



Workshop Manual

chassis

FTO '98



FTO

WORKSHOP MANUAL

FOREWORD

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

TECHNICAL INFORMATION MANUAL

PYME9801

WORKSHOP MANUAL

ENGINE GROUP

PWEE9801

ELECTRICAL WIRING

PHME9801

BODY REPAIR MANUAL

PBME9801

PARTS CATALOGUE

B806G208A□

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



General	00
Engine	11
Engine Lubrication	12
Fuel	13
Engine Cooling	14
Intake and Exhaust	15
Engine Electrical	16
Emission Control	17
Clutch	21
Manual Transmission	22
Automatic Transmission	23
Front Axle	26
Rear Axle	27
Wheel and Tyre	31
Power Plant Mount	32
Front Suspension	33
Rear Suspension	34
Service Brakes	35
Parking Brakes	36
Steering	37
Body	42
Exterior	51
Interior and Supplemental Restraint System (SRS)	52
Chassis Electrical	54
Heater, Air Conditioner and Ventilation	55

FRONT AXLE

CONTENTS

SERVICE SPECIFICATIONS	2	ON-VEHICLE SERVICE	4
LUBRICANTS	2	Hub Axial Play Check	4
SPECIAL TOOLS	2	AXLE HUB	5
		DRIVE SHAFT	10

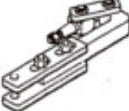
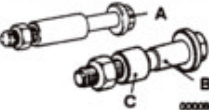
SERVICE SPECIFICATIONS

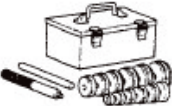
Items	Standard value	Limit
Hub axial play mm	—	0.05
Wheel bearing starting torque Nm	—	1.8 or less
Setting of T.J. boot length mm	90 ± 3	—

LUBRICANTS

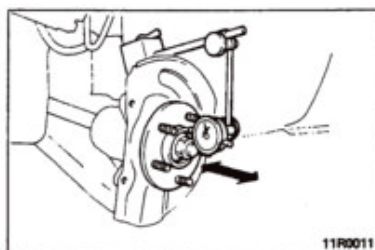
Items	Specified lubricant	Quantity g
T.J. boot grease	Repair kit grease	105 ± 10
B.J. boot grease	Repair kit grease	110 ± 10

SPECIAL TOOLS

Tool	Number	Name	Use
	MB990767	End yoke holder	Fixing of the hub
	MB991113 or MB990635	Steering linkage puller	- Removal of the lower arm ball joint and knuckle - Removal of the knuckle and tie rod end ball joint
	MB991354	Puller body	Removal of the drive shaft
	MB990241 A: MB990242 B: MB990244	Axle shaft puller A: Puller shaft B: Puller bar	
	MB991056 or MB991355	Knuckle arm bridge	Removal of the hub
	A: MB991017 B: MB990998 C: MB991000	A, B: Front hub remover and installer C: Spacer	- Removal of or pressing-in the hub - Provisional holding of the wheel bearing

Tool	Number	Name	Use
	MB990810	Side bearing pulley	Removal of the wheel bearing inner race (outside)
	MB990925	Bearing and oil seal installer set	- Removal of wheel bearing - Installation of oil seal
 8990890	MB990890	Rear suspension bushing base	- Press-fitting of wheel bearing - Press-fitting of inner oil seal
	MB990883	Rear suspension arbor	
	MB990326	Preload socket	Measurement of the wheel bearing starting torque
	MB991561	Boot band clipping tool	Resin boot band installation
 8990847	MB990847	Rear suspension bushing remover and installer base	Press-fitting of outer oil seal
 8990947	MB990947	Lower arm bushing arbor	

 A Installer adapter  C Brass bar B Bar (snap-in type)  Tool box A11WD113					
Type	Tool number	O.D. mm	Type	Tool number	O.D. mm
A	MB990926	39	A	MB990933	63.5
	MB990927	45		MB990934	67.5
	MB990928	49.5		MB990935	71.5
	MB990929	51		MB990936	75.5
	MB990930	54		MB990937	79
	MB990931	57	B	MB990938	—
	MB990932	61	C	MB990939	—



ON-VEHICLE SERVICE

HUB AXIAL PLAY CHECK

1. Remove the disc brake caliper and suspend it with a wire.
2. Remove the brake disc from the front hub.
3. Attach a dial gauge as shown in the illustration, and then measure the axial play while moving the hub in the axial direction.

Limit: 0.05 mm

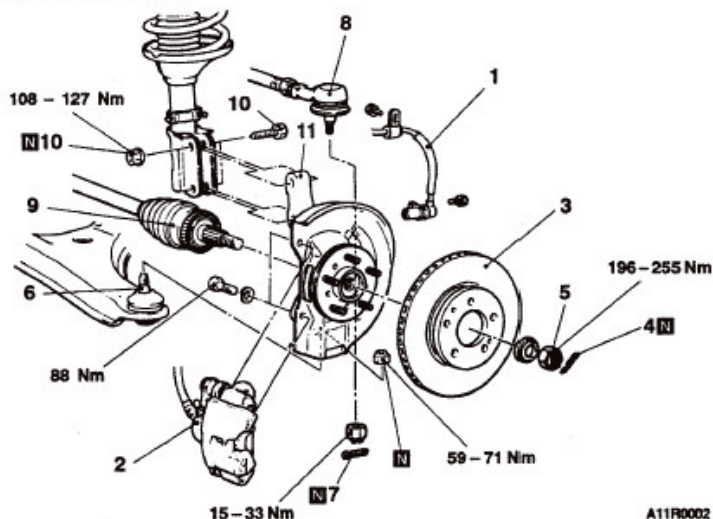
4. If axial play exceeds the limit, disassemble and check parts.

AXLE HUB

REMOVAL AND INSTALLATION

Caution

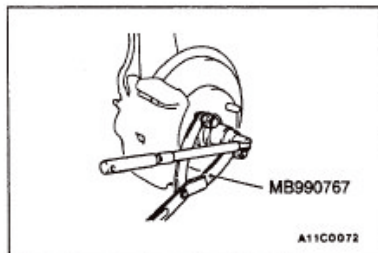
1. Be careful when handling the pole piece at the tip of the speed sensor so as not to damage it by striking against other parts.
2. Be careful not to damage the ABS rotors installed to the B.J. outer race during removal and installation of the drive shaft.



Removal steps

1. Front speed sensor
2. Caliper assembly
3. Brake disc
4. Split pin
5. Drive shaft nut
6. Connection for lower arm ball joint

7. Split pin
8. Connection for tie rod end
9. Drive shaft
10. Front strut mounting bolt and nut
11. Hub and knuckle



REMOVAL SERVICE POINTS

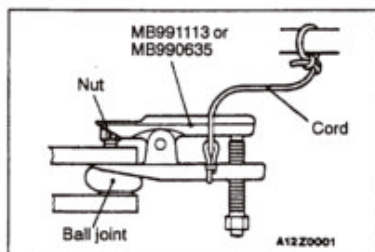
◀A▶ CALIPER ASSEMBLY REMOVAL

Secure the removed caliper assembly with wire, etc.

◀B▶ DRIVE SHAFT NUT REMOVAL

Caution

When the drive shaft is loosened, do not apply the vehicle weight on the wheel bearing.

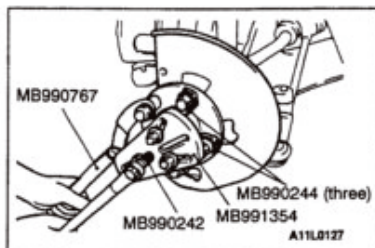


◀C▶ LOWER ARM BALL JOINT/TIE ROD END DISCONNECTION

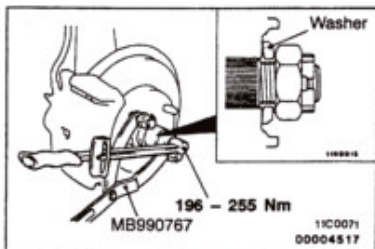
Use the special tool to disconnect the ball joint connection.

Caution

1. Only loosen the nut; do not remove it from the ball joint.
2. Support the special tool with a cord, etc. to prevent it from coming off.



◀D▶ DRIVE SHAFT REMOVAL



INSTALLATION SERVICE POINT

▶A◀ DRIVE SHAFT NUT INSTALLATION

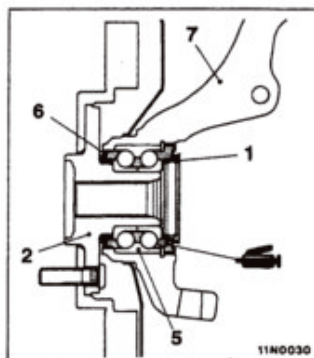
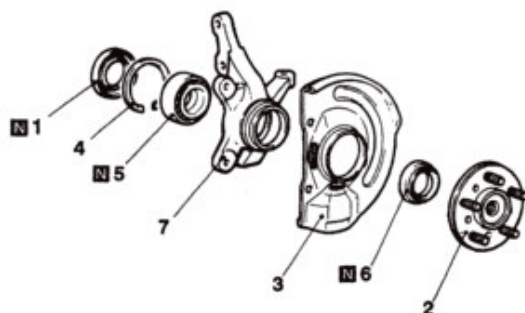
- (1) Be sure to install the drive shaft washer in the specified direction.
- (2) Using the special tool, tighten the drive shaft nut.

Caution

Before securely tightening the drive shaft nuts, make sure there is no load on the wheel bearings.

- (3) If the split pin is not aligned with the bolt pin hole, tighten the nut further. Then when the nearest bolt pin hole is aligned, insert the split pin into the hole and secure it.

DISASSEMBLY AND REASSEMBLY



11R0004
00008091

Disassembly steps



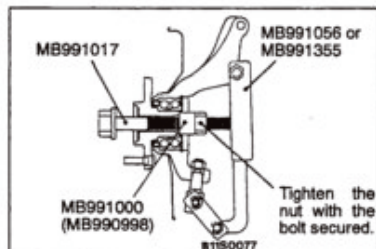
1. Inner oil seal
2. Hub
3. Dust cover
4. Snap ring
5. Wheel bearing
6. Outer oil seal
7. Knuckle



Reassembly steps



7. Knuckle
5. Wheel bearing
4. Snap ring
6. Outer oil seal
3. Dust cover
2. Hub
- Wheel bearing starting torque check
- Hub axial play check
1. Inner oil seal



DISASSEMBLY SERVICE POINTS

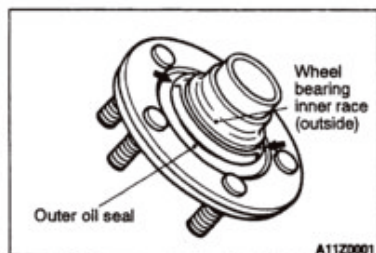
◀A▶ HUB REMOVAL

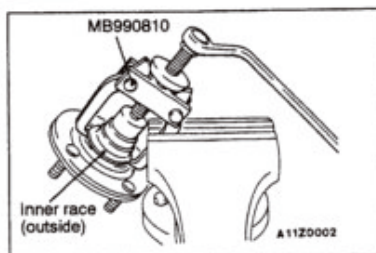
Caution

When removing the hub, always replace the wheel bearing with a new part.

◀B▶ WHEEL BEARING REMOVAL

- (1) Crush the oil seal in two places so that the tabs of the special tool will be caught on the wheel bearing inner race (outside).

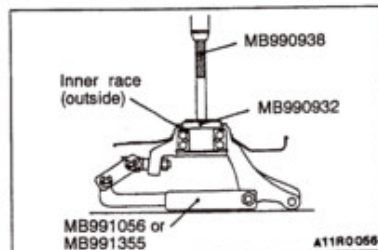




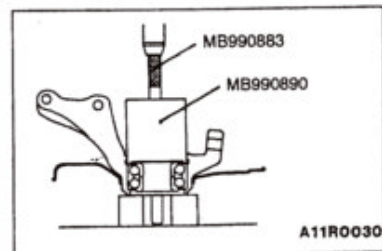
- (2) Remove the wheel bearing inner race (outside) from the hub by using the special tool.

Caution

When removing the inner race (outside) from the hub, be careful not to let the hub drop.



- (3) Install the inner race (outside) that was removed from the hub to the wheel bearing, and then use the special tool to remove the wheel bearing.



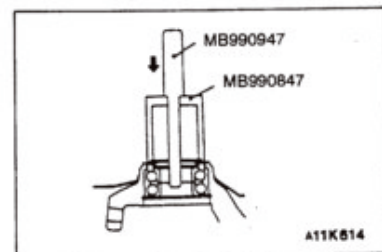
REASSEMBLY SERVICE POINTS

▶A◀ WHEEL BEARING INSTALLATION

- (1) Fill the wheel bearing with multipurpose grease.
- (2) Apply a thin coating of multipurpose grease to the knuckle and bearing contact surfaces.
- (3) Press-in the bearing by using the special tools.

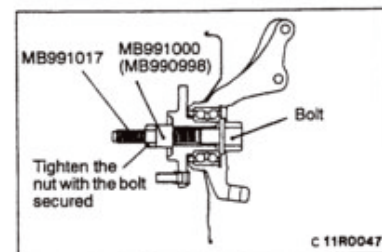
Caution

Always press the outer race when pressing-in the wheel bearing, otherwise wheel bearing may be damaged.



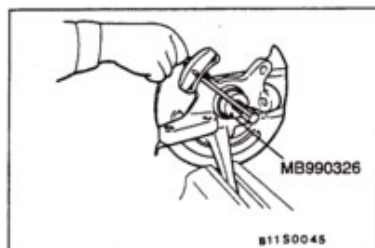
▶B◀ OUTER OIL SEAL INSTALLATION

- (1) Fill the oil seal rear part with multipurpose grease. Drive the oil seal (hub side) into the knuckle by using the special tools until it is flush with the knuckle end surface.
- (2) Apply multipurpose grease to the lip of the oil seal and to the surfaces of the oil seal which contact the front hub.



▶C◀ WHEEL BEARING STARTING TORQUE CHECK

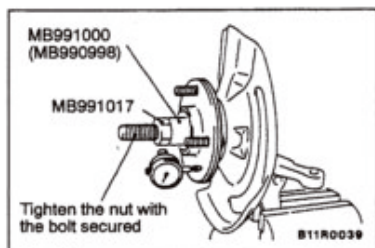
- (1) Use the special tools to mount the hub onto the knuckle.
- (2) Tighten the nut of the special tool to 196-255 Nm.
- (3) Rotate the hub in order to seat the bearing.



- (4) Measure the wheel bearing starting torque (hub starting torque) by using the special tool.

Limit: 1.8 Nm or less

- (5) The starting torque must be within the limit and, in addition, the bearing must not feel rough when rotated.

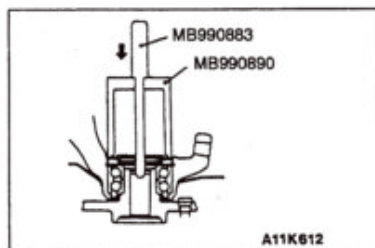


►D◄ HUB AXIAL PLAY CHECK

- (1) Use a vice to hold the knuckle and measure to determine whether the axial play of the hub is within the specified limit or not.

Limit: 0.05 mm

- (2) If the hub axial play is not within the limit range while the nut is tightened to 196–255 Nm, the bearing, hub and/or knuckle have probably not been installed correctly. Replace the bearing and re-install.



►E◄ INNER OIL SEAL INSTALLATION

- (1) Apply multipurpose grease to the reverse side of the inner oil seal.
- (2) Drive the inner oil seal into the knuckle until it contacts the snap ring.
- (3) Apply multipurpose grease to the lip of the inner oil seal.

DRIVE SHAFT

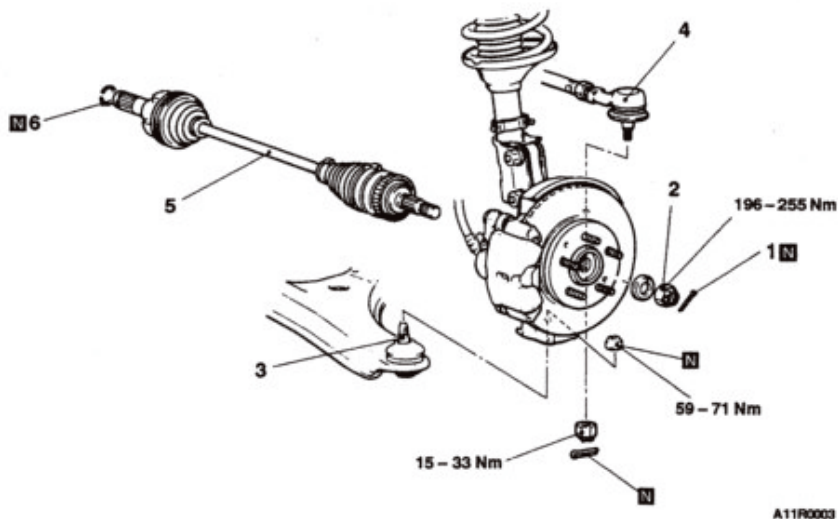
REMOVAL AND INSTALLATION

Caution

Be careful not to damage the ABS rotors installed to the B.J. outer race during removal and installation of the drive shaft.

Pre-removal and Post-installation Operation

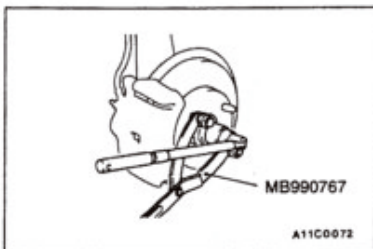
- Check the dust cover for cracks or damage by pushing it with a finger.
- Brake Hose Clamp, Front Speed Sensor Bracket and Stabilizer Link Connection Removal and Installation (Refer to GROUP 33A – Strut Assembly.)



Removal steps

1. Split pin
2. Drive shaft nut
3. Connection for lower arm ball joint

4. Connection for tie rod end
5. Drive shaft
6. Circlip

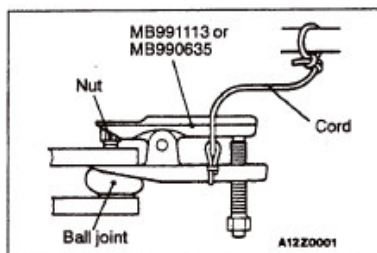


REMOVAL SERVICE POINTS

▶▶ DRIVE SHAFT NUT REMOVAL

Caution

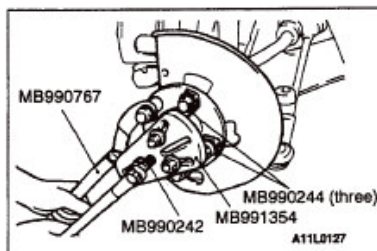
Do not apply the vehicle weight to the wheel bearing while loosening the drive shaft nut.



◀B▶ LOWER ARM BALL JOINT/TIE ROD END DISCONNECTION

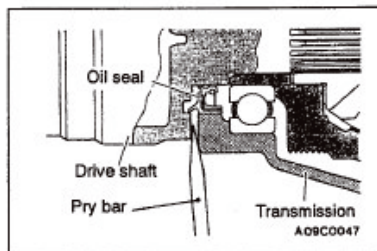
Use the special tool to disconnect the ball joint connection.
Caution

1. Only loosen the nut; do not remove it from the ball joint.
2. Support the special tool with a cord, etc. to prevent it from coming off.



◀C▶ DRIVE SHAFT REMOVAL

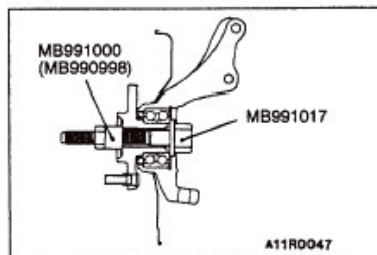
- (1) Use the special tools to push out the drive shaft from the hub.



- (2) Insert a pry bar between the transmission case and the drive shaft as shown to remove the drive shaft.

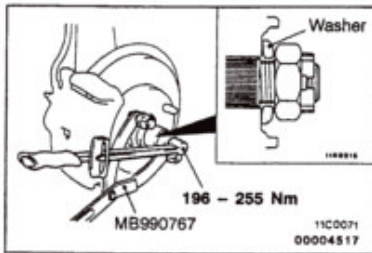
Caution

1. Do not pull on the drive shaft; doing so will damage the T.J.; be sure to use the pry bar.
2. Do not insert the pry bar so deep as to damage the oil seal.



Caution

Do not apply the vehicle weight to the wheel bearing with the drive shaft removed. If, however, the vehicle weight must be applied to the bearing (because of moving the vehicle), temporarily secure the wheel bearing by using the special tool.

**INSTALLATION SERVICE POINTS****►A◄ DRIVE SHAFT NUT INSTALLATION**

- (1) Be sure to install the drive shaft washer in the specified direction.
- (2) Using the special tool, tighten the drive shaft nut.

Caution

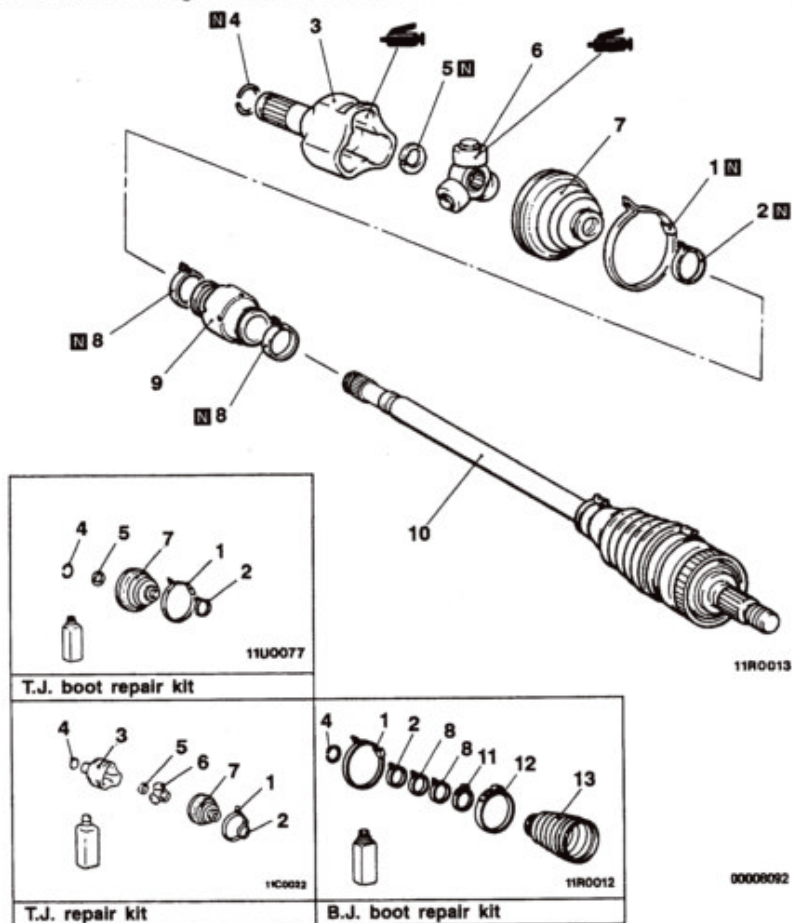
Before securely tightening the drive shaft nuts, make sure there is no load on the wheel bearings.

- (3) If the position of the split pin holes does not match, tighten the nut up to 255 Nm in maximum.
- (4) Install the split pin in the first matching holes and bend it securely.

DISASSEMBLY AND REASSEMBLY

Caution

1. Never disassemble the B.J. assembly except when replacing the B.J. boot.
2. Be sure not to damage the ABS rotor attached to the B.J. outer race when doing any work.



Disassembly steps

1. T.J. boot band (large)
2. T.J. boot band (small)
3. T.J. case
4. Circlip
5. Snap ring
6. Spider assembly
7. T.J. boot

- 8. Damper band
- 9. Dynamic damper
- 10. B.J. assembly
- 11. B.J. boot band (small)
- 12. B.J. boot band (large)
- 13. B.J. boot

DISASSEMBLY SERVICE POINTS**◀A▶ T.J. CASE/SPIDER ASSEMBLY REMOVAL**

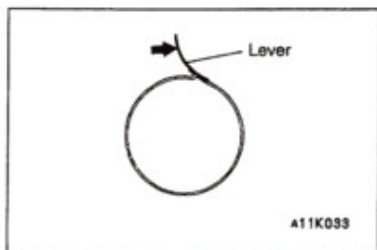
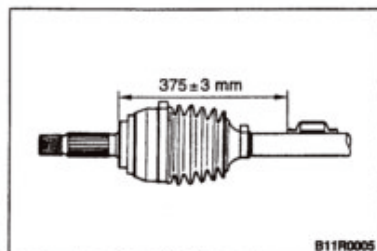
- (1) Wipe off grease from the spider assembly and the inside of the T.J. case.
- (2) Always clean the spider assembly when the grease contains water or foreign material.

Caution

Do not disassemble the spider assembly.

◀B▶ T.J. BOOT REMOVAL

- (1) Wipe off grease from the shaft spline.
- (2) When reusing the T.J. boot, wrap plastic tape around the shaft spline to avoid damaging the boot.

**REASSEMBLY SERVICE POINTS****▶A◀ DYNAMIC DAMPER/DAMPER BAND/T.J. BOOT INSTALLATION**

- (1) Straighten the B.J. and install the dynamic damper in the position shown in the illustration.

Caution

1. There should be no grease adhered to the rubber part of the dynamic damper.
2. The damper band and T.J. boot band are identified by the identification number stamped on the lever. Take good care to install the correct one.

Items	Identification number
Damper band	20 – 83 # BJ82
T.J. boot band	20 – 146 # BJ87

- (2) Wrap plastic tape around the shaft spline, and then install the T.J. boot band (small) and T.J. boot.

►B◄ SPIDER ASSEMBLY/T.J. CASE INSTALLATION

- (1) Apply the specified grease furnished in the repair kit to the spider assembly between the spider axle and the roller.

Specified grease: Repair kit grease

Caution

1. The drive shaft joint uses special grease. Do not mix old and new or different types of grease.
 2. If the spider assembly has been cleaned, take special care to apply the specified grease.
- (2) Install the spider assembly to the shaft from the direction of the spline bevelled section.
- (3) After applying the specified grease to the T.J. case, insert the drive shaft and apply grease one more time.

Specified grease: Repair kit grease

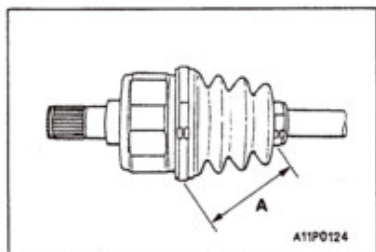
Amount to use: 105 ± 10 g

NOTE

The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.

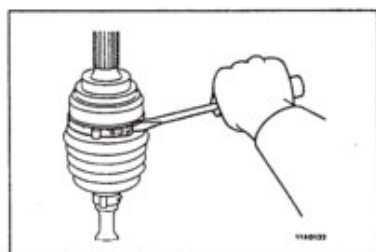
Caution

The drive shaft joint uses special grease. Do not mix old and new or different types of grease.

**►C◄ T.J. BOOT BAND (SMALL)/T.J. BOOT BAND (LARGE) INSTALLATION**

Set the T.J. boot bands at the specified distance in order to adjust the amount of air inside the T.J. boot, and then tighten the T.J. boot bands securely.

Standard value (A): 90 ± 3 mm

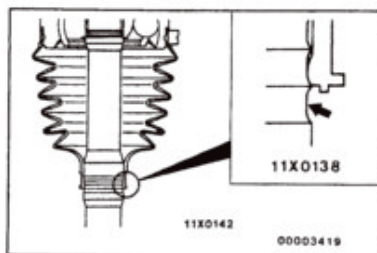
**B.J. BOOT (RESIN BOOT) REPLACEMENT**

- (1) Remove the B.J. boot bands (large and small).

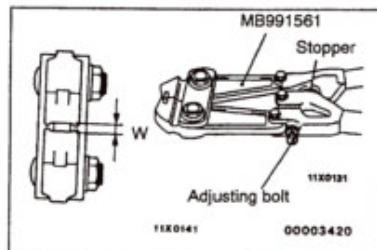
NOTE

The B.J. boot bands cannot be re-used.

- (2) Remove the B.J. boot.



- (3) Install the B.J. boot with the part with the smallest diameter in a position such that the shaft groove can be seen.



- (4) Turn the adjusting bolt on the special tool so that the size of the opening (W) is at the standard value.

Standard value (W): 2.9 mm

<If it is larger than 2.9 mm>

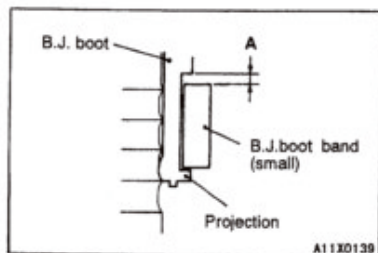
Tighten the adjusting bolt.

<If it is smaller than 2.9 mm>

Loosen the adjusting bolt.

NOTE

- (1) The value of W will change by approximately 0.7 mm for each turn of the adjusting bolt.
- (2) The adjusting bolt should not be turned more than once.

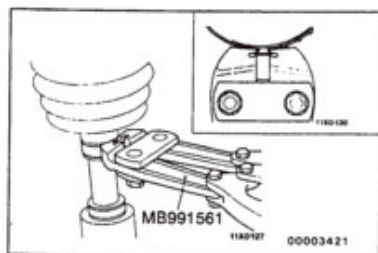


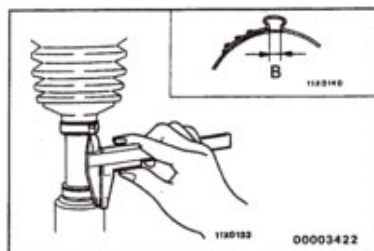
- (5) Place the B.J. boot band (small) against the projection at the edge of the boot, and then secure it so that there is a clearance left as shown by (A) in the illustration.

- (6) Use the special tool to crimp the B.J. boot band (small).

Caution

- (1) Secure the drive shaft in an upright position and clamp the part of the B.J. boot band to be crimped securely in the jaws of the special tool.
- (2) Crimp the B.J. boot band until the special tool touches the stopper.





- (7) Check that the crimping amount (B) of the B.J. boot band is at the standard value.

Standard value (B): 2.4 – 2.8 mm

<If the crimping amount is larger than 2.8 mm>
Readjust the value of (W) in step (4) according to the following formula, and then repeat the operation in step (6).

$$W = 5.5 \text{ mm} - B$$

Example: If $B = 2.9 \text{ mm}$, then $W = 2.6 \text{ mm}$.

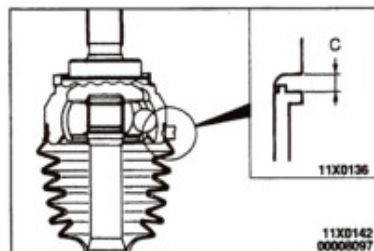
<If the crimping amount is smaller than 2.4 mm>
Remove the B.J. boot band, readjust the value of (W) in step (4) according to the following formula, and then repeat the operations in steps (5) and (6) using a new B.J. boot band.

$$W = 5.5 \text{ mm} - B$$

Example: If $B = 2.3 \text{ mm}$, then $W = 3.2 \text{ mm}$.

- (8) Check that the B.J. boot band is not sticking out past the place where it has been installed.
If the B.J. boot band is sticking out, remove it and then repeat the operations in steps (5) to (7) using a new B.J. boot band.
(9) Fill the inside of the B.J. boot with the specified amount of the specified grease.

Specified grease: Repair kit grease

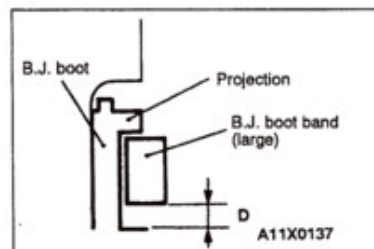


- (10) Install the B.J. boot band (large) so that there is the clearance (C) between it and the B.J. housing is at the standard value.

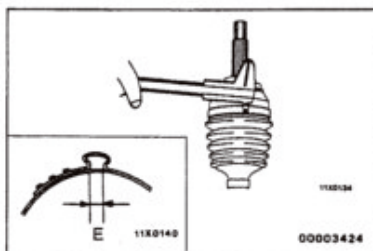
Standard value (C): 0.1 – 1.55 mm

- (11) Follow the same procedure as in step (4) to adjust the size of the opening (W) on the special tool so that it is at the standard value.

Standard value (W): 3.2 mm



- (12) Place the B.J. boot band (large) against the projection at the edge of the boot, and then secure it so that there is a clearance left as shown by (D) in the illustration.
(13) Use the special tool to crimp the B.J. boot band (large) in the same way as in step (6).



- (14) Check that the crimping amount (E) of the B.J. boot band is at the standard value.

Standard value (E): 2.4 – 2.8 mm

<If the crimping amount is larger than 2.8 mm>
Readjust the value of (W) in step (11) according to the following formula, and then repeat the operation in step (13).

$$W = 5.8 \text{ mm} - E$$

Example: If $E = 2.9 \text{ mm}$, then $W = 2.9 \text{ mm}$.

<If the crimping amount is smaller than 2.4 mm>
Remove the B.J. boot band, readjust the value of (W) in step (11) according to the following formula, and then repeat the operations in steps (12) and (13) using a new B.J. boot band.

$$W = 5.8 \text{ mm} - E$$

Example: If $E = 2.3 \text{ mm}$, then $W = 3.5 \text{ mm}$.

- (15) Check that the B.J. boot band is not sticking out past the place where it has been installed.
If the B.J. boot band is sticking out, remove it and then repeat the operations in steps (12) to (14) using a new B.J. boot band.

REAR AXLE

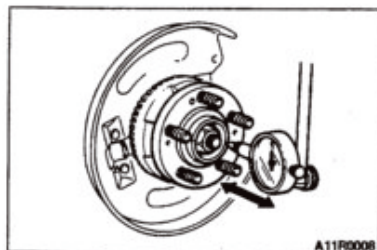
CONTENTS

SERVICE SPECIFICATIONS	2	Rear Hub Rotary-Sliding Resistance Check	2
ON-VEHICLE SERVICE	2	REAR AXLE HUB	3
Wheel Bearing Axial Play Check	2		



SERVICE SPECIFICATIONS

Items	Limit
Wheel bearing axial play mm	0.05
Wheel bearing rotary-sliding resistance N	17 or less



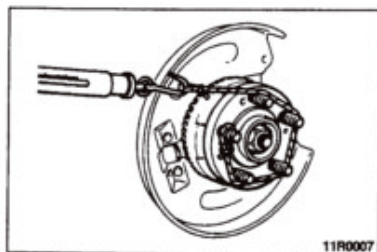
ON-VEHICLE SERVICE

WHEEL BEARING AXIAL PLAY CHECK

1. Remove the hub cap.
2. Remove the caliper assembly and brake disc.
3. Place a dial gauge against the hub surface as shown in the figure, then move the hub in the axial direction and measure the axial play.

Limit: 0.05 mm

4. If the axial play exceeds the limit, tighten the flange nut to the specified torque (177 Nm) and check the axial play again.
5. Replace the rear hub assembly if an adjustment cannot be made to within the limit.



REAR HUB ROTARY-SLIDING RESISTANCE CHECK

1. Remove the caliper assembly and brake disc.
2. After turning the hub a few times to seat the bearing, wind a rope around the hub bolt and turn the hub by pulling at a 90° angle with a spring balance. Measure to determine whether or not the rotary-sliding resistance of the rear hub is at the limit value.

Limit: 17 N or less

3. If the value exceeds the limit, loosen the flange nut and then tighten it to the specified torque (177 Nm) and check the rear hub rotary sliding resistance again.
4. Replace the rear hub assembly if an adjustment cannot be made to within the limit.

REAR AXLE HUB

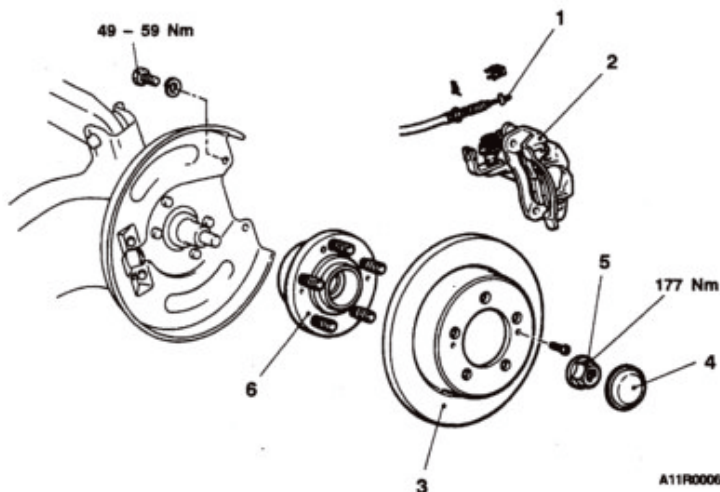
REMOVAL AND INSTALLATION

Caution

The rear hub assembly should not be disassembled.

Post-Installation Operation

Parking Brake Adjustment (Refer to GROUP 36 – On-vehicle Service.)



Removal steps

1. Parking brake cable connection
2. Caliper assembly
3. Brake disc

4. Hub cap
5. Flange nut
6. Rear hub assembly

REMOVAL SERVICE POINT

◀▶ CALIPER ASSEMBLY REMOVAL

Use a wire to secure the removed caliper assembly at the nearby place so that the caliper weight will not be applied to the brake hoses.

NOTES

WHEEL AND TYRE

CONTENTS

SERVICE SPECIFICATIONS	2	Tyre Wear Check	2
ON-VEHICLE SERVICE	2	Wheel Runout Check	2
Tyre Inflation Pressure Check	2	WHEEL AND TYRE	2



SERVICE SPECIFICATIONS

Items		Limit
Tread depth of tyre mm		1.6
Wheel runout (Radial runout) mm	Aluminium wheel	1.0 or less
Wheel runout (Lateral runout) mm	Aluminium wheel	1.0 or less

ON-VEHICLE SERVICE**TYRE INFLATION PRESSURE CHECK****NOTE**

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

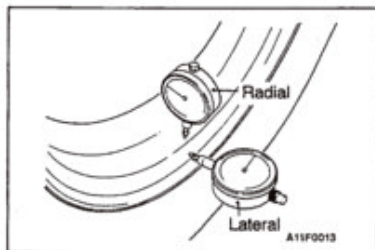
TYRE WEAR CHECK

Measure the tread depth of tyres.

Limit: 1.6 mm

NOTE

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

**WHEEL RUNOUT CHECK****Limit:**

Radial runout 1.0mm

Lateral runout 1.0mm

WHEEL AND TYRE**INSTALLATION SERVICE POINT**

Tighten the wheel nut to the specified torque.

Tightening torque: 88 – 108 Nm

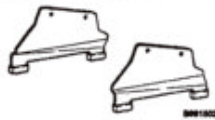
POWER PLANT MOUNT

CONTENTS

SPECIAL TOOLS	2	ENGINE ROLL STOPPER, CENTERMEMBER	6
ENGINE MOUNTING	3	CROSSMEMBER	7
TRANSMISSION MOUNTING	5		



SPECIAL TOOLS

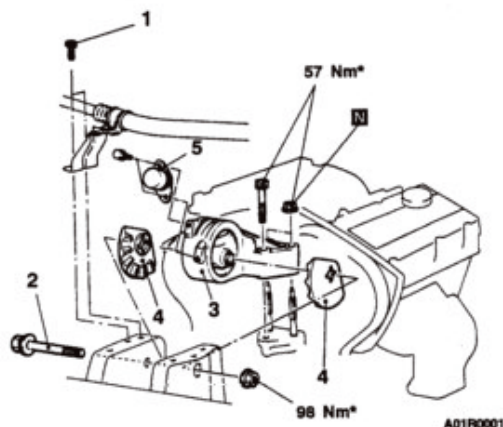
Tool	Number	Name	Use
 MB991453	MB991453	Engine hanger	To support the engine assembly during removal and installation of the transmission mount
 Z303827	GENERAL SERVICE TOOL MZ203827	Engine lifter	
 MB991602	MB991602	Foot assembly	

ENGINE MOUNTING**REMOVAL AND INSTALLATION****Caution**

In order to prevent the bushing from twisting, mounting locations marked by * should be provisionally tightened, and then fully tightened after loading the full weight of the engine on the vehicle body.

Pre-removal and Post-Installation Operation

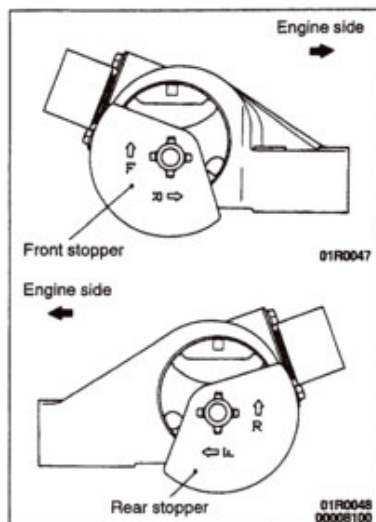
Place a Garage Jack against the Oil Pan. Jack up the Engine and Transmission Assembly until there is no weight on the Engine Mount Bracket Insulator.

**Removal steps**

1. A/C hose clamp mounting bolt
2. Engine mount insulator mounting bolt



3. Engine mount bracket
4. Engine mount stopper
5. Dynamic damper

**INSTALLATION SERVICE POINT****►A◄ENGINE MOUNT STOPPER INSTALLATION**

Install the engine mount stopper so that the arrow points in the direction as shown in the figure.

TRANSMISSION MOUNTING

REMOVAL AND INSTALLATION

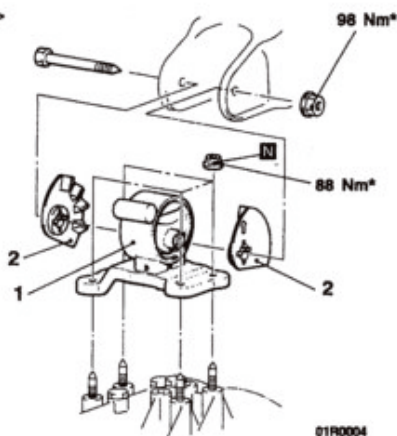
Caution

In order to prevent the bushing from twisting, mounting locations marked by * should be provisionally tightened, and then fully tightened after loading the full weight of the engine on the vehicle body.

Pre-removal and Post-Installation Operation

- Air Cleaner Assembly Removal and Installation
- Battery and Battery Tray Removal and Installation

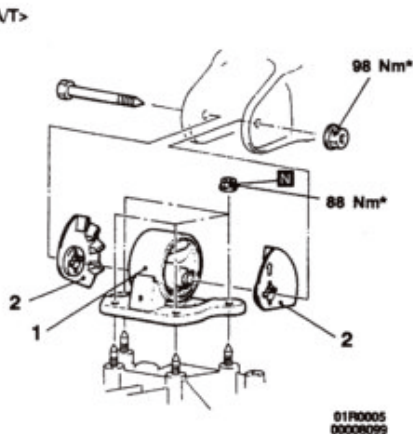
<M/T>



Removal steps

- Centermember mounting bolt
(Refer to P.32-6.)

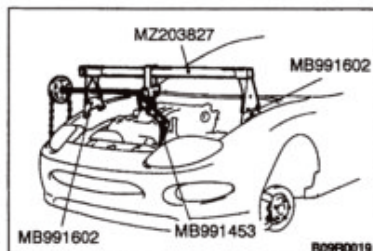
<A/T>



<A>

>A<

1. Transmission mount bracket
2. Transmission mount stopper



REMOVAL SERVICE POINT

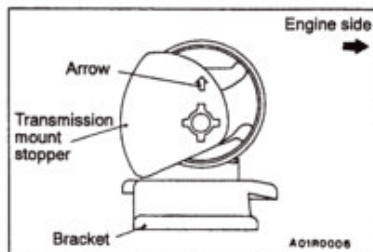
<A> TRANSMISSION MOUNT BRACKET REMOVAL

- (1) Install the special tool to the vehicle body to support the engine and transmission assembly.
- (2) Remove the centermember mounting bolt.
- (3) Remove the mounting bolt and nut of the transmission mount bracket.
- (4) After lowering the engine and transmission assembly, remove the transmission mount bracket.

INSTALLATION SERVICE POINT

>A< TRANSMISSION MOUNT STOPPER INSTALLATION

Install the transmission mount stopper so that the arrow points in the direction as shown in the figure.

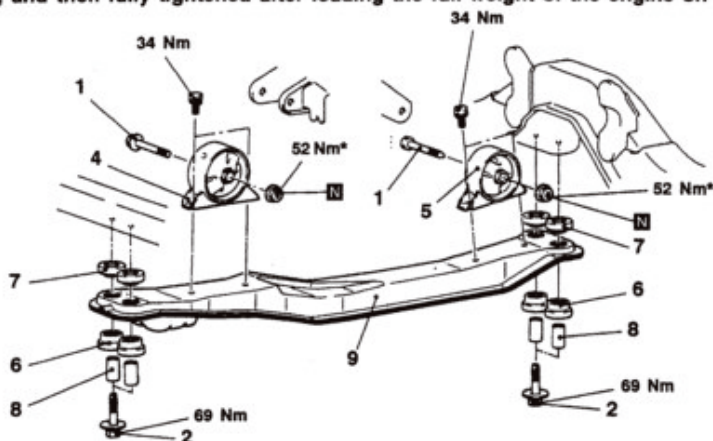


ENGINE ROLL STOPPER, CENTERMEMBER

REMOVAL AND INSTALLATION

Caution

In order to prevent the bushing from twisting, mounting locations marked by * should be provisionally tightened, and then fully tightened after loading the full weight of the engine on the vehicle body.



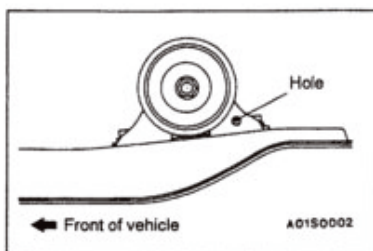
A01R0003

Removal steps

1. Bolts
2. Bolts
3. Centermember assembly
(Parts from No.6 to No.9)

►B◄ 4. Front roll stopper bracket assembly

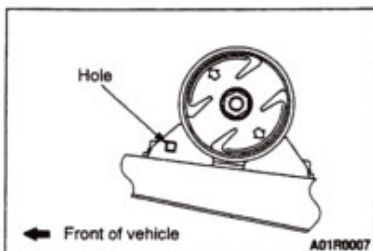
- A◄ 5. Rear roll stopper bracket assembly
6. Bushing (lower)
7. Bushing (upper)
8. Collar
9. Centermember



INSTALLATION SERVICE POINT

►A◄ REAR ROLL STOPPER BRACKET ASSEMBLY INSTALLATION

Install so that the hole in the rear roll stopper bracket is facing towards the rear of the vehicle.



►B◄ FRONT ROLL STOPPER BRACKET ASSEMBLY INSTALLATION

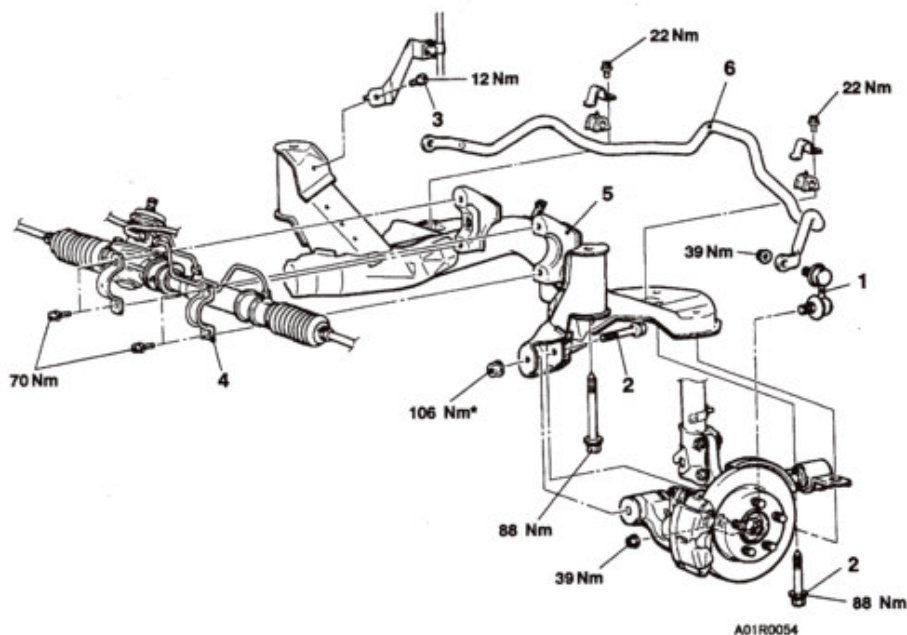
Install so that the hole in the front roll stopper bracket is facing towards the front of the vehicle.

CROSSMEMBER**REMOVAL AND INSTALLATION****Caution**

In order to prevent the bushing from twisting, mounting locations marked by * should be provisionally tightened, and then fully tightened after loading the full weight of the engine on the vehicle body.

Pre-removal and Post-Installation Operation

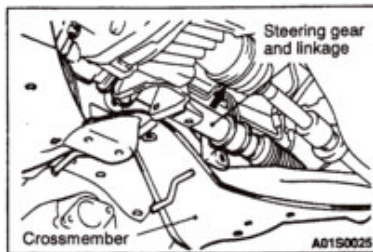
- Front Exhaust Pipe Removal and Installation (Refer to GROUP 15.)
- Centermember Assembly Removal and Installation (Refer to P.32-6.)

**Removal steps**

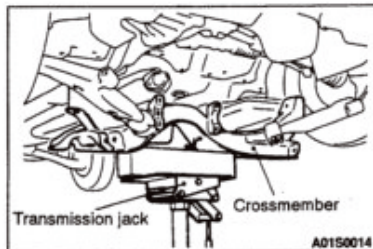
1. Stabilizer link
2. Lower arm mounting bolt
3. Oil return pipe clamp mounting bolt



4. Clamp
5. Crossmember
6. Stabilizer bar

**REMOVAL SERVICE POINT****◀A▶ CROSSMEMBER REMOVAL**

Remove the crossmember while supporting the steering gear and linkage in the direction shown by the arrow.

**INSTALLATION SERVICE POINT****▶A◀ CROSSMEMBER INSTALLATION**

Install the crossmember while supporting it by the transmission jack.

FRONT SUSPENSION

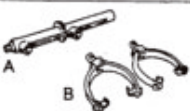
CONTENTS

SERVICE SPECIFICATIONS	2	STRUT ASSEMBLY	5
SPECIAL TOOLS	2	LOWER ARM	8
ON-VEHICLE SERVICE	3	STABILIZER BAR	10
Front Wheel Alignment Check and Adjustment	3		
Ball Joint Dust Cover Check	4		

SERVICE SPECIFICATIONS

Items		Standard value
Toe-in	At the centre of tyre tread mm	0 ± 3
	Toe-angle (per wheel)	$0^{\circ}00' \pm 8'$
Camber		$-0^{\circ}30' \pm 30'$ (difference between right and left wheel: less than 30°)
Caster		$2^{\circ}48' \pm 30'$ (difference between right and left wheel: less than 30°)
Side slip mm		0 ± 3
Lower arm ball joint starting torque Nm		$1.0 - 7.4$
Stabilizer link ball stud turning torque Nm		$1.7 - 3.1$

SPECIAL TOOLS

Tools	Number	Name	Use
	MB991004	Wheel alignment gauge attachment	Measurement of the wheel alignment
 B99C278	MB990278 or MB990775	Special spanner	Disassembly and reassembly of the strut assembly
 A B 00003796	A: MB991237 B: MB991238	A: Spring compressor body B: Arm set	Compression of the front coil spring
	MB991113 or MB990635	Steering linkage puller	Disconnection of the lower arm ball joint connection
	MB990800	Ball joint remover and installer	Installation of the lower arm ball joint dust cover
	MB990326	Preload socket	- Measurement of the ball joint starting torque - Measurement of the stabilizer link ball stud turning torque

ON-VEHICLE SERVICE**FRONT WHEEL ALIGNMENT CHECK AND ADJUSTMENT**

The front suspension, steering system, and wheels should be serviced to normal condition prior to measurement of wheel alignment.

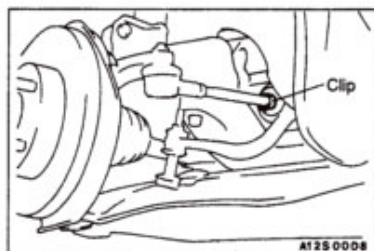
Measure the wheel alignment with the vehicle parked on a level surface.

TOE-IN**Standard value:**

At the centre of tyre tread 0 ± 3 mm

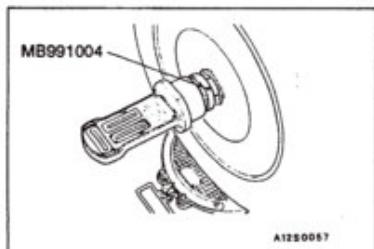
Toe-angle (per wheel) $0^{\circ}00' \pm 8'$

1. If the toe-in is not within the standard value, adjust the toe-in by undoing the clips and turning the left and right tie rod turn buckles 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. After adjustment, use the turning radius gauge to check that the steering angle is within the standard value. (Refer to GROUP 37A – On-vehicle Service.)

**CAMBER AND CASTER****Standard value:**

Camber $-0^{\circ}30' \pm 30'$ (difference between right and left wheel: less than $30'$)

Caster $2^{\circ}48' \pm 30'$ (difference between right and left wheel: less than $30'$)

NOTE

1. Camber and caster are preset at the factory and cannot be adjusted.
2. Attach the camber/caster/kingpin gauge to the drive shaft by using the special tool. Tighten the special tool to the same torque 196–255 Nm as the drive shaft nut.

Caution

Never subject the wheel bearings to the vehicle load when the drive shaft nuts are loosened.

SIDE SLIP

Standard value: 0 ± 3 mm

BALL JOINT DUST COVER CHECK

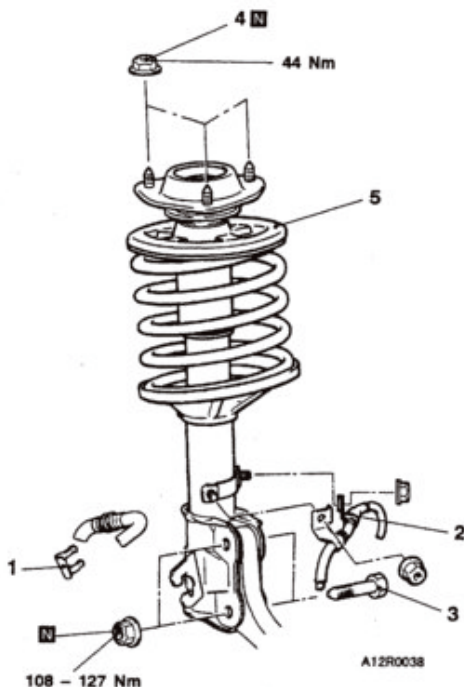
- (1) Check the dust cover for cracks or damage by pushing it with finger.
- (2) If the dust cover is cracked or damaged, replace the lower arm assembly or stabilizer link.

NOTE

Cracks or damage of the dust cover may cause damage of the ball joint.

STRUT ASSEMBLY**REMOVAL AND INSTALLATION****Post-Installation Operation**

- Front Wheel Alignment Adjustment
(Refer to P.33A-3.)

**Removal steps**

1. Brake hose clamp
2. Front speed sensor bracket
3. Bolts

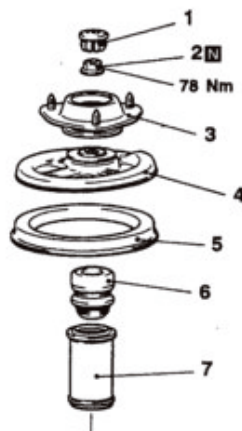
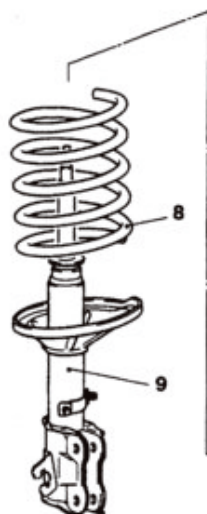
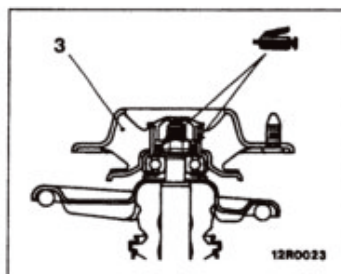
4. Flange nut
5. Strut assembly

REMOVAL SERVICE POINT

◀▶ BOLTS REMOVAL

- (1) Suspend the lower arm from the vehicle with wire.
- (2) Remove the strut and knuckle connection.

DISASSEMBLY AND REASSEMBLY



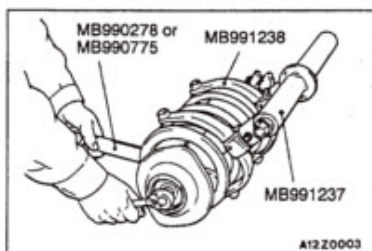
12R0011
00008101

Disassembly steps



1. Dust cover
2. Self-locking nut
3. Strut insulator assembly
4. Spring upper seat assembly
5. Upper spring pad

6. Bump rubber
7. Dust cover
8. Coil spring
9. Strut assembly

**DISASSEMBLY SERVICE POINT****◀A▶ SELF-LOCKING NUT REMOVAL**

- (1) Use the special tools to compress the coil spring.

Caution

1. To hold the coil spring securely, install the special tools evenly, and so that the space between both arms of the special tool will be maximum within the installation range.
2. Do not use an impact wrench to tighten the bolt of the special tool, otherwise the special tool will break.

- (2) Use the special tool to hold the spring upper seat and loosen the self-locking nut.

Caution

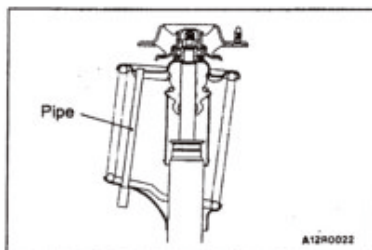
Do not use an impact wrench to loosen the self-locking nut. Vibration of the impact wrench will cause the special tool to slip. This is dangerous.

REASSEMBLY SERVICE POINT**▶A◀ SELF-LOCKING NUT INSTALLATION**

- (1) With the coil spring held compressed by the special tools, provisionally tighten the self-locking nut.

Caution

Do not use an impact wrench to tighten the bolt of the special tool, otherwise the special tool will break.

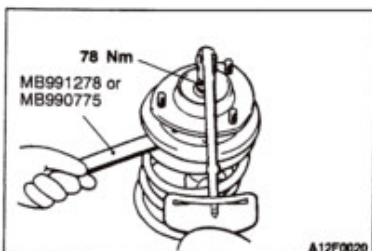


- (2) Line up the holes in the strut assembly spring lower seat with the hole in the spring upper seat.

NOTE

The job is easily accomplished with a pipe.

- (3) Correctly align both ends of the coil spring with the grooves in the spring seat, and then loosen the special tools.



- (4) Using the same special tool, tighten the self-locking nut to the specified torque.

Caution

Do not use an impact wrench to tighten the self-locking nut. Vibration of the impact wrench will cause the special tool to slip. This is dangerous.

- (5) Fill the strut insulator bearing with multi-purpose grease.

Caution

Do not apply the grease to the insulator rubber part.

LOWER ARM

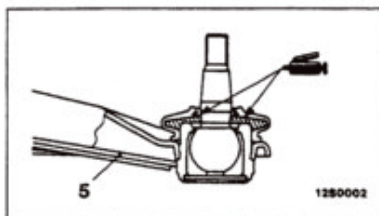
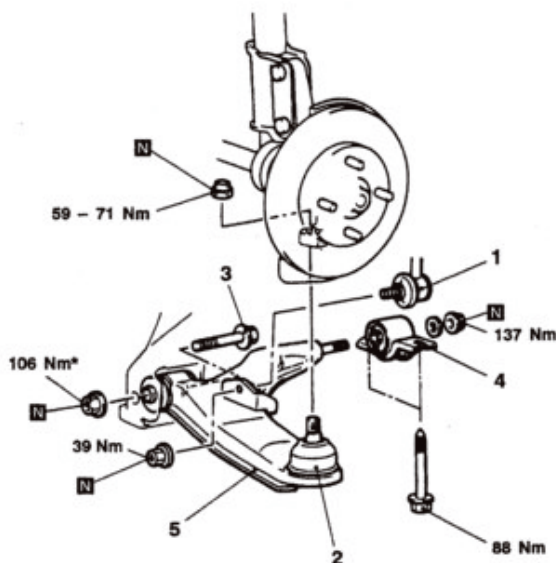
REMOVAL AND INSTALLATION

Caution

In order to prevent the bushing from twisting, parts marked by * should be provisionally tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Post-Installation Operation

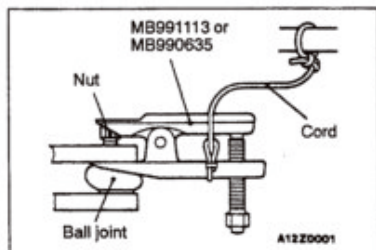
- Check the Dust Cover for Cracks or Damage by Pushing it with a Finger.
- Front Wheel Alignment Adjustment (Refer to P.33A-3.)



Removal steps

1. Lower arm and stabilizer link connection
2. Lower arm ball joint connection

- ▶ A ◀
3. Bolt
 4. Bushing assembly
 5. Lower arm assembly

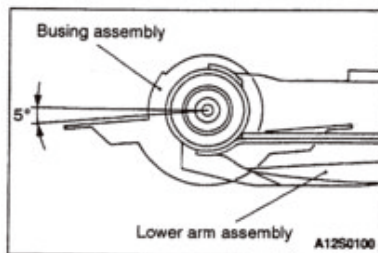


REMOVAL SERVICE POINT

◀ A ▶ LOWER ARM BALL JOINT DISCONNECTION

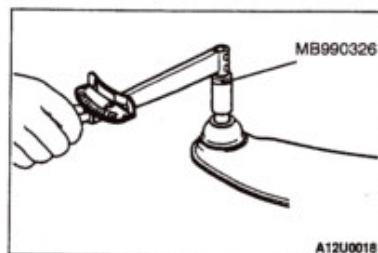
Caution

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

**INSTALLATION SERVICE POINT****►◄ BUSHING ASSEMBLY INSTALLATION**

Install the bushing assembly to the lower arm assembly as shown in the illustration, and then tighten the self-locking nut.

Tightening torque: 137 Nm

**INSPECTION****BALL JOINT STARTING TORQUE CHECK**

- (1) After shaking the ball joint stud several times, install the nut to the stud and use the special tool to measure the starting torque of the ball joint.

Standard value: 1.0–7.4 Nm

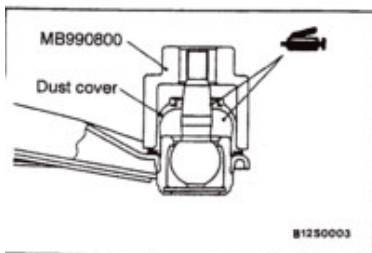
- (2) If the measured value exceeds the standard value, replace the ball joint.
- (3) If the measured value is lower than the standard value, check that the ball joint does not feel stiff. If it doesn't feel stiff, it is possible to use the ball joint.

LOWER ARM BALL JOINT DUST COVER CHECK

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

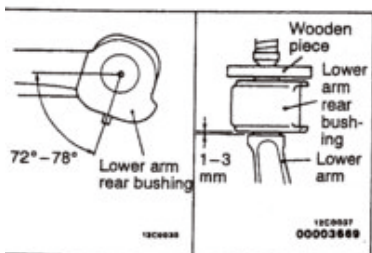
NOTE

Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.

**BALL JOINT DUST COVER REPLACEMENT**

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

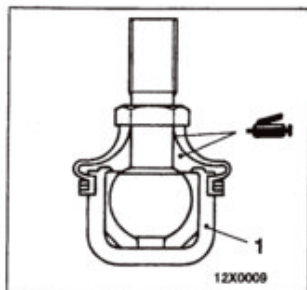
- (1) Remove the dust cover.
- (2) Apply multipurpose grease to the lip and inside of the dust cover.
- (3) Drive in the dust cover with special tool until it is fully seated.
- (4) Check the dust cover for cracks or damage by pushing it with a finger.

**LOWER ARM REAR BUSHING REPLACEMENT**

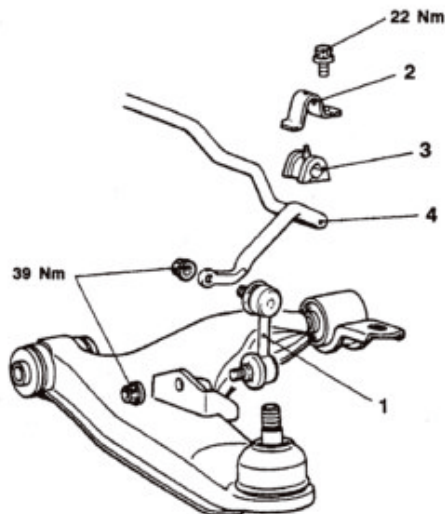
- (1) Apply soapy water between the shaft and old bushing, and pry up bushing using a screwdriver.
- (2) Apply soapy water to the shaft and new bushing and install new bushing into the shaft at the angle shown in the illustration.
- (3) Use a press to press-in the bushing as illustrated.

STABILIZER BAR**REMOVAL AND INSTALLATION****Pre-removal Operation**

- Crossmember Removal (Refer to GROUP 32.)

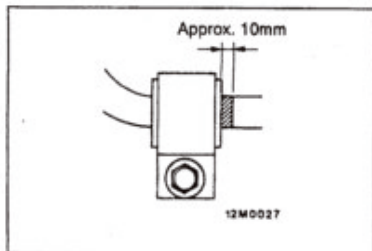
**Post-installation Operation**

- Crossmember Installation (Refer to GROUP 32.)
- Check the Dust Cover for Cracks or Damage by Pushing it with a Finger.

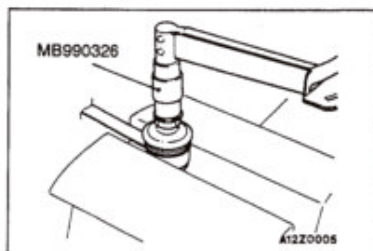
**Removal steps**

- A◄
1. Stabilizer link
 2. Fixture

- A◄
3. Bushing
 4. Stabilizer bar

**INSTALLATION SERVICE POINT****►A◄ BUSHING/FIXTURE INSTALLATION**

Place the identification mark of the stabilizer bar to the left, and install the bushing so that the identification mark protrudes approximately 10 mm from the edge of the inside of the bushing.

**INSPECTION****STABILIZER LINK BALL STUD TURNING TORQUE CHECK**

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

Standard value: 1.7 – 3.1 Nm

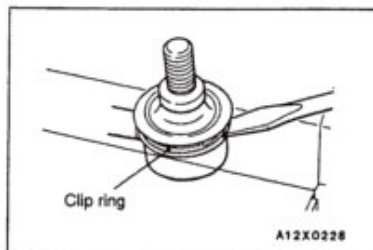
- (2) When the measured value exceeds the standard value, replace the stabilizer link.
- (3) When the measured value is lower than the standard value, check that the ball stud does not feel stiff. If it doesn't feel stiff, it is possible to use that stabilizer link.

STABILIZER LINK BALL JOINT DUST COVER CHECK

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

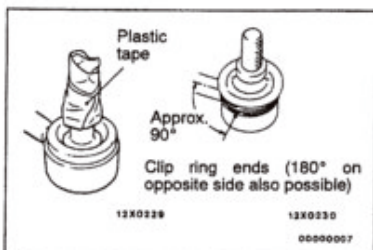
NOTE

Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.

**STABILIZER LINK BALL JOINT DUST COVER REPLACEMENT**

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

- (1) Remove the clip ring and the dust cover.
- (2) Apply multipurpose grease to the inside of the dust cover.



- (3) Use plastic tape on the stabilizer link threads as shown in the illustration, and then install the dust cover to the stabilizer link.
- (4) Secure the dust cover by the clip ring. When installing the clip ring, align the ends at a 90° angle from the axis of the stabilizer link.
- (5) Check the dust cover for cracks or damage by pushing it with finger.

REAR SUSPENSION

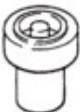
CONTENTS

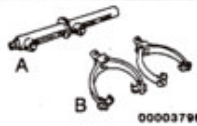
SERVICE SPECIFICATIONS	2	CONTROL LINK, UPPER LINK AND LOWER ARM	5
SPECIAL TOOLS	2	TRAILING ARM	7
ON-VEHICLE SERVICE	3	SHOCK ABSORBER ASSEMBLY	9
Rear Wheel Alignment Check and Adjustment	3	STABILIZER BAR	12
Ball Joint Dust Cover Check	4		

SERVICE SPECIFICATIONS

Items		Specifications
Toe-in	At the centre of tyre tread mm	3 ±2
	Toe-angle (per wheel)	0°08' ±05'
Camber		-1° ± 30' (difference between right and left wheels: less than 30')
Stabilizer link ball stud turning torque Nm		0.6 – 1.3
Stabilizer installation bolt protrusion mm		17 – 19

SPECIAL TOOLS

Tool	Number	Name	Use
	MB991004	Wheel alignment gauge attachment	Measurement of the wheel alignment
	MB991447	Bushing remover and installer	Driving out and press-fitting of lower arm bushing
	MB991448	Bushing remover and installer base	
	MB991449	Bushing remover and installer supporter	

Tool	Number	Name	Use
	MB991444	Bushing remover and installer arbor	Driving out and press-fitting of trailing arm bushing
	MB991445	Bushing remover and installer base	
	MB991446	Bushing remover and installer spacer	
	A: MB991237 B: MB991239	A: Spring compressor body B: Arm set	Compression of the rear coil spring
	MB990326	Preload socket	Measurement of stabilizer link stud turning torque

ON-VEHICLE SERVICE

REAR WHEEL ALIGNMENT CHECK AND ADJUSTMENT

The rear suspension and wheels should be serviced to the normal condition prior to measurement of wheel alignment. Measure the wheel alignment with the vehicle parked on level ground.

TOE-IN

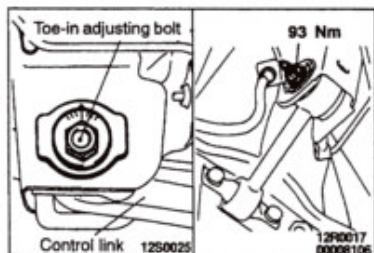
Standard value: 1 – 5 mm

At the centre of tyre tread 3 ± 2 mm

Toe angle (per wheel) $0^{\circ}08' \pm 05'$

If outside the standard value, adjust by the following procedure.

(1) Be sure to adjust the camber before adjusting the toe-in.



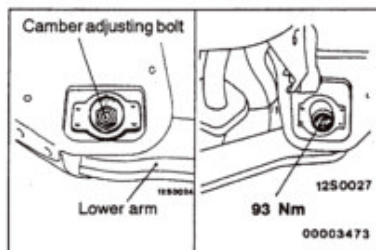
- (2) Adjust by turning the toe adjusting bolt (mounting bolt on the inside of the control link).
- LH: Turning clockwise → toe-in direction
RH: Turning clockwise → toe-out direction

The scale has gradations of approximately 2.6 mm (single side toe angle equivalent to 16")

CAMBER

Standard value: $-1^{\circ} \pm 30'$

(The difference between the left and right wheels should be 30' or less.)



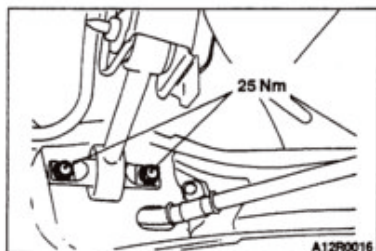
If outside the standard value, adjust by the following procedure.

- (1) Remove the connection between the control link and the trailing arm.
- (2) Adjust by turning the camber adjusting bolt (mounting bolt for the lower arm and rear crossmember).

Left wheel: clockwise + camber

Right wheel: clockwise – camber

The scale has gradations of approximately 14'



- (3) Tighten the control link to the trailing arm at the specified torque.
- (4) After adjusting the camber, be sure to adjust the toe-in.

BALL JOINT DUST COVER CHECK

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

NOTE

Cracks or damage of the dust cover may cause damage of the ball joint.

CONTROL LINK, UPPER LINK AND LOWER ARM

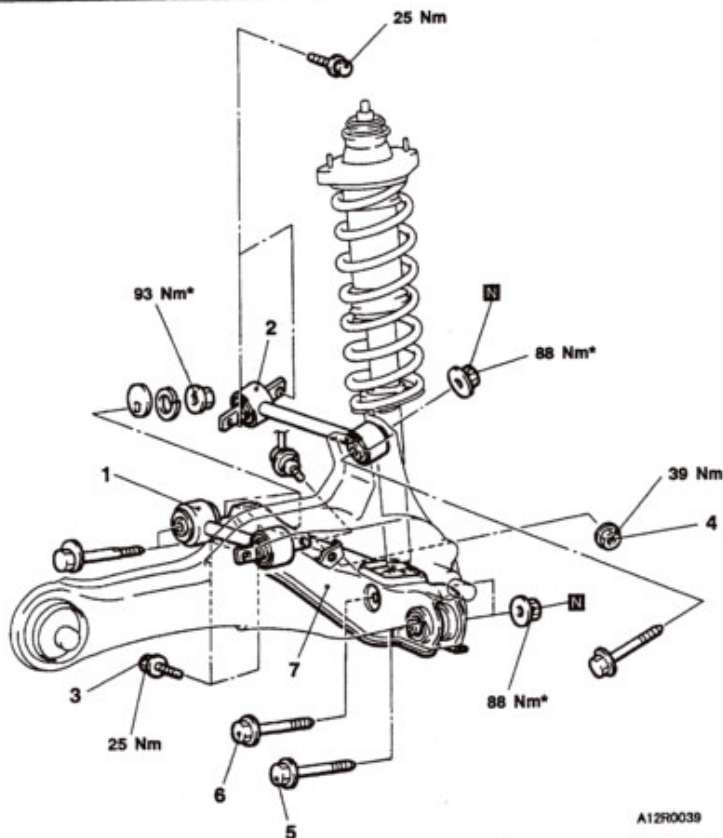
REMOVAL AND INSTALLATION

Caution

In order to prevent the bushing from twisting, parts marked by * should be provisionally tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Post-Installation Operation

- Wheel Alignment Check (Refer to P.34-3.)

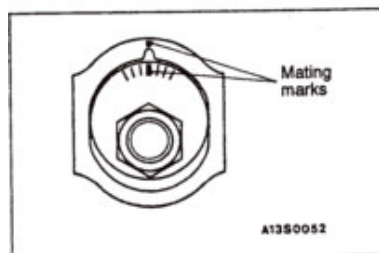


A12R0039

- 1. Control link
- 2. Upper link

Lower arm removal steps

3. Control link and trailing arm connection
4. Stabilizer link and lower arm connection
5. Lower arm and trailing arm connection
6. Shock absorber assembly and lower arm connection
7. Lower arm



REMOVAL SERVICE POINTS

◀A▶ CONTROL LINK/LOWER ARM REMOVAL

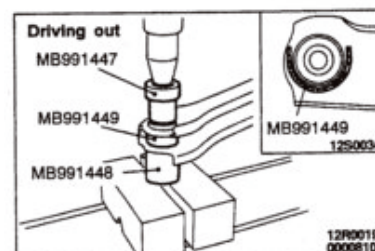
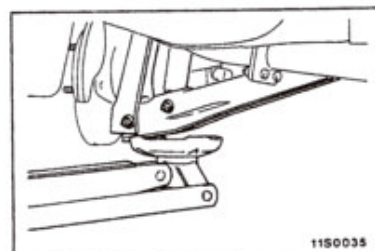
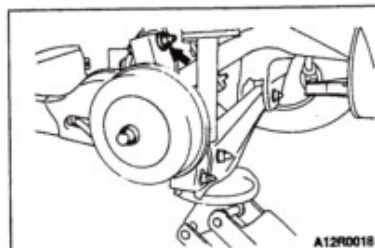
After making a mating marks on the toe-in or camber adjusting bolt, remove the control link and lower arm.

◀B▶ UPPER LINK REMOVAL

Support the lower arm with a jack and disconnect the upper link and trailing arm.

◀C▶ LOWER ARM AND TRAILING ARM DISCONNECTION

After supporting the lower arm with a jack, separate the connection.



LOWER ARM BUSHING REPLACEMENT

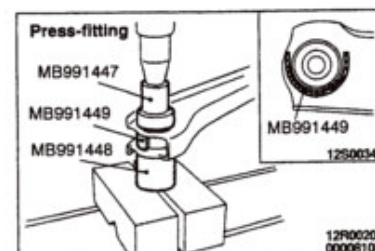
Use the special tools to drive out and press-fit the lower arm bushing.

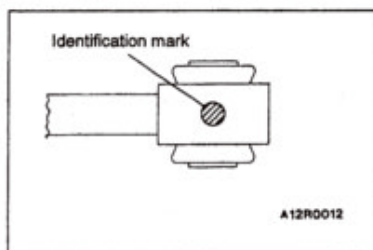
NOTE

If the special tool (MB991449) is hard to install, tap it with a plastic hammer.

Caution

Because the outside diameter of both edges of the bushing are different, be careful not to mistake the direction when driving out and press-fitting.





INSTALLATION SERVICE POINT

►A◄ UPPER LINK/CONTROL LINK INSTALLATION

Install the upper link and control link so that their identification marks face upward.

TRAILING ARM

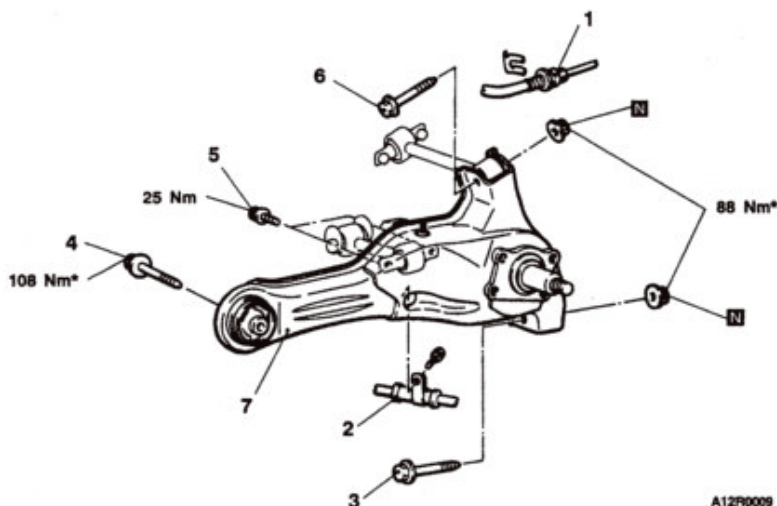
REMOVAL AND INSTALLATION

Caution

In order to prevent the bushing from twisting, parts marked by * should be provisionally tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Pre-removal and Post-Installation Operation

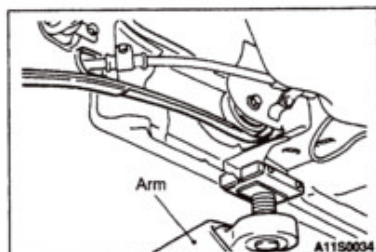
- Rear Disc Brake Removal and Installation (Refer to GROUP 35A.)



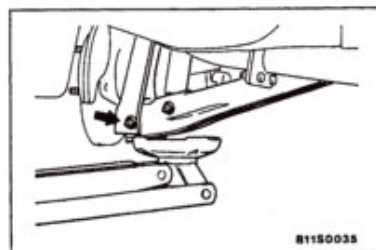
Removal steps

1. Lifting up
2. Brake hose
3. Parking brake cable
4. Lower arm and trailing arm connection
5. Trailing arm and body connection

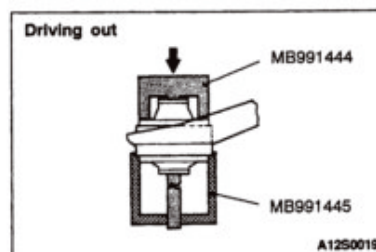
6. Control link and trailing arm connection
7. Upper link and trailing arm connection
8. Trailing arm

**REMOVAL SERVICE POINTS****◀A▶ LIFTING UP**

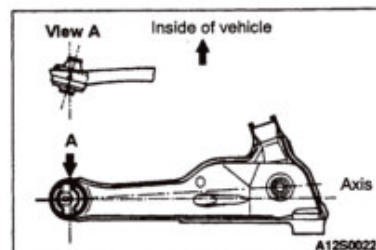
When removing the trailing arm, move the lifting arm slightly towards the front of the vehicle so that it will not be in the way.

**◀B▶ LOWER ARM AND TRAILING ARM DISCONNECTION**

After supporting the lower arm with a jack, separate the lower arm and trailing arm connection.

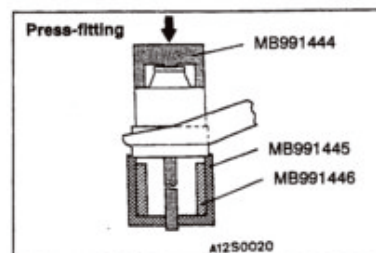
**TRAILING ARM BUSHING REPLACEMENT**

- (1) Use the special tools to drive out the trailing arm bushing.



- (2) Set the installation direction and installation location of the trailing arm bushing.

1. Place the long projecting end of the trailing arm bushing inner pipe towards the inside of the vehicle.
2. Set so that the trailing arm bushing is symmetrical to the axis between the centre of the trailing arm bushing and the centre of the spindle.



- (3) Use the special tools to press-fit the trailing arm bushing.

SHOCK ABSORBER ASSEMBLY

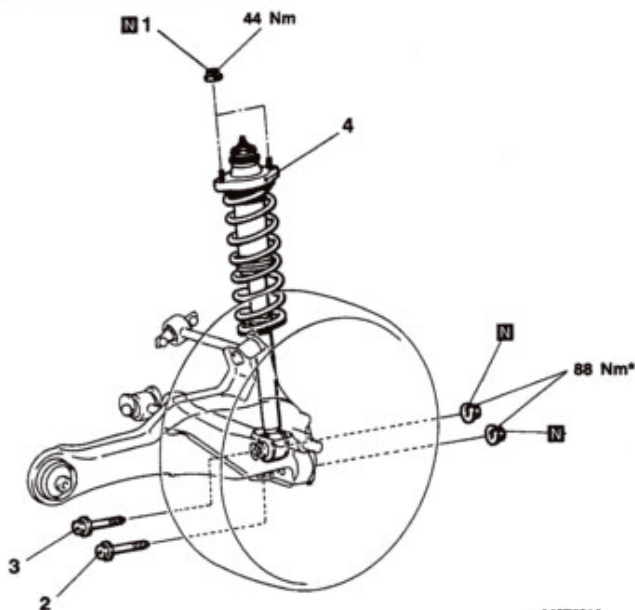
REMOVAL AND INSTALLATION

Caution

In order to prevent the bushing from twisting, parts marked with * should be provisionally tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

Pre-removal and Post-Installation Operation

- Trunk Side Trim Removal and Installation (Refer to GROUP 52A – Trims.)

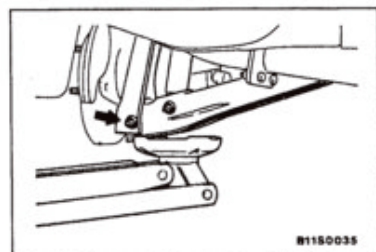


A12P0014

Removal steps

1. Self-locking flange nut
2. Lower arm and trailing arm connection

3. Shock absorber assembly and lower arm connection
4. Shock absorber assembly



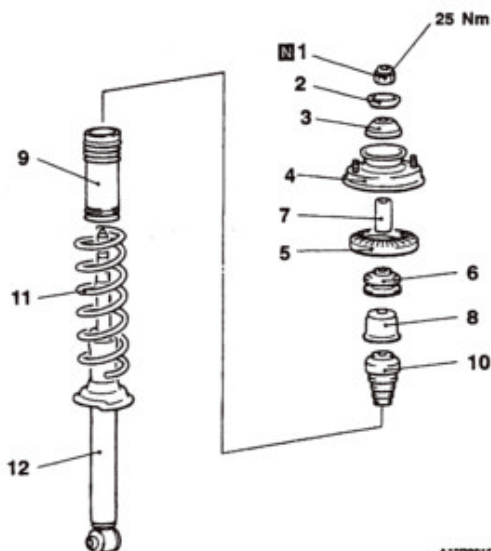
B1150035

REMOVAL SERVICE POINT

◀A▶ LOWER ARM AND TRAILING ARM DISCONNECTION

After supporting the lower arm with a jack, separate the lower arm and trailing arm connection.

DISASSEMBLY AND REASSEMBLY

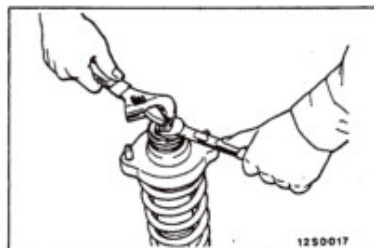
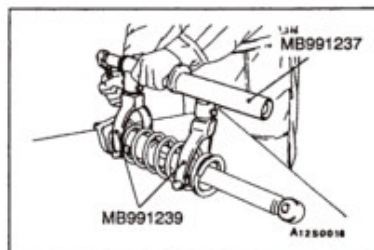


A12R0015

Disassembly steps

- ◀A▶ ▶D▶ 1. Self-locking nut
2. Washer
▶C▶ ▶B▶ 3. Upper bushing B
4. Bracket
5. Spring pad

6. Upper bushing A
7. Coller
8. Cup
9. Dust cover
10. Bump rubber
▶A▶ 11. Coil spring
12. Shock absorber



DISASSEMBLY SERVICE POINT

◀A▶ SELF-LOCKING NUT REMOVAL

- (1) Use the special tools to compress the coil spring.

