

SECTION **CL**  
CLUTCH

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# PRECAUTIONS

## PRECAUTIONS

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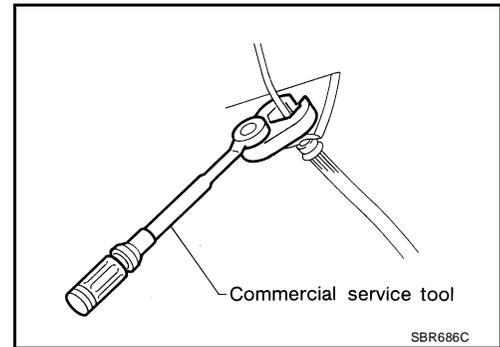
### Precautions

ECS004P9

- Recommended fluid is brake fluid “DOT 3”.
- 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

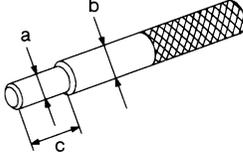
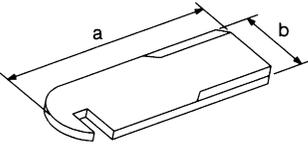
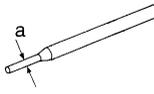
## PREPARATION

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### Special Service Tools

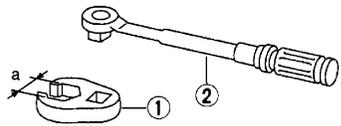
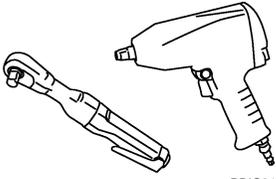
ECS004PA

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST20630000 (J26366) Clutch aligning bar	 <p>Installing clutch cover and clutch disc  <b>a: 15.8 mm (0.622 in) dia.</b>  <b>b: 22.9 mm (0.902 in) dia.</b>  <b>c: 45.0 mm (1.772 in)</b></p> <p style="text-align: right;">NT405</p>
ST20050240 ( — ) Diaphragm spring adjusting wrench	 <p>Adjusting unevenness of diaphragm spring of clutch cover  <b>a: 150 mm (5.91 in)</b>  <b>b: 25 mm (0.98 in)</b></p> <p style="text-align: right;">NT404</p>
KV32101000 (J25689-A) Pin punch	 <p>Removing and installing spring pin  <b>a: 4 mm (0.16 in) dia.</b></p> <p style="text-align: right;">NT410</p>

### Commercial Service Tools

ECS004PB

Tool name	Description
1 Flare nut crowfoot 2 Torque wrench	 <p>Removing and installing clutch piping  <b>a: 10 mm (0.39 in)</b></p> <p style="text-align: right;">NT360</p>
Power tool	 <p>Loosening bolts and nuts</p> <p style="text-align: right;">PBIC0190E</p>

# NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

## NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PF0:00003

### NVH TROUBLESHOOTING CHART

ECS004PC

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.

		CL-6	CL-7	CL-9	CL-11	EM-63, "Removal and Installation" (QR25DE), EC-1009, "Diagnostic Procedure" (VQ35DE)	CL-13	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-15	CL-16	CL-16	CL-16	CL-16, "FLYWHEEL"	
Reference page																				
SUSPECTED PARTS (Possible cause)		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)	
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

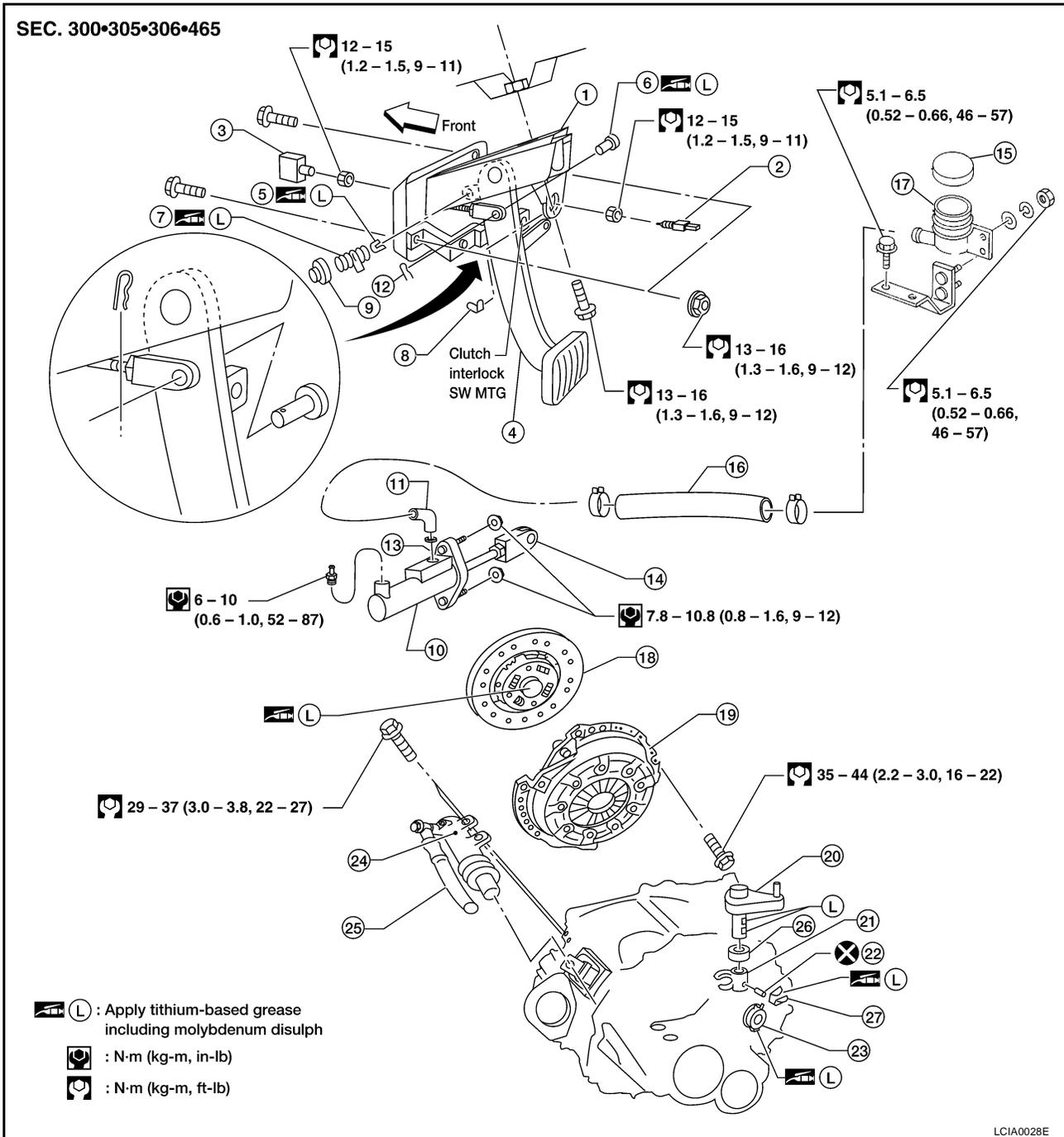
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ECS004PD

