

SECTION **CL**  
CLUTCH

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E

CONTENTS

<b>PRECAUTIONS</b> .....	<b>2</b>	REMOVAL .....	11	F
Service Notice or Precautions .....	2	INSTALLATION .....	12	
<b>PREPARATION</b> .....	<b>3</b>	Disassembly and Assembly .....	12	G
Special Service Tools .....	3	DISASSEMBLY .....	12	
Commercial Service Tools .....	3	INSPECTION AFTER DISASSEMBLY .....	12	H
<b>NOISE, VIBRATION AND HARSHNESS (NVH)</b>		ASSEMBLY .....	12	
<b>TROUBLESHOOTING</b> .....	<b>5</b>	<b>CLUTCH PIPING</b> .....	<b>13</b>	I
NVH Troubleshooting Chart .....	5	Removal and Installation .....	13	
<b>CLUTCH PEDAL</b> .....	<b>6</b>	<b>CLUTCH RELEASE MECHANISM</b> .....	<b>14</b>	J
On-Vehicle Inspection and Adjustment .....	6	Removal and Installation .....	14	
Removal and Installation .....	7	COMPONENTS .....	14	K
COMPONENTS .....	7	REMOVAL .....	14	
REMOVAL .....	7	INSPECTION AFTER REMOVAL .....	15	L
INSPECTION AFTER REMOVAL .....	7	INSTALLATION .....	15	
INSTALLATION .....	7	<b>CLUTCH DISC, CLUTCH COVER AND FLYWHEEL</b> ..	<b>17</b>	M
<b>CLUTCH FLUID</b> .....	<b>8</b>	Removal and Installation .....	17	
Air Bleeding Procedure .....	8	COMPONENTS .....	17	
<b>CLUTCH MASTER CYLINDER</b> .....	<b>9</b>	REMOVAL .....	17	
Components .....	9	INSPECTION AND ADJUSTMENT AFTER		
Removal and Installation .....	9	REMOVAL .....	17	
REMOVAL .....	9	INSTALLATION .....	18	
INSTALLATION .....	9	<b>SERVICE DATA AND SPECIFICATIONS (SDS) .....</b>	<b>20</b>	
Disassembly and Assembly .....	10	Clutch Control System .....	20	
DISASSEMBLY .....	10	Clutch Master Cylinder .....	20	
INSPECTION AFTER DISASSEMBLY .....	10	Clutch Operating Cylinder .....	20	
ASSEMBLY .....	10	Clutch Disc .....	20	
<b>OPERATING CYLINDER</b> .....	<b>11</b>	Clutch Cover .....	20	
Components .....	11	Clutch Pedal .....	20	
Removal and Installation .....	11			

# PRECAUTIONS

## PRECAUTIONS

PFP:00001

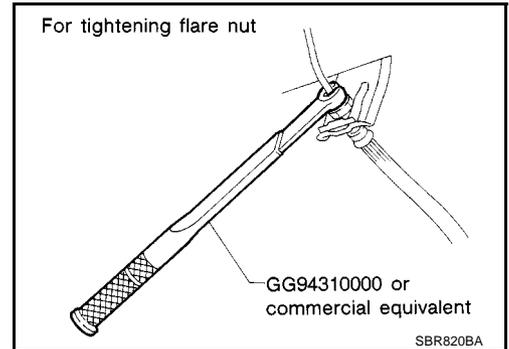
### Service Notice or Precautions

ECS001CC

- Recommended clutch fluid is brake fluid "DOT 3" or "DOT 4". Refer to [MA-14, "RECOMMENDED FLUIDS AND LUBRICANTS"](#) .
- Do not reuse drained clutch fluid.
- Be careful not to splash clutch fluid on painted areas.
- Use a flare nut wrench, when removing and installing clutch piping.
- Use new clutch fluid to clean or wash all parts of master cylinder and operating cylinder.
- Do not 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

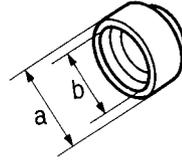
## PREPARATION

PPF:00002

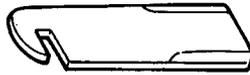
### Special Service Tools

ECS001CD

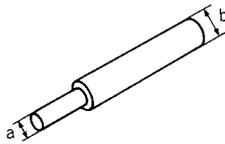
Tool number Tool name	Description
KV30101400 Drift a: 51 mm (2.01 in) dia. b: 44 mm (1.73 in) dia.	Installing release bearing
ST20050240 Diaphragm adjusting wrench	Adjusting unevenness of diaphragm spring of clutch cover
KV30100100 Clutch aligning bar a: 15.7 mm (0.618 in) dia. b: 22.8 mm (0.898 in) dia.	Installing clutch disc



ZZA0838D



ZZA0508D

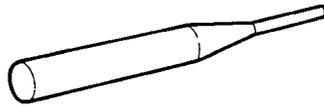


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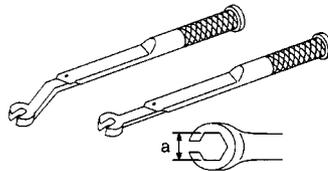
### Commercial Service Tools

ECS001CE

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

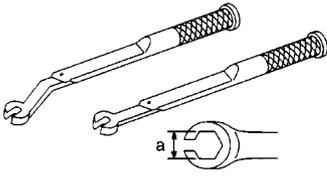
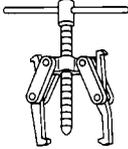


ZZA0515D



S-NT406

# PREPARATION

Tool name	Description
<p data-bbox="140 214 384 268">Flare nut torque wrench a: 14 mm (0.55 in)</p>  <p data-bbox="836 417 890 431">S-NT406</p>	<p data-bbox="995 214 1422 268">Removing and installing clutch piping (For LHD models)</p>
<p data-bbox="140 455 204 470">Puller</p>  <p data-bbox="836 651 877 666">NT077</p>	<p data-bbox="995 455 1262 470">Removing release bearing</p>

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PPF:00003

### NVH Troubleshooting Chart

EC5001CF

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-6	CL-8	CL-9	CL-11	EM-106	CL-14	CL-17										EM-134		
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		

