SECTION CL
CLUTCH

CONTENTS

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000000991848

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-5	CL-6	CL-12	EM-72	CL-16	CL-16	CL-13	CL-13	CL-13	CL-13	CL-13	CL-13	CL-13	CL-14	CL-13	EM-84
SUSPECTED PARTS (Possible cause)		CLUTCH PEDAL (Inspection and adjustment)	CLUTCH LINE (Air in line)	CSC (Concentric slave cylinder) (Worn, dirty or damaged)	ENGINE MOUNTING (Loose)	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														
	Clutch noisy			1													
	Clutch slips	1								2	2			3		4	5
	Clutch does not disengage	1	2	4		5	5	5	5	5			5	6	6	7	

PRECAUTION

PRECAUTIONS

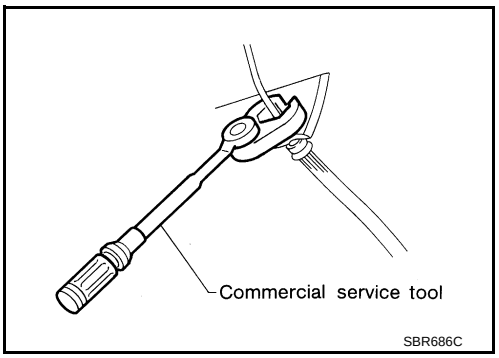
Service Notice or Precautions

INFOID:0000000000991849

- Always use recommended fluid. Refer to MA-11, "Fluids and Lubricants".
- Never reuse drained fluid.
- Be careful not to splash fluid on painted areas.
- When removing and installing clutch piping, use Tool.
- Use new fluid to clean or wash all parts of master 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.



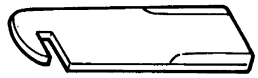
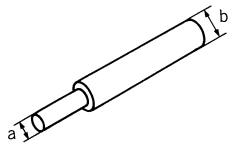
PREPARATION

PREPARATION

Special Service Tools

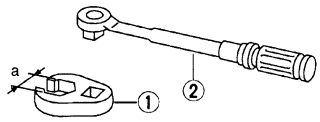
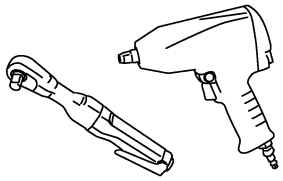
INFOID:0000000000991850

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
ST20050240 (—) Diaphragm adjusting wrench  ZZA0508D	Adjusting unevenness of diaphragm spring of clutch cover
ST20670000 (—) Clutch aligning bar  ZZA1178D	Installing clutch disc **a: 15 mm (0.59 in) dia.** **b: 23 mm (0.91 in) dia.**

Commercial Service Tools

INFOID:0000000000991851

Tool name	Description
1. Flare nut crowfoot 2. Torque wrench  S-NT360	Removing and installing clutch piping **a: 10 mm (0.39 in)**
Power tool  PBIC0190E	Loosening bolts and nuts

ON-VEHICLE MAINTENANCE

CLUTCH PEDAL

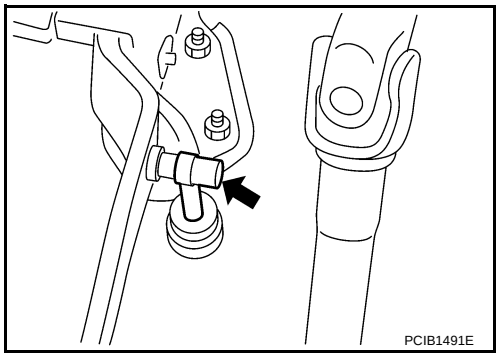
Inspection and Adjustment

INFOID:0000000000991852

1. Check to see if the master cylinder rod end moves freely. It should not be bound by the clutch pedal.
   - If the rod end does not move freely, remove the rod end and check for deformation or damage on the rod end. Leave the rod end removed for step 2.
2. Check the clutch pedal stroke for free range of movement.

a. With the master cylinder rod end removed, manually move the clutch pedal up and down to determine if it moves freely.

b. If any sticking is noted, replace the clutch pedal assembly. Reverify that the master cylinder rod end moves freely.



