This file is available for free download at http://www.iluvmyrx7.com

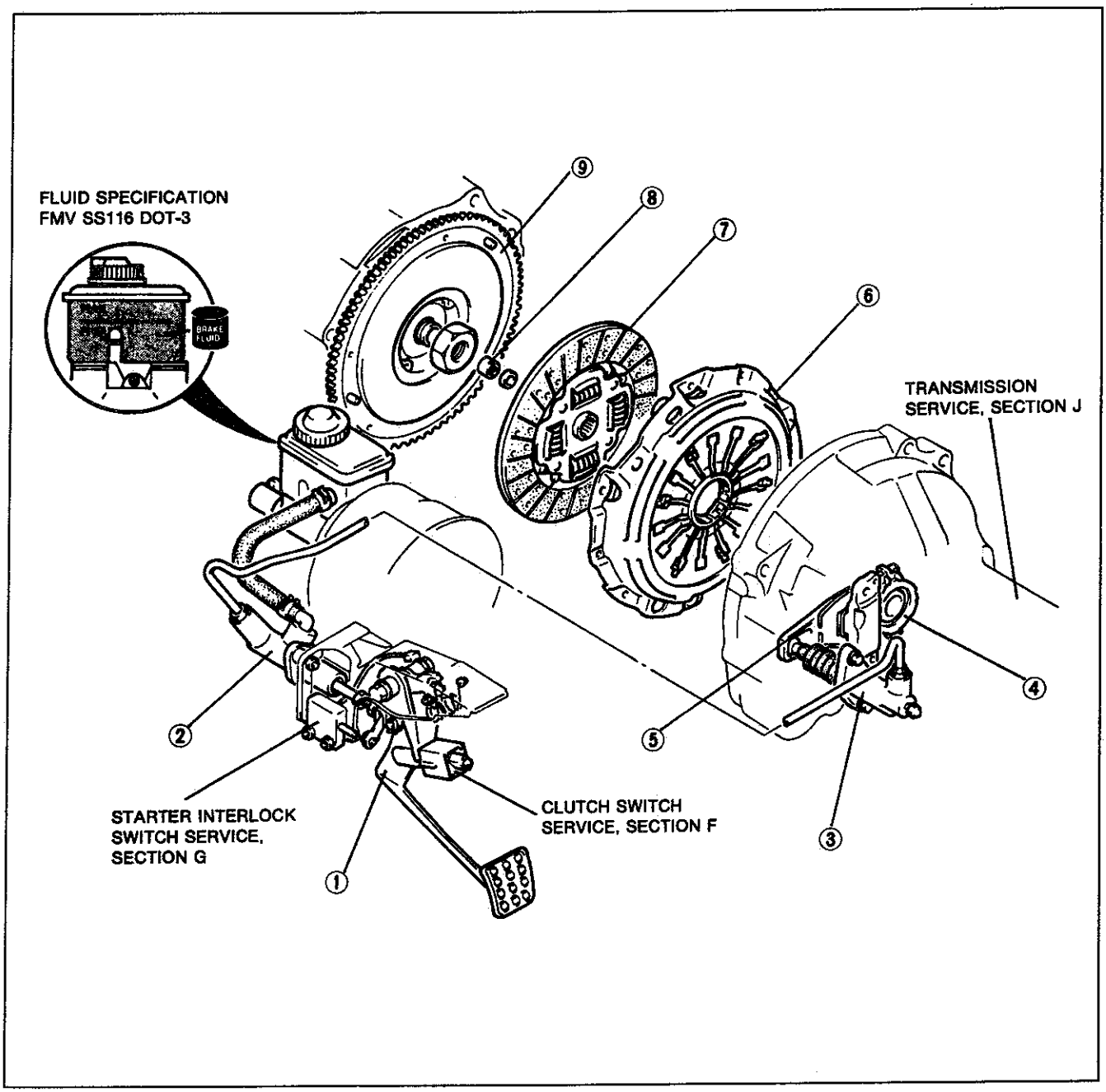
This file was not scanned to deprive Mazda of any money - it was scanned due to the rareness of the original manuals and the overwhelming need of the RX-7 owner to have this information so that they can accurately troubleshoot problems. Perhaps if Mazda's dealerships could support the Rotary Engine it wouldn't be so necessary for the owners to do so.

Many thanks to Lenny Terris for scanning this.

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

CLUTCH

INDEX



OUTLINE

SPECIFICATIONS

Item \ Transmission model			R15M-D (R5M-D)
Clutch control			Hydraulic
Clutch pedal	Type		Suspended
	Pedal ratio		6.35
	Full stroke	mm {in}	135 {5.32}
	Height (with carpet)	mm {in}	165.5–177.0 {6.516–6.968}
Clutch disc	Outer diameter	mm {in}	236 {9.29}
	Inner diameter	mm {in}	160 {6.30}
	Facing thickness	Flywheel side mm {in}	3.5 {0.14}
		Pressure plate side mm {in}	3.5 {0.14}
Clutch cover	Type		Diaphragm spring
	Set load	N {kgf, lbf}	7,220 {736,1619}
Clutch master cylinder	Inner diameter	mm {in}	15.87 {0.625}
Clutch release cylinder	Inner diameter	mm {in}	19.05 {0.750}
Clutch fluid			FMVSS116 DOT-3

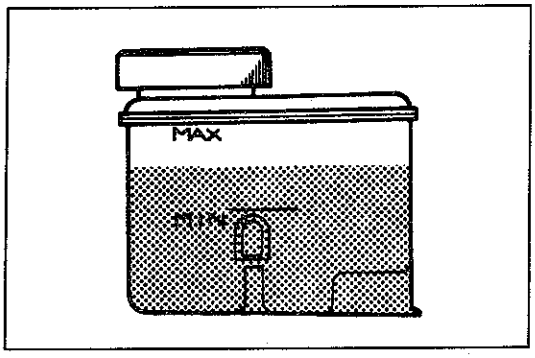
TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action	Page
Slipping	Clutch disc facing worn excessively	Replace	H–17
	Clutch disc facing surface hardened or oil soaked	Repair or replace	H–17
	Pressure plate damaged	Replace	H–17
	Flywheel damaged	Replace	H–17
	Diaphragm spring damaged or weak	Replace	H–17
	Insufficient clutch pedal play	Adjust	H–6
	Clutch pedal sticking	Repair or replace	H–7, 8
Faulty disengagement	Clutch disc damaged or excessive runout	Replace	H–17
	Clutch disc splices rusted or worn	Repair or replace	H–17
	Oil on clutch disc facing	Repair or replace	H–17
	Diaphragm spring damaged or weak	Replace	H–17
	Excessive clutch pedal play	Adjust	H–6
	Leakage of clutch fluid	Locate and repair or replace	—
Clutch vibrates when accelerating	Oil on clutch disc facing	Repair or replace	H–17
	Clutch disc facing hardened or damaged	Repair or replace	H–17
	Diaphragm spring weak	Replace	H–17
	Clutch disc facing rivets loose	Replace	H–17
	Pressure plate damaged or excessive runout	Replace	H–17
	Flywheel surface hardened or damaged	Repair or replace	H–17
	Loose or worn engine mount	Tighten or replace	—
Clutch pedal sticks	Pedal shaft not properly lubricated	Lubricate or replace	H–8
Abnormal noise	Clutch release collar damaged	Replace	H–17
	Release collar not properly lubricated	Lubricate or replace	H–17
	Torsion spring weak	Replace	H–17
	Pilot bearing worn or damaged	Replace	H–17
	Worn pivot points of release fork	Repair or replace	H–17
	Release fork contact points not properly lubricated	Lubricate or replace	H–17
Clutch pedal vibrates when engine running	Improper installation of or damage to wedge collar and wire ring assembly	Replace	H–17

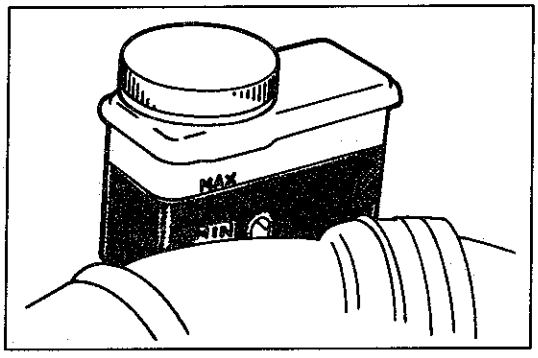
CLUTCH FLUID

PREPARATION
SST

49 0259 770B Wrench flare nut 	For air bleeding



INSPECTION
1. Make sure that the fluid level in the reservoir is between the MAX and MIN mark.
2. If the fluid level is extremely low, check the clutch and brake systems for leakage.



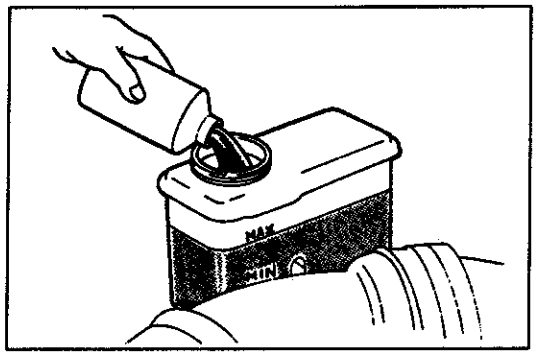
REPLACEMENT

Note
- A common reservoir is used for the clutch and brake system fluids.