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# CLUTCH PEDAL

## CLUTCH PEDAL

PFP:46540

### On-Vehicle Inspection and Adjustment

ECS001CG

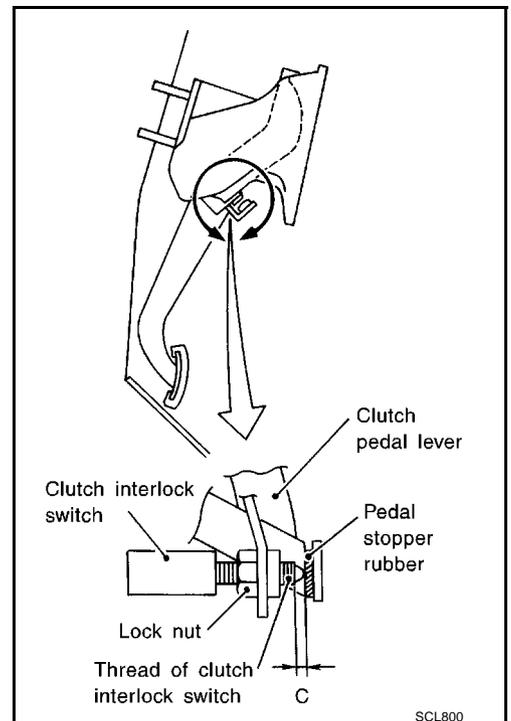
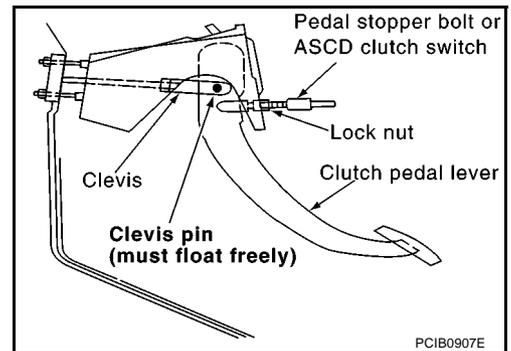
1. Make sure that clevis pin floats freely in the bore of clutch pedal. It should not be bound by clevis or clutch pedal.
  - a. If clevis pin is not free, make sure that pedal stopper bolt or ASCD clutch switch is not applying pressure to clutch pedal causing clevis pin to bind. To adjust, loosen lock nut and turn pedal stopper bolt or ASCD clutch switch.
  - b. Tighten lock nut.
  - c. Make sure that clevis pin floats in the 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 the 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 found, replace related parts (clutch pedal bracket, assist spring, bushing etc.) Re-assemble clutch pedal and again make sure that clevis pin floats freely in the bore of clutch pedal.
3. Adjust clearance "C" while depressing clutch pedal fully. (With clutch interlock switch)

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

4. 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 is found, repair or replace related parts as necessary.
  - b. If hydraulic system repair was necessary, bleed the clutch hydraulic system. Refer to [CL-8, "Air Bleeding Procedure"](#) .

#### NOTE:

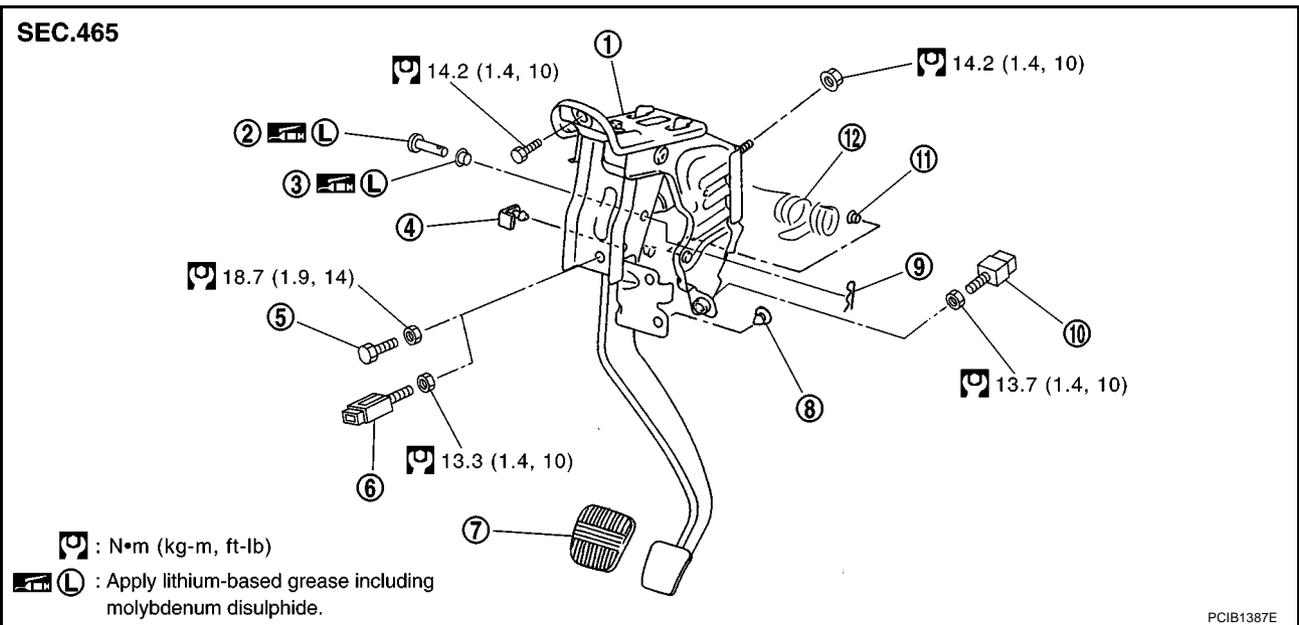
Do not use a vacuum assist or any other type of power bleeder on this system. Use of a vacuum assist or power bleeder will not purge all the air from the system.



# CLUTCH PEDAL

ECS001CH

## Removal and Installation COMPONENTS



- |                             |                                      |                                   |
|-----------------------------|--------------------------------------|-----------------------------------|
| 1. Clutch pedal assembly    | 2. Clevis pin                        | 3. Bushing                        |
| 4. Stopper rubber           | 5. Pedal stopper bolt (Without ASCD) | 6. ASCD clutch switch (With ASCD) |
| 7. Pedal pad                | 8. Stopper rubber                    | 9. Snap pin                       |
| 10. Clutch interlock switch | 11. Bushing                          | 12. Assist spring                 |

### REMOVAL

1. Disconnect clutch interlock switch and ASCD clutch switch (with ASCD) harness connectors.
2. Remove snap pin and clevis pin from clevis of clutch master cylinder.
3. Remove clutch pedal assembly mounting nuts and bolt, and then remove clutch pedal assembly from the vehicle.

### 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.

### INSTALLATION

Installation is the reverse order of removal.

#### NOTE:

Tighten pedal stopper bolt lock nut or ASCD clutch switch lock nut to the specified torque after installing clutch pedal assembly in vehicle and adjusting the pedal free play.

