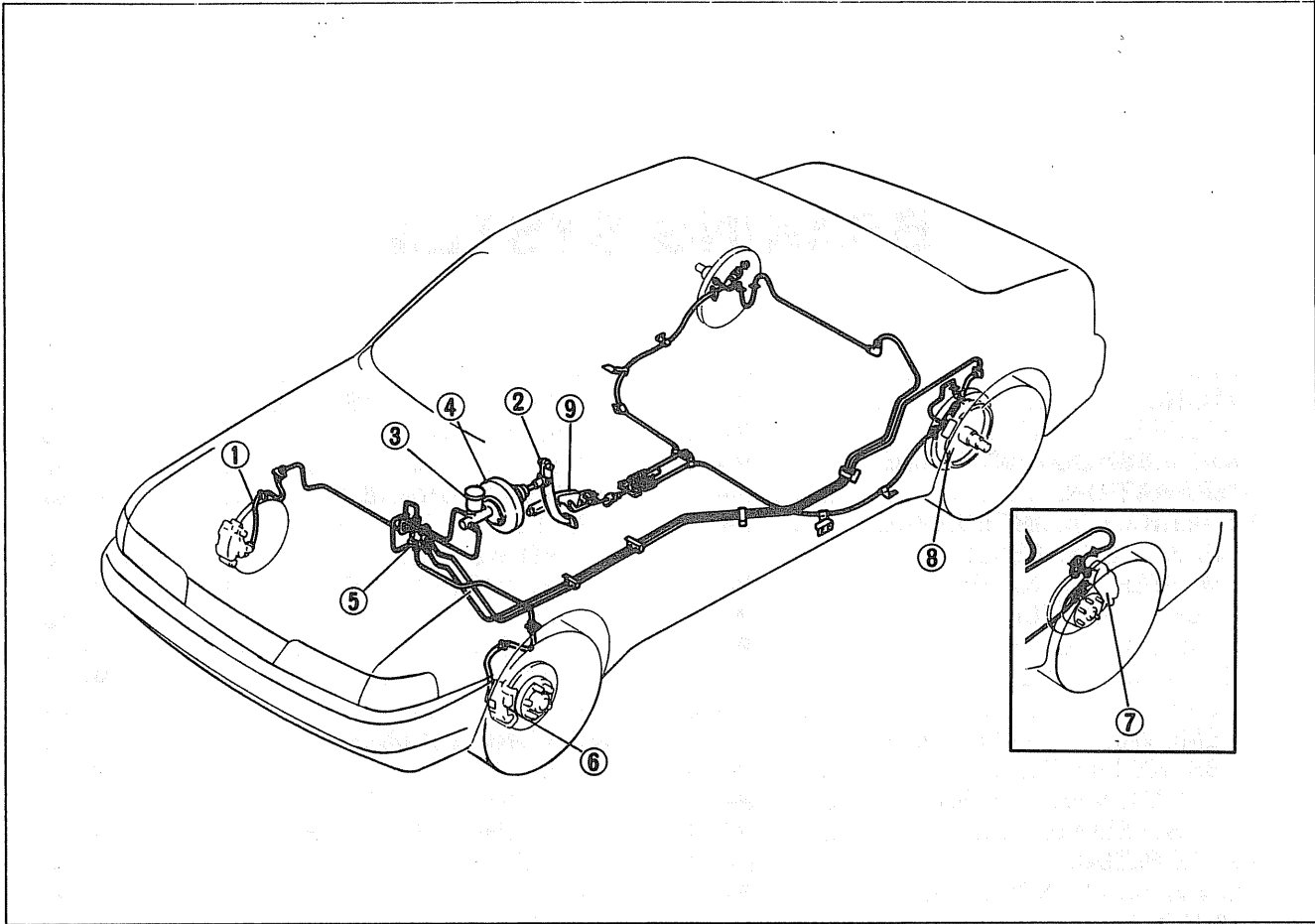


# BRAKING SYSTEM

<b>INDEX</b> .....	P- 2	<b>REMOVAL</b> .....	P-33
<b>OUTLINE</b> .....	P- 4	<b>DISASSEMBLY / ASSEMBLY</b> .....	P-34
<b>SPECIFICATIONS</b> .....	P- 4	<b>INSPECTION</b> .....	P-35
<b>TROUBLESHOOTING GUIDE</b> .....	P- 5	<b>INSTALLATION</b> .....	P-37
<b>PREPARATION</b> .....	P- 6	<b>REAR DISC BRAKE</b> .....	P-38
<b>ON-VEHICLE MAINTENANCE</b> .....	P- 7	<b>SIMPLE INSPECTION OF DISC</b>	
<b>BRAKE FLUID LEVEL IN</b>		<b>PAD WEAR</b> .....	P-38
<b>MASTER CYLINDER RESERVOIR</b> ...	P- 7	<b>REPLACEMENT OF DISC PAD</b> .....	P-38
<b>BRAKE HYDRAULIC LINE</b> .....	P- 7	<b>REMOVAL</b> .....	P-40
<b>STRUCTURAL VIEW</b> .....	P- 7	<b>DISASSEMBLY / ASSEMBLY</b> .....	P-41
<b>ON-VEHICLE INSPECTION OF</b>		<b>INSPECTION</b> .....	P-44
<b>BRAKE LINES</b> .....	P- 8	<b>INSTALLATION</b> .....	P-45
<b>REMOVAL / INSTALLATION OF</b>		<b>REAR DRUM BRAKE</b> .....	P-46
<b>BRAKE LINES</b> .....	P- 9	<b>REMOVAL</b> .....	P-46
<b>REPLACEMENT OF BRAKE FLUID</b> ..	P- 9	<b>DISASSEMBLY / ASSEMBLY</b>	
<b>AIR BLEEDING</b> .....	P- 9	<b>OF WHEEL CYLINDER</b> .....	P-49
<b>BRAKE PEDAL</b> .....	P-10	<b>INSPECTION</b> .....	P-50
<b>ON-VEHICLE INSPECTION</b> .....	P-10	<b>INSTALLATION</b> .....	P-51
<b>REMOVAL</b> .....	P-12	<b>PARKING BRAKE</b> .....	P-54
<b>INSPECTION</b> .....	P-12	<b>ON-VEHICLE MAINTENANCE</b> .....	P-54
<b>INSTALLATION</b> .....	P-13	<b>REMOVAL / INSTALLATION</b>	
<b>MASTER CYLINDER</b> .....	P-14	<b>OF PARKING BRAKE LEVER</b> .....	P-55
<b>REMOVAL</b> .....	P-14	<b>REMOVAL OF PARKING BRAKE</b>	
<b>DISASSEMBLY / ASSEMBLY</b> .....	P-15	<b>CABLE</b> .....	P-57
<b>INSPECTION</b> .....	P-17	<b>INSTALLATION OF PARKING</b>	
<b>INSTALLATION</b> .....	P-18	<b>BRAKE CABLE</b> .....	P-58
<b>POWER BRAKE UNIT</b> .....	P-22	<b>ANTI-LOCK BRAKE SYSTEM</b>	
<b>FUNCTION CHECK</b> .....	P-22	<b>(ABS)</b> .....	P-60
<b>INSPECTION OF CHECK VALVE</b> .....	P-23	<b>PREPARATION</b> .....	P-60
<b>REMOVAL</b> .....	P-24	<b>OUTLINE</b> .....	P-61
<b>DISASSEMBLY / ASSEMBLY</b> .....	P-25	<b>WIRING DIAGRAM</b> .....	P-62
<b>INSPECTION</b> .....	P-27	<b>TROUBLESHOOTING</b> .....	P-63
<b>INSTALLATION</b> .....	P-28	<b>DIAGNOSTIC SYSTEM INSPECTION</b> ..	P-64
<b>PROPORTIONING/DUAL</b>		<b>MEMORY CANCEL</b> .....	P-70
<b>PROPORTIONING VALVE</b> .....	P-29	<b>ABS COMPONENTS INSPECTION</b> .....	P-71
<b>FUNCTION CHECK</b> .....	P-29	<b>CONTROL UNIT CIRCUIT</b> .....	P-75
<b>REMOVAL / INSTALLATION</b> .....	P-30	<b>ABS WARNING LAMP</b> .....	P-77
<b>FRONT DISC BRAKE</b> .....	P-31	<b>HYDRAULIC UNIT FLUID</b> .....	P-79
<b>SIMPLE INSPECTION OF</b>		<b>HYDRAULIC UNIT</b> .....	P-80
<b>DISC PAD WEAR</b> .....	P-31	<b>RELAY BOX</b> .....	P-81
<b>REPLACEMENT OF DISC PAD</b> .....	P-31	<b>REMOVAL/INSTALLATION</b> .....	P-83

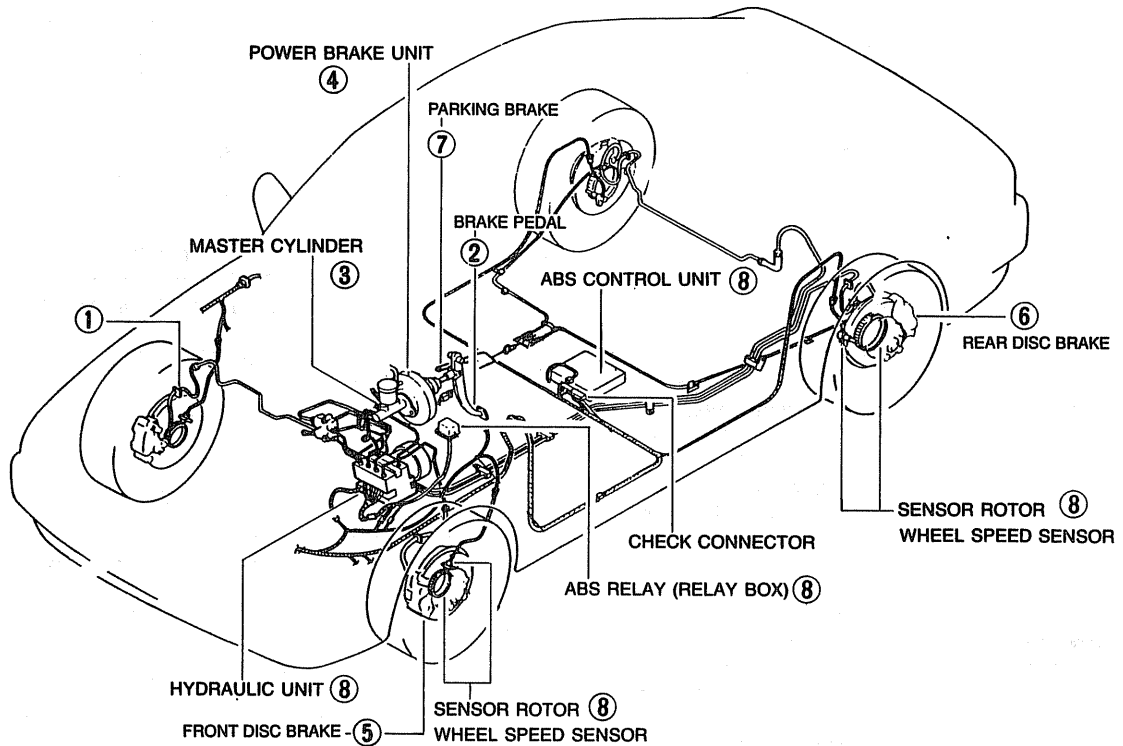
## INDEX



06U0PX-002

- |  |  |   |
|--|--|---|
| <p>1. Brake hydraulic line<br/>On-vehicle<br/>inspection..... page P- 8<br/>Removal /<br/>Installation ..... page P- 9</p> <p>2. Brake pedal<br/>On-vehicle<br/>inspection..... page P-10<br/>Removal /<br/>Inspection..... page P-12<br/>Installation ..... page P-13</p> <p>3. Master Cylinder<br/>Removal..... page P-14<br/>Disassembly /<br/>Assembly ..... page P-15<br/>Inspection..... page P-17<br/>Installation ..... page P-18</p> <p>4. Power brake unit<br/>Removal..... page P-24<br/>Disassembly /<br/>Assembly ..... page P-25<br/>Inspection..... page P-27<br/>Installation ..... page P-28</p> <p>5. Dual proportioning valve<br/>Function check page P-29<br/>Removal /<br/>Installation ..... page P-30</p> | <p>6. Front disc brake<br/>Simple Inspection of<br/>disc pad wear page P-31<br/>Replacement of<br/>disc pad..... page P-31<br/>Removal..... page P-33<br/>Disassembly /<br/>Assembly ..... page P-34<br/>Inspection..... page P-35<br/>Installation ..... page P-37</p> <p>7. Rear disc brake<br/>Simple Inspection of<br/>disc pad wear page P-38<br/>Replacement of<br/>disc pad..... page P-38<br/>Removal..... page P-38<br/>Disassembly /<br/>Assembly ..... page P-41<br/>Inspection..... page P-44<br/>Installation ..... page P-45</p> | <p>8. Rear drum brake<br/>Removal..... page P-46<br/>Disassembly /<br/>Assembly of wheel<br/>cylinder ..... page P-49<br/>Inspection..... page P-50<br/>Installation ..... page P-51</p> <p>9. Parking brake<br/>On-vehicle<br/>maintenance... page P-54<br/>Removal / Installation<br/>of parking<br/>brake lever ... page P-55<br/>Removal of parking<br/>brake cable.... page P-57<br/>Installation of parking<br/>brake cable.... page P-58</p> |
|--|--|---|

ANTI-LOCK BRAKE SYSTEM (ABS)



16U0PX-034

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|---|--|--|
| <p>1. Brake hydraulic line<br/>On-vehicle inspection..... page P- 8<br/>Removal / Installation ..... page P- 9</p> <p>2. Brake pedal<br/>On-vehicle inspection..... page P-10<br/>Removal / Inspection..... page P-12<br/>Installation ..... page P-13</p> <p>3. Master cylinder<br/>Removal..... page P-14<br/>Disassembly / Assembly ..... page P-15<br/>Inspection..... page P-17<br/>Installation ..... page P-18</p> <p>4. Power brake unit<br/>Removal..... page P-24<br/>Disassembly / Assembly ..... page P-25<br/>Inspection..... page P-27<br/>Installation ..... page P-28</p> | <p>5. Front disc brake<br/>Simple Inspection of disc pad wear page P-31<br/>Replacement of disc pad..... page P-31<br/>Removal..... page P-33<br/>Disassembly / Assembly ..... page P-34<br/>Inspection..... page P-35<br/>Installation ..... page P-37</p> <p>6. Rear disc brake<br/>Simple Inspection of disc pad wear page P-38<br/>Replacement of disc pad..... page P-38<br/>Removal..... page P-40<br/>Disassembly / Assembly ..... page P-41<br/>Inspection..... page P-44<br/>Installation ..... page P-45</p> | <p>7. Parking brake<br/>On-vehicle maintenance... page P-54<br/>Removal / Installation of parking brake lever... page P-55<br/>Removal of parking brake cable.... page P-57<br/>Installation of parking brake cable.... page P-58</p> <p>8. Anti-lock brake system (ABS)<br/>Wiring diagram page P-62<br/>Trouble-shooting ..... page P-63<br/>Diagnostic System<br/>Inspection . . . . page P-64<br/>Memory cancel page P-70<br/>Wheel speed sensor ..... page P-73<br/>Sensor rotor ..... page P-74<br/>Control unit circuit ..... page P-75<br/>Hydraulic unit fluid ..... page P-79<br/>Hydraulic unit... page P-80<br/>Relay box..... page P-81</p> |
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## OUTLINE

## SPECIFICATIONS

Item		Specification
Brake pedal	Type	Suspended
	Pedal lever ratio	4.2
	Max. stroke	mm (in) 136.5 (5.37)
Master cylinder	Type	Tandem (with level sensor)
	Bore diameter	mm (in) 22.22 (0.875)
Front disc brake	Type	Mounting support, Ventilated disc
	Cylinder bore	mm (in) 53.97 (2.125)
	Pad dimensions (area x thickness) mm <sup>2</sup> x mm (in <sup>2</sup> x in)	4,800 x 10.0 (7.44 x 0.39)
	Disc plate dimensions (outer diameter x thickness)	mm (in) 264 x 24 (10.39 x 0.94)
Rear disc brake (Turbo model)	Type	Mounting support, Solid disc
	Cylinder bore	mm (in) 30.2 (1.19)
	Pad dimensions (area x thickness) mm <sup>2</sup> x mm (in <sup>2</sup> x in)	2,900 x 8.0 (4.5 x 0.31)
	Disc plate dimensions (outer diameter x thickness)	mm (in) 259 x 10.0 (10.2 x 0.39)
Rear drum brake (Non-Turbo model)	Type	Leading-trailing
	Cylinder bore	mm (in) 17.46 (0.687)
	Lining dimensions (width x length x thickness)	mm (in) 30 x 219.3 x 4.5 (1.18 x 8.63 x 0.18)
	Drum inner diameter	mm (in) 228.6 (9.0)
	Shoe clearance adjustment	Automatic adjuster
Power brake unit	Type	Vacuum multiplier
	Diameter	mm (in) 238 (9.37)
Braking force control device		Dual proportioning valve or ABS (if equipped)
Brake fluid		FMVSS 116 : DOT 3, SAE : J1703
Parking brake	Type	Center lever (Mechanical, two rear brakes)

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## TROUBLESHOOTING GUIDE


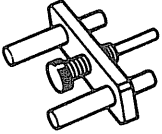
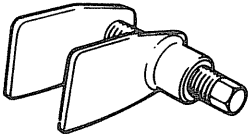
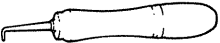
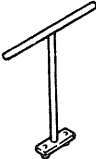
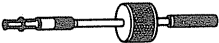
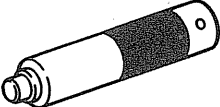
The below table covers the normal braking system. Refer to page P-60 for ABS system.

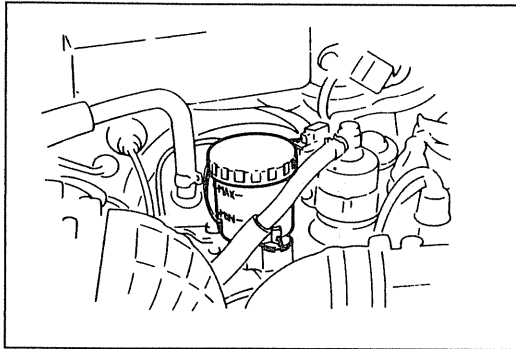
Problem	Possible cause	Remedy	Page
<b>Poor braking</b>	Leakage of brake fluid Air in system Worn pad or lining Brake fluid, grease, oil, or water on pad or lining Hardening of pad or lining surface or poor contact Malfunction of disc brake piston Malfunction of master cylinder or wheel cylinder Malfunction of power brake unit Malfunction of check valve (vacuum hose) Damaged vacuum hose Deterioration of flexible hose Malfunction of dual proportioning valve	Repair Air bleed Replace Clean or replace Grind or replace Replace Repair or replace Repair or replace Repair or replace Replace Replace Replace	— P- 9 P-31, 38, 46 P-31, 38, 46 P-31, 38, 46 P-34, 41 P-14, 47 P-24 P-24 P-24 — P-30
<b>Brakes pull to one side</b>	Worn pad or lining Brake fluid, grease, oil, or water on pad or lining Hardening of pad or lining surface or poor contact Abnormal wear or distortion of disc, drum, pad, or lining Malfunction of automatic adjuster Looseness of backing plate mounting bolts Malfunction of wheel cylinder Improper adjustment of wheel bearing preload or wear Improper adjustment of wheel alignment Unequal tire air pressure	Replace Clean or replace Grind or replace Repair or replace Repair or replace Tighten Repair or replace Refer to Section M Refer to Section R Refer to Section Q	P-31, 38, 46 P-31, 38, 46 P-31, 38, 46 P-31, 38, 46 P-48 P-51 P-47 — — —
<b>Brakes do not release</b>	No brake pedal play Improper adjustment of push rod clearance Clogged master cylinder return port Shoe not returning properly Wheel cylinder not returning properly Improper return due to malfunction of piston seal of disc brake Excessive runout of disc plate Improper return of parking brake cable or improper adjustment Improper adjustment of wheel bearing preload	Adjust Adjust Clean Adjust Clean or replace Replace Replace Repair or adjust Refer to Section M	P-11 P-18 — — P-47 P-34, 41 — P-54 —
<b>Pedal goes too far (too much pedal stroke)</b>	Air in system due to insufficient brake fluid Improper adjustment of pedal play Worn pad or lining Air in system	Add fluid and bleed air Adjust Replace Air bleed	P- 9 P-11 P-31, 38, 46 P- 9
<b>Abnormal noise or vibration during braking</b>	Worn pad or lining Deterioration of pad or lining Brakes do not release Foreign material or scratches on disc plate or drum contact surface Looseness of backing plate or caliper mounting bolts Damage or deviation of disc or drum contact surface Poor contact of pad or lining Insufficient grease on sliding parts	Replace Grind or replace Repair Clean Tighten Replace Repair or replace Apply grease	P-31, 38, 46 P-31, 38, 46 — — P-51 P-46 P-31, 38, 46 —
<b>Parking brake does not hold well</b>	Excessive lever stroke Brake cable stuck or damaged Brake fluid or oil on pad or lining Hardening of pad or lining surface or poor contact	Adjust Repair or replace Clean or replace Grind or replace	P-54 P-57 P-31, 38, 46 P-31, 38, 46

16U0PX-002

### PREPARATION

#### SST

<p>49 0259 770B</p> <p>Wrench, flare nut</p> 	<p>For removal and installation brake pipes</p>	<p>49 F043 001</p> <p>Adjust gauge</p> 	<p>For adjustment of push rod clearance</p>
<p>49 0221 600C</p> <p>Expand tool, disc brake</p> 	<p>For installation of disc pads</p>	<p>49 0208 701A</p> <p>Boot air out tool</p> 	<p>For removal of piston seal</p>
<p>49 FA18 602</p> <p>Wrench, disc brake piston</p> 	<p>For removal and installation of disc caliper piston</p>	<p>49 1285 071</p> <p>Puller, bearing</p> 	<p>For removal of caliper needle bearing</p>
<p>49 B043 002</p> <p>Installer, bearing</p> 	<p>For installation of caliper needle bearing</p>	06U0PX-006	



96U11X-005

**ON-VEHICLE MAINTENANCE**

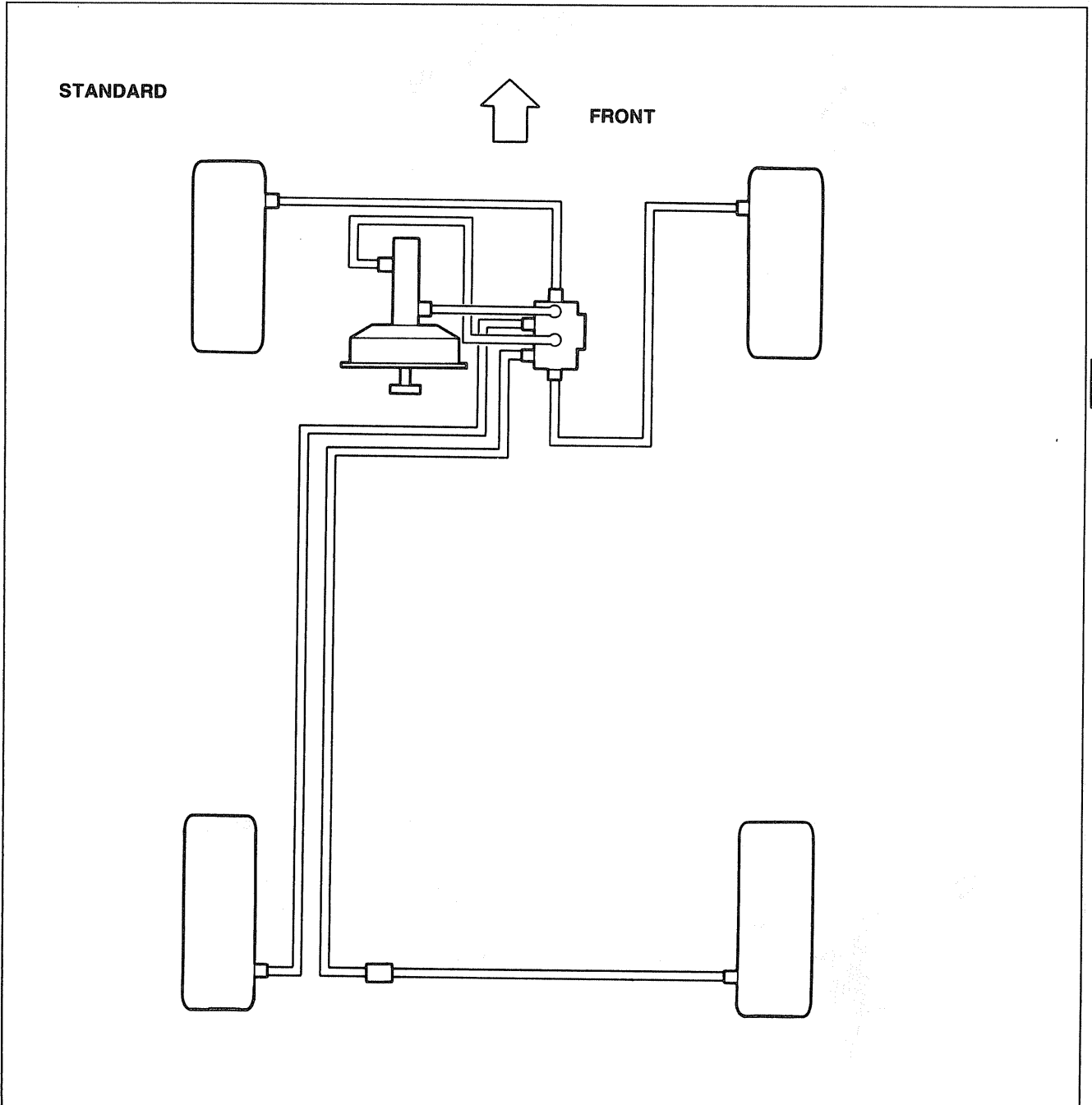
**BRAKE FLUID LEVEL IN MASTER CYLINDER RESERVOIR**

Check the fluid level in the reservoir. It should be between the MAX and MIN lines on the reservoir. If the fluid level is extremely low, check the brake system for leaks.

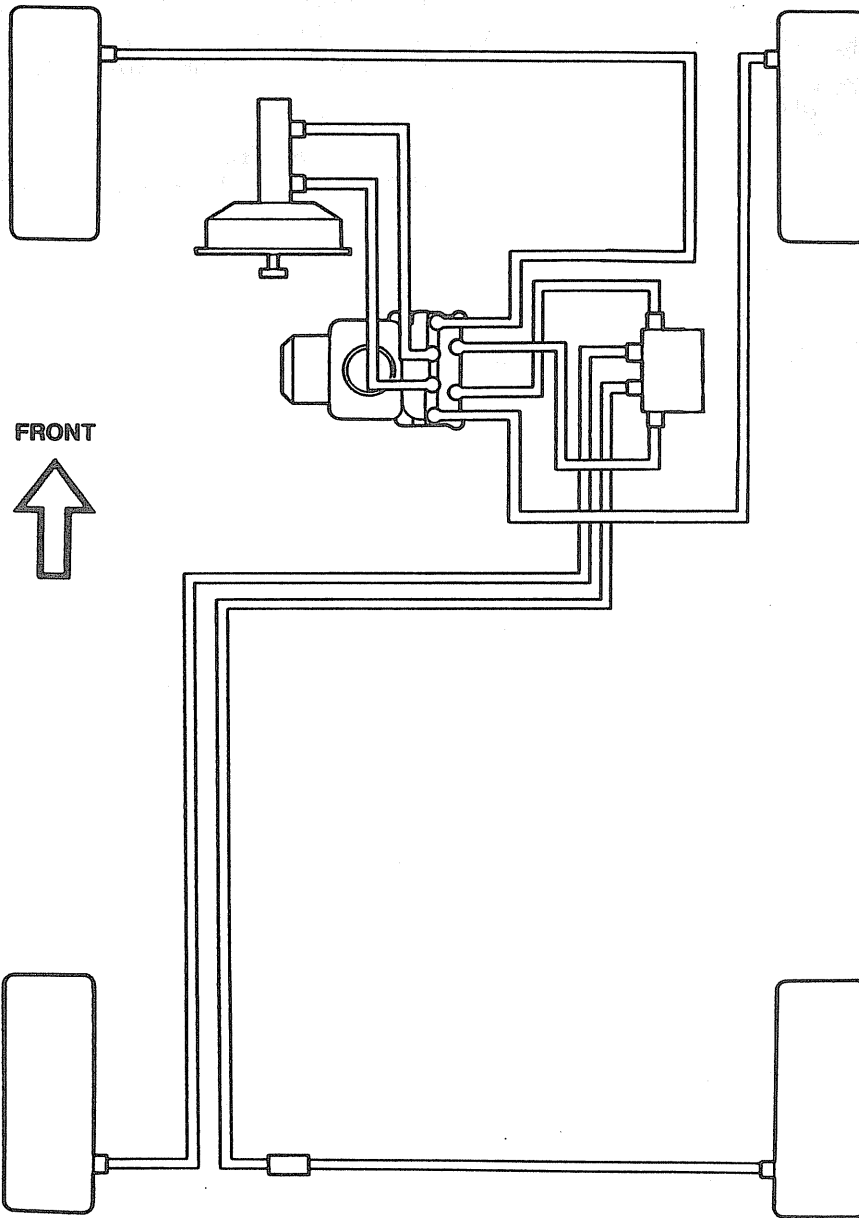
**Fluid specification:**  
**FMVSS 116: DOT-3, SAE: J1703**

**BRAKE HYDRAULIC LINE**

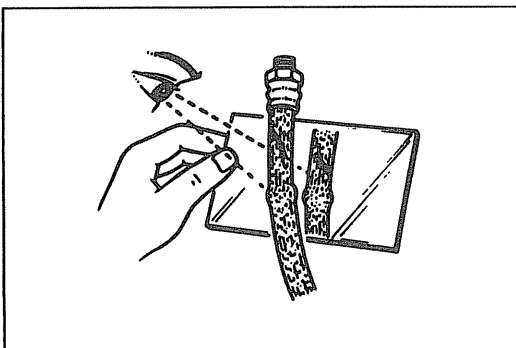
**STRUCTURAL VIEW**



ABS



86U11X-008



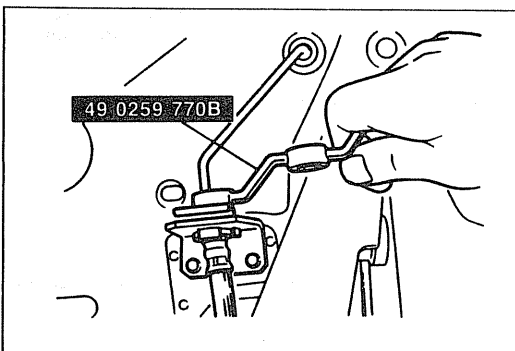
86U11X-009

**ON-VEHICLE INSPECTION OF BRAKE LINES**

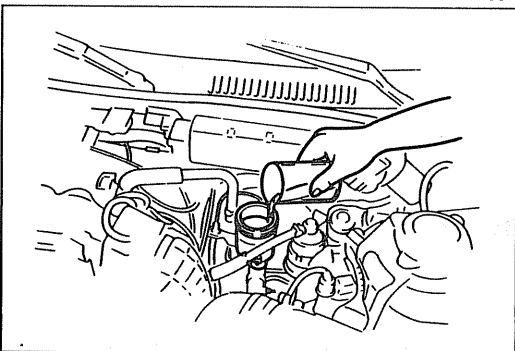
Check the following and replace or repair any faulty parts.

1. Cracks, damage, corrosion of brake hose
2. Damage to brake hose threads
3. Scars, cracks, and swelling of flexible hose
4. Fluid leakage of all lines





06U0PX-007



06U0PX-008

**REMOVAL / INSTALLATION OF BRAKE LINES**

1. Loosen or tighten the flare nut with the **SST**.

**Flare nut tightening torque:**

**13—22 N·m (1.3—2.2 m·kg, 9.4—16 ft·lb)**

2. When connecting the flexible hose, do not overtighten or twist it.
3. After installation:
  - (1) Check that the hose does not contact other parts when the vehicle bounces, or when the steering wheel is turned all the way to the right or left.
  - (2) Bleed the air from the brake system. (Refer to page P-9.)

**REPLACEMENT OF BRAKE FLUID**

1. Remove the brake fluid from the reservoir with a suction pump.
2. Fill the reservoir with new, specified brake fluid.
3. Pump out the old brake fluid by loosening the bleeder screws (one-by-one) and pumping the brake pedal. (Refer to page P-10 for details.)

**AIR BLEEDING**

**Air Bleeding Locations**

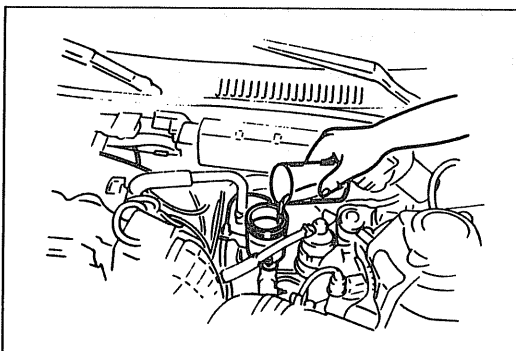
When the following parts are removed, air bleeding is necessary after installation.

Removed part			Air bleeding location			
			Front		Rear	
			Right side	Left side	Right side	Left side
Master cylinder			*	*	*	*
Wheel cylinder or caliper	Front	Right side	*	—	—	—
		Left side	—	*	—	—
	Rear disc	Right side	—	—	*	—
		Left side	—	—	—	*
	Rear drum	Right side	—	—	*	—
		Left side	—	—	—	*
Dual proportioning valve			*	*	*	*
Hydraulic unit (ABS)			*	*	*	*

ABS: Anti-lock Brake System

96U11X-008

\*: Indicates where air bleeding is necessary



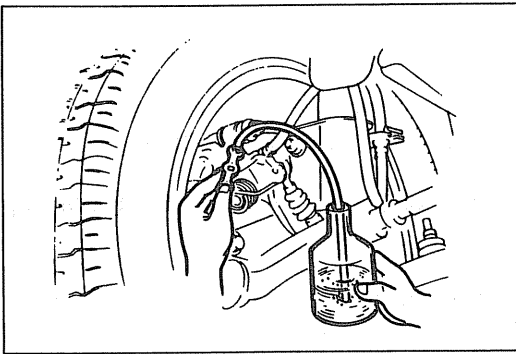
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**Procedure**

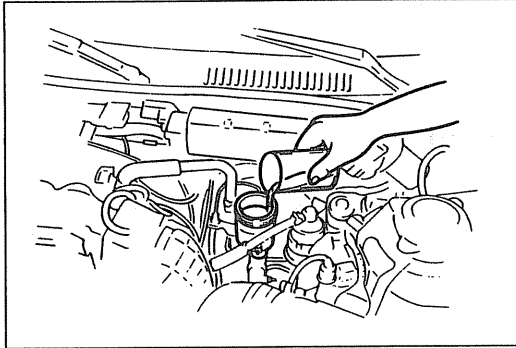
1. Jack up the vehicle and support it with safety stands.
2. Fill the reservoir with brake fluid. Be sure that it is at least half full at all times during the air bleeding process.

**Caution**

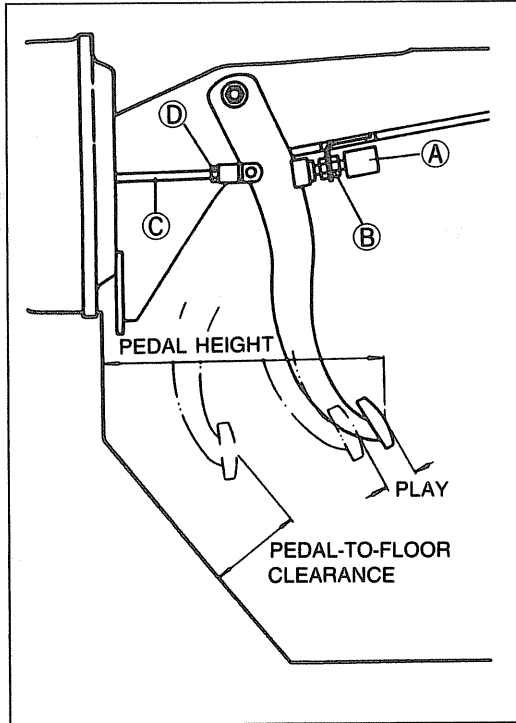
- Be careful not to spill brake fluid onto a painted surface.
- Use only the specified brake fluid. Do not mix it with any other type.



96U11X-009



86U11X-015



06U0PX-036

3. Remove the bleeder cap; then connect one end of a transparent vinyl tube to the bleeder screw and place the other end in a clear receptacle.
4. Have an assistant depress the brake pedal a few times, and then hold it in the depressed position.
5. Loosen the bleeder screw, drain out the fluid, and retighten the bleeder.

**Note**

- The two people should stay in voice contact with each other.
- Be sure the pedal remains depressed until the bleeder is tightened.

6. Repeat steps 4 and 5 until no air is discharged.
7. Tighten the bleeder screw, and check that there is no fluid leakage.

**Bleeder screw tightening torque:**

6—9 N·m (60—90 cm·kg, 52—78 in·lb)

**Caution**

- Be sure to clean away any spilled fluid with rags.

8. Add brake fluid to the reservoir up to the specified level.

**BRAKE PEDAL****ON-VEHICLE INSPECTION****Pedal Height Inspection**

Check that the distance from the center of the upper surface of the pedal pad to the firewall is as specified.

**Pedal height: 171—181mm (6.73—7.13 in)  
(With carpet)**

**Adjustment**

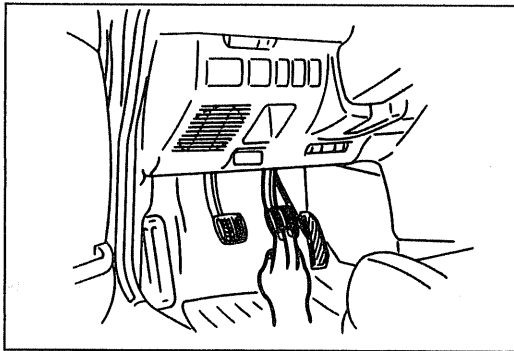
1. Disconnect the stoplight switch connector.
2. Loosen locknut B and turn switch A until it does not contact the pedal.
3. Loosen locknut D and turn rod C to adjust the height.
4. Adjust the pedal free play and tighten locknut D.
5. Turn the stoplight switch until it contacts the pedal; then turn an additional 1/2 turn. Tighten locknut B.

**Locknut B tightening torque:**

14—18 N·m (1.4—1.8 m·kg, 10—13 ft·lb)

**Locknut D tightening torque:**

24—34 N·m (2.4—3.5 m·kg, 17—25 ft·lb)

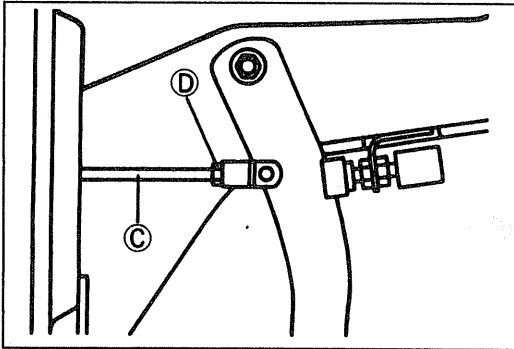


86U11X-017

### Pedal Play Inspection

1. Depress the pedal a few times to eliminate the vacuum in the system.
2. Depress the pedal again by hand with a force of 20 N (2 kg, 4.4 lb), and check the free play. (Until the valve plunger contacts the stopper plate = until the power piston begins to move.)

**Pedal play: 4—7mm (0.16—0.28 in)**



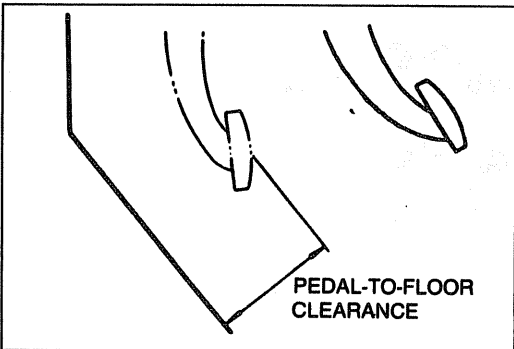
96U11X-010

### Adjustment

Loosen locknut D of operating rod C; then turn the rod to adjust the free play.

### Locknut D tightening torque:

**24—34 N·m (2.4—3.5 m·kg, 17—25 ft·lb)**



96U11X-011

### Pedal-to-Floor Clearance Inspection

Start the engine and check that the distance from the floor panel to the center of the upper surface of the pedal pad is as specified when the pedal is depressed with a force of 589 N (60 kg, 132 lb).