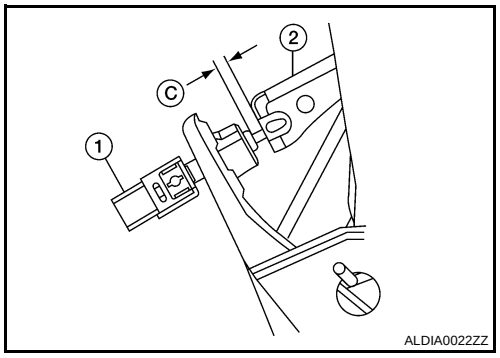
3. Inspect the ASCD switch position.

a. If the rod end does not move freely, check that the ASCD switch is not applying pressure to the clutch pedal causing the rod end to bind. To adjust, disconnect the ASCD switch electrical connector and turn the ASCD switch.

b. Connect the ASCD switch electrical connector.

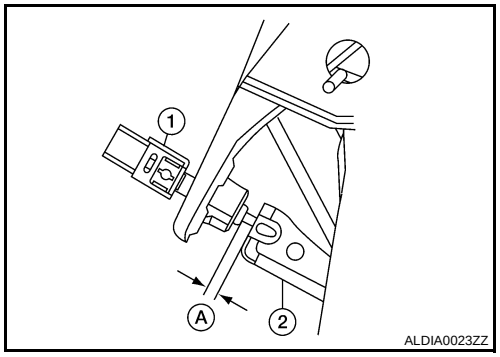
4. Adjust clutch interlock switch (1) position so that clearance between clutch pedal (2) and thread end of clutch interlock switch (1), with clutch pedal fully depressed, is within specification (C).

Clearance C : 0.74 - 1.96 mm (0.0291 - 0.0772 in)



5. Adjust ASCD clutch switch (1) position so that clearance between clutch pedal (2) and thread end of ASCD clutch switch (1), with clutch pedal fully released, is within specification (A).

Clearance A : 0.74 - 1.96 mm (0.0291 - 0.0772 in)



6. Check the clutch hydraulic system components (clutch master cylinder, CSC) 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-6, "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.

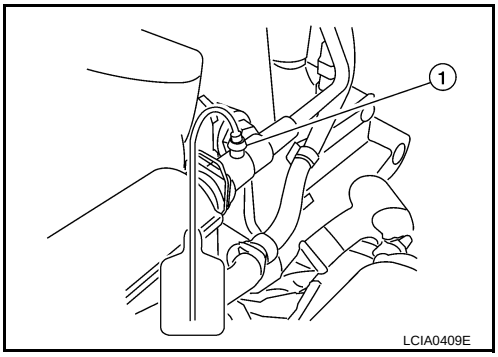
CLUTCH FLUID

Air Bleeding Procedure

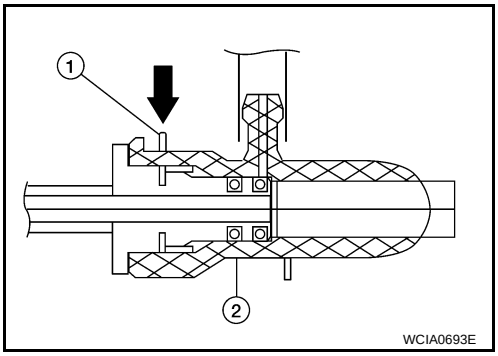
INFOID:0000000000991853

CAUTION:
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.
- Carefully monitor clutch fluid level in reservoir tank during bleeding operation.
- First bleed the air from the CSC connector air bleed port and then from the air bleed connector valve.

1. Fill master cylinder reservoir tank with new clutch fluid.
2. Connect a transparent vinyl tube and container to the CSC connector air bleed port (1).
3. Fully depress the clutch pedal several times.



