

WORKSHOP MANUAL

TF SERIES

CLUTCH

SECTION 7C

ISUZU

ISUZU



International Service & Parts
Tokyo, Japan

NOTICE

Before using this Workshop Manual to assist you in performing vehicle service and maintenance operations, it is recommended that you carefully read and thoroughly understand the information contained in Section - OA under the headings "GENERAL REPAIR INSTRUCTIONS" and "HOW TO USE THIS MANUAL".

All material contained in this Manual is based on the latest product information available at the time of publication.

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SECTION 7C

CLUTCH

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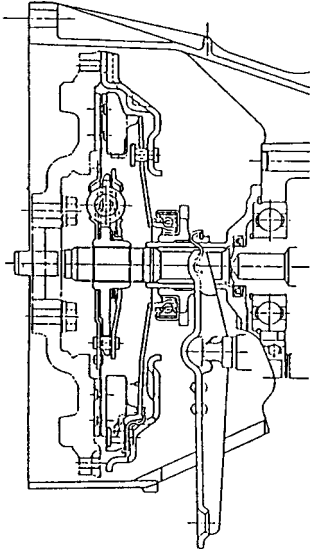
MAIN DATA AND SPECIFICATIONS

ENGINE		HEC Engine Series with MSG		4JA1	HEC Engine Series with MUA		4JB1T	4JG2T	6VD1
Type		Dry single plate with diaphragm							
Size	mm(in)	215 (8.465)	225 (8.858)	240 (9.449)			250 (9.843)	260 (10.24)	
Clamping force	kg(lb)	500 (1103)	500 (1103)	560 (1235)			640 (1411)	735 (1621)	
	(N)	(4903)	(4903)	(5492)			(6276)	(7208)	
Pressure plate									
Outside diameter	mm(in)	215 (8.465)	225 (8.858)	240 (9.449)			250 (9.843)	260 (10.24)	
Inside diameter	mm(in)	150 (5.906)	154 (6.063)	160 (6.299)			160 (6.299)	170 (6.70)	
Driven plate									
Thickness	mm(in)								
at free		8.4 (0.331)		8.6 (0.339)		8.0 (0.315)	8.2 (0.323)	8.3 (0.327)	
at compressed		8.0 (0.315)	7.8 (0.307)	8.0 (0.315)		7.8 (0.307)	8.0 (0.315)	8.0 (0.315)	
CLUTCH CONTROL		LHD					RHD		
Type		Hydraulic							
Pedal free play	mm(in)	5.0-15.0 (0.2-0.6)							
Pedal height	mm(in)								
4JG2T		185.5-195.5 (7.30-7.70)					—		
Others		178-188 (7.01-7.40)					216-226 (8.50-8.90)		
Master cylinder									
Bore×Stroke	mm(in)	15.87×35 (0.625×1.38)							
Slave cylinder									
Bore×Stroke	mm(in)								
HEC Engine Series for LHD/4JA1		20.64×16 (0.813×0.63)							
HEC Engine Series for RHD/4JB1T/4JG2T		22.22×15 (0.875×0.59)							
6VD1		22.22×17 (0.875×0.67)							

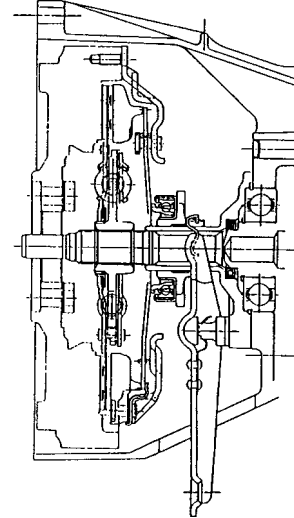
GENERAL DESCRIPTION

HYDRAULIC CONTROL TYPE

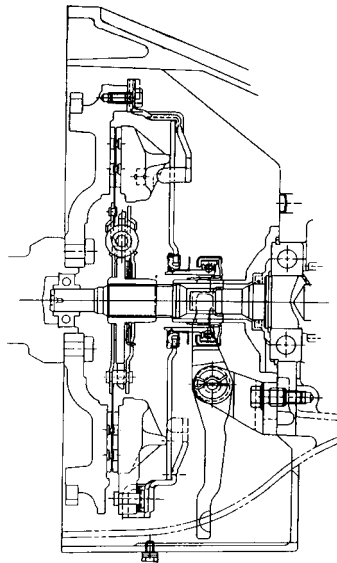
HEC Engine Series



4J Engine Series



6VD1



The clutch assembly consists of the pressure plate, the clutch cover, the diaphragm spring pivot pin and the driven plate assembly.

The clutch pedal is connected to the shift block through the clutch shaft and the shift fork.

The driven plate assembly is installed between the flywheel and the pressure plate.

Diaphragm spring pressure holds the driven plate against flywheel and the pressure plate to provide the friction necessary to engage the clutch.

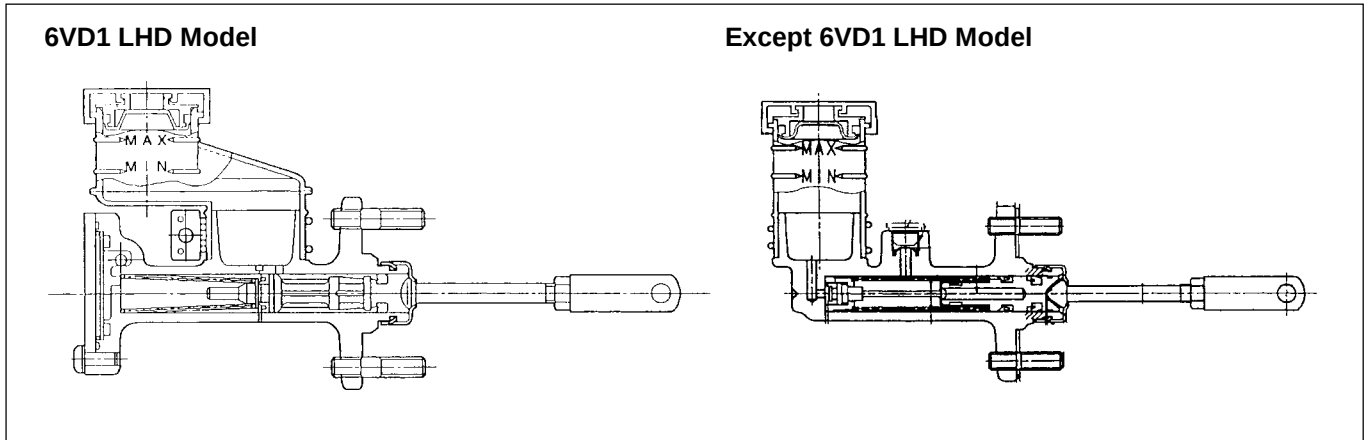
Depressing the clutch pedal moves the shift fork against the shift block.

The shift block forces the release bearing against the diaphragm to overcome the force of the diaphragm spring and separate the driven plate from the flywheel and pressure plate to disengage the clutch.

Except 6VD1 (3.2L) engine model, the conventional push-type clutch is used.

For 6VD1 (3.2L) engine model, the pull-type clutch is employed. The pull-type clutch is disengaged by pulling the release lever (release bearing) to disengage the pressure plate.

MASTER CYLINDER



The master cylinder converts mechanical energy into hydraulic energy.

Depressing the clutch pedal causes the push rod to move against the piston to close the return port.

Clutch fluid is forced out of the master cylinder.

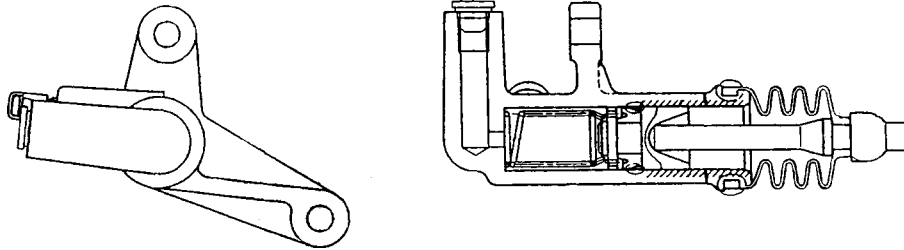
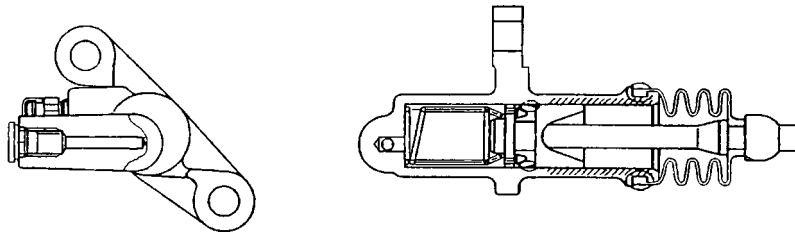
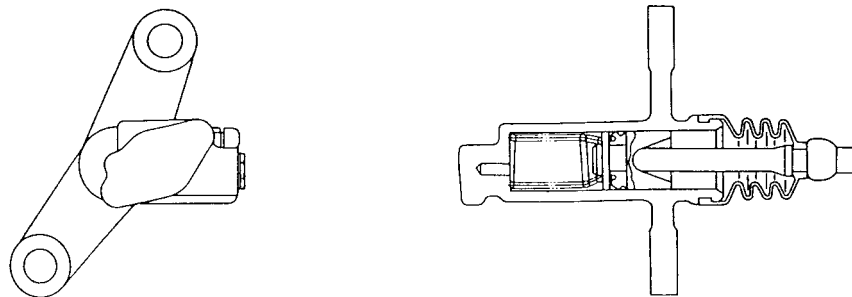
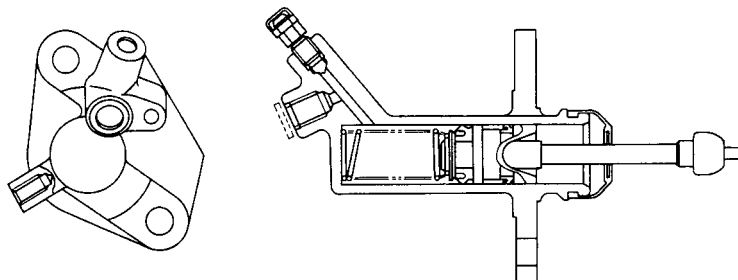
Releasing the clutch pedal causes the return spring to force the piston back to its original position.

The return port is opened and the clutch fluid flows back into the fluid reservoir.

Quickly releasing the clutch pedal will cause the fluid pressure at the return spring side to be lower than the fluid pressure at the push rod side.

This allows the fluid at the push rod side to quickly flow to the return spring side through a port in the piston head.

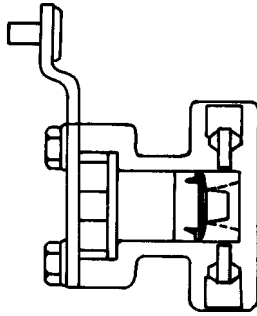
This equalizes the pressure at both sides of the piston.

SLAVE CYLINDER**MUA Series****MSG Series****4J Engine Series****6VD1 Engine Series**

The slave cylinder converts hydraulic energy into mechanical energy. Hydraulic fluid supplied by the master cylinder moves the slave cylinder piston to actuate the shift fork. The mechanical energy produced by the slave cylinder is directly proportional to the diameters of the master cylinder and the slave cylinder. A bleeder screw is provided to bleed the slave cylinder.

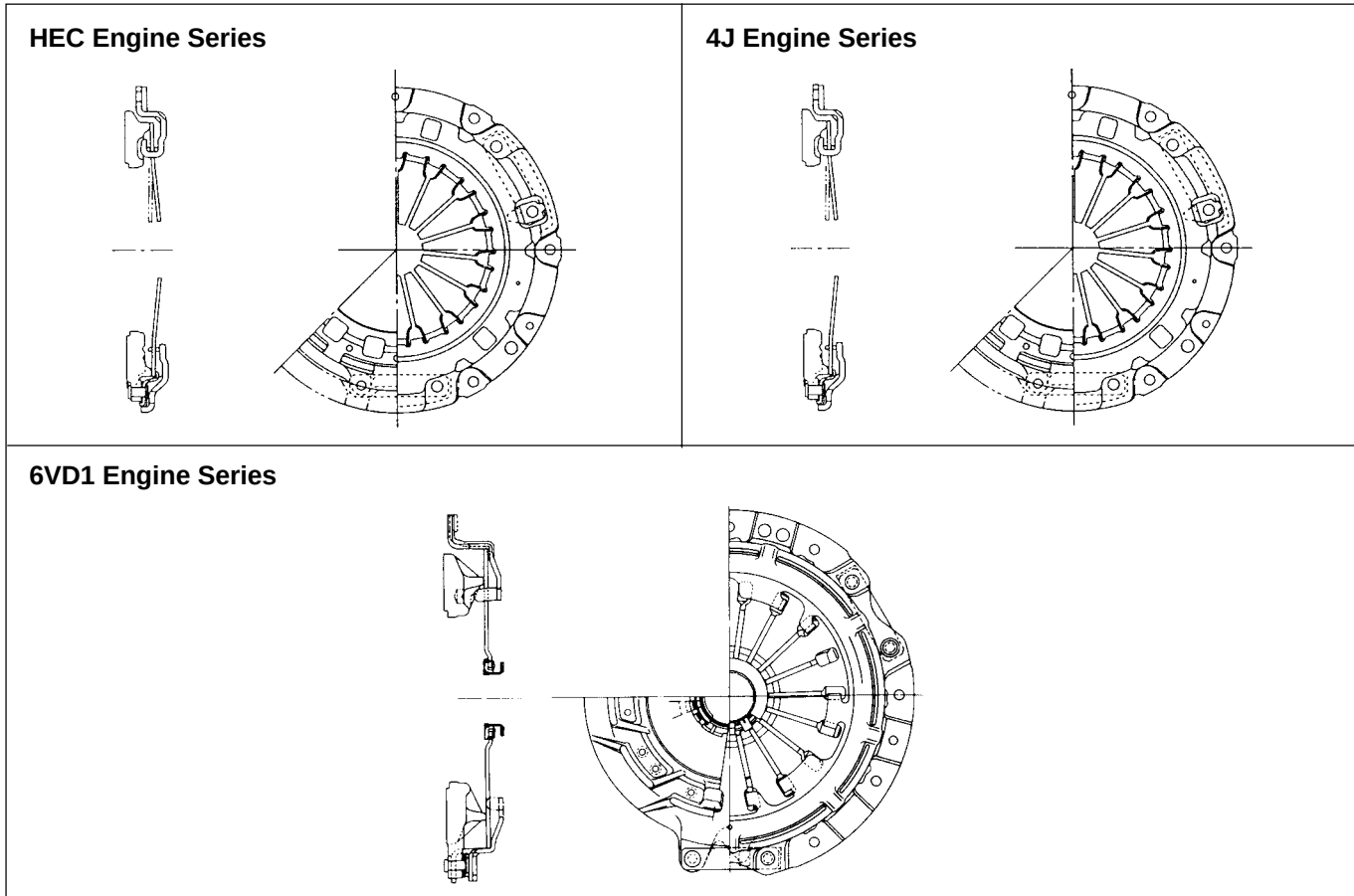
HYDRAULIC DAMPER CYLINDER

Except 6VD1 LHD Model



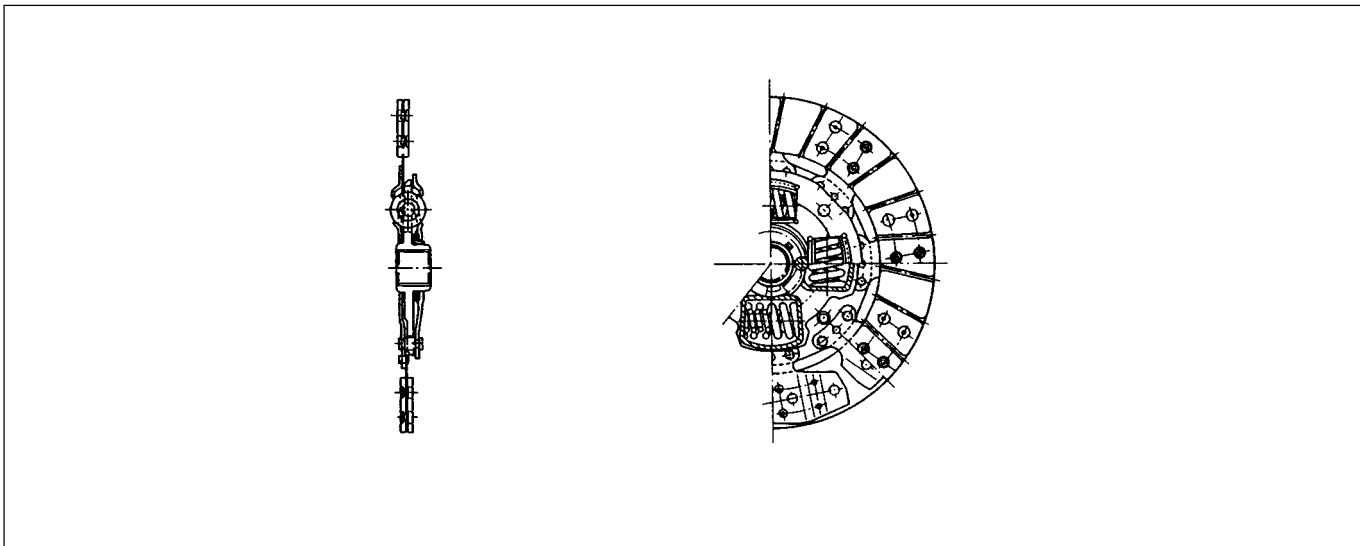
The hydraulic damper cylinder is installed between the master cylinder and the slave cylinder to smooth out variations in clutch pedal feel.