## CLUTCH PEDAL

### Components

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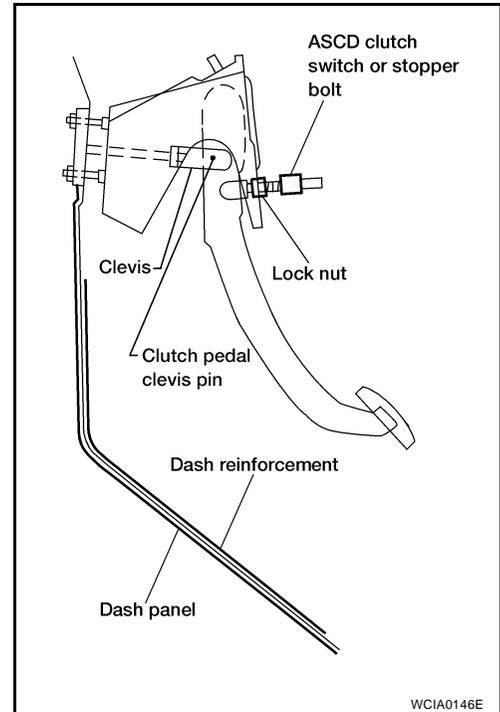
- |                            |                       |                            |
|----------------------------|-----------------------|----------------------------|
| 1. Clutch pedal bracket    | 2. ASCD clutch switch | 3. Clutch interlock switch |
| 4. Clutch pedal            | 5. Bushing            | 6. Clevis pin              |
| 7. Assist spring           | 8. Stopper rubber     | 9. Bushing                 |
| 10. Clutch master cylinder | 11. Nipple            | 12. Snap pin               |
| 13. Seal                   | 14. Clevis            | 15. Reservoir cap          |
| 16. Hose                   | 17. Reservoir tank    | 18. Clutch disc            |
| 19. Clutch cover           | 20. Withdrawal lever  | 21. Clutch lever           |
| 22. Spring pin             | 23. Release bearing   | 24. Operating cylinder     |
| 25. Clutch hose            | 26. Spacer            | 27. Holder                 |

# CLUTCH PEDAL

ECS004PE

## On-vehicle Inspection and Adjustment

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



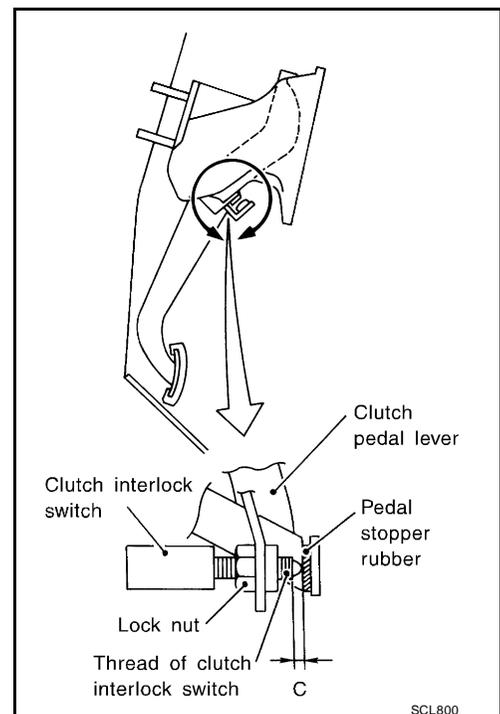
3. Adjust the clearance "C" while fully depressing the clutch pedal (with the clutch interlock switch) as shown.

