN_H line, an error in the CAN communication may be caused.</p>

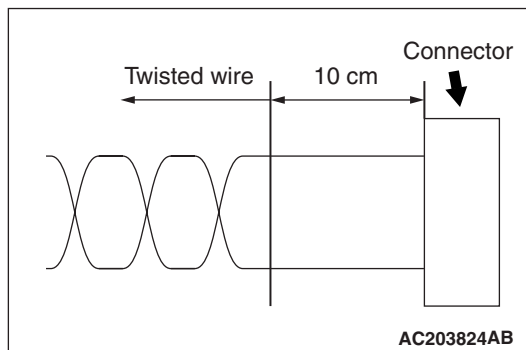
PRECAUTIONS ON HOW TO REPAIR THE CAN BUS LINES

M1548301900198

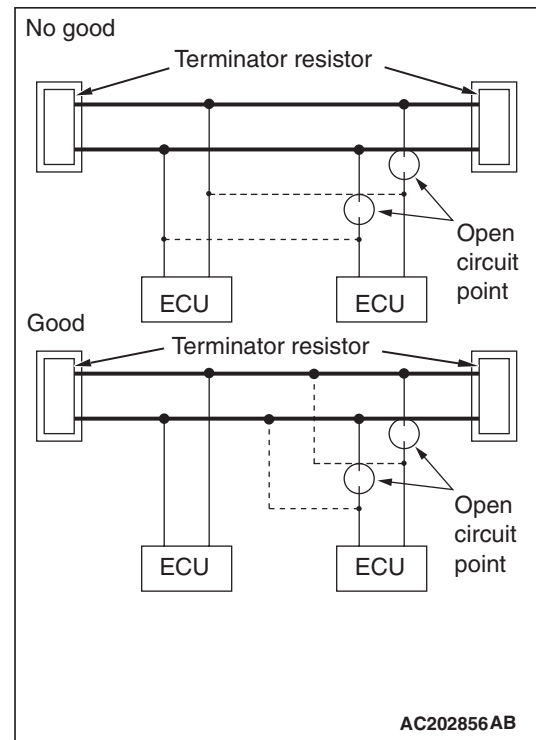
PRECAUTIONS ON HOW TO REPAIR THE CAN BUS LINES



- If the CAN bus line(s) are repaired, renew all the twisted wires between the end connectors. If the wiring harness is partially repaired, or only CAN_L or CAN_H line is repaired, noise suppression is deteriorated, causing a communication error.



- If the connector or wire on the main bus line or the sub-bus wire is replaced, the frayed end of the twisted wire should be within 10 cm from the connector. If it exceeds 10 cm, twist the wiring harness just like the original twisted wire. If the frayed end exceeds 10 cm, noise suppression is deteriorated, causing a communication error.



- If a sub-bus line is repaired, splice a new wire directly into the main bus line. If a new wire is spliced into the sub-bus line, which is connected to another device, the CAN communication will be disabled.

PRECAUTIONS ON HOW TO REPAIR THE TERMINATOR RESISTOR

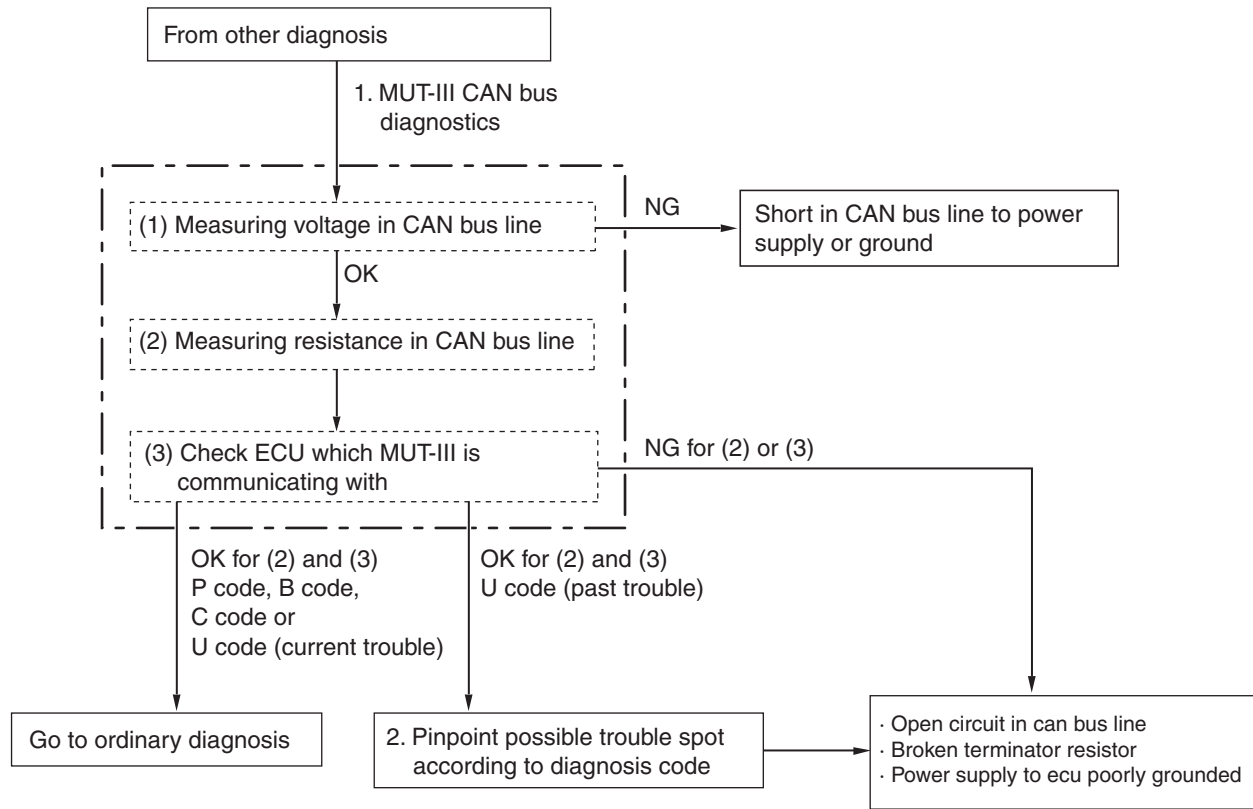
If one-side terminator resistor is broken, the CAN communication will continue although noise suppression is deteriorated. No diagnosis codes may be set even if the terminator resistor was broken. If a damage is found, replace the ECU which incorporates the defective terminator resistor.

EXPLANATION ABOUT THE MUT-III CAN BUS DIAGNOSTICS

M1548300100199

The MUT-III CAN bus diagnostics carries out the three checks below automatically, and then displays current condition of the CAN bus lines according to the check results.

CAN BUS LINE DIAGNOSTIC FLOW



AC204700AF

1. MUT-III CAN bus diagnostics

The MUT-III diagnoses CAN bus lines in accordance with the following strategy.

NOTE: When the MUT-III carries out the voltage and resistance measurements, it will cease the communication between each of the ECU. If the MUT-III cannot cease the communication, it will carry out the voltage measurement.

(1) Measuring voltage in CAN bus line

Diagnoses the power supply (such as wires of higher voltage than CAN communication line) and earthing (such as wires of lower voltage than CAN communication line) of CAN bus lines for short circuit by measuring the voltages between the CAN_L line or H line and body earth.

Terminal to be diagnosed	Normal value	Measurement value	Trouble when the measurement value does not meet the normal value	Note
Measuring the voltage between the CAN_L line and body earth	1.0 V or more and 4.0 V or less	Less than 1.0 V	Short to earth of the CAN_L line	If the CAN_L or H line is shorted to earth or power supply, a diagnosis code may not be set.
		More than 4.0 V	Short to power supply of the CAN_L line	
Measuring the voltage between the CAN_H line and body earth	1.0 V or more and 4.0 V or less	Less than 1.0 V	Short to earth of the CAN_H line	
		More than 4.0 V	Short to power supply of the CAN_H line	

(2) Measuring resistance in CAN bus line

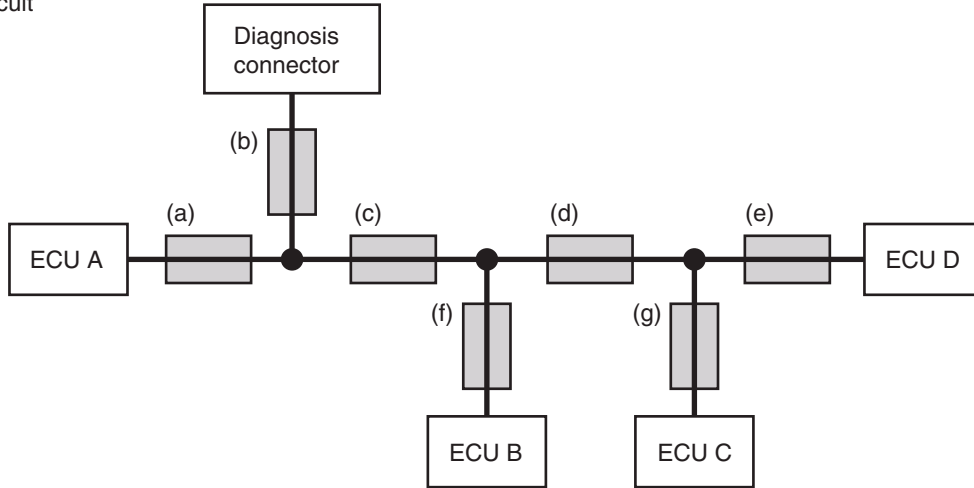
Checks the terminator resistors (incorporated in the combination meter or the engine-ECU), which are connected to each end of a CAN bus line, for breakage and a CAN bus main line for open circuit by measuring the resistance value between a CAN_L line and H line.

Normal value	Measurement value	Trouble when the measurement value does not meet the normal value	Note
60 ± 10 Ω	120 ± 20 Ω	Trouble in a CAN main line or terminator resistor	If only one terminator resistor is broken at either side, the CAN communication will continue although noise suppression is deteriorated. If a CAN main bus line is open circuit, the CAN communication is suspended at that open circuit point.
	No continuity	Trouble in CAN main bus line or between the diagnosis connector and main bus line	–
	2 Ω or less	CAN bus line (between CAN_L and H lines) is shorted	If a CAN bus line is shorted, all ECUs cease communicating each other (This fail-safe function is called "Bus off").
	Other than above	Poorly engaged connector	–

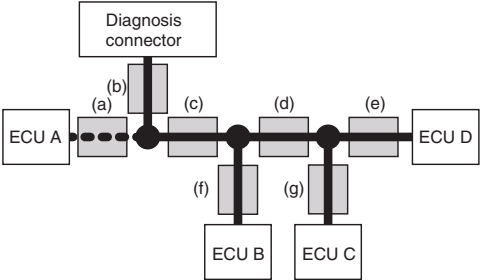
(3) Checking the communication condition of ECUs

The MUT-III narrows down troubles in circuit by itself. Its strategy is as follows.

Reference circuit



AC502594AB

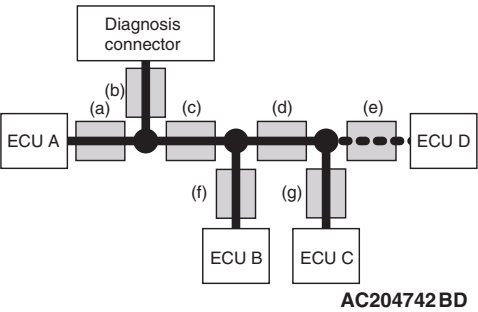
ECU which cannot communicate with the MUT-III	Possible trouble spot	Logic for narrowing down trouble spot	
ECU A	CAN bus line (a) and power supply system to ECU A	<p>ECU A communicates with the MUT-III via CAN bus lines (a) and (b). The MUT-III judges that CAN bus line (b) is normal, because it can communicate with other ECUs. Possible trouble may be present in CAN bus line (a) or the power supply system to ECU A.</p>	 <p style="text-align: right;">AC204742 AZ</p>

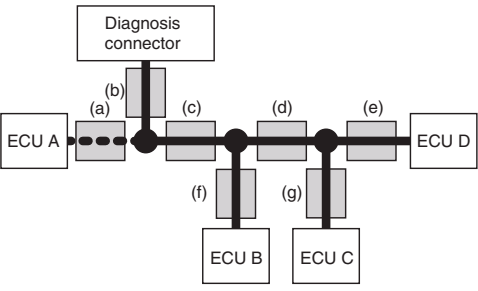
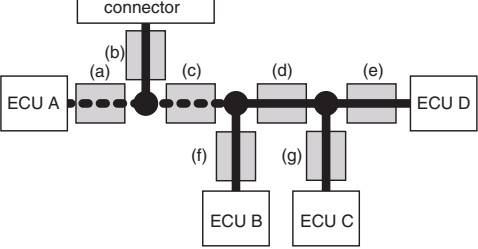
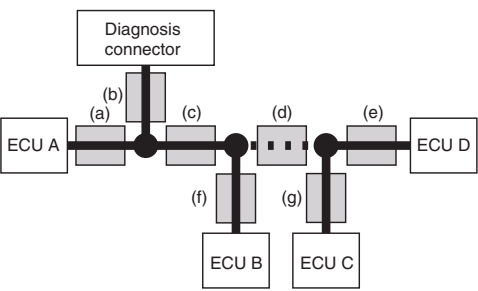
ECU which cannot communicate with the MUT-III	Possible trouble spot	Logic for narrowing down trouble spot	
ECU C	CAN bus line (g) and power supply system to ECU C	ECU C communicates with the MUT-III via CAN bus lines (b), (c), (d) and (g). The MUT-III judges that CAN bus lines (b), (c) and (d) are normal, because it can communicate with ECUs B and D. Possible trouble may be present in CAN bus line (g) or the power supply system to ECU C.	<p align="right">AC204742BA</p>
ECU C and ECU D	Trouble in CAN bus line (d)	ECUs C and D communicate with the MUT-III via CAN bus lines (b), (c), (d), (e) and (g). The MUT-III judges that CAN bus lines (b) and (c) are normal, because it can communicate with ECU B. Possible trouble may be present in CAN bus line (d), (e) or (g) or the power supply system to ECU D. CAN bus line (d) is shared by ECUs C and D when they communicate with the MUT-III, so CAN bus line (d) is suspected as ultimate cause. CAN bus line (g) or (e) and power supply systems to ECU C or D are also suspected as second cause.	<p align="right">AC204742BB</p>
ECU B and ECU D	CAN bus line (e) or (f) or power supply system to ECU B or D	ECUs C and D communicate with the MUT-III via CAN bus lines (b), (c), (d), (e) and (g). The MUT-III judges that CAN bus lines (b), (c) and (d) are normal, because it can communicate with ECU C. Possible trouble may be present in CAN bus line (f) or (e) or the power supply system to ECU B or D.	<p align="right">AC204742BC</p>

2. If diagnosis code related to CAN communication is set as past trouble, isolate opens as described below.

NOTE: If you pinpoint trouble spot according to diagnosis code, you should use time-out diagnosis code. diagnosis code related to failure information is set when the data to be set contains an error, so CAN bus line itself is probably normal.

NOTE: Time-out diagnosis code codes are stored in each ECU memory individually. Therefore, it is possible that these diagnosis code codes have not been set simultaneously. If the trouble spot cannot be found when you diagnose by judging from multiple diagnosis code codes, check the communication lines between each ECU.

Diagnosis code to be set	Possible trouble spot	Logic for narrowing down trouble spot	
Time-out diagnosis code associated with ECU D is stored in ECU A, ECU B and ECU C.	Trouble in CAN bus line (e) and power supply system to ECU D	When time-out diagnosis code associated with ECU D is stored in ECU A, B and C, or time-out diagnosis code associated with ECUs A, B and C is stored in ECU D, or "bus off" diagnosis code is stored in ECU D, CAN bus line (e) is suspected. When diagnosis code is not stored in ECU D, the power supply to ECU D is suspected.	 <p style="text-align: right;">AC204742 BD</p>
Time-out diagnosis code associated with ECUs A, B and C is stored in ECU.			
"Bus off" diagnosis code is stored in ECU D.			

Diagnosis code to be set	Possible trouble spot	Logic for narrowing down trouble spot	
Time-out diagnosis code associated with ECU A is stored in ECUs B, C and D.	Trouble in CAN bus line (a) and power supply system to ECU A.	When time-out diagnosis code associated with ECU A is stored in ECUs B, C and D, or time-out diagnosis code associated with ECUs B, C and D is stored in ECU A, or "bus off" diagnosis code is stored in ECU A, CAN bus line (a) or (c) is suspected. When diagnosis code is not stored in ECU A, the power supply to ECU A is suspected.	 <p align="right">AC204742 BE</p>
Time-out diagnosis code associated with ECUs B, C and D is stored in ECU D.			 <p align="right">AC204742 BF</p>
"Bus off" diagnosis code is stored in ECU A.			 <p align="right">AC204742 BG</p>
Time-out diagnosis code codes associated with ECUs C and D are stored in ECU A and ECU B.	Trouble in CAN bus line (d)	If time-out diagnosis code codes associated with ECUs C and D are stored in ECUs A and B, or time-out codes associated with ECUs A and B are stored in ECUs C and D, CAN bus line (d) is suspected. CAN bus line (g) or (e) and power supply systems to ECU C or D are also suspected as second cause.	
Time-out diagnosis code codes associated with ECUs A and B are stored in ECU C and ECU D.			

TROUBLESHOOTING

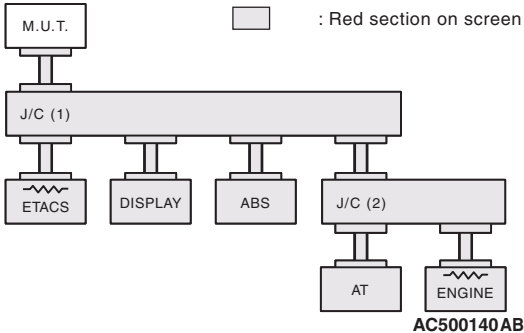
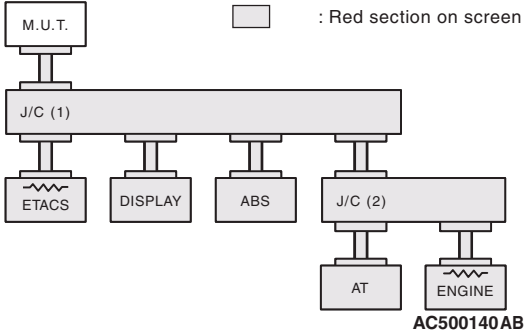
CAN BUS DIAGNOSTICS TABLE

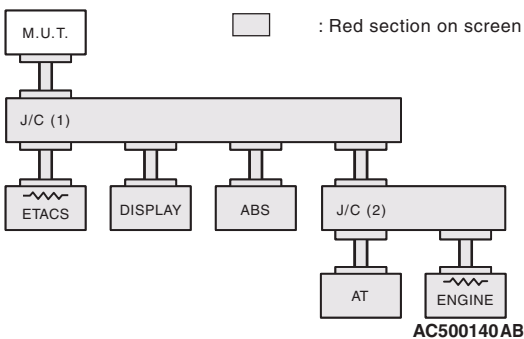
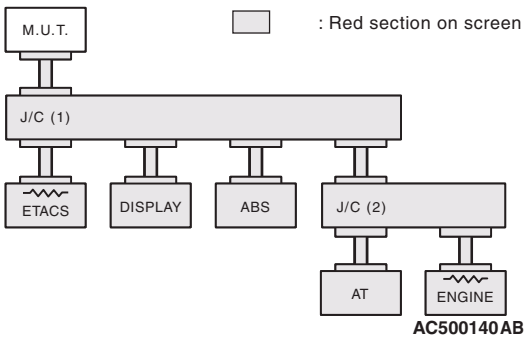
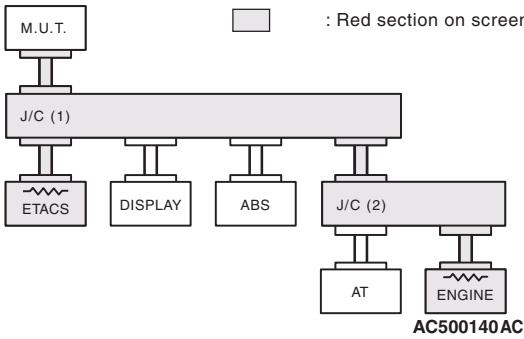
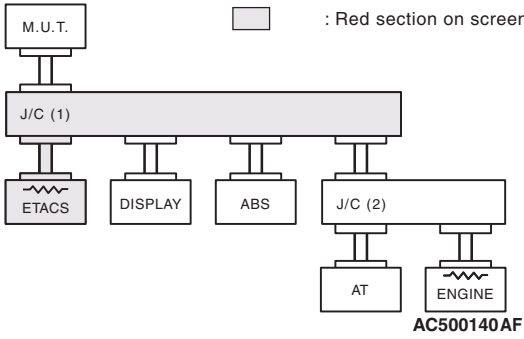
M1548300200293

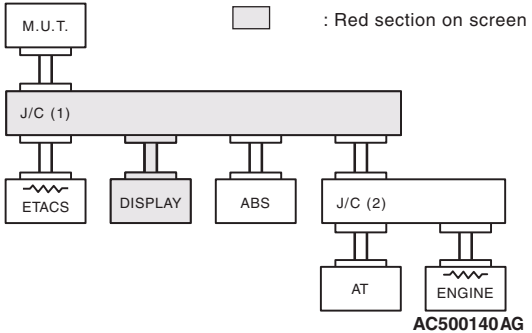
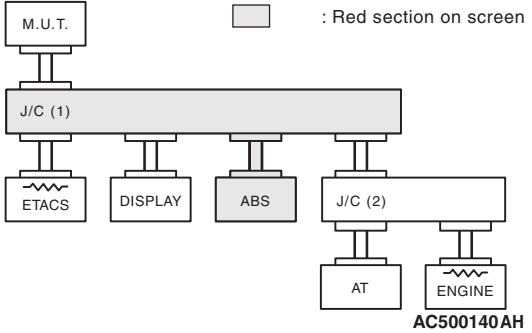
This diagnosis applies only to the CAN bus lines. If a different system is defective, proceed to the applicable diagnosis section for each system. Observe the diagnosis procedure below only when the CAN bus line is defective.

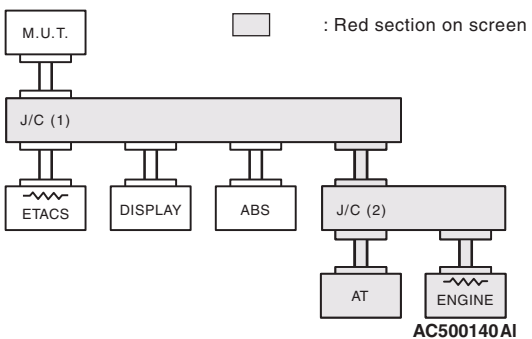
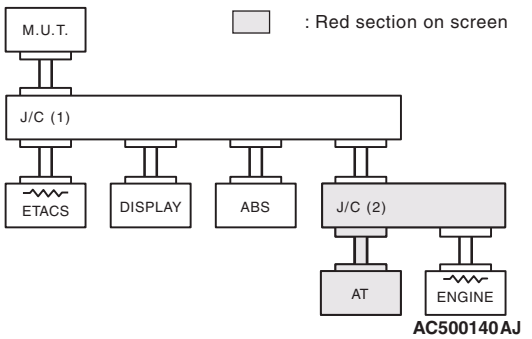
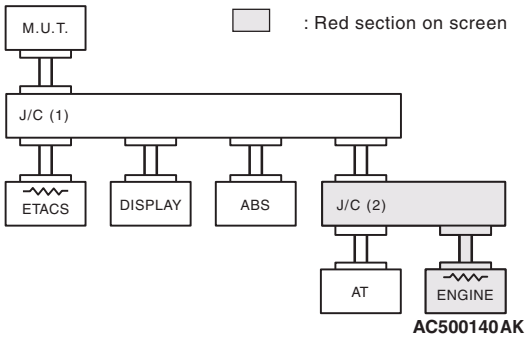
CAUTION

During diagnosis, a diagnosis code associated with another system may be set when the ignition switch is turned on with connector(s) disconnected. After completing the repair, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.

M.U.T.-III screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 <p>M.U.T. : Red section on screen</p> <p>J/C (1)</p> <p>ETACS DISPLAY ABS J/C (2)</p> <p>AT ENGINE</p> <p>AC500140AB</p>	<p>Short circuit to battery in red displayed area is estimated.</p>	<p>Diagnosis Item 1 Diagnose shorts in the power supply to CAN bus line</p>	<p>P.54C-18</p>
 <p>M.U.T. : Red section on screen</p> <p>J/C (1)</p> <p>ETACS DISPLAY ABS J/C (2)</p> <p>AT ENGINE</p> <p>AC500140AB</p>	<p>Earthing in red displayed area is estimated.</p>	<p>Diagnosis Item 2 Diagnose shorts in the ground to CAN bus line</p>	<p>P.54C-30</p>

M.U.T.-III screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 <p align="center">AC500140 AB</p>	<p>Short circuit between CAN_H and CAN_L in red displayed area is estimated.</p>	<p>Diagnosis Item 3 Diagnose shorts between CAN_H and L lines</p>	<p>P.54C-45</p>
 <p align="center">AC500140 AB</p>	<p>Disconnection in red displayed area is estimated.</p>		
 <p align="center">AC500140 AC</p>	<p>Disconnection in red displayed area is estimated.</p>	<p>Diagnosis Item 4 Diagnose the terminator resistors</p>	<p>P.54C-55</p>
 <p align="center">AC500140 AF</p>	<p>Harness disconnection or loose connection in red displayed area is estimated.</p>	<p>Diagnosis Item 5 Diagnose when the M.U.T.-III cannot receive the data sent by ETACS-ECU.</p>	<p>P.54C-58</p>

M.U.T.-III screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 <p>AC500140 AG</p>	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 6 Diagnose when the M.U.T.-III cannot receive the data sent by RV meter. <Vehicles with RV meter>	P.54C-62
 <p>AC500140 AH</p>	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 7 Diagnose when the M.U.T.-III cannot receive the data sent by ABS-ECU. <Vehicles with ABS>	P.54C-65

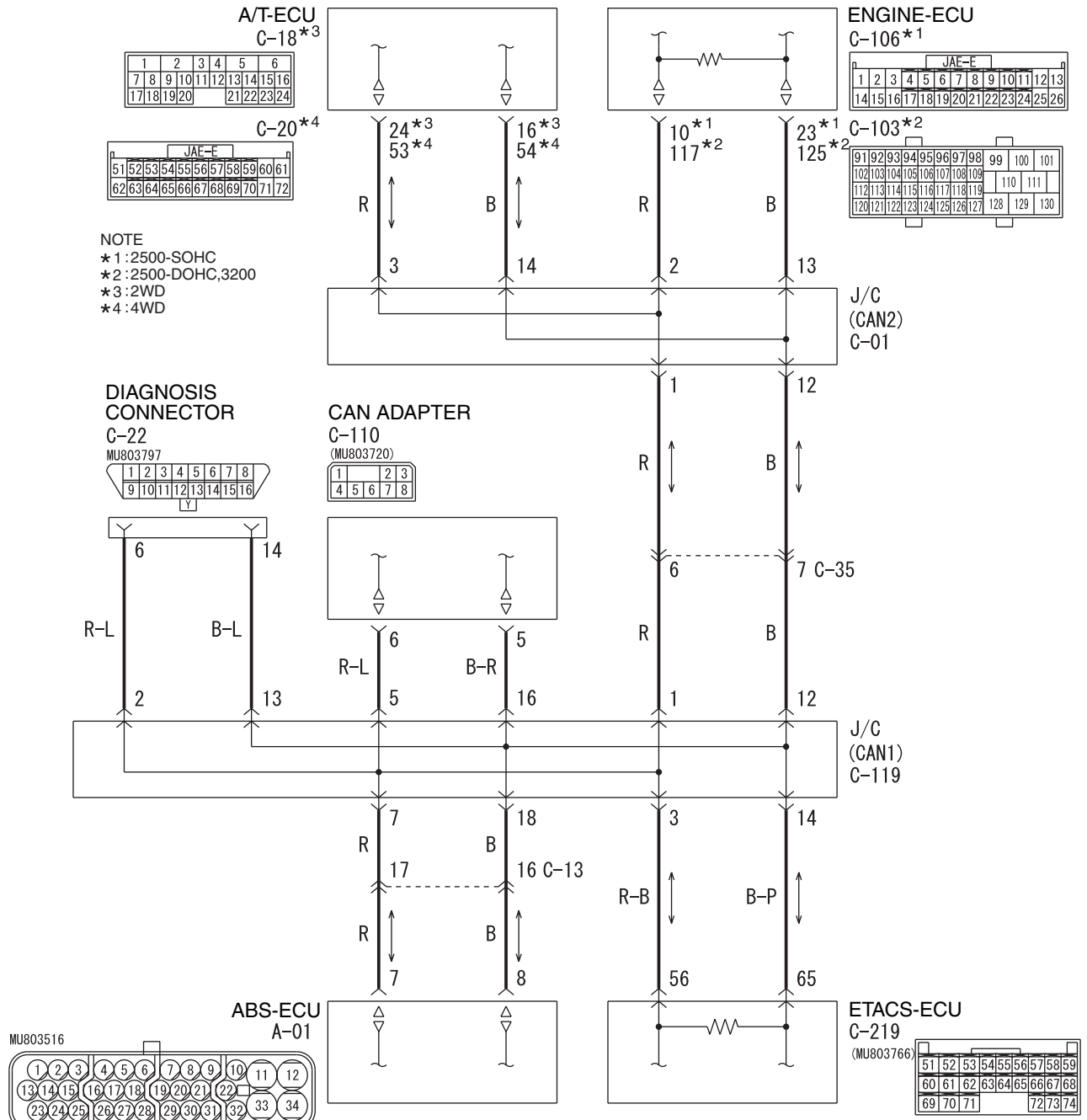
M.U.T.-III screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 <p>AC500140 AI</p>	<p>Harness disconnection or loose connection in red displayed area is estimated.</p>	<p>Diagnosis Item 8 Diagnose the lines between the joint connectors (CAN1 and CAN2)</p>	<p>P.54C-70</p>
 <p>AC500140 AJ</p>	<p>Harness disconnection or loose connection in red displayed area is estimated.</p>	<p>Diagnosis Item 9 Diagnose when the M.U.T.-III cannot receive the data sent by A/T-ECU. <A/T></p>	<p>P.54C-76</p>
 <p>AC500140 AK</p>	<p>Harness disconnection or loose connection in red displayed area is estimated.</p>	<p>Diagnosis Item 10 Diagnose when the M.U.T.-III cannot receive the data sent by engine-ECU.</p>	<p>P.54C-80</p>

CAN BUS DIAGNOSIS

Diagnosis Item 1: Diagnose shorts in the power supply to CAN bus line

CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



NOTE
 *1 : 2500-SOHC
 *2 : 2500-DOHC,3200
 *3 : 2WD
 *4 : 4WD

DIAGNOSIS CONNECTOR C-22

CAN ADAPTER C-110 (MU803720)

Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

FUNCTION

When diagnosing the CAN bus lines, the M.U.T.-III measures the voltage of CAN_H and CAN_L line and detects the short to power supply or ground.