# CLUTCH FLUID

## CLUTCH FLUID

PFP:00017

### Air Bleeding Procedure

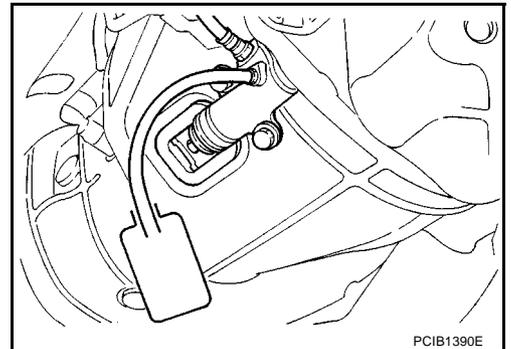
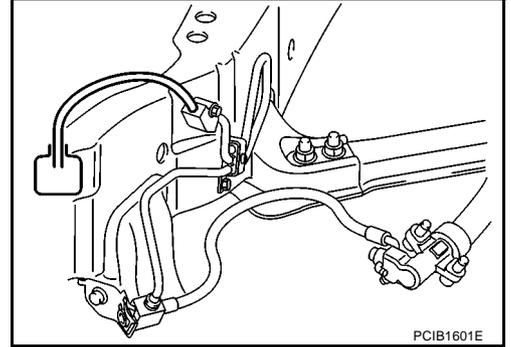
ECS001C1

#### 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.

#### CAUTION:

- Monitor clutch fluid level in reservoir tank to make sure it does not empty.
  - Keep painted surface on the body or other parts free of clutch fluid. If it spills, wipe up immediately and wash the affected area with water.
  - For RHD models: Bleed air for operating cylinder.
  - For LHD models: Bleed air for clutch connector first, and then for operating cylinder.
1. Fill 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 to release air.
  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 clutch fluid.
  8. Tighten air bleeder valve to the specified torque. Refer to [CL-11, "Components"](#) and [CL-13, "Removal and Installation"](#).



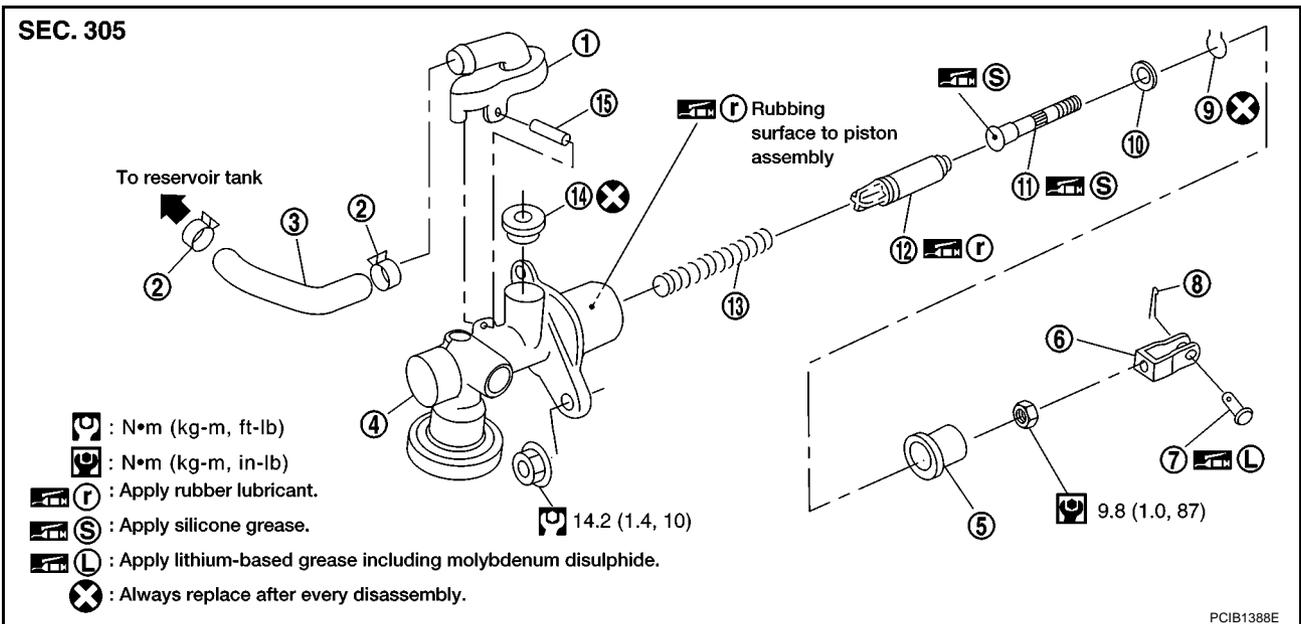
# CLUTCH MASTER CYLINDER

## CLUTCH MASTER CYLINDER

PPF:30610

### Components

ECS001CJ



- |                   |               |                     |
|-------------------|---------------|---------------------|
| 1. Nipple         | 2. Clamp      | 3. Hose             |
| 4. Cylinder body  | 5. Dust cover | 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 and Installation

### REMOVAL

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

#### CAUTION:

**Keep painted surface on the body or other parts free of clutch fluid. If it spills, wipe up immediately and wash the affected area with water.**

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

### INSTALLATION

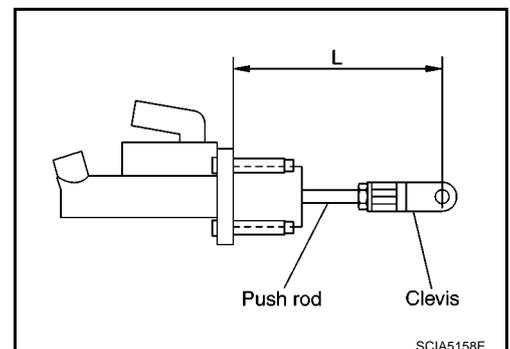
- Check position of clevis and push rod. If measurement is outside the standard length, adjust position of clevis and push rod.

#### Length "L"

**RHD models : 111.0 mm (4.37 in)**

**LHD models : 120.5 mm (4.74 in)**

- Connect clutch tube to master cylinder assembly and temporarily tighten flare nut.
- Install master cylinder assembly and tighten mounting nuts to the specified torque. Refer to [CL-9, "Components"](#).
- Tighten clutch tube flare nut to the specified torque using a flare nut torque wrench. Refer to [CL-13, "Removal and Installation"](#).
- Set clevis to clutch pedal and insert clevis pin.



# CLUTCH MASTER CYLINDER

6. Attach snap pin to clevis pin.
7. Install hose to nipple.
8. After completing this procedure, inspect and adjust for clutch pedal and then bleed the air from the clutch hydraulic system. Refer to [CL-6, "On-Vehicle Inspection and Adjustment"](#) and [CL-8, "Air Bleeding Procedure"](#).

