SECTION CL

CLUTCH

CONTENTS

PRECAUTIONS

PFP:00001

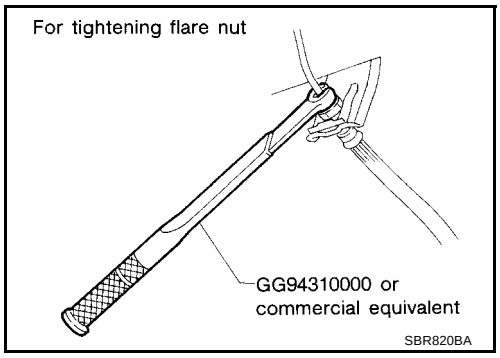
Caution

ECS004JW

- **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.

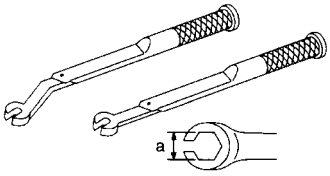
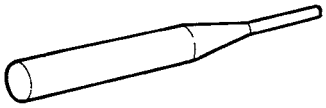
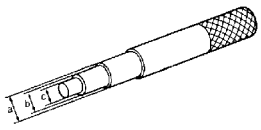
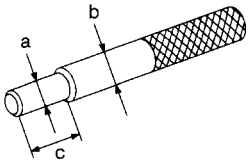


PREPARATION

PFP:00002

Special Service Tools

ECS008B7

Tool name Tool number		Description
Flare nut torque wrench GG94310000 a: 10 mm (0.39 in)	 S-NT406	Removing and installing clutch piping
Pin punch ST23550000 Tip diameter: 4.5 mm (0.177 in) dia.	 ZZA0515D	Removing and installing master cylinder spring pin
Diaphragm spring adjusting wrench ST20050240	 ZZA0508D	Adjusting unevenness of diaphragm spring of clutch cover
Clutch aligning bar KV30101600 (New) KV30100100 (Former) a: 22.8 mm (0.898 in) dia. b: 15.7 mm (0.618 in) dia. c: 12.0 mm (0.472 in) dia.	 ZZA0505D	Installing clutch cover and disc (QR engine models)
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)	 S-NT405	Installing clutch cover and disc (YD engine models)

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

ECS008B8

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.

CLUTCH

Reference page		CL-5	CL-8	CL-9	CL-11	EM-69 (QR engine models), EM-193 (YD engine models)	CL-13	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	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

PFP:46540

On-Vehicle Inspection and Adjustment

ECS001WB

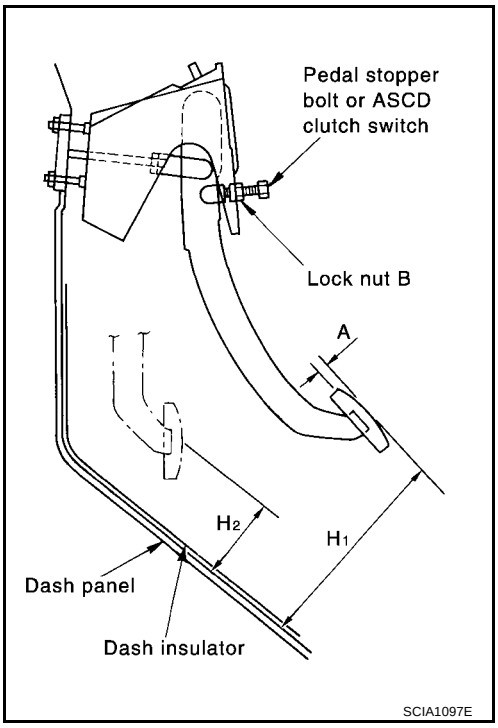
HEIGHT ADJUSTMENT

1. Check that clutch pedal height H_1 from upper surface of the dash panel is within the specified range.

   Pedal height H_1 (RHD models):
   171 - 181 mm (6.73 - 7.13 in)
   Pedal height H_1 (LHD models):
   167 - 177 mm (6.57 - 6.97 in)

2. If pedal height H_1 is outside the specification, loosen pedal stopper bolt (or ASCD clutch switch) lock nut B and turn pedal stopper bolt (or ASCD clutch switch) to adjust.
3. When pedal height comes into the specified range, tighten stopper bolt (or ASCD clutch switch) lock nut B to the specified torque.

   Lock nut B:
   With Pedal stopper bolt:
   : 15.7 - 21.6 N·m (1.6 - 2.2 kg-m, 12 - 15 ft-lb)
   With ASCD clutch switch:
   : 11.8 - 14.7 N·m (1.2 - 1.4 kg-m, 9 - 10 ft-lb)



4. Check that free play A at pedal pad top surface and pedal height H_2 when clutch is disengaged are within the specified ranges below.

