

SECTION **CL**
CLUTCH

CONTENTS

YD			
PRECAUTIONS	2	OPERATING CYLINDER	11
Caution	2	Removal and Installation	11
PREPARATION	3	REMOVAL	11
Special Service Tools	3	INSTALLATION	11
Commercial Service Tool	3	Disassembly and Assembly	11
NOISE, VIBRATION AND HARSHNESS (NVH)		DISASSEMBLY	11
TROUBLESHOOTING	4	INSPECTION AFTER DISASSEMBLY	11
NVH Troubleshooting Chart	4	ASSEMBLY	11
CLUTCH PEDAL	5	CLUTCH PIPING	12
On-Vehicle Inspection and Adjustment	5	Removal and Installation	12
HEIGHT ADJUSTMENT	5	CLUTCH RELEASE MECHANISM	13
CLUTCH SWITCH POSITION ADJUSTMENT	5	Removal and Installation (RS6F51A)	13
FREE PLAY INSPECTION	6	REMOVAL	13
CLEARANCE CHECK	6	INSPECTION AFTER REMOVAL	13
Removal and Installation	6	INSTALLATION	13
INSPECTION AFTER REMOVAL	7	CLUTCH DISC, CLUTCH COVER AND FLYWHEEL	15
CLUTCH FLUID	8	Removal and Installation	15
Air Bleeding Procedure	8	REMOVAL	15
CLUTCH MASTER CYLINDER	9	INSPECTION AND ADJUSTMENT AFTER	
Removal and Installation	9	REMOVAL	15
REMOVAL	9	INSTALLATION	16
INSTALLATION	10	SERVICE DATA AND SPECIFICATIONS (SDS)	17
Disassembly and Assembly	10	Clutch Control System	17
DISASSEMBLY	10	Clutch Master Cylinder	17
INSPECTION AFTER DISASSEMBLY	10	Clutch Operating Cylinder	17
ASSEMBLY	10	Clutch Disc	17
		Clutch Cover	17
		Clutch Pedal	17

PRECAUTIONS

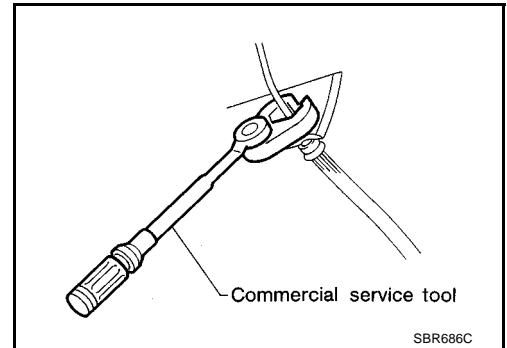
Caution

ECS009XD

- Recommended fluid is brake fluid “DOT 3” or “DOT 4”.
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas.
- When removing and installing clutch piping, use Tool.
- Use new brake fluid to clean or wash all parts of master cylinder and operating cylinder.
- Never use mineral oils such as gasoline or kerosene. It will ruin the rubber parts of the hydraulic system.

WARNING:

After cleaning clutch disc, wipe it with a dust collector. Do not use compressed air.



SBR686C

PREPARATION

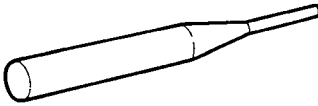

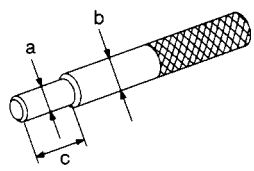
[YD]

PREPARATION

PFP:00002

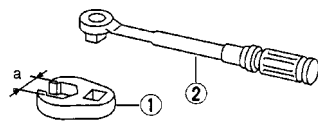
Special Service Tools

ECS009XE

Tool name Tool number	Description
<p>Pin punch ST23550000 Tip diameter: 4.5 mm (0.177 in) dia.</p>  <p>ZZA0515D</p>	<p>Removing and installing master cylinder spring pin</p>
<p>Diaphragm adjusting wrench ST20050240</p>  <p>ZZA0508D</p>	<p>Adjusting unevenness of diaphragm spring of clutch cover</p>
<p>Clutch aligning bar ST20630000 a: 15.8 mm (0.622 in) dia. b: 22.9 mm (0.902 in) dia. c: 45.0 mm (1.077 in)</p>  <p>S-NT405</p>	<p>Installing clutch cover and disc (YD22DDTi engine model)</p>

Commercial Service Tool

ECS009XF

Tool name	Description
<p>1. Flare nut crowfoot 2. Torque wrench a: 10 mm (0.39 in)</p>  <p>S-NT360</p>	<p>Removing and installing clutch piping</p>

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

[YD]

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

ECS009XG

Use the chart below to help you find the cause of the symptom. The numbers indicate the order of the inspection. If necessary, repair or replace these parts.

Reference page		CL-5	CL-8	CL-9	CL-11	EM-89	CL-13	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-16	CL-16	CL-16	CL-16
SUSPECTED PARTS (Possible cause)		CLUTCH PEDAL (Free play out of adjustment)	CLUTCH LINE (Air in line)	MASTER CYLINDER PISTON CUP (Damaged)	OPERATING CYLINDER PISTON CUP (Damaged)	ENGINE MOUNTING (Loose)	RELEASE BEARING (Worn, dirty or damaged)	CLUTCH DISC (Out of true)	CLUTCH DISC (Runout is excessive)	CLUTCH DISC (Lining broken)	CLUTCH DISC (Dirty or burned)	CLUTCH DISC (Oily)	CLUTCH DISC (Worn out)	CLUTCH DISC (Hardened)	CLUTCH DISC (Lack of spline grease)	DIAPHRAGM SPRING (Damaged)	DIAPHRAGM SPRING (Out of tip alignment)	PRESSURE PLATE (Distortion)	FLYWHEEL (Distortion)	
Symptom	Clutch grabs/chatters					1			2			2	2	2			2			
	Clutch pedal spongy		1	2	2															
	Clutch noisy						1													
	Clutch slips	1										2	2			3		4	5	
	Clutch does not disengage	1	2	3	4			5	5	5	5	5			5	6	6	7		

CLUTCH PEDAL

On-Vehicle Inspection and Adjustment
HEIGHT ADJUSTMENT

1. Check that clutch pedal height H₁ from upper surface of the dash panel is within the specified range.

Pedal height H₁ : 162 - 171 mm (6.34 - 6.73 in)

2. If pedal height H₁ is outside the specification, loosen stopper bolt lock nut B and turn stopper bolt to adjust.
3. When pedal height comes into the specified range, tighten stopper bolt lock nut B to the specified torque.

