

SECTION **CL**
CLUTCH

A
B
CL

D

E

CONTENTS

PRECAUTIONS	2	CLUTCH RELEASE MECHANISM	10	F
Precautions	2	Components	10	
PREPARATION	3	Removal and Installation	10	
Special Service Tools	3	Inspection	11	G
Commercial Service Tools	3	Lubrication	11	
NOISE, VIBRATION, AND HARSHNESS (NVH)		CLUTCH DISC, CLUTCH COVER AND FLYWHEEL..	12	
TROUBLESHOOTING	4	Components	12	H
NVH Troubleshooting Chart	4	Inspection and Adjustment	12	
CLUTCH SYSTEM — HYDRAULIC TYPE	5	CLUTCH DISC	12	
Components	5	CLUTCH COVER AND FLYWHEEL	13	
Inspection and Adjustment	6	FLYWHEEL INSPECTION	13	I
CLUTCH PEDAL INSPECTION AND ADJUST- MENT	6	Installation	13	
BLEEDING PROCEDURE	6	SERVICE DATA AND SPECIFICATIONS (SDS)	15	J
CLUTCH MASTER CYLINDER	8	Clutch Control System	15	
Components	8	Clutch Master Cylinder (with clutch damper)	15	
Disassembly and Assembly	8	Clutch Operating Cylinder	15	
Inspection	8	Clutch Disc	15	K
OPERATING CYLINDER	9	Clutch Cover	15	
Components	9	Clutch Pedal	15	L
Inspection	9			

M

PRECAUTIONS

PRECAUTIONS

PFP:00001

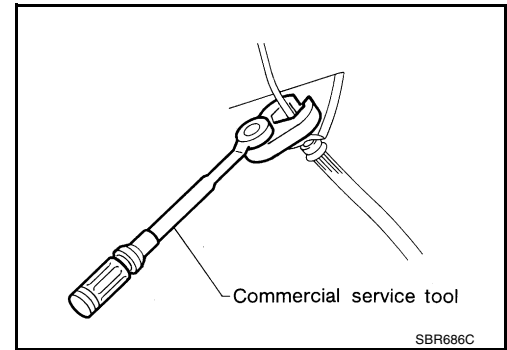
Precautions

ECS007GL

- 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.



PREPARATION

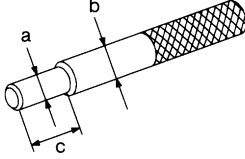
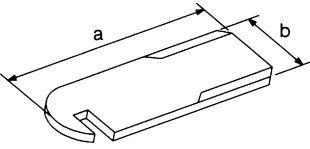
PREPARATION

PF0:00002

Special Service Tools

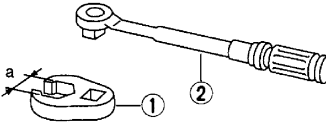
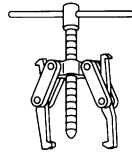
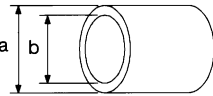
ECS007GM

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	 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	 Adjusting unevenness of diaphragm spring of clutch cover a: 150 mm (5.91 in) b: 25 mm (0.98 in)

Commercial Service Tools

ECS007GN

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

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

ECS007G0

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-6	CL-8	CL-9	EM-46 (KA24DE), EM-128 (VG33E & VG33ER)	CL-11	CL-12	CL-13	CL-13	CL-13
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					
	Clutch pedal spongy		1	2	2						
	Clutch noisy						1				
	Clutch slips	1							2	2	
	Clutch does not dis-engage	1	2	3	4			5	5		5