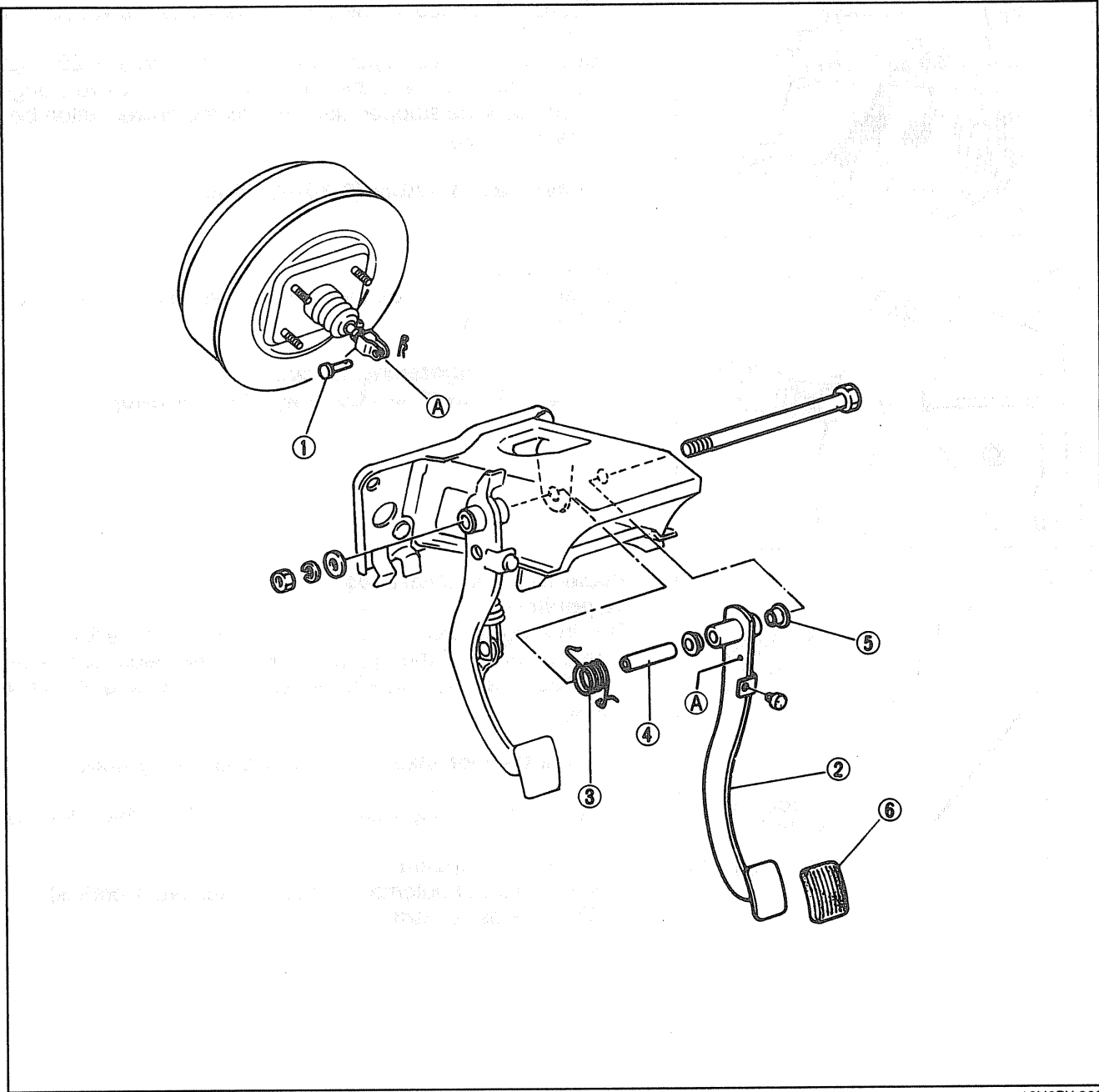
**Pedal-to-floor clearance: 95mm (3.74 in) min.**

If the distance is less than specified, check for the following problems.

1. Air in brake system
2. Malfunction of automatic adjuster (rear drum brakes)
3. Worn shoes or pads

**REMOVAL**

Remove in the order shown in the figure.

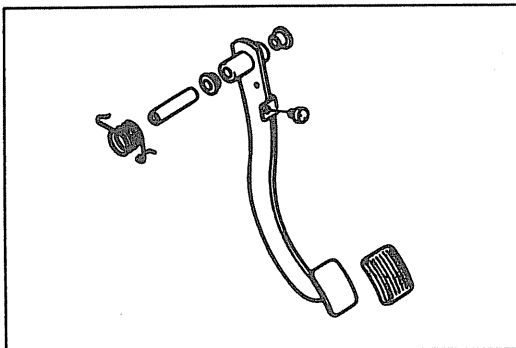


16U0PX-003

- 1. Clevis pin
- 2. Brake pedal

- 3. Return spring
- 4. Guide pipe

- 5. Bushing
- 6. Brake pad



**INSPECTION**

Check the following and replace or repair any faulty parts.

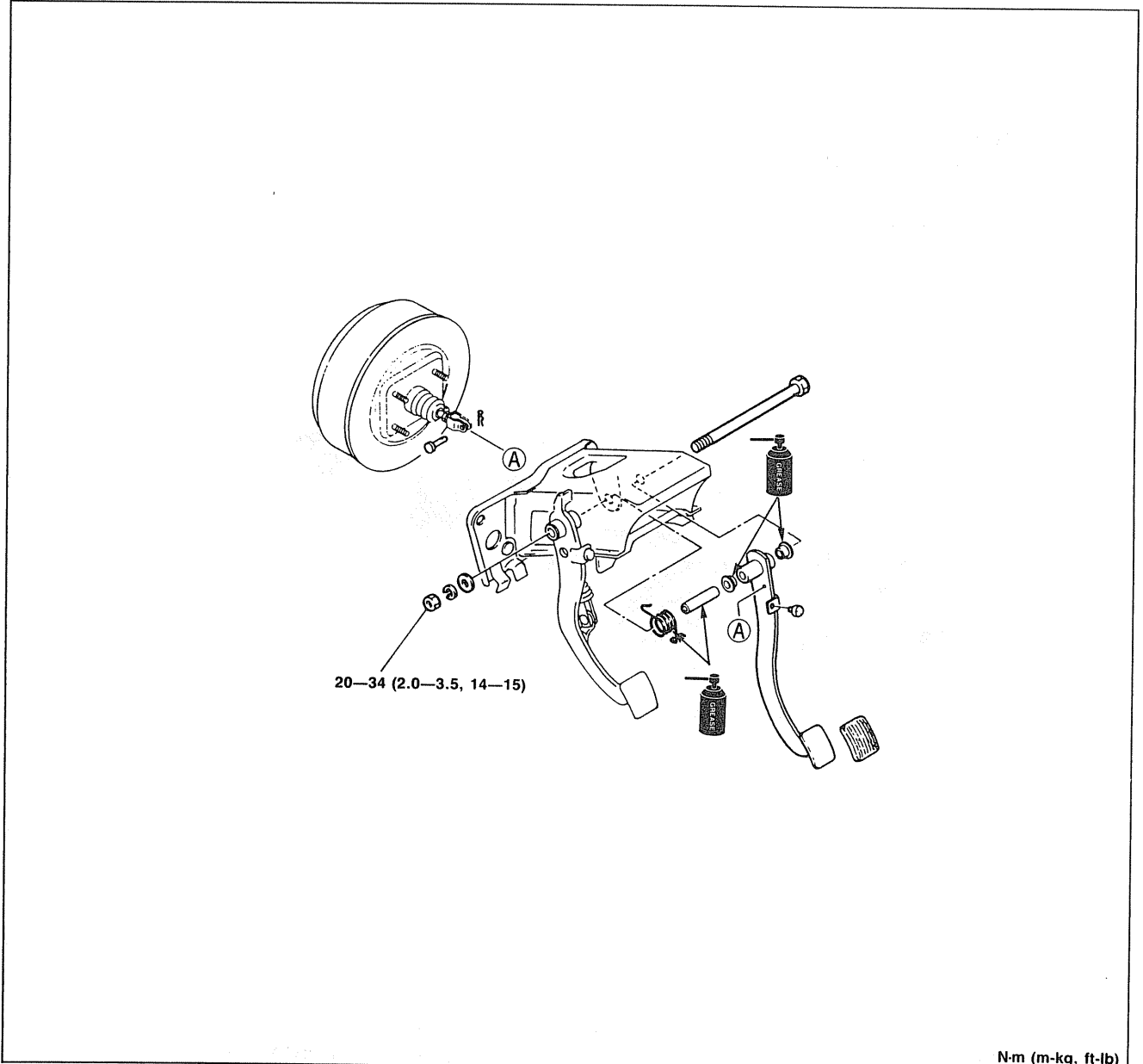
- 1. Pedal pad for wear or damage
- 2. Bushing for wear
- 3. Bolt for bending
- 4. Pedal for bending
- 5. Return spring for weakness or damage

86U11X-021

## INSTALLATION

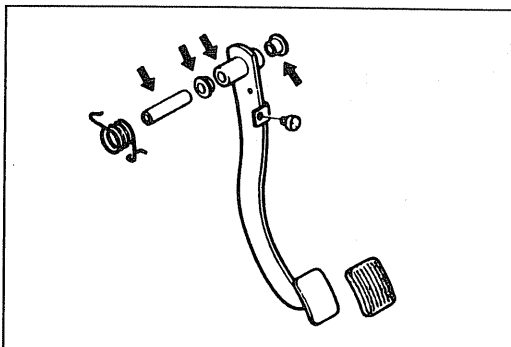
1. Install in the reverse order of removal, referring to **Installation Note**.
2. Tighten all nuts and bolts, referring to the torque specifications.
3. After installation:  
Check and adjust the pedal height and play. (Refer to pages P-10, 11.)

## Torque Specifications



N-m (m-kg, ft-lb)

16UOPX-004



86U11X-023

### Installation Note

#### Application of grease

- Apply grease to the following parts:
- (1) Inner and outer surfaces of bushing
  - (2) Outer surface of guide pipe
  - (3) Contact surface of clevis pin and spring

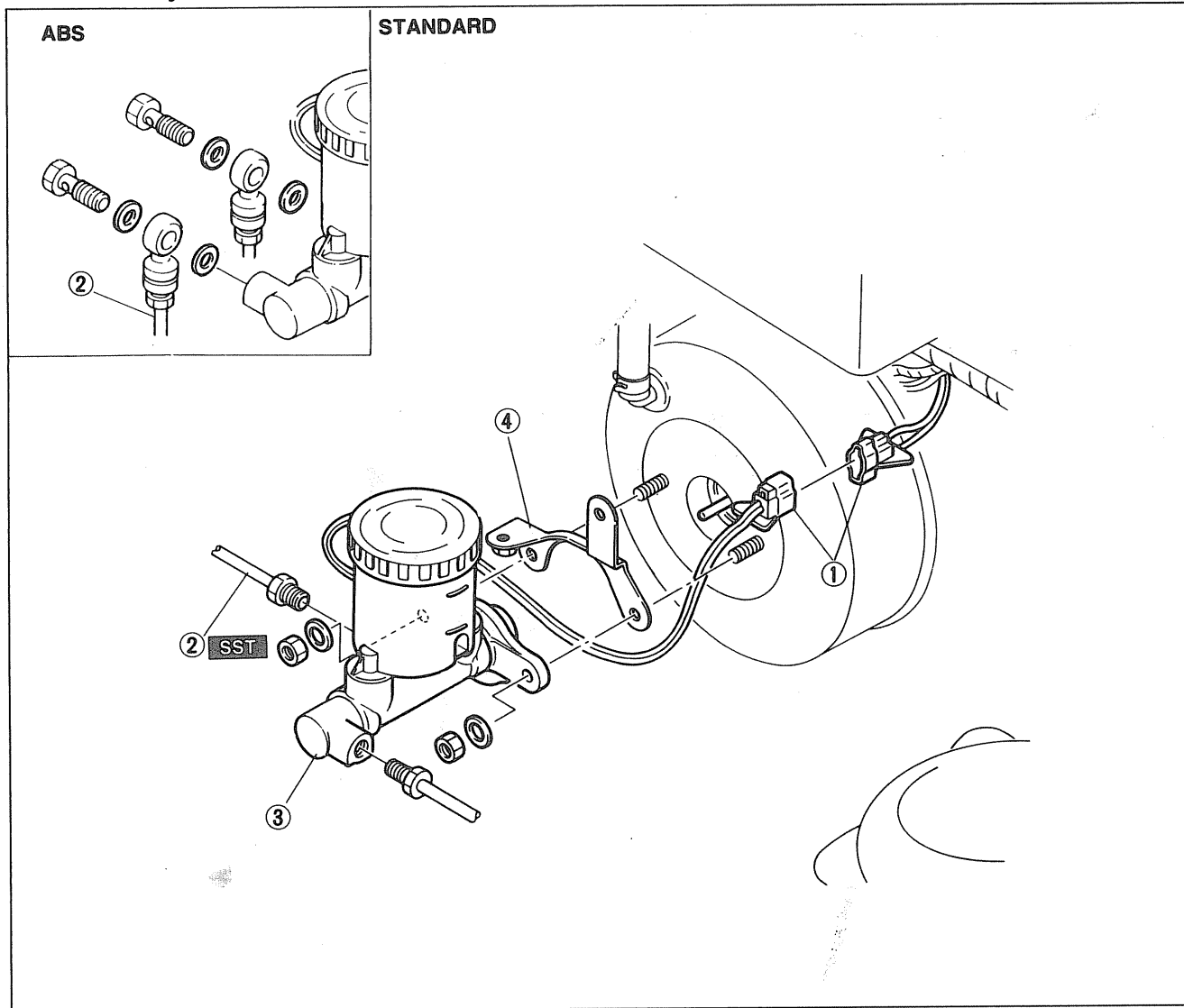
MASTER CYLINDER

REMOVAL

Remove in the order shown in the figure, referring to **Removal Note**.

Caution

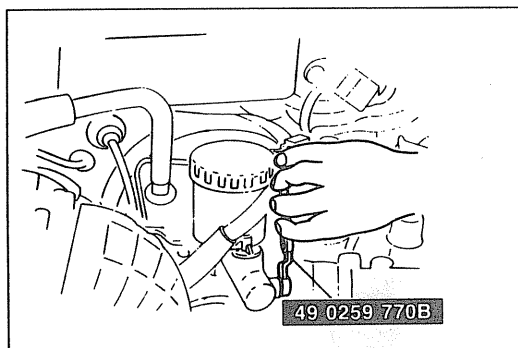
- Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.



16U0PX-005

- 1. Fluid level sensor connector
- 2. Brake pipe

- 3. Master cylinder
- 4. Clutch pipe holder (MTX, ABS)



Removal Note

**Brake pipe (Standard)**

1. Place rags under the master cylinder to prevent brake fluid from dripping on painted surfaces.
2. Disconnect the brake pipe from the master cylinder with the **SST**.

## DISASSEMBLY / ASSEMBLY

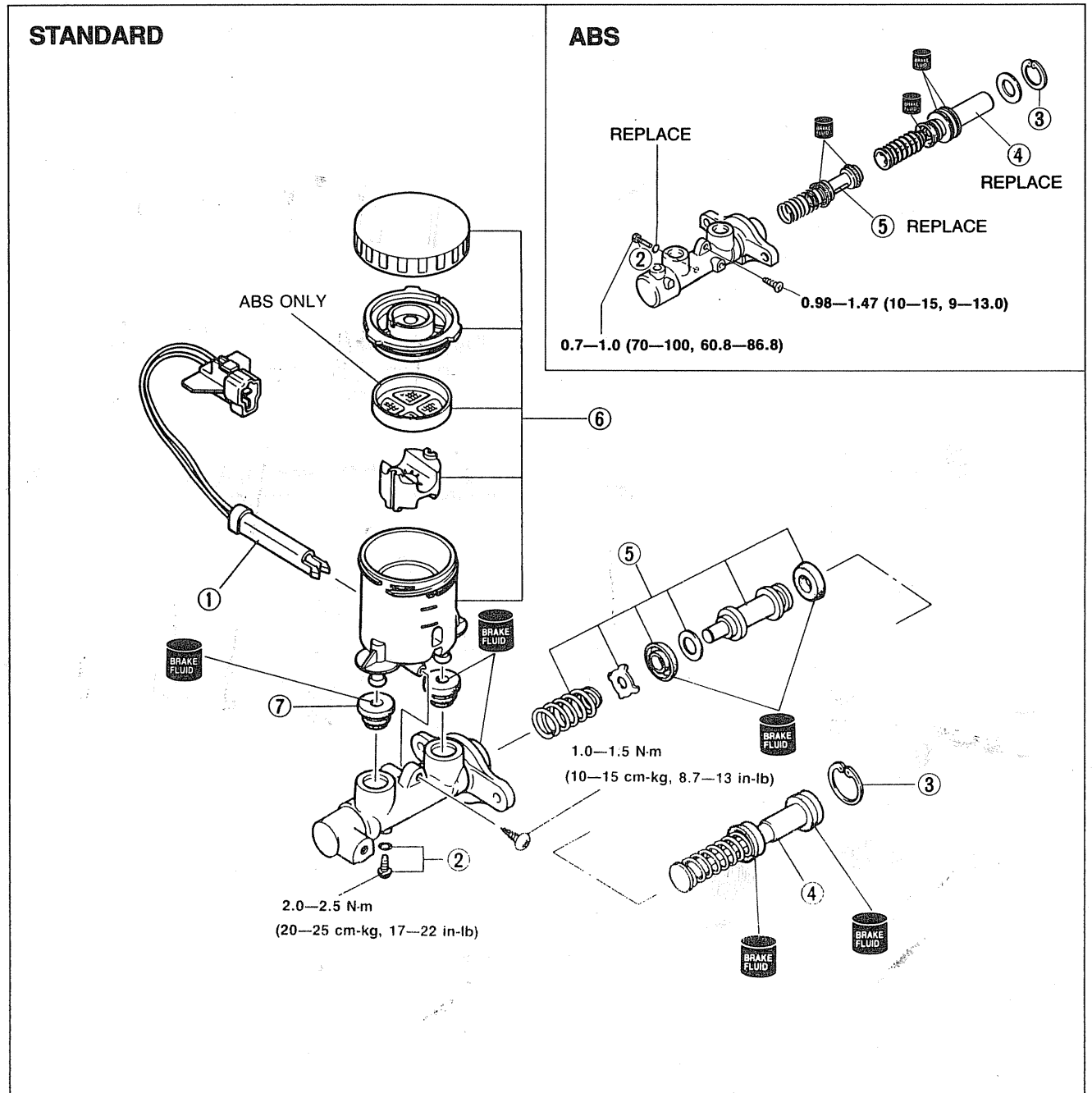
1. Pour out the brake fluid.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
3. Assemble in the reverse order of disassembly, referring to the **Assembly Note**.

### Caution

- Be careful not to let foreign material into the master cylinder during repairs.
- Do not scratch the inside of the cylinder or the outer surface of the piston.

### Note

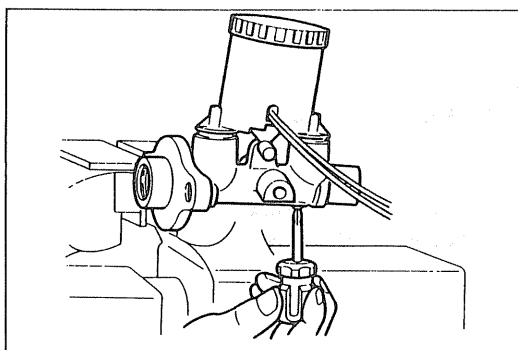
- The primary piston assembly is not repairable. Replace it as an assembly.



1. Fluid level sensor
2. Stopper screw and O-ring
3. Snap ring
4. Primary piston assembly

5. Secondary piston assembly
6. Reservoir assembly
7. Bushing

16UOPX-006



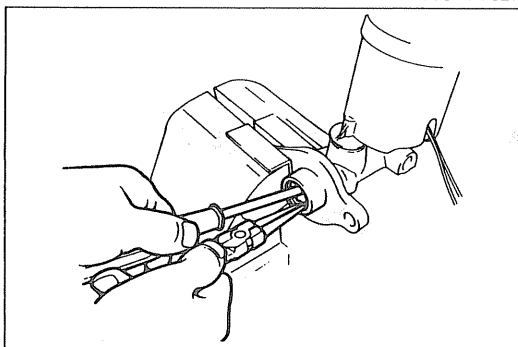
86U11X-027

### STANDARD Disassembly Note Stopper screw

Remove the stopper screw with a Phillips screwdriver.

#### Note

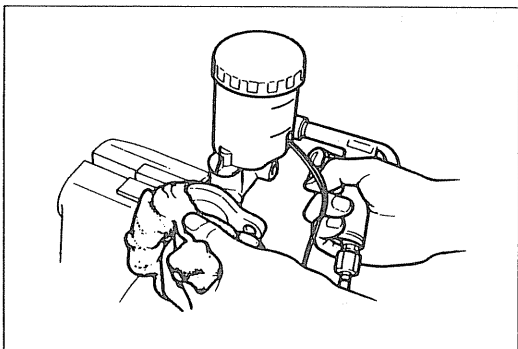
- Prepare a suitable container for the brake fluid to drain into.



96U11X-015

### Snap ring

Push the primary piston with a Phillips screwdriver and remove or install the snap ring with snap-ring pliers.



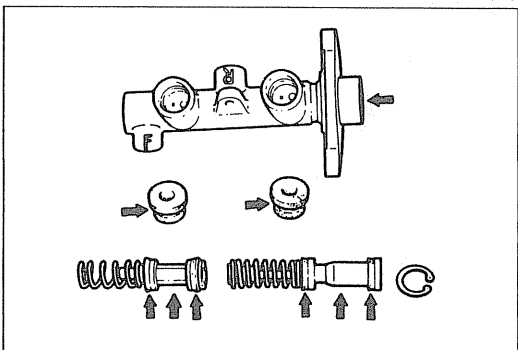
86U11X-029

### Secondary Piston Assembly

Remove the secondary piston assembly by gradually blowing compressed air into the cylinder.

#### Caution

- Use a rag to catch the secondary piston assembly when applying compressed air.



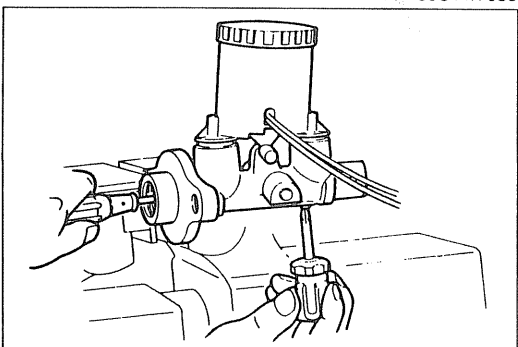
86U11X-030

### Assembly Note

#### Application of brake fluid

Before assembly, apply brake fluid to the following parts:

1. Cylinder inner surface
2. Piston
3. Piston cups
4. Bushings

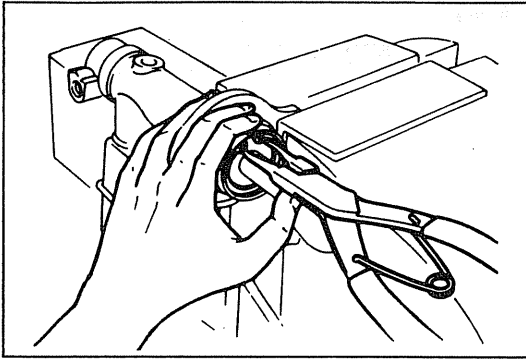


96U11X-016

### Stopper screw

1. Push the primary piston assembly all the way in with a Phillips screwdriver.
2. Tighten the stopper screw.
3. Push and release the piston to verify that the position of the stopper screw is correct.





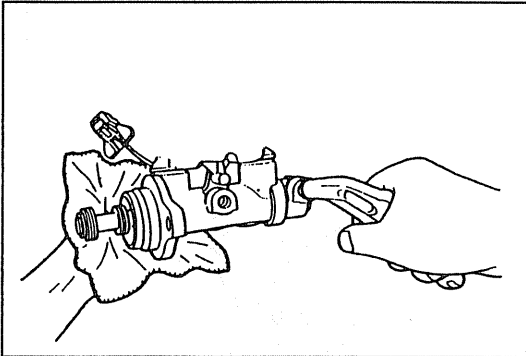
16UOPX-079

## ABS

### Disassembly note

#### Snap ring

Push the piston in fully with a rod and remove the snap ring using snap-ring pliers.



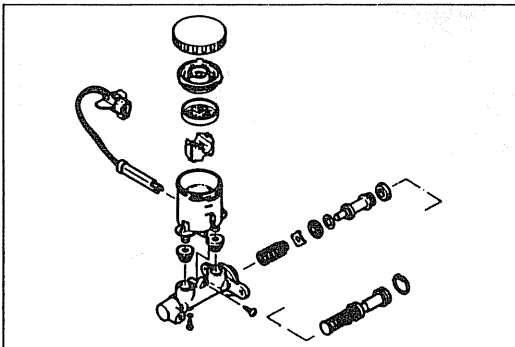
16UOPX-080

### Secondary piston assembly

Remove the secondary piston assembly by gradually blowing compressed air into the cylinder.

#### Caution

- Use a rag to catch the secondary piston assembly.

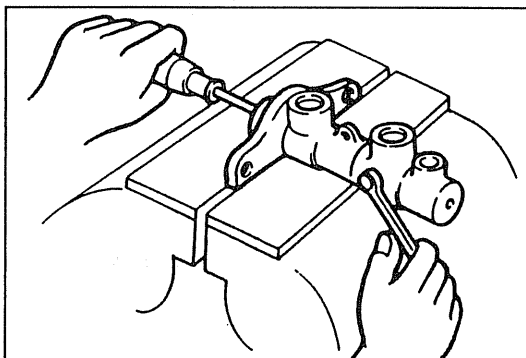


86U11X-032

## INSPECTION

Check the following and replace any faulty parts.

1. Piston and cylinder bore for abnormal wear, rust, and damage
2. Springs for weakness and damage
3. Reservoir for damage and deformation



16UOPX-081

## Assembly note

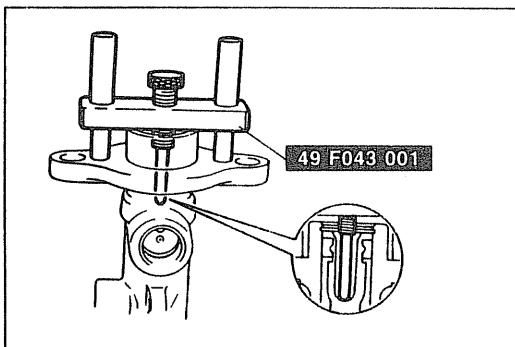
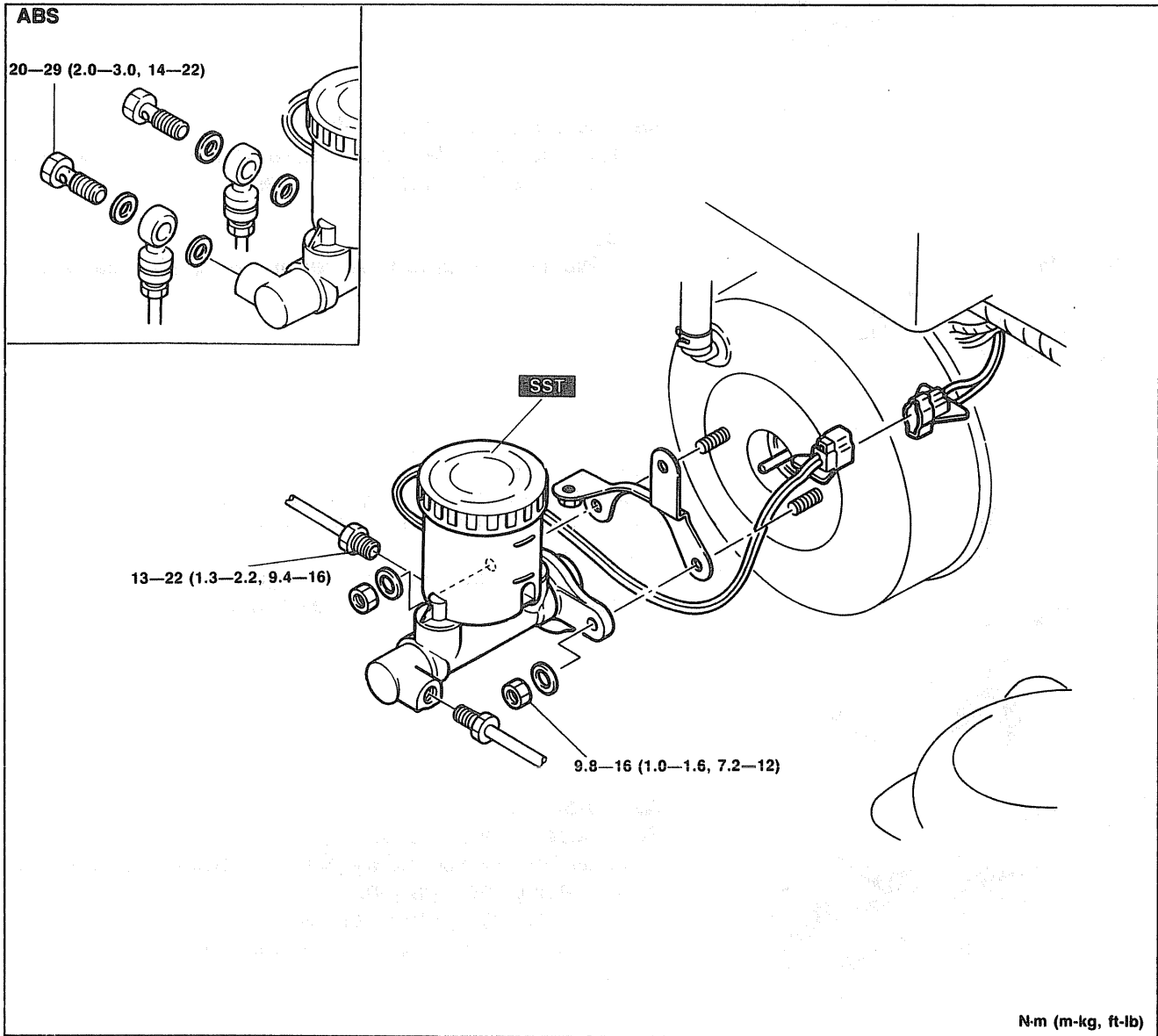
### Secondary piston assembly

1. Install the new secondary piston assembly with the piston hole facing the stop pin.
2. Install and tighten the stop pin.
3. Push and release the piston to verify that it is held by the stop pin.

### INSTALLATION

1. Install in the reverse order of removal, referring to **Installation Note**.
2. Tighten all nuts and bolts to the specified torque, referring to the torque specifications.
3. After installation:
  - (1) Fill the reservoir with the specified fluid.
  - (2) Bleed air from the system. (Refer to page P-9.)
  - (3) Check each part for fluid leakage.

### Torque Specifications



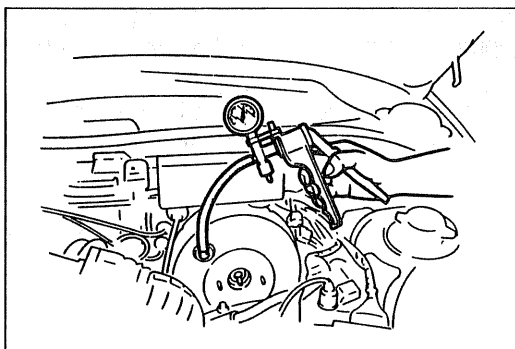
### STANDARD

#### Installation Note

#### Piston to push rod clearance

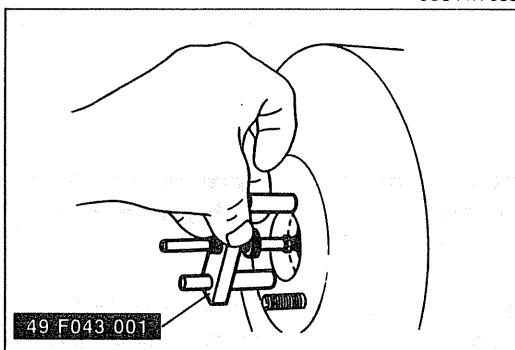
Before installing the master cylinder, check the clearance between the piston of the master cylinder and the push rod of the power brake unit as follows.

1. Place the **SST** atop the master cylinder; then turn the adjust bolt until it contacts the bottom of the push rod hole in the piston.



86U11X-035

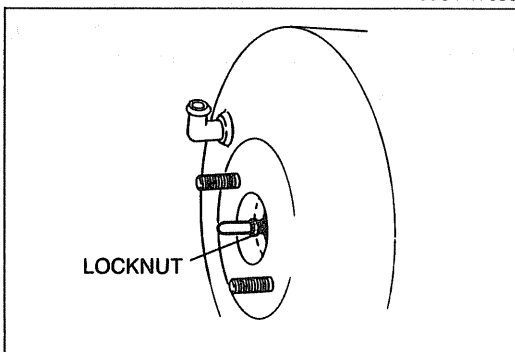
2. Apply **500 mmHg (19.7 inHg)** vacuum to the power brake unit with a vacuum pump.



49 F043 001

86U11X-036

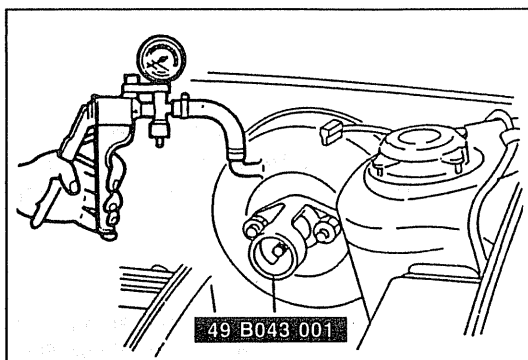
3. Invert the **SST** used in step 1, and place it on the power brake unit.



LOCKNUT

86U11X-037

4. Check the clearance between the end of the gauge and the push rod of the power brake unit. If it is not **0mm**, loosen the push rod locknut and turn the push rod to adjust.



49 B043 001

16U0PX-077

## ABS

### Installation Note Master cylinder Push Rod Clearance Inspection

Inspect the push rod clearance as follows.

Be sure that the clutch pipe holder is installed.

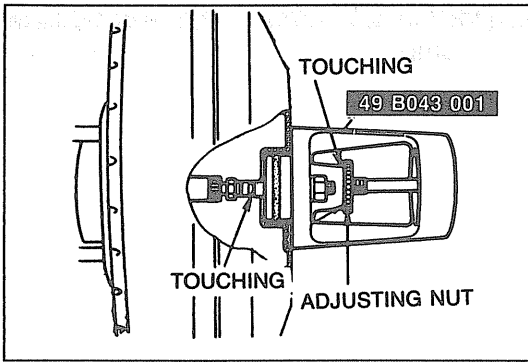
1. Turn the nut of the **SST** clockwise to fully retract its gauge rod. Attach the **SST** to the power brake unit.

### Tightening torque:

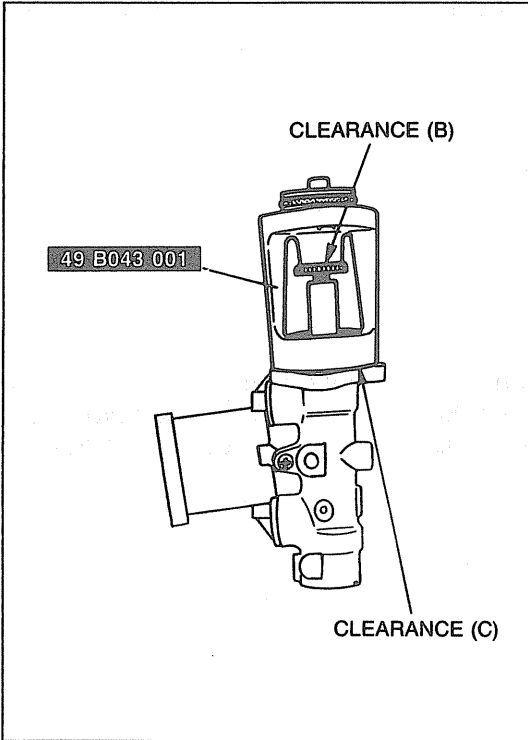
**10—16 N·m (100—160 cm·kg, 87—140 in·lb)**

2. Apply **500 mm-Hg (19.7 in-Hg)** vacuum using a vacuum pump.

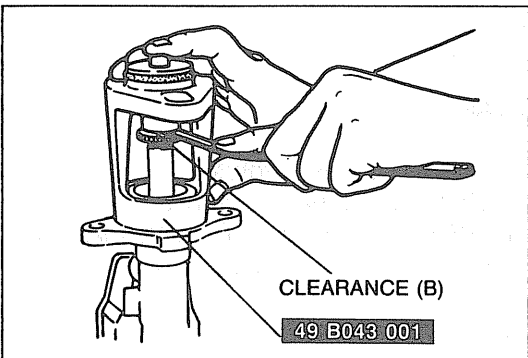
# MASTER CYLINDER



97G0PX-010



05E0PX-049



97G0PX-012

3. Turn the adjusting nut of the **SST** counterclockwise until the gauge rod just contacts the push rod end of the power brake unit.  
Push lightly on the end of the gauge rod to be sure it is seated. Verify that there is no gap between the adjusting nut and **SST** body.

3. If immediately after the engine starts, the pedal moves down slightly, the unit is operating.

4. Remove the **SST** from the power brake unit without disturbing the adjusting nut. Set the **SST** onto the master cylinder as shown in the figure.

**Caution**

- When pushing use only enough pressure to bottom the rod in the piston. If too much pressure is applied, a false reading will occur.

5. Push lightly on the end of the **SST** gauge rod to be sure it is bottomed in the master cylinder piston, and note any clearance between the **SST** body and the adjusting nut (clearance B) or between the body and the master cylinder (clearance C). Adjust the push rod as necessary as outlined in "Adjustment" below.

Measurement	Push rod
Clearance at (B)	Too short
Clearance at (C)	Too long
No clearance at (B) or (C)	OK

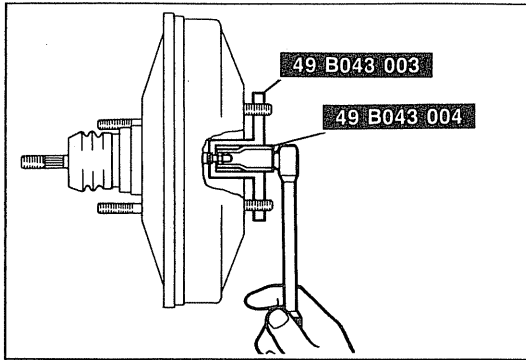
**Adjustment**

**Note**

- The threads of the push rod are specially designed so that the bolt becomes harder to turn past a certain point to prevent loosening of the bolt. Turn the bolt only within this range when adjusting.

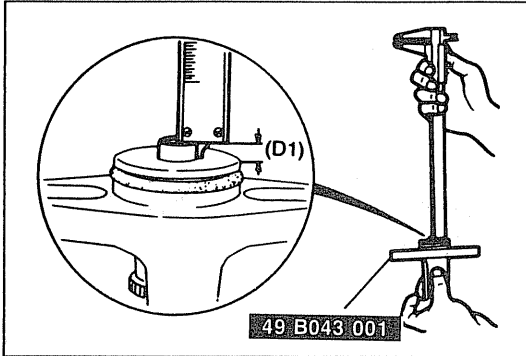
**Clearance at B**

1. Push lightly on the end of the **SST** gauge rod, and measure the clearance between the adjusting nut and the **SST** body.



15U0PX-019

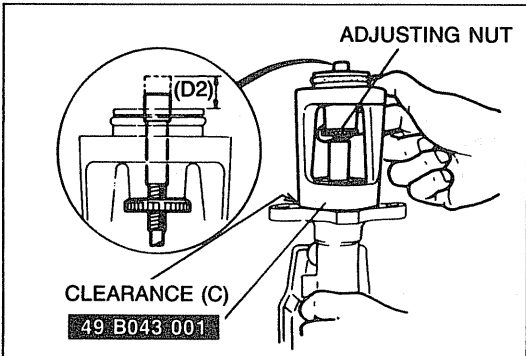
- Using the **SST**, turn the nut to lengthen the power booster push rod an amount equal to the clearance measured at B.



97G0PX-014

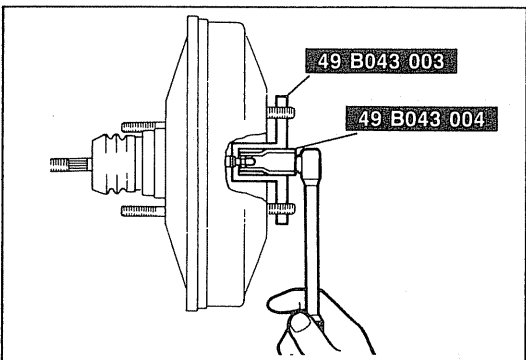
### Clearance at C

- Measure and record height D1 of the gauge rod.



