SERVICE MANUAL

DATSUN 280Z
MODEL S30 SERIES

NISSAN

NISSAN MOTOR CO., **LTD.**
TOKYO, JAPAN

SECTION CL

CLUTCH

CL

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CLUTCH

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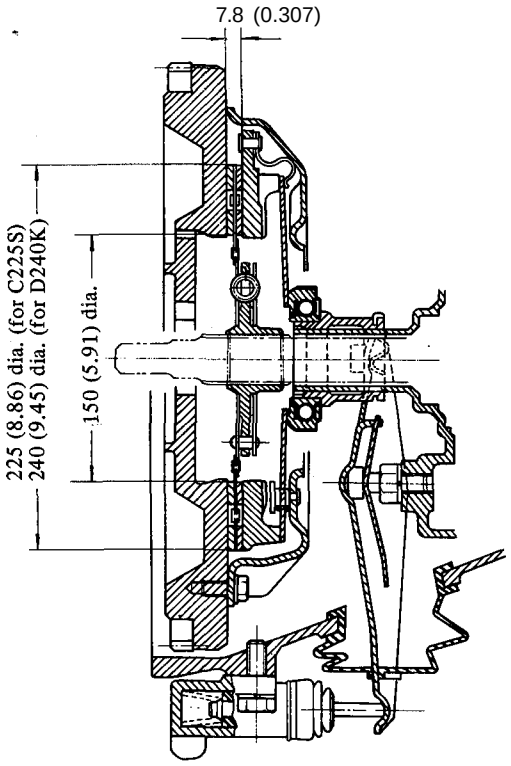
DESCRIPTION

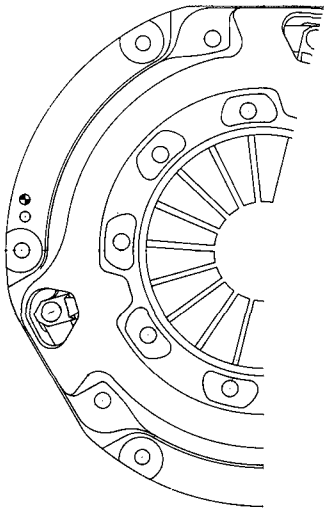
There are two types of clutch — C225S for S30 models and D240K for GS30 (2 + 2 seats) models.

The clutch is a single dry disc diaphragm spring type. The major components are clutch cover, pressure plate, diaphragm spring, and wire rings. The clutch disc is provided with riveted plates on both surfaces and coil springs arranged in a link. The coil springs absorb shock while engaging the clutch, softening the smoothing clutch engagement.

Release bearing, sleeve, and withdrawal lever are used to control clutch engagement and disengagement.

Each part of the clutch assembly is secured with rivets. Therefore, when a problem is uncorrectable, replace the clutch assembly.





Unit: mm (in)

CL234*

Fig. CL-1 Construction of clutch

CLUTCH DISC AND COVER

REMOVAL

1. Remove transmission from engine. For removal procedure, refer to the Section Transmission.
2. Insert Clutch Aligning Bar ST20630000 into clutch disc hub until it will no longer go. It is important to support weight of clutch disc in the steps that follow. See Figure CL-2.

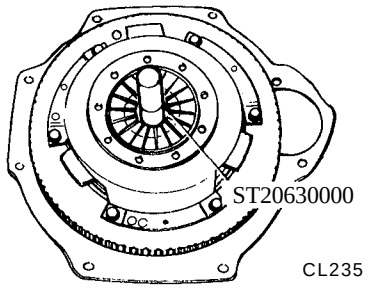


Fig. CL-2 Supporting clutch assembly

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 criss-cross fashion.
4. Remove clutch disc and cover assembly.

INSPECTION

Wash all the 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, the 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 less than 0.3 mm (0.012 in) at rivet. See Figure CL-3.

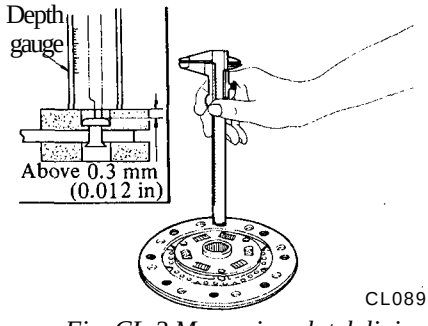


Fig. CL-3 Measuring clutch lining

3. Check disc plate for runout whenever the old disc or a new one is installed.
4. If runout exceeds the specified value at the outer circumference, replace or repair disc. See Figure CL4.

