

CLUTCH

3020-01/3020-04/3030-04/3030-01/3010-01/3010-01/
3020-01/3010-01/3020-01/3030-01/3020-04/

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CLUTCH**3020-01****GENERAL****1. CLUTCH SPECIFICATIONS**

Description			Specification
Operating type			Hydraulic
Clutch pedal	Type		Suspended
	Maximum pedal stroke		Diesel engine equipped vehicle: 140 mm
	Pedal free play		5 ~ 10 mm
Clutch disc	Type		Single dry diaphragm
	Dimension of facing		240 × 155 × 4.0 mm
	Facing size/quantity		263 cm ² / 2
	Thickness of disc		Free: 9.4 ~ 10 mm When loaded: 9.0 ± 0.3 mm
Clutch cover assembly setting force			Min. 720 kg
Clutch master cylinder	Stroke	5MT	30 mm
		6MT	27 mm
	Inner diameter		Φ 17.46 mm
Concentric slave cylinder	Stroke		7.0 mm
	Sectional area		706 mm ²
Clutch fluid			DOT3 or DOT4

2. TIGHTENING TORQUE

Description	Tightening Torque
Clutch housing bolt (8 locations)	49 ~ 59 Nm
Clutch cover (pressure plate) bolt	21 ~ 27 Nm
Concentric slave cylinder bolt (3 locations)	10 ~ 16 Nm
Concentric slave cylinder flare nut	20 ~ 25 Nm
Adapter flare nut	20 ~ 25 Nm
Clutch oil pipe flange nut	15 ~ 18 Nm
Master cylinder bolt	8 ~ 18 Nm
Fulcrum (clutch pedal bushing) bolt/nut	16 ~ 22 Nm
Clutch pedal bracket mounting bolt	8 ~ 18 Nm
Stopper bolt	16 ~ 22 Nm

Modification basis	
Application basis	
Allocated VIN	

CLUTCH

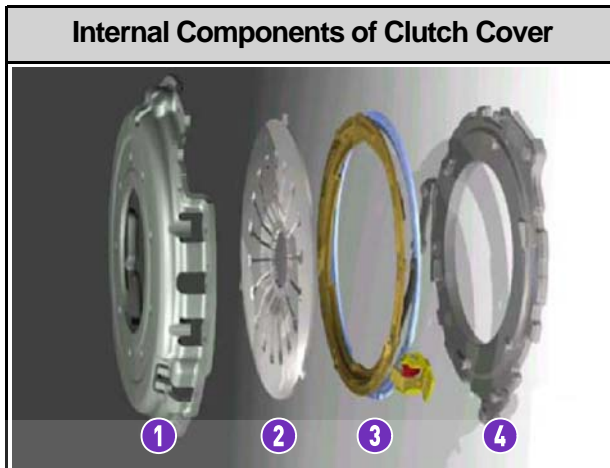
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OVERVIEW AND OPERATION PROCESS

1. FUNCTION AND OVERVIEW

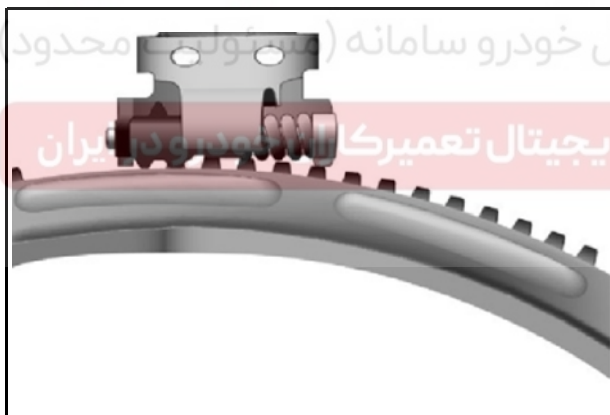
1) SAT (Self Adjusting Technology) Clutch System

(1) Function



SAT is new clutch system which adjusts the clutch freeplay according to the wear of clutch disc.

(2) Operation description



- Diaphragm spring rotates the adjusting equipment as clutch disc is wearing and so, pressure plate is pushed to clutch disc side at the amount of wear.
- Disc wear (Free play) → Diaphragm spring (1) → Adjusting equipment (2, 3) → Pressure plate (4)

2) Overview

► Driving Elements

The driving elements consist of two flat surfaces machined to a smooth finish.

One of these is the rear face of the engine flywheel and the other is the clutch pressure plate. The clutch pressure plate is fitted into a clutch steel cover, which is bolted to the flywheel.

► Driven Elements

The driven element is the clutch disc with a splined hub which is free to slide lengthwise along the splines of the input shaft.

The driving and driven elements are held in contact by spring pressure. This pressure is exerted by a diaphragm spring in the clutch cover pressure plate assembly.

► Operating Elements

The clutch "release" system consists of the clutch pedal and clutch release cylinder.

This system directly releases the clutch by using hydraulic pressure while the conventional clutch system releases the clutch by using release lever and release fork. This system provides higher efficiency than conventional clutch system, and its durability is superior.

- 1) Clutch master cylinder (mounted on clutch pedal)
- 2) Concentric slave cylinder pipe (mounted inside of transmission)

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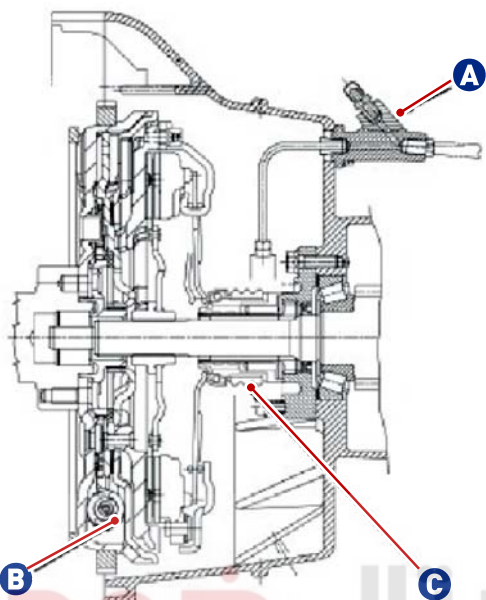
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3) Functions

