

HOW TO USE THIS MANUAL

00100010234

MAINTENANCE, REPAIR AND SERVICING EXPLANATIONS

This manual provides explanations, etc. concerning procedures for the inspection, maintenance, repair and servicing of the subject model. Unless otherwise specified, each service procedure covers all models. Procedures covering specific models are identified by the model codes, or similar designation (engine type, transaxle type, etc.). A description of these designations is covered in this manual under "VEHICLE IDENTIFICATION".

ON-VEHICLE SERVICE

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

SERVICE PROCEDURES

The service steps are arranged in numerical order. Attention must be paid in performing vehicle service are described in detail in SERVICE POINTS.

DEFINITION OF TERMS

STANDARD VALUE

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

LIMIT

Shows the standard for judging the quality of a part or assembly on inspection and means the maximum or minimum value within which the part or

assembly must be kept functionally or in strength. It is a value established outside the range of standard value.

REFERENCE VALUE

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

CAUTION

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

TIGHTENING TORQUE INDICATION

The tightening torque shown in this manual is a basic value with a tolerance of $\pm 10\%$ except the following cases when the upper and lower limits of tightening torque are given.

- (1) The tolerance of the basic value is within $\pm 10\%$.
- (2) Special bolts or the like are in use.
- (3) Special tightening methods are used.

SPECIAL TOOL NOTE

Only MMC special tool part numbers are called out in the repair sections of this manual. Please refer to the special tool cross reference chart, which is located in the service manual at the beginning of each group, for a cross reference from the MMC special tool number to the special tool number that is available in your market.

MODEL INDICATIONS

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

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

A/T : Indicates the automatic transaxle, or models equipped with the automatic transaxle.

VEHICLE IDENTIFICATION NUMBER LIST

2-DOOR MODELS FOR FEDERAL

V.I.N. (except sequence number)	Brand	Engine Displacement	Model Code
JA3AY11A_XU	Mitsubishi Mirage	1.5L [SOHC-MFI]	CJ2ADNSEL2M CJ2ADRSEL2M
JA3AY21A_XU			CJ2ADNMEL2M CJ2ADRME2M
JA3AY31C_XU		1.8L [SOHC-MFI]	CJ5ADNDEL2M CJ5ADRDEL2M

2-DOOR MODELS FOR CALIFORNIA

V.I.N. (except sequence number)	Brand	Engine Displacement	Model Code
JA3AY11A_XU	Mitsubishi Mirage	1.5L [SOHC-MFI]	CJ2ADNSEL7M CJ2ADRSEL7M
JA3AY31C_XU		1.8L [SOHC-MFI]	CJ5ADNDEL7M CJ5ADRDEL7M

4-DOOR MODELS FOR FEDERAL

V.I.N. (except sequence number)	Brand	Engine Displacement	Model Code
JA3AY26A_XU	Mitsubishi Mirage	1.5L [SOHC-MFI]	CK2ASNME2M CK2ASRMEL2M
JA3AY36A_XU			CK2ASRDEL2M
JA3AY36C_XU		1.8L [SOHC-MFI]	CK5ASNDEL2M CK5ASRDEL2M
JA3AY46C_XU			CK5ASRJEL2M

4-DOOR MODELS FOR CALIFORNIA

V.I.N. (except sequence number)	Brand	Engine Displacement	Model Code
JA3AY26A_XU	Mitsubishi Mirage	1.5L [SOHC-MFI]	CK2ASNME7M CK2ASRMEL7M
JA3AY36C_XU		1.8L [SOHC-MFI]	CK5ASNDEL7M CK5ASRDEL7M

9. DRIVE BELT

For Generator, Water Pump, Power Steering Pump (Check condition)

Check the tension of the drive belt. Inspect the drive belt for evidence of cuts and cracks and replace it if defective.

WATER PUMP AND GENERATOR

1. Check the drive belt tension with one of the following methods.

Standard value:

Items	1.5L engine	1.8L engine
Vibration frequency Hz	150 - 184	151 - 195
Tension N (lbs.)	392 - 588 (88 - 132)	294 - 490 (66 - 110)
Deflection (Reference value) mm (in.)	8.7 - 11.4 (.34 - .45)	8.0 - 10.5 (.31 - .41)

When using the scan tool (MUT-II)

1. Connect the special tool (belt tension meter set) to the scan tool (MUT-II).
2. Connect the scan tool (MUT-II) to the diagnosis connector.
3. Set the ignition switch to the ON position, and select "Belt Tension Measurement" on the menu screen.
4. Place the microphone approx. 10 to 20 mm (.39 to .79 in.) from the rear center (arrow section) of the pulleys shown in the illustration.
5. With a finger, lightly press the center (arrow section) of the pulleys shown in the illustration, and check that the vibration frequency of the belt is at the standard value.

