SECTION CL

CLUTCH

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CL

Refer to section MA (Clutch) for:

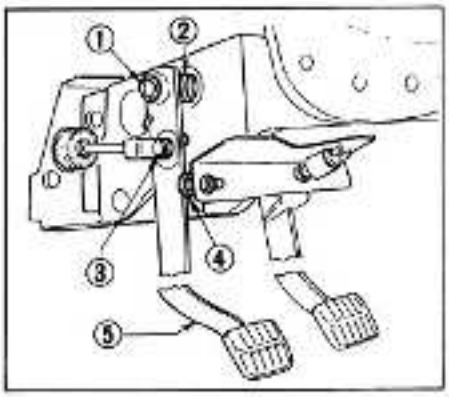
- CHECKING CLUTCH PEDAL HEIGHT AND FREE PLAY

HYDRAULIC CLUTCH CONTROL

CLUTCH PEDAL

REMOVAL

1. Remove instrument lower cover.
2. Pry off snap pin and take out clevis pin.



1 E-ring
2 Return spring
3 Clevis pin
4 Stopper bolt
5 Clutch pedal

3. Remove stopper bolt.
4. Remove E-ring on fulcrum pin, then remove clutch pedal and return spring.

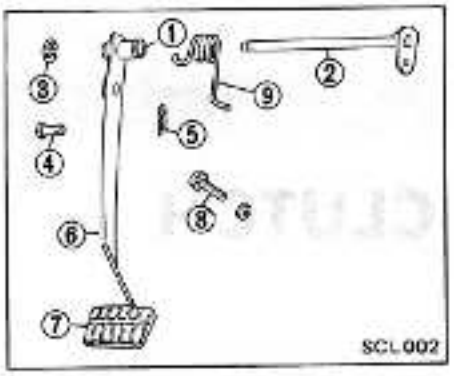
INSPECTION

Inspect the following parts: If abnormalities are found, repair or replace the affected parts.

1. Clutch pedal bushing ① at boss, fulcrum pin ② and E-ring ③ for wear, deformation or damage.

Bushing is press-fitted. If it shows sign of abnormality, replace pedal assembly.

2. Clevis pin ④ for wear or damage, and snap pin ⑤ for any deformation.
3. Pedal ⑥, pedal pad ⑦ and pedal stopper ⑧ for deformation or damage.
4. Return spring ⑨ for fatigue or damage.

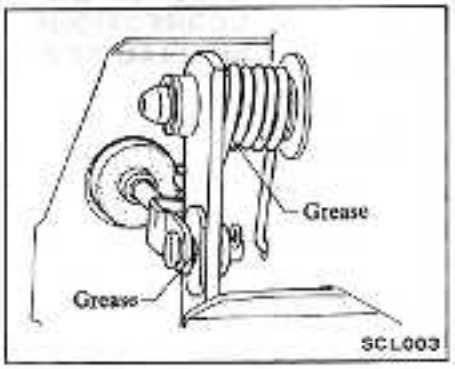


INSTALLATION

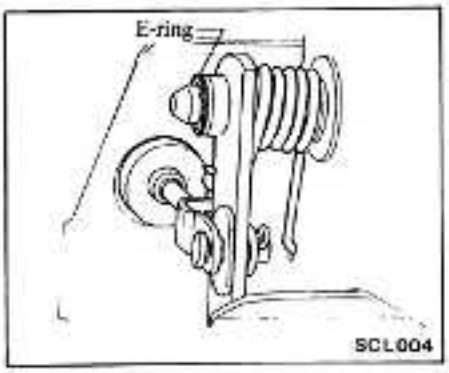
1. Install clutch pedal in reverse order of removal.

Ovserve following:

a. Apply grease to boss of clutch pedal, return spring and fulcrum pin.



b. Firmly attach E-ring to fulcrum pin.



c. Install clevis pin on the left of clutch pedal and attach snap pin securely.

d. Install return spring as shown in bottom Figure on this page.

2. After assembly, adjust clutch pedal height and free play.

Refer to Clutch Pedal Height and Free Play (Section MA).

Ⓣ : Pedal stopper lock nut
7.8 - 11.8 N-m
(0.8 - 1.2 kg-m,
5.8 - 8.7 ft-lb)