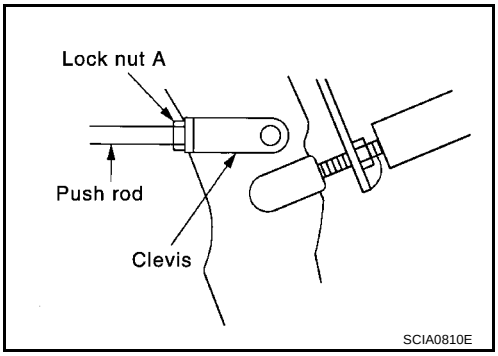
   A: Pedal free play at the pedal pad:
   9 - 16 mm (0.35 - 0.63 in)
   [Looseness at clevis pin: 1.0 - 3.0 mm (0.039 - 0.118 in)]
   Pedal height H_2 when clutch is disengaged:
   85 mm (3.35 in) or more

5. Check that free play A at pedal pad top surface and pedal height H_2 when clutch is disengaged are within the specified ranges below. If it is 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.

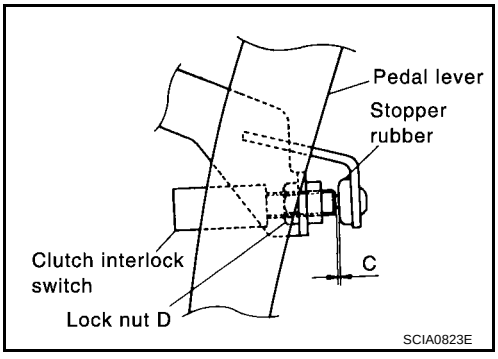
   Lock nut A:
   : 7.8 - 11.8 N·m (0.8 - 1.2 kg-m, 69 - 104 in-lb)



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.

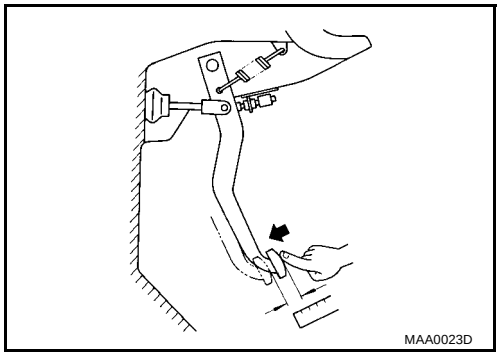
  Clearance C:
  0.1 - 1.0 mm (0.004 - 0.039 in)
  Lock nut D:
  : 11.8 - 14.7 N·m (1.2 - 1.4 kg-m, 9 - 10 ft-lb)



FREE PLAT 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.

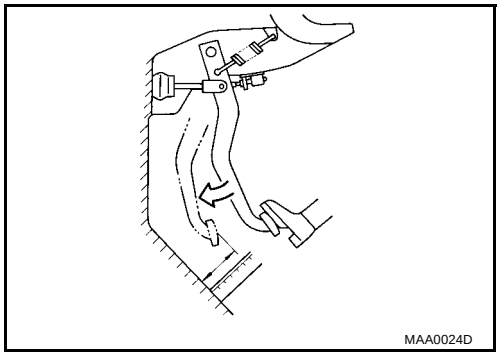
Pedal free play: 9 - 16 mm (0.35 - 0.63 in)



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.

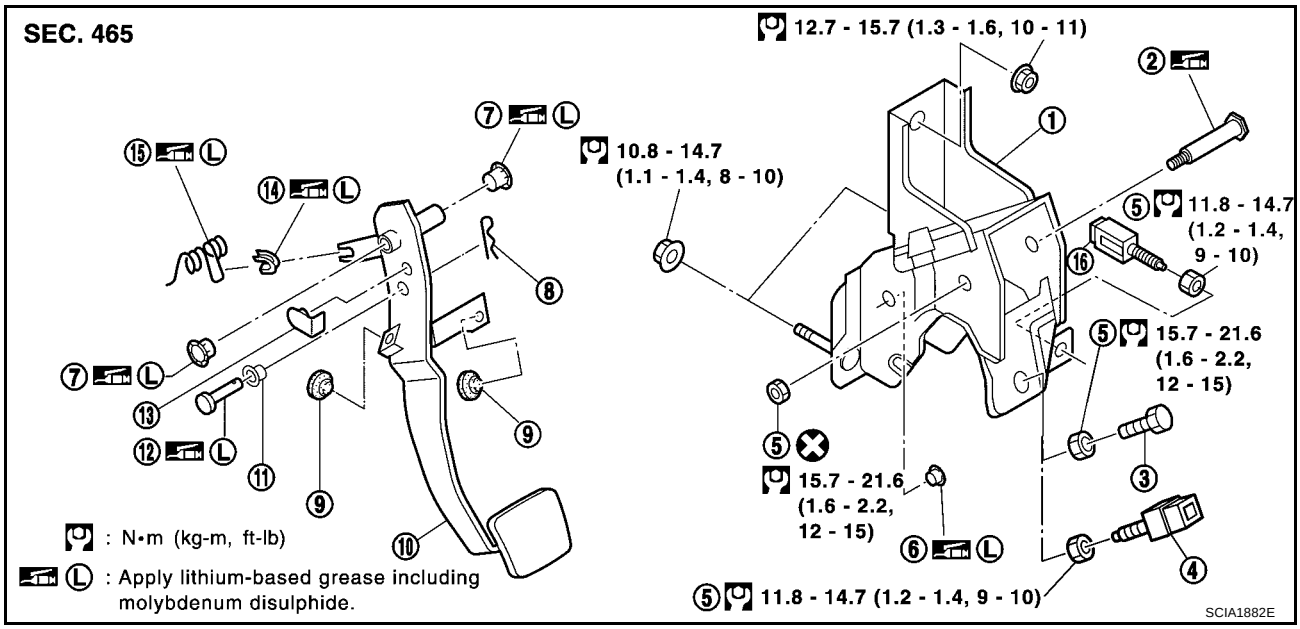
Pedal height when the clutch disengages:
85 mm (3.35 in) or more