CLUTCH SYSTEM — HYDRAULIC TYPE

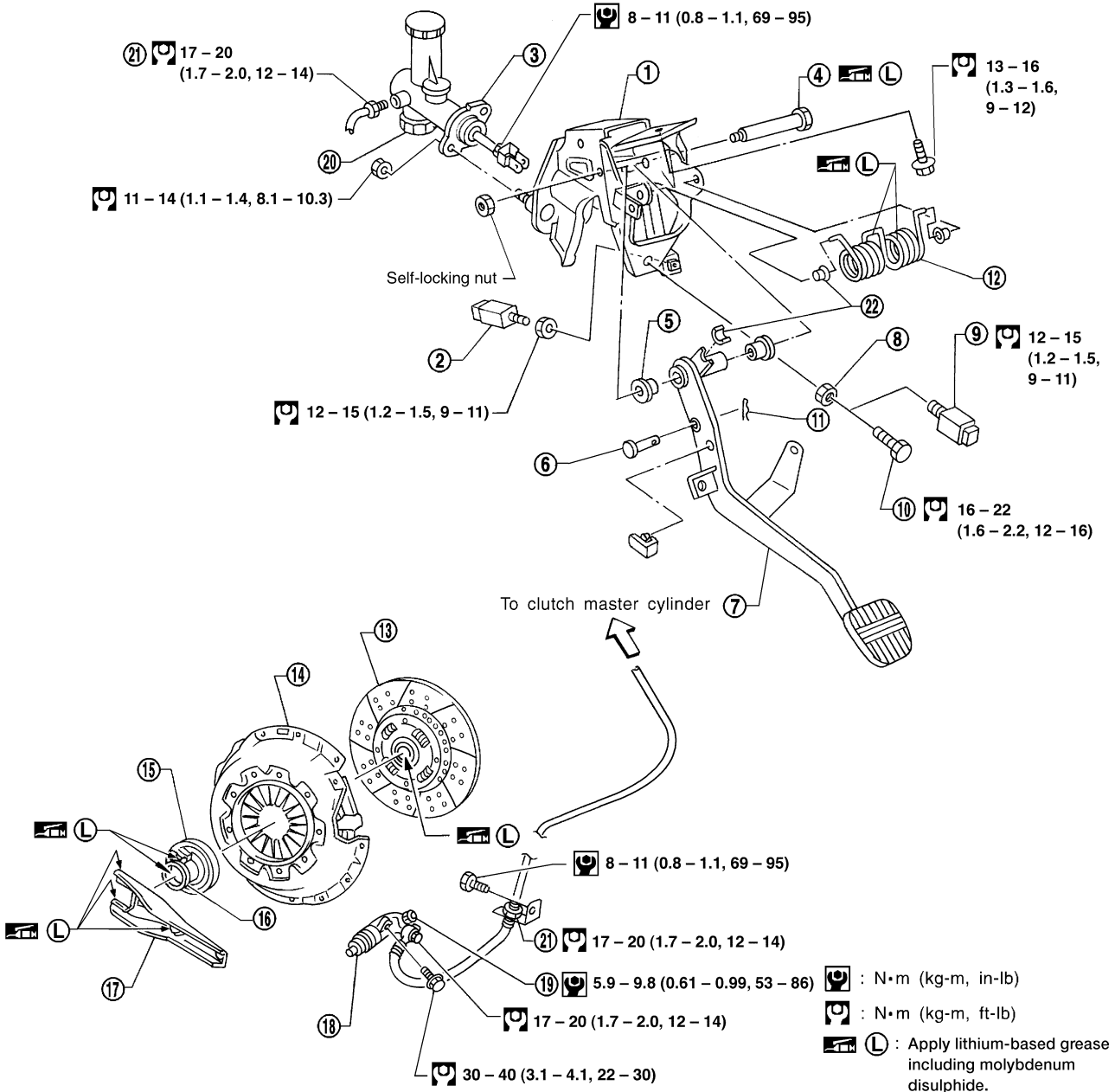
CLUTCH SYSTEM — HYDRAULIC TYPE

PF30502

Components

ECS007GP

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 clutch 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 (not serviceable) | 21. Flare nut |
| 22. Bushing | | |

