# SECTION CLUTCH CL

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# PRECAUTIONS

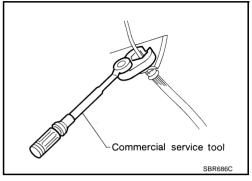
# PRECAUTIONS

#### Caution

- 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.



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# PREPARATION

# PREPARATION

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**Special Service Tools** The actual shapes of Kent-Moore tool may differ from those of special service tools illustrated here. ACS0014U

Tool number (Kent-Moore No.) Tool name		Description	[
KV30101400		Installing release bearing	С
() a: 51 mm (2.01 in) dia. b: 44 mm (1.73 in) dia. Drift	ab		[
ST20050240 ()	ZZA0838D	Adjusting unevenness of diaphragm spring of clutch cover	6
Diaphragm adjusting wrench			F
	ZZA0508D		(
ST20670000 ( — ) a: 15 mm (0.59 in) dia.	t b	Installing clutch disc	ŀ
b: 23 mm (0.91 in) dia. Clutch aligning bar			Г
	a 1117 ZZA1178D		
commercial Service Tool	5	ACS0014V	1
Tool name		Description	
Pin punch Tip diameter: 4.5 mm (0.177 in) dia.		Removing and installing master cylinder spring pin	ŀ
	0		
Power tool	ZZA0515D	Lessoning halts and puts	n
Fower tool	PBIC0190E	Loosening bolts and nuts	Γ
1. Flare nut crowfoot 2. Torque wrench a: 10 mm (0.39 in)		Removing and installing clutch piping	
	S-NT360		

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

# NVH Troubleshooting Chart

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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 pa	age	<u>CL-5</u>	<u>CL-7</u>	<u>CL-8</u>	<u>CL-11</u>	<u>EM-90</u>	<u>CL-13</u>	<u>CL-15</u>	<u>CL-15</u>	<u>CL-15</u>	<u>CL-15</u>	<u>CL-15</u>	<u>CL-15</u>	<u>CL-15</u>	<u>CL-14</u>	<u>CL-16</u>	<u>CL-16</u>	<u>CL-16</u>	<u>EM-119</u>
SUSPECTED	D 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)
	Clutch grabs/chatters					1			2			2	2	2			2		
	Clutch pedal spongy		1	2	2														
Symptom	Clutch noisy						1												
	Clutch slips	1										2	2			3		4	5
	Clutch does not disengage	1	2	3	4			5	5	5	5	5			5	6	6	7	

# CLUTCH PEDAL

# **On-Vehicle Inspection and Adjustment**

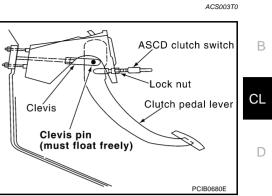
- 1. Check to see if the clevis pin floats freely in the bore of the clutch pedal. It should not be bound by the clevis or clutch pedal.
- a. If the clevis pin is not free, check that the ASCD clutch switch is not applying pressure to the clutch pedal causing the clevis pin to bind. To adjust, loosen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

#### Clearance C : 0.1 - 1.0mm (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 noted, repair or replace related parts as necessary.
- b. If hydraulic system repair was necessary, bleed the clutch hydraulic system. Refer to  $\underline{\text{CL-7, "Bleeding"}}$  .