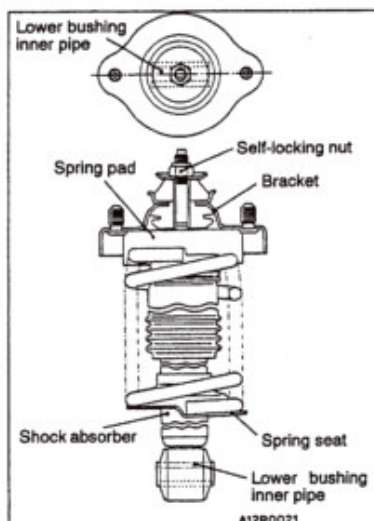
Caution

1. To hold the coil spring securely, install the special tools evenly, and so that the space between both arms of the special tool will be maximum within the installation range.
2. Do not use an impact wrench to tighten the bolt of the special tool, otherwise the special tool will break.

- (2) Holding the piston rod, remove the self-locking nut.

Caution

Do not use an impact wrench to loosen the self-locking nut. Vibration of the impact wrench will cause the special tool to slip. This is dangerous.



REASSEMBLY SERVICE POINTS

►A◄ COIL SPRING INSTALLATION

- (1) Use the special tools (MB991237, MB991239) to compress the coil spring, and install it to the shock absorber.

Caution

Do not use an impact wrench to loosen the self-locking nut. Vibration of the impact wrench will cause the special tool to slip. This is dangerous.

- (2) Align the end of the coil spring with the stepped section of the spring seat of the shock absorber.

►B◄ SPRING PAD INSTALLATION

Align the stepped section of the spring pad with the end of the coil spring, and install the spring pad.

►C◄ BRACKET INSTALLATION

Install the bracket so that the lower bushing inner pipe of the shock absorber and the line between the bracket mounting bolts are straight when looking from above.

►D◄ SELF-LOCKING NUT INSTALLATION

- (1) Provisionally tighten the self-locking nut.
- (2) Remove the special tools (MB991237, MB991239), tighten the self-locking nut to the specified torque.

Caution

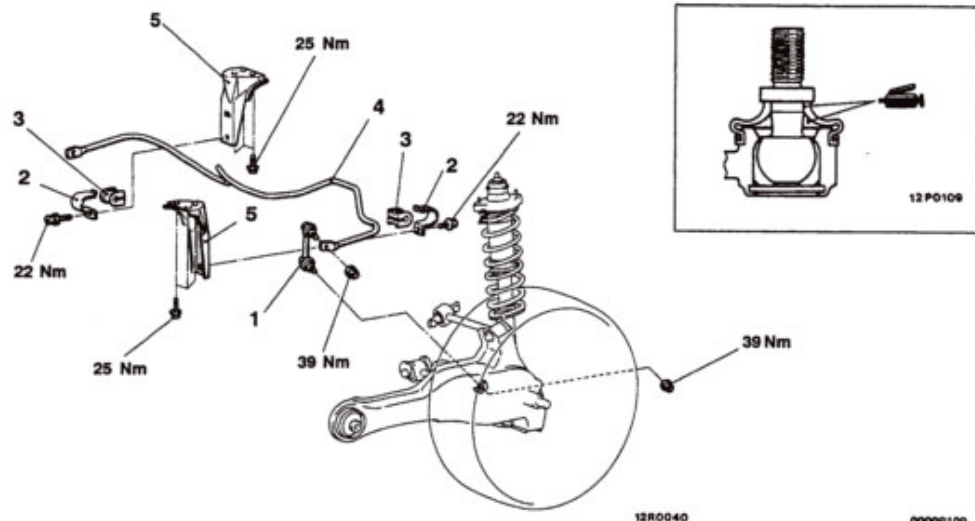
Do not use an impact wrench to tighten the self-locking nut. Vibration of the impact wrench will cause the special tool to slip. This is dangerous.

STABILIZER BAR

REMOVAL AND INSTALLATION

Post-Installation Operation

Check the Dust Cover for Cracks or Damage by Pushing it with Finger.



12R0040

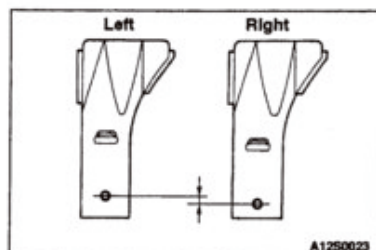
00008109

Removal steps

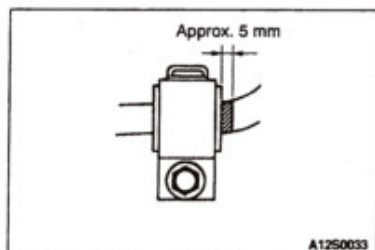
1. Stabilizer link
2. Fixture
3. Bushing



4. Stabilizer bar
5. Stabilizer bar bracket

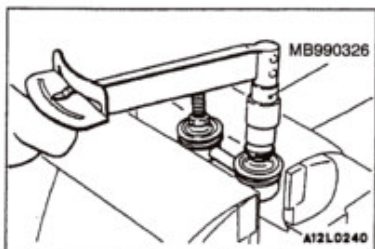
**INSTALLATION SERVICE POINTS****►A◄ STABILIZER BAR BRACKET INSTALLATION**

The right and left stabilizer brackets are different in its fixture installation position. Be careful not to confuse them.



►B◄ STABILIZER BAR/BUSHING INSTALLATION

Place the identification mark of the stabilizer bar to the left, and install the bushing so that the identification mark protrudes approximately 5 mm from the edge of the inside of the bushing.



INSPECTION

STABILIZER LINK BALL STUD TURNING TORQUE CHECK

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

Standard value: 0.6 – 1.3 Nm

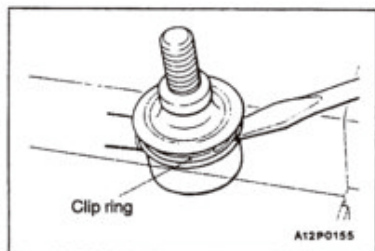
2. When the measured value exceeds the standard value, replace the stabilizer link.
3. When the measured value is lower than the standard value, check that the ball stud does not feel stiff. If it does not feel stiff, it is possible to use that stabilizer link.

STABILIZER LINK BALL JOINT DUST COVER CHECK

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

NOTE

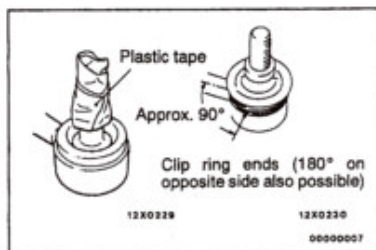
Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.



STABILIZER LINK BALL JOINT DUST COVER REPLACEMENT

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Remove the clip ring and the dust cover.
2. Apply multipurpose grease to the lip and inside of the dust cover.



3. Use plastic tape on the stabilizer link threads as shown in the illustration, and then install the dust cover to the stabilizer link.
4. Secure the dust cover with the clip ring. When installing the clip ring, align the ends at a 90° angle from the axis of the stabilizer link.
5. Check the dust cover for cracks or damage by pushing it with finger.

SERVICE BRAKES

CONTENTS

BASIC BRAKE SYSTEM 35A

ANTI-SKID BRAKING SYSTEM (ABS) 35B



BASIC BRAKE SYSTEM

CONTENTS

SERVICE SPECIFICATIONS	3	Bleeding	9
LUBRICANTS	3	Disc Brake Pad Check and Replacement	10
SEALANTS	4	Brake Disc Thickness Check	11
SPECIAL TOOL	4	Brake Disc Run-out Check	11
ON-VEHICLE SERVICE	5	Brake Disc Run-out Correction	11
Brake Pedal Check and Adjustment	5	BRAKE PEDAL	13
Brake Booster Operating Test	6	MASTER CYLINDER AND BRAKE BOOSTER	14
Check Valve Operation Check	8	Master Cylinder	16
Proportioning Valve Function Test	8	DISC BRAKE	17
Brake Fluid Level Sensor Check	9		

SERVICE SPECIFICATIONS

Items		Standard value	Limit
Brake pedal height mm		193.5 – 196.5	–
Brake pedal free play mm		3–8	–
Brake pedal to floor board clearance mm		80 or more	–
Brake fluid pressure when the brake booster is not working kPa	Pedal depressing force 98 N	147 or more	–
	Pedal depressing force 294 N	1,471 or more	–
Brake fluid pressure when the brake booster is working MPa	Pedal depressing force 98 N	2.94 – 4.31	–
	Pedal depressing force 294 N	6.86 – 10.29	–
Proportioning valve	Split point MPa	2.45	–
	Output fluid pressure (Input fluid pressure) MPa	3.4 (6.37)	–
	Output fluid pressure difference between left and right MPa	–	3.9
Clearance between brake booster push rod and primary piston mm		0.6 – 0.8	–
Front disc brake	Pad thickness mm	10.0	2.0
	Disc thickness mm	24.0	22.4
	Disc runout mm	–	0.06
	Drag force N	94	–
Rear disc brake	Pad thickness mm	9.5	2.0
	Disc thickness mm	10.0	8.4
	Disc runout mm	–	0.04
	Drag force N	69 or less	–
Hub axial play mm		–	0.05

LUBRICANTS

Items	Specified Lubricant
Brake fluid	DOT3 or DOT4
Piston boot, piston seal	Repair kit grease (orange)
Guide pin, lock pin	
Pin boot, guide pin sleeve	
Piston, wheel cylinder body	
Backing plate	Brake grease SAE J310, NLGI No.1
Shoe and lining assembly	
Auto adjuster assembly	

SEALANTS

Items	Specified sealant	Remarks
Fitting	3M ATD Part No.8663 or equivalent	Semi-drying sealant
Vacuum switch		

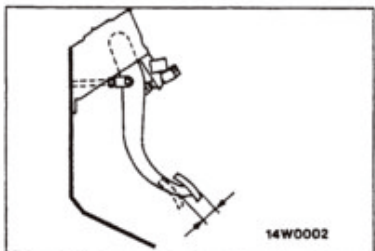
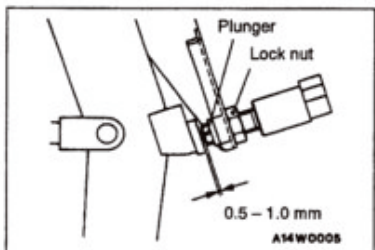
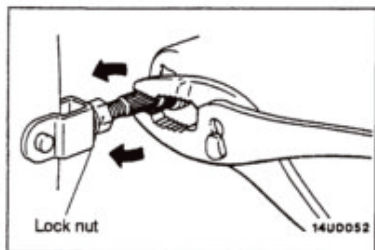
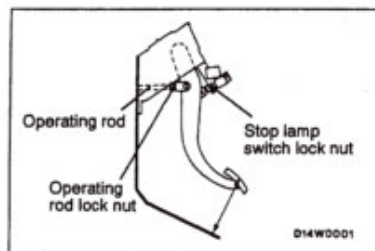
SPECIAL TOOL

Tool	Number	Name	Use
	MB990964 1. MB990520 2. MB990621 (C) 2. MB990623 (D)	Brake tool set	Pushing-in of the disc brake piston

ON-VEHICLE SERVICE**BRAKE PEDAL CHECK AND ADJUSTMENT****BRAKE PEDAL HEIGHT**

1. Turn up the carpet, etc under the brake pedal.
2. Measure the brake pedal height as illustrated. If the brake pedal height is not within the standard value, follow the procedure below.

Standard value: 193.5 – 196.5 mm



- (1) Disconnect the stop lamp switch connector.
- (2) Loosen the stop lamp switch lock nut, and back the stop lamp switch until its plunger separates from the brake pedal arm.
- (3) Adjust the brake pedal height by turning the operating rod with pliers (with the operating rod lock nut loosened), until the correct brake pedal height is obtained.
- (4) Screw in the stop lamp switch until its plunger contacts the brake pedal stopper.
- (5) Back the stop lamp switch half to one turn until the shown value is obtained and secure it with the lock nut.
- (6) Connect the connector of the stop lamp switch.
- (7) Check that the stop lamp is not illuminated with the brake pedal unpressed.

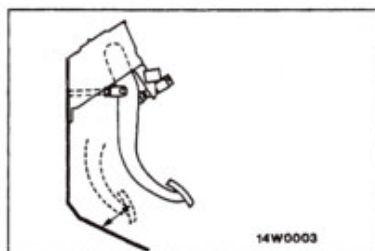
3. Return the carpet etc.

BRAKE PEDAL FREE PLAY

With the engine stopped, depress the brake pedal two or three times. After eliminating the vacuum in the power brake booster, press the pedal down by hand, and confirm that the amount of movement before resistance is met (the free play) is within the standard value range.

Standard value: 3–8 mm

If the free play is not within the standard value, it is probably due to excessive play between brake pedal and clevis pin or between the clevis pin and booster push rod, incorrect height of the brake pedal, faulty installation of the stop lamp switch. Check and replace faulty parts as required.

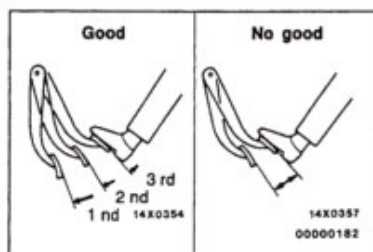


CLEARANCE BETWEEN BRAKE PEDAL AND FLOOR BOARD

1. Turn up the carpet etc. under the brake pedal.
2. Start the engine, depress the brake pedal with approximately 490 N of force, and measure the clearance between the brake pedal and the floorboard.

Standard value: 80 mm or more

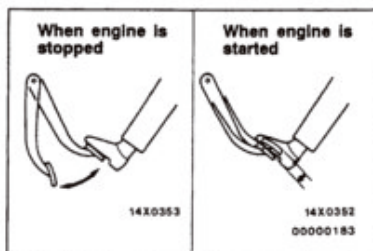
3. If the clearance is outside the standard value, check for air trapped in the brake line, brake pad thickness and dragging in the parking brake. Adjust and replace defective parts as required.
4. Return the carpet etc.



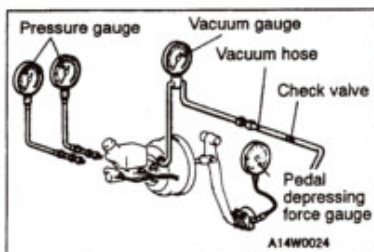
BRAKE BOOSTER OPERATING TEST

For simple checking of the brake booster operation, carry out the following tests:

1. Run the engine for one or two minutes, and then stop it.
If the pedal depresses fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly, if the pedal height remains unchanged, the booster is defective.



2. With the engine stopped, depress the brake pedal several times.
Then depress the brake pedal and start the engine. If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is defective.
3. With the engine running, depress the brake pedal and then stop the engine.
If the pedal height does not change for 30 seconds, the booster is in good condition, if the pedal rises, the booster is defective.
If the above three tests are okay, the booster performance can be determined as good.
If one of the above three tests is not okay at last, the check valve, vacuum hose, or booster will be defective.

**Checking procedure by using a simple tester**

1. Check the operation of the check valve prior to this inspection. (Refer to P.35A-8.)
2. Disconnect the vacuum hose from the brake booster, and connect it to the vacuum gauge. Connect other vacuum hoses (integrating no check valve) to the vacuum gauge and brake booster. Connect the vacuum gauge and pedal depressing force gauge as shown in the figure. Bleed the air in the pressure gauge, and then carry out the test as follows:

- (1) Air tightness test when the brake booster is not operating

Start the engine. If the vacuum gauge reading reaches -67 kPa (500 mmHg), stop the engine. Check the vacuum gauge reading. If the vacuum drop is less than -3.3 kPa (25 mmHg) for approx. 15 seconds, the brake booster is in good condition.

- (2) Air tightness test when the brake booster is operating
Start the engine, and depress the brake pedal with a 196 N of depressing force. If the vacuum gauge reading reaches -67 kPa (500 mmHg), stop the engine. Check the vacuum gauge reading. If the vacuum drop is less than -3.3 kPa (25 mmHg) for approx. 15 seconds, the brake booster is in good condition.

If the brake booster does not pass either of the tests above, the brake booster and/or vacuum hose are faulty.

- (3) Characteristic test of the brake booster
This test should be carried out after steps (1) and (2).

- a. Test when the brake booster is not operating
Confirm that the vacuum gauge indicates 0 kPa (0 mmHg) with the engine stopped, and then measure the brake fluid pressure when the brake pedal is depressed by the force of 98 N and 294 N.

Standard value: 1,471 kPa (Pedal depressing force: approx. 294 N)

- b. Test when the brake booster is operating
Start the engine, and confirm that the vacuum gauge indicates -67 kPa (500 mmHg), and then measure the brake fluid pressure when the brake pedal is depressed by the force of 98 N and 294 N.

Standard value:

2.9 – 4.4 MPa

(Pedal depressing force: approx. 98 N)

6.9 – 10.3 MPa

(Pedal depressing force: approx. 294 N)

NOTE

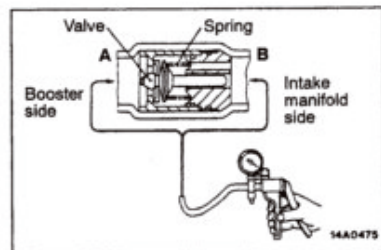
The operation test of the brake booster is only a simple test. Therefore, if the booster is defective as an unit, always follow the bench test specified by its manufacturer.

CHECK VALVE OPERATION CHECK

1. Remove the vacuum hose. (Refer to P.35A-16.)

Caution

The check valve should not be removed from the vacuum hose.

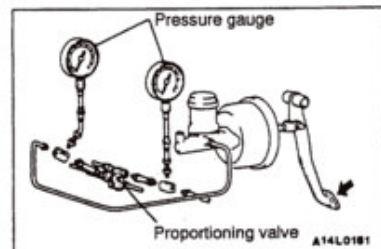


2. Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Normal condition
Connection at the brake booster side (A)	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side (B)	A negative pressure (vacuum) is not created.

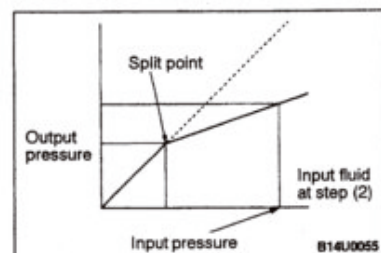
Caution

If the check valve is defective, replace it as an assembly unit together with the vacuum hose.



PROPORTIONING VALVE FUNCTION TEST

1. Connect two pressure gauges, one each to the input side and output side of the proportioning valve, as shown.
2. Bleed the air in the brake line and the pressure gauge.
3. While gradually depressing the brake pedal, make the following measurements and check to be sure that the measured values are within the allowable range.



- (1) Output fluid pressure begins to drop relative to input pressure (split point).

Standard value: 2.45 MPa

- (2) Check to be sure that the output fluid pressure is at the standard value when the pedal depression force is increased so that the input fluid pressure is at the values shown in the table below.

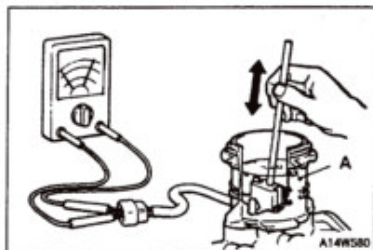
Standard value:

Output fluid pressure MPa	Output fluid pressure MPa
6.37	3.43

- (3) Output fluid pressure difference between left and right brake lines.

Limit: 3.92 MPa

4. If the measured pressures are not within the standard value ranges, replace the proportioning valve.

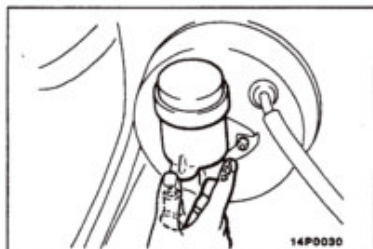
**BRAKE FLUID LEVEL SENSOR CHECK**

The brake fluid level sensor is in good condition if there is no continuity when the float surface is above "A" and if there is continuity when the float surface is below "A".

BLEEDING**Caution**

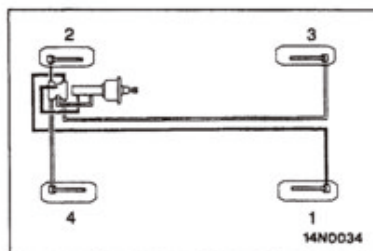
Use the specified brake fluid. Avoid using a mixture of the specified brake fluid and other fluid.

Specified brake fluid: DOT3 or DOT4

**MASTER CYLINDER BLEEDING**

The master cylinder used has no check valve, so if bleeding is carried out by the following procedure, bleeding of air from the brake pipeline will become easier. (When brake fluid is not contained in the master cylinder.)

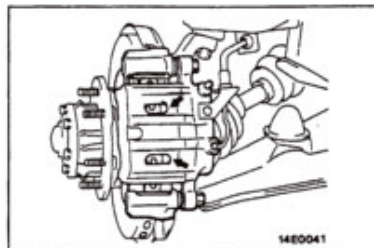
- (1) Fill the reserve tank with brake fluid.
- (2) Keep the brake pedal depressed.
- (3) Have another person cover the master cylinder outlet with a finger.
- (4) With the outlet still closed, release the brake pedal.
- (5) Repeat steps (2)–(4) three or four times to fill the inside of the master cylinder with brake fluid.

**BRAKE PIPE LINE BLEEDING**

Bleed the air in the sequence shown in the figure.

DISC BRAKE PAD CHECK AND REPLACEMENT**NOTE**

The wear indicator contacts the brake disc when the brake pad thickness becomes 2 mm and emit a squealing sound to warn the driver.



1. Check brake pad thickness through caliper body check port.

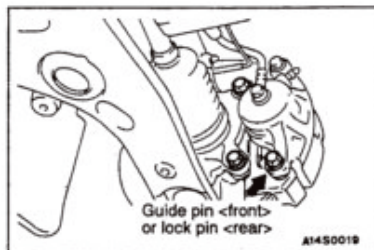
Standard value:

10 mm <Front>, 9.5 mm <Rear>

Limit: 2.0 mm

Caution

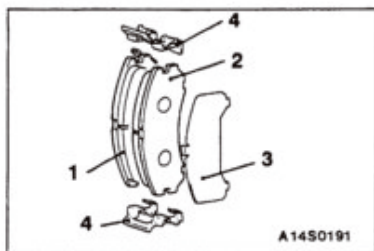
When the limit is exceeded, replace the pads at both sides, and also the brake pads for the wheels on the opposite side at the same time.



2. Remove the guide pin <front> or lock pin <rear>. Lift caliper assembly and retain with wires.

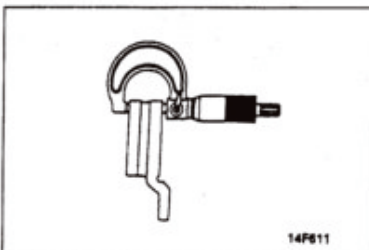
Caution

Do not wipe off the special grease that is on the guide pin and lock pin. Also, do not contaminate the lock pin and guide pin.



3. Remove the following parts from caliper support.
 - (1) Pad and wear indicator assembly
 - (2) Pad assembly
 - (3) Outer shim
 - (4) Clip

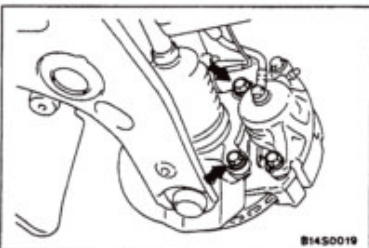
4. In order to measure the brake drag force after pad installation, measure the rotary-sliding resistance of the hub with the pads removed. (Refer to P.35A-18.)
5. Install the pads and the caliper assembly, and then check the brake drag force. (Refer to P.35A-18.)

**BRAKE DISC THICKNESS CHECK**

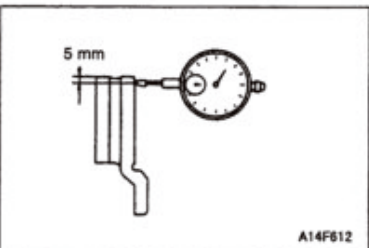
1. Remove dirt and rusts from the brake disc surface.
2. Measure the disc thickness at more than four points.

Standard value: 24.0 mm <Front>, 10.0 mm <Rear>

Limit: 22.4 mm <Front>, 8.4 mm <Rear>

**BRAKE DISC RUN-OUT CHECK**

1. Remove the brake assembly and secure by using a wire



2. Place a dial gauge approximately 5 mm from the outer circumference of the brake disc, and measure the run-out of the disc.

Limit:

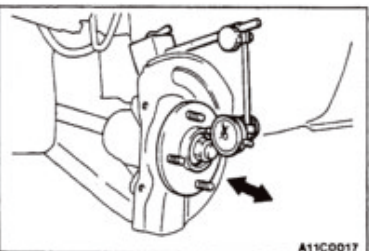
0.06 mm or less <Front>

0.07 mm or less <Rear>

BRAKE DISC RUN-OUT CORRECTION

1. If the run-out of the brake disc exceeds the limit, correct by the following procedure.

- (1) Before removing the brake disc, chalk both sides of the wheel stud on the side at which run-out is greatest.



- (2) Remove the brake disc, and then place a dial gauge as shown in the illustration; then move the hub in the axial direction and measure the play.

Limit: 0.05 mm

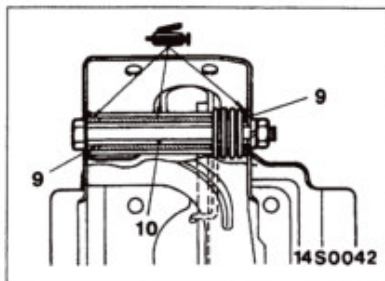
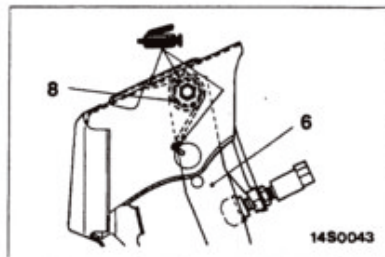
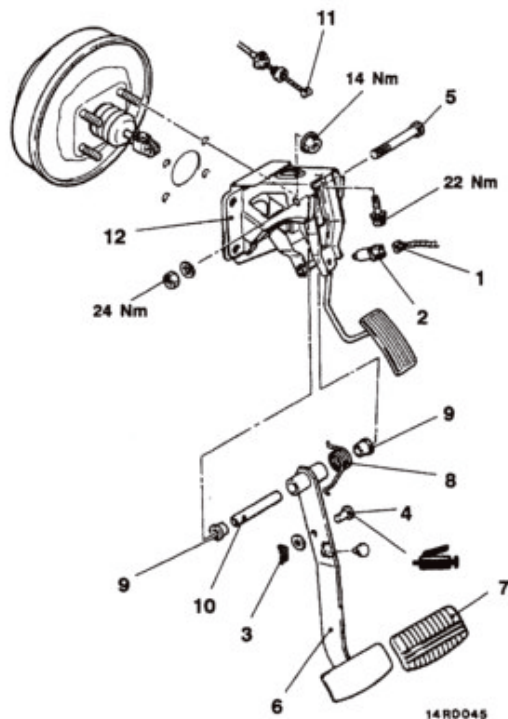
If the play is equivalent to or exceeds the limit, disassemble the hub and knuckle, and check each part.

- (3) If the play does not exceed the limit specification, install the brake disc at a position 180° away from the chalk mark, and then check the run-out of the brake disc once again.
2. If the run-out cannot be corrected by changing the phase of the brake disc, replace the disc.
3. Tighten the brake assembly to the specified torque.

Tightening torque: 88 Nm <Front>, 49 – 59 Nm <Rear>

BRAKE PEDAL**REMOVAL AND INSTALLATION**

Post-Installation Operation
 Brake Pedal Adjustment (Refer to P.35A-5.)



00008115

Removal steps

1. Harness connector
2. Stop lamp switch
3. Split pin
4. Clevis pin
5. Brake pedal shaft bolt
6. Brake pedal

7. Brake pedal pad
8. Brake pedal return spring
9. Bushing
10. Pipe
11. Accelerator cable connection
12. Pedal support member

MASTER CYLINDER AND BRAKE BOOSTER

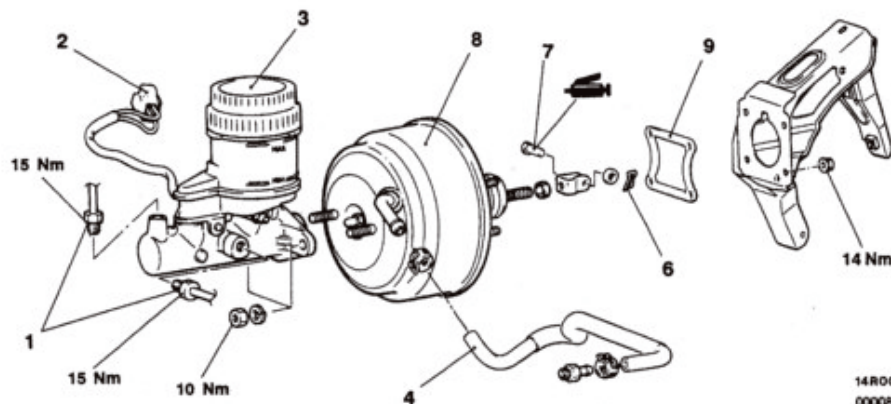
REMOVAL AND INSTALLATION

Pre-removal Operation

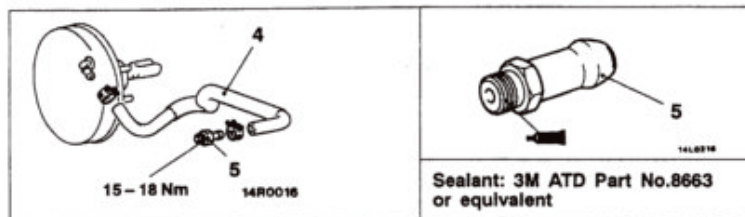
Brake Fluid Draining

Post-Installation Operation

- Brake Fluid Supplying
- Brake Line Bleeding (Refer to P.35A-9.)
- Brake Pedal Adjustment (Refer to P.35A-5.)



14R0046
00008116



Removal steps

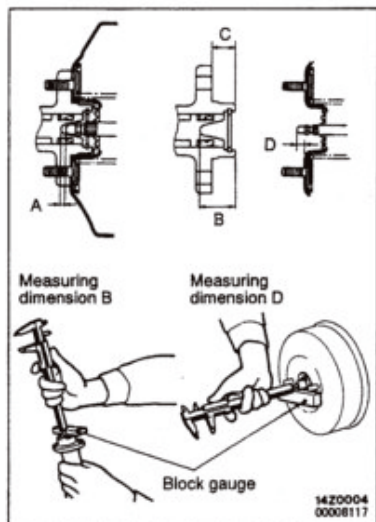
1. Brake pipe connection
2. Brake fluid level sensor connector
3. Master cylinder assembly
 - Clearance between primary piston and push rod check and adjustment
4. Vacuum hose

5. Fitting
6. Snap pin
7. Clevis pin
8. Brake booster
9. Sealer

INSTALLATION SERVICE POINTS

▶A◀ VACUUM HOSE CONNECTION

Insert securely and completely until the vacuum hose at the engine side contacts the edge of the hexagonal part of the fitting, and then secure by using the hose clip.

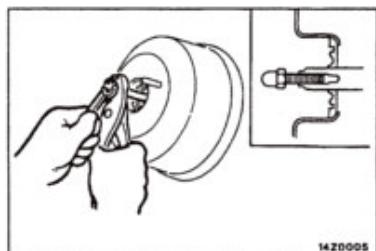


▶B◀ CLEARANCE BETWEEN PRIMARY PISTON AND PUSH ROD CHECK AND ADJUSTMENT

1. Measure B, C and D dimensions, and calculate clearance A.

$$A = B - D - C$$

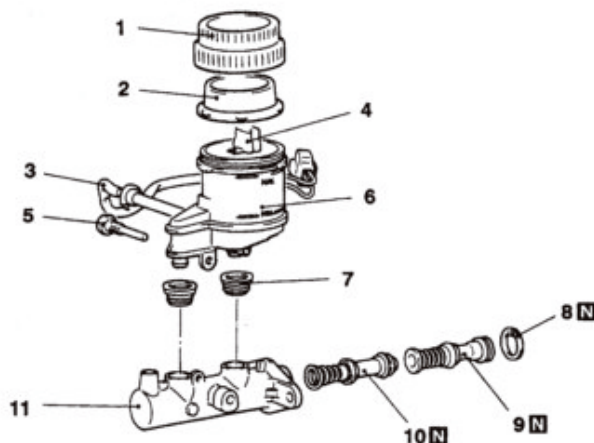
Standard value: 0.6 – 0.8 mm



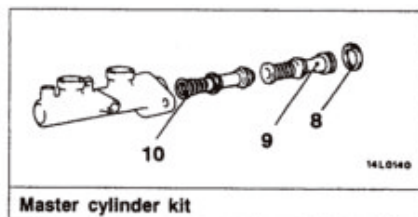
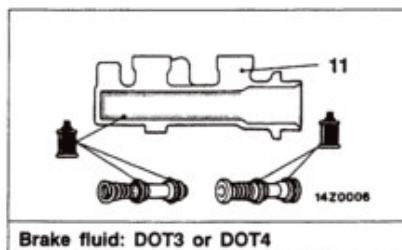
35A-16 BASIC BRAKE SYSTEM – Master Cylinder and Brake Booster

MASTER CYLINDER

DISASSEMBLY AND REASSEMBLY



14R0014



Disassembly steps

1. Reservoir cap
2. Diaphragm
3. Brake fluid level sensor
4. Float
5. Reservoir stopper bolt
6. Reservoir tank

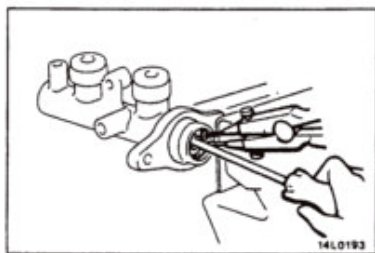


7. Reservoir seal
8. Stopper ring
9. Primary piston assembly
10. Secondary piston assembly
11. Master cylinder body

DISASSEMBLY SERVICE POINT

◀▶ STOPPER RING REMOVAL

Remove the stopper ring while pushing the primary piston assembly.



DISC BRAKE

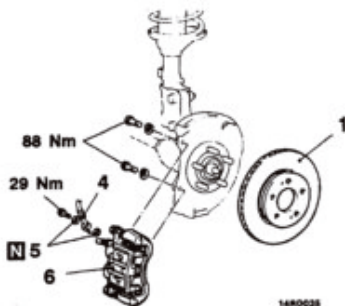
REMOVAL AND INSTALLATION

Pre-removal Operation
Brake Fluid Draining

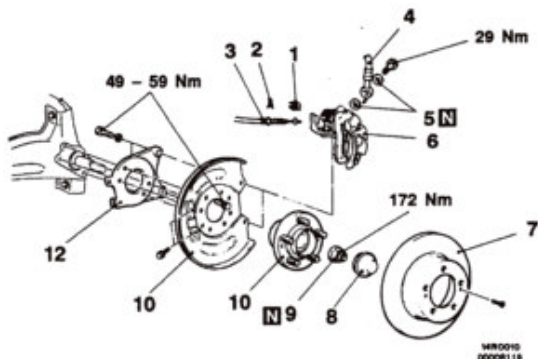
Post-installation Operation

- Brake Fluid Supplying
- Brake Line Bleeding (Refer to P.35A-9.)

<Front>



<Rear>

**Front disc brake removal steps**

4. Brake hose connection
5. Gasket
6. Disc brake assembly
7. Brake disc

Rear disc brake removal steps

1. Clip
2. Retainer spring
3. Parking brake cable connection

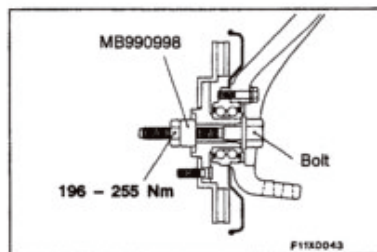
4. Brake hose connection
5. Gasket
6. Disc brake assembly
7. Brake disc
8. Hub cap
9. Self-locking nut
10. Rear hub assembly
11. Dust shield
12. Disc brake adaptor

INSTALLATION SERVICE POINT**DISC BRAKE ASSEMBLY INSTALLATION**

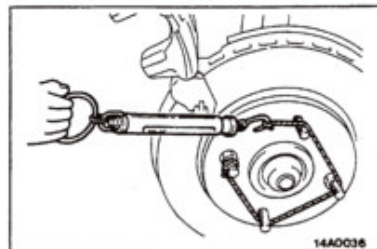
1. In order to measure the brake drag torque after pad installation, measure the rotary-sliding resistance of the hub with the pads removed by the following procedure.

<Front>

- (1) Remove the drive shaft.
(Refer to GROUP 26.)



- (2) Attach the special tool to the front hub assembly as shown in the illustration, and tighten it to the specified torque.



- (3) Use a spring balance to measure the rotary-sliding resistance of the hub in the forward direction.

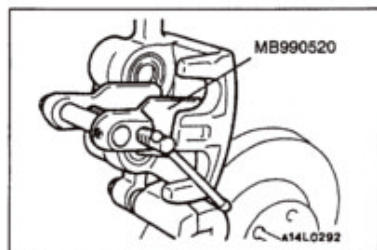
<Rear>

- Use a spring balance to measure the rotary-sliding resistance of the hub in the forward direction.

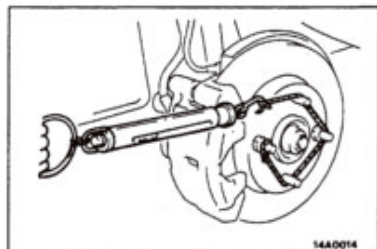
2. After installing the caliper support to the knuckle, install the pad clips and the pads to the caliper support.

Caution

Do not let any oil, grease or other contamination get onto the friction surfaces of the pads and brake discs.



3. Clean piston and insert it into cylinder with special tool.
4. Lower the caliper assembly being careful that the piston boot does not become caught, and tighten the lock pin.
5. Start the engine and then depress the brake pedal 2-3 times.
6. Stop engine.
7. Turn brake disc forward 10 times.



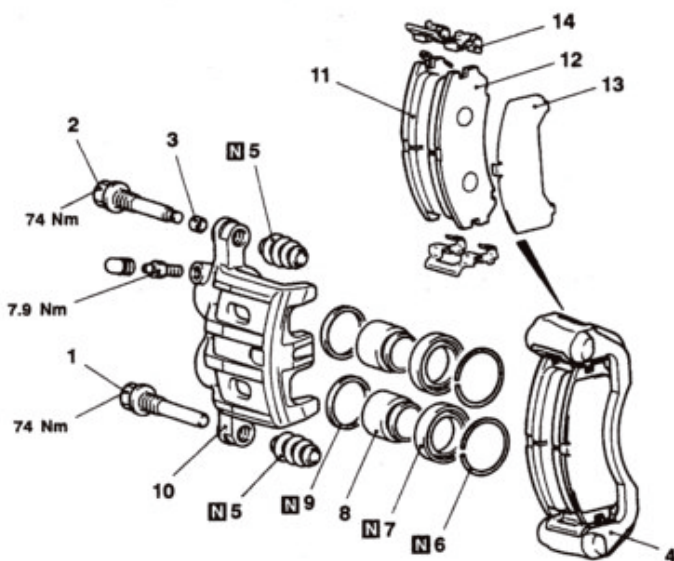
8. Use a spring balance to measure the rotary-sliding resistance of the hub in the forward direction.
9. Calculate the drag force of the disc brake (difference between of values measured in item 8 and item 1.)

Standard value: 94 N <Front>, 69 N <Rear>

10. If the drag force of the disc brake exceeds the standard value, disassemble piston and clean piston. Check for corrosion or worn piston seal, and check the sliding condition of the lock pin and guide pin.

DISASSEMBLY AND REASSEMBLY

<Front disc brake – 2-piston type>

14S0190
00008121

Brake caliper kit	Pad repair kit	Seal and boots repair kit

Disassembly steps



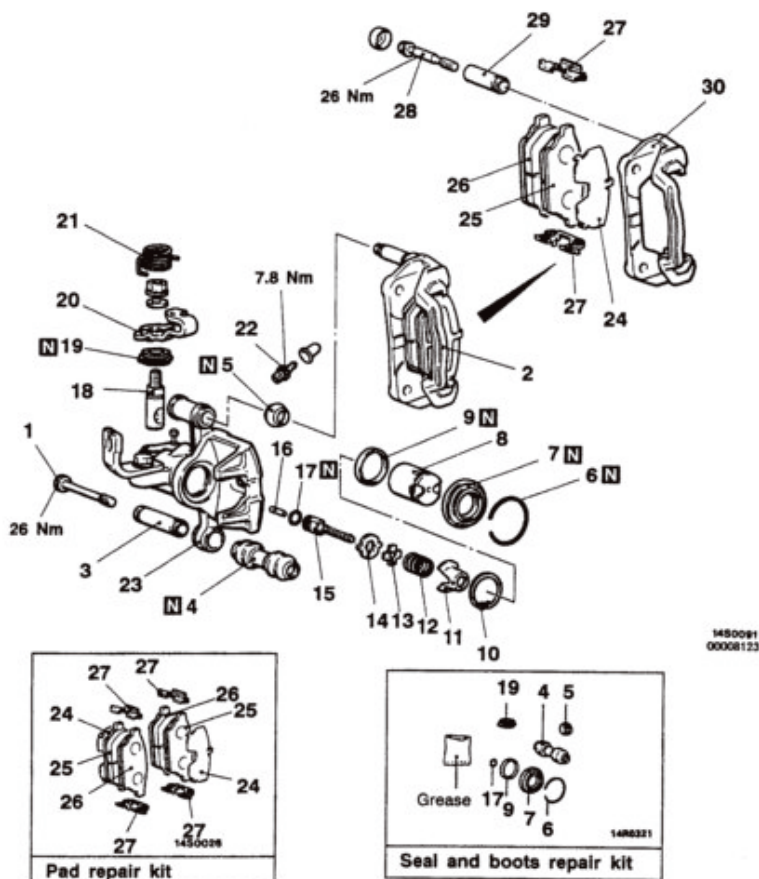
1. Guide pin
2. Lock pin
3. Bushing
4. Caliper support (pad, clip, shim)
5. Boot
6. Boot ring
7. Piston boot



8. Piston
9. Piston seal
10. Caliper body
11. Pad and wear indicator assembly
12. Pad assembly
13. Outer shim
14. Clip



<Rear disc brake>

**Disassembly steps**

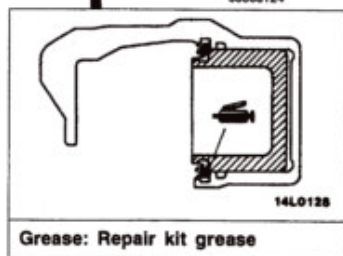
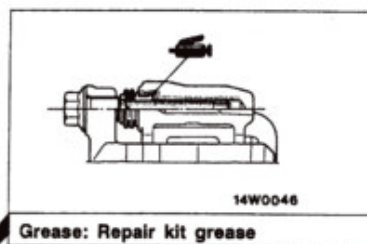
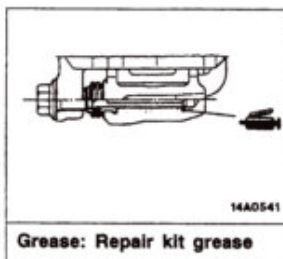
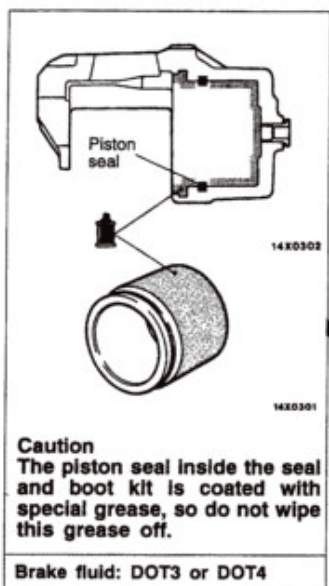
1. Lock pin
2. Caliper support (pad, clip, shim)
3. Lock pin sleeve
4. Lock pin boot
5. Guide pin boot
6. Boot ring
7. Piston boot
8. Piston assembly
9. Piston seal
10. Snap ring
11. Spring case
12. Return spring
13. Stopper plate
14. Stopper
15. Adjuster spindle

16. Connecting link
17. O-ring
18. Spindle lever
19. Lever boot
20. Parking brake lever
21. Return spring
22. Bleeder screw
23. Caliper body
24. Outer shim
25. Pad assembly
26. Pad and wear indicator assembly
27. Clip
28. Guide pin
29. Guide pin sleeve
30. Support mounting

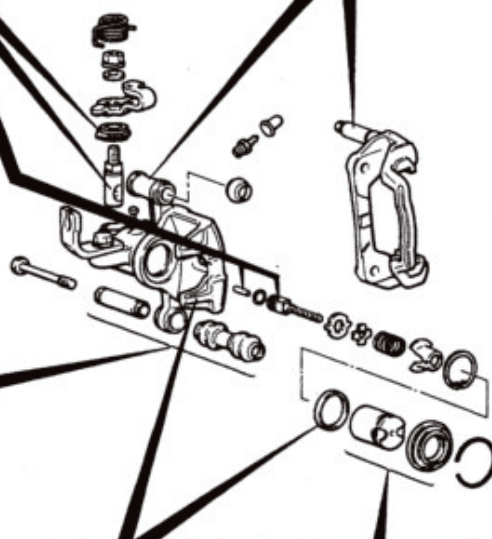
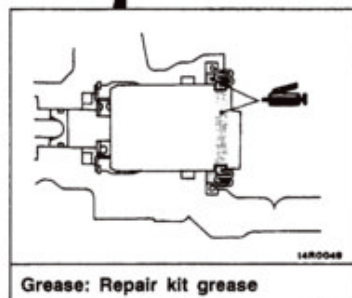
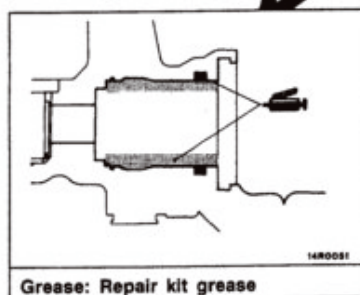
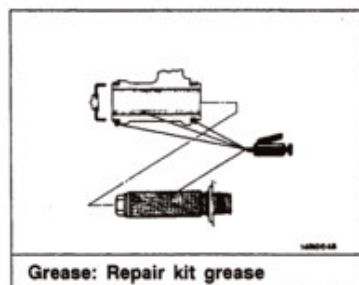
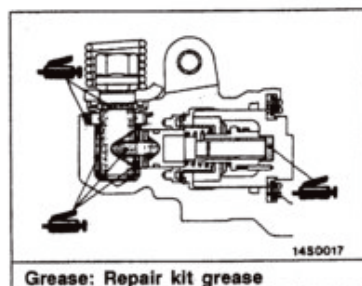


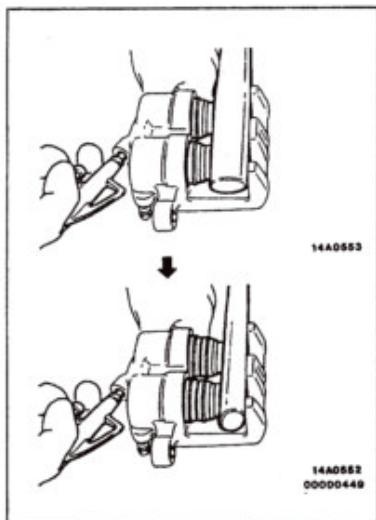
LUBRICATION POINTS

<Front disc brake>



<Rear disc brake>



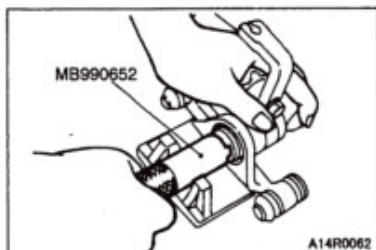
**DISASSEMBLY SERVICE POINTS****◀A▶ PISTON BOOT/PISTON REMOVAL <FRONT DISC BRAKE>**

Pump in compressed air through the brake hose installation hole and remove the pistons and piston boot.

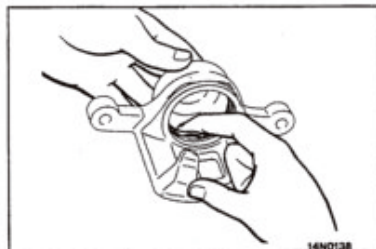
Caution

When removing the pistons, be sure to use the handle of a plastic hammer and adjust the height of the two pistons while pumping in air slowly so that the pistons protrude evenly.

Do not remove one piston completely before trying to remove the other piston because it will become impossible to remove the second piston.

**◀B▶ Using the special tool, turn the piston to remove it from the caliper body.**

Using the special tool, turn the piston to remove it from the caliper body.

**◀C▶ PISTON SEAL REMOVAL**

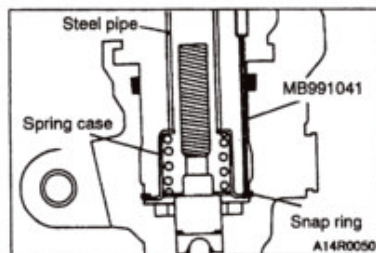
1. Remove piston seal with finger tip.

Caution

Do not use a flat-tipped screwdriver or other tool to prevent damage to inner cylinder.

2. Clean piston surface and cylinder inner surface with trichloroethylene, alcohol or specified brake fluid.

Specified brake fluid: DOT3 or DOT4

**◀D▶ SNAP RING REMOVAL**

Use a steel pipe (approx. diameter of 19 mm) to press down the spring case. Then use the special tool to remove the snap ring.

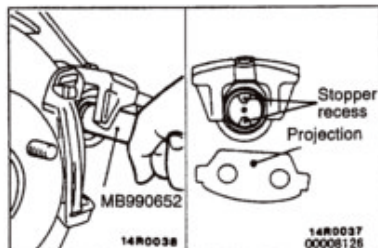
REASSEMBLY SERVICE POINT

▶A◀ SNAP RING INSTALLATION

Use a steel pipe (approx. diameter of 19 mm) to install the snap ring in the same manner as removal.

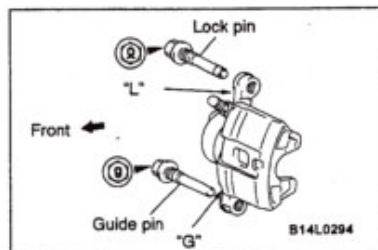
Caution

Assemble the snap ring so that the snap ring open end may face the bleeder.



▶B◀ PISTON ASSEMBLY INSTALLATION

Use the special tool to screw in the piston gradually. Make sure that the stopper recess of the piston is aligned with the projection on the back of the pad.



▶C◀ LOCK PIN/GUIDE PIN INSTALLATION <FRONT DISC BRAKE>

Install the guide pin and lock pin as illustrated that each head mark of the guide pin and the lock pin matches the indication mark ("G" or "L") located on the caliper body.

INSPECTION

PAD WEAR CHECK

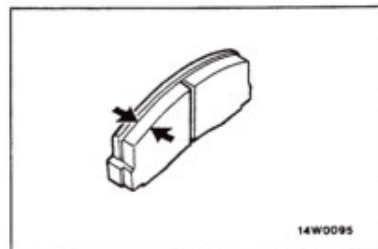
Measure the pad thickness at the thinnest and worn area of the part. Replace the pad assembly if the pad thickness is less than the limit value.

Standard value: 10.0 mm <Front>, 9.5 mm <Rear>

Limit: 2.0 mm

Caution

1. When replacing the brake pads, replace the right and left brake pads, and also replace the brake pads for the wheel on the opposite side at the same time.
2. If there is a significant difference in the thickness of the brake pads on the right and left wheels, check the sliding portions of the caliper.



ANTI-SKID BRAKING SYSTEM (ABS)

CONTENTS

SERVICE SPECIFICATIONS	3
SPECIAL TOOLS	3
TROUBLESHOOTING	4
ON-VEHICLE SERVICE	22

Brake Pedal Check and Adjustment	Refer to GROUP 35A
Brake Booster Operating Test	22
Check Valve Operation Check	Refer to GROUP 35A

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module and clock spring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

Proportioning Valve Function Test Refer to GROUP 35A	Master Cylinder 31
Bleeding 24	FRONT DISC BRAKE Refer to GROUP 35A
Front Disc Brake Pad Check and Replacement Refer to GROUP 35A	REAR DISC BRAKE Refer to GROUP 35A
Brake Disc Check Refer to GROUP 35A	PROPORTIONING VALVE Refer to GROUP 35A
Wheel Speed Sensor Output Voltage Check 25	HYDRAULIC UNIT 33
Hydraulic Unit Check 26	WHEEL SPEED SENSOR 35
Motor Relay Continuity Check 28	ABS-ECU* 38
Valve Relay Continuity Check 28	
Remedy for a Flat Battery 28	
BRAKE PEDAL Refer to GROUP 35A	
MASTER CYLINDER AND BRAKE BOOSTER 29	

SERVICE SPECIFICATIONS

Items		Standard value
Brake fluid pressure when the brake booster is not working kPa	Pedal depressing force 98 N	49 or more
	Pedal depressing force 294 N	1,177 or more
Brake fluid pressure when the brake booster is working kPa	Pedal depressing force 98 N	2.9 - 4.4
	Pedal depressing force 294 N	6.9 - 10.3
Clearance between brake booster push rod and primary piston mm		0.40 - 0.60
Hydraulic unit solenoid valve resistance Ω		2.96 - 3.20
Clearance between speed sensor and ABS rotor (rear) mm	Rear	0.3 - 0.9
Wheel speed sensor internal resistance k Ω		1.4 - 2.2
Wheel speed sensor insulation resistance k Ω		100 or more

SPECIAL TOOLS

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	For checking of ABS (Diagnosis code display when using the MUT-II)
	MB991529	Diagnosis code check harness	For checking of ABS (Diagnosis code display when using the ABS warning lamp)

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

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

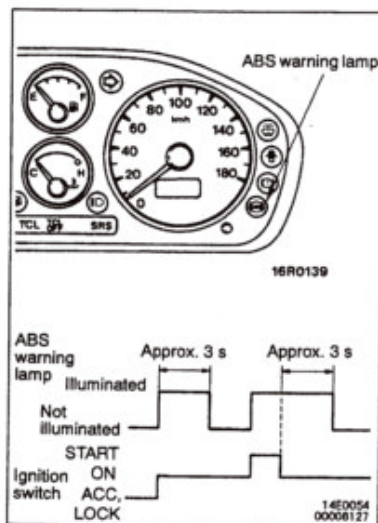
NOTES WITH REGARD TO DIAGNOSIS

The phenomena listed in the following table are not abnormal.

Phenomenon	Explanation of phenomenon
System check sound	When starting the engine, a thudding sound can sometimes be heard coming from inside the engine compartment, but this is because the system operation check is being performed, and is not an abnormality.
ABS operation sound	1. Sound of the motor inside the ABS hydraulic unit operation. (whine) 2. Sound is the generated along with vibration of the brake pedal. (scraping) 3. When ABS operates, sound is generated from the vehicle chassis due to repeated brake application and release. (Thump: suspension; squeak: tyres)
ABS operation (Long braking distance)	For road surfaces such as snow-covered roads and gravel roads, the braking distance for vehicles with ABS can sometimes be longer than that for other vehicles. Accordingly, advise the customer to drive safely on such roads by lowering the vehicle speed and not being too overconfident.

Diagnosis detection condition can vary depending on the diagnosis code.

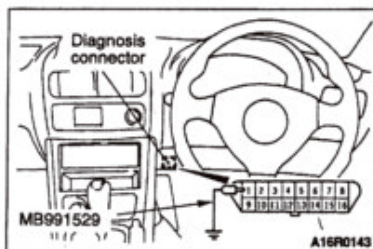
Make sure that checking requirements listed in the comment column are satisfied when checking the trouble symptom again.



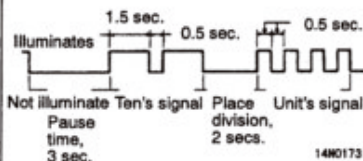
ABS WARNING LAMP INSPECTION

Check that the ABS warning lamp illuminates as follows.

1. When the ignition key is turned to "ON", the ABS warning lamp illuminates for approximately 3 seconds and then switches off.
2. When the ignition key is turned to "START", the ABS warning lamp remains illuminated.
3. When the ignition key is turned from "START" back to "ON", the ABS warning lamp illuminates for approximately 3 seconds and then switches off.
4. If the illumination is other than the above, check the diagnosis codes.



When the diagnosis code No.24 is output



When the no diagnosis code is output



DIAGNOSIS FUNCTION

HOW TO READ THE DIAGNOSIS CODE

When using the MUT-II

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

When using the ABS warning lamp

1. Turn the ignition switch to OFF, and disconnect the valve relay connector.
2. Use the special tool to connect the diagnosis connector terminal No.1 to the earth.
3. Turn the ignition switch to ON and read out a diagnosis code by observing how the warning lamp flashes.

NOTE

An actual diagnosis code and code No.52 indicating the valve relay fault (open and short circuits) are displayed as the valve relay connector is disconnected.

4. After repairing the actual fault, disconnect the diagnosis code check harness and connect the valve relay connector, and turn the ignition switch to ON again. Follow "ABS WARNING LAMP INSPECTION" on page 35B-4. If a trouble is found out in the inspection process, the valve relay system may be defective. (Refer to P.35B-28.)

HOW TO ERASE THE DIAGNOSIS CODE

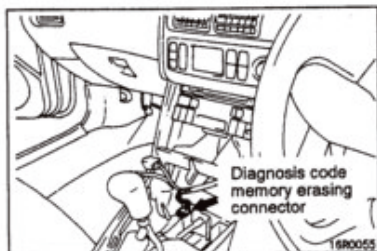
When using the MUT-II

1. Use the MUT-II to erase the memory. (For details, refer to MUT-II Reference Manual.)

NOTE

Once the memory has been erased, the diagnosis system can not accept the MUT-II. To confirm a diagnosis code, stop the engine and start it, and then operate the MUT-II again.

2. Check the diagnosis code and confirm that the memory is erased.

**When not using the MUT-II**

1. Connect the two terminals of the diagnosis code memory erasing connector (2-pin connector in the illustration at the left) each other, and turn the ignition switch to ON. At this time, the valve relay is turned off and the ABS warning lamp illuminates.
2. After approx. seven seconds have passed, turn the ignition switch to OFF.
3. Disconnect the two terminals of the diagnosis code memory erasing connector, and turn the ignition switch to ON. This operation erases the diagnosis code memory completely.

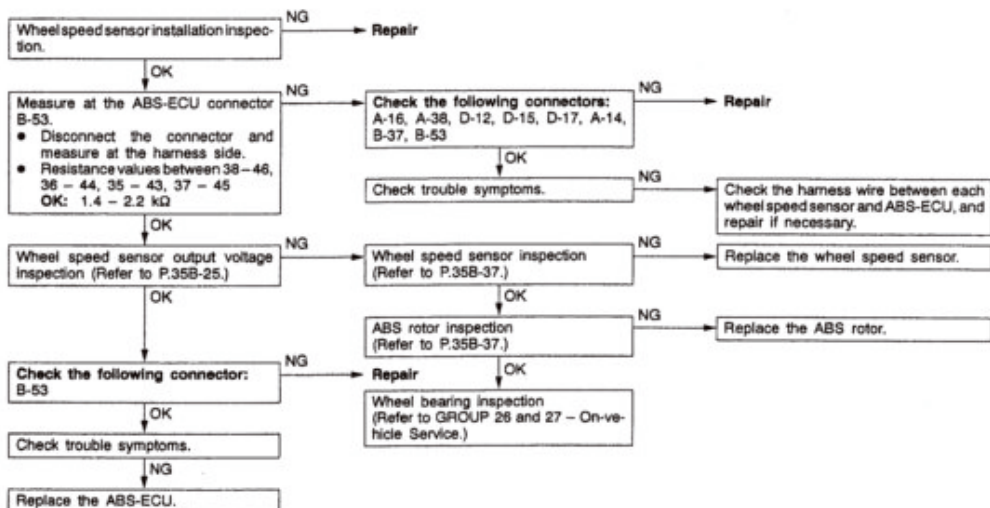
INSPECTION CHART FOR DIAGNOSIS CODES

Inspect according to the inspection chart that is appropriate for the diagnosis code.

Diagnosis code No.	Inspection item	Diagnosis content	Reference page
11	Front right wheel speed sensor	Open circuit	35B-8
12	Front left wheel speed sensor		
13	Rear right wheel speed sensor		
14	Rear left wheel speed sensor		
16	Power supply system (low battery voltage)		35B-9
21	Front right wheel speed sensor	Short circuit	35B-8
22	Front left wheel speed sensor		
23	Rear right wheel speed sensor		
24	Rear left wheel speed sensor		
31	Front right speed sensor ABS rotor (defective teeth)		35B-9
32	Front left speed sensor ABS rotor (defective teeth)		
33	Rear right speed sensor ABS rotor (defective teeth)		
34	Rear left speed sensor ABS rotor (defective teeth)		
41	Front right solenoid valve		35B-10
42	Front left solenoid valve		
43	Rear right solenoid valve		
44	Rear left solenoid valve		
51	Valve relay problem (stays on)		35B-10
52	Valve relay problem (stays off)		35B-11
53	Motor relay problem (stays off)		35B-12
54	Motor relay problem (stays on)		35B-13
55	Motor system (seized pump motor)		35B-13
63	ABS-ECU		35B-26 (Replace the hydraulic unit.)

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code Nos. 11, 12, 13, 14 Wheel speed sensor open circuit	Probable cause
Code Nos. 21, 22, 23, 24 Wheel speed sensor short circuit	
Code Nos. 11, 12, 13, 14 are output when the ABS-ECU detects an open circuit in at least one of the four wheel-speed sensors.	• Malfunction of wheel speed sensor • Malfunction of wiring harness or connector • Malfunction of ABS-ECU
Code Nos. 21, 22, 23, 24 are output under the following case: • When an open circuit cannot be found, but more than one wheel speed sensor does not output any signal during driving at 10 km/h or higher.	• Malfunction of wheel speed sensor • Malfunction of ABS rotor • Malfunction of wheel bearing • Malfunction of wiring harness or connector • Malfunction of ABS-ECU • Excessive gap between ABS rotor and wheel speed sensor

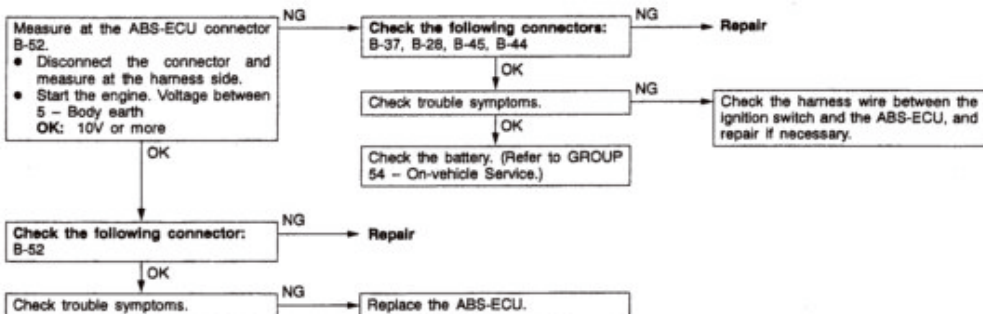


Code No. 16 Power supply system (low battery voltage)	Probable cause
The voltage of the ABS-ECU power supply drops lower than the specified value. If the voltage returns to the specified value, this code is no longer output.	• Malfunction of wiring harness or connector. • Malfunction of ABS-ECU • Malfunction of battery

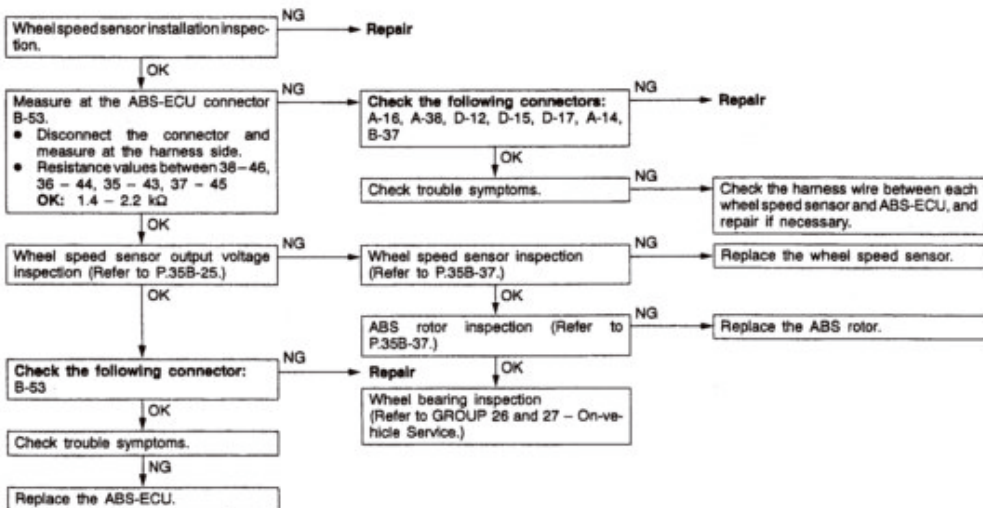
Caution

If battery voltage drops during inspection, this code will be output as well. If the voltage returns to standard value, this code is no longer output.

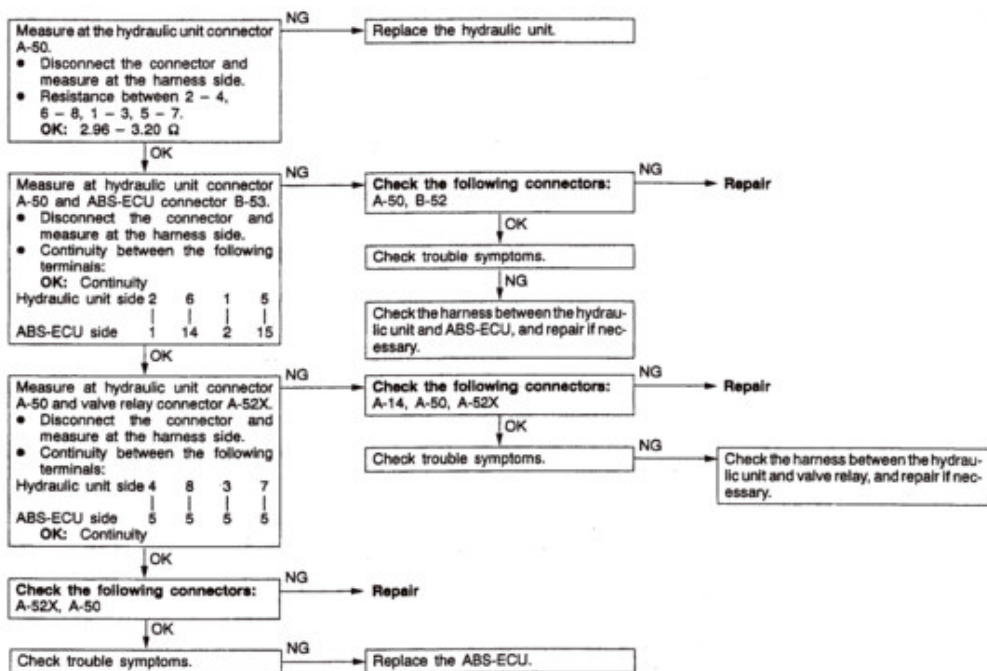
Before carrying out the following inspection, check the battery level, and refill it if necessary.



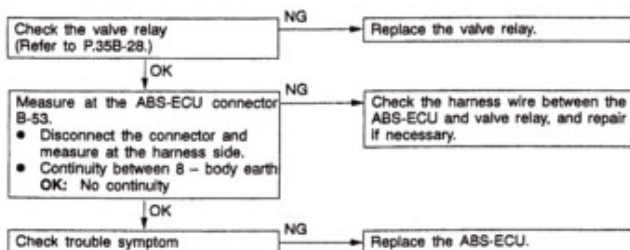
Code Nos. 31, 32, 33, 34 Speed sensor ABS rotor (defective teeth)	Probable cause
These diagnosis codes are displayed when the system detects partial or complete missing of the ABS rotor teeth, or the anti-lock control is continuously on due to a defective sensor or deformed ABS rotor.	• Malfunction of wheel speed sensor • Malfunction of ABS rotor • Malfunction of wheel bearing • Malfunction of wiring harness or connector • Malfunction of ABS-ECU



Code Nos.41, 42, 43, 44 Solenoid valve	Probable cause
The ABS-ECU always monitors the solenoid valve drive circuit. It determines that there is an open or short-circuit in the solenoid coil or in a harness. When no current flows in the solenoid even though the ABS-ECU turns on it, and vice versa.	- Malfunction of wiring harness - Malfunction of hydraulic unit - Malfunction of ABS-ECU



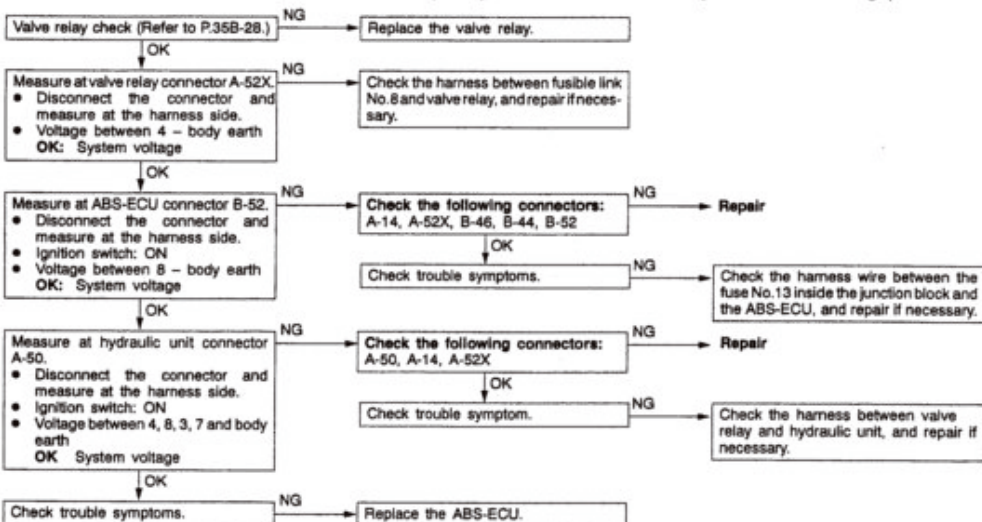
Code No. 51 Valve relay problem (stays on)	Probable cause
If the solenoid valve is energized when the valve relay is turned off due to the initial check (ignition switch: ON), the ABS-ECU judges the relay contact welding or short in the valve relay drive circuit and sends this diagnosis code.	- Malfunction of ABS valve relay - Malfunction of harness or connector - Malfunction of ABS-ECU



Code No.52 Valve relay problem (stays off)	Probable cause
If the solenoid valve is not energized when the valve relay is turned on due to the initial check (ignition switch: ON), the ABS-ECU judges that the relay stays off and sends this diagnosis code.	- Malfunction of valve relay - Malfunction of wiring harness or connector - Malfunction of ABS-ECU

NOTE

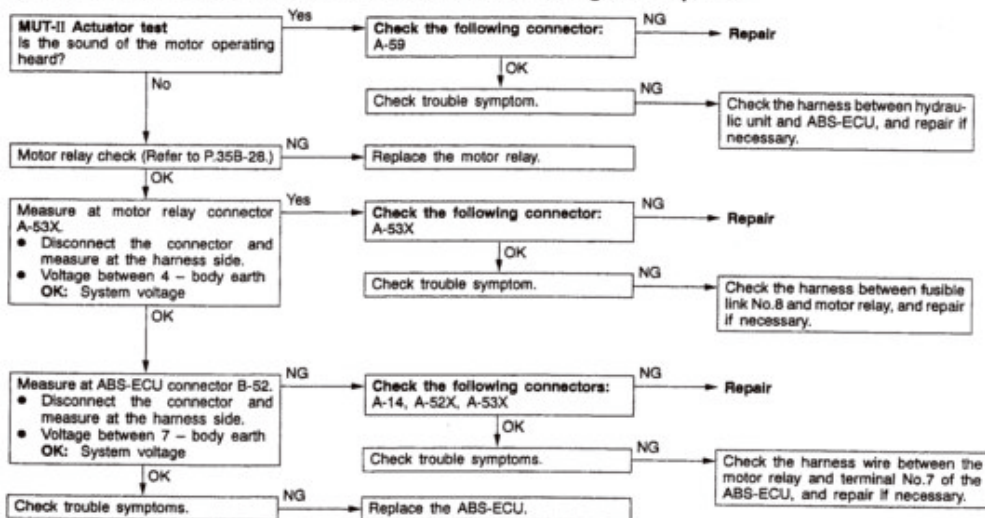
Whenever reading the diagnosis codes using the ABS warning lamp (refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points), this diagnosis code will be output. That is not a malfunction but because the valve relay connector is disconnected. After repairing all other malfunctions, connect the valve relay connector again to check the valve relay. Then check that the ABS warning lamp does not illuminate. If it illuminates, the valve relay may be defective. So carry out the following procedure.



Code No.53 Motor relay problem (stays off)	Probable cause
This code is displayed when the motor monitor terminal voltage is low with the motor relay on.	• Malfunction of motor relay • Malfunction of wiring harness or connector • Malfunction of ABS-ECU

Caution

Because force-driving of the motor by means of the actuator test will drain the battery, the engine should be started and left to run for a while after testing is completed.



Code No.54 Motor relay problem (stays on)

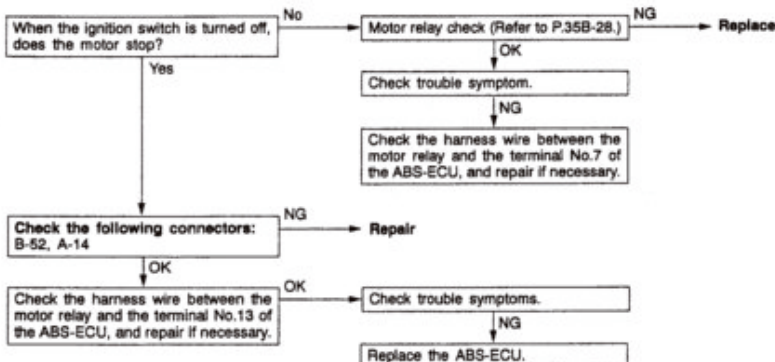
This diagnosis code is displayed as defects such as the motor relay contact welding when the motor monitor remains on even though the ABS-ECU attempts to turn off the pump motor.

Probable cause

- Malfunction of motor relay
- Malfunction of harness or connector
- Malfunction of hydraulic unit
- Malfunction of ABS-ECU

Caution

If there is a melted contact in the motor relay, the motor will keep running, even if the ignition switch is turned off. In this case, immediately remove the fusible link No.8, or disconnect the hydraulic unit connector A-60 or motor relay connector A-62X. Excessive running of the motor will waste battery.

**Code No.55 Motor system (seized pump motor)**

ABS-ECU drives the motor after an initial check. If ABS-ECU detects an abnormal motor operation, the ABS-ECU tries to drive the motor again when the vehicle speed reaches 10 km/h. If the ABS-ECU detects a defective motor operation again at this time, this code is displayed.

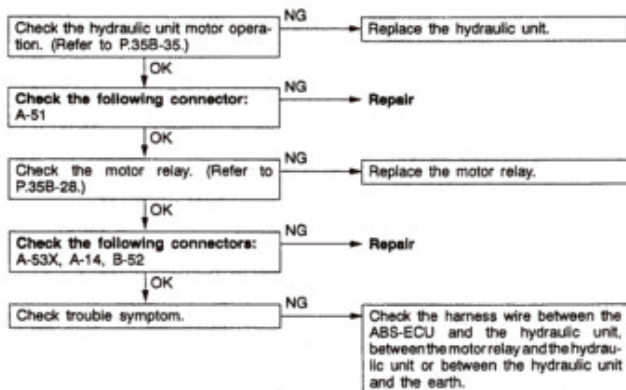
Probable cause

- Malfunction of harness or connector
- Malfunction of hydraulic unit

Caution

If the battery is weak, the ABS-ECU cancels driving the motor. Prior to this check, confirm that the battery is well charged.

Carry out the motor drive check during the vehicle is stopped.



INSPECTION CHART FOR TROUBLE SYMPTOMS

Get an understanding of the trouble symptoms and check according to the inspection procedure chart.

Trouble symptoms		Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	Communication with all systems is not possible.	1	35B-15
	Communication with ABS only is not possible.	2	35B-16
When the ignition key is turned to "ON" (engine stopped), the ABS warning lamp does not illuminate.		3	35B-17
After the engine starts, the ABS warning lamp remains illuminated.		4	35B-17
When the ignition key is turned to "START", the ABS warning lamp does not illuminate.		5	35B-18
After the ignition key is turned to "ON", the ABS warning lamp blinks twice, and when turned to "START", it illuminates. When returned to "ON", the lamp flashes once, and then switches off.		6	35B-18
Brake operation is abnormal		7	35B-19

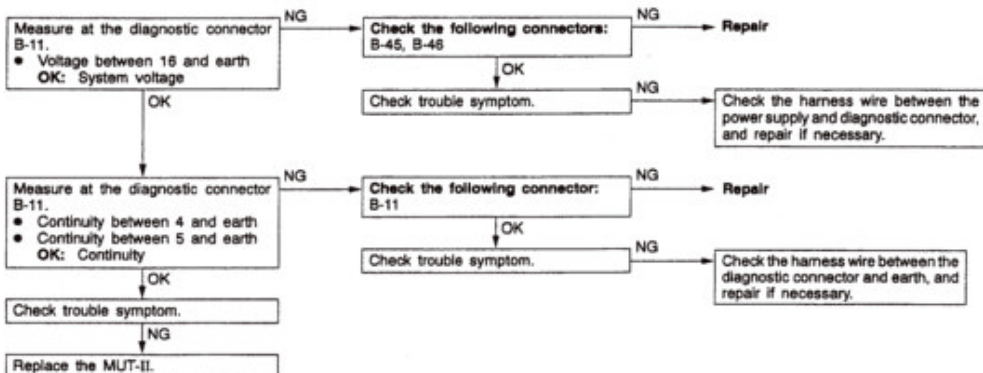
Caution

1. If steering movements are made when driving at high speed, or when driving on road surfaces with low frictional resistance, or when passing over bumps, the ABS may operate even though sudden braking is not being applied. Because of this, when getting information from the customer, check if the problem occurred while driving under such conditions as these.
2. During ABS operation, the brake pedal may vibrate or may not be able to be depressed. Such phenomena are due to intermittent changes in hydraulic pressure inside the brake line to prevent the wheels from locking and is not an abnormality.

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

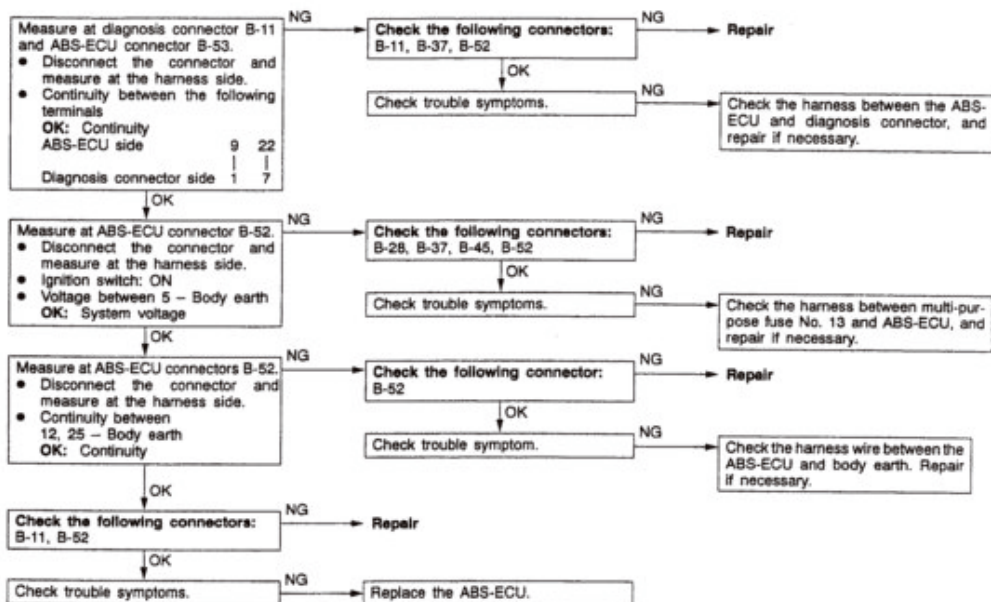
Inspection Procedure 1

Communication with MUT-II is not possible. (Communication with all systems is not possible.)	Probable cause
The cause is probably a defect in the power supply system (including earth) for the diagnosis line.	- Malfunction of the diagnosis connector - Malfunction of the harness wire



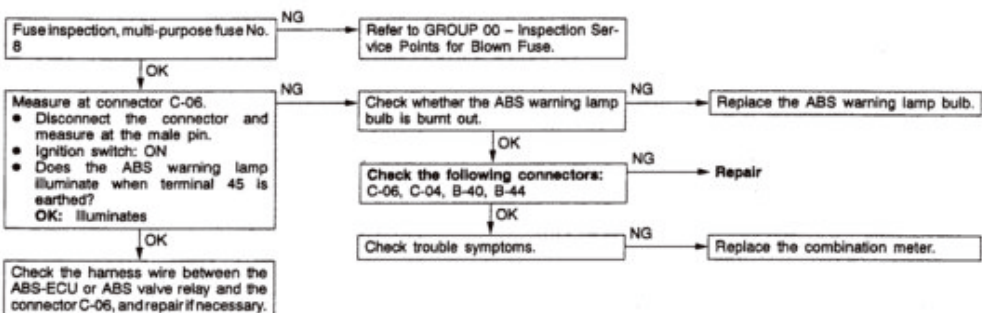
Inspection Procedure 2

Communication with MUT-II is not possible. (Communication with ABS only is not possible.)	Probable cause
When communication with the MUT-II is not possible, the cause is probably an open circuit in the ABS-ECU power circuit or an open circuit in the diagnosis output circuit.	- Blown fuse - Malfuction of wiring harness or connector - Malfuction of ABS-ECU



Inspection Procedure 3

When ignition key is turned to "ON" (engine stopped), ABS warning lamp does not illuminate.	Probable cause
When the ABS-ECU is energized, the valve relay is turned from off to on, off and on again as an initial check. Therefore, if the warning lamp is not illuminated, the following causes may be suspected: open circuit in the warning lamp power supply circuit, blown lamp bulb, open circuits in both the warning lamp-to-the ABS-ECU and the warning lamp-to-the valve relay.	- Blown fuse - Burnt out ABS warning lamp bulb - Malfunction of wiring harness or connector

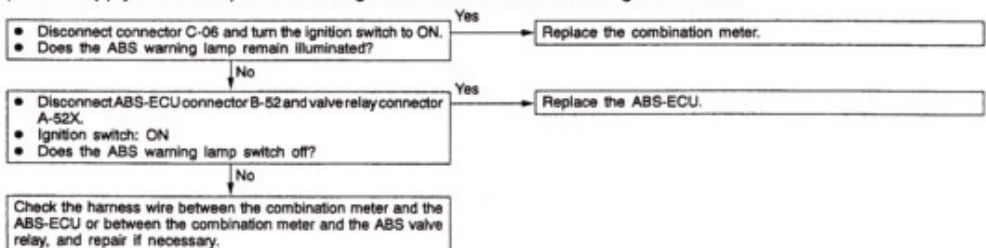


Inspection Procedure 4

Even after the engine is started, the ABS warning lamp remains illuminated.	Probable cause
The cause is probably a short-circuit in the ABS warning lamp illumination circuit.	- Malfunction of combination meter - Malfunction of ABS-ECU - Malfunction of wiring harness

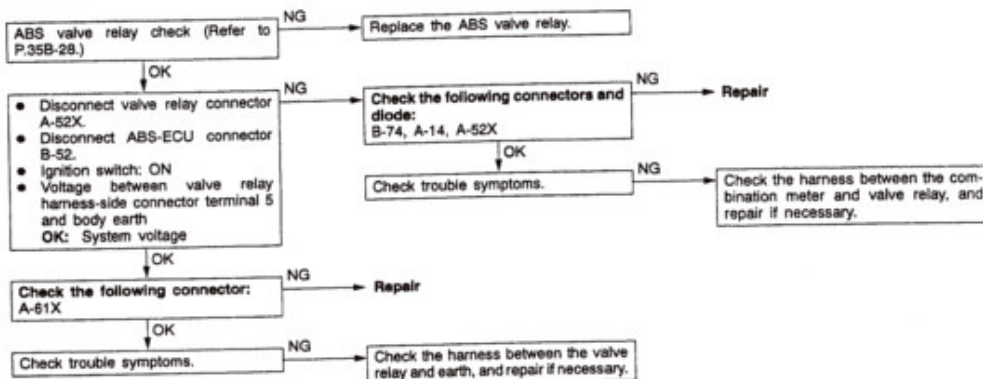
NOTE

This trouble symptom is limited to cases where communication with the MUT-II is possible (ABS-ECU power supply is normal) and the diagnosis code is a normal diagnosis code.