WCL044

CLUTCH SYSTEM — HYDRAULIC TYPE

ECS007G0

Inspection and Adjustment

CLUTCH PEDAL INSPECTION AND ADJUSTMENT

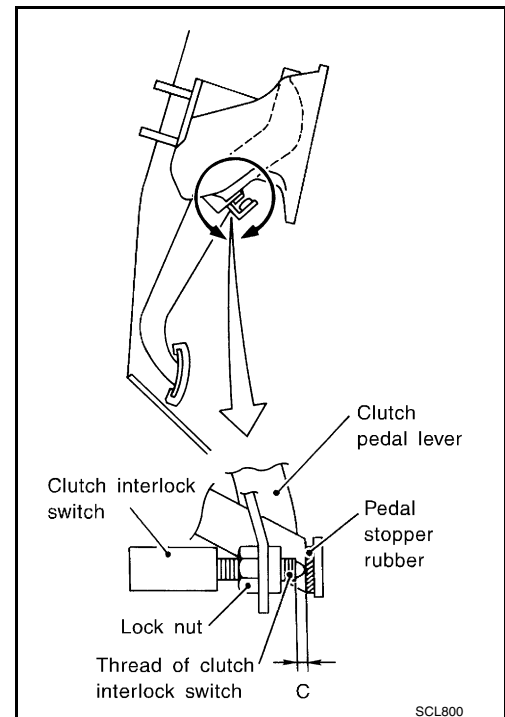
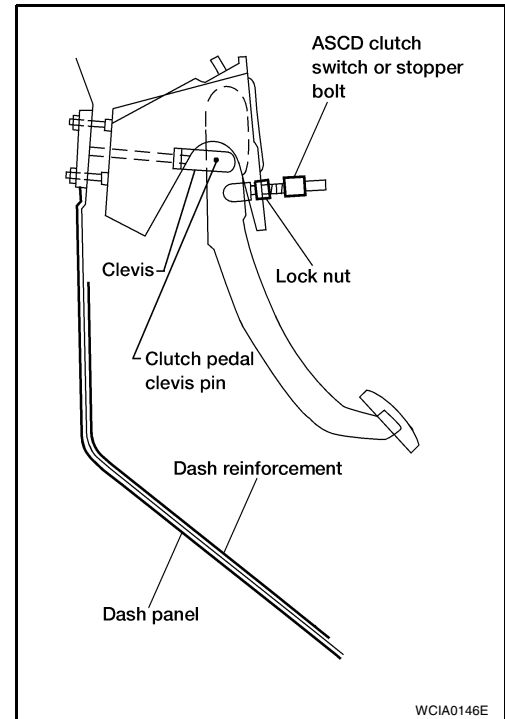
1. Check to see if the clutch pedal clevis pin floats freely in the bore of the clutch pedal. It should not be bound by the clevis or clutch pedal.
 - a. If the pin is not free, check that the ASCD switch or pedal stopper bolt is not applying pressure to the clutch pedal causing the pin to bind. To adjust, 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 fully depressing the clutch pedal (with the clutch interlock switch) as shown.

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

4. 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 the hydraulic system was necessary, bleed the clutch hydraulic system. Refer to [CL-6, "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.



BLEEDING PROCEDURE

CAUTION:

Carefully monitor the fluid level at the clutch master cylinder during the bleeding operation.

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.

1. Top off the clutch master cylinder reservoir with the recommended brake fluid "DOT 3".

CLUTCH SYSTEM — HYDRAULIC TYPE

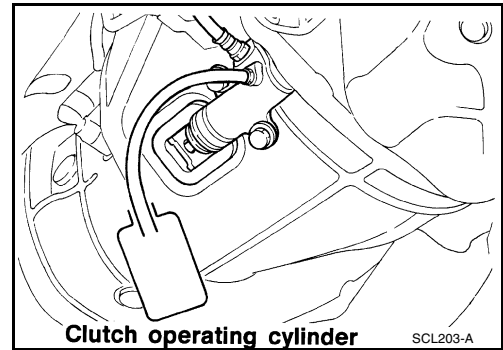
CAUTION:

Do not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

2. Connect a transparent vinyl tube to the air bleeder as shown.
3. Slowly depress the clutch pedal to its full stroke and release it completely. Repeat this operation several times at 2 to 3 seconds intervals.
4. Open the air bleeder with the clutch pedal fully depressed.
5. Close the air bleeder and tighten to specification.

Air bleeder : 5.9 - 9.8 N·m (0.6 - 1.0 kg·m,
52 - 87 in·lb)

6. Release the clutch pedal and wait at least 5 seconds.
7. Repeat steps 3 through 6 above until no more air bubbles are in the brake fluid coming out of the vinyl tube attached to the air bleeder.



