## DLN SECTION DRIVELINE С

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## < PRECAUTION > PRECAUTION PRECAUTIONS

#### Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

#### WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see "SRS AIR BAG".
- Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

#### PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

#### WARNING:

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

#### Service Notice or Precautions for Transfer

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- Never reuse transfer fluid, once it has been drained.
- Check the fluid level or replace the fluid only with the vehicle parked on level ground.
- During removal or installation, keep inside of transfer clear of dust or dirt.
- Replace all tires at the same time. Always use tires of the proper size and the same brand and pattern. Fitting improper size and unusually worn tires applies excessive force to vehicle mechanism and can cause longitudinal vibration.
- Disassembly should be done in a clean work area, it is preferable to work in dustproof area.
- Before proceeding with disassembly, thoroughly clean the transfer. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Check for the correct installation status prior to removal or disassembly. If matching marks are required, be certain they do not interfere with the function of the parts when applied.
- Check appearance of the disassembled parts for damage, deformation, and unusual wear. Replace them with a new ones if necessary.
- Gaskets, seals and O-rings should be replaced any time the transfer is disassembled.
- In principle, tighten bolts or nuts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, use it.
- Observe the specified torque when assembling.
- Clean and flush the parts sufficiently and blow-dry them.
- Be careful not to damage sliding surfaces and mating surfaces.
- Clean inner parts with lint-free cloth or towels. Do not use cotton work gloves and rags to prevent adhering fibers.



#### < PRECAUTION >

#### Precautions for Removing Battery Terminal

• When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.

#### NOTE:

ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

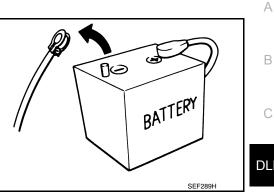
· For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch. NOTE:

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

 After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC. NOTE:

PRECAUTIONS

The removal of 12V battery may cause a DTC detection error.



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## < PREPARATION > PREPARATION PREPARATION

## Special Service Tools

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The actual shapes of TechMate tools may differ from those of special service tools illustrated here.

Tool number (TechMate No.) Tool name		Description
ST27862000 ( — ) Drift a: 62.5 mm (2.461 in) dia. b: 42 mm (1.65 in) dia.	a b ZZA0194D	Installing front oil seal
KV381054S0 (J-34286) Puller	ZZA0601D	Removing rear oil seal
ST30720000 (J-25405) Drift a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.	a b State St	<ul> <li>Installing rear oil seal</li> <li>Installing main shaft oil seal</li> </ul>
KV40104830 ( — ) Drift a: 70 mm (2.76 in) dia. b: 63.5 mm (2.500 in) dia.	a b b b b b b b b b b b b b b b b b b b	Installing rear oil seal
ST33052000 ( — ) Drift a: 28 mm (1.10 in) dia. b: 22 mm (0.87 in) dia.	zza1000D	Removing main shaft assembly
ST35321000 ( — ) Drift a: 49 mm (1.93 in) dia. b: 41 mm (1.61 in) dia.	ZZA1000D	Installing main shaft assembly

#### PREPARATION

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Tool number (TechMate No.) Tool name		Description	A
ST31214000 (J-25269-B) Drift a: 34 mm (1.34 in) dia. b: 25.5 mm (1.004 in) dia.		<ul> <li>Removing front drive shaft front bearing</li> <li>Removing front drive shaft rear bearing</li> </ul>	В
	al bl ZZA0534D		С
ST33200000 (J-26082)		Installing front drive shaft front bearing	DLN
Drift a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.			E
	ZZA1002D		F
KV38104010		Installing front drive shaft rear bearing	
Drift a: 67 mm (2.64 in) dia. b: 49 mm (1.93 in) dia.			G
	-a→		Н

#### Commercial Service Tools

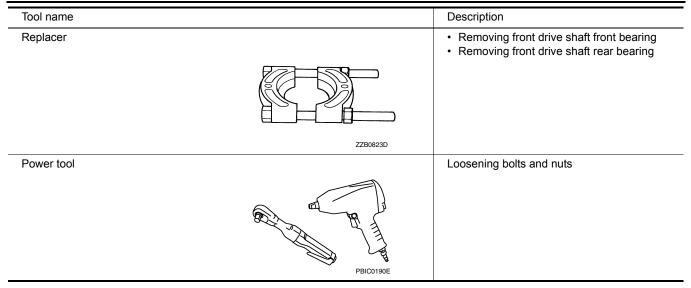
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Tool name		Description	
Flange wrench	~	Removing and installing self-lock nut	
	NT771		
Puller		Removing companion flange	
	NT077		

#### PREPARATION

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#### **COMPONENT PARTS**

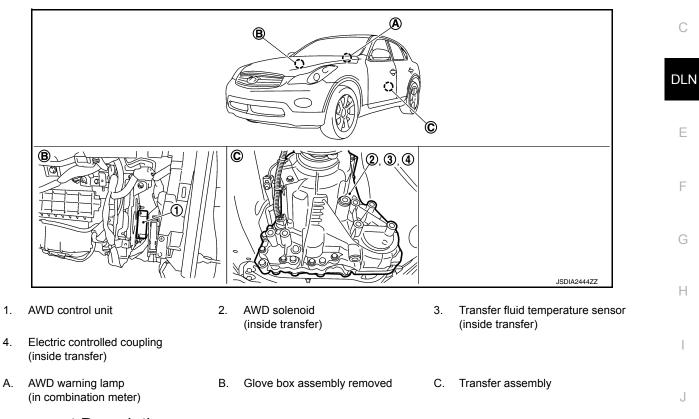
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## < SYSTEM DESCRIPTION > SYSTEM DESCRIPTION **COMPONENT PARTS**

**Component Parts Location** 

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#### **Component Description**

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Component parts	Reference/Function
AWD control unit	DLN-12, "AWD Control Unit"
Wheel sensor	BRC-36, "Description"
AWD solenoid	DLN-12, "AWD Solenoid"
Transfer fluid temperature sensor	DLN-12, "Transfer Fluid Temperature Sensor"
Electric controlled coupling	DLN-12, "Electric Controlled Coupling"
AWD warning lamp	DLN-15, "AWD SYSTEM : System Description"
ABS actuator and electric unit (control unit)	<ul><li>Transmits the following signals to AWD control unit via CAN communication.</li><li>Vehicle speed signal</li><li>Stop lamp switch signal (brake signal)</li></ul>
ECM	<ul> <li>Transmits the following signals to AWD control unit via CAN communication.</li> <li>Accelerator pedal position signal</li> <li>Engine speed signal</li> </ul>
Unified mater and A/C amp	Transmits conditions of parking brake switch to AWD control unit via CAN communication.
Unified meter and A/C amp.	Receive AWD warning lamp signal from AWD control unit via CAN communication.

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#### **COMPONENT PARTS**

#### < SYSTEM DESCRIPTION >

#### AWD Control Unit

- AWD control unit controls driving force distribution by signals from each sensor from rear wheel driving mode (0:100) to 4-wheel driving mode (50:50).
- Rear wheel driving conditions is available by fail-safe function if malfunction is detected in AWD system.

#### AWD ACTUATOR RELAY

AWD actuator relay is integrated with AWD control unit, and supplies AWD solenoid with voltage.

#### AWD Solenoid

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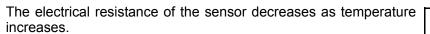
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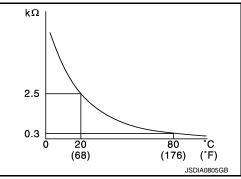
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AWD solenoid is integrated with electric controlled coupling, and controls electric controlled coupling by command current from AWD control unit.

#### Transfer Fluid Temperature Sensor

- Transfer fluid temperature sensor is integrated with electric controlled coupling.
- Transfer fluid temperature sensor detects the transfer fluid temperature and transmits a signal to AWD control unit.





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**Electric Controlled Coupling** 

Electric controlled coupling is integrated with transfer and transmits driving force to rear final drive. For operation, refer to DLN-13, "Operation Description".

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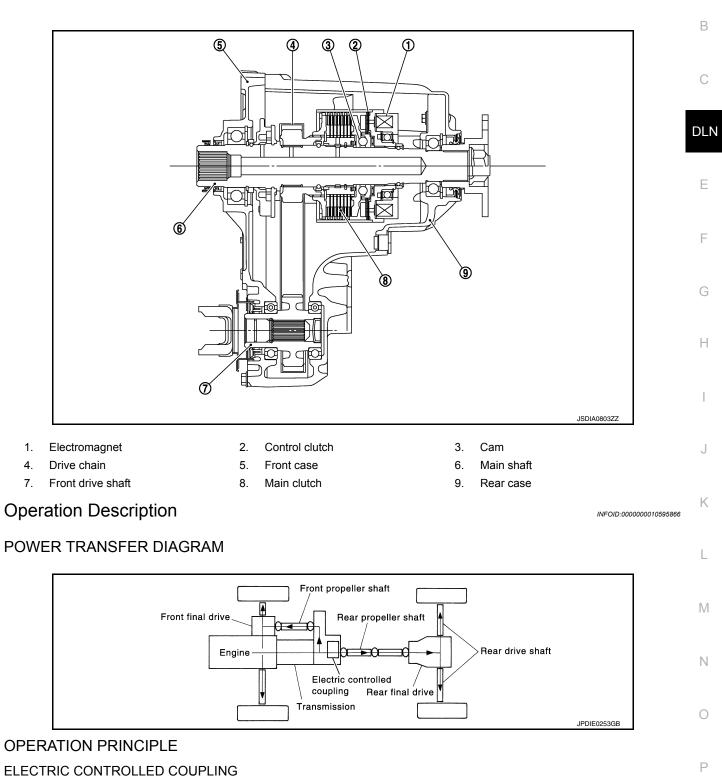
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#### < SYSTEM DESCRIPTION >

#### STRUCTURE AND OPERATION

#### Sectional View

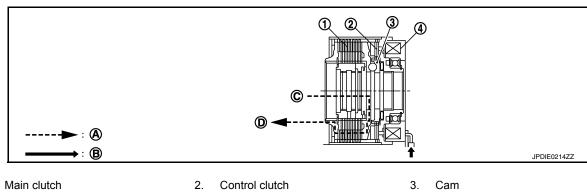
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#### STRUCTURE AND OPERATION

#### < SYSTEM DESCRIPTION >



4. Electromagnet

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Torque flow

Current commanded from AWD con- C. From transmission

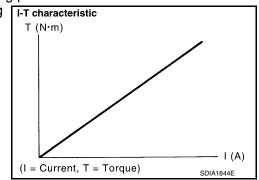
- D. To front propeller shaft
- 1. AWD control unit supplies command current to electric controlled coupling (AWD solenoid).
- 2. Control clutch is engaged by electromagnet and torque is detected in control clutch.

trol unit

- The cam operates in response to control clutch torque and applies pressure to main clutch. 3.
- 4. Main clutch transmits torque to front wheels according to pressing power.

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• Transmission torque to front wheels is determined according I-T characteristic to command current. T (N•m)



#### SYSTEM

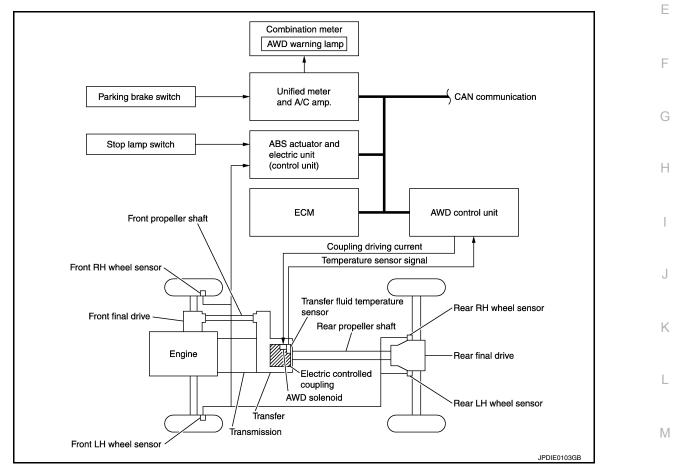
#### < SYSTEM DESCRIPTION >

#### SYSTEM AWD SYSTEM

#### AWD SYSTEM : System Description

- Pressing force of multiple disc clutch is controlled by electric control. Driving torque distribution of front and rear wheels changes automatically between approximately 0 : 100 (Rear wheel drive) and 50 : 50 (AWD) to have an optimized torque distribution adapted to road condition change.
- In accordance with fail-safe function, when system is malfunctioning, AWD control stops, and the system becomes rear wheel drive. Refer to <u>DLN-16, "AWD SYSTEM : Fail-safe"</u>.
- When a high load status continues for electric controlled coupling, AWD control temporarily becomes rear wheel drive, according to protection function. Refer to <u>DLN-16</u>, "AWD SYSTEM : Protection Function".

#### SYSTEM DIAGRAM



#### **INPUT/OUTPUT SIGNAL**

It transmits/receives each signal from the following control unit via CAN communication line.

Component parts	Signal item	
ABS actuator and electric unit (control unit)	<ul> <li>Transmits the following signals to AWD control unit via CAN communication.</li> <li>Vehicle speed signal</li> <li>Stop lamp switch signal (brake signal)</li> </ul>	
ECM	<ul><li>Transmits the following signals to AWD control unit via CAN communication.</li><li>Accelerator pedal position signal</li><li>Engine speed signal</li></ul>	— F
Unified meter and A/C amp.	Transmits conditions of parking brake switch to AWD control unit via CAN communication.Receive AWD warning lamp signal from AWD control unit via CAN communication.	

#### **OPERATION CHARACTERISTIC**

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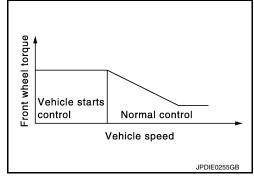
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#### < SYSTEM DESCRIPTION >

#### VEHICLE STARTS CONTROL

- At the start, torque distribution for front and rear wheels is fixed by electric control and stable start is achieved.
- Makes possible stable driving, with no wheel spin, on snowy roads or other slippery surfaces.



#### NORMAL CONTROL

- On roads which do not require AWD, it contributes to improved fuel economy by driving in conditions close to rear-wheel drive and it results in better fuel efficiency and provides FR-like steering characteristics.
- When spin occurs on rear wheel, distribute optimum torque to front wheel and keep stable driving.
- The vehicle cornering status is judged according to information from each sensor, and the optimum torque is distributed to front wheels for preventing tight cornering/braking symptom.

#### AWD WARNING LAMP INDICATION CONDITION

- Turns ON when there is a malfunction in AWD system. AWD warning lamp indicates the vehicle is in fail-safe mode.
- Also turns ON when ignition switch is turned ON, for the purpose of lamp check. Turns OFF approximately for 1 second after the engine starts if system is normal.

AWD WARNING LAMP INDICATION

Condition	AWD warning lamp	
Lamp check	Turns ON when ignition switch is turned ON. (Turns OFF approx. 1 second after the engine start.)	
AWD system malfunction	ON	
Protection function is activated due to heavy load to electric controlled coupling. (AWD system is not malfunctioning and AWD system changes to rear wheel drive.)	Quick blinking: 2 times/second (Blinking in approx. 1 minute and then turning OFF)	
Large difference in diameter of front/rear tires	Slow blinking: 1 time/2 seconds (Continuing to blink until turning ignition switch OFF)	
Other than above (system normal)	OFF	

#### **CAUTION:**

#### AWD warning lamp also turns ON due to data reception error, CAN communication error etc.

#### AWD SYSTEM : Fail-safe

INFOID:000000010595868

INFOID:000000010595869

- If any malfunction occurs in AWD electrical system, and control unit detects the malfunction, AWD warning lamp on combination meter turns ON to indicate system malfunction.
- When AWD warning lamp is ON, vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque)

#### AWD SYSTEM : Protection Function

AWD system activates its protection function (shuts down AWD system temporarily) if AWD system detects high load continuously or the front wheel tire size differs from the rear tire size. (AWD system is automatically restored if AWD system no longer detects any overload or the tire size difference is eliminated.)

DTC	Warning lamp	Error area and root cause	Contents of protection function
_	Blinking <sup>*1</sup>	Transfer assembly in protection mode. It is not malfunction. (Internal temperature rise of electronic controlled coupling)	Shuts down AWD sys-
_	Blinking <sup>*2</sup>	Malfunction in each tire or different tire diameter	tem temporarily

#### < SYSTEM DESCRIPTION >

- \*1: Quick blinking: 2 times/second (blinking for approximately 1 minute and then turned OFF)
- \*2: Slow blinking: 1 time/2 seconds (continuing to blink until ignition switch is turned OFF)

#### NOTE:

- If the warning lamp blinks slowly during driving but remains OFF after the engine is restarted, the system is normal. If it again blinks slowly after driving for some time, vehicle must be inspected.
- When there is a difference of revolution speed between the front and rear wheel the shift occasionally changes to direct 4-wheel driving conditions automatically. This is not a malfunction.

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#### DIAGNOSIS SYSTEM (AWD CONTROL UNIT)

#### < SYSTEM DESCRIPTION >

## DIAGNOSIS SYSTEM (AWD CONTROL UNIT)

#### **CONSULT** Function

INFOID:000000010595870

[TRANSFER: ETX13C]

#### APPLICATION ITEMS

CONSULT can display each diagnostic item using the diagnostic test modes as follows.

Diagnostic test mode	Function	
ECU Identification	AWD control unit part number can be read.	
Self Diagnostic Result	Self-diagnostic results and freeze frame data can be read and erased quickly.*	
Data Monitor	Input/Output data in the AWD control unit can be read.	
Active Test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the AWD control unit and also shifts some parameters in a specified range.	

\* : The following diagnosis information is erased by erasing.

DTC

Freeze frame data (FFD)

#### ECU IDENTIFICATION

AWD control unit part number can be read.

SELF DIAGNOSTIC RESULT Refer to <u>DLN-22, "DTC Index"</u>.

When "PRSNT" is displayed on self-diagnosis result.

The system is presently malfunctioning.

When "PAST" is displayed on self-diagnosis result.

• System malfunction in the past is detected, but the system is presently normal.

#### FREEZE FRAME DATA (FFD)

The following vehicle status is recorded when DTC is detected and is displayed on CONSULT.

Item name	Display item
IGN COUNTER (0 – 39)	<ul> <li>The number of times that ignition switch is turned ON after the DTC is detected is displayed.</li> <li>When "0" is displayed : It indicates that the system is presently malfunctioning.</li> <li>When except "0" is displayed : It indicates that system malfunction in the past is detected, but the system is presently normal.</li> <li>NOTE:</li> <li>Each time when ignition switch is turned OFF to ON, numerical number increases in 1→2→338→39.</li> <li>When the operation number of times exceeds 39, the number do not increase and "39" is displayed until self-diagnosis is erased.</li> </ul>

#### DATA MONITOR

#### NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Monitor item (Unit)	Remarks
STOP LAMP SW [On/Off]	Stop lamp switch signal status via CAN communication line is displayed.
ENG SPEED SIG [Run/Stop]	Engine status is displayed.
ETS ACTUATOR [On/Off]	Operating condition of AWD actuator relay (integrated in AWD control unit) is displayed.
4WD WARN LAMP [On/Off]	Control status of AWD warning lamp is displayed.
4WD MODE SW [##] <sup>*1</sup>	Mode switch is not equipped, but displayed.
4WD MODE MON [AUTO]	Control status of AWD is displayed.
DIS-TIRE MONI [mm]	Improper size tire installed condition is displayed.
P BRAKE SW [On/Off]	Parking brake switch signal status via CAN communication line is displayed.
BATTERY VOLT [V]	Power supply voltage for AWD control unit

**Revision: February 2015** 

#### DIAGNOSIS SYSTEM (AWD CONTROL UNIT)

#### < SYSTEM DESCRIPTION >

[TRANSFER: ETX13C]

Monitor item (Unit)	Remarks	_
THRTL POS SEN [%]	Throttle opening status is displayed.	- A
ETS SOLENOID [A]	Monitored value of current at AWD solenoid	-
FR RH SENSOR [km/h] or [mph]	Wheel speed calculated by front RH wheel sensor signal is displayed.	В
FR LH SENSOR [km/h] or [mph]	Wheel speed calculated by front LH wheel sensor signal is displayed.	-
RR RH SENSOR [km/h] or [mph]	Wheel speed calculated by rear RH wheel sensor signal is displayed.	-
RR LH SENSOR [km/h] or [mph]	Wheel speed calculated by rear LH wheel sensor signal is displayed.	С

\*1: It is not setting, but it is displayed.

#### ACTIVE TEST

Use this mode to determine and identify the details of a malfunction based on self-diagnostic results or data monitor. AWD control unit gives drive signal to actuator with receiving command from CONSULT to check operation of actuator.

Test item	Condition	Description	
ETS S/V (Detects AWD solenoid)	<ul> <li>Vehicle stopped</li> <li>Engine running</li> <li>No DTC detected</li> </ul>	<ul> <li>Change command current value to AWD solenoid, and then change driving mode. (Monitor value is normal if it is within approx. ±10% of command value.)</li> <li>Qu: Increase current value in increments of 0.2 A</li> <li>Qd: Decrease current value in increments of 0.2 A</li> <li>UP: Increase current value in increments of 0.02 A</li> <li>DOWN: Decrease current value in increments of 0.02 A</li> </ul>	F

#### **CAUTION:**

Never energize continuously for a long time.

Revision: February 2015

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## ECU DIAGNOSIS INFORMATION AWD CONTROL UNIT

#### **Reference Value**

INFOID:000000010595871

#### VALUES ON THE DIAGNOSIS TOOL

#### NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

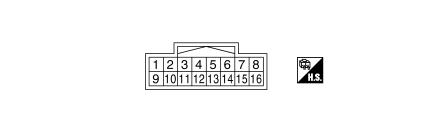
Monitor item	Condition	Value/Status
STOP LAMP SW	Brake pedal: Depressed	On
STOP LAWF SW	Brake pedal: Released	Off
ENG SPEED SIG	Engine stopped (Engine speed: Less than 400 rpm)	Stop
	Engine running (Engine speed: 400 rpm or more)	Run
ETS ACTUATOR	Engine stopped (Ignition switch: ON)	Off
LISACIONION	Engine running	On
4WD WARN LAMP	AWD warning lamp: ON	On
	AWD warning lamp: OFF	Off
4WD MODE SW <sup>*1</sup>	Always	##
4WD MODE MON	Engine running	AUTO
	Vehicle running with normal size tire installed	0 – 4 mm
DIS-TIRE MONI	Vehicle running with improper size tire installed (Front/rear tire size difference, wear condition)	4 – 8 mm, 8 – mm
	Parking brake operated	On
P BRAKE SW	Parking brake not operated	Off
BATTERY VOLT	Always	Battery voltage
THRTL POS SEN	When depressing accelerator pedal (Value rises gradually in response to throttle position.)	0 – 100%
	Engine running <ul> <li>At idle speed</li> </ul>	Approx. 0.000 A
ETS SOLENOID	Engine running <ul> <li>3,000 rpm or more constant</li> </ul>	Approx. 0.000 – 0.500 A <sup>*2</sup>
	Vehicle stopped	0.00 km/h (0.00 mph)
FR RH SENSOR	Vehicle running CAUTION: Check air pressure of tire under standard condition.	Approx. equal to the indication on speedometer (Inside of ±10%)
	Vehicle stopped	0.00 km/h (0.00 mph)
FR LH SENSOR	Vehicle running CAUTION: Check air pressure of tire under standard condition.	Approx. equal to the indication on speedometer (Inside of ±10%)
	Vehicle stopped	0.00 km/h (0.00 mph)
RR RH SENSOR	Vehicle running CAUTION: Check air pressure of tire under standard condition.	Approx. equal to the indication on speedometer (Inside of ±10%)
	Vehicle stopped	0.00 km/h (0.00 mph)
RR LH SENSOR	Vehicle running CAUTION: Check air pressure of tire under standard condition.	Approx. equal to the indication on speedometer (Inside of ±10%)

#### AWD CONTROL UNIT

#### < ECU DIAGNOSIS INFORMATION >

\*1: It is not setting, but it is displayed.\*2: The values are changed by throttle opening and engine speed.

#### **TERMINAL LAYOUT**



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#### PHYSICAL VALUES

	nal No. e color)	Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output	Condition	
1	Ground	AWD solenoid power sup-	Output	Engine speed: At idle	0 V
(BR)	Giouna	ply	Output	Engine speed: 3,000 rpm or more constant	2.5 V*
2	Ground	AWD solenoid ground	Input	Engine speed: At idle	0 V
(Y)	Ground	AWD solenoid ground	input	Engine speed: 3,000 rpm or more constant	0 V
3 (W)	Ground	Transfer fluid temperature sensor ground	Input	Always	0 V
7	Ground	Ignition switch	Input	Ignition switch: ON	Battery voltage
(G)	Cround		mput	Ignition switch: OFF	0 V
8 (L)	_	CAN-H	Input/ Output	_	_
9 (O)	Ground	Power supply (AWD sole- noid)	Input	Always	Battery voltage
10 (B)	Ground	Ground		Always	0 V
11 (GR)	Ground	Ground		Always	0 V
13	Ground	Transfer fluid temperature	Output	Transfer temperature: 20°C (68°F)	1.56 V
(LG)	LG) Ground	sensor power supply	output	Transfer temperature: 80°C (176°F)	0.44 V
15 (Y)	Ground	Power supply (AWD con- trol unit)	Input	Always	Battery voltage
16 (P)	_	CAN-L	Input/ Output	_	_

\*: The values are changed by throttle opening and engine speed.

#### **CAUTION:**

When using circuit tester to measure voltage for inspection, be sure not to extend forcibly any connector terminals.

#### Fail-safe

INFOID:0000000010595872

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- If any malfunction occurs in AWD electrical system, and control unit detects the malfunction, AWD warning lamp on combination meter turns ON to indicate system malfunction.
- When AWD warning lamp is ON, vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque)

#### AWD CONTROL UNIT

#### < ECU DIAGNOSIS INFORMATION >

#### **Protection Function**

INFOID:000000010595873

AWD system activates its protection function (shuts down AWD system temporarily) if AWD system detects high load continuously or the front wheel tire size differs from the rear tire size. (AWD system is automatically restored if AWD system no longer detects any overload or the tire size difference is eliminated.)

DTC	Warning lamp	Error area and root cause	Contents of protection function
_	Blinking <sup>*1</sup>	Transfer assembly in protection mode. It is not malfunction. (Internal temperature rise of electronic controlled coupling)	Shuts down AWD sys-
_	Blinking <sup>*2</sup>	Malfunction in each tire or different tire diameter	tem temporarily

\*1: Quick blinking: 2 times/second (blinking for approximately 1 minute and then turned OFF) \*2: Slow blinking: 1 time/2 seconds (continuing to blink until ignition switch is turned OFF)

#### NOTE:

- If the warning lamp blinks slowly during driving but remains OFF after the engine is restarted, the system is normal. If it again blinks slowly after driving for some time, vehicle must be inspected.
- When there is a difference of revolution speed between the front and rear wheel the shift occasionally changes to direct 4-wheel driving conditions automatically. This is not a malfunction.

#### **DTC Inspection Priority Chart**

INFOID:000000010595874

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	U1000 CAN COMM CIRCUIT     U1010 CONTROL UNIT (CAN)
2	<ul> <li>C1201 CONTROLLER FAILURE</li> <li>C1205 4WD ACTUATOR RLY</li> <li>P1804 CONTROL UNIT 3</li> <li>P1809 CONTROL UNIT 4</li> </ul>
3	C1203 ABS SYSTEM     C1210 ENGINE SIGNAL 1
4	C1204 4WD SOLENOID     P1826 OIL TEMP SEN

#### DTC Index

INFOID:000000010595875

DTC	Display Items	Reference
C1201	CONTROLLER FAILURE	DLN-32, "DTC Logic"
C1203	ABS SYSTEM	DLN-33, "DTC Logic"
C1204	4WD SOLENOID	DLN-34, "DTC Logic"
C1205	4WD ACTUATOR RLY	DLN-37, "DTC Logic"
C1210	ENGINE SIGNAL 1	DLN-39, "DTC Logic"
P1804	CONTROL UNIT 3	DLN-40, "DTC Logic"
P1809	CONTROL UNIT 4	DLN-41, "DTC Logic"
P1826	OIL TEMP SEN	DLN-42, "DTC Logic"
U1000	CAN COMM CIRCUIT	DLN-45, "DTC Logic"
U1010	CONTROL UNIT (CAN)	DLN-46, "DTC Logic"

#### NOTE:

If some DTCs are displayed at the same time, refer to DLN-22, "DTC Inspection Priority Chart".

#### AWD SYSTEM

#### [TRANSFER: ETX13C]

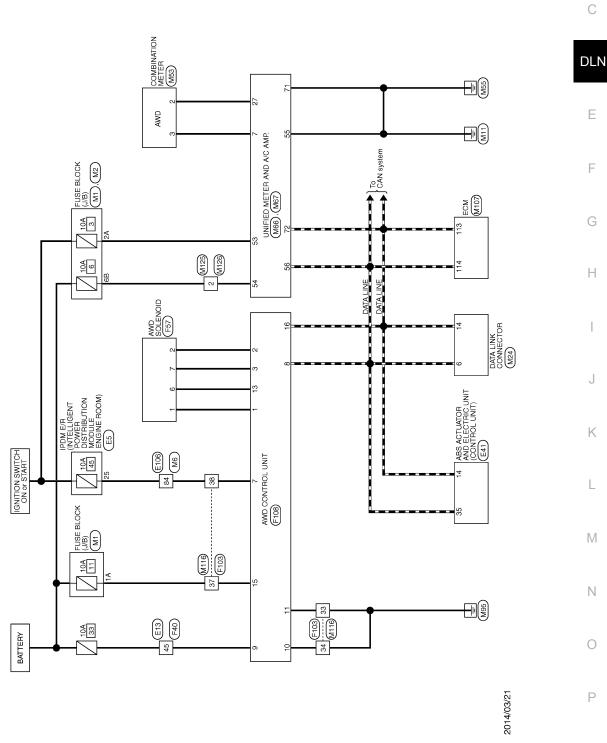
## < WIRING DIAGRAM >

## WIRING DIAGRAM

AWD SYSTEM

Wiring Diagram

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AWD SYSTEM

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#### [TRANSFER: ETX13C]

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**AWD SYSTEM** 

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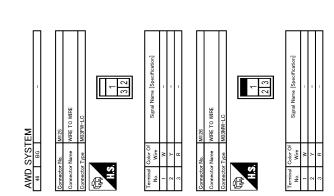
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**AWD SYSTEM** 



JRDWC2967GB

< BASIC INSPECTION >

BASIC INSPECTION
DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

DETAILED FLOW

**1.**INTERVIEW FROM THE CUSTOMER

Clarify customer complaints before inspection. First of all, perform an interview utilizing <u>DLN-30</u>, "<u>Diagnostic</u> <u>Work Sheet</u>" and reproduce symptoms as well as fully understand it. Ask customer about his/her complaints carefully. Check symptoms by driving vehicle with customer, if necessary.

Customers are not professional. Never guess easily like "maybe the customer means that...," or "maybe the customer mentions this symptom".

>> GO TO 2.

2.CHECK SYMPTOM

Reproduce the symptom that is indicated by the customer, based on the information from the customer obtained by interview. Also check that the symptom is not caused by protection function. Refer to <u>DLN-22</u>. "<u>Protection Function</u>".

#### CAUTION:

When the symptom is caused by normal operation, fully inspect each portion and obtain the understanding of customer that the symptom is not caused by a malfunction.

>> GO TO 3.

**3.** PERFORM SELF-DIAGNOSIS

#### 

Perform self-diagnosis for "ALL MODE AWD/4WD".

#### Is any DTC detected?

YES >> Record or print self-diagnosis results. GO TO 4.

NO >> GO TO 6.

**4.**RECHECK SYMPTOM

#### With CONSULT

1. Erase self-diagnostic results for "ALL MODE AWD/4WD".

2. Perform DTC confirmation procedures for the error detected system.

#### NOTE:

If some DTCs are detected at the same time, determine the order for performing the diagnosis based on <u>DLN-</u> M 22, "DTC Inspection Priority Chart".

#### Is any DTC detected?

YES >> GO TO 5.

NO >> Check harness and connectors based on the information obtained by interview. Refer to <u>GI-45</u>, <u>"Intermittent Incident"</u>.

## **5**.REPAIR OR REPLACE ERROR-DETECTED PARTS

• Repair or replace error-detected parts.

• Reconnect part or connector after repairing or replacing.

When DTC is detected, erase self-diagnostic results for "ALL MODE AWD/4WD".

#### >> GO TO 7.

#### **O**.IDENTIFY ERROR-DETECTED SYSTEM BY SYMPTOM DIAGNOSIS

Estimate error-detected system based on symptom diagnosis and perform inspection. <u>Can the error-detected system be identified?</u> INFOID:0000000010595877

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#### DIAGNOSIS AND REPAIR WORK FLOW

#### < BASIC INSPECTION >

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#### YES >> GO TO 7.

NO >> Check harness and connectors based on the information obtained by interview. Refer to <u>GI-45</u>, <u>"Intermittent Incident"</u>.

#### 7.FINAL CHECK

#### With CONSULT

- 1. Check the reference value for AWD control unit.
- 2. Recheck the symptom and check that symptom is not reproduced on the same conditions.

#### Is the symptom reproduced?

YES >> GO TO 3.

NO >> INSPECTION END

#### Diagnostic Work Sheet

INFOID:000000010595878

#### Description

- In general, customers have their own criteria for a problem. Therefore, it is important to understand the symptom and status well enough by asking the customer about his/her concerns carefully. To systemize all the information for the diagnosis, prepare the interview sheet referring to the interview points.
- In some cases, multiple conditions that appear simultaneously may cause a DTC to be detected.

#### Interview sheet sample

			Interview sheet				
Customer	MR/MS	Registration number			Initial year registration		
name		Vehicle type			VIN		
Storage date		Engine			Mileage		km (Mile)
		□Vehicle doe	s not enter AWD	mode.	· ·		
		□AWD warnir	ng lamp turns on.				
Symptom		□Heavy tight-	corner braking sy	mptom occu	irs		
- ) p		□Noise □	Vibration				
		□Others (					)
First occurrence		DRecently DOthers ( )					
Frequency of	occurrence	□Always □Under a certain conditions of □Sometimes (time(s)/day)					
		□Irrelevant					
Climate con-	Weather	□Fine □C	Cloud □Rain	□Snow	□Others (		)
ditions	Temperature	□Hot □W	′arm □Cool	□Cold	□Temperature	(Approx.	°C)
	Relative humidity	□High □N	loderate □L	w			
Road conditio	ns	□Urban area □Mounting ro	□Suburb are ad (uphill or dow		way Rough road		
Operation con	ditions, etc.	□Irrelevant □When engin □During drivin □During dece	ng During a	ring idling cceleration ring cornerin	□At constant ig (right curve or	1 0	

#### DIAGNOSIS AND REPAIR WORK FLOW

#### < BASIC INSPECTION >

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		Deschelsent's s	1-10-1	
Customer	MR/MS	Registration number	Initial year registration	
ame		Vehicle type	VIN	
Storage date		Engine	Mileage	km (Mile)
Other conditions				
/lemo				

## DTC/CIRCUIT DIAGNOSIS

C1201 AWD CONTROL UNIT

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1201	CONTROLLER FAILURE	Malfunction has occurred inside AWD control unit.	Internal malfunction of AWD control unit

#### DTC CONFIRMATION PROCEDURE

1.DTC REPRODUCTION PROCEDURE

#### With CONSULT

- Turn the ignition switch OFF to ON.
- 2. Perform self-diagnosis for "ALL MODE AWD/4WD".

#### Is DTC "C1201" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>DLN-32, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END

#### Diagnosis Procedure

#### **1.**PERFORM SELF-DIAGNOSIS

#### With CONSULT

- 1. Erase self-diagnostic results for "ALL MODE AWD/4WD".
- 2. Turn the ignition switch OFF, and then wait 10 seconds or more.
- 3. Perform self-diagnosis for "ALL MODE AWD/4WD".

#### Is DTC "C1201" detected?

- YES >> Replace AWD control unit. Refer to <u>DLN-59</u>, "Removal and Installation".
- NO >> Check AWD control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace error-detected parts.

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#### C1203 ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

< DTC/CIRCUIT DIAGNOSIS >

## C1203 ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

#### **DTC Logic**

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<ul> <li>1.PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS</li> <li>With CONSULT Perform self-diagnosis for "ABS". Is any DTC detected? YES &gt;&gt; Check the DTC. Refer to <u>BRC-140, "DTC No. Index"</u>. NO &gt;&gt; GO TO 2. </li> <li>2.ERASE SELF-DIAGNOSTIC RESULT </li> <li>With CONSULT 1. Erase self-diagnostic results for "ALL MODE AWD/4WD". 2. Start the engine and drive vehicle at 30 km/h (19 MPH) or more for approximately 1 minute. 3. Check that ABS warning lamp turns OFF. 4. Perform self-diagnosis for "ALL MODE AWD/4WD". Does ABS warning lamp turn OFF? YES &gt;&gt; GO TO 3. NO &gt;&gt; Perform trouble diagnosis for ABS warning lamp system. Refer to <u>BRC-125, "Component Function Check".</u> 3.CHECK TERMINALS AND HARNESS CONNECTORS Check AWD control unit pin terminals for damage or loose connection with harness connector. Is inspection result normal?</li></ul>	DTC	Display items	Malfunction detected condition	Possible cause
<ul> <li>1.DTC REPRODUCTION PROCEDURE</li> <li>With CONSULT <ol> <li>Start the engine and drive at 30 km/h (19 MPH) or more for approximately 1 minute.</li> <li>Perform self-diagnosis for "ALL MODE AWD/4WD".</li> <li>Is DTC "C1203" detected?</li> <li>YES &gt;&gt; Proceed to diagnosis procedure. Refer to DLN-33. "Diagnosis Procedure".</li> <li>NO &gt;&gt; INSPECTION END</li> </ol> </li> <li>Diagnosis Procedure <ul> <li>IPERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS</li> </ul> </li> <li>With CONSULT Perform self-diagnosis for "ABS". <ul> <li>Is any DTC detected?</li> <li>YES &gt;&gt; Check the DTC. Refer to BRC-140. "DTC No. Index".</li> <li>NO &gt;&gt; GO TO 2.</li> </ul> </li> <li>2. ERASE SELF-DIAGNOSTIC RESULT With CONSULT Perform self-diagnosis for "ALL MODE AWD/4WD". 2. Start the engine and drive vehicle at 30 km/h (19 MPH) or more for approximately 1 minute. 3. Check that ABS warning lamp turns OFF. 4. Perform self-diagnosis for "ALL MODE AWD/4WD". Does ABS warning lamp turn OFF? YES &gt;&gt; GO TO 3. NO &gt;&gt; Perform trouble diagnosis for ABS warning lamp system. Refer to BRC-125. "Component Function Check". 3. CHECK TERMINALS AND HARNESS CONNECTORS Check AWD control unit pin terminals for damage or loose connection with harness connector. Isinspection result normal? YES &gt;&gt; After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "C1203" is detected, Replace AWD control unit. Refer to DLN-59. "Removal and Installation".</li></ul>	C1203	ABS SYSTEM	been detected by ABS actuator and	
With CONSULT <ol> <li>Start the engine and drive at 30 km/h (19 MPH) or more for approximately 1 minute.</li> <li>Perform self-diagnosis for "ALL MODE AWD/4WD".</li> <li><u>Is DTC "C1203" detected?</u></li> <li>YES &gt;&gt; Proceed to diagnosis procedure. Refer to <u>DLN-33. "Diagnosis Procedure"</u>.</li> <li>NO &gt;&gt; INSPECTION END</li> <li>Diagnosis Procedure</li> <li><i>Insection Proceed to Proceed to Proceed to Proceedure</i>.</li> <li><i>Insection Proceed to Proceed to Proceedure</i>.</li> <li><i>Insection Proceed to Proceedure</i>.</li> <li><i>Insection Proceed to Proceedure</i>.</li> <li><i>Insection Proceedure</i>.</li> <li></li></ol>	DTC CONFIR	MATION PROCEDUR	E	
<ul> <li>1. Start the engine and drive at 30 km/h (19 MPH) or more for approximately 1 minute.</li> <li>2. Perform self-diagnosis for "ALL MODE AWD/4WD".</li> <li>Is DTC "C1203" detected?</li> <li>YES &gt;&gt; Proceed to diagnosis procedure. Refer to <u>DLN-33. "Diagnosis Procedure"</u>.</li> <li>NO &gt;&gt; INSPECTION END</li> <li>Diagnosis Procedure</li> <li>I.PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS</li> <li>@With CONSULT</li> <li>Perform self-diagnosis for "ABS".</li> <li>Is any DTC detected?</li> <li>YES &gt;&gt; Check the DTC. Refer to <u>BRC-140. "DTC No. Index"</u>.</li> <li>NO &gt;&gt; GO TO 2.</li> <li>2. ERASE SELF-DIAGNOSTIC RESULT</li> <li>@With CONSULT</li> <li>1. Erase self-diagnostic results for "ALL MODE AWD/4WD".</li> <li>2. Start the engine and drive vehicle at 30 km/h (19 MPH) or more for approximately 1 minute.</li> <li>3. Check that ABS warning lamp turns OFF.</li> <li>4. Perform self-diagnosis for "ALL MODE AWD/4WD".</li> <li>Does ABS warning lamp turn OFF?</li> <li>YES &gt;&gt; GO TO 3.</li> <li>NO &gt;&gt; Perform trouble diagnosis for ABS warning lamp system. Refer to <u>BRC-125. "Component Function Check".</u></li> <li>3. CHECK TERMINALS AND HARNESS CONNECTORS</li> <li>Check AWD control unit pin terminals for damage or loose connection with harness connector.</li> <li>Is inspection result normal?</li> <li>YES &gt;&gt; After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "C1203" is detected, Replace AWD control unit. Refer to <u>DLN-59. "Removal and Installation"</u>.</li> </ul>	1.DTC REPRO	DUCTION PROCEDU	RE	
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Does ABS warning lamp turn OFF?         YES       >> GO TO 3.         NO       >> Perform trouble diagnosis for ABS warning lamp system. Refer to BRC-125, "Component Func- tion Check".         3.CHECK TERMINALS AND HARNESS CONNECTORS         Check AWD control unit pin terminals for damage or loose connection with harness connector.         Is inspection result normal?         YES       >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "C1203" is detected, Replace AWD control unit. Refer to DLN-59, "Removal and Installation".	3. Check that	ABS warning lamp turn	s OFF.	TOXIMALELY T MINULE.
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Check AWD control unit pin terminals for damage or loose connection with harness connector. <u>Is inspection result normal?</u> YES >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "C1203" is detected, Replace AWD control unit. Refer to <u>DLN-59</u> , " <u>Removal and Installation</u> ".	<u> </u>			
<u>Is inspection result normal?</u> YES >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "C1203" is detected, Replace AWD control unit. Refer to <u>DLN-59</u> , " <u>Removal and Installation</u> ".				harness connector
YES >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "C1203" is detected, Replace AWD control unit. Refer to <u>DLN-59</u> , " <u>Removal and Installation</u> ".			or damage or loose connection with	
	YES >> Aft	er turning the ignition s		
				, removar and motaliation.