## Disassembly and Assembly

### DISASSEMBLY

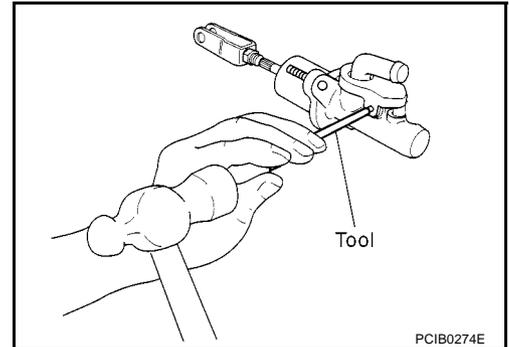
ECS001CL

1. Remove spring pin using a pin punch.
2. Remove nipple and seal from cylinder body.
3. Loosen push rod lock nut then remove clevis and lock nut, if necessary.

#### NOTE:

Clutch pedal height is controlled with position of clevis and push rod.

4. Remove dust cover from cylinder body.
5. Remove stopper ring and stopper. Remove push rod from cylinder body while holding it securely to prevent piston assembly popping out.
6. 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 return spring
- Cracked or deformed dust cover

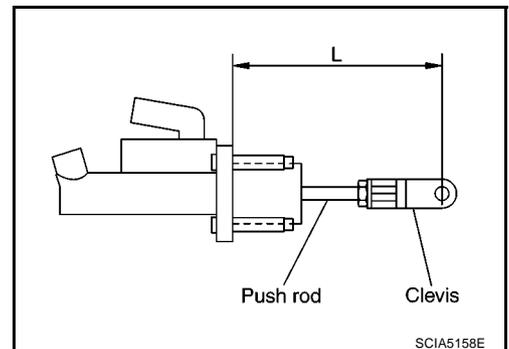
### ASSEMBLY

1. Apply rubber lubricant to the internal surface of cylinder body, the sliding surface of piston assembly, and piston cup. Insert return spring and piston assembly to cylinder body.
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 dust cover to cylinder body.
4. Install seal and nipple to cylinder body.
5. Install spring pin using a pin punch.
6. Install clevis to push rod.
7. Check and adjust the positions of clevis and push rod. After adjusting "L", tighten lock nut to the specified torque. Refer to [CL-9, "Components"](#).

#### Length "L"

RHD models : 111.0 mm (4.37 in)

LHD models : 120.5 mm (4.74 in)



# OPERATING CYLINDER

PFP:30620

A

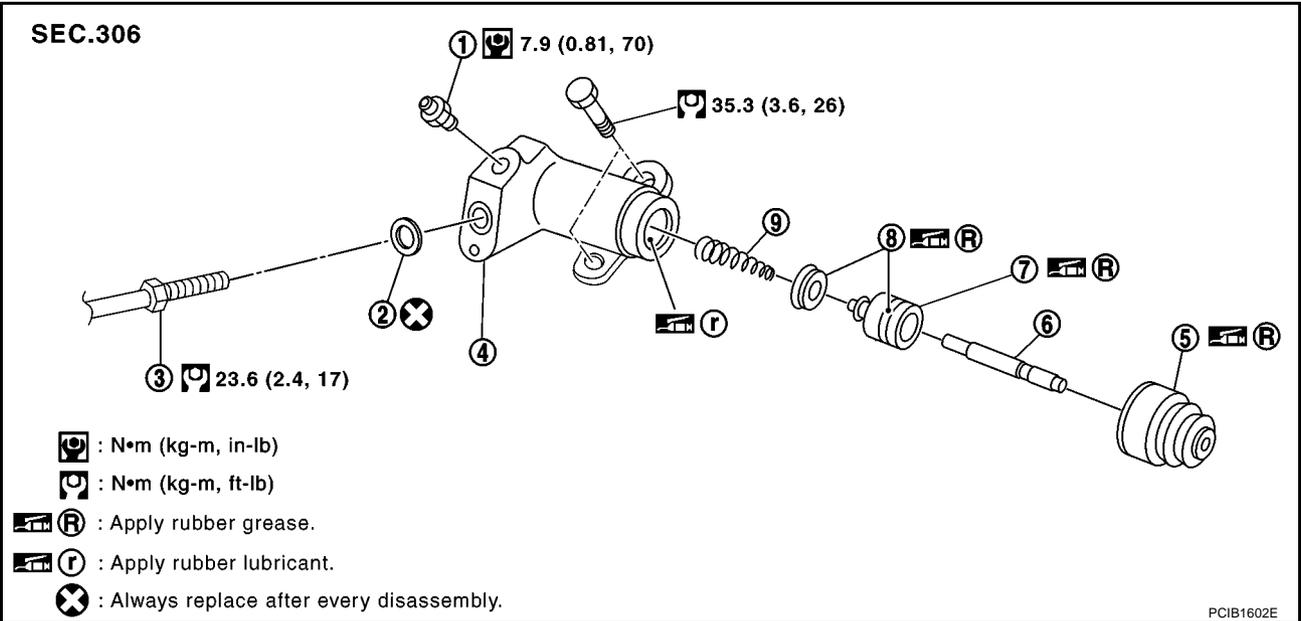
## OPERATING CYLINDER

### Components

ECS001CM

B

#### RHD models



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

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D

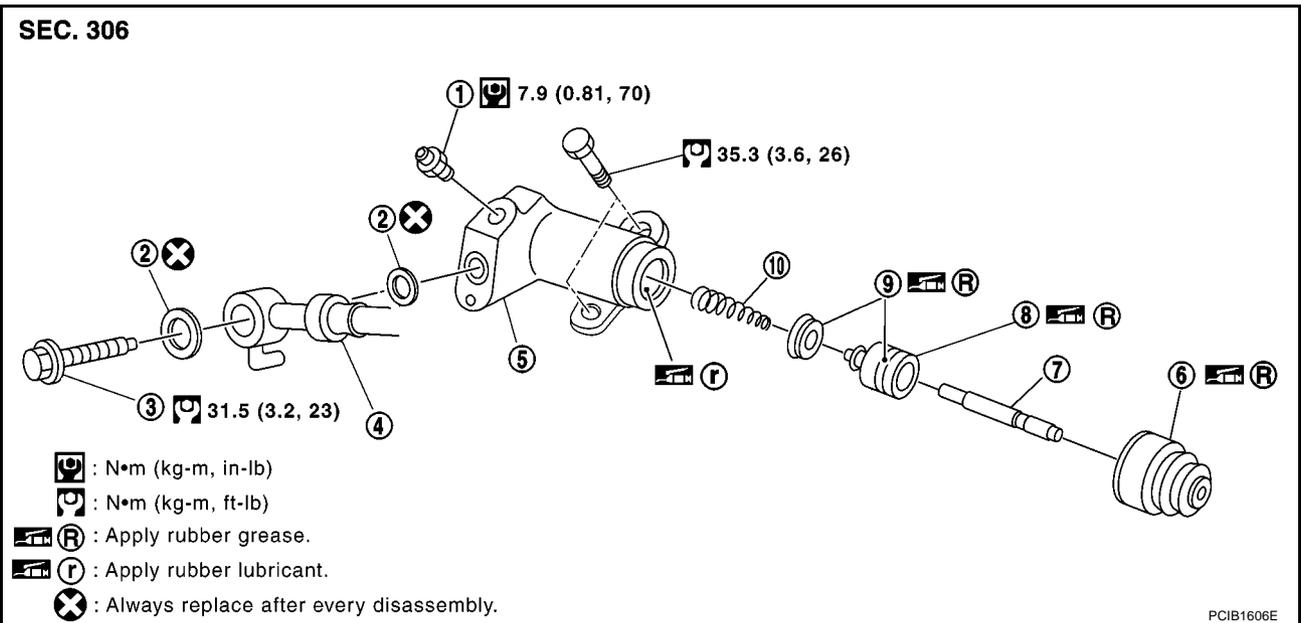
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#### LHD models



