

SECTION **CL**
CLUTCH

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PRECAUTIONS

PRECAUTIONS

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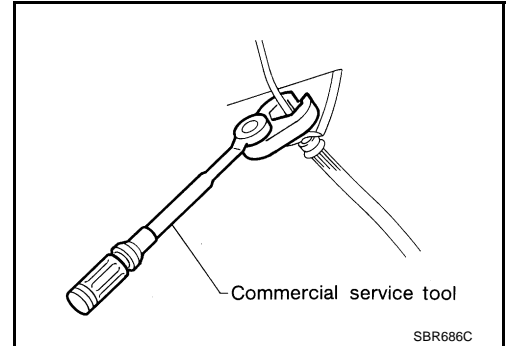
Caution

ACS003LR

- 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

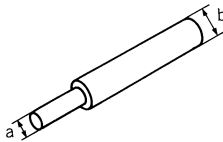
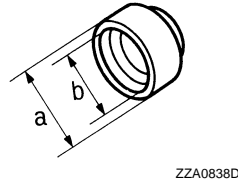
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Special Service Tools

ACS003LS

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

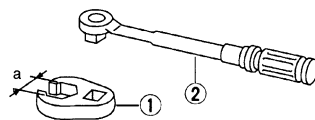
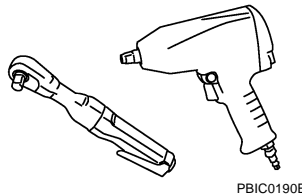
Tool number (Kent-Moore No.) Tool name	Description
KV30101400 (—) a: 51 mm (2.01 in) dia. b: 44 mm (1.73 in) dia. Drift	Installing release bearing
ST20050240 (—) Diaphragm adjusting wrench	Adjusting unevenness of diaphragm spring of clutch cover
ST20670000 (—) a: 15 mm (0.59 in) dia. b: 23 mm (0.91 in) dia. Clutch aligning bar	Installing clutch disc



Commercial Service Tools

ACS003LT

Tool name	Description
Pin punch Tip diameter: 4.5 mm (0.177 in) dia.	Removing and installing master cylinder spring pin
Power tool	Loosening bolts and nuts
1. Flare nut crowfoot 2. Torque wrench a: 10 mm (0.39 in)	Removing and installing clutch piping



NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PF0:00003

NVH Troubleshooting Chart

ACS003LU

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

Symptom		SUSPECTED PARTS (Possible cause)																Reference page
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Clutch grabs/chatters						1												CL-5, "On-Vehicle Inspection and Adjustment"
Clutch pedal spongy			1	2	2													CL-7, "Bleeding"
Clutch noisy								1										CL-9, "Disassembly and Assembly"
Clutch slips		1																CL-11, "Disassembly and Assembly"
Clutch does not disengage		1	2	3	4				5	5	5	5	5	5				EM-104, "Removal and Installation"
																		CL-13, "Removal and Installation"
																		CL-15, "Removal and Installation"
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																		CL-15, "Removal and Installation"
																		EM-137, "FLYWHEEL DEFLECTION"

CLUTCH PEDAL

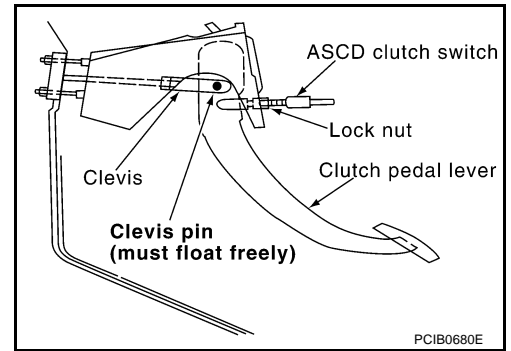
CLUTCH PEDAL

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On-Vehicle Inspection and Adjustment

ACS003LV

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.) Re-assemble 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)

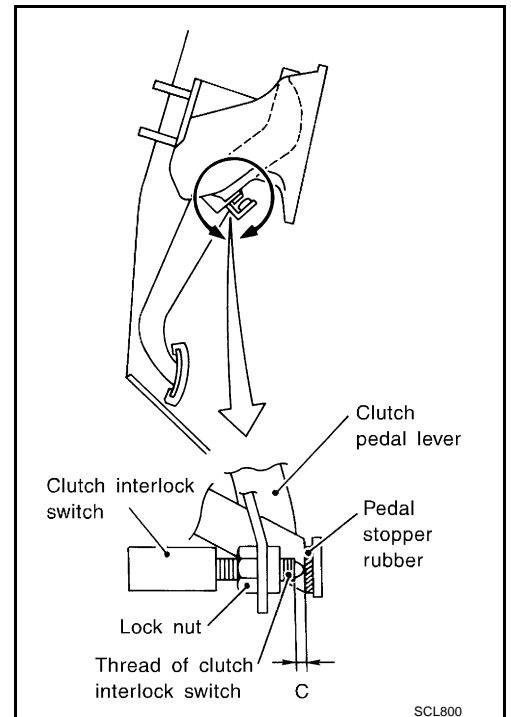


Clearance C : 0.1 - 1.0mm (0.004 - 0.039 in)

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 [CL-7, "Bleeding"](#) .