CLUTCH MASTER CYLINDER

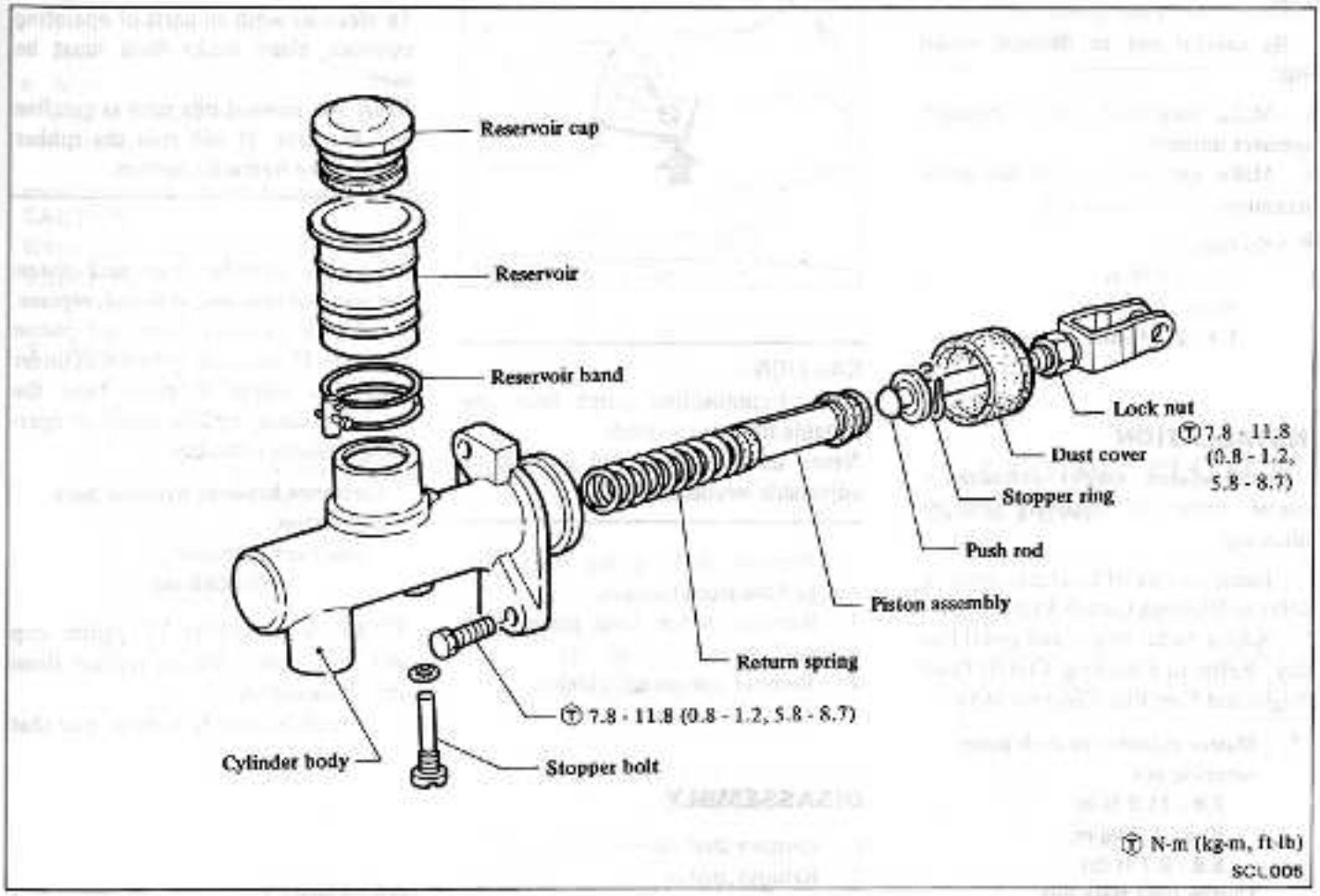
REMOVAL

1. Remove snap pin from clevis pin.
2. Pull out clevis pin.
3. Disconnect clutch tube.
4. Remove master cylinder.

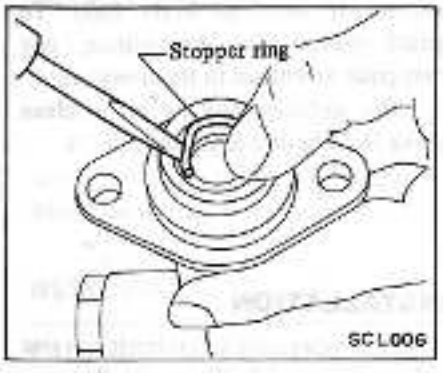
When disconnecting clutch tube, be sure to receive draining clutch fluid into a container. Use of rags is also suggested to keep adjacent parts and area clean.

CAUTION:
When disconnecting clutch tube, use suitable flare nut wrench.
Never use an open end wrench or adjustable wrench.

DISASSEMBLY



1. Remove dust cover and take off stopper ring.



2. Then, the push rod and stopper can be taken out.
3. Loosen stopper bolt and take it out.
4. The piston, spring seat, and return spring can be taken out.

Discard piston cup and dust cover.

CAUTION:
Never detach reservoir. If it is removed for any reason, discard it and install new one.

INSPECTION

CAUTION:
To clean or wash all parts of master cylinder, clean brake fluid must be used. Never use mineral oils such as gasoline and kerosene. It will ruin the rubber parts of the hydraulic system.

1. Check cylinder bore and piston for score or rust and if found, replace.
2. Check cylinder bore and piston for wear. If the clearance between cylinder bore and piston exceeds specified value, replace piston assembly or master cylinder assembly.

Clearance between cylinder bore and piston:
Less than 0.15 mm (0.0059 in)

3. Check condition of piston cup and dust cover. Always replace them after disassembly.
4. Check all recesses, openings and internal passages to ensure that they are clean and free from foreign matter.

ASSEMBLY

1. Apply grease to cylinder body, sliding part and piston cup.

2. Install piston assembly to cylinder body.

Be careful not to damage piston cup.

4. Make sure that master cylinder operates normally.
5. Make sure that piston can move maximum stroke smoothly.

Ⓣ : Stopper bolt
1.5 - 2.9 N·m
(0.15 - 0.3 kg-m,
1.1 - 2.2 ft-lb)

INSTALLATION

Install clutch master cylinder in reverse order of removal. Observe following:

1. Bleed air out of hydraulic system. Refer to Bleeding Clutch System.
2. Adjust pedal height and pedal free play. Refer to Checking Clutch Pedal Height and Free Play (Section MA).