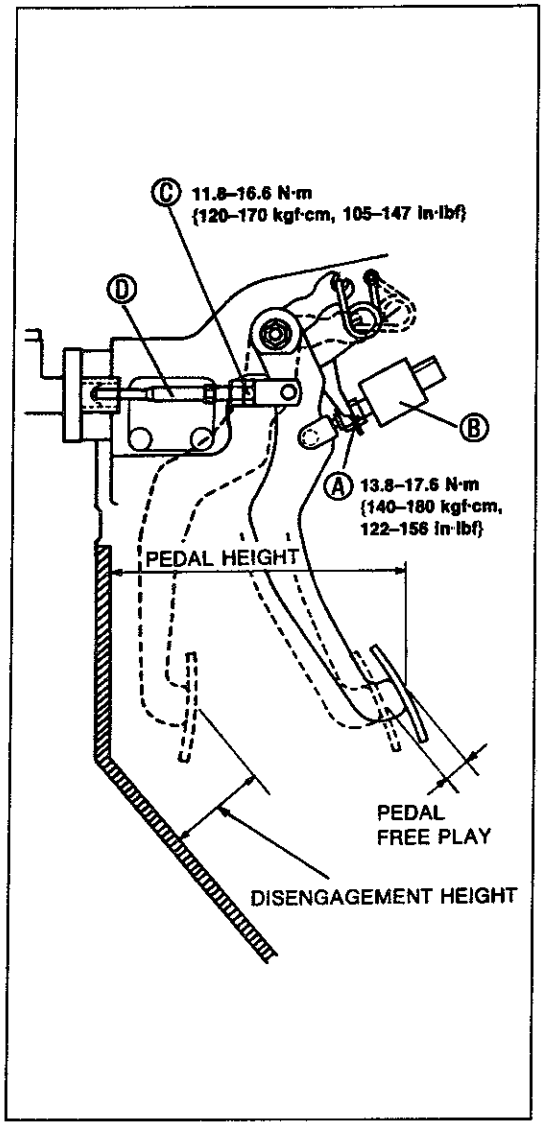
Caution
- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

1. Remove the brake fluid from the reservoir by using a suction pump, and fill the reservoir with new fluid of the specified type.
2. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder plug.
3. Insert the other end of the vinyl hose into a clear container.
4. Working with another person, have the person depress the clutch pedal several times, then hold it down.
5. With the clutch pedal depressed, loosen the bleeder screw by using the **SST** to let the fluid escape. Close the bleeder screw.
6. Repert steps 4 and 5 until only clean fluid is seen make sure the reservoir is always 3/4 full or more during this procedure.
7. Modify the bleeder screw tightening torque to allow for a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
8. Tighten the bleeder screw by using the **SST.**

Tightening torque:
5.9–8.8 N·m{60–90 kgf·cm,53–78 in·lbf}



9. Fill the reservoir to MAX with new fluid of the specified type.
10. Slowly pump the clutch pedal several times. Verify that there is no fluid leakage.
11. Check operation of the clutch system.
12. Check operation of the brake system.



CLUTCH PEDAL

ADJUSTMENT

Height

Inspection

1. Measure the distance from the upper surface of the pedal to the carpet.

Pedal height: 165.5–177.0 mm {6.516–6.968 in} (with carpet)

2. If necessary, adjust the pedal height.

Adjustment

1. Disconnect the clutch switch connector.
2. Loosen locknut A and turn clutch switch B until the pedal height is correct.
3. Tighten locknut A.

Tightening torque:
13.8–17.6 N·m{140–180 kgf·cm122–156 in·lbf}

4. After adjustment, measure the pedal free play.

Free Play

Inspection

1. Depress the clutch pedal by hand until clutch resistance is felt.

Free play: 0.6–3.2 mm {0.02–0.13 in}
Total free play: 5.1–14 mm {0.20–0.55 in}

2. If necessary, adjust the pedal free play.

Adjustment

1. Loosen locknut C and turn push rod D until pedal free play is correct.
2. Verify that the disengagement height (from the upper surface of the pedal to the carpet) is correct when the pedal is fully depressed.

Minimum disengagement height: 48 mm {1.9 in} (with carpet)

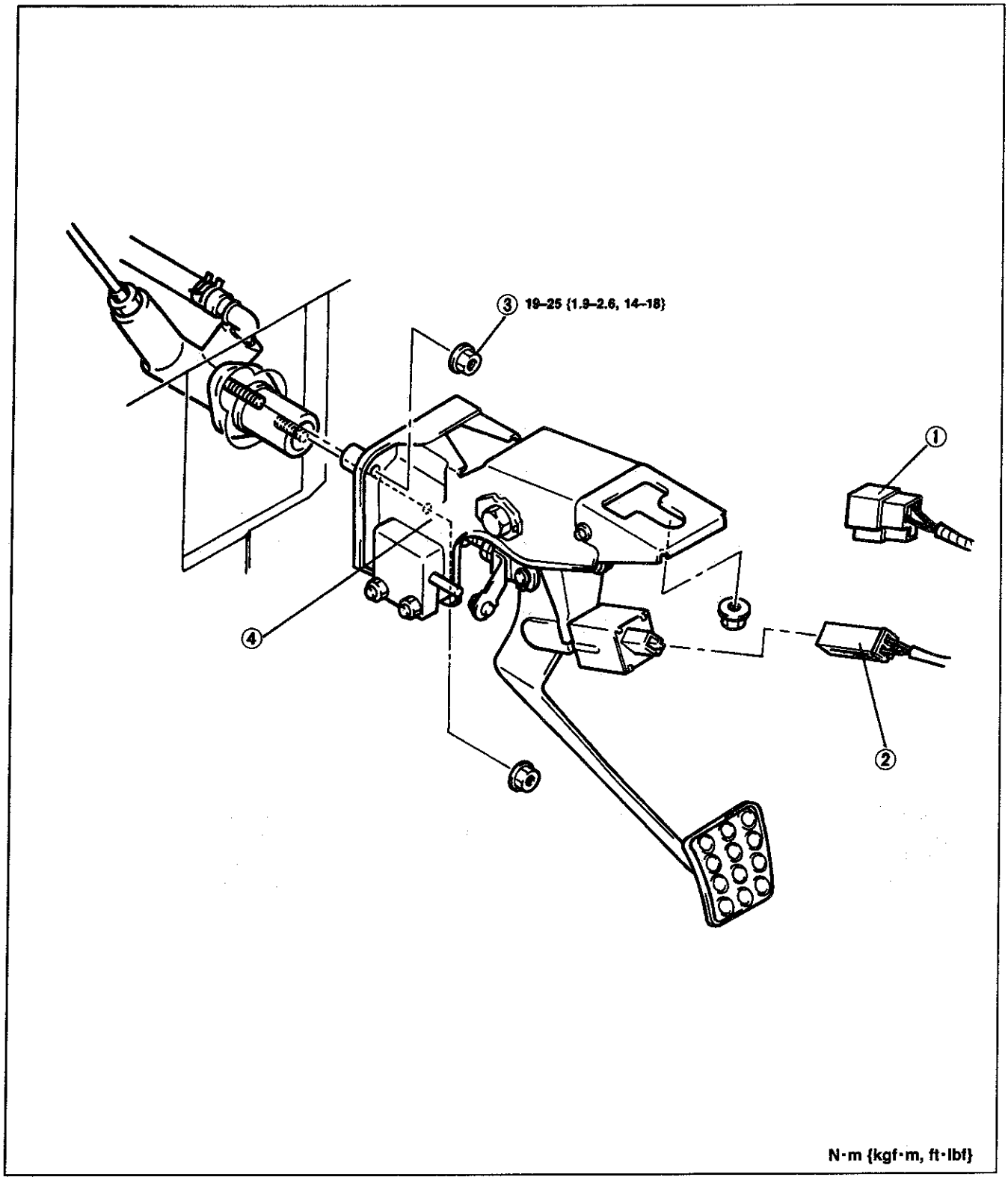
3. Tighten locknut C.

Tightening torque:
11.8–16.6 N·m{120–170 kgf·cm,105–147 in·lbf}

4. After adjustment, measure the pedal height.

REMOVAL / INSTALLATION

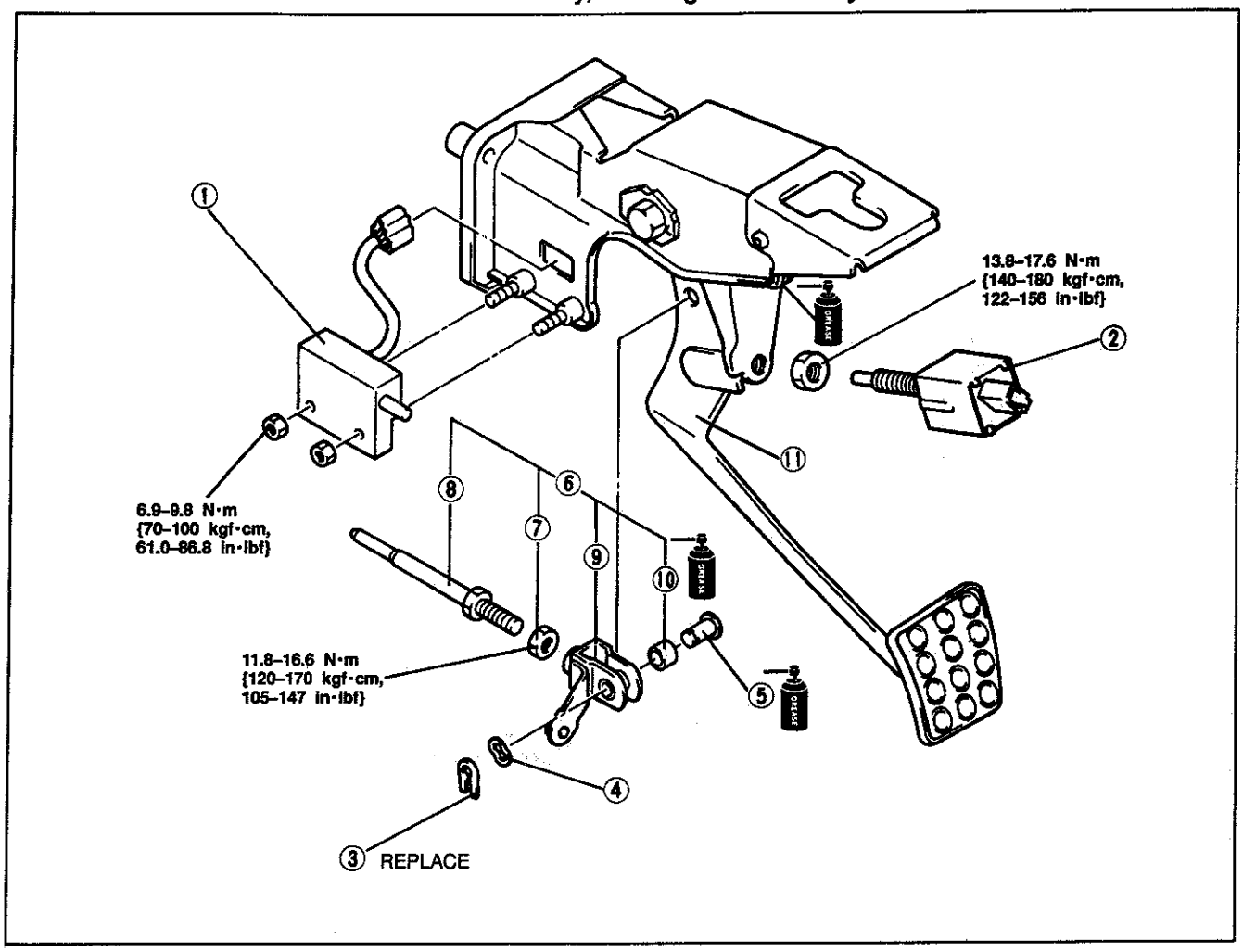
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