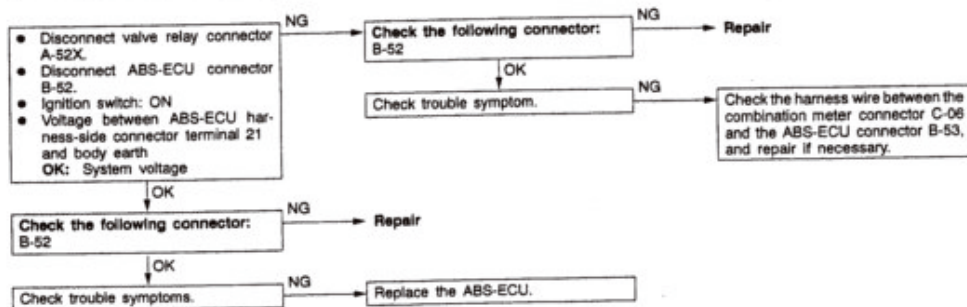
Inspection Procedure 5

When the ignition key is turned to "START", the ABS warning lamp does not illuminate.	Probable cause
Current does not flow in the ABS-ECU when the ignition switch is turned to "START". Current flows in the ABS warning lamp even when the ignition switch is turned to "START". Therefore, the valve relay, which current is supplied through the ABS-ECU, turns off when the ignition switch is at "START". However, the warning lamp circuit of the valve relay must turn on in turn. So the cause must be a defective circuit on valve relay side.	• Malfunction of wiring harness or connector • Malfunction of valve relay



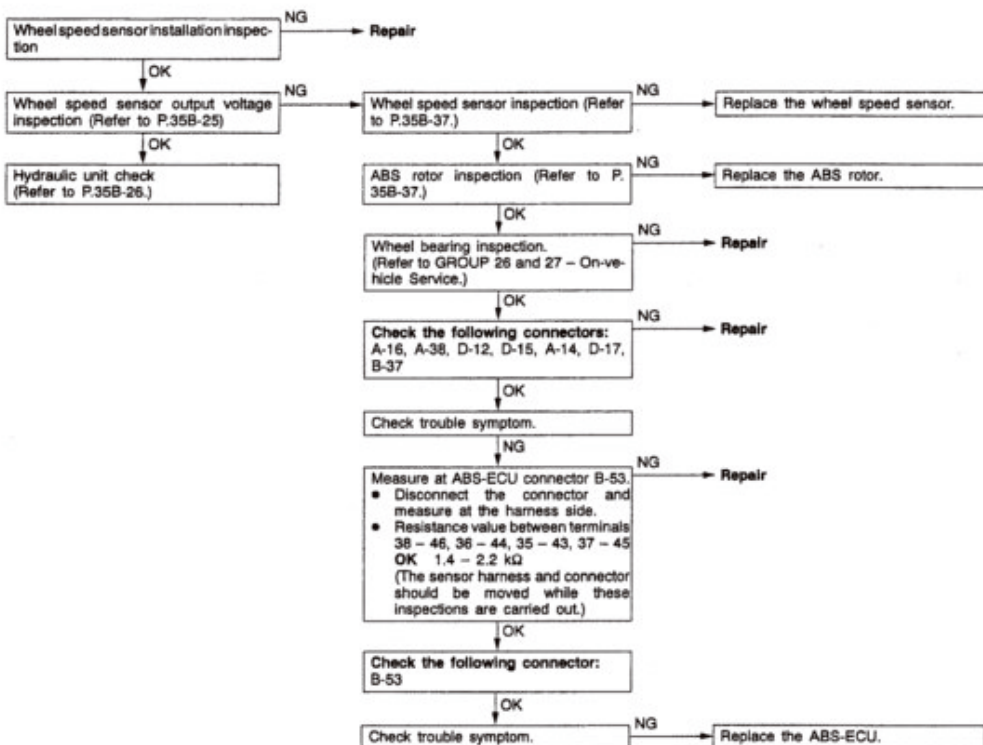
Inspection Procedure 6

After the ignition key is turned to "ON", the ABS warning lamp blinks twice, and when turned to "START", it illuminates. When returned to "ON", the lamp flashes once, and then switches off.	Probable cause
The ABS-ECU causes the ABS warning lamp to illuminate during the initial check (approx. 3 seconds). During the initial check, the valve relay turns from off to on, off and back to on again. If there is an open circuit in the harness between the ABS-ECU and the ABS warning lamp, the lamp will illuminate only when the valve relay is OFF during valve relay test, etc.	• Malfunction of wiring harness or connector • Malfunction of ABS-ECU



Inspection Procedure 7

Brake operation is abnormal.	Probable cause
This varies depending on the driving conditions and the road surface conditions, so problem diagnosis is difficult. However, if a normal diagnosis code is displayed, carry out the following inspection.	- Improper installation of wheel speed sensor - Incorrect sensor harness contact - Foreign material adhering to wheel speed sensor - Malfunction of wheel speed sensor - Malfunction of ABS rotor - Malfunction of wheel bearing - Malfunction of hydraulic unit - Malfunction of ABS-ECU



DATA LIST REFERENCE TABLE

The following items can be read by the MUT-II from the ABS-ECU input data.

1. When the system is normal

Item No.	Check item	Checking requirements	Normal value
11	Front-right wheel speed sensor	Perform a test run	Vehicle speeds displayed on the speedometer and MUT-II are identical.
12	Front-left wheel speed sensor		
13	Rear-right wheel speed sensor		
14	Rear-left wheel speed sensor		
16	ABS-ECU power supply voltage	Ignition switch power supply voltage and valve monitor voltage	9-16 V
33	Stop lamp switch	Depress the brake pedal.	ON
		Release the brake pedal.	OFF

2. When the ABS-ECU shut off ABS operation.

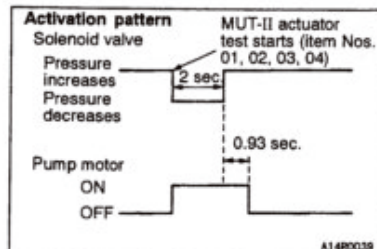
When the diagnosis system stops the ABS-ECU, the MUT-II display data will be unreliable.

ACTUATOR TEST REFERENCE TABLE

The MUT-II activates the following actuators for testing.

NOTE

1. If the ABS-ECU runs down, actuator testing cannot be carried out.
2. Actuator testing is only possible when the vehicle is stationary. If the vehicle speed during actuator testing exceeds 10 km/h, forced actuation will be canceled.



ACTUATOR TEST SPECIFICATIONS

No.	Item	
01	Solenoid valve for front-left wheel	Solenoid valves and pump motors in the hydraulic unit (simple inspection mode)
02	Solenoid valve for front-right wheel	
03	Solenoid valve for rear-left wheel	
04	Solenoid valve for rear-right wheel	

CHECK AT ABS-ECU

TERMINAL VOLTAGE

1. Measure the voltages between terminals (15) and (25) (earth terminals) and each respective terminal.
2. The terminal layouts are shown in the illustrations below.



14000300

Connector terminal No.	Signal	Checking requirements		Normal condition
1	Output to front-left solenoid valve	Ignition switch: ON (One second has passed after engine stated.)		System voltage
2	Output to rear-left solenoid valve			
5	ABS-ECU power supply	Ignition switch: ON		System voltage
		Ignition switch: START		0 V
7	Output to motor relay	Ignition switch: ON (One second has passed after engine stated.)	Motor is on.	2 V or less
			Motor is off.	System voltage
8	Output to valve relay	Ignition switch: ON	The relay is on. (One second has passed after engine stated.)	0 – 2 V
			The relay is off. The system runs down.	System voltage
9	Diagnosis code output	Connect the MUT-II.		0 V
		Do not connect the MUT-II.		Approx. 12 V
10	Diagnosis code erasing output	Do not connect the MUT-II.		0 or 12 V (alternates at intervals of 0.5 sec.)
11	Input from stop lamp switch	Ignition switch: ON	Stop lamp switch ON	System voltage
			Stop lamp switch OFF	0 V or less
13	Motor monitor	Ignition switch: ON (One second has passed after engine stated.)	Motor is on.	System voltage
			Motor is off.	0.5V or less
14	Output to front-right solenoid valve	Ignition switch: ON (One second has passed after engine stated.)		System voltage
15	Output to rear-left solenoid valve	Ignition switch: ON (One second has passed after engine stated.)		System voltage
21	Output to ABS warning lamp	Ignition switch: ON	The lamp is switched off.	System voltage
			The lamp is illuminated.	0 – 3 V
22	Input/output from/to MUT-II	Connect the MUT-II.		Serial communication with MUT-II
		Do not connect the MUT-II.		1 V or less

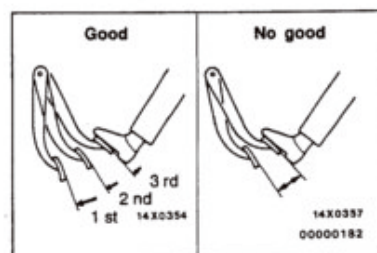
RESISTANCE AND CONTINUITY BETWEEN HARNESS-SIDE CONNECTOR TERMINALS

1. Turn the ignition switch off and disconnect the ABS-ECU connectors before checking resistance and continuity.
2. Check them between the terminals indicated in the table below.
3. The terminal layouts are shown in the illustration below.



1400038

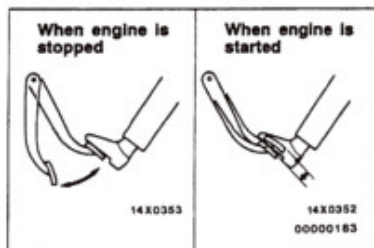
Connector terminal No.	Signal	Normal condition
1 – Body earth	Hydraulic unit solenoid valve (front left)	2.96 – 3.20 Ω
2 – Body earth	Hydraulic unit solenoid valve (rear left)	2.96 – 3.20 Ω
12 – Body earth	ABS-ECU earth	Continuity
13 – Body earth	ABS motor monitor	Continuity
14 – Body earth	Hydraulic unit solenoid valve (front right)	2.96 – 3.20 Ω
15 – Body earth	Hydraulic unit solenoid valve (rear right)	2.96 – 3.20 Ω
25 – Body earth	ABS-ECU earth	Continuity
35-43	Rear-left wheel speed sensor	1.4 – 2.2 k Ω
36-44	Front-right wheel speed sensor	1.4 – 2.2 k Ω
37-45	Rear-right wheel speed sensor	1.4 – 2.2 k Ω
38-46	Front-left wheel speed sensor	1.4 – 2.2 k Ω

**ON-VEHICLE SERVICE****BRAKE BOOSTER OPERATING TEST**

For simple checking of the brake booster operation, carry out the following tests:

1. Run the engine for one or two minutes, and then stop it.

If the pedal depresses fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly, if the pedal height remains unchanged, the booster is defective.



2. With the engine stopped, depress the brake pedal several times.

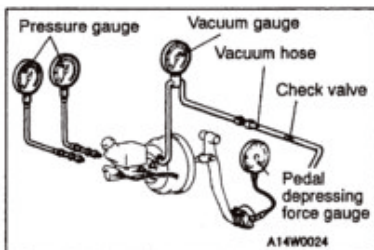
Then depress the brake pedal and start the engine. If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is defective.

3. With the engine running, depress the brake pedal and then stop the engine.

If the pedal height does not change for 30 seconds, the booster is in good condition, if the pedal rises, the booster is defective.

If the above three tests are okay, the booster performance can be determined as good.

If one of the above three tests is not okay at last, the check valve, vacuum hose, or booster will be defective.



Checking procedure by using a simple tester

1. Check the operation of the check valve prior to this inspection. (Refer to GROUP 35A – On-vehicle Service.)
2. Disconnect the vacuum hose from the brake booster, and connect it to the vacuum gauge. Connect other vacuum hoses (integrating no check valve) to the vacuum gauge and brake booster. Connect the vacuum gauge and pedal depressing force gauge as shown in the figure. Bleed the air in the pressure gauge, and then carry out the test as follows:

- (1) Air tightness test when the brake booster is not operating

Start the engine. If the vacuum gauge reading reaches -67 kPa (500 mmHg), stop the engine. Check the vacuum gauge reading. If the vacuum drop is less than -3.3 kPa (25 mmHg) for approx. 15 seconds, the brake booster is in good condition.

- (2) Air tightness test when the brake booster is operating
- Start the engine, and depress the brake pedal with a $50 - 98$ N of depressing force. If the vacuum gauge reading reaches -67 kPa (500 mmHg), stop the engine. Check the vacuum gauge reading. If the vacuum drop is less than -3.3 kPa (25 mmHg) for approx. 15 seconds, the brake booster is in good condition.

If the brake booster does not pass either of the tests above, the brake booster and/or vacuum hose are faulty.

- (3) Characteristic test of the brake booster
- This test should be carried out after steps (1) and (2).

- a. Test when the brake booster is not operating. Confirm that the vacuum gauge indicates 0 kPa (0 mmHg) with the engine stopped, and then measure the brake fluid pressure when the brake pedal is depressed by the force of 98 N and 294 N.

Standard value:

49 kPa or more (Pedal depressing force: approx. 98N)

1,177 kPa or more (Pedal depressing force: approx. 294 N)

- b. Test when the brake booster is operating. Start the engine, and confirm that the vacuum gauge indicates -67 kPa (500 mmHg), and then measure the brake fluid pressure when the brake pedal is depressed by the force of 98 N and 294 N.

Standard value:

2.9 – 4.4 MPa

(Pedal depressing force: approx. 98 N)

6.9 – 10.3 MPa

(Pedal depressing force: approx. 294 N)

NOTE

The operation test of the brake booster is only a simple test. Therefore, if the booster is defective as an unit, always follow the bench test specified by its manufacturer.

BLEEDING

Caution

Use the specified brake fluid. Avoid using a mixture of the specified brake fluid and other fluid.

Specified brake fluid: DOT3 or DOT4

MASTER CYLINDER BLEEDING

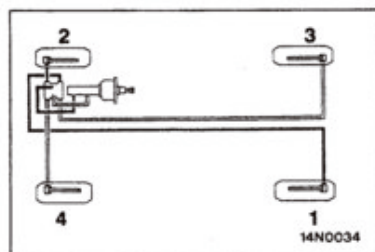
Refer to GROUP 35A — On-vehicle Service.

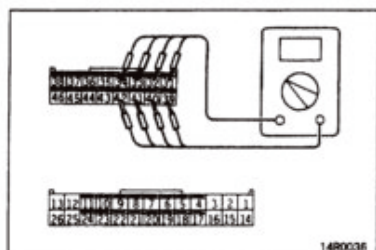
BRAKE PIPE LINE BLEEDING

Start the engine and bleed the air in the sequence shown in the figure.

Caution

Be sure to install a filter to the master cylinder reservoir tank when supplying brake fluid.





WHEEL SPEED SENSOR OUTPUT VOLTAGE CHECK

1. Lift up the vehicle and release the parking brake.
2. Disconnect the ABS-ECU connector, and measure the output voltage at the harness-side connector.

Caution

First, remove the double-lock of the ABS-ECU connector and then insert the probe from the harness side. It will cause improper contact of the connector to insert the probe from the terminal side.

3. Rotate the wheel to be measured at approximately 1/2–1 rotation per second, and check the output voltage using a circuit tester or an oscilloscope.

Wheel speed sensor	Front left	Front right	Rear left	Rear right
Terminal No.	38 46	36 44	35 43	37 45

Output voltage

When measuring with a circuit tester:
70 mV or more

When measuring with an oscilloscope:
200 mV p-p or more

4. If the output voltage is lower than the above values, the reason could be as follow:
 - Excessive clearance between speed sensor pole piece and ABS rotor
 - Faulty wheel speed sensor.
 So check and replace the wheel speed sensor.

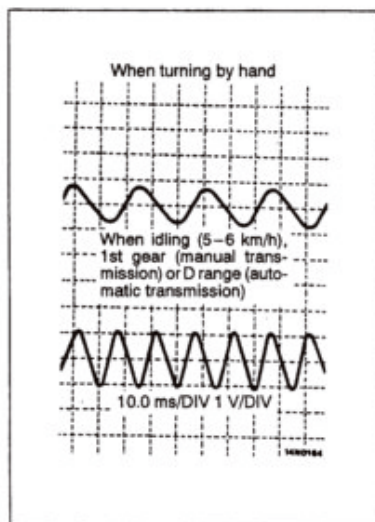
Inspecting Waveforms With An Oscilloscope

Use the following method to observe the output voltage waveform from each wheel sensor with an oscilloscope.

- Start the engine, and rotate the front wheels by engaging 1st gear (vehicles with manual transmission) or D range (vehicles with automatic transmission). Turn the rear wheels manually so that they rotate at a constant speed.

NOTE

1. Check the connection of the sensor harness and connector before using the oscilloscope.
2. The waveform measurements can also be taken while the vehicle is actually moving.
3. The output voltage will be small when the wheel speed is low, and similarly it will be large when the wheel speed is high.



Points In Waveform Measurement

Symptom	Probable causes	Remedy
Too small or zero waveform amplitude	Faulty wheel speed sensor	Replace sensor
Waveform amplitude fluctuates excessively (this is no problem if the minimum amplitude is 100 mV or more)	Axle hub eccentric or with large runout	Replace hub
	ABS-ECU earth faulty	Repair
Noisy or disturbed waveform	Open circuit in sensor	Replace sensor
	Open circuit in harness	Correct harness
	Incorrectly mounted wheel speed sensor	Mount correctly
	ABS rotor with missing or damaged teeth	Replace ABS rotor

NOTE

The wheel speed sensor cable moves following motion of the front or rear suspension. Therefore, it is likely that it has an open circuit only when driving on rough roads and it functions normally on ordinary roads. It is, therefore, recommended to observe sensor output voltage waveform also under special conditions, such as rough road driving.

HYDRAULIC UNIT CHECK

Caution

Turn the ignition switch off before connecting or disconnecting the MUT-II.

1. Jack up the vehicle and support the vehicle with rigid racks placed at the specified jack-up points or place the wheels which are checked on the rollers of the braking force tester.

Caution

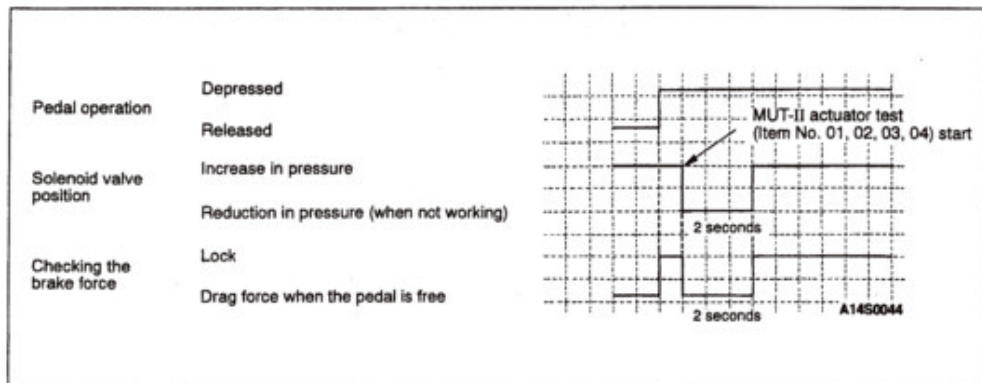
1. The roller of the braking force tester and the tyre should be dry during testing.
2. When testing the front brakes, apply the parking brake, and when testing the rear brakes, stop the front wheels by chocking them.
2. Release the parking brake, and feel the drag force (drag torque) on each road wheel. When using the braking force tester, take a reading of the brake drag force.
3. Turn the ignition key to the OFF position and set the MUT-II.
4. After checking that the shift lever <M/T> or the selector lever <A/T> is in neutral, start the engine.
5. Use the MUT-II to force-drive the actuator.

NOTE

1. During the actuator test, the ABS warning lamp will illuminate and the anti-skid control will be cancelled.
2. When the ABS has been interrupted by the fail-safe function, the MUT-II actuator testing cannot be used.
6. Turn the wheel by hand and check the change in braking force when the brake pedal is depressed. When using the braking force tester, depress the brake pedal until the braking force is at the following values, and check that the braking force decreases when the actuator is force-driven.

Front wheel	785–981 N
Rear wheel	294–490 N

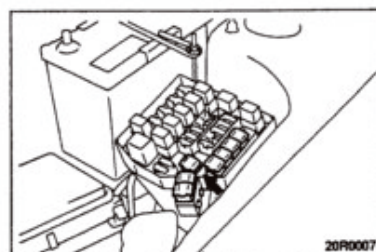
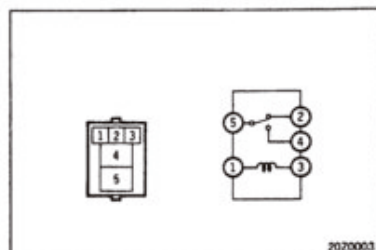
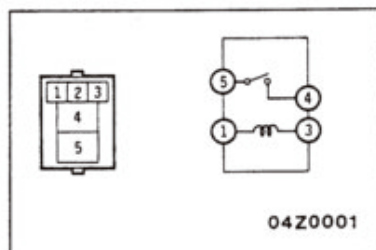
The result should be as shown in the following diagram.



7. If the result of inspection is abnormal, correct according to the "Diagnosis Table" (Refer to P.35B-27).
8. After inspection, disconnect the MUT-II immediately after turning the ignition switch to OFF.

Diagnosis Table

No.	MUT-II display	Operation	Judgement – Normal	Judgement – Abnormal	Probable cause	Remedy
01	Front right solenoid valve	(1) Depress brake pedal to lock wheel. (2) Using the MUT-II, select the wheel to be checked and force the actuator to operate. (3) Turn the selected wheel manually to check the change of brake force.	Brake force released for 2 seconds after locking.	Wheel does not lock when brake pedal is depressed.	Clogged brake line other than hydraulic unit	Check and clean brake line
02	Front left solenoid valve				Clogged hydraulic circuit in hydraulic unit	Replace hydraulic unit assembly
03	Rear right solenoid valve			Brake force is not released	Incorrect brake tube connection in hydraulic unit	Connect correctly
04	Rear left solenoid valve				Hydraulic unit solenoid valve not functioning correctly	Replace hydraulic unit assembly



MOTOR RELAY CONTINUITY CHECK

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

VALVE RELAY CONTINUITY CHECK

Battery voltage	Terminal No.				
	1	2	3	4	5
Power is not supplied	○		○		○
Power is supplied	⊖		⊕		○

REMEDY FOR A FLAT BATTERY

When booster cables are used to start the engine when the battery is completely flat and then the vehicle is immediately driven without waiting for the battery to recharge itself to some extent, the engine may misfire, and driving might not be possible.

This happens because ABS consumes a great amount of current for its self-check function; the remedy is to either allow the battery to recharge sufficiently, or to remove the fuse for ABS circuit, thus disabling the anti-skid brake system. The ABS warning lamp will illuminate when the fuse (for ABS) is removed.

After the battery has sufficiently recharged, install the fuse (for ABS) and restart the engine; then check to be sure the ABS warning lamp is not illuminated.

MASTER CYLINDER AND BRAKE BOOSTER

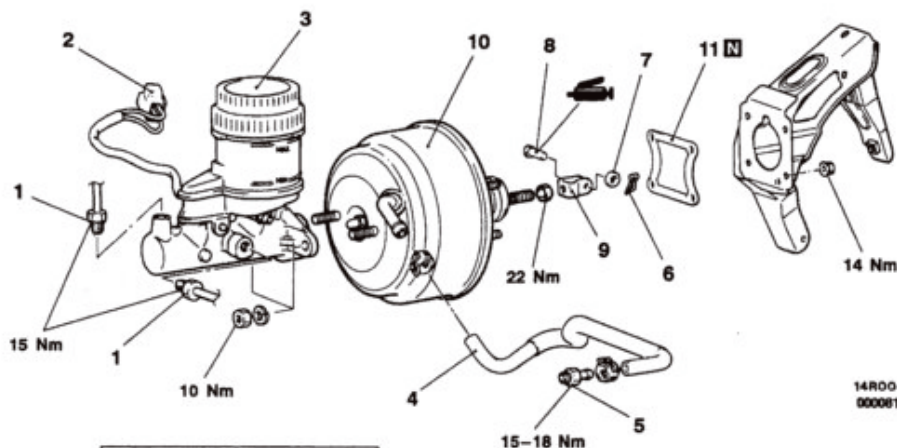
REMOVAL AND INSTALLATION

Pre-removal Operation

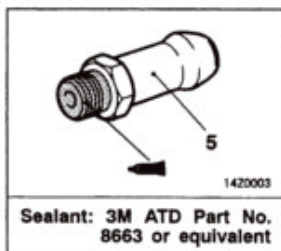
- Brake Fluid Draining
- Timing Belt Cover (Front Upper Right) Removal (Refer to GROUP 11A – Timing Belt.)
- Clutch Master Cylinder Removal (Refer to GROUP 21 – Clutch Control.) <M/T>
- Clutch Hose Bracket Removal (Refer to GROUP 21 – Clutch Control.) <M/T>

Post-installation Operation

- Clutch Hose Bracket Installation (Refer to GROUP 21 – Clutch Control.) <M/T>
- Clutch Master Cylinder Installation (Refer to GROUP 21 – Clutch Control.) <M/T>
- Timing Belt Cover (Front Upper Right) Installation (Refer to GROUP 11A – Timing Belt.)
- Brake Fluid Supplying
- Brake Line Bleeding (Refer to P.35B-24.)
- Brake Pedal Adjustment (Refer to GROUP 35A – On-vehicle Service.)



14R0046
00000131



Master cylinder removal steps

- B➤
1. Brake pipe connection
 2. Brake fluid level sensor connector
 3. Master cylinder assembly
 - Clearance adjustment between brake booster push rod and primary piston

Brake booster removal steps

- A➤
3. Master cylinder
 4. Vacuum hose
 5. Fitting
 6. Snap pin
 7. Washer
 8. Clevis pin
 9. Clevis
 10. Brake booster
 11. Sealer

INSTALLATION SERVICE POINTS

►A◀ VACUUM HOSE CONNECTION

Insert securely and completely until the vacuum hose at the engine side contacts the edge of the hexagonal part of the fitting, and then secure by using the hose clip.

►B◀ CLEARANCE ADJUSTMENT BETWEEN BRAKE BOOSTER PUSH ROD AND PRIMARY PISTON

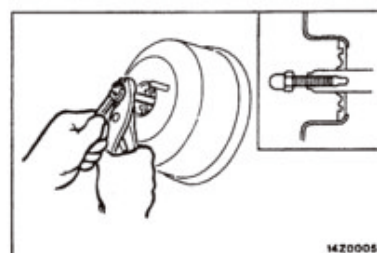
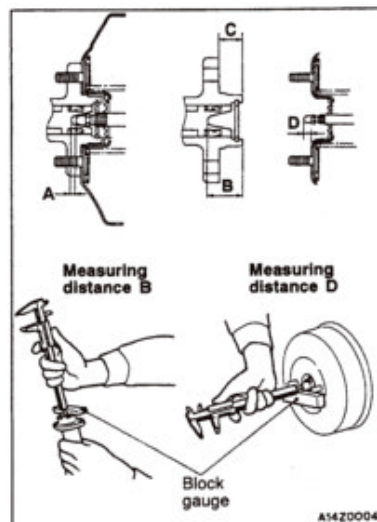
1. Calculate clearance A from the B, C and D measurements.

$$A = B - C - D$$

Standard value: 0.40–0.60 mm

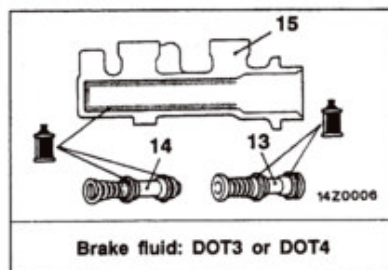
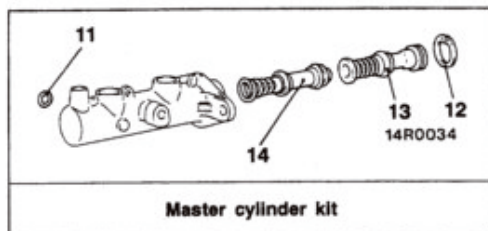
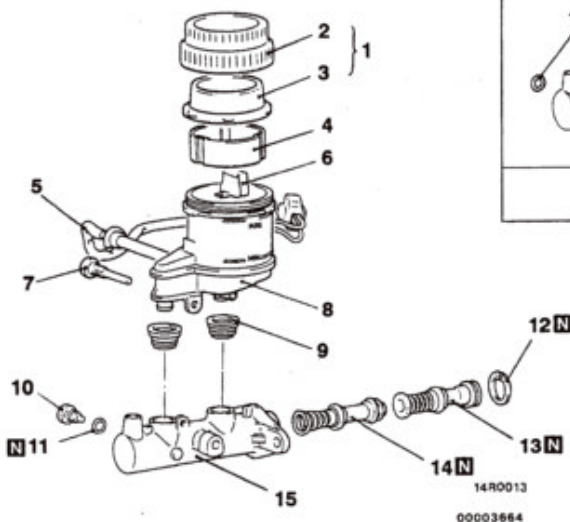
NOTE

When brake booster negative pressure of -66.7 kPa (500 mmHg) is applied, clearance value (A) will become 0.10 – 0.30 mm.



2. If the clearance is not within the standard value range, adjust by changing the push rod length by turning the screw of the push rod.

MASTER CYLINDER DISASSEMBLY AND REASSEMBLY



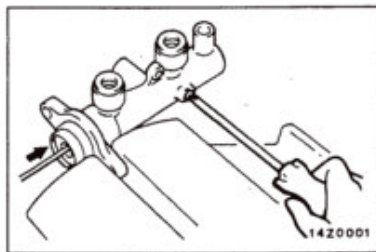
Disassembly steps

1. Reservoir cap assembly
2. Reservoir cap
3. Diaphragm
4. Filter
5. Brake fluid level sensor
6. Float
7. Reservoir stopper bolt

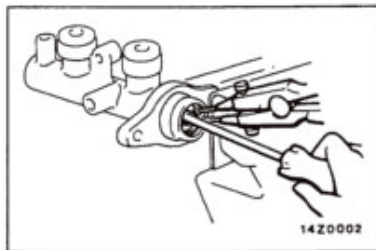
◀A▶

◀B▶

8. Reservoir tank
9. Reservoir seal
10. Piston stopper bolt
11. Gasket
12. Piston stopper ring
13. Primary piston assembly
14. Secondary piston assembly
15. Master cylinder body

**DISASSEMBLY SERVICE POINTS****◀A▶ PISTON STOPPER BOLT REMOVAL**

Remove the piston stopper bolt, while depressing the piston.

**◀B▶ PISTON STOPPER RING REMOVAL**

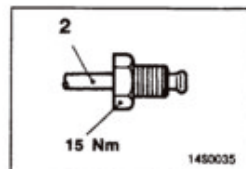
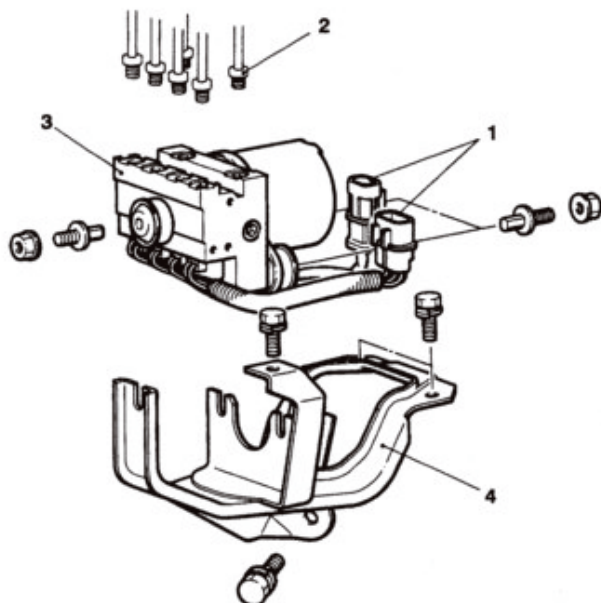
Remove the piston stopper ring, while depressing the piston.

HYDRAULIC UNIT**REMOVAL AND INSTALLATION****Pre-removal Operation**

- Brake Fluid Draining
- Battery Bracket Removal

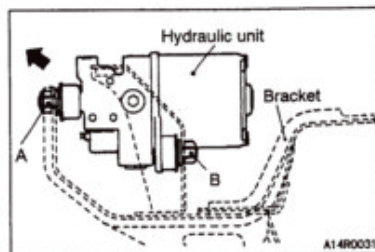
Post-installation Operation

- Battery Bracket Installation
- Brake Fluid Supplying
- Brake Line Bleeding (Refer to P35B-24.)
- Hydraulic Unit Inspection (Refer to P.35B-26.)

14R0015
00008133**Removal steps**

1. Harness connector
2. Brake pipe connection
3. Hydraulic unit assembly
4. Hydraulic unit bracket

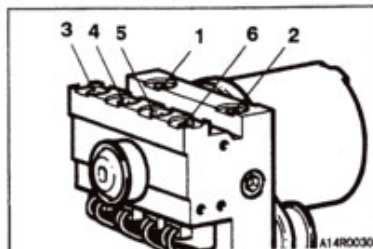


**REMOVAL SERVICE POINT****▶A▶ HYDRAULIC UNIT ASSEMBLY REMOVAL**

1. Remove the nut A.
2. Take out the hydraulic unit to the arrow direction.
3. Remove the connector from the bracket.
4. Remove nut B.

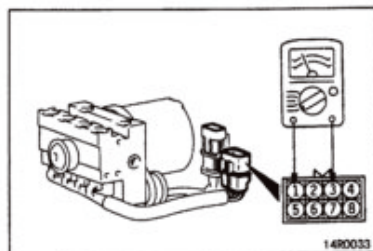
Caution

1. The hydraulic unit assembly is heavy, and so care should be taken when removing it.
2. The hydraulic unit assembly is not to be disassembled; its nuts and bolts should absolutely not be loosened.
3. The hydraulic unit assembly must not be dropped or otherwise subjected to impact shocks.
4. The hydraulic unit assembly must not be turned upside down or laid on its side.

**INSTALLATION SERVICE POINT****▶A▶ BRAKE PIPE CONNECTION**

Connect the pipes to the hydraulic unit assembly as shown in the illustration.

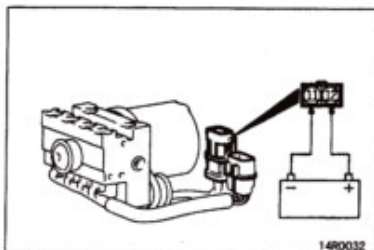
1. From the master cylinder (Secondary)
2. From the master cylinder (Primary)
3. To the front brake (LH)
4. To the proportioning valve (RH)
5. To the proportioning valve (LH)
6. To the front brake (RH)

**INSPECTION****SOLENOID VALVE CHECK**

Measure the resistance between terminals.

Standard value: 2.96 – 3.20 Ω

Solenoid valve	Measurement terminals
Front (right side)	8 – 6
Front (left side)	4 – 2
Rear (right side)	7 – 5
Rear (left side)	3 – 1

**MOTOR OPERATION CHECK**

Connect the battery and check to be sure that the sound of the hydraulic unit motor operating can be heard.

Caution

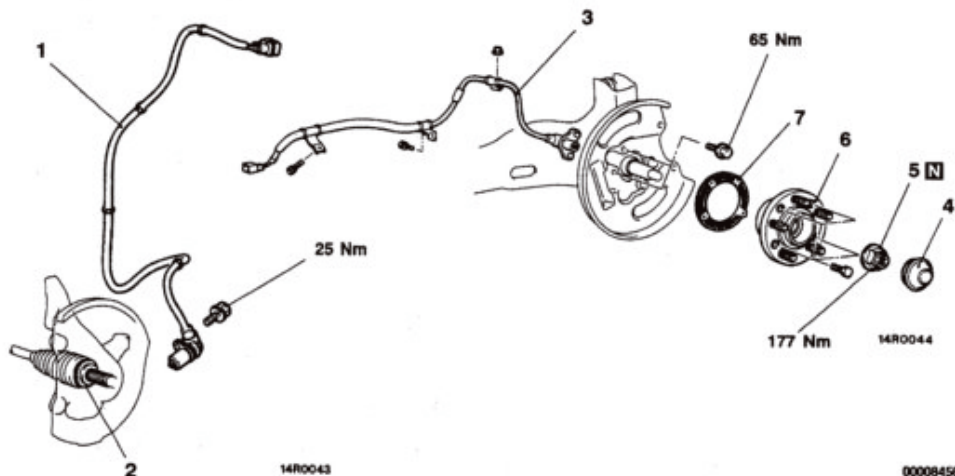
The battery power should not be applied for more than 1 second.

WHEEL SPEED SENSOR**REMOVAL AND INSTALLATION****Post-Installation Operation**

- Wheel Speed Sensor Output Voltage Check
(Refer to P.35B-25.)

<Front>

<Rear>

**Front speed sensor removal steps**

- Splash shield (Refer to GROUP 42 – Fender.)
1. Front speed sensor
 2. Front ABS rotor (Refer to GROUP 26 – Drive shaft.)

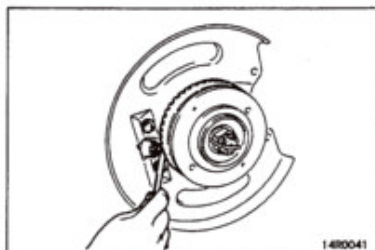
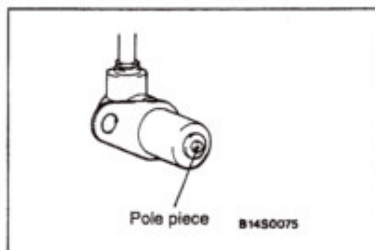
5. Self-locking flange nut
6. Rear hub assembly (Refer to GROUP 27 – Rear Axle Hub.)
7. Rear ABS rotor

Rear speed sensor removal steps

3. Rear speed sensor
4. Hub cap

NOTE

The front ABS rotor is integrated with the drive shaft and is not disassembled.



REMOVAL SERVICE POINT

◀▶ FRONT SPEED SENSOR/REAR SPEED SENSOR REMOVAL

Be careful when removing the speed sensor so as not to damage the pole piece at the tip of the sensor by striking it against other parts.

INSTALLATION SERVICE POINT

▶◀ REAR SPEED SENSOR INSTALLATION

Caution

Be careful that the pole piece at the end of the speed sensor and the ABS rotor teeth do not become damaged by striking them against the metal parts.

Insert a thickness gauge into the space between the speed sensor's pole piece and the ABS rotor's toothed surface, and then tighten the speed sensor bracket at the position where the clearance is the standard value all around.

Standard value: 0.3 - 0.9 mm

INSPECTION

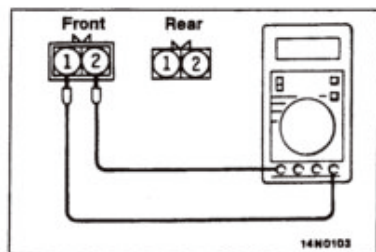
SPEED SENSOR INTERNAL RESISTANCE CHECK

- (1) Check whether any metallic foreign material has adhered to the pole piece at the speed sensor tip, and if so, remove it.

Also check whether the pole piece is damaged, and if so, replace it with a new one.

NOTE

The pole piece can become magnetized because of the magnet built into the speed sensor, with the result that metallic foreign material easily adheres to it. Moreover, the pole piece may not be able to function to correctly sense the wheel rotation speed if it is damaged.



- (2) Measure the resistance between the speed sensor terminals.

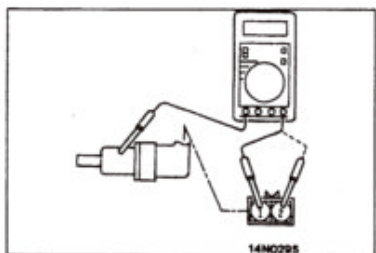
Standard value: 1.4 – 2.2 k Ω

If the internal resistance of the speed sensor is not within the standard value, replace with a new speed sensor.

- (3) Check the speed sensor cable for breakage, damage or disconnection; replace with a new one if a problem is found.

NOTE

When checking for cable damage, remove the cable clamp part from the body and then bend and pull the cable near the clamp to check whether or not temporary disconnection occurs.



SPEED SENSOR INSULATION INSPECTION

- (1) Remove all connections from the speed sensor, and then measure the resistance between terminals (1) and (2) and the body of the speed sensor.

Standard value: 100 k Ω or more

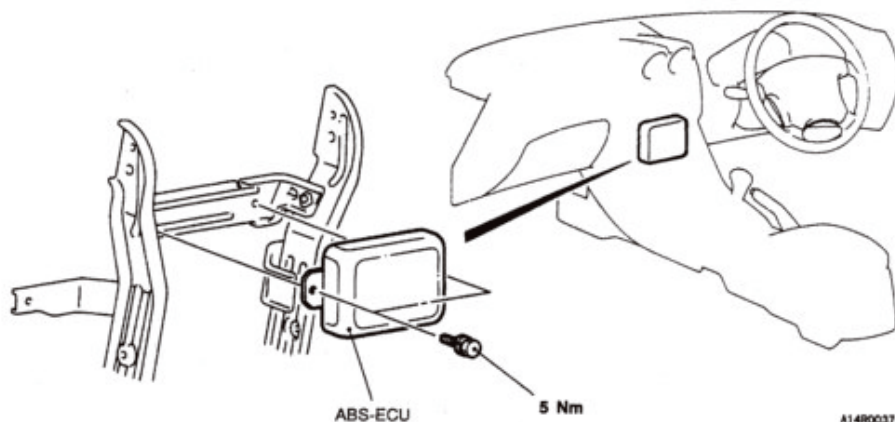
- (2) If the speed sensor insulation resistance is outside the standard value range, replace with a new speed sensor.

ABS ROTOR

Check whether ABS rotor teeth are broken or deformed, and, if so, replace the ABS rotor.

ABS-ECU**REMOVAL AND INSTALLATION**

- Pre-removal and Post-Installation Operation**
- Center Panel Removal and Installation
(Refer to GROUP 52A — Instrument Panel.)



A14R0037

PARKING BRAKES

CONTENTS

SERVICE SPECIFICATION	2	Parking Brake Switch Check	3
ON-VEHICLE SERVICE	2	PARKING BRAKE LEVER	3
Parking Brake Lever Stroke Check and Adjustment	2	PARKING BRAKE CABLE	4



SERVICE SPECIFICATION

Item	Standard value
Parking brake lever stroke [Operation force: Approx. 196 N]	4 – 6 notches

ON-VEHICLE SERVICE

PARKING BRAKE LEVER STROKE CHECK
AND ADJUSTMENT

LEVER STROKE CHECK

Standard value:

4 – 6 notches [Operation force: Approx. 196 N]

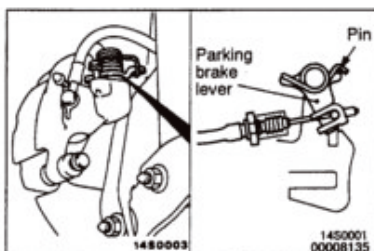
LEVER STROKE ADJUSTMENT

If the parking brake lever stroke is not within the standard value, adjust as described below.

1. Remove the rear floor console.
2. Loosen the adjusting nut at the floor console, thus freeing the parking brake cable.
3. With the engine idling, forcefully depress the brake pedal a few times and confirm that the pedal stroke stops changing.

NOTE

If the pedal stroke stops changing, the automatic adjuster mechanism is functioning normally, and the clearance between the pad and disc is correct.



4. Confirm that the caliper-side parking lever touches the pin.

NOTE

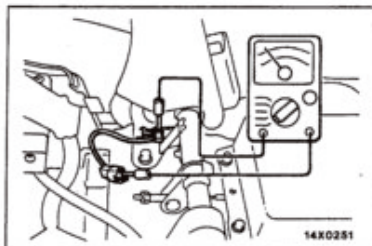
If the parking brake lever does not touch the pin, the parking brake cable may be seized or incorrectly routed, or the automatic adjuster mechanism in the rear brake caliper may be defective. Check the parking brake cable and disassemble and check the rear brake caliper.

5. Turn the adjusting nut to adjust the parking brake lever stroke to the standard value. After adjusting, check that there is no play between the adjusting nut and the parking brake lever. Also, check that the adjusting nut is securely held by the nut holder.

Caution

If the parking brake lever stroke is below the standard value, the rear brakes may drag.

6. After adjusting the parking brake lever stroke, jack up the rear of the vehicle. Release the parking brake and turn the rear wheels to check that the rear brakes are not dragging and the caliper side parking lever touches the pin.

**PARKING BRAKE SWITCH CHECK**

Check for continuity between the parking brake switch terminal and the switch mounting bolt.

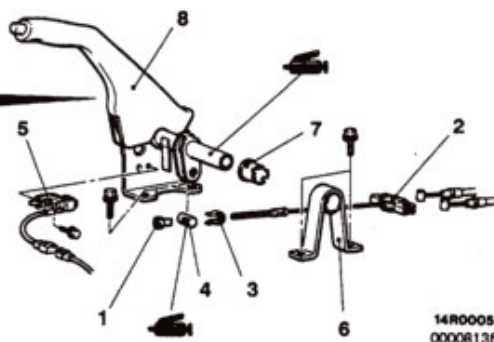
When parking brake lever is pulled	Continuity
When parking brake lever is released	No continuity

PARKING BRAKE LEVER**REMOVAL AND INSTALLATION****Pre-removal Operation**

- Floor Console and Rear Seat Removal (Refer to GROUP 52A.)

Post-installation Operation

- Parking Brake Lever Stroke Adjustment (Refer to P.36-2.)
- Floor Console and Rear Seat Installation (Refer to GROUP 52A.)

**Removal steps**

1. Adjusting nut
2. Cable equalizer
3. Nut holder
4. Lever pin

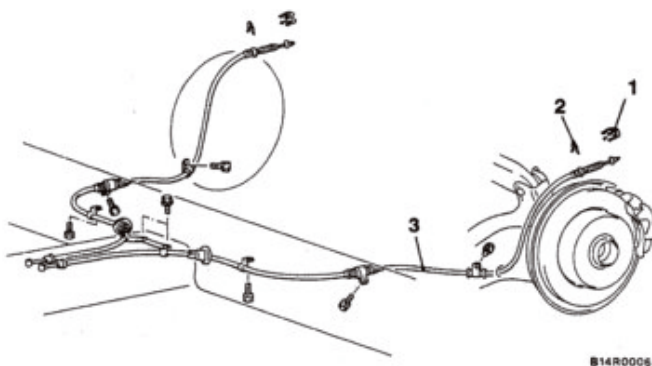
5. Parking brake switch
6. Parking brake stay
7. Bushing
8. Parking brake lever assembly

PARKING BRAKE CABLE**REMOVAL AND INSTALLATION****Pre-removal Operation**

- Floor Console and Rear Seat Removal (Refer to GROUP 52A.)

Post-installation Operation

- Parking Brake Lever Stroke Adjustment (Refer to P.36-2.)
- Floor Console and Rear Seat Installation (Refer to GROUP 52A.)

**Removal steps**

1. Cable retainer
2. Parking clip
3. Parking brake cable

STEERING

CONTENTS

SERVICE SPECIFICATIONS	2	Fluid Level Check	7
LUBRICANTS	2	Fluid Replacement	7
SEALANT	2	Bleeding	8
SPECIAL TOOLS	3	Oil Pump Pressure Test	9
ON-VEHICLE SERVICE	5	Power Steering Oil Pressure Switch Check ...	10
Steering Wheel Free Play Check	5	Ball Joint Dust Cover Check	10
Steering Angle Check	6	STEERING WHEEL AND SHAFT*	11
Tie Rod End Ball Joint Starting Torque Check	6	POWER STEERING GEAR BOX AND LINKAGE	14
Stationary Steering Effort Check	6	POWER STEERING OIL PUMP	27
Checking Steering Wheel Return to Centre	7	POWER STEERING HOSES	31
Drive Belt Tension Check	7		

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SERVICE SPECIFICATIONS

Items		Standard value	Limit
Steering wheel free play mm	with engine stopped	0 – 10	—
	with engine running	—	30
Steering angle	Inner wheel	$37^{\circ}00' \pm 1^{\circ}30'$	—
	Outer wheel <reference value>	$30^{\circ}00'$	—
Tie rod end ball joint starting torque Nm		0.5 – 2.5	—
Stationary steering effort N (Fluctuation allowance)		34 or less (5.9 or less)	—
Oil pump pressure MPa	Oil pump relief pressure	8.8	—
	Pressure under no-load conditions	0.3 – 0.8	—
	Steering gear retention hydraulic pressure	8.8	—
Oil pressure switch operating pressure MPa	OFF → ON	1.5 – 2.0	—
	ON → OFF	0.7 – 2.0	—
Total pinion torque Nm (Change in torque: 0.4 Nm)		0.6 – 1.4	—
Tie rod joint swing resistance N (Tie rod joint swing torque Nm)		6 – 20 (1.5 – 4.9)	—
Band crimped width mm		2.4 – 2.8	—

LUBRICANTS

Items	Specified lubricant	Quantity
Power steering fluid	Automatic transmission fluid DEXRON or DEXRON II	Approx. 0.9 ℓ
Bellows	Silicone grease	As required
Pinion and valve assembly	Repair kit grease	As required
Rack assembly		

SEALANT

Items	Specified sealant	Remarks
End plug screw	3M ATD Part No. 8663 or equivalent	Semi-drying sealant
Power steering rack support cover screw		

SPECIAL TOOLS

Tool	Number	Name	Use
	MB990635 or MB991113	Steering linkage puller	Disconnection of tie rod end
	MB990685	Torque wrench	- Measurement of the ball joint starting torque - Measurement of the total pinion torque
 B991006	MB991006	Preload socket	Measurement of the total pinion torque
 B990326	MB990326	Preload socket	Measurement of the ball joint starting torque
 B990993	MB990993	Power steering oil pressure gauge adapter (pump side)	Measurement of oil pressure
 B990994	MB990994	Power steering oil pressure gauge adapter (hose side)	
 B990662	MB990662	Oil pressure gauge assembly	
	MB990607	Torque wrench socket	- Removal of rack support cover - Measurement of the total pinion torque
 B990803	MB990803	Steering wheel puller	Removal of the steering wheel

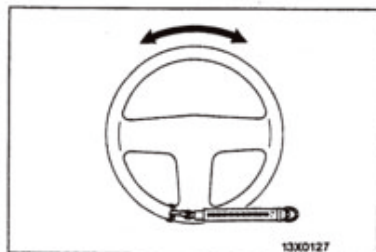
Tool	Number	Name	Use
 B991202	MB991202	Oil seal and bearing installer	Press fitting of valve housing needle bearing and lower bearing
 B991197	MB991197	Bar (long type)	Press-fitting of the gear housing oil seal
 B991198	MB991199	Oil seal installer	
 B991212	MB991213	Oil seal protector	Rack assembly installation
 B990925	MB990925	Bearing and oil seal installer set	Installation of the oil seal and bearing (Refer to GROUP 26 – Special Tool.)
 B991120	MB991120	Needle bearing puller	Removal of valve housing needle bearing
 B991203	MB991203	Oil seal and bearing installer	Press-fitting of the valve housing oil seal and bearing
 B991317	MB991317	Seal ring installer	Compression of the pinion seal rings
 B990941	MB990941	Torque tube bearing installer	Installation of valve housing oil seal

Tool	Number	Name	Use
	MB991561	Boot band crimping tool	Installation of bellows band
 8990776	MB990776	Front axle base	Press-fitting of the dust cover

ON-VEHICLE SERVICE

STEERING WHEEL FREE PLAY CHECK

1. With engine running (hydraulic operation), set front wheels straight ahead.



2. Measure the play on steering wheel circumference before wheels start to move when slightly moving steering wheel in both directions.

Limit: 30 mm or less

3. When play exceeds the limit, check for play on steering shaft connection and steering linkage. Correct or replace.
4. If the free play still exceeds the limit value, set steering wheel straight ahead with engine stopped. Load 5 N towards steering wheel circumference and check play.

Standard value (steering wheel play with engine stopped): 0 – 10 mm

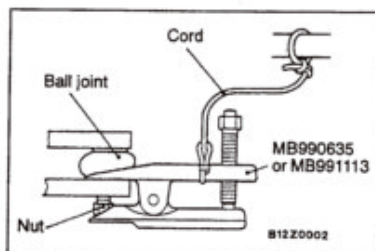
If the play exceeds the standard value, remove the steering gear box and check total pinion torque. (Refer to P.37A-15.)

STEERING ANGLE CHECK

1. Locate front wheels on turning radius gauge and measure steering angle.

Standard value:Inner wheel $37^{\circ}00' \pm 1^{\circ}30'$ Outer wheel $30^{\circ}00'$ <Reference value>

2. When the angle is not within the standard value, the toe is probably incorrect. Adjust toe (Refer to GROUP 33A – On-vehicle Service) and recheck steering angle.



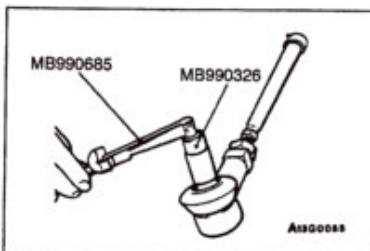
TIE ROD END BALL JOINT STARTING TORQUE CHECK

1. Disconnect tie rod and knuckle with special tool.

Caution

(1) Using the special tool, loosen the tie rod end mounting nut. Only loosen the nut; do not remove it from the ball joint.

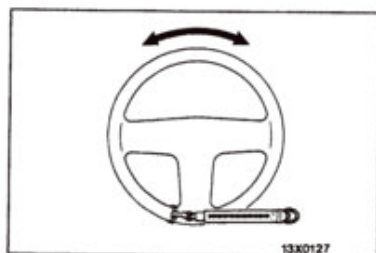
(2) Support the special tool with a cord, etc. to prevent it from coming off.



2. Move ball joint stud several times and install nut on stud. Measure ball joint starting torque with special tools.

Standard value: 0.5 – 2.5 Nm

3. When the starting torque exceeds the standard value, replace tie rod end.
4. When the starting torque is under the standard value, check ball joint for end play or ratcheting. If none of these, the joint is still serviceable.



STATIONARY STEERING EFFORT CHECK

1. With the vehicle stopped on a flat, paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and set it to $1,000 \pm 100$ r/min.

Caution

After checking, the engine r/min must return to the standard idling r/min.

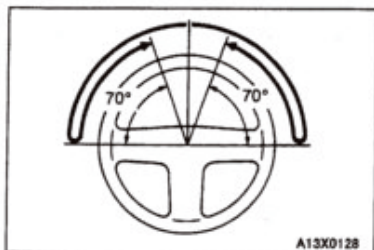
3. Attach a spring balance to the outer circumference of the steering wheel and measure the steering force required to turn the steering wheel from the straight ahead position to the left and right (within a range of 1.5 turns). Also check to be sure that there is no significant fluctuation of the required steering force.

Standard value:

Steering effort: 34 N or less

Fluctuation allowance: 5.9 N or less

4. If the measured value is not within the standard value, check and adjust each parts.



CHECKING STEERING WHEEL RETURN TO CENTRE

To make this test, conduct a road test and check as follows.

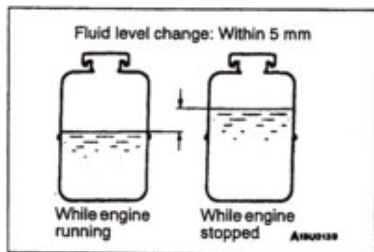
1. Make both gradual and sudden turns and check the steering "feeling" to be sure that there is not difference in the steering force required and the wheel return between left and right turns.
2. At a speed of 35 km/h, turn the steering wheel 90° and release the steering wheel after 1 or 2 seconds. If the steering wheel then returns 70° or more, the return can be judged to be satisfactory.

NOTE

There will be a momentary feeling or "heaviness" when the wheel is turned quickly, but this is not abnormal. (This is because the oil pump discharge amount is especially apt to be insufficient during idling.)

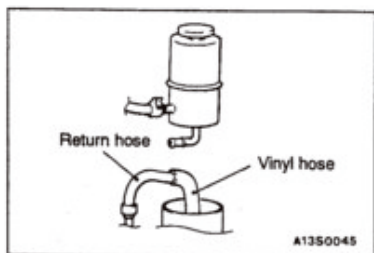
DRIVE BELT TENSION CHECK

Refer to GROUP 11A – On-vehicle Service.



FLUID LEVEL CHECK

1. Park the vehicle on a flat, level surface, start the engine, and then turn the steering wheel several times to raise the temperature of the fluid to approximately 50–60°C.
2. With the engine running, turn the wheel all the way to the left and right several times.
3. Check that the fluid in the oil reservoir has no foaming or milkiness. Check the difference of the fluid level when the engine is stopped, and while it is running. If the change of the fluid level is 5 mm or more, air bleeding should be done.



FLUID REPLACEMENT

1. Raise the front wheels on a jack, and then support the vehicle with rigid racks.
2. Disconnect the return hose connection.
3. Connect a vinyl hose to the return hose, and drain the oil into a container.
4. Disconnect the high tension cable.

Caution

Be careful not to position the high-tension cable near the delivery pipe.

5. While operating the starter motor intermittently, turn the steering wheel all the way to the left and right several times to drain all of the fluid.
6. Connect the return hoses securely, and then secure it with the clip.
7. Fill the oil reservoir with the specified fluid up to the lower position of the filter, and then bleed the air.

Specified fluid:

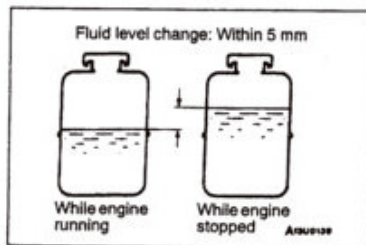
**Automatic transmission fluid
DEXRON or DEXRON II**

BLEEDING

1. Jack up the front wheels and support them by using a rigid rack.
2. Disconnect the high-tension cable. While cranking the engine by the starter motor intermittently several times (within 15 to 20 seconds), turn the steering wheel all the way to the left and right five or six times.

Caution

- (1) Be careful not to position the high-tension cable near the delivery pipe.
 - (2) During air bleeding, refill the fluid so that the level never falls below the lower position of the filter.
 - (3) If air bleeding is done while engine is running, the air will be broken up and absorbed into the fluid; be sure to do the bleeding only while cranking.
3. Connect the high-tension cable. Start the engine (idling).
 4. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
 5. Confirm that the fluid is not milky, and that the level is up to the specified position on the level gauge.
 6. Confirm that there is very little change in the fluid level when the steering wheel is turned left and right.

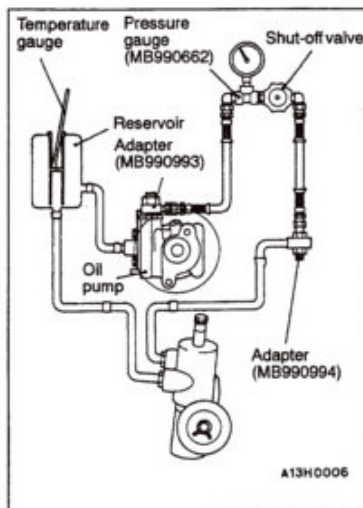


7. Check whether or not the change in the fluid level is within 5 mm when the engine is stopped and when it is running.
8. If the change of the fluid level is 5 mm or more, the air has not been completely bled from the system, and thus must be bled completely.

Caution

- (1) If the fluid level rises suddenly after the engine is stopped, the air has not been completely bled.

- (2) If air bleeding is not complete, there will be abnormal noises from the pump and the flow-control valve, and this condition could cause a lessening of the life of the pump, etc.



OIL PUMP PRESSURE TEST

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C.
3. Start the engine and idle it at $1,000 \pm 100$ r/min.
4. Fully close the shut-off valve of the pressure gauge and measure the oil pump relief pressure to confirm that it is within the standard value range.

Standard value: 8.8 MPa

Caution

Pressure gauge shut off valve must not remain closed for more than 10 seconds.

5. If it is not within the standard value, disassemble and check the oil pump, and measure the pressure again.
6. Check whether or not the hydraulic pressure is the standard value when no-load conditions are created by fully opening the shut-off valve of the pressure gauge.

Standard value: 0.3 – 0.8 MPa

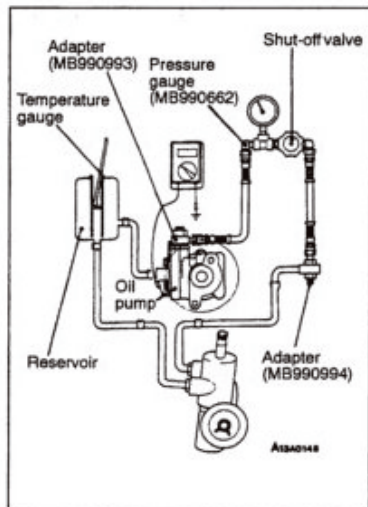
7. If it is not within the standard value, the probable cause is a malfunction of the oil line or steering gear box, so check these parts and repair as necessary.
8. Turn the steering wheel all the way to the left or right; hold the steering wheel and check whether or not the hydraulic pressure is the standard value.

Standard value: 8.8 MPa

9. If the pressure is less than the standard value, disassemble and reassemble the steering gear box. If it is more than the standard value, disassemble and reassemble the oil pump, and check the flow control valve. Then measure the oil pressure again.
10. Remove the special tools, and then tighten the pressure hose to the specified torque.

Tightening torque: 18 Nm

11. Bleed the system.



POWER STEERING OIL PRESSURE SWITCH CHECK

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C.
3. Start the engine and let it run at idling.
4. Disconnect the connection of the connector for the oil pressure switch, and place an ohmmeter in position.
5. Gradually close the shut-off valve of the pressure gauge and increase the hydraulic pressure, then check whether or not the hydraulic pressure that activates the switch is the standard value.

Standard value: 1.5 – 2.0 MPa

6. Gradually open the shut-off valve and reduce the hydraulic pressure; then check whether or not the hydraulic pressure that deactivates the switch is the standard value.

Standard value: 0.7 – 2.0 MPa

7. Remove the special tools, and then tighten the pressure hose to the specified torque.

Tightening torque: 18 Nm

8. Bleed the system.

BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the tie rod end.

NOTE

Cracks or damage of the dust cover may cause damage of the ball joint.

STEERING WHEEL AND SHAFT

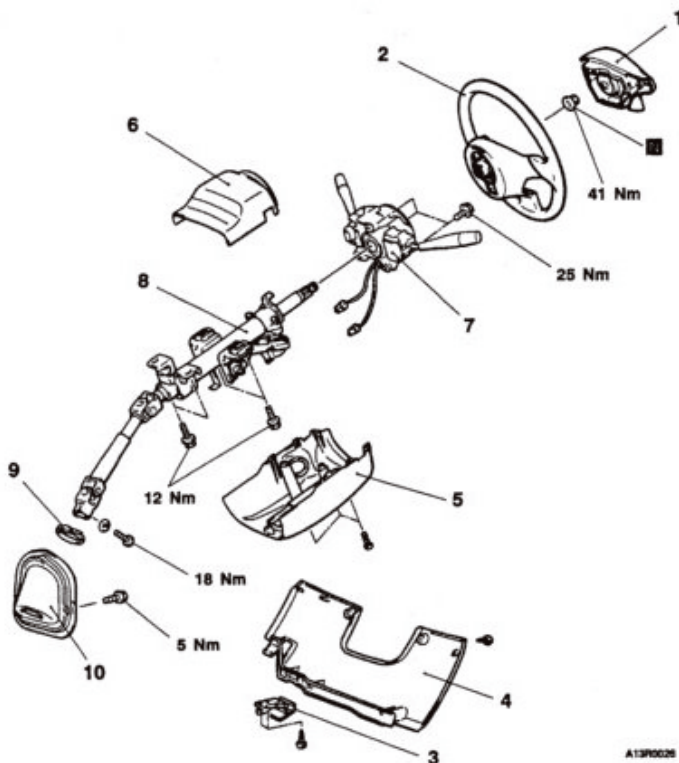
REMOVAL AND INSTALLATION

CAUTION: SRS

Before removal of air bag module and clock spring, refer to GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.

Post-Installation Operation

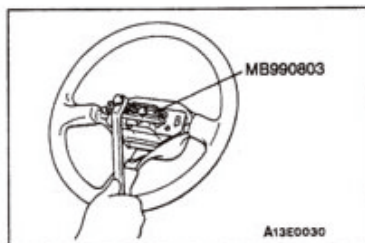
- Checking Steering Wheel Position with Wheels Straight Ahead

**Removal steps**

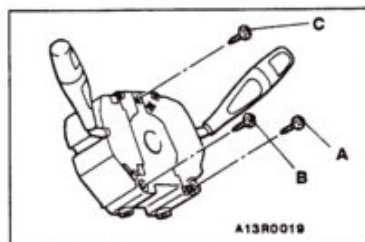
1. Air bag module (Refer to GROUP 52B.)
2. Steering wheel
3. Lock release handle
4. Instrument lower panel assembly
5. Lower column cover
6. Upper column cover

- A◄
7. Clock spring and column switch (Refer to GROUP 52B.)
 8. Steering column and shaft assembly
 9. Band
 10. Steering cover

◄A►

**REMOVAL SERVICE POINT**

◀▶ STEERING WHEEL REMOVAL

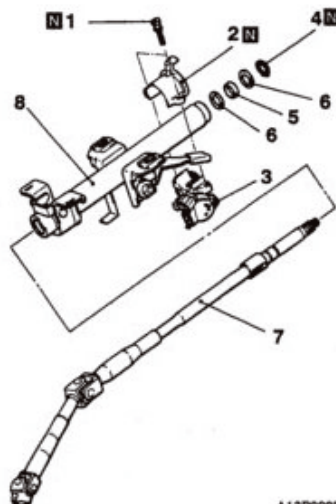
**INSTALLATION SERVICE POINT**

▶▶▶ CLOCK SPRING AND COLUMN SWITCH INSTALLATION

Tighten the screws in an alphabetical order.

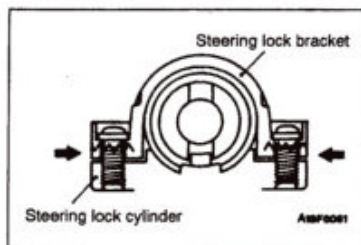
NOTE

Unless the screws are tightened in the alphabetical order, the column switch may be installed incorrectly.

DISASSEMBLY AND REASSEMBLY**Disassembly steps**

1. Special bolt
2. Steering lock bracket
3. Steering lock cylinder assembly
4. Snap ring

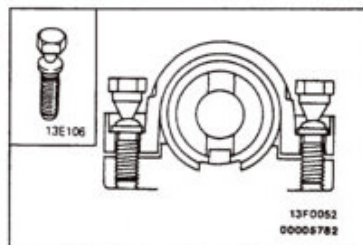
5. Spacer
6. Stopper
7. Steering shaft assembly
8. Steering column assembly

**DISASSEMBLY SERVICE POINT****◀▶ STEERING LOCK BRACKET/STEERING LOCK CYLINDER REMOVAL**

If it is necessary to remove the steering lock cylinder, use a hacksaw to cut the special bolts at the steering lock bracket side.

REASSEMBLY SERVICE POINT**▶◀ STEERING LOCK CYLINDER/STEERING LOCK BRACKET/SPECIAL BOLT INSTALLATION**

1. When installing the steering lock cylinder and steering lock bracket to the column tube, temporarily install the steering lock in alignment with the column boss.



2. After checking that the lock works properly, tighten the special bolts until the head twists off.

Caution

The steering lock bracket and bolts must be replaced with new ones when the steering lock is installed.

POWER STEERING GEAR BOX AND LINKAGE

REMOVAL AND INSTALLATION

CAUTION: SRS

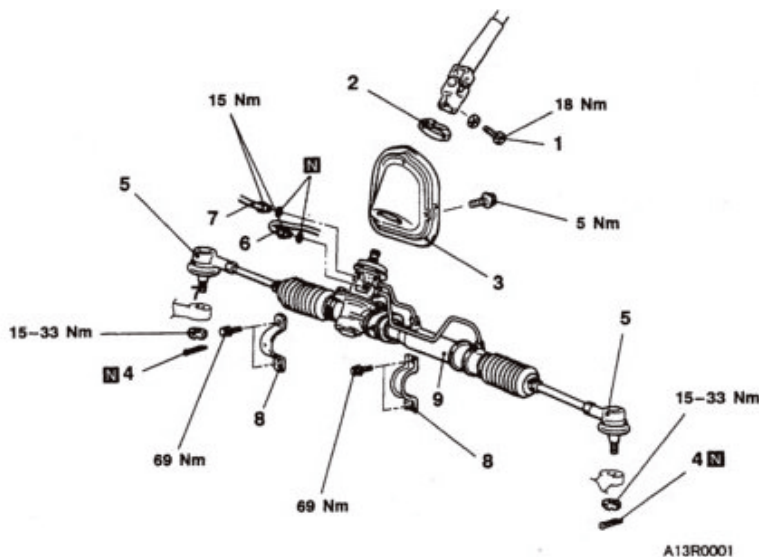
Before removal of steering gear box, refer to GROUP 52B, set the front wheels in straight ahead position and remove ignition key. Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

Pre-removal Operation

- Power Steering Fluid Draining (Refer to P.37A-7.)
- Center Member Removal (Refer to GROUP 32.)
- Front Exhaust Pipe Removal (Refer to GROUP 15.)

Post-installation Operation

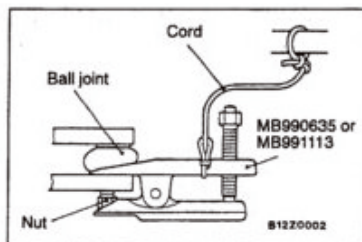
- Check the Dust Cover for Cracks or Damage by Pushing it with Finger
- Front Exhaust Pipe Installation (Refer to GROUP 15.)
- Center Member Installation (Refer to GROUP 32.)
- Power Steering Fluid Supplying (Refer to P.37A-7.)
- Power Steering Fluid Line Bleeding (Refer to P.37A-8.)
- Checking Steering Wheel Position with Wheels Straight Ahead
- Front Wheel Alignment Adjustment (Refer to GROUP 33A.)

**Removal steps**

1. Steering gear and joint connecting bolt
2. Band
3. Steering cover
4. Split pin



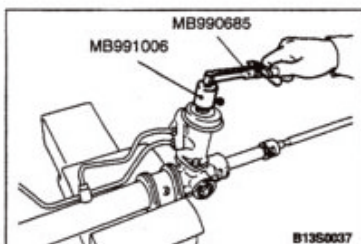
5. Tie-rod end and knuckle connection
6. Pressure pipe connection
7. Return pipe connection
8. Cylinder clamp
9. Steering gear and linkage

**REMOVAL SERVICE POINTS****◀A▶ TIE ROD END DISCONNECTION****Caution**

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

◀B▶ STEERING GEAR AND LINKAGE REMOVAL**Caution**

Be careful not to damage the boot when removing the steering gear and linkage.

**INSPECTION****GEAR BOX TOTAL PINION TORQUE**

1. Using the special tools, rotate the pinion gear at the rate of one rotation in approximately 4 to 6 seconds to check the total pinion torque.

Standard value: 0.6 – 1.4 Nm
[Change in torque: 0.4 Nm or less]

Caution

When holding the steering gear box assembly in a vice, secure its mounting positions. If it is secured in any other places, the gear housing may become deformed or damaged.

NOTE

When measuring, remove the bellows from the gear housing. Measure the pinion torque through the whole stroke of the rack.

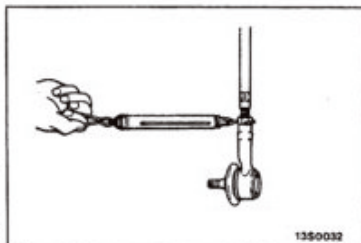
2. If the measured value is not within the standard range, adjust the total pinion torque.
3. If the total pinion torque cannot be adjusted to within the standard value, disassemble the gear box, and check and replace any parts if necessary.

TIE ROD SWING RESISTANCE

1. Give 10 hard swings to the tie rod.
2. Face the tie rod end downward and measure the tie rod swing resistance (swing torque) with a spring balance as shown in the figure.

Standard value: 6 – 20 N (1.5–4.9 Nm)

3. If the measured value exceeds the standard value, replace tie rod.



4. Even if the measured value is below the standard value, the tie rod which swings smoothly without excessive play may be used.

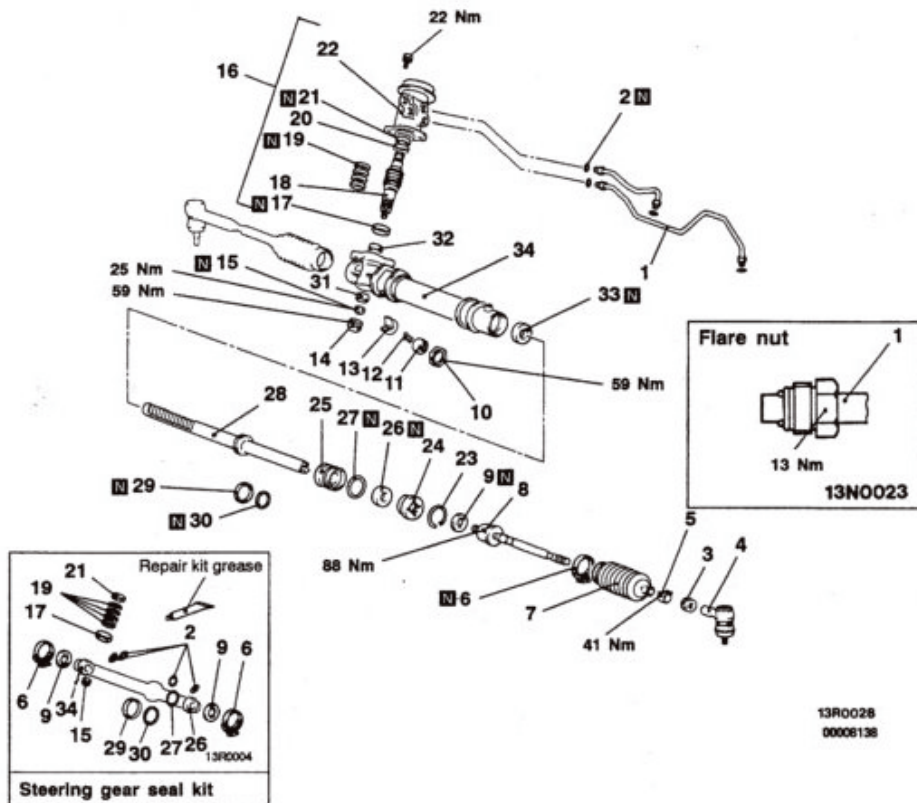
TIE ROD END BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the tie rod end. (Refer to P.37A-17.)

NOTE

Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.

DISASSEMBLY AND REASSEMBLY

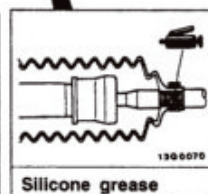
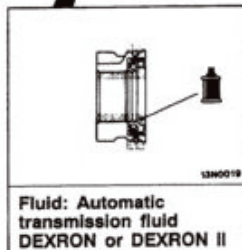
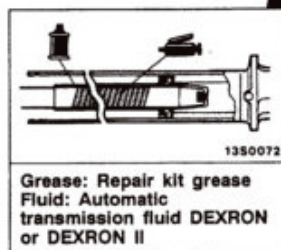
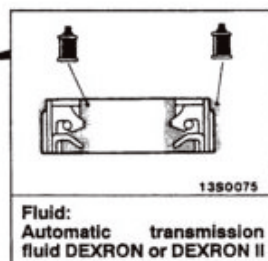
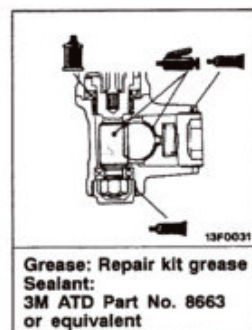
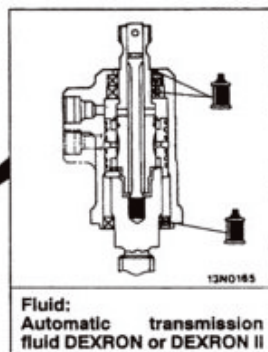
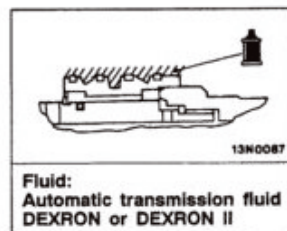
13R0028
00006138

Disassembly steps

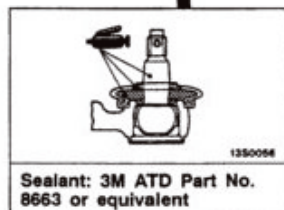
1. Feed pipe
2. O-ring
- ▶M▶ 3. Tie-rod end locking nut
- ▶M▶ 4. Tie-rod end
- ▶L▶ 5. Bellows clip
- ▶L▶ 6. Bellows band
- ▶K▶ 7. Bellows
- ▶K▶ 8. Tie-rod
- ▶K▶ 9. Tab washer
- ▶J▶ • Total pinion torque adjustment
- ▶A▶ 10. Locking nut
- ▶A▶ 11. Rack support cover
- ▶A▶ 12. Rack support spring
- ▶A▶ 13. Rack support
- ▶A▶ 14. End plug
- ▶A▶ 15. Self-locking nut
- ▶B▶ ▶H▶ 16. Valve housing assembly
- ▶B▶ ▶H▶ 17. Lower oil seal

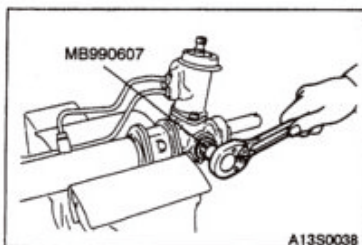
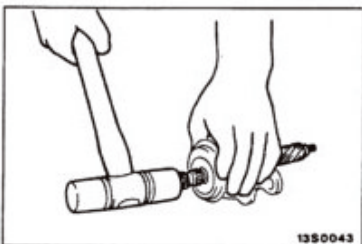
- ▶B▶ 18. Pinion and valve assembly
- ▶C▶ ▶G▶ 19. Seal ring
- ▶D▶ ▶F▶ 20. Upper bearing
- ▶D▶ ▶F▶ 21. Upper oil seal
- ▶E▶ ▶E▶ 22. Valve housing
- ▶F▶ ▶D▶ 23. Circlip
- ▶F▶ ▶D▶ 24. Rack stopper
- ▶G▶ ▶D▶ 25. Rack bushing
- ▶F▶ ▶C▶ 26. Oil seal
- ▶C▶ ▶C▶ 27. O-ring
- ▶H▶ ▶B▶ 28. Rack
- ▶H▶ ▶B▶ 29. Seal ring
- ▶J▶ ▶B▶ 30. O-ring
- ▶J▶ ▶A▶ 31. Lower bearing
- ▶J▶ ▶A▶ 32. Needle roller bearing
- ▶J▶ ▶A▶ 33. Oil seal
- ▶J▶ ▶A▶ 34. Gear housing

Lubrication and Sealing Points

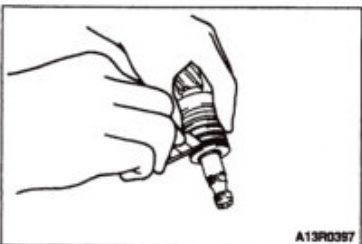


13R0028
00008139



**DISASSEMBLY SERVICE POINTS****◀A▶ RACK SUPPORT COVER REMOVAL****◀B▶ LOWER OIL SEAL/PINION AND VALVE ASSEMBLY REMOVAL**

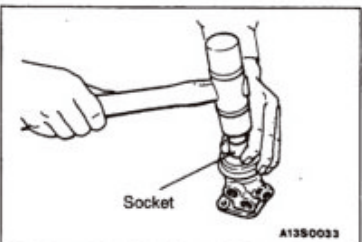
Using a plastic hammer, tap the spline of the pinion and valve assembly slightly to remove the pinion and valve assembly together with the lower oil seal from the valve housing.

**◀C▶ SEAL RING REMOVAL**

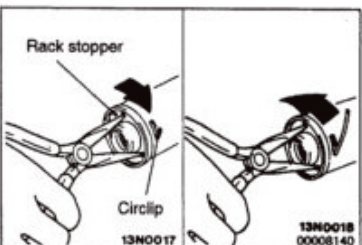
Cut the seal ring and remove it from the pinion and valve assembly and the rack.

Caution

When cutting the seal ring, be careful not to damage the pinion and valve assembly or the rack.

**◀D▶ UPPER BEARING/UPPER OIL SEAL REMOVAL**

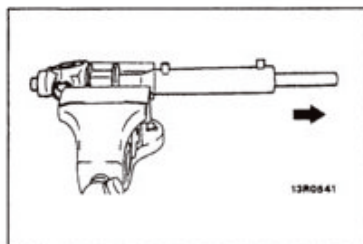
Use a socket, remove the oil seal and the bearing from the valve housing assembly simultaneously.

**◀E▶ CIRCLIP REMOVAL**

1. Turn the rack stopper clockwise until the end of the circlip comes out of the slot in the rack housing.
2. Turn the rack stopper anticlockwise to remove the circlip.

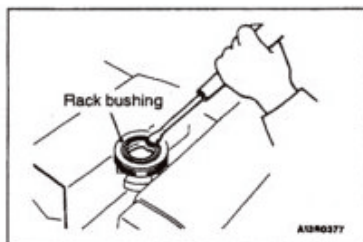
Caution

Note that if the rack stopper is first turned anticlockwise, the circlip will get caught in the slot in the housing and the rack stopper will not turn.



◀F▶ RACK STOPPER/RACK BUSHING/RACK ASSEMBLY REMOVAL

Pull out the rack assembly gently, and remove the rack stopper and rack bushing together.

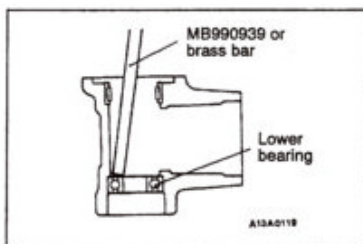


◀G▶ OIL SEAL REMOVAL

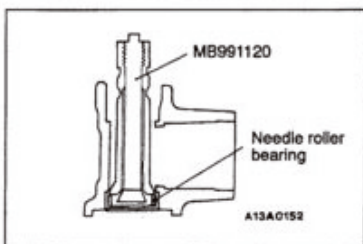
Partially bend the oil seal to remove from the rack bushing.

Caution

Do not damage the oil seal press fitting surface of the rack bushing.



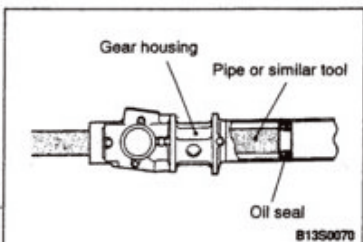
◀H▶ LOWER BEARING REMOVAL



◀I▶ NEEDLE ROLLER BEARING REMOVAL

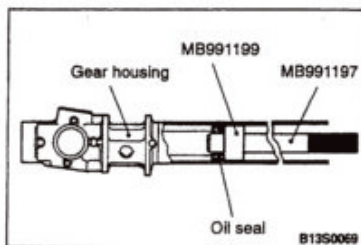
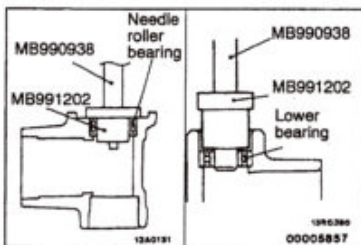
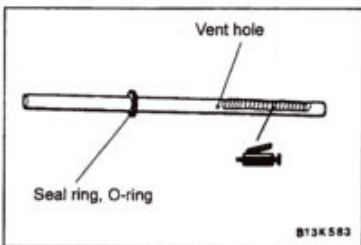
Caution

Do not open the special tool excessively to prevent damaging housing inside.



◀J▶ OIL SEAL REMOVAL

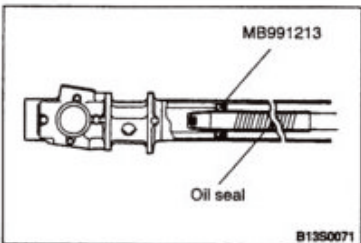
Use a piece of pipe or similar tool to remove the oil seal from the gear housing.

**REASSEMBLY SERVICE POINTS****►A◄ OIL SEAL INSTALLATION****►B◄ NEEDLE ROLLER BEARING/LOWER BEARING INSTALLATION****►C◄ RACK ASSEMBLY INSTALLATION**

1. Apply a coating of repair kit grease to the rack tooth face.

Caution

Do not close the vent hole in the rack with grease.



2. Cover rack serrations with special tool.
3. Apply the specified fluid to the special bolt, seal ring and O-ring.

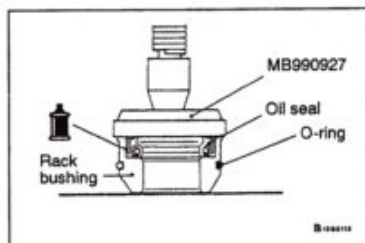
Specified fluid:

**Automatic transmission fluid
DEXRON or DEXRON II**

4. Insert the rack which has been covered by the special tool into the gear housing from the power cylinder side gradually.

Caution

Insert the tip of the special tool along the centre of the oil seal carefully to prevent the oil seal retainer spring from disengaging.

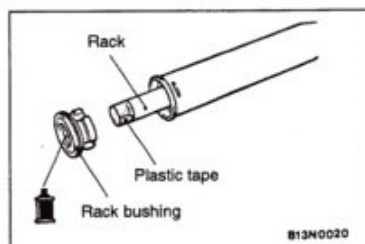


►D◄ OIL SEAL/RACK BUSHING INSTALLATION

1. Apply the specified fluid to the outer surface of the oil seal. Press-fit the oil seal using the special tool and a press until it is flush with the bushing end face.