A

B

CL

D

E

F

G

H

I

J

K

L

M

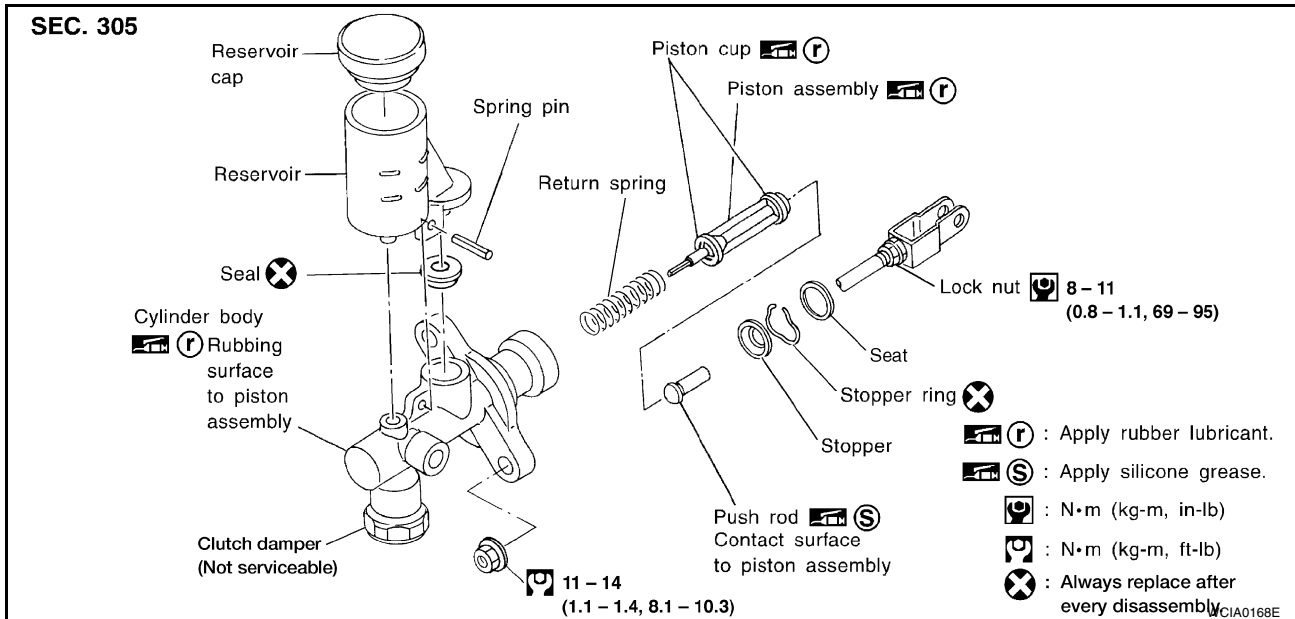
CLUTCH MASTER CYLINDER

CLUTCH MASTER CYLINDER

PFP:30610

Components

ECS007GR



Disassembly and Assembly

ECS007GS

- 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

ECS007GT

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

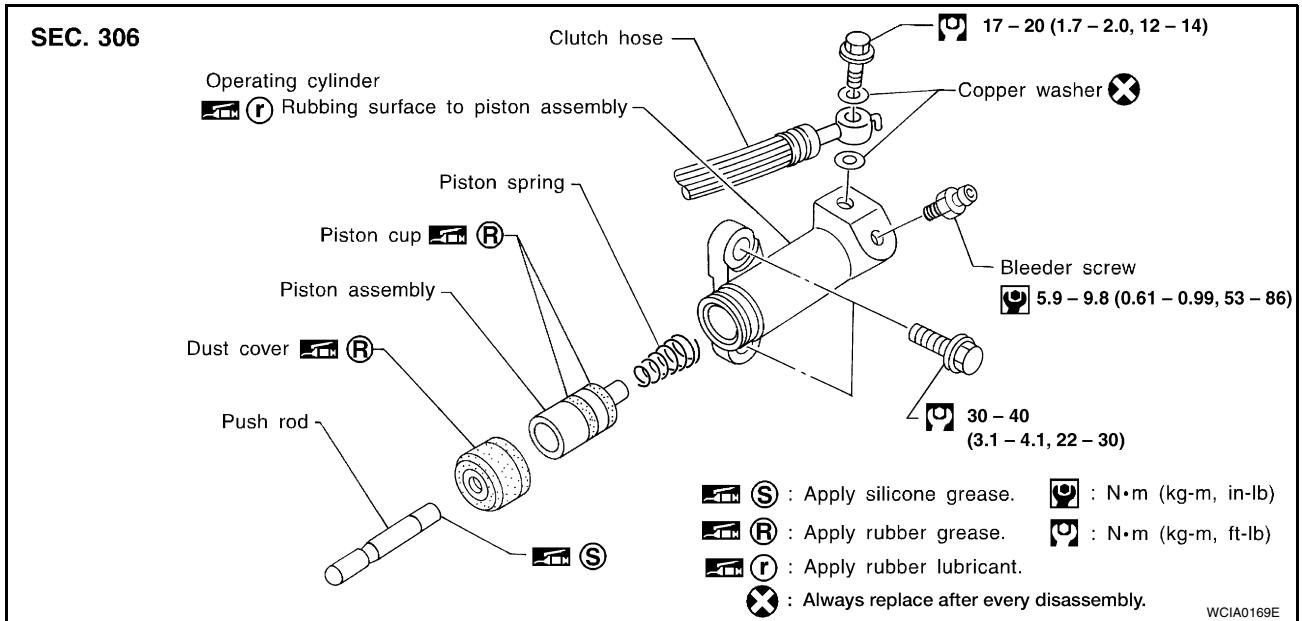
OPERATING CYLINDER