Components of Clutch Assembly



A Adapter/Pipe Assembly



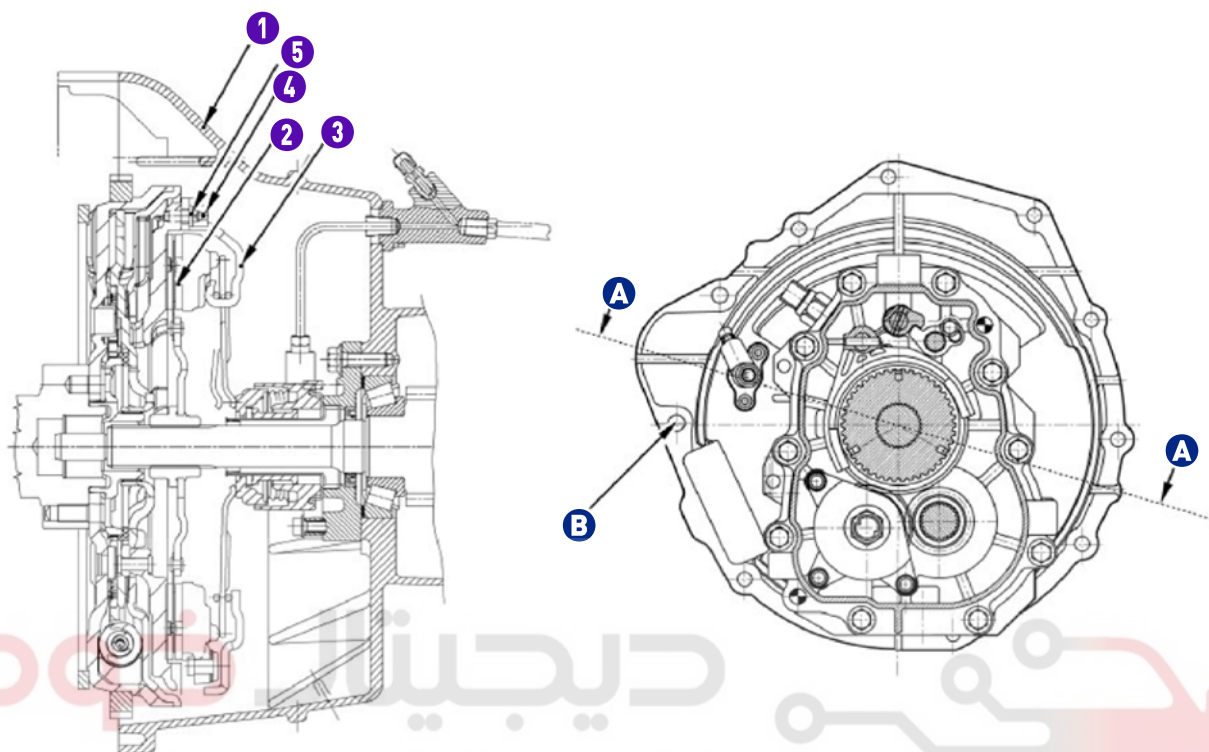
B Clutch Assembly



C Concentric Slave Cylinder



Cross Sectional View of Clutch Assembly



1.	Transmission housing	4.	Bolt
2.	Clutch disc assembly	5.	Washer
3.	Clutch disc cover assembly	6.	Bolt

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CONFIGURATION AND FUNCTION

3020-01 CLUTCH MASTER CYLINDER

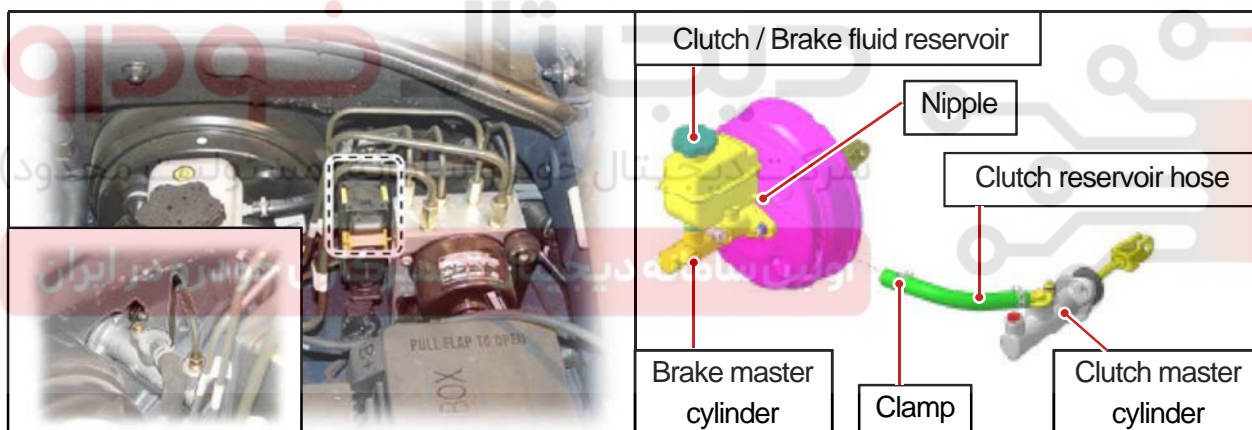
1) Overview

The clutch master cylinder generates the hydraulic pressure by moving the piston within the cylinder. It consists of oil tank, cylinder, piston, piston cup spring and push rod, and the clutch fluid is supplied from the brake fluid reservoir tank.

2) Operation

When depressing the clutch pedal, the push rod pushes the piston and the piston cup, which sends the oil in the oil reservoir tank to the concentric slave cylinder through the hose and pipe. During this operation, an oil pressure is produced within the master cylinder and transmitted as follows: concentric slave cylinder → clutch cover → clutch disc.

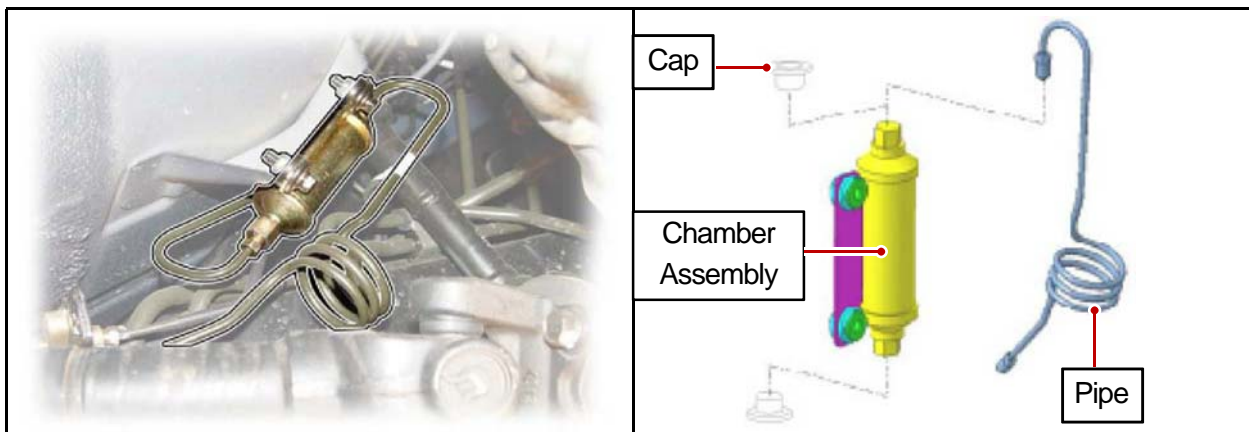
When releasing the clutch pedal, it returns to its original position through the motion of the clutch cover and the spring within the cylinder, and the clutch operation stops. The piston in cylinder returns to its original position.



