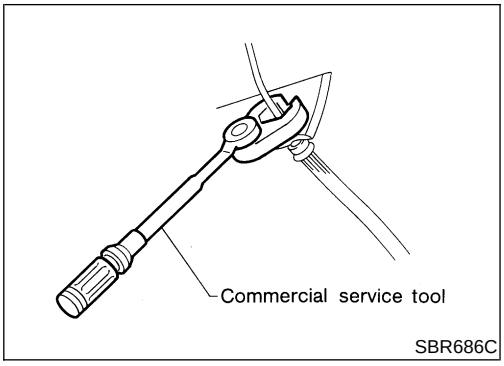
CLUTCH

SECTION CL

CONTENTS



Precautions

NECL0001

- **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, operating cylinder and clutch damper.**
- **Never use mineral oils such as gasoline or kerosene. It will ruin the rubber parts of the hydraulic system.**

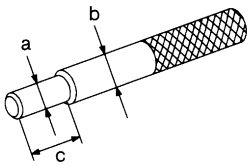
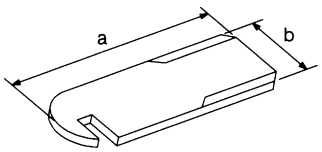
WARNING:

After cleaning the clutch disc, wipe it with a dust collector. Do not use compressed air.

Special Service Tools

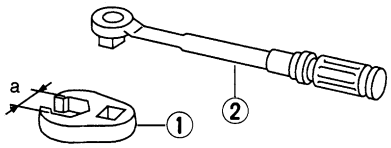
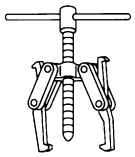
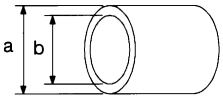
NECL0002

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

Tool number (Kent-Moore No.) Tool name	Description	
ST20630000 (J26366) Clutch aligning bar	 NT405	Installing clutch cover and clutch disc **a: 15.9 mm (0.626 in) dia.** **b: 22.8 mm (0.898 in) dia.** **c: 55 mm (2.17 in)**
ST20050240 (—) Diaphragm spring adjusting wrench	 NT404	Adjusting unevenness of diaphragm spring of clutch cover **a: 150 mm (5.91 in)** **b: 25 mm (0.98 in)**

Commercial Service Tools

NECL0003

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench	 NT360	Removing and installing clutch piping **a: 10 mm (0.39 in)**
Bearing puller	 NT077	Removing release bearing
Bearing drift	 NT474	Installing release bearing **a: 52 mm (2.05 in) dia.** **b: 45 mm (1.77 in) dia.**

NVH Troubleshooting Chart

NECL0027S01

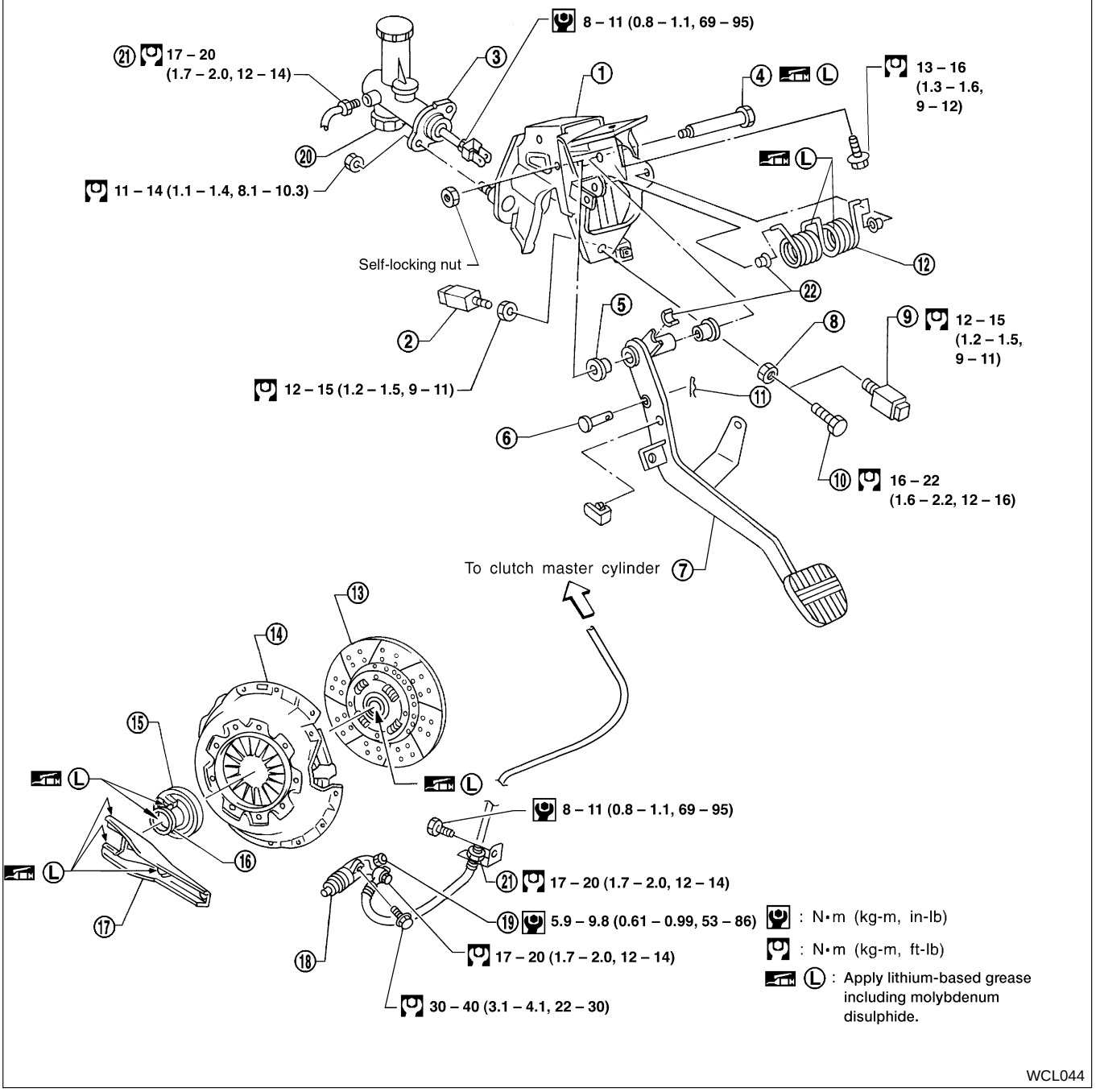
Use the chart below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, repair or replace these parts.