#### C1204 AWD SOLENOID

#### < DTC/CIRCUIT DIAGNOSIS >

## C1204 AWD SOLENOID

DTC Logic

INFOID:000000010595883

INFOID:000000010595884

[TRANSFER: ETX13C]

#### DTC DETECTION LOGIC

DTC	Display items	Malfunction detected condition	Possible cause
C1204	4WD SOLENOID	Malfunction related to AWD solenoid has been detected.	<ul> <li>Internal malfunction of electronic con- trolled coupling</li> <li>Malfunction of AWD solenoid power supply circuit (open or short)</li> <li>Malfunction of AWD solenoid com- mand current</li> </ul>

#### DTC CONFIRMATION PROCEDURE

1.DTC REPRODUCTION PROCEDURE

#### (P)With CONSULT

Turn the ignition switch OFF to ON. 1.

Perform self-diagnosis for "ALL MODE AWD/4WD". 2.

#### Is DTC "C1204" detected?

>> Proceed to diagnosis procedure. Refer to DLN-34, "Diagnosis Procedure". YES

NO >> INSPECTION END

#### **Diagnosis** Procedure

## 1. CHECK AWD SOLENOID POWER SUPPLY (1)

1. Turn the ignition switch OFF.

2. Disconnect AWD control unit harness connector.

3. Check the voltage between AWD control unit harness connector and ground.

	AWD co	ntrol unit		Valtaga	
-	Connector	Terminal		Voltage	
	F108	9	Ground	Battery voltage	

4. Turn the ignition switch OFF. **CAUTION:** 

Never start the engine.

5. Check the voltage between AWD control unit harness connector and ground.

AWD co	ntrol unit		Voltage
Connector	Terminal		
F108	9	Ground	Battery voltage

#### Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2.

**2.**CHECK AWD SOLENOID POWER SUPPLY (2)

1. Turn the ignition switch OFF.

- 2. Check the 10A fuse (#33)
- 3. Check the harness for open or short between AWD control unit harness connector No.9 terminal and 10A (#33).

#### Is the inspection result normal?

- YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-6, "Wiring Diagram - BAT-**TERY POWER SUPPLY -**"
- NO >> Repair or replace error-detected parts.

#### **DLN-34**

		ROL UNIT (			
heck the co	ontinuity bet	ween AWD	control unit	harness conn	ector and ground.
AWE	) control unit				
Connector		inal	_	Continuity	
	10				
F108	11		Ground	Existed	
the inspec	tion result n	ormal?			
	GO TO 4.				
	•	•	detected pa	rts.	
	WD SOLEN		. ,		
heck the re	esistance be	tween AWD	control unit	t terminals.	
	AWD contro	lunit			
Terminal		Terminal	Resi	stance (Approx.)	
F108	1	2	,	2.45 Ω	
	tion result n			2.70.32	
	GO TO 7.				
	GO TO 5.				
.CHECK /	WD SOLEN		JIT (2)		
			ess connect WD control		connector and AWD solenoid harness connecto
Check th		v between A		unit harness o	connector and AWD solenoid harness connecto
Check th	ne continuity ntrol unit Terminal	v between A	WD control solenoid Terminal		connector and AWD solenoid harness connecto
Check the AWD co	ne continuity ntrol unit Terminal 1	v between A	WD control solenoid Terminal 1	unit harness o	connector and AWD solenoid harness connecto
Check the AWD co Connector F108	ne continuity ntrol unit Terminal 1 2	AWD Connector F57	WD control solenoid Terminal 1 2	Unit harness of Continuity	
Check the AWD co Connector F108	ne continuity ntrol unit Terminal 1 2	AWD Connector F57	WD control solenoid Terminal 1 2	Unit harness of Continuity	connector and AWD solenoid harness connecto
AWD co Connector F108 Check th	ne continuity ntrol unit Terminal 1 2	AWD Connector F57	WD control solenoid Terminal 1 2	unit harness of Continuity Existed unit harness of	
AWD co Connector F108 Check th	ntrol unit Terminal 1 2 ne continuity	/ between A AWD Connector F57 / between A	WD control solenoid Terminal 1 2	Unit harness of Continuity	
AWD co Connector F108 Check th AWE Connector	ntrol unit Terminal 1 2 ne continuity	/ between A AWD Connector F57 / between A	WD control solenoid Terminal 1 2 WD control	unit harness of Continuity Existed unit harness of Continuity	
Check the AWD co Connector F108 Check the AWE	ne continuity ntrol unit Terminal 1 2 ne continuity D control unit Termi	/ between A AWD Connector F57 / between A	WD control solenoid Terminal 1 2	unit harness of Continuity Existed unit harness of	
AWD co Connector F108 Check th AWE Connector F108	ne continuity ntrol unit Terminal 1 2 ne continuity C control unit Termi 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	v between A AWD Connector F57 v between A	WD control solenoid Terminal 1 2 WD control	unit harness of Continuity Existed unit harness of Continuity	
Check the AWD co Connector F108 Check the AWE Connector F108 the inspector YES >>	ne continuity ntrol unit Terminal 1 2 ne continuity D control unit Termi 1 2 control unit 1 2 control unit 2 control unit 2 cont	v between A AWD Connector F57 v between A nal	WD control solenoid Terminal 1 2 WD control Ground	Unit harness of Continuity Continuity Unit harness of Continuity Not existed	
Check the AWD co Connector F108 Check the Connector F108 Check the Connector F108 the inspector YES >> NO >>	ne continuity ntrol unit Terminal 1 2 ne continuity 0 control unit Termi 0 control unit 1 2 control unit 2 control unit 1 2 control unit 2 control unit control unit	v between A AWD Connector F57 v between A nal ormal? place error-	WD control solenoid Terminal 1 2 WD control	Unit harness of Continuity Continuity Unit harness of Continuity Not existed	
Check the AWD co Connector F108 Check the Connector F108 Connector F108 the inspector YES >> NO >>	ne continuity ntrol unit Terminal 1 2 ne continuity 0 control unit Control unit 1 2 control unit 1 2 control unit Control unit 1 2 control unit 1 2 control unit Control unit 1 2 control unit 2 control unit	v between A AWD Connector F57 v between A nal nal normal? place error- NOID	WD control solenoid Terminal 1 2 WD control Ground detected pa	unit harness of Continuity Unit harness of Continuity Not existed rts.	connector and the ground.
Check the AWD co Connector F108 Check the Connector F108 Connector F108 the inspector (ES >> NO >> .CHECK A heck AWD	ntrol unit Terminal 1 2 ne continuity 0 control unit Termi 0 control unit 1 2 control unit 1 2 control unit 1 2 control unit 0 control unit 2 control unit 1 2 control unit 0 control unit 1 2 control unit 1 2 control unit 1 2 control unit 1 2 control unit 1 2 control unit 1 2 control unit 1 2 control unit 1 2 control unit 2 control unit 1 2 control unit 2 control control c	v between A AWD Connector F57 v between A nal ormal? place error- NOID efer to DLN	WD control solenoid Terminal 1 2 WD control Ground detected pa	Unit harness of Continuity Continuity Unit harness of Continuity Not existed	connector and the ground.
AWD co Connector F108 Check th AWE Connector F108 the inspec	ntrol unit Terminal 1 2 ne continuity Control unit Control unit 1 2 ction result n GO TO 6. Repair or re AWD SOLEN solenoid. R ction result n	v between A AWD Connector F57 v between A nal ormal? place error- NOID efer to DLN	WD control solenoid Terminal 1 2 WD control Ground detected pa	unit harness of Continuity Unit harness of Continuity Not existed rts.	connector and the ground.
AWD co Connector F108 Check th AWE Connector F108 the inspec YES >> CHECK A heck AWD the inspec YES >>	ntrol unit Terminal 1 2 ne continuity Control unit Control unit 1 2 ne continuity Control unit 1 2 control unit 1 2 control unit Control unit 1 2 control unit Control unit 1 2 control unit 2 control unit 2 control unit 2 control unit 2 control unit 2 control unit 2 control unit 2 control unit 2 control control unit 2 control unit 2 control unit 2 control unit 2 control unit 2 control control unit 2 control control unit 2 control control unit 2 control control unit 2 control control contr	AWD Connector F57 between A nal nal place error- NOID efer to DLN ormal?	WD control solenoid Terminal 1 2 WD control Ground detected pa -36, "Compo	unit harness of Continuity Existed unit harness of Continuity Not existed rts.	connector and the ground.
Check the AWD co Connector F108 Check the AWE Connector F108 the inspector YES >> CHECK A heck AWD the inspector YES >> NO >>	ntrol unit Terminal 1 2 ne continuity Control unit Control unit 1 2 ne continuity Control unit 1 2 control unit 1 2 control unit Control unit 1 2 control unit Control unit 1 2 control unit 2 control unit 2 control unit 2 control unit 2 control unit 2 control unit 2 control unit 2 control unit 2 control control unit 2 control unit 2 control unit 2 control unit 2 control unit 2 control control unit 2 control control unit 2 control control unit 2 control control unit 2 control control contr	AWD Connector F57 between A nal nal place error- NOID efer to DLN ormal?	WD control solenoid Terminal 1 2 WD control Ground detected pa -36, "Compo	unit harness of Continuity Existed unit harness of Continuity Not existed rts.	connector and the ground.
Check the AWD co Connector F108 Check the AWE Connector F108 the inspector YES >> CHECK A heck AWD the inspector YES >> NO >>	ntrol unit Terminal 1 2 ne continuity 0 control unit Termi 0 control unit 1 2 tion result n GO TO 6. Repair or re WD SOLEN solenoid. R ction result n GO TO 7. AWD solenc View".	AWD Connector F57 between A nal ormal? place error- NOID efer to DLN ormal? bid is malfun	WD control solenoid Terminal 1 2 WD control Ground detected pa -36, "Compo	unit harness of Continuity Existed unit harness of Continuity Not existed rts.	connector and the ground.

**C1204 AWD SOLENOID** 

YES >> Replace AWD control unit. Refer to <u>DLN-59, "Removal and Installation"</u>.

## DLN-35

#### < DTC/CIRCUIT DIAGNOSIS >

#### NO >> Repair or replace error-detected parts.

#### Component Inspection

INFOID:000000010595885

[TRANSFER: ETX13C]

## 1. CHECK AWD SOLENOID

- 1. Turn the ignition switch OFF.
- 2. Disconnect AWD solenoid harness connector.
- 3. Check the resistance between AWD solenoid connector terminals.

AWD s	olenoid	Resistance (Approx.)
Terr	ninal	
1	2	2.45 Ω

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> AWD solenoid is malfunctioning. Replace electric controlled coupling. Refer to <u>DLN-76</u>, "Exploded <u>View</u>".

### C1205 AWD ACTUATOR RELAY

### < DTC/CIRCUIT DIAGNOSIS >

DTC DETECTION LOGIC

### C1205 AWD ACTUATOR RELAY

### DTC Logic

[TRANSFER: ETX13C]

INFOID:000000010595886

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DTC	Display it	em	Malfunction detected condition	Possible cause
C1205	4WD ACTUATOR	RLY AWE cont	unction has been detected from Dactuator relay integrated with AW rol unit, or malfunction related to D solenoid has been detected.	<ul> <li>Internal malfunction of AWD control unit</li> <li>Malfunction of AWD solenoid power supply circuit (open or short)</li> </ul>
<b>FC CONFIF</b>	RMATION PRO	CEDURE		
DTC REPR	ODUCTION PRO	OCEDURE		
With CONS	ULT			
	gnition switch OF elf-diagnosis for '			
	5" detected?			
'ES >> Pi	roceed to diagnos		Refer to <u>DLN-37, "Diagnos</u>	s Procedure".
	ISPECTION END	)		
agnosis F	Procedure			INFOID:00000001059588
CHECK AV	VD SOLENOID C	CIRCUIT (1)		
	gnition switch OF			
Disconne	ct AWD control u	nit harness con		
Check the	continuity betwe	en AWD contro	ol unit harness connector a	nd the ground.
AWD c	control unit			
Connector	Terminal	—	Continuity	
F108	1	Ground	Not existed	
1100	2	Crodina	Notexisted	
-	on result normal?	) -		
	O TO 2. O TO 3.			
	RMINALS AND I	HARNESS CO	NNECTORS	
			damage or loose connection	n with harness connector.
			mage or loose connection v	
	on result normal?			
				rmation procedure again. When DTC -59, "Removal and Installation".
	epair or replace of			
CHECK AV	VD SOLENOID			
	ct AWD solenoid			
Check the	continuity betwe	en AWD solen	oid harness connector and	the ground.
WD solenoid				
AWD solenoid Terminal		Continuity		

Is the inspection result normal?

Ground

Not existed

1

2

### C1205 AWD ACTUATOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 4.

NO >> Replace electric controlled coupling. Refer to <u>DLN-76, "Exploded View"</u>.

### **4.**CHECK AWD SOLENOID CIRCUIT

Check the continuity between AWD control unit harness connector and the ground.

AWD co	AWD control unit Connector Terminal		Continuity
Connector			Continuity
F108	1	Ground	Not existed
1 100	2	Globalia	Not existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5. CHECK TERMINALS AND HARNESS CONNECTORS

1. Check AWD control unit pin terminals for damage or loose connection with harness connector.

2. Check AWD solenoid pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> After connecting each harness connector, perform DTC confirmation procedure again. When DTC "C1205" is detected, GO TO 1.

NO >> Repair or replace damaged parts.

### C1210 ECM

### < DTC/CIRCUIT DIAGNOSIS >

## C1210 ECM

## DTC Logic

INFOID:000000010595888

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DTC	Display item	Malfunction detected condition	Possible cause	
C1210	ENGINE SIGNAL 1	Malfunction related to engine signal has been detected.	Malfunction of engine control system	(
TC CONFI	RMATION PROCEDU	RE		D
.DTC REPI	RODUCTION PROCEDU	JRE		U
. Perform	SULT engine. Drive the vehicle self-diagnosis for "ALL M 10" detected?			E
	Proceed to diagnosis process of the second sec	cedure. Refer to <u>DLN-39, "Diagnosis F</u>	Procedure".	
Diagnosis	Procedure		INFOID:000000010595889	
	I ECM SELF-DIAGNOS	S		
With CON Perform self-	SULT diagnosis for "ENGINE".			
	heck the DTC. Refer to	<u>EC-576, "DTC_Index"</u> .		
	GO TO 2. ERMINALS AND HARNE			
		for damage or loose connection with	harness connector	
	result normal?			
		switch OFF, perform DTC confirmat ace AWD control unit. Refer to DLN-5		
		tected narts		
"(	Repair or replace error-de			
"(	repair or replace error-de			

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### P1804 TRANSFER CONTROL UNIT

#### < DTC/CIRCUIT DIAGNOSIS >

### P1804 TRANSFER CONTROL UNIT

### DTC Logic

INFOID:000000010595890

INFOID:000000010595891

[TRANSFER: ETX13C]

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1804	CONTROL UNIT 3	Malfunction has occurred inside AWD control unit.	Malfunction is detected in the memory (EEPROM) system of transfer control unit.

### DTC CONFIRMATION PROCEDURE

### 1.DTC REPRODUCTION PROCEDURE

#### ()With CONSULT

- 1. Turn the ignition switch ON.
- 2. Perform self-diagnosis for "ALL MODE AWD/4WD".

#### Is DTC "P1804" detected?

- YES >> Proceed to diagnosis procedure. Refer to <u>DLN-40, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END.

### Diagnosis Procedure

1.REPLACE AWD CONTROL UNIT

#### **CAUTION:**

#### Replace AWD control unit when DTC "P1804" is detected simultaneously with other items.

>> Replace AWD control unit. Refer <u>DLN-59, "Removal and Installation"</u>.

### P1809 TRANSFER CONTROL UNIT

#### < DTC/CIRCUIT DIAGNOSIS >

## P1809 TRANSFER CONTROL UNIT

## DTC Logic

[TRANSFER: ETX13C]

INFOID:000000010595892

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DTC	Display item	Malfunction detected condition	Possible cause
P1809	CONTROL UNIT 4	Malfunction has occurred inside AWD control unit.	AD converter system of transfer control unit is malfunctioning.
C CONFI	RMATION PROCEDU	RE	
DTC REPI	RODUCTION PROCEDU	JRE	
With CON			
	ignition switch ON. self-diagnosis for "ALL M	IODE AWD/4WD".	
DTC "P180	9" detected?		
	Proceed to diagnosis processing to the second se	cedure. Refer to <u>DLN-41, "Diagnosis</u>	Procedure".
	Procedure		INFOID:00000001059589
-			
	AWD CONTROL UNIT		
	D control unit when DT	C "P1809" is detected simultaneo	usly with other items.
	D control unit when DT	C "P1809" is detected simultaneo	usly with other items.
lace AW		C "P1809" is detected simultaneo t. Refer <u>DLN-59, "Removal and Insta</u>	
blace AWI			
blace AWI			
blace AWI			
lace AW			
blace AWI			
lace AW			
blace AWI			

### P1826 TRANSFER FLUID TEMPERATURE

### < DTC/CIRCUIT DIAGNOSIS >

### P1826 TRANSFER FLUID TEMPERATURE

### DTC Logic

INFOID:000000010595894

[TRANSFER: ETX13C]

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1826	OIL TEMP SEN	Transfer fluid temperature sensor volt- age condition is continued 0 V or more than 2.45 V for several seconds.	<ul> <li>Malfunction of transfer fluid tempera- ture sensor or transfer fluid tempera- ture sensor circuit.</li> <li>Malfunction of AWD control unit.</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### **1.**DTC REPRODUCTION PROCEDURE

#### With CONSULT

- 1. Turn the ignition switch ON.
- 2. Perform self-diagnosis for "ALL MODE AWD/4WD".

#### Is DTC "P1826" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>DLN-42, "Diagnosis Procedure"</u>.

NO >> INSPECTION ĔND.

### **Diagnosis** Procedure

INFOID:000000010595895

### **1**.CHECK TRANSFER FLUID TEMPERATURE SENSOR SIGNAL (1)

- 1. Turn the ignition switch OFF.
- 2. Disconnect AWD solenoid harness connector.
- 3. Turn the ignition switch ON.
- 4. Check the voltage between AWD solenoid harness connector terminals.

	AWD solenoid				
Connector	Teri	minal	(Approx.)		
F57	6	2.5 V			

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK TRANSFER FLUID TEMPERATURE SENSOR

Check transfer fluid temperature sensor. Refer to <u>DLN-43</u>, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> AWD solenoid is malfunctioning. Replace electric controlled coupling. Refer to <u>DLN-76</u>, "Exploded <u>View"</u>.

## **3.**CHECK TRANSFER FLUID TEMPERATURE SENSOR SIGNAL (2)

Check the voltage between AWD solenoid harness connector and ground.

AWD s	AWD solenoid		Voltage	
Connector	Terminal		(Approx.)	
F57	6	Ground	2.5 V	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 5.

4.CHECK AWD CONTROL UNIT GROUND

### P1826 TRANSFER FLUID TEMPERATURE

### < DTC/CIRCUIT DIAGNOSIS >

- 1. Turn the ignition switch OFF.
- 2. Disconnect AWD control unit harness connector.
- 3. Check the continuity between AWD control unit harness connector and ground.

					-
	control unit		_	Continuity	
Connector	Termina	al			-
F108	10 11	(	Ground	Existed	
s the inspection	on result no	ormal?			-
	O TO 5.				
	epair or rep				
			PERATUR	RE SENSOR C	
	gnition swite ct AWD con		rness con	nector	
					connector and AWD solenoid harness connector.
					_
AWD cont			solenoid	Continuity	
Connector	Terminal	Connector	Termina	1	_
F108	13	F57	6 7	Existed	
4 Chook the	-	hotwoon A	-		-
4. Check the	continuity	between A		or unit namess	connector and the ground.
AWD c	control unit				-
Connector	Termin	Terminal		Continuity	
F108	13		Draund	Not ovisted	-
FIUO	3		Bround	Not existed	
is the inspection		ormal?			-
	O TO 2. epair or rep	laco orror (	hotoctod n	arte	
<b>6.</b> снеск те	• •				
					connection with harness connector. amage or loose connection with harness connec-
Is the inspection	<u>on result no</u>	ormal?			
					moval and Installation".
NO >> R	epair or rep	lace error-o	detected p	oarts.	
Componen	t Inspecti	ion			INFOID:000000010595896
<b>1.</b> CHECK TR	ANSFER F	LUID TEM	PERATUR	RE SENSOR	
	on switch C				
	ct AWD sole				ainela
	istance Det	ween AVVD	solenoid	connector terr	III als.
3. Check res					
3. Check res	lenoid			Resistance	
		Conc	lition	Resistance (Approx.)	
AWD so					

Is inspection result normal?

YES >> INSPECTION END

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### P1826 TRANSFER FLUID TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

NO >> Transfer fluid temperature sensor is malfunctioning. Replace electric controlled coupling. Refer to DLN-76, "Exploded View".

#### < DTC/CIRCUIT DIAGNOSIS >

### **U1000 CAN COMM CIRCUIT**

### Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle mul-В tiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 С communication lines (CAN-H line, CAN-L line) allowing a high rate of information transmission with less wiring. Each control unit communicate data but selectively reads required data only.

### DTC Logic

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
U1000	CAN COMM CIRCUIT	AWD control unit is not transmitting/re- ceiving CAN communication signal for 2 seconds or more.	CAN communication error
TC CONFIR	MATION PROCEDUR	E	
.DTC REPR	ODUCTION PROCEDUF	RE	
With CONS	ULT		
2			
. Turn the ig	nition switch OFF to ON. elf-diagnosis for "ALL MO		
. Turn the ig	nition switch OFF to ON. Alf-diagnosis for "ALL MO		
. Turn the ig . Perform se <u>s DTC "U1000</u> YES >> Pro	nition switch OFF to ON. elf-diagnosis for "ALL MO <u>" detected?</u>		Procedure".
. Turn the ig . Perform se <u>s DTC "U1000</u> YES >> Pro	nition switch OFF to ON. elf-diagnosis for "ALL MO <u>" detected?</u> oceed to diagnosis proce SPECTION END	DE AWD/4WD".	Procedure".
. Turn the ig . Perform se <u>s DTC "U1000</u> YES >> Pro NO >> IN Diagnosis F	nition switch OFF to ON. elf-diagnosis for "ALL MO <u>" detected?</u> oceed to diagnosis proce SPECTION END	DE AWD/4WD". edure. Refer to <u>DLN-45, "Diagnosis F</u>	
. Turn the ig . Perform se <u>s DTC "U1000</u> YES >> Pro NO >> IN Diagnosis F	nition switch OFF to ON. elf-diagnosis for "ALL MO <u>oceed to diagnosis proce</u> SPECTION END Procedure	DE AWD/4WD". edure. Refer to <u>DLN-45, "Diagnosis F</u>	

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### U1010 CONTROL UNIT (CAN)

### Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN-H line, CAN-L line) allowing a high rate of information transmission with less wiring. Each control unit communicate data but selectively reads required data only.

### DTC Logic

INFOID:000000010595901

INFOID:000000010595900

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
U1010	CONTROL UNIT (CAN)	Detecting error during the initial diagno- sis of CAN controller of AWD control unit.	Internal malfunction of AWD control unit

### DTC CONFIRMATION PROCEDURE

**1.**DTC REPRODUCTION PROCEDURE

#### With CONSULT

- 1. Turn the ignition switch OFF to ON.
- 2. Perform self-diagnosis for "ALL MODE AWD/4WD".

#### Is DTC "U1010" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>DLN-46, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

### Diagnosis Procedure

1.CHECK AWD CONTROL UNIT

Check AWD control unit harness connector for disconnection and deformation.

#### Is the inspection result normal?

- YES >> Replace AWD control unit. Refer to <u>DLN-59</u>, "Removal and Installation".
- NO >> Repair or replace error-detected parts.

			SUPPL	Y AND GI	ROUND CIRCUIT [TRANSFER: ETX13C]	
	SUPPLY		ROUNF	) CIRCUI		
	Procedur				• INFOID:000000010595903	А
<b>1.</b> CHECK /	AWD CONTR		OWER SUI	PPLY (1)		В
1. Turn the 2. Disconn	e ignition swite lect AWD con	ch OFF. itrol unit har	ness conne	ector.	nnector and ground.	С
AWD	control unit				-	
Connector	Terminal		VOI	age (Approx.)		DL
F108	7	Grour	nd	0 V	-	
CAUTIC Never s	tart the engi	ne.	control un	it harness co	nnector and ground.	F
AWD	control unit			Voltage	-	
Connector	Terminal			voltage	_	G
F108	7	Grour	nd Ba	attery voltage	_	
NO >> 2.CHECK A 1. Turn the 2. Check th 3. Disconn	GO TO 3. GO TO 2. AWD CONTR e ignition swite he 10A fuse ( hect IPDM E/F he continuity	ch OFF. #45). R harness co	onnector.		connector and IPDM E/R harness connector.	H I J
	ontrol unit	IPDN			-	
Connector	Terminal	Connector	Terminal	Continuity		K
F108	7	E5	25	Existed	-	
	he continuity	between AV	VD control	unit harness	connector and the ground.	L
Connector	control unit Terminal			Continuity	- -	N
F108	7	Grour	nd I	Not existed	-	
YES >> NO >>	<u>ction result no</u> Perform the t <u>IGNITION PC</u> Repair or rep AWD CONTR	rouble diag <u>OWER SUP</u> lace error-d	<u>PLY -"</u> . etected pa	rts.	supply circuit. Refer to <u>PG-44, "Wiring Diagram -</u>	N
	e ignition swite he voltage be		control un	it harness co	nnector and ground.	Ρ
AWD	control unit				-	
Connector	Terminal	— —	Volt	tage (Approx.)		
	Terrinia					

F108 15 Ground 3. Turn the ignition switch ON. CAUTION:

### POWER SUPPLY AND GROUND CIRCUIT

#### < DTC/CIRCUIT DIAGNOSIS >

#### Never start the engine.

4. Check the voltage between AWD control unit harness connector and ground.

AWD co	AWD control unit		Voltage	
Connector	Terminal		voltage	
F108	15	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 4.

4. CHECK AWD CONTROL UNIT POWER SUPPLY (4)

- 1. Turn the ignition switch OFF.
- 2. Check the 10A fuse (#11).
- 3. Disconnect fuse block (J/B) harness connector.
- 4. Check the continuity between AWD control unit harness connector and fuse block (J/B).

AWD co	AWD control unit		Fuse block (J/B)		
Connector	Terminal	Connector	Terminal	Continuity	
F108	15	M1	1A	Existed	

5. Check the continuity between AWD control unit harness connector and the ground.

AWD control unit			Continuity
Connector	Terminal		Continuity
F108	15	Ground	Not existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to <u>PG-6. "Wiring Diagram - BAT-</u> <u>TERY POWER SUPPLY -"</u>.

NO >> Repair or replace error-detected parts.

**5.**CHECK AWD SOLENOID POWER SUPPLY (1)

- 1. Turn the ignition switch OFF.
- 2. Check the voltage between AWD control unit harness connector and ground.

AWD control unit			Voltage	
Connector	Terminal		voltage	
F108	9	Ground	Battery voltage	

3. Turn the ignition switch ON. CAUTION:

### Never start the engine.

4. Check the voltage between AWD control unit harness connector and ground.

AWD co	AWD control unit		Voltage
Connector	Terminal		voltage
F108	9	Ground	Battery voltage

#### Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6.CHECK AWD SOLENOID POWER SUPPLY (2)

1. Turn the ignition switch OFF.

2. Check the 10A fuse (#33).

### POWER SUPPLY AND GROUND CIRCUIT

#### < DTC/CIRCUIT DIAGNOSIS >

#### [TRANSFER: ETX13C]

	JII DIAGNUS	ol2 >		
<ol> <li>Check the box.</li> </ol>	e harness for o	pen or short be	etween AWD con	trol unit harness connector No.9 terminal and fuse
	on result norm	al?		
Ţ	ERY POWER			y circuit. Refer to <u>PG-6, "Wiring Diagram - BAT-</u>
CHECK A	VD CONTROL	UNIT GROUN	1D	
I. Turn the i	gnition switch	OFF.		
2. Check the	e continuity bet	tween AWD co	ntrol unit harness	connector and ground.
				_
AWD co	ontrol unit	_	Continuity	
Connector	Terminal		,	_
F108	10	Ground	Existed	
1 100	11	Clound	Existed	
s the inspecti	on result norm	al?		
	SPECTION E			
NO >> R	epair or replac	e error-detecte	ed parts.	

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### < DTC/CIRCUIT DIAGNOSIS >

### AWD WARNING LAMP

### Component Function Check

**1.**CHECK AWD WARNING LAMP FUNCTION

1. Turn the ignition switch ON.

2. Check that AWD warning lamp lights up.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to diagnosis procedure. Refer to <u>DLN-50, "Diagnosis Procedure"</u>.

### Diagnosis Procedure

INFOID:000000010595905

INFOID:000000010595904

### **1.**CHECK POWER SUPPLY AND GROUND CIRCUIT

Perform the trouble diagnosis for power supply and ground circuit. Refer to <u>DLN-47, "Diagnosis Procedure"</u>. Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace the error-detected parts.

2.PERFORM SELF-DIAGNOSIS

#### (B) With CONSULT

Perform self-diagnosis for "ALL MODE AWD/4WD".

#### Is any DTC detected?

YES >> Check the DTC. Refer to <u>DLN-22, "DTC Index"</u>.

NO >> GO TO 3.

**3.**CHECK AWD WARNING LAMP SIGNAL

#### With CONSULT

Turn the ignition switch ON.
 CAUTION:

Never start the engine.

2. Check "4WD WARN LAMP" of CONSULT "DATA MONITOR" for "ALL MODE AWD/4WD".

Does the item on "DATA MONITOR" indicate "On"?

- YES >> Perform the trouble diagnosis for combination meter power supply circuit. Refer to <u>MWI-55</u>. <u>"COMBINATION METER : Diagnosis Procedure"</u>.
- NO >> Replace AWD control unit. Refer to <u>DLN-59</u>, "Removal and Installation".

SYMPTOM DIAGNOSIS AWD WARNING LAMP DOES NOT TURN ON Description exconoscenses AWD warning lamp does not turn ON when the ignition switch is turned to ON. Diagnosis Procedure exconoscenses 1.CHECK AWD WARNING LAMP Perform the trouble diagnosis for AWD warning lamp. Refer to <u>DLN-50. "Diagnosis Procedure"</u> . Is the inspection result normal? YES >> Check each hamess connector pin terminal for malfunction or disconnection. NO >> Repair or replace the error-detected parts.
Description       INFOID:00000010595906         AWD warning lamp does not turn ON when the ignition switch is turned to ON.       INFOID:00000010595907         Diagnosis Procedure       INFOID:00000010595907         1.CHECK AWD WARNING LAMP       Perform the trouble diagnosis for AWD warning lamp. Refer to DLN-50, "Diagnosis Procedure".         Is the inspection result normal?       YES         YES       >> Check each harness connector pin terminal for malfunction or disconnection.
AWD warning lamp does not turn ON when the ignition switch is turned to ON. Diagnosis Procedure 1.CHECK AWD WARNING LAMP Perform the trouble diagnosis for AWD warning lamp. Refer to <u>DLN-50, "Diagnosis Procedure"</u> . Is the inspection result normal? YES >> Check each harness connector pin terminal for malfunction or disconnection.
Diagnosis Procedure       INFOID:00000010595907         1.CHECK AWD WARNING LAMP         Perform the trouble diagnosis for AWD warning lamp. Refer to DLN-50, "Diagnosis Procedure".         Is the inspection result normal?         YES       >> Check each harness connector pin terminal for malfunction or disconnection.
1.CHECK AWD WARNING LAMP Perform the trouble diagnosis for AWD warning lamp. Refer to <u>DLN-50, "Diagnosis Procedure"</u> . <u>Is the inspection result normal?</u> YES >> Check each harness connector pin terminal for malfunction or disconnection.
Perform the trouble diagnosis for AWD warning lamp. Refer to <u>DLN-50, "Diagnosis Procedure"</u> . <u>Is the inspection result normal?</u> YES >> Check each harness connector pin terminal for malfunction or disconnection.
Is the inspection result normal? YES >> Check each harness connector pin terminal for malfunction or disconnection.

### AWD WARNING LAMP DOES NOT TURN OFF

#### < SYMPTOM DIAGNOSIS >

### AWD WARNING LAMP DOES NOT TURN OFF

### Description

AWD warning lamp does not turn OFF several seconds after the engine started.

### Description

**1.**PERFORM SELF-DIAGNOSIS

#### With CONSULT

Perform self-diagnosis for "ALL MODE AWD/4WD".

Is any DTC detected?

YES >> Check the DTC. Refer to <u>DLN-22, "DTC Index"</u>.

NO >> GO TO 2.

2. CHECK AWD WARNING LAMP

Perform the trouble diagnosis of the AWD warning lamp. Refer to <u>DLN-50, "Diagnosis Procedure"</u>.

Is the inspection result normal?

YES >> Check each harness connector pin terminal for malfunction or disconnection.

NO >> Repair or replace the error-detected parts.

INFOID:000000010595908

INFOID:000000010595909

[TRANSFER: ETX13C]

#### **HEAVY TIGHT-CORNER BRAKING SYMPTOM OCCURS** [TRANSFER: ETX13C] < SYMPTOM DIAGNOSIS > HEAVY TIGHT-CORNER BRAKING SYMPTOM OCCURS А Description INFOID:000000010595910 Heavy tight-corner braking symptom occurs when the vehicle is driven and the steering wheel is turned fully to В either side after the engine is started. NOTE: Light tight-corner braking symptom may occur depending on driving conditions. This is not malfunction. Diagnosis Procedure INFOID:0000000010595911 **1.**PERFORM ECM SELF-DIAGNOSIS DLN With CONSULT Perform self-diagnosis for "ENGINE". Ε Is any DTC detected? YES >> Check the DTC. NO >> GO TO 2. 2.PERFORM SELF-DIAGNOSIS With CONSULT Perform self-diagnosis for "ALL MODE AWD/4WD". Is DTC "U1000" detected? YES >> Proceed to LAN-16, "Trouble Diagnosis Flow Chart". NO >> GO TO 3. Н 3.CHECK TRANSFER FLUID TEMPERATURE SENSOR Perform the trouble diagnosis of the transfer fluid temperature sensor. Refer to DLN-42, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace the error-detected parts.

**4.**CHECK AWD SOLENOID

Perform the trouble diagnosis of the AWD solenoid. Refer to <u>DLN-34, "Diagnosis Procedure"</u>.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace the error-detected parts. 5.CHECK ELECTRIC CONTROLLED COUPLING

1. Turn the ignition switch OFF.

Set the transmission to neutral. Release the parking brake.
 Lift up the vehicle.
 Rotate the rear propeller shaft.
 Hold the front propeller shaft lightly.

Does the front propeller shaft rotate?

YES >> Replace electric controlled coupling for mechanical malfunction (clutch sticking etc.). Refer to <u>DLN-76, "Exploded View"</u>.

NO >> Check each harness connector pin terminal for disconnection.

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### VEHICLE DOES NOT ENTER AWD MODE

#### < SYMPTOM DIAGNOSIS >

### VEHICLE DOES NOT ENTER AWD MODE

### Description

Vehicle does not enter 4-wheel drive mode even though AWD warning lamp turned to OFF.

### **Diagnosis** Procedure

1.CHECK AWD WARNING LAMP

Turn the ignition switch ON.

Does AWD warning lamp turn ON?

YES >> GO TO 2.

NO >> Proceed to diagnosis procedure. Refer to <u>DLN-51, "Diagnosis Procedure"</u>.

2.CRUISE TEST

Drive the vehicle for a period of time.

Does any symptom occur?

YES >> Replace electric controlled coupling for mechanical malfunction (mechanical engagement of clutch is not possible). Refer to <u>DLN-76. "Exploded View"</u>.

NO >> Check each harness connector pin terminal for disconnection.

INFOID:000000010595912

### AWD WARNING LAMP BLINKS QUICKLY

#### < SYMPTOM DIAGNOSIS >

### AWD WARNING LAMP BLINKS QUICKLY

### Description

While driving, AWD warning lamp blinks 2 times in 1 second and it turns OFF after 1 minute. **NOTE:** 

- This symptom protects drivetrain parts when a heavy load is applied to the electric controlled coupling and multiple disc clutch temperature increases. Also, optional distribution of torque sometimes becomes rigid before lamp blinks quickly. Both cases are not malfunction. Refer to <u>DLN-22</u>, "Protection Function".
- When this symptom occurs, stop vehicle and allow it to idle for some times. Blinking will stop and system will be restored.

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[TRANSFER: ETX13C]

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### AWD WARNING LAMP BLINKS SLOWLY

#### < SYMPTOM DIAGNOSIS >

### AWD WARNING LAMP BLINKS SLOWLY

### Description

AWD warning lamp blinks at approximately 2 seconds intervals while driving.

### Diagnosis Procedure

INFOID:000000010595916

INFOID:000000010595915

### **1.**CHECK TIRE

Check the following.

- Tire pressure
- Wear condition
- Front and rear tire size (There is no difference between front and rear tires.)

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace error-detected parts. And then, drive the vehicle at speed of 20 km/h (12 MPH) or more for 5 seconds or more. Improper size information is initialized accordingly.

### 2.CHECK INPUT SIGNAL OF TIRE DIAMETER

#### With CONSULT

- 1. Start the engine.
- 2. Drive at 20 km/h (12 MPH) or more for approximately 4 minutes.
- 3. Check "DIS-TIRE MONI" of CONSULT "DATA MONITOR" for "ALL MODE AWD/4WD".

Does the item on "DATA MONITOR" indicate "0 - 4 mm"?

- YES >> INSPECTION END
- NO >> GO TO 3.
- **3.**TERMINAL INSPECTION

Check AWD control unit harness connector for disconnection.

Is the inspection result normal?

- YES >> Replace AWD control unit. Refer to <u>DLN-59</u>, "Removal and Installation".
- NO >> Repair or replace the error-detected parts.

### NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING [TRANSFER: ETX13C]

### < SYMPTOM DIAGNOSIS >

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

### NVH Troubleshooting Chart

INFOID:000000010595917

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Use the chart below to find the cause of the symptom. The numbers indicate the order of the inspection. If necessary, repair or replace these parts.

Reference			DLN-58. "Inspection"		DLN-66, "Exploded View"	DLN-66. "Exploded View"	DLN-79, "Inspection"	DLN-79, "Inspection"	DLN-74, "Inspection"	C DLN
SUSPECTED P (Possible cause		TRANSFER FLUID (Level Iow)	TRANSFER FLUID (Wrong)	TRANSFER FLUID (Level too high)	LIQUID GASKET (Damaged)	OIL SEAL (Worn or damaged)	GEAR (Worn or damaged)	BEARING (Worn or damaged)	TRANSFER CASE (Damaged)	F G
Symptom	Noise	1	2				3	3	3	_
Cymptoli	Transfer fluid leakage		4	1	2	2			3	

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## PERIODIC MAINTENANCE TRANSFER FLUID

### Inspection

### FLUID LEAKAGE

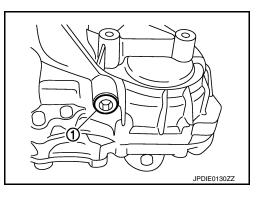
Check transfer surrounding area (oil seal, drain plug, and filler plug etc.) for fluid leakage. Repair or replace parts causing fluid leakage, if necessary.

### FLUID LEVEL

If there is no fluid leakage, the fluid level is judged as normal.

### Draining

- 1. Run the vehicle to warm up the transfer unit sufficiently.
- 2. Stop the engine, and remove the drain plug (1) to drain the transfer fluid.
- Set a new gasket onto the drain plug, and install it on the transfer and tighten to the specified torque. Refer to <u>DLN-66.</u> <u>"Exploded View"</u>. CAUTION: Never reuse gasket.



INFOID:000000010595920

### Refilling

1. Remove filler plug (1) and gasket. Then fill fluid up to mounting hole for the filler plug.

Fluid and viscosity

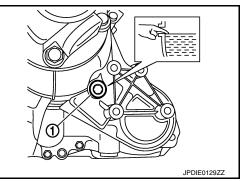
Fluid capacity

: Refer to <u>MA-10, "Fluids</u> and <u>Lubricants"</u>. : Refer to <u>DLN-85, "General</u> <u>Specifications"</u>.

#### **CAUTION:**

#### Carefully fill the fluid. (Fill up for approximately 3 minutes.)

- 2. Leave the vehicle for 3 minutes, and check the fluid level again.
- Set a new gasket onto filler plug, and install it on transfer and tighten to the specified torque. Refer to <u>DLN-66</u>, "Exploded View". CAUTION: Never reuse gasket.



**Revision: February 2015** 

INFOID:000000010595918

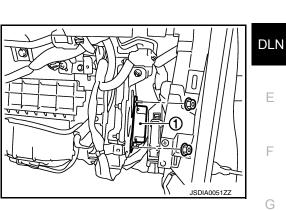
# < REMOVAL AND INSTALLATION >

## REMOVAL AND INSTALLATION AWD CONTROL UNIT

Removal and Installation

### REMOVAL

- 1. Remove the glove box assembly. Refer to IP-13. "Removal and Installation".
- 2. Disconnect AWD control unit harness connector.
- 3. Remove AWD control unit (1) mounting nuts.
- 4. Remove AWD control unit.