TROUBLE JUDGEMENT CONDITIONS

The M.U.T.-III judges the trouble when it is impossible to receive the periodically sent data and the voltage of CAN_H or CAN_L line is more than 4.0 volts.

TROUBLESHOOTING HINTS

- Malfunction of the wiring harness
- Short to power supply of the connector
- Malfunction of each ECU

DIAGNOSIS PROCEDURE

STEP 1. Check the CAN bus lines. Voltage measurement at C-22 diagnosis connector.

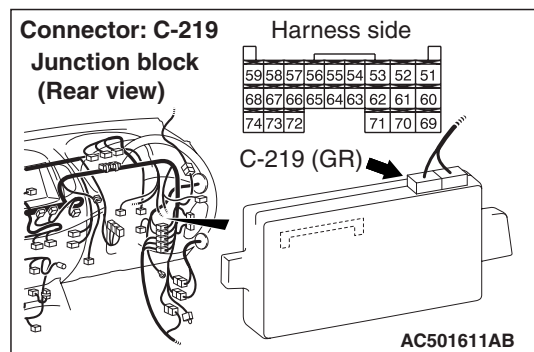
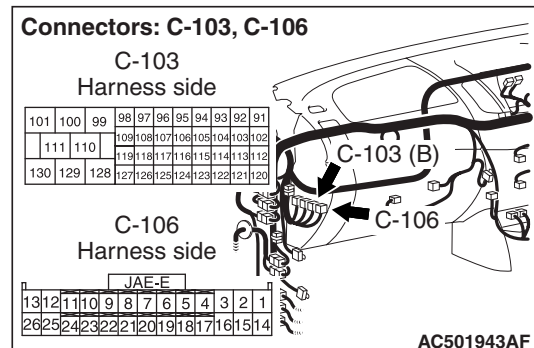
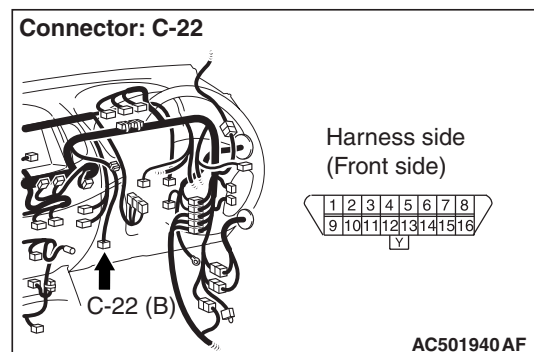
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54C-5.

⚠ CAUTION

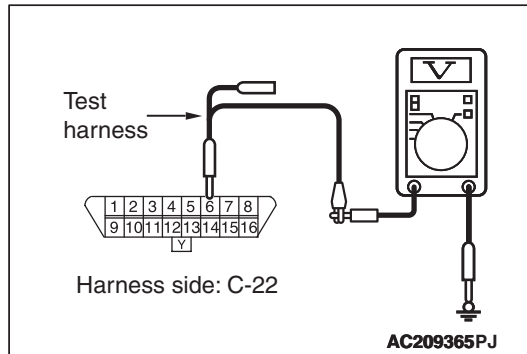
The test wiring harness should be used. For details refer to P.54C-5.

NOTE: This inspection allows you to check that there is a short to power supply in either CAN_H line or CAN_L line. Thus, in the following steps, check the CAN bus line that is defective.



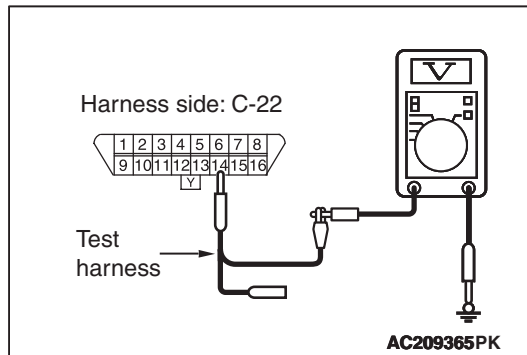
- (1) Disconnect engine-ECU connector C-106 <2500-SOHC> or C-103 <2500-DOHC, 3200> and ETACS-ECU connector C-219, and measure the voltage at the harness side of diagnosis connector C-22.

- (2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



- (3) Voltage between C-22 diagnosis connector terminal No.6 (CAN_H) and body earth

OK: 4.0 V or less



- (4) Voltage between C-22 diagnosis connector terminal No.14 (CAN_L) and body earth

OK: 4.0 V or less

- (5) Disconnect the negative battery terminal.

Q: Is the check result normal?

YES : <Both of the measurement results show 4.0 V or less> Go to Step 12.

NO : <Either of CAN_H line or CAN_L line the measurement results show 4.0 V or less> Go to Step 2.

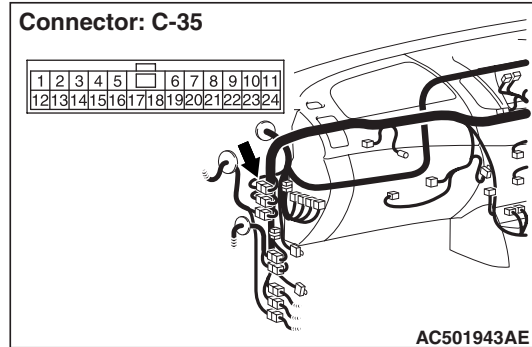
STEP 2. Check the CAN line. Voltage measurement at C-35 intermediate connector.

⚠ CAUTION

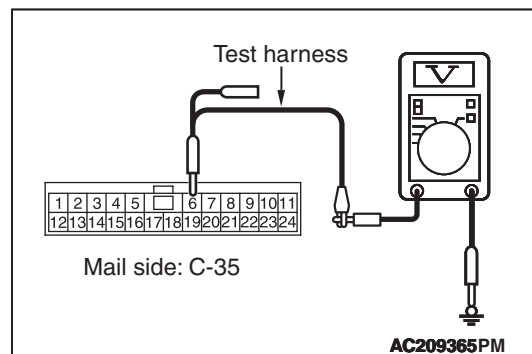
A digital multimeter should be used. For details refer to [P.54C-5](#).

⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

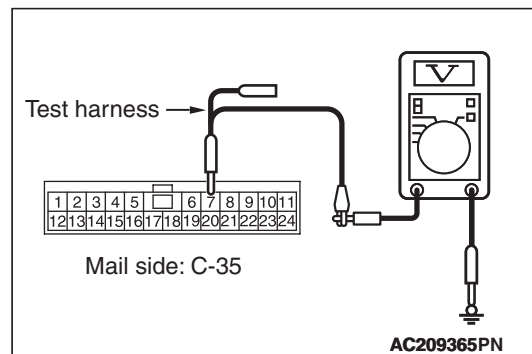


- (1) Disconnect the intermediate connector, and measure at its male-side intermediate connector (at the front wiring harness side).
(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



- (3) Voltage between C-35 intermediate connector terminal No.6 (CAN_H) and body earth

OK: 4.0 V or less



- (4) Voltage between C-35 intermediate connector terminal No.7 (CAN_L) and body earth

OK: 4.0 V or less

- (5) Disconnect the negative battery terminal.

Q: Is the check result normal?

YES : <4.0 V or less> Go to Step 7.

NO : <more than 4.0 V> Go to Step 3.

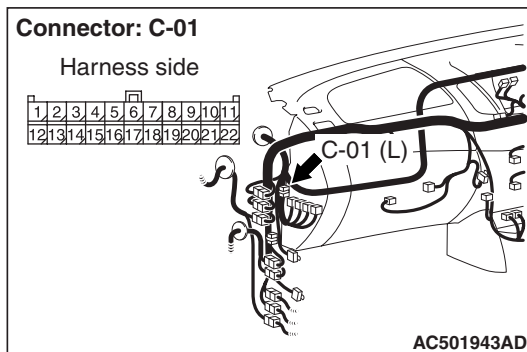
STEP 3. Check the CAN line between joint connector (CAN2) and the engine-ECU. Voltage measurement at C-01 joint connector (CAN2).

CAUTION

A digital multimeter should be used. For details refer to P.54C-5.

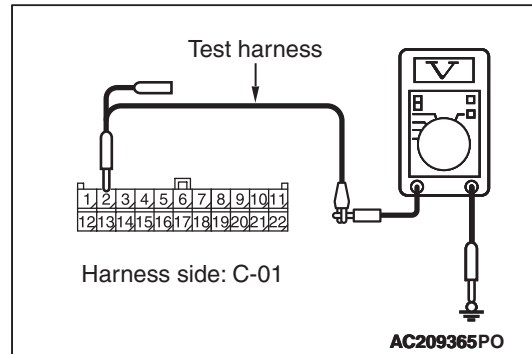
CAUTION

The test wiring harness should be used. For details refer to P.54C-5.



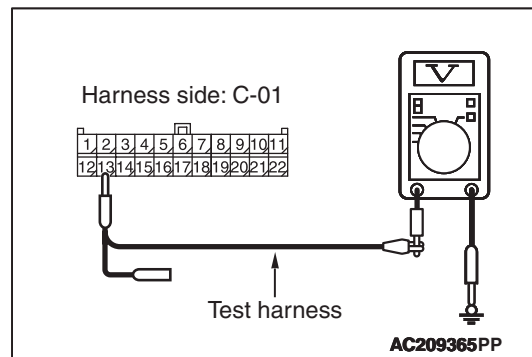
(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-01 joint connector (CAN2) terminal No.2 (CAN_H) and body earth

OK: 4.0 V or less



(4) Voltage between C-01 joint connector (CAN2) terminal No.13 (CAN_L) and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

Q: Is the check result normal?

YES <M/T> : <4.0 V or less> Repair intermediate connector (C-35), or the wiring harness between joint connector (CAN2) and intermediate connector (C-35).

YES <A/T> : <4.0 V or less> Go to Step 4.

NO : <more than 4.0 V> Repair the wiring harness between joint connector (CAN2) and the engine-ECU connector.

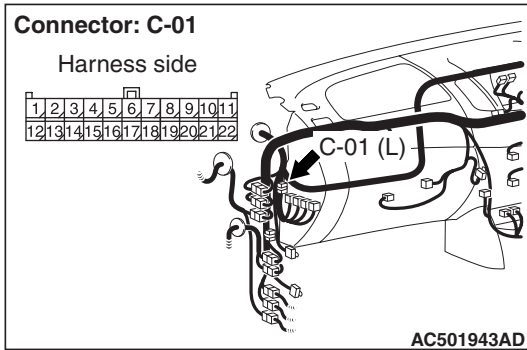
STEP 4. Check the CAN line between joint connector (CAN2) and the A/T-ECU. Voltage measurement at C-01 joint connector (CAN2).

CAUTION

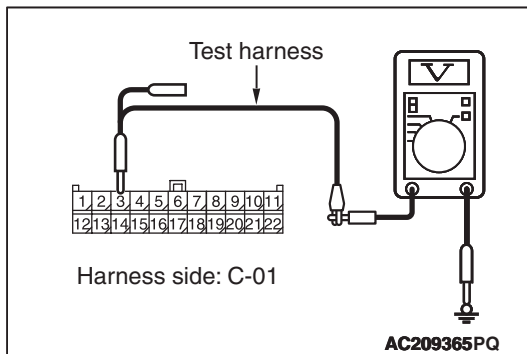
A digital multimeter should be used. For details refer to P.54C-5.

CAUTION

The test wiring harness should be used. For details refer to P.54C-5.

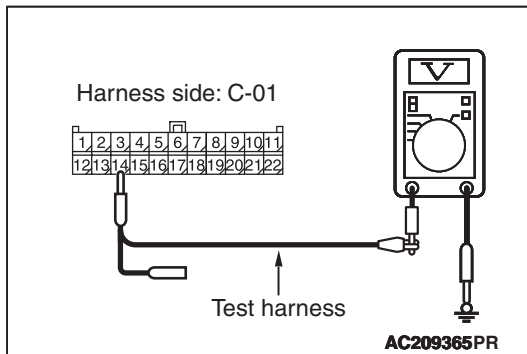


- (1) Disconnect joint connector (CAN2), and measure at the wiring harness side.
- (2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



- (3) Voltage between C-01 joint connector (CAN2) terminal No.3 (CAN_H) and body earth

OK: 4.0 V or less



- (4) Voltage between C-01 joint connector (CAN2) terminal (CAN_L) No.14 and body earth

OK: 4.0 V or less

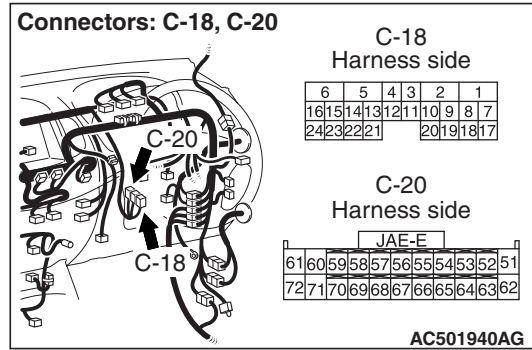
- (5) Disconnect the negative battery terminal.

Q: Is the check result normal?

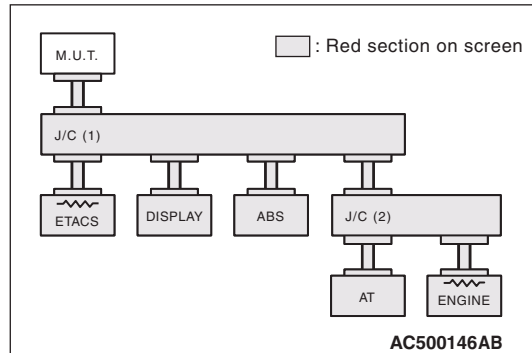
YES : <4.0 V or less> Repair intermediate connector (C-35), or the wiring harness between joint connector (CAN2) and the intermediate connector (C-35).

NO : <more than 4.0 V> Go to Step 5.

STEP 5. M.U.T.-III CAN bus diagnostics [A/T-ECU connector disconnected]



- (1) Disconnect A/T-ECU connector C-18 <2WD> or C-20 <4WD>, and diagnose by using the M.U.T.-III.



- (2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN2) and the A/T-ECU connector.

NO : Check the A/T-ECU connector, and repair if necessary. If the A/T-ECU connector is in good condition, Go to Step 6.

STEP 6. M.U.T.-III CAN bus diagnostics (retest the system)

Diagnose CAN bus lines, and check if M.U.T.-III screen shows normal state.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the A/T-ECU connector, and repair if necessary. If the A/T-ECU connector is in good condition, replace the A/T-ECU.

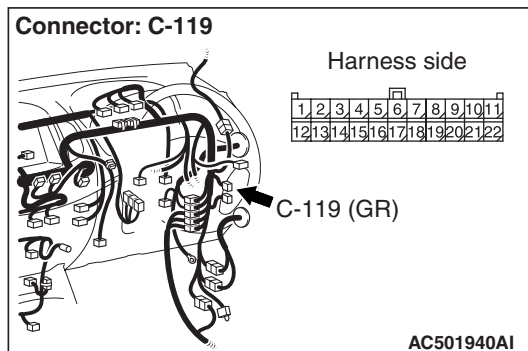
STEP 7. Check the CAN line between joint connector (CAN1) and the ETACS-ECU. Voltage measurement at C-119 joint connector (CAN1).

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

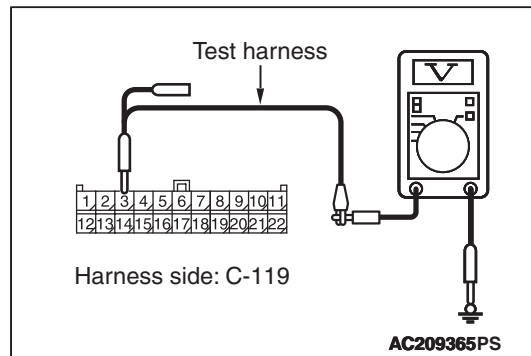
⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



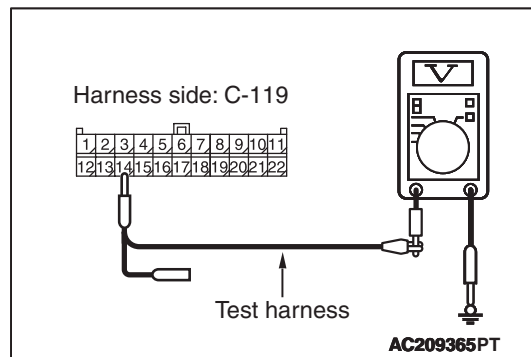
(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-119 joint connector (CAN1) terminal No.3 (CAN_H) and body earth

OK: 4.0 V or less



(4) Voltage between C-119 joint connector (CAN1) terminal No.14 (CAN_L) and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

Q: Is the check result normal?

YES <vehicles without RV meter and ABS> : <4.0 V or less> Go to Step 13.

YES <vehicles with RV meter> : <4.0 V or less> Go to Step 8.

YES <vehicles with ABS> : <4.0 V or less> Go to Step 10.

YES <vehicles with RV meter and ABS> : <4.0 V or less> Go to Step 8.

NO : <more than 4.0 V> Repair the wiring harness between joint connector (CAN1) and the ETACS-ECU connector.

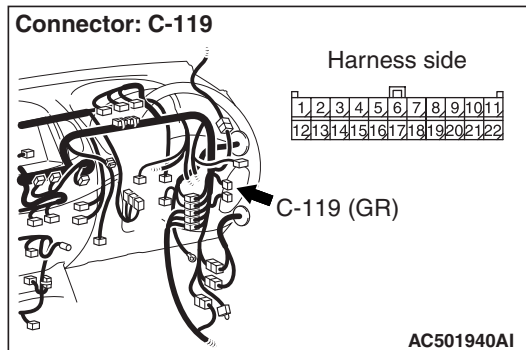
STEP 8. Check the CAN line between joint connector (CAN1) and the CAN adapter. Voltage measurement at C-119 joint connector (CAN1).

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

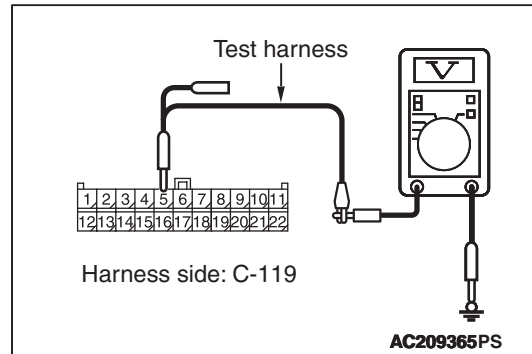
⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



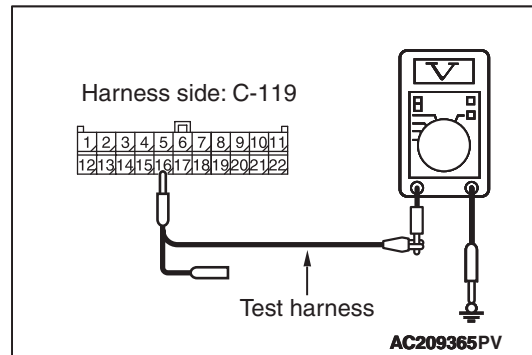
(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-119 joint connector (CAN1) terminal (CAN_H) No.5 and body earth

OK: 4.0 V or less



(4) Voltage between C-119 joint connector (CAN1) terminal (CAN_L) No.16 and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

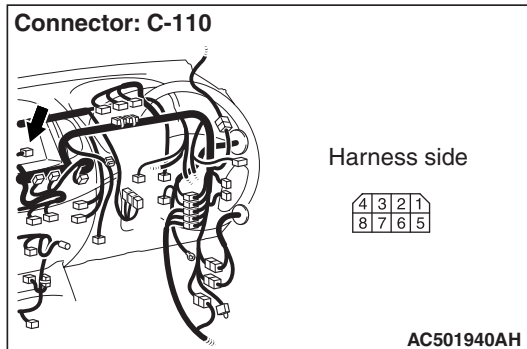
Q: Is the check result normal?

YES <vehicles without ABS> : <4.0 V or less> Go to Step 13.

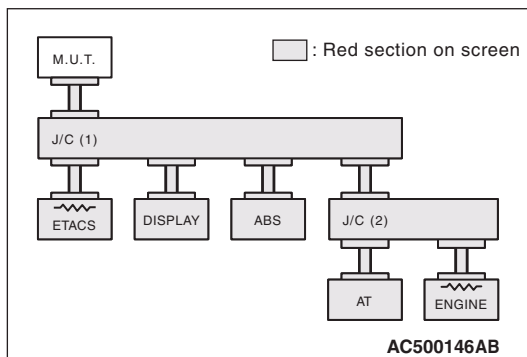
YES <vehicles with ABS> : <4.0 V or less> Go to Step 10.

NO : <more than 4.0 V> Go to Step 9.

STEP 9. M.U.T.-III CAN bus diagnostics [CAN adapter connector disconnected]



(1) Disconnect CAN adapter connector C-110, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) and the CAN adapter connector.

NO : Check the CAN adapter connector, and repair if necessary. If the CAN adapter connector is in good condition, refer to GROUP 54A –RV meter .

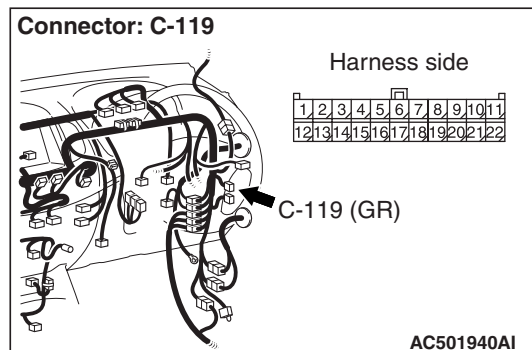
STEP 10. Check the CAN line between joint connector (CAN1) and the ABS-ECU. Voltage measurement at C-119 joint connector (CAN1).

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

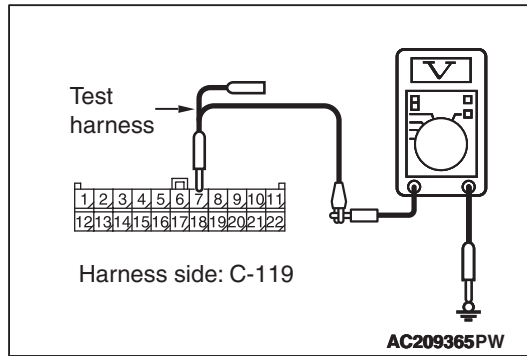
⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



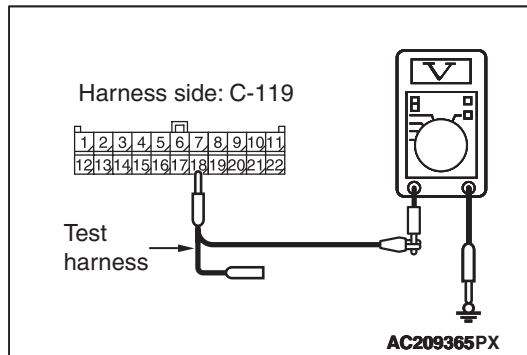
(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

- (2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



- (3) Voltage between C-119 joint connector (CAN1) terminal No.7 (CAN_H) and body earth

OK: 4.0 V or less



- (4) Voltage between C-119 joint connector (CAN1) terminal No.18 (CAN_L) and body earth

OK: 4.0 V or less

- (5) Disconnect the negative battery terminal.

CAUTION

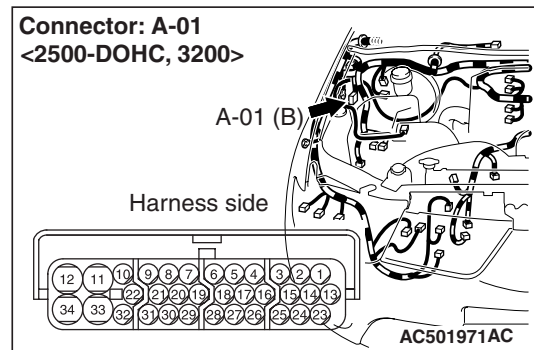
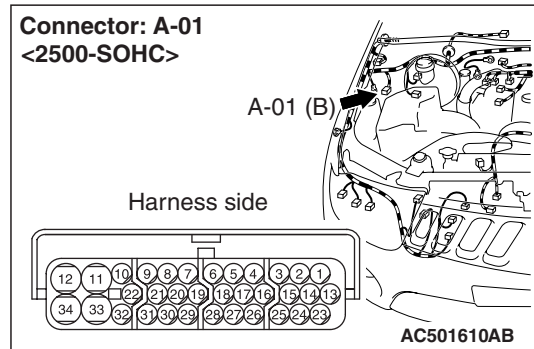
Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-5.

Q: Is the check result normal?

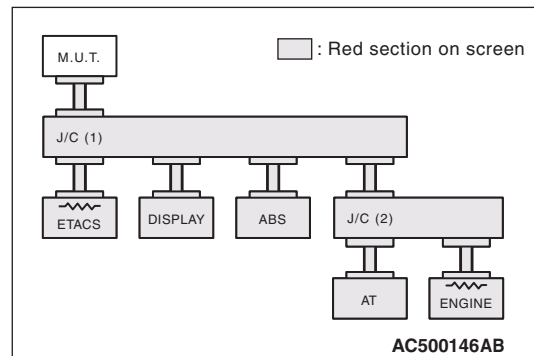
YES : <4.0 V or less> Go to Step 13.

NO : <more than 4.0 V> Go to Step 11.

STEP 11. M.U.T.-III CAN bus diagnostics
[ABS-ECU connector disconnected]



- (1) Disconnect ABS-ECU connector A-01, and diagnose by using the M.U.T.-III.