Lock nut B

 : 15.7 - 21.6 N·m (1.6 - 2.2 kg·m, 12 - 15 ft·lb)

4. Confirm that when the clutch is disengaged, free play A (at the pedal pad's top surface) and pedal height H₂, are within the range shown below:

A: Pedal free play at the pedal pad:

9 - 16 mm (0.35 - 0.63 in)

[Looseness at clevis pin: 1.0 - 3.0 mm (0.04 - 0.12 in)]

Pedal height H₂ with the clutch disengaged:

78.0 mm (3.071 in) or more


5. Check that free play A, at the top surface of the pedal pad, and the pedal height H₂ are outside the specification, loosen lock nut A and turn push rod to adjust.

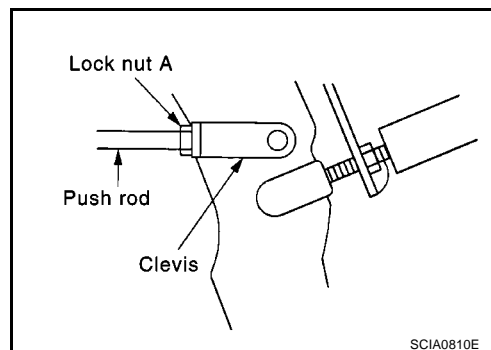
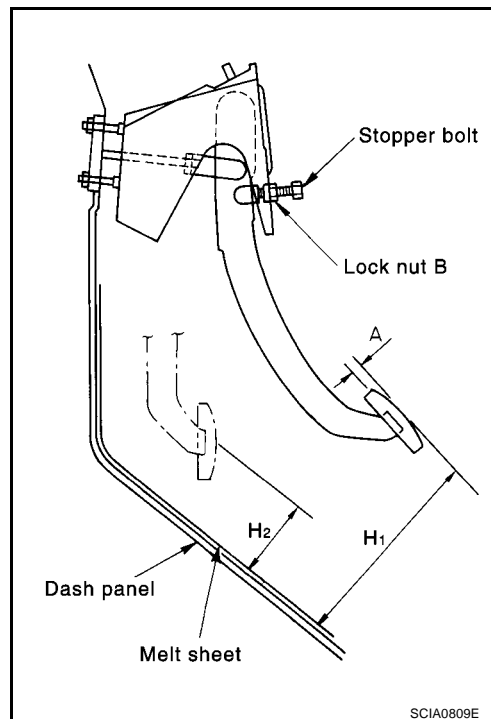
CAUTION:

Threaded end of the push rod must be positioned inside the clevis.

6. Tighten lock nut A to the specified torque.

Lock nut A

 : 7.8 - 11.8 N·m (0.8 - 1.2 kg·m, 69 - 104 in·lb)



CLUTCH SWITCH POSITION ADJUSTMENT

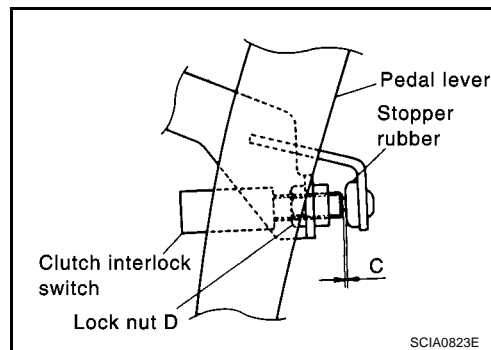
- Adjust the clutch switch position until, with the clutch pedal depressed, the clearance between the stopper rubber and threaded end of the clutch switch is within the range specified as clearance C. Tighten lock nut D.

Clearance : 0.1 - 1.0 mm (0.004 - 0.039 in)

C

Lock nut D

 : 11.8 - 14.7 N·m (1.2 - 1.5 kg·m, 9 - 10 ft·lb)



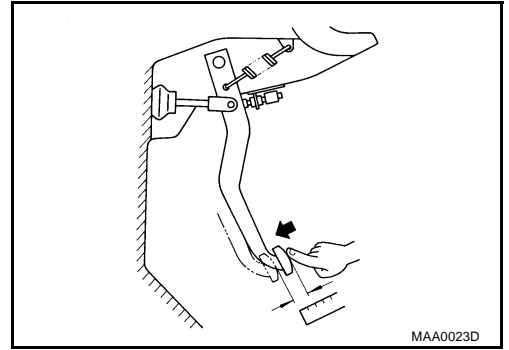
CLUTCH PEDAL

[YD]

FREE PLAY INSPECTION

- Press the clutch pedal by hand until certain resistance can be felt. Using a scale, check that the free play is within the specified range.

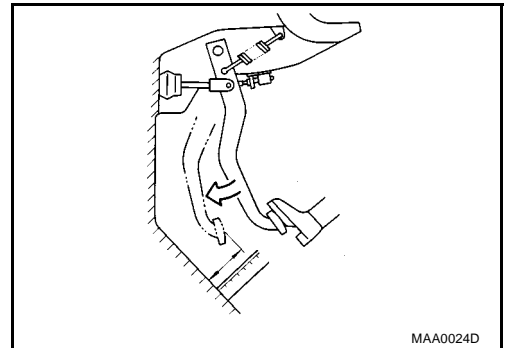
Pedal free play : 9 - 16 mm (0.35 - 0.63 in)



CLEARANCE CHECK

1. Start the engine and let it idle.
2. Apply parking brake.
3. Depress the brake pedal.
4. Fully depress clutch pedal and shift to 1st gear.
5. Release clutch pedal gradually. Stop releasing the pedal at the point where the clutch is about to be engaged. Using a scale, check the clearance between the clutch pedal and floor panel to see if it is within the specified range.