PF3:30620

OPERATING CYLINDER

Components

ECS007GU



Inspection

ECS007GV

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

CLUTCH RELEASE MECHANISM

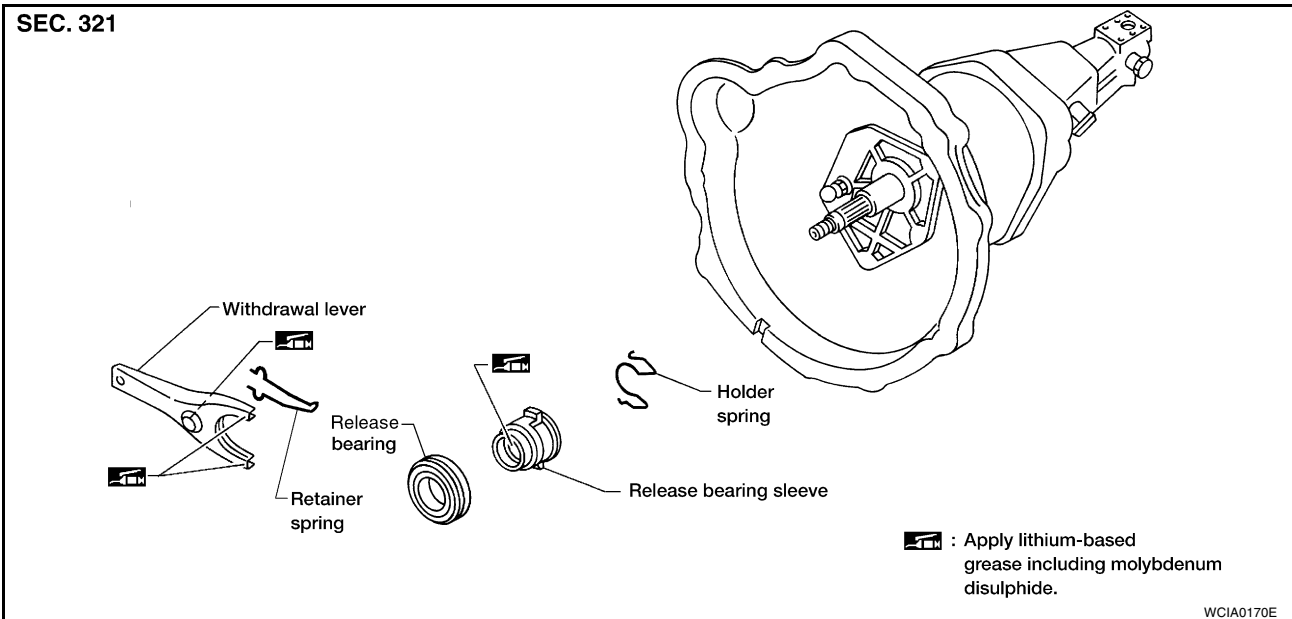
CLUTCH RELEASE MECHANISM

PFP:30502

Components

ECS007GW

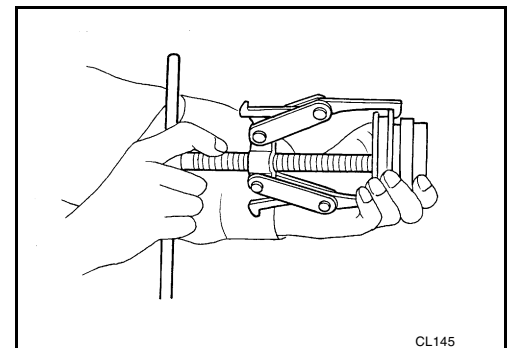
SEC. 321



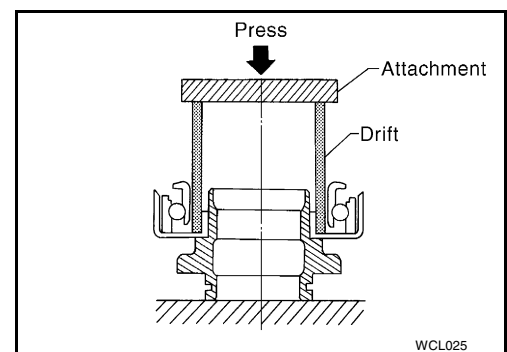
Removal and Installation

ECS007GX