Reference page		CL-6	CL-7	CL-8	CL-9	***EM-41*** (KA24DE), ***EM-112*** (VG33E & VG33ER)	CL-10	CL-12	CL-12	CL-12	CL-12	CL-12	CL-12	CL-12	CL-12	CL-13	CL-13	CL-13	CL-13
SUSPECTED 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)
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	

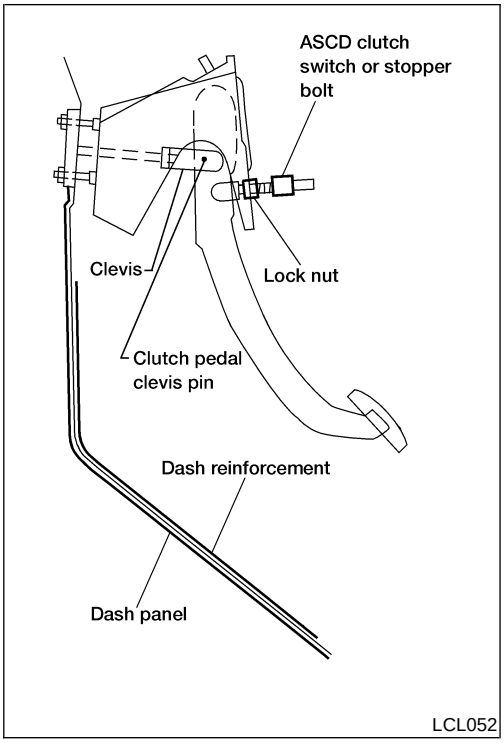
Components

NECL0004

SEC. 300 • 305 • 306 • 465



1. Clutch pedal bracket
2. Clutch interlock switch
3. Clutch master cylinder
4. Fulcrum pin
5. Bushing
6. Clevis pin
7. Clutch pedal
8. Lock nut
9. ASCD cancel switch
10. Pedal stopper bolt (without ASCD)
11. Snap pin
12. Assist spring
13. Clutch disc
14. Clutch cover
15. Release bearing
16. Release bearing sleeve
17. Withdrawal lever
18. Operating cylinder
19. Air bleeder
20. Clutch damper
21. Flare nut
22. Bushing



Inspection and Adjustment

NECL0005

ADJUSTING CLUTCH PEDAL

NECL0005S01

1. Check to see if the clutch pedal clevis pin floats freely in the bore of the clutch pedal. It should not be bound by the clevis or clutch pedal.

a. If the pin is not free, check that the ASCD switch or pedal stopper bolt is not applying pressure to the clutch pedal causing the pin to bind. To adjust, loosen the ASCD switch or pedal stopper bolt lock nut and turn the ASCD switch or pedal stopper bolt.

b. Tighten the lock nut.