Ⓣ : Master cylinder to dash panel securing nut
7.8 - 11.8 N·m
(0.8 - 1.2 kg-m,
5.8 - 8.7 ft-lb)
Clutch tube flare nut
15 - 18 N·m
(1.5 - 1.8 kg-m,
11 - 13 ft-lb)
Push rod lock nut
7.8 - 11.8 N·m
(0.8 - 1.2 kg-m,
5.8 - 8.7 ft-lb)

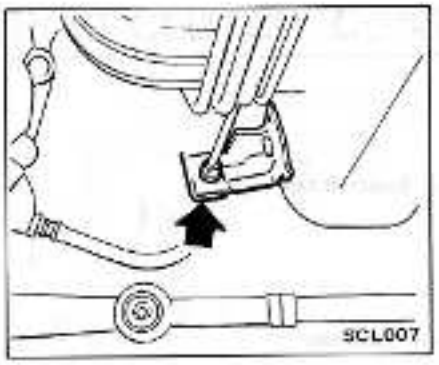
CAUTION:
When connecting clutch tube, use Tool GG94310000.

When tightening flare nut, hold pipe by hand to prevent it from twisting.

OPERATING CYLINDER

REMOVAL

1. Loosen clutch tube flare nut at the bracket on side member.



CAUTION:
When disconnecting clutch tube, use suitable flare nut wrench.
Never use an open end wrench or adjustable wrench.

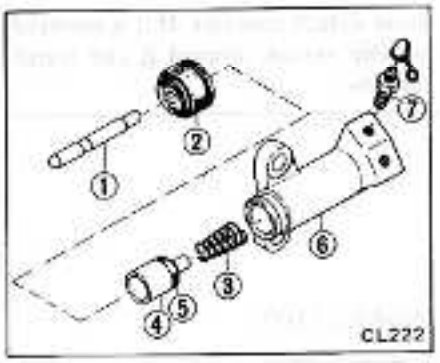
2. Remove lock spring, then disengage hose from bracket.
3. Remove clutch hose from operating cylinder.
4. Remove operating cylinder.

DISASSEMBLY

1. Remove dust cover and push rod.
2. Remove piston and piston cup as an assembly.

Discard piston cup and dust cover.

3. Remove bleeder screw.



1 Push rod
2 Dust cover
3 Piston spring
4 Piston
5 Piston cup
6 Operating cylinder
7 Bleeder screw

INSPECTION

Visually inspect all disassembled parts and replace parts which are worn or damage.

CAUTION:
To clean or wash all parts of operating cylinder, clean brake fluid must be used.
Never use mineral oils such as gasoline and kerosene. It will ruin the rubber parts of the hydraulic system.

1. Check cylinder bore and piston for score or rust and, if found, replace.
2. Check cylinder bore and piston for wear. If clearance between cylinder bore and piston is more than the specified value, replace piston or operating cylinder assembly.

Clearance between cylinder bore and piston:
Less than 0.15 mm
(0.0059 in)

3. Check condition of piston cup and dust cover. Always replace them after disassembly.
4. Check bleeder hole to be sure that it is clean.

ASSEMBLY

Assemble operating cylinder in reverse order of disassembly. Observe following:

1. Prior to assembly, dip a new piston cup in clean brake fluid. To install piston cup on piston, pay particular attention to its direction.
2. Dip cylinder and piston in clean brake fluid before assembly.

INSTALLATION

Install operating cylinder in reverse order of removal. Observe following:

Bleed air thoroughly from clutch hydraulic system. Refer to Bleeding Clutch System.

a. When operating cylinder is removed from, or installed on, clutch housing without disconnecting clutch hose from operating cylinder, loosen bleeder screw so that push rod moves lightly.

b. Exercise care not to warp or twist clutch hose. Be sure to install clutch hose away from exhaust tube.

c. When tightening flare nut, hold pipe by hand to prevent it from twisting.

CAUTION:
When connecting clutch tube, use Tool GG94310000.

Ⓣ : Bleeder screw
6.9 - 8.8 N·m
(0.7 - 0.9 kg-m,
5.1 - 6.5 ft-lb)
Operating cylinder to clutch housing securing bolts
30 - 40 N·m
(3.1 - 4.1 kg-m,
22 - 30 ft-lb)
Clutch hose to operating cylinder
17 - 21 N·m
(1.7 - 2.1 kg-m,
12 - 15 ft-lb)

CLUTCH LINE

INSPECTION

Check clutch lines (tube and hose) for evidence of cracks, deterioration or other damage. Replace if necessary.

If leakage occurs at or around joints, retighten and, if necessary, replace damaged parts.

REMOVAL

CAUTION:
When disconnecting clutch tube, use suitable flare nut wrench.
Never use an open end wrench or adjustable wrench.

1. Disconnect clutch tube from clutch hose at bracket on side member.
2. Remove lock spring, then disengage hose from bracket.
3. Remove clutch hose from operating cylinder.
4. Disconnect clutch tube from master cylinder.
5. Remove clamp fixing clutch tube to dash panel.

INSTALLATION

Wipe the opening ends of hydraulic line to remove any foreign matter before making connections.

1. Install clutch tube.
(1) Connect clutch tube to master cylinder with flare nut.
(2) Fix clutch tube to dash panel with clamp.
(3) Then tighten flare nut.

Ⓣ : Clutch hose to master cylinder
15 - 18 N·m
(1.5 - 1.8 kg-m,
11 - 13 ft-lb)

2. Install clutch hose on operating cylinder with a gasket in place.

Use new gasket.

Ⓣ : Clutch hose to operating cylinder
17 - 21 N·m
(1.7 - 2.1 kg-m,
12 - 15 ft-lb)

3. Engage opposite end of hose with bracket. Install lock spring fixing hose to bracket.

a. When tightening flare nut, hold pipe by hand to prevent it from twisting.

b. Exercise care not to warp or twist clutch hose.

