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PRECAUTIONS

PRECAUTIONS

PFP:00001

Caution

ECS004JW

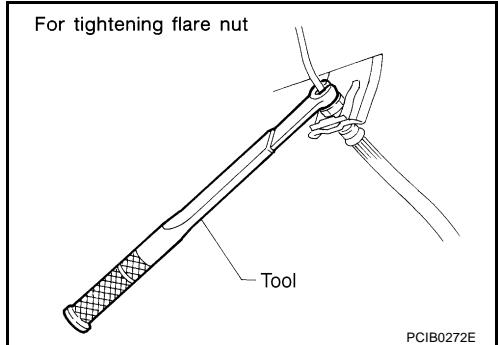
- Recommended clutch fluid is brake fluid "DOT 3" or "DOT 4". Refer to [MA-17, "Fluids and Lubricants"](#).
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas.
- When removing and installing clutch piping, use Tool.

Tool number : GG94310000 or Commercial equivalent

- 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 corrode the rubber parts of the hydraulic system.

WARNING:

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



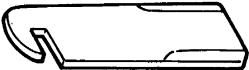
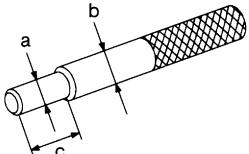
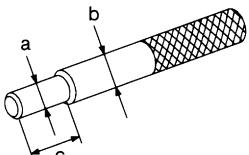
PREPARATION

PREPARATION

Special Service Tools

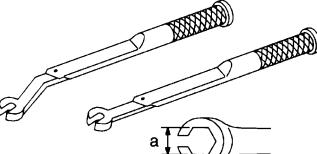
PFP:00002

ECS008B7

Tool number Tool name	Description
ST20050240 Diaphragm adjusting wrench	Adjusting unevenness of diaphragm spring of clutch cover
 ZZA0508D	
KV30101600 Clutch aligning bar a: 15.9 mm (0.626 in) dia. b: 17.9 mm (0.705 in) dia. c: 40 mm (1.57 in) dia.	Installing clutch cover and clutch disc (QR engine model)
 S-NT405	
ST20630000 Clutch aligning bar a: 15.8 mm (0.622 in) dia. b: 22.9 mm (0.902 in) dia. c: 45.0 mm (1.077 in)	Installing clutch cover and clutch disc (YD engine model)
 S-NT405	

Commercial Service Tools

ECS00CRA

Tool name	Description
Pin punch Tip diameter: 4.5 mm (0.177 in) dia.	Removing and installing master cylinder spring pin
 ZZA0515D	
GG94310000 Flare nut torque wrench a: 10 mm (0.39 in)	Removing and installing clutch piping
 S-NT406	

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

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

SUSPECTED PARTS (Possible cause)

Symptom	SUSPECTED PARTS (Possible cause)										Reference page																																																																	
	CLUTCH PEDAL (Inspection and 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)							
	Clutch grabs/chatters				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)							
	Clutch pedal spongy				1	2	2	2	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)			
	Clutch noisy								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)			
	Clutch slips				1				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)			
	Clutch does not disengage				1	2	3	4	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)			

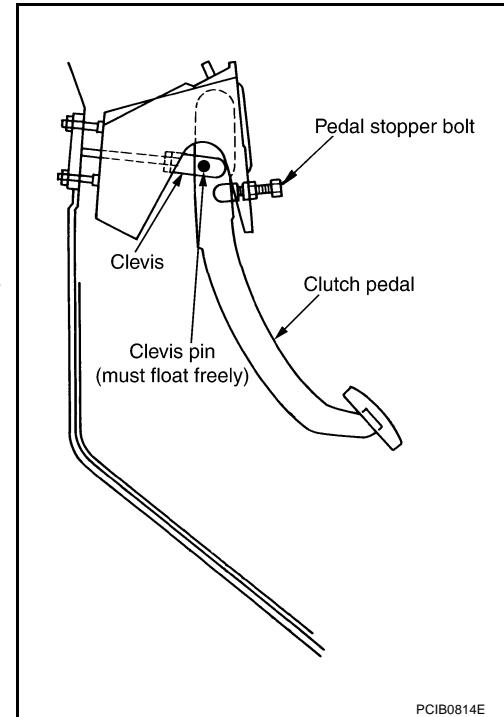
CLUTCH PEDAL

PFP:46540

On-Vehicle Inspection and Adjustment

ECS001WB

1. Check to see if clevis pin floats freely in bore of clutch pedal. It should not be bound by clevis or clutch pedal.
 - a. If clevis pin is not free, check that pedal stopper bolt is not applying pressure to clutch pedal causing clevis pin to bind. To adjust, loosen lock nut and turn pedal stopper bolt.
 - b. Tighten lock nut.
 - c. Verify that clevis pin floats in bore of clutch pedal. It should not be bound by clutch pedal.
 - d. If clevis pin is still not free, remove clevis pin and check for deformation or damage. Replace clevis pin if necessary. Leave clevis pin removed for step 2.
2. Check clutch pedal stroke for free range of movement.
 - a. With clevis pin removed, manually move clutch pedal up and down to determine if it moves freely.
 - b. If any sticking is noted, replace related parts (clutch pedal bracket, assist spring, bushing etc.). Reassemble clutch pedal and re-verify that clevis pin floats freely in bore of clutch pedal.