**Pedal height when the clutch disengages:
78.0 mm (3.071 in) or more**



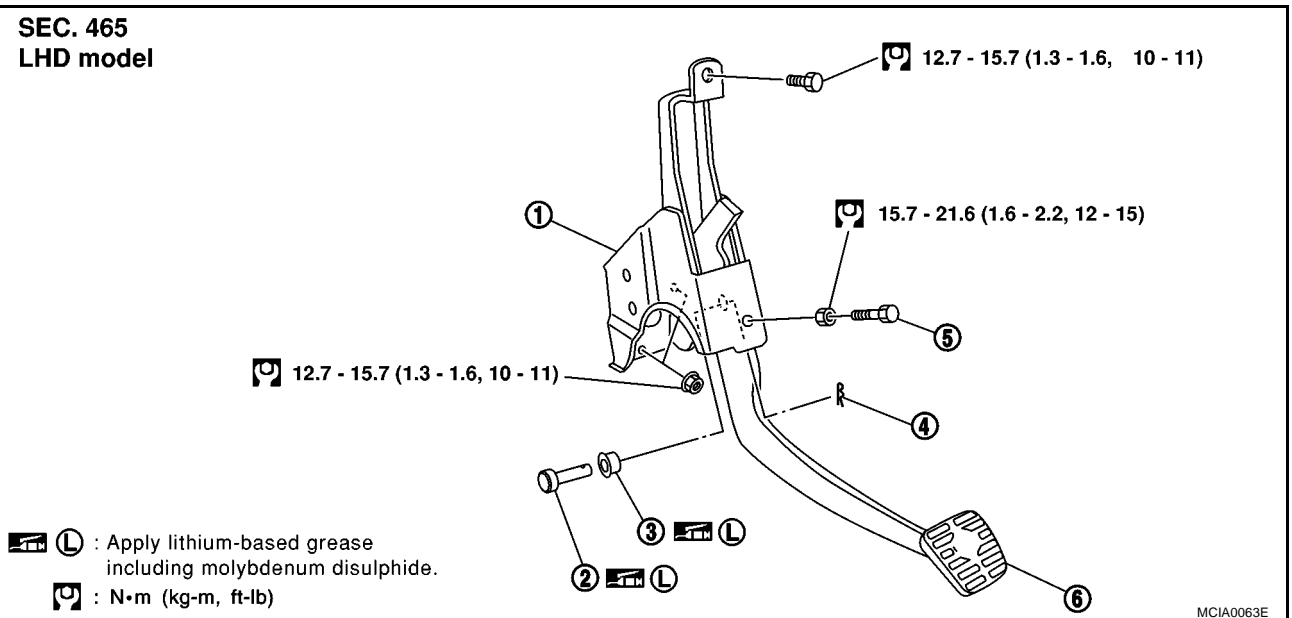
NOTE:

Pedal height at clutch disengagement varies slightly from the clutch engagement point. Despite this, pedal height at clutch engagement is commonly used for both cases in order to simplify the inspection.

Removal and Installation

ECS009XI

**SEC. 465
LHD model**

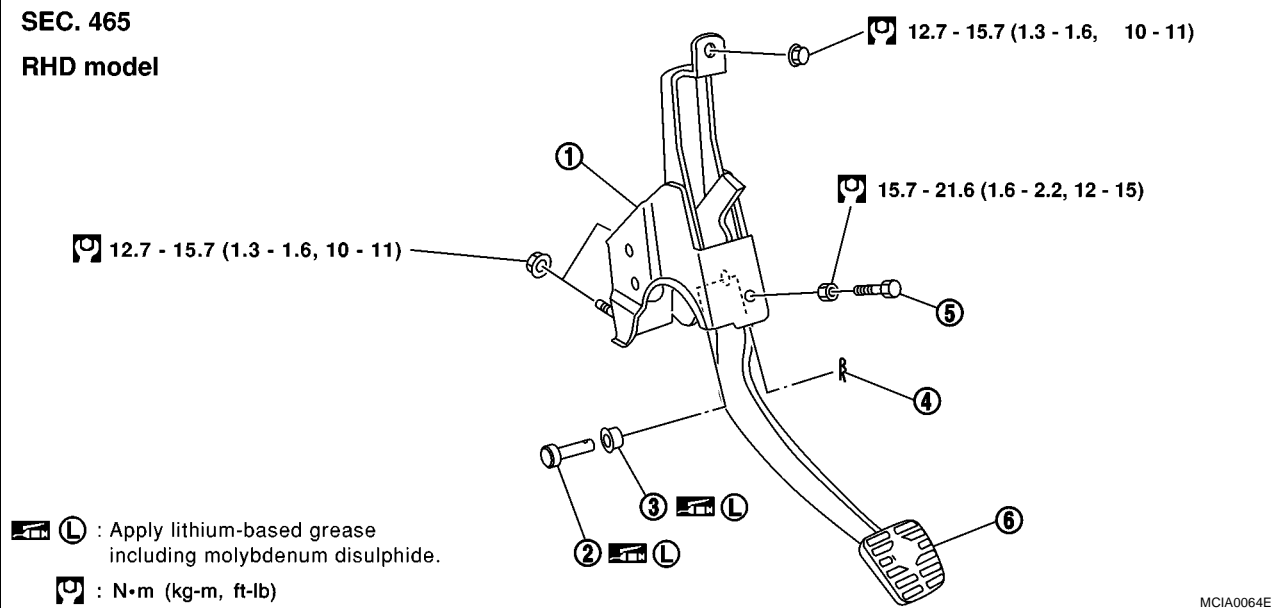


CLUTCH PEDAL

[YD]

SEC. 465

RHD model



1. Clutch pedal assembly

2. Clevis pin

3. Bushing

4. Snap pin

5. Stopper bolt

NOTE:

Install clutch pedal assembly and adjust the pedal height. Tighten stopper bolt to the specified torque.

INSPECTION AFTER REMOVAL

- Check clutch pedal for bend, damage, or a cracked weld. If bend, damage, or a cracked weld is found, replace the clutch pedal.
- Check assist spring for settling. If settling is found, replace the assist spring.