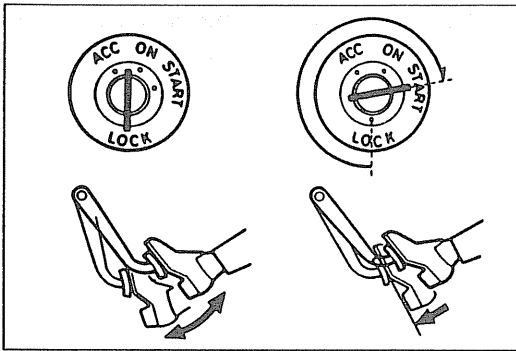
97G0PX-015

- Turn the adjusting nut until the **SST** body sets squarely on the master cylinder. (Turn only enough for the body to touch.)
- Measure and record height D2 of the gauge rod.

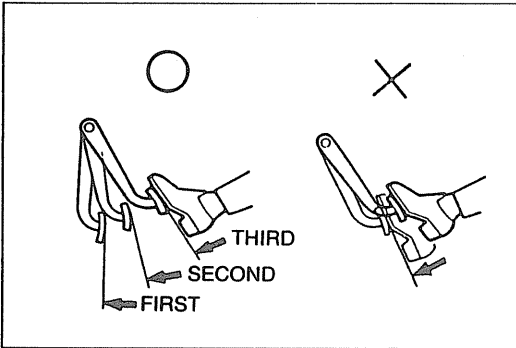


15U0PX-020

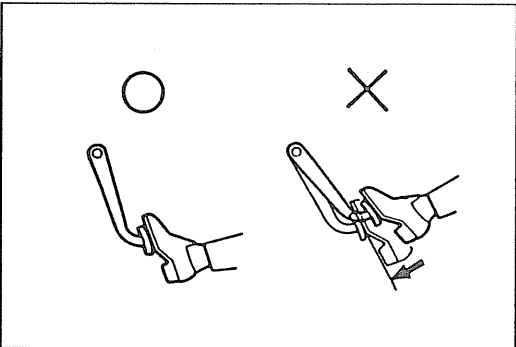
- Subtract D1 from D2 and using the **SST**, turn the nut to shorten the power booster push rod an amount equal to the difference.



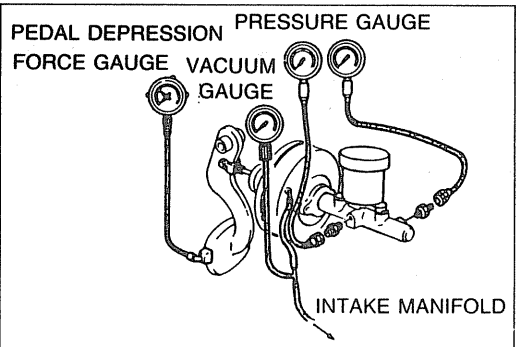
96U11X-019



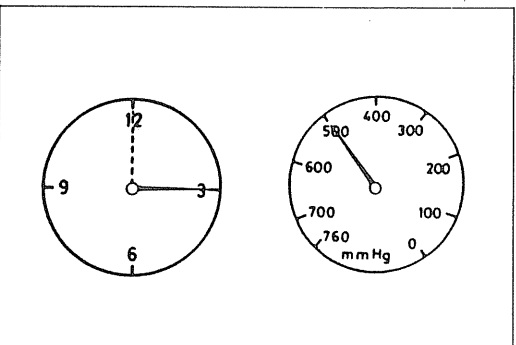
86U11X-039



86U11X-040



96U11X-020



69G11X-039

## POWER BRAKE UNIT

### FUNCTION CHECK

#### Simple Method

##### First step

1. With the engine stopped, depress the pedal a few times.
2. With the pedal depressed, start the engine.
3. If immediately after the engine starts, the pedal moves down slightly, the unit is operating.

##### Second step

1. Start the engine.
2. Stop the engine after it has run for **1 or 2 minutes**.
3. Depress the pedal with the usual force.
4. If the first pedal stroke is long and becomes shorter with subsequent strokes, the unit is operating.
5. If a problem is found, inspect for damage of the check valve or vacuum hose, and examine the installation condition. Repair if necessary, and inspect it once again.

##### Third step

1. Start the engine.
2. Depress the pedal with the usual force.
3. Stop the engine with the pedal still depressed.
4. Hold the pedal down for **about 30 seconds**.
5. If the pedal height does not change, the unit is operating.
6. If there is a problem, check for damage to the check valve or vacuum hose, and check the connection. Repair if necessary, and check once again.

If the nature of the problem is still not clear after following the 3 steps above, follow the more detailed check described in "Method using tester".

#### Method Using Tester

Connect a pressure gauge, vacuum gauge, and pedal depression force gauge as shown in the figure. After bleeding the air from the pressure gauge, conduct the test as described in the following steps.

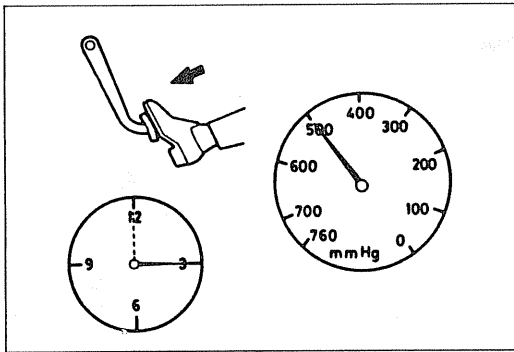
#### Note

- Use commercially available gauges and pedal depression force gauge.

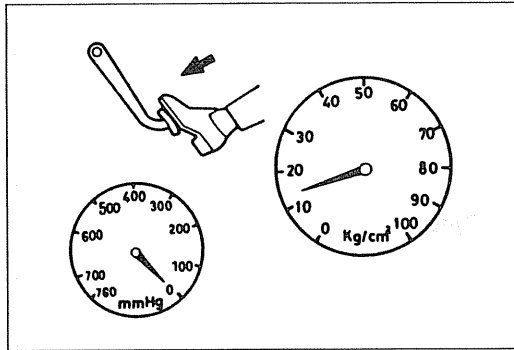
#### Checking for Vacuum Loss:

##### Unloaded Condition

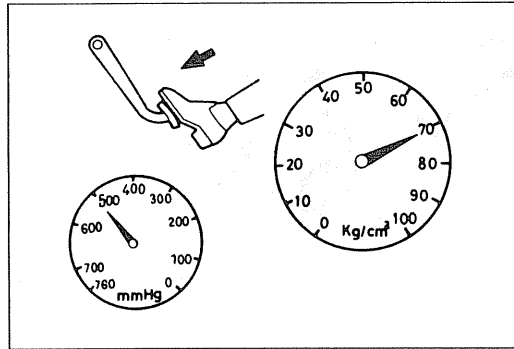
1. Start the engine.
2. Stop the engine when the vacuum gauge reading reaches **500 mmHg (19.7 inHg)**.
3. Observe the vacuum gauge for **15 seconds**. If the gauge shows **475—500 mmHg (18.7—19.7 inHg)**, the unit is operating.



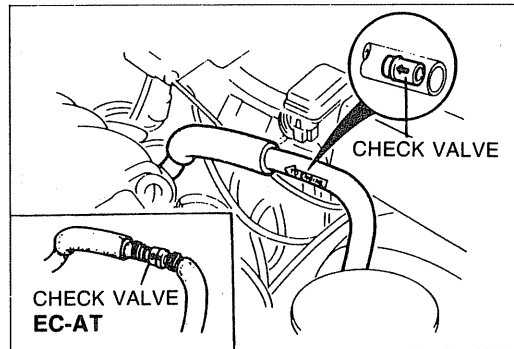
86U11X-042



69G11X-041



96U11X-021



86U11X-044

**Loaded Condition**

1. Start the engine.
2. Depress the brake pedal with a force of **196 N (20 kg, 44 lb)**.
3. With the brake pedal depressed, stop the engine when the vacuum gauge reading reaches **500 mmHg (19.7 inHg)**.
4. Observe the vacuum gauge for **15 seconds**. If the gauge shows **475–500 mmHg (18.7–19.7 inHg)**, the unit is operating.

**Checking for Hydraulic Pressure**

1. With the engine stopped and the vacuum at **0**, if the pedal force and fluid pressure are within specification, the unit is operating.

Pedal force	Fluid pressure
196 N (20 kg, 44 lb)	1,177 kPa (12 kg/cm <sup>2</sup> , 171 psi) min.

2. Start the engine. Depress the brake pedal when the vacuum reaches **500 mmHg (19.7 inHg)**. If the pedal force and fluid pressure are within specification, the unit is operating.

Pedal force	Fluid pressure
196 N (20 kg, 44 lb)	7,063 kPa (72 kg/cm <sup>2</sup> , 1,023 psi) min.

**INSPECTION OF CHECK VALVE**

**Note (Except EC-AT)**

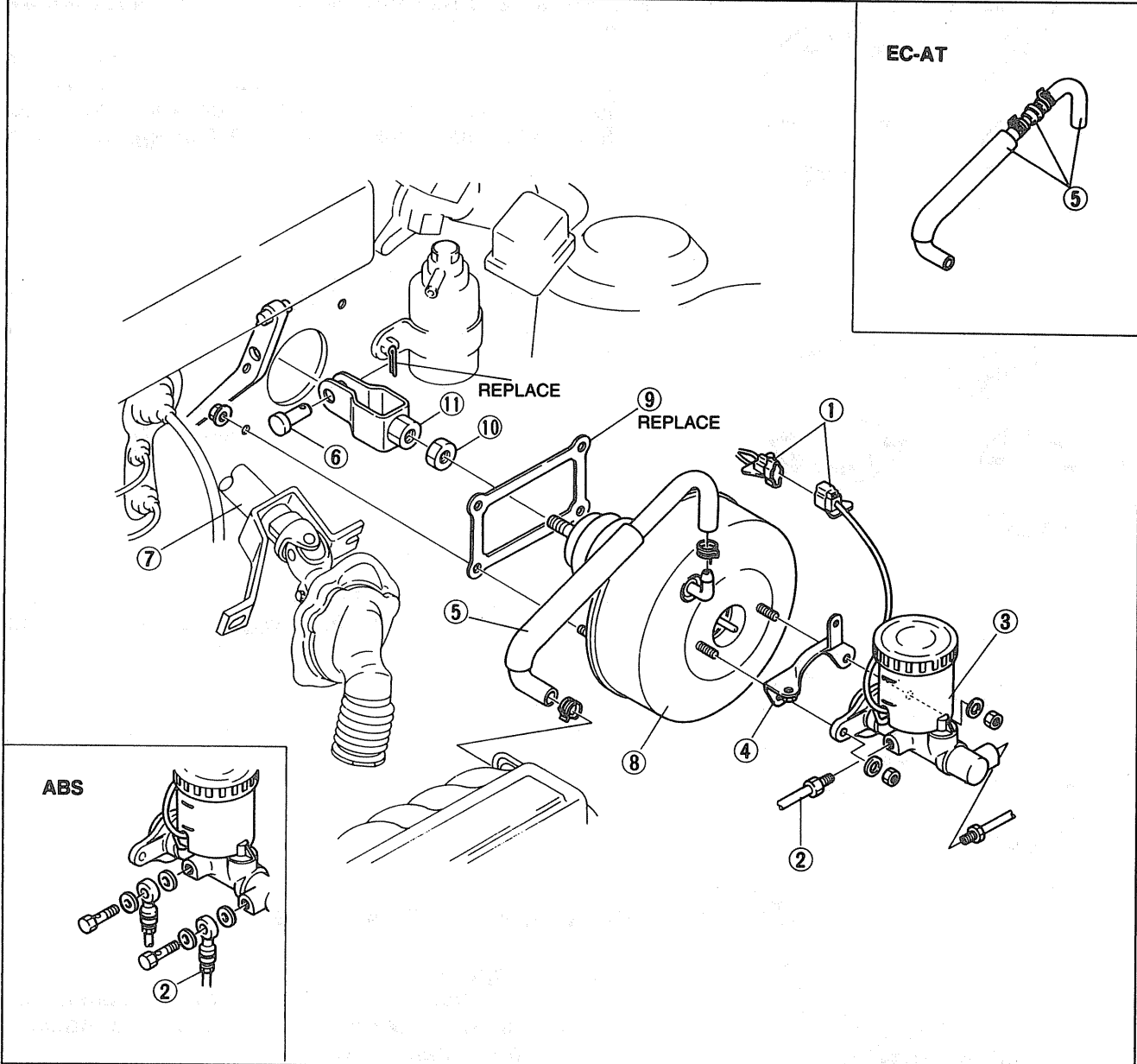
- The check valve is pressed into the vacuum hose. There is an arrow on the hose surface to indicate direction of installation.

**Inspection**

1. Disconnect the vacuum hose from the engine.
2. Apply suction and pressure to the hose from the engine side. Check that air flows only toward the engine. If the air passes in both directions or not at all, replace the check valve (along with the hose).

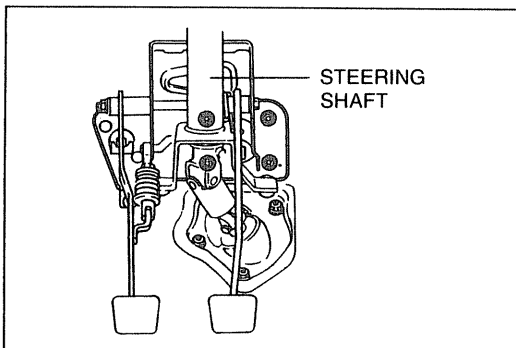
REMOVAL

Remove in the order shown in the figure, referring to **Removal Note**.



16U0PX-008

- |                                 |                                |                     |
|---------------------------------|--------------------------------|---------------------|
| 1. Fluid level sensor connector | 5. Vacuum hose and check valve | 8. Power brake unit |
| 2. Brake pipe                   | 6. Clevis pin                  | 9. Gasket           |
| 3. Master cylinder              | 7. Steering shaft              | 10. Locknut         |
| 4. Clutch pipe holder           |                                | 11. Operating lever |



**Removal Note**  
**Steering Shaft**

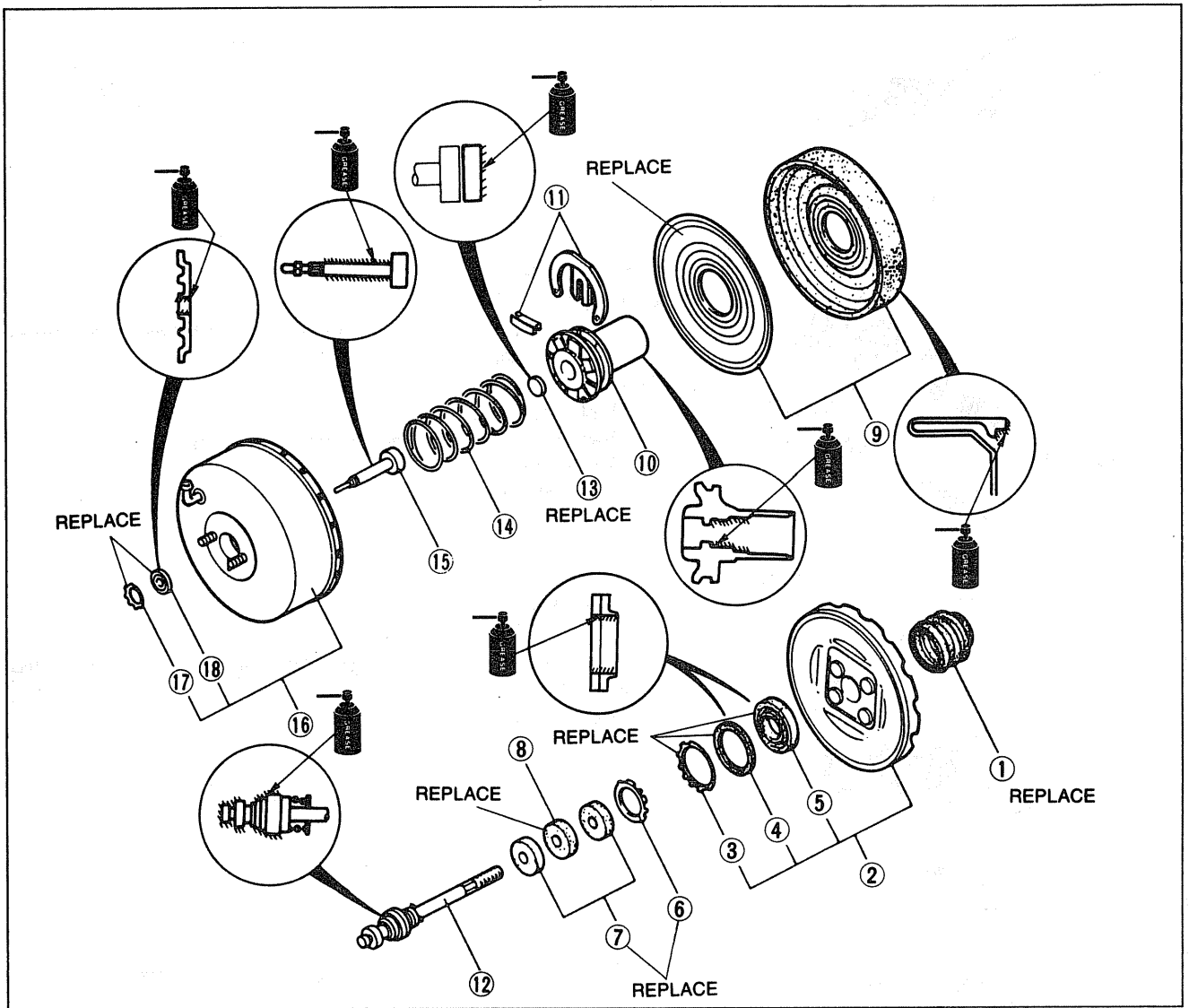
To remove the mounting nuts, the steering shaft must be removed. (Refer to Section N.)

16U0PX-009



**DISASSEMBLY / ASSEMBLY**

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



16U0PX-010

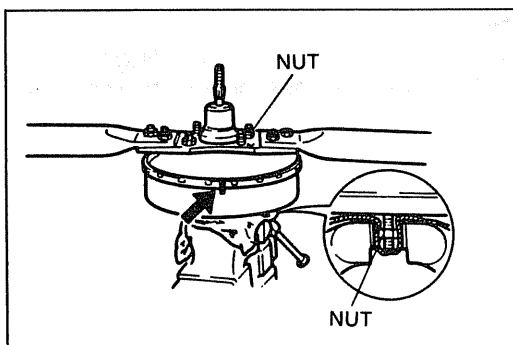
- |                        |                                    |                          |
|------------------------|------------------------------------|--------------------------|
| 1. Dust boot           | 7. Air filters                     | 13. Reaction disc        |
| 2. Rear shell assembly | 8. Air silencer                    | 14. Spring               |
| 3. Retainer            | 9. Diaphragm and plate             | 15. Push rod             |
| 4. Bearing             | 10. Power piston assembly          | 16. Front shell assembly |
| 5. Dust seal           | 11. Retainer key                   | 17. Retainer             |
| 6. Retainer            | 12. Valve rod and plunger assembly | 18. Seal                 |

**Disassembly Note**  
**Front and rear shell**

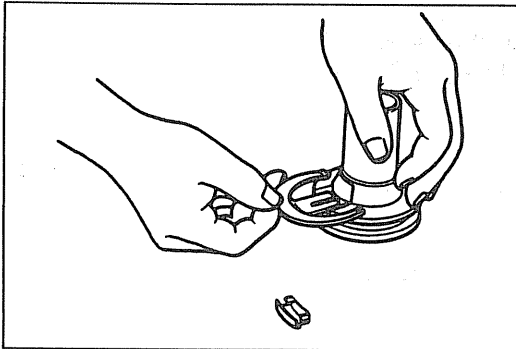
1. Secure the front shell studs in a vise after attaching suitable nuts to them to prevent damage to the studs.
2. Before separating the front and rear shell assemblies, make matching marks to be used during reassembly.
3. Fit a locally provided wrench onto the rear shell studs; then fasten two of them with suitable nuts.
4. Rotate the rear shell counterclockwise to unlock.

**Caution**

- **The rear shell is spring loaded; loosen it carefully.**



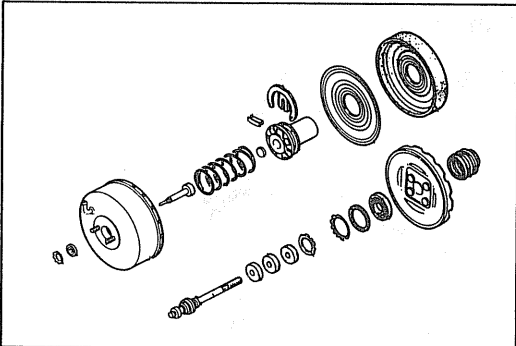
96U11X-025



96U11X-026

**Retainer key**

Depress the plunger rod fully, and remove the retainer key.



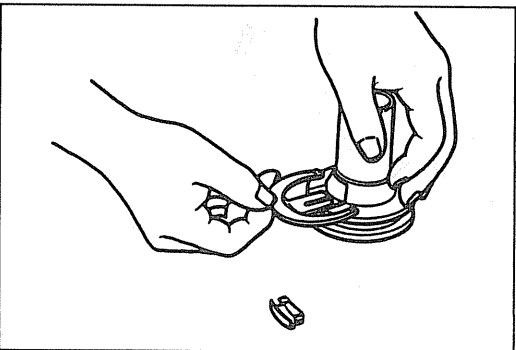
96U11X-027

**Assembly Note**

**Application of Grease**

Before assembly, coat the following parts with silicone grease.

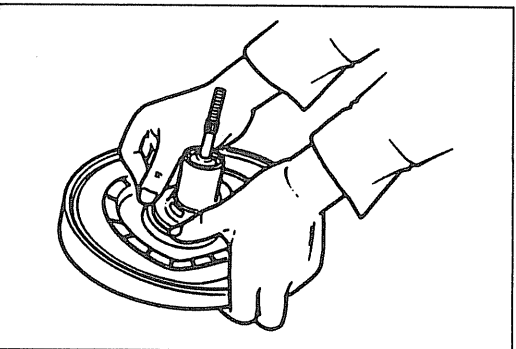
- (1) Entire surface of reaction disc
- (2) Dust seal lip
- (3) Push rod
- (4) Diaphragm to shell contacting surfaces
- (5) Power piston
- (6) Valve plunger oil seal



86U11X-051

**Retainer key**

1. Push down the plunger rod.
2. Align the groove of the valve plunger with the slot of the power piston.
3. Insert the retainer key.



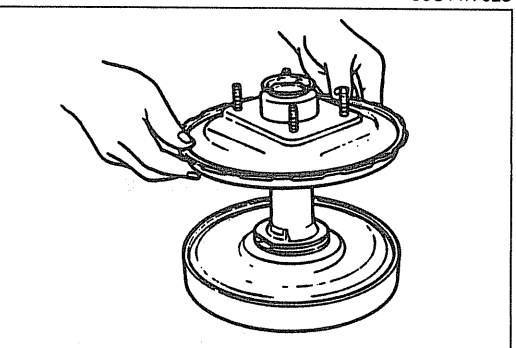
96U11X-028

**Diaphragm**

Install the diaphragm onto the power piston and plate.

**Caution**

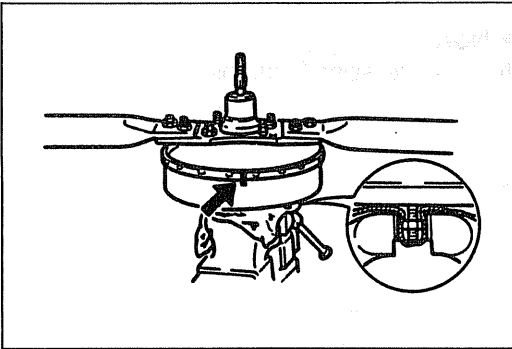
- Check that the diaphragm is well seated in the groove.



86U11X-053

**Rear shell assembly**

Assemble the rear shell assembly; carefully guiding the tube end of the power piston through the dust seal of the rear shell.



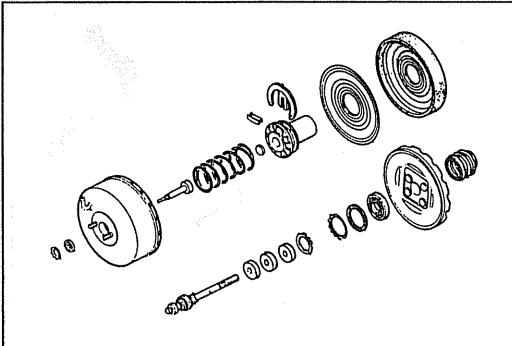
86U11X-054

**Front shell and rear shell**

Press down the rear shell assembly, and rotate it clockwise until the matching marks are aligned.

**Caution**

- Fit suitable nuts to two studs of the rear shell and tighten them to mount the wrench.



86U11X-055

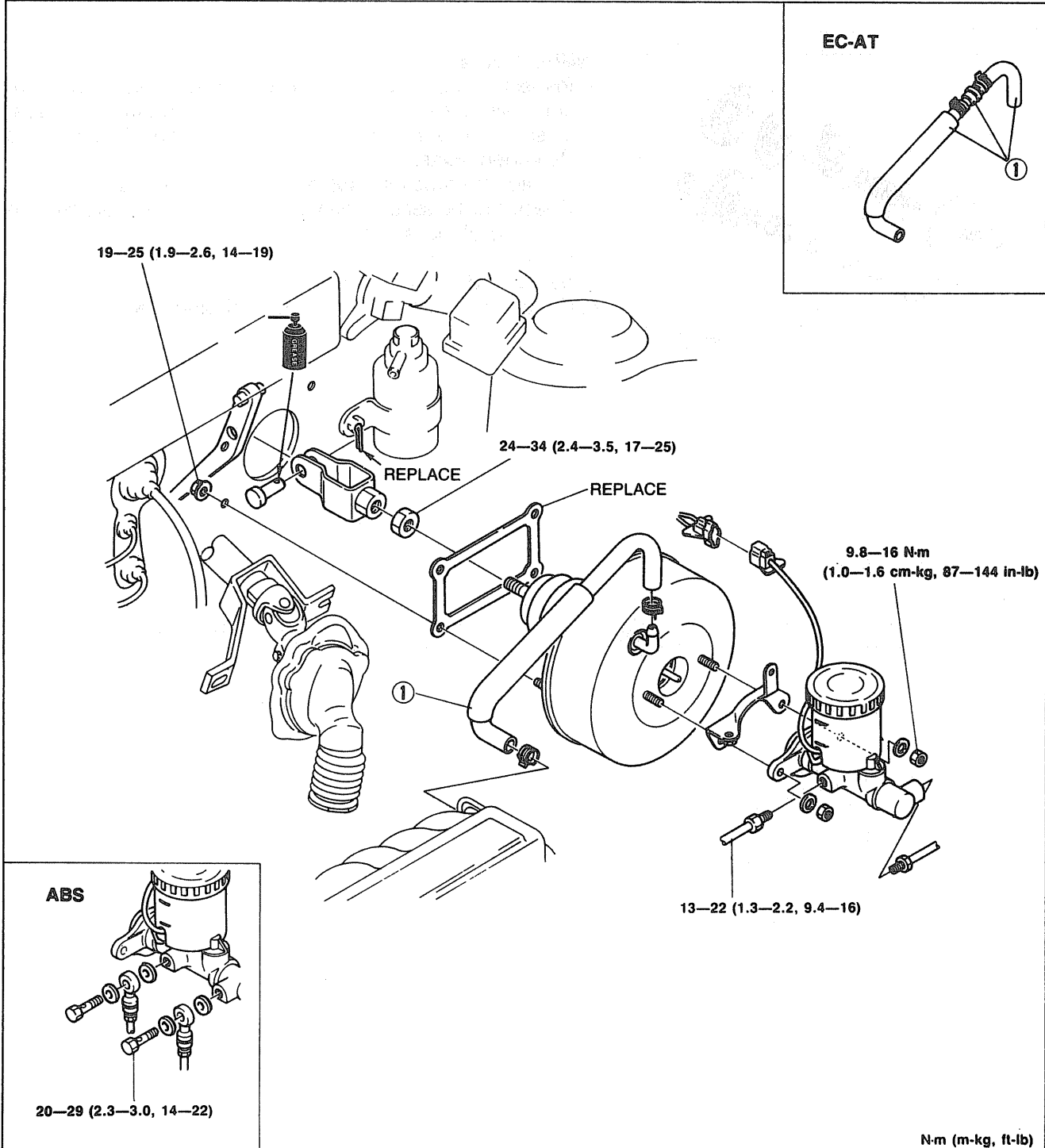
**INSPECTION**

1. Inspect all rubber parts. Wipe free of fluid and carefully inspect all rubber parts for cuts, nicks, and other damage.
2. Check the power piston for cracks, distortion, chipping, and damaged seats.
3. Inspect the reaction disc rubber for deterioration.
4. Check that the seats of the valve rod and plunger are smooth and free of nicks and dents.
5. Inspect the front and rear shells for scratches, scores, pits, dents, and other damage.
6. Check the diaphragm for cuts and other damage.

### INSTALLATION

1. Install in the reverse order of removal, referring to **Installation Note**.
2. Tighten all nuts and bolts to the specified torque, referring to the torque specifications.
3. After installation:
  - (1) Add fluid and bleed the air. (Refer to page P-9.)
  - (2) Check all parts for fluid leakage.
  - (3) Make an on-vehicle check of the unit. (Refer to page P-20.)
  - (4) Verify that the vacuum hose does not contact other parts.

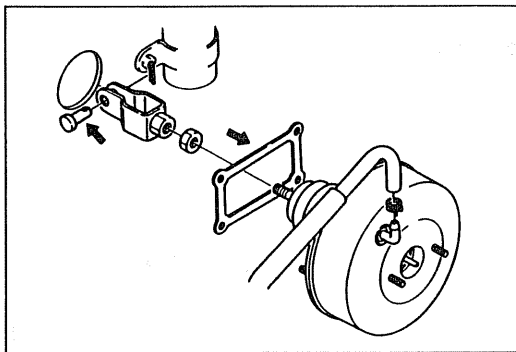
### Torque Specifications



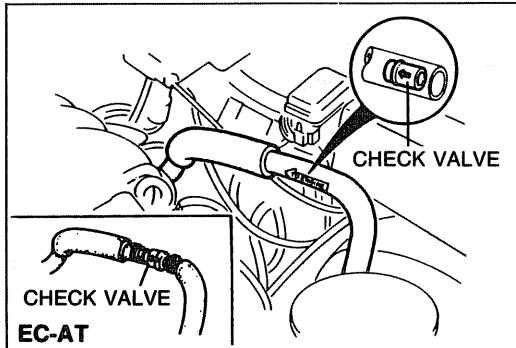
N-m (m-kg, ft-lb)

16UOPX-011

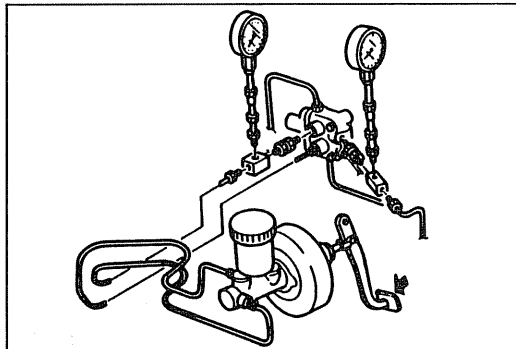
1. Vacuum hose and check valve.



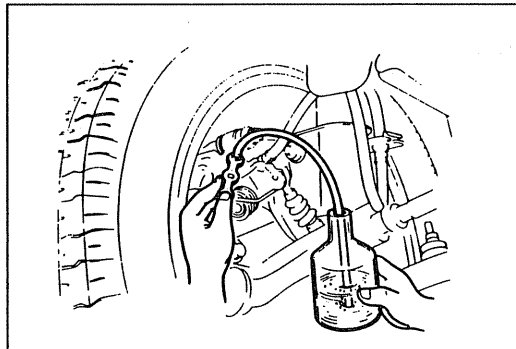
86U11X-057



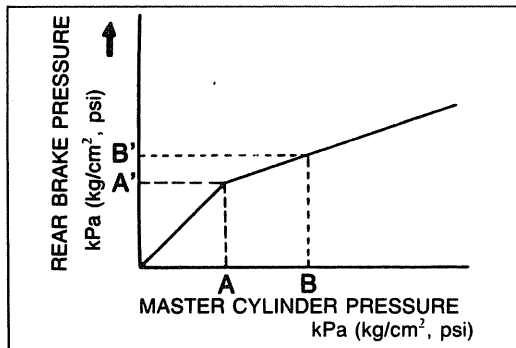
96U11X-058



96U11X-030



06U0PX-013



06U0PX-014

**Installation Note**

**Application of grease and sealant**

1. Apply grease to the clevis pin contact surface.
2. Apply sealant to the gasket contact surface.

**Vacuum hose and check valve**

Install the vacuum hose and check valve noting the installation direction.

**Note (Except EC-AT)**

- The check valve is pressed into the vacuum hose.

**PROPORTIONING VALVE**

**FUNCTION CHECK**

1. Connect two pressure gauges (9,810 kPa [100 kg/cm<sup>2</sup>, 1,422 psi]) to the brake pipes and adapters as shown in the figure.

**Adapter and flare nut tightening torque:**

**13—22 N·m (1.3—2.2 m·kg, 9.4—16 ft·lb)**

**Note**

- Disconnect and connect the brake pipes with the SST (49 0259 770B).

2. Bleed air from the brake system. (Refer to page P-9.)
3. Depress the brake pedal until the master cylinder pressure equals A; then measure rear brake pressure A'.
4. Depress the brake pedal again, apply additional pressure until A reaches B; then measure pressure B'.

**Specification**

**STANDARD**

Fluid pressure		kPa (kg/cm <sup>2</sup> , psi)	
A	A'	B	B'
2,943 (30, 427)	2,943 ± 196 (30 ± 2, 427 ± 28)	6,867 (70, 995)	4,120 ± 294 (42 ± 3, 597 ± 43)

**ABS**

2,943 (30,427)	2,943 (30,427) ± 196 (2,28)	5,886 (60,853)	3,826 (39,555) ± 294 (3,43)
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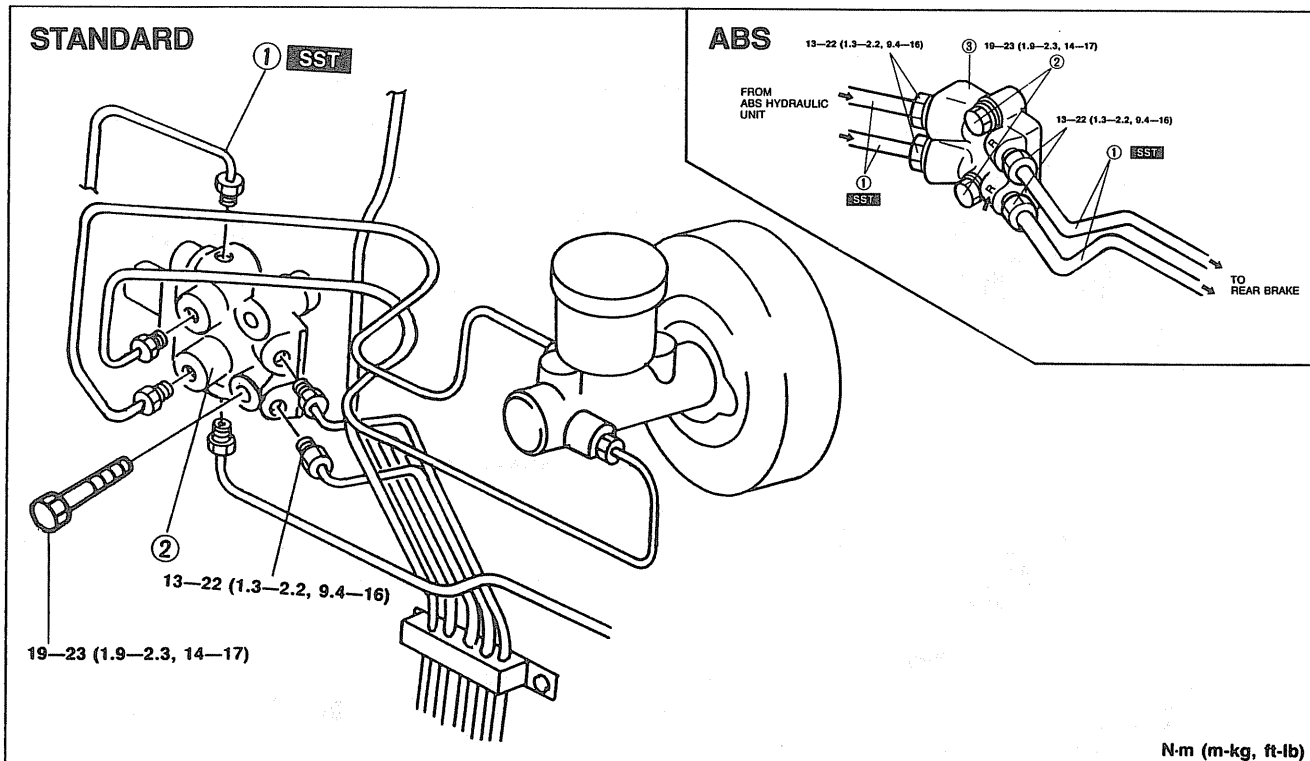
5. If the measurements are not within specification, replace the valve assembly.
6. Install the brake pipes to the valve, and bleed air from the brake system.

**REMOVAL / INSTALLATION**

1. Remove in the order shown in the figure, referring to **Removal / Installation Note**.
2. Install in the reverse order of removal.
3. After installation:
  - (1) Add brake fluid and bleed the air. (Refer to page P-9.)
  - (2) Check the brake lines for fluid leakage.

**Caution**

- Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.

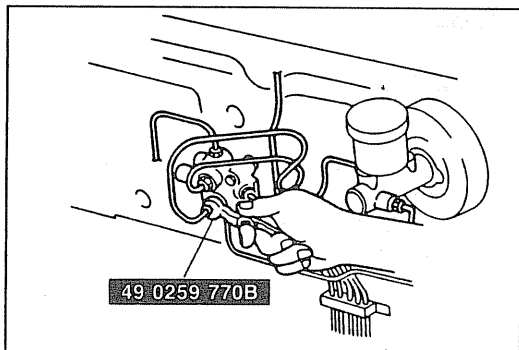


N-m (m-kg, ft-lb)

1. Brake pipe

2. Dual proportioning valve

16U0PX-012

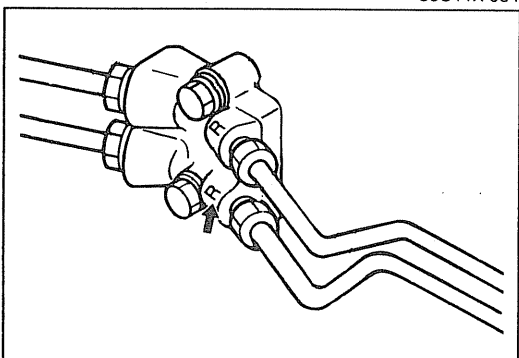


86U11X-064

**STANDARD**

**Removal / Installation Note**

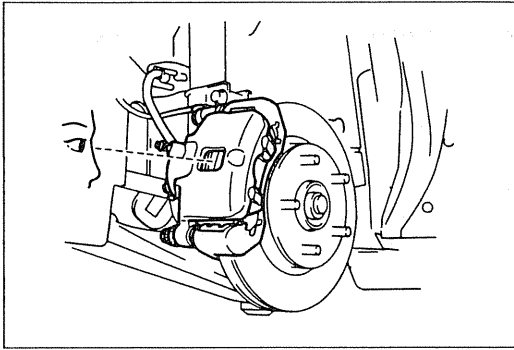
Disconnect and connect the brake pipes with the **SST**.



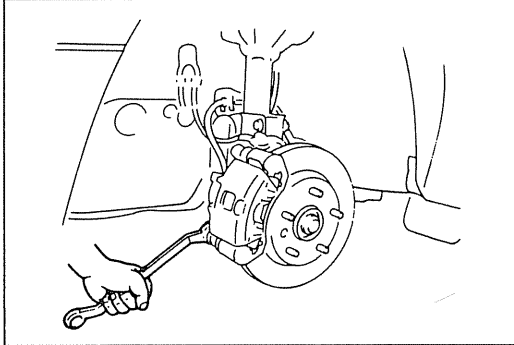
**ABS**

**Proportioning valve**

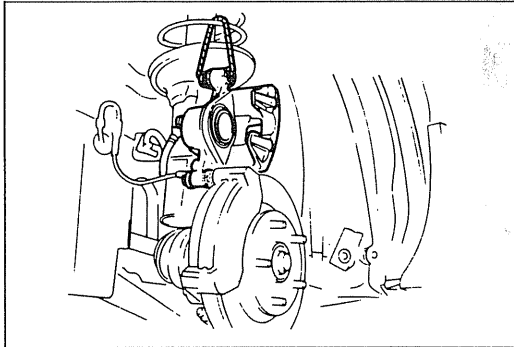
Install the proportioning valve with the "R" toward the rear brake line.