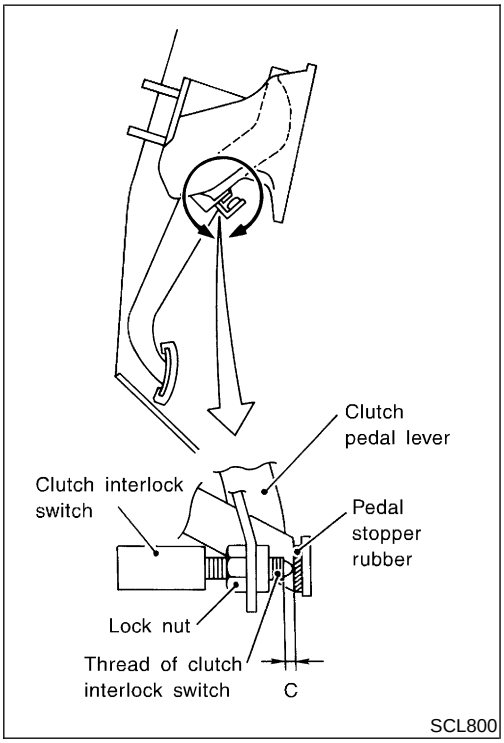
c. Verify that the clutch pedal clevis pin floats freely in the bore of the clutch pedal. It should not be bound by the clevis or clutch pedal.

d. If the pin is still not free, remove the pin and check for deformation or damage. Replace the pin if necessary. Leave the pin removed for step 2.

2. Check the clutch pedal stroke for free range of movement.

a. With the clutch pedal clevis pin removed, manually move the pedal up and down to determine if it moves freely.

b. If any sticking is noted, replace the related parts (clutch pedal, pedal bracket, assist spring, bushing, etc. Reassemble the pedal and re-verify that the clevis pin floats freely in the bore of the pedal.



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

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

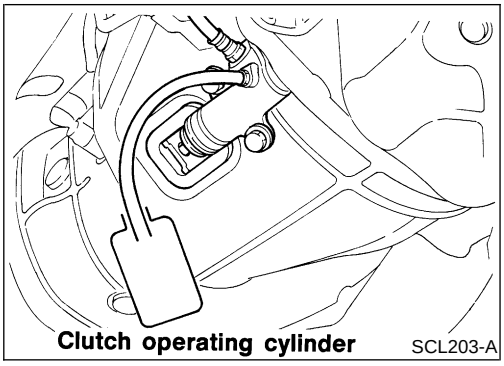
4.

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.

Check the clutch hydraulic system components (clutch master cylinder, clutch operating cylinder, clutch withdrawal lever, clutch release bearing, etc.) for sticking or binding.

a. If any sticking or binding is noted, repair or replace the related parts as necessary.

b. If a hydraulic system repair was necessary, bleed the clutch hydraulic system. Refer to CL-7.



AIR BLEEDING PROCEDURE

NECL0005S02

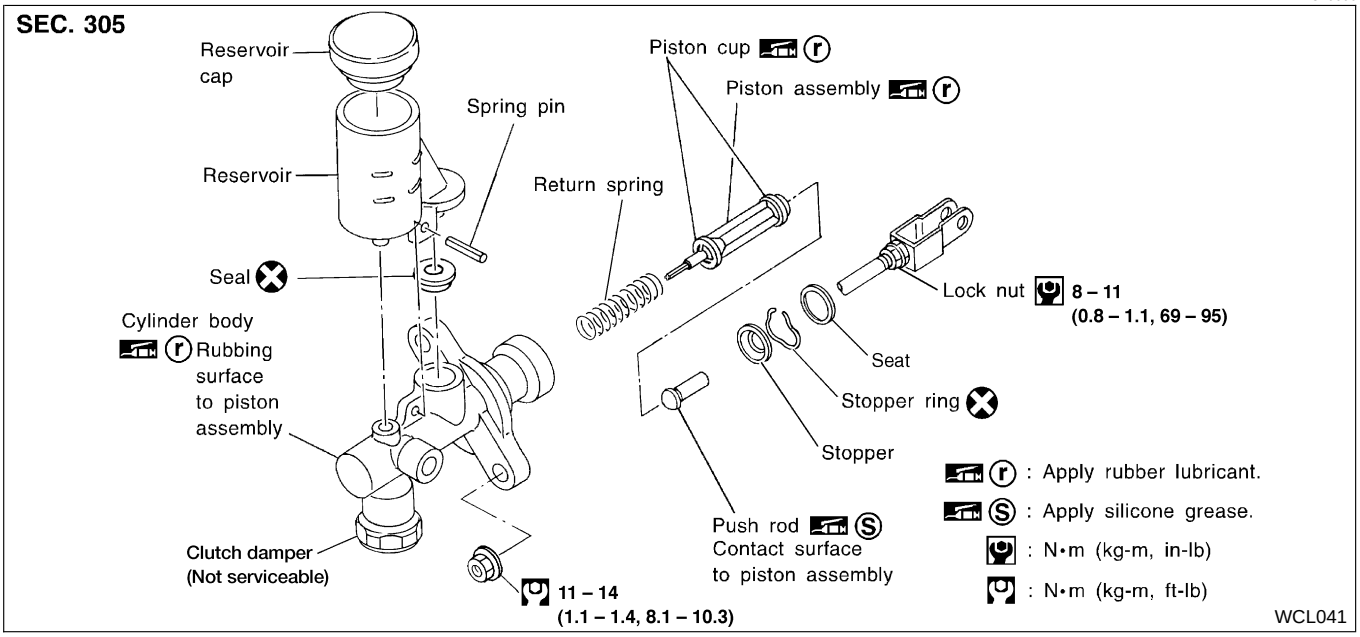
Bleed air according to the following procedure.