**Clearance "C" : 0.1 - 1.0 mm (0.004 - 0.039 in)**

4. Check the clutch hydraulic 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 is noted, repair or replace the related parts as necessary.
  - b. If any 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 of the air from the system.



## Removal and Installation

Refer to [CL-5, "Components"](#).

### INSPECTION AFTER REMOVAL

- Inspect for clutch bending, damage and welding cracks. Replace if necessary.
- Make sure that the assist spring and return spring have not lost their spring. Replace if necessary.

ECS004PF

# CLUTCH FLUID

## CLUTCH FLUID

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### Air Bleeding Procedure

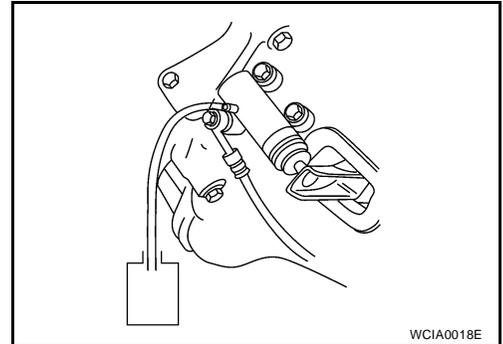
ECS004PG

#### 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 of the air from the system.

- Bleed air according to the following procedure.
- Carefully monitor fluid level at reservoir tank during bleeding operation.
- When bleeding the air from the clutch fluid, first bleed the air from the operating cylinder air bleed valve and then from the bleed connector air bleed valve.

1. Top off reservoir with new recommended brake fluid.
2. Connect a transparent vinyl tube to the air bleeder valve on the clutch operating cylinder.
3. Fully depress the clutch pedal several times.
4. With clutch pedal depressed, open the bleeder valve to release air.
5. Close the bleeder valve.



6. Repeat steps 3 through 5 until clear brake fluid comes out of the air bleeder valve.

**Air bleeder valve tightening torque : 5.9 - 9.8 N·m (0.6 - 1.0 kg-m, 52 - 87 in-lb)**

7. Perform steps 1 through 6 for bleeding air from the air bleeder valve on the bleed connector.

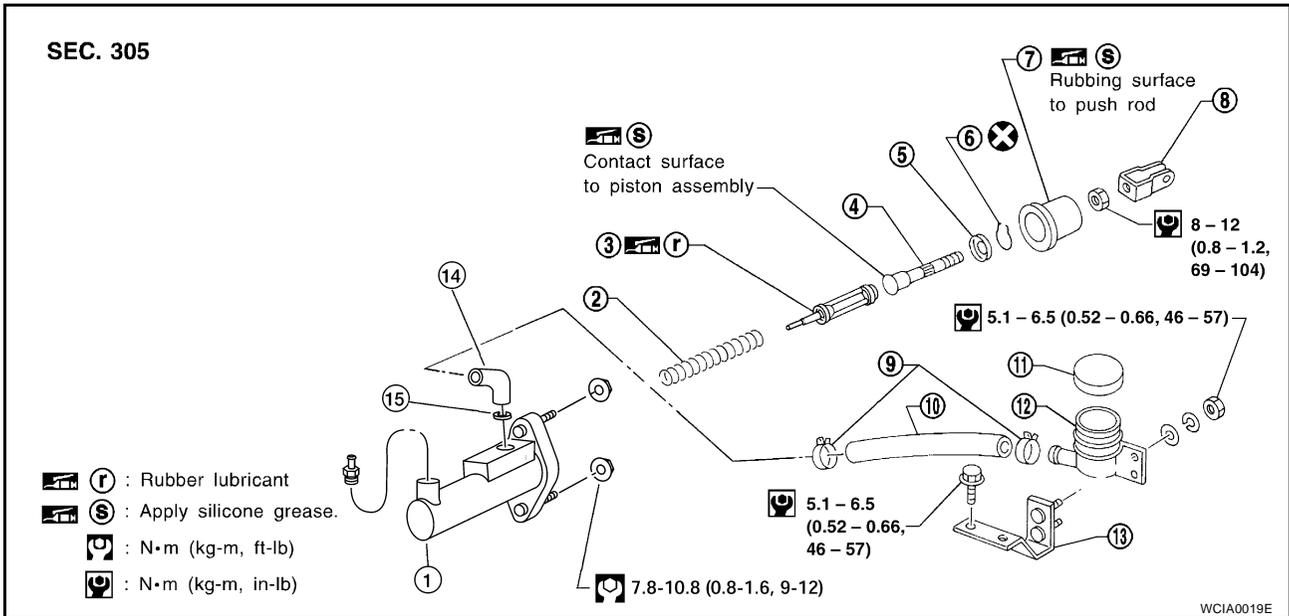
# CLUTCH MASTER CYLINDER

PFP:30610

## CLUTCH MASTER CYLINDER

### Removal and Installation

ECS004PH



- |                           |                   |                    |
|---------------------------|-------------------|--------------------|
| 1. Clutch master cylinder | 2. Return spring  | 3. Piston assembly |
| 4. Push rod               | 5. Stopper        | 6. Stopper ring    |
| 7. Dust cover             | 8. Clevis         | 9. Hose clamp      |
| 10. Hose                  | 11. Reservoir cap | 12. Reservoir tank |
| 13. Bracket               | 14. Nipple        | 15. Seal           |

### REMOVAL

1. Drain brake fluid from hydraulic clutch system.

#### CAUTION:

**Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**

2. Remove clutch tube using a flare nut wrench.
3. Remove snap pin between clutch pedal and push rod, and remove clevis pin.
4. Unscrew master cylinder assembly mounting nuts and reservoir tank bracket mounting bolts to remove master cylinder assembly from vehicle.