Specified fluid:

Automatic transmission fluid
DEXRON or DEXRON II

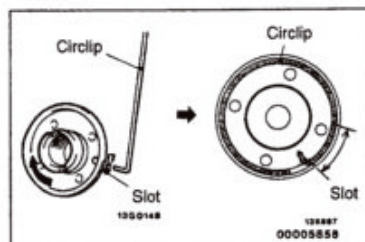


2. Apply the specified fluid to the oil seal inner surface and the O-ring.

Specified fluid:

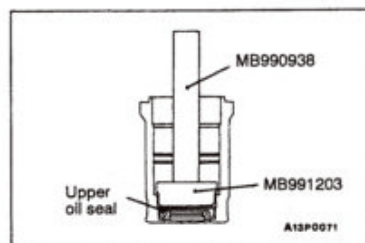
Automatic transmission fluid
DEXRON or DEXRON II

3. Wrap the rack end with plastic tape, and push the rack bushing onto the rack.

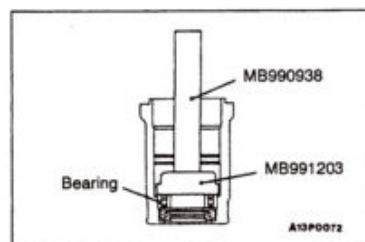


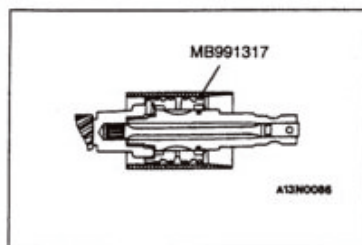
►E◄ CIRCLIP INSTALLATION

Insert the circlip to the rack stopper hole through the cylinder slot. Turn the rack stopper clockwise and insert the circlip firmly.



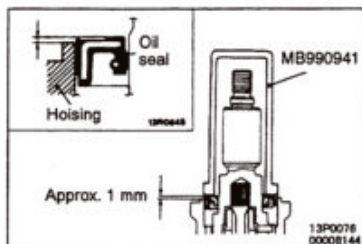
►F◄ UPPER OIL SEAL/UPPER BEARING INSTALLATION





►G◄ SEAL RING INSTALLATION

Compress the seal ring with the special tool or by hand after installation in order to install the valve housing to the gear box easily.

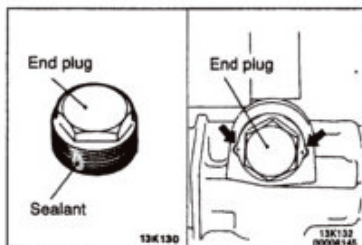


►H◄ LOWER OIL SEAL INSTALLATION

Use the special tool to press the oil seal into the valve housing. The upper surface of the oil seal should project outwards approx. 1 mm from the housing edge surface.

Caution

If the oil seal is flush with or lower than the housing edge, it will cause oil leaks and require reassembly.



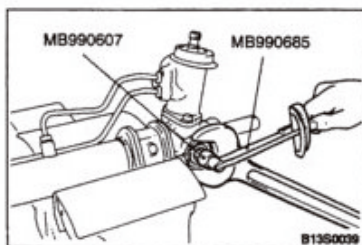
►I◄ END PLUG INSTALLATION

1. Apply the specified sealant to the threaded part of the end plug.

Specified sealant:

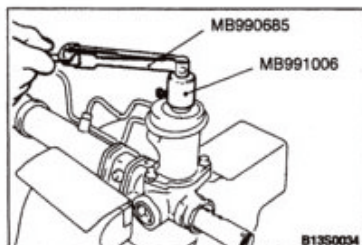
3M ATD Part No.8663 or equivalent

2. Caulk the threaded portion of the end plug at two places by using a punch.



►J◄ TOTAL PINION TORQUE ADJUSTMENT

1. Using the special tools, tighten the rack support cover to 15 Nm.
2. Turn back the rack support cover approx. 30°.



3. Using the special tools, rotate the pinion shaft at the rate of one rotation in 4 to 6 seconds to check the total pinion torque and the change in torque.

Standard value:

Total pinion torque: 0.6 - 1.4 Nm

Change in torque: 0.4 Nm or less

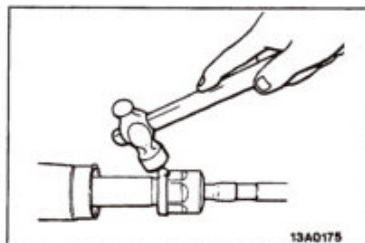
4. If the total pinion torque or the change in torque is outside the standard value, return the rack support cover within 0 to 30°, and adjust again.

Caution

- (1) When adjusting, set the standard value at its highest value.
- (2) Assure no ratcheting or catching when operating the rack towards the shaft direction.
- (3) Measure the total pinion torque through the whole stroke of the rack.

NOTE

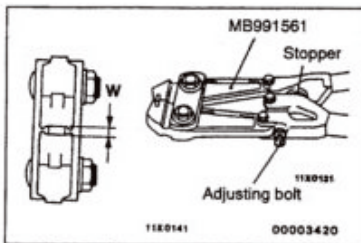
If the total pinion torque cannot be adjusted to the standard value within the specified return angle, check the rack support cover components and replace any parts if necessary.



13A0175

►K◄ TAB WASHER/TIE ROD INSTALLATION

After installing the tie rod to the rack, fold the tab washer end (2 locations) to the tie rod notch.

**►L◄ BELLOWS BAND INSTALLATION**

1. Turn the adjusting bolt of the special tool to adjust the opening dimension (W) to the standard value.

Standard value (W): 2.9 mm

<When more than 2.9 mm>

Screw in the adjusting bolt.

<When less than 2.9 mm>

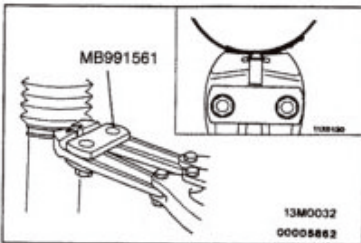
Loosen the adjusting bolt.

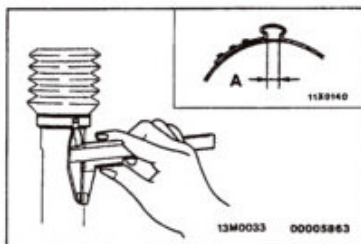
NOTE

- (1) The dimension (W) is adjusted by approx. 0.7 mm per one turn.
 - (2) Do not turn the adjusting bolt more than one turn.
2. Use the special tool to crimp the bellows band.

Caution

- (1) Hold the rack housing, and use the special tool to crimp the bellows band securely.
- (2) Crimp the bellows band until the special tool touches the stopper.





3. Check that the crimped width (A) is within the standard value.

Standard value (A): 2.4 – 2.8 mm

<When more than 2.8 mm>

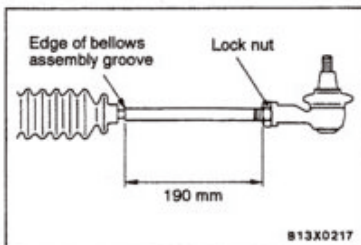
Readjust the dimension (W) of step (1) to the value calculated by the following equation, and repeat step (2).

$W = 5.5 \text{ mm} - A$ [Example: If (A) is 2.9 mm, (W) is 2.6 mm.]

<When less than 2.4 mm>

Remove the bellows band, readjust the dimension (W) of step (1) to the value calculated by the following equation, and use a new bellows band to repeat steps (2) to (3).

$W = 5.5 \text{ mm} - A$ [Example: If (A) is 2.3 mm, (W) is 3.2 mm.]



►◄ TIE ROD END/TIE ROD END LOCKING NUT INSTALLATION

Screw in the tie rod end to have its right and left length as illustrated. Lock with lock nut.

INSPECTION

RACK CHECK

- Check the rack tooth surfaces for damage or wear.
- Check the oil seal contact surfaces for uneven wear.
- Check the rack for bends.

PINION AND VALVE ASSEMBLY CHECK

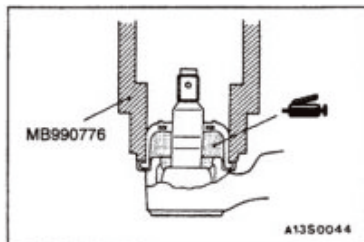
- Check the pinion gear tooth surfaces for damage or wear.
- Check for worn or defective seal ring.

BEARING CHECK

- Check for roughness or abnormal noise during bearing operation.
- Check the bearing for play.
- Check the needle roller bearing for roller slip-off.

OTHER CHECK

- Check the cylinder inner surface of the rack housing for damage.
- Check the boots for damage, cracking or deterioration.
- Check the rack support for uneven wear or dents.
- Check the rack bushing for uneven wear or damage.

**TIE ROD END BALL JOINT DUST COVER REPLACEMENT**

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Apply grease to the inside of the dust cover.
2. Apply the specified sealant to the mounting surface of the dust cover.

Specified sealant: 3M ATD Part No.8663 or equivalent

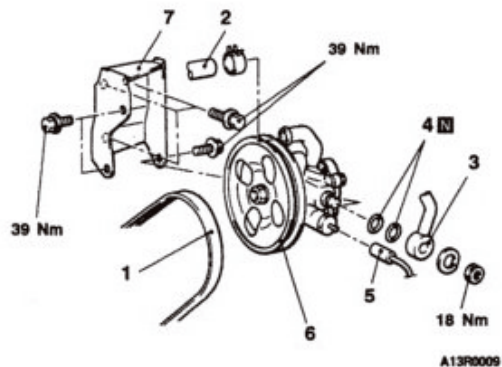
3. Drive in the dust cover with special tool until it is fully seated.
4. Check the dust cover for cracks or damage by pushing it with finger.

POWER STEERING OIL PUMP**REMOVAL AND INSTALLATION****Pre-removal Operation**

- Power Steering Fluid Draining (Refer to P.37A-7.)
- Radiator Removal (Refer to GROUP 14.)

Post-installation Operation

- Radiator Installation (Refer to GROUP 14.)
- Power Steering Fluid Supplying (Refer to P.37A-7.)
- Oil Pump Drive Belt Tension Adjusting (Refer to GROUP 11A - On-vehicle Service.)

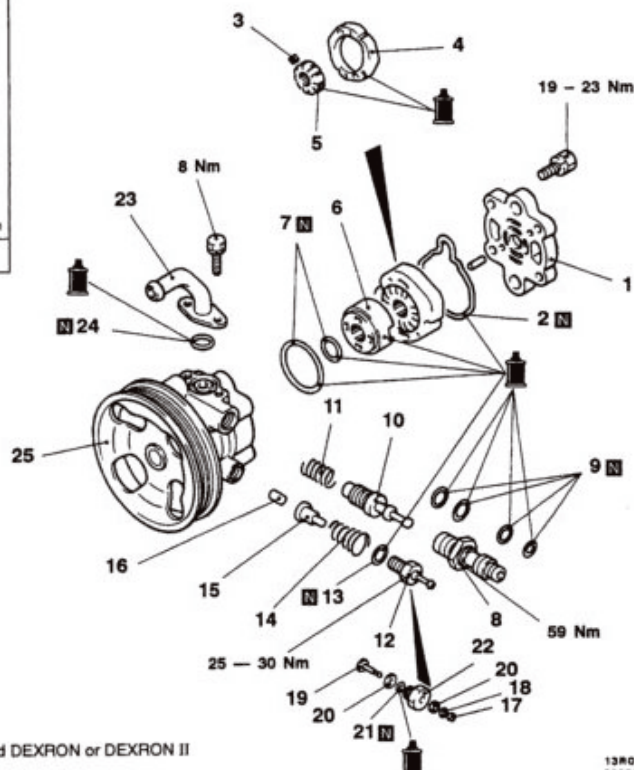
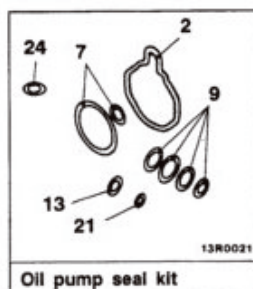
**Removal steps**

1. Drive belt
2. Suction hose
3. Pressure hose
4. O-ring
5. Pressure switch connector
6. Oil pump
7. Oil pump bracket

DISASSEMBLY AND REASSEMBLY

Caution

Do not disassemble the flow control valve.



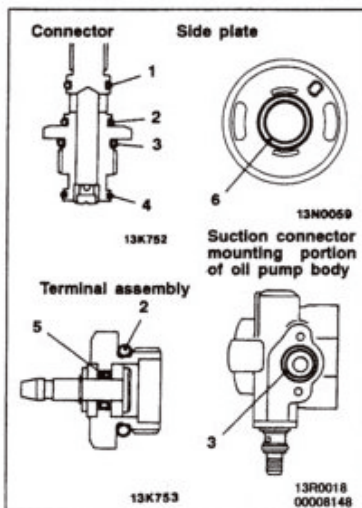
: Automatic transmission fluid DEXRON or DEXRON II

13W0020
00008147

Disassembly steps

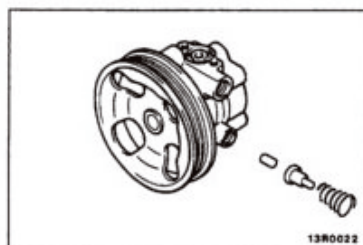
- 1. Pump cover
- ▶E◀ 2. O-ring
- ▶D◀ 3. Vanes
- ▶C◀ 4. Cam ring
- ▶A◀ 5. Rotor
- ▶A◀ 6. Side plate
- ▶A◀ 7. O-ring
- ▶A◀ 8. Connector
- ▶A◀ 9. O-ring
- ▶A◀ 10. Flow control valve
- ▶A◀ 11. Flow control spring
- ▶A◀ 12. Terminal assembly
- ▶A◀ 13. O-ring

- ▶B◀ 14. Spring
- 15. Plunger
- 16. Piston rod
- 17. Snap ring
- 18. Washer
- ▶A◀ 19. Terminal
- ▶A◀ 20. Insulator
- ▶A◀ 21. O-ring
- ▶A◀ 22. Plug
- ▶A◀ 23. Suction connector
- ▶A◀ 24. O-ring
- 25. Oil pump body

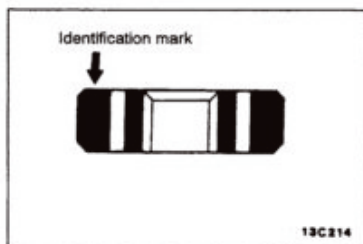
**REASSEMBLY SERVICE POINTS****►A◄ O-RINGS INSTALLATION**

Apply the specified fluid on O-rings to install.

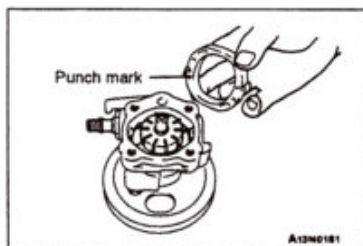
No.	I.D. × Width mm
1	11 × 1.9
2	13 × 1.9
3	17.8 × 2.4
4	13.5 × 1.5
5	3.8 × 1.9
6	16.8 × 2.4

**►B◄ SPRING INSTALLATION**

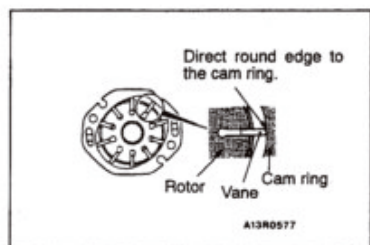
Fit the spring to the oil pump body with the larger diameter end at the terminal assembly side.

**►C◄ ROTOR INSTALLATION**

Install the rotor to the shaft with the identification mark is facing up (pump cover side).

**►D◄ CAM RING INSTALLATION**

Install the cam ring with the punch mark facing the side plate.

**►◄ VANE INSTALLATION**

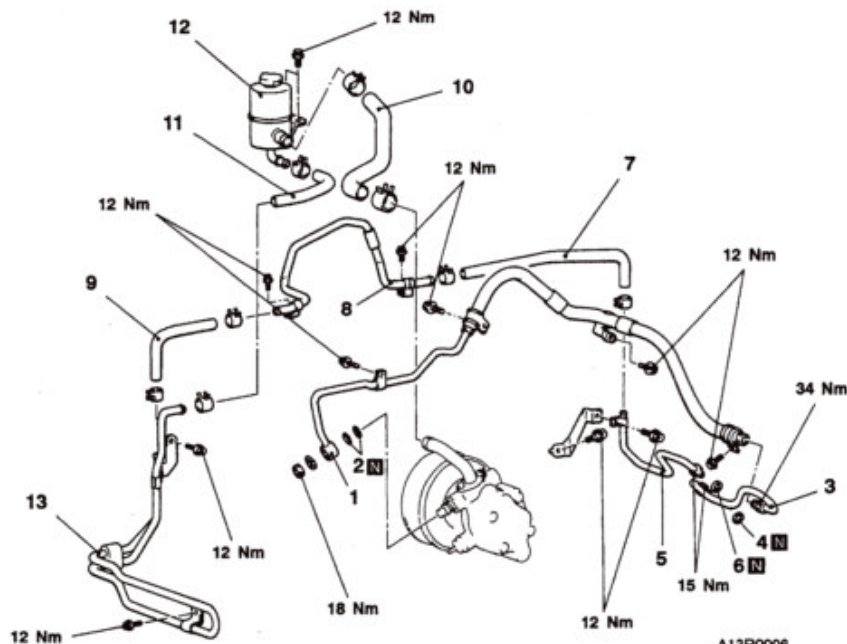
Install the vanes on the rotor, paying close attention to the installation direction.

POWER STEERING HOSES**REMOVAL AND INSTALLATION****Pre-removal Operation**

- Power Steering Fluid Draining (Refer to P.37A-7.)
- Front Bumper Removal (Refer to GROUP 51.)

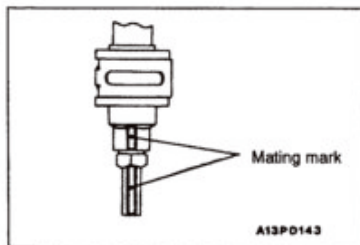
Post-Installation Operation

- Front Bumper Installation (Refer to GROUP 51.)
- Power Steering Fluid Supplying (Refer to P.37A-7.)



- ▶◀
1. Pressure pipe and hose assembly
 2. O-ring
 3. Pressure pipe
 4. O-ring
 5. Return pipe
 6. O-ring
 7. Return hose

8. Return pipe
9. Return hose
10. Suction hose
11. Return hose
12. Oil reservoir
13. Cooler pipe

**INSTALLATION SERVICE POINT****▶◀PRESSURE PIPE AND HOSE INSTALLATION**

Align the marks on the pressure hose and pressure pipe, and install the pressure hose.



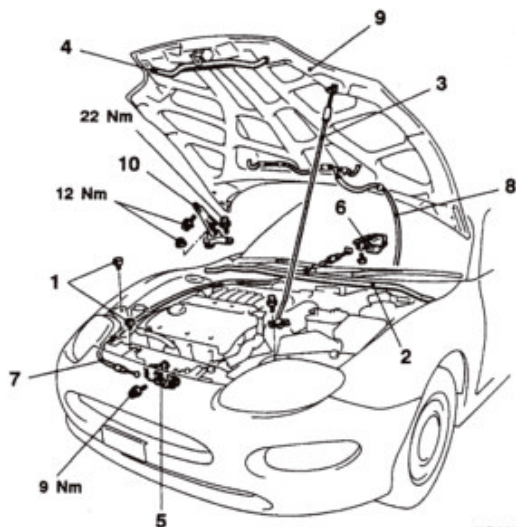
BODY

CONTENTS

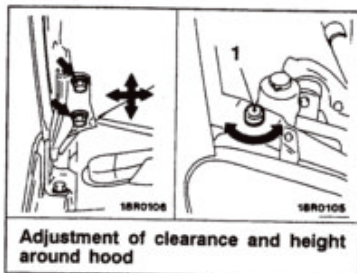
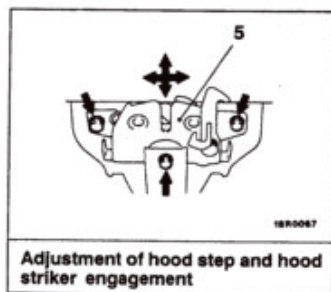
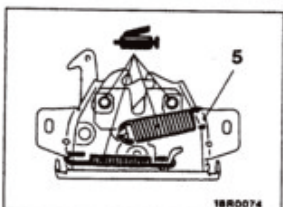
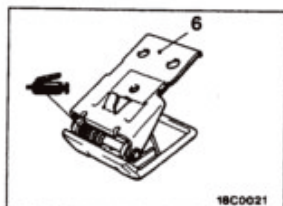
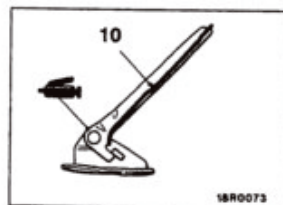
HOOD	2	Power Window Operation Current Inspection	26
TRUNK LID	3	Circuit Breaker (Incorporated in the Power Window Motor) Inspection	26
FENDER	4	Door Inside Handle Play Check and Adjustment	27
SEALANT	4	DOOR ASSEMBLY	28
FENDER	5	DOOR TRIM AND WATERPROOF FILM	30
FUEL FILLER DOOR	6	DOOR GLASS AND REGULATOR	31
WINDOW GLASS	7	DOOR HANDLE AND LATCH	34
ADHESIVES	7	DOOR BELTLINE MOULDING AND DOOR WEATHERSTRIP	37
SPECIAL TOOLS	7	KEYLESS ENTRY SYSTEM	38
WINDOW REPAIR	7	TROUBLESHOOTING	38
WINDSHIELD	10	ON-VEHICLE SERVICE	41
QUARTER WINDOW GLASS	14	How to Replace a Battery of the Transmitter	41
REAR WINDOW GLASS	15	Secret Code Registration Method	42
DOOR	17	KEYLESS ENTRY SYSTEM	43
SERVICE SPECIFICATIONS	17	SUNROOF	44
SEALANT	17	ADHESIVES	44
SPECIAL TOOLS	17	TROUBLESHOOTING	44
TROUBLESHOOTING	18	ON-VEHICLE SERVICE	48
ON-VEHICLE SERVICE	23	Water Test	48
Door Fit Adjustment	23	Sunroof Fit Adjustment	48
Door Window Glass Adjustment	23	SUNROOF	49
Power Window Safety Mechanism Check	26		
Door Outside Handle Play Check	26		

HOOD

REMOVAL AND INSTALLATION



18R0021
00006149



1. Bumper
2. Hood weatherstrip
3. Hood support rod
4. Front hood weatherstrip
5. Hood latch
6. Hood lock release handle

Hood lock release cable removal steps

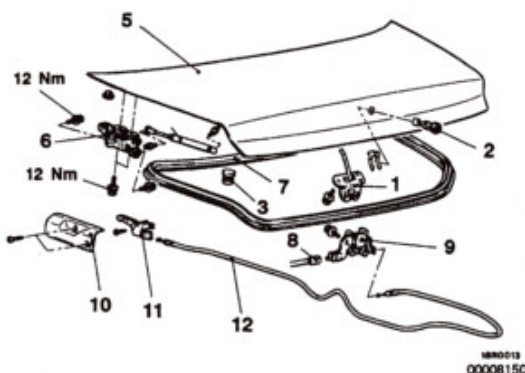
- Splash shield <RH> (Refer to P.42-5.)
- 7. Hood lock release cable

Hood and hood hinge removal steps

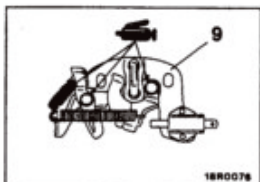
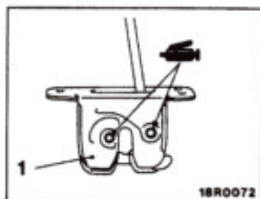
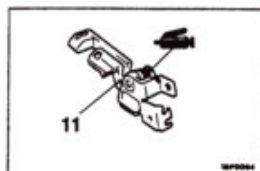
8. Washer tube connection
9. Hood
10. Hood hinge

TRUNK LID

REMOVAL AND INSTALLATION



18R0013
00008150



Adjustment of clearance around trunk lid and trunk lid striker engagement

1. Trunk lid latch assembly
2. Trunk lid lock cylinder
3. Bumper
4. Trunk lid gas spring



Trunk lid panel and trunk lid hinge removal steps



4. Trunk lid gas spring
5. Trunk lid panel
6. Trunk lid hinge

Trunk lid weatherstrip removal



4. Trunk lid gas spring
7. Trunk lid weatherstrip removal

Trunk lid striker removal steps

- Rear end trim cover (Refer to GROUP 52A - Trims.)
- 8. Trunk room lamp switch connector
- 9. Trunk lid striker

Trunk lid release handle and cable removal steps

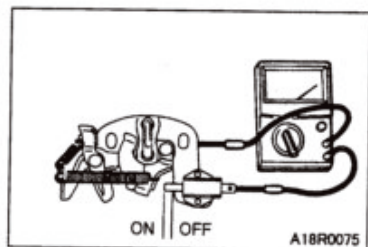
- Rear end trim cover (Refer to GROUP 52A.)
- Quarter trim (Refer to GROUP 52A.)
- Scuff plate (RH) (Refer to GROUP 52A.)
- Trunk room side trim (Refer to GROUP 52A.)
- 10. Trunk lid release handle cover
- 11. Trunk lid release handle
- 12. Trunk lid release cable

REMOVAL SERVICE POINT**◀▶ TRUNK LID GAS SPRING REMOVAL****Caution**

- (1) Never disassemble the trunk lid gas spring and do not throw it into fire.
- (2) Drill a hole in the trunk lid gas spring cylinder to drain the gas when it is disposed of.

INSTALLATION SERVICE POINT**▶◀ TRUNK LID WEATHER STRIP INSTALLATION**

Install the trunk lid weatherstrip so that the marking is aligned with the body centre line.

**INSPECTION****TRUNK ROOM LAMP SWITCH CONTINUITY CHECK**

Switch position	Terminal No.1	Body earth
ON (Released)		
OFF (Pushed)		

FENDER**SEALANT**

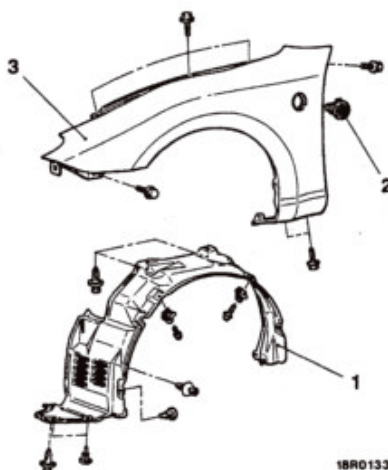
Item	Specified sealant	Remark
Splash shield	3M ATD Part No. 8625 or equivalent	Ribbon sealer

FENDER

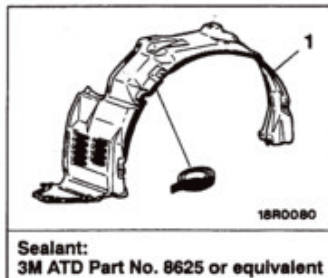
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Front Bumper Removal and Installation (Refer to GROUP 51.)
- Side Air Dam Removal and Installation (Refer to GROUP 51 – Aero Parts.)



18R0133



18R0080

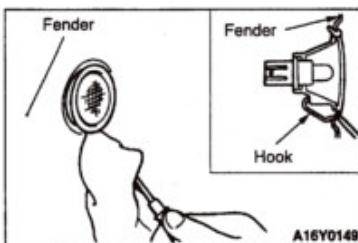
Sealant:
3M ATD Part No. 8625 or equivalent

00008312

Removal steps

- ◀A▶ ▶A▶
1. Splash shield
 2. Side turn signal lamp

3. Fender

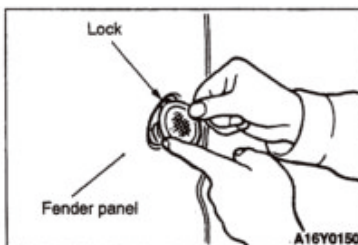


A16Y0149

REMOVAL SERVICE POINT

◀A▶ SIDE-TURN SIGNAL LAMP REMOVAL

Using a flat-tipped screwdriver, pry off the lamp hook from the fender, and then remove the side turn-signal lamp.



A16Y0150

INSTALLATION SERVICE POINT

▶A◀ SIDE TURN-SIGNAL LAMP INSTALLATION

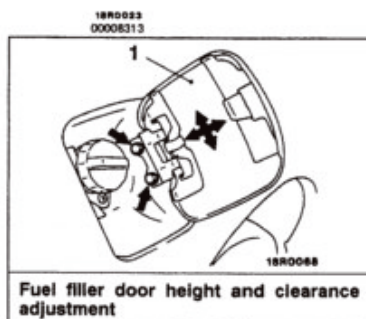
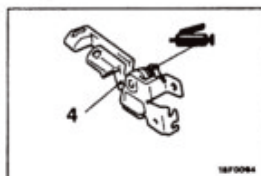
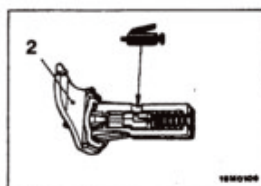
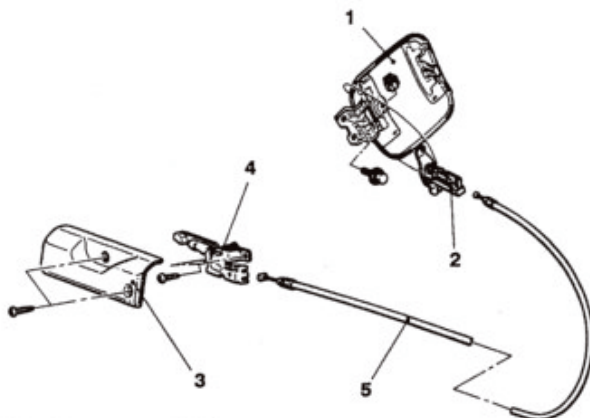
1. Insert the lock to the fender panel.
2. Push the side turn-signal lamp towards the fender and fix it with a hook.

FUEL FILLER DOOR

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Front Seat (driver's side), Rear Seat Removal and Installation (Refer to GROUP 52A.)
- Scuff Plate (RH), Trunk Side Trim (RH), Quarter Trim (RH) Removal and Installation (Refer to GROUP 52A.)



Removal steps

1. Fuel filler door pannel assembly
2. Fuel filler door hook assembly
3. Release handle cover
4. Lid lock release handle
5. Fuel filler door lock release cable

WINDOW GLASS

ADHESIVES

Items	Specified adhesives
Windshield	3M ATD Part No. 8609 Super Fast Urethane Auto Glass Sealants or equivalent
Quarter window glass	
Rear window glass	
Windshield	Double-sided tape (6 mm width, 0.125 mm thickness)
Clip	
Rear window glass	

SPECIAL TOOLS

Tool	Number	Name	Use
 B990480	MB990480	Glass holder	Removal and installation of window glass
 B990784	MB990784	Ornament remover	Removal of moulding cover

WINDOW REPAIR

The following glass sections are installed by means of a liquid urethane adhesive method.

- Windshield
- Quarter window glass
- Rear window glass

ITEMS NEEDED

Name	Remarks
Adhesive	3M ATD Part No. 8609 Super Fast Urethane Auto Glass Sealant or equivalent
Primer	3M ATD Part No. 8608 Super Fast Urethane Primer or equivalent
Spacers	Available as service part
Anti-rust solvent (or Tectyl 506T... Valvoline Oil Company)	For rust prevention
Isopropyl alcohol	For grease removal from bonded surface
Steel piano wire	Dia. x length...0.6mm x 1m For cutting adhesive
Adhesive gun	For pressing-out adhesive

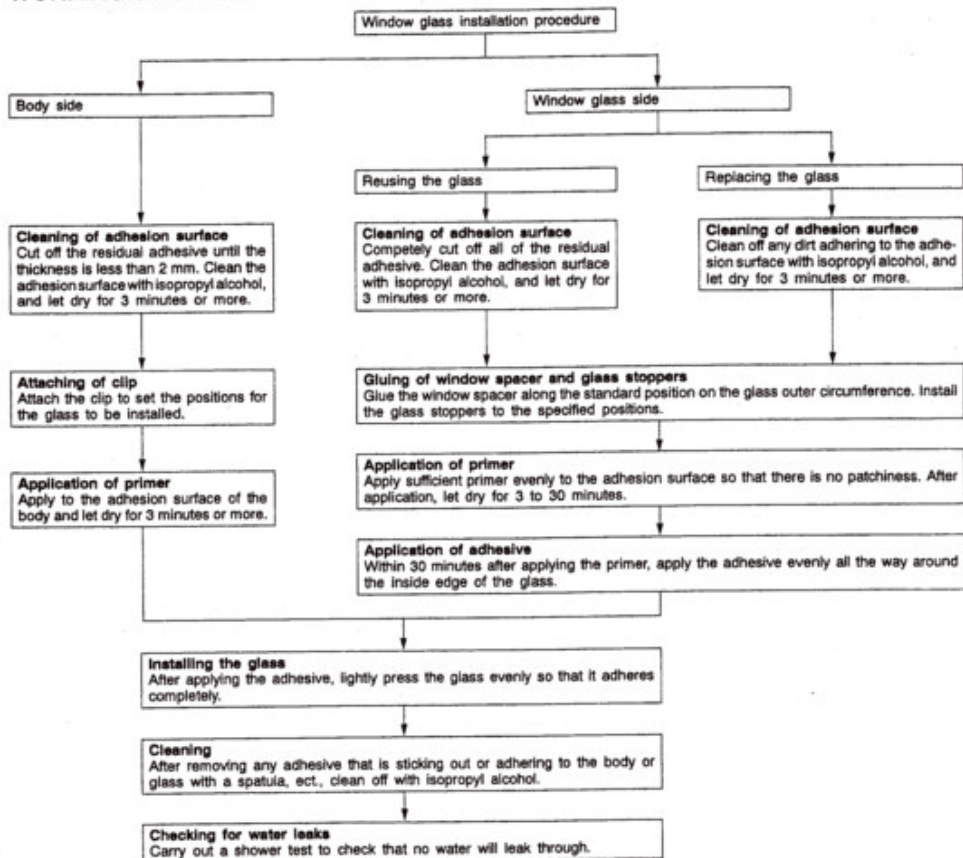
HANDLING OF AUTO WINDOW SEALER

Keep the sealant in a cool place, not exposed to the direct rays of the sun. Do not place any heavy article on the sealant nor press it, otherwise it will become deformed. Avoid storing the sealant for more than 6 months, because it will lose its sealing effect.

BODY PINCH-WELD FLANGE SERVICING.

Before servicing the body pinch-weld flange, remove old adhesive completely. If the flange requires painting, bake it after painting is completed.

WORKING PROCESS

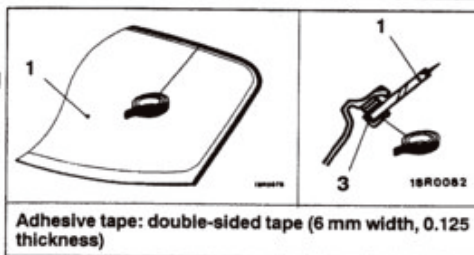
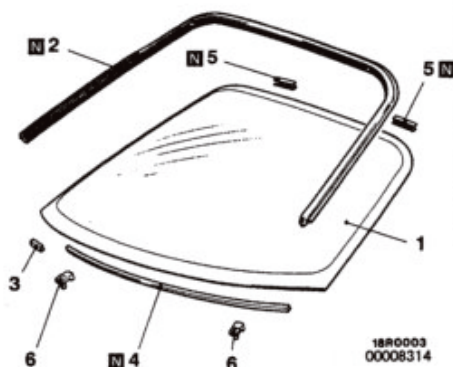
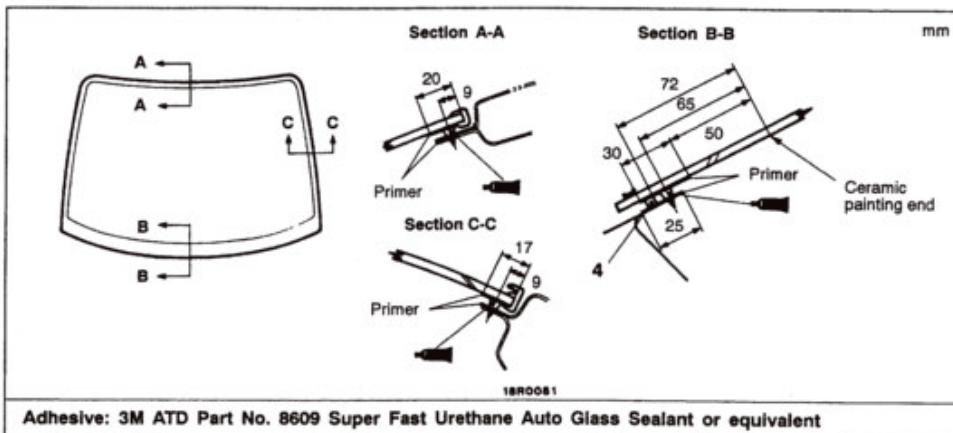


WINDSHIELD

REMOVAL AND INSTALLATION

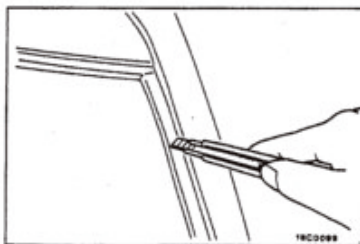
Pre-removal and Post-Installation Operation

- Front Deck Garnish Removal and Installation (Refer to GROUP 51 – Windshield Wiper and Washer.)
- Front Pillar Trim Removal and Installation (Refer to GROUP 52A.)
- Headlining Removal and Installation

**Removal steps**

1. Windshield
2. Windshield moulding
3. Clip

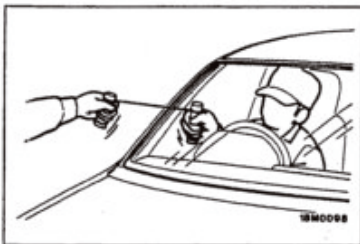
4. Window spacer
5. Dual-lock fastener
6. Windshield spacer



REMOVAL SERVICE POINTS

◀A▶ WINDSHIELD REMOVAL

1. In order to protect the body (paint surface), apply cloth tape to all body areas around the installed windshield.
2. Use a knife to cut a part of the moulding.

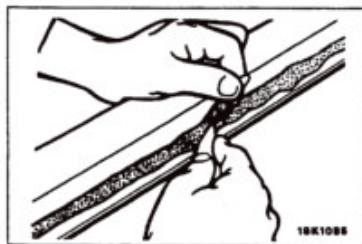
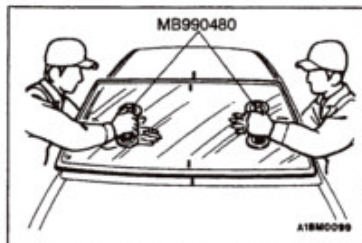


3. Using a sharp-point drill, make hole in the windshield adhesive.
4. Pass the piano wire from the inside of the vehicle through the hole.
5. Pull the piano wire alternately from the inside and outside along the windshield to cut the adhesive.

Caution

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

6. Make mating marks on the windshield and body.
7. Use the special tool to remove the windshield.



8. 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.

9. Finish the flange surfaces so that they are smooth.

Caution

- (1) Be careful not to remove more adhesive than is necessary.
- (2) Be careful also not to damage the paintwork on the body surface with the knife. If the paintwork is damaged, repair the damaged area with repair paint or anti-rust agent.

10. When reusing the windshield, remove the adhesive still adhering to the windshield, and clean with isopropyl alcohol.
11. Clean the body side in the same way.

Caution

Let the cleaned places stand for 3 minutes or more, and carry out the next procedures after they have dried. Also, do not touch any surface that has been cleaned.

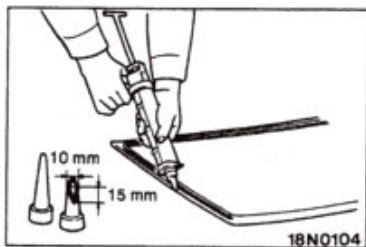
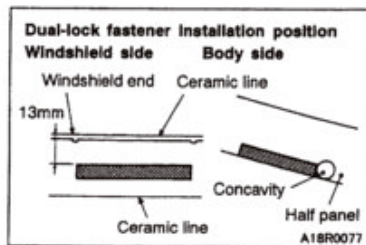
INSTALLATION SERVICE POINT

▶◀ DUAL-LOCK FASTENER/WINDOW SPACER/ CLIP/WINDSHIELD INSTALLATION

1. When replacing the windshield, temporarily set the windshield against the body, and place a mating marks on the windshield and body.
2. Use isopropyl alcohol to degrease the entire circumference of the windshield and the body flanges.
3. Soak a sponge in the primer, and apply evenly to the windshield and the body in the specified places.
4. Apply the primer, and then let it dry for 3 to 30 minutes.

Caution

- (1) 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.
- (2) Do not touch the coated surface.



5. Install the dual-lock fasteners and window spacers to the specified positions on the windshield without twists or drift.
6. Install the clips to the windshield where it corresponds to the fastener installation positions on the front deck garnish.
7. 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.

8. After applying the adhesive, align the mating marks on the windshield and the body, and then press the windshield gently to seat it.
9. Use a spatula or the like to remove any excessive adhesive. Then clean the surface with isopropyl alcohol.
10. Try not to move the vehicle until the adhesive sets. Wait 30 minutes or more, and then test for water leakage.

Caution

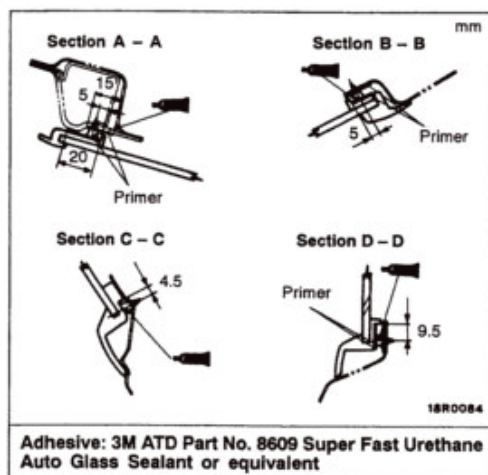
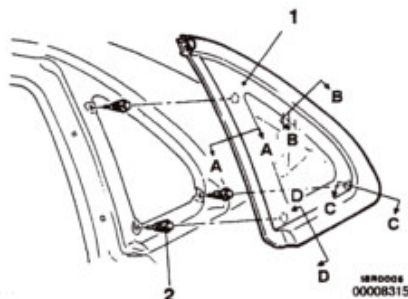
- (1) **Do not move the vehicle unless absolutely necessary.**
- (2) **When testing for water leakage, do not pinch the end of the hose to spray the water.**

QUARTER WINDOW GLASS

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Quarter Trim, Rear Pillar Trim Removal and Installation (Refer to GROUP 52A.)



Removal steps

- ◀A▶ ▶A▶
1. Quarter window glass
 2. Clip

REMOVAL SERVICE POINT

◀A▶ QUARTER WINDOW GLASS REMOVAL

1. Remove the quarter window glass in the same manner as for the windshield, except the clips. (Refer to P.42-11.)
2. Push the quarter window glass from the compartment side to remove the quarter window glass disengaging clips.

INSTALLATION SERVICE POINT

▶A▶ QUARTER WINDOW GLASS INSTALLATION

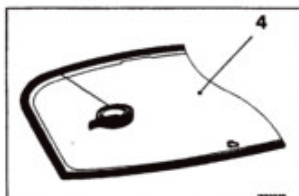
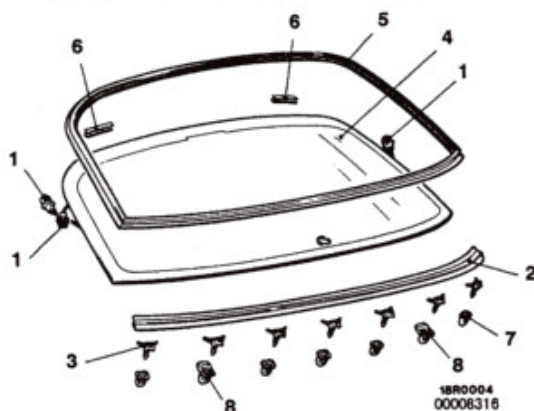
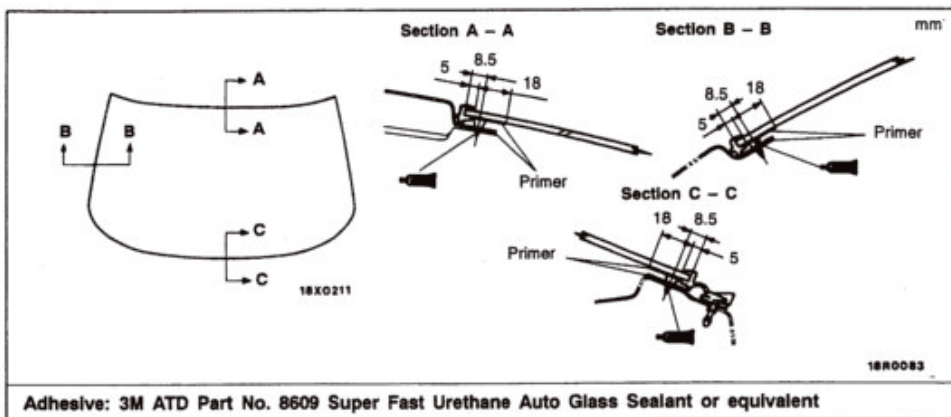
Install the quarter window glass in the same manner as for the windshield. (Refer to P.42-11.)

REAR WINDOW GLASS

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Rear Wiper Arm Removal and Installation (Refer to GROUP 51.)
- Trunk Lid Removal and Installation (Refer to P.42-3.)
- Rear Shelf Trim and Rear Pillar Trim Removal and Installation (Refer to GROUP 52A.)
- Headlining Removal and Installation



Adhesive tape:
double-sided tape [6 mm width
and 0.125 mm thickness]

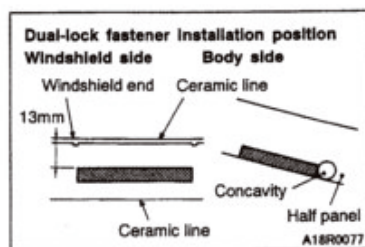
Removal steps

1. Harness connector
2. Moulding cover
3. Moulding cover clip
4. Rear window glass

5. Moulding
6. Dual-lock fastener
7. Clip grommet A
8. Spacer grommet

REMOVAL SERVICE POINT**◀A▶ REAR WINDOW GLASS REMOVAL**

Remove the rear window glass by the same procedure as for the windshield. (Refer to P.42-10.)

**INSTALLATION SERVICE POINT****▶A◀ DUAL-LOCK FASTENER/REAR WINDOW GLASS INSTALLATION**

1. Use unleaded gasoline to degrease the glass and body surfaces which the dual-lock fasteners will be attached to, and then attach the dual-lock fasteners.
2. Apply the primer and adhesive to the specified position, and install the rear window glass in the same manner as the windshield. (Refer to P.42-12.)

DOOR**SERVICE SPECIFICATIONS**

Items		Standard value
Clearance between door window glass and weather strip holder mm	Front pillar	7.4 ± 1.0
	Roof	3.3 ± 1.0
Overlap dimension between door window glass end and glass catch mm	Front pillar	3.0 ± 1.0
	Roof	3.0 ± 1.0
Clearance between door window glass end and weather strip holder mm	Center pillar	10.7 ± 1.0
Door outside handle play mm		8.5 or more
Power window operating current A		8 or more (at 20°C)
Door inside handle play mm		5.5 or more

SEALANT

Item	Specified sealant	Remark
Waterproof film	3M ATD Part No. 8625 or equivalent	Ribbon sealer

SPECIAL TOOLS

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Removal of door trim
 00003936	MB990900 or MB991164	Door adjusting wrench	Adjustment of door fit
A  B  C  D  C991223	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: probe	Measurement of terminal voltage A: Connector pin contact pressure inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection

TROUBLESHOOTING

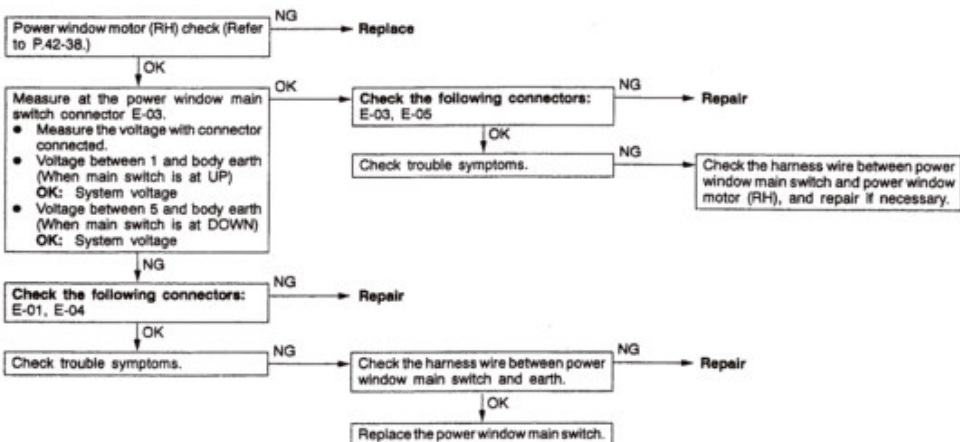
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure	Reference page
Driver's side power window cannot be operated by the power window main switch.	1	42-18
Passenger's side power window cannot be operated by the power window main switch. (However, it can be operated by the power window sub-switch.)	2	42-19
Passenger's side power window cannot be operated by the power window sub-switch. (However, it can be operated by the power window main switch.)	3	42-19
Passenger's side power window cannot be operated by both the power window sub-switch and by the power window main switch.	4	42-20
When the glass is raised, it then lowers automatically.	5	42-21
The glass is not lowered when something is jammed in the window.	6	42-21
When the glass is fully raised, it then lowers automatically.	7	42-22

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 1

Driver's side power window cannot be operated by the power window main switch.	Probable cause
The cause may be a malfunction of the earth circuit in the power window main switch or of the power supply circuit for the power window motor. The cause may also be a malfunction of the control circuit inside the power window main switch.	- Malfunction of power window motor - Malfunction of power window main switch - Malfunction of wiring harness or connector



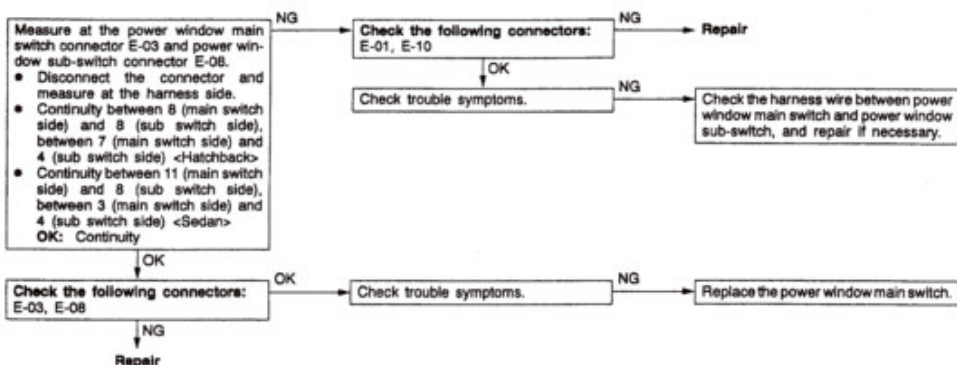
Inspection Procedure 2

Passenger's side power window cannot be operated by the power window main switch. (However, it can be operated by the power window sub-switch.)

Probable cause

The cause may be a malfunction of the power window main switch, or an open circuit or short-circuit in the communication line.

- Malfunction of power window main switch
- Malfunction of wiring harness or connector



Inspection Procedure 3

Passenger's side power window cannot be operated by the power window sub-switch. (However, it can be operated by the power window main switch.)

Probable cause

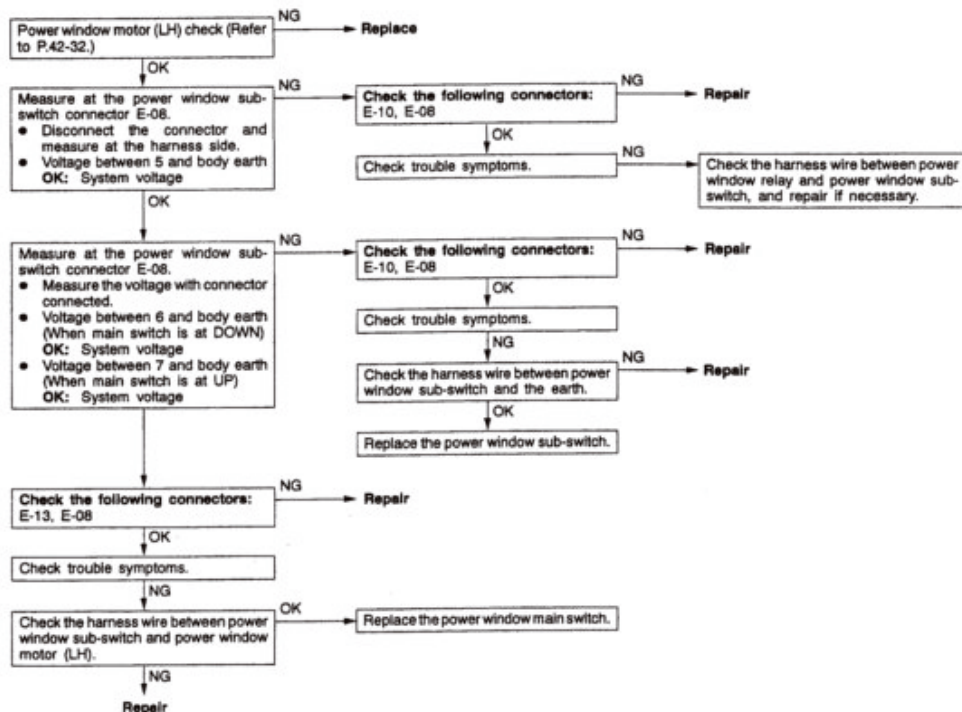
The cause may be a malfunction of the power window sub-switch.

- Malfunction of power window sub-switch

Replace the power window sub-switch

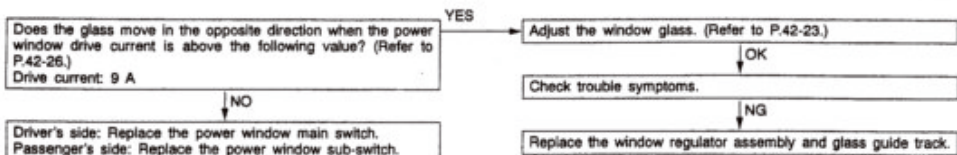
Inspection Procedure 4

Passenger's side power window cannot be operated by both the power window sub-switch and by the power window main switch.	Probable cause
One of the following items can be defective: • Power supply circuit of the power window sub-switch • Earth circuit • Power window motor (LH) • Lock switch • Power window main switch • Power window sub-switch	• Malfunction of power window main switch • Malfunction of power window sub-switch • Malfunction of power window motor (LH) • Malfunction of wiring harness or connector



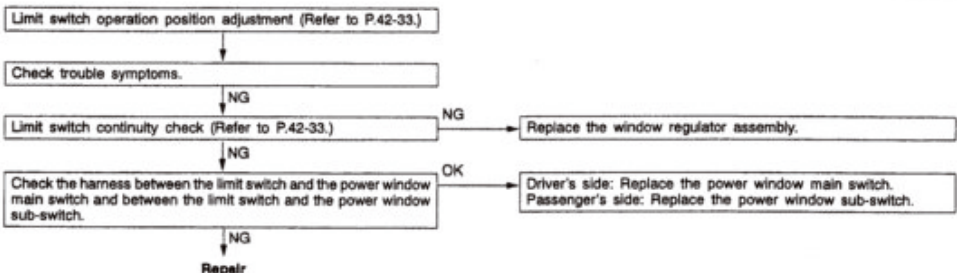
Inspection Procedure 5

When the glass is raised, it then lowers automatically.	Probable cause
If the sliding resistance is too large when the glass is being raised, it is judged that something is jammed in the window, and the window is lowered by approximately 110 mm.	- Incorrect window glass adjustment - Glass slider is incorrectly installed or warped - Malfunction of power window main switch or sub-switch



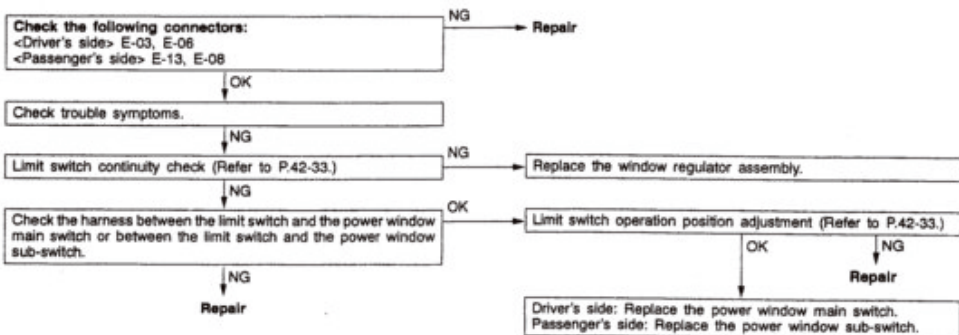
Inspection Procedure 6

The glass is not lowered when something is jammed in the window.	Probable cause
The safety mechanism is released under the following conditions, and the window will not be lowered even if something becomes jammed in it. - If the limit switch is always off - If there is an open circuit in the harness between the limit switch and the power window main switch or the power window sub-switch - If the limit switch turns off before the set value is reached - If the window is within 15 mm of being fully closed (normal setting to prevent the window from being lowered)	- Malfunction of limit switch - Malfunction of wiring harness - Malfunction of power window main switch or sub-switch - Incorrect limit switch operation position



Inspection Procedure 7

When the glass is fully raised, it then lowers automatically.	Probable cause
When the window is within 15 mm of being fully closed, the limit switch turns off to prevent the window from being lowered. However, the above problem can occur if there is a malfunction of the limit switch or a short-circuit in a harness.	• Malfunction of limit switch • Malfunction of wiring harness or connector • Incorrect limit switch operation position





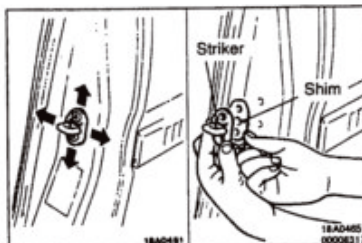
ON-VEHICLE SERVICE

DOOR FIT ADJUSTMENT

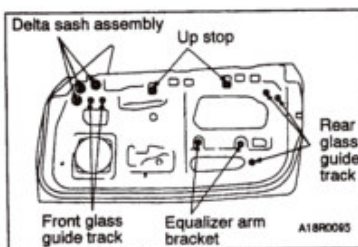
1. If the clearance between the door and the vehicle body is uneven, affix protective tape to the fender around the hinge and to the edge of the door. Then use the special tool to loosen the door hinge mounting bolts on the body, and adjust the clearance around the door so that it becomes even.
2. If the door and the body are not flush with each other, remove the door check spring pin and use the special tool to loosen the door hinge mounting bolts on the body. Then align the door.

Caution

Do not load more than 98 Nm on the special tool (MB991164).

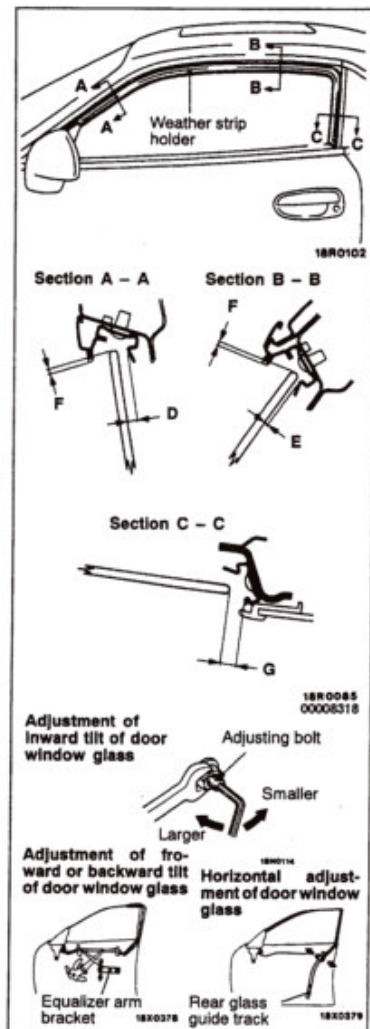


3. If the door opening and closing is heavy, adjust the meshing of the striker and the door latch (in the longitudinal direction) by adding shims to the striker and by moving the striker up and down or to the left and right.



DOOR WINDOW GLASS ADJUSTMENT

1. Remove the door trim and the waterproof film. (Refer to P.42-30.)
2. Remove the drip line weatherstrip. (Refer to P.42-37.)
3. Loosen the mounting bolts for the front glass guide track, rear glass guide track, equalizer arm bracket, up stop and delta sash assembly.



4. Adjust the inward tilt of the door glass by turning the adjusting bolts on the front and rear glass guide tracks so that the clearances (D) and (E) between the door window glass and weatherstrip holder satisfy the standard values.

Standard value:

(D) 7.4 ± 1.0 mm

(E) 3.3 ± 1.0 mm

Caution

Turn each two bolts on the front and rear glass guide tracks by the same amount.

5. Carry out the following adjustments so that the overlapping dimension (F) of the door window glass end and glass catch, and clearance (G) between the door window glass end and weatherstrip holder satisfy the standard values. Horizontal adjustment of the door window glass; move the rear glass guide track forward and backward. Forward and backward tilt adjustment; move the equalizer arm bracket up and down.

Standard value:

(F) 3.0 ± 1.0 mm

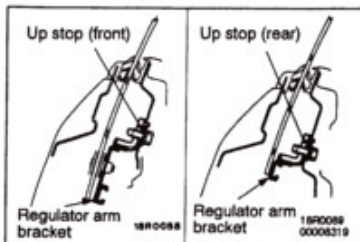
(G) 10.7 ± 1.0 mm

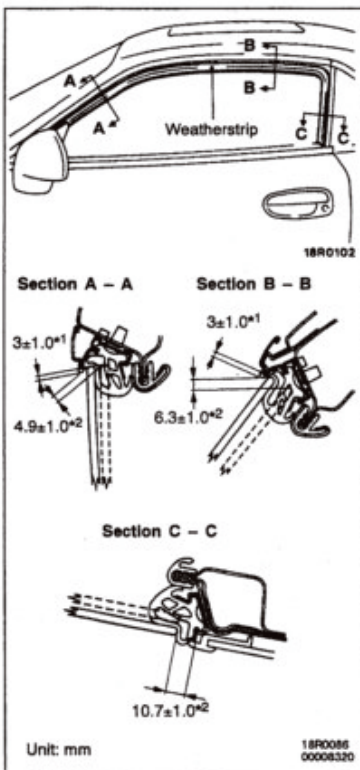
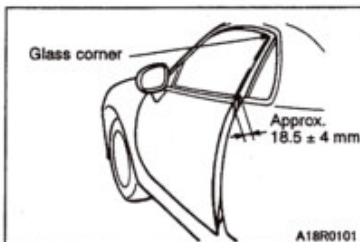
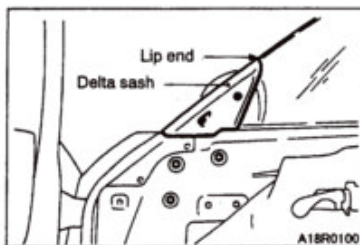
Caution

Do not let to turn the inner stabilizer adjusting bolt.

6. Tighten the front and rear glass guide tracks mounting bolts.
- Caution**
Do not let to turn the bolts of each guide track.
7. Tighten the equalizer arm bracket mounting bolt.

8. Tighten each up stop while pushing it toward the regulator arm bracket.





9. Tighten the delta sash mounting bolts while adjusting that the delta sash may be flush with the door glass.
10. Install the drip line weatherstrip to the weatherstrip holder.

Caution

Be careful to install the drip line weatherstrip without twists or drifts.

11. Check the alignment of the door window glass as follows:
 - (1) Close the door gradually with the door glass fully closed. When the corner of the front door glass contacts the weatherstrip, check that the dimension between the front door and side panel outer is approx. 18.5 ± 4 mm as shown.

NOTE

If the door glass is not tilted inward sufficiently, the door glass will interfere with the glass catch when the door or door glass is closed fully. If the door glass is tilted inward excessively, the door glass or door can not be closed fully.

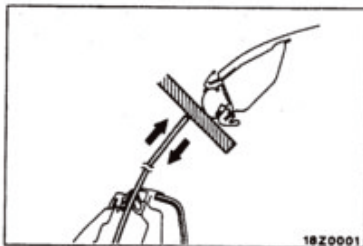
- (2) Close the door with the door glass fully closed. Check that overlap dimension of the door glass and door glass catch is as shown by (*1).

NOTE

If the dimension is too narrow, the door glass will interfere with the glass catch. If the dimension is too wide, the glass will not overlap the glass catch, resulting in wind noise.

- (3) Close the door gradually with the door glass fully closed. When the door glass passes below the glass catch, check that clearance (*2) between the glass and glass catch ends is at the shown dimension.
- (4) Close the door, and check that the door glass can move up and down smoothly without noise.
- (5) When the door is closed fully, the door glass end, glass catch and weatherstrip should be parallel each other, and the two up stops should be contact the regulator arm bracket.

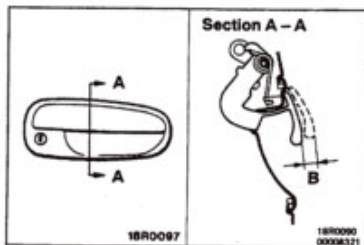
12. Install the waterproof film and door trim.



18Z0001

POWER WINDOW SAFETY MECHANISM CHECK

1. Place a wooden board with a thickness of approximately 20 mm as shown in the illustration, and then raise the window glass.
2. Check that the window lowers by a distance of approximately 110 mm when the window clamps the wooden board. If this doesn't happen, refer to "Troubleshooting" (P.42-18).



18R0097

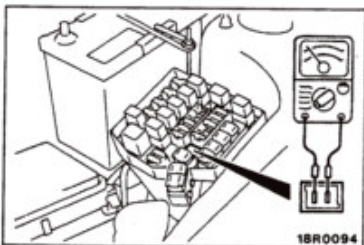
18R0090
00006321

DOOR OUTSIDE HANDLE PLAY CHECK

1. Check that the door outside handle play is within the standard value range.

Standard value (B): 8.5 mm or more

2. If the door outside handle play is not within the standard value range, check the door outside handle and the door latch assembly. Replace, if necessary.



18R0094

POWER WINDOW OPERATION CURRENT INSPECTION

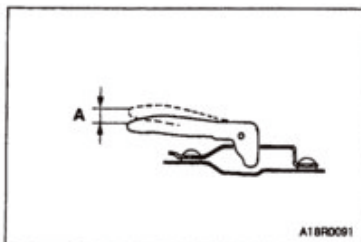
1. Remove the power window fuse and connect a circuit tester as shown in the illustration.
2. When the power window switch is operated to the UP position, a large amount of current flows at the time the window starts to close and when it is fully closed, so measure the operation current in the interval between these two points.

Standard value: 8 A or more (at 20°C)

3. If the operation current is outside the standard value, refer to "Troubleshooting" (P.42-18).

CIRCUIT BREAKER (INCORPORATED IN THE POWER WINDOW MOTOR) INSPECTION

1. Operate the power window switch to the UP position to fully close the window glass, and keep operating the switch for a further 10 seconds.
2. Release the power window switch from the UP position and immediately press it to the DOWN position. The condition of the circuit breaker is good if the power window glass starts to move downwards within 60 seconds.



DOOR INSIDE HANDLE PLAY CHECK AND ADJUSTMENT

1. Check that the door inside handle play is within the standard value range.

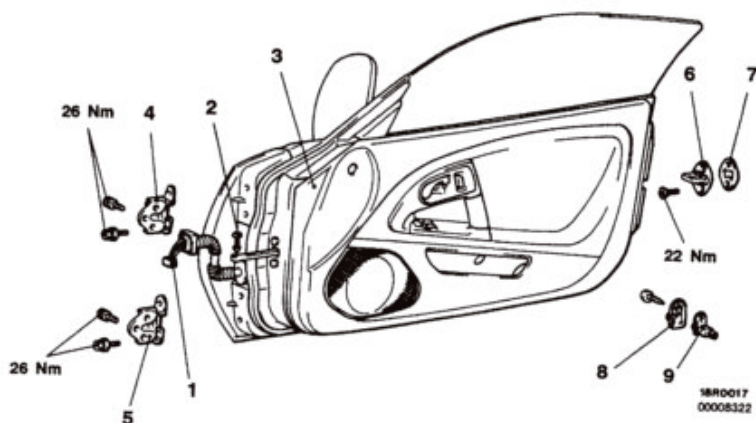
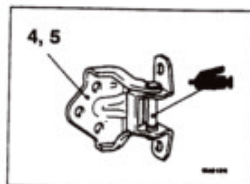
Standard value (A): 5.5 mm or more

2. If the door inside handle play is outside the standard value range, check the door inside handle and the door latch assembly. Replace, if necessary.

DOOR ASSEMBLY

REMOVAL AND INSTALLATION

Post-Installation Operation
Door Adjustment (Refer to P.42-23.)



Door assembly removal steps

1. Harness connector
2. Spring pin
3. Door assembly
4. Door upper hinge
5. Door lower hinge

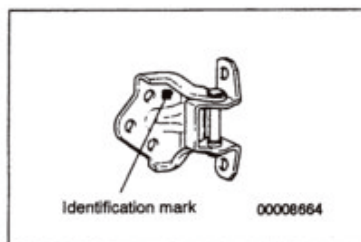


Striker removal steps

6. Striker
7. Striker shim

Door switch removal steps

8. Door switch cap
9. Door switch

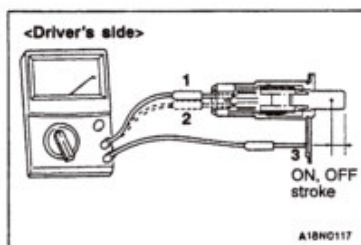


INSTALLATION SERVICE POINT

▶A◀ DOOR LOWER HINGE/DOOR UPPER HINGE INSTALLATION

The door hinges differ according to where they are used, so check the identification marks before installation.

Applicable location		Identification mark
Left side door	Upper hinge	E1
	Lower hinge	F1
Right side door	Upper hinge	F1
	Lower hinge	E1

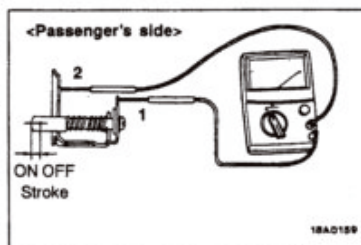


INSPECTION

DOOR SWITCH CONTINUITY CHECK

<Driver's side>

Switch position	Terminal No.		
	1	2	3
Released (ON)	○	○	○
Depressed (OFF)			

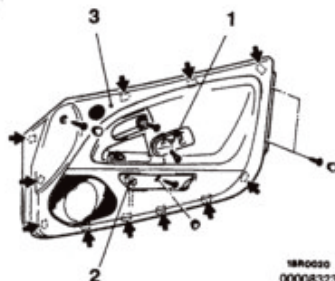
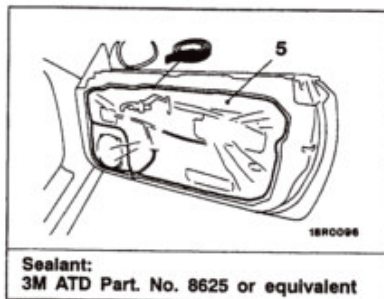
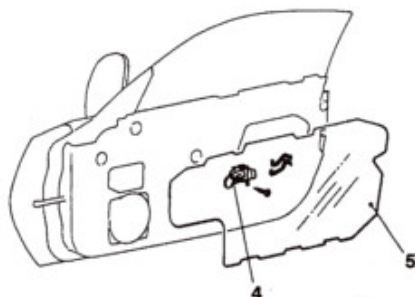


<Passenger's side>

Switch position	Terminal No.	
	1	2
Released (ON)	○	○
Depressed (OFF)		

DOOR TRIM AND WATERPROOF FILM**REMOVAL AND INSTALLATION**

Pre-removal and Post-Installation Operation
Door Window Inner Weather Strip Removal and
Installation (Refer to P.42-37.)

**NOTE**

← : Resine clip position

Removal steps

1. Cover
2. Harness connector
3. Door trim

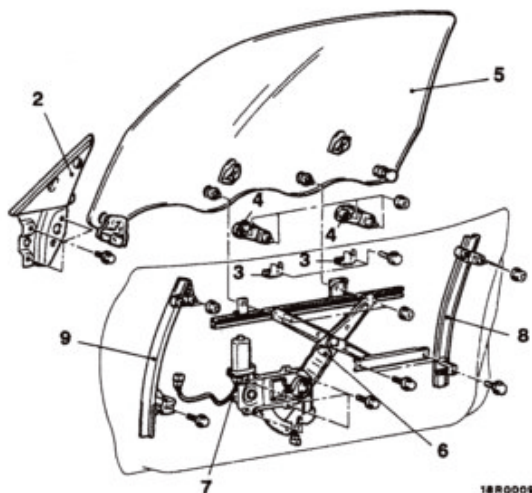
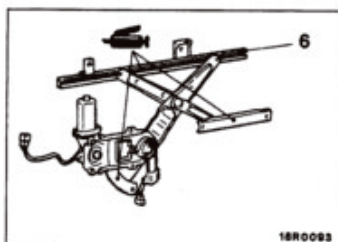
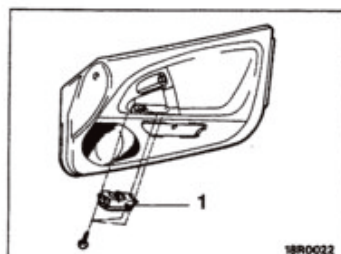
4. Door inside handle
5. Waterproof film

DOOR GLASS AND REGULATOR

REMOVAL AND INSTALLATION

Post-installation Operation

- Door Window Glass Adjustment (Refer to P.42-23.)



Power window switch removal steps

- Door trim (Refer to P.42-30.)
- 1. Power window switch

Window regulator assembly removal steps

- Waterproof film (Refer to P.42-30.)
- Door bettline moulding (Refer to P.42-37.)
- 2. Delta sash

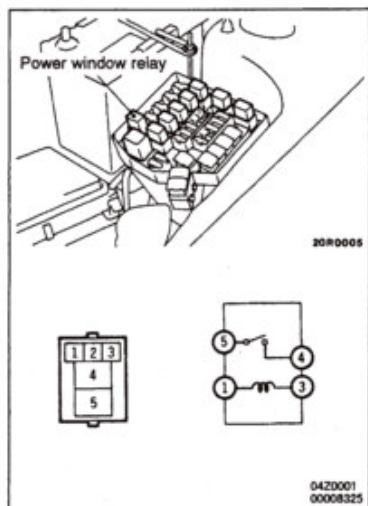
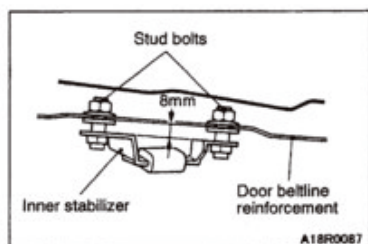
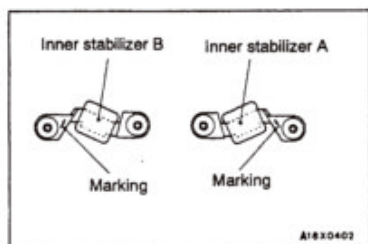
- ▶A◀
3. Up stop
 4. Inner stabilizer B <right door>, inner stabilizer A <left door>
 5. Door window glass
 6. Window regulator assembly
 7. Power window motor
 8. Rear glass guide track
 9. Front glass guide track

INSTALLATION SERVICE POINT

▶A◀ INNER STABILIZER B/INNER STABILIZER A INSTALLATION

1. Check the identification colour of the inner stabilizers A and B.

Item		Identification colour
Inner stabilizer A	Left door	Gray
Inner stabilizer B	Right door	Yellow



2. Install the inner stabilizer so that the marking faces up.

3. Tighten or loosen the stud bolts to adjust the clearance between the inner stabilizer and door beltline inner reinforcement to the dimension shown in the figure.

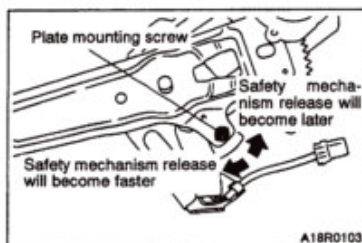
INSPECTION

POWER WINDOW RELAY CONTINUITY CHECK

Battery voltage	Terminal No.			
	1	3	4	5
Not applied	○	○		
Applied	⊕	⊖	○	○

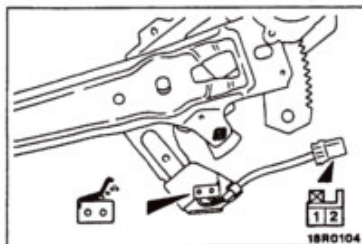
POWER WINDOW MOTOR CHECK

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.



ADJUSTMENT OF LIMIT SWITCH OPERATION POSITION

Loosen the plate mounting screw, and adjust the operation position of the limit switch (safety mechanism release position) by moving the plate to left or right.



LIMIT SWITCH CONTINUITY CHECK

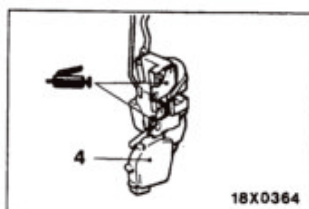
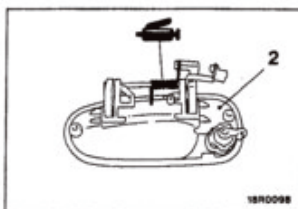
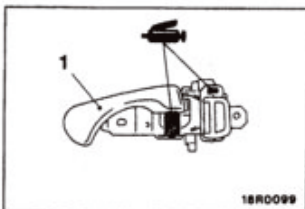
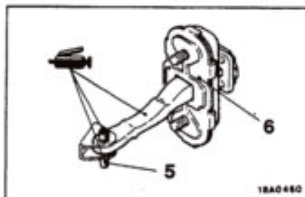
Switch position	Terminal No.	
	1	3
ON	○	○
OFF		

DOOR HANDLE AND LATCH

REMOVAL AND INSTALLATION

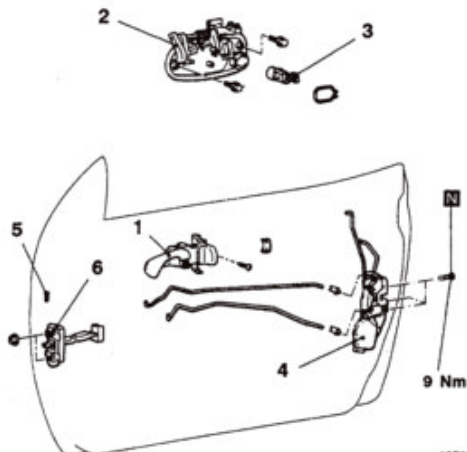
Pre-removal Operation

- Door Trim Removal (Refer to P.42-30.)



Post-Installation Operation

- Door Inside Handle Play Check (Refer to P.42-27.)
- Door Adjustment (Refer to P.42-23.)
- Door Trim Installation (Refer to P.42-31.)



Door handle and door latch assembly removal steps

1. Door inside handle
- Waterproof film (Refer to P.42-31.)
2. Door outside handle
3. Door lock key cylinder
4. Door latch assembly

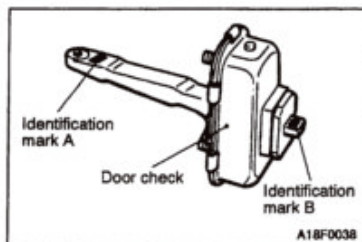
Door check removal steps

1. Door inside handle
- Waterproof film (Refer to P.42-31.)
5. Spring pin
6. Door check

Door-lock ECU removal

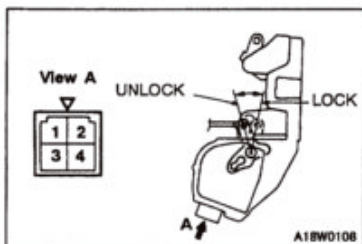
- ## 7. Door-lock ECU



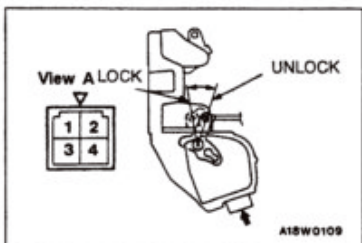
**INSTALLATION SERVICE POINT****▶A◀ DOOR CHECK INSTALLATION**

Install the door check so that the identification mark faces upwards.

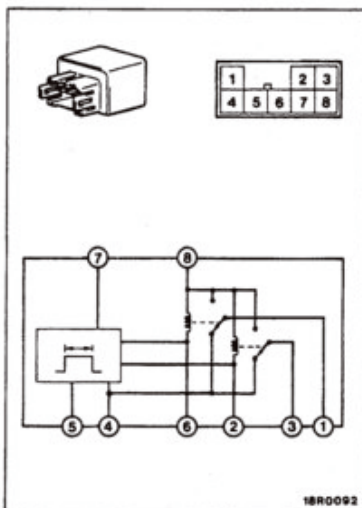
Applicable location	Identification mark	
	A	B
Left door	WL	L
Right door	WR	R

**INSPECTION****DOOR LOCK ACTUATOR CHECK****<Right side>**

Rod position	Terminal No.				Rod operation
	1	2	3	4	
LOCK			⊖	⊕	LOCK position → UNLOCK position
UNLOCK			⊕	⊖	UNLOCK position → LOCK position
LOCK					
UNLOCK	○	○			

**<Left side>**

Rod position	Terminal No.				Rod operation
	1	2	3	4	
LOCK			⊕	⊖	LOCK position → UNLOCK position
UNLOCK			⊖	⊕	UNLOCK position → LOCK position

**DOOR-LOCK ECU CHECK**

1. Apply a battery voltage to the terminals No.7 and No.8 and earth the terminal No.4.
2. Using a needle-type voltmeter, measure the voltage under the following condition.

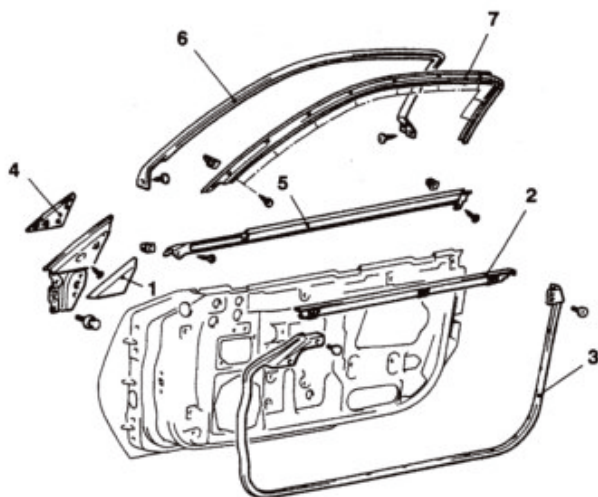
Measurement condition	Terminal No.	
	1	3
Earth the terminal No.5	0 V	The needle swings immediately when terminal No.5 is earthed.
Release the terminal No.5 from earth	The needle swings immediately when terminal No.5 is released.	0 V
Earth the terminal No.2	0 V	Battery voltage
Earth the terminal No.6	Battery voltage	0 V

NOTE

Because the battery voltage is applied to the terminals No.1 and No.3 for approx. 0.5 second, the needle swings momentary.

3. Check that there is continuity between the terminals No.1, No.3 and No.4.

DOOR BELTLINE MOULDING AND DOOR WEATHERSTRIP REMOVAL AND INSTALLATION



A18R0018

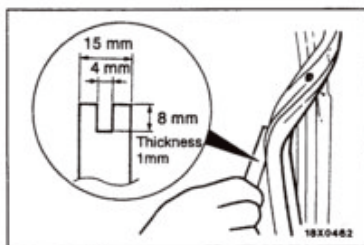
Door beltline mounting removal steps

1. Delta cover inner
2. Door window inner weatherstrip
- Door trim (Refer to P.42-30.)
3. Door outer opening weatherstrip
4. Delta cover outer
5. Door beltline moulding



Dripline weatherstrip removal steps

6. Dripline weatherstrip
7. Dripline weatherstrip holder



REMOVAL SERVICE POINT

◀A▶ DOOR OUTER OPENING WEATHERSTRIP REMOVAL

Make a tool as shown in the illustration to remove the door opening weatherstrip.

INSTALLATION SERVICE POINT

▶A◀ DOOR OUTER OPENING WEATHERSTRIP INSTALLATION

The clip colour identifies the left and right weatherstrips, so be sure to use the colours so as to install correctly.