1. Starter interlock switch connector
2. Clutch switch connector
3. Nut
4. Clutch pedal assembly
   Adjustment .... page H–6
   Overhaul ..... page H–8

OVERHAUL

1. Disassemble in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. Starter interlock switch
2. Clutch switch
3. Retaining ring
4. Wave washer
5. Pin
6. Push rod assembly
   Inspect for damage and bending.
7. Nut
8. Push rod
9. Fork
10. Spacer
11. Clutch pedal assembly

CLUTCH MASTER CYLINDER

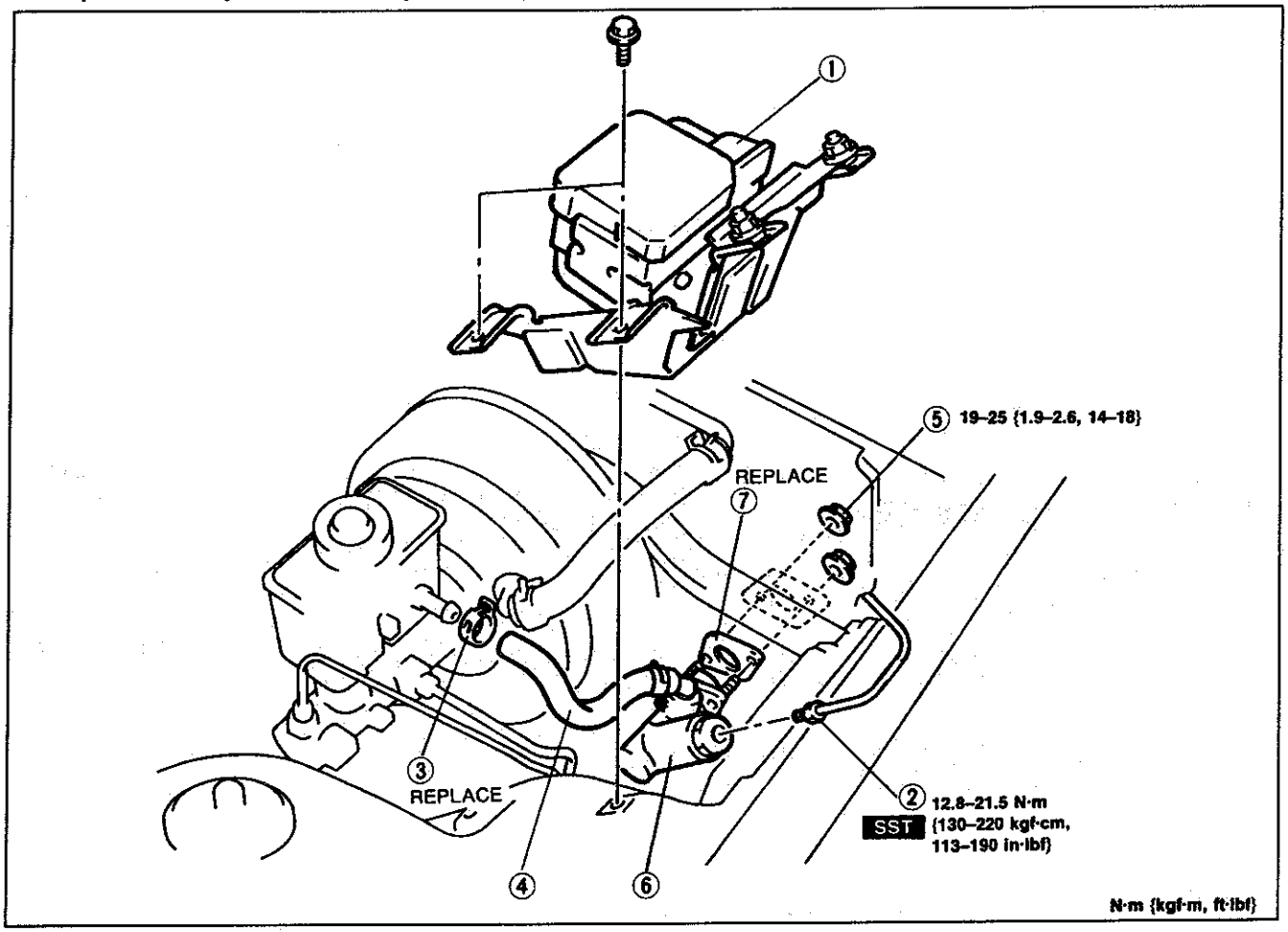
PREPARATION
SST

49 0259 770B Wrench, flare nut		For disconnecting and connecting clutch pipe

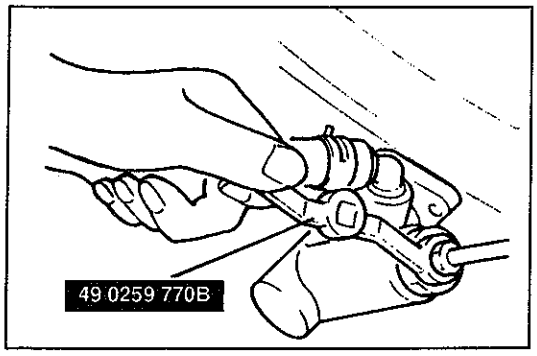
REMOVAL / INSTALLATION

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

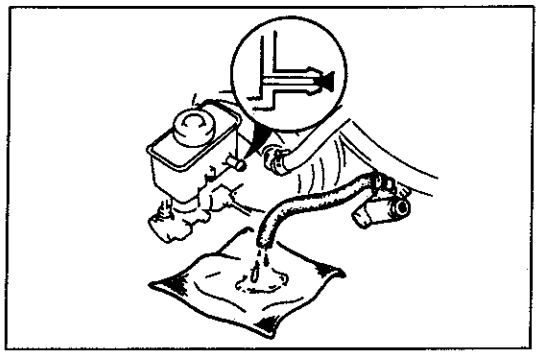
1. Remove in the order shown in the figure, referring to **Removal Note.**
2. Install in the reverse order of removal, referring to **Installation Note.**
3. After installation, bleed the clutch system. (Refer to page H–11.)
4. Inspect and adjust the clutch pedal height and free play. (Refer to page H–6.)



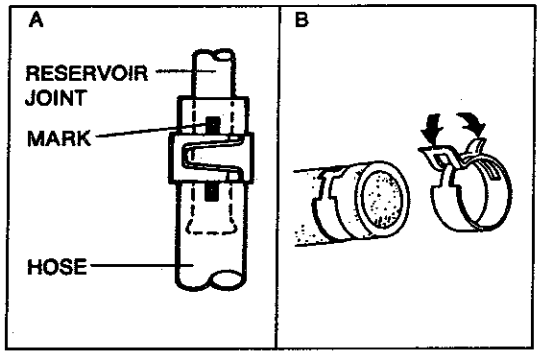
1. Cruise control actuator assembly
2. Clutch pipe
   Removal Note ..... page H–10
   Installation Note ..... page H–10
3. Clamp
4. Clutch hose
   Installation Note ..... page H–10
5. Nut
6. Clutch master cylinder
   Overhaul ..... page H–12
   Inspect for fluid leakage from the cylinder bore
   Air bleeding ... page H–11
7. Gasket



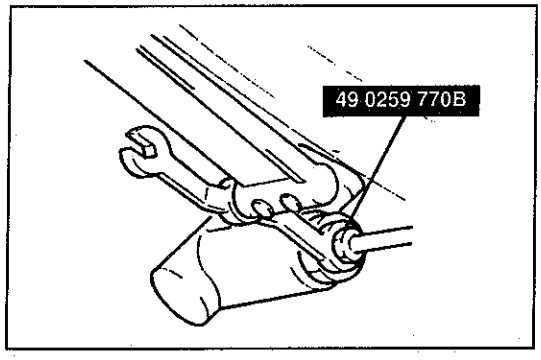
Removal Note
Clutch pipe
1. Disconnect the clutch pipe by using the **SST**.



2. Disconnect the clutch hose from the reservoir.
3. Plug the outlet of the reservoir.

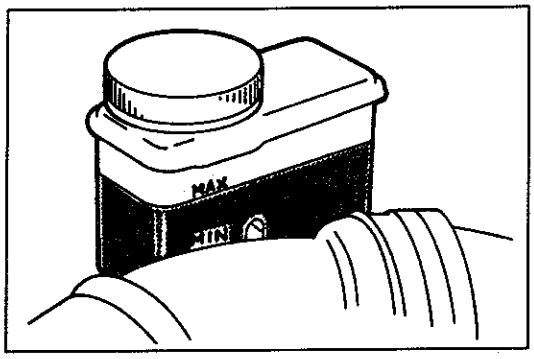


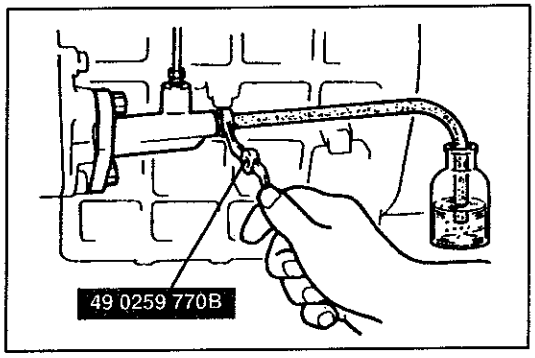
Installation Note
Clutch hose
Install the clutch hose with the mark facing upward, as shown in figure A. If reusing the clutch hose, install the new hose clamp exactly into the mark left by the previous hose clamp, as shown in figure B.

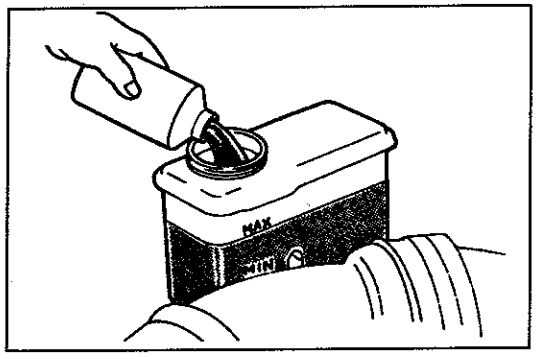


Clutch pipe
1. Modify the clutch pipe tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
2. Tighten the clutch pipe by using the **SST**.