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3020-04 CLUTCH RELEASE CHAMBER

The clutch release chamber keeps the oil pressure in the clutch hose and pipe stable and also helps the oil pressure to transfer quickly and generates the remaining pressure in the hose and pipe when the clutch is operated.



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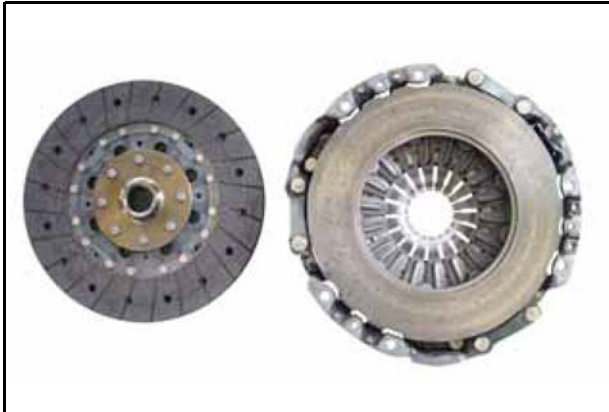
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3030-04 CLUTCH ASSEMBLY

Clutch assembly is composed of clutch cover (diaphragm spring, pressure plate) and clutch disc.

1) Clutch Disc

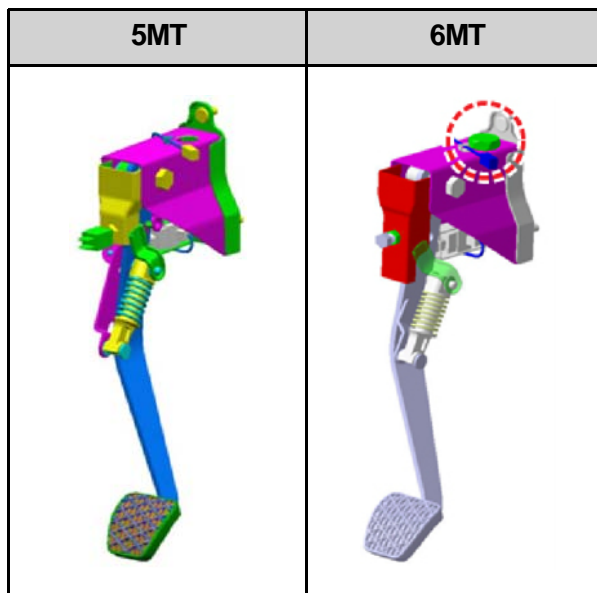
The clutch disc is installed between the engine flywheel and the pressure plate. The spline part is installed in the center of the disc and transmits the engine's electric power to the transmission. The transmission input shaft can be inserted into the spline part. The clutch disc has friction materials on its edges, where the engine power can be interrupted, and the cushion spring is installed to prevent friction materials (facing) from unevenly wearing out.

2) Clutch Cover

When depressing the clutch pedal, the concentric slave cylinder pushes the pressure plate diaphragm and separates the pressure plate. The advantages of using the diaphragm spring: the pressure varies only a little even when the clutch disc facing is considerably worn out, its structure is simple, and the pedal effort is small.

S.G.N.

3030-01 CLUTCH PEDAL



- Pendant type clutch pedal (leverage effect is applied to reduce the effort to the feet).

The clutch pedal has some free play that

- prohibits its operation prior to generating the resistance by depressing the pedal and touching the release bearing pressure plate.

This free play is to prevent the clutch disc from burning out that is resulted from the overheating caused by the clutch slipping while driving. If this free play is too wide, engine power disconnection is difficult and the gear damage with abnormal noise will occur.

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REMOVAL AND INSTALLATION

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3010-01 CLUTCH TROUBLE DIAGNOSIS

Check		Possible Cause	Action
Clutch slips		Excessive wear of facing	Replace
		Hard or oily facing	Adjust or replace
		Damaged diaphragm or flywheel	Replace
		Damaged or burnt diaphragm spring	Replace
		Insufficient clutch pedal free play	Adjust
		Faulty operation of clutch pedal	Repair or replace
		Worn or damaged clutch disc	Replace
Poor disengagement		Vibration or excessive run-out of disc	Replace
		Rust or wear of clutch disc spline	Repair or replace
		Oily facing	Adjust or replace
		Burnt diaphragm spring	Replace
		Excessive clutch pedal free play	Adjust
Hard to shift or will not shift		Excessive clutch pedal free play	Adjust pedal freeplay
		Faulty clutch release cylinder	Repair release cylinder
		Worn disc, excessive run-out, damaged lining	Repair or replace
		Dirty or burred splines on input shaft or clutch disc	Repair as necessary
		Damaged clutch pressure plate	Replace
Clutch chatters when starting		Oily facing	Repair or replace
		Hard or faulty facing	Replace
		Burnt cushion spring	Replace
		Faulty pressure plate	Replace
		Bent clutch diaphragm spring	Replace
		Hard or bent flywheel	Adjust or replace
		Engine mounts loose or burnt lever	Tighten or replace
Difficult pedal operation		Poor bleeding in hydraulic system	Bleed or replace
		Poor lubrication on pedal shaft	Lubricate or replace
		Poor lubrication on clutch pedal	Repair
Clutch noisy	Not using the clutch	Insufficient clutch pedal free play	Adjust
		Excessive wear of clutch disc facing	Replace
	After disengagement	Worn or damaged concentric slave cylinder	Replace
	When disengaging	Faulty installation of clutch assembly or bearing	Repair
	Clutch pedal is partially depressed and vehicle speed is reduced	Damaged pilot bushing	Replace

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3010-01

CLUTCH INSPECTION AND MAINTENANCE

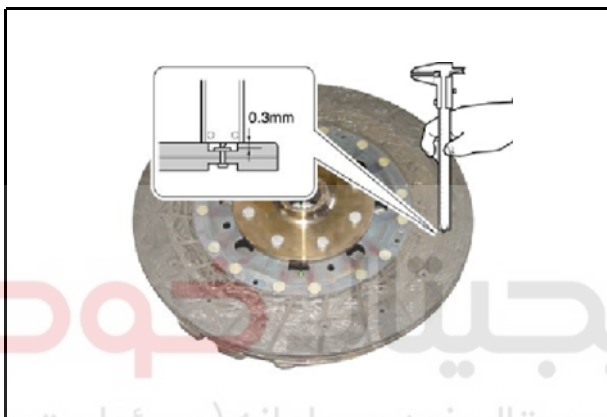


1. Clutch Cover Assembly

- 1) Check the diaphragm spring tip for wear and height unevenness.