Item	Identification colour
Left door	White
Right door	Orange

KEYLESS ENTRY SYSTEM

TROUBLESHOOTING

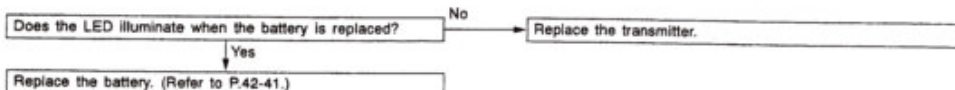
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure No.	Inspection procedure No.	Reference page
None of the doors can be locked or unlocked.	When the lock switch on the transmitter is pressed, its LED is not illuminated.	1	42-38
	When the lock switch on the transmitter is pressed, its LED is illuminated.	2	42-39
Some of the doors can be locked or unlocked.		3	42-39
All of the doors can be locked and unlocked using the transmitter, but the map lamp does not flash or illuminate. (However, the map lamp operates normally when the doors are opened and closed.)		4	42-40

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

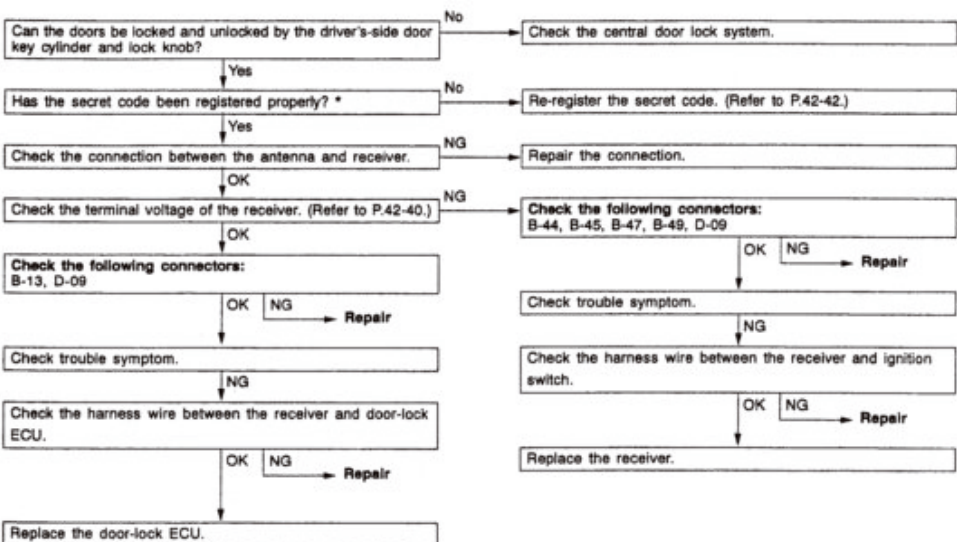
INSPECTION PROCEDURE 1

When the lock switch on the transmitter is pressed, its LED is not illuminated, and none of the doors can be locked or unlocked.	Probable cause
If the LED is not illuminated, the battery may be flat or the transmitter may be defective.	• Flat transmitter battery • Malfunction of transmitter



INSPECTION PROCEDURE 2

When the lock switch on the transmitter is pressed, its LED is illuminated, but none of the doors can be locked or unlocked.	Probable cause
The central door lock system does not work by means of the transmitter, but works by means of the door lock key. In this case, the transmitter or receiver may be defective.	- Malfunction of central door lock system - Malfunction of receiver - Improper antenna connection

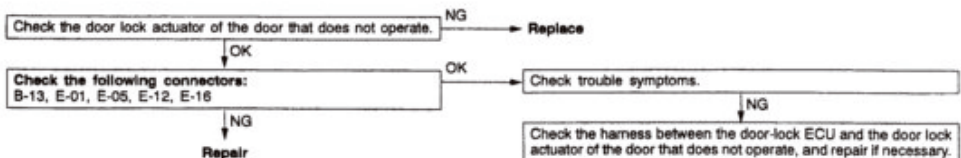


NOTE

*: This should be done if a transmitter or receiver has been replaced, and if a secret code has not been registered properly.

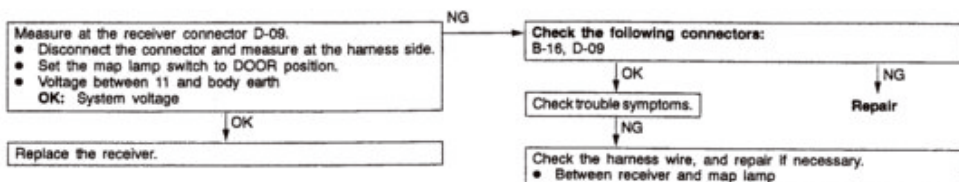
INSPECTION PROCEDURE 3

Some of the doors can be locked or unlocked	Probable cause
The cause may be a malfunction of a wiring harness between the door-lock ECU and the door lock actuator	- Malfunction of door lock actuator - Malfunction of wiring harness or connector



INSPECTION PROCEDURE 4

All of the doors can be locked and unlocked using the transmitter, but the map lamp does not flash or illuminate. (However, the map lamp operates normally when the doors are opened and closed.)	Probable cause
If the map lamp operates normally when the doors are opened and closed, the cause of the problem may be a malfunction of the receiver or of the harness between the receiver and the map lamp.	• Malfunction of receiver • Malfunction of connector or wiring harness



INSPECTION OF RECEIVER TERMINAL VOLTAGE

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

18W0311

Terminal	Signal name	Conditions		Terminal voltage
2	Door switch	Map lamp switch: OFF or ON	One door is open (Door switch: ON)	0 V
			All doors are closed (Door switch: OFF)	0 V
		Map lamp switch: DOOR	One door is open (Door switch: ON)	0 V
			All doors are closed (Door switch: OFF)	Battery voltage
6	Door lock actuator switch (driver's side)	LOCK		5 V (pulse output*)
		UNLOCK		0 V
8	Key reminder switch	OFF (When ignition key is inserted)		5 V (pulse output*)
		ON (When ignition key is removed)		0 V
9	Ignition switch	Ignition switch: ACC or ON		Battery voltage
		Ignition switch: OFF		0 V
10	Receiver power supply	At all times		Battery voltage
11	Map lamp output	All doors are closed (Door switch: OFF)	Map lamp switch: OFF or ON	0 V
			Map lamp switch: DOOR	Battery voltage

Terminal	Signal name	Conditions	Terminal voltage
12	Door lock output	When door lock control unit outputs signal, or door lock switch: LOCK	0 V
		Other than above	Battery voltage
14	Door unlock output	When door lock control unit outputs signal, or door lock switch or door lock key cylinder: UNLOCK	0 V
		Other than above	Battery voltage
20	Earth	At all times	0 V

NOTE

Values marked with * should be measured using an oscilloscope. (The value will alternate between 0 V and 0.03 V if a circuit tester is used.)

ON-VEHICLE SERVICE**HOW TO REPLACE A BATTERY OF THE TRANSMITTER**

1. Remove the set screw to remove the battery from the transmitter.
2. Install a battery with its (+) side face-down.

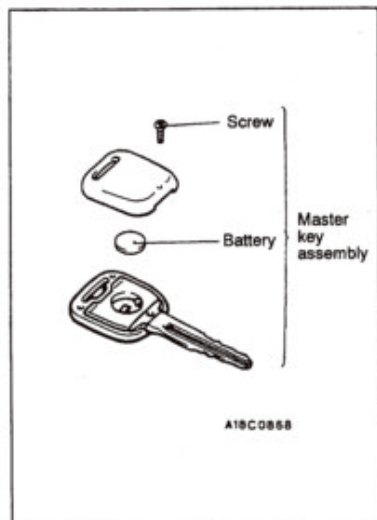
Battery required for replacement:

Coin type battery CR2032

3. Insert the claw first, and with care not to displace the O-ring, assemble the transmitter.
4. Check to see if the keyless entry system operates.

NOTE

- (1) Do not let water or dust stick to the inside of the transmitter when it is open. Also, do not touch the precision electronic device.
- (2) If the O-ring is displaced during the assembly of the transmitter, water or dust penetrates in it causing trouble.



SECRET CODE REGISTRATION METHOD

Each individual secret code is registered inside the transmitter, and so it is necessary to register these codes with the EEPROM inside the receiver in the following cases.

- When either the transmitter or receiver is replaced;
- If a second transmitter is to be used;
- If it appears that a problem is occurring because of faulty registration of a code.

A maximum of two different codes can be stored in the memory area of the EEPROM (two different transmitters can be used). When the code for the first transmitter is registered, the previously-registered codes for two transmitters are cleared. Therefore, if you are using two transmitters or are adding a second transmitter, the codes for both transmitters must be registered at the same time.

1. Check that the doors lock normally when the key is used.
2. Connect the MUT-II to the diagnosis connector.

NOTE

This will connect terminal (1) of the diagnosis connector to earth, and the system will be in secret code registration standby mode.

Caution

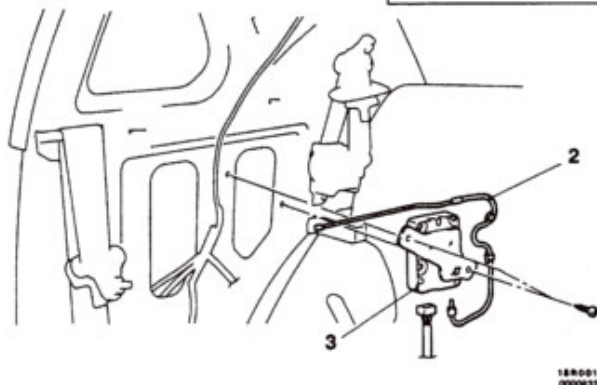
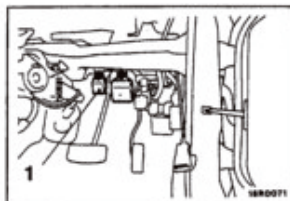
Always turn the ignition switch to OFF before connecting and disconnecting the MUT-II.

3. Close all doors.
4. Turn the ignition switch to the ACC position, then return to the OFF position.

5. Press the transmitter switch, and then press it two times within 10 seconds of the first press. This will register the code.
6. After registration is completed, the doors will be automatically locked and unlocked once.
7. If you are using two transmitters or have added a second transmitter, the same registration procedure should be carried out for the second transmitter, and it should be carried out within one minute after registration of the code for the first transmitter has been completed. After the second registration is completed, the doors will be automatically locked and unlocked once.
8. Registration mode will be cancelled under the following conditions.
 - When the secret codes for two transmitters have been registered;
 - When 1 minute has passed after registration mode started;
 - If the MUT-II is disconnected (the earth connection is broken);
 - If the ignition switch is turned to ON;
 - If any of the doors are opened;
9. After the registration is completed, carry out the following work, and then check that the keyless entry system operates normally.
 - Remove the ignition key.
 - Close all of the doors.

KEYLESS ENTRY SYSTEM**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

- Side Cover Removal and Installation (Refer to GROUP 52A – Instrument Panel.)

**Door-lock ECU removal**

1. Door-lock-ECU

Receiver removal steps

- Quarter trim (Refer to GROUP 52A.)
- 2. Antenna
- 3. Receiver

INSPECTION**DOOR-LOCK ECU CHECK**

Refer to P.42-36.

SUNROOF

ADHESIVES

Items	Specified sealant	Remarks
Roof lid glass seal	3M 8155 Quick Fix Adhesive	As required
Roof lid glass mounting screw	3M Stud Locking 4170	As required

TROUBLESHOOTING

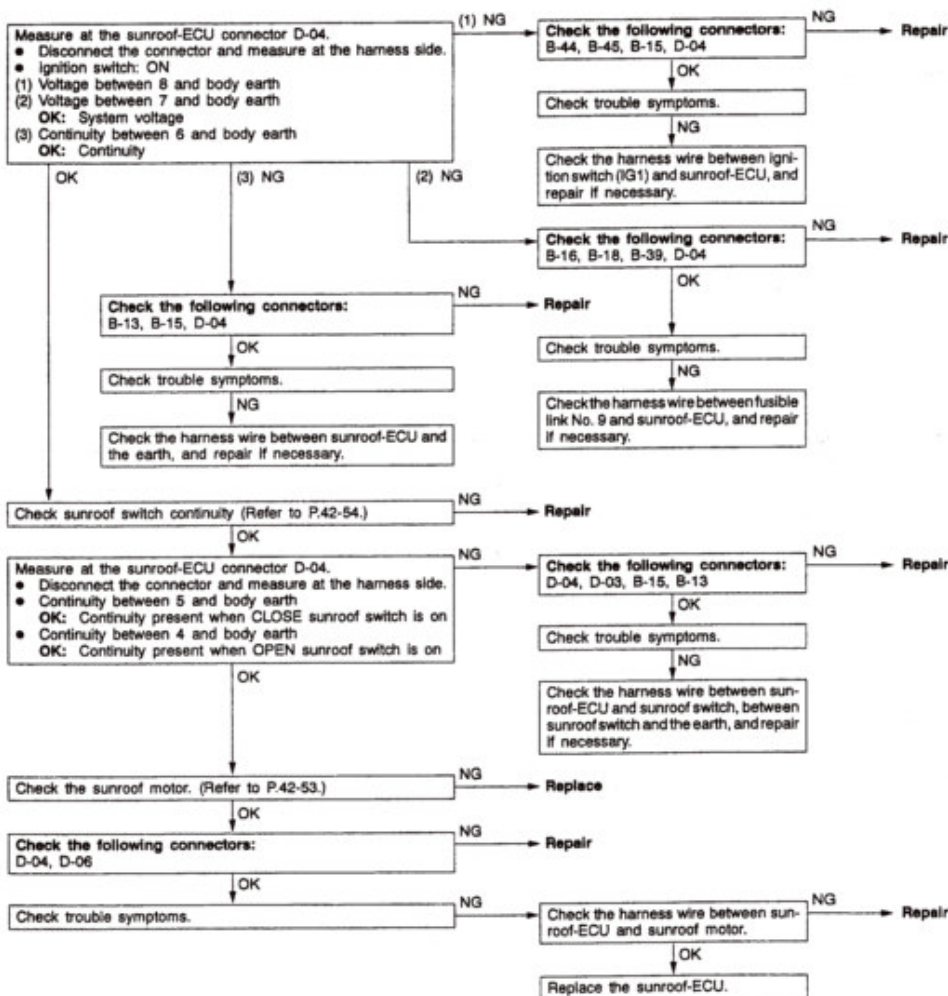
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure	Reference page
The sunroof does not operate when the ignition switch is turned to ON.	1	42-44
The motor does not reverse its direction when a load of 140 N or more is applied while the sunroof is closing.	2	42-45
The timer does not operate for 30 seconds after the ignition switch is turned to OFF.	3	42-46
Opening or closing of the sunroof is possible for 30 seconds immediately after turning the ignition switch to OFF, but the timer function does not operate continuously for another 30 seconds if the driver's side door is opened within 30 seconds.	4	42-46

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 1

The sunroof does not operate when the ignition switch is turned to ON.	Probable cause
One of the following items may be defective. • Sunroof switch • Sunroof motor • Sunroof-ECU • Power supply circuit • Earth circuit	• Malfunction of sunroof switch • Malfunction of sunroof motor • Malfunction of sunroof-ECU • Malfunction of wiring harness or connector



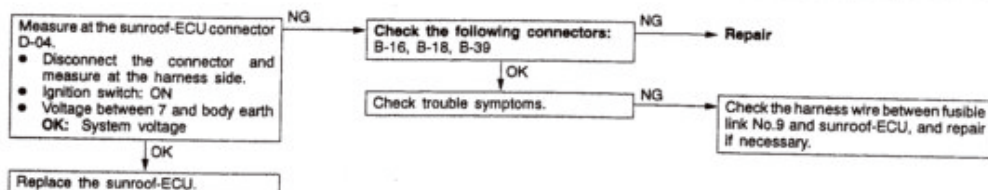
Inspection Procedure 2

The motor does not reverse its direction when a load of 140 N or more is applied while the sunroof is closing.	Probable cause
The sunroof-ECU monitors the load conditions from the amount of current flowing to the motor. If more than the constant amount of current is flowing, the direction of motor operation is reversed to prevent jamming. If the motor does not reverse direction even when an excessive load is being applied, the cause may be a malfunction of the sunroof-ECU.	Malfunction of sunroof-ECU

Replace the sunroof-ECU.

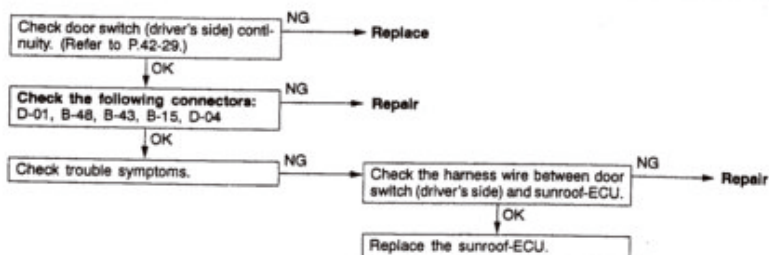
Inspection Procedure 3

The timer does not operate for 30 seconds after the ignition switch is turned to OFF.	Probable cause
The sunroof-ECU has a timer function which operates for 30 seconds after the ignition switch is turned to OFF. If the timer does not operate, the cause may be a malfunction of the sunroof-ECU or of the wiring harness or connector.	• Malfunction of sunroof-ECU • Malfunction of wiring harness or connector



Inspection Procedure 4

Opening or closing of the sunroof is possible for 30 seconds immediately after turning the ignition switch to OFF, but the timer function does not operate continuously for another 30 seconds if the driver's side door is opened within 30 seconds.	Probable cause
The operation period for the sunroof timer is extended when an on signal is output from the driver's-side door switch. Because of this, if the timer operation period is not extended, the cause may be a malfunction of the door switch input circuit.	• Malfunction of the door switch (driver's side) • Malfunction of sunroof-ECU • Malfunction of wiring harness or connector

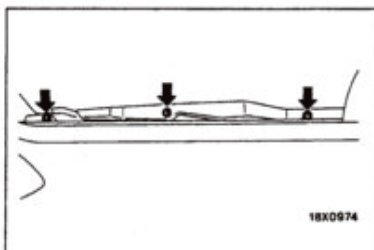
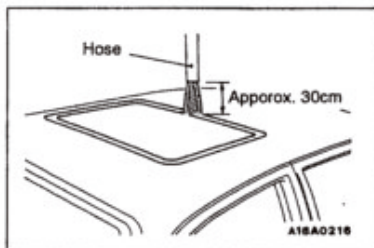
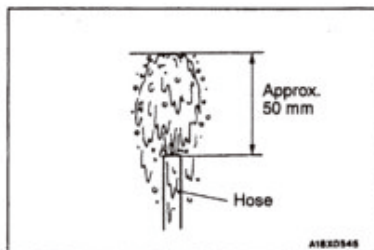


TERMINAL VOLTAGE CHART



00008665

Terminal No.	Check Item	Check Condition		Normal Condition
1, 2	—	—		—
3	Door switch input	Driver's door switch	ON	0 V
			OFF	Battery voltage
4	Sunroof switch (open input)	Sunroof switch (open position)	ON	0 V
			OFF	Battery voltage
5	Sunroof switch (close or down) input	Sunroof switch (close position or down position)	ON	0 V
			OFF	Battery voltage
6	Earth	Always		0 V
7	ECU power supply	Always		Battery voltage
8	Timer operation power supply	Ignition switch: ON		Battery voltage
9, 10	Motor output	While sunroof is operating		Battery voltage
		Other than the above		0 V



ON-VEHICLE SERVICE

WATER TEST

Check if there are any leaks in the sunroof by the following procedure.

1. Fully close the roof lid glass.
2. Adjust the water pressure so that water comes out of the hose to a height of approximately 50 cm when the hose is held vertically facing upwards.
3. Hold the end of the hose approximately 30 cm above the roof and let the water run onto the weatherstrip for 5 minutes or more.
4. While doing this, check if any water leaks through into the passenger compartment from around the roof lid glass.

SUNROOF FIT ADJUSTMENT

Close the sunroof completely and adjust it as follows:

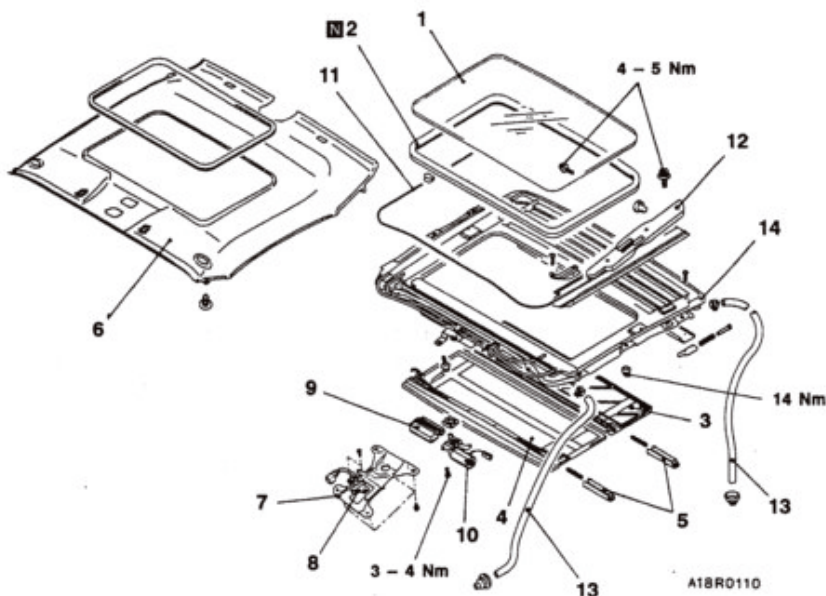
1. Lower the front part of roof lid glass seal 1 mm from the roof surface.
2. Lift the rear part of roof lid glass seal 1 mm from the roof surface.
3. After adjustment, tighten the roof lid glass mounting screws.

SUNROOF

REMOVAL AND INSTALLATION

Post-Installation Operation

- Sunroof Water Test (Refer to P.42-48.)
- Sunroof Fit Adjustment (Refer to P.42-48.)



Roof lid glass removal steps

◀A▶ ▶F▶
◀B▶ ▶E▶

1. Roof lid glass assembly
2. Roof lid glass seal

Sunshade removal steps

◀A▶ ▶F▶
◀C▶ ▶C▶
◀C▶ ▶C▶
◀D▶ ▶C▶

1. Roof lid glass
3. Rear sunshade
4. Front sunshade
5. Sunshade slide block

Sunroof switch removal steps

6. Headlining
7. Bracket
8. Sunroof switch

Sunroof-ECU removal steps

◀E▶ ▶D▶

6. Headlining
9. Sunroof-ECU

Sunroof motor removal steps

6. Headlining
7. Bracket
10. Sunroof motor

Sunroof guide assembly removal steps

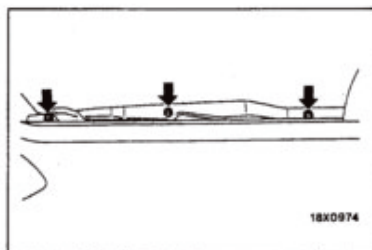
◀A▶ ▶F▶
◀C▶ ▶C▶
◀C▶ ▶C▶
◀F▶ ▶B▶
◀G▶ ▶B▶

1. Roof lid glass
3. Rear sunshade
4. Front sunshade
11. Sunroof drive cable
12. Sunroof guide assembly

Sunroof assembly removal steps

◀H▶ ▶A▶

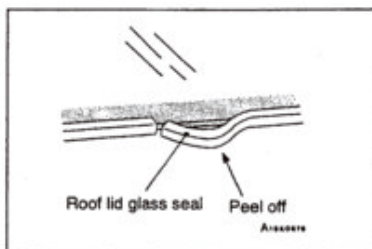
6. Headlining
7. Bracket
13. Drain hose connection
14. Sunroof assembly

**REMOVAL SERVICE POINTS****◀A▶ ROOF LID GLASS REMOVAL**

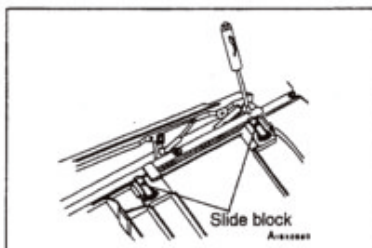
1. Tilt up the sunroof.
2. Remove the roof lid glass mounting screws and lift the roof lid glass to remove it.

Caution

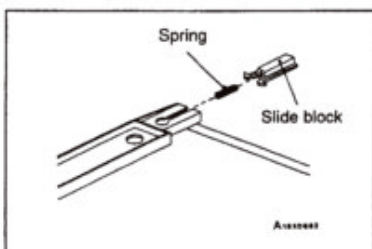
Do not close the sunroof with roof lid glass removed. Otherwise, the sunroof guide assembly will be damaged.

**◀B▶ ROOF LID GLASS SEAL REMOVAL**

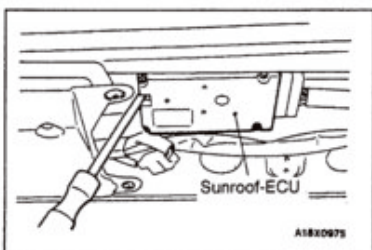
Peel off the seal, starting from the seam.

**◀C▶ REAR SUNSHADE/FRONT SUNSHADE REMOVAL**

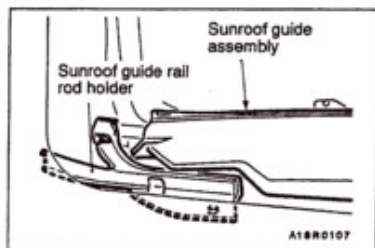
1. Push the rear sunshade slide block to the sunshade to remove it from the sunroof guide assembly, and then remove the rear sunshade.
2. Remove the front sunshade in the same manner as step 1.

**◀D▶ SUNSHADE SLIDE BLOCK REMOVAL**

Pinch the slide block end by finger, and pull the slide block to remove it and spring from the slide channel.

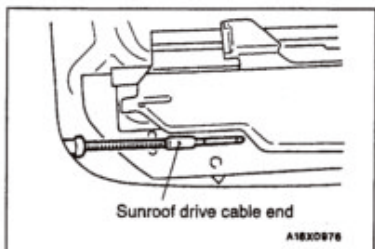
**◀E▶ SUNROOF-ECU REMOVAL**

1. Close the roof lid glass completely.
2. Place a flat-tipped screwdriver on the tab of the sunroof-ECU, and push the tab to the right.
3. Lower the sunroof-ECU and let it slide to the left.



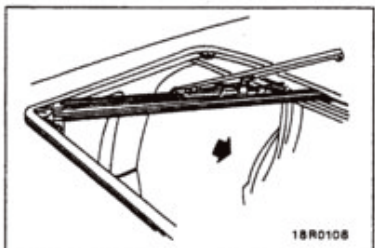
◀F▶ SUNROOF DRIVE CABLE REMOVAL

1. Set the sunroof guide assembly to the sunroof tilt-up position. Remove the sunroof guide rail rod holder.
2. Set the sunroof guide assembly to the sunroof closed position. Remove the sunroof drive cable from the sunroof guide assembly.



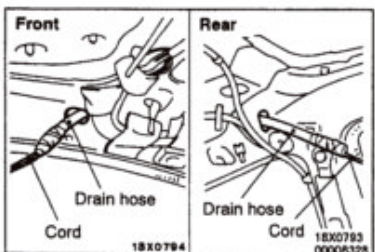
◀G▶ SUNROOF GUIDE ASSEMBLY REMOVAL

1. Move the roof drip rear channel backward and remove the guide assembly screw, rear screw and spacer.
2. Move the rear part of guide assembly to the centre of vehicle and remove the guide assembly.



◀H▶ DRAIN HOSE REMOVAL

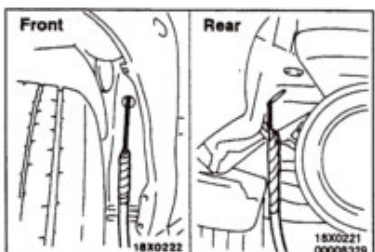
Remove the grommet, tie a cord to the end of the drain hose. Using a plastic tape, wrap the drain hose end to secure the cord, and pull out the drain hose through the wheel house.

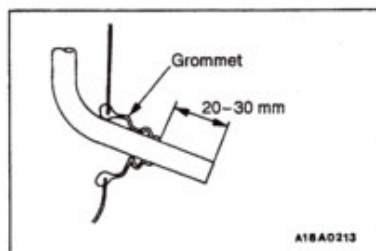


INSTALLATION SERVICE POINTS

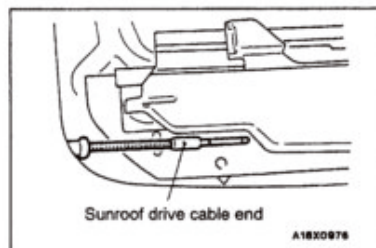
▶A▶ DRAIN HOSE INSTALLATION

1. Tie the cord that was used during removal to the end of the drain hose, and wind tape around it so that there is no unevenness.
2. Pull the cord to pull through the drain hose





3. Make the protrusion from the drain hose grommet as shown in the illustration.

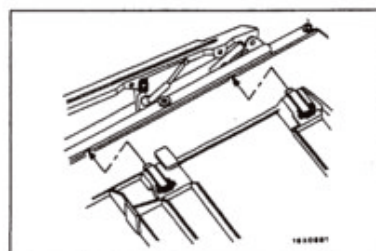


►B◄ SUNROOF DRIVE CABLE INSTALLATION

Caution

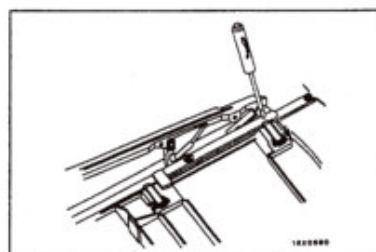
1. If the cable is twisted, replace it. When replacing cable, right and left cables should be replaced as a set.
2. Apply a grease to the cables before installation.

Set the sunroof guide assembly to the sunroof closed position and install the sunroof drive cable to the sunroof guide assembly.

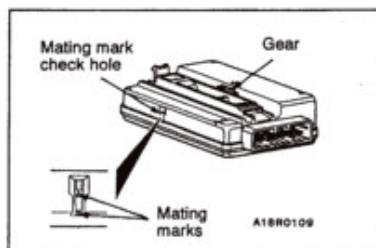


►C◄ FRONT SUNSHADE/REAR SUNSHADE INSTALLATION

1. Insert the slide block (at the right side of the front sunshade) into the lower slide groove of the right guide assembly.
2. Engage the slide block (at the left side of the front sunshade) into the lower slide groove of the left guide assembly while pushing it toward the sunshade.

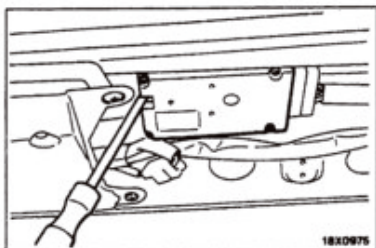


3. Push the front sunshade to move it to the front position.
4. Make sure the stop tab of the rear sunshade contacts the stop bumper of the guide assembly. Engage the slide block (at the right side of the rear sunshade) into the upper slide groove at the right guide assembly. Engage the slide block (at the left side of the rear sunshade) into the upper slide groove at the left guide assembly.
5. Move the sunshade forward and backward to check that it moves smoothly.

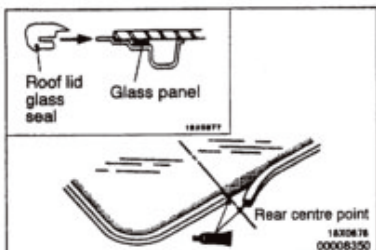


►D◄ SUNROOF-ECU INSTALLATION

1. Close the sunroof completely.
2. Turn the sunroof-ECU gear until two mating marks (white) are aligned, observing them through the mating mark check hole.



- Place a flat-tipped screwdriver on the tab of the sunroof-ECU, and push the tab to the right while being careful not to pinch the wires.



►E◄ ROOF LID GLASS SEAL INSTALLATION

- Position one end of the roof lid glass seal at the rear centre of the roof lid glass. Install the roof lid glass seal by pressing it into the glass while stretching it slightly.
- Leave the other end of the roof lid glass seal by approx. 10 cm without attaching it to the roof lid glass. Cut the other end of the seal at the points where the seal ends overlap approx. 3 mm.
- Apply the specified adhesive to the seal ends, and fix the seal ends.

Specified adhesive: 3M 8155 Quick Fix Adhesive

- Press the seal which has not been installed correctly into the glass panel.

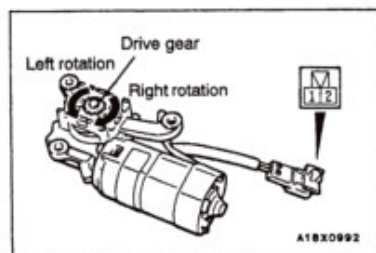
NOTE

The 3-mm overlap strengthens the bonding at the seal ends.

►F◄ ROOF LID GLASS INSTALLATION

- Place the roof lid glass on the guide assembly and align the installation holes.
- Apply the specified adhesive to the roof lid glass installation screws, and then install the roof lid glass.

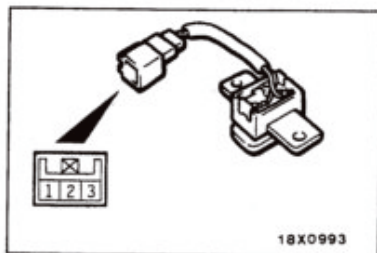
Specified adhesive: 3M Stud Locking 4170



INSPECTION

SUNROOF MOTOR CHECK

Battery connection terminal		Drive gear rotation direction
1	2	
⊖	⊕	Right
⊕	⊖	Left



SUNROOF SWITCH CONTINUITY CHECK

Switch position	Terminal No.		
	1	2	3
Slide open	○	○	
Off			
Slide close		○	○

EXTERIOR

CONTENTS

SERVICE SPECIFICATIONS	2	AERO PARTS	5
ADHESIVE	2	WINDSHIELD WIPER AND WASHER	7
SPECIAL TOOL	2	REAR WIPER AND WASHER	10
FRONT BUMPER	2	MARKS	12
REAR BUMPER	4	DOOR MIRROR	14

SERVICE SPECIFICATIONS

Items		Standard value
Windshield wiper arm and blade assembly stop position (Distance from the top of wiper blade to the end of front deck garnish) mm	LH	33 ± 5
	RH	33 ± 5
Rear wiper arm and blade assembly stop position (Distance from the top of wiper blade to the glass end line) mm		8 ± 3

ADHESIVE

Items	Specified sealant and adhesives
Side air dam (rear)	Adhesive tape: double-sided tape (5 mm width and 1.2 mm thickness)

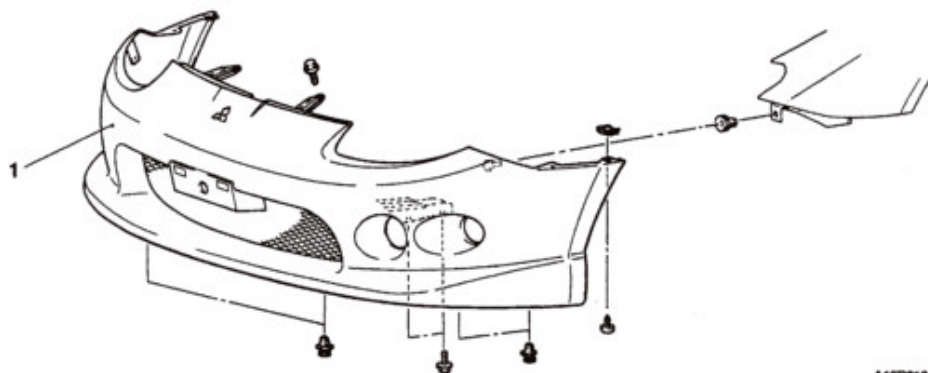
SPECIAL TOOL

Tool	Number	Name	Use
	MB990784	Ornament remover	- Removal of electrically remote-controlled mirror switch - Removal of side air dam (rear)

FRONT BUMPER

REMOVAL AND INSTALLATION

- Pre-removal and Post-installation Operation**
- Splash Shield Removal and Installation
(Refer to GROUP 42 – Fender.)

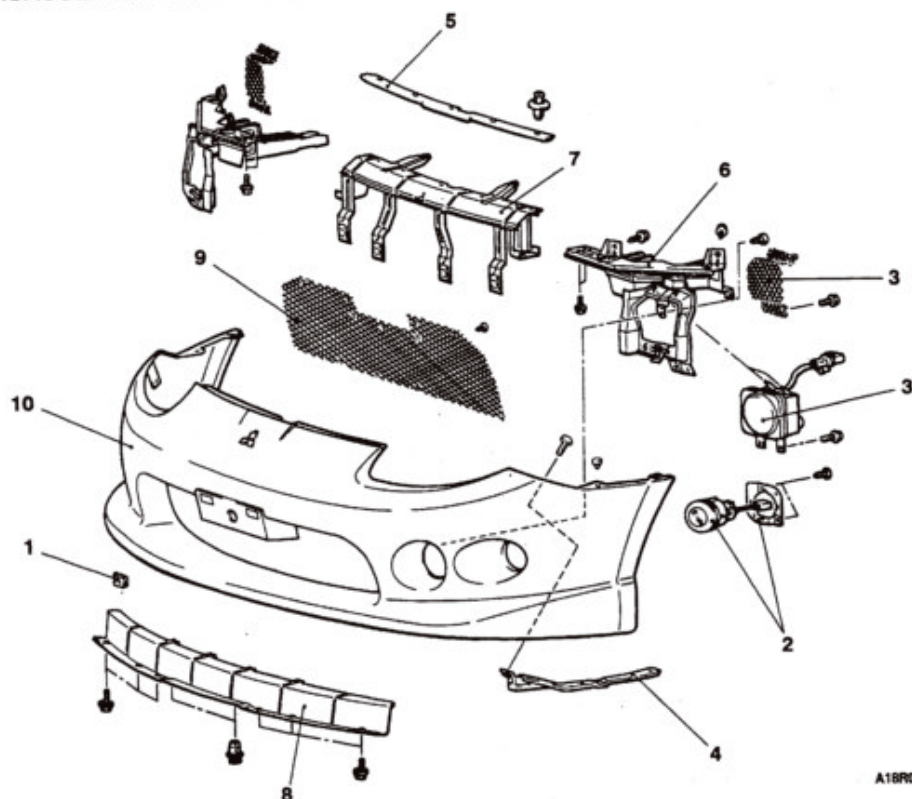


A16P0121

Removal steps

- Fog lamp and turn-signal lamp connector connection
1. Front bumper assembly

DISASSEMBLY AND REASSEMBLY



A1BR0125

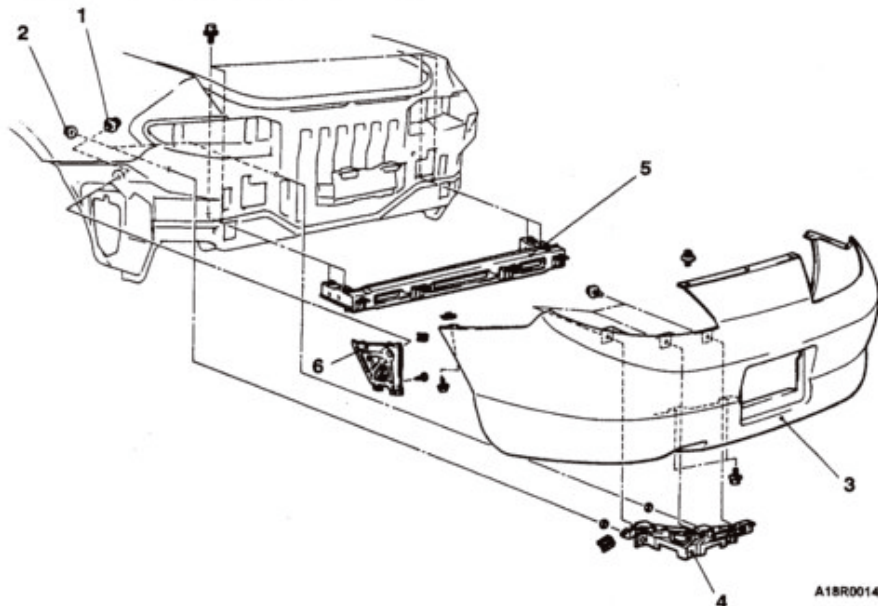
Removal steps

1. Licence plate bracket
2. Front turn-signal lamp assembly
3. Side bumper net or front fog lamp assembly
4. Fascia plate
5. Front bumper plate
6. Front bumper reinforcement assembly

7. Front bumper centre reinforcement assembly
8. Front bumper lower reinforcement assembly
9. Bumper net
10. Front bumper face

REAR BUMPER**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

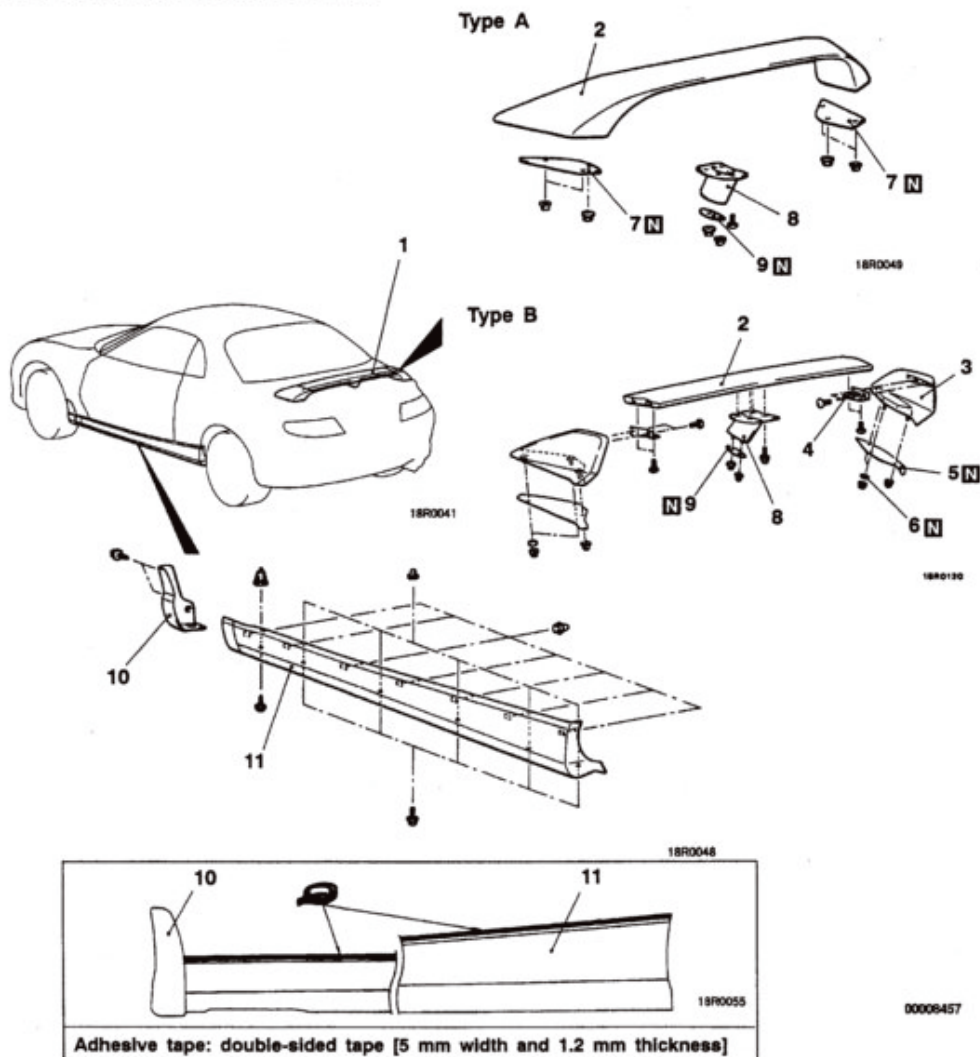
- Rear End Trim Cover, Trunk Side Box and Trunk Rear Trim Removal and Installation (Refer to GROUP 52A.)

**Removal steps**

1. Rear bumper side bracket mounting bolt
2. Rear bumper rear bracket mounting bolt
3. Rear bumper face
4. Rear bumper rear bracket
5. Rear bumper reinforcement assembly
6. Rear bumper side bracket

AERO PARTS

REMOVAL AND INSTALLATION



Air spoiler removal steps

1. Air spoiler assembly
2. Air spoiler
3. Side air spoiler
4. Joint plate
5. Side packing B
6. Side packing A

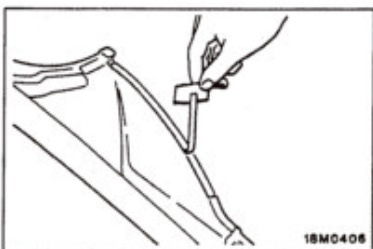
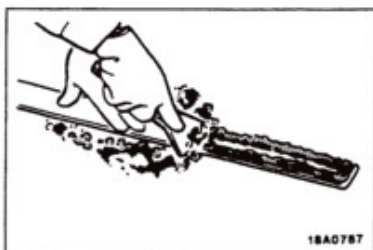
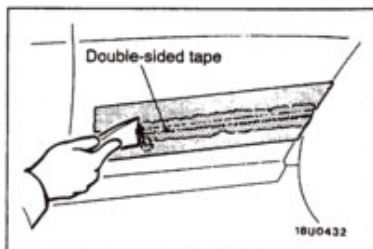
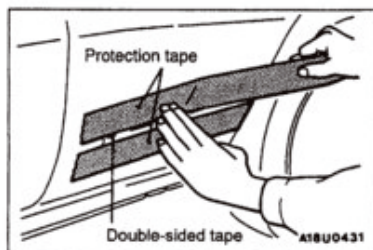
7. Side seal pad
8. Center spoiler stay
9. Center packing

Side air dam removal steps

10. Side air dam (front)
11. Side air dam (rear)



00009457

**REMOVAL SERVICE POINT****◀▶ SIDE AIR DAM (REAR) REMOVAL**

1. Attach protection tape all the way along the edges of the double-sided tape which is still adhering to the body.
2. Use a resin spatula to scrape off the double-sided tape.
3. Peel off the protection tape.
4. Wipe the body surface and clean it with a rag moistened with isopropyl alcohol.

INSTALLATION SERVICE POINT**▶◀ SIDE AIR DAM (REAR) INSTALLATION**

Double-sided tape affixing to the side air dam (rear) (when reusing)

1. Scrape off the double-sided tape with a resin spatula or gasket scraper.
2. Wipe off the side air dam (rear) adhesion surface and clean it with a shop towel moistened with isopropyl alcohol.
3. Affix the specified double sided tape to the side air dam (rear).

Specified adhesive tape:

**Double-sided tape
(5 mm width and 1.2 mm thickness)**

4. Remove strip paper from the pressure sensitive double-sided tape.

NOTE

Affix double-sided tape to the end of strip paper for ease of strip paper removal.

5. Install the side air dam (rear).

NOTE

If it is hard to affix the double-sided tape in winter, heat the application surfaces at both the vehicle body and the side air dam (rear).

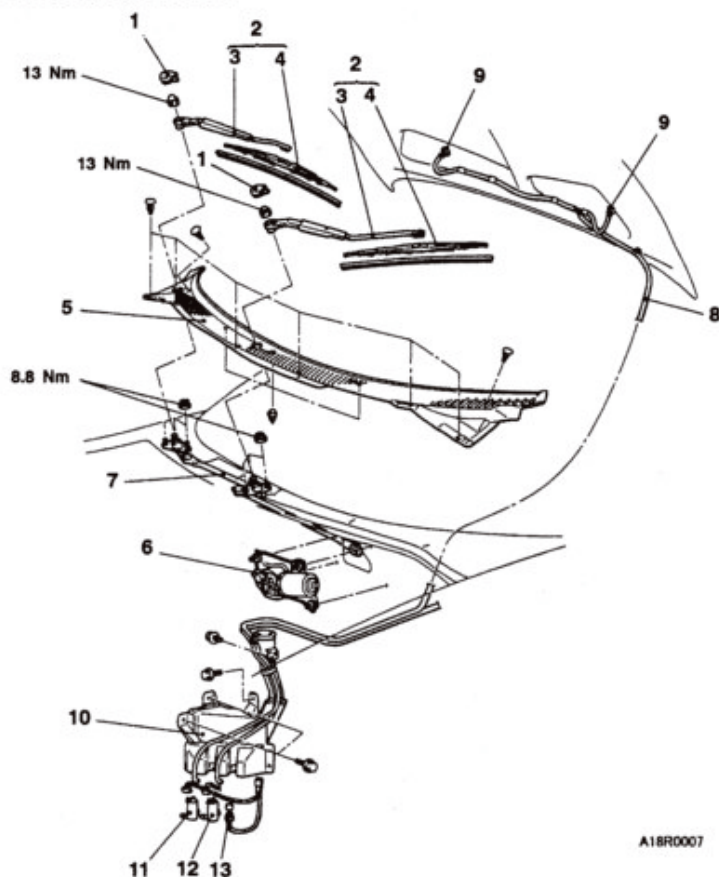
Body 40–60°C

Side air dam (rear) 20 – 30 °C

Apply pressure fully to the side air dam (rear).

WINDSHIELD WIPER AND WASHER

REMOVAL AND INSTALLATION



Wiper motor and linkage removal steps

- ▶ A ◀
1. Shaft cover
 2. Wiper arm and blade assembly
 3. Wiper arm
 4. Wiper blade
 5. Front deck garnish
 6. Wiper motor
 7. Linkage assembly

Washer nozzle removal steps

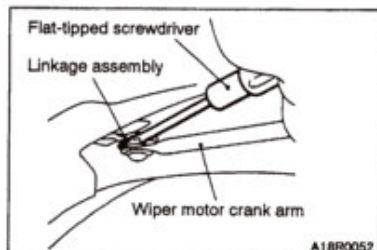
- ◀ A ▶
8. Washer hose
 9. Washer nozzle

Washer tank removal steps

- Front bumper (Refer to P.51-2.)
- 8. Washer hose
- 10. Washer tank assembly
- 11. Washer motor (Front)
- 12. Washer motor (Rear)
- 13. Washer fluid level sensor

NOTE

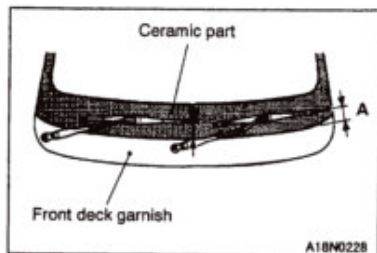
For removal and installation of the column switch assembly (windshield wiper and washer switch), refer to GROUP 37A – Steering Wheel and Shaft.

**REMOVAL SERVICE POINT****◀A▶ WIPER MOTOR REMOVAL**

1. Remove the wiper motor mounting bolt.
2. Using flat-tipped screwdriver, disconnect the crank arm of wiper motor from the linkage assembly and remove the wiper motor.

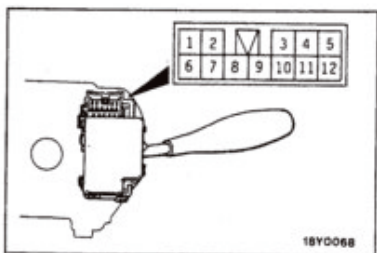
Caution

Because the installation angle of the crank arm and the motor has been set, do not remove them unless it is necessary to do so. If they must be removed, remove them only after marking their mounting positions.

**INSTALLATION SERVICE POINT****▶A◀ WIPER ARM AND BLADE ASSEMBLY INSTALLATION**

Install the wiper blade in the specified position (standard value) as shown in the illustration.

Standard value (A): 33 ± 5 mm

**INSPECTION****COLUMN SWITCH ASSEMBLY CHECK****Wiper and Washer Switch Continuity Check**

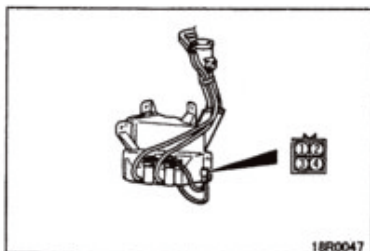
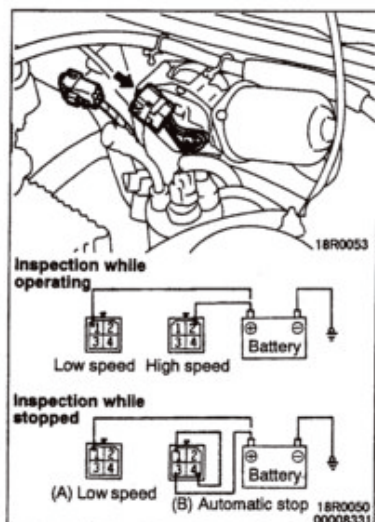
Switch position		Terminal No.				
		8	9	10	11	12
Wiper switch	OFF			○	○	
	LO	○		○		
	HI	○	○			
Washer switch	ON	○				○

**Intermittent Wiper Relay Check
(Intermittent Operation Check)**

1. Connect the column switch connector.
2. Turn the ignition switch to ACC.
3. Inspect the intermittent operation time when the wiper switch is turned to INT.

FAST: Approx. 2 seconds

SLOW: Approx. 16 seconds

**WIPER MOTOR CHECK**

Check the wiper motor after disconnecting the wiring harness connector, and with the wiper motor remaining installed to the body.

Low Speed and High Speed Operation

Connect a battery to the wiper motor as shown in the illustration and inspect motor operation at low speed and high speed.

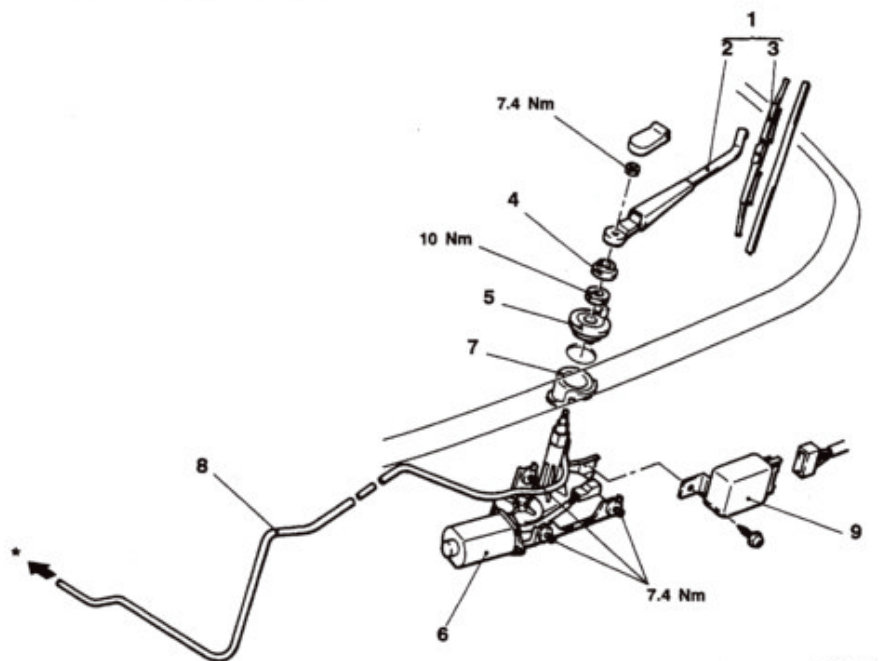
Stop Position

1. Connect a battery to the wiper motor as shown (A) in the figure. Run the wiper motor at low speed, disconnect the battery, and stop the motor.
2. Reconnect the battery as shown (B) in the illustration, and confirm that after the motor starts turning at low speed, it stops at the automatic stop position.

WASHER MOTOR CHECK

1. Check that the washer tank is filled with washer fluid before checking the washer motor.
2. Check that the washer fluid gushes out when battery voltage is applied to terminal 1 and terminal 2 is earthed.

REAR WIPER AND WASHERREMOVAL AND INSTALLATION



A18R0008

Wiper motor assembly removal steps

- A◄
1. Wiper arm and blade assembly
 2. Wiper arm
 3. Wiper blade
 4. Shield cap
 5. Nozzle collar assembly
 6. Wiper motor assembly
 7. Packing and washer

Rear washer hose removal steps

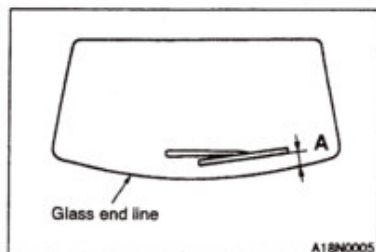
- Scuff plate, quarter trim (LH), rear seat (Refer to GROUP 52A.)
8. Washer hose

Rear intermittent wiper relay removal

9. Rear intermittent wiper relay

NOTE

1. *: To washer tank assembly (Refer to P.51-7.)
2. For removal and installation of the column switch assembly (windshield wiper and washer switch), refer to GROUP 37A – Steering Wheel and Shaft.)

**INSTALLATION SERVICE POINT****►A◄ WIPER ARM AND BLADE ASSEMBLY INSTALLATION**

Install the wiper arm so that the wiper blade stops at the specified position.

Standard value (A): 8 ± 3 mm

INSPECTION**WIPER MOTOR CHECK**

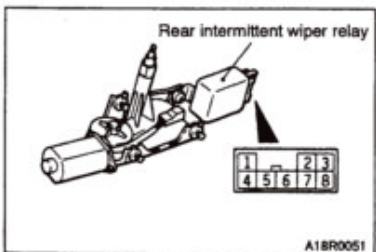
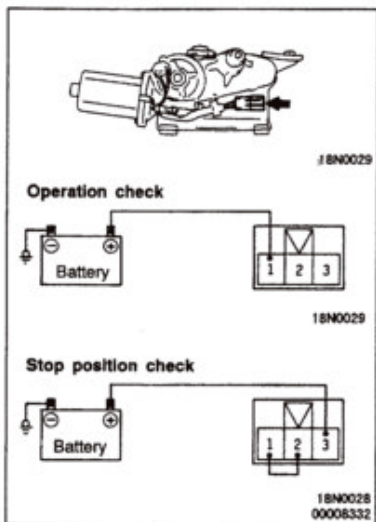
Check the wiper motor after first disconnecting the wiring harness connector, and with the wiper motor remaining installed to the body.

Wiper Motor Operation

Connect a battery to the wiper motor as shown in the illustration and inspect the motor operation.

Stop Position

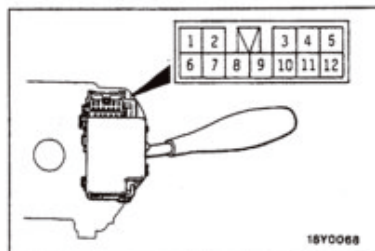
1. Run the wiper motor, disconnect the battery, and stop the motor.
2. Reconnect the battery as shown in the illustration, and confirm that after the motor starts turning, it stops at the automatic stop position.

**REAR INTERMITTENT WIPER RELAY CHECK**

1. Apply battery voltage to terminal 4, and earth the terminal 7.
2. Measure voltage according to the table below.

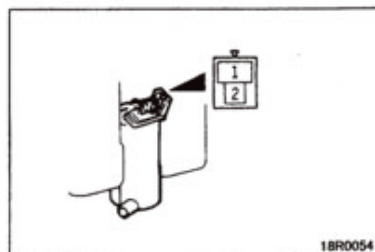
Measurement requirement	Terminal number 2
Apply battery voltage to terminal 6.	Battery voltage
Apply battery voltage to terminal 5.	Battery voltage generates every approx. eight seconds.
Apply battery voltage to terminal 8.	Battery voltage.

3. Check that there is continuity between terminals 1 and 2.



COLUMN SWITCH (WIPER AND WASHER) CHECK

Switch position		Terminal No.			
		2	3	4	8
Wiper switch	INT		○	○	○
	ON			○	○
Washer switch	ON	○			○

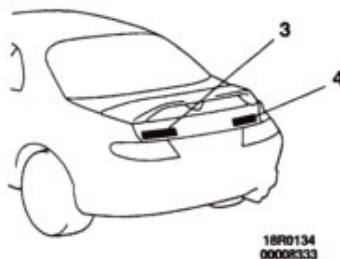
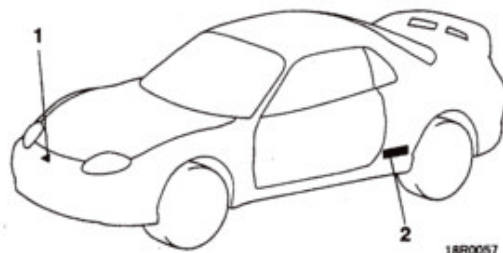


WASHER MOTOR CHECK

1. With the washer motor installed to the washer tank, fill the washer tank with water.
2. Check that washer fluid sprays strongly when battery voltage is applied to terminal 2 and terminal 1 is earthed.

MARKS

REMOVAL AND INSTALLATION



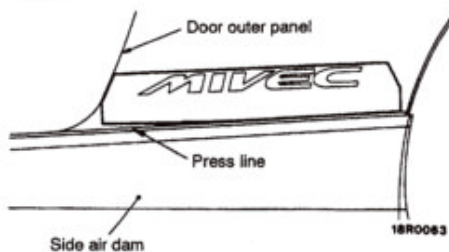
- ▶A 1. Three diamond mark
 ▶A 2. "MIVEC" decal
 ▶A 3. MITSUBISHI mark
 ▶A 4. GRADE mark

INSTALLATION SERVICE POINT

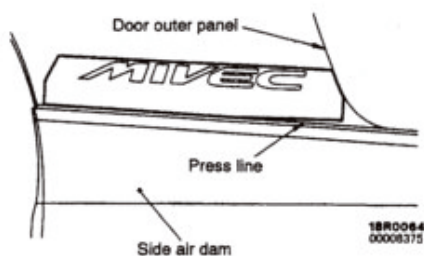
▶A◀ MARK INSTALLATION
INSTALLATION POSITION

2. "MIVEC" DECAL

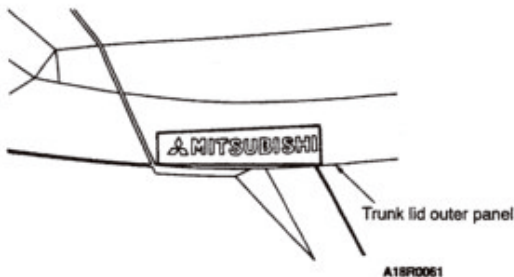
<LH>



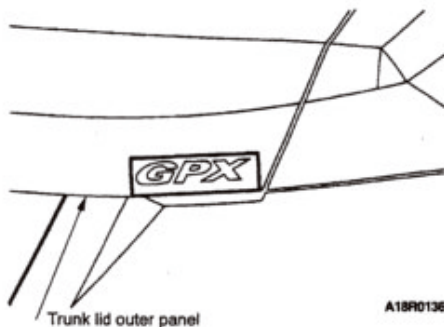
<RH>



3. 'MITSUBISHI' MARK



4. GRADE MARK (GPX)



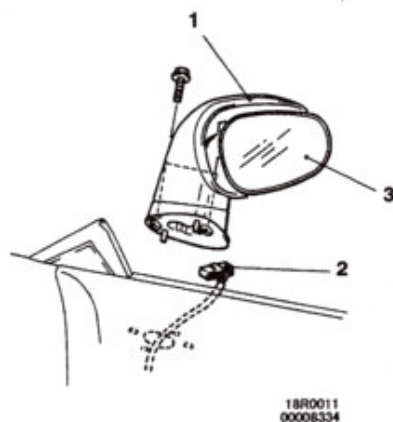
INSTALLATION PROCEDURE

1. Clean the mark installation surfaces on the body with unleaded petrol.
2. Peel off the backing paper from the reverse side of the marks, and then attach the marks to the vehicle body so that they fit properly into position.
3. Peel off the application tape.

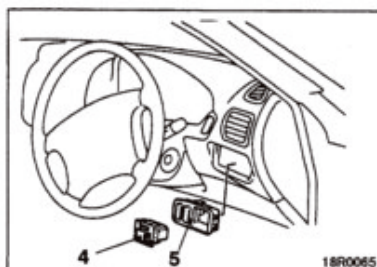
Caution

When attaching the marks, the surrounding temperature should be 20–38°C and the air should be completely free from dust.

If the surrounding temperature is lower than 20°C, the marks and the places on the body where the marks are to be attached should be heated to 20–38°C.

DOOR MIRROR**REMOVAL AND INSTALLATION****Door mirror removal steps**

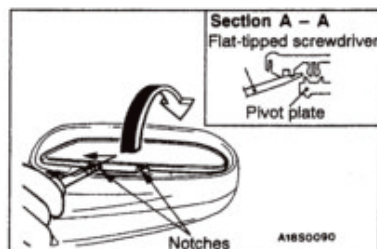
1. Door mirror
2. Harness connector
3. Mirror

**Electrically remote-controlled mirror switch removal steps**

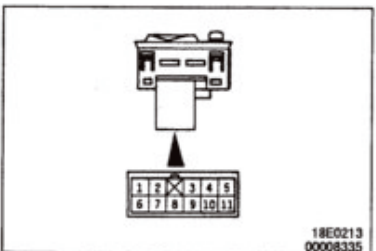
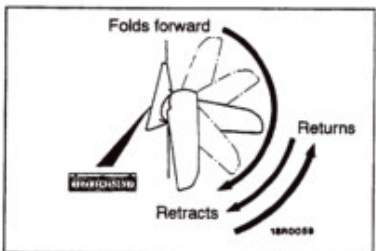
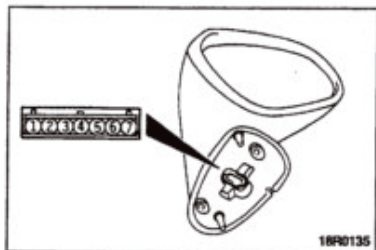
4. Instrument panel switch
5. Mirror switch

Remote-controlled mirror-ECU removal

6. Remote-controlled mirror-ECU

**REMOVAL SERVICE POINT****◀▶ MIRROR REMOVAL**

Let the mirror face up, insert a flat-tipped screwdriver wound with masking tape, and remove the mirror by levering out the mirror.



INSPECTION

ELECTRICALLY REMOTE-CONTROLLED MIRROR OPERATION CHECK

Terminal to be connected to battery			Direction of operation
3	4	5	
⊖	-----	⊕	UP
⊕	-----	⊖	DOWN
⊕	-----	⊖	LEFT
⊖	-----	⊕	RIGHT

OPERATION TEST OF ELECTRIC RETRACTABLE FUNCTION

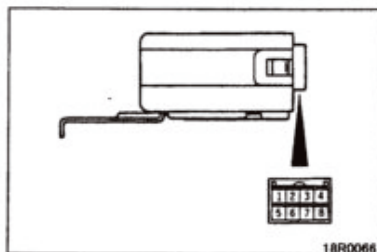
Terminal to be connected to battery		Direction of operation
6	7	
⊖	⊕	UP
⊕	⊖	DOWN

NOTE

If the motor still operates after the mirror has operated, the limit switch may be defective.

REMOTE-CONTROLLED MIRROR SWITCH CONTINUITY CHECK

[illegible]

**REMOTE-CONTROLLED MIRROR ECU CHECK**

1. Apply a battery voltage to the terminal No.5 and earth the terminal No.7.
2. Measure the voltage in the following condition.

Measurement condition	Terminal No.	
	6	8
Apply a battery voltage to terminal No.1, and release.	From battery voltage to 0 V	0 V
Apply a battery voltage to terminal No.2, and release.	0 V	From battery voltage to 0 V

3. Check the continuity among terminal Nos. 6, 7 and 8.

INTERIOR AND SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

INTERIOR	52A
SUPPLEMENTAL RESTRAINT SYSTEM (SRS)	52B

INTERIOR

CONTENTS

SPECIAL TOOL	3	Front Seat	8
INSTRUMENT PANEL*	3	Rear Seat	10
FLOOR CONSOLE	6	SEAT BELT	11
TRIMS	7	Front Seat Belt	11
SEAT	8	Rear Seat Belt	12
		INSIDE REAR VIEW MIRROR	13

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Removal of trim, etc.

INSTRUMENT PANEL**REMOVAL AND INSTALLATION**

For installation of the instrument panel, the bolts and screws described below are used. They are indicated by symbols in the illustration.

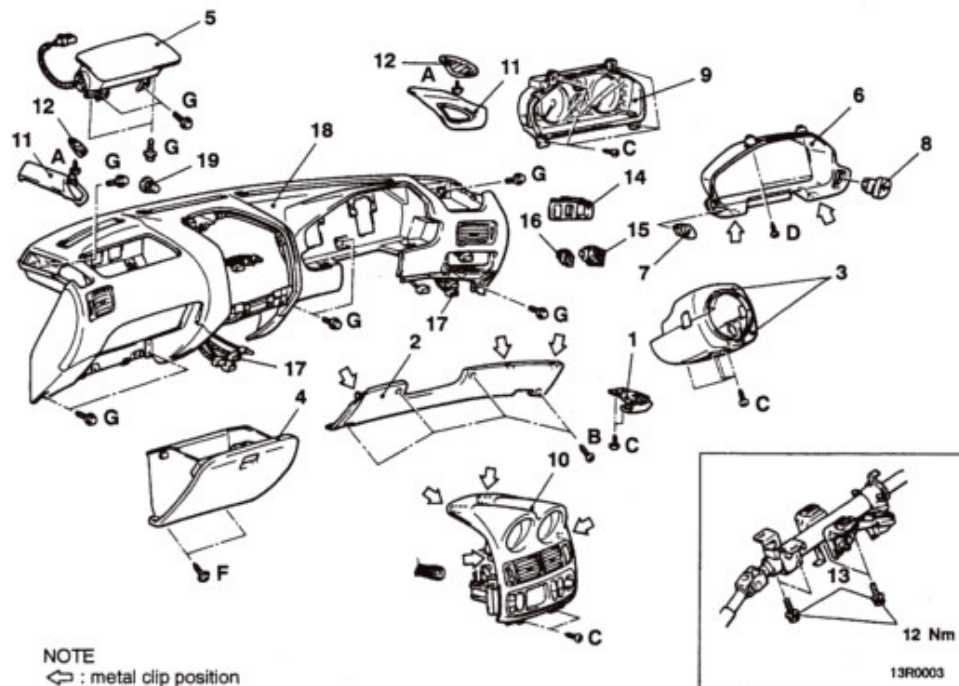
Name	Symbol	Size mm (D x L)	Colour	Shape
Tapping screw	A	4 x 12	—	 19Z0004
	B	5 x 16	Black	
	C	5 x 16	—	
	D	5 x 20	—	 19Z0013
	E	5 x 12	—	 19Z0022
Washer-assembled screw	F	5 x 16	—	 19Z0007
Washer-assembled bolt	G	6 x 16	—	 19Z0010

CAUTION: SRS

- When removing and installing the instrument panel, do not let it bump against the SRS-ECU.
- For the passenger side air bag module removal/installation, always observe the service procedures of GROUP 52B – Air Bag Module and Clock Spring.

Pre-removal and Post-Installation Operation

- Floor Console Assembly Removal and Installation
(Refer to P.52A-6.)

**NOTE**

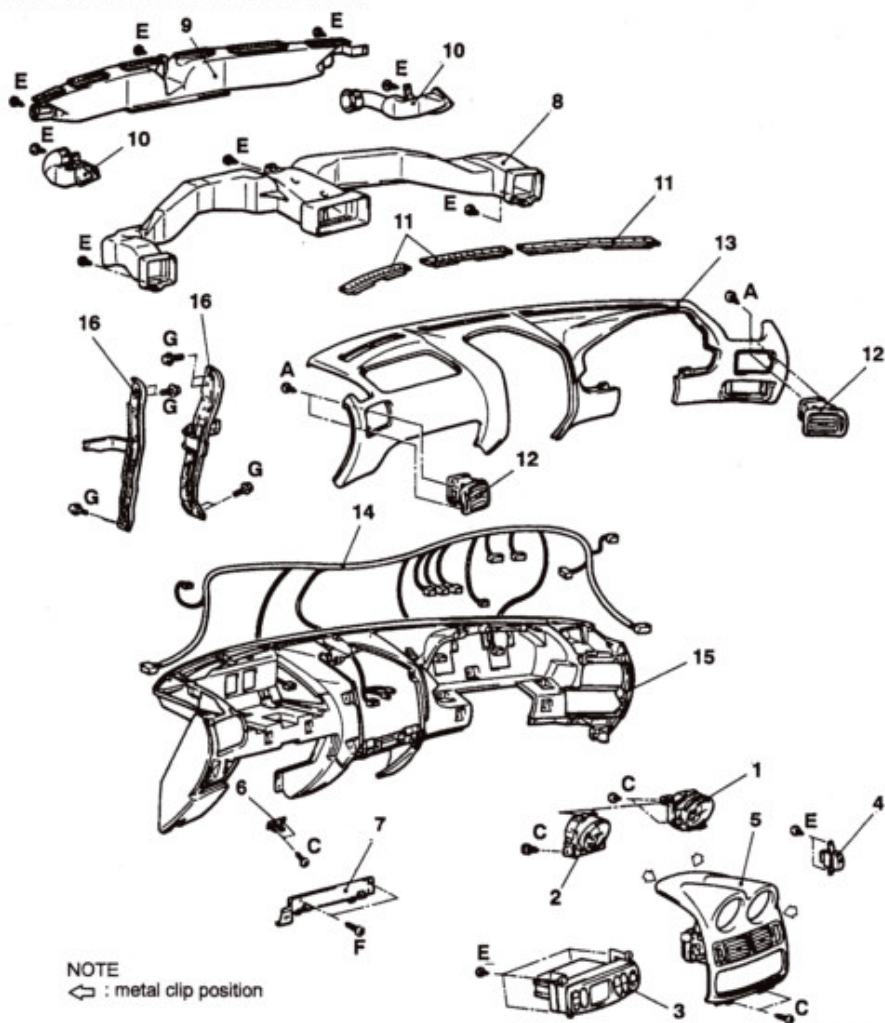
↔ : metal clip position

16R0022
00008336

Removal steps

1. Hood lock release handle
2. Driver side lower cover
3. Column cover
4. Glove box
5. Front passenger's air bag module
(Refer to GROUP 52B – Air Bag Module and Clock Spring.)
6. Meter bezel
7. Antenna switch or plug
8. Fog lamp switch or plug
9. Combination meter
10. Center panel
11. Tweeter garnish
12. Side defroster grill
13. Steering column assembly
installation bolt
14. Switch panel
15. Remote control switch or plug
16. TCL switch <Vehicles with TCL>
17. Harness connector
18. Instrument panel assembly
19. Grommet

DISASSEMBLY AND REASSEMBLY



A19R0027

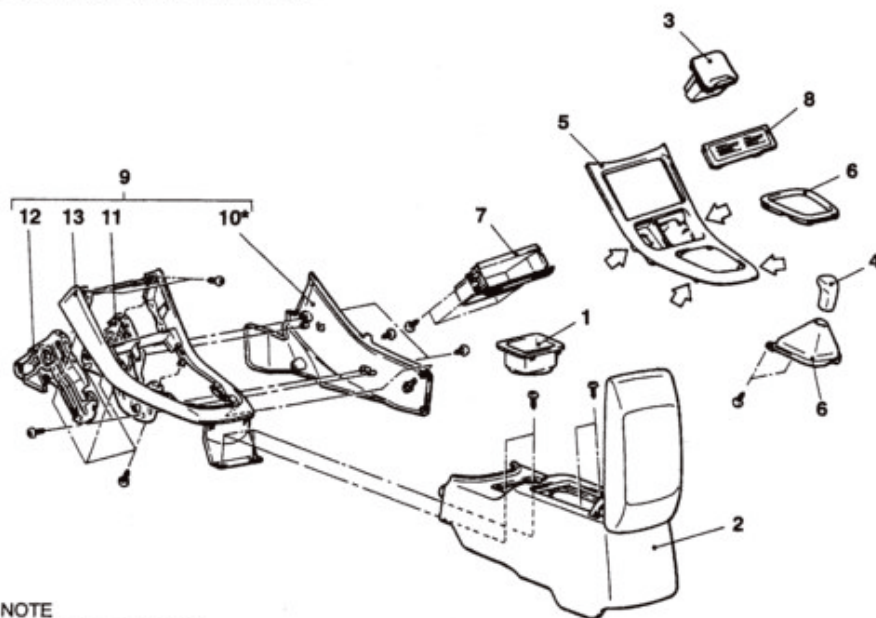
Disassembly steps

1. Voltmeter
2. Clock
3. A/C-ECU
4. Hazard lamp switch
5. Center panel
6. Glove box striker
7. Glove box frame
8. Distribution duct

9. Defroster nozzle
10. Side defroster duct
11. Defroster garnish
12. Side air outlet assembly
13. Instrument pad
14. Instrument panel wiring harness
15. Instrument panel
16. Center reinforcement

FLOOR CONSOLE

REMOVAL AND INSTALLATION



NOTE

↔ : metal clip position

*: also equipped at the left side

A18R0028

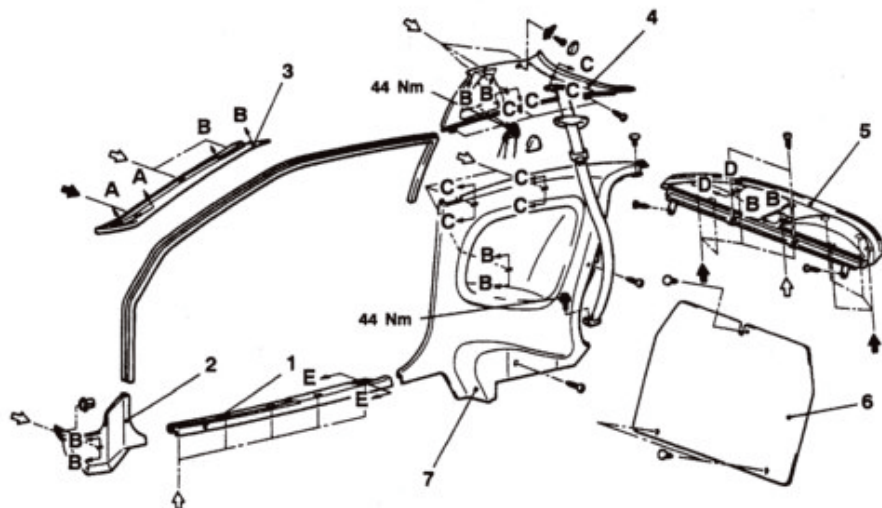
Removal steps

1. Cup tray
2. Rear floor console
3. Ashtray
4. Shift lever knob <M/T>
5. Radio panel
6. Shift lever cover or A/T panel
7. Box
8. Radio plug

9. Front floor console, front console frame and console side cover assembly
10. Console side cover
11. Front console frame (RH)
12. Front console frame (LH)
13. Front floor console

TRIMS

REMOVAL AND INSTALLATION



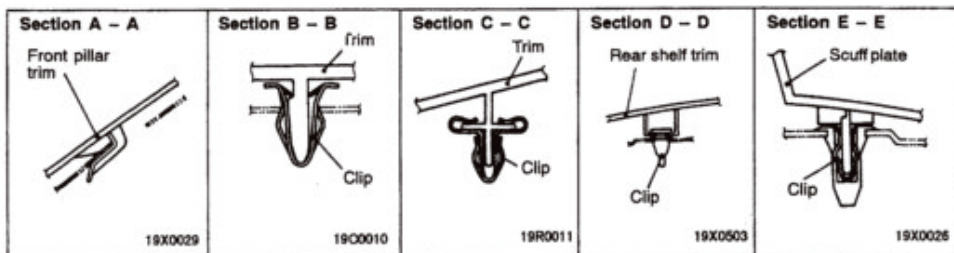
NOTE

↔ : metal clip position

➡ : resin clip position

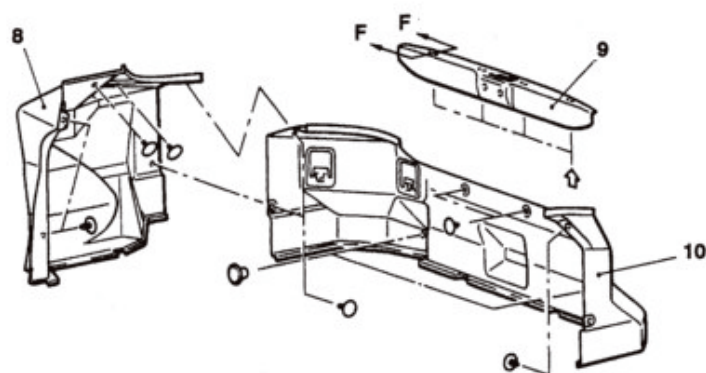
For door trim, refer to GROUP 42.

19R0018
00008337



1. Front scuff plate
2. Cowl side trim
3. Front pillar trim
4. Rear pillar trim

5. Rear shelf trim
6. Rear partition board
7. Quarter trim



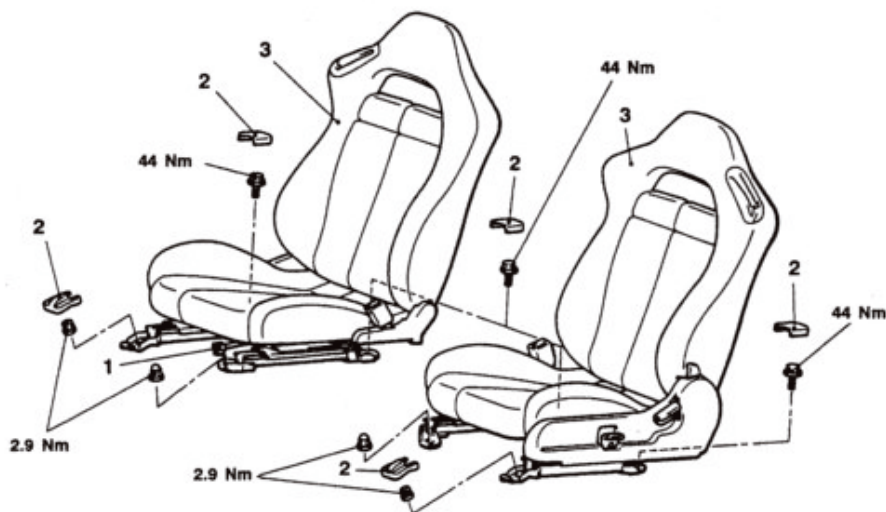
19R0021
00008338

- 8. Trunk side trim
- 9. Rear end trim cover
- 10. Trunk rear trim

SEAT

FRONT SEAT

REMOVAL AND INSTALLATION



A19R0002

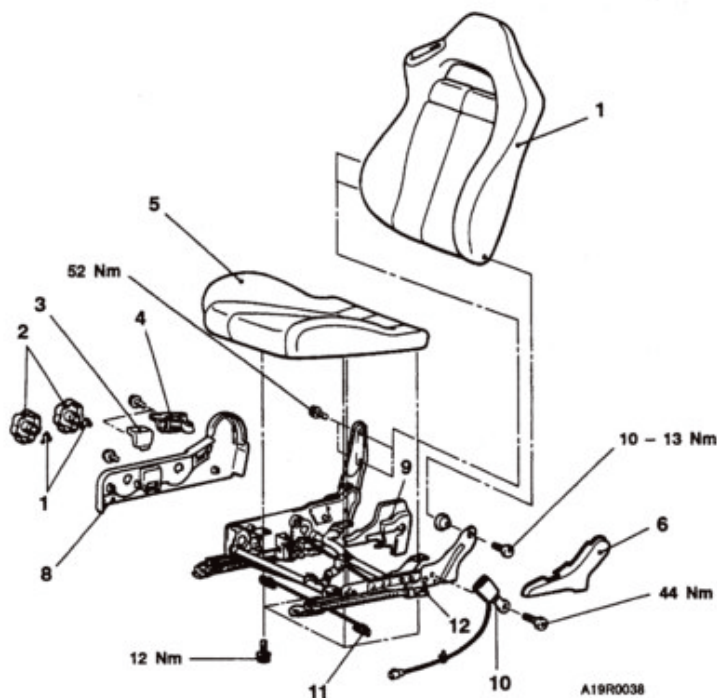
Removal steps

1. Harness connector
2. Seat anchor cover
3. Front seat assembly

NOTE

After provisionally tightening the seat assembly mounting nuts and bolts in every installation location, fully tighten them to the specified torque.

DISASSEMBLY AND REASSEMBLY

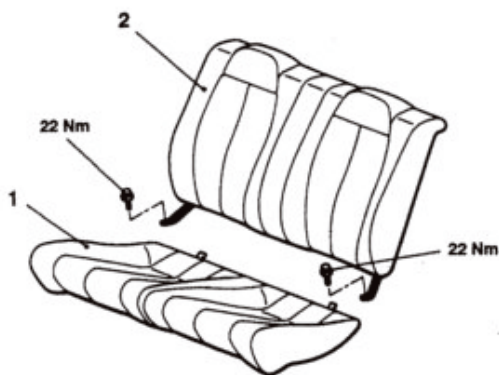


Disassembly steps

1. Clip
2. Height adjuster knob
3. Slide adjuster knob
4. Reclining adjuster knob
5. Front seat cushion assembly
6. Front seat hinge cover

7. Front seatback assembly
8. Front seat side shield cover
9. Reclining adjuster inner cover
10. Inner seat belt
11. Pull wire
12. Seat adjuster assembly

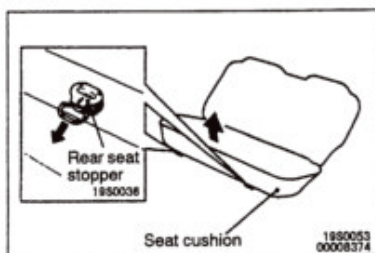
REAR SEAT REMOVAL AND INSTALLATION



A19R0003

Removal steps

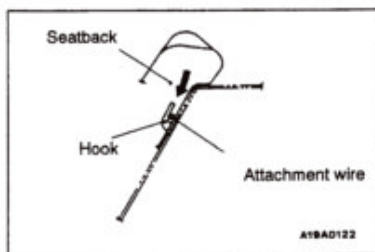
1. Seat cushion
2. Seatback



REMOVAL SERVICE POINT

SEAT CUSHION REMOVAL

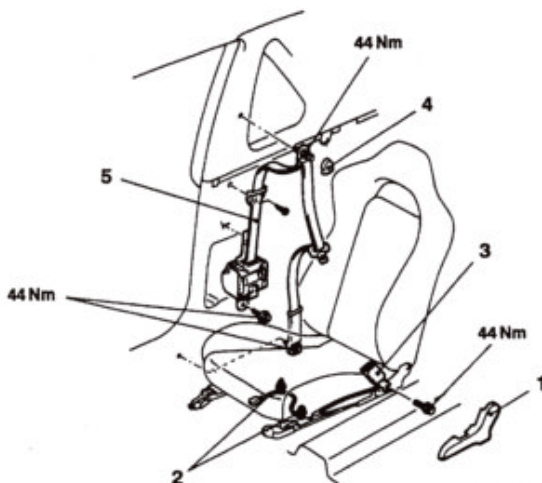
While keeping the rear seat stopper pulled, lift up the seat cushion to remove it.



INSTALLATION SERVICE POINT

SEATBACK INSTALLATION

Push the seatback in the direction indicated in the illustration; then securely attach the attachment wire to the body side hook and install the seatback.