#### 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.

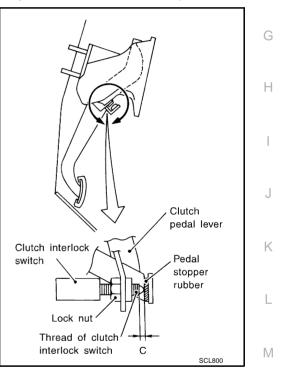




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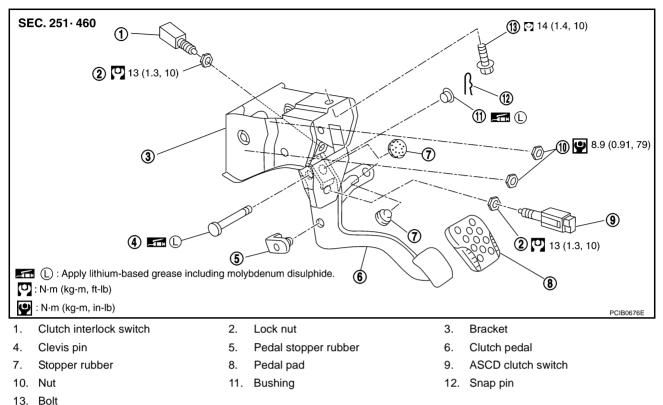
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# **CLUTCH PEDAL**

#### **Removal and Installation**



## NOTE:

Tighten the ASCD clutch switch lock nut to the specified torque after installing the clutch pedal assembly in the vehicle and adjusting the pedal height.

#### REMOVAL

- 1. Remove driver side kicking plate inner. Refer to EI-29, "Removal and Installation" .
- 2. Remove footrest. Refer to EI-33, "Removal and Installation" .
- 3. Remove dash side finisher (LH). Refer to IP-11, "Removal and Installation" .
- 4. Remove instrument driver panel lower. Refer to IP-11, "Removal and Installation" .
- 5. Remove the clutch interlock switch and ASCD clutch switch connector and harness.
- 6. Remove the snap pin and clevis pin.
- 7. Remove the pedal bracket mounting bolt and nuts and then remove the clutch pedal assembly.

#### **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 assembly.

#### INSTALLATION

To install, reverse the removal procedure, following the cautions below:

- Install clutch pedal assembly and adjust the pedal height. Tighten ASCD clutch switch lock nut to the specified torque.
- After installing the clutch interlock switch, adjust the switch position.

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# **CLUTCH FLUID**

# **CLUTCH FLUID**

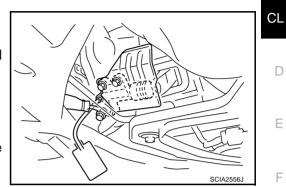
## Bleeding

#### **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.
- 1. Fill the master cylinder reservoir tank with new clutch fluid.
- 2. Connect a transparent vinyl hose to the air bleeder.
- 3. Depress the clutch pedal quickly and fully a few times and hold it.
- 4. With clutch pedal depressed, open air bleeder.
- 5. Close air bleeder.
- 6. Release clutch pedal and wait for 5 seconds.
- 7. Repeat steps 3 to 6 until no bubbles can be observed in the brake fluid.
- 8. Tighten air bleeder to the specified torque.

#### Air bleeder:

**P**: 7.9 N·m (0.81 kg-m, 70 in-lb)



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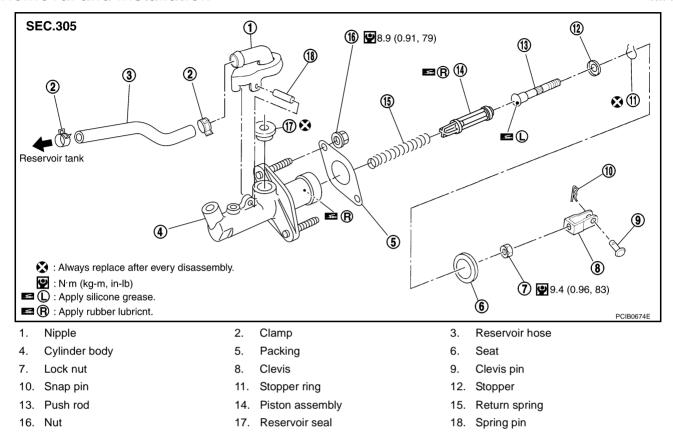
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# **CLUTCH MASTER CYLINDER**