4. Connect clutch tube to hose with flare nut and tighten it.

Ⓣ : Flare nut
15 - 18 N·m
(1.5 - 1.8 kg-m,
11 - 13 ft-lb)

5. Check distance between clutch line and adjacent parts (especially between hose and exhaust tube).
7. Bleed air out of hydraulic system.

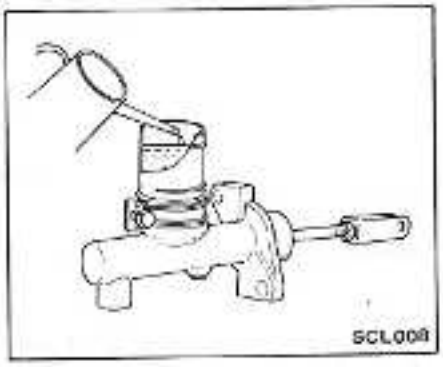
Refer to Bleeding Clutch System for adjustment.

CAUTION:
When tightening flare nut, use Tool GG94310000.

BLEEDING CLUTCH SYSTEM

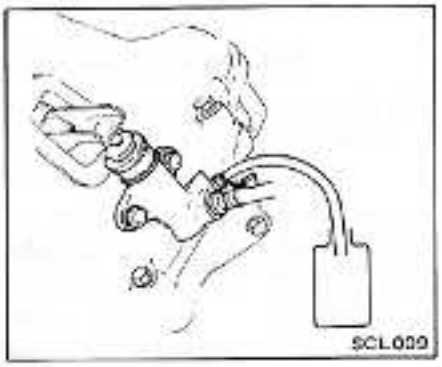
The hydraulic clutch system must be bled whenever clutch line has been disconnected or air has entered it.

1. Remove cap of reservoir and top up with recommended brake fluid.

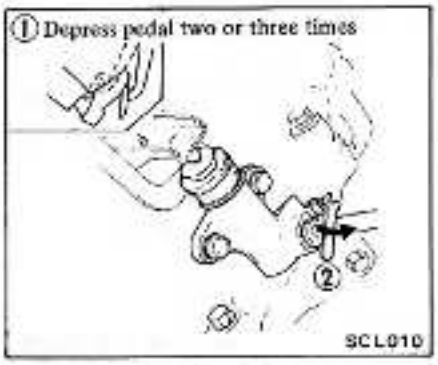


2. Thoroughly clean mud and dust from bleeder screw of operating cylinder so that outlet hole is free from any foreign material. Install bleeder hose (vinyl hose) on bleeder screw.

Place the other end of it in a container filled with brake fluid.



3. Have a co-worker depress clutch pedal two or three times. With clutch pedal depressed fully, loosen bleeder screw to bleed air out of clutch system.



4. Close bleeder screw quickly as clutch pedal is on down stroke.
5. Allow clutch pedal to return slowly with bleeder screw closed.
6. Repeat steps 3 through 5 until no air bubble shows in the vinyl hose.

Ⓣ : **Bleeder screw**
6.9 - 8.8 N-m
(0.7 - 0.9 kg-m,
5.1 - 6.5 ft-lb)

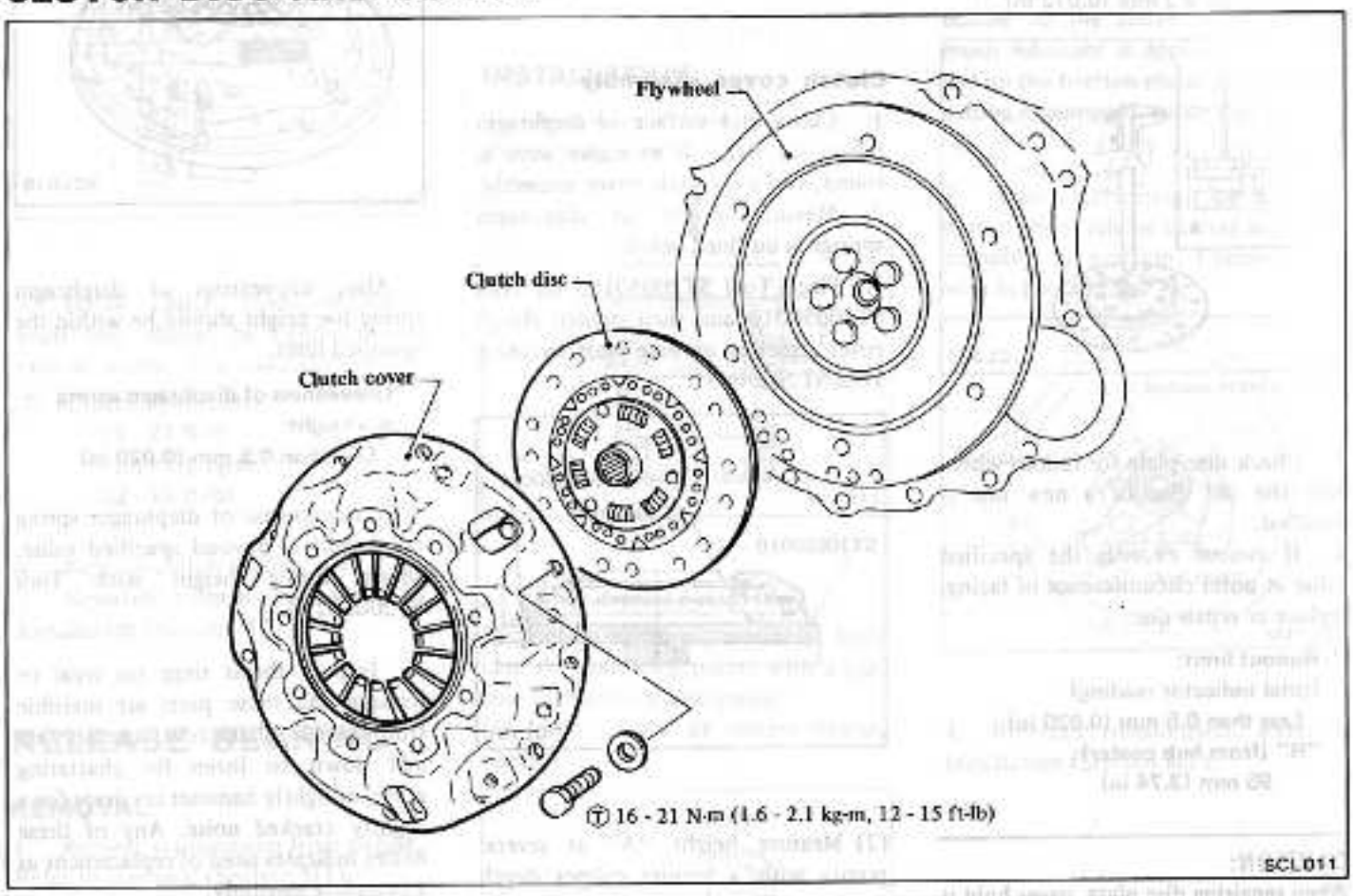
7. Depress and release clutch pedal several times; then, check for external hydraulic leaks at connections.