Unevenness limit	0.8 mm
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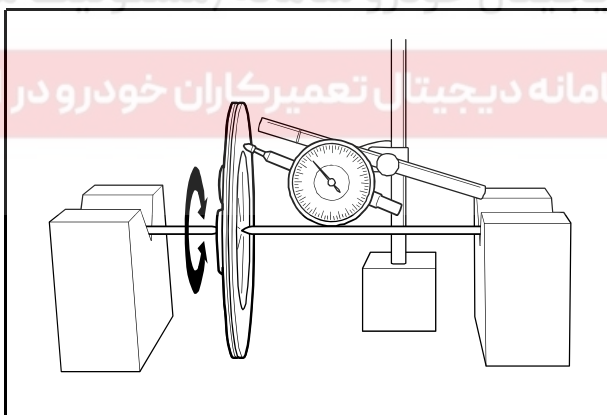
- 2) Check the pressure plate surface for wear, crack and discoloration.
- 3) Check the strap plate rivet for looseness and replace the clutch cover if necessary.



2. Clutch Disc

- 1) Check the facing for rivet looseness, sticks, oil and grease.
- 2) Measure the rivet head depth. If it is out of limit, replace the disc.

Wear limit	0.3 mm
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3. Clutch Disc Run-Out

- 1) Measure the clutch disc run-out and if it is out of limit, replace the disc.

Run-out limit	Within 0.7 mm
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4. Pressure Plate

- 1) Check the pressure spring for wear.

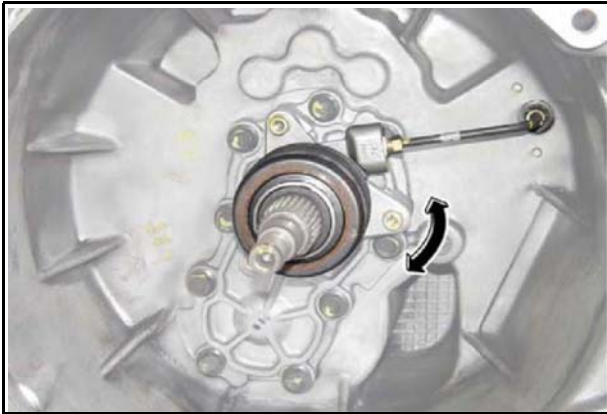
CAUTION

- The excessively worn components should be replaced.

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Affected VIN	

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5. Concentric Slave Cylinder

- 1) Check any heat damage, abnormal noise, poor rotation and wear of the concentric slave cylinder bearing.

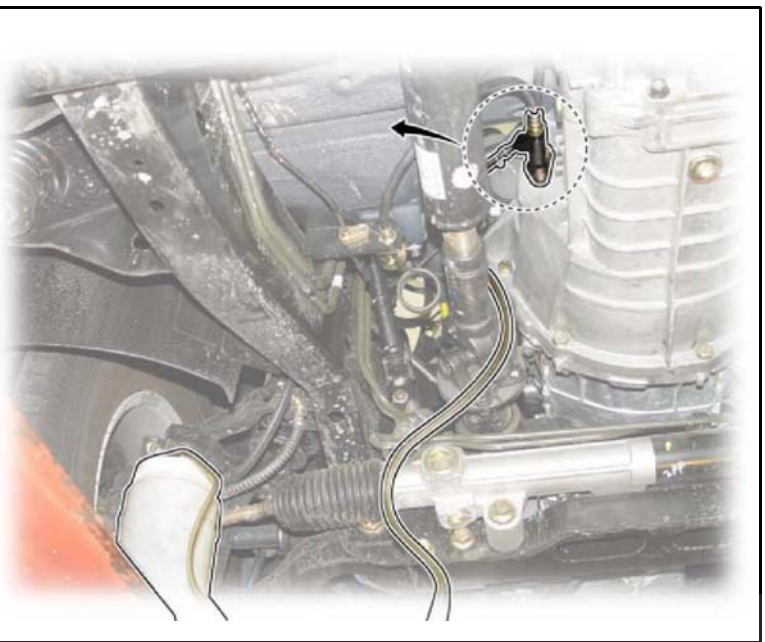
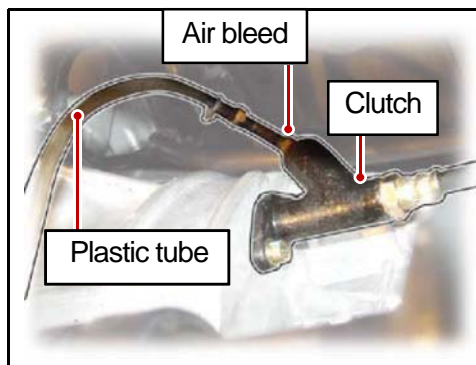
concentric slave cylinder assembly



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3020-01 CLUTCH AIR BLEEDING



1. Remove the air bleed bolt cap on the release cylinder.
Connect a plastic tube to the bolt.
2. Put the other side of the tube into a empty container.
3. Slowly pump the clutch pedal several times.
With clutch pedal fully depressed, undo the
4. air bleed bolt and bleed the air and fluid from the fluid line.
Repeat step 3 through 4 until no more air
5. bubbles are in the escaping fluid.

Clutch fluid

DOT 3.4D

CAUTION

- This work has to be done by two service persons.
- After bleeding, check the clutch system for operation and noise.
- Use only the Ssangyong genuine clutch fluid, and check the clutch fluid level in reservoir.