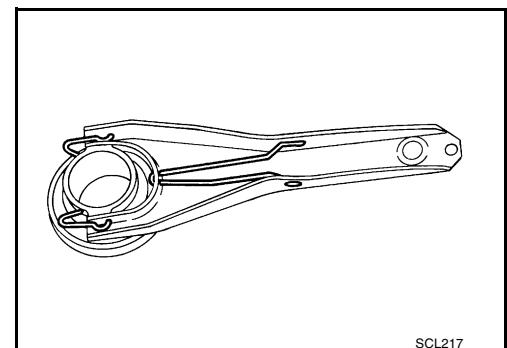
- Remove release bearing.



- Install release bearing with suitable drift.



- Install retainer spring and holder spring.



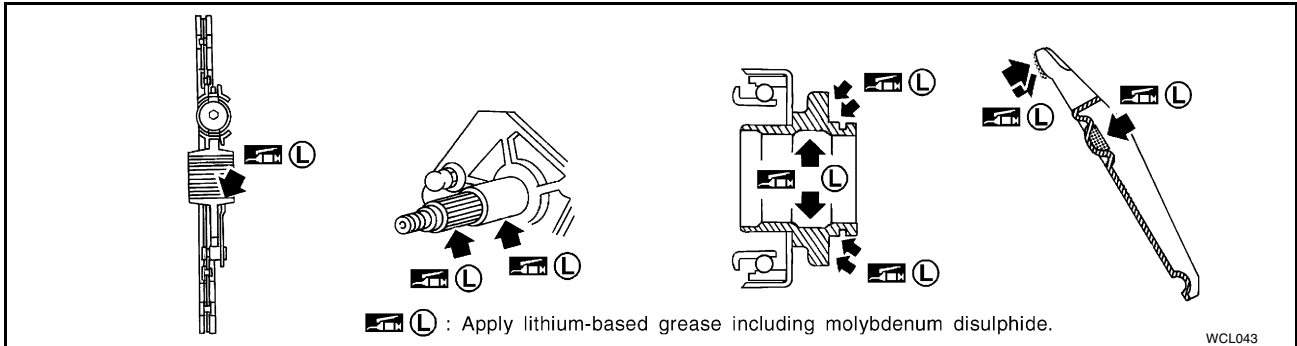
CLUTCH RELEASE MECHANISM

Inspection

ECS007GY

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

ECS007GZ

- Apply recommended grease to contact surface and rubbing surface.