Tightening torque:
12.8–21.5 N·m{130–220 kgf·cm,113–190 in·lbf}







AIR BLEEDING

The clutch hydraulic system must be bled to remove air introduced whenever a hydraulic line is disconnected.

Caution

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

1. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder plug.
2. Insert the other end of the vinyl hose into a fluid-filled clear container.
3. Working with another person, have the person depress the clutch pedal several times, then hold it down.
4. With the clutch pedal depressed, loosen the bleeder screw by using the **SST** to let fluid and air escape. Close the bleeder screw.
5. Repeat steps 3 and 4 until no air bubbles are seen. Make sure the reservoir is always 3/4 full or more during this procedure.
6. Modify the bleeder screw tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
7. Tighten the bleeder screw by using the **SST**.

   Tightening torque:
   5.9–8.8 N·m{60–90 kgf·cm,53–78 in·lbf}

8. Fill the reservoir to MAX with new fluid of the specified type.
9. Slowly pump the clutch pedal several times. Verify that there is no fluid leakage.
10. Check operation of the clutch system.
11. Check operation of the brake system.

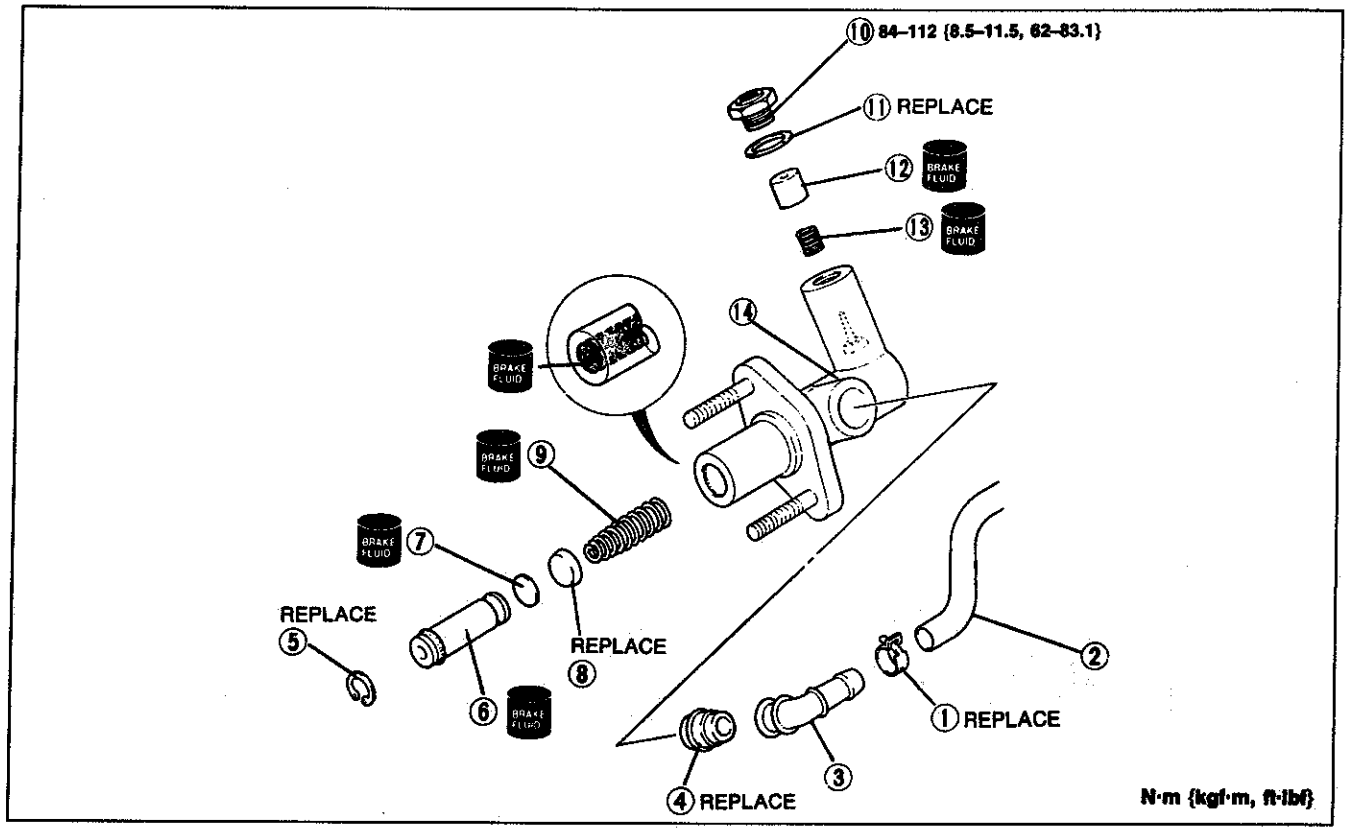
OVERHAUL

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.

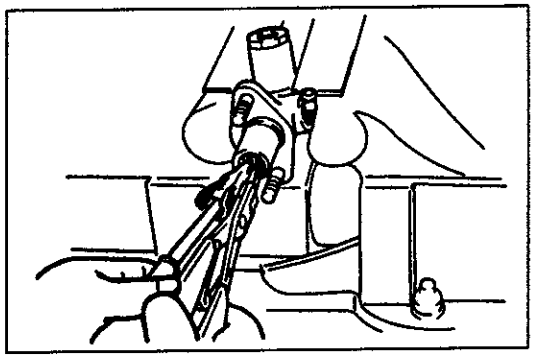
Warning

- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eyewear whenever using compressed air.**

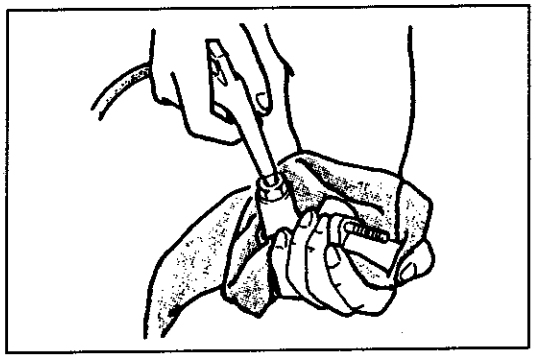
3. Wipe all parts, and clean all ports, passages, and inner parts with compressed air.
4. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. Hose clamp
2. Clutch hose
3. Joint
4. Bushing
5. Snap ring
   Disassembly Note ..... below
   Assembly Note ..... page H-13
6. Piston and secondary cup assembly
   Disassembly Note ..... page H-13
   Inspect for wear, scoring, and cracks
   Assembly Note ..... page H-13
7. Spacer
8. Primary cup
   Inspect for wear and cracks
9. Return spring
10. Joint bolt
11. Packing
12. One-way valve piston
    Disassembly Note ..... page H-13
13. Return spring
14. Master cylinder body
    Inspect for scoring and corrosion.
    Replace master cylinder assembly if any scoring or corrosion is found.



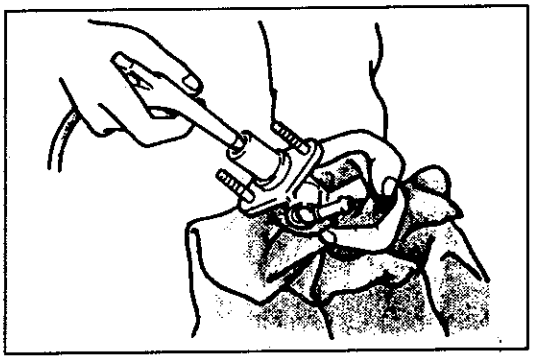
Disassembly Note
Snap ring
While holding the piston down with a cloth-wrapped pin punch, remove the snap ring.



Piston and secondary cup assembly

Warning
- **Applying compressed air to the cylinder assembly can make the contents suddenly pop out, possibly causing injury. Hold a rag over the cylinder opening when using compressed air.**

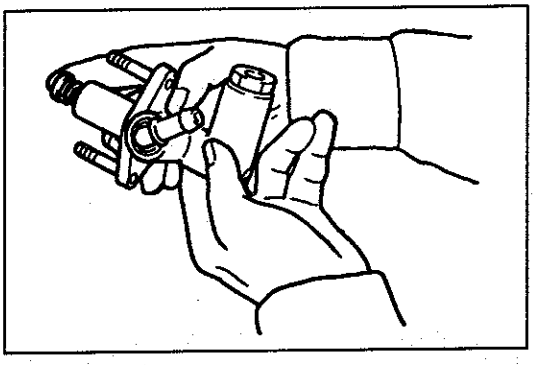
Remove the piston-and-secondary-cup assembly, spacer, primary cup, and the return spring by applying compressed air through the clutch pipe installation hole.



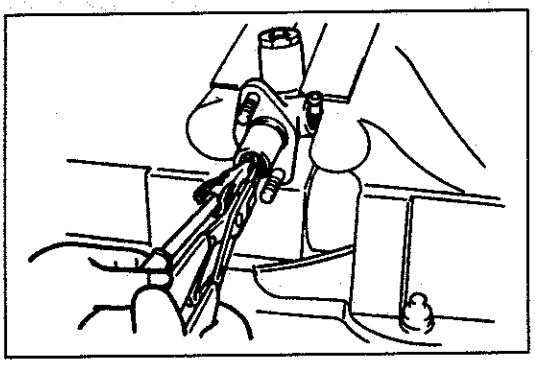
One-way valve piston

Warning
- **Applying compressed air to the cylinder assembly can make the contents suddenly pop out, possibly causing injury. Hold a rag over the cylinder opening when using compressed air.**

Remove the piston by applying compressed air through the cylinder bore.



Assembly Note
Piston and secondary cup assembly
1. Apply new fluid of the specified type to the cylinder bore and all internal parts.
2. Verify that all parts are completely free of dirt, dust, and other small particles.
3. Install the spring, primary cup, spacer, and piston-and-secondary-cup assembly into the master cylinder body.



Snap ring
While holding the piston down with a cloth-wrapped pin punch, install the snap ring.