### INSTALLATION

1. Connect clutch tube to master cylinder assembly, and hand-tighten flare nut.
2. Install master cylinder assembly to vehicle, and tighten mounting nuts to the specified torque.

**Master cylinder assembly tightening torque : 7.8 - 10.8 N·m (0.8 - 1.1 kg-m, 69 - 95 in-lb)**

3. Tighten reservoir tank bracket mounting bolts.

**Reservoir tank bracket tightening torque : 5.1 - 6.5 N·m (0.52 - 0.66 kg-m, 45.1 - 57.3 in-lb)**

4. Tighten clutch tube flare nut using a flare nut torque wrench.

**Clutch tube flare nut tightening torque : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)**

5. After installing clevis pin, install snap pin to connect clutch pedal to push rod.  
After finishing the operation, bleed air from clutch piping. (Refer to [CL-7, "Air Bleeding Procedure"](#) .)

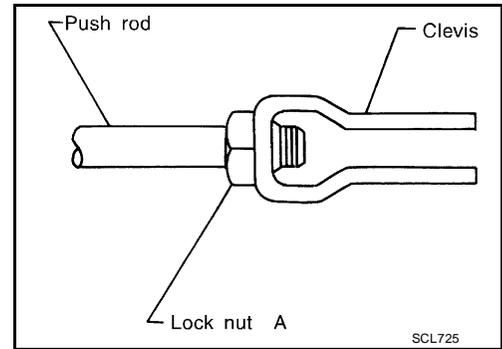
# CLUTCH MASTER CYLINDER

## Disassembly and Assembly

### DISASSEMBLY

ECS004PI

1. Loosen push rod lock nut A to remove clevis and lock nut A.
2. Remove dust cover.
3. Remove stopper ring and stopper, and remove push rod from cylinder body. During removal, keep push rod depressed, to prevent piston inside master cylinder from popping out.
4. Remove piston assembly from cylinder body.



### INSPECTION AFTER DISASSEMBLY

Inspect for the following, and replace parts if necessary.

- Damage, wear, rust, and pinholes on the cylinder inner wall
- Damage and deformation of the reservoir tank
- Weak spring
- Crack and deformation of the dust cover

### ASSEMBLY

1. Apply rubber lubricant to the sliding part of piston assembly, and insert piston assembly.
2. After installing stopper to push rod, install stopper ring while keeping piston assembly depressed by hand, so that piston assembly will not pop out.

#### **CAUTION:**

**Stopper ring cannot be reused. Always use a new stopper ring for assembly.**

3. Install dust cover.
4. Install clevis to push rod, and tighten lock nut "A" to the specified torque.

**Lock nut "A" tightening torque : 7.8 - 11.8 N-m (0.8 - 1.2 kg-m, 69 - 104 in-lb)**

5. Install seal and nipple to cylinder body, and install spring pin using a pin punch.

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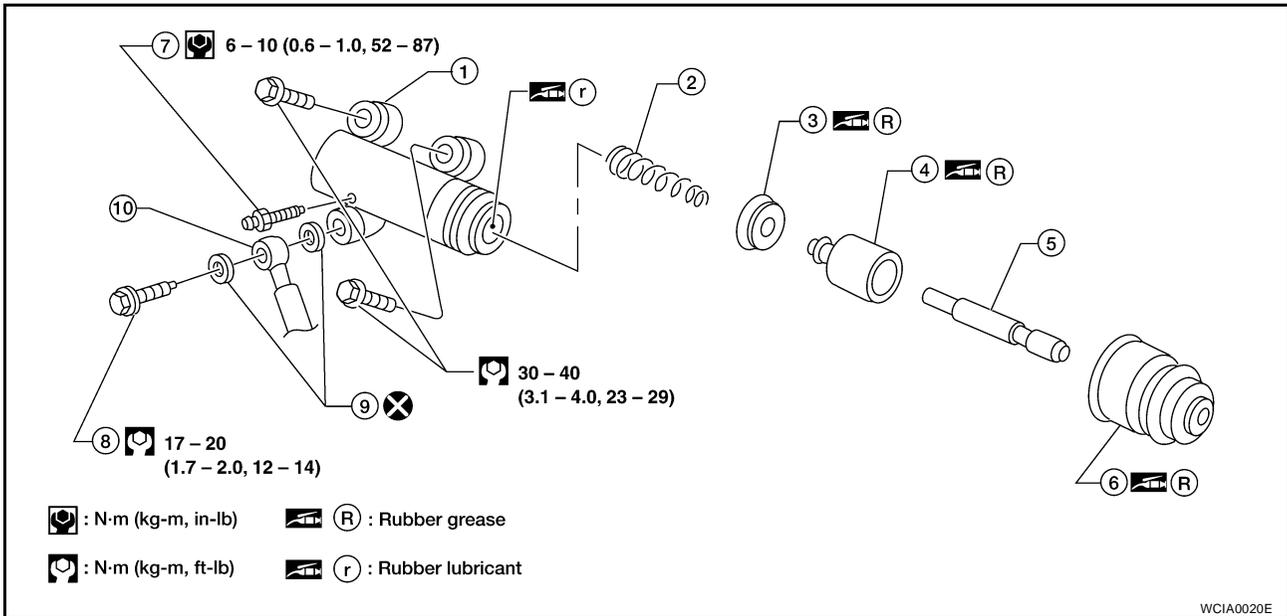
# OPERATING CYLINDER