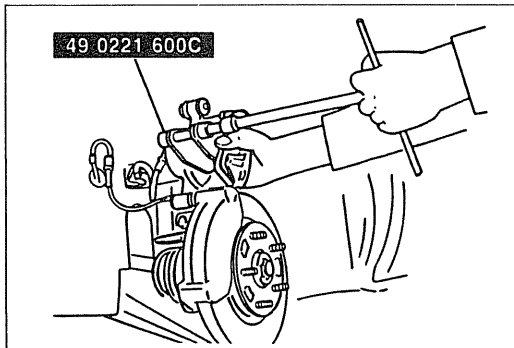
86U11X-065



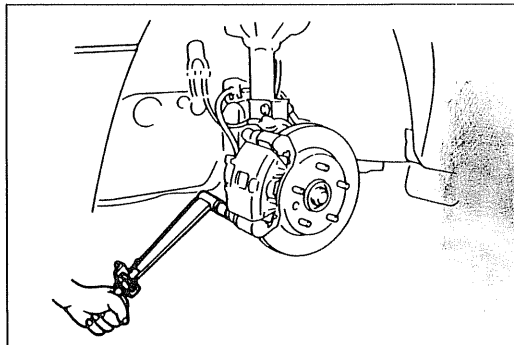
96U11X-033



86U11X-067



86U11X-068



86U11X-069

## FRONT DISC BRAKE

### SIMPLE INSPECTION OF DISC PAD WEAR

1. Loosen the front wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Look through the caliper inspection hole and check that the remaining thickness of the pad is **2mm (0.08 in) min.**

#### Note

- **When the remaining thickness becomes 2mm (0.08 in), the wear indicator will make a squealing noise while the vehicle is in motion to indicate that the pad should be replaced.**

### REPLACEMENT OF DISC PAD

#### Caution

- **Replace the left and right pad sets at the same time.**

1. Loosen the front wheel lug nuts.
2. Block the rear wheels firmly.
3. Jack up the front of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove the lower mounting bolt.
6. Pivot the caliper on the top bolt and support it.
7. Remove the pads and shims.

#### Warning

- **Asbestos dust is a health hazard. Do not blow away brake dust with compressed air.**

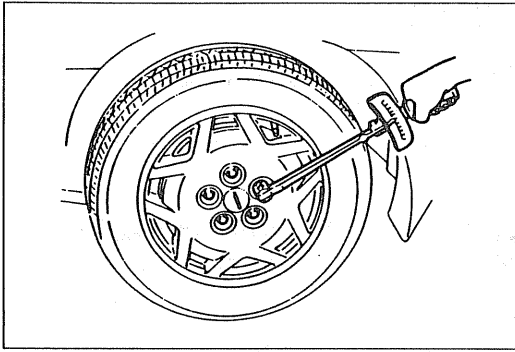
8. Apply the grease supplied in the pad attachment set to the new shims and attach them to the new pads.
9. Push the piston inward with the **SST** and the old pad.
10. Install the new pads and shims into the mounting support.

11. Lower the caliper assembly onto the mounting support.
12. Tighten the mounting bolt to the specified torque.

#### Tightening torque:

**31—41 N·m (3.2—4.2 m·kg, 23—30 ft·lb)**

## FRONT DISC BRAKE



86U11X-070

13. Mount the wheels.
14. Apply the brakes a few times; then turn the wheels and check that the brakes do not drag excessively.
15. Lower the vehicle.
16. Tighten the wheel lug nuts.

**Tightening torque:****88—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)**



## REMOVAL

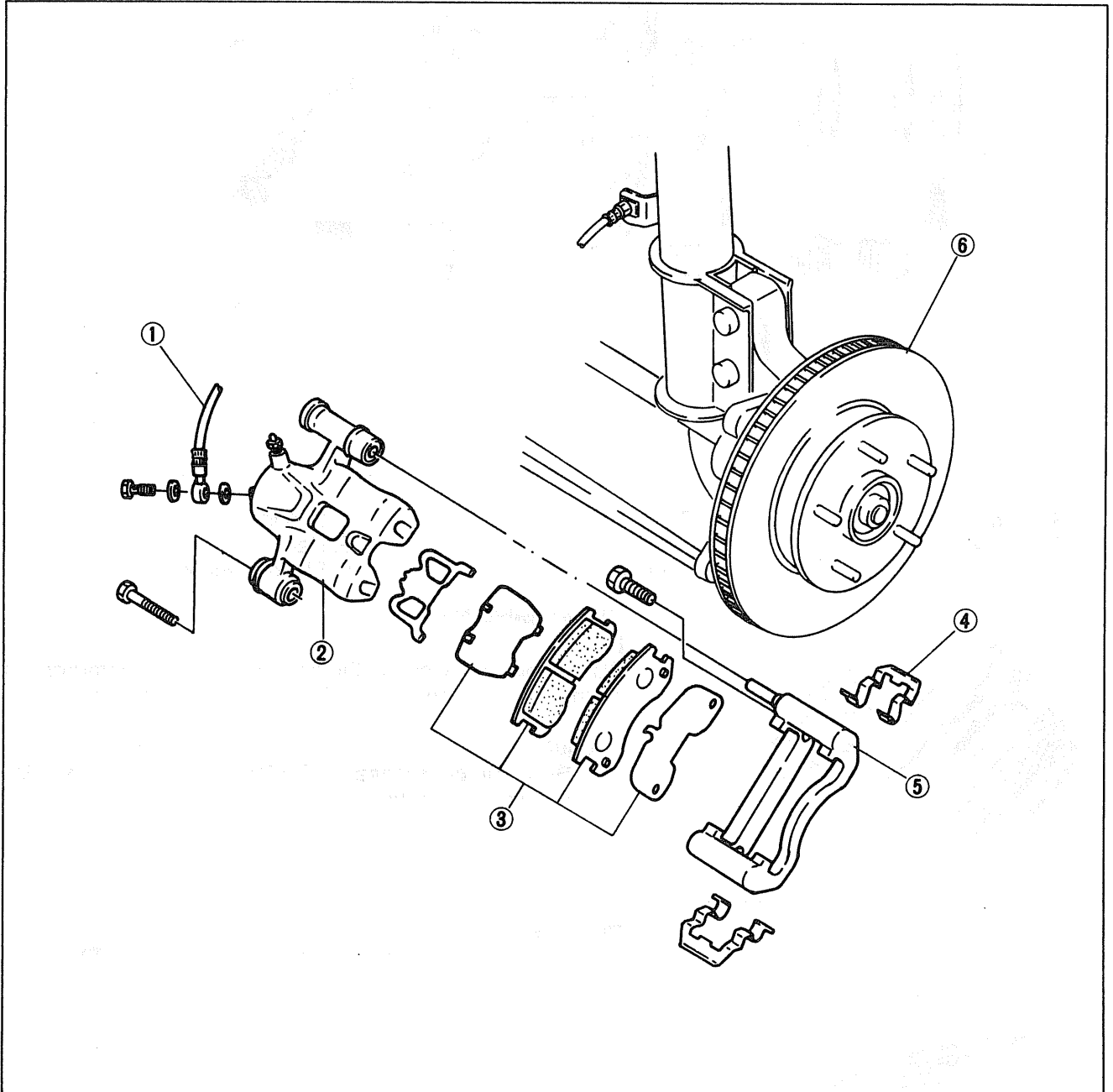
1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the order shown in the figure.

## Warning

- **Asbestos dust is a health hazard. Do not blow away brake dust with compressed air. Use a vacuum cleaner or equivalent to remove brake dust.**

## Caution

- **Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.**



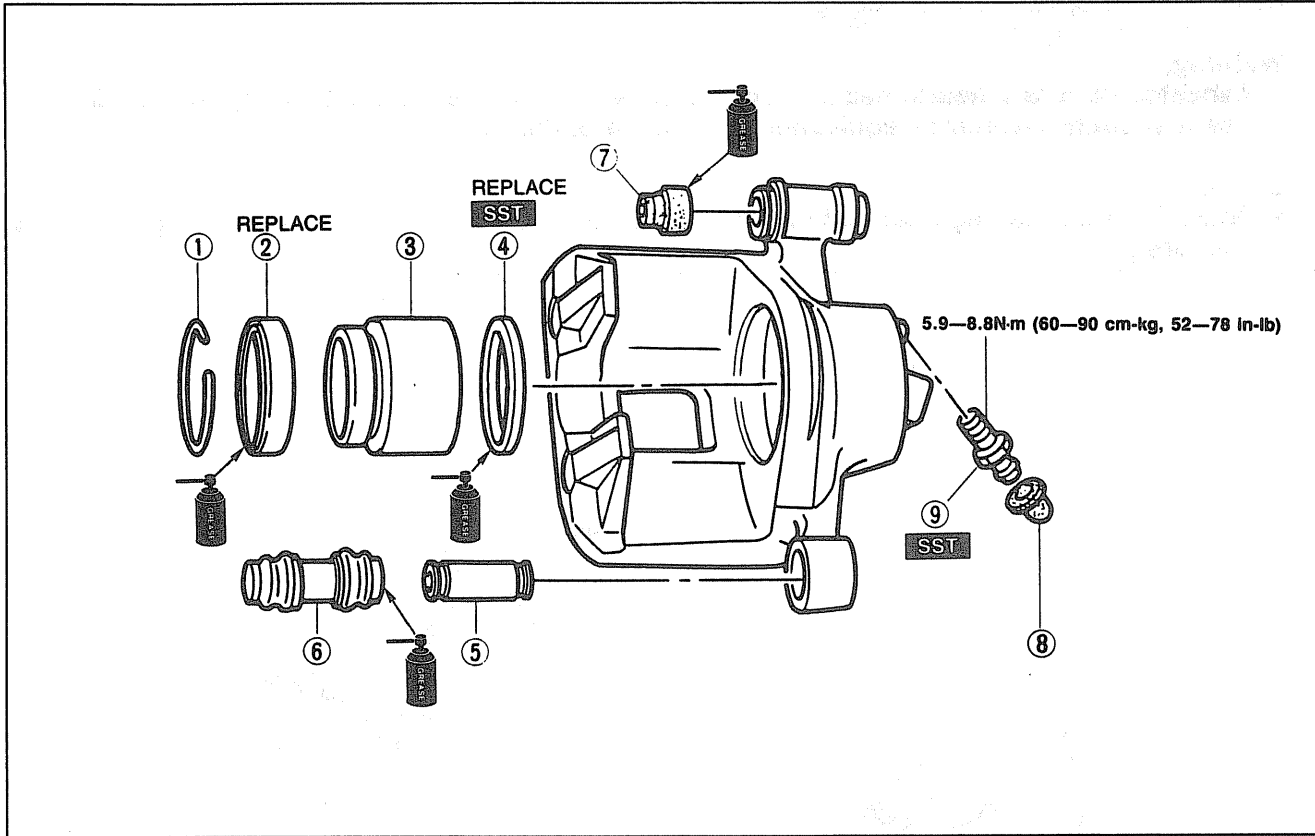
16U0PX-013

1. Flexible hose
2. Caliper assembly
3. Pad and shim

4. Guide plate
5. Mounting support
6. Disc plate (Refer to Section M)

**DISASSEMBLY / ASSEMBLY**

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts, referring to **Inspection Note**.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

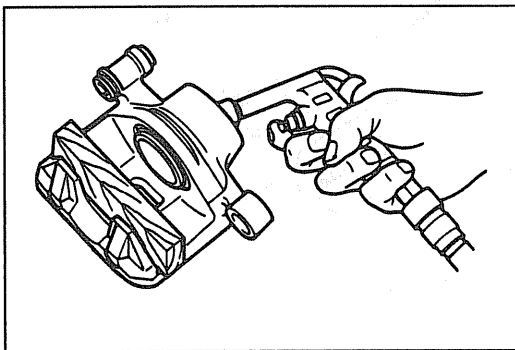


16U0PX-014

1. Snap ring
2. Dust seal
3. Piston

4. Piston seal
5. Guide pin
6. Pin boot

7. Bushing
8. Cap
9. Bleeder screw



96U11X-036

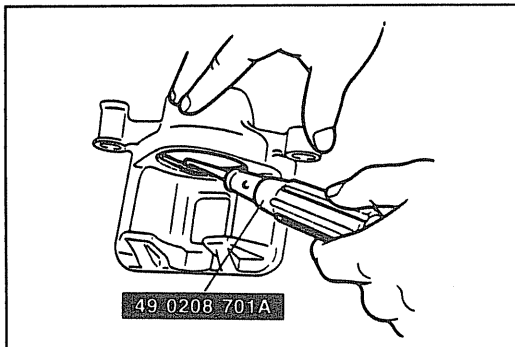
**Disassembly Note**

**Piston**

Place a piece of wood in the caliper; then blow compressed air through the hose connection hole to force out the piston.

**Caution**

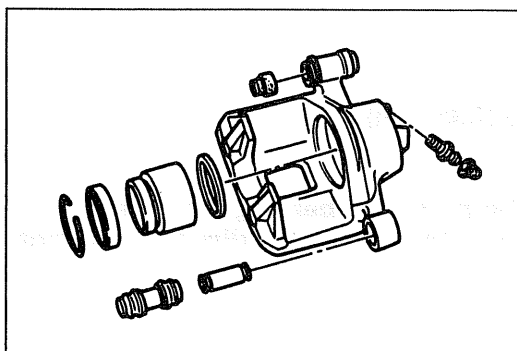
- Blow the compressed air slowly to prevent the piston from popping out.



86U11X-074

**Piston seal**

Remove the piston seal from the caliper with the **SST**.

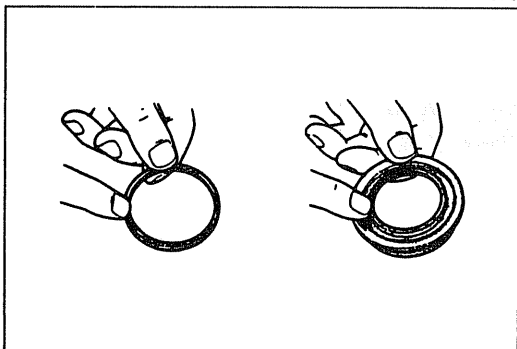


86U11X-075

### Inspection Note

Check the following and replace any faulty parts.

1. Cylinder and piston for wear or rust
2. Caliper body for damage or cracks
3. Boot for damage or poor sealing



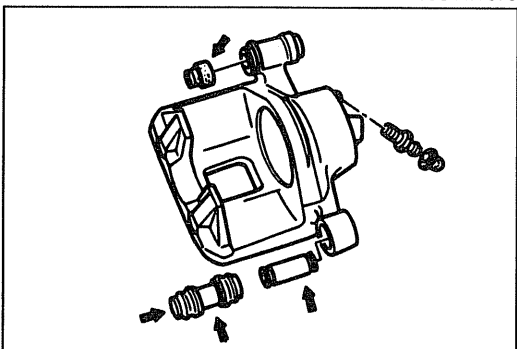
86U11X-076

### Assembly Note

#### Application of grease

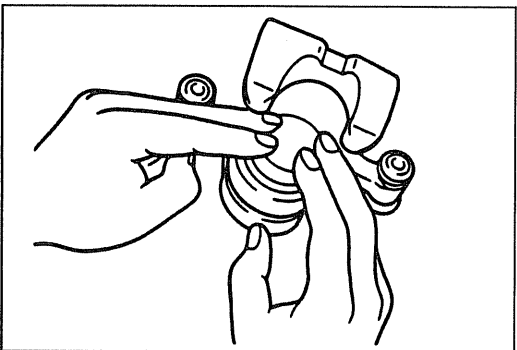
Coat the following parts with the grease supplied in the seal kit.

1. Piston seal
2. Dust seal



86U11X-077

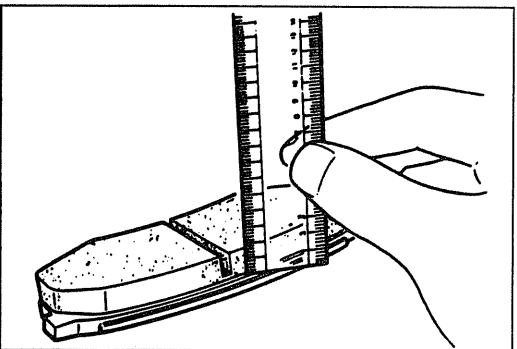
3. Guide pin
4. Guide pin boot
5. Bushing



86U11X-078

### Piston

Coat the piston and the cylinder with brake fluid; then insert the piston straight into the cylinder.



86U11X-079

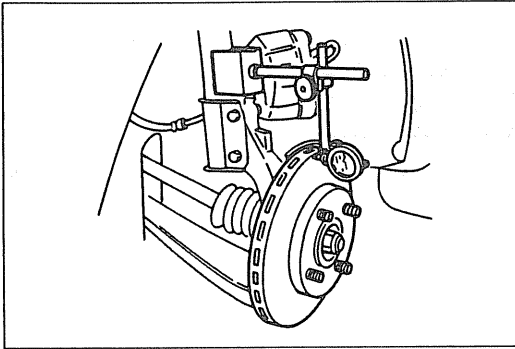
### INSPECTION

Check the following and replace any faulty parts.

#### Disc Pad

1. Oil or grease on facing
2. Abnormal wear or cracks
3. Deterioration or heat damage
4. Remaining lining thickness

**Thickness: 2.0mm (0.08 in) min.**



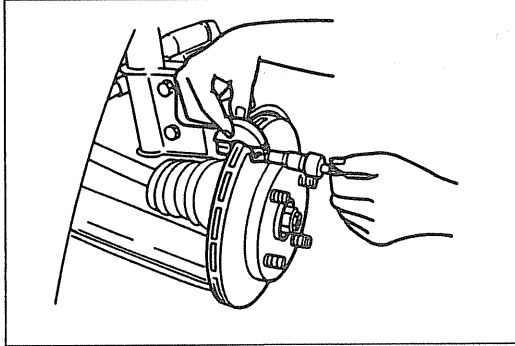
86U11X-080

**Disc Plate**

## 1. Runout

**Runout: 0.1mm (0.004 in) max.****Caution**

- There must be no wheel bearing looseness.
- Measure at the outer edge of the disc plate surface.



96U11X-037

## 2. Wear or damage

**Thickness****Standard: 24mm (0.94 in)****Minimum: 22mm (0.87 in)**

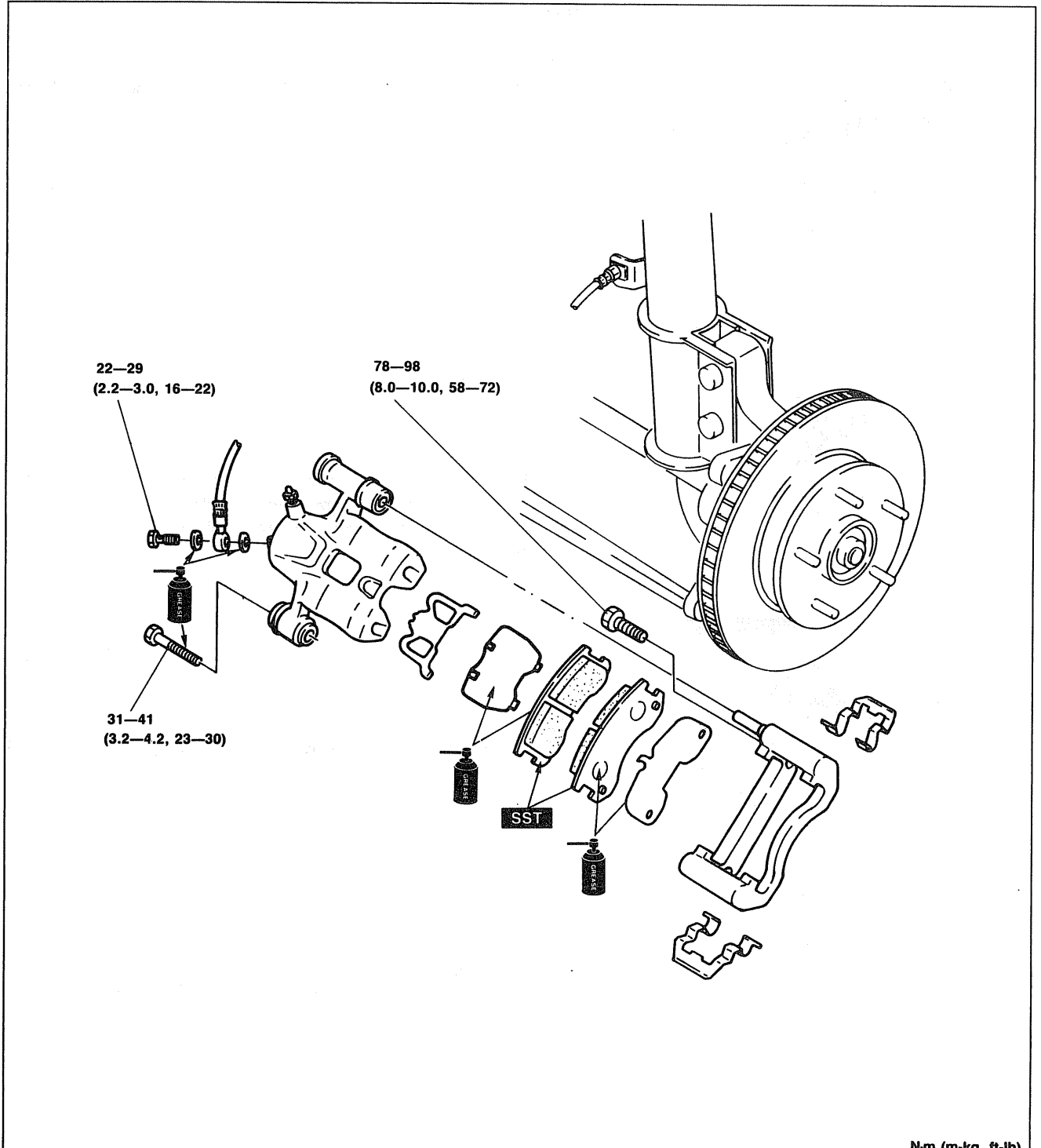
## INSTALLATION

1. Install in the reverse order of removal.
2. Tighten all nuts and bolts to the specified torque, referring to the torque specifications.
3. After installation:
  - (1) Add brake fluid and bleed air. (Refer to page P-9.)
  - (2) Depress the brake pedal a few times and check that the front brakes do not drag excessively while rotating the wheels.

### Note

- Refer to page P-31 for pad installation.

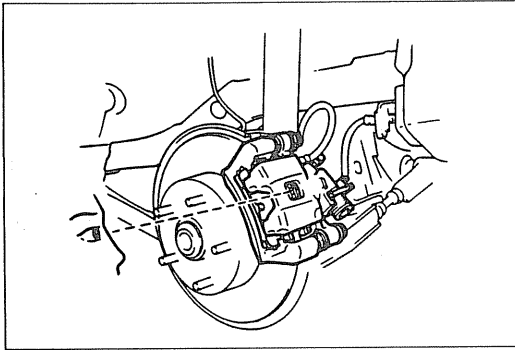
## Torque Specifications



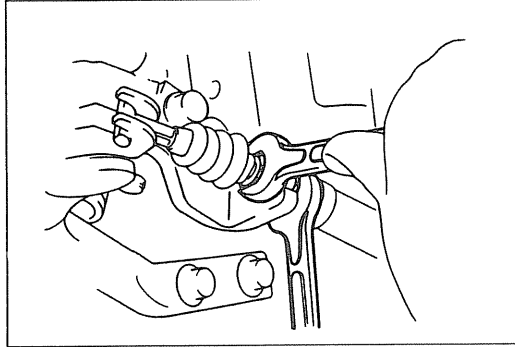
N-m (m-kg, ft-lb)

06U0PX-016

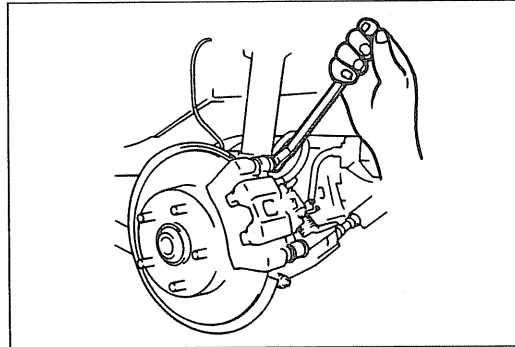
P-37



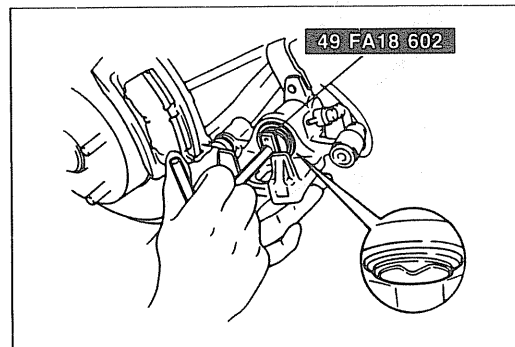
86U11X-083



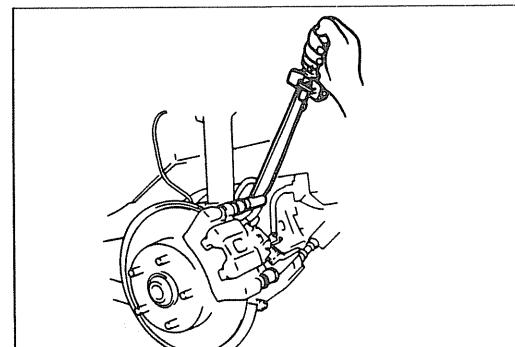
96U11X-039



96U11X-040



86U11X-086



86U11X-087

## REAR DISC BRAKE

### SIMPLE INSPECTION OF DISC PAD WEAR

1. Loosen the rear wheel lug nuts.
2. Jack up the rear of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Look through the caliper inspection hole and check that the remaining thickness of the pad is **1mm (0.04 in) min.**

### REPLACEMENT OF DISC PAD

#### Caution

- Replace the left and right pad sets at the same time.

1. Loosen the wheel lug nuts.
2. Release the parking brake.
3. Jack up the rear of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove the parking brake cable from the cable bracket and the operating lever.

6. Remove the upper mounting bolt, then pivot the caliper downward.
7. Remove the V-springs.
8. Remove the pads and shims.

#### Warning

- Asbestos dust is a health hazard. Do not blow away brake dust with compressed air.
- Use a vacuum cleaner or equivalent to remove brake dust.

9. Apply the grease supplied in the pad attachment set to the new shims; then attach them to the new pads.
10. Turn the piston fully inward by rotating the **SST** clockwise. Align the piston groove as shown in the illustration.

#### Note

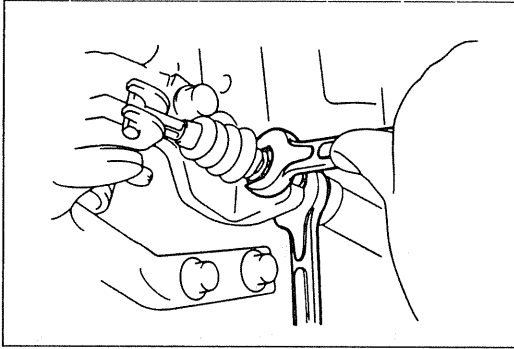
- The piston groove and inner pad alignment pin must be aligned when the inner pad is installed.

11. Install the pads and shims to the mounting support.
12. Install the pad clip.

13. Lift the caliper assembly onto the mounting support.
14. Tighten the mounting bolt to the specified torque.

#### Tightening torque:

**16–24 N·m (1.6–2.4 m·kg, 12–17 ft·lb)**



96U11X-041

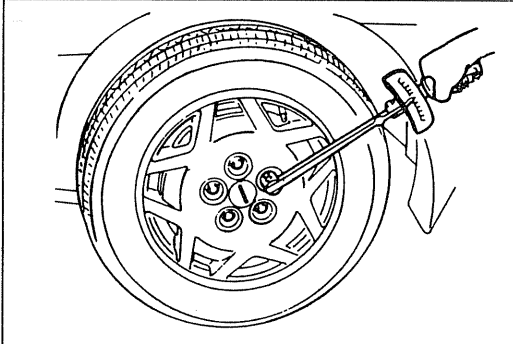
15. Connect the parking cable end to the operating lever; then tighten the locknut.

**Tightening torque:**

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

**Caution**

- There must be no clearance between the cable end and the operating lever.



86U11X-089

16. Mount the wheels.
17. Apply the brakes a few times; then check that the brakes do not drag excessively while turning the wheels.
18. Lower the vehicle.
19. Tighten the wheel lug nuts.

**Tightening torque:**

**88—118 N·m (9—12 m·kg, 65—87 ft·lb)**

**REMOVAL**

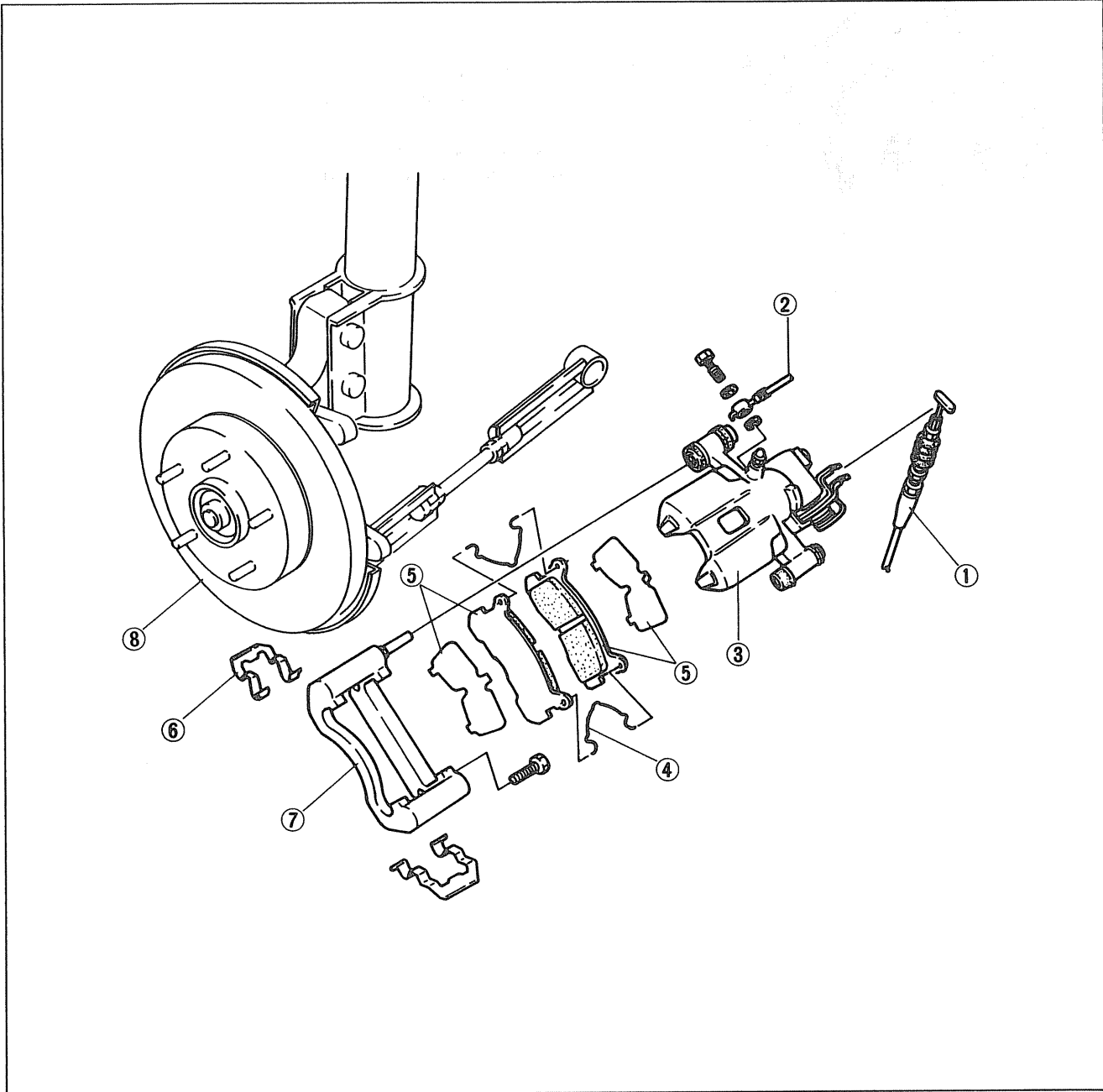
1. Loosen the wheel lug nuts.
2. Release the parking brakes.
3. Jack up the rear of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove in the order shown in the figure.

**Warning**

- **Asbestos dust is a health hazard. Do not blow away brake dust with compressed air.**

**Caution**

- **Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.**



16U0PX-015

1. Parking brake cable
2. Flexible hose
3. Caliper assembly

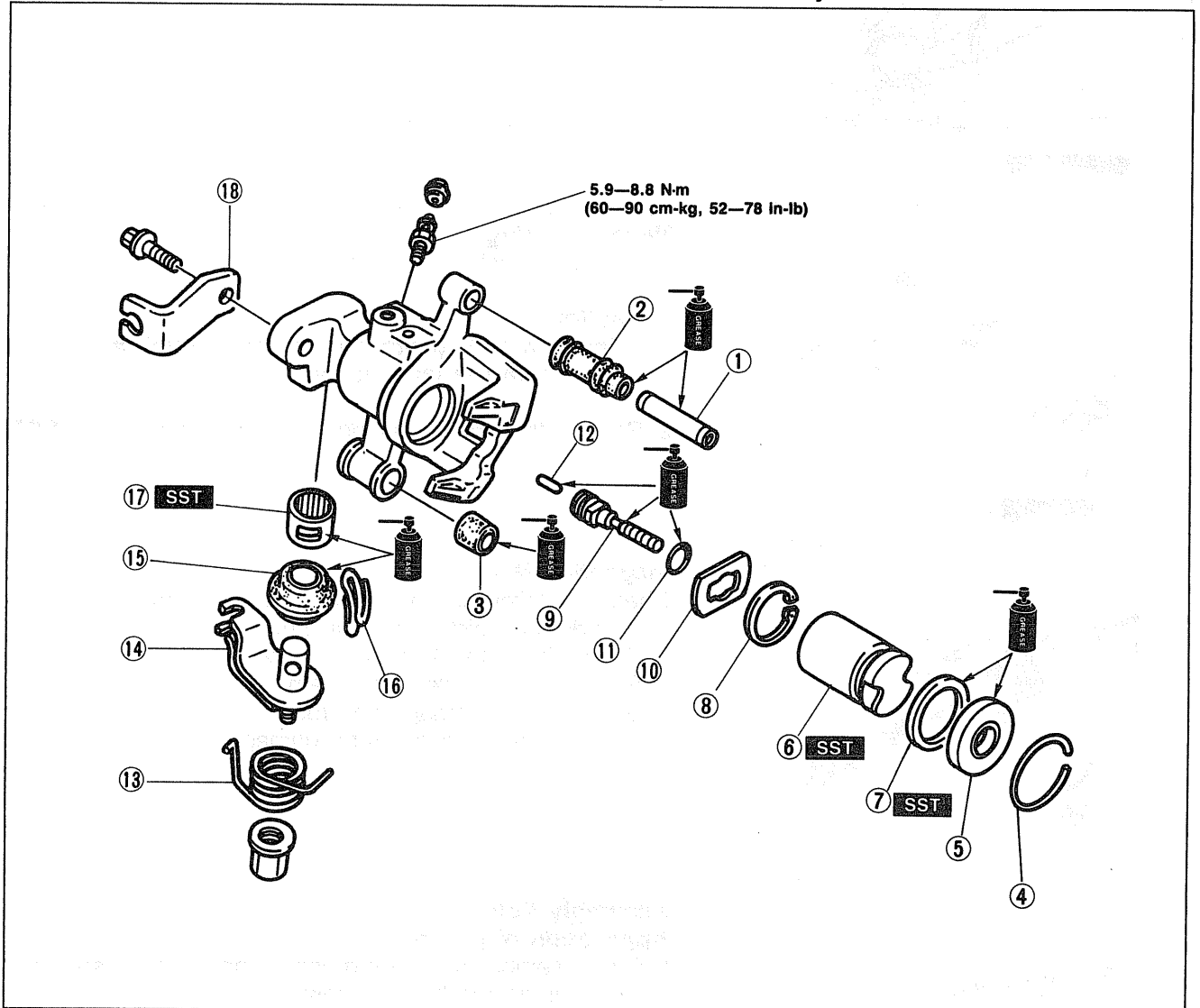
4. V-spring
5. Pad and shim
6. Guide plate

7. Mounting support
8. Disc plate  
(Refer to Section M)



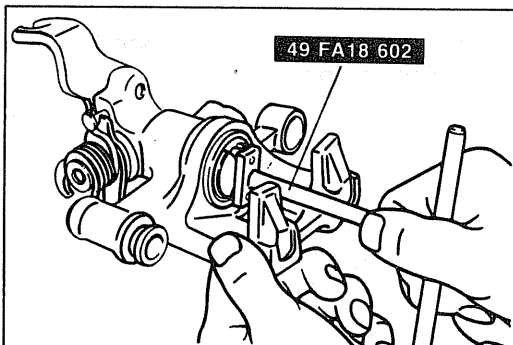
**DISASSEMBLY / ASSEMBLY**

1. Disassemble the caliper in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts, referring to **Inspection Note**.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



16U0PX-016

- |                   |                     |                     |
|-------------------|---------------------|---------------------|
| 1. Guide pin      | 7. Piston seal      | 13. Return spring   |
| 2. Pin boot       | 8. Snap ring        | 14. Operating lever |
| 3. Bushing        | 9. Adjuster spindle | 15. Boot            |
| 4. Retaining ring | 10. Stopper         | 16. Boot clip       |
| 5. Dust seal      | 11. O-ring          | 17. Needle bearing  |
| 6. Piston         | 12. Connecting link | 18. Cable bracket   |



96U11X-043

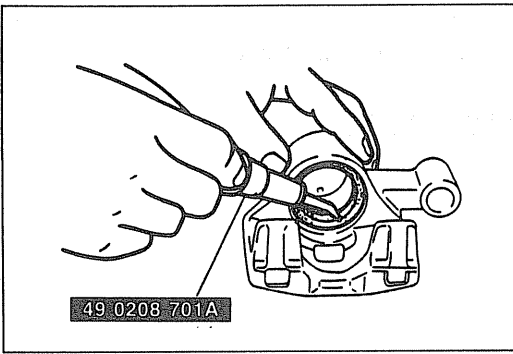
**Disassembly Note**

**Piston**

Remove the piston with the **SST**.

**Note**

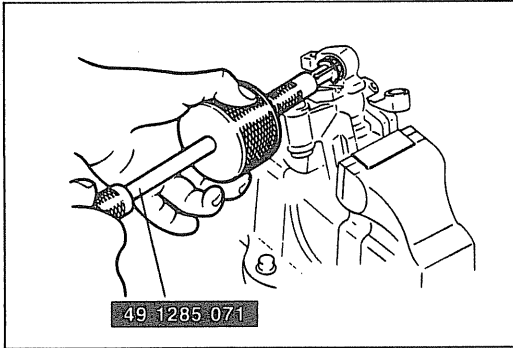
- The piston is removed by turning the **SST** counter-clockwise.



86U11X-093

**Piston seal**

Remove the piston seal with the **SST**.



86U11X-094

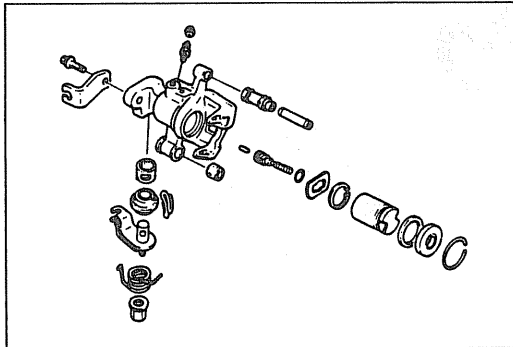
**Needle bearing**

1. Secure the caliper in a vise.

**Caution**

- Insert a soft, protective material (such as copper plates) in the jaws of the vise.

2. Remove the needle bearing from the caliper with the **SST**.

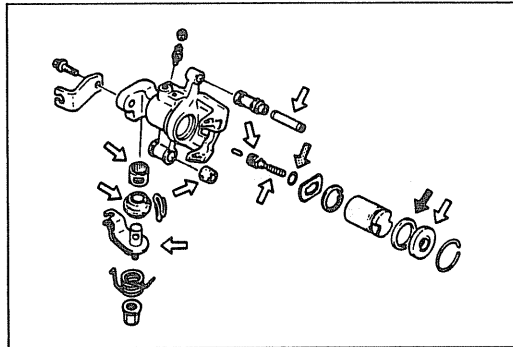


86U11X-095

**Inspection Note**

Check the following and repair or replace any faulty parts.

