SECTION DLN
DRIVELINE

CONTENTS

TRANSFER: ATX90A

REAR FINAL DRIVE: R230

PRECAUTION

PRECAUTIONS

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

INFOID:0000000009008187

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. 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:

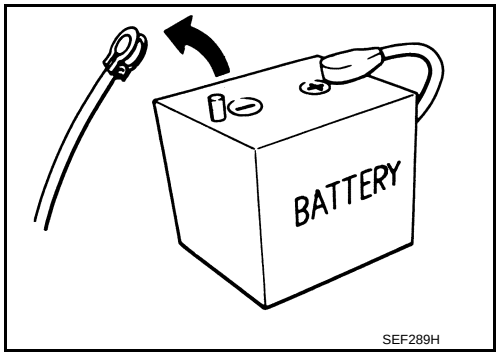
Always observe the following items for preventing accidental activation.

- **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.**

Precautions for Removing of Battery Terminal

INFOID:0000000009864135

- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
  NOTE:
  ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  NOTE:
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.



SEF289H

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  NOTE:
  The removal of 12V battery may cause a DTC detection error.

Service Notice or Precautions for Transfer

INFOID:0000000009008188

CAUTION:

- **Use Genuine NISSAN Transfer Fluid. Refer to MA-15, "FOR NORTH AMERICA : Fluids and Lubricants" (For NORTH AMERICA), MA-16, "FOR MEXICO : Fluids and Lubricants" (For MEXICO).**
- **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.**

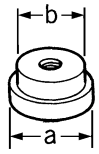
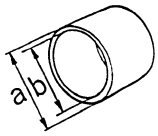
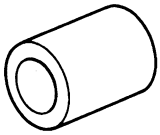
PREPARATION

PREPARATION

Special Service Tools

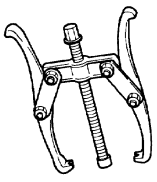
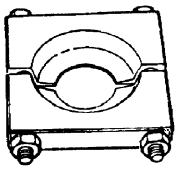
INFOID:0000000009008189

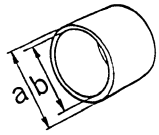
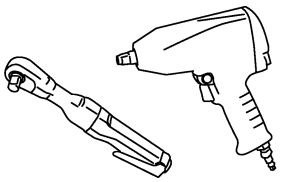
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST30701000 (J-25742-2) Drift a: 61.5 mm (2.421 in) dia. b: 41 mm (1.61 in) dia.  ZZA1000D	Removing dust shield from companion flange
KV40104710 (—) Drift a: 76.3 mm (3.004 in) dia. b: 67.9 mm (2.673 in) dia.  ZZA1003D	• Installing rear oil seal • Installing input oil seal
KV10119400 (—) Spline socket  ZZA1205D	• Installing transfer control actuator • Installing transfer rotary position sensor

Commercial Service Tools

INFOID:0000000009008190

Tool name	Description
Puller  ZZA0119D	• Removing dust shield from shaft flange • Removing dust shield from companion flange
Replacer  ZZA0700D	• Removing dust shield from shaft flange • Removing dust shield from companion flange

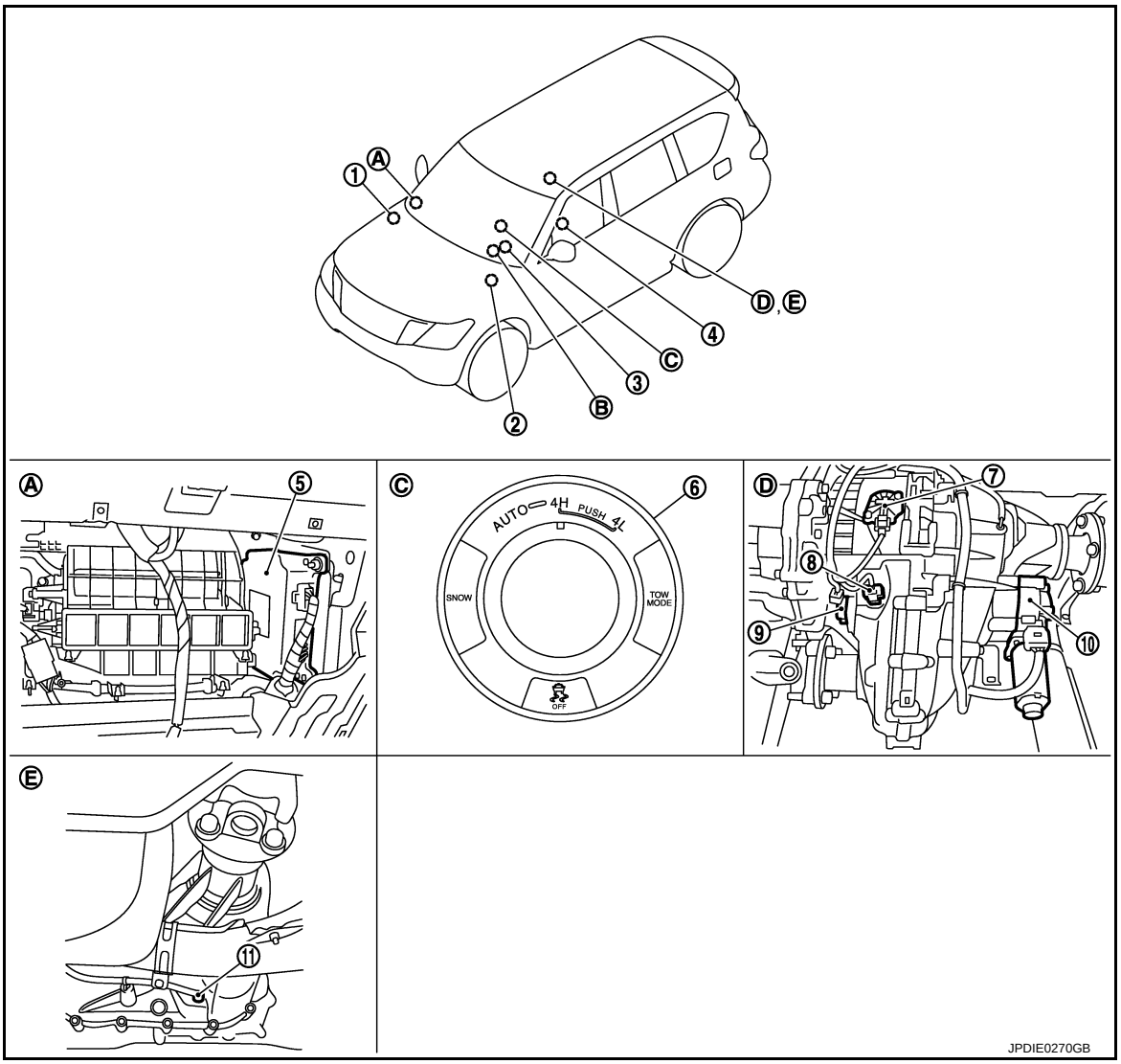
Tool name	Description
Drift a: 63 mm (2.48 in) dia. b: 59 mm (2.32 in) dia.  ZZA1003D	Installing front oil seal
Power tool  PBIC0190E	Loosening bolts and nuts

SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:0000000009008191



1.	ECM Refer to EC-23, "Component Parts Location" (For USA and Canada), EC-593, "Component Parts Location" (For Mexico).	2.	ABS actuator and electric unit (control unit) Refer to BRC-9, "Component Parts Location".	3.	Steering angle sensor Refer to BRC-9, "Component Parts Location".
4.	Control valve & TCM Refer to TM-11, "A/T CONTROL SYSTEM : Component Parts Location".	5.	Transfer control unit	6.	4WD switch assembly
7.	Transfer lock position sensor	8.	Transfer Hi-Lo position sensor	9.	Transfer rotary position sensor
10.	Transfer control actuator	11.	Transfer fluid temperature sensor		
A.	Back of glove box assembly	B.	4WD indicator lamp, 4WD warning lamp, ATP warning lamp (in combination meter)	C.	Console assembly
D.	Transfer assembly upper side	E.	Transfer assembly under side		

Component Description

INFOID:0000000009008192

Component parts		Reference/Function
Transfer control unit		DLN-12, "Transfer Control Unit"
Transfer control actuator	Transfer motor	DLN-12, "Transfer Control Actuator"
	Transfer internal speed sensor	DLN-12, "Transfer Control Actuator"
	Transfer motor temperature sensor	DLN-12, "Transfer Control Actuator"
Transfer Hi-Lo position sensor		DLN-13, "Transfer Hi-Lo Position Sensor"
Transfer rotary position sensor		DLN-13, "Transfer Rotary Position Sensor"
Transfer lock position sensor		DLN-13, "Transfer Lock Position Sensor"
Transfer fluid temperature sensor		DLN-13, "Transfer Fluid Temperature Sensor"
4WD mode switch		DLN-19, "4WD SYSTEM : System Description"
4WD indicator lamp		DLN-19, "4WD SYSTEM : System Description"
4WD warning lamp		DLN-19, "4WD SYSTEM : System Description"
ATP warning lamp		DLN-19, "4WD SYSTEM : System Description"
ABS actuator and electric unit (control unit)		Transmits the following signals via CAN communication line to transfer control unit. • Vehicle speed signal (ABS) • Stop lamp switch signal (brake signal) • ABS operation signal/ABS malfunction signal • TCS operation signal/TCS malfunction signal • VDC operation signal/VDC malfunction signal
Steering angle sensor		Transmits the following signals via CAN communication line to transfer control unit. • Steering angle sensor signal/Steering angle sensor malfunction signal
ECM		Transmits the following signals via CAN communication line to transfer control unit. • Accelerator pedal position signal • Engine speed signal • Engine torque signal
TCM		Transmits the following signals via CAN communication line to transfer control unit. • Shift position signal • Gear position signal • Output shaft revolution signal

Transfer Control Unit

INFOID:0000000009008193

- Transfer control unit operates transfer control actuator, 4WD warning lamp and 4WD mode indicator lamp according to input signal from 4WD shift switch and each sensor and control unit.
- When 4WD system is malfunctioning, 4WD warning lamp turns ON and fail-safe status activates.
- When protection is necessary, 4WD warning lamp blinks and protection status activates.

Transfer Control Actuator

INFOID:0000000009008194

Transfer control actuator integrates transfer motor, transfer internal position sensor, and transfer motor temperature sensor, and switches 4WD mode (AUTO⇔4H⇔4L).

TRANSFER MOTOR

Transfer motor operates according to signal from transfer control unit and switches 4WD mode (AUTO⇔4H⇔4L). It also performs front and rear distribution of traction force during AUTO mode.

TRANSFER INTERNAL SPEED SENSOR

Transfer internal speed sensor detects rotation status of transfer motor and transmits signal to transfer control unit.

TRANSFER MOTOR TEMPERATURE SENSOR

- Transfer motor temperature sensor measures temperature of transfer motor.

- This sensor uses a thermistor and its electrical resistance varies as the temperature varies. The electrical resistance decreases as the temperature increases.

Transfer Hi-Lo Position Sensor

INFOID:0000000009008195

Transfer Hi-Lo position sensor detects engagement status of Hi-Lo sleeve and transmits signal to transfer control unit.

Transfer Rotary Position Sensor

INFOID:0000000009008196

Transfer rotary position sensor detects rotation status of actuator shaft and transmits signal to transfer control unit.

Transfer Lock Position Sensor

INFOID:0000000009008197

Transfer lock position sensor detects engagement status of lock sleeve and transmits signal to transfer control unit.

Transfer Fluid Temperature Sensor

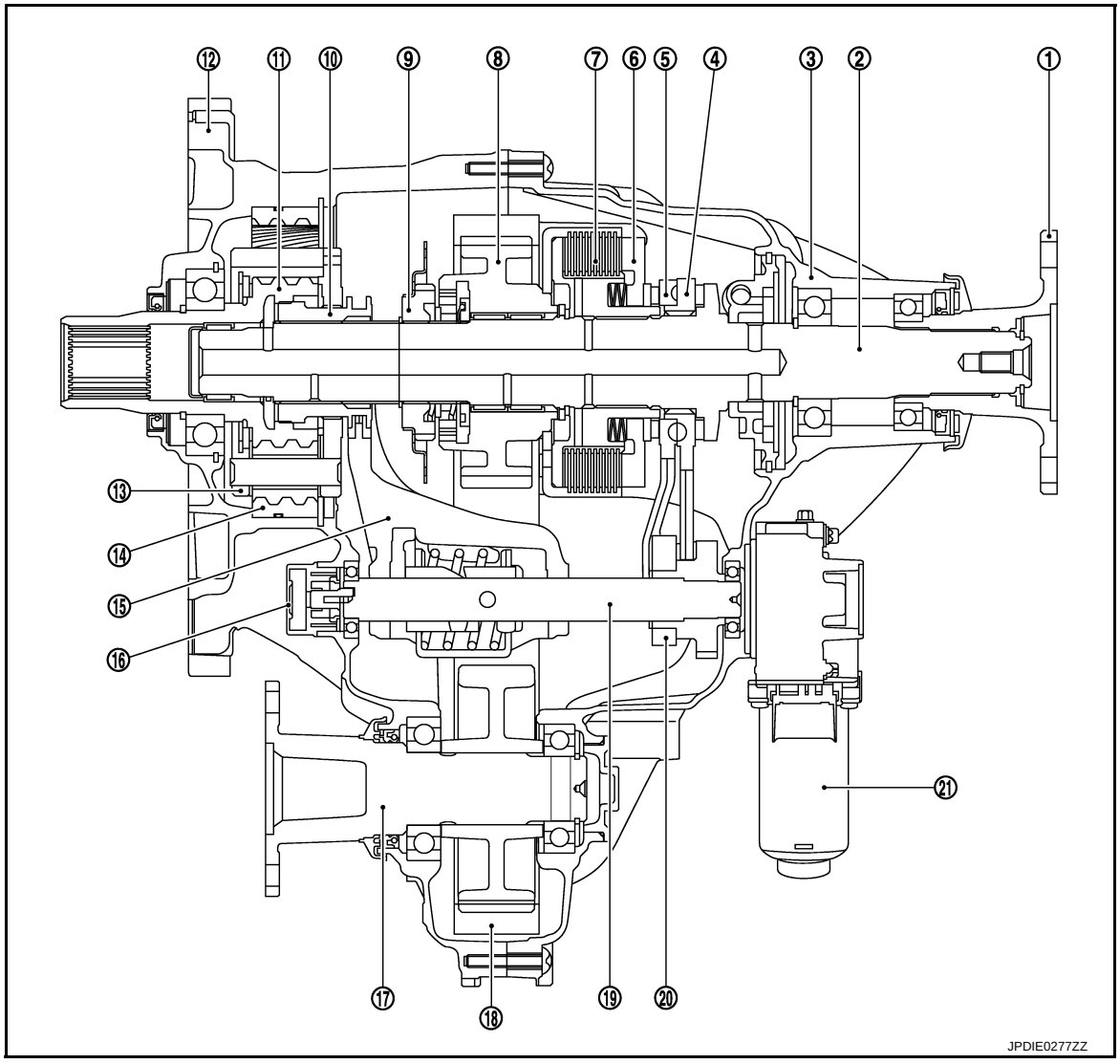
INFOID:0000000009008198

- Transfer fluid temperature sensor measures temperature of transfer fluid.
- This sensor uses a thermistor and its electrical resistance varies as the temperature varies. The electrical resistance decreases as the temperature increases.

STRUCTURE AND OPERATION

Sectional View

INFOID:0000000009008199

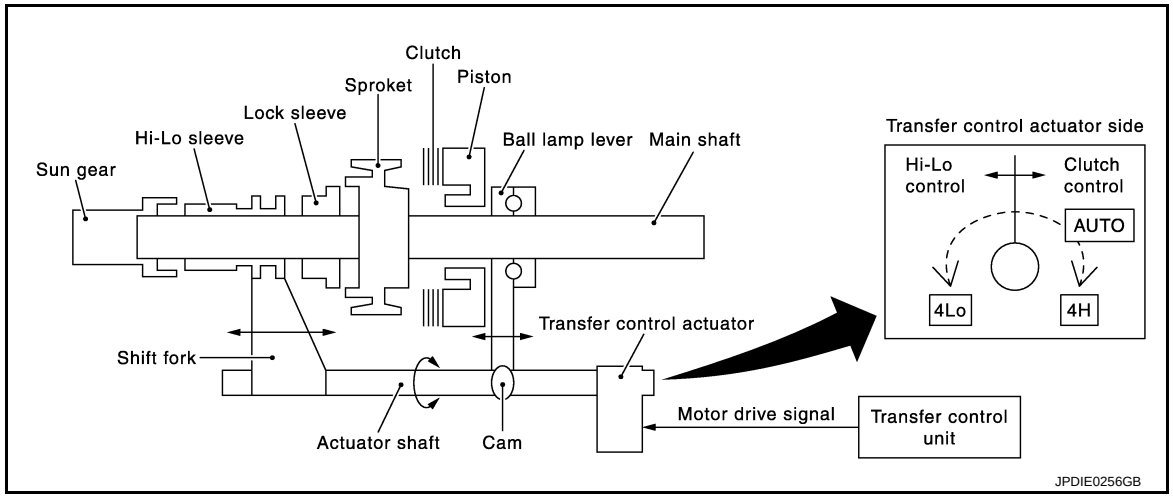


1. Rear companion flange
2. Main shaft
3. Rear case
4. Ball ramp lever
5. Ball lamp lever
6. Piston
7. Clutch
8. Sprocket
9. Lock sleeve
10. Hi-Lo sleeve
11. Sun gear
12. Front case
13. Planetary carrier assembly
14. Internal gear
15. Shift fork
16. Transfer rotary position sensor
17. Front shaft flange
18. Drive chain
19. Actuator shaft
20. Cam
21. Transfer control actuator

Torque Split Mechanism

INFOID:0000000009008200

CONTROL DIAGRAM



DESCRIPTION

- Ball ramp lever operates in the direction of main shaft axis according to rotation of actuator shaft and presses piston. Pressure is applied to each clutch and torque is transmitted.
- Shift fork operates in the direction of main shaft axis according to rotation of actuator shaft and performs engagement and disengagement to Hi-Lo sleeve and lock sleeve of main shaft. Mode is switched between 4H⇔4L.

AUTO MODE

- The optimum torque distribution is electronically performed for front and rear wheels according to road conditions.
- Stable start without wheel spin is possible on slippery road conditions, such as on a snowy road.
- When road condition does not require 4WD driving, the status becomes close to rear wheel drive, which results in better fuel efficiency and provides FR-like steering characteristics.
- The vehicle cornering status is judged according to information from each sensor, and the optimum torque is distributed to front wheels for preventing tight-corner braking symptom.

NOTE:
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.

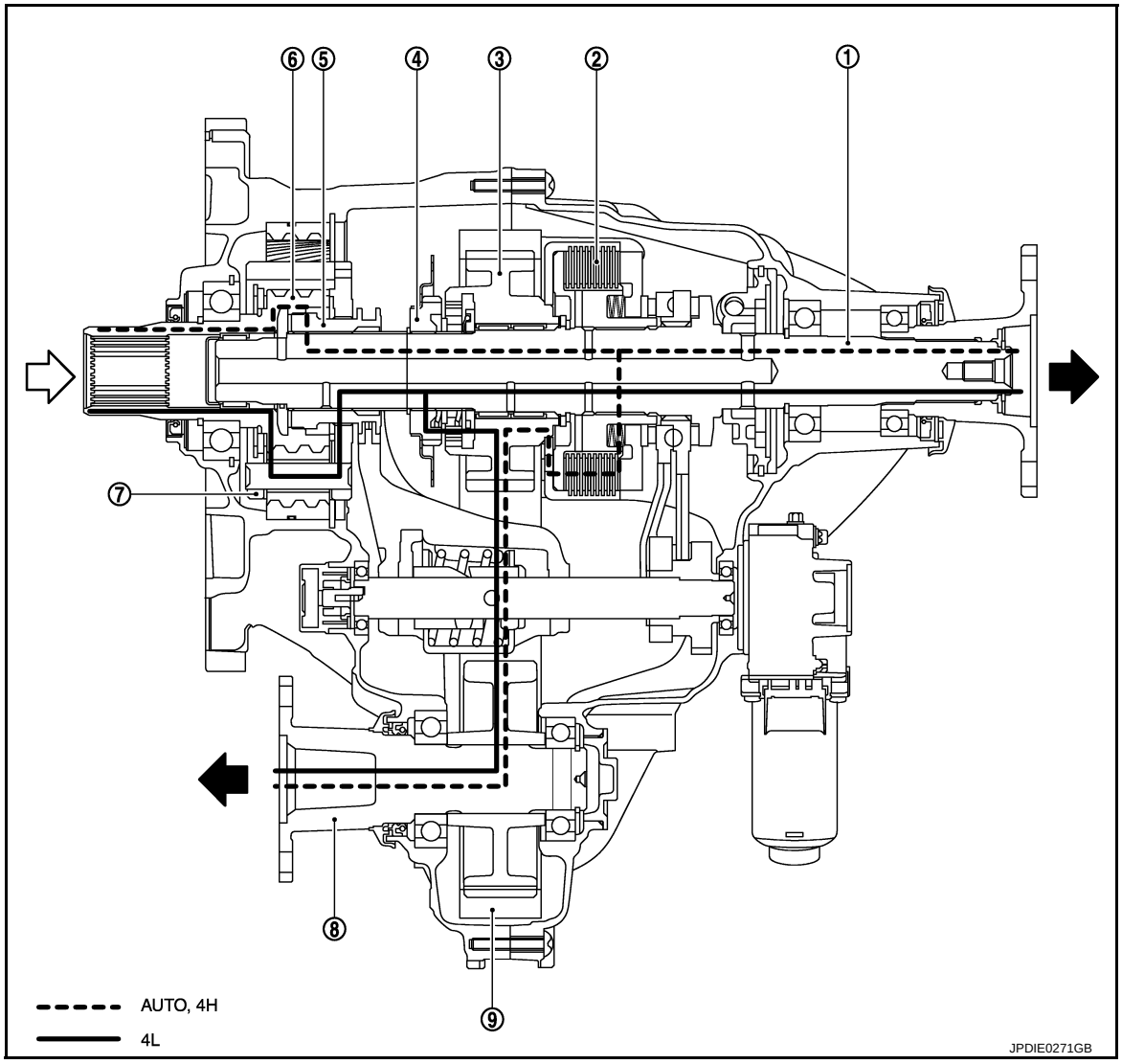
4H MODE

- Torque distribution for front and rear wheels is fixed and stable start is achieved while driving on an rough, sandy or snowy road.

4L MODE

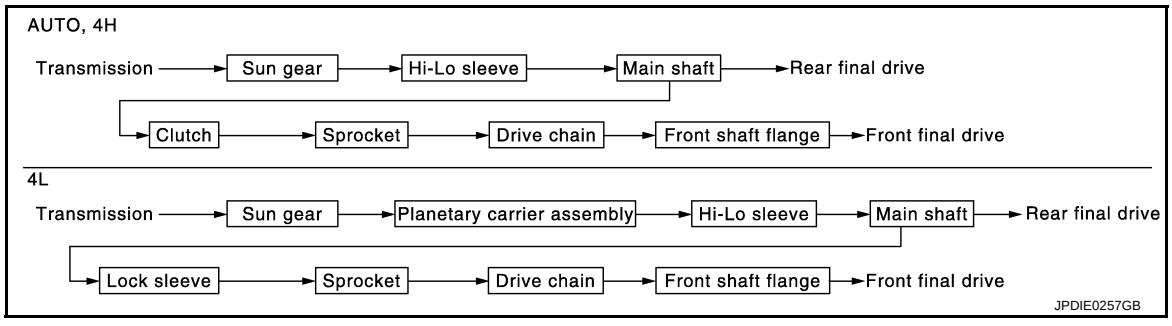
- Large traction force is obtained due to low gear. High running ability and escaping ability are achieved.
- Switching from 4H mode to 4L mode is not possible when the vehicle is running or A/T shift selector is shifted to any position other than neutral.

TORQUE DISTRIBUTION DIAGRAM



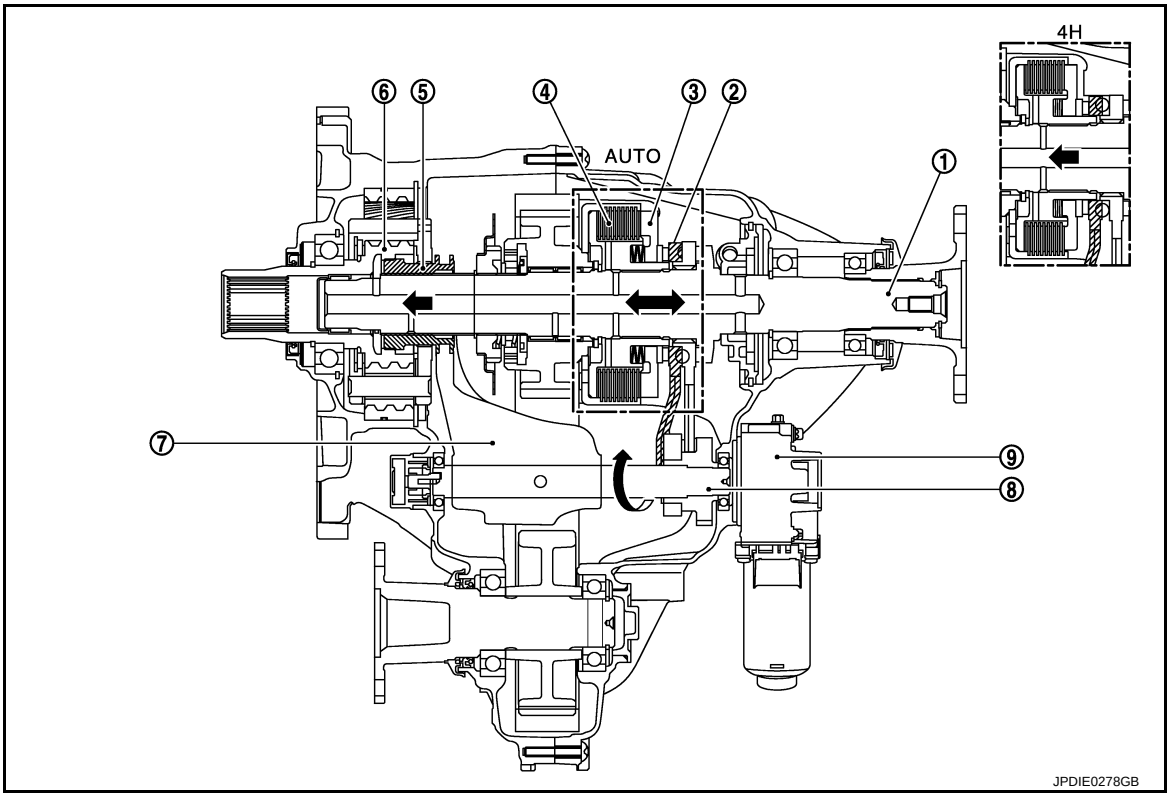
1. Main shaft
2. Clutch
3. Sprocket
4. Lock sleeve
5. Hi-Lo sleeve
6. Sun gear
7. Planetary carrier assembly
8. Front shaft flange
9. Drive chain

TORQUE DISTRIBUTION FLOW



OPERATION PRINCIPLE

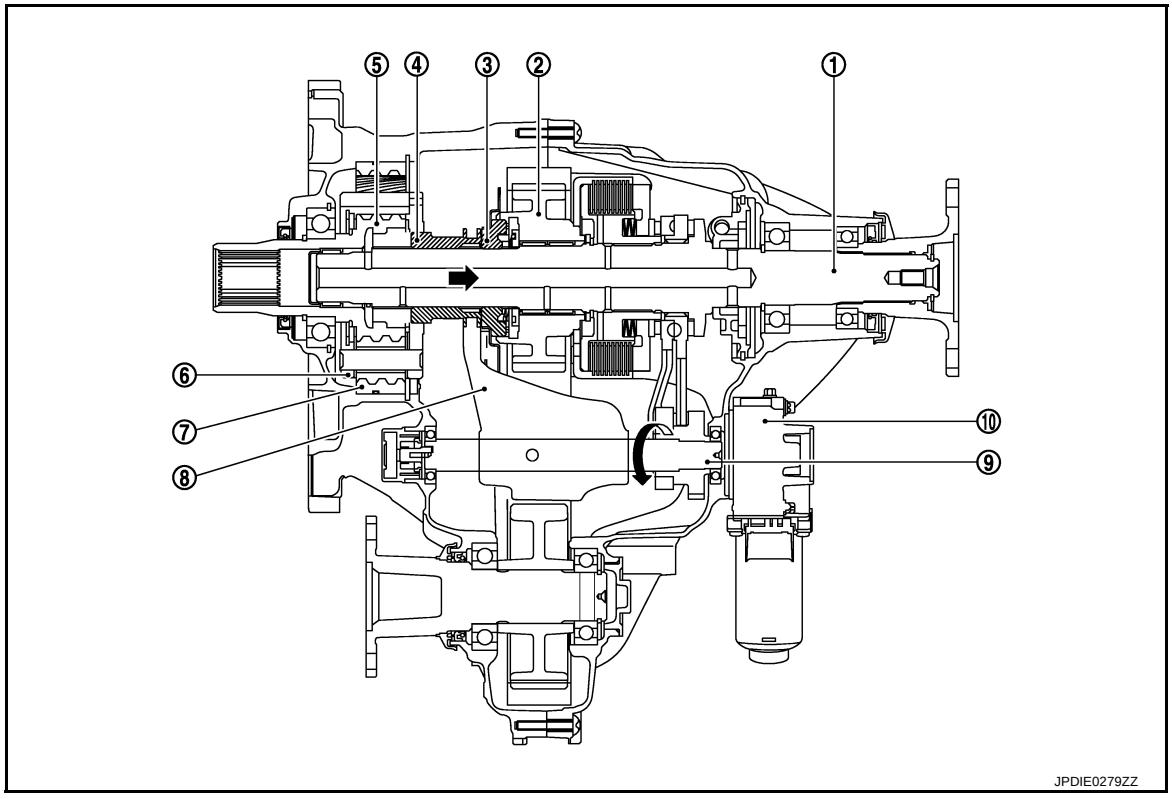
AUTO, 4H MODE



1. Main shaft
2. Ball lamp lever
3. Piston
4. Clutch
5. Hi-Lo sleeve
6. Sun gear
7. Shift fork
8. Actuator shaft
9. Transfer control actuator

1. Transfer control unit supplies command current to transfer motor.
2. Transfer motor operates and actuator shaft rotates clockwise.
3. Shift fork operates according to rotation of actuator shaft. Sun gear and Hi-Lo sleeve are engaged.
4. Ball ramp lever operates in axial direction via cam fixed on actuator shaft according to traction torque of transfer motor, presses piston, and thrusts multiple plate clutch.
5. Torque is transmitted to front wheels according to thrusting pressure of multiple plate clutch.
   NOTE:
   Torque transmitted to the front wheel is determined according to the command current.

4L MODE



1. Main shaft
2. Sprocket
3. Lock sleeve
4. Hi-Lo sleeve
5. Sun gear
6. Planetary carrier assembly
7. Internal gear
8. Shift fork
9. Actuator shaft
10. Transfer control actuator

1. Transfer control unit supplies command current to transfer motor.
2. Transfer motor operates and actuator shaft rotates counterclockwise.
3. Shift fork operates according to rotation of actuator shaft. Planetary carrier assembly and Hi-Lo sleeve are engaged.

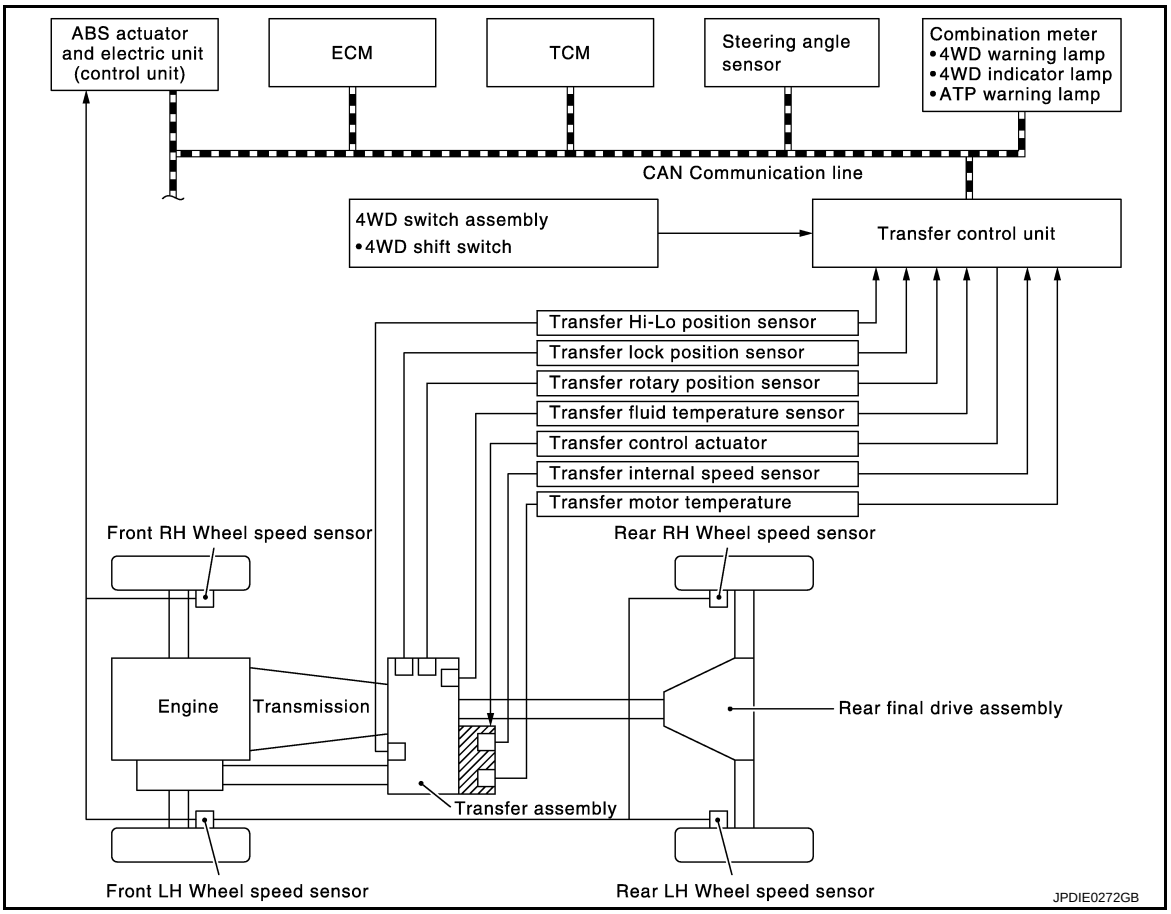
SYSTEM
4WD SYSTEM
4WD SYSTEM : System Description

INFOID:0000000009008201

- In AUTO mode, distribution of traction force is controlled from 2WD status (0:100) to 4WD status (50:50) according to signal from each sensor and switch.
- In accordance with fail-safe function, when system is malfunctioning, 4WD warning lamp on combination meter turns ON and 4WD control stops. For fail-safe function, refer to DLN-21, "4WD SYSTEM : Fail-Safe".
- When a high load status continues for transfer assembly (transfer control actuator or transfer fluid), 4WD control temporarily becomes 4H or 2WD status, according to protection function.

NOTE:
4WD system is not malfunctioning.

SYSTEM DIAGRAM



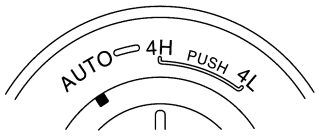
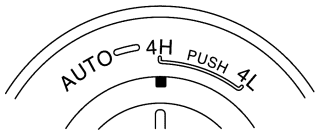
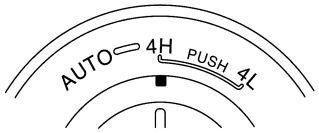
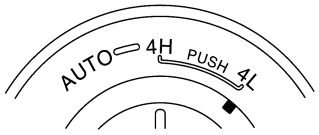
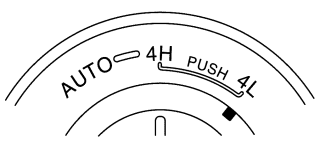
INPUT/OUTPUT SIGNAL

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

Component parts	Control signal
ABS actuator and electric unit (control unit)	Transmits the following signals via CAN communication line to transfer control unit. • Vehicle speed signal (ABS) • Stop lamp switch signal (brake signal) • ABS operation signal/ABS malfunction signal • TCS operation signal/TCS malfunction signal • VDC operation signal/VDC malfunction signal
ECM	Transmits the following signals via CAN communication line to transfer control unit. • Accelerator pedal position signal • Engine speed signal • Engine torque signal

Component parts	Control signal
TCM	Transmits the following signals via CAN communication line to transfer control unit. • Shift position signal • Gear position signal • Output shaft revolution signal
Steering angle sensor	Transmits the following signals via CAN communication line to transfer control unit. • Steering angle sensor signal/Steering angle sensor malfunction signal
Combination meter	Receives the following signals via CAN communication line from transfer control unit. • 4WD warning lamp signal • ATP warning lamp signal • 4WD mode indicator signal

4WD SHIFT SWITCH AND 4WD SHIFT INDICATOR LAMP

4WD shift switch	4WD shift indicator lamp (in Information display)	4WD shift procedure
AUTO  JPDIE0230ZZ	 JPDIE0234ZZ	1. Start the engine. 2. Turn the 4WD shift switch. **NOTE:** Mode can be switched between AUTO⇔4H while driving straight.
4H  JPDIE0231ZZ	 JPDIE0235ZZ	
 JPDIE0231ZZ ↓↑  JPDIE0233ZZ 4WD status: 4H⇔4L	 JPDIE0236ZZ (Blinking)*1*2	1. Start the engine. 2. Never drive the vehicle. 3. Shift A/T shift selector to N position. 4. Press and rotate 4WD shift switch while depressing brake pedal. **CAUTION:** **4WD mode does not switch when 4WD shift switch is operated while the vehicle is running or A/T shift selector is shifted to any position other than neutral.**
4L  JPDIE0233ZZ	 JPDIE0237ZZ	

*1: Blinking 2 times/1 second
*2: “4HI” and “4LO” blink alternately.

CONDITION FOR TURN ON THE WARNING LAMP

4WD Warning Lamp

- Turns ON when there is a malfunction in 4WD system. 4WD warning lamp indicates the vehicle is in fail-safe mode.
- Also turns ON when ignition switch is turned ON, for the purpose of lamp check. Turns OFF approximately for 1 second after the engine starts if system is normal.

Condition	4WD warning lamp
Lamp check	Turns ON when ignition switch is turned ON. Turns OFF approx. 1 second after the engine start.
4WD system malfunction	ON
Protection function is activated due to heavy load to transfer assembly. (4WD system is not malfunctioning.)	Quick blinking: 2 times/second (Blinking in approx. 1 minute and then turning OFF)
Large difference in diameter of front/rear tires	Slow blinking: 1 time/2 seconds (Continuing to blink until turning ignition switch OFF)
Other than above (system normal)	OFF

ATP Warning Lamp

When the A/T shift selector is in P position, the vehicle may move if the transfer case in neutral. ATP warning lamp is turned on to indicate this condition to the driver.

CONDITION FOR OPERATE WARNING BUZZER

For preventing an incorrect operation during 4H⇔4L switching, warning buzzer sounds from inside of transfer control unit and warns the driver, when certain conditions are satisfied.

Condition			Warning buzzer
4WD shift status	A/T shift selector	Engine speed	
4H⇔4L	N range	350 – 1,600 rpm	OFF
		Under 350 rpm or over 1,600 rpm	ON
	Except N range	Always	

4WD SYSTEM : Fail-Safe

INFOID:0000000009008202

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

DIAGNOSIS SYSTEM (TRANSFER CONTROL UNIT)

CONSULT Function

INFOID:0000000009008203

FUNCTION

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

Diagnostic test mode	Function
ECU Identification	Transfer control unit part number can be read.
Self Diagnostic Result	Self-diagnostic results can be read and erased quickly.*
Data Monitor	Input/Output data in the transfer control unit can be read.
Work Support	This mode enables a technican to adjust some devices faster and more accurately by following the indications on the CONSULT

*: The following diagnosis information is erased by erasing.
- DTC

ECU IDENTIFICATION

Transfer control unit part number can be read.

SELF DIAGNOSTIC RESULT

Refer to DLN-30, "DTC Index".

When "0" is displayed on self-diagnosis result.
- The system is presently malfunctioning.

When except "0" is displayed on self-diagnosis result.
- 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...110→111.
When the operation number of times exceeds 111, the number do not increase and “111” is displayed until self-diagnosis is erased*.
*: For “U1000” and “U1010”, the maximum value is “39”.

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.

X: Applicable

Monitor item (Unit)	SELECT MONITOR ITEM		Remarks
	ECU INPUT SIGNALS	MAIN SIGNALS	
4WD MODE [BOTNG/SWTNG/4L/4H/AUTO]		X	Control status of 4WD mode is displayed.
2WD SW [On/Off]	X		4WD shift switch (2WD) is not equipped, but it is displayed.
AUTO SW [On/Off]	X		4WD shift switch signal (AUTO) is displayed.
4H SW [On/Off]	X		4WD shift switch signal (4H) is displayed.
4L SW [On/Off]	X		4WD shift switch signal (4L) is displayed.
T/M RANGE [D/N/R/P]	X		A/T shift selector position via CAN communication line is displayed.
N RANGESW [On/Off]	X		A/T shift selector position (N) via CAN communication line is displayed.
R RANGE SW [On/Off]	X		A/T shift selector position (R) via CAN communication line is displayed.
ING SW [On/Off]	X		Ignition switch status is displayed.
TCS OPER [On/Off]	X		TCS operation status via CAN communication line is displayed.