NOTE:

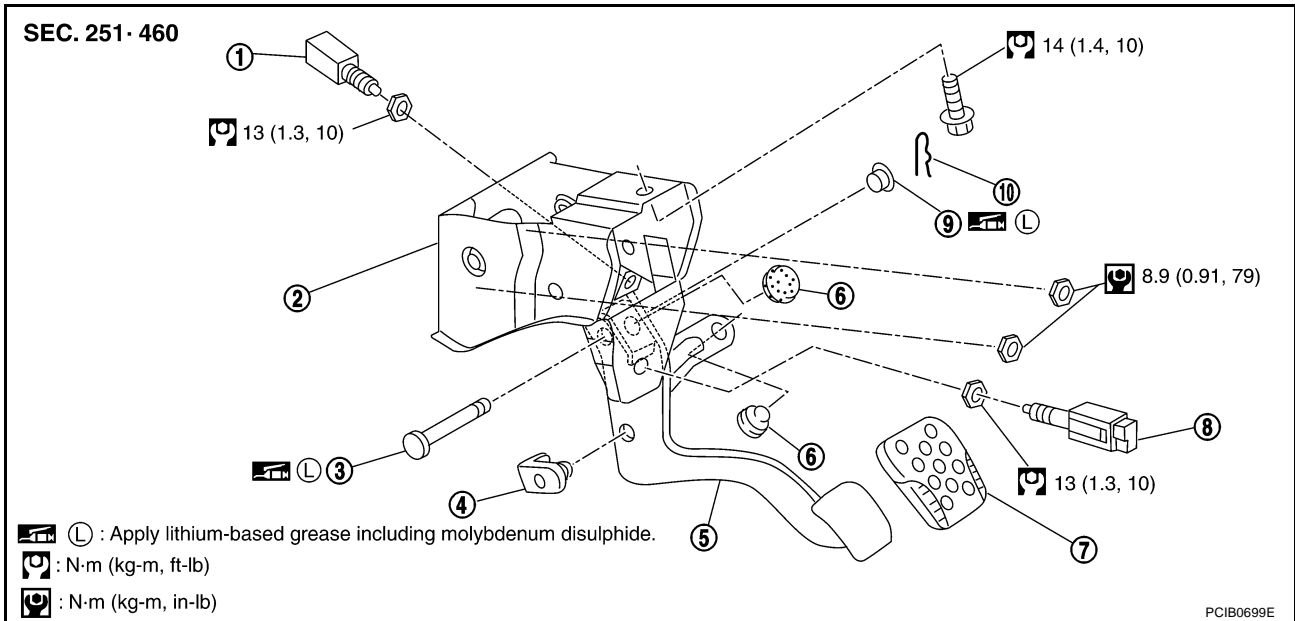
Do not use a vacuum assist or any other type of power bleeder on this system. Use of a vacuum assist or power bleeder will not purge all the air from the system.



CLUTCH PEDAL

ACS003LW

Removal and Installation



- | | | |
|----------------------------|-----------------------|-------------------|
| 1. Clutch interlock switch | 2. Bracket | 3. Clevis pin |
| 4. Pedal stopper rubber | 5. Clutch pedal | 6. Stopper rubber |
| 7. Pedal pad | 8. ASCD clutch switch | 9. Bushing |
| 10. Snap pin | | |

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 front kicking plate. Refer to [EI-39, "Removal and Installation"](#).
2. Remove foot-rest (driver). Refer to [EI-43, "Removal and Installation"](#).
3. Remove dash side finisher. Refer to [EI-39, "Removal and Installation"](#).
4. Remove instrument lower driver panel. Refer to [IP-10, "Component Parts Drawing"](#).
5. Remove VDC/TCS/ABS control unit. (VDC/TCS/ABS model) Refer to [BRC-66, "Removal and Installation"](#).
6. Remove the clutch interlock switch and ASCD clutch switch connector and harness.
7. Remove the snap pin and clevis pin.
8. 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.