PRESSURE PLATE ASSEMBLY



The pressure plate assembly consists of the clutch cover, the pressure plate with diaphragm spring. Operating the clutch pedal causes the pressure plate to move in an axial direction to engage and disengage the clutch.

DRIVEN PLATE ASSEMBLY



The driven plate assembly consists of the plate and the facing. The plate consists of the clutch center, the cushioning plate and the torsion springs. The facing is riveted to both sides of the cushioning plate. The cushioning plate provides a longer service life by minimizing wear and vibration at the clutch contact surfaces.

TORQUE SPECIFICATION

STANDARD BOLTS

The torque values given in the following table should be applied where a particular torque is not specified.

		Strength Class	4.8/4T	7T	8.8		9.8/9T
					Refined	Non-Refined	
		Bolt Identification					
Bolt Diameterx Pitch (mm)		 No mark	-				
Standard Hex. Head Bolt	M6 × 1.0	6 (0.6 / 52 lb.in)	7 (0.7 / 61 lb.in)	8 (0.8 / 69 lb.in)		-	
	M8 × 1.25	13 (1.3 / 113 lb.in)	17 (1.7 / 12)	20 (2.0 / 14)		24 (2.4 / 17)	
	M10 × 1.25	27 (2.8 / 20)	37 (3.8 / 27)	42 (4.3 / 31)		50 (5.1 / 37)	
	M12 × 1.25	61 (6.3 / 45)	76 (7.8 / 56)	87 (8.9 / 64)		95 (9.7 / 70)	
	M14 × 1.5	96 (9.8 / 71)	116 (11.8 / 85)	133 (13.6 / 98)		142 (14.5 / 105)	
	M16 × 1.5	130 (13.3 / 96)	170 (17.3 / 125)	193 (19.7 / 143)		200 (20.4 / 148)	
	M18 × 1.5	188 (19.2 / 139)	244 (24.9 / 180)	278 (28.3 / 205)		287 (29.3 / 212)	
	M20 × 1.5	258 (26.3 / 190)	337 (34.4 / 249)	385 (39.3 / 284)		396 (40.4 / 292)	
	M22 × 1.5	332 (33.9 / 245)	453 (46.3 / 335)	517 (52.7 / 381)		530 (54.1 / 391)	
	M24 × 2.0	449 (45.8 / 331)	570 (58.2 / 421)	651 (66.3 / 480)		692 (70.6 / 511)	
	*M10 × 1.5	26 (2.7 / 20)	36 (3.7 / 27)	41 (4.2 / 30)		48 (4.9 / 35)	
	*M12 × 1.75	57 (5.8 / 42)	71 (7.2 / 52)	80 (8.2 / 59)		89 (9.1 / 66)	
	*M14 × 2.0	89 (9.1 / 66)	110 (11.2 / 81)	125 (12.7 / 92)		133 (13.6 / 98)	
	*M16 × 2.0	124 (12.7 / 92)	162 (16.5 / 119)	185 (18.9 / 137)		191 (19.5 / 141)	
Flange Bolt	M6 × 1.0	7 (0.7 / 61 lb.in)	8 (0.8 / 69 lb.in)	9 (0.9 / 78 lb.in)		-	
	M8 × 1.25	15 (1.5 / 11)	19 (1.9 / 14)	22 (2.2 / 16)		26 (2.7 / 20)	
	M10 × 1.25	31 (3.2 / 23)	41 (4.2 / 30)	47 (4.8 / 35)		56 (5.7 / 41)	
	M12 × 1.25	69 (7.0 / 51)	85 (8.7 / 63)	97 (9.9 / 72)		106 (10.8 / 78)	
	M14 × 1.5	104 (10.6 / 77)	126 (12.8 / 93)	144 (14.6 / 106)		154 (15.7 / 114)	
	M16 × 1.5	145 (14.8 / 127)	188 (19.2 / 139)	214 (21.8 / 158)		221 (22.5 / 163)	
	M18 × 1.5	-	-	-		-	
	M20 × 1.5	-	-	-		-	
	M22 × 1.5	-	-	-		-	
	M24 × 2.0	-	-	-		-	
	*M10 × 1.5	30 (3.1 / 22)	40 (4.1 / 30)	46 (4.7 / 34)		54 (5.5 / 40)	
	*M12 × 1.75	64 (6.5 / 47)	78 (8.0 / 58)	89 (9.1 / 66)		99 (10.1 / 73)	
	*M14 × 2.0	97 (9.9 / 72)	119 (12.1 / 88)	135 (13.8 / 99.7)		144 (14.7 / 107)	
	*M16 × 2.0	137 (14.0 / 101)	178 (18.2 / 132)	203 (20.7 / 132)		210 (21.5 / 155)	

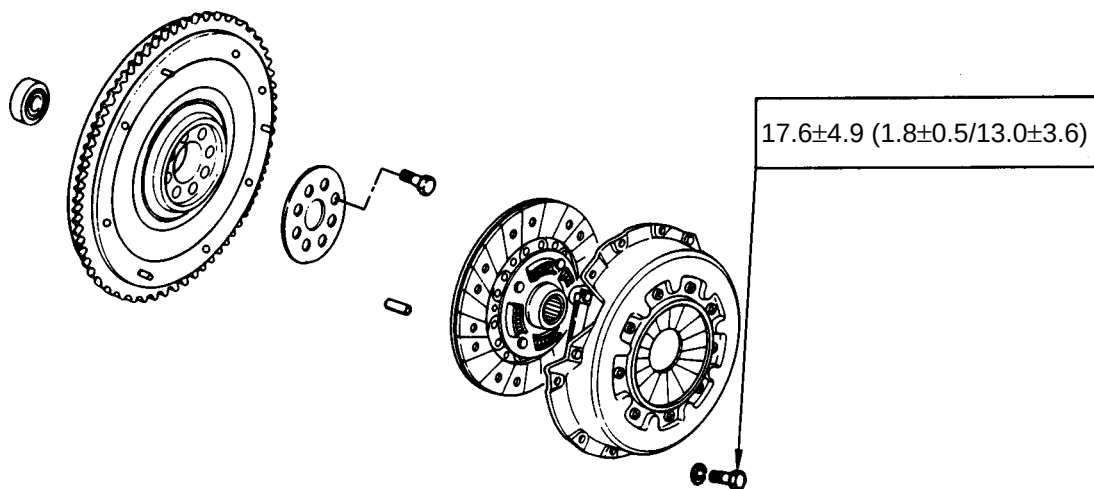
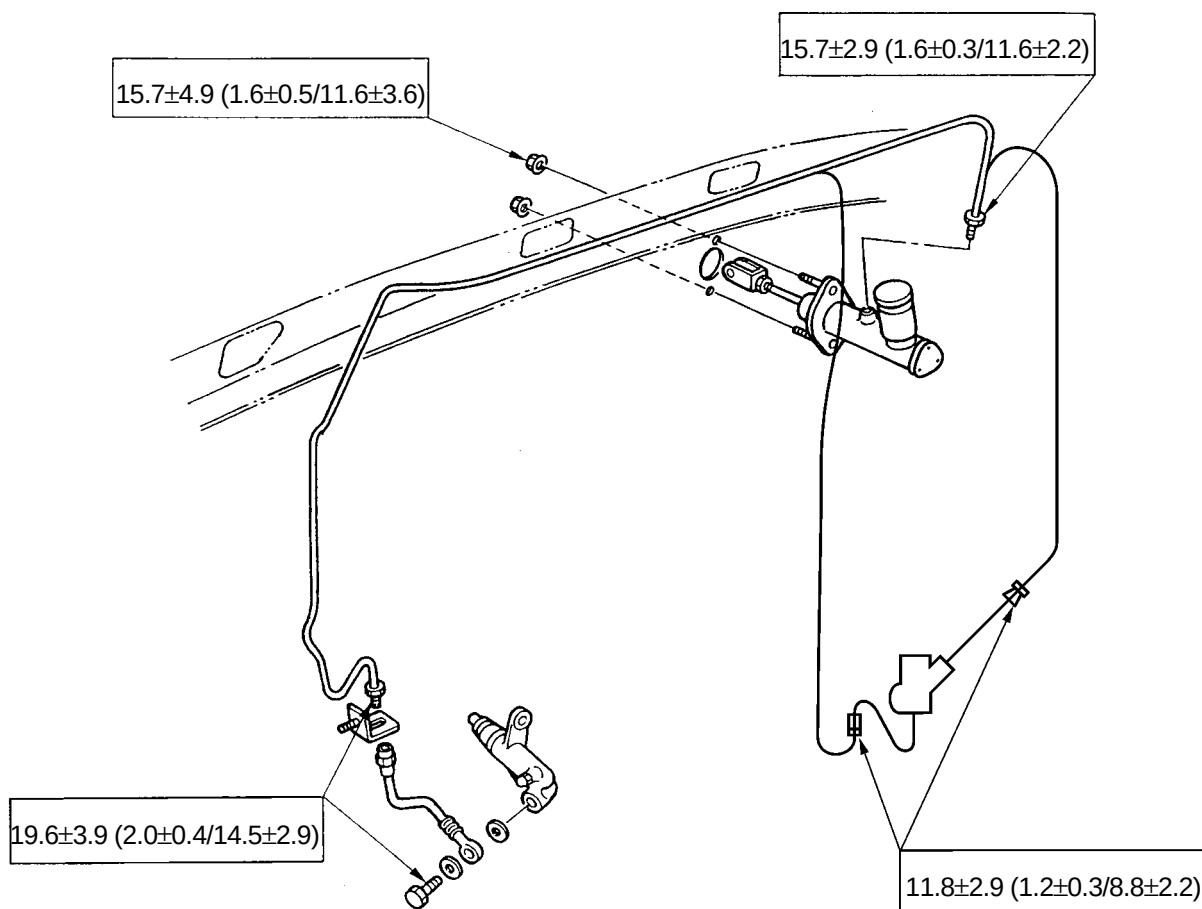
The asterisk * indicates that the bolts are used for female-threaded parts that are made of soft materials such as casting, etc.

FLARE NUTS

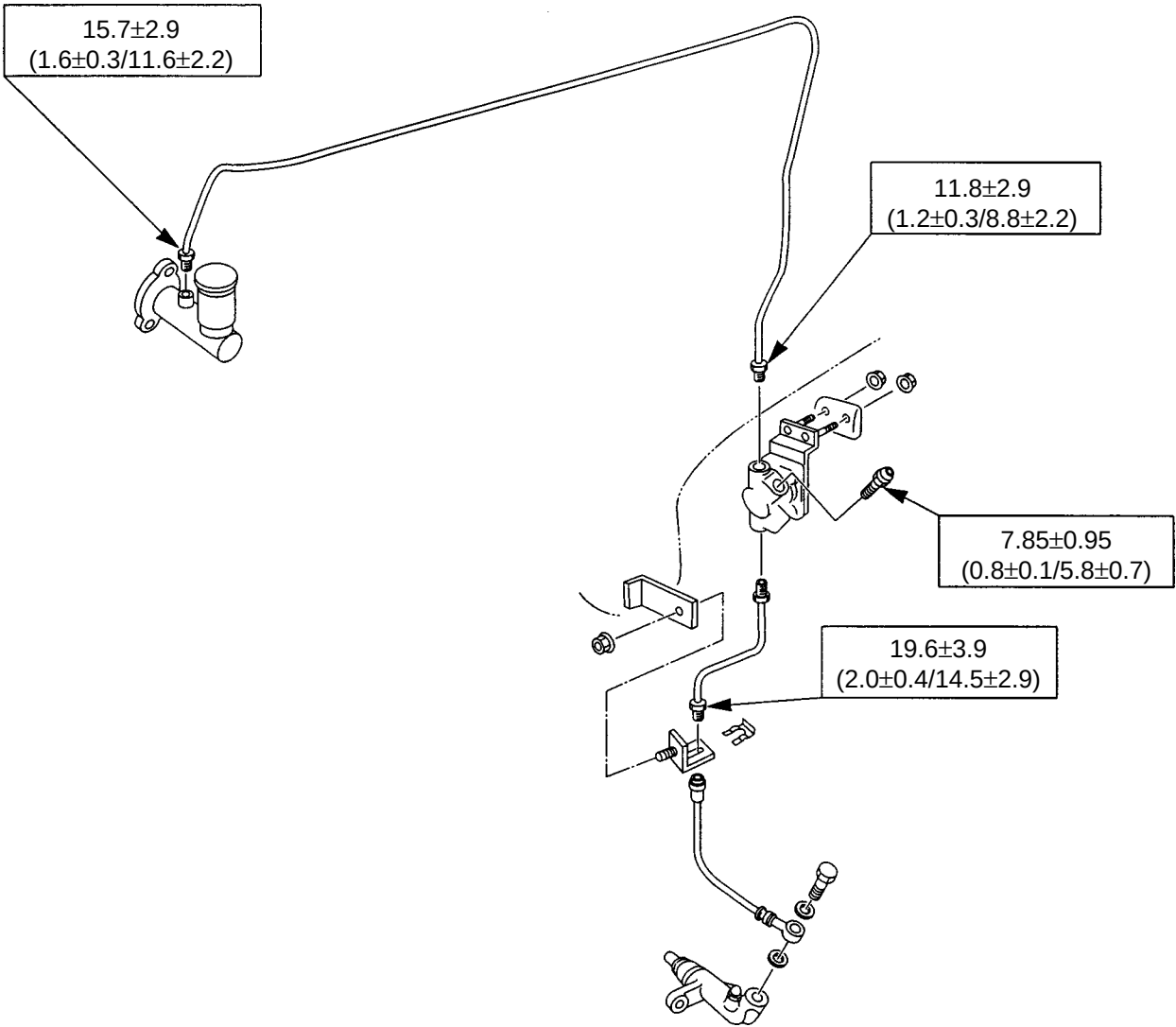
Pipe diameter mm (in)	Torque N-m (kgf-m / lb-ft)	Pipe diameter mm (in)	Torque N-m (kgf-m / lb-ft)
4.76 (0.187)	16 (1.6 / 12)	10.00 (0.394)	54 (5.5 / 40)
6.35 (0.250)	26 (2.7 / 20)	12.00 (0.472)	88 (9.0 / 65)
8.00 (0.315)	44 (4.5 / 33)	15.00 (0.591)	106 (10.8 / 78)

**SPECIAL PARTS FIXING NUTS AND BOLTS**

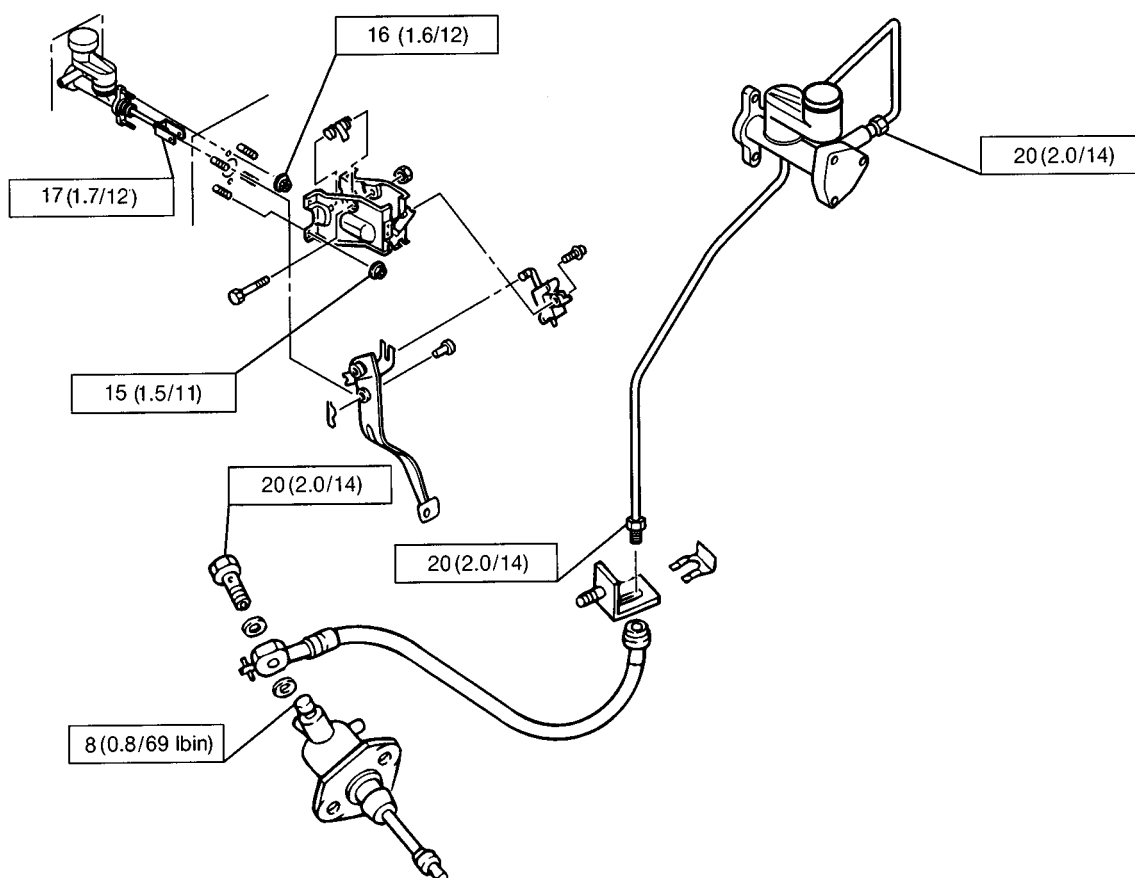
N·m (kgf·m/lb·ft)

