SECTION DLN
DRIVELINE

CONTENTS

TRANSFER: ETX13C

REAR FINAL DRIVE: R190

PRECAUTION

PRECAUTIONS

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

INFOID:0000000009708763

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

INFOID:0000000009643523

- 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.

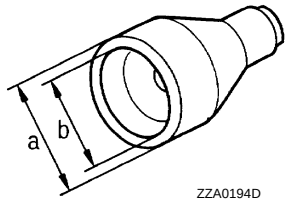
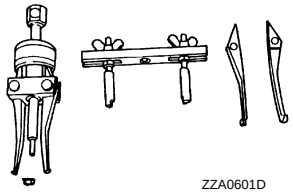
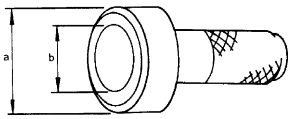
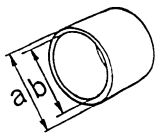
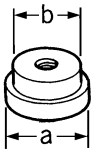
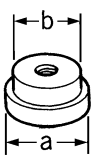
PREPARATION

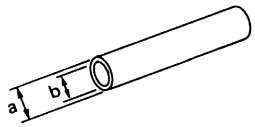
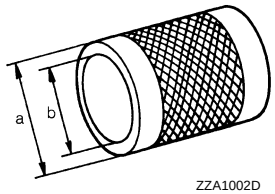
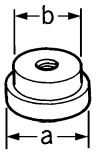
PREPARATION

Special Service Tools

INFOID:0000000009643524

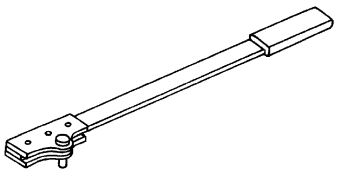
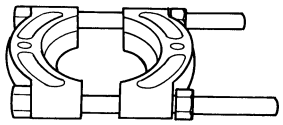
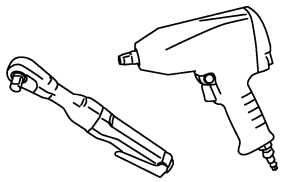
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST27862000 (—) Drift a: 62.5 mm (2.461 in) dia. b: 42 mm (1.65 in) dia.  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.  ZZA0811D	• Installing rear oil seal • Installing main shaft oil seal
KV40104830 (—) Drift a: 70 mm (2.76 in) dia. b: 63.5 mm (2.500 in) dia.  ZZA1003D	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

Tool number (Kent-Moore No.) Tool name	Description
ST31214000 (J-25269-B) Drift a: 34 mm (1.34 in) dia. b: 25.5 mm (1.004 in) dia.  ZZA0534D	• Removing front drive shaft front bearing • Removing front drive shaft rear bearing
ST33200000 (J-26082) Drift a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.  ZZA1002D	Installing front drive shaft front bearing
KV38104010 (—) Drift a: 67 mm (2.64 in) dia. b: 49 mm (1.93 in) dia.  ZZA1000D	Installing front drive shaft rear bearing

Commercial Service Tools or/and Repair Part

INFOID:0000000009643525

Tool name	Description
Flange wrench  NT771	Removing and installing self-lock nut
Separator  ZZB0823D	• Removing front drive shaft front bearing • Removing front drive shaft rear bearing
Power tool  PBIC0190E	Loosening bolts and nuts

Lubricant or/and Sealant

INFOID:0000000009732252

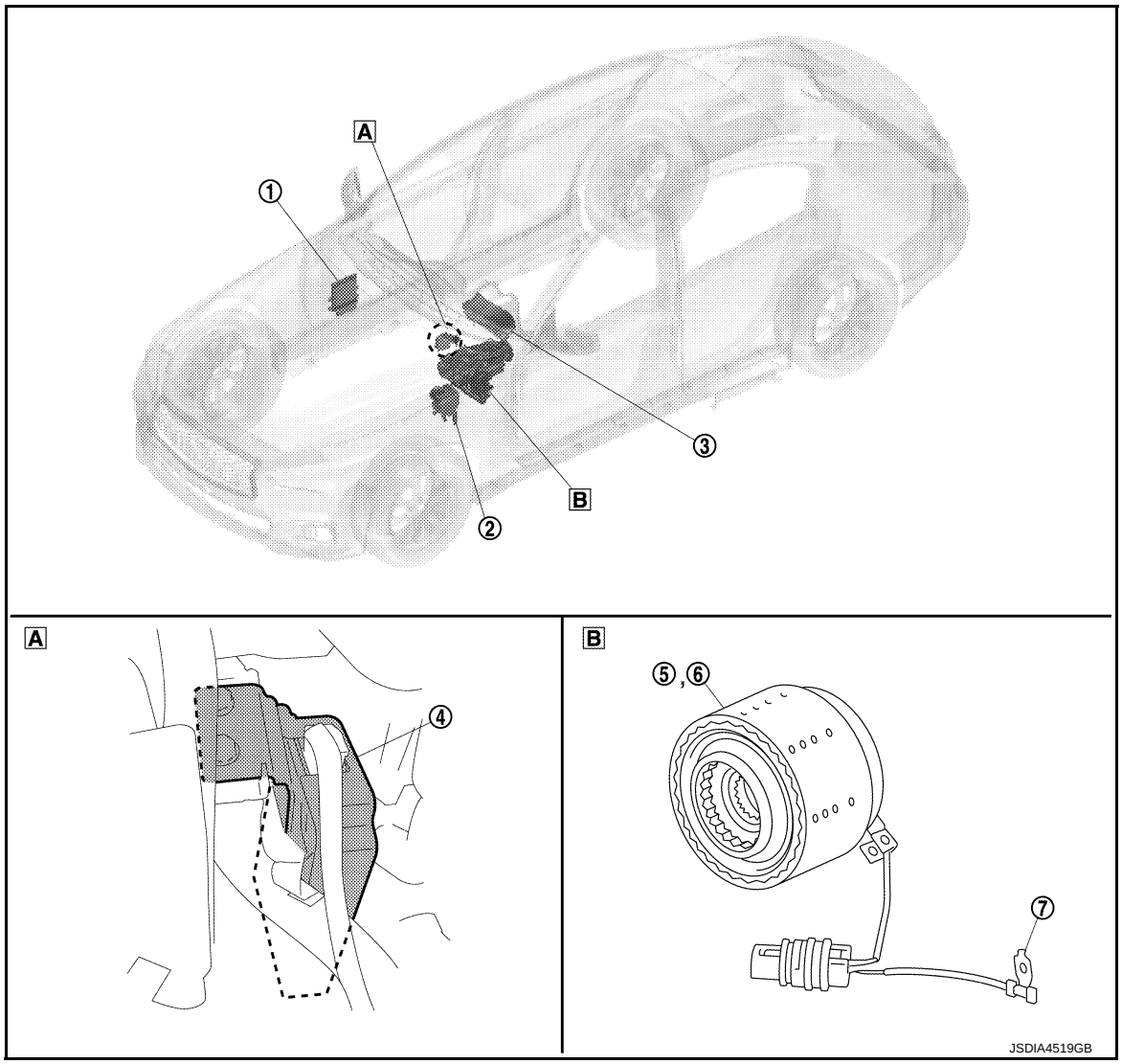
Item	Use
Anaerobic Liquid Gasket (Three Bond 1133C or equivalent)	Application to mating surface of rear case

SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:0000000009643526



A Instrument lower panel LH removed B Transfer inside

No.	Component	Function
①	ECM	Mainly transmits the following signals to AWD control unit via CAN communication. • Accelerator pedal position signal • Engine speed signal For detailed installation location, refer to EC-16, "ENGINE CONTROL SYSTEM : Component Parts Location".
②	ABS actuator and electric unit (control unit)	Mainly transmits the following signals to AWD control unit via CAN communication. • Each wheel speed signal • Stop lamp switch signal (brake signal) For detailed installation location, refer to BRC-9, "Component Parts Location".

No.	Component	Function
③	Combination meter	Mainly transmits the following signals to AWD control unit via CAN communication. • Parking brake switch signal Mainly receives the following signals from AWD control unit via CAN communication. • AWD warning signal For detailed installation location, refer to MWI-7, "METER SYSTEM : Component Parts Location".
④	AWD control unit • AWD actuator relay	Refer to DLN-11, "AWD Control Unit".
⑤	Electric controlled coupling	Refer to DLN-11, "Electric Controlled Coupling".
⑥	AWD solenoid	Refer to DLN-11, "AWD Solenoid".
⑦	Transfer fluid temperature sensor	Refer to DLN-11, "Transfer Fluid Temperature Sensor".

AWD Control Unit

INFOID:0000000009643528

- 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.

Electric Controlled Coupling

INFOID:0000000009643531

Electric controlled coupling is installed in transfer and transmits driving force to front final drive. For operation, refer to DLN-12, "Operation Description".

AWD Solenoid

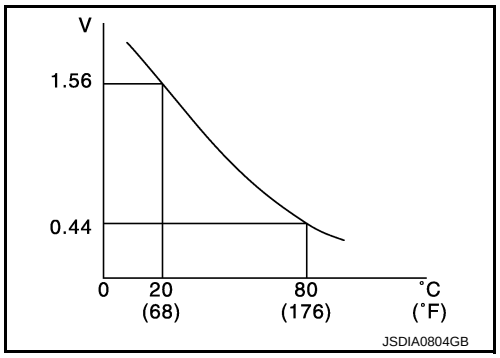
INFOID:0000000009643529

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

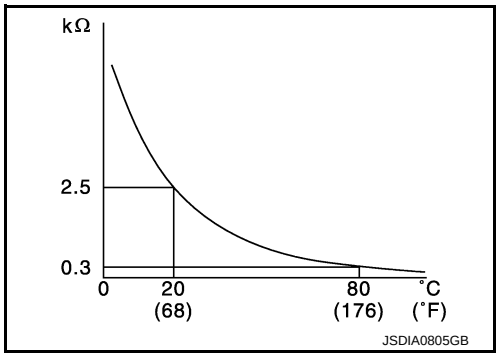
Transfer Fluid Temperature Sensor

INFOID:0000000009643530

- 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.



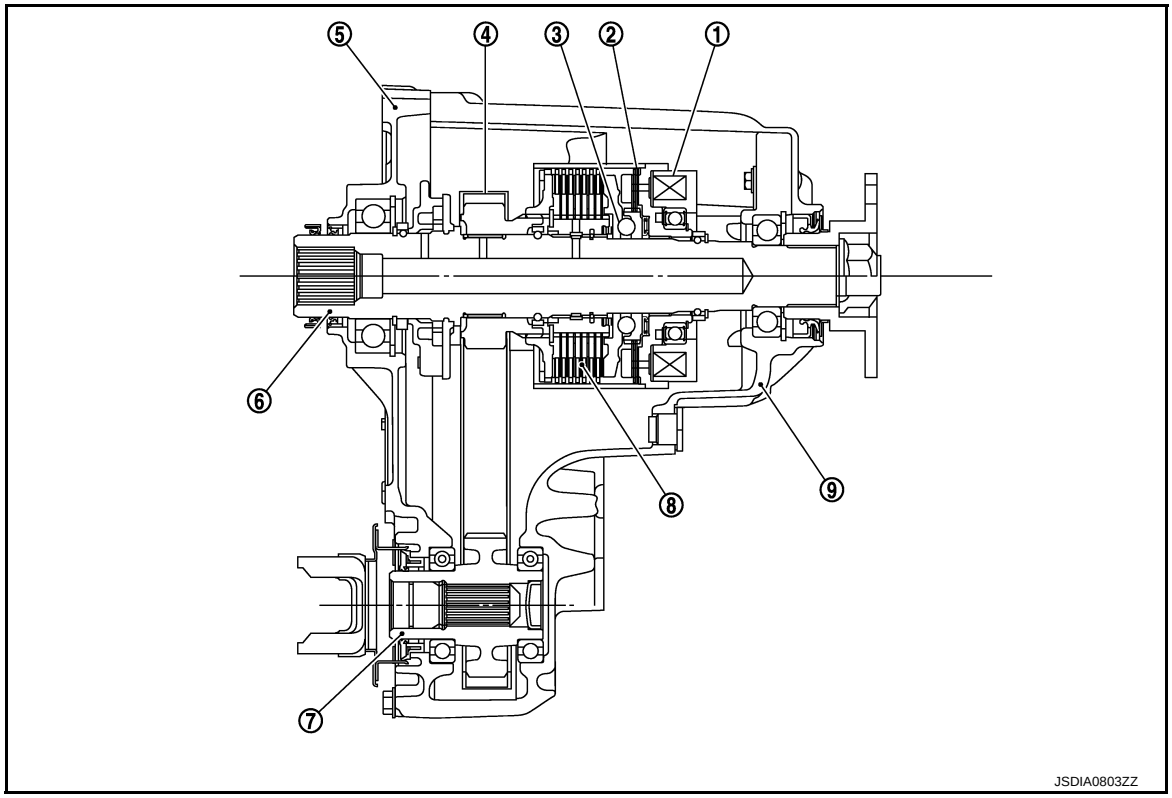
- The electrical resistance of the sensor decreases as temperature increases.



STRUCTURE AND OPERATION

Sectional View

INFOID:0000000009643532

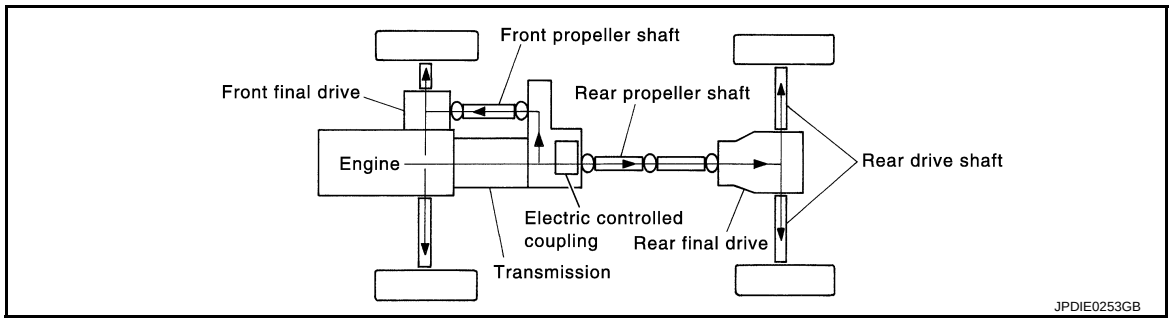


① Electromagnet	② Control clutch	③ Cam
④ Drive chain	⑤ Front case	⑥ Main shaft
⑦ Front drive shaft	⑧ Main clutch	⑨ Rear case

Operation Description

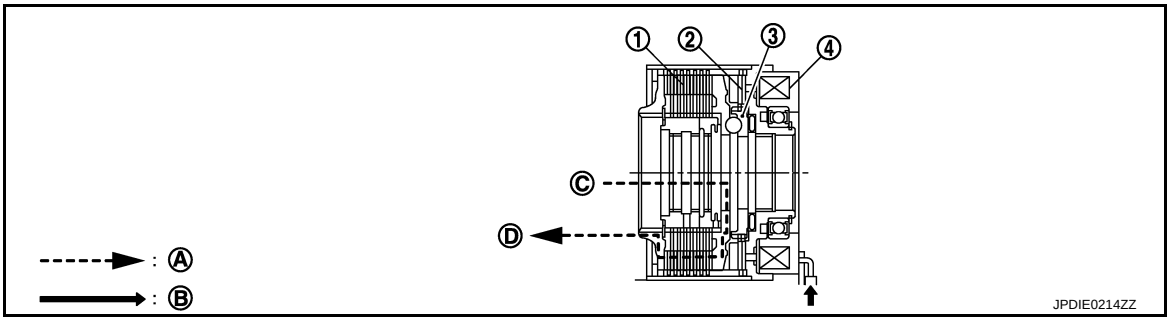
INFOID:0000000009643533

POWER TRANSFER DIAGRAM



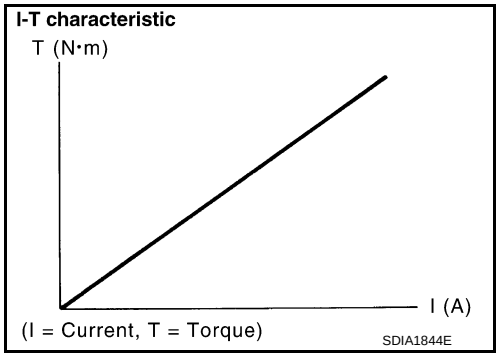
OPERATION PRINCIPLE

ELECTRIC CONTROLLED COUPLING



① Main clutch	② Control clutch	③ Cam
④ Electromagnet		
Ⓐ Torque flow	Ⓑ Current commanded from AWD control unit	Ⓒ From transmission
Ⓓ 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.
3. The cam operates in response to control clutch torque and applies pressure to main clutch.
4. Main clutch transmits torque to front wheels according to pressing power.
   - Transmission torque to front wheels is determined according to command current.

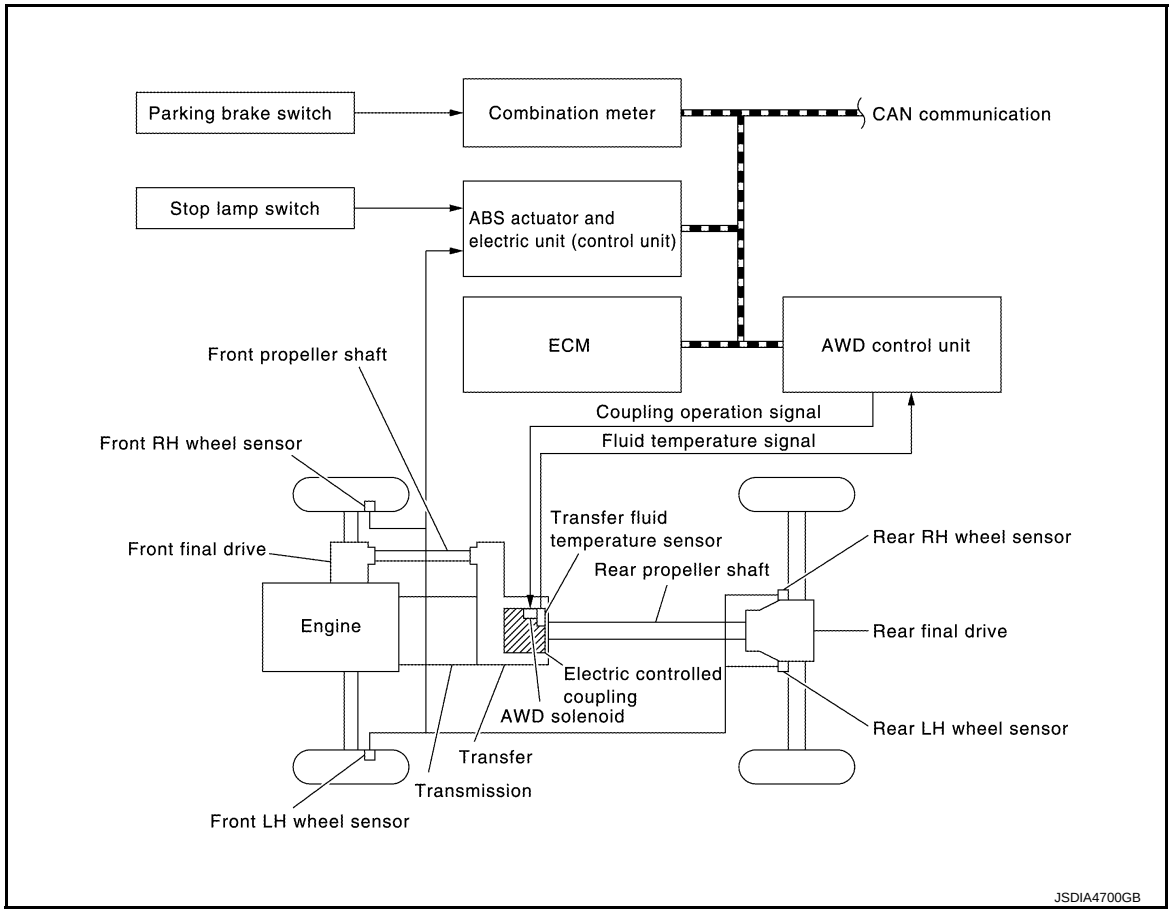


SYSTEM
AWD SYSTEM
AWD SYSTEM : System Description

INFOID:0000000009643534

- 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 DLN-16, "AWD SYSTEM : Fail-safe".
- When a high load status continues for electric controlled coupling, AWD control temporarily becomes rear wheel drive, according to protection function. Refer to DLN-16, "AWD SYSTEM : Protection Function".

SYSTEM DIAGRAM



Signal with Communication Line

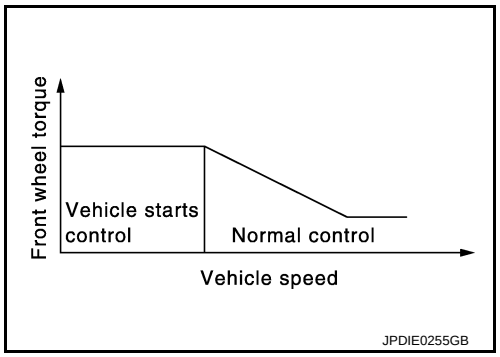
Major signal transmission between each unit via CAN communication lines are shown in the following table.

Component parts	Signal item
ECM	Mainly transmits the following signals to AWD control unit via CAN communication. • Accelerator pedal position signal • Engine speed signal
ABS actuator and electric unit (control unit)	Mainly transmits the following signals to AWD control unit via CAN communication. • Each wheel speed signal • Stop lamp switch signal (brake signal)
Combination meter	Mainly transmits the following signals to AWD control unit via CAN communication. • Parking brake switch signal Mainly receives the following signals from AWD control unit via CAN communication. • AWD warning signal

OPERATION CHARACTERISTIC

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.

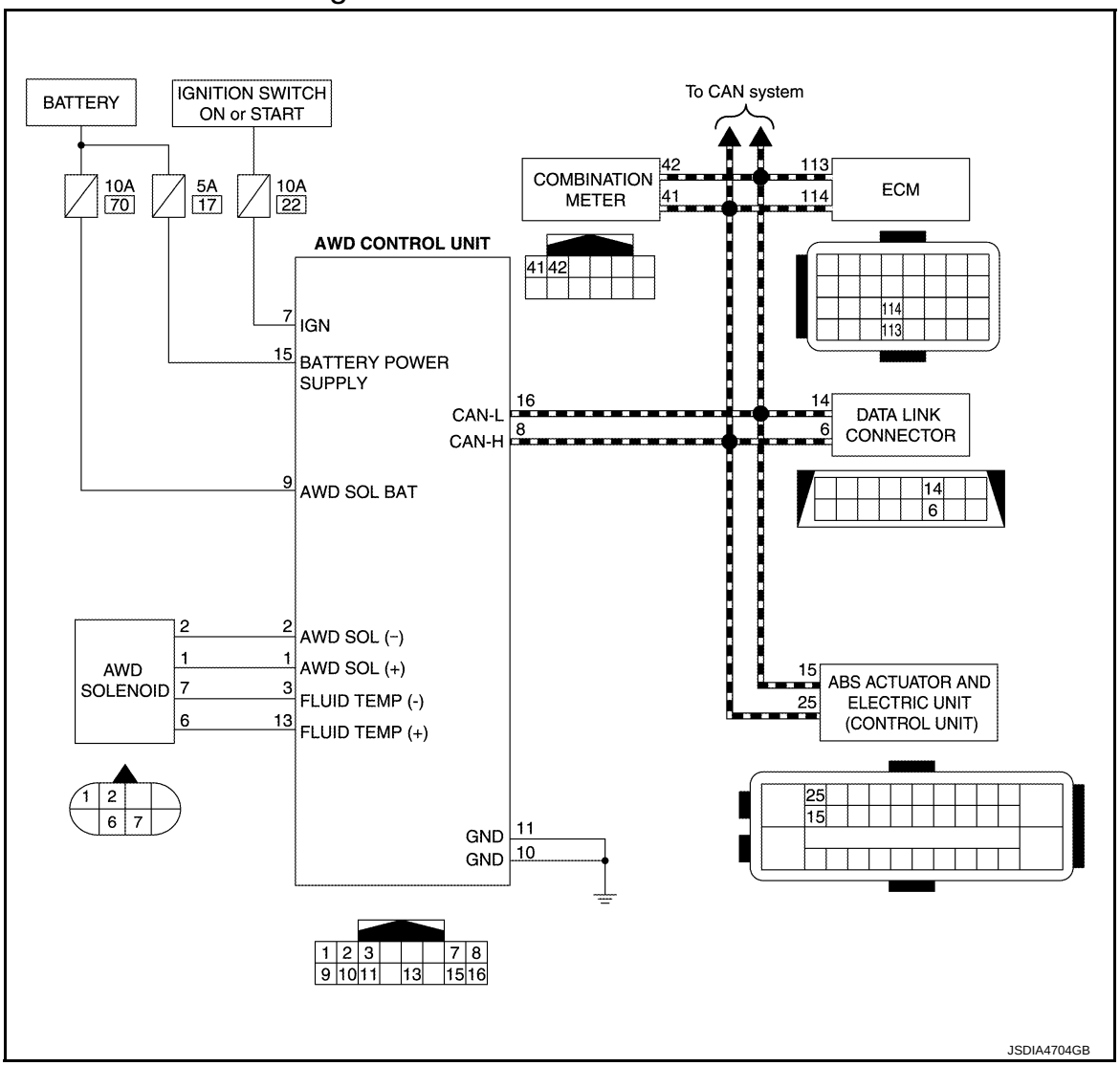


Normal Control

- 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 SYSTEM : Circuit Diagram

INFOID:0000000009726402



AWD SYSTEM : Fail-safe

INFOID:0000000009726403

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

AWD SYSTEM : Protection Function

INFOID:0000000009726404

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	AWD warning (on information display)	Error area and root cause	Contents of protection function
—	Refer to DLN-16, "INFORMATION DISPLAY (COMBINATION METER) : AWD Warning".	Transfer assembly in protection mode. It is not malfunction. (Internal temperature rise of electronic controlled coupling)	Shuts down AWD system temporarily (Rear wheel drive)
—		Malfunction in each tire or different tire diameter	

NOTE:

- If the AWD warning displays during driving but remains not displayed after the engine is restarted, the system is normal. If it again displays 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.

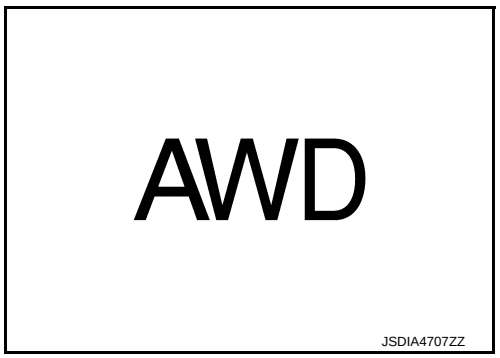
INFORMATION DISPLAY (COMBINATION METER)

INFORMATION DISPLAY (COMBINATION METER) : AWD Warning

INFOID:0000000009715185

DESIGN/PURPOSE

AWD warning is displayed when the AWD system has a malfunction. AWD warning indicates that the vehicle is in fail-safe mode or protection function mode.

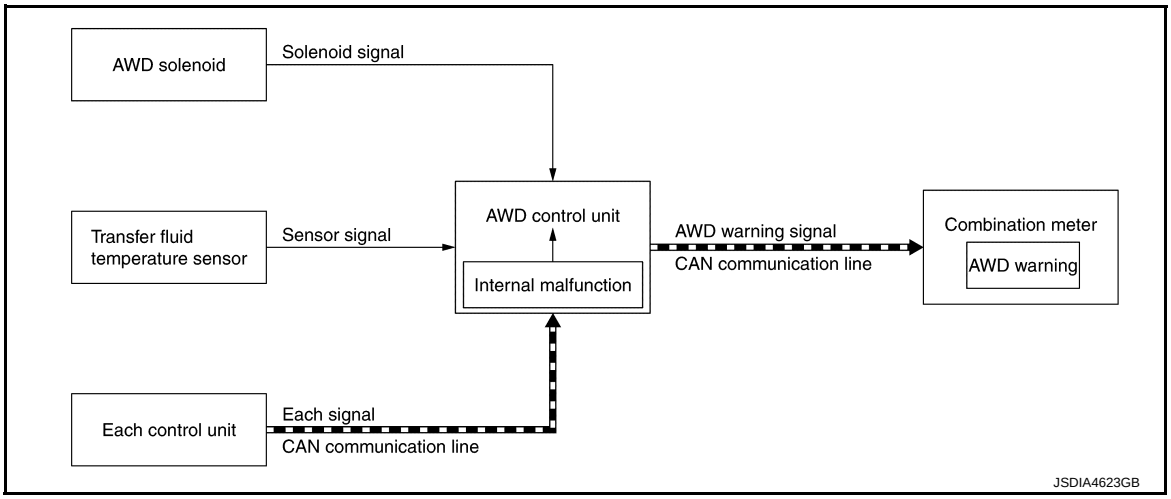
Symbol	Message	Condition
 JSDIA4707ZZ	AWD Error See Owner's Manual	AWD system malfunction.
	AWD High Temp. Stop vehicle	Protection function is activated due to heavy load to electric controlled coupling. (AWD system is not malfunctioning and AWD system changes to rear wheel drive.)
	Tire Size Incorrect See Owner's Manual	Large difference in diameter of front/rear tires.

SYNCHRONIZATION WITH MASTER WARNING LAMP

Applicable

For master warning lamp, refer to MWI-34, "WARNING LAMPS/INDICATOR LAMPS : Master Warning Lamp".

SYSTEM DIAGRAM



SIGNAL PATH

- The AWD control unit judges and decides a mode from among normal mode, fail-safe mode, and protection function mode, according to signals received from each switch, sensor, and control unit.
- The AWD control unit transmits AWD warning signal to the combination meter via CAN communication when judging fail-safe mode or protection function mode.
- The combination meter displays AWD warning on the information display when receiving AWD warning signal transmitted from the AWD control unit.

WARNING CONDITION

AWD warning is displayed when the AWD system goes into fail-safe mode or protection function mode.

WARNING CANCEL CONDITION

When any of the conditions listed below is satisfied:

- Ignition switch is in a position other than ON.
- AWD warning becomes invisible when the AWD system returns to normal.

WARNING/INDICATOR/CHIME LIST

WARNING/INDICATOR/CHIME LIST : Warning/Indicator (On Information Display)

INFOID:0000000009715187

Name	Function
AWD warning	Refer to DLN-16, "INFORMATION DISPLAY (COMBINATION METER) : AWD Warning".

DIAGNOSIS SYSTEM (AWD CONTROL UNIT)

CONSULT Function

INFOID:0000000009643537

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 DLN-22, "DTC Index".

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)	The number of times that ignition switch is turned ON after the DTC is detected is displayed. • When “0” is displayed: It indicates that the system is presently malfunctioning. • When except “0” is displayed: It indicates that system malfunction in the past is detected, but the system is presently normal. **NOTE:** Each time when ignition switch is turned OFF to ON, numerical number increases in 1→2→3...38→39. When the operation number of times exceeds 39, the number do not increase and “39” is displayed until self-diagnosis is erased.

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 (on information display) is displayed.
4WD MODE SW [##]*1	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.

Monitor item (Unit)	Remarks
THRTL POS SEN [%]	Throttle opening status is displayed.
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.
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.

*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)	• Vehicle stopped • Engine running • No DTC detected	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.) • Qu: Increase current value in increments of 0.2 A • Qd: Decrease current value in increments of 0.2 A • UP: Increase current value in increments of 0.02 A • DOWN: Decrease current value in increments of 0.02 A

CAUTION:
Never energize continuously for a long time.

ECU DIAGNOSIS INFORMATION

AWD CONTROL UNIT

Reference Value

INFOID:0000000009643538

VALUES ON THE DIAGNOSIS TOOL

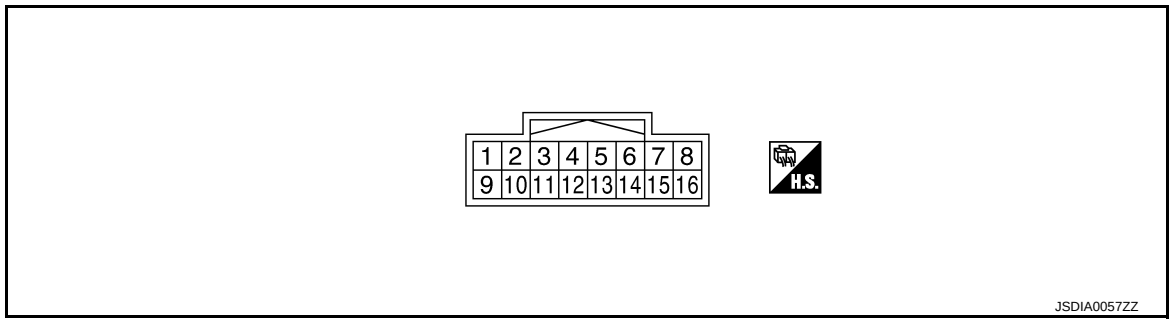
NOTE:

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
	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
	Engine running	On
4WD WARN LAMP	AWD warning (on information display): Displayed	On
	AWD warning (on information display): Not displayed	Off
4WD MODE SW*1	Always	##
4WD MODE MON	Engine running	AUTO
DIS-TIRE MONI	Vehicle running with normal size tire installed	0 – 4 mm
	Vehicle running with improper size tire installed (Front/rear tire size difference, wear condition)	4 – 8 mm, 8 – mm
P BRAKE SW	Parking brake operated	On
	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%
ETS SOLENOID	Engine running • At idle speed	Approx. 0.000 A
	Engine running • 3,000 rpm or more constant	Approx. 0.000 – 0.500 A*2
FR RH SENSOR	Vehicle stopped	0.00 km/h (0.00 mph)
	Vehicle running **CAUTION:** **Check air pressure of tire under standard condition.**	Approx. equal to the indication on speedometer (Inside of ±10%)
FR LH SENSOR	Vehicle stopped	0.00 km/h (0.00 mph)
	Vehicle running **CAUTION:** **Check air pressure of tire under standard condition.**	Approx. equal to the indication on speedometer (Inside of ±10%)
RR RH SENSOR	Vehicle stopped	0.00 km/h (0.00 mph)
	Vehicle running **CAUTION:** **Check air pressure of tire under standard condition.**	Approx. equal to the indication on speedometer (Inside of ±10%)
RR LH SENSOR	Vehicle stopped	0.00 km/h (0.00 mph)
	Vehicle running **CAUTION:** **Check air pressure of tire under standard condition.**	Approx. equal to the indication on speedometer (Inside of ±10%)

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

TERMINAL LAYOUT



PHYSICAL VALUES

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
1 (BR)	Ground	AWD solenoid power supply	Output	Engine speed: At idle	0 V
				Engine speed: 3,000 rpm or more constant	3.1 V*1
2 (Y)	Ground	AWD solenoid ground	Input	Engine speed: At idle	0 V
				Engine speed: 3,000 rpm or more constant	0 V
3 (W/B)	Ground	Transfer fluid temperature sensor ground	Input	Always	0 V
7 (G)	Ground	Ignition switch	Input	Ignition switch: ON	Battery voltage
				Ignition switch: OFF	0 V
8 (L)	—	CAN-H	Input/ Output	—	—
9 (BG)	Ground	Power supply (AWD solenoid)	Input	Always	Battery voltage
10 (B)	Ground	Ground	—	Always	0 V
11 (B)	Ground	Ground	—	Always	0 V
13 (LG)	Ground	Transfer fluid temperature sensor power supply	Output	Transfer temperature: 20°C (68°F)	1.56 V
				Transfer temperature: 80°C (176°F)	0.44 V
15 (W)	Ground	Power supply (AWD control unit)	Input	Always	Battery voltage
16 (R)*2 (P)*3	—	CAN-L	Input/ Output	—	—

*1: The values are changed by depressed accelerator pedal opening and engine speed.
*2: With Gateway.
*3: Without Gateway.

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

Fail-safe

INFOID:0000000009643539

- If any malfunction occurs in AWD electrical system, and control unit detects the malfunction, AWD warning on information display (combination meter) is displayed to indicate system malfunction.

- When AWD warning (AWD Error) is displayed, vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

Protection Function

INFOID:0000000009643540

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	AWD warning (on information display)	Error area and root cause	Contents of protection function
—	Refer to DLN-16, "INFORMATION DISPLAY (COMBINATION METER) : AWD Warning".	Transfer assembly in protection mode. It is not malfunction. (Internal temperature rise of electronic controlled coupling)	Shuts down AWD system temporarily (Rear wheel drive)
—		Malfunction in each tire or different tire diameter	

NOTE:
- If the AWD warning displays during driving but remains not displayed after the engine is restarted, the system is normal. If it again displays 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:0000000009643541

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	• C1201 CONTROLLER FAILURE • C1205 4WD ACTUATOR RLY • P1804 CONTROL UNIT 3 • P1809 CONTROL UNIT 4
3	• C1203 ABS SYSTEM • C1210 ENGINE SIGNAL 1
4	• C1204 4WD SOLENOID • P1826 OIL TEMP SEN

DTC Index

INFOID:0000000009643542

DTC	Display Items	Reference
C1201	CONTROLLER FAILURE	DLN-31, "DTC Description"
C1203	ABS SYSTEM	DLN-32, "DTC Description"
C1204	4WD SOLENOID	DLN-33, "DTC Description"
C1205	4WD ACTUATOR RLY	DLN-36, "DTC Description"
C1210	ENGINE SIGNAL 1	DLN-38, "DTC Description"
P1804	CONTROL UNIT 3	DLN-39, "DTC Description"
P1809	CONTROL UNIT 4	DLN-40, "DTC Description"
P1826	OIL TEMP SEN	DLN-41, "DTC Description"
U1000	CAN COMM CIRCUIT	DLN-44, "DTC Description"
U1010	CONTROL UNIT (CAN)	DLN-45, "DTC Description"

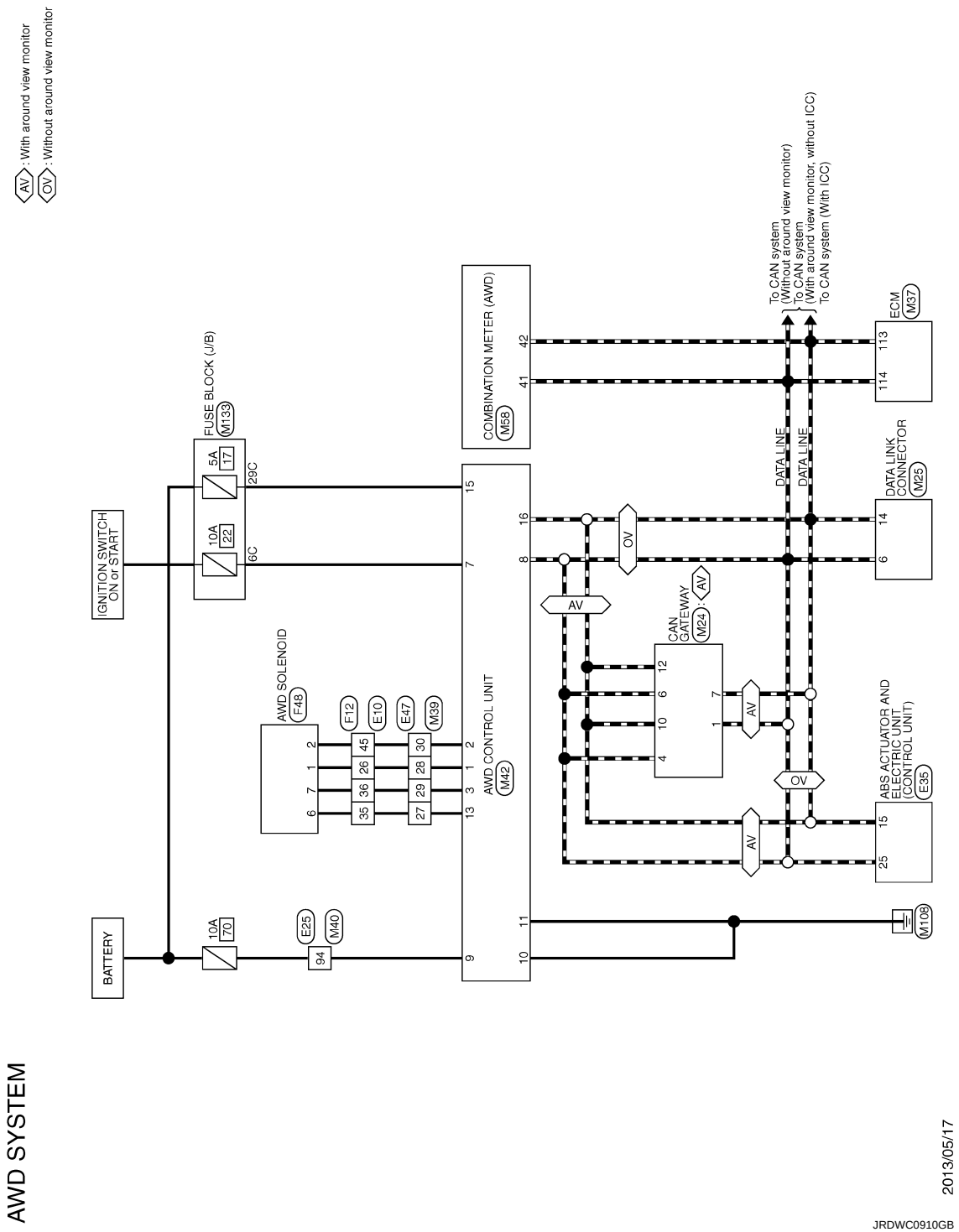
NOTE:
If some DTCs are displayed at the same time, refer to DLN-22, "DTC Inspection Priority Chart".