Runout: 0.5 mm (0.020 in)
total indicator reading

R (from the hub center):
112 mm (4.41 in)
C225S
119.5 mm (4.70 in)
D240K

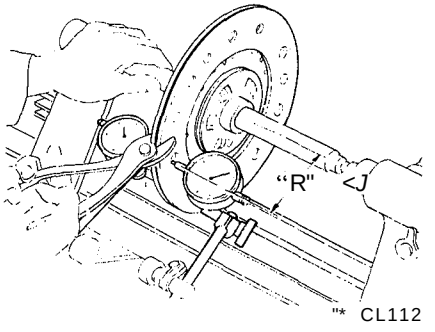


Fig. CL-4 Repairing disc runout

5. Check the fit of disc hub on transmission main drive gear splines for smooth sliding. If splines are worn that is, backlash exceeds 0.4 mm (0.016 in) at the outer edge of clutch disc, clutch disc or main drive gear should be replaced.

Clutch cover assembly

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

(1) Place Distance Piece ST20050100 on Base Plate ST20050010 and then tighten clutch cover assembly on the base plate by using Set Bolts ST20050051. See Figure CL-5.

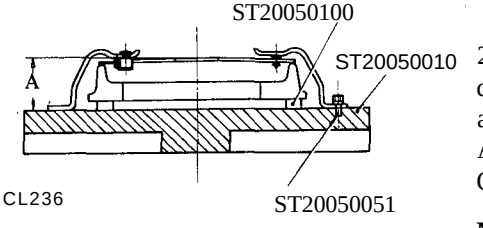


Fig. CL-5 Measuring the height of diaphragm spring

(2) Measure the height "A" at several points with a vernier caliper depth gauge. See Figure CL-5. If the height "A" of spring end is beyond the specified value, adjust the spring height with Diaphragm Spring Adjusting Wrench ST20050240 as shown in Figure CL-6.

A: 33 to 35 mm
(1.30 to 1.38 in)
C225S
37.5 to 39.5 mm
(1.48 to 1.56 in)
D240K

If necessary, replace clutch cover assembly. Also, unevenness of diaphragm spring toe height should be less than 0.5 mm (0.020 in).

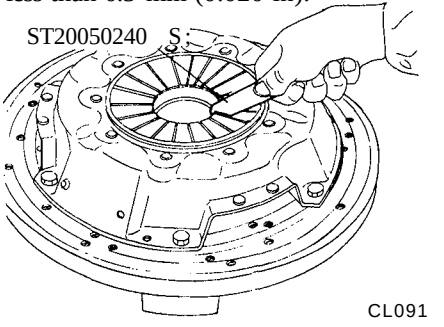


Fig. CL-6 Adjusting spring height

3. Inspect thrust rings for wear or damage. As these parts are invisible from outside, shake cover assembly up and down to listen for clattering noise, or hammer lightly on rivets and listen 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.

Note: Take special care to prevent grease or oil from getting on clutch linings.

2. Install clutch disc and clutch cover assembly. Support clutch disc and cover assemblies with Clutch Aligning Bar ST20630000. See Figure CL-7.

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

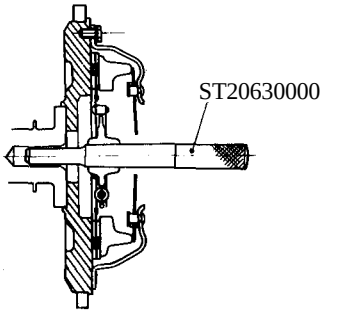


Fig. CL-7 Installing clutch cover assembly

3. Install bolts to tighten clutch cover assembly to flywheel squarely. Bolts should be tightened one turn each at a time in a criss-cross fashion to the specified torque, 1.5 to 2.2 kg-m(11 to 16 ft-lb).

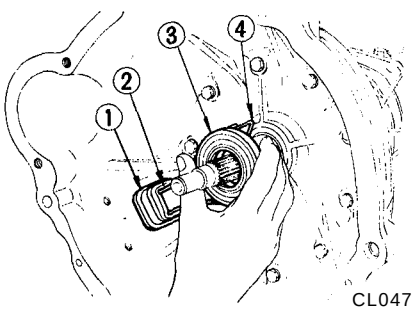
Note: Dowels are used to locate clutch cover on flywheel properly.