Monitor item (Unit)	SELECT MONITOR ITEM		Remarks
	ECU INPUT SIGNALS	MAIN SIGNALS	
VDC OPER [On/Off]	X		VDC operation status via CAN communication line is displayed.
ABS OPER [On/Off]	X		ABS operation status via CAN communication line is displayed.
SAND MODE IND [On/Off]			This indicator is not equipped, but it is displayed.
ROCK MODE IND [On/Off]			This indicator is not equipped, but it is displayed.
SNOW MODE IND [On/Off]			This indicator is not equipped, but it is displayed.
ONROAD MODE IND [On/Off]			This indicator is not equipped, but it is displayed.
SAND MODE SW [On/Off]	X		This switch is not equipped, but it is displayed.
ROCK MODE SW [On/Off]	X		This switch is not equipped, but it is displayed.
SNOW MODE SW [On/Off]	X		This switch is not equipped, but it is displayed.
ONROAD MODE SW [On/Off]	X		This switch is not equipped, but it is displayed.
HI/LO POSI SEN 3 [On/Off]	X		Transfer Hi-Lo position sensor (3) status is displayed.
HI/LO POSI SEN 1 [On/Off]	X		Transfer Hi-Lo position sensor (1) status is displayed.
LOCK POSI SEN [OPEN/LOCK/BAT/UNLEAN/HI TEMP/ERROR/GND]	X		Transfer lock position sensor signal is displayed.
ATP IND [On/Off]			Control status of ATP warning lamp is displayed.
4WD FAILLAMP [On/Off]		X	Control status of ATP warning lamp is displayed.
4WD MODE IND [4L/LOCK/AUTO]		X	Control status of 4WD mode indicator lamp is displayed. (LOCK means 4H of 4WD mode)
MOTOR DRIVE B [HI/LO/PWM]		X	Driving status of transfer motor is displayed. (Reverse side)
MOTOR DRIVE A [HI/LO/PWM]		X	Driving status of transfer motor is displayed. (Drive side)
FLUID TEMP SEN [V]	X		Temperature of transfer fluid is displayed.
MOTOR TEMP [V]	X		Temperature of transfer motor is displayed.
C/U POWER SUP [V]	X		Power supply voltage value of transfer control unit is displayed.
MOTOR POWER SUP [V]	X		Power supply voltage value of transfer motor unit is displayed.
ROTARY POSI SEN [%]	X		Transfer rotary position sensor signal is displayed.
THRTL POSI SEN [%]	X	X	Throttle opening status via CAN communication line is displayed.
AT R SPEED [km/h]	X		Output shaft revolution speed via CAN communication line is displayed.
T/M GEAR [0 - 7]	X		Current transmission gear via CAN communication line is displayed.
COMPR VHCL SPEED [km/h]		X	Vehicle speed calculated by transfer control unit is displayed.

Monitor item (Unit)	SELECT MONITOR ITEM		Remarks
	ECU INPUT SIGNALS	MAIN SIGNALS	
VHCL/S SEN-FR [km/h]	X		Wheel speed (front) average calculated by transfer control.
VHCL/S SEN-RR [km/h]	X		Wheel speed (rear) average calculated by transfer control.
ENG SPEED [rpm]	X		Engine status via CAN communication line is displayed.
INTERNL SPEED SEN [count]	X		Transfer internal speed sensor status is displayed.
TRANSFER TORQUE [Nm]		X	Commanded transfer communication torque is displayed.
UNIT PARAMETER [A1 - A9, B1 - B9, C1 - C9, D1 - D9, E1 - E9, F1 - F9, G1 - G9, H1 - H9, J1 - J9]			Unit parameter of transfer recognized by transfer control unit is displayed.

WORK SUPPORT

Function	Description
UNIT CHARACTERISTIC WRITE	Writes the unit parameter of transfer to transfer control unit.
START CALIBRATION	Perform initial calibration of transfer control unit.
LOCK SLEEVE SENSOR* INITIALIZE	Format learning the transfer lock position sensor written to transfer control unit.
LOCK SLEEVE SENSOR* LEARNING	Perform learning the transfer lock position sensor.
OIL DETERIORATION INFO RESET	Format the transfer fluid viscosity written to transfer control unit.

*: “LOCK SLEEVE SENSOR” means transfer lock position sensor.

ECU DIAGNOSIS INFORMATION

TRANSFER CONTROL UNIT

Reference Value

INFOID:0000000009008204

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.

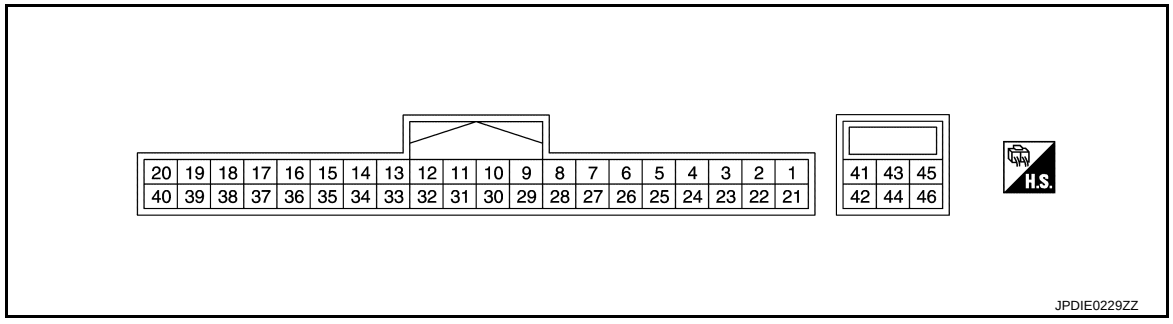
Monitor item	Condition		Value/Status
4WD MODE	Ignition switch: ON	4WD is booting	BOTNG
		4WD mode is switching	SWTNG
		4WD mode: 4L	4L
		4WD mode: 4H	4H
		4WD mode: AUTO	AUTO
2WD SWITCH *1	Always		Off
AUTO SWITCH	4WD shift switch: AUTO		On
	4WD shift switch: 4H or 4L		Off
4H SWITCH	4WD shift switch: 4H		On
	4WD shift switch: AUTO or 4L		Off
4L SWITCH	4WD shift switch: 4L		On
	4WD shift switch: AUTO or 4H		Off
T/M RANGE	A/T shift selector: D		D
	A/T shift selector: N		N
	A/T shift selector: R		R
	A/T shift selector: P		P
N RANGE SW	A/T shift selector: N		On
	A/T shift selector: Except N		Off
R RANGE SW	A/T shift selector: R		On
	A/T shift selector: Except R		Off
IGN SW	Ignition switch: ON		On
	Ignition switch: OFF		Off
TCS OPER SW	TCS is operating		On
	TCS is not operating		Off
VDC OPER SW	VDC is operating		On
	VDC is not operating		Off
ABS OPER SW	ABS is operating		On
	ABS is not operating		Off
SAND MODE IND*2	Always		Off
ROCK MODE IND*2	Always		Off
SNOW MODE IND*2	Always		Off
ON ROAD MODE IND*2	Always		On
SAND MODE SW*3	Always		Off
ROCK MODE SW*3	Always		Off
SNOW MODE SW*3	Always		Off

Monitor item	Condition		Value/Status
ON ROAD MODE SW*3	Always		On
HI-LO POSI SEN 3	4WD mode: AUTO or 4H		On
	4WD mode: Shifting		Off
	4WD mode: 4L		Off
HI-LO POSI SEN 1	4WD mode: AUTO or 4H		On
	4WD mode: Shifting		On
	4WD mode: 4L		Off
LOCK POSI SEN	When lock sleeve is opening		OPEN
	When lock sleeve locking		LOCK
	When transfer lock position sensor signal circuit is short. (Battery short)		BAT
	When transfer lock position sensor is unlearned.		UNLEAN
	When the temperature of transfer lock position sensor is high.		HI TMP
	When transfer lock position sensor is malfunctioning.		ERROR
	When transfer lock position sensor signal circuit is short. (Ground short)		GND
ATP IND	ATP warning lamp: ON		On
	ATP warning lamp: OFF		Off
4WD FAIL LAMP	4WD warning lamp: ON		On
	4WD warning lamp: OFF		Off
4WD MODE IND	4WD shift switch: AUTO		AUTO
	4WD shift switch: 4H		LOCK
	4WD shift switch: 4L		4L
MOTOR DRIVE B	When transfer motor is driving in reversal. (100% duty controlled)		HI
	When transfer motor is driving or stopping.		LO
	When transfer motor is driving in reversal. (PWM output)		PWM
MOTOR DRIVE A	When transfer motor is driving. (100% duty controlled)		HI
	When transfer motor is driving in reversal or stopping.		LO
	When transfer motor is driving. (PWM output)		PWM
FLUID TEMP SE	The temperature of transfer fluid is 20 – 80°C.		Approx. 1.1 – 0.3 V
MOTOR TEMP	The temperature of transfer motor is 20 – 80°C.		Approx. 1.1 – 0.3 V
C/U POWER SUP	Always		Battery voltage
MOTOR POWER SUP	Always		Battery voltage
ROTARY POSI SEN	4WD mode: AUTO A/T shift selector: D	Depress the accelerator pedal several times.	Value is changing
THRTL POS SEN	When depressing accelerator pedal (Value rises gradually in response to throttle position)		0 – 100 %
AT R SPEED	Vehicle stopped		0.00 km/h (0.00 mph)
	Vehicle driving (4WD mode: AUTO) **CAUTION:** **Check air pressure of tire under standard condition.**		Approx. equal to the indication on speedometer (inside of ±10 %)
T/M GEAR	A/T shift selector: D Vehicle driving		1 2 3 4 5 6 7

Monitor item	Condition		Value/Status
COMPR VHCL SPEED	Vehicle stopped		0.00 km/h (0.00 mph)
	Vehicle driving **CAUTION:** **Check air pressure of tire under standard condition.**		Approx. equal to the indication on speedometer (inside of ±10 %)
VHCL/S SEN-FR	Vehicle stopped		0.00 km/h (0.00 mph)
	Vehicle driving **CAUTION:** **Check air pressure of tire under standard condition.**		Approx. equal to the indication on speedometer (inside of ±10 %)
VHCL/S SEN-RR	Vehicle stopped		0.00 km/h
	Vehicle driving **CAUTION:** **Check air pressure of tire under standard condition.**		Approx. equal to the indication on speedometer (inside of ±10 %)
ENGINE SPEED	Engine: Running		Approx. equal to the indication on tachometer (inside of ±10 %)
INTRNL SPEED SEN	4WD mode: AUTO A/T shift selector: D	Depress the accelerator pedal several times.	Value is changing
TRANSFER TORQUE	4WD shift switch: AUTO		0 - 2250 N·m
	4WD shift switch: 4H		0 - 2250 N·m
	4WD shift switch: 4L		0 Nm
UNIT PARAMETER	Always		A1 - A9 B1 - B9 C1 - C9 D1 - D9 E1 - E9 F1 - F9 G1 - G9 H1 - H9 J1 - J9

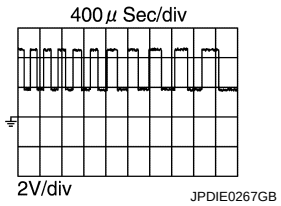
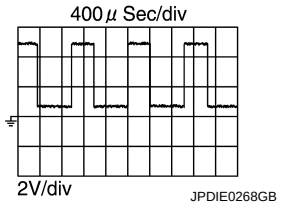
*1: 4WD shift switch (2WD) is not equipped, but it is displayed.
*2: This indicator is not equipped, but it is displayed.
*3: This switch is not equipped, but it is displayed.

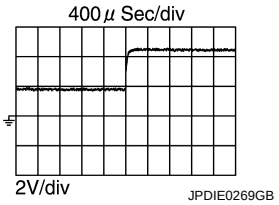
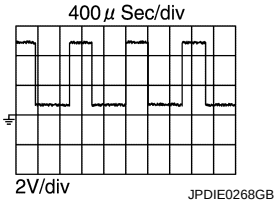
TERMINAL LAYOUT



PHYSICAL VALUES

Terminal No. (Wire color)		Description		Condition		Value (Approx.)
+	-	Signal name	Input/ Output			
6 (BR)	Ground	Hi-Lo position sensor 1	Input/ Output	Engine: Running (Never drive the vehicle.)	4WD mode: AUTO or 4H	0 V
					4WD mode: Shifting	0 V
					4WD mode: 4L	5 V

Terminal No. (Wire color)		Description		Condition		Value (Approx.)
+	-	Signal name	Input/ Output			
7 (Y)	Ground	Transfer fluid temperature sensor power supply	Input	Engine: Running		0 – 5 V
9 (G)	Ground	Transfer internal speed sensor (GND)	—	Always		0 V
10 (Y/G)	Ground	Transfer internal speed sensor (IMP)	Input	Ignition switch: ON	• 4WD mode: AUTO • A/T shift selector: N • Transfer motor: Driving	
11 (V)	Ground	4WD shift SW (4L)	Input	Ignition switch: ON	4WD shift switch: 4L	Battery voltage
					4WD shift switch: Except 4L	0 V
12 (L)	—	CAN-H	Input/ Output	—		—
13 (P)	—	CAN-L	Input/ Output	—		—
14 (W/R)	Ground	4WD shift SW (AUTO)	Input	Ignition switch: ON	4WD shift switch: AUTO	Battery voltage
					4WD shift switch: Except AUTO	0 V
15 (P/B)	Ground	Transfer rotary position sensor (PWM)	Input	Ignition switch: ON	• 4WD mode: AUTO • A/T shift selector: N	
16 (LG)	Ground	Transfer rotary position sensor (GND)	—	Always		0 V
17 (W/L)	Ground	Transfer lock position sensor power supply	Input	Ignition switch: ON		5 V
				10 seconds or more later after ignition switch turned OFF		0 V
18 (BR/Y)	Ground	Transfer rotary position sensor power supply	Input	Ignition switch: ON		5 V
				10 seconds or more later after ignition switch turned OFF		0 V
20 (GR)	Ground	Transfer control unit power supply	Input	Always		Battery voltage
25 (P/L)	Ground	Hi-Lo position sensor 3	Input/ Output	Engine: Running (Never drive the vehicle.)	4WD mode: AUTO or 4H	0 V
					4WD mode: Shifting	5 V
					4WD mode: 4L	5 V
28 (W)	Ground	Transfer motor temperature sensor power supply	Input	Ignition switch: ON		0 – 5 V
				Ignition switch: OFF		0 V

Terminal No. (Wire color)		Description		Condition		Value (Approx.)
+	-	Signal name	Input/ Output			
29 (LG/R)	Ground	Hi-Lo position sensor 2	Input/ Output	Engine: Running (Never drive the vehicle.)	Always	0 V
30 (R/B)	Ground	Transfer lock position sensor (GND)	—	Always		0 V
31 (L/O)	Ground	Transfer internal speed sensor (DIR)	Input	Ignition switch: ON	• 4WD mode: AUTO • A/T shift selector: N • When changing the transfer motor rotation direction.	
32 (BR/R)	Ground	Ignition switch	Input	Ignition switch: ON		Battery voltage
				Ignition switch: OFF		0 V
35 (R)	Ground	4WD shift SW (4H)	Input	Ignition switch: ON	4WD shift switch: 4H	Battery voltage
					4WD shift switch: Except 4H	0 V
36 (L/R)	Ground	Transfer fluid temperature sensor (GND)	—	Always		0 V
38 (G/O)	Ground	Transfer lock position sensor signal	Input	Ignition switch: ON	• 4WD mode: AUTO • A/T shift selector: N	
39 (R/W)	Ground	Transfer internal speed sensor power supply	Input	Ignition switch: ON		8 V
				Ignition switch: OFF		0 V
41 (W/R)	Ground	Transfer control actuator power supply	Input	Always		Battery voltage
43 (G/R)	Ground	Motor drive B	Input/ Output	Transfer motor: Driving		0 V - Battery voltage
44 (B)	Ground	GND	—	Always		0 V
45 (G/Y)	Ground	Motor drive A	Input/ Output	Transfer motor: Driving		0 V - Battery voltage
46 (B)	Ground	Transfer control actuator (GND)	—	Always		0 V

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

Fail-Safe

INFOID:0000000009008205

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

DTC Inspection Priority Chart

INFOID:0000000009008206

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	• P1802 CONTROL UNIT 1 • P1803 CONTROL UNIT 2 • P1804 CONTROL UNIT 3 • P1809 CONTROL UNIT 4 • P180C SEN POWER SUPPLY (5V) • P180E SEN POWER SUPPLY (8V) • P1811 BATTERY VOLTAGE • P181B INCOMP SELFSHUT • P181C MOTOR POWER SUPPLY • P181F INCOMP CALIBRATION
3	• P1807 VECL SPEED SEN-AT • P1808 VECL SPEED SEN-ABS • P1816 PNP SW/CIRC • P181E ST ANGLE SEN SIG • P1820 ENGINE SPEED SIG • P1829 THROTTLE POSI SEN • P1830 ABS OP SIG • P1831 VDC OP SIG • P1832 TCS OP SIG
4	• P180D ROTARY POSITION SEN • P1813 4WD MODE SW • P181A MOTOR TEMP SEN • P1826 OIL TEMP SEN • P182A HI-LO POSITION SEN • P182B LOCK POSITION SEN
5	• P180F MOTOR SYSTEM • P1817 SHIFT ACTUATOR

DTC Index

INFOID:0000000009008207

DTC	Display Items	Reference
P1802	CONTROL UNIT 1	DLN-52, "DTC Logic"
P1803	CONTROL UNIT 2	DLN-52, "DTC Logic"
P1804	CONTROL UNIT 3	DLN-52, "DTC Logic"
P1807	VHCL SPEED SEN-AT	DLN-53, "DTC Logic"
P1808	VHCL SPEED SEN-ABS	DLN-54, "DTC Logic"
P1809	CONTROL UNIT 4	DLN-52, "DTC Logic"
P180C	SEN POWER SUPPLY (5V)	DLN-55, "DTC Logic"
P180D	ROTARY POSITION SEN	DLN-58, "DTC Logic"
P180E	SEN POWER SUPPLY (8V)	DLN-61, "DTC Logic"
P180F	MOTOR SYSTEM	DLN-63, "DTC Logic"
P1811	BATTERY VOLTAGE	DLN-66, "DTC Logic"
P1813	4WD MODE SW	DLN-69, "DTC Logic"
P1816	PNP SW/CIRC	DLN-72, "DTC Logic"
P1817	SHIFT ACTUATOR	DLN-73, "DTC Logic"
P181A	MOTOR TEMP SEN	DLN-75, "DTC Logic"
P181B	IMCOMP SELFSHUT	DLN-77, "DTC Logic"

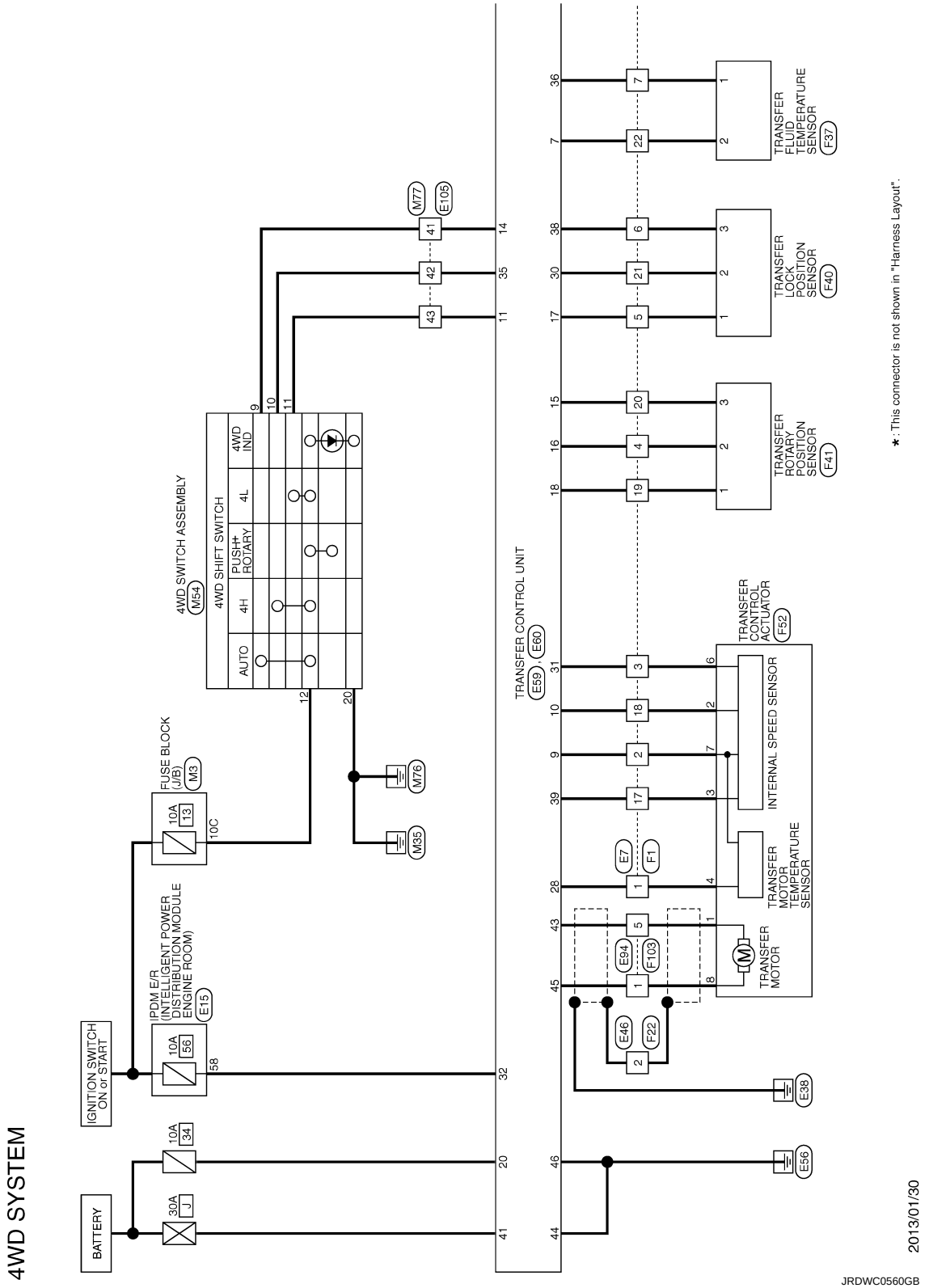
DTC	Display Items	Reference
P181C	MOTOR POWER SUPPLY	DLN-79, "DTC Logic"
P181E	ST ANGLE SEN SIG	DLN-81, "DTC Logic"
P181F	INCOMP CALIBRATION	DLN-82, "DTC Logic"
P1826	OIL TEMP SEN	DLN-84, "DTC Logic"
P1820	ENGINE SPEED SIG	DLN-83, "DTC Logic"
P1829	THROTTLE POSI SEN	DLN-86, "DTC Logic"
P182A	HI-LO POSITION SEN	DLN-87, "DTC Logic"
P182B	LOCK POSITION SEN	DLN-89, "DTC Logic"
P1830	ABS OP SIG	DLN-92, "DTC Logic"
P1831	VDC OP SIG	DLN-93, "DTC Logic"
P1832	TCS OP SIG	DLN-94, "DTC Logic"
U1000	CAN COMM CIRCUIT	DLN-95, "DTC Logic"
U1010	CONTROL UNIT (CAN)	DLN-96, "DTC Logic"

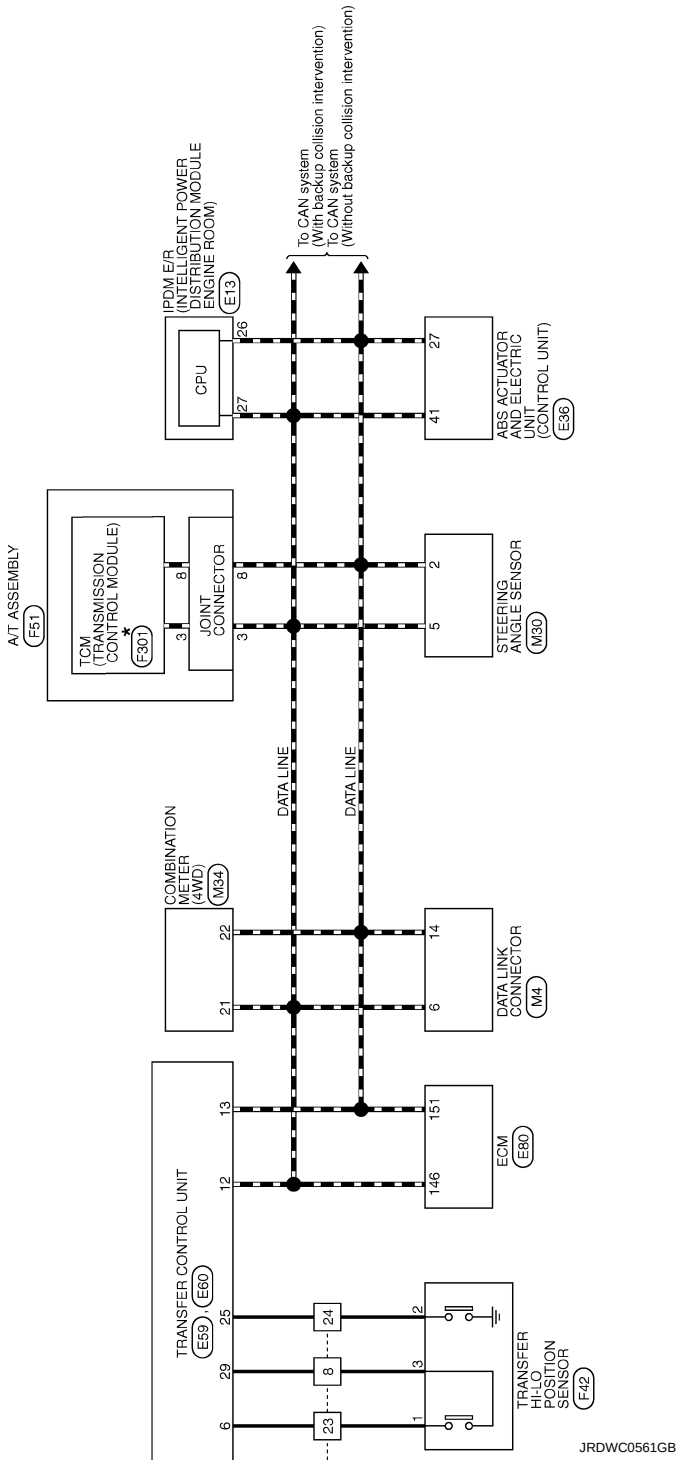
WIRING DIAGRAM

4WD SYSTEM

Wiring Diagram

INFOID:0000000009008208




To CAN system
(With backup collision intervention)
To CAN system
(Without backup collision intervention)
IPDM E/R
(INTELLIGENT POWER
DISTRIBUTION MODULE
ENGINE ROOM)
E13
CPU
26
27
ABS ACTUATOR
AND ELECTRIC
UNIT
(CONTROL UNIT)
E36
27
41
A/T ASSEMBLY
F51
TCM
(TRANSMISSION
CONTROL MODULE)
*
F301
3
8
JOINT
CONNECTOR
8
3
STEERING
ANGLE SENSOR
M30
2
5
DATA LINE
DATA LINE
COMBINATION
METER
(4WD)
M34
22
21
DATA LINK
CONNECTOR
M4
14
6
TRANSFER CONTROL UNIT
E59
E60
13
12
ECM
E80
151
146
25
29
6
24
8
23
TRANSFER
HI-LO
POSITION
SENSOR
F42
2
3
1
JRDWC0561GB

JRDWC1132GB

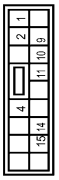
JRDWC1133GB

4WD SYSTEM

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Type	TH32FW-NH

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	G	-
3	L/O	-
4	LG	-
5	W/L	-
6	G/O	-
7	L/R	-
8	LG/R	-
14	R	-
16	SB	-
17	R/W	-
18	Y/G	-
19	BR/Y	-
20	P/B	-
21	R/B	-
22	Y	-
23	BR/W	-
24	P/L	-
29	P	-
30	BR	-
31	L	-
32	P	-

Connector No.	F22
Connector Name	WIRE TO WIRE
Connector Type	NS16FW-CS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	SHIELD	-
4	V	-
9	B	-
10	L/W	-
11	W	-
14	SB	-
15	G	-

Connector No.	F37
Connector Name	TRANSFER FLUID TEMPERATURE SENSOR
Connector Type	E02FGY-RS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	L/R	-
2	Y	-

Connector No.	F40
Connector Name	TRANSFER LOCK POSITION SENSOR
Connector Type	RH03FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W/L	-
2	R/B	-
3	G/O	-

Connector No.	F41
Connector Name	TRANSFER ROTARY POSITION SENSOR
Connector Type	RH03FGY

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR/Y	-
2	LG	-
3	P/B	-

Connector No.	F42
Connector Name	TRANSFER HI-LO POSITION SENSOR
Connector Type	PE203FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR/W	-
2	P/L	-
3	LG/R	-

Connector No.	F51
Connector Name	A/T ASSEMBLY
Connector Type	RK10FG

Terminal No.	Color Of Wire	Signal Name [Specification]
1	V	IGNITION POWER SUPPLY
2	P	BATTERY POWER SUPPLY
3	L	CAN-H
4	SB	K-LINE
5	B	GROUND
6	V	IGNITION POWER SUPPLY
7	R	BACK-UP LAMP RELAY
8	P	CAN-L
9	BR	STARTER RELAY
10	B	GROUND

JRDWC1134GB

4WD SYSTEM

Connector No.	F52
Connector Name	TRANSFER CONTROL ACTUATOR
Connector Type	DH208FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G/R	-
2	Y/G	-
3	R/W	-
4	W	-
6	L/O	-
7	G	-
8	G/Y	-

Connector No.	F103
Connector Name	WIRE TO WIRE
Connector Type	M06FW-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G/Y	-
2	R	-
3	V	-
4	R	-
5	G/R	-
6	B/R	-

Connector No.	F301
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Type	SP10FG

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	-	IGNITION POWER SUPPLY
2	-	BATTERY POWER SUPPLY
3	-	CAN-H
4	-	K-LINE
5	-	GROUND
6	-	IGNITION POWER SUPPLY
7	-	BACK-UP LAMP RELAY
8	-	CAN-L
9	-	STARTER RELAY
10	-	GROUND

Connector No.	M3
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS12FW-CS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
10C	G/R	-
11C	R/L	-
12C	G/R/L	-
6C	R	-
7C	B	-
8C	W	-

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
3	LG	-
4	B	-
5	B	-
6	L	-
7	SB	-
8	GR	-
11	SB	-
12	R	-
13	L	-
14	P	-
16	Y	-

Connector No.	M30
Connector Name	STEERING ANGLE SENSOR
Connector Type	TH08FW-NH

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	P	-
4	GR	-
5	L	-

Connector No.	M34
Connector Name	COMBINATION METER
Connector Type	TH40FW-NH

H.S.

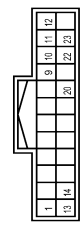
Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	BATTERY POWER SUPPLY
2	GR	IGNITION SIGNAL
3	B	GROUND
4	B	ILL GND
5	B	ILL CONTROL OUTPUT
7	R	TOW MODE SIGNAL
8	P/L	TRIP RESET SWITCH SIGNAL
11	G	ENTER SWITCH SIGNAL
12	O	SELECT SWITCH SIGNAL
13	W/R	ILLUMINATION CONTROL SWITCH SIGNAL (+)
14	R	ILLUMINATION CONTROL SWITCH SIGNAL (-)
15	R/W	AIR BAG SIGNAL
18	W/R	AMBIENT SENSOR SIGNAL
19	V/W	A/C AUTO AMP. CONNECTION RECOGNITION SIGNAL
20	B	AMBIENT SENSOR GROUND
21	L	CAN-H
22	P	CAN-L
23	B	GROUND
24	V	FUEL LEVEL SENSOR GROUND
25	O/L	ALTERNATOR SIGNAL
26	W	PARKING BRAKE SWITCH SIGNAL
28	GR/R	SECURITY SIGNAL
29	BR	WASHER LEVEL SWITCH SIGNAL
30	SB	VEHICLE SPEED SIGNAL (2-PULSE)
31	BR/W	VEHICLE SPEED SIGNAL (8-PULSE)
33	W	SNOW MODE SIGNAL
34	BR/Y	FUEL LEVEL SENSOR SIGNAL
35	O/B	SEAT BELT BUCKLE SWITCH SIGNAL (DRIVER SIDE)
36	G/Y	PASSENGER SEAT BELT WARNING SIGNAL
37	R/Y	NON-MANUAL MODE SIGNAL
38	L/W	MANUAL MODE SHIFT DOWN SIGNAL
39	Y/B	MANUAL MODE SHIFT UP SIGNAL
40	G/W	MANUAL MODE SIGNAL

JRDWC1135GB

4WD SYSTEM

Connector No.	M54
Connector Name	4WD SWITCH ASSEMBLY
Connector Type	TH24FW-NH

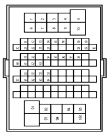
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L/W	VDC OFF SW
9	W/R	AUTO SW
10	R	4H SW
11	V	4L SW
12	GR	IGN
13	L/W	LIGHT SW
14	B/O	ILL CONT
20	B	GND
22	W	SNOW SW
23	R	TOW

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	L/W	-
3	R/B	-
4	L	-
5	Y	-
6	SB	-
7	W/G	-
8	P/B	-
9	W/B	-
10	G	-
11	L	-
12	P	-
13	P/B	-
14	BR	-
15	O/L	-
16	SB	-
18	BR	-
19	Y/G	-
20	BR/Y	-
21	V	-
22	L	-
23	Y	-
24	L/W	-
28	O	-
29	R/W	-
30	O/L	-
31	Y	-
32	GR/R	-
34	Y	-
35	R	-
36	B/O	-
37	G/Y	-
38	G	-
40	SB	-
41	W/R	-
42	R	-
43	V	-
51	L/O	-
52	BR/W	-
53	BR/Y	-
54	GR/L	-
60	W	-
61	B	-
62	G	-
63	R	-
64	SHIELD	-
91	BR	-
92	L/W	-
94	Y/B	-
95	L/R	-
97	R	-
98	O/L	-
100	W/B	-

JRDWC1136GB

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000009008209

DETAILED FLOW

1.INTERVIEW FROM THE CUSTOMER

Clarify customer complaints before inspection. First of all, perform an interview utilizing DLN-40, "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 fail-safe function. Refer to DLN-29, "Fail-Safe".

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-30, "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 “ALL MODE AWD/4WD”.
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:0000000009008210

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 4WD mode.			
		☐4WD warning lamp turns on.			
		☐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 (°F)]			
	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					

ADDITIONAL SERVICE WHEN REPLACING TRANSFER CONTROL UNIT

Description

INFOID:0000000009008211

Perform writing unit parameter and initial calibration after replacing transfer control unit. Refer to DLN-42, "Work Procedure".

Work Procedure

INFOID:0000000009008212

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F is detected.)

1. WRITE UNIT PARAMETER

Perform writing unit parameter to control unit. Refer to DLN-49, "Work Procedure".

>> GO TO 2.

2. INITIAL CALIBRATION (1)

With CONSULT

1. Start the engine.
   CAUTION:
   Never drive the vehicle.
2. Check “4WD MODE”, “T/M RANGE”, “COMPR VHCL SPEED”, “MOTOR POWER SUP” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.
3. Continue the following condition more than 10 seconds.

4WD MODE	: AUTO
T/M RANGE	: N
COMPR VHCL SPEED	: 0 km/h (Never drive the vehicle)
MOTOR POWER SUP	: More than 11 V

Does the transfer motor operate automatically?

YES >> After the transfer motor operation stop (After approximately 10 seconds) GO TO 4.
NO >> GO TO 3.

3. INITIAL CALIBRATION (2)

With CONSULT

1. Select “START CALIBRATION” of CONSULT “WORK SUPPORT” for “ALL MODE AWD/4WD”.
2. Wait until the motor operation stop. (After approximately 10 seconds)

>> GO TO 4.

4. PERFORM SELF-DIAGNOSIS

With CONSULT

1. Erase self-diagnosis result for “ALL MODE AWD/4WD”.
2. Turn the ignition switch ON to OFF.
   CAUTION:
   Wait for 10 seconds after turning ignition switch OFF.
3. Start the engine.
   CAUTION:
   Never drive the vehicle.
4. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is “DTC P181F” detected?

YES >> GO TO 1.
NO >> WORK END

ADDITIONAL SERVICE WHEN REPLACING TRANSFER ASSEMBLY

Description

INFOID:0000000009008213

Perform writing unit parameter, transfer fluid viscosity learning and initial calibration after replacing transfer assembly. Refer to DLN-43, "Work Procedure".

Work Procedure

INFOID:0000000009008214

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F is detected.)

1. WRITE UNIT PARAMETER

Perform writing unit parameter to control unit. Refer to DLN-49, "Work Procedure".

>> GO TO 2.

2. PREPARATION BEFORE WORK

With CONSULT
1. Start the engine.
   CAUTION:
   Never drive the vehicle.
2. Check “4WD MODE”, “T/M RANGE”, “COMPR VHCL SPEED”, “MOTOR POWER SUP” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.
3. Continue the following condition more than 10 seconds.

4WD MODE	: AUTO
T/M RANGE	: N
COMPR VHCL SPEED	: 0 km/h (Never drive the vehicle)
MOTOR POWER SUP	: More than 11 V

>> GO TO 3.

3. PERFORM TRANSFER FLUID VISCOSITY LEARNING

With CONSULT
1. Select “OIL DETERIORATION INFO RESET” of CONSULT “WORK SUPPORT” for “ALL MODE AWD/4WD”.
2. Select “Start”.

>> GO TO 4.

4. INITIAL CALIBRATION

With CONSULT
1. Select “START CALIBRATION” of CONSULT “WORK SUPPORT” for “ALL MODE AWD/4WD”.
2. Wait until the motor operation stop. (After approximately 10 seconds)

>> GO TO 5.

5. PERFORM SELF-DIAGNOSIS

With CONSULT
1. Erase self-diagnosis result for “ALL MODE AWD/4WD”.
2. Turn the ignition switch ON to OFF.
   CAUTION:
   Wait for 10 seconds after turning ignition switch OFF.
3. Start the engine.
   CAUTION:
   Never drive the vehicle.
4. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is “DTC P181F” detected?

YES >> GO TO 1.
NO >> WORK END

TRANSFER LOCK POSITION SENSOR LEARNING

Description

INFOID:0000000009008215

- Detect a stroke of transfer lock sleeve and learn operating area of transfer lock sleeve (Lock/Unlock)
- Perform the learning of transfer lock position sensor by “WORK SUPPORT” of CONSULT function. Refer to DLN-45, "Work Procedure".

CAUTION:
Before performing the learning of lock position sensor, must erase learning of transfer lock position sensor.

Function	Description
LOCK SLEEVE SENSOR* INITIALIZE	Format learning the transfer lock position sensor written to transfer control unit.
LOCK SLEEVE SENSOR* LEARNING	Perform learning the transfer lock position sensor.

*: “LOCK SLEEVE SENSOR” means transfer lock position sensor.

Work Procedure

INFOID:0000000009008216

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F or P182B is detected.)

1.PREPARATION BEFORE WORK

With CONSULT

1. Continue the following condition at vehicle.

Engine	: Running
Parking brake	: Apply
Brake pedal	: Release
Electrical system like air conditioner	: OFF

CAUTION:
Never drive the vehicle.

2. Check “4WD MODE”, “T/M RANGE”, “COMPR VHCL SPEED”, “MOTOR POWER SUP” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.
3. Continue the following condition.

4WD MODE	: 4L
T/M RANGE	: N
COMPR VHCL SPEED	: 0 km/h (Never drive the vehicle)
MOTOR POWER SUP	: More than 11 V

>> GO TO 2.

2.PERFORM LOCK POSITION SENOR LEARNING

With CONSULT

1. Select “LOCK SLEEVE SENSOR LEARNING” of CONSULT “WORK SUPPORT” for “ALL MODE AWD/4WD”.
2. Select “Start”.
3. Wait until the motor operation stop.

Is “Error” detected?

YES (within 5 times)>>GO TO 1.
YES (over 5 times)>>Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-127, "Removal and Installation".
NO >> GO TO 3.

3.PERFORM SELF-DIAGNOSIS

With CONSULT

1. Erase self-diagnosis result for “ALL MODE AWD/4WD”.
2. Turn the ignition switch ON to OFF.
   CAUTION:
   Wait for 10 seconds after turning ignition switch OFF.
3. Start the engine.
   CAUTION:
   Never drive the vehicle.
4. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is “DTC P182B” detected?

YES >> GO TO 1.
NO >> WORK END

TRANSFER ROTARY POSITION SENSOR LEARNING

Description

INFOID:0000000009008217

Perform initial calibration after replacing transfer rotary position sensor. Refer to DLN-47, "Work Procedure".

Work Procedure

INFOID:0000000009008218

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F is detected.)

1.INITIAL CALIBRATION

With CONSULT

1. Start the engine.
   CAUTION:
   Never drive the vehicle.
2. Check “4WD MODE”, “T/M RANGE”, “COMPR VHCL SPEED”, “MOTOR POWER SUP” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.
3. Continue the following condition.

4WD MODE	: AUTO
T/M RANGE	: N
COMPR VHCL SPEED	: 0 km/h (Never drive the vehicle)
MOTOR POWER SUP	: More than 11 V

4. Select “START CALIBRATION” of CONSULT “WORK SUPPORT” for “ALL MODE AWD/4WD”.
5. Wait till the motor operates. (Aprrox. 10 seconds)

>> GO TO 2.

2.PERFORM SELF-DIAGNOSIS

With CONSULT

1. Erase self-diagnosis result for “ALL MODE AWD/4WD”.
2. Turn the ignition switch ON to OFF.
   CAUTION:
   Wait for 10 seconds after turning ignition switch OFF.
3. Start the engine.
   CAUTION:
   Never drive the vehicle.
4. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is “DTC P180D” detected?