CAUTION

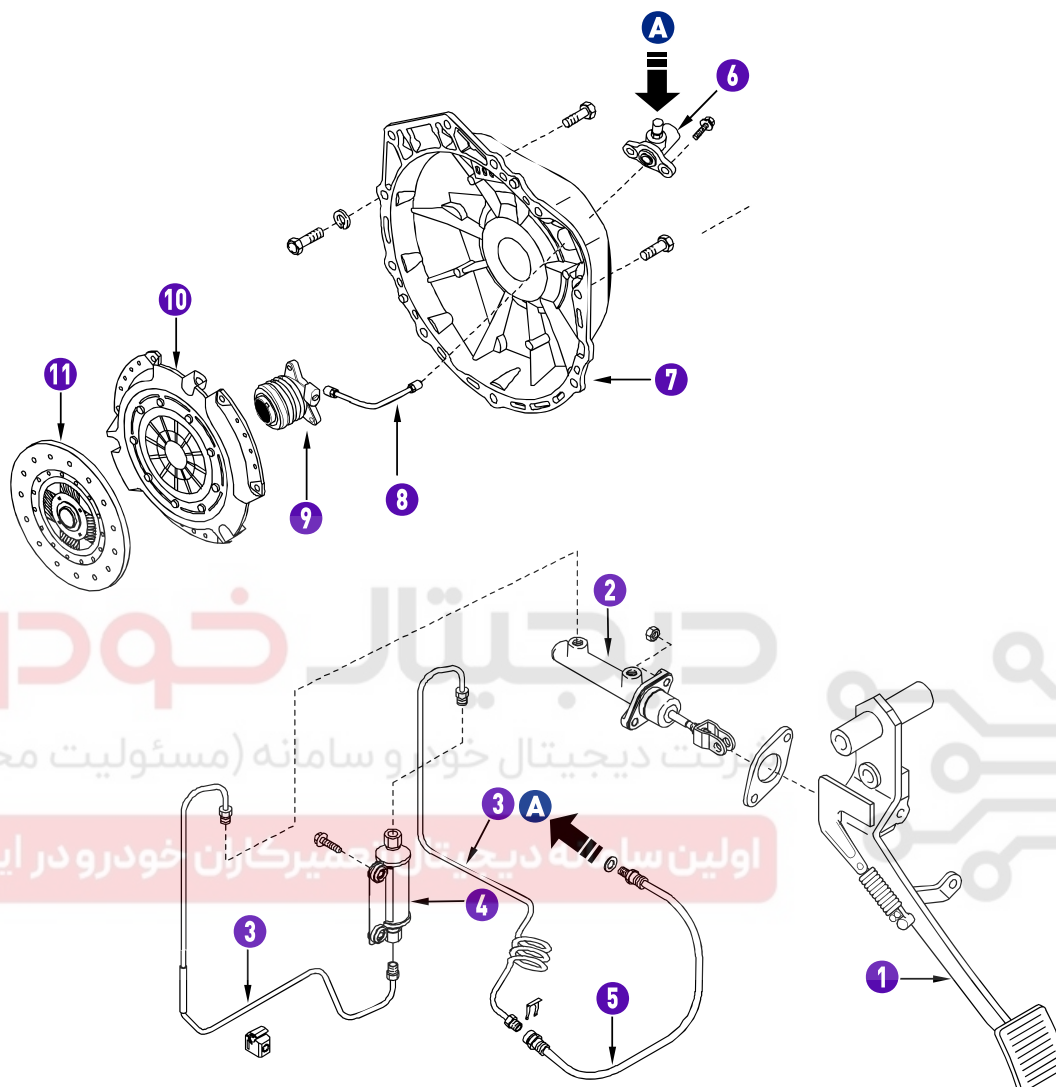
- Keep the fluid level over MAX in reservoir during bleeding operation.
- Do not let the fluid contact a painted surface.

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3010-01 CLUTCH ASSEMBLY**Components**

1.	Clutch pedal	7.	Clutch housing
2.	Clutch master cylinder	8.	Concentric slave pipe
3.	Clutch hydraulic pipe	9.	Concentric slave cylinder
4.	Clutch fluid chamber	10.	Clutch cover
5.	Clutch hydraulic hose	11.	Clutch disc
6.	Adapter		

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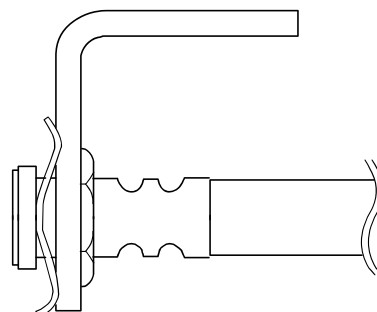
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Modification basis	
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Affected VIN	021 62 99 92 92

1. Disconnect the clutch fluid hose from the adapter.



Hose connection (clip mounted)



2. Remove the transmission assembly.



3. Insert the centering pin (special tool) into center spline.

Loosen the clutch cover bolts 1/2 turns in cross sequence until the spring tension is released.

CAUTION

- Do not remove the bolts at a time, or clutch cover may be damaged or deformed.