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

ECS001WC



1. Pedal bracket assembly
2. Fulcrum pin
3. Pedal stopper bolt (Without ASCD)
4. ASCD clutch switch (With ASCD)
5. Lock nut
6. Bushing
7. Bushing
8. Snap pin
9. Stopper rubber
10. Clutch pedal
11. Bushing
12. Clevis pin
13. Stopper rubber
14. Bushing
15. Assist spring
16. Clutch switch

NOTE:
Install clutch pedal assembly and adjust the pedal height. Tighten pedal stopper bolt (or ASCD clutch switch) 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

PFP:00017

Air Bleeding Procedure

ECS008B9

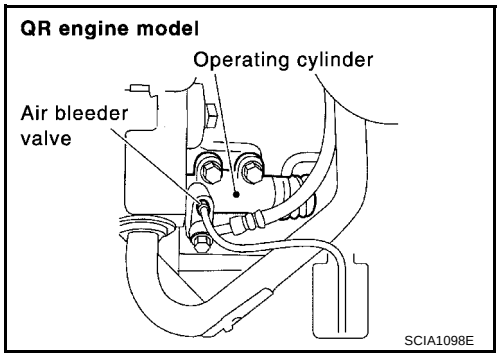
CAUTION:

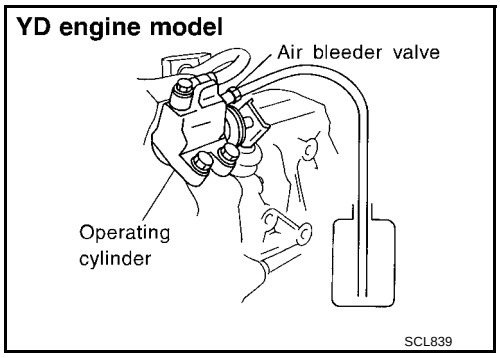
- **Monitor fluid level in the reservoir tank to make sure it does not empty.**
- **Do not spill clutch fluid onto painted surfaces. If it spills, wipe up immediately and wash the affected area with water.**
- Bleed the operating cylinder.

1. Fill the master cylinder reservoir tank with new clutch fluid.
2. Connect a transparent vinyl hose to the air bleeder valve.
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 valve.
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 (0.61 - 0.99 kg-m, 53 - 86 in-lb)