PCIB0814E

3. Check clutch hydraulic and system components (clutch master cylinder, clutch operating cylinder, clutch withdrawal lever, clutch release bearing, etc.) for sticking or binding.
 - a. If any sticking or binding noted, repair or replace related parts as necessary.
 - b. If hydraulic system repair was necessary, bleed the clutch hydraulic system. Refer to [CL-7, "Air Bleeding Procedure"](#).

NOTE:

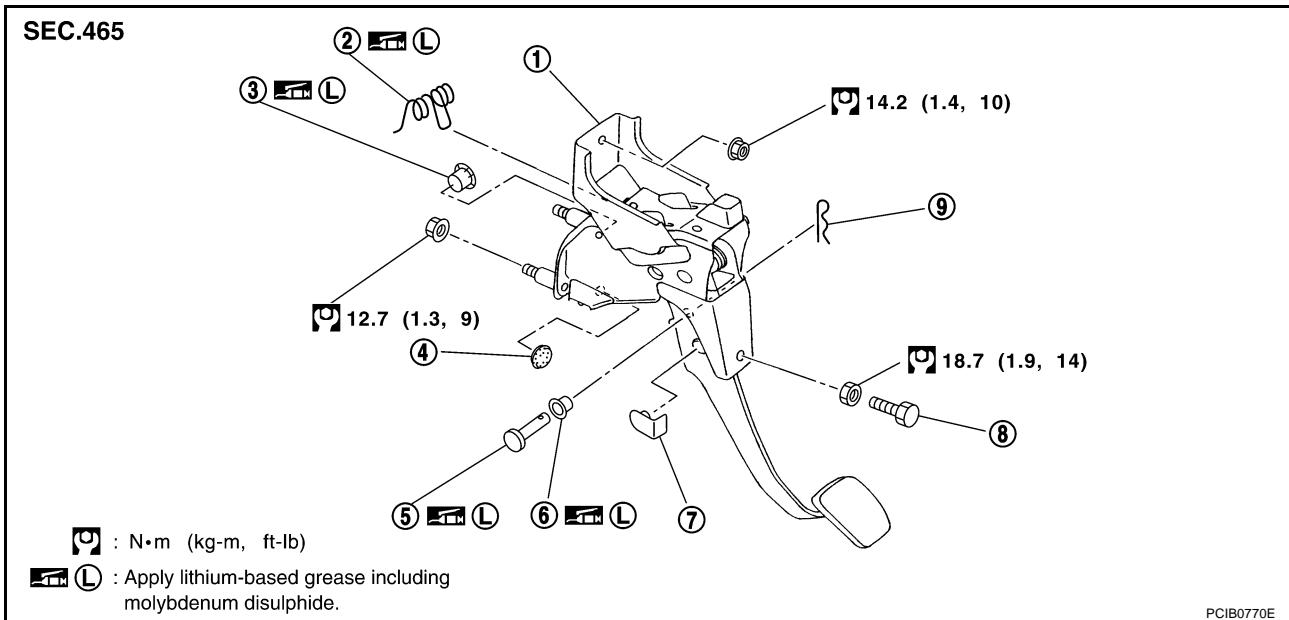
Do not use a vacuum assist or any other type of power bleeder on this system. Use of a vacuum assist or power bleeder will not purge all the air from the system.