Caution

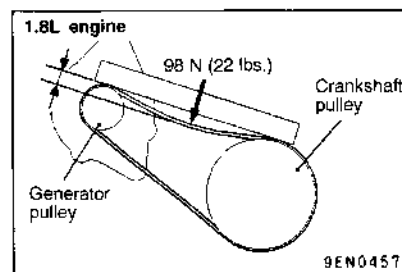
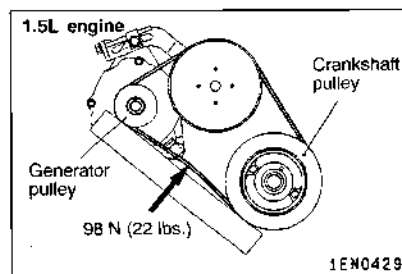
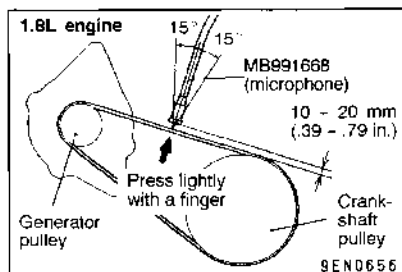
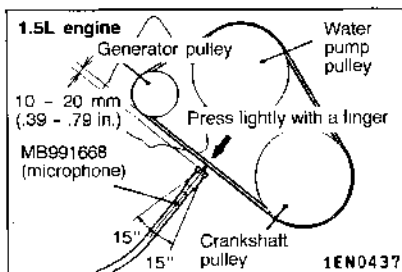
1. Measure the belt surface temperature when it is close to the room temperature.
2. Make sure that water and oil, etc., do not come in contact with the microphone.
3. When measuring, if the microphone is subject to strong winds, or if there is noise in the near area, a value differing from the actual value may be indicated.
4. If the measurement is carried out when the microphone is contacting the belt, a value differing from the actual value may be indicated.
5. Do not measure while the engine is running.

When using belt tension gauge

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

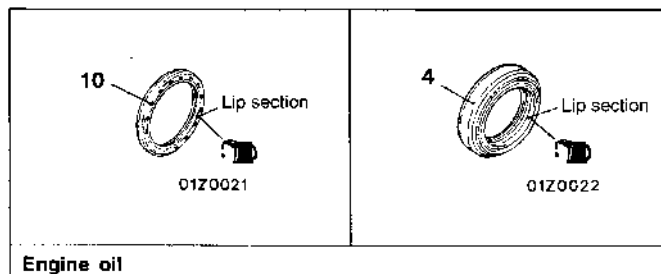
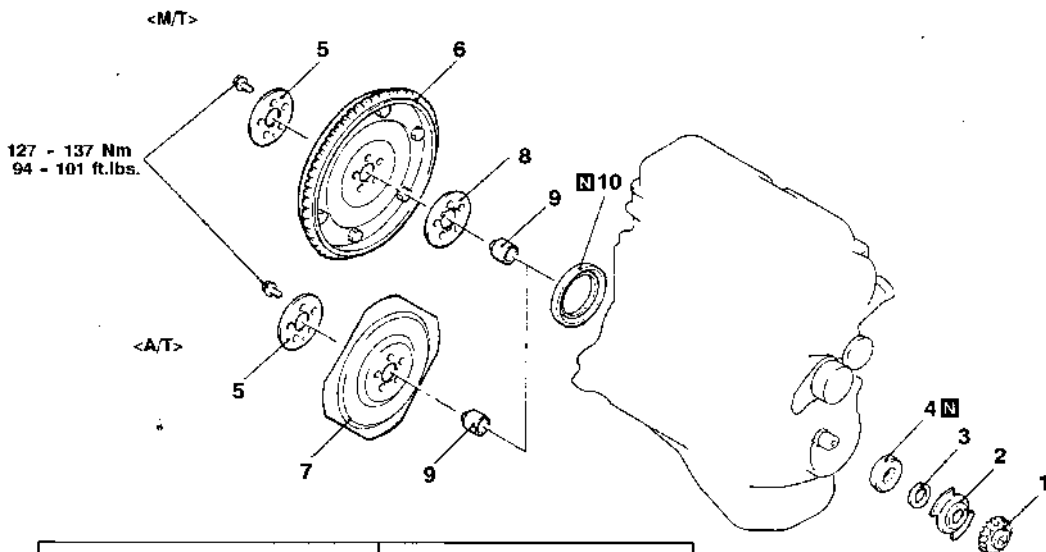
When checking the deflection amount

Apply a pressing force of 98 N (22 lbs.) at the center (arrow section) of the pulleys shown in the illustration, and check that the amount of belt deflection is at the standard value.