- (2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Check the intermediate connector (C-13), and repair if necessary. If the intermediate connector is in good condition, repair the wiring harness between joint connector (CAN1) and the ABS-ECU connector.

NO : Check the ABS-ECU connector, and repair if necessary. If the ABS-ECU connector is in good condition, go to Step 12.

STEP 12. M.U.T.-III CAN bus diagnostics (retest the system)

Diagnose CAN bus lines, and check if M.U.T.-III screen shows normal state.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the ABS-ECU connector, and repair if necessary. If the ABS-ECU connector is in good condition, replace the ABS-ECU.

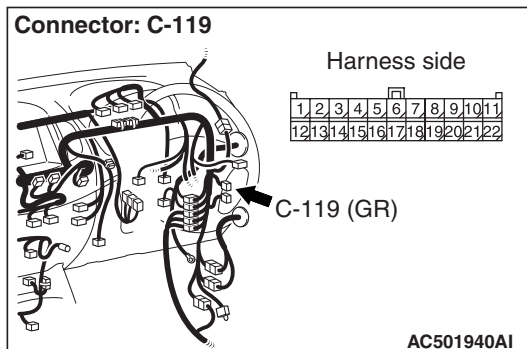
STEP 13. Check the CAN line between joint connector (CAN1) and the diagnosis connector. Voltage measurement at C-119 joint connector (CAN1).

CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

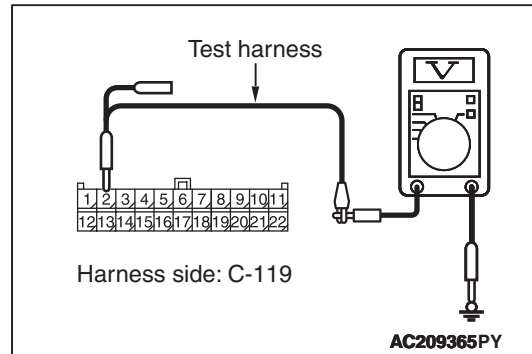
CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



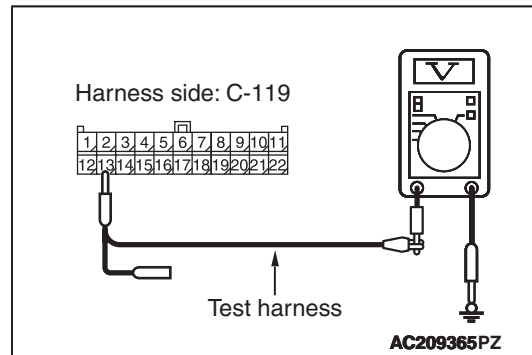
(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-119 joint connector (CAN1) terminal No.2 (CAN_H) and body earth

OK: Less than 1.0 V



(4) Voltage between C-119 joint connector (CAN1) terminal No.13 (CAN_L) and body earth

OK: Less than 1.0 V

(5) Disconnect the negative battery terminal.

CAUTION

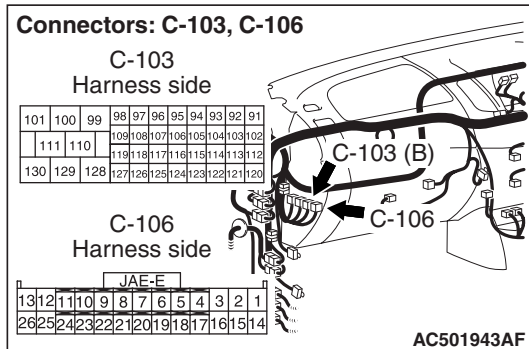
Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

Q: Is the check result normal?

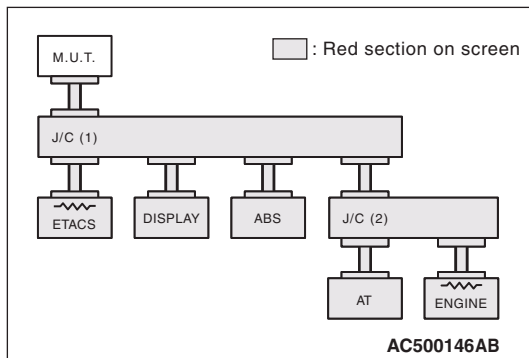
YES : <Less than 1.0 V> Repair the intermediate connector, or the wiring harness between joint connector (CAN1) and the intermediate connector (C-35).

NO : <1.0 V or more> Repair the diagnosis connector, or the wiring harness between joint connector (CAN1) and the diagnosis connector.

STEP 14. M.U.T.-III CAN bus diagnostics [engine-ECU connector disconnected]



(1) Disconnect engine-ECU connector C-106 <2500-SOHC> or C-103 <2500-DOHC, 3200>, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the engine-ECU connector, and repair if necessary. If the engine-ECU connector is in good condition, go to Step 15.

STEP 15. M.U.T.-III CAN bus diagnostics (retest the system)

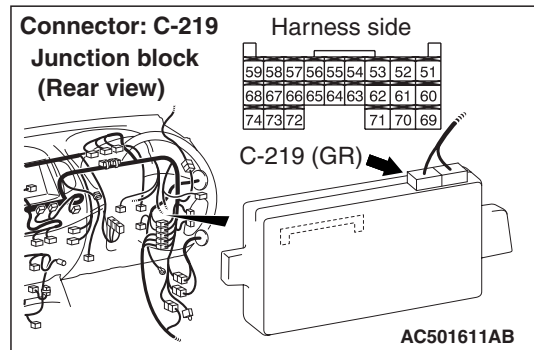
Diagnose CAN bus lines, and check if M.U.T.-III screen shows normal state.

Q: Is the check result normal?

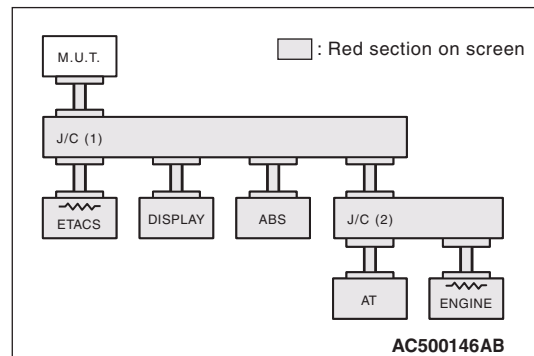
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the engine-ECU connector, and repair if necessary. If the engine-ECU connector is in good condition, replace the engine-ECU.

STEP 16. M.U.T.-III CAN bus diagnostics [ETACS-ECU connector disconnected]



(1) Disconnect ETACS-ECU connector C-219, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the ETACS-ECU connector, and repair if necessary. If the ETACS-ECU connector is in good condition, go to Step 17.

STEP 17. M.U.T.-III CAN bus diagnostics (retest the system)

Diagnose CAN bus lines, and check if M.U.T.-III screen shows normal state.

Q: Is the check result normal?

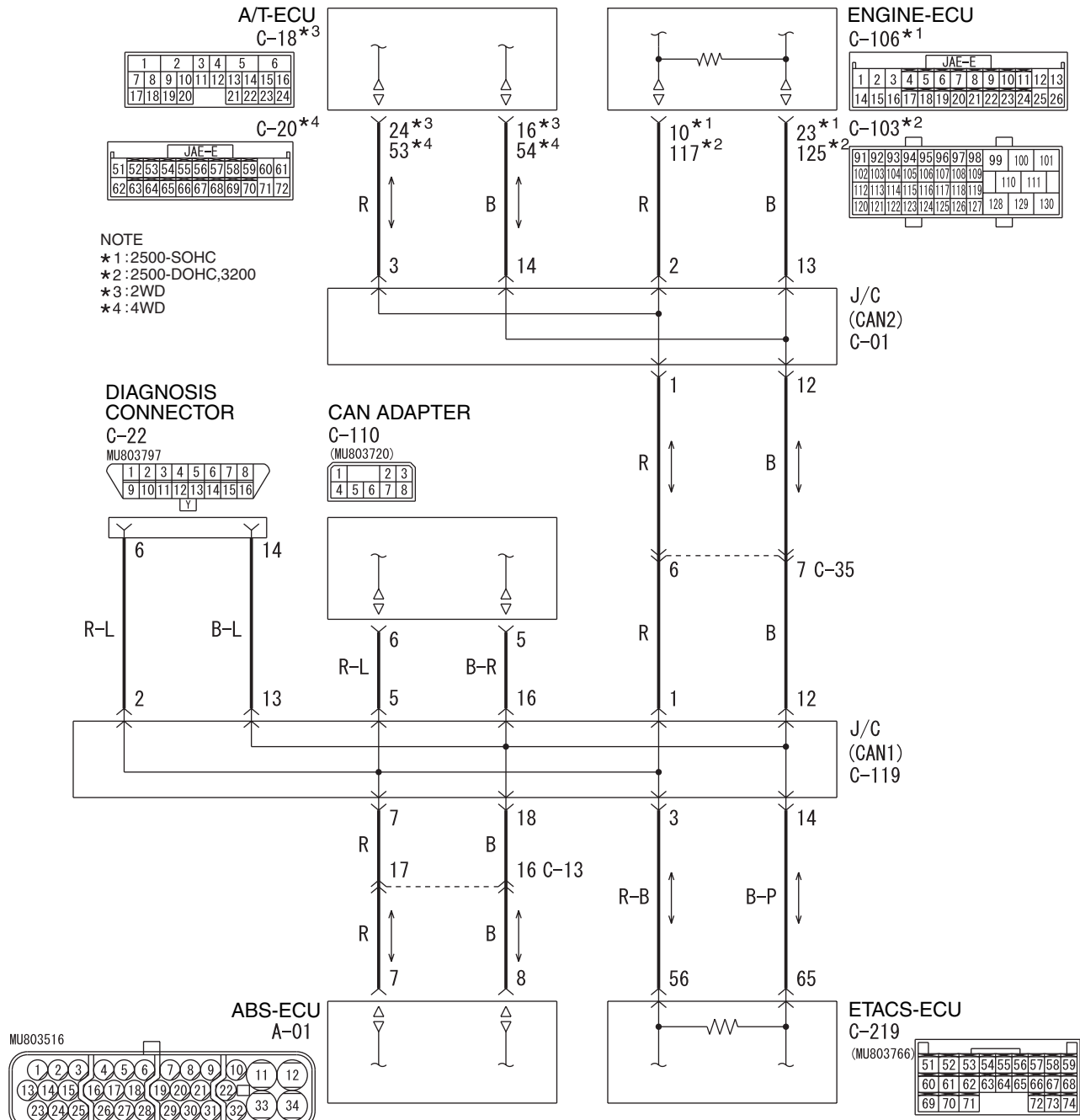
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the ETACS-ECU connector, and repair if necessary. If the ETACS-ECU connector is in good condition, replace the ETACS-ECU.

Diagnosis Item 2: Diagnose shorts in the ground to CAN bus line

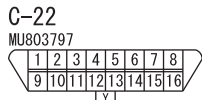
CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.

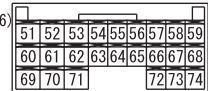
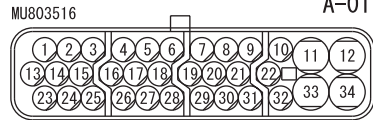
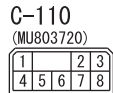


NOTE
 *1 : 2500-SOHC
 *2 : 2500-DOHC,3200
 *3 : 2WD
 *4 : 4WD

DIAGNOSIS CONNECTOR



CAN ADAPTER



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

FUNCTION

When diagnosing the CAN bus lines, the M.U.T.-III measures the voltage of CAN_H and CAN_L line and detects the short to power supply or ground.

TROUBLE JUDGEMENT CONDITIONS

The M.U.T.-III judges the trouble when it is impossible to receive the periodically sent data and the voltage of CAN_H or CAN_L line is less than 1.0 volt.

TROUBLESHOOTING HINTS

- Malfunction of the wiring harness
- Malfunction of the connector
- Malfunction of each ECU

DIAGNOSIS PROCEDURE

STEP 1. Check the CAN bus lines. Resistance measurement at C-22 diagnosis connector.

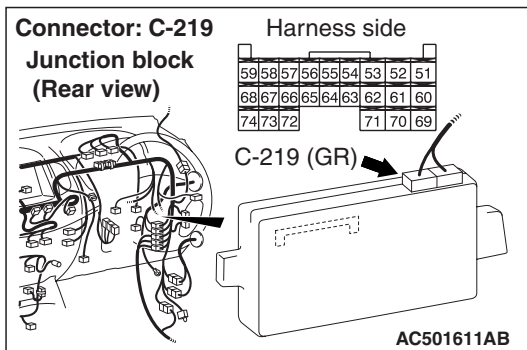
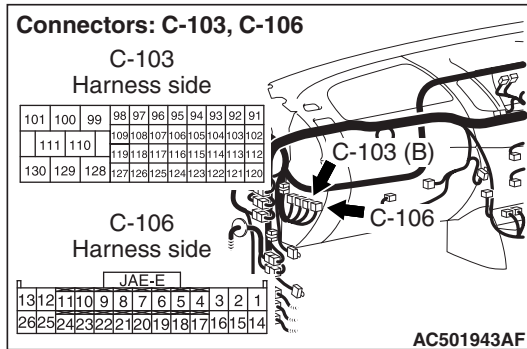
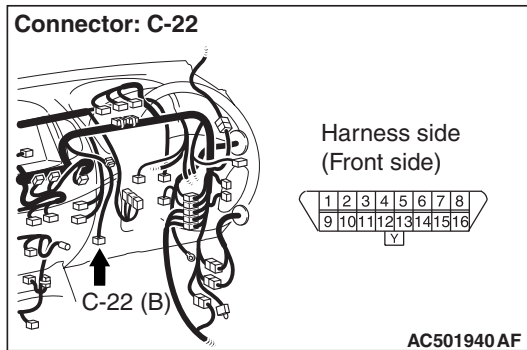
CAUTION

A digital multimeter should be used. For details refer to P.54C-5.

CAUTION

The test wiring harness should be used. For details refer to P.54C-5.

NOTE: This inspection allows you to check that there is a short to ground in either CAN_H line or CAN_L line. Thus, in the following steps, check the CAN bus line that is defective.

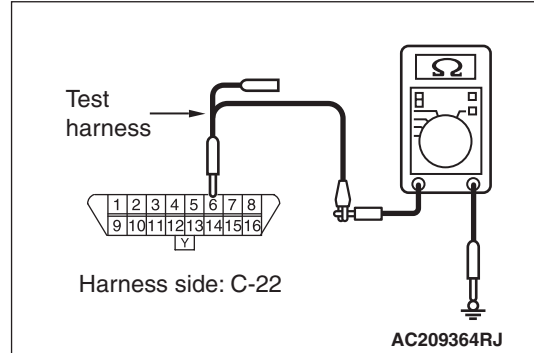


(1) Disconnect engine-ECU connector C-106 <2500-SOHC> or C-103 <2500-DOHC, 3200> and ETACS-ECU connector C-219, and measure the resistance at harness side of diagnosis connector C-22.

CAUTION

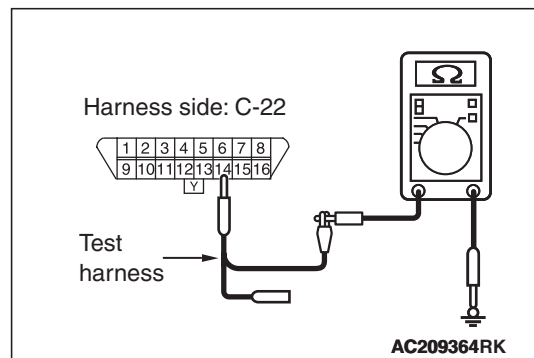
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54C-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-22 diagnosis connector terminal No.6 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between C-22 diagnosis connector terminal No.14 (CAN_L) and body earth

OK: 1 kΩ or more

Q: Is the check result normal?

YES : <Both of the measurement results show 1 kΩ or more> Go to Step 12.

NO : <Either of CAN_H line or CAN_L line the measurement results show 1 kΩ or more> Go to Step 2.

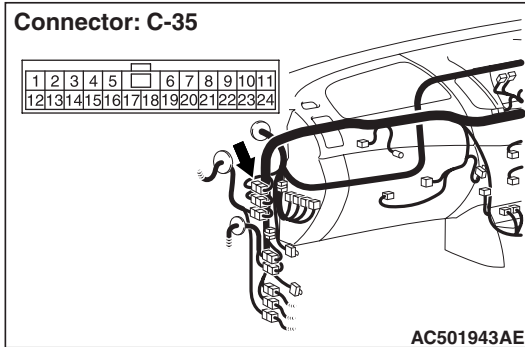
STEP 2. Check the CAN line. Resistance measurement at C-35 intermediate connector.

CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

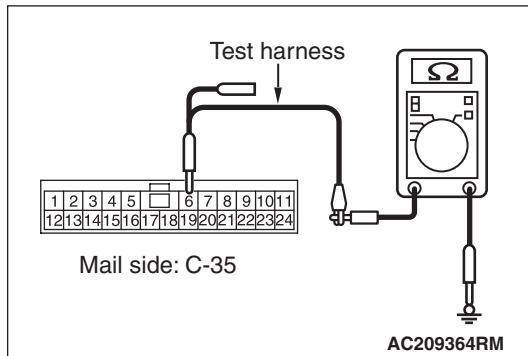


- (1) Disconnect the intermediate connector (C-35), and measure at its male-side intermediate connector (at the front wiring harness side).

CAUTION

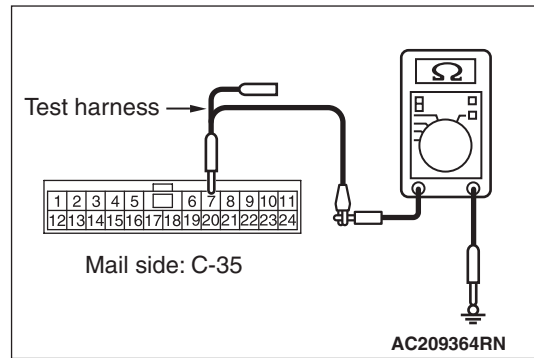
When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

- (2) Ensure that the negative battery terminal is disconnected.



- (3) Resistance between C-35 intermediate connector terminal No.6 (CAN_H) and body earth

OK: 1 kΩ or more



- (4) Resistance between C-35 intermediate connector terminal No.7 (CAN_L) and body earth

OK: 1 kΩ or more

Q: Is the check result normal?

YES : <1 kΩ or more> Go to Step 7.

NO : <less than 1 kΩ> Go to Step 3.

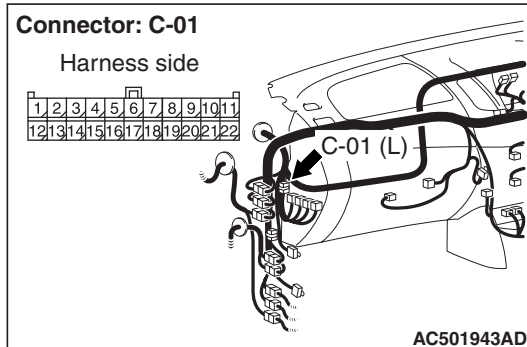
STEP 3. Check the CAN line between joint connector (CAN2) and the engine-ECU. Resistance measurement at C-01 joint connector (CAN2).

CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

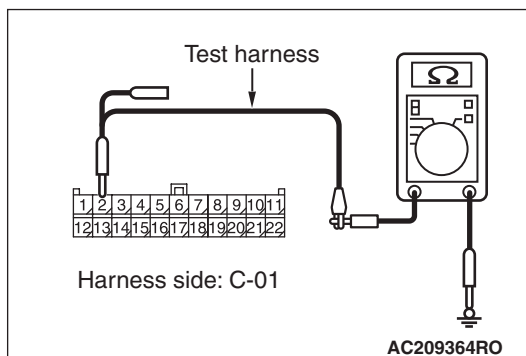


- (1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

CAUTION

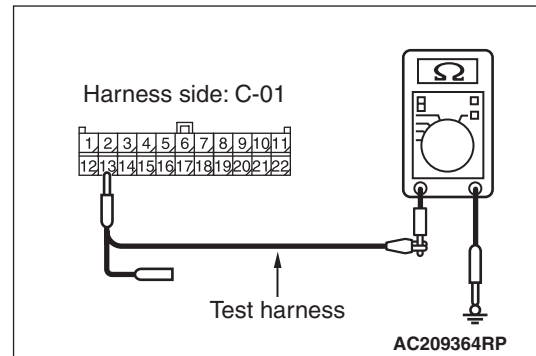
When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

- (2) Ensure that the negative battery terminal is disconnected.



- (3) Resistance between C-01 joint connector (CAN2) terminal No.2 (CAN_H) and body earth

OK: 1 kΩ or more



- (4) Resistance between C-01 joint connector (CAN2) terminal No.13 (CAN_L) and body earth

OK: 1 kΩ or more

Q: Is the check result normal?

YES <M/T> : <1 kΩ or more> Repair intermediate connector (C-35), or the wiring harness between joint connector (CAN2) and intermediate connector (C-35).

YES <A/T> : <1 kΩ or more> Go to Step 4.

NO : <less than 1 kΩ> Repair the wiring harness between joint connector (CAN2) and the engine-ECU connector.

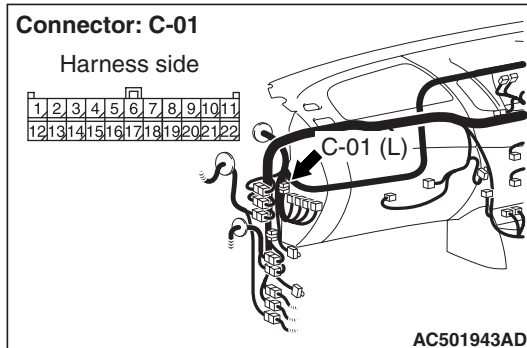
STEP 4. Check the CAN line between joint connector (CAN2) and the A/T-ECU. Resistance measurement at C-01 joint connector (CAN2).

CAUTION

A digital multimeter should be used. For details refer to P.54C-5.

CAUTION

The test wiring harness should be used. For details refer to P.54C-5.

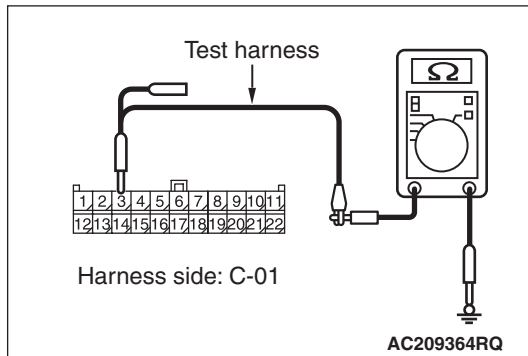


(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

CAUTION

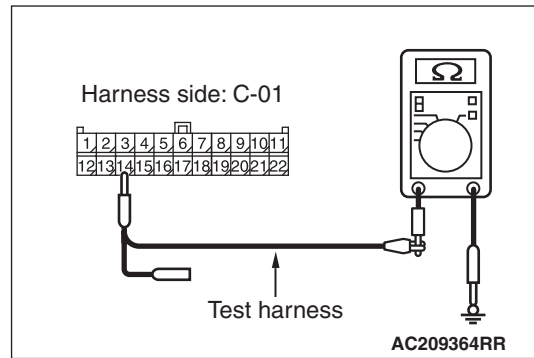
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54C-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-01 joint connector (CAN2) terminal No.3 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between C-01 joint connector (CAN2) terminal No.14 (CAN_L) and body earth

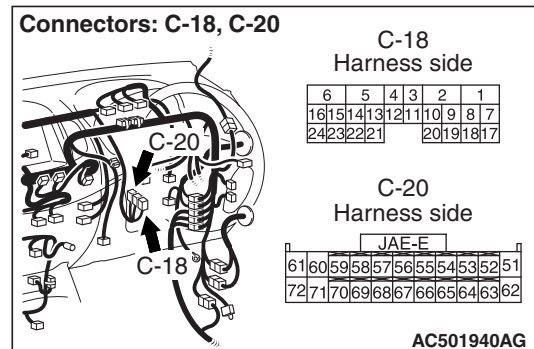
OK: 1 kΩ or more

Q: Is the check result normal?

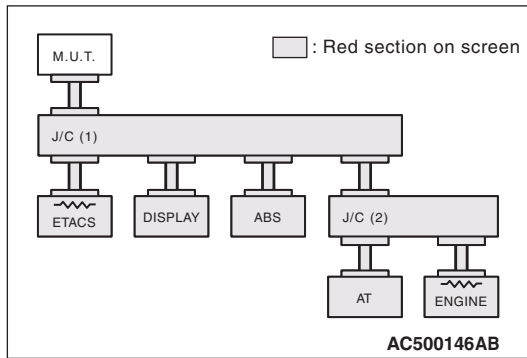
YES : <1 kΩ or more> Repair intermediate connector (C-35), or the wiring harness between joint connector (CAN2) and intermediate connector (C-35).

NO : <less than 1 kΩ> Go to Step 5.

STEP 5. M.U.T.-III CAN bus diagnostics [A/T-ECU connector disconnected]



(1) Disconnect A/T-ECU connector C-18 <2WD> or C-20 <4WD>, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN2) and the A/T-ECU connector.

NO : Check the A/T-ECU connector, and repair if necessary. If the A/T-ECU connector is in good condition, Go to Step 6.

STEP 6. M.U.T.-III CAN bus diagnostics (retest the system)

Diagnose CAN bus lines, and check if M.U.T.-III screen shows normal state.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the A/T-ECU connector, and repair if necessary. If the A/T-ECU connector is in good condition, replace the A/T-ECU.

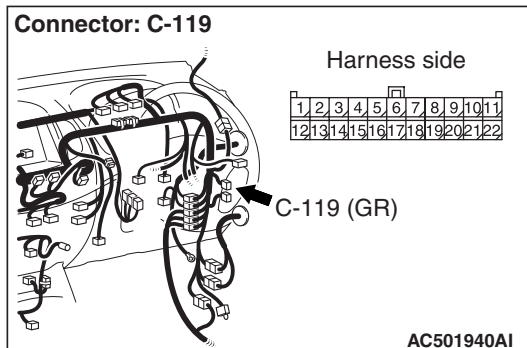
STEP 7. Check CAN line between joint connector (CAN1) and the ETACS-ECU. Resistance measurement at C-119 joint connector (CAN1).

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

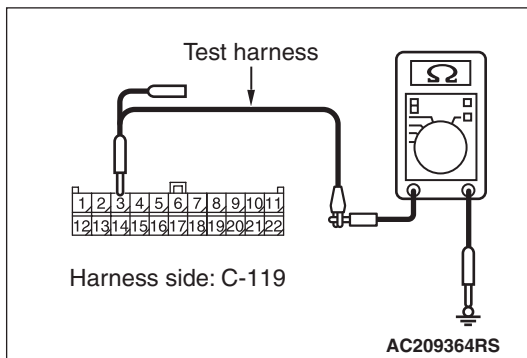


(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

⚠ CAUTION

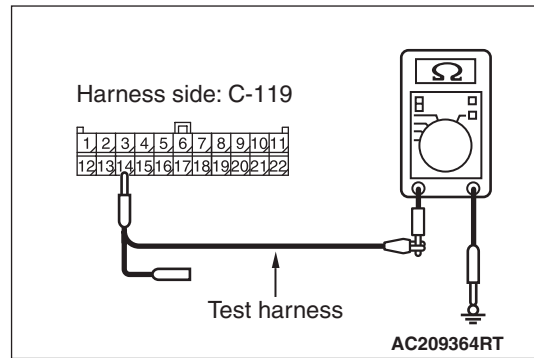
When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-119 joint connector (CAN1) terminal No.3 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between C-119 joint connector (CAN1) terminal No.14 (CAN_L) and body earth

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

Q: Is the check result normal?

YES <vehicles without RV meter and ABS> : <1 kΩ or more> Go to Step 13.

YES <vehicles with RV meter> : <1 kΩ or more> Go to Step 8.

YES <vehicles with ABS> : <1 kΩ or more> Go to Step 10.

YES <vehicles with RV meter and ABS> : <1 kΩ or more> Go to Step 8.

NO : <less than 1 kΩ> Repair the wiring harness between joint connector (CAN1) and the ETACS-ECU connector.