PF3:30620

## OPERATING CYLINDER

### Removal and Installation

ECS004PJ



- |                  |                  |                  |
|------------------|------------------|------------------|
| 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  |                  |                  |

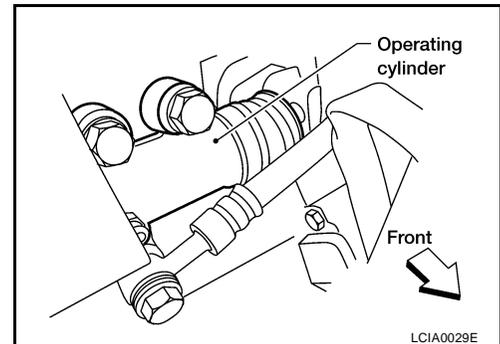
### REMOVAL

1. Drain the brake fluid from hydraulic clutch system.

#### CAUTION:

Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

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



### INSTALLATION

Installation is in the reverse order of removal.

#### CAUTION:

- Install the hose without twisting it.
- The copper washer of the union bolt should not be reused. Always use a new copper washer for installation.
- After finishing the operation, bleed air from the clutch piping. Refer to [CL-7. "Air Bleeding Procedure"](#).

### Disassembly and Assembly DISASSEMBLY

ECS004PK

Remove the dust cover, and remove the piston assembly from the cylinder body.

# OPERATING CYLINDER

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## INSPECTION AFTER DISASSEMBLY

Inspect for the following, and replace any parts if necessary.

- Damage, foreign material, wear, rust, and pinholes on the cylinder inner surface, piston, and sliding part of the piston cup.
- Weak spring.
- Cracking and deformation of the dust cover.

## ASSEMBLY

Assembly is in the reverse order of disassembly.

### **CAUTION:**

**Apply recommended rubber grease to the piston cup and piston before assembly.**

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# CLUTCH PIPING

PF3:30650

## CLUTCH PIPING

### Removal and Installation

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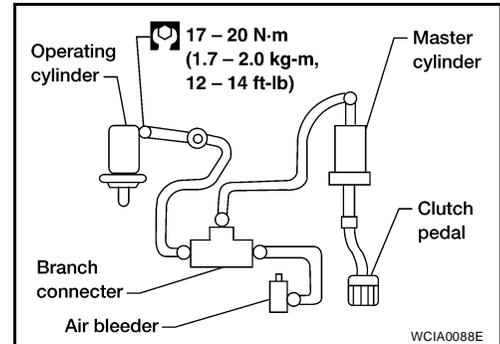
#### REMOVAL

1. Remove the fuel filter mounting bracket.
2. Remove the air cleaner and air duct. Refer to [EM-110, "AIR CLEANER AND AIR DUCT"](#) (QR25DE), [EM-14, "AIR CLEANER AND AIR DUCT"](#) (VQ35DE).
3. Drain brake fluid from hydraulic clutch system.

#### CAUTION:

**Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**

4. Remove flare nut using a flare nut wrench.
5. Remove clutch hose from the operating cylinder and the clutch tube.



#### INSTALLATION

1. When installing clutch hose to bracket, face lock plate in the correct direction as shown to secure clutch hose.

#### CAUTION:

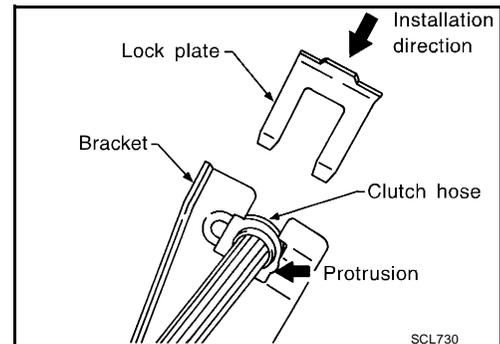
**Install clutch hose without twisting or bending it.**

2. Tighten flare nut to the specified torque, using a flare nut wrench.

**Flare nut : 15 - 18 N-m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)**

#### CAUTION:

**Be careful not to damage flare nut and clutch tube.**



3. Install clutch hose to operating cylinder, and tighten mounting bolts to the specified torque.

**Clutch hose fitting : 17 - 20 N-m (1.7 - 2.0 kg-m, 12 - 14 ft-lb)**

4. Install the remaining components in the reverse order of removal.
5. After finishing the installation, bleed the air from the clutch hydraulic system. Refer to [CL-7, "Air Bleeding Procedure"](#).