# CLUTCH MASTER CYLINDER Removal and Installation

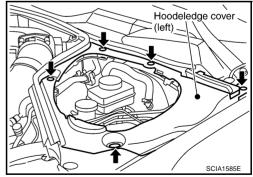


#### REMOVAL

- 1. Remove driver side kicking plate. Refer to EI-29, "Removal and Installation" .
- 2. Remove footrest.Refer to EI-33, "Removal and Installation" .
- 3. Remove dash side finisher (LH). Refer to IP-11, "Removal and Installation" .
- 4. Remove instrument driver panel lower. Refer to IP-11, "Removal and Installation" .
- 5. Remove snap pin and clevis pin from the clevis, and separate it from clutch pedal.
- 6. Remove clips, and remove hoodledge cover (left).
- 7. Drain clutch fluid in the reservoir tank and remove reservoir hose from nipple.

#### **CAUTION:**

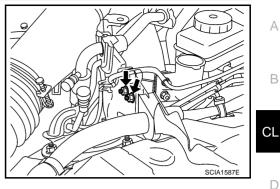
Do not spill clutch fluid onto painted surfaces. If it spills, wipe up immediately and wash the affected area with water.



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- 8. Remove the reservoir tank mounting nuts and then remove the reservoir tank.
- 9. Using a flare nut wrench, remove clutch tube.
- 10. First remove nuts on master cylinder assembly, and then 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 nuts to the specified torque.

#### **P**: 8.9 N·m (0.91 kg-m, 79 in-lb)

3. Using a flare nut torque wrench, tighten clutch tube flare nut to the specified torque.

#### <sup>1</sup>: 16 N·m (1.6 kg-m, 12 ft-lb)

- 4. Install clevis to the clutch pedal, and fix clevis with clevis pin.
- 5. Install snap pin to the clevis pin.
- 6. Install reservoir hose to the nipple. Install the reservoir tank to the vehicle, and then tighten mounting nuts to the specified torque.

#### **P**: 5.8 N·m (0.59 kg-m, 51 in-lb)

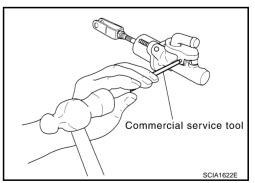
- After completing this procedure, inspect and adjust pedal height and then bleed the clutch tube. Refer to <u>CL-5</u>, "<u>On-Vehicle</u> <u>Inspection and Adjustment</u>" and <u>CL-7</u>, "<u>Bleeding</u>".
- 8. Install hoodledge cover (left).
- 9. Install instrument driver panel lower. Refer to <u>IP-11, "Removal</u> <u>and Installation"</u>.
- 10. Install dash side finisher (LH). Refer to <u>IP-11, "Removal and</u> <u>Installation"</u>.
- 11. Install footrest.Refer to EI-33, "FLOOR TRIM" .
- 12. Install driver side kicking plate. Refer to EI-29, "Removal and Installation" .

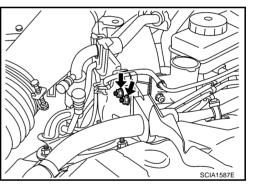
# Disassembly and Assembly DISASSEMBLY

- 1. Using a pin punch (commercial service tool), remove spring pin, nipple and reservoir seal from the cylinder body.
- 2. Loosen push rod lock nut. Remove clevis and lock nut.
- 3. Remove the seat from the cylinder body.
- 4. Remove the stopper ring and stopper, and then remove the push rod, piston assembly, and return spring from the cylinder body.

#### **CAUTION:**

Restrain the push rod while doing this because there is a danger the piston assembly will fly out of the cylinder body.





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# **CLUTCH MASTER CYLINDER**

#### **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 pin hole
- Damaged or deformed nipple or reservoir tank
- Settling of the spring
- Cracked and deformed seat

#### ASSEMBLY

- 1. Apply rubber lubricant to internal surface of the cylinder body, sliding surface of piston assembly, and the piston cup. Insert return spring and piston assembly to the cylinder body.
- 2. Apply silicone grease to the push rod and install the stopper before installing the stopper ring.