a. **Brake fluid containing air is white and has visible air bubbles.**
b. **Brake fluid containing no air runs out of bleeder screw in a solid stream without air bubbles.**
c. **Pay close attention to clutch fluid level in reservoir during bleeding operation.**
d. **Add brake fluid to reservoir only up to the specified level. Do not overfill.**

CAUTION:
a. **Do not re-use brake fluid drained during bleeding operation.**
b. **Exercise care not to splash brake fluid on exterior finish as it will damage the paint.**
c. **When tightening flare nut, use Tool GG94310000.**

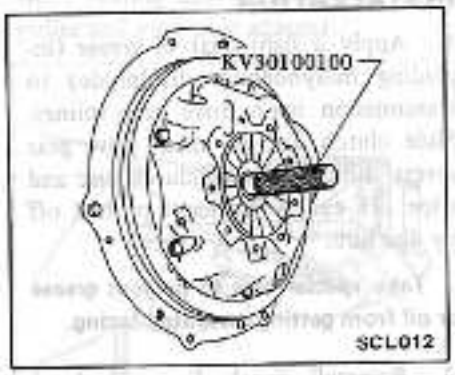
CLUTCH UNIT

CLUTCH DISC AND COVER

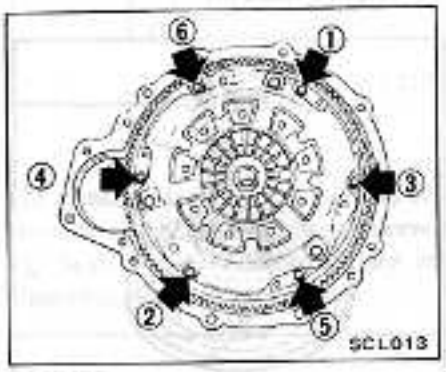


REMOVAL

1. Remove transmission from engine. Refer to Removal (Section MT).
2. Insert Tool into clutch disc hub.



3. Loosen bolts attaching clutch cover to flywheel, one turn each at a time, until spring pressure is released. Be sure to turn them out in a crisscross fashion.



4. Remove clutch disc and cover assembly.

INSPECTION

Wash all disassembled parts except disc assembly in suitable cleaning solvent to remove dirt and grease before making inspection and adjustment.

Flywheel and pressure plate

Check friction surface of flywheel and pressure plate for scoring or roughness. Slight roughness may be smoothed by using fine emery cloth. If surface is deeply scored or grooved, the part should be replaced.

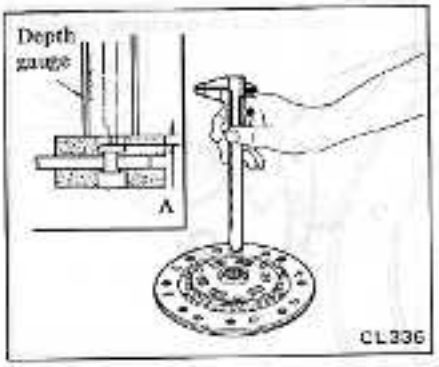
Clutch disc assembly

Inspect clutch disc for worn or oily facings, loose rivets and broken or loose torsional springs.

1. If facings are oily, disc should be replaced. In this case, inspect transmission front cover oil seal, pilot bushing, engine rear oil seals and other points for oil leakage.

2. The disc should also be replaced when facings are worn locally or worn down to the specified limit.

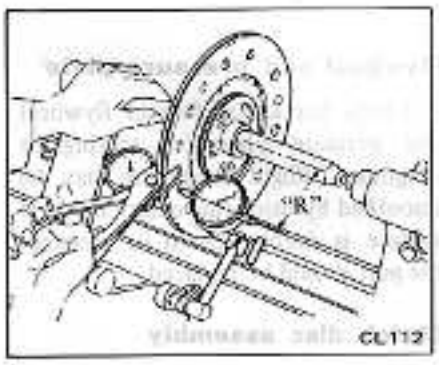
Wear limit of facing "A":
Less than 0.3 mm (0.012 in)



3. Check disc plate for runout whenever the old disc or a new one is installed.
4. If runout exceeds the specified value at outer circumference of facing, replace or repair disc.