CRANKSHAFT OIL SEAL

REMOVAL AND INSTALLATION



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Crankshaft front oil seal removal steps

- Timing belt (Refer to P.11A-32.)
- 1. Crankshaft sprocket
- 2. Crankshaft sensing blade
- 3. Crankshaft spacer
- 4. Crankshaft front oil seal



Crankshaft rear oil seal removal steps

- Transaxle assembly
- Clutch cover and disc <M/T>
- 5. Adapter plate
- 6. Flywheel <M/T>
- 7. Drive plate <A/T>
- 8. Adapter plate <M/T>
- 9. Crankshaft bushing
- 10. Crankshaft rear oil seal



Caution

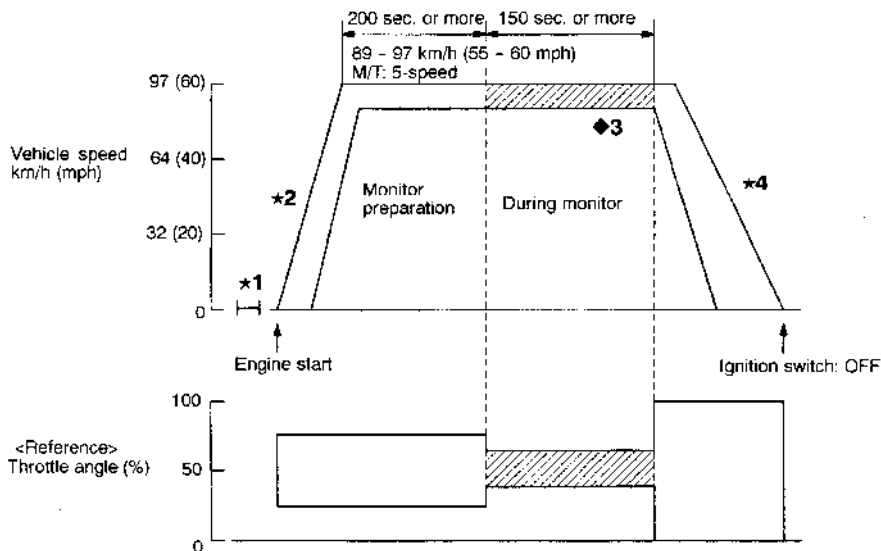
Do not disassemble the flywheel, as its runout is adjusted as an assembly. If it is disassembled, the flywheel may lose the balance and get damage.

Evaporative emission control system leak monitor (P0442, P0450, P0455)

Test requirements/procedure

- All of the following requirements should be met when carrying out a drive test.
 - Engine coolant temperature: 45°C (113°F) or less (before starting drive test, engine stopped)
 - Atmospheric temperature: 5°C (41°F) or more, 45°C (113°F) or less
 - Condition of A/T:
 - Selector lever position: D range
 - Overdrive switch: ON
- One trip monitor will be completed by driving according to the steps below (from start to switch off). (It takes approx. 8 minutes.)
 - Check that both engine coolant temperature and air intake temperature satisfy requirement 1 (engine stopped).
 - Monitor preparation period; Start the engine, and accelerate to 89 - 97 km/h (55 - 60 mph). For this period, acceleration, deceleration, or braking may be carried out. Continue driving between 89 and 97 km/h (55 and 60 mph) for 200 seconds or more. For this period, braking or throttle operation may be carried out if vehicle speed is within the specified value.
 - Drive between 89 and 97 km/h (55 and 60 mph) at a constant throttle angle (by not moving the throttle pedal as much as possible) for 150 seconds or more during monitor. Moreover, do not turn the steering wheel suddenly.
 - Decelerate and stop the vehicle. After stop, turn off the ignition switch.

Drive cycle pattern



7FU1957

Caution
Drive within the shaded area in the graph above.

INSPECTION PROCEDURE FOR DIAGNOSTIC TROUBLE CODES

Code No. P0100 Volume Air Flow Circuit Malfunction

Background

- While the engine is running, the volume air flow sensor outputs a pulse signal which corresponds to the volume of air flow.
- The engine control module checks whether the frequency of this signal output by the volume air flow sensor while the engine is running at or above the set value.

Check Area

- Engine speed is not lower than 500 r/min.

Judgment Criteria

- Sensor output frequency has continued to be 3.3 Hz or lower for 2 sec

Check Area

- Throttle position sensor voltage is 2V or lower.
- Engine speed is not higher than 2000 r/min.

Judgment Criteria

- Sensor output frequency has continued to be 800 Hz or higher for 2 sec

Check Area

- Throttle position sensor voltage is 1.5 V or more.
- Engine speed is 2000 r/min or more.