CLUTCH FLUID

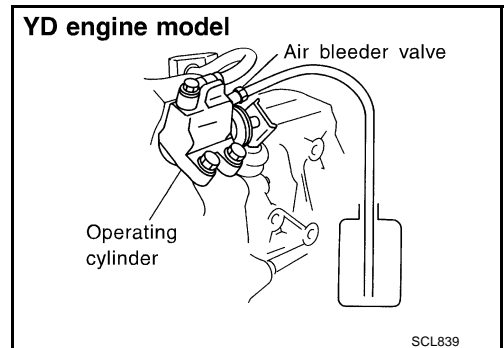
Air Bleeding Procedure

CAUTION:

- Monitor fluid level in the reservoir to make sure it does not empty.
- Do not spill clutch fluid onto painted surfaces. If it spills, wipe up immediately and wash the affected area with water.
- Bleed the operating cylinder.
 1. Fill the master cylinder reservoir tank with new clutch fluid.
 2. Connect a transparent vinyl hose to the air bleeder.
 3. Depress the clutch pedal slowly and fully a few times at an interval of 2 to 3 seconds and hold it.
 4. With clutch pedal depressed, open air bleeder.
 5. Close air bleeder.
 6. Release clutch pedal and wait for 5 seconds.
 7. Repeat steps 3 to 6 until no bubbles can be observed in the brake fluid.

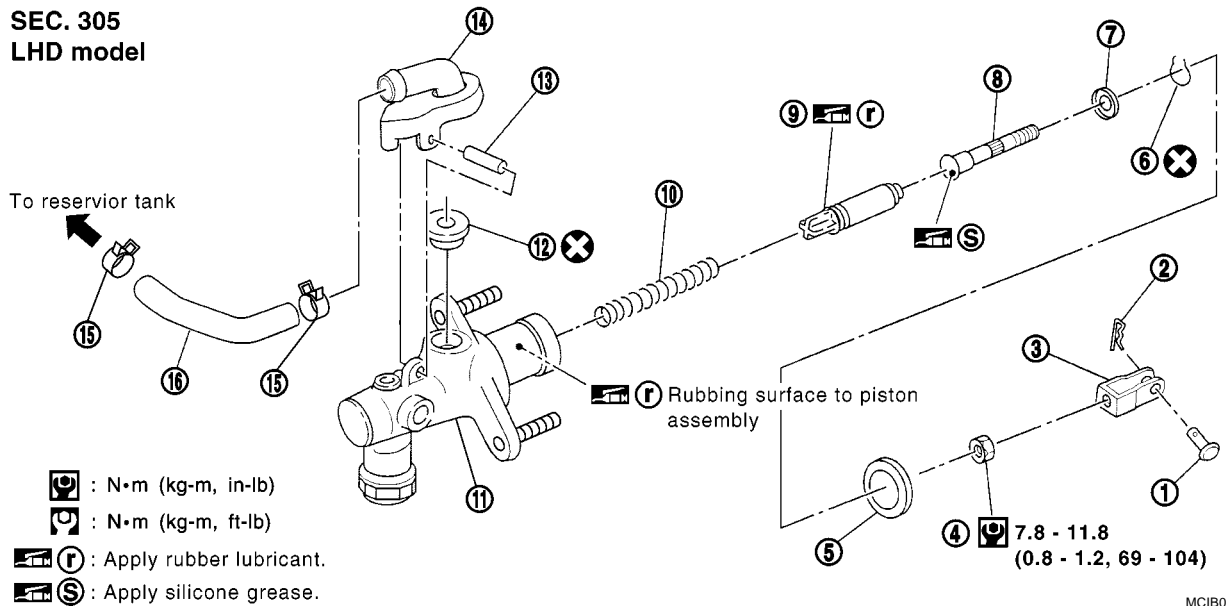
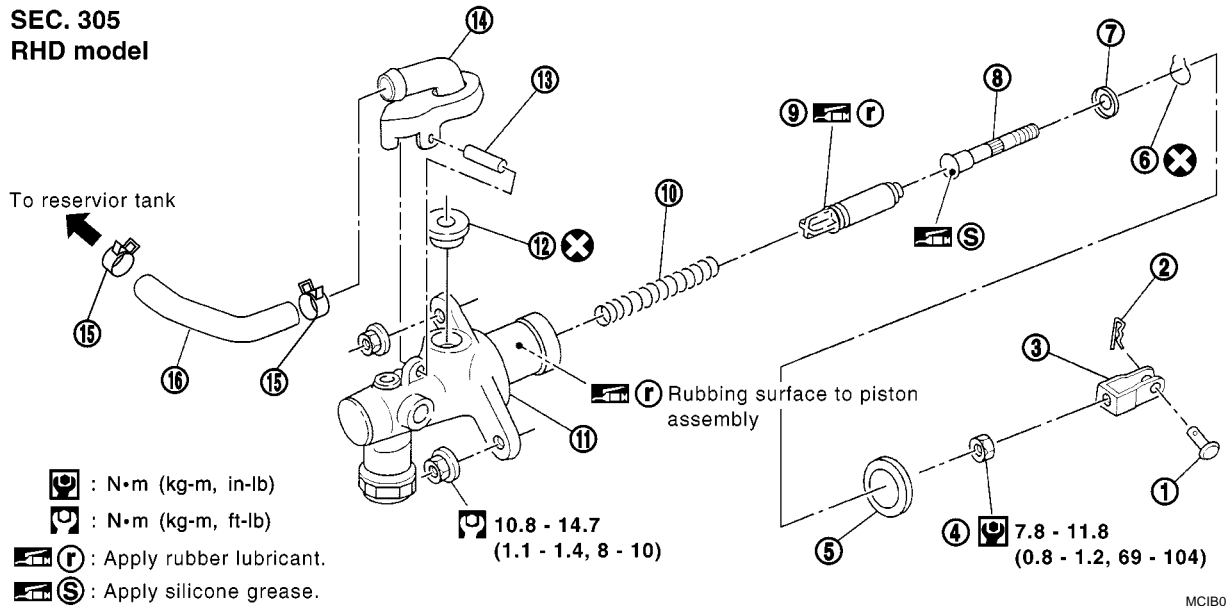
Air bleeder

: 5.9 - 9.8 N·m (0.6 - 1.0 kg·m, 52 - 86 in·lb)



CLUTCH MASTER CYLINDER

Removal and Installation

SEC. 305
LHD modelSEC. 305
RHD model

- | | | |
|-------------------|-------------------|--------------------|
| 1. Clevis pin | 2. Snap pin | 3. Clevis |
| 4. Lock nut | 5. Dust cover | 6. Stopper ring |
| 7. Stopper | 8. Push rod | 9. Piston assembly |
| 10. Return spring | 11. Cylinder body | 12. Seal |
| 13. Spring pin | 14. Nipple | 15. Clamp |
| 16. Hose | | |

REMOVAL

- Using one of the following methods, remove hose from the nipple.
 - Drain clutch fluid from reservoir tank and remove hose.
 - Remove hose from the nipple. Immediately plug hose and reservoir tank to prevent clutch fluid from dripping.