**HEC Engine Series LHD Model**

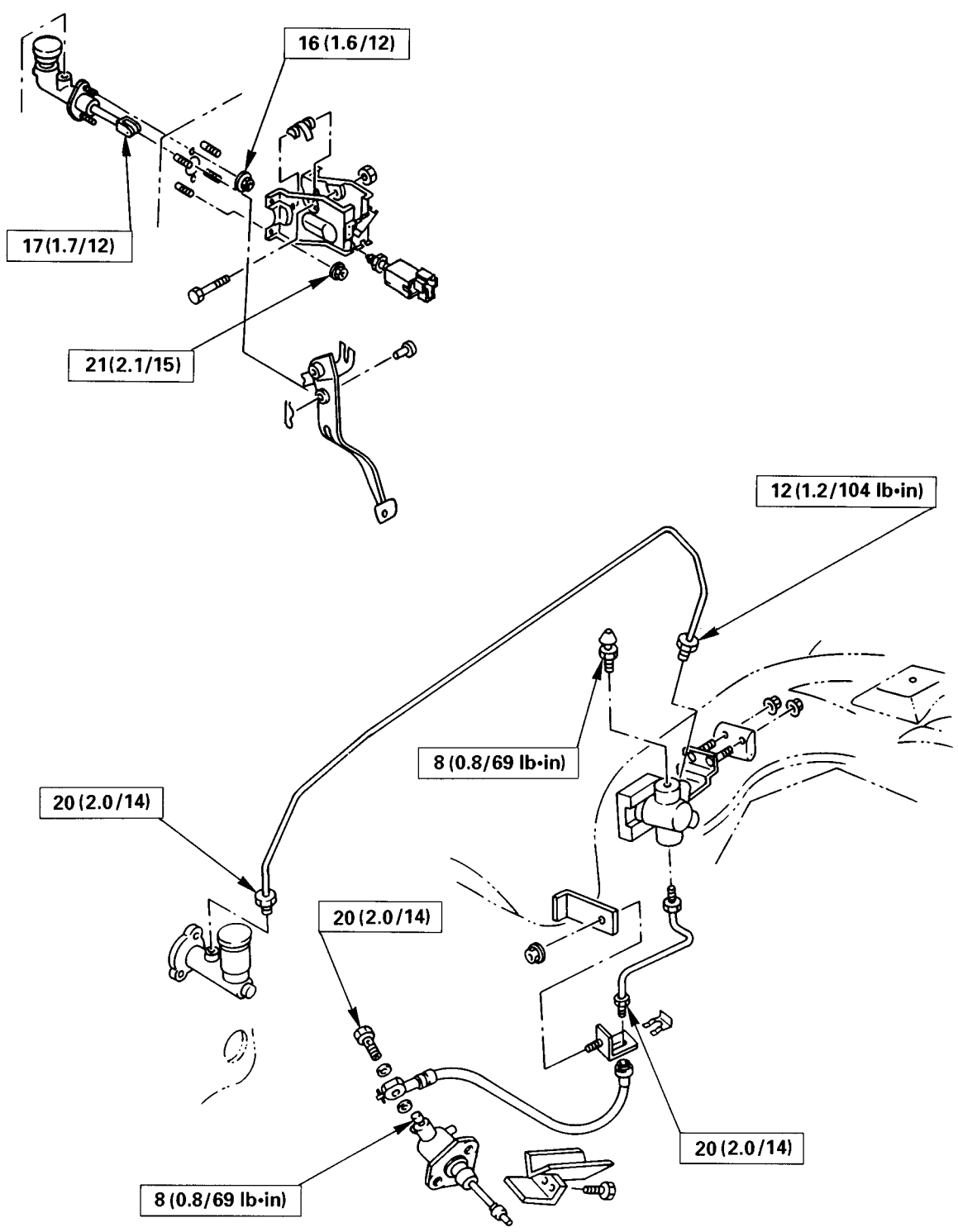
HEC Engine Series RHD Model, 4J Engine Series



6VD1 LHD Model

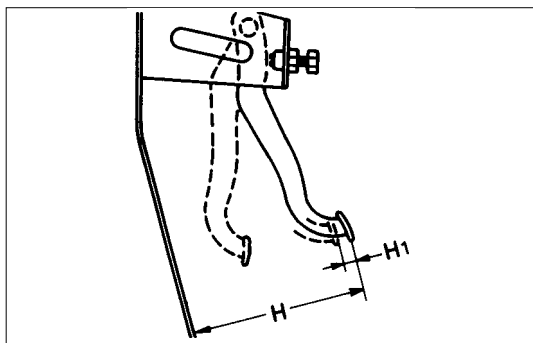


6VD1 RHD Model



SERVICING

Servicing refers to general maintenance procedures to be performed by qualified service personnel.



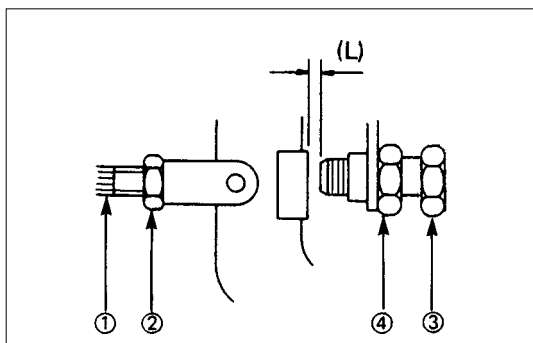
CLUTCH PEDAL HEIGHT

Inspection

Measure to verify that the distance from the upper surface of the pedal pad to the firewall is within the standard value.

Clutch Pedal Height(H) mm(in)

	RHD	LHD
HEC ENGINE	216-226 (8.50-8.89)	178-188 (7.01-7.40)
4JG2T ENGINE	—	185.5-195.5 (7.30-7.70)
OTHER ENGINE	203-213 (7.99-8.39)	178-188 (7.01-7.40)



Adjustment

- Loosen clutch master cylinder push rod lock nut ②.
Turn push rod ① by hand to set clutch pedal height (H) to within specification.
- After the adjustment, tighten lock nut ②.
- Turn the clutch switch ③ or stopper bolt ③ until the switch bolt ③ or stopper bolt ③ just touches the clutch pedal arm.
Adjust clutch switch ③ or stopper bolt ③ by backing it out half a turn, and measure the clearance (L) between the clutch pedal arm and the clutch switch bolt end ③ or stopper bolt ③.
Lock the lock nut ④.
Connect clutch switch connector.

Clutch switch and clutch pedal

Clearance mm(in)

(L)	0.5-1.5 (0.020-0.059)
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CLUTCH PEDAL PLAY

Inspection

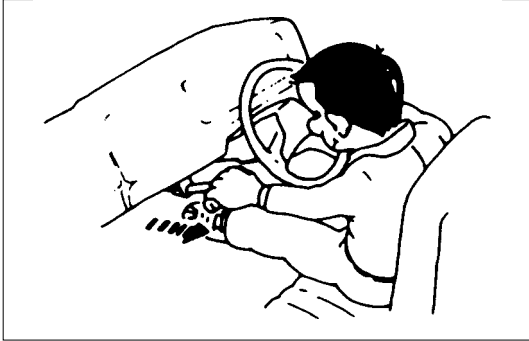
Depress the clutch pedal lightly by hand, and measure to determine if the free play is within the standard value.

Pedal Free Play mm(in)

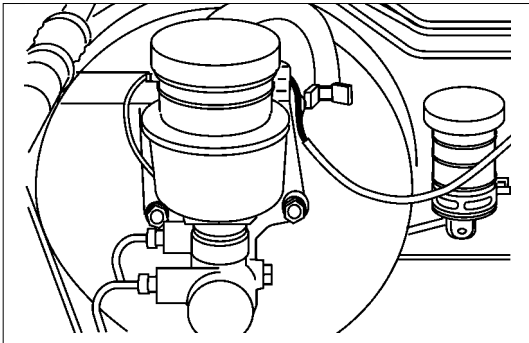
H1	5.0-15.0 (0.2-0.6)
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Bleeding Procedure

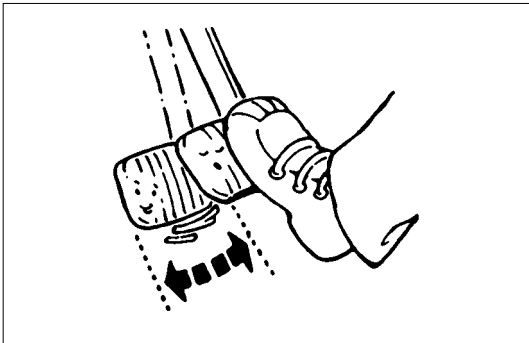
1. Bleed air from clutch operating cylinder according to the following procedure.
Carefully monitor fluid level at master cylinder during bleeding operation.



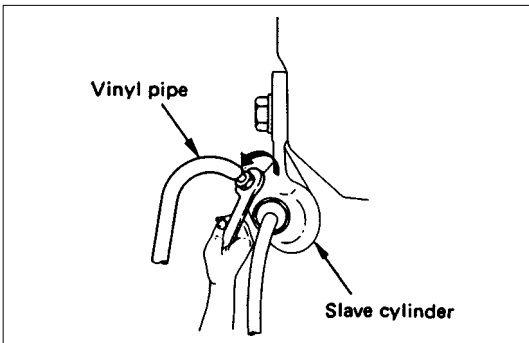
1. Set the parking brake.



2. Top up reservoir with recommended brake fluid.
3. Connect a transparent vinyl tube to air bleeder valve.



4. Fully depress clutch pedal several times.

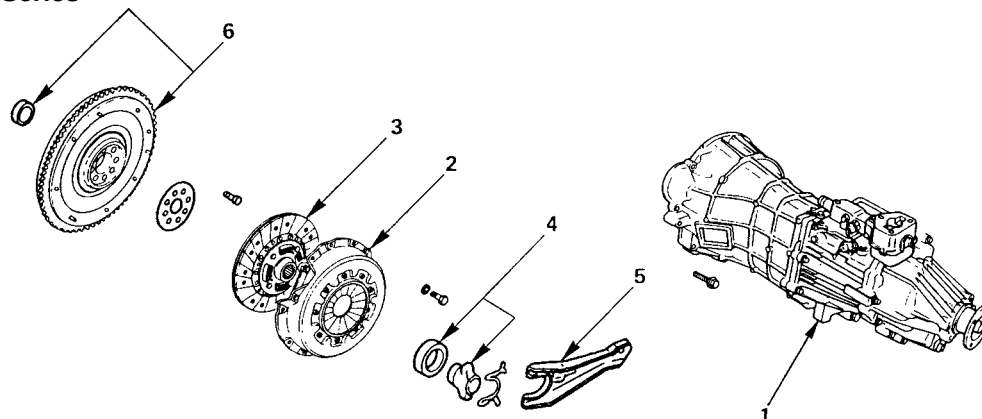


5. With clutch pedal depressed, open bleeder valve to release air.
6. Close bleeder valve.
7. Repeat steps 5 through 6 above until brake fluid flows from air bleeder valve without air bubbles.
8. Bleed air from clutch damper according to the above procedure.
9. Repeat the above bleeding procedure 1 and 2 several times.

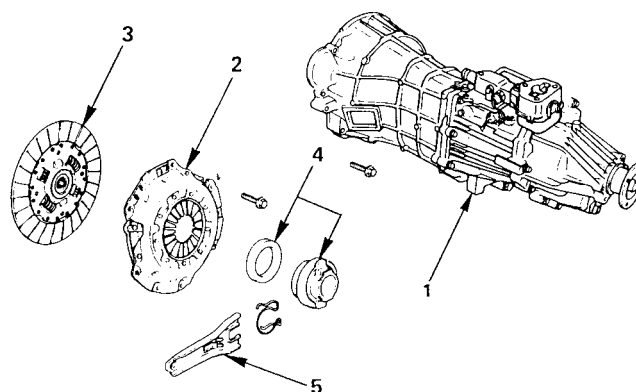
CLUTCH

REMOVAL AND INSTALLATION

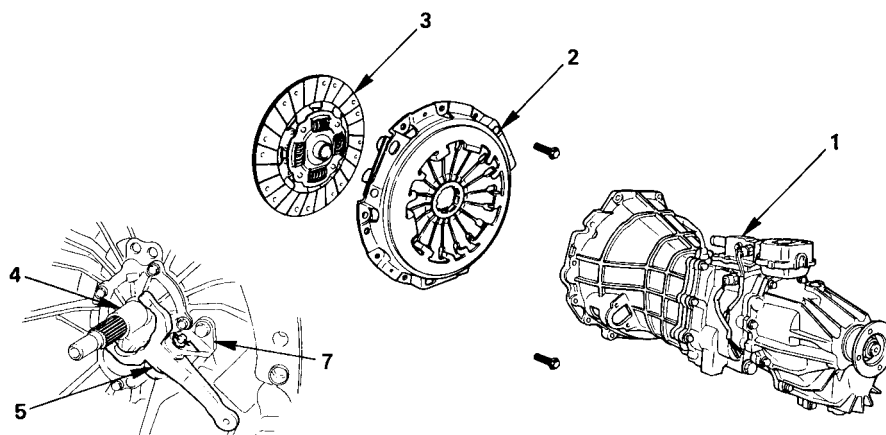
HEC Engine Series



4J Engine Series



6VD1



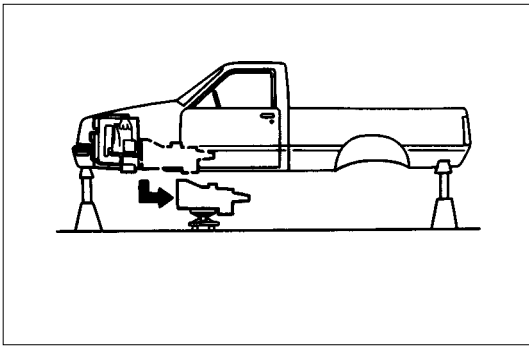
Removal Steps

1. Transmission assembly
- ▲ 2. Pressure Plate assembly
- ▲ 3. Driven plate assembly
4. Release bearing
5. Shift fork
6. Flywheel assembly and crank bearing (HEC Engine Series)

7. Fulcrum bridge (6VD1)

Installation Steps

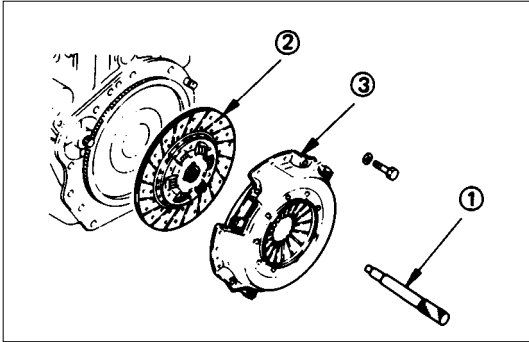
To install, follow the removal steps in the reverse order.



Important Operations - Removal

1. Transmission Assembly

Refer to "MANUAL TRANSMISSION" of section 7B and 7B1 for "REMOVAL AND INSTALLATION" procedure.

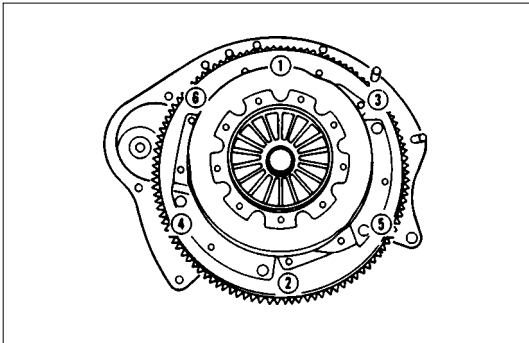


2. Clutch Pressure Plate Assembly (HEC Engine Series)

3. Driven Plate Assembly (HEC Engine Series)

- (1) Use the clutch pilot aligner ① to prevent the driven plate assembly ② from falling free.