INSTALLATION Install in the reverse order of removal.



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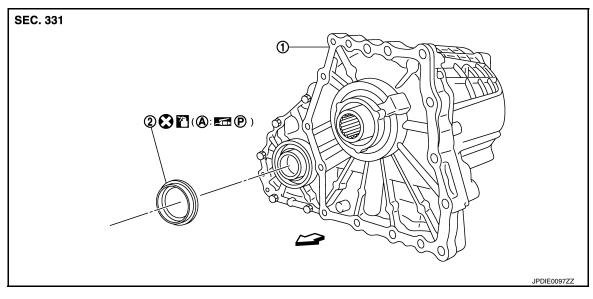
### < REMOVAL AND INSTALLATION >

### FRONT OIL SEAL

**Exploded View** 

INFOID:000000010595922

[TRANSFER: ETX13C]



1. Transfer assembly

2. Front oil seal

- A. Oil seal lip
- C: Vehicle front

T: Apply transfer fluid. Refer to MA-10, "Fluids and Lubricants".

P: Apply petroleum jelly.

Refer to <u>GI-4</u>, "Components" for symbols not described above.

### Removal and Installation

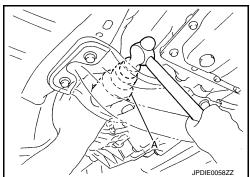
REMOVAL

- 1. Remove the drain plug to drain the transfer fluid. Refer to <u>DLN-58, "Draining"</u>.
- 2. Remove the front propeller shaft. Refer to <u>DLN-90, "Removal and Installation"</u>.
- 3. Remove front oil seal. CAUTION:

#### Never damage the front case and front drive shaft.

#### INSTALLATION

- Apply transfer fluid to outside of front oil seal, install it with a drift (A) [SST: ST27862000 ( — )] until the end face of front case.
   CAUTION:
  - Never reuse front oil seal.
  - Apply petroleum jelly to oil seal lip.
  - When installing, never incline front oil seal.
- 2. Install front propeller shaft. Refer to <u>DLN-90</u>, "Removal and <u>Installation</u>".
- 3. Fill with new transfer fluid, check fluid level and for fluid leakage. Refer to <u>DLN-58, "Inspection"</u>.



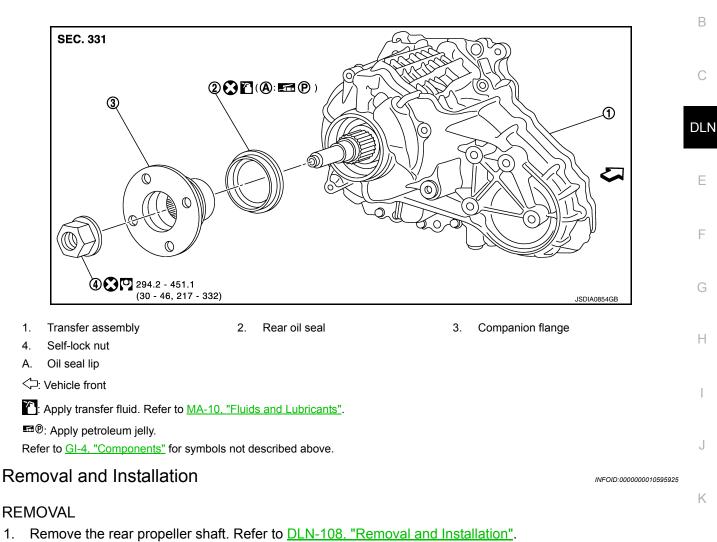
### < REMOVAL AND INSTALLATION >

### REAR OIL SEAL

**Exploded View** 

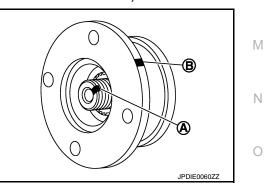
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- 2. Remove self-lock nut of companion flange with a flange wrench (commercial service tool).
- 3. Put matching mark (A) on the end of the main shaft. The mark should be in line with the mark (B) on the companion flange. CAUTION:

For matching mark, use paint. Never damage main shaft.



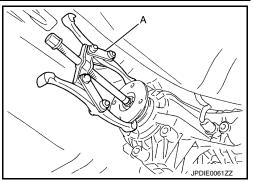
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### **REAR OIL SEAL**

### < REMOVAL AND INSTALLATION >

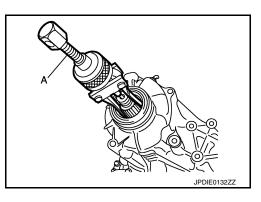
Remove the companion flange with a puller (A) (commercial service tool).
 CAUTION:

Never damage the companion flange.



5. Remove the rear oil seal with the puller (A) [SST: KV381054S0 (J-34286)]. CAUTION:

Never damage the rear case.

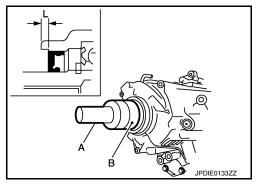


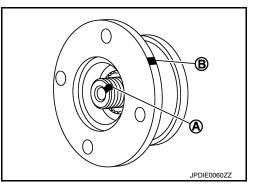
### INSTALLATION

- 1. Apply transfer fluid to rear oil seal, install it with the drifts (A and B) within the dimension (L) shown as follows.
  - A : Drift [SST: ST30720000 (J-25405)]
  - B : Drift [SST: KV40104830 ( )]
  - L : 6.7 7.3 mm (0.264 0.287 in)

#### **CAUTION:**

- Never reuse rear oil seal.
- Apply petroleum jelly to oil seal lip.
- When installing, never incline rear oil seal.
- 2. Align the matching mark (A) of main shaft with the mark (B) of companion flange, then install the companion flange.





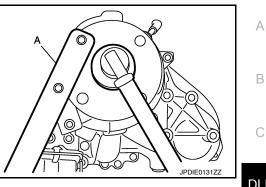
### **REAR OIL SEAL**

### < REMOVAL AND INSTALLATION >

 Using a flange wrench (A) (commercial service tool), install the self-lock nut of companion flange and tighten to the specified torque. Refer to <u>DLN-61, "Exploded View"</u>. CAUTION:

#### Never reuse self-lock nut.

- 4. Install the rear propeller shaft. Refer to <u>DLN-108</u>, "<u>Removal and</u> <u>Installation</u>".
- 5. Check fluid level. Refer to <u>DLN-58, "Inspection"</u>.



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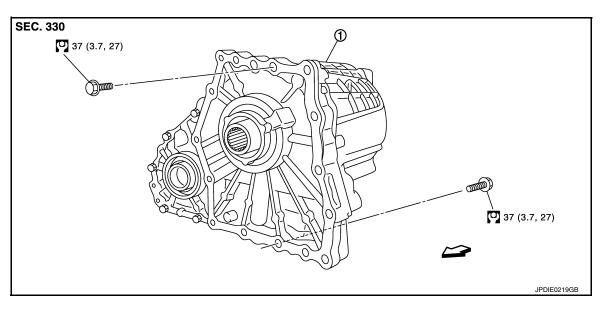
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## UNIT REMOVAL AND INSTALLATION TRANSFER ASSEMBLY

Exploded View

INFOID:000000010595926



1. Transfer assembly

C: Vehicle front Refer to <u>GI-4, "Components"</u> for symbols in the figure.

### Removal and Installation

INFOID:000000010595927

### REMOVAL

- 1. Remove rear propeller shaft. Refer to <u>DLN-108, "Removal and Installation"</u>.
- 2. Remove front propeller shaft. Refer to <u>DLN-90, "Removal and Installation"</u>.
- 3. Disconnect AWD solenoid harness connector and separate harness from transfer assembly.
- 4. Remove transfer breather hose.
- 5. Remove control rod. Refer to TM-184, "Removal and Installation".
- 6. Support transfer assembly and transmission assembly with a jack. CAUTION:
  - Secure transfer assembly and transmission assembly to a jack.
- 7. Remove rear engine mounting member and engine mounting insulator with power tool. Refer to <u>EM-75</u>, <u>"AWD : Removal and Installation"</u>.
- 8. Lower jack to the position where the top transfer mounting bolts can be removed.
- 9. Remove transfer mounting bolts with power tool and separate transfer from transmission.

#### INSTALLATION

Note the following, and install in the reverse order of removal.

### TRANSFER ASSEMBLY

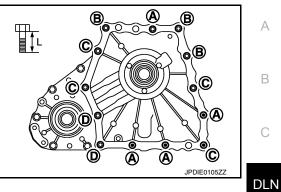
### < UNIT REMOVAL AND INSTALLATION >

· When installing the transfer to the transmission, install the mounting bolts following the standard below, tighten bolts to the specified torque.

Bolt No.	A	В	С	D
Quantity	4	3	4	2
Bolt length " L " mm (in)	75 (2.95)	45 (1.77)	40 (1.57)	30 (1.18)

():Transfer to transmission.

:Transmission to transfer.

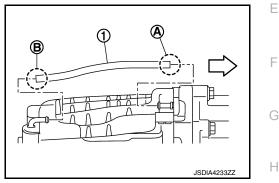


[TRANSFER: ETX13C]

- · When installing transfer air breather hose, make sure there are no pinched or restricted areas on the transfer air breather hose caused by bending or winding.
- Be sure to insert until front side end (A) of air breather hose (1) reaches the end and rear side end (B) reaches the tube bent R.

#### $\triangleleft$ : Vehicle front

· After the installation, check the fluid level, fluid leakage and the A/T positions. Refer to DLN-58, "Inspection".



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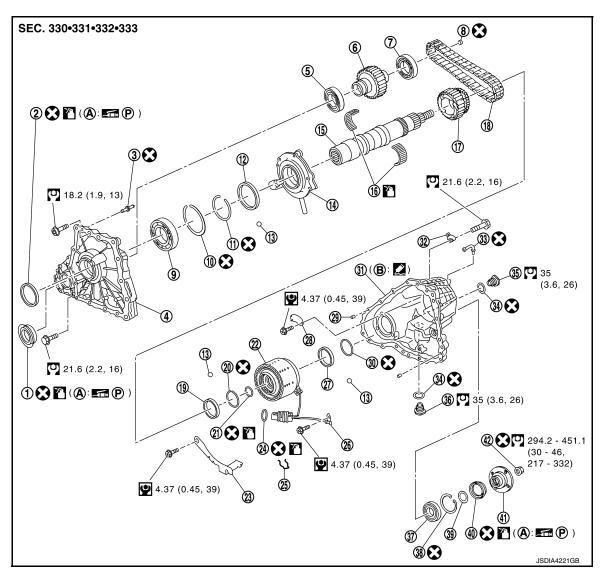
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## UNIT DISASSEMBLY AND ASSEMBLY FRONT CASE AND REAR CASE

**Exploded View** 

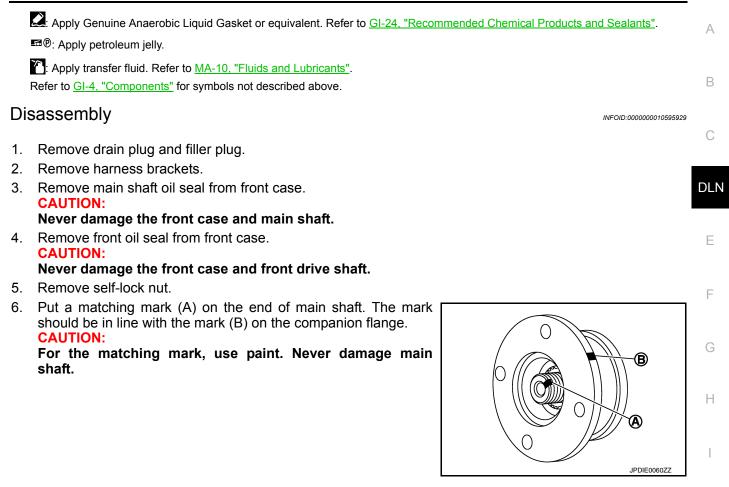


- 1. Front oil seal
- 4. Front case
- 7. Front drive shaft rear bearing
- 10. Snap ring
- 13. Steel ball
- 16. Needle bearing
- 19. Spacer
- 22. Electric controlled coupling
- 25. Retainer
- 28. Baffle plate
- 31. Rear case
- 34. Gasket
- 37. Rear bearing
- 40. Rear oil seal
- A. Oil seal lip
- **Revision: February 2015**

- 2. Main shaft oil seal
- 5. Front drive shaft front bearing
- 8. Plug
- 11. Snap ring
- 14. Oil pump
- 17. Sprocket
- 20. Snap ring
- 23. Oil cover
- 26. Transfer fluid temperature sensor
- 29. Dowel pin
- 32. Harness bracket
- 35. Filler plug
- 38. Snap ring
- 41. Companion flange
- B. Matching surface

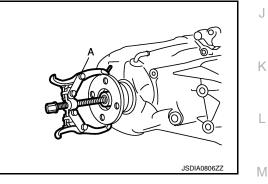
- 3. Breather tube
- 6. Front drive shaft
- 9. Main shaft bearing
- 12. Spacer
- 15. Main shaft
- 18. Drive chain
- 21. Circlip
- 24. O-ring
- 27. Spacer
- 30. Snap ring
- 33. Breather tube
- 36. Drain plug
- 39. Spacer
- 42. Self-lock nut

### < UNIT DISASSEMBLY AND ASSEMBLY >

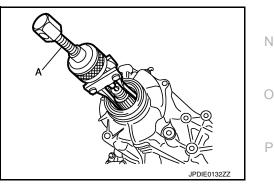


Remove companion flange with a puller (A) (commercial service tool).
 CAUTION:

Never damage the companion flange.



- Remove rear oil seal from rear case with the puller (A) [SST: KV381054S0 (J-34286)].
   CAUTION: Never damage the rear case.
- 9. Remove spacer from main shaft.

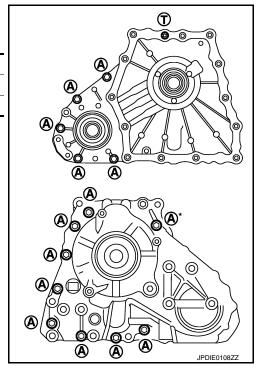


### < UNIT DISASSEMBLY AND ASSEMBLY >

10. Remove front case and rear case fixing bolts, then remove harness bracket.

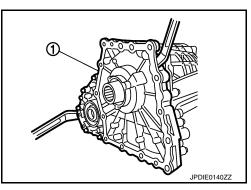
Bolts symbol	Quantity
A	14
T (TORX bolt)	1

\*: With harness bracket.

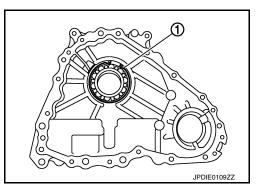


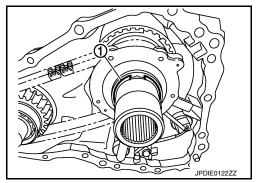
Remove front case (1) from rear case by levering it up with a suitable tool.
 CAUTION:

Never damage the mating surface.



- 12. Remove snap ring (1) from front case. CAUTION: Never damage front case.
- 13. Remove main shaft bearing from front case. CAUTION: Never use tools. Always remove by hand.
- 14. Remove snap ring (1) from main shaft.
   CAUTION: Never damage main shaft.





## [TRANSFER: ETX13C]

### < UNIT DISASSEMBLY AND ASSEMBLY >

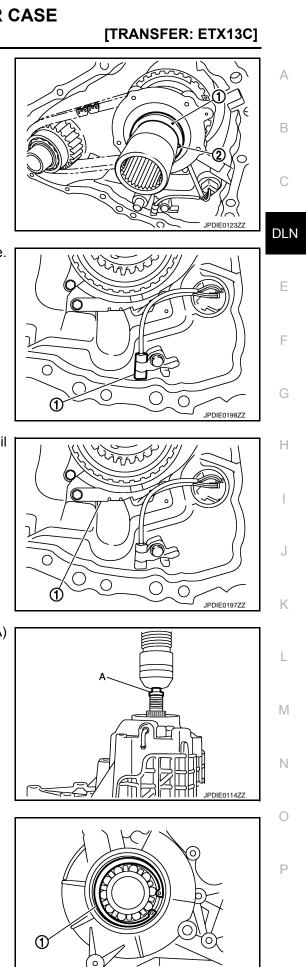
- 15. Remove spacer (1) and steel ball (2) from main shaft.
   CAUTION:
   Be careful not to drop the steel ball.
- 16. Remove Oil pump from main shaft.
- 17. Remove drive chain and front drive shaft. CAUTION: Never use tools. Always remove by hand.
- 18. Remove transfer fluid temperature sensor bolt from rear case. And then, remove transfer fluid temperature sensor (1).

- 19. Remove oil cover bolts from rear case. And then, remove oil cover (1).
- 20. Remove retainer from AWD solenoid harness connector.
- 21. Remove AWD solenoid harness connector from rear case.
- 22. Remove O-ring from AWD solenoid harness connector.
- 23. Remove main shaft assembly from rear case with the drift (A) [SST: ST33052000 ( )].

**DLN-69** 

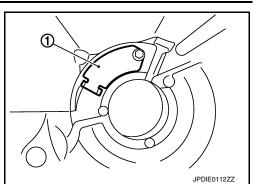
- 24. Remove snap ring (1) from rear case.
- Remove rear bearing from rear case.
   CAUTION: Never use tools. Always remove by hand.

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### < UNIT DISASSEMBLY AND ASSEMBLY >

- 26. Remove baffle plate (1) from rear case.
- 27. Remove breather tube from rear case.
- 28. Remove breather tube from front case.
- 29. Perform inspection after disassembly. Refer to <u>DLN-74, "Inspec-</u> <u>tion"</u>.



[TRANSFER: ETX13C]

Assembly

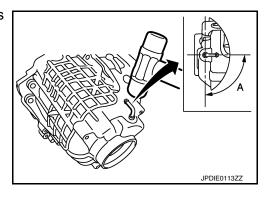
- Install breather tube to front case. CAUTION: Never reuse breather tube.
- 2. Install breather tube to rear case within the angle (A) shown as follows.

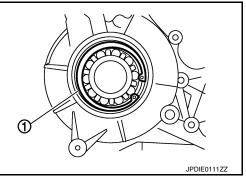
Angle (A) : 80 – 100°

#### **CAUTION:** Never reuse breather tube.

### 3. Install baffle plate to rear case.

- Install rear bearing to rear case.
   CAUTION: Never use tools. Always install by hand.
- Install snap ring (1) to rear case.
   CAUTION: Never reuse snap ring.

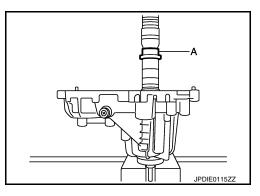




Install main shaft assembly to rear case with the drift (A) [SST: ST35321000 ( — )].
 CAUTION:

Apply transfer fluid to the sliding surface of main shaft and needle bearing.

- 7. Install O-ring to AWD solenoid harness connector. CAUTION:
  - Never reuse O-ring.
  - Apply transfer fluid to O-ring.
- 8. Install AWD solenoid harness connector into rear case.
- 9. Install retainer to AWD solenoid harness connector.



### < UNIT DISASSEMBLY AND ASSEMBLY >

10. Hold electric controlled coupling harness (1) with oil cover hold plate (2), install oil cover (3) to rear case (4).



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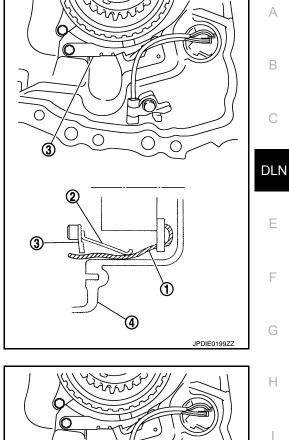
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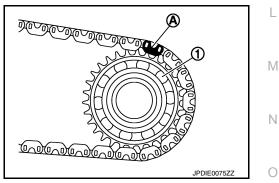


11. Install transfer fluid temperature sensor (1) to rear case.

12. Set drive chain to front drive shaft. **CAUTION:** Identification mark (A) of drive chain should be in the side of front bearing (1) of front drive shaft. 13. Install drive chain to main shaft, and then install front drive shaft. **CAUTION:** 

Never use tools. Always install by hand.

14. Install oil pump to main shaft.



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### < UNIT DISASSEMBLY AND ASSEMBLY >

16. Install snap ring (1) to main shaft.

• Never reuse snap ring. • Never damage main shaft. 17. Install main shaft bearing to front case.

18. Install snap ring (1) to front case.

• Never reuse snap ring. • Never damage front case.

**CAUTION:** 

**CAUTION:** 

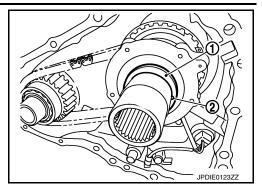
CAUTION:

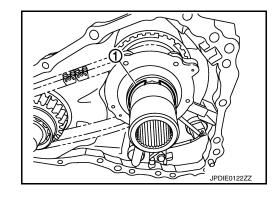
**CAUTION:** 

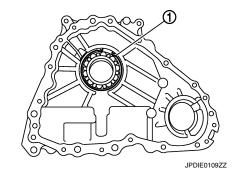
15. Install spacer (1) and steel ball (2) to main shaft.

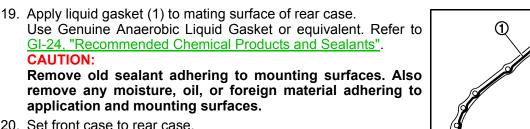
Never use tools. Always install by hand.

### [TRANSFER: ETX13C]









20. Set front case to rear case. **CAUTION:** Never damage the mating surface transmission side. JPDIE0142ZZ

### FRONT CASE AND REAR CASE

### < UNIT DISASSEMBLY AND ASSEMBLY >

21. Tighten front case and rear case fixing bolts.

Bolts symbol	Quantity
A	14
T (TORX bolt)	1

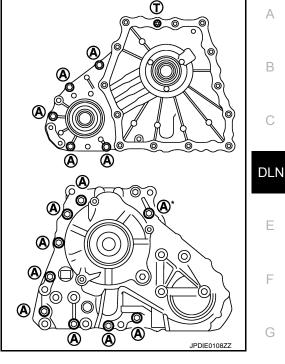
\*: With harness bracket.

22. Install spacer to main shaft. **CAUTION:** Apply transfer fluid to spacer.

- 23. Apply transfer fluid to outside of rear oil seal, and install rear oil seal to rear case with the drifts (A and B) within the dimension (L) shown as follows.
  - : Drift [SST: ST30720000 (J-25405)] А
  - В : Drift [SST: KV40104830 ( )]
  - : 6.7 7.3 mm (0.264 0.287 in) L

### **CAUTION:**

- Never reuse rear oil seal.
- · Apply petroleum jelly to oil seal lip.
- When installing, never incline rear oil seal.
- 24. Install companion flange while aligning the matching mark (A) of main shaft with the mark (B) of companion flange.



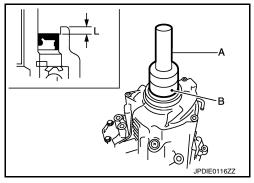
[TRANSFER: ETX13C]

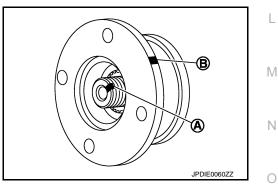
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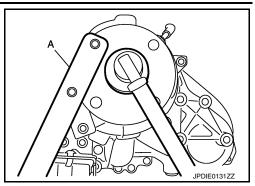
### FRONT CASE AND REAR CASE

### < UNIT DISASSEMBLY AND ASSEMBLY >

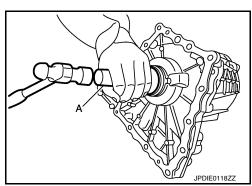
25. Tighten self-lock nut to the specified torque with flange wrench (A) (commercial service tool).
 CAUTION:

Never reuse self-lock nut.





- 26. Apply transfer fluid to outside of main shaft oil seal, and install main shaft oil seal until it is flush with the end face of front case with the drift (A) [SST: ST30720000 (J-25405)].
  CAUTION:
  - Never reuse main shaft oil seal.
  - Apply petroleum jelly to oil seal lip.
  - When installing, never incline main shaft oil seal.



- Apply transfer fluid to outside of front oil seal, and install front oil seal until it is flush with the end face of front case with the drift (A) [SST: ST27862000 ( )].
   CAUTION:
  - Never reuse front oil seal.
  - Apply petroleum jelly to oil seal lip.
  - When installing, never incline front oil seal.
- 28. Set gasket to drain plug. Install it to rear case. CAUTION:

Never reuse gasket.

- 29. Set gasket to filler plug. Install it to rear case. CAUTION:
  - Never reuse gasket.
  - After oil is filled, tighten filler plug to specified torque.

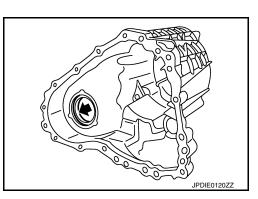
### Inspection

### INSPECTION AFTER DISASSEMBLY

Check items below. If necessary, replace them with new ones.

### Cases

- Contact surfaces of bearing for wear, damage, etc.
- Damage and cracks of case.





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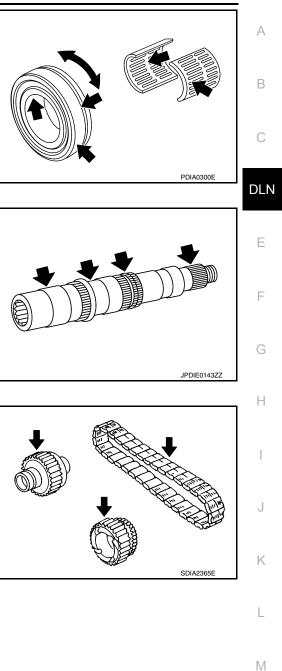
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### FRONT CASE AND REAR CASE

### < UNIT DISASSEMBLY AND ASSEMBLY >

Damage and rough rotation of bearing.

### [TRANSFER: ETX13C]



Shaft Dama

Damage, peeling, dent, uneven wear, bending, etc. of shaft.

Gears and Chain

- Excessive wear, damage, peeling, etc. of gear and chain.
- · Cracks, damage, wear, etc of drive chain.

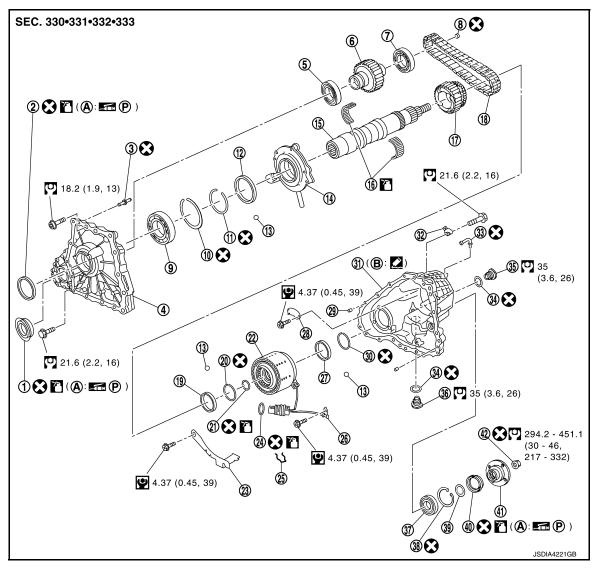
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### MAIN SHAFT

**Exploded View** 

INFOID:000000010595932



- 1. Front oil seal
- 4. Front case
- 7. Front drive shaft rear bearing
- 10. Snap ring
- 13. Steel ball
- 16. Needle bearing
- 19. Spacer
- 22. Electric controlled coupling
- 25. Retainer
- 28. Baffle plate
- 31. Rear case
- 34. Gasket
- 37. Rear bearing
- 40. Rear oil seal
- A. Oil seal lip

- 2. Main shaft oil seal
- 5. Front drive shaft front bearing
- 8. Plug
- 11. Snap ring
- 14. Oil pump
- 17. Sprocket
- 20. Snap ring
- 23. Oil cover
- 26. Transfer fluid temperature sensor
- 29. Dowel pin
- 32. Harness bracket
- 35. Filler plug
- 38. Snap ring
- 41. Companion flange
- B. Matching surface

- 3. Breather tube
- 6. Front drive shaft
- 9. Main shaft bearing
- 12. Spacer
- 15. Main shaft
- 18. Drive chain
- 21. Circlip
- 24. O-ring
- 27. Spacer
- 30. Snap ring
- 33. Breather tube
- 36. Drain plug
- 39. Spacer
- 42. Self-lock nut

Apply Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-24. "Recommended Chemical Products and Sealants".

Revision: February 2015

### **DLN-76**

[TRANSFER: ETX13C]

2. Remove snap ring (1) from main shaft.

< UNIT DISASSEMBLY AND ASSEMBLY >

Apply transfer fluid. Refer to <u>MA-10, "Fluids and Lubricants"</u>. Refer to <u>GI-4, "Components"</u> for symbols not described above.

■ ®: Apply petroleum jelly.

Disassembly

 Remove spacer (1) and steel ball (2) from main shaft.
 CAUTION: Be careful not to drop the steel ball.

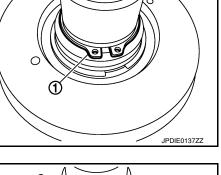
4. Using a press, remove electric controlled coupling from main shaft.

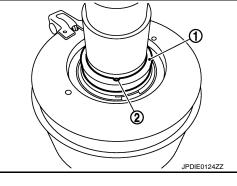
Revision: February 2015

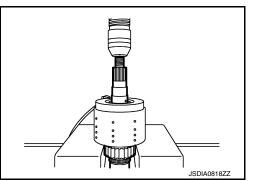
- 5. Remove circlip (1) from notch (A) of electric controlled coupling.
  - C: Front side

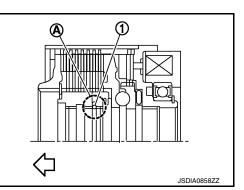
### **CAUTION:**

- Never remove the circlip from the electric controlled coupling rear side.
- Never damage electric control coupling spline, bush, etc.
- 6. Remove snap ring from main shaft.











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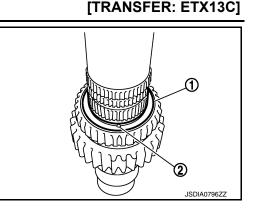
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### **MAIN SHAFT**

### < UNIT DISASSEMBLY AND ASSEMBLY >

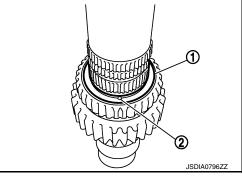
- Remove spacer (1) and steel ball (2) from main shaft.
   CAUTION: Be careful not to drop the steel ball.
- 8. Remove sprocket from main shaft.
- 9. Remove needle bearing from main shaft.
- 10. Perform inspection after disassembly. Refer to <u>DLN-79, "Inspec-</u> tion".



INFOID:000000010595934

### Assembly

- Install needle bearing to main shaft.
   CAUTION: Apply transfer fluid to the periphery of needle bearing.
- 2. Install sprocket to main shaft.
- Install spacer (1) and steel ball (2) to main shaft.
   CAUTION: Be careful not to drop the steel ball.
- 4. Install snap ring to main shaft. CAUTION: Never reuse snap ring.



5. Install circlip (1) to notch (A) of the electric controlled coupling.

### <⊐:Front side

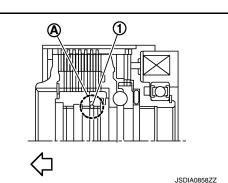
### **CAUTION:**

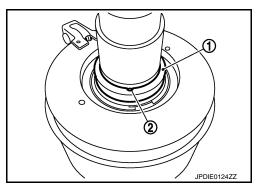
- Never install the circlip to the notches other than notch (A).
- Never install the circlip from the electric controlled coupling rear side.
- Never reduce the outer diameter of circlip to less than 43.2 mm (1.701 in).
- Never damage electric control coupling spline, bush, etc.
- Never reuse circlip.
- 6. Install electric controlled coupling to main shaft. CAUTION:

### Securely insert it until locked.

7. Install spacer (1) and steel ball (2) to main shaft. CAUTION:

Be careful not to drop the steel ball.

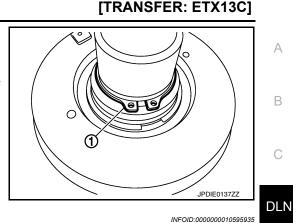




### **MAIN SHAFT**

### < UNIT DISASSEMBLY AND ASSEMBLY >

- Install snap ring (1) to main shaft.
   CAUTION: Never reuse snap ring.
- 9. Install main shaft assembly to rear case, then install front case and rear case. Refer to <u>DLN-70, "Assembly"</u>.



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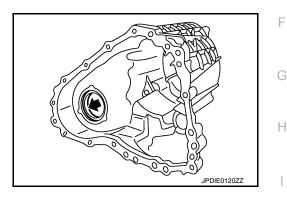
Inspection

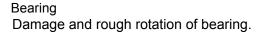
### INSPECTION AFTER DISASSEMBLY

Check items below. If necessary, replace them with new ones.

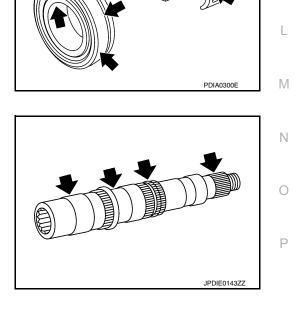
Cases

- · Contact surfaces of bearing for wear, damage, etc.
- Damage and cracks of case.





Shaft Damage, peeling, dent, uneven wear, bending, etc. of shaft.

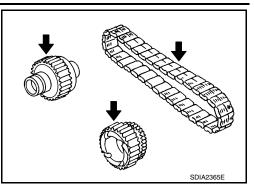


Gears and Chain

### < UNIT DISASSEMBLY AND ASSEMBLY >

### [TRANSFER: ETX13C]

- Excessive wear, damage, peeling, etc. of gear and chain.
  Cracks, damage, wear, etc of drive chain.



### < UNIT DISASSEMBLY AND ASSEMBLY >

## FRONT DRIVE SHAFT AND DRIVE CHAIN

### **Exploded View**

 $\bigcirc$ 

Front oil seal

Front case

Snap ring

Steel ball

Spacer

Retainer

28. Baffle plate

31. Rear case

37. Rear bearing

40. Rear oil seal

Oil seal lip

34. Gasket

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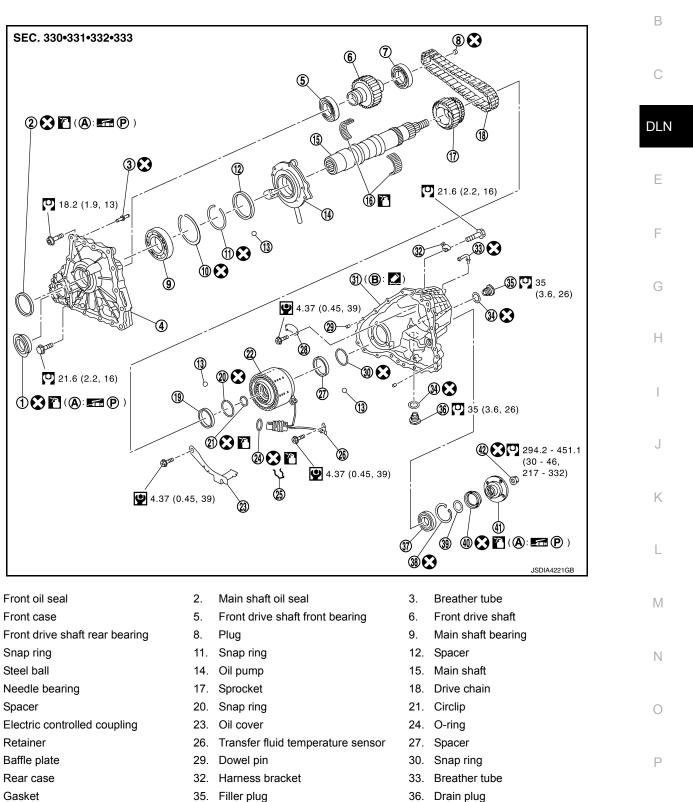
25.

A.

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[TRANSFER: ETX13C]



39.

Spacer

42. Self-lock nut

- 35. Filler plug
- 38. Snap ring
- 41. Companion flange
- Β. Matching surface

Apply Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

### **Revision: February 2015**



### FRONT DRIVE SHAFT AND DRIVE CHAIN

### < UNIT DISASSEMBLY AND ASSEMBLY >

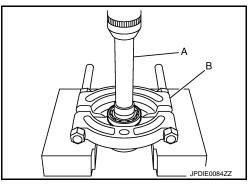
[TRANSFER: ETX13C]

P: Apply petroleum jelly.

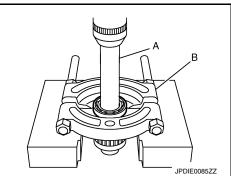
Apply transfer fluid. Refer to <u>MA-10, "Fluids and Lubricants"</u>. Refer to <u>GI-4, "Components"</u> for symbols not described above.

### Disassembly

- 1. Separate front case and rear case. Refer to <u>DLN-67, "Disassembly"</u>.
- Remove drive chain and front drive shaft.
   CAUTION: Never use tools. Always remove by hand.
- 3. Remove front drive shaft front bearing with the drift (A) and replacer (B).
  - A: Drift [SST: ST31214000 (J-25269-B)]
  - B: Replacer (commercial service tool)

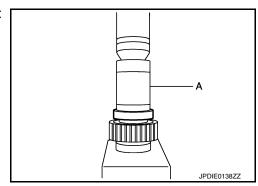


- 4. Remove front drive shaft rear bearing with the drift (A) and replacer (B).
  - A: Drift [SST: ST31214000 (J-25269-B)]
  - B: Replacer (commercial service tool)
- 5. Remove plug from front drive shaft.
- 6. Perform inspection after disassembly. Refer to <u>DLN-83. "Inspec-</u> tion".



### Assembly

- Install plug to front drive shaft. CAUTION: Never reuse plug.
- 2. Install front drive shaft front bearing with the drift (A) [SST: ST33200000 (J-26082)].



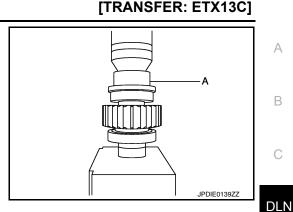
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### FRONT DRIVE SHAFT AND DRIVE CHAIN

### < UNIT DISASSEMBLY AND ASSEMBLY >

3. Install front drive shaft rear bearing with the drift (A) [SST: KV38104010 ( — )].

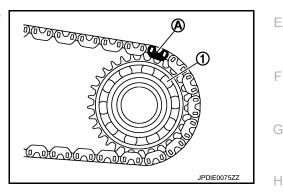


Set drive chain to front drive shaft. **CAUTION:** Identification mark (A) of drive chain should be in the side of front bearing (1) of front drive shaft.

5. Install drive chain to main shaft, and then install front drive shaft. **CAUTION:** 

### Never use tools. Always install by hand.

Install front case to rear case. Refer to <u>DLN-70, "Assembly"</u>.



Inspection

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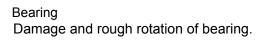
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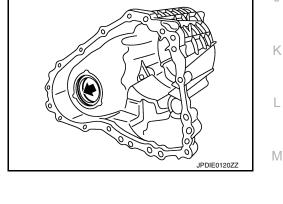
### INSPECTION AFTER DISASSEMBLY

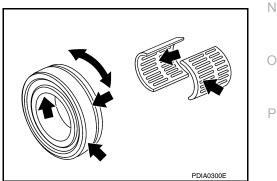
Check items below. If necessary, replace them with new ones.

### Cases

- Contact surfaces of bearing for wear, damage, etc.
- · Damage and cracks of case.







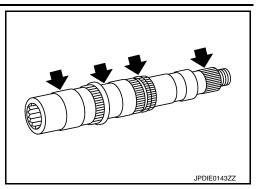
Shaft

### FRONT DRIVE SHAFT AND DRIVE CHAIN

### < UNIT DISASSEMBLY AND ASSEMBLY >

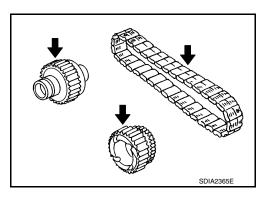
Damage, peeling, dent, uneven wear, bending, etc. of shaft.

### [TRANSFER: ETX13C]



Gears and Chain

- Excessive wear, damage, peeling, etc. of gear and chain.
- · Cracks, damage, wear, etc of drive chain.



# SERVICE DATA AND SPECIFICATIONS (SDS) < SERVICE DATA AND SPECIFICATIONS (SDS) [TRANSFER: ETX13C] SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

### **General Specifications**

INFOID:000000010595940 B

		AWD	
Applied model		VQ37VHR	
		A/T	_
Transfer model		ETX13C	DLN
Fluid capacity (Approx.)	$\ell$ (US pt, Imp pt)	1.0 (2-1/8, 1-3/4)	

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# < PRECAUTION > PRECAUTION PRECAUTIONS

### Precautions for Removing Battery Terminal

• When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.

### NOTE:

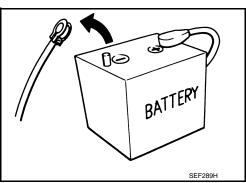
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

• For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch. **NOTE:** 

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
 NOTE:

The removal of 12V battery may cause a DTC detection error.



INFOID:000000011007625

**Revision: February 2015** 

# PREPARATION

-

< PREPARATION >

## PREPARATION

### **Commercial Service Tools**

Tool name	De	escription	0
Power tool	Lo	oosening bolts and nuts	C
			DLN
	PBIC0190E		Е

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INFOID:000000010595942

### NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING < SYMPTOM DIAGNOSIS > [FRONT PROPELLER SHAFT: 2S56A]

# SYMPTOM DIAGNOSIS

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

### NVH Troubleshooting Chart

INFOID:000000010595941

Use the chart below to find the cause of the symptom. If necessary, repair or replace these parts.