Tightening torque $24 \pm 3 \text{ Nm}$

Modification basis	
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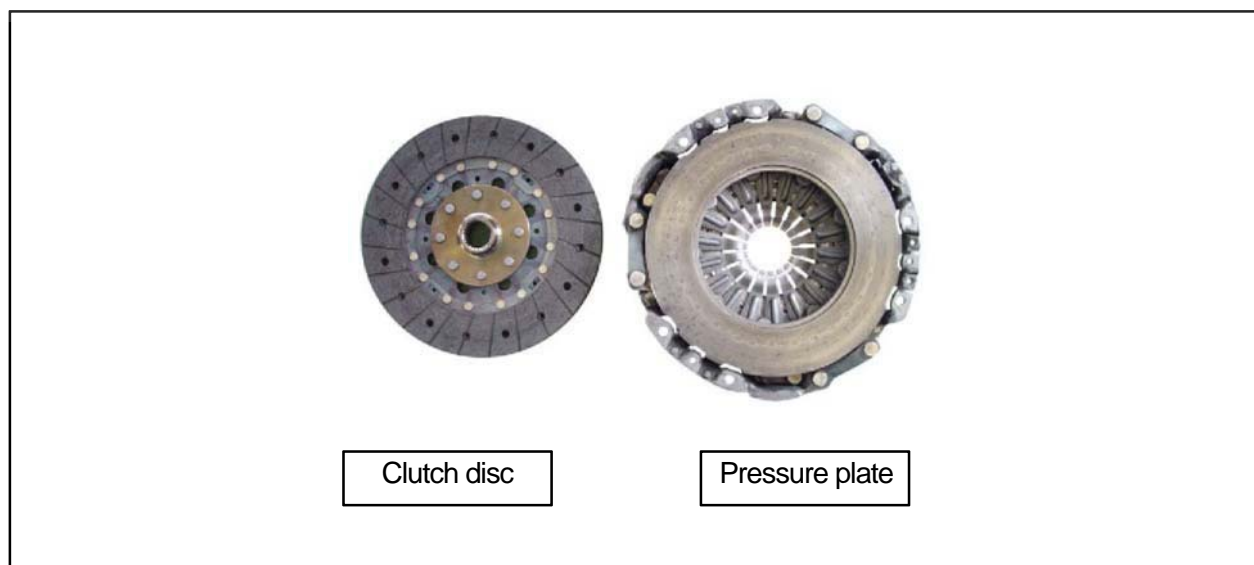
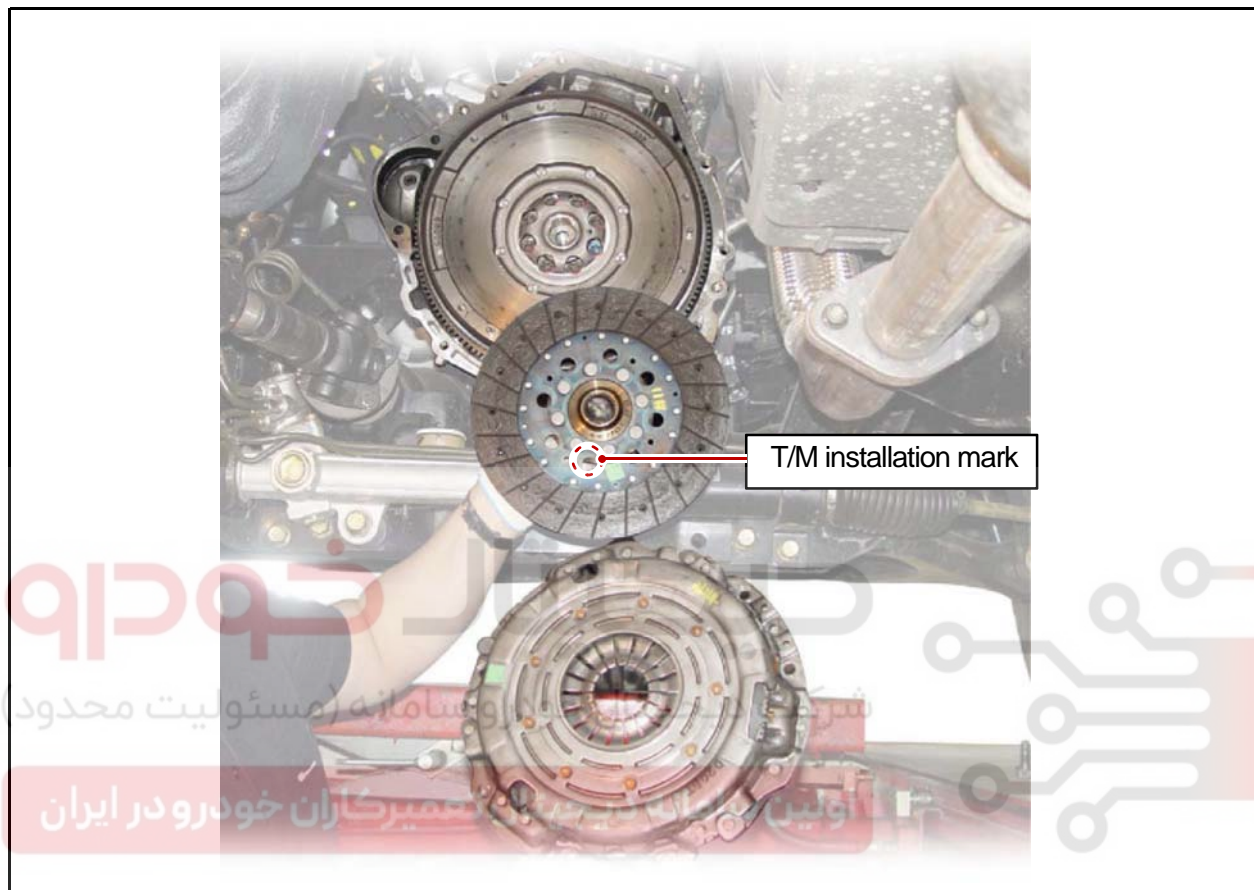
CLUTCH

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4. Unscrew the bolts and remove the clutch cover, pressure plate and clutch disc.

CAUTION

- Be careful not to drop the pressure plate and clutch disc.



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3010-01 CLUTCH REPLACEMENT**CAUTION**

- To prevent early wear and slip in clutch disc, always use the designated tools and special tools for maintenance.

Service Instruction

1. Replacement of clutch disc → Replace the clutch cover assembly together.
2. Reinstallation of clutch disc & cover → Apply the zig set (SST) on the clutch cover set.
(Example: engine removal and reinstallation, flywheel related job, checking the clutch assy)

CAUTION

- When reinstall the clutch assembly without the special zig, disc can be slipped and worn easily.

**How to Use Special Tool**

How to identify SAT clutch specification Identify the SAT clutch with compensation device (arrow) on clutch cover.

Installation of Special Zig

Remove the transmission and place the zig set (4 pieces) between the clutch cover and diaphragm spring around (refer to the picture).



* P/No: D9930 - 0010C

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3171-14 CONCENTRIC SLAVE CYLINDER

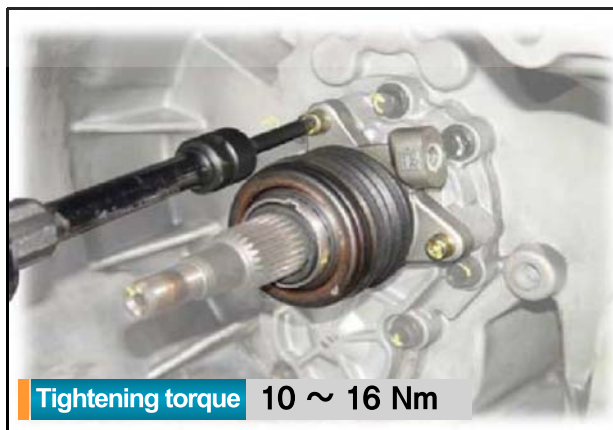
1. Unscrew the nut and remove the oil pipe from the clutch housing.

Tightening torque 20 ~ 25 Nm



2. Unscrew the oil pipe adapter mounting bolt from the clutch housing and remove the adapter and oil pipe.

3. Unscrew three bolts and remove the concentric slave cylinder assembly on the input shaft of cylinder.



Tightening torque 10 ~ 16 Nm



4. Install in the reverse order of removal.



CAUTION

- Before installation, clean all the components.
- Do not re-use the used clutch fluid.
- Apply a small amount of clutch fluid on the internal components such as piston.
- Replace parts if necessary.

Keep the specified tightening torque.