4. Remove Clutch Aligning Bar.
5. Install transmission as described in the pertinent parts.

RELEASE BEARING

REMOVAL

1. Remove transmission from engine. For removal procedure, refer to the Section Transmission.
2. Remove holder spring from bearing sleeve; disconnect clutch withdrawal lever from bearing sleeve.
3. Remove release bearing and sleeve **as** an assembly from mainshaft. See Figure CL-8.



1 Dust cover
2 Withdrawal lever
3 Release bearing
4 Holder spring

Fig. CL-8 Removing clutch release mechanism

4. Remove clutch release bearing from bearing sleeve, using a universal puller and a suitable adapter. See Figure CL-9.

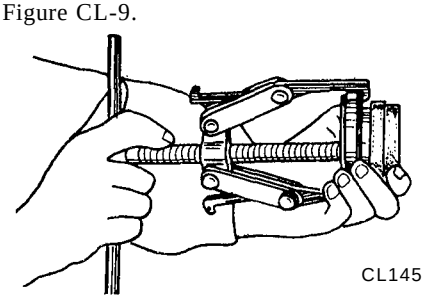


Fig. CL-9 Disassembling release bearing

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. See Figure CL-10.

Note: Do not press outer race.

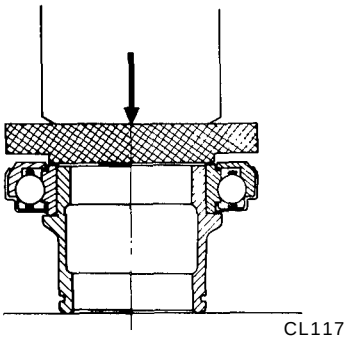


Fig. CL-10 Installing release bearing

2. Before or during assembly, lubricate the following points with a light coat of multi-purpose grease.

(1) Inner groove of release bearing sleeve.

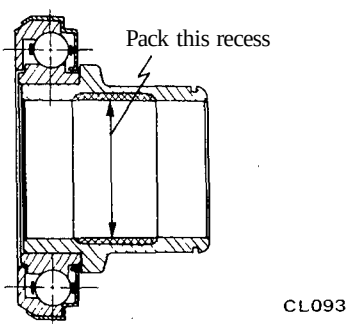


Fig.CL-11 Lubricating recess of bearing sleeve

(2) Contact surface of withdrawal lever, lever ball pin and bearing sleeve.
(3) Contact surfaces of transmission front cover. See Figure CL-12.

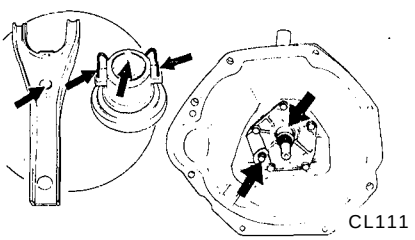


Fig. CL-12 Lubricating points of withdrawal lever and front cover

(4) Contact surfaces of transmission main drive gear splines, [grease (including Molybdenum Disulphide)]

Note: A very small amount of grease should be applied 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 bearing sleeve on clutch housing. After connecting them to holder spring, install dust cover on clutch housing.
4. Reinstall transmission as described in Section Transmission.

PILOT BUSHING

REMOVAL

1. Remove transmission from engine. For removal procedure, refer to the Section under Transmission.
2. Remove clutch disc and cover assembly. Refer to Clutch Disc.
3. Remove pilot bushing in crankshaft by Pilot Bush Puller ST 16610001. See Figure CL-13.

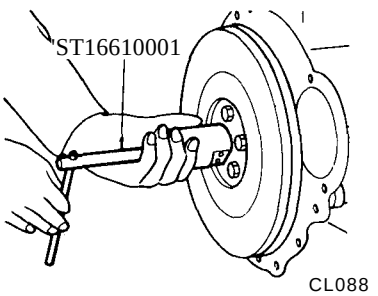


Fig. CL-13 Removing pilot bushing

INSPECTION

Check the fit of pilot bushing in the bore of crankshaft.

Check pilot bushing in crankshaft for wear, roughness or bellmouthed condition. If necessary, replace it. When bushing is faulty, be sure to check transmission main drive gear at the same time.

INSTALLATION

1. Before installing a new bushing, thoroughly clean bushing hole. Install bushing in crankshaft, using a soft hammer. Bushing need not be oiled. See Figure CL-14.