Judgment Criteria

- Sensor output frequency is 60 Hz or less for 2 seconds.

Probable cause

- Volume air flow sensor failed
- Open or shorted volume airflow sensor circuit, or loose connector
- Engine control module failed

Measure at the volume air flow sensor connector A-58.

- Measure with the connector connected. (Use the test harness: MB991709).

1. Voltage between 3 and ground (Engine: idling)
OK: 2.2-3.2 V
2. Voltage between 7 and ground
OK: 0-1 V (Engine: idling)
6-9 V (3,000 r/min)

↓
OK

Replace the ECM.

1. NG → Check the volume air flow sensor circuit. (Refer to P.13B-123, INSPECTION PROCEDURE 47.)

2. NG → Measure at the ECM connectors B-40.
 - Measure with the connector connected.
 - Voltage between 19 and ground (Ignition switch: ON)
OK: 6-9 V

↓
OK

Check the following connector:
B-40

↓
OK

Check trouble symptom.

↓
NG

Replace the ECM.

- Check the following connector: A-58 → Repair

↓
OK

Check trouble symptom.

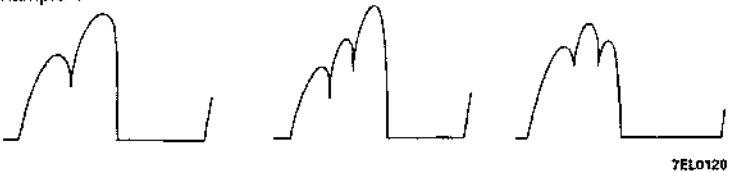




↓
NG

Replace the volume air flow sensor.

ABNORMAL WAVEFORMS EXAMPLES

NOTE

1. The size of the waveform patterns differs largely, depending on the adjustment of the analyzer's variable knob.
2. Identification of abnormal waveforms is easiest with a large output current (regulator not operating). These waveforms can be observed when the headlights are on.
3. Check the condition of the charging warning light (illuminated/not illuminated). Also, check the condition of all charging system components.

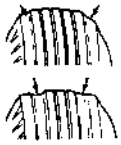


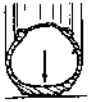


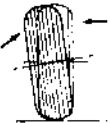

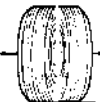

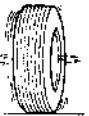

Abnormal waveforms	Problem cause
<p>Example 1</p>  <p>7EL0120</p>	Open diode
<p>Example 2</p>  <p>7EL0121</p>	Short in diode
<p>Example 3</p>  <p>7EL0122</p>	Broken wire in stator coil
<p>Example 4</p>  <p>7EL0123</p>	Short in stator coil
<p>Example 5</p>  <p>Charging warning light is illuminated.</p> <p>7EL0124</p>	Open supplementary diode

INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODE

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Code	Diagnosis item		Reference page
11	Throttle position sensor system	Short circuit	23A-22
12		Open circuit	23A-22
14		Sensor maladjustment	23A-22
15	Oil temperature sensor system	Open circuit	23A-22
16		Short circuit	23A-22
21	Crankshaft position sensor system	Open circuit	23A-22
22	Input shaft speed sensor system	Short circuit/open circuit	23A-23
23	Output shaft speed sensor system	Short circuit/open circuit	23A-24
26	Stop light switch system	Short circuit/open circuit	23A-25
27	Park/Neutral position switch system	Open circuit	23A-25
28		Short circuit	23A-25
31	Low and reverse solenoid valve system	Short circuit/open circuit	23A-26
32	Underdrive solenoid valve system	Short circuit/open circuit	23A-26
33	Second solenoid valve system	Short circuit/open circuit	23A-26
34	Overdrive solenoid valve system	Short circuit/open circuit	23A-26
36	Torque converter clutch solenoid system	Short circuit/open circuit	23A-26
41	1st gear incorrect ratio		23A-27
42	2nd gear incorrect ratio		23A-28
43	3rd gear incorrect ratio		23A-29
44	4th gear incorrect ratio		23A-30
46	Reverse gear incorrect ratio		23A-31
51	Abnormal communication with ECM		23A-32
52	Torque converter clutch solenoid system	Defective system	23A-26
53		Lock-up stuck on	23A-26
54	A/T Control relay system	Short circuit to ground/open circuit	23A-32
56	N range light system	Short circuit to ground	23A-33
71	Malfunction of TCM		23A-33