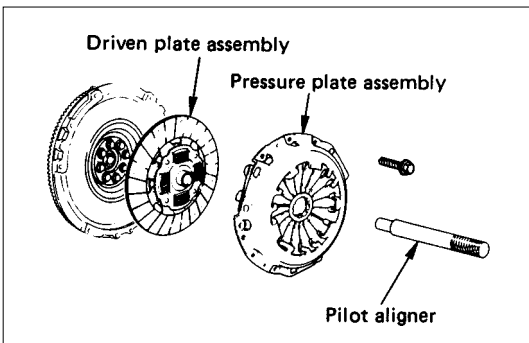
Clutch Pilot Aligner : 5-8840-2634-0



- (2) Loosen the clutch cover bolts in the numerical order shown in the illustration.

- (3) Remove the pressure plate assembly ③ from the flywheel.

- (4) Remove the driven plate from the flywheel.



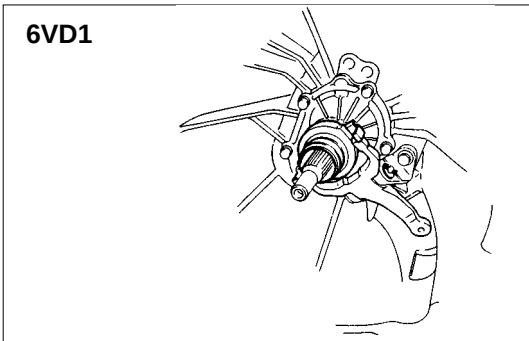
3. Driven Plate Assembly (Except HEC Engine Series)

- (1) Use the pilot aligner to prevent the driven plate assembly from falling free.

Pilot aligner: 5-8525-3001-0 (J-24547)

- (2) Mark the flywheel, clutch cover and pressure plate lug for alignment when installing.

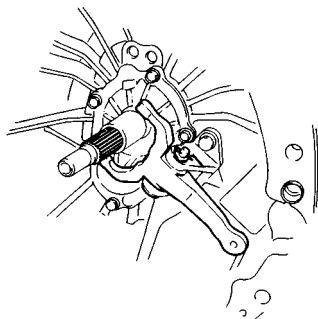
6VD1



4. Release Bearing (6VD1)

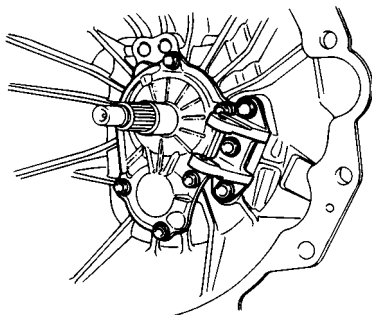
Remove the release bearing from the transmission case.

6VD1

**5. Shift Fork (6VD1)**

- (1) Remove the snap pin.
- (2) Remove the shift fork pin and shift fork from the fulcrum bridge.

6VD1

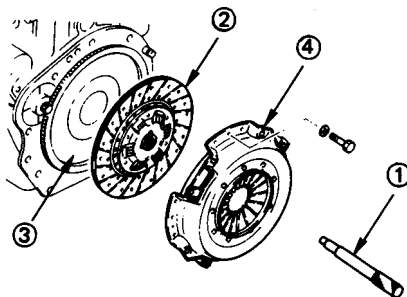
**7. Fulcrum Bridge (6VD1)**

- (1) Remove the fulcrum bridge bolts.
- (2) Remove the fulcrum bridge from the transmission case.

**Important Operations - Installation**

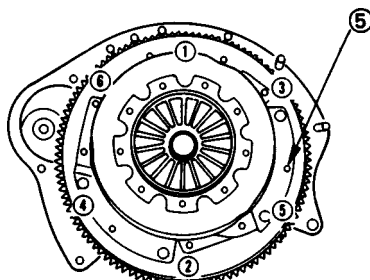
Follow the removal procedure in reverse order to perform the installation procedure.

Pay careful attention to the important points during the installation procedure.

**3. Driven plate Assembly (HEC Engine Series)****2. Clutch Pressure Plate Assembly (HEC Engine Series)**

- (1) Clean the flywheel surface.
- (2) Clean the facing surface.
- (3) Use the clutch pilot aligner ① to install the driven plate assembly ② to the flywheel ③.

Clutch Pilot Aligner : 5-8840-2634-0



- (4) Clean the pressure plate surfaces.



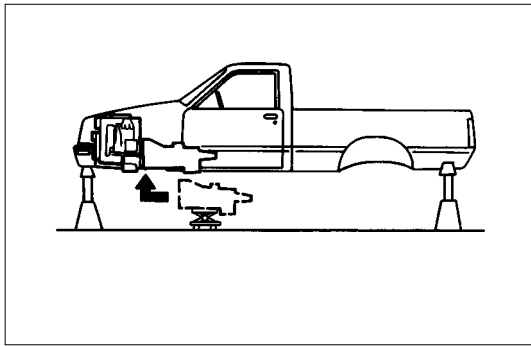
- (5) Align the pressure plate assembly ④ with the flywheel knock pin ⑤.

- (6) Install the pressure plate assembly to the flywheel.

- (7) Tighten the clutch cover bolts a little at a time in the numerical order shown in the illustration.

Clutch Cover Bolt Torque N·m (kgf·m/lb·ft)

17.6 ± 4.9 ($1.8 \pm 0.5/13.0 \pm 3.6$)

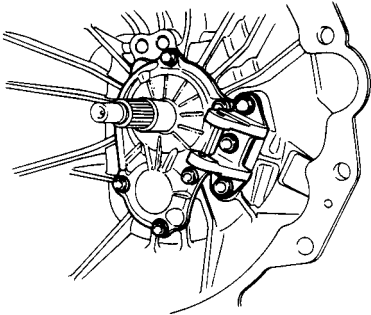


8. Remove the clutch pilot aligner.

Note:

Do not strike the clutch pilot aligner with a hammer to remove it.

6VD1

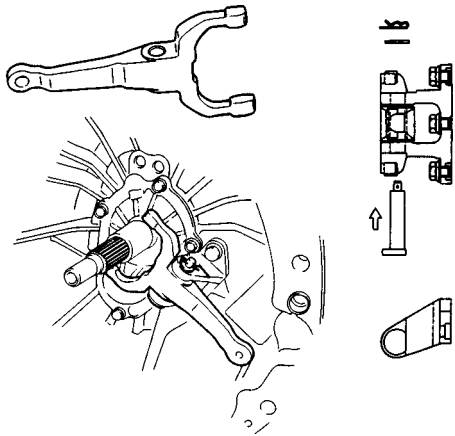


7. Fulcrum Bridge (6VD1)

- (1) Install the fulcrum bridge to the transmission case.
- (2) Tighten three fulcrum bridge bolts to the specified torque.

Fulcrum Bridge Bolt Torque	N·m (kg·m/lb·ft)
	39 (3.9/28)

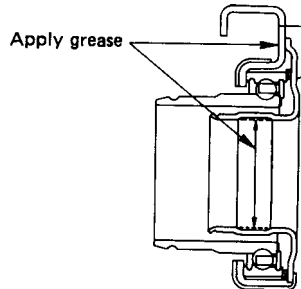
6VD1



5. Shift Fork (6VD1)

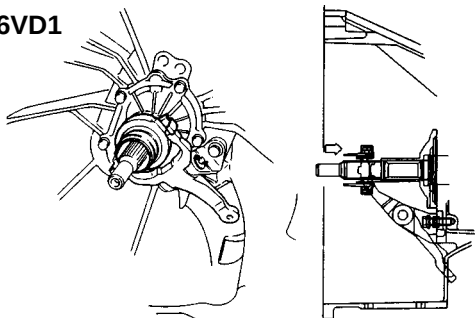
- (1) Apply molybdenum disulfide contained type grease to the pin hole inner circumferences and thrust surfaces.
- (2) Attach the shift fork to the fulcrum bridge and insert the pin from below of the fulcrum bridge.
- (3) Install the washer and snap pin.

6VD1

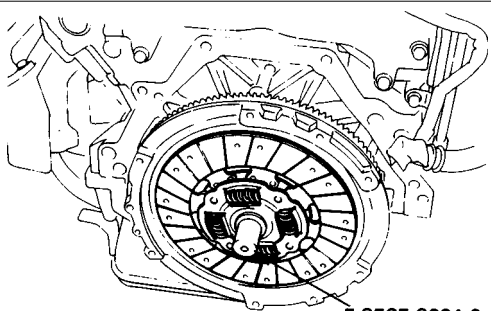


4. Release Bearing (6VD1)

- (1) Apply molybdenum disulfide contained type grease to the areas shown in illustration.

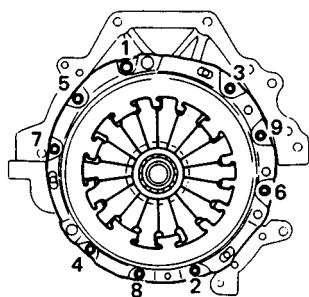
6VD1

(2) Install the release bearing in the proper direction.



3. Driven Plate Assembly (Except HEC Engine Series)

Use the pilot aligner to install the driven plate assembly.
Pilot aligner: 5-8525-3001-0 (J-24547)

6VD1

2. Pressure Plate Assembly (6VD1)

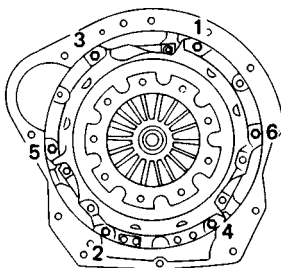
(1) Tighten the bolts holding the pressure plate assembly in the order shown in illustration.

Pressure Plate Bolt Torque	N·m (kgf·m/lb·ft)
20.6 ± 2.9 ($2.1 \pm 0.3 / 15.2 \pm 2.2$)	

(2) Remove the aligner.

NOTE:

Do not strike the aligner with a hammer to remove it.

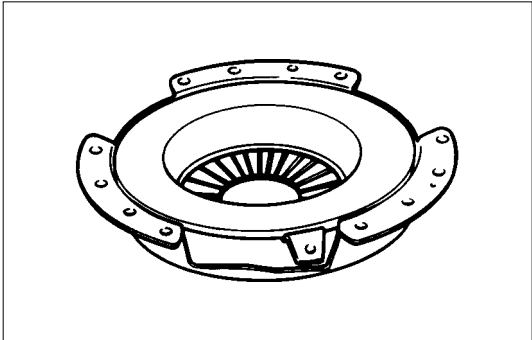


1. Transmission Assembly



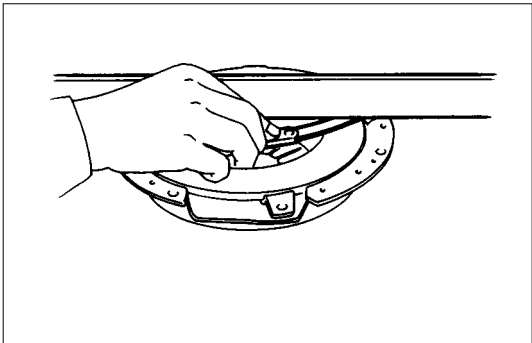
INSPECTION AND REPAIR

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.



PRESSURE PLATE ASSEMBLY

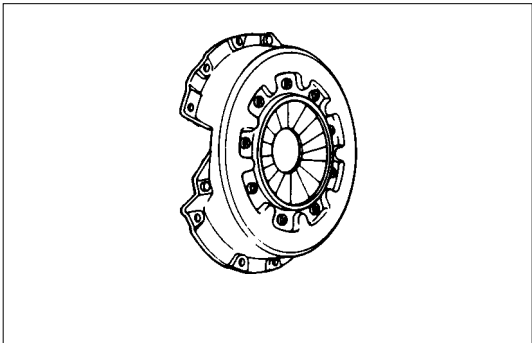
Visually inspect the pressure plate friction surface for excessive wear and heat cracks.
If excessive wear or deep heat cracks are present, the pressure plate must be replaced.



Pressure Plate Warpage

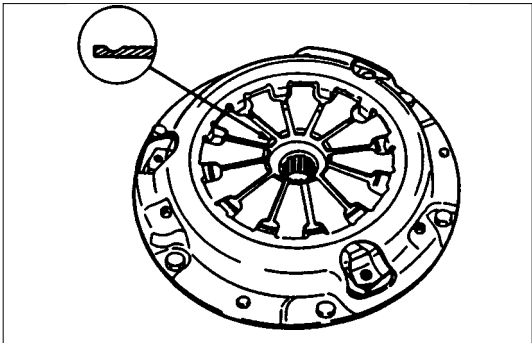
Use a straight edge and a feeler gauge to measure the pressure plate friction surface flatness in four directions.
If any of the measured values exceed the specified limit, the pressure plate must be replaced.

Pressure Plate Warpage	mm(in)
Limit	
0.3 (0.012)	

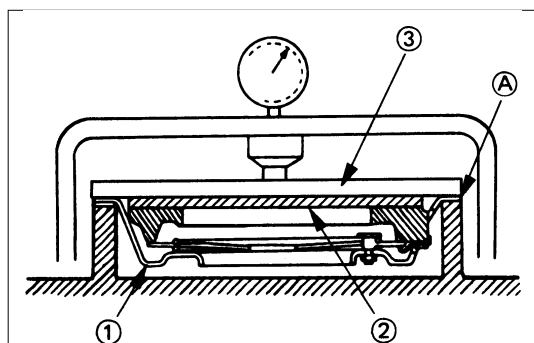


Clutch Cover

Visually inspect the entire clutch cover for excessive wear, cracking , and other damage.
The clutch cover must be replaced if any of these conditions are present.



1. Abrasion, scratches, cracks and deflection of friction face to the disc, loose rivet and wear of ring
- Grind small scratches, or replace the assembly if extreme scratches are found.



Clutch Set Force (Except 6VD1)

1. Position the pressure plate assembly ① as shown in the illustration.
2. Place the new driven plate ② over the pressure plate assembly.

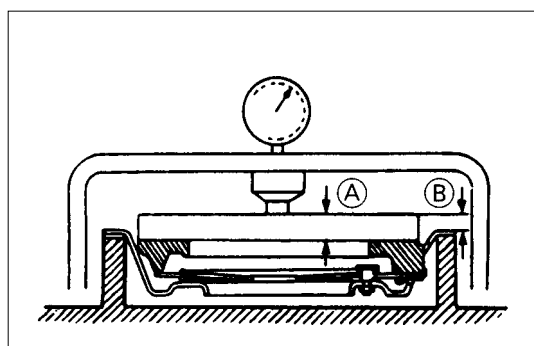
Driven Plate Thickness (Reference) mm(in)

	Standard	
	Free	Compressed
HEC (MSG)	8.4 (0.330)	8.0 (0.315)
HEC (MUA)	8.6 (0.338)	8.0 (0.315)
4JG2T	8.2 (0.323)	8.0 (0.315)
4JA1	8.0 (0.315)	7.8 (0.307)
4JB1T	8.0 (0.315)	7.8 (0.307)

3. Place a metal sheet ③ between the press and the driving plate.
4. Compress the metal sheet and the driven plate until the driven plate is flush with the drive plate assembly ④.
5. Note the pressure gauge reading.

Driven Plate Slamping Force N (kg/lb)

	Standard
HEC (MSG), 4JA1	4,903 (500/1,103)
HEC (MUA), 4JB1T	5,492 (560/1,235)
4JG2T	6,276 (640/1,411)

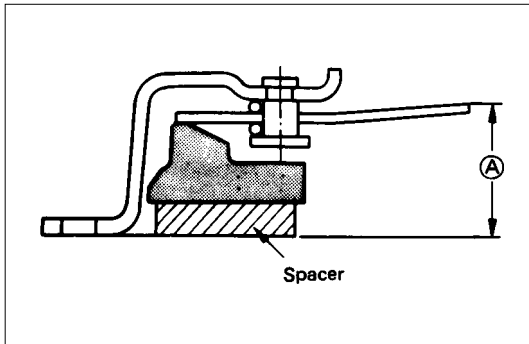


Clutch Set Force (6VD1)

1. Invert the pressure plate assembly.
2. Place a new driven plate over the pressure plate.
A metal sheet with ④ thickness of 8.0 mm (0.315 in) may be used in place of the driven plate.
3. Compress the pressure plate assembly until the distance ⑤ becomes 12 mm (0.472 in).
4. Note the pressure gauge reading.
If the measured value is less than the specified limit, the pressure plate assembly must be replaced.