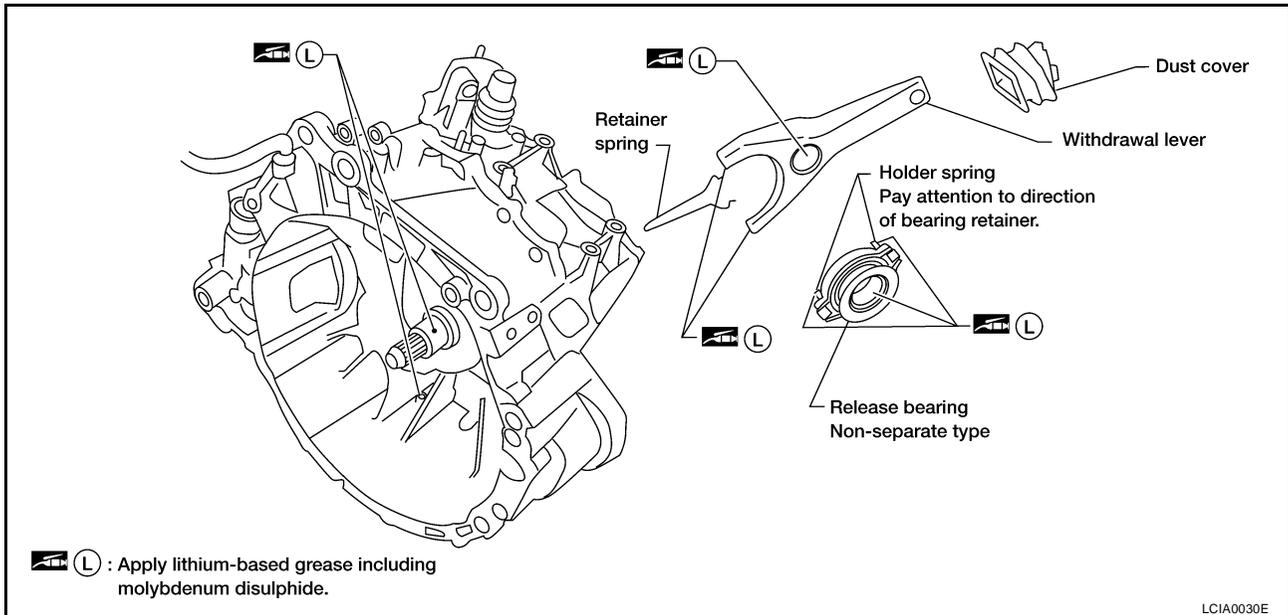
# CLUTCH RELEASE MECHANISM

PFP:30502

## CLUTCH RELEASE MECHANISM

### Removal and Installation

ECS004PM

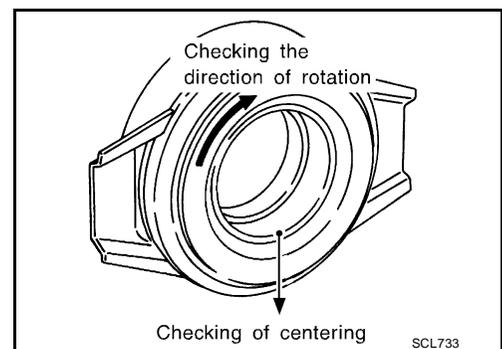


### REMOVAL

1. Remove the manual transaxle from the vehicle. Refer to [MT-16, "Removal and Installation"](#).
2. Move withdrawal lever enough to remove release bearing, and remove release bearing from clutch lever.
3. Remove withdrawal lever retainer spring.
4. Pull out withdrawal lever and remove dust cover.

### INSPECTION AFTER REMOVAL

- Replace the release bearing if it is seized, damaged, faulty in rotation direction, or has poor aligning function.
- Replace the withdrawal lever if its contact surface is worn abnormally.
- Replace the dust seal if it is deformed or cracked.

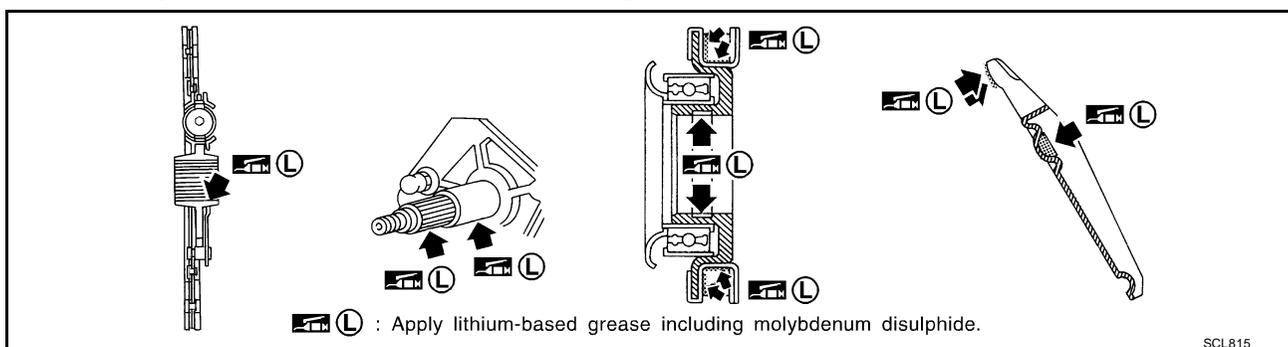


### INSTALLATION

Installation is in the reverse order of removal.