Reference		DLN-89, "Inspection"	1	I	1	Ι	DLN-91, "Inspection"	DLN-91, "Inspection"	NVH of FRONT and REAR FINAL DRIVE in this section.	NVH in FAX, RAX, FSU and RSU section.	NVH in WT section.	NVH in WT section.	NVH in FAX and RAX section.	NVH in BR section.	NVH in ST section.
Possible cause and SUSPEC	TED PARTS	Uneven rotating torque	Center bearing improper installation	Excessive center bearing axial end play	Center bearing mounting (insulator) cracks, damage or deterioration	Excessive joint angle	Rotation imbalance	Excessive runout	DIFFERENTIAL	AXLE AND SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Symptom	Shake		×			×				×	×	×	×	×	×
Annlinghla	Vibration	×	×	×	×	×	×	×		×	×		×		×

×: Applicable

# PERIODIC MAINTENANCE FRONT PROPELLER SHAFT

### Inspection

### APPEARANCE AND NOISE

- Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace propeller shaft assembly.

### VIBRATION

If vibration is present at high speed, inspect propeller shaft runout first.

1. With a dial indicator, measure propeller shaft runout at runout measuring points by rotating final drive companion flange with hands.

⟨□ : Vehicle Front

Propeller shaft runout

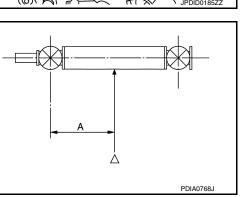
: Refer to <u>DLN-93, "Propel-</u> ler Shaft Runout".

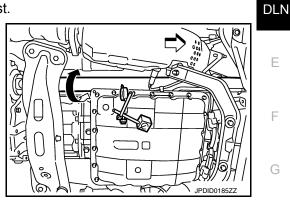
Propeller shaft runout measuring point (Point "△")

### Dimension

### A: 381.5 mm (15.02 in)

- 2. If runout still exceeds specifications, separate propeller shaft at final drive companion flange; then change the phase between companion flange and propeller shaft by the one bolt hole at a time and install propeller shaft.
- 3. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
- 4. Check the vibration by driving vehicle.





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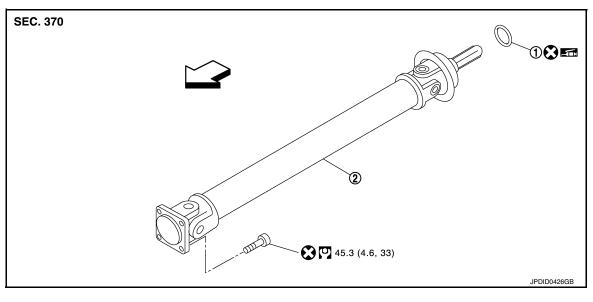
[FRONT PROPELLER SHAFT: 2S56A]

# REMOVAL AND INSTALLATION FRONT PROPELLER SHAFT

Exploded View

INFOID:000000010595944

INFOID:000000010595945



1. O-ring

2. Propeller shaft assembly

C: Vehicle front

Refer to <u>GI-4, "Components"</u> for symbols in the figure.

### Removal and Installation

REMOVAL

- 1. Shift the transmission to the neutral position, and then release the parking brake.
- 2. Remove engine undercover with a power tool.
- 3. Remove front cross bar.
- 4. Remove the three-way catalyst (right bank) with a power tool. Refer to EX-5, "Exploded View".
- Put matching mark onto propeller shaft flange yoke and final drive companion flange.
   CAUTION:

For matching mark, use paint. Never damage propeller shaft flange and final drive companion flange.

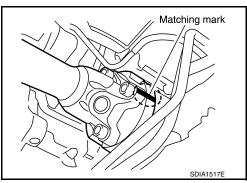
- 6. Remove the propeller shaft assembly fixing bolts.
- Remove propeller shaft assembly from the front final drive and transfer.
   CAUTION:

### Never damage the transfer front oil seal.

- 8. Hang steering hydraulic line not to interfere with work. Refer to <u>ST-53, "AWD : Exploded View"</u>.
- 9. Remove propeller shaft assembly from O-ring.

### INSTALLATION

Note the following, and install in the reverse order of removal.

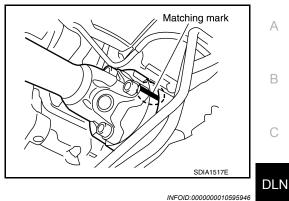


### FRONT PROPELLER SHAFT

### < REMOVAL AND INSTALLATION >

### [FRONT PROPELLER SHAFT: 2S56A]

- Align matching mark to install propeller shaft assembly to final drive companion flange.
- Perform inspection after installation. Refer to <u>DLN-91, "Inspection"</u>.
- CAUTION:
- Never damage the transfer front oil seal.
- Never reuse O-ring.
- Apply multi-purpose grease onto O-ring.



Ε

Inspection

INSPECTION AFTER REMOVAL

Appearance

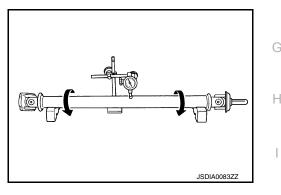
Check propeller shaft for bend and damage. If damage is detected, replace propeller shaft assembly.

Propeller Shaft Runout

Check propeller shaft runout at measuring point with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly.



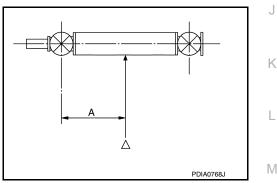
: Refer to <u>DLN-93, "Propel-</u> ler Shaft Runout".



Propeller shaft runout measuring point (Point "△")

Dimension

A: 381.5 mm (15.02 in)



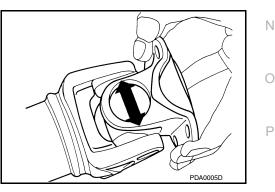
Journal Axial Play

As shown in the figure, while fixing yoke on one side, check axial play of joint. If it is outside the standard, replace propeller shaft assembly.

Journal axial play

: Refer to <u>DLN-93, "Journal</u> <u>Axial Play"</u>.

CAUTION: Never disassemble joints.



### INSPECTION AFTER INSTALLATION

After assembly, perform a driving test to check propeller shaft vibration. If vibration occurred, separate propeller shaft from final drive. Reinstall companion flange by changing the phase between companion flange and

### < REMOVAL AND INSTALLATION >

[FRONT PROPELLER SHAFT: 2S56A]

propeller shaft by the one bolt hole at a time. Then perform driving test and check propeller shaft vibration again at each point.

### SERVICE DATA AND SPECIFICATIONS (SDS) D SPECIFICATIONS (SDS) [FRONT PROPELLER SHAFT: 2S56A]

### < SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS)

## **General Specifications**

INFOID:000000010595947 B

А

	AWD						
Applied model	VQ37VHR						
	A/T						
Propeller shaft model	2S56A						
Number of joints	2						
Type of journal bearings (Non-disassembly type)	Shell type						
Coupling method with transfer	Sleeve type						
Coupling method with front final drive	Flange type						
Shaft length (Spider to spider)	763 mm (30.04 in)						
Shaft outer diameter	42.7 mm (1.681 in)						
ropeller Shaft Runout	INFOID:000000010595948						
	Unit: mm (in)						
Item	Limit						
item							
	0.8 (0.031)						
Propeller shaft runout	0.8 (0.031)						
Propeller shaft runout							
	INFOID:000000010595949						

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# < PRECAUTION > PRECAUTION PRECAUTIONS

### Precautions for Removing Battery Terminal

INFOID:0000000011007626

 When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
 NOTE:

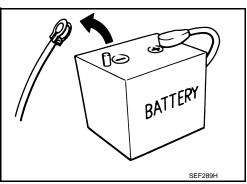
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

• For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch. **NOTE:** 

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
 NOTE:

The removal of 12V battery may cause a DTC detection error.



### [REAR PROPELLER SHAFT: 3S80A-R]

# < PREPARATION >

# PREPARATION

## PREPARATION

### **Commercial Service Tools**

INFOID:000000010595951

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Tool name		Description	
Power tool		Loosening bolts and nuts	
			DLN
	PBIC0190E		E

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### NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING < SYMPTOM DIAGNOSIS > [REAR PROPELLER SHAFT: 3S80A-R]

# SYMPTOM DIAGNOSIS

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

### NVH Troubleshooting Chart

INFOID:000000010595950

Use the chart below to find the cause of the symptom. If necessary, repair or replace these parts.

			, <b>,</b>						-	-	1	1			
Reference		DLN-97, "Inspection"	DLN-101, "Inspection"	I	DLN-101, "Inspection"	I	DLN-101, "Inspection"	DLN-101, "Inspection"	NVH of REAR FINAL DRIVE in this section.	NVH in FAX, RAX, FSU and RSU section.	NVH in WT section.	NVH in WT section.	NVH in RAX section.	NVH in BR section.	NVH in ST section.
Possible cause and SUSPEC		Uneven rotating torque	Center bearing improper installation	Excessive center bearing axial end play	Center bearing mounting (insulator) cracks, damage or deterioration	Excessive joint angle	Rotation imbalance	Excessive runout	DIFFERENTIAL	AXLE AND SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
0. materia	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Symptom	Shake		×			×				×	×	×	×	×	×
	Vibration	×	×	×	×	×	×	×		×	×		×		×

×: Applicable

### < PERIODIC MAINTENANCE >

# PERIODIC MAINTENANCE REAR PROPELLER SHAFT

### Inspection

### APPEARANCE AND NOISE

- Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace propeller shaft assembly.

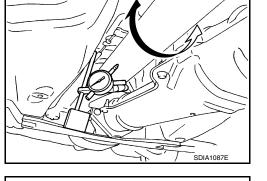
### VIBRATION

If vibration is present at high speed, inspect propeller shaft runout first.

1. With a dial indicator, measure propeller shaft runout at runout measuring points by rotating final drive companion flange with hands.

Propeller shaft runout

: Refer to <u>DLN-103, "Pro-</u> peller Shaft Runout".



Propeller shaft runout measuring point (Point "△")

⟨□ : Vehicle Front

Dimension

A: 192 mm (7.56 in) B: 172 mm (6.77 in) C: 172 mm (6.77 in)

- 2. If runout still exceeds specifications, separate propeller shaft at final drive companion flange; then change the phase between companion flange and propeller shaft by the one bolt hole at a time and install propeller shaft.
- 3. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
- 4. Check the vibration by driving vehicle.

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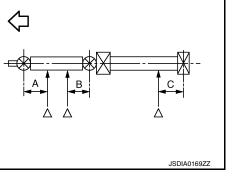
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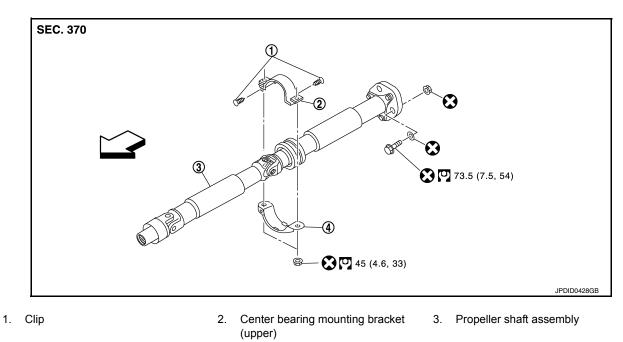


[REAR PROPELLER SHAFT: 3S80A-R]

# REMOVAL AND INSTALLATION REAR PROPELLER SHAFT

Exploded View

INFOID:000000010595953



4. Center bearing mounting bracket (lower)

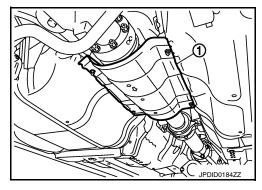
: Vehicle front Refer to <u>GI-4, "Components"</u> for symbols in the figure.

# Removal and Installation

INFOID:000000010595954

### REMOVAL

- 1. Shift the transmission to the neutral position, and then release the parking brake.
- 2. Remove the floor reinforcement.
- 3. Remove the center muffler with power tool. Refer to EX-5. "Exploded View".
- 4. Remove the heat insulator (1).



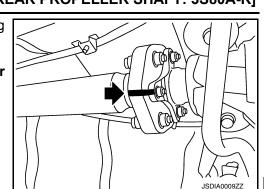
### REAR PROPELLER SHAFT

### < REMOVAL AND INSTALLATION >

### [REAR PROPELLER SHAFT: 3S80A-R]

Put matching marks ( ) onto propeller shaft rubber coupling 5. and final drive companion flange. **CAUTION:** 

For matching marks, use paint. Never damage propeller shaft rubber coupling and final drive companion flange.



6. Loosen mounting nuts (1) of center bearing mounting brackets (upper/lower).

⟨□ : Vehicle front

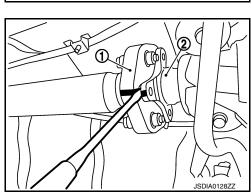
### CAUTION: Tighten mounting nuts temporarily.

Remove propeller shaft assembly fixing bolts and nuts ( 7. CAUTION:

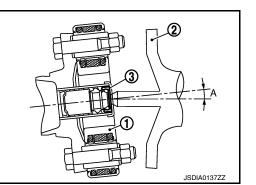
Never remove the rubber coupling from the propeller shaft assembly.

8. Slightly separate the rubber coupling (1) from the final drive companion flange (2). CAUTION:

Never damage the final drive companion flange and rubber coupling.



- 9. Remove center bearing mounting bracket fixing nuts. CAUTION:
  - The angle (A), which the third axis rubber coupling (1) forms with the final drive companion flange (2), must be 5° or less.
  - Never damage the grease seal (3).
  - Never damage the rubber coupling.
- 10. Slide the propeller shaft in the vehicle forward direction slightly. Separate the propeller shaft from the final drive companion flange. CAUTION:



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### **REAR PROPELLER SHAFT**

### < REMOVAL AND INSTALLATION >

### [REAR PROPELLER SHAFT: 3S80A-R]

- The angle, which the third axis rubber coupling forms with the final drive companion flange, must be  $5^{\circ}$  or less.
- Never damage the grease seal.
- Never damage the rubber coupling.
- 11. Remove the propeller shaft assembly from the vehicle. **CAUTION:**

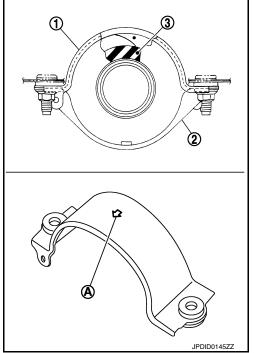
### Never damage the rear oil seal of transmission.

12. Remove clip and center bearing mounting bracket (upper/lower).

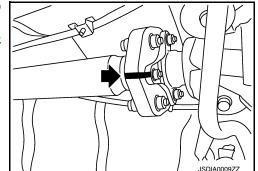
### INSTALLATION

Note the following, and install in the reverse order of removal.

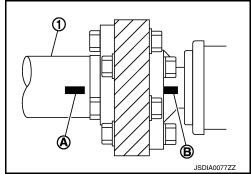
- Install center bearing mounting bracket (upper) (1) with its arrow mark (A) facing forward.
- Adjust position of center bearing mounting bracket (upper), center bearing mounting bracket (lower) (2) sliding back and forth to prevent play in thrust direction of center bearing insulator (3). Install center bearing mounting bracket (upper/lower) to vehicle.



- Align matching marks to install propeller shaft rubber coupling to final drive companion flange.
- Perform inspection after installation. Refer to <u>DLN-101, "Inspec-</u> tion".



- If propeller shaft or final drive has been replaced, connect them as follows:
- Install the propeller shaft (1) while aligning its matching mark (A) with the matching mark (B) on the joint as close as possible.



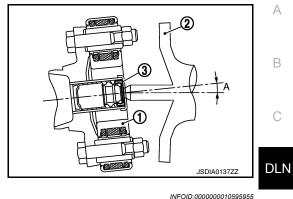
### REAR PROPELLER SHAFT

### < REMOVAL AND INSTALLATION >

### [REAR PROPELLER SHAFT: 3S80A-R]

### **CAUTION:**

- The angle (A), which the third axis rubber coupling (1) forms with the final drive companion flange (2), must be 5° or less.
- Never damage the grease seal (3).
- Never damage the rubber coupling.
- Never damage the rear oil seal of transmission.
- Never damage the rubber coupling, protect it with a shop towel or equivalent.



Inspection

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### INSPECTION AFTER REMOVAL

### Appearance

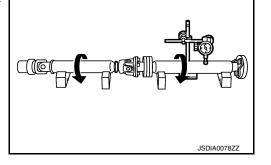
Check propeller shaft for bend and damage. If damage is detected, replace propeller shaft assembly.

**Propeller Shaft Runout** 

Check propeller shaft runout at measuring points with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly.

**Propeller shaft runout** 

: Refer to DLN-103, "Propeller Shaft Runout".

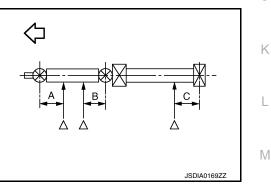


Propeller shaft runout measuring point (Point "△")

: Vehicle Front

**Dimension** 

A: 192 mm (7.56 in) B: 172 mm (6.77 in) C: 172 mm (6.77 in)



Journal Axial Play

As shown in the figure, while fixing yoke on one side, check axial play of joint. If it is outside the standard, replace propeller shaft assembly.

Journal axial play

: Refer to DLN-103, "Journal Axial Play".

CAUTION: Never disassemble joints. SPD874

Center Bearing

Check center bearing for noise and damage. If noise or damage is detected, replace propeller shaft assembly. **CAUTION:** 

### **Revision: February 2015**

**DLN-101** 

### < REMOVAL AND INSTALLATION >

### [REAR PROPELLER SHAFT: 3S80A-R]

### Never disassemble center bearing.

### INSPECTION AFTER INSTALLATION

After assembly, perform a driving test to check propeller shaft vibration. If vibration occurred, separate propeller shaft from final drive. Reinstall companion flange by changing the phase between companion flange and propeller shaft by the one bolt hole at a time. Then perform driving test and check propeller shaft vibration again at each point.

### SERVICE DATA AND SPECIFICATIONS (SDS) D SPECIFICATIONS (SDS) [REAR PROPELLER SHAFT: 3S80A-R]

### < SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

### **General Specifications**

INFOID:000000010595956

А

		2WD						
Applied model		VQ37VHR						
		A/T						
Propeller shaft model		3S80A-R						
Number of joints		3						
	1st joint	Shell type						
Type of journal bearings (Non-disassembly type)	2nd joint	Shell type						
	3rd joint	Rubber coupling type						
Coupling method with trar	smission	Sleeve type						
Coupling method with rea	r final drive	Rubber coupling type						
Chaft langth	1st (Spider to spider)	697 mm (27.44 in)						
Shaft length	2nd (Spider to rubber coupling center)	722 mm (28.43 in)						
Shaft outer diameter	1st	82.6 mm (3.252 in)						
	2nd	75.0 mm (2.953 in)						
Propeller Shaft R	unout	INFOID:000000010595957						
		Unit: mm (in)						
	Item	Limit						
Propeller shaft runout		0.8 (0.031)						
lournal Axial Pla	y	INFOID:000000010595958						
		Unit: mm (in)						
	Item	Standard						
		0 (0)						

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### < PRECAUTION >

# PRECAUTION PRECAUTIONS

### Precautions for Removing Battery Terminal

 When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
 NOTE:

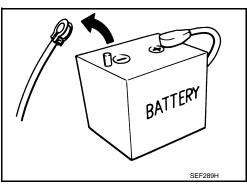
### ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

• For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch. **NOTE:** 

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
 NOTE:

The removal of 12V battery may cause a DTC detection error.



INFOID:000000011007627

### NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING < SYMPTOM DIAGNOSIS > [REAR PROPELLER SHAFT: 3F80A-1VL107]

# SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

### NVH Troubleshooting Chart

INFOID:000000010595959 B

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Use the chart below to find the cause of the symptom. If necessary, repair or replace these parts.

Reference		DLN-107, "Inspection"	DLN-111, "Inspection"	1	DLN-111, "Inspection"	1	DLN-111, "Inspection"	DLN-111, "Inspection"	NVH of FRONT and REAR FINAL DRIVE in this section.	NVH in FAX, RAX, FSU and RSU section.	NVH in WT section.	NVH in WT section.	NVH in FAX and RAX section.	NVH in BR section.	NVH in ST section.	C DLN E G H
Possible cause and SUSPECT	red parts	Uneven rotating torque	Center bearing improper installation	Excessive center bearing axial end play	Center bearing mounting (insulator) cracks, damage or deterioration	Excessive joint angle	Rotation imbalance	Excessive runout	DIFFERENTIAL	AXLE AND SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING	I J K L N
	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×	×	0
Symptom	Shake		×			×				×	×	×	×	×	×	-
Applicable	Vibration	×	×	×	×	×	×	×		×	×		×		×	P

×: Applicable

# < PREPARATION >

# PREPARATION

### PREPARATION

### **Commercial Service Tools**

INFOID:000000010595960

Tool name		Description
Power tool		Loosening bolts and nuts
	PBIC0190E	

### < PERIODIC MAINTENANCE >

# PERIODIC MAINTENANCE REAR PROPELLER SHAFT

### Inspection

### APPEARANCE AND NOISE

- Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace propeller shaft assembly.

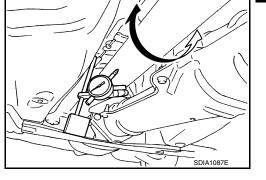
### VIBRATION

If vibration is present at high speed, inspect propeller shaft runout first.

1. With a dial indicator, measure propeller shaft runout at runout measuring points by rotating final drive companion flange with hands.

Propeller shaft runout

: Refer to <u>DLN-113, "Pro-</u> peller Shaft Runout".



в

Propeller shaft runout measuring point (Point "△")

⟨□ : Vehicle Front

Dimension

A: 162 mm (6.38 in) B: 245 mm (9.65 in) C: 185 mm (7.28 in)

- 2. If runout still exceeds specifications, separate propeller shaft at final drive companion flange or transfer companion flange; then change the phase between companion flange and propeller shaft by the one bolt hole at a time and install propeller shaft.
- 3. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
- 4. Check the vibration by driving vehicle.

[REAR PROPELLER SHAFT: 3F80A-1VL107]

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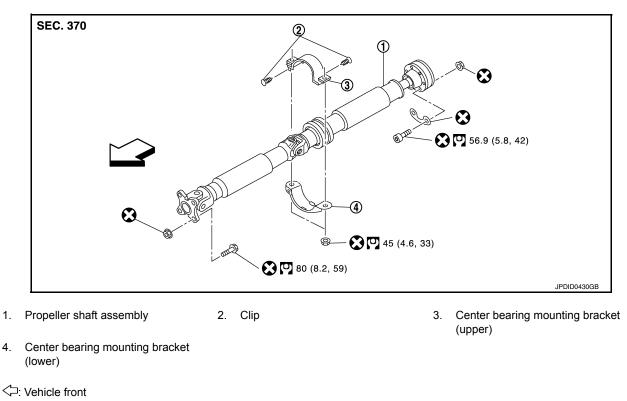
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[REAR PROPELLER SHAFT: 3F80A-1VL107]

# REMOVAL AND INSTALLATION REAR PROPELLER SHAFT

Exploded View

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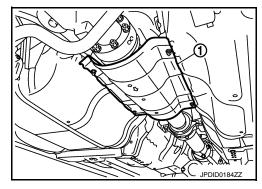


Refer to <u>GI-4</u>, "Components" for symbols in the figure.

### **Removal and Installation**

### REMOVAL

- 1. Shift the transmission to the neutral position, and release the parking brake.
- 2. Remove the floor reinforcement.
- 3. Remove the center muffler with power tool. Refer to EX-5, "Exploded View".
- 4. Remove the heat insulator (1).



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#### < REMOVAL AND INSTALLATION >

## [REAR PROPELLER SHAFT: 3F80A-1VL107]

 Put matching marks (A) on propeller shaft flange yoke and transfer companion flange.
 CAUTION:

For matching marks, use paint. Never damage propeller shaft flange yoke and transfer companion flange.

 Put matching marks (A) on propeller shaft rebro joint and final drive companion flange.
 CAUTION:

For matching marks, use paint. Never damage propeller shaft rebro joint and final drive companion flange.

 Loosen mounting nuts (1) of center bearing mounting brackets (upper/lower).
 CAUTION: Tighten mounting nuts temporarily.

#### ⟨□ : Vehicle front

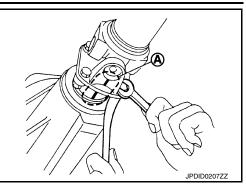
- 8. Remove propeller shaft assembly fixing bolts and nuts.
- 9. Remove center bearing mounting bracket fixing nuts.
- 10. Remove propeller shaft assembly. CAUTION:

If constant velocity joint was bent during propeller shaft assembly removal, installation, or transportation, its boot ma

assembly removal, installation, or transportation, its boot may be damaged. Wrap boot interference area to metal part with shop cloth or rubber to protect boot from breakage.

#### INSTALLATION

Note the following, and install in the reverse order of removal.



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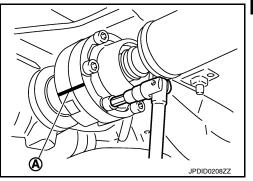
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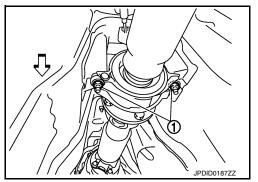
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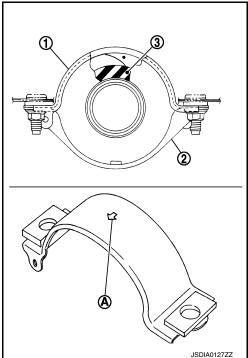




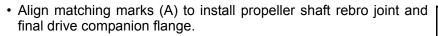
#### < REMOVAL AND INSTALLATION >

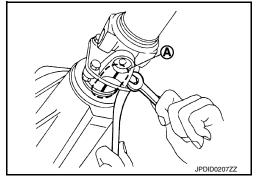
## [REAR PROPELLER SHAFT: 3F80A-1VL107]

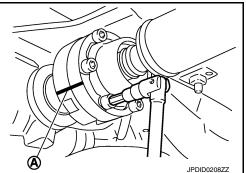
- Install center bearing mounting bracket (upper) (1) with its arrow mark (A) facing forward.
- Adjust position of center bearing mounting bracket (upper), center bearing mounting bracket (lower) (2) sliding back and forth to prevent play in thrust direction of center bearing insulator (3). Install center bearing mounting bracket (upper/lower) to vehicle.



• Align matching marks (A) to install propeller shaft flange yoke and transfer companion flange.







**CAUTION:** 

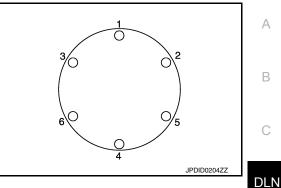
#### < REMOVAL AND INSTALLATION >

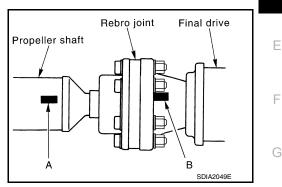
## [REAR PROPELLER SHAFT: 3F80A-1VL107]

Tighten mounting bolt and nut in the order shown in the figure. Perform inspection after removal. Refer to <u>DLN-111, "Inspection"</u>.

- If propeller shaft or final drive has been replaced, connect them as follows:
- Install the propeller shaft while aligning its matching mark (A) with the matching mark (B) on the joint as close as possible. **CAUTION:**

Avoid damaging the rebro joint boot, protect it with a shop towel or equivalent.





Inspection

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INSPECTION AFTER REMOVAL

Appearance

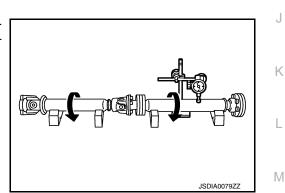
Check propeller shaft for bend and damage. If damage is detected, replace propeller shaft assembly.

Propeller Shaft Runout

Check propeller shaft runout at measuring points with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly.

**Propeller shaft runout** 

: Refer to DLN-113, "Propeller Shaft Runout".

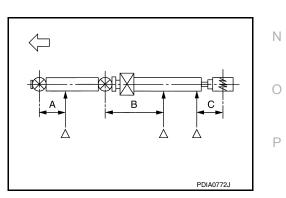


Propeller shaft runout measuring point (Point "△")

⟨□ : Vehicle Front

**Dimension** 

A: 162 mm (6.38 in) B: 245 mm (9.65 in) C: 185 mm (7.28 in)



Journal Axial Play

#### < REMOVAL AND INSTALLATION >

## [REAR PROPELLER SHAFT: 3F80A-1VL107]

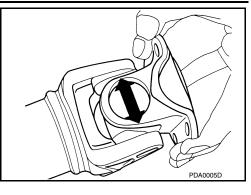
As shown in the figure, while fixing yoke on one side, check axial play of joint. If it is outside the standard, replace propeller shaft assembly.

Journal axial play

: Refer to DLN-113, "Journal Axial Play".

#### **CAUTION:**

Never disassemble joints.



#### Center Bearing

Check center bearing for noise and damage. If noise or damage is detected, replace propeller shaft assembly. **CAUTION:** 

#### Never disassemble center bearing.

#### INSPECTION AFTER INSTALLATION

After assembly, perform a driving test to check propeller shaft vibration. If vibration occurred, separate propeller shaft from final drive or transfer. Reinstall companion flange by changing the phase between companion flange and propeller shaft by the one bolt hole at a time. Then perform driving test and check propeller shaft vibration again at each point.

## SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS) [REAR PROPELLER SHAFT: 3F80A-1VL107]

## SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

## **General Specifications**

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Applied model		AWD	
		VQ37VHR	-
		A/T	-
Propeller shaft model		3F80A-1VL107	
Number of joints		3	
	1st joint	Shell type	-
Type of journal bearings (Non-disassembly type)	2nd joint	Shell type	-
	3rd joint	Rebro joint type	_
Coupling method with transn	nission	Flange type	_
Coupling method with rear fi	nal drive	Rebro joint type	_
	1st (Spider to spider)	435 mm (17.12 in)	-
Shaft length	2nd (Spider to spider)	706 mm (27.80 in)	-
Obeth extendious star	1st	82.6 mm (3.252 in)	-
Shaft outer diameter	2nd	75.0 mm (2.953 in)	
ropeller Shaft Rui	nout	INFOID:000000010595966	6
		Unit: mm (in)	)
Item		Limit	
Propeller shaft runout		0.8 (0.031)	_
ournal Axial Play		INFOID:000000010595967	7
		Unit: mm (in)	)
Item		Standard	

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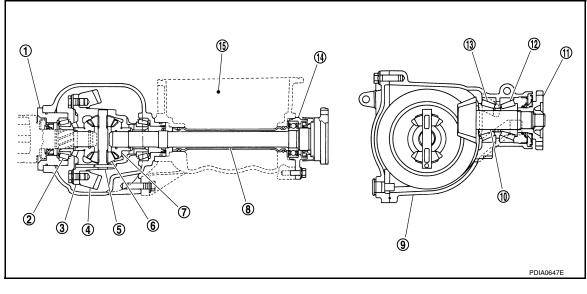
## < SYSTEM DESCRIPTION >

# SYSTEM DESCRIPTION FRONT FINAL DRIVE ASSEMBLY

System Diagram

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**CROSS-SECTIONAL VIEW** 



- 1. Side retainer
- 4. Drive gear
- 7. Side gear
- 10. Drive pinion
- 13. Pinion rear bearing

- 2. Side bearing
- 5. Pinion mate shaft
- 8. Side shaft
- 11. Companion flange
- 14. Extension tube retainer
- 3. Differential case
- 6. Pinion mate gear
- 9. Gear carrier
- 12. Pinion front bearing
- 15. Engine assembly

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING < SYMPTOM DIAGNOSIS > [FRONT FINAL DRIVE: F160A]

# SYMPTOM DIAGNOSIS

Use the chart below to find the cause of the symptom. If necessary, repair or replace these parts.

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## NVH Troubleshooting Chart

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# < PRECAUTION > PRECAUTION PRECAUTIONS

## Service Notice or Precautions for Front Final Drive

• Check for the correct installation status prior to removal or disassembly. If matching marks are required, be certain they never interfere with the function of the parts when applied.

- Overhaul should be done in a clean work area, it is preferable to work in dustproof area.
- Before disassembly, using steam or white gasoline, completely remove sand and mud from the exterior of the unit, preventing them from entering into the unit during disassembly or assembly.
- Check appearance of the disassembled parts for damage, deformation, and unusual wear. Replace them with new ones if necessary.
- Gaskets, seals and O-rings should be replaced any time when the unit is disassembled.
- In principle, tighten bolts or nuts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, observe it.
- Clean and flush the parts sufficiently and blow-dry them.
- · Be careful not to damage sliding surfaces and mating surfaces.
- When applying sealant, remove the old sealant from the mounting surface; then remove any moisture, oil, and foreign materials from the application and mounting surfaces.
- Always use shop paper for cleaning the inside of components.
- Avoid using cotton gloves or shop rags to prevent entering of lint.
- During assembly, observe the specified tightening torque, and apply new gear oil, petroleum jelly, or multipurpose grease as specified for each vehicle, if necessary.

#### NOTE:

Front oil seal cannot be replaced on vehicle, because there is not enough room.

## Precautions for Removing Battery Terminal

 When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
 NOTE:

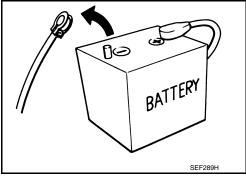
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

• For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch. **NOTE:** 

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
 NOTE:

The removal of 12V battery may cause a DTC detection error.



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# PREPARATION

## PREPARATION

## **Special Service Tools**

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The actual shapes of TechMate tools may differ from those of special service tools illustrated here.

Tool number (TechMate No.) Tool name	differ from those of special service tools illustra	Description	С
KV381054S0 (J-34286) Puller		<ul> <li>Removing side oil seal (right side)</li> <li>Removing side bearing outer race</li> </ul>	<b>DLN</b>
ST33400001 (J-26082) Drift a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.	ZZA0702D	<ul> <li>Installing side oil seal (right side)</li> <li>Installing front oil seal</li> </ul>	F G H
KV38102100 (J-25803-01) Drift a: 44 mm (1.73 in) dia. b: 36 mm (1.42 in) dia. c: 24.5 mm (0.965 in) dia.	C a b ZZA1046D	Installing side oil seal (left side)	J
KV38100200 ( — ) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.		Installing side shaft oil seal	K
ST30032000 (J-26010-01) Drift a: 80 mm (3.15 in) dia. b: 38 mm (1.50 in) dia. c: 31 mm (1.22 in) dia.	ZZA1143D	<ul> <li>Installing side shaft</li> <li>Installing pinion rear bearing inner race</li> </ul>	M N O
KV10111100 (J-37228) Seal cutter	S-NT107	Removing carrier cover	P

[FRONT FINAL DRIVE: F160A]

## PREPARATION

#### < PREPARATION >

Tool number		
(TechMate No.) Tool name		Description
ST3306S001 (J-22888-D) Differential side bearing puller set 1: ST33051001 (J-22888-20) Puller 2: ST33061000 (J-8107-2) Base a: 28.5 mm (1.122 in) dia. b: 38 mm (1.50 in) dia.		Removing and installing side bearing inner race
ST33230000 (J-25805-01) Drift a: 51 mm (2.01 in) dia. b: 41 mm (1.61 in) dia. c: 28.5 mm (1.122 in) dia.	ZZA1046D	Installing side bearing inner race
ST30611000 (J-25742-1) Drift bar	Б-NTO90	Installing side bearing outer race (Use with KV31103000)
KV31103000 (J-38982) Drift a: 49 mm (1.93 in) dia. b: 70 mm (2.76 in) dia.	a ZZA1113D	Installing side bearing outer race
ST3127S000 (J-25765-A) Preload gauge	ZZAOBOGD	Measuring pinion bearing preload and total preload
(J-8129) Spring gauge	Callemanna Fall	Measuring turning torque
	NT127	

## PREPARATION

## [FRONT FINAL DRIVE: F160A]

Tool number (TechMate No.) Tool name		Description
ST37820000 ( — ) Drift a: 39 mm (1.54 in) dia. b: 72 mm (2.83 in) dia.	ba	Installing pinion front and rear bearing outer race
KV38102510	ZZA0836D	Installing front oil seal
() Drift a: 71 mm (2.80 in) dia. b: 65 mm (2.56 in) dia.		
Commercial Service Tools	ZZA0636D	INFOID:000000010595972
Tool name Flange wrench		Description           Removing and installing drive pinion lock nut
Replacer	NT035	Removing pinion rear bearing inner race
Spacer a: 60 mm (2.36 in) dia. b: 36 mm (1.42 in) dia.		Installing pinion front bearing inner race
c: 30 mm (1.18 in)	a ZZA1133D	
Power tool	PBIC0190E	Loosening bolts and nuts

< PREPARATION >

#### < PERIODIC MAINTENANCE >

## PERIODIC MAINTENANCE FRONT DIFFERENTIAL GEAR OIL

### Inspection

#### **OIL LEAKAGE**

Make sure that oil is not leaking from final drive assembly or around it.

#### OIL LEVEL

• Remove filler plug (1) and check oil level from filler plug mounting hole as shown in the figure.

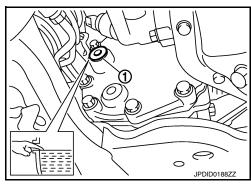
#### CAUTION:

#### Never start engine while checking oil level.

• Set a gasket on filler plug and install it on final drive assembly. Refer to <u>DLN-126</u>, "Exploded View".

CAUTION:

Never reuse gasket.



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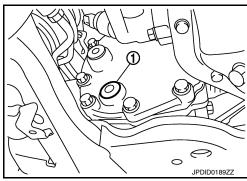
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## Draining

- 1. Stop engine.
- 2. Remove drain plug (1) and drain gear oil.
- Set a gasket on drain plug and install it to final drive assembly and tighten to the specified torque. Refer to <u>DLN-126</u>, "Exploded <u>View"</u>.
   CAUTION:

Never reuse gasket.



## Refilling

1. Remove filler plug (1). Fill with new gear oil until oil level reaches the specified level near filler plug mounting hole.

**Oil grade and Viscosity** 

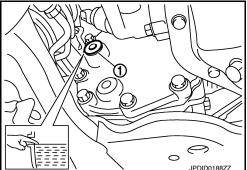
: Refer to <u>MA-10, "Fluids</u> and Lubricants".

Oil capacity

: Refer to <u>DLN-151, "Gen-</u> eral Specifications".

After refilling oil, check oil level. Set a gasket to filler plug, then install it to final drive assembly. Refer to <u>DLN-126. "Exploded</u> <u>View"</u>.
 CAUTION:

Never reuse gasket.



#### < REMOVAL AND INSTALLATION >

#### **REMOVAL AND INSTALLATION** А SIDE OIL SEAL **RIGHT SIDE** В **RIGHT SIDE : Exploded View** INFOID:000000010595976 С SEC. 381 ന 2 🔀 🎦 (A): 📼 ) DLN Е F JPDID0298ZZ Н 1. Front final drive assembly 2. Side oil seal (right side) Oil seal lip A: C: Vehicle front : Apply gear oil. Apply multi-purpose grease. Refer to GI-4, "Components" for symbols not described above. **RIGHT SIDE : Removal and Installation** INFOID:000000010595977 Κ REMOVAL 1. Remove the front drive shaft. Refer to FAX-24, "Exploded View". L Remove the side oil seal using a puller (A) [SST: KV381054S0 2. (J-34286)]. D **CAUTION:** Μ Never damage gear carrier.

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## SIDE OIL SEAL

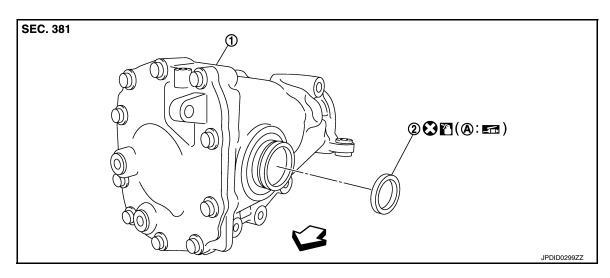
#### < REMOVAL AND INSTALLATION >

- Using the drift (A) [SST: ST33400001 (J-26082)], press-fit side oil seal so that its surface comes face-to-face with the end surface of the side retainer. CAUTION:
  - Apply multi-purpose grease to sealing lips of side oil seal.
  - Never reuse oil seal.
  - When installing, never incline oil seal.
- 2. Install the front drive shaft. Refer to FAX-24, "Exploded View".
- 3. When oil leaks while removing, check oil level after the installation. Refer to <u>DLN-120, "Inspection"</u>.

## LEFT SIDE

LEFT SIDE : Exploded View

INFOID:000000010595978



- 1. Front final drive assembly
- 2. Side oil seal (left side)

- A: Oil seal lip
- C: Vehicle front

Apply gear oil.

Apply multi-purpose grease.

Refer to <u>GI-4, "Components"</u> for symbols not described above.

## LEFT SIDE : Removal and Installation

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#### REMOVAL

1. Remove the front final drive assembly from vehicle with power tool. Refer to <u>DLN-124</u>, "Exploded View". **NOTE:** 

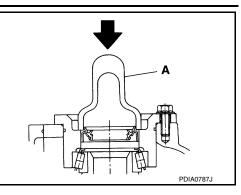
# Left side oil seal is attached to engine assembly. Replace it after removing front final drive assembly from vehicle.

 Remove the side oil seal using a flat-bladed screwdriver.
 CAUTION: Never damage gear carrier.

#### INSTALLATION

1. Apply multi-purpose grease to sealing lips of side oil seal.

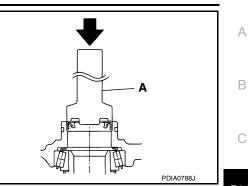
#### [FRONT FINAL DRIVE: F160A]



## SIDE OIL SEAL

#### < REMOVAL AND INSTALLATION >

- Using the drift (A) [SST: KV38102100 (J-25803-01)], press-fit side oil seal so that its surface comes face-to-face with the end surface of the gear carrier.
   CAUTION:
  - Never reuse oil seal.
  - When installing, never incline oil seal.
- 3. Install the front final drive assembly on vehicle. Refer to <u>DLN-124</u>, "Exploded View".
- 4. Install the front drive shaft. Refer to FAX-24, "Exploded View".
- 5. When oil leaks while removing, check oil level after the installation. Refer to <u>DLN-120, "Inspection"</u>.