Clutch Set Force N (kg/lb)

	Standard	Limit
6VD1	7,208 (735/1,621)	6,669 (680/1,499)



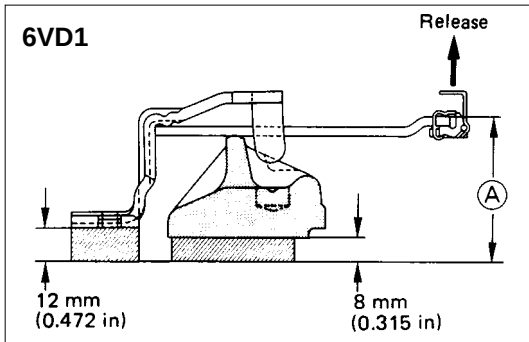
Diaphragm Spring Finger Height (Except 6VD1)

- Place the appropriate spacer beneath the pressure plate.
Refer to the table below.

Spacer Thickness	mm(in)
HEC, 4JG2T	8.0 (0.315)
4JA1, 4JB1T	7.8 (0.307)

- Fully compress the pressure plate and the diaphragm spring.
There are two ways to do this.
 - Use a bench press to press down the assembly from the top.
 - Tighten the fixing bolts.
- Measure the spring finger height $\textcircled{A}$ from the base to the spring tip.

Spring Finger Height	mm(in)
HEC MSG	37-39
HEC MUA	39.9-41.9
4JA1	30.5-32.5 (1.20-1.28)
4JB1T	35.0-37.0 (1.38-1.46)
4JG2T	39.0-41.0 (1.53-1.61)



Diaphragm Spring Finger Height (6VD1)

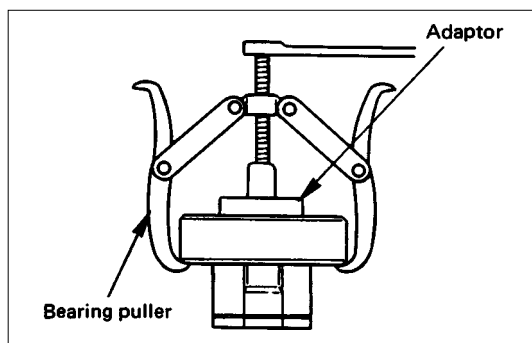
- Place a new driven plate or a 8.0 mm (0.315 in) spacer beneath the pressure plate.
- Fully compress the pressure plate and diaphragm spring.
There are two ways to do this.
 - Use a bench press to press down on the assembly from the top.
 - Tighten the fixing bolts.

NOTE: (6VD1)

Pre-load on diaphragm spring finger must be 49 - 98N (5.0 - 10.0 kg / 11 - 22 lb) in direction of release, when clutch cover assembly is bolted to the flywheel.

- Measure the spring height from base to spring tip $\textcircled{A}$.
If the measured value exceeds the specified limit, the pressure plate assembly must be replaced.

Spring Finger Height	mm(in)
Standard	
6VD1	49.9-51.9 (1.965-2.043)

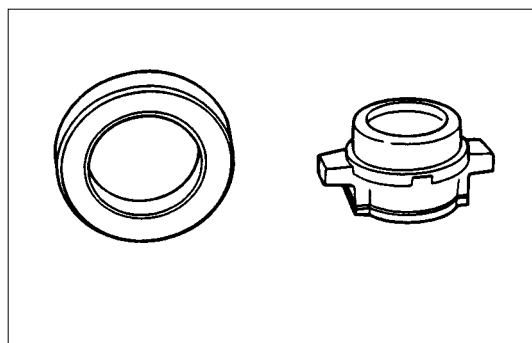


Release Bearing Replacement Removal (Except 6VD1)

Use the bearing puller and the adapter to remove the release bearing.

Bearing Puller : 5-8840-0013-0 (J-22888)

Adapter : 5-8840-0124-0 (J-2241-11)



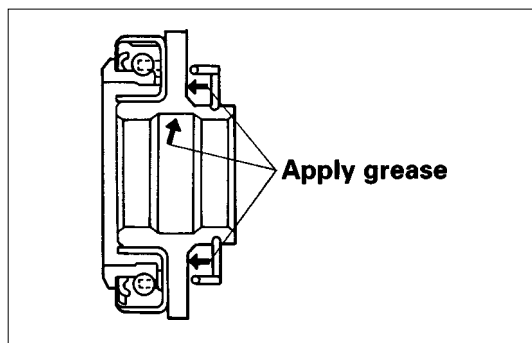
Release Bearing Installation (Except 6VD1)



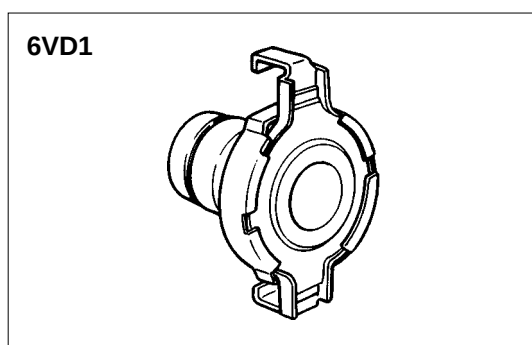
1. Set the release bearing to the shift block bearing fitting surfaces.

The release bearing must be perfectly horizontal.

2. Use a bench press to fit the release bearing to the shift block.



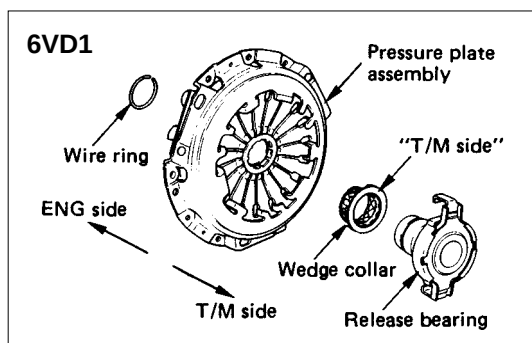
Install the parts as illustrated after applying wheel bearing grease or multi-purpose type grease (NLGI No.2 or No.3).



Release Bearing (6VD1)

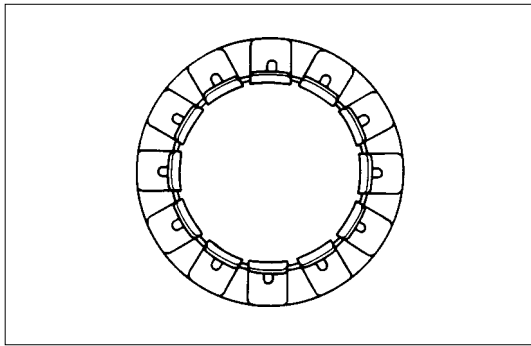
1. Visually check the release bearing for excessive play, noise and breakage.

If any of these conditions are discovered, the release bearing must be replaced.



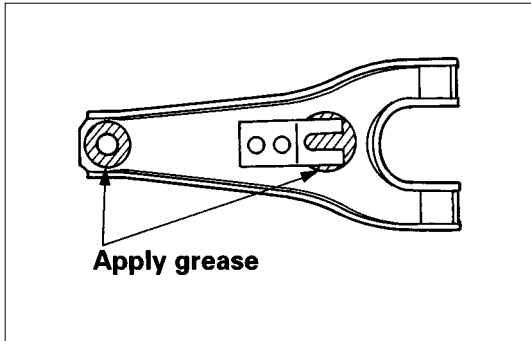
NOTE:

When replacing the release bearing, replace both the wedge collar and wire ring at the same time.



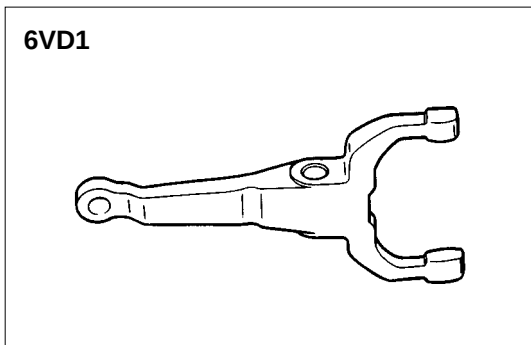
Wedge Collar (6VD1)

1. Visually check the surfaces of the wedge collar making contact with the release bearing for excessive wear and damage.
2. Replace any exhibiting excessive wear damage.



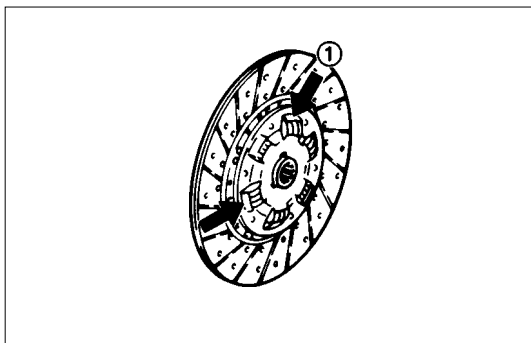
Shift Fork (Except 6VD1)

1. Visually inspect the surfaces of the shift fork making contact with the shift block for excessive wear and damage.
2. Remove any minor stepping or abrasion from the shift block with an oil stone.
Replace any exhibiting excessive wear or damage.
3. Apply multi-purpose type grease (NLGI No.2 or No.3) to  area.



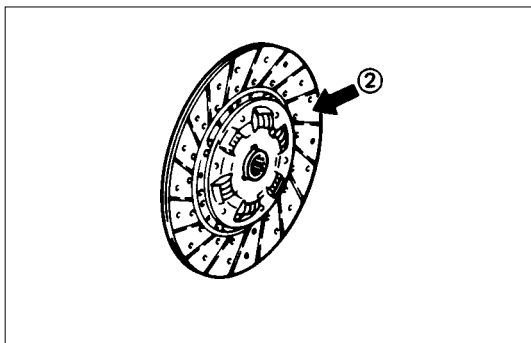
Shift Fork (6VD1)

1. Visually check the surfaces of the shift fork making contact with the release bearing for excessive wear and damage.
2. Remove any minor stepping or abrasion from shift fork with an oil stone.
Replace any exhibiting excessive wear or damage.



DRIVEN PLATE ASSEMBLY

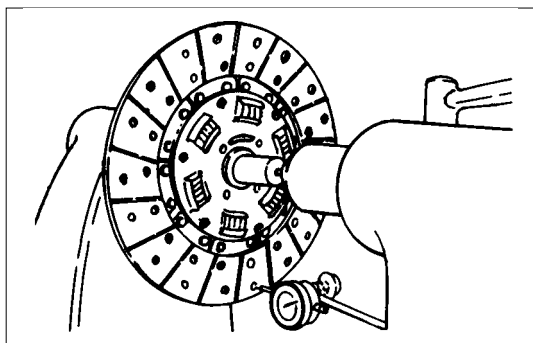
1. Visually inspect the torsion spring ① for looseness, breakage, and weakening.
If any of these conditions are discovered, the driven plate assembly must be replaced.



2. Visually inspect the facing surfaces ② for cracking and excessive scorching.
Visually inspect the facing surfaces for the presence of oil or grease.
If any of these conditions are discovered, the facing must be cleaned or replaced.

3. Check that the driven plate moves smoothly on the transmission top gear shaft spline.

Minor ridges on the top gear shaft spline may be removed with an oil stone.



Driven Plate Warpage

1. Insert the clutch pilot aligner into the driven plate splined hub.

The clutch pilot aligner must be held perfectly horizontal.

Clutch Pilot Aligner : 5-8840-2634-0 (HEC Engine Series)

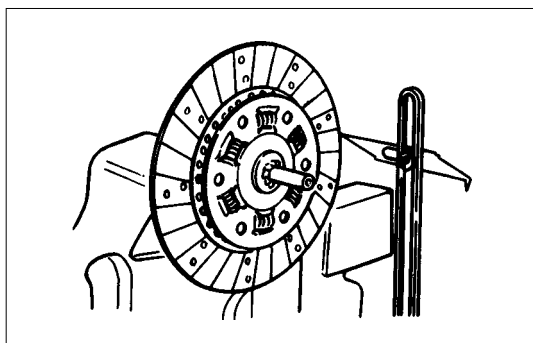
5-8525-3001-0 (J-24547) (Except HEC Engine Series)

2. Set a dial indicator to the driven plate outside circumference.
3. Slowly turn the driven plate.

Read the dial indicator as you turn the driven plate.

If the measured value exceeds the specified limit, the driven plate assembly and/or the facing must be replaced.

Driven Plate Warpage		mm(in)
Standard	Limit	
0.7 (0.028)	1.0 (0.039)	



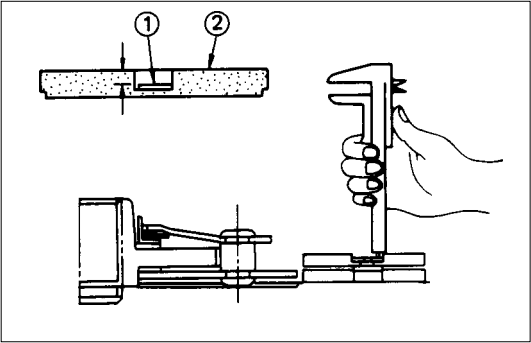
Driven Plate Splined Hub Spline Wear

1. Clean the driven plate splined hub.
2. Install the driven plate to the transmission top gear shaft spline.
3. Set a surface gauge to the driven plate outside circumference.
4. Slowly turn the driven plate counterclockwise.

Measure the spline rotation play as you turn the driven plate.

If the measured value exceeds the specified limit, the driven plate assembly must be replaced.

Driven Plate Splined Hub Spline Wear		mm(in)
Standard	Limit	
0.5 (0.020)	1.0 (0.039)	



Rivet Head Depression

Use a depth gauge or a straight edge with steel rule to measure the rivet head depression ① from the facing surface ②.

Be sure to measure the rivet head depression on both sides of the driven plate.

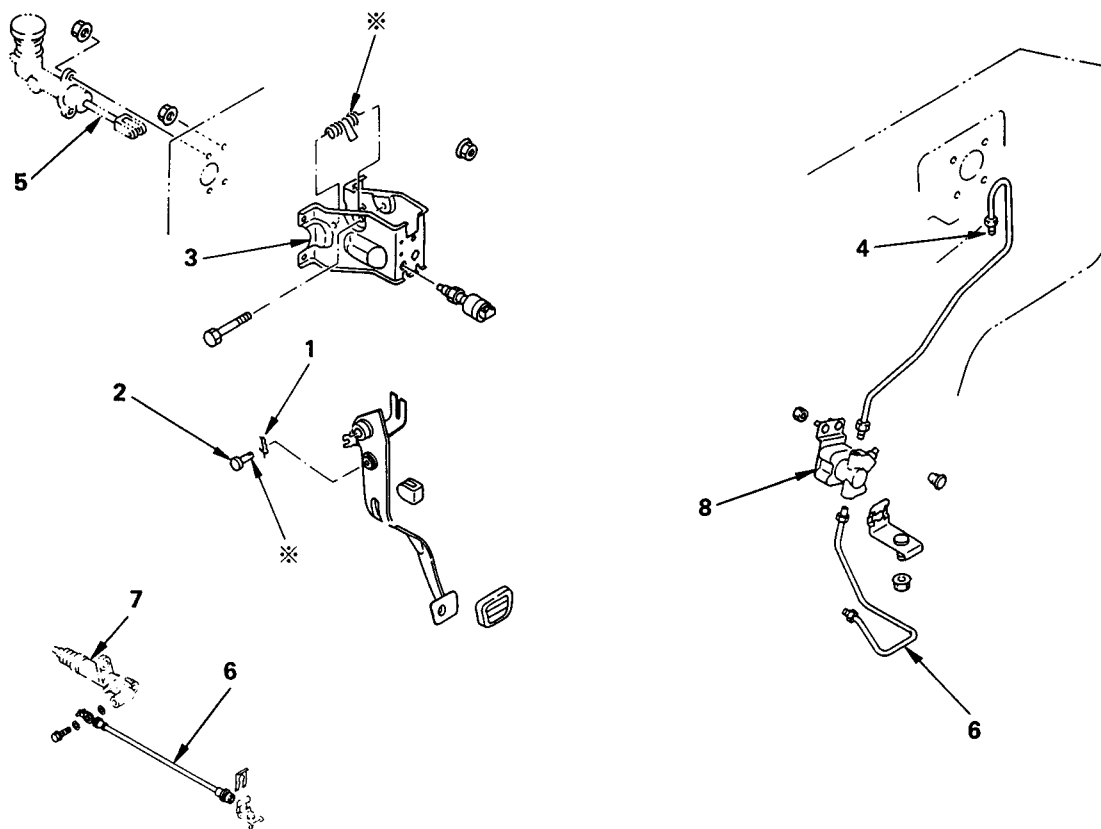
If the measured value is less than the specified limit, the facing must be replaced.