Bleed air from operating cylinder.

1. Fill the master cylinder reservoir tank with new brake fluid.
2. Connect a transparent vinyl hose to the air bleeder.
3. Slowly depress the clutch pedal to its full stroke length and release it completely. Repeat this operation several times at 2 to 3 second intervals.
4. Open the air bleeder with the clutch pedal fully depressed.
5. Close the air bleeder.
6. Release the clutch pedal and wait at least 5 seconds.
7. Repeat steps 3 through 6 above until air bubbles no longer appear in the brake fluid.

Components

NECL0006



Disassembly and Assembly

NECL0007

- Use a screwdriver to remove stopper ring while pushing push rod into cylinder.
- When installing stopper ring, tap in lightly while pushing push rod into cylinder.

Inspection

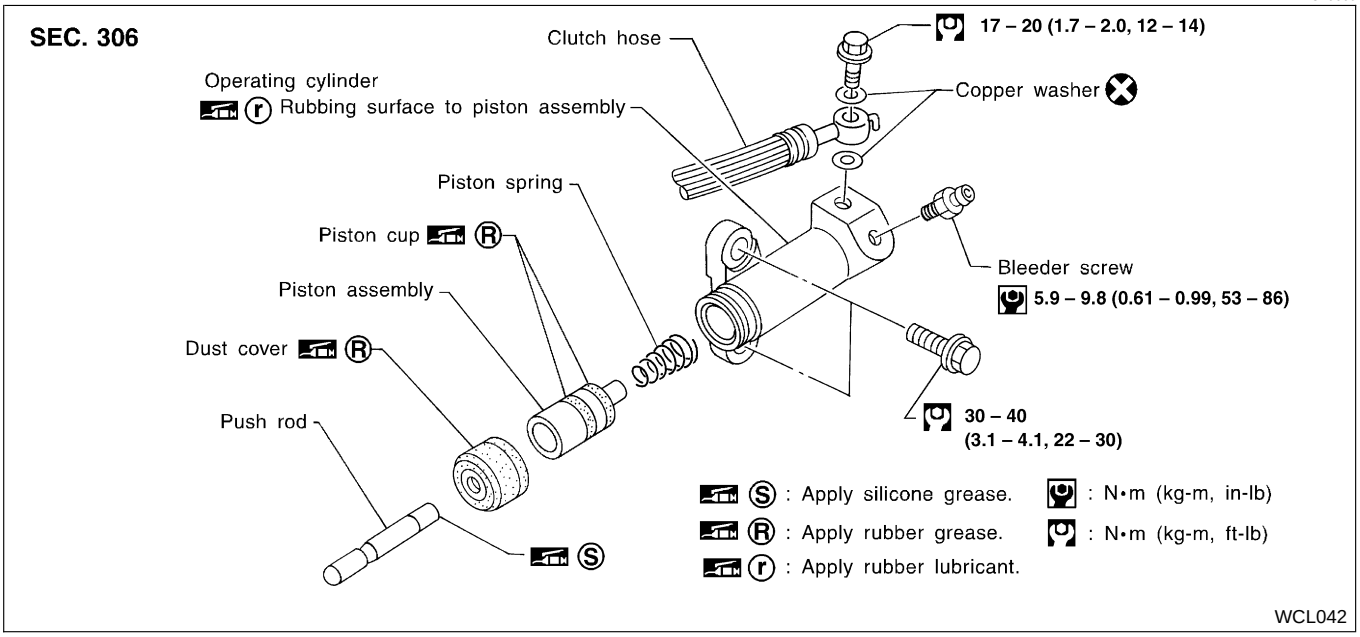
NECL0008

Check the following items, and replace if necessary.