CLUTCH FLUID

CLUTCH FLUID

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Bleeding

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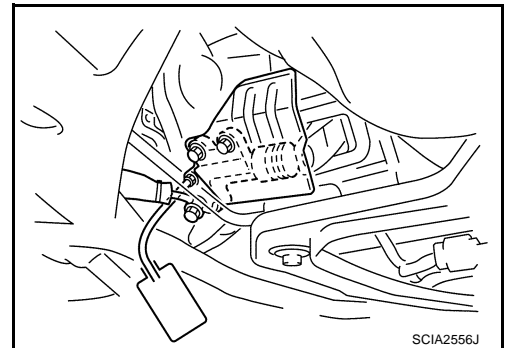
CAUTION:

- 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.

NOTE:

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

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. Refer to [CL-11, "Removal and Installation"](#).



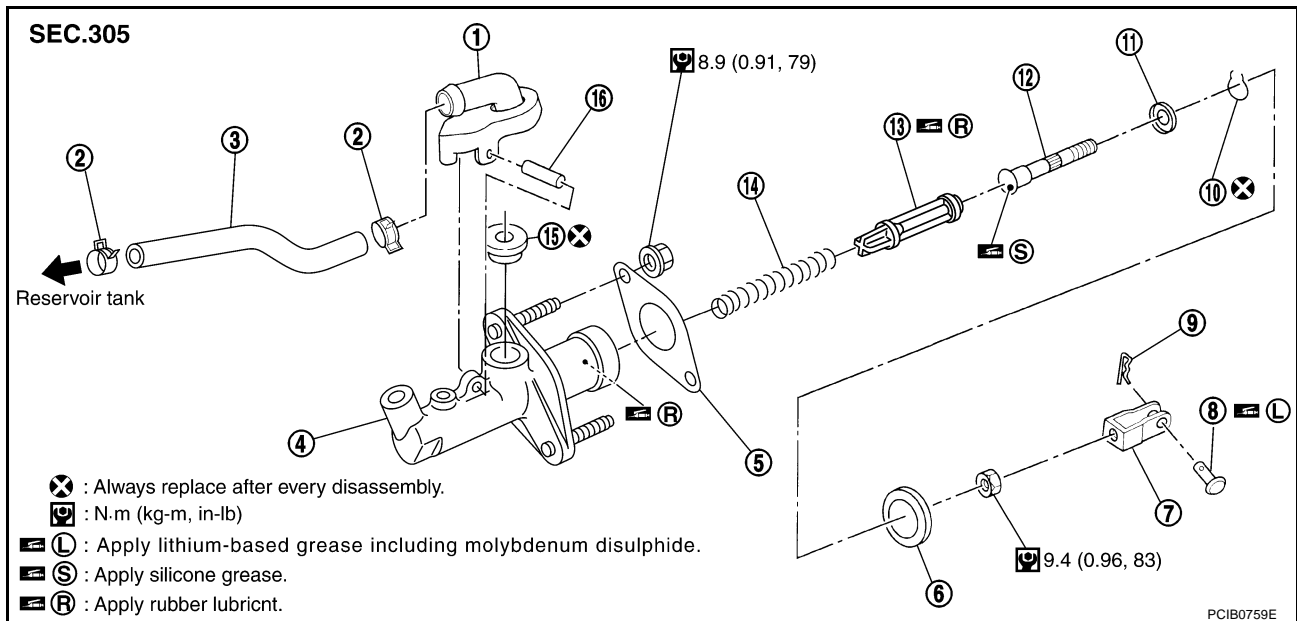
CLUTCH MASTER CYLINDER

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ACS003LY

CLUTCH MASTER CYLINDER

Removal and Installation



- | | | |
|---------------------|-------------------|--------------------|
| 1. Nipple | 2. Clamp | 3. Reservoir hose |
| 4. Cylinder body | 5. Packing | 6. Seat |
| 7. Clevis | 8. Clevis pin | 9. Snap pin |
| 10. Stopper ring | 11. Stopper | 12. Push rod |
| 13. Piston assembly | 14. Return spring | 15. Reservoir seal |
| 16. Spring pin | | |