TROUBLESHOOTING

Symptom		Probable cause		Remedy	Reference page
Rapid wear at shoulders	 11X0109	Under-inflation or lack of rotation	 11X0116	Adjust the tire pressure.	Refer to P.31-5
Rapid wear at center	 11X0110	Over-inflation or lack of rotation	 11X0117		
Cracked treads	 11X0111	Under-inflation		Adjust the tire pressure.	Refer to P.31-5
Wear on one side	 11X0112	Excessive camber	 11X0118	Check the camber	Refer to GROUP 33A - On-vehicle Service.
Feathered edge	 11X0113	Incorrect toe-in	 11X0119	Adjust the toe-in.	
Bald spots	 11X0114	Unbalanced wheel	 11X0120	Adjust the imbalanced wheels.	-
Scalloped wear		Lack of rotation of tires or out-of-alignment suspension		Rotate the tires, check the front suspension alignment.	Refer to GROUP 33A - On-vehicle Service.

GENERAL INFORMATION

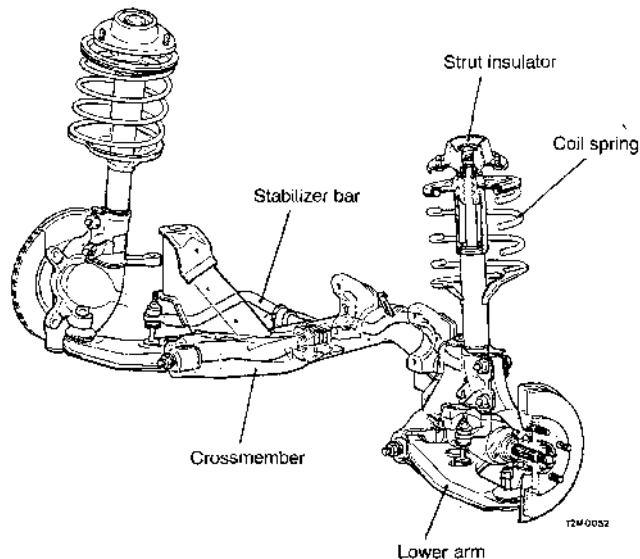
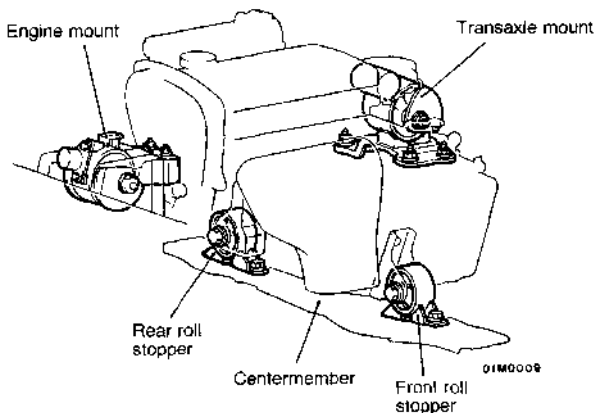
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The engine-transaxle mount is of an inertial axis supporting type. The inertial axis supporting type mount supports the front upper part of the engine at the front and the rear upper part of the transaxle at the rear. This arrangement effectively suppresses the engine vibration.

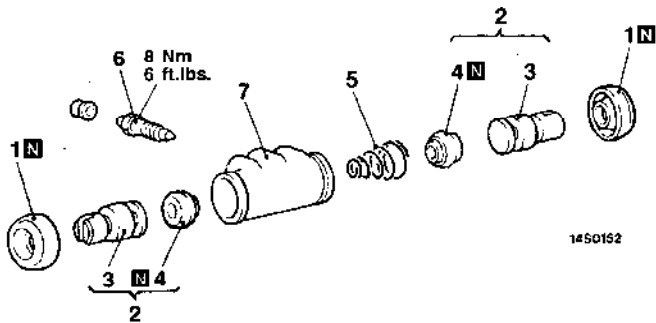
The centermember is bolted to the body and crossmember, supporting the front and rear roll stopper bracket.

The crossmember is bolted to the body, supporting the lower arm, steering gear box assembly, stabilizer bar, and centermember.

CONSTRUCTION DIAGRAM

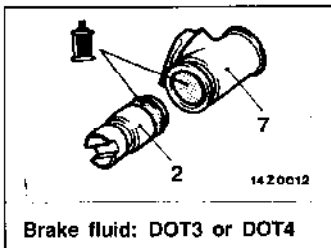


**WHEEL CYLINDER
DISASSEMBLY AND REASSEMBLY**

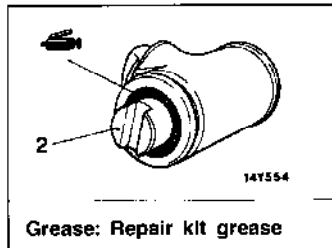


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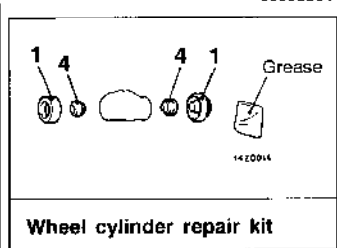
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Brake fluid: DOT3 or DOT4