Runout limit:
(total indicator reading)
Less than 0.6 mm (0.020 in)
"R" (from hub center):
95 mm (3.74 in)

CAUTION:
When repairing disc plate, never hold it forcibly with pliers or bend it excessively; otherwise facing will be damaged.



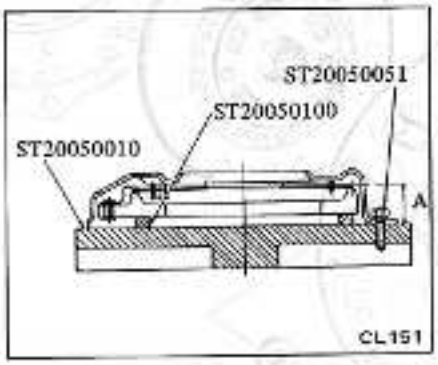
5. Check fit of disc hub on transmission main drive gear splines for smooth sliding. If splines are worn, clutch disc or main drive gear should be replaced; that is, backlash exceeds the specified value at outer edge of clutch disc.

Backlash:
Less than 0.4 mm (0.016 in)

Clutch cover assembly

1. Check end surface of diaphragm spring for wear. If excessive wear is found, replace clutch cover assembly.
2. Measure height of diaphragm springs as outlined below:

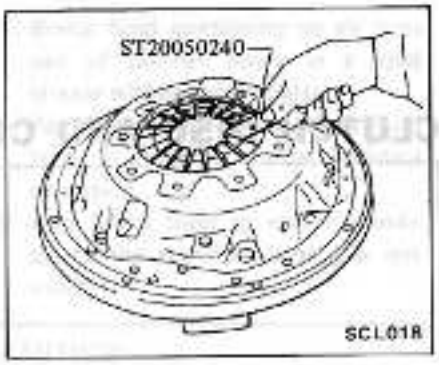
(1) Place Tool ST20050100 on Tool ST20050010 and then tighten clutch cover assembly on base plate by using Tool ST20050051.



(2) Measure height "A" at several points with a vernier caliper depth gauge.

Diaphragm spring height "A":
31.6 - 33.6 mm
(1.244 - 1.323 in)

If height "A" of spring end is beyond specified value, adjust spring height with Tool ST20050240. If necessary, replace clutch cover assembly.



Also, unevenness of diaphragm spring toe height should be within the specified limit.

Unevenness of diaphragm spring toe height:
Less than 0.5 mm (0.020 in)

If unevenness of diaphragm spring toe height is beyond specified value, adjust spring height with Tool ST20050240.

3. Inspect thrust rings for wear or damage. As these parts are invisible from outside, shake cover assembly up and down to listen for chattering noise, or lightly hammer on rivets for a slightly cracked noise. Any of these noises indicates need of replacement as a complete assembly.

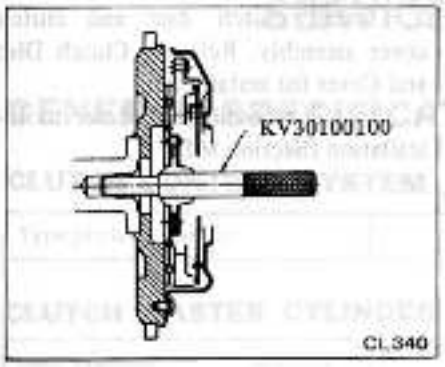
INSTALLATION

1. Apply a light coat of grease (including molybdenum disulphide) to transmission main drive gear splines. Slide clutch disc on main drive gear several times. Remove clutch disc and wipe off excess lubricant pushed off by disc hub.

Take special care to prevent grease or oil from getting on clutch facing.

2. Reinstall clutch disc and clutch cover assembly. Support clutch disc and cover assemblies with Tool KV30100100.

Be sure to keep disc facings, flywheel and pressure plate clean and dry.



3. Install clutch cover assembly. Each bolt should be tightened one turn at a time in a crisscross fashion.

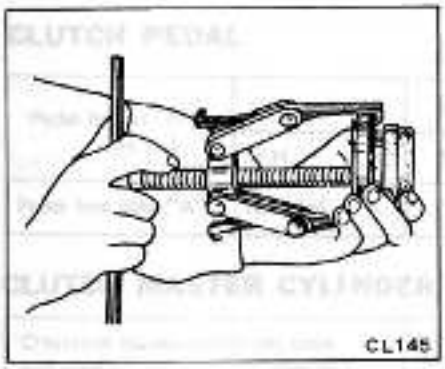
Ⓣ : **Clutch cover bolt**
16 - 21 N·m
(1.6 - 2.1 kg-m,
12 - 15 ft-lb)

4. Remove clutch aligning bar.
5. Reinstall transmission. Refer to Installation (Section MT).

RELEASE BEARING

REMOVAL

1. Remove transmission from engine. Refer to Removal (Section MT).
2. Disconnect holder spring from bearing sleeve.
3. Remove release bearing and sleeve as an assembly from transmission case front cover.
4. Take clutch release bearing out from bearing sleeve, using a universal puller and a suitable adapter.



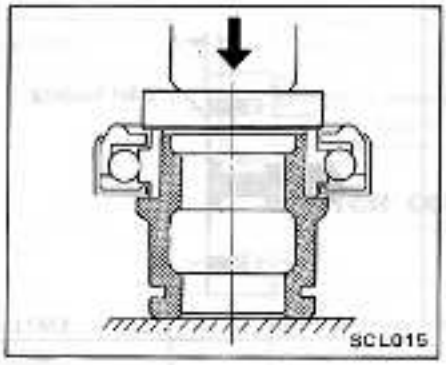
INSPECTION

Check for abnormal wear on contact surface of withdrawal lever, ball pin and bearing sleeve.