CAUTION:

Do not spill clutch fluid onto painted surfaces. If it spills, wipe up immediately and wash the affected area with water.

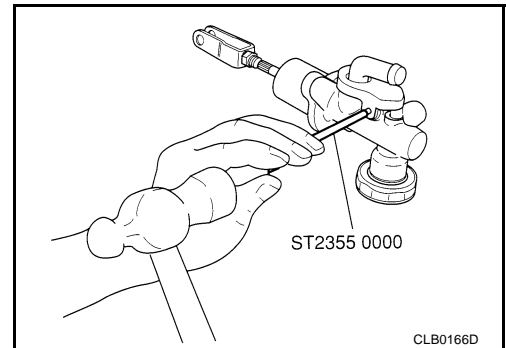
2. Using a flare nut wrench, remove clutch tube.
3. Remove snap pin and clevis pin on clevis in passenger compartment to separate clutch pedal.
4. First remove the mounting nuts on the master cylinder assembly, and then the master cylinder assembly from the vehicle.

INSTALLATION

1. Connect clutch tube to master cylinder assembly and temporarily tighten flare nut.
2. Install master cylinder assembly and tighten mounting nut to the specified torque.
3. Using a flare nut torque wrench, tighten clutch tube flare nut to the specified torque.
4. Attach clevis of the clevis pin to the clutch pedal.
5. Attach snap pin to the clevis pin.
6. Install hose to the nipple.
7. After completing this procedure, inspect and adjust pedal height and then bleed the clutch tube. Refer to [CL-5, "On-Vehicle Inspection and Adjustment"](#) , [CL-8, "Air Bleeding Procedure"](#)

Disassembly and Assembly**DISASSEMBLY**

1. Using a pin punch, remove spring pin, nipple and seal from the cylinder body.
2. Loosen push rod lock nut. Remove clevis and lock nut.
3. Remove dust cover.
4. Remove stopper ring and stopper. Remove push rod from cylinder body while holding it securely to reduce possibility of the piston popping out.
5. Remove piston assembly and return spring.

**INSPECTION AFTER DISASSEMBLY**

Check for any of the conditions shown below. If any malfunction is found, replace the part concerned.

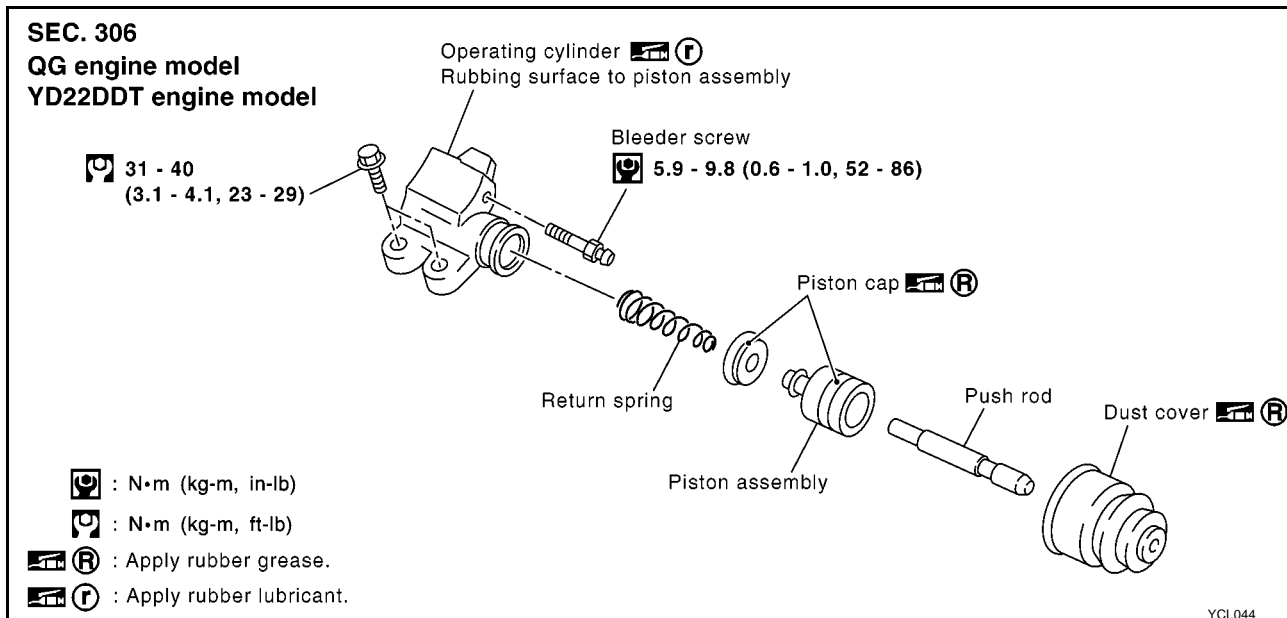
- Damaged cylinder internal wall, foreign matter, wear, corrosion, or pinhole
- Damaged or deformed nipple or reservoir tank
- Settling of the spring
- Cracked or deformed dust cover

ASSEMBLY

1. Apply rubber lubricant to internal surface of the cylinder body, sliding surface of piston assembly, and the piston cup. Insert piston assembly and return spring.
2. Apply silicon grease to push rod and install stopper. Install stopper ring while holding down the push rod by hand to prevent the piston assembly from popping out.
3. Install dust cover.
4. Install clevis to the push rod and tighten lock nut to the specified torque.
5. Install seal and nipple to the cylinder body. Using a pin punch, install spring pin.

OPERATING CYLINDER

Removal and Installation



- | | | |
|------------------|------------------|------------------|
| 1. Cylinder body | 2. Piston spring | 3. Piston cup |
| 4. Piston | 5. Push rod | 6. Dust cover |
| 7. Air bleeder | 8. Union bolt | 9. Copper washer |
| 10. Clutch hose | 11. Spacer | |

REMOVAL

1. Drain clutch fluid.

CAUTION:

Do not spill clutch fluid onto painted surfaces. If it spills, wipe up immediately and wash the affected area with water.

2. Remove clutch hose from the operating cylinder.
3. Remove operating cylinder mounting bolt and remove operating cylinder.

INSTALLATION

Paying attention to the following items, install in the reverse order of removal.