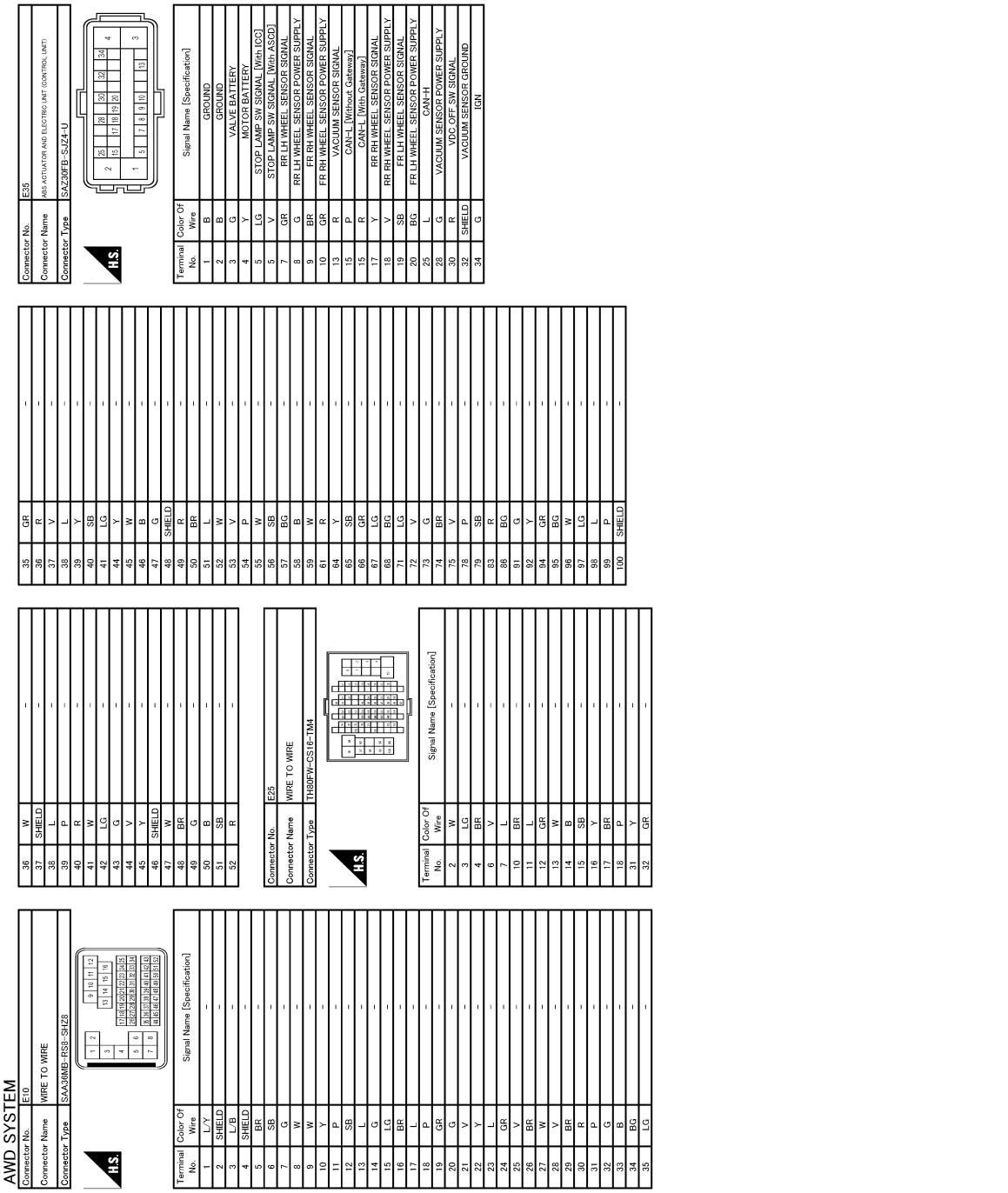
WIRING DIAGRAM

AWD SYSTEM

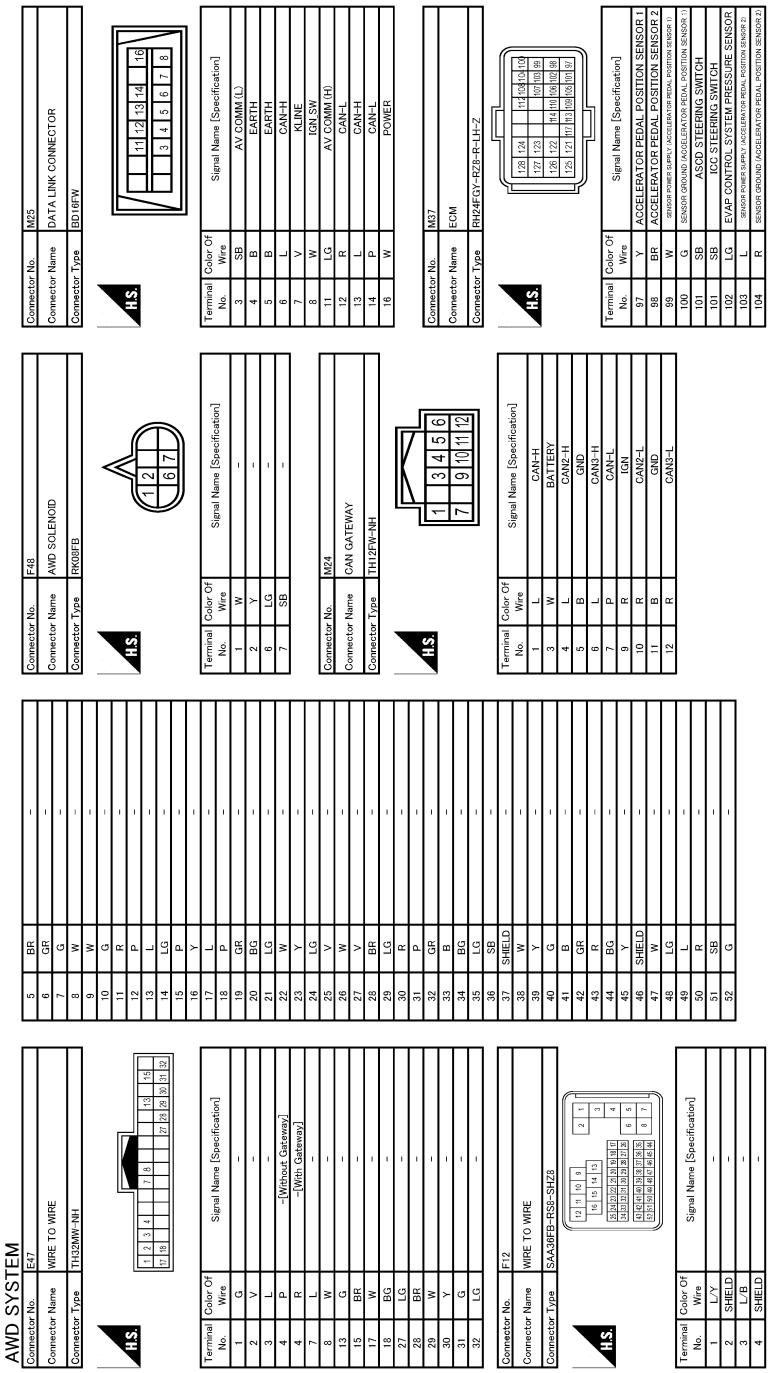
Wiring Diagram

INFOID:0000000009643543

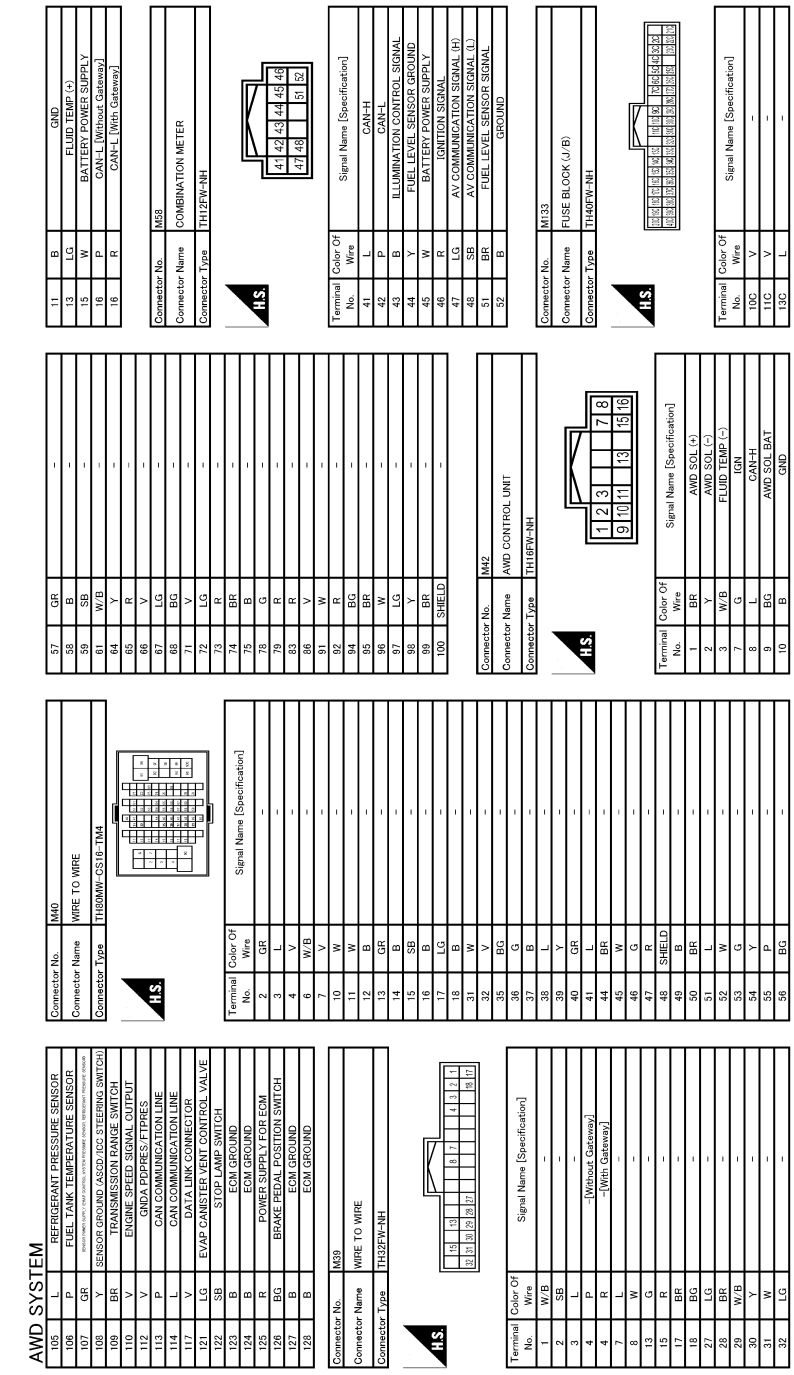




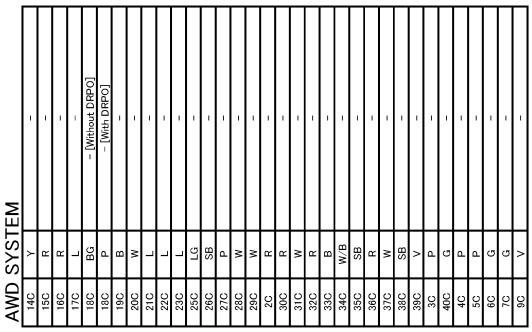
JRDWC0911GB



JRDWC0912GB



JRDWC0913GB



JRDWC0914GB

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000009643544

DETAILED FLOW

1.INTERVIEW FROM THE CUSTOMER

Clarify customer complaints before inspection. First of all, perform an interview utilizing DLN-29, "Diagnostic Work Sheet" 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.

CAUTION:

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 DLN-22, "Protection Function".

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

With CONSULT

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 DLN-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 GI-43, "Intermittent Incident".

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.

6.IDENTIFY ERROR-DETECTED SYSTEM BY SYMPTOM DIAGNOSIS

Estimate error-detected system based on symptom diagnosis and perform inspection.

Can the error-detected system be identified?

YES >> GO TO 7.
NO >> Check harness and connectors based on the information obtained by interview. Refer to GI-43, "Intermittent Incident".

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:0000000009643545

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 name	MR/MS	Registration number		Initial year registration	
		Vehicle type		VIN	
Storage date		Engine		Mileage	km (Mile)
Symptom		☐Vehicle does not enter AWD mode.			
		☐AWD warning (AWD Error) is displayed.			
		☐Heavy tight-corner braking symptom occurs			
		☐Noise ☐Vibration			
		☐Others ( )			
First occurrence		☐Recently ☐Others ( )			
Frequency of occurrence		☐Always ☐Under a certain conditions of ☐Sometimes (time(s)/day)			
Climate conditions		☐Irrelevant			
	Weather	☐Fine ☐Cloud ☐Rain ☐Snow ☐Others ( )			
	Temperature	☐Hot ☐Warm ☐Cool ☐Cold ☐Temperature (Approx. °C)			
	Relative humidity	☐High ☐Moderate ☐Low			
Road conditions		☐Urban area ☐Suburb area ☐High way ☐Mounting road (uphill or down hill) ☐Rough road			
Operation conditions, etc.		☐Irrelevant ☐When engine starts ☐During idling ☐During driving ☐During acceleration ☐At constant speed driving ☐During deceleration ☐During cornering (right curve or left curve)			

Interview sheet

Customer name	MR/MS	Registration number		Initial year registration	
		Vehicle type		VIN	
Storage date		Engine		Mileage	km (Mile)
Other conditions					

Memo

DTC/CIRCUIT DIAGNOSIS

C1201 AWD CONTROL UNIT

DTC Description

INFOID:0000000009643546

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
C1201	CONTROLLER FAILURE (Control unit failure)	Malfunction has occurred inside AWD control unit.

POSSIBLE CAUSE

Internal malfunction of AWD control unit

FAIL-SAFE

Vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. DTC REPRODUCTION PROCEDURE

With CONSULT

1. 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 DLN-31, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-43, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000009643547

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 DLN-55, "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.

C1203 ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

DTC Description

INFOID:0000000009643548

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
C1203	ABS SYSTEM (ABS system)	Malfunction related to wheel sensor has been detected by ABS actuator and electric unit (control unit).

POSSIBLE CAUSE

ABS malfunction (wheel speed signal error)

FAIL-SAFE

Vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.DTC REPRODUCTION PROCEDURE

With CONSULT

1. Start the engine and drive at 30 km/h (19 MPH) or more for approximately 1 minute.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “C1203” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-32, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-43, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000009643549

1.PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS

With CONSULT

Perform self-diagnosis for “ABS”.

Is any DTC detected?

YES >> Check the DTC. Refer to BRC-57, "DTC Index".
NO >> GO TO 2.

2.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-55, "Removal and Installation".
NO >> Repair or replace error-detected parts.

C1204 AWD SOLENOID

DTC Description

INFOID:0000000009643550

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
C1204	AWD SOLENOID (AWD solenoid)	Malfunction related to AWD solenoid has been detected.

POSSIBLE CAUSE

- Internal malfunction of electronic controlled coupling
- Malfunction of AWD solenoid power supply circuit (open or short)
- Malfunction of AWD solenoid command current

FAIL-SAFE

Vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.DTC REPRODUCTION PROCEDURE

With CONSULT

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

Is DTC “C1204” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-33, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-43, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000009643551

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 control unit		—	Voltage
Connector	Terminal		
M42	9	Ground	Battery voltage

4. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
5. Check the voltage between AWD control unit harness connector and ground.

AWD control unit		—	Voltage
Connector	Terminal		
M42	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 (#70)
3. Check the harness for open or short between AWD control unit harness connector No.9 terminal and 10A (#70).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-12, "Wiring Diagram - BATTERY POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

3.CHECK AWD CONTROL UNIT GROUND

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

AWD control unit		—	Continuity
Connector	Terminal		
M42	10	Ground	Existed
	11		

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK AWD SOLENOID CIRCUIT (1)

Check the resistance between AWD control unit terminals.

AWD control unit			Resistance (Approx.)
Connector	Terminal		
M42	1	2	2.45 Ω

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 5.

5.CHECK AWD SOLENOID CIRCUIT (2)

1. Disconnect AWD solenoid harness connector.
2. Check the continuity between AWD control unit harness connector and AWD solenoid harness connector.

AWD control unit		AWD solenoid		Continuity
Connector	Terminal	Connector	Terminal	
M42	1	F48	1	Existed
	2		2	

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

AWD control unit		—	Continuity
Connector	Terminal		
M42	1	Ground	Not existed
	2		

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK AWD SOLENOID

Check AWD solenoid. Refer to DLN-35, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> AWD solenoid is malfunctioning. Replace electric controlled coupling. Refer to DLN-75, "Disassembly" and DLN-76, "Assembly".

7. CHECK TERMINALS AND HARNESS CONNECTORS

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

Is the inspection result normal?

YES >> Replace AWD control unit. Refer to DLN-55, "Removal and Installation".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000009643552

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 solenoid		Resistance (Approx.)
Terminal		
1	2	2.45 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> AWD solenoid is malfunctioning. Replace electric controlled coupling. Refer to DLN-75, "Disassembly" and DLN-76, "Assembly".

C1205 AWD ACTUATOR RELAY

DTC Description

INFOID:0000000009643553

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
C1205	AWD ACTUATOR RLY (AWD actuator relay)	Malfunction has been detected from AWD actuator relay integrated with AWD control unit, or malfunction related to AWD solenoid has been detected.

POSSIBLE CAUSE

- Internal malfunction of AWD control unit
- Malfunction of AWD solenoid power supply circuit (open or short)

FAIL-SAFE

Vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.DTC REPRODUCTION PROCEDURE

With CONSULT

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

Is DTC “C1205” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-36, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-43, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000009643554

1.CHECK AWD SOLENOID CIRCUIT (1)

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

AWD control unit		—	Continuity
Connector	Terminal		
M42	1	Ground	Not existed
	2		

Is the inspection result normal?

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

2.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, replace AWD control unit. Refer to DLN-55, "Removal and Installation".

NO >> Repair or replace damaged parts.

3. CHECK AWD SOLENOID

1. Disconnect AWD solenoid harness connector.
2. Check the continuity between AWD solenoid harness connector and the ground.

AWD solenoid			
Terminal		—	Continuity
1	Ground		Not existed
2			

Is the inspection result normal?

YES >> GO TO 4.
NO >> AWD solenoid is malfunctioning. Replace electric controlled coupling. Refer to DLN-75, "Disassembly" and DLN-76, "Assembly".

4. CHECK AWD SOLENOID CIRCUIT

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

AWD control unit		—	Continuity
Connector	Terminal		
M42	1	Ground	Not existed
	2		

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 Description

INFOID:0000000009643555

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
C1210	ENGINE SIGNAL 1 (Engine signal 1)	Malfunction related to engine signal has been detected.

POSSIBLE CAUSE

Malfunction of engine control system

FAIL-SAFE

Vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.DTC REPRODUCTION PROCEDURE

With CONSULT

1. Start the engine. Drive the vehicle for a while.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “C1210” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-38, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-43, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000009643556

1.PERFORM ECM SELF-DIAGNOSIS

With CONSULT

Perform self-diagnosis for “ENGINE”.

Is any DTC detected?

YES >> Check the DTC. Refer to EC-106, "DTC Index".
NO >> GO TO 2.

2.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 “C1210” is detected, Replace AWD control unit. Refer to DLN-55, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1804 TRANSFER CONTROL UNIT

DTC Description

INFOID:0000000009643557

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1804	CONTROL UNIT 3 (Control unit 3)	Malfunction has occurred inside AWD control unit.

POSSIBLE CAUSE

Malfunction is detected in the memory (EEPROM) system of transfer control unit.

FAIL-SAFE

Vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.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 DLN-39, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-43, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000009643558

1.REPLACE AWD CONTROL UNIT

CAUTION:
Replace AWD control unit when DTC “P1804” is detected simultaneously with other items.

>> Replace AWD control unit. Refer DLN-55, "Removal and Installation".

P1809 TRANSFER CONTROL UNIT

DTC Description

INFOID:0000000009643559

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1809	CONTROL UNIT 4 (Control unit 4)	Malfunction has occurred inside AWD control unit.

POSSIBLE CAUSE

AD converter system of transfer control unit is malfunctioning.

FAIL-SAFE

Vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.DTC REPRODUCTION PROCEDURE

With CONSULT

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

Is DTC “P1809” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-40, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-43, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000009643560

1.REPLACE AWD CONTROL UNIT

CAUTION:
Replace AWD control unit when DTC “P1809” is detected simultaneously with other items.

>> Replace AWD control unit. Refer DLN-55, "Removal and Installation".

P1826 TRANSFER FLUID TEMPERATURE

DTC Description

INFOID:0000000009643561

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P1826	OIL TEMP SEN (Oil temperature sensor)	Transfer fluid temperature sensor voltage condition is continued 0 V or more than 2.45 V for several seconds.

POSSIBLE CAUSE

- Malfunction of transfer fluid temperature sensor or transfer fluid temperature sensor circuit.
- Malfunction of AWD control unit.

FAIL-SAFE

Vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.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 DLN-41, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-43, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000009643562

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			Voltage (Approx.)
Connector	Terminal		
F48	6	7	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 DLN-43, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Transfer fluid temperature sensor is malfunctioning. Replace electric controlled coupling. Refer to DLN-75, "Disassembly" and DLN-76, "Assembly".

3.CHECK TRANSFER FLUID TEMPERATURE SENSOR SIGNAL (2)

Check the voltage between AWD solenoid harness connector and ground.

AWD solenoid		—	Voltage (Approx.)
Connector	Terminal		
F48	6	Ground	2.5 V

Is the inspection result normal?

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

4.CHECK AWD CONTROL UNIT GROUND

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.

AWD control unit		—	Continuity
Connector	Terminal		
M42	10	Ground	Existed
	11		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK TRANSFER FLUID TEMPERATURE SENSOR CIRCUIT

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

AWD control unit		AWD solenoid		Continuity
Connector	Terminal	Connector	Terminal	
M42	13	F48	6	Existed
	3		7	

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

AWD control unit		—	Continuity
Connector	Terminal		
M42	13	Ground	Not existed
	3		

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

6.CHECK TERMINALS AND HARNESS CONNECTORS

- Check AWD control unit pin terminals for damage or loose connection with harness connector.
- Check transfer fluid temperature sensor pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> Replace AWD control unit. Refer to DLN-55, "Removal and Installation".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000009643563

1. CHECK TRANSFER FLUID TEMPERATURE SENSOR

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

AWD solenoid		Condition	Resistance (Approx.)
Terminal			
6	7	20°C (68°F)	2.5 kΩ
		80°C (176°F)	0.3 kΩ

Is inspection result normal?

YES >> INSPECTION END

NO >> Transfer fluid temperature sensor is malfunctioning. Replace electric controlled coupling. Refer to DLN-75, "Disassembly" and DLN-76, "Assembly".

U1000 CAN COMM CIRCUIT

DTC Description

INFOID:0000000009643565

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1000	CAN COMM CIRCUIT (CAN communication circuit)	AWD control unit is not transmitting/receiving CAN communication signal for 2 seconds or more.

POSSIBLE CAUSE

CAN communication error

FAIL-SAFE

Vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.DTC REPRODUCTION PROCEDURE

With CONSULT

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

Is DTC “U1000” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-44, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-43, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000009643566

Proceed to LAN-26, "Trouble Diagnosis Flow Chart".

U1010 CONTROL UNIT (CAN)

DTC Description

INFOID:0000000009643568

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 DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
U1010	CONTROL UNIT (CAN) [Control unit (CAN)]	Detecting error during the initial diagnosis of CAN controller of AWD control unit.

POSSIBLE CAUSE

Internal malfunction of AWD control unit

FAIL-SAFE

Vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.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 DLN-45, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-43, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000009643569

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 DLN-55, "Removal and Installation".
NO >> Repair or replace error-detected parts.

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000009643570

1.CHECK AWD CONTROL UNIT 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 control unit		—	Voltage (Approx.)
Connector	Terminal		
M42	7	Ground	0 V

4. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
5. Check the voltage between AWD control unit harness connector and ground.

AWD control unit		—	Voltage
Connector	Terminal		
M42	7	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK AWD CONTROL UNIT POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#22).
3. Disconnect fuse block (J/B) harness connector.
4. Check the continuity between AWD control unit harness connector and fuse block (J/B) harness connector.

AWD control unit		Fuse block (J/B)		Continuity
Connector	Terminal	Connector	Terminal	
M42	7	M133	6C	Existed

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

AWD control unit		—	Continuity
Connector	Terminal		
M42	7	Ground	Not existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ignition power supply circuit. Refer to PG-54, "Wiring Diagram - IGNITION POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

3.CHECK AWD CONTROL UNIT POWER SUPPLY (3)

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

AWD control unit		—	Voltage (Approx.)
Connector	Terminal		
M42	15	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 control unit		—	Voltage
Connector	Terminal		
M42	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 5A fuse (#17).
3. Disconnect fuse block (J/B) harness connector.
4. Check the continuity between AWD control unit harness connector and fuse block (J/B) harness connector.

AWD control unit		Fuse block (J/B)		Continuity
Connector	Terminal	Connector	Terminal	
M42	15	M133	29C	Existed

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

AWD control unit		—	Continuity
Connector	Terminal		
M42	15	Ground	Not existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-12, "Wiring Diagram - BATTERY POWER SUPPLY -".
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		
M42	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 control unit		—	Voltage
Connector	Terminal		
M42	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 (#70).
3. Check the harness for open or short between AWD control unit harness connector No.9 terminal and fuse box.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-12, "Wiring Diagram - BATTERY POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

7. CHECK AWD CONTROL UNIT GROUND

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

AWD control unit		—	Continuity
Connector	Terminal		
M42	10	Ground	Existed
	11		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

SYMPTOM DIAGNOSIS

HEAVY TIGHT-CORNER BRAKING SYMPTOM OCCURS

Description

INFOID:0000000009643577

Heavy tight-corner braking symptom occurs when the vehicle is driven and the steering wheel is turned fully to 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:0000000009643578

1.PERFORM ECM SELF-DIAGNOSIS

With CONSULT
Perform self-diagnosis for “ENGINE”.

Is any DTC detected?

YES >> Check the DTC. Refer to EC-106, "DTC Index".
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 DLN-44, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK TRANSFER FLUID TEMPERATURE SENSOR

Perform the trouble diagnosis of the transfer fluid temperature sensor. Refer to DLN-41, "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 DLN-33, "Diagnosis Procedure".

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.
2. Set the transmission to neutral. Release the parking brake.
3. Lift up the vehicle.
4. Rotate the rear propeller shaft.
5. 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 DLN-74, "Exploded View".
NO >> Check each harness connector pin terminal for disconnection.

VEHICLE DOES NOT ENTER AWD MODE

Description

INFOID:0000000009643579

Vehicle does not enter 4-wheel drive mode even though AWD warning is not displayed.

Diagnosis Procedure

INFOID:0000000009643580

1.CHECK INFORMATION DISPLAY (COMBINATION METER)

Perform the trouble diagnosis of combination meter. Refer to MWI-62, "On Board Diagnosis Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace the error-detected parts.

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 DLN-74, "Exploded View".
NO >> Check each harness connector pin terminal for disconnection.

AWD HIGH TEMP IS DISPLAYED ON INFORMATION DISPLAY

Description

INFOID:0000000009643581

While driving, AWD warning (AWD High Temp. Stop vehicle) is displayed on information display (combination meter).

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 DLN-22, "Protection Function".
- When this symptom occurs, stop vehicle and allow it to idle for some times. Blinking will stop and system will be restored.

TIRE SIZE INCORRECT IS DISPLAYED ON INFORMATION DISPLAY

Description

INFOID:0000000009643582

While driving, AWD warning (Tire Size Incorrect: See Owner's Manual) is displayed on information display (combination meter).

Diagnosis Procedure

INFOID:0000000009643583

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 DLN-55, "Removal and Installation".
NO >> Repair or replace the error-detected parts.

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009643584

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-54, "Inspection"			DLN-64, "Exploded View"	DLN-64, "Exploded View"	DLN-77, "Inspection"	DLN-77, "Inspection"	DLN-72, "Inspection"
SUSPECTED PARTS (Possible cause)		TRANSFER FLUID (Level low)	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)
Symptom	Noise	1	2				3	3	3
	Transfer fluid leakage		4	1	2	2			3

PERIODIC MAINTENANCE

TRANSFER FLUID

Inspection

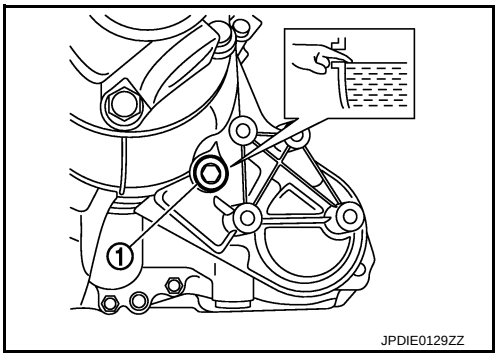
INFOID:0000000009643585

FLUID LEAKAGE

Check transfer surrounding area (oil seal, drain plug, and filler plug etc.) for fluid leakage.

FLUID LEVEL

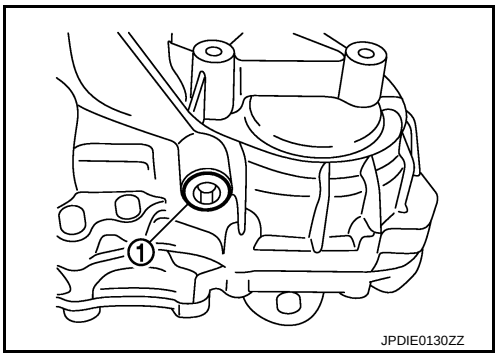
1. Remove filler plug ① and gasket. Then check that fluid is filled up from mounting hole for the filler plug.
   CAUTION:
   Never start engine while checking fluid level.
2. Set a new gasket onto filler plug, and install it on transfer and tighten to the specified torque. Refer to DLN-64, "Exploded View".
   CAUTION:
   Never reuse gasket.



Draining

INFOID:0000000009643586

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.
3. Set a new gasket onto drain plug, and install it on the transfer and tighten to the specified torque. Refer to DLN-64, "Exploded View".
   CAUTION:
   Never reuse gasket.



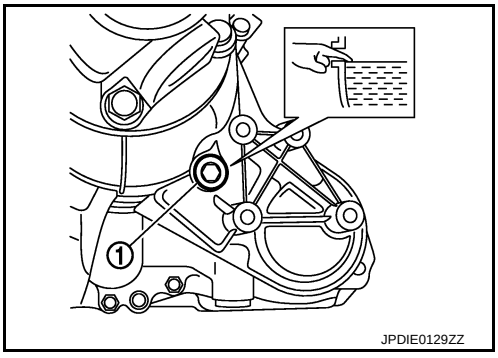
Refilling

INFOID:0000000009643587

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

Recommended fluid and capacity	**: Refer to MA-14, "FOR NORTH AMERICA : Fluids and Lubricants".**

   CAUTION:
   Carefully fill the fluid. (Fill up for approximately 3 minutes.)
2. Leave the vehicle for 3 minutes, and check the fluid level again.
3. Set a new gasket onto filler plug, and install it on transfer and tighten to the specified torque. Refer to DLN-64, "Exploded View".
   CAUTION:
   Never reuse gasket.

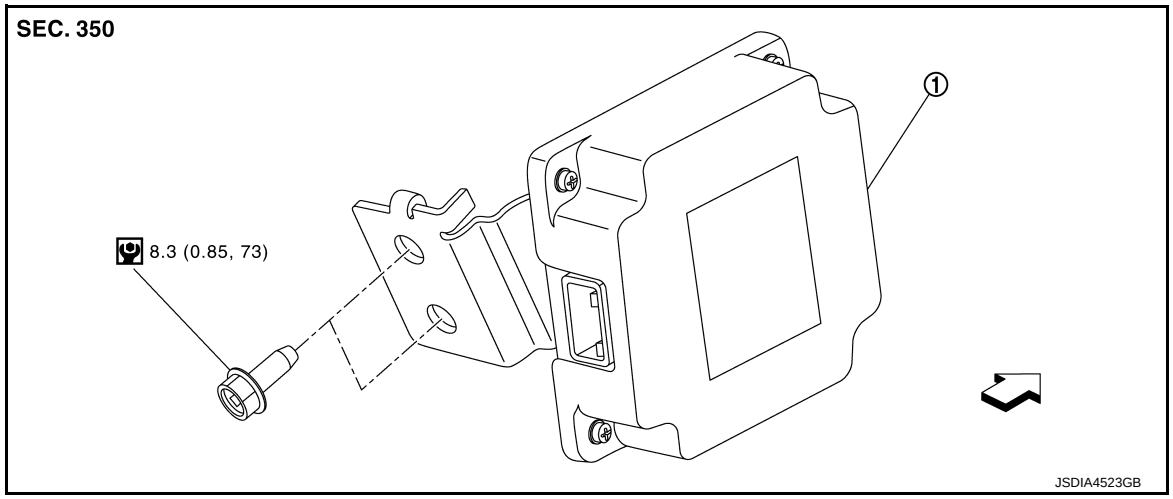


REMOVAL AND INSTALLATION

AWD CONTROL UNIT

Exploded View

INFOID:0000000009697396



① AWD control unit

⇦ : Vehicle front

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000009643588

REMOVAL

1. Turn the ignition switch OFF.
2. Instrument lower panel LH. Refer to IP-12, "Removal and Installation".
3. Remove steering column assembly mounting parts to lower steering column assembly. Refer to ST-31, "Removal and Installation" (Models with vehicle speed sensitive P/S), ST-87, "Removal and Installation" (Models with direct adaptive steering).
4. Disconnect AWD control unit harness connector.
5. Remove AWD control unit mounting bolts.
6. Remove AWD control unit.

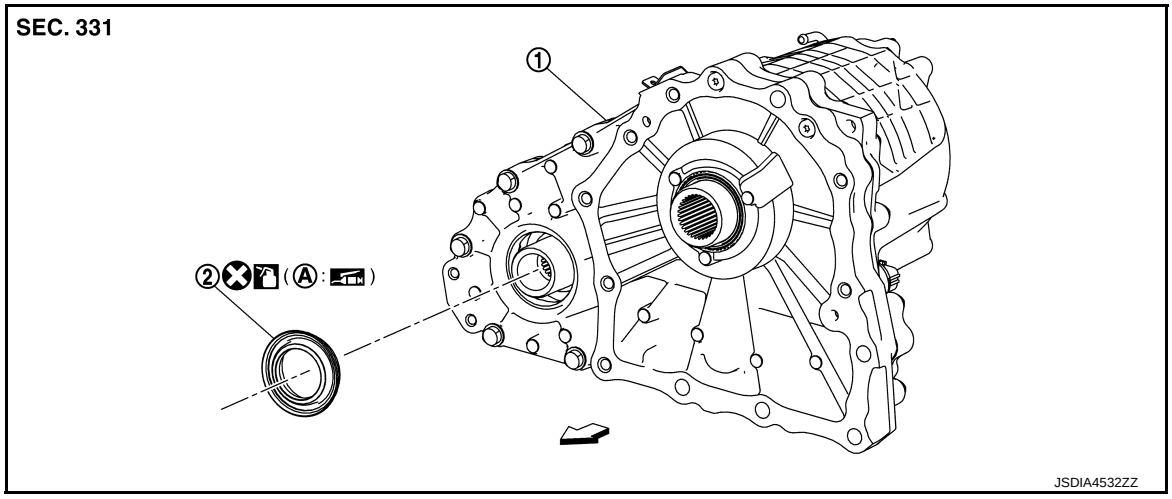
INSTALLATION

Install in the reverse order of removal.

FRONT OIL SEAL

Exploded View

INFOID:0000000009643589



① Transfer assembly
② Front oil seal
Ⓐ Oil seal lip
⇦ : Vehicle front
: Always replace after every disassembly.
: Apply transfer fluid.
: Apply multi-purpose grease.

Removal and Installation

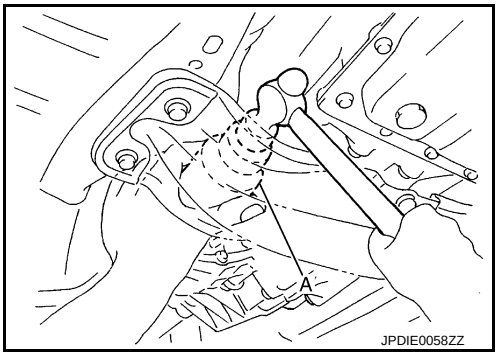
INFOID:0000000009643590

REMOVAL

1. Remove the drain plug to drain the transfer fluid. Refer to DLN-54, "Draining".
2. Remove the front propeller shaft. Refer to DLN-88, "Removal and Installation".
3. Remove front oil seal.
   CAUTION:
   Never damage the front case and front drive shaft of transfer.

INSTALLATION

1. 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 multi-purpose grease to oil seal lip.**
   - **When installing, never incline front oil seal.**
2. Install front propeller shaft. Refer to DLN-88, "Removal and Installation".
3. Fill with new transfer fluid. Refer to DLN-54, "Refilling".
4. Perform inspection after installation. Refer to DLN-56, "Inspection".



Inspection

INFOID:0000000009705599

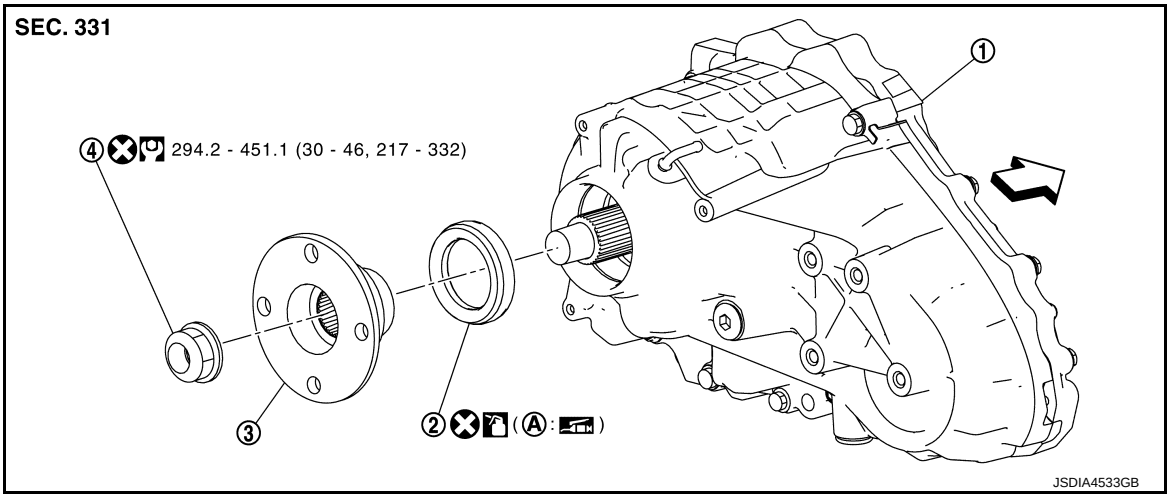
INSPECTION AFTER INSTALLTION

Check fluid level and for fluid leakage. Refer to DLN-54, "Inspection".

REAR OIL SEAL

Exploded View

INFOID:0000000009643591



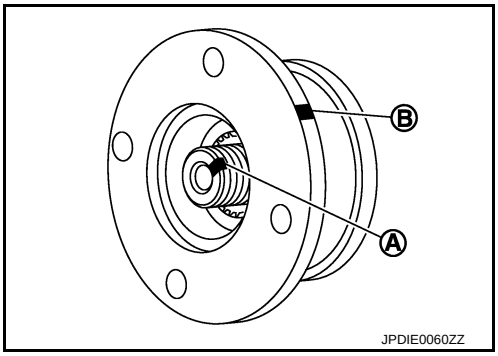
① Transfer assembly
② Rear oil seal
③ Companion flange
④ Self-lock nut
Ⓐ Oil seal lip
⇦ : Vehicle front
: N·m (kg-m, ft-lb)
: Always replace after every disassembly.
: Apply transfer fluid.
: Apply multi-purpose grease.

Removal and Installation

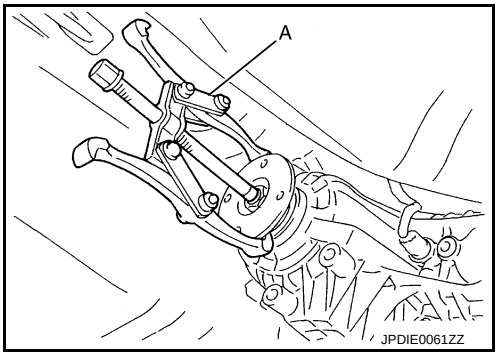
INFOID:0000000009643592

REMOVAL

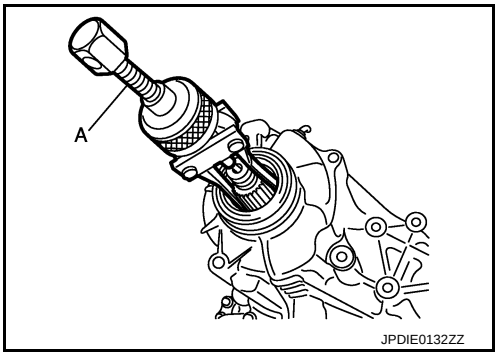
1. Remove the rear propeller shaft. Refer to DLN-108, "Removal and Installation".
2. Remove self-lock nut of companion flange with a flange wrench (commercial service tool).
3. Put matching mark Ⓐ on the end of the main shaft. The mark should be in line with the mark Ⓑ on the companion flange.
   CAUTION:
   For matching mark, use paint. Never damage main shaft.



4. Remove the companion flange with a puller (A).
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.



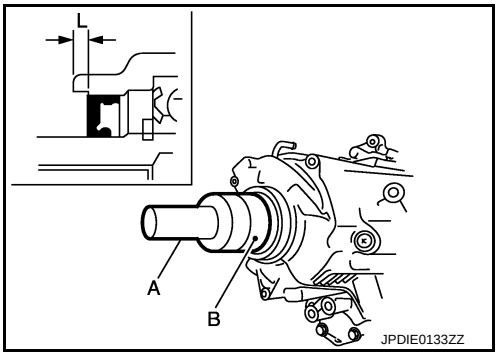
INSTALLATION

1. Apply transfer fluid to rear oil seal, install it with the drifts (A and B) within the dimension (L) shown as follows.

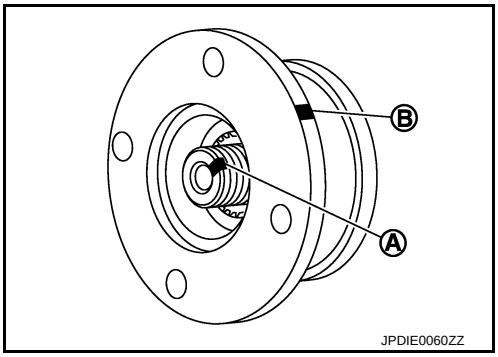
A : Drift [SST: ST30720000 (J-25405)]
B : Drift [SST: KV40104830 (—)]

L : 6.7 – 7.3 mm (0.264 – 0.287 in)

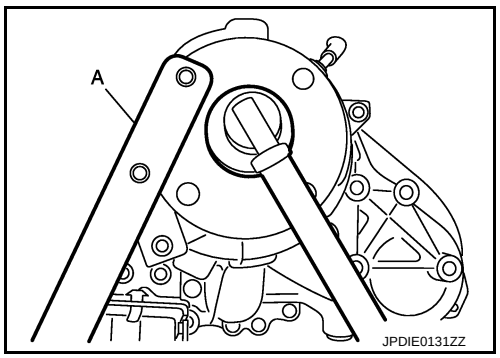
CAUTION:
- **Never reuse rear oil seal.**
- **Apply multi-purpose grease to oil seal lip.**
- **When installing, never incline rear oil seal.**



2. Align the matching mark Ⓐ of main shaft with the mark Ⓑ of companion flange, then install the companion flange.



3. Using a flange wrench (A) (commercial service tool), install the self-lock nut of companion flange and tighten to the specified torque. Refer to DLN-57, "Exploded View".
   CAUTION:
   Never reuse self-lock nut.
4. Install the rear propeller shaft. Refer to DLN-108, "Removal and Installation".
5. Perform inspection after installation. Refer to DLN-59, "Inspection".



INFOID:0000000009705600

Inspection

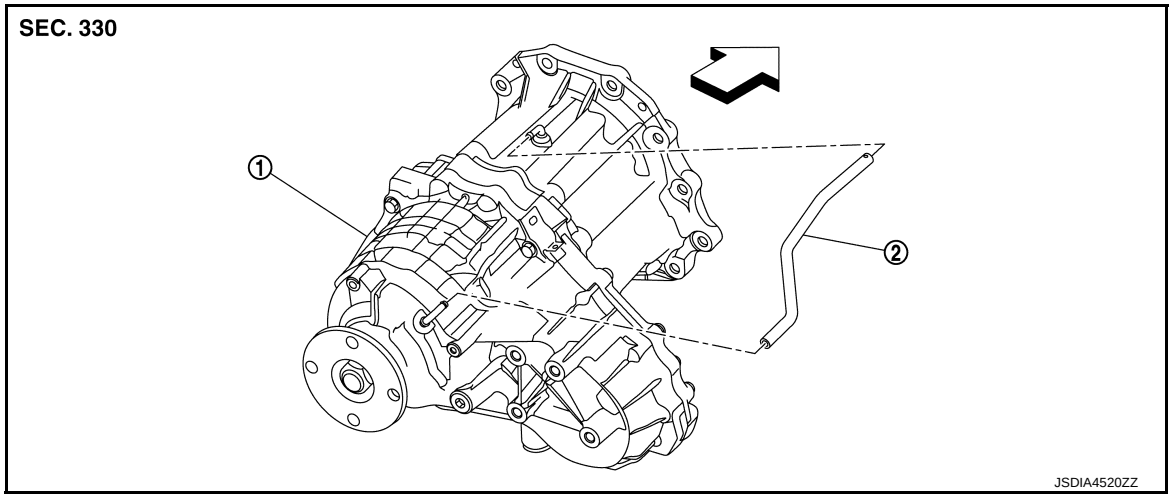
INSPECTION AFTER INSTALLTION

Check fluid level and for fluid leakage. Refer to DLN-54, "Inspection".

AIR BREATHER

Exploded View

INFOID:0000000009696919



① Transfer assembly ② Air breather hose

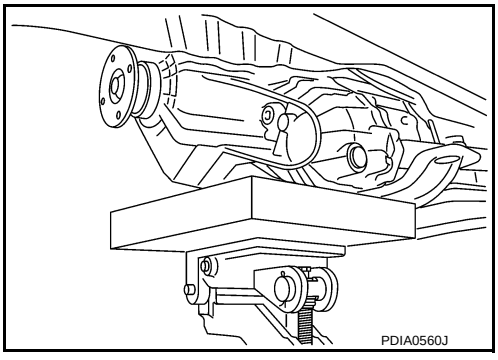
⇦: Vehicle front

Removal and Installation

INFOID:0000000009696920

REMOVAL

1. Remove rear propeller shaft. Refer to DLN-108, "Removal and Installation".
2. Remove control rod of A/T. Refer to TM-215, "Removal and Installation".
3. Support transfer assembly with a jack.
   CAUTION:
   Secure transfer assembly to a jack.
4. Remove rear engine mounting member and engine mounting insulator. Refer to EM-81, "AWD : Exploded View".
5. Lower jack to the position where the transfer air breather hose can be removed.
6. Remove air breather hose.

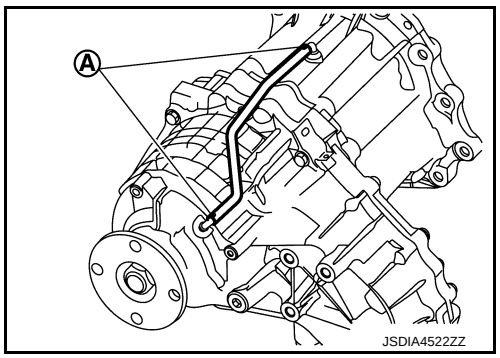


INSTALLATION

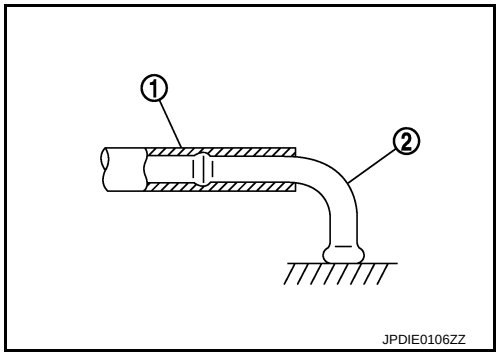
Note the following, and install in the reverse order of removal.

- 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.

- Set transfer air breather hose with the paint mark Ⓐ facing upward.



- Be sure to insert air breather hose ① to air breather tube ② until hose end reaches the tube bend R portion.

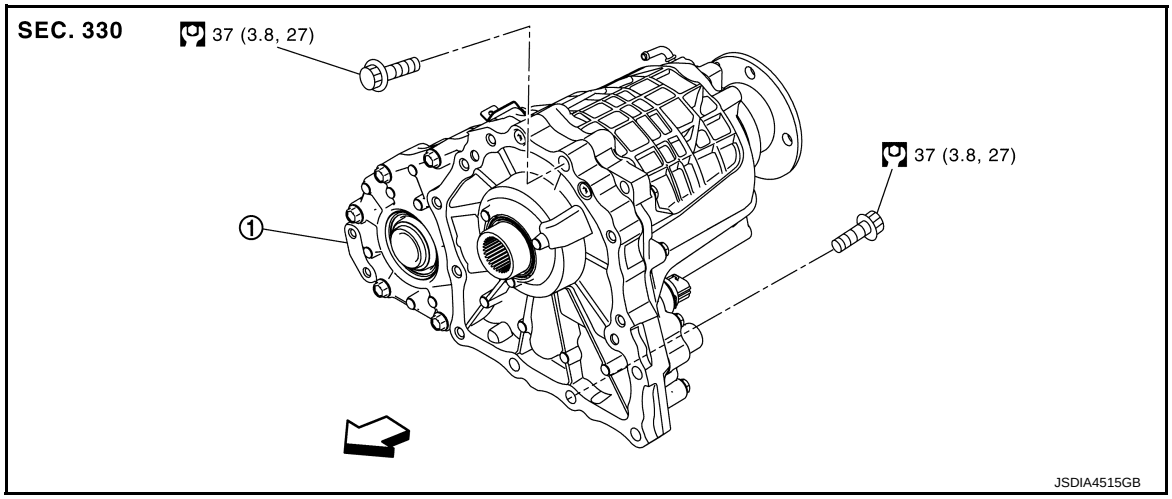


UNIT REMOVAL AND INSTALLATION

TRANSFER ASSEMBLY

Exploded View

INFOID:0000000009643593



① Transfer assembly

⇦: Vehicle front

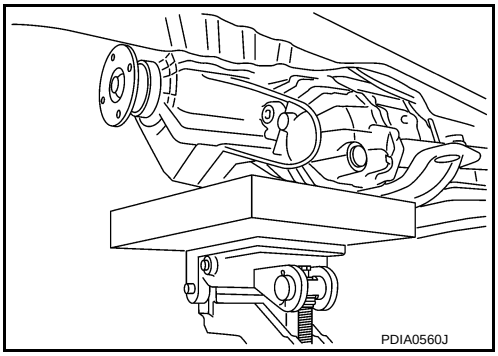
: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:0000000009643594

REMOVAL

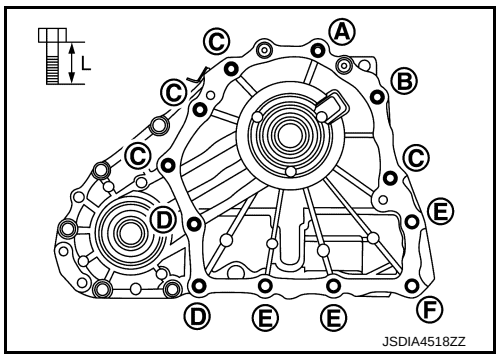
1. Remove rear propeller shaft. Refer to DLN-108, "Removal and Installation".
2. Remove front propeller shaft. Refer to DLN-88, "Removal and Installation".
3. Disconnect AWD solenoid harness connector and separate harness from transfer assembly.
4. Remove control rod of A/T. Refer to TM-215, "Removal and Installation".
5. Support transfer assembly and transmission assembly with a jack.
   CAUTION:
   Secure transfer assembly and transmission assembly to a jack.
6. Remove rear engine mounting member and engine mounting insulator. Refer to EM-81, "AWD : Exploded View".
7. Lower jack to the position where the top transfer mounting bolts can be removed.
8. Remove transfer breather hose. Refer to DLN-60, "Removal and Installation".
9. Remove transfer mounting bolts and separate transfer from transmission.