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

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## Removal and Installation

### REMOVAL

ECS001CN

1. Drain clutch fluid.

# OPERATING CYLINDER

---

## **CAUTION:**

**Keep painted surface on the body or other parts free of clutch fluid. If it spills, wipe up immediately and wash the affected area with water.**

2. Remove clutch hose from operating cylinder assembly.
3. Remove operating cylinder assembly mounting bolts, and then remove operating cylinder assembly from the vehicle.

## **INSTALLATION**

Note the following, and install in the reverse order of removal.

- Install clutch hose with care so that it will not be bent or twisted.
- Tighten clutch hose to the specified torque.

## **CAUTION:**

**Do not reuse copper washer.**

- After completing the procedure, bleed the air from the clutch hydraulic system. Refer to [CL-8, "Air Bleeding Procedure"](#).

## **Disassembly and Assembly**

*ECS001CO*

### **DISASSEMBLY**

- Remove dust cover and push rod. Then remove piston, piston cup and piston spring from 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 piston 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 then install push rod and dust cover.

# CLUTCH PIPING

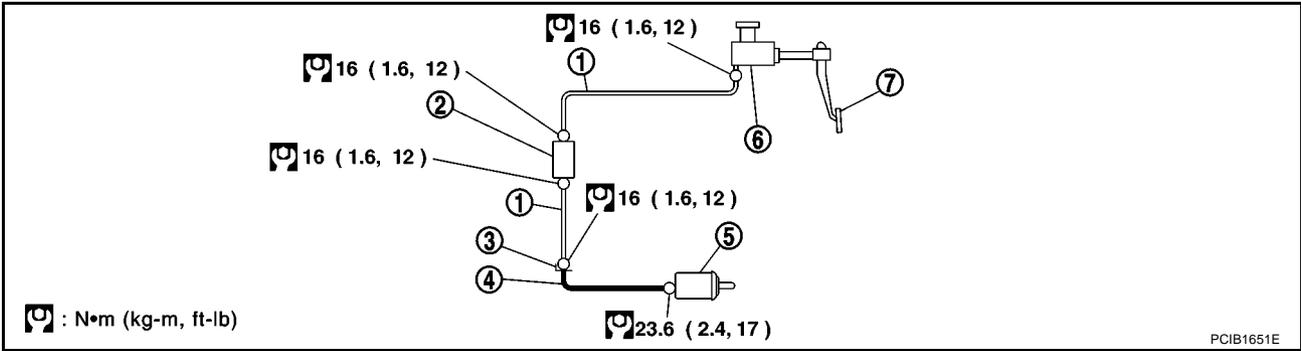
## CLUTCH PIPING

PFP:30650

### Removal and Installation

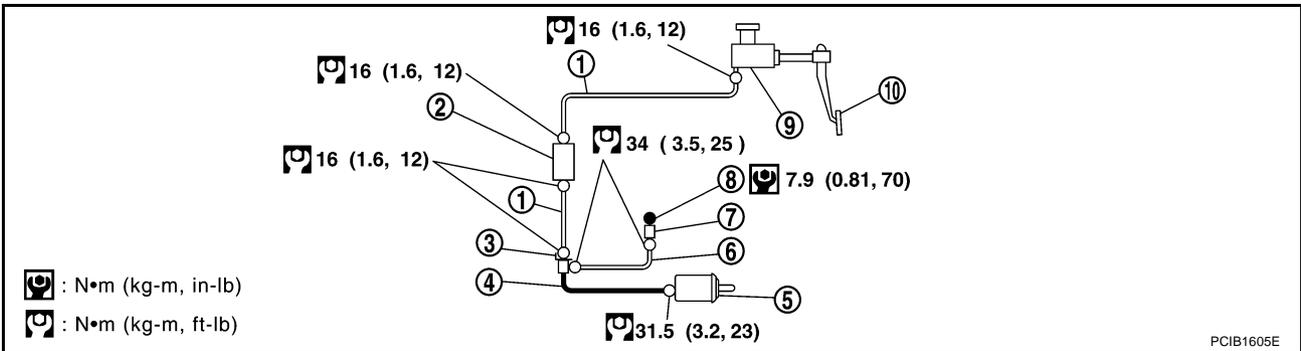
ECS001CP

#### RHD models



- |                 |                       |                    |
|-----------------|-----------------------|--------------------|
| 1. Clutch tube  | 2. Clutch orifice     | 3. Lock plate      |
| 4. Clutch hose  | 5. Operating cylinder | 6. Master cylinder |
| 7. Clutch pedal |                       |                    |

#### LHD models



- |                     |                       |                    |
|---------------------|-----------------------|--------------------|
| 1. Clutch tube      | 2. Clutch orifice     | 3. Lock plate      |
| 4. Clutch hose      | 5. Operating cylinder | 6. Clutch tube     |
| 7. Clutch connector | 8. Air bleeder valve  | 9. Master cylinder |
| 10. Clutch pedal    |                       |                    |

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

#### CAUTION:

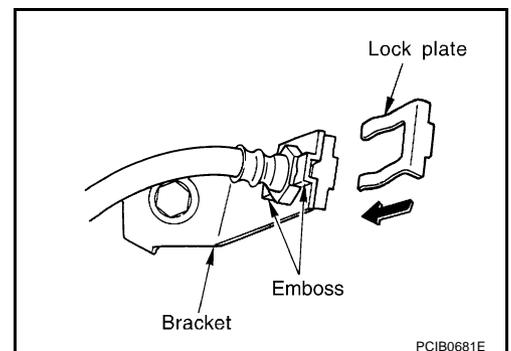
Keep painted surface on the body or other parts free of clutch fluid. If it spills, wipe up immediately and wash the affected area with water.