1. Cylinder and piston for wear and rust
2. Caliper body for damage and cracks
3. Sleeve bolt and sleeve for damage and wear
4. Guide pin for damage and rust
5. Adjuster spindle threads for damage



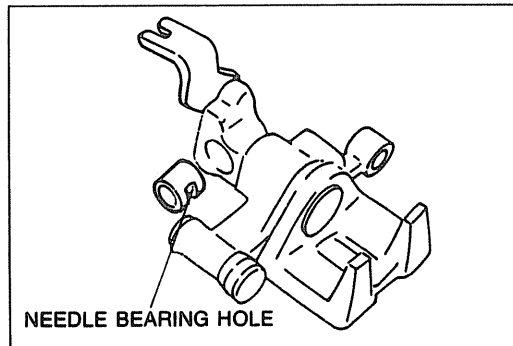
86U11X-096

**Assembly Note**

**Application of grease**

Before assembly, apply the grease supplied in the seal kit to the parts indicated by the arrows.

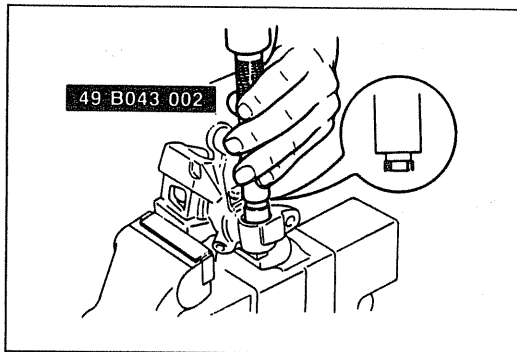
- ⇨ : Orange grease
- ⇨ : White grease
- ⇨ : Red grease



96U11X-044

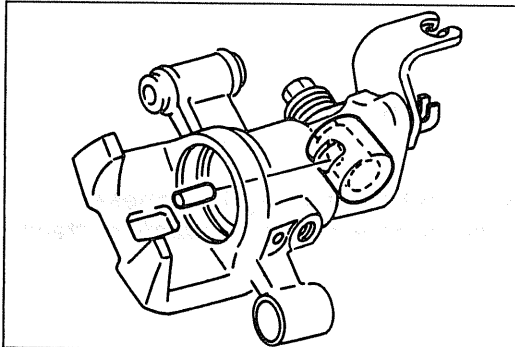
**Needle bearing**

1. Set the needle bearing in the caliper with the needle bearing hole facing the caliper cylinder.



86U11X-098

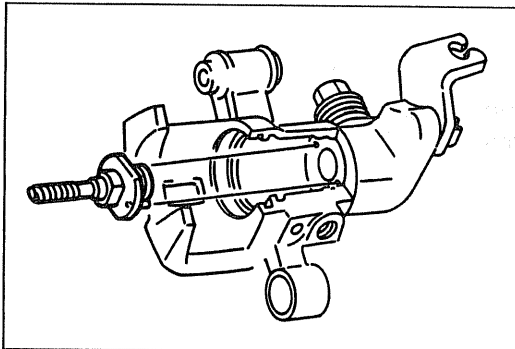
2. Press the needle bearing into the caliper with the **SST** until the **SST** bottoms against the caliper.



86U11X-099

### Connecting link

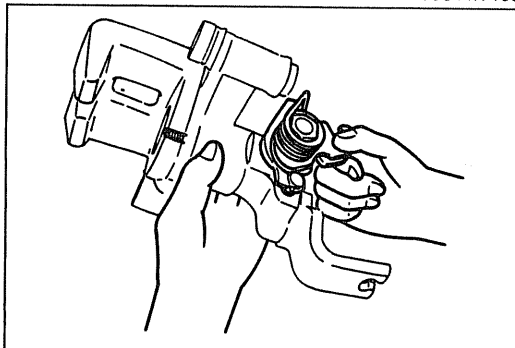
- Install the connecting link into the operating lever.



86U11X-100

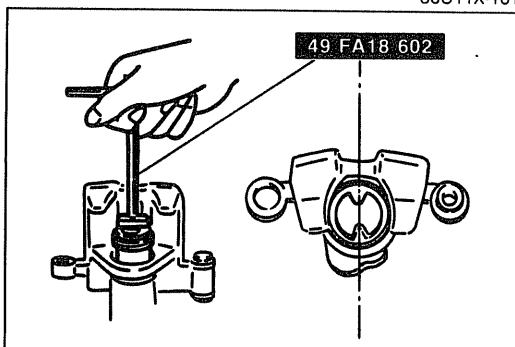
### Adjuster spindle

1. Assemble the adjuster spindle and the stopper.
2. Install the adjuster and stopper straight into the caliper cylinder with the two stopper pins fit into the caliper.
3. Install the snap ring.



86U11X-101

4. Move the operating lever and check that the adjuster spindle moves smoothly.



96U11X-045

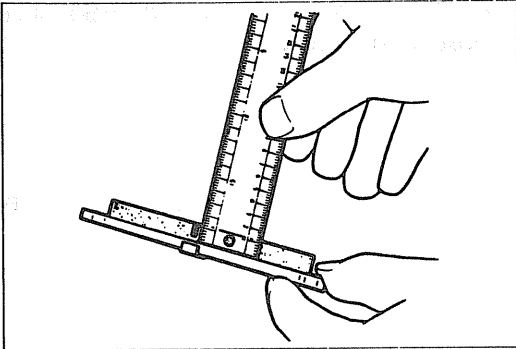
### Piston

1. Clean the piston.
2. Install the dust seal in the piston groove.
3. Turn the piston into the caliper cylinder by rotating the **SST** clockwise.

### Note

- Turn the piston in fully, and align the piston grooves as shown in the illustration.

4. Fit the dust seal into the caliper cylinder.



86U11X-103

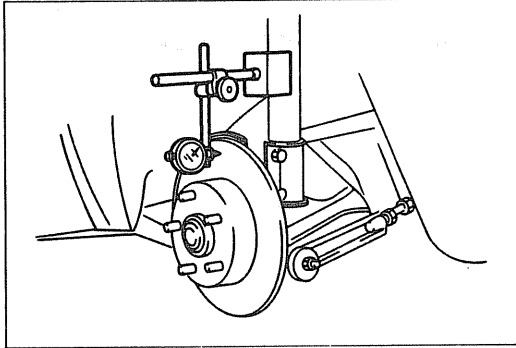
**INSPECTION**

Check the following and replace or repair any faulty parts.

**Disc Pad**

1. Oil or grease on facing
2. Abnormal wear or cracks
3. Deterioration or heat damage
4. Remaining lining thickness

**Thickness: 1mm (0.04 in) min.**



86U11X-104

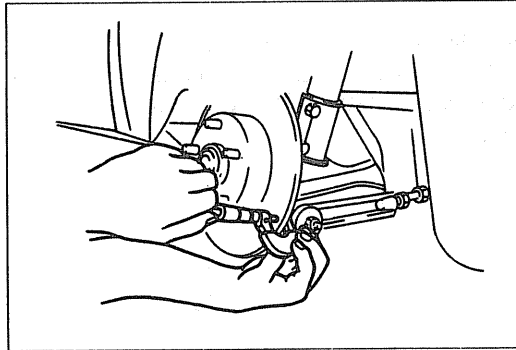
**Disc Plate**

1. Runout

**Runout: 0.1mm (0.004 in) max.**

**Caution**

- There must be no wheel bearing looseness.
- Measure at the outer edge of the disc plate surface.



86U11X-105

2. Wear or damage

**Thickness**

**Standard: 10mm (0.39 in)**

**Minimum: 8mm (0.31 in)**

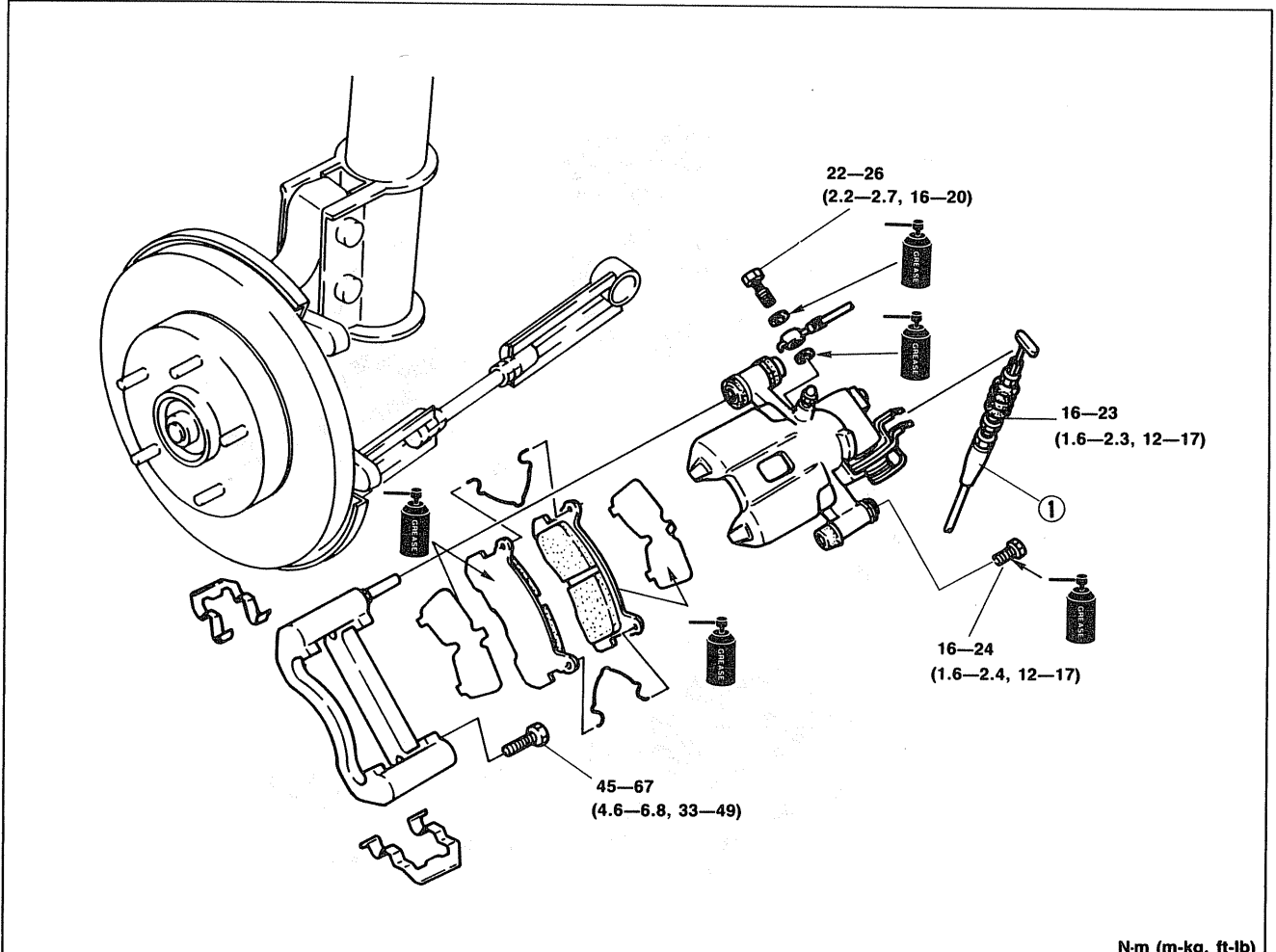
## INSTALLATION

1. Install in the reverse order of removal, referring to **Installation Note** for specially marked parts.
2. Tighten all nuts and bolts to the specified torque, referring to the torque specifications.
3. After installation:
  - (1) Add brake fluid and bleed air. (Refer to page P-9.)
  - (2) Adjust the parking brake lever stroke. (Refer to page P-54.)
  - (3) Depress the brake pedal a few times, and check that the rear brakes do not drag excessively while rotating the wheel.

### Note

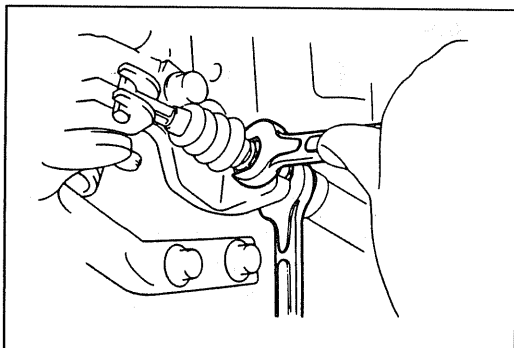
- Refer to page P-38 for pad installation.

## Torque Specifications



16U0PX-017

### 1. Parking brake cable



86U11X-107

### Installation Note

#### Parking brake cable

Connect the parking brake cable end onto the operating lever; then fix it to the bracket by the locknut.

### Caution

- There must be no clearance between the cable end and the operating lever.

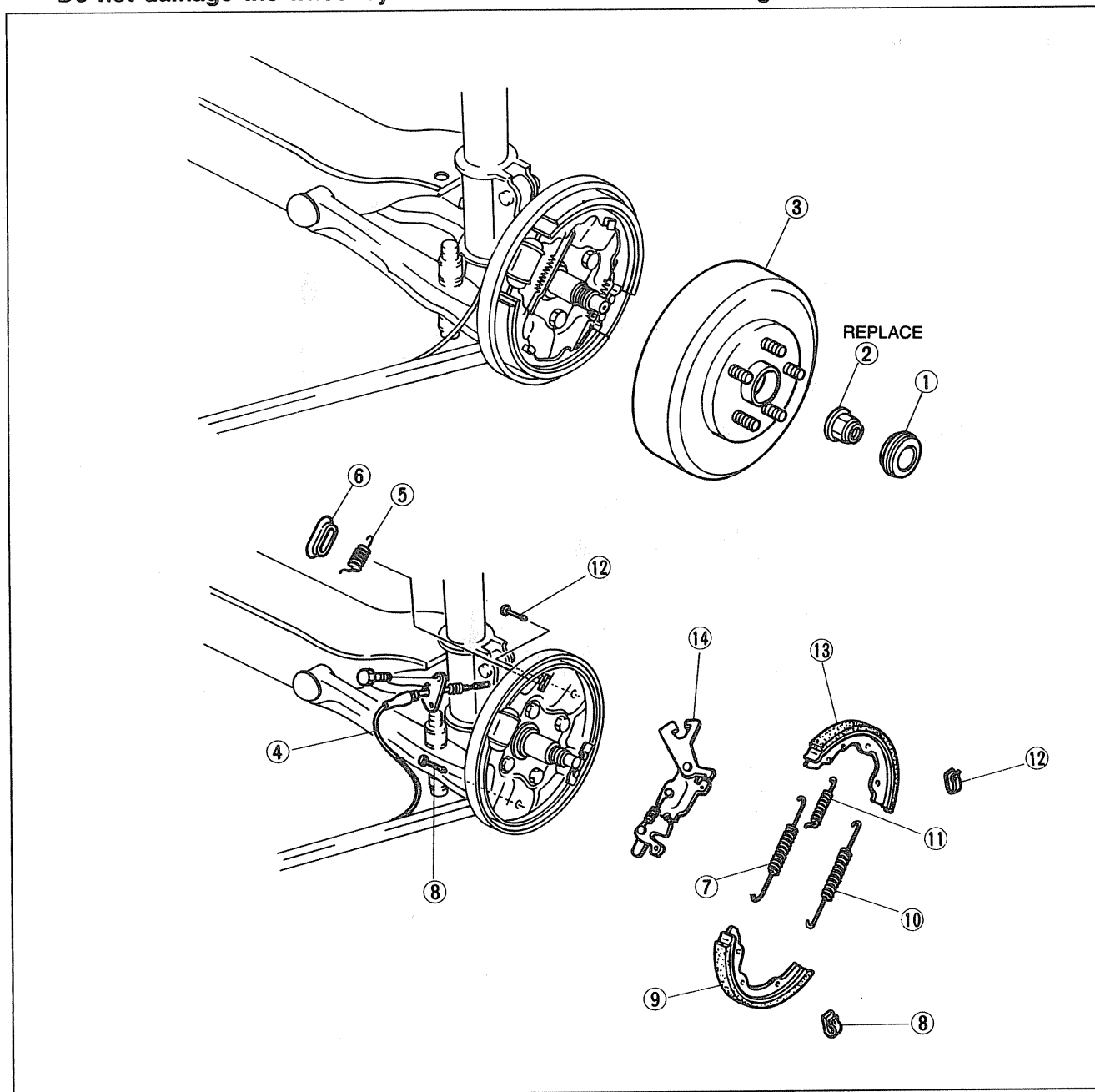
REAR DRUM BRAKE

REMOVAL

1. Loosen the wheel lug nuts.
2. Release the parking brake.
3. Jack up the rear of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove in the order shown in the figure, referring to **Removal Note**.

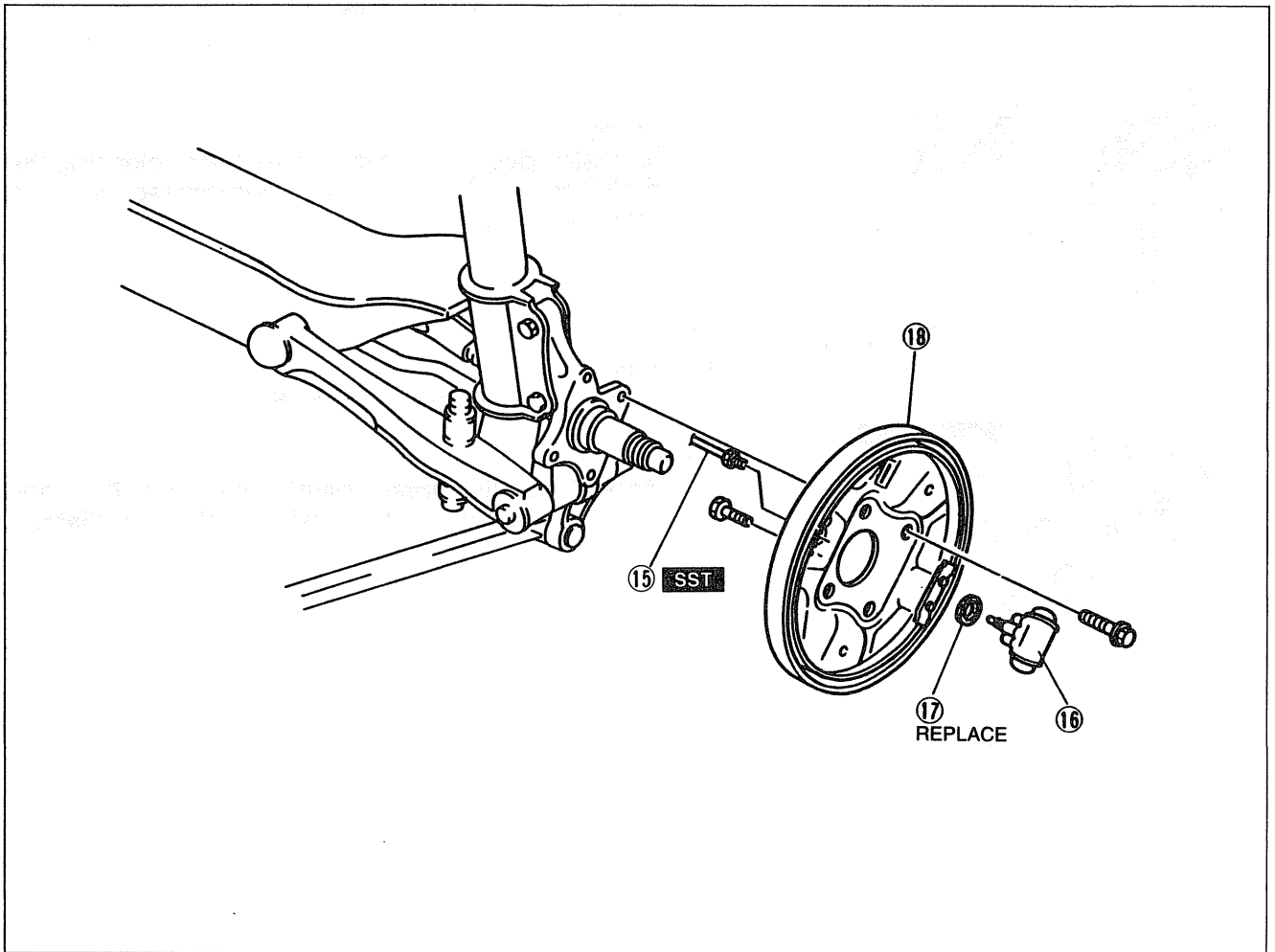
Caution

- Do not damage the wheel cylinder dust boots when removing the brake shoes.



16UOPX-018

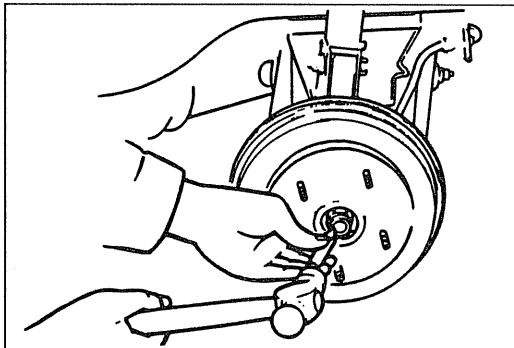
- |                        |                              |                                |
|------------------------|------------------------------|--------------------------------|
| 1. Hub cap             | 6. Dust cover                | 11. Anti-rattle spring         |
| 2. Locknut             | 7. Return spring (upper)     | 12. Hold pin and spring        |
| 3. Brake drum          | 8. Hold pin and spring       | 13. Brake shoe (trailing side) |
| 4. Parking brake cable | 9. Brake shoe (leading side) | 14. Operating lever assembly   |
| 5. Return spring       | 10. Return spring (lower)    |                                |



86U11X-109

- 15. Brake pipe
- 16. Wheel cylinder assembly

- 17. Gasket
- 18. Backing plate



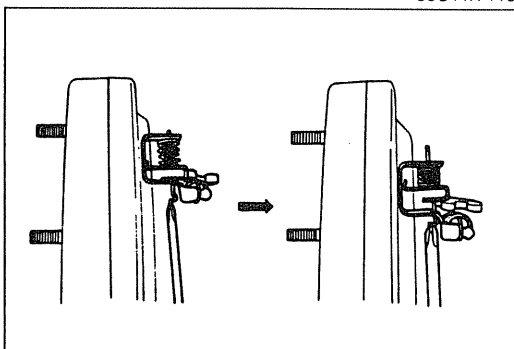
86U11X-110

**Removal Note**  
**Locknut**

Uncrimp the locknut, and remove it.

**Caution**

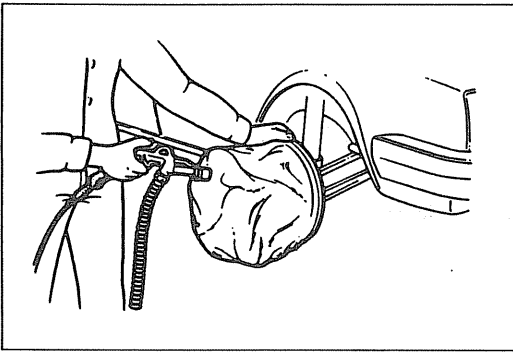
- Do not reuse the locknut.



86U11X-111

**Brake drum**

If the drum is difficult to remove, push the operating lever stopper (at backing plate) upward to release the operating lever and increase shoe clearance.



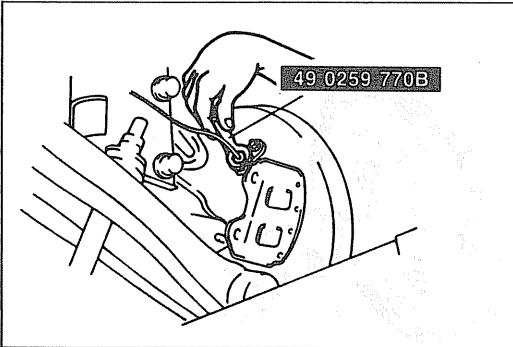
86U11X-112

**Cleaning of drum brake assembly**

Use a vacuum cleaner or equivalent to clean the brake assembly

**Warning**

- **Asbestos dust is a health hazard. When cleaning the brake assembly, do not use compressed air or a brush.**



86U11X-113

**Brake pipe**

Disconnect the brake pipe with the SST.

**Caution**

- **Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.**



## DISASSEMBLY / ASSEMBLY OF WHEEL CYLINDER

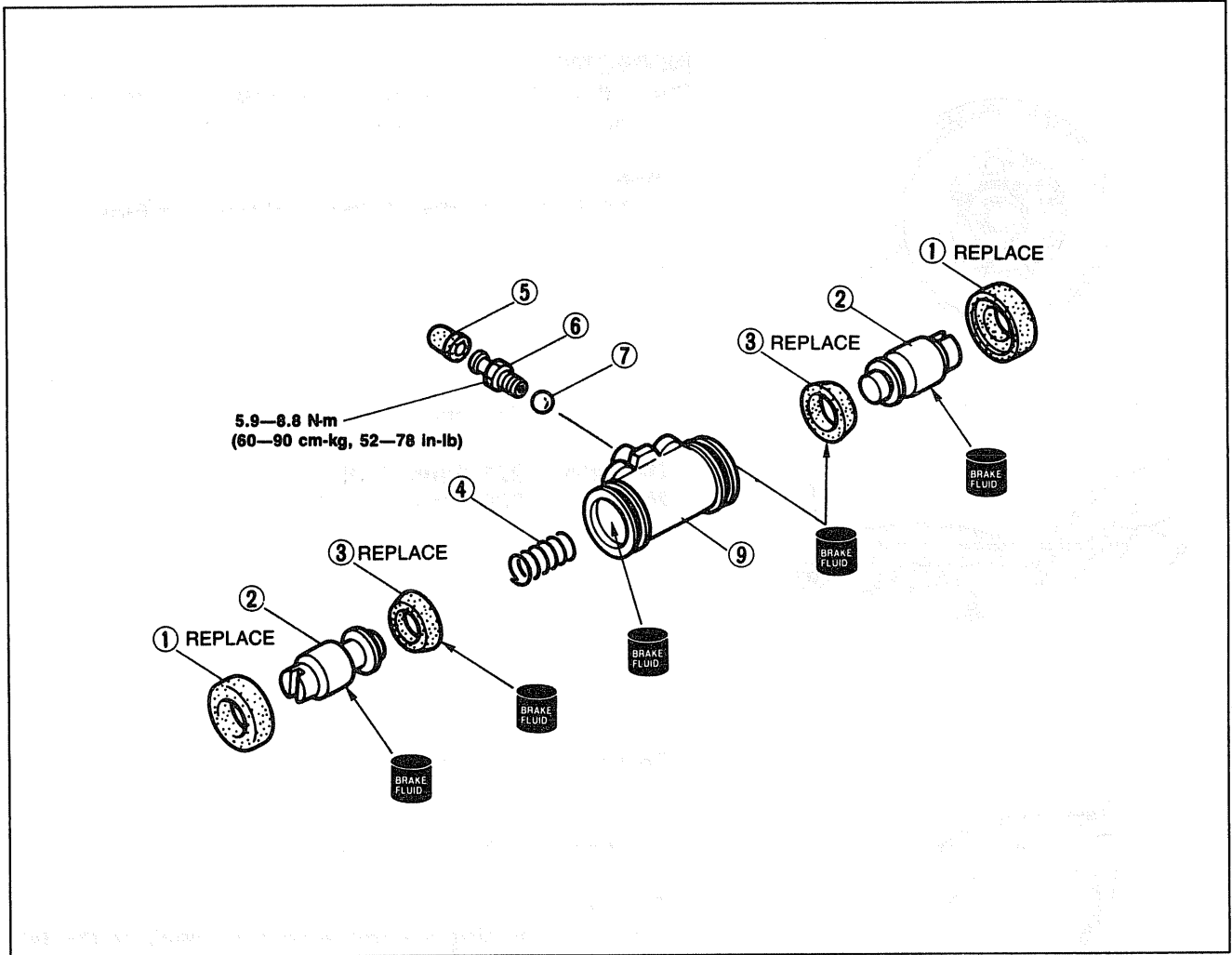
1. Disassemble in the order shown in the figure.
2. Inspect all parts, referring to **Inspection Note**.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

### Caution

- Do not damage the piston or cylinder. Do not let foreign material enter the cylinder.

### Note

- Use new piston cups when installing.

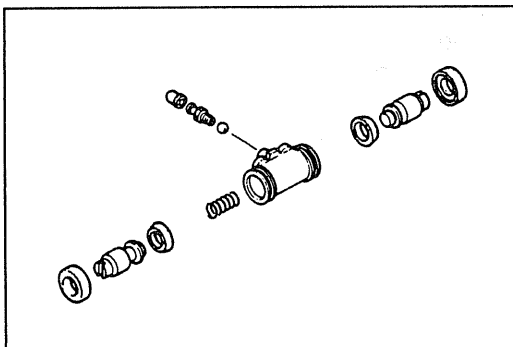


16U0PX-019

1. Dust boot
2. Piston
3. Piston cup

4. Spring
5. Rubber cap
6. Bleeder screw

7. Steel ball
8. Wheel cylinder body

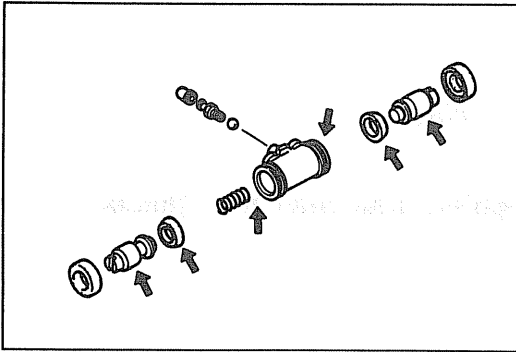


86U11X-115

### Inspection Note

Check the following and repair or replace any faulty parts.

1. Weak or broken spring
2. Worn, rusted, or damaged wheel cylinder

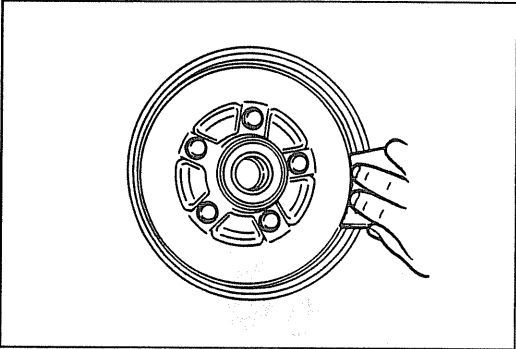


96U11X-049

**Assembly Note**

Before assembly, apply brake fluid to the following parts:

1. Piston cup
2. Cylinder bore
3. Piston



86U11X-117

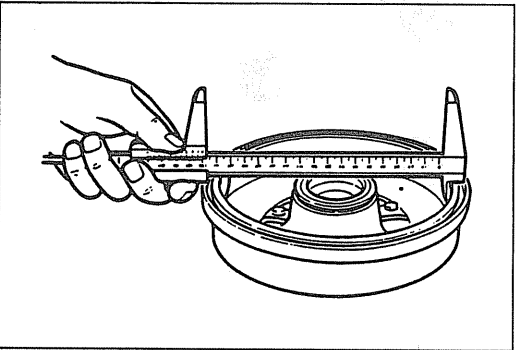
**INSPECTION**

Check the following and repair or replace any faulty parts.

1. Scratches, uneven or abnormal wear inside drum

**Note**

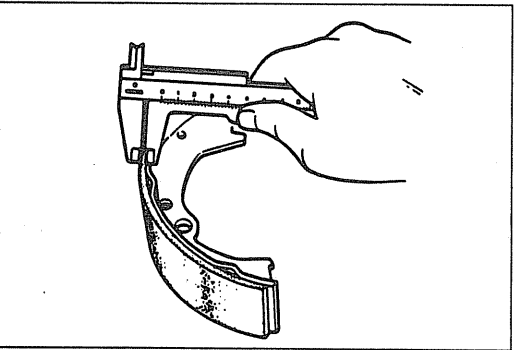
- Repair by sanding if the problem is minor.



86U11X-118

2. Drum inner diameter

**Diameter: 228.6mm (9.00 in)**  
**Maximum: 230.1mm (9.06 in)**



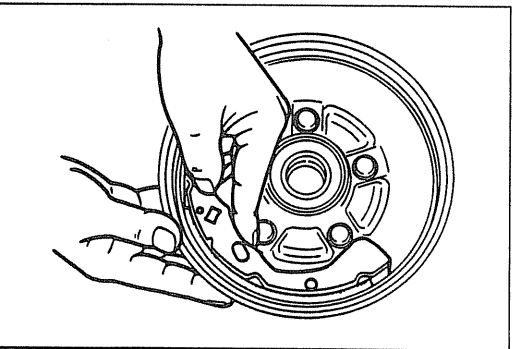
96U11X-050

3. Peeling, cracking, or extremely uneven wear of lining
4. Lining wear

**Thickness: 1.0mm (0.04 in) min.**

**Caution**

- When replacing a shoe assembly, replace the left and right shoe sets at the same time.



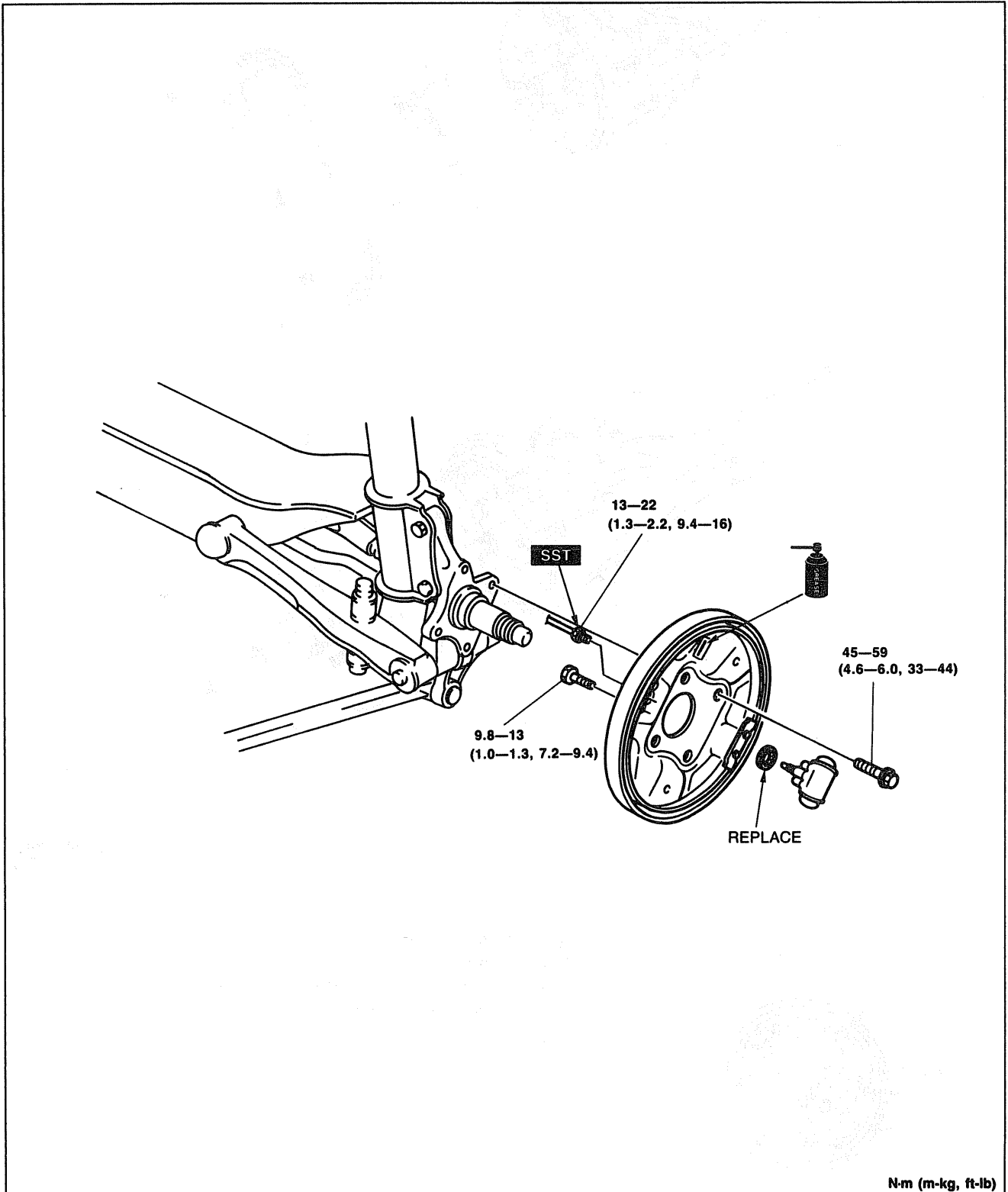
86U11X-120

5. Fit of drum and lining
  - (1) Apply chalk to the inside of the drum.
  - (2) Rub the shoe against the drum.
  - (3) Check lining to drum contact.
  - (4) After checking, remove chalk.

## INSTALLATION

1. Install in the reverse order of removal.
2. Tighten all nuts and bolts to the specified torque, referring to the torque specifications.
3. After installation:
  - (1) Add brake fluid and bleed air. (Refer to page P-9.)
  - (2) Adjust the parking brake lever stroke. (Refer page to P-54.)
  - (3) Depress the brake pedal a few times, and check that the rear brakes do not drag while rotating the wheel.