- Rubbing surface of cylinder and piston, for uneven wear, rust or damage
- Piston with piston cup, for wear or damage
- Return spring, for wear or damage
- Reservoir, for deformation or damage

Components

NECL0009



Inspection

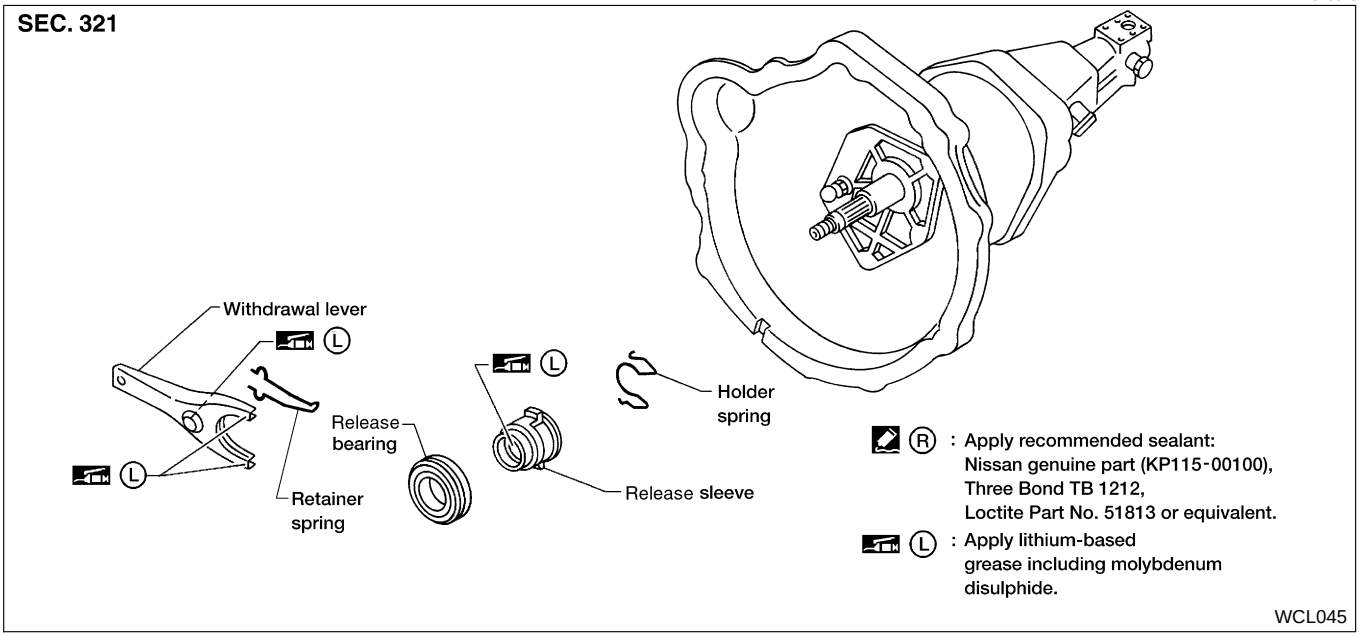
NECL0010

Check the following items, and replace if necessary.

- Rubbing surface of cylinder and piston, for uneven wear, rust or damage
- Piston with piston cup, for wear or damage
- Piston spring, for wear or damage
- Dust cover, for cracks, deformation or damage

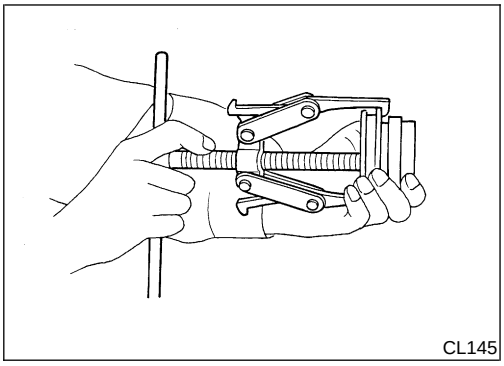
Components

NECL0013

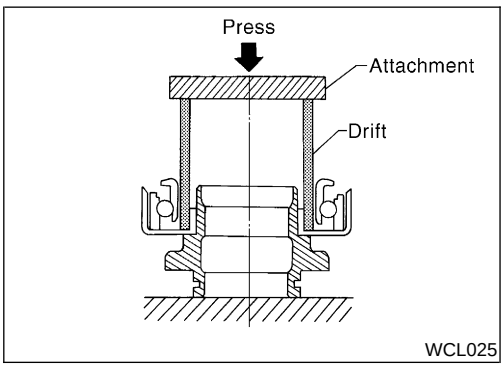


Removal and Installation

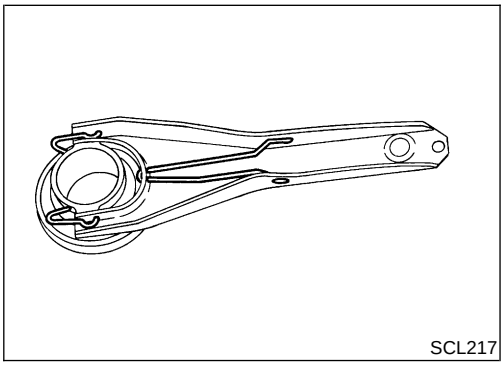
NECL0014



- Remove release bearing.



- Install release bearing with suitable drift.