CLUTCH RELEASE CYLINDER

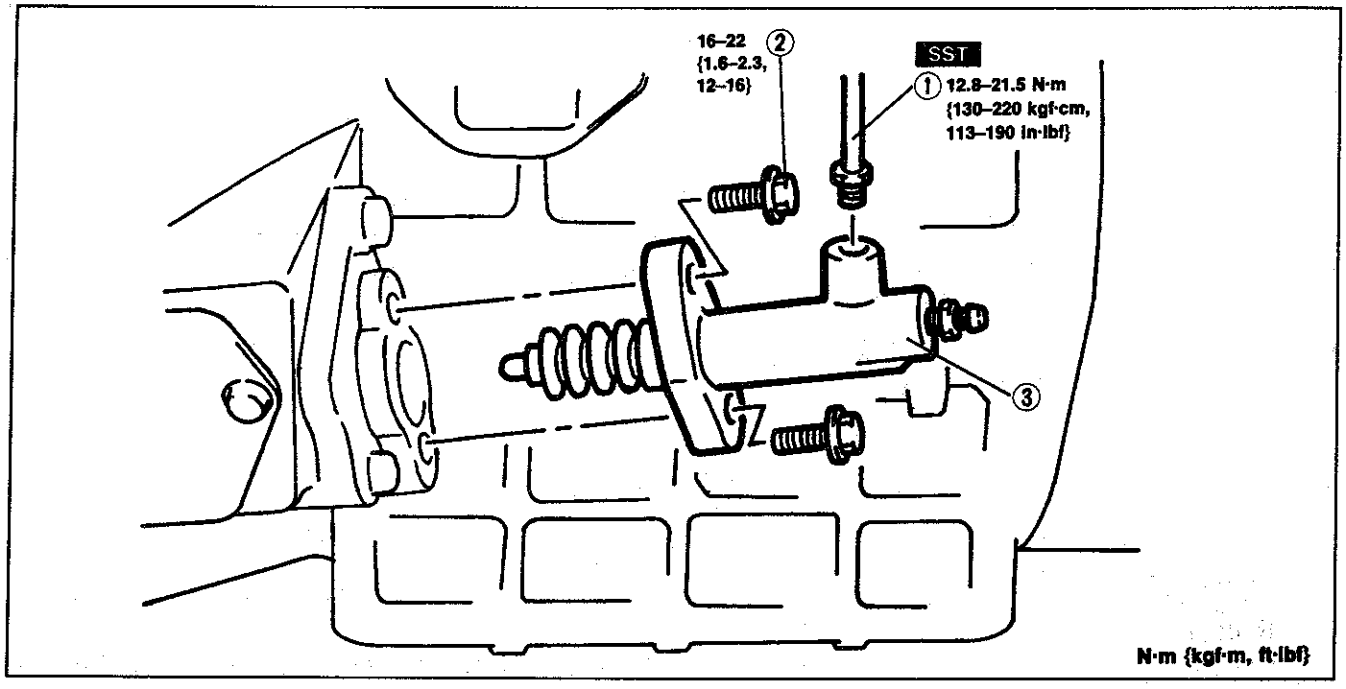
PREPARATION
SST

49 0259 770B Wrench, flare nut		For disconnecting and connecting clutch pipe

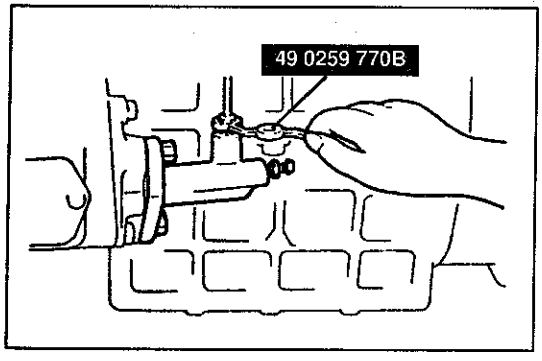
REMOVAL / INSTALLATION

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

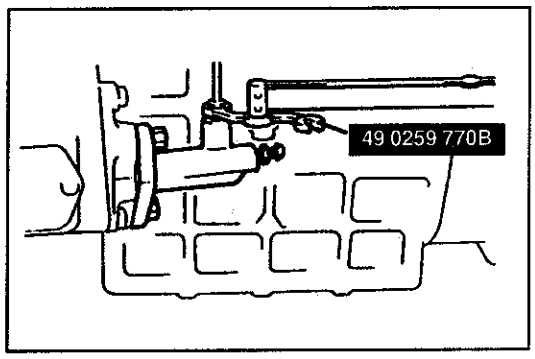
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal, referring to **Installation Note**.
3. After installation, bleed the clutch system. (Refer to page H-11.)



1. Clutch pipe
   Removal Note ..... below
   Installation Note ..... page H-15
2. Bolt
3. Clutch release cylinder
   Remove boot and check for fluid leakage
   Overhaul ..... page H-15



Removal Note
Clutch pipe
Disconnect the clutch pipe by using the **SST**, and plug the clutch pipe immediately.



Installation Note
Clutch pipe
1. Modify the clutch pipe tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
2. Tighten the clutch pipe onto the clutch release cylinder by using the **SST**.

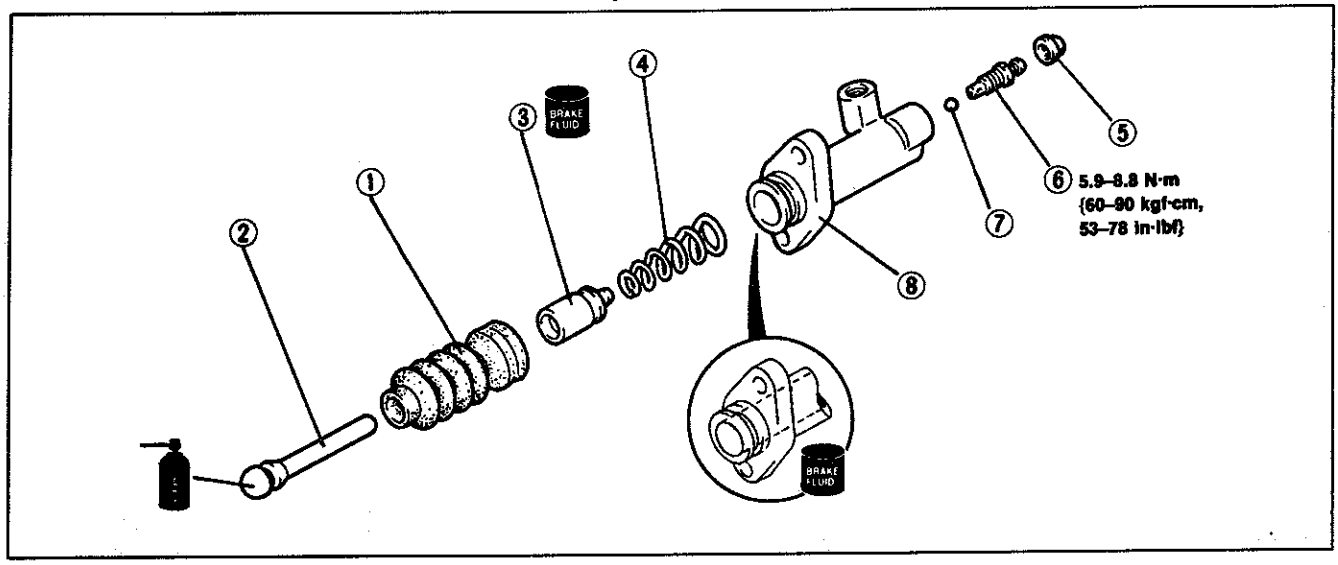
Tightening torque:
12.8–21.5 N·m{130–220 kgf·cm,113–190 in·lbf}

OVERHAUL

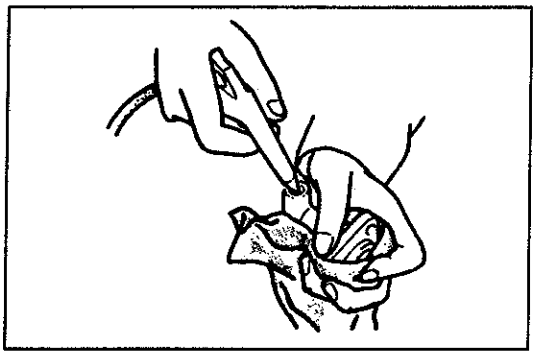
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eyewear whenever using compressed air.**

3. Wipe all parts, and clean all ports, passages, and inner parts with compressed air.
4. Assemble in the reverse order of disassembly.



1. Boot
2. Push rod
3. Piston and cup assembly
   Disassembly Not ..... page H–16
   Inspect for wear, scoring and cracks
4. Return spring
5. Bleeder cap
6. Bleeder screw
7. Steel ball
8. Release cylinder body
   Inspect cylinder bore for scoring and corrosion
   Replace cylinder assembly if any is found



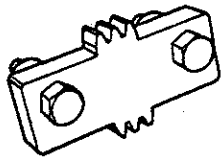
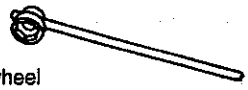
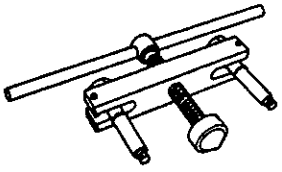
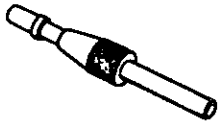
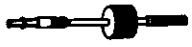
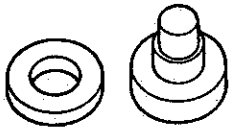
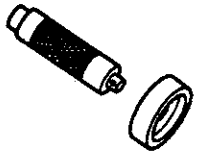
Disassembly Note
Piston and cup assembly

Warning
- **Applying compressed air to the cylinder assembly can make the contents suddenly pop out, possibly causing injury. Hold a rag over the cylinder opening when using compressed air.**

Remove the piston and cup assembly by applying compressed air through the clutch pipe installation hole.