[FRONT FINAL DRIVE: F160A]

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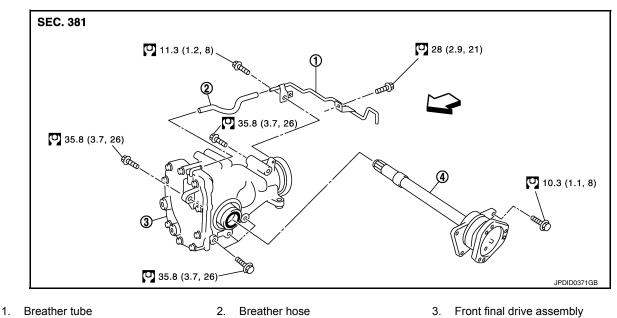
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## FRONT FINAL DRIVE ASSEMBLY

Exploded View

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4. Side shaft

C: Vehicle front

Refer to <u>GI-4, "Components"</u> for symbols in the figure.

## Removal and Installation

## REMOVAL

- 1. Remove both front drive shaft. Refer to FAX-24, "Exploded View".
- 2. Remove front crossbar with power tool.
- 3. Separate steering outer socket and steering knuckle. Refer to ST-35, "AWD : Exploded View".
- 4. Remove side shaft.
- 5. Remove three way catalyst (right bank) with power tool. Refer to EX-5. "Exploded View".
- 6. Remove front propeller shaft. Refer to <u>DLN-90, "Exploded View"</u>.
- 7. Separate power steering solenoid valve connector.
- 8. Separate power steering hydraulic line. Refer to ST-53, "AWD : Exploded View".
- 9. Remove stabilizer assembly with power tool. Refer to <u>FSU-38</u>, "Exploded View".
- 10. Separate steering lower joint and steering gear assembly. Refer to ST-35, "AWD : Exploded View".
- 11. Set a suitable jack to engine.
- 12. Remove front suspension member with power tool. Refer to FSU-39, "Exploded View".
- 13. Remove breather hose and tube.
- 14. Remove engine mounting bracket (RH) (Lower) and engine mounting insulator (RH) with power tool. Refer to <u>EM-74, "AWD : Exploded View"</u>.
- 15. Remove final drive assembly mounting bolts with power tool and separate front final drive assembly from engine.

#### INSTALLATION

Note the following, install in the reverse order of removal.

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## FRONT FINAL DRIVE ASSEMBLY

#### < UNIT REMOVAL AND INSTALLATION >

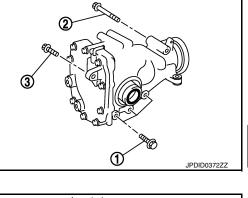
- · When installing the side shaft, apply multi-purpose grease to contact surface of side shaft and side shaft oil seal.
- · Tighten mounting bolts in the order described below when installing front final drive assembly: side of gear carrier (1), upper side of gear carrier (2), part of carrier cover (3). **CAUTION:**

Align the mating faces of gear carrier and oil pan for installation.

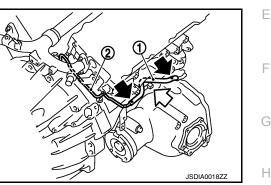
• When installing breather hose (1) and tube (2), refer to the figure. **CAUTION:** 

Make sure there are no pinched or restricted areas on the breather hose caused by bending or winding when installing it.

- Make sure the paint mark facing up (-).
- Securely install the hose until it seats the rounded portion of the tube. (( ) (front final drive side).
- Securely install the hose until it to paint mark of the tube. ( (vehicle rear side).
- Face the bend of the breather hose ( $\triangleleft$ ) to the engine.
- When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-120, "Inspection".



[FRONT FINAL DRIVE: F160A]



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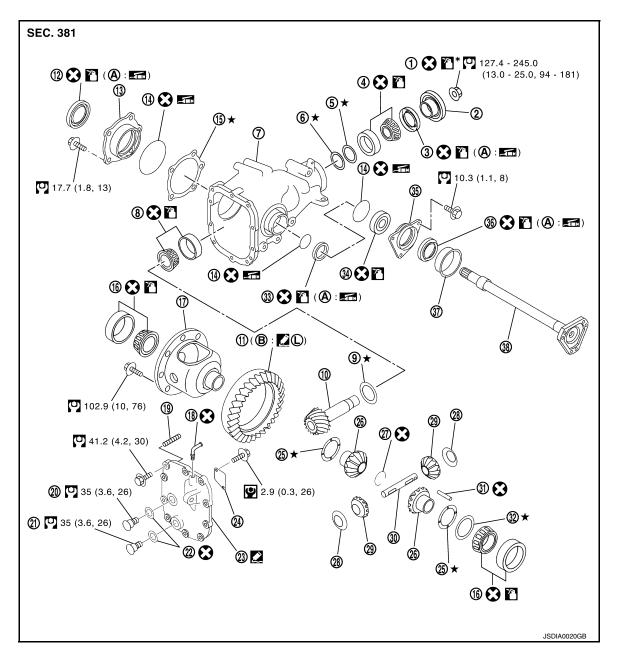
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# <u>< UNIT DISASSEMBLY AND ASSEMBLY ></u> UNIT DISASSEMBLY AND ASSEMBLY SIDE SHAFT

Exploded View

INFOID:000000010595982



- 1. Drive pinion lock nut
- 4. Pinion front bearing
- 7. Gear carrier
- 10. Drive pinion
- 13. Side retainer
- 16. Side bearing
- 19. Dowel pin
- 22. Gasket
- 25. Side gear thrust washer
- 28. Pinion mate thrust washer

- 2. Companion flange
- 5. Drive pinion bearing adjusting wash- 6. er
- 8. Pinion rear bearing
- 11. Drive gear
- 14. O-ring
- 17. Differential case
- 20. Filler plug
- 23. Carrier cover
- 26. Side gear
- 29. Pinion mate gear

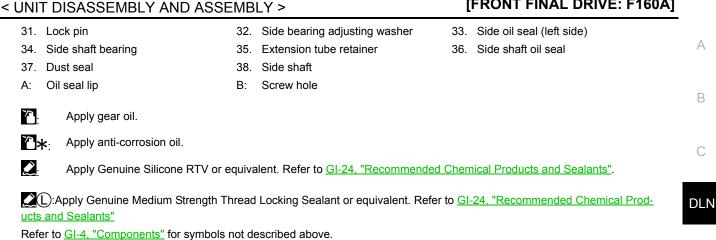
- 3. Front oil seal
  - Drive pinion adjusting washer
- 9. Pinion height adjusting washer
- 12. Side oil seal (right side)
- 15. Side bearing adjusting shim
- 18. Breather connector
- 21. Drain plug
- 24. Gear oil defense
- 27. Circular clip
- 30. Pinion mate shaft

**Revision: February 2015** 

**DLN-126** 

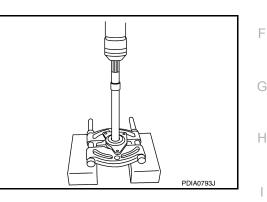


## [FRONT FINAL DRIVE: F160A]



Disassembly

1. Hold extension tube retainer with puller, then press out side shaft using a press.



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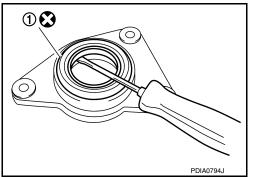
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2. Remove side shaft oil seal (1) from extension tube retainer with a suitable tool. **CAUTION:** 

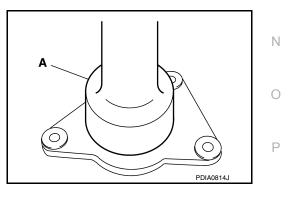
#### Never damage extension tube retainer.

- 3. Remove side shaft bearing from extension tube retainer.
- 4. Remove O-ring from extension tube retainer.
- 5. Remove dust seal from side shaft.



## Assembly

- Using the drift (A) [SST: KV38100200 ( )], install side shaft 1. oil seal.
  - **CAUTION:**
  - Never reuse oil seal. When installing, never incline oil seal.
  - · Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.
- Install dust seal.

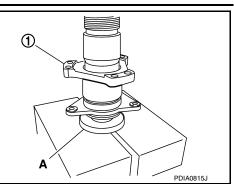


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## SIDE SHAFT

## < UNIT DISASSEMBLY AND ASSEMBLY >

- Support side shaft bearing with the drift (A) [SST: ST30032000 (J-26010-01)], then press side shaft (1) into the side shaft bearing using a press.
- Apply multi-purpose grease to O-ring, and install it to extension tube retainer.
   CAUTION:
  - Never reuse O-ring.



Inspection After Disassembly

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#### DRIVE GEAR AND DRIVE PINION

- · Clean up the disassembled parts.
- If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
- If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.

#### BEARING

- Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

#### SIDE GEAR AND PINION MATE GEAR

- · Clean up the disassembled parts.
- If any cracks or damage on the surface of the tooth is found, replace.
- If any worn or chipped mark on the contact sides of the thrust washer is found, replace.

#### SIDE GEAR THRUST WASHER AND PINION MATE THRUST WASHER

- Clean up the disassembled parts.
- If it is chipped (by friction), damaged, or unusually worn, replace.

#### OIL SEAL

- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

#### DIFFERENTIAL CASE

- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

#### COMPANION FLANGE

- · Clean up the disassembled parts.
- If any chipped mark [about 0.1 mm, (0.004 in)] or other damage on the contact sides of the lips of the companion flange is found, replace.

#### [FRONT FINAL DRIVE: F160A]

## < UNIT DISASSEMBLY AND ASSEMBLY >

DIFFERENTIAL ASSEMBLY

**Exploded View** 

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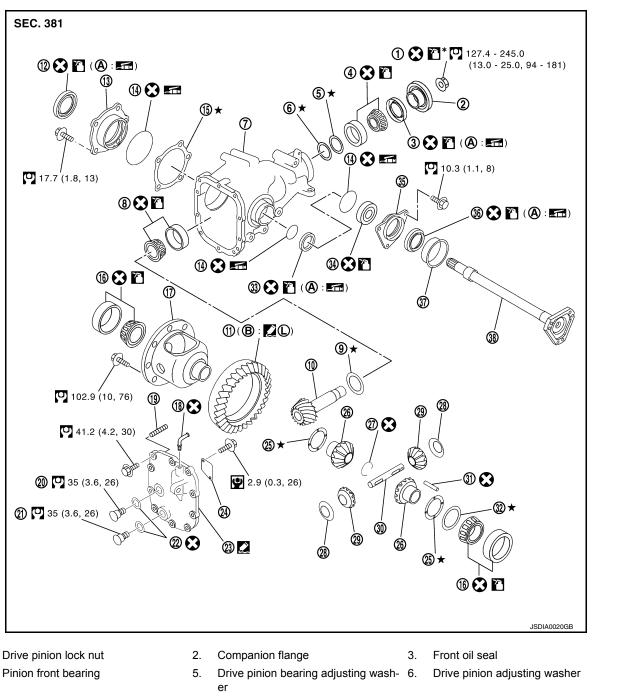
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7. Gear carrier

1.

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- 10. Drive pinion
- 13. Side retainer
- 16. Side bearing
- 19. Dowel pin
- 22. Gasket
- 25. Side gear thrust washer
- 28. Pinion mate thrust washer
- 31. Lock pin

- 8. Pinion rear bearing
- 11. Drive gear
- 14. O-ring
- 17. Differential case
- 20. Filler plug
- 23. Carrier cover
- 26. Side gear
- 29. Pinion mate gear
- 32. Side bearing adjusting washer

- 9. Pinion height adjusting washer
- 12. Side oil seal (right side)
- 15. Side bearing adjusting shim
- 18. Breather connector
- 21. Drain plug
- 24. Gear oil defense
- 27. Circular clip
- 30. Pinion mate shaft
- 33. Side oil seal (left side)

**DLN-129** 

#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 34. Side shaft bearing
- 37. Dust seal
- A: Oil seal lip

35. Extension tube retainer38. Side shaft

36. Side shaft oil seal

[FRONT FINAL DRIVE: F160A]

- B: Screw hole
- Apply gear oil.

**)**.

Apply anti-corrosion oil.

Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

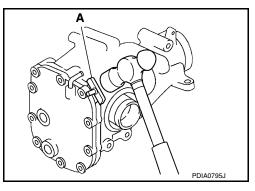
Characteristic Content of Co

Refer to <u>GI-4, "Components"</u> for symbols not described above.

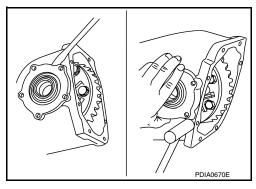
## Disassembly

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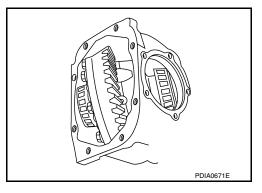
- 1. Drain gear oil, if necessary.
- 2. Remove carrier cover mounting bolts.
- 3. Remove carrier cover to insert the seal cutter (A) [SST: KV10111100 (J-37228)] between gear carrier and carrier cover. CAUTION:
  - Never damage the mating surface.
  - Never insert flat-bladed screwdriver, this may damage the mating surface.



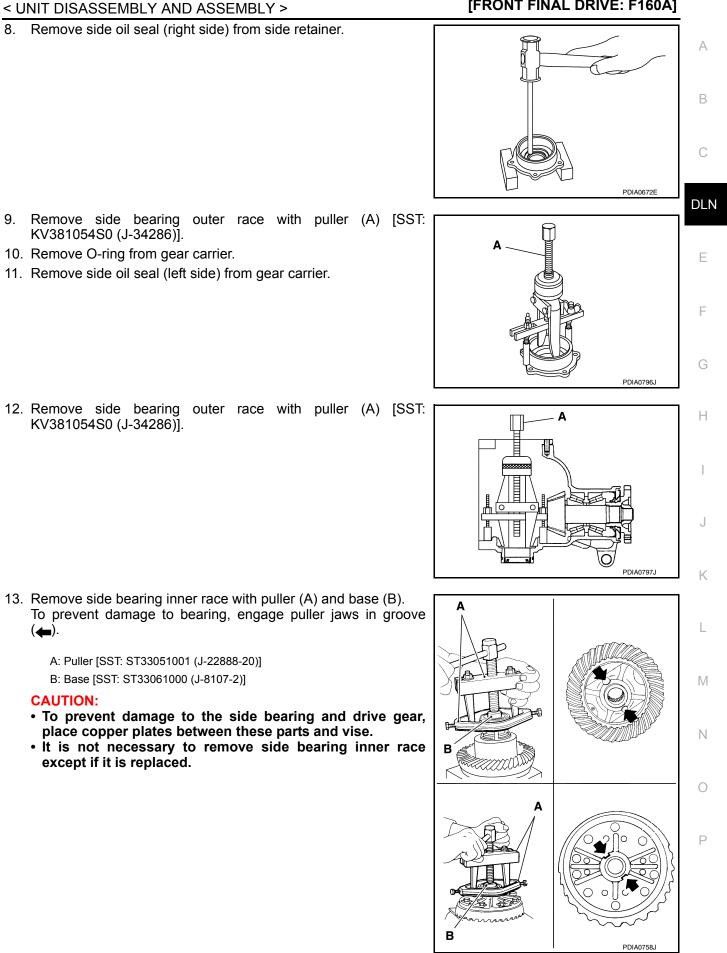
- Remove side retainer.
   Remove side bearing adjusting shim.
- 6. Remove O-ring from side retainer.



7. Remove differential case assembly from gear carrier.



## [FRONT FINAL DRIVE: F160A]



#### < UNIT DISASSEMBLY AND ASSEMBLY >

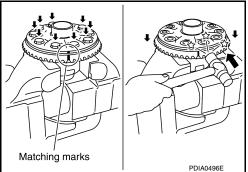
14. For proper reinstallation, paint matching marks on one differential case assembly.
 CAUTION:
 For matching marks, use paint. Never damage differential

For matching marks, use paint. Never damage differential case and drive gear.

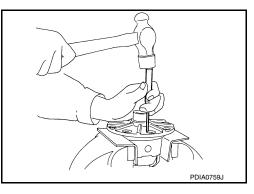
- 15. Remove drive gear mounting bolts.
- 16. Tap drive gear off differential case assembly with a soft hammer. **CAUTION:**

Tap evenly all around to keep drive gear from bending.

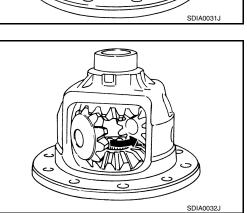
17. Remove lock pin of pinion mate shaft with a punch from drive gear side.



[FRONT FINAL DRIVE: F160A]



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18. Remove pinion mate shaft.

19. Turn pinion mate gear, then remove pinion mate gears, pinion mate thrust washers, side gears and side gear thrust washers from differential case.

#### < UNIT DISASSEMBLY AND ASSEMBLY >

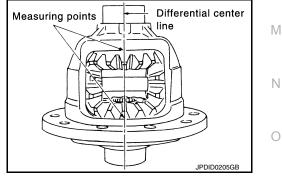
Assembly

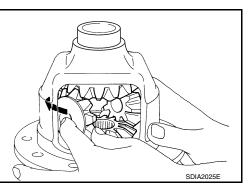
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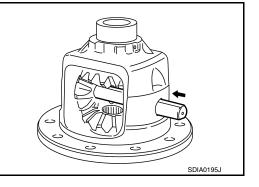
1. Install side gear thrust washers with the same thickness as the ones installed prior to disassembly or reinstall the old ones on the side gears.

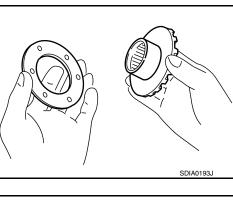
- 2. Install side gears and thrust washers into differential case. CAUTION:
  - Never reuse circular clip.
  - Make sure that the circular clip is installed to side gear (side retainer side).
- 3. Align 2 pinion mate gears in diagonally opposite positions, then rotate and install them into differential case after installing thrust washer to pinion mate gear.
- 4. Align the lock pin holes on differential case with shaft, and install pinion mate shaft.

- 5. Measure side gear end play. If necessary, select the appropriate side gear thrust washers.
- a. Place differential case straight up so that side gear to be measured comes upward.









[FRONT FINAL DRIVE: F160A]

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#### < UNIT DISASSEMBLY AND ASSEMBLY >

b. Using feeler gauge, measure the clearance between side gear back and differential case at 3 different points, while rotating side gear. Average the 3 readings, and then measure the clearance of the other side as well.

Side gear back clearance

: Refer to <u>DLN-151, "Differ-</u> ential Side Gear Clearance".

#### CAUTION:

To prevent side gear from tilting, insert feeler gauges with the same thickness from both sides.

c. If the back clearance is outside the specification, use a thicker/ thinner side gear thrust washer to adjust. For selecting thrust washer, refer to the latest parts information.

When the back clearance	Use a thicker thrust wash-
is large:	er.
When the back clearance	Use a thinner thrust wash-
is small:	er.

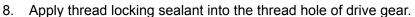
#### CAUTION:

Select a side gear thrust washer for right and left individually.

 Drive a lock pin into pinion mate shaft, using a punch. Make sure lock pin is flush with differential case.
 CAUTION:

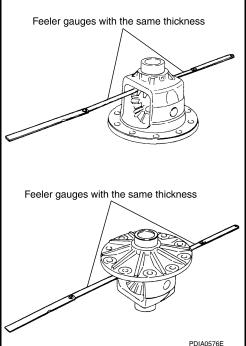
Never reuse lock pin.

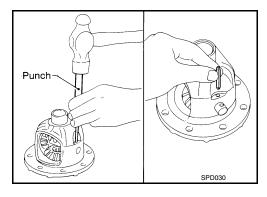
7. Align the matching mark of drive gear with the mark of differential case, then place drive gear.

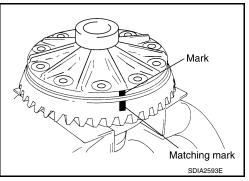


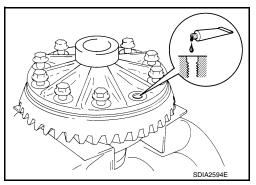
 Use Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to <u>GI-24</u>, <u>"Recommended Chemical</u> <u>Products and Sealants"</u>. CAUTION:

Drive gear back and threaded holes must be cleaned and degreased sufficiently.









#### < UNIT DISASSEMBLY AND ASSEMBLY >

9. Install drive gear on the mounting bolts. **CAUTION:** Tighten bolts in a crisscross fashion.

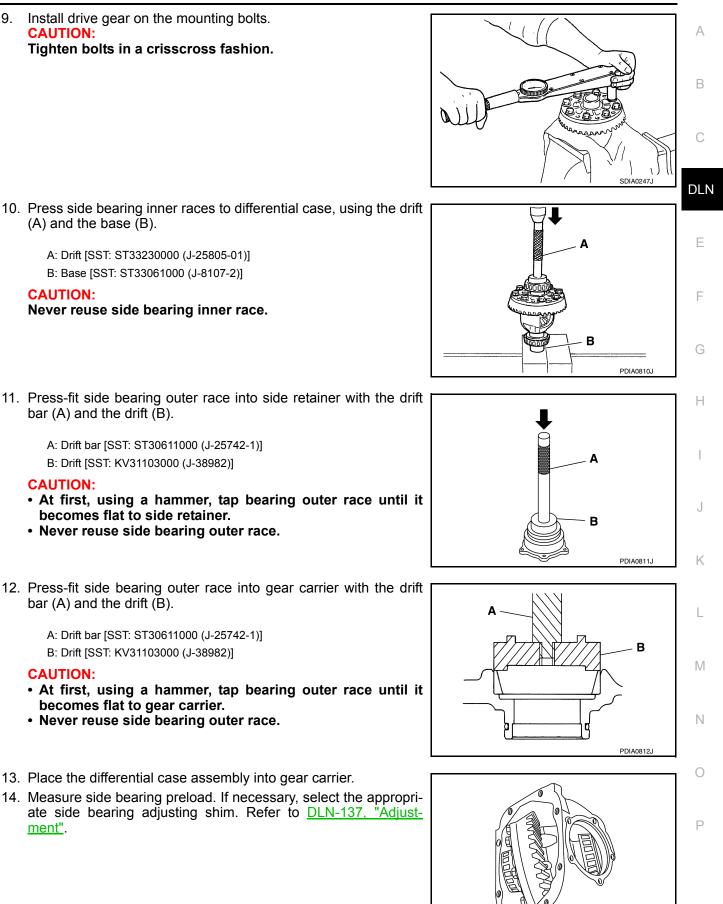
CAUTION:

**CAUTION:** 

**CAUTION:** 

ment".

[FRONT FINAL DRIVE: F160A]



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## < UNIT DISASSEMBLY AND ASSEMBLY >

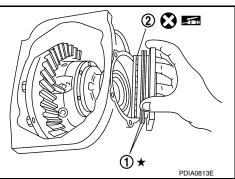
15. Install selected side bearing adjusting shim (1). Refer to DLN-137, "Adjustment".

2: O-rina

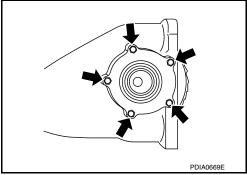
16. Apply multi-purpose grease to O-ring, and install it to side retainer. **CAUTION:** 

#### Never reuse O-ring.

- 17. Install side retainer assembly to gear carrier.
- 18. Install side retainer mounting bolts.



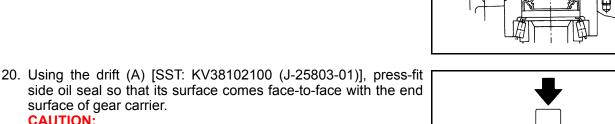
[FRONT FINAL DRIVE: F160A]



19. Using the drift (A) [SST: ST33400001 (J-26082)], press-fit side oil seal so that its surface comes face-to-face with the end surface of the side retainer.

**CAUTION:** 

- Never reuse oil seal.
- · When installing, never incline oil seal.
- Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.



CAUTION: Never reuse oil seal.

surface of gear carrier.

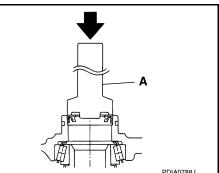
- When installing, never incline oil seal.
- Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.
- 21. Apply multi-purpose grease to O-ring, and install it to gear carrier.

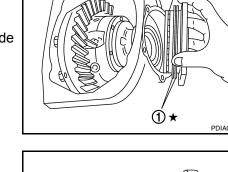
#### **CAUTION:**

#### Never reuse O-ring.

22. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to DLN-137, "Adjustment".

Recheck above items. Readjust as described above, if necessary.





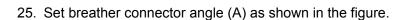
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 23. Apply sealant to mating surface of carrier cover.
  - Use Genuine Silicone RTV or equivalent. Refer to <u>GI-24</u>, <u>"Recommended Chemical Products and Sealants"</u>. CAUTION:

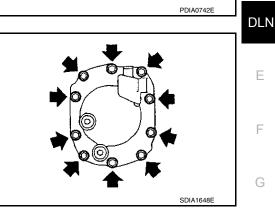
Remove old sealant adhering to mounting surfaces. Also remove any moisture, oil, or foreign material adhering to application and mounting surfaces.

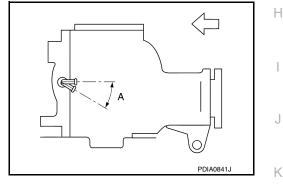
- PDIA0742E
- 24. Install carrier cover on gear carrier and tighten mounting bolts.



C: Vehicle front

: **0 – 30**°





Adjustment

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#### TOTAL PRELOAD TORQUE

· Before inspection and adjustment, drain gear oil.

- 1. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
- 2. Rotate drive pinion at least 20 times to check for smooth operation of the bearing.
- 3. Measure total preload with preload gauge (A) [SST: ST3127S000 (J-25765-A)].

#### **Total preload torque**

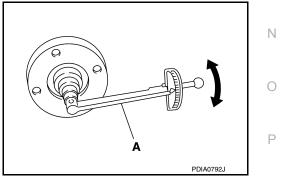
: Refer to <u>DLN-151, "Pre-</u> load Torque".

#### NOTE:

# Total preload torque = Pinion bearing preload torque + Side bearing preload torque

• If measured value is out of the specification, disassemble it to check and adjust each part. Adjust the pinion bearing preload and side bearing preload.

Adjust the pinion bearing preload first, then adjust the side bearing preload.



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[FRONT FINAL DRIVE: F160A]

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#### < UNIT DISASSEMBLY AND ASSEMBLY >

#### When the preload torque is large

On pinion bearings:	Decrease the drive pinion bearing adjusting washer and drive pinion adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.	
On side bearings:	Increase the side bearing adjusting shim thickness. For select parts refer to parts information. For selecting adjusting washer, refer to the latest parts information.	
When the preload torqu	ie is small	
On pinion bearings:	Increase the drive pinion bearing adjusting washer and drive pinion adjusting washer thickness. For selecting adjusting washer, refer to	

On side bearings: Decrease the side bearing adjusting shim thickness. For select parts refer to parts information. For selecting adjusting washer, refer to the latest parts information.

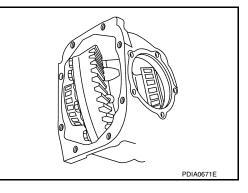
#### SIDE BEARING PRELOAD

• Before inspection and adjustment, drain gear oil.

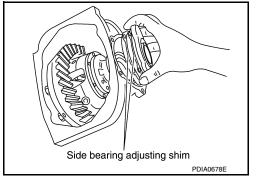
- 1. Remove carrier cover and side retainer. Refer to <u>DLN-130, "Disassembly"</u>.
- 2. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.

the latest parts information.

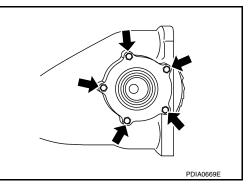
3. Place the differential case assembly into gear carrier.



- 4. Install side bearing adjusting shim before disassembling or shim which thickness is the same as the one before disassembling.
- Install side retainer assembly to gear carrier.
   CAUTION: Never install O-ring.



6. Install side retainer mounting bolts to the specified torque.



#### < UNIT DISASSEMBLY AND ASSEMBLY >

 Measure the turning torque of the gear carrier at the drive gear mounting bolts with a spring gauge [SST: — (J-8129)].

If the turning torque is outside the specification, use a thicker/

thinner side bearing adjusting shim to adjust. For selecting

If the turning torque is less than the specified range:

If the turning torque is greater than the specification:

Record the total amount of shim thickness required for the cor-

Decrease the side bearing adjusting shim thickness.

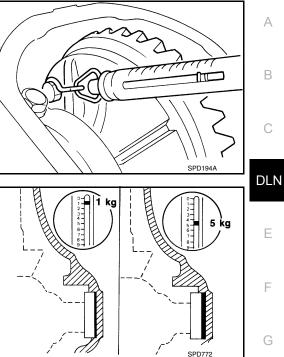
Increase the side bearing adjusting shim thickness.

#### Specification

8.

: 34.2 – 39.2 N (3.5 – 4.0 kg, 7.7 – 8.8 lb) of pulling force at the drive gear bolt





#### DRIVE GEAR RUNOUT

1. Remove carrier cover. Refer to DLN-130, "Disassembly".

adjusting shim, refer to the latest parts information.

- 2. Fit a dial indicator to the drive gear back face.
- 3. Rotate the drive gear to measure runout.

rect carrier side bearing preload.

#### **Drive gear runout**

#### : Refer to <u>DLN-151, "Drive</u> <u>Gear Runout"</u>.

 If the runout is outside of the repair limit, check drive gear assembly condition; foreign material may be caught between drive gear and differential case, or differential case or drive gear may be deformed, etc.
 CAUTION:

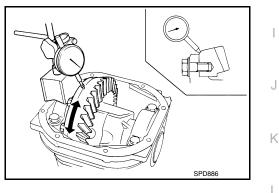
#### Replace drive gear and drive pinion gear as a set.

#### TOOTH CONTACT

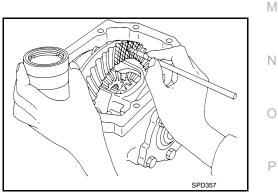
Before inspection and adjustment, drain gear oil.

- 1. Remove carrier cover. Refer to <u>DLN-130, "Disassembly"</u>.
- 2. Apply red lead to drive gear. CAUTION:

Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on drive gear.



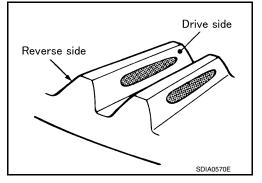
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

 Rotate drive gear back and forth several times, check drive pinion gear to drive gear tooth contact.
 CAUTION:

Check tooth contact on drive side and reverse side.



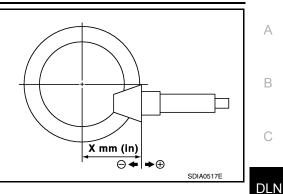
Tooth cont	act pattern		
Back side	Drive side	Pinion height adjusting washer selection value [mm(in)]	Adjustment requirement (Yes/No)
Heel side Toe side	Toe side Heel side		(185/190)
		+0.15 (+0.0059)	
		+0.12 (+0.0047)	Yes
		+0.09 (+0.0035)	
		+0.06 (+0.0024)	
		+0.03 (+0.0012)	
		0	No
		-0.03 (-0.0012)	
		-0.06 (-0.0024)	
		-0.09 (-0.0035)	
		-0. 12 (-0. 0047)	Yes
		-0. 15 (-0. 0059)	

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#### < UNIT DISASSEMBLY AND ASSEMBLY >

4. If tooth contact is improperly adjusted, follow the procedure below to adjust the pinion height [dimension (X)].

## [FRONT FINAL DRIVE: F160A]



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(Face contact)

Drive

surface

Drive

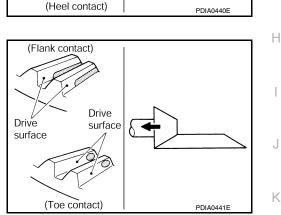
surface

 If the tooth contact is near the face (face contact), or near the heel (heel contact), thicken pinion height adjusting washers to move drive pinion closer to drive gear.

For selecting adjusting washer, refer to the latest parts information.

• If the tooth contact is near the flank (flank contact), or near the toe (toe contact), thin pinion height adjusting washers to move drive pinion farther from drive gear.

For selecting adjusting washer, refer to the latest parts information.



#### BACKLASH

Before inspection and adjustment, drain gear oil.

- 1. Remove carrier cover. Refer to DLN-130, "Disassembly".
- 2. Fit a dial indicator to the drive gear face to measure the backlash.

#### Backlash

#### : Refer to <u>DLN-151, "Back-</u> lash".

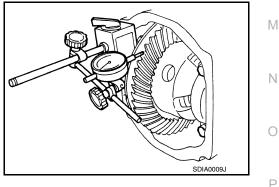
• If the backlash is outside of the specified value, change the thickness of side bearing adjusting washer.

When the backlash is large:

Decrease side bearing adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.

When the backlash is small:

Increase side bearing adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.



## < UNIT DISASSEMBLY AND ASSEMBLY >

#### INFOID:000000010595990

## DRIVE GEAR AND DRIVE PINION

Inspection After Disassembly

- Clean up the disassembled parts.
- If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
- If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.

#### BEARING

- · Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

#### SIDE GEAR AND PINION MATE GEAR

- · Clean up the disassembled parts.
- If any cracks or damage on the surface of the tooth is found, replace.
- If any worn or chipped mark on the contact sides of the thrust washer is found, replace.

#### SIDE GEAR THRUST WASHER AND PINION MATE THRUST WASHER

- · Clean up the disassembled parts.
- If it is chipped (by friction), damaged, or unusually worn, replace.

#### **OIL SEAL**

- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

#### DIFFERENTIAL CASE

- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

#### COMPANION FLANGE

- · Clean up the disassembled parts.
- If any chipped mark [about 0.1 mm, (0.004 in)] or other damage on the contact sides of the lips of the companion flange is found, replace.

#### **DRIVE PINION**

#### [FRONT FINAL DRIVE: F160A]

# DRIVE PINION

Exploded View

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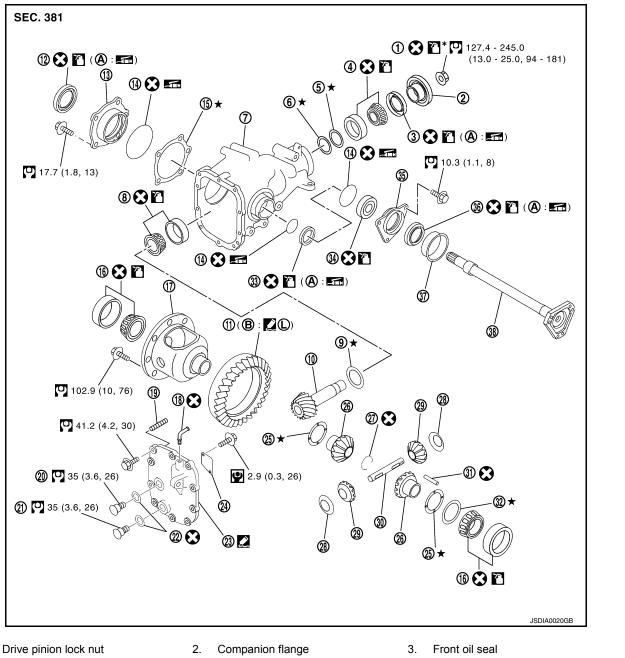
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- 4. Pinion front bearing
- 7. Gear carrier

1.

- 10. Drive pinion
- 13. Side retainer
- 16. Side bearing
- 19. Dowel pin
- 22. Gasket
- 25. Side gear thrust washer
- 28. Pinion mate thrust washer
- 31. Lock pin

- 5. Drive pinion bearing adjusting wash- 6. er
- 8. Pinion rear bearing
- 11. Drive gear
- 14. O-ring
- 17. Differential case
- 20. Filler plug
- 23. Carrier cover
- 26. Side gear
- 29. Pinion mate gear
- 32. Side bearing adjusting washer

- 6. Drive pinion adjusting washer
- 9. Pinion height adjusting washer
- 12. Side oil seal (right side)
- 15. Side bearing adjusting shim
- 18. Breather connector
- 21. Drain plug
- 24. Gear oil defense
- 27. Circular clip
- 30. Pinion mate shaft
- 33. Side oil seal (left side)

**Revision: February 2015** 

## **DRIVE PINION**

35. Extension tube retainer

38. Side shaft

B: Screw hole

#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 34. Side shaft bearing
- 37. Dust seal
- A: Oil seal lip

Apply gear oil.

Apply anti-corrosion oil.

Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

Characteristic Content of Co

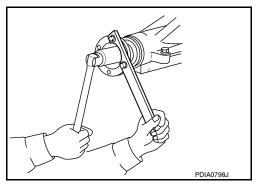
Refer to <u>GI-4, "Components"</u> for symbols not described above.

## Disassembly

**)**.

INFOID:000000010595992

- 1. Remove differential case assembly. Refer to <u>DLN-130, "Disassembly"</u>.
- 2. Remove drive pinion lock nut with a flange wrench (commercial service tool).



3. Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).

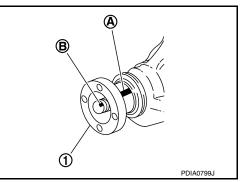
#### CAUTION:

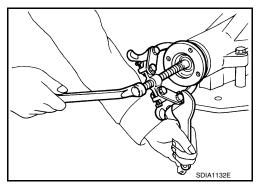
# For matching mark, use paint. Never damage companion flange and drive pinion.

**NOTE:** The matching mark on the final drive companion flange indicates the maximum vertical runout position.

When replacing companion flange, matching mark is not necessary.

4. Remove companion flange using the suitable puller (commercial service tool).



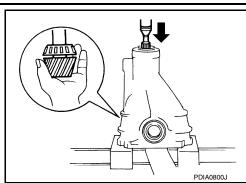


36. Side shaft oil seal

# **DRIVE PINION**

#### < UNIT DISASSEMBLY AND ASSEMBLY >

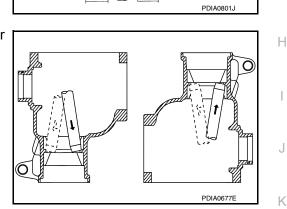
- Press drive pinion assembly out of gear carrier. CAUTION: Never drop drive pinion assembly.
- 6. Remove front oil seal.
- 7. Remove pinion front bearing inner race.
- 8. Remove drive pinion bearing adjusting washer and drive pinion adjusting washer.



9. Remove pinion rear bearing inner race and pinion height adjusting washer with replacer (A) (commercial service tool).

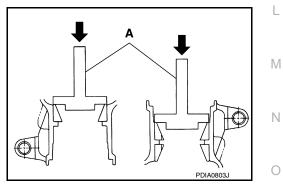
 Tap pinion front/rear bearing outer races uniformly a brass rod or equivalent to removed. CAUTION:

Never damage gear carrier.



# Assembly

- Install pinion front and rear bearing outer races using drift (A) [SST: ST37820000 ( — )].
   CAUTION:
  - At first, using a hammer, tap bearing outer race until it becomes flat to gear carrier.
  - Never reuse pinion front and rear bearing outer race.





INFOID:000000010595993

[FRONT FINAL DRIVE: F160A]

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# **DRIVE PINION**

#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 2. Temporarily install pinion height adjusting washer (1).
  - When hypoid gear set has been replaced
  - Select pinion height adjusting washer. Refer to <u>DLN-147</u>, <u>"Adjustment"</u>.

#### When hypoid gear set has been reused

- Temporarily install the removed pinion height adjusting washer or same thickness washer to drive pinion.
- Install selected pinion height adjusting washer (2) to drive pinion. Press pinion rear bearing inner race (1) to it, using drift (A) [SST: ST30032000 (J-26010-01)].
   CAUTION:
  - Pay attention to the direction of pinion height adjusting washer. (Assemble as shown in the figure.)
  - Never reuse pinion rear bearing inner race.
- 4. Temporarily assemble removed drive pinion adjusting washer and drive pinion bearing adjusting washer or same thickness of them to drive pinion.
- 5. Apply gear oil to pinion rear bearing, and assemble drive pinion into gear carrier.
- Apply gear oil to pinion front bearing, and assemble pinion front bearing inner race to drive pinion assembly.
   CAUTION:

Never reuse pinion front bearing inner race.

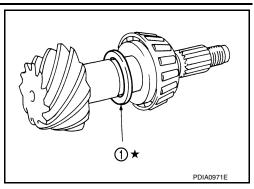
- 7. Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.
- 8. Adjust pinion bearing preload. If necessary, select the appropriate drive pinion adjusting washer and drive pinion bearing adjusting washer. Refer to <u>DLN-147</u>, "Adjustment".
- 9. Using the drifts (A and B), install front oil seal as shown in figure.

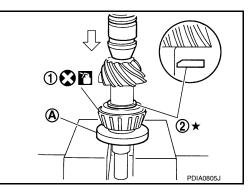
A: Drift [SST: ST33400001 (J-26082)] B: Drift [SST: KV38102510 ( — )]

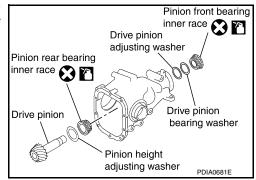
#### CAUTION:

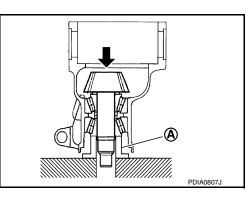
- Never reuse oil seal.
- When installing, never incline oil seal.
- Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.

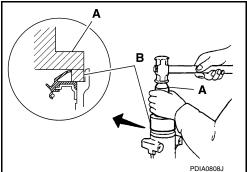
#### **DLN-146**







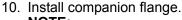




2015 QX50

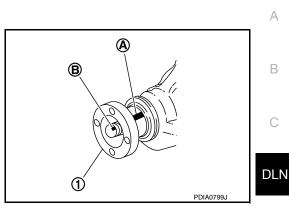
#### < UNIT DISASSEMBLY AND ASSEMBLY >

# [FRONT FINAL DRIVE: F160A]



NOTE:

When reusing drive pinion, align the matching mark (B) of drive pinion with the matching mark (A) of companion flange, and then install companion flange (1).



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11. Apply anti-corrosion oil to the thread and seat of new drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion, using flange wrench (commercial service tool).