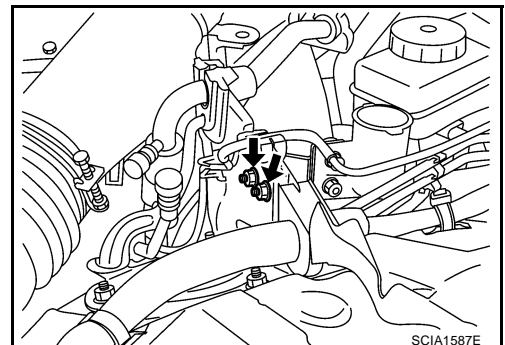
REMOVAL

- Remove front kicking plate. Refer to [EI-39, "Removal and Installation"](#).
- Remove foot-rest (driver). Refer to [EI-43, "Removal and Installation"](#).
- Remove dash side finisher. Refer to [EI-39, "Removal and Installation"](#).
- Remove instrument lower driver panel. Refer to [IP-10, "Component Parts Drawing"](#).
- Remove VDC/TCS/ABS control unit. (VDC/TCS/ABS model) Refer to [BRC-66, "Removal and Installation"](#).
- Remove snap pin and clevis pin from the clevis, and separate it from clutch pedal.
- Remove clips, and remove hoodledge cover.
- 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.

- Remove the reservoir tank mounting nuts and then remove the reservoir tank.
- Using a flare nut wrench, remove clutch tube.
- First remove nuts on master cylinder assembly, and then master cylinder assembly from the vehicle.



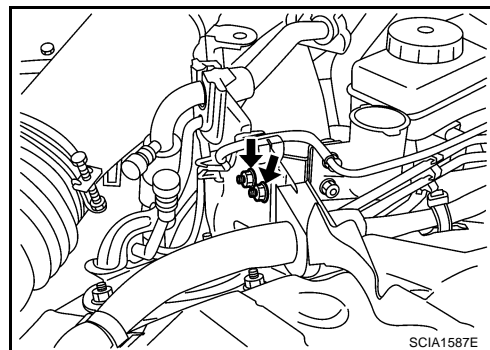
CLUTCH MASTER CYLINDER

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. 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-12, "Removal and Installation"](#).
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.

: **5.8 N-m (0.59 Kg-m, 51 in-lb)**

7. After completing this procedure, inspect and bleed the clutch tube. Refer to [CL-5, "On-Vehicle Inspection and Adjustment"](#) and [CL-7, "Bleeding"](#).
8. Install hoodledge cover.
9. Install VDC/TCS/ABS control unit. (VDC/TCS/ABS model) Refer to [BRC-66, "Removal and Installation"](#).
10. Install instrument lower driver panel. Refer to [IP-10, "Component Parts Drawing"](#).
11. Install dash side finisher. Refer to [EI-39, "Removal and Installation"](#).
12. Install foot-rest (driver). Refer to [EI-43, "Removal and Installation"](#).
13. Install front kicking plate. Refer to [EI-39, "Removal and Installation"](#).



Disassembly and Assembly

DISASSEMBLY

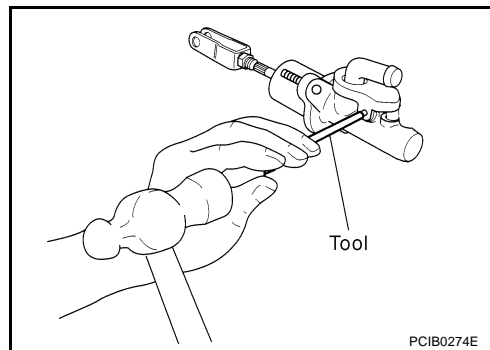
1. Using a pin punch, remove spring pin, nipple and reservoir seal from the cylinder body.

Tool number : **Commercial service tool**

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, 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.



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. Refer to [CL-8, "Removal and Installation"](#).
5. Install reservoir seal and nipple to the cylinder body. Using a pin punch, install spring pin.