CLUTCH UNIT

PREPARATION
SST

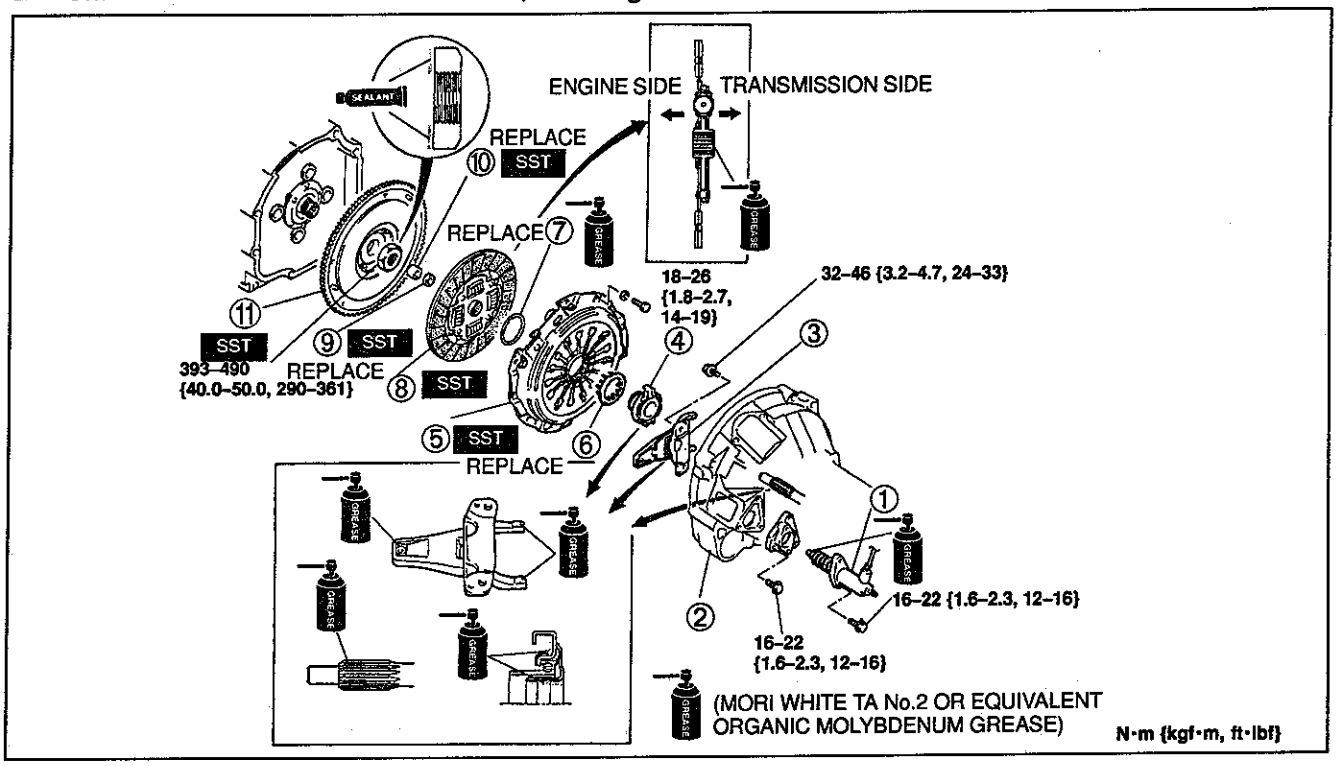
49 F011 101 Brake, ring gear 	For prevention of engine rotation	49 0820 035 Box wrench, flywheel 	For removal and installation of flywheel
49 0839 305A Puller, counterweight 	For removal of flywheel	49 SE01 310A Clutch disc centering tool 	For support of clutch disc
49 1285 071 Puller, bearing 	For removal of pilot bearing and oil seal	49 1285 073 Chuck (Part of 49 1285 071) 	For removal of pilot bearing and oil seal
49 F011 1A1 Installer set, bearing 	For installation of pilot bearing and oil seal	49 G030 795 Installer, oil seal 	For installation of pilot bearing and oil seal
49 G030 797 Handle (Part of 49 G030 795) 	For installation of pilot bearing and oil seal		

REMOVAL / INSTALLATION

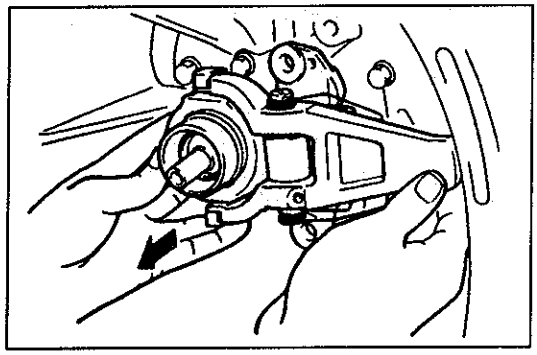
Note

- The clutch release cylinder can be removed from the trans with the clutch pipe connected.

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal, referring to **Installation Note**.



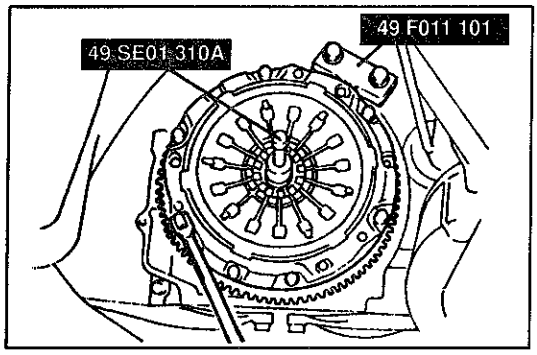
1. Clutch release cylinder
2. Transmission
   Service ..... section J
3. Clutch release fork assembly
   Removal Note ..... below
   Inspection .... page H–21
   Overhaul ..... page H–22
4. Clutch release collar
   Removal Note ..... below
   Inspection .... page H–23
5. Clutch cover
   Removal Note
   ..... page H–18
   Inspection .... page H–20
   Installation Note
   ..... page H–20
6. Wedge collar
   Removal Note
   ..... page H–18
   Installation Note
   ..... page H–19
7. Wire ring
8. Clutch disc
   Removal Note
   ..... page H–18
   Inspection .... page H–21
   Installation Note
   ..... page H–20
9. Oil seal
   Removal Note
   ..... page H–18
   Installation Note
   ..... page H–19
10. Pilot bearing
    Removal Note
    ..... page H–18
    Inspection .... page H–23
    Installation Note
    ..... page H–19
11. Flywheel
    Removal Note
    ..... page H–18
    Inspection .... page H–23
    Installation Note
    ..... page H–19



Removal Note

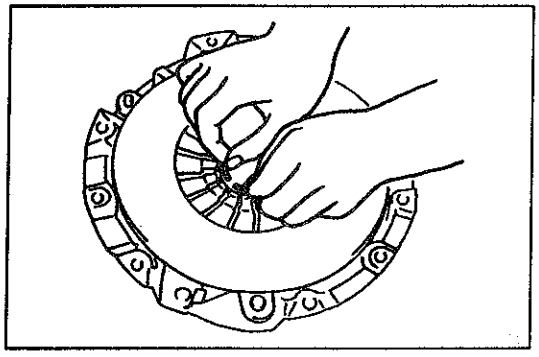
Clutch release fork assembly and clutch release collar

1. Remove the release fork assembly bolts.
2. Remove the release fork assembly and release collar together as shown in the figure.



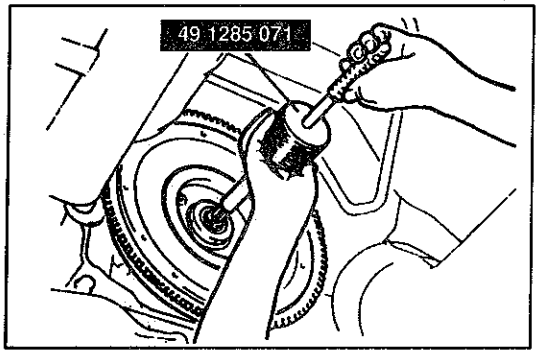
Clutch cover and clutch disc

1. Install the **SSTs.**
2. Loosen each bolt one turn at a time in a crisscross pattern until spring tension is released.
3. Remove the clutch cover and disc.



Wedge collar

1. Remove the wire ring from the wedge collar.
2. Remove the wedge collar from the clutch cover.

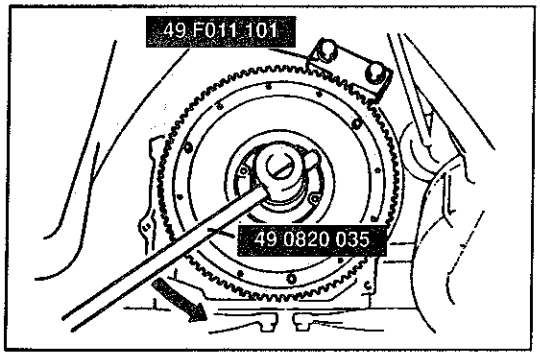


Oil seal and pilot bearing

Note

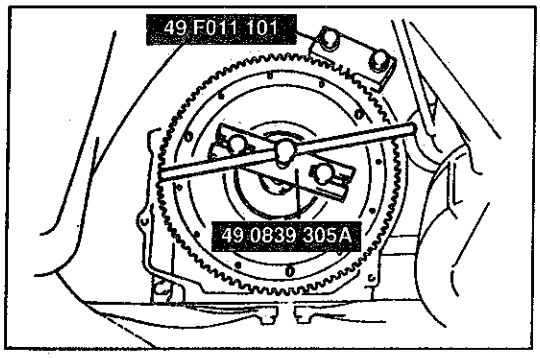
- The pilot bearing and oil seal do not need to be removed unless you are replacing them.

Remove the pilot bearing together with the oil seal by using the **SST.**

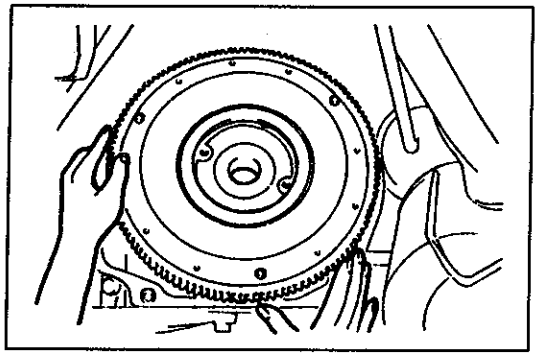


Flywheel

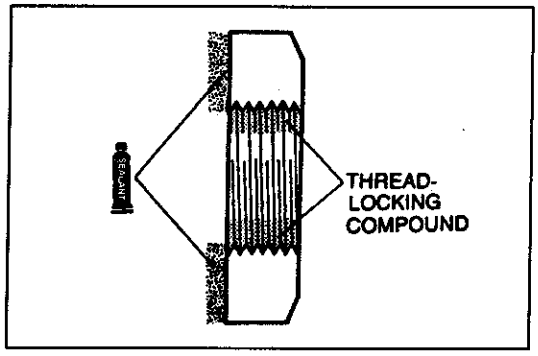
1. Hold the flywheel by using the **SST** or equivalent.
2. Using the **SST** (box wrench), loosen the looknut to he end of the eccentric shaft.