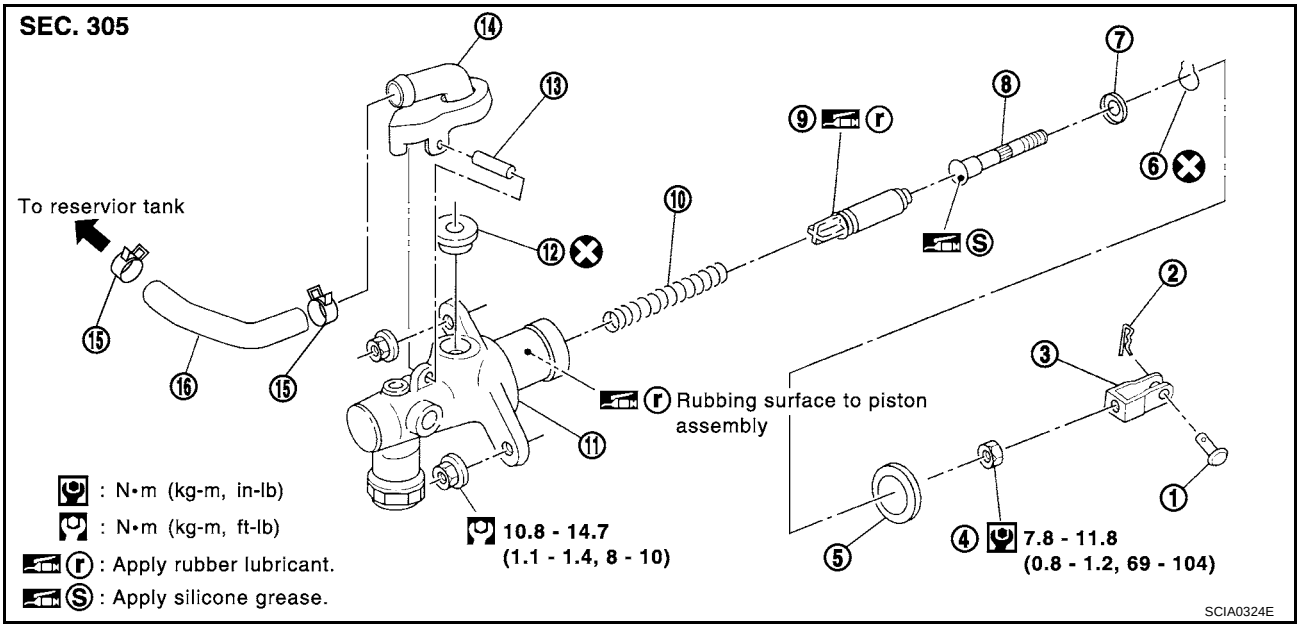
CLUTCH MASTER CYLINDER

PFP:30610

Removal and Installation

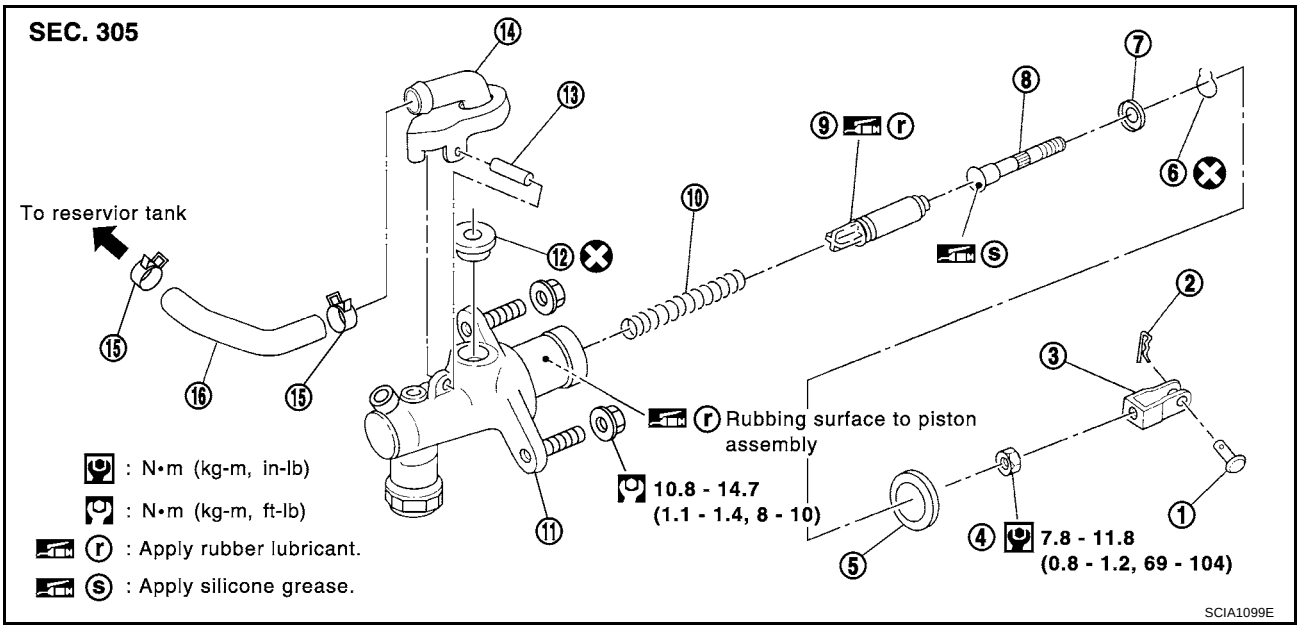
ECS008BA

—RHD model—



1. Clevis pin
2. Snap pin
3. Clevis
4. Lock nut
5. Seat
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

—LHD model—



1. Clevis pin
2. Snap pin
3. Clevis
4. Lock nut
5. Seat
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

1. 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

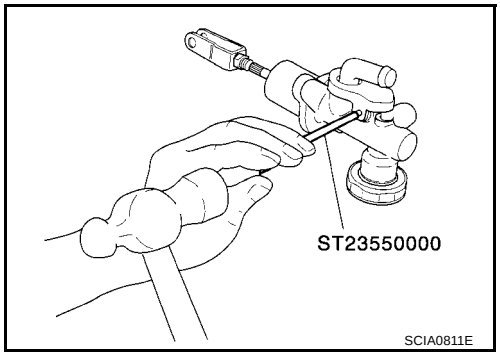
1. Connect clutch tube to master cylinder assembly and temporarily tighten flare nut.
2. Install master cylinder assembly and tighten mounting nut to the specified torque.
3. Using a flare nut torque wrench, tighten clutch tube flare nut to the specified torque.
4. Attach clevis of the clevis pin to 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

ECS008BB

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 seat.
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 seat