#### NOTE:

- Clean old grease and abrasive materials off the grease application areas.



## CLUTCH RELEASE MECHANISM

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- Apply approximately 1 mm (0.04 in) thick coat of clutch sleeve grease to withdrawal lever and holder spring frictional surfaces.
- Apply a coat of clutch sleeve grease to the grooves on contact surfaces of the withdrawal lever ball pin and inner surface of release bearing; make sure that grease is flush with grooves.
- Apply a thin coat of clutch sleeve grease to release bearing frictional surface. After grease application, install release bearing. Wipe off excess grease forced out during bearing installation.

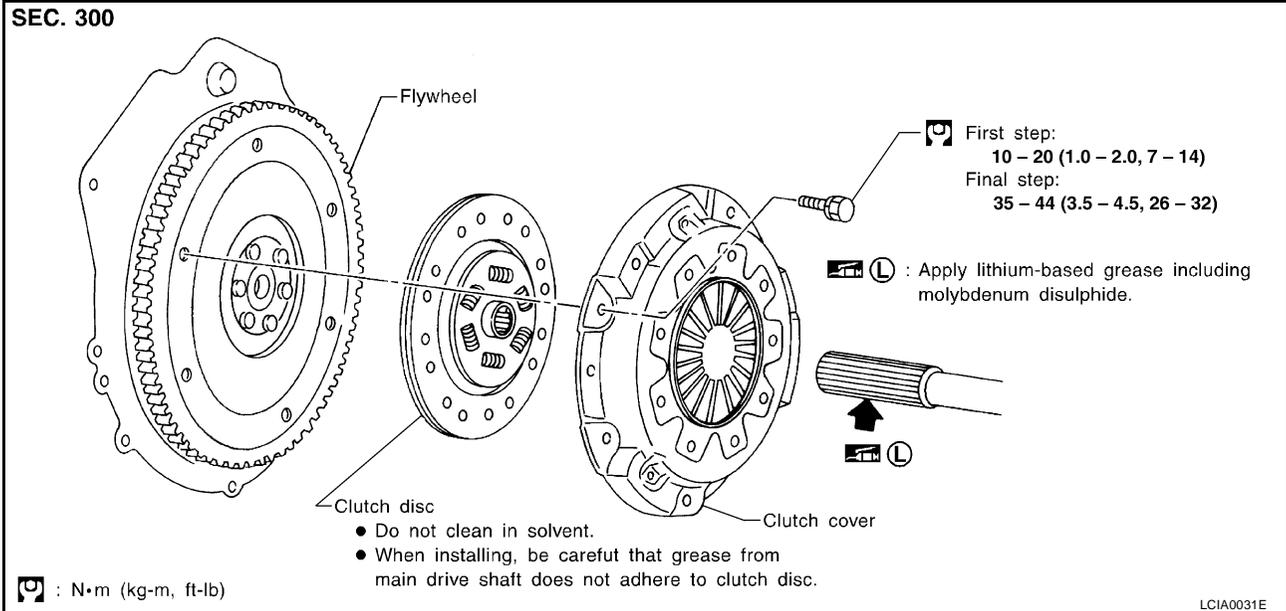
# CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

## CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

PF:30100

### Removal and Installation

ECS004PN



### REMOVAL

1. Remove the manual transaxle from the vehicle. Refer to [MT-16, "Removal and Installation"](#).
2. Evenly loosen the bolts holding the clutch cover, using power tool. Then remove the clutch cover and the clutch disc.

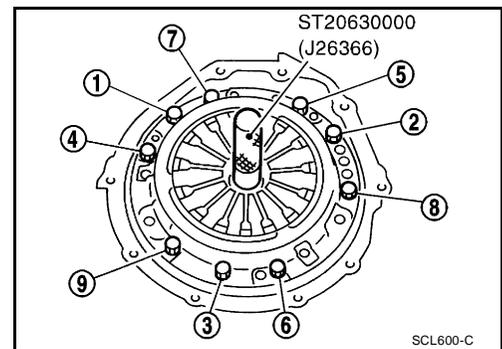
### INSTALLATION

Installation is in the reverse order of removal.

- Insert Tool into clutch disc hub when installing clutch cover and disc as shown.
- Be careful not to allow grease to contaminate the clutch facing.
- Tighten bolts in numerical order as shown, in two steps to specification.

**First step : 10 - 20 N·m (1.0 - 2.0 kg·m, 7 - 14 ft·lb)**

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

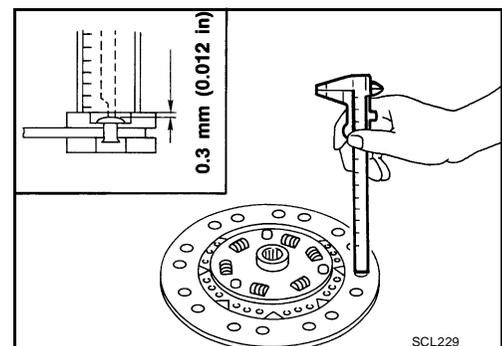


### Inspection and Adjustment after Removal

#### CLUTCH DISC

Check clutch disc for wear of facing surface left above the rivet head as shown.