YES >> GO TO 1.
NO >> WORK END

TRANSFER FLUID VISCOSITY LEARNING

Description

INFOID:0000000009008219

Perform transfer fluid viscosity learning and initial calibration after draining and refilling transfer fluid. Refer to DLN-48, "Work Procedure".

Work Procedure

INFOID:0000000009008220

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F is detected.)

1. PREPARATION BEFORE WORK

With CONSULT

1. Start the engine.
   CAUTION:
   Never drive the vehicle.
2. Check “4WD MODE”, “T/M RANGE”, “COMPR VHCL SPEED”, “MOTOR POWER SUP” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.
3. Continue the following condition more than 10 seconds.

4WD MODE	: AUTO
T/M RANGE	: N
COMPR VHCL SPEED	: 0 km/h (Never drive the vehicle)
MOTOR POWER SUP	: More than 11 V

>> GO TO 2.

2. TRANSFER FLUID VISCOSITY LEARNING

With CONSULT

1. Select “OIL DETERIORATION INFO RESET” of CONSULT “WORK SUPPORT” for “ALL MODE AWD/4WD”.
2. Select “Start”.

>> GO TO 3.

3. INITIAL CALIBRATION

With CONSULT

1. Select “START CALIBRATION” of CONSULT “WORK SUPPORT” for “ALL MODE AWD/4WD”.
2. Wait until the motor operation stop. (After approximately 10 seconds)

>> GO TO 4.

4. PERFORM SELF-DIAGNOSIS

With CONSULT

1. Erase self-diagnosis result for “ALL MODE AWD/4WD”.
2. Turn the ignition switch ON to OFF.
   CAUTION:
   Wait for 10 seconds after turning ignition switch OFF.
3. Start the engine.
   CAUTION:
   Never drive the vehicle.
4. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is “DTC P181F” detected?

YES >> GO TO 1.
NO >> WORK END

CONFIGURATION (TRANSFER CONTROL UNIT)

Description

INFOID:0000000009008221

Perform writing unit parameter after replacing transfer control unit, transfer assembly and transfer control actuator. Refer to DLN-49, "Work Procedure".

Work Procedure

INFOID:0000000009008222

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F is detected.)

1.CONFIRM REPLACING PARTS

Confirm the replacing parts.

What is the replacing parts?

Transfer control unit>>GO TO 2.
Transfer control actuator>>GO TO 3.
Transfer assembly>>GO TO 4.

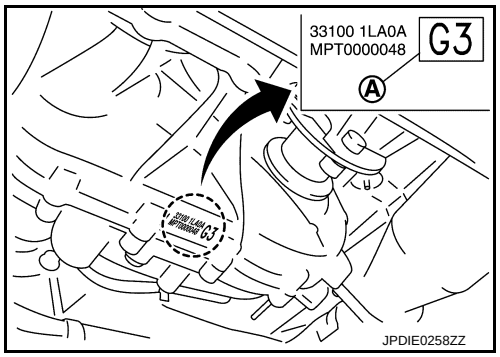
2.WRITE UNIT PARAMETER (1)

With CONSULT

1. Make the new unit parameter with the following procedure.

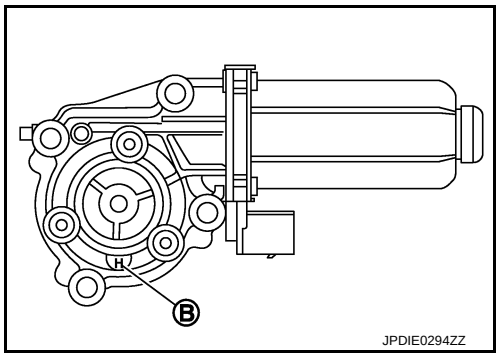
- Confirm the alphabet of unit parameter (A).

NOTE:
- This illustration is sample.
- For this illustration, the unit parameter is “G3” and the alphabet of unit parameter is “G”.



- Confirm the alphabet of transfer control actuator parameter (B).

NOTE:
- Original transfer control actuator does not have marking of alphabet.
- Just in case that transfer control actuator has been replaced, it has marking of alphabet.
- This illustration is sample of replaced transfer control actuator.
- For this illustration, the alphabet of transfer control actuator parameter is “H”.



- Make new alphabet of unit parameter as to the alphabets of unit parameter and the transfer control actuator parameter, using following chart.

When the alphabet of transfer control actuator parameter is no marking.

The alphabet of original unit parameter	A	B	C	D	E	F	G	H	J
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
The new alphabet of unit parameter	A	B	C	D	E	F	G	H	J

When the alphabet of transfer control actuator parameter is “C”.

The alphabet of original unit parameter	A	B	C	D	E	F	G	H	J
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
The new alphabet of unit parameter	A	B	C	C	D	E	E	F	G

When the alphabet of transfer control actuator parameter is “H”.

The alphabet of original unit parameter	A	B	C	D	E	F	G	H	J
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
The new alphabet of unit parameter	B	C	D	D	E	F	F	G	H

When the alphabet of transfer control actuator parameter is “N”.

The alphabet of original unit parameter	A	B	C	D	E	F	G	H	J
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
The new alphabet of unit parameter	C	D	E	E	F	G	G	H	J

NOTE:
For the sample illustrations, the new alphabet of unit parameter is “F”.

- Add the same number of unit parameter behind the new alphabet of unit parameter.

NOTE:
For the sample illustration, the number of unit parameter is “3” and new unit parameter is “F3”.

2. Turn the ignition switch OFF to ON.
3. Select “UNIT CHARACTERISTICS WRITE” of CONSULT “WORK SUPPORT” for “ALL MODE AWD/ 4WD”.
4. Input new unit parameter.
5. Select “Start”.
6. Check that "UNIT CHARACTERISTICS WRITE COMPLETED" or "UNIT CHARACTERISTICS WRITE ALREADY WRITTEN" is displayed.

>> WORK END.

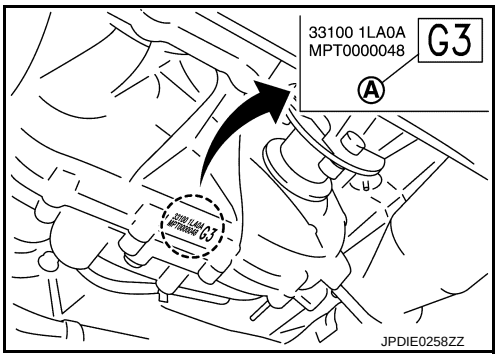
3. WRITE UNIT PARAMETER (2)

With CONSULT

1. Make the new unit parameter with the following procedure.

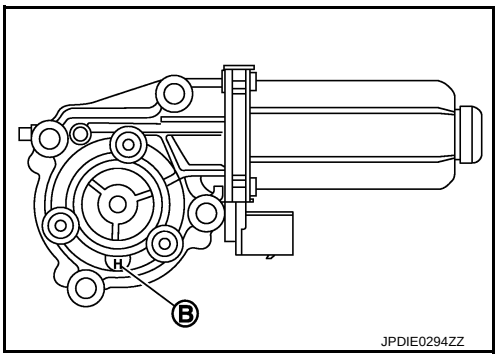
- Confirm the alphabet of unit parameter (A).

NOTE:
- This illustration is sample.
- For this illustration, the unit parameter is “G3” and the alphabet of unit parameter is “G”.



- Confirm the alphabet of transfer control actuator parameter (B).

NOTE:
- Original transfer control actuator does not have marking of alphabet.
- Just in case that transfer control actuator has been replaced, it has marking of alphabet.
- This illustration is sample of replaced transfer control actuator.
- For this illustration, the alphabet of transfer control actuator parameter is “H”.



- Make new alphabet of unit parameter as to the alphabets of unit parameter and the transfer control actuator parameter, using following chart.

When the alphabet of transfer control actuator parameter is “C”.

The alphabet of original unit parameter	A	B	C	D	E	F	G	H	J
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
The new alphabet of unit parameter	A	B	C	C	D	E	E	F	G

When the alphabet of transfer control actuator parameter is “H”.

The alphabet of original unit parameter	A	B	C	D	E	F	G	H	J
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
The new alphabet of unit parameter	B	C	D	D	E	F	F	G	H

When the alphabet of transfer control actuator parameter is “N”.

The alphabet of original unit parameter	A	B	C	D	E	F	G	H	J
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
The new alphabet of unit parameter	C	D	E	E	F	G	G	H	J

NOTE:
For the sample illustrations, the new alphabet of unit parameter is “F”.

- Add the same number of unit parameter behind the new alphabet of unit parameter.

NOTE:
For the sample illustration, the number of unit parameter is “3” and new unit parameter is “F3”.

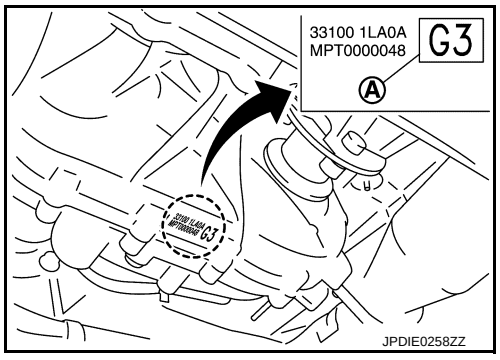
2. Turn the ignition switch OFF to ON.
3. Select “UNIT CHARACTERISTICS WRITE” of CONSULT “WORK SUPPORT” for “ALL MODE AWD/4WD”.
4. Input new unit parameter.
5. Select “Start”.
6. Check that "UNIT CHARACTERISTICS WRITE COMPLETED" or "UNIT CHARACTERISTICS WRITE ALREADY WRITTEN" is displayed.

>> WORK END.

4. WRITE UNIT PARAMETER (3)

With CONSULT

1. Confirm the unit parameter (A).
   NOTE:
   - This illustration is sample.
   - For this illustration, the unit parameter is “G3”.
2. Turn the ignition switch OFF to ON.
3. Select “UNIT CHARACTERISTICS WRITE” of CONSULT “WORK SUPPORT” for “ALL MODE AWD/4WD”.
4. Input unit parameter.
5. Select “Start”.
6. Check that "UNIT CHARACTERISTICS WRITE COMPLETED" or "UNIT CHARACTERISTICS WRITE ALREADY WRITTEN" is displayed.



>> WORK END.

DTC/CIRCUIT DIAGNOSIS

P1802, P1803, P1804, P1809 TRANSFER CONTROL UNIT

DTC Logic

INFOID:0000000009008223

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1802	CONTROL UNIT 1	Malfunction is detected in the memory (RAM) system of transfer control unit.	Internal malfunction of transfer control unit.
P1803	CONTROL UNIT 2	Malfunction is detected in the memory (ROM) system of transfer control unit.	
P1804	CONTROL UNIT 3	Malfunction is detected in the memory (EEPROM) system of transfer control unit.	
P1809	CONTROL UNIT 4	AD converter system of transfer control unit is malfunctioning.	

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”.

Are DTC’s “P1802, P1803, P1804 or P1809” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-52, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008224

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 and more.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Are DTC’s “P1802, P1803, P1804 or 1809” detected?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Check transfer control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace error-detected parts.

P1807 OUT PUT SHAFT SPEED SENSOR

DTC Logic

INFOID:0000000009008225

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1807	VHCL SPEED SEN-AT	• Malfunction is detected in output speed signal that is output from TCM through CAN communication. • Improper signal is input while driving.	• Harness or connector (CAN communication line) • TCM - Internal malfunction of TCM - Output speed signal error

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 “P1807” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-53, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008226

1.PERFORM TCM SELF-DIAGNOSIS

With CONSULT

Perform self-diagnosis for “TRANSMISSION”.

Is any DTCs detected?

YES >> Check the DTC. Refer to TM-82, "DTC Index".
NO >> GO TO 2.

2.CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer 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 "P1807" is detected, Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1808 WHEEL SPEED SENSOR

DTC Logic

INFOID:0000000009008227

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1808	VHCL SPEED SEN-ABS	• Malfunction is detected in vehicle speed signal that is output from ABS actuator and electric unit (control unit) through CAN communication. • Improper signal is input while driving.	• Harness or connector (CAN communication line) • Malfunction of ABS actuator and electric unit (control unit) - Malfunction of ABS actuator and electric unit (control unit) circuit error - Vehicle speed signal error

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 “P1808” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-54, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008228

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

With CONSULT

Perform self-diagnosis for “ABS”.

Is any DTCs detected?

YES >> Check the DTC. Refer to BRC-50, "DTC Index".
NO >> GO TO 2.

2.CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer 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 "P1808" is detected, Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P180C SENSOR POWER SUPPLY (5V)

Description

INFOID:0000000009008229

Supplies power (5V) to transfer lock position sensor and transfer rotary position sensor.

DTC Logic

INFOID:0000000009008230

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P180C	SEN POWER SUPPLY (5V)	When the sensor power supply (5V) voltage is lower or higher than normal.	• Malfunction of transfer lock position sensor power supply circuit (open or short) • Malfunction of transfer rotary position sensor power supply circuit (open or short)

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 “P180C” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-55, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008231

1.CHECK TRANSFER LOCK POSITION SENSOR POWER SUPPLY (1)

1. Turn the ignition switch OFF.
2. Disconnect transfer lock position sensor harness connector and transfer rotary position sensor harness connector.
3. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
4. Check the voltage between transfer lock position sensor harness connector terminals.

+		–	Voltage
Transfer lock position sensor			
Connector	Terminal		
F40	1	2	Approx. 5 V

Is the inspection result normal?

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

2.CHECK TRANSFER LOCK POSITION SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.

3. Check the continuity between transfer control unit harness connector and transfer lock position sensor harness connector.

Transfer control unit		Transfer lock position sensor		Continuity
Connector	Terminal	Connector	Terminal	
E59	17	F40	1	Existed
	30		2	

4. Check the continuity between transfer lock position sensor harness connector and ground.

Transfer lock position sensor		—	Continuity
Connector	Terminal		
F40	1	Ground	Not existed

Is the inspection result normal?

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

3.CHECK TRANSFER LOCK POSITION SENSOR POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Connect transfer lock position sensor harness connector.
3. Turn the ignition switch ON.

CAUTION:
Never start the engine.

4. Check the voltage between transfer lock position sensor harness connector terminals.

+		–	Voltage
Transfer lock position sensor			
Connector	Terminal		
F40	1	2	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace transfer lock position sensor. Refer to DLN-124, "Removal and Installation".

4.CHECK TRANSFER ROTARY POSITION SENSOR POWER SUPPLY (1)

1. Turn the ignition switch OFF.
2. Connect transfer control unit harness connector.
3. Turn the ignition switch ON.

CAUTION:
Never start the engine.

4. Check the voltage between transfer rotary position sensor harness connector terminals.

+		–	Voltage
Transfer rotary position sensor			
Connector	Terminal		
F41	1	2	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK TRANSFER ROTARY POSITION SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer rotary position sensor harness connector.

Transfer control unit		Transfer rotary position sensor		Continuity
Connector	Terminal	Connector	Terminal	
E59	18	F41	1	Existed
	16		2	

4. Check the continuity between transfer rotary position sensor harness connector and ground.

Transfer rotary position sensor		—	Continuity
Connector	Terminal		
F41	1	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

6. CHECK TRANSFER ROTARY POSITION SENSOR POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Connect transfer lock position sensor harness connector.
3. Turn the ignition switch ON.

CAUTION:
Never start the engine.

4. Check the voltage between transfer rotary position sensor harness connector terminals.

+		–	Voltage
Transfer rotary position sensor			
Connector	Terminal		
F41	1	2	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace transfer rotary position sensor. Refer to DLN-122, "Removal and Installation".

7. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P180D TRANSFER ROTARY POSITION SENSOR

DTC Logic

INFOID:0000000009008232

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P180D	ROTARY POSITION SEN	Malfunction is detected in transfer rotary position sensor.	Transfer rotary position sensor • Transfer rotary position sensor error • Transfer rotary position sensor circuit error

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. Turn the 4WD shift switch AUTO⇒4H⇒4L⇒4H⇒AUTO.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P180D” detected?

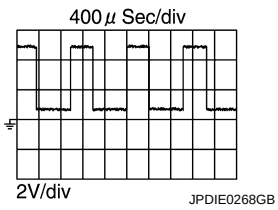
YES >> Proceed to diagnosis procedure. Refer to DLN-58, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008233

1.CHECK TRANSFER ROTARY POSITION SENSOR SIGNAL

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

+		–	Voltage
Transfer control unit			
Connector	Terminal		
E59	15	Ground	

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK TRANSFER ROTARY POSITION SENSOR POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer rotary position sensor harness connector.
3. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
4. Check the voltage between transfer rotary position sensor harness connector terminals.

+		–	Voltage
Transfer rotary position sensor			
Connector	Terminal		
F41	1	2	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK TRANSFER ROTARY POSITION SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer rotary position sensor harness connector.

Transfer control unit		Transfer rotary position sensor		Continuity
Connector	Terminal	Connector	Terminal	
E59	18	F41	1	Existed
	16		2	

4. Check the continuity between transfer rotary position sensor harness connector and ground.

Transfer rotary position sensor		—	Continuity
Connector	Terminal		
F41	1	Ground	Not existed

Is the inspection result normal?

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

4. CHECK TRANSFER ROTARY POSITION SENSOR SIGNAL CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer rotary position sensor harness connector.

Transfer control unit		Transfer rotary position sensor		Continuity
Connector	Terminal	Connector	Terminal	
E59	15	F41	3	Existed

4. Check the continuity between transfer rotary position sensor harness connector and ground.

Transfer rotary position sensor		—	Continuity
Connector	Terminal		
F41	3	Ground	Not existed

Is the inspection result normal?

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

5. REPLACE TRANSFER ROTARY POSITION SENSOR

1. Replace transfer rotary position sensor. Refer to DLN-122, "Removal and Installation".
2. Perform confirmation procedure again. Refer to DLN-58, "DTC Logic".

Is DTC “P180D” detected?

YES >> GO TO 6.

NO >> INSPECTION END

6. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P180E SENSOR POWER SUPPLY (8V)

Description

INFOID:0000000009008234

Supplies power (8V) to transfer internal speed sensor.

DTC Logic

INFOID:0000000009008235

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P180E	SEN POWER SUPPLY (8V)	When the sensor power supply (8V) voltage is lower or higher than normal.	Malfunction of transfer internal speed sensor power supply circuit (open or short)

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 “P180E” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-61, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008236

1.CHECK TRANSFER INTERNAL SPEED SENSOR POWER SUPPLY (1)

1. Turn the ignition switch OFF.
2. Disconnect transfer control actuator harness connector.
3. Turn the ignition switch ON.

CAUTION:
Never start the engine.

4. Check the voltage between transfer control actuator harness connector terminals.

+		–	Voltage
Transfer control actuator			
Connector	Terminal		
F52	3	7	Approx. 8 V

Is the inspection result normal?

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

2.CHECK TRANSFER INTERNAL SPEED SENSOR CIRCUIT

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

Transfer control unit		Transfer control actuator		Continuity
Connector	Terminal	Connector	Terminal	
E59	39	F52	3	Existed
	9		7	

4. Check the continuity between transfer control actuator harness connector and ground.

Transfer control actuator		—	Continuity
Connector	Terminal		
F52	7	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK TRANSFER INTERNAL SPEED SENSOR POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Connect transfer control actuator harness connector.
3. Turn the ignition switch ON.

CAUTION:
Never start the engine.

4. Check the voltage between transfer control actuator harness connector terminals.

+		–	Voltage
Transfer control actuator			
Connector	Terminal		
F52	3	7	Approx. 8 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Transfer internal speed sensor is malfunctioning. Replace transfer control actuator. Refer to DLN-119, "Removal and Installation".

4. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P180F TRANSFER INTERNAL SPEED SENSOR

DTC Logic

INFOID:0000000009008237

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P180F	MOTOR SYSTEM	• Malfunction is detected in transfer motor. • Malfunction is detected in transfer internal speed sensor.	Transfer control actuator • Transfer motor error • Transfer internal speed sensor circuit error • Transfer assembly internal malfunction.

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. Turn the 4WD shift switch AUTO⇒4H⇒4L⇒4H⇒AUTO.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P180F” detected?

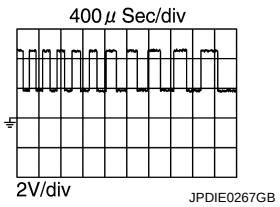
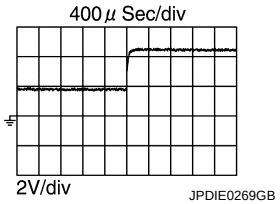
YES >> Proceed to diagnosis procedure. Refer to DLN-63, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008238

1.CHECK TRANSFER INTERNAL SPEED SENSOR SIGNAL

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

+		—	Condition	Voltage
Transfer control unit				
Connector	Terminal			
E59	10	Ground	4WD mode: AUTO A/T shift selector: N Depress accelerator pedal several time	
	31	Ground		 **NOTE:** When changing the transfer motor rotation direction.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK TRANSFER INTERNAL SPEED SENSOR POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer control actuator harness connector.
3. Turn the ignition switch ON.
4. Check the voltage between transfer control actuator harness connector terminals.

+		–	Voltage
Transfer control actuator			
Connector	Terminal		
F52	3	7	Approx. 8 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK TRANSFER INTERNAL SPEED SENSOR POWER SUPPLY CIRCUIT

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

Transfer control unit		Transfer control actuator		Continuity
Connector	Terminal	Connector	Terminal	
E59	39	F52	3	Existed
	9		7	

4. Check the continuity between transfer control actuator harness connector and ground.

Transfer control actuator		—	Continuity
Connector	Terminal		
F52	3	Ground	Not existed

Is the inspection result normal?

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

4. CHECK TRANSFER INTERNAL SPEED SENSOR SIGNAL CIRCUIT

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

Transfer control unit		Transfer control actuator		Continuity
Connector	Terminal	Connector	Terminal	
E59	10	F52	2	Existed
	31		6	

4. Check the continuity between transfer control actuator harness connector and ground.

Transfer control actuator		—	Continuity
Connector	Terminal		
F52	2	Ground	Not existed
	6		

Is the inspection result normal?

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

5. REPLACE TRANSFER CONTROL ACTUATOR

1. Replace transfer control actuator. Refer to DLN-119, "Removal and Installation".
2. Perform confirmation procedure again. Refer to DLN-58, "DTC Logic".

Is DTC “P180F” detected?

YES >> GO TO 6.
NO >> INSPECTION END

6. CHECK TRANSFER INTERNAL FUNCTION

With CONSULT

1. Remove transfer control actuator. Refer to DLN-119, "Removal and Installation".
2. Turn the actuator shaft. Refer to DLN-119, "Inspection".
3. Check “ROTARY POSI SEN” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.

Monitor item	Condition	Status
ROTARY POSI SEN	Turn the actuator shaft.	Value is changing

Is the inspection result normal?

YES >> GO TO 7.
NO >> Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-127, "Removal and Installation".

7. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1811 POWER SUPPLY CIRCUIT FOR TRANSFER CONTROL UNIT

Description

INFOID:0000000009008239

Supplies power to transfer control unit.

DTC Logic

INFOID:0000000009008240

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1811	BATTERY VOLTAGE	When transfer control unit power supply is lower or higher than normal	Malfunction of transfer control unit power supply circuit (open or short)

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 “P1811” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-66, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008241

1.CHECK TRANSFER CONTROL UNIT POWER SUPPLY (1)

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

Transfer control unit		—	Voltage
Connector	Terminal		
E59	20	Ground	Battery voltage

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

Transfer control unit		—	Voltage
Connector	Terminal		
E59	20	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK TRANSFER CONTROL UNIT POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#34).

3. Check the harness for open or short between transfer control unit harness connector No.20 terminal and 10A (#34).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -".

NO >> Repair or replace error-detected parts.

3.CHECK TRANSFER CONTROL UNIT POWER SUPPLY (3)

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

Transfer control unit		—	Voltage
Connector	Terminal		
E59	32	Ground	0 V

3. Turn the ignition switch ON.

CAUTION:

Never start the engine.

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

Transfer control unit		—	Voltage
Connector	Terminal		
E59	32	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK TRANSFER CONTROL UNIT POWER SUPPLY (4)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#56).
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between transfer control unit harness connector and IPDM E/R harness connector.

IPDM E/R		Transfer control unit		Continuity
Connector	Terminal	Connector	Terminal	
E15	58	E59	32	Existed

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

Transfer control unit		—	Continuity
Connector	Terminal		
E59	32	Ground	Not existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ignition power supply circuit. Refer to PG-59, "Wiring Diagram - IGNITION POWER SUPPLY -".

NO >> Repair or replace error-detected parts.

5.CHECK TRANSFER CONTROL UNIT GROUND

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

Transfer control unit		—	Continuity
Connector	Terminal		
E60	46	Ground	Existed
	44		

Is the inspection result normal?

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

6. CHECK TERMINALS AND HARNESS CONNECTORS

Check the transfer control unit pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1813 4WD MODE SWITCH

DTC Logic

INFOID:0000000009008242

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1813	4WD MODE SW	Multiple signals received from 4WD shift switch are detected.	• 4WD switch assembly - Internal malfunction of 4WD switch assembly - Malfunction of 4WD switch assembly circuit • Transfer control unit

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. Turn the 4WD shift switch AUTO⇒4H⇒4L⇒4H⇒AUTO.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P1813” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-69, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008243

1.CHECK TRANSFER SHIFT SWITCH

Check 4WD switch assembly. Refer to DLN-70, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> 4WD shift switch is malfunctioning. Replace 4WD switch assembly. Refer to DLN-113, "Removal and Installation".

2.CHECK 4WD SHIFT SWITCH CIRCUIT (1)

1. Disconnect transfer control unit harness connector.
2. Check the continuity between transfer control unit harness connector and 4WD switch assembly harness connector.

Transfer control unit		4WD switch assembly		Continuity
Connector	Terminal	Connector	Terminal	
E59	11	M54	11	Existed
			10	Not existed
			9	Not existed
	35		11	Not existed
			10	Existed
			9	Not existed
	14		11	Not existed
			10	Not existed
			9	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK 4WD SHIFT SWITCH CIRCUIT (2)

Check the continuity between 4WD switch assembly harness connector and ground.

4WD switch assembly		—	Continuity
Connector	Terminal		
M54	11	Ground	Not existed
	10		
	9		

Is the inspection result normal?

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

4.CHECK TERMINALS AND HARNESS CONNECTORS

- Check transfer control unit pin terminals for damage or loose connection with harness connector.
- Check 4WD switch assembly pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000009008244

1.CHECK 4WD SHIFT SWITCH

1. Turn the ignition switch OFF.
2. Remove 4WD switch assembly. Refer to DLN-113, "Removal and Installation".
3. Check the continuity between 4WD switch assembly harness connector terminals.

4WD switch assembly		Condition	Continuity
Terminal			
12	9	4WD shift switch: AUTO	Existed
		4WD shift switch: 4H or 4L	Not existed
12	10	4WD shift switch: 4H	Existed
		4WD shift switch: AUTO or 4L	Not existed
12	11	4WD shift switch: 4L	Existed
		4WD shift switch: AUTO or 4H	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace 4WD switch assembly. Refer to DLN-113, "Removal and Installation".

P1816 PARKING/NEUTRAL POSITION SWITCH

DTC Logic

INFOID:0000000009008245

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1816	PNP SW/CIRC	Malfunction is detected in shift position signal that is output from TCM through CAN communication.	• Harness or connector (CAN communication line) • TCM - Internal malfunction of TCM - A/T shift selector error

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. Shift the A/T shift selector P position.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P1816” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-72, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008246

1.PERFORM TCM SELF-DIAGNOSIS

With CONSULT

Perform self-diagnosis for “TRANSMISSION”.

Is any DTCs detected?

YES >> Check the DTC. Refer to TM-82, "DTC Index".
NO >> GO TO 2.

2.CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer 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 "P1816" is detected, Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1817 TRANSFER MOTOR

DTC Logic

INFOID:0000000009008247

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1817	SHIFT ACTUATOR	Malfunction is detected in transfer motor.	Transfer control actuator • Transfer motor error • malfunction of transfer motor circuit

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. Turn the 4WD shift switch AUTO⇒4H⇒4L⇒4H⇒AUTO.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P1817” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-73, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008248

1.CHECK TRANSFER MOTOR CIRCUIT (1)

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

Transfer control unit		Transfer control actuator		Continuity
Connector	Terminal	Connector	Terminal	
E60	45	F52	8	Existed
	43		1	

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

Transfer control unit		—	Continuity
Connector	Terminal		
E60	45	Ground	Not existed
	43		

Is the inspection result normal?

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

2.CHECK TRANSFER MOTOR

Check the transfer control actuator. Refer to DLN-74, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Transfer motor is malfunctioning. Replace transfer control actuator. Refer to DLN-119, "Removal and Installation".

3.CHECK TRANSFER INTERNAL FUNCTION

With CONSULT

1. Remove transfer control actuator. Refer to DLN-119, "Removal and Installation".
2. Turn the actuator shaft. Refer to DLN-119, "Inspection".
3. Check “ROTARY POSI SEN” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.

Monitor item	Condition	Status
ROTARY POSI SEN	Turn the actuator shaft.	Value is changing

Is the inspection result normal?

YES >> GO TO 4.
NO >> Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-127, "Removal and Installation".

4.CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000009008249

1.CHECK TRANSFER MOTOR

1. Remove transfer control actuator. Refer to DLN-119, "Removal and Installation".
2. Apply 12 V to transfer control actuator connector No. 1 terminal and No. 8 terminal.
   CAUTION:
   - **Never make the terminals short.**
   - **Connect the fuse between the terminals when applying the voltage.**
3. Check the operation of transfer control actuator.

Transfer control actuator		Condition	Operation
Terminal			
1	8	Apply the voltage between No. 1 (+) terminal and No. 8 (–) terminal.	Operate clockwise
		Apply the voltage between No. 1 (–) terminal and No. 8 (+) terminal.	Operate counter-clockwise

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace transfer control actuator. Refer to DLN-119, "Removal and Installation".

P181A TRANSFER MOTOR TEMPERATURE SENSOR

DTC Logic

INFOID:0000000009008250

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P181A	MOTOR TEMP SEN	When vehicle speed is 40 km/h or more and transfer motor temperature is lower than normal	Transfer control actuator • Malfunction of transfer motor temperature sensor circuit. (open)
		When transfer motor temperature is higher than normal	Transfer control actuator • Malfunction of transfer motor temperature sensor circuit. (short)

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 40 km/h (25 MPH) or more for approximately 1 minute.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P181A” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-75, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008251

1.CHECK TRANSFER MOTOR TEMPERATURE SENSOR POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer control actuator harness connector.
3. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
4. Check the voltage between transfer control actuator harness connector terminals.

+		–	Voltage
Transfer control actuator			
Connector	Terminal		
F52	4	7	Approx. 5 V

Is the inspection result normal?

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

2.CHECK TRANSFER MOTOR TEMPERATURE SENSOR CIRCUIT

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

Transfer control unit		Transfer control actuator		Continuity
Connector	Terminal	Connector	Terminal	
E59	28	F52	4	Existed
	9		7	

4. Check the continuity between transfer control actuator harness connector and ground.

Transfer control actuator		—	Continuity
Connector	Terminal		
F52	7	Ground	Not existed

Is the inspection result normal?

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

3.CHECK TRANSFER MOTOR TEMPERATURE SENSOR

Check the transfer control actuator. Refer to DLN-76, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Transfer motor temperature sensor is malfunctioning. Replace transfer control actuator. Refer to DLN-119, "Removal and Installation".

4.CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000009008252

1.CHECK TRANSFER MOTOR TEMPERATURE SENSOR

1. Turn the ignition switch OFF.
2. Disconnect transfer control actuator harness connector.
3. Check the resistance between transfer control actuator harness connector terminals.

Transfer control actuator		Condition	Resistance
Terminal			
4	7	20°C (68°F)	Approx. 12.5 kΩ
		80°C (176°F)	Approx. 1.3 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Transfer motor temperature sensor is malfunctioning. Replace transfer control actuator. Refer to DLN-119, "Removal and Installation".

P181B INCOMPLETE SELFSHUT

DTC Logic

INFOID:0000000009008253

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P181B	IMCOMP SELFSHUT	When ignition switch is OFF and transfer control unit power supply is lower or higher than normal	Self-shut is incomplete.

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

Is DTC “P181B” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-77, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008254

1.CHECK TRANSFER CONTROL UNIT POWER SUPPLY (1)

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

Transfer control unit		—	Voltage
Connector	Terminal		
E59	20	Ground	Battery voltage

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

Transfer control unit		—	Voltage
Connector	Terminal		
E59	20	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK TRANSFER CONTROL UNIT POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#34).
3. Check the harness for open or short between transfer control unit harness connector No.20 terminal and 10A (#34).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

3. CHECK TRANSFER CONTROL UNIT GROUND

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

Transfer control unit		—	Continuity
Connector	Terminal		
E60	44	Ground	Existed
	46		

Is the inspection result normal?

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

4. CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer 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 "P181B" is detected, Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P181C TRANSFER MOTOR POWER SUPPLY

Description

INFOID:0000000009008255

Supplies power to transfer control actuator (transfer motor).

DTC Logic

INFOID:0000000009008256

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P181C	MOTOR POWER SUPPLY	When transfer control actuator power supply is lower or higher than normal	Malfunction of transfer control actuator (transfer motor) power supply circuit

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 “P181C” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-79, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008257

1.CHECK TRANSFER MOTOR POWER SUPPLY (2)

Check the voltage between transfer control unit harness connector and ground.

+		–	Voltage
Transfer control unit			
Connector	Terminal		
E60	41	46	Battery voltage

Is the inspection result normal?

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

2.CHECK TRANSFER MOTOR POWER SUPPLY CIRCUIT (2)

1. Turn the ignition switch OFF.
2. Check the 30A fusible link (J).
3. Check the harness for open or short between transfer control unit harness connector No.41 terminal and 30A fusible link (J).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

3.CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P181E STEERING ANGLE SENSOR

DTC Logic

INFOID:0000000009008258

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P181E	ST ANGLE SEN SIG	Malfunction is detected in steering angle sensor signal through CAN communication.	• Harness or connector (CAN communication line) • Steering angle sensor - Steering angle sensor error - Malfunction of steering angle sensor circuit error

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 “P181E” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-81, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008259

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

With CONSULT

Perform self-diagnosis for “ABS”.

Is DTC “C1143” detected?

YES >> Proceed to diagnosis procedure. Refer to BRC-104, "Diagnosis Procedure".
NO >> GO TO 2.

2.CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer 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. If DTC “P181E” is detected, replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P181F INCOMPLETE CALIBRATION

DTC Logic

INFOID:0000000009008260

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P181F	INCOMP CALIBRATION	When incomplete calibration of transfer control unit is detected.	Initial calibration of transfer is incomplete

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 “P181F” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-82, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008261

1.PERFORM INITIAL CALIBRATION

1. Erase self-diagnostic result for “ALL MODE AWD/4WD”.
2. Perform initial calibration. Refer to DLN-42, "Work Procedure".
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is any DTC except “P181F” detected?

YES >> Check DTC.
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS

With CONSULT
1. Erase self-diagnostic result 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 “P181F” detected?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Check transfer control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace the error-detected parts.

P1820 ENGINE SPEED SIGNAL

DTC Logic

INFOID:0000000009008262

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1820	ENGINE SPEED SIG	Malfunction is detected in engine speed signal that is output from ECM through CAN communication.	• Harness or connector (CAN communication line) • Internal malfunction of ECM

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 20 km/h (12 MPH) or more.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P1820” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-83, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008263

1.PERFORM ECM SELF-DIAGNOSIS

With CONSULT

Perform self-diagnosis for “ENGINE”.

Is any DTCs detected?

YES >> Check the DTC.
- For USA and Canada: Refer to EC-107, "DTC Index".
- For Mexico: Refer to EC-672, "DTC Index".

NO >> GO TO 2.

2.CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer 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 "P1820" is detected, Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1826 TRANSFER FLUID TEMPERATURE

DTC Logic

INFOID:0000000009008264

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1826	OIL TEMP SEN	When vehicle speed is 40 km/h or more and transfer fluid temperature is lower than normal	Transfer fluid temperature • Malfunction of transfer fluid temperature sensor circuit (open)
		When transfer fluid temperature is higher than normal	Transfer fluid temperature • Malfunction of transfer fluid temperature sensor circuit (short)

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 40 km/h (25 MPH) or more for approximately 1 minute.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P1826” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-84, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008265

1.CHECK TRANSFER FLUID TEMPERATURE SENSOR POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer fluid temperature sensor harness connector.
3. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
4. Check the voltage between transfer fluid temperature sensor harness connector terminals.

+		–	Voltage
Transfer fluid temperature sensor			
Connector	Terminal		
F37	2	1	Approx. 5 V

Is the inspection result normal?

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

2.CHECK TRANSFER FLUID TEMPERATURE SENSOR CIRCUIT

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

Transfer control unit		Transfer fluid temperature sensor		Continuity
Connector	Terminal	Connector	Terminal	
E59	7	F37	2	Existed
	36		1	

4. Check the continuity between transfer fluid temperature sensor harness connector and ground.

Transfer fluid temperature sensor		—	Continuity
Connector	Terminal		
F37	2	Ground	Not existed

Is the inspection result normal?

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

3.CHECK TRANSFER FLUID TEMPERATURE SENSOR

Check the transfer fluid temperature sensor. Refer to DLN-85, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace transfer fluid temperature sensor. Refer to DLN-126, "Removal and Installation".

4.CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000009008266

1.CHECK TRANSFER FLUID TEMPERATURE SENSOR

1. Turn the ignition switch OFF.
2. Disconnect transfer fluid temperature sensor harness connector.
3. Check the resistance between transfer control fluid temperature sensor connector terminals.

Transfer fluid temperature sensor		Condition	Resistance
Terminal			
2	1	20°C (68°F)	Approx. 2.5 kΩ
		80°C (176°F)	Approx. 0.3 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace transfer fluid temperature sensor. Refer to DLN-126, "Removal and Installation".

P1829 ACCELERATOR PEDAL POSITION SENSOR

DTC Logic

INFOID:0000000009008267

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1829	THROTTLE POSI SEN	Malfunction is detected in accelerator pedal position signal that is output from ECM through CAN communication.	• Harness or connector (CAN communication line) • Internal malfunction of ECM

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

Is DTC “P1829” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-86, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008268

1.PERFORM ECM SELF-DIAGNOSIS

With CONSULT
Perform self-diagnosis for “ENGINE”.

Is any DTCs detected?

YES >> Check the DTC.
- For USA and Canada: Refer to EC-107, "DTC Index".
- For Mexico: Refer to EC-672, "DTC Index".

NO >> GO TO 2.

2.CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer 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 "P1829" is detected, Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P182A TRANSFER HI-LO POSITION SENSOR

DTC Logic

INFOID:0000000009008269

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P182A	HI-LO POSITION SEN	Malfunction related to transfer Hi-Lo position sensor has been detected.	Internal malfunction of transfer Hi-Lo position sensor

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.
   CAUTION:
   Never drive the vehicle.
2. Turn the 4WD shift switch AUTO⇒4H⇒4L⇒4H⇒AUTO.
3. Drive at 20 km/h (12 MPH) or more for 1 minute or more.
4. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P182A” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-87, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008270

1.CHECK TRANSFER HI-LO POSITION SENSOR SIGNAL

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Check the voltage between transfer control unit harness connector and ground.

+		–	Condition	Voltage
Transfer control unit				
Connector	Terminal			
E59	6	Ground	4WD mode: AUTO or 4H	Approx. 0 V
			4WD mode: 4L	Approx. 5 V
	25		4WD mode: AUTO or 4H	Approx. 0 V
			4WD mode: 4L	Approx. 5 V

CAUTION:
After operating 4WD shift switch, move the vehicle back and forth to check voltage.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK TRANSFER HI-LO POSITION SENSOR POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer Hi-Lo position sensor harness connector.
3. Turn the ignition switch ON.

CAUTION:
Never start the engine.

4. Check the voltage between transfer Hi-Lo position sensor harness connector terminals.

+		–	Voltage
Transfer Hi-Lo position sensor			
Connector	Terminal		
F42	1	Ground	Approx. 5 V
	2		

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK TRANSFER HI-LO POSITION SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer Hi-Lo position sensor harness connector.

Transfer control unit		Transfer Hi-Lo position sensor		Continuity
Connector	Terminal	Connector	Terminal	
E59	6	F42	1	Existed
	25		2	
	29		3	

4. Check the continuity between transfer Hi-Lo position sensor harness connector and ground.

Transfer Hi-Lo position sensor		—	Continuity
Connector	Terminal		
F42	1	Ground	Not existed
	2		
	3		

Is the inspection result normal?

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

4. REPLACE TRANSFER HI-LO POSITION SENSOR

1. Replace transfer Hi-Lo position sensor. Refer to DLN-121, "Removal and Installation".
2. Perform confirmation procedure again. Refer to DLN-87, "DTC Logic".

Is DTC “P182A” detected?

YES >> GO TO 5.
NO >> INSPECTION END

5. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P182B TRANSFER LOCK POSITION SENSOR

DTC Logic

INFOID:0000000009008271

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P182B	Lock POSITION SEN	Malfunction related to transfer lock position sensor has been detected.	• Transfer lock position sensor - Transfer lock position sensor error - Malfunction of transfer lock position sensor circuit

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. Turn the 4WD shift switch AUTO⇒4H⇒4L⇒4H⇒AUTO.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P182B” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-89, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008272

1.CHECK TRANSFER LOCK POSITION SENSOR

With CONSULT
1. Start the engine.
2. Turn the 4WD shift switch AUTO⇒4H⇒4L⇒4H⇒AUTO.
3. Check “LOCK POSI SEN” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.