CLUTCH PEDAL

Removal and Installation

ECS001WC

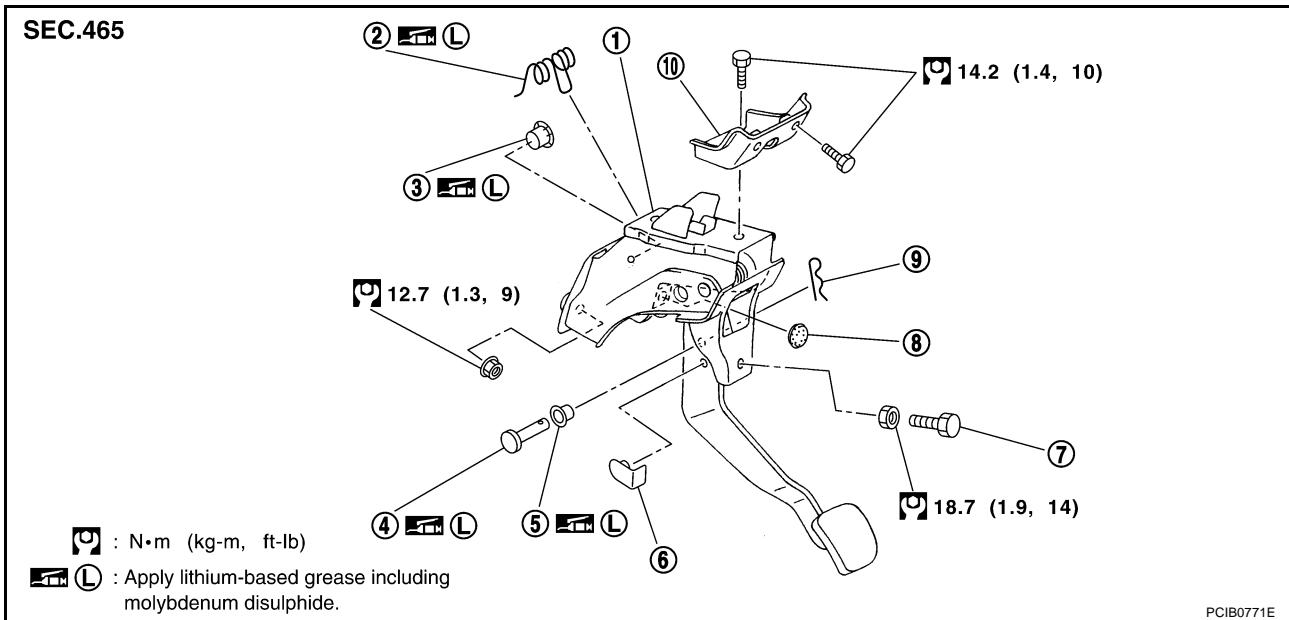
—RHD model—



PCIB0770E

1. Clutch pedal assembly
2. Assist spring
3. Bushing
4. Stopper rubber
5. Clevis pin
6. Bushing
7. Stopper rubber
8. Pedal stopper bolt
9. Snap pin

—LHD model—



PCIB0771E

1. Clutch pedal assembly
2. Assist spring
3. Bushing
4. Clevis pin
5. Bushing
6. Stopper rubber
7. Pedal stopper bolt
8. Stopper rubber
9. Snap pin
10. Bracket

NOTE:

Install clutch pedal assembly and check to see clevis pin floats freely in bore of clutch pedal.

INSPECTION AFTER REMOVAL

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

CLUTCH FLUID

PFP:00017

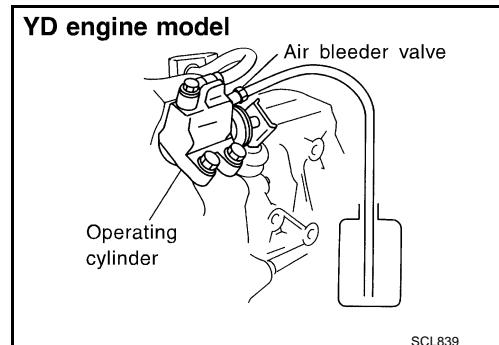
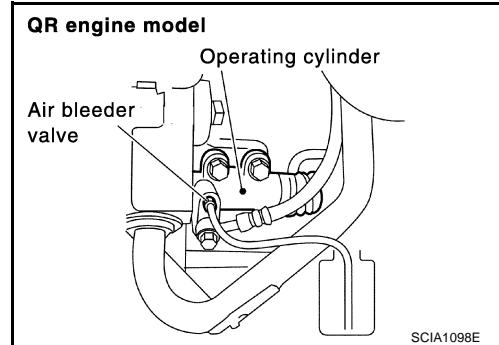
Air Bleeding Procedure

ECS008B9

CAUTION:

- Monitor clutch fluid level in 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 air of operating cylinder.

1. Fill master cylinder reservoir tank with new clutch fluid.
2. Connect a transparent vinyl hose to air bleeder valve.
3. Depress clutch pedal slowly and fully several times at an interval of 2 to 3 seconds and hold it.
4. With clutch pedal depressed, open air bleeder valve.
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 clutch fluid.
8. Tighten air bleeder valve to the specified torque. Refer to [CL-10, "Removal and Installation"](#).