ASSEMBLY

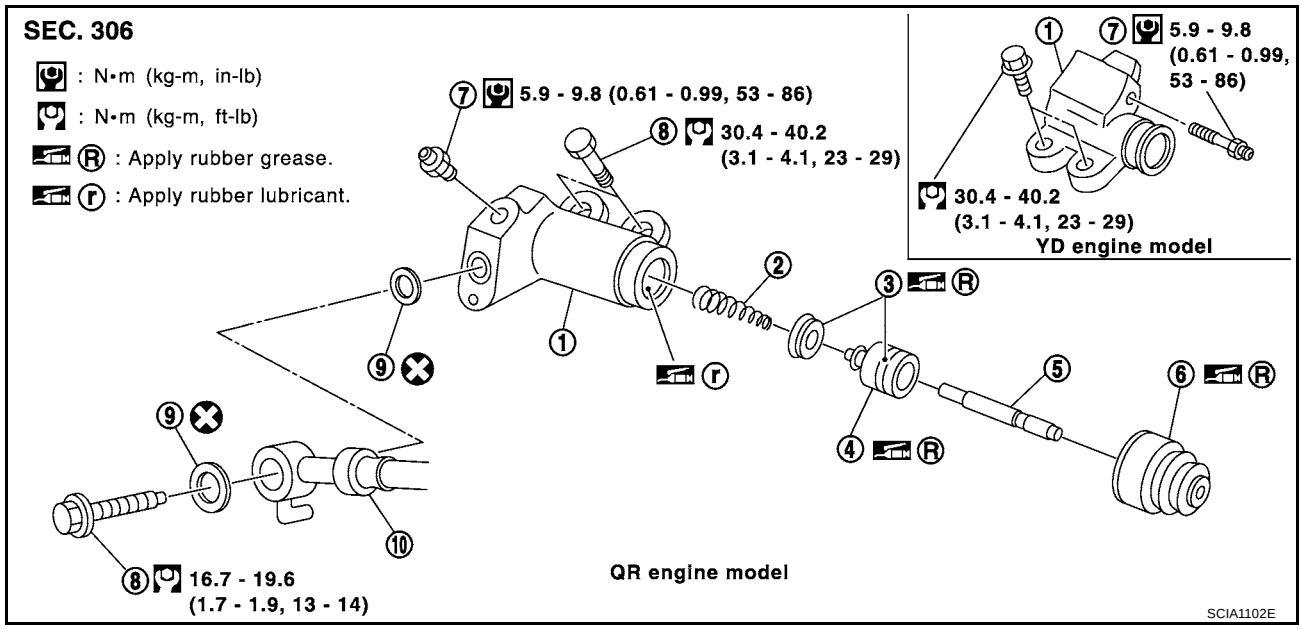
1. Apply rubber lubricant to internal surface of the cylinder body, sliding surface of piston assembly, and the piston cup. Insert piston assembly and return spring.
2. Apply silicon grease to push rod and install stopper. Install stopper ring while holding down the push rod by hand to prevent the piston assembly from popping out.
3. Install seat.
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

PFP:30620

Removal and Installation

ECS008BC



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

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 from vehicle.

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

ECS008BD

DISASSEMBLY

- 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 and piston spring into the cylinder body.
2. Apply rubber grease to dust cover and install push rod and dust cover.

CLUTCH PIPING

PFP:30650

Removal and Installation

ECS008BE

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:

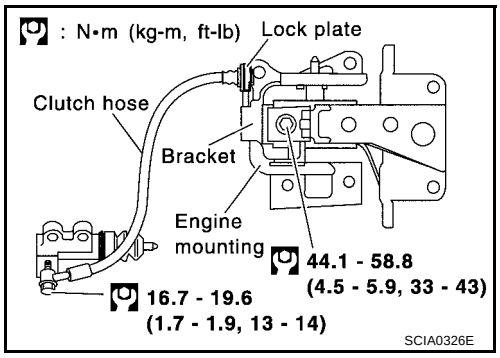
  : 15 - 17 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)

- Tighten clutch hose union bolt to the specified torque:

  : 16.7 - 19.6 N·m (1.7 - 1.9 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" .)