Grease: Repair kit grease



Wheel cylinder repair kit

Disassembly steps

1. Boots
2. Piston assembly
3. Pistons
4. Piston cups

5. Spring
6. Bleeder
7. Wheel cylinder body



REASSEMBLY SERVICE POINT

▶◀ PISTON CUP/PISTON REASSEMBLY

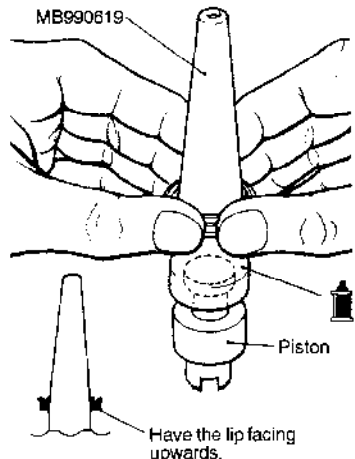
- (1) Use alcohol or specified brake fluid to clean the wheel cylinder and the piston.
- (2) Apply the specified brake fluid to the piston cups and the special tool.

Specified brake fluid: DOT3 or DOT4

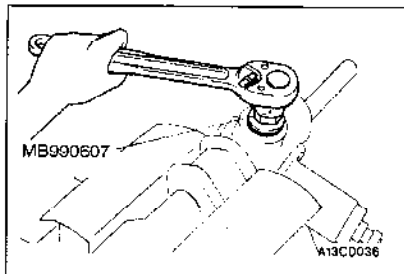
- (3) Set the piston cup on the special tool with the lip of the cup facing up, fit the cup onto the special tool, and then slide it down the outside of the tool into the piston groove.

Caution

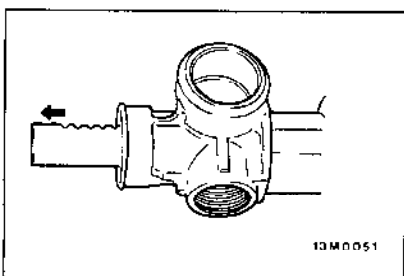
In order to keep the piston cup from becoming twisted or slanted, slide the piston cup down the tool slowly and carefully, without stopping.



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**DISASSEMBLY SERVICE POINTS****◀A▶ RACK SUPPORT COVER REMOVAL**

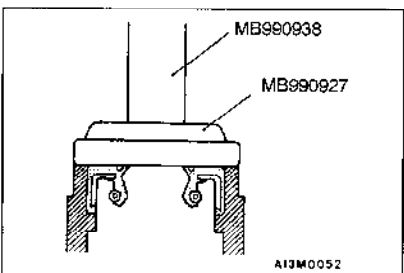
Use the special tool to remove the rack support cover from the gear box.

**◀B▶ RACK REMOVAL**

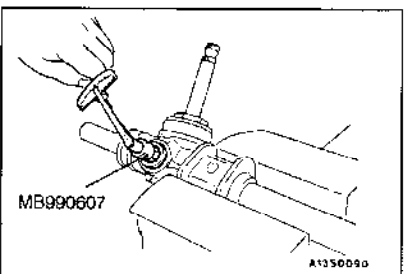
Pull out the rack from the gear housing in the direction shown in the illustration.

Caution

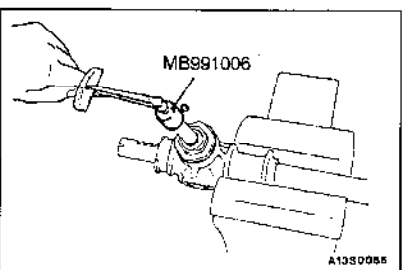
If the rack is pulled out in the wrong direction, the bushing in the gear box may be damaged by the rack threads.

**REASSEMBLY SERVICE POINTS****▶A◀ OIL SEAL INSTALLATION**

Use the special tool to press the oil seal in the top plug.

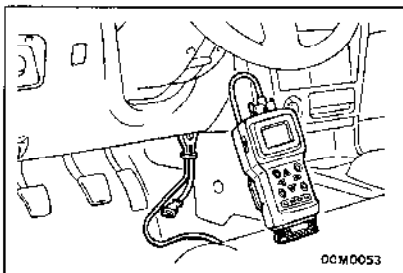
**▶B◀ RACK SUPPORT COVER INSTALLATION**

Position the rack at its center and tighten the rack support cover to 15 Nm (11 ft.lbs.).