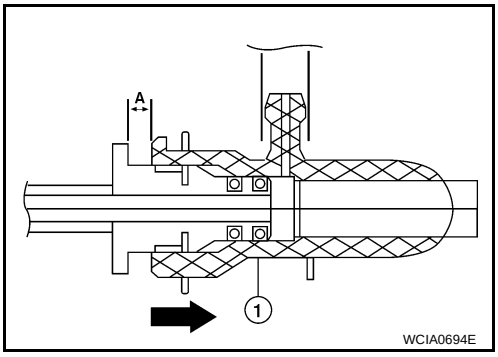
4. With clutch pedal depressed, push the lock pin (1) of the CSC connector (2) as shown.
   CAUTION:
   Hold the lock pin in to prevent the connector from separating.



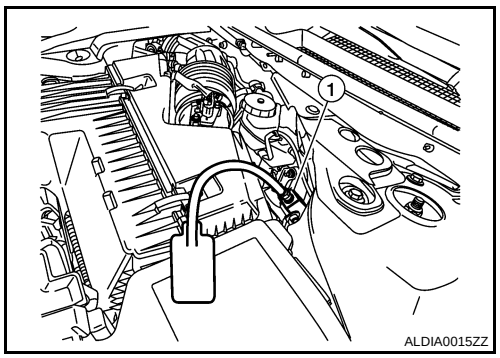
5. Slide the CSC connector (1) as shown to bleed the air.

   Dimension A : 5 mm (0.20 in)

6. Return the CSC connector and lock pin to their original positions.
7. Release the clutch pedal and wait for 5 seconds.
8. Repeat steps 3 through 6 until no air bubbles can be observed in the clutch fluid.



9. Connect a transparent vinyl tube and container to the air bleed connector valve (1).
10. Fully depress the clutch pedal several times.
11. With clutch pedal depressed, open the air bleed connector valve to bleed the air.
12. Close the air bleed connector valve.
13. Release the clutch pedal and wait for 5 seconds.
14. Repeat steps 9 through 13 until no air bubbles can be observed in the clutch fluid.
15. Check clutch fluid level in reservoir tank.