SEAT BELT**FRONT SEAT BELT****REMOVAL AND INSTALLATION**

A19A0005

Driver's side inner seat belt removal steps

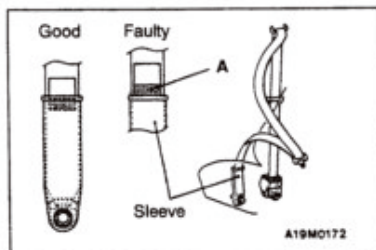
- Front seat assembly (driver's side) (Refer to P.52A-8.)
- 1. Front seat hinge cover
- 2. Clip
- 3. Inner seat belt

Passenger's side inner seat belt removal steps

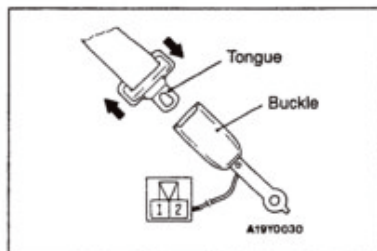
- Rear floor console (Refer to P.52A-6.)
- 1. Front seat hinge cover
- 3. Inner seat belt

Outer seat belt removal steps

- Quarter trim (Refer to P.52A-7.)
- 4. Sash guide cover
- 5. Outer seat belt

**INSPECTION****OUTER SEAT BELT CHECK**

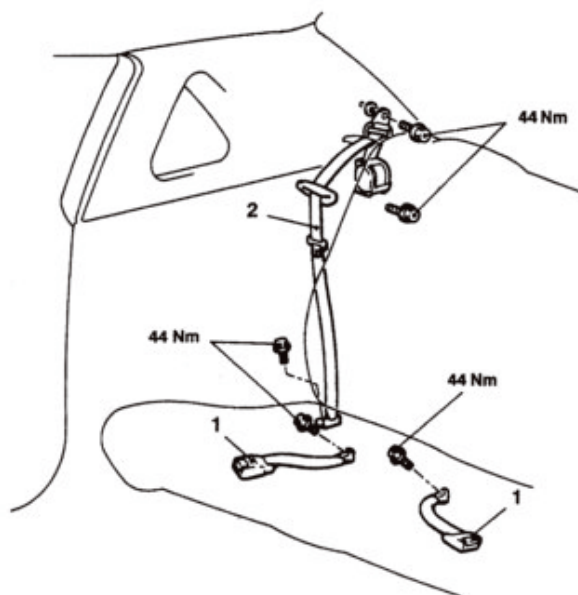
Check that the "A" part of the label does not appear outside the seat belt sleeve. If it appears, replace the seat belt.

**SEAT BELT SWITCH CONTINUITY CHECK**

If there is no continuity, replace the inner seat belt.

Item	1	2
Seat belt fastened		
Seat belt not fastened	○	○

REAR SEAT BELT REMOVAL AND INSTALLATION

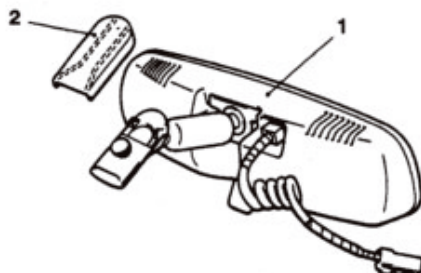
**Inner seat belt removal steps**

- Rear seat (Refer to P.52A-10.)
- 1. Inner seat belt

Outer seat belt removal steps

- Rear seat (Refer to P.52A-10.)
- Quarter trim (Refer to P.52A-7.)
- Rear pillar trim (Refer to P.52A-7.)
- 2. Outer seat belt

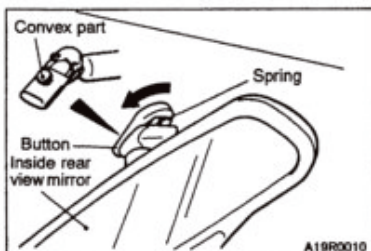
INSIDE REAR VIEW MIRROR REMOVAL AND INSTALLATION



A19R0009

Removal steps

1. Inside rear view mirror
2. Button



A19R0010

REMOVAL SERVICE POINT

◀▶ INSIDE REAR VIEW MIRROR REMOVAL

Turn the mirror 90° in the direction of the arrow shown in the illustration, and then push it downward to remove.

NOTE

1. The convex part of the mirror is engaged with the spring on the button.
2. If the mirror receives more than a load of 440 N, it may fall down.

NOTES

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

SRS SERVICE PRECAUTIONS	2	SRS AIR BAG CONTROL UNIT (SRS-ECU)	19
SPECIAL TOOLS	4	AIR BAG MODULES AND CLOCK SPRING	20
TEST EQUIPMENT	5	AIR BAG MODULE DISPOSAL PROCEDURES	26
TROUBLESHOOTING	5	Undeployed Air Bag Module Disposal	26
POST-COLLISION DIAGNOSIS	15	Deployed Air Bag Module Disposal Procedures	31
INDIVIDUAL COMPONENT SERVICE	17		
WARNING/CAUTION LABELS	18		

CAUTION

- Carefully read and observe the information in the SERVICE PRECAUTIONS (P.52B-2.) prior to any service.
- For information concerning troubleshooting or maintenance, always observe the procedures in the Troubleshooting (P.52B-5.) section.
- If any SRS components are removed or replaced in connection with any service procedures, be sure to follow the procedures in the INDIVIDUAL COMPONENT SERVICE section (P.52B-17.) for the components involved.
- If you have any questions about the SRS, please contact your local distributor.

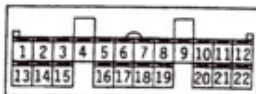
SRS SERVICE PRECAUTIONS

1. 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.
2. Do not use any electrical test equipment on or near SRS components, except those specified on P.52B-5.
3. **Never Attempt to Repair the Following Components:**
 - SRS air bag control unit (SRS-ECU)
 - Clock spring
 - Front air bag modules (Driver's side and front passenger's side)
4. If the SRS air bag harness connector is defective, replace it with a new one. If the SRS air bag harness is defective, repair or replace according to the following table.

NOTE

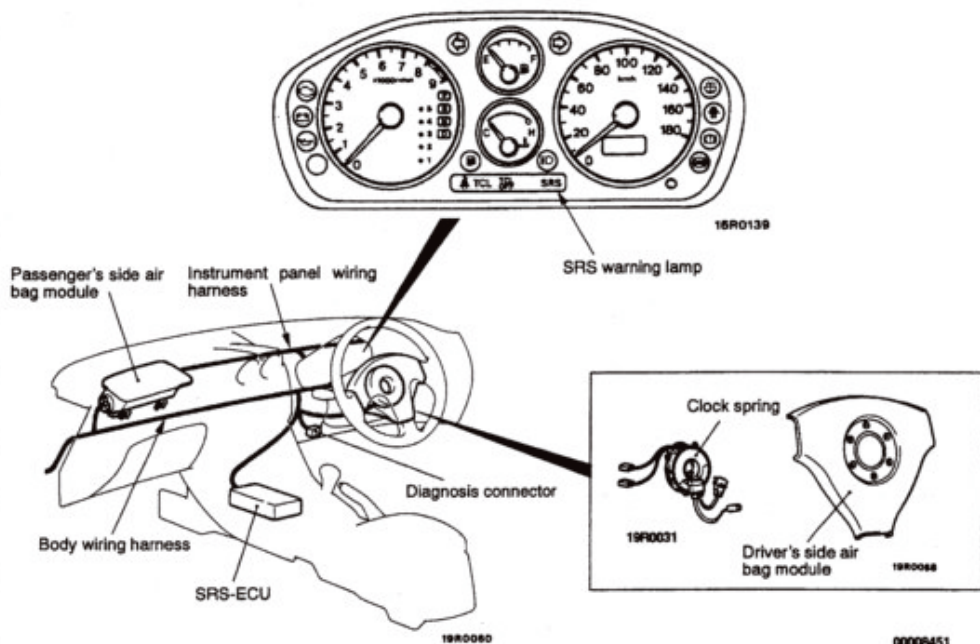
If any of these components are diagnosed as faulty, they should only be replaced, in accordance with the INDIVIDUAL COMPONENTS SERVICE procedures in this manual, starting at page 52B-17.

SRS-ECU connector

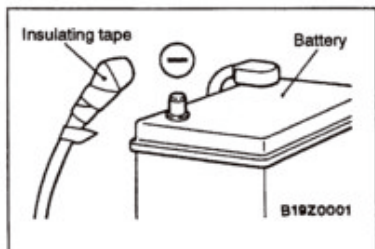


A19F0054

SRS-ECU harness connector terminal No. and colour	SRS-ECU terminal No.	Destination of harness	Remedy
22-pin, yellow	1	—	Repair or replace each wiring harness
	2, 14	Body wiring harness → Earth	
	3, 4	—	
	5	Body wiring harness → Junction block (fuse No.8)	
	6	Body wiring harness → Diagnosis connector	
	7 to 11	—	
	12	Body wiring harness → Instrument panel wiring harness → SRS warning lamp	
	13, 22	Body wiring harness → Passenger's side air bag module	
	15, 20	Body wiring harness → Clock spring	Replace clock spring or repair or replace body wiring harness
	16	Body wiring harness → Instrument panel wiring harness → Junction block (fuse No.4)	Repair or replace each wiring harness
	17 to 19, 21	—	—



00005451



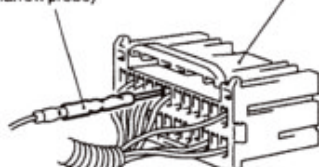
5. After disconnecting the battery cable, wait 60 seconds or more before proceeding with the following work. Also, wrap the disconnected battery cable with a insulating tape. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, 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.

6. SRS components should not be subjected to heat of 93°C or more, so remove the SRS-ECU, air bag module clock spring before drying or baking the vehicle after painting.
7. Whenever you finish servicing the SRS, erase the diagnosis code and check warning lamp operation to make sure that the system functions properly. (Refer to P.52B-6.)
8. Before disconnecting the SRS-ECU connector, be sure to remove the driver's side air bag module and then remove the connection between the passenger's side air bag module and the body wiring harness.

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

MB991222
(narrow probe)

SRS-ECU harness connector



19R0052

SRS-ECU harness connector (rear side)

19R0053
00006452

10. Make certain that the ignition switch is OFF when the MUT-II is connected or disconnected.
11. If you have any questions about the SRS, please contact your local distributor.

NOTE

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

SPECIAL TOOLS

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	• Reading diagnosis codes • Erasing diagnosis code • Reading trouble period • Reading erase times
	MB991613	SRS check harness	Checking the SRS electrical circuitry
	MB990803	Steering wheel puller	Steering wheel removal
	MB686560	SRS air bag adapter harness A	• Deployment of air bag modules inside the vehicle • Deployment of air bag module (front passenger's side) outside the vehicle
	MR203491 or MB628919	SRS air bag adapter harness B	Deployment of air bag module (driver's side) outside the vehicle

Tool	Number	Name	Use
    8991223	MB991223 D: MB991222	Test harness set D: Probe for connecting the commercial tester (narrow probe)	Checking the continuity and measuring the voltage at the SRS-ECU harness connector

TEST EQUIPMENT

Tool	Name	Use
	Digital multi-meter	Checking the SRS electrical circuitry (Use a multi-meter for which the maximum test current is 2 mA or less at the minimum range of resistance measurement)

TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

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

DIAGNOSIS FUNCTION

DIAGNOSIS CODES CHECK

Connect the MUT-II to the diagnosis connector (16-pin), then check diagnosis codes.
(Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)

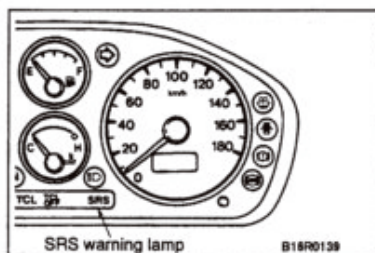
ERASING DIAGNOSIS CODES

WHEN USING THE MUT-II

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

Caution

Turn off the Ignition switch before connecting or disconnecting the MUT-II.



SRS WARNING LAMP INSPECTION

1. Check to be sure that the SRS warning lamp illuminates when the ignition switch is turned to ON position.
2. Check to be sure that it illuminates for approximately 7 seconds and then switches off.
3. If the above is satisfied, check the diagnosis codes.

INSPECTION CHART FOR DIAGNOSIS CODES

Inspect according to the inspection chart that is appropriate for the diagnosis code.

Code No.	Diagnosis item	Reference page
14	Analog G-sensor system in the SRS-ECU	52B-7
15	Safing G-sensor system in the SRS-ECU	52B-7
21, 22, 61, 62	Driver's side air bag module (squib) system	52B-7
24, 25, 64, 65	Front passenger's side air bag module (squib) system	52B-9
31, 32	SRS-ECU capacitor system	52B-9
34*	Connector lock system	52B-9
35	SRS-ECU (deployed air bag) system	52B-10
41*	IG ₁ (A) power circuit system	52B-10
42*	IG ₁ (B) power circuit system	52B-11
43	SRS warning lamp drive circuit system	Lamp does not illuminate.*
		Lamp does not switch off.
44*	SRS warning lamp drive circuit system	52B-13
45	Safing G sensor diagnosis circuit system in the SRS-ECU	52B-13
51, 52	Driver's side air bag module (squib ignition drive circuit) system	52B-13
54, 55	Front passenger's side air bag module (squib ignition drive circuit) system	52B-13

NOTE

- (1) *: If the vehicle condition returns to normal, the diagnosis code will be automatically erased, and the SRS warning lamp will return to normal.
- (2) If the vehicle has a discharged battery it will store the fault codes 41 or 42. When these diagnosis codes are displayed, check the battery.

INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

Code No.14 Analog G-sensor system in the SRS-ECU	Probable cause
The SRS-ECU monitors the output of the analog G-sensor inside the SRS-ECU. It outputs this code when any of the following are detected. • When the analog G-sensor is not operating • When the characteristics of the analog G-sensor are abnormal • When the output from the analog G-sensor is abnormal	• Malfunction of SRS-ECU

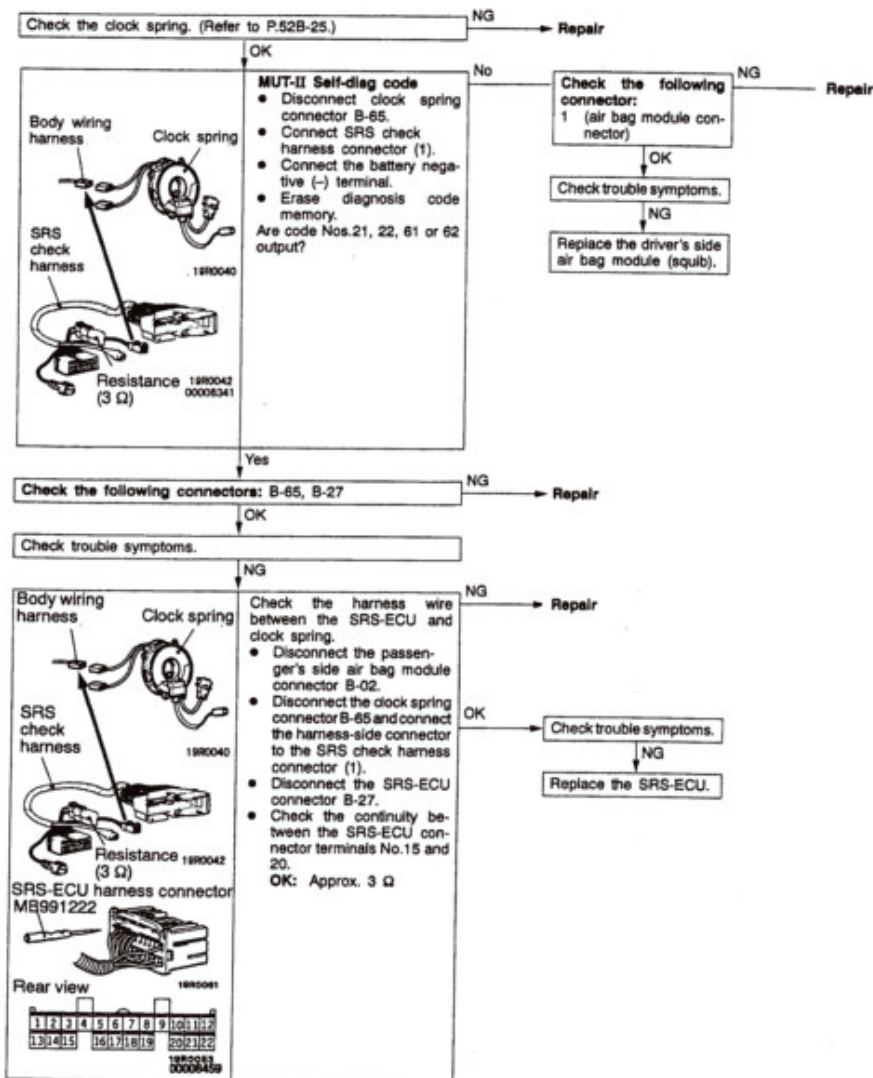
Replace the SRS-ECU.

Code No.15 Safing G-sensor system in the SRS-ECU	Probable cause
This code is output if there is a short circuit between the terminals of the safing G-sensor inside the SRS-ECU. The trouble cause will be short circuit in the safing G sensor.	• Malfunction of SRS-ECU

Replace the SRS-ECU.

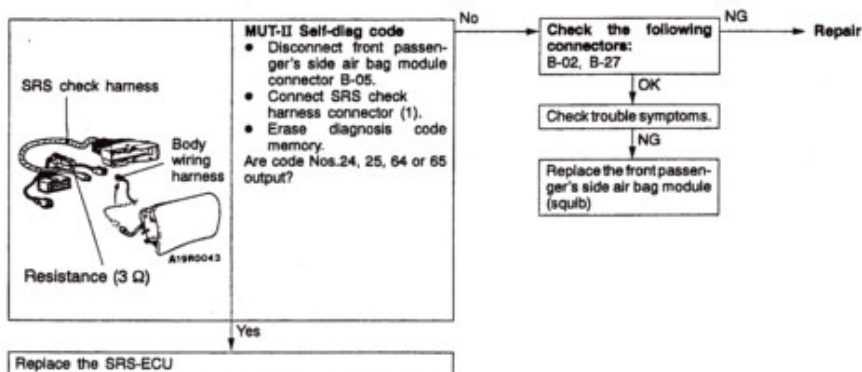
Code No.21, 22, 61 or 62 Driver's side air bag module (squib) system	Probable cause
These diagnosis codes are output if there is abnormal resistance between the input terminals of the driver's side air bag module (squib). The trouble causes for each diagnosis code No. are as follows.	• Malfunction of clock spring • Partial open circuit due to the defective clock spring neutral position • Malfunction of wiring harnesses or connectors • Malfunction of driver's side air bag module (squib) • Malfunction of SRS-ECU

Code No.	Probable cause
21	• Short in driver's side air bag module (squib) or harness short • Short in clock spring
22	• Open circuit in driver's side air bag module (squib) or open harness • Open circuit in clock spring • Poor connection of the driver's side air bag module (squib) connector • Partial open circuit due to the defective clock spring neutral position • Malfunction of connector contact
61	• Short in driver's side air bag module (squib) harness leading to the power supply
62	• Short in driver's side air bag module (squib) harness leading to the earth



Code No.24, 25, 64 or 65 Front passenger's side air bag module (squib) system	Probable cause
These diagnosis codes are output if there is abnormal resistance between the input terminals of the driver's side air bag module (squib). The trouble causes for each diagnosis code No. are as follows.	• Malfunction of wiring harnesses or connectors • Malfunction of front passenger's side air bag module (squib) • Malfunction of SRS-ECU

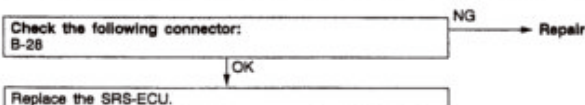
Code No.	Probable cause
24	• Short in front passenger's side air bag module (squib) or harness short
25	• Open circuit in front passenger's side air bag module (squib) or open harness • Malfunction of connector contact
64	• Short in front passenger's side air bag module (squib) harness leading to the power supply
65	• Short in front passenger's side air bag module (squib) harness leading to the earth



Code No.31 or 32 SRS-ECU capacitor system	Probable cause
This diagnosis code is displayed when the terminal voltage of the DC-DC converter, which is included in the SRS-ECU, increases (code No.31) or decreases (code No.32). However, if diagnosis codes No.41 and No.42 indicating the voltage drop of the battery are displayed, diagnosis code No.32 is not displayed.	• Malfunction of SRS-ECU

Replace the SRS-ECU.

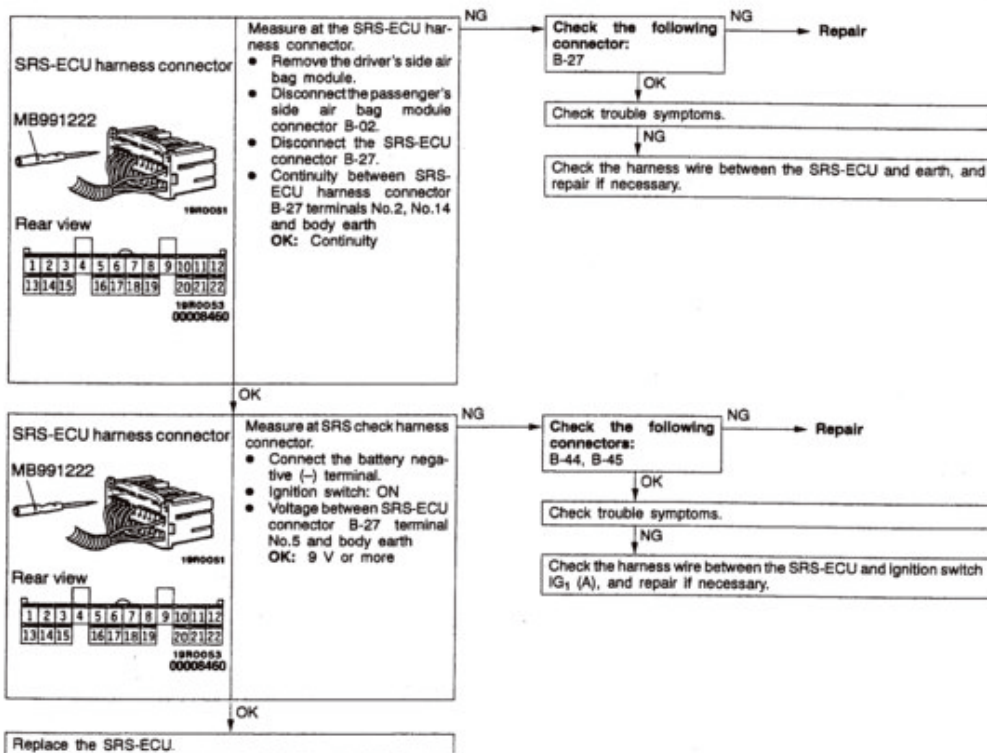
Code No.34 Connector lock system	Probable cause
This diagnosis code is output when SRS-ECU detects that the SRS-ECU lock lever is open. However, if the vehicle condition returns to normal, diagnosis code No.34 will be automatically erased, and the SRS warning lamp will switch off.	• Malfunction of connectors • Malfunction of SRS-ECU



Code No.35 SRS-ECU (deployed air bag) system	Probable cause
This diagnosis code is output after the air bag deploys. If this code is output before the air bag has deployed, the cause is probably a malfunction inside the SRS-ECU.	Malfunction of SRS-ECU

Replace the SRS-ECU.

Code No.41 IG ₁ (A) power circuit system	Probable cause
This diagnosis code is output if the voltage between the IG ₁ (A) terminal (SRS-ECU terminal No.5) and the earth is lower than the specified value for a continuous period of 5 seconds or more. However, if the vehicle condition returns to normal, diagnosis code No.41 will be automatically erased, and the SRS warning lamp will switch off. If diagnosis code No.42 is displayed simultaneously, battery voltage is low. First check the battery.	- Malfunction of wiring harnesses or connectors - Malfunction of SRS-ECU



Code No.42 IG₁ (B) power circuit system

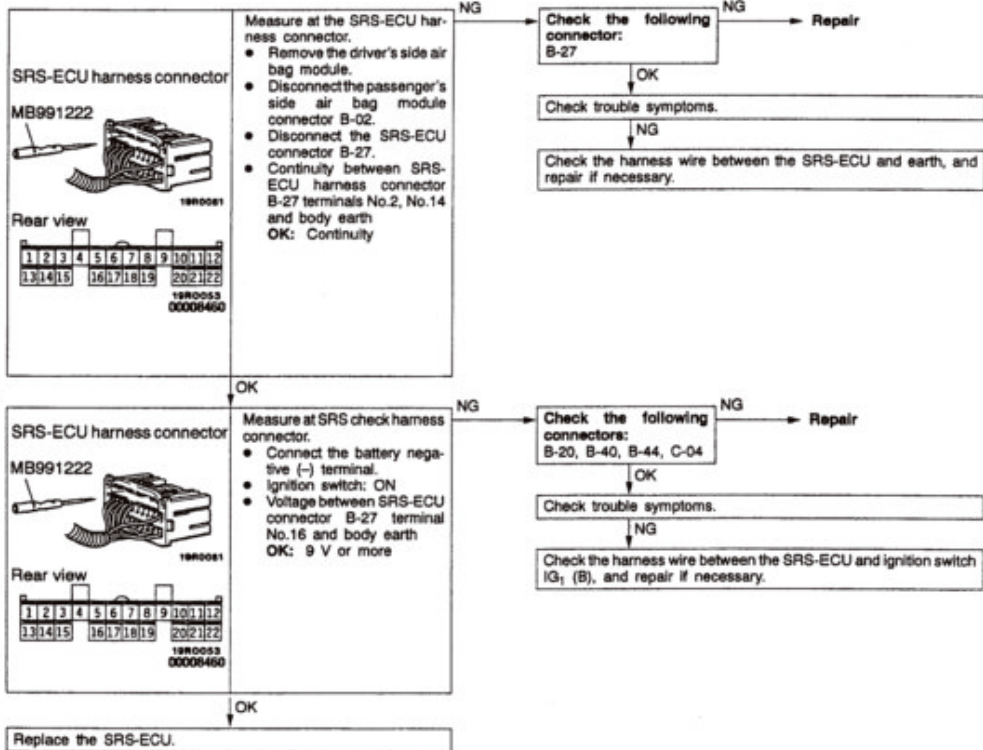
This diagnosis code is output if the voltage between the IG₁ (B) terminal (SRS-ECU terminal No.16) and the earth is lower than the specified value for a continuous period of 5 seconds or more.

However, if the vehicle condition returns to normal, diagnosis code No.42 will be automatically erased, and the SRS warning lamp will switch off.

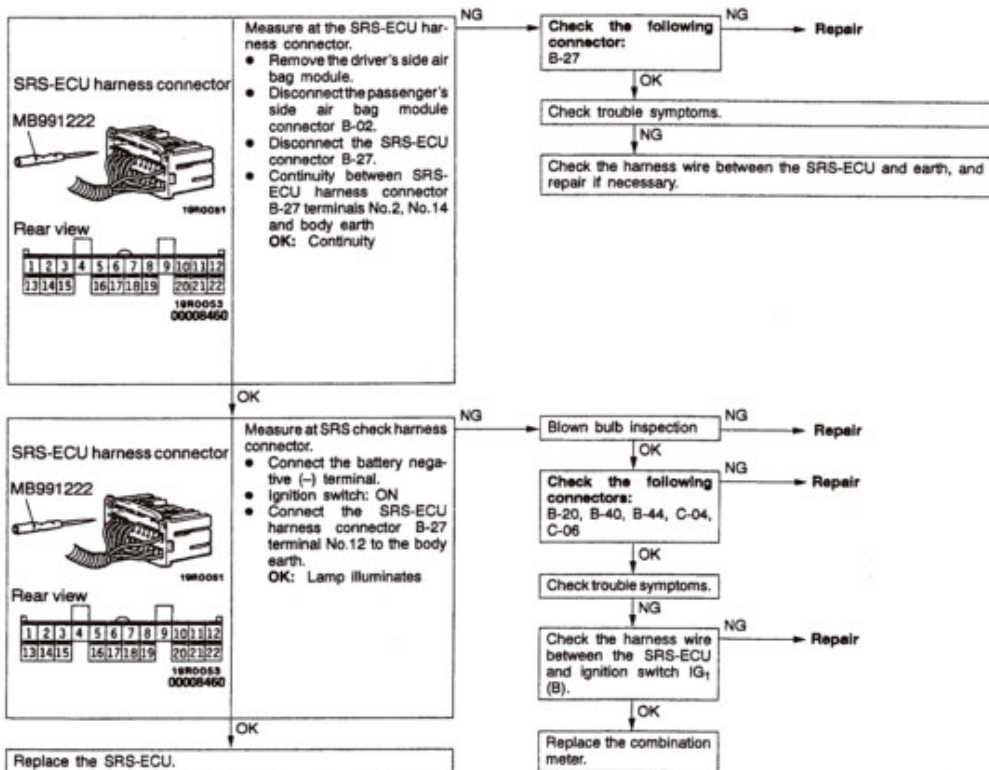
If diagnosis code No.41 is displayed simultaneously, battery voltage is low. First check the battery.

Probable cause

- Malfunction of wiring harnesses or connectors
- Malfunction of SRS-ECU



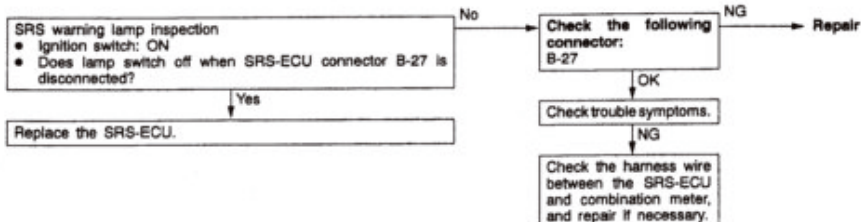
Code No.43 SRS warning lamp drive circuit system (Lamp does not illuminate.)	Probable cause
This diagnosis code is output when an open circuit occurs in the warning lamp drive circuit for a continuous period of 5 seconds. However, if the vehicle condition returns to normal, this diagnosis code No.43 will be automatically erased, and the SRS warning lamp will return to normal.	• Malfunction of wiring harnesses or connectors • Blown bulb • Malfunction of SRS-ECU • Malfunction of combination meter



**Code No.43 SRS warning lamp drive circuit system
(Lamp does not switch off.)**
Probable cause

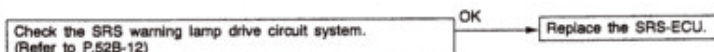
This diagnosis code is output when a short to earth occurs in the harness between the lamp and the SRS-ECU while SRS-ECU is monitoring the SRS warning lamp and the lamp is ON.

- Malfunction of wiring harnesses or connectors
- Malfunction of SRS-ECU


Code No.44 SRS warning lamp drive circuit system
Probable cause

This diagnosis code is output when a short occurs in the lamp drive circuit or a malfunction of the output transistor inside the SRS-ECU is detected while the SRS-ECU is monitoring the SRS warning lamp drive circuit.

- Malfunction of wiring harnesses or connectors
- Malfunction of SRS-ECU


Code No.45 Safing G sensor diagnosis circuit system in the SRS-ECU
Probable cause

This diagnosis code is output if there is malfunction of the safing G sensor diagnosis circuit in the SRS-ECU.

- Malfunction of SRS-ECU

Replace the SRS-ECU.

Code No.51 or 52 Driver's side air bag module (squib ignition drive circuit) system
Probable cause

This diagnosis code is output if a short (No.51) or an open circuit (No.52) is detected in the squib ignition drive circuit for the driver's seat.

- Malfunction of SRS-ECU

Replace the SRS-ECU.

Code No.54 or 55 Front passenger's side air bag module (squib ignition drive circuit) system
Probable cause

This diagnosis code is output if a short (No.54) or an open circuit (No.55) is detected in the squib ignition drive circuit for the passenger's seat.

- Malfunction of SRS-ECU

Replace the SRS-ECU.

INSPECTION CHART FOR TROUBLE SYMPTOMS

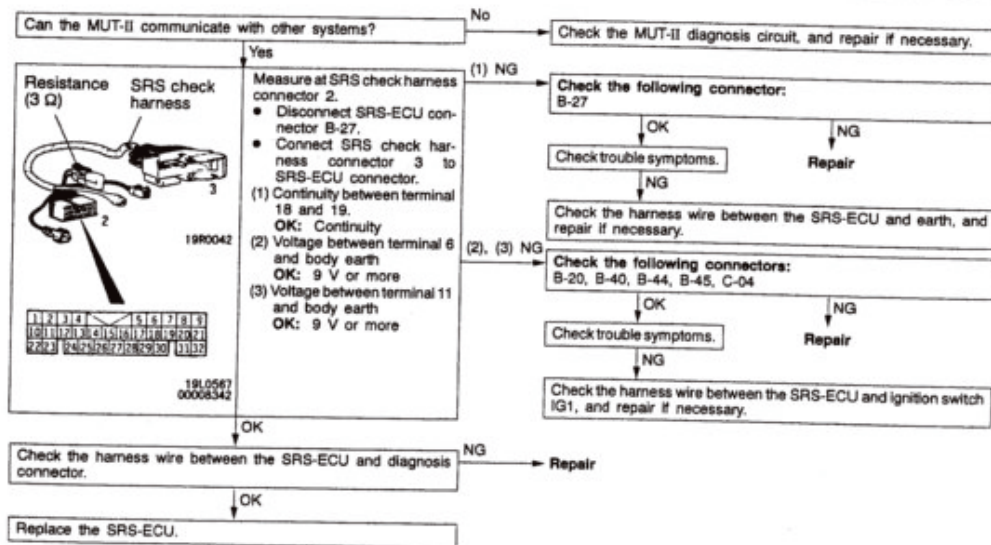
Get an understanding of the trouble symptoms and check according to the inspection procedure chart.

Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	1	52B-14
SRS warning lamp does not illuminate.	Refer to diagnosis code No.43.	52B-12
SRS warning lamp does not switch off.	Refer to diagnosis code No.43.	52B-13

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 1

Communication with MUT-II is not possible.	Probable cause
If the MUT-II can not communicate with any systems, the diagnosis circuit may be defective. If the MUT-II can not communicate with the SRS air bag only, the SRS diagnosis output or power supply circuits (including earth circuit) may be open.	- Malfunction of wiring harnesses or connectors - Malfunction of SRS-ECU



POST-COLLISION DIAGNOSIS

To inspect and service the SRS after a collision (whether or not the air bags have deployed), perform the following steps.

SRS-ECU MEMORY CHECK

1. Connect the MUT-II to the diagnosis connector.
(Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)
2. Read (and write down) all displayed diagnosis codes using the MUT-II.

NOTE

If the battery power supply has been disconnected or disrupted by the collision, the MUT-II cannot communicate with the SRS-ECU. Inspect and, if necessary, repair the body wiring harness before proceeding further.

3. Read the data list (fault duration and how many times memories are erased) using the MUT-II.

NOTE

- (1) Maximum time to be stored: 9,999 minutes (Approx. 7 days)
- (2) Maximum time to be erased memory: 250 times
4. Erase the diagnosis codes and after waiting 45 seconds or more read (and write down) all displayed diagnosis codes.

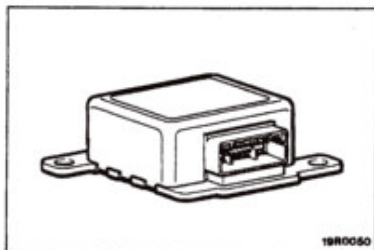
REPAIR PROCEDURE

WHEN AIR BAGS DEPLOY.

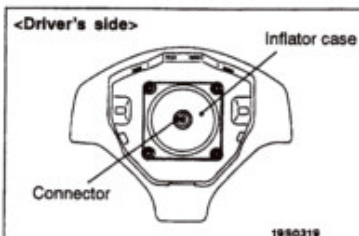
1. Replace the following parts with new ones.
 - SRS-ECU (Refer to P.52B-20.)
 - Driver's side air bag module (Refer to P.52B-24.)
 - Front passenger's side air bag module (Refer to P.52B-24.)
2. Check the following parts and replace if there are any malfunctions.
 - Clock spring (Refer to P.52B-25.)
 - Steering wheel, steering column and lower shaft assembly
 - (1) Check wiring harness (built into steering wheel) and connectors for damage, and terminals for deformation.
 - (2) Check the air bag module-to-steering wheel installation condition.
 - (3) Check steering wheel for noise, binds or difficult operation and excessive free play.
3. Check harnesses for binding, connectors for damage, poor connections, and terminals for deformation.
(Refer to P.52B-17.)

WHEN AIR BAG DOES NOT DEPLOY IN LOW-SPEED COLLISION.

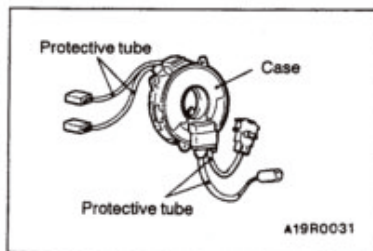
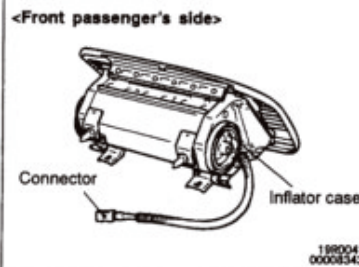
Check the SRS components. If the SRS components are showing any visible damage such as dents, cracks, or deformation, replace them with new ones. Concerning parts removed for inspection, replacement with new parts and cautionary points for working, refer to appropriate INDIVIDUAL COMPONENT SERVICE, P.52B-17.

**SRS-ECU**

1. Check SRS-ECU case and brackets for dents, cracks or deformation.
2. Check connector and lock lever for damage, and terminals for deformation.

**Air bag modules**

1. Check pad cover for dents, cracks or deformation.
2. Check connector for damage, terminals deformities, and harness for binds.
3. Check air bag inflator case for dents, cracks or deformities.
4. Check air bag module to steering wheel installation condition.

**Clock spring**

1. Check clock spring connectors and protective tube for damage, and terminals for deformation.
2. Visually check the case for damage.

Steering wheel, steering column and lower shaft assembly

1. Check wiring harness (built into steering wheel) and connectors for damage, and terminals for deformation.
2. Check air bag module-to-steering wheel installation condition.
3. Check steering wheel for noise, binds or difficult operation and excessive free play.

Harness connector (body, instrument panel wiring harness)

Check harnesses for binding, connectors for damage, and terminals for deformation. (Refer to P.52B-2.)

INDIVIDUAL COMPONENT SERVICE

If the SRS components are to be removed or replaced as a result of maintenance, troubleshooting, etc., follow each procedure (P.52B-19 – P.52B-25)

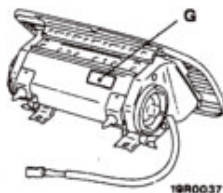
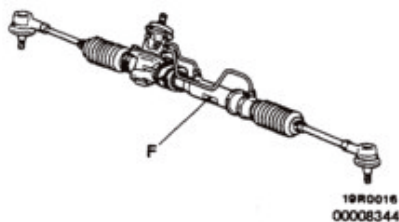
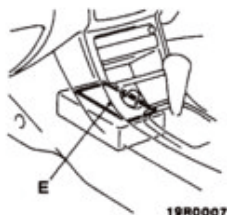
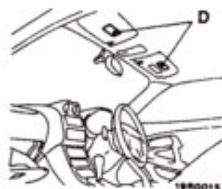
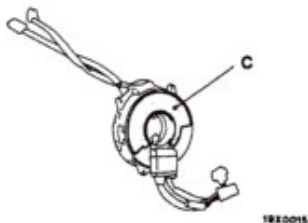
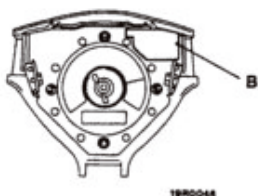
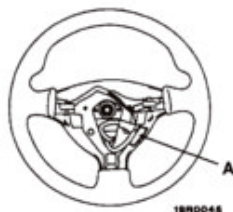
Caution

1. SRS components should not be subjected to heat (93°C or more), so remove the SRS-ECU, air bag module and clock spring before drying or baking the vehicle after painting.
2. If the SRS components are removed, they should be stored in a clean, dry place until they are reinstalled.

WARNING/CAUTION LABELS

A number of caution labels related to the SRS are found in the vehicle, as shown in the following illustration (places A to G). Follow label instructions

when servicing SRS. If labels are dirty or damaged, replace them with new ones.



SRS AIR BAG CONTROL UNIT (SRS-ECU)

Caution

1. Disconnect the battery (-) terminal and wait for 60 seconds or more before starting work. Furthermore, the disconnected battery terminal should be covered with tape to insulate it. (Refer to P.52B-3.)
2. Never attempt to disassemble or repair the SRS-ECU. If faulty, replace it.
3. Do not drop or subject the SRS-ECU to impact or vibration.

If denting, cracking, deformation, or rust are discovered in the SRS-ECU, replace it with a new SRS-ECU. Discard the old one.

4. After deployment of an air bag, replace the SRS-ECU with a new one.
5. Never use an ohmmeter on or near the SRS-ECU, and use only the special test equipment described on P.52B-4.

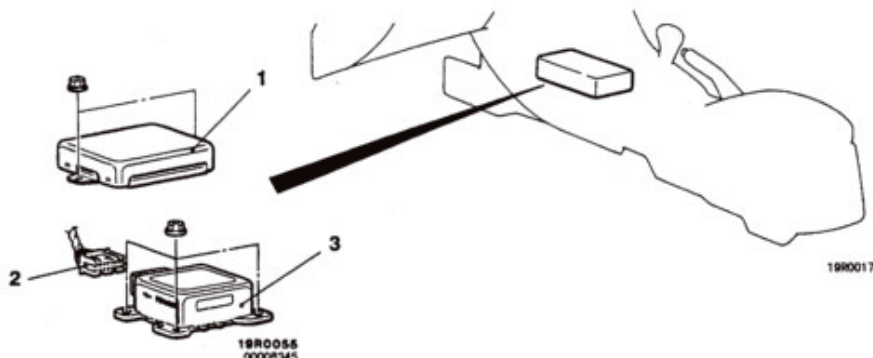
REMOVAL AND INSTALLATION

Pre-removal Operation

- Turn the ignition key to the "LOCK" position.
- Front Floor Console, Front Floor Frame, Console Side Cover Removal (Refer to GROUP 52A.)

Post-installation Operation

- Front Floor Console, Front Floor Frame, Console Side Cover Installation (Refer to GROUP 52A.)



Removal steps

- B◄
- Post-installation inspection
 - Negative (-) battery cable connection
 - Driver's side air bag module
 - Passenger's side air bag module connector connection

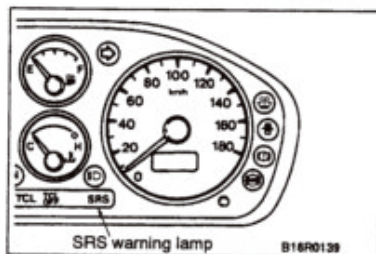
- A◄
1. TCL-ECU <Vehicles with TCL>
 2. Harness connector
 3. SRS-ECU

INSTALLATION SERVICE POINTS

►A◄ SRS-ECU INSTALLATION

Caution

The SRS may not activate if SRS-ECU is not installed properly, which could result in serious injury or death to the vehicle's driver or front passenger.



►B◄ POST-INSTALLATION INSPECTION

1. Reconnect the negative battery terminal.
2. Turn the ignition key to the "ON" position.
3. Does the "SRS" warning lamp illuminate for about 7 seconds, and then remain extinguished for at least 45 seconds?
4. If yes, SRS system is functioning properly.
If no, consult page 52B-6.

INSPECTION

- Check the SRS-ECU and brackets for dents, cracks or deformation.
- Check connector for damage, and terminals for deformation.

Caution

If a dent, crack, deformation or rust is discovered, replace the SRS-ECU with a new one.

NOTE

For checking of the SRS-ECU other than described above, refer to the section concerning troubleshooting. (Refer to P.52B-6.)

AIR BAG MODULES AND CLOCK SPRING

Caution

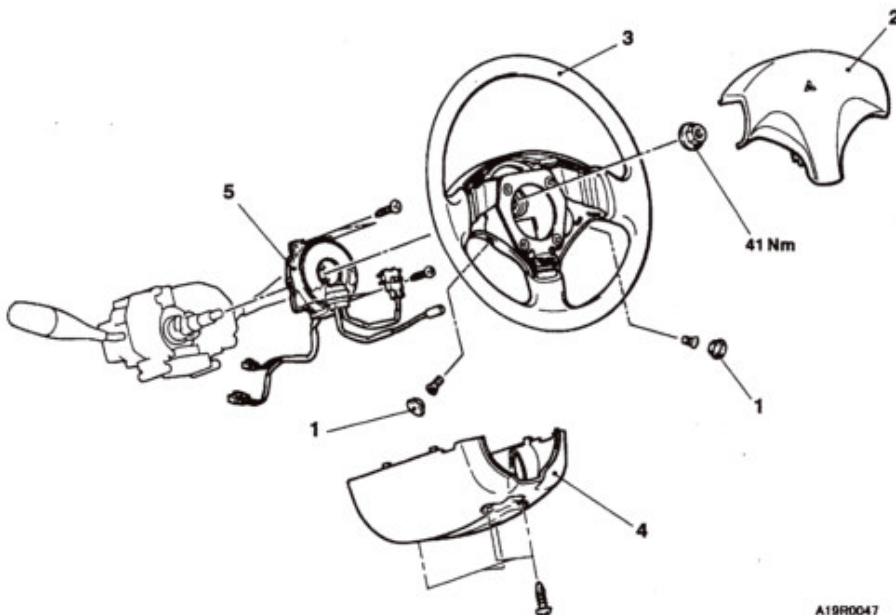
1. Disconnect the battery (–) terminal and wait for 60 seconds or more before starting work. Furthermore, the disconnected battery terminal should be covered with tape to insulate it. (Refer to P.52B-3.)
2. Never attempt to disassemble or repair the air bag modules or clock spring. If faulty, replace it.
3. Do not drop the air bag modules or clock spring or allow contact with water, grease or oil.
Replace it if a dent, crack, deformation or rust is detected.
4. The air bag modules 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.
5. Do not expose the air bag modules to temperatures over 93°C.
6. After deployment of an air bag, replace the air bag modules. Check the clock spring, and if faulty, replace it with a new part.
7. Wear gloves and safety glasses when handling air bags that have already deployed.
8. An undeployed air bag module should only be disposed of in accordance with the procedures (Refer to P.52B-26.)

REMOVAL AND INSTALLATION

<Air bag module (driver's side), clock spring>

Pre-removal Operation

- After setting the steering wheel and the front wheels to the straight ahead position, remove the ignition key.

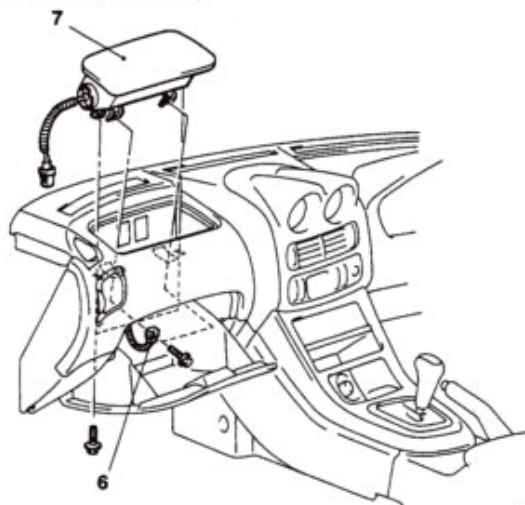
**Air bag module removal steps**

- Post-installation inspection
- Negative (-) battery cable connection
- 1. Cover
- 2. Air bag module (Driver's side)
- Pre-installation inspection

Clock spring removal steps

- Post-installation inspection
- Negative (-) battery cable connection
- 1. Cover
- 2. Air bag module (Driver's side)
- 3. Steering wheel
- 4. Column cover lower
- 5. Clock spring
- Pre-installation inspection

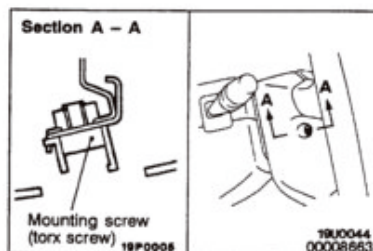
<Air bag module (front passenger's side)>



A18R0012

Air bag module removal steps

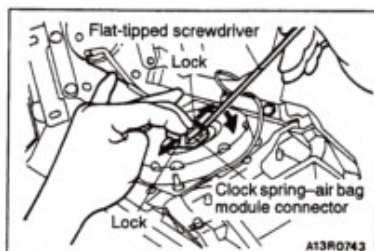
- E◀
- Post-installation inspection
 - Negative (-) battery cable connection
 - Glove box (Refer to GROUP 52A – Instrument Panel.)
- ◀D▶
- 6. Air bag module and body wiring harness connection
 - 7. Air bag module (Front passenger's side)
- A◀
- Pre-installation inspection

**REMOVAL SERVICE POINTS****◀A▶ AIR BAG MODULE REMOVAL (DRIVER'S SIDE)**

1. Remove the air bag module mounting screw (torx screw) from the side of the steering wheel.

NOTE

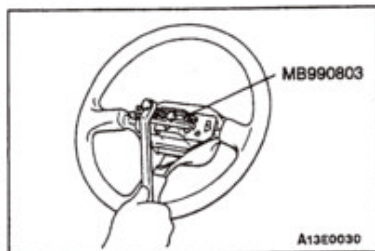
Do not remove the air bag module mounting screw (torx screw) from the sleeve.



2. Press the air bag's lock towards the outer side to spread it open. Use a flat-tipped screwdriver, as shown in the figure at the left, to pry so as to remove the connector gently.

Caution

1. When disconnect the air bag module-clock spring connector, take care not to apply excessive force to it.
2. The removed air bag module should be stored in a clean, dry place with the pad cover face up.

**◀B▶ STEERING WHEEL REMOVAL****◀C▶ CLOCK SPRING REMOVAL****Caution**

The removed clock spring should be stored in a clean, dry place.

**◀D▶ AIR BAG MODULE REMOVAL
(FRONT PASSENGER'S SIDE)****Caution**

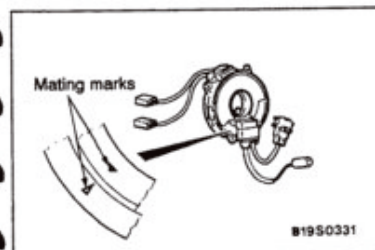
The removed air bag module should be stored in a clean, dry place with the pad cover face up.

INSTALLATION SERVICE POINTS**▶A▶ PRE-INSTALLATION INSPECTION**

1. When installing the new air bag modules and clock spring, refer to "INSPECTION".

Caution

Dispose of air bag modules only according to the specified procedure. (Refer to P.52B-26.)

**▶B▶ CLOCK SPRING INSTALLATION**

Align the mating marks of the clock spring and, after turning the front wheels to the straight-ahead position, install the clock spring to the column switch.

Mating Mark Alignment

Turn the clock spring clockwise fully, and then turn back it approx. three and four fifth turns counterclockwise to align the mating marks.

Caution

If the clock spring's mating marks are not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver.

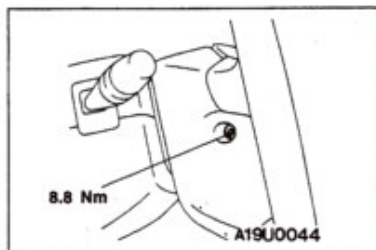
▶C▶ STEERING WHEEL INSTALLATION

1. Before installation of the steering wheel, be sure to first turn the vehicle's front wheels to the straight-ahead position and align the mating marks of the clock spring.

Caution

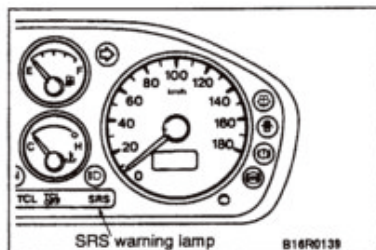
Be sure when installing the steering wheel, that the harness of the clock spring does not become caught or tangled.

2. After installing, turn the steering wheel all the way in both directions to confirm that steering is normal.



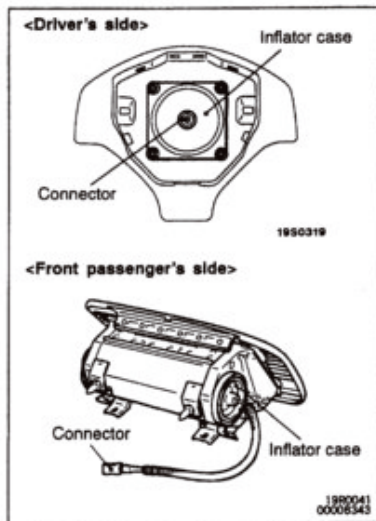
►D◄ AIR BAG MODULE INSTALLATION (DRIVER'S SIDE)

1. Securely connect the air bag module connector.
2. Tighten the air bag module mounting screw to the specified torque.



►E◄ POST-INSTALLATION INSPECTION

1. Turn the steering wheel to the left and right and confirm that there is no noise and steering wheel turns smoothly.
2. Reconnect the negative battery terminal.
3. Turn the ignition key to the "ON" position.
4. Does the "SRS" warning lamp illuminate for about 7 seconds, and then remain extinguished for at least 45 seconds?
5. If yes, SRS system is functioning properly.
If no, consult page 52B-6.



INSPECTION

AIR BAG MODULE CHECK

If any improper part is found during the following inspection, replace the air bag modules with a new one. Dispose the old one according to the specified procedure. (Refer to P.52B-26.)

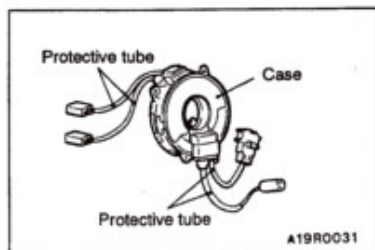
Caution

Never attempt to measure the circuit resistance of the air bag modules (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bags deployment will result in serious personal injury.

1. Check pad cover for dents, cracks or deformation.
2. Check the harness and connectors for damage, terminals for deformation, and harness for binds.
3. Check air bag inflator case for dents, cracks or deformation.
4. Check the air bag module-to-steering wheel installation condition.

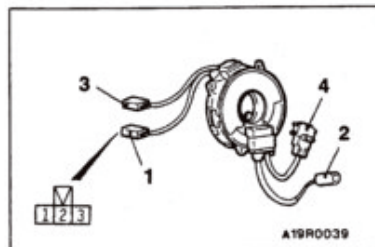
Caution

If dents, cracks, deformation, or rust are discovered in the air bag module, replace it with a new one. Dispose of the old one according to the specified procedure. (Refer to P.52B-26.)

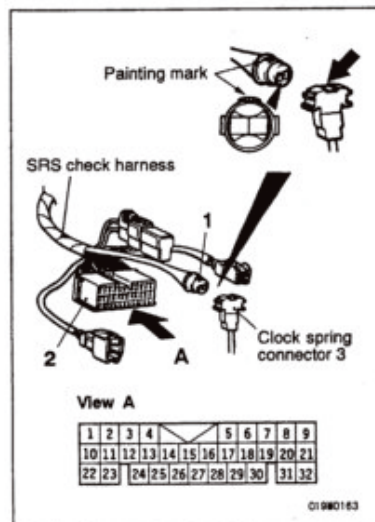
**CLOCK SPRING CHECK**

If, as result of following checks, even one abnormal point is discovered, replace the clock spring with a new one.

1. Check connectors and protective tube for damage, and terminals for deformation.
2. Visually check the case for damage.



3. Check that there is continuity between terminal (3) of the clock spring No.1 connector and the No. 2 connector.



4. Align the painting mark of the SRS check harness No.1 connector to the arrow portion of the clock spring No.3 connector and connect the connector.
5. Check for continuity between terminal 25 and terminal 26 of SRS Check Harness connector No. 2.

AIR BAG MODULE DISPOSAL PROCEDURES

Before disposing of a vehicle which is equipped with air bag, or when disposing of the air bags

themselves, following procedures must be used to deploy the air bags before disposal.

UNDEPLOYED AIR BAG MODULE DISPOSAL

Caution

1. If the vehicle is to be scrapped or otherwise disposed of, deploy the air bags inside the vehicle. If the vehicle will continue to be operated and only the air bag modules are to be disposed of, deploy the air bags outside the vehicle.
2. Since a large amount of smoke is produced when the air bags are deployed, avoid residential areas whenever possible.
3. Since there is loud noise when the air bags are deployed, avoid residential areas whenever possible. If anyone is nearby, give warning of the impending noise.
4. Suitable ear protection should be worn by personnel performing these procedures or by people in the immediate area.

AIR BAG MODULE DEPLOYMENT

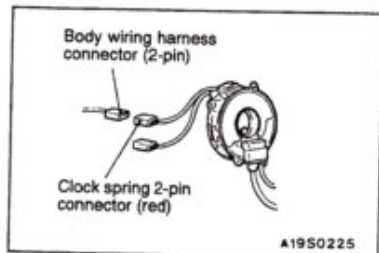
Deployment Inside The Vehicle

(when disposing of a vehicle)

1. Move the vehicle to an isolated spot.
2. Disconnect the negative (-) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution

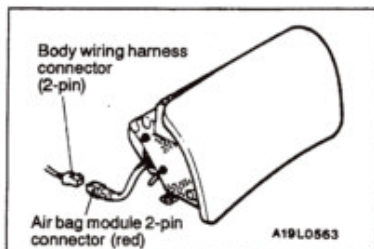
Wait at least 60 seconds after disconnecting the battery cables before doing any further work.
(Refer to P.52B-3.)



3. To deploy the air bag module (driver's side):
 - (1) Remove the steering column lower cover.
 - (2) Remove the connection between the clock spring 2-pin connector (red) and the body wiring harness connector.

NOTE

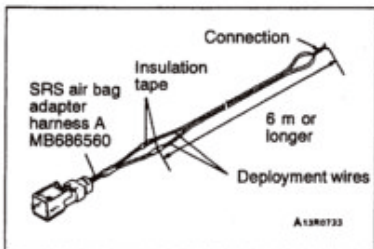
If the clock spring connector is disconnected from the body wiring harness, both electrodes of the clock spring connector will be automatically shorted to prevent unintended deployment of the air bag due to static electricity, etc.



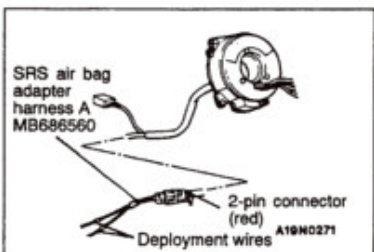
4. To deploy the air bag module (front passenger's side):
 - (1) Remove the glove box. (Refer to P.52B-22.)
 - (2) Remove the connection between the air bag module (front passenger's side) connector (red 2-pin) and the body wiring harness connector.

NOTE

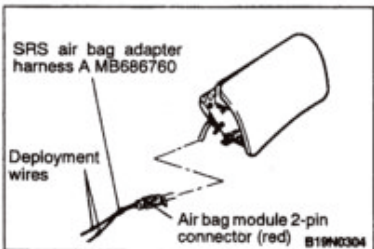
When the air bag module connector is disconnected from the body wiring harness, both electrodes of the air bag module connector will be automatically shorted to prevent unintended deployment of the air bag due to static electricity, etc.



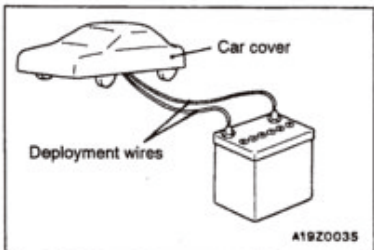
5. Connect two deployment wires, each six meters or longer, to the two leads of SRS air bag adapter harness A and cover the connections with insulation tape. The other ends of the two deployment wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



6. For driver's side air bag module, connect the clock spring 2-pin connector (red) to SRS air bag adapter harness A and pass the deployment wires out of the vehicle.



7. For front passenger's side air bag module, connect the air bag module 2-pin connector (red) to SRS air bag adapter harness A and pass the deployment wires out of the vehicle.



8. In order to suppress the noise of this operation as much as possible, shut all windows fully, close doors, and place a cover over the vehicle.

Caution

If window glass is damaged in any way, there is a possibility that it may shatter during this operation. Therefore, a cover must be placed over the vehicle.

9. At a location as far away from the vehicle as possible, disconnect the two connected deployment 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 deploying the air bag in this manner, first check to be sure that there is no one in or near the vehicle. Wear safety glasses.
 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.
 3. If the air bag module fails to deploy when the procedures above are followed, do not go near the module. Contact your local distributor.
10. After deployment, dispose of the air bag module according to the Deployed Air Bag Module Disposal Procedures. (Refer to P.52B-31.)

DEPLOYMENT OUTSIDE THE VEHICLE

Caution

1. This should be carried out in a wide, flat area at least 6 m away from obstacles and other people.
 2. Do not perform deployment outside, if a strong wind is blowing, and if there is even a slight breeze, the air bag module should be placed and deployed downwind from the battery.
1. Disconnect the negative (–) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

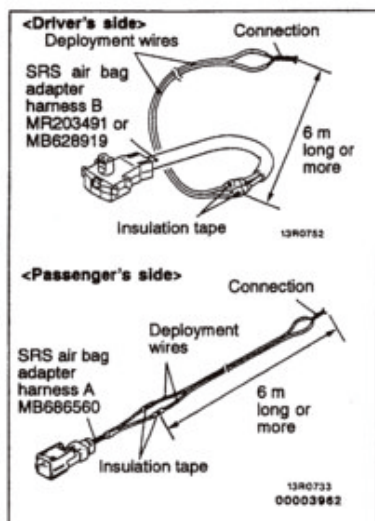
Caution

Wait at least 60 seconds after disconnecting the battery cables before doing any further work. (Refer to P.52B-3.).

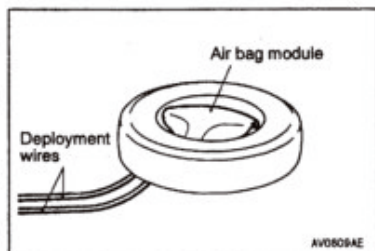
2. Remove the air bag modules from the vehicle. (Refer to P.52B-20.)

Caution

The air bag module should be stored on a flat surface and placed so that the pad cover face up. Do not place anything on top of it.



3. Connect two deployment wires, each six meters or longer, to the two leads of SRS air bag adapter harness B <driver's side> or SRS air bag adapter harness A <front passenger's side>, and cover the connections with insulation tape. The other ends of the two deployment wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag module.



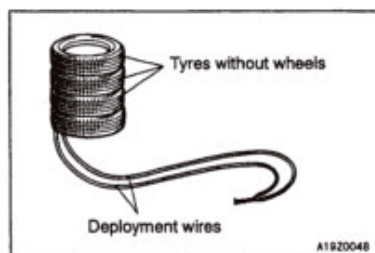
4. Set the air bag modules as follows:

<Air bag module (driver's side)>

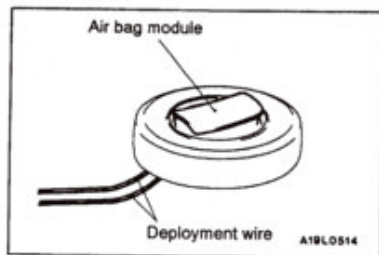
- (1) Install old nuts to the four bolts behind the driver's side air bag module, and tie thick wires holding the air bag module to the wheel.
- (2) Take the SRS air bag adapter harness B that is connected to the deployment wires, pass it beneath the old tyre wheel assembly, and connect it to the air bag module.
- (3) Pass the thick wires through the wheel nut hole, and then secure the air bag module to an old tyre with a wheel in it so that the pad on the module is facing upwards.

Caution

Leave some space below the wheel for the adaptor harness. If there is no space, the reaction when the air bag deploys could damage the adaptor harness.



- (4) Place three old tyres with no wheels on top of the tyre secured to the air bag module.

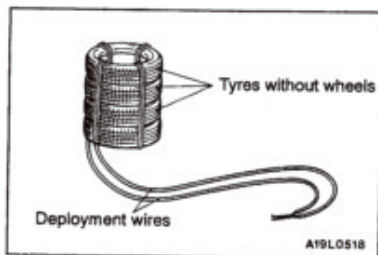


<Air bag module (front passenger's side)>

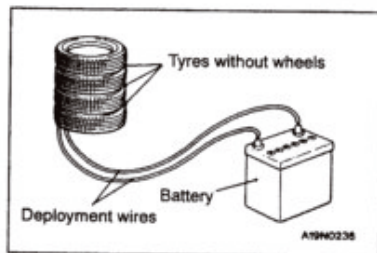
- (1) Connect the deployment wires to the SRS air bag adapter harness A, pass it beneath the old tyre wheel assembly, and connect it to the air bag module.
- (2) Pass the thick wires into the hole of the air bag module bracket, and secure it to the wheel of the old tyre with wheel (4 locations), with 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 adapter harness.
2. Do not have the connector of the SRS air bag adapter harness A inserted between the tyres.



- (3) Place three old tyres, without wheels, on top of the tyre secured to the air bag module, and secure all tyres 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 deployment 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.

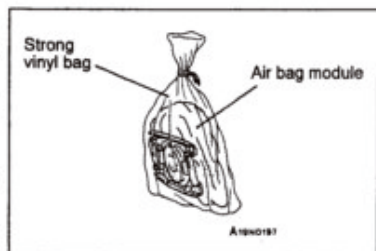
Caution

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.
3. If the air bag module fails to deploy, contact your local distributor.
6. After deployment, dispose the air bag module according to the Deployment Air Bag Module Disposal Procedures.

DEPLOYED AIR BAG MODULE DISPOSAL PROCEDURES

After deployment, the air bag module should be disposed of in the same manner as any other scrap parts, adhering to local laws and/or legislation that may be in force except that the following points should be carefully noted during disposal.

1. The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it cool before attempting to handle it.
2. Do not put water or oil on the air bag after deployment.
3. There may be, adhered to the deployed air bag module, material that could irritate the eye and/or skin, so wear gloves and safety glasses when handling a deployed air bag module. IF AFTER FOLLOWING THESE PRECAUTIONS, ANY MATERIAL DOES GET INTO THE EYES OR ON THE SKIN, IMMEDIATELY RINSE THE AFFECTED AREA WITH A LARGE AMOUNT OF CLEAN WATER.
IF ANY IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.



4. Tightly seal the air bag module in a strong vinyl bag for disposal.
5. Be sure to always wash your hands after completing this operation.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840.

CHASSIS ELECTRICAL

CONTENTS

| | | | |
|--|----|---|----|
| BATTERY | 3 | SPECIAL TOOLS | 12 |
| SERVICE SPECIFICATION | 3 | TROUBLESHOOTING | 12 |
| ON-VEHICLE SERVICE | 3 | ON-VEHICLE SERVICE | 16 |
| Fluid Level and Specific Gravity Check | 3 | Speedometer Check | 16 |
| Charging | 3 | Tachometer Check | 16 |
| Battery Testing Procedure | 4 | Fuel Gauge Simple Check | 17 |
| IGNITION SWITCH | 5 | Fuel Gauge Unit Check | 17 |
| TROUBLESHOOTING | 5 | Vehicle Voltmeter Simple Check | 18 |
| IGNITION SWITCH | 9 | Engine Coolant Temperature Gauge Simple Check | 19 |
| COMBINATION METERS AND SUB-METERS | 11 | Engine Coolant Temperature Gauge Unit Check | 19 |
| SERVICE SPECIFICATIONS | 11 | COMBINATION METERS AND SUB-METERS | 20 |
| SEALANT | 11 | | |

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

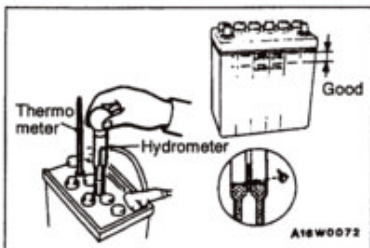
The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

| | | | |
|--|----|---|--------------------|
| HEADLAMP* | 22 | TRACTION CONTROL (TCL)
..... Refer to GROUP 13C | |
| SERVICE SPECIFICATIONS | 22 | RADIATOR FAN MOTOR
..... Refer to GROUP 14 | |
| TROUBLESHOOTING | 23 | AUTOMATIC TRANSMISSION
..... Refer to GROUP 23 | |
| ON-VEHICLE SERVICE | 23 | SERVICE BRAKES (ABS)
..... Refer to GROUP 35B | |
| Headlamp Aiming | 23 | DOOR GLASS AND REGULATOR
(POWER WINDOWS)
..... Refer to GROUP 42 | |
| Intensity Measurement | 25 | DOOR HANDLE AND LATCH
(DOOR LOCKING)
..... Refer to GROUP 42 | |
| Bulb Replacement | 25 | KEYLESS ENTRY SYSTEM
..... Refer to GROUP 42 | |
| HEADLAMP | 27 | SUNROOF | Refer to GROUP 42 |
| FOG LAMP AND FRONT TURN
SIGNAL LAMP | 29 | WINDSHIELD WIPER AND WASHER
..... Refer to GROUP 51 | |
| SERVICE SPECIFICATIONS | 29 | REAR WIPER AND WASHER
..... Refer to GROUP 51 | |
| ON-VEHICLE SERVICE | 29 | DOOR MIRROR (ELECTRONIC
CONTROLLED DOOR MIRROR)
..... Refer to GROUP 51 | |
| Fog Lamp Aiming | 29 | SUPPLEMENTAL RESTRAINT SYSTEM
(SRS) | Refer to GROUP 52B |
| Bulb Replacement | 30 | HEATER | Refer to GROUP 55 |
| FOG LAMP AND FRONT TURN SIGNAL
LAMP | 31 | AIR CONDITIONER
..... Refer to GROUP 55 | |
| REAR COMBINATION LAMP | 33 | | |
| TROUBLESHOOTING | 33 | | |
| REAR COMBINATION LAMP | 33 | | |
| HAZARD WARNING LAMP
SWITCH | 35 | | |
| SPEAKER | 36 | | |
| ANTENNA | 37 | | |
| REAR WINDOW DEFOGGER | 40 | | |
| TROUBLESHOOTING | 40 | | |
| ON-VEHICLE SERVICE | 40 | | |
| Printed-heater Line Check | 40 | | |
| Rear Window Defogger Relay Continuity Check
..... | 40 | | |

BATTERY

SERVICE SPECIFICATION

| Item | Specification |
|---------------------------------------|--------------------|
| Specific gravity of the battery fluid | 1.220–1.290 [20°C] |



ON-VEHICLE SERVICE

FLUID LEVEL AND SPECIFIC GRAVITY CHECK

1. Inspect whether or not the battery fluid is between the UPPER LEVEL and LOWER LEVEL marks.
2. Use a hydrometer and thermometer to check the specific gravity of the battery fluid.

Standard value: 1.220–1.290 [20°C]

The specific gravity of the battery fluid varies with the temperature, so use the following formula to calculate the specific gravity for 20°C. Use the calculated value to determine whether or not the specific gravity is satisfactory.

$$D20 = Dt + 0.0007 (t - 20)$$

D20: Specific gravity of the battery fluid calculated for 20°C.

Dt: Actually measured specific gravity

t: Actually measured temperature

CHARGING

1. When charging a battery while still installed in the vehicle, disconnect the battery cables to prevent damage to electrical parts.
2. The current normally used for charging a battery should be approximately 1/10th of the battery capacity.
3. When performing a quick-charging due to lack of time, etc., the charging current should never exceed the battery capacity as indicated in amperes.
4. Determining if charging is completed.
 - (1) If the specific gravity of the battery fluid reaches 1.250–1.290 and remains constant for at least one hour.
 - (2) If the voltage of each cell reaches 2.5–2.8 V and remains constant for at least one hour.

Caution

1. Be careful since the battery fluid level may rise during charging.
2. Keep all sources of fire away while charging because there is a danger of explosion.
3. Be careful not to do anything that could generate sparks while charging.
4. When charging is completed, replace the battery caps, pour clean water over the battery to remove any sulfuric acid and dry.

BATTERY TESTING PROCEDURE**TEST STEP**

- (1) Turn headlights on for 15 seconds.
 (2) Turn headlights off for 2 minutes to allow battery voltage to stabilize.
 (3) Disconnect cables.

OK

Read open circuit voltage.
OK: Open circuit voltage is more than 12.4 V
 (specific gravity: 1.240)

NG

Charge battery at 5 amps. (see LOAD TEST RATE CHART)

OK

Retest

- (1) Connect a load tester to the battery.
 (2) Load the battery at the recommended discharge rate (see LOAD TEST RATE CHART) for 15 seconds.
 (3) Read voltage after 15 seconds, then remove load.
 (4) Compare the measured value with the minimum voltage (see LOAD TEST CHART).
OK: Higher than minimum voltage

NG

Replace battery

OK

Normal

LOAD TEST RATE CHART

| | |
|--|-----------|
| Battery type | 46B24R(S) |
| Charging time when fully discharged h [5-amp rated current charging] | 8 |
| Load test (Amps) | 160 |

LOAD TEST CHART

| | | | | | | | | |
|-------------------|--------------|----------|----------|--------|---------|----------|-----------|------------|
| Temperature °C | 21 and above | 20 to 16 | 15 to 10 | 9 to 4 | 3 to -1 | -2 to -7 | -8 to -12 | -13 to -18 |
| Minimum voltage V | 9.6 | 9.5 | 9.4 | 9.3 | 9.1 | 8.9 | 8.7 | 8.5 |

IGNITION SWITCH

TROUBLESHOOTING

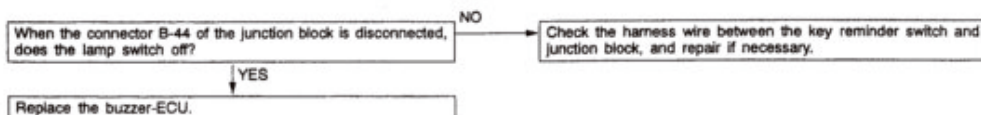
INSPECTION CHART FOR TROUBLE SYMPTOMS

| Trouble symptoms | | Inspection procedure | Reference page |
|-------------------------------------|---|----------------------|----------------|
| Ignition key hole illumination lamp | Key hole illumination lamp remains illuminated. | 1 | 54-5 |
| | Even if driver's side door is opened, key hole illumination lamp does not illuminate. | 2 | 54-6 |
| | While key hole illumination lamp is illuminated, ignition key is turned to the ON position but key hole illumination lamp does not switch off. (However, it switch off after 10 seconds.) | 3 | 54-7 |
| Key reminder warning buzzer | While the key reminder warning buzzer is sounding, the ignition key is turned to the ON position but the sound dose not stop. (However, it stops when the driver's side door is closed.) | 3 | 54-7 |
| | The key reminder warning buzzer dose not stop sounding even if the key is removed. (However, it stops when the driver's side door is closed.) | 4 | 54-7 |
| | Then key reminder warning buzzer does not sound ever if the driver's side door is opened while the key is still inserted. (However, the ignition key should be in the OFF position.) | 5 | 54-8 |

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 1

| Key hole illumination lamp remains illuminated. | Probable cause |
|--|--|
| The cause is probably a harness short or a defective buzzer-ECU. | <ul style="list-style-type: none"> Malfunction of harness wire Malfunction of buzzer-ECU |



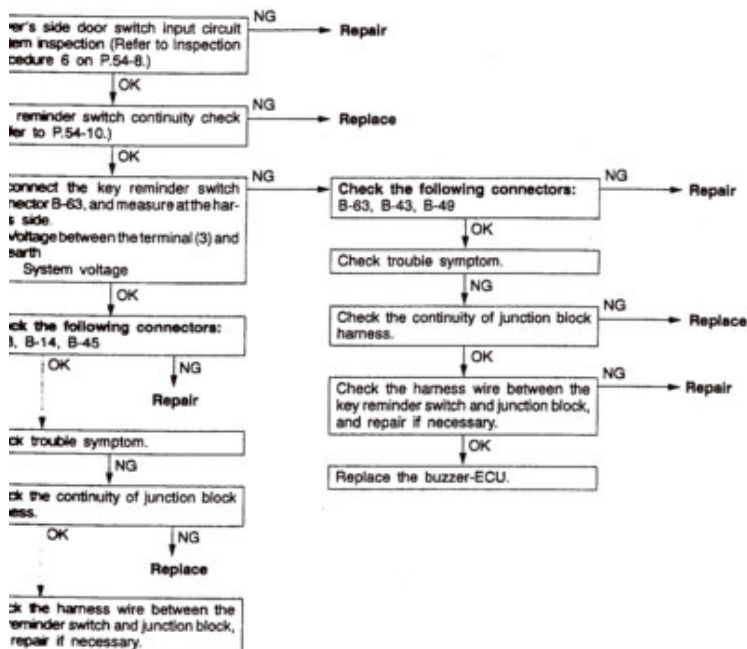
INSPECTION PROCEDURE 2

When driver's side door is opened, key hole illumination lamp does not illuminate.

Probable cause

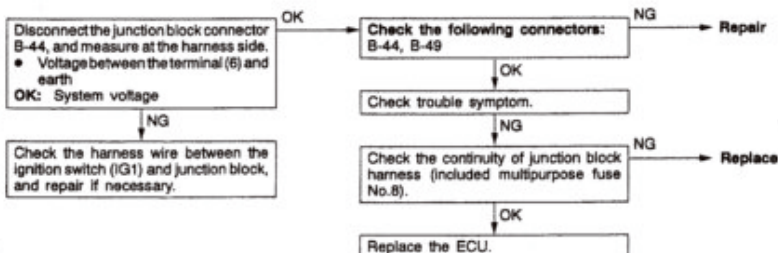
The cause is probably a defective key hole illumination lamp circuit system or a defective driver's side door switch input circuit system.

- Malfunction of door switch
- Malfunction of bulb
- Malfunction of connector
- Malfunction of harness wire
- Malfunction of buzzer-ECU



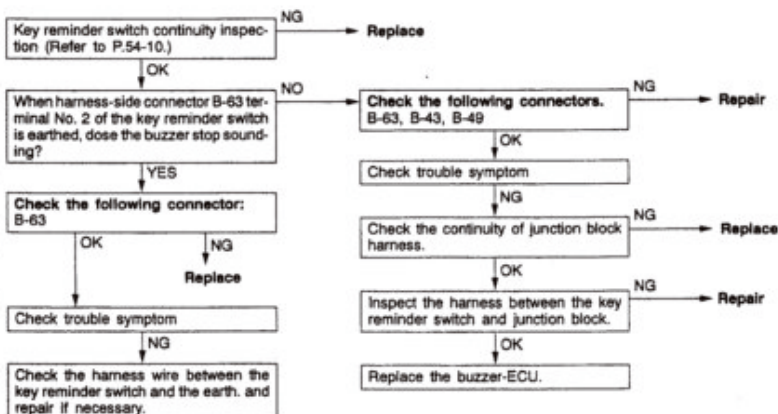
INSPECTION PROCEDURE 3

| | |
|--|--|
| <p>While key hole illumination lamp is illuminated, ignition key is turned to the ON position but key hole illumination lamp does not switch off. (However, it switch off after 10 seconds.)</p> <p>While the key reminder warning buzzer is sounding, the ignition key is turned to the ON position but the sound does not stop. (However, it stops when the driver's side door is closed.)</p> | Probable cause |
| <p>The cause is probably a defective ignition switch input circuit or a defective buzzer-ECU. Furthermore, if there is a malfunction of a multipurpose fuse, the cause may also be a short circuit in a harness.</p> | <ul style="list-style-type: none"> • Malfunction of fuse • Malfunction of harness wire or connector • Malfunction of buzzer-ECU |



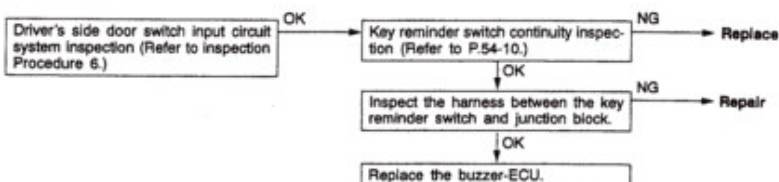
Inspection Procedure 4

| | |
|--|--|
| <p>The key reminder warning buzzer does not stop sounding even if the key is removed. (However, it stops when the driver's side door is closed.)</p> | Probable cause |
| <p>The cause is probably a malfunction of the key reminder switch input circuit system, or a malfunction of buzzer-ECU.</p> | <ul style="list-style-type: none"> • Malfunction of key reminder switch • Malfunction of harness or connector • Malfunction of buzzer-ECU |



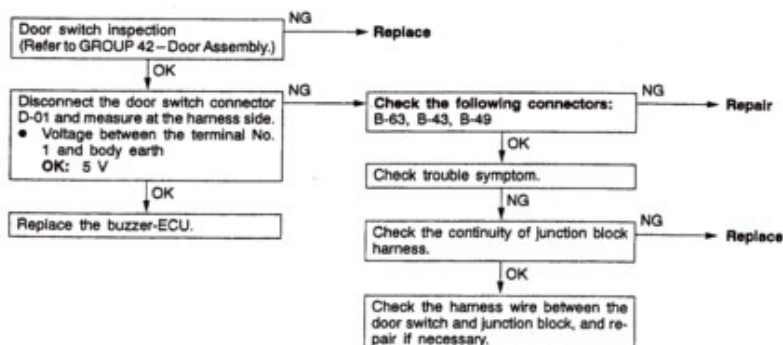
Inspection Procedure 5

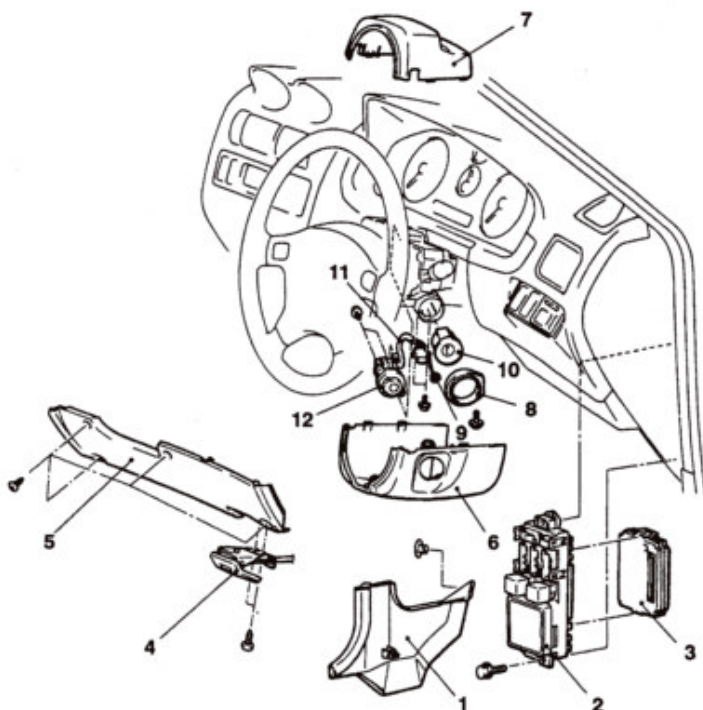
| | |
|--|--|
| Then Key reminder warning buzzer dose not sound ever If the driver's side door is opened while the key is still inserted. (However, the ignition key should be in the OFF position.) | Probable cause |
| The cause is probably a malfunction of the door switch input circuit system, or a malfunction of the key reminder switch input circuit system. | <ul style="list-style-type: none"> ● Malfunction of door switch ● Malfunction of key reminder switch ● Malfunction of harness or connector ● Malfunction of buzzer-ECU |



Inspection Procedure 6

Driver's side door switch input circuit system inspection



IGNITION SWITCH**REMOVAL AND INSTALLATION**

A16R0099

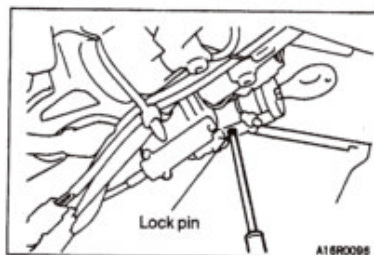
Buzzer-ECU removal steps

1. Cowl side trim (R.H.)
(Refer to GROUP 52A.)
2. Junction block
3. Buzzer-ECU

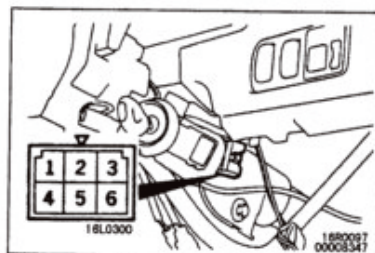
Ignition switch removal steps

4. Hood lock release handle
5. Driver side lower cover (Refer to GROUP 52A – Instrument Panel.)
6. Column cover, lower
7. Column cover, upper
8. Illumination ring or ring cover
9. Key hole illumination lamp bulb
10. Steering lock cylinder
11. Key reminder switch
12. Ignition switch



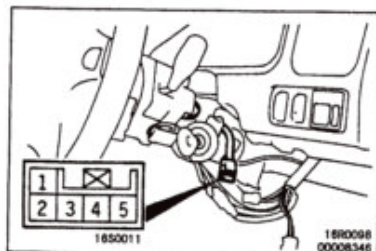
**REMOVAL SERVICE POINT****▶ STEERING LOCK CYLINDER REMOVAL**

1. Insert the key in the steering lock cylinder and turn it to the "ACC" position.
2. Using a cross-tip (+) screwdriver (small) or a similar tool, push the lock pin of the steering lock cylinder inward and then pull the steering lock cylinder toward you.