CAUTION:

Too much lubricant might damage clutch disc facing.

CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

PF:30100

Components

ECS007H0

SEC. 300

KA24DE and VG33E models
 1st step: 10 – 20 (1.0 – 2.0, 8 – 14)
 Final step: 22 – 29 (2.2 – 3.0, 16 – 22)

VG33ER model
 1st step: 10 – 20 (1.0 – 2.0, 8 – 14)
 Final step: 34.3–44.1(3.5–4.5, 26–32)

• 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

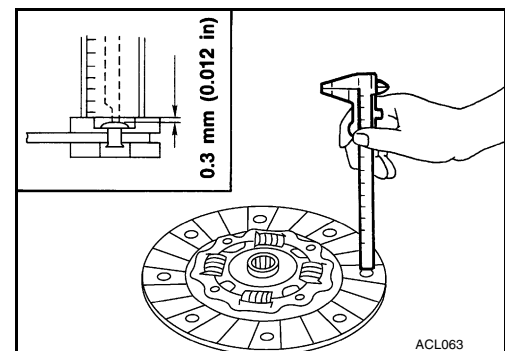
Inspection and Adjustment CLUTCH DISC

ECS007H1

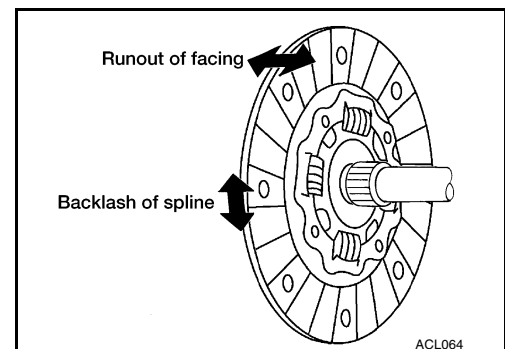
Check the following items, and replace if necessary.

- 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 limit of facing (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 DISC, CLUTCH COVER AND FLYWHEEL

CLUTCH COVER AND FLYWHEEL

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

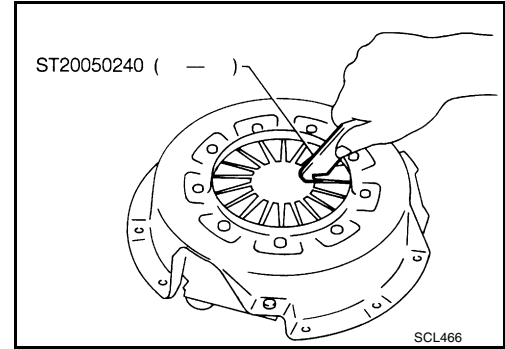
Uneven limit of diaphragm spring toe height

KA24DE, VG33ER : 0.7 mm (0.028 in)

VG33E : 0.5 mm (0.020 in)

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

Tool number : ST20050240 (—)

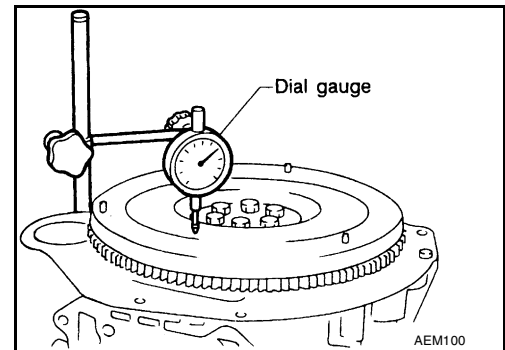


FLYWHEEL INSPECTION

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-58, "FLYWHEEL/DRIVE PLATE RUNOUT"](#) (KA24DE), or [EM-140, "FLYWHEEL/DRIVE PLATE RUNOUT"](#) (VG33E, VG33ER), "Flywheel/Drive Plate Runout".