A: Preload gauge [SST: ST3127S000 (J-25765-A)]

#### **CAUTION:**

#### Never reuse drive pinion lock nut.

12. Tighten to drive pinion lock nut, while adjusting pinion bearing preload torque, using preload gauge [SST: ST3127S000 (J-25765-A)].

**Pinion bearing preload** 

: Refer to DLN-151, "Preload Torque".

#### CAUTION:

- · Adjust to the lower limit of the drive pinion lock nut tightening torque first.
- After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.
- 13. Install differential case assembly. Refer to DLN-133, "Assembly".

#### CAUTION:

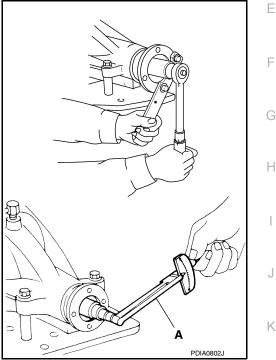
#### Never install carrier cover yet.

- 14. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and companion flange runout. Refer to DLN-137, "Adjustment" and DLN-147, "Adjustment". Recheck above items. Readjust the above description, if necessary.
- 15. Check total preload torque. Refer to DLN-137, "Adjustment".
- 16. Install carrier cover. Refer to DLN-133, "Assembly".

#### Adjustment

#### PINION GEAR HEIGHT

If the hypoid gear set has been replaced, select the pinion height adjusting washer.



INFOID:000000010595994

# **DRIVE PINION**

#### < UNIT DISASSEMBLY AND ASSEMBLY >

1. Use the formula below to calculate pinion height adjusting washer thickness.

#### Washer selection equation:

- $T = T_0 + (t_1 t_2)$ 
  - T: Correct washer thickness
  - To: Removed washer thickness
  - t1: Old drive pinion head letter "H  $\times$  0.01" ("H": machined tolerance 1/100 mm  $\times$  100)
  - t2: New drive pinion head letter "H  $\times$  0.01" ("H": machined tolerance 1/100 mm  $\times$  100)

# Example:

```
T = 3.21 + [(2 \times 0.01) - (-1 \times 0.01)] = 3.24
To: 3.21
t1: +2
t2: -1
```

TH\* SDIA0249J

[FRONT FINAL DRIVE: F160A]

2. Select the proper pinion height adjusting washer. For selecting adjusting washer, refer to the latest parts information.

If unable to find a washer of desired thickness, use a washer with thickness closest to the calculated value.

#### Example:

Calculated value... T = 3.22 mm Used washer... T = 3.21 mm

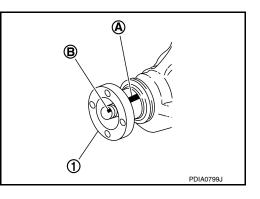
#### PINION BEARING PRELOAD

Assemble the drive pinion parts if they are disassembled. Refer to DLN-145, "Assembly".

- 1. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.
- 2. Install companion flange.

#### NOTE:

When reusing drive pinion, align the matching mark (B) of drive pinion with the matching mark (A) of companion flange, and then install companion flange (1).



# **DRIVE PINION**

#### < UNIT DISASSEMBLY AND ASSEMBLY >

3. Temporarily tighten removed drive pinion lock nut to drive pinion, using flange wrench (commercial service tool).

A: Preload gauge [SST: ST3127S000 (J-25765-A)]

#### NOTE:

Use removed drive pinion lock nut only for the preload measurement.

- Rotate drive pinion at least 20 times to check for smooth operation of the bearing.
- 5. Tighten to drive pinion lock nut, while adjust pinion bearing preload torque, using preload gauge [SST: ST3127S000 (J-25765-A)].

#### Pinion bearing preload

#### : Refer to DLN-151, "Preload Torque".

#### CAUTION:

- Adjust to the lower limit of the drive pinion lock nut tightening torque first.
- After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.
- 6. If the pinion bearing preload torque is outside the specification,
- use a thicker/thinner drive pinion bearing adjusting washer and drive pinion adjusting washer to adjust.

#### When the preload torque is large:

Decrease the drive pinion bearing adjusting washer and drive pinion adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.

#### When the preload is small:

Increase the drive pinion bearing adjusting washer and drive pinion adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.

7. Remove companion flange, after adjustment.

#### COMPANION FLANGE RUNOUT

- 1. Fit a dial indicator onto the companion flange face (inner side of the propeller shaft mounting bolt holes).
- 2. Rotate companion flange to check for runout.

# Companion flange runout

panion Flange Runout".

: Refer to DLN-151, "Com-

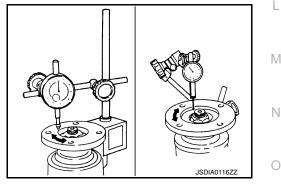
- Fit a test indicator to the inner side of companion flange (socket 3 diameter).
- Rotate companion flange to check for runout. 4

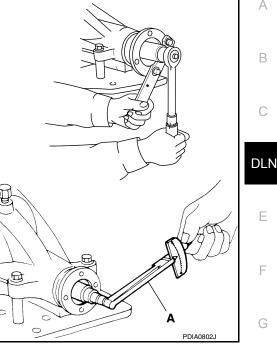
#### **Companion flange runout** : Refer to DLN-151, "Companion Flange Runout".

- If the runout value is outside the runout limit, follow the procedure below to adjust.
- a. Check for runout while changing the phase between companion flange and drive pinion by 90° step, and search for the position where the runout is the minimum.
- If the runout value is still outside of the limit after the phase has been changed, possible cause will be an h assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.
- If the runout value is still outside of the limit after the check and repair, replace companion flange. C.

# **Revision: February 2015**

#### **DLN-149**





[FRONT FINAL DRIVE: F160A]

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#### < UNIT DISASSEMBLY AND ASSEMBLY >

# Inspection After Disassembly

INFOID:000000010595995

#### DRIVE GEAR AND DRIVE PINION

- Clean up the disassembled parts.
- If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
- If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.

#### BEARING

- · Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

#### SIDE GEAR AND PINION MATE GEAR

- · Clean up the disassembled parts.
- If any cracks or damage on the surface of the tooth is found, replace.
- If any worn or chipped mark on the contact sides of the thrust washer is found, replace.

#### SIDE GEAR THRUST WASHER AND PINION MATE THRUST WASHER

- · Clean up the disassembled parts.
- If it is chipped (by friction), damaged, or unusually worn, replace.

#### **OIL SEAL**

- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

#### DIFFERENTIAL CASE

- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

#### COMPANION FLANGE

- · Clean up the disassembled parts.
- If any chipped mark [about 0.1 mm, (0.004 in)] or other damage on the contact sides of the lips of the companion flange is found, replace.

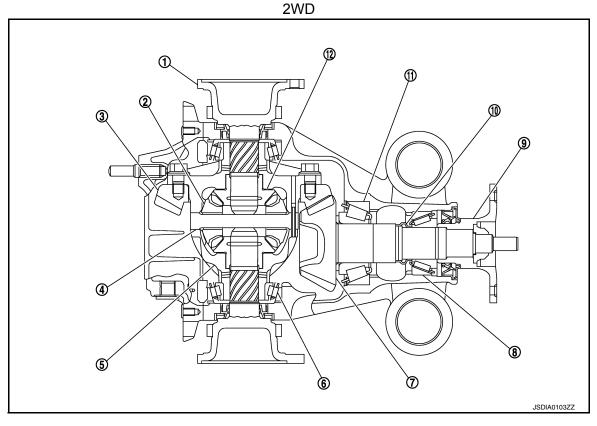
SERVICE DATA AND S < SERVICE DATA AND SPECIFICATIONS (SDS)	PECIFICATIONS (SDS) [FRONT FINAL DRIVE: F160A]
SERVICE DATA AND SPECIF	
SERVICE DATA AND SPECIFICATION	
	13 (303)
General Specifications	INFOID:000000010595996
	AWD
Applied model	VQ37VHR
	A/T
Final drive model	F160A
Gear ratio	3.133
Number of teeth (Drive gear/Drive pinion)	47/15
Oil capacity (Approx.) $\ell$ (US pt, Imp pt)	0.65 (1-3/8, 1-1/8)
Number of pinion gears	2
Drive pinion adjustment spacer type	Solid
Drive Gear Runout	INFOID:000000010595997
	Unit: mm (in)
Item	Limit
Drive gear back face runout	0.05 (0.0020)
Differential Side Gear Clearance	INFOID:000000010595998
Item	Unit: mm (in) Standard
Side gear backlash (Clearance between side gear and differential case)	0.2 (0.008) or less (Each gear should rotate smoothly without excessive resistance during differential motion.)
Preload Torque	INFOID:000000010595999
	Unit: N⋅m (kg-m, in-lb)
Item	Standard
Pinion bearing (P1)	0.78 - 1.57 (0.08 - 0.16, 7 - 13)
Side bearing (P2)	0.78 - 1.08 (0.08 - 0.11, 7 - 9)
Side bearing to pinion bearing (Total preload) (Total preload = P1 + P2)	1.56 – 2.65 (0.16 – 0.27, 14 – 23)
Backlash	INFOID:000000010596000
	Unit: mm (in)
Item	Standard
Drive gear to drive pinion gear	0.10 – 0.15 (0.0039 – 0.0059)
Companion Flange Runout	INFOID:000000010596001
-	Unit: mm (in)
Item	Limit
Companion flange face runout	0.18 (0.0071)
Inner side of the companion flange runout	0.13 (0.0051)

# SYSTEM DESCRIPTION REAR FINAL DRIVE ASSEMBLY

System Diagram

INFOID:000000010596002

**CROSS-SECTIONAL VIEW** 

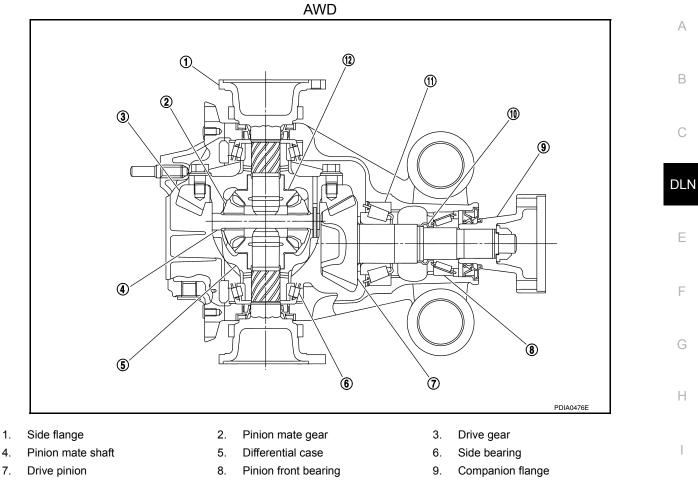


- 1. Side flange
- 4. Pinion mate shaft
- 7. Drive pinion
- 10. Collapsible spacer
- 2. Pinion mate gear
- 5. Differential case
- 8. Pinion front bearing
- 11. Pinion rear bearing
- 3. Drive gear
- 6. Side bearing
- 9. Companion flange
- 12. Side gear

# **REAR FINAL DRIVE ASSEMBLY**

#### < SYSTEM DESCRIPTION >

#### [REAR FINAL DRIVE: R200]



- 10. Collapsible spacer
- 11. Pinion rear bearing
- 12. Side gear

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# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING < SYMPTOM DIAGNOSIS > [REAR FINAL DRIVE: R200]

# SYMPTOM DIAGNOSIS

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

# NVH Troubleshooting Chart

INFOID:000000010596003

2WD

Use the chart below to find the cause of the symptom. If necessary, repair or replace these parts.

Reference		DLN-191, "2WD : Inspection After Disassembly"	DLN-187, "2WD : Adjustment"	DLN-191, "2WD : Inspection After Disassembly"	DLN-187, "2WD : Adjustment"	DLN-187, "2WD:Adjustment"	DLN-161, "Inspection"	NVH of REAR PROPELEER SHAFT in this section.	NVH in FAX, RAX, FSU and RSU sections.	NVH in WT section.	NVH in WT section.	NVH in RAX section.	NVH in BR section.	NVH in ST section.
Possible cause and SUSPECTEI	) PARTS	Gear tooth rough	Gear contact improper	Tooth surfaces worn	Backlash incorrect	Companion flange excessive runout	Gear oil improper	PROPELLER SHAFT	AXLE AND SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×

×: Applicable

AWD

### NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING [REAR FINAL DRIVE: R200]

#### < SYMPTOM DIAGNOSIS >

mptom Noise			-										
ssible cause and SUSPECTED PARTS	Gear tooth rough	Gear contact improper	Tooth surfaces worn	Backlash incorrect	Companion flange excessive runout	Gear oil improper	PROPELLER SHAFT	AXLE AND SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
the chart below to find the cause of the syn	DLN-204, "AWD : Inspection After Disassembly"	DLN-199, "AWD : Adjustment"	DLN-204. "AWD : Inspection After Disassembly"	DLN-199. "AWD : Adjustment"	DLN-199, "AWD : Adjustment"	DLN-161, "Inspection"	NVH of FRONT and REAR PROPELEER SHAFT in this section.	NVH in FAX, RAX, FSU and RSU sections.	NVH in WT section.	NVH in WT section.	NVH in FAX and RAX section.	NVH in BR section.	NVH in ST section.

×: Applicable

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INFOID:000000010596004

INFOID:0000000011007629

# < PRECAUTION > PRECAUTION PRECAUTIONS

Service Notice or Precautions for Rear Final Drive

- Check for the correct installation status prior to removal or disassembly. If matching marks are required, be certain they never interfere with the function of the parts when applied.
- Overhaul should be done in a clean work area, it is preferable to work in dustproof area.
- Before disassembly, using steam or white gasoline, completely remove sand and mud from the exterior of the unit, preventing them from entering into the unit during disassembly or assembly.
- Check appearance of the disassembled parts for damage, deformation, and unusual wear. Replace them with new ones, if necessary.
- Gaskets, seals and O-rings should be replaced any time when the unit is disassembled.
- In principle, tighten bolts or nuts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, observe it.
- Clean and flush the parts sufficiently and blow-dry them.
- · Be careful not to damage sliding surfaces and mating surfaces.
- When applying sealant, remove the old sealant from the mounting surface; then remove any moisture, oil, and foreign materials from the application and mounting surfaces.
- Always use shop paper for cleaning the inside of components.
- Never use cotton gloves or shop rags to prevent entering of lint.
- During assembly, observe the specified tightening torque, and apply new gear oil, petroleum jelly, or multipurpose grease as specified for each vehicle, if necessary.

# Precautions for Removing Battery Terminal

 When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
 NOTE:

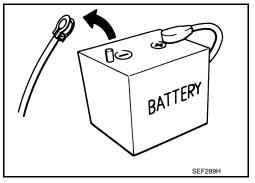
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

• For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch. **NOTE:** 

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

• After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC. **NOTE:** 

The removal of 12V battery may cause a DTC detection error.



#### PREPARATION А PREPARATION **Special Service Tools** INFOID:000000010596005 В The actual shapes of TechMate tools may differ from those of special service tools illustrated here. Tool number С Description (TechMate No.) Tool name KV40104100 Removing side flange DLN ( \_ ) Attachment Е ZZA0804D F ST36230000 Removing side flange (J-25840-A) Sliding hammer ഘ අ Н ZZA0803D ST3127S000 Measuring pinion bearing preload and total (J-25765-A) preload Preload gauge ZZA0806D KV381054S0 Removing front oil seal Κ (J-34286) Puller A. L ZZA0601D Μ ST30720000 Installing front oil seal (J-25405) · Installing pinion rear bearing outer race Drift Ν a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia. Ο ZZA0811D KV38107900 Installing side flange (J-39352) Ρ Protector S-NT129

< PREPARATION >

# PREPARATION

#### < PREPARATION >

Tool number (TechMate No.) Tool name		Description
KV38100200 (J-26233) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.		Installing side oil seal
KV10111100 (J-37228) Seal cutter	ZZA1143D	Removing rear cover
KV38100800 (J-25604-01) Attachment A: 541 mm (21.30 in) B: 200 mm (7.87 in)	S-NT046	Fixing unit assembly
ST3306S001 (J-22888-D) Differential side bearing puller set 1: ST33051001 (J-22888-20) Puller 2: ST33061000 (J-8107-2) Base a: 28.5 mm (1.122 in) dia. b: 38 mm (1.50 in) dia.		Removing and installing side bearing inner race
KV10112100 (BT-8653-A) Angle wrench		Tightening the drive gear mounting bolt
KV38100300 (J-25523) Drift a: 54 mm (2.13 in) dia. b: 46 mm (1.81 in) dia. c: 32 mm (1.26 in) dia.	ZZA0120D	Installing side bearing inner race

# PREPARATION

# [REAR FINAL DRIVE: R200]

Tool number (TechMate No.) Tool name		Description	A
(J-8129) Spring gauge		Measuring turning torque	E
	NT127		(
KV40105230 ( — ) Drift a: 92 mm (3.62 in) dia. b: 86 mm (3.39 in) dia. c: 45 mm (1.77 in) dia.		Installing pinion rear bearing outer race	E
ST30611000 (J-25742-1) Drift bar		Installing pinion front bearing outer race (Use with ST30613000)	(
ST30613000 (J-25742-3) Drift a: 72 mm (2.83 in) dia. b: 48 mm (1.89 in) dia.	S-NT090	Installing pinion front bearing outer race	
ST30901000 (J-26010-01) Drift a: 79 mm (3.11 in) dia. b: 45 mm (1.77 in) dia. c: 35.2 mm (1.386 in) dia.	a b c ZZA0978D	Installing pinion rear bearing inner race	ſ

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< PREPARATION >

# PREPARATION

#### < PREPARATION >

# [REAR FINAL DRIVE: R200]

Tool name		Description
Flange wrench		Removing and installing drive pinion lock nut
	0	
	NT035	
Puller		Removing companion flange
Sliding hammer	ZZA0119D	Removing differential case assembly
C C C C C C C C C C C C C C C C C C C		
	Ţ.	
-	NT125	
Replacer		Removing pinion rear bearing inner race
	ZZA0700D	
Spacer		Installing pinion front bearing inner race
a: 60 mm (2.36 in) dia. b: 36 mm (1.42 in) dia. c: 30 mm (1.18 in)		
	a ZZA1133D	
Power tool		Loosening bolts and nuts

#### < PERIODIC MAINTENANCE >

# PERIODIC MAINTENANCE REAR DIFFERENTIAL GEAR OIL

# Inspection

#### OIL LEAKAGE

· Make sure that oil is not leaking from final drive assembly or around it.

#### OIL LEVEL

• Remove filler plug (1) and check oil level from filler plug mounting hole as shown in the figure.

#### CAUTION:

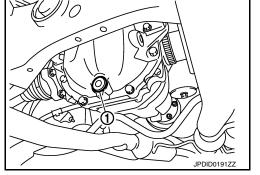
#### Never start engine while checking oil level.

 Set a gasket on filler plug and install it on final drive assembly. Refer to <u>DLN-180</u>, "<u>2WD</u> : <u>Exploded View</u>" (2WD), <u>DLN-192</u>, "<u>AWD</u> : <u>Exploded View</u>" (AWD).
 CAUTION:

Never reuse gasket.

# Draining

- 1. Stop engine.
- 2. Remove drain plug (1) and drain gear oil.
- Set a gasket on drain plug and install it to final drive assembly and tighten to the specified torque. Refer to <u>DLN-180, "2WD :</u> <u>Exploded View"</u> (2WD), <u>DLN-192, "AWD : Exploded View"</u> (AWD). <u>CAUTION:</u> Never reuse gasket.



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# Refilling

1. Remove filler plug (1). Fill with new gear oil until oil level reaches the specified level near filler plug mounting hole.

Oil grade and viscosity

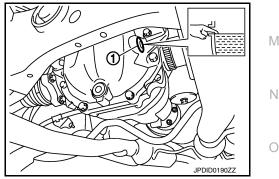
: Refer to <u>MA-10, "Fluids</u> and Lubricants". : Refer to <u>DLN-221, "Gen-</u>

eral Specification".

 After refilling oil, check oil level. Set a gasket to filler plug, then install it to final drive assembly. Refer to <u>DLN-180, "2WD :</u> <u>Exploded View"</u> (2WD), <u>DLN-192, "AWD : Exploded View"</u> (AWD). CAUTION:

Never reuse gasket.

**Oil capacity** 



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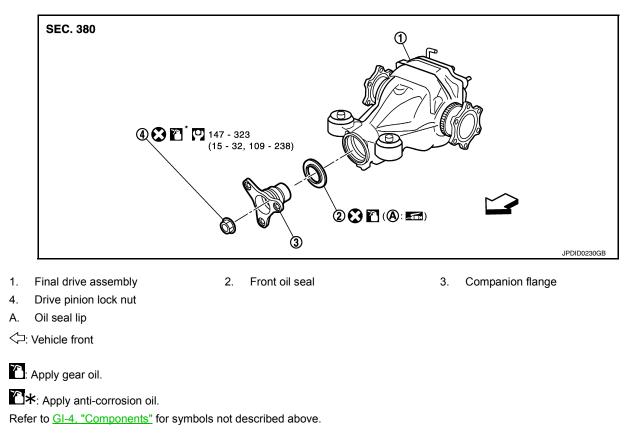
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# < REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > FRONT OIL SEAL 2WD

2WD : Exploded View

INFOID:000000010596010



# 2WD : Removal and Installation

INFOID:000000010596011

# REMOVAL

#### CAUTION:

Verify identification stamp of replacement frequency put in the lower part of gear carrier to determine replacement for collapsible spacer when replacing front oil seal. Refer to "Identification stamp of replacement frequency of front oil seal". If collapsible spacer replacement is necessary, remove final drive assembly and disassemble it to replace front oil seal and collapsible spacer. Refer to <u>DLN-176</u>, "<u>2WD : Removal and Installation</u>" and <u>DLN-181</u>, "<u>2WD : Disassembly</u>".

NOTE:

The reuse of collapsible spacer is prohibited in principle. However, it is reusable on a one-time basis only in cases when replacing front oil seal.

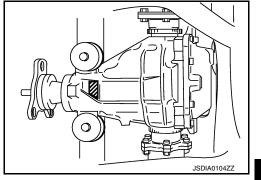
Identification stamp of replacement frequency of front oil seal

#### < REMOVAL AND INSTALLATION >

- The diagonally shaded area in the figure shows stamping point for replacement frequency of front oil seal.
- The following table shows if collapsible spacer replacement is needed before replacing front oil seal.

When collapsible spacer replacement is required, disassemble final drive assembly to replace collapsible spacer and front oil seal. Refer to <u>DLN-181</u>, "2WD : Disassembly".

Stamp	collapsible spacer replacement
No stamp	Not required
"0" or "0" on the far right of stamp	Required
"01" or "1" on the far right of stamp	Not required



[REAR FINAL DRIVE: R200]

#### **CAUTION:**

#### Make a stamping after replacing front oil seal.

After replacing front oil seal, make a stamping on the stamping point in accordance with the table below in
order to identify replacement frequency.

#### CAUTION:

#### Make a stamping from left to right.

Stamp before stamping	Stamping on the far right	Stamping	
No stamp	0	0	
"0" (Front oil seal was replaced once.)	1	01	
"01" (Collapsible spacer and front oil seal were replaced last time.)	0	010	
"0" is on the far right. (Only front oil seal was replaced last time.)	1	01	
"1" is on the far right. (Collapsible spacer and front oil seal were replaced last time.)	0	010	

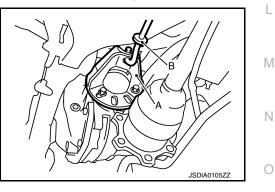
1. Drain gear oil. Refer to DLN-161, "Draining".

- 2. Make a judgment if a collapsible spacer replacement is required.
- 3. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
- 4. Remove rear wheel sensor. Refer to <u>BRC-154, "REAR WHEEL SENSOR : Exploded View"</u>.
- 5. Remove drive shaft from final drive. Then suspend it by wire, etc. Refer to RAX-10, "Exploded View".
- 6. Install attachment (A) to side flange, and then pull out the side flange with the sliding hammer (B).
  - A : Attachment [SST: KV40104100 ( )
  - B : Sliding hammer [SST: ST36230000 (J-25840-A)]

#### NOTE:

#### Circular clip installation position: Final drive side

7. Remove rear propeller shaft. Refer to DLN-98, "Exploded View".





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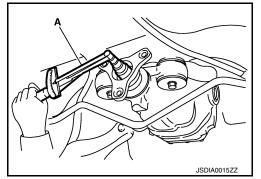
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 Measure the total preload with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].
 NOTE:

#### Record the preload measurement.



B

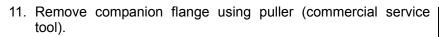
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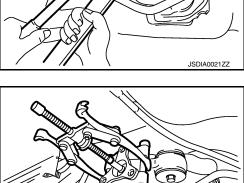
Put matching mark (B) on the end of the drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).
 CAUTION:

For matching mark, use paint. Never damage companion flange and drive pinion. NOTE:

The matching mark on the final drive companion flange indicates the maximum vertical runout position.

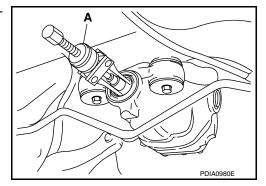
10. Remove drive pinion lock nut, using the flange wrench (commercial service tool).







 Remove front oil seal using the puller (A) [SST: KV381054S0 (J-34286)].



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# INSTALLATION

- 1. Apply multi-purpose grease to front oil seal lips.
- Install front oil seal using the drift (A) [SST: ST30720000 (J-25405)] as shown in figure. CAUTION:
  - Never reuse oil seal.
  - Never incline oil seal when installing.

3. Align the matching mark (B) of drive pinion with the matching mark (A) of companion flange (1), and then install the companion flange.

- 4. Apply anti-corrosion oil to the thread and seat of new drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion, using flange wrench (commercial service tool).
  - A : Preload gauge [SST: ST3127S000 (J-25765-A)]

#### CAUTION:

#### Never reuse drive pinion lock nut.

5. Tighten drive pinion lock nut within the limits of specified torque so as to keep the pinion bearing preload within a standard values, using preload gauge [SST: ST3127S000 (J-25765-A)].

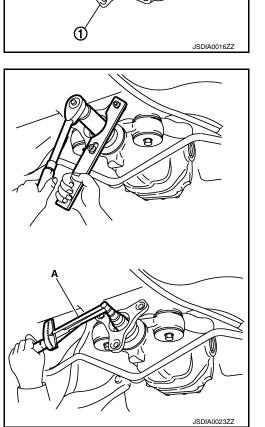
#### Standard

Total preload torque

: A value that add 0.1 - 0.4N·m (0.01 - 0.04 kg-m) to the measured value when removing.

# CAUTION:

- Adjust to the lower limit of the drive pinion lock nut tightening torque first.
- If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.





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- 6. Set a dial indicator (A) vertically to the tip of the drive pinion.
- 7. Rotate drive pinion to check for runout.

#### **Drive pinion runout**

#### : Refer to <u>DLN-221, "Drive</u> <u>Pinion Runout (2WD)"</u>.

- If the runout value is still outside of the limit after the phase has been changed, possible causes are an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.
- Make a stamping for identification of front oil seal replacement frequency. Refer to "Identification stamp of replacement frequency of front oil seal".
   CAUTION:

#### Make a stamping after replacing front oil seal.

- 9. Install rear propeller shaft. Refer to <u>DLN-98, "Exploded View"</u>.
- 10. Install side flange with the following procedure.
- a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
- b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
- c. Put a suitable drift on the center of side flange, then drive it until sound changes.

#### NOTE:

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When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.

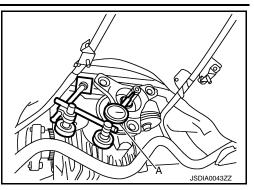
d. Confirm that the dimension of the side flange (1) installation measurement (A) in the figure comes into the following.

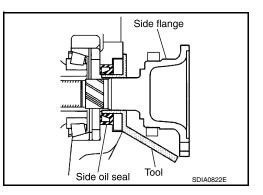
#### Standard

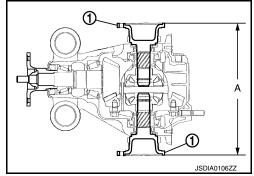
#### : 326 – 328 mm (12.83 – 12.91 in)

- 11. Install drive shaft. Refer to RAX-10, "Exploded View".
- 12. Install rear wheel sensor. Refer to <u>BRC-154</u>, <u>"REAR WHEEL</u> <u>SENSOR : Exploded View"</u>.
- 13. Install center muffler. Refer to EX-5, "Exploded View".
- 14. Refill gear oil to the final drive and check oil level. Refer to <u>DLN-</u> <u>161, "Refilling"</u>.
- 15. Check the final drive for oil leakage. Refer to <u>DLN-161, "Inspection"</u>.

#### AWD







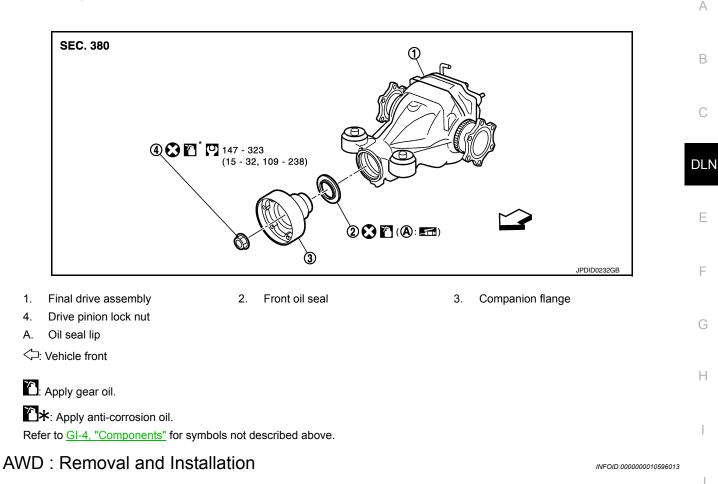
#### [REAR FINAL DRIVE: R200]

#### < REMOVAL AND INSTALLATION >

# AWD : Exploded View

[REAR FINAL DRIVE: R200]

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#### REMOVAL

#### CAUTION:

Verify identification stamp of replacement frequency put in the lower part of gear carrier to determine Κ replacement for collapsible spacer when replacing front oil seal. Refer to "Identification stamp of replacement frequency of front oil seal". If collapsible spacer replacement is necessary, remove final drive assembly and disassemble it to replace front oil seal and collapsible spacer. Refer to DLN-178, "AWD : Removal and Installation" and DLN-193, "AWD : Disassembly".

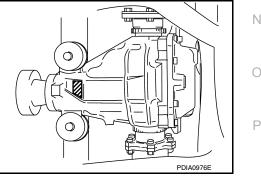
#### NOTE:

The reuse of collapsible spacer is prohibited in principle. However, it is reusable on a one-time basis only in cases when replacing front oil seal.

Identification stamp of replacement frequency of front oil seal

- The diagonally shaded area in the figure shows stamping point for replacement frequency of front oil seal.
- The following table shows if collapsible spacer replacement is needed before replacing front oil seal. When collapsible spacer replacement is required, disassemble final drive assembly to replace collapsible spacer and front oil seal. Refer to DLN-193, "AWD : Disassembly".

Stamp	collapsible spacer replacement
No stamp	Not required
"0" or "0" on the far right of stamp	Required
"01" or "1" on the far right of stamp	Not required



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**CAUTION:** 

Make a stamping after replacing front oil seal.

#### < REMOVAL AND INSTALLATION >

After replacing front oil seal, make a stamping on the stamping point in accordance with the table below in ٠ order to identify replacement frequency. CAUTION:

#### Make a stamping from left to right.

Stamp before stamping	Stamping on the far right	Stamping
No stamp	0	0
"0" (Front oil seal was replaced once.)	1	01
"01" (Collapsible spacer and front oil seal were replaced last time.)	0	010
"0" is on the far right. (Only front oil seal was replaced last time.)	1	01
"1" is on the far right. (Collapsible spacer and front oil seal were replaced last time.)	0	010

- 1. Drain gear oil. Refer to DLN-161, "Draining".
- 2. Make a judgment if a collapsible spacer replacement is required.
- 3. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
- Remove rear wheel sensor. Refer to BRC-154, "REAR WHEEL SENSOR : Exploded View".
- 5. Remove drive shaft from final drive. Then suspend it by wire, etc. Refer to RAX-10, "Exploded View".
- Install attachment (A) to side flange, and then pull out the side 6. flange with the sliding hammer (B).
  - A : Attachment [SST: KV40104100 ( )

ST3127S000 (J-25765-A)].

Record the preload measurement.

B : Sliding hammer [SST: ST36230000 (J-25840-A)]

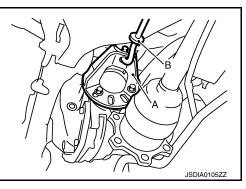
#### NOTE:

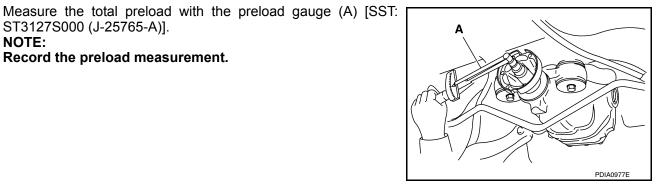
NOTE:

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#### Circular clip installation position: Final drive side

7. Remove rear propeller shaft. Refer to DLN-108, "Exploded View".

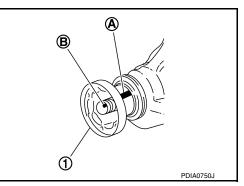




Put matching mark (B) on the end of the drive pinion. The 9. matching mark should be in line with the matching mark (A) on companion flange (1). CAUTION:

For matching mark, use paint. Never damage companion flange and drive pinion. NOTE:

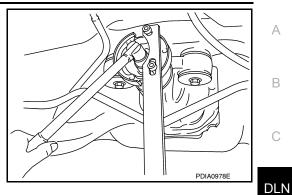
The matching mark on the final drive companion flange indicates the maximum vertical runout position.



#### < REMOVAL AND INSTALLATION >

10. Remove drive pinion lock nut using the flange wrench (commercial service tool).

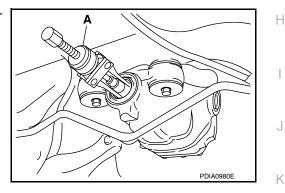
#### [REAR FINAL DRIVE: R200]



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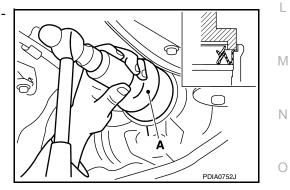
11. Remove companion flange using puller (commercial service tool).

12. Remove front oil seal using the puller (A) [SST: KV381054S0 (J-34286)].



#### INSTALLATION

- 1. Apply multi-purpose grease to front oil seal lips.
- Install front oil seal using the drift (A) [SST: ST30720000 (J-25405)] as shown in figure.
  - CAUTION:
  - Never reuse oil seal.
  - Never incline oil seal when installing.



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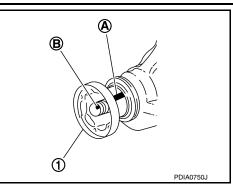
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#### < REMOVAL AND INSTALLATION >

3. Align the matching mark (B) of drive pinion with the matching mark (A) of companion flange (1), and then install the companion flange.

#### [REAR FINAL DRIVE: R200]



- 4. Apply anti-corrosion oil to the thread and seat of new drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion, using flange wrench (commercial service tool).
  - A : Preload gauge [SST: ST3127S000 (J-25765-A)]

#### **CAUTION:**

#### Never reuse drive pinion lock nut.

 Tighten drive pinion lock nut within the limits of specified torque so as to keep the pinion bearing preload within a standard values, using preload gauge [SST: ST3127S000 (J-25765-A)].

#### Standard

**Total preload torque** 

: A value that add 0.1 - 0.4N·m (0.01 - 0.04 kg-m) to the measured value when removing.

#### **CAUTION:**

- Adjust to the lower limit of the drive pinion lock nut tightening torque first.
- If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.
- 6. Fit a test indicator to the inner side of companion flange (socket diameter).
- 7. Rotate companion flange to check for runout.

#### **Companion flange runout**

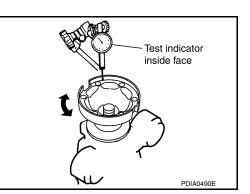
: Refer to <u>DLN-222, "Com-</u> panion Flange Runout (AWD)".

- If the runout value is outside the runout limit, follow the procedure below to adjust.
- Check for runout while changing the phase between companion flange and drive pinion by 90° step, and search for the position where the runout is the minimum.
- If the runout value is still outside of the limit after the phase has been changed, possible cause will be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.
- If the runout value is still outside of the limit after the check and repair, replace companion flange.
- 8. Make a stamping for identification of front oil seal replacement frequency. Refer to "Identification stamp of replacement frequency of front oil seal".

#### CAUTION:

Make a stamping after replacing front oil seal.

9. Install rear propeller shaft. Refer to <u>DLN-108, "Exploded View"</u>.



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#### < REMOVAL AND INSTALLATION >

- 10. Install side flange with the following procedure.
- a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
- b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
- c. Put a suitable drift on the center of side flange, then drive it until sound changes.

NOTE:

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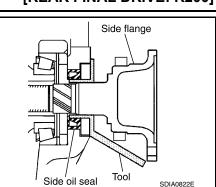
When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.

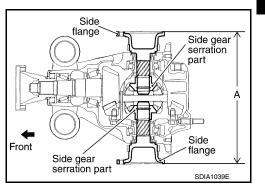
d. Confirm that the dimension of the side flange installation measurement (A) in the figure comes into the following.

#### Standard

#### : 326 – 328 mm (12.83 – 12.91 in)

- 11. Install drive shaft. Refer to RAX-10, "Exploded View".
- 12. Install rear wheel sensor. Refer to <u>BRC-154</u>, "REAR WHEEL <u>SENSOR : Exploded View"</u>.
- 13. Install center muffler. Refer to EX-5, "Exploded View".
- 14. Refill gear oil to the final drive and check oil level. Refer to <u>DLN-</u> <u>161, "Refilling"</u>.
- 15. Check the final drive for oil leakage. Refer to DLN-161, "Inspection".





# [REAR FINAL DRIVE: R200]

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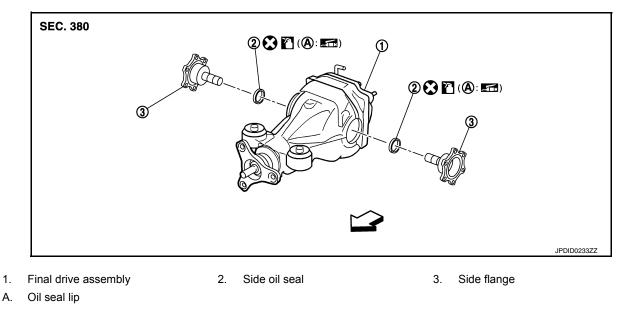
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#### < REMOVAL AND INSTALLATION > SIDE OIL SEAL

# 2WD

2WD : Exploded View

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C: Vehicle front

: Apply gear oil.

Refer to GI-4, "Components" for symbols not described above.