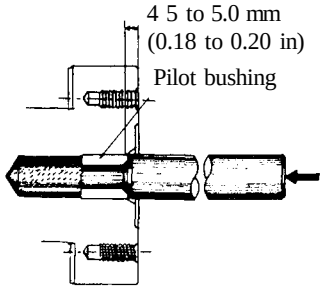


Fig. CL-14 Installing pilot bushing

2. Install clutch disc and clutch cover assembly. Refer to Clutch Disc.
3. Install transmission as described in Section Transmission.

CLUTCH CONTROL

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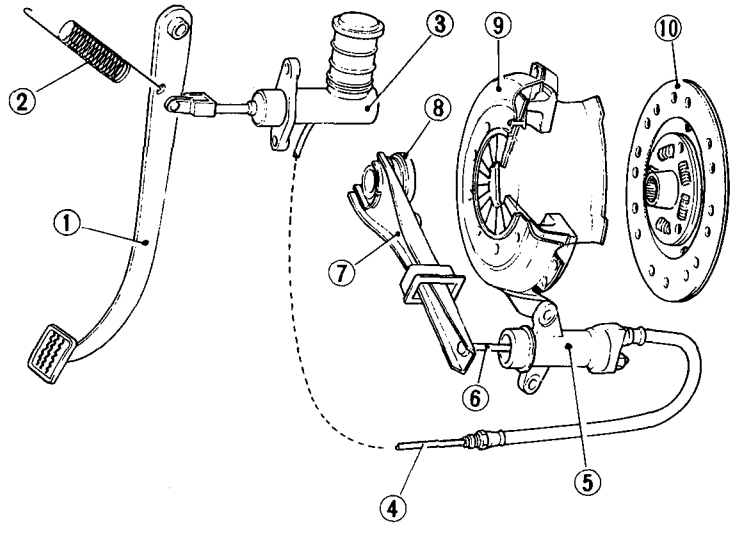
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DESCRIPTION

The hydraulic clutch control consists of a pendent pedal, master cylinder, operating cylinder and withdrawal lever.

When the clutch pedal is depressed, the piston of the master cylinder forces the brake fluid to the operating cylinder through a pipe line. The movement of the operating cylinder piston is transmitted to the withdrawal lever through the push rod, thus disengaging the clutch.

The operating cylinder is a non-adjustable type that uses no return spring. In this unit, the withdrawal-to-push rod play adjustment is not necessary since the "S" shown in Figure CL-16 serves to automatically compensate for wear on clutch disc.



1 Clutch pedal
2 Return spring
3 Clutch master cylinder
4 Clutch piping
5 Operating cylinder
6 Push rod
7 Withdrawal lever
8 Release bearing
9 Clutch cover
10 Clutch disc

Fig. CL-15 Clutch operating system

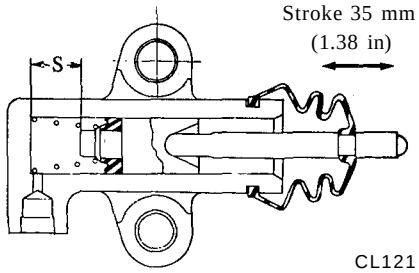


Fig. CL-16 Non-adjustable operating cylinder

BLEEDING CLUTCH SYSTEM

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

When pedal action has a "spongy" feeling, it is an indication that air has entered into the system.

Bleeding clutch system is an essential part of regular clutch service.

1. Remove reservoir cap 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 4 and 5 until no air bubble shows in the vinyl hose.

Bleeder screw tightening torque:
0.7 to 0.9 kg-m
(5.1 to6.5ft-lb)

7. Operate clutch several times; then, check for external hydraulic leaks at connections.

Notes:

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. Do not reuse brake fluid drained during bleeding operation.

e. Exercise care not to splash brake fluid on exterior finish as it will damage the paint.

f. Pour brake fluid into reservoir up to the specified level.

ADJUSTMENT

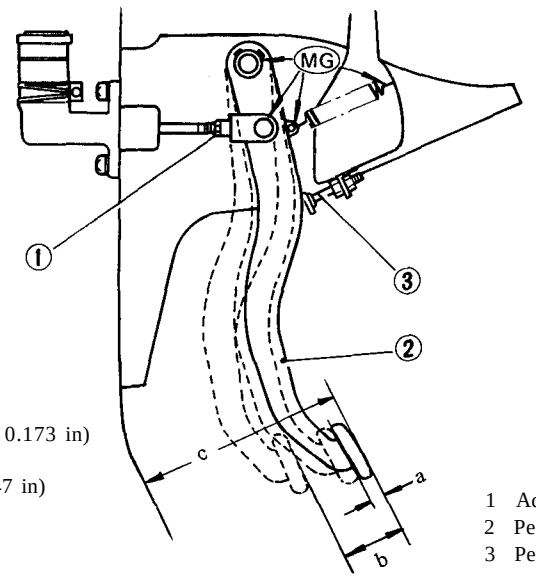
CLUTCH PEDAL HEIGHT

1. Adjust the pedal head height to 226 mm (8.90 in) by adjusting the master cylinder push rod length.

Note: The pedal stopper should be free.