INSTALLATION

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

- When installing the transfer to the transmission, install the mounting bolts following the standard below, tighten bolts to the specified torque. For each tightening torque, refer to DLN-62, "Exploded View".



Bolt symbol	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ
Quantity	1	1	4	2	3	1
Bolt length " L " mm (in)	75 (2.95)	45 (1.77)	40 (1.57)	30 (1.18)	75 (2.95)	40 (1.57)
Insertion direction	Transmission to transfer				Transfer to transmission	

- Perform inspection after installation. Refer to DLN-63, "Inspection".

Inspection

INFOID:0000000009697384

INSPECTION AFTER INSTALLATION

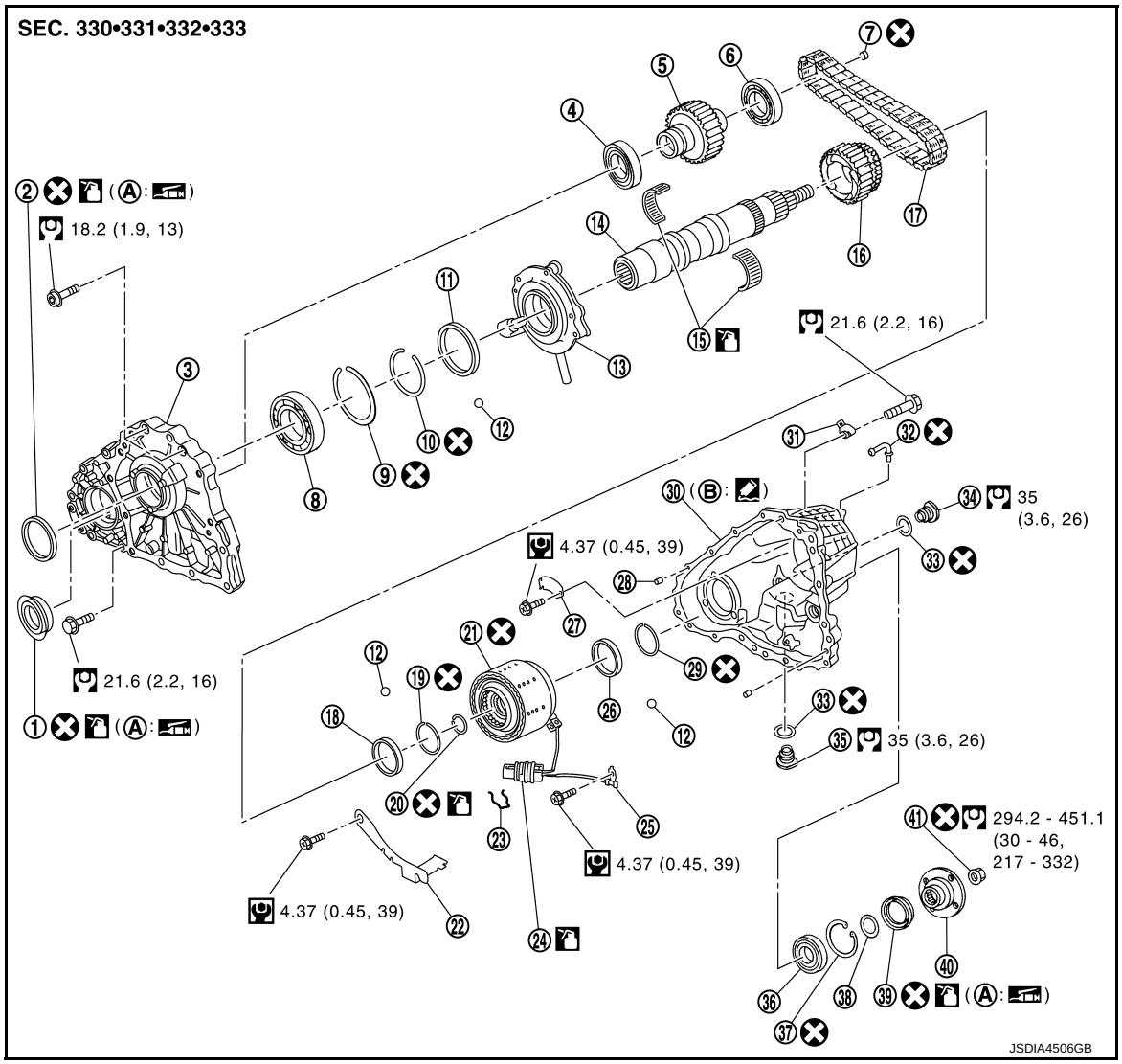
- Check the fluid level, fluid leakage. Refer to DLN-54, "Inspection".
- Check the A/T positions. Refer to TM-105, "Inspection and Adjustment".

UNIT DISASSEMBLY AND ASSEMBLY

FRONT CASE AND REAR CASE

Exploded View

INFOID:0000000009643597



① Front oil seal	② Main shaft oil seal	③ Front case
④ Front drive shaft front bearing	⑤ Front drive shaft	⑥ Front drive shaft rear bearing
⑦ Plug	⑧ Main shaft bearing	⑨ Snap ring
⑩ Snap ring	⑪ Spacer	⑫ Steel ball
⑬ Oil pump	⑭ Main shaft	⑮ Needle bearing
⑯ Sprocket	⑰ Drive chain	⑱ Spacer
⑲ Snap ring	⑳ Circlip	㉑ Electric controlled coupling
㉒ Oil cover	㉓ Retainer	㉔ O-ring
㉕ Transfer fluid temperature sensor	㉖ Spacer	㉗ Baffle plate
㉘ Dowel pin	㉙ Snap ring	㉚ Rear case
㉛ Harness bracket	㉜ Breather tube	㉝ Gasket
㉞ Filler plug	㉟ Drain plug	㊱ Rear bearing

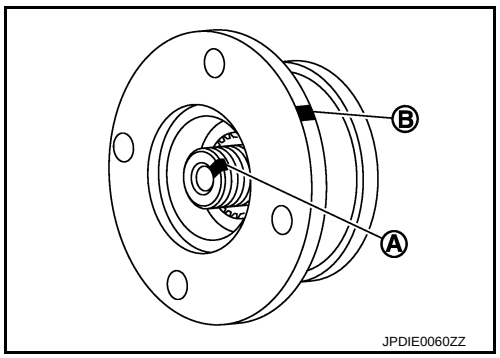
㊲ Snap ring
㊳ Spacer
㊴ Rear oil seal
㊵ Companion flange
㊶ Self-lock nut
Ⓐ Oil seal lip
Ⓑ Matching surface

: N·m (kg-m, in-lb)
: N·m (kg-m, ft-lb)
: Always replace after every disassembly.
: Apply transfer fluid.
: Apply multi-purpose grease.
: Apply Genuine Anaerobic Liquid Gasket Three Bond 1133C or equivalent.

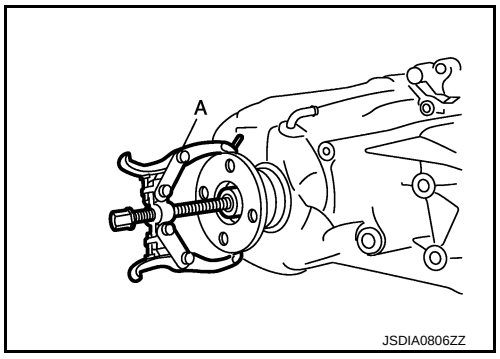
Disassembly

INFOID:0000000009643598

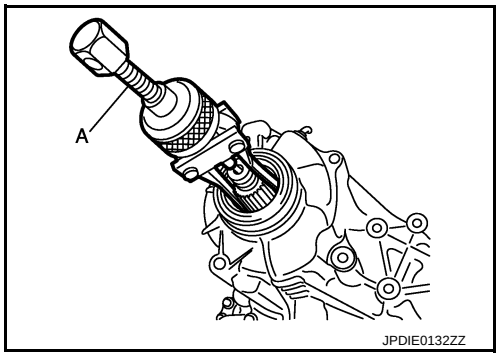
1. Remove drain plug, filler plug and gaskets.
2. Remove main shaft oil seal from front case.
   CAUTION:
   Never damage the front case and main shaft.
3. Remove front oil seal from front case.
   CAUTION:
   Never damage the front case and front drive shaft.
4. Remove self-lock nut.
5. Put a matching mark Ⓐ on the end of main shaft. The mark should be in line with the mark Ⓑ on the companion flange.
   CAUTION:
   For the matching mark, use paint. Never damage main shaft.



6. Remove companion flange with a puller (A).
   CAUTION:
   Never damage the companion flange.



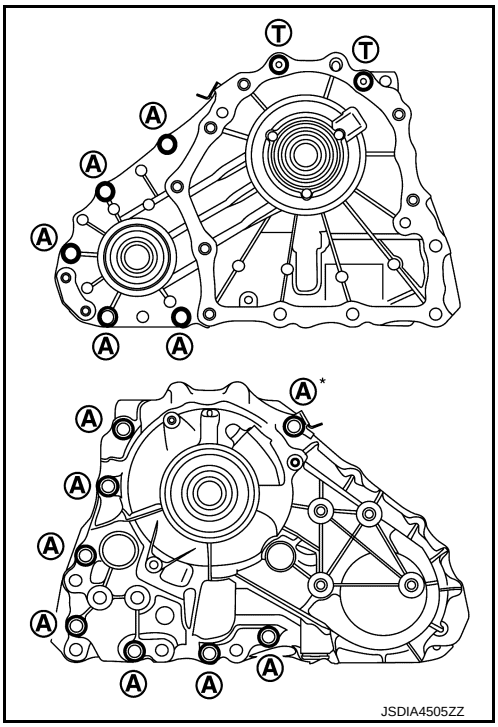
7. Remove rear oil seal from rear case with the puller (A) [SST: KV381054S0 (J-34286)].
   CAUTION:
   Never damage the rear case.
8. Remove spacer from main shaft.



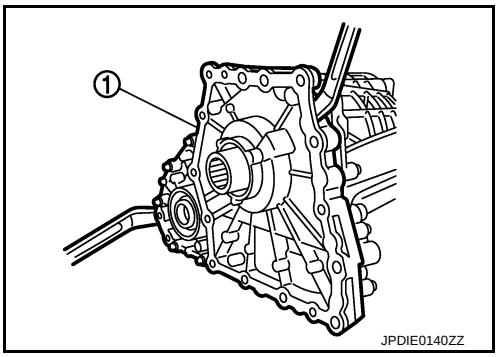
9. Remove front case and rear case fixing bolts, then remove harness bracket.

Bolts symbol	Quantity
Ⓐ	13
Ⓣ (TORX bolt)	2

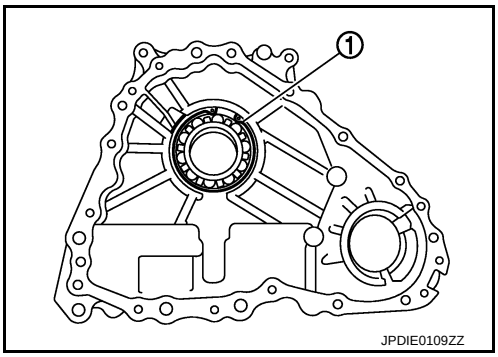
*: With harness bracket.



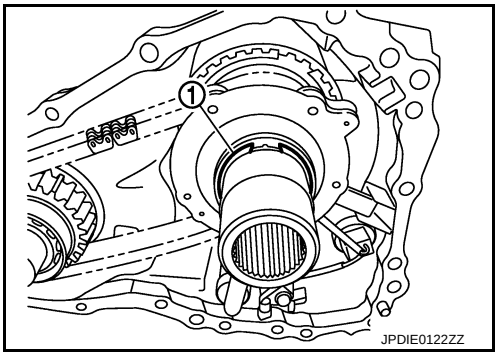
10. Remove front case ① from rear case by levering it up with a suitable tool.
CAUTION:
Never damage the mating surface.



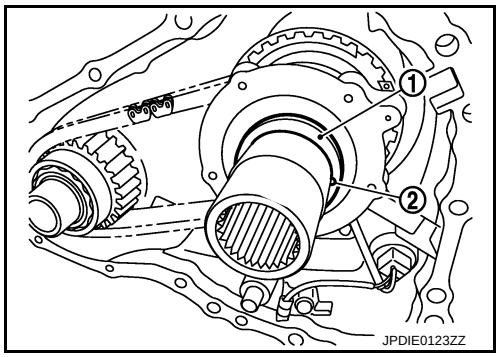
11. Remove snap ring ① from front case.
CAUTION:
Never damage front case.
12. Remove main shaft bearing from front case.
CAUTION:
Never use tools. Always remove by hand.



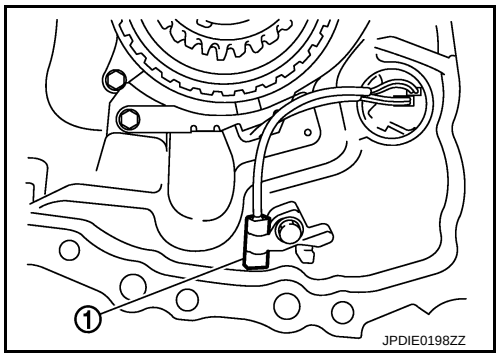
13. Remove snap ring ① from main shaft.
CAUTION:
Never damage main shaft.



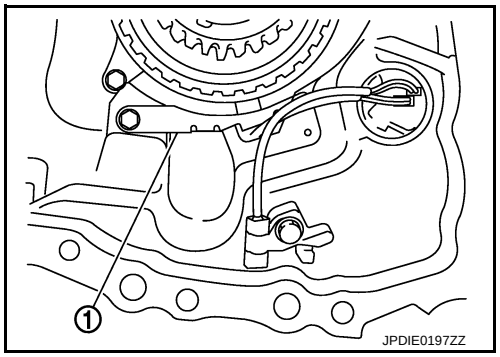
14. Remove spacer ① and steel ball ② from main shaft.
CAUTION:
Be careful not to drop the steel ball.
15. Remove oil pump from main shaft.
16. Remove drive chain and front drive shaft assembly.
CAUTION:
Never use tools. Always remove by hand.



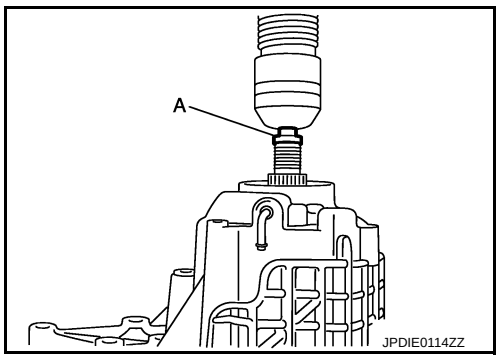
17. Remove transfer fluid temperature sensor bolt from rear case. And then, remove transfer fluid temperature sensor ①.



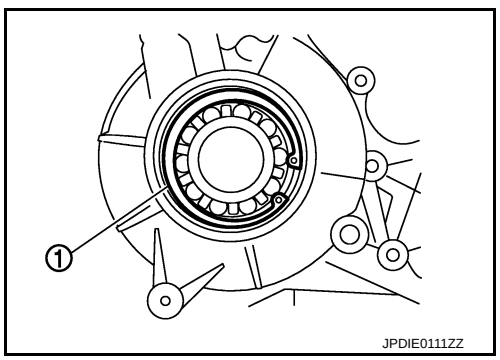
18. Remove oil cover ①.
19. Remove retainer from AWD solenoid harness connector.
20. Remove AWD solenoid harness connector from rear case.



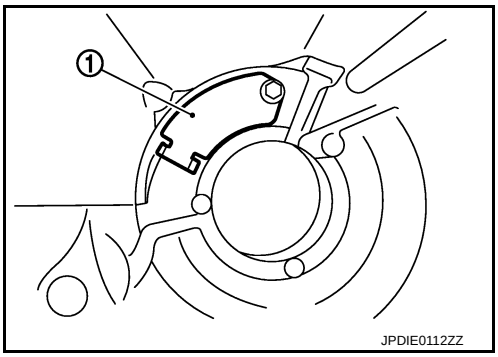
21. Remove main shaft assembly from rear case with the drift (A) [SST: ST33052000 (—)].



22. Remove snap ring ① from rear case.
23. Remove rear bearing from rear case.
CAUTION:
Never use tools. Always remove by hand.



24. Remove baffle plate ① from rear case.
25. Remove breather tube from rear case.
26. Perform inspection after disassembly. Refer to DLN-72, "Inspection".



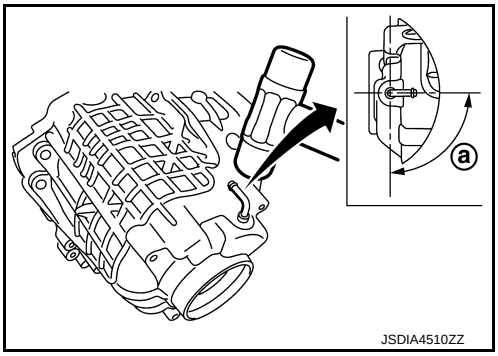
Assembly

INFOID:0000000009643599

1. Install breather tube to rear case within the angle ⓐ shown as follows.

Angle ⓐ : 80 – 100°

CAUTION:
Never reuse breather tube.

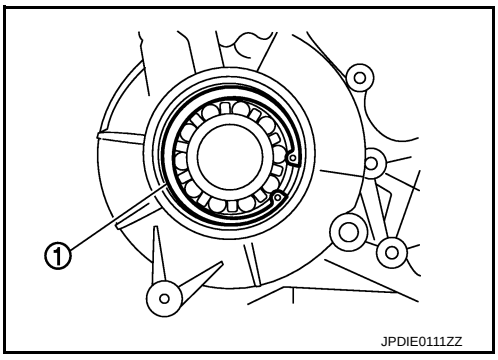


2. Install baffle plate to rear case.
3. Install rear bearing to rear case.

CAUTION:
Never use tools. Always install by hand.

4. Install snap ring ① to rear case.

CAUTION:
Never reuse snap ring.



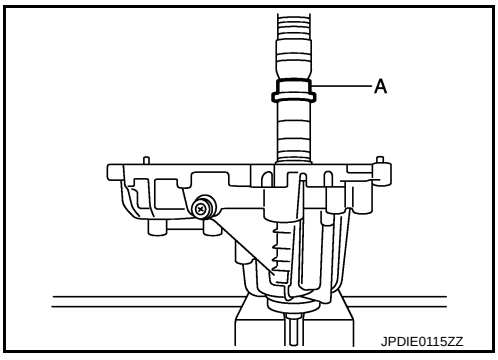
5. Install main shaft assembly to rear case with the drift (A) [SST: ST35321000 (—)].

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

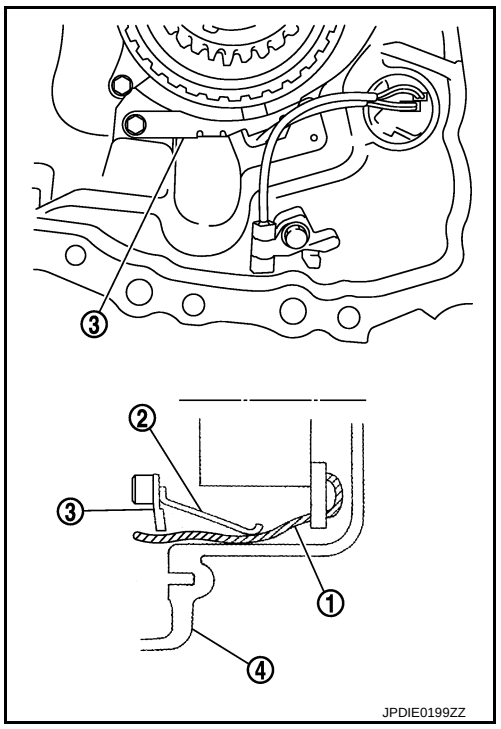
6. Install AWD solenoid harness connector into rear case.

CAUTION:
- **O-ring is non-reusable. When replace it, replace electric controlled coupling.**
- **Apply transfer fluid to O-ring.**

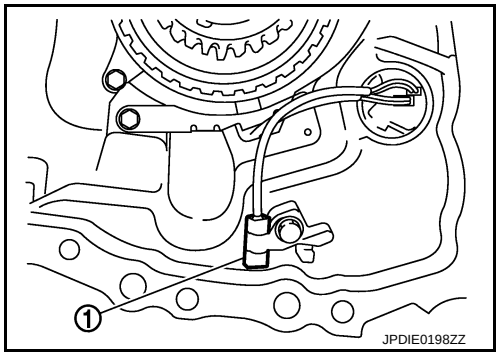
7. Install retainer to AWD solenoid harness connector.



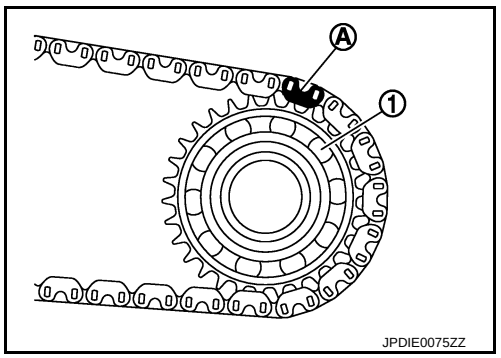
8. Hold electric controlled coupling harness ① with oil cover hold plate part ②, install oil cover ③ to rear case ④.



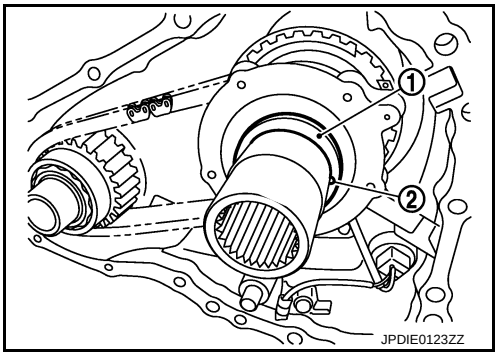
9. Install transfer fluid temperature sensor ① to rear case.



10. Set drive chain to front drive shaft.
CAUTION:
Identification mark Ⓐ of drive chain should be in the side of front bearing ① of front drive shaft.
11. Install drive chain to main shaft, and then install front drive shaft assembly.
CAUTION:
Never use tools. Always install by hand.
12. Install oil pump to main shaft.

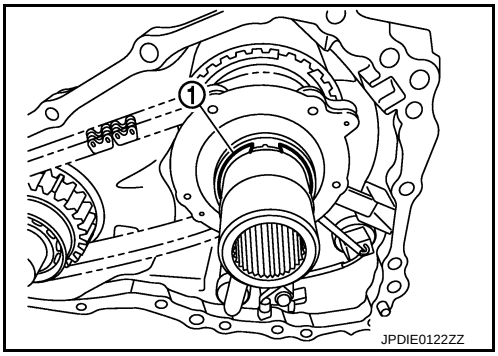


13. Install spacer ① and steel ball ② to main shaft.

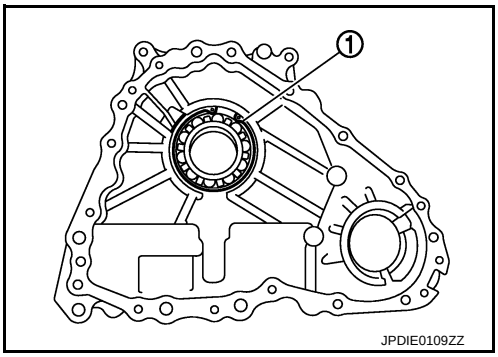


14. Install snap ring ① to main shaft.
CAUTION:
- **Never reuse snap ring.**
- **Never damage main shaft.**

15. Install main shaft bearing to front case.
CAUTION:
Never use tools. Always install by hand.

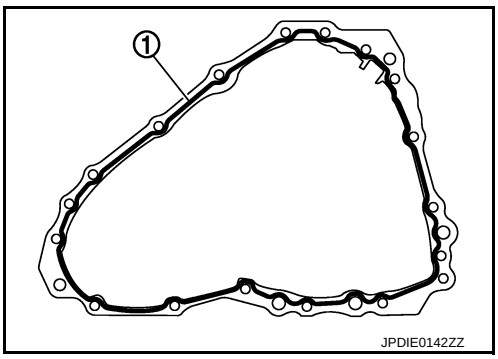


16. Install snap ring ① to front case.
CAUTION:
- **Never reuse snap ring.**
- **Never damage front case.**



17. Apply liquid gasket ① to mating surface of rear case.
CAUTION:
Remove old sealant adhering to mounting surfaces. Also remove any moisture, oil, or foreign material adhering to application and mounting surfaces.

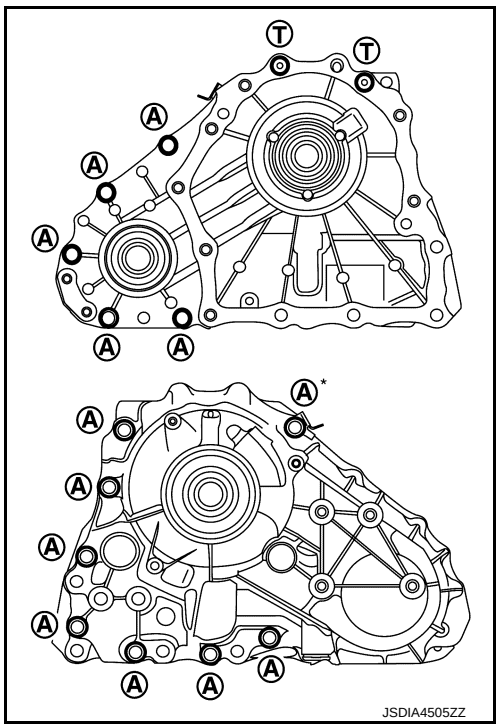
18. Set front case to rear case.
CAUTION:
Never damage the mating surface transmission side.



19. Tighten front case and rear case fixing bolts.
    - For "*" mark bolt, tighten it after attach harness bracket.

Bolts symbol	Quantity
Ⓐ	13
Ⓣ (TORX bolt)	2

*: With harness bracket.

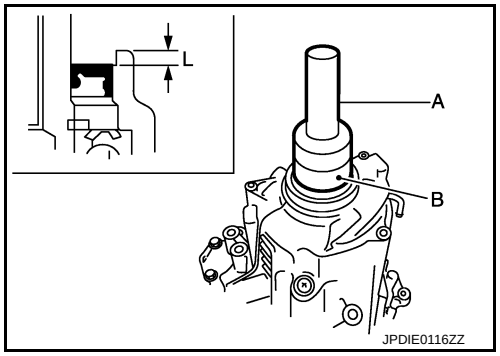


20. Install spacer to main shaft.

21. 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.

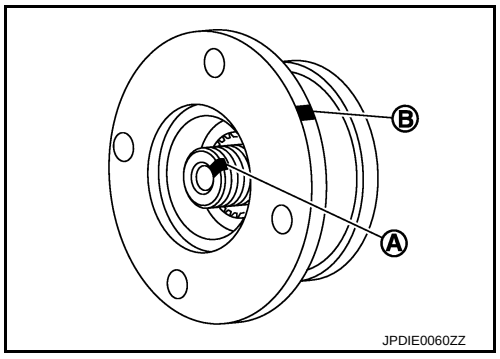
    A : Drift [SST: ST30720000 (J-25405)]
    B : Drift [SST: KV40104830 (—)]

    L : 6.7 – 7.3 mm (0.264 – 0.287 in)

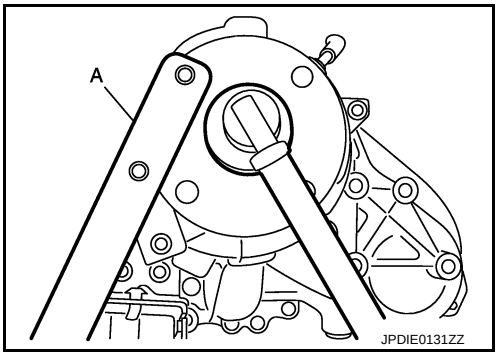


CAUTION:
- **Never reuse rear oil seal.**
- **Apply multi-purpose grease to oil seal lip.**
- **When installing, never incline rear oil seal.**

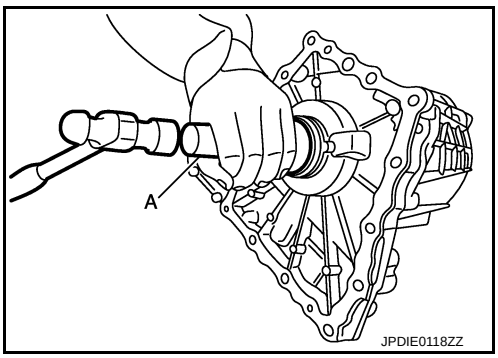
22. Install companion flange while aligning the matching mark Ⓐ of main shaft with the mark Ⓑ of companion flange.



23. Tighten self-lock nut to the specified torque with flange wrench (A) (commercial service tool).
CAUTION:
Never reuse self-lock nut.



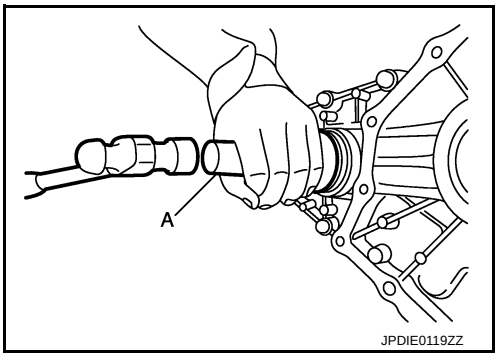
24. Apply transfer fluid to outside of main shaft oil seal, and install main shaft oil seal until it is flush with the end face of front case with the drift (A) [SST: ST30720000 (J-25405)].
CAUTION:
- **Never reuse main shaft oil seal.**
- **Apply multi-purpose grease to oil seal lip.**
- **When installing,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



25. 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 multi-purpose grease to oil seal lip.**
- **When installing, never incline front oil seal.**

26. Set gasket to drain plug. Install it to rear case.
CAUTION:
Never reuse gasket.

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



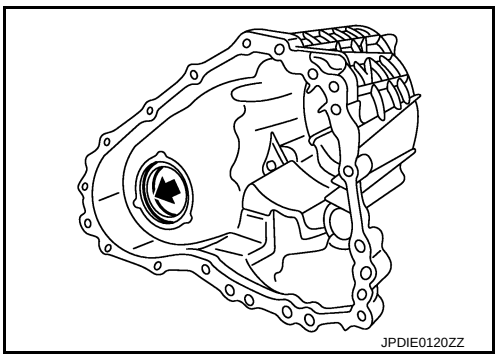
Inspection

INFOID:0000000009643600

INSPECTION AFTER DISASSEMBLY

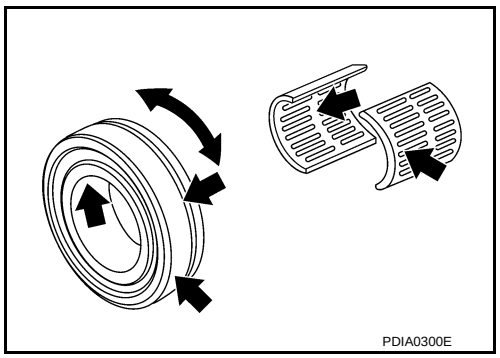
Check items below. If necessary, replace them with new ones.

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



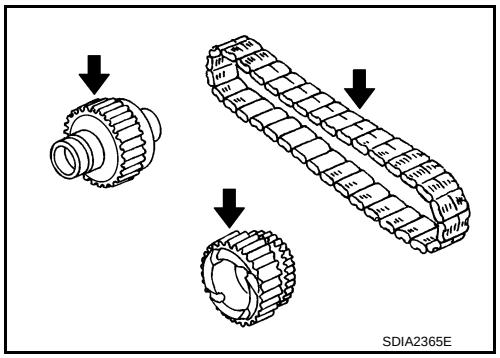
Bearing

Damage and rough rotation of bearing.


PDIA0300E

Gears and Chain

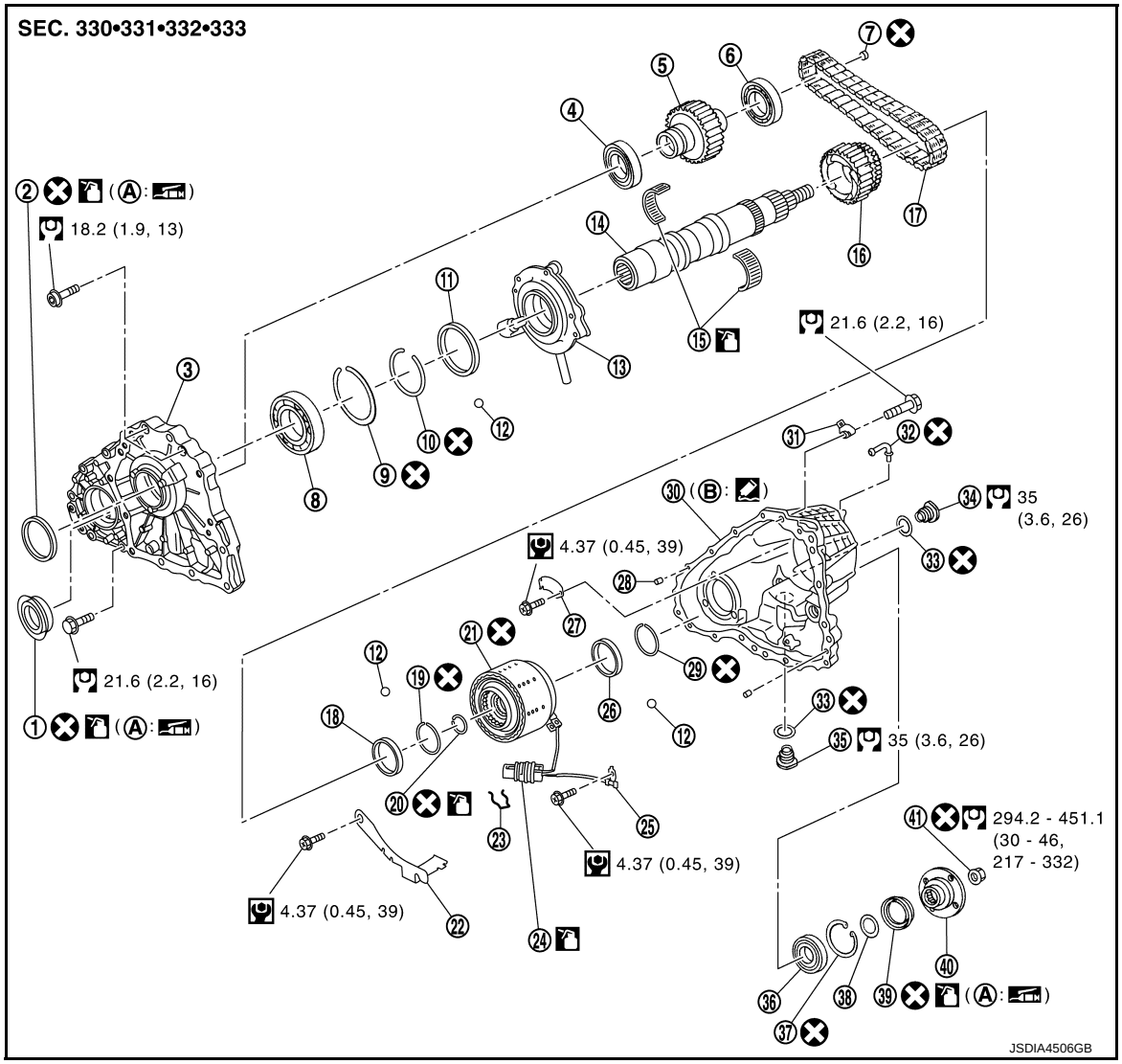
- Excessive wear, damage, peeling, etc. of gear and chain.
- Cracks, damage, wear, etc. of drive chain.


SDIA2365E

MAIN SHAFT

Exploded View

INFOID:0000000009695246



① Front oil seal
② Main shaft oil seal
③ Front case
④ Front drive shaft front bearing
⑤ Front drive shaft
⑥ Front drive shaft rear bearing
⑦ Plug
⑧ Main shaft bearing
⑨ Snap ring
⑩ Snap ring
⑪ Spacer
⑫ Steel ball
⑬ Oil pump
⑭ Main shaft
⑮ Needle bearing
⑯ Sprocket
⑰ Drive chain
⑱ Spacer
⑲ Snap ring
⑳ Circlip
㉑ Electric controlled coupling
㉒ Oil cover
㉓ Retainer
㉔ O-ring
㉕ Transfer fluid temperature sensor
㉖ Spacer
㉗ Baffle plate
㉘ Dowel pin
㉙ Snap ring
㉚ Rear case
㉛ Harness bracket
㉜ Breather tube
㉝ Gasket
㉞ Filler plug
㉟ Drain plug
㊱ Rear bearing
㊲ Snap ring
㊳ Spacer
㊴ Rear oil seal
㊵ Companion flange
㊶ Self-lock nut

Ⓐ Oil seal lip Ⓑ Matching surface

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

: Apply transfer fluid.

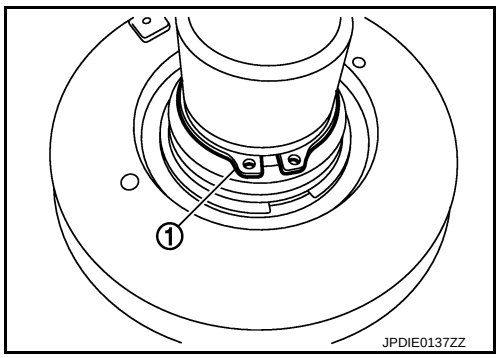
: Apply multi-purpose grease.

: Apply Genuine Anaerobic Liquid Gasket Three Bond 1133C or equivalent.

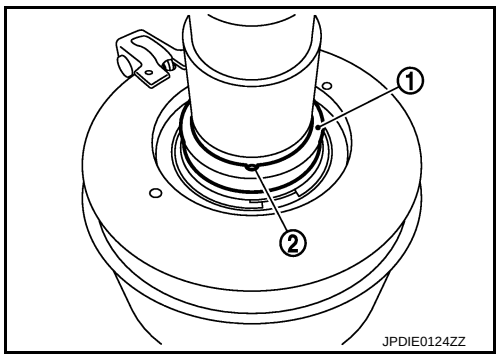
Disassembly

INFOID:0000000009643602

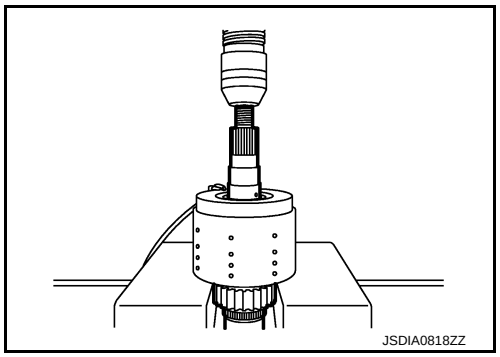
1. Separate front case and rear case, then remove main shaft assembly. Refer to DLN-65, "Disassembly".
2. Remove snap ring ① from main shaft.



3. 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.

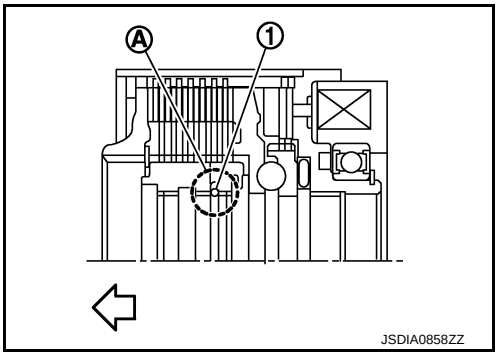


5. Remove circlip ① from notch Ⓐ of electric controlled coupling.

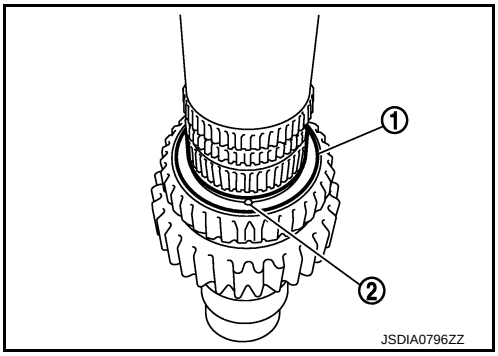
⇦ : Front side

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.



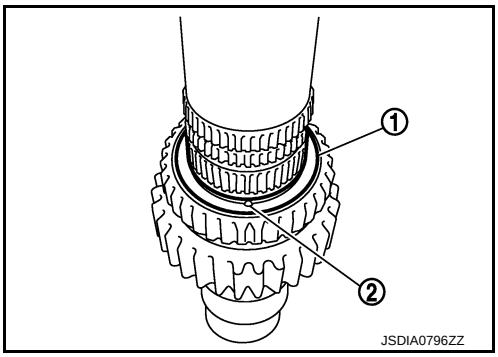
7. Remove spacer ① and steel ball ② from main shaft.
CAUTION:
Be careful not to drop the steel ball.
8. Remove sprocket from main shaft.
9. Remove needle bearing from main shaft.
10. Perform inspection after disassembly. Refer to DLN-77, "Inspection".



Assembly

INFOID:0000000009643603

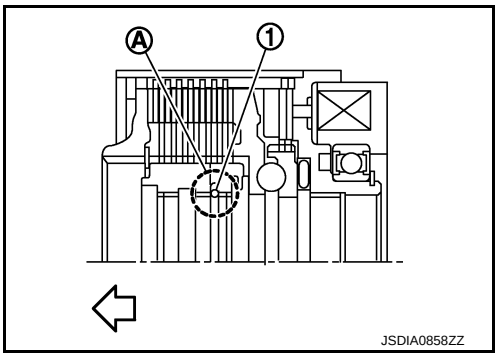
1. Install needle bearing to main shaft.
CAUTION:
Apply transfer fluid to the periphery of needle bearing.
2. Install sprocket to main shaft.
3. Install spacer ① and steel ball ② to main shaft.
CAUTION:
Be careful not to drop the steel ball.
4. Install snap ring to main shaft.
CAUTION:
Never reuse snap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



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

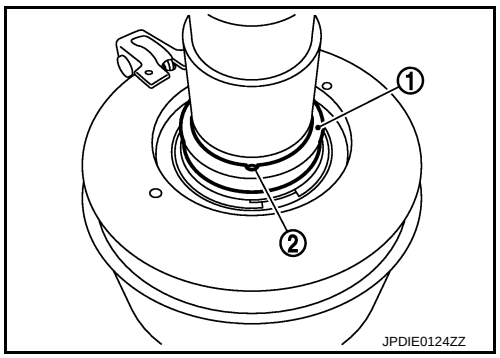
⇦ : Front side

CAUTION:
- **Never install the circlip to the notches other than notch Ⓐ.**
- **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.**
- **Never reuse O-ring of AWD solenoid harness connector. When replace it, replace electric controlled coupling.**

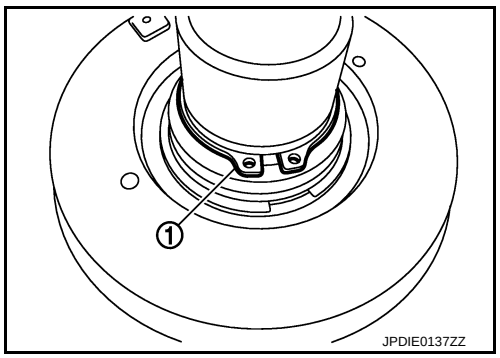


6. Install electric controlled coupling to main shaft.
CAUTION:
Securely insert it until locked.

7. Install spacer ① and steel ball ② to main shaft.
CAUTION:
Be careful not to drop the steel ball.



8. 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 DLN-68, "Assembly".



Inspection

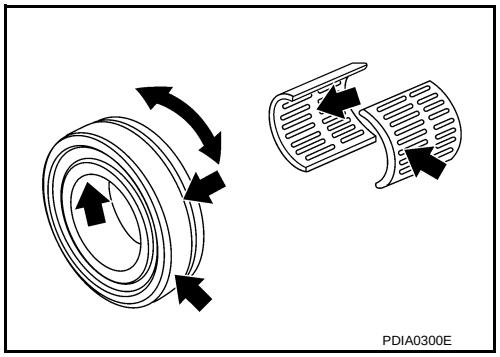
INFOID:0000000009643604

INSPECTION AFTER DISASSEMBLY

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

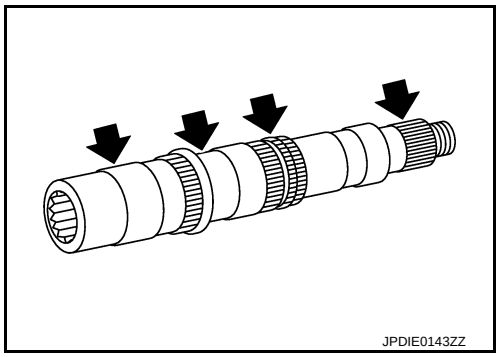
Bearing

Damage and rough rotation of bearing.