CLUTCH MASTER CYLINDER

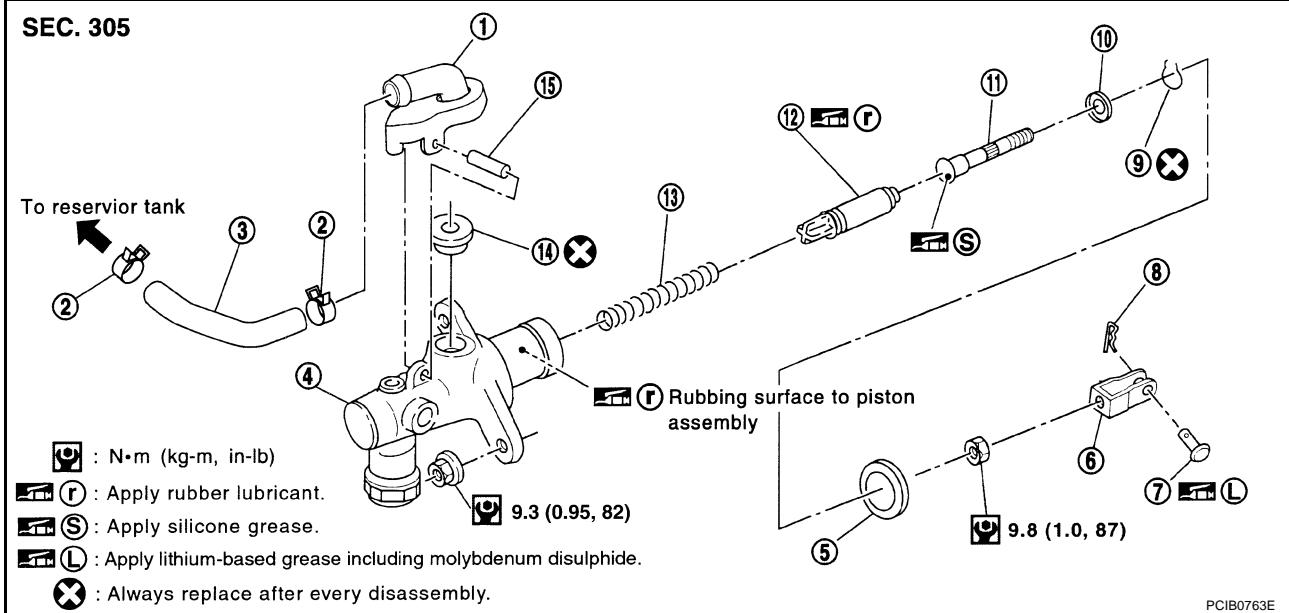
CLUTCH MASTER CYLINDER

PFP:30610

Removal and Installation

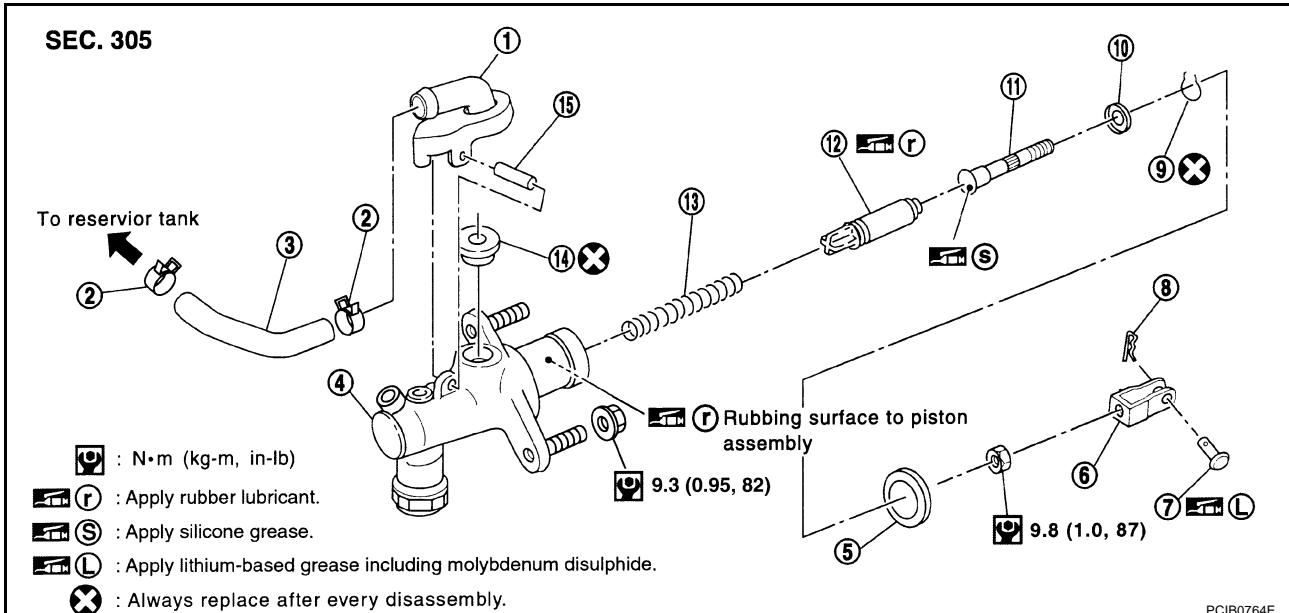
ECS008BA

—RHD model—



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

—LHD model—



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

REMOVAL

1. Using one of the following methods, remove hose from nipple.

CLUTCH MASTER CYLINDER

- Drain clutch fluid from reservoir tank and remove hose.
- Remove hose from 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 torque wrench, remove clutch tube.
3. Remove snap pin and clevis pin on clevis in passenger compartment to separate clutch pedal.
4. First remove mounting nuts on master cylinder assembly, and then master cylinder assembly from vehicle.

INSTALLATION

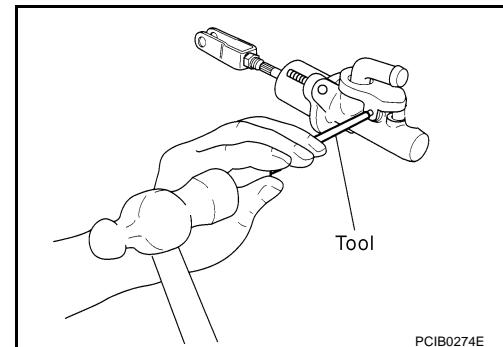
1. Connect clutch tube to master cylinder assembly and temporarily tighten flare nut.
2. Install master cylinder assembly and tighten mounting nut to the specified torque. Refer to [CL-8, "Removal and Installation"](#).
3. Using a flare nut torque wrench, tighten clutch tube flare nut to the specified torque. Refer to [CL-11, "Removal and Installation"](#).
4. Attach clevis of clevis pin to clutch pedal.
5. Attach snap pin to clevis pin.
6. Install hose to nipple.
7. After completing this procedure, inspect and adjust pedal height and then bleed clutch tube. Refer to [CL-5, "On-Vehicle Inspection and Adjustment"](#), [CL-7, "Air Bleeding Procedure"](#)

Disassembly and Assembly

DISASSEMBLY

ECS008BB

1. Remove spring pin, nipple and seal from cylinder body using a pin punch.
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.