Rivet Head Depression			mm(in)
	Standard		Limit
	Fly wheel side	P/Plate side	
HEC	1.65~2.25 (0.065-0.089)		0.2 (0.008)
4JA1	1.35~1.95 (0.053-0.077)	1.65~2.25 (0.065-0.089)	
4JB1T, 4JG2T	1.3~1.9 (0.051-0.075)		
6VD1	1.6 (0.063)		

CLUTCH CONTROL

↔ ↔ REMOVAL AND INSTALLATION

Except 6VD1 Engine



* Apply grease
(BESCO chassis grease)

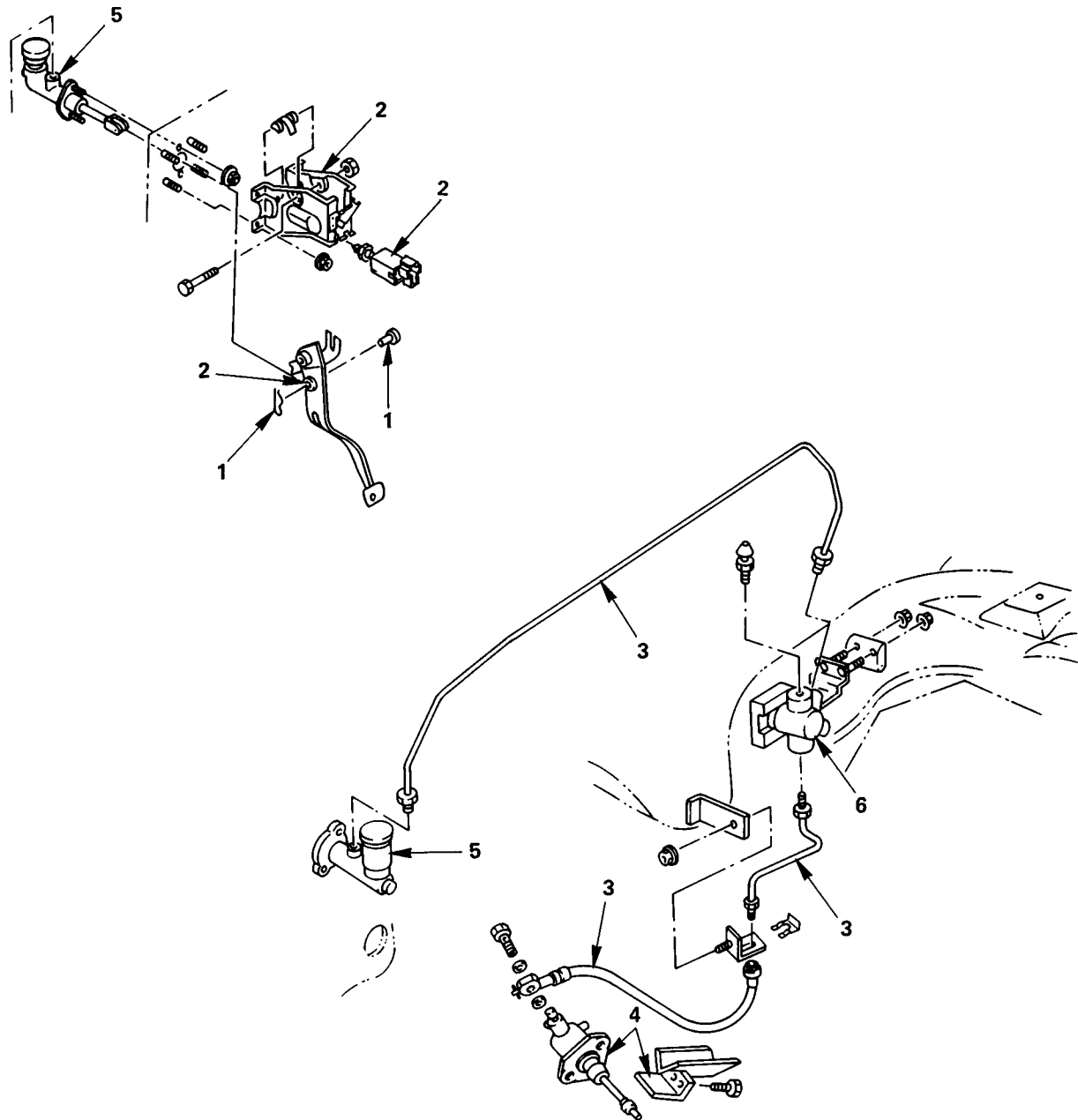
Removal Steps

1. Pin
2. Jaw joint pin
3. Pedal assembly
4. Oil line
5. Master cylinder assembly
6. Oil line
7. Slave cylinder assembly
8. Damper cylinder assembly

Installation Steps

To install, follow the removal steps in the reverse order.

6VD1 RHD Model

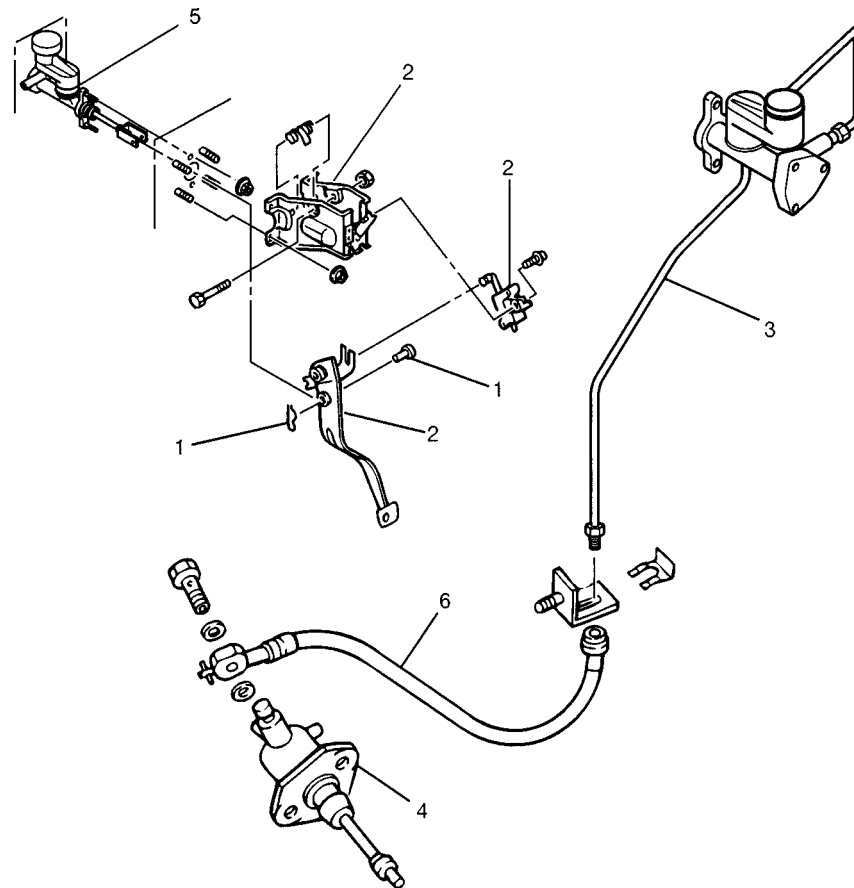


Removal Steps

1. Pin and jaw joint pin
2. Pedal assembly and switch
3. Oil line pipe
4. Slave cylinder assembly and heat protector
5. Master cylinder assembly
6. Damper cylinder assembly

Installation Steps

To install, follow the removal steps in the reverse order.

6VD1 LHD Model**Removal Steps**

- | | |
|------------------------------|-----------------------------|
| 1. Pin and jaw joint pin | 4. Slave cylinder assembly |
| 2. Pedal assembly and switch | 5. Master cylinder assembly |
| 3. Oil line pipe | 6. Oil line hose |

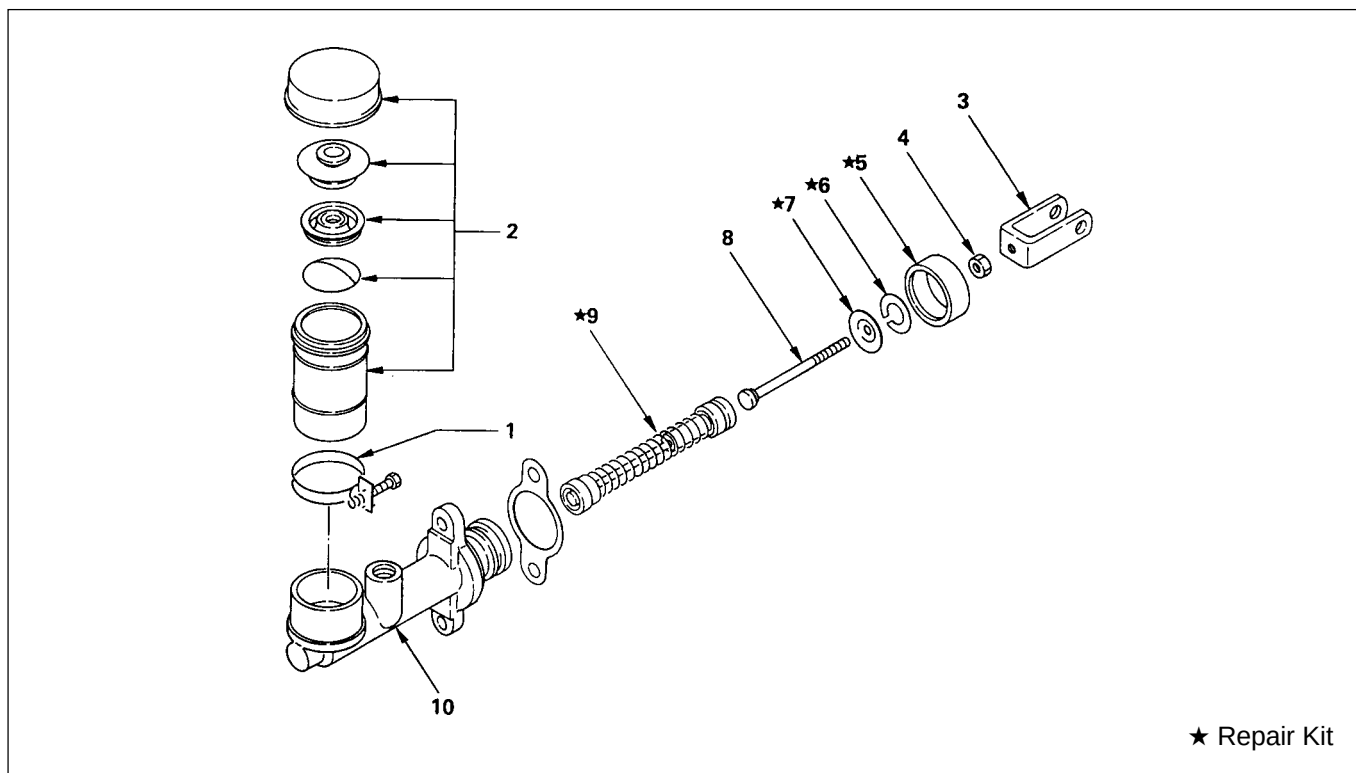
Installation Steps

To install, follow the removal steps in the reverse order.

MASTER CYLINDER (Except 6VD1 Engine)



DISASSEMBLY



★ Repair Kit

Disassembly Steps

- | | |
|----------------------|--------------------|
| 1. Oil tank band | 6. Stopper ring |
| 2. Oil tank assembly | 7. Stopper |
| 3. Joint | 8. Push rod |
| 4. Lock nut | 9. Piston assembly |
| 5. Dust cover | 10. Cylinder body |

Important : Take care not to disassemble the push rod stopper for master cylinder which calk to the master cylinder body due to the component parts do not disassemble.



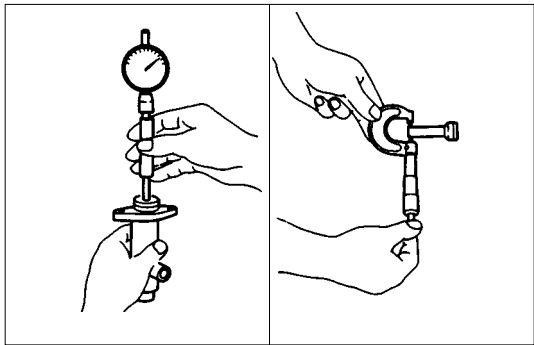
INSPECTION AND REPAIR

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.



Cylinder Body

1. Clean the cylinder body.
2. Check the fluid return port for restrictions and clean it if necessary.



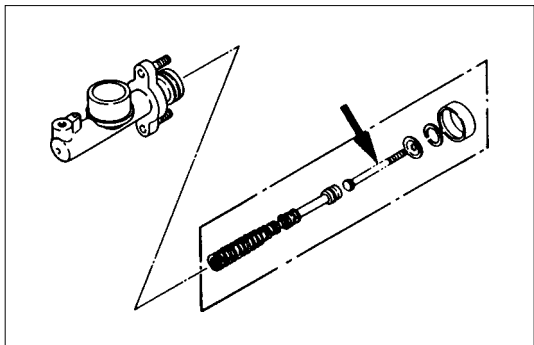
Cylinder Bore and piston Clearance

1. Clean the cylinder body and the piston.
2. Use an inside dial indicator to measure the cylinder bore.
3. Use a micrometer to measure the piston diameter.
4. Calculate the clearance between the cylinder bore and the piston diameter.

If the clearance exceeds the limit, the entire slave cylinder assembly must be replaced.

Cylinder Bore and Piston Clearance mm(in)

Standard	Limit
0.07 (0.0028)	0.15 (0.006)

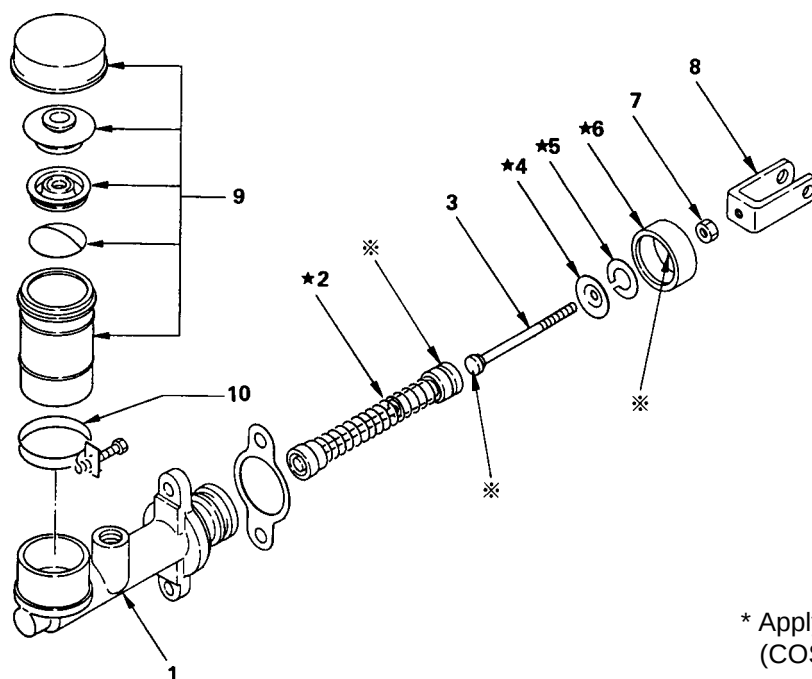


Inner Parts

Replace the inner parts with new parts shown in the illustration.