#### **CAUTION:**

Restrain the push rod while doing this because there is a danger the piston assembly will fly out of the master cylinder.

- 3. Install seat to the cylinder body.
- 4. Install clevis to the push rod and tighten lock nut to the specified torque.

#### **P**: 9.4 N·m (0.96 kg-m, 83 in-lb)

5. Install reservoir seal and nipple to the cylinder body. Using a pin punch (commercial service tool), install spring pin.

# **OPERATING CYLINDER**

# **OPERATING CYLINDER**



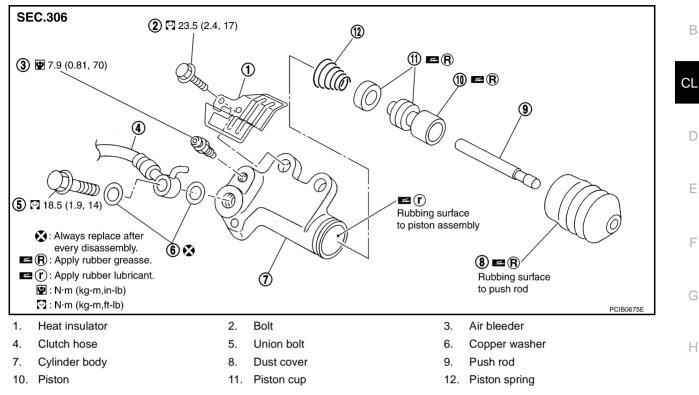
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# **Removal and Installation**



#### REMOVAL

1. Drain clutch fluid.

#### CAUTION:

J 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.
- Κ Remove operating cylinder mounting bolt and then remove heat insulator and operating cylinder from the 3. vehicle.

#### INSTALLATION

To install, reverse the removal procedure, following the cautions below:

- Install hose with care so that it will not be bent or twisted. Refer to CL-12, "Removal and Installation".
- After completing the procedure, bleed the clutch tube. Refer to CL-7, "Bleeding" .

#### Disassembly and Assembly DISASSEMBLÝ

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 pin hole
- 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.

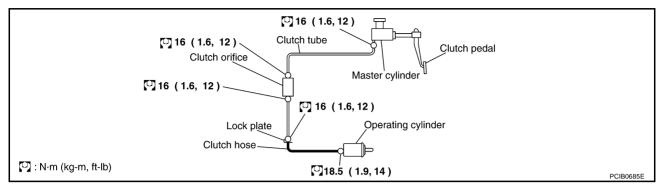
# **CLUTCH PIPING**

# CLUTCH PIPING



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## **Removal and Installation**



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

- Do not spill clutch fluid onto painted surfaces. If it spills, wipe up immediately and wash the affected area with water.
- When fixing clutch hose to bracket, align clutch hose metal fittings with bracket positioning emboss and lock plate to secure. At this time, prevent twisting or damage of clutch hose. In addition, be careful not to damage clutch hose.
- Tighten clutch tube flare nut to the specified torque.

## **O:** 16 N·m (1.6 kg-m, 12 ft-lb)

#### **CAUTION:**

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

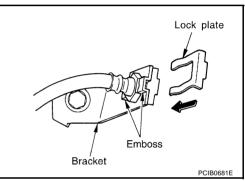
• Tighten the union bolt to the specified torque.