2. Adjust the pedal height to 223 mm (8.78 in) by screwing the pedal stopper and lock up the lock nut. See Figure CL-17.

Note: Depress and release clutch pedal over its entire stroke to ensure that the clutch linkage operates smoothly without squeak noise, interference and binding.



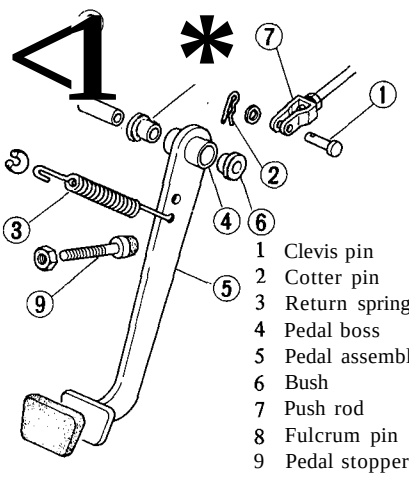
a: Free play
1.8 to 4.4 mm (0.071 to 0.173 in)
b: Free travel
6 to 12 mm (0.24 to 0.47 in)
c: Pedal height
223 (8.78)
(Mg) = Multi-purpose grease

1 Adjust nut
2 Pedal lever
3 Pedal stopper

CL240

Fig. CL-17 Pedal height adjustment

CLUTCH PEDAL



1 Clevis pin
2 Cotter pin
3 Return spring
4 Pedal boss
5 Pedal assembly
6 Bush
7 Push rod
8 Fulcrum pin
9 Pedal stopper

CL239

Fig. CL-18 Exploded view of clutch pedal

REMOVAL

1. Unhook return spring.
2. Pry off cotter pin and remove clevis pin; disconnect push rod from pedal assembly.
3. Back off fulcrum pin and remove pedal assembly

Note: Before removing pedal, be sure to measure the pedal head height from toe board.

INSPECTION

Thoroughly clean all disassembled parts (indicated below) and carefully check for wear, damage and other abnormal conditions. Repair or replace, if necessary.

1. Pedal head rubber
2. Return spring
3. Pedal lever boss
4. Clevis pin
5. Nylon bushing
6. Pedal shaft, etc.

INSTALLATION

Installation is in the reverse order of removal.

Apply multi-purpose grease to the friction surface of clevis pin. See Figure CL-17.

Tightening torque:
Fulcrum pin
3.5 to 4.8 kg-m
(25 to 29 ft-lb)

CLUTCH MASTER CYLINDER

REMOVAL

1. Remove clevis pin at push rod.
2. Disconnect clutch tube from master cylinder and drain clutch fluid.
3. Remove bolts securing master cylinder to the car, and dismount master cylinder.

Note: Remove dust cover from master cylinder body, on the driver's seat side.

DISASSEMBLY

1. Remove dust cover and remove stopper ring from body.
2. Remove push rod and piston assembly.
3. Remove spring seat from piston and take off piston cup, if necessary. See Figure CL-19.

Note: Discard piston cup after removal.

INSPECTION

Note: 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 and piston for uneven wear or damage, and replace if necessary.
2. If the clearance between cylinder and piston is more than 0.15 mm (0.0059 in), replace cylinder.
3. Renew piston cup when disassembled. It must also be replaced when wear or deformation due to fatigue or damage is found.
4. Damaged dust cover, oil reservoir or cap, should be replaced. Return spring and valve spring must also be replaced when they are broken or weak.
5. Replace clutch hose and tube if any abnormal sign of damage or deformation is found.

ASSEMBLY

To assemble, reverse the order of disassembly. Closely observe the following instructions.