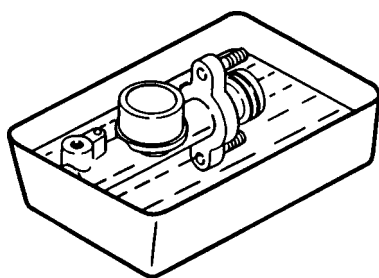
REASSEMBLY



* Apply grease
(COSMO rubber grease)
★ Repair Kit

Reassembly Steps

- ▲ 1. Cylinder body
- 2. Piston and assembly
- 3. Push rod
- 4. Stopper
- 5. Stopper ring
- 6. Dust cover
- 7. Lock nut
- 8. Joint
- 9. Oil tank assembly
- 10. Oil tank band



Important Operations

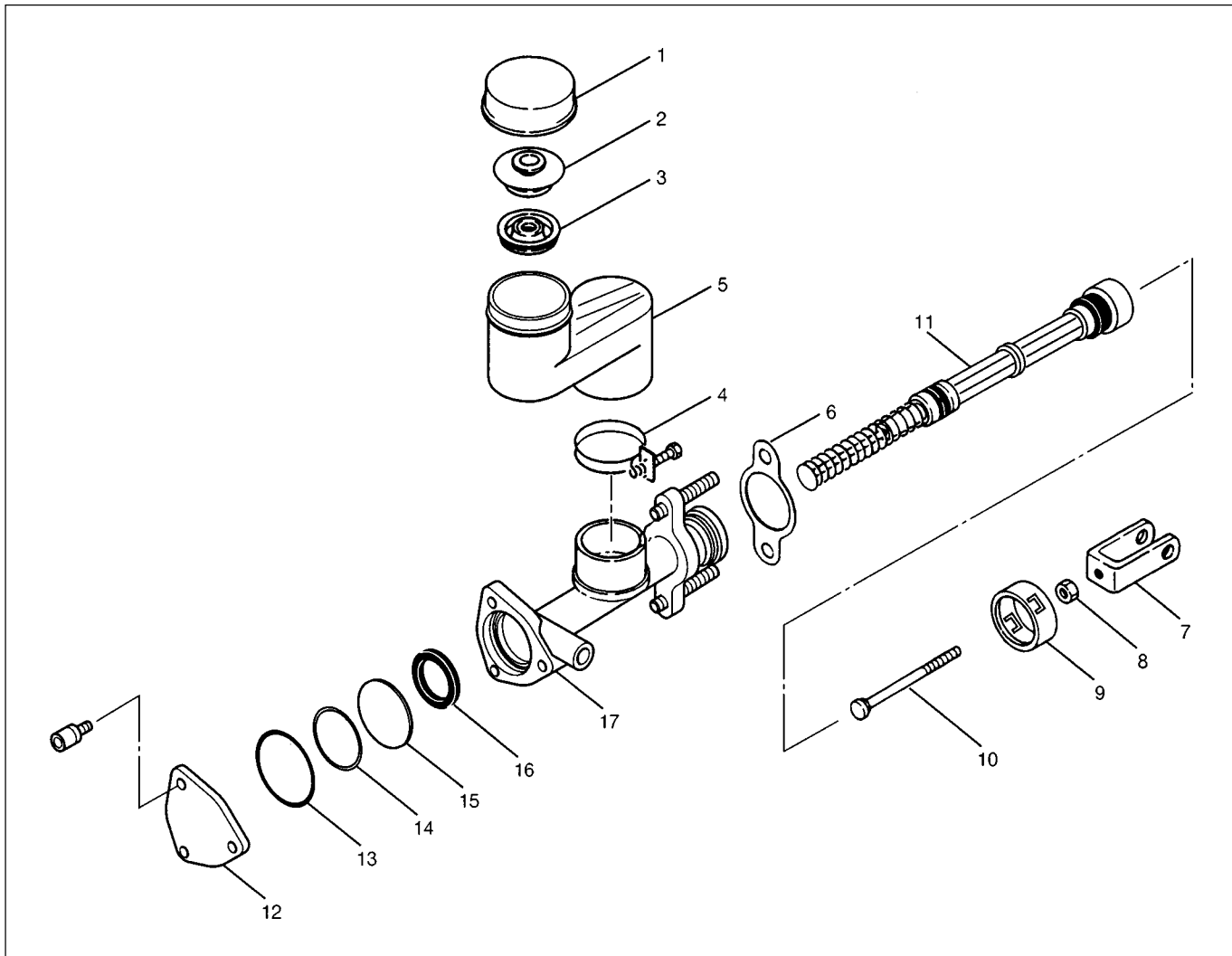


1. Cylinder Body

Immerse the cylinder body in clean brake fluid.

Master Cylinder (6VD1 LHD Model)

DISASSEMBLY AND REASSEMBLY



Disassembly Steps

- | | |
|------------------|---------------------|
| 1. Reservoir cap | 10. Push rod |
| 2. Base cap | 11. Piston assembly |
| 3. Seal | 12. Plate |
| 4. Clip | 13. O-ring |
| 5. Reservoir | 14. Damper ring |
| 6. Gasket | 15. Diaphragm |
| 7. Yoke | 16. Seal ring |
| 8. Nut | 17. Cylinder body |
| 9. Rod stopper | |

Reassembly Steps

To reassemble, follow disassembly steps in the reverse order.

Disassembly

- | | |
|---|---|
| 1. Disassemble reservoir cap 1., base cap 2., seal 3., clip 4., and reservoir 5.. | 4. Disassemble plate 12., o-ring 13., damper ring 14., diaphragm 15., and seal ring 16. from cylinder body 17.. |
| 2. Disassembly gasket 6., yoke 7., and nut 8.. | |
| 3. Disassemble rod stopper 9., push rod 10., and piston assembly 11.. | |

Inspection and Repair

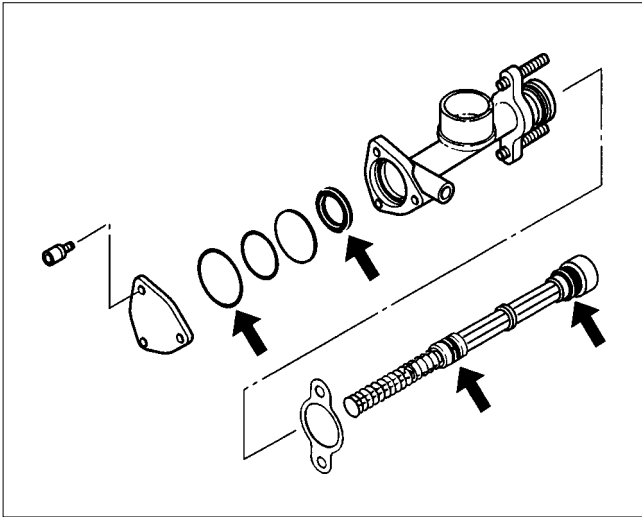
Make the necessary adjustments, repair, and part replacements if excessive wear or damage is discovered during inspection.

Cylinder Body

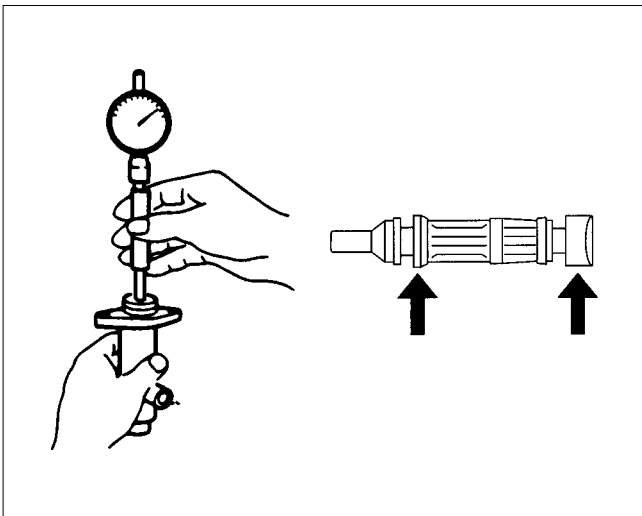
1. Clean the cylinder body.
2. Check the fluid return port for restrictions and clean it if necessary.

Inner Parts

1. Visually inspect the disassembled parts for excessive wear and damage.
Replace the inner parts with new parts shown in the illustration.



2. Measure the clearance between master cylinder wall and piston.



If the measured value exceeds the specified limit, the master cylinder assembly must be replaced.

Standard: 0.07 mm (0.0028 in)

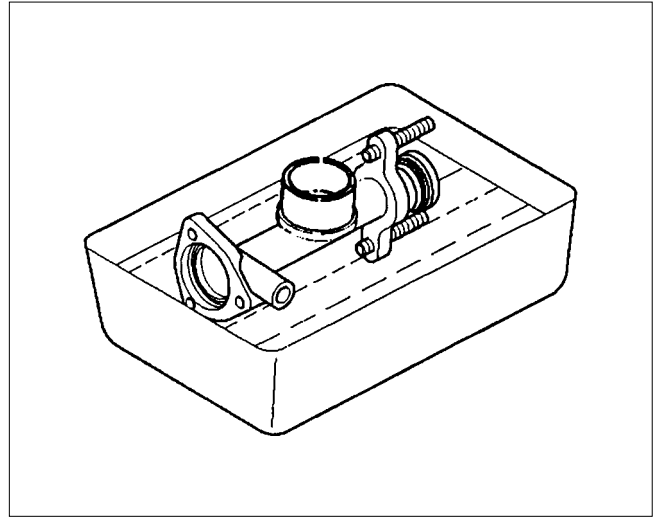
Limit: 0.15 mm (0.0059 in)

Reassembly

To reassemble, follow the disassembly steps in the reverse order, noting the following points:

Cylinder Body

Immerse the cylinder body in clean brake fluid.



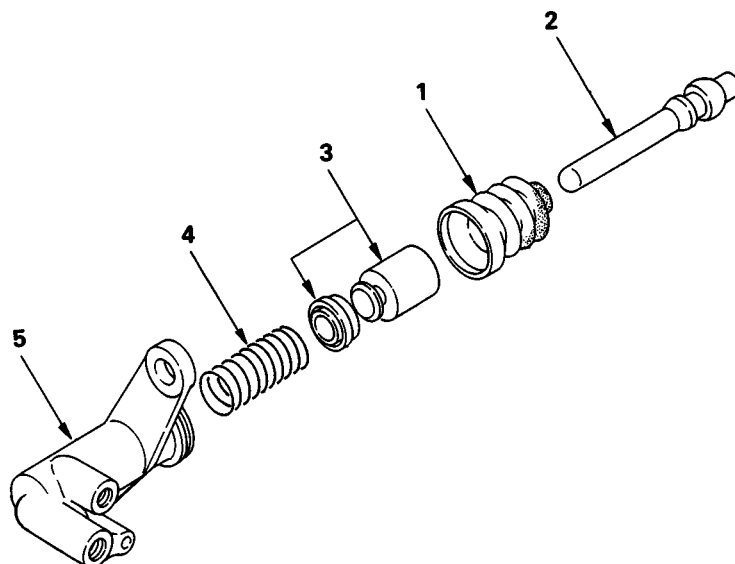
Piston Assembly

Before installing, apply a thin coat of rubber grease to the piston. Install cup in groove in piston with lip turned to front of cylinder. Use care to prevent damaging the lip of the piston seat.

SLAVE CYLINDER (Except 6VD1 Engine)

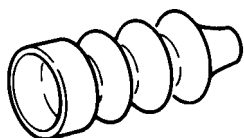


DISASSEMBLY



Disassembly Steps

- ▲ 1. Boot
- 2. Push rod
- 3. Piston and piston cup
- 4. Spring
- 5. Cylinder body
- 6. Solenoid switch



Important Operations

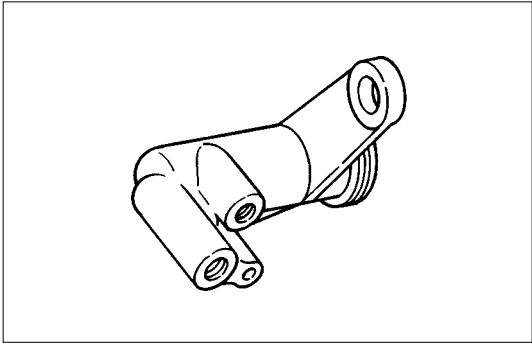
1. Boot

Brake fluid spilled on painted or plastic surfaces will cause serious damage.

Take care not to spill brake fluid.

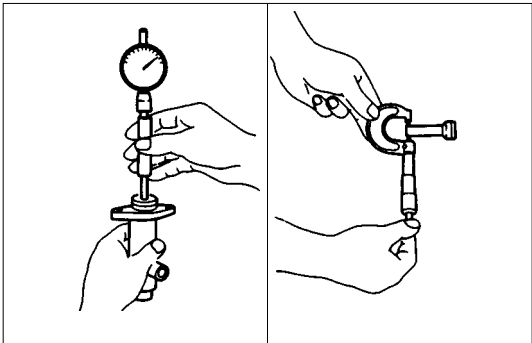
INSPECTION AND REPAIR

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.



Cylinder Body

1. Clean the cylinder body.
2. Check the fluid return port for restrictions and clean it if necessary.

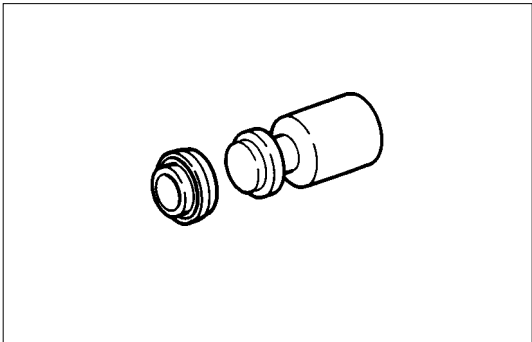


Cylinder Bore and piston Clearance

1. Clean the cylinder body and the piston.
2. Use an inside dial indicator to measure the cylinder bore.
3. Use a micrometer to measure the piston diameter.
4. Calculate the clearance between the cylinder bore and the piston diameter.

If the clearance exceeds the limit, the entire slave cylinder assembly must be replaced.

Cylinder Bore and Piston Clearance		mm(in)
Standard	Limit	
0.07 (0.0028)	0.15 (0.006)	

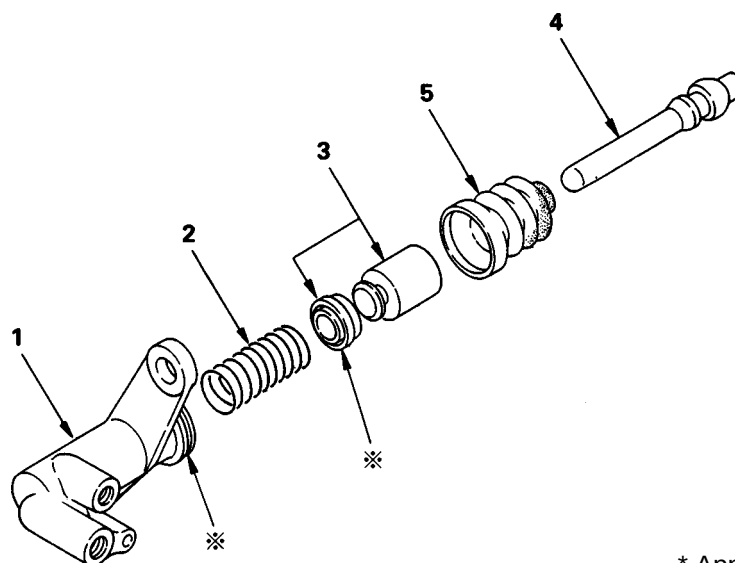


Piston and Piston Cup

Visually inspect the disassembled piston and piston cup for excessive wear and damage.
Replace the inner parts with new parts (Repair kit A) shown in the illustration.



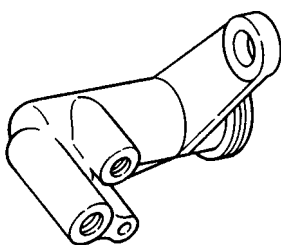
REASSEMBLY



* Apply grease
(COSMO rubber grease)

Reassembly Steps

- ▲ 1. Cylinder body
- ▲ 2. Spring
- ▲ 3. Piston and piston cup
- 4. Push rod
- 5. Boot
- 6. Solenoid switch



Important Operations



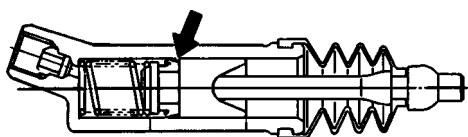
1. Cylinder Body

- 1) Clean the cylinder body.
- 2) Apply brake fluid to the cylinder bore.



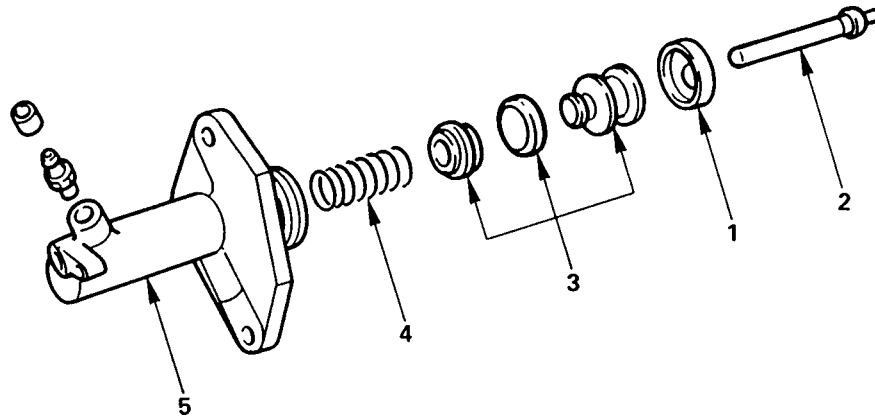
3. Piston and piston Cup

- 1) Apply brake fluid to the piston and piston cup.
- 2) Install the cups to the piston.
Note the installation direction of the piston cups in the illustration.
- 3) Install the piston and piston cup to the cylinder body.



SLAVE CYLINDER (6VD1 Engine)

6VD1

**Disassembly Steps**

1. Boot
2. Push rod
3. Piston and piston cup
4. Spring
5. Cylinder body

Reassembly Steps

To reassemble, follow disassembly steps in the reverse order.

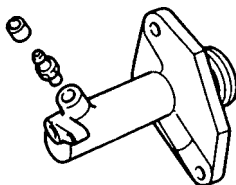
**DISASSEMBLY**

1. Boot
2. Push Rod
3. Piston and Piston Cup
4. Spring
5. Cylinder Body

**INSPECTION AND REPAIR**

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.

6VD1

**Cylinder body**

- 1) Clean the cylinder body.
- 2) Check the fluid return port for restrictions and clean it if necessary.