## **O:** 18.5 N·m (1.9 kg-m, 14 ft-lb)

#### CAUTION:

#### Do not reuse the copper washer.

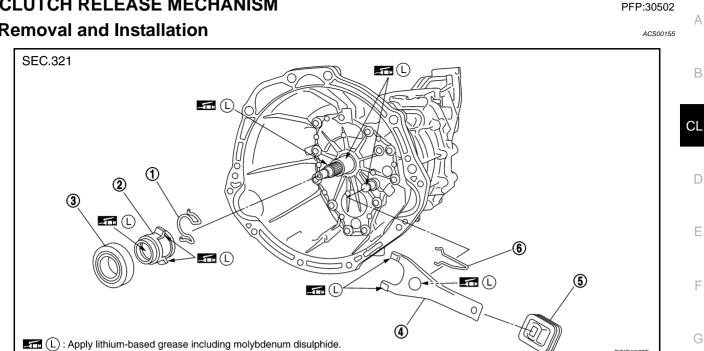
• After installation, bleed the clutch tube. Refer to CL-7, "Bleeding".



# **CLUTCH RELEASE MECHANISM**

# **CLUTCH RELEASE MECHANISM**

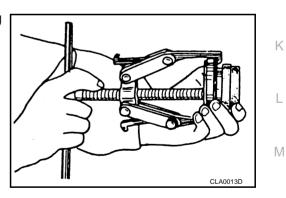
# **Removal and Installation**



PCIB0677E 1. Holder spring 2. Release bearing sleeve 3. Release bearing Withdrawal lever 5. 4. Dust cover 6. Retainer spring

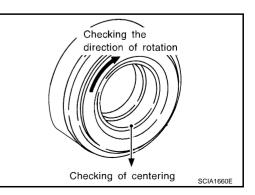
#### REMOVAL

- 1. Remove manual transmission from the vehicle. Refer to MT-19, "Removal and Installation from Vehicle".
- 2. Remove release bearing sleeve assembly, holder spring, and withdrawal lever from inside the clutch housing.
- Remove dust cover. 3.
- 4. Remove retainer spring from withdrawal lever.
- 5. Using a puller as shown in the figure, remove release bearing from release bearing sleeve.



## **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 out, replace it.
- If dust cover is cracked or deformed, replace it.



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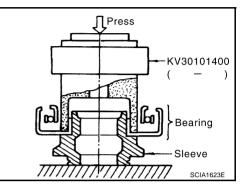
# INSTALLATION

#### **CAUTION:**

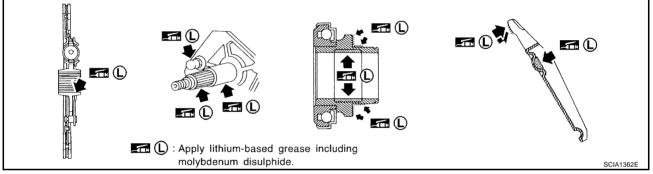
- Be sure to apply grease to the points specified. Otherwise, noise, poor disengagement, or damage to the clutch may result. Excessive grease may cause slip or quiver. Wipe off any grease oozing from the parts.
- Be careful not to bring any grease into contact with the clutch disc facing, pressure plate surface, or flywheel surface.
- 1. Using a drift (special service tool), install release bearing to release bearing sleeve.

#### CAUTION:

Press bearing inner race by pushing with a drift (special service tool).



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



#### **CAUTION:**

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

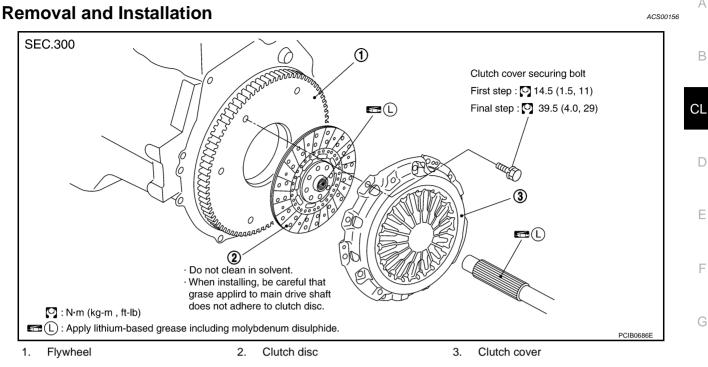
- Evenly apply a 1 mm thick coating of recommended grease to withdrawal lever and release bearing sleeve or holder spring sliding surface.
- Apply recommended grease to ball pin contact surface of the withdrawal lever and inner slots of the release bearing. The grease surface should be level with the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