Monitor item	Condition	Status
LOCK POSI SEN	4WD shift switch: AUTO or 4H	OPEN
	4WD shift switch: 4L	LOCK
	When transfer lock position sensor is unlearned.	UNLEAN
	When the temperature of transfer lock position sensor is high.	HI TEMP
	When transfer lock position sensor is malfunctioning.	ERROR
	When transfer lock position sensor signal circuit is short. (Battery short)	BAT
	When transfer lock position sensor signal circuit is short. (Ground short)	GND

What is the item on "DATA MONITOR"?

OPEN >> GO TO 7.
LOCK >> GO TO 7.
UNLEAN>>GO TO 6.
HI TEMP>>GO TO 5.
ERROR>>GO TO 5.
BAT >> GO TO 2.

GND >> GO TO 2.

2.CHECK TRANSFER LOCK POSITION POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer position sensor harness connector.
3. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
4. Check the voltage between transfer position sensor harness connector terminals.

+		–	Voltage
Transfer lock position sensor			
Connector	Terminal		
F40	1	2	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK TRANSFER LOCK POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer lock position sensor harness connector.

Transfer control unit		Transfer lock position sensor		Continuity
Connector	Terminal	Connector	Terminal	
E59	17	F40	1	Existed
	30		2	

4. Check the continuity between transfer lock position harness connector and ground.

Transfer lock position sensor		-	Continuity
Connector	Terminal		
F40	1	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

4.CHECK TRANSFER LOCK POSITION SENSOR SIGNAL CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer lock position sensor harness connector.

Transfer control unit		Transfer lock position sensor		Continuity
Connector	Terminal	Connector	Terminal	
E59	38	F40	3	Existed

4. Check the continuity between transfer lock position harness connector and ground.

Transfer lock position sensor		-	Continuity
Connector	Terminal		
F40	3	Ground	Not existed

Is the inspection result normal?

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

5. REPLACE TRANSFER LOCK POSITION SENSOR

1. Replace transfer lock position sensor. Refer to DLN-124, "Removal and Installation".
2. Perform confirmation procedure again. Refer to DLN-89, "DTC Logic".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 7.

6. PERFORM LEARNING OF TRANSFER LOCK POSITION SENSOR

Transfer lock position sensor. Refer to DLN-45, "Work Procedure".

>> GO TO 7.

7. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1830 ABS OPERATION SIGNAL

DTC Logic

INFOID:0000000009008273

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1830	ABS OP SIG	Malfunction is detected in ABS operation signal that is output from ABS actuator and electric unit (control unit) through CAN communication.	Malfunction of ABS system

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

Is DTC “P1830” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-92, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008274

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

With CONSULT

Perform self-diagnosis for “ABS”.

Is any DTCs detected?

YES >> Check the DTC. Refer to BRC-50, "DTC Index".
NO >> GO TO 2.

2.CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer 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 "P1830" is detected, Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1831 VDC OPERATION SIGNAL

DTC Logic

INFOID:0000000009008275

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1831	VDC OP SIG	Malfunction is detected in VDC operation signal that is output from ABS actuator and electric unit (control unit) through CAN communication.	Malfunction of VDC system

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

Is DTC “P1831” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-93, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008276

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

With CONSULT
Perform self-diagnosis for “ABS”.

Is any DTCs detected?

YES >> Check the DTC. Refer to BRC-50, "DTC Index".
NO >> GO TO 2.

2.CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer 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 "P1831" is detected, Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1832 TCS OPERATION SIGNAL

DTC Logic

INFOID:0000000009008277

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1832	TCS OP SIG	Malfunction is detected in TCS operation signal that is output from ABS actuator and electric unit (control unit) through CAN communication.	Malfunction of TCS system

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

Is DTC “P1832” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-94, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008278

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

With CONSULT

Perform self-diagnosis for “ABS”.

Is any DTCs detected?

YES >> Check the DTC. Refer to BRC-50, "DTC Index".
NO >> GO TO 2.

2.CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer 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 "P1832" is detected, Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000009008279

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

DTC Logic

INFOID:0000000009008280

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
U1000	CAN COMM CIRCUIT	Transfer control unit is not transmitting/ receiving CAN communication signal for 2 seconds or more.	• CAN communication error • Malfunction of transfer control unit

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-95, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008281

Proceed to LAN-22, "Trouble Diagnosis Flow Chart".

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000009008282

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

DTC Logic

INFOID:0000000009008283

DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
U1010	CONTROL UNIT (CAN)	Detecting error during the initial diagnosis of CAN controller of transfer control unit.	Malfunction of transfer control unit

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-96, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009008284

1.CHECK TRANSFER CONTROL UNIT

Check transfer control unit harness connector for disconnection and deformation.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace error-detected parts.

POWER SUPPLY AND GROUND CIRCUIT

Description

INFOID:0000000009008285

Supplies power to 4WD system.

Diagnosis Procedure

INFOID:0000000009008286

1.CHECK TRANSFER CONTROL UNIT POWER SUPPLY (1)

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

Transfer control unit		—	Voltage
Connector	Terminal		
E59	20	Ground	Battery voltage

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

Transfer control unit		—	Voltage
Connector	Terminal		
E59	20	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK TRANSFER CONTROL UNIT POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#34).
3. Check the harness for open or short between transfer control unit harness connector No.20 terminal and 10A (#34).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

3.CHECK TRANSFER CONTROL UNIT POWER SUPPLY (3)

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

Transfer control unit		—	Voltage
Connector	Terminal		
E59	32	Ground	Approx. 0 V

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

Transfer control unit		—	Voltage
Connector	Terminal		
E59	32	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK TRANSFER CONTROL UNIT POWER SUPPLY (4)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#56).
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between transfer control unit harness connector and IPDM E/R harness connector.

IPDM E/R		Transfer control unit		Continuity
Connector	Terminal	Connector	Terminal	
E15	58	E59	32	Existed

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

Transfer control unit		—	Continuity
Connector	Terminal		
E59	32	Ground	Not existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ignition power supply circuit. Refer to PG-59, "Wiring Diagram - IGNITION POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

5. CHECK TRANSFER MOTOR POWER SUPPLY

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

Transfer control unit		—	Voltage
Connector	Terminal		
E60	41	Ground	Battery voltage

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

Transfer control unit		—	Voltage
Connector	Terminal		
E60	41	Ground	Battery voltage

Is the inspection result normal?

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

6. CHECK TRANSFER MOTOR POWER SUPPLY CIRCUIT

1. Turn the ignition switch OFF.
2. Check the 30A fusible link (J).
3. Check the harness for open or short between transfer control unit harness connector No.41 terminal and 30A fusible link (J).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

7. CHECK 4WD SWITCH ASSEMBLY POWER SUPPLY (1)

1. Turn the ignition switch OFF.

2. Disconnect 4WD switch assembly harness connector.
3. Check the voltage between 4WD switch assembly harness connector and ground.

4WD switch assembly		—	Voltage
Connector	Terminal		
M54	12	Ground	Approx. 0 V

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

4WD switch assembly		—	Voltage
Connector	Terminal		
M54	12	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. CHECK 4WD SWITCH ASSEMBLY POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#13).
3. Disconnect fuse block (J/B) harness connector.
4. Check the continuity between transfer control unit harness connector and IPDM E/R harness connector.

Fuse block (J/B)		4WD switch assembly		Continuity
Connector	Terminal	Connector	Terminal	
M3	10C	M54	12	Existed

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

4WD switch assembly		—	Continuity
Connector	Terminal		
M54	12	Ground	Not existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ignition power supply circuit. Refer to PG-59, "Wiring Diagram - IGNITION POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

9. CHECK TRANSFER CONTROL UNIT GROUND

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

Transfer control unit		—	Voltage
Connector	Terminal		
E60	44	Ground	Approx. 0 V
	46		

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

Transfer control unit		—	Continuity
Connector	Terminal		
E60	44	Ground	Existed
	46		

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10. CHECK 4WD SWITCH ASSEMBLY GROUND

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

4WD switch assembly		—	Voltage
Connector	Terminal		
M54	20	Ground	Approx. 0 V

Is the inspection result normal?

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

4WD WARNING LAMP

Component Function Check

INFOID:0000000009008287

1.CHECK 4WD WARNING LAMP FUNCTION

1. Turn the ignition switch OFF to ON.
2. Check that 4WD warning lamp light up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed diagnosis procedure. Refer to DLN-101, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009008288

1.CHECK POWER SUPPLY AND GROUND CIRCUIT

Perform the trouble diagnosis for power supply and ground circuit. Refer to DLN-66, "Diagnosis Procedure".

Is the inspection result normal?

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

2.PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is any DTC detected?

YES >> Check the DTC. Refer to DLN-30, "DTC Index".
NO >> GO TO 3.

3.CHECK 4WD WARNING LAMP SIGNAL

With CONSULT

1. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
2. Check “4WD FAIL LAMP” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.

Does the item on “DATA MONITOR” indicate “On”?

YES >> Check combination meter. Refer to MWI-66, "COMBINATION METER : Diagnosis Procedure".
NO >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".

4WD INDICATOR LAMP

Component Function Check

INFOID:0000000009008289

1.CHECK 4WD MODE INDICATOR LAMP FUNCTION

1. Start the engine
   CAUTION:
   Never drive the vehicle.
2. Turn the 4WD shift switch AUTO⇒4H⇒4L⇒4H⇒AUTO.
3. Check the 4WD shift switch position (“AUTO”, “4H” and “4L”) and the indication of the 4WD mode indicator lamp mutually coincide.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to diagnosis procedure. Refer to DLN-102, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009008290

1.CHECK POWER SUPPLY AND GROUND CIRCUIT

Perform the trouble diagnosis for power supply and ground circuit. Refer to DLN-66, "Diagnosis Procedure".

Is the inspection result normal?

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

2.CHECK 4WD WARNING LAMP SIGNAL

With CONSULT

1. Start the engine.
   CAUTION:
   Never drive the vehicle.
2. Turn the 4WD shift switch AUTO⇒4H⇒4L⇒4H⇒AUTO.
3. Check “4WD MODE IND” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.

Monitor item	Condition	Status
4WD MODE IND	4WD shift switch: AUTO	AUTO
	4WD shift switch: 4H	4H
	4WD shift switch: 4L	4L

Is the inspection result normal?

YES >> Check combination meter. Refer to MWI-66, "COMBINATION METER : Diagnosis Procedure".
NO >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".

SYMPTOM DIAGNOSIS

HEAVY TIGHT-CORNER BRAKING SYMPTOM OCCURS

Description

INFOID:0000000009008291

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:0000000009008292

1.PERFORM ECM SELF-DIAGNOSIS

With CONSULT
Perform self-diagnosis for “ECM”.

Is any DTC detected?

YES >> Check the DTC.
- For USA and Canada: Refer to EC-107, "DTC Index".
- For Mexico: Refer to EC-672, "DTC Index".

NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS

With CONSULT
Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is any DTC detected?

YES >> Check the DTC. Refer to DLN-30, "DTC Index".
NO >> GO TO 3.

3.CHECK TRANSFER INTERNAL FUNCTION

With CONSULT
1. Remove transfer control actuator. Refer to DLN-119, "Removal and Installation".
2. Turn the actuator shaft. Refer to DLN-119, "Inspection".
3. Check “ROTARY POSI SEN” of CONSULT “DATA MONITOR” for “ALL MODE AWD/4WD”.

Monitor item	Condition	Status
ROTARY POSI SEN	Turn the actuator shaft.	Value is changing

Is the inspection result normal?

YES >> INSPECTION END
NO >> Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-127, "Removal and Installation".

4WD MODE DOES NOT CHANGE

Description

INFOID:0000000009008293

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

Diagnosis Procedure

INFOID:0000000009008294

1.PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is any DTC detected?

YES >> Check DTC. Refer to DLN-30, "DTC Index".
NO >> GO TO 2.

2.CHECK 4WD MODE INDICATOR LAMP

Check 4WD mode indicator lamp function. Refer to DLN-102, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to diagnosis procedure. Refer to DLN-102, "Diagnosis Procedure".

3.CHECK 4WD SHIFT SWITCH

Perform rouble diagnosis of the 4WD shift switch. Refer to DLN-69, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-127, "Removal and Installation".
NO >> Replace 4WD switch assembly. Refer to DLN-113, "Removal and Installation".

4WD MODE INDICATOR LAMP CONTINUES BLINKING

Description

INFOID:0000000009008295

After shift the 4WD mode 4H to 4L, 4WD mode indicator lamp continues to blink.

Diagnosis Procedure

INFOID:0000000009008296

1.MOVE THE VEHICLE

Move the vehicle back and forth.

Does the 4WD indicator lamp stop to blink?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK 4WD MODE INDICATOR LAMP

Check 4WD mode indicator lamp function. Refer to DLN-102, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to diagnosis procedure. Refer to DLN-102, "Diagnosis Procedure".

3.PERFORM SELF-DIAGNOSIS

With CONSULT

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

Is any DTC detected?

YES >> Check DTC. Refer to DLN-30, "DTC Index".
NO >> Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-127, "Removal and Installation".

4WD WARNING LAMP BLINKS QUICKLY

Description

INFOID:0000000009008297

While driving, 4WD warning lamp blinks 2 times in 1 second and it turns OFF after 1 minute.

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

4WD WARNING LAMP BLINKS SLOWLY

Description

INFOID:0000000009008298

4WD warning lamp blinks at approximately 2 seconds intervals while driving.

Diagnosis Procedure

INFOID:0000000009008299

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.TERMINAL INSPECTION

Check 4WD control unit harness connector for disconnection.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Repair or replace the error-detected parts.

INFORMATION DISPLAY IS NOT DISPLAYED

Description

INFOID:0000000009008300

Information display is not displayed.

NOTE:

When the combination meter receives 4WD shift switch signal, it displays a message on the information display and inform the driver of 4WD mode status. About indication contents, refer to DLN-19, "4WD SYSTEM : System Description" (4WD mode).

Diagnosis Procedure

INFOID:0000000009008301

1.CHECK 4WD SHIFT SWITCH

Perform trouble diagnosis for 4WD shift switch. Refer to DLN-69, "Diagnosis Procedure".

Is the inspection result normal?

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

2.CHECK 4WD MODE INDICATOR LAMP

Perform trouble diagnosis for 4WD mode indicator. Refer to DLN-102, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK THE INFORMATION DISPLAY

Check that information except 4WD mode is displayed on information display.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-112, "Removal and Installation".
NO >> Check information display. Refer to MWI-30, "On Board Diagnosis Function".

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009008302

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-110, "Inspection"				Front oil seal: DLN-114, "Exploded View" Rear oil seal: DLN-116, "Exploded View"			
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:0000000009008303

FLUID LEAKAGE

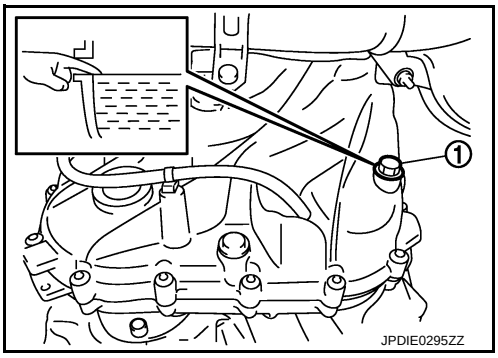
Check transfer surrounding area (oil seal, drain plug, and filler plug etc.) for fluid leakage.

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 then tighten to the specified torque.

   Specified torque : 48 N·m (4.9 kg-m, 35 ft-lb)

   CAUTION:
   Never reuse gasket.



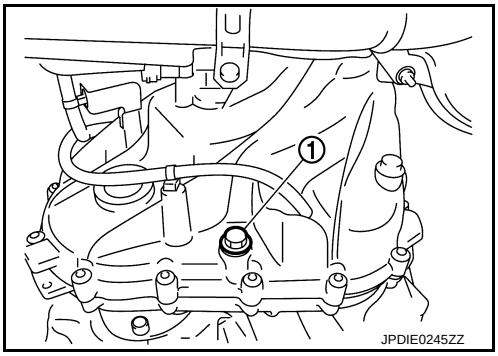
Draining

INFOID:0000000009008304

1. Run the vehicle to warm up the transfer unit sufficiently.
2. Stop the engine.
3. Remove the drain plug (1) and drain transfer fluid.
4. Set a new gasket onto drain plug, and install it to transfer and tighten to the specified torque.

   Specified torque : 48 N·m (4.9 kg-m, 35 ft-lb)

   CAUTION:
   Never reuse gasket.



Refilling

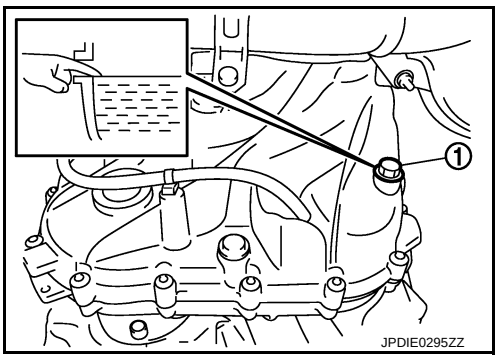
INFOID:0000000009008305

1. Remove filler plug (1). Fill up with new transfer fluid up to mounting hole for the filler plug.

   Fluid grade and Viscosity : Refer to MA-15, "FOR NORTH AMERICA : Fluids and Lubricants" (for NORTH AMERICA), MA-16, "FOR MEXICO : Fluids and Lubricants" (for MEXICO).

   Fluid capacity : Refer to DLN-131, "General Specifications".

   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.



Specified torque : 48 N·m (4.9 kg-m, 35 ft-lb)

CAUTION:
Never reuse gasket.

4. Perform learning of transfer fluid viscosity. Refer to DLN-48, "Work Procedure".

REMOVAL AND INSTALLATION

TRANSFER CONTROL UNIT

Removal and Installation

INFOID:0000000009008306

REMOVAL

1. Turn the ignition switch OFF.
2. Disconnect negative battery terminal.
   CAUTION:
   Wait for 5 seconds after turning ignition switch OFF.
3. Remove the glove box assembly. Refer to IP-14, "Removal and Installation".
4. Disconnect the transfer control unit connector.
5. Move instrument lower cover to backward. Refer to IP-14, "Removal and Installation".
6. Remove the transfer control unit.

INSTALLATION

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

- When replacing transfer control unit, perform writing unit parameter and initial calibration. Refer to DLN-42, "Work Procedure".

4WD MODE SWITCH

Removal and Installation

INFOID:0000000009008307

REMOVAL

NOTE:
4WD shift switch is integrated in 4WD switch assembly.

1. Remove console finisher assembly from center console assembly. Refer to IP-25, "Removal and Installation"
2. Disconnect 4WD switch assembly harness connector.
3. Press 4WD switch assembly fixing pawls, and remove 4WD switch assembly from console finisher assembly.

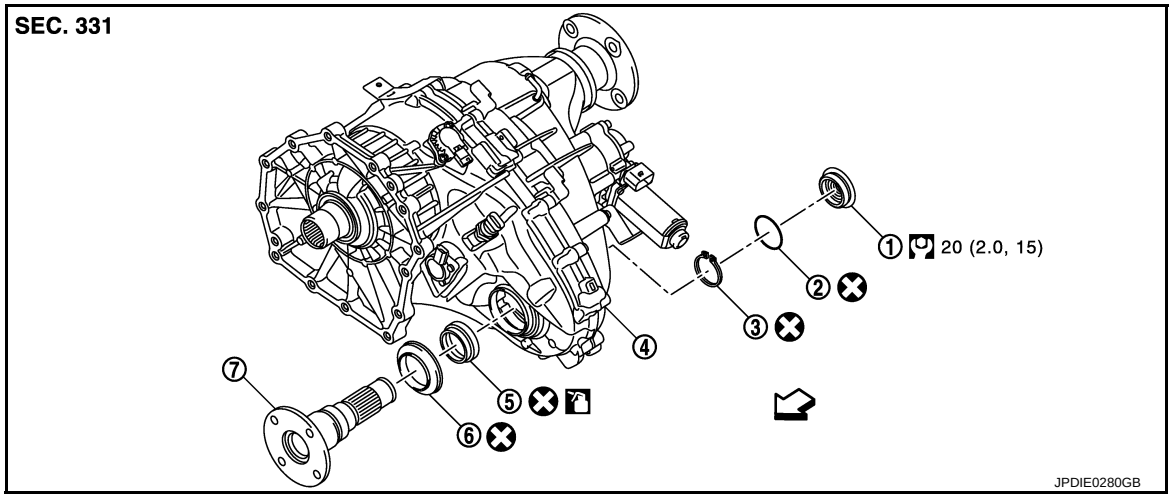
INSTALLATION

Install in the reverse order of removal.

FRONT OIL SEAL

Exploded View

INFOID:0000000009008308



1. Plug
2. O-ring
3. Snap ring
4. Transfer assembly
5. Front oil seal
6. Dust shield
7. Front shaft flange

⇦: Vehicle front

: Apply transfer fluid. Refer to MA-15, "FOR NORTH AMERICA : Fluids and Lubricants" (for NORTH AMERICA), MA-16, "FOR MEXICO : Fluids and Lubricants" (for MEXICO).

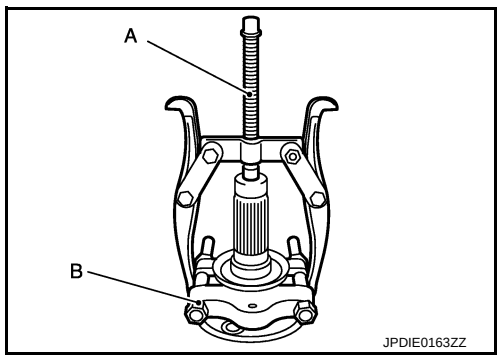
Refer to GI-4, "Components" for symbols not described above.

Removal and Installation

INFOID:0000000009008309

REMOVAL

1. Remove the drain plug to drain the transfer fluid. Refer to DLN-110, "Draining".
2. Remove the front propeller shaft. Refer to DLN-137, "Removal and Installation".
3. Remove the plug.
4. Remove the O-ring from the plug.
5. Remove the snap ring.
6. Remove the front shaft flange, using a plastic hammer.
7. Remove the dust shield from the front shaft flange, using puller and replacer.

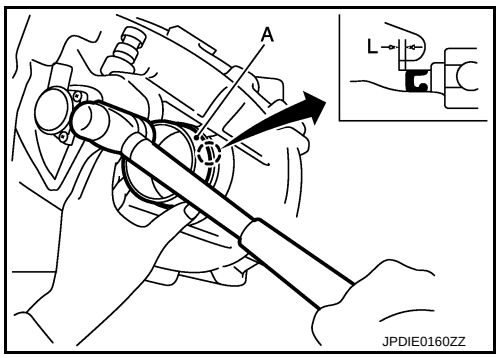


A : Puller (commercial service tool)
B : Replacer (commercial service tool)

8. Remove front oil seal from front case.
CAUTION:
Never damage the front case.

INSTALLATION

1. Install front oil seal with a drift (A) (commercial service tool) within the dimension (L) shown as follows.



When the dust shield is resin type:

L : 5.3 – 5.7 mm (0.209 – 0.224 in)

When the dust shield is metal type:

L : 4.8 – 5.2 mm (0.189 – 0.205 in)

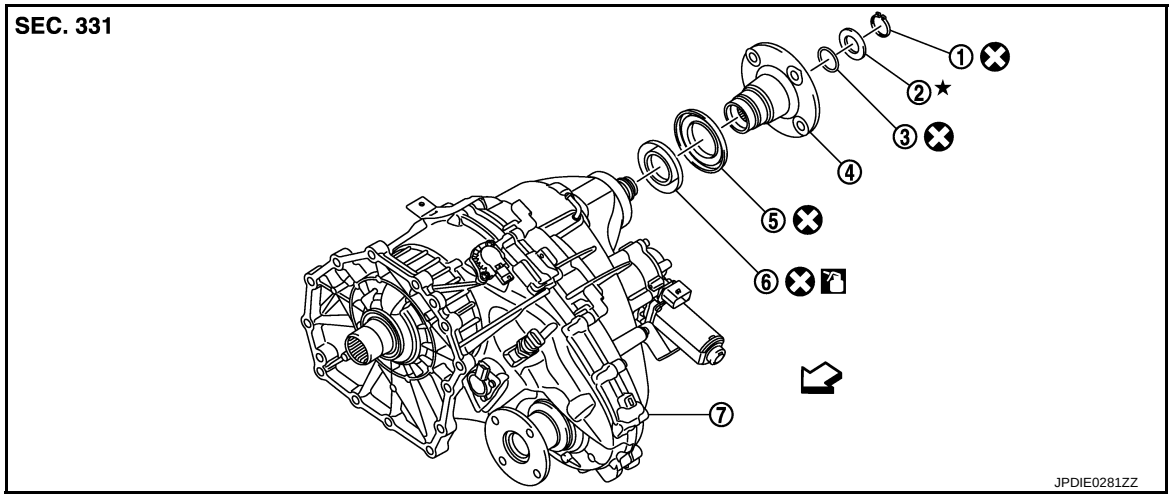
CAUTION:
- **Never reuse front oil seal.**
- **Apply transfer fluid onto circumference of oil seal.**

2. Install the dust shield to the front shaft flange.
3. Install the front shaft flange.
4. Install the snap ring.
   CAUTION:
   Never reuse the snap ring.
5. Install the O-ring to plug.
   CAUTION:
   - **Never reuse the O-ring.**
   - **Never damage the O-ring.**
6. Tighten the plug to specified torque.
7. Install front propeller shaft. Refer to DLN-137, "Removal and Installation".
8. Fill with new transfer fluid, check fluid level and for fluid leakage. Refer to DLN-110, "Inspection".

REAR OIL SEAL

Exploded View

INFOID:0000000009008310



1. Snap ring
2. Adjusting shim
3. O-ring
4. Rear companion flange
5. Dust shield
6. Rear oil seal
7. Transfer assembly

⇦: Vehicle front

: Apply transfer fluid. Refer to MA-15, "FOR NORTH AMERICA : Fluids and Lubricants" (for NORTH AMERICA), MA-16, "FOR MEXICO : Fluids and Lubricants" (for MEXICO).

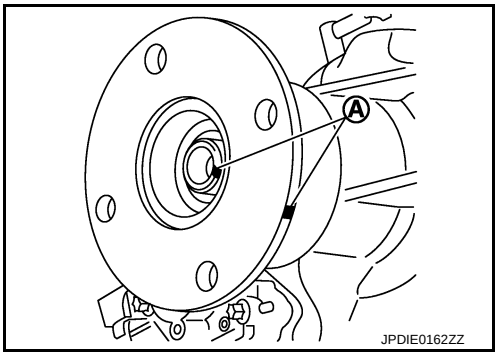
Refer to GI-4, "Components" for symbols not described above.

Removal and Installation

INFOID:0000000009008311

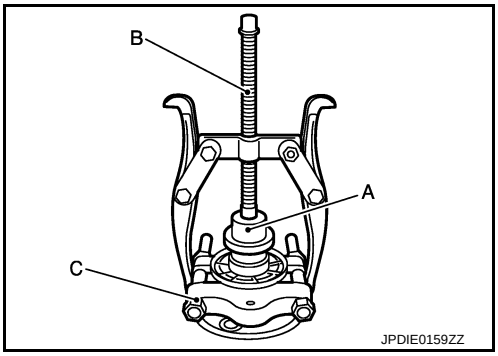
REMOVAL

1. Remove the rear propeller shaft. Refer to DLN-146, "Removal and Installation".
2. Put matching marks (A) on the end of the main shaft and the rear companion flange.
   CAUTION:
   For matching mark, using paint. Never damage main shaft.
3. Remove the snap ring.
4. Remove the adjusting shim.
5. Remove the rear companion flange, using a plastic hammer.



6. Remove the dust shield from rear companion flange, using the drift, puller and replacer.

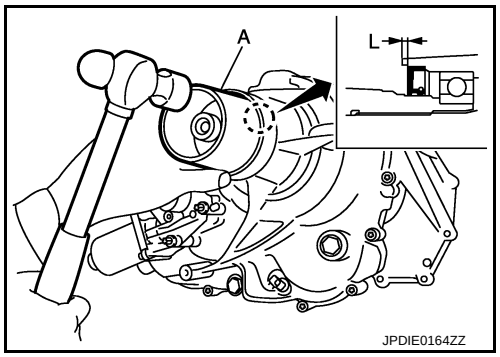
   A : Drift [SST: ST30701000 (J-25742-2)]
   B : Puller (commercial service tool)
   C : Replacer (commercial service tool)



7. Remove the o-ring from rear companion flange.
8. Remove the rear oil seal from rear case.
   CAUTION:
   Never damage rear case and main shaft.

INSTALLATION

1. Install rear oil seal, with a drift (A) [SST: KV40104710 (—] within the dimension (L) show as follows.



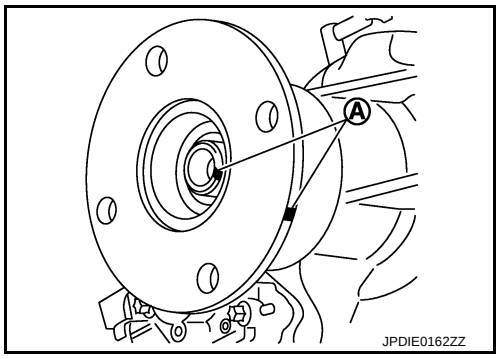
L : 2.8 – 3.2 (0.110 – 0.126 in)

CAUTION:
- **Never reuse front oil seal.**
- **Apply transfer fluid onto circumference of oil seal.**

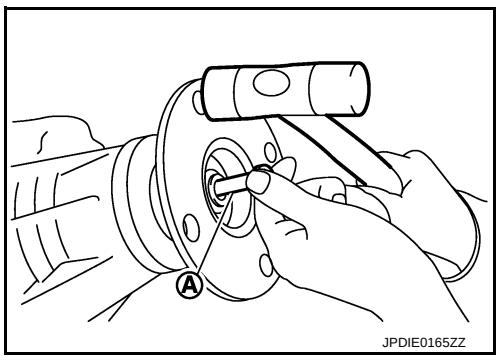
2. Install the dust shield to the rear companion flange.

3. Install the rear companion flange to main shaft.

CAUTION:
- **Align the matching marks (A) of main shaft and rear companion flange.**

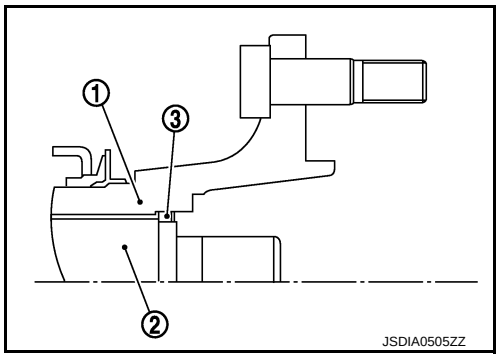


- **Install bolt (A) (M12×1.75 mm) to main shaft, then install the rear companion flange by hammering while pulling the bolt.**



4. Install the O-ring (3) to gap between rear companion flange (1) and main shaft (2).

CAUTION:
- **Never reuse the O-ring.**
- **Never damage the O-ring.**



5. Select adjusting shim. Refer to DLN-117, "Adjustment".
6. Install adjusting shim.
7. Install the snap ring.
8. Install the rear propeller shaft. Refer to DLN-146, "Removal and Installation".
9. Check fluid level and for fluid leakage. Refer to DLN-110, "Inspection".

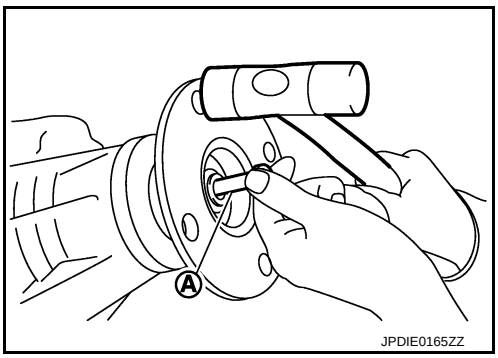
Adjustment

INFOID:0000000009008312

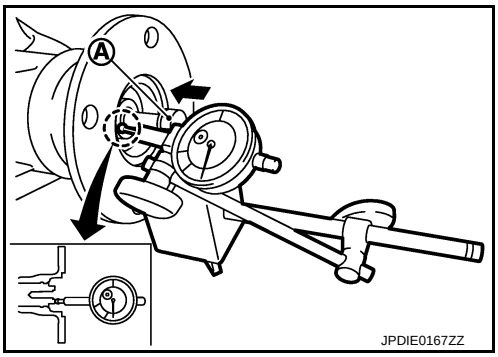
ADJUSTING SHIM

1. Remove the snap ring.
2. Remove the adjusting shim.

3. Remove the O-ring.
4. Install the thinnest adjusting shim.
5. Install the snap ring to main shaft.
6. Install the bolt (A) (M12×1.75 mm) to main shaft, then hummer the rear companion flange while pulling the bolt.



7. Fit a dial indicator onto the end of main shaft.
8. Check the clearance between rear companion flange and main shaft during pushing the bolt (A) at ⬅ direction.
9. Use the formula below to calculate adjusting shim thickness.



Shim selection equation:

$T = T_0 + (C - 0.1)$

T: Correct shim thickness

T_0: The thinnest shim thickness

C: Measured clearance between rear companion flange and main shaft

CAUTION:

Adjusting shim thickness is in step of 0.1 mm. When a calculation result includes the second decimal place, it must be rounded down.

Example:

$T = 2.1 + (0.34 - 0.1) = 2.34$

T_0: 2.1

C: 0.34

Calculated value... T = 2.34 mm

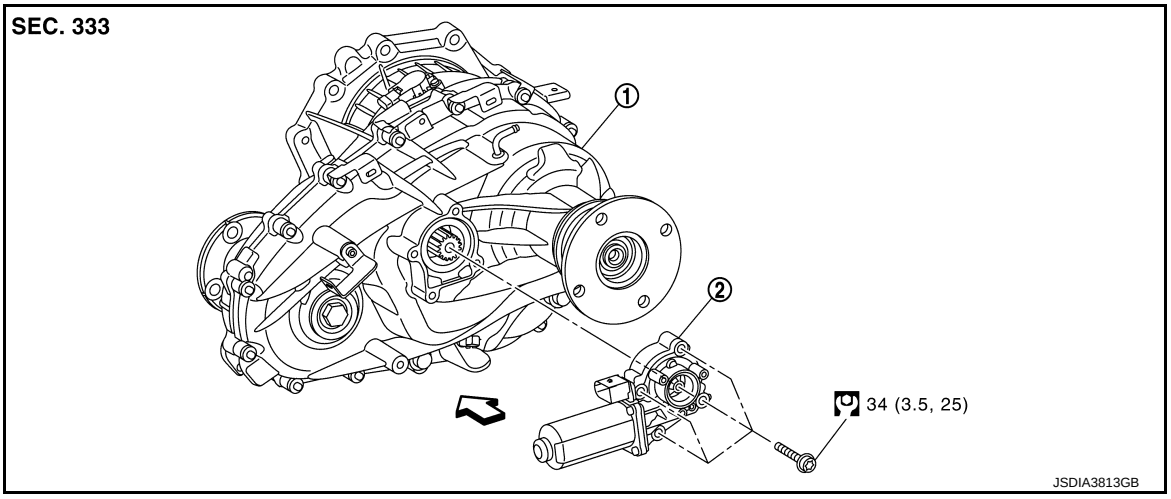
Used shim... T = 2.3 mm

10. Select the proper adjusting shim. For selecting adjusting shim, refer to the latest parts information.

TRANSFER CONTROL ACTUATOR

Exploded View

INFOID:0000000009008313



1. Transfer assembly
2. Transfer control actuator

⇦: Vehicle front

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

Removal and Installation

INFOID:0000000009008314

REMOVAL

CAUTION:

If DTC about transfer control actuator is detected, perform inspection after removal.

1. Turn the ignition switch OFF.
2. Disconnect negative battery terminal.
   CAUTION:
   Wait for 5 seconds after turning ignition switch OFF.
3. Disconnect the transfer control actuator connector.
4. Remove the bolts and detach the transfer control actuator.
5. Perform inspection after removal. Refer to DLN-119, "Inspection".

INSTALLATION

Note the following, and installing the reverse order of removal.

- Never damage oil seal of transfer motor.
- If transfer control actuator has been replaced, perform writing the unit parameter. Refer to DLN-49, "Work Procedure"
- Perform inspection after installation. Refer to DLN-119, "Inspection"

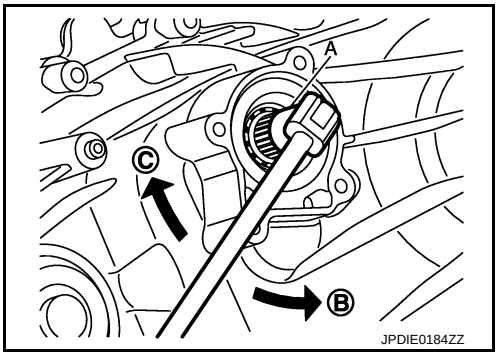
Inspection

INFOID:0000000009008315

INSPECTION AFTER REMOVAL

1. Check the oil seal assembled transfer control actuator for wear, crack and damage. Replace if there is malfunction.
2. Check the transfer assembly as follows.

a. Install the spline socket (A) [SST: KV10119400 (—)] to transfer assembly in the figure.
b. When turn the shaft in (B) direction, check returning to (C) direction by spring power.
CAUTION:
The maximum turning force shall be 30 N·m (3.1 kg-m, 22 ft-lb).
c. When turn the shaft in (C) direction, check locking the shaft.



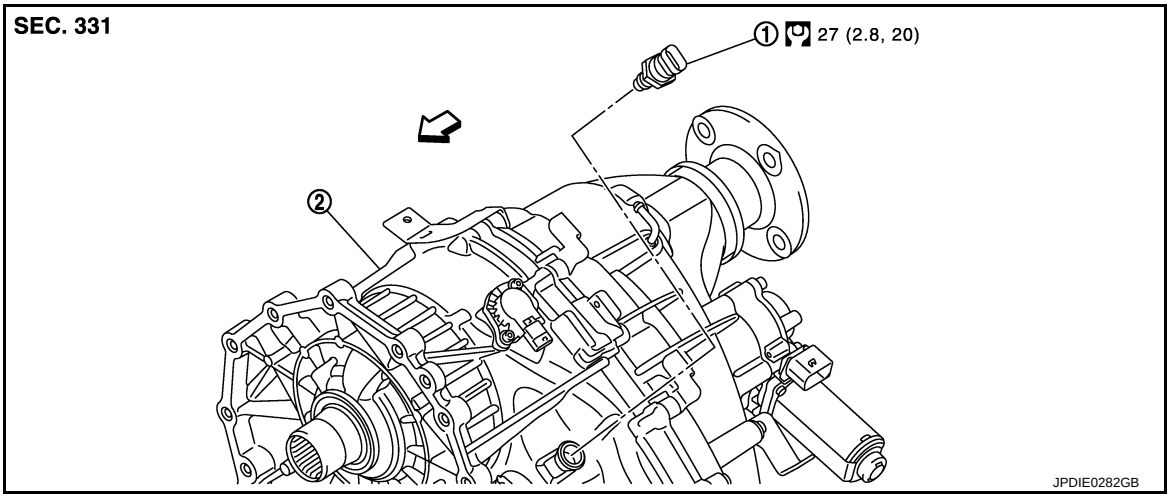
INSPECTION AFTER INSTALLATION

After driving, check the surface fitting transfer control actuator to transfer assembly for fluid leakage.

TRANSFER HI-LO POSITION SENSOR

Exploded View

INFOID:0000000009008316



1. Transfer Hi-Lo position sensor
2. Transfer assembly

⇦: Vehicle front

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

Removal and Installation

INFOID:0000000009008317

REMOVAL

1. Turn the ignition switch OFF.
2. Disconnect negative battery terminal.
   CAUTION:
   Wait for 5 seconds after turning ignition switch OFF.
3. Remove exhaust front tube (LH). Refer to EX-5, "Removal and Installation".
4. Support transfer assembly and transmission assembly with a jack.
5. Remove front suspension rear cross member with a power tool. Refer to TM-218, "4WD : Removal and Installation".
6. Remove rear engine mounting cross member with a power tool. Refer to TM-218, "4WD : Removal and Installation".
7. Remove heat insulator of exhaust front tube (LH).
8. Lower jack to the position where the transfer Hi-Lo position sensor can be removed.
9. Disconnect the transfer Hi-Lo position sensor connector.
10. Remove the transfer Hi-Lo position sensor.
11. Perform inspection after removal. Refer to DLN-121, "Inspection".

INSTALLATION

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

- Never damage O-ring of transfer Hi-Lo position sensor.
- Perform inspection after installation. Refer to DLN-121, "Inspection".

Inspection

INFOID:0000000009008318

INSPECTION AFTER REMOVAL

Check the O-ring assembled transfer Hi-Lo position sensor for wear, crack and damage. Replace the transfer Hi-Lo position sensor if there is malfunction.