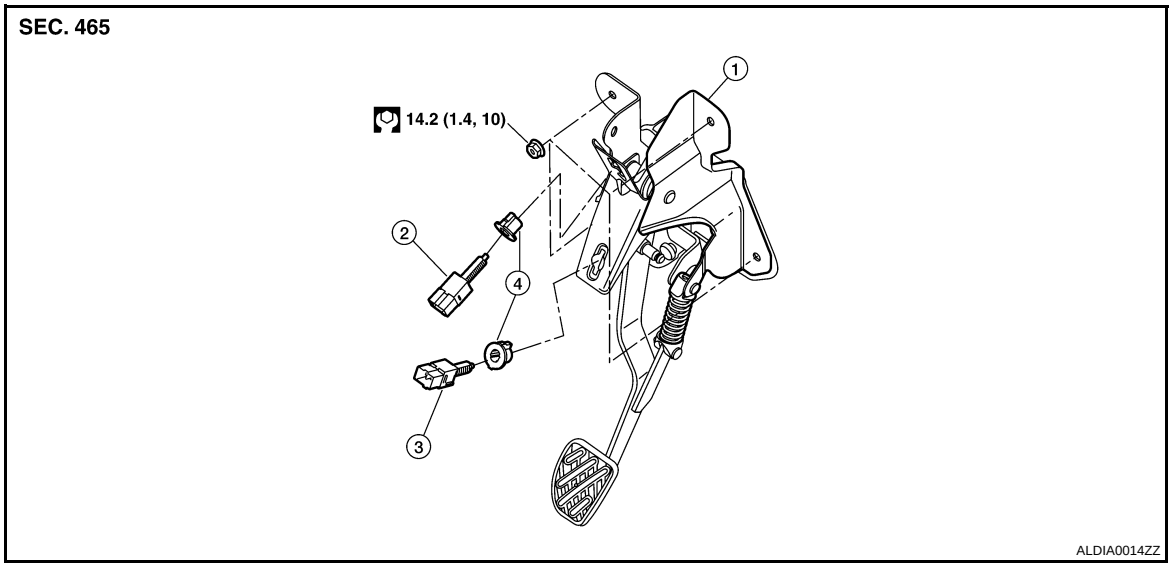


ON-VEHICLE REPAIR

CLUTCH PEDAL

Exploded View

INFOID:0000000000991854



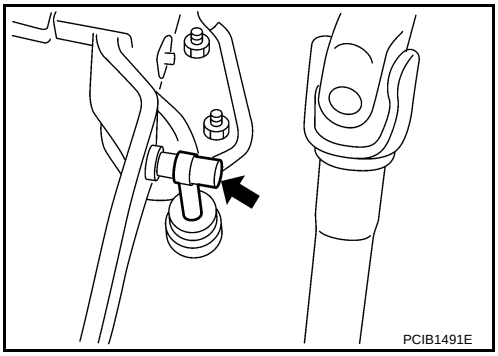
1. Clutch pedal assembly
2. Clutch interlock switch
3. ASCD clutch switch
4. Lock nut

Removal and Installation

INFOID:0000000000991855

REMOVAL

1. Disconnect master cylinder rod end from clutch pedal lever.
2. Disconnect the ASCD clutch switch and clutch interlock switch harness connectors.
3. Remove clutch pedal assembly nuts and then remove clutch pedal assembly.



INSTALLATION

Installation is in the reverse order of removal.

- After installing the clutch switches, adjust the switch positions. Refer to CL-5, "Inspection and Adjustment".

Inspection

INFOID:0000000000991856

- After removal, check clutch pedal for bend, damage or a cracked weld. If bend, damage or a cracked weld is found, replace clutch pedal assembly.

CLUTCH MASTER CYLINDER

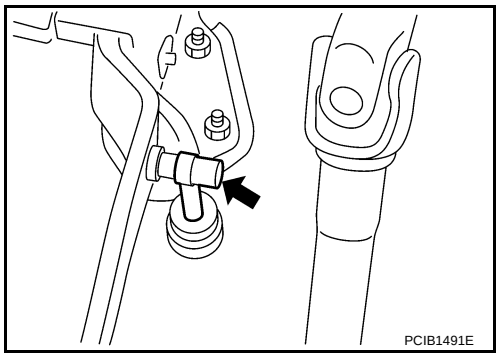
Removal and Installation

INFOID:0000000000991857

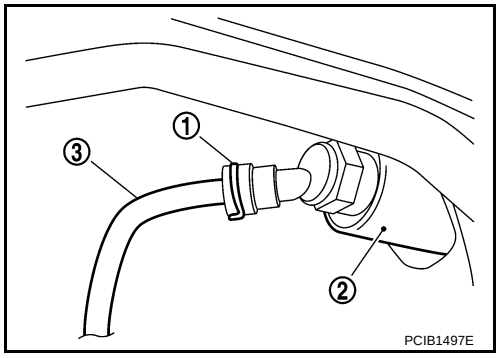
REMOVAL

1. Remove the air cleaner and air duct. Refer to EM-24, "Removal and Installation" for QR25 and EM-132, "Removal and Installation" for VQ35.
2. Use one of the following methods to remove hose from master cylinder.
   - Drain clutch fluid from reservoir tank and remove hose.
   - Remove hose from master cylinder. Immediately plug hose and reservoir tank to prevent clutch fluid from dripping.

   CAUTION:
   Do not spill clutch fluid onto painted surfaces. If it spills, wipe up immediately and wash the affected area with water.
3. Remove master cylinder rod end from clutch pedal assembly.



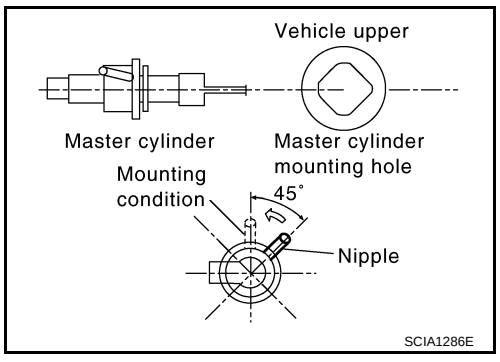
4. Remove lock pin (1) from connector of master cylinder (2) and separate clutch tube (3).