- Install hose with care so that it will not be bent or twisted.
- After completing the procedure, bleed the clutch tube. Refer to [CL-8, "Air Bleeding Procedure"](#).

Disassembly and Assembly

DISASSEMBLY

ECS009XN

- Remove dust cover and push rod. Remove piston, piston cup, and piston spring from inside the cylinder body.

INSPECTION AFTER DISASSEMBLY

Check for any of the conditions shown below. If any malfunction is found, replace the part concerned.

- Damage to cylinder inner surface or piston sliding surface. Foreign matter, wear, corrosion, or pinhole
- Settling of the spring
- Cracked or deformed dust cover

ASSEMBLY


1. Apply rubber lubricant to cylinder body inner surface and rubber grease to the piston cup and piston. Insert piston assembly into the cylinder body.
2. Apply rubber grease to dust cover and install push rod and dust cover.

CLUTCH PIPING

Removal and Installation

Carefully observe the following steps during clutch tube removal and installation.

- Do not spill clutch fluid onto painted surfaces. If it spills, wipe up immediately and wash the affected area with water.
- To fix clutch hose on the bracket, position hose clasp on the bracket locating embossment and drive the lock plate vertically from above. Be careful not to bend or twist the hose. Do not scratch or damage the clutch hose.
- Tighten clutch tube flare nut to the specified torque below:

 : 15 - 17 N·m (1.5 - 1.8 kg·m, 11 - 13 ft·lb)

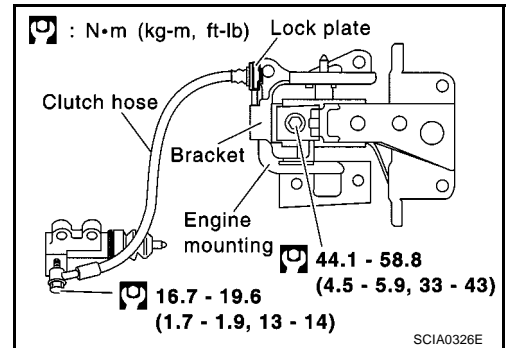
- Tighten clutch hose union bolt to the specified torque:

 : 16.7 - 19.6 N·m (1.7 - 2.0 kg·m, 13 - 14 ft·lb)

CAUTION:

Do not reuse the copper washer.

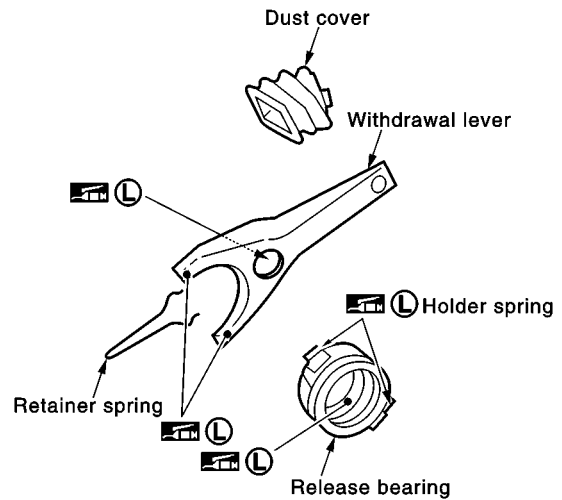
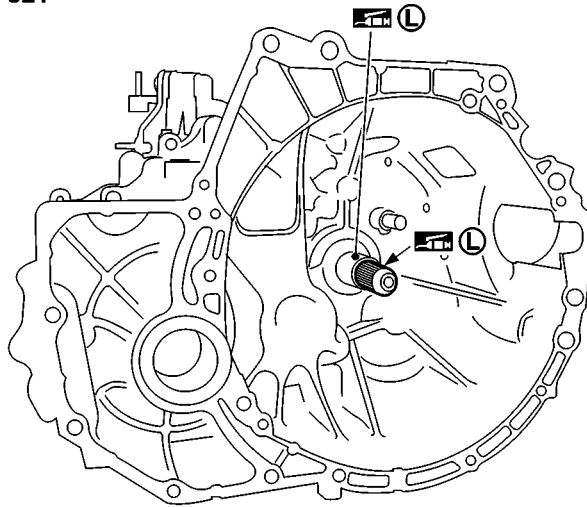
- After installation, bleed the clutch tube. Refer to [CL-8. "Air Bleeding Procedure"](#)




CLUTCH RELEASE MECHANISM

Removal and Installation (RS6F51A)

SEC. 321



 L : Apply lithium-based grease including molybdenum disulphide.

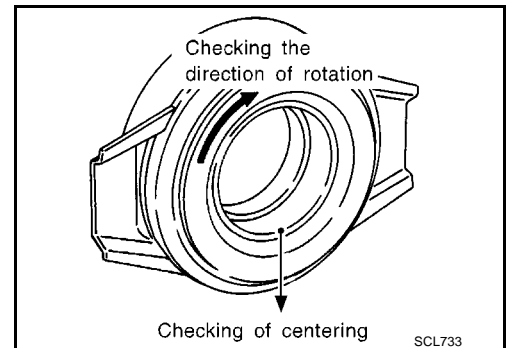
SCIA0328E

REMOVAL

1. Remove manual transaxle from the vehicle. Refer to [MT-15, "TRANSAXLE ASSEMBLY"](#) (RS6F51A).
2. Remove release bearing, holder spring, and withdrawal lever from inside the clutch housing.
3. Remove dust cover.
4. Remove retainer spring from the withdrawal lever.

INSPECTION AFTER REMOVAL

- If release bearing is seized, damaged, not properly centered or does not rotate smoothly, replace it.
- If contact surface of the withdrawal lever is excessively worn, replace it.
- If dust cover is cracked, replace it.