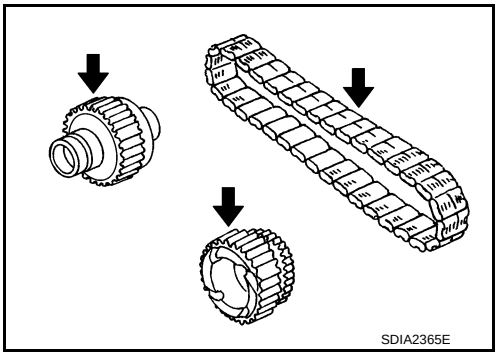
Shaft

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



Gears and Chain

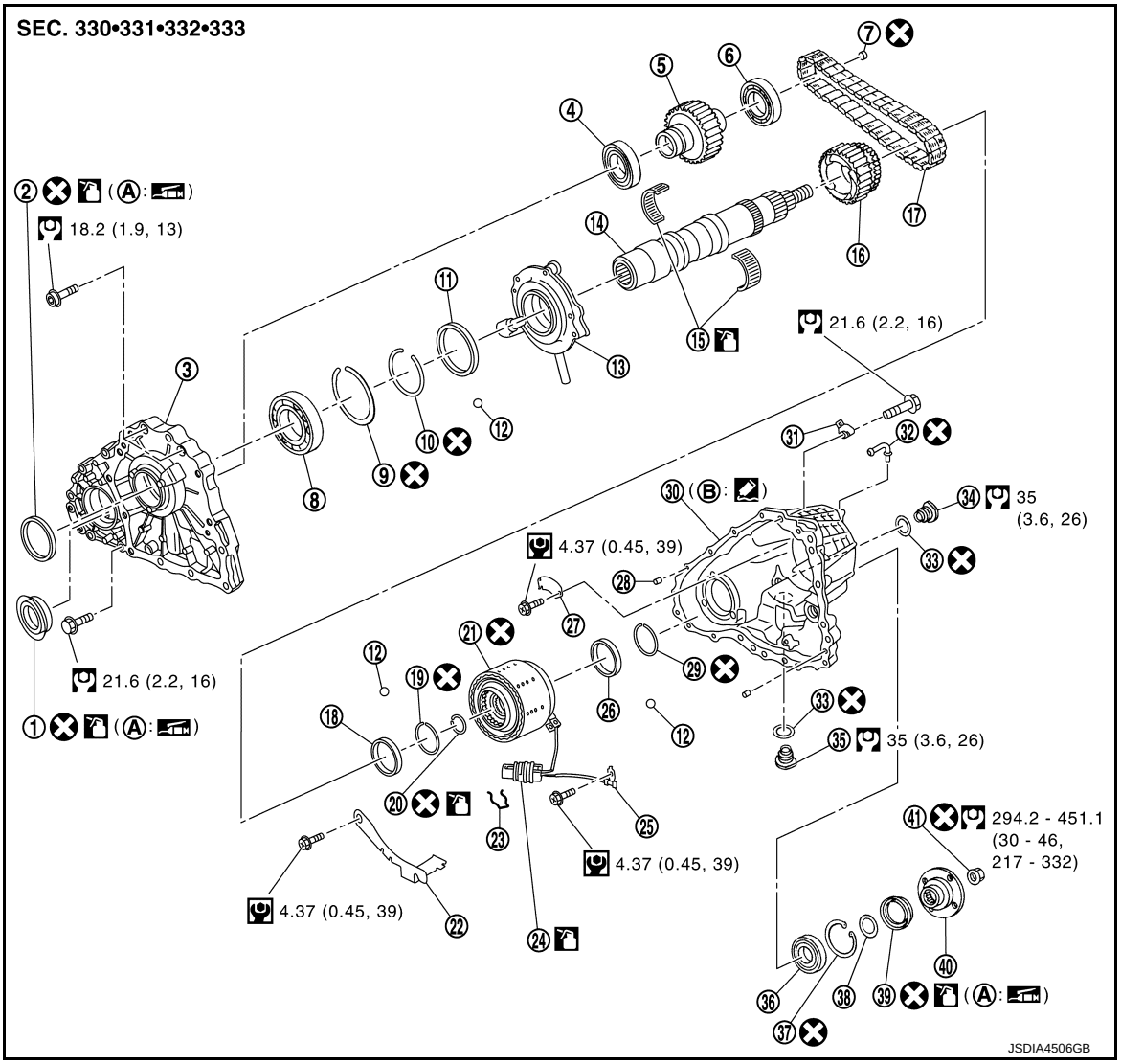
- Excessive wear, damage, peeling, etc. of gear and chain.
- Cracks, damage, wear, etc. of drive chain.



FRONT DRIVE SHAFT AND DRIVE CHAIN

Exploded View

INFOID:0000000009695247



① Front oil seal	② Main shaft oil seal	③ Front case
④ Front drive shaft front bearing	⑤ Front drive shaft	⑥ Front drive shaft rear bearing
⑦ Plug	⑧ Main shaft bearing	⑨ Snap ring
⑩ Snap ring	⑪ Spacer	⑫ Steel ball
⑬ Oil pump	⑭ Main shaft	⑮ Needle bearing
⑯ Sprocket	⑰ Drive chain	⑱ Spacer
⑲ Snap ring	⑳ Circlip	㉑ Electric controlled coupling
㉒ Oil cover	㉓ Retainer	㉔ O-ring
㉕ Transfer fluid temperature sensor	㉖ Spacer	㉗ Baffle plate
㉘ Dowel pin	㉙ Snap ring	㉚ Rear case
㉛ Harness bracket	㉜ Breather tube	㉝ Gasket
㉞ Filler plug	㉟ Drain plug	㊱ Rear bearing
㊲ Snap ring	㊳ Spacer	㊴ Rear oil seal
㊵ Companion flange	㊶ Self-lock nut	

Ⓐ Oil seal lip Ⓑ Matching surface

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

: Apply transfer fluid.

: Apply multi-purpose grease.

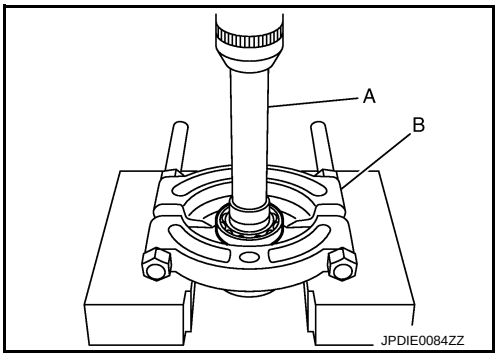
: Apply Genuine Anaerobic Liquid Gasket Three Bond 1133C or equivalent.

Disassembly

INFOID:0000000009643606

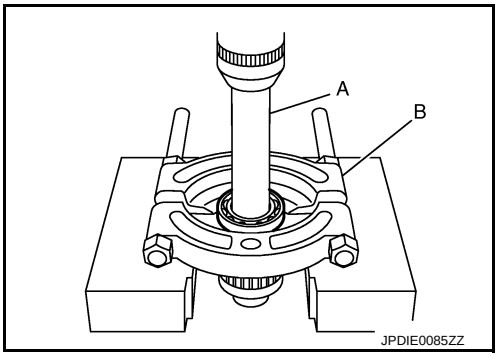
1. Separate front case and rear case. Refer to DLN-65, "Disassembly".
2. Remove drive chain and front drive shaft assembly.
   CAUTION:
   Never use tools. Always remove by hand.
3. Remove front drive shaft front bearing with the drift (A) and separator (B).

   A : Drift [SST: ST31214000 (J-25269-B)]
   B : Separator (commercial service tool)



4. Remove front drive shaft rear bearing with the drift (A) and separator (B).

   A : Drift [SST: ST31214000 (J-25269-B)]
   B : Separator (commercial service tool)

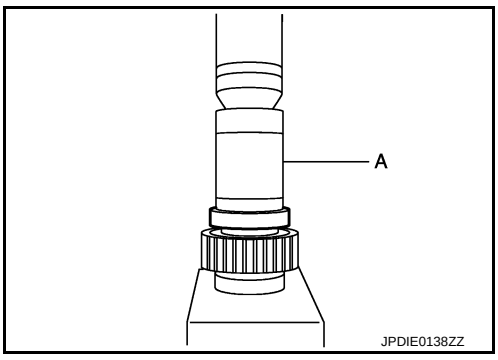


5. Remove plug from front drive shaft.
6. Perform inspection after disassembly. Refer to DLN-81, "Inspection".

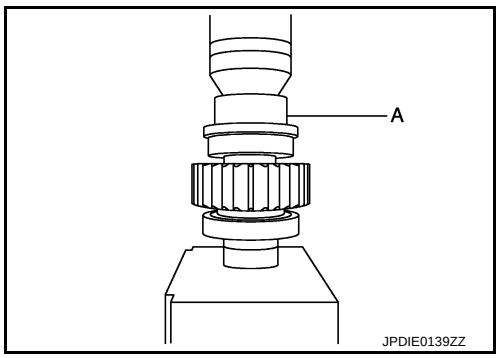
Assembly

INFOID:0000000009643607

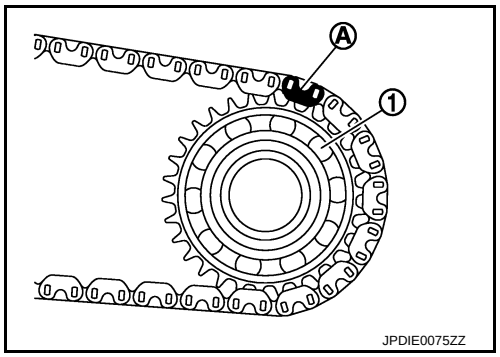
1. Install plug to front drive shaft.
   CAUTION:
   Never reuse plug.
2. Install front drive shaft front bearing with the drift (A) [SST: ST33200000 (J-26082)].



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



4. Set drive chain to front drive shaft.
CAUTION:
Identification mark Ⓐ 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.
6. Install front case to rear case. Refer to DLN-68, "Assembly".



Inspection

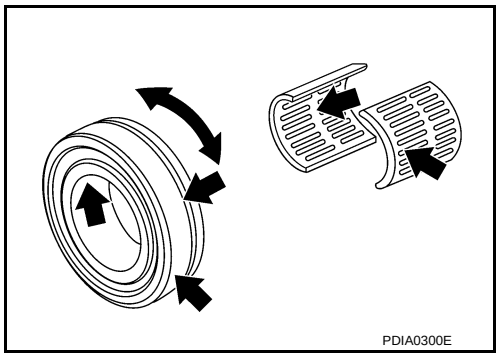
INFOID:0000000009643608

INSPECTION AFTER DISASSEMBLY

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

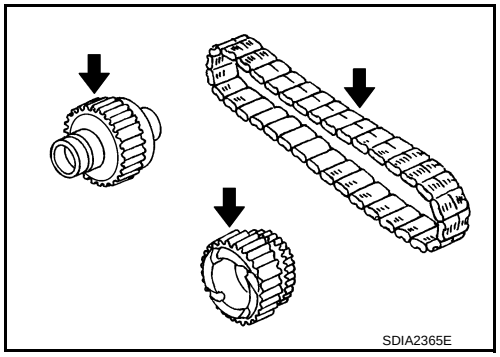
Bearing

Damage and rough rotation of bearing.



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)

General Specifications

INFOID:0000000009643609

Applied model	Axle	AWD
	Engine	VQ37VHR
	Transmission	A/T
Transfer model		ETX13C
Fluid capacity		Refer to MA-14, "FOR NORTH AMERICA : Fluids and Lubricants".

PRECAUTION

PRECAUTIONS

Service Notice or Precautions for Propeller Shaft

INFOID:0000000009643610

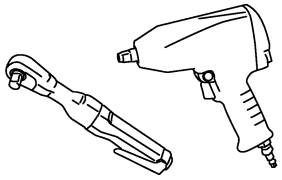
- Replace the propeller shaft assembly if there is a breakage or deflection on tube.
- Never hit the tube or apply an impact on it during repair service. Never damage the tube as well.
- The joint cannot be disassembled. Never disassemble it.

PREPARATION

PREPARATION

Commercial Service Tools or/and Repair Part

INFOID:0000000009643611

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

SYSTEM DESCRIPTION

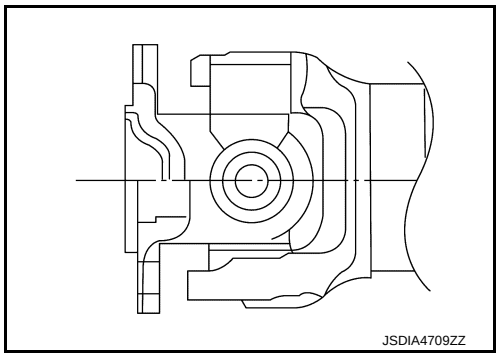
STRUCTURE AND OPERATION

Sectional View

INFOID:0000000009643612

PART OF JOINT

Universal Type (Shell Type)



SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009643613

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

Possible cause and SUSPECTED 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
Reference		DLN-87, "Inspection"	—	—	—	—	DLN-87, "Inspection"	DLN-87, "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.
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×	×
	Shake		×			×				×	×	×	×	×	×
	Vibration	×	×	×	×	×	×	×		×	×		×		×

×: Applicable

PERIODIC MAINTENANCE

FRONT PROPELLER SHAFT

Inspection

INFOID:0000000009643614

APPEARANCE AND NOISE

Check the propeller shaft tube surface for dents or cracks. If malfunction is detected, replace propeller shaft assembly.

VIBRATION

If vibration is present at high speed, adjust the propeller shaft phase first.

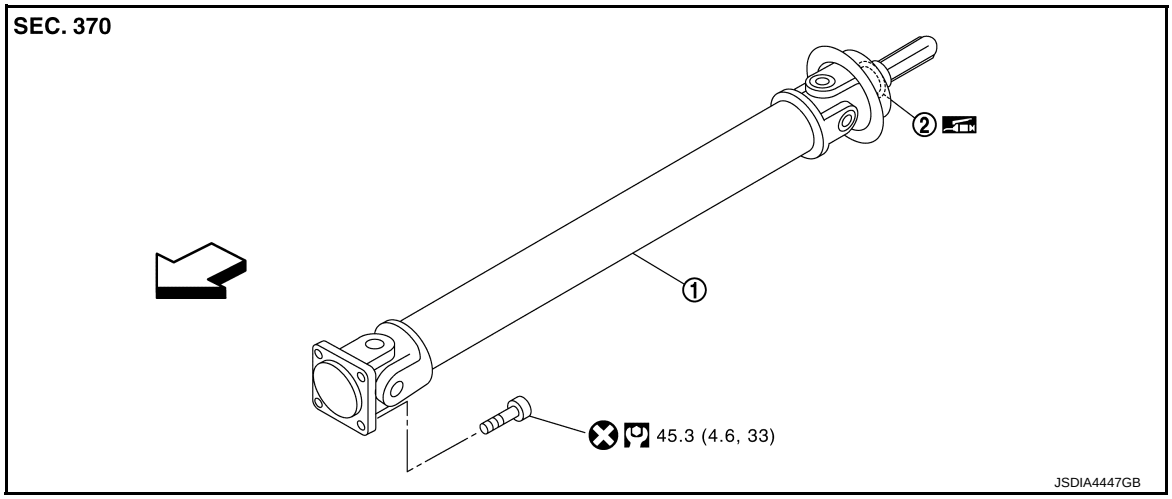
1. Check the propeller shaft for bend and damage. If damaged, replace propeller shaft assembly.
2. Perform a cruise test drive to check the propeller shaft for runout. If vibration occurs, separate propeller shaft at final drive companion flange; then change the phase between companion flange and propeller shaft by the one bolt hole at a time and install propeller shaft.
3. If vibration is still detected, measure propeller shaft runout after removing it. Refer to DLN-89, "Inspection".

REMOVAL AND INSTALLATION

FRONT PROPELLER SHAFT

Exploded View

INFOID:0000000009643615



① Propeller shaft assembly ② O-ring

⇦: Vehicle front

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

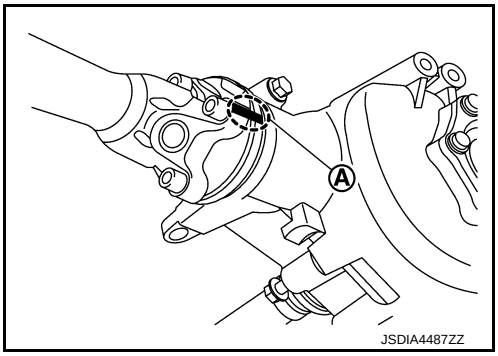
: Apply multi-purpose grease.

Removal and Installation

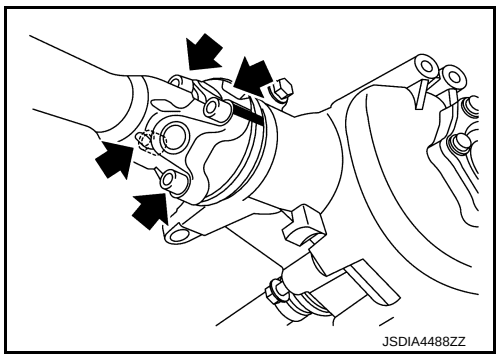
INFOID:0000000009643616

REMOVAL

1. Shift transmission to the neutral position, and then release parking brake.
2. Remove front under cover. Refer to EXT-32, "FRONT UNDER COVER : Exploded View".
3. Remove front cross bar. Refer to FSU-38, "Exploded View".
4. Remove exhaust front tube and three-way catalyst (bank 1). Refer to EX-6, "Removal and Installation".
5. Remove steering gear assembly. Refer to ST-98, "Removal and Installation". (Models with direct adaptive steering)
6. Put matching marks Ⓐ on propeller shaft flange yoke and final drive companion flange.
   CAUTION:
   For matching mark, use paint. Never damage propeller shaft flange yoke and final drive companion flange.



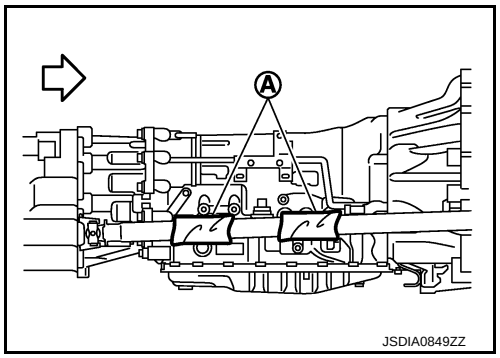
7. Remove propeller shaft assembly fixing bolts and nuts, and separate propeller shaft assembly from final drive companion flange.



8. Remove propeller shaft assembly from the vehicle.
CAUTION:
- **Never damage transfer front oil seal.**
- **Never damage O-ring.**
- **Wrap transmission interference area Ⓐ with shop cloth or equivalent to protect propeller shaft from breakage.**

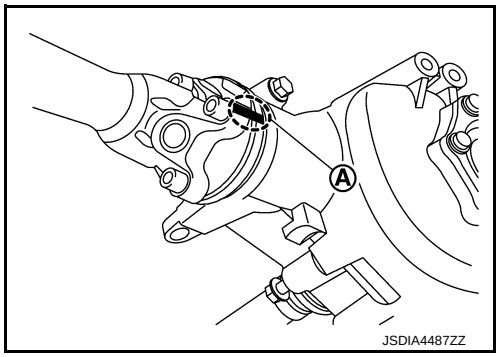
⇦ : Vehicle front

9. Perform inspection after removal. Refer to DLN-89, "Inspection".



INSTALLATION

Note the following, and install in the reverse order of removal.
- For non-reusable parts, refer to DLN-88, "Exploded View".
- For each tightening torque, refer to DLN-88, "Exploded View".
- Apply multi-purpose grease onto O-ring.
- When installing propeller shaft assembly to transfer, never damage transfer front oil seal.
- Wrap power steering piping interference area with shop cloth or equivalent to protect power steering piping from breakage. (Models with vehicle speed sensitive P/S)
- Align matching marks Ⓐ to install propeller shaft flange yoke and final drive companion flange.
- Perform inspection after installation. Refer to DLN-89, "Inspection".



Inspection

INFOID:0000000009643617

INSPECTION AFTER REMOVAL

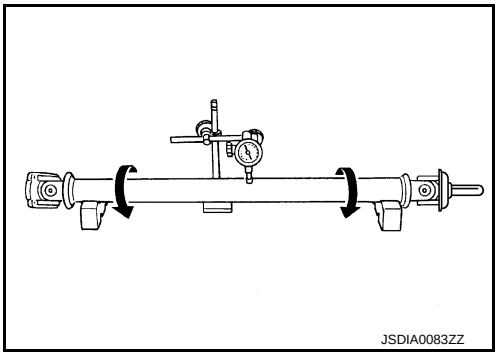
Appearance

Check propeller shaft tube surface for dents or cracks. If malfunction 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.

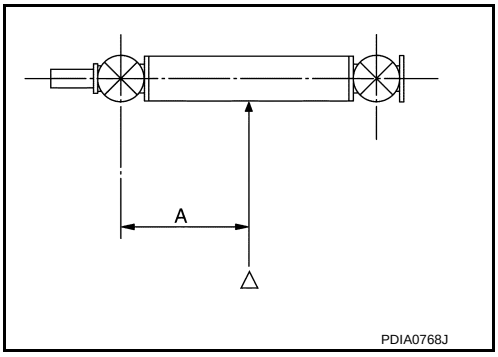
Propeller shaft runout : Refer to DLN-91, "Propeller Shaft Runout".



- Propeller shaft runout measuring point (Point "△").

Dimension

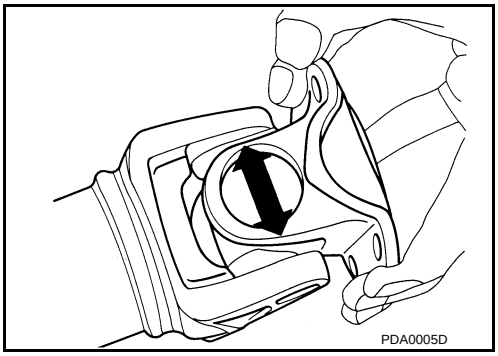
A : 381.5 mm (15.02 in)



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 DLN-91, "Journal Axial Play".



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 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)

General Specifications

INFOID:0000000009643618

Applied model	Axle	AWD
	Engine	VQ37VHR
	Transmission	A/T
Propeller shaft model		2S56A
Number of joints		2
Joint type	1st joint	Universal (Shell type)
	2nd joint	Universal (Shell type)
Coupling method	Transfer side	Sleeve type
	Front final drive side	Flange type
Shaft length (Spider to spider)		763.0 mm (30.04 in)
Shaft outer diameter		42.7 mm (1.681 in)

Propeller Shaft Runout

INFOID:0000000009643619

Unit: mm (in)

Item	Standard
Propeller shaft runout	0.8 (0.031) or less

Journal Axial Play

INFOID:0000000009643620

Unit: mm (in)

Item	Standard
Journal axial play	0 (0)

PRECAUTION

PRECAUTIONS

Service Notice or Precautions for Propeller Shaft

INFOID:0000000009643621

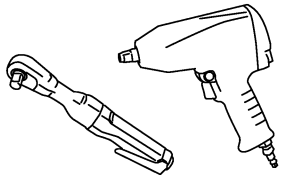
- Replace the propeller shaft assembly if there is a breakage or deflection on tube.
- Never hit the tube or apply an impact on it during repair service. Never damage the tube as well.
- The joint cannot be disassembled. Never disassemble it.
- The angle which rubber coupling forms with companion flange must be 4 degrees or less. Never damage grease seal in rubber coupling.

PREPARATION

PREPARATION

Commercial Service Tools or/and Repair Part

INFOID:0000000009643622

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

SYSTEM DESCRIPTION

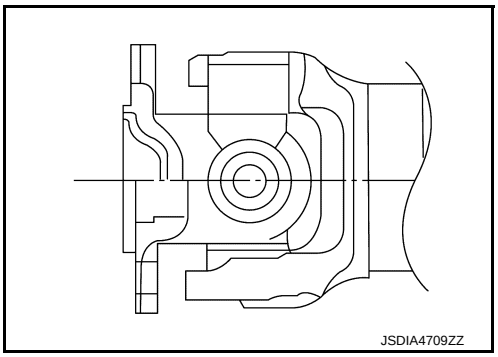
STRUCTURE AND OPERATION

Sectional View

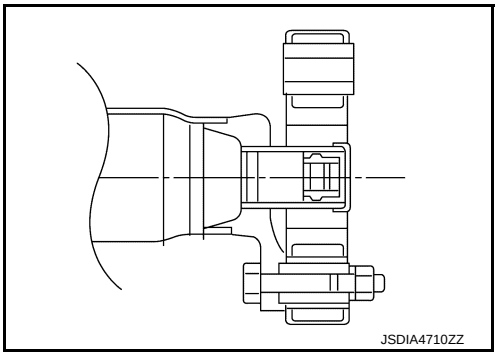
INFOID:0000000009643623

PART OF JOINT

Universal Type (Shell Type)



Rubber Coupling Type



SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009643624

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

Reference		DLN-96, "Inspection"	DLN-97, "Exploded View"	—	DLN-100, "Inspection"	—	DLN-96, "Inspection"	DLN-96, "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 SUSPECTED 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
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×	×
	Shake		×			×				×	×	×	×	×	×
	Vibration	×	×	×	×	×	×	×		×	×		×		×

×: Applicable

PERIODIC MAINTENANCE

REAR PROPELLER SHAFT

Inspection

INFOID:0000000009643625

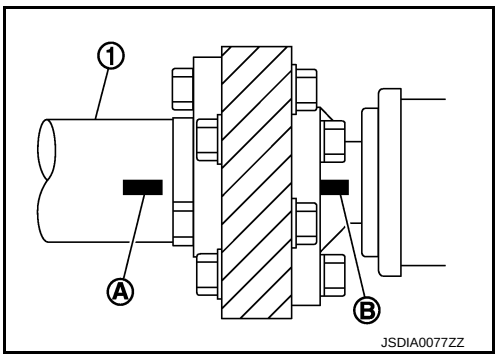
APPEARANCE AND NOISE

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

VIBRATION

If vibration is present at high speed, adjust the propeller shaft phase first.

1. Check the propeller shaft for bend and damage. If damaged, replace propeller shaft assembly.
2. If the alignment mark Ⓐ of the propeller shaft ① and the alignment mark Ⓑ of the companion flanges on the final drive are not on an axis, re-install these parts to a closer position as possible.
3. Perform a cruise test drive to check the propeller shaft for runout after installation. If vibration still occurs, 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.
4. If vibration is still detected, measure propeller shaft runout after removing it. Refer to DLN-100, "Inspection".



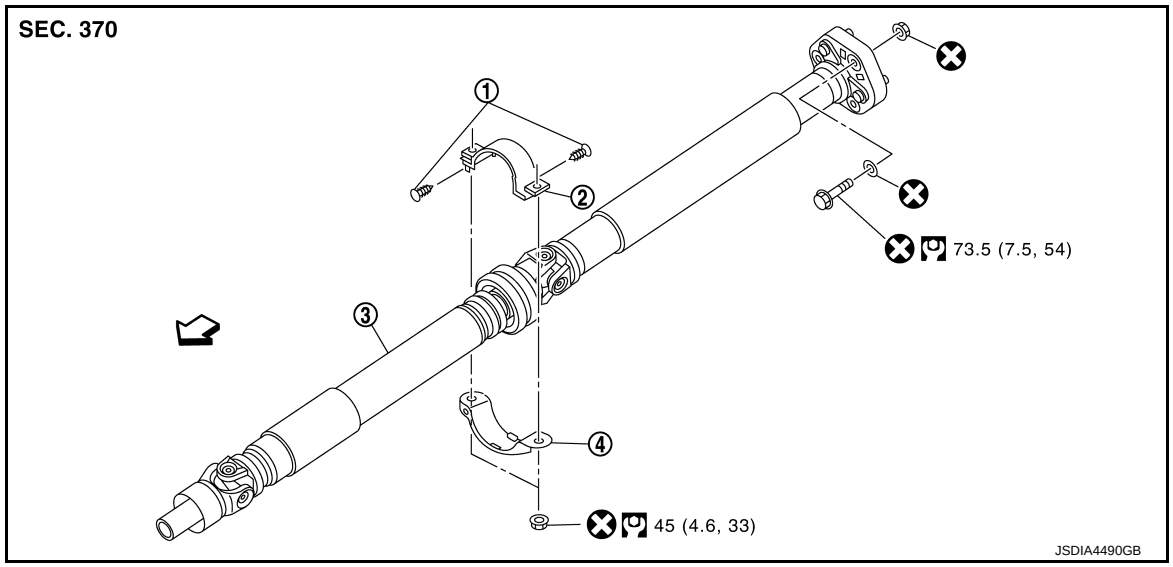
REMOVAL AND INSTALLATION

REAR PROPELLER SHAFT

Exploded View

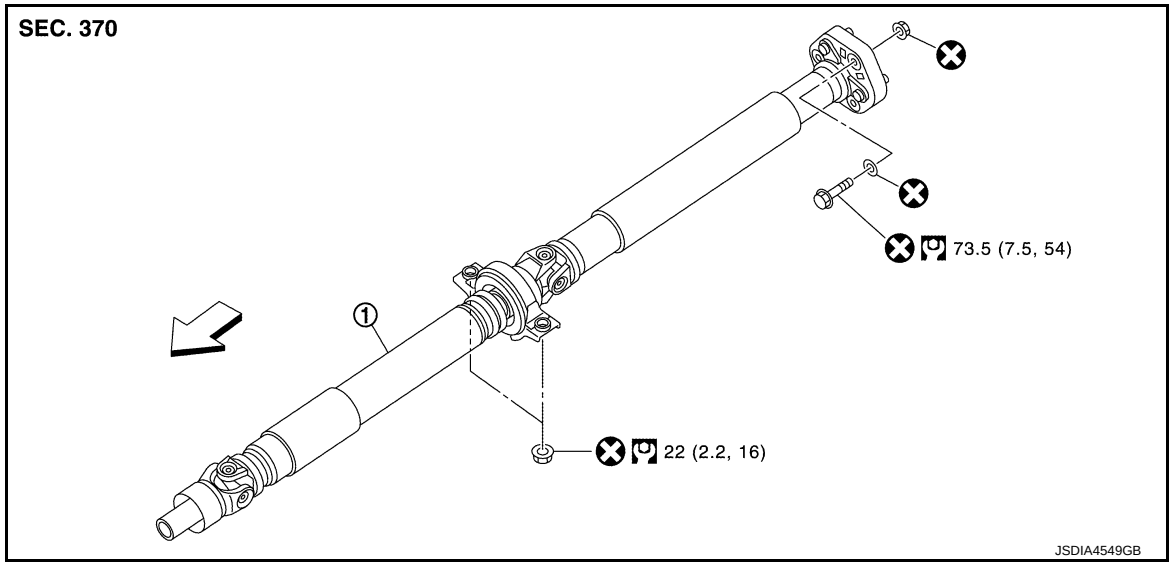
INFOID:0000000009643626

SEPARABLE CENTER BEARING MOUNTING BRACKET



① Clip
② Center bearing mounting bracket (upper)
③ Propeller shaft assembly
④ Center bearing mounting bracket (lower)
⇦: Vehicle front
: N·m (kg-m, ft-lb)
: Always replace after every disassembly.

INSEPARABLE CENTER BEARING MOUNTING BRACKET



① Propeller shaft assembly
⇦: Vehicle front

: N·m (kg-m, ft-lb)

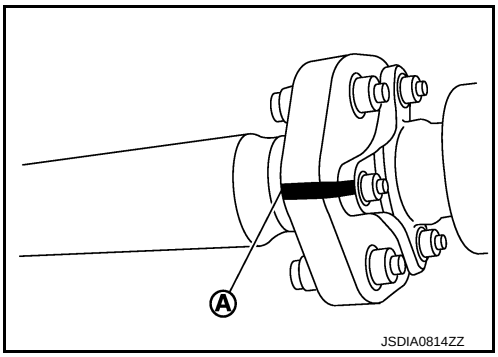
: Always replace after every disassembly.

Removal and Installation

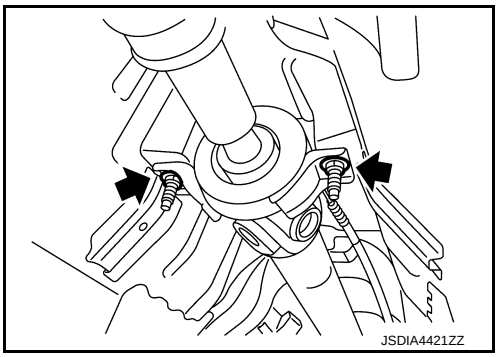
INFOID:0000000009643627

REMOVAL

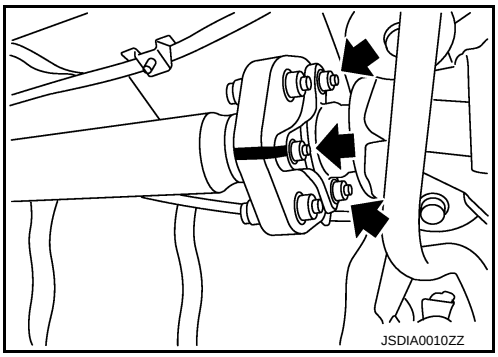
1. Shift transmission to the neutral position, and then release parking brake.
2. Remove tunnel stay.
3. Remove center muffler and exhaust front tube. Refer to EX-6, "Removal and Installation".
4. Remove heat insulator.
5. Put matching marks Ⓐ on propeller shaft rubber coupling and final drive companion flange.
   CAUTION:
   For matching mark, use paint. Never damage propeller shaft rubber coupling and final drive companion flange.



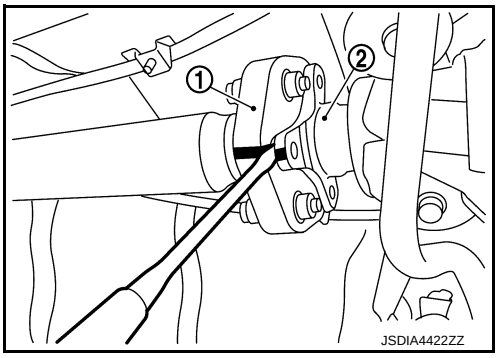
6. Loosen mounting nuts of center bearing mounting bracket.
   NOTE:
   Tighten mounting nuts temporarily.



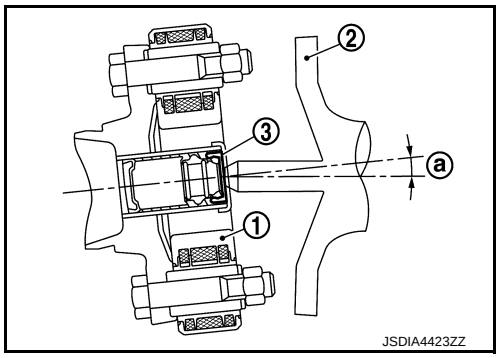
7. Remove propeller shaft assembly fixing bolts, nuts, and washers.
   CAUTION:
   Be careful not to remove wrong fixing bolts and nuts. Never separate the rubber coupling from propeller shaft.



8. Slightly separate rubber coupling ① from final drive companion flange ②.
   CAUTION:
   Never damage final drive companion flange and rubber coupling.



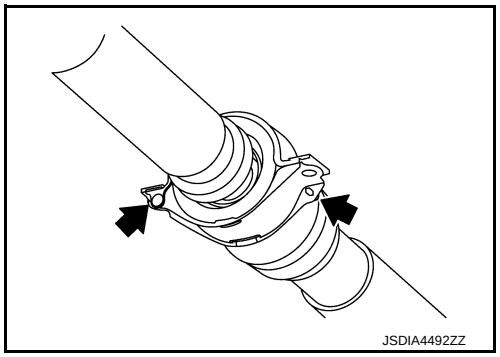
9. Remove center bearing mounting bracket fixing nuts.
CAUTION:
The angle ⓐ which rubber coupling ① forms with companion flange ② must be 4 degrees or less. Never damage grease seal ③.



10. Slide propeller shaft in the vehicle forward direction slightly. Separate propeller shaft from final drive companion flange.
CAUTION:
- **The angle which rubber coupling forms with companion flange must be 4 degrees or less.**
- **Never damage grease seal.**
- **Never damage rubber coupling.**

11. Remove propeller shaft assembly from the vehicle.
CAUTION:
Never damage rear oil seal of transmission.

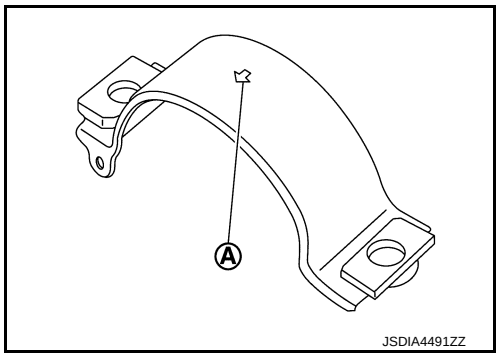
12. Remove clips and then remove center bearing mounting bracket (upper/lower). (If separable center bearing mounting bracket)



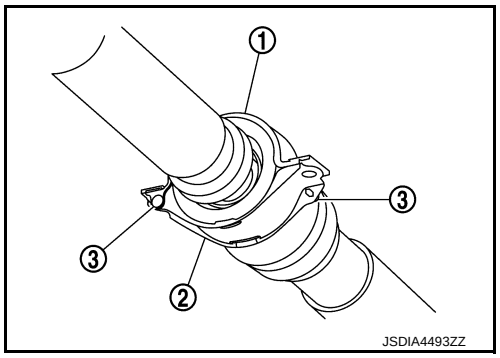
13. Perform inspection after removal. Refer to DLN-100, "Inspection".

INSTALLATION

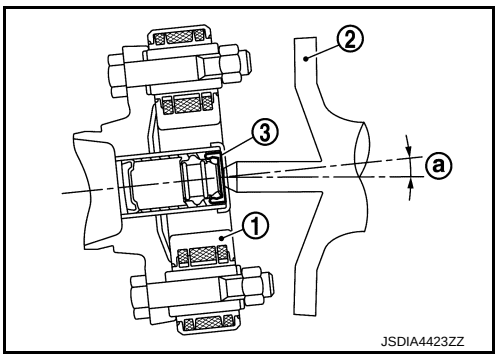
Note the following, and install in the reverse order of removal.
- For non-reusable parts, refer to DLN-97, "Exploded View".
- For each tightening torque, refer to DLN-97, "Exploded View".
- Never damage rubber coupling, protect it with a shop towel or equivalent.
- When installing propeller shaft assembly to transmission, never damage rear oil seal of transmission.
- Install center bearing mounting bracket (upper) with its arrow mark Ⓐ facing forward. (If separable center bearing mounting bracket)



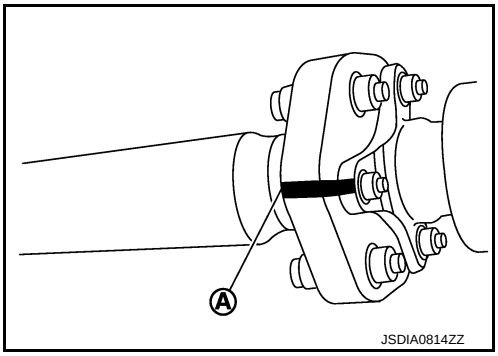
- When installing center bearing mounting brackets to the vehicle, after center bearing mounting bracket (upper) ① and center bearing mounting bracket (lower) ② are fixed with clips ③. (If separable center bearing mounting bracket)



- The angle ⓐ which rubber coupling ① forms with companion flange ② must be 4 degrees or less. Never damage grease seal ③.
- Center bearing mounting bracket fixing nuts must be tightened in the order from left to right.

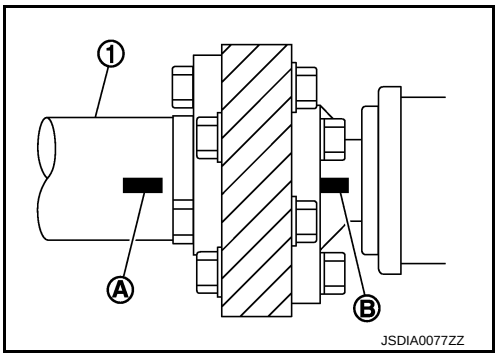


- Align matching marks Ⓐ to install propeller shaft rubber coupling to final drive companion flange.



- If propeller shaft or final drive has been replaced, connect them as follows:

- Install propeller shaft ① while aligning its matching mark Ⓐ of propeller shaft with matching mark Ⓑ of final drive on the joint as close as possible.
- Perform inspection after installation. Refer to DLN-100, "Inspection".



Inspection

INFOID:0000000009643628

INSPECTION AFTER REMOVAL

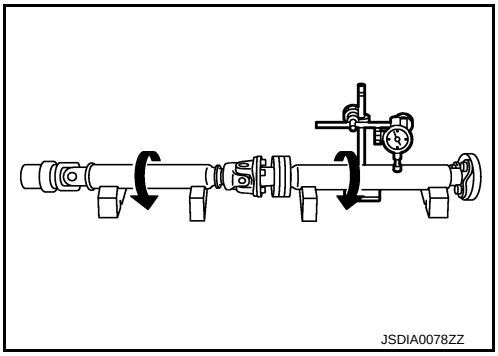
Appearance

- Check propeller shaft tube surface for dents or cracks. If malfunction is detected, replace propeller shaft assembly.
- Check rubber coupling for wear, cracks, or damage. If malfunction 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-102, "Propeller Shaft Runout".**

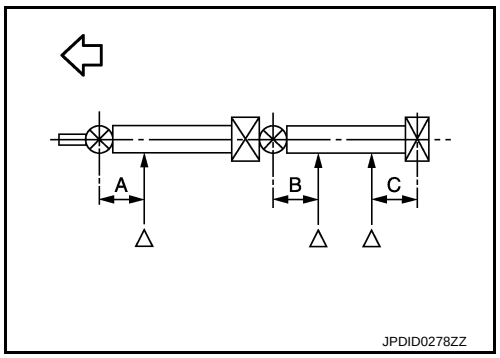


- Propeller shaft runout measuring point (Point "△").

⇦ : Front side

Dimension

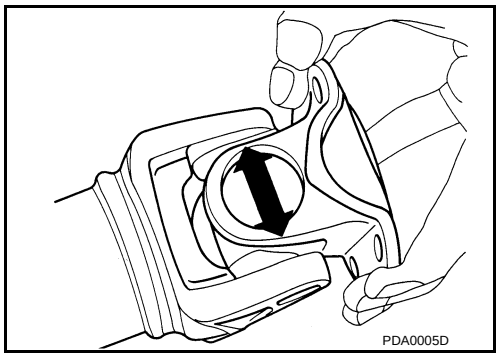
A : 172 mm (6.77 in)
B : 172 mm (6.77 in)
C : 172 mm (6.77 in)



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-102, "Journal Axial Play".



CAUTION:
Never disassemble joints.

Center Bearing

Check center bearing for noise and damage. If malfunction 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. 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)

General Specifications

INFOID:0000000009643629

Applied model	Axle	2WD
	Engine	VQ37VHR
	Transmission	A/T
Propeller shaft model		3S80A-R
Number of joints		3
Joint type	1st joint	Universal (Shell type)
	2nd joint	Universal (Shell type)
	3rd joint	Rubber coupling type
Coupling method	Transmission side	Sleeve type
	Rear final drive side	Flange type
Shaft length	1st shaft (Spider to spider)	774.0 mm (30.47 in)
	2nd shaft (Spider to rubber coupling center)	689.0 mm (27.13 in)
Shaft outer diameter	1st shaft	75.0 mm (2.953 in)
	2nd shaft	65.0 mm (2.559 in)

Propeller Shaft Runout

INFOID:0000000009643630

Unit: mm (in)

Item	Standard
Propeller shaft runout	0.8 (0.031) or less

Journal Axial Play

INFOID:0000000009643631

Unit: mm (in)

Item	Standard
Journal axial play	0 (0)

PRECAUTION

PRECAUTIONS

Service Notice or Precautions for Propeller Shaft

INFOID:0000000009643632

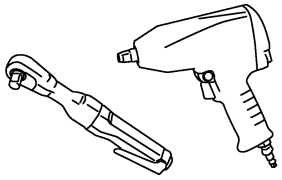
- Replace the propeller shaft assembly if there is a breakage or deflection on tube.
- Never hit the tube or apply an impact on it during repair service. Never damage the tube as well.
- The joint cannot be disassembled. Never disassemble it.
- The angle which rubber coupling forms with companion flange must be 4 degrees or less. Never damage grease seal in rubber coupling.

PREPARATION

PREPARATION

Commercial Service Tools or/and Repair Part

INFOID:0000000009643633

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

SYSTEM DESCRIPTION

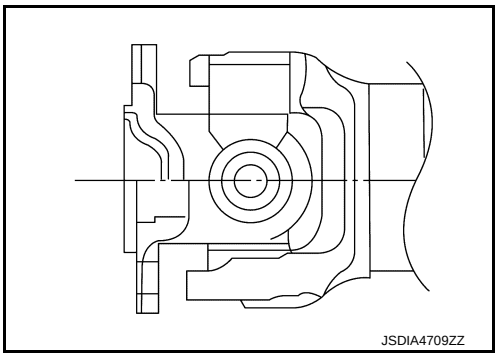
STRUCTURE AND OPERATION

Sectional View

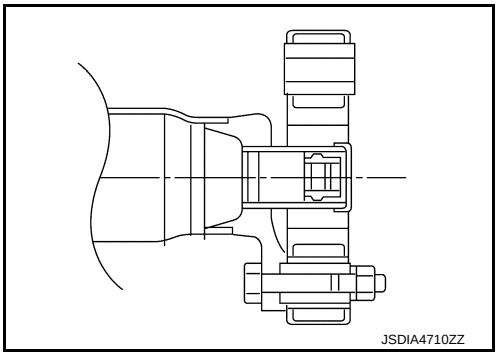
INFOID:0000000009643634

PART OF JOINT

Universal Type (Shell Type)



Rubber Coupling Type



SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009643635

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

Reference		DLN-107, "Inspection"	DLN-108, "Exploded View"	—	DLN-107, "Inspection"	—	DLN-107, "Inspection"	DLN-107, "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 SUSPECTED 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
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×	×
	Shake		×			×				×	×	×	×	×	×
	Vibration	×	×	×	×	×	×	×		×	×		×		×

×: Applicable

PERIODIC MAINTENANCE

REAR PROPELLER SHAFT

Inspection

INFOID:0000000009643636

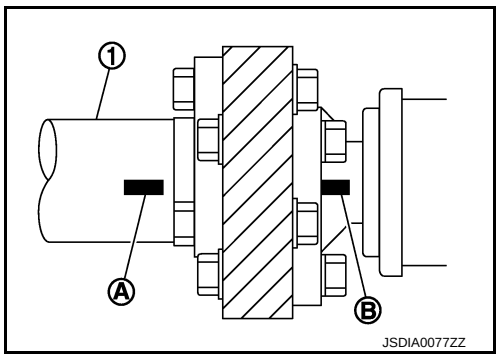
APPEARANCE AND NOISE

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

VIBRATION

If vibration is present at high speed, adjust the propeller shaft phase first.

1. Check the propeller shaft for bend and damage. If damaged, replace propeller shaft assembly.
2. If the alignment mark Ⓐ of the propeller shaft ① and the alignment mark Ⓑ of the companion flanges on the final drive are not on an axis, re-install these parts to a closer position as possible.
3. Perform a cruise test drive to check the propeller shaft for runout after installation. If vibration still occurs, 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.
4. If vibration is still detected, measure propeller shaft runout after removing it. Refer to DLN-111, "Inspection".