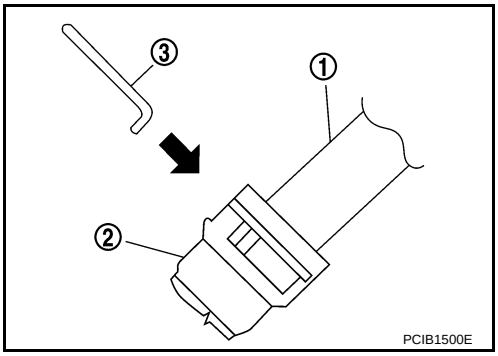
5. Rotate master cylinder clockwise by 45° and remove from the vehicle.

INSTALLATION

1. Tilt master cylinder clockwise by 45° and insert it in the mounting hole. Rotate counterclockwise to secure it. At this time, nipple is in the up position.
2. Install master cylinder rod end to clutch pedal.



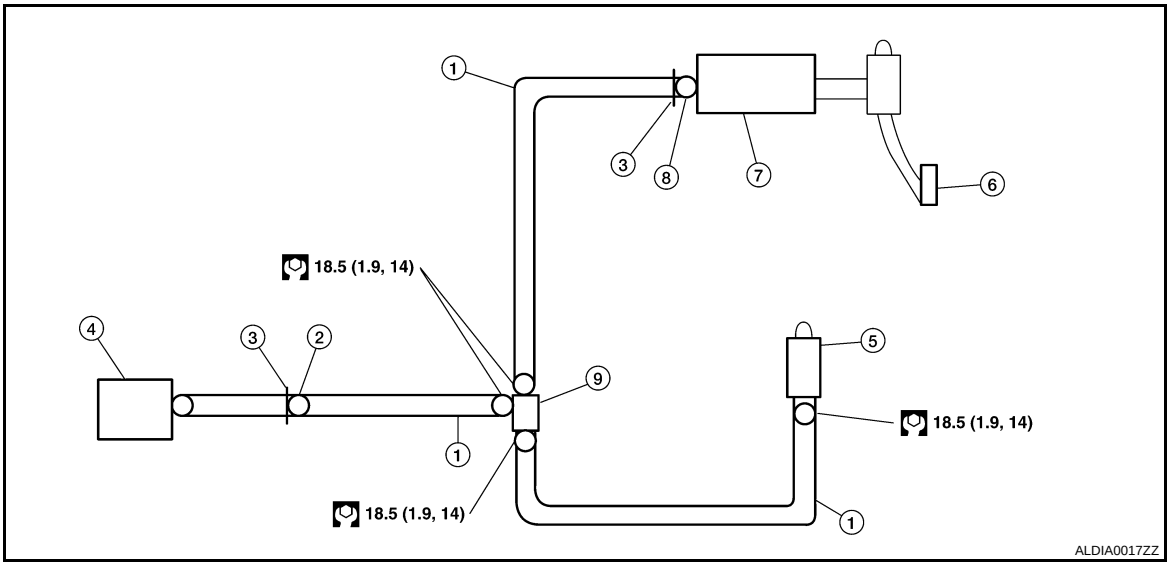
3. Install clutch tube (1) fully into connector of master cylinder (2).
4. Install lock pin (3) fully into connector of master cylinder (2).
5. Fill with new clutch fluid and bleed clutch hydraulic system. Refer to CL-5, "Inspection and Adjustment".
6. Inspect clutch pedal operation. Refer to CL-5, "Inspection and Adjustment".
7. Install the air cleaner and air duct. Refer to EM-24, "Removal and Installation" for QR25 and EM-132, "Removal and Installation" for VQ35.



CLUTCH PIPING

Exploded View

INFOID:0000000000991858



1. Clutch tube
2. CSC connector
3. Lock pin
4. CSC
5. Air bleed connector valve
6. Clutch pedal
7. Clutch master cylinder
8. Clutch master cylinder connector
9. Branch connector

Removal and Installation

INFOID:0000000000991859

CAUTION:

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

REMOVAL

1. Remove the air cleaner and air duct. Refer to EM-24, "Removal and Installation" for QR25 and EM-132, "Removal and Installation" for VQ35.
2. Remove the lock pin and disconnect the clutch master cylinder connector.
3. Remove the clutch tubes from the branch connector.
4. Remove the clutch tube and air bleed connector valve.
5. Remove the branch connector.
6. Remove lock pin and disconnect the CSC connector.