- To fix clutch hose on bracket, position clutch hose clasp on the emboss of bracket 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.
- Tighten clutch hose or union bolt to the specified torque.

#### CAUTION:

Do not reuse copper washer.

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



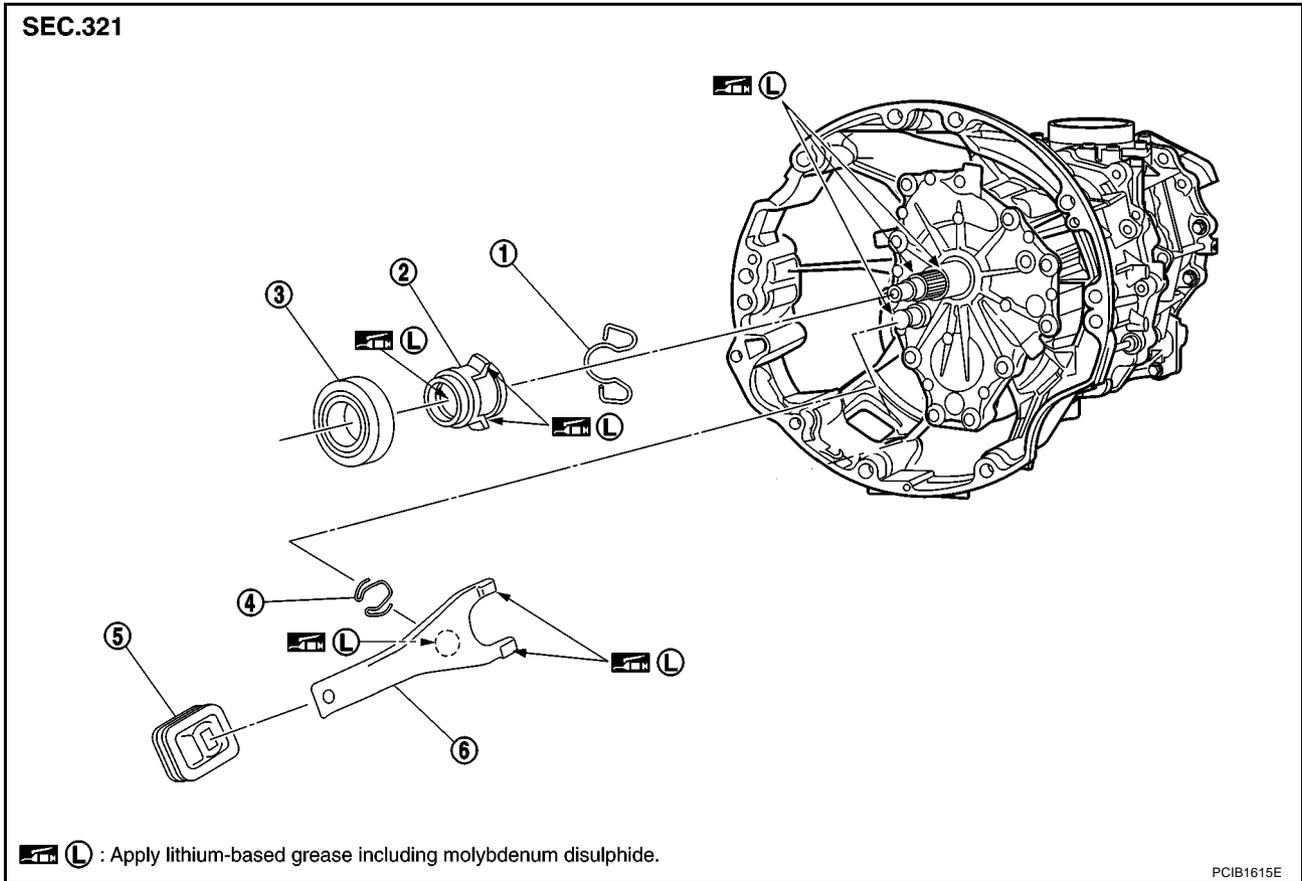
# CLUTCH RELEASE MECHANISM

PFP:30502

ECS001CQ

## CLUTCH RELEASE MECHANISM

### Removal and Installation COMPONENTS



1. Holder spring

2. Release bearing sleeve

3. Release bearing

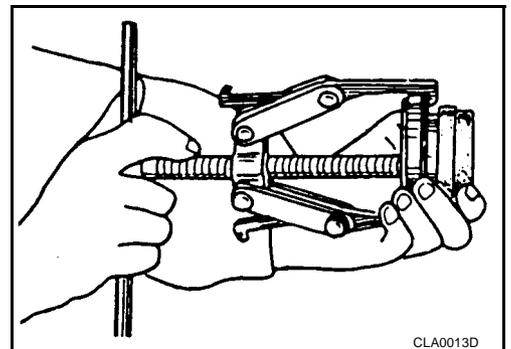
4. Snap spring

5. Dust cover

6. Withdrawal lever

### REMOVAL

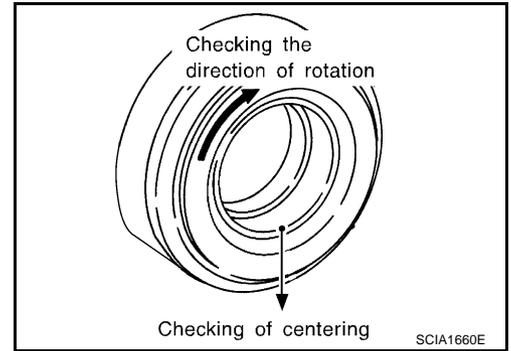
1. Remove manual transmission from the vehicle. Refer to [MT-16. "Removal and Installation from Vehicle"](#).
2. Remove release bearing sleeve assembly, holder spring and withdrawal lever from inside clutch housing.
3. Remove dust cover.
4. Remove snap spring from withdrawal lever.
5. Remove release bearing from release bearing sleeve using a puller.