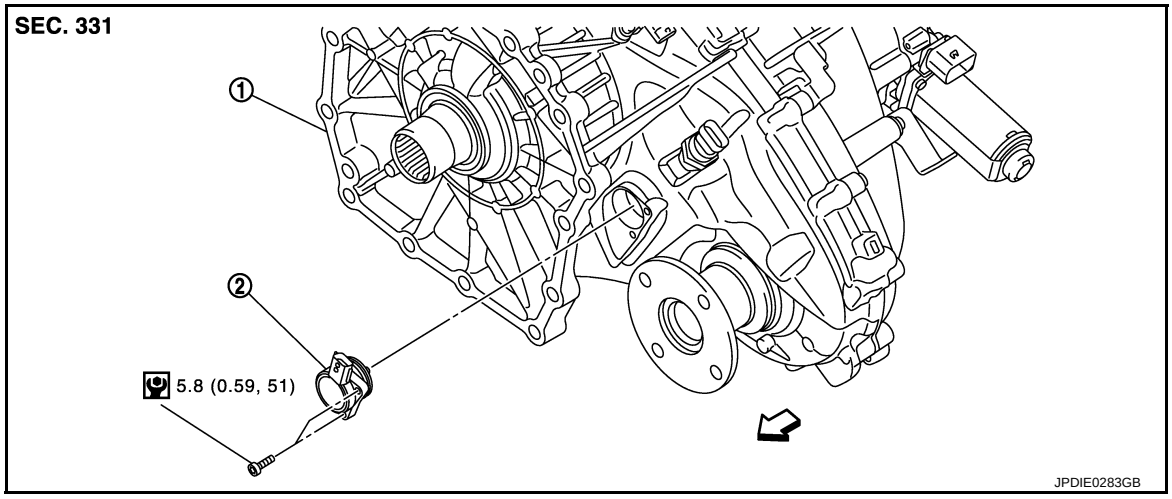
INSPECTION AFTER INSTALLATION

After driving, check the surface fitting transfer Hi-Lo position sensor to transfer assembly for fluid leakage.

TRANSFER ROTARY POSITION SENSOR

Exploded View

INFOID:0000000009008319



1. Transfer assembly
2. Transfer rotary position sensor

⇦: Vehicle front

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

Removal and Installation

INFOID:0000000009008320

REMOVAL

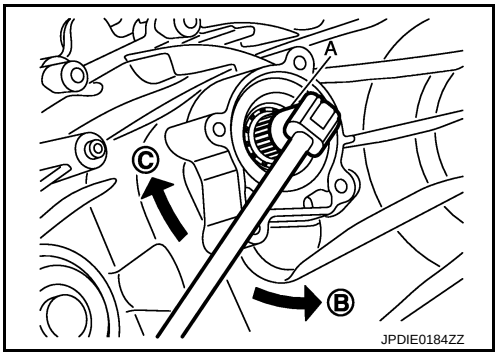
1. Turn the ignition switch OFF.
2. Disconnect negative battery terminal.
   CAUTION:
   Wait for 5 seconds after turning ignition switch OFF.
3. Support transfer assembly and transmission assembly with a jack.
4. Remove front suspension rear cross member with a power tool. Refer to TM-218, "4WD : Removal and Installation".
5. Remove rear engine mounting cross member with a power tool. Refer to TM-218, "4WD : Removal and Installation".
6. Disconnect the transfer rotary position sensor connector.
7. Remove the transfer rotary position sensor.
8. Perform inspection after removal. Refer to DLN-123, "Inspection".

INSTALLATION

1. Remove the transfer control actuator. Refer to DLN-119, "Exploded View"
2. Shift transfer assembly into AUTO as follows.

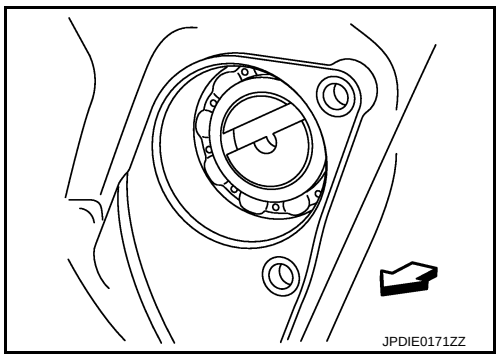
a. Install the spline socket (A) [SST: KV10119400 (—)] to transfer assembly in the figure.

b. Turn the shaft (B) direction and remove the spline socket at a position returning to (C) direction by spring power.
   CAUTION:
   The maximum turning force shall be 30 N·m (3.1 kg-m, 22 ft-lb).

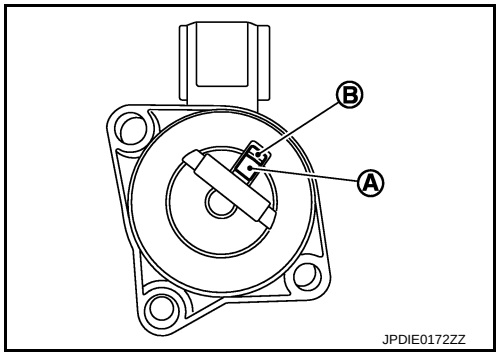


c. Check that the surface fitting transfer rotary position sensor to transfer assembly is in the figure.

⇦: Vehicle front



3. Install the transfer rotary position sensor.
CAUTION:
- **Check that part (A) of transfer rotary position sensor is in the position (B).**
- **Never damage O-ring of transfer rotary position sensor.**
4. Connect transfer rotary position sensor connector.
5. Install the transfer control actuator. Refer to DLN-119, "Exploded View".
6. Perform inspection after installation. Refer to DLN-123, "Inspection".
7. When replacing the transfer rotary position sensor, perform learning of transfer rotary position sensor. Refer to DLN-47, "Work Procedure".



Inspection

INFOID:0000000009008321

INSPECTION AFTER REMOVAL

Check the O-ring assembled transfer rotary position sensor for wear, crack and damage. Replace the transfer rotary position sensor if there is malfunction.

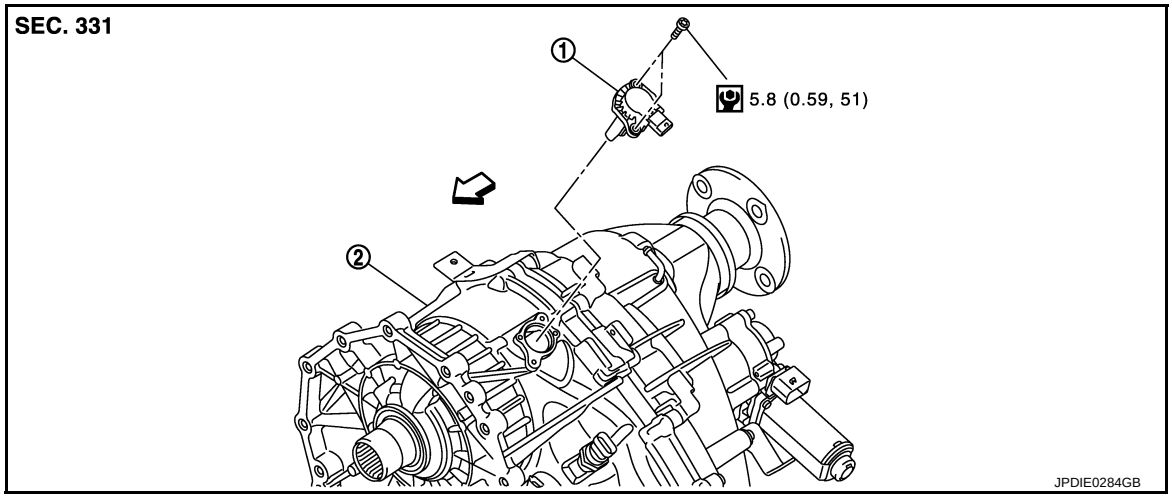
INSPECTION AFTER INSTALLATION

After driving, check the surface fitting transfer rotary position sensor to transfer assembly for fluid leakage.

TRANSFER LOCK POSITION SENSOR

Exploded View

INFOID:0000000009008322



1. Transfer lock position sensor
2. Transfer assembly

⇦: Vehicle front

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

Removal and Installation

INFOID:0000000009008323

REMOVAL

1. Shift the transmission to the neutral position, and release the parking brake.
2. Turn the ignition switch OFF.
3. Disconnect negative battery terminal.
   CAUTION:
   Wait for 5 seconds after turning ignition OFF.
4. Support transfer assembly and transmission assembly with a jack.
5. Remove the front propeller shaft assembly fixing bolts from transfer companion flange. Refer to DLN-137, "Removal and Installation".
   CAUTION:
   Put matching marks on front propeller shaft flange yoke and transfer companion flange.
   NOTE:
   It is not necessary to remove the propeller shaft fixing bolts from front final drive companion flange.
6. Remove the rear propeller shaft assembly fixing bolts from transfer companion flange. Refer to DLN-146, "Removal and Installation".
   CAUTION:
   Put matching marks on rear propeller shaft flange yoke and transfer companion flange.
   NOTE:
   It is not necessary to remove the propeller shaft fixing bolts from rear final drive companion flange.
7. Remove rear engine mounting cross member with a power tool. Refer to TM-218, "4WD : Removal and Installation".
8. Lower jack to the position where the transfer lock position sensor can be removed.
9. Disconnect the transfer lock position sensor connector.
10. Remove the transfer lock position sensor.
11. Perform inspection after removal. Refer to DLN-125, "Inspection".

INSTALLATION

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

- Never damage O-ring of transfer lock position sensor.

- Perform inspection after installation. Refer to DLN-125, "Inspection".
- When replacing the transfer lock position sensor, perform learning of transfer lock position sensor. Refer to DLN-45, "Work Procedure".
- After learning of transfer lock position sensor, align matching mark to fix propeller shaft flange yoke and transfer companion flange. Refer to DLN-137, "Removal and Installation" (front propeller shaft), DLN-146, "Removal and Installation" (rear propeller shaft).

Inspection

INFOID:0000000009008324

INSPECTION AFTER REMOVAL

Check the O-ring assembled transfer lock position sensor for wear, crack and damage. Replace the transfer lock position sensor if there is malfunction.

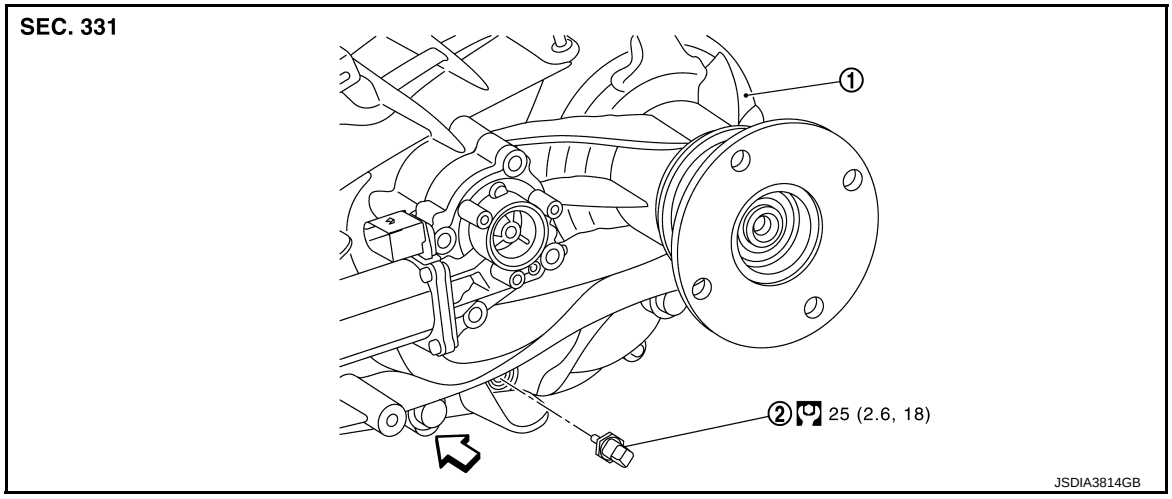
INSPECTION AFTER INSTALLATION

After driving, check the surface fitting transfer lock position sensor to transfer assembly for fluid leakage.

TRANSFER FLUID TEMPERATURE SENSOR

Exploded View

INFOID:0000000009008325



1. Transfer assembly
2. Transfer fluid temperature sensor

⇦: Vehicle front

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

Removal and Installation

INFOID:0000000009008326

REMOVAL

1. Drain transfer fluid. Refer to DLN-110, "Draining".
2. Disconnect the transfer fluid temperature sensor connector.
3. Remove the transfer fluid temperature sensor.
4. Perform inspection after removal. Refer to DLN-126, "Inspection".

INSTALLATION

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

- Perform inspection after installation. Refer to DLN-126, "Inspection".
- After refilling new transfer fluid, perform learning of transfer fluid viscosity. Refer to DLN-48, "Work Procedure".

Inspection

INFOID:0000000009008327

INSPECTION AFTER REMOVAL

Check the washer assembled transfer fluid temperature sensor for wear, crack and damage. Replace the transfer fluid temperature sensor if there is malfunction.

INSPECTION AFTER INSTALLATION

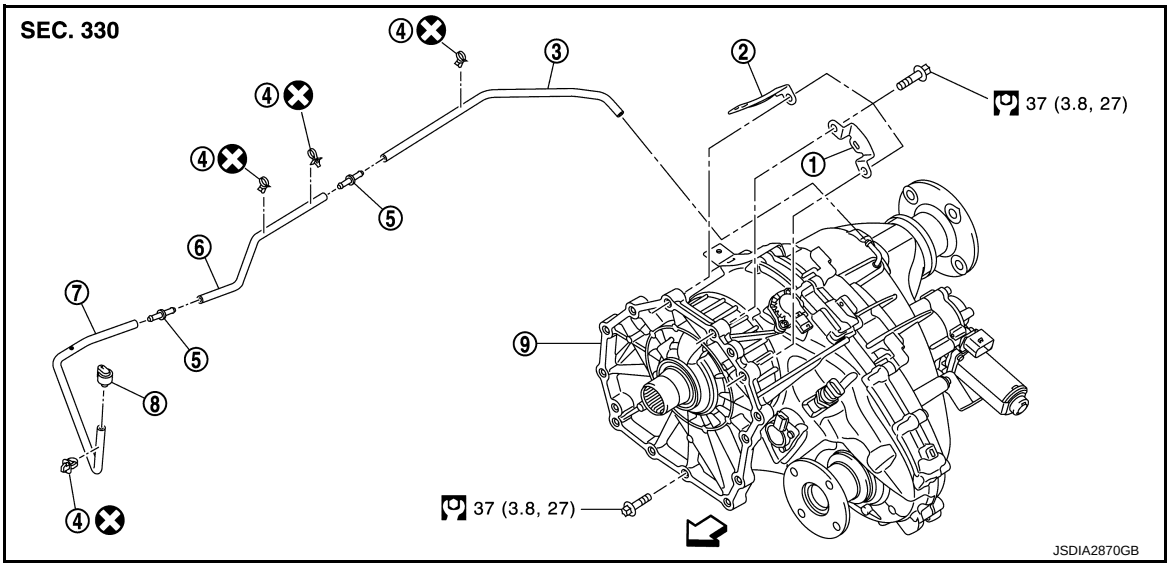
After driving, check the surface fitting transfer fluid temperature sensor to transfer assembly for fluid leakage.

UNIT REMOVAL AND INSTALLATION

TRANSFER ASSEMBLY

Exploded View

INFOID:0000000009008328



1. Bracket
2. Bracket
3. Breather hose
4. Hose clip
5. Hose connector
6. Breather hose
7. Breather hose
8. Breather
9. Transfer assembly

⇦: Vehicle front

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

Removal and Installation

INFOID:0000000009008329

REMOVAL

1. Remove rear propeller shaft. Refer to DLN-146, "Removal and Installation".
2. Remove front propeller shaft. Refer to DLN-137, "Removal and Installation".
3. Disconnect transfer control actuator, transfer rotary position sensor, transfer lock position sensor, transfer Hi-Lo position sensor and transfer fluid temperature sensor harness connectors and separate harnesses from transfer assembly.
4. Remove transfer breather hose.
5. Remove exhaust front tube (LH) with a power tool. Refer to EX-5, "Removal and Installation".
6. Remove exhaust front tube (RH) with a power tool. Refer to EX-5, "Removal and Installation".
7. Remove main muffler with a power tool. Refer to EX-5, "Removal and Installation".
8. Support transfer assembly and transmission assembly with a jack.
   CAUTION:
   Secure transfer assembly and transmission assembly to a jack.
9. Remove rear engine mounting member and engine mounting insulator with a power tool. Refer to EM-105, "Removal and Installation".
10. Lower jack to the position where the top transfer mounting bolts can be removed.
11. Remove transfer mounting bolts and separate transfer from transmission.
    CAUTION:
    Secure transfer assembly and transmission assembly to a jack.

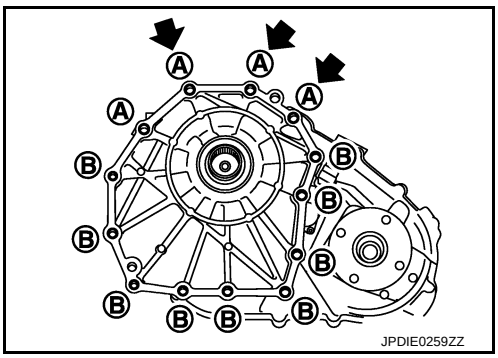
INSTALLATION

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.

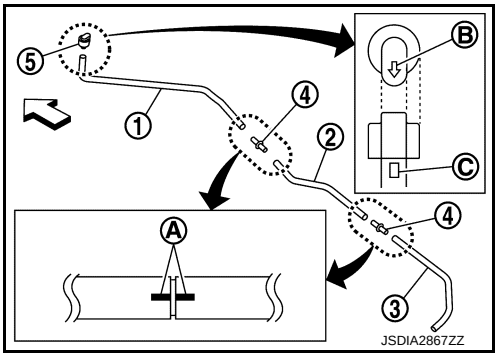
Bolt symbol	A	B
Insertion direction	Transfer to transmission	Transmission to transfer

➡ : Tightening the bolt with bracket

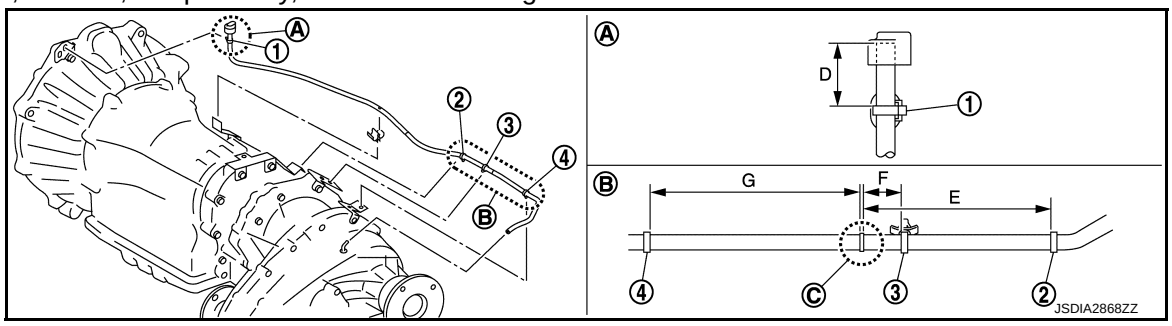


- When installing transfer breather hose assembly, check that there are no bend and twist on the transfer breather hose.
- Align paint marks (A) to connect breather hoses (1), (2), and (3) with breather connectors (4) in numerical order.
  Align arrow mark (B) of breather (5) with mark "C" of breather hose.

⇦ : Vehicle front



- Install hose clip (1) to the position where the distance from the breather side hose end is dimension "D." Install hose clip (2), (3), and (4) to the positions where the distance from breather hose joint (C) is dimension "E," "F," and "G," respectively, as shown in the figure.



Dimension

D: 26.3 mm (1.035 in)

E: 121.7 mm (4.791 in)

F: 25.0 mm (0.984 in)

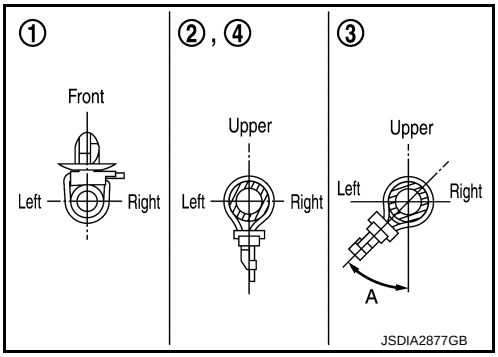
G: 143.0 mm (5.630 in)

CAUTION:

- **To install hose clips (1), (2), (3), and (4), observe the angle/ orientation shown in the figure.**

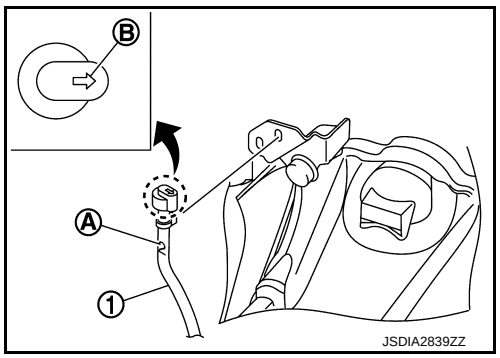
Angle A: 45° ± 15°

- **Never reuse hose clip**
- **After tightening band of clip, cut the extra part.**



Transmission side hose end

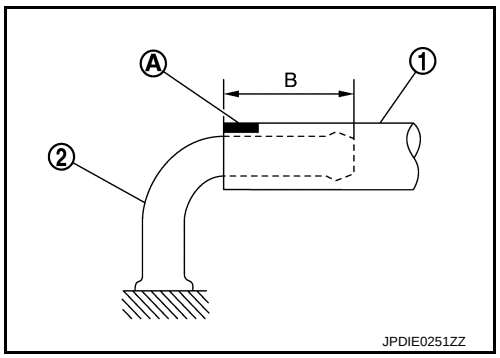
- Install the transfer breather hose (1) with the paint mark (A) faced backward and the arrow mark (B) faced rightward.



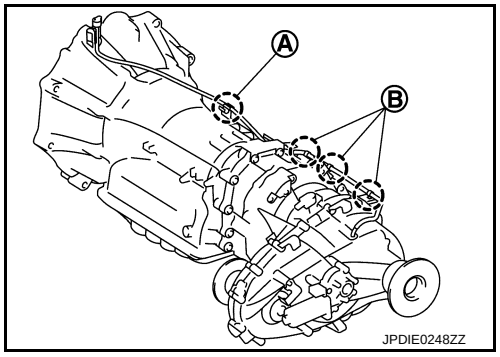
Transfer side hose end

- Install the transfer breather hose (1) with the paint mark (A) faced upward, and insert breather hose to breather tube (2) until dimension (B) shown as follows.

B: 20 mm (0.79 in)



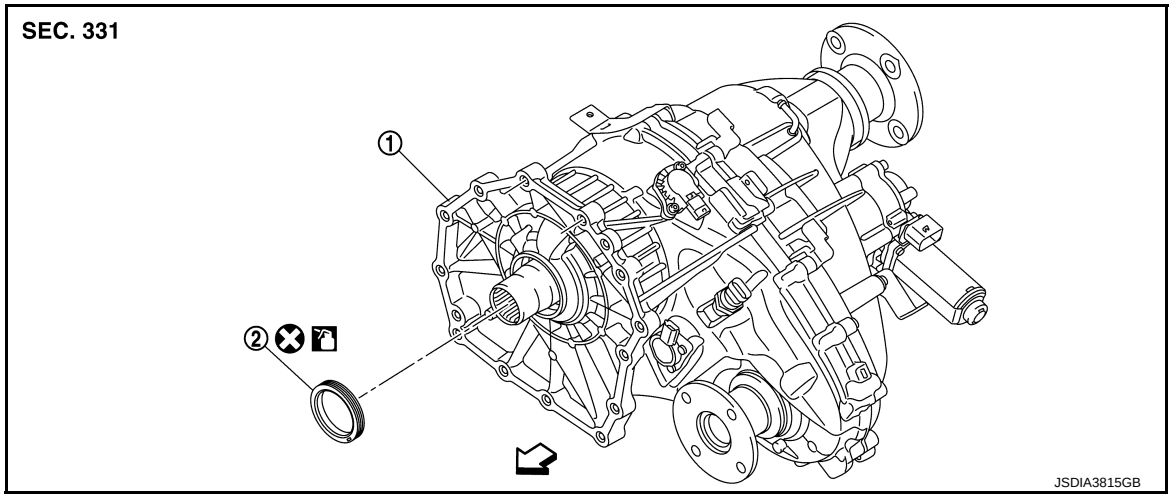
- Fix breather hose in (A) and (B) positions. For (A), face the paint mark upward.
- Check oil level and check for oil leakage after installation. Refer to DLN-110, "Inspection".
- If replacing transfer assembly, perform writing unit parameter, learning of fluid viscosity and initial calibration. Refer to DLN-43, "Work Procedure".



INPUT OIL SEAL

Exploded View

INFOID:0000000009008330



1. Transfer assembly
2. Input oil seal

: Apply transfer fluid. Refer to MA-15, "FOR NORTH AMERICA : Fluids and Lubricants" (for NORTH AMERICA), MA-16, "FOR MEXICO : Fluids and Lubricants" (for MEXICO).

⇦: Vehicle front

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

Removal and Installation

INFOID:0000000009008331

REMOVAL

1. Remove transfer assembly from vehicle. Refer to DLN-127, "Exploded View".
2. Remove input oil seal from front case, using a suitable tool.
   CAUTION:
   Never damage the front case and input.

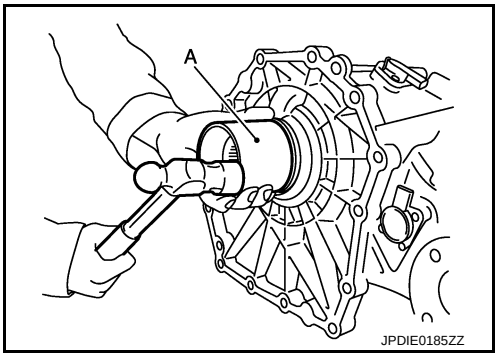
INSTALLATION

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

- Install input oil seal, with a drift (A) [SST: KV40104710 (—)] until it is flush with the end face of front case with the drift

CAUTION:

- **Never reuse input oil seal.**
- **Apply transfer fluid onto circumference of oil seal.**



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

INFOID:0000000009008332

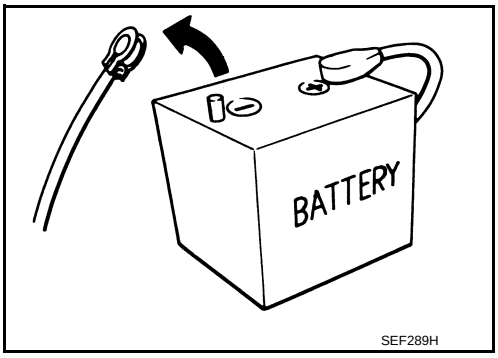
Applied model		4WD
		VK56VD
		A/T
Transfer model		ATX90A
Fluid capacity (Approx.)	ℓ (US pt, Imp pt)	1.5 (3-1/8, 2-5/8)
Gear ratio	4H	1.000
	4L	2.679

PRECAUTION

PRECAUTIONS

Precautions for Removing of Battery Terminal

INFOID:0000000009864143



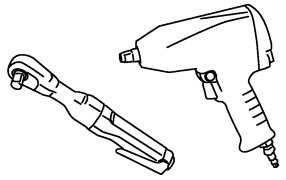
- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
  NOTE:
  ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  NOTE:
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  NOTE:
  The removal of 12V battery may cause a DTC detection error.

PREPARATION

PREPARATION

Commercial Service Tools

INFOID:0000000009008333

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

SYMPTOM DIAGNOSIS

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009008334

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

		Reference	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
		Possible cause and SUSPECTED PARTS	DLN-135, "Inspection"	—	—	—	—	DLN-135, "Inspection"	DLN-135, "Inspection"	NVH of FRONT and REAR FINAL DRIVE in hits 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:0000000009008335

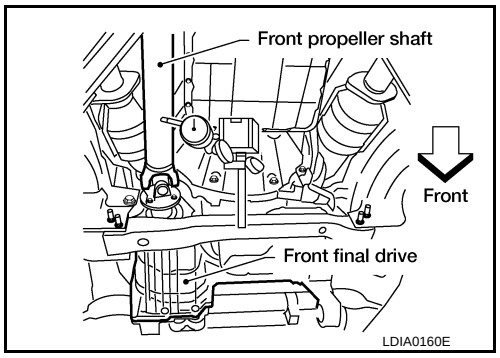
APPEARANCE AND NOISE

Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.

VIBRATION

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

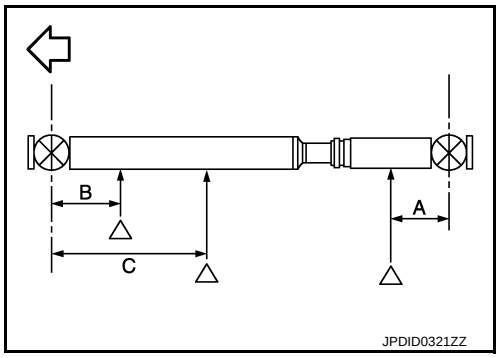
1. With a dial indicator, measure propeller shaft runout at runout measuring points by rotating final drive companion flange with hands.



⇦: Vehicle front

Propeller shaft runout **: Refer to DLN-141, "Propeller Shaft Runout".**

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



⇦: Vehicle front

Dimension

A	**: 80 – 100 mm (3.15 – 3.94 in)**
B	**: 100 – 120 mm (3.94 – 4.72 in)**
C	**: 254.5 mm (10.02 in)**

2. If runout still exceeds specifications, separate propeller shaft at final drive companion flange or transfer companion flange; then change the phase between companion flange and propeller shaft by the one bolt hole at a time and install propeller shaft.
3. If runout is more than the limit value, remove and check propeller shaft.
4. Check the vibration by driving vehicle.

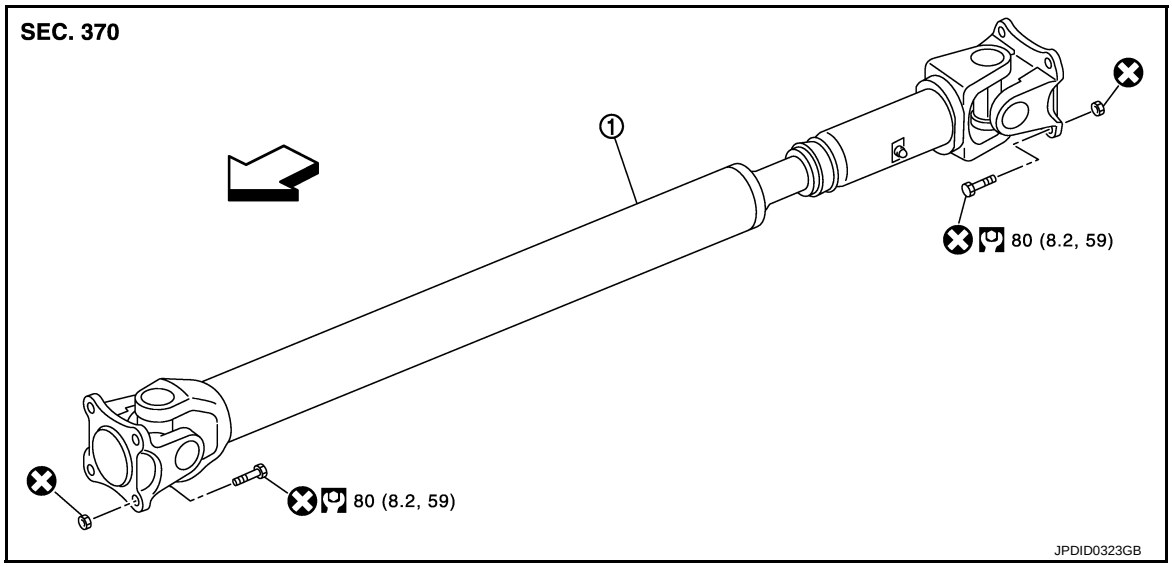
REMOVAL AND INSTALLATION

FRONT PROPELLER SHAFT

Exploded View

INFOID:0000000009008336

REMOVAL

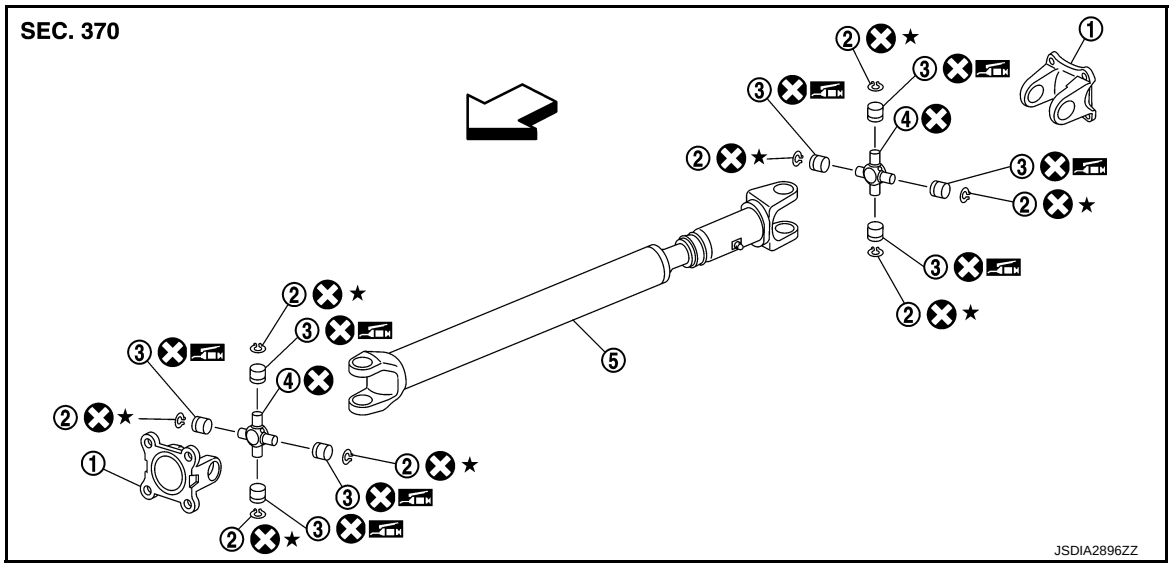


1. Propeller shaft assembly

⇦: Vehicle front

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

DISASSEMBLY



1. Flange yoke
2. Snap ring*
3. Bearing*
4. Journal*
5. Propeller shaft

*: Replace “2”, “3” and “4” as a set.

⇦: Vehicle front

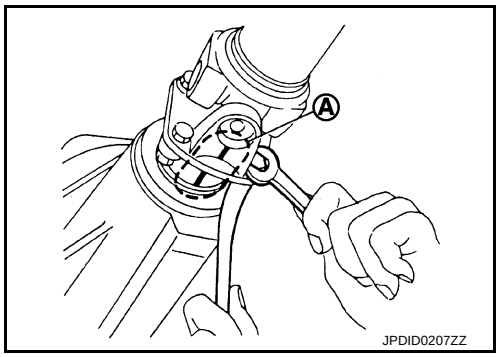
Refer to GI-4, "Components" for symbols not described above.

Removal and Installation

INFOID:0000000009008337

REMOVAL

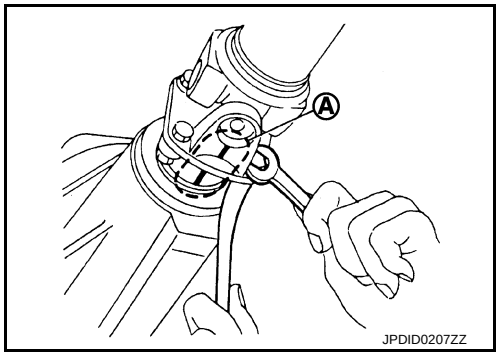
1. Shift the transmission to the neutral position, and then release the parking brake.
2. Remove protector A and B with power tool. Refer to SCS-39, "PPMU, MIDDLE TUBE ASSEMBLY, PPMU PIPE : Removal and Installation".
3. Remove front suspension rear cross member with a power tool. Refer to TM-218, "4WD : Removal and Installation".
4. Put matching mark (A) on front propeller shaft flange yoke and final drive companion flange.
   CAUTION:
   For matching mark, use paint. Never damage propeller shaft flange and final drive companion flange.
5. Put matching mark (A) on front propeller shaft flange yoke and transfer companion flange.
   CAUTION:
   For matching mark, use paint. Never damage propeller shaft flange and transfer companion flange.
6. Remove the propeller shaft assembly fixing bolts.
7. Remove propeller shaft assembly from the front final drive and transfer.
8. Perform inspection after removal. Refer to DLN-139, "Inspection".



INSTALLATION

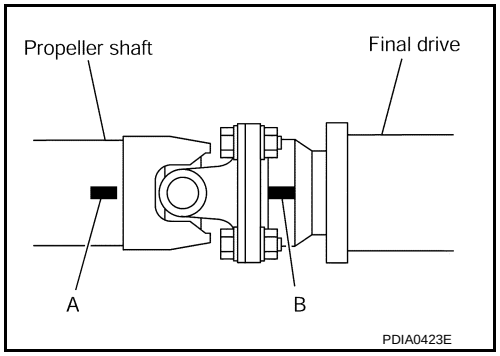
Note the following, and install in the reverse order of removal.

- Align matching mark (A) to install propeller shaft flange yoke and transfer companion flange.
- Align matching mark (A) to install propeller shaft flange yoke and front final drive companion flange.
- Perform inspection after installation. Refer to DLN-139, "Inspection".



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

- Install the propeller shaft while aligning its matching mark (A) with the matching mark (B) on the joint as close as possible.

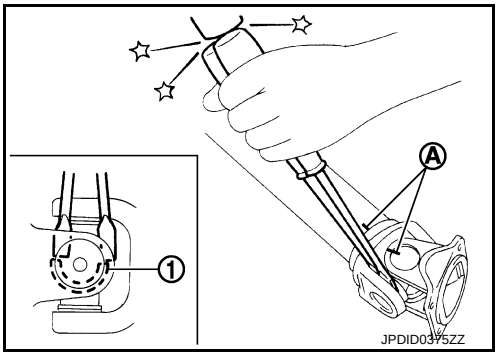


Disassembly and Assembly

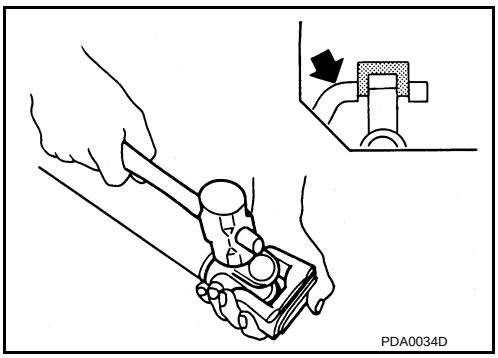
INFOID:0000000009008338

DISASSEMBLY

1. Put a matching mark (A) between propeller shaft and flange yoke and remove snap rings (1).
CAUTION:
For matching mark, use paint. Never damage the surface.



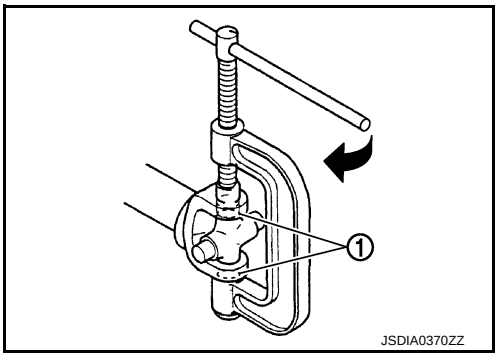
2. Lightly tap bottom of yoke using a copper hammer and remove journal bearing.
CAUTION:
Never damage the yoke.



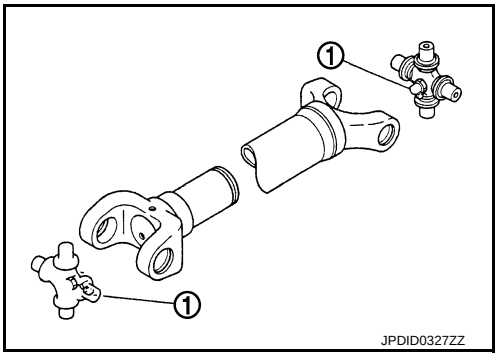
ASSEMBLY

1. Install journal bearing to journal.
CAUTION:
- **Never reuse journal or journal bearing.**
- **Always replace journal, journal bearing, and snap rings as a set.**
- **Apply multi-purpose grease to journal bearing.**

2. Install bearing (1) using a vise.
CAUTION:
Never damage bearing or flange yoke.



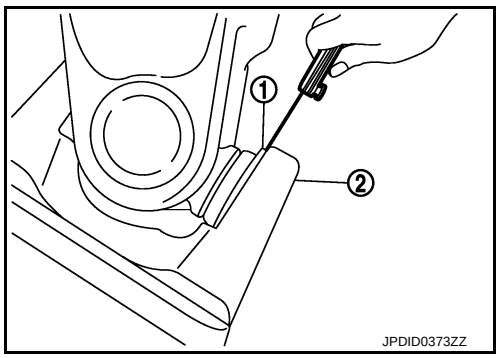
3. Install journal to propeller shaft so that grease nipple (1) on journal portion is in the same direction.
CAUTION:
Never reuse journal.



4. Measure journal axial play. If necessary, select the appropriate snap ring.

a. While pushing to 98 N·m (10 kg-m, 72 ft-lb), check the clearance between snap ring (1) and flange yoke (2).

Journal axial play **: Refer to DLN-141, "Journal Axial Play"**

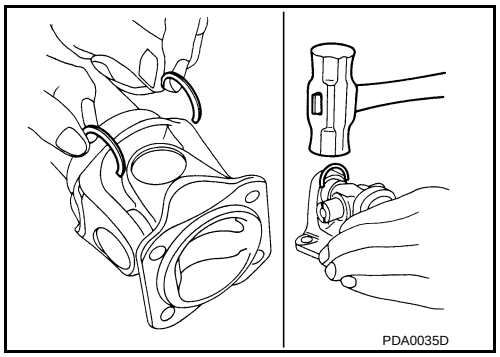


b. If journal axial play is outside the specification, use a thicker/thinner snap ring to adjust.

CAUTION:

- **Never reuse snap ring.**
- **Select snap rings so that thickness difference between LH and RH is within 0.06 mm. For selecting snap ring, refer to the latest parts information.**

5. Install selected snap ring as shown in the figure.



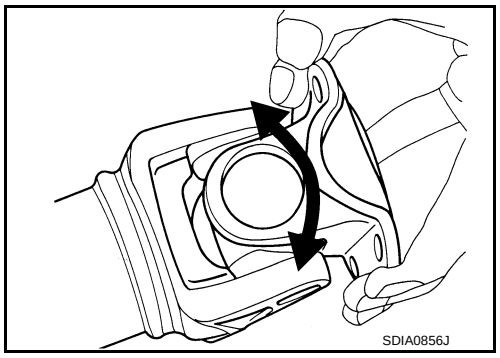
6. Check that joint moves smoothly.