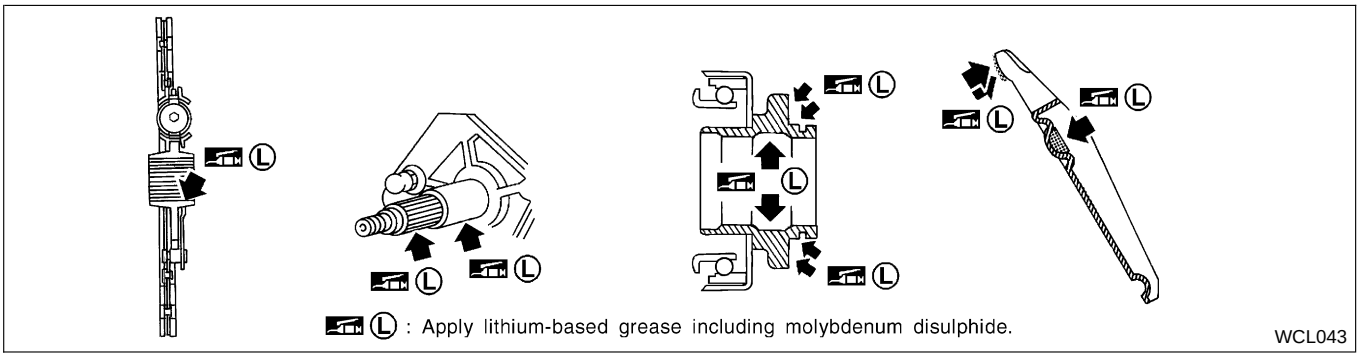
- Install retainer spring and holder spring.

Inspection

NECL0015

Check the following items, and replace if necessary.

- Release bearing, to see that it rolls freely and is free from noise, cracks, pitting or wear
- Release sleeve and withdrawal lever rubbing surface, for wear, rust or damage



Lubrication

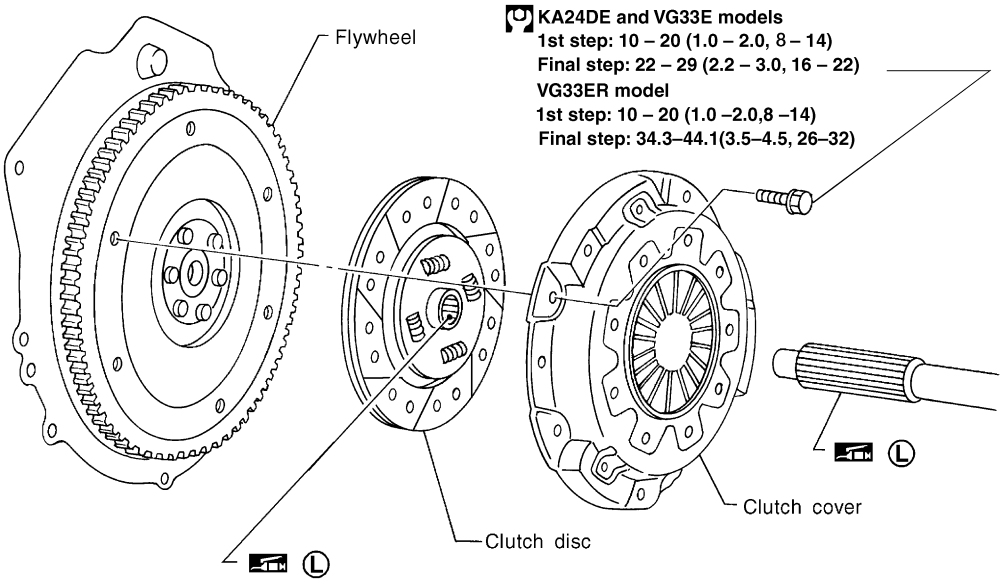
NECL0016

- Apply recommended grease to contact surface and rubbing surface.
- **Too much lubricant might damage clutch disc facing.**

Components

NECL0018

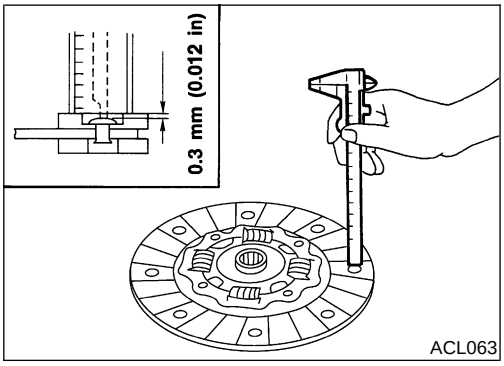
SEC. 300



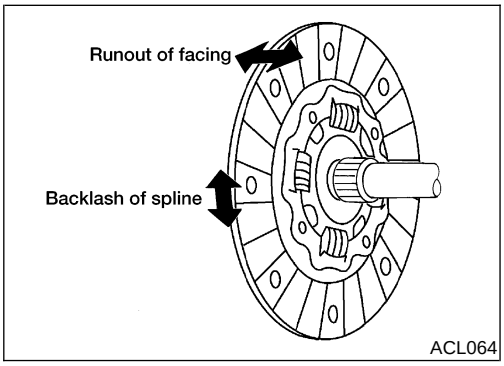
- Do not clean clutch disc surface with solvent.
- When installing, be careful that grease from main drive shaft does not adhere to clutch disc.