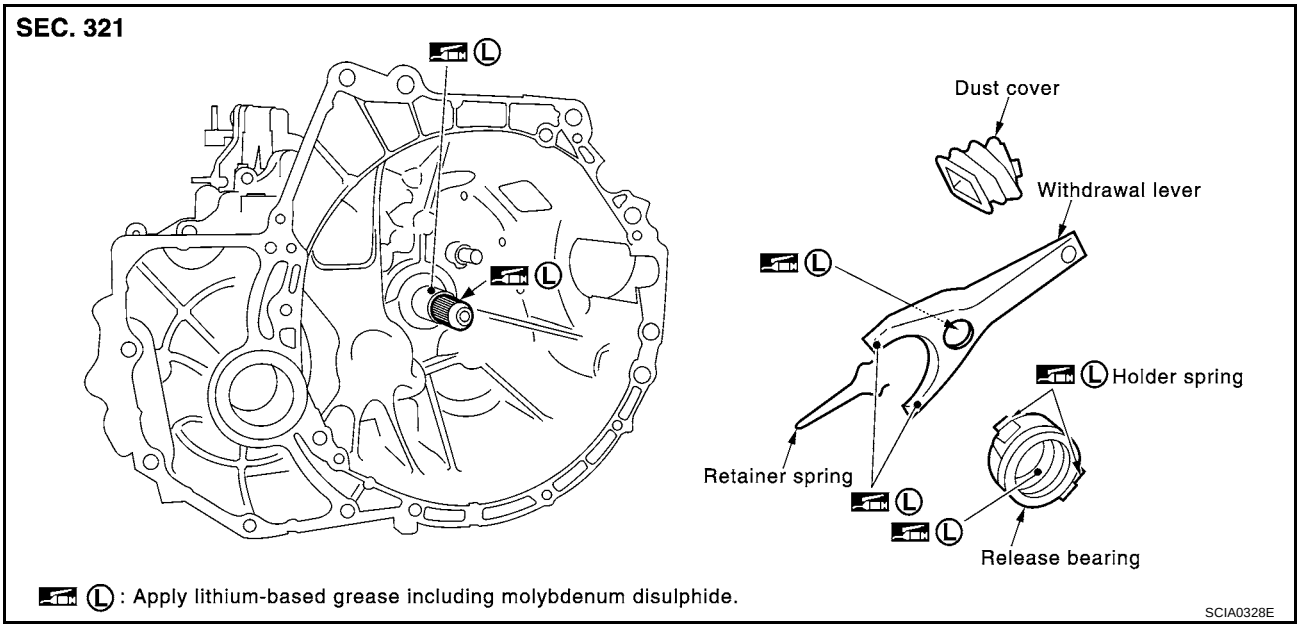


CLUTCH RELEASE MECHANISM

PFP:30502

Removal and Installation

ECS008BF

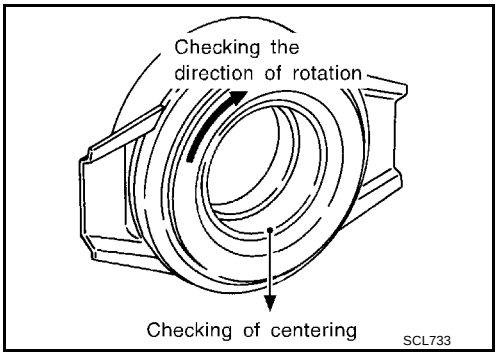


REMOVAL

1. Remove manual transaxle from the vehicle.
   - Refer to MT-15, "Removal and Installation" .
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.

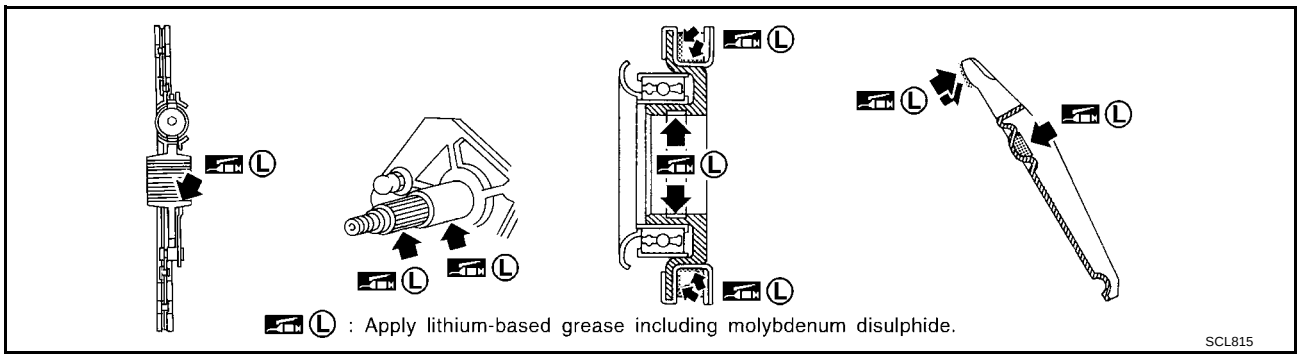


INSTALLATION

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 quiver. Wipe off any grease oozing from the parts.**
- **Be careful not to bring any grease into contact with the clutch disk facing, pressure plate surface, or flywheel surface.**

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.

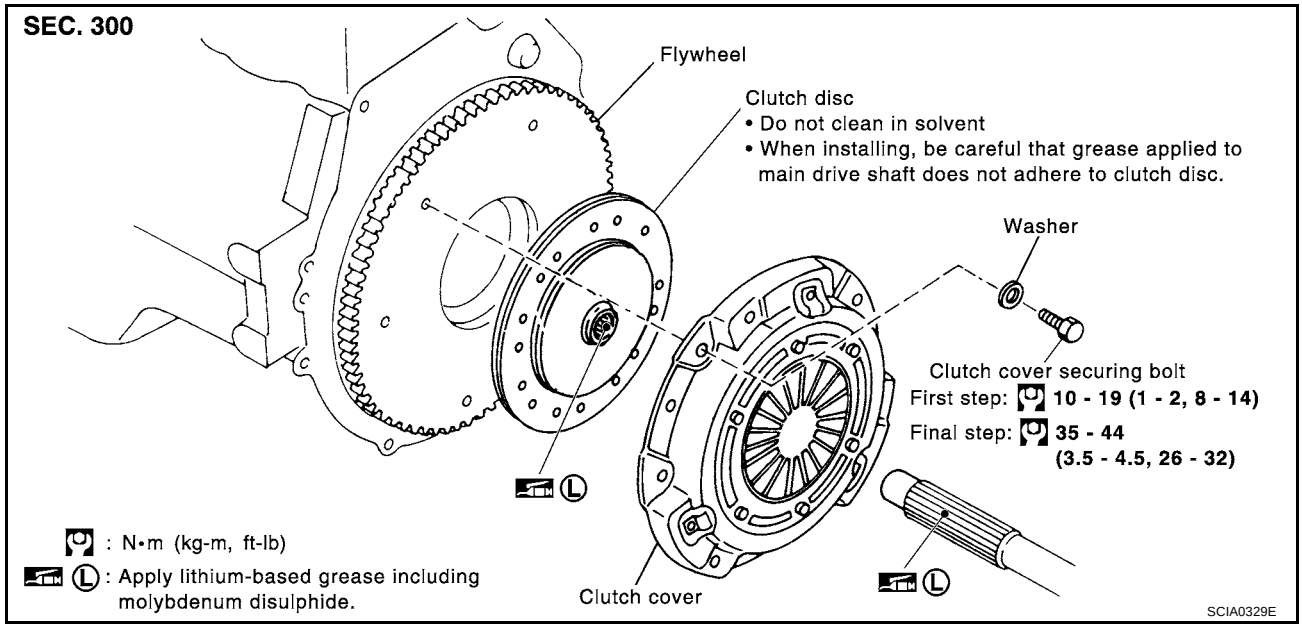
CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