**INSPECTION****IGNITION SWITCH CONTINUITY CHECK**

1. Disconnect the wiring connector from the ignition switch.
2. Operate the switch, and check the continuity between the terminals.

| Ignition key position | Terminal No. | | | | | |
|-----------------------|--------------|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| LOCK | | | | | | |
| ACC | ○ | | | | | ○ |
| ON | ○ | ○ | | ○ | | ○ |
| START | ○ | ○ | ○ | | ○ | |

**KEY REMINDER SWITCH CONTINUITY CHECK**

Disconnect the key reminder switch connector with the switch installed on the vehicle, and then check continuity.

| Ignition key | Terminal No. | | | |
|--------------|--------------|---|---|---|
| | 2 | 5 | 3 | 4 |
| Removed | ○ | ○ | | |
| Inserted | | | ○ | ○ |

COMBINATION METERS AND SUB-METERS**SERVICE SPECIFICATIONS**

| Items | | Standard value |
|---|---|----------------|
| Speedometer indication error km/h | 40 | 37 – 45 |
| | 80 | 75 – 88 |
| | 120 | 113 – 132 |
| | 160 | 150 – 176 |
| Tachometer indication error r/min | 700 | ±70 |
| | 3,000 | +220, -110 |
| | 5,000 | +300, -100 |
| | 6,000 | +325, -75 |
| | 8,000 | +350, -50 |
| Fuel gauge unit resistance Ω | Float point F | 11.7 ± 1.5 |
| | Float point E | 100 ± 2.0 |
| Fuel gauge unit float height mm | A (Float point F) | 12.8 |
| | B (Float point E) | 135.8 |
| Fuel gauge resistance Ω | Power supply and earth | 192 – 224 |
| | Power supply and fuel gauge | 101 – 114 |
| | Fuel gauge and earth | 91 – 110 |
| Engine coolant temperature gauge resistance Ω | Power supply and earth | 192 – 233 |
| | Power supply and engine coolant temperature gauge | 53 – 59 |
| | Engine coolant temperature gauge and earth | 245 – 292 |
| Engine coolant temperature gauge unit resistance (at 70°C) Ω | | 104 ± 13.5 |

SEALANT

| Items | Specified sealant | Remark |
|--|--|----------------|
| Engine coolant temperature gauge unit threaded portion | 3M Adhesive nut locking No. 4171 or equivalent | Drying sealant |

SPECIAL TOOLS

| Tool | Number | Name | Use |
|--|-------------|------------------------|---|
| A

B

C

D

<small>C891223</small> | MB991223 | Harness set | Making voltage and resistance measurements during troubleshooting |
| | A: MB991219 | A: Test harness | A: Connector pin contact pressure check |
| | B: MB991220 | B: LED harness | B: Power circuit check |
| | C: MB991221 | C: LED harness adapter | C: Power circuit check |
| | D: MB991222 | D: Probe | D: Commercial tester connection |

TROUBLESHOOTING

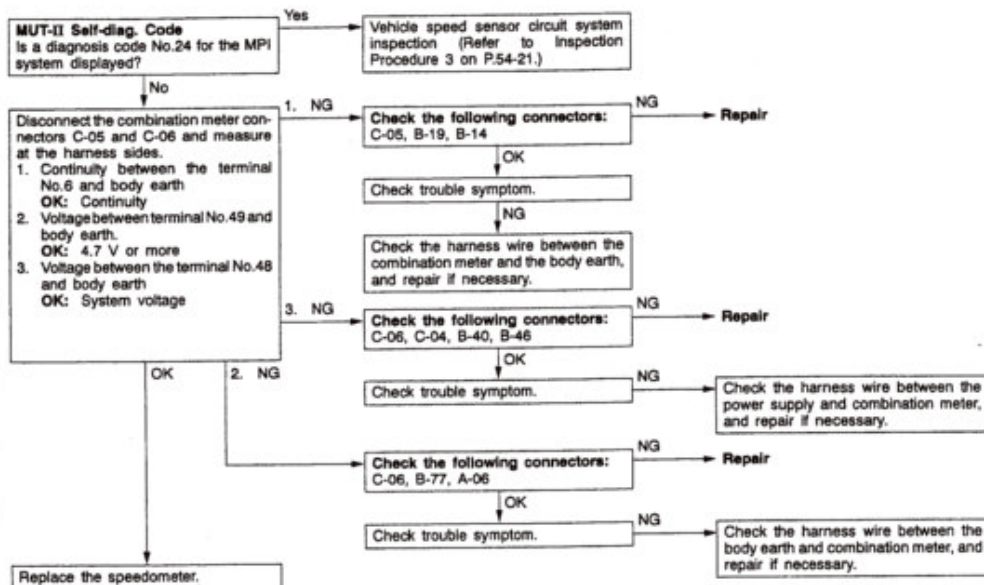
INSPECTION CHART FOR TROUBLE SYMPTOMS

| Trouble symptom | Inspection procedure | Reference page |
|----------------------------|----------------------|----------------|
| Speedometer does not work. | 1 | 54-13 |
| Tachometer does not work. | 2 | 54-14 |
| Voltmeter does not work. | 4 | 54-15 |

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 1

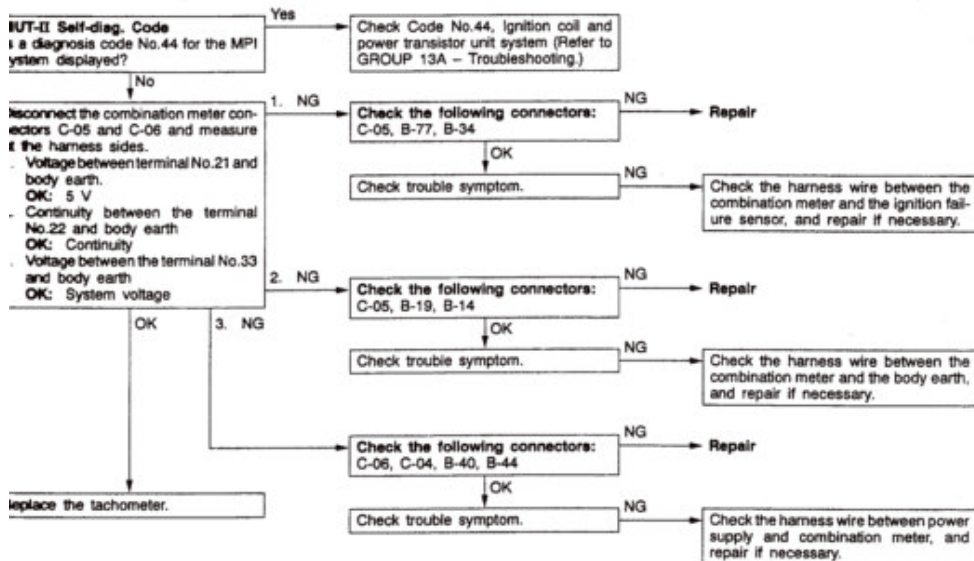
| Speedometer does not work. | Probable cause |
|---|--|
| If no diagnosis code regarding the vehicle speed sensor is not displayed, the vehicle speed sensor is normal. | <ul style="list-style-type: none"> Malfunction of vehicle speed sensor Malfunction of speedometer Malfunction of harness or connector Malfunction of related ECU |



4-14 CHASSIS ELECTRICAL – Combination Meters and Sub-Meters

Inspection Procedure 2

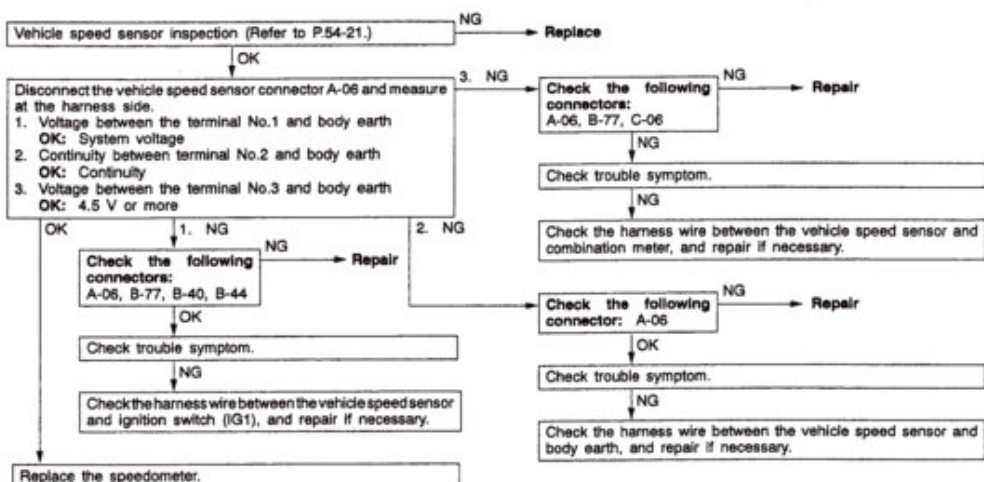
| Tachometer does not work. | Probable cause |
|--|--|
| The ignition signal may not be input from the engine, or there may be a malfunction in the power supply or ground circuit. | <ul style="list-style-type: none"> Malfunction of tachometer Malfunction of harness or connector |



Inspection Procedure 3

Vehicle speed sensor circuit system inspection

The signals, which the vehicle speed sensor sends, are shared by speedometer, engine-ECU and A/T-ECU.

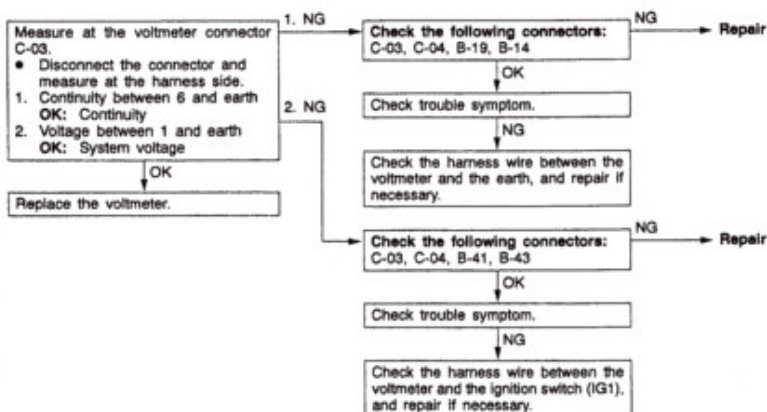


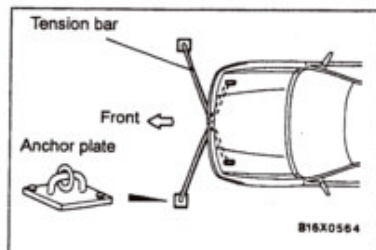
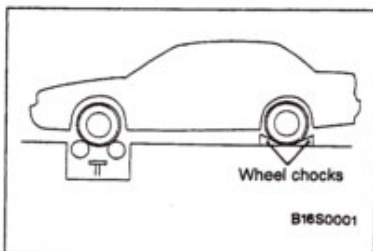
NOTE

If a trouble is not resolved by the above checks, the signals which are sent by the vehicle speed sensor may be short-circuited in the harness, speedometer, engine-ECU or A/T-ECU.

Inspection Procedure 4

| Voltmeter does not work. | Probable cause |
|---|---|
| The cause is probably a defective voltmeter, power supply or earth circuit. | <ul style="list-style-type: none"> Malfunction of voltmeter Malfunction of harness or connector |





ON-VEHICLE SERVICE

SPEEDOMETER CHECK

1. Adjust tire pressure to the specified level.
2. Set the vehicle onto a speedometer tester and use wheel chocks to hold the rear wheels.
3. Pull the parking brake lever.
4. Turn the TCL switch to OFF. <Vehicles with TCL>

5. To prevent the front wheel from moving from side to side, attach tension bars to the tie-down hook, and secure both ends to anchor plates.
6. To prevent the vehicle from launching, attach a chain or wire to the rear retraction hook, and make sure the end of the chain or wire is secured firmly.
7. Check if the speedometer indicator range is within the standard values or the fluctuation of the needle is within the limits.

Caution

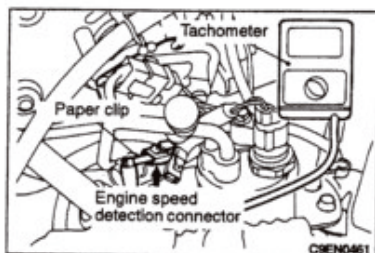
Do not operate the clutch suddenly. Do not increase/decrease speed rapidly while testing.

Standard values:

| Standard indication km/h | Allowable range km/h |
|--------------------------|----------------------|
| 40 | 37 – 45 |
| 80 | 75 – 88 |
| 120 | 113 – 132 |
| 160 | 150 – 176 |

Limits (Fluctuation of the needle):

±3 km/h (vehicle speed: 35 km/h or more)



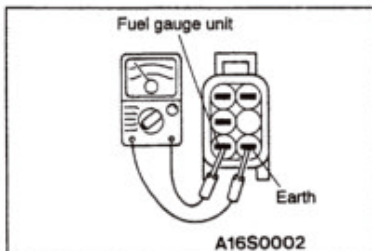
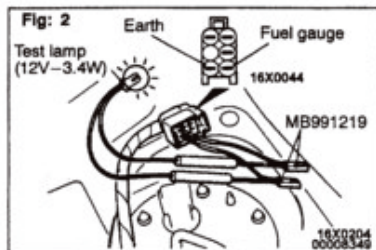
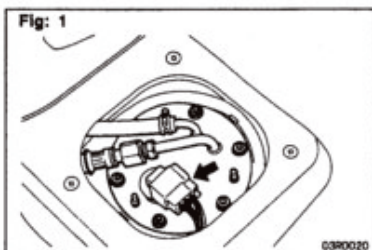
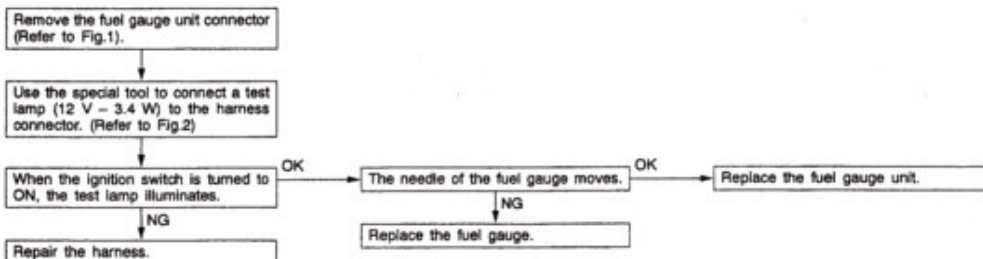
TACHOMETER CHECK

1. Insert a paper clip in the engine speed detection connector from the harness side, and attach an external high quality tachometer.
2. Compare the readings of the vehicle tachometer and the external tachometer at every engine speed, and check if the variations are within the standard values.

Standard values:

| | | | | | | | |
|-----------------------------------|-----|--------------|--------------|--------------|--------------|-------------|-------------|
| Engine speed r/min | 700 | 2,000 | 3,000 | 4,000 | 5,000 | 6,000 | 8,000 |
| Tachometer indication error r/min | ±70 | +165
-105 | +220
-110 | +260
-100 | +300
-100 | +325
-75 | +350
-50 |

FUEL GAUGE SIMPLE CHECK



FUEL GAUGE UNIT CHECK

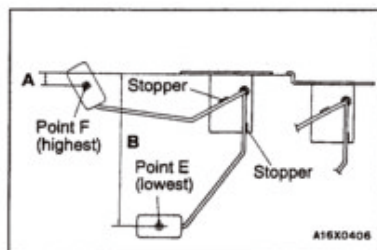
Remove the fuel gauge unit from the fuel tank.
(Refer to GROUP 13B.)

FUEL GAUGE UNIT RESISTANCE

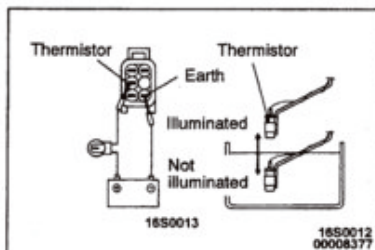
- Check that resistance value between the fuel gauge terminal and earth terminal is at standard value when fuel gauge unit float is at point F (highest) and point E (lowest).

Standard value:**Point F:** $11.7 \pm 1.5 \Omega$ **Point E:** $100 \pm 2.0 \Omega$

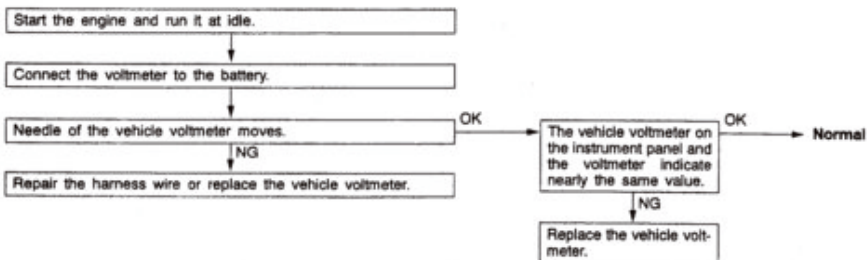
2. Check that resistance value changes smoothly when float moves slowly between point F (highest) and point E (lowest).

**FUEL GAUGE UNIT FLOAT HEIGHT**

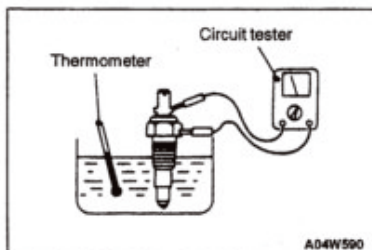
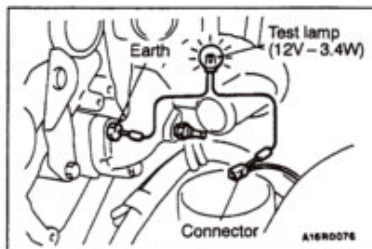
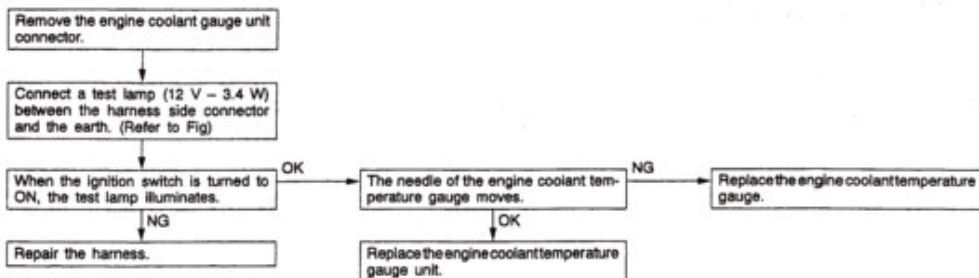
Move float and measure the height A at point F (highest) and B at point E (lowest) with float arm touching stopper.

Standard value:**A:** 12.8 mm**B:** 135.8 mm**THERMISTOR**

1. Connect fuel gauge unit (thermistor) to battery via test lamp (12 V – 3.4 W). Immerse in water.
2. Condition is good if lamp goes off when the thermistor is immersed in water and goes on when it is taken out of water.

VEHICLE VOLTMETER SIMPLE CHECK

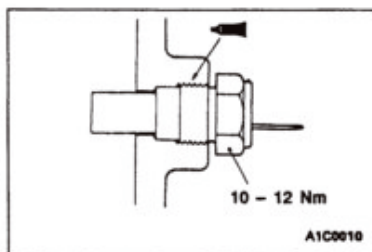
ENGINE COOLANT TEMPERATURE GAUGE SIMPLE CHECK



ENGINE COOLANT TEMPERATURE GAUGE UNIT CHECK

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: $104 \pm 13.5 \Omega$



4. After checking, apply the specified adhesive around the thread of engine coolant temperature gauge unit.

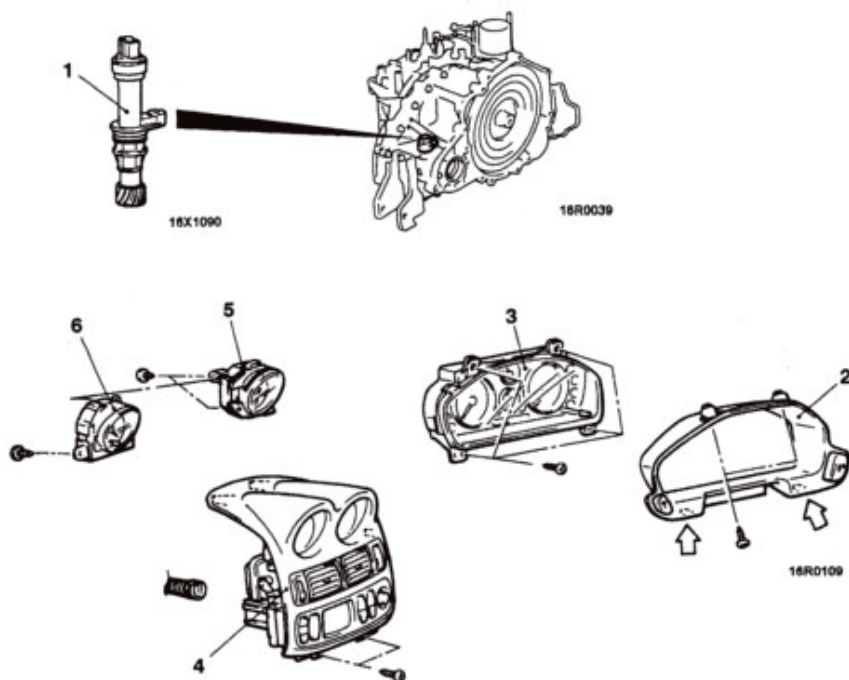
Specified sealant:

3M Adhesive Nut Locking No. 4171 or equivalent

5. Add engine coolant. (Refer to GROUP 14 – On-vehicle Service.)

COMBINATION METERS AND SUB-METERS

REMOVAL AND INSTALLATION



NOTE

↔ : indicates metal clip position.

Vehicle speed sensor removal steps

- Battery and battery tray
- Air Cleaner
- 1. Vehicle speed sensor

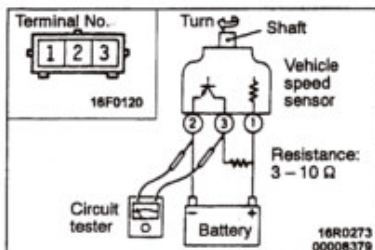
Combination meter removal steps

2. Meter bezel

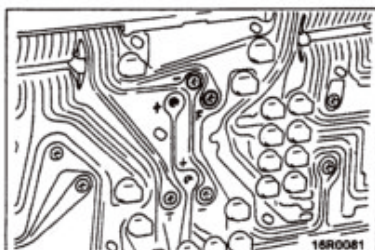
3. Combination meter

Sub-meter (voltmeter and clock) removal steps

4. Center panel (Refer to GROUP 52A – Instrument Panel.)
5. Voltmeter
6. Clock

**INSPECTION****VEHICLE SPEED SENSOR CHECK**

1. Remove the vehicle speed sensor and connect a 3 – 10 k Ω resistance as shown in the illustration.
2. Turn the shaft of the vehicle speed sensor and check that there is voltage between terminals 2 – 3. (1 turn = 4 pulses)

**FUEL GAUGE RESISTANCE CHECK**

1. Remove the power supply tightening screw.
2. Use an ohmmeter to measure the resistance value between the terminals.

NOTE

Each terminal is indicated by (+), (–) and (F).

Standard value:

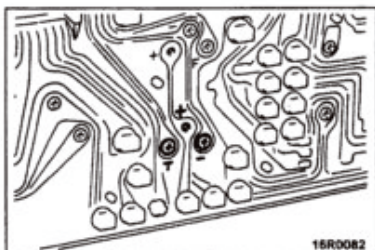
Power supply (+) – Earth (–): 192 – 224 Ω

Power supply (+) – Fuel gauge (F): 101 – 114 Ω

Fuel gauge (F) – Earth (–): 91 – 110 Ω

Caution

When inserting the testing probe into the power supply terminal, be careful not to touch the printed board.

**ENGINE COOLANT TEMPERATURE GAUGE RESISTANCE CHECK**

1. Remove the power supply tightening screw.
2. Use an ohmmeter to measure the resistance value between the terminals.

NOTE

Each terminal is indicated by (+), (–) and (T).

Standard value:

Power supply (+) – Earth (–): 192 – 233 Ω

Power supply (+) – Engine coolant temperature gauge (T): 53 – 59 Ω

Engine coolant temperature gauge (T) – Earth (–): 245 – 292 Ω

Caution

When inserting the testing probe into the power supply terminal, be careful not to touch the printed board.

HEADLAMP

SERVICE SPECIFICATIONS

| Items | | | Standard value | Limit |
|-------------------------------|----------------------|----------------|---|----------------|
| Headlight aiming for low beam | Vertical direction | | 22 mm below horizontal (H) | — |
| | Horizontal direction | | Position where the 15° sloping section intersects the vertical line (V) | — |
| Headlamp aiming for high beam | Vertical direction | | 22 mm below horizontal (H) | — |
| | Horizontal direction | Left headlamp | Parallel with moving direction | — |
| | | Right headlamp | 13 mm to the left | — |
| Headlamp intensity cd | | | — | 12,000 or more |

How to Handle the Headlamp Assembly

The headlamp assembly uses a plastic outer lens. Observe the following precautions not to damage the lens.

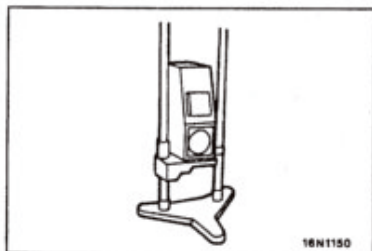
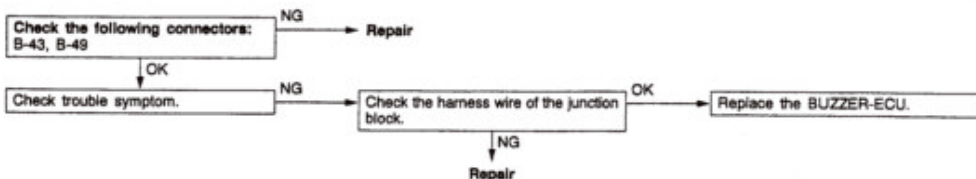
- Do not keep the headlamp illuminated for more than three minutes while it is covered with a protector.
- Do not apply a masking tape to the outer lens.
- Do not scratch the outer lens by a sharp-pointed tool.
- Always use the genuine wax remover to rinse the lens thoroughly.
- Always use the specified genuine part to replace the bulb.

Precautions Regarding Discharge Headlamp

- Do not touch the discharge headlamp connector. When the lighting switch is turned on, high voltage of approx. 20,000 V is generated in the connector. Touching the connector results in a significant accident.
- Do not use a tester, etc. to the discharge headlamp connector to carry out a measure. Connecting a tester, etc. results a significant accident or injury.
- Turn the lighting switch off and then remove the battery connection and controller connection before doing any work. Carry out any work in a waterless place to prevent electric shock.
- Before turning the discharge headlamp on, be sure to confirm that the discharge headlamp bulb is installed to the vehicle.
- Be sure to use the vehicle battery to turn the discharge headlamp on.
- If the discharge headlamp or controller is damaged, be sure to replace it with a new part.

TROUBLESHOOTING

| | |
|---|--|
| The Ignition key is removed and the driver's side door is opened while the tail lamps or headlamps are operating, but the lighting monitor buzzer does not sound. (But the Ignition key warning buzzer sounds when the Ignition key is inserted.) | Probable cause |
| The lighting switch input circuit or the buzzer-ECU may be defective. When the ignition key warning buzzer is sounding, the lighting monitor buzzer does not sound even if the tail lamps or headlamps are turned on. | <ul style="list-style-type: none"> • Malfunction of harness or connector • Malfunction of BUZZER-ECU |



ON-VEHICLE SERVICE

HEADLAMP AIMING

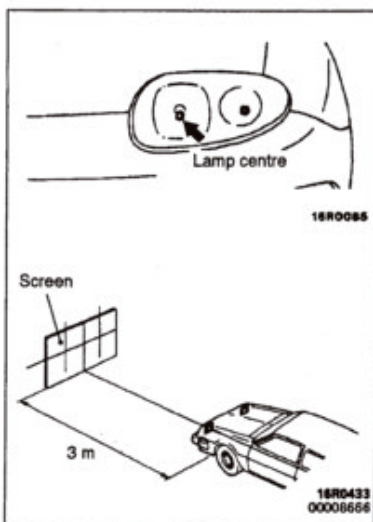
<USING A BEAMSETTING EQUIPMENT>

1. The headlamps should be aimed with the proper beamsetting equipment, and in accordance with the equipment manufacture's instructions.

NOTE

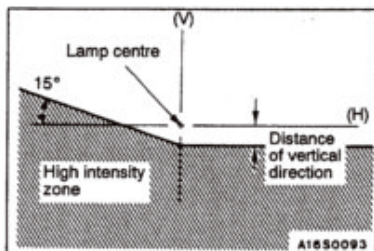
If there are any regulations pertinent to the aiming of headlamps in the area where the vehicle is to be used, adjust so as to meet those requirements.

2. Alternately turn the adjusting screw to adjust the headlamp aiming. (Refer to P.54-25.)
3. With the engine running at 2,000 r/min aim the headlamp.



<USING A SCREEN>

1. Inflate the tyres to the specified pressures and there should be no other load in the vehicles other than driver or substituted weight of approximately 75 kg placed in driver's position.
2. Set the distance between the screen and the centre marks of the headlamps as shown in the illustration.



3. Check if the beam shining onto the screen is at the standard value.

Standard value:

<For lower beam adjustment>

(Vertical direction)

22 mm below horizontal (H)

(Horizontal direction)

Position where the 15° sloping section intersects the vertical line (V)

Standard value:

<For upper beam adjustment>

(Vertical direction)

22 mm below horizontal (H)

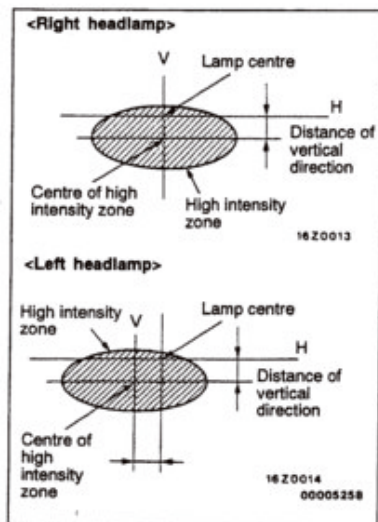
(Horizontal direction)

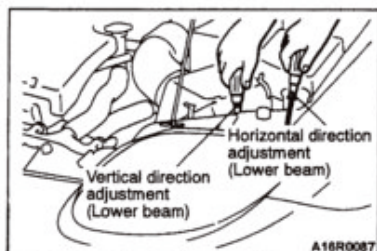
Left headlamp: Parallel with moving direction

Right headlamp: 13 mm to the left

Caution

- (1) When making the aiming adjustment, be sure to mask those lamps which are not being adjusted.
- (2) When it is difficult, because of outside light, to distinguish the light/dark dividing line, use a curtain, screen or similar material to reduce the effects of the outside light.

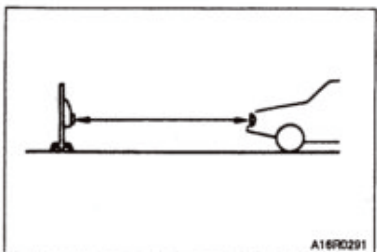
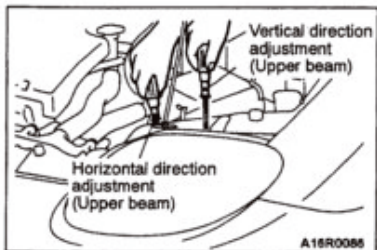




4. Alternately turn the adjusting screw to adjust the headlamp aiming.

Caution

Be sure to adjust the aiming adjustment screw in the tightening direction.

**INTENSITY MEASUREMENT**

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: 12,000 cd or more

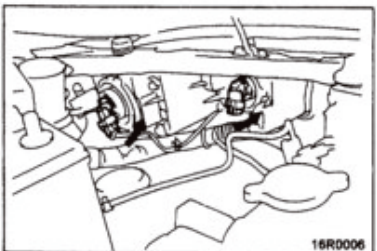
NOTE

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.

BULB REPLACEMENT

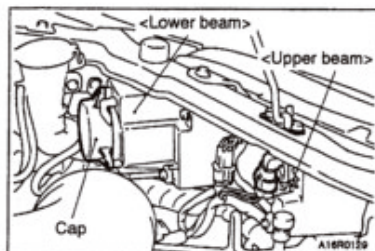
<Vehicles without discharge headlamp>

1. Disconnect the connector.
2. Turn the bulb connector counterclockwise, and remove the bulb.



Caution

- (1) Always use the specified genuine part to replace the bulb.
- (2) Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.
3. After replacement of the bulb, connect the connector securely.

**<Vehicles with discharge headlamp>****<Upper beam>**

1. Disconnect the connector.
2. Turn the bulb connector counterclockwise, and remove the bulb.
3. After replacement of the bulb, connect the connector securely.

<Lower beam>

1. Disconnect the negative battery terminal.
2. Disconnect the front harness from the headlamp assembly.
3. Disconnect the upper beam connector, and remove the headlamp assembly from the vehicle body.
4. Remove the cap.
5. Pinch the spring and pull out the headlamp bulb.
6. After replacement of the bulb, install the cap, and then install the headlamp assembly to the vehicle body and connect the connector securely.

Caution

- (1) Always use the specified genuine part to replace the bulb.
- (2) Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.
- (3) Do not touch the electrode of the lower beam bulb, as high voltage is generated.

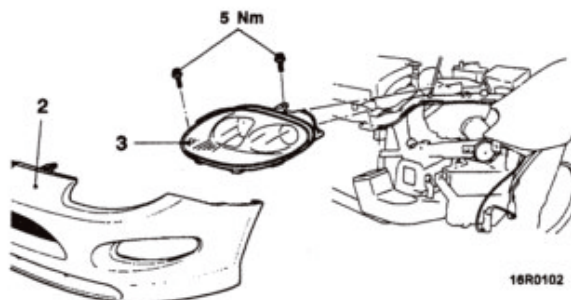
HEADLAMP

REMOVAL AND INSTALLATION

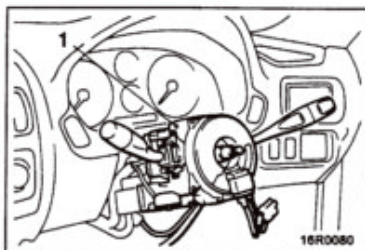
CAUTION: SRS

Before removal of air bag module and clock spring, refer to GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.

Vehicle without discharge headlamp

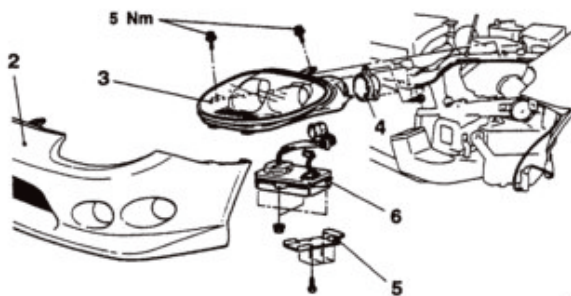


16R0102



16R0080

Vehicle with discharge headlamp



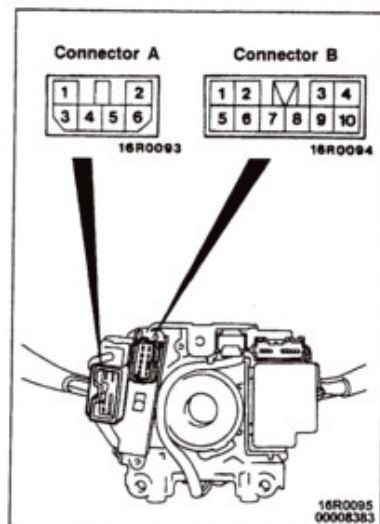
16R0128

00006461

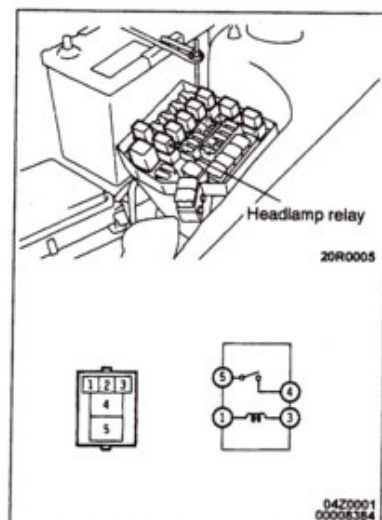
1. Column switch (Refer to GROUP 37A – Steering Wheel and Shaft.)

Removal steps

2. Front bumper (Refer to GROUP 51.)
 - Negative battery terminal (Vehicle with discharge headlamp)
 - Front wiring harness and headlamp assembly connection (Vehicle with discharge headlamp)
3. Headlamp assembly
4. Cap (Vehicle with discharge headlamp)
5. Cover (Vehicle with discharge headlamp)
6. Controller (Vehicle with discharge headlamp)

**INSPECTION****LIGHTING SWITCH, DIMMER/PASSING SWITCH AND TURN-SIGNAL LAMP SWITCH CHECK**

| Switch position | | Connector A—
terminal No. | | | Connector B—
terminal No. | | | |
|---------------------------|---------|------------------------------|---|---|------------------------------|---|---|---|
| | | 5 | 6 | 7 | 1 | 2 | 4 | 6 |
| LIGHTING SWITCH | OFF | | | | | | | |
| | TAIL | ○ | — | ○ | | | | |
| | HEAD | ○ | | ○ | | | | |
| DIMMER/
PASSING SWITCH | UPPER | | | | | | ○ | ○ |
| | PASSING | | | | ○ | ○ | — | ○ |

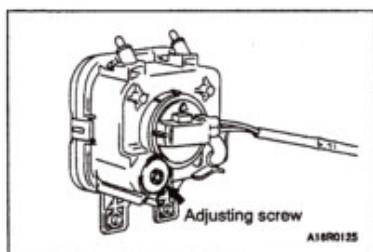
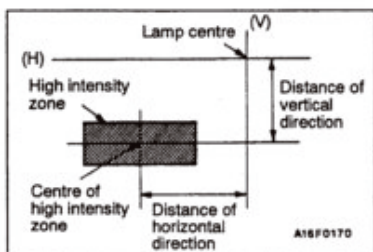
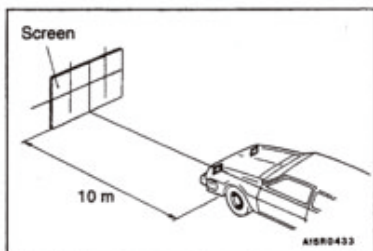
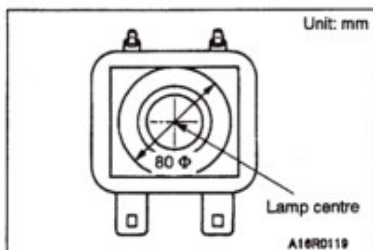
**HEADLAMP RELAY CHECK**

| Battery voltage | Terminal No. | | | |
|-----------------|--------------|---|---|---|
| | 1 | 3 | 4 | 5 |
| Supplied | ⊕ | ⊖ | ○ | ○ |
| Not supplied | ○ | ○ | | |

FOG LAMP AND FRONT TURN SIGNAL LAMP

SERVICE SPECIFICATIONS

| Items | | Standard value |
|-----------------|----------------------|------------------------------------|
| Fog lamp aiming | Vertical direction | 47 mm below horizontal (H) |
| | Horizontal direction | 35 mm to left of vertical line (V) |



ON-VEHICLE SERVICE

FOG LAMP AIMING

1. Measure the centre of the fog lamp, as shown in the illustration.
2. Set the distance between the screen and centre of the fog lamps as shown in the illustration.
3. Inflate the tyres to the specified pressures and there should be no other load in the vehicles other than driver or substituted weight of approximately 75 kg placed in the driver's position.
4. With the engine running at 2,000 r/min, aim the fog lamp.
5. Check if the beam shining onto the screen is at the standard value.

Standard value:

(Vertical direction)

47 mm below horizontal (H)

(Horizontal direction)

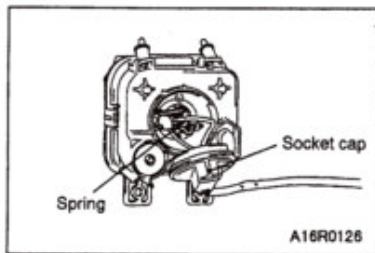
35 mm to left of vertical line (V)

NOTE

The horizontal direction is non-adjustable. If the deviation of the light beam axis exceeds the standard value, check to be sure that the mounting location or some other point is not defective.

Caution

When making the adjustment, be sure to mask those lamps which are not being adjusted.



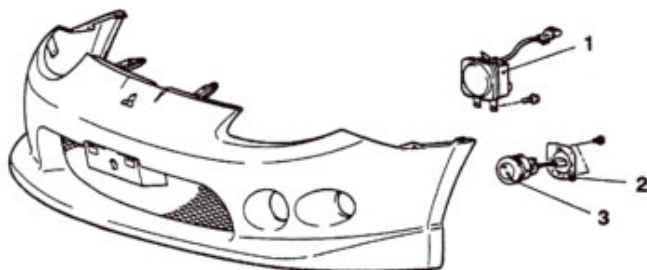
BULB REPLACEMENT

1. Remove the fog lamp.
2. Remove the socket cap.
3. Pinch the spring and pull out the bulb.
4. Disconnect the connector and replace the bulb.

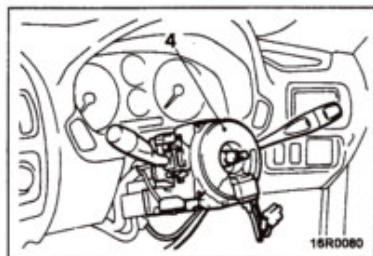
Caution

Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.

FRONT FOG LAMP AND FRONT TURN SIGNAL LAMP REMOVAL AND INSTALLATION



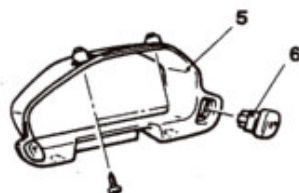
16R0120



16R0080

Fog lamp and front turn signal lamp removal steps

1. Fog lamp assembly
2. Front turn signal lamp bracket
3. Front turn signal lamp
4. Column switch (Refer to GROUP 37A
– Steering Wheel and Shaft.)

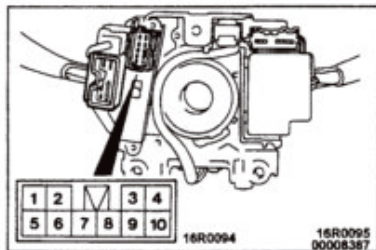
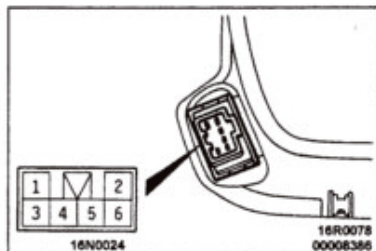


16R0110

00006462

Fog lamp switch removal steps

5. Meter bezel (Refer to GROUP 52A
– Instrument Panel.)
6. Fog lamp switch



INSPECTION

FOG LAMP SWITCH CONTINUITY CHECK

| Switch position | Terminal No. | | | | | |
|-----------------|--------------|---|---|-----|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| OFF | | | | ILL | | |
| ON | | | | ILL | | |

TURN SIGNAL LAMP SWITCH CONTINUITY CHECK

| Switch position | | Terminal No. | | |
|-------------------------|-----|--------------|---|---|
| | | 3 | 8 | 9 |
| Turn signal lamp switch | RH | | | |
| | OFF | | | |
| | LH | | | |

REAR COMBINATION LAMP

TROUBLESHOOTING

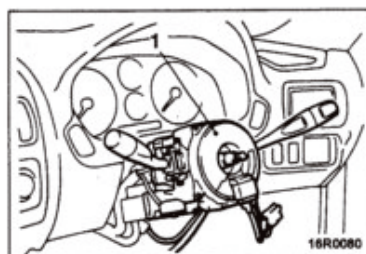
For troubleshooting of the lighting monitor buzzer, refer to P.54-23.

REAR COMBINATION LAMP

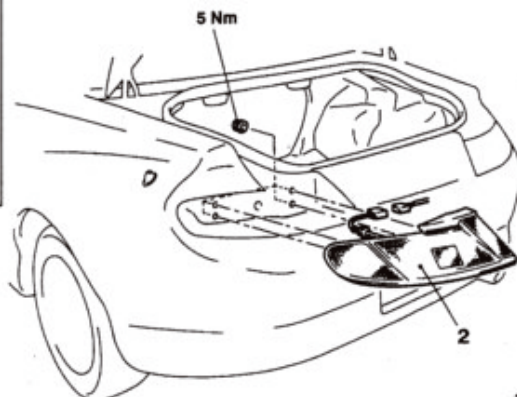
REMOVAL AND INSTALLATION

Caution: SRS

Before removal of air bag module and clock spring, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

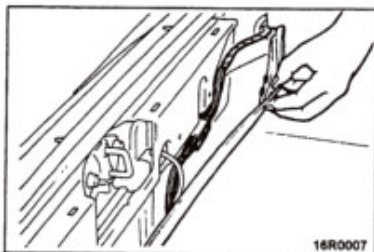


1. Column switch
(Refer to GROUP 37A – Steering Wheel and Shaft.)

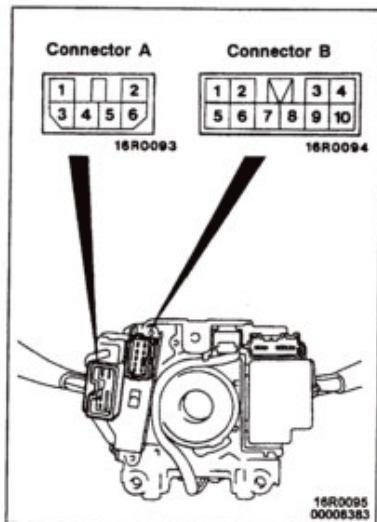
**Rear combination lamp removal steps**

- Rear end trim cover
(Refer to GROUP 52A.)
- 2. Rear combination lamp



**REMOVAL SERVICE POINT****◀▶ REAR COMBINATION LAMP REMOVAL**

1. Open the trunk rear trim lid and remove the rear combination lamp mounting nuts.
2. Remove the four clips at the rear side of the trunk rear trim.
3. Turn up the trunk room rear side trim as shown in the figure, and disconnect the connector.

**INSPECTION****LIGHTING SWITCH CHECK**

| Switch position | | Terminal No. | | | |
|-----------------|------|--------------|---|---|-------------|
| | | Connector A | | | Connector B |
| | | 5 | 6 | 7 | 1 |
| Lighting switch | OFF | | | | |
| | TAIL | ○ | | ○ | |
| | HEAD | ○ | | ○ | |
| | | | ○ | | ○ |

HAZARD WARNING LAMP SWITCH

REMOVAL AND INSTALLATION



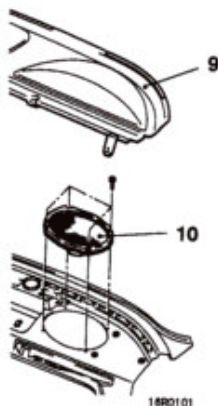
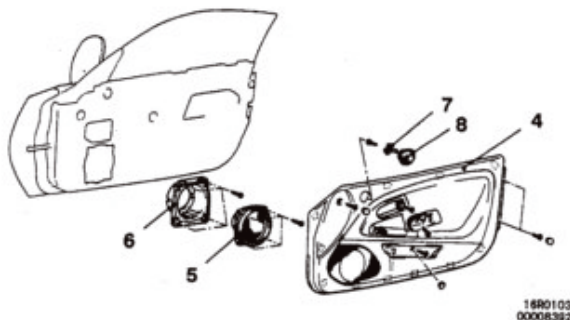
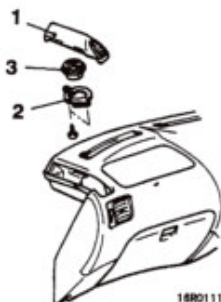
Removal steps

1. Center panel (Refer to GROUP 52A.)
2. Hazard warning lamp switch



INSPECTION

| Switch position | Terminal No. | | | | | | | | |
|-----------------|--------------|---|---|---|---|---|---|-----|----|
| | 1 | 2 | 4 | 5 | 6 | 7 | 9 | - | 10 |
| OFF | | | | ○ | — | ○ | ○ | ILL | ○ |
| ON | ○ | ○ | ○ | ○ | ○ | | ○ | ILL | ○ |

SPEAKER**REMOVAL AND INSTALLATION****Speaker (instrument panel) removal steps**

1. Tweeter garnish (Refer to GROUP 52A - Instrument Panel.)
2. Speaker bracket
3. Speaker

Speaker (door) removal steps

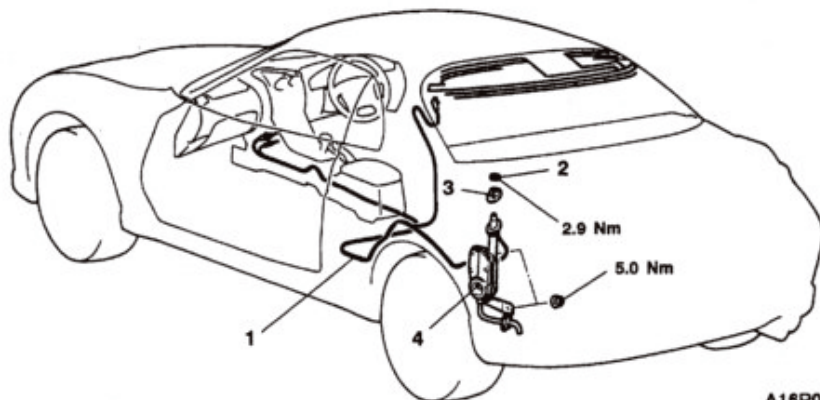
4. Door trim (Refer to GROUP 42.)
5. Speaker
6. Speaker cover
7. Speaker bracket
8. Tweeter speaker

Speaker (rear shelf) removal steps

9. Rear shelf trim
10. Speaker

ANTENNA

REMOVAL AND INSTALLATION



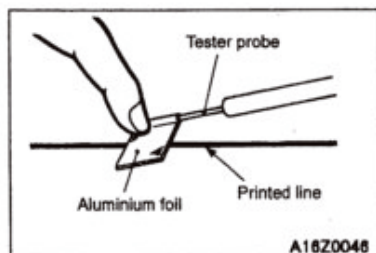
A16R0142

Antenna feeder cable removal steps

- Floor console box (Refer to GROUP 52A.)
- Front seat (passenger's side) (Refer to GROUP 52A.)
- Front scuff plate (LH) (Refer to GROUP 52A.)
- Cowl side trim (LH) (Refer to GROUP 52A.)
- Quarter trim (LH) (Refer to GROUP 52A.)
- 1. Antenna feeder cable

Motor antenna removal steps

- 2. Ring nut
- 3. Base
- 4. Motor antenna



A16Z0046

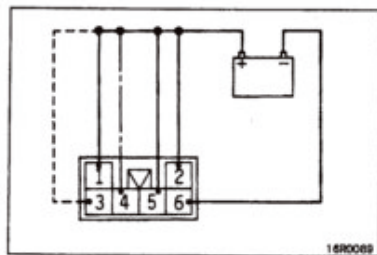
INSPECTION

GLASS ANTENNA CONTINUITY CHECK

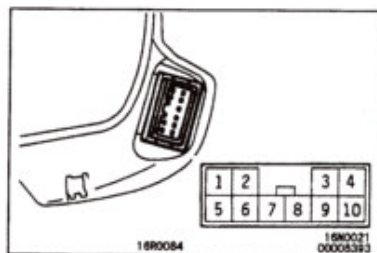
1. Wrap the tester probe with aluminium foil as shown in the illustration.
2. Touch the aluminium foil to the antenna printed line while sliding the aluminium foil along the printed line, and check the continuity.

Caution

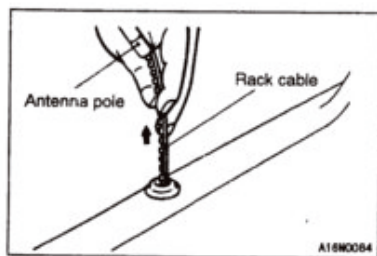
Be careful not to damage the antenna printed line.

**MOTOR ANTENNA ASSEMBLY CHECK**

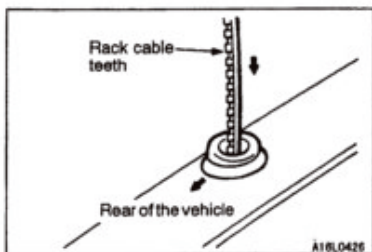
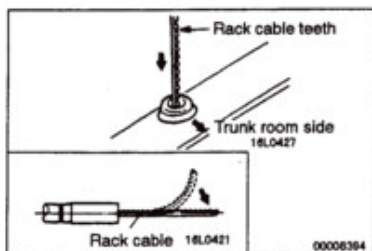
1. Connect the circuit as indicated by the solid lines in the illustration.
2. Check that the motor antenna extends when the connection indicated by the one dot line is made.
3. Check that the motor antenna retracts halfway when the connection indicated by the broken line is made, and the motor antenna extends up to the original position when the connection indicated by the broken line is released.
4. Check that the motor antenna retracts fully when the connection indicated by the one dot line is removed.

**ANTENNA SWITCH CONTINUITY CHECK**

| Switch position | Terminal No. | | | | |
|-----------------|--------------|---|-------|----------|----|
| | 5 | 6 | 9 | | 10 |
| FULL | | | ○ — ○ | ILL
⬇ | ○ |
| HALF | ○ — ○ | | ○ — ○ | ILL
⬇ | ○ |

**ANTENNA POLE REPLACEMENT**

1. Set the antenna switch to OFF position.
2. Remove the ring nut.
3. After turning the ignition switch to ACC or ON, turn the radio switch to ON to raise the antenna pole, and remove it, together with the rack cable.



4. Draw out the antenna pole to the maximum extension.

NOTE

If there is a bend in the motor end of the rack cable, remove the bend.

5. Insert the rack cable into the motor assembly with the rack cable teeth facing the trunk room side.

6. Turn the rack cable teeth towards the rear of the vehicle (right 90°) so that the rack cable meshes with the motor gear.

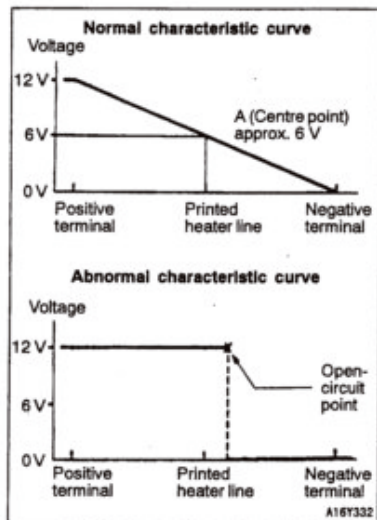
If the rack cable pulls out with no resistance when it is lightly pulled, then the cable is not meshed with the motor gear, so check that there are no bends in the end of the rack cable, and then repeat steps 4 and 5 above.

7. Set the antenna pole vertically and turn the radio switch OFF to wind up the rack cable. Insert the antenna to the motor antenna side to align it with the wound-up rack cable.
8. After tightening the ring nut, check the movement of the antenna by turning the radio switch ON and OFF.

REAR WINDOW DEFOGGER

TROUBLESHOOTING

Refer to GROUP 55.



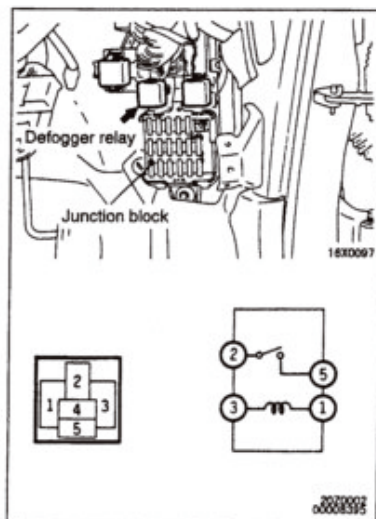
ON-VEHICLE SERVICE

PRINTED-HEATER LINE CHECK

1. Run engine at 2,000 r/min. Check heater element with battery at full.
2. Turn ON rear window defogger switch. Measure heater element voltage with circuit tester at rear window glass centre A.
Condition is good if it indicates about 6V.
3. If 12 V 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 (0V).
4. If 0 V is indicated at A, there is a break in the positive terminals from A. Detect where the voltage changes suddenly (12 V) in the same method described above.

REAR WINDOW DEFOGGER RELAY CONTINUITY CHECK

| Battery voltage | Terminal No. | | | |
|-----------------------|--------------|---|---|---|
| | 1 | 3 | 2 | 4 |
| Power is not supplied | ○ | ○ | | |
| Power is supplied | ⊖ | ⊕ | ○ | ○ |



HEATER, AIR CONDITIONER AND VENTILATION

CONTENTS

| | | | |
|--|----------|--|-----------|
| AUTOMATIC AIR CONDITIONER | 3 | ON-VEHICLE SERVICE | 25 |
| SERVICE SPECIFICATIONS | 3 | Sight Glass Refrigerant Level Test | 25 |
| LUBRICANTS | 3 | Magnetic Clutch Test | 25 |
| SEALANT | 3 | Receiver Drier Test | 25 |
| SPECIAL TOOLS | 4 | Dual Pressure Switch Check | 26 |
| TROUBLESHOOTING | 4 | | |

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

| | | | |
|--|----|--------------------------------|----|
| Compressor Drive Belt Adjustment | 26 | REFRIGERANT LINE | 45 |
| Charging | 27 | ENGINE COOLANT TEMPERATURE | |
| Performance Test | 32 | SWITCH | 46 |
| Refrigerant Leak Repair | 33 | BLOWER MOTOR ASSEMBLY AND | |
| Compressor Noise | 34 | BLOWER MOTOR HI RELAY | 47 |
| Power Relay Check | 34 | DAMPER MOTOR ASSEMBLY AND | |
| Idle-up Operation Check | 35 | POWER TRANSISTOR | 49 |
| AIR CONDITIONER CONTROL UNIT | | PHOTO SENSOR | 52 |
| (A/C-ECU) | 36 | OUTSIDE AIR TEMPERATURE SENSOR | |
| HEATER UNIT*, HEATER CORE AND | | | 53 |
| BLOWER UNIT | 37 | HEATER WATER TEMPERATURE | |
| EVAPORATOR | 38 | SENSOR* | 54 |
| COMPRESSOR AND TENSION PULLEY | | VENTILATORS | 56 |
| | 39 | | |
| CONDENSER AND CONDENSER FAN | | | |
| MOTOR | 43 | | |

AUTOMATIC AIR CONDITIONER

SERVICE SPECIFICATIONS

| Items | | Standard value |
|--|--------------------|--|
| Idle speed r/min | | 700 ± 50 |
| Idle-up speed r/min | | 900 ± 50 |
| Air mix damper motor potentiometer resistance kΩ | MAX. HOT position | Approx. 4.8 |
| | MAX. COOL position | Approx. 0.2 |
| Outlet air changeover damper motor potentiometer resistance kΩ | DEF position | Approx. 0.2 |
| | FACE position | Approx. 4.8 |
| Air gap (Magnetic clutch) mm | | 0.3 – 0.5 |
| Engine coolant temperature switch °C | Continuity | Less than approx. 115°C |
| | No continuity | Approx. 115°C or higher
(When the switch is off, until the temperature drops up to approx. 108°C) |

LUBRICANTS

| Items | Specified lubricants | Quantity |
|--|----------------------|-------------|
| Each connection of refrigerant line | SUN PAG 56 | As required |
| Compressor refrigerant unit lubricant ml | SUN PAG 56 | 120 |

SEALANT

| Item | Specified sealant |
|-----------------------------------|---|
| Engine coolant temperature switch | 3M Nut Locking Part No.4171 or equivalent |

SPECIAL TOOLS

| Tool | Number | Name | Use |
|---|----------|------------------------------|---|
|  | MB991367 | Special spanner | Removal and installation of armature mounting nut of compressor |
|  | MB991386 | Pin | |
| 
8991502 | MB991502 | MUT-II sub-assembly | Inspection of automatic air conditioner |
| 
8991529 | MB991529 | Diagnosis code check harness | Inspection of automatic air conditioner using a voltmeter |

TROUBLESHOOTING**STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING**

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

DIAGNOSIS FUNCTION**DIAGNOSIS CODES CHECK**

Connect the MUT-II or voltmeter to the diagnosis connector (16-pin), then check diagnosis codes.
(Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)

ERASING DIAGNOSIS CODES

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

INSPECTION CHART FOR DIAGNOSIS CODES

| Code No. | Diagnosis item | Reference page |
|----------|---|----------------|
| 11 | Inside air temperature sensor system (open circuit) | 55-5 |
| 12 | Inside air temperature sensor system (short circuit) | 55-5 |
| 13 | Outside air temperature sensor system (open circuit) | 55-6 |
| 14 | Outside air temperature sensor system (short circuit) | 55-6 |
| 15 | Heater water temperature sensor system (open circuit) | 55-7 |
| 16 | Heater water temperature sensor system (short circuit) | 55-7 |
| 21 | Air thermo sensor system (open circuit) | 55-8 |
| 22 | Air thermo sensor system (short circuit) | 55-8 |
| 31 | Potentiometer system of air mix damper motor assembly | 55-9 |
| 32 | Potentiometer system of air outlet changeover damper motor assembly | 55-10 |
| 41 | Drive system of air mix damper motor assembly | 55-11 |
| 42 | Drive system of air outlet changeover damper motor assembly | 55-11 |

INSPECTION PROCEDURES FOR DIAGNOSIS CODES

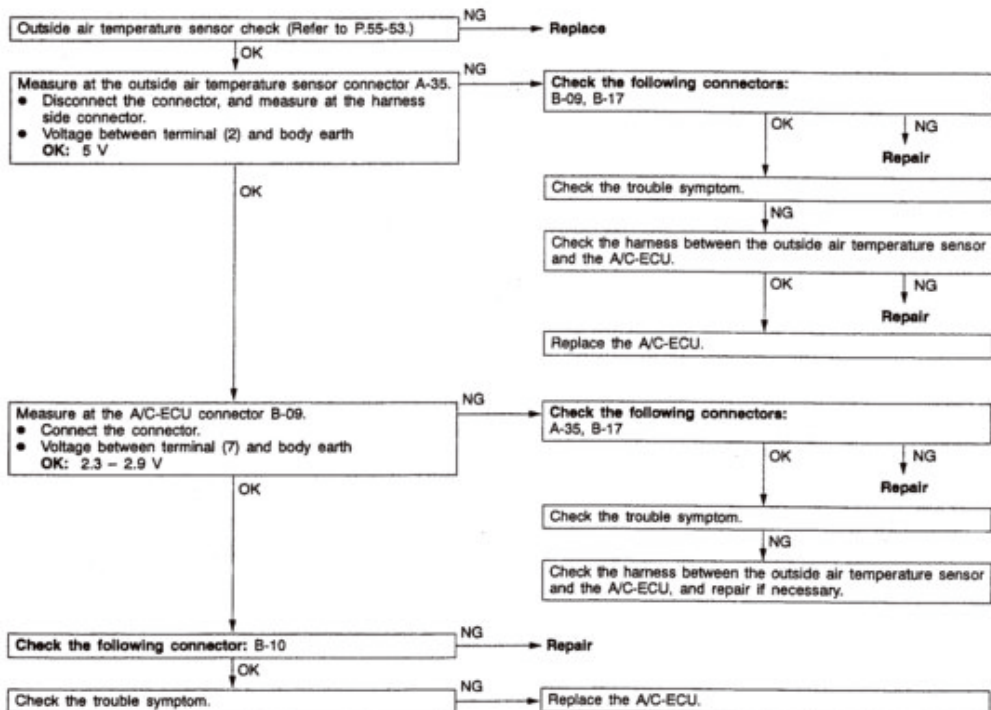
| Code No.11 Inside air temperature sensor system (open circuit) | Probable cause |
|--|--|
| This diagnosis code is displayed when the inside air temperature sensor does not send any signals to the A/C-ECU due to open circuit in the power supply or input line of the inside air temperature sensor. | <ul style="list-style-type: none"> Malfunction of the A/C-ECU |

Replace the A/C-ECU.

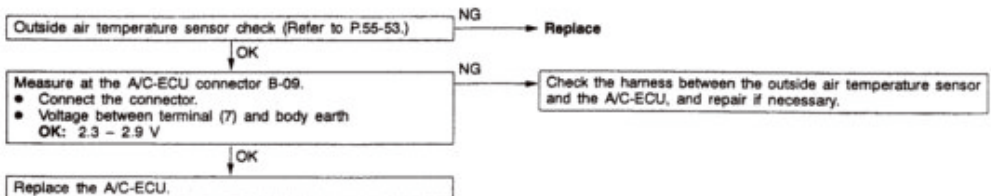
| Code No.12 Inside air temperature sensor system (short circuit) | Probable cause |
|---|--|
| This diagnosis code is displayed when the inside air temperature sensor sends the power supply voltage to the A/C-ECU due to short circuit in the power supply and output lines of the inside air temperature sensor. | <ul style="list-style-type: none"> Malfunction of the A/C-ECU |

Replace the A/C-ECU.

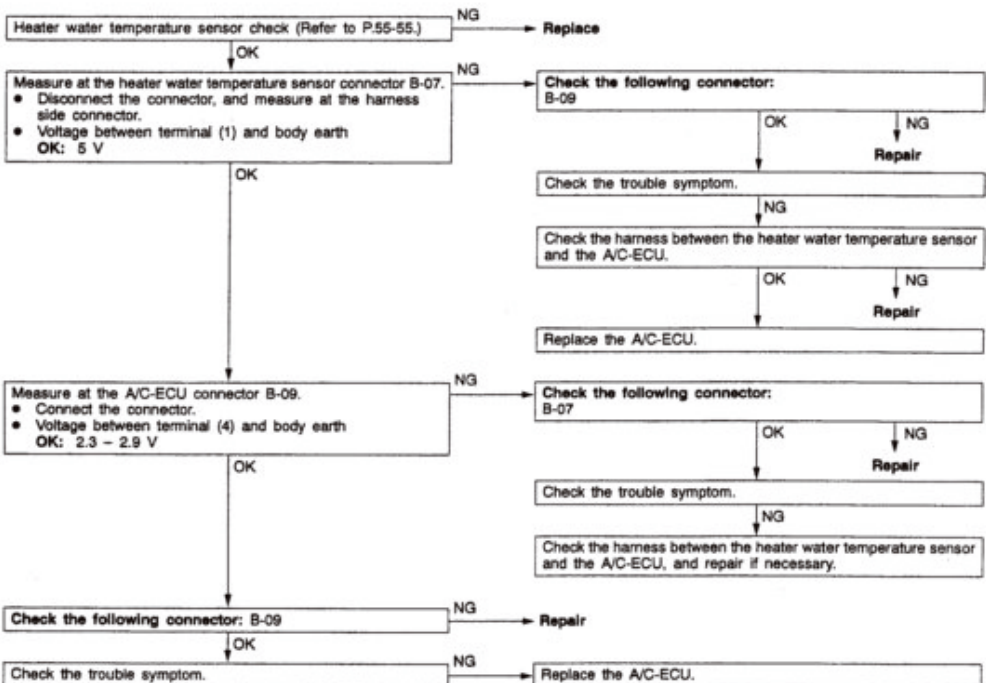
| Code No.13 Outside air temperature sensor system (open circuit) | Probable cause |
|--|---|
| This diagnosis code is displayed when the outside air temperature sensor does not send any signals to the A/C-ECU due to open circuit in the power supply or input line of the outside air temperature sensor. | <ul style="list-style-type: none"> • Malfunction of connector • Malfunction of harness • Malfunction of the outside air temperature sensor • Malfunction of the A/C-ECU |



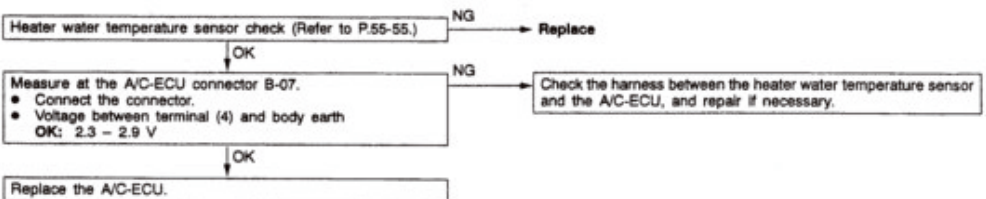
| Code No.14 Outside air temperature sensor system (short circuit) | Probable cause |
|---|---|
| This diagnosis code is displayed when the outside air temperature sensor sends the power supply voltage to the A/C-ECU due to short circuit in the power supply and output lines of the outside air temperature sensor. | <ul style="list-style-type: none"> • Malfunction of harness • Malfunction of connector • Malfunction of the outside air temperature sensor • Malfunction of the A/C-ECU |



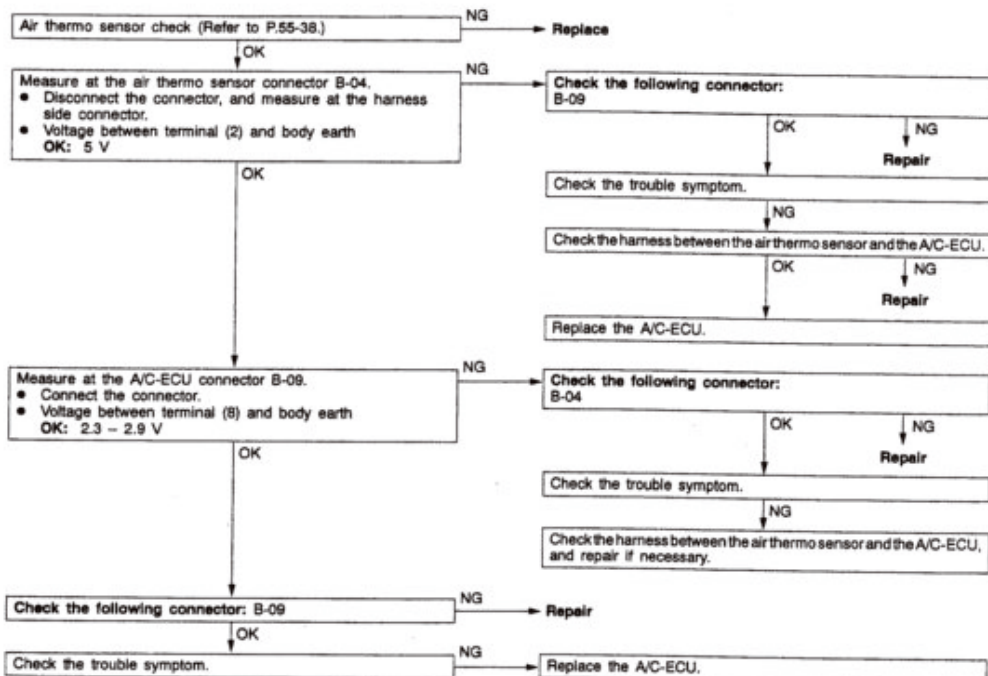
| Code No.15 Heater water temperature sensor system (open circuit) | Probable cause |
|--|--|
| This diagnosis code is displayed when the heater water temperature sensor does not send any signals to the A/C-ECU due to open circuit in the power supply or input line of the heater water temperature sensor. | <ul style="list-style-type: none"> • Malfunction of connector • Malfunction of harness • Malfunction of the heater water temperature sensor • Malfunction of the A/C-ECU |



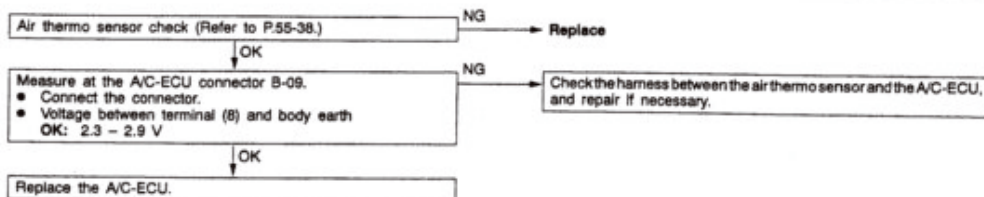
| Code No.16 Heater water temperature sensor system (short circuit) | Probable cause |
|---|--|
| This diagnosis code is displayed when the heater water temperature sensor sends the power supply voltage to the A/C-ECU due to short circuit in the power supply and output lines of the heater water temperature sensor. | <ul style="list-style-type: none"> • Malfunction of harness • Malfunction of connector • Malfunction of the heater water temperature sensor • Malfunction of the A/C-ECU |



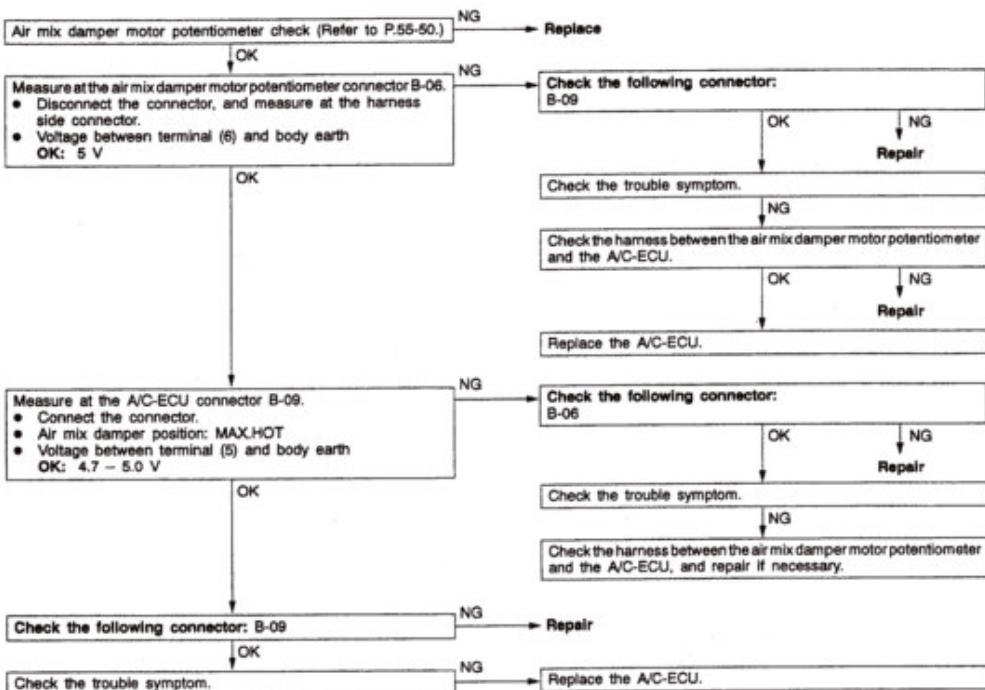
| Code No.21 Air thermo sensor system (open circuit) | Probable cause |
|--|--|
| This diagnosis code is displayed when the air thermo sensor does not send any signals to the A/C-ECU due to open circuit in the power supply or input line of the air thermo sensor. | <ul style="list-style-type: none"> • Malfunction of connector • Malfunction of harness • Malfunction of the air thermo sensor • Malfunction of the A/C-ECU |



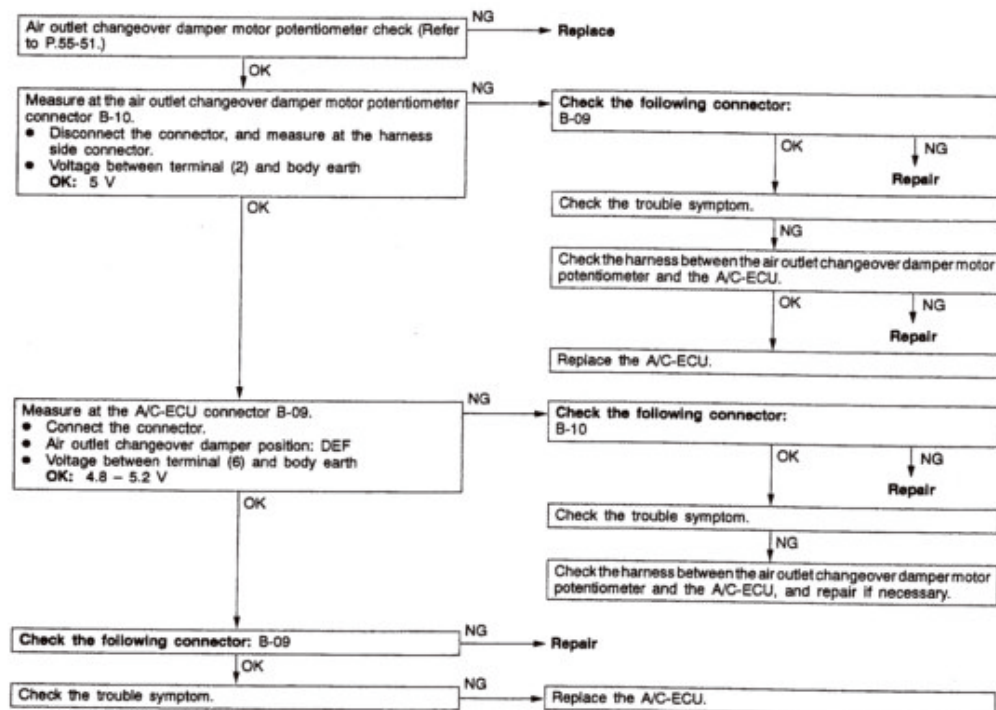
| Code No.22 Air thermo sensor system (short circuit) | Probable cause |
|---|--|
| This diagnosis code is displayed when the air thermo sensor sends the power supply voltage to the A/C-ECU due to short circuit in the power supply and output lines of the air thermo sensor. | <ul style="list-style-type: none"> • Malfunction of harness • Malfunction of connector • Malfunction of the air thermo sensor • Malfunction of the A/C-ECU |



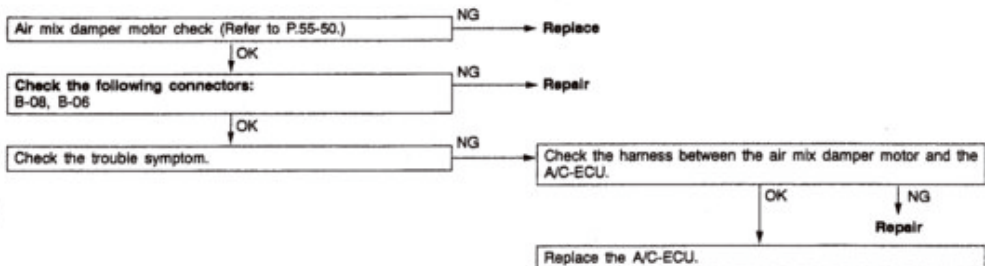
| Code No.31 Potentiometer system of air mix damper motor assembly | Probable cause |
|---|---|
| This diagnosis code is displayed when the air mix damper potentiometer does not send any signals to the A/C-ECU due to open or short circuit in the wiring harness. | <ul style="list-style-type: none"> Malfunction of the air mix damper motor potentiometer Malfunction of connector Malfunction of harness Malfunction of the A/C-ECU |



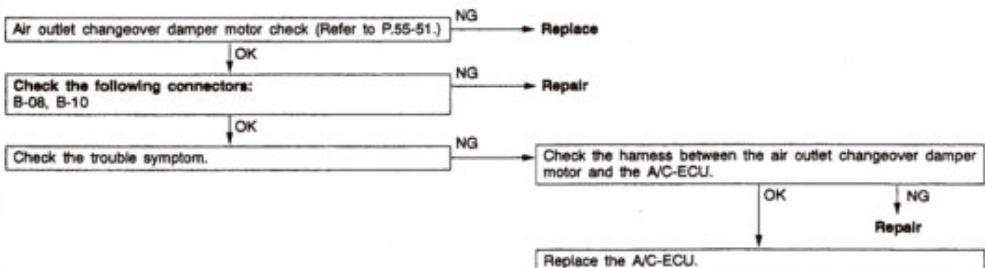
| Code No.32 Potentiometer system of air outlet change-over damper motor assembly | Probable cause |
|---|---|
| This diagnosis code is displayed when the air outlet changeover damper potentiometer does not send any signals to the A/C-ECU due to open or short circuit in the wiring harness. | <ul style="list-style-type: none"> • Malfunction of the air outlet changeover damper motor potentiometer • Malfunction of connector • Malfunction of the A/C-ECU • Malfunction of harness |



| Code No.41 Drive system of air mix damper motor assembly | Probable cause |
|--|--|
| This diagnosis code is displayed when the air mix damper can not be turned to the predetermined angle. | <ul style="list-style-type: none"> • Malfunction of the air mix damper motor assembly • Malfunction of connector • Malfunction of harness • Malfunction of the A/C-ECU |



| Code No.42 Drive system of air outlet changeover damper motor assembly | Probable cause |
|--|--|
| This diagnosis code is displayed when the air outlet changeover damper can not be turned to the predetermined opening angle. | <ul style="list-style-type: none"> • Malfunction of the air outlet changeover damper motor assembly • Malfunction of connector • Malfunction of harness • Malfunction of the A/C-ECU |



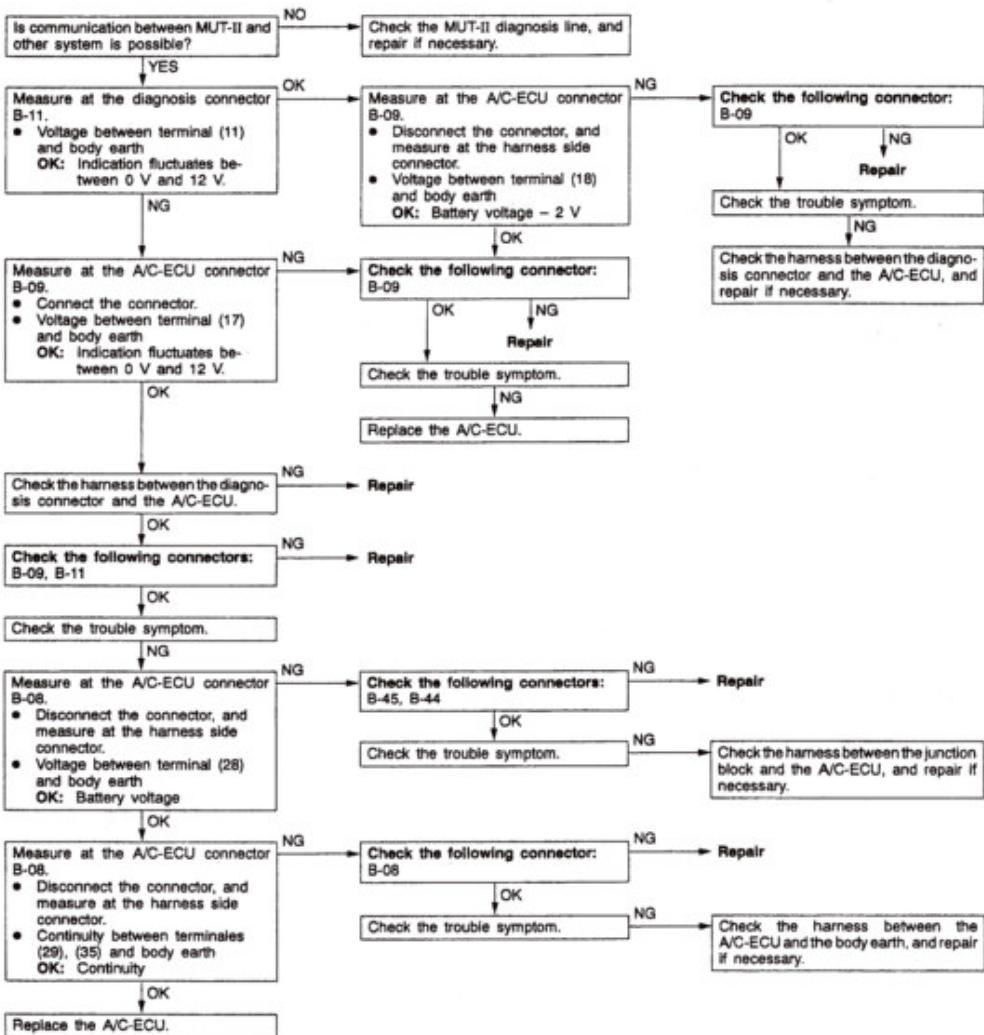
INSPECTION CHART FOR TROUBLE SYMPTOMS

| Trouble symptom | Inspection procedure No. | Reference page |
|--|--------------------------|----------------|
| Communication with the MUT-II is not possible. | 1 | 55-13 |
| Air conditioner does not operate. | 2 | 55-14 |
| A/C graphic display on control panel is blank. | 3 | 55-15 |
| Temperature cannot be set. | 4 | 55-15 |
| A/C outlet air temperature does not increase. | 5 | 55-15 |
| A/C outlet air temperature does not decrease. | 6 | 55-15 |
| Blower does not operate. | 7 | 55-16 |
| Blower does not operate in the HI position. | 8 | 55-17 |
| Blower air amount cannot be changed. | 9 | 55-18 |
| Air outlet port cannot be changed. | 10 | 55-18 |
| Inside/outside air changeover is not possible. | 11 | 55-19 |
| Defroster function does not operate. | 12 | 55-19 |
| Condenser fan does not operate. | 13 | 55-20 |
| Rear defogger does not operate. | 14 | 55-21 |
| A/C-ECU power supply circuit check | 15 | 55-21 |
| A/C compressor control circuit check | 16 | 55-22 |

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

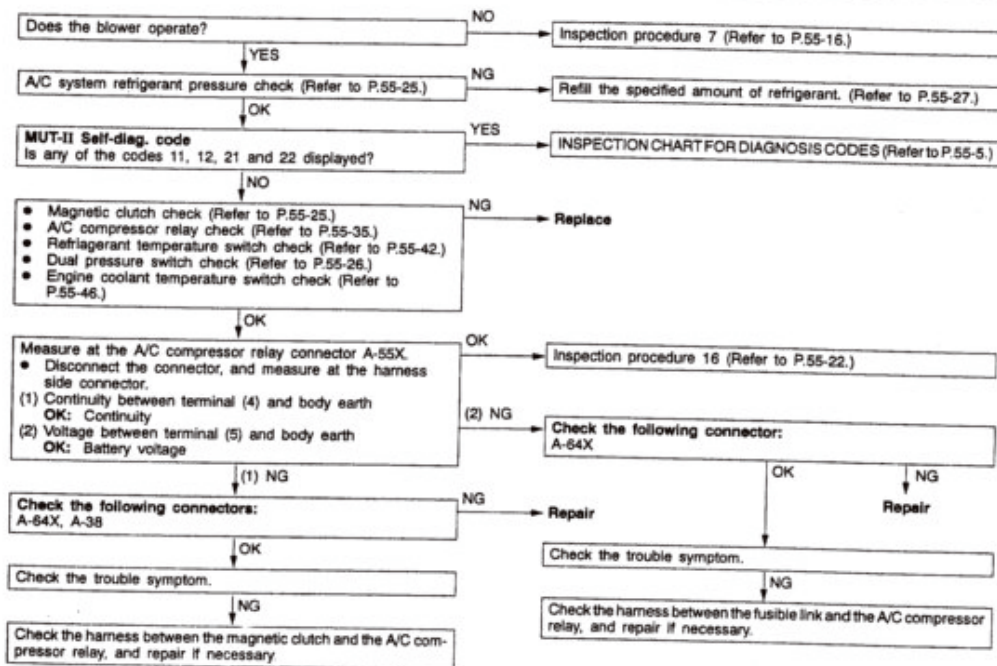
Inspection procedure 1

| Communication with the MUT-II is not possible. | Probable cause |
|--|---|
| If communication with all other systems is not possible, there is a high possibility that there is a malfunction of the diagnosis line. If communication with only the A/C is not possible, the cause is probably a malfunction of the diagnosis line or of the A/C-ECU power supply system (earth). | <ul style="list-style-type: none"> Malfunction of connector or harness Malfunction of A/C-ECU |



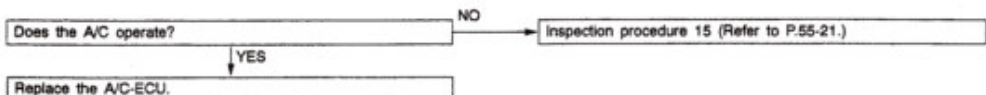
Inspection procedure 2

| Air conditioner does not operate. | Probable cause |
|--|--|
| If the A/C does not operate when the A/C switch is on and the temperature setting is at 17°C, the cause is probably insufficient refrigerant, or a malfunction of the blower or of the magnet clutch power supply. | <ul style="list-style-type: none"> • Malfunction of blower • Insufficient refrigerant • Malfunction of magnetic clutch • Malfunction of air thermo sensor • Malfunction of A/C compressor relay • Malfunction of refrigerant temperature switch • Malfunction of dual pressure switch • Malfunction of engine coolant temperature switch • Malfunction of connector or harness • Malfunction of engine-ECU • Malfunction of A/C-ECU |



Inspection procedure 3

| A/C graphic display on control panel is blank. | Probable cause |
|---|---|
| The cause is probably a malfunction of the A/C-ECU power supply system (earth). | <ul style="list-style-type: none"> • Malfunction of connector or harness • Malfunction of A/C-ECU |



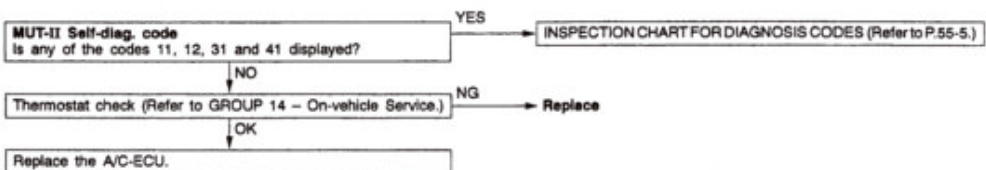
Inspection procedure 4

| Temperature cannot be set. | Probable cause |
|--|---|
| The cause is probably a malfunction of the temperature setting signal input system or output system. | <ul style="list-style-type: none"> • Malfunction of connector or harness • Malfunction of A/C-ECU |

Inspection procedure 15 (Refer to P.55-21.)