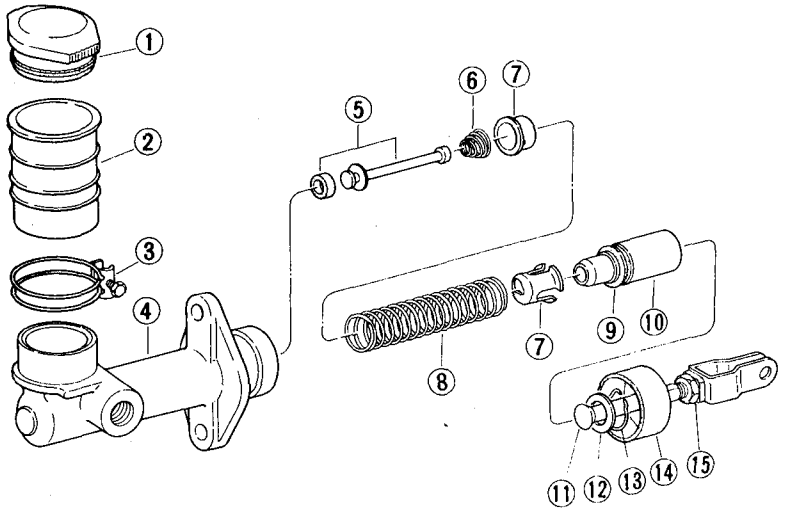
1. Dip piston cup in brake fluid before installing. Make sure that it is correctly faced in position.
2. Apply a coating of brake fluid to cylinder and piston when assembling.

INSTALLATION

To install, reverse the order of removal. Closely observe the following instructions.

1. Adjust pedal height by changing push rod length.
2. Bleed air out of hydraulic system.

Tightening torque:
Master cylinder to dash panel securing bolts
0.8 to 1.1 kg-m
(5.8 to 8.0 ft-lb)
Clutch tube connector
1.5 to 1.8 kg-m
(11 to 13 ft-lb)

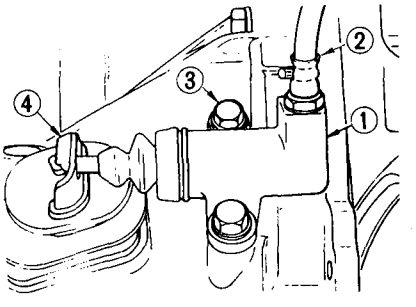


1 Reservoir cap
2 Reservoir
3 Reservoir band
4 Cylinder body
5 Valve assembly
6 Valve spring
7 Spring seat
8 Return spring
9 Piston cup
10 Piston
11 Push rod
12 Stopper
13 Stopper ring
14 Dust cover
15 Nut

CL202

Fig. CL-19 Exploded view of master cylinder

OPERATING CYLINDER



1 Clutch operating cylinder
2 Clutch hose
3 Bolts
4 Withdrawal lever

CL221

Fig. CL-20 Operating cylinder

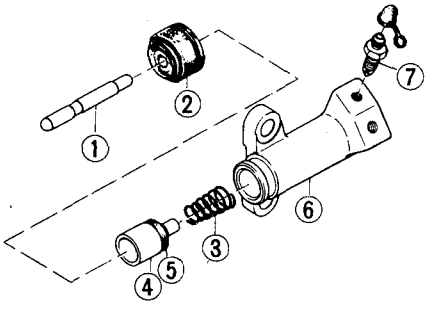
REMOVAL

1. Remove return spring.
2. Detach clutch hose from operating cylinder.
3. Remove two bolts securing operating cylinder to clutch housing.

DISASSEMBLY

See Figure CL-21.

1. Remove push rod with dust cover.
2. Remove piston assembly and piston spring.
3. Remove bleeder screw.



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

CL288

Fig. CL-21 Exploded view of operating cylinder

INSPECTION

Visually inspect all disassembled parts, replacing those found worn or damaged beyond specifications.

Note: 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 and piston for uneven wear or damage, and replace if necessary.
2. Renew piston cup when disassembled. It must also be replaced when wear or deformation due to fatigue or damage is found.
3. Damaged dust cover should be replaced. Return spring must also be replaced when it is broken or weak.

ASSEMBLY

Assembly is in the reverse order of disassembly. However, observe the following assembly notes.

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

Note: Be sure to install piston assembly with piston spring in place.

INSTALLATION

Install operating cylinder in the reverse procedures of removal.

Notes:

a. Bleed air thoroughly from clutch hydraulic system, referring to the section under Bleeding Clutch System.

b. When operating cylinder is removed from, and installed to, clutch housing without disconnecting clutch hose from operating cylinder, loosen bleeder screw so that push rod moves lightly.