PFP:30100

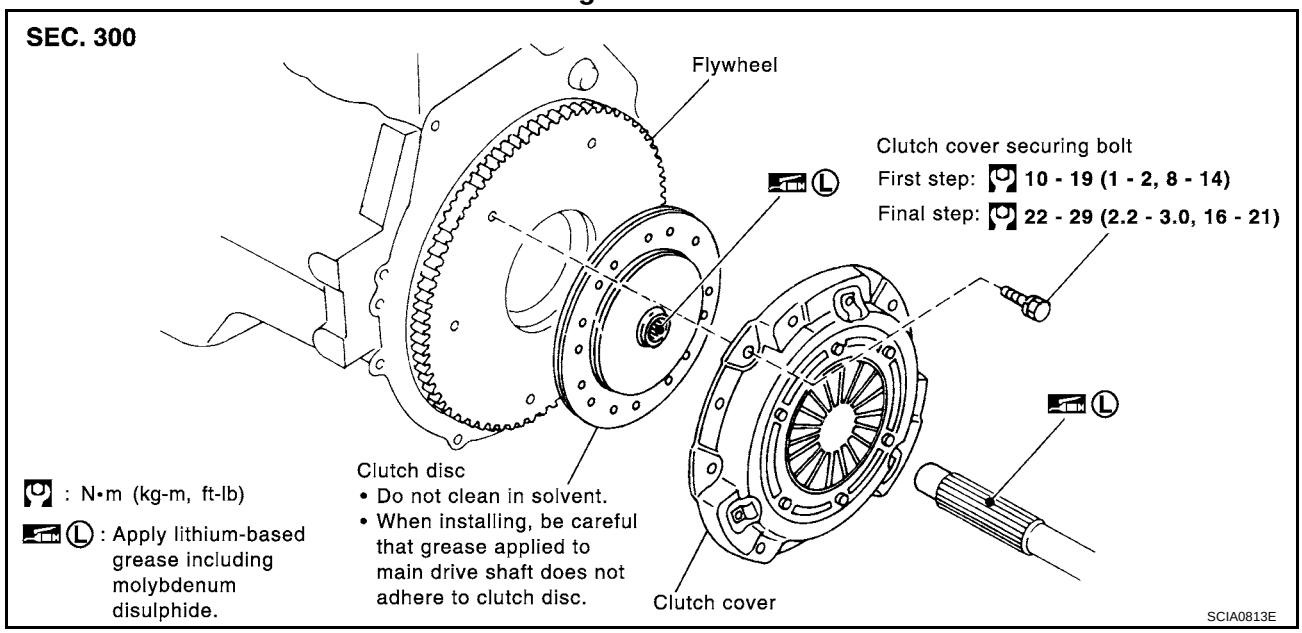
Removal and Installation

ECS008BG

—QR engine models—



—YD engine models—



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, "Removal and Installation" .
2. Loosen clutch cover mounting bolts evenly. Remove clutch cover and clutch disc.

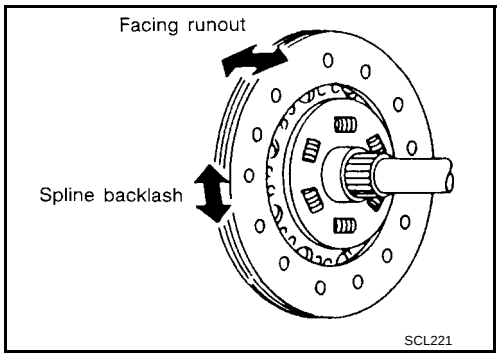
INSPECTION AND ADJUSTMENT AFTER REMOVAL

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:

  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.

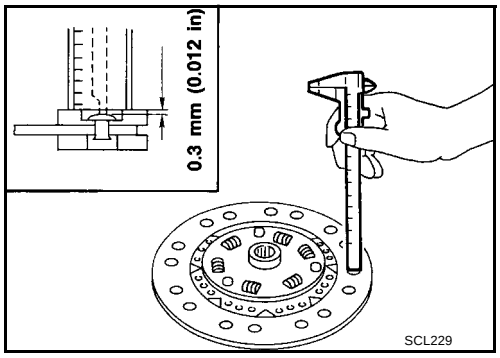
  Maximum allowable spline backlash:

  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 clutch disc.