Hold bearing inner race and rotate outer race while applying pressure to it. If the bearing rotation is rough or noisy, replace bearing.

INSTALLATION

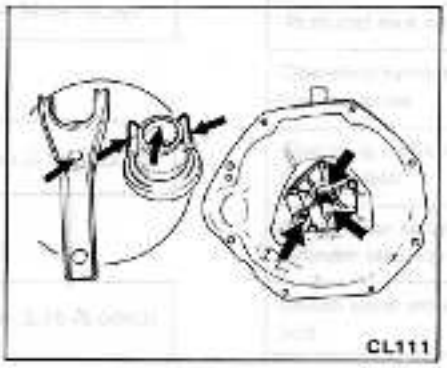
1. Assemble release bearing on sleeve, using a press.



Do not depress outer race.

2. Before or during assembly, lubricate the following points with a light coat of multi-purpose grease.
(1) Inner groove of release bearing sleeve.

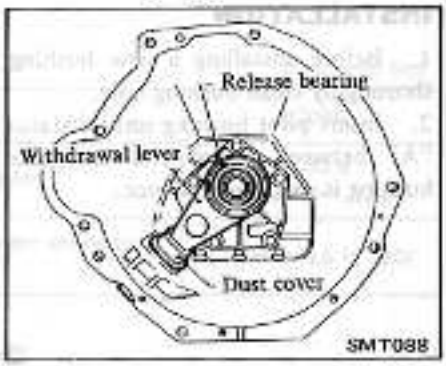
(2) Contact surfaces of withdrawal lever, lever ball pin and bearing sleeve.
(3) Bearing sleeve sliding surface of transmission case front cover.



(4) Transmission main drive gear splines. (Use grease including molybdenum disulphide.)

A small amount of grease should be coated to the above points. If too much lubricant is applied, it will run out on the friction plates when hot, resulting in damaged clutch disc facings.

3. After lubricating, install withdrawal lever, release bearing and sleeve assembly in position. Connect them with holder spring.

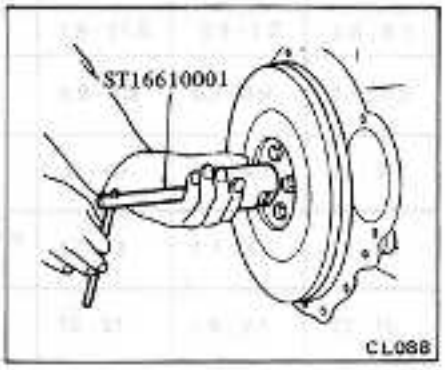


4. Reinstall transmission. Refer to Installation (Section MT).

PILOT BUSHING

REMOVAL

1. Remove transmission from engine. Refer to Removal (Section MT).
2. Remove clutch disc and cover assembly. Refer to Clutch Disc and Cover for removal.
3. Remove pilot bushing in crankshaft with Tool.



INSPECTION

Check pilot bushing for fit in bore of crankshaft.

Check inner surface of pilot bushing for wear, roughness or bell-mouthed condition. If pilot bushing is worn or damaged, replace. When bushing is damaged, be sure to check transmission main drive gear at the same time.

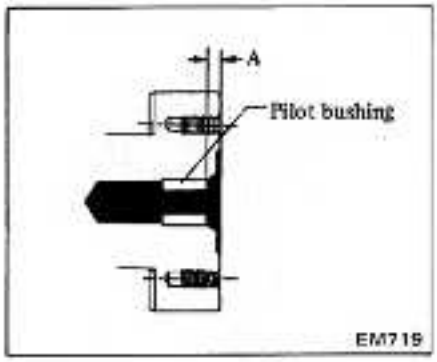
INSTALLATION

1. Before installing a new bushing, thoroughly clean bushing hole.
2. Insert pilot bushing until distance "A" between flange end and pilot bushing is specified distance.

Distance "A":
4.0 mm (0.157 in)

Do not oil bushing.

When inserting pilot bushing, be careful not to damage edge of pilot bushing.



3. Install clutch disc and clutch cover assembly. Refer to Clutch Disc and Cover for installation.
4. Install transmission. Refer to Installation (Section MT).

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

CLUTCH CONTROL SYSTEM

Type of clutch control	Hydraulic

CLUTCH MASTER CYLINDER

Inner diameter mm (in)	15.88 (5/8)

CLUTCH OPERATING CYLINDER

Type	Non-adjustable
Inner diameter mm (in)	17.46 (11/16)

CLUTCH DISC

Type	200CBL
Facing size Outer dia. x Inner dia. x Thickness mm (in)	200 x 130 x 3.5 (7.87 x 5.12 x 0.138)
Thickness of disc assembly Free mm (in)	8.50 - 9.20 (0.3346 - 0.3622)
Installed mm (in)	7.6 - 8.0 (0.299 - 0.315)
Number of torsion springs	6

CLUTCH COVER

Type	C200S
Full load N (kg, lb)	3,923 (400, 882)

INSPECTION AND ADJUSTMENT

CLUTCH PEDAL

Pedal height "H" mm (in)	L.H.	168 - 174 (6.61 - 6.85)
	R.H.	155 - 161 (6.10 - 6.34)
Pedal free play "A" mm (in)		1 - 5 (0.04 - 0.20)

CLUTCH MASTER CYLINDER

Clearance between cylinder bore and piston mm (in)	Less than 0.15 (0.0059)

CLUTCH OPERATING CYLINDER

Clearance between cylinder bore and piston mm (in)	Less than 0.15 (0.0059)

CLUTCH DISC

Unit: mm (in)