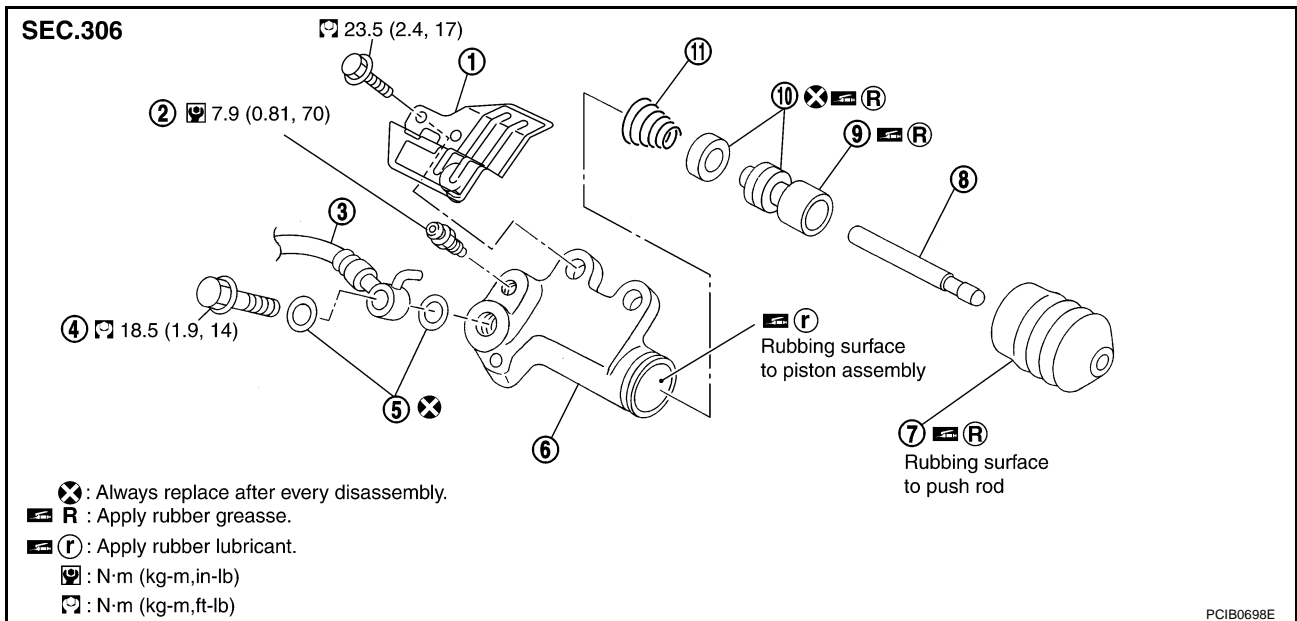
OPERATING CYLINDER

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OPERATING CYLINDER

Removal and Installation

ACS003M0



- | | | |
|-------------------|-------------------|------------------|
| 1. Heat insulator | 2. Air bleeder | 3. Clutch hose |
| 4. Union bolt | 5. Copper washer | 6. Cylinder body |
| 7. Dust cover | 8. Push rod | 9. Piston |
| 10. Piston cup | 11. 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 the operating cylinder.
3. Remove operating cylinder mounting bolt and then remove heat insulator and operating cylinder from the 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

DISASSEMBLY

ACS003M1

- Remove dust cover and push rod. Remove piston assembly 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.

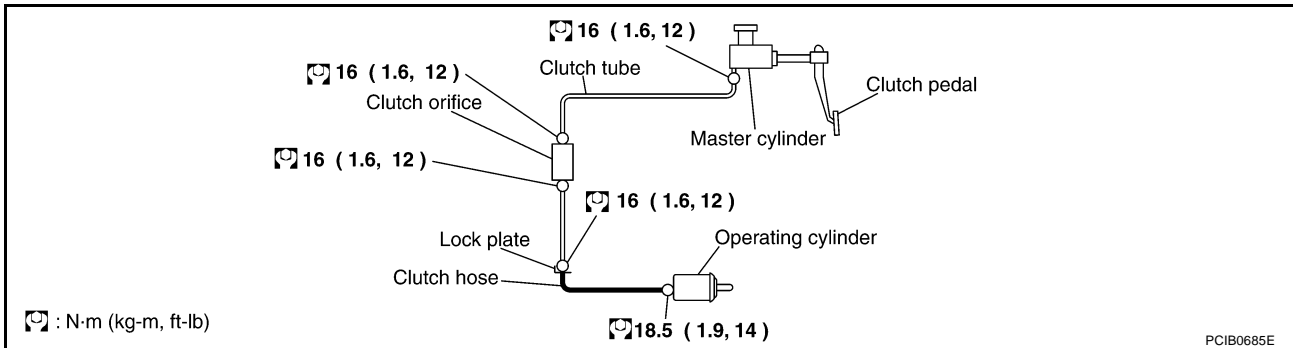
CLUTCH PIPING

CLUTCH PIPING

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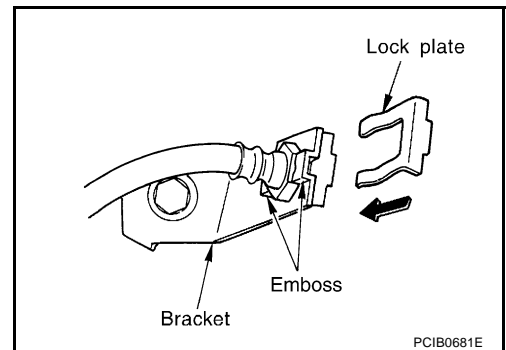
Removal and Installation

ACS003M2



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.
CAUTION:
Be careful not to damage flare nut and clutch tube.
- Tighten the union bolt to the specified torque. Refer to [CL-11, "Removal and Installation"](#).
- **CAUTION:**
Do not reuse the copper washer.
- After installation, bleed the clutch tube. Refer to [CL-7, "Bleeding"](#).