SCL733

INSTALLATION

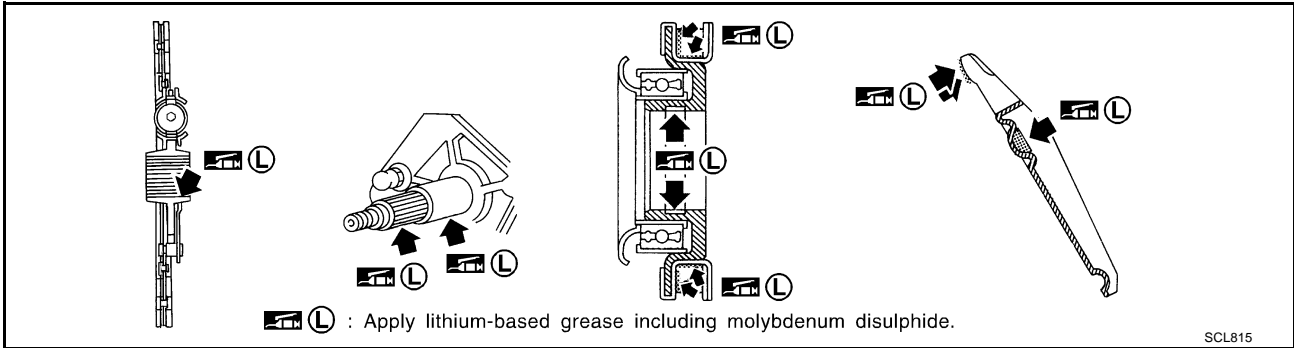
CAUTION:

- Be sure to apply grease to the points specified. Otherwise, noise, poor disengagement, or damage to the clutch may result. Excessive grease may cause slip or judder. Wipe off any grease oozing from the parts.
- Be careful not to bring any grease into contact with the clutch disc facing, pressure plate surface, or flywheel surface.

CLUTCH RELEASE MECHANISM

[YD]

1. Following the instructions below, apply grease to the specified points.



CAUTION:

Wipe off any old grease, debris, or powdery residue left on the grease applying surfaces.

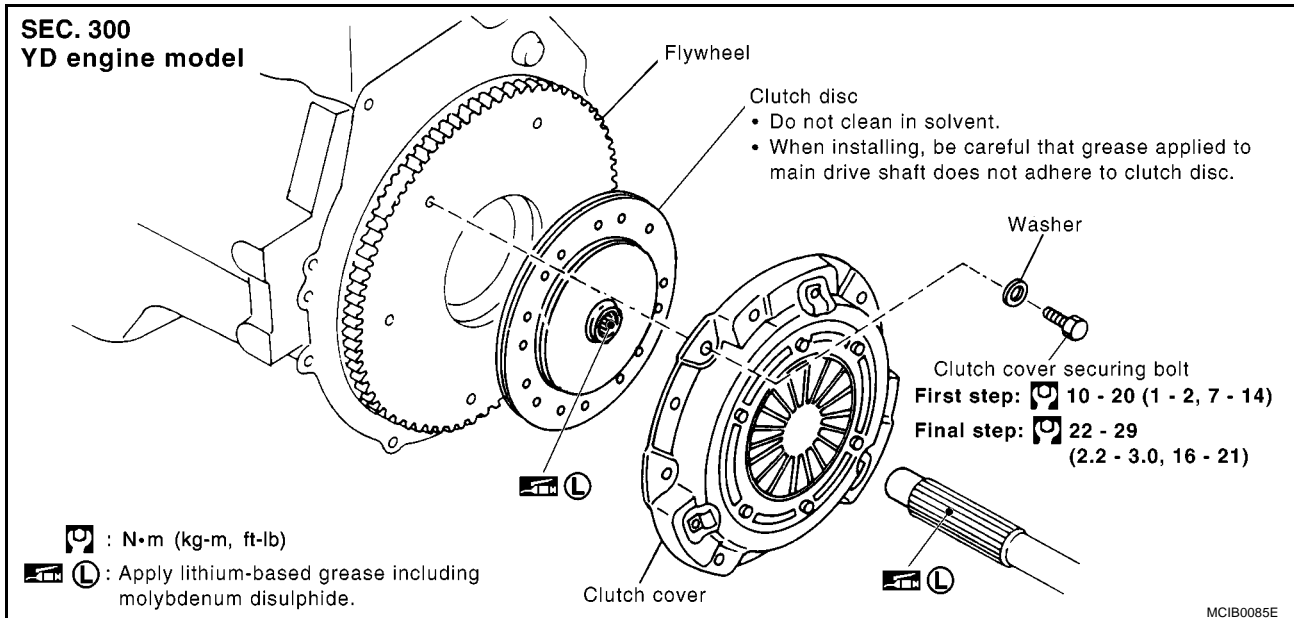
- Evenly apply a 1-mm thick coating of recommended grease to withdrawal lever and holder spring sliding surface.
 - Apply recommended grease to withdrawal lever ball pin contact surface and inner slots of the release bearing. The grease surface should be level with the surrounding area.
 - Apply a thin coat of recommended grease evenly to the release bearing sliding surface. Install release bearing. Wipe off any excess grease that oozes from the parts and then remove release bearing.
2. Install in the reverse order of the removal.

CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

PFP:30100

Removal and Installation

ECS009XR

**CAUTION:**

Be careful not to bring any grease into contact with the clutch disc facing, pressure plate surface, or flywheel surface.

REMOVAL

1. Remove manual transaxle from the vehicle. Refer to [MT-15, "TRANSAXLE ASSEMBLY"](#) (RS6F51A).
2. Loosen clutch cover mounting bolts evenly. Remove clutch cover and clutch disc.

INSPECTION AND ADJUSTMENT AFTER REMOVAL**Clutch Disc**

- Measure circumferential runout relative to the clutch disc center spline. If it is outside the specification, replace the clutch disc.

Runout limit/diameter of the area to be measured:

MODEL 240 1.0 mm (0.039 in) or less/230 mm (9.06 in) dia.

- Measure clutch disc spline and input shaft spline backlash at the circumference of the disc. If outside the specification, replace.

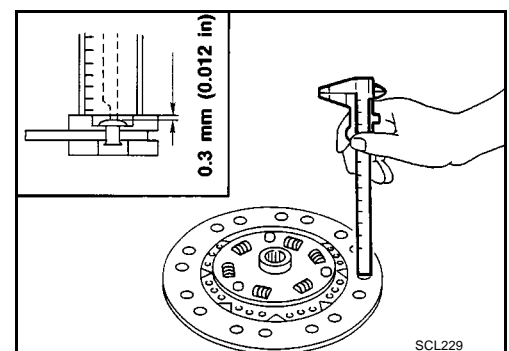
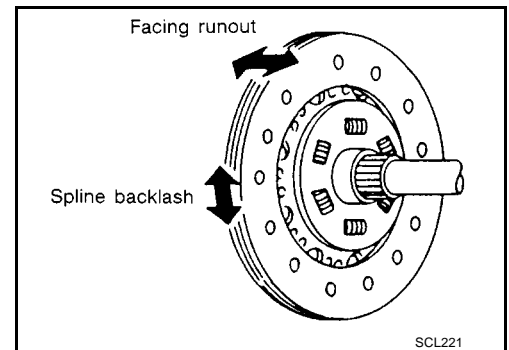
Maximum allowable spline backlash:

MODEL 240 1.0 mm (0.039 in)

- Using calipers, measure the depth to the clutch disc facing rivet heads. If it exceeds the allowable wear limit, replace the facing.