PCIB0274E

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 spring
- Cracked or deformed seat

ASSEMBLY

1. Apply rubber lubricant to internal surface of cylinder body, sliding surface of piston assembly, and piston cup. Insert piston assembly and return spring.
2. Apply silicon grease to push rod and install stopper. Install stopper ring while holding down push rod by hand to prevent piston assembly from popping out.
3. Install seat.
4. Install clevis to push rod and tighten lock nut to the specified torque. Refer to [CL-8, "Removal and Installation"](#).
5. Install seal and nipple to cylinder body. Install spring pin, using a pin punch.

OPERATING CYLINDER

OPERATING CYLINDER

PFP:30620

Removal and Installation

ECS008BC

SEC. 306

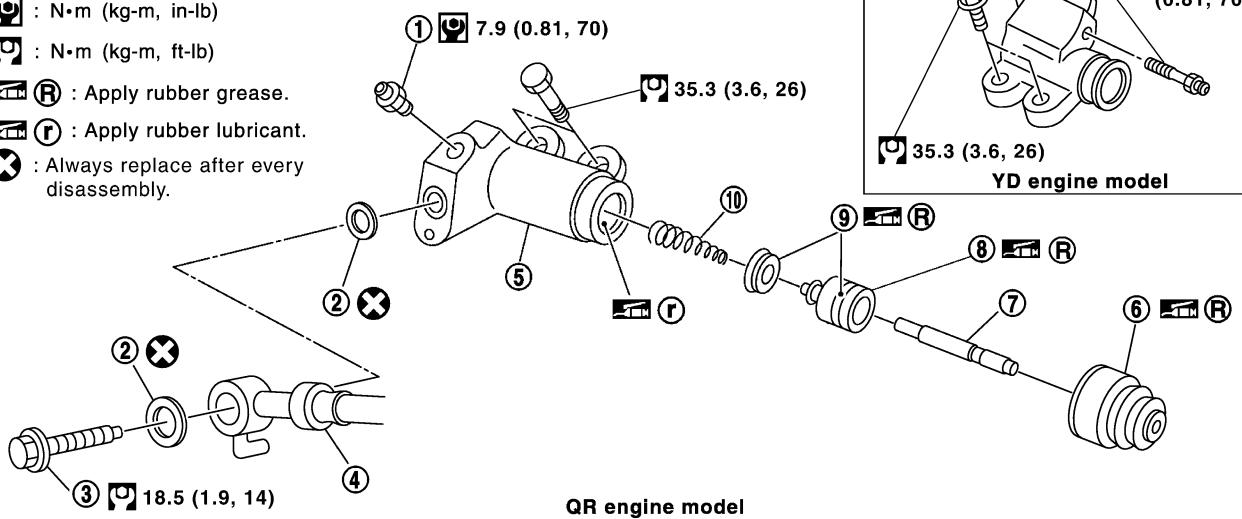
: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

: Apply rubber grease.

: Apply rubber lubricant.

: Always replace after every disassembly.



PCIB0765E

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

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 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 clutch tube. Refer to [CL-7, "Air Bleeding Procedure"](#) .

Disassembly and Assembly

ECS008BD

DISASSEMBLY

- Remove dust cover and push rod. Remove piston, piston cup, and piston spring from inside 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 internal 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 internal surface and rubber grease to piston cup and piston. Insert piston assembly and piston spring into cylinder body.
2. Apply rubber grease to dust cover and install push rod and dust cover.

CLUTCH PIPING

CLUTCH PIPING

Removal and Installation

PFP:30650

ECS008BE

A

B

CL

D

E

F

G

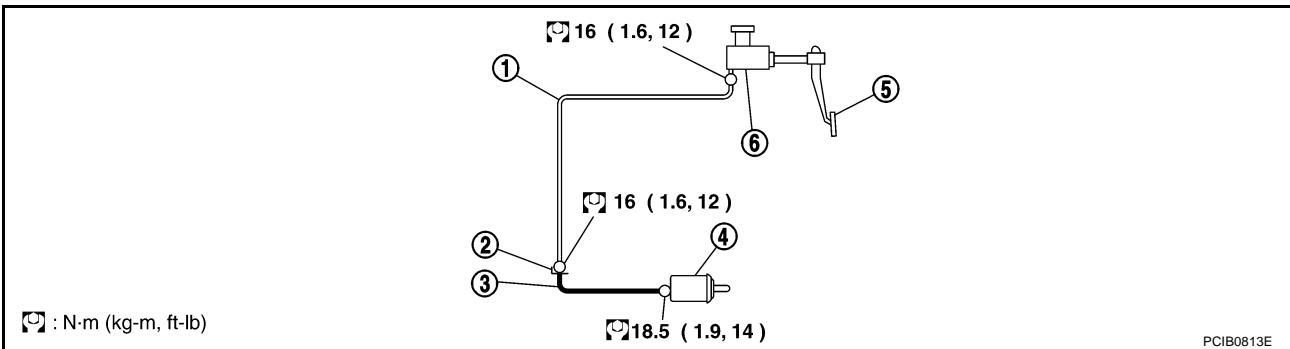
H

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L

M



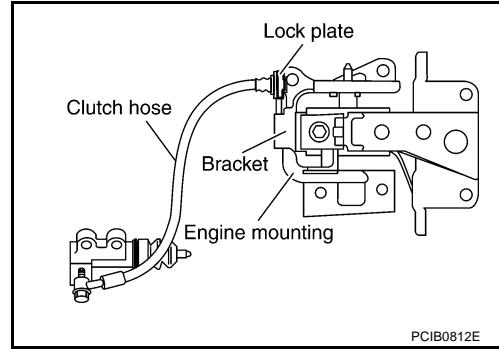
1. Clutch tube
2. Lock plate
3. Clutch hose
4. Operating cylinder
5. Clutch pedal
6. Master cylinder