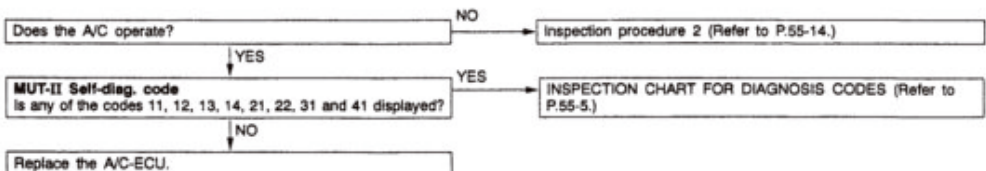
Inspection procedure 5

| A/C outlet air temperature does not increase. | Probable cause |
|---|---|
| If the outlet air temperature does not increase when the temperature setting is increased, the cause is probably a sensor malfunction or a problem with operation of the air mix damper. The MUT-II can be used to check the diagnosis codes in order to check the cause of the problem for each separate system. | <ul style="list-style-type: none"> • Malfunction of air mix damper motor potentiometer • Malfunction of air mix damper motor • Malfunction of air mix damper • Malfunction of connector or harness • Malfunction of thermostat • Malfunction of A/C-ECU |



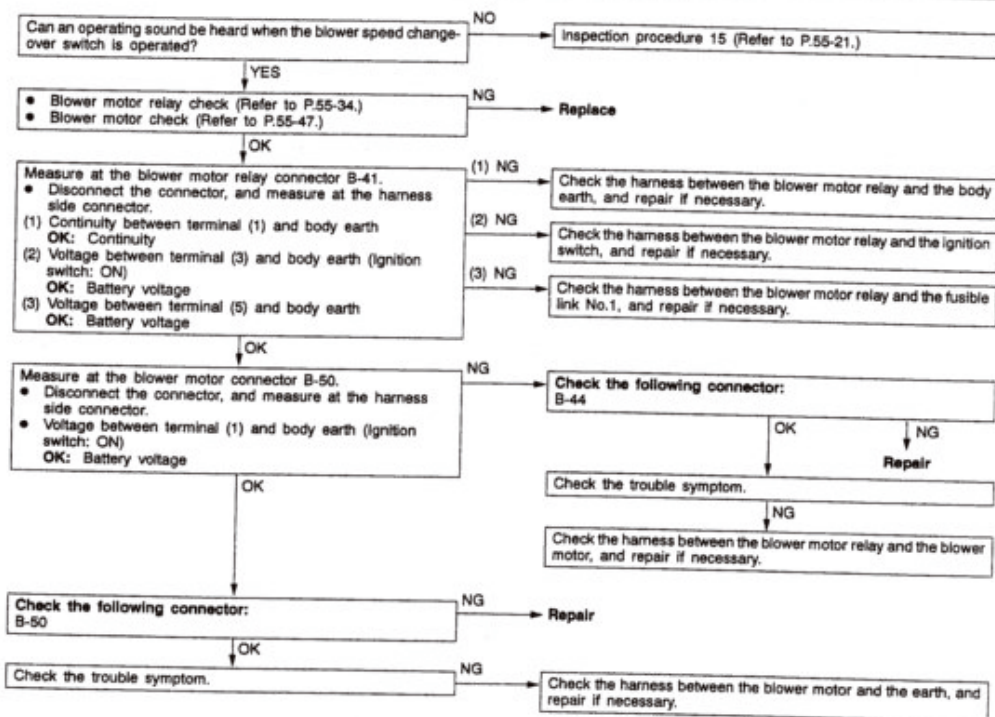
Inspection procedure 6

| A/C outlet air temperature does not decrease. | Probable cause |
|---|---|
| If the outlet air temperature does not decrease when the temperature setting is decreased, the cause is probably a problem in A/C system operation due to a sensor error, or a problem with operation of the air mix damper. The MUT-II can be used to check the diagnosis codes in order to check the cause of the problem for each separate system. | <ul style="list-style-type: none"> • Malfunction of outside air temperature sensor • Malfunction of air mix damper motor potentiometer • Malfunction of air mix damper motor • Malfunction of air thermo sensor • Malfunction of connector or harness • Malfunction of air mix damper • Malfunction of A/C-ECU |



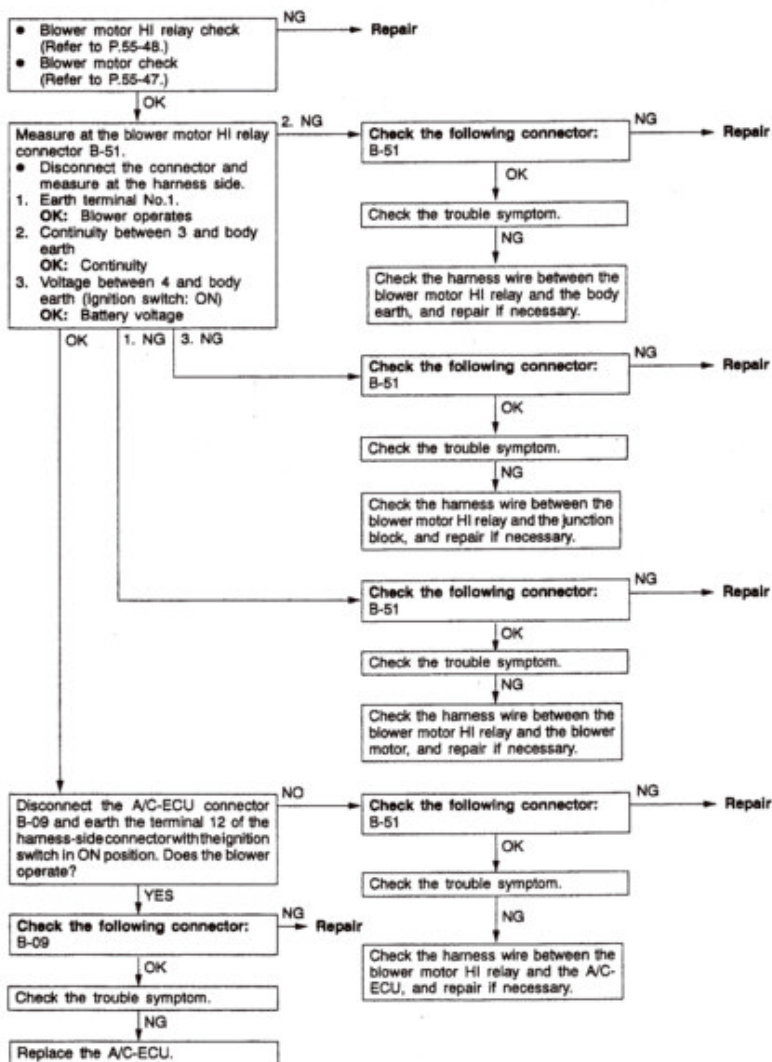
Inspection procedure 7

| Blower does not operate. | Probable cause |
|---|---|
| If no air comes out of the blower even though the blower switch is on, the cause is probably a malfunction of the blower motor relay circuit. | <ul style="list-style-type: none"> • Malfunction of blower motor relay • Malfunction of blower motor • Malfunction of connector or harness • Malfunction of A/C-ECU |

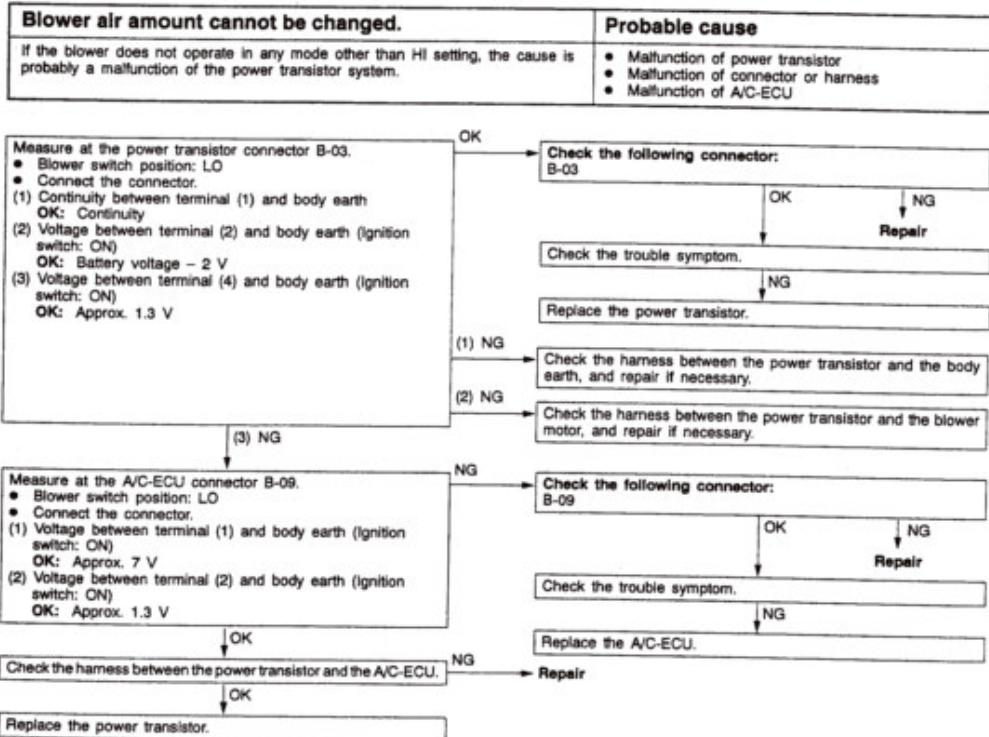


Inspection procedure 8

| Blower does not operate in the HI position. | Probable cause |
|--|--|
| If the blower does not operate in the HI position while the temperature control is set to 17°C or 32°C, the blower motor HI relay circuit system may be defective. | <ul style="list-style-type: none"> • Malfunction of blower motor HI relay • Malfunction of blower motor • Malfunction of connector or harness • Malfunction of A/C-ECU |

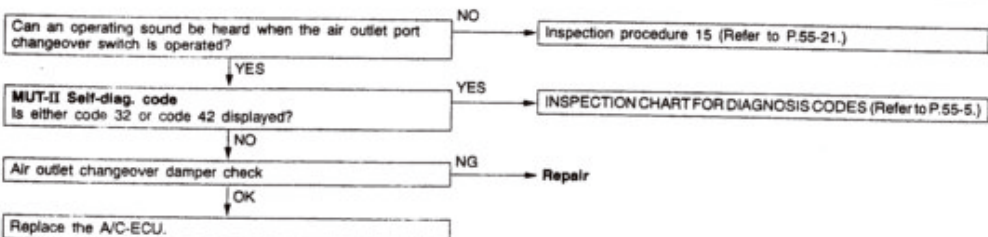


Inspection procedure 9



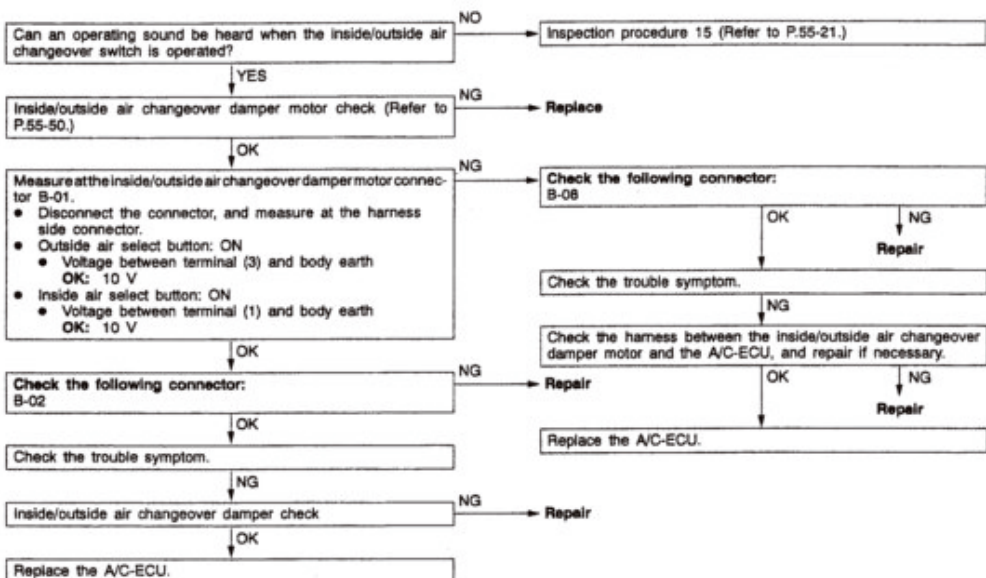
Inspection procedure 10

| Air outlet port cannot be changed. | Probable cause |
|--|--|
| The cause is probably a malfunction of the air outlet port changeover signal input system or output system. The MUT-II can be used to check the diagnosis codes in order to check the cause of the problem for each separate system. | <ul style="list-style-type: none"> Malfunction of air outlet changeover damper motor potentiometer Malfunction of air outlet changeover damper motor Malfunction of air outlet changeover damper Malfunction of connector or harness Malfunction of A/C-ECU |



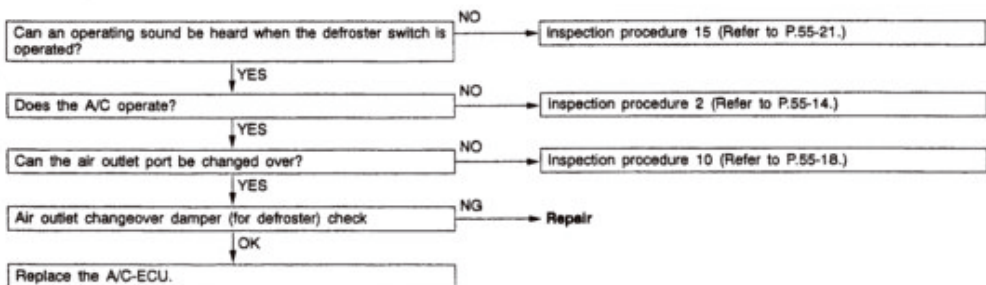
Inspection procedure 11

| Inside/outside air changeover is not possible. | Probable cause |
|---|---|
| If inside/outside air changeover is not possible even when the inside/outside air changeover switch is on, the cause is probably a malfunction of the inside/outside air changeover damper motor. | <ul style="list-style-type: none"> Malfunction of inside/outside air changeover damper motor Malfunction of inside/outside air changeover damper Malfunction of connector or harness Malfunction of A/C-ECU |



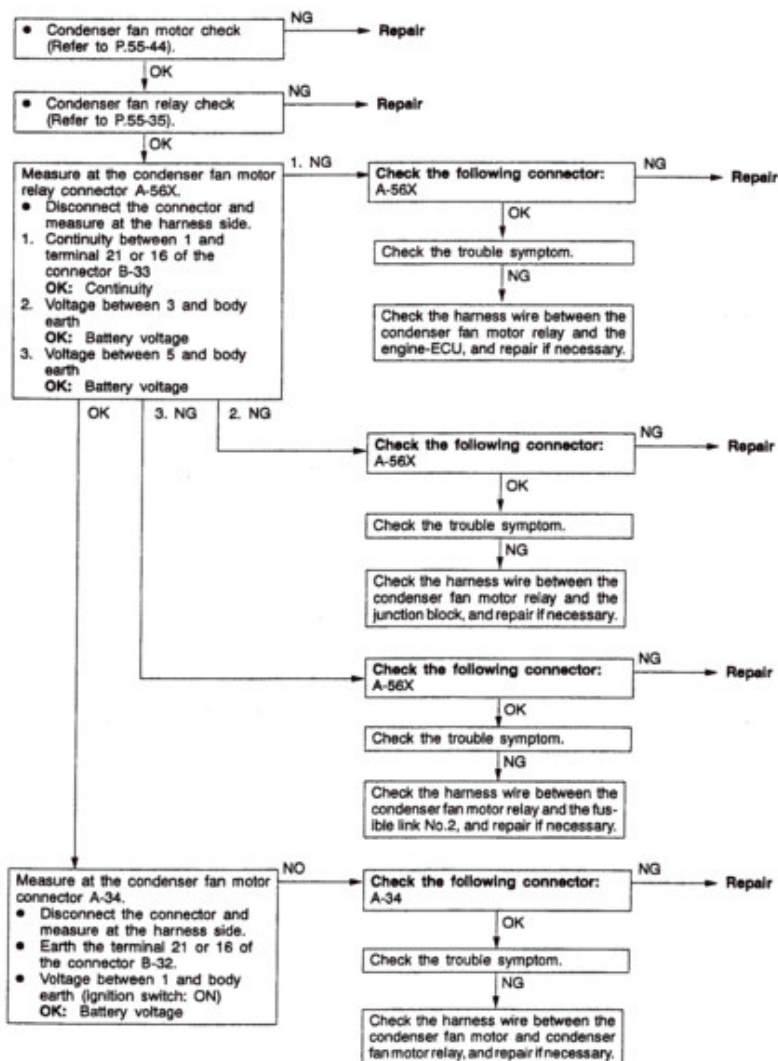
Inspection procedure 12

| Defroster function does not operate. | Probable cause |
|---|--|
| If the defroster function does not operate when the defroster switch is turned on, the cause is probably a malfunction of the A/C or of the air outlet port changeover circuit. | <ul style="list-style-type: none"> Malfunction of air conditioner drive system Malfunction of air outlet changeover damper drive system Malfunction of connector or harness Malfunction of A/C-ECU |



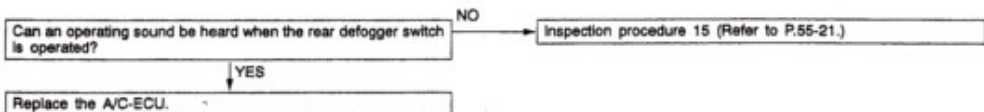
Inspection procedure 13

| Condenser fan does not operate. | Probable cause |
|--|---|
| If the condenser fan does not operate while the air conditioning is turned on, the condenser fan motor operation circuit may be defective. This causes a poor cooling performance while the vehicle is stationary. | <ul style="list-style-type: none"> • Malfunction of condenser fan motor • Malfunction of condenser fan motor relay • Malfunction of harness or connector |



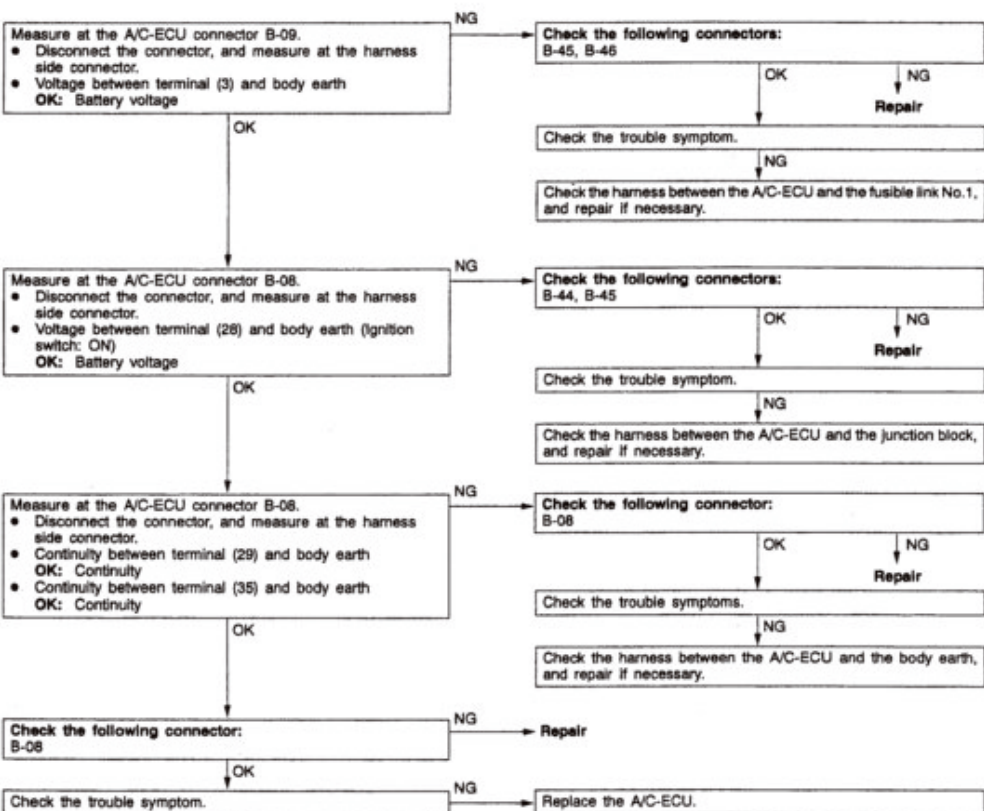
Inspection procedure 14

| Rear defogger does not operate. | Probable cause |
|---|---|
| If the rear defogger does not operate when the rear defogger switch is turned on (timer operates for 20 minutes), the cause is probably a malfunction of the A/C-ECU power supply system (earth). | <ul style="list-style-type: none"> Malfunction of connector or harness Malfunction of A/C-ECU |



Inspection procedure 15

A/C-ECU power supply circuit check



Inspection procedure 16

A/C compressor control circuit check

Measure at the A/C-ECU connector B-08.

- Blower switch and A/C switch: ON
- Setting temperature: 17°C
- Connect the connector.
- Voltage between terminal (34) and body earth (ignition switch: ON)

OK: Battery voltage

OK

NG

Check the following connector:
B-08

OK

NG

Repair

Check the trouble symptom.

NG

Replace the A/C-ECU.

Measure at the A/C compressor relay connector A-55X.

- Disconnect the connector, and measure at the harness side connector.
- Voltage between terminal (3) and body earth

OK: Battery voltage

OK

NG

Check the following connectors:
A-11, A-13, B-08, B-36

OK

NG

Repair

Check the trouble symptom.

NG

Check the harness between the A/C-ECU and the A/C compressor relay, and repair if necessary.

Measure at the engine-ECU connector B-32.

- Disconnect the connector, and measure at the harness side connector.
- Voltage between terminal (22) and body earth

OK: Battery voltage

OK

NG

Check the following connectors:
A-13, A-55X

OK

NG

Repair

Check the trouble symptom.

NG

Check the harness between the A/C compressor relay and the engine-ECU, and repair if necessary.

Replace the engine-ECU.

DATA LIST REFERENCE TABLE

| Item No. | Check item | Check condition | | Normal condition |
|----------|--|---------------------|-----------------|--|
| 11 | Inside air temperature sensor | Ignition switch: ON | | Inside air temperature and temperature displayed on the MUT-II are identical. |
| 13 | Outside air temperature sensor | Ignition switch: ON | | Outside air temperature and temperature displayed on the MUT-II are identical. |
| 15 | Heater water temperature sensor | Ignition switch: ON | | Heater core surface temperature and temperature displayed on the MUT-II are identical. |
| 21 | Air thermo sensor | Ignition switch: ON | | Evaporator surface temperature and temperature displayed on the MUT-II are identical. |
| 25 | Photo sensor | Ignition switch: ON | | Amount of incident light is proportional to voltage displayed on the MUT-II. |
| 31 | Air mix damper motor potentiometer | Ignition switch: ON | Damper position | Opening degree (%) |
| | | | MAX. HOT | Approx. 100 |
| | | | MAX. COOL | Approx. 0 |
| 32 | Air outlet changeover damper motor potentiometer | Ignition switch: ON | Damper position | Opening degree (%) |
| | | | FACE | Approx. 0 |
| | | | FOOT | Approx. 50 |
| | | | FOOT/DEF. | Approx. 75 |
| | | | DEF. | Approx. 100 |

CHECK AT THE A/C-ECU TERMINALS



00008600

(): reference value

| Terminal No. | Check item | Check condition | Normal condition |
|--------------|---------------------------------------|--|-------------------------|
| 1 | Power MOS FET drain output | When blower switch is at OFF | Battery voltage |
| | | When blower switch is at LO | Approx. 7 V |
| | | When blower switch is at HI | Almost no voltage (0 V) |
| 2 | Power MOS FET gate output | When blower switch is at OFF | 0 V |
| | | When blower switch is at LO | Approx. 1.3 V |
| | | When blower switch is at HI | Approx. 2.5 V |
| 3 | A/C-ECU backup power supply | At all times | Battery voltage |
| 4 | Heater water temperature sensor input | When sensor section temperature is 25°C (4 kΩ) | 2.3 – 2.9 V |

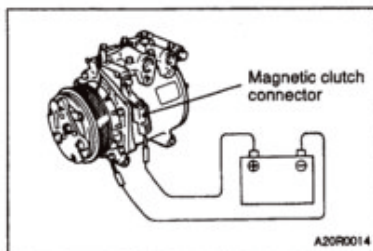
| Terminal No. | Check item | Check condition | Normal condition |
|--------------|--|---|-----------------------|
| 5 | Air mix damper motor potentiometer input | When damper is moved to MAX. HOT position | 4.7 - 5.0 V |
| 6 | Air outlet changeover damper motor potentiometer input | When damper is moved to DEF. position | 4.8 - 5.2 V |
| 7 | Outside air temperature sensor input | When sensor section temperature is 25°C (4 kΩ) | 2.3 - 2.9 V |
| 8 | Air thermo sensor input | When sensor section temperature is 25°C (4 kΩ) | 2.3 - 2.9 V |
| 9 | Photo sensor (-) | At luminous intensity of 100,000 lux or more | -0.1 - 0.2 V |
| | | At luminous intensity of 0 lux | 0 V |
| 10 | Sensor power supply | At all times | 4.8 - 5.2 V |
| 12 | Front blower motor HI relay (energizing circuit) | When blower switch is in HI position | 1.5 V or less |
| | | When blower switch is in position other than HI | Battery voltage |
| 16 | Rear defogger | When rear defogger switch is ON | 1.5 V or less |
| | | When rear defogger switch is OFF | Battery voltage |
| 17 | Diagnosis data output | When ignition switch is ON | 0 V ↔ Battery voltage |
| 18 | Diagnosis control output | When ignition switch is ON | Battery voltage - 2 V |
| 19 | Photo sensor (+) | At all times | 0 V |
| 20 | Sensor earth | At all times | 0 V |
| 21 | Air outlet changeover damper motor (FACE) | Set to FACE position | 10 V |
| | | Set to DEF. position | 0.5 V |
| 22 | Air mix damper motor (MAX. COOL) | Set to MAX. COOL position | 10 V |
| | | Set to MAX. HOT position | 0.5 V |
| 23 | Inside/outside air changeover damper motor (inside air) | Set to inside air position | 0.5 V |
| | | Set to outside air position | 10 V |
| 24 | Air outlet changeover damper motor (DEF.) | Set to FACE position | 0.5 V |
| | | Set to DEF. position | 10 V |
| 25 | Air mix damper motor (MAX. HOT) | Set to MAX. COOL position | 0.5 V |
| | | Set to MAX. HOT position | 10 V |
| 26 | Inside/outside air changeover damper motor (outside air) | Set to inside air position | 10 V |
| | | Set to outside air position | 0.5 V |
| 28 | IG ₂ power supply | When ignition switch is ON | Battery voltage |
| 29 | Earth | At all times | Continuity |
| 30 | ILL. power supply | When lighting switch is at ON | Battery voltage |
| 34 | A/C output | When A/C is OFF | 0 V |
| | | When A/C is ON | Battery voltage |
| 35 | Earth | At all times | Continuity |

ON-VEHICLE SERVICE

SIGHT GLASS REFRIGERANT LEVEL TEST

The sight glass is a refrigerant level indicator. To check the refrigerant level, clean the sight glass and start the vehicle engine. Push the A/C button to operate the compressor, place the blower switch to high and move the temperature control lever to max cool. After operating for a few minutes in this manner, check the sight glass.

1. If the sight glass is clear, the magnetic clutch is engaged, the compressor discharge line is warm and the compressor inlet line is cool; the system has a full charge.
2. If the sight glass is clear, the magnetic clutch is engaged and there is no significant temperature difference between compressor inlet and discharge lines; the system has lost some refrigerant.
3. If the sight glass shows foam or bubbles, the system could be low on charge. The system has to be recharged with refrigerant.



MAGNETIC CLUTCH TEST

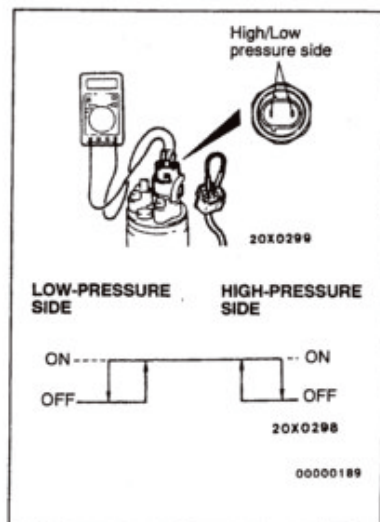
1. Disconnect the connector (1-pin) to the magnetic clutch.
2. Connect battery (+) voltage directly to the connector for the magnetic clutch.
3. If the magnetic clutch is normal, there will be "click". If the pulley and armature do not make contact ('click'), there is a malfunction.

RECEIVER DRIER TEST

Operate the unit and check the piping temperature by touching the receiver drier outlet and inlet.

If there is a difference in the temperatures, the receiver drier is restricted.

Replace the receiver drier.

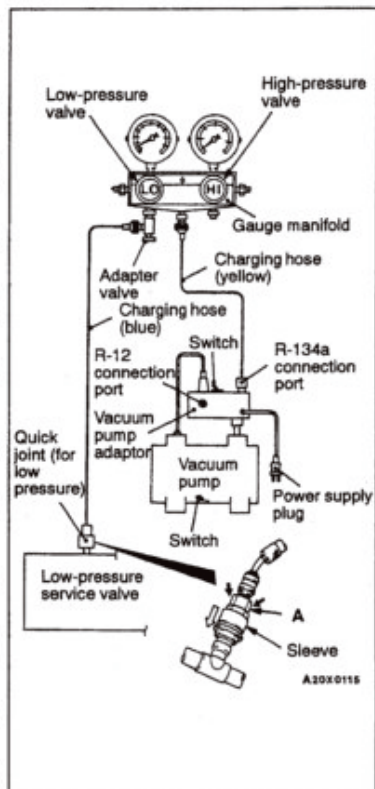
**DUAL PRESSURE SWITCH CHECK**

1. Remove the dual pressure switch connector and connect the high/low pressure side terminals located on the harness side as shown in the illustration.
2. Install a gauge manifold to the high-pressure side service valve of the refrigerant line. (Refer to Performance Test.)
3. When the high/low pressure sides of the dual pressure switch are at operation pressure (ON) and there is continuity between the respective terminals, then the condition is normal. If there is no continuity, replace the switch.

| Items | Switch position | |
|------------------------|-----------------|----------|
| | OFF → ON | ON → OFF |
| Low-pressure side kPa | 221 | 196 |
| High-pressure side kPa | 2,550 | 3,138 |

COMPRESSOR DRIVE BELT ADJUSTMENT

Refer to GROUP 11A - On-vehicle Service.



CHARGING

1. With the handles turned back all the way (valve closed), install the adaptor valve to the low-pressure side of the gauge manifold.
2. Connect the charging hose (blue) to the adaptor valve.
3. Connect the quick joint (for low pressure) to the charging hose (blue).
4. Connect the quick joint (for low pressure) to the low pressure service valve.

NOTE

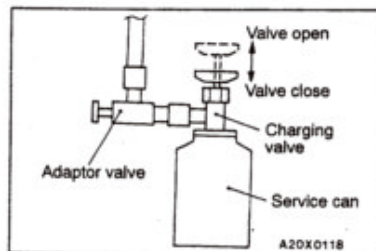
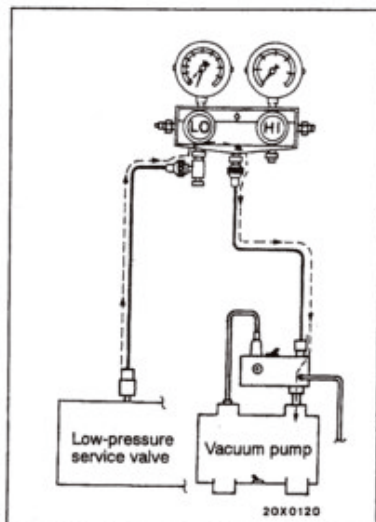
The low-pressure service valve should be connected to the suction hose.

Caution

- (1) Use tools that are suited to R-134a.
 - (2) To install the quick joint, press section "A" firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.
5. Close the high and low-pressure valves of the gauge manifold.
 6. Install the vacuum pump adaptor to the vacuum pump.
 7. Connect the vacuum pump plug to the vacuum pump adaptor.
 8. Connect the charging hose (yellow) to the R-134a connection port of the vacuum pump adaptor.
 9. Tighten the adaptor valve handle (valve open).
 10. Open the low-pressure valve of the gauge manifold.
 11. Turn the power switch of the vacuum pump to the ON position.

NOTE

Even if the vacuum pump power switch is turned ON, the vacuum pump will not operate because of the power supply connection in step (7).



12. Turn the vacuum pump adaptor switch to the R-134a side to start the vacuum pump.

Caution

Do not operate the compressor for evacuation.

13. Evacuate to a vacuum reading of 100 kPa or higher (takes approx. 10 minutes).
14. Turn the vacuum pump adaptor switch OFF and allow to stand it for 5 minutes.

Caution

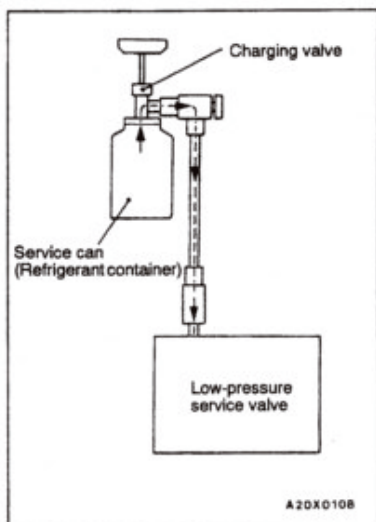
Do not operate the compressor in the vacuum condition; damage may occur.

15. Carry out a leak test. (Good if the negative pressure does not drop.)

Caution

If the negative pressure drops, increase the tightness of the connections, and then repeat the evacuation procedure from step (12).

16. With the handle turned back all the way (valve open), install the charging valve to the service can.
17. Turn the handle of the adaptor valve back all the way (valve closed), remove it from the gauge manifold and install the service can.
18. Tighten the handle of the charging valve (valve closed) to puncture the service can.



19. Turn the handle of the charging valve back (valve open) and tighten the handle of the adaptor valve (valve open) to charge the system with refrigerant.

Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

20. If the refrigerant is not drawn in, turn the handle of the adaptor valve back all the way (valve closed).
21. Check for gas leaks using a leak detector.
If a gas leak is detected, re-tighten the connections, and then repeat the charging procedure from evacuation in step (12).

Caution

The leak detector for R-134a should be used.

22. Start the engine.
23. Operate the A/C and set to the lowest temperature (MAX. COOL).
24. Fix the engine speed at 1,500 r/min.
25. Tighten the handle of the adaptor valve (valve open) to charge the required volume of refrigerant.

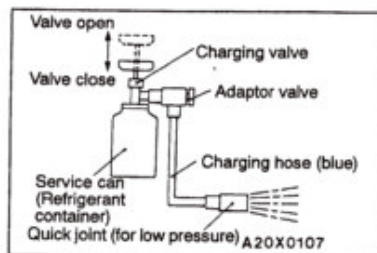
Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

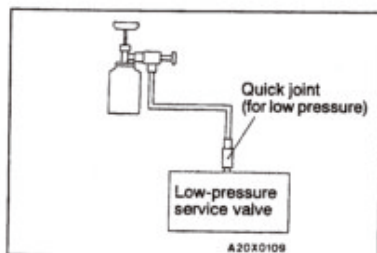
26. After charging with refrigerant, turn the handle of the adaptor valve back all the way (valve closed).
27. Tighten the charging valve handle (valve closed).
Remove the quick joint (for low pressure) from the low-pressure service valve.

NOTE

If the service can is not emptied completely, keep the handles of the charging valve and adaptor valve closed for the next charging.

**CORRECTING LOW REFRIGERANT LEVEL IN CASE THE SERVICE CAN IS USED.**

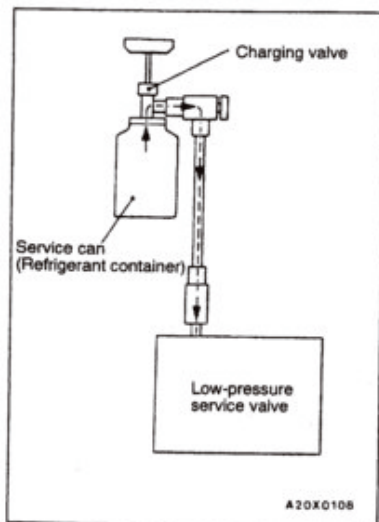
1. Install the charging valve with the handle turned all the way back (valve open) to the service can.
2. Install the adaptor valve with the handle turned all the way back (valve close) to the charging valve.
3. Connect the charging hose (blue) to the adaptor valve.
4. Connect the charging hose (blue) to the quick joint (for low pressure).
5. Tighten the handle of the charging valve (valve close), and pierce the service can.
6. Turn the handle of the adaptor valve to bleed the air.



7. Install the quick joint (for low pressure) to the low-pressure service valve.

NOTE

The low-pressure service valve should be connected to the suction hose.



8. Start the engine.
9. Operate the air conditioner and set at the lowest temperature (MAX. COOL).
10. Fix the engine speed at 1,500 r/min.
11. Tighten the handle of the adaptor valve (valve open), and replenish refrigerant while checking the quantity through the sight glass.

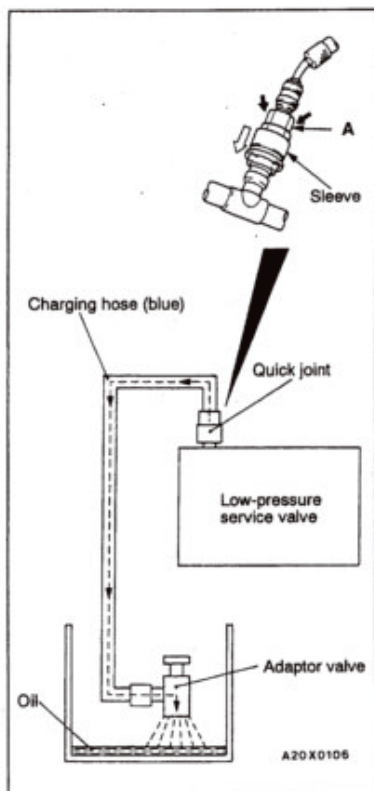
Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is changed in gas state.

12. After replenishing is completed, turn the handle of the adaptor valve all the way back (valve close), and remove the quick joint.

NOTE

When there is remainder of refrigerant in the service can, keep it for next use with the charge valve and the valve of the adaptor valve being closed.



DISCHARGING SYSTEM

1. Run the engine at an engine speed of 1,200–1,500 r/min for approximately 5 minutes with the A/C operating to return to the oil.

NOTE

Returning the oil will be more effective if it is done while driving.

2. Stop the engine.
3. Connect the charging hose (blue) to the adaptor valve with its handle turned back all the way (valve closed).
4. Connect the quick joint to the charging hose (blue).
5. Install the quick joint to the low-pressure service valve.

NOTE

The low-pressure service valve should be connected to the suction hose.

Caution

To connect the quick joint, press section "A" firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

6. Place the adaptor valve inside the container and discharge the refrigerant by opening the handle gradually so that oil does not gush out.

NOTE

Any oil remaining in the container should be returned to the A/C system.

REFILLING OF OIL IN THE A/C SYSTEM

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.

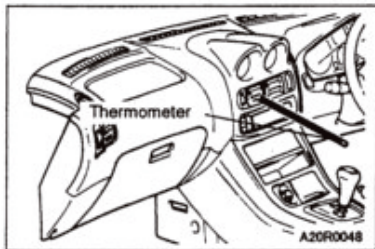
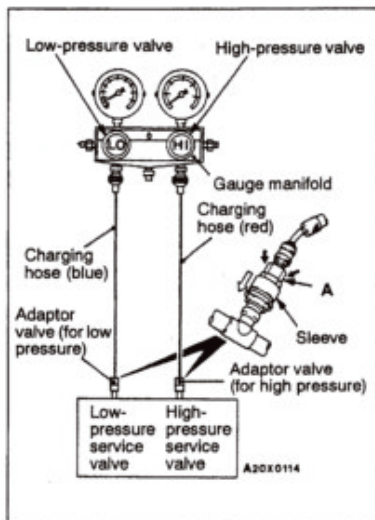
When a compressor is installed at the factory, it contains 120 ml of refrigerant oil. While the A/C system is in operation, the oil is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in various parts of the system.

When the following system components are changed, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor oil: SUN PAG 56

Quantity

Condenser: 15 ml
Evaporator: 60 ml
Suction hose: 10 ml
Receiver: 10 ml

**PERFORMANCE TEST**

1. The vehicles to be tested should be in a place that is not in direct sunlight.
2. Close the high and low-pressure valve of the gauge manifold.
3. Connect the charging hose (blue) to the low-pressure valve and connect the charging hose (red) to the high-pressure valve of the gauge manifold.
4. Install the quick joint (for low pressure) to the charging hose (blue), and connect the quick joint (for high pressure) to the charging hose (red).
5. Connect the quick joint (for low pressure) to the low-pressure service valve and connect the quick joint (for high pressure) to the high-pressure service valve.

NOTE

The high-pressure service valve is on liquid pipe B and the low-pressure service valve is on the suction hose.

Caution

To connect the quick joint, press section "A" firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

6. Start the engine.
7. Set the controls to the A/C as follows:
A/C switch: A/C - ON position
Mode selection: Face position
Temperature control: Max. cooling position
Air selection: Recirculation position
Blower switch: HI (Fast) position
8. Adjust engine speed to 1,000 r/min with A/C clutch engaged.
9. Engine should be warmed up with doors and windows closed.
10. Insert a thermometer in the center air outlet and operate the engine for 20 minutes.
11. Note the discharge air temperature.

NOTE

If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

| | |
|-------------------------------|-------------|
| Garage ambient temperature °C | 35 |
| Discharge air temperature °C | 15.6-18.0 |
| Compressor high pressure kPa | 1,805-1,900 |
| Compressor low pressure kPa | 305-1340 |

REFRIGERANT LEAK REPAIR

LOST CHARGE

If the system has lost all charge due to a leak:

1. Evacuate the system. (See procedure.)
2. Charge the system with approximately one pound of refrigerant.
3. Check for leaks.
4. Discharge the system.
5. Repair leaks.
6. Replace receiver drier.

Caution

Replacement filter-drier units must be sealed while in storage. The drier used in these units will saturate water quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick reassembly to avoid keeping the system open any longer than necessary.

7. Evacuate and charge system.

LOW CHARGE

If the system has not lost all of its refrigerant charge; locate and repair all leaks. If it is necessary to increase the system pressure to find the leak (because of an especially low charge) add refrigerant. If it is possible to repair the leak without discharging the refrigerant system, use the procedure for correcting low refrigerant level.

HANDLING TUBING AND FITTINGS

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed. The system must be completely discharged before opening any fitting or connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly.

Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing. A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose.

Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 80 mm from the exhaust manifold. It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.

Unified plumbing connections with O-rings, these O-rings are not reusable.

COMPRESSOR NOISE

You must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, in gear or neutral, engine temperature or any other special conditions.

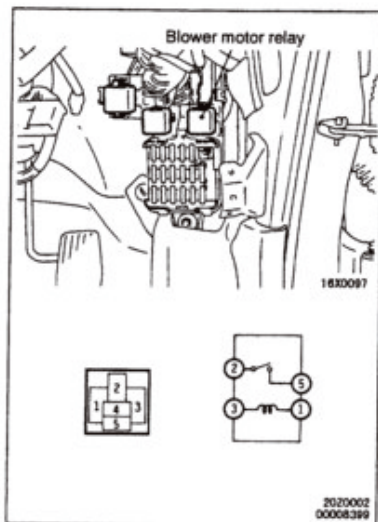
Noises that develop during A/C operation can often be misleading. For example: what sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly. Verify accessory drive belt tension (power steering or alternator).

Improper accessory drive belt tension can cause a misleading noise when the compressor is engaged and little or no noise when the compressor is disengaged.

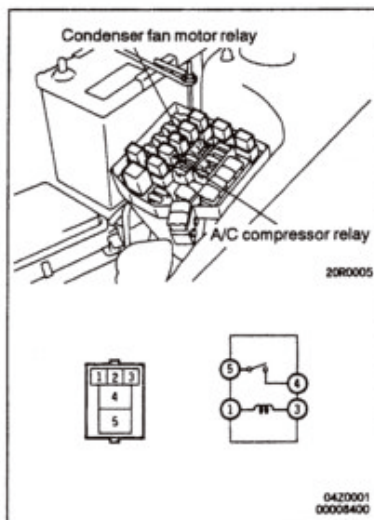
Drive belts are speed-sensitive. That is, at different engine speeds, and depending upon belt tension, belts can develop unusual noises that are often mistaken for mechanical problems within the compressor.

ADJUSTMENT

1. Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise. To duplicate high ambient conditions (high head pressure), restrict air flow through condenser. Install manifold gauge set to make sure discharge pressure doesn't exceed 2,070 kPa.
2. Tighten all compressor mounting bolts, clutch mounting bolt, and compressor drive belt. Check to assure clutch coil is tight (no rotation or wobble).
3. Check refrigerant hoses for rubbing or interference that can cause unusual noises.
4. Check refrigerant charge. (See "Charging System".)
5. Recheck compressor noise as in Step 1.
6. If noise still exists, loosen compressor mounting bolts and retorque. Repeat Step 1.
7. If noise continues, replace compressor and repeat Step 1.

**POWER RELAY CHECK****BLOWER MOTOR RELAY**

| Battery voltage | Terminal No. | | | |
|-----------------------|--------------|---|---|---|
| | 1 | 3 | 2 | 5 |
| Power is not supplied | ○ | ○ | | |
| Power is supplied | ⊕ | ⊖ | ○ | ○ |



A/C COMPRESSOR RELAY AND CONDENSER FAN MOTOR RELAY

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

IDLE-UP OPERATION CHECK

- Before inspection and adjustment, set vehicle in the following condition:
 - Engine coolant temperature: 80 – 95°C
 - Lights, electric cooling fan and accessories: Set to OFF
 - Transmission: Neutral (P for vehicles with A/T)
- Check whether or not the idle speed is within the standard value.

Standard value: 700 ± 50 r/min

NOTE

There is no necessity to make an adjustment, because the idle speed is automatically adjusted by the ISC system. If, however, there occurs a deviation from the standard value for some reason, check the ISC system. (Refer to GROUP 13A – On-vehicle Service.

- When the A/C is running after turning the A/C switch to ON, check to be sure that the idle speed is within the standard value.

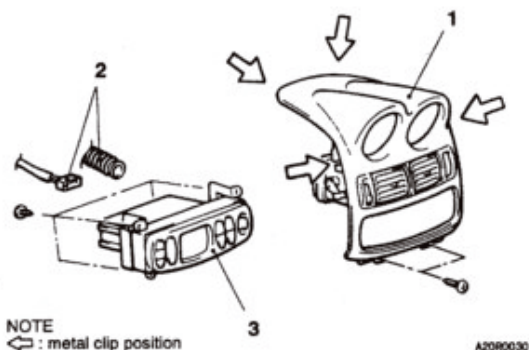
Standard value: 900 ± 50 r/min

AIR CONDITIONER CONTROL UNIT (A/C-ECU)

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Radio Panel Removal and Installation
(Refer to GROUP 52A - Floor Console Box.)



Removal steps

1. Center panel
2. Harness connector connection and aspirator hose connection
3. A/C-ECU

HEATER UNIT, HEATER CORE AND BLOWER UNIT

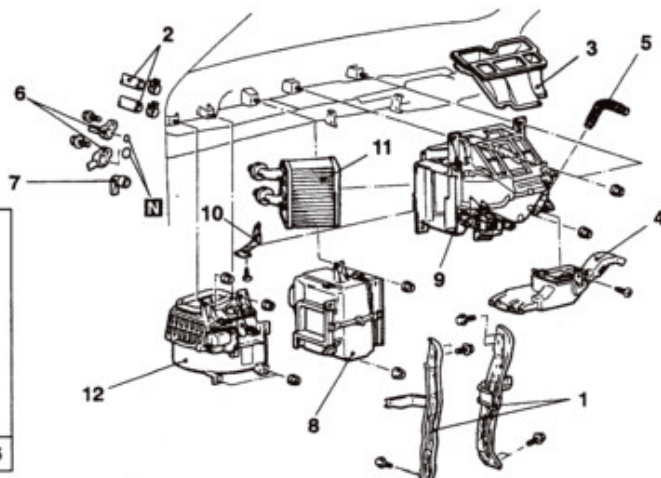
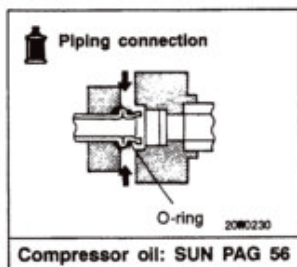
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Instrument Panel and Floor Console Box Removal and Installation (Refer to GROUP 52A.)
- Refrigerant Draining and Supplying (Refer to P.55-27.)
- Air Cleaner Cover and Hose Removal and Installation (Refer to GROUP 15.)

Caution: SRS

When removing and installing the heater unit, do not let it bump against the SRS-ECU or the components.



20R0044
00008591

Heater unit and heater core removal steps

- Draining and refilling engine coolant (Refer to GROUP 14 - On-vehicle service.)
1. Center reinforcement
 2. Heater hose connection
 3. Center ventilation duct
 4. Foot distribution duct
 5. Aspirator hose
 6. Suction hose and liquid pipe connection

7. Drain hose
8. Evaporator
9. Heater unit
10. Heater core support
11. Heater core

Blower unit removal steps

6. Suction hose and liquid pipe connection
7. Drain hose
8. Evaporator
12. Blower unit

REMOVAL SERVICE POINT

◀A▶ SUCTION HOSE AND LIQUID PIPE DISCONNECTION

Plug the disconnected hoses and evaporator nipple not to let foreign material get into them.

Caution

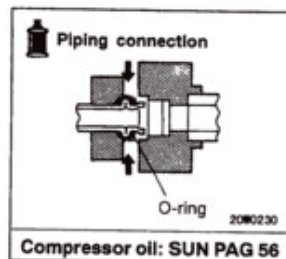
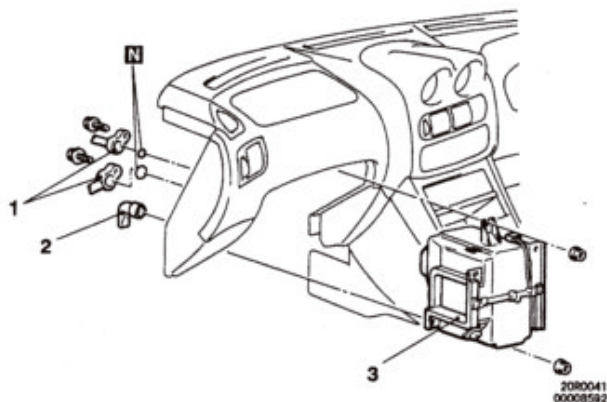
The compressor oil and receiver will absorb water vapour easily. Therefore, use a blank plug which isolates the air.

EVAPORATOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Discharging and Charging of Refrigerant (Refer to P.55-27.)
- Glove Box and Glove Box Frame Removal and Installation (Refer to GROUP 52A—Instrument Panel.)
- Air Cleaner and Hose Removal and Installation (Refer to GROUP 15.)



Removal steps

1. Suction hose and liquid pipe connection
2. Drain hose
3. Evaporator

REMOVAL SERVICE POINT

SUCTION HOSE AND LIQUID PIPE
DISCONNECTION

Plug the disconnected hose and the evaporator nipple not to let foreign matter get into them.

Caution

The compressor oil and receiver will absorb water vapour easily. Therefore, use a blank plug which isolates the air.

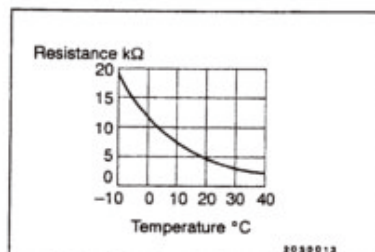
INSPECTION

AIR THERMO SENSOR

When the resistance value between the sensor terminals is measured under two or more temperature conditions, the resistance value should be close to the values shown in the graph.

NOTE

The temperature conditions when testing should not exceed the range of the characteristic curve in the graph.



COMPRESSOR AND TENSION PULLEY

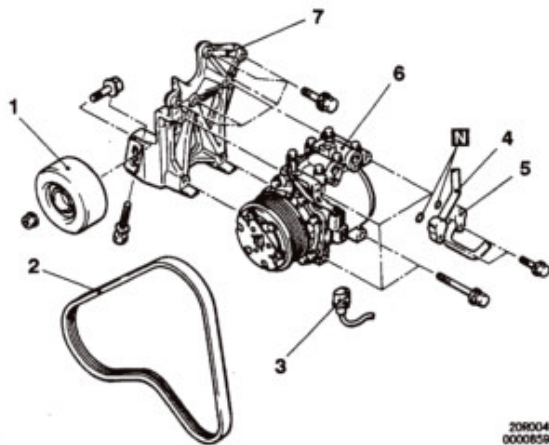
REMOVAL AND INSTALLATION

Pre-removal Operation

- Discharging of Refrigerant (Refer to P.55-27.)

Post-installation Operation

- Drive Belt Tension Adjustment (Refer to GROUP 11A – On-vehicle Service.)
- Charging of Refrigerant (Refer to P.55-27.)



Piping connection

O-ring

20W0230

Compressor oil: SUN PAG 56

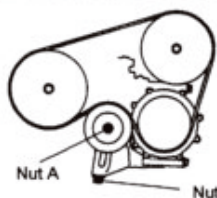
20R0040
0000593

Removal steps

- Tension pulley
- Drive belt
- Harness connector
- Suction hose connection



- Hose connections
- Compressor
- Compressor bracket



C20R0001

REMOVAL SERVICE POINTS

◀A▶ DRIVE BELT REMOVAL

- Loosen the nut A.
- Loosen the bolt B for adjustment.
- Remove the drive belt.
- Remove the tension pulley.

◀B▶ HOSE DISCONNECTION

Plug the disconnected hose and the compressor nipple not to let foreign matter get into them.

Caution

Seal the hoses completely, otherwise the compressor oil will absorb water vapour easily.

◀C▶ COMPRESSOR REMOVAL

When doing this work, be careful not to spill the compressor oil.

INSTALLATION SERVICE POINT**►A◀COMPRESSOR INSTALLATION**

If a new compressor is installed, first adjust the amount of oil according to the procedures described below, and then install the compressor.

1. Measure the amount (X mℓ) of oil within the removed compressor.
2. Drain (from the new compressor) the amount of oil calculated according to the following formula, and then install the new compressor.

New compressor oil amount

$$120 \text{ mℓ} - X \text{ mℓ} = Y \text{ mℓ}$$

NOTE

- (1) Y mℓ indicates the amount of oil in the refrigerant line, the condenser, the evaporator etc.
- (2) When replacing the following parts at the same times as the compressor, subtract the rated oil amount of the each part from Y mℓ and discharge from the new compressor.

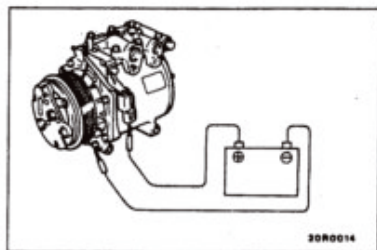
Quantity

Evaporator: 60 mℓ

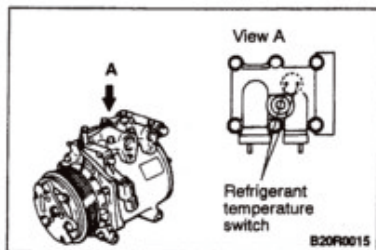
Condenser: 15 mℓ

Suction hose: 10 mℓ

Receiver: 10 mℓ

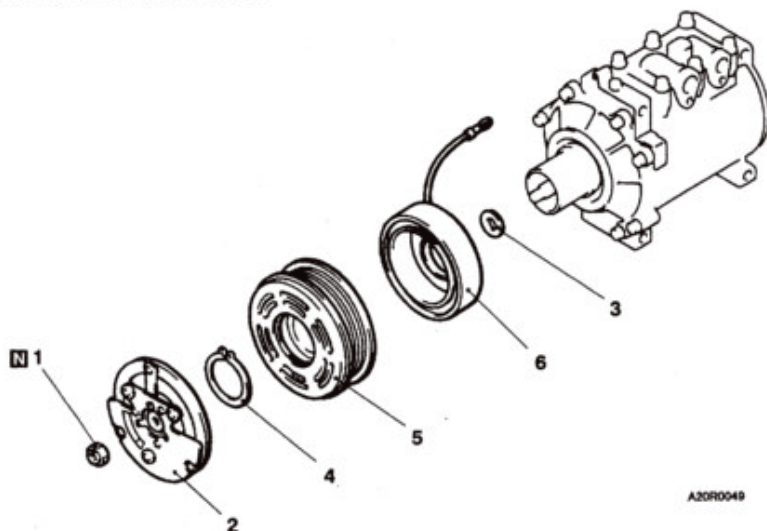
**INSPECTION****COMPRESSOR MAGNETIC CLUTCH OPERATION CHECK**

Connect the battery (+) terminal to the compressor side terminal, and earth the battery (-) terminal to the body of the compressor. The condition is normal if the sound of the magnetic clutch (click) can be heard.

**REFRIGERANT TEMPERATURE SWITCH SIMPLE CHECK**

When the A/C is off, check that there is continuity between the refrigerant temperature switch terminals. If no, replace the compressor.

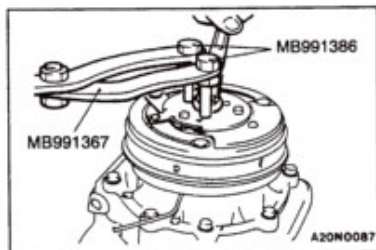
MAGNETIC CLUTCH DISASSEMBLY AND REASSEMBLY



Disassembly steps

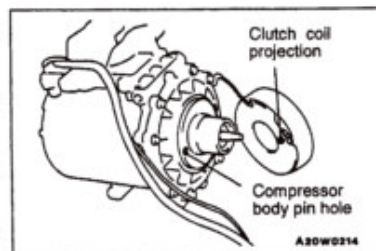
- Air gap adjustment
- 1. Nut
- 2. Armature plate
- 3. Shims

- B◄ 4. Snap ring
- A◄ 5. Rotor
- A◄ 6. Clutch coil



DISASSEMBLY SERVICE POINT

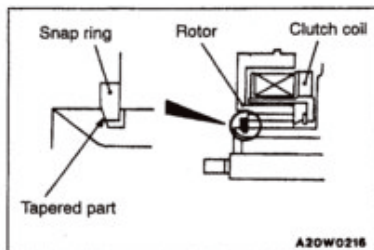
◄A► NUT REMOVAL



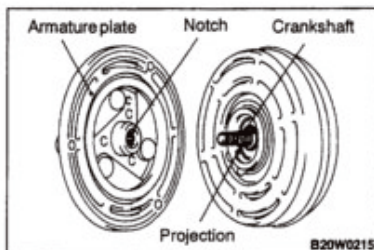
REASSEMBLY SERVICE POINTS

►A◄ CLUTCH COIL INSTALLATION

When installing the clutch coil to the A/C compressor body, install so that the pin hole of the A/C compressor body and the clutch coil projection are aligned.

**►B◄ SNAP RING INSTALLATION**

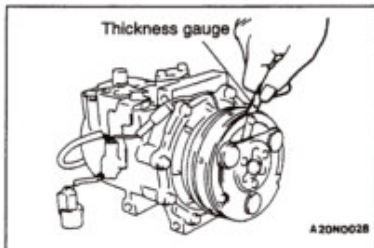
Use a snap ring pliers to install the snap ring so that the tapered surface is at the outer side.

**►C◄ ARMATURE PLATE INSTALLATION**

Align the projection of the crankshaft spline and the notch of the armature plate, and then install the armature plate.

►D◄ NUT INSTALLATION

Use the special tool to hold the magnet clutch in the same manner as removal, and tighten the nut.

**►E◄ AIR GAP ADJUSTMENT**

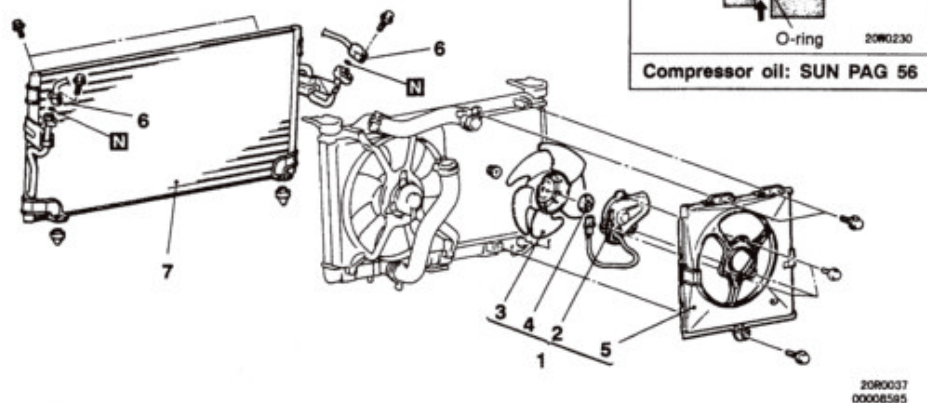
Check whether or not the air gap of the clutch is within the standard value.

Standard value: 0.3-0.5 mm

If there is a deviation of the air gap from the standard value, make the necessary adjustment by adjusting the number of shims.

CONDENSER AND CONDENSER FAN MOTOR

REMOVAL AND INSTALLATION



Shroud removal steps

1. Condenser fan motor and shroud assembly
2. Condenser fan motor
3. Condenser fan
4. Spacer
5. Shroud

Condenser removal steps

- Discharging and charging of refrigerant (Refer to P.55-27.)
- Engine coolant draining and supplying (Refer to GROUP 14 - On-vehicle service.)
- Radiator (Refer to GROUP 14.)
- 6. Discharge hose and liquid pipe A connection
- 7. Condenser



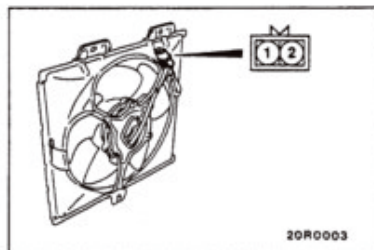
REMOVAL SERVICE POINT

◀A▶ DISCHARGE HOSE AND LIQUID PIPE A CONNECTION

Plug the disconnected pipe, hose and the condenser nipple not to let foreign matter get into them.

Caution

The compressor oil and receiver will absorb water vapour easily. Therefore, use a blank plug which isolates the air.

**INSPECTION****CONDENSER FAN MOTOR CHECK**

Check that the motor turns when the battery voltage is applied between terminals. Also check that the abnormal noise is not heard from the motor.

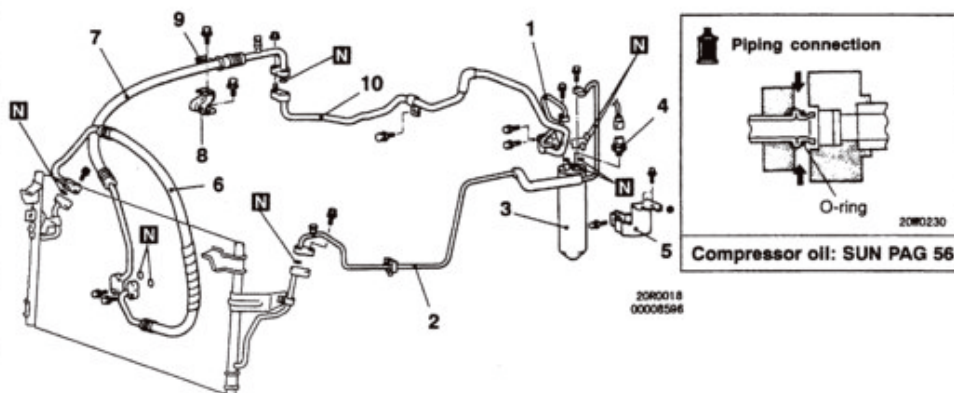
| Terminal to be connected to the battery | | Motor |
|---|---|-------|
| 1 | 2 | |
| ⊕ | ⊖ | Turns |

REFRIGERANT LINE

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Discharging and Changing of Refrigerant (Refer to P.55-27.)
- Air Cleaner Removal and Installation (Refer to GROUP 15.)
- Battery and Battery Tray Removal and Installation



Removal steps

1. Liquid pipe C
2. Liquid pipe A
3. Receiver assembly
4. Dual pressure switch
5. Receiver bracket assembly



6. Discharge hose
7. Suction hose
8. Bracket
9. Clamp
10. Suction pipe



REMOVAL SERVICE POINT

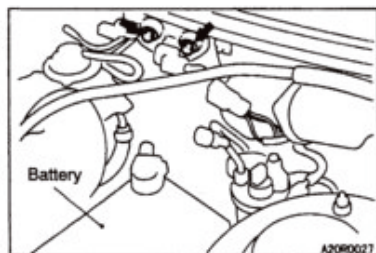
HOSE/PIPE DISCONNECTION

1. Plug the disconnected hose, the condenser, the evaporator and the compressor nipple not to let foreign matter get into them.

Caution

The compressor oil and receiver will absorb water vapour easily. Therefore, use a blank plug which isolates the air.

2. Remove the solenoid valve bracket mounting bolts and move aside the solenoid valve bracket to the engine. Then remove the suction hose.

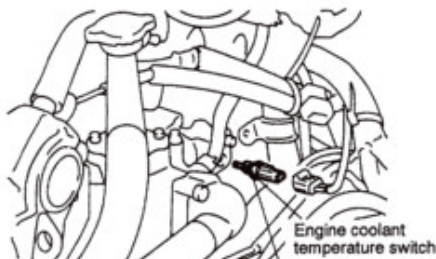


ENGINE COOLANT TEMPERATURE SWITCH

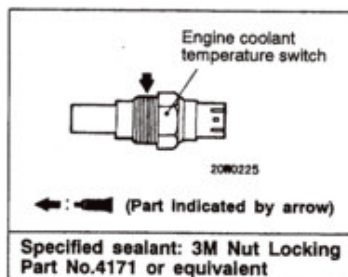
REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Engine Coolant Draining and Supplying
(Refer to GROUP 14 - On-vehicle Service.)

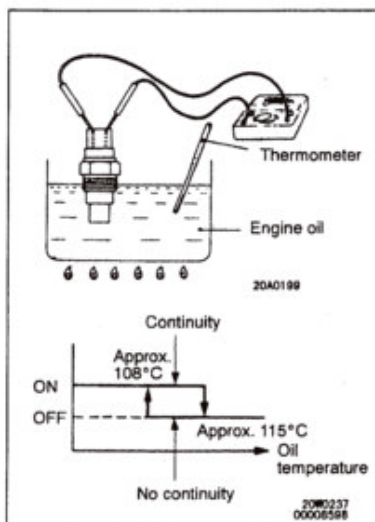


29 Nm

20R0009
00006367Engine coolant
temperature switch

20R0225

← (Part Indicated by arrow)

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

20A0199

20R0237
00006598

INSPECTION

ENGINE COOLANT TEMPERATURE SWITCH

1. Immerse the engine coolant temperature switch thread in the engine oil and warm the engine oil by a cooker, etc.

Caution

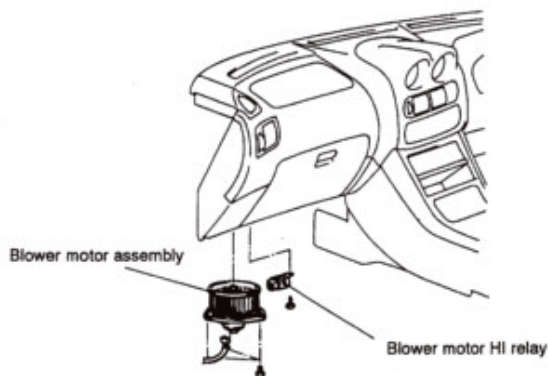
Do not heat the oil more than necessary.

2. Check the continuity between switch terminals.

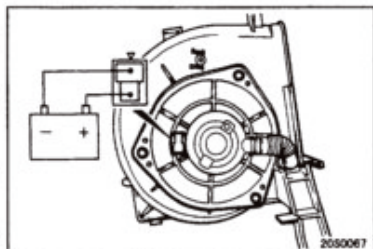
Standard value:

| Items | Oil temperature |
|---------------|---|
| Continuity | Less than approx. 115°C |
| No continuity | Approx. 115°C or more (When the switch is off, until the temperature drops up to approx. 108°C) |

BLOWER MOTOR ASSEMBLY AND BLOWER MOTOR HI RELAY REMOVAL AND INSTALLATION



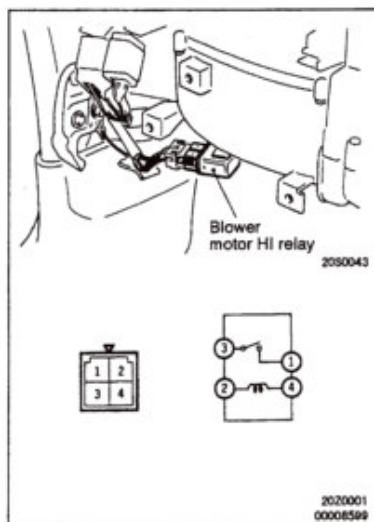
A20R0042



INSPECTION

BLOWER MOTOR CHECK

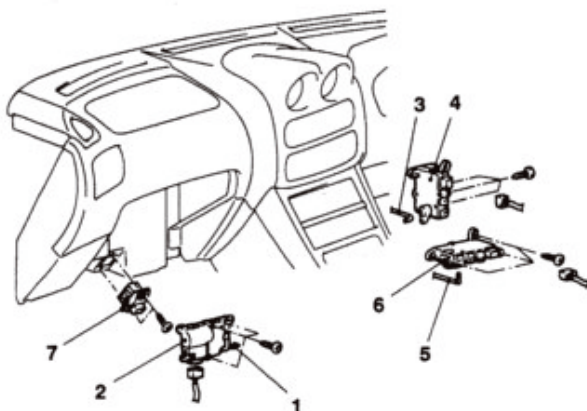
When battery voltage is applied between the terminals, check that the motor operates. Also, check that there is no abnormal noise.



BLOWER MOTOR HI RELAY CONTINUITY CHECK

| Battery voltage | Terminal No. | | | |
|----------------------|--------------|---|---|---|
| | 1 | 2 | 3 | 4 |
| Power is not applied | | ○ | — | ○ |
| Power is applied | ○ | ⊕ | ○ | ⊖ |

DAMPER MOTOR ASSEMBLY AND POWER TRANSISTOR REMOVAL AND INSTALLATION



A20R0043

Inside/outside air changeover damper motor assembly removal steps

- Glove box and glove box frame (Refer to GROUP 52A - Instrument Panel.)
- 1. Linkage connection
- 2. Inside/outside air changeover damper motor assembly

Outlet air changeover damper motor assembly removal steps

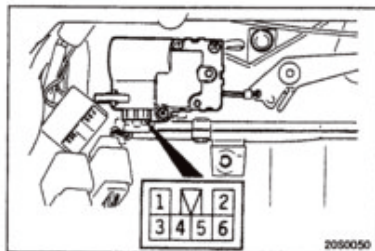
- Instrument lower panel (Refer to GROUP 52A - Instrument Panel.)
- 3. Linkage connection
- 4. Outlet air changeover damper motor assembly

Air mix damper motor assembly removal steps

- Front floor console, console side cover (Refer to GROUP 52A - Instrument Panel.)
- 5. Linkage connection
- 6. Air mix damper motor assembly

Power transistor removal steps

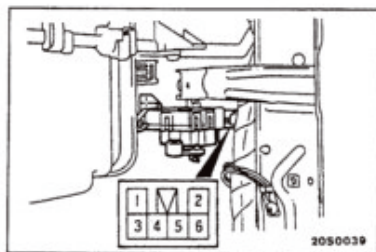
- Glove box and glove box frame (Refer to GROUP 52A - Instrument Panel.)
- 7. Power transistor

**INSPECTION****INSIDE/OUTSIDE CHANGEOVER DAMPER MOTOR CHECK**

| Terminal to be connected to the battery | | Lever operation |
|---|---|-----------------------------------|
| 1 | 3 | |
| ⊖ | ⊕ | Moves to the outside air position |
| ⊕ | ⊖ | Moves to the inside air position |

Caution

Cut off the battery voltage when the damper is moved to the inside air position or outside air position.

**AIR MIX DAMPER MOTOR CHECK
MOTOR CHECK**

| Terminal to be connected to the battery | | Lever operation |
|---|---|--------------------|
| 1 | 3 | |
| ⊕ | ⊖ | Moves to COOL side |
| ⊖ | ⊕ | Moves to HOT side |

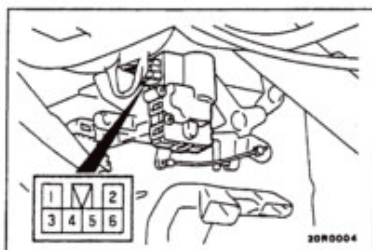
Caution

Cut off the battery voltage when the damper is moved to COOL or HOT position.

POTENTIOMETER CHECK

Measure the resistance between connector terminals No.2 and No.5 or between terminals No.5 and No.6 in the above step. Check that resistance values change within the standard value gradually.

Standard value: Approx. 0.18 – 4.82 kΩ



AIR OUTLET CHANGEOVER DAMPER MOTOR CHECK MOTOR CHECK

| Terminal to be connected to the battery | | Lever operation |
|---|---|-----------------------------|
| 1 | 3 | |
| + | - | Moves to DEFROSTER position |
| - | + | Moves to FACE position |

Caution

Cut off the battery voltage when the damper is moved to DEFROSTER or FACE position.

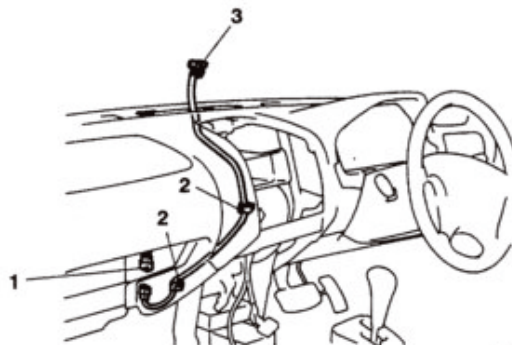
POTENTIOMETER CHECK

Measure the resistance between connector terminals No.2 and No.5 or between terminals No.5 and No.6 in the above step. Check that resistance values change within the standard value.

Standard value: Approx. 0.18 - 4.82 k Ω

PHOTO SENSOR**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

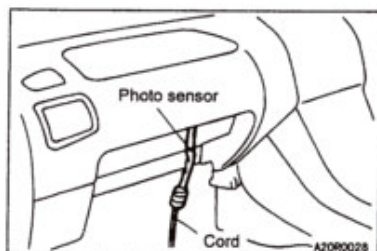
- Front Floor Console Removal and Installation (Refer to GROUP 52A.)
- Center Panel and Glove Box Removal and Installation (Refer to GROUP 52A - Instrument Panel.)



A20R0036

Removal step

1. Harness connector connection
2. Clip
3. Photo sensor



A20R0025

REMOVAL SERVICE POINT**◀▶ HARNESS CONNECTOR DISCONNECTION**

Tie a cord to the photo sensor connector, wrap the connector with an adhesive tape securely, and pull up the photo sensor toward the top of the instrument panel.

INSPECTION

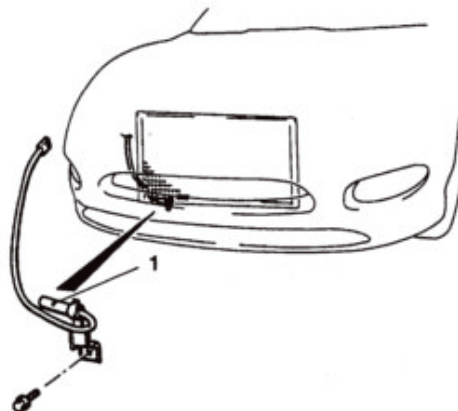
If the blower speed drops when the receiver section of the photo sensor is covered with your hand, then the photo sensor is normal. If the speed does not drop, replace the photo sensor.

OUTSIDE AIR TEMPERATURE SENSOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

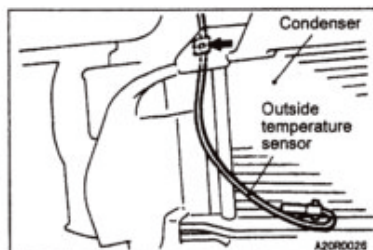
- Front Bumper Removal and Installation
(Refer to GROUP 51.)



A20R0016

Removal step

1. Outside temperature sensor



A20R0026

REMOVAL SERVICE POINT

◀A▶ OUTSIDE TEMPERATURE SENSOR REMOVAL

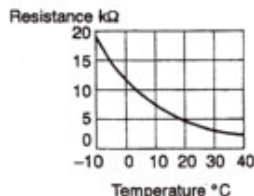
Remove the cable band of the outside temperature sensor from the condenser.

INSPECTION

When the resistance value between the sensor terminals is measured under two or more temperature conditions, the resistance value should be close to the values shown in the graph.

NOTE

The temperature conditions when testing should not exceed the range of the characteristic curve in the graph.



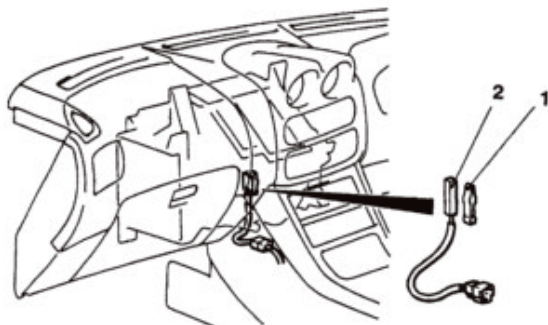
20550013

HEATER WATER TEMPERATURE SENSOR**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

- Front Floor Console, Console Side Cover Removal and Installation (Refer to GROUP 52A.)
- TCL-ECU <Vehicles with TCL> Removal and Installation (Refer to GROUP 13C.)
- Foot Duct Removal and Installation (Refer to P.55-56.)

Caution: SRS

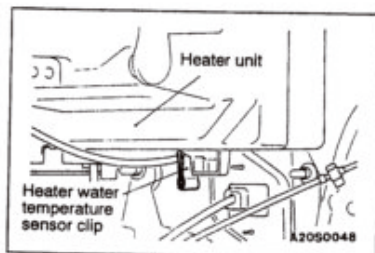
When removing and installing the TCL-ECU, do not let it bump against the SRS-ECU



A20R0030

Removal steps

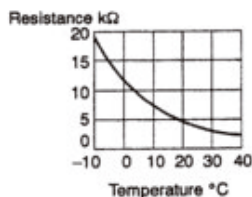
1. Heater water temperature sensor clip
2. Heater water temperature sensor

**REMOVAL SERVICE POINT****HEATER WATER TEMPERATURE SENSOR CLIP AND HEATER WATER TEMPERATURE SENSOR REMOVAL**

Pull out the heater water temperature sensor clip which is at the bottom of the heater unit, and then remove the heater water temperature sensor from the heater unit.

INSTALLATION SERVICE POINT**HEATER WATER TEMPERATURE SENSOR AND HEATER WATER TEMPERATURE SENSOR CLIP INSTALLATION**

Insert the heater water temperature sensor into its mounting hole at the bottom of the heater unit, and then fix it by inserting the heater water temperature sensor clip.



20 80013

INSPECTION

When the resistance value between the sensor terminals is measured under two or more temperature conditions, the resistance value should be close to the values shown in the graph.

NOTE

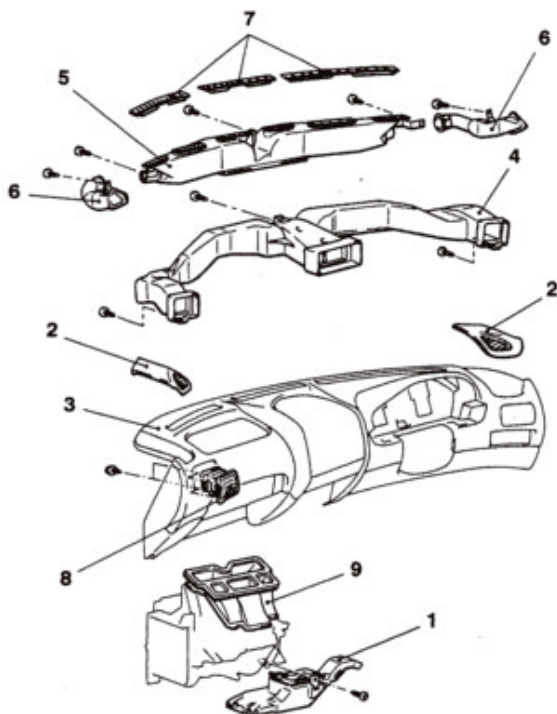
The temperature conditions when testing should not exceed the range of the characteristic curve in the graph.

VENTILATORS

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Floor Console Removal and Installation
(Refer to GROUP 52A.)



A20R0011

Removal steps

1. Foot duct
2. Tweeter garnish
3. Instrument panel
(Refer to GROUP 52A.)
4. Distribution duct assembly
5. Defroster nozzle assembly
6. Side defroster duct
7. Defroster garnish
8. Side air outlet assembly
9. Center ventilation duct assembly