Facing wear limit (depth to the rivet head):

0.3 mm (0.012 in)



Clutch Cover

Check diaphragm spring lever claws for unevenness with the lever still on the vehicle. If they exceed the tolerance, adjust lever height using a diaphragm adjusting wrench (special service tool).

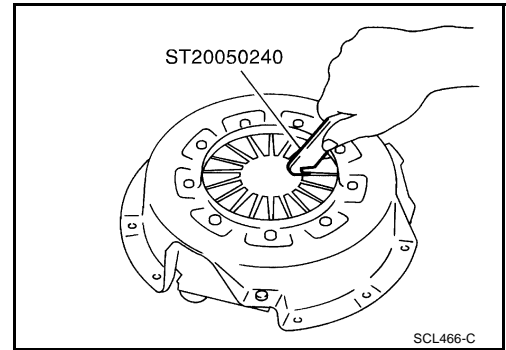
Tolerance for diaphragm spring lever unevenness:

MODEL 240 **0.7 mm (0.028 in)**

- Check clutch cover thrust ring for wear or breakage. If wear or breakage is found, replace clutch cover assembly.

NOTE:

- Worn thrust ring will generate a beating noise when tapped at the rivet with a hammer.
- Broken thrust ring will make a clinking sound when cover is shaken up and down.
- If a trace of burn or discoloration is found on the clutch cover pressure plate to clutch disc contact surface, repair the surface with sandpaper. If surface is damaged or distorted, replace the assembly.

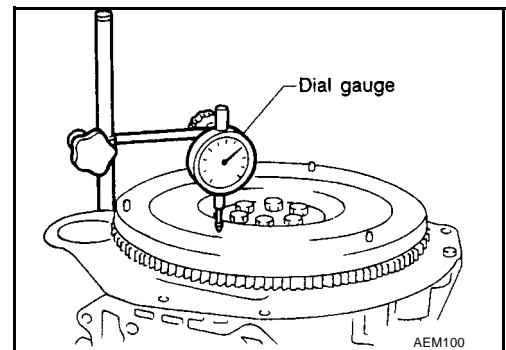


Flywheel Runout

Using a dial gauge, measure runout at the flywheel clutch contact surface. If runout is outside the specification, replace the flywheel. If a trace of burn or discoloration is found on the surface, repair it with sandpaper.

Allowable flywheel runout:

Vehicles with **EM-113, "Flywheel Runout"**
YD22DDTi:



CAUTION:

Measure it at flywheel outer face (not on knock pin and clutch cover mounting hole).

INSTALLATION

- Apply recommended grease to clutch disc and input shaft splines.

CAUTION:

Be sure to apply grease to the points specified. Otherwise, noise, poor disengagement, or damage to the clutch may result. Excessive grease may cause slip or judder. Wipe off any grease oozing from the parts.

- Install clutch disc and clutch cover. Pre-tighten mounting bolts and install clutch aligning bar.

Engine type	Tool number
YD22DDTi	ST20630000

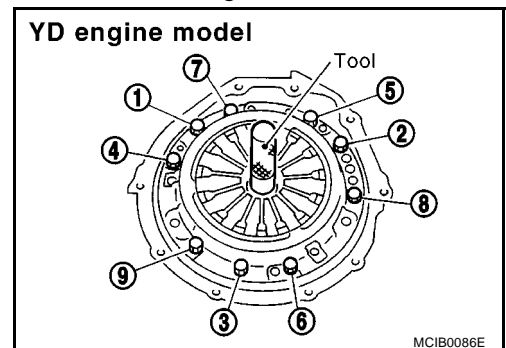
- Tighten clutch cover attaching bolts evenly in two steps in the order shown in the figure.

Tightening torque:

First step : 9.9 - 19 N·m (1.0 - 2.0 kg·m, 7 - 14 ft·lb)

Final step

YD22DDTi : 22 - 29 N·m (2.2 - 3.0 kg·m, 16 - 21 ft·lb)



- Install manual transaxle. Refer to [MT-15, "TRANSAXLE ASSEMBLY"](#) (RS6F51A).

SERVICE DATA AND SPECIFICATIONS (SDS)

[YD]

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Clutch Control System

ECS009XS

Type of clutch control	Hydraulic
------------------------	-----------

Clutch Master Cylinder

ECS009XT

Unit: mm (in)

Inner diameter	15.87 (5/8)
----------------	-------------

Clutch Operating Cylinder

ECS009XU

Unit: mm (in)

Inner diameter	19.05 (3/4)
----------------	-------------

Clutch Disc

ECS009XV

Unit: mm (in)

Engine type	YD22DDTi
Model	240
Facing size (outer dia. × inner dia. × thickness)	240 × 170 × 3.5 (9.45 × 6.69 × 0.138)
Thickness of disc assembly with load	7.5 - 8.1 (0.295 - 0.319) with 6,865 N (700.2 kg, 1543.3 lb)
Wear limit of facing surface to rivet head	0.3 (0.012)
Runout limit/diameter of the area to be measured	1.0 (0.039) or less/230 (9.06) dia.
Maximum allowable spline backlash	1.0 (0.039)

Clutch Cover

ECS009XW

Unit: mm (in)

Engine type	YD22DDTi
Model	240
Full-load	6,867 N (700.4 kg, 1543.7 lb)
Diaphragm spring lever height	37.0 - 39.0 (1.457 - 1.535)
Uneven limit diaphragm spring toe height	0.7 (0.028)

Clutch Pedal

ECS009XX

Unit: mm (in)

Pedal height	162 - 171 (6.34 - 6.73)
Pedal height at clutch disengagement	78.0 (3.071) or more
Pedal free play	9 - 16 (0.35 - 0.63)
Clearance between clutch switch thread end and stopper rubber	0.1 - 1.0 (0.04 - 0.039)