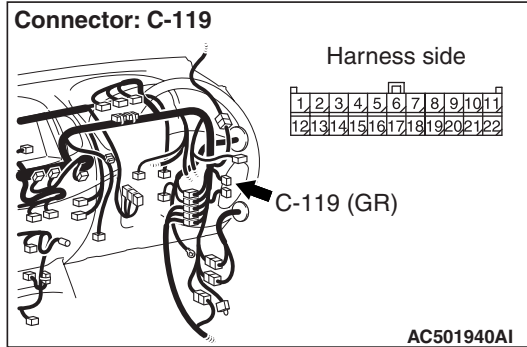
STEP 8. Check the CAN line between joint connector (CAN1) and the CAN adapter. Resistance measurement at C-119 joint connector (CAN1).

CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

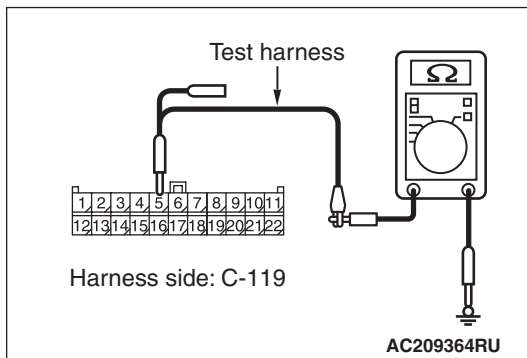


(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

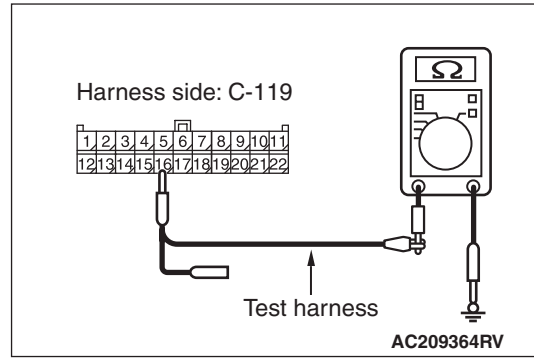
CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-119 joint connector (CAN1) terminal No.5 (CAN_H) and body earth
OK: 1 kΩ or more



(4) Resistance between C-119 joint connector (CAN1) terminal No.16 (CAN_L) and body earth

OK: 1 kΩ or more

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

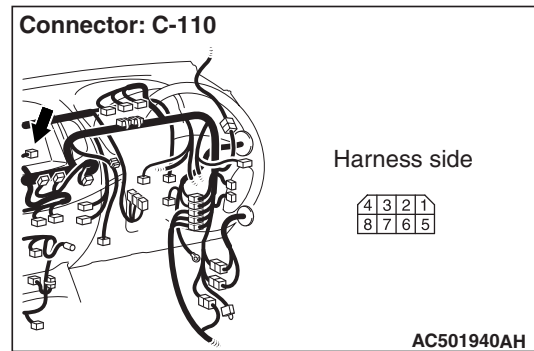
Q: Is the check result normal?

YES <vehicles without ABS> : <1 kΩ or more> Go to Step 13.

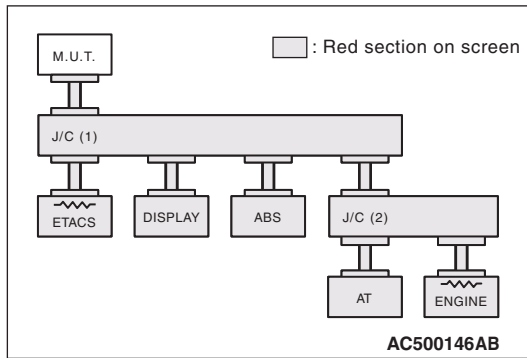
YES <vehicles with ABS> : <1 kΩ or more> Go to Step 10.

NO : <less than 1 kΩ> Go to Step 9.

STEP 9. M.U.T.-III CAN bus diagnostics [CAN adapter connector disconnected]



(1) Disconnect CAN adapter connector C-110, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) and the CAN adapter connector.

NO : Check the CAN adapter connector, and repair if necessary. If the CAN adapter connector is in good condition, refer to GROUP 54A –RV meter .

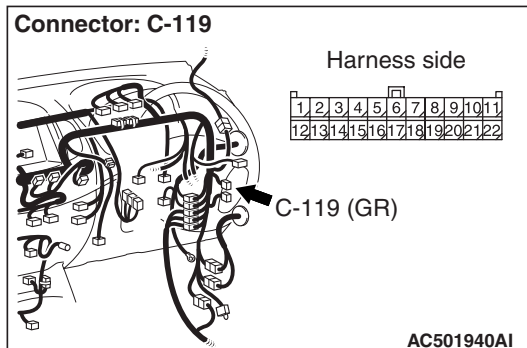
STEP 10. Check the CAN line between joint connector (CAN1) and the ABS-ECU. Resistance measurement at C-119 joint connector (CAN1).

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

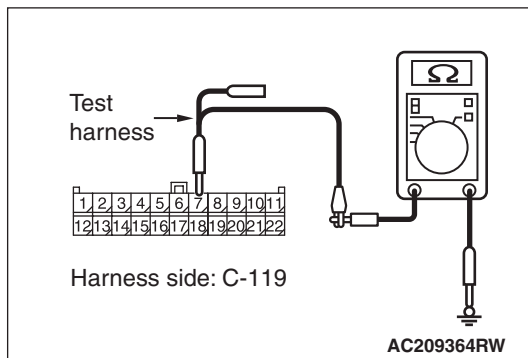


- (1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

⚠ CAUTION

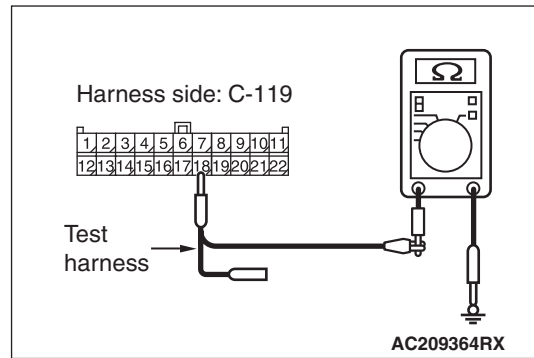
When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

- (2) Ensure that the negative battery terminal is disconnected.



- (3) Resistance between C-119 joint connector (CAN1) terminal No.7 (CAN_H) and body earth

OK: 1 kΩ or more



- (4) Resistance between C-119 joint connector (CAN1) terminal No.18 (CAN_L) and body earth

OK: 1 kΩ or more

⚠ CAUTION

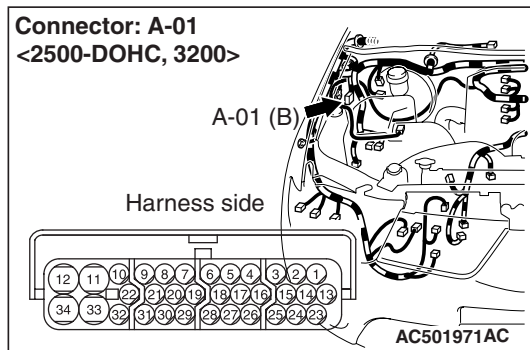
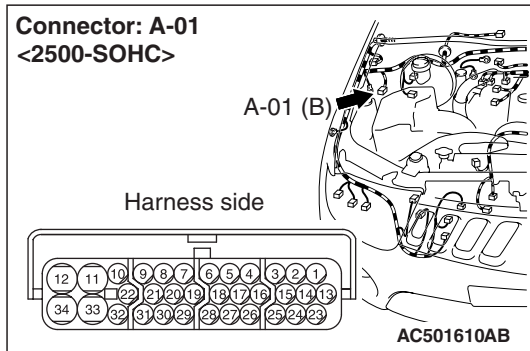
Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

Q: Is the check result normal?

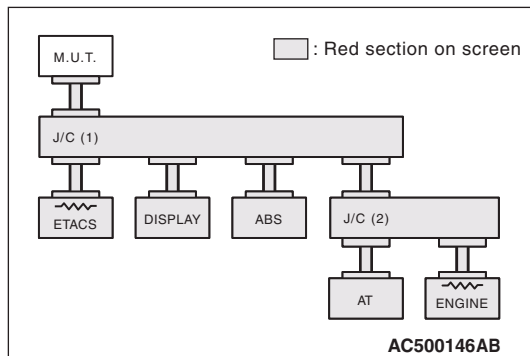
YES : <1 kΩ or more> Go to Step 13.

NO : <less than 1 kΩ> Go to Step 11.

**STEP 11. M.U.T.-III CAN bus diagnostics
[ABS-ECU connector disconnected]**



(1) Disconnect ABS-ECU connector A-01, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Check intermediate connector (C-13), and repair if necessary. If the intermediate connector is in good condition, repair the wiring harness between joint connector (CAN1) and the ABS-ECU connector.

NO : Check the ABS-ECU connector, and repair if necessary. If the ABS-ECU connector is in good condition, go to Step 12.

STEP 12. M.U.T.-III CAN bus diagnostics (retest the system)

Diagnose CAN bus lines, and check if M.U.T.-III screen shows normal state.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the ABS-ECU connector, and repair if necessary. If the ABS-ECU connector is in good condition, replace the ABS-ECU.

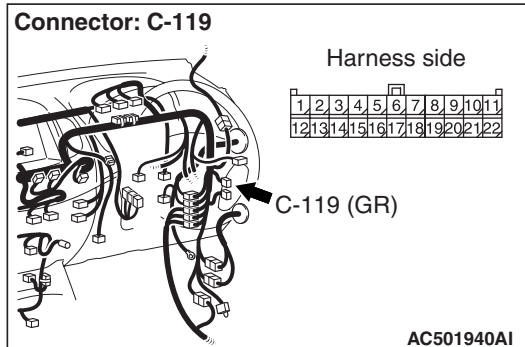
STEP 13. Check the CAN line between joint connector (CAN1) and the diagnosis connector. Resistance measurement at C-119 joint connector (CAN1).

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

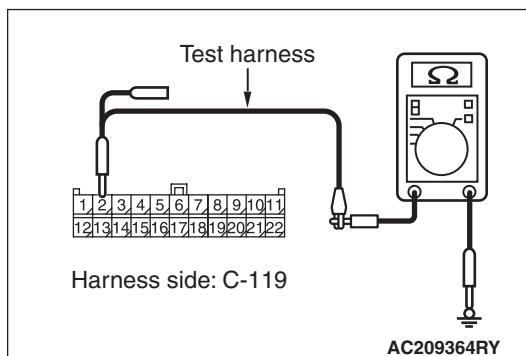


- (1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

⚠ CAUTION

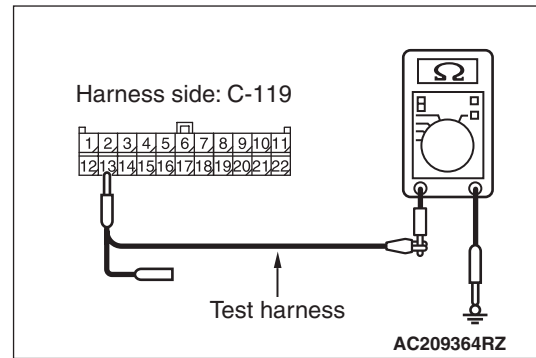
When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

- (2) Ensure that the negative battery terminal is disconnected.



- (3) Resistance between C-119 joint connector (CAN1) terminal No.2 (CAN_H) and body earth

OK: Less than 1.0 V



- (4) Resistance between C-119 joint connector (CAN1) terminal No.13 (CAN_L) and body earth

OK: Less than 1.0 V

⚠ CAUTION

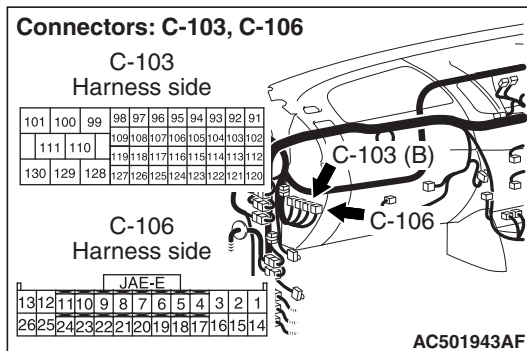
Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

Q: Is the check result normal?

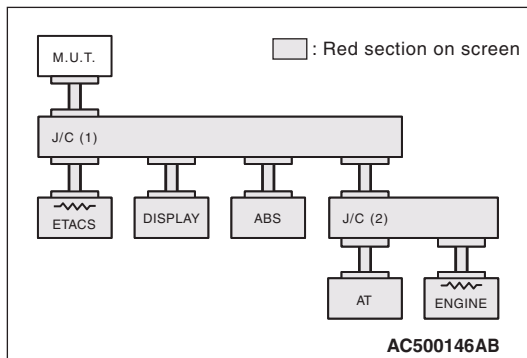
YES : <1 kΩ or more> Repair the intermediate connector (C-35), or the wiring harness between joint connector (CAN1) and the intermediate connector (C-35).

NO : <less than 1 kΩ > Repair the diagnosis connector, or the wiring harness between joint connector (CAN1) and the diagnosis connector.

**STEP 14. M.U.T.-III CAN bus diagnostics
[engine-ECU connector disconnected]**



- (1) Disconnect engine-ECU connector C-106 <2500-SOHC> or C-103 <2500-DOHC, 3200>, and diagnose by using the M.U.T.-III.



- (2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the engine-ECU connector, and repair if necessary. If the engine-ECU connector is in good condition, go to Step 15.

STEP 15. M.U.T.-III CAN bus diagnostics (retest the system)

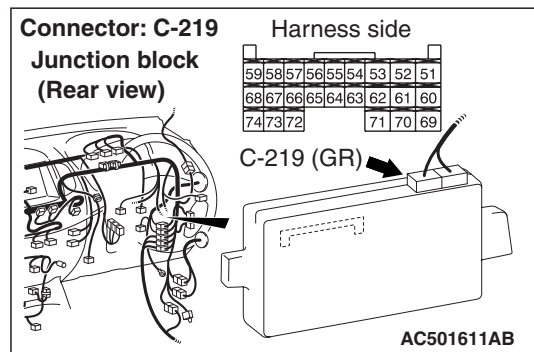
Diagnose CAN bus lines, and check if M.U.T.-III screen shows normal state.

Q: Is the check result normal?

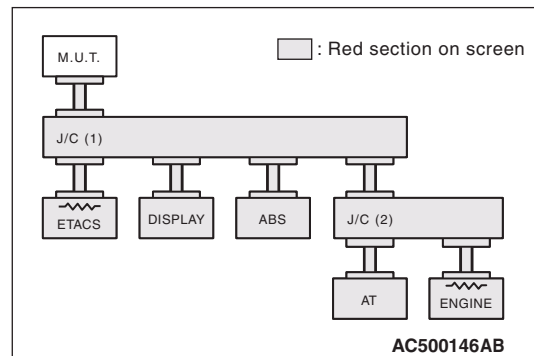
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the engine-ECU connector, and repair if necessary. If the engine-ECU connector is in good condition, replace the engine-ECU.

**STEP 16. M.U.T.-III CAN bus diagnostics
[ETACS-ECU connector disconnected]**



- (1) Disconnect ETACS-ECU connector C-219, and diagnose by using the M.U.T.-III.



- (2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the ETACS-ECU connector, and repair if necessary. If the ETACS-ECU connector is in good condition, go to Step 17.

STEP 17. M.U.T.-III CAN bus diagnostics (retest the system)

Diagnose CAN bus lines, and check if M.U.T.-III screen shows normal state.

Q: Is the check result normal?

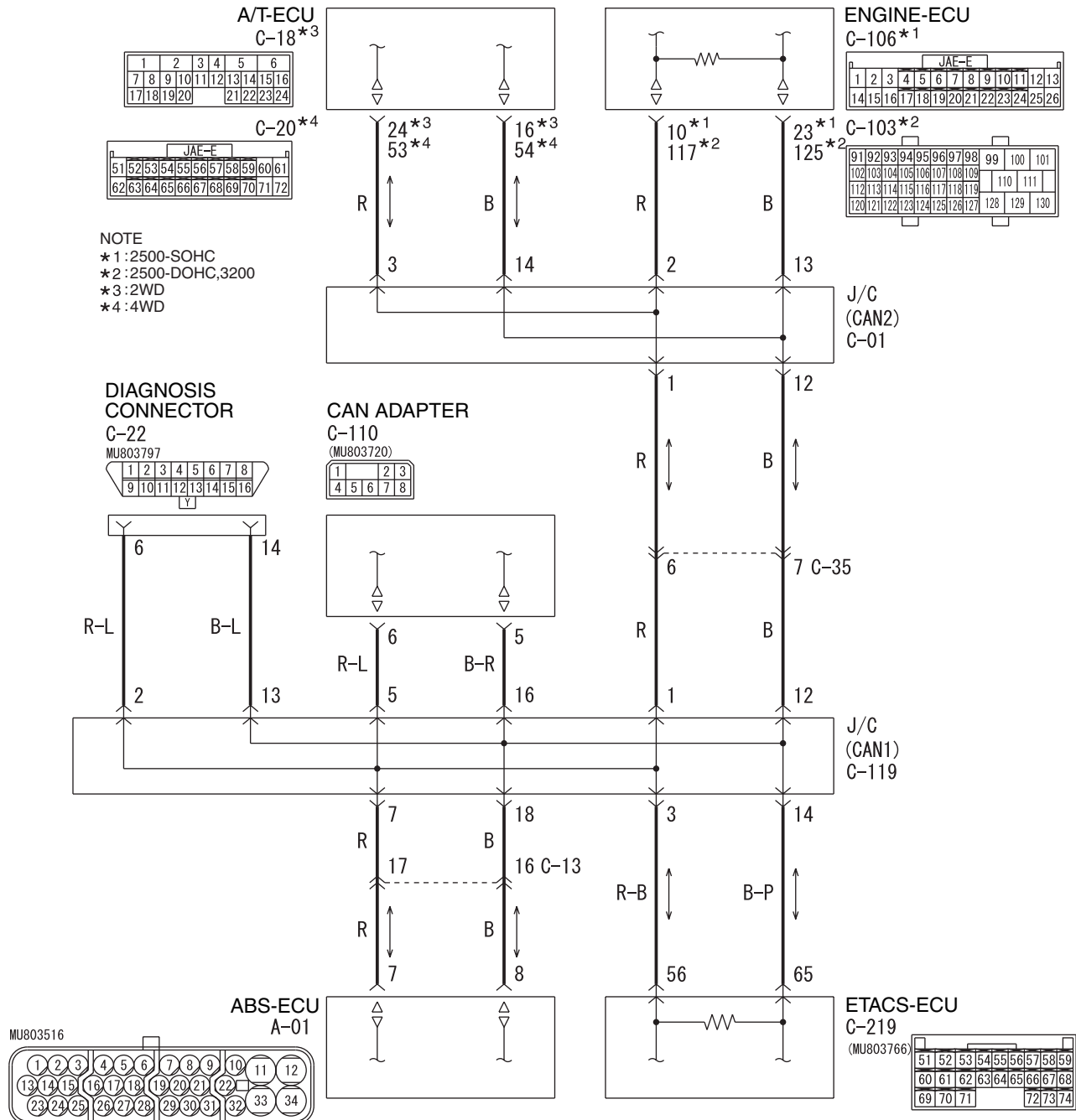
YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 –How to use Troubleshooting/inspection Service Points –How to Cope with Intermittent Malfunction).

NO : Check the ETACS-ECU connector, and repair if necessary. If the ETACS-ECU connector is in good condition, replace the ETACS-ECU.

Diagnosis Item 3: Diagnose shorts between CAN_H and L lines

CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

FUNCTION

The M.U.T.-III judges a short between CAN_H and CAN_L line when all data from ECU cannot be received while checking periodically sent data from each ECU even if the voltage is normal.

TROUBLE JUDGEMENT CONDITIONS

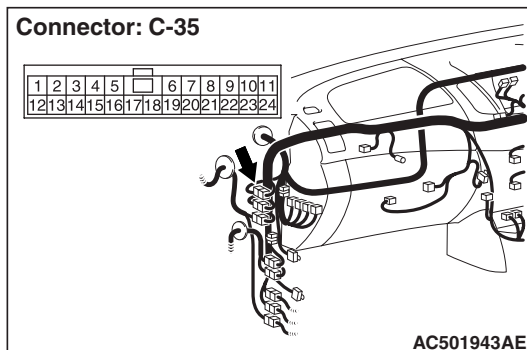
The M.U.T.-III judges the trouble when it is impossible to send and receive the all ECU periodically sent data and the voltage of CAN_H and CAN_L line is 4.0 volts or less and 1.0 volt or more.

TROUBLESHOOTING HINTS

- Malfunction of the wiring harness

NOTE: The M.U.T.-III cannot receive all the periodically sent data from each ECU by the open circuit of harness between the diagnosis connector, the joint connector (CAN1) and the joint connector (CAN2). In addition, the M.U.T.-III measures the voltage itself and shows 2.5 volts due to the open circuit of harness. Therefore, it is judged as a short between CAN_H and CAN_L line.

- Malfunction of the connector
- Malfunction of each ECU

DIAGNOSIS PROCEDURE**STEP 1. Connector check: C-35 intermediate connector****CAUTION**

The strand end of the twist wire should be within 10 cm from the connector. For details refer to [P.54C-5](#).

Q: Is the check result normal?

YES : Go to Step 2.

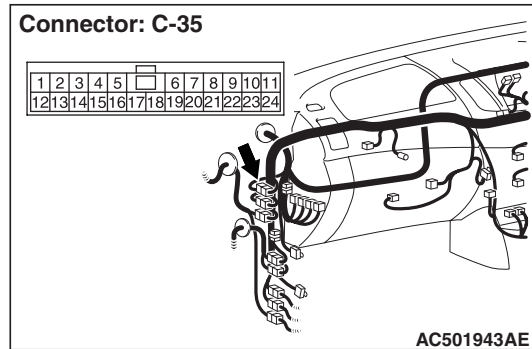
NO : Repair the defective connector.

STEP 2. Resistance measurement at C-35 intermediate connector.**CAUTION**

A digital multimeter should be used. For details refer to [P.54C-5](#).

CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

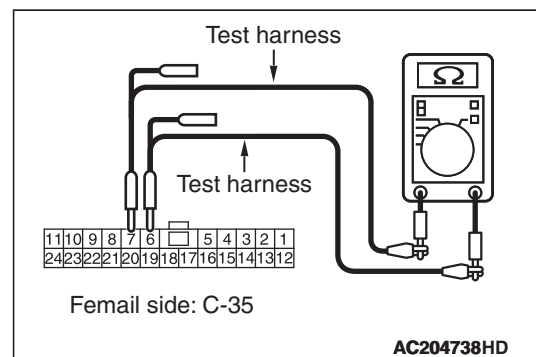


- (1) Disconnect the connector, and measure at its female-side intermediate connector (at the instrument panel wiring harness side).
- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Resistance between C-35 intermediate connector terminal Nos.6 and 7

OK: $120 \pm 20 \Omega$

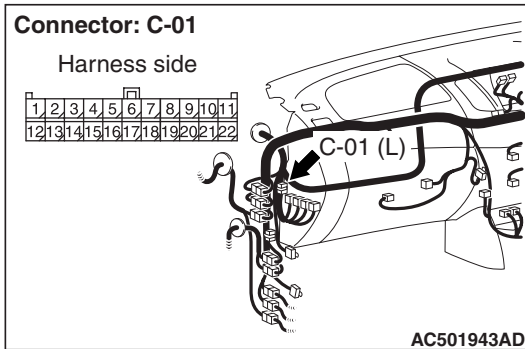
Q: Is the check result normal?

YES : <Within $120 \pm 20 \Omega$ > Go to Step 3.

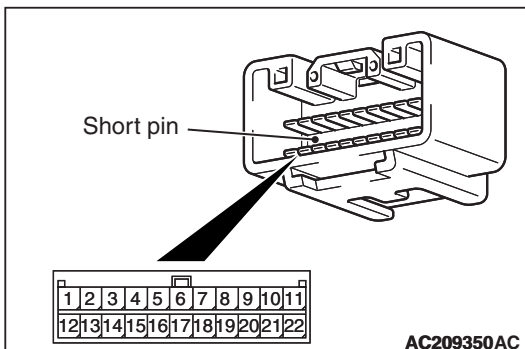
NO : <Not within $120 \pm 20 \Omega$ > Go to Step 8.

STEP 3. Connector check: C-01 joint connector (CAN2)

CAUTION



The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54C-5.



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 4.

NO : Repair a defective connector or replace the joint connector.

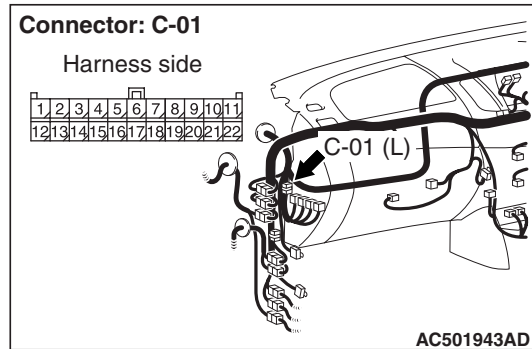
STEP 4. Resistance measurement at C-01 joint connector (CAN2).

CAUTION

A digital multimeter should be used. For details refer to P.54C-5.

CAUTION

The test wiring harness should be used. For details refer to P.54C-5.

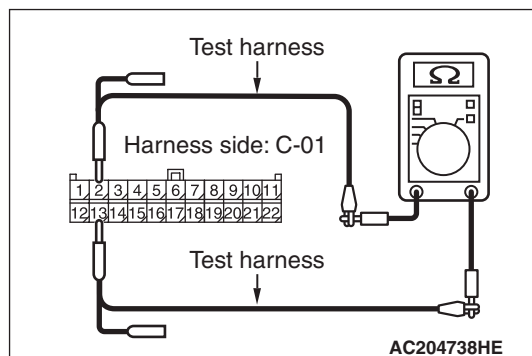


- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54C-5.

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Resistance between C-01 joint connector (CAN2) terminal Nos.2 and 13

OK: 120 ± 20 Ω

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-5.

Q: Is the check result normal?

YES <M/T> : <Within 120 ± 20 Ω> Repair the wiring harness between joint connector (CAN2) and the engine-ECU connector.

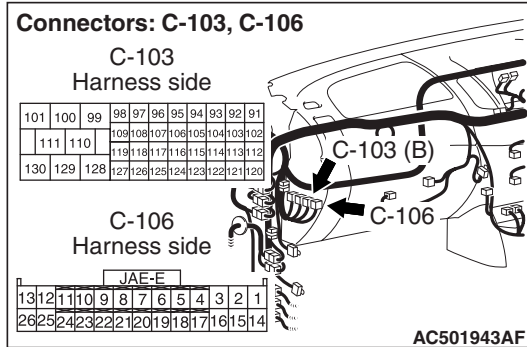
YES <A/T> : <Within 120 ± 20 Ω> Go to Step 6.

NO : <Not within 120 ± 20 Ω> Go to Step 5.

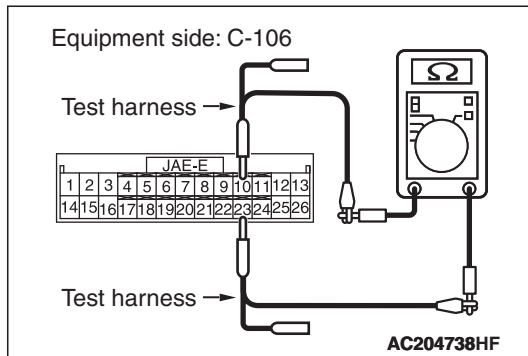
STEP 5. Resistance measurement at C-106 <2500-SOHC> or C-103 <2500-DOHC, 3200> engine-ECU connector.

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

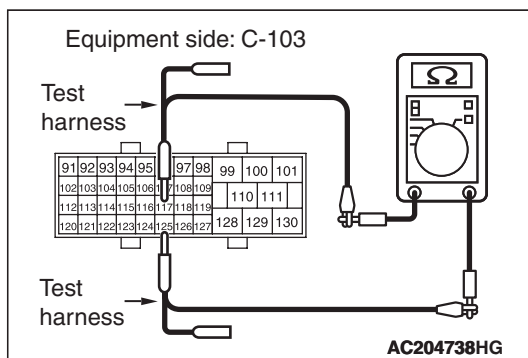


(1) Remove the engine-ECU, and measure at the equipment side.