: Apply lithium-based grease including molybdenum disulphide.
: N•m (kg-m, ft-lb)

WCL034



ACL063



ACL064

Inspection and Adjustment

NECL0019

CLUTCH DISC

NECL0019S01

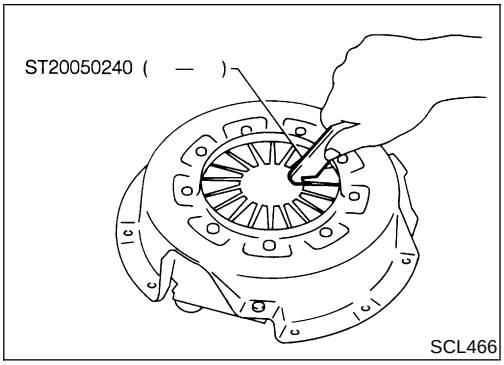
Check the following items, and replace if necessary.

- Clutch disc, for burns, discoloration, oil or grease leakage
- Clutch disc, for wear of facing

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

- Clutch disc, for backlash of spline and runout of facing

  Maximum backlash of spline (at outer edge of disc) :
  1.0 mm (0.039 in)
  Runout of facing limit (at outer edge of disc) :
  1.0 mm (0.039 in)
  Distance of runout check point (from hub center) :
  Model 240: 115 mm (4.53 in)
  Model 250: 120 mm (4.72 in)



CLUTCH COVER AND FLYWHEEL

NECL0019S02

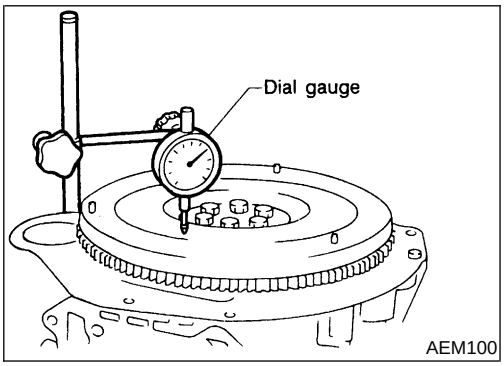
- Check clutch cover, installed on vehicle, for uneven diaphragm spring toe height.

  Uneven limit:

  KA24DE, VG33ER: 0.7 mm (0.028 in)

  VG33E: 0.5 mm (0.020 in)

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



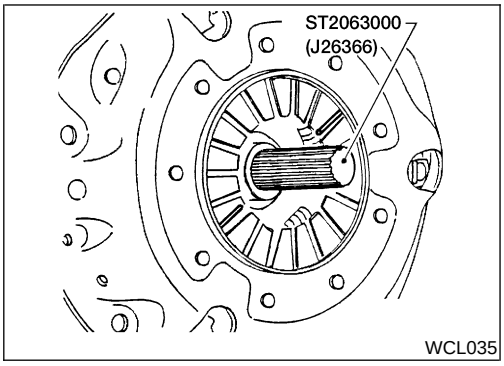
FLYWHEEL INSPECTION

NECL0019S03

CAUTION:

Do not allow any magnetic materials to contact the ring gear teeth.

- Inspect contact surface of flywheel for slight burns or discoloration. Clean flywheel with emery paper.
- Check flywheel runout. Refer to ***EM-52*** (KA24DE), or ***EM-123*** (VG33E, VG33ER), "Flywheel/Drive Plate Runout".