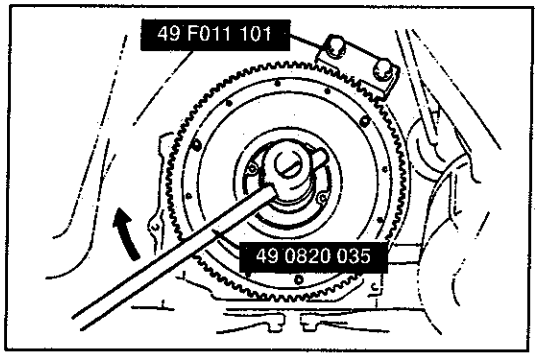
3. Loosen the flywheel from the eccentric shaft by using the **SST** (pulles).
4. Remove the locknut and Flywheel.
5. Remove the key from the eccentric shaft.
6. Inspect for oil leakage past the crankshaft rear oil seal. If there is any such leakage or if the oil seal is damaged, refer to section C and replace the crankshaft rear oil seal.



Installation Note
Flywheel
1. Set the key in the eccentric shaft.
2. Align the groove with the eccentric shaft key and slide the flywheel into place.

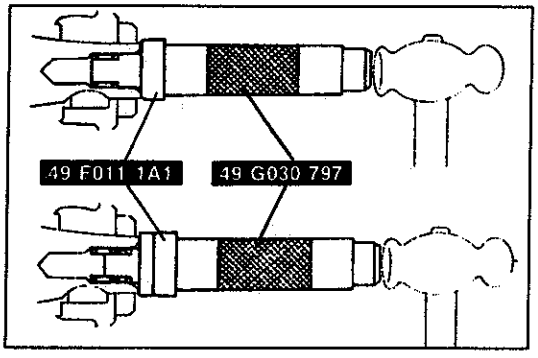


3. Apply a small amount of sealant and thread-locking compound to the flywheel locknut as shown.



4. Install the **SST** to the flywheel.
5. Tighten the locknut by using the **SST** (box wrench).

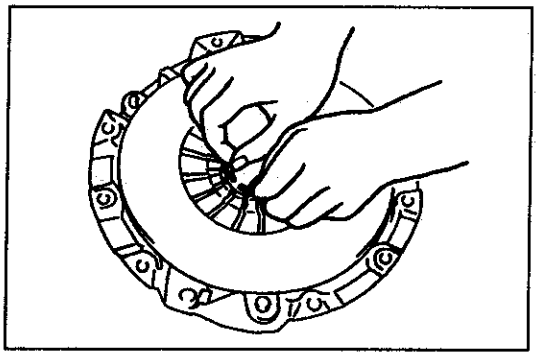
Tightening torque:
393–490 N·m{40.0–50.0 kgf·m,290–361 ft·lbf}



Pilot bearing and oil seal
1. Install the new bearing by using the **SST**.

Bearing outer diameter: 20 mm {0.79 in}
Insertion depth: 11.5–12.3 mm {0.453–0.482 in}

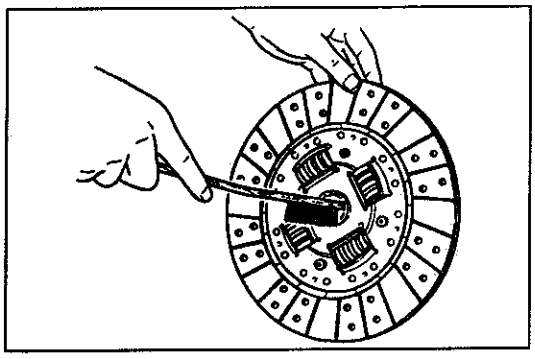
2. Install the new oil seal by using the **SST**.



Wedge collar

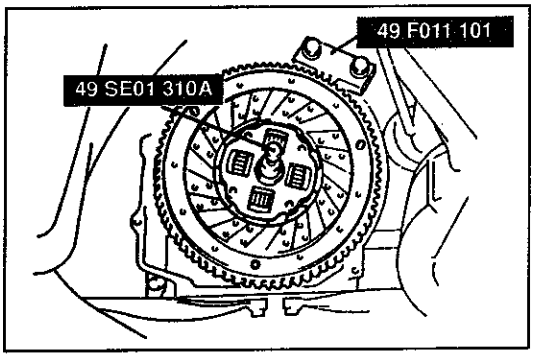
Caution
- **If the wire ring or wedge collar is bent, it can separate from the release collar, disconnecting the clutch. When installing the wire ring and wedge collar, fit them onto the clutch cover without bending them.**

1. Install a new wedge collar to the clutch cover.
2. Apply a small amount of grease to a new wire ring and install into exact position.

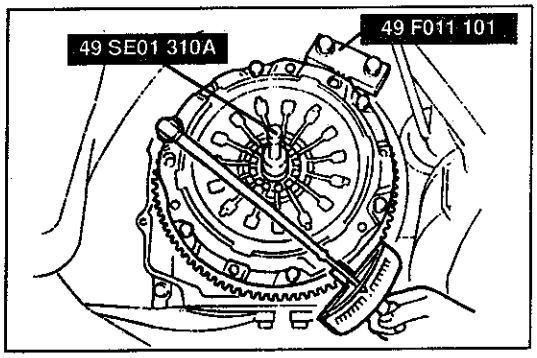


Clutch disc

1. Clean the clutch disc splines and main drive gear splines. Apply molybdenum sulfide grease to the splines.



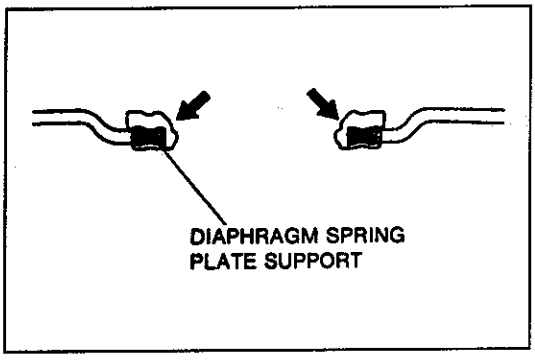
2. Hold the flywheel by using the **SST** or equivalent.
3. Hold the clutch disc in position by using the **SSTs**.



Clutch cover

1. Align the dowel holes with the flywheel dowels and set the clutch cover in place, being careful not to dent or scratch the wedge collar and wire ring.
2. Tighten the bolts evenly and gradually in a crisscross pattern, while securing the flywheel by using the **SST**.

Tightening torque:
18–26 N·m{1.8–2.7 kgf·m,14–19 ft·lbf}

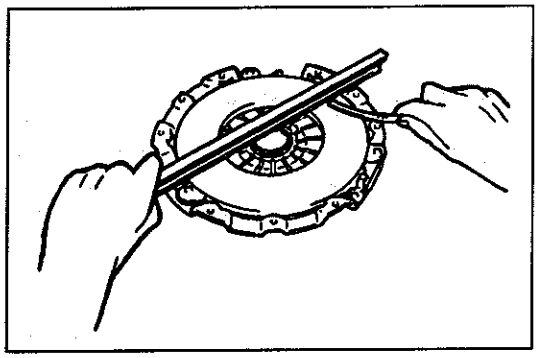


CLUTCH COVER

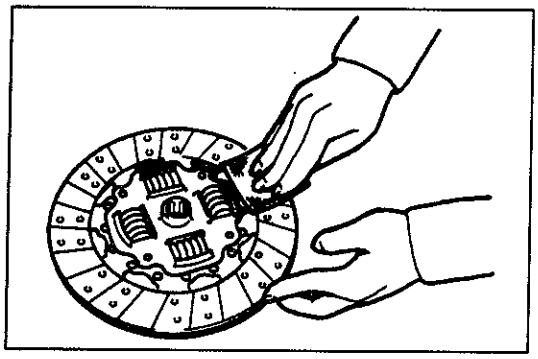
INSPECTION

1. Inspect for wear or damage to the wire ring contact surface of the diaphragm spring plate.
2. Inspect for loosening of the diaphragm spring plate support.
3. If the diaphragm spring plate is loose or damaged, replace the clutch coves.
4. Measure the flatness of the pressure plate/clutch disc contact surface in a crisscross pattern with a straightedge and a feeler gauge.

Maximum: 0.20 mm {0.008 in}



5. Check for discoloration of the pressure plate/clutch disc contact surface.
6. Remove minor discoloration with emery paper. Replace if discoloration is major.

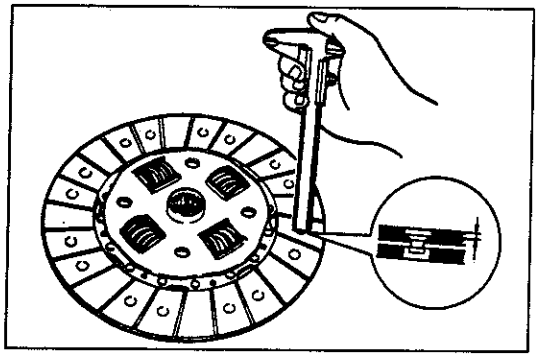


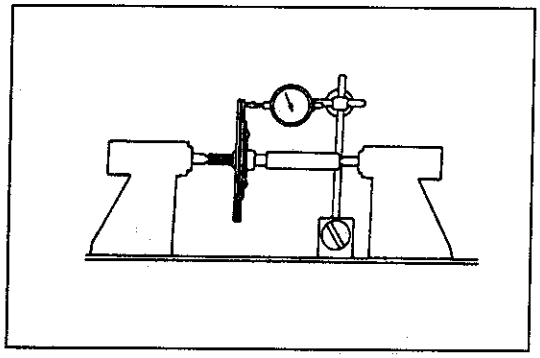
CLUTCH DISC

INSPECTION

1. Inspect the lining surface for burning or oil contamination. Remove minor scratches or discoloration with sandpaper.
2. Inspect for loose facing rivets and torsion springs. Replace the clutch disc if any are loose.
3. Measure the thickness of the lining at a rivet head on both sides with vernier calipers. Replace if thickness is less than minimum.