(2) Resistance between C-106 engine-ECU connector terminal Nos.10 and 23 <2500-SOHC>

OK: $120 \pm 20 \Omega$



(3) Resistance between C-103 engine-ECU connector terminal Nos.117 and 125 <2500-DOHC, 3200>

OK: $120 \pm 20 \Omega$

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

Q: Is the check result normal?

YES : <Within $120 \pm 20 \Omega$ > Repair the wiring harness between joint connector (CAN2) and the engine-ECU connector.

NO : <Not within $120 \pm 20 \Omega$ > Check the engine-ECU connector, and repair if necessary. If the engine-ECU connector is in good condition, replace the engine-ECU.

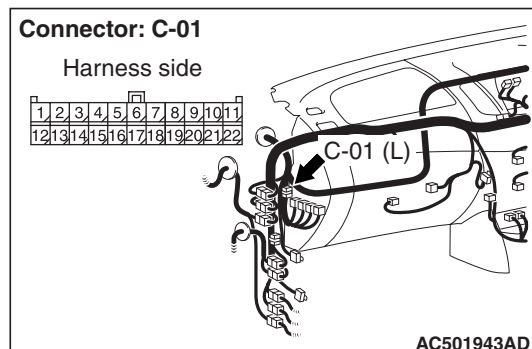
STEP 6. Resistance measurement at C-01 joint connector (CAN2).

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



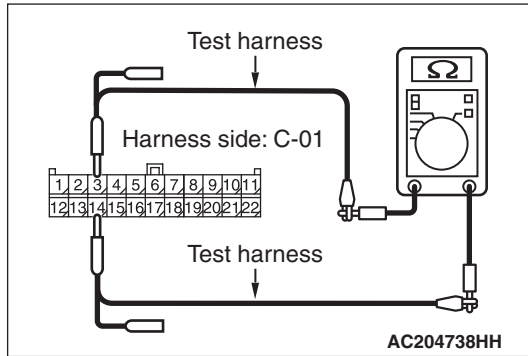
(1) Disconnect the connector, and measure at the wiring harness side.

- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Resistance between C-01 joint connector (CAN2) terminal Nos.3 and 14

OK: 1 kΩ or more

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

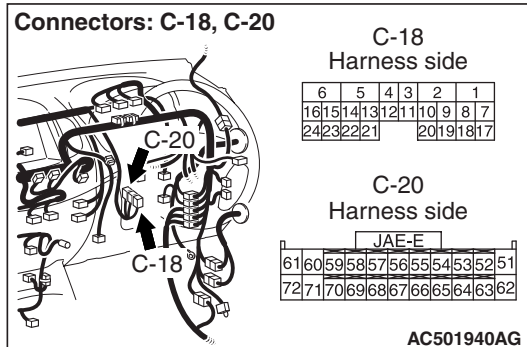
Q: Is the check result normal?

- YES** : <1 kΩ or more> Repair the wiring harness between joint connector (CAN2) and intermediate connector (C-35).
NO : <Less than 1 kΩ> Go to Step 7.

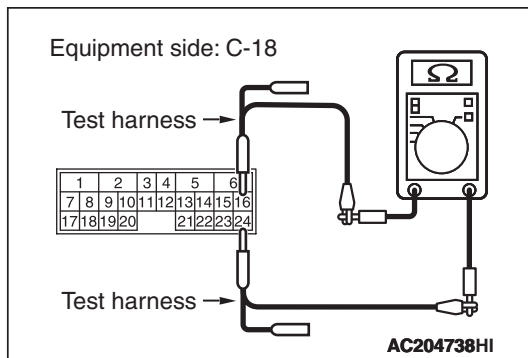
STEP 7. Resistance measurement at C-18 <2WD> or C-20 <4WD> A/T-ECU connector.

CAUTION

A digital multimeter should be used. For details refer to P.54C-5.

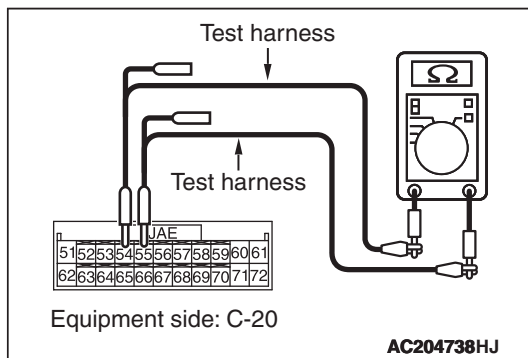


(1) Remove the A/T-ECU, and measure at the equipment side.



(2) Resistance between C-18 A/T-ECU connector terminal Nos.16 and 24 <2WD>

OK: 1 kΩ or more



(3) Resistance between C-20 A/T-ECU connector terminal Nos.53 and 54 <4WD>

OK: 1 kΩ or more

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-5.

Q: Is the check result normal?

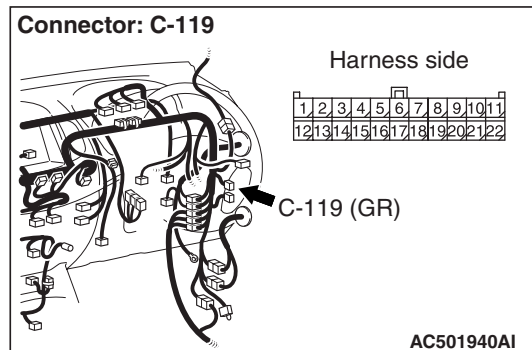
YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN2) and the

A/T-ECU connector.

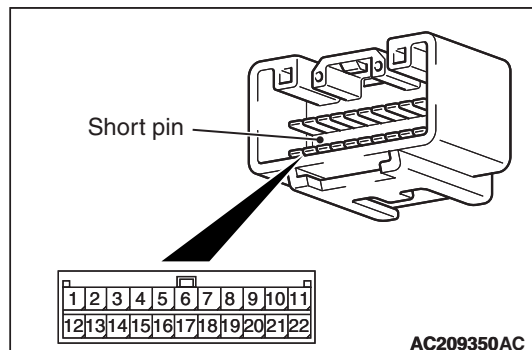
NO : <Less than 1 kΩ> Check the A/T-ECU connector, and repair if necessary. If the A/T-ECU connector is in good condition, replace the A/T-ECU.

STEP 8. Connector check: C-119 joint connector (CAN1)

CAUTION



The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54C-5.



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair a defective connector or replace the joint connector.

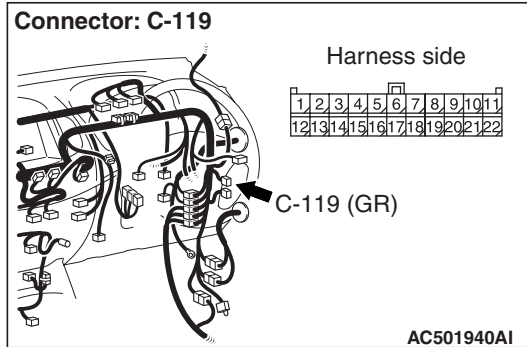
STEP 9. Resistance measurement at C-119 joint connector (CAN1).

CAUTION

A digital multimeter should be used. For details refer to P.54C-5.

CAUTION

The test wiring harness should be used. For details refer to P.54C-5.

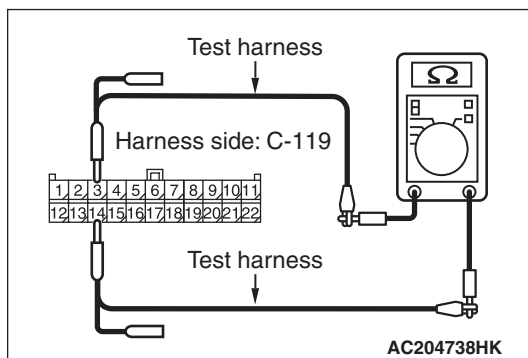


- (1) Disconnect joint connector (CAN1), and measure at the wiring harness side.
- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54C-5.

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Resistance between C-119 joint connector (CAN1) terminal Nos.3 and 14

OK: $120 \pm 20 \Omega$

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-5.

Q: Is the check result normal?

YES <vehicles without RV meter and ABS> :

<Within $120 \pm 20 \Omega$ > Go to Step 15.

YES <vehicles with RV meter> : <Within $120 \pm 20 \Omega$ > Go to Step 11.

YES <vehicles with ABS> : <Within $120 \pm 20 \Omega$ > Go to Step 13.

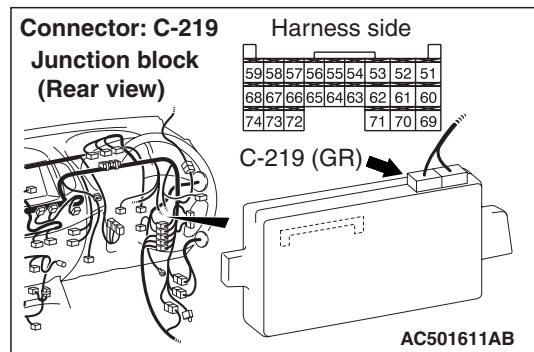
YES <vehicles with RV meter and ABS> : <Within $120 \pm 20 \Omega$ > Go to Step 11.

NO : <Not within $120 \pm 20 \Omega$ > Go to Step 10.

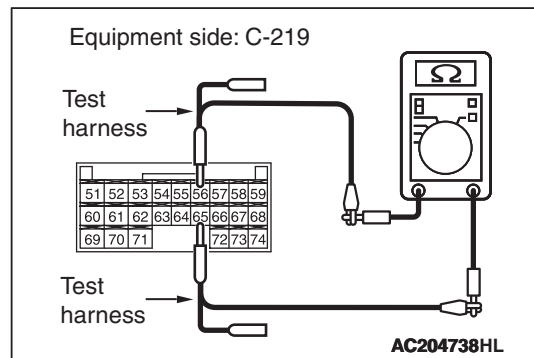
STEP 10. Resistance measurement at C-219 ETACS-ECU connector.

CAUTION

A digital multimeter should be used. For details refer to P.54C-5.



- (1) Remove the ETACS-ECU, and measure at the equipment side.



- (2) Resistance at C-219 ETACS-ECU connector terminal Nos.56 and 65

OK: $120 \pm 20 \Omega$

Q: Is the check result normal?

YES : <Within $120 \pm 20 \Omega$ > Repair the wiring harness between joint connector (CAN1) and the ETACS-ECU connector.

NO : <Not within $120 \pm 20 \Omega$ > Check the ETACS-ECU connector, and repair if necessary. If the ETACS-ECU connector is in good condition, replace the ETACS-ECU.

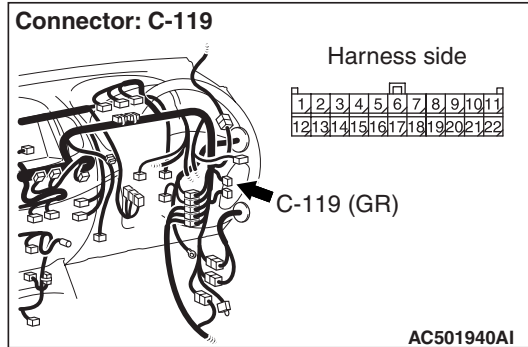
STEP 11. Resistance measurement at C-119 joint connector (CAN1).

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

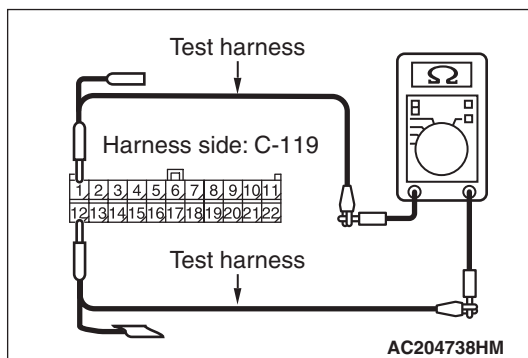


- (1) Disconnect joint connector (CAN1), and measure at the wiring harness side.
- (2) Turn the ignition switch to the LOCK (OFF) position.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Resistance between C-119 joint connector (CAN1) terminal Nos.1 and 12

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

Q: Is the check result normal?

YES <vehicles without ABS> : <1 kΩ or more> Go to Step 15.

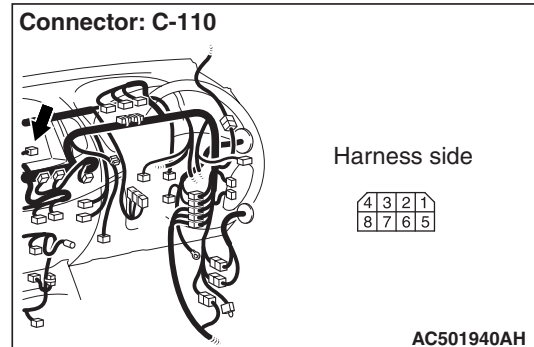
YES <vehicles with ABS> : <1 kΩ or more> Go to Step 13.

NO : <Less than 1 kΩ> Go to Step 12.

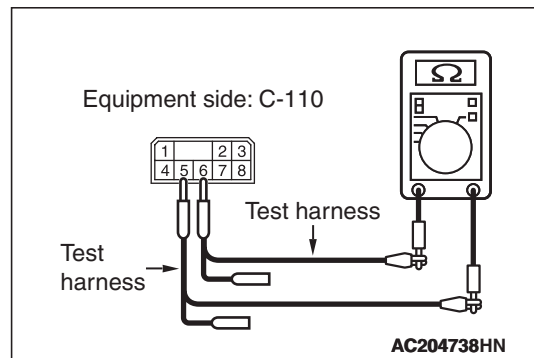
STEP 12. Resistance measurement at C-110 CAN adapter connector.

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).



- (1) Remove the CAN adapter, and measure at the equipment side.



- (2) Resistance at C-110 CAN adapter connector terminal Nos.5 and 6

OK: 1 kΩ or more

Q: Is the check result normal?

YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN1) and the CAN adapter connector.

NO : <Less than 1 kΩ> Check the CAN adapter connector, and repair if necessary. If the CAN adapter connector is in good condition, replace the CAN adapter.

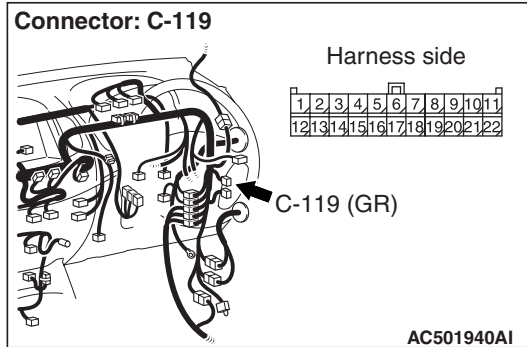
STEP 13. Resistance measurement at C-119 joint connector (CAN1).

CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



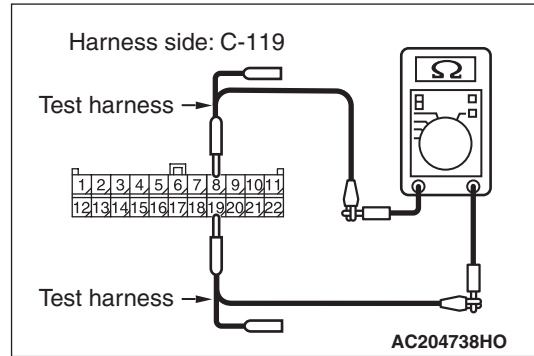
(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

(2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

(3) Ensure that the negative battery terminal is disconnected.



(4) Resistance between C-119 joint connector (CAN1) terminal Nos.7 and 18

OK: 1 kΩ or more

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

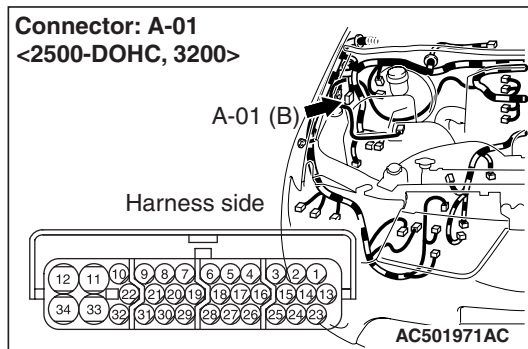
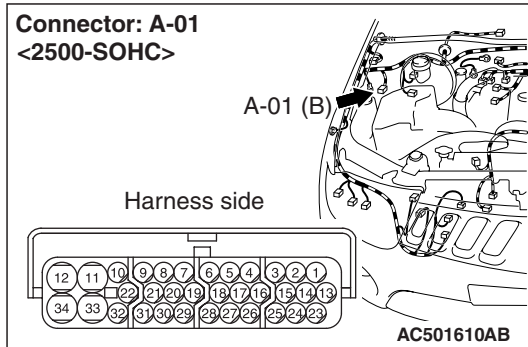
Q: Is the check result normal?

YES : <1 kΩ or more> Go to Step 15.

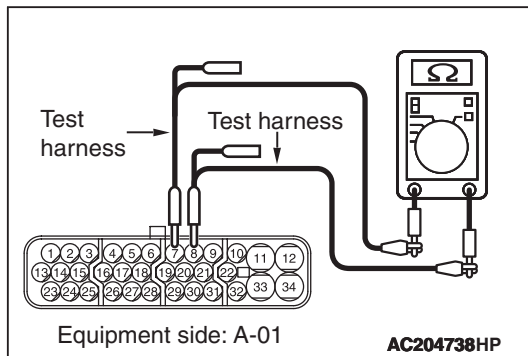
NO : <Less than 1 kΩ> Go to Step 14.

**STEP 14. Resistance measurement at A-01
ABS-ECU connector.****⚠ CAUTION**

A digital multimeter should be used. For details refer to [P.54C-5](#).



- (1) Remove the ABS-ECU, and measure at the equipment side.



- (2) Resistance at A-01 ABS-ECU connector terminal Nos.7 and 8

OK: 1 kΩ or more

Q: Is the check result normal?

YES : <1 kΩ or more> Check intermediate connector (C-13), and repair if necessary. If the intermediate connector (C-13) is in good condition, repair the wiring harness between joint connector (CAN1) and the ABS-ECU connector.

NO : <Less than 1 kΩ> Check the ABS-ECU connector, and repair if necessary. If the ABS-ECU connector is in good condition,

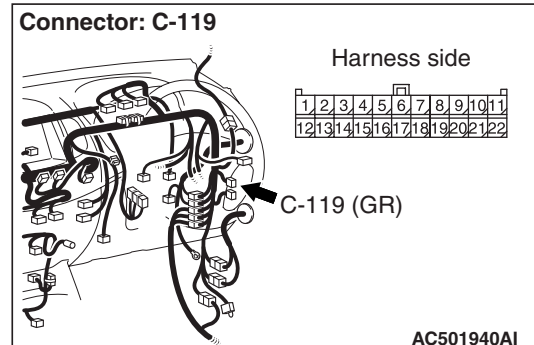
replace the ABS-ECU.

**STEP 15. Resistance measurement at C-119 joint
connector (CAN1).****⚠ CAUTION**

A digital multimeter should be used. For details refer to [P.54C-5](#).

⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

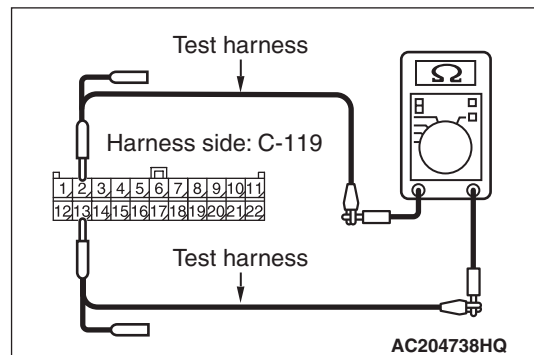


- (1) Disconnect the joint connector (CAN1), and measure at the wiring harness side.
(2) Turn the ignition switch to the LOCK (OFF) position.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Resistance between C-119 joint connector (CAN1) terminal Nos.2 and 13

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

Q: Is the check result normal?

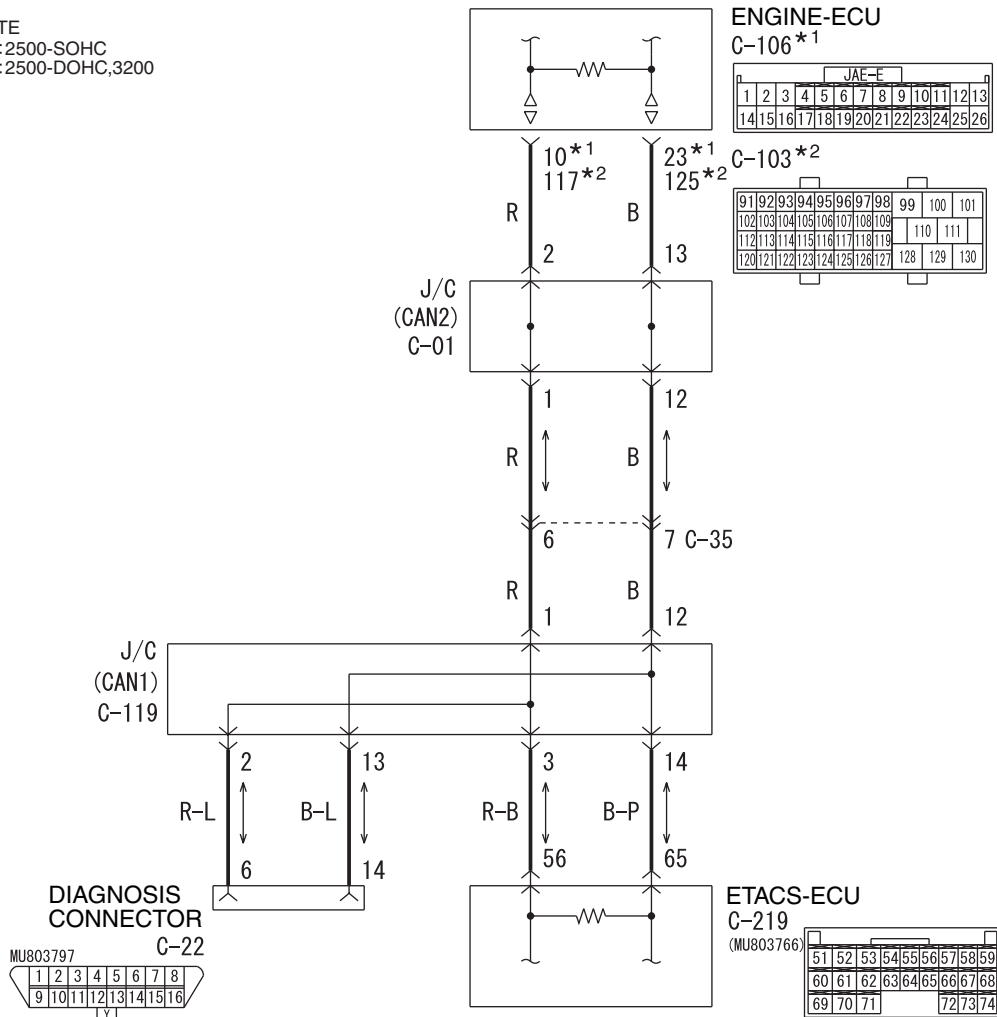
- YES :** <1 kΩ or more> Repair the wiring harness between joint connector (CAN1) and the intermediate connector (C-35).
- NO :** <Less than 1 kΩ> Check the diagnosis connector, and repair if necessary. If the diagnosis connector is in good condition, repair the wiring harness between joint connector (CAN1) and the diagnosis connector.

Diagnosis Item 4: Diagnose the terminator resistors

CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.

NOTE
*1 : 2500-SOHC
*2 : 2500-DOHC, 3200



Wire colour code
B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

FUNCTION

The resistance in the communication errors condition cannot be measured by the CAN bus diagnostics, therefore, judge the terminator resistor only when receiving the each ECU periodically sent data normally.

TROUBLE JUDGEMENT CONDITIONS

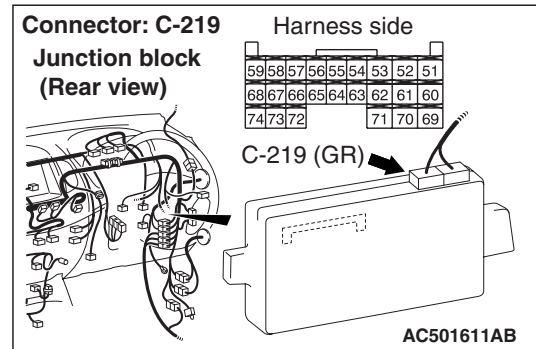
The M.U.T.-III judges the trouble when the periodically sent data from each ECU can be received normally but the resistance value between CAN_H and CAN_L line is other than from 50 ohms to 70 ohms.

PROBABLE CAUSES

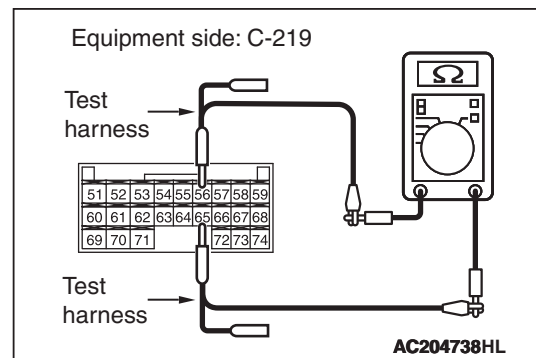
- Damaged harness wires and connectors
- Malfunction of the ETACS-ECU
- Malfunction of the engine-ECU

DIAGNOSIS PROCEDURE**STEP 1. Resistance measurement at C-219 ETACS-ECU connector.****⚠ CAUTION**

A digital multimeter should be used. For details refer to P.54C-5.



- (1) Remove the ETACS-ECU, and measure at the equipment side.



- (2) Resistance at C-219 ETACS-ECU connector terminal Nos.56 and 65

OK: $120 \pm 20 \Omega$

Q: Is the check result normal?

YES : <Within $120 \pm 20 \Omega$ > Go to Step 2.

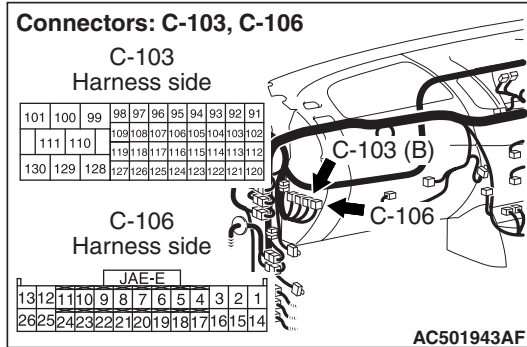
NO : <Not within $120 \pm 20 \Omega$ > Replace the ETACS-ECU.

STEP 2. Resistance measurement at C-106 <2500-SOHC> or C-103 <2500-DOHC, 3200> engine-ECU connector.

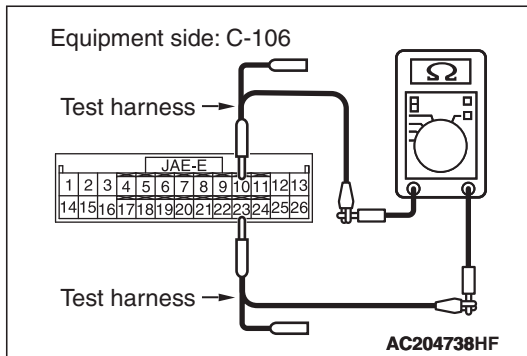
⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

YES : <Within $120 \pm 20 \Omega$ > Repair the wiring harness between the ETACS-ECU connector and the engine-ECU connector.
NO : <Not within $120 \pm 20 \Omega$ > Replace the engine-ECU.

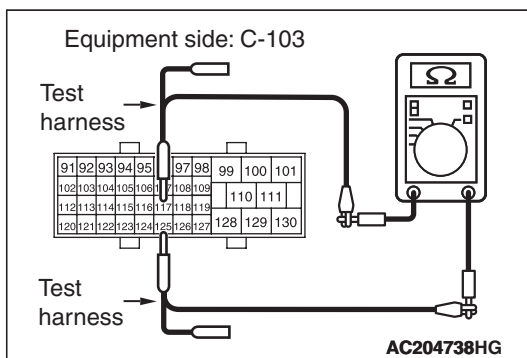


(1) Remove the engine-ECU, and measure at the equipment side.