INSTALLATION

Installation is in the reverse order of removal.

- Make sure that all tubes are fully installed into connectors.
- Make sure that all connector lock pins are fully installed.
- After installation, bleed clutch hydraulic system. Refer to CL-6, "Air Bleeding Procedure".

REMOVAL AND INSTALLATION

CSC (CONCENTRIC SLAVE CYLINDER)

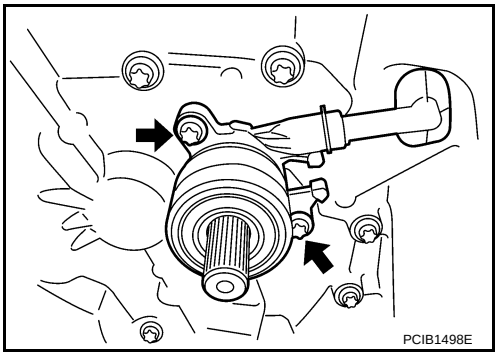
Removal and Installation

INFOID:0000000000991860

CAUTION:
- **If transaxle assembly is removed from the vehicle, always replace CSC. Return CSC insert to original position to remove transaxle assembly. Dust on clutch disc sliding parts may damage CSC seal and may cause clutch fluid leakage.**
- **Do not spill clutch fluid onto painted surfaces. If it spills, wipe up immediately and wash the affected area with water.**

REMOVAL

1. Remove the transaxle assembly. Refer to TM-25, "Removal and Installation".
2. Remove CSC bolts and CSC from clutch housing.



INSTALLATION

Installation is in the reverse order of removal.

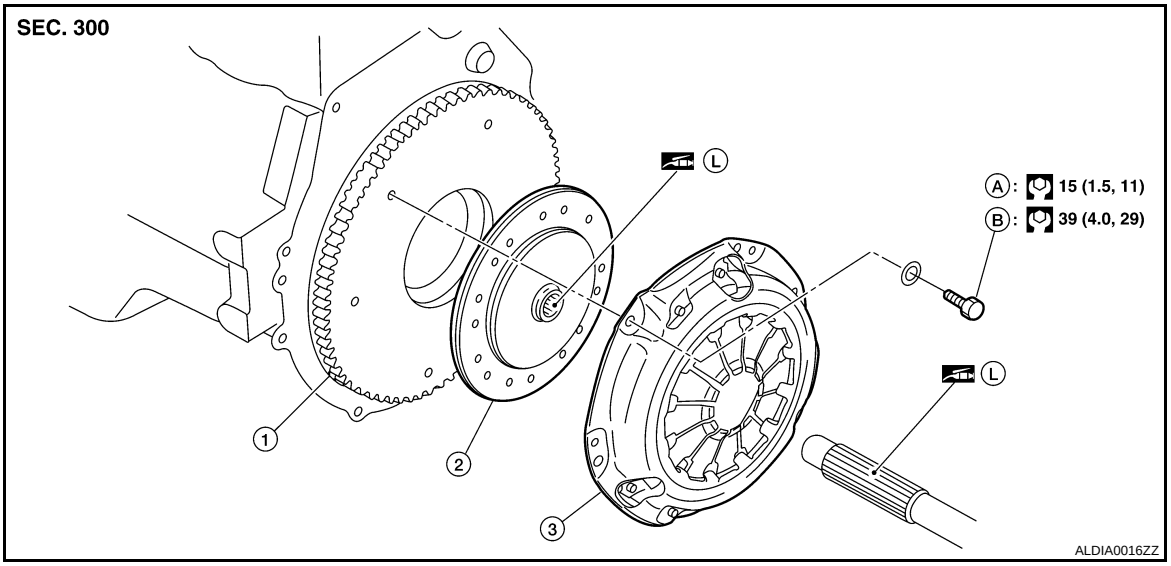
CAUTION:
- **Do not reuse CSC.**
- **Do not insert and operate CSC because piston and stopper of CSC components may fall off.**

After installation, bleed clutch hydraulic system. Refer to CL-6, "Air Bleeding Procedure".