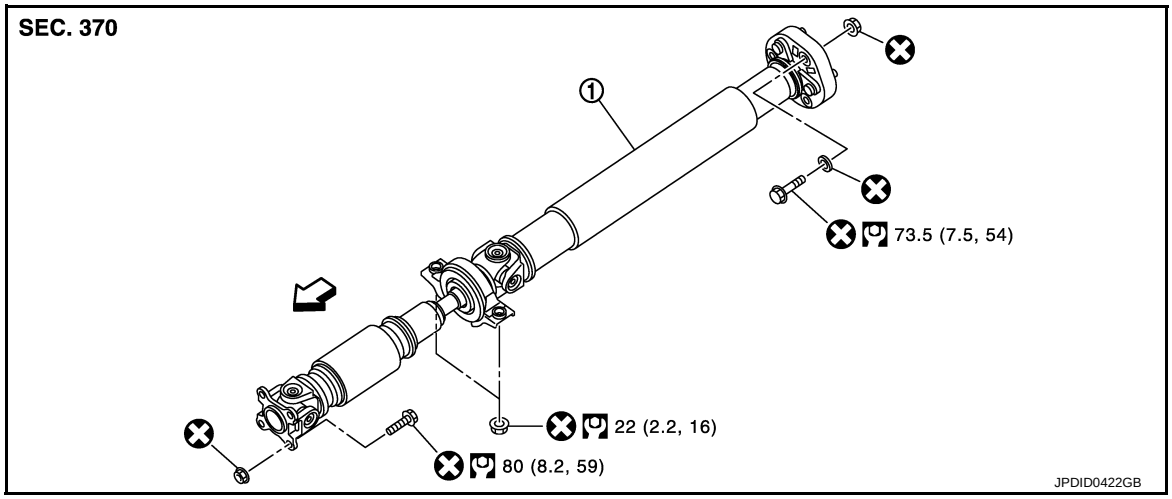


REMOVAL AND INSTALLATION

REAR PROPELLER SHAFT

Exploded View

INFOID:0000000009643637



1. Propeller shaft assembly

⇦: Vehicle front

: N·m (kg-m, ft-lb)

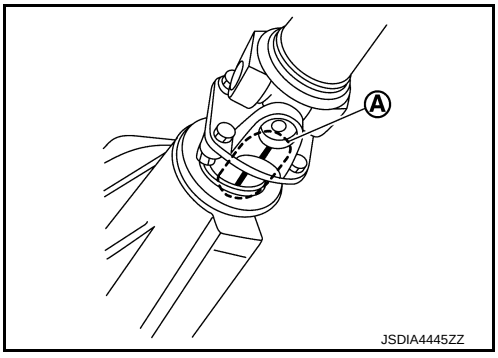
: Always replace after every disassembly.

Removal and Installation

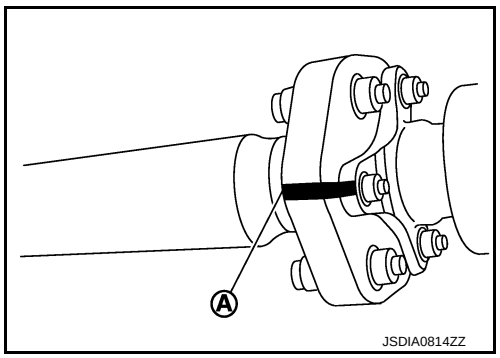
INFOID:0000000009643638

REMOVAL

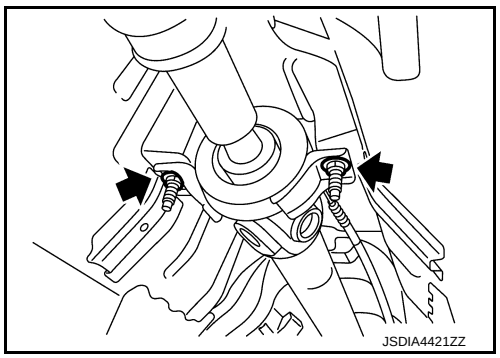
1. Shift transmission to the neutral position, and then release parking brake.
2. Remove tunnel stay.
3. Remove center muffler and exhaust front tube. Refer to EX-6, "Removal and Installation".
4. Remove heat insulator.
5. Put matching marks Ⓐ on propeller shaft flange yoke and transfer companion flange.
   CAUTION:
   For matching mark, use paint. Never damage propeller shaft flange yoke and transfer companion flange.



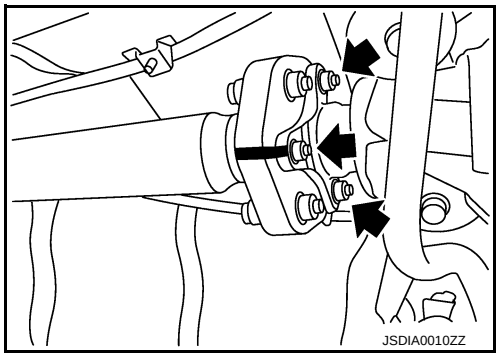
6. Put matching marks Ⓐ on propeller shaft rubber coupling and final drive companion flange.
CAUTION:
For matching mark, use paint. Never damage propeller shaft rubber coupling and final drive companion flange.



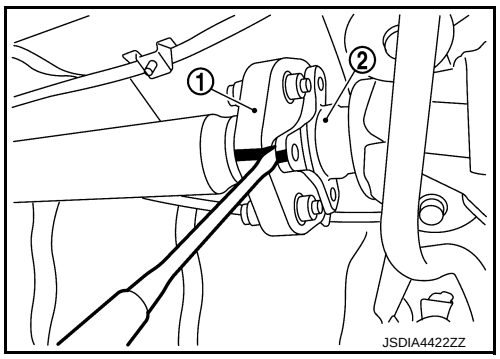
7. Loosen mounting nuts of center bearing mounting bracket.
NOTE:
Tighten mounting nuts temporarily.



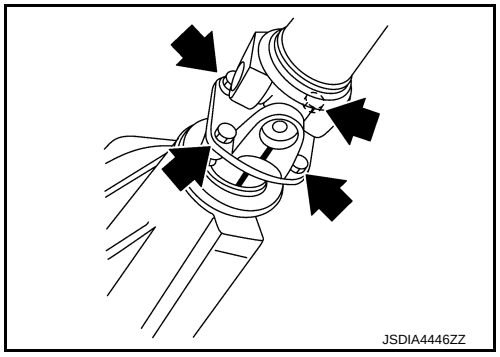
8. Remove propeller shaft assembly fixing bolts, nuts, and washers.
CAUTION:
Be careful not to remove wrong fixing bolts and nuts. Never separate the rubber coupling from propeller shaft.



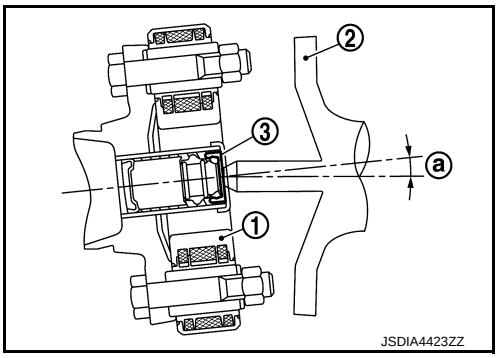
9. Slightly separate rubber coupling ① from final drive companion flange ②.
CAUTION:
Never damage final drive companion flange and rubber coupling.



10. Remove propeller shaft assembly fixing bolts and nuts, and separate propeller shaft assembly from transfer companion flange.



11. Remove center bearing mounting bracket fixing nuts.
CAUTION:
The angle ⓐ which rubber coupling ① forms with companion flange ② must be 4 degrees or less. Never damage grease seal ③.

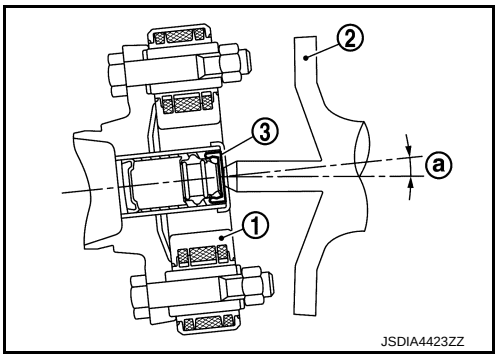


12. Slide propeller shaft in the vehicle forward direction slightly. Separate propeller shaft from final drive companion flange.
CAUTION:
- **The angle which rubber coupling forms with companion flange must be 4 degrees or less.**
- **Never damage grease seal.**
- **Never damage rubber coupling.**

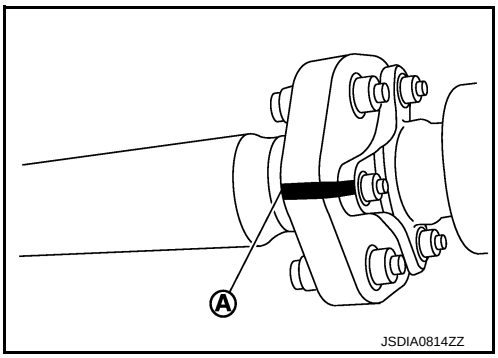
13. Remove propeller shaft assembly from the vehicle.
14. Perform inspection after removal. Refer to DLN-111, "Inspection".

INSTALLATION

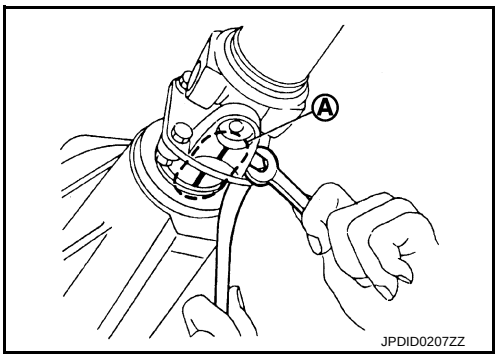
Note the following, and install in the reverse order of removal.
- For non-reusable parts, refer to DLN-108, "Exploded View".
- For each tightening torque, refer to DLN-108, "Exploded View".
- Never damage rubber coupling, protect it with a shop towel or equivalent.
- The angle ⓐ which rubber coupling ① forms with companion flange ② must be 4 degrees or less. Never damage grease seal ③.
- Center bearing mounting bracket fixing nuts must be tightened in the order from left to right.



- Align matching marks Ⓐ to install propeller shaft rubber coupling to final drive companion flange.

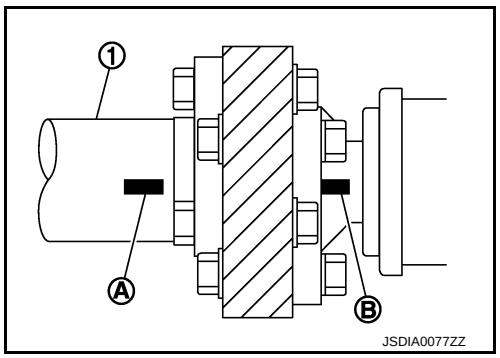


- Align matching marks Ⓐ to install propeller shaft flange yoke and transfer companion flange.



- If propeller shaft or final drive has been replaced, connect them as follows:

- Install propeller shaft ① while aligning its matching mark Ⓐ of propeller shaft with matching mark Ⓑ of final drive on the joint as close as possible.
- Perform inspection after installation. Refer to DLN-111, "Inspection".



JSDIA0077ZZ

INFOID:0000000009643639

Inspection

INSPECTION AFTER REMOVAL

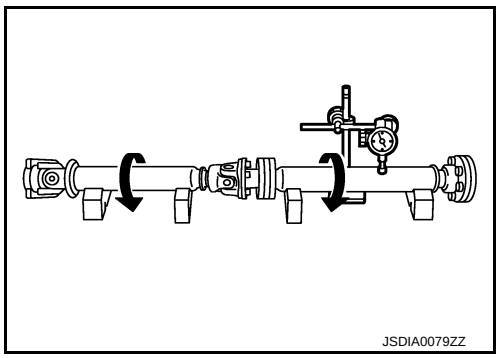
Appearance

- Check propeller shaft tube surface for dents or cracks. If malfunction is detected, replace propeller shaft assembly.
- Check rubber coupling for wear, cracks, or damage. If malfunction 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".

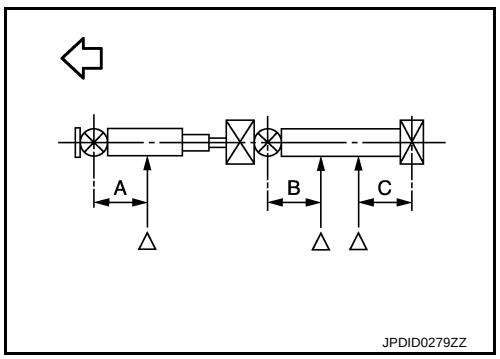

JSDIA0079ZZ

- Propeller shaft runout measuring point (Point "△").

⇦ : Front side

Dimension

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



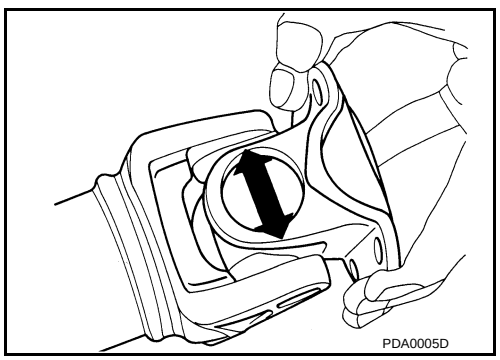
JPDID0279ZZ

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-113, "Journal Axial Play".

CAUTION:
Never disassemble joints.


PDA0005D

Center Bearing

Check center bearing for noise and damage. If malfunction 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. 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)

General Specifications

INFOID:0000000009643640

Applied model	Axle	AWD
	Engine	VQ37VHR
	Transmission	A/T
Propeller shaft model		3F80A-R
Number of joints		3
Joint type	1st joint	Universal (Shell type)
	2nd joint	Universal (Shell type)
	3rd joint	Rubber coupling type
Coupling method	Traansfer side	Flange type
	Rear final drive side	Flange type
Shaft length	1st shaft (Spider to spider)	514.0 mm (20.24 in)
	2nd shaft (Spider to rubber coupling center)	709.0 mm (27.91 in)
Shaft outer diameter	1st shaft	75.0 mm (2.953 in)
	2nd shaft	65.0 mm (2.559 in)

Propeller Shaft Runout

INFOID:0000000009643641

Unit: mm (in)

Item	Standard
Propeller shaft runout	0.8 (0.031) or less

Journal Axial Play

INFOID:0000000009643642

Unit: mm (in)

Item	Standard
Journal axial play	0 (0)

PRECAUTION

PRECAUTIONS

Service Notice or Precautions for Front Final Drive

INFOID:0000000009643644

- 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 a 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.
- Left side oil seal cannot be replaced on vehicle, because it is attached to oil pan of engine. Replace it after removing front final drive assembly from vehicle.

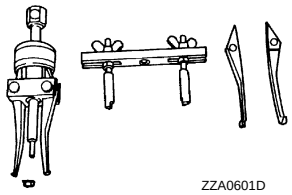
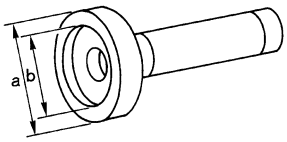
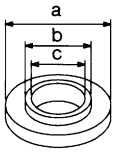
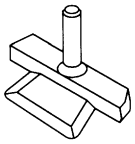
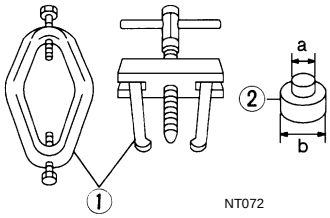
PREPARATION

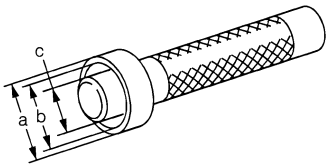
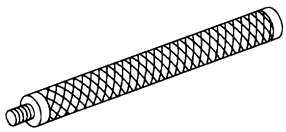
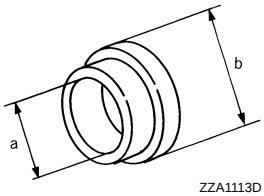
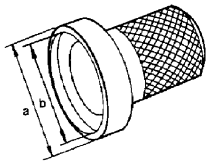
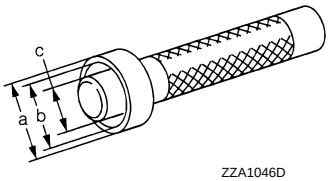
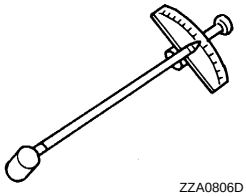
PREPARATION

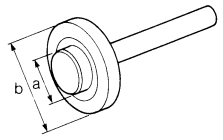
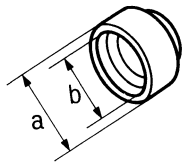
Special Service Tools

INFOID:0000000009643645

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

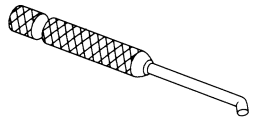
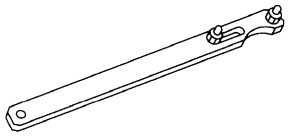
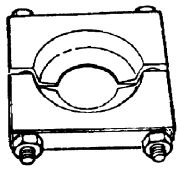
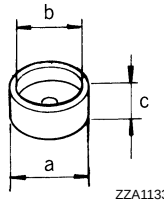
Tool number (Kent-Moore No.) Tool name	Description
KV381054S0 (J-34286) Puller  ZZA0601D	• Removing side oil seal (right side) • Removing side bearing outer race
KV38100200 (—) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.  ZZA1143D	Installing side shaft oil seal
ST30032000 (J-26010-01) Drift a: 80 mm (3.15 in) dia. b: 38 mm (1.50 in) dia. c: 31 mm (1.22 in) dia.  S-NT107	• Installing side shaft • Installing pinion rear bearing inner race
KV10111100 (J-37228) Seal cutter  S-NT046	Removing carrier cover
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.  NT072	Removing and installing side bearing inner race

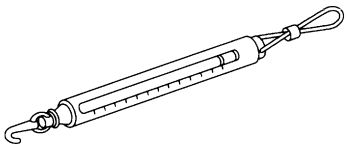
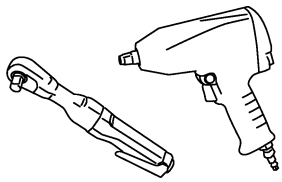
Tool number (Kent-Moore No.) Tool name	Description
ST33230000 (J-25805-01) Drift a: 51 mm (2.01 in) dia. b: 41 mm (1.61 in) dia. c: 28.5 mm (1.122 in) dia.  ZZA1046D	Installing side bearing inner race
ST30611000 (J-25742-1) Drift bar  S-NT090	Installing side bearing outer race (Use with KV31103000)
KV31103000 (J-38982) Drift a: 49 mm (1.93 in) dia. b: 70 mm (2.76 in) dia.  ZZA1113D	Installing side bearing outer race
ST33400001 (J-26082) Drift a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.  ZZA0702D	• Installing side oil seal (right side) • Installing front oil seal
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.  ZZA1046D	Installing side oil seal (left side)
ST3127S000 (J-25765-A) Preload gauge  ZZA0806D	Measuring pinion bearing preload and total preload

Tool number (Kent-Moore No.) Tool name	Description
ST37820000 (—) Drift a: 39 mm (1.54 in) dia. b: 72 mm (2.83 in) dia.  ZZA0836D	Installing pinion front and rear bearing outer race
KV38102510 (—) Drift a: 71 mm (2.80 in) dia. b: 65 mm (2.56 in) dia.  ZZA0838D	Installing front oil seal

Commercial Service Tools or/and Repair Part

INFOID:0000000009643646

Tool name	Description
Oil seal remover  S-NT294	Removing side shaft oil seal
Flange wrench  NT035	Removing and installing drive pinion lock nut
Separator  ZZA0700D	• Removing extension tube retainer • Removing pinion rear bearing inner race
Spacer a: 60 mm (2.36 in) dia. b: 36 mm (1.42 in) dia. c: 30 mm (1.18 in)  ZZA1133D	Installing pinion front bearing inner race

Tool name	Description
Spring gauge  NT127	Measuring turning torque
Power tool  PBIC0190E	Loosening bolts and nuts

Lubricant or/and Sealant

INFOID:0000000009800290

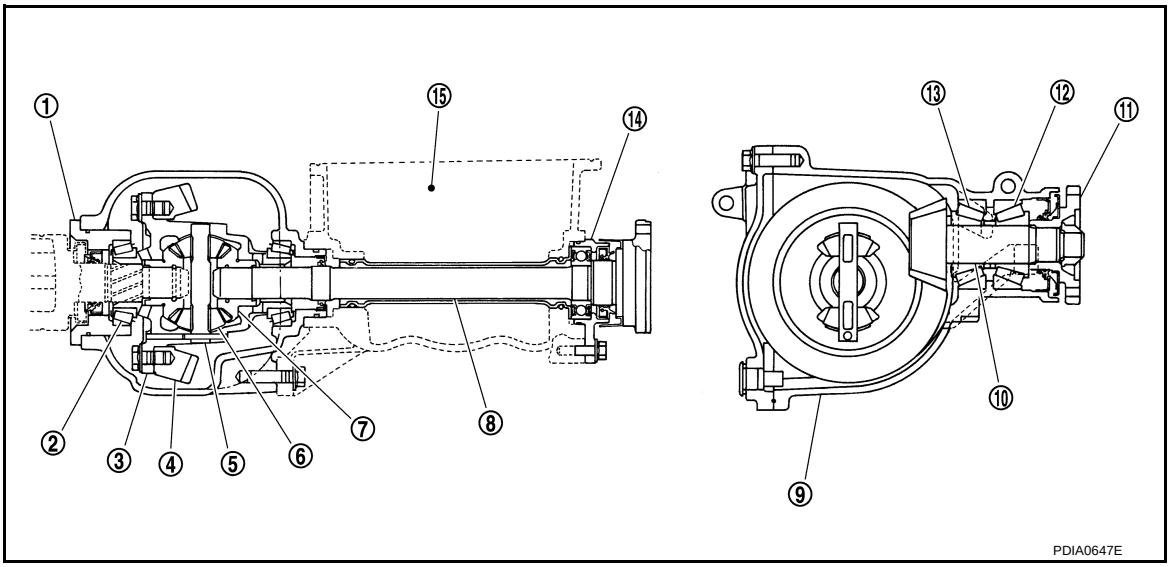
Item	Use
Red lead or equivalent	Checking tooth contact

SYSTEM DESCRIPTION

STRUCTURE AND OPERATION

Sectional View

INFOID:0000000009643647



① Side retainer	② Side bearing	③ Differential case
④ Drive gear	⑤ Pinion mate shaft	⑥ Pinion mate gear
⑦ Side gear	⑧ Side shaft	⑨ Gear carrier
⑩ Drive pinion	⑪ Companion flange	⑫ Pinion front bearing
⑬ Pinion rear bearing	⑭ Extension tube retainer	⑮ Engine oil pan

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009643648

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

		Reference	DLN-144, "Inspection"	DLN-139, "Adjustment"	DLN-144, "Inspection"	DLN-139, "Adjustment"	DLN-139, "Adjustment"	DLN-121, "Inspection"	NVH of FRONT and REAR PROPELLER 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.
		Possible 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
Symptom	Noise		×	×	×	×	×	×	×	×	×	×	×	×	×

×: Applicable

PERIODIC MAINTENANCE

FRONT DIFFERENTIAL GEAR OIL

Inspection

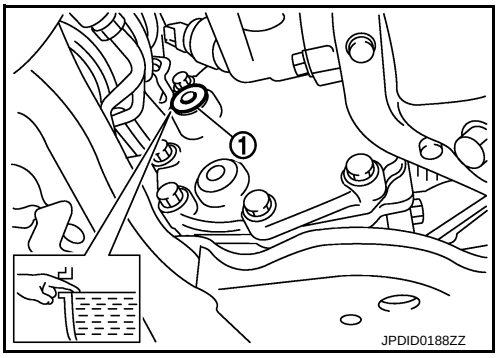
INFOID:0000000009643649

OIL LEAKAGE

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

OIL LEVEL

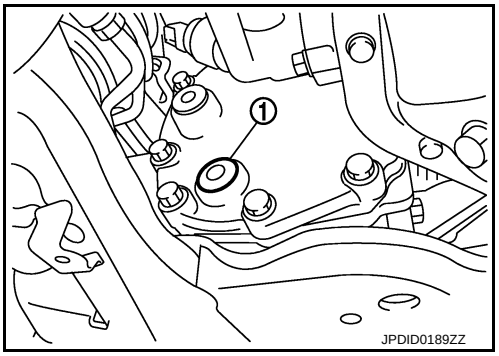
- Remove filler plug ① and check oil level from filler plug mounting hole as shown in the figure.
  CAUTION:
  Never start engine while checking oil level.
- Set a gasket on filler plug and install it on final drive assembly. Refer to DLN-131, "Exploded View".
  CAUTION:
  Never reuse gasket.



Draining

INFOID:0000000009643650

1. Stop engine.
2. Remove drain plug ① and drain gear oil.
3. Set a gasket on drain plug and install it to final drive assembly and tighten to the specified torque. Refer to DLN-131, "Exploded View".
   CAUTION:
   Never reuse gasket.



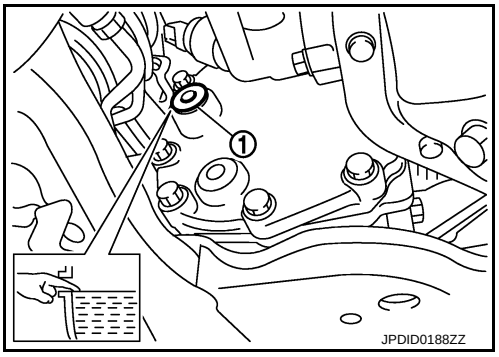
Refilling

INFOID:0000000009643651

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

   Recommended oil and capacity : **Refer to MA-14, "FOR NORTH AMERICA : Fluids and Lubricants".**

2. After refilling oil, check oil level. Set a gasket to filler plug, then install it to final drive assembly. Refer to DLN-131, "Exploded View".
   CAUTION:
   Never reuse gasket.



REMOVAL AND INSTALLATION

FRONT OIL SEAL

Removal and Installation

INFOID:0000000009652438

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

SIDE OIL SEAL

LEFT SIDE

LEFT SIDE : Removal and Installation

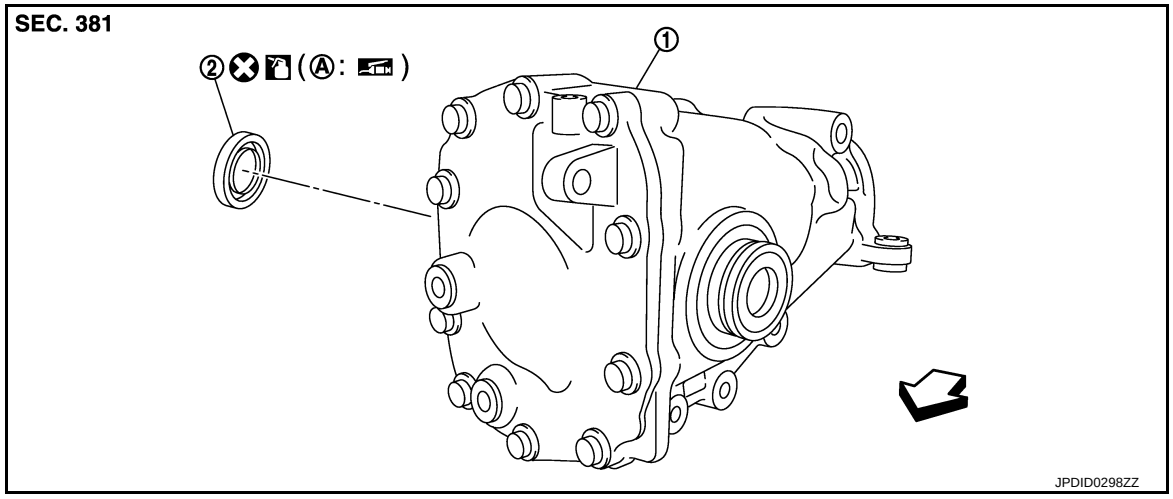
INFOID:0000000009643655

NOTE:
Left side oil seal cannot be replaced on vehicle, because it is attached to oil pan of engine. Replace it after removing front final drive assembly from vehicle.

RIGHT SIDE

RIGHT SIDE : Exploded View

INFOID:0000000009643652



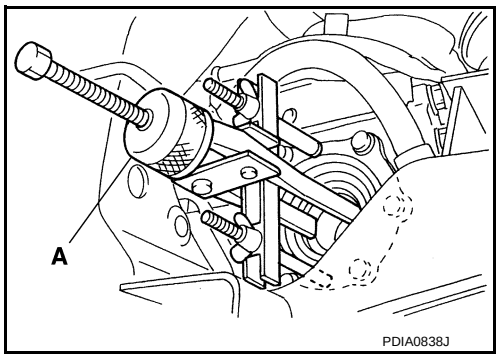
① Front final drive assembly
② Side oil seal
Ⓐ Oil seal lip
⇦ : Vehicle front
: Always replace after every disassembly.
: Apply gear oil.
: Apply multi-purpose grease.

RIGHT SIDE : Removal and Installation

INFOID:0000000009643653

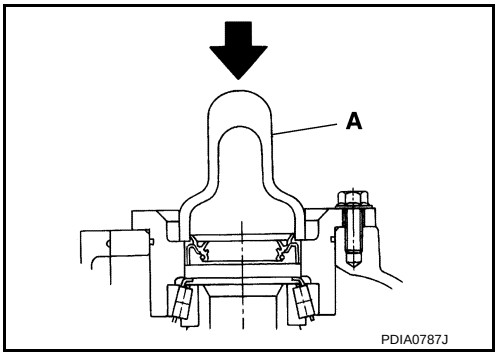
REMOVAL

1. Remove the front drive shaft. Refer to FAX-25, "RIGHT SIDE : Removal and Installation".
2. Remove the side oil seal using a puller (A) [SST: KV381054S0 (J-34286)].
   CAUTION:
   Never damage side retainer.



INSTALLATION

1. 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 lip, and gear oil onto the circumference of oil seal.**
2. Install the front drive shaft. Refer to FAX-25, "RIGHT SIDE : Removal and Installation".
3. Perform inspection after installation. Refer to DLN-124, "RIGHT SIDE : Inspection".



RIGHT SIDE : Inspection

INFOID:0000000009652695

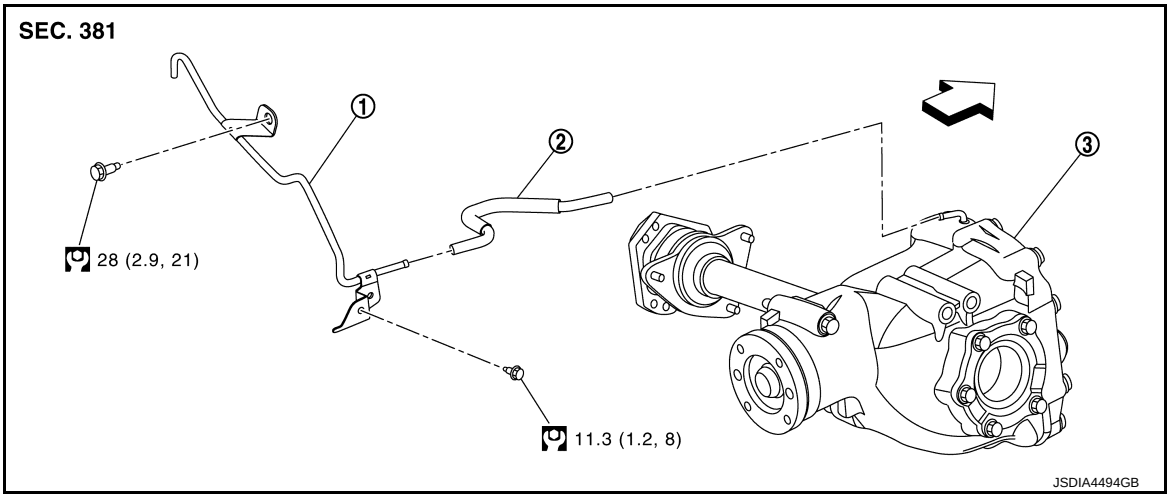
INSPECTION AFTER INSTALLATION

Check oil level and final drive for oil leakage. Refer to DLN-121, "Inspection".

AIR BREATHER

Exploded View

INFOID:0000000009781319



① Air breather tube ② Air breather hose ③ Front final drive assembly

⇦: Vehicle front

: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:0000000009781320

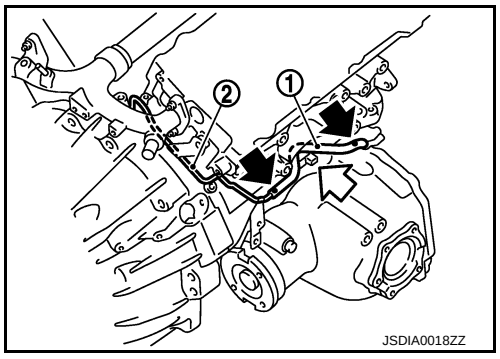
REMOVAL

1. Remove front under cover. Refer to EXT-32, "FRONT UNDER COVER : Exploded View".
2. Support engine with a suitable jack.
   CAUTION:
   Secure engine assembly to a jack.
3. Remove engine mounting bracket (RH), engine mounting bracket (RH) (lower) and engine mounting insulator (RH). Refer to EM-81, "AWD : Exploded View" and EM-81, "AWD : Removal and Installation".
4. Remove air breather tube and air breather hose.

INSTALLATION

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

- For each tightening torque, refer to DLN-125, "Exploded View".
- Install air breather hose ① and tube ② as shown in the figure.
  CAUTION:
  Make sure there are no pinched or restricted areas on air 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. (Air breather tube side).
- Face the bend of air breather hose to the engine side (⇦).

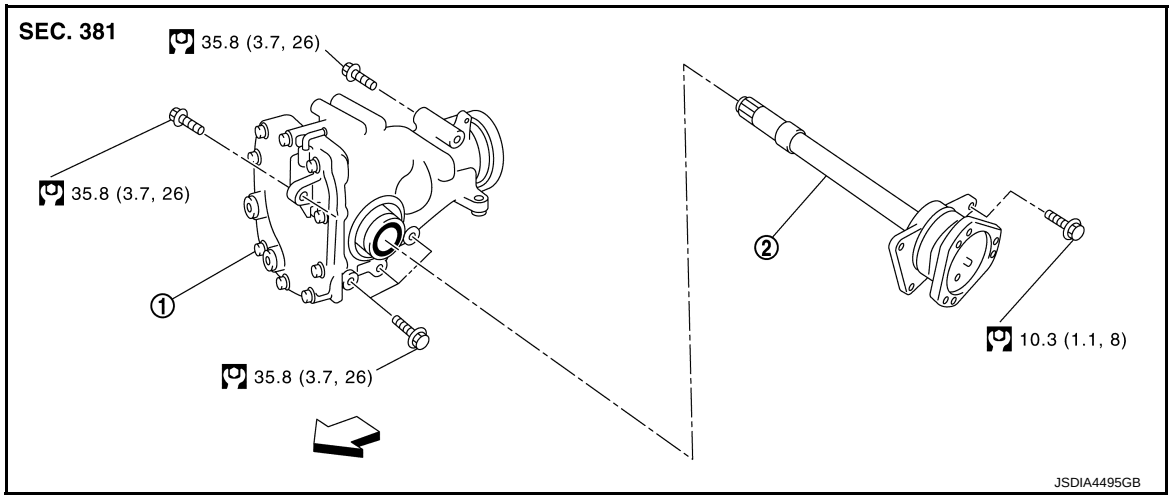


UNIT REMOVAL AND INSTALLATION

FRONT FINAL DRIVE ASSEMBLY

Exploded View

INFOID:0000000009643656



① Front final drive assembly ② Side shaft assembly

⇦: Vehicle front

: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:0000000009643657

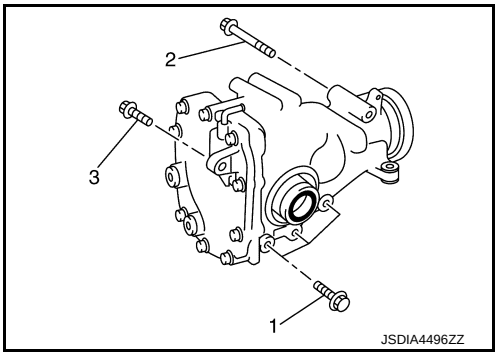
REMOVAL

1. Remove engine assembly, transmission assembly, transfer assembly and front final drive assembly together with front suspension member. Refer to EM-81, "AWD : Removal and Installation".
2. Lift and support engine assembly with hoist and remove engine mounting bracket (RH), engine mounting bracket (RH) (lower) and engine mounting insulator (RH). Refer to EM-81, "AWD : Removal and Installation".
3. Remove air breather tube and air breather hose. Refer to DLN-125, "Removal and Installation".
4. Remove side shaft assembly.
5. Remove front final drive assembly.

INSTALLATION

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

- When installing the side shaft assembly, 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). For each tightening torque, refer to DLN-126, "Exploded View".
  CAUTION:
  Align the mating faces of gear carrier and oil pan for installation.
- Perform inspection after installation. Refer to DLN-127, "Inspection".



Inspection

INFOID:0000000009652696

INSPECTION AFTER INSTALLATION

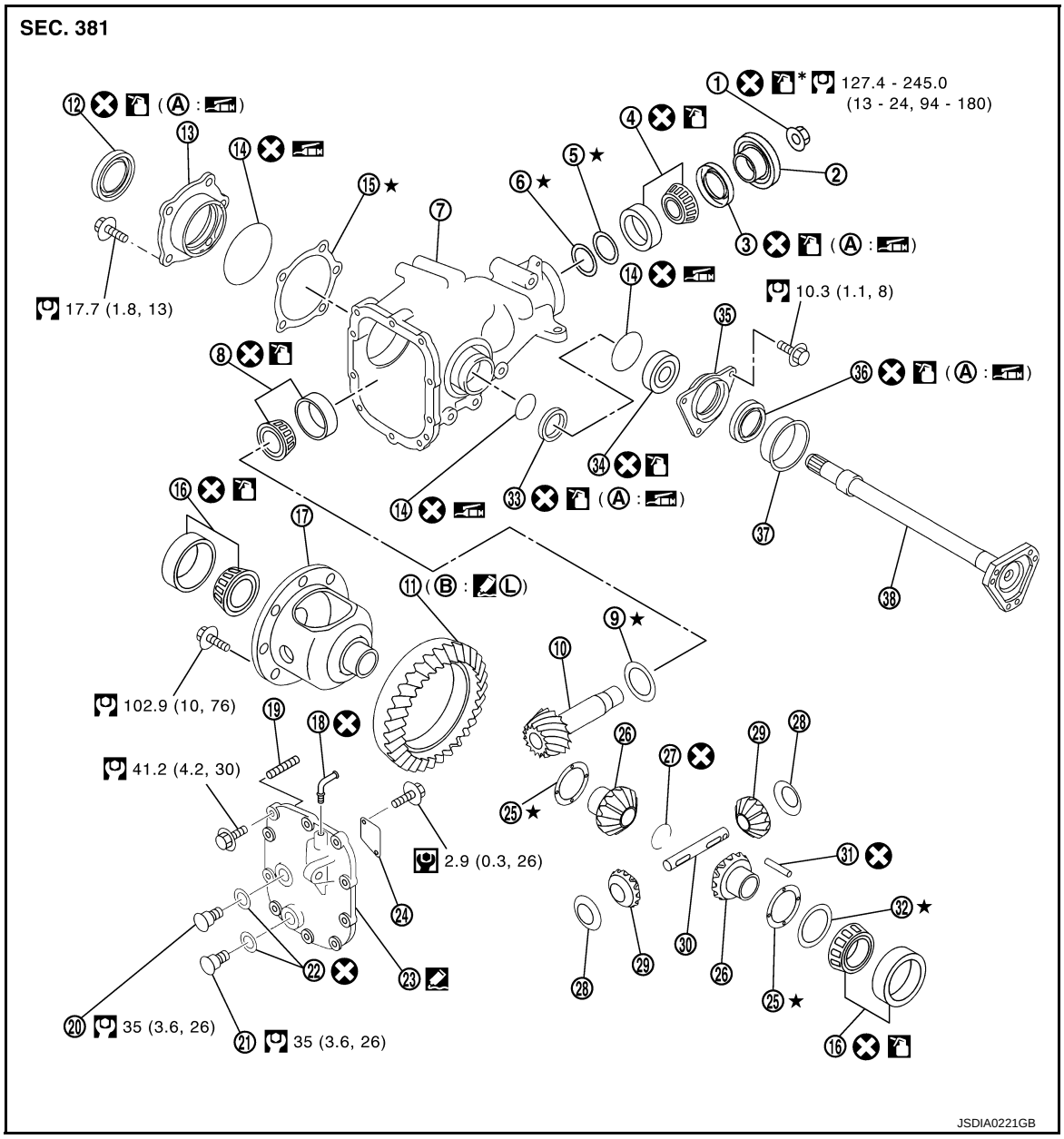
When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-121, "Inspection".

UNIT DISASSEMBLY AND ASSEMBLY

SIDE SHAFT

Exploded View

INFOID:0000000009660811



① Drive pinion lock nut	② Companion flange	③ Front oil seal
④ Pinion front bearing	⑤ Drive pinion bearing adjusting washer	⑥ Drive pinion adjusting washer
⑦ Gear carrier	⑧ Pinion rear bearing	⑨ Pinion height adjusting washer
⑩ Drive pinion	⑪ Drive gear	⑫ Side oil seal (right side)
⑬ Side retainer	⑭ O-ring	⑮ Side bearing adjusting shim
⑯ Side bearing	⑰ Differential case	⑱ Breather connector
⑲ Dowel pin	⑳ Filler plug	㉑ Drain plug
㉒ Gasket	㉓ Carrier cover	㉔ Gear oil defense

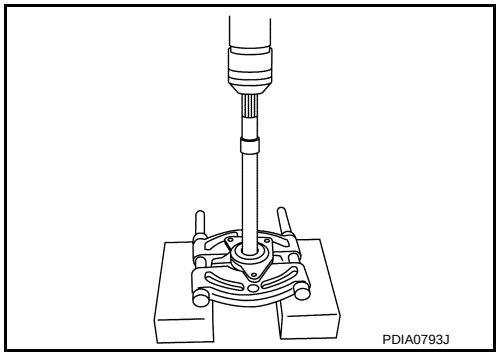
㉕ Side gear thrust washer
㉖ Side gear
㉗ Circular clip
㉘ Pinion mate thrust washer
㉙ Pinion mate gear
㉚ Pinion mate shaft
㉛ Lock pin
㉜ Side bearing adjusting washer
㉝ Side oil seal (left side)
㉞ Side shaft bearing
㉟ Extension tube retainer
㊱ Side shaft oil seal
㊲ Dust seal
㊳ Side shaft
Ⓐ Oil seal lip
Ⓑ Screw hole

: N·m (kg-m, in-lb)
: N·m (kg-m, ft-lb)
: Always replace after every disassembly.
★: Select with proper thickness.
: Apply gear oil.
*: Apply anti-corrosion oil.
: Apply multi purpose grease.
: Apply Genuine Silicone RTV or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".
Ⓛ: Apply Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

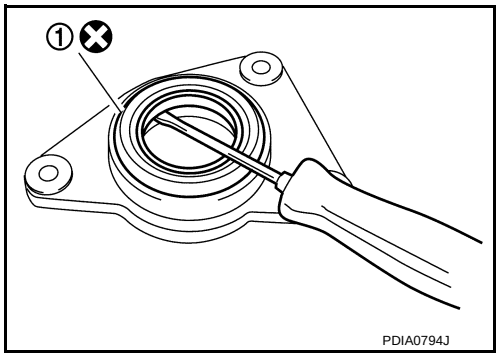
Disassembly

INFOID:0000000009643661

1. Hold extension tube retainer with separator (commercial service tool), then press out side shaft using a press.
2. Remove dust seal from side shaft.


PDIA0793J

3. Remove side shaft oil seal ① from extension tube retainer with oil seal remover.
CAUTION:
Never damage extension tube retainer.
4. Remove side shaft bearing from extension tube retainer.
5. Remove O-ring from extension tube retainer.
6. Perform inspection after disassembly. Refer to DLN-130, "Inspection".

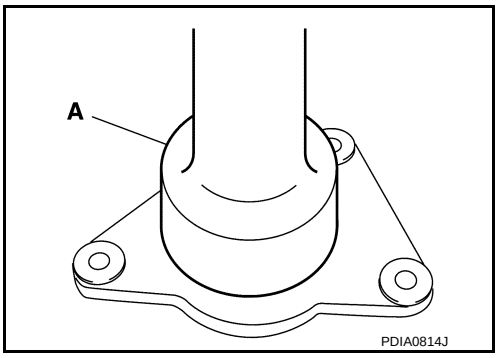


PDIA0794J

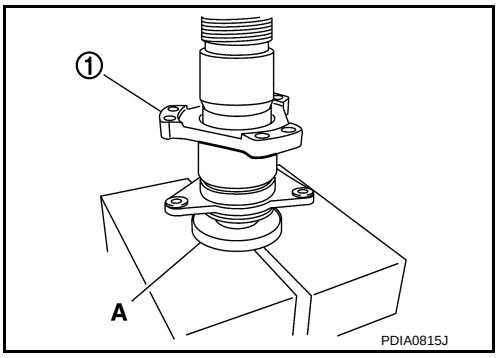
Assembly

INFOID:0000000009643662

1. Using the drift (A) [SST: KV38100200 (—)], install side shaft 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.**
2. Install dust seal.