# 2WD : Removal and Installation

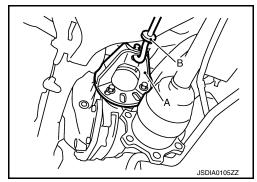
INFOID:000000010596015

# REMOVAL

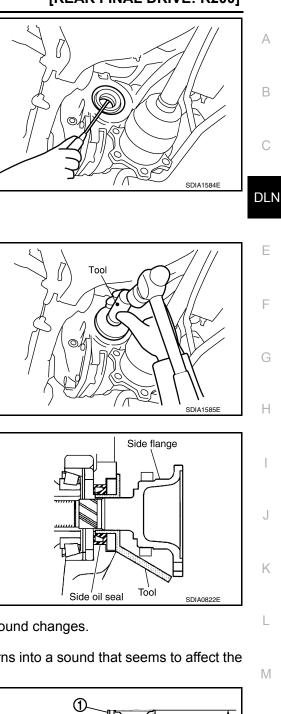
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- 1. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
- 2. Remove rear wheel sensor. Refer to <u>BRC-154, "REAR WHEEL SENSOR : Exploded View"</u>.
- Remove drive shaft from final drive with a power tool. Then suspend it by wire, etc. Refer to RAX-10, 3. "Exploded View".
- 4. Install attachment (A) to side flange, and then pull out the side flange with the sliding hammer (B).
  - A : Attachment [SST: KV40104100 ( )
  - B : Sliding hammer [SST: ST36230000 (J-25840-A)]

```
NOTE:
Circular clip installation position: Final drive side
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5. Remove side oil seal, using a suitable tool. CAUTION: Never damage gear carrier.



#### INSTALLATION

- 1. Apply multi-purpose grease to side oil seal lips.
- Install side oil seal until it becomes flush with the case end, using the drift [SST: KV38100200 (J-26233)]. **CAUTION:** 
  - Never reuse oil seal.
  - · When installing, never incline oil seal.

- Install side flange with the following procedure. 3.
- Attach the protector [SST: KV38107900 (J-39352)] to side oil a. seal.
- After the side flange is inserted and the serrated part of side b. gear has engaged the serrated part of flange, remove the protector.
- c. Put a suitable drift on the center of side flange, then drive it until sound changes. NOTE:

When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.

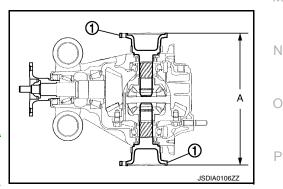
d. Confirm that the dimension of the side flange(1) installation measurement (A) in the figure comes into the following.

#### Standard

Α : 326 - 328 mm (12.83 - 12.91 in)

- Install drive shaft. Refer to <u>RAX-10, "Exploded View"</u>.
- 5. Install rear wheel sensor. Refer to BRC-154, "REAR WHEEL SENSOR : Exploded View".
- Install center muffler. Refer to <u>EX-5, "Exploded View"</u>.
- When oil leaks while removing, check oil level after the installation. Refer to DLN-161, "Inspection".

AWD



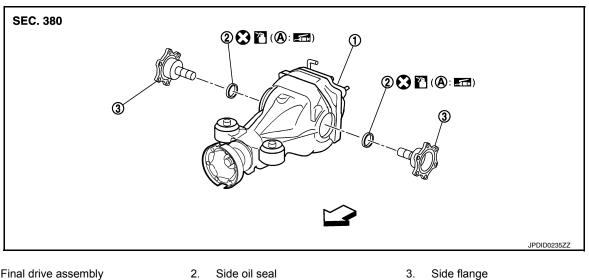
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# SIDE OIL SEAL

#### < REMOVAL AND INSTALLATION >

# AWD : Exploded View

INFOID:000000010596016



3.

- Final drive assembly 1.
- Oil seal lip Α.

C: Vehicle front

: Apply gear oil.

Refer to GI-4, "Components" for symbols not described above.

# AWD : Removal and Installation

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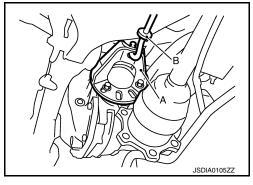
#### REMOVAL

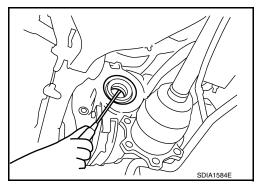
- 1. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
- 2. Remove rear wheel sensor. Refer to BRC-154, "REAR WHEEL SENSOR : Exploded View".
- 3. Remove drive shaft from final drive with a power tool. Then suspend it by wire, etc. Refer to RAX-10. "Exploded View".
- 4. Install attachment (A) to side flange, and then pull out the side flange with the sliding hammer (B).
  - A : Attachment [SST: KV40104100 ( )
  - B : Sliding hammer [SST: ST36230000 (J-25840-A)]

#### NOTE:

Circular clip installation position: Final drive side

5. Remove side oil seal, using a suitable tool. **CAUTION:** Never damage gear carrier.





Tool

#### INSTALLATION

- 1. Apply multi-purpose grease to side oil seal lips.
- Install side oil seal until it becomes flush with the case end, using the drift [SST: KV38100200 (J-26233)].
   CAUTION:
  - Never reuse oil seal.
  - When installing, never incline oil seal.

- 3. Install side flange with the following procedure.
- a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
- b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
- c. Put a suitable drift on the center of side flange, then drive it until sound changes. **NOTE:**

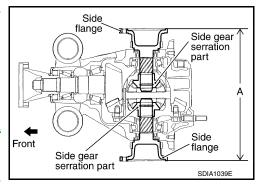
When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.

d. Confirm that the dimension of the side flangeinstallation measurement (A) in the figure comes into the following.

#### Standard

#### Α

- : 326 328 mm (12.83 12.91 in)
- 4. Install drive shaft. Refer to <u>RAX-10, "Exploded View"</u>.
- Install rear wheel sensor. Refer to <u>BRC-154</u>, "<u>REAR WHEEL</u> <u>SENSOR : Exploded View</u>".
- 6. Install center muffler. Refer to EX-5, "Exploded View".
- 7. When oil leaks while removing, check oil level after the installation. Refer to <u>DLN-161</u>, "Inspection".

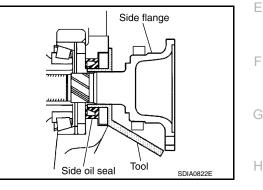




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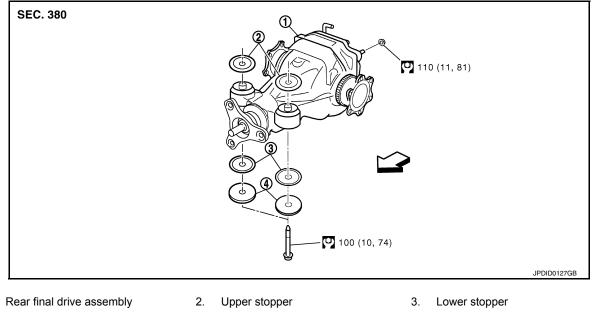
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[REAR FINAL DRIVE: R200]



4. Washer

1.

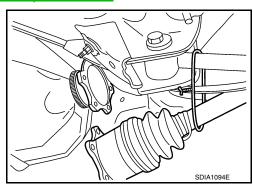
C: Vehicle front

Refer to <u>GI-4, "Components"</u> for symbols in the figure.

# 2WD : Removal and Installation

#### REMOVAL

- 1. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
- 2. Remove stabilizer bar with a power tool. Refer to <u>RSU-16, "Exploded View"</u>.
- 3. Remove rear propeller shaft from the final drive. Refer to <u>DLN-98, "Exploded View"</u>.
- 4. Remove drive shaft from final drive with a power tool. Then suspend it by wire, etc. Refer to <u>RAX-10</u>, "Exploded View".
- 5. Remove breather hose from the final drive.
- Remove rear wheel sensor. Refer to <u>BRC-154</u>, "<u>REAR WHEEL</u> <u>SENSOR : Exploded View</u>".



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# **REAR FINAL DRIVE ASSEMBLY**

#### < UNIT REMOVAL AND INSTALLATION >

7. Set a suitable jack to rear final drive assembly. **CAUTION:** 

#### Never place a jack on the rear cover (aluminum case).

8. Remove the mounting bolts and nuts connecting to the suspension member, and remove rear final drive assembly with a power tool.

#### **CAUTION:**

Secure rear final drive assembly to a suitable jack while removing it.

#### INSTALLATION

Note the following, and installation is in the reverse order of removal. CAUTION:

Ε Check that there are no pinched or restricted areas on the breather hose caused by bending or winding when installing it.

• Install the breather hose (1) to breather connector until dimension (A) shown as follows.

#### **A**:

**Final drive side** : 20 mm (0.79 in) Suspension member : 20.5 mm (0.807 in) side

#### **CAUTION:**

- Never reuse hose clamp.
- Install the hose clamp at the final drive side, with the tab facing downward.
- Install the hose clamp at the suspension member side, with the tab facing downward.
- If remove breather connector, install breather hose (1) as shown in the figure.
  - 2 : Suspension member
  - 3 : Metal connector

#### : Vehicle front

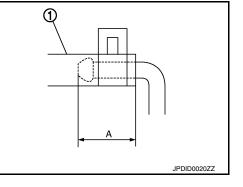
- For installation, insert the resin connector into rear suspension member. Install the metal connector in rear cover so that a paint mark becomes forward of the vehicle as shown in the figure. Arrange the breather hose then to pass by over wheel sensor harness.

#### CAUTION:

#### Never reuse breather connector.

• When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-161, Ν "Inspection".

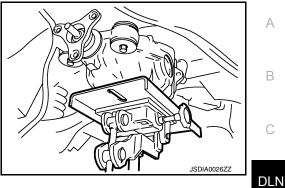
#### AWD

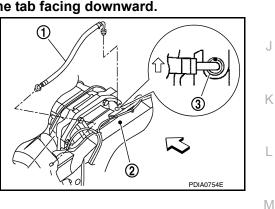


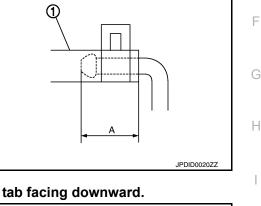
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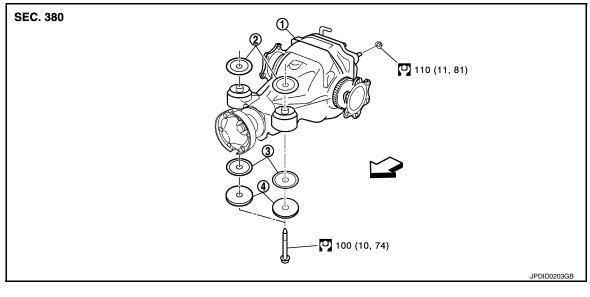
# [REAR FINAL DRIVE: R200]

# REAR FINAL DRIVE ASSEMBLY

## < UNIT REMOVAL AND INSTALLATION >

# AWD : Exploded View

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- 1. Rear final drive assembly
- 2. Upper stopper

4. Washer

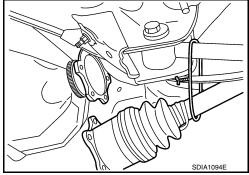
Vehicle front
Refer to <u>GI-4, "Components"</u> for symbols in the figure.

#### AWD : Removal and Installation

INFOID:000000010596021

#### REMOVAL

- 1. Remove center muffler with a power tool. Refer to EX-5. "Exploded View".
- 2. Remove stabilizer bar with a power tool. Refer to RSU-16, "Exploded View".
- 3. Remove rear propeller shaft from the final drive. Refer to DLN-108, "Exploded View".
- Remove drive shaft from final drive with a power tool. Then suspend it by wire, etc. Refer to <u>RAX-10</u>, "Exploded View".
- 5. Remove breather hose from the final drive.
- 6. Remove rear wheel sensor. Refer to <u>BRC-154</u>, <u>"REAR WHEEL</u> <u>SENSOR : Exploded View"</u>.



3. Lower stopper

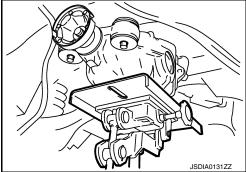
7. Set a suitable jack to rear final drive assembly. CAUTION:

#### Never place a jack on the rear cover (aluminum case).

8. Remove the mounting bolts and nuts connecting to the suspension member, and remove rear final drive assembly with a power tool.

#### CAUTION:

Secure rear final drive assembly to a suitable jack while removing it.



#### INSTALLATION

#### Revision: February 2015

Check that there are no pinched or restricted areas on the breather hose caused by bending or wind-

# (A) shown as follows.

ing when installing it.

< UNIT REMOVAL AND INSTALLATION >

**A**:

CAUTION:

**Final drive side** : 20 mm (0.79 in) Suspension member : 20.5 mm (0.807 in) side

Note the following, and installation is in the reverse order of removal.

#### **CAUTION:**

- Never reuse hose clamp.
- Install the hose clamp at the final drive side, with the tab facing downward.
- Install the hose clamp at the suspension member side, with the tab facing downward.
- If remove breather connector, install breather hose (1) as shown in the figure.
  - 2 : Suspension member
  - : Metal connector 3

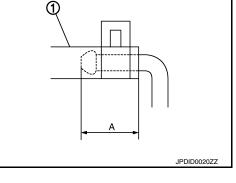
#### C: Vehicle front

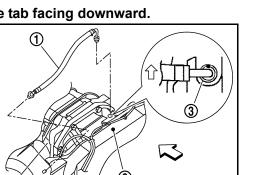
- For installation, insert the resin connector into rear suspension member. Install the metal connector in rear cover so that a paint mark becomes forward of the vehicle as shown in the figure. Arrange the breather hose then to pass by over wheel sensor harness.

#### **CAUTION:**

#### Never reuse breather connector.

• When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-161, "Inspection".





[REAR FINAL DRIVE: R200]

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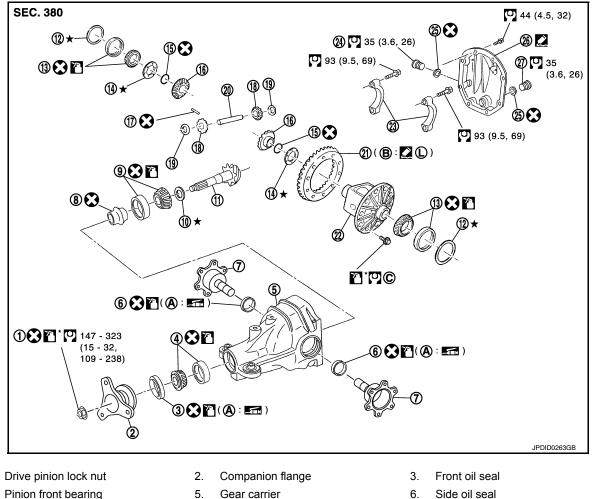
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# UNIT DISASSEMBLY AND ASSEMBLY DIFFERENTIAL ASSEMBLY 2WD

2WD : Exploded View

INFOID:000000010596022



- 4.
- Side flange 7.

1.

- 10. Pinion height adjusting washer
- 13. Side bearing
- 16. Side gear
- 19. Pinion mate thrust washer
- 22. Differential case
- 25. Gasket
- Α. Oil seal lip

- 5. Gear carrier
- 8. Collapsible spacer
- 11. Drive pinion
- 14. Side gear thrust washer
- 17. Lock pin
- 20. Pinion mate shaft
- 23. Bearing cap
- 26. Rear cover
- B. Screw hole

- 6. Side oil seal
- 9. Pinion rear bearing
- Side bearing adjusting washer 12.
- 15. Circular clip
- 18. Pinion mate gear
- 21. Drive gear
- 24. Filler plug
- 27. Drain plug
- C. Comply with the assembly procedure when tightening. Refer to DLN-183, "2WD : Assembly".

: Apply gear oil.

Apply anti-corrosion oil.

Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

#### < UNIT DISASSEMBLY AND ASSEMBLY >

20): Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24. "Recommended Chemical Products and Sealants".

Refer to GI-4, "Components" for symbols not described above.

#### 2WD : Disassembly

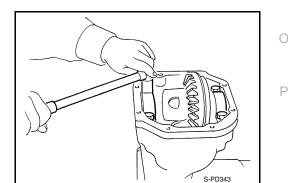
- 1. Drain gear oil, if necessary.
- 2. Remove side flange.
- 3. Remove rear cover mounting bolts.
- 4. Remove rear cover to insert the seal cutter (A) [SST: KV10111100 (J-37228)] between gear carrier and rear cover. **CAUTION:** 
  - Never damage the mating surface.
  - Never insert flat-bladed screwdriver, this may damage the mating surface.
- Using two 45 mm (1.77 in) spacers, mount carrier on the attach-5. ment (A) [SST: KV38100800 (J-25604-01)].

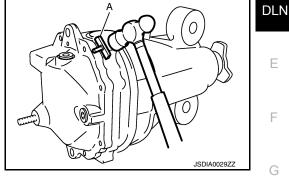
6. For proper reinstallation, paint matching marks on one side of the bearing cap.

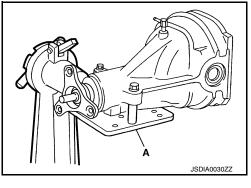
**CAUTION:** 

- · For matching marks, use paint. Never damage bearing caps and gear carrier.
- · Bearing caps are manufactured as integral molding. Use the matching marks to them in their original positions.
- Matching marks SDIA1795E

Remove bearing caps.







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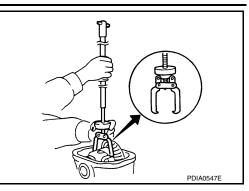
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

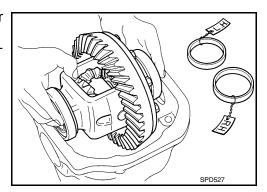
8. Lift differential case assembly out with a sliding hammer (commercial service tool).

#### [REAR FINAL DRIVE: R200]



• Keep side bearing outer races together with inner race. Never mix them up.

Also, keep side bearing adjusting washers together with bearings.

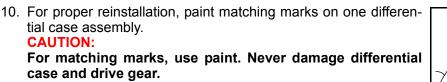


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- 9. Remove side bearing inner race with puller (A) and base (B). To prevent damage to bearing, engage puller jaws in groove (().
  - A : Puller [SST: ST33051001 (J-22888-20)]
  - B : Base [SST: ST33061000 (J-8107-2)]

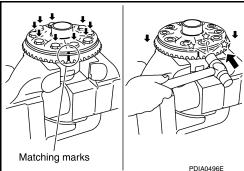
#### **CAUTION:**

- To prevent damage to the side bearing and drive gear, place copper plates between these parts and vise.
- It is not necessary to remove side bearing inner race except when it is replaced.



- 11. Remove drive gear mounting bolts.
- 12. Tap drive gear off differential case assembly with a soft hammer. CAUTION:

Tap evenly all around to keep drive gear from bending.



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#### < UNIT DISASSEMBLY AND ASSEMBLY >

13. Remove lock pin of pinion mate shaft with a punch from drive gear side.

#### [REAR FINAL DRIVE: R200]



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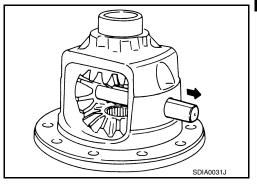




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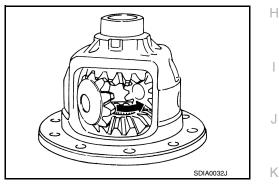
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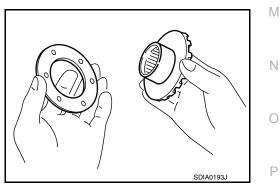
- 15. Turn pinion mate gear, then remove pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from differential case.
- 16. Remove circular clip from side gear. CAUTION: Never damage side gear.

14. Remove pinion mate shaft.



2WD : Assembly

- 1. Install circular clip to side gear. CAUTION: Never damage side gear.
- Install side gear thrust washers with the same thickness as the ones installed prior to disassembly or reinstall the old ones on the side gears.



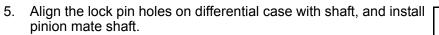
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

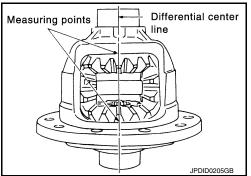
3. Install side gears and thrust washers into differential case. CAUTION:

Make sure that the circular clip is installed to side gears.

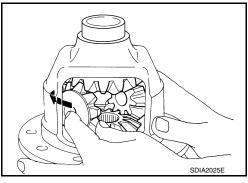
4. Align 2 pinion mate gears in diagonally opposite positions, then rotate and install them into differential case after installing thrust washer to pinion mate gear.



- 6. Measure side gear end play. If necessary, select the appropriate side gear thrust washers.
- a. Place differential case straight up so that side gear to be measured comes upward.



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#### < UNIT DISASSEMBLY AND ASSEMBLY >

b. Using feeler gauge, measure the clearance between side gear back and differential case at 3 different points, while rotating side gear. Average the 3 readings, and then measure the clearance of the other side as well.

Side gear back clearance

: Refer to <u>DLN-221, "Differ-</u> ential Side Gear Clearance".

#### CAUTION:

To prevent side gear from tilting, insert feeler gauges with the same thickness from both sides.

c. If the back clearance is outside the specification, use a thicker/ thinner side gear thrust washer to adjust. For selecting thrust washer, refer to the latest parts information.

Use a thicker thrust wash-
er.
Use a thinner thrust wash-
er.

#### CAUTION:

Select a side gear thrust washer for right and left individually.

 Drive a lock pin into pinion mate shaft, using a punch. Make sure lock pin is flush with differential case.
 CAUTION:

Never reuse lock pin.

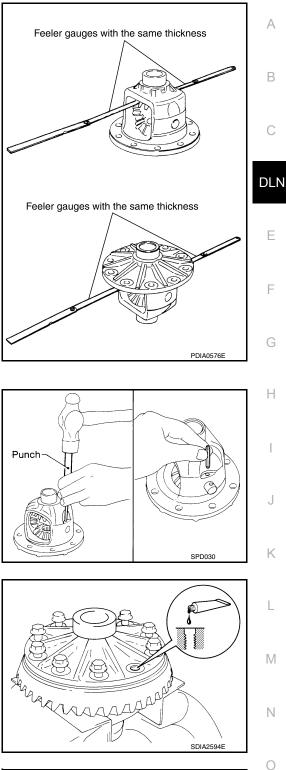
 Apply thread locking sealant into the thread hole of drive gear. Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to <u>GI-24</u>, "Recommended Chemical Products and <u>Sealants</u>". CAUTION:

Clean and degrease drive gear back and threaded holes sufficiently.

- Install the drive gear to differential case.
   CAUTION: Align the matching marks of differential case and drive gear.
- Tighten the mounting bolts with the following procedure.
   CAUTION:
   Apply anti-corrosion oil to the thread and seat of mounting
- a. Tighten the bolts in a crisscross fashion to the specified torque.

#### Drive gear mounting : 78.5 N•m (8.0 kg-m, 58 ft-lb) bolts tightening torque

b. Tighten the bolts additionally to the specified angle.





#### [REAR FINAL DRIVE: R200]

**Revision: February 2015** 

bolts.

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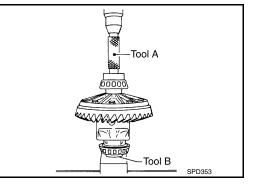
#### Drive gear mounting : 31 to 36 degree bolts tightening angle

#### CAUTION:

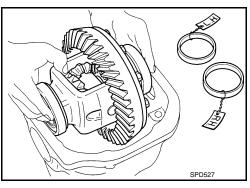
Check the tightening angle using the angle wrench [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.

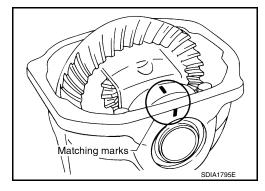
- Press side bearing inner races to differential case, using the drift (A) and the base (B).
  - A : Drift [SST: KV38100300 (J-25523)]
  - B : Base [SST: ST33061000 (J-8107-2)]

#### CAUTION: Never reuse side bearing inner race.



- Set bearing outer races to differential case assembly, and install it with removed side bearing adjusting washer or same thickness washer into gear carrier.
   CAUTION:
  - Apply differential gear oil to the side bearings.
  - Install side bearing and side bearing adjusting washer in correct location. (drive gear tooth side or drive gear back side)
- 13. Measure side bearing preload. If necessary, select the appropriate side bearing adjusting washers. Refer to <u>DLN-187, "2WD :</u> <u>Adjustment"</u>.
- 14. Align matching marks on bearing cap with that on gear carrier.
- 15. Install bearing caps and tighten bearing cap mounting bolts.





- Using the drift [SST: KV38100200 (J-26233)], drive side oil seals until it becomes flush with the case end. CAUTION:
  - Never reuse oil seal.
  - When installing, never incline oil seal.
  - Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.
- Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to <u>DLN-187, "2WD : Adjustment"</u>.

Recheck above items. Readjust the above description, if necessary.

#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 18. Apply sealant to mating surface of rear cover.
  - Use Genuine Silicone RTV or equivalent. Refer to <u>GI-24,</u> <u>"Recommended Chemical Products and Sealants"</u>. CAUTION:

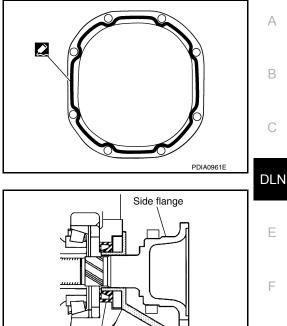
Remove old sealant adhering to mounting surfaces. Also remove any moisture, oil, or foreign material adhering to application and mounting surfaces.

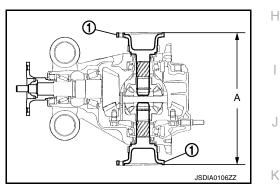
- 19. Install rear cover on gear carrier and tighten mounting bolts.
- 20. Install side flange with the following procedure.
- a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
- b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
- c. Put a suitable drift on the center of side flange, then drive it until sound changes. **NOTE:**

When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.

d. Confirm that the dimension of the side flange(1) installation measurement (A) in the figure comes into the following.







Tool

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Side oil seal

#### 2WD : Adjustment

#### TOTAL PRELOAD TORQUE

Before inspection and adjustment, drain gear oil.

- 1. Secure final drive assembly onto an attachment [SST: KV38100800 (J-25604-01)].
- 2. Remove side flanges.
- 3. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
- 4. Rotate drive pinion at least 20 times to check for smooth operation of the bearing.
- 5. Measure total preload with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].

#### **Total preload torque**

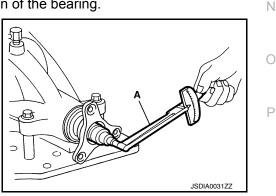
: Refer to <u>DLN-221, "Pre-</u>load Torque".

#### NOTE:

Total preload torque = Pinion bearing preload torque + Side bearing preload torque

• If measured value is out of the specification, disassemble it to check and adjust each part. Adjust the pinion bearing preload and side bearing preload.

Adjust the pinion bearing preload first, then adjust the side bearing preload.



#### < UNIT DISASSEMBLY AND ASSEMBLY >

On pinion bearings:	Replace the collapsible spacer.
On side bearings:	Use thinner side bearing adjusting washers by the same amount to each side. For selecting adjusting washer, refer to the latest parts information.

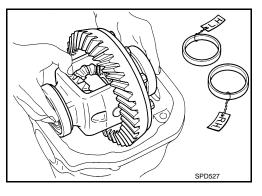
#### When the preload is small

On pinion bearings:	Tighten the drive pinion lock nut.
On side bearings:	Use thicker side bearing adjusting washers by the same amount to each side. For selecting adjusting washer, refer to the latest parts in- formation.

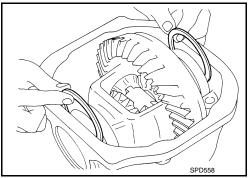
#### SIDE BEARING PRELOAD

Before inspection and adjustment, drain gear oil.

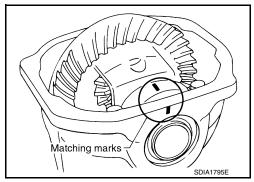
- 1. Remove rear cover. Refer to <u>DLN-181, "2WD : Disassembly"</u>.
- 2. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.
- 3. Place the differential case, with side bearings and bearing races installed, into gear carrier.



4. Insert left and right original side bearing adjusting washers in place between side bearings and gear carrier.



- 5. Install bearing caps in their correct locations and tighten bearing cap mounting bolts.
- 6. Turn the carrier several times to seat the bearings.



#### < UNIT DISASSEMBLY AND ASSEMBLY >

 Measure the turning torque of the carrier at the drive gear mounting bolts with a spring gauge [SST: — (J-8129)].

> Standard Specification

: 34.2 – 39.2 N (3.5 – 4.0 kg, 7.7 – 8.8 lb) of pulling force at the drive gear bolt



8. If the turning torque is outside the specification, use a thicker/ thinner side bearing adjusting washer to adjust. For selecting adjusting washer, refer to the latest parts information.

If the turning torque is less<br/>than the specified range:Use a thicker adjusting<br/>washer.If the turning torque is<br/>greater than the specifica-<br/>tion:Use a thinner adjusting<br/>washer.

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#### **CAUTION:**

Select a side bearing adjusting washer for right and left individually.

9. Record the total amount of washer thickness required for the correct carrier side bearing preload.

#### DRIVE GEAR RUNOUT

- 1. Remove rear cover. Refer to <u>DLN-181, "2WD : Disassembly"</u>.
- 2. Fit a dial indicator to the drive gear back face.
- 3. Rotate the drive gear to measure runout.

#### Drive gear runout

#### : Refer to <u>DLN-221, "Drive</u> <u>Gear Runout"</u>.

 If the runout is outside of the repair limit, check drive gear assembly condition; foreign material may be caught between drive gear and differential case, or differential case or drive gear may be deformed, etc.
 CAUTION:

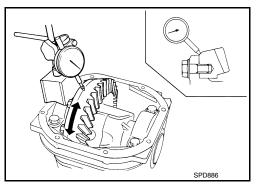
#### Replace drive gear and drive pinion gear as a set.

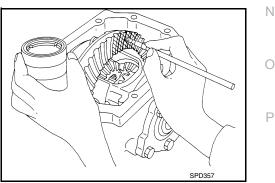
#### TOOTH CONTACT

Before inspection and adjustment, drain gear oil.

- 1. Remove rear cover. Refer to <u>DLN-181, "2WD : Disassembly"</u>.
- 2. Apply red lead to drive gear.
- CAUTION:

Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on drive gear.





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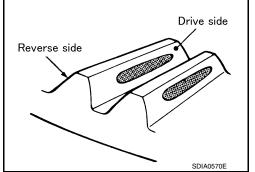
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

 Rotate drive gear back and forth several times, check drive pinion gear to drive gear tooth contact. CAUTION:

Check tooth contact on drive side and reverse side.

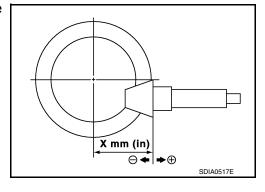


[REAR FINAL DRIVE: R200]

Tooth contact condition		Pinion height adjusting		Adjustment	Possible cause		
Drive	side	Back side		washer selection valve [ mm (in) ]		(Yes/No)	Possible cause
Heel side	Toe side	Toe side	Heel side		+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
[	<u>ار ، «</u>	Cathorna and and a	$\neg$	Thicker	+0.06 (+0.0024)	res	Occurrence of noise when accelerating.
	<u></u>	(1)	$\neg$		+0.03 (+0.0012)		
<u> </u>			$\neg$		0	Νο	_
<u> </u>			$\neg$		-0.03 (-0.0012)		
;	<b>)</b>		»	Thinner	-0.06 (-0.0024)	N	Occurrence of noise at constant speed and decreasing speed.
	······	<b></b>			-0.09 (-0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.

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4. If tooth contact is improperly adjusted, follow the procedure below to adjust the pinion height [dimension (X)].

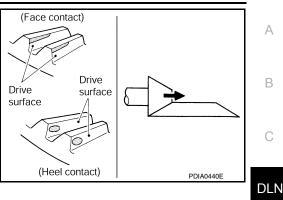


#### < UNIT DISASSEMBLY AND ASSEMBLY >

 If the tooth contact is near the face (face contact), or near the heel (heel contact), thicken pinion height adjusting washers to move drive pinion closer to drive gear.

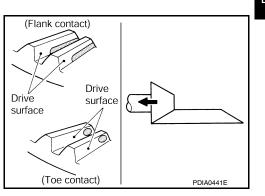
For selecting adjusting washer, refer to the latest parts information.

#### [REAR FINAL DRIVE: R200]



 If the tooth contact is near the flank (flank contact), or near the toe (toe contact), thin pinion height adjusting washers to move drive pinion farther from drive gear.

For selecting adjusting washer, refer to the latest parts information.



#### BACKLASH

Before inspection and adjustment, drain gear oil.

- 1. Remove rear cover. Refer to <u>DLN-181, "2WD : Disassembly"</u>.
- Fit a dial indicator to the drive gear face to measure the backlash.

#### Backlash

: Refer to DLN-221, "Backlash".

• If the backlash is outside of the specified value, change the thickness of side bearing adjusting washer.

When the backlash is large:

Make drive gear back side adjusting washer thicker, and drive gear tooth side adjusting washer thinner by the same amount. For selecting adjusting washer, refer to the latest parts information.

#### When the backlash is small:

Make drive gear back side adjusting washer thinner, and drive gear tooth side adjusting washer thicker by the same amount. For selecting adjusting washer, refer to the latest parts information.

#### **CAUTION:**

Never change the total amount of washers as it changes the bearing preload.

2WD : Inspection After Disassembly

#### DRIVE GEAR AND DRIVE PINION

- · Clean up the disassembled parts.
- If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
- If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.

**DLN-191** 

BEARING





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**Revision: February 2015** 

#### < UNIT DISASSEMBLY AND ASSEMBLY >

#### · Clean up the disassembled parts.

• If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

#### SIDE GEAR AND PINION MATE GEAR

- · Clean up the disassembled parts.
- If any cracks or damage on the surface of the tooth is found, replace.
- If any worn or chipped mark on the contact sides of the thrust washer is found, replace.

#### SIDE GEAR THRUST WASHER AND PINION MATE THRUST WASHER

- · Clean up the disassembled parts.
- If it is chipped (by friction), damaged, or unusually worn, replace.

#### **OIL SEAL**

- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

#### DIFFERENTIAL CASE

- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

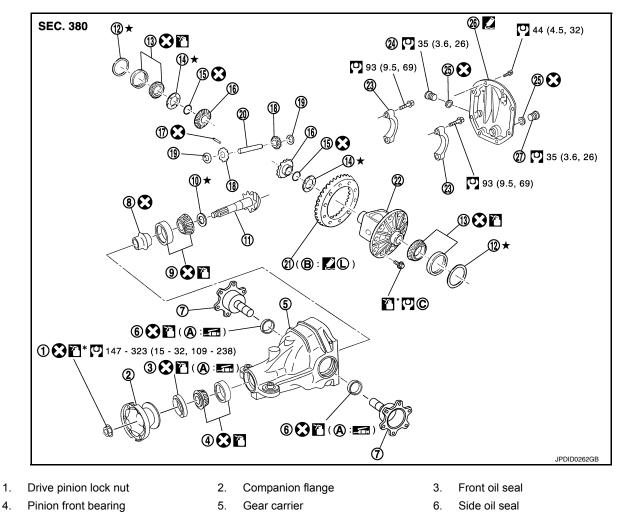
#### COMPANION FLANGE

- Clean up the disassembled parts.
- If any chipped mark [about 0.1 mm, (0.004 in)] or other damage on the contact sides of the lips of the companion flange is found, replace.

#### AWD

#### AWD : Exploded View

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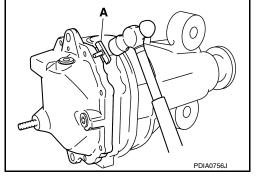
**DLN-192** 

[REAR FINAL DRIVE: R200] < UNIT DISASSEMBLY AND ASSEMBLY > 7. Side flange 8. Collapsible spacer 9. Pinion rear bearing А 10. Pinion height adjusting washer 11. Drive pinion 12. Side bearing adjusting washer 13. Side bearing 14. Side gear thrust washer 15. Circular clip 16. Side gear 17. Lock pin 18. Pinion mate gear В 19. Pinion mate thrust washer 20. Pinion mate shaft 21. Drive gear 22. Differential case 23. Bearing cap 24. Filler plug 25. Gasket 26. Rear cover 27. Drain plug С Oil seal lip Α. B. Screw hole C. Comply with the assembly procedure when tightening. Refer to DLN-196, "AWD : Assembly". DLN : Apply gear oil. Apply anti-corrosion oil. Е Section 2. Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants". 201: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products F and Sealants".

Refer to GI-4, "Components" for symbols not described above.

#### AWD : Disassembly

- Drain gear oil, if necessary. 1.
- 2. Remove side flange.
- 3. Remove rear cover mounting bolts.
- Remove rear cover to insert the seal cutter (A) [SST: 4. KV10111100 (J-37228)] between gear carrier and rear cover. CAUTION:
  - Never damage the mating surface.
  - Never insert flat-bladed screwdriver, this may damage the mating surface.



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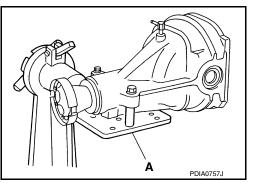
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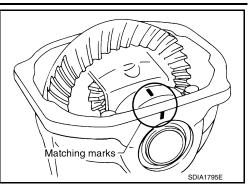
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5. Using two 45 mm (1.77 in) spacers, mount carrier on the attachment (A) [SST: KV38100800 (J-25604-01)].

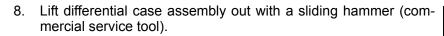


#### < UNIT DISASSEMBLY AND ASSEMBLY >

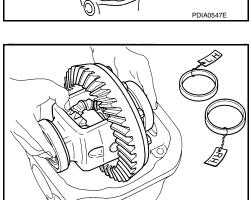
- 6. For proper reinstallation, paint matching marks on one side of the bearing cap. CAUTION:
  - For matching marks, use paint. Never damage bearing caps and gear carrier.
  - Bearing caps are manufactured as integral molding. Use the matching marks to them in their original positions.



7. Remove bearing caps.

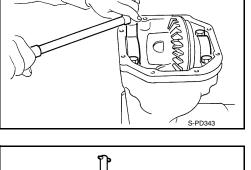


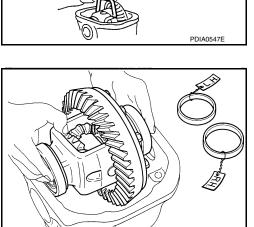
· Keep side bearing outer races together with inner race. Never mix them up. Also, keep side bearing adjusting washers together with bear-



ings.

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#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 9. Remove side bearing inner race with puller (A) and base (B). To prevent damage to bearing, engage puller jaws in groove ().
  - A : Puller [SST: ST33051001 (J-22888-20)]
  - B : Base [SST: ST33061000 (J-8107-2)]

#### CAUTION:

- To prevent damage to the side bearing and drive gear, place copper plates between these parts and vise.
- It is not necessary to remove side bearing inner race except when it is replaced.

 For proper reinstallation, paint matching marks on one differential case assembly.
 CAUTION:

For matching marks, use paint. Never damage differential case and drive gear.

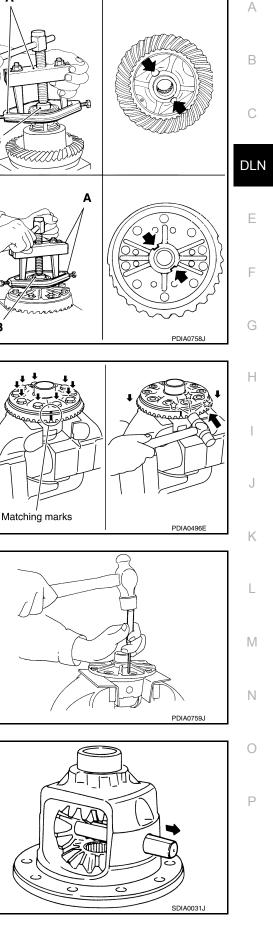
- 11. Remove drive gear mounting bolts.
- 12. Tap drive gear off differential case assembly with a soft hammer.

Tap evenly all around to keep drive gear from bending.

13. Remove lock pin of pinion mate shaft with a punch from drive gear side.

14. Remove pinion mate shaft.

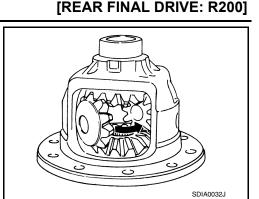




#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 15. Turn pinion mate gear, then remove pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from differential case.
- 16. Remove circular clip from side gear. CAUTION:

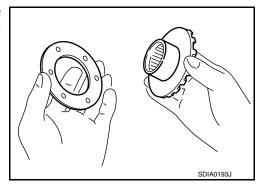
Never damage side gear.



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#### AWD : Assembly

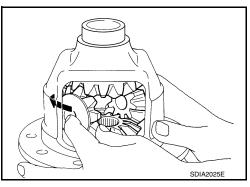
- 1. Install circular clip to side gear. CAUTION: Never damage side gear.
- 2. Install side gear thrust washers with the same thickness as the ones installed prior to disassembly or reinstall the old ones on the side gears.

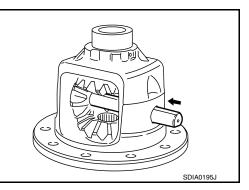


3. Install side gears and thrust washers into differential case. CAUTION:

#### Make sure that the circular clip is installed to side gears.

- 4. Align 2 pinion mate gears in diagonally opposite positions, then rotate and install them into differential case after installing thrust washer to pinion mate gear.
- 5. Align the lock pin holes on differential case with shaft, and install pinion mate shaft.





6. Measure side gear end play. If necessary, select the appropriate side gear thrust washers.

#### < UNIT DISASSEMBLY AND ASSEMBLY >

Place differential case straight up so that side gear to be meaa. sured comes upward.

#### [REAR FINAL DRIVE: R200]

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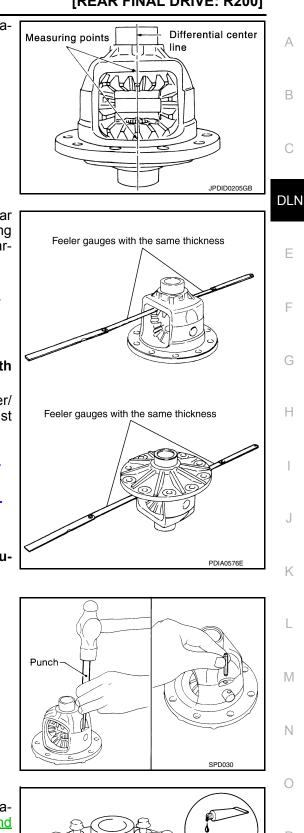
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b. Using feeler gauge, measure the clearance between side gear back and differential case at 3 different points, while rotating side gear. Average the 3 readings, and then measure the clearance of the other side as well.

Side gear back clearance

: Refer to DLN-221, "Differential Side Gear Clearance".

#### CAUTION:

#### To prevent side gear from tilting, insert feeler gauges with the same thickness from both sides.

If the back clearance is outside the specification, use a thicker/ C. thinner side gear thrust washer to adjust. For selecting thrust washer, refer to the latest parts information.

> When the back clearance is large: When the back clearance is small:

Use a thicker thrust washer. Use a thinner thrust washer.

#### CAUTION:

Select a side gear thrust washer for right and left individually.

7. Drive a lock pin into pinion mate shaft, using a punch. Make sure lock pin is flush with differential case. CAUTION: Never reuse lock pin.

8. Apply thread locking sealant into the thread hole of drive gear. Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants". **CAUTION:** 

Clean and degrease drive gear back and threaded holes sufficiently.

9. Install the drive gear to differential case. CAUTION: Align the matching marks of differential case and drive gear.

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#### < UNIT DISASSEMBLY AND ASSEMBLY >

- Tighten the mounting bolts with the following procedure.
   CAUTION:
   Apply anti-corrosion oil to the thread and seat of mounting bolts.
- a. Tighten the bolts in a crisscross fashion to the specified torque.

Drive gear mounting : 78.5 N•m (8.0 kg-m, 58 ft-lb) bolts tightening torque

b. Tighten the bolts additionally to the specified angle.

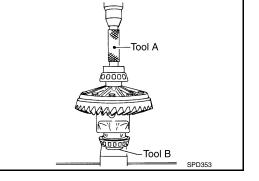
Drive gear mounting : 31 to 36 degree bolts tightening angle

#### **CAUTION:**

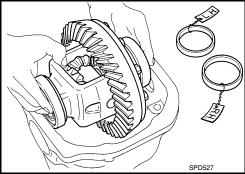
Check the tightening angle using the angle wrench [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.

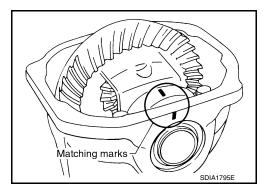
- 11. Press side bearing inner races to differential case, using the drift (A) and the base (B).
  - A : Drift [SST: KV38100300 (J-25523)]
  - B : Base [SST: ST33061000 (J-8107-2)]

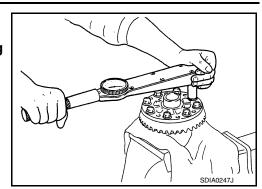
**CAUTION:** Never reuse side bearing inner race.



- Set bearing outer races to differential case assembly, and install it with removed side bearing adjusting washer or same thickness washer into gear carrier.
   CAUTION:
  - Apply differential gear oil to the side bearings.
  - Install side bearing and side bearing adjusting washer in correct location. (drive gear tooth side or drive gear back side)
- Measure side bearing preload. If necessary, select the appropriate side bearing adjusting washers. Refer to <u>DLN-199, "AWD :</u> <u>Adjustment"</u>.
- 14. Align matching marks on bearing cap with that on gear carrier.
- 15. Install bearing caps and tighten bearing cap mounting bolts.







#### < UNIT DISASSEMBLY AND ASSEMBLY >

- Using the drift (A) [SST: KV38100200 (J-26233)], drive side oil seals until it becomes flush with the case end. CAUTION:
  - Never reuse oil seal.
  - When installing, never incline oil seal.
  - Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.
- 17. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to <u>DLN-199. "AWD : Adjustment"</u>.

Recheck above items. Readjust the above description, if necessary.

- 18. Apply sealant to mating surface of rear cover.
  - Use Genuine Silicone RTV or equivalent. Refer to <u>GI-24</u>, <u>"Recommended Chemical Products and Sealants"</u>. CAUTION:

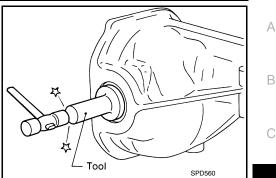
Remove old sealant adhering to mounting surfaces. Also remove any moisture, oil, or foreign material adhering to application and mounting surfaces.

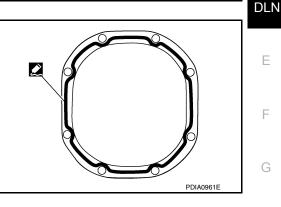
- 19. Install rear cover on gear carrier and tighten mounting bolts.
- 20. Install side flange with the following procedure.
- a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
- b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
- Put a suitable drift on the center of side flange, then drive it until sound changes.
   NOTE:

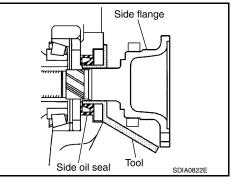
When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.

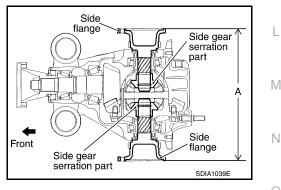
d. Confirm that the dimension of the side flange installation measurement (A) in the figure comes into the following.











#### AWD : Adjustment

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#### TOTAL PRELOAD TORQUE

Before inspection and adjustment, drain gear oil.

- 1. Secure final drive assembly onto an attachment [SST: KV38100800 (J-25604-01)].
- 2. Remove side flanges.
- 3. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
- 4. Rotate drive pinion at least 20 times to check for smooth operation of the bearing.

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#### **DLN-199**

#### < UNIT DISASSEMBLY AND ASSEMBLY >

5. Measure total preload with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].

#### Total preload torque

#### : Refer to <u>DLN-221, "Pre-</u> load Torque".

#### NOTE:

#### Total preload torque = Pinion bearing preload torque + Side bearing preload torque

• If measured value is out of the specification, disassemble it to check and adjust each part. Adjust the pinion bearing preload and side bearing preload.

Adjust the pinion bearing preload first, then adjust the side bearing preload.

#### When the preload torque is large

On pinion bearings: Replace the collapsible spacer.

formation.

On side bearings:

Use thinner side bearing adjusting washers by the same amount to each side. For selecting adjusting washer, refer to the latest parts in-

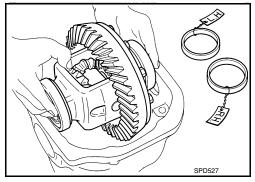
#### When the preload is small

On pinion bearings:Tighten the drive pinion lock nut.On side bearings:Use thicker side bearing adjusting washers by the same amount to<br/>each side. For selecting adjusting washer, refer to the latest parts in-<br/>formation.

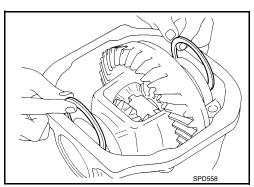
#### SIDE BEARING PRELOAD

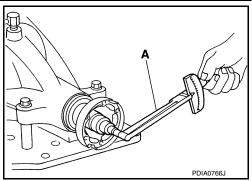
Before inspection and adjustment, drain gear oil.

- 1. Remove rear cover. Refer to <u>DLN-193, "AWD : Disassembly"</u>.
- 2. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.
- 3. Place the differential case, with side bearings and bearing races installed, into gear carrier.



4. Insert left and right original side bearing adjusting washers in place between side bearings and gear carrier.





#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 5. Install bearing caps in their correct locations and tighten bearing cap mounting bolts.
- Turn the carrier several times to seat the bearings.

- 7. Measure the turning torque of the carrier at the drive gear mounting bolts with a spring gauge [SST: — (J-8129)].
  - Standard **Specification**

: 34.2 – 39.2 N (3.5 – 4.0 kg, 7.7 – 8.8 lb) of pulling force at the drive gear bolt

- 8. If the turning torque is outside the specification, use a thicker/ thinner side bearing adjusting washer to adjust. For selecting adjusting washer, refer to the latest parts information.

If the turning torque is less Use a thicker adjusting than the specified range: If the turning torque is greater than the specifica- washer. tion:

washer. Use a thinner adjusting

#### CAUTION:

Select a side bearing adjusting washer for right and left individually.

9. Record the total amount of washer thickness required for the correct carrier side bearing preload.

#### DRIVE GEAR RUNOUT

- 1. Remove rear cover. Refer to DLN-193, "AWD : Disassembly".
- 2. Fit a dial indicator to the drive gear back face.
- 3. Rotate the drive gear to measure runout.

#### **Drive gear runout**

#### : Refer to DLN-221, "Drive Gear Runout".

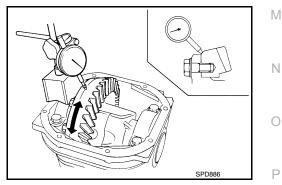
• If the runout is outside of the repair limit, check drive gear assembly condition; foreign material may be caught between drive gear and differential case, or differential case or drive gear may be deformed, etc. CAUTION:

#### Replace drive gear and drive pinion gear as a set.

#### TOOTH CONTACT

Before inspection and adjustment, drain gear oil.

1. Remove rear cover. Refer to <u>DLN-193</u>, "AWD : Disassembly".



### Matching marks SDIA1795E

[REAR FINAL DRIVE: R200]

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**Revision: February 2015** 

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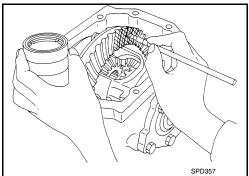
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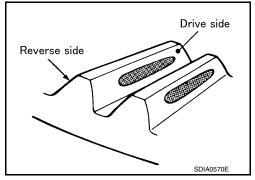
#### < UNIT DISASSEMBLY AND ASSEMBLY >

Apply red lead to drive gear.
 CAUTION:
 Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on drive gear.



 Rotate drive gear back and forth several times, check drive pinion gear to drive gear tooth contact.
 CAUTION:

Check tooth contact on drive side and reverse side.



Tooth co	ntact condition	Pinion height adjusting washer selection valve		Adjustment	Possible cause
Drive side	Back side	[ mm (in) ]		(Yes/No)	T USSIDIE Cause
Heel side Toe si	e Toe side Heel side		+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
	(allowed and a second s	Thicker	+0.06 (+0.0024)	165	Occurrence of noise when accelerating.
			+0.03 (+0.0012)		
			0	Νο	-
			-0.03 (-0.0012)		
( *****)		Thinner ↓	-0.06 (-0.0024)	Y	Occurrence of noise at constant speed and decreasing speed.
·····			-0.09 (-0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.

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#### < UNIT DISASSEMBLY AND ASSEMBLY >

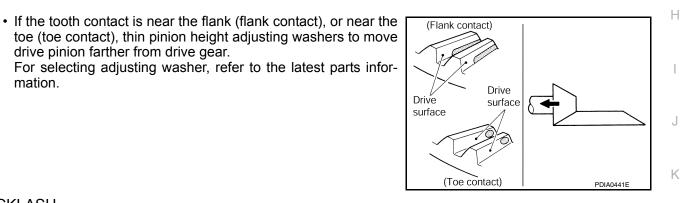
move drive pinion closer to drive gear.

4. If tooth contact is improperly adjusted, follow the procedure below to adjust the pinion height [dimension (X)].

#### [REAR FINAL DRIVE: R200]

#### А В X mm (in) SDIA0517E DLN

• If the tooth contact is near the face (face contact), or near the (Face contact) heel (heel contact), thicken pinion height adjusting washers to Е For selecting adjusting washer, refer to the latest parts infor-Drive Drive surface F surface (Heel contact) PDIA0440E



#### BACKLASH

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Before inspection and adjustment, drain gear oil.

drive pinion farther from drive gear.

- 1. Remove rear cover. Refer to <u>DLN-193</u>, "AWD : Disassembly".
- 2. Fit a dial indicator to the drive gear face to measure the backlash.

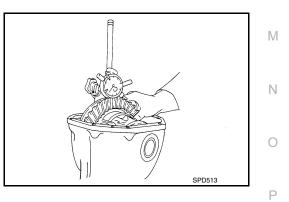
#### **Backlash**

#### : Refer to DLN-221, "Backlash".

• If the backlash is outside of the specified value, change the thickness of side bearing adjusting washer.

#### When the backlash is large:

Make drive gear back side adjusting washer thicker, and drive gear tooth side adjusting washer thinner by the same amount. For selecting adjusting washer, refer to the latest parts information.



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#### < UNIT DISASSEMBLY AND ASSEMBLY >

#### When the backlash is small:

Make drive gear back side adjusting washer thinner, and drive gear tooth side adjusting washer thicker by the same amount. For selecting adjusting washer, refer to the latest parts information.

#### CAUTION:

Never change the total amount of washers as it changes the bearing preload.

#### AWD : Inspection After Disassembly

INFOID:000000010596031

#### DRIVE GEAR AND DRIVE PINION

- · Clean up the disassembled parts.
- If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
- If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.

#### BEARING

- · Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

#### SIDE GEAR AND PINION MATE GEAR

- Clean up the disassembled parts.
- If any cracks or damage on the surface of the tooth is found, replace.
- If any worn or chipped mark on the contact sides of the thrust washer is found, replace.

#### SIDE GEAR THRUST WASHER AND PINION MATE THRUST WASHER

- · Clean up the disassembled parts.
- If it is chipped (by friction), damaged, or unusually worn, replace.

#### OIL SEAL

- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

#### DIFFERENTIAL CASE

- · Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

#### COMPANION FLANGE

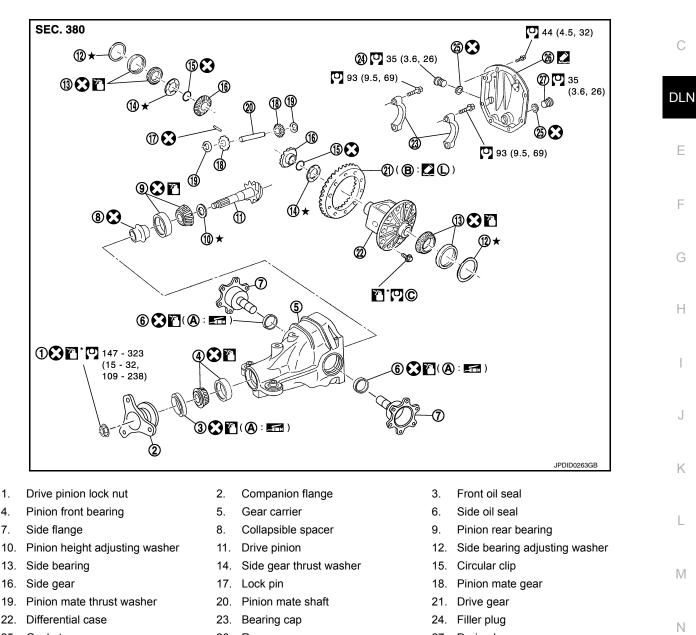
- · Clean up the disassembled parts.
- If any chipped mark [about 0.1 mm, (0.004 in)] or other damage on the contact sides of the lips of the companion flange is found, replace.

#### **DRIVE PINION** 2WD

[REAR FINAL DRIVE: R200]

INFOID:000000010596032 В

А



25. Gasket

1.

4.

7.

19.

Oil seal lip Α.

- 26. Rear cover
- Screw hole Β.

- 27. Drain plug Comply with the assembly proce-C.
  - dure when tightening. Refer to DLN-183, "2WD : Assembly".

: Apply gear oil.

Apply anti-corrosion oil.

Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

C: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24. "Recommended Chemical Products" and Sealants".

Refer to GI-4, "Components" for symbols not described above.

#### **DLN-205**

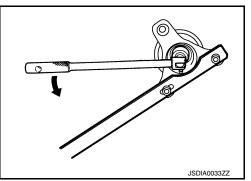
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

#### 2WD : Disassembly

- INFOID:000000010596033
- 1. Remove differential case assembly. Refer to <u>DLN-181, "2WD : Disassembly"</u>.
- 2. Remove drive pinion lock nut with the flange wrench (commercial service tool).



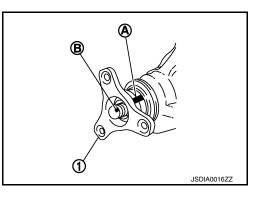
 Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).
 CAUTION:

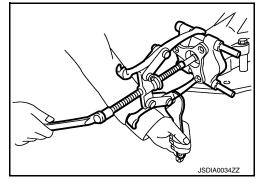
For matching mark, use paint. Never damage companion flange and drive pinion. NOTE:

The matching mark on the final drive companion flange indicates the maximum vertical runout position.

When replacing companion flange, matching mark is not necessary.

4. Remove companion flange using the suitable puller (commercial service tool).





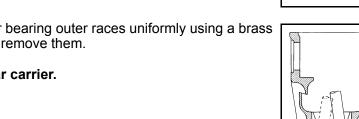
- PDIA0760J
- Press drive pinion assembly out of gear carrier.
   CAUTION: Never drop drive pinion assembly.
- 6. Remove front oil seal.
- 7. Remove side oil seal.
- 8. Remove pinion front bearing inner race.
- 9. Remove collapsible spacer.

#### < UNIT DISASSEMBLY AND ASSEMBLY >

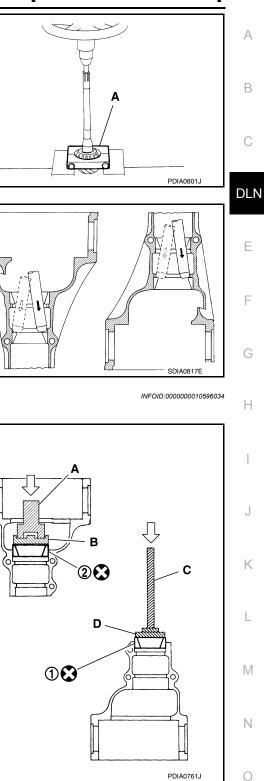
10. Remove pinion rear bearing inner race and pinion height adjusting washer with the replacer (A) (commercial service tool).

11. Tap pinion front/rear bearing outer races uniformly using a brass rod or equivalent to remove them. **CAUTION:** 

Never damage gear carrier.



#### [REAR FINAL DRIVE: R200]



2WD : Assembly

- 1. Install front bearing outer race (1) and rear bearing outer race (2) using drifts (A, B and D) and drift bar (C).
  - : Drift [SST: ST30720000 (J-25405)] А
  - В : Drift [SST: KV40105230 ( — )]
  - С : Drift bar [SST: ST30611000 (J-25742-1)]
  - D : Drift [SST: ST30613000 (J-25742-3)]

#### **CAUTION:**

- At first, using a hammer, tap bearing outer race until it becomes flat to gear carrier.
- Never reuse pinion front and rear bearing outer race.

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#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 2. Temporarily install pinion height adjusting washer (1).
  - When hypoid gear set has been replaced
  - Select pinion height adjusting washer. Refer to <u>DLN-211,</u> "<u>2WD : Adjustment</u>".

#### When hypoid gear set has been reused

 Temporarily install the removed pinion height adjusting washer or same thickness washer to drive pinion.
 CAUTION:

#### Pay attention to the direction of pinion height adjusting washer. (Assemble as shown in the figure.)

Install pinion rear bearing inner race (1) to drive pinion with the drift (A) [SST: ST30901000 (J-26010-01)].
 CAUTION:

#### Never reuse pinion rear bearing inner race.

- 4. Check and adjust the tooth contact and back lash of drive gear and drive pinion following the procedure below.
- a. Assemble drive pinion into gear carrier.
  - Never assemble collapsible spacer at this time.
  - Apply gear oil to pinion rear bearing.
- b. Assemble pinion front bearing inner race to drive pinion assembly.

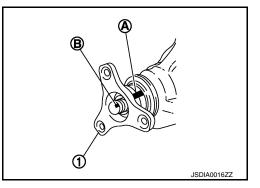
#### CAUTION:

- Never reuse pinion front bearing inner race.
- Apply gear oil to pinion front bearing.
- c. Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.

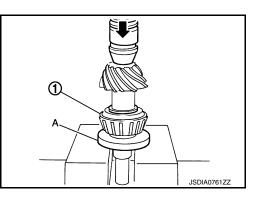
#### d. Install companion flange.

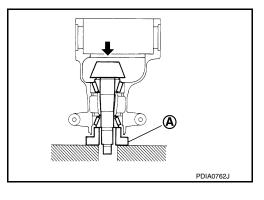
#### CAUTION: Never install front oil seal at this time. NOTE:

When reusing drive pinion, align the matching mark (B) of drive pinion with the matching mark (A) of companion flange, and then install companion flange (1).



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#### < UNIT DISASSEMBLY AND ASSEMBLY >

- Temporarily tighten removed drive pinion nut to drive pinion, e. using flange wrench (commercial service tool).
  - A : Preload gauge [SST: ST3127S000 (J-25765-A)]

#### NOTE:

Use removed drive pinion nut only for the preload measurement.

- f. Rotate drive pinion more than 20 times to adjust bearing.
- Tighten to drive pinion lock nut using flange wrench (commercial q. service tool), while adjusting pinion bearing preload torque using preload gauge [SST: ST3127S000 (J-25765-A)].

#### Pinion bearing preload (without oil seal)

: 1.0 - 1.3 N·m (0.11 – 0.13 kg-m, 9 – 11 in-lb)

#### CAUTION:

Drive pinion nut is tightened with no collapsible spacer. Be careful not to overtighten it. While measuring the preload, tighten drive pinion nut in 5° to 10° increments.

- h. Assemble removed drive side bearing adjusting washer or same thickness of it and install differential case assembly. Refer to DLN-183, "2WD : Assembly". CAUTION:
  - Apply differential gear oil to the side bearings.
  - Install side bearing and side bearing adjusting washer in correct location. (drive gear tooth side or drive gear back side)
- i. Install bearing caps.
- Check and adjust tooth contact and drive gear to drive pinion backlash. Refer to DLN-187, "2WD : Adjustj. ment".
- Remove bearing caps and differential case assembly. k.
- Remove companion flange. Ι.
- m. Remove drive pinion assembly from gear carrier. CAUTION:

#### Never drop the drive pinion assembly.

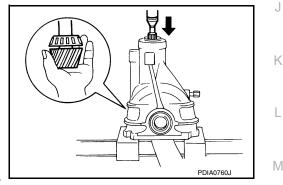
- n. Remove pinion front bearing inner race.
- Assemble collapsible spacer. CAUTION: Never reuse collapsible spacer.
- Assemble drive pinion into gear carrier. CAUTION:

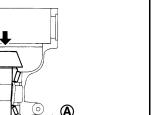
#### Apply gear oil to pinion rear bearing.

Assemble pinion front bearing inner race to drive pinion assembly.

#### CAUTION:

- Never reuse pinion front bearing inner race.
- Apply gear oil to pinion front bearing.
- 8. Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.





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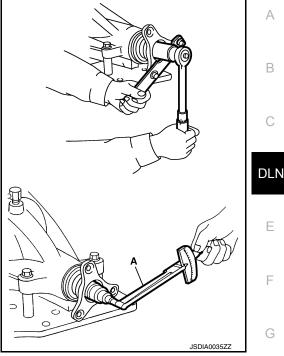
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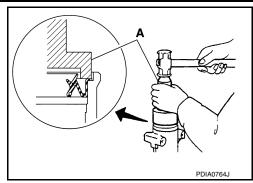
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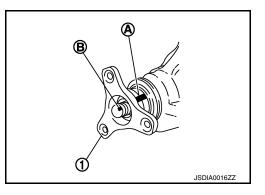
#### < UNIT DISASSEMBLY AND ASSEMBLY >

- Using the drift (A) [SST: ST30720000 (J-25405)], install front oil seal as shown in figure.
   CAUTION:
  - Never reuse oil seal.
  - When installing, never incline oil seal.
  - Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.



10. Install companion flange. NOTE:

When reusing drive pinion, align the matching mark (B) of drive pinion with the matching mark (A) of companion flange, and then install companion flange (1).



- 11. Apply anti-corrosion oil to the thread and seat of drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion, using flange wrench (commercial service tool).
  - A : Preload gauge [SST: ST3127S000 (J-25765-A)]

#### **CAUTION:**

#### Never reuse drive pinion lock nut.

 Adjust to the drive pinion lock nut tightening torque and pinion bearing preload torque, using preload gauge [SST: ST3127S000 (J-25765-A)].

**Pinion bearing preload** 

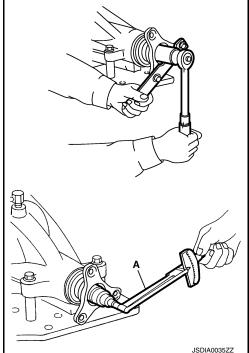
: Refer to <u>DLN-221, "Pre-</u> load Torque".

#### **CAUTION:**

- Adjust to the lower limit of the drive pinion lock nut tightening torque first.
- If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.
- After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.
- Install differential case assembly. Refer to <u>DLN-183, "2WD :</u> <u>Assembly"</u>.
   CAUTION:

#### Never install rear cover at this timing.

- 14. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and companion flange runout. Refer to <u>DLN-187</u>, "<u>2WD</u>: <u>Adjustment</u>" and <u>DLN-211</u>, "<u>2WD</u>: <u>Adjustment</u>". Recheck above items. Readjust the above description, if necessary.
- 15. Check total preload torque. Refer to DLN-187, "2WD : Adjustment".
- 16. Install rear cover. Refer to DLN-183, "2WD : Assembly".



#### < UNIT DISASSEMBLY AND ASSEMBLY >

#### 2WD : Adjustment

#### **PINION GEAR HEIGHT**

If the hypoid gear set has been replaced, select the pinion height adjusting washer.

1. Use the formula below to calculate pinion height adjusting washer thickness.

Washer selection equation:

 $T = T_0 + (t_1 - t_2)$ 

- Т: -**Correct washer thickness**
- To: **Removed washer thickness**
- t1: Old drive pinion head letter "H × 0.01" ("H": machined tolerance 1/100 mm × 100)
- New drive pinion head letter "H  $\times$  0.01" t2: ("H": machined tolerance 1/100 mm × 100)

#### **Example:**

 $T = 3.21 + [(2 \times 0.01) - (-1 \times 0.01)] = 3.24$ 

- To: 3.21 +2 t1:
- -1 t2:
- Select the proper pinion height adjusting washer. For selecting adjusting washer, refer to the latest parts 2 information.

#### **CAUTION:**

If unable to find a washer of desired thickness, use a washer with thickness closest to the calculated value.

#### **Example:**

Calculated value... T = 3.22 mm Used washer... T = 3.21 mm

#### **DRIVE PINION RUNOUT**

- 1. Set a dial indicator (A) vertically to the tip of the drive pinion.
- 2. Rotate drive pinion to check for runout.

#### **Drive pinion runout**

: Refer to DLN-221, "Drive Pinion Runout (2WD)".

If the runout value is outside of the limit, possible causes are an 3. assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.

#### 2WD : Inspection After Disassembly

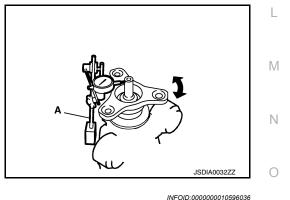
#### DRIVE GEAR AND DRIVE PINION

- Clean up the disassembled parts.
- If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
- If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.

**DLN-211** 

#### BEARING

Clean up the disassembled parts.



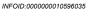
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is
observed, replace as a bearing assembly (as a new set).

#### SIDE GEAR AND PINION MATE GEAR

- · Clean up the disassembled parts.
- If any cracks or damage on the surface of the tooth is found, replace.
- If any worn or chipped mark on the contact sides of the thrust washer is found, replace.

#### SIDE GEAR THRUST WASHER AND PINION MATE THRUST WASHER

- Clean up the disassembled parts.
- If it is chipped (by friction), damaged, or unusually worn, replace.

#### OIL SEAL

- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

#### DIFFERENTIAL CASE

- · Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

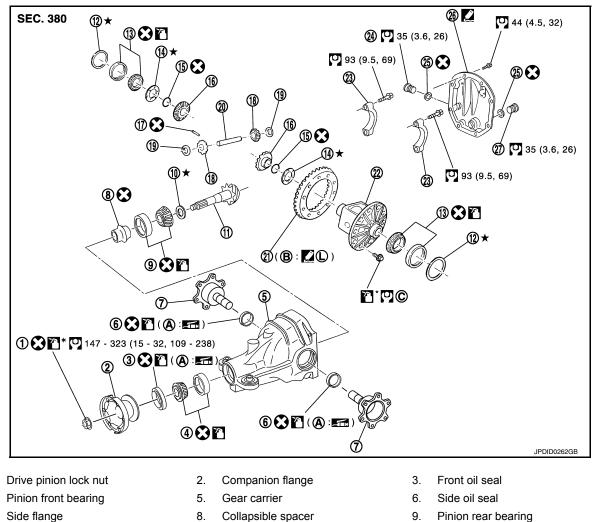
#### COMPANION FLANGE

- · Clean up the disassembled parts.
- If any chipped mark [about 0.1 mm, (0.004 in)] or other damage on the contact sides of the lips of the companion flange is found, replace.

#### AWD

AWD : Exploded View

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7. Side flange

1. 4.

**DLN-212** 

#### < UNIT DISASSEMBLY AND ASSEMBLY >

10. Pinion height adjusting washer

19. Pinion mate thrust washer

- 11. Drive pinion 14. Side gear thrust washer
  - 17. Lock pin
  - 20. Pinion mate shaft
  - 23. Bearing cap
  - 26. Rear cover
  - В. Screw hole

- [REAR FINAL DRIVE: R200]
- 12. Side bearing adjusting washer А 15. Circular clip 18. Pinion mate gear 21. Drive gear В 24. Filler plug 27. Drain plug Comply with the assembly proce-C. dure when tightening. Refer to DLN-

196, "AWD : Assembly".

: Apply gear oil.

13. Side bearing

22. Differential case

Oil seal lip

16. Side gear

25. Gasket

A.

Apply anti-corrosion oil.

Section 2. Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

201: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products" and Sealants".

**DLN-213** 

Refer to GI-4, "Components" for symbols not described above.

#### AWD : Disassembly

- Remove differential case assembly. Refer to <u>DLN-193</u>, "AWD : <u>Disassembly</u>".
- 2. Remove drive pinion lock nut with the flange wrench (commercial service tool).

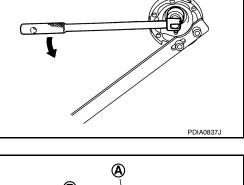
3. Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1). **CAUTION:** 

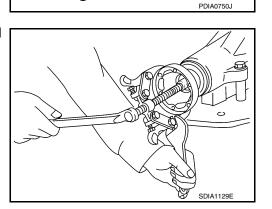
For matching mark, use paint. Never damage companion flange and drive pinion. NOTE:

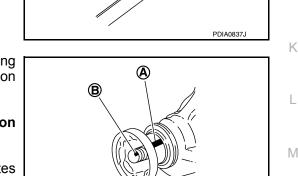
The matching mark on the final drive companion flange indicates the maximum vertical runout position.

When replacing companion flange, matching mark is not necessary.

Remove companion flange using the suitable puller (commercial 4 service tool).







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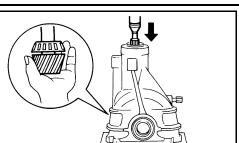
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

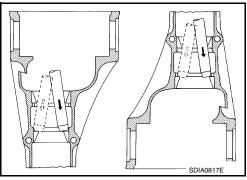
- 5. Press drive pinion assembly out of gear carrier. **CAUTION:** Never drop drive pinion assembly.
- 6. Remove front oil seal.
- 7. Remove side oil seal.
- 8. Remove pinion front bearing inner race.
- 9. Remove collapsible spacer.



- 10. Remove pinion rear bearing inner race and pinion height adjust-PDIA0801J
- 11. Tap pinion front/rear bearing outer races uniformly using a brass rod or equivalent to remove them. **CAUTION:**

ing washer with the replacer (A) (commercial service tool).

Never damage gear carrier.



#### [REAR FINAL DRIVE: R200]

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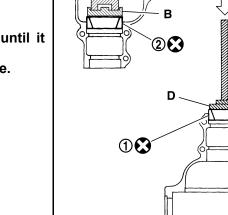
#### < UNIT DISASSEMBLY AND ASSEMBLY >

#### AWD : Assembly

- Install front bearing outer race (1) and rear bearing outer race (2) using drifts (A, B and D) and drift bar (C).
  - A : Drift [SST: ST30720000 (J-25405)]
  - B : Drift [SST: KV40105230 ( )]
  - C : Drift bar [SST: ST30611000 (J-25742-1)]
  - D : Drift [SST: ST30613000 (J-25742-3)]

#### **CAUTION:**

- At first, using a hammer, tap bearing outer race until it becomes flat to gear carrier.
- Never reuse pinion front and rear bearing outer race.



2. Temporarily install pinion height adjusting washer (1).

#### When hypoid gear set has been replaced

 Select pinion height adjusting washer. Refer to <u>DLN-218</u>, <u>"AWD : Adjustment"</u>.

#### When hypoid gear set has been reused

 Temporarily install the removed pinion height adjusting washer or same thickness washer to drive pinion.

#### CAUTION:

Pay attention to the direction of pinion height adjusting washer. (Assemble as shown in the figure.)

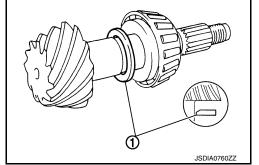
 Install pinion rear bearing inner race (1) to drive pinion with the drift (A) [SST: ST30901000 (J-26010-01)].
 CAUTION:

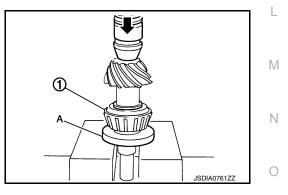
#### Never reuse pinion rear bearing inner race.

- 4. Check and adjust the tooth contact and back lash of drive gear and drive pinion following the procedure below.
- Assemble drive pinion into gear carrier.
   CAUTION:
  - Never install collapsible spacer at this time.
  - Apply gear oil to pinion rear bearing.
- Assemble pinion front bearing inner race to drive pinion assembly.

#### **CAUTION:**

- Never reuse pinion front bearing inner race.
- Apply gear oil to pinion front bearing.





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[REAR FINAL DRIVE: R200]

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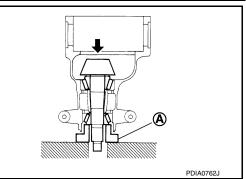
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

c. Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.

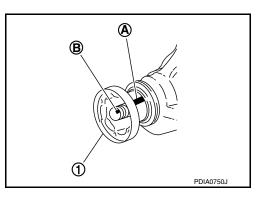




Install companion flange.
 CAUTION:

#### Never install front oil seal at this time. NOTE:

When reusing drive pinion, align the matching mark (B) of drive pinion with the matching mark (A) of companion flange, and then install companion flange (1).



- e. Temporarily tighten removed drive pinion nut to drive pinion, using flange wrench (commercial service tool).
  - A : Preload gauge [SST: ST3127S000 (J-25765-A)]

#### NOTE:

Use removed drive pinion nut only for the preload measurement.

- f. Rotate drive pinion more than 20 times to adjust bearing.
- g. Tighten to drive pinion lock nut using flange wrench (commercial service tool), while adjusting pinion bearing preload torque using preload gauge [SST: ST3127S000 (J-25765-A)].

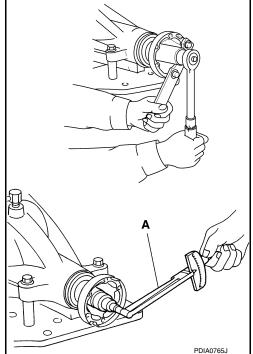
Pinion bearing preload (without oil seal)

: 1.0 - 1.3 N·m (0.11 – 0.13 kg-m, 9 – 11 in-lb)

#### **CAUTION:**

Drive pinion nut is tightened with no collapsible spacer. Be careful not to overtighten it. While measuring the preload, tighten drive pinion nut in 5° to 10° increments.

- Assemble removed drive side bearing adjusting washer or same thickness of it and install differential case assembly. Refer to <u>DLN-196, "AWD : Assembly"</u>.
   CAUTION:
  - Apply differential gear oil to the side bearings.
  - Install side bearing and side bearing adjusting washer in correct location. (drive gear tooth side or drive gear back side)
- i. Install bearing caps.
- j. Check and adjust tooth contact and drive gear to drive pinion backlash. Refer to <u>DLN-199</u>, "<u>AWD : Adjust-ment</u>".
- k. Remove bearing caps and differential case assembly.
- I. Remove companion flange.



#### < UNIT DISASSEMBLY AND ASSEMBLY >

- Remove drive pinion assembly from gear carrier. m. CAUTION: Never drop the drive pinion assembly.
- n. Remove pinion front bearing inner race.
- 5. Assemble collapsible spacer. **CAUTION:**

#### Never reuse collapsible spacer.

- 6. Assemble drive pinion into gear carrier. **CAUTION:** Apply gear oil to pinion rear bearing.
- 7. Assemble pinion front bearing inner race to drive pinion assembly.

#### **CAUTION:**

- Never reuse pinion front bearing inner race.
- Apply gear oil to pinion front bearing.
- 8. Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.

9. Using the drift (A) [SST: ST30720000 (J-25405)], install front oil seal as shown in figure.

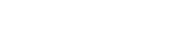
#### **CAUTION:**

10. Install companion flange.

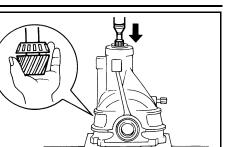
install companion flange (1).

NOTE:

- Never reuse oil seal. • When installing, never incline oil seal.
- · Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.



#### [REAR FINAL DRIVE: R200]



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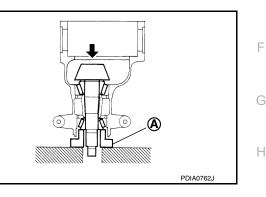
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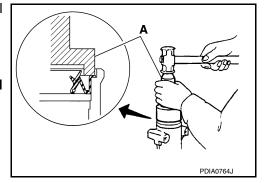
PDIA0760J

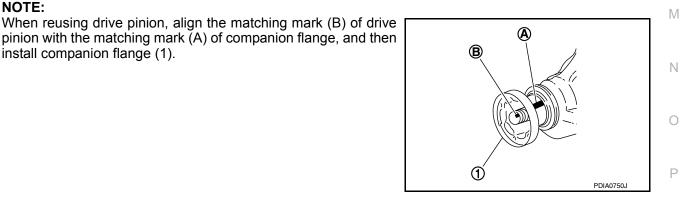
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 11. Apply anti-corrosion oil to the thread and seat of drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion, using flange wrench (commercial service tool).
  - A : Preload gauge [SST: ST3127S000 (J-25765-A)]

#### CAUTION:

#### Never reuse drive pinion lock nut.

12. Adjust to the drive pinion lock nut tightening torque and pinion bearing preload torque, using preload gauge [SST: ST3127S000 (J-25765-A)].

**Pinion bearing preload** 

#### : Refer to DLN-221, "Preload Torque".

#### **CAUTION:**

- Adjust to the lower limit of the drive pinion lock nut tightening torgue first.
- If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.
- After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.
- 13. Install differential case assembly. Refer to DLN-196, "AWD : Assembly". CAUTION:

#### Never install rear cover at this timing.

- 14. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and companion flange runout. Refer to DLN-199, "AWD : Adjustment" and DLN-218, "AWD : Adjustment". Recheck above items. Readjust the above description, if necessary.
- 15. Check total preload torgue. Refer to DLN-199, "AWD : Adjustment".
- 16. Install rear cover. Refer to DLN-196, "AWD : Assembly".

#### AWD : Adjustment

#### PINION GEAR HEIGHT

If the hypoid gear set has been replaced, select the pinion height adjusting washer.

Use the formula below to calculate pinion height adjusting 1. washer thickness.

#### Washer selection equation:

- $T = T_0 + (t_1 t_2)$ 
  - T: **Correct washer thickness**
  - To: **Removed washer thickness**
  - Old drive pinion head letter "H  $\times$  0.01" t1: ("H": machined tolerance  $1/100 \text{ mm} \times 100$ )
  - t2: New drive pinion head letter "H × 0.01" ("H": machined tolerance 1/100 mm × 100)

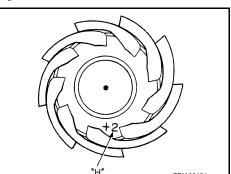
#### **Example:**