(2) Resistance between C-106 engine-ECU connector terminal Nos.10 and 23 <2500-SOHC>

OK: $120 \pm 20 \Omega$



(3) Resistance between C-103 engine-ECU connector terminal Nos.117 and 125 <2500-DOHC, 3200>

OK: $120 \pm 20 \Omega$

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

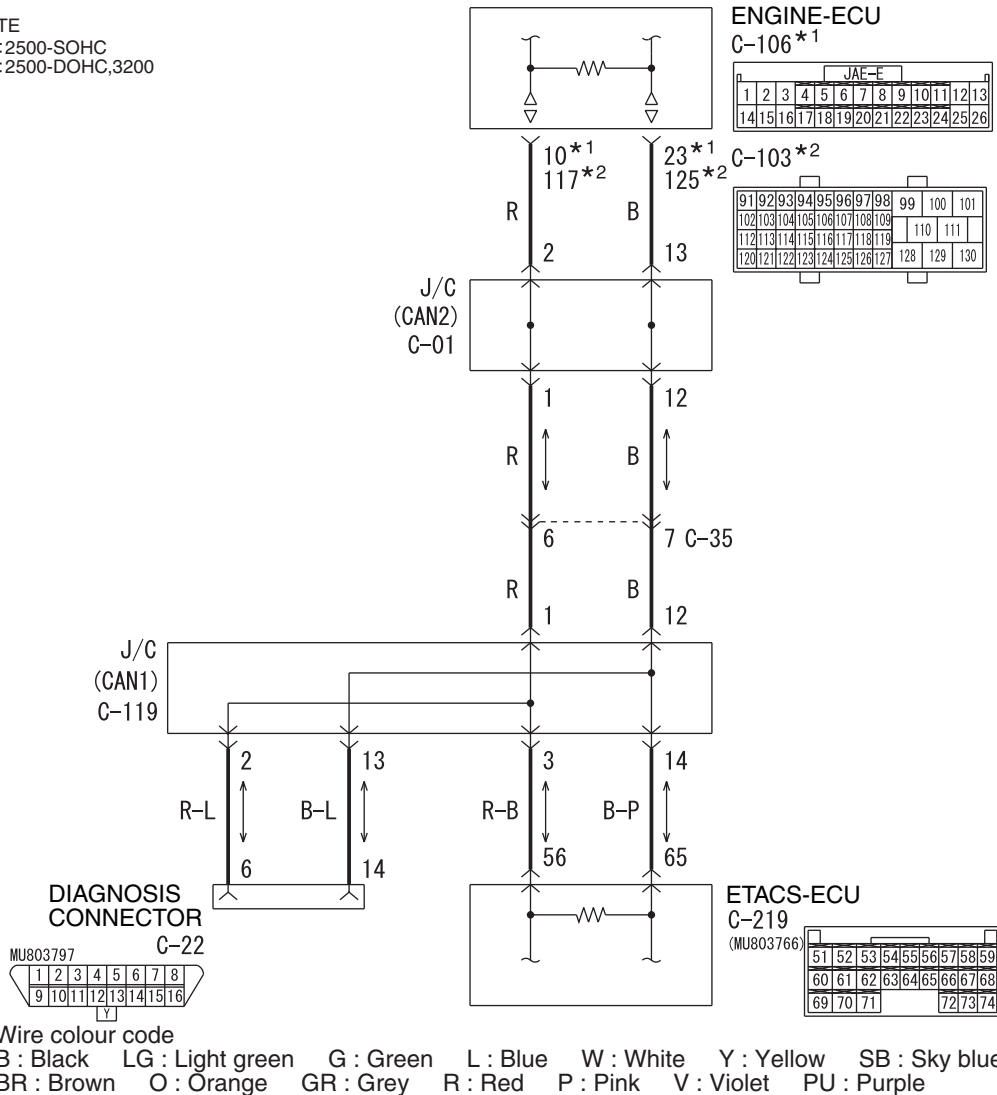
Q: Is the check result normal?

Diagnosis Item 5: Diagnose when the M.U.T.-III cannot receive the data sent by ETACS-ECU.

CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.

NOTE
* 1 : 2500-SOHC
* 2 : 2500-DOHC,3200



W6C54X008A

FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the ETACS-ECU" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the ETACS-ECU data only.

TROUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from combination meter cannot be received and sent.

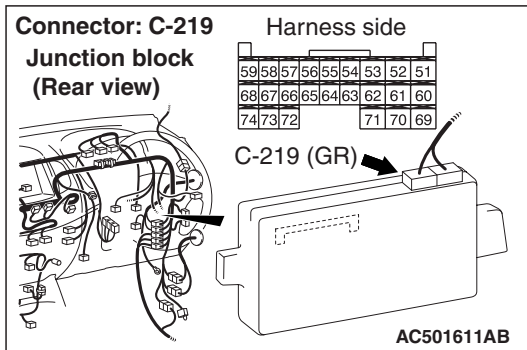
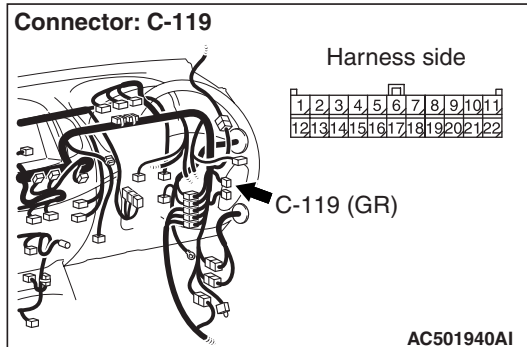
PROBABLE CAUSES

- Damaged harness wires and connectors
- Power supply circuit malfunction of the ETACS-ECU
- Malfunction of the ETACS-ECU

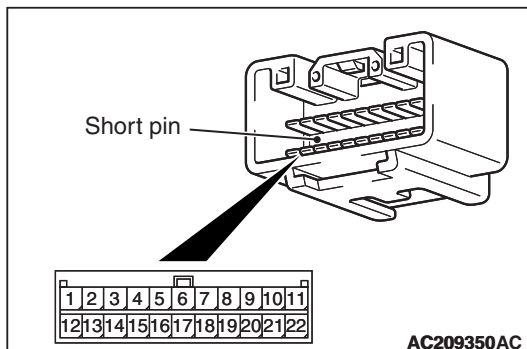
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-119 joint connector (CAN1) and C-219 ETACS-ECU connector

CAUTION



The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54C-5.



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

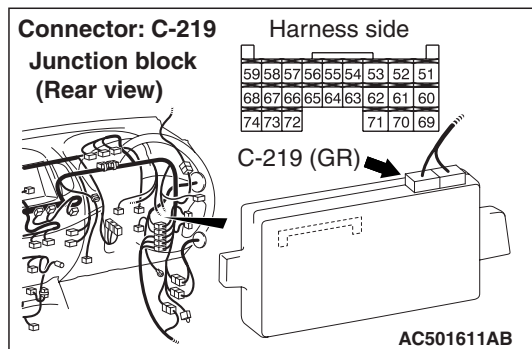
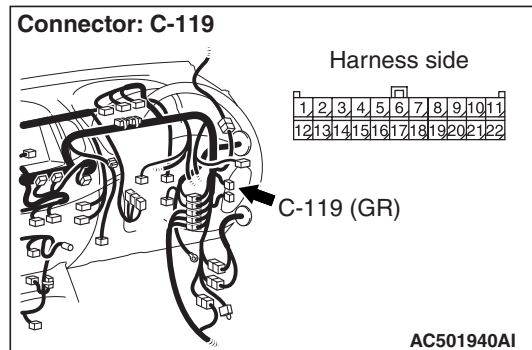
STEP 2. Resistance measurement at C-119 joint connector (CAN1) and C-219 ETACS-ECU connector.

CAUTION

A digital multimeter should be used. For details refer to P.54C-5.

CAUTION

The test wiring harness should be used. For details refer to P.54C-5.



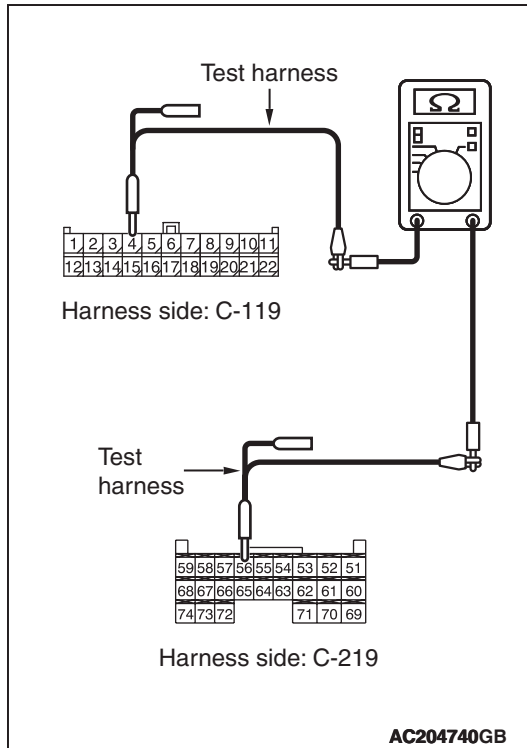
(1) Disconnect the joint connector (CAN1) and the ETACS-ECU connector, and measure at the wiring harness side.

- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

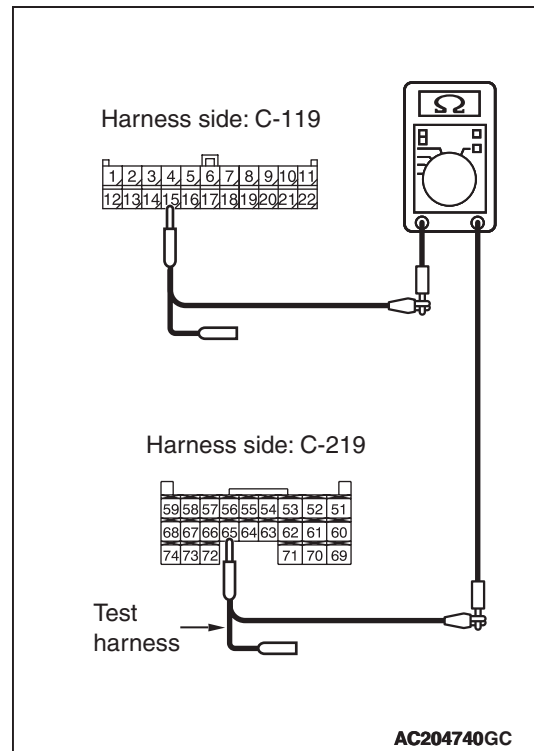
When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Continuity between C-119 joint connector (CAN1) terminal No.3 and C-219 ETACS-ECU connector terminal No.56

OK: 2 Ω or less



- (5) Continuity between C-119 joint connector (CAN1) terminal No.14 and C-219 ETACS-ECU connector terminal No.65

OK: 2 Ω or less

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

- Q: Is the check result normal?**

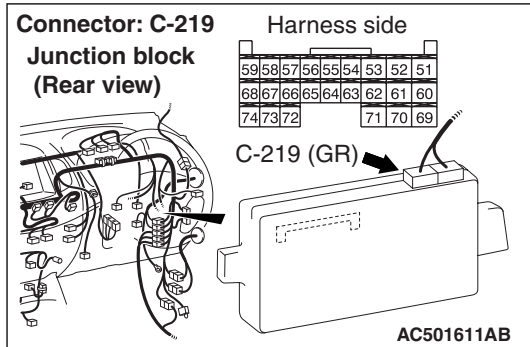
YES : <All the resistances measure 2 Ω or less>
Go to Step 3.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN1) and the ETACS-ECU connector.

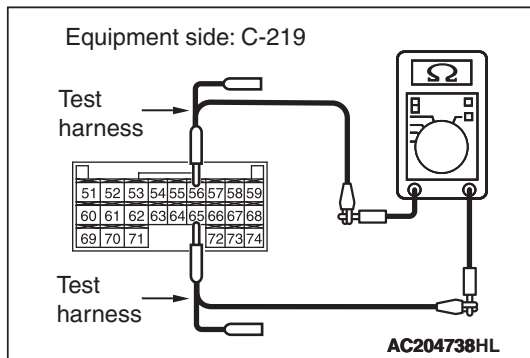
STEP 3. Resistance measurement at C-219 ETACS-ECU connector.

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).



(1) Remove the ETACS-ECU, and measure at the equipment side.



(2) Resistance at C-219 ETACS-ECU connector terminal Nos.56 and 65

OK: $120 \pm 20 \Omega$

Q: Is the check result normal?

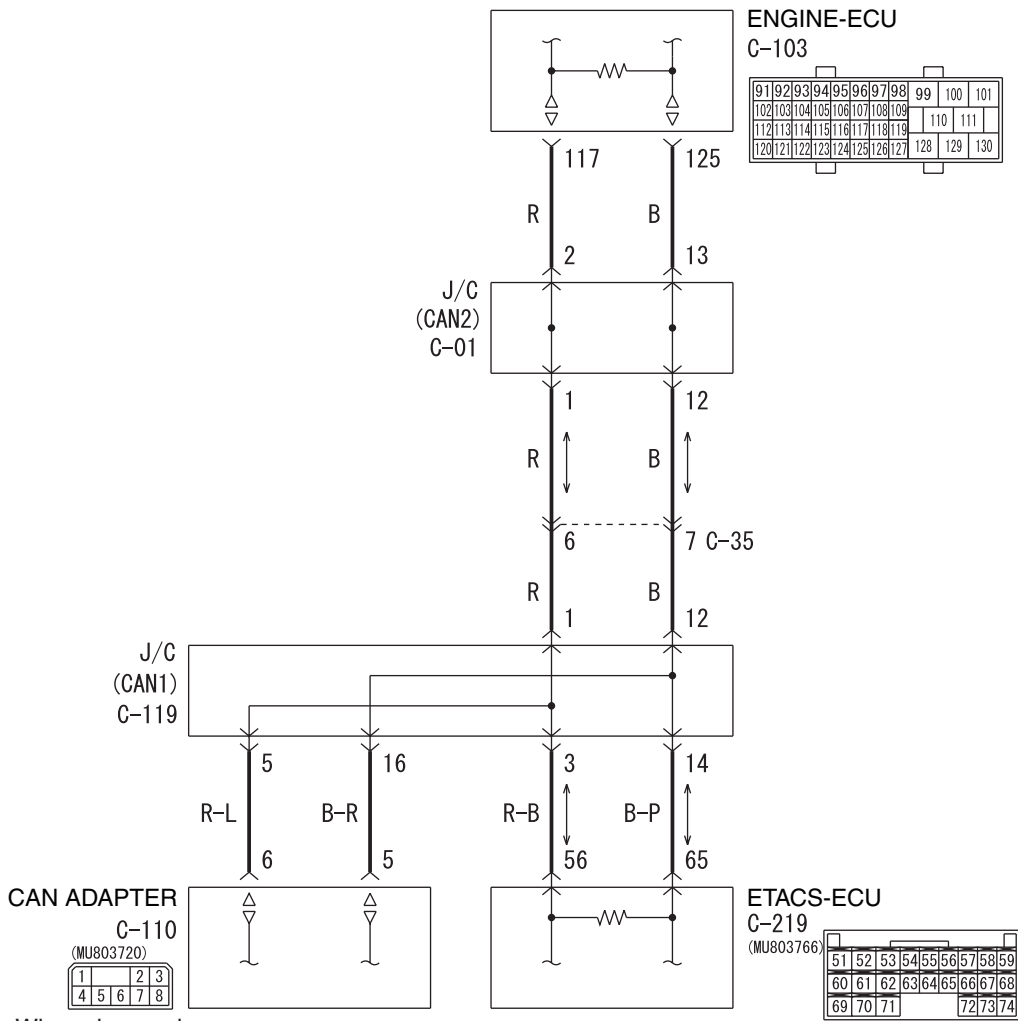
YES : <Within $120 \pm 20 \Omega$ > Power supply to the ETACS-ECU may be suspected. Diagnose the SWS. Refer to .

NO : <Not within $120 \pm 20 \Omega$ > Replace the ETACS-ECU.

Diagnosis Item 6: Diagnose when the M.U.T.-III cannot receive the data sent by CAN adapter.
<Vehicles with RV meter>

CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W6C54X010A

FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the CAN adapter" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the CAN adapter data only.

TROUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from CAN adapter cannot be received and sent.

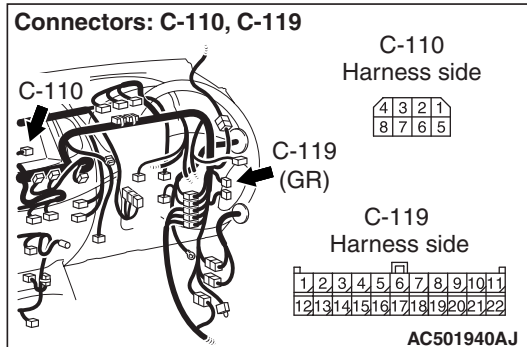
PROBABLE CAUSES

- Damaged harness wires and connectors
- Power supply circuit malfunction of the CAN adapter
- Malfunction of the CAN adapter

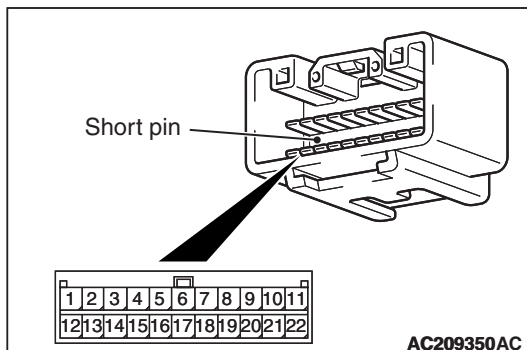
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-119 joint connector (CAN1) and C-110 CAN adapter connector

CAUTION



The strand end of the twist wire should be within 10 cm from the connector. For details refer to [P.54C-5](#).



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

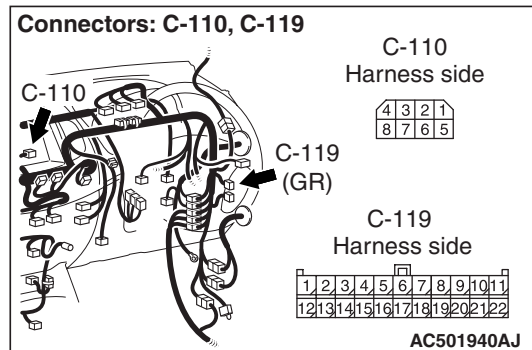
STEP 2. Resistance measurement at C-119 joint connector (CAN1) and C-110 CAN adapter connector.

CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



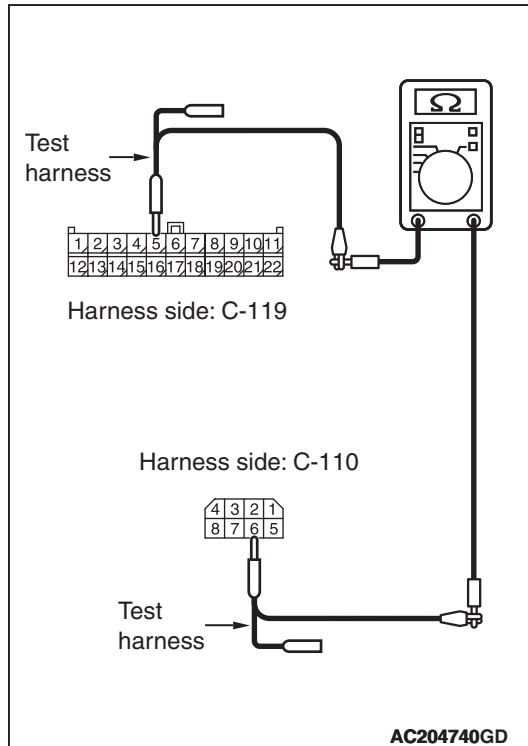
(1) Disconnect joint connector (CAN1) and the CAN adapter connector, and measure at the wiring harness side.

- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

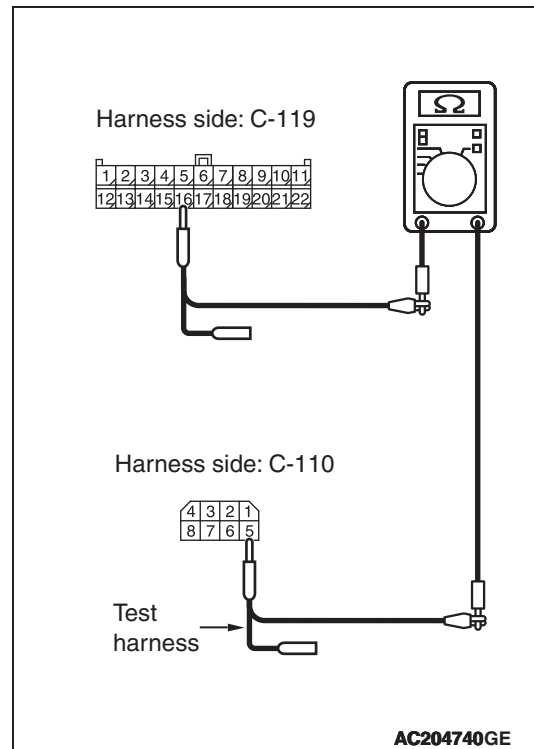
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54C-5.

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Continuity between C-119 joint connector (CAN1) terminal No.5 and C-110 CAN adapter connector terminal No.6

OK: 2 Ω or less



- (5) Continuity between C-119 joint connector (CAN1) terminal No.16 and C-110 CAN adapter connector terminal No.5

OK: 2 Ω or less

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-5.

- Q: Is the check result normal?**

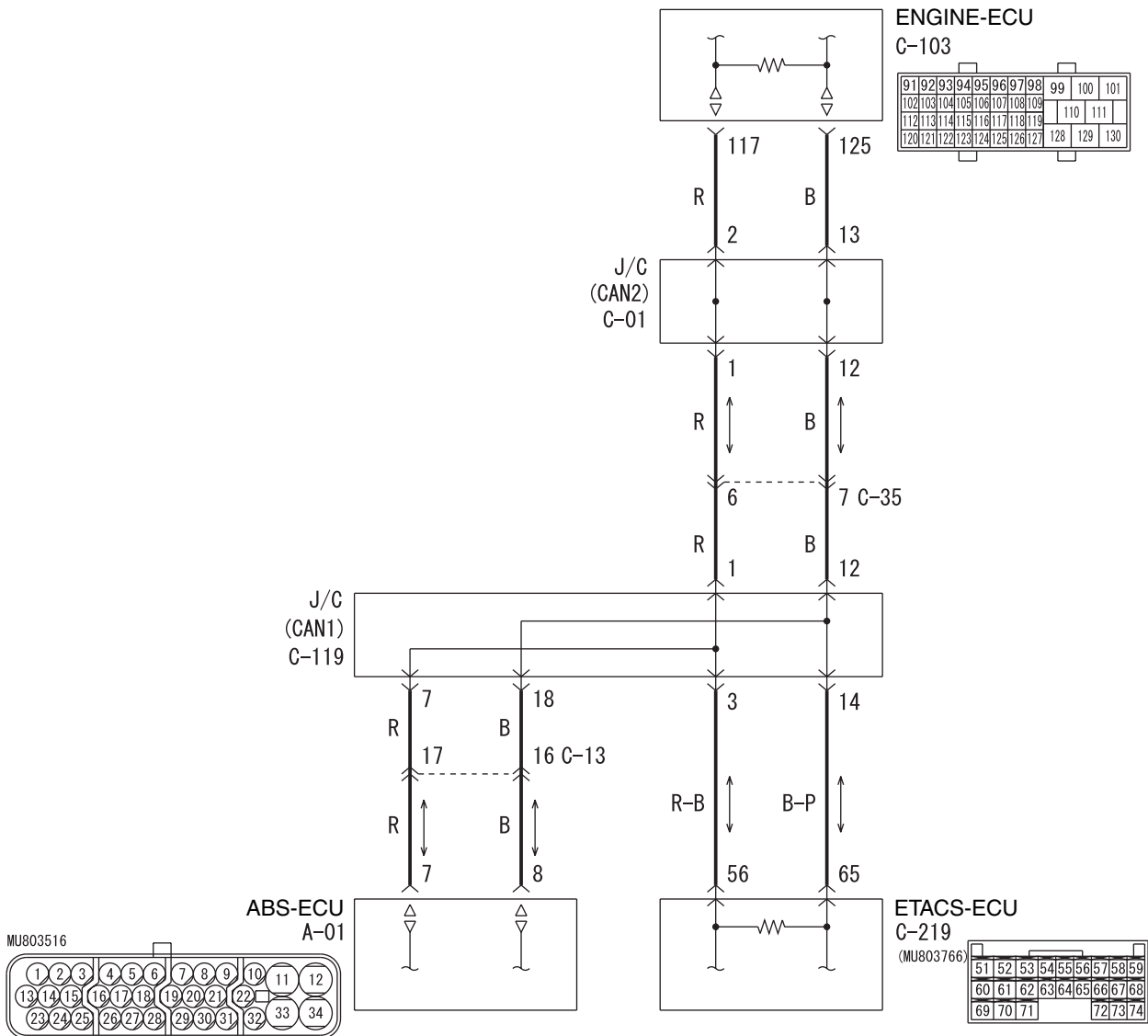
YES : <All the resistances measure 2 Ω or less>
Power supply to the CAN adapter may be suspected. Diagnose the RV meter. Refer to

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN1) and the CAN adapter connector.

Diagnosis Item 7: Diagnose when the M.U.T.-III cannot receive the data sent by ABS-ECU. <Vehicles with ABS>

CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W6C54X011A

FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the ABS-ECU" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the ABS-ECU data only.

TROUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from ABS-ECU cannot be received and sent.

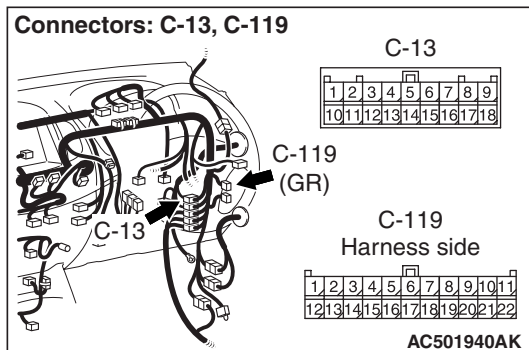
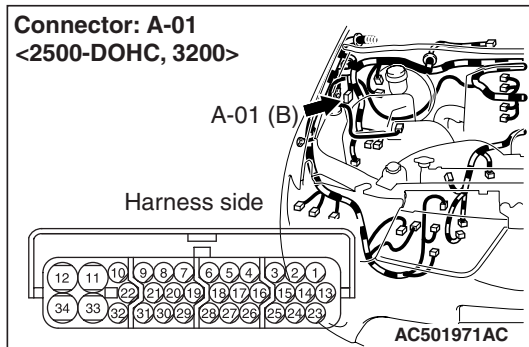
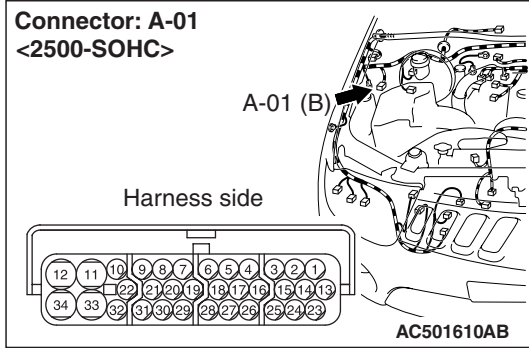
PROBABLE CAUSES

- Damaged harness wires and connectors
- Power supply circuit malfunction of the ABS-ECU
- Malfunction of the ABS-ECU

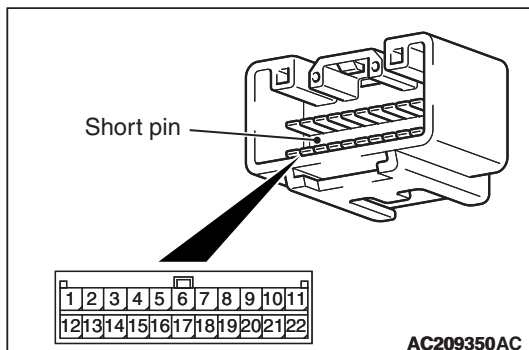
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-13 intermediate connector, C-119 joint connector (CAN1) and A-01 ABS-ECU connector

CAUTION



The strand end of the twist wire should be within 10 cm from the connector. For details refer to [P.54C-5](#).