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



Inspection

INFOID:0000000009643663

INSPECTION AFTER DISASSEMBLY

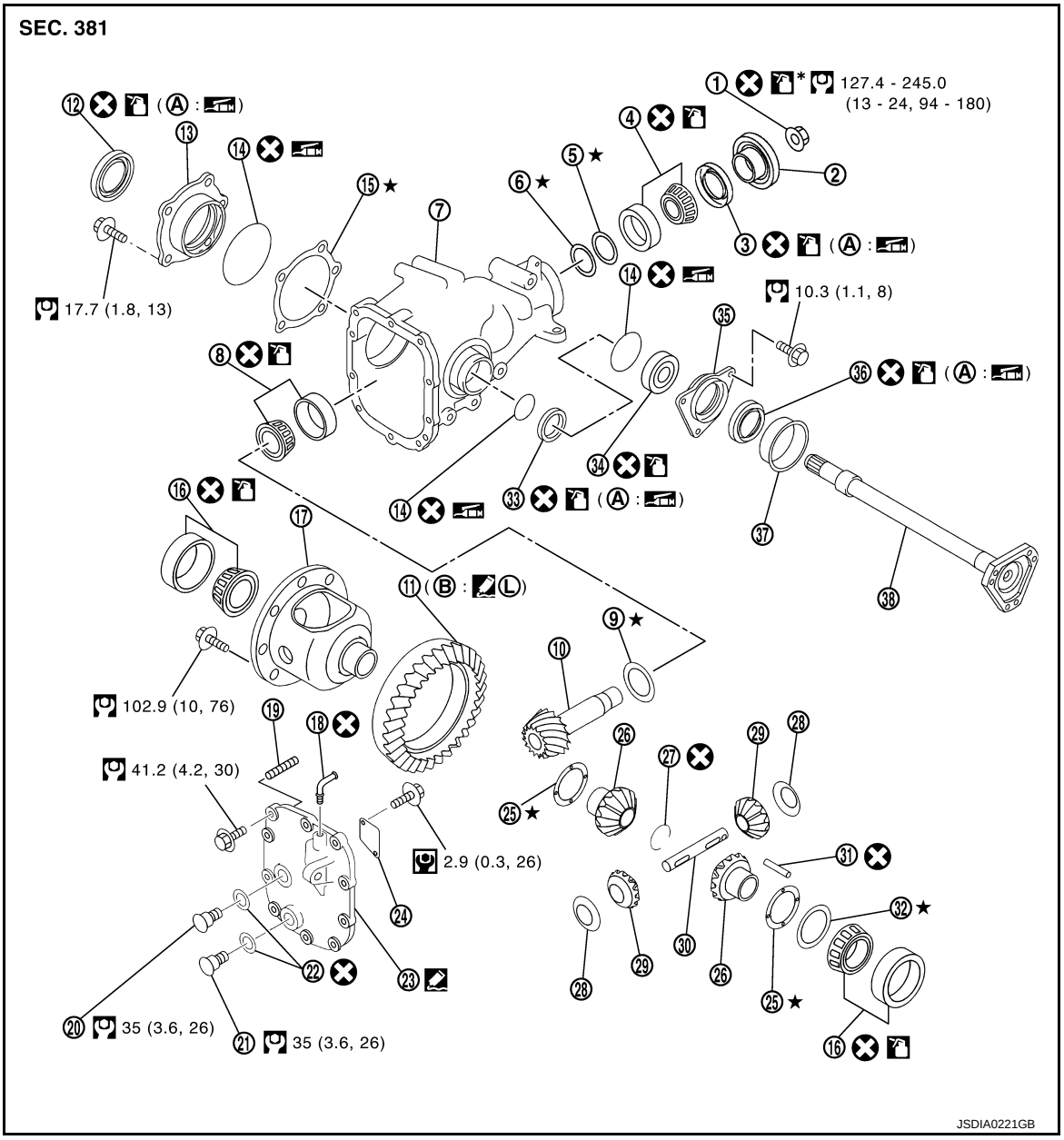
Bearing
- Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

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

DIFFERENTIAL ASSEMBLY

Exploded View

INFOID:0000000009643664



① Drive pinion lock nut	② Companion flange	③ Front oil seal
④ Pinion front bearing	⑤ Drive pinion bearing adjusting washer	⑥ Drive pinion adjusting washer
⑦ Gear carrier	⑧ Pinion rear bearing	⑨ Pinion height adjusting washer
⑩ Drive pinion	⑪ Drive gear	⑫ Side oil seal (right side)
⑬ Side retainer	⑭ O-ring	⑮ Side bearing adjusting shim
⑯ Side bearing	⑰ Differential case	⑱ Breather connector
⑲ Dowel pin	⑳ Filler plug	㉑ Drain plug
㉒ Gasket	㉓ Carrier cover	㉔ Gear oil defense
㉕ Side gear thrust washer	㉖ Side gear	㉗ Circular clip
㉘ Pinion mate thrust washer	㉙ Pinion mate gear	㉚ Pinion mate shaft

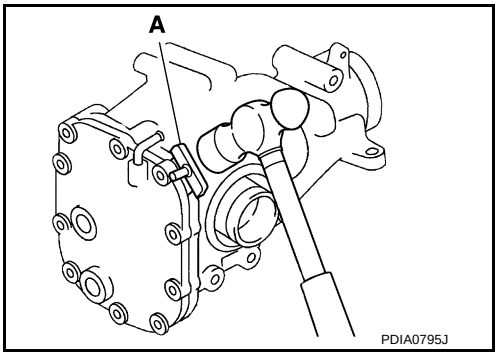
(31) Lock pin
(32) Side bearing adjusting washer
(33) Side oil seal (left side)
(34) Side shaft bearing
(35) Extension tube retainer
(36) Side shaft oil seal
(37) Dust seal
(38) Side shaft
Ⓐ Oil seal lip
Ⓑ Screw hole

: N·m (kg-m, in-lb)
: N·m (kg-m, ft-lb)
: Always replace after every disassembly.
★: Select with proper thickness.
: Apply gear oil.
*: Apply anti-corrosion oil.
: Apply multi purpose grease.
: Apply Genuine Silicone RTV or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".
Ⓛ: Apply Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

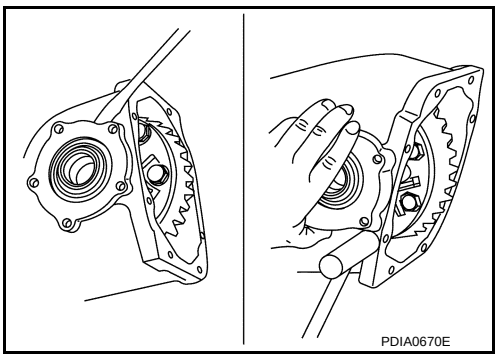
Disassembly

INFOID:0000000009643665

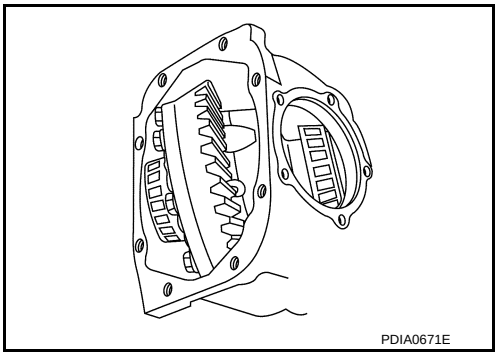
1. Drain gear oil, if necessary.
2. Remove carrier cover mounting bolts.
3. Remove carrier cover to insert the seal cutter (A) [SST: KV10111100 (J-37228)] between gear carrier and carrier cover.
   CAUTION:
   - **Never damage the mating surface.**
   - **Never insert flat-bladed screwdriver, this may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



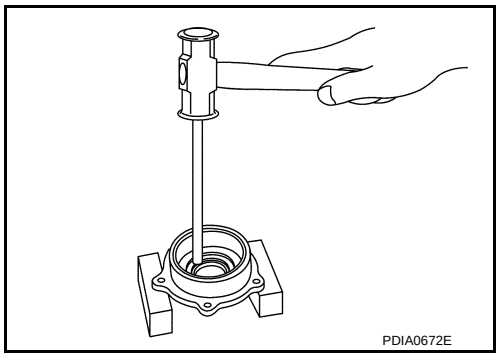
4. Remove side retainer.
5. Remove side bearing adjusting shim.
6. Remove O-ring from side retainer.



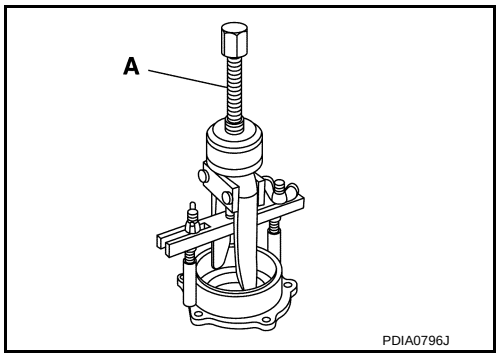
7. Remove differential case assembly from gear carrier.



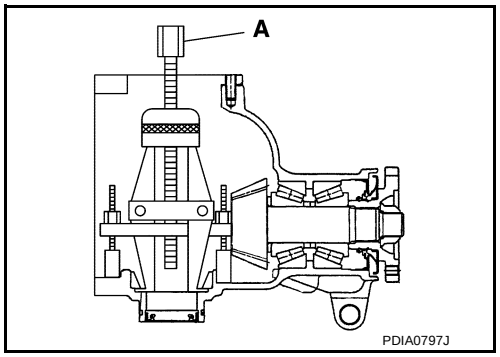
8. Remove side oil seal (right side) from side retainer.



9. Remove side bearing outer race with puller (A) [SST: KV381054S0 (J-34286)].
10. Remove O-ring from gear carrier.
11. Remove side oil seal (left side) from gear carrier.



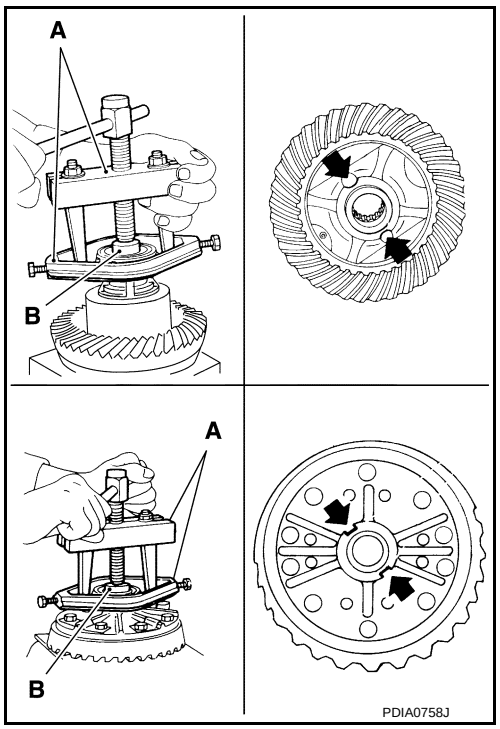
12. Remove side bearing outer race with puller (A) [SST: KV381054S0 (J-34286)].



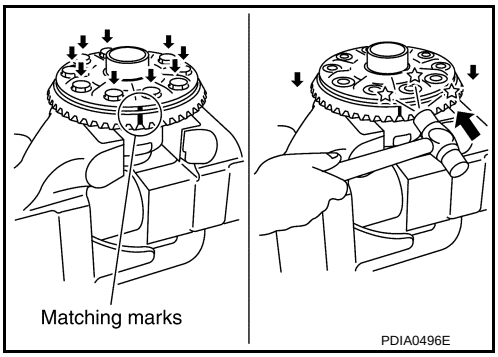
13. Remove side bearing inner race with puller (A) and drift (B).
To prevent damage to bearing, engage puller jaws in groove (⬅).

A: Puller [SST: ST33051001 (J-22888-20)]
B: Base [SST: ST33061000 (J-8107-2)]

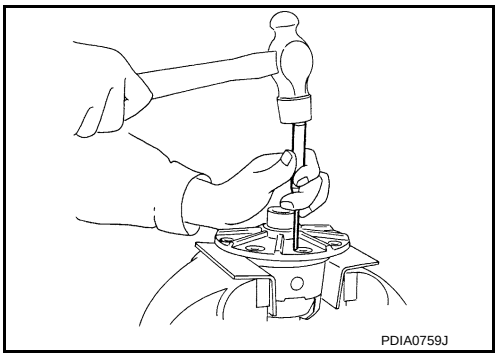
CAUTION:
- **To prevent damage to the side bearing and drive gear, place copper plates between these parts and vise.**
- **It is not necessary to remove side bearing inner race except if it is replaced.**



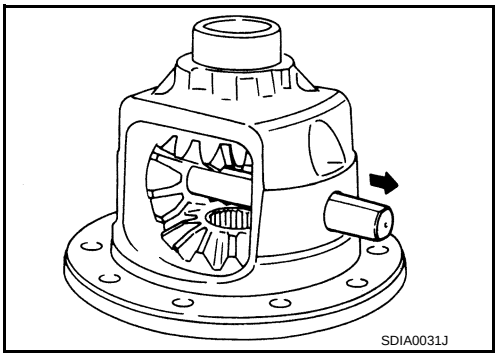
14. For proper reinstallation, paint matching marks on one differential case assembly.
CAUTION:
For matching marks, use paint. Never damage differential case and drive gear.
15. Remove drive gear mounting bolts.
16. Tap drive gear off differential case assembly with a soft hammer.
CAUTION:
Tap evenly all around to keep drive gear from bending.



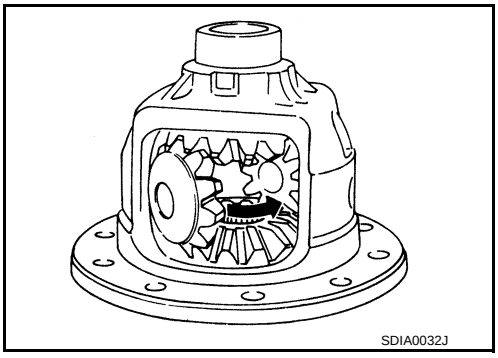
17. Remove lock pin of pinion mate shaft with a punch from drive gear side.



18. Remove pinion mate shaft.



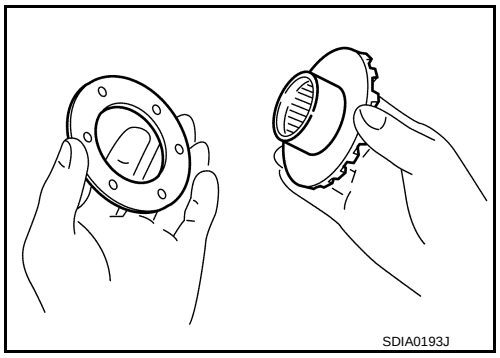
19. Turn pinion mate gear, then remove pinion mate gears, pinion mate thrust washers, side gears and side gear thrust washers from differential case.
20. Perform inspection after disassembly. Refer to DLN-144, "Inspection".



Assembly

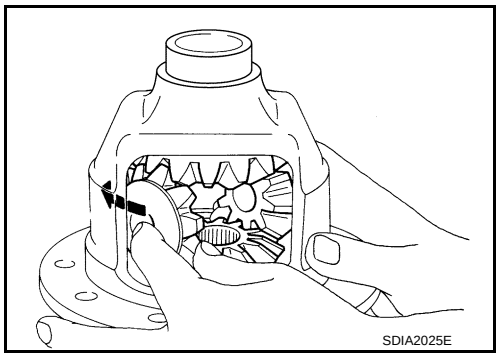
INFOID:0000000009643666

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.

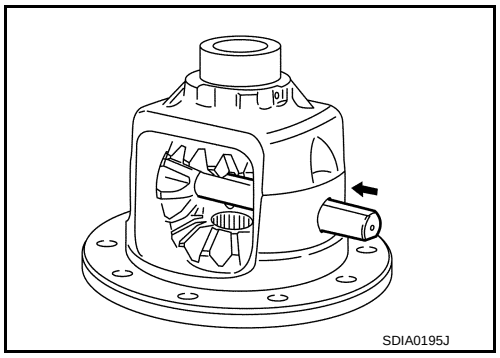


2. Install side gears and thrust washers into differential case.
CAUTION:
- **Never reuse circular clip.**
- **Make sure that the circular clip is installed to side gear (side retainer side).**

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.

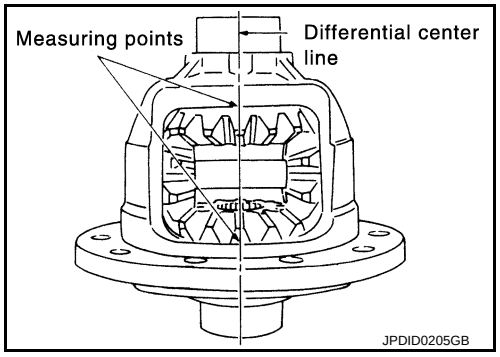


4. Align the lock pin holes on differential case with shaft, and install pinion mate shaft.



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.



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.

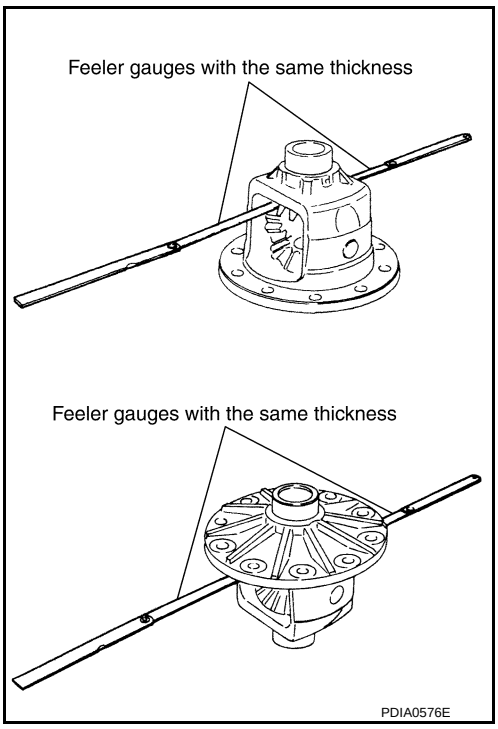
Side gear back clearance	**: Refer to DLN-153, "Differential Side Gear Clearance".**

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

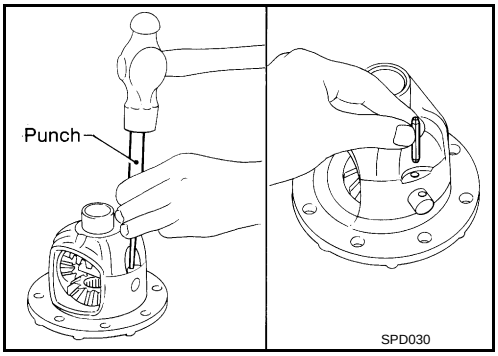
c. If the back clearance is outside the specification, use a thicker/thinner side gear thrust washer to adjust. For selecting thrust washer, refer to the latest parts information.

When the back clearance is large:	**Use a thicker thrust washer.**
When the back clearance is small:	**Use a thinner thrust washer.**

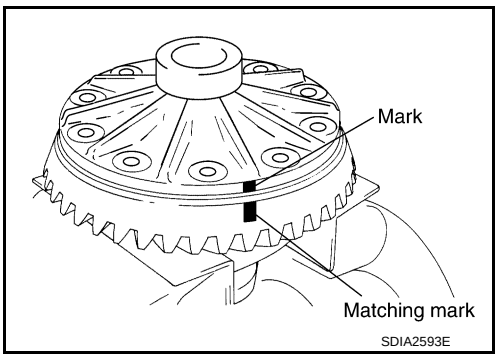
CAUTION:
Select a side gear thrust washer for right and left individually.



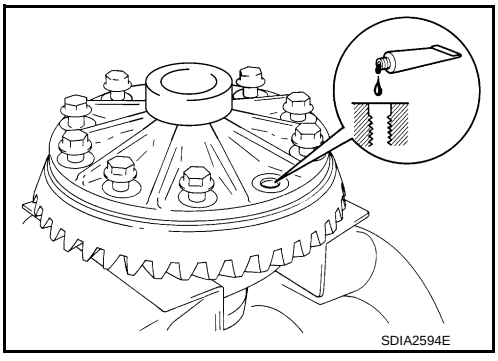
6. Drive a lock pin into pinion mate shaft, using a punch.
Make sure lock pin is flush with differential case.
CAUTION:
Never reuse lock pin.



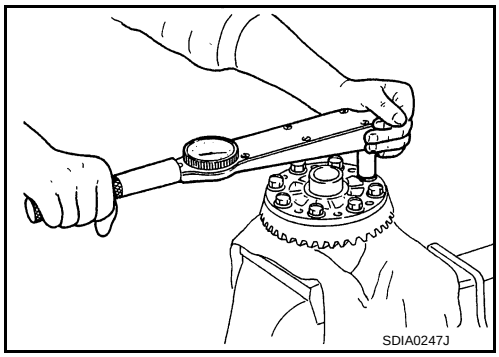
7. Align the matching mark of drive gear with the mark of differential case, then place drive gear.



8. Apply thread locking sealant into the thread hole of drive gear.
CAUTION:
Drive gear back and threaded holes must be cleaned and decreased sufficiently.



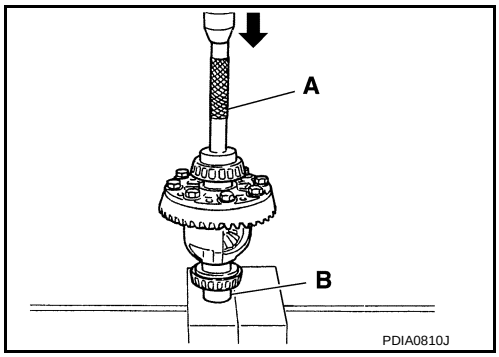
9. Install drive gear on the mounting bolts.
CAUTION:
Tighten bolts in a crisscross fashion.


SDIA0247J

10. Press side bearing inner races to differential case, using the drift (A) and the base (B).

A: Drift [SST: ST33230000 (J-25805-01)]
B: Base [SST: ST33061000 (J-8107-2)]

CAUTION:
Never reuse side bearing inner race.

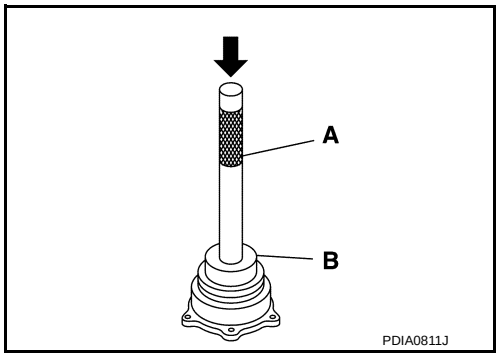


PDIA0810J

11. Press-fit side bearing outer race into side retainer with the drift bar (A) and the drift (B).

A: Drift bar [SST: ST30611000 (J-25742-1)]
B: Drift [SST: KV31103000 (J-38982)]

CAUTION:
- **At first, using a hammer, tap bearing outer race until it becomes flat to side retainer.**
- **Never reuse side bearing outer race.**

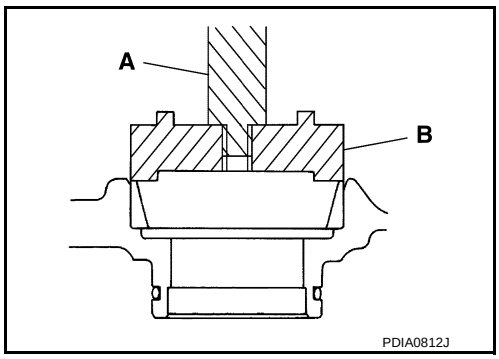


PDIA0811J

12. Press-fit side bearing outer race into gear carrier with the drift bar (A) and the drift (B).

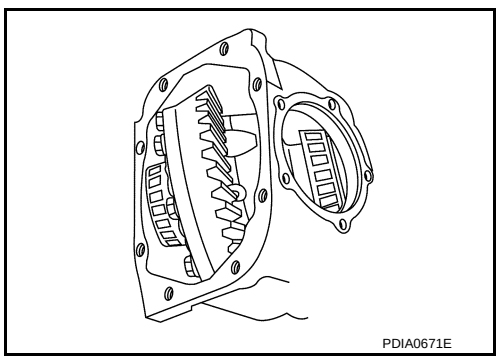
A: Drift bar [SST: ST30611000 (J-25742-1)]
B: Drift [SST: KV31103000 (J-38982)]

CAUTION:
- **At first, using a hammer, tap bearing outer race until it becomes flat to gear carrier.**
- **Never reuse side bearing outer race.**



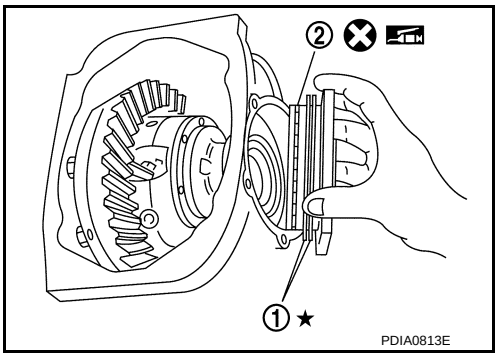
PDIA0812J

13. Place the differential case assembly into gear carrier.
14. Measure side bearing preload. If necessary, select the appropriate side bearing adjusting shim. Refer to DLN-139, "Adjustment".


PDIA0671E

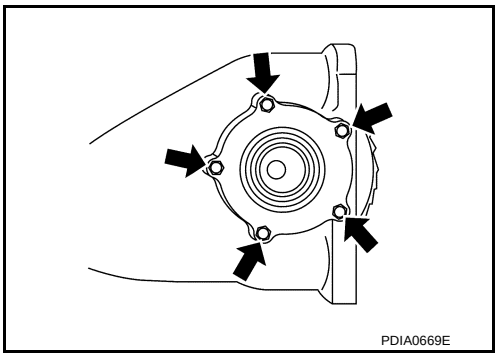
15. Install selected side bearing adjusting shim ①. Refer to DLN-139, "Adjustment".

② : O-ring

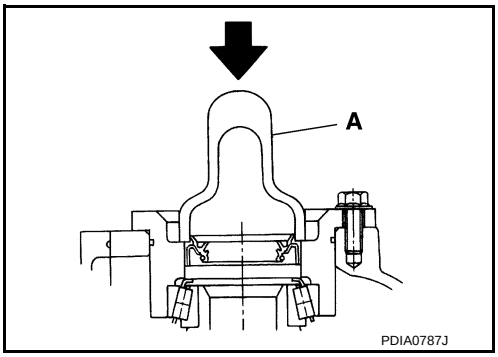


16. Apply multi-purpose grease to O-ring, and install it to side retainer.
CAUTION:
Never reuse O-ring.
17. Install side retainer assembly to gear carrier.

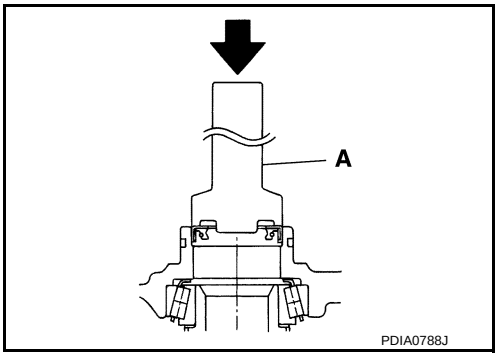
18. Install side retainer mounting bolts.



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.**

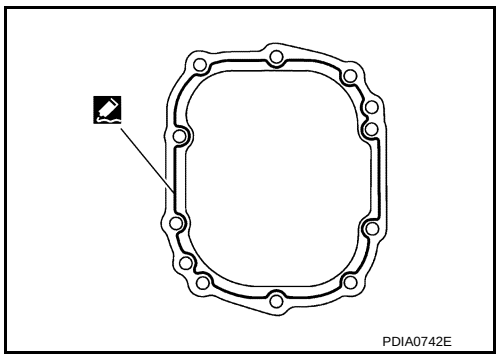


20. Using the drift (A) [SST: KV38102100 (J-25803-01)], press-fit side oil seal so that its surface comes face-to-face with the end surface of gear carrier.
CAUTION:
- **Never reuse oil seal.**
- **When installing, never incline oil seal.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**
21. Apply multi-purpose grease to O-ring, and install it to gear carrier.
CAUTION:
Never reuse O-ring.

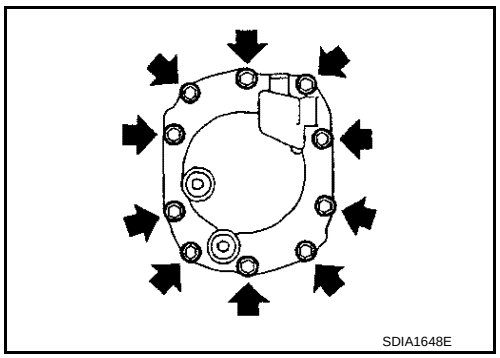


22. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to DLN-139, "Adjustment".
Recheck above items. Readjust as described above, if necessary.

23. Apply sealant to mating surface of carrier cover.
CAUTION:
Remove old sealant adhering to mounting surfaces. Also remove any moisture, oil, or foreign material adhering to application and mounting surfaces.


PDIA0742E

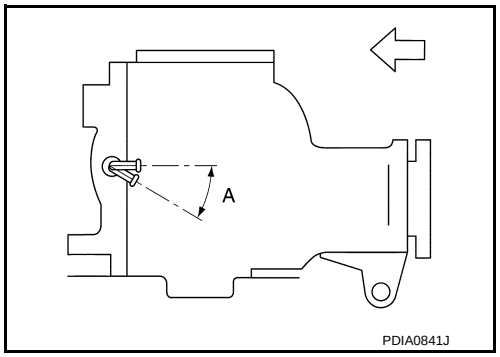
24. Install carrier cover on gear carrier and tighten mounting bolts.


SDIA1648E

25. Set breather connector angle (A) as shown in the figure.

⇦: Vehicle front

A : 0 – 30°



PDIA0841J

Adjustment

INFOID:0000000009643667

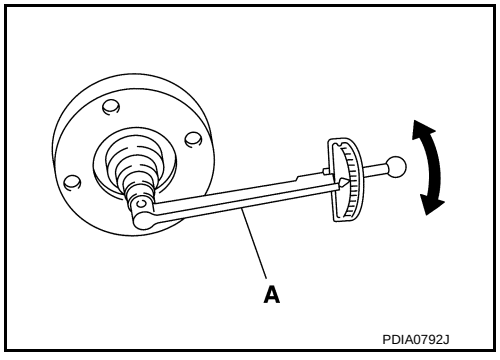
TOTAL PRELOAD TORQUE

- 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 DLN-153, "Preload 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.



PDIA0792J

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

When the preload torque is small

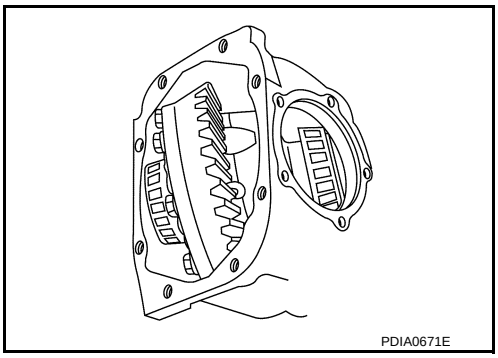
On pinion bearings: **Increase the drive pinion bearing adjusting washer and drive pinion adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.**

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

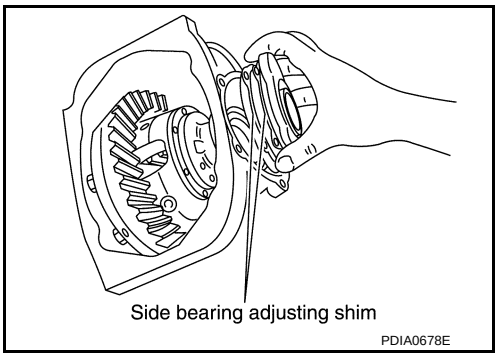
SIDE BEARING PRELOAD

- Before inspection and adjustment, drain gear oil.

1. Remove carrier cover and side retainer. Refer to DLN-132, "Disassembly".
2. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.
3. Place the differential case assembly into gear carrier.

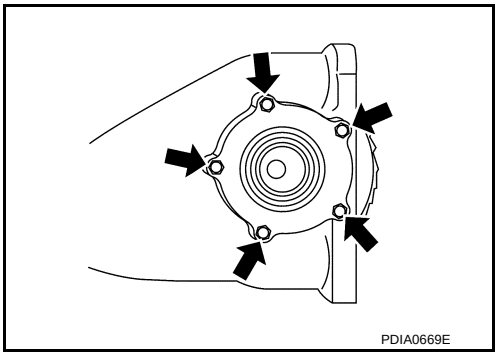

PDIA0671E

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



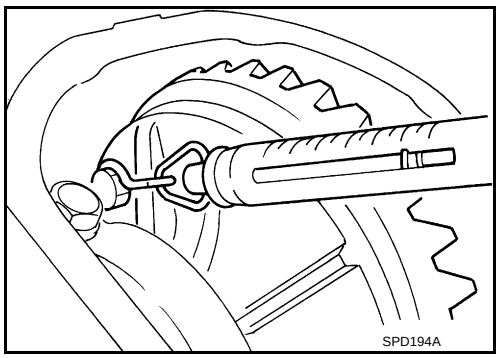
PDIA0678E

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


PDIA0669E

7. Measure the turning torque of the gear carrier at the drive gear mounting bolts with a spring gauge (commercial service tool).

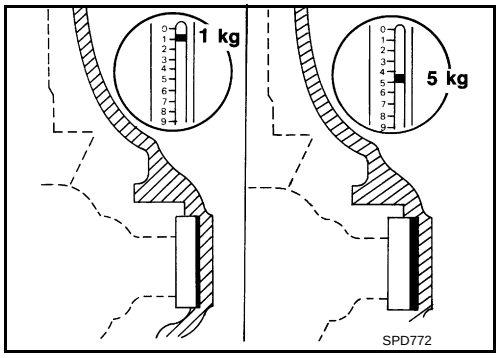
Specification : 34.2 – 39.2 N (3.5 – 4.0 kg, 7.7 – 8.8 lb) of pulling force at the drive gear bolt



8. If the turning torque is outside the specification, use a thicker/thinner side bearing adjusting shim to adjust. For selecting adjusting shim, refer to the latest parts information.

If the turning torque is less than the specified range:
Decrease the side bearing adjusting shim thickness.
If the turning torque is greater than the specification:
Increase the side bearing adjusting shim thickness.

9. Record the total amount of shim thickness required for the correct carrier side bearing preload.

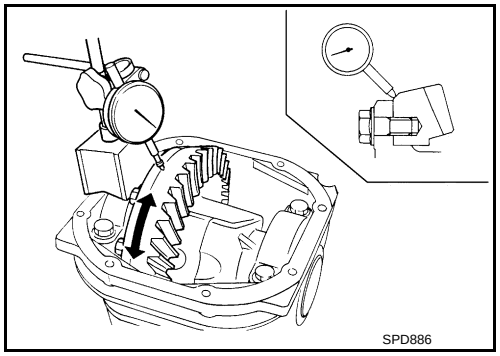


DRIVE GEAR RUNOUT

1. Remove carrier cover. Refer to DLN-132, "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-153, "Drive Gear Runout".

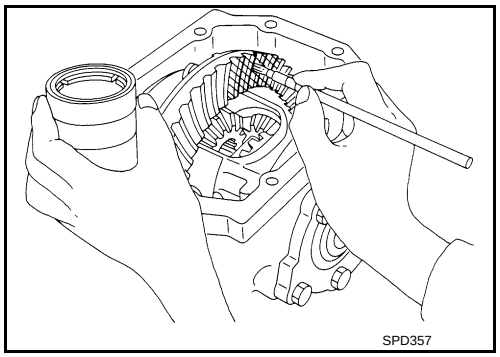
- If the runout is outside of the repair limit, check drive gear assembly condition; foreign material may be caught between drive gear and differential case, or differential case or drive gear may be deformed, etc.
  CAUTION:
  Replace drive gear and drive pinion gear as a set.



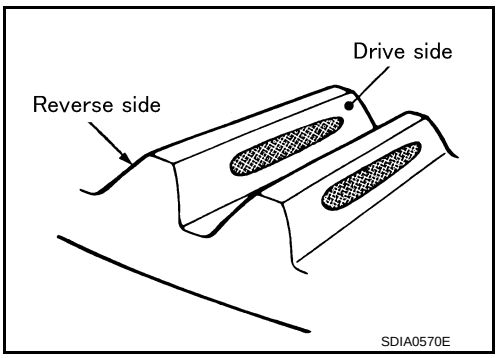
TOOTH CONTACT

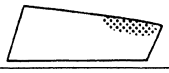
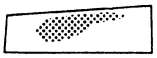
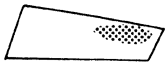
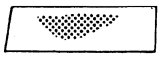
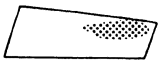
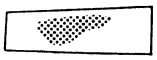
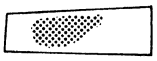
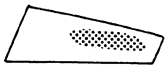
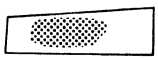
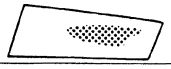
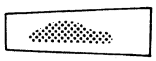
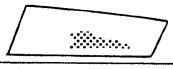
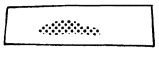
Before inspection and adjustment, drain gear oil.

1. Remove carrier cover. Refer to DLN-132, "Disassembly".
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.



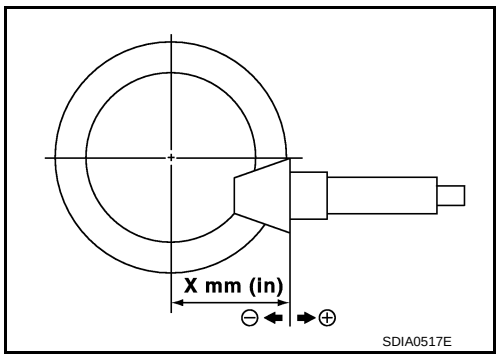
3. Rotate drive gear back and forth several times, check drive pinion gear to drive gear tooth contact.
CAUTION:
Check tooth contact on drive side and reverse side.



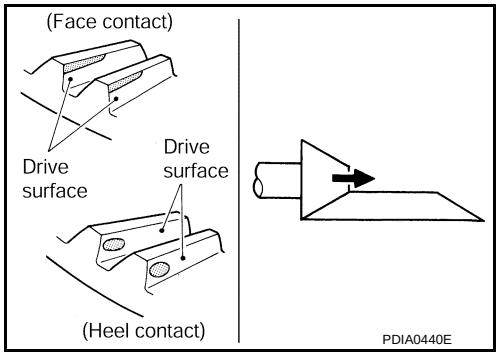
Tooth contact pattern				Pinion height adjusting washer selection value [mm(in)]	Adjustment requirement (Yes/No)
Back side		Drive side			
Heel side	Toe side	Toe side	Heel side		
				+0.15 (+0.0059)	Yes
				+0.12 (+0.0047)	
				+0.09 (+0.0035)	
				+0.06 (+0.0024)	No
				+0.03 (+0.0012)	
				0	
				−0.03 (−0.0012)	
				−0.06 (−0.0024)	
				−0.09 (−0.0035)	Yes
				−0.12 (−0.0047)	
				−0.15 (−0.0059)	

PDIA0667E

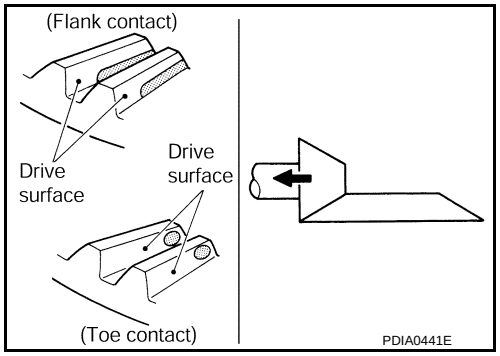
4. If tooth contact is improperly adjusted, follow the procedure below to adjust the pinion height [dimension (X)].



- 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.

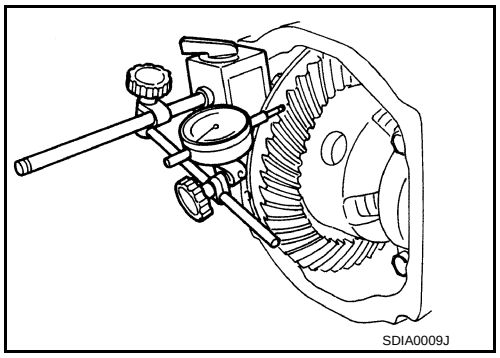


BACKLASH

Before inspection and adjustment, drain gear oil.

1. Remove carrier cover. Refer to DLN-132, "Disassembly".
2. Fit a dial indicator to the drive gear face to measure the backlash.

Backlash : Refer to DLN-153, "Backlash".



- 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.

Inspection

INFOID:0000000009643668

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.

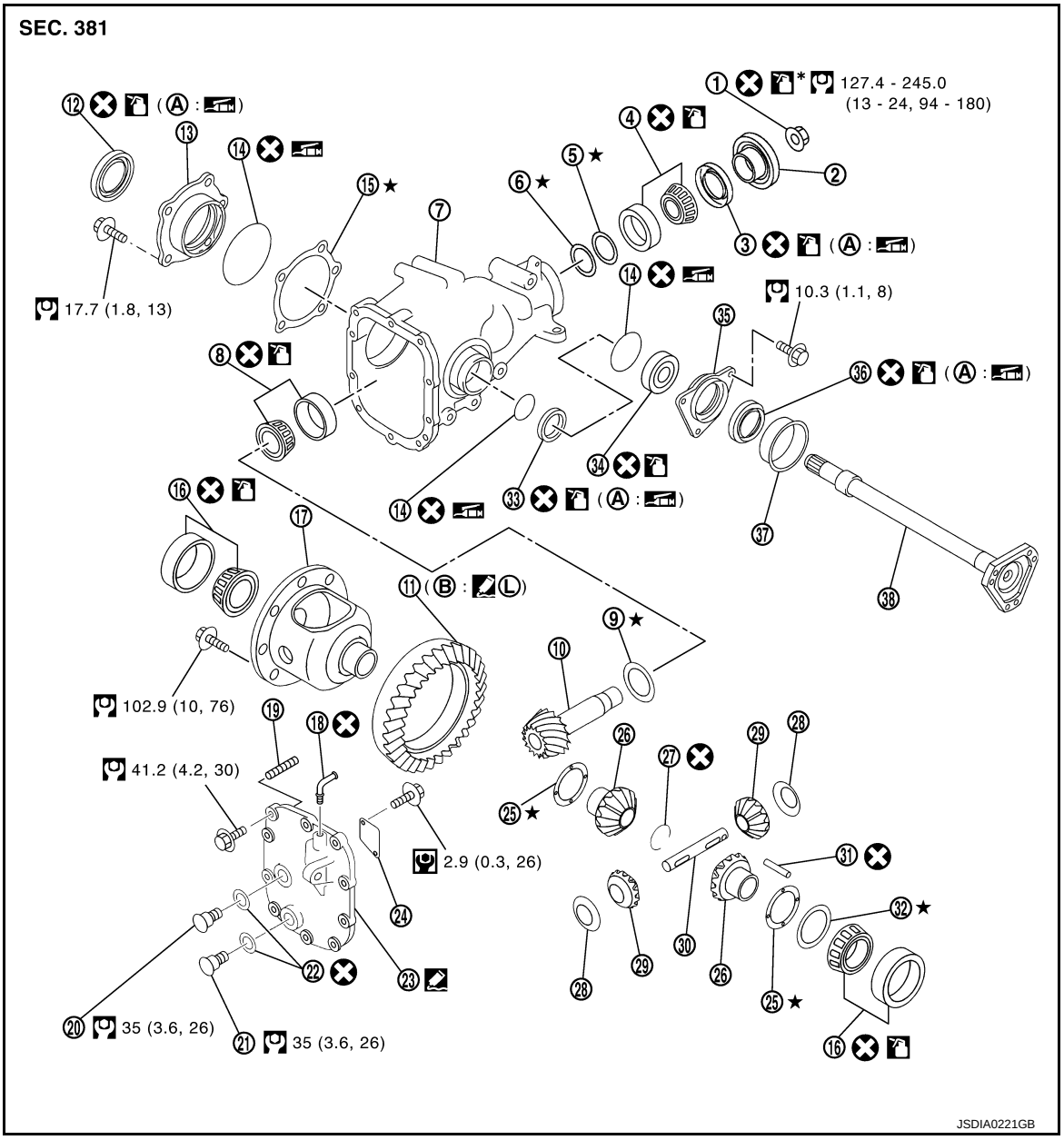
Oil Seal
- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

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

DRIVE PINION

Exploded View

INFOID:0000000009660812



① Drive pinion lock nut	② Companion flange	③ Front oil seal
④ Pinion front bearing	⑤ Drive pinion bearing adjusting washer	⑥ Drive pinion adjusting washer
⑦ Gear carrier	⑧ Pinion rear bearing	⑨ Pinion height adjusting washer
⑩ Drive pinion	⑪ Drive gear	⑫ Side oil seal (right side)
⑬ Side retainer	⑭ O-ring	⑮ Side bearing adjusting shim
⑯ Side bearing	⑰ Differential case	⑱ Breather connector
⑲ Dowel pin	⑳ Filler plug	㉑ Drain plug
㉒ Gasket	㉓ Carrier cover	㉔ Gear oil defense
㉕ Side gear thrust washer	㉖ Side gear	㉗ Circular clip
㉘ Pinion mate thrust washer	㉙ Pinion mate gear	㉚ Pinion mate shaft

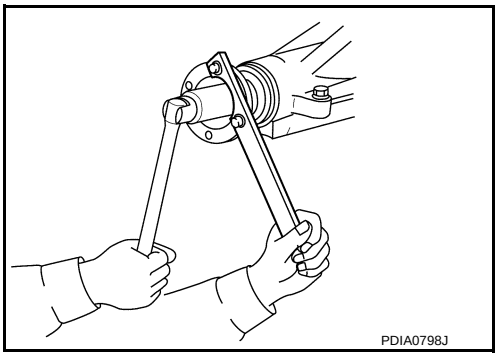
㉛ Lock pin
㉜ Side bearing adjusting washer
㉝ Side oil seal (left side)
㉞ Side shaft bearing
㉟ Extension tube retainer
㊱ Side shaft oil seal
㊲ Dust seal
㊳ Side shaft
Ⓐ Oil seal lip
Ⓑ Screw hole

: N·m (kg-m, in-lb)
: N·m (kg-m, ft-lb)
: Always replace after every disassembly.
★: Select with proper thickness.
: Apply gear oil.
*: Apply anti-corrosion oil.
: Apply multi purpose grease.
: Apply Genuine Silicone RTV or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".
Ⓛ: Apply Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

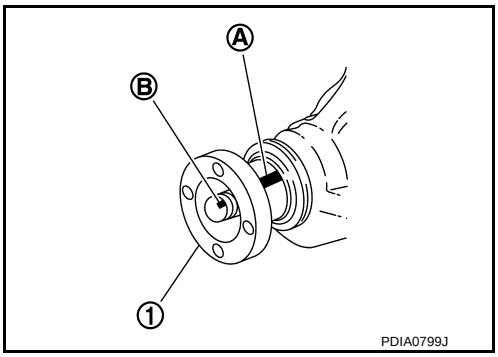
Disassembly

INFOID:0000000009643670

1. Remove differential case assembly. Refer to DLN-132, "Disassembly".
2. Remove drive pinion lock nut with a flange wrench (commercial service tool).

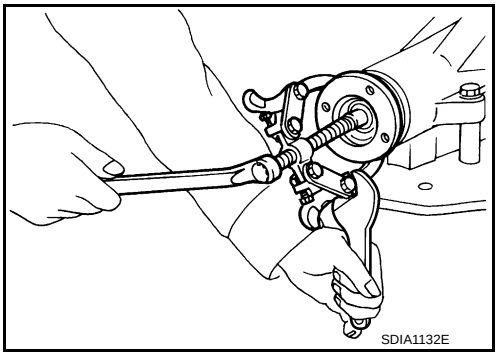

PDIA0798J

3. Put matching mark Ⓑ on the end of drive pinion. The matching mark should be in line with the matching mark Ⓐ 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.

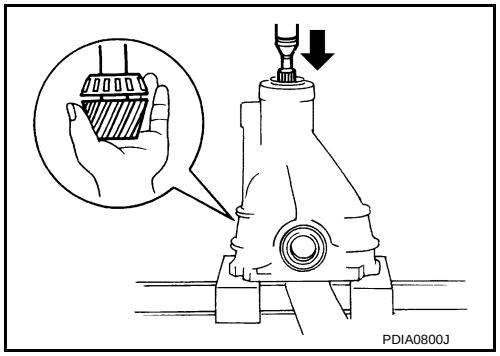


PDIA0799J

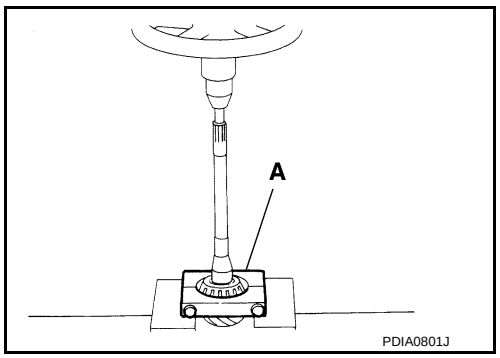
4. Remove companion flange using the suitable puller.