#### CAUTION:

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

# **CLUTCH DISC, CLUTCH COVER**

# **CLUTCH DISC, CLUTCH COVER**



#### **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 transmission from the vehicle. Refer to MT-19, "Removal and Installation from Vehicle".
- Loosen clutch cover mounting bolts with power tool. Remove clutch cover and clutch disc. 2.

#### INSPECTION AND ADJUSTMENT AFTER REMOVAL

#### **Clutch Disc**

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

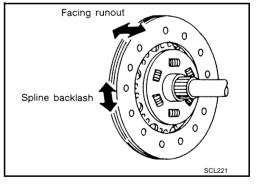
# Runout limit/diameter of the area to be measured:

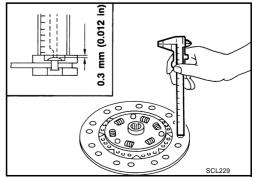
- 0.7 mm (0.028 in) or less/240 mm (9.45 in) dia.
- Measure backlash for clutch disc spline and main drive shaft spline at the circumference of the disc. If it is outside the specified range, replace the clutch disc.

Maximum backlash of spline: 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)





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#### **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: 0.5mm (0.020 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.

#### INSTALLATION

- 1. Apply recommended grease to clutch disc and main drive shaft spline.
  - **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.

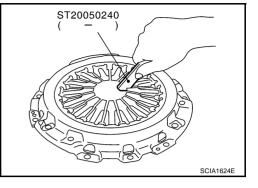
- 2. Install clutch disc and clutch cover. Pre-tighten mounting bolts and install clutch aligning bar (special service tool).
- 3. Tighten clutch cover attaching bolts evenly in two steps in the order shown in the figure.

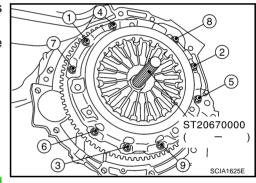
#### First step:

Second step:

2: 39.5 N·m (4.0 kg-m, 29 ft-lb)

4. Install manual transmission. Refer to <u>MT-19, "Removal and</u> <u>Installation from Vehicle"</u>.





# SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS) PFP:00030							
Clutch Control System	ACS003T1						
Type of clutch control	Hydraulic						
Clutch Master Cylinder	ACS00372						
Inner diameter	Unit: mm (in) 15.87 (5/8)						
Clutch Operating Cylinder	ACS003T3 Unit: mm (in)						
Inner diameter	19.05 (3/4)						
Clutch Disc	ACS003T4 Unit: mm (in)						
Engine model	VQ35DE						
Model	250						
Facing size (Outer dia. $\times$ inner dia. $\times$ thickness)	$250 \times 170 \times 3.2~(9.84 \times 6.69 \times 0.126)$						
Wear limit (depth to the rivet head)	0.3 (0.012)						
Runout limit/diameter of the area to be measured	0.7 (0.028) or less/240 (9.45) dia.						
Maximum backlash of spline (at outer edge disc)	1.0 (0.039)						
Clutch Cover	ے۔ ACS00375 Unit: mm (in)						
Engine model	VQ35DE						
Model	250						
Set-load	8,630 N (880 kg)						
Diaphragm spring lever height	39.5 - 41.5 (1.555 - 1.634)						
Uneven limit of diaphragm spring toe height	0.5 (0.020)						
Clutch Pedal	ACS00376 Unit: mm (in)						
Clearance "C" between pedal stopper rubber and clu threaded while clutch pedal is fully depressed.	ch interlock switch 0.1 - 1.0 (0.004 - 0.039)						

Μ