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 clutch hose clasp on the bracket locating emboss and drive lock plate vertically from above. Be careful not to bend or twist clutch hose. Do not scratch or damage clutch hose.
- Tighten clutch tube flare nut to the specified torque. Refer to [CL-11, "Removal and Installation"](#) .
- Tighten clutch hose union bolt to the specified torque. Refer to [CL-11, "Removal and Installation"](#) .
- After installation, bleed clutch tube. Refer to [CL-7, "Air Bleeding Procedure"](#) .

CAUTION:

Do not reuse the copper washer.



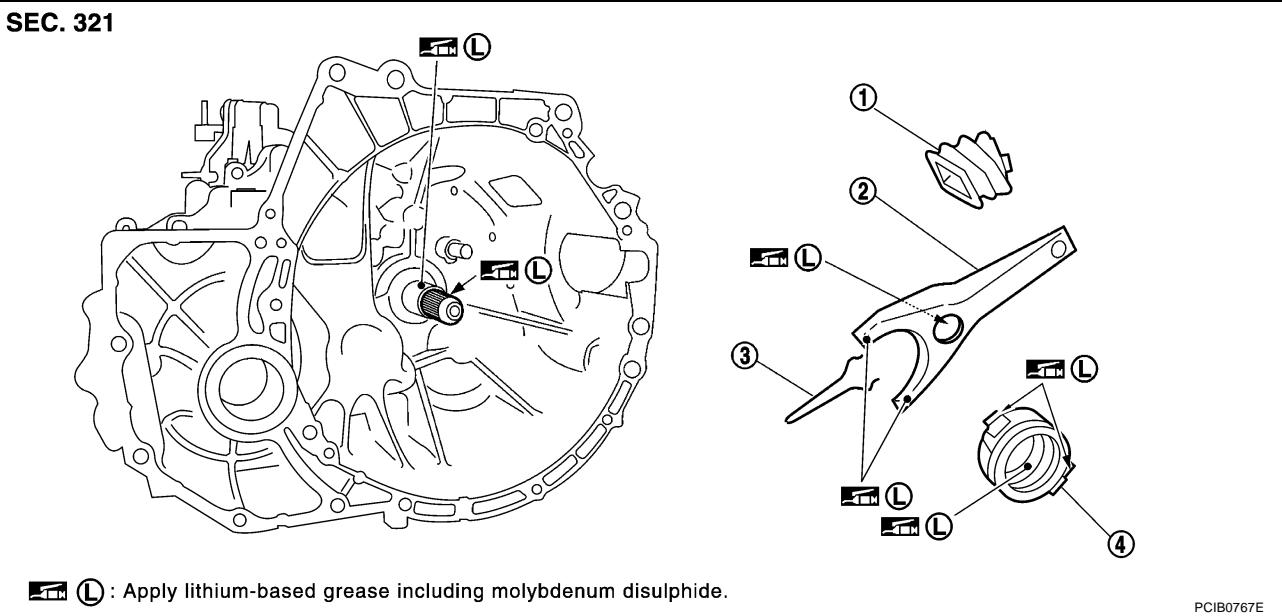
CLUTCH RELEASE MECHANISM

CLUTCH RELEASE MECHANISM

PFP:30502

Removal and Installation

ECS008BF



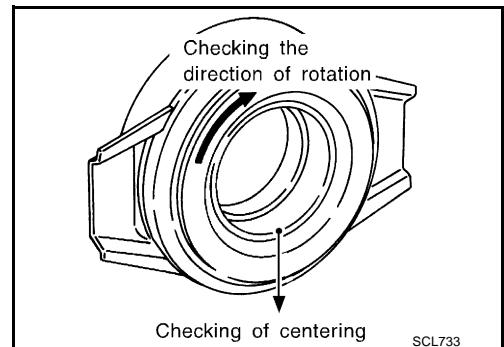
1. Dust cover
2. Withdrawal lever
3. Retainer spring
4. Release bearing

REMOVAL

1. Remove manual transaxle from the vehicle. Refer to [MT-17, "Removal and Installation"](#) .
2. Remove release bearing, withdrawal lever from inside clutch housing.
3. Remove dust cover.
4. Remove retainer spring from 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 withdrawal lever is excessively worn, replace it.
- If dust cover is cracked, replace it.