Installation

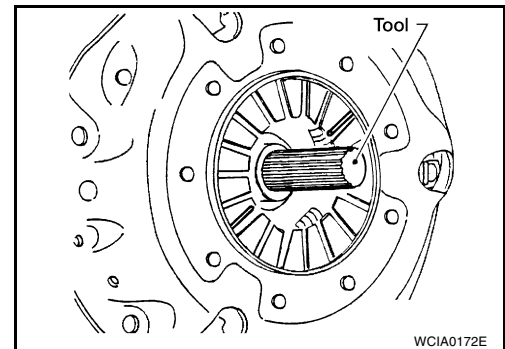
CAUTION:

Too much lubricant may damage clutch disc facing.

- Apply recommended grease to contact surface of splines.
- Insert Tool into clutch disc hub when installing clutch cover and disc.

Tool number : ST20630000 (J26366)

- Be careful not to allow grease to contaminate clutch facing.



A
B
CL
D
E
F
G
H
I
J
K
L
M

CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

- Tighten bolts in numerical order, in two steps with Tool in place.

KA24DE, VG33E models

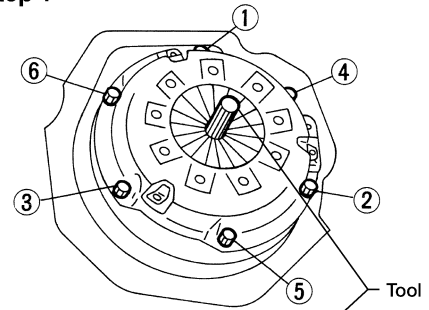
Step 1 : 10 - 20 N·m (1.0 - 2.0 kg-m, 8 - 14 ft-lb)

Step 2 : 22 - 29 N·m (2.2 - 3.0 kg-m, 16 - 22 ft-lb)

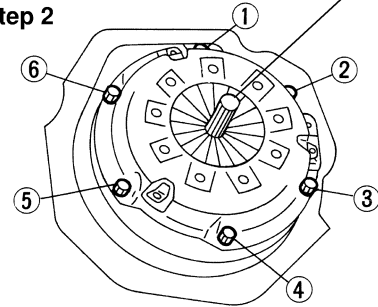
Tool number : ST20630000 (J26366)

KA24DE and VG33E models

Step 1



Step 2



WCIA0173E

VG33ER model

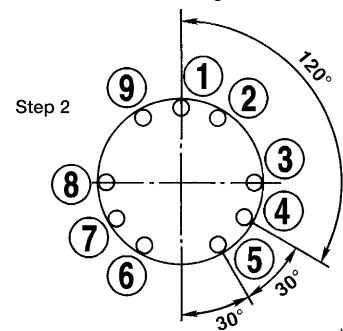
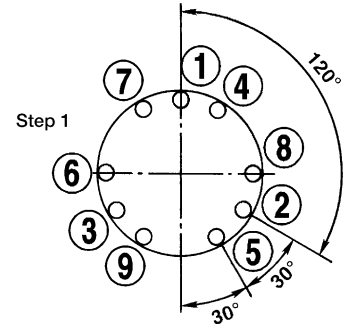
Step 1 : 10 - 20 N·m (1.0 - 2.0 kg-m, 8 - 14 ft-lb)

Step 2 : 34.3 - 44.1 N·m (3.5 - 4.5 kg-m, 26 - 32 ft-lb)

Tool number : ST20630000 (J26366)

VG33ER model

Tighten all bolts in numerical order with 1st torque. Then tighten with 2nd torque.



WCIA0174E

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

Clutch Control System

ECS007H3

Type of clutch control	Hydraulic
------------------------	-----------

Clutch Master Cylinder (with clutch damper)

ECS007H4

Inner diameter	15.87 mm (5/8 in)
----------------	-------------------

Clutch Operating Cylinder

ECS007H5

Inner diameter	19.05 mm (3/4 in)
----------------	-------------------

Clutch Disc

ECS007H6

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

ECS007H7

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)
	4WD	—	6,473 N (660 kg, 1,455 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

ECS007H8

Unit: mm (in)

Clearance between pedal stopper bracket and clutch interlock switch (with clutch pedal fully depressed.)	0.1 - 1.0 (0.004 - 0.039)
--	---------------------------

*: Measured from surface of dash lower panel to pedal pad.

SERVICE DATA AND SPECIFICATIONS (SDS)