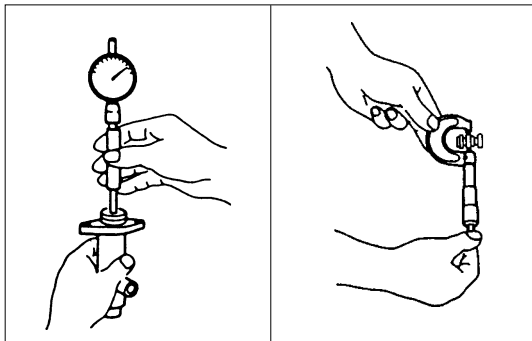
6VD1



Piston and piston cup

Visually inspect the disassembled piston and piston cup for excessive wear and damage.

Replace the inner parts with new parts shown in the illustration.



Measure the clearance between slave cylinder wall and piston. If the measured value exceeds the specified limit, the slave cylinder assembly must be replaced.

Slave Cylinder Wall and Piston Clearance		mm(in)
Standard	Limit	
0.07 (0.0028)	0.15 (0.0059)	



REASSEMBLY

To reassemble, follow the disassembly steps in the reverse order, noting the following points:

1. Piston Assembly

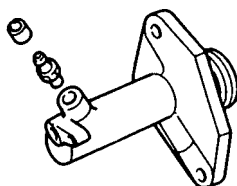


1) Before installing the parts, apply a thin coat of rubber grease.



2) Install cup in groove in piston with the lip turned to the front of cylinder. Use care so as not to scratch the cylinder.

6VD1

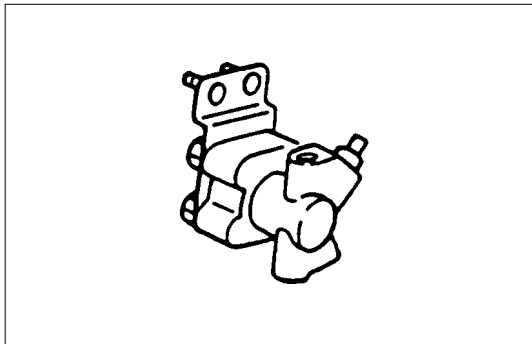


HYDRAULEC DAMPER CYLINDER (Except 6VD1 Engine)



INSPECTION AND REPAIR

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.



Visually check for oil leakage and other damage. If oil leakage or other damage is discovered during the inspection; the damper cylinder assembly must be replaced as a unit.

TROUBLESHOOTING

Refer to this Section to quickly diagnose and repair clutch problems.

Each troubleshooting chart has three headings arranged from left to right.

(1) checkpoint (2) Trouble Cause (3) Countermeasure

This Section is divided into five sub-sections:

1. Clutch Slippage
2. Clutch Does Not Release Properly
3. Clutch Shudder
4. Clutch Noise
 - 1) Clutch pedal Depressed (Clutch Disengaged)
 - 2) Clutch pedal Not Depressed (Clutch Engaged)
5. Oil Leakage

1. CLUTCH SLIPPAGE

Checkpoint		Trouble Cause	Countermeasure
Clutch pedal free play	NG	No push rod play in the master cylinder	Adjust the push rod play
	NG	No push rod play in the slave cylinder	Adjust the push rod play
OK			
Shift block	NG	Insufficient grease on the front cover contact surfaces	Clean and grease the shift block
	NG	Transmission front cover unevenly worn	Repair or replace the transmission front cover
OK			
Grease or oil adhering to the facing	NG	Too much grease	Clean the related parts and/or replace the facing
	NG	Defective transmission front cover oil seal	Clean the related parts and/or replace the facing Replace the transmission front cover oil seal
OK			

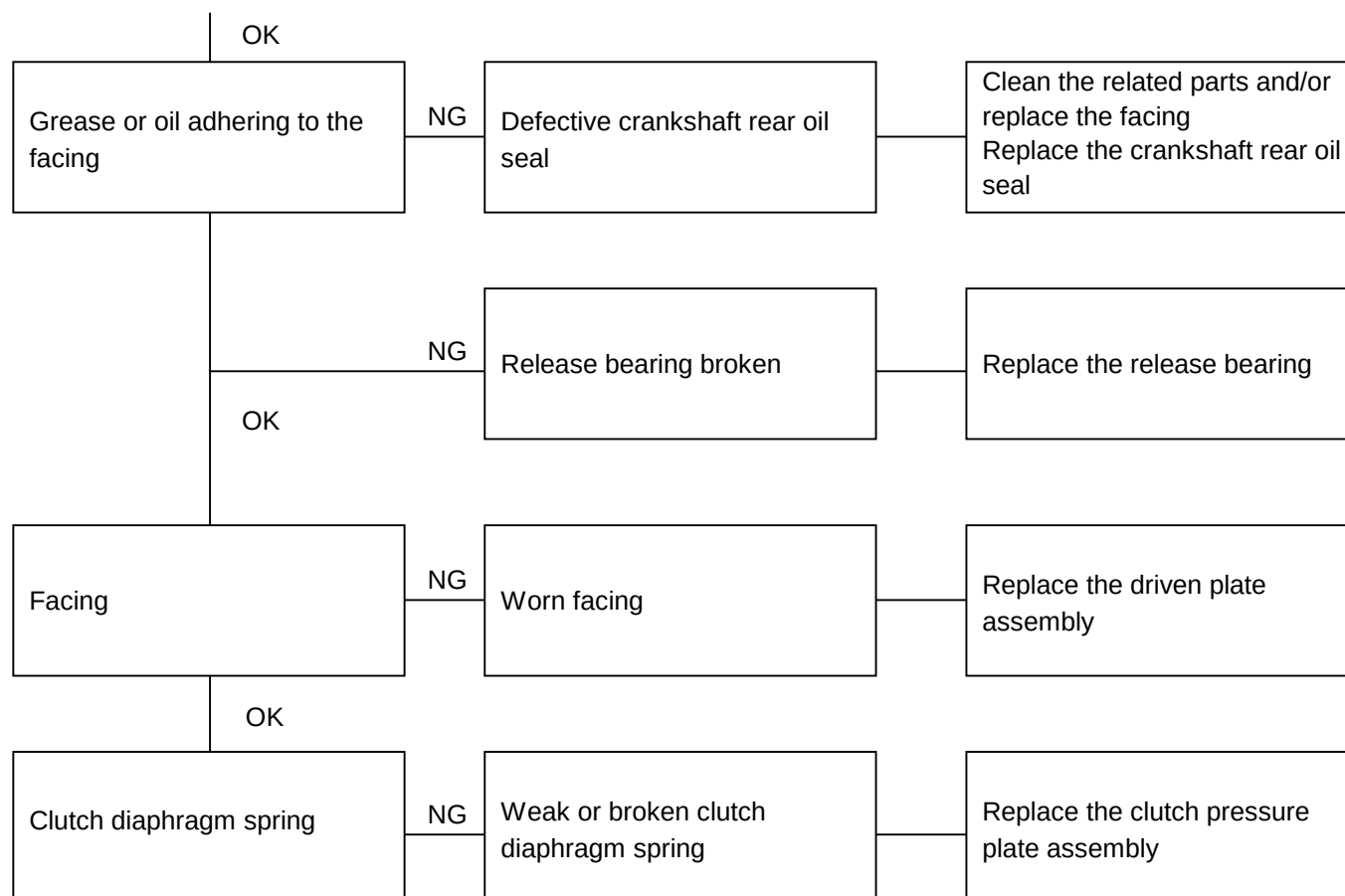
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Checkpoint

Trouble Cause

Countermeasure

Continued from the previous page



2. CLUTCH DOES NOT RELEASE PROPERLY

Checkpoint		Trouble Cause	Countermeasure
Clutch pedal free play	NG	Too much push rod play in the master cylinder	Adjust the push rod play
	NG	Too much push rod play in the slave cylinder	Adjust the push rod play
OK			
Hydraulic circuit	NG	Air in the hydraulic circuit	Bleed the hydraulic circuit
	OK		
Driven plate	NG	Driven plate warped or unevenly worn	Replace the driven plate
	NG	Insufficient grease on the spline contact surface of the splined hub	Clean and grease the splined contact surface
	NG	Corrosion or step wear on the top gear shaft spline	Clean or repair the top gear shaft spline Replace the top gear shaft
	OK		
Pressure plate	NG	Pressure plate unevenly worn	Replace the pressure plate assembly
	OK		

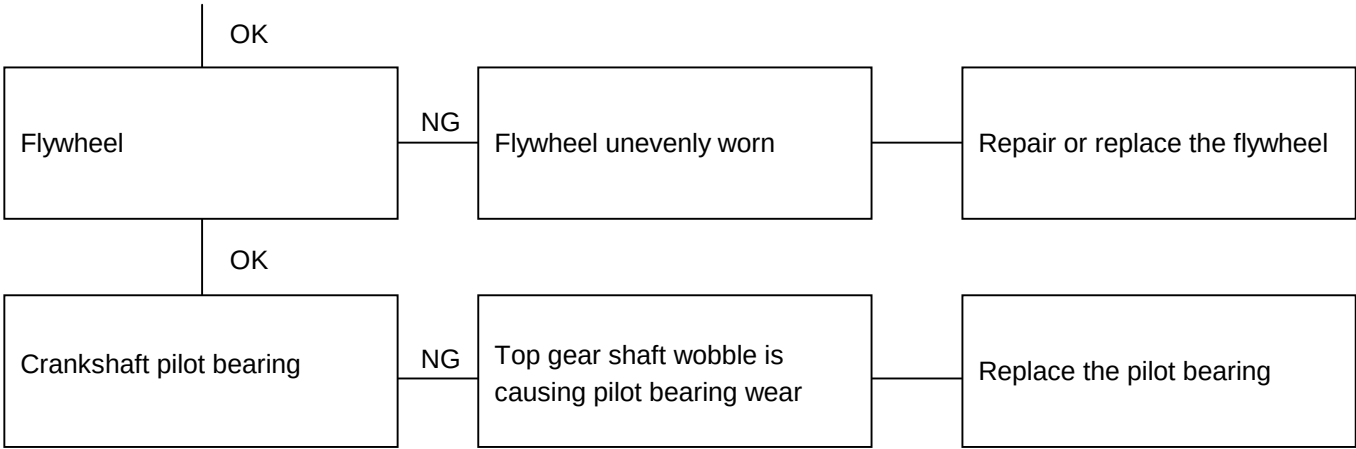
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Checkpoint

Trouble Cause

Countermeasure

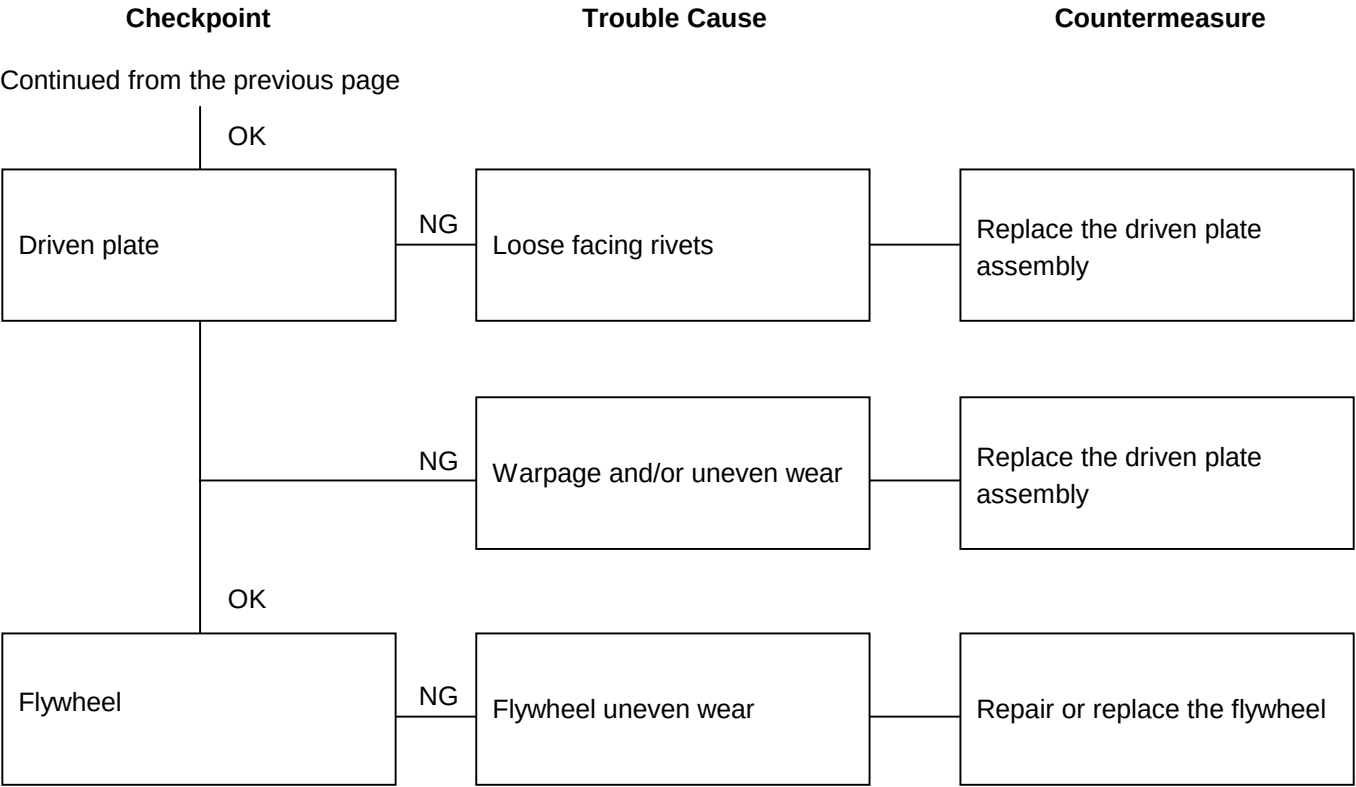
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3. CLUTCH SHUDDER

Checkpoint		Trouble Cause	Countermeasure
Power train	NG	Poorly connected components causing looseness and abrasion	Tighten the connections Repair or replace the applicable parts
	OK		
Pressure plate	NG	Pressure plate unevenly worn	Replace the pressure plate assembly
	OK		
Grease or oil adhering to the facing	NG	Too much grease	Clean the related parts and/or replace the facing
	NG	Defective transmission front cover oil seal	Clean the related parts and/or replace the facing Replace the transmission front cover oil seal
	NG	Defective crankshaft rear oil seal	Clean the related parts and/or replace the facing Replace the crankshaft rear oil seal
	OK		
Driven plate	NG	Insufficient grease on the spline contact surface of the splined hub	Clean and grease the spline contact surface
	NG	Corrosion or step wear on the top gear shaft spline	Clean or repair the top gear shaft spline Replace the top gear shaft
	OK		

Continued on the next page



4. CLUTCH NOISE

1) Clutch Pedal Depressed (Clutch Disengaged)

Checkpoint		Trouble Cause	Countermeasure
Pedal shaft and sleeve	NG	Insufficient grease at the pedal shaft and sleeve	Clean and grease the pedal shaft and sleeve
	NG	Worn pedal shaft and/or sleeve	Replace the pedal shaft with the sleeve
	OK		
Master cylinder piston and push rod contact faces	NG	Insufficient grease at the maser cylinder piston and push rod contact faces	Clean and grease the master cylinder piston and push rod contact faces
	OK		
Driven plate	NG	Loose or broken damper spring	Replace the driven plate assembly
	OK		
Crankshaft pilot bearing	NG	Insufficient grease at the crankshaft pilot bearing (pilot bearing worn)	Replace the crankshaft pilot bearing

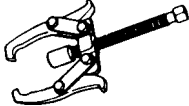
2) Clutch Pedal Not Depressed (Clutch Engaged)

Driven plate damper spring	NG	Weak or broken damper spring	Replace the driven plate
	OK		
Crankshaft pilot bearing	NG	Insufficient grease at the crankshaft pilot bearing (pilot bearing worn)	Replace the crankshaft pilot bearing

5. OIL LEAKAGE

Checkpoint		Trouble Cause	Countermeasure
Master cylinder	NG	Weak or damaged piston cap	Replace the piston cap
OK			
Master cylinder fluid pipe and hose	NG	Loosely connected fluid pipe and/or hose	Tighten the fluid pipe and/or hose connections
OK			
Slave cylinder	NG	Weak or damaged piston cup	Replace the piston cup
OK			
Slave cylinder oil pipe	NG	Loosely connected oil pipe	Tighten the oil pipe connection
OK			
Fluid reservoir	NG	Loosely connected oil pipe	Tighten the oil pipe

SPECIAL SERVICE TOOL

ITEM NO.	ILLUSTRATION	PART NO.	PART NAME
		5-8840-2634-0	Clutch pilot aligner (HEC Engine Series)
CLL-3		5-8840-0013-0 (J-22888)	Bearing puller (Except 6VD1 Engine)
CLL-4		5-8840-0124-0 (J-2241-11)	Bearing puller adapter (Except 6VD1 Engine)

TFCLU-WE-0005A AR

You are requested to order this manual using the manual number that is shown above.

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