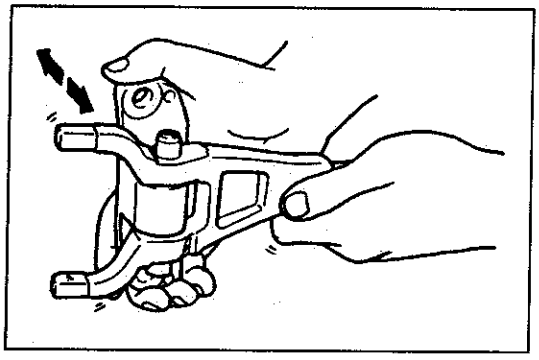
Thickness: 0.3 mm {0.012 in} min.





4. Measure the clutch disc runout with a dial indicator. Replace the clutch disc if runout is excessive.

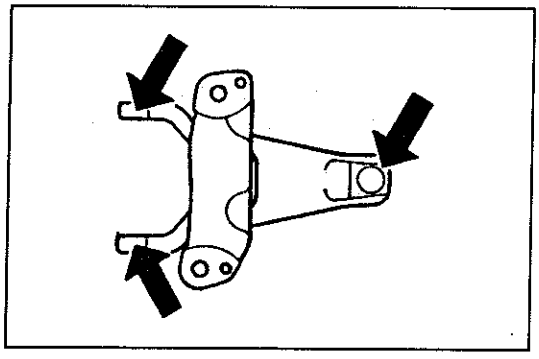
Runout: 0.6 mm {0.024 in} max.



CLUTCH RELEASE FORK ASSEMBLY

INSPECTION

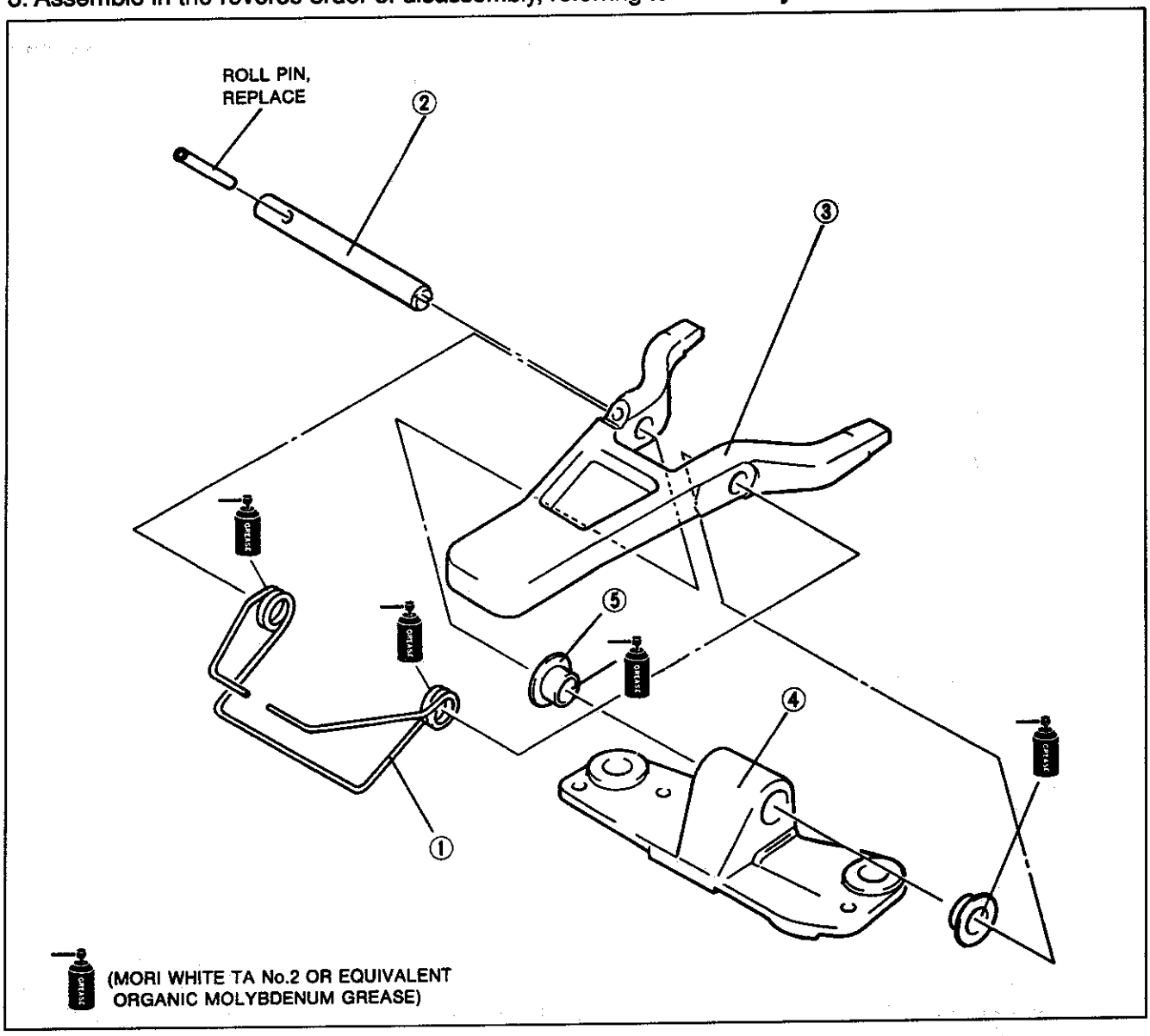
1. Remove the return spring.
2. Swing the release fork back and forth, and make sure it moves smoothly.



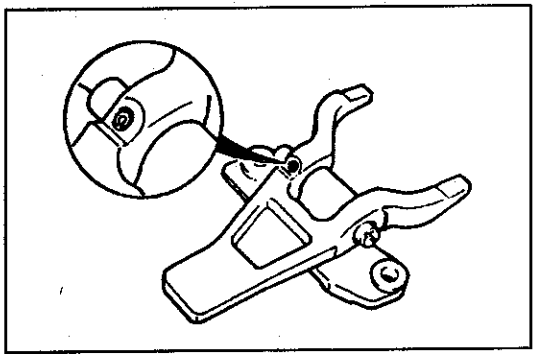
3. Inspect for wear and damage to the push rod contact surface.
4. Inspect for wear and damage to the release collar contact surfaces.
5. Replace parts as necessary.

OVERHAUL

1. Disassemble in the order shown.
2. Inspect all parts and replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

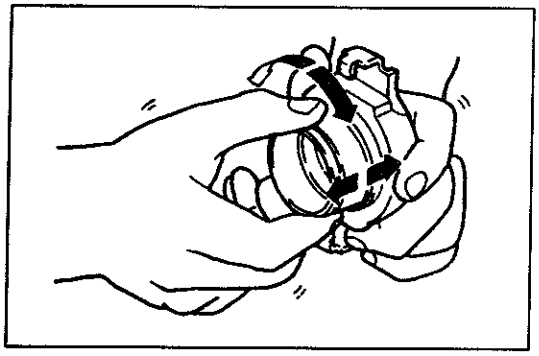


1. Return spring
   Inspect for damage and bending
2. Fork shaft
   Assembly Note ..... below
3. Clutch release fork
   Inspect for wear and damage
4. Release fork support
5. Bushing
   Inspect bushing bore for wear and damage



Assembly Note
Fork shaft

1. Install the roll pin with the split facing as shown.
2. Make sure the roll pin is installed flush with the release fork surface.

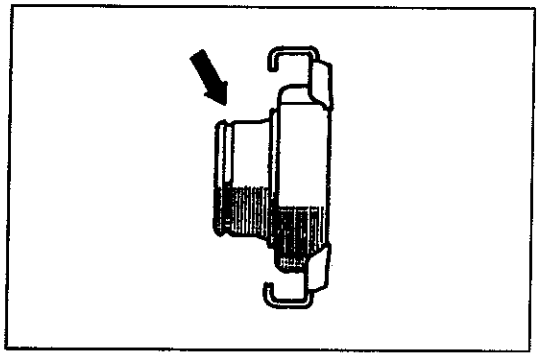


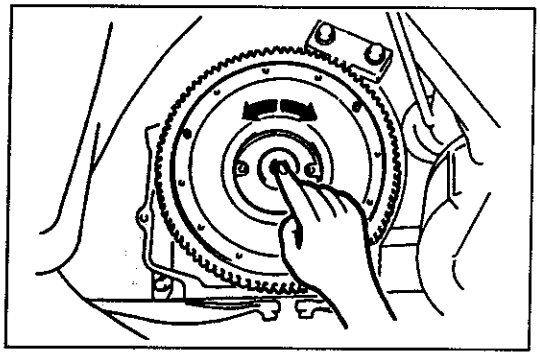
CLUTCH RELEASE COLLAR

INSPECTION

Caution
- **Cleaning the clutch release collar with cleaning fluids or a steam cleaner can wash the grease out of the sealed bearing.**

1. Turn the collar while applying force in the axial direction. If the collar sticks or has excessive resistance, replace it.
2. Inspect for wear and damage to the release collar groove. Replace if worn or damaged.

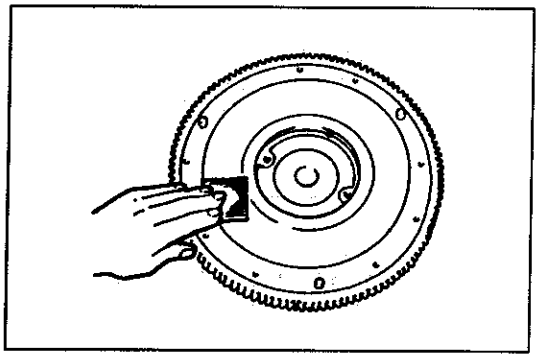




PILOT BEARING

INSPECTION

Without removing the pilot bearing from the flywheel, inspect the pilot bearing for wear and damage, and check the rotating condition. Replace the pilot bearing if worn or damaged, or if roating condition is poor.



FLYWHEEL

INSPECTION

1. Inspect the contact surface for scoring, cracks, and burning.
2. Remove minor scoring and burning with emery paper. Replace if scoring or burning is major, or if flywheel is cracked.
3. Inspect the ring gear teeth for wear and damage.
4. Measure the flywheel runout with a dial indicator. Replace the flywheel if runout is excessive.

Runout: 0.2 mm {0.008 in} max.