CLUTCH RELEASE MECHANISM

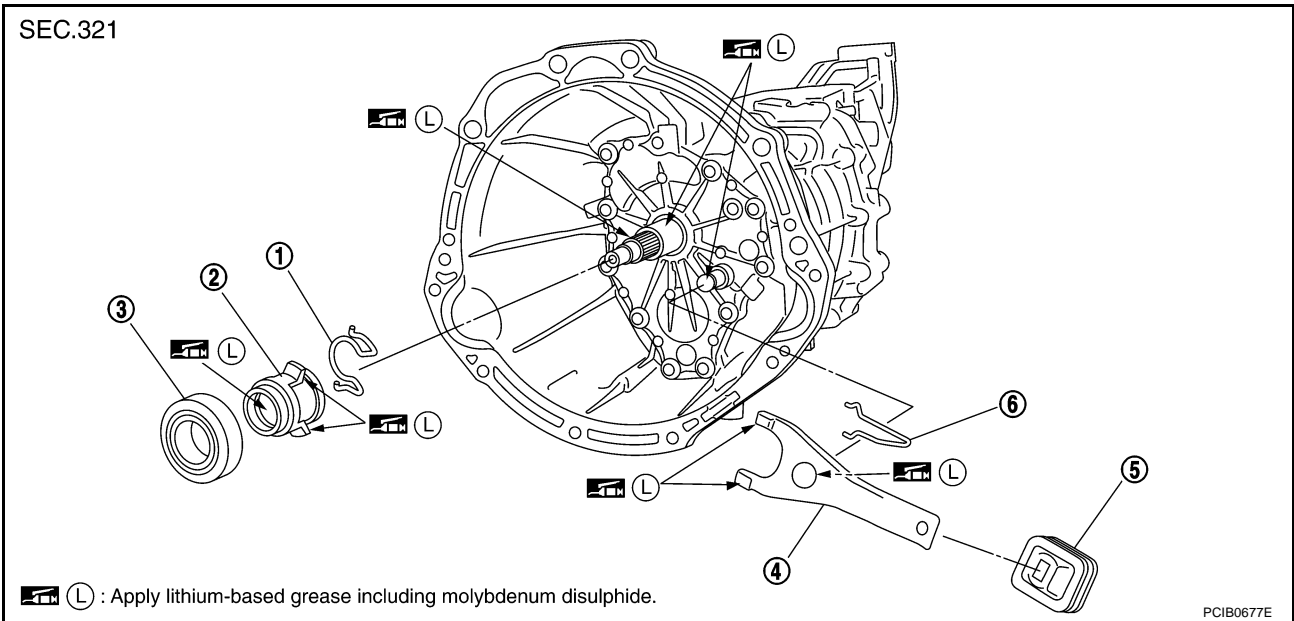
CLUTCH RELEASE MECHANISM

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Removal and Installation

ACS003M3

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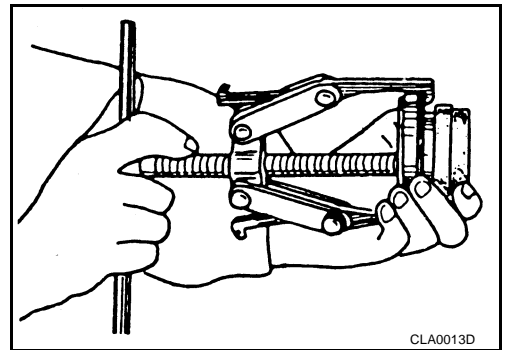


(L) : Apply lithium-based grease including molybdenum disulphide.

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

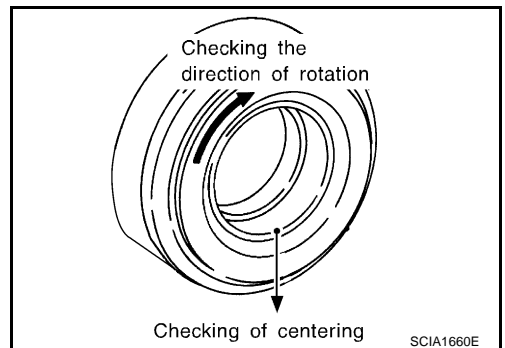
REMOVAL

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.
3. Remove dust cover.
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.