**▶C◀ TOTAL PINION TORQUE ADJUSTMENT**

- (1) In neutral position, use the special tool to rotate the pinion shaft clockwise one turn per 4 - 6 seconds. Return the rack support cover 30° - 60° and adjust the torque to the standard value.

Standard value: 0.3 - 1.4 mm (3 - 12 in. lbs.)
[Torque variation: 0.4 Nm (3 in. lbs.)]



TROUBLESHOOTING

DIAGNOSTIC FUNCTION

INPUT SIGNAL INSPECTION POINTS
<VEHICLES WITH ETACS-ECU>

When Using the Scan Tool

1. Connect the scan tool to the data link connector.

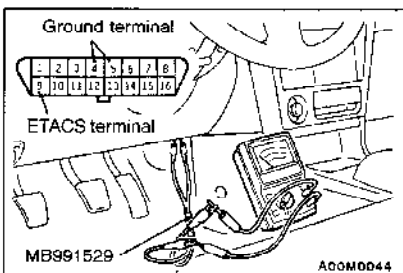
Caution

The scan tool should be connected or disconnected after turning the ignition switch to the OFF position.

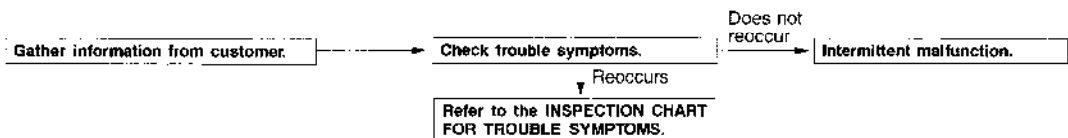
2. If buzzer of the scan tool sounds once when the front seat belt buckle switch is operated (ON/OFF), the ETACS-ECU input signal for that switch circuit system is normal.

When Using the Voltmeter

1. Use the special tool to connect a voltmeter between the ground terminal and the ETACS terminal of the data link connector.
2. If the voltmeter indicator deflects once when the front seat belt buckle switch is operated (ON/OFF), the ETACS-ECU input signal for that switch circuit system is normal.

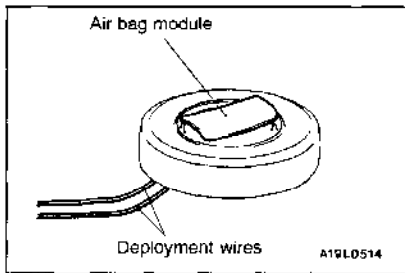


STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING



INSPECTION CHART FOR TROUBLE SYMPTOM

Trouble symptom	Inspection procedure No.	Reference page
Communication with scan tool is not possible. <Vehicles with ETACS-ECU>	Communication with all systems is not possible.	1 52A-5
	No communication with switch signal input.	2 52A-5
When the seat belts are not fastened and the ignition switch is turned to the ON position, the seat belt warning buzzer does not sound and the seat belt warning light does not illuminate nor flash.	3	52A-5
When the seat belts are not fastened and the ignition switch is turned to the ON position, the seat belt warning light illuminates or flashes, but the seat belt warning buzzer does not sound.	4	52A-6
When the seat belts are not fastened and the ignition switch is turned to the ON position, the seat belt warning buzzer sound, but the seat belt warning light does not illuminate nor flash.	5	52A-7
After having the ignition switch turned to the ON position, the seat belt warning buzzer does not stop sounding for six seconds, even though the seat belt is buckled immediately.	Refer to inspection procedure No.4	52A-6

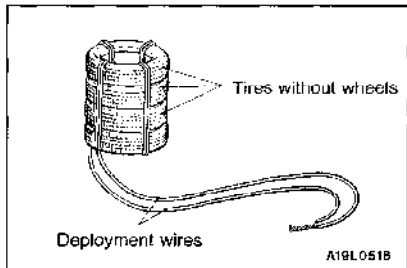


<Air bag module (front passenger's side)>

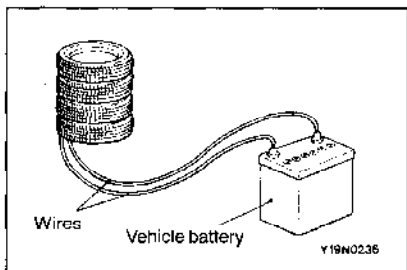
- (1) Connect the deployment wires to the SRS air bag adaptor harness A, pass it beneath the tire and wheel assembly, and connect it to the air bag module.
- (2) Pass the thick wires into the hole of the air bag module bracket, and secure it to the wheel of the old tire with wheel (4 locations), with the air bag facing upwards.