Reference value (After adaptation)

Bending resistance **: 1.96 N·m (0.20 kg-m, 17 in-lb) or less**

NOTE:
The bending resistance [1.96 N·m (0.20 kg-m, 17 in-lb) or less] may not be satisfied soon after the installation.

7. Check the journal axial play. Refer to DLN-139, "Inspection".



Inspection

INFOID:0000000009008339

INSPECTION AFTER REMOVAL

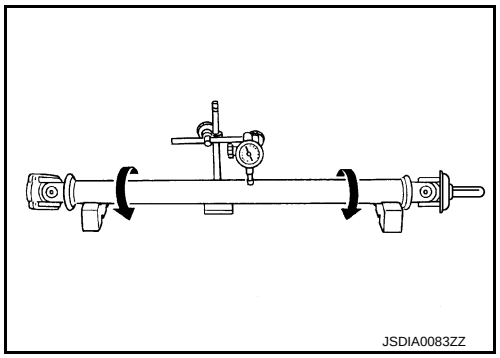
Appearance

Check the propeller shaft for dents or cracks. If damage is detected, replace the propeller shaft assembly.

Propeller Shaft Runout

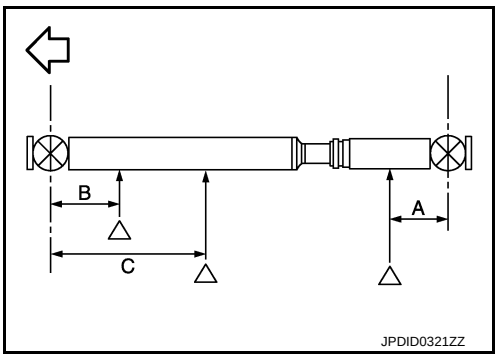
Check propeller shaft runout at measuring point with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly.

Propeller shaft runout **: Refer to DLN-141, "Propeller Shaft Runout"**



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

⇦: Vehicle front

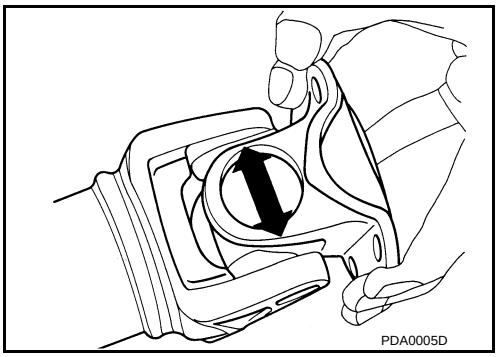


Dimension

A	**: 80 – 100 mm (3.15 – 3.94 in)**
B	**: 100 – 120 mm (3.94 – 4.72 in)**
C	**: 254.5 mm (10.02 in)**

Journal Axial Play

As shown in the figure, while fixing yoke on one side, check axial play of joint. If axial play exceeds specifications, replace propeller shaft assembly.



Journal axial play **: Refer to DLN-141, "Journal Axial Play"**

INSPECTION AFTER INSTALLATION

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

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specification

INFOID:0000000009008340

Applied model		4WD
		VK56VD
		A/T
Propeller shaft model		2F P15
Number of joints		2
Type of journal bearings	1st joint	Shell type
	2nd joint	Shell type
Coupling method with transfer		Flange type
Coupling method with rear final drive		Flange type
Shaft length (Spider to spider)		729 mm (28.70 in)
Shaft outer diameter		68.9 mm (2.713 in)

Propeller Shaft Runout

INFOID:0000000009008341

Unit: mm (in)

Item	Limit
Propeller shaft runout	1.0 (0.04)

Journal Axial Play

INFOID:0000000009008342

Unit: mm (in)

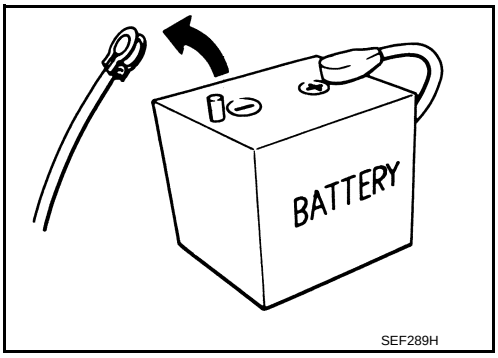
Item	Standard
Journal axial play	0.06 (0.0024)

PRECAUTION

PRECAUTIONS

Precautions for Removing of Battery Terminal

INFOID:0000000009864145



- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
  NOTE:
  ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  NOTE:
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  NOTE:
  The removal of 12V battery may cause a DTC detection error.

SYMPTOM DIAGNOSIS

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009008343

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

		Reference	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
		Possible cause and SUSPECTED PARTS	DLN-144, "Inspection"	—	—	—	—	DLN-144, "Inspection"	DLN-144, "Inspection"	NVH of FRONT and REAR FINAL DRIVE in hits 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

REAR PROPELLER SHAFT

Inspection

INFOID:0000000009008344

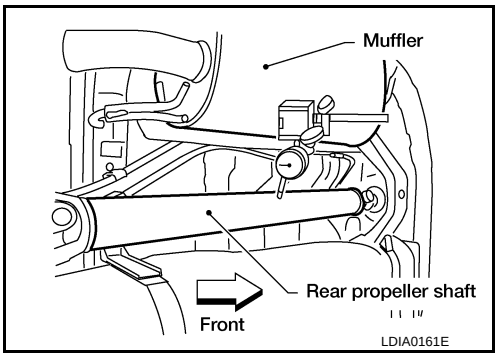
APPEARANCE AND NOISE

Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.

VIBRATION

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

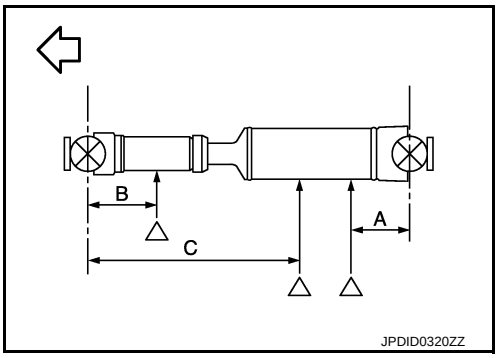
1. With a dial indicator, measure propeller shaft runout at runout measuring points by rotating final drive companion flange with hands.



⇦: Vehicle front

Propeller shaft runout	**: Refer to DLN-150, "Propeller Shaft Runout".**

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



⇦: Vehicle front

Dimension

A	**: 120 – 150 mm (4.72 – 5.91 in)**
B	**: 150 – 180 mm (5.91 – 7.09 in)**
C	**: 703.5 mm (27.70 in)**

2. If runout still exceeds specifications, separate propeller shaft at final drive companion flange or transfer companion flange; then change the phase between companion flange and propeller shaft by the one bolt hole at a time and install propeller shaft.
3. If runout is more than the limit value, remove and check propeller shaft.
4. Check the vibration by driving vehicle.

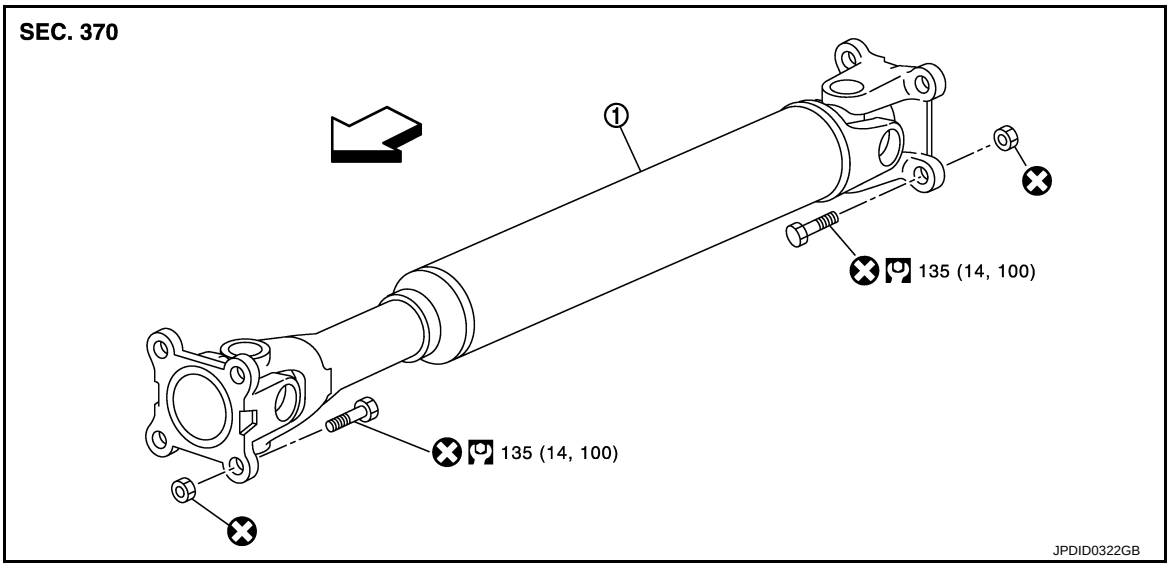
REMOVAL AND INSTALLATION

REAR PROPELLER SHAFT

Exploded View

INFOID:0000000009008345

REMOVAL

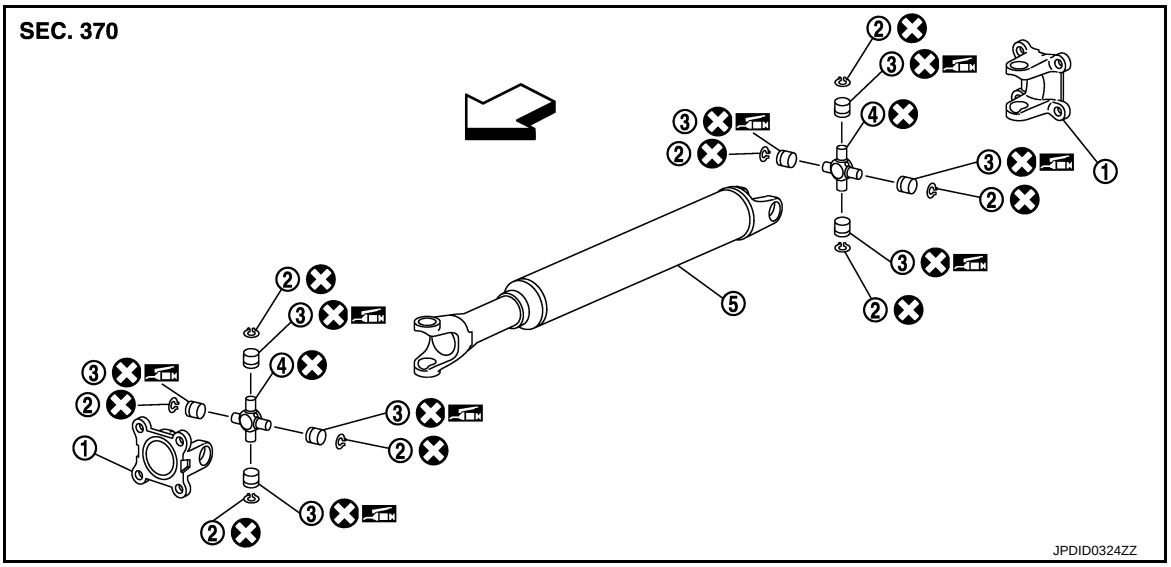


1. Propeller shaft assembly

⇦: Vehicle front

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

DISASSEMBLY



1. Flange yoke
2. Snap ring*
3. Bearing*
4. Journal*
5. Propeller shaft

*: Replace “2”, “3” and “4” as a set.

⇦: Vehicle front

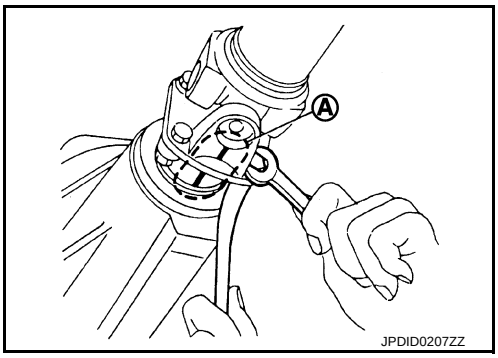
Refer to GI-4, "Components" for symbols not described above.

Removal and Installation

INFOID:0000000009008346

REMOVAL

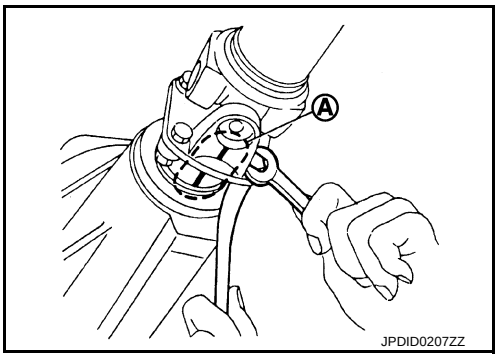
1. Shift the transmission to the neutral position, and then release the parking brake.
2. Put matching mark (A) on rear propeller shaft flange yoke and rear drive companion flange.
   CAUTION:
   For matching mark, use paint. Never damage propeller shaft flange and final drive companion flange.
3. Put matching mark (A) on rear propeller shaft flange yoke and transfer companion flange.
   CAUTION:
   For matching mark, use paint. Never damage propeller shaft flange and transfer companion flange.
4. Remove the propeller shaft assembly fixing bolts.
5. Remove propeller shaft assembly from the rear final drive and transfer.
6. Perform inspection after removal. Refer to DLN-148, "Inspection".



INSTALLATION

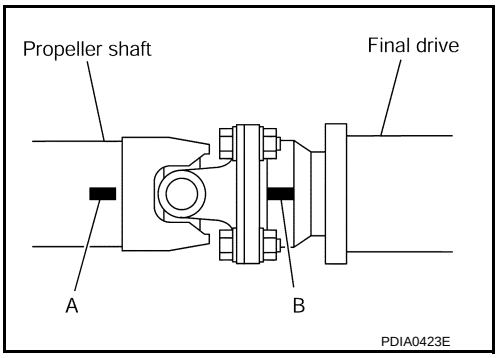
Note the following, and install in the reverse order of removal.

- Align matching mark (A) to install propeller shaft flange yoke and transfer companion flange.
- Align matching mark (A) to install propeller shaft flange yoke and rear final drive companion flange.
- Perform inspection after installation. Refer to DLN-148, "Inspection".



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

- Install the propeller shaft while aligning its matching mark (A) with the matching mark (B) on the joint as close as possible.

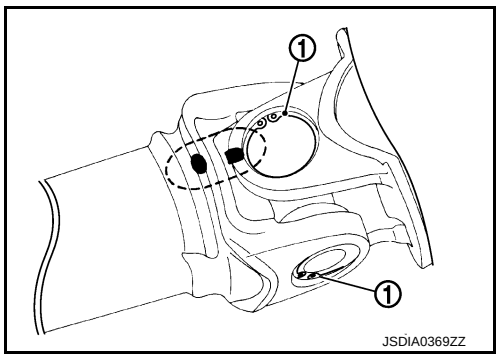


Disassembly and Assembly

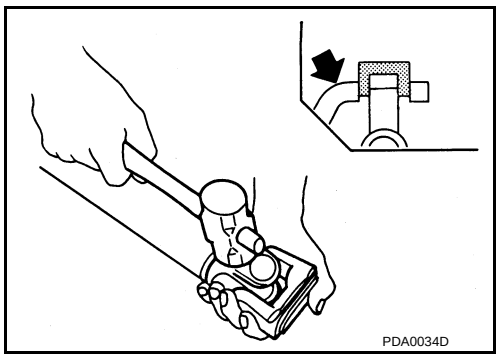
INFOID:0000000009008347

DISASSEMBLY

1. Put a matching mark between propeller shaft and flange yoke and remove snap rings (1).
CAUTION:
For matching mark, use paint. Never damage the surface.



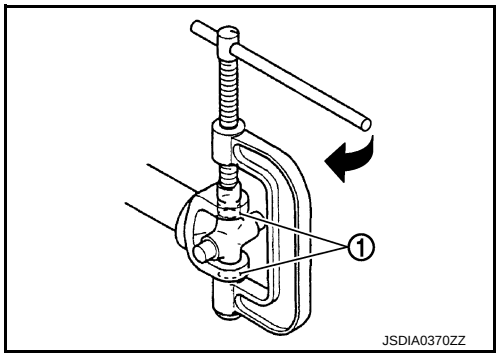
2. Lightly tap bottom of yoke using a copper hammer and remove journal bearing.
CAUTION:
Never damage the yoke.
3. Remove grease nipple.



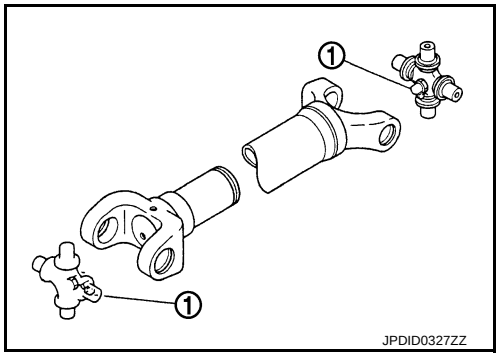
ASSEMBLY

1. Install journal bearing to journal.
CAUTION:
- **Never reuse journal or journal bearing.**
- **Always replace journal, journal bearing, and snap rings as a set.**
- **Apply multi-purpose grease to journal bearing.**

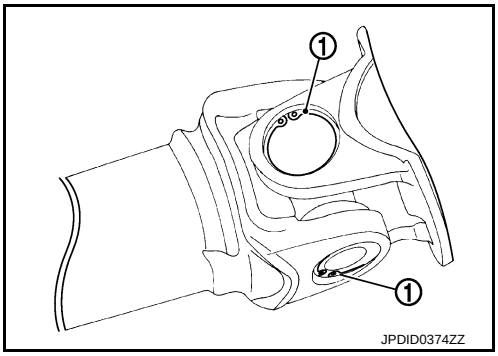
2. Install bearing (1) using a vise.
CAUTION:
Never damage bearing or flange yoke.



3. Install journal to propeller shaft so that grease nipple (1) on journal portion is in the same direction.
CAUTION:
Never reuse journal.



4. Install snap ring (1).



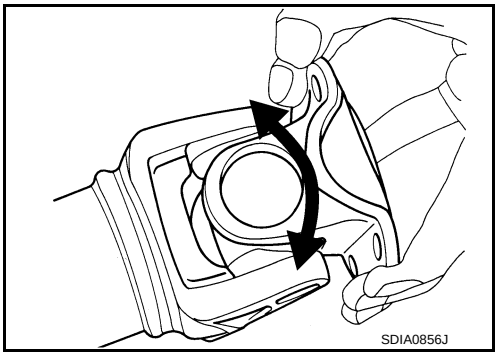
5. Check that joint moves smoothly.

Reference value (After adaptation)

Bending resistance : 2.26 N·m (0.23 kg-m, 20 in-lb) or less

NOTE:
The bending resistance [2.26 N·m (0.23 kg-m, 20 in-lb) or less] may not be satisfied soon after the installation.

6. Check the journal axial play. Refer to DLN-148, "Inspection".



Inspection

INFOID:0000000009008348

INSPECTION AFTER REMOVAL

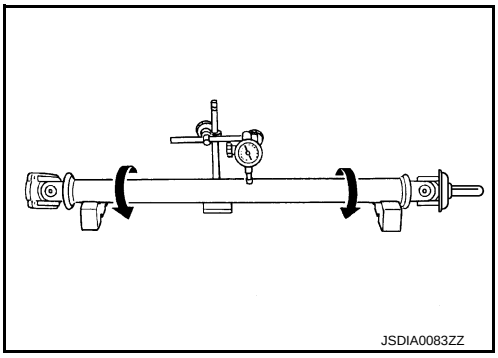
Appearance

Check the propeller shaft for dents or cracks. If damage is detected, replace the propeller shaft assembly.

Propeller Shaft Runout

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

Propeller shaft runout : Refer to DLN-150, "Propeller Shaft Runout"



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

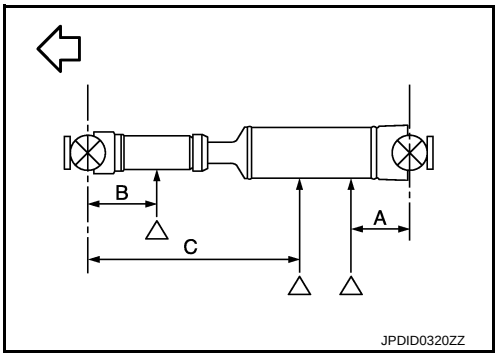
⇦: Vehicle front

Dimension

A : 120 – 150 mm (4.72 – 5.91 in)

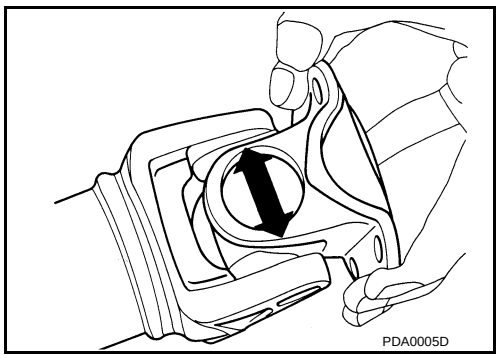
B : 150 – 180 mm (5.91 – 7.09 in)

C : 703.5 mm (27.70 in)



Journal Axial Play

As shown in the figure, while fixing yoke on one side, check axial play of joint. If axial play exceeds specifications, replace propeller shaft assembly.



Journal axial play **: Refer to DLN-150, "Journal Axial Play"**

INSPECTION AFTER INSTALLATION

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

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specification

INFOID:0000000009008349

Applied model		4WD
		VK56VD
		A/T
Propeller shaft model		2F P26
Number of joints		2
Type of journal bearings	1st joint	Shell type
	2nd joint	Shell type
Coupling method with transfer		Flange type
Coupling method with rear final drive		Flange type
Shaft length (Spider to spider)		1168mm (45.98 in)
Shaft outer diameter		101.6 mm (4.00 in)

Propeller Shaft Runout

INFOID:0000000009008350

Unit: mm (in)

Item	Limit
Propeller shaft runout	1.0 (0.04)

Journal Axial Play

INFOID:0000000009008351

Unit: mm (in)

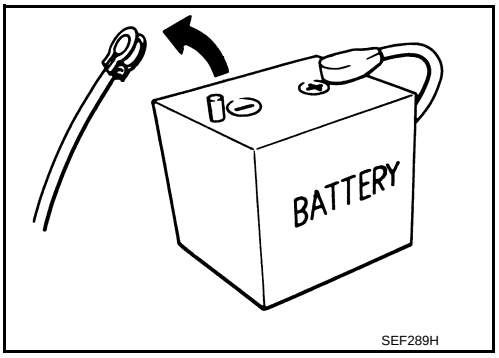
Item	Standard
Journal axial play	0 (0)

PRECAUTION

PRECAUTIONS

Precautions for Removing of Battery Terminal

INFOID:0000000009864146



- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
  NOTE:
  ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  NOTE:
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  NOTE:
  The removal of 12V battery may cause a DTC detection error.

SYMPTOM DIAGNOSIS

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009008352

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

		Reference	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
		DLN-153, "Inspection"	—	—	—	—	DLN-153, "Inspection"	DLN-153, "Inspection"	NVH of REAR FINAL DRIVE in this section.	NVH in RAX 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																
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×	×	
	Shake		×			×				×	×	×	×	×	×	
	Vibration	×	×	×	×	×	×	×		×	×		×		×	

×: Applicable

PERIODIC MAINTENANCE

REAR PROPELLER SHAFT

Inspection

INFOID:0000000009008353

APPEARANCE AND NOISE

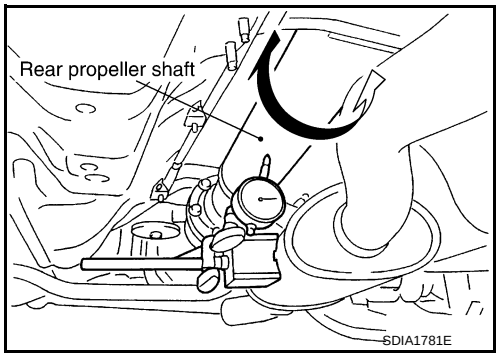
Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.

VIBRATION

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

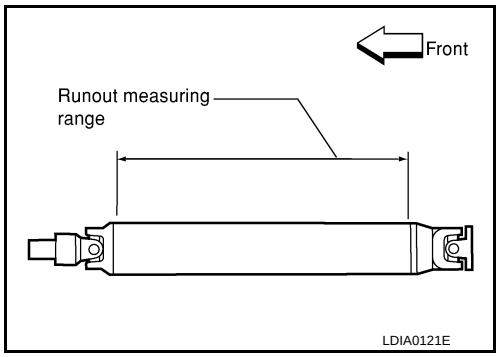
1. With a dial indicator, measure propeller shaft runout at runout measuring points by rotating final drive companion flange with hands.

Propeller shaft runout **: Refer to DLN-159, "Propeller Shaft Runout".**



- Propeller shaft runout measuring range.

⇦: Vehicle front



2. If runout still exceeds specifications, separate propeller shaft at final drive companion flange; then change the phase between companion flange and propeller shaft by the one bolt hole at a time and install propeller shaft.
3. If runout is more than the limit value, remove and check propeller shaft.
4. Check the vibration by driving vehicle.

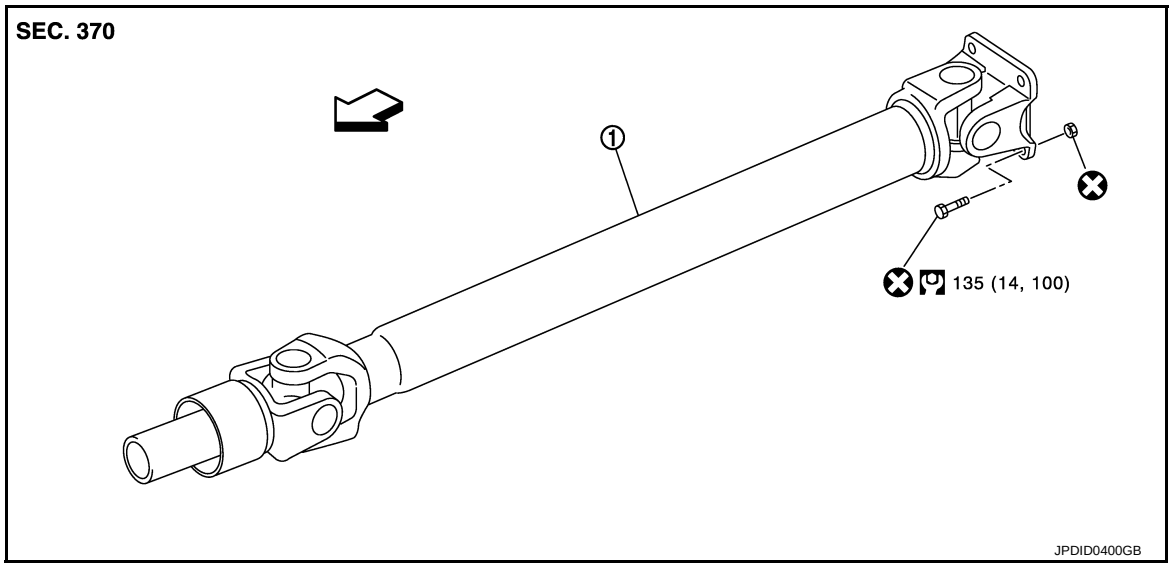
REMOVAL AND INSTALLATION

REAR PROPELLER SHAFT

Exploded View

INFOID:0000000009008354

REMOVAL

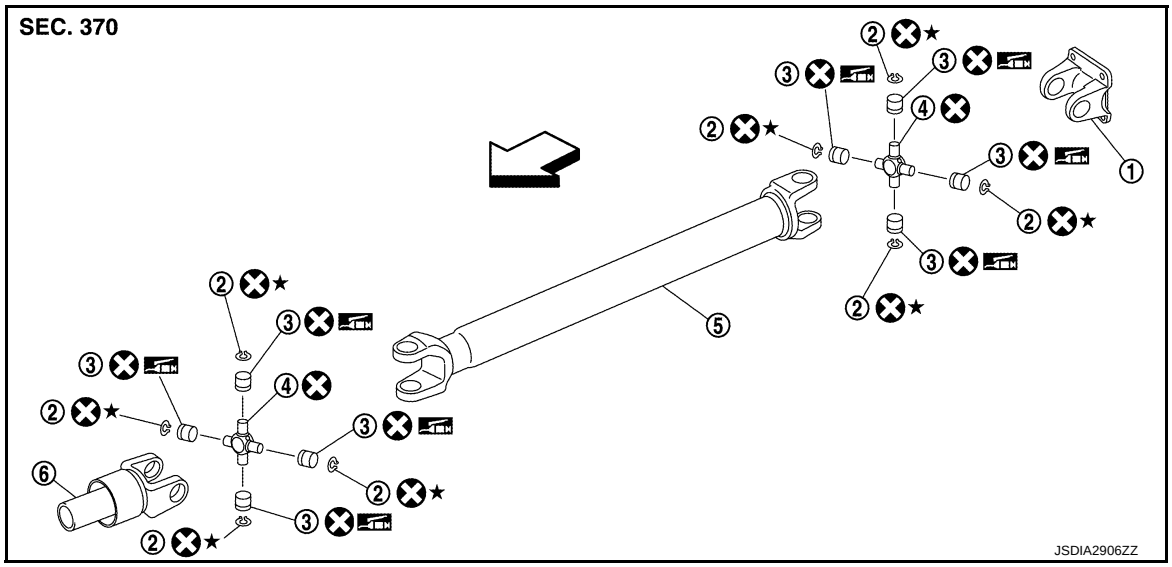


1. Propeller shaft assembly

⇦: Vehicle front

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

DISASSEMBLY



1. Flange yoke
2. Snap ring
3. Bearing
4. Journal
5. Propeller shaft
6. Sleeve yoke

⇦: Vehicle front

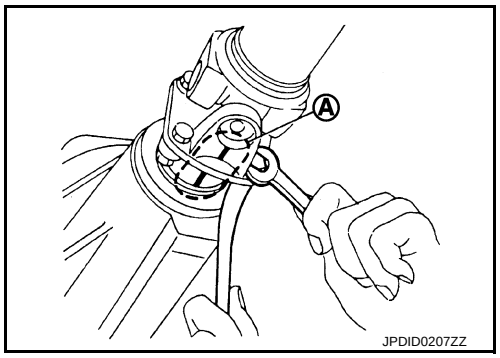
Refer to GI-4, "Components" for symbols not described above.

Removal and Installation

INFOID:0000000009008355

REMOVAL

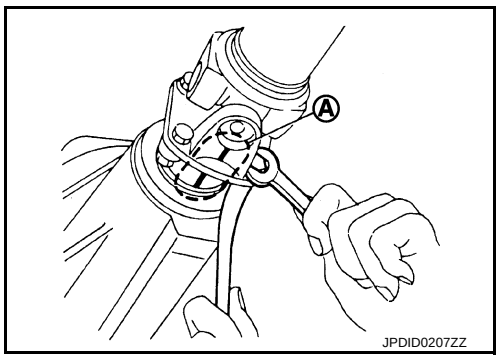
1. Shift the transmission to the neutral position, and then release the parking brake.
2. Put matching mark (A) on rear propeller shaft flange yoke and rear drive companion flange.
   CAUTION:
   For matching mark, use paint. Never damage propeller shaft flange and final drive companion flange.
3. Remove the propeller shaft assembly fixing bolts.
4. Remove propeller shaft assembly from the rear final drive and transfer.
5. Perform inspection after removal. Refer to DLN-157, "Inspection".



INSTALLATION

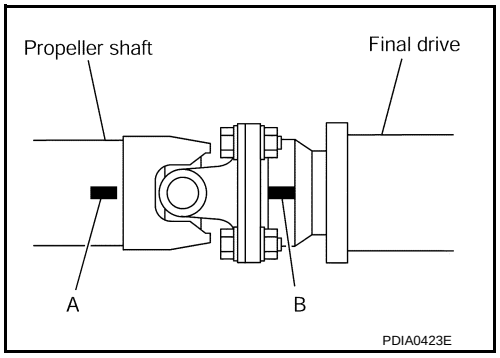
Note the following, and install in the reverse order of removal.

- Align matching mark (A) to install propeller shaft flange yoke and transfer companion flange.
- Align matching mark (A) to install propeller shaft flange yoke and rear final drive companion flange.
- Perform inspection after installation. Refer to DLN-157, "Inspection".



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

- Install the propeller shaft while aligning its matching mark (A) with the matching mark (B) on the joint as close as possible.

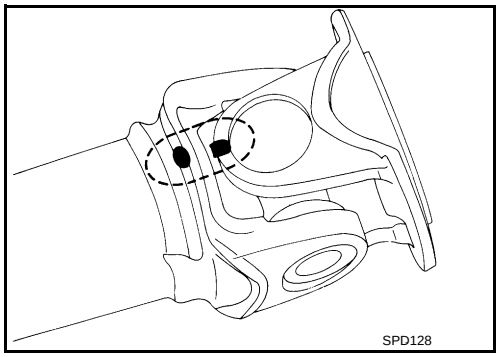


Disassembly and Assembly

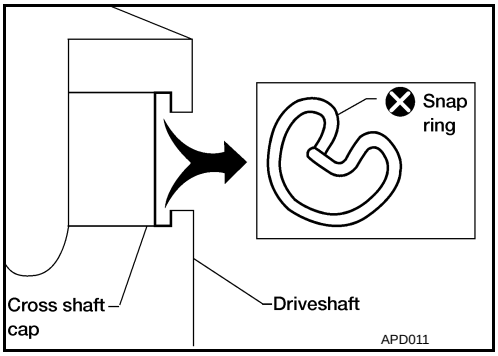
INFOID:0000000009008356

DISASSEMBLY

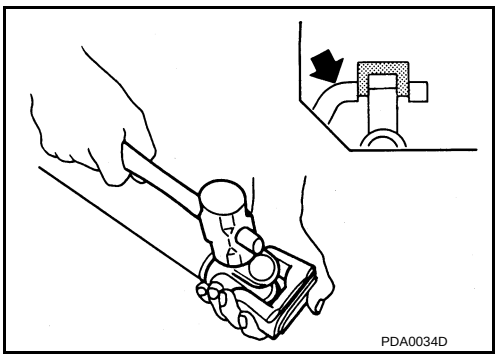
1. Put a matching mark between propeller shaft and flange yoke as shown.
   CAUTION:
   For matching mark, use paint. Never damage the surface.



2. Remove snap ring.



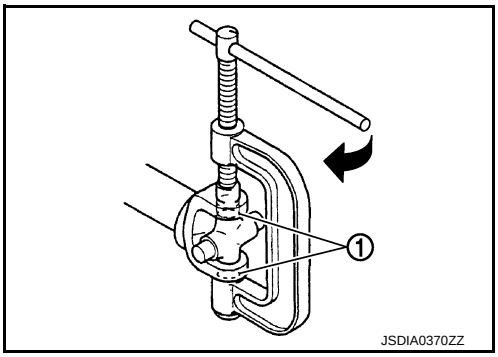
3. Lightly tap bottom of yoke using a copper hammer and remove journal bearing.
CAUTION:
Never damage the yoke.



ASSEMBLY

1. Install journal bearing to journal.
CAUTION:
- **Never reuse journal or journal bearing.**
- **Always replace journal, journal bearing, and snap rings as a set.**
- **Apply multi-purpose grease to journal bearing.**

2. Install bearing (1) using a vise.
CAUTION:
Never damage bearing or flange yoke.

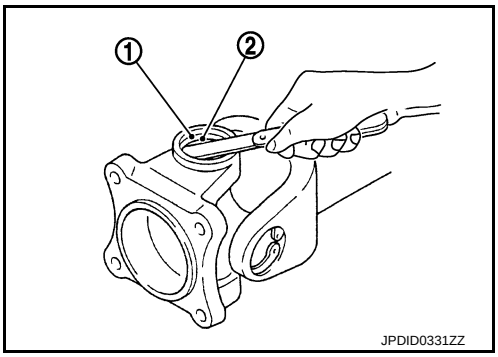


3. Measure journal axial play. If necessary, select the appropriate snap ring.

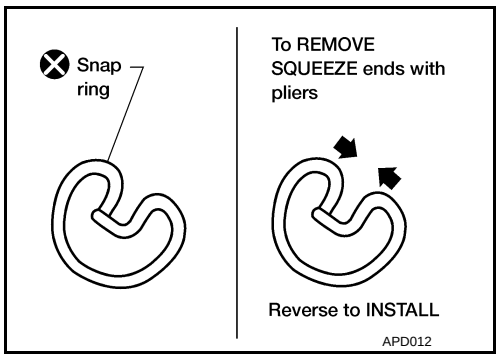
a. While pushing to 98 N·m (10 kg-m, 72 ft-lb), check the clearance between snap ring (1) and needle bearing (2).

Journal axial play **: Refer to DLN-159, "Journal Axial Play"**

b. If journal axial play is outside the specification, use a thicker/thinner snap ring to adjust.
CAUTION:
- **Never reuse snap ring.**
- **Select snap rings so that thickness difference between LH and RH is within 0.02 mm (0.0008 in). For selecting snap ring, refer to the latest parts information.**



4. Install snap ring (1).



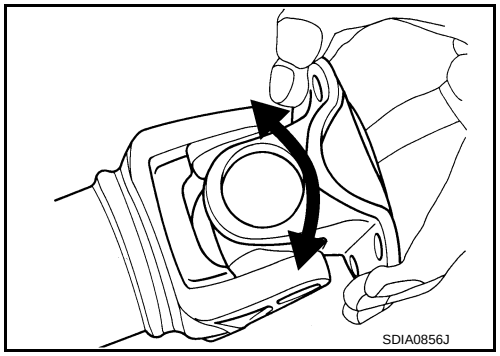
5. Check that joint moves smoothly.

Reference value (After adaptation)

Bending resistance : 2.26 N·m (0.23 kg-m, 20 in-lb) or less

NOTE:
The bending resistance [2.26 N·m (0.23 kg-m, 20 in-lb) or less] may not be satisfied soon after the installation.

6. Check the journal axial play. Refer to DLN-157, "Inspection".



Inspection

INFOID:0000000009008357

INSPECTION AFTER REMOVAL

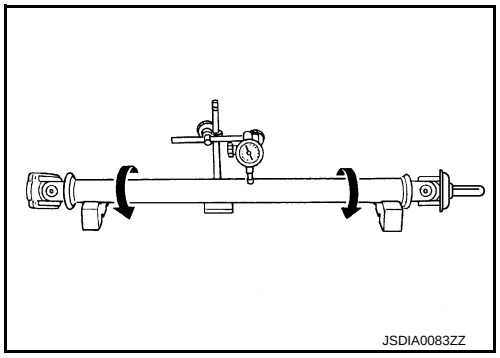
Appearance

Check the propeller shaft for dents or cracks. If damage is detected, replace the propeller shaft assembly.

Propeller Shaft Runout

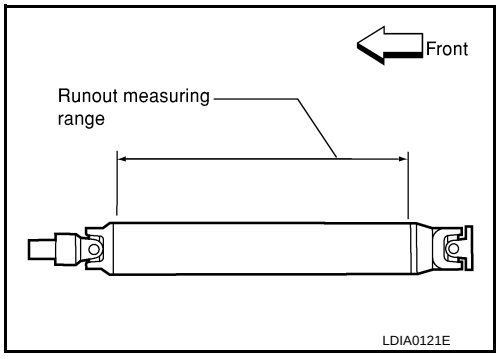
Check propeller shaft runout at measuring point with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly.

Propeller shaft runout : Refer to DLN-159, "Propeller Shaft Runout"



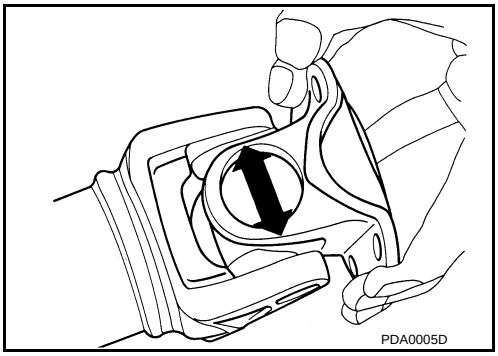
- Propeller shaft runout measuring range.

⇦: Vehicle front



Journal Axial Play

As shown in the figure, while fixing yoke on one side, check axial play of joint. If axial play exceeds specifications, replace propeller shaft assembly.



Journal axial play **: Refer to DLN-159, "Journal Axial Play"**

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 Specification

INFOID:0000000009008358

Applied model		2WD
		VK56VD
		A/T
Propeller shaft model		2S1410
Number of joints		2
Type of journal bearings	1st joint	Shell type
	2nd joint	Shell type
Coupling method with transfer		Sleeve type
Coupling method with rear final drive		Flange type
Shaft length (Spider to spider)		1590.4 mm (62.61 in)
Shaft outer diameter		127.6 mm (5.02 in)

Propeller Shaft Runout

INFOID:0000000009008359

Unit: mm (in)

Item	Limit
Propeller shaft runout	1.02 (0.0402)

Journal Axial Play

INFOID:0000000009008360

Unit: mm (in)

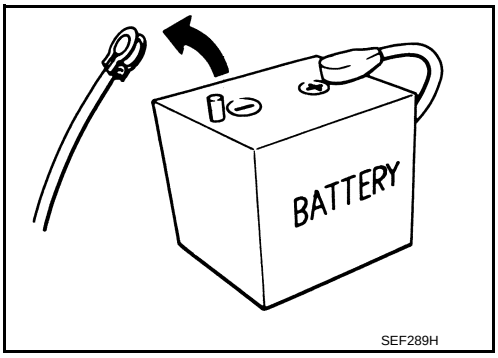
Item	Standard
Journal axial play	0.02 (0.0008)

PRECAUTION

PRECAUTIONS

Precautions for Removing of Battery Terminal

INFOID:0000000009864147



- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
  NOTE:
  ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  NOTE:
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  NOTE:
  The removal of 12V battery may cause a DTC detection error.