  Facing wear limit (depth to the rivet head):

  0.3 mm (0.012 in)

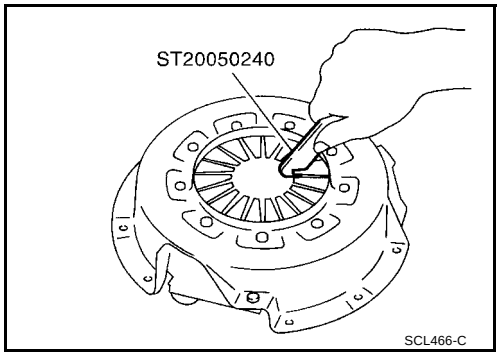


Clutch Cover

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:

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.

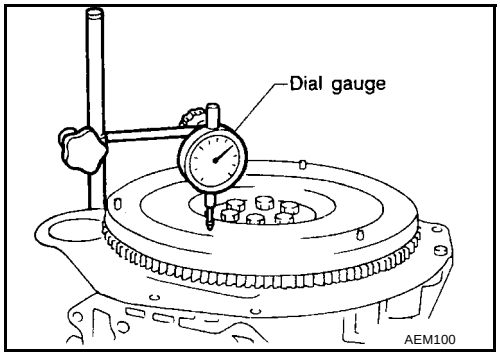
Allowable flywheel runout:

Vehicles with QR engine models:

Refer to EM-97, "Flywheel Deflection" .

Vehicles with YD engine models:

Refer to EM-218, "Flywheel Deflection" .



CAUTION:

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

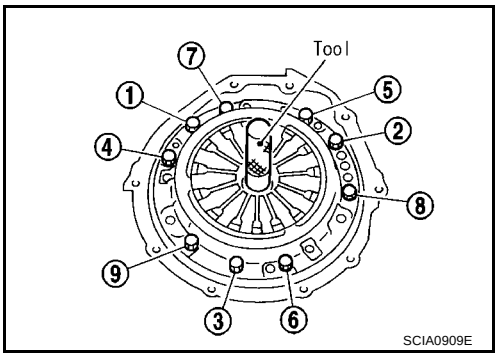
INSTALLATION

1. 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 quiver. Wipe off any grease oozing from the parts.

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

Engine type	Tool number
QR engine	KV30100100
YD engine	ST20630000



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

   First step:

   : 10 - 19 N·m (1.0 - 2.0 kg-m, 8 - 14 ft-lb)

   Final step:

   QR engine models

   : 35 - 44 N·m (3.5 - 4.5 kg-m, 26 - 32 ft-lb)

   YD engine models

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

4. Install manual transaxle.
   - Refer to MT-15, "Removal and Installation" .

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Clutch Control System

ECS008BH

Type of clutch control	Hydraulic

Clutch Master Cylinder

ECS008BI

Inner diameter	15.87 mm (5/8 in)

Clutch Operating Cylinder

ECS008BJ

Inner diameter	19.05 mm (3/4 in)

Clutch Disc

ECS008BK

Engine type	QR20DE	QR25DE	YD22DDTi
Model	240		
Facing size (outer dia. x inner dia. x thickness)	240 mm x 160 mm x 3.5 mm (9.45 in x 6.30 in x 0.138 in)		
Thickness of disc assembly with load	7.90 - 8.30 mm (0.3110 - 0.3268 in) with 5,688 N (580 kg, 1,279lb)		
Wear limit of facing surface to rivet head	0.3 mm (0.012 in)		
Runout limit/diameter of the area to be measured	1.0 mm (0.039 in) or less/ 230 mm (9.06 in) dia.		
Maximum spline backlash (at outer edge of disc)	1.0 mm (0.039 in)		

Clutch Cover

ECS008BL

Engine type	QR20DE	QR25DE	YD22DDTi
Model	240		250
Set-load	4,903 N (500 kg, 1,103 lb)	5,884 N (600 kg, 1,323 lb)	6,865 N (700 kg, 1,544 lb)
Diaphragm spring lever height	37.0 - 39.0 mm (1.457 - 1.535 in)		
Uneven limit diaphragm spring toe height	0.7 mm (0.028 in) or less		

Clutch Pedal

ECS001WL

Engine type		QR20DE	QR25DE	YD22DDTi
Pedal height	RHD models	171 - 181mm (6.73 - 7.13 in)		
	LHD models	167 - 177mm (6.57 - 6.97 in)		
Pedal height at clutch disengagement	RHD models	85 mm (3.35 in) or more		
	LHD models	85 mm (3.35 in) or more		
Pedal free play [Looseness at clevis pin]		9 - 16 mm (0.35 - 0.63 in) [1.0 - 3.0 mm (0.039 - 0.118 in)]		
Clearance between clutch switch thread end and stopper rubber		0.1 - 1.0 mm (0.004 - 0.039 in)		