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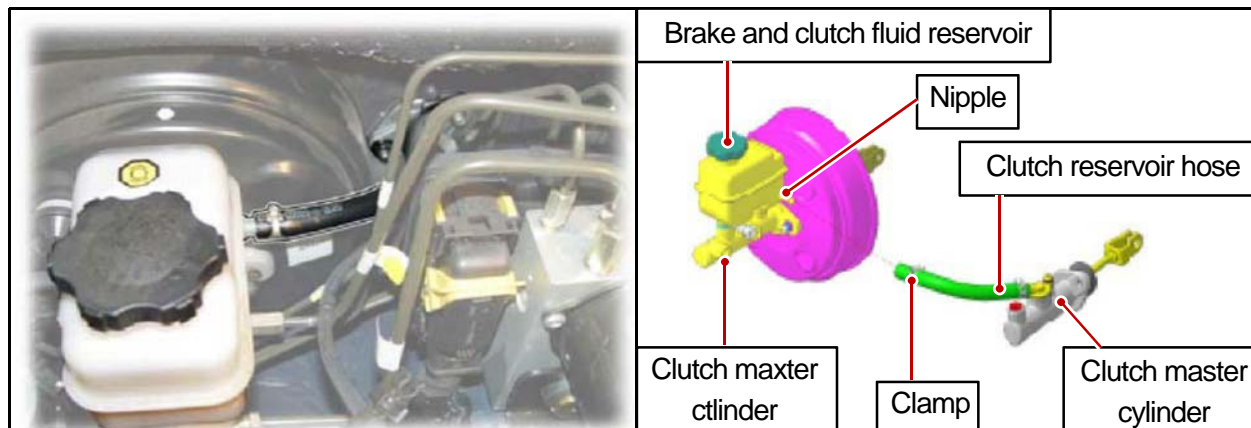
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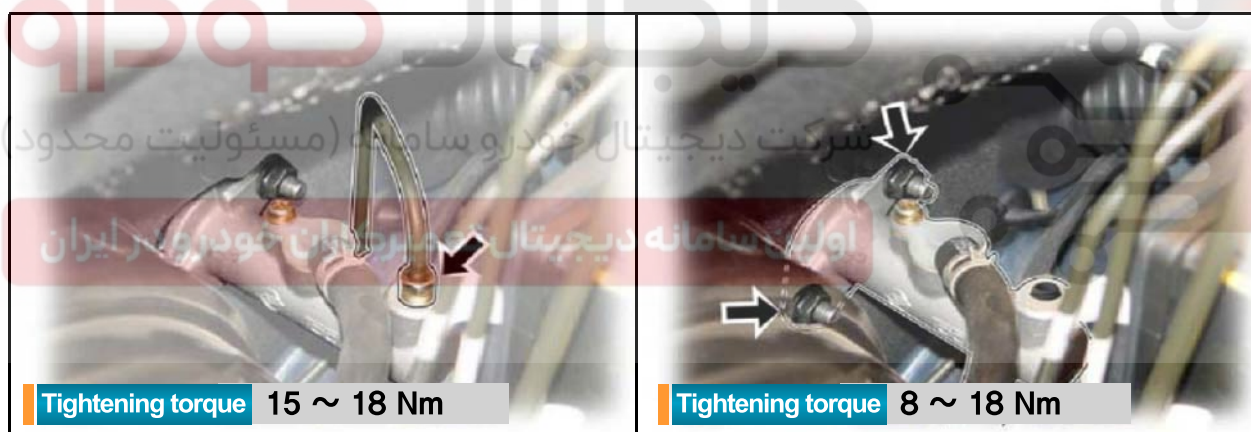
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3020-01 CLUTCH MASTER CYLINDER

1. Drain the clutch fluid.
2. Disconnect the clutch fluid feed hose from the brake reservoir.



3. Disconnect the clutch fluid feed pipe (to chamber) and unscrew two clutch master cylinder mounting nuts (10 mm).



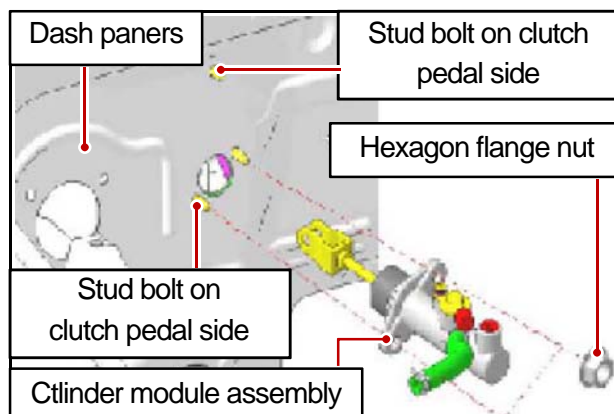
4. Disconnect the clutch master cylinder push rod from the clutch pedal and remove the clutch master cylinder.
5. Install in the reverse order of removal and check "air bleeding and clutch pedal operation" after installation.
6. Fill brake and clutch fluid reservoir



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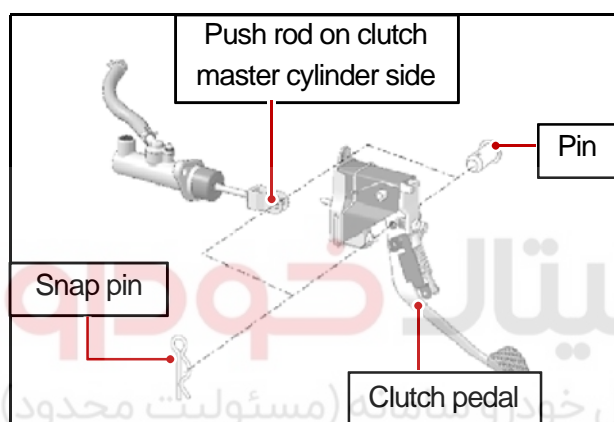
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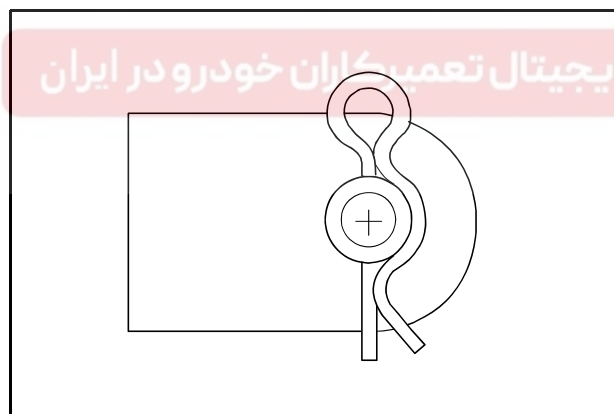
3030-01 CLUTCH PEDAL

1. Unscrew the clutch master cylinder mounting bolts.

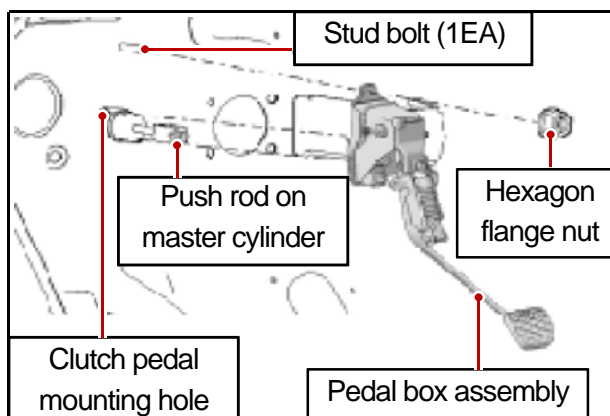
Tightening torque 8 ~ 18 Nm



2. Remove the snap pin from master cylinder push rod.

**CAUTION**

- Securely install the snap pin as shown in figure.