**Wear limit of facing surface to rivet head : 0.3 mm (0.012 in)**



# CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

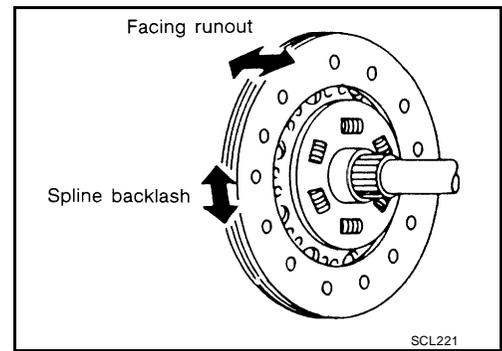
- Check clutch disc for backlash of spline and runout of facing.

**Maximum backlash of spline (at outer edge of disc) : 1.0 mm (0.039 in)**

**Runout limit : 1.0 mm (0.039 in)**

**Distance of runout check point (from hub center)**  
**QR25DE: 230 mm (9.06 in)**  
**VQ35DE: 240 mm (9.45 in)**

- Check clutch disc for burns, discoloration or oil or grease leakage. Replace if necessary.

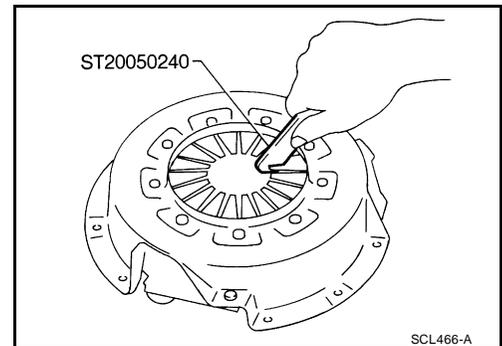


## CLUTCH COVER

- Check clutch cover installed on vehicle for unevenness of diaphragm spring toe height.

**Uneven limit : 1.0 mm (0.039 in)**

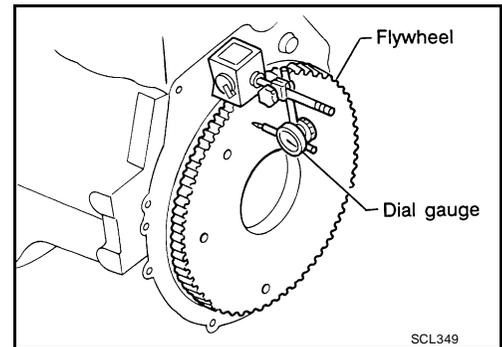
- If out of limit, adjust the height with Tool.



## FLYWHEEL

- Check contact surface of flywheel for slight burns or discoloration. Repair flywheel with emery paper.
- Check flywheel runout.

**Maximum allowable runout : Refer to [EM-90, "MOVEMENT AMOUNT OF FLYWHEEL \(M/T MODEL\)" \(QR25DE\)](#), [EM-204, "Movement Around in the Radial \(rotation\) Direction" \(VQ35DE\)](#).**



# SERVICE DATA AND SPECIFICATIONS (SDS)

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PFP:00100

### Clutch Control System

*ECS004PP*

Type of clutch control	Hydraulic
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### Clutch Master Cylinder

*ECS004PQ*

Unit: mm (in)

Inner diameter	15.87 (5/8)
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### Clutch Operating Cylinder

*ECS004PR*

Unit: mm (in)

Inner diameter	19.05 (3/4)
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### Clutch Disc

*ECS004PS*

Engine	QR25DE	VQ35DE
Model	240	250
Facing size (Outer dia. × inner dia. × thickness)	240 mm × 160 mm × 3.5 mm (9.45 in × 6.30 in × 0.138 in)	250 mm × 160 mm × 3.5 mm (9.84 in × 6.30 in × 0.138 in)
Thickness of disc assembly With load	8.1 mm (0.319 in) with 5,884 N (600 kg, 1,322 lb)	8.3 mm (0.327 in) with 4903 N (500 kg, 1102 lb)
Wear limit of facing surface to rivet head	0.3 mm (0.012 in)	
Facing runout limit	1.0 mm (0.039 in)	
Distance of runout check point (from the hub center)	230 mm (9.06 in)	240 mm (9.45 in)
Maximum spline backlash (at outer edge of disc)	1.0 mm (0.039 in)	

### Clutch Cover

*ECS004PT*

Engine	QR25DE	VQ35DE
Model	240	250
Set load	5,688 N (580 kg, 1,279 lb)	7,355 N (750 kg, 1,654 lb)
Set height	38 mm (1.50 in)	40.5 (1.59 in)
Uneven limit of diaphragm spring toe height	1.0 mm (0.039 in)	

### Clutch Pedal

*ECS004PU*

Unit: mm (in)

Clearance "C" between pedal stopper rubber and clutch interlock switch threaded end while clutch pedal is fully depressed.	0.1 - 1.0 (0.004 - 0.039)
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## SERVICE DATA AND SPECIFICATIONS (SDS)

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