When checking the joint connector, ensure that its

wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

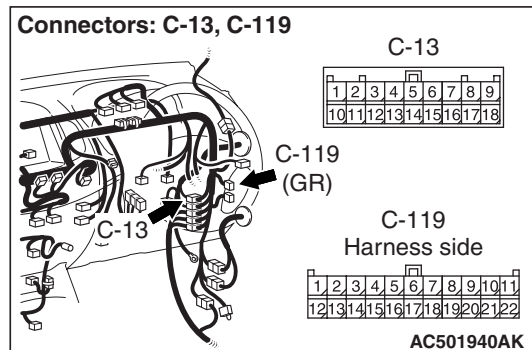
STEP 2. Resistance measurement at C-119 joint connector (CAN1) and C-13 intermediate connector.

CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



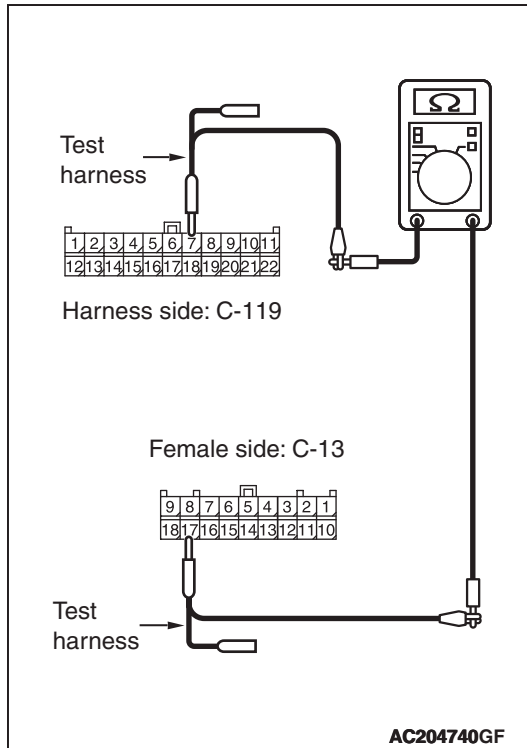
(1) Disconnect the joint connector (CAN1) and the intermediate connector, and measure at the wiring harness side.

- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

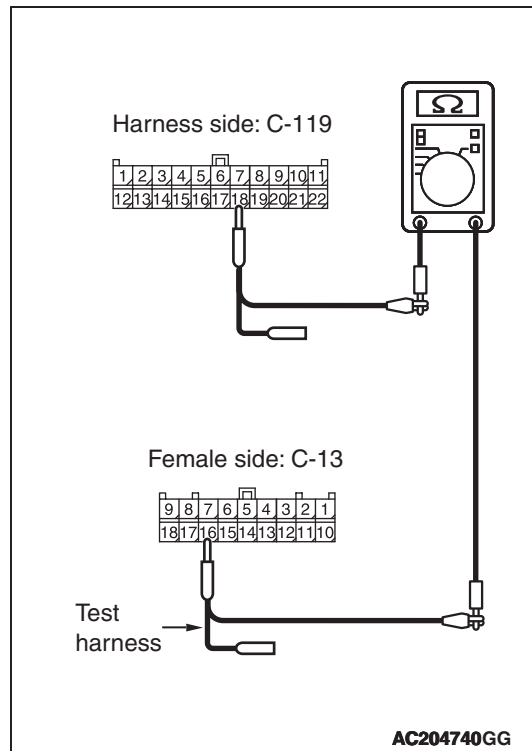
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54C-5.

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Continuity between C-119 joint connector (CAN1) terminal No.7 and C-13 intermediate connector terminal No.17

OK: 2 Ω or less



- (5) Continuity between C-119 joint connector (CAN1) terminal No.18 and C-13 intermediate connector terminal No.16

OK: 2 Ω or less

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-5.

Q: Is the check result normal?

YES : <All the resistances measure 2 Ω or less>
Go to Step 3.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN1) and intermediate connector (C-13).

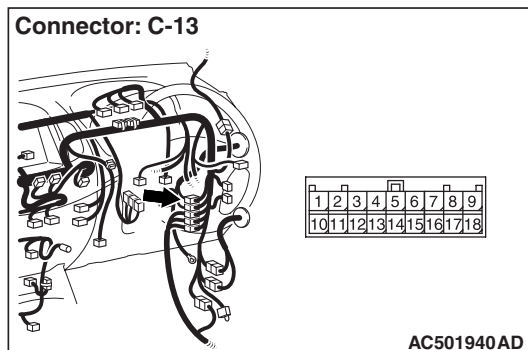
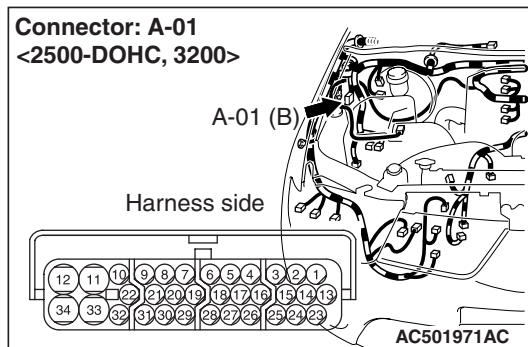
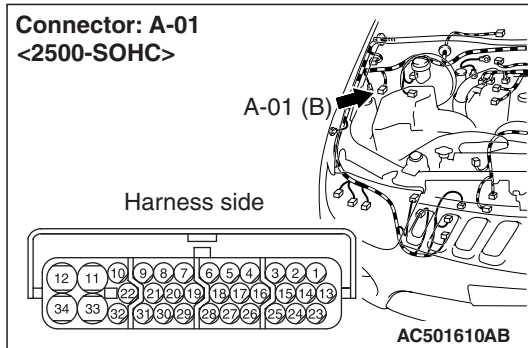
STEP 3. Resistance measurement at C-13 intermediate connector and A-01 ABS-ECU connector.

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



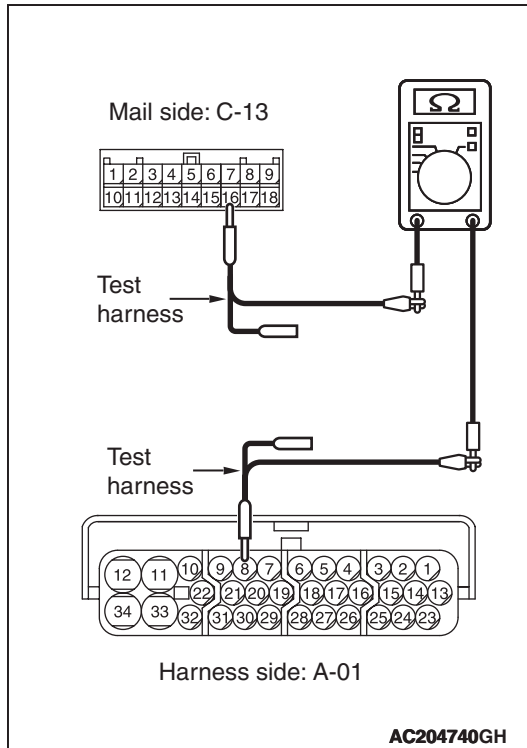
- (1) Disconnect the intermediate connector and the ABS-ECU connector, and measure at the wiring harness side.

- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

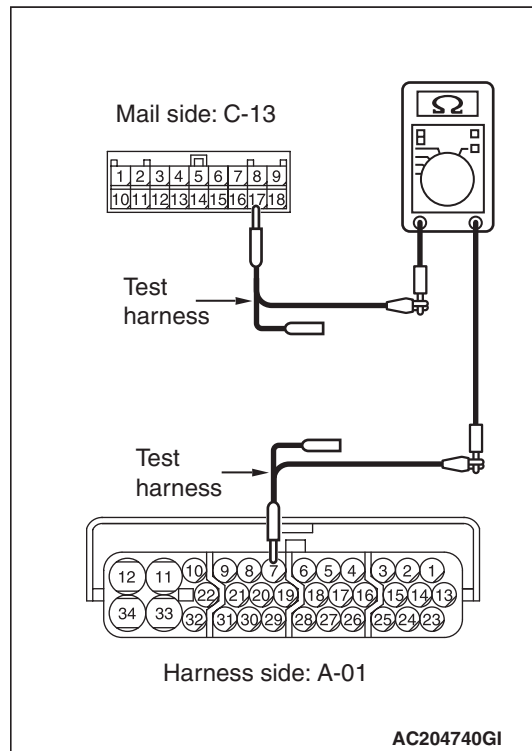
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54C-5.

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Continuity between C-13 intermediate connector terminal No.16 and A-01 ABS-ECU connector terminal No.8

OK: 2 Ω or less



- (5) Continuity between C-13 intermediate connector terminal No.17 and A-01 ABS-ECU connector terminal No.7

OK: 2 Ω or less

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-5.

- Q: Is the check result normal?**

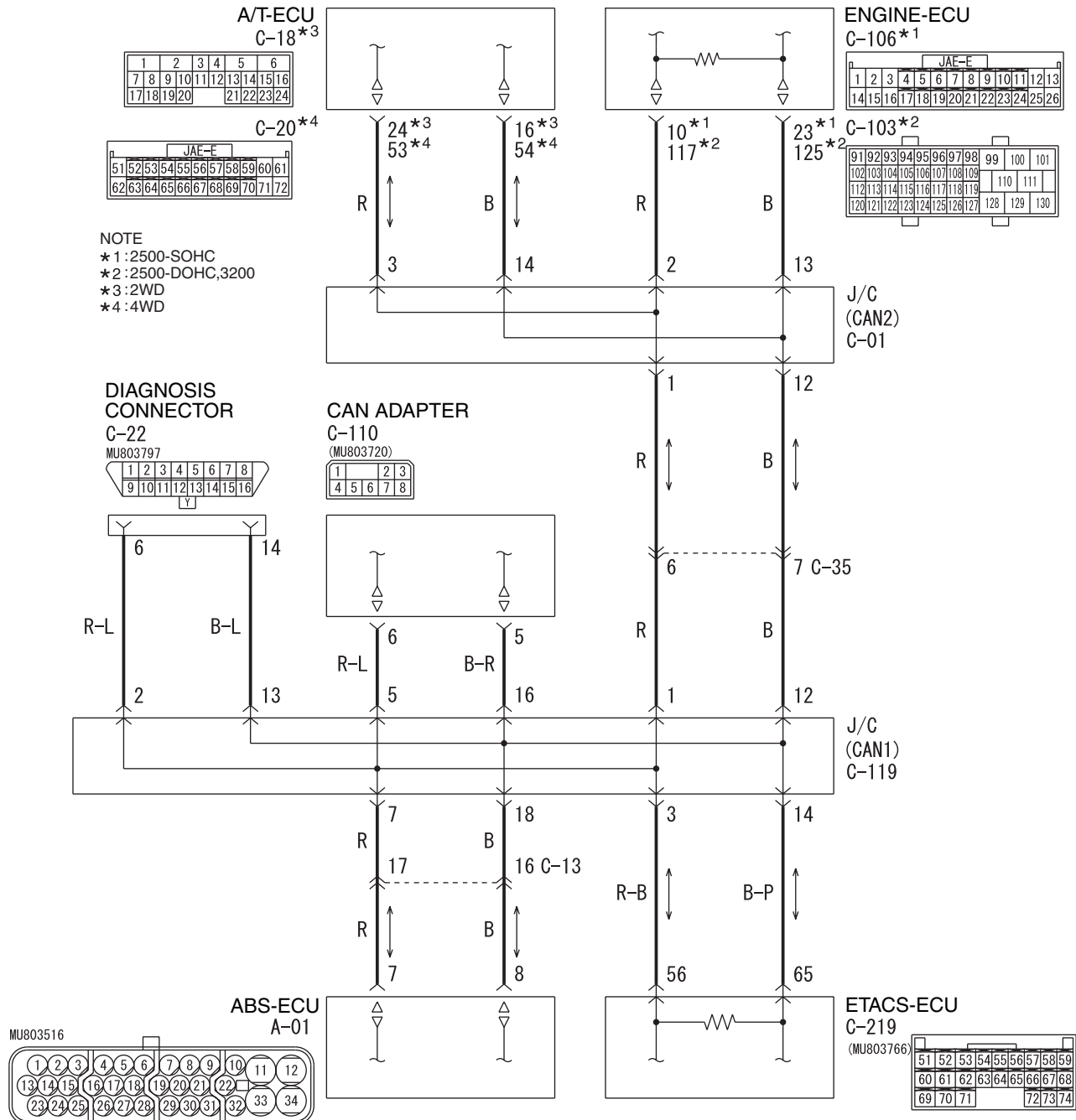
YES : <All the resistances measure 2 Ω or less>
Power supply to the ABS-ECU may be suspected. Diagnose the ABS. Refer to .

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between intermediate connector (C-13) and the ABS-ECU connector.

Diagnosis Item 8: Diagnose the lines between the joint connectors (CAN1 and CAN2)

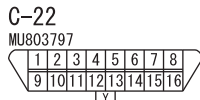
CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.

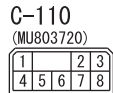


NOTE
 *1 : 2500-SOHC
 *2 : 2500-DOHC,3200
 *3 : 2WD
 *4 : 4WD

DIAGNOSIS CONNECTOR



CAN ADAPTER



Wire colour code
 B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
 BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

FUNCTION

The diagnostic result demonstrates that "diagnose the lines between the joint connectors (CAN1 and CAN2)" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the engine-ECU and the A/T-ECU <A/T> data.

TROUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from engine-ECU and the A/T-ECU <A/T> cannot be received and sent.

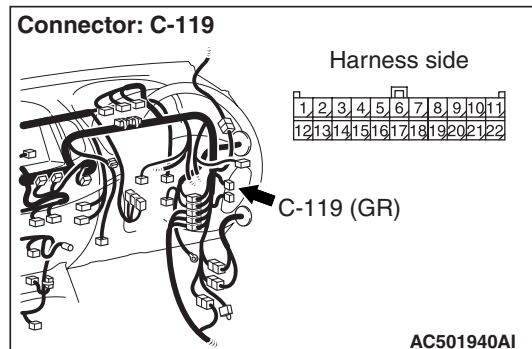
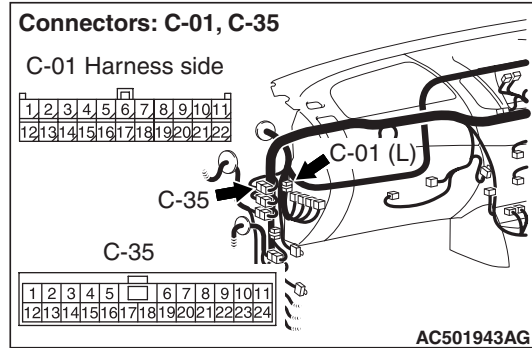
PROBABLE CAUSE

Damaged harness wires and connectors

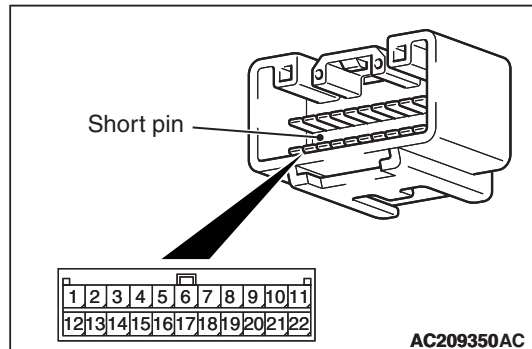
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-35 intermediate connector, C-119 joint connector (CAN1) and C-01 joint connector (CAN2)

⚠ CAUTION



The strand end of the twist wire should be within 10 cm from the connector. For details refer to [P.54C-5](#).



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

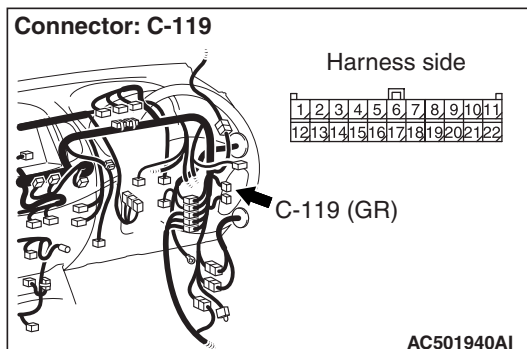
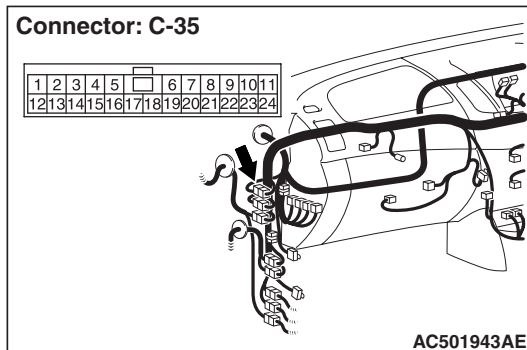
STEP 2. Resistance measurement at C-119 joint connector (CAN1) and C-35 intermediate connector.

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



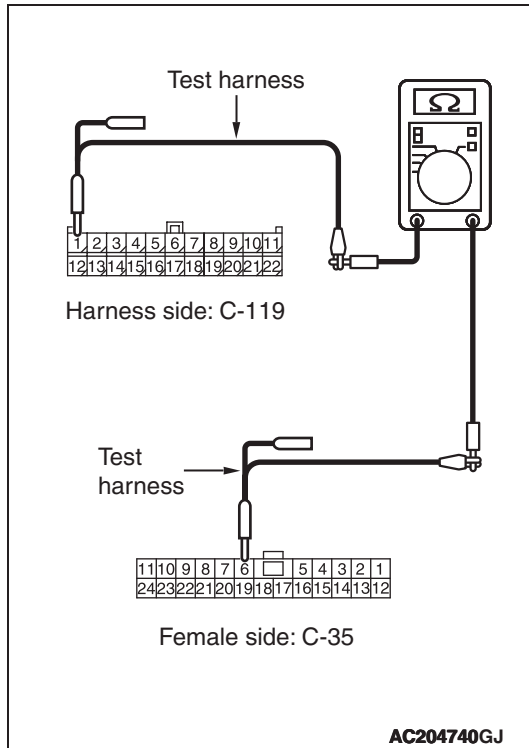
- (1) Disconnect the joint connector (CAN1) and the intermediate connector, and measure at the wiring harness side.

- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

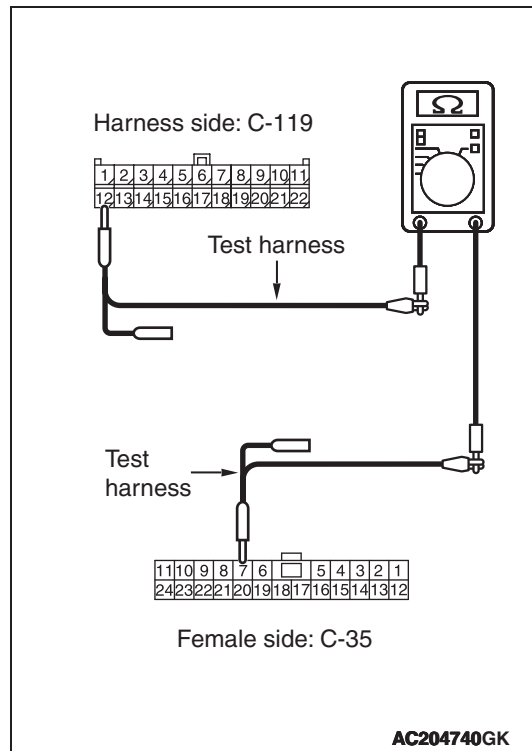
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54C-5.

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Continuity between C-119 joint connector (CAN1) terminal No.1 and C-35 intermediate connector terminal No.6

OK: 2 Ω or less



- (5) Continuity between C-119 joint connector (CAN1) terminal No.12 and C-35 intermediate connector terminal No.7

OK: 2 Ω or less

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-5.

- Q: Is the check result normal?**

YES : <All the resistances measure 2 Ω or less>
Go to Step 3.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN1) and intermediate connector (C-35).

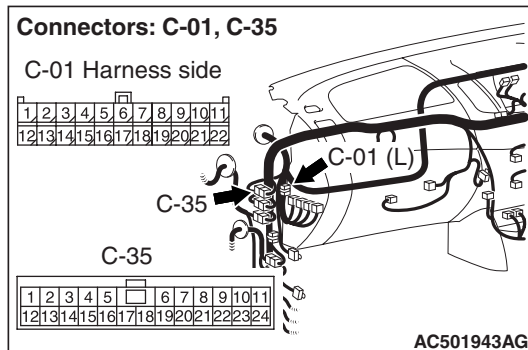
STEP 3. Resistance measurement at C-01 joint connector (CAN2) and C-35 intermediate connector.

⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

⚠ CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).



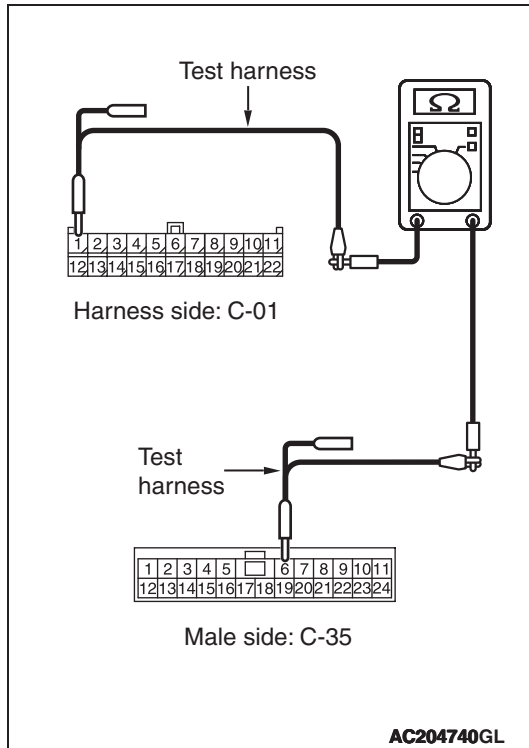
- (1) Disconnect joint connector (CAN2) and the intermediate connector, and measure at the wiring harness side.

- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

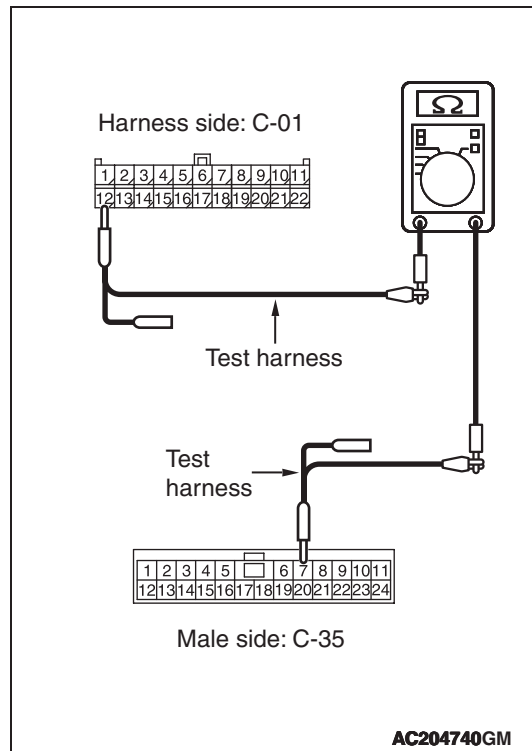
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54C-5.

- (3) Ensure that the negative battery terminal is disconnected.



- (4) Continuity between C-01 joint connector (CAN2) terminal No.1 and C-35 intermediate connector terminal No.6

OK: 2 Ω or less



- (5) Continuity between C-01 joint connector (CAN2) terminal No.12 and C-35 intermediate connector terminal No.7

OK: 2 Ω or less

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-5.

- Q: Is the check result normal?**

YES : <All the resistances measure 2 Ω or less>

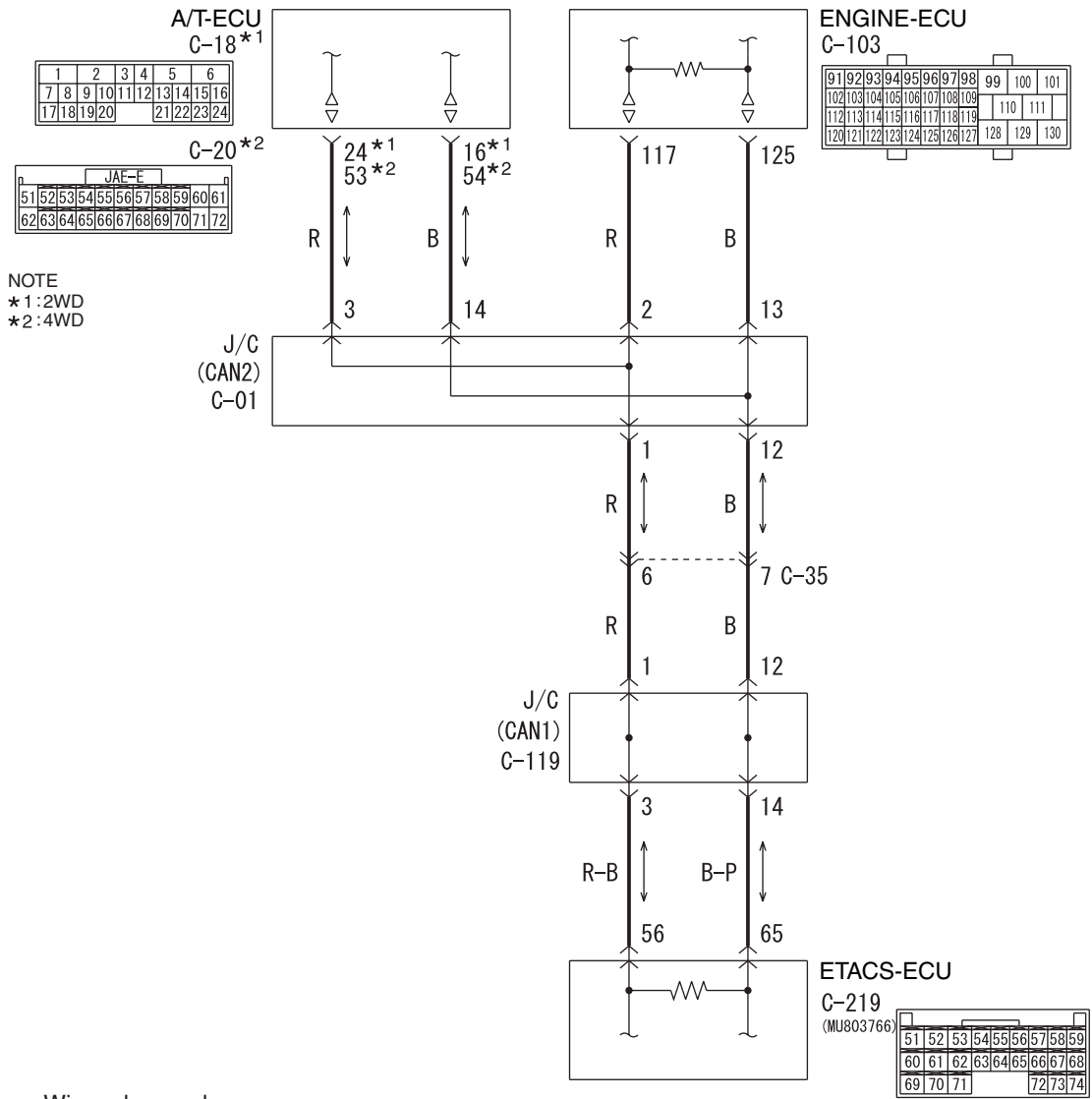
Follow diagnosis item 5 "Diagnose the lines from the main bus line to the ETACS-ECU," diagnosis item 6 "Diagnose the lines between CAN main bus line and the CAN adapter <vehicles with RV meter>," diagnosis item 7 "Diagnose the lines between CAN main bus line and the ABS-ECU <vehicles with ABS>," diagnosis item 9 "Diagnose the lines from the main bus line to the A/T-ECU <A/T>" and diagnosis item 10 "Diagnose the lines from the main bus line to the engine-ECU." Refer to P.54C-14.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between the intermediate connector and the intermediate connector.

Diagnosis Item 9: Diagnose when the M.U.T.-III cannot receive the data sent by A/T-ECU. <A/T>

CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



NOTE
*1: 2WD
*2: 4WD

Wire colour code
B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W6C54X012A

FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the A/T-ECU" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the A/T-ECU data only.

TROUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from A/T-ECU cannot be received and sent.