# CLUTCH RELEASE MECHANISM

## 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:

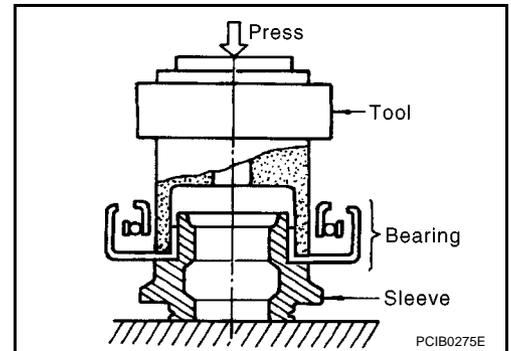
- Be sure to apply grease to the points specified. Otherwise, noise, poor disengagement, or damage to the clutch may result. Excessive grease may cause slip or judder. Wipe off any grease oozing from the parts.
- Be careful not to bring any grease to the clutch disk facing, pressure plate surface and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

1. Install release bearing to release bearing sleeve using the drift.

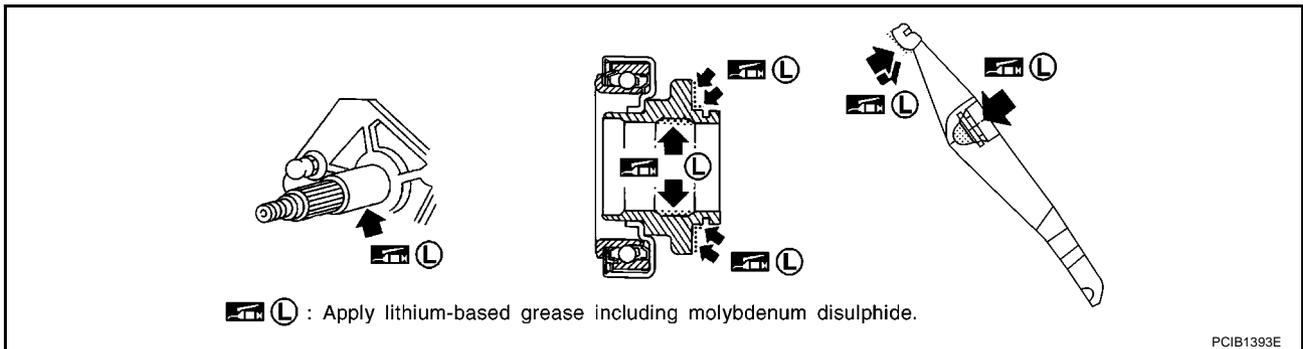
**Tool number : KV30101400**

### CAUTION:

Press bearing inner race by pushing with the drift.



2. 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.

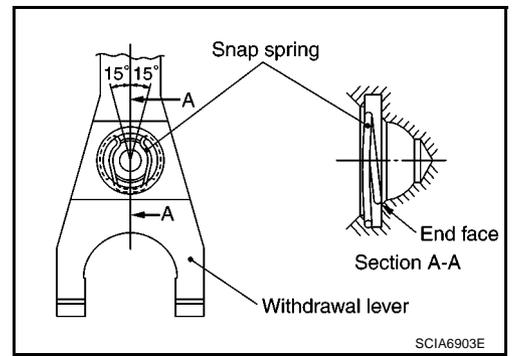
- Evenly apply approximately 1 mm (0.04 in) thick coating of recommended grease to withdrawal lever and release bearing sliding surface.
  - Apply recommended grease to withdrawal lever ball pin contact surface and inner slots of release bearing sleeve. The grease surface should be level with the surrounding area.
  - Apply a thin coat of recommended grease evenly to release bearing sleeve sliding surface of front cover. Install release bearing sleeve assembly to front cover. Wipe off any excess grease that oozes from the parts and then remove release bearing sleeve assembly.
3. To install, reverse the removal procedure, following the cautions below.

### CAUTION:

- Before installing manual transmission to the vehicle, make sure that each sliding surface slides smoothly by operating withdrawal lever.

## CLUTCH RELEASE MECHANISM

- When assembling, make sure that both ends of snap spring touch the end face of withdrawal lever.
- Be careful with the orientation snap spring.



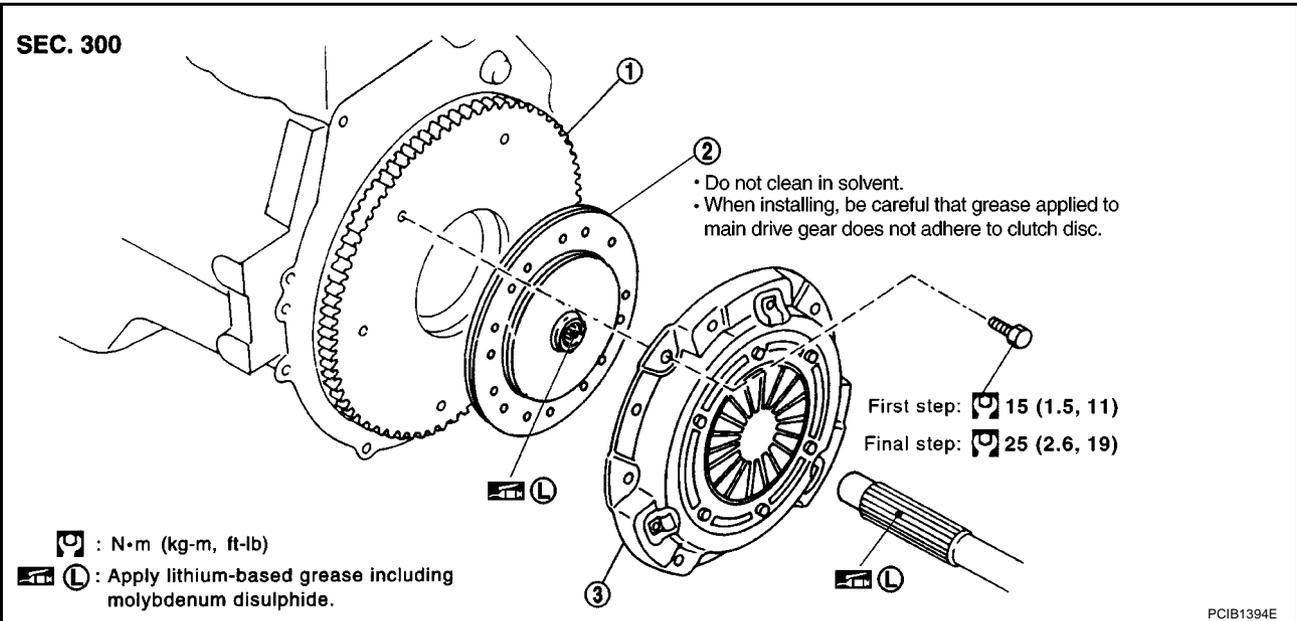
# CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

## CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

PF30100

### Removal and Installation COMPONENTS

ECS001CR



### CAUTION:

- Be careful not to bring any grease to the clutch disc facing, pressure plate surface and flywheel surface.
- If the flywheel is removed, align the dowel pin with smallest hole of flywheel. Refer to [EM-114, "ASSEMBLY"](#).