Precaution for Servicing Front Final Drive

INFOID:0000000009008361

- Before starting diagnosis of the vehicle, understand the symptoms well. Perform correct and systematic operations.
- Check for the correct installation status prior to removal or disassembly. When matching marks are required, be certain they do not interfere with the function of the parts they are applied to.
- Overhaul should be done in a clean work area, a dust proof area is recommended.
- Before disassembly, completely remove sand and mud from the exterior of the unit, preventing them from entering into the unit during disassembly or assembly.
- Always use shop paper for cleaning the inside of components.
- Avoid using cotton gloves or a shop cloth to prevent the entering of lint.
- Check appearance of the disassembled parts for damage, deformation, and abnormal wear. Replace them with new ones if necessary.
- Gaskets, seals and O-rings should be replaced any time the unit is disassembled.
- Clean and flush the parts sufficiently and blow them dry.
- Be careful not to damage sliding surfaces and mating surfaces.
- When applying sealant, remove the old sealant from the mating surface; then remove any moisture, oil, and foreign materials from the application and mating surfaces.
- In principle, tighten nuts or bolts gradually in several steps working diagonally from inside to outside. If a tightening sequence is specified, observe it.
- During assembly, observe the specified tightening torque.
- Add new differential gear oil, petroleum jelly, or multi-purpose grease, as specified.

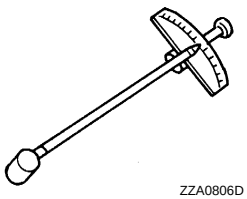
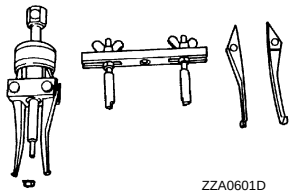
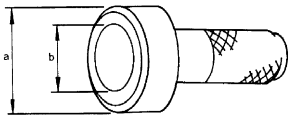
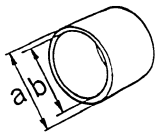
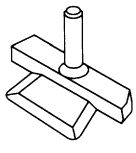
PREPARATION

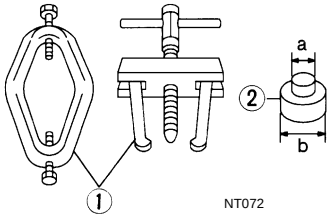
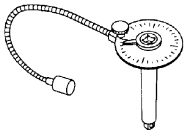
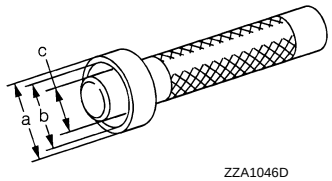
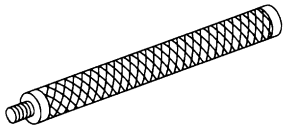
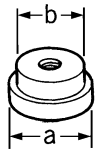
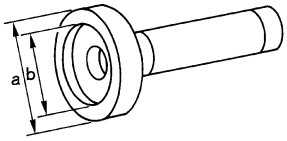
PREPARATION

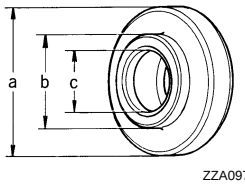
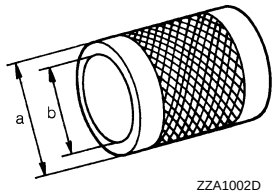
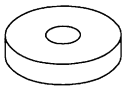
Special Service Tool

INFOID:0000000009008362

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

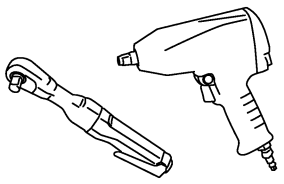
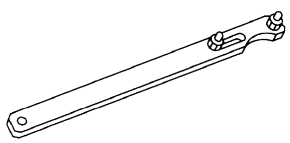
Tool number (Kent-Moore No.) Tool name	Description
ST3127S000 (J-25765-A) Preload gauge  ZZA0806D	Measuring pinion bearing preload and total preload
KV381054S0 (J-34286) Puller  ZZA0601D	Removing front oil seal
ST30720000 (J-25405) Drift a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.  ZZA0811D	• Installing front oil seal • Installing side oil seal • Installing pinion front bearing outer race
ST27863000 (—) Drift a: 74.5 mm (2.933 in) dia. b: 62.5 mm (2.461 in) dia.  ZZA1003D	• Installing front oil seal • Installing side oil seal
KV10111100 (J-37228) Seal cutter  S-NT046	Removing carrier cover

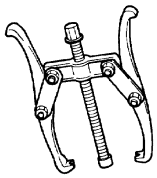
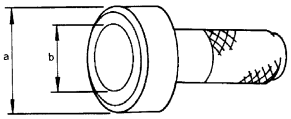
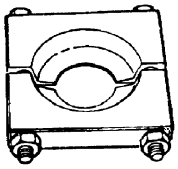
Tool number (Kent-Moore No.) Tool name		Description
ST3306S001 (J-22888-D) Differential side bearing puller set 1: ST33051001 (J-22888-20) Puller 2: ST33061000 (J-8107-2) Base a: 28.5 mm (1.122 in) dia. b: 38 mm (1.50 in) dia.	 NT072	Removing and installing side bearing inner race
KV10112100 (BT-8653-A) Angle wrench	 ZZA0120D	Tightening the drive gear mounting bolts
ST33230000 (J-35867) Drift a: 51 mm (2.01 in) dia. b: 41 mm (1.61 in) dia. c: 28 mm (1.10 in) dia.	 ZZA1046D	Installing side bearing inner race
ST30611000 (J-25742-1) Drift bar	 S-NT090	Installing pinion rear bearing outer race (Use with ST30613000)
ST30613000 (J-25742-3) Drift a: 72 mm (2.83 in) dia. b: 48 mm (1.89 in) dia.	 ZZA1000D	Installing pinion rear bearing outer race
KV38100200 (J-26233) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.	 ZZA1143D	Installing pinion front bearing outer race

Tool number (Kent-Moore No.) Tool name	Description
ST30901000 (J-26010-01) Drift a: 79 mm (3.11 in) dia. b: 45 mm (1.77 in) dia. c: 35.2 mm (1.386 in) dia.  ZZA0978D	Installing drive pinion rear bearing inner race
ST33200000 (J-26082) Drift a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.  ZZA1002D	Installing drive pinion front bearing inner race
— (J-34309) Differential shim selector tool  NT134	Adjusting bearing preload and pinion gear height
— (J-25269-18) Side bearing disc (2 Req'd)  NT135	Selecting pinion height adjusting washer

Commercial Service Tool

INFOID:0000000009008363

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts
Flange wrench  NT035	Removing and installing drive pinion lock nut

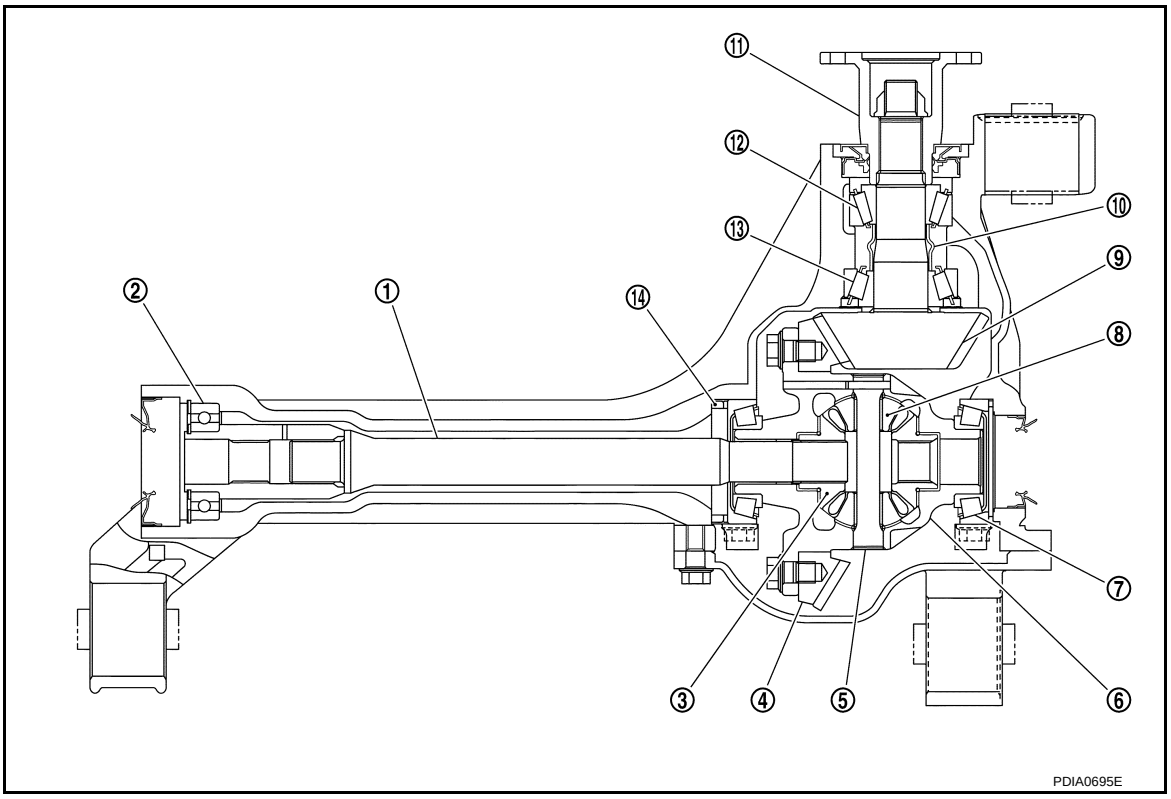
Tool name	Description
Puller  ZZA0119D	Removing companion flange
Drift a: 63 mm (2.48 in) dia. or less b: 49 mm (1.93 in) dia. or more  ZZA0811D	Removing and Installing bushing
Sliding hammer  NT125	Removing differential case assembly
Replacer  ZZA0700D	Removing pinion rear bearing inner race

SYSTEM DESCRIPTION

STRUCTURE AND OPERATION

Sectional View

INFOID:0000000009008364



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

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009008365

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

Reference		DLN-186, "Inspection"	DLN-183, "Adjustment"	DLN-186, "Inspection"	DLN-183, "Adjustment"	DLN-183, "Adjustment"	DLN-167, "Inspection"	NVH of FRONT PROPELLER SHAFT in this section. NVH of 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

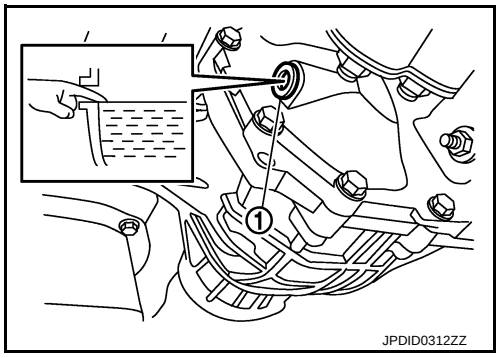
INFOID:0000000009008366

OIL LEAKAGE

Check that oil is not leaking from the front final drive assembly or around it.

OIL LEVEL

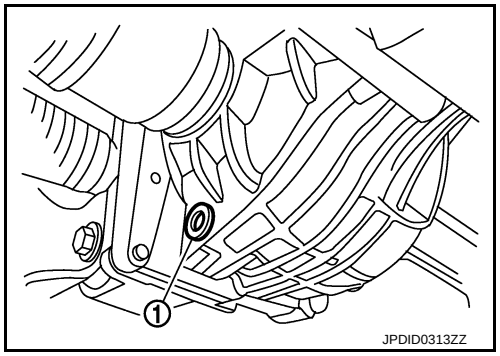
- Remove filler plug (1) and check oil level from filler plug mounting hole as shown in the figure.
  CAUTION:
  Never start engine while checking oil level.
- Set a gasket on filler plug and install it on final drive assembly. Refer to DLN-179, "Exploded View".
  CAUTION:
  Never reuse gasket.



Draining

INFOID:0000000009008367

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-179, "Exploded View".
   CAUTION:
   Never reuse gasket.

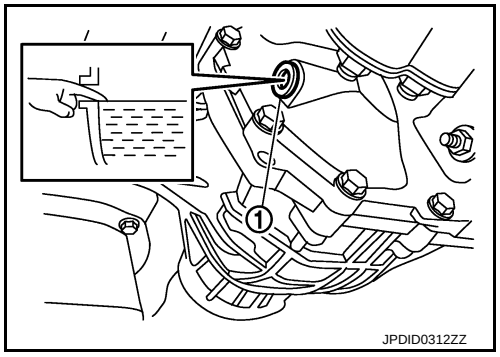


Refilling

INFOID:0000000009008368

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

Oil grade and Viscosity	**: Refer to MA-15, "FOR NORTH AMERICA : Fluids and Lubricants" (for NORTH AMERICA), MA-16, "FOR MEXICO : Fluids and Lubricants" (for MEXICO).**
Oil capacity	**: Refer to DLN-198, "General Specifications".**



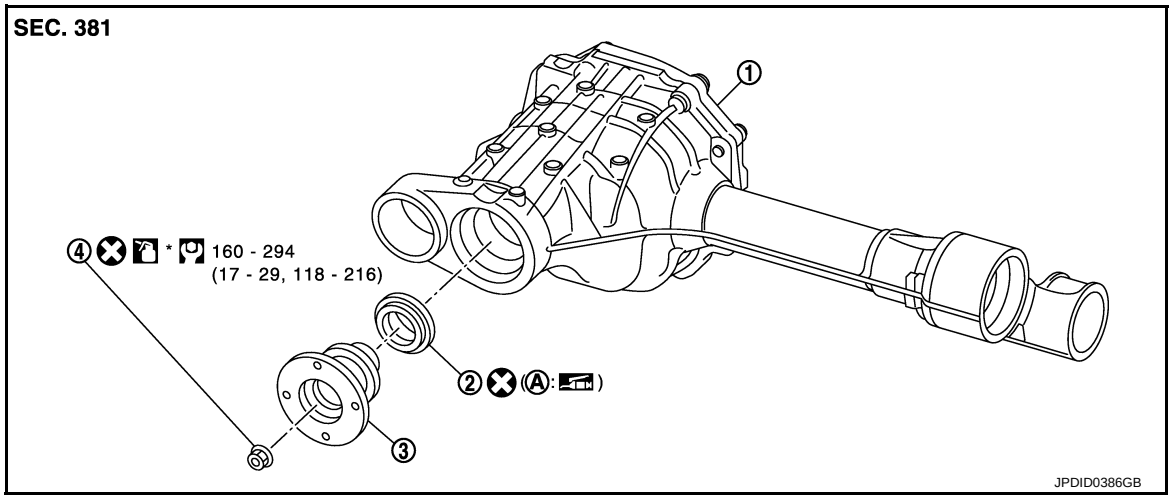
2. After refilling oil, check oil level. Set a gasket to filler plug, then install it to final drive assembly. Refer to DLN-179, "Exploded View".
   CAUTION:
   Never reuse gasket.

REMOVAL AND INSTALLATION

FRONT OIL SEAL

Exploded View

INFOID:0000000009008369



1. Front final drive assembly
2. Front oil seal
3. Companion flange
4. Drive pinon lock nut
A. Oil seal lip

: Apply multi-purpose grease.

*: Apply anti-corrosion oil.

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

Removal and Installation

INFOID:0000000009008370

REMOVAL

CAUTION:

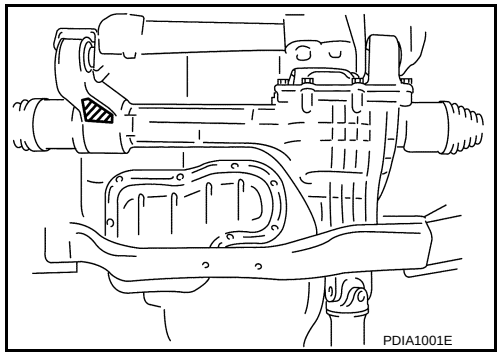
Verify identification stamp of replacement frequency put in the lower part of gear carrier to determine replacement for collapsible spacer when replacing front oil seal. Refer to “Identification stamp of replacement frequency of front oil seal”. If collapsible spacer replacement is necessary, remove final drive assembly and disassemble it to replace front oil seal and collapsible spacer. Refer to DLN-174, "Removal and Installation" and DLN-180, "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-180, "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

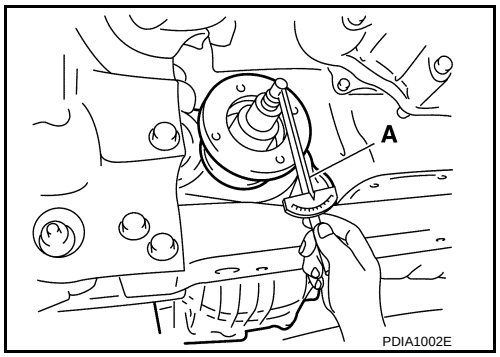
CAUTION:
Make a stamping after replacing front oil seal.

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

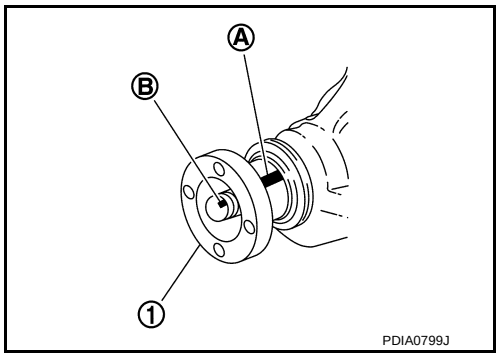
CAUTION:
Make a stamping from left to right.

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

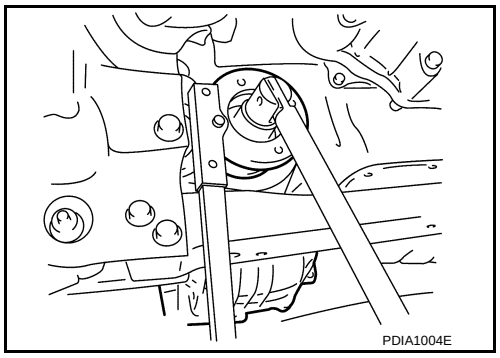
1. Make a judgement if a collapsible spacer replace is required.
2. Drain gear oil. Refer to DLN-167, "Draining".
3. Remove the drive shafts from the front final drive assembly. Refer to FAX-21, "Removal and Installation".
4. Remove the front propeller shaft from the front final drive assembly. Refer to DLN-137, "Removal and Installation".
5. Measure the total preload torque using preload gauge (A) [SST: ST3127S000 (J-25765-A)].
   NOTE:
   Record the total preload torque measurement.



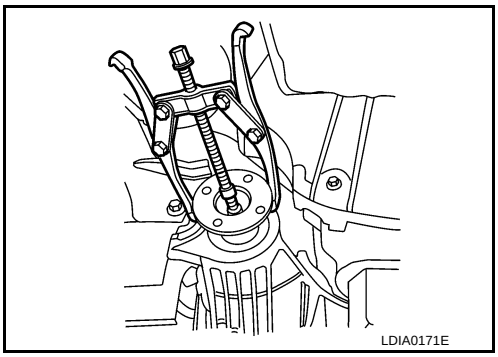
6. Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).
   CAUTION:
   For matching, marks use paint. Never damage companion flange and drive pinion.



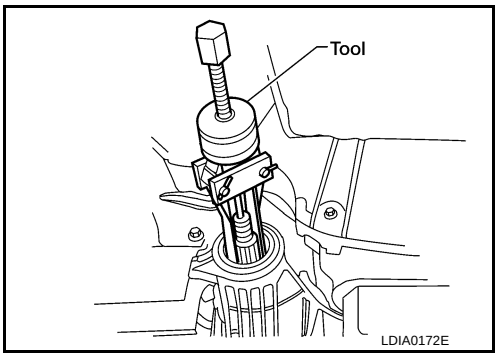
7. Remove the drive pinion lock nut using flange wrench (commercial service tool).



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



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



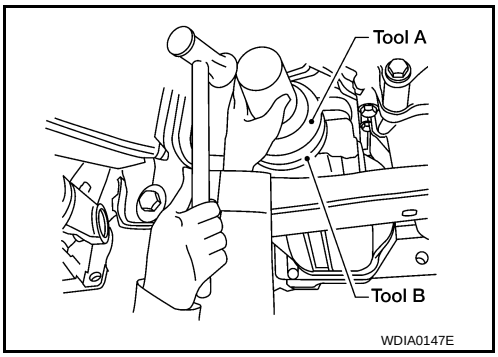
INSTALLATION

1. Drive the front oil seal in evenly until it becomes flush with the gear carrier using drifts (A and B).

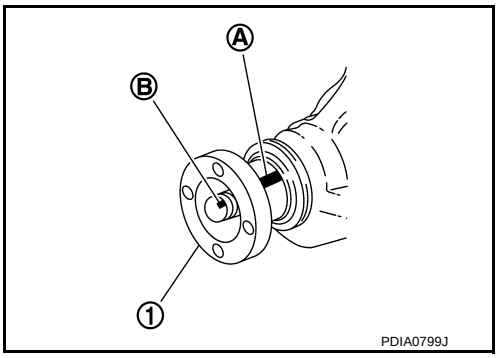
   A: Drift [SST: ST30720000 (J-25405)]

   B: Drift [SST: ST27863000 (—)]

   CAUTION:
   - **Never reuse oil seal.**
   - **Never incline oil seal when installing.**
   - **Apply multi-purpose grease to the lips and differential gear oil to the circumference of oil seal.**



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



3. 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).

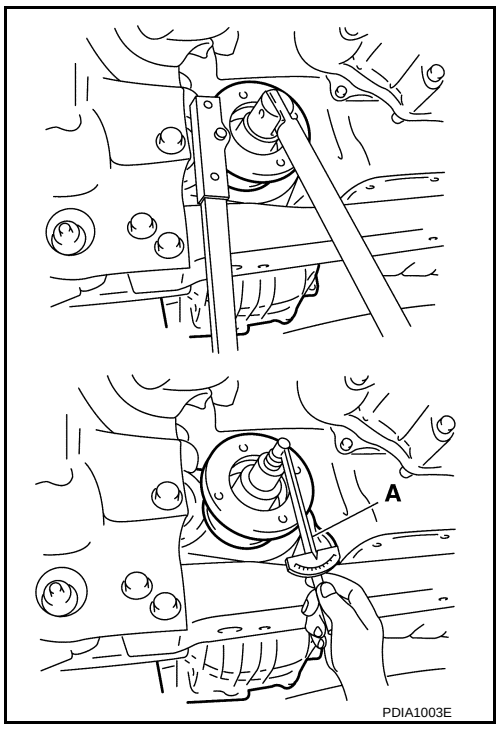
A: Preload gauge [SST: ST3127S000 (J-25765-A)]

CAUTION:
Never reuse drive pinion lock nut.

4. 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, 1 – 3 in-lb) to the measured value when removing.

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

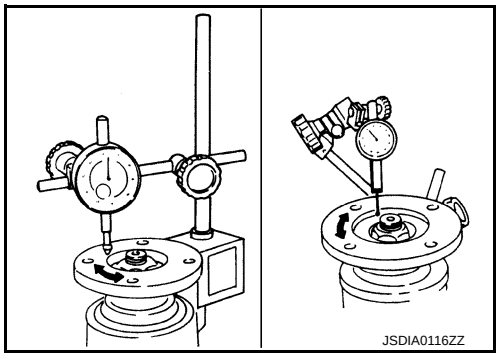


5. Fit a dial indicator onto the companion flange face (inner side of the propeller shaft mounting bolt holes).
6. Rotate the companion flange to check for runout.

Companion flange runout : Refer to DLN-198, "Companion Flange Runout".

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

Companion flange runout : Refer to DLN-198, "Companion Flange Runout".



9. If the runout value is outside the repair limit, follow the procedure below to adjust.

a. Check for runout while changing the phase between companion flange and drive pinion gear 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 causes are be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.

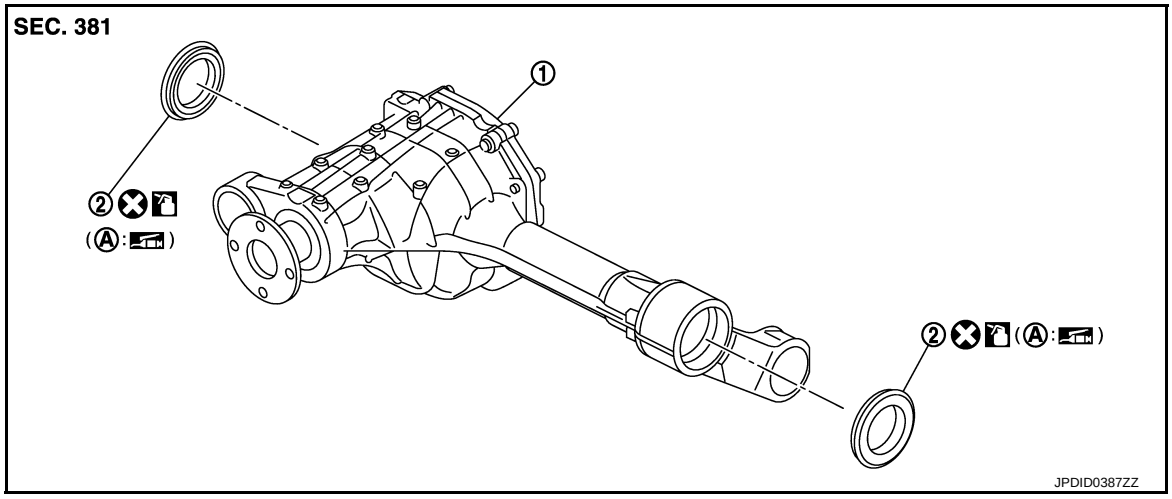
c. If the runout value is still outside of the limit after the check and repair, replace companion flange.

10. Install front propeller shaft. Refer to DLN-137, "Removal and Installation".
11. Install drive shaft. Refer to FAX-21, "Removal and Installation".
12. Refill gear oil to the final drive and check oil level. Refer to DLN-167, "Refilling".
13. Check the final drive for oil leakage. Refer to DLN-167, "Inspection".

SIDE OIL SEAL

Exploded View

INFOID:0000000009008371



1. Front final drive assembly
2. Side oil seal

A. Oil seal lip

: Apply gear oil.

: Apply multi-purpose grease.

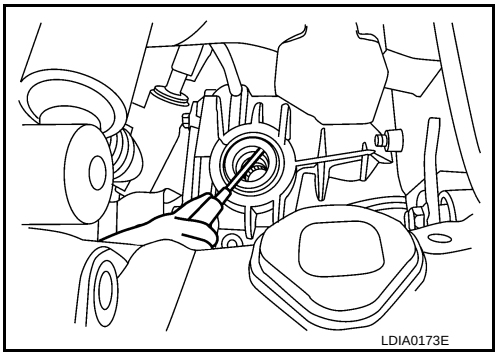
Refer to GI-4, "Components" for symbols not described on the above.

Removal and Installation

INFOID:0000000009008372

REMOVAL

1. Drain gear oil. Refer to DLN-167, "Draining".
2. Remove the drive shafts from the front final drive assembly. Refer to FAX-21, "Removal and Installation".
3. Remove the side oil seal using suitable tool.
   CAUTION:
   Never damage gear carrier.



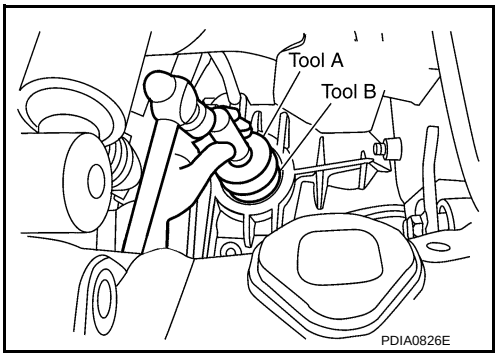
INSTALLATION

1. Drive the new side oil seal in evenly until it becomes flush with the gear carrier using drifts (A and B).

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

   B: Drift [SST: ST27863000 (—)]

   CAUTION:
   - **Never reuse side oil seal.**
   - **Never incline the new side oil seal when installing.**
   - **Apply multi-purpose grease to the lips and differential gear oil to the circumference of the new side oil seal.**



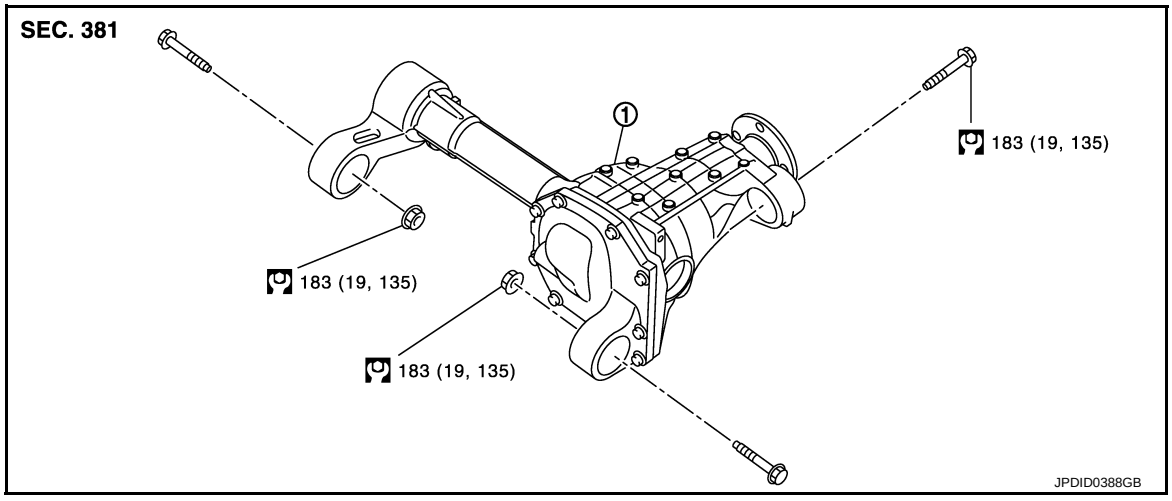
2. Install drive shaft. Refer to FAX-21, "Removal and Installation".
3. Refill gear oil to the final drive and check oil level. Refer to DLN-167, "Refilling".
4. Check the final drive for oil leakage. Refer to DLN-167, "Inspection".

UNIT REMOVAL AND INSTALLATION

FRONT FINAL DRIVE ASSEMBLY

Exploded View

INFOID:0000000009008373



1. Front final drive assembly

Refer to GI-4, "Components" for symbols in figure.

Removal and Installation

INFOID:0000000009008374

REMOVAL

1. Drain the differential gear oil. Refer to DLN-167, "Draining".
2. Remove the drive shafts. Refer to FAX-21, "Removal and Installation".
3. Remove the front propeller shaft from the front final drive assembly. Refer to DLN-137, "Removal and Installation".
4. Disconnect the breather hose from the front final drive assembly.
5. Support the front final drive assembly using a suitable jack.
6. Remove the front final drive assembly bolts, then remove the front final drive assembly with a power tool.
   CAUTION:
   Secure the front final drive assembly to a suitable jack while removing it.

INSTALLATION

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

CAUTION:

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

- Install the breather hose (1) as shown in the figure.

⇦: Vehicle front

- Install the breather hose (1) of final side with the paint mark (A) facing vehicle front, and insert the breather hose until dimension (B) shown as follows.

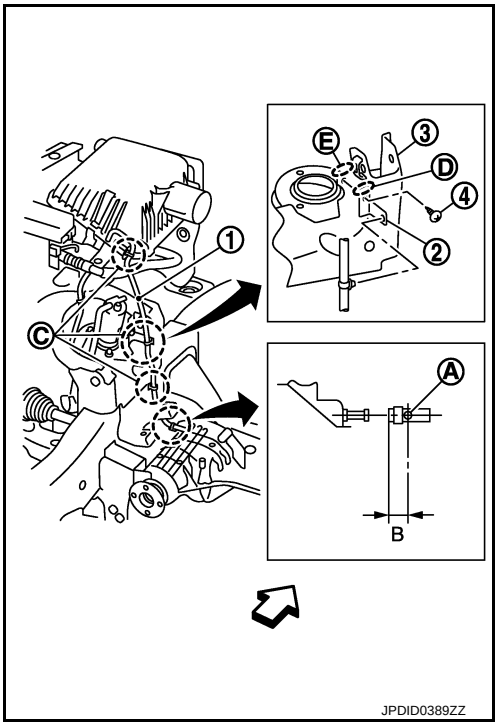
B: 20 mm (0.79 in)

CAUTION:
- **Never reuse hose clamp.**
- **Install the hose clamp with the tab facing vehicle front.**

- Be sure to fix the breather hose in (C) position.
- If remove the bracket (2), align stopper part (D) to part (E) of suspension mounting bracket (3), and tighten the mounting bolt (4) to specified torque.

Specified torque: 8.3 N•m (0.85 kg-m, 73 in-lb)

- When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-167, "Inspection".



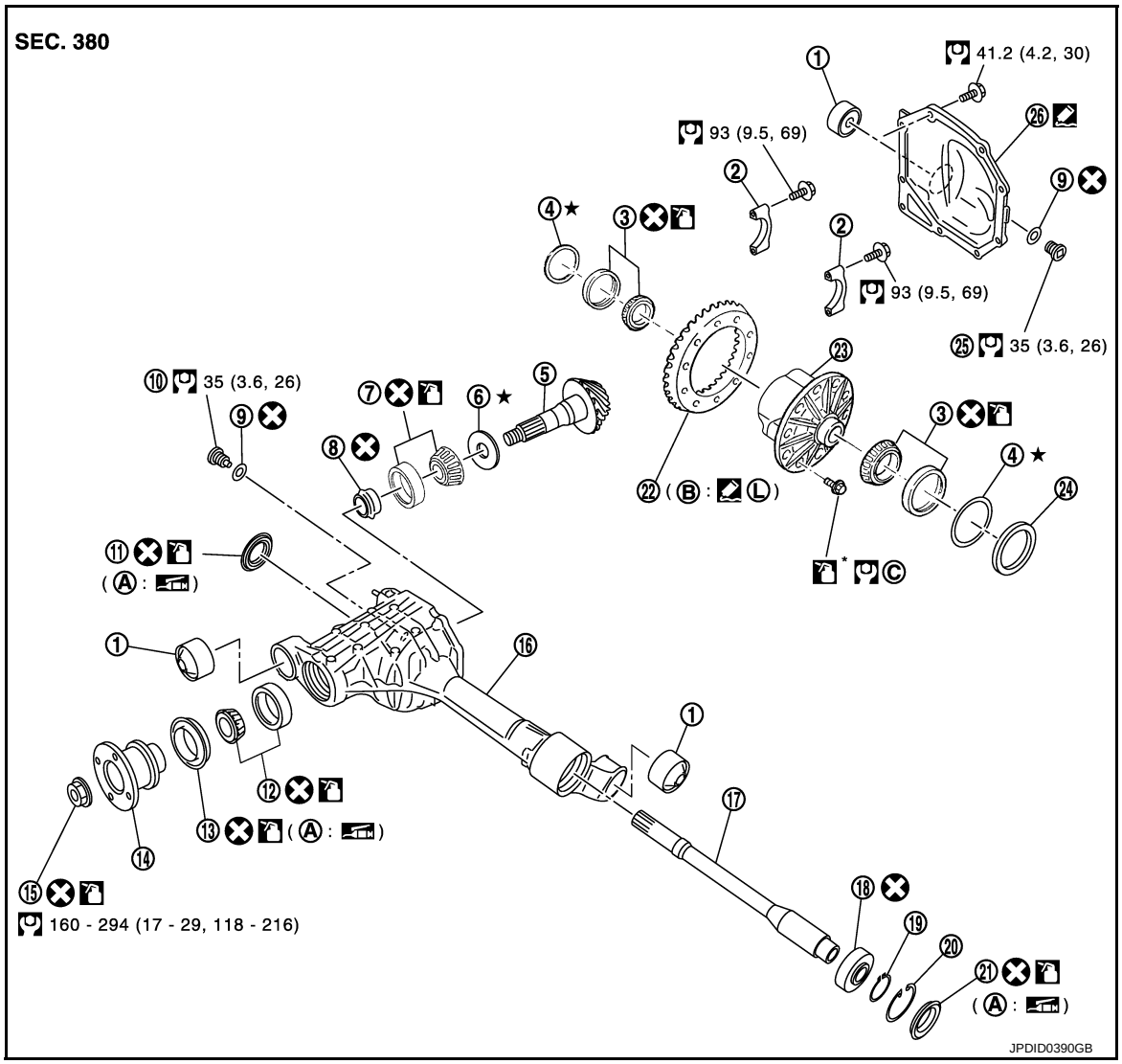
JPDID0389ZZ

UNIT DISASSEMBLY AND ASSEMBLY

SIDE SHAFT

Exploded View

INFOID:0000000009008375



1. Bushing
2. Bearing cap
3. Side bearing
4. Side bearing adjusting washer
5. Drive pinion
6. Pinion height adjusting washer
7. Pinion rear bearing
8. Collapsible spacer
9. Gasket
10. Drain plug
11. Side oil seal (left side)
12. Pinion front bearing
13. Front oil seal
14. Companion flange
15. Drive pinion lock nut
16. Gear carrier
17. Side shaft
18. Side shaft bearing
19. Snap ring
20. Snap ring
21. Side oil seal (right side)
22. Drive gear
23. Differential case assembly
24. Housing spacer
25. Filler plug
26. Carrier cover
A: Oil seal lip
B: Screw hole
C. Comply with the assembly procedure when tightening. Refer to DLN-181, "Assembly".

: 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".

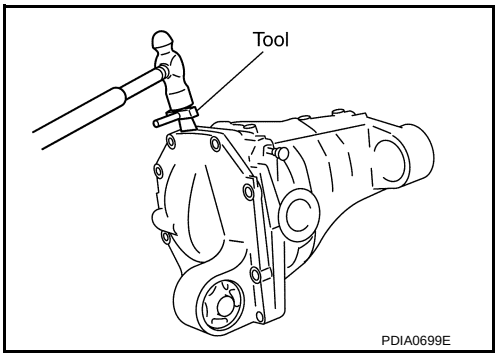
Ⓛ: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

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

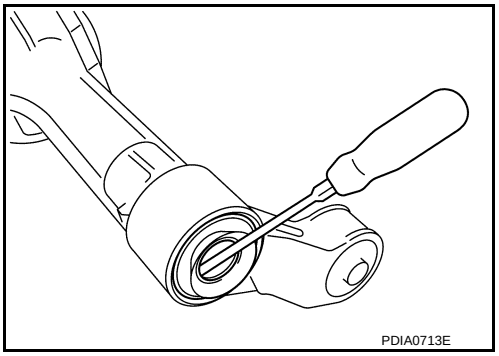
Disassembly

INFOID:0000000009008376

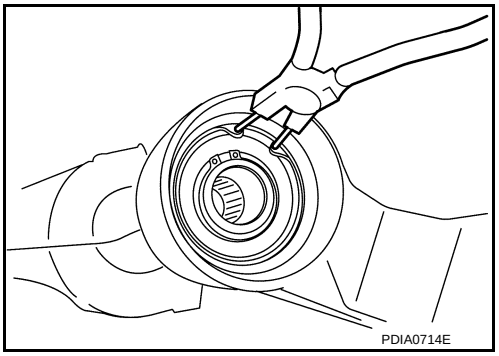
1. Drain the differential gear oil if necessary.
2. Remove the carrier cover bolts
3. Remove carrier cover to insert the seal cutter (A) [SST: KV10111100 (J-37228)] between gear carrier and carrier cover.
   CAUTION:
   - **Never damage the mating surface.**
   - **Never insert flat-bladed screwdriver,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



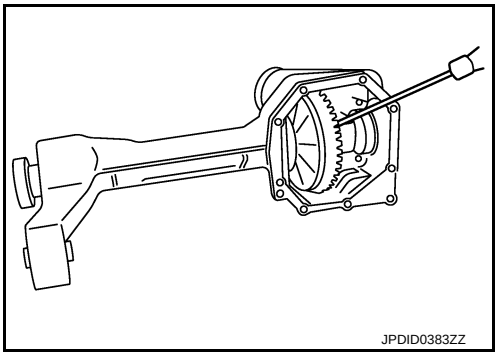
4. Remove side oil seal (right side) with a suitable tool.
   CAUTION:
   Never damage gear carrier.



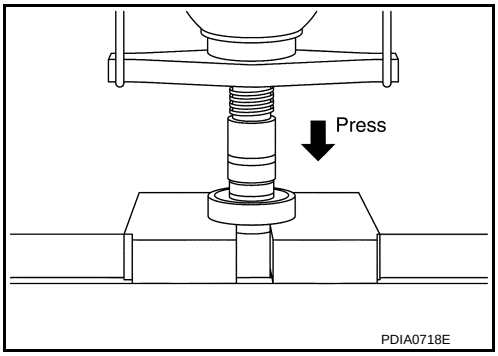
5. Remove snap ring (hole side) with a suitable tool.



6. Remove differential side shaft assembly out of gear carrier with a suitable tool.
   NOTE:
   Tap on differential side shaft assembly from side gear side.
7. Remove snap ring (differential side shaft side).