CLUTCH DISC AND CLUTCH COVER

Exploded View

INFOID:0000000000991861



1. Flywheel
2. Clutch disc *1, *2
3. Clutch cover

A. First step
B. Final Step

: Apply lithium-based grease including molybdenum disulphide

*1. Do not clean in solvent.
*2. When installing, be careful that grease applied to input shaft does not adhere to clutch disc.

Removal and Installation

INFOID:0000000000991862

CAUTION:

- **If transaxle assembly is removed from the vehicle, always replace CSC (Concentric Slave Cylinder). Return CSC insert to original position to remove transaxle assembly. Dust on clutch disc sliding parts may damage CSC seal and may cause clutch fluid leakage.**
- **Be careful not to apply any grease to the clutch disc facing, pressure plate surface and flywheel surface.**
- **If flywheel is removed, align dowel pin with the smallest hole of flywheel (for VQ engine models). Refer to EM-204, "Disassembly and Assembly".**
- **Replace clutch disc and clutch cover as a set (for VQ engine models).**

REMOVAL

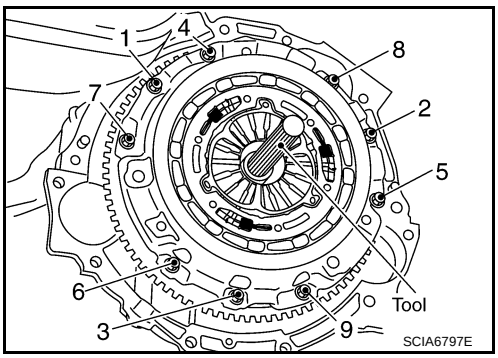
1. Remove transaxle assembly from the vehicle. Refer to TM-25, "Removal and Installation".
2. Loosen clutch cover bolts evenly. Then remove clutch cover and clutch disc.

INSTALLATION

1. Clean clutch disc and input shaft splines to remove grease and dust caused by abrasion.
2. Apply recommended grease to clutch disc and input shaft splines.
   CAUTION:
   Be sure to apply grease to the points specified. Otherwise, noise, poor disengagement, or damage to the clutch may result. Excessive grease may cause slip or shudder. If it adheres to CSC seal, it will cause clutch fluid leakage. Wipe off excess grease.

3. Install clutch disc using Tool.

Tool number : KV30101000 (—)

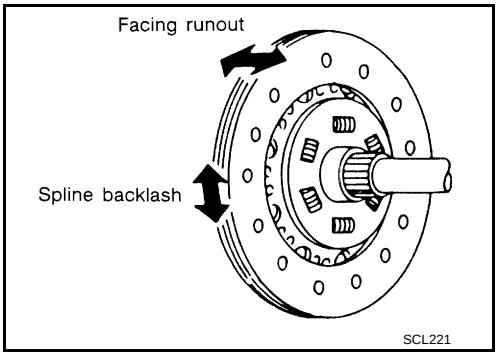


4. Install clutch cover. Pre-tighten clutch cover bolts.
5. Tighten clutch cover bolts evenly in two steps in the order shown. Refer to CL-13, "Exploded View".
6. Install transaxle assembly. Refer to TM-25, "Removal and Installation".

Inspection

INFOID:0000000000991863

CLUTCH DISC



- Measure circumference runout relative to clutch disc center spline. If it is outside the specification, replace clutch cover (for QR engine models) or clutch disc and clutch cover as a set (for VQ engine models).

Runout limit/diameter of the area to be measured

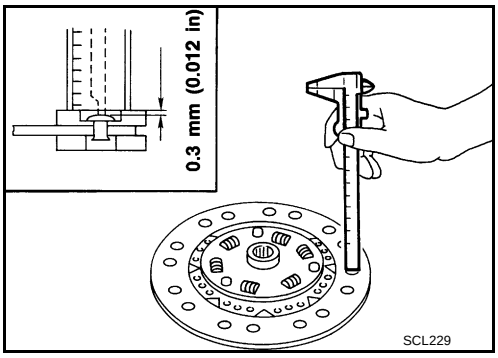
QR25DE engine models : 0.7 mm (0.028 in) or less/ 230 mm (9.06 in) dia.