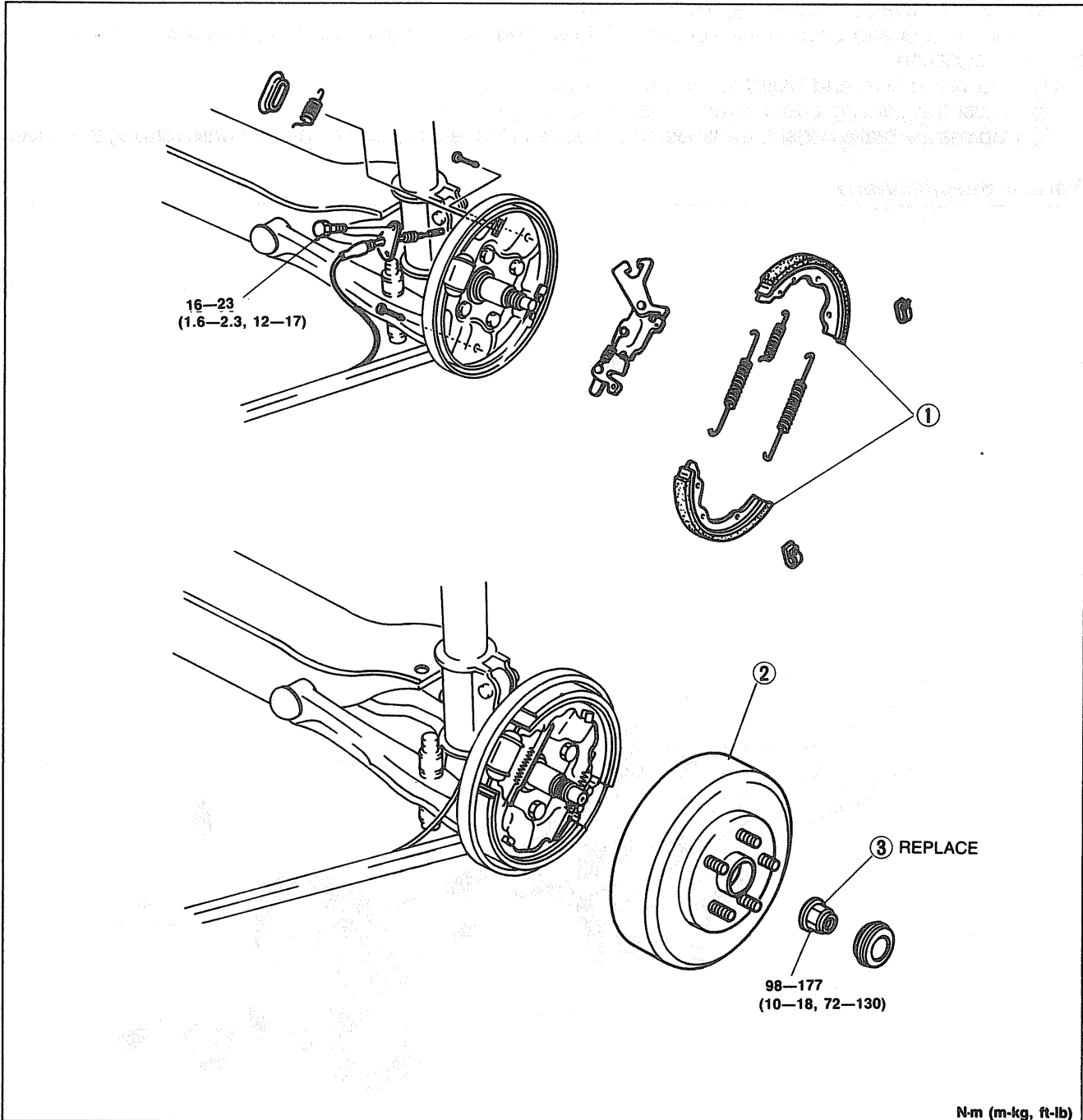
## Torque Specifications



N-m (m-kg, ft-lb)

06U0PX-019

Torque Specifications

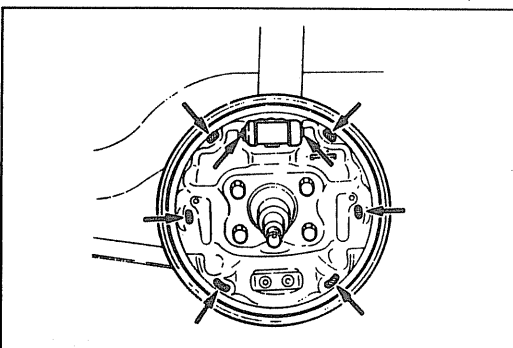


86U11X-122

1. Brake shoe

2. Brake drum

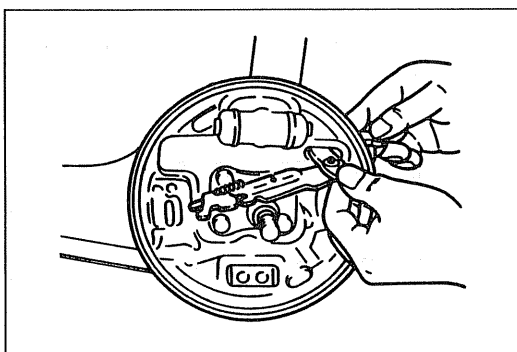
3. Locknut



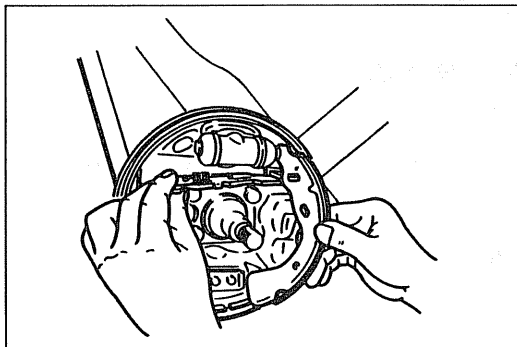
86U11X-123

**Installation Note**  
**Brake shoes**

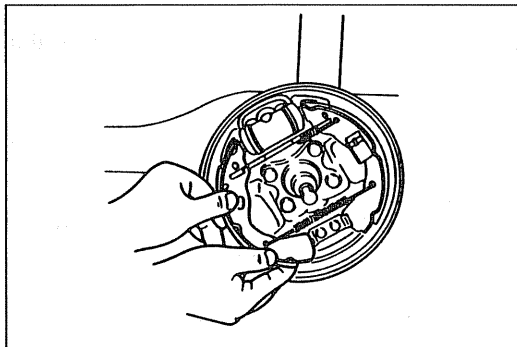
1. Apply grease to the following points:
  - (1) Shoe and cylinder contact points
  - (2) Shoe anchor points
  - (3) Projections of backing plate



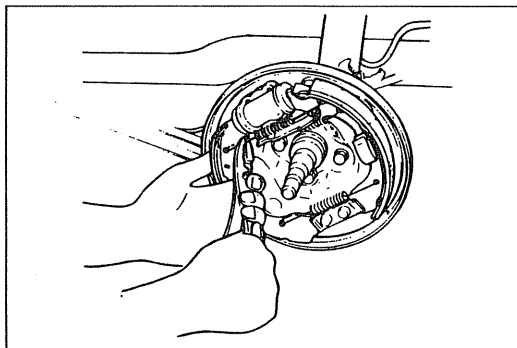
86U11X-124



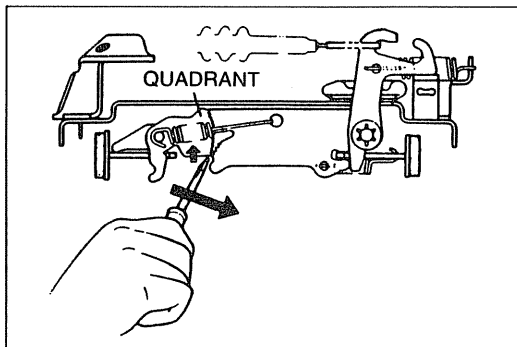
86U11X-125



96U11X-052



86U11X-127



86U11X-128

2. Install the operating lever assembly through the backing plate.
3. Install the return spring to the backing plate (reverse side) and the operating lever.

4. Install the shoe (trailing side) to the operating lever, then to the wheel cylinder and anchor plate.
5. Fix the shoe with the hold spring and hold pin.
6. Install the anti-rattle spring.

7. Install the return spring (lower) to the shoes (trailing side and leading side).
8. Install the leading side shoe to the operating lever, then to the wheel cylinder and anchor plate.
9. Fix the shoe with the hold spring and hold pin.

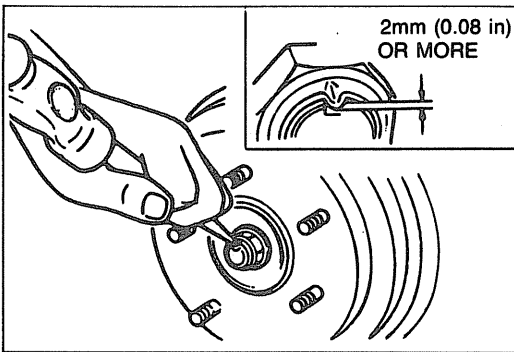
10. Install the return spring (upper).

### Brake drum

1. Move the quadrant against the backing plate with a screwdriver and increase the shoe clearance.
2. Install the brake drum.

### Note

- The shoe clearance will be automatically adjusted by applying parking brake.



86U11X-129

**Locknut**

Tighten the new locknut to the specified torque and securely stake it to the spindle groove.

**Tightening torque:**

**98—177 N·m (10—18 m·kg, 72—130 ft·lb)**

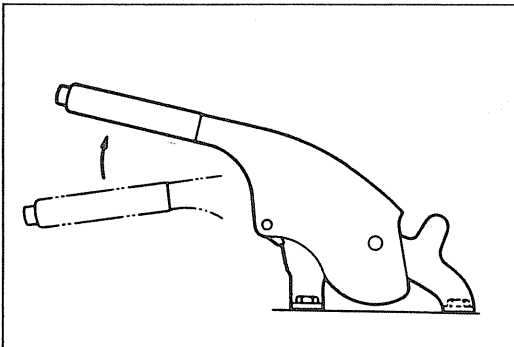
**Caution**

- Do not use a pointed tool for staking.

**PARKING BRAKE****ON-VEHICLE MAINTENANCE****Parking Brake Lever Stroke****Inspection**

Check that the stroke is within specification when the parking brake lever is pulled with a force of 98 N (10 kg, 22 lb).

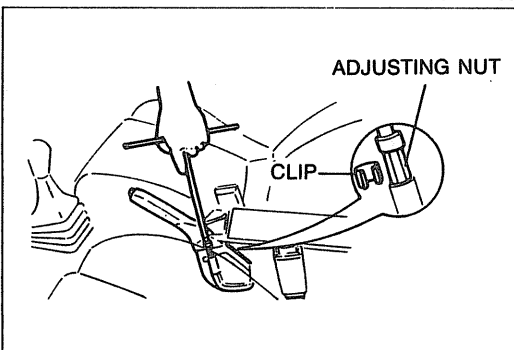
**Stroke: 5—7 notches**



86U11X-130

**Adjustment**

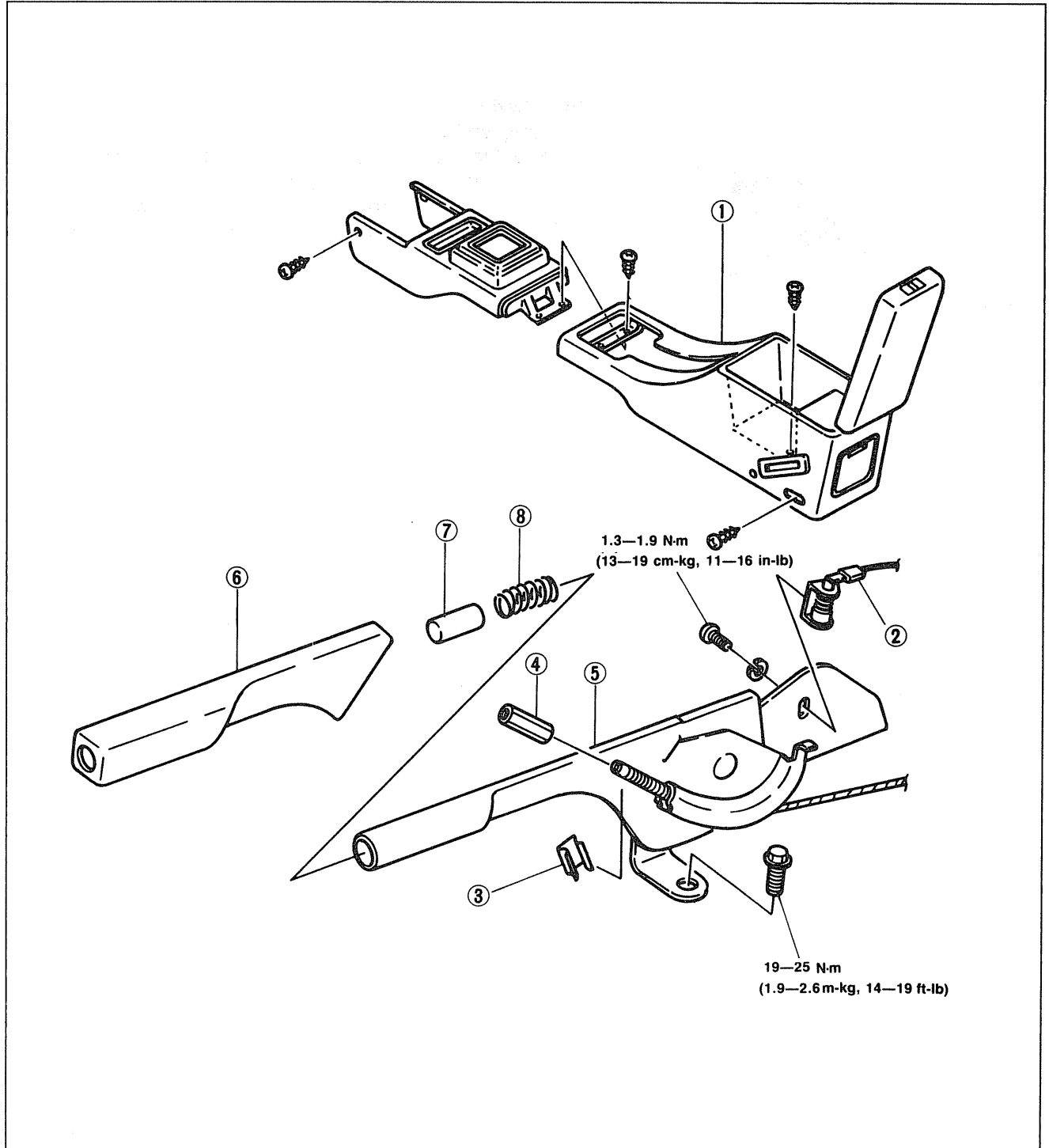
1. Before adjustment, start the engine and depress the brake pedal several times.
2. Stop the engine.
3. Remove the adjusting nut clip and turn the adjusting nut at the front of the parking cable.
4. After adjustment, check the following points:
  - (1) Turn the ignition switch ON, pull the parking brake lever one notch and check that the parking brake warning lamp illuminates.
  - (2) Check that the rear brakes do not drag.



96U11X-053

## REMOVAL / INSTALLATION OF PARKING BRAKE LEVER

1. Block the wheels firmly.
2. Release the parking brakes.
3. Remove in the order shown in the figure.
4. Inspect all parts, referring to **Inspection Note**.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. After installation:  
Adjust the parking lever stroke. (Refer to page P-54.)

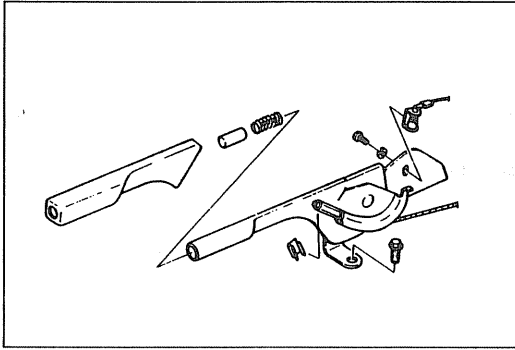


16U0PX-020

1. Rear console
2. Parking brake switch
3. Clip

4. Adjusting nut
5. Parking brake lever
6. Cover

7. Button
8. Spring

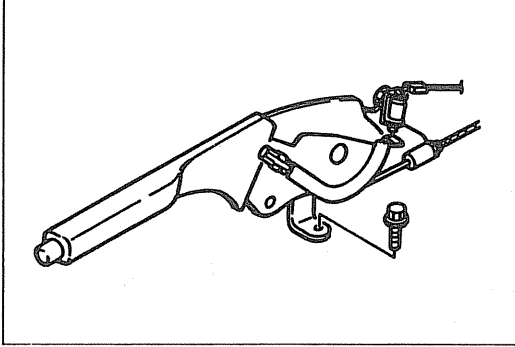


86U11X-134

**Inspection Note**

Check the following and replace any faulty parts.

1. Sector and ratchet pawl for wear and damage
2. Spring for weakness and breakage



86U11X-135

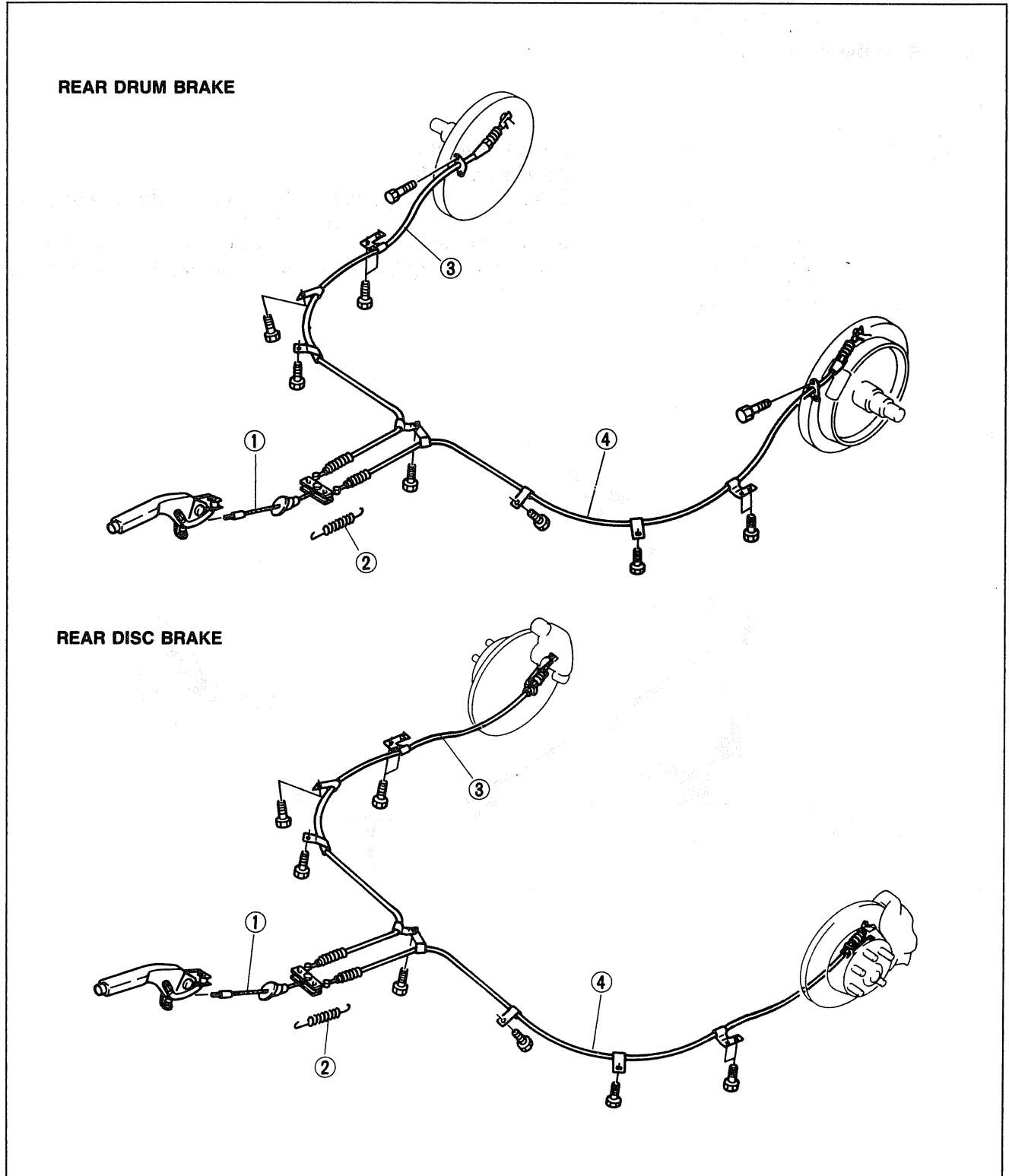
**Installation Note****Parking switch**

1. Install the parking switch so that it contacts the parking brake lever when the lever is released.
2. Turn the ignition switch ON, and check that the parking brake warning lamp illuminates with the lever pulled one notch.



## REMOVAL OF PARKING BRAKE CABLE

1. Block the wheels firmly.
2. Remove the rear console. (Refer to page P-54.)
3. Release the parking brake and remove the adjusting nut of the parking brake lever. (Refer to page P-54.)
4. Jack up the vehicle and support it with safety stands.
5. Remove the parking brake cable in the order shown in the figure.



1. Front parking cable  
2. Spring

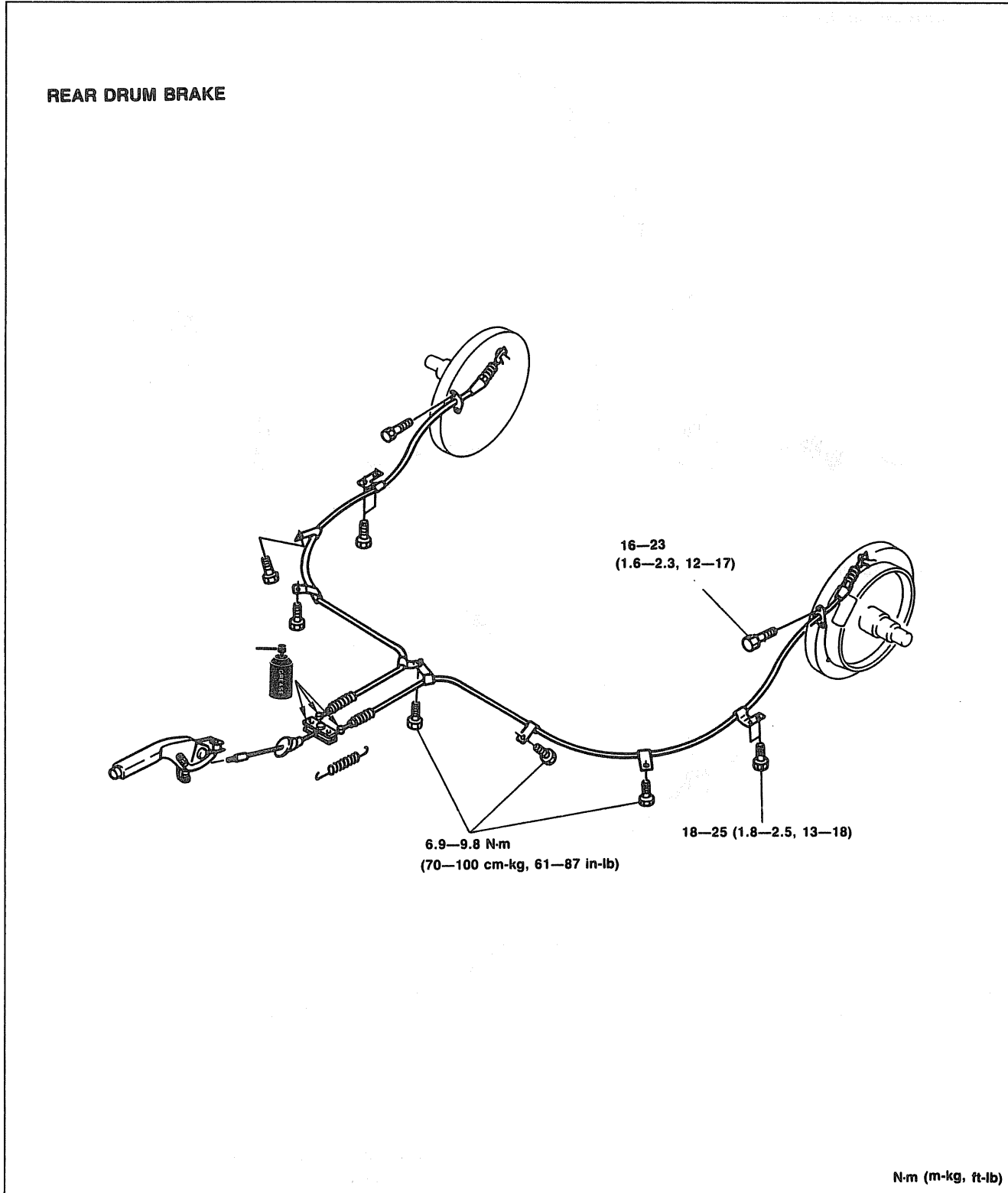
3. Parking brake cable (left)  
4. Parking brake cable (right)

16U0PX-021

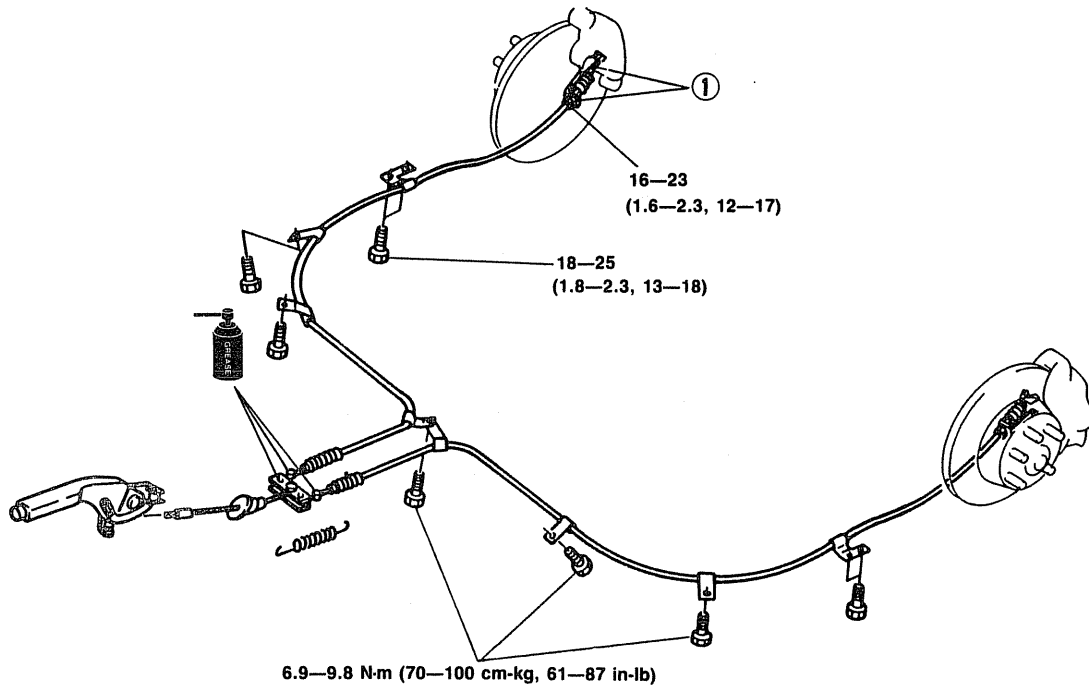
**INSTALLATION OF PARKING BRAKE CABLE**

1. Install in the reverse order of removal, referring to **Installation Note**.
2. Tighten all nuts and bolts to the specified torque, referring to the torque specifications.
3. After installation:
  - (1) Adjust the parking brake lever stroke. (Refer to page P-54.)
  - (2) Depress the brake pedal a few times, and check that the rear brakes do not drag while rotating the wheels.

**Torque Specifications**



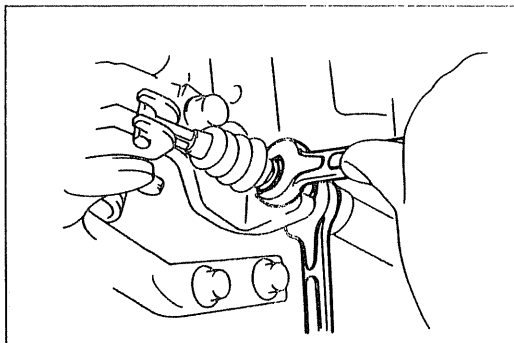
REAR DISC BRAKE



N-m (m-kg, ft-lb)

86U11X-138

1. Parking brake cable (rear disc brake)



96U11X-057

**Installation Note**

**Parking brake cable (Rear disc brake)**

Connect the cable end to the operating lever; then tighten the locknut.

**Tightening torque:**


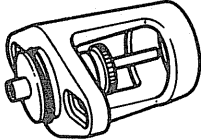
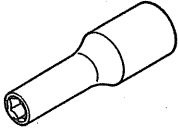
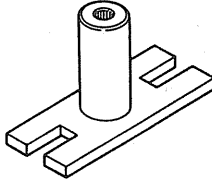
16-23 N-m (1.6-2.3 m-kg, 12-17 ft-lb)

**Caution**

- There must be no clearance between the cable end and the operating lever.

ANTI-LOCK BRAKE SYSTEM (ABS)

PREPARATION  
SST

<p>49 0259 770B Wrench, flare nut</p> 	<p>For removal and installation of brake pipes</p>	<p>49 B043 001 Gauge, adjust</p> 	<p>For adjustment of push rod clearance</p>
<p>49 B043 004 Wrench, socket</p> 	<p>For adjustment of push rod clearance</p>	<p>49 B043 003 Lock tool, turning</p> 	<p>For adjustment of push rod clearance</p>

16U0PX-078

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**OUTLINE**

- The warning and fail-safe circuits of the ABS control unit work together to alert the driver of an ABS malfunction by illuminating the ABS warning lamp and **shutting down** ABS operation. If a problem occurs, the brake system reverts to lamp normal braking.
- Malfunction codes are stored in the ABS control unit and are output during the diagnostic mode on command of the technician. These codes help to locate the probable cause of a malfunction. The codes are shown as flashing of the ABS warning lamp and pulsations of an analog voltmeter pointer.

16U0PX-092

**SERVICE NOTE**

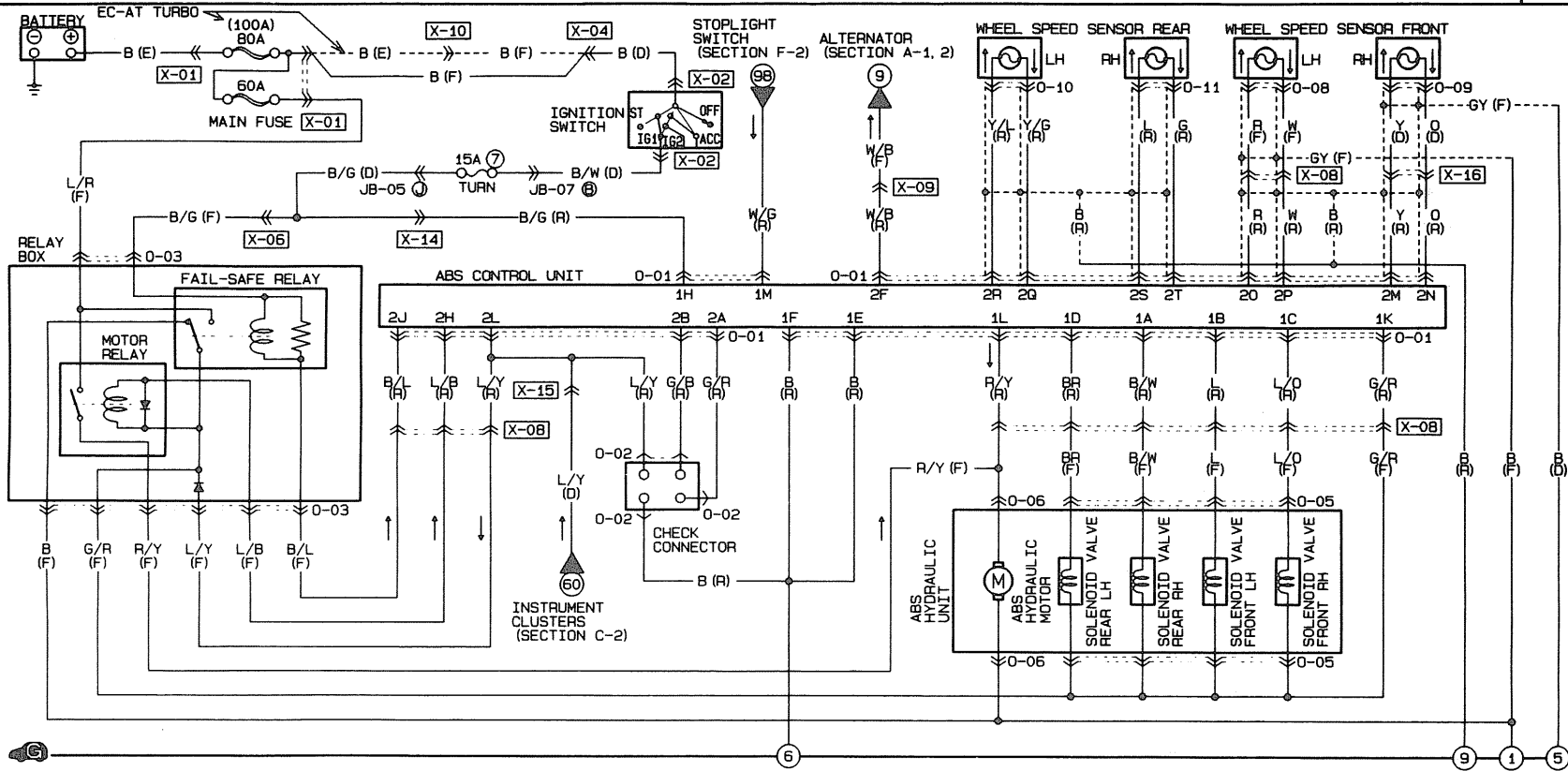
1. Do not turn the ignition switch ON while an ABS related connector is disconnected. This will be judged as a malfunction and be stored in the ABS control unit memory.
2. Be sure to remove the jumper wire from the check connector after inspecting and repairing.
3. The malfunction memory is not canceled by disconnecting the battery. After repairs are made, be sure to erase the memory as directed. (Refer to page **P-70**.)
4. The ABS warning lamp may illuminate under any of the following conditions:
  - When the vehicle is traveling on snow or ice with the parking brake activated or a brake dragging at one wheel.
  - When the vehicle is traveling on snow or ice with repeated sudden acceleration and braking.
  - When different size tires are used.
  - When tires of different gripping performance are used.
  - When the vehicle is jacked up, if a wheel is turned manually or by the engine for over 20 seconds while the ignition is ON.
  - When there is insufficient battery voltage.

**Note**

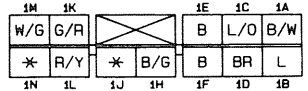
- **Under the above conditions there will be no entry of a failure to the ABS control unit memory and the failure will be erased when the ignition switch is turned OFF.**

16U0PX-093

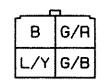
# ANTI-LOCK BRAKE SYSTEM (COMPACT TYPE)



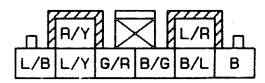
0-01 ABS CONTROL UNIT (R)



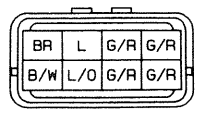
0-02 CHECK CONNECTOR (R)



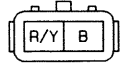
0-03 RELAY BOX (F)



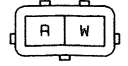
0-05 ABS HYDRAULIC UNIT (F)



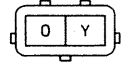
0-06 ABS HYDRAULIC UNIT (F)



0-08 WHEEL SPEED SENSOR FRONT LH (F)



0-09 WHEEL SPEED SENSOR FRONT RH (D)



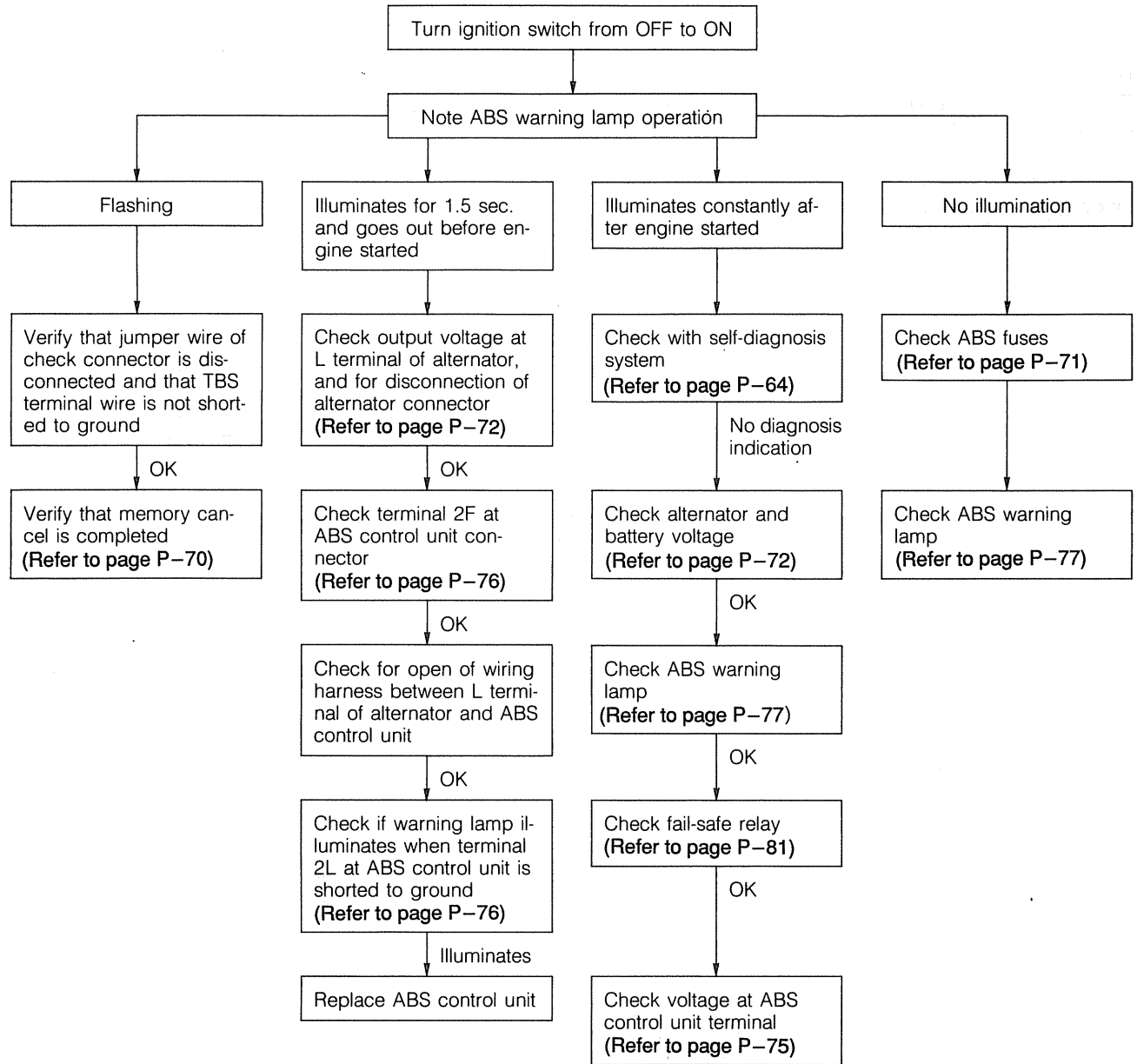
0-10 WHEEL SPEED SENSOR REAR LH (R)



0-11 WHEEL SPEED SENSOR REAR RH (R)



TROUBLESHOOTING MAIN FLOWCHART



16U0PX-095

DIAGNOSTIC SYSTEM INSPECTION

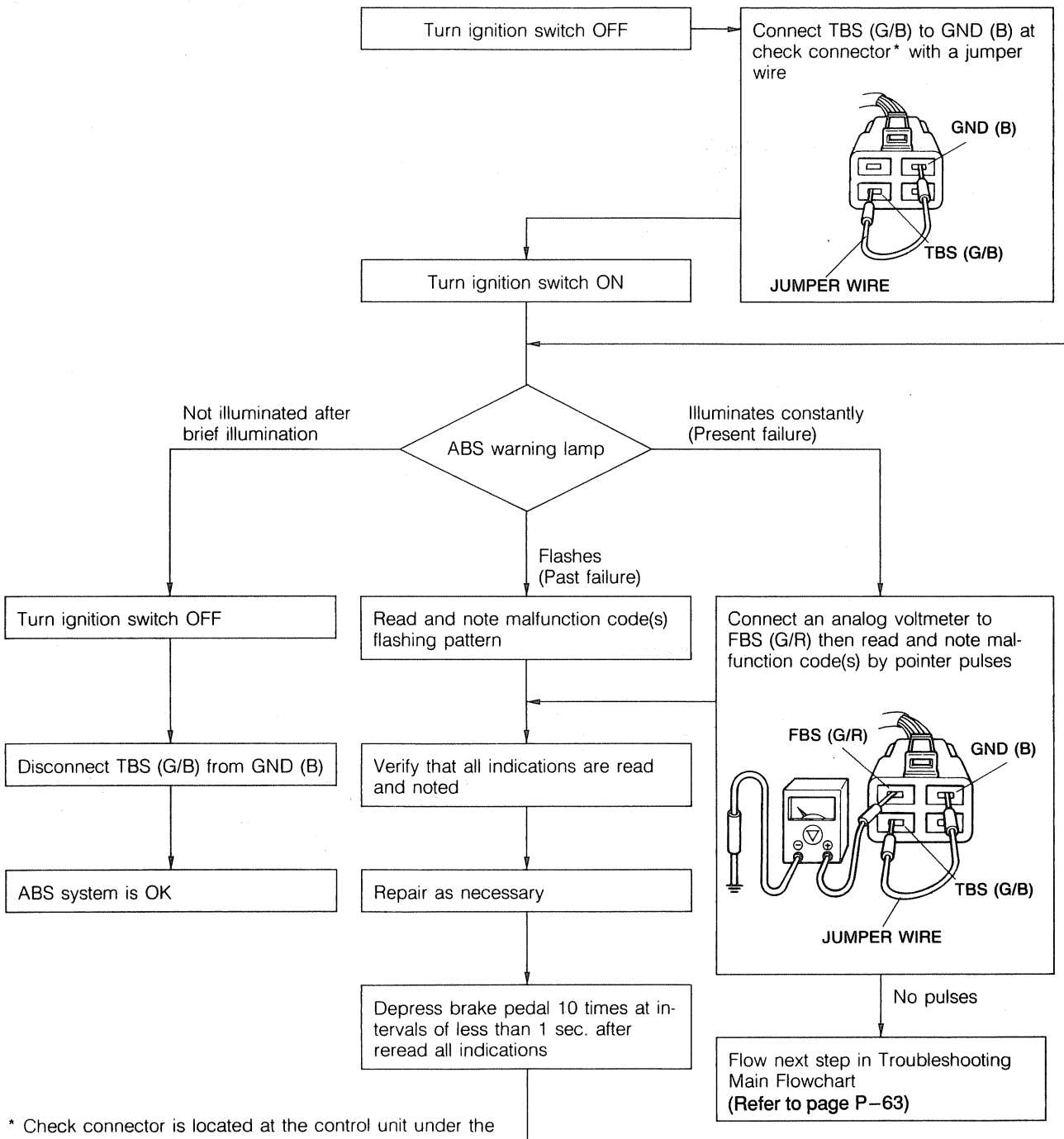
OUTLINE

The ABS control unit contains self-diagnostic and memory functions to watch for and indicate present and past failures.

Read and note the diagnostic indications as shown below, then take action according to the Malfunction Code Table. (Refer to page P-66.)

16U0PX-096

DIAGNOSIS FLOWCHART



\* Check connector is located at the control unit under the driver's seat.

16U0PX-097



**Note**

- Verify that the battery voltage is above 10V with the engine idling.
- The malfunction codes can be obtained only with the vehicle stopped. If the wiring harness for the warning lamp check connector is faulty, the diagnosis check cannot be made.
- If the ABS warning lamp remains illuminated while the TBS terminal is grounded, it indicates a present failure and a malfunction code cannot be obtained by the warning lamp. A present failure malfunction code can only be obtained by connecting an analog voltmeter to the FBS terminal with the TBS terminal grounded.
- If the ABS warning lamp starts flashing after the TBS terminal is grounded, it indicates a past failure and a malfunction code can be obtained by reading the warning lamp flashing pattern or by connecting an analog voltmeter to the FBS terminal and counting the pulsations of the voltmeter pointer.
- When all check items are complete, do not fail to disconnect the jumper wire from the check connector.