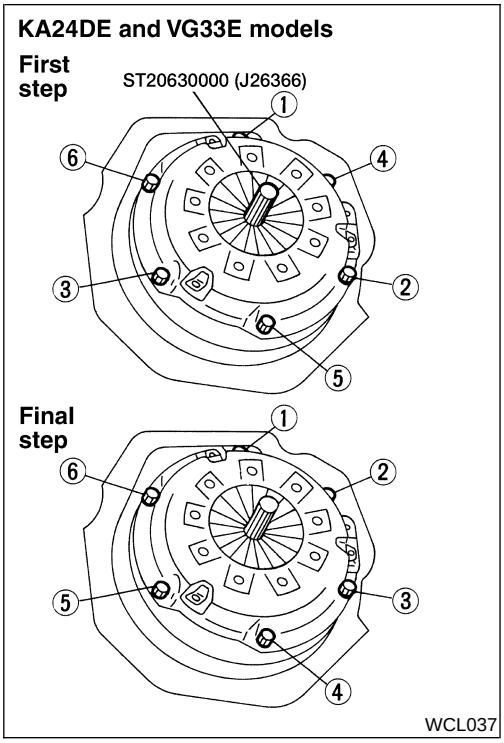


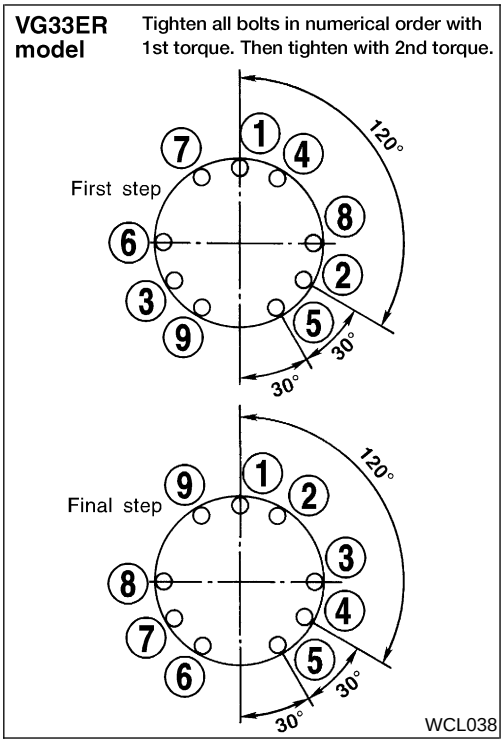
Installation

NECL0020

- Apply recommended grease to contact surface of splines.
- **Too much lubricant may damage clutch disc facing.**
- Insert Tool into clutch disc hub when installing clutch cover and disc.
- Be careful not to allow grease to contaminate clutch facing.

Installation (Cont'd)





- Tighten bolts in numerical order, in two steps.

KA24DE, VG33E models

First step:

: 10 - 20 N·m (1.0 - 2.0 kg-m, 8 - 14 ft-lb)

Final step:

: 22 - 29 N·m (2.2 - 3.0 kg-m, 16 - 22 ft-lb)

VG33ER model

First step:

: 10 - 20 N·m (1.0 - 2.0 kg-m, 8 - 14 ft-lb)

Final step:

: 34.3 - 44.1 N·m (3.5 - 4.5 kg-m, 26 - 32 ft-lb)

Clutch Control System

NECL0028

Type of clutch control	Hydraulic

Clutch Master Cylinder (with clutch damper)

NECL0021

Inner diameter	15.87 mm (5/8 in)

Clutch Operating Cylinder

NECL0022

Inner diameter	19.05 mm (3/4 in)

Clutch Disc

NECL0029

Unit: mm (in)

Model	240	250	250
Engine	KA24DE	VG33E	VG33ER
Facing size (Outer dia. x inner dia. x thickness)	240 x 150 x 3.5 (9.45 x 5.91 x 0.138)	250 x 160 x 3.5 (9.84 x 6.30 x 0.138)	250 x 160 x 3.5 (9.84 x 6.30 x 0.138)
Thickness of disc assembly with load	7.75 - 8.25 (0.305 - 0.3248) with 4,903 N (500 kg, 1,103 lb)	8.1 - 8.5 (0.3189 - 0.3346) with 6,473 N (660 kg, 1,455 lb)	8.1 - 8.5 (0.3189 - 0.3346) with 4,903 N (500 kg, 1,103 lb)
Wear limit of facing surface to rivet head	0.3 (0.012)	0.3 (0.012)	0.3 (0.012)
Runout limit of facing	1.0 (0.039)	1.0 (0.039)	1.0 (0.039)
Distance of runout check point (from hub center)	115 (4.53)	120 (4.72)	120 (4.72)
Maximum backlash of spline (at outer edge of disc)	1.0 (0.039)	1.0 (0.039)	1.0 (0.039)

Clutch Cover

NECL0030

Unit: mm (in)

Engine		KA24DE	VG33E	VG33ER
Model		240	250	250
Set-load	2WD	4,903 N (500 kg, 1,103 lb)	6,473 N (660 kg, 1,455 lb)	7,355 N (750 kg, 1,653 lb)
	4WD	—	6,473 N (660 kg, 1,455 lb)	7,355 N (750 kg, 1,653 lb)
Diaphragm spring height		37.5 - 39.5 (1.476 - 1.555)	36.5 - 38.5 (1.437 - 1.516)	37 - 39 (1.457 - 1.535)
Uneven limit of diaphragm spring toe height		0.7 (0.028)	0.5 (0.020)	0.7 (0.028)

Clutch Pedal

NECL0031

Unit: mm (in)

Engine	KA24DE	VG33E, VG33ER
Clearance “C” between pedal stopper bracket and clutch pedal position switch (with clutch pedal fully depressed.)	0.1 - 1.0 (0.004 - 0.039)	0.1 - 1.0 (0.004 - 0.039)

NOTES