CLUTCH RELEASE MECHANISM

INSTALLATION

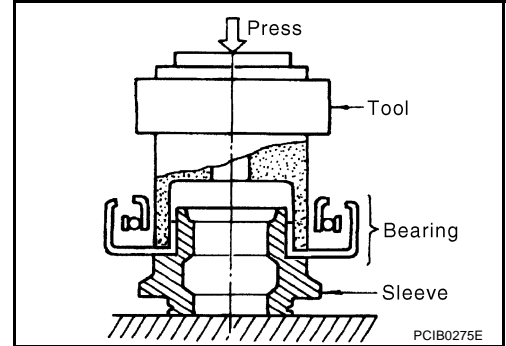
CAUTION:

- 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, install release bearing to release bearing sleeve.

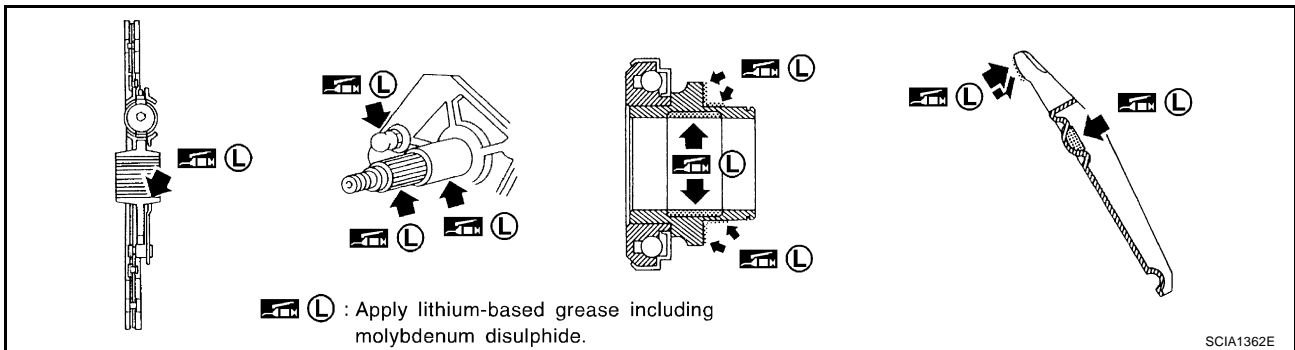
Tool number : KV 30101400 (-)

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.