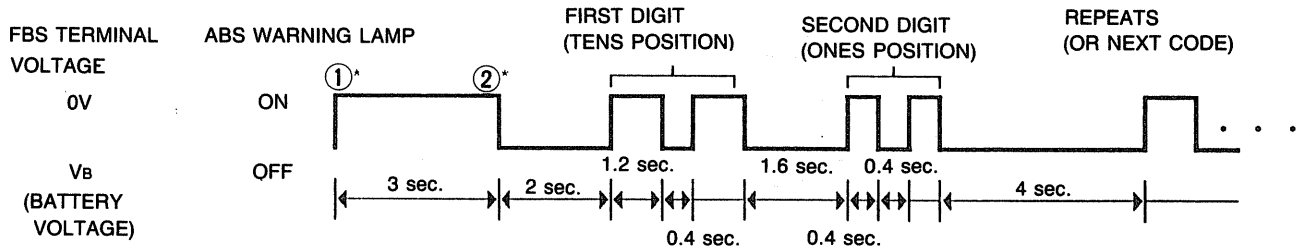
16UOPX-098

**HOW TO READ MALFUNCTION CODE**

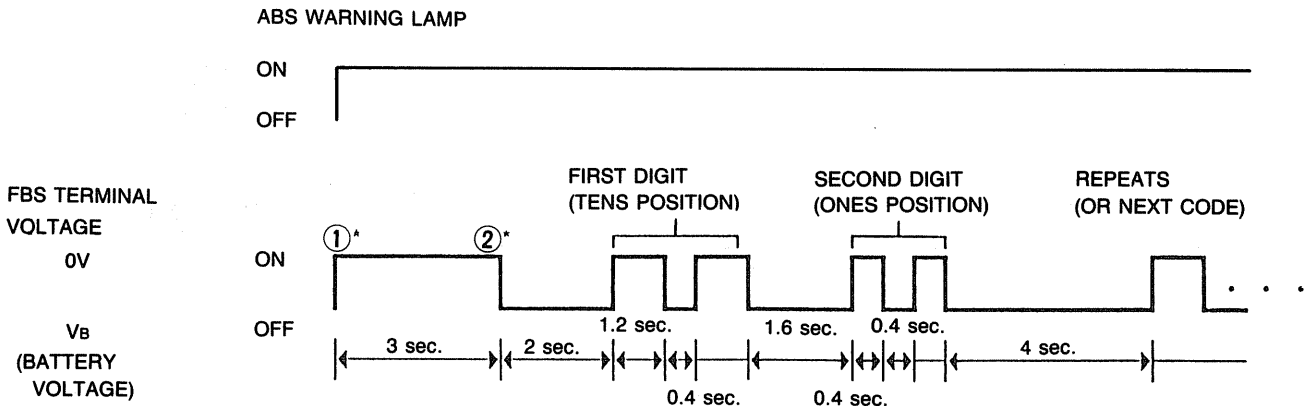
Note the flashing of the ABS warning lamp or the pulsations of the voltmeter pointer to determine the malfunction code(s).

- When memorized (past failure)

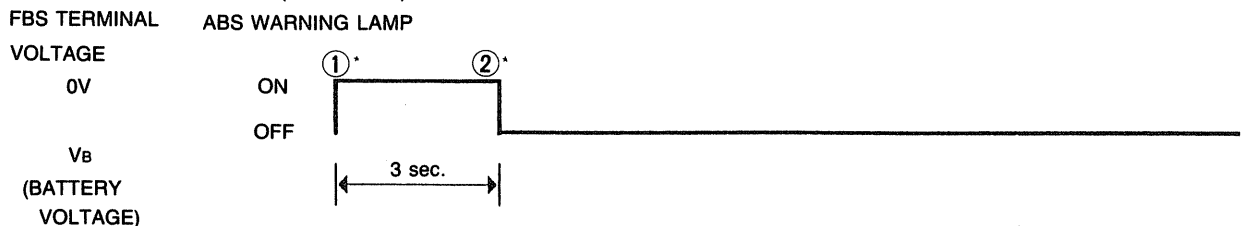
Code No: 2 2  
(a) (b)



- When memorized (present failure)



- When not memorized (no failure)



\* There are two types of starting points as follows:  
(1): TBS terminal connected to ground before turning ignition switch ON.  
(2): TBS terminal connected to ground after turning ignition switch ON.

MALFUNCTION CODE TABLE

Note

- The voltmeter indication shows all malfunction codes (present and past failures) at one time. After repairing a failure, perform the memory cancel operation.

Code No.	Possible cause	Diagnosis indication		Diagnosis chart No.	
		Warning lamp indication	Voltmeter indication (present and past failures)		
11	Right front wheel speed sensor Right front sensor rotor	Present failure: remains ON		ABS-1	
12	Left front wheel speed sensor Left front sensor rotor				
13	Right rear wheel speed sensor Right rear sensor rotor				
14	Left rear wheel speed sensor Left rear sensor rotor				
15	Wheel speed sensor		Past failure: same as voltmeter indication		ABS-2
22	Hydraulic unit Harness			ABS-3	
51	Fail-safe relay			ABS-4	
53	Motor Motor relay			ABS-5	
61	ABS control unit		ABS-6		

16U0PX-100

**Diagnosis Chart**

<b>ABS-1</b>		<b>Malfunction code: 11—14</b>	
		<b>Possible failure: Wheel speed sensor, harness, sensor rotor, hydraulic pressure 11: Right front 12: Left front 13: Right rear 14: Left rear</b>	
<b>Step</b>	<b>Check item</b>	<b>Remark</b>	<b>Refer to</b>
1	Check control unit connector	Check for poor connection	—
2	Check wiring harness between control unit and wheel speed sensor	Check for open or short to ground	—
3	Check wheel speed sensor	—	P-73
4	Check sensor rotor	—	P-74
5	Check stoplight switch	—	P-74
6	Check hydraulic system	If a problem is found, replace hydraulic unit or repair hydraulic system piping as necessary	P-78
7	If all above are OK after malfunction code(s) is erased, recheck for diagnosis code after driving from vehicle stop to over 10 km/h (6 mph)	If code of 11—14 is obtained, replace ABS control unit	P-90
8	If all above are OK, there was a temporary poor contact in wiring and now ABS system is functioning		

16U0PX-101

<b>ABS-2</b>		<b>Malfunction code: 15</b>	
		<b>Possible failure: Wheel speed sensor, harness</b>	
<b>Step</b>	<b>Check item</b>	<b>Remark</b>	<b>Refer to</b>
1	If all the malfunction are OK after malfunction code is erased, recheck for diagnosis code after driving from vehicle stop to over 10 km/h (6 mph)	If code of 11—14 is obtained, go to ABS-1	Above
		If code 15 is obtained, replace ABS control unit	P-90
		If nothing is displayed, there was a temporary poor contact in wiring and now ABS is OK	—

16U0PX-102

**DIAGNOSTIC SYSTEM INSPECTION**

<b>ABS-3</b>		<b>Malfunction code: 22</b>	
		<b>Possible failure: Solenoid valve, harness</b>	
<b>Step</b>	<b>Check item</b>	<b>Remark</b>	<b>Refer to</b>
1	Check control unit connector	Check for poor connection	—
2	Check wiring harness between hydraulic unit and control unit	Check for open or short to ground	—
3	Check hydraulic unit solenoid valve	Check for open circuit	P-80
4	Check ABS warning lamp operation	If warning lamp illuminates constantly after turning ignition switch ON, replace control unit	—
		If warning lamp does not illuminate after turning ignition switch ON, there was a temporary poor contact in wiring and now ABS system is functioning	

16U0PX-103

<b>ABS-4</b>		<b>Malfunction code: 51</b>	
		<b>Possible failure: Fail-safe relay</b>	
<b>Step</b>	<b>Check item</b>	<b>Remark</b>	<b>Refer to</b>
1	Check pump fuse	Check pump fuse condition	P-71
		Check short to ground	—
2	Check relay box	Check for open circuit	P-81
3	Check wiring harness between relay box and hydraulic unit or control unit	Check for open or short to ground	—
4	Check ABS warning lamp operation	If warning lamp illuminates constantly after turning ignition switch ON, replace ABS control unit	—
		If warning lamp does not illuminate after turning ignition switch ON, there was a temporary poor contact in wiring and now ABS system is functioning	

16U0PX-104

# DIAGNOSTIC SYSTEM INSPECTION

**P**

<b>ABS-5</b>	<b>Malfunction code: 53</b>		
	<b>Possible failure: Motor, motor relay</b>		
Step	Check item	Remark	Refer to
1	Check motor relay	If pump motor continues operating after turning ignition switch OFF, motor relay may be faulty	P-81
2	Check ABS pump fuse	Check ABS pump fuse condition	P-71
		Check short to ground	—
3	Check wiring harness between relay box and hydraulic unit or control unit	Check for open or short to ground	—
4	Check voltage at control unit terminal	Turn ignition switch ON and check motor relay terminal voltage	P-76
5	Check motor	Check for open circuit	P-80
6	Check wiring harness between motor and ground	Check for open circuit	—
7	Check wiring harness between motor and control unit	Check for open or short to ground	—
8	Check ABS warning lamp operation	If warning lamp illuminates constantly, after turning ignition switch ON replace control unit	—
		If warning lamp does not illuminate after turning ignition switch ON, there was a temporary poor contact in wiring and now ABS systems is functioning	

16U0PX-105

<b>ABS-6</b>		<b>Malfunction code: 61</b>	
		<b>Possible failure: ABS control unit</b>	
<b>Step</b>	<b>Check item</b>	<b>Remark</b>	<b>Refer to</b>
1	—	Replace ABS control unit	P-90

16U0PX-106

**MEMORY CANCEL**

Malfunction codes memorized in the ABS control unit are canceled by performing the following steps.

1. Connect the TBS terminal to GND at the check connector.
2. Output all memorized codes.
3. After verifying that the first code is repeated, depress the brake pedal 10 times at intervals of less than one second (1 sec.).

**Note**

- **Malfunction codes cannot be canceled if the following occur:  
If intervals of depressing the brake pedal exceed one second (1 sec.).  
Stoplight bulb or switch has failed.**
- **While performing the memory cancel operation, the ABS warning lamp will illuminate.**
- **After memory cancel, the ABS control unit will perform self-diagnosis.**

16U0PX-107

ABS COMPONENTS INSPECTION

FUSES

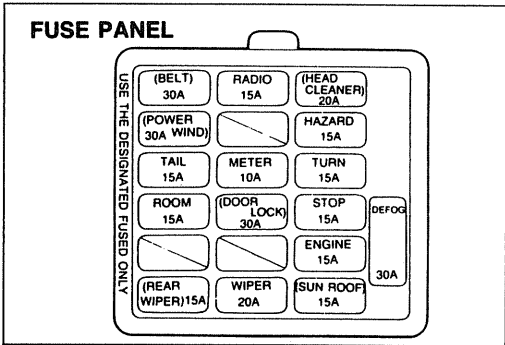
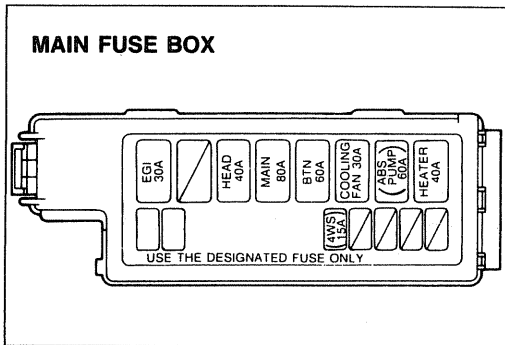
Inspection

Check the fuses according to the following table. If a fuse is burned, replace it.

Fuse name	Rating (Amp)	Location	Failure condition	Refer to
ABS PUMP	60	Main fuse box	<ul style="list-style-type: none"> <li>• ABS warning lamp illuminates (Malfunction code 51 or 53)</li> <li>• Motor and solenoid valves do not operate</li> </ul>	P-68, 69
MAIN	80 (100*)		<ul style="list-style-type: none"> <li>• Engine does not start</li> </ul>	—
TURN	15	Fuse panel (at driver's side)	<ul style="list-style-type: none"> <li>• ABS warning lamp illuminates after engine started</li> <li>• ABS control unit not activated</li> </ul>	—
STOP	15		<ul style="list-style-type: none"> <li>• Stoplights do not illuminate</li> </ul>	—
METER	10		<ul style="list-style-type: none"> <li>• No ABS warning lamps in instrument cluster illuminate</li> </ul>	—

\* For EC-AT Turbo

16U0PX-108



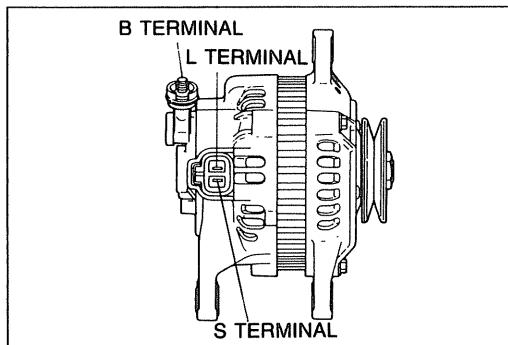
**ALTERNATOR**

The ABS control unit judges if the engine is running according to the output voltage at the alternator terminal L. The output voltage is not detected by the self-diagnosis system.

To determine a possible failure of the alternator, refer to the table below.

ABS warning lamp condition	Possible cause
Lamp goes out before engine started	<ul style="list-style-type: none"> <li>• Open circuit between alternator and the ABS control unit (terminal 2F)</li> <li>• Disconnection or open at alternator connector (terminal L)</li> </ul>
Lamp remains illuminated	<ul style="list-style-type: none"> <li>• Alternator problem (low output voltage at terminal L)</li> </ul>

16U0PX-109



16U0PX-110

**Inspection**

1. Start the engine.
2. Check the voltage at the alternator terminals with the engine idling.

**Specifications:**

- Terminal B: Battery voltage**
- Terminal L: Battery voltage**
- Terminal S: Battery voltage**

**BATTERY**

If the battery voltage is low, the ABS the warning lamp may illuminate.

16U0PX-111

**Inspection**

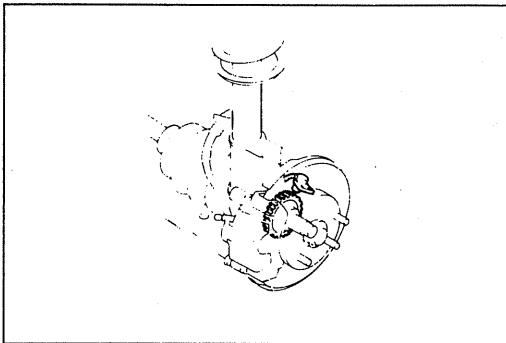
1. Start the engine.
2. Check the voltage at the battery and at the ABS control unit terminal 1H.

**Voltage: 10V min.**

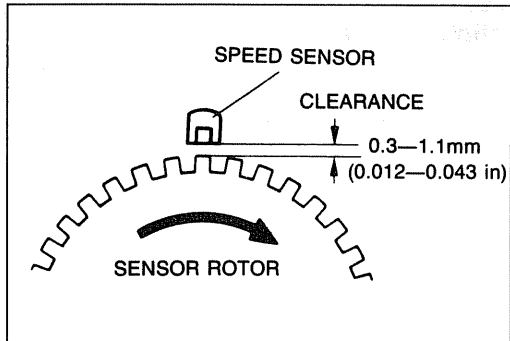
3. If battery voltage is below specification, charge or replace the battery as necessary.
4. If battery voltage is within specification and terminal 1H voltage is below specification, check the wiring harness between the battery and the ABS control unit terminal 1H.

16U0PX-112

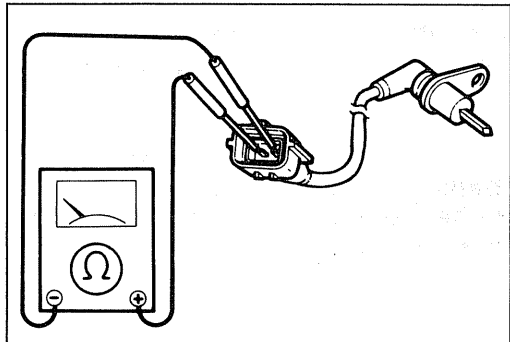




16U0PX-113



16U0PX-114



16U0PX-115

## WHEEL SPEED SENSOR

### Inspection of installation

1. Jack up the vehicle and support it on safety stands.
2. Remove the wheel and tire assembly.
3. Check for looseness and damage.

2. Check the clearance between the wheel speed sensor and the sensor rotor.

**Clearance: 0.3—1.1mm (0.012—0.043 in)**

3. If not as specified, replace the wheel speed sensor or sensor rotor as needed.

### Inspection of resistance

1. Check resistance at the wheel speed sensor terminals.

**Resistance: 1 k $\Omega$   $\pm$  0.2 k $\Omega$**

2. If not as specified, replace the wheel speed sensor.

### Inspection of voltage

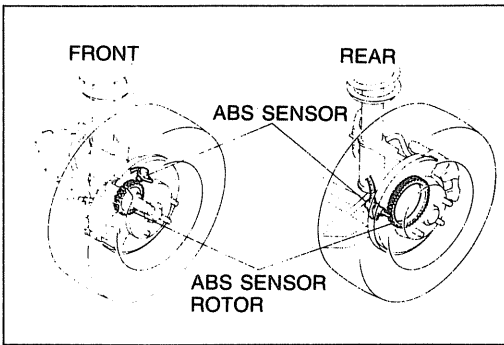
#### Caution

- The ABS control unit will memorize a failure when the wheel is turned, perform the memory cancel operation after completing the test.

1. Jack up the vehicle and support it on safety stands.
2. Disconnect the wheel speed sensor connector.
3. While rotating a wheel one revolution per second by hand, check for voltage at the wheel speed sensor terminal. Check each wheel.

**Voltage: 0.25—1.1V (AC)**

4. If not specified, replace the wheel speed sensor or sensor rotor as needed.



16U0PX-117

**SENSOR ROTOR**

**Inspection**

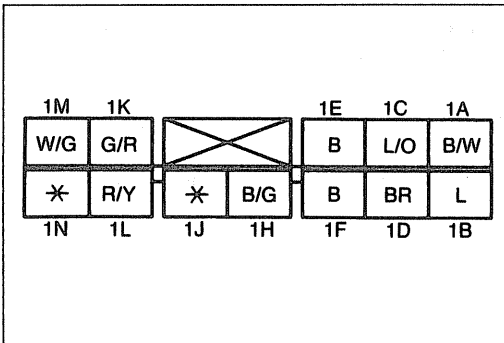
1. Jack up the vehicle and support it on safety stands.
2. Remove the wheel and tire assembly.
3. Visually check the sensor rotor for missing or damaged teeth.
4. Replace the sensor rotor if necessary.

**STOPLIGHT SWITCH**

**Inspection of stoplight switch**

1. Depress the brake pedal.
2. Verify that the stoplights illuminate.
3. If not illuminated, check the following:
  - Stoplight bulbs
  - Stoplight fuse
  - Stoplight switch
  - Stoplight harness
4. Repair or replace parts as necessary.

16U0PX-118



16U0PX-119

**ABS CONTROL UNIT**

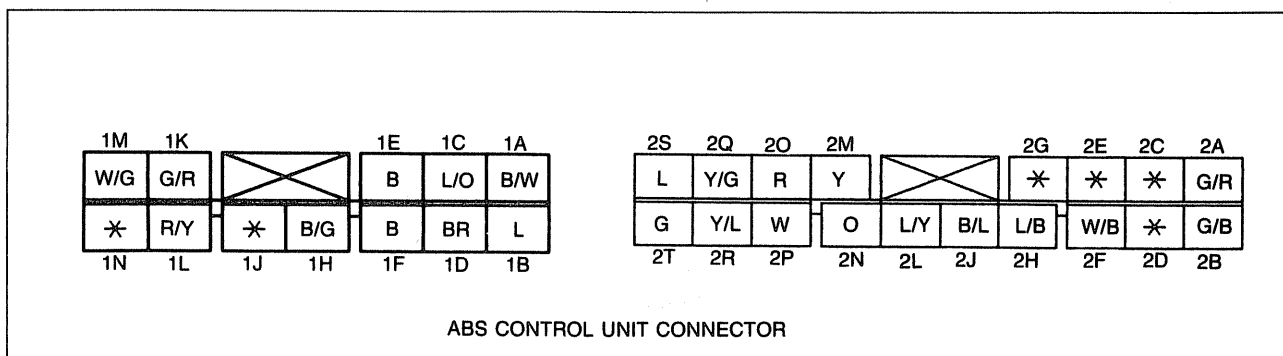
**Inspection of ABS control unit harness**

1. Turn the ignition switch OFF.
2. Disconnect the ABS control unit connector (12 pins).
3. Turn the ignition switch ON.
4. Check for voltage between terminal 1M at the vehicle side harness and a ground. (Refer to page P-75.)
5. If not as specified, check wiring harness between the stoplight switch and the ABS control unit.

## CONTROL UNIT CIRCUIT

**Caution**

- When checking for voltage at the control unit terminals, insert the probe from the rear of the connector (harness side) to prevent damaging the terminals.



16U0PX-120

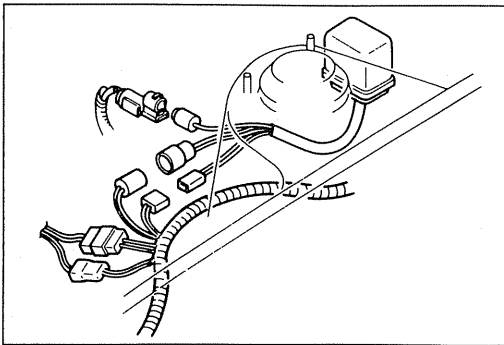
VB: Battery voltage

Connector	Terminal	Wire color	Connected to	Condition	Voltage	Remark
12 pins	1A	B/W	Right rear wheel solenoid	Solenoid ON*	0—2	*Solenoid is ON only when ABS system is functioning. Voltage when solenoid is ON can be measured following "Hydraulic System Test". (Refer to page P-78)
				Ignition switch ON	VB	
	1B	L	Left front wheel solenoid	Solenoid ON*	0—2	
				Ignition switch ON	VB	
	1C	L/O	Right front wheel solenoid	Solenoid ON*	0—2	
				Ignition switch ON	VB	
	1D	BR	Left rear wheel solenoid	Solenoid ON*	0—2	
				Ignition switch ON	VB	
	1E	B	Ground	Constant	0	
	1F	B	Ground	Constant	0	
	1H	B/G	Battery	Ignition switch ON	VB	
				Ignition switch OFF	0	
	1J	—	Not used	—	—	
	1K	G/R	Solenoid monitor	If malfunction present	0	
Ignition switch ON				VB		
1L	R/Y	Motor	Motor running	VB		
			Motor stopped	0—1		
1M	W/G	Stoplight switch	Brake pedal depressed	VB		
			Brake pedal released	0—2		
1N	—	Not used	—	—		

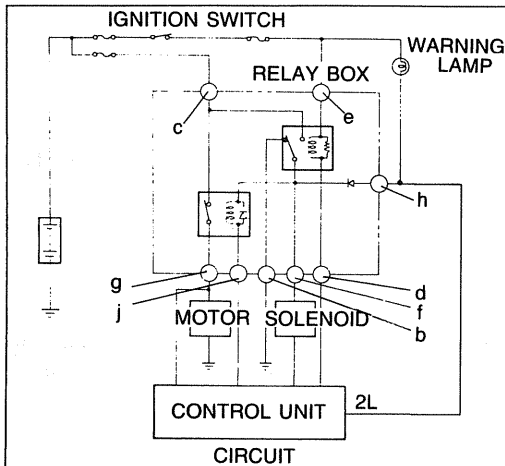
## ABS COMPONENTS INSPECTION

Connector	Terminal	Wire color	Connected to	Condition	Voltage	Remark
18 pins	2A	G/R	FBS check terminal	Ignition switch ON	0	
	2B	G/B	TBS check terminal	Normal mode	VB	
				Diagnostic mode	0	
	2C	—	Not used	—	—	
	2D	—	Not used	—	—	
	2E	—	Not used	—	—	
	2F	W/B	Alternator terminal	Ignition switch ON (engine off)	0.8—3	<ul style="list-style-type: none"> <li>• Turn wheel at specified speed to prevent incorrect diagnosis</li> <li>• Check following terminals of wheel speed sensor in AC range:                2N-2M (right front)                2O-2P (left front)                2R-2Q (left rear)                2S-2T (right rear)             </li> </ul>
				Engine idling	VB	
	2G	—	Ground	Constant	0	
	2H	L/B	Motor relay	Motor relay ON	0—2	
				Motor relay OFF	VB	
	2J	B/L	Fail-safe relay	Normal	0—2	
				If malfunction present	VB	
	2L	L/Y	Warning lamp	Illuminated	0—3	
				Not illuminated	VB	
	2M	Y	Wheel speed sensor	Right front	Vehicle stopped	
	2N	O			Wheel turned 1 revolution per second	0.25—1.1
	2O	R		Left front	Vehicle stopped	0
2P	W	Wheel turned 1 revolution per second			0.25—1.1	
2Q	Y/G	Left rear		Vehicle stopped	0	
				Wheel turned 1 revolution per second	0.25—1.1	
2R	Y/L	Right rear		Vehicle stopped	0	
2S	L			Wheel turned 1 revolution per second	0.25—1.1	
2T	G				0.25—1.1	

16U0PX-121



16U0PX-122



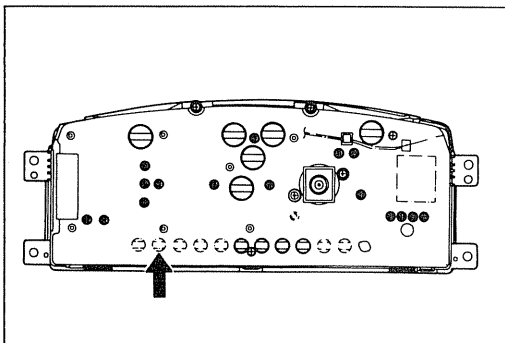
L	Y/G	R	Y		*	*	*	G/R
G	Y/L	W	O	L/Y	B/L	L/B	W/B	* G/B

ABS CONTROL UNIT CONNECTOR (18 PINS)



RELAY BOX CONNECTOR

16U0PX-123



16U0PX-124

## ABS WARNING LAMP

### Inspection of harness

1. Turn the ignition switch OFF, and disconnect the ABS control unit connector (18 pins).
2. Turn the ignition switch ON. If the warning lamp is ON, go to next step. If the warning lamp is OFF, check the relay box and the harness. (Warning lamp-Relay box (h)-Relay box (b)-Ground)
3. Disconnect the relay box connector.
4. If the warning lamp remains illuminated, check the warning lamp harness for shorting to ground.
5. Keeping the same conditions, ground the terminals below and check the operation of the warning lamp as shown in the chart.

○ ...Illuminated  
 × ...Not illuminated

Operation	Terminal		Action
	Control unit 2L (L/Y)	Relay box h (L/Y)	
Warning lamp	○	×	Check harness between control unit and relay box
	×	○	↑
	×	×	Check bulb and harness between instrument cluster and control unit, relay box

6. Keeping the above conditions, connect the ABS control unit connector and check operation of the warning. If the warning lamp does not illuminate, replace the ABS control unit.
7. Start the engine after connecting the connector to the relay box.
8. Replace the ABS control unit if the warning lamp remains ON and no diagnosis code is shown during the diagnosis mode.

### Inspection of bulb

1. Remove the meter assembly.
2. Remove the warning lamp bulb from the rear of the cluster.
3. Check the condition of the bulb.
4. Replace the bulb if necessary.

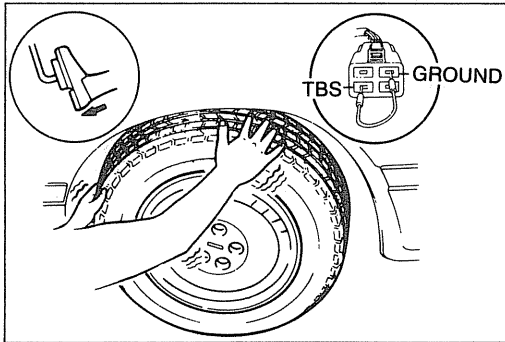
**HYDRAULIC SYSTEM**

The ABS control unit contains a self-diagnostic function to check the hydraulic system operation. During the diagnostic mode, the ABS control unit activates the hydraulic unit to reduce the hydraulic pressure of the right front, left front, right rear, left rear in sequence for 0.5 second each at intervals of 1.5 seconds.

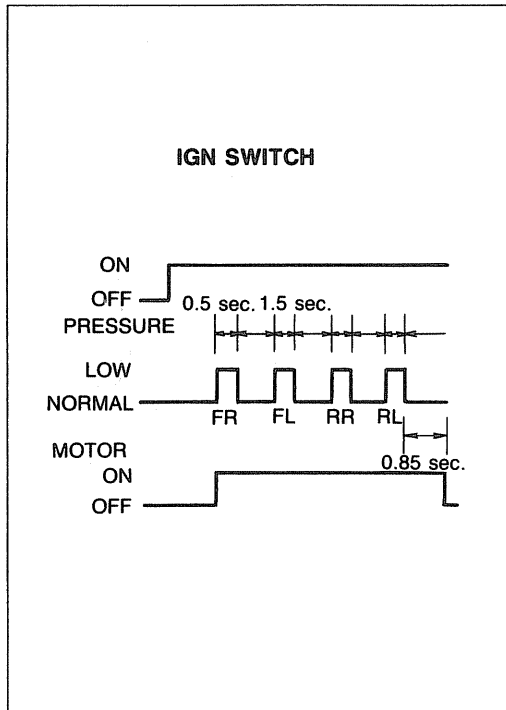
**Note**

- Verify that the battery is fully charged.
- Verify that the ABS warning lamp goes out after the engine is started.
- If the lamp stays ON after the engine has started, the ABS control unit detects a failure and will not activate the hydraulic unit.

16U0PX-125



16U0PX-126



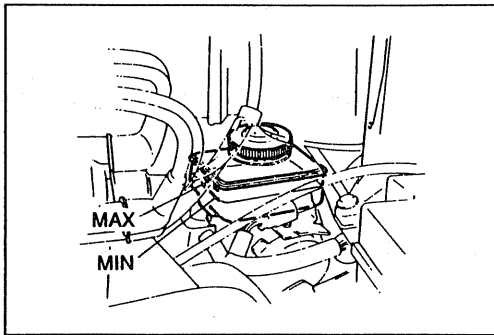
16U0PX-127

**Inspection**

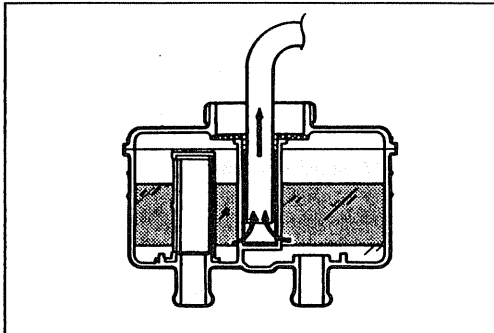
1. Jack up the vehicle and support it on safety stands with all wheels clear of the ground. Shift the transaxle neutral or P range.
2. Release the parking brake.
3. Check the wheels for brake drag while rotating each by hand.
4. Using a jumper wire, connect the TBS and GND terminals of the check connector.
5. Depress the brake pedal and have an assistant verify that the right front wheel will not turn.
6. With the brake pedal still depressed, turn the ignition switch ON and verify that the brake is released momentarily (approx. 0.5 sec.) and the wheel turns when pressure-reduction operates.
7. Check operation of the remaining wheels in order: left front, right rear, left rear.
8. If Steps 5 and 6 show correct operation, the following systems are OK:
  - Brake piping to hydraulic unit
  - Braking system, including hydraulic unit
  - Electrical system in hydraulic unit (solenoid, motor, etc.)
  - ABS control unit, its output system (solenoid, relay, etc.) and harness

The following are not checked with the above steps.

  - Input system and harness of ABS control unit
  - Fluid leakage
  - Intermittent failure
9. Replace the hydraulic unit if necessary.



06U0PX-031



16U0PX-033

## HYDRAULIC UNIT FLUID

### Inspection of Level

1. Run the engine for 10 seconds to let the pump motor build pressure in the accumulator; then stop the engine.
2. Check that the fluid level is between the MAX and MIN lines on the reservoir.
3. If the level is lower than the MIN line and leakage from cap is not found, replace the hydraulic unit assembly.  
(Refer to page P-89.)

### Replacement

1. Remove the reservoir cap and retainer.
2. Use a suction pump and a soft vinyl hose to suck fluid from the reservoir.

### Caution

- A hard hose may damage the filter in the reservoir.

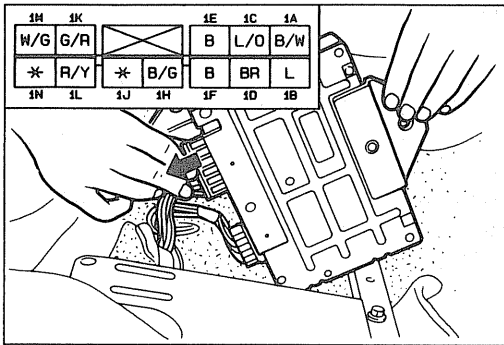
3. Fill the reservoir with the specified type and amount of brake fluid.

### Caution

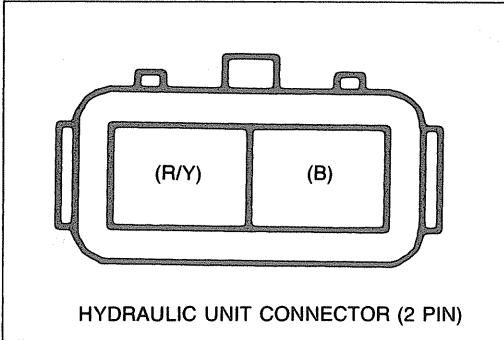
- Do not allow any foreign material into the reservoir.
- Do not soak the upper filter with brake fluid, because pouring fluid in may become difficult.

**Fluid: FMVSS 116: DOT-3, SAE: J1703**

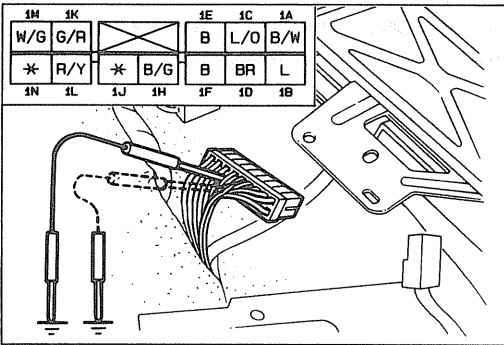
4. Check the fluid level as described above.



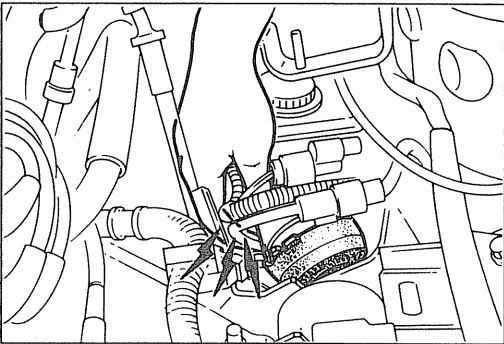
16U0PX-128



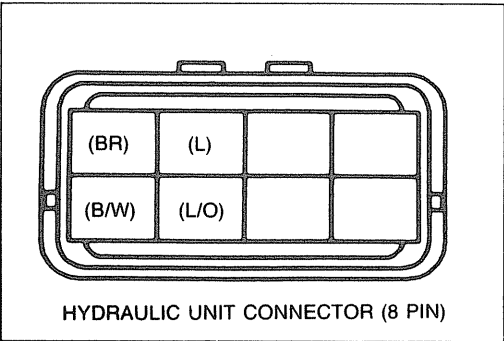
16U0PX-129



16U0PX-130



16U0PX-131



16U0PX-132

**HYDRAULIC UNIT**

1. Turn the ignition switch OFF, and disconnect the ABS control unit connector (12 pin).
2. Measure the resistance between 1L (R/Y) terminal of the control unit connector and a ground.

**Resistance: 1Ω max. (Approx. 0.4Ω)**

3. If not as specified, check the wiring harness between the motor and the control unit and check the motor.

**Inspection of Motor**

1. Turn the ignition switch OFF.
2. Disconnect the hydraulic unit connector (2 pin).
3. Measure the resistance between the connector terminals.

**Resistance: 1Ω max. (Approx. 0.4Ω)**

4. Verify that the motor operates when applying 12V to connector (2-pin).
5. If not as specified, replace the hydraulic unit.

**Inspection of Solenoid Valve**

**Inspection at control unit**

1. Turn the ignition switch OFF.
2. Measure the resistance between a ground and the following terminals at the ABS control unit connector (12 pin).  
Terminal: 1A (B/W), Right rear  
1B (L), Left front  
1C (L/O), Right front  
1D (BR), Left rear

**Resistance: Approx. 3Ω**

3. If not as specified, check the wiring harness between the hydraulic unit connector (8 pin) and the ABS control unit.

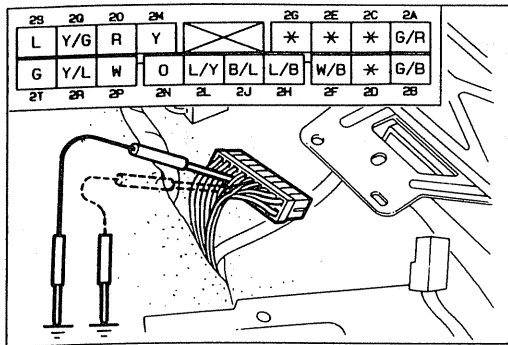
**Inspection at hydraulic unit**

1. Disconnect the hydraulic unit connector (8 pin).
2. Measure the resistance between a ground and the terminals shown in the figure.

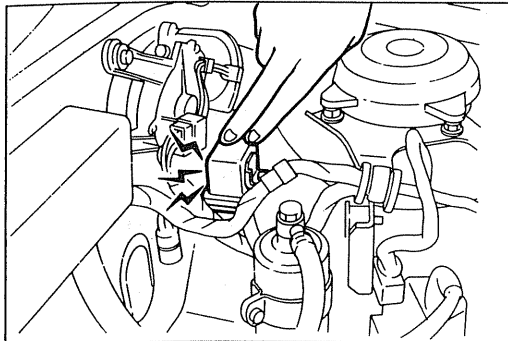
**Resistance: approx. 3Ω**

3. If not as specified, check the hydraulic unit wiring harness or replace the hydraulic unit if necessary.

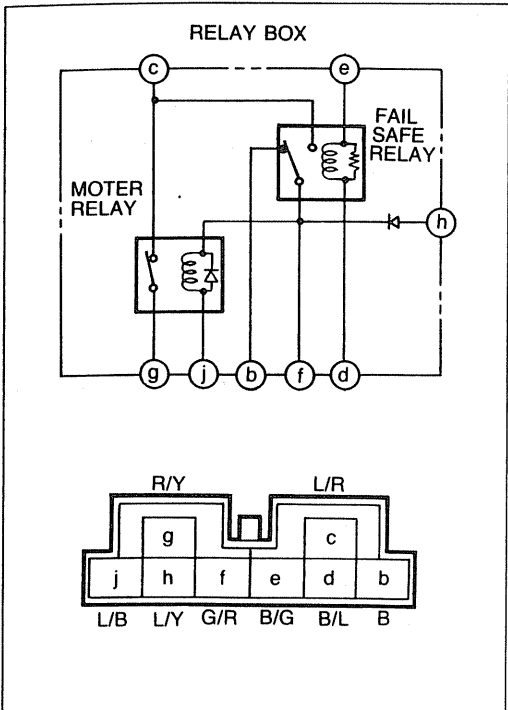




16U0PX-133



16U0PX-134



16U0PX-135

## RELAY BOX Fail-safe Relay Inspection of harness

1. Turn the ignition switch OFF and disconnect the ABS control unit connector (18 pin).
2. Turn the ignition switch ON.
3. Connect terminal 2J (B/L) of the control unit connector (18 pin) to a ground.
4. Check the following points:

Condition	Action
Fail-safe relay in relay box does not click when 2J terminal grounded	<ul style="list-style-type: none"> <li>• Check fail-safe relay</li> <li>• Check harness between fail-safe relay and control unit</li> </ul>
Warning lamp illuminates after grounding 2J terminal	<ul style="list-style-type: none"> <li>• Check fail-safe relay</li> </ul>
1D (BR) terminal of control unit connector does not indicate 12V	<ul style="list-style-type: none"> <li>• Check fail-safe relay</li> <li>• Check harness between fail-safe relay and hydraulic unit</li> </ul>

## Inspection of fail-safe relay

1. Measure resistance between terminals e (B/G) and d (B/L) of relay box connector.

**Resistance: 60—100Ω**

2. Check continuity between terminals b (B) and c (L/R) and between c (L/R) and f (G/R).

Terminal	Continuity
b-f	Yes
c-f	No

3. Apply 12V to terminals e (B/G) and d (B/L). Check for continuity between terminals c (L/R) and f (G/R) and b (B) and f (G/R).