PROBABLE CAUSES

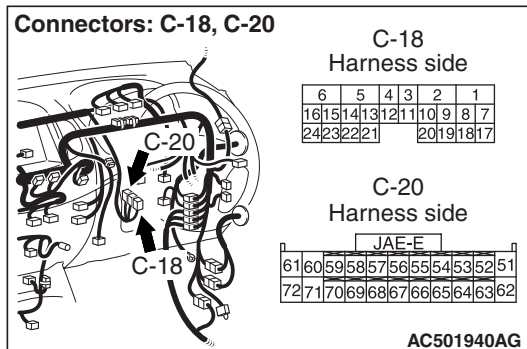
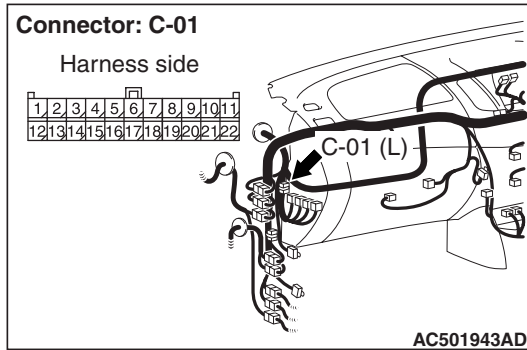
- Damaged harness wires and connectors
- Power supply circuit malfunction of the A/T-ECU

- Malfunction of the A/T-ECU

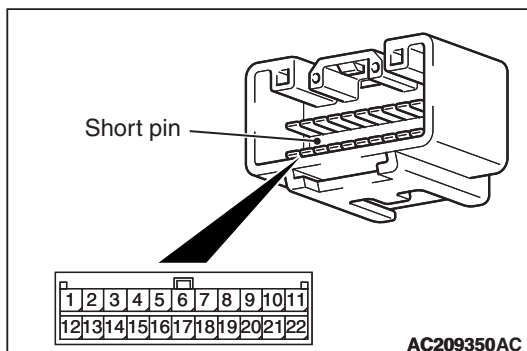
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-01 joint connector (CAN2) and C-18 <2WD> or C-20 <4WD> A/T-ECU connector

CAUTION



The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54C-5.



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

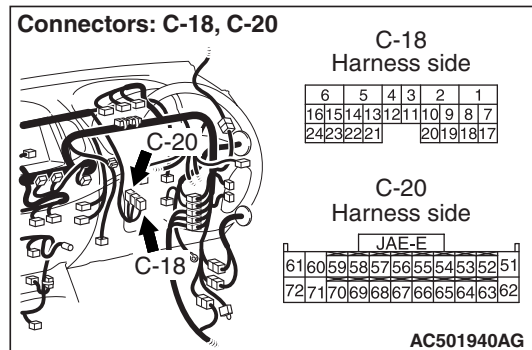
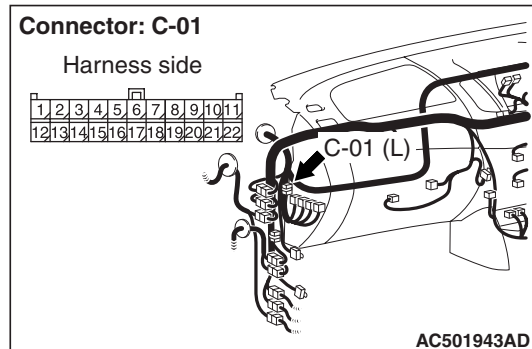
STEP 2. Resistance measurement at C-01 joint connector (CAN2) and C-18 <2WD> or C-20 <4WD> A/T-ECU connector.

CAUTION

A digital multimeter should be used. For details refer to P.54C-5.

CAUTION

The test wiring harness should be used. For details refer to P.54C-5.



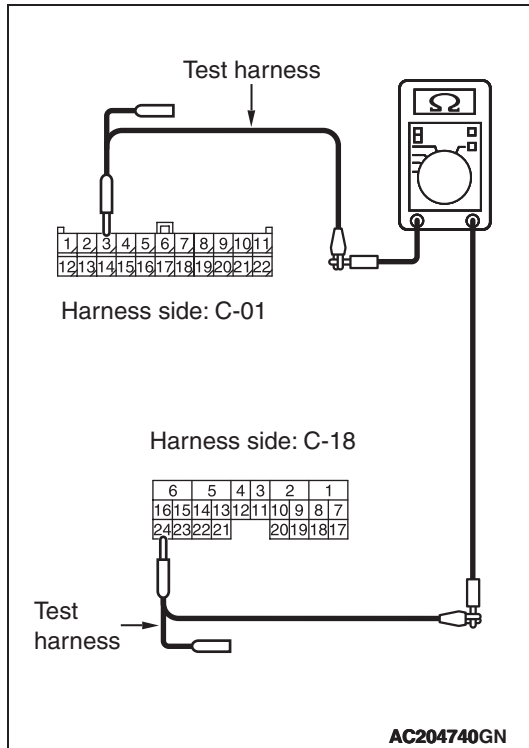
(1) Disconnect joint connector (CAN2) and the A/T-ECU connector, and measure at the wiring harness side.

(2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

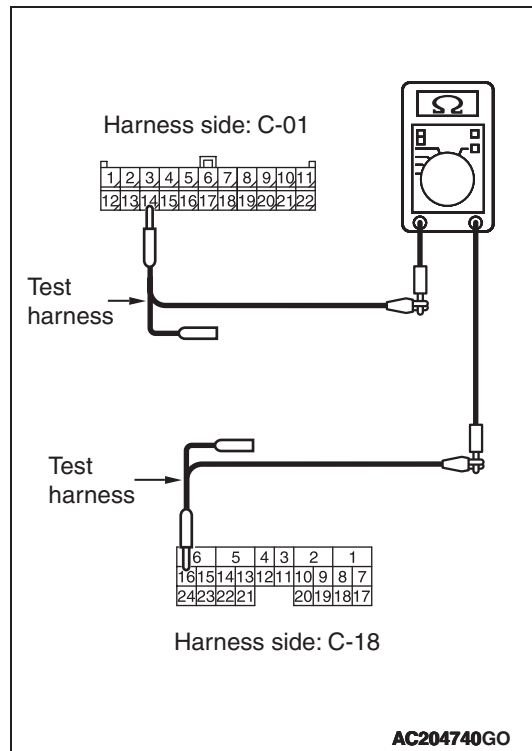
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54C-5.

(3) Ensure that the negative battery terminal is disconnected.



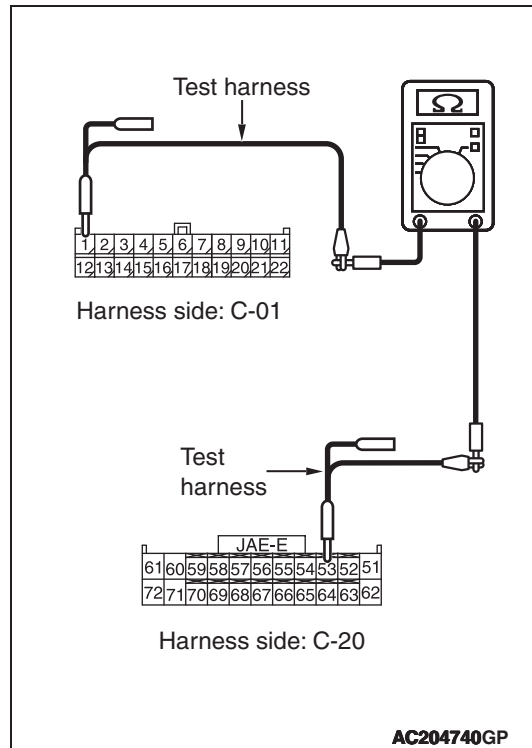
(4) Continuity between C-01 joint connector (CAN2) terminal No.3 and C-18 A/T-ECU connector terminal No.24 <2WD>

OK: 2 Ω or less



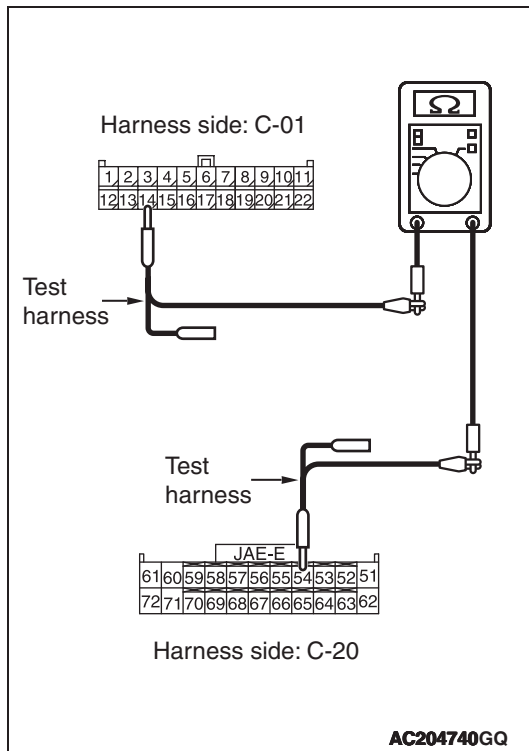
(5) Continuity between C-01 joint connector (CAN2) terminal No.14 and C-18 A/T-ECU connector terminal No.16 <2WD>

OK: 2 Ω or less



(6) Continuity between C-01 joint connector (CAN2) terminal No.3 and C-20 A/T-ECU connector terminal No.53 <4WD>

OK: 2 Ω or less



YES : <All the resistances measure 2 Ω or less>
Power supply to the A/T-ECU may be suspected. Diagnose the A/T. Refer to <2WD> or <4WD>.

NO : <Either or all of the voltages measure more than 2 Ω > Repair the wiring harness between joint connector (CAN2) and the A/T-ECU connector.

(7) Continuity between C-01 joint connector (CAN2) terminal No.14 and C-20 A/T-ECU connector terminal No.54 <4WD>

OK: 2 Ω or less

CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

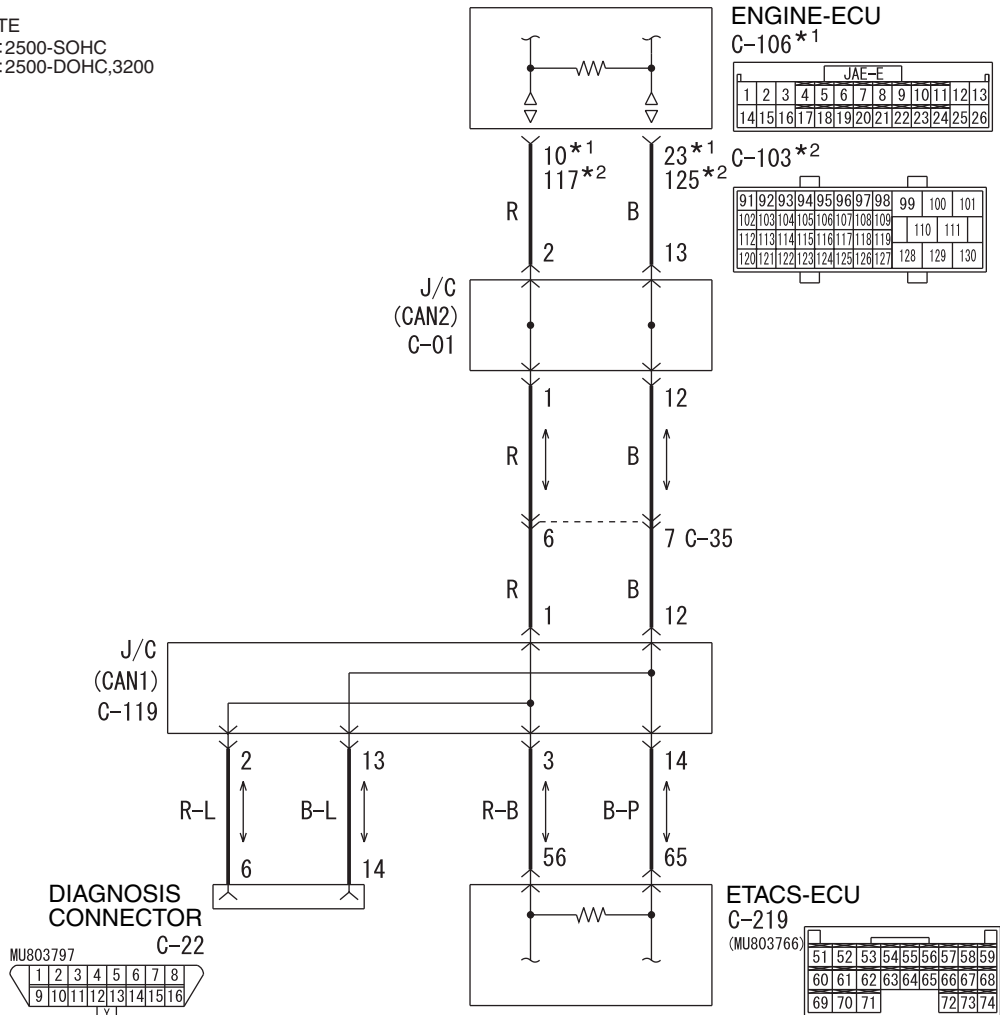
Q: Is the check result normal?

Diagnosis Item 10: Diagnose when the M.U.T.-III cannot receive the data sent by engine-ECU.

CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.

NOTE
* 1 : 2500-SOHC
* 2 : 2500-DOHC,3200



Wire colour code
B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the engine-ECU" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the engine-ECU data only.

TROUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from combination meter cannot be received and sent.

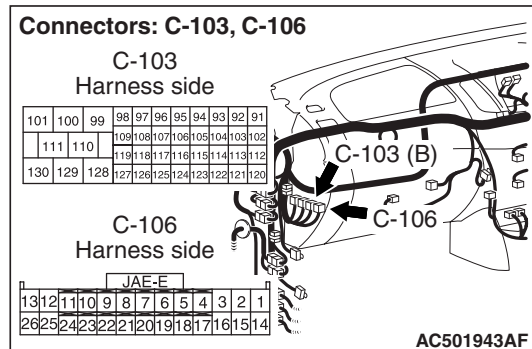
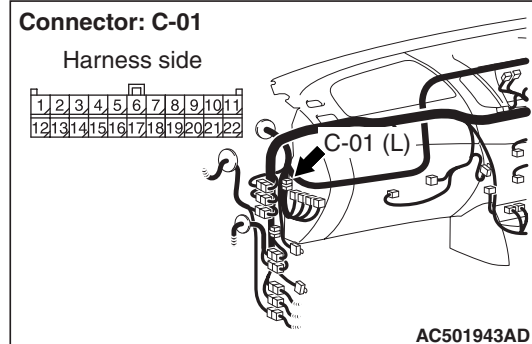
PROBABLE CAUSES

- Damaged harness wires and connectors
- Power supply circuit malfunction of the engine-ECU
- Malfunction of the engine-ECU

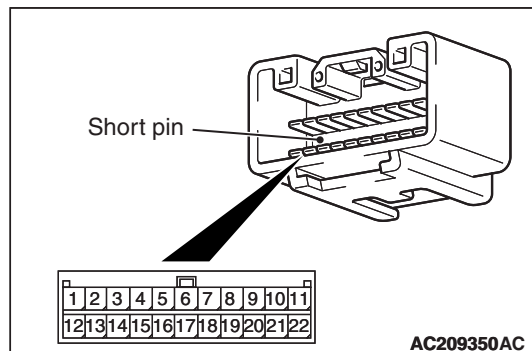
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-01 joint connector (CAN2) and C-106 engine-ECU connector

⚠ CAUTION



The strand end of the twist wire should be within 10 cm from the connector. For details refer to [P.54C-5](#).



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

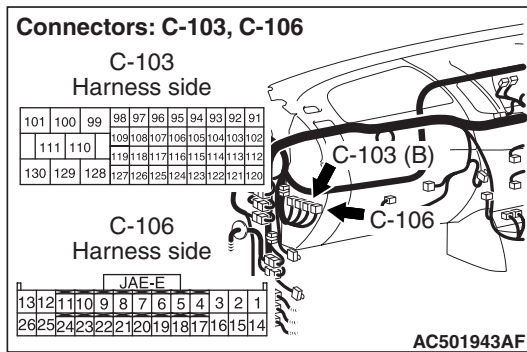
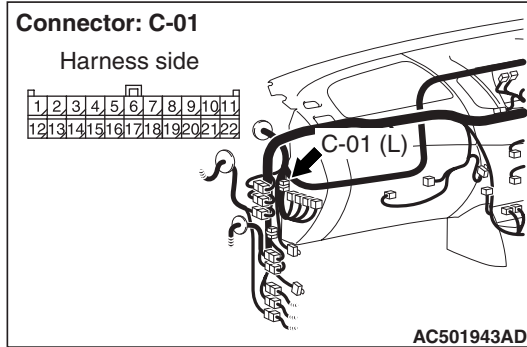
STEP 2. Resistance measurement at C-01 joint connector (CAN2) and C-106 <2500-SOHC> or C-103 <2500-DOHC, 3200> engine-ECU connector.

CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

CAUTION

The test wiring harness should be used. For details refer to [P.54C-5](#).

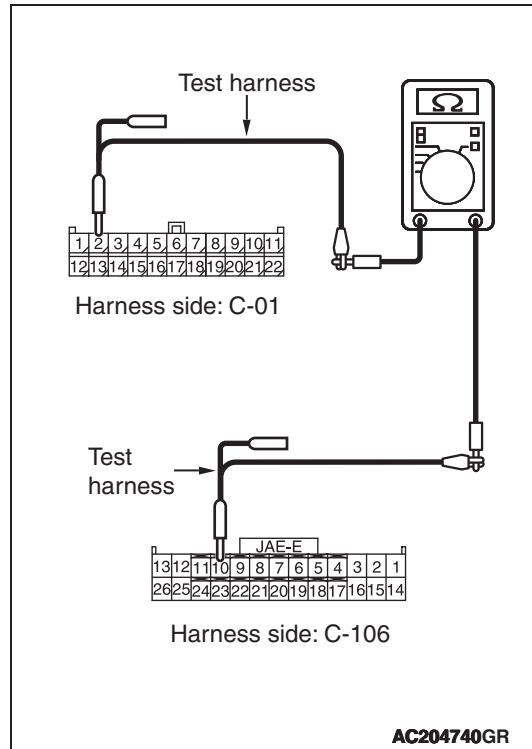


- (1) Disconnect the joint connector (CAN2) and the engine-ECU connector, and measure at the wiring harness side.
- (2) Turn the ignition switch to the LOCK (OFF) position.

CAUTION

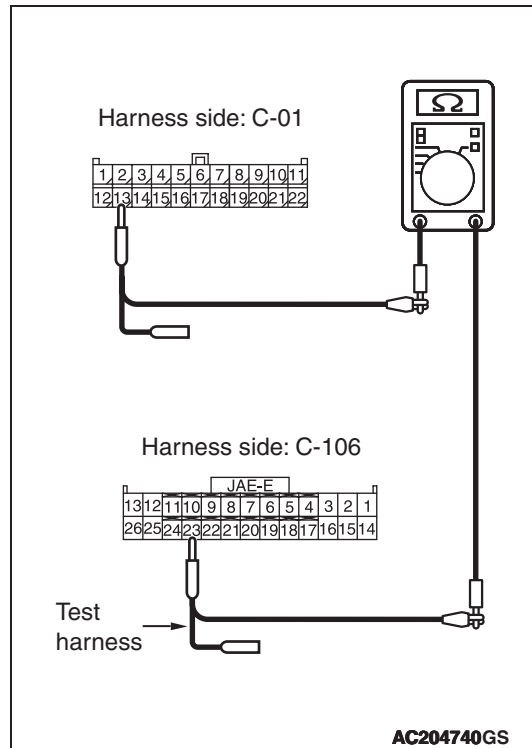
When measuring the resistance, disconnect the negative battery terminal. For details refer to [P.54C-5](#).

- (3) Ensure that the negative battery terminal is disconnected.



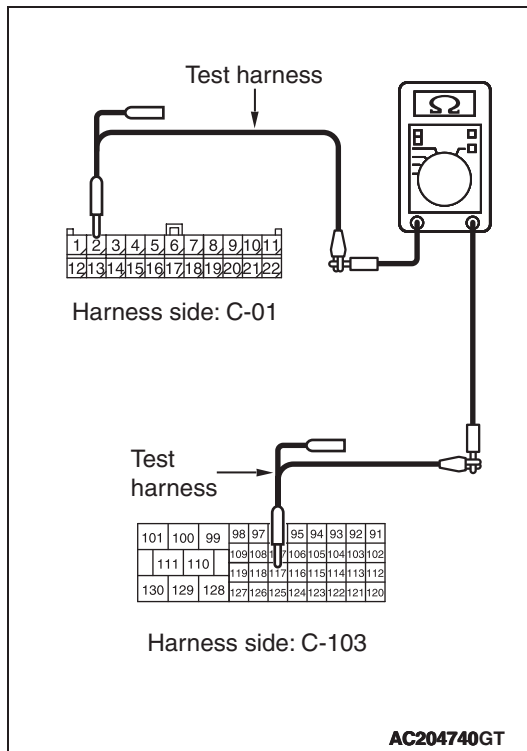
- (4) Continuity between C-01 joint connector (CAN2) terminal No.2 and C-106 engine-ECU connector terminal No.10 <2500-SOHC>

OK: 2 Ω or less



- (5) Continuity between C-01 joint connector (CAN2) terminal No.13 and C-106 engine-ECU connector terminal No.23 <2500-SOHC>

OK: 2 Ω or less



(6) Continuity between C-01 joint connector (CAN2) terminal No.2 and C-103 engine-ECU connector terminal No.117 <2500-DOHC, 3200>

OK: 2 Ω or less

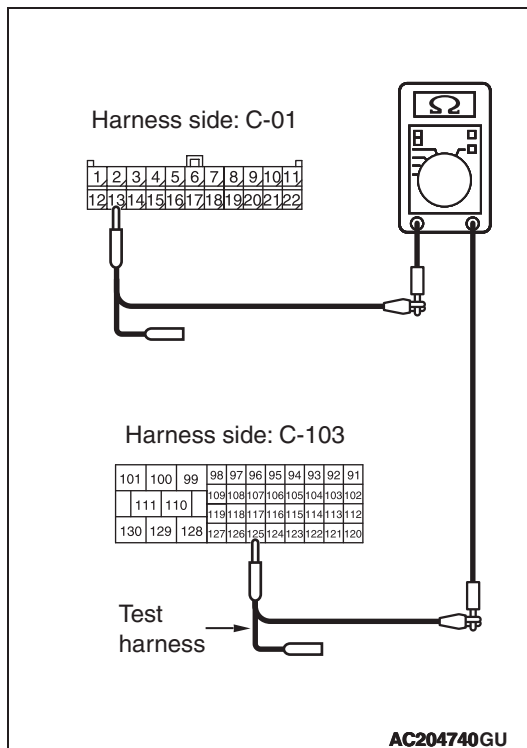
CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54C-5.

Q: Is the check result normal?

YES : <All the resistances measure 2 Ω or less>
Go to Step 3.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN2) and the engine-ECU connector.



(7) Continuity between C-01 joint connector (CAN2) terminal No.13 and C-103 engine-ECU connector terminal No.125 <2500-DOHC, 3200>

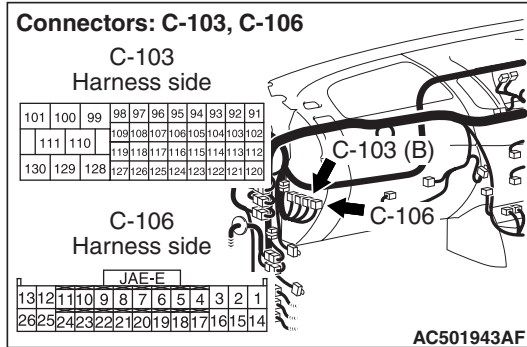
OK: 2 Ω or less

STEP 3. Resistance measurement at C-106
<2500-SOHC> or C-103 <2500-DOHC, 3200>
engine-ECU connector.

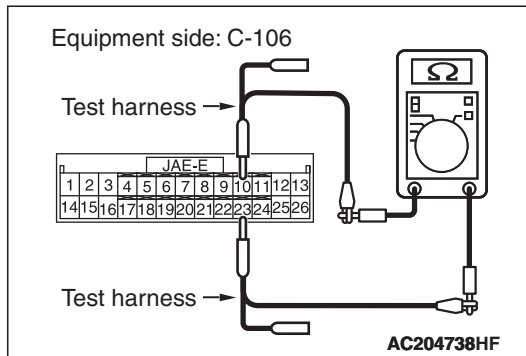
⚠ CAUTION

A digital multimeter should be used. For details refer to [P.54C-5](#).

YES : <Within $120 \pm 20 \Omega$ > Power supply to the engine-ECU may be suspected. Diagnose the fuel system. Refer to <2500-SOHC>, <2500-DOHC> or <3200>.
NO : <Not within $120 \pm 20 \Omega$ > Replace the engine-ECU.

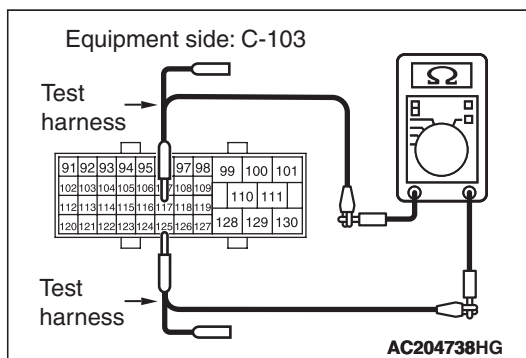


(1) Remove the engine-ECU, and measure at the equipment side.



(2) Resistance between C-106 engine-ECU connector terminal Nos.10 and 23 <2500-SOHC>

OK: $120 \pm 20 \Omega$



(3) Resistance between C-103 engine-ECU connector terminal Nos.117 and 125 <2500-DOHC, 3200>

OK: $120 \pm 20 \Omega$

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to [P.54C-5](#).

Q: Is the check result normal?

CAN COMMUNICATION SIGNAL TABLE

M1548300400231

Signal	Transmitter ECU	Receiver ECU				
		Engine-ECU *1	Engine-ECU *2	A/T-ECU	RV meter	ETACS-ECU
Transmission torque request signal	Engine-ECU	–	–	×	–	–
Engine torque signal		–	–	×	–	–
Vehicle speed signal		–	–	–	×	×
Vehicle speed sensor fail signal		–	–	–	×	×
Starter motor signal		–	–	–	–	×
Torque converter lock up clutch request signal		–	–	×	–	–
Shift pattern request signal		–	–	×	–	–
Engine coolant temperature signal		–	–	×	–	–
Fuel consumption signal		–	–	–	×	–
A/C clutch signal		–	–	×	–	–
Engine torque request signal	A/T-ECU	–	×	–	–	–
Target gear signal		–	–	–	–	×
A/T fluid temperature signal		–	×	–	–	–
Operating buzzer request signal	RV meter	–	–	–	–	×
Keep communication on request signal		–	–	–	–	×
Function customize signal		–	–	–	–	×
Ignition switch (ACC) signal	ETACS-ECU	–	–	–	×	–
Ignition switch (IG1) signal		–	–	–	×	–
Illumination request signal		–	–	–	×	–
Fog light indicator lamp illuminate signal		–	×	–	–	–
Turn-signal indicator lamp illuminate signal		–	×	–	–	–
High-beam indicator lamp illuminate signal		–	×	–	–	–
Wiper status signal		–	×	–	–	–
Headlamp illuminate signal		–	×	–	–	–
Position lamp illuminate signal		–	×	–	–	–
Diagnosis code setting enabled signal		×	×	×	×	–
Free run counter signal	×	×	×	–	–	

NOTE:

- "×" indicates the applicable points.
- *1: Vehicles without Common Rail System
- *2: Vehicles with Common Rail System

CAN COMMUNICATION-RELATED DIAGNOSIS CODE (U CODE) TABLE

M1548300300278

Code No.	Diagnostic item	Output ECU	Action
U1073	Bus Off	Engine-ECU, A/T-ECU, ABS-ECU, ETACS-ECU	CAN main bus line diagnostics
U1100	Engine-ECU time-out (related to engine)	A/T-ECU, ETACS-ECU	
U1101	A/T-ECU time-out (related to automatic transmission) <A/T>	Engine-ECU, A/T-ECU	
U1109	ETACS-ECU time-out	Engine-ECU, A/T-ECU	
U1111	RV meter time-out	ETACS-ECU	
U1120	Failure information of Engine-ECU	A/T-ECU	
U1150	Failure information of vehicles speed	ETACS-ECU	Diagnose CAN main bus lines and confirm input signals.
U1190	The network system diagnosis code output permitted signal can not be received.	Engine-ECU, A/T-ECU	