Tightening torque:
Operating cylinder to clutch housing securing bolts:
2.5 to3.0kg-m
(18 to 22 ft-lb)
Bleeder screw:
0.7 to 0.9 kg-m
(5.1 to 6.5 ft-lb)
Clutch hose connector:
1.7 to 2.0 kg-m
(12 to 14 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

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 fixing hose to bracket, then disengage hose from bracket. Remove lock plate 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 matters before making connections.

1. (1) Connect clutch tube to master cylinder with flare nut.
(2) Fix clutch tube to dash panel with clamp.
(3) Then tighten flare nut to specified torque with Brake Pipe Wrench GG94310000.

Flare nut tightening torque:
1.5 to 1.8 kg-m
(11 to 13 ft-lb)

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

Note: Use new gasket.

Tightening torque:
1.7 to 2.0 kg-m
(12 to 14 ft-lb)

3. Fit lock plate to bracket.
4. Engage the opposite end of hose with bracket. Install lock spring fixing hose to bracket.

Note: Exercise care not to warp or twist hose.

5. Connect clutch tube to hose with flare nut and tighten to specified torque.
6. Check distance between clutch line and adjacent parts (especially between hose and exhaust tube).
7. Bleed air out of hydraulic system. Refer to page CL-6.

SERVICE DATA AND SPECIFICATIONS

Clutch cover

Clutch cover type		C225S (S30) D240K [GS30 (2 + 2 seats)]
Diaphragm spring-to-flywheel height	mm (in)	43 to 45 (1.69 to 1.77)
Unevenness of diaphragm spring toe height	mm (in)	0.5 (0.020)
Diaphragm spring installed load	kg (lb)	550 (1,213) S30 500 (1,102) GS30 (2+ 2 seats)
Out of flatness of pressure plate	mm (in)	0.05 (0.0020)
Allowable refacing limit	mm (in)	1.0 (0.0394)

Clutch disc

Facing size Outer dia. x inside dia. x thickness	mm (in)	225 x 150 x 3.5 (C225S) (8.86x5.91 x 0.138) 240 x 150x3.5 (D240K) (9.45 x5.91 x 0.138)
Allowable minimum depth of rivet head from facing surface	mm (in)	0.3(0.0118)
Allowable free play of spline	mm (in)	0.4(0.0157)

Clutch pedal

Free play	mm (in)	1.8 to 4.4(0.071 to 0.173)
Free travel	mm (in)	6 to 12 (0.24 to 0.47)
Pedal height	mm (in)	223(8.78)

Master cylinder — clutch

Master cylinder diameter	mm (in)	15.87 (0.6248)

Operating cylinder — clutch

Operating cylinder diameter	mm (in)	19.05(0.7500)

Tightening torque

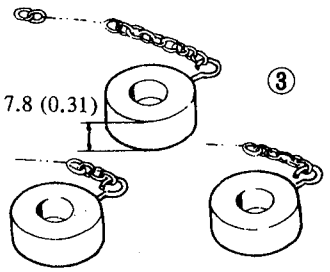
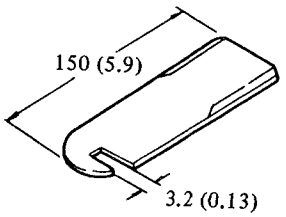
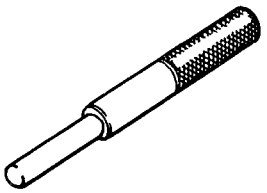
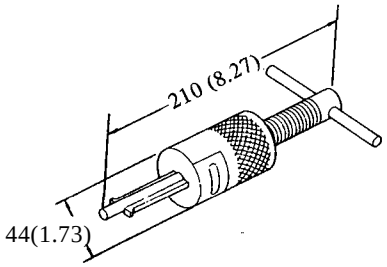
Clutch assembly securing bolt	kg-m (ft-lb)	1.5 to 2.2 (11 to 16)
Push rod adjusting nut	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Clutch tube connector (Flare nut)	kg-m (ft-lb)	1.5 to 1.8 (11 to 13)
Operating cylinder to clutch housing securing bolts	kg-m (ft-lb)	2.5 to 3.0 (18 to 22)
Clutch hose connector	kg-m (ft-lb)	1.7 to 2.0 (12 to 14)