3. Unscrew the mounting nut (12 mm) and remove the pedal box assembly.

Tightening torque 8 ~ 18 Nm

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1) Installation Notice

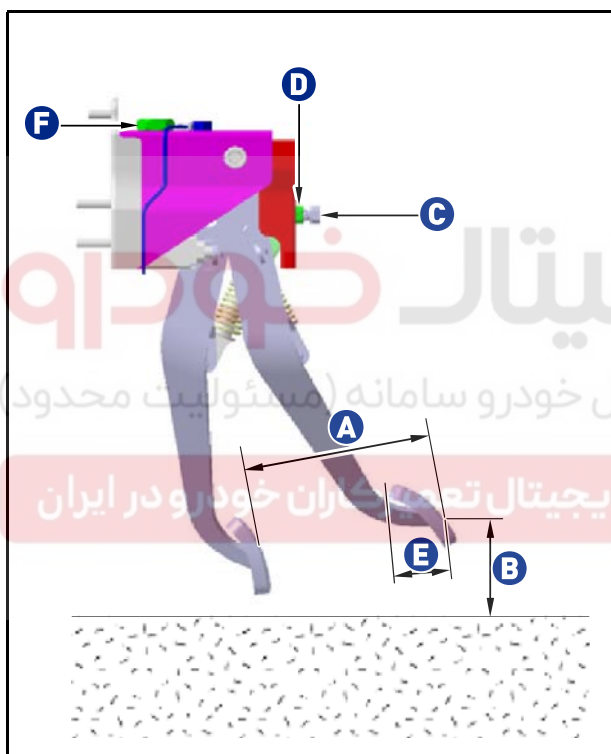
Install in the reverse order of removal.

Adjust pedal stroke after installation.

⚠ CAUTION

- Apply long-life grease (T/M DBL 6611.00) to the connections.
- Remove foreign materials.
- Keep the tightening torque.
- Replace the bushings with new ones.

2) Inspection and Adjustment



► Pedal Stroke (A)

Maximum pedal stroke	5MT : 140mm 6MT : 145mm
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► Pedal Height (B)

Height (from carpet)	181 ± 5 mm
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⚠ CAUTION

- To adjust the pedal stroke, loosen the lock nut (C) of the stopper bolt (D) and turn the stopper bolt until the stroke is correct. After adjustment, tighten the lock nut.

► Pedal Free Play (E)

Free play	5~15 mm
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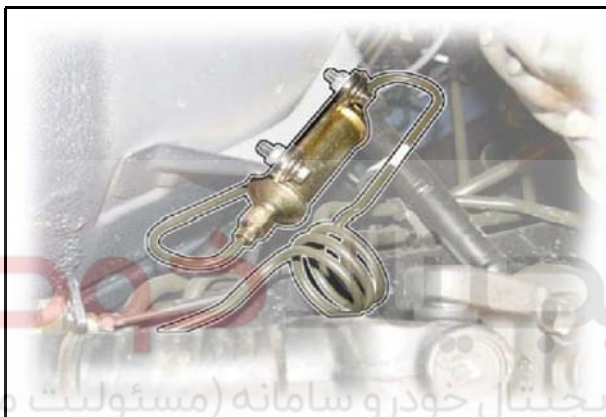
⚠ CAUTION

- To adjust the pedal free play, loosen the lock nut (F) of the master cylinder and turn the push rod until the free play is correct.

- Check the fulcrum bolt and the bushing for wear, the pedal for bending and the spring for damage.

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3020-04 CLUTCH CHAMBER



1. Drain the fluid.
2. Unscrew the bolt and remove the supply pipe from clutch master cylinder.

Tightening torque 15 ~ 18 Nm

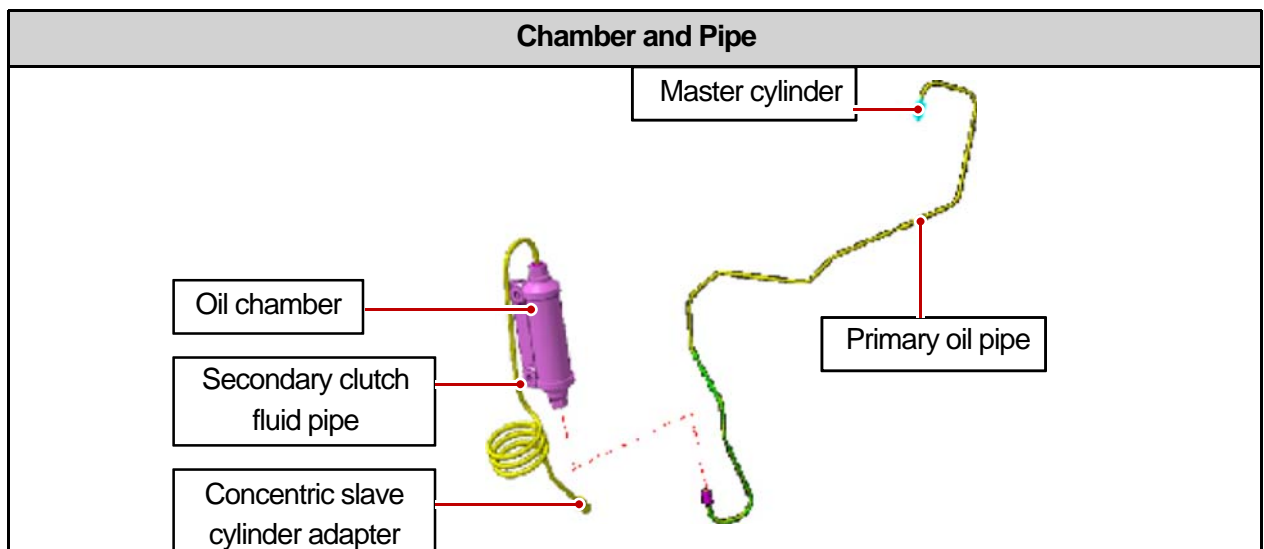
3. Unscrew the supply pipe bolt and remove primary oil pipe from clutch fluid chamber.
4. Unscrew the pipe bolt and remove the secondary clutch fluid pipe from concentric slave cylinder adapter.
5. Install the pipes. Be careful not to mix the pipes.

Tightening torque 15 ~ 18 Nm

CAUTION

- Make sure to bleed the air from the system after installation.
- Check each pipe bolt for oil leaks.
- Clutch pipes are reusable. However, you must check the pipes for damages and cracks.

Chamber and Pipe



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Memo

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