Terminal	Continuity
c-f	Yes
b-f	No

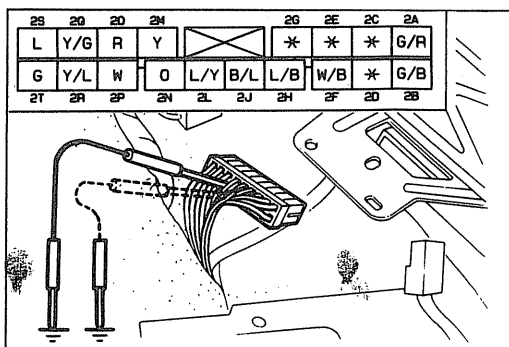
4. If not as specified, replace the relay box.

## Inspection of warning lamp diode

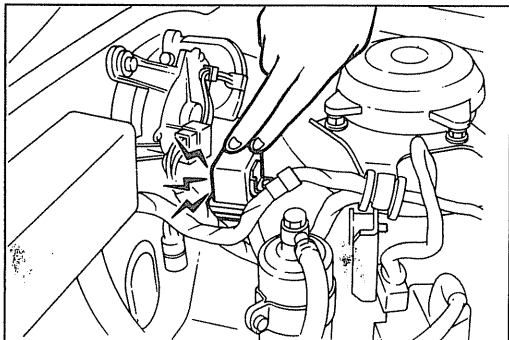
1. Check for continuity between terminals h (L/Y) and f (G/R).

Terminal	Continuity
h (⊕)-f (⊖)	No
h (⊖)-f (⊕)	Yes

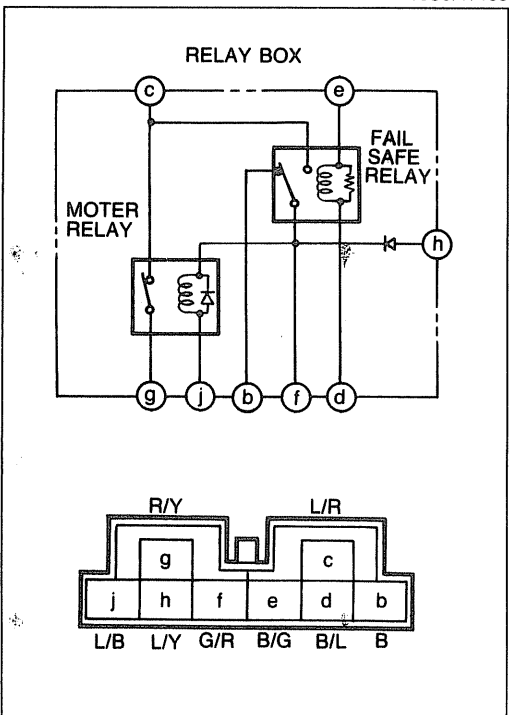
2. If not as specified, replace the relay box.



16U0PX-137



16U0PX-138



16U0PX-139

**Motor Relay Inspection of harness**

**Caution**

- Check the fail-safe relay before performing these checks.

1. Turn the ignition switch OFF and disconnect the control unit connector (18 pin).
2. Turn the ignition switch ON.
3. Connect terminal 2J (B/L) to a ground.
4. Connect terminal 2H (L/B) to a ground.
5. Check the following points:

Condition	Action
Motor relay in relay box does not click when terminals grounded	<ul style="list-style-type: none"> <li>• Check harness between fail-safe relay and control unit</li> <li>• Check fail-safe relay</li> </ul>
Motor does not operate	<ul style="list-style-type: none"> <li>• Check fail-safe relay</li> <li>• Check harness between fail-safe relay and motor</li> <li>• Check fuse</li> </ul>

**Caution**

- Do not allow the motor to operate for more than two seconds.

**Inspection of motor relay**

1. Measure the resistance between terminals f (G/R) and j (L/B) or b (B) and j (L/B) of relay box connector.

**Resistance: 50—90Ω**

2. Check continuity between terminals c (L/R) and g (R/Y).

Terminal	Continuity
c-g	No

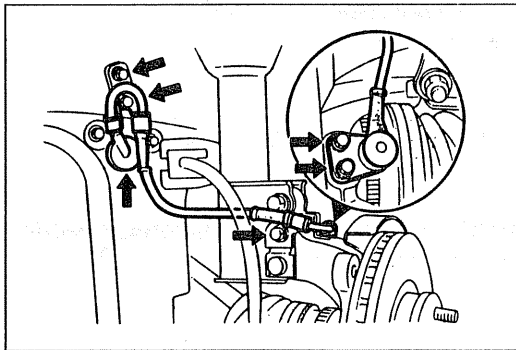
3. Apply 12V to terminals h (L/Y) (+) and j (L/B) (-). Check for continuity between terminals c (L/R) and g (R/Y).

**Caution**

- When applying voltage, connect (+) terminal to h (L/Y).

Terminal	Continuity
c-g	Yes

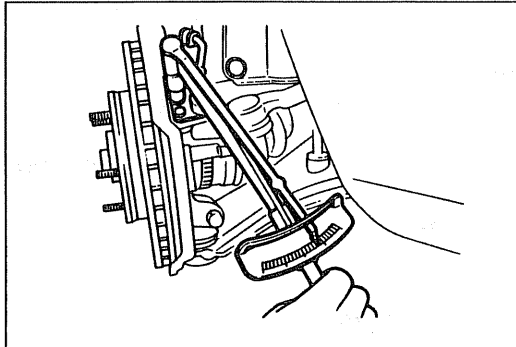
4. If not as specified, replace the relay box.



86U11X-169

**Removal of Front Wheel-speed Sensor**

1. Remove the wheel and tire.
2. Remove the parts shown in the figure, and remove the sensor from the knuckle.



86U11X-170

**Installation of Front Wheel-speed Sensor**

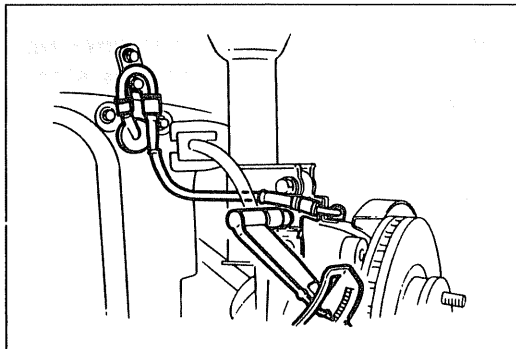
1. Install the sensor to the knuckle.

**Tightening torque:**

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

**Caution**

- The left and right sensors are not interchangeable. L or R is indicated on the bracket.



86U11X-171

2. Install the sensor harness bracket onto the knuckle.

**Tightening torque:**

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

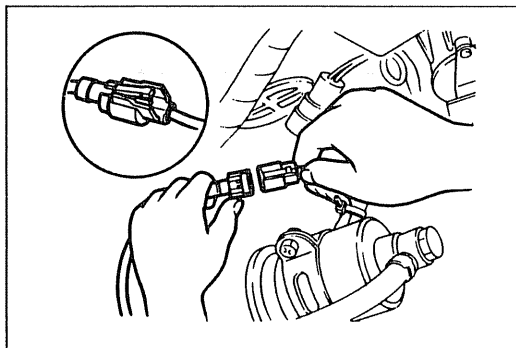
3. Push the sensor harness through the splash shield and secure it with the clip.
4. Install the sensor harness bracket to the body.

**Tightening torque:**

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

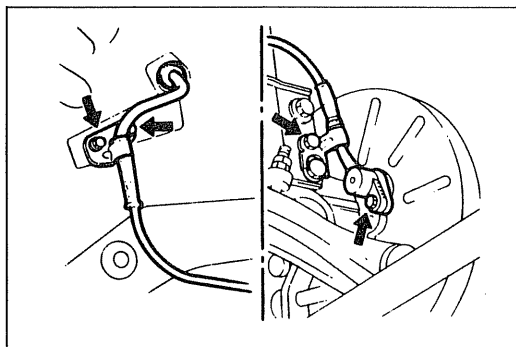
**Caution**

- Verify that the harness is not twisted, and does not contact the shock absorber or body when the steering wheel is turned.



86U11X-172

5. Connect the sensor connector.
6. Install the wheel and tire.

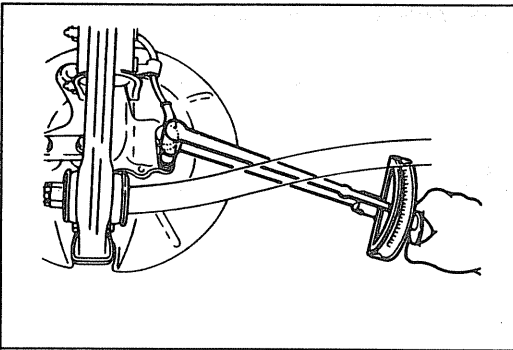


86U11X-173

**Removal of Rear Wheel-speed Sensor**

1. Remove the wheel and tire.
2. Remove the parts shown in the figure, and remove the sensor from the hub spindle.

**ABS REMOVAL/INSTALLATION**



86U11X-174

**Installation of Rear Wheel-speed Sensor**

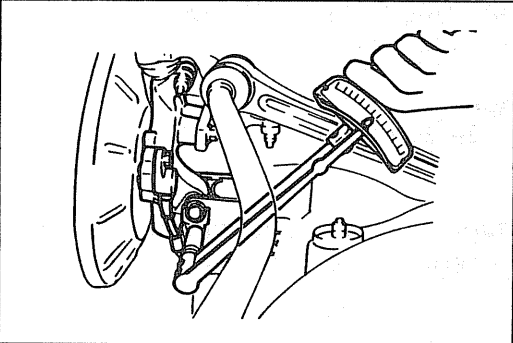
1. Install the sensor to the hub spindle.

**Tightening torque:**

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

**Caution**

- The left and right sensors are not interchangeable. L or R is indicated on the bracket.



96U11X-074

2. Install the sensor harness bracket onto the knuckle.

**Tightening torque:**

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

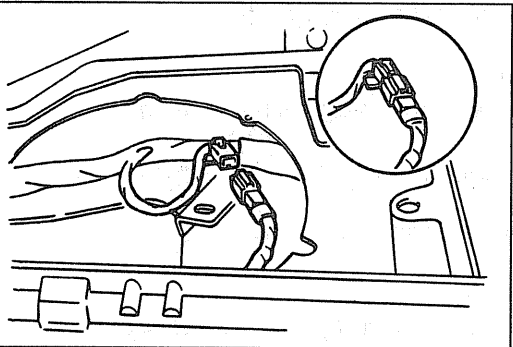
3. Feed the sensor harness through the body and install the grommet.
4. Install the sensor harness bracket to the body.

**Tightening torque:**

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

**Caution**

- Verify that the harness is not twisted, and does not contact the shock absorber or body when the steering wheel is turned.



16U0PX-027

5. Connect the sensor connector.
6. Install the wheel and tire.

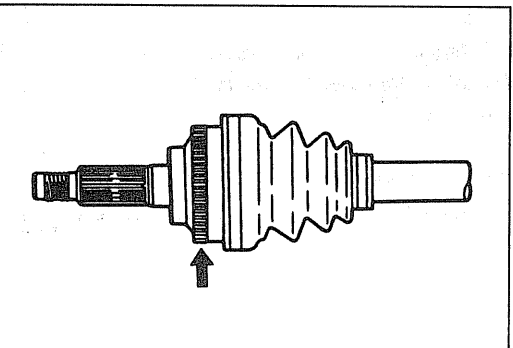
**STOPLIGHT SWITCH**

Refer to Section T.

**SENSOR ROTOR**

**Inspection**

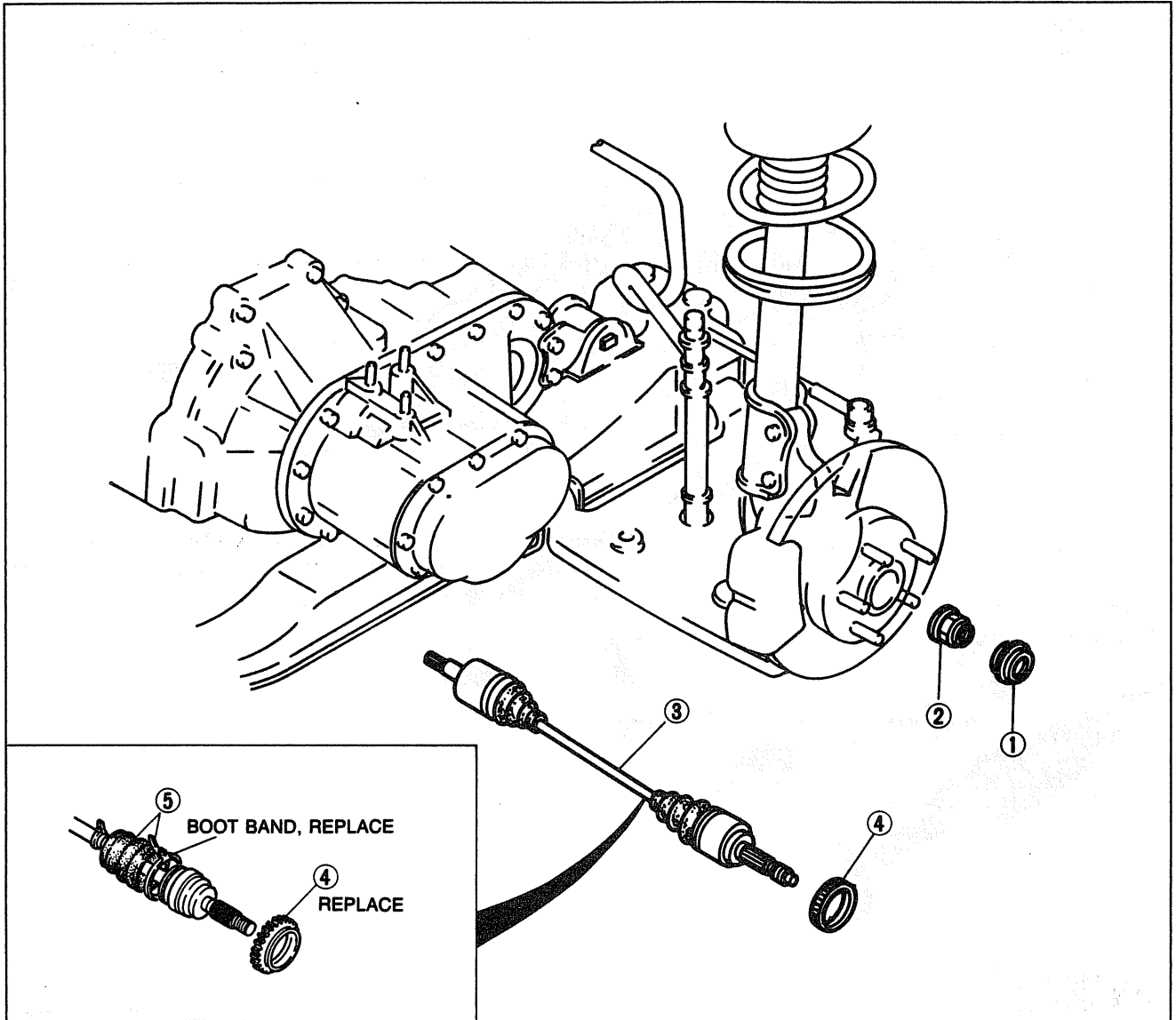
Check the sensor rotor for missing or damaged teeth.



86U11X-177

## Removal of Front Sensor Rotor

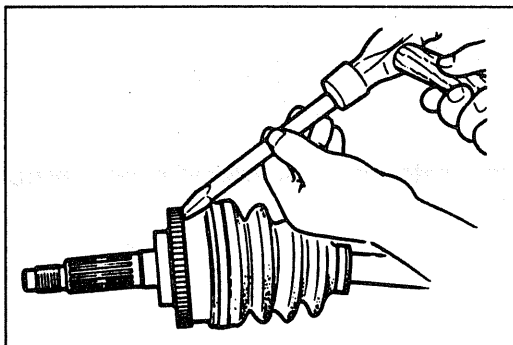
1. Loosen the front wheel lug nuts.
2. Block the rear wheels.
3. Jack up the front of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove in the sequence shown in the figure, referring to **Removal Note**.



16U0PX-028

1. Hub cap
2. Locknut
3. Driveshaft (Refer to Section M)

4. Sensor rotor
5. Boot and boot band



86U11X-179

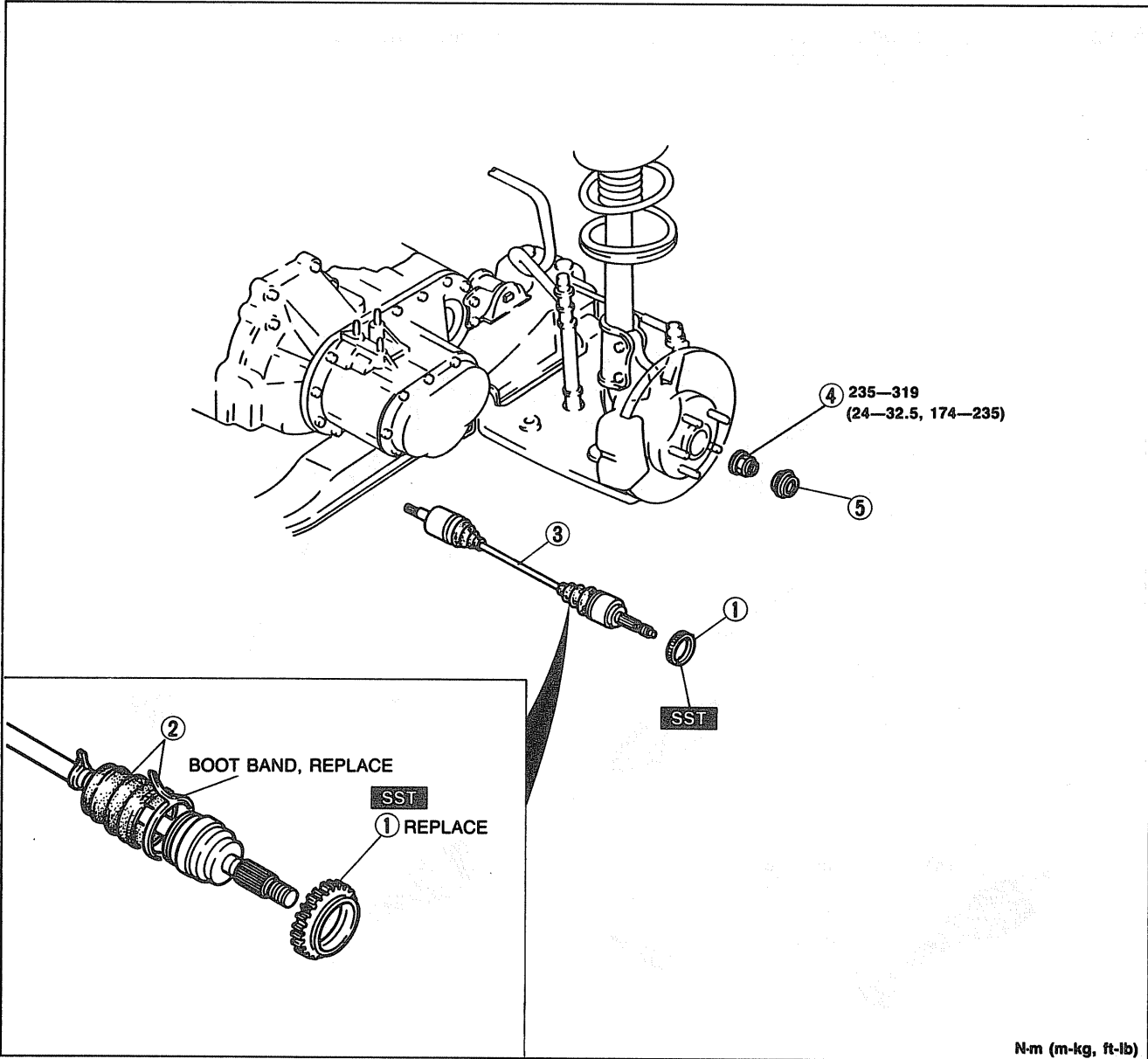
### Removal note Sensor rotor

Tap the sensor rotor off the driveshaft with a chisel.

**Installation of Front Sensor Rotor**

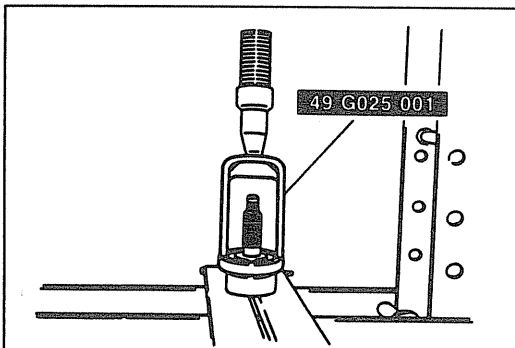
Install in the order shown in the figure, referring to **Installation Note**.

**Torque Specifications**



- 1. Sensor rotor
- 2. Boot and boot band
- 3. Driveshaft

- 4. Locknut
- 5. Hub cap



86U11X-181

**Installation note**

**Sensor rotor**

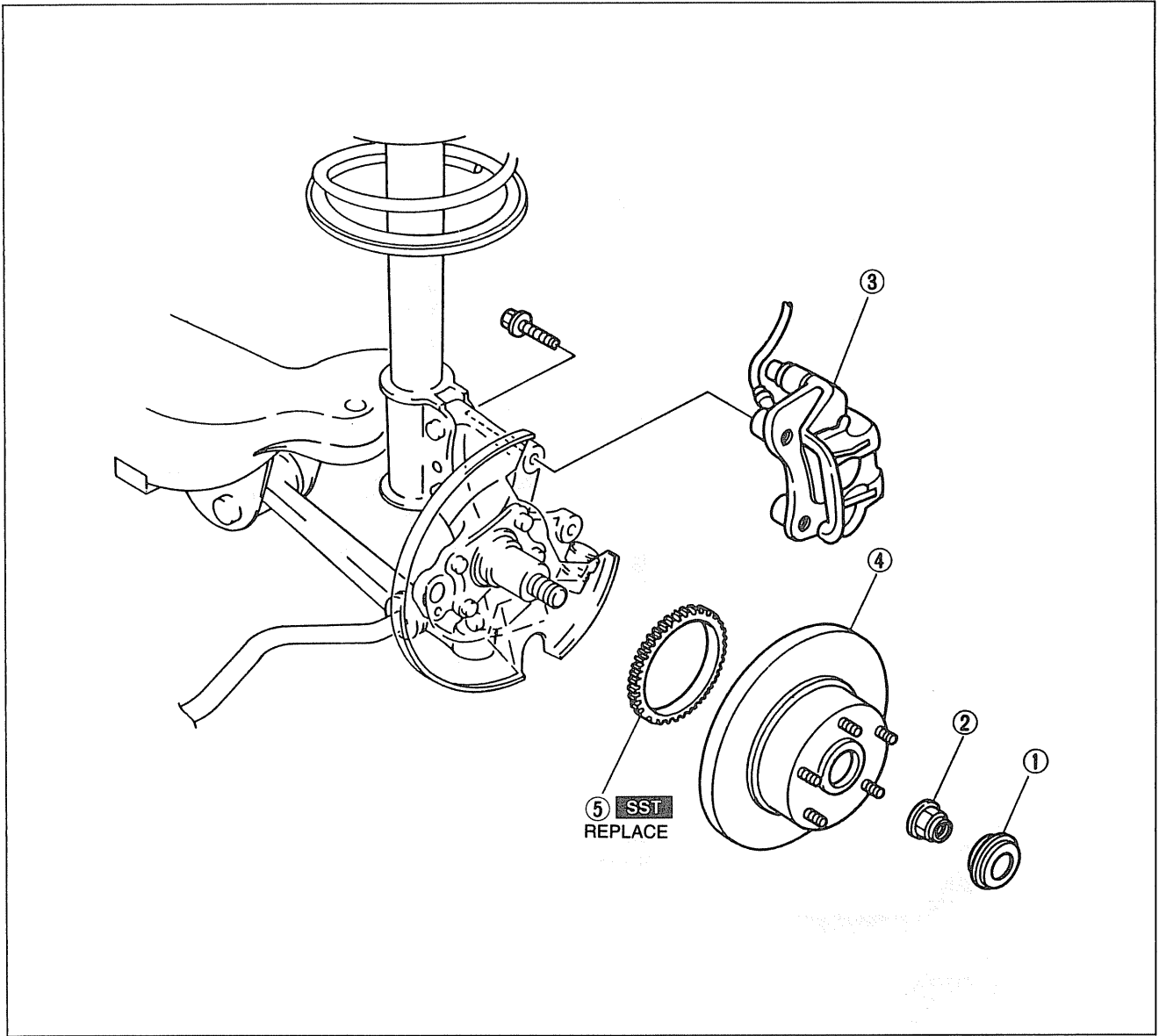
Press the sensor rotor onto the driveshaft with the **SST**.

**Caution**

- Install the sensor rotor with chamfered edge toward the driveshaft.

**Removal of Rear Sensor Rotor**

1. Loosen the rear wheel lug nuts.
2. Block the front wheels.
3. Jack up the rear of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove in the order shown in the figure, referring to **Removal Note**.

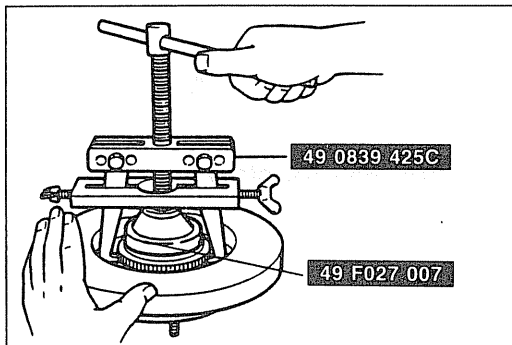


16U0PX-030

1. Hub cap
2. Locknut

3. Caliper assembly and mounting support

4. Disc plate
5. Sensor rotor



86U11X-183

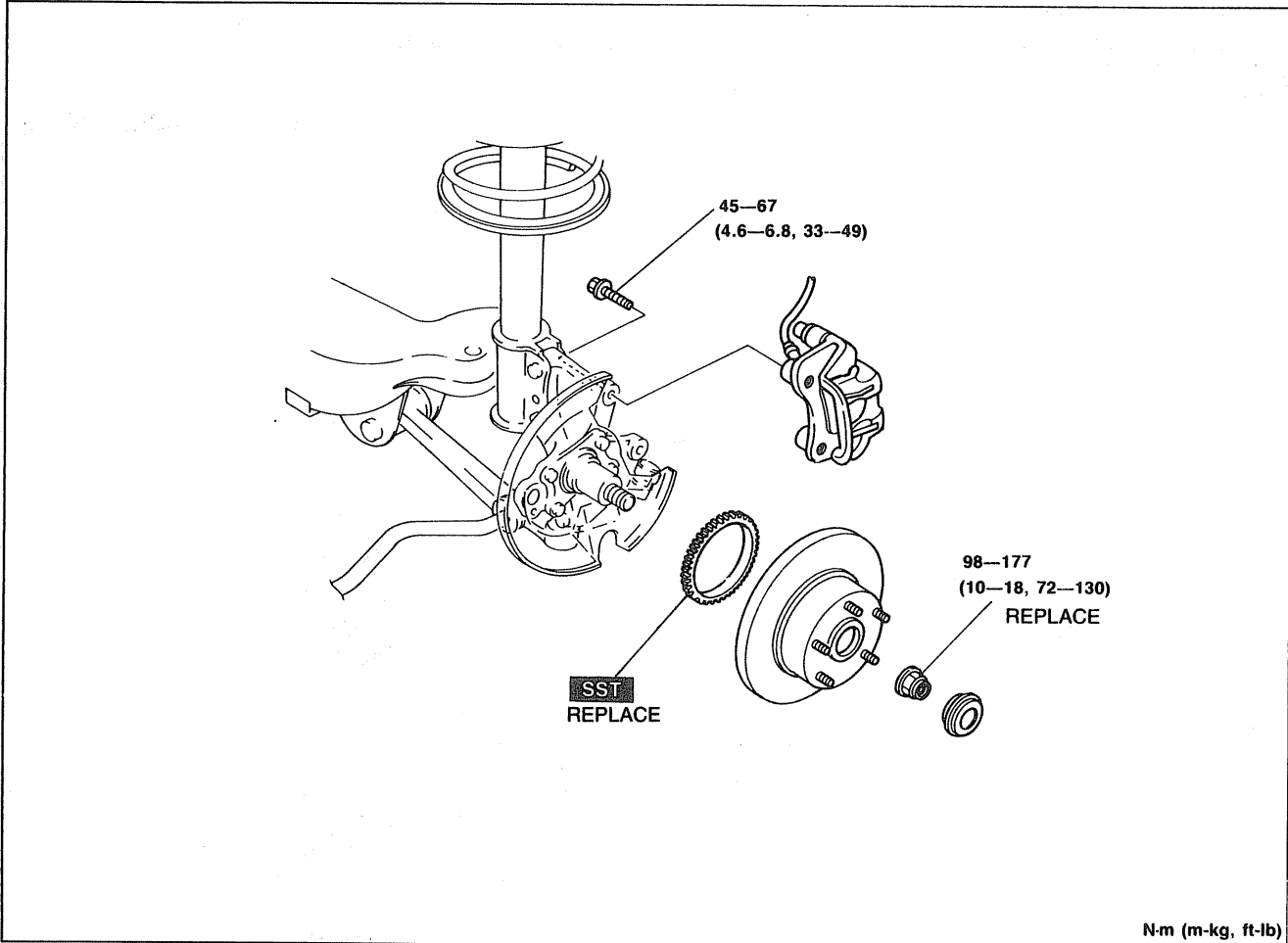
**Removal note**  
**Sensor rotor**

Remove the sensor rotor from the hub assembly with the **SST**.

**Installation of Rear Sensor Rotor**

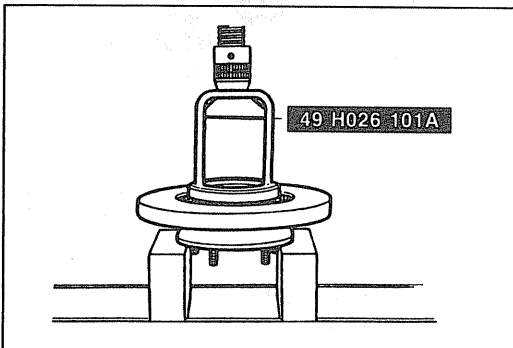
Install in the reverse order of removal, referring to **Installation Note**.

**Torque Specifications**



N-m (m-kg, ft-lb)

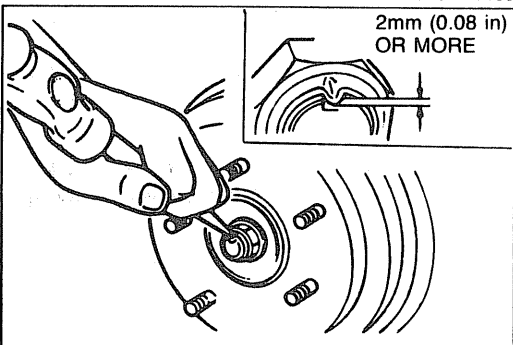
16U0PX-031



86U11X-185

**Installation  
Sensor rotor**

Press the sensor rotor onto the hub with the **SST**.



96U11X-080

**Locknut**

1. Install and tighten a new locknut.
2. Stake the locknut securely in the driveshaft groove.

**Caution**

- Do not use a pointed tool for staking.

3. Check that the hub rotates freely by hand.



HYDRAULIC UNIT

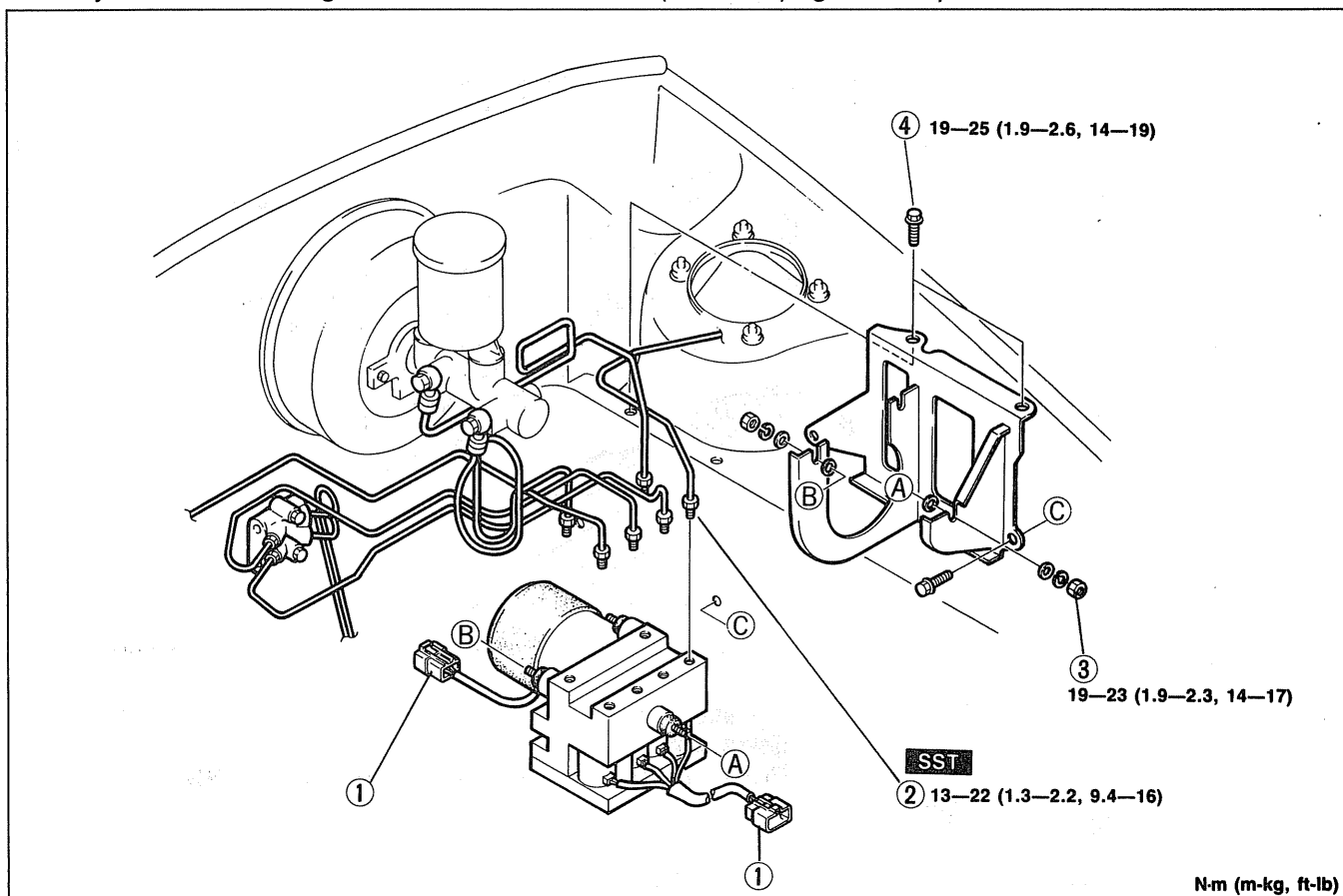
Removal / Installation

1. Remove the nuts mounting the fuel filter and igniter to the bracket, and move them toward the engine.
2. Remove the air cleaner assembly.
3. Remove the hydraulic unit in the order shown in the figure, referring the **Removal Note**.

Caution

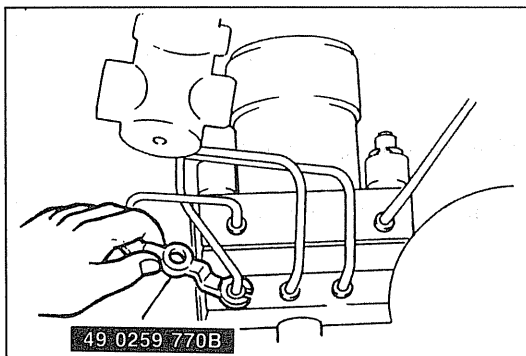
- The hydraulic unit is not serviceable. If there is a malfunction, replace the hydraulic unit assembly.

4. Install in the reverse order of removal, referring the **Installation Note**.
5. Add brake fluid, bleed the air, and check for fluid leakage.
6. Verify whether the diagnosis code is cancelled. (Refer to page P-70.)



1. Connector
2. Brake pipe  
Removal / Installation Note..... below
3. Mount bushing and nut

4. Mount bolt  
Removal / Installation Note..... below
5. Hydraulic unit assembly



Removal / Installation Note  
Brake pipes

Caution

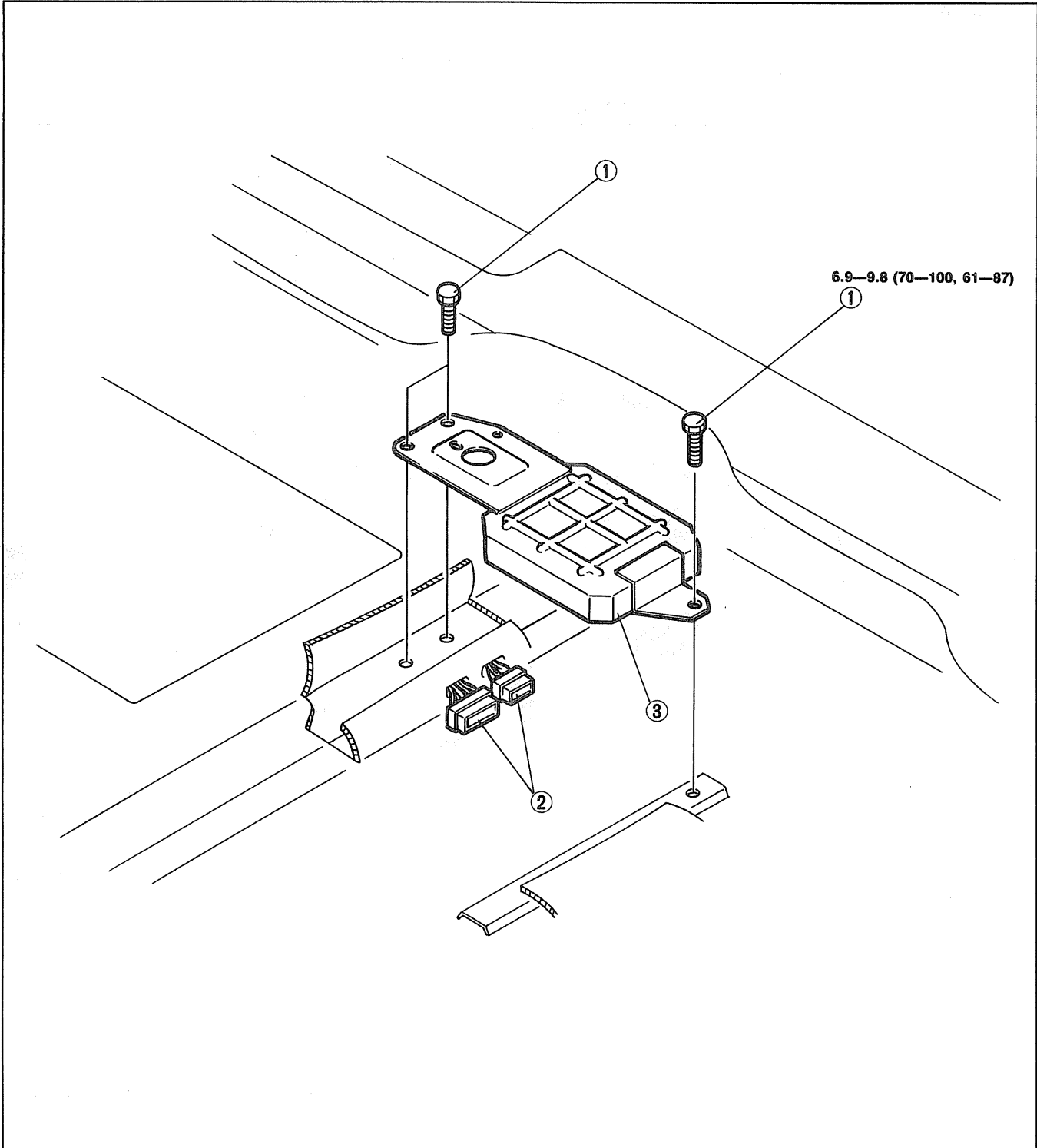
- Brake fluid will damage pointed surfaces. If it does get on a painted surface, wipe it off immediately.

Loosen and tighten the brake pipes with the **SST**.

## CONTROL UNIT

## Removal / Installation

1. Disconnect the negative battery cable.
2. Remove the front driver's seat.
3. Roll back the carpet.
4. Remove in the order shown in the figure.
5. Install in the reverse order of removal.
6. Connect the negative battery cable, verify whether the diagnosis code is cancelled. (Refer to page P-70.)



1. Bolt
2. Connector

3. ABS control unit

16U0PX-091