SDIA1132E

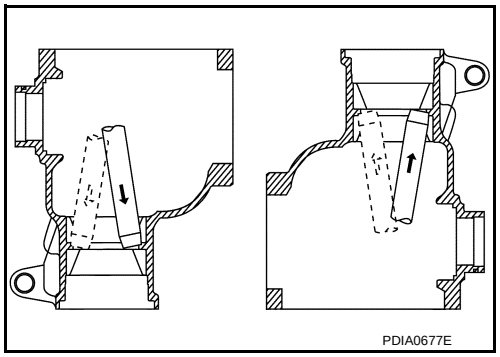
5. Press drive pinion assembly out of gear carrier.
CAUTION:
Never drop drive pinion assembly.
6. Remove front oil seal.
7. Remove pinion front bearing inner race.
8. Remove drive pinion bearing adjusting washer and drive pinion adjusting washer.



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



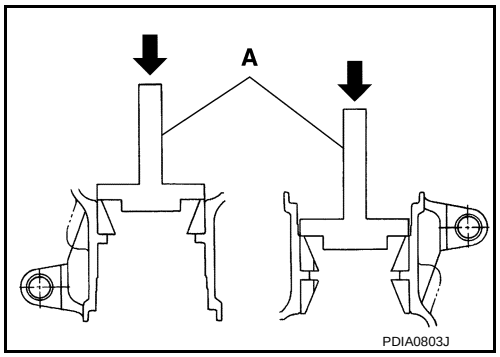
10. Tap pinion front/rear bearing outer races uniformly a brass rod or equivalent to removed.
CAUTION:
Never damage gear carrier.
11. Perform inspection after disassembly. Refer to DLN-152, "Inspection".



Assembly

INFOID:0000000009643671

1. 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.**

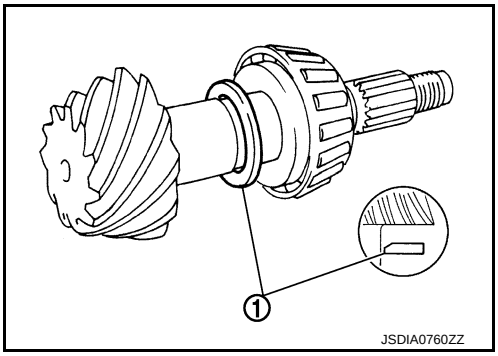


2. Temporarily install pinion height adjusting washer ①.

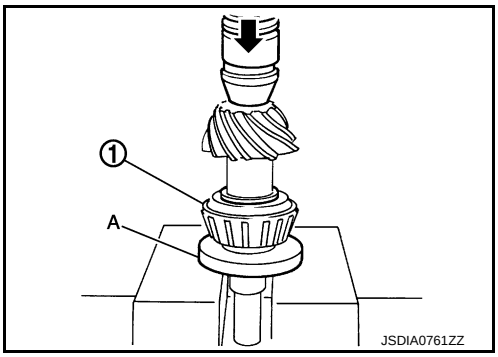
When hypoid gear set has been replaced
- Select pinion height adjusting washer. Refer to DLN-149, "Adjustment".

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.)**
- **Never reuse pinion rear bearing inner race.**

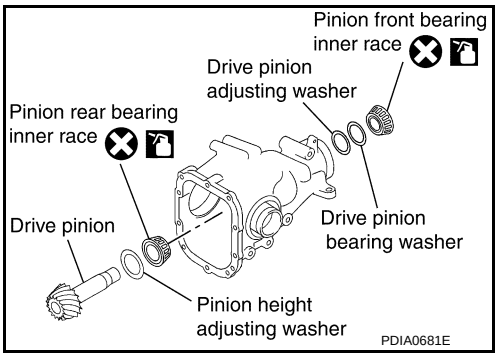


3. Install pinion rear bearing inner race ① to drive pinion with the drift (A) [SST: ST30032000 (J-26010-01)].

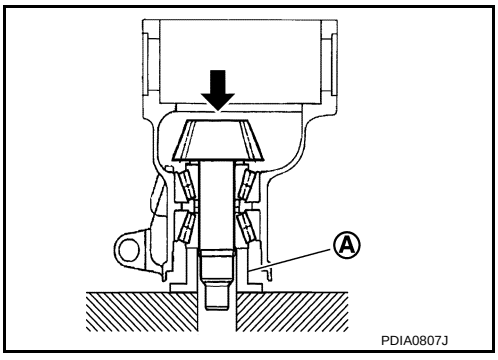


4. Temporarily assemble removed drive pinion adjusting washer and drive pinion bearing adjusting washer or same thickness of them to drive pinion.
5. Apply gear oil to pinion rear bearing, and assemble drive pinion into gear carrier.
6. Apply gear oil to pinion front bearing, and assemble pinion front bearing inner race to drive pinion assembly.

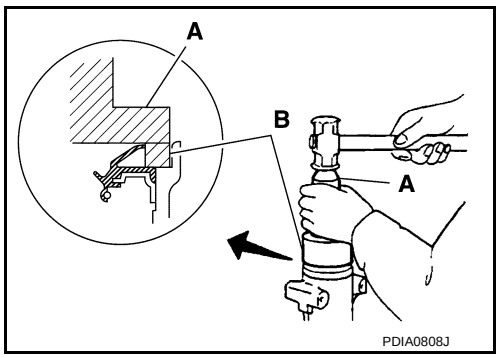
CAUTION:
Never reuse pinion front bearing inner race.



7. Using suitable spacer Ⓐ (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 DLN-149, "Adjustment".



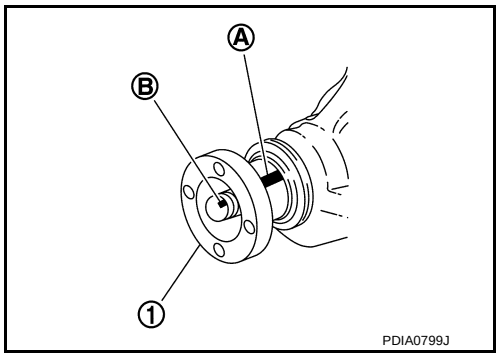
9. Using the drifts (A and B), install front oil seal as shown in figure.



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.**

10. Install companion flange.
NOTE:
When reusing drive pinion, align the matching mark Ⓑ of drive pinion with the matching mark Ⓐ of companion flange, and then install companion flange ①.



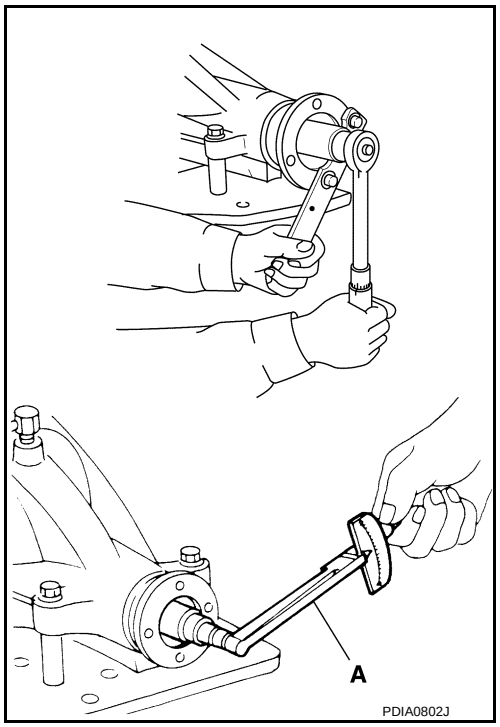
11. Apply anti-corrosion oil to the thread and seat of new drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion, using flange wrench (commercial service tool).

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-153, "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-135, "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-139, "Adjustment" and DLN-149, "Adjustment".
Recheck above items. Readjust the above description, if necessary.
15. Check total preload torque. Refer to DLN-139, "Adjustment".
16. Install carrier cover. Refer to DLN-135, "Assembly".

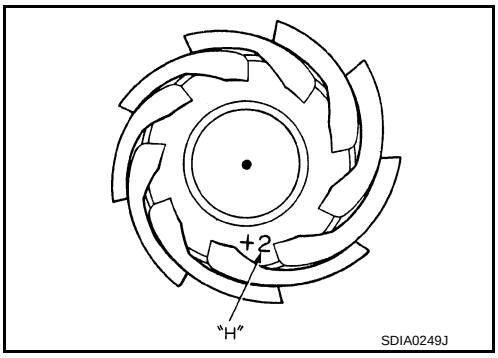
Adjustment

INFOID:0000000009643672

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:

$T = T_0 + (t_1 - t_2)$

T: Correct washer thickness

T_0: Removed washer thickness

t_1: Old drive pinion head letter "H $\times$ 0.01" ("H": machined tolerance 1/100 mm $\times$ 100)

t_2: New drive pinion head letter "H $\times$ 0.01" ("H": machined tolerance 1/100 mm $\times$ 100)

Example:

$T = 3.21 + [(2 \times 0.01) - (-1 \times 0.01)] = 3.24$

T_0: 3.21

t_1: +2

t_2: −1

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:

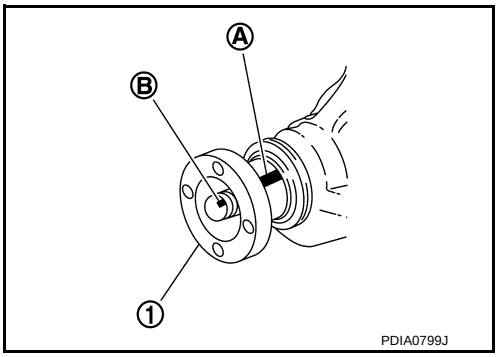
Calculated value... T = 3.22 mm

Used washer... T = 3.21 mm

PINION BEARING PRELOAD

Assemble the drive pinion parts if they are disassembled. Refer to DLN-147, "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 Ⓑ of drive pinion with the matching mark Ⓐ of companion flange, and then install companion flange ①.



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

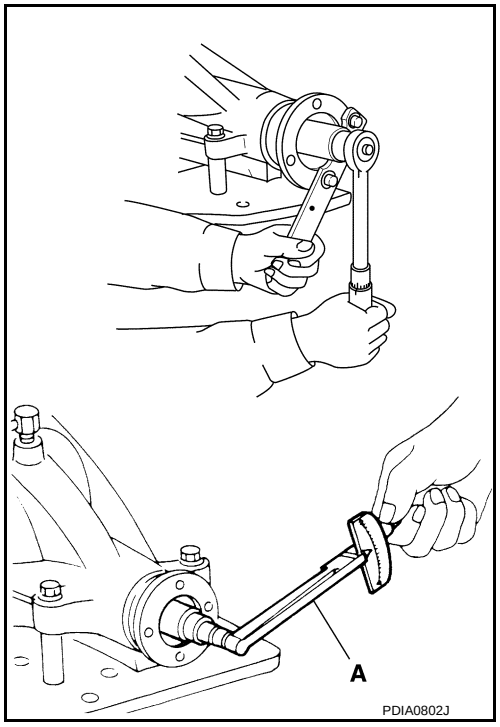
A: Preload gauge [SST: ST3127S000 (J-25765-A)]

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

4. 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-153, "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.

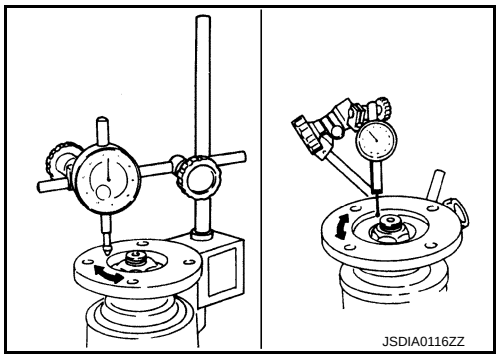
7. Remove companion flange, after adjustment.

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 face runout : Refer to DLN-153, "Companion Flange Runout".

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



Inner side of the companion flange runout : Refer to DLN-153, "Companion Flange Runout".

5. 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.

Inspection

INFOID:0000000009643673

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).

Oil Seal

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

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 SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

INFOID:0000000009643674

Applied model	Axle	AWD
	Engine	VQ37VHR
	Transmission	A/T
Final drive model		F160A
Gear ratio		3.133
Number of teeth (Drive gear/Drive pinion)		47/15
Number of pinion gears		2
Drive pinion adjustment spacer type		Solid
Oil capacity		Refer to MA-14, "FOR NORTH AMERICA : Fluids and Lubricants".

Drive Gear Runout

INFOID:0000000009643675

Unit: mm (in)

Item	Standard
Drive gear back face runout	0.05 (0.0020) or less

Differential Side Gear Clearance

INFOID:0000000009643676

Unit: mm (in)

Item	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:0000000009643677

Unit: N·m (kg-m, in-lb)

Item	Standard
Pinion bearing (P_1)	0.78 – 1.57 (0.08 – 0.16, 7 – 13)
Side bearing (P_2)	0.78 – 1.08 (0.08 – 0.11, 7 – 9)
Side bearing to pinion bearing (Total preload) (Total preload = P_1 + P_2)	1.56 – 2.65 (0.16 – 0.27, 14 – 23)

Backlash

INFOID:0000000009643678

Unit: mm (in)

Item	Standard
Drive gear to drive pinion gear	0.10 – 0.15 (0.0039 – 0.0059)

Companion Flange Runout

INFOID:0000000009643679

Unit: mm (in)

Item	Standard
Companion flange face runout	0.18 (0.0071) or less
Inner side of the companion flange runout	0.13 (0.0051) or less

PRECAUTION

PRECAUTIONS

Service Notice or Precautions for Rear Final Drive

INFOID:0000000009643680

- 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 a 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.

NOTE:
To remove rear drive shaft, it is necessary to lift down and hold rear final drive assembly.

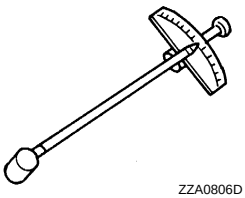
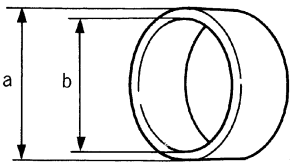
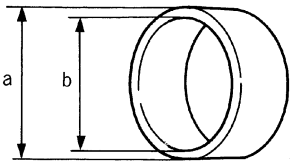
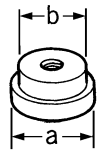
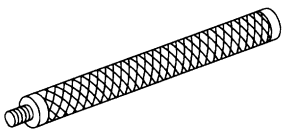
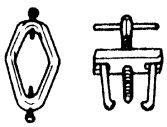
PREPARATION

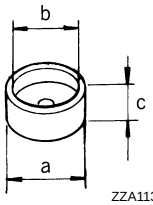
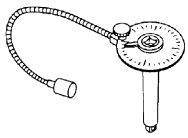
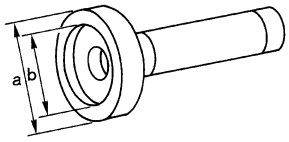
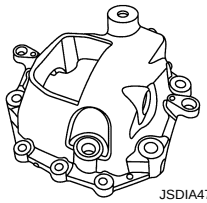
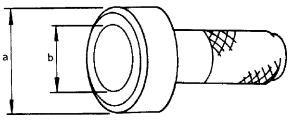
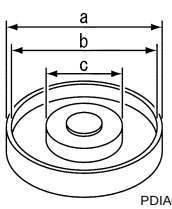
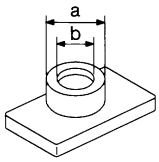
PREPARATION

Special Service Tools

INFOID:0000000009643681

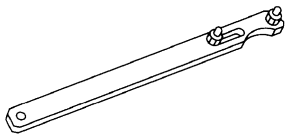
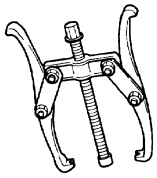
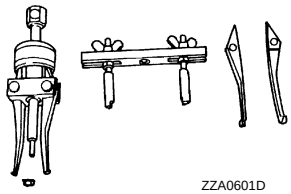
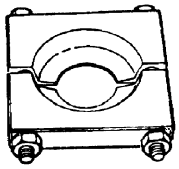
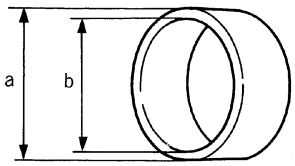
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
ST3127S000 (J-25765-A) Preload gauge	 ZZA0806D	Measuring pinion bearing preload and total preload
KV40104710 (—) Drift a: 76.3 mm (3.004 in) dia. b: 67.9 mm (2.673 in) dia.	 ZZA0936D	Installing front oil seal
KV40104830 (—) Drift a: 70 mm (2.76 in) dia. b: 63.5 mm (2.50 in) dia.	 ZZA0936D	Installing side oil seal
ST30613000 (J-25742-3) Drift a: 72 mm (2.83 in) dia. b: 48 mm (1.89 in) dia.	 ZZA1000D	• Removing and Installing rear cover (2 pieces are used.) • Removing and Installing differential case (2 pieces are used.) • Installing pinion front bearing outer race
ST30611000 (J-25742-1) Drift bar	 S-NT090	Installing pinion front bearing outer race (Use with ST30613000)
ST33051001 (J-22888-20) Puller	 PDIA0747J	Removing side bearing inner race

Tool number (Kent-Moore No.) Tool name		Description
KV40104920 (—) Adaptor a: 44.7 mm (1.760 in) dia. b: 41 mm (1.61 in) dia. c: 15 mm (0.59 in)	 ZZA1133D	Removing and installing side bearing inner race
KV10112100 (BT-8653-A) Angle wrench	 ZZA0120D	Tightening the drive gear mounting bolt
KV38100200 (J-26233) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.	 ZZA1143D	Installing side bearing inner race
KV385J9010 (—) Dummy cover set	 JSDIA4759ZZ	• Checking backlash • Checking drive gear runout • Checking tooth contact
ST30720000 (J-25405) Drift a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.	 ZZA0811D	Installing pinion rear bearing outer race
KV40105230 (—) Drift a: 92 mm (3.62 in) dia. b: 86 mm (3.39 in) dia. c: 45 mm (1.77 in) dia.	 PDIA0591E	Installing pinion rear bearing outer race
ST38220000 (—) Press stand a: 75 mm (2.95 in) dia. b: 63 mm (2.48 in) dia.	 S-NT509	Installing pinion front bearing inner race

Commercial Service Tools or/and Repair Part

INFOID:0000000009643682

Tool name	Description
Flange wrench  NT035	Removing and installing drive pinion lock nut
Puller  ZZA0119D	Removing companion flange
Oil seal remover  ZZA0601D	• Removing front oil seal • Removing side oil seal
Replacer  ZZA0700D	Removing pinion rear bearing inner race
Drift a: More than inner diameter b: 45 – 50 mm (1.77 – 1.97 in) dia.  ZZA0936D	Installing pinion rear bearing inner race

Lubricant or/and Sealant

INFOID:0000000009800297

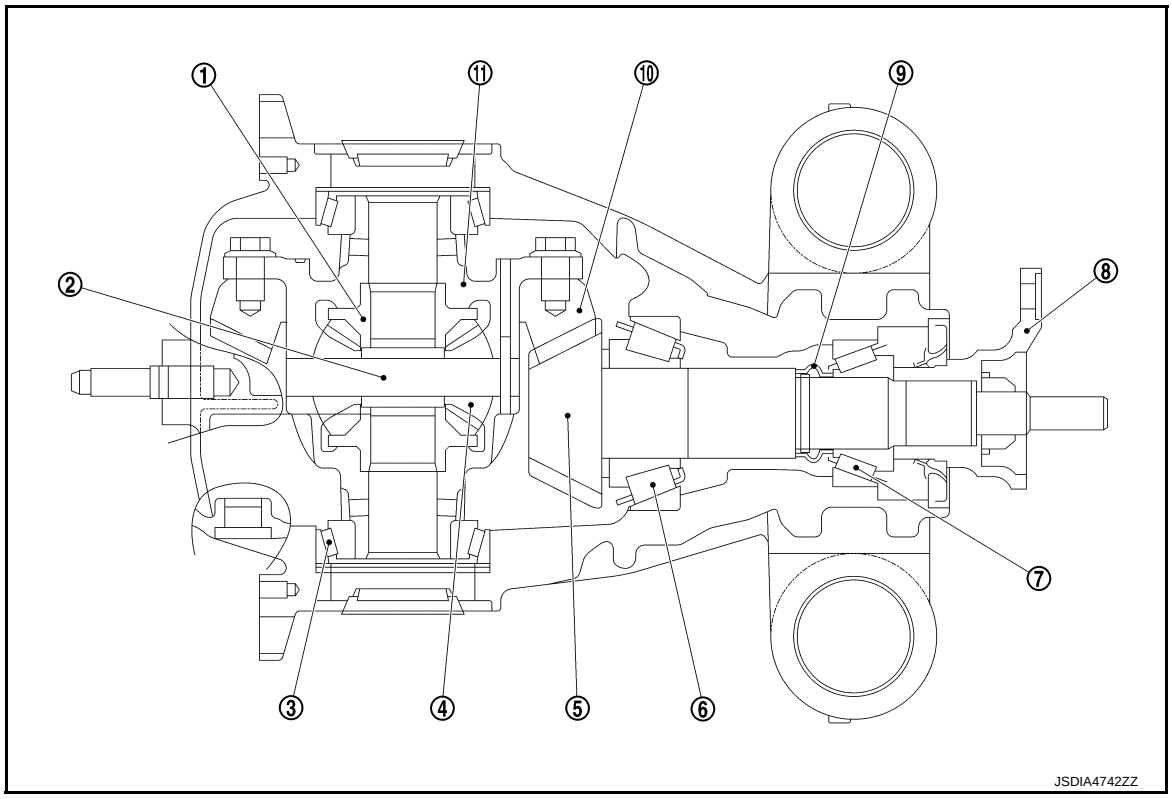
Item	Use
Red lead or equivalent	Checking tooth contact

SYSTEM DESCRIPTION

STRUCTURE AND OPERATION

Sectional View

INFOID:0000000009643683



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

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009643684

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

Reference		DLN-176, "Inspection"	DLN-173, "Adjustment"	DLN-176, "Inspection"	DLN-173, "Adjustment"	DLN-184, "Adjustment"	DLN-160, "Inspection"	NVH of FRONT* and REAR PROPELLER 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.
Possible 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
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×

×: Applicable

*: AWD models only

PERIODIC MAINTENANCE

REAR DIFFERENTIAL GEAR OIL

Inspection

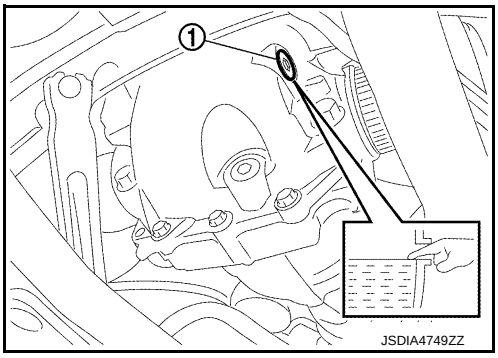
INFOID:0000000009643685

OIL LEAKAGE

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

OIL LEVEL

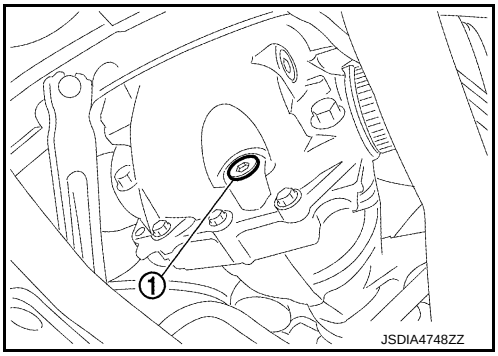
- Remove filler plug ① and check oil level from filler plug mounting hole as shown in the figure.
  CAUTION:
  Never start engine while checking oil level.
- Set a gasket on filler plug and install it on final drive assembly. Refer to DLN-169, "Exploded View".
  CAUTION:
  Never reuse gasket.



Draining

INFOID:0000000009643686

1. Stop engine.
2. Remove drain plug ① and drain gear oil.
3. Set a gasket on drain plug and install it to final drive assembly and tighten to the specified torque. Refer to DLN-169, "Exploded View".
   CAUTION:
   Never reuse gasket.



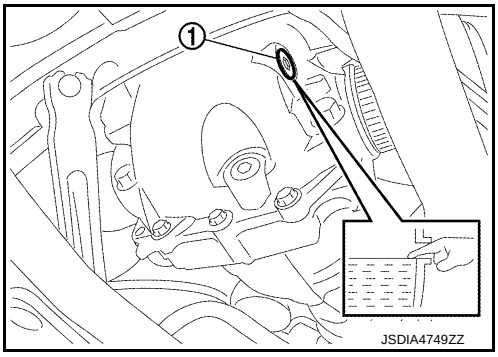
Refilling

INFOID:0000000009643687

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

   Recommended oil and capacity : **Refer to MA-14, "FOR NORTH AMERICA : Fluids and Lubricants" (For North America), MA-15, "FOR MEXICO : Fluids and Lubricants" (For Mexico).**

2. After refilling oil, check oil level. Set a gasket to filler plug, then install it to final drive assembly. Refer to DLN-169, "Exploded View".
   CAUTION:
   Never reuse gasket.

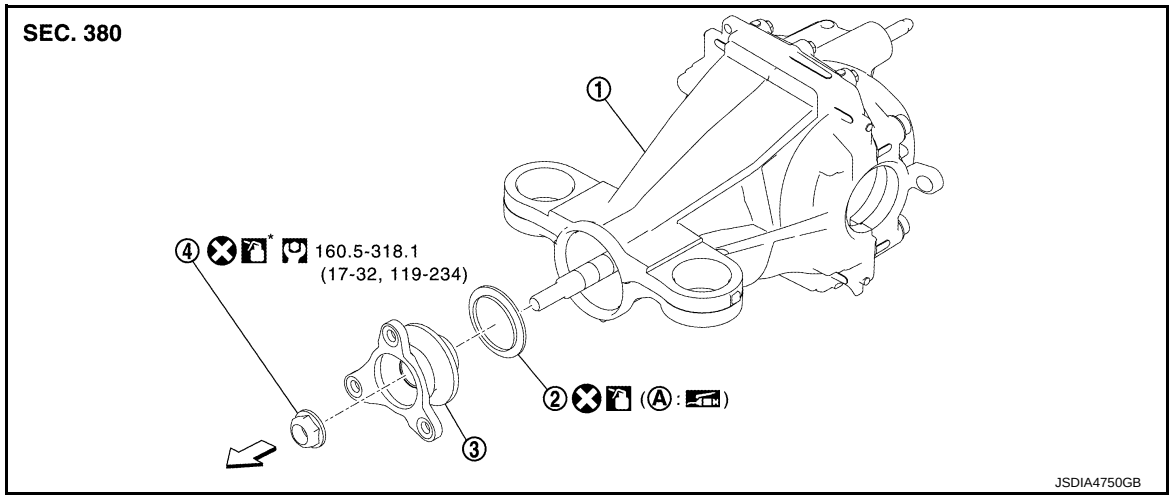


REMOVAL AND INSTALLATION

FRONT OIL SEAL

Exploded View

INFOID:0000000009643688



① Final drive assembly
② Front oil seal
③ Companion flange
④ Drive pinion lock nut
Ⓐ Oil seal lip
⇦: Vehicle front
: N·m (kg-m, ft-lb)
: Always replace after every disassembly.
: Apply gear oil.
*: Apply anti-corrosion oil.
: Apply multi-purpose grease.

Removal and Installation

INFOID:0000000009643689

REMOVAL

CAUTION:

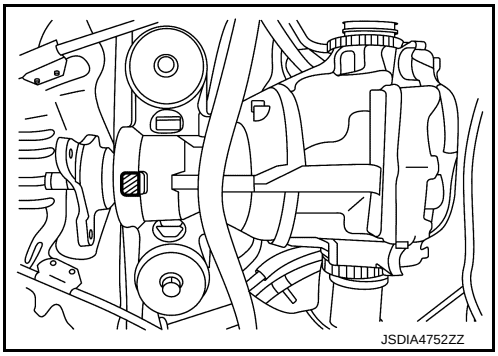
Verify identification stamp of replacement frequency put in the lower part of gear carrier to determine replacement for collapsible spacer when replacing front oil seal. Refer to “Identification stamp of replacement frequency of front oil seal”. If collapsible spacer replacement is necessary, remove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

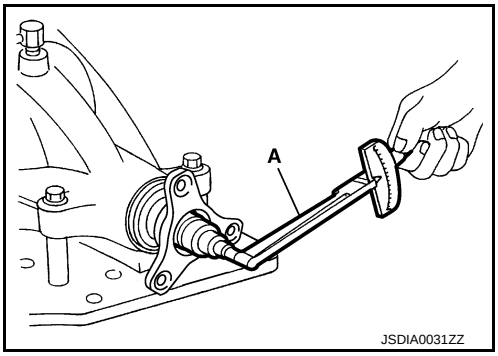
CAUTION:
Make a stamping after replacing front oil seal.

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

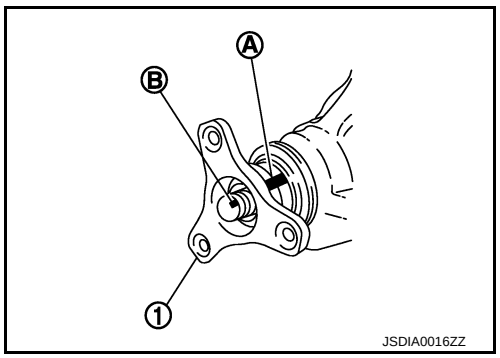
CAUTION:
Make a stamping from left to right.

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

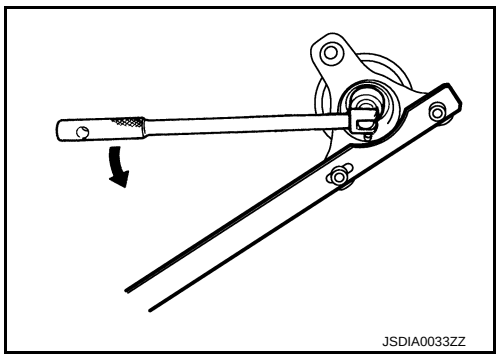
1. Make a judgment if a collapsible spacer replacement is required.
2. Drain gear oil. Refer to DLN-160, "Draining".
3. Remove final drive assembly. Refer to DLN-167, "Removal and Installation".
   NOTE:
   - It is necessary to separate the rear drive shaft from final drive to measure the total preload.
   - It is necessary to remove final drive assembly to separate the rear drive shaft from final drive.
4. Measure the total preload with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].
   NOTE:
   Record the preload measurement.



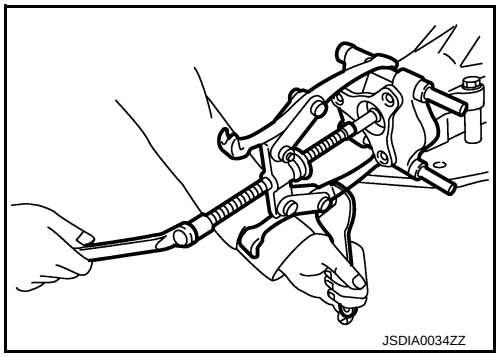
5. Put matching mark Ⓑ on the end of the drive pinion. The matching mark should be in line with the matching mark Ⓐ on companion flange ①.
CAUTION:
For matching mark, use paint. Never damage companion flange and drive pinion.



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

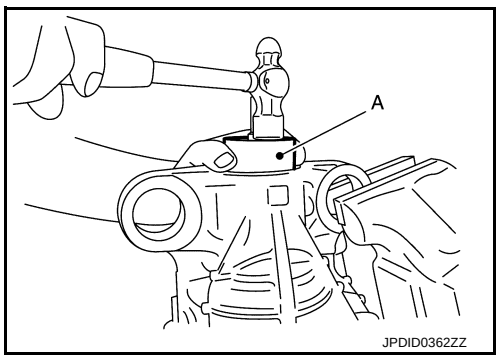


7. Remove companion flange using pullers (commercial service tool).
8. Remove front oil seal using oil seal remover (commercial service tool).

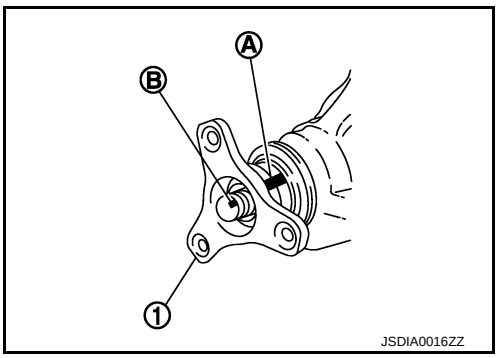


INSTALLATION

1. Apply multi-purpose grease to front oil seal lips.
2. Install front oil seal using the drift (A) [SST: KV40104710 (—)] as shown in figure.
CAUTION:
- **Never reuse oil seal.**
- **Never incline oil seal when installing.**



3. Align the matching mark Ⓑ of drive pinion with the matching mark Ⓐ 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).

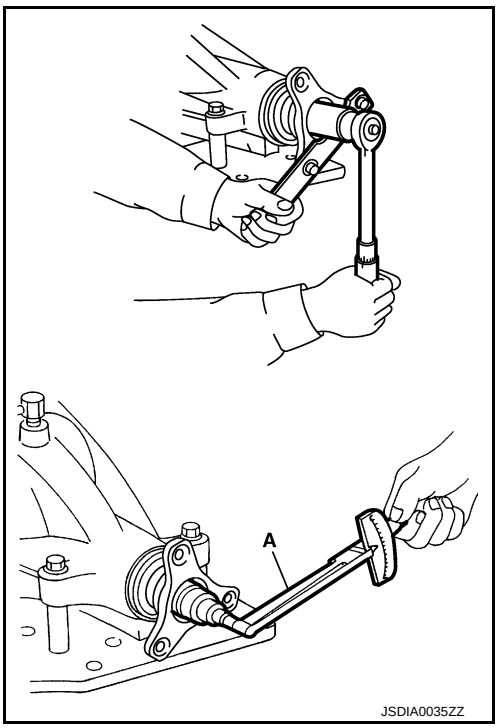
A : Preload gauge (SST: ST3127S000)

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)].

Total preload torque : A value that add 0.1 – 0.4 N·m (0.01 – 0.04 kg-m, 0.1 –0.3 in-lb) to the measured value before 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. 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.

7. Install final drive assembly. Refer to DLN-167, "Removal and Installation".
8. Refill gear oil to the final drive. Refer to DLN-160, "Refilling".
9. Perform inspection after installation. Refer to DLN-164, "Inspection".

Inspection

INFOID:0000000009759584

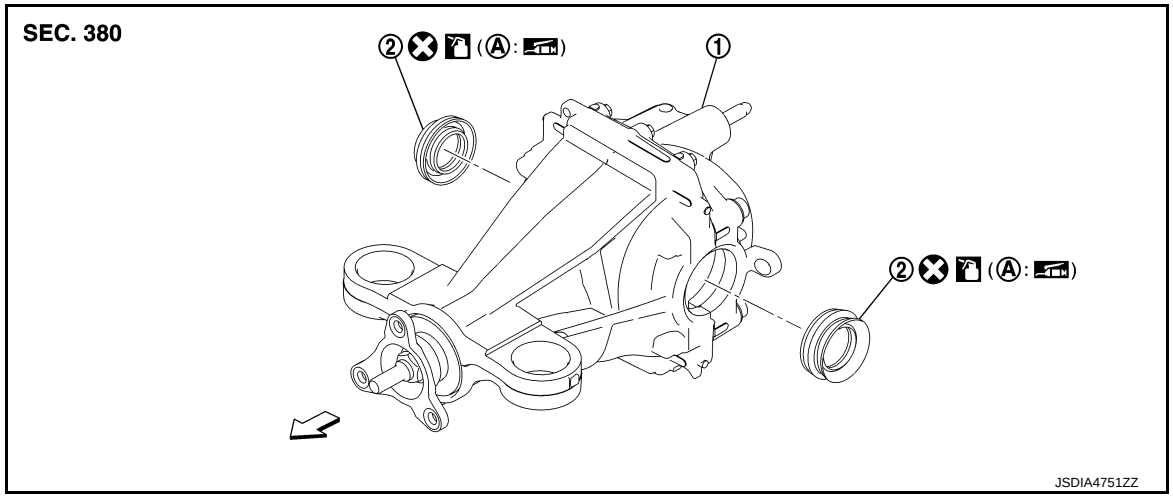
INSPECTION AFTER INSTALLATION

Check oil level and final drive for oil leakage. Refer to DLN-160, "Inspection".

SIDE OIL SEAL

Exploded View

INFOID:0000000009643690



① Final drive assembly ② Side oil seal

Ⓐ Oil seal lip

⇦: Vehicle front

: Always replace after every disassembly.

: Apply gear oil.

: Apply multi-purpose grease.

Removal and Installation

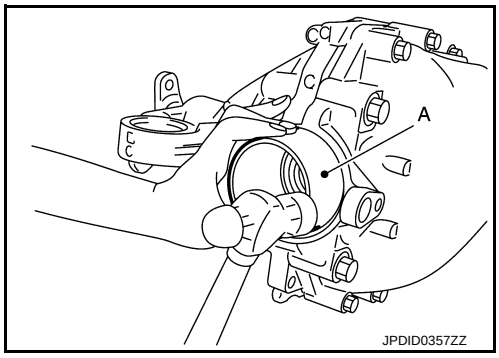
INFOID:0000000009643691

REMOVAL

1. Remove final drive assembly. Refer to DLN-167, "Removal and Installation".
   NOTE:
   It is necessary to remove final drive assembly to remove the rear drive shaft.
2. Remove side oil seal, using oil seal remover.
   CAUTION:
   Never damage gear carrier.

INSTALLATION

1. Apply multi-purpose grease to side oil seal lips.
2. Install side oil seal until it becomes flush with the case end, using the drift (A) [SST: KV40104830 (—)].
   CAUTION:
   - **Never reuse oil seal.**
   - **When installing, never incline oil seal.**
3. Install final drive assembly. Refer to DLN-167, "Removal and Installation".
4. Perform inspection after installation. Refer to DLN-165, "Inspection".



Inspection

INFOID:0000000009759585

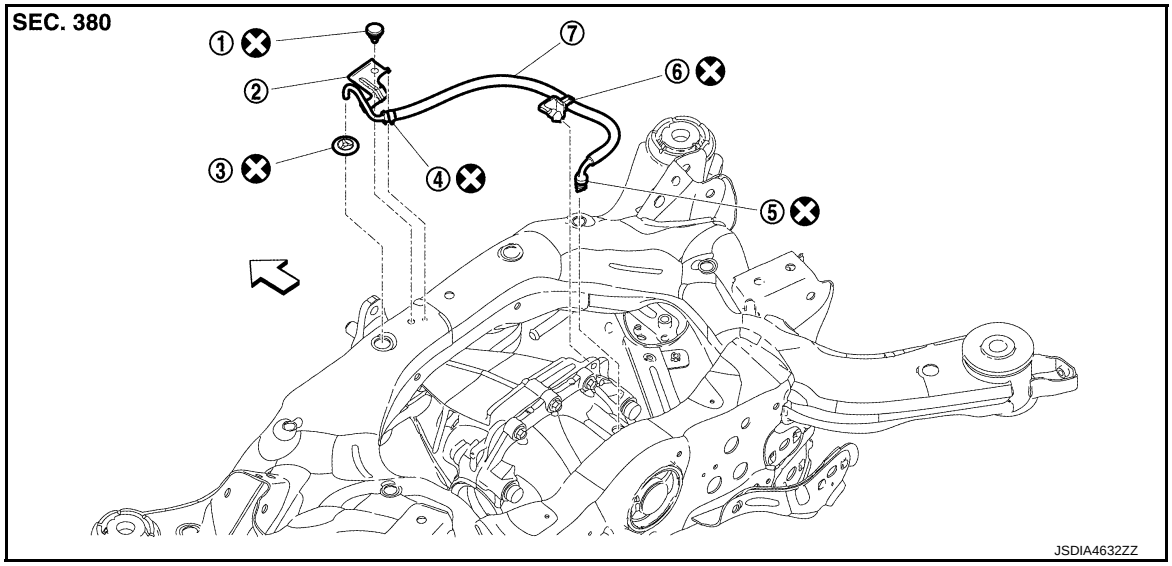
INSPECTION AFTER INSTALLATION

When oil leaks while removing, check oil level after the installation. Refer to DLN-160, "Inspection".

AIR BREATHER

Exploded View

INFOID:0000000009725437



① Trim clip
② Breather tube
③ Plug
④ Hose clamp
⑤ Breather connector
⑥ Clip
⑦ Air breather hose

⇦: Vehicle front

⊗: Always replace after every disassembly.

Removal and Installation

INFOID:0000000009725438

REMOVAL

1. Remove trim clip.
2. Remove clip from rear final drive.
3. Remove air breather hose and breather tube together.
4. Loosen hose clamp and remove breather tube from air breather hose.
5. Remove hose clamp and clip from air breather hose.
6. Remove plug.
7. Remove breather connector.

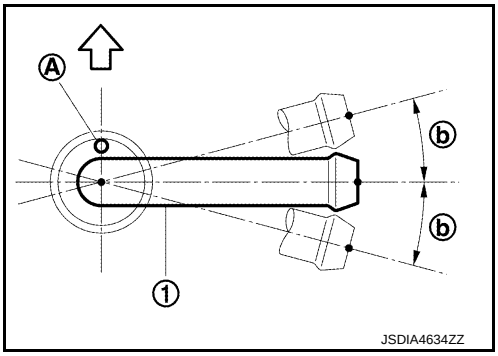
INSTALLATION

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

- For non-reusable parts, refer to DLN-166, "Exploded View".
- Set breather connector ① to rear final drive with the paint mark Ⓐ facing vehicle front shown as follows.

⇦ : Vehicle front

Angle ⓑ : Within 15°



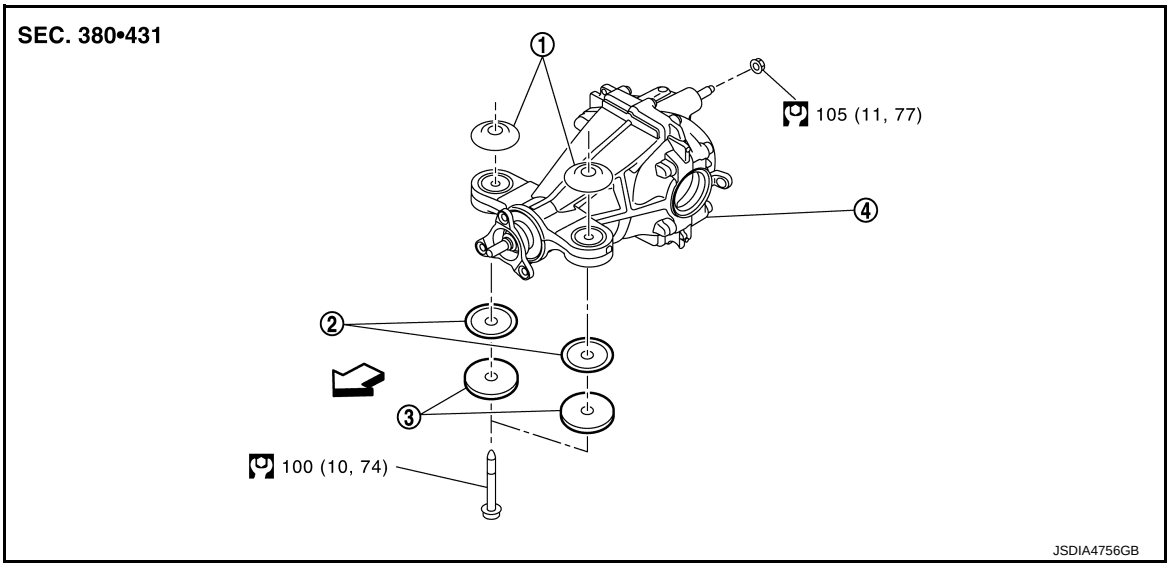
- When installing air breather hose, make sure there are no pinched or restricted areas on air breather hose caused by bending or winding.

UNIT REMOVAL AND INSTALLATION

REAR FINAL DRIVE ASSEMBLY

Exploded View

INFOID:0000000009643692



① Upper stopper ② Lower stopper ③ Washer
④ Rear final drive assembly
⇦ : Vehicle front
: N·m (kg-m, ft-lb)

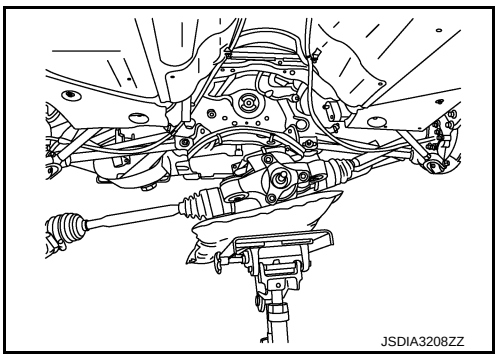
Removal and Installation

INFOID:0000000009643693

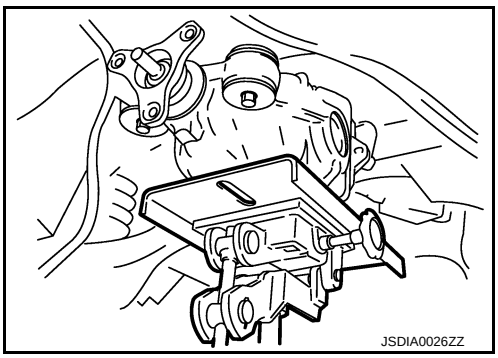
REMOVAL

1. Remove center muffler. Refer to EX-6, "Removal and Installation".
2. Remove stabilizer bar. Refer to RSU-21, "Removal and Installation".
3. Remove rear propeller shaft from the final drive. Refer to DLN-98, "Removal and Installation" (2WD), DLN-108, "Removal and Installation" (AWD).
4. Remove rear suspension member stay. Refer to RSU-23, "Removal and Installation".
5. Remove rear wheel sensor. Refer to BRC-175, "REAR WHEEL SENSOR : Removal and Installation".
6. Remove breather hose from the final drive. Refer to DLN-166, "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 nut connecting to the suspension member.
   CAUTION:
   Secure rear final drive assembly to suitable jack.
9. Separate drive shafts from final drive. Refer to RAX-13, "Removal and Installation".
   NOTE:

To remove rear drive shaft, it is necessary to lift down and hold rear final drive assembly.



10. Remove rear final drive assembly.
CAUTION:
Secure rear final drive assembly to suitable jack while removing it.



INSTALLATION

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

- For each tightening torque, refer to DLN-167, "Exploded View".
- When install the drive shafts to final drive, remove wheel hub rock nut. Refer to RAX-8, "Removal and Installation".
- Perform inspection after installation. Refer to DLN-168, "Inspection".