Caution

1. Leave some space below the wheel for the deployment wires.
If there is no space, the reaction of the air bag deployment could result in damage of the adaptor harness.
2. During deployment takes place, do not have the connector of the SRS air bag adaptor harness A inserted between the tires.



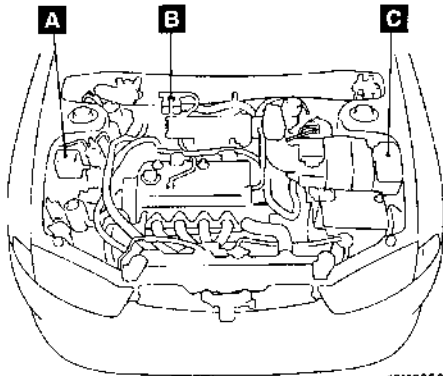
- (3) Place four old tires without wheels on top of the tire secured to the air bag module, and secure all tires together with ropes (4 locations).



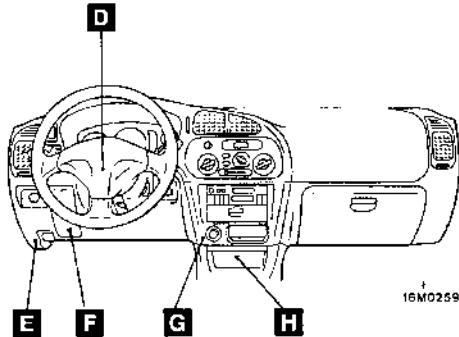
5. At a location as far away from the air bag module as possible, and from a shielded position, disconnect the two connected wires from each other, and connect them to the two terminals of the battery (which has been removed from the vehicle) to deploy the air bag.

Caution

1. Before deployment, check carefully to be sure that no one is nearby.
2. The inflator will be quite hot immediately following the deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it. Although not poisonous, do not inhale gas from air bag deployment. See Deployed Air Bag Module Disposal Procedures (P.52B-39) for post-deployment handling instructions.
3. If the air bag fails to deploy, do not go near the module. Contact the MMSA Tech Line.
6. After deployment, dispose of the air bag module according to the Deployed Air Bag Module Disposal Procedures on the next page.

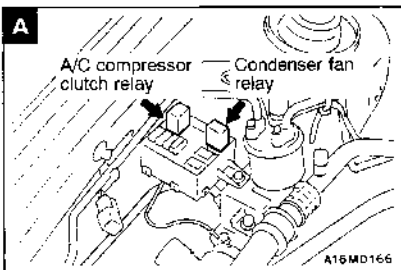


16M0258

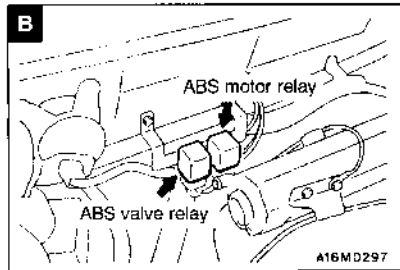


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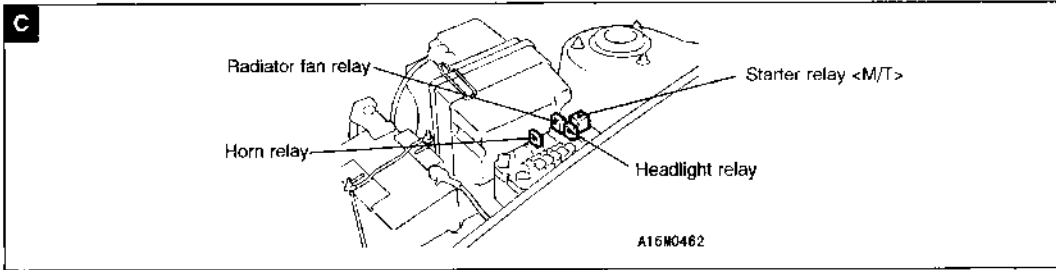
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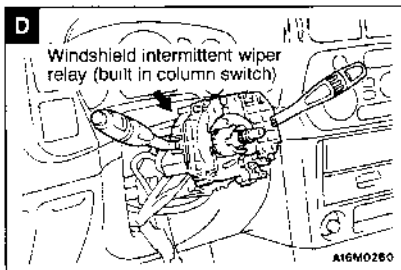
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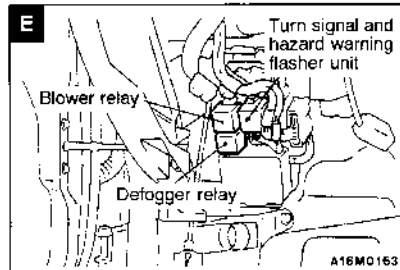
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A16M0462



A16M0280



A16M0163