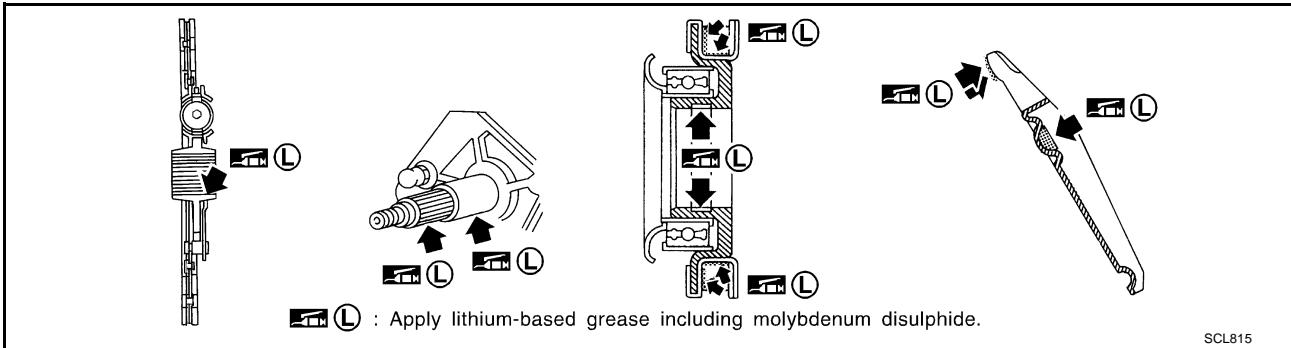
INSTALLATION

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.

CLUTCH RELEASE MECHANISM

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.

A
B
CL
D
E
F
G
H
I
J
K
L
M

CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

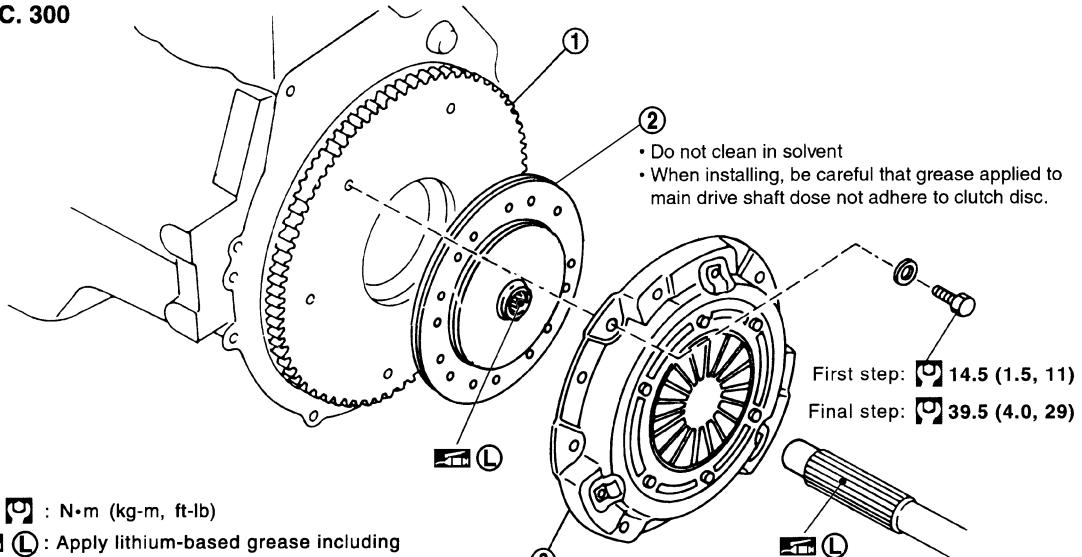
PFP:30100

Removal and Installation

ECS008BG

—QR engine model—

SEC. 300



1. Flywheel

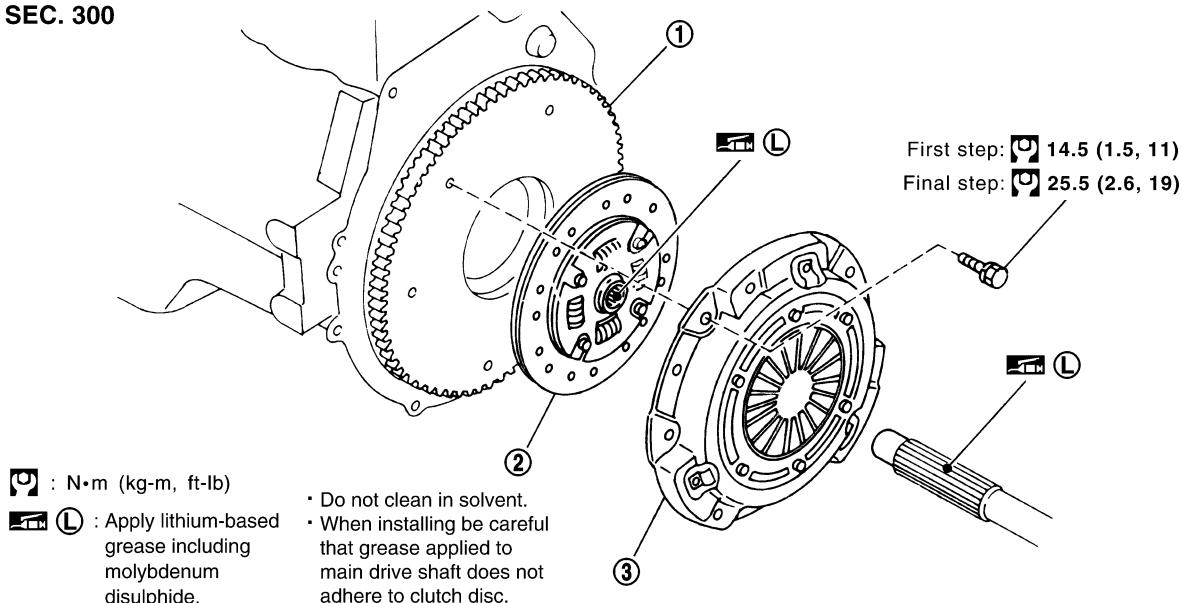
2. Clutch disc

3. Clutch cover

PCIB0768E

—YD engine model—

SEC. 300



1. Flywheel

2. Clutch disc

3. Clutch cover

PCIB0769E

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-17, "Removal and Installation"](#)
2. Loosen clutch cover mounting bolts evenly. Remove clutch cover and clutch disc.

CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

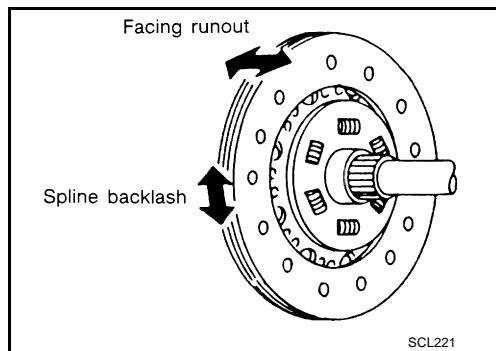
INSPECTION AND ADJUSTMENT AFTER REMOVAL

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.

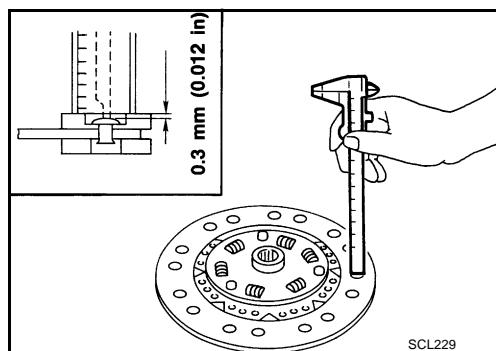


SCL221

- 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)



SCL229

- 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)

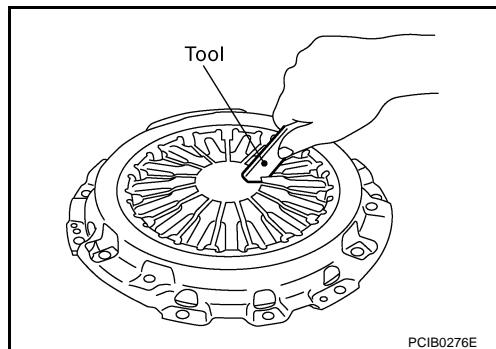
Clutch Cover

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.

Tolerance for diaphragm spring lever unevenness:

0.7 mm (0.028 in)

Tool number : ST 20050240



PCIB0276E

- 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.

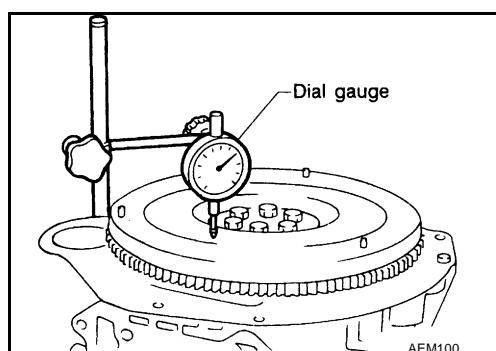
Allowable flywheel runout:

Vehicles with QR engine models:

Refer to [EM-108, "FLYWHEEL DEFLECTION \(M/T MODELS\)"](#).

Vehicles with YD engine models:

Refer to [EM-235, "FLYWHEEL DEFLECTION"](#).



AEM100

CAUTION:

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

CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

INSTALLATION

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

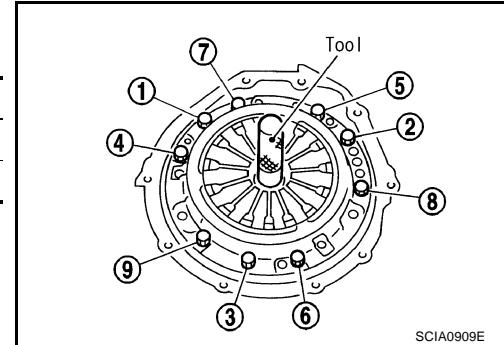
CAUTION:

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	KV30101600
YD engine	ST20630000

3. Tighten clutch cover attaching bolts evenly in two steps in the order shown in the figure. Refer to [CL-14, "Removal and Installation"](#).
4. Install manual transaxle. Refer to [MT-17, "Removal and Installation"](#).



SERVICE DATA AND SPECIFICATIONS (SDS)

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PFP:00030

Clutch Control System

ECS008BH

Type of clutch control	Hydraulic
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Clutch Master Cylinder

ECS008BI

Inner diameter	15.87 mm (5/8 in)
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Clutch Operating Cylinder

ECS008BJ

Inner diameter	19.05 mm (3/4 in)
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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)	7.70 - 8.10 mm (0.303 - 0.319 in) with 7,845N (800 kg, 1,764 lb)	
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)	7,600 N (755 kg, 1,708 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		

SERVICE DATA AND SPECIFICATIONS (SDS)