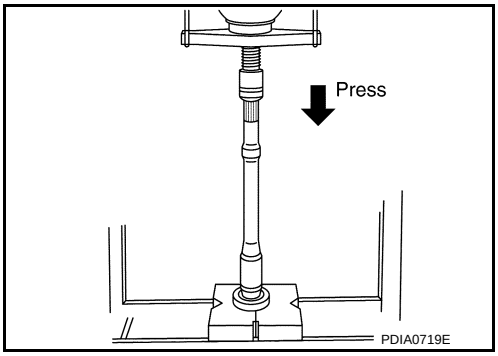
8. Press differential side shaft out of differential side shaft bearing.
CAUTION:
Never drop differential side shaft.
9. Perform inspection after disassembly. Refer to DLN-178, "Inspection".



Assembly

INFOID:0000000009008377

1. Press differential side shaft bearing to differential side shaft.
CAUTION:
Never reuse differential side shaft bearing.
2. Install snap ring (differential side shaft side).
3. Install differential side shaft assembly into gear carrier.
4. Install snap ring (hole side).

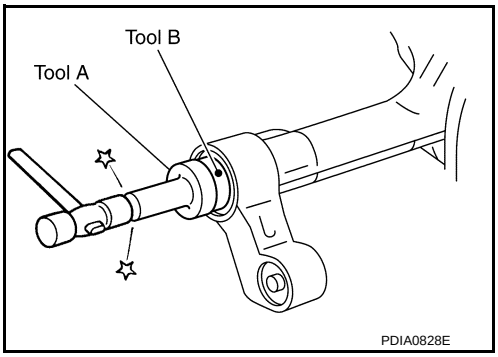


5. Install side oil seal (right side) until it becomes flush with the gear carrier, with the drifts (A and B).

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

B: Drift [SST: ST27863000 (—)]

CAUTION:
- **Never reuse side 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.**



Inspection

INFOID:0000000009008378

INSPECTION AFTER DISASSEMBLY

Side Shaft
- If it is chipped (by friction), cracked, damaged, or unusually worn, replace.

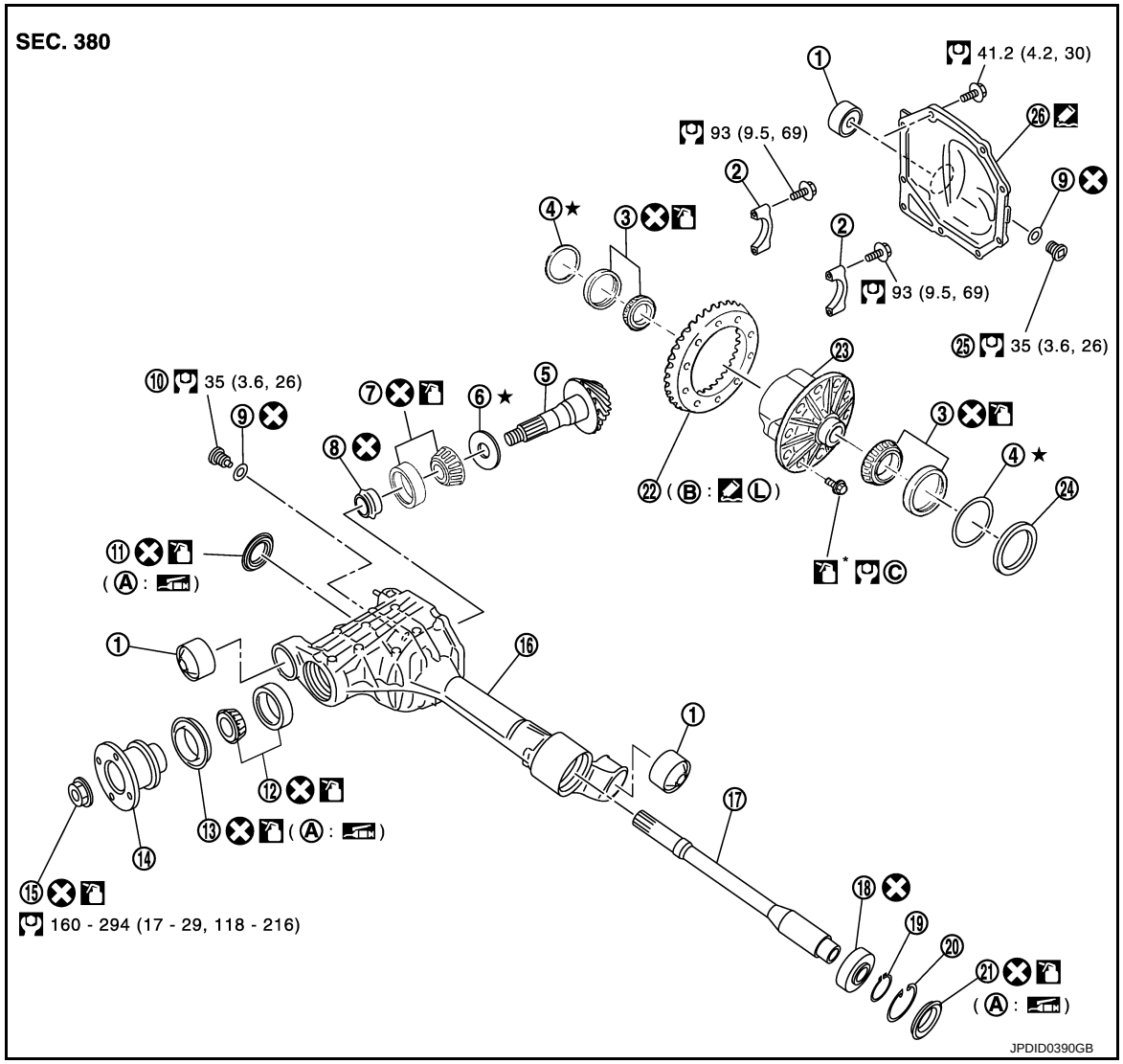
Bearing
- Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

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

DIFFERENTIAL ASSEMBLY

Exploded View

INFOID:0000000009008379



1. Bushing	2. Bearing cap	3. Side bearing
4. Side bearing adjusting washer	5. Drive pinion	6. Pinion height adjusting washer
7. Pinion rear bearing	8. Collapsible spacer	9. Gasket
10. Drain plug	11. Side oil seal (left side)	12. Pinion front bearing
13. Front oil seal	14. Companion flange	15. Drive pinion lock nut
16. Gear carrier	17. Side shaft	18. Side shaft bearing
19. Snap ring	20. Snap ring	21. Side oil seal (right side)
22. Drive gear	23. Differential case assembly	24. Housing spacer
25. Filler plug	26. Carrier cover	
A: Oil seal lip	B: Screw hole	C. Comply with the assembly procedure when tightening. Refer to DLN-181, "Assembly".

: 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".

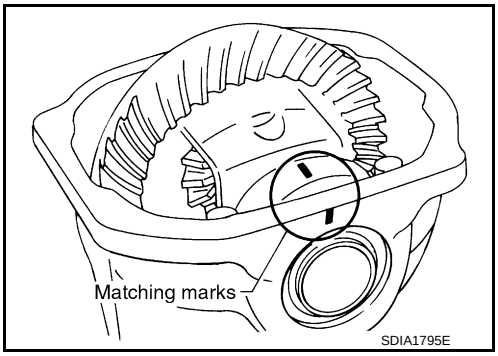
Ⓛ: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

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

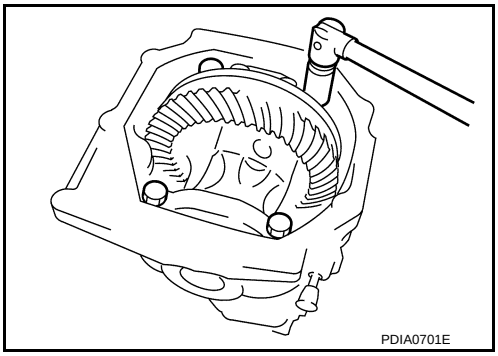
Disassembly

INFOID:0000000009008380

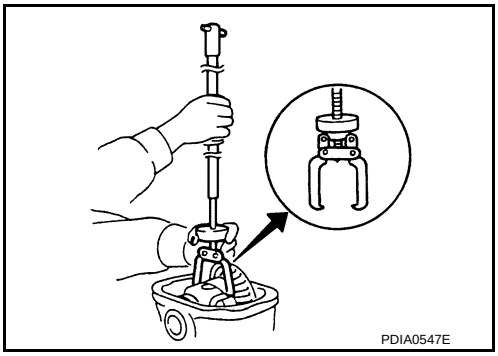
1. Remove bushing with drift (commercial service tool).
2. Remove differential side shaft assembly. Refer to DLN-177, "Disassembly".
3. Remove side oil seal (left side) from gear carrier with a suitable tool.
4. For proper reinstallation, paint matching marks on one side of the side bearing cap and gear carrier.
   CAUTION:
   - **For matching marks, use paint. Never damage side bearing cap and gear carrier.**
   - **Bearing caps are manufactured as integral molding. Use the matching marks to them in their original positions.**



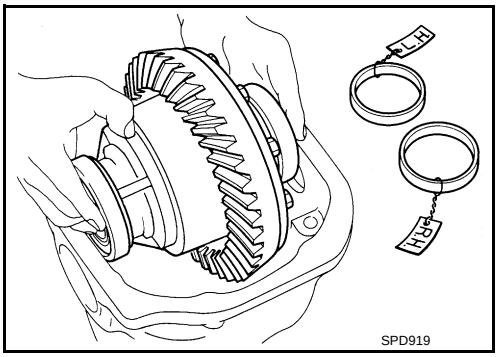
5. Remove the side bearing caps.



6. Lift the differential case assembly out of the gear carrier with sliding hammer (commercial service tool).



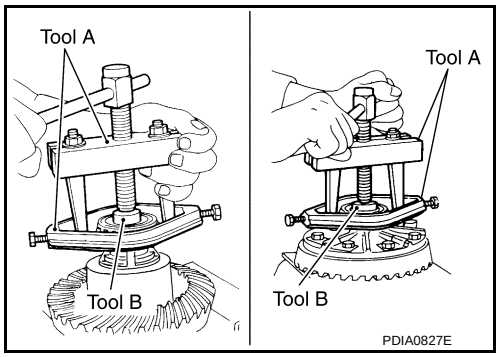
7. Remove the differential case assembly with the side bearing outer race and side bearing adjusting washer.
   CAUTION:
   - **Keep side bearing outer races together with side bearing inner races. Do not mix them up.**
   - **Keep side bearing adjusting washers together with side bearings.**



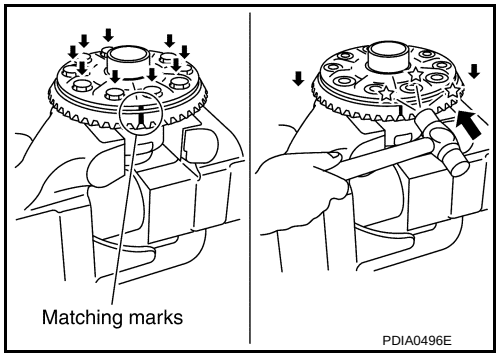
8. Remove housing spacer.
9. Remove side bearing inner race with the puller (A) and base (B).

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 necessary to remove side bearing inner race except when it is replaced.**



10. For proper reinstallation, paint matching marks on the differential case and drive gear.
CAUTION:
For matching marks, use paint. Never damage differential case and drive gear.
11. Remove the drive mounting gear bolts.
12. Tap the drive gear off the differential case using suitable tool.
CAUTION:
Tap evenly all around to keep drive gear from bending.
13. Perform inspection after disassembly. Refer to DLN-186, "Inspection".

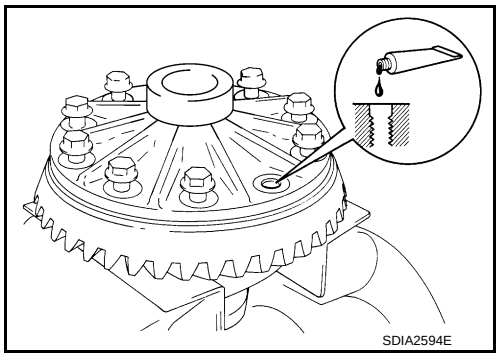


Assembly

INFOID:0000000009008381

1. Apply thread locking sealant into the threaded holes of the drive gear and install the new drive gear bolts.
- Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

CAUTION:
Clean degrees drive gear back and threaded holes sufficiently.
2. Install the drive gear to differential case assembly.
CAUTION:
Align the matching marks of differential case assembly and drive gear



3. Tighten the drive gear mounting bolts with the following procedure.
CAUTION:
Apply anti-corrosion oil to the thread and seat of mounting bolts.

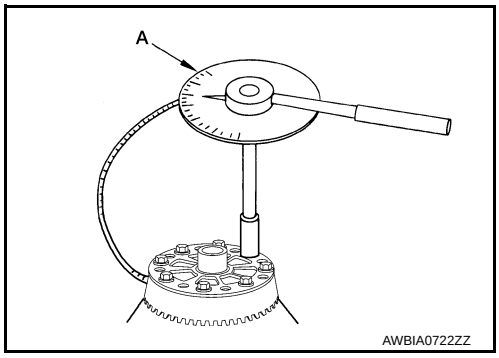
a. Tighten the bolts in a crisscross fashion to the specified torque.

Drive gear mounting bolts tightening torque : 58.8 N•m (6.0 kg-m, 43 ft-lb)

b. Tighten the bolts additionally at the specified angle.

Drive gear mounting bolts tightening angle : 34 to 39 degree

CAUTION:
Check the tightening angle using the angle wrench (A) [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.

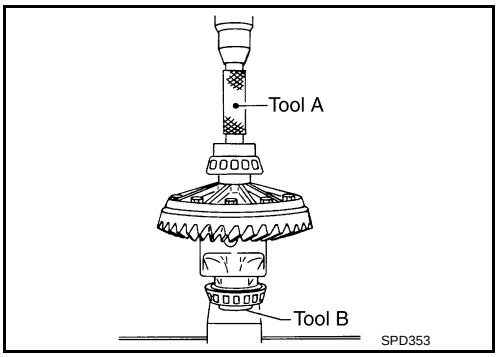


4. Press side bearing inner races to the differential case with the drift (A) and the base (B).

   A: Drift [SST: ST33230000 (J-35867)]

   B: Base [SST: ST33061000 (J-8107-2)]

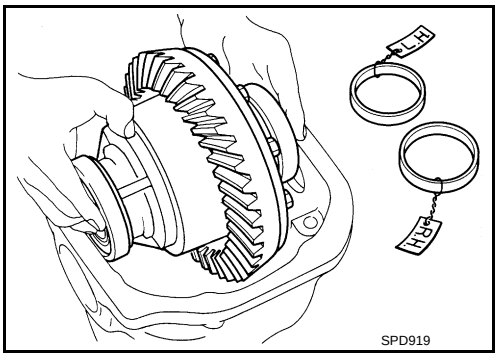
   CAUTION:
   Never reuse side bearing inner races.



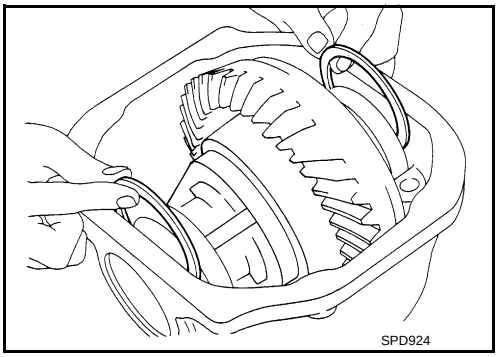
5. Install housing spacer.

6. Install the differential case assembly with the side bearing outer races into the gear carrier.

   CAUTION:
   - **Never reuse side bearing outer race when replacing side bearing inner race (replace as a set).**
   - **Apply differential gear oil to the side bearings.**

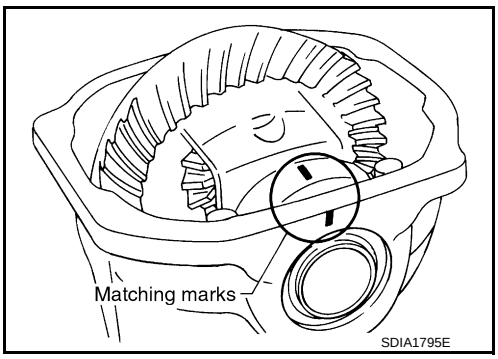


7. Insert left and right original side bearing adjusting washers in place between side bearings and gear carrier.



8. Install the side bearing caps with the matching marks aligned and tighten the side bearing cap bolts to the specified torque.

   CAUTION:
   Align matching marks on bearing cap with that on gear carrier.

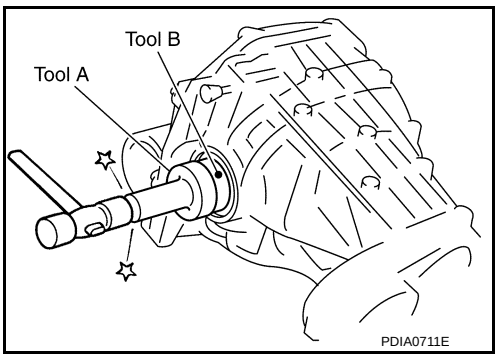


9. Install side oil seal (left side) until it becomes flush with the gear carrier with the drift (A and B).

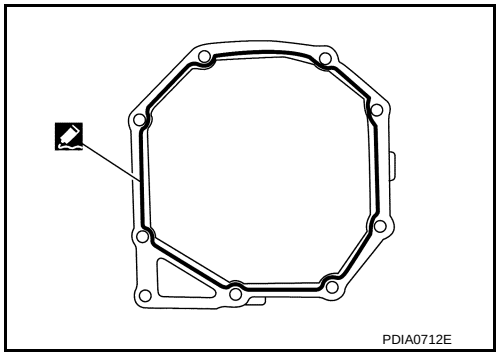
   A: Drift [SST: ST30720000 (J-25405)]

   B: Drift [SST: ST27863000 (—)]

   CAUTION:
   - **Never reuse side 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. Check and adjust drive gear runout, tooth contact, backlash, and total preload torque. Refer to DLN-183, "Adjustment".
Recheck above items. Readjust the above description, if necessary.
11. Apply sealant to match surface of carrier cover.
• Use Genuine Silicone RTV or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".
CAUTION:
Remove any old sealant adhering to the mating surfaces. Also remove any moisture, oil, or foreign material adhering to the application and mating surfaces.
12. Install the carrier cover to the gear carrier. Tighten the bolts to the specified torque.
13. Install side shaft. Refer to DLN-178, "Assembly".
14. Install bushing with drift (commercial service tool).


PDIA0712E

Adjustment

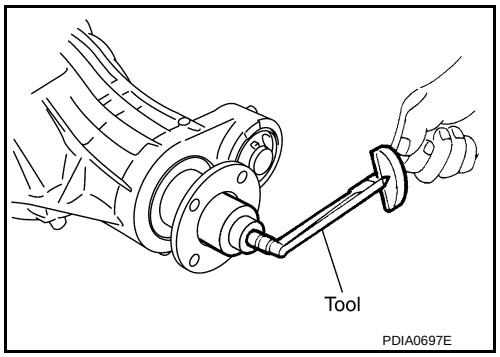
INFOID:0000000009008382

TOTAL PRELOAD TORQUE

1. Install the differential side shaft. Refer to DLN-178, "Assembly".
2. Rotate the drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
3. Rotate the drive pinion at least 20 times to check for smooth operation of the bearings.
4. Measure total preload torque with the preload gauge [SST: ST3127S000 (J-25765-A)].

Total preload torque : Refer to DLN-198, "Preload Torque".

NOTE:
Total preload torque = Drive pinion bearing preload torque + Side bearing preload torque



PDIA0697E

• If the measured value is out of the specification, check and adjust each part. Adjust the drive pinion bearing preload torque first, then adjust the side bearing preload torque.

When the preload torque is large

On drive 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 washer thickness. For selecting adjusting washer, refer to the latest parts information.**

When the preload torque is small

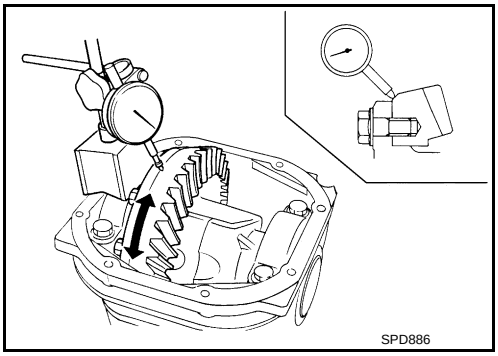
On drive pinion bearings:	**Increase the drive pinion bearing adjusting washer and drive pinion adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.**
On side bearings:	**Decrease the side bearing adjusting washer thickness. For selecting adjusting washer,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

DRIVE GEAR RUNOUT

1. Remove carrier cover. Refer to DLN-180, "Disassembly".

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

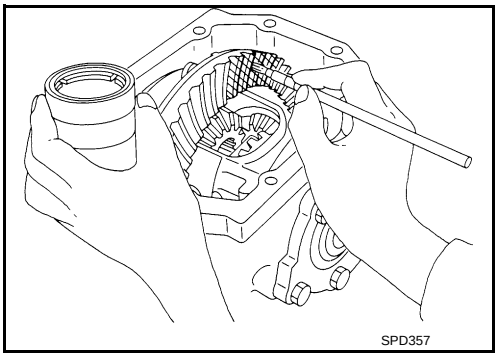
Drive gear runout **: Refer to DLN-198, "Drive Gear Runout".**



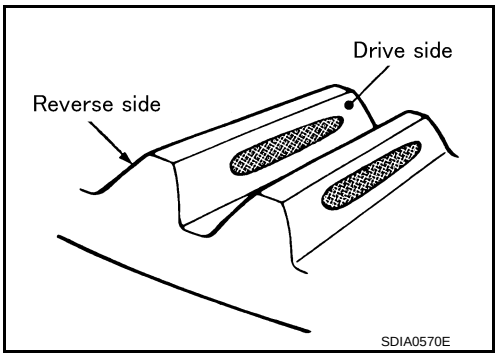
- If the runout is outside of the repair limit, check drive gear assembly condition; foreign material may be caught between the drive gear and differential case, or differential case or drive gear may be deformed.
  CAUTION:
  Replace drive gear and drive pinion as a set.

TOOTH CONTACT

1. Remove carrier cover. Refer to DLN-180, "Disassembly".
2. Apply red lead to the drive gear.
   CAUTION:
   Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on the drive gear.



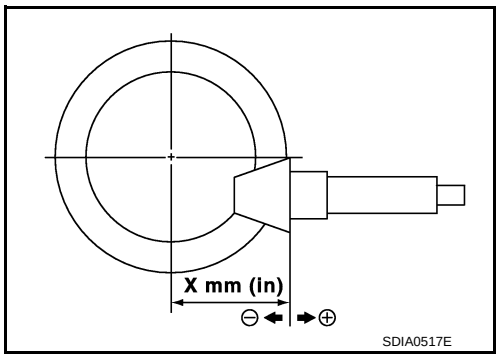
3. Rotate the drive gear back and forth several times. Then check for correct drive pinion to drive gear tooth contact as shown.
   CAUTION:
   Check tooth contact on drive side and reverse side.



Tooth contact condition		Drive pinion adjusting shim selection value [mm (in)]		Adjustment (Yes/No)	Possible cause
Drive side	Back side				
Heel side Toe side	Toe side Heel side	Thicker ↑	+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
			+0.06 (+0.0024)		Occurrence of noise when accelerating.
			+0.03 (+0.0012)	No	–
			0		
		Thinner ↓	−0.03 (−0.0012)		
			−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.

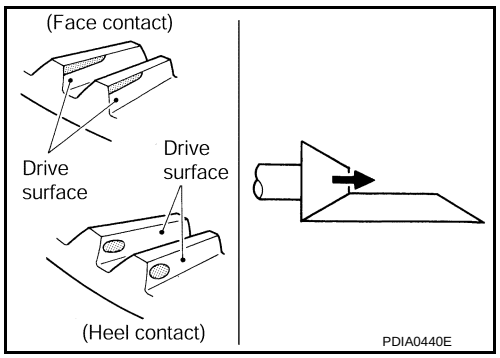
SDIA2549E

4. If the tooth contact is improperly adjusted, adjust the drive pinion height (dimension X).



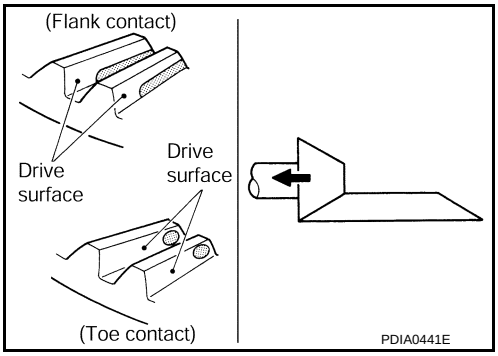
SDIA0517E

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



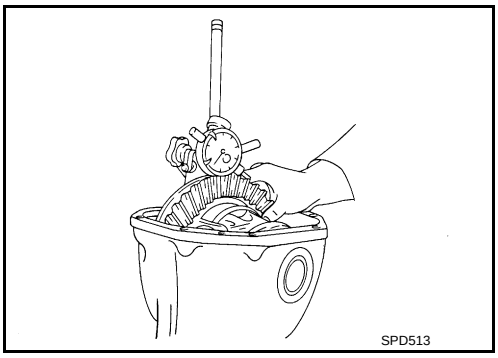
PDIA0440E

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



BACKLASH

1. Remove carrier cover. Refer to DLN-180, "Disassembly".
2. Fit a dial indicator to the drive gear face to measure the backlash.



Backlash **: Refer to DLN-198, "Backlash".**

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

When the backlash is large:

Make drive gear back side adjusting washer thicker, and drive tooth side adjusting washer thinner by the same amount. For selecting adjusting washer, refer to the latest parts information.

If the backlash is less than specification:

Make drive gear back side adjusting washer thinner, and drive 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 preload torque.

Inspection

INFOID:0000000009008383

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.

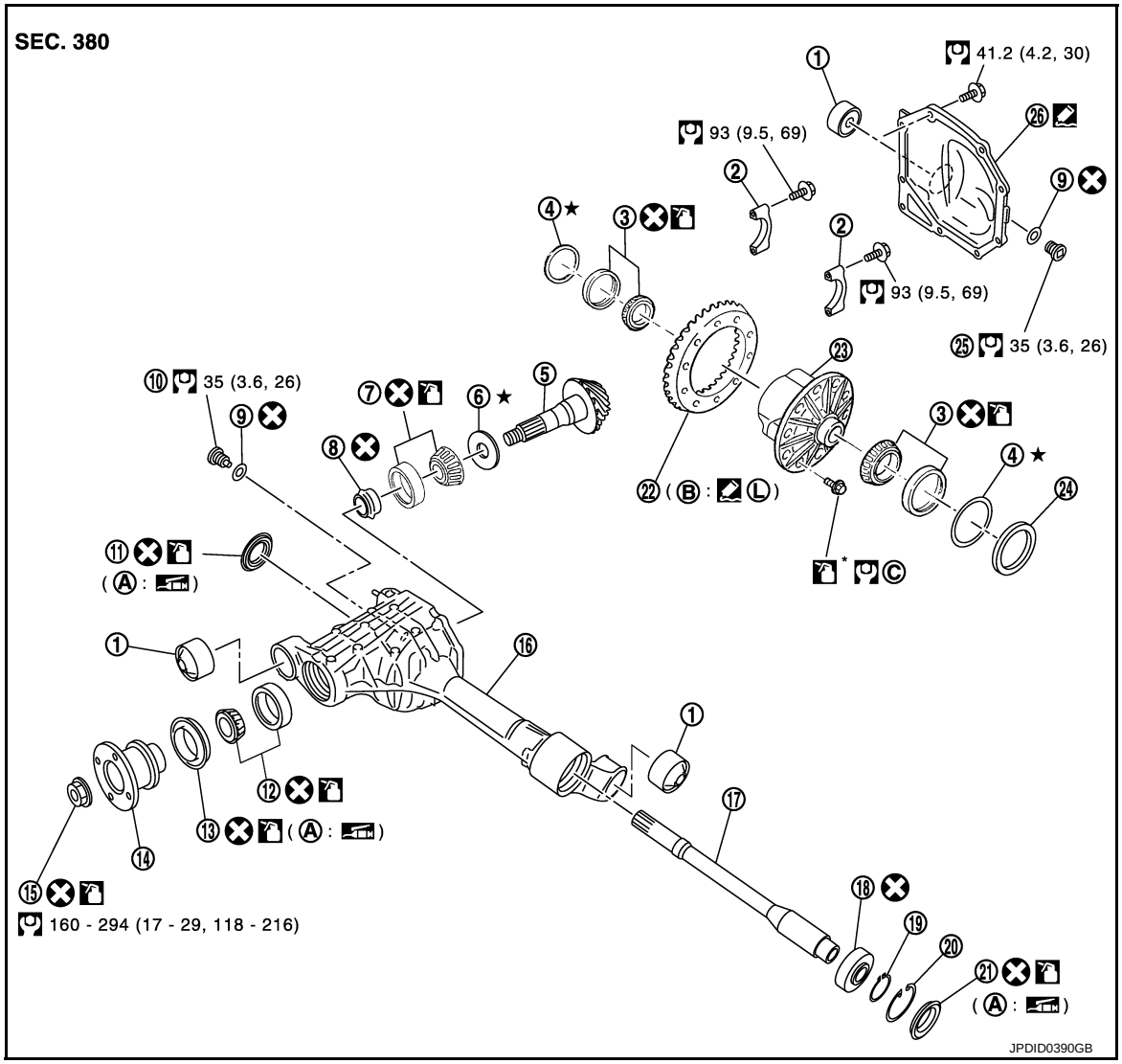
Differential Case

- 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:0000000009008384



1. Bushing
2. Bearing cap
3. Side bearing
4. Side bearing adjusting washer
5. Drive pinion
6. Pinion height adjusting washer
7. Pinion rear bearing
8. Collapsible spacer
9. Gasket
10. Drain plug
11. Side oil seal (left side)
12. Pinion front bearing
13. Front oil seal
14. Companion flange
15. Drive pinion lock nut
16. Gear carrier
17. Side shaft
18. Side shaft bearing
19. Snap ring
20. Snap ring
21. Side oil seal (right side)
22. Drive gear
23. Differential case assembly
24. Housing spacer
25. Filler plug
26. Carrier cover
A: Oil seal lip
B: Screw hole
C. Comply with the assembly procedure when tightening. Refer to DLN-181, "Assembly".

: 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".

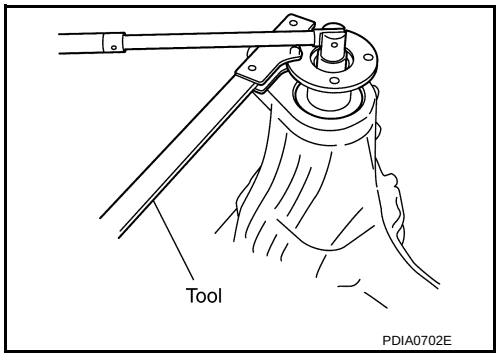
Ⓛ: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

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

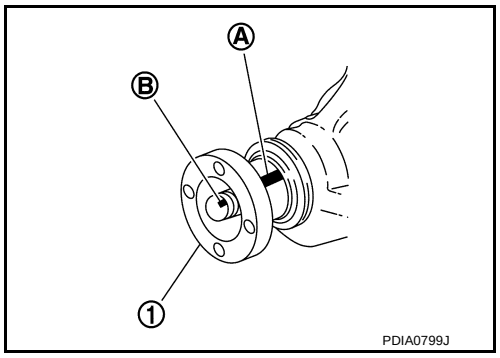
Disassembly

INFOID:0000000009008385

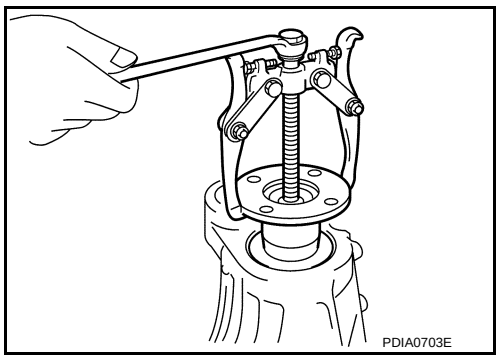
1. Remove the side shaft. Refer to DLN-177, "Disassembly".
2. Remove the differential assembly. Refer to DLN-180, "Disassembly".
3. Remove the drive pinion lock nut with a flange wrench (commercial service tool).



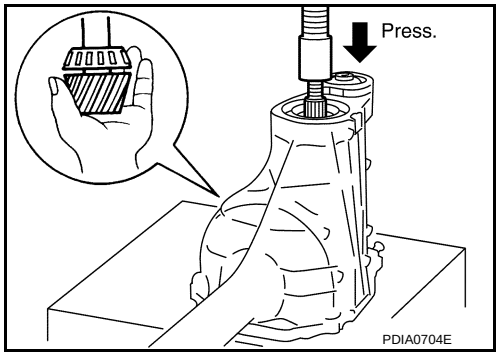
4. Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).
CAUTION:
For matching, marks use paint. Never damage companion flange and drive pinion.



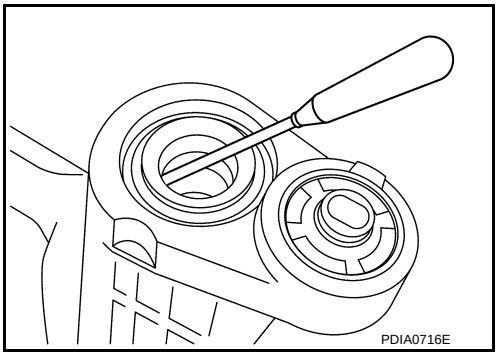
5. Remove the companion flange with the puller (commercial service tool).



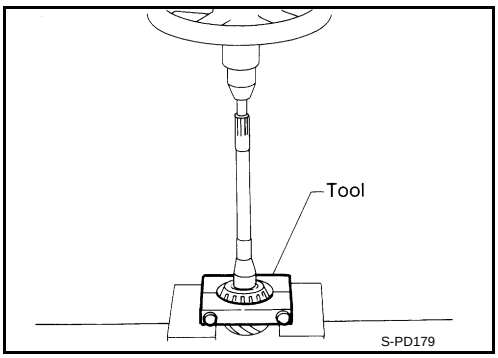
6. Press the drive pinion assembly.
CAUTION:
Never drop drive pinion assembly.



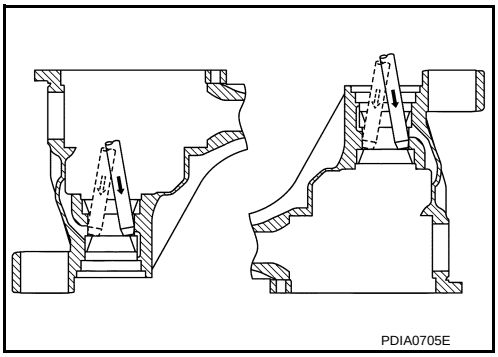
7. Remove the front oil seal with a suitable tool.
CAUTION:
Never damage gear carrier.
8. Remove the drive pinion front bearing inner race.
9. Remove the collapsible spacer.



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



11. Remove the drive pinion front and rear bearing outer races by tapping them uniformly with a suitable tool.
CAUTION:
Never damage gear carrier.
12. Perform inspection after disassembly. Refer to DLN-196, "Inspection".



Assembly

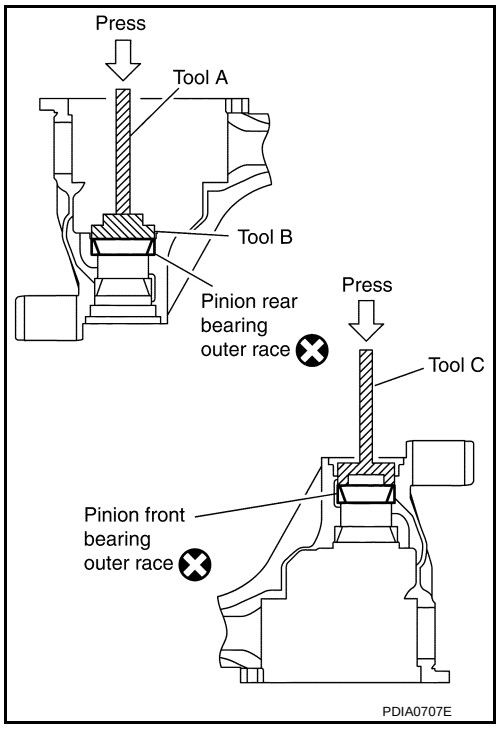
INFOID:0000000009008386

1. Install drive pinion rear bearing outer race and drive pinion front bearing outer race using drifts (A, B, and C).

   A: Drift bar [SST: ST30611000 (J-25742-1)]
   B: Drift [SST: ST30313000 (J-25742-3)]
   C: Drift [SST: KV38100200 (J-26233)]

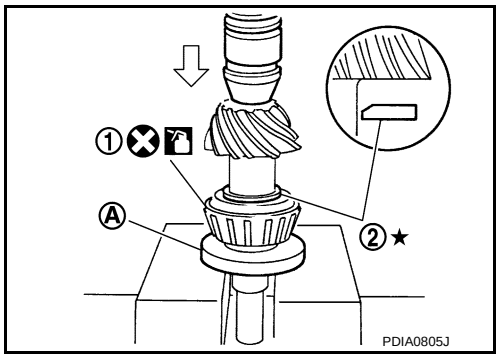
   CAUTION:
   - **First tap the drive pinion bearing outer race until it becomes flush with the gear carrier.**
   - **Never reuse drive pinion front and rear bearing outer race.**

2. Select pinion height adjusting washer. Refer to DLN-193, "Adjustment".



3. Install selected drive pinion height adjusting washer (2) to drive pinion. Press pinion rear bearing inner race (1) to it, using drift (A) [SST: ST30901000 (J-26010-01)].

   CAUTION:
   - **Be careful of the direction of pinion height adjusting washer. (Assemble as shown in the figure.)**
   - **Never reuse pinion rear bearing inner race.**



4. Assemble collapsible spacer.

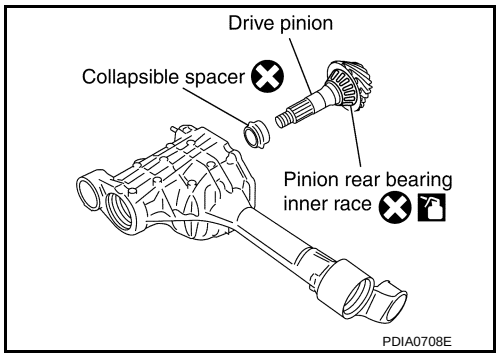
   CAUTION:
   Never reuse collapsible spacer.

5. Assemble drive pinion into gear carrier.

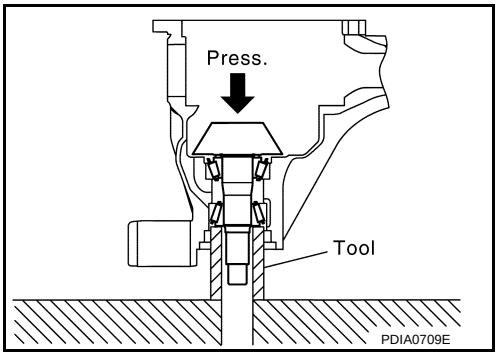
   CAUTION:
   Apply gear oil to pinion rear bearing.

6. 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.**



7. Using drift [SST: ST33200000 (J-26082)], press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.



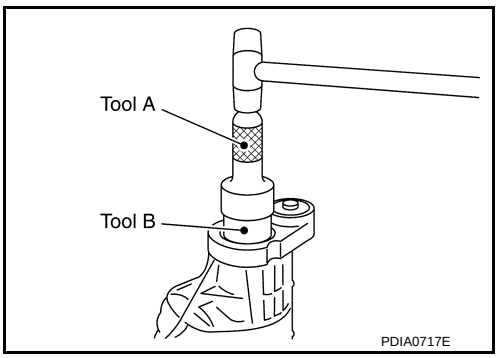
8. Install front oil seal as shown in figure with the drifts (A and B).

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

B: Drift [SST: ST27863000 (—)]

CAUTION:

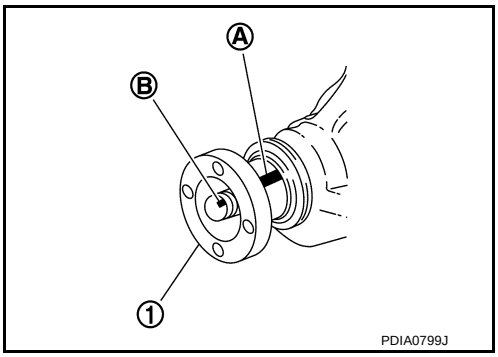
- **Never reuse oil seal.**
- **When installing, never incline oil seal.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**



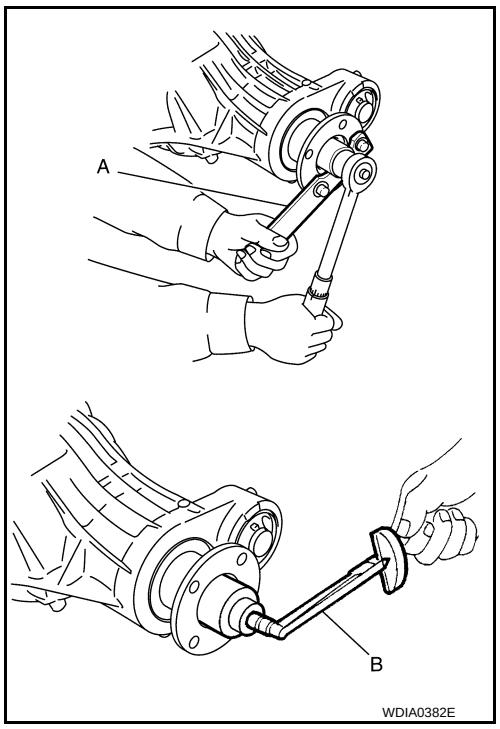
9