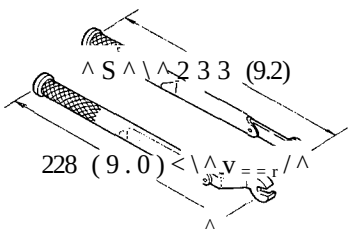
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause and testing	Corrective action
Clutch slips	Slipping of the 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. Some of the above conditions are also experienced when engine problem is occurring. 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 until it is no longer serviceable. TO TEST FOR SLIPPING CLUTCH, proceed as follows: During upgrade travelling, run engine at about 40 to 50 km/h (25 to 31 MPH) with gear shift lever in 3rd speed position, shift into highest gear and at the same time rev up engine. If clutch is slipping, car will not readily respond to depression of accelerator pedal.	
	• Clutch facing worn excessively.	Replace.
	• Oil or grease on clutch facing.	Replace.
	• Warped clutch cover or pressure plate.	Repair or replace.
Clutch drags	Dragging clutch is particularly noticeable when shifting gears, especially into low gear. TO TEST FOR DRAGGING CLUTCH, proceed as follows: (1) Start engine. Disengage clutch. Shift into reverse gear, and then into Neutral. Gradually increase engine speed, and again shift into reverse gear. If clutch is dragging, gear "grating" is heard when shifting from Neutral into Reverse. (2) Stop engine and shift gear. (Conduct this test at each gear position.) (3) Gears are smoothly shifted in step (2), but drag when shifting to 1st speed position at idling. a. If dragging is encountered at the end of shifting, check condition of synchro-mechanism in transmission. b. If dragging is encountered at the beginning of shifting, proceed to step (4) below. (4) Push change lever toward Reverse side, depress pedal to check for free travel. a. If pedal can be depressed further, check clutch condition. b. If pedal cannot be depressed further, proceed to step (5) below. (5) Check clutch control, (pedal height, free pedal play, free travel withdrawal lever play, etc.) If no abnormal condition exists and if pedal cannot be depressed further, check clutch condition.	
	• Clutch disc runout or warped.	Repair or replace.
	• Wear or rust on hub splines in clutch disc.	Clean and lubricate with grease, or replace.
	• Diaphragm spring toe height out of adjustment or toe tip worn.	Adjust or replace.
	• Worn or improperly installed parts.	Repair or replace.

Condition	Probable cause and testing	Corrective action
Clutch chatters	Clutch chattering is usually noticeable when car is just rolled off with clutch partially engaged.	
	• Weak or broken clutch disc torsion spring.	Replace.
	• Oil or grease on clutch facing.	Replace.
	• Clutch facing out of proper contact or clutch disc runout.	Replace.
	• Loose rivets.	Replace.
	• Warped pressure plate or clutch cover surface.	Repair or replace.
	• Unevenness of diaphragm spring toe height.	Adjust or replace.
	• Loose engine mounting or deteriorated rubber.	Retighten or replace.
Noisy clutch	A noise is heard after clutch is disengaged.	
	• Damaged release bearing.	Replace.
	A noise is heard when clutch is disengaged.	
	• Insufficient grease on the sliding surface of bearing sleeve.	Apply grease.
	• Clutch cover and bearing are not installed correctly.	Adjust.
	A noise is heard when car is suddenly started off with clutch partially engaged.	
	• Damaged pilot bushing.	Replace.
Clutch grabs	When grabbing of clutch occurs, car will not start off smoothly from a standing start or clutch is engaged before clutch pedal is fully depressed.	
	• Oil or grease on clutch facing.	Replace.
	• Clutch facing worn or loose rivets.	Replace.
	• Wear or rust on splines in drive shaft and clutch disc.	Clean or replace.
	• Warped flywheel or pressure plate.	Repair or replace.
	• Loose mountings for engine or power train units.	Retighten.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
1	ST20050010 Base plate	 SE002	S30 610 710 C110 C130 230	Fig. CL-5
2	ST20050051 Set bolt			
3	ST20050100 Distance piece 7.8 mm (0.31 in)	 SE003		
4	ST20050240 Diaphragm spring adjusting wrench	 SE032	S30 610 710 C110 C130 230	Fig. CL-6
5	ST20630000 Clutch aligning bar	This tool is used to conduct disc centering by inserting the tool into pilot bush in flywheel, when installing clutch assembly to flywheel.  SEO01	S30 610 710 C110 C130 230	Fig. CL-2 Fig CL-7
6	ST16610001 Pilot bush puller	 SE191	L26 L24 G20 G18 L18 L16 L14	Fig.CL-13

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
7	GG94310000 Brake pipe torque wrench	This tool is used to tighten and loosen brake and clutch type flare nut. A built-in torque limiting wrench is provided to assure torque accuracy. 	All models	Page CL-7 Page CL-8