Model	200CBL
Wear limit of facing surface to rivet head	0.3 (0.012)
Runout limit	0.5 (0.020)
Distance of runout checking point (from the hub center)	95 (3.74)
Maximum backlash of spline (at outer edge of disc)	0.4 (0.016)

CLUTCH COVER

Unit: mm (in)

Model	C200S
Diaphragm spring height	31.6 - 33.6 (1.244 - 1.323)
Unevenness of diaphragm spring toe height	Less than 0.5 (0.020)

PILOT BUSHING

Inserted distance of pilot bushing mm (in)	4.0 (0.157)

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Pedal stopper bolt lock nut	7.8 - 11.8	0.8 - 1.2	5.8 - 8.7
Master cylinder push rod lock nut	7.8 - 11.8	0.8 - 1.2	5.8 - 8.7
Master cylinder stopper bolt	1.5 - 2.9	0.15 - 0.3	1.1 - 2.2
Master cylinder securing nut	7.8 - 11.8	0.8 - 1.2	5.8 - 8.7
Clutch tube flare nut	15 - 18	1.5 - 1.8	11 - 13
Push rod lock nut	7.8 - 11.8	0.8 - 1.2	5.8 - 8.7
Operating cylinder bleeder screw	6.9 - 8.8	0.7 - 0.9	5.1 - 6.5
Operating cylinder securing bolt	30 - 40	3.1 - 4.1	22 - 30
Clutch hose to operating cylinder securing nut	17 - 21	1.7 - 2.1	12 - 15
Clutch cover securing bolt	16 - 21	1.6 - 2.1	12 - 15

TROUBLE DIAGNOSES AND CORRECTIONS

CLUTCH SLIP

Slipping of clutch may be noticeable when any of the following symptoms is encountered during operation.
(1) Car will not respond to engine speed during acceleration.
(2) Insufficient car speed.
(3) Lack of power during uphill driving.
(4) Increasing of fuel consumption.

Some of the above conditions may also be attributable to engine problem. First determine whether engine or clutch is causing the problem.

If slipping clutch is left unheeded, wear and/or overheating will occur on clutch facing to such an extent that it is no longer serviceable.

TO TEST FOR SLIPPING CLUTCH, proceed as follows:

Inspection

Insure that parking brake is engaged. Disengage clutch and shift transmission gears into TOP. Gradually increase engine speed while simultaneously engaging clutch. If engine stops while clutch is being engaged, clutch is functioning properly. If car does not move and the engine does not stop, clutch is slipping.

Probable cause	Corrective action
• Clutch facing hardened or wet with oil	Repair or replace
• Clutch facing excessively worn	Replace (Replace if engine/transmission oil seal is faulty)
• Diaphragm spring weak or damaged	Replace
• Flywheel or pressure plate warped	Repair or replace
• Particles in return port of master cylinder; Piston fails to return to its original position	Clean or replace faulty parts
• Clutch tube deformed or crushed	Replace

CLUTCH DRAGS

Dragging clutch is particularly noticeable when shifting gears, especially into low gear.

TO TEST FOR DRAGGING CLUTCH, proceed to inspection.

Inspection

Disengage clutch and shift gears into Reverse. Shift gears into Neutral, gradually increasing engine speed. After a short intermission, shift gears into Reverse. If noise is heard while gears are being shifted, clutch is dragging.

Probable cause	Corrective action
• Clutch disc hub splines worn or rusted	Replace (or remove rust) and coat with grease
• Oil leakage at master cylinder, operating cylinder, tube or hose	Replace faulty parts
• Air in hydraulic system	Bleed air
• Insufficient pedal stroke	Adjust
• Clutch disc runout or warped	Replace
• Diaphragm spring fatigued	Replace
• Piston cup deformed or damaged	Replace
• Lack of grease on pilot bushing	Coat with grease
• Clutch facing wet with oil	Replace (Replace if engine/transmission oil seal is faulty)

CLUTCH CHATTERS

Clutch chattering is usually noticeable when car is just rolled off with clutch partially engaged.

Probable cause	Corrective action
• Oil on clutch facing	Replace
• Diaphragm spring fatigued	Replace
• Clutch facing hardened	Replace
• Clutch facing warped	Repair or replace
• Pressure plate worn or warped	Replace
• Engine mounting loose or rubber deteriorated	Tighten or replace
• Clutch facing rivets loose	Replace

NOISY CLUTCH

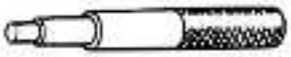
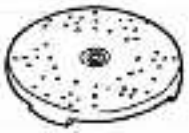
Probable cause	Corrective action
• Release bearing/sleeve damaged or improperly lubricated	Replace
• Pilot bushing worn, jammed or damaged	Replace
• Clutch facing rivets loose	Replace
• Disc plate cracked	Replace
• Clutch disc torsion springs fatigued	Replace

RABBIT-HOPPING CLUTCH

When "rabbit-hopping" of clutch occurs, car will not roll off smoothly from a standing start or clutch will be engaged before clutch pedal is fully depressed.

Probable cause	Corrective action
• Oil on clutch facing	Replace
• Clutch facing worn or rivets loose	Replace
• Flywheel/pressure plate warped or worn	Replace
• Mounting bolts on engine or power train loose	Tighten
• Diaphragm spring fatigued	Replace

SPECIAL SERVICE TOOLS

Tool number	Tool name
KV30100100	Clutch aligning bar 
ST20050100	Distance piece 
ST20050010	Base plate 
ST20050051	Set bolt 
ST20050240	Diaphragm spring adjusting wrench 
ST16610001	Pilot bushing puller 
GG94310000	Flare nut torque wrench