```
T = 3.21 + [(2 \times 0.01) - (-1 \times 0.01)] = 3.24
   To:
           3.21
           +2
   t1:
   t2:
           -1
```

## SDIA0249J

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# PDIA0765J



#### < UNIT DISASSEMBLY AND ASSEMBLY >

 Select the proper pinion height adjusting washer. For selecting adjusting washer, refer to the latest parts information.
 CAUTION:

If unable to find a washer of desired thickness, use a washer with thickness closest to the calculated value.

#### Example:

Calculated value... T = 3.22 mm Used washer... T = 3.21 mm

#### COMPANION FLANGE RUNOUT

- 1. Fit a test indicator to the inner side of companion flange (socket diameter).
- 2. Rotate companion flange to check for runout.

#### Companion flange runout : Refer to <u>DLN-222, "Com-</u> panion Flange Runout (AWD)".

- If the runout value is outside the runout limit, follow the procedure below to adjust.
- a. Check for runout while changing the phase between companion flange and drive pinion by 90° step, and search for the position where the runout is the minimum.
- b. If the runout value is still outside of the limit after the phase has been changed, possible cause will be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.
- c. If the runout value is still outside of the limit after the check and repair, replace companion flange.

#### AWD : Inspection After Disassembly

#### DRIVE GEAR AND DRIVE PINION

- Clean up the disassembled parts.
- If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
- If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.

#### BEARING

- Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

#### SIDE GEAR AND PINION MATE GEAR

- Clean up the disassembled parts.
- If any cracks or damage on the surface of the tooth is found, replace.
- If any worn or chipped mark on the contact sides of the thrust washer is found, replace.

#### SIDE GEAR THRUST WASHER AND PINION MATE THRUST WASHER

- · Clean up the disassembled parts.
- If it is chipped (by friction), damaged, or unusually worn, replace.

#### OIL SEAL

- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

#### DIFFERENTIAL CASE

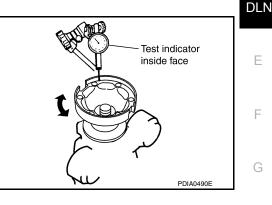
- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

#### COMPANION FLANGE

· Clean up the disassembled parts.

#### **Revision: February 2015**

#### **DLN-219**



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< UNIT DISASSEMBLY AND ASSEMBLY >

• If any chipped mark [about 0.1 mm, (0.004 in)] or other damage on the contact sides of the lips of the companion flange is found, replace.

SERVICE DATA AND S < SERVICE DATA AND SPECIFICATIONS (SDS)	(RE	AR FINAL DRIVE: R200]		
SERVICE DATA AND SPECIF	ICATIONS (SD	S)		
SERVICE DATA AND SPECIFICATION	NS (SDS)			
General Specification		INFOID:000000010596042		
		NN 012.00000001000042		
	2WD	AWD		
Applied model	VQ37	'VHR		
	A	Т		
Final drive model	R2	00		
Gear ratio	3.1	33		
Number of teeth (Drive gear/Drive pinion)	47/	15		
Oil capacity (Approx.) $\ell$ (US pt, Imp pt)	1.4 (3,	2-1/2)		
Number of pinion gears	2	2		
Drive pinion adjustment spacer type	Collapsible			
Drive Gear Runout		INFOID:000000010596043		
		Unit: mm (in)		
Item	Lir	nit		
Drive gear back face runout	0.05 (0	0.0020)		
Differential Side Gear Clearance		INFOID:000000010596044		
Item	Unit: mm (i			
lien	Standard			
Side gear backlash (Clearance between side gear and differential case)	al (Each gear should rotate smoothly without excessive resistanc during differential motion.)			
Preload Torque		INFOID:000000010596045		
		Unit: N⋅m (kg-m, in-lb)		
Item	Stan	dard		
Pinion bearing (P1)	2.65 - 3.23 (0.27 - 0.32, 24 - 28)			
Side bearing (P2)	0.20 - 0.52 (0.02 - 0.05, 2 - 4)			
Side bearing to pinion bearing (Total preload) (Total preload = P1 + P2)	2.85 – 3.75 (0.29 – 0.38, 26 – 33)			
Backlash		INFOID:000000010596046		
		Unit: mm (in)		
Item	Stan	dard		
Drive gear to drive pinion gear	0.10 – 0.15 (0.0	0039 – 0.0059)		
Drive Pinion Runout (2WD)		INFOID:000000010596047		
		Unit: mm (in)		
Item	Lir	nit		
Tip of drive pinion runout	0.8 (0	031)		

SERVICE DATA AND SPECIFICATIONS (SDS)

Tip of drive pinion runout 0.8 (0.031)

#### SERVICE DATA AND SPECIFICATIONS (SDS) ND SPECIFICATIONS (SDS) [REAR FINAL DRIVE: R200]

#### < SERVICE DATA AND SPECIFICATIONS (SDS)

#### Companion Flange Runout (AWD)

INFOID:000000010596048

Unit: mm (in)

Item	Limit
Inner side of the companion flange runout	0.08 (0.0031)