Inspection

INFOID:0000000009759586

INSPECTION AFTER INSTALLATION

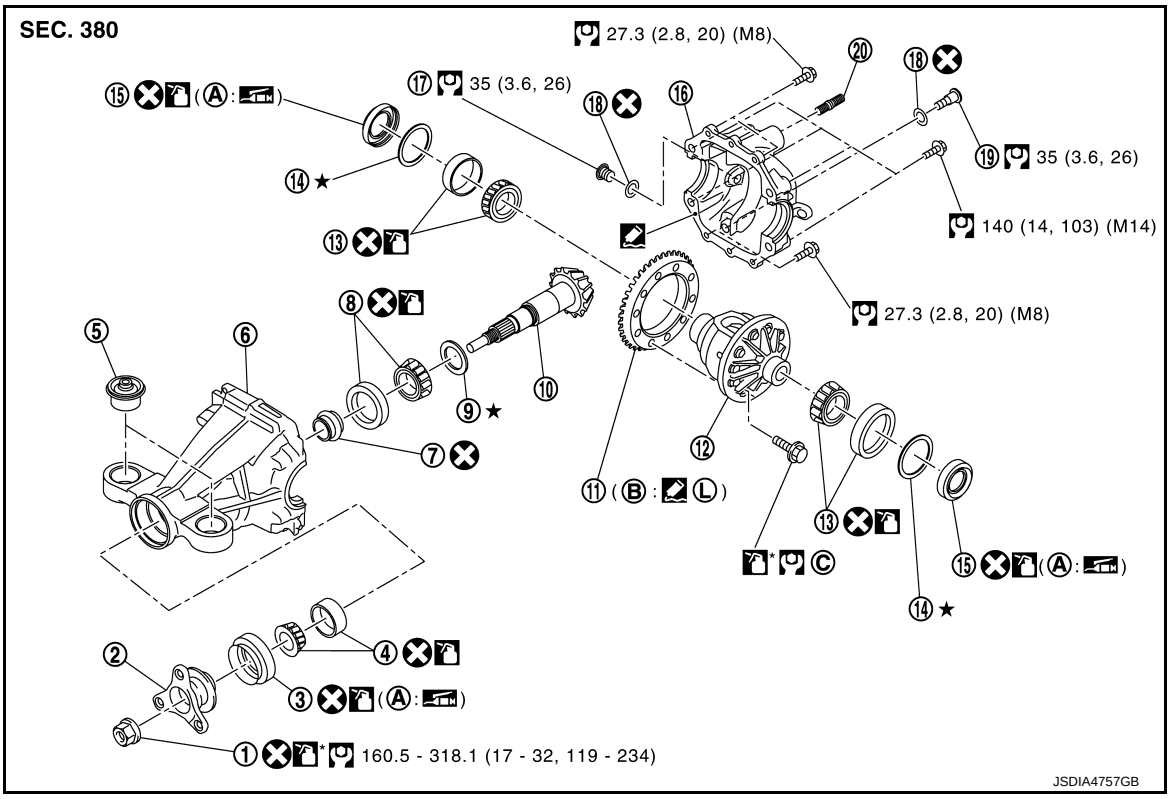
When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-160, "Inspection".

UNIT DISASSEMBLY AND ASSEMBLY

DIFFERENTIAL ASSEMBLY

Exploded View

INFOID:0000000009643694



① Drive pinion lock nut	② Companion flange	③ Front oil seal
④ Pinion front bearing	⑤ Mounting insulator	⑥ Gear carrier
⑦ Collapsible spacer	⑧ Pinion rear bearing	⑨ Pinion height adjusting washer
⑩ Drive pinion	⑪ Drive gear	⑫ Differential assembly
⑬ Side bearing	⑭ Side bearing adjusting washer	⑮ Side oil seal
⑯ Rear cover	⑰ Filler plug	⑱ Gasket
⑲ Drain plug	⑳ Stud bolt	
Ⓐ Oil seal lip	Ⓑ Screw hole	Ⓒ Comply with the assembly procedure when tightening. Refer to DLN-171, "Assembly".

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

★: Select with proper thickness.

: Apply gear oil.

*: Apply anti-corrosion oil.

: Apply multi purpose grease.

: Apply Genuine Silicone RTV or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

Ⓛ: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

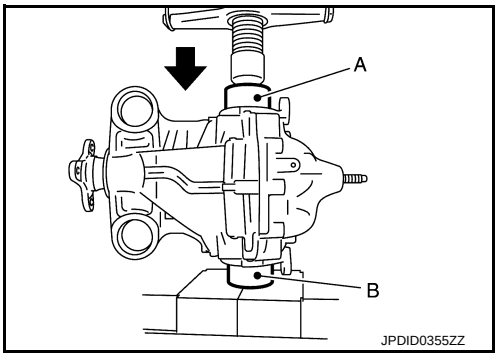
Disassembly

INFOID:0000000009643695

1. Drain gear oil, if necessary.
2. Remove the side oil seal, using oil seal remover.
   CAUTION:
   Never damage gear carrier and rear cover.
3. Remove rear cover mounting bolts.
4. Set drifts (A and B) to the right and left side bearing adjusting washers individually. Press differential assembly with side bearing to remove gear carrier assembly and rear cover assembly.

   A : Drift [SST: ST30613000 (J-25742-3)]
   B : Drift [SST: ST30613000 (J-25742-3)]

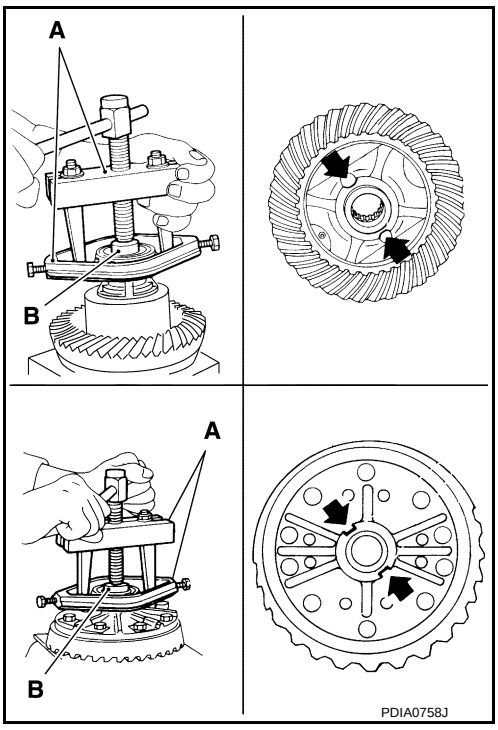
   CAUTION:
   The pressure shall be as low as possible to remove gear carrier assembly and rear cover assembly. The maximum pressure shall be 10 kN (1 ton, 1.0 Imp ton).
   NOTE:
   Differential assembly, side bearings, and adjusting washers are compressed and integrated in gear carrier and rear cover.



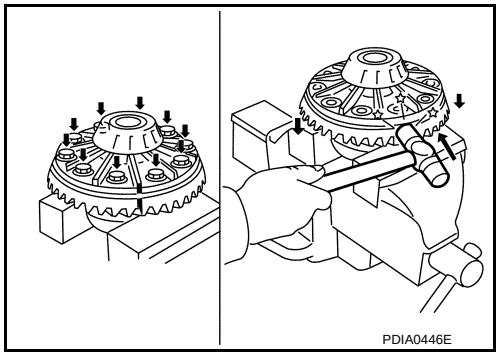
5. Remove stud bolt from rear cover.
   NOTE:
   It is not necessary to remove stud bolt except when it is replaced.
6. Remove side bearing adjusting washers and side bearing outer races.
   CAUTION:
   Mark the side bearing adjusting washers so that the original mounting positions (right/left) can be identified later.
7. Remove side bearing inner races, using puller (A) and the adaptor (B).

   A : Puller [SST: ST33051001 (J-22888-20)]
   B : Adaptor [SST: KV40104920 (—)]

   CAUTION:
   - **To prevent damage to the side bearing and drive gear, place copper plates between these parts and vise.**
   - **To prevent damage to bearing, engage puller jaws in groove (⬅).**
   - **It is not necessary to remove side bearing inner race except when it is replaced.**



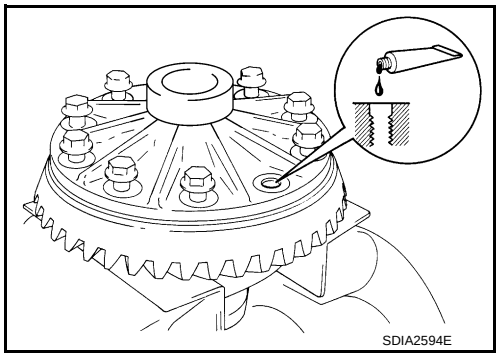
8. For proper reinstallation, paint matching marks on one differential assembly and drive gear.
CAUTION:
For matching marks, use paint. Never damage differential assembly and drive gear.
9. Remove drive gear mounting bolts.
10. Tap drive gear off differential assembly with a soft hammer.
CAUTION:
Tap evenly all around to keep drive gear from bending.
11. Perform inspection after disassembly. Refer to DLN-176, "Inspection".


PDIA0446E

INFOID:0000000009643696

Assembly

1. Apply thread locking sealant into the thread hole of drive gear.
CAUTION:
Clean and degrees drive gear back and threaded holes sufficiently.
2. Install the drive gear to differential assembly.
CAUTION:
Align the matching mark of differential assembly and drive gear.

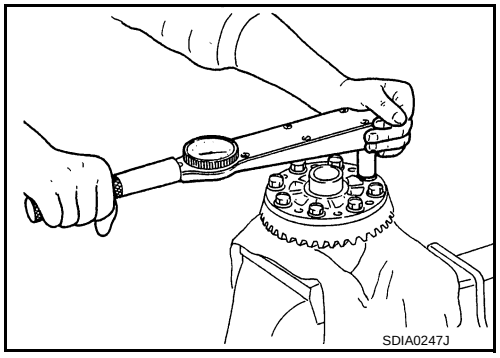

SDIA2594E

3. 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 bolts tightening torque	**: 78.5 N•m (8.0 kg-m, 58 ft-lb)**

b. Tighten the bolts additionally to the specified angle.

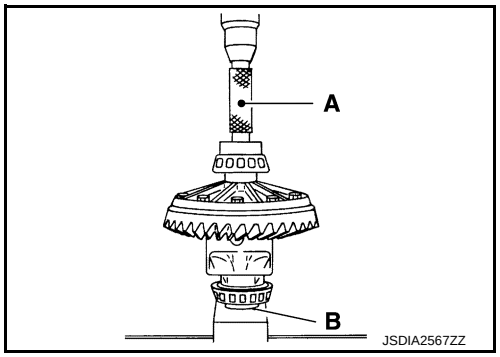
Drive gear mounting bolts tightening angle	**: 31 to 36 degree**


SDIA0247J

CAUTION:
Check the tightening angle using the angle wrench [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.
4. Press side bearing inner races to differential assembly, using the drift (A) and the adaptor (B).

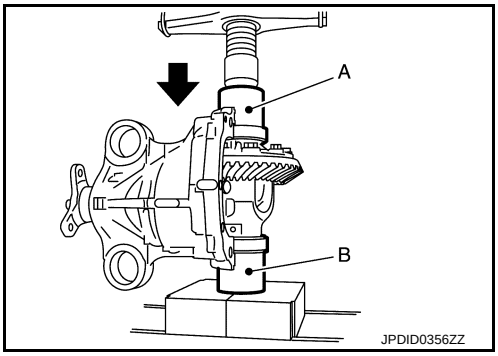
A : Drift [SST: KV38100200 (J-26233)]
B : Adaptor [SST: KV40104920 (—)]

CAUTION:
Never reuse side bearing inner race.



JSDIA2567ZZ

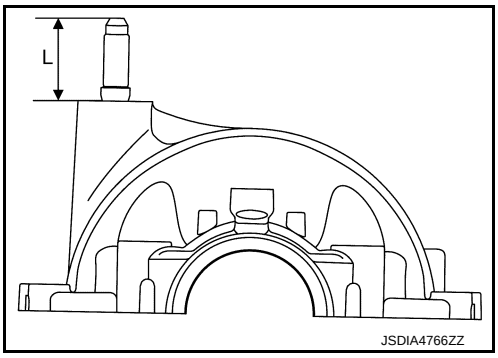
5. Set the drifts (A and B) to the right and left side bearing adjusting washers individually. Compress differential assembly and side bearing to install differential assembly to gear carrier assembly.



A : Drift [SST: ST30613000 (J-25742-3)]
B : Drift [SST: ST30613000 (J-25742-3)]

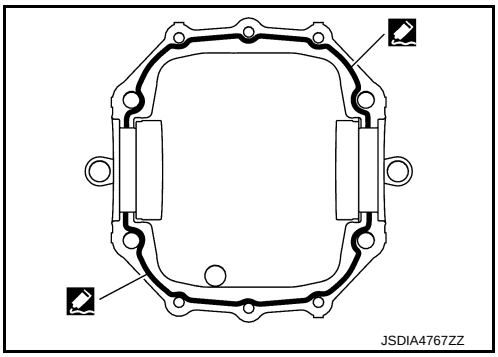
CAUTION:
- **The drift shall be placed on the center of the adjusting washers.**
- **The pressure shall be as low as possible to install differential assembly into gear carrier assembly. The maximum pressure shall be 10 kN (1 ton, 1.0 Imp ton).**
- **If the adjusting washers are installed by tapping, the gear carrier may be damaged. Avoid tapping.**

6. Install dummy cover set [SST: KV385J9010 (—)], check and adjust drive gear runout, tooth contact, backlash, and total preload torque. Refer to DLN-173, "Adjustment".
7. Remove dummy cover set.
8. Install stud bolt to rear cover in the following specified length.



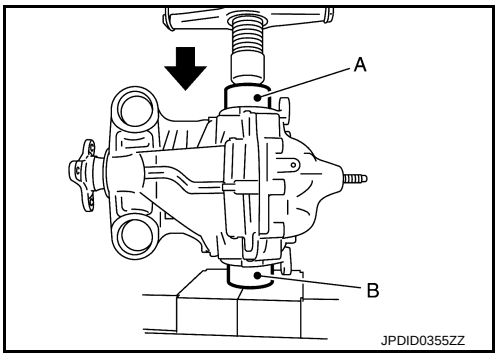
Length (L) : 47.3 mm (1.862 in) or less

9. Apply liquid gasket to mating surface of rear cover.



CAUTION:
- **Remove old gasket adhering to the mounting surfaces. Also remove any moisture, oil, or foreign material adhering to the mounting surfaces.**
- **The width of sealant bead is approximately 3 mm (0.12 in). Apply sealant evenly.**

10. Set the drifts (A and B) to the right and left side bearing adjusting washers individually. Compress differential assembly and side bearing to install rear cover.



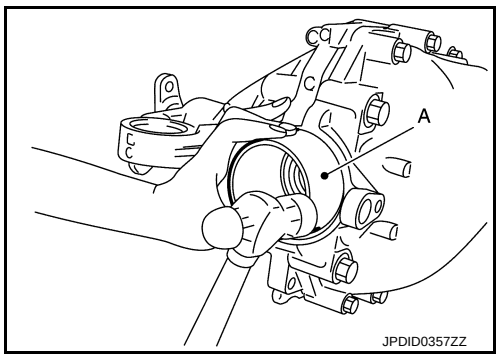
A : Drift [SST: ST30613000 (J-25742-3)]
B : Drift [SST: ST30613000 (J-25742-3)]

CAUTION:
- **The drift shall be placed on the center of the adjusting washers.**
- **The pressure shall be as low as possible to install the rear cover. The maximum pressure shall be 10 kN (1 ton, 1.0 Imp ton).**
- **If rear cover is forced in by tapping, rear cover may be damaged by adjusting washers. Avoid tapping.**

11. Tighten rear cover mounting bolts to the specified torque.

12. Using the drift (A) [SST: KV40104830 (—)], drive side oil seals until it becomes flush with the carrier end.
CAUTION:
- **Never reuse oil seals.**
- **When installing, do not incline oil seals.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**

13. Check total preload torque. Refer to DLN-173, "Adjustment".



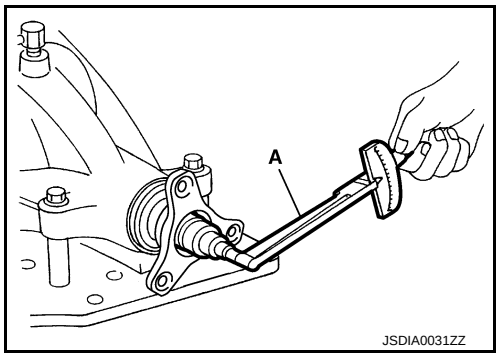
Adjustment

INFOID:0000000009643697

TOTAL PRELOAD TORQUE

Before inspection and adjustment, drain gear oil.

1. Secure final drive assembly onto a suitable attachment.
2. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
3. Rotate drive pinion at least 20 times to check for smooth operation of the bearing.
4. While rotate drive pinion at 60 rpm, measure total preload with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].



Total preload torque : Refer to DLN-185, "Preload 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.**
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.**

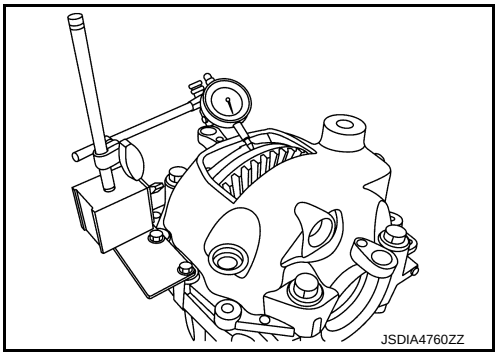
When the preload is small

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 information.**

DRIVE GEAR RUNOUT

1. Remove rear cover. Refer to DLN-170, "Disassembly".
2. Using rear cover mounting bolt, install dummy cover set [SST: KV385J9010 (—)] to gear carrier. Refer to DLN-171, "Assembly".
CAUTION:
Liquid gasket is not necessary. Never apply liquid gasket to rear cover.
NOTE:
The installation procedure is the same as that of rear cover.

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



Drive gear back face runout **: Refer to DLN-185, "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 as a set.

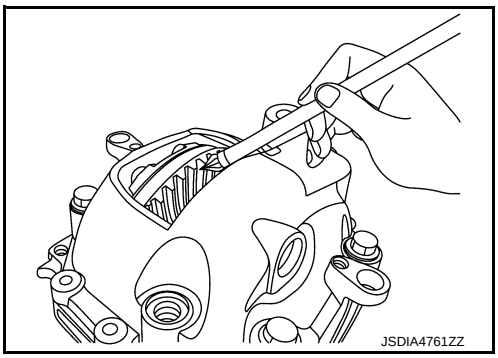
TOOTH CONTACT

1. Remove rear cover. Refer to DLN-170, "Disassembly".
2. Using rear cover mounting bolt, install dummy cover set [SST: KV385J9010 (—)] to gear carrier. Refer to DLN-171, "Assembly".

CAUTION:
Liquid gasket is not necessary. Never apply liquid gasket to rear cover.
NOTE:
The installation procedure is the same as that of rear cover.

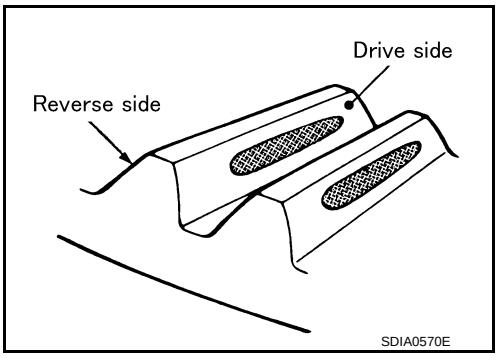
3. Apply red lead to drive gear.

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



4. 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.

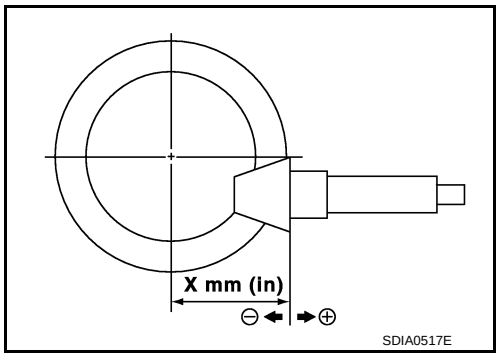


Tooth Contact Judgment Guide

Tooth contact condition		Pinion height adjusting washer selection valve [mm (in)]		Adjustment (Yes/No)	Possible cause
Drive side	Back side				
Heel side Toe side	Toe side Heel side		+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
		Thicker	+0.06 (+0.0024)		Occurrence of noise when accelerating.
			+0.03 (+0.0012)	No	–
			0		
			-0.03 (-0.0012)		
		Thinner	-0.06 (-0.0024)	Yes	Occurrence of noise at constant speed and decreasing speed.
			-0.09 (-0.0035)		Occurrence of noise and scoring sound in all speed ranges.

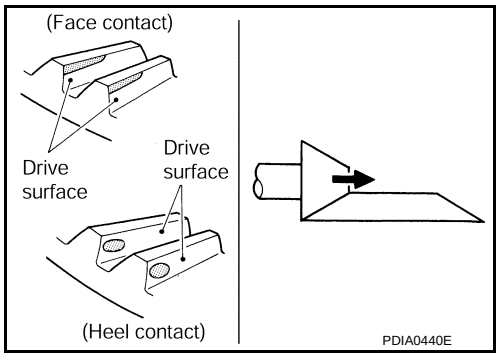
SDIA0207E

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



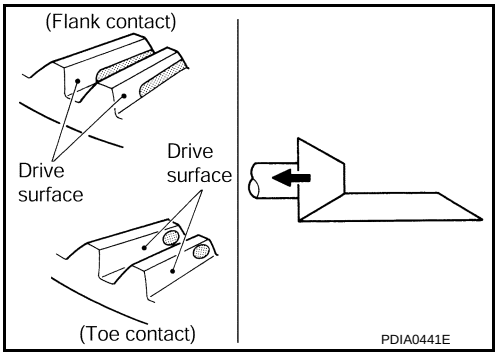
SDIA0517E

- If the tooth contact is near the face (face contact), or near the heel (heel contact), thicken drive pinion height adjusting washer to move drive pinion closer to drive gear.
  For selecting adjusting washer, refer to the latest parts information.



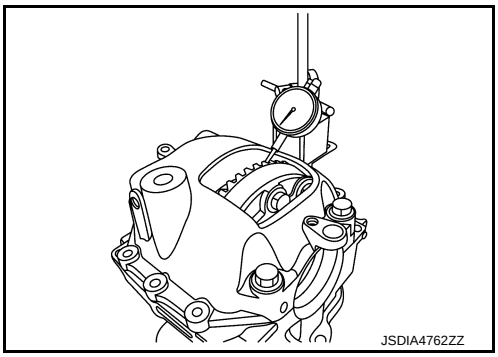
PDIA0440E

- If the tooth contact is near the flank (flank contact), or near the toe (toe contact), thin drive pinion height adjusting washer to move drive pinion farther from drive gear.
  For selecting adjusting washer, refer to the latest parts information.



BACKLASH

1. Remove rear cover. Refer to DLN-170, "Disassembly".
2. Using rear cover mounting bolt, install dummy cover set [SST: KV385J9010 (—)] to gear carrier. Refer to DLN-171, "Assembly".
   CAUTION:
   Liquid gasket is not necessary. Never apply liquid gasket to rear cover.
   NOTE:
   The installation procedure is the same as that of rear cover.
3. Fit a dial indicator to the drive gear face to measure the backlash.



Backlash : Refer to DLN-185, "Backlash".

- If the backlash is outside of the specified value, change the thickness of side bearing adjusting washers.

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.

Inspection

INFOID:0000000009643698

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).

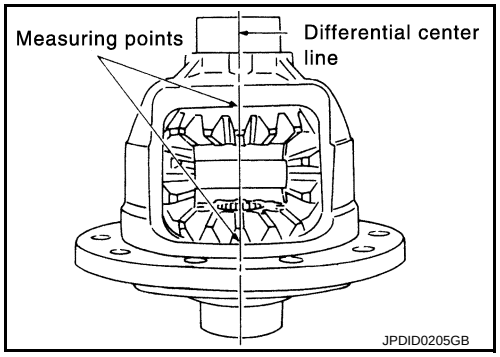
Oil Seal

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

Differential Assembly

- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.
- If any cracks or damage on the surface of the side gear and pinion mate gear tooth is found, replace.
- If it is chipped (by friction), damaged, or unusually worn, replace.
- Measure and check side gear end play with the following procedure.

1. Place differential assembly straight up so that side gear to be measured comes upward.

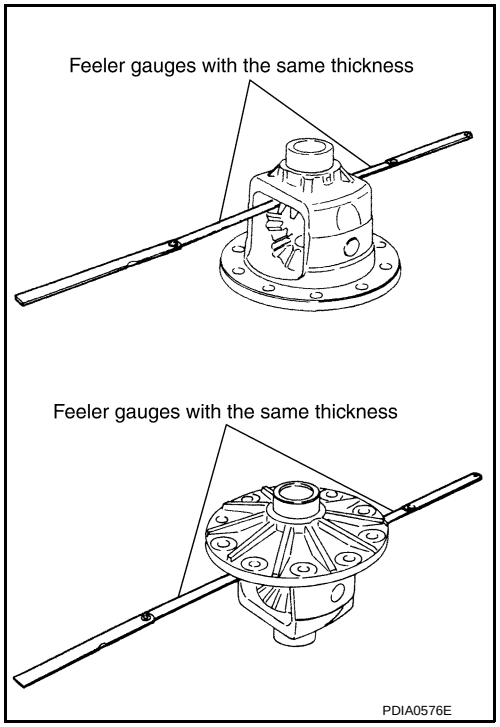


2. Using feeler gauge, measure the clearance between side gear back and differential case at 3 different points, while rotating side gear. Average the 3 readings, and then measure the clearance of the other side as well.

Side gear back clearance	**: Refer to DLN-185, "Differential Side Gear Clearance".**

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

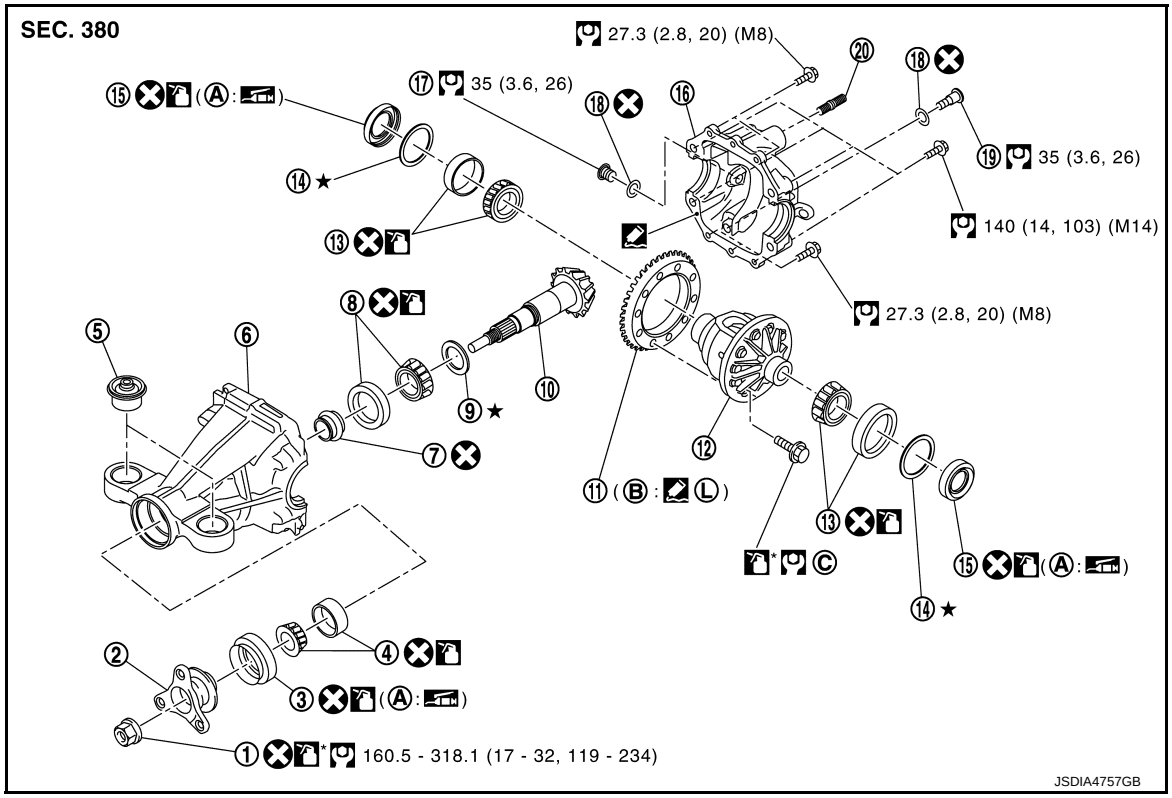
- If the back clearance is outside the specification, replace differential.



DRIVE PINION

Exploded View

INFOID:0000000009760982



① Drive pinion lock nut	② Companion flange	③ Front oil seal
④ Pinion front bearing	⑤ Mounting insulator	⑥ Gear carrier
⑦ Collapsible spacer	⑧ Pinion rear bearing	⑨ Pinion height adjusting washer
⑩ Drive pinion	⑪ Drive gear	⑫ Differential assembly
⑬ Side bearing	⑭ Side bearing adjusting washer	⑮ Side oil seal
⑯ Rear cover	⑰ Filler plug	⑱ Gasket
⑲ Drain plug	⑳ Stud bolt	
Ⓐ Oil seal lip	Ⓑ Screw hole	Ⓒ Comply with the assembly procedure when tightening. Refer to DLN-171, "Assembly".

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

★: Select with proper thickness.

: Apply gear oil.

*: Apply anti-corrosion oil.

: Apply multi purpose grease.

: Apply Genuine Silicone RTV or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

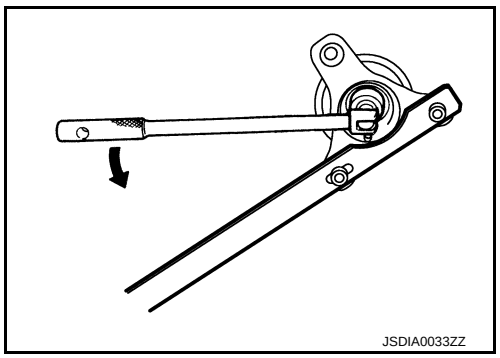
Ⓛ: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

Disassembly

INFOID:0000000009643700

1. Remove differential assembly. Refer to DLN-170, "Disassembly".

2. Remove drive pinion lock nut with the flange wrench (commercial service tool).



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

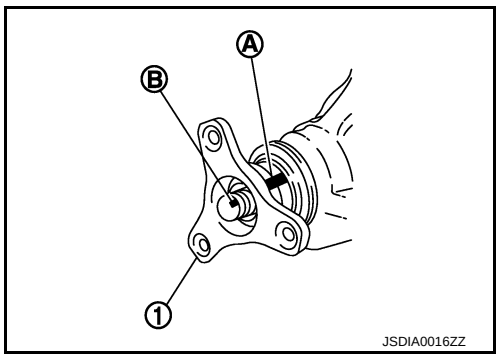
CAUTION:

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

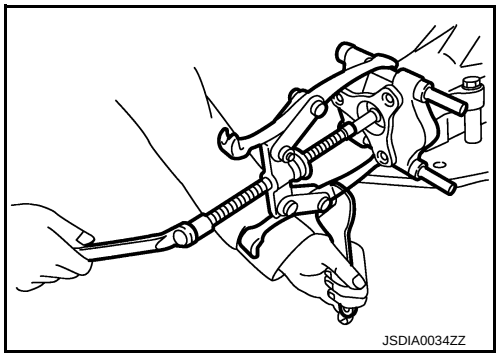
NOTE:

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 pullers (commercial service tool).

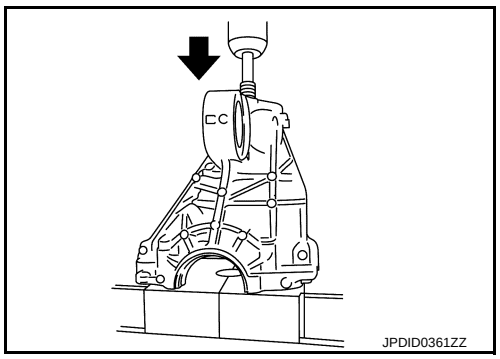


5. Press drive pinion assembly out of gear carrier.

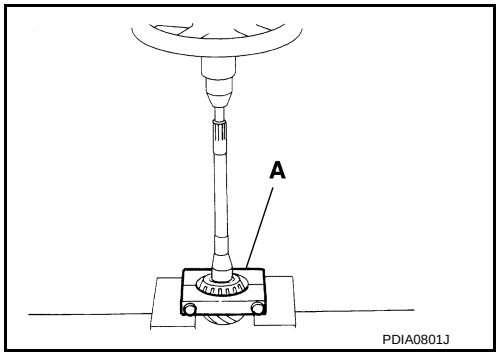
CAUTION:

Never drop drive pinion assembly.

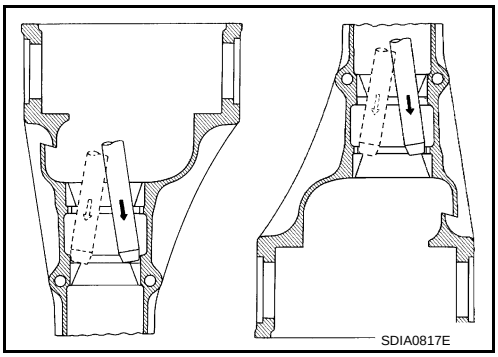
6. Remove front oil seal.
7. Remove pinion front bearing inner race.
8. Remove collapsible spacer.



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



10. Tap pinion front/rear bearing outer races uniformly using a brass rod or equivalent to remove them.
CAUTION:
Never damage gear carrier.
11. Perform inspection after disassembly. Refer to DLN-184, "Inspection".



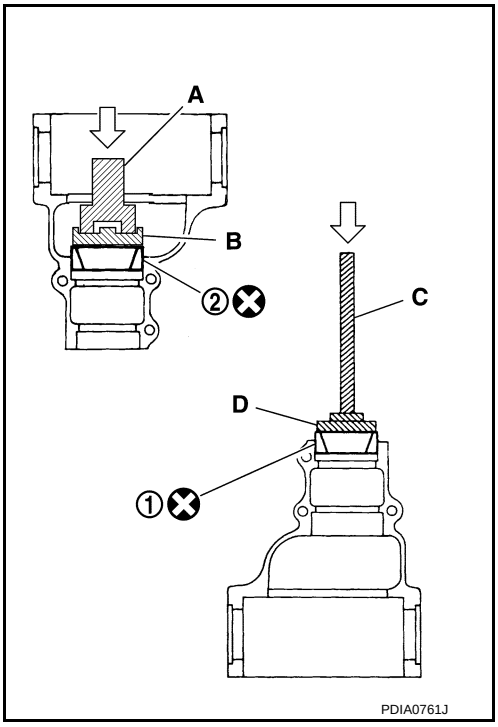
Assembly

INFOID:0000000009643701

1. 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.**

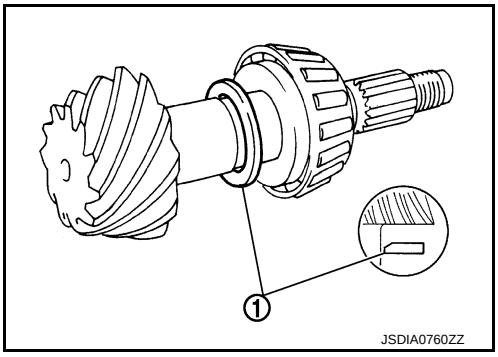


2. Temporarily install pinion height adjusting washer ①.

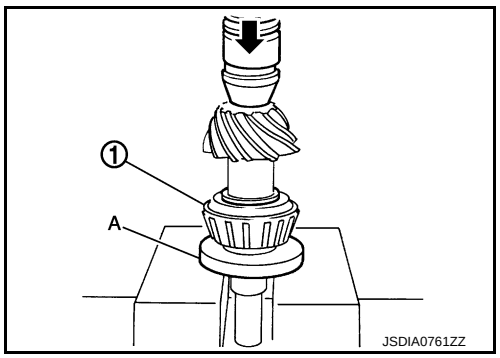
When hypoid gear set has been replaced
- Select pinion height adjusting washer. Refer to DLN-184, "Adjustment".

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.)



3. Install pinion rear bearing inner race ① to drive pinion with the drift (A) (commercial service tool).
CAUTION:
Never reuse pinion rear bearing inner race.

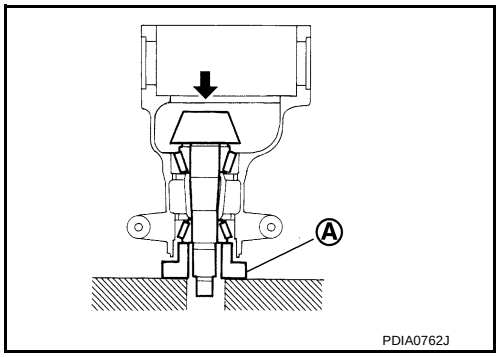


4. Check and adjust the tooth contact and back lash of drive gear and drive pinion following the procedure below.

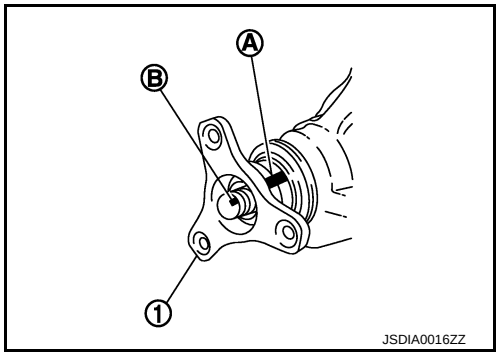
a. Assemble drive pinion into gear carrier.
CAUTION:
- **Never assemble collapsible spacer.**
- **Apply gear oil to pinion rear bearing.**

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 press stand (A) [SST: ST38220000 (—)], 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 assemble front oil seal.
NOTE:
When reusing drive pinion, align the matching mark Ⓑ of drive pinion with the matching mark Ⓐ 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)]

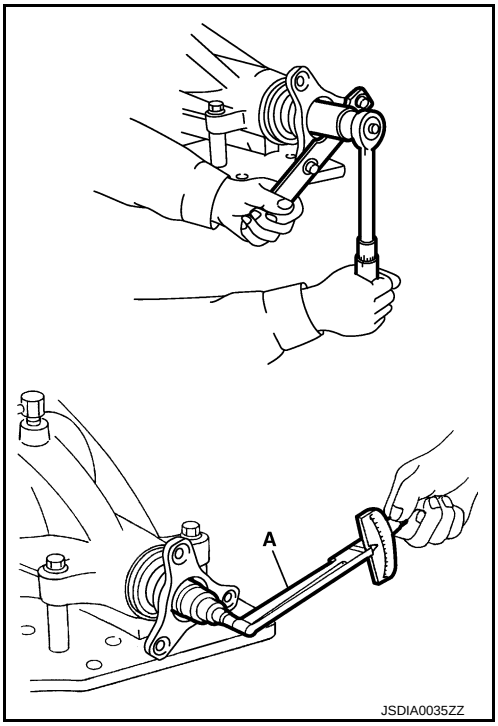
NOTE:
Use removed drive pinion nut only for the preload measurement.

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 lock nut is tightened with no collapsible spacer. Be careful not to overtighten it. While measuring the preload, tighten it by 5° to 10°.



h. Assemble removed side bearing adjusting washer or same thickness of it and install differential assembly. Refer to DLN-171, "Assembly".
CAUTION:
Apply differential gear oil to the side bearings.

i. Check and adjust tooth contact, drive gear to drive pinion backlash. Refer to DLN-173, "Adjustment".

j. Remove differential assembly.

k. Remove companion flange.

l. Remove drive pinion assembly from gear carrier.

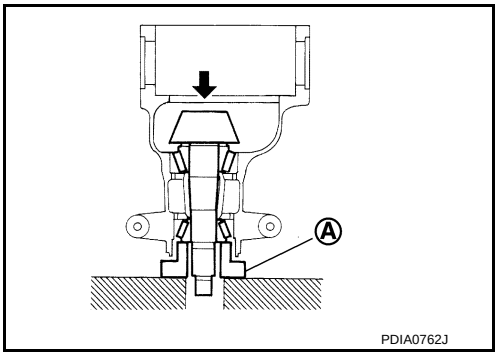
m. Remove pinion front bearing inner race.

5. Assemble collapsible spacer.
CAUTION:
Never reuse collapsible spacer.

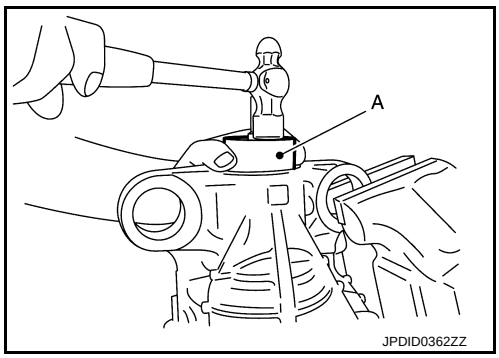
6. Assemble drive pinion into gear carrier.
CAUTION:
Apply gear oil to pinion rear bearing.

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 press stand (A) [SST: ST38220000 (—)], press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.



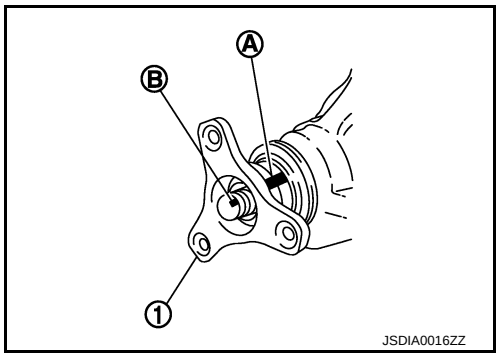
9. Install front oil seal until it becomes flush with the carrier end, using the drift (A) [SST: KV40104710 (—)] as shown in figure.



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.**

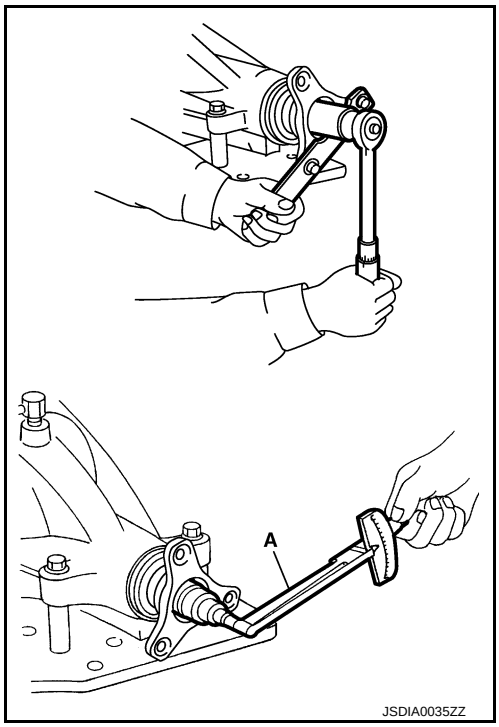
10. Install companion flange.

NOTE:
When reusing drive pinion, align the matching mark Ⓑ of drive pinion with the matching mark Ⓐ 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.

12. Adjust to the drive pinion lock nut tightening torque and pinion bearing preload torque, using preload gauge [SST: ST: ST3127S000 (J-25765-A)].

Pinion bearing preload : Refer to DLN-185, "Preload 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.**

13. Install differential assembly. Refer to DLN-171, "Assembly".

CAUTION:
Never install rear cover at this timing.

14. Check and adjust drive gear runout, tooth contact, and drive gear to drive pinion backlash. Refer to DLN-173, "Adjustment".
15. Check total preload torque. Refer to DLN-173, "Adjustment".
16. Install rear cover. Refer to DLN-171, "Assembly".

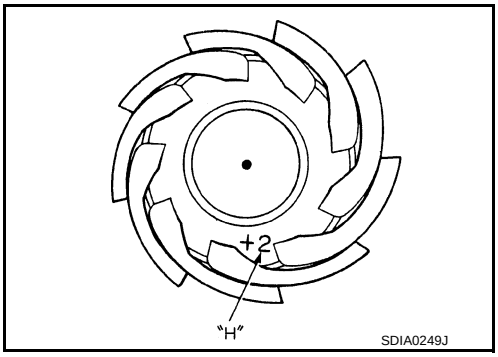
Adjustment

INFOID:0000000009643702

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:

$T = T_0 + (t_1 - t_2)$

- T: Correct washer thickness
- T_0: Removed washer thickness
- t_1: Old drive pinion head letter "H × 0.01" ("H": machined tolerance 1/100 mm × 100)
- t_2: New drive pinion head letter "H × 0.01" ("H": machined tolerance 1/100 mm × 100)

Example:

$T = 3.21 + [(2 \times 0.01) - (-1 \times 0.01)] = 3.24$

- T_0: 3.21
- t_1: +2
- t_2: −1

2. 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

Inspection

INFOID:0000000009643703

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).

Oil Seal

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

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 SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

INFOID:0000000009643704

Applied model	Axle	2WD	AWD
	Engine	VQ37VHR	
	Transmission	A/T	
Final drive model		R190	
Gear ratio		3.133	
Number of teeth (Drive gear/Drive pinion)		47/15	
Number of pinion gears		2	
Drive pinion adjustment spacer type		Collapsible	
Oil capacity		For North America: Refer to MA-14, "FOR NORTH AMERICA : Fluids and Lubricants". For Mexico: Refer to MA-15, "FOR MEXICO : Fluids and Lubricants".	

Drive Gear Runout

INFOID:0000000009643705

Unit: mm (in)

Item	Standard
Drive gear back face runout	0.05 (0.0020) or less

Differential Side Gear Clearance

INFOID:0000000009643706

Unit: mm (in)

Item	Standard
Side gear backlash (Clearance between side gear and differential case)	0.10 (0.004) or less (Each gear should rotate smoothly without excessive resistance during differential motion.)

Preload Torque

INFOID:0000000009643707

Unit: N·m (kg-m, in-lb)

Item	Standard
Pinion bearing (P_1)	1.436 – 2.20 (0.15 – 0.22, 13 – 19)
Side bearing (P_2)	0.236 – 0.472 (0.03 – 0.04, 2 – 4)
Side bearing to pinion bearing (Total preload) (Total preload = P_1 + P_2) **NOTE:** Rotating speed: 60 rpm	1.672 – 2.672 (0.17 – 0.27, 15 – 23)

Backlash

INFOID:0000000009643708

Unit: mm (in)

Item	Standard
Drive gear to drive pinion gear	0.10 – 0.15 (0.0039 – 0.0059)