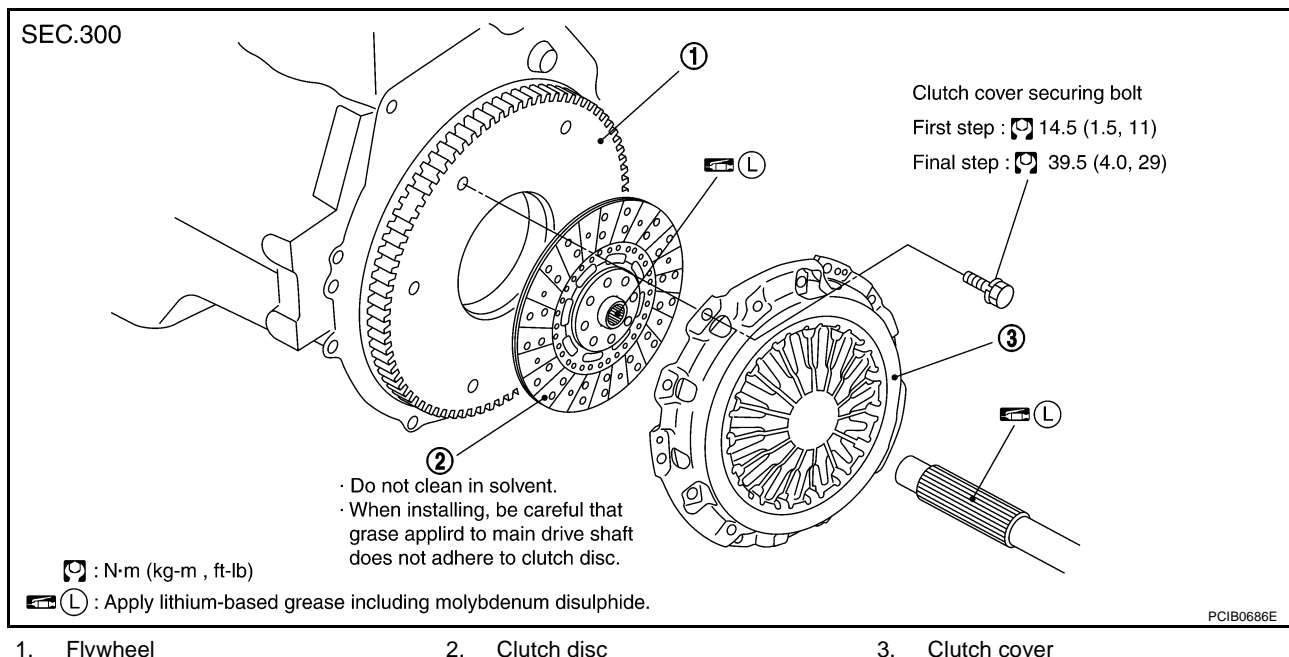
CLUTCH DISC, CLUTCH COVER

CLUTCH DISC, CLUTCH COVER

PFP:30100

Removal and Installation

ACS003M4



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"](#).
2. Loosen clutch cover mounting bolts with power tool. Remove clutch cover and clutch disc.

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.

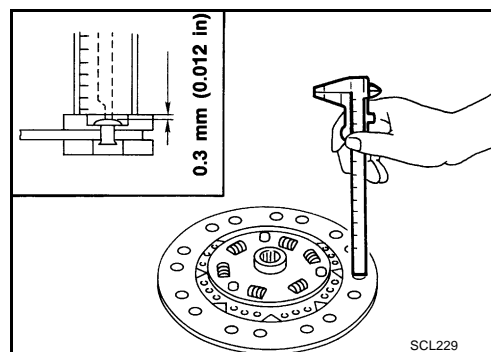
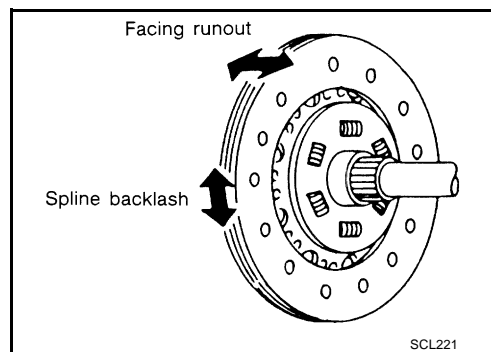
Runout limit/diameter of the area to be measured:
0.7 mm (0.028 in) or less/240 mm (9.45 in) dia.

- 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)



CLUTCH DISC, CLUTCH COVER

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.

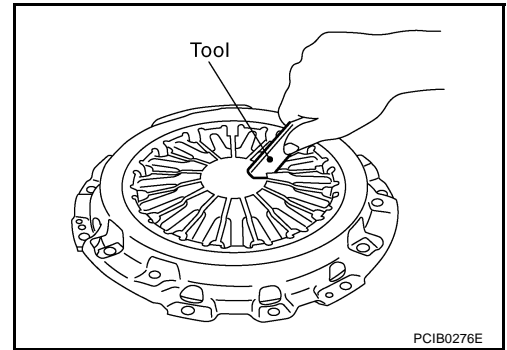
Tolerance for diaphragm spring lever unevenness:
0.5 mm (0.02 in)

Tool number : ST 20050240 (-)

- 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.

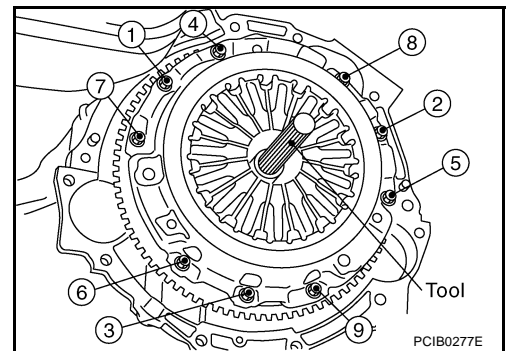
CAUTION:

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.
3. Tighten clutch cover attaching bolts evenly in two steps in the order shown in the figure. Refer to [CL-15, "Removal and Installation"](#).

Tool number : ST20670000 (-)

4. Install manual transmission. Refer to [MT-19, "Removal and Installation from Vehicle"](#).



SERVICE DATA AND SPECIFICATIONS (SDS)

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PPF:00030

Clutch Control System

ACS003M5

Type of clutch control	Hydraulic
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Clutch Master Cylinder

ACS003M6

Unit: mm (in)

Inner diameter	15.87 (5/8)
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Clutch Operating Cylinder

ACS003M7

Unit: mm (in)

Inner diameter	19.05 (3/4)
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Clutch Disc

ACS003M8

Unit: mm (in)

Engine model	VQ35DE
Model	250
Facing size (Outer dia. × inner dia. × thickness)	250 × 170 × 3.2 (9.84 × 6.69 × 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

ACS003M9

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 (0.02)

Clutch Pedal

ACS003MA

Unit: mm (in)

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