VQ35DE engine models : 1.0 mm (0.039 in) or less/ 230 mm (9.06 in) dia.

- Measure backlash for clutch disc spline and main drive shaft spline at the circumference of clutch disc. If it is outside the specified range, replace clutch cover (for QR engine models) or clutch disc and clutch cover as a set (for VQ engine models).

Maximum backlash of spline : 1.0 mm (0.039 in)

- Check clutch disc for burns, discoloration or oil or grease leakage. Replace if necessary.
- Measure the depth to clutch disc facing rivet heads using suitable tool. If it exceeds the allowable wear limit, replace clutch disc (for QR engine models) or clutch disc and clutch cover as a set (for VQ engine models).



Facing wear limit (depth to the rivet head):
0.3 mm (0.012 in)

CLUTCH COVER

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

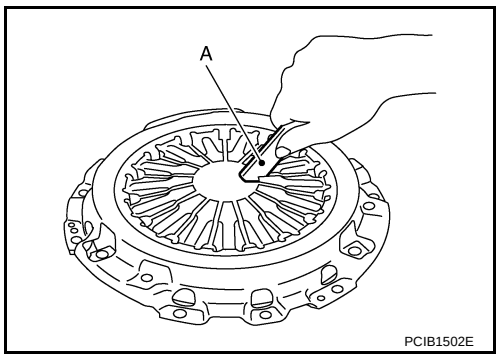
Uneven limit

QR25DE engine models : 0.7 mm (0.028 in) or less

VQ35DE engine models : 0.8 mm (0.031 in) or less

- If out of limit, adjust the height using Tool (A)

Tool number A : ST20050240 (—)



- Check clutch cover thrust ring for wear or breakage. If wear or breakage is found, replace clutch cover (for QR engine models) or clutch disc and clutch cover as a set (for VQ engine models).
  NOTE:
  - Worn thrust ring will generate a beating noise when tapped at the rivet using suitable tool.
  - 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 clutch cover pressure plate to clutch disc contact surface, repair the surface with sandpaper. If surface is damaged or distorted, replace clutch cover (for QR engine models) or clutch disc and clutch cover as a set (for VQ engine models).

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Clutch Control System

INFOID:0000000000991864

Type of clutch control	Hydraulic

Clutch Pedal

INFOID:0000000000991865

Unit: mm (in)

Clearance ″A″ between clutch pedal and ASCD switch threaded end while clutch pedal is fully released.	0.74 - 1.96 (0.0291 - 0.0772)
Clearance ″C″ between clutch pedal and clutch interlock switch threaded end while clutch pedal is fully depressed.	0.74 - 1.96 (0.0291 - 0.0772)

Clutch Disc

INFOID:0000000000991866

Unit: mm (in)

Engine model	QR25DE	VQ35DE
Model	240	
Facing size (Outer dia. × Inner dia. × Thickness)	240 × 160 × 8.0 (9.45 × 6.30 × 0.31)	240 × 160 × 8.4 (9.45 × 6.30 × 0.33)
Thickness of disc assembly with load	7.15 - 7.65 (0.2815 - 0.3012) with 6,370 N (649.7 kg, 1,432.0 lb)	7.6 - 8.0 (0.299 - 0.31) with 9,900 N (1,009.8 kg, 2,225.5 lb)
Runout limit/diameter of the area to be measured	0.7 (0.028) or less / 230 (9.06) dia.	1.0 (0.039) or less / 230 (9.06) dia.
Maximum spline backlash (at outer edge disc)	1.0 (0.039)	
Wear limit (depth to the rivet head)	0.3 (0.012)	

Clutch Cover

INFOID:0000000000991867

Unit: mm (in)

Engine model	QR25DE	VQ35DE
Set-load	6,370 N (649.7 kg, 1432.0 lb)	9,900 N (1,009.8 kg, 2,225.5 lb)
Diaphragm spring lever height	28.6 - 30.6 (1.126 - 1.205)	41.6 - 43.8 (1.638 - 1.724)
Uneven limit of diaphragm spring toe height	0.7 (0.028) or less	0.8 (0.031) or less