### REMOVAL

1. Remove manual transmission from the vehicle. Refer to [MT-16, "Removal and Installation from Vehicle"](#).
2. Loosen clutch cover mounting bolts evenly. Then remove clutch cover and clutch disc.

### INSPECTION AND ADJUSTMENT AFTER REMOVAL

#### Clutch Disc

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

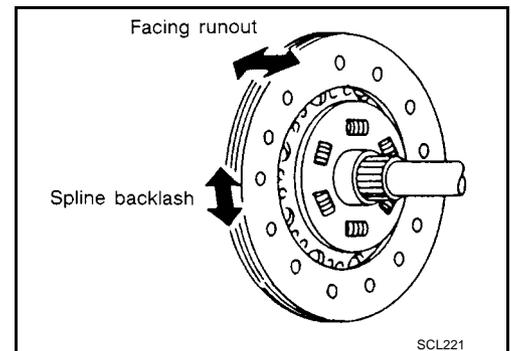
**Runout limit/diameter of the area to be measured**

**: 1.0 mm (0.039 in)/230 mm (9.06 in) dia.**

- Measure backlash to clutch disc spline and main drive gear spline at the circumference of clutch disc. If outside the specification, replace clutch disc.

**Maximum allowable spline backlash**

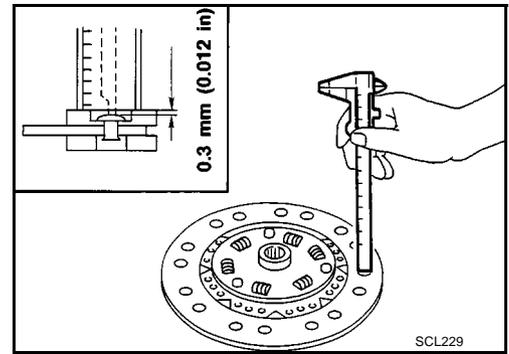
**: 1.0 mm (0.039 in)**



# CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

- Measure the depth to clutch disc facing rivet heads using a calipers. If it exceeds the allowable wear limit, replace 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 the diaphragm adjusting wrench.

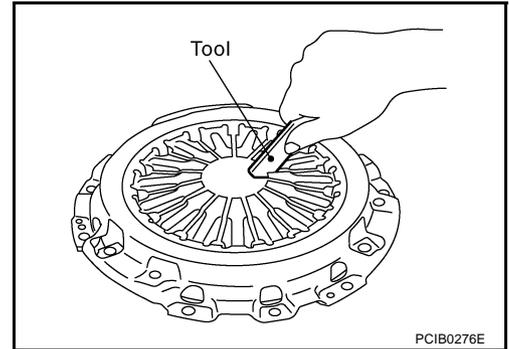
**Tolerance for diaphragm spring lever unevenness**  
**: 0.7 mm (0.028 in) or less**

**Tool number** : **ST20050240**

- 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.



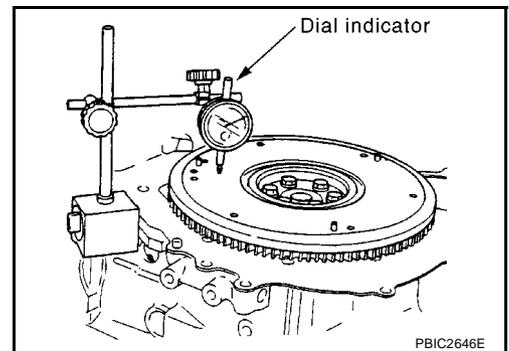
## Flywheel Runout

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

**Allowable flywheel runout**  
**: Refer to [EM-134, "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 main drive gear splines.

### CAUTION:

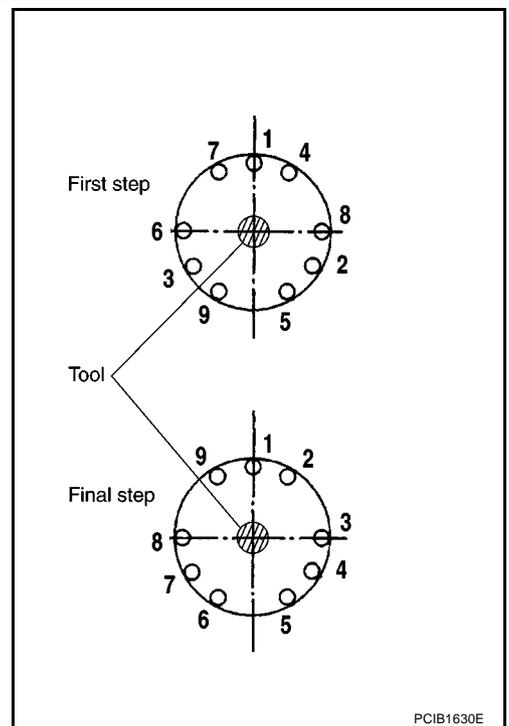
Be sure to apply grease to the points specified. Otherwise, noise, poor disengagement, or damage to the clutch may result. Excessive grease may cause slip or judder. Wipe off any grease oozing from the parts.

## CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

2. Install clutch disc using the clutch aligning bar.

**Tool number : KV30100100**

3. Install clutch cover. Pre-tighten clutch cover mounting bolts.
4. Tighten clutch cover mounting bolts evenly in two steps in the order shown in the figure. Refer to [CL-17, "COMPONENTS"](#) .
5. Install manual transmission. Refer to [MT-16, "Removal and Installation from Vehicle"](#) .



A

B

CL

D

E

F

G

H

I

J

K

L

M

# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### Clutch Control System

ECS00ICS

Type of clutch control	Hydraulic
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### Clutch Master Cylinder

ECS00ICT

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

ECS00ICU

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

ECS00ICV

Facing size (outer dia. x inner dia. x thickness)	240 mm × 160 mm × 3.15 mm (9.45 in × 6.30 in × 0.1240 in)
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) / 230 mm (9.06 in) dia.
Maximum spline backlash (at outer edge of disc)	1.0 mm (0.039 in)

### Clutch Cover

ECS00ICW

Set-load	9,810 N (1,000 kg, 2,205 lb)
Diaphragm spring lever height	39.0 - 41.0 mm (1.535 - 1.614 in)
Uneven limit diaphragm spring toe height	0.7 mm (0.028 in) or less

### Clutch Pedal

ECS00ICX

Clearance "C" between pedal stopper rubber and clutch interlock switch threaded while clutch pedal is fully depressed	0.1 - 1.0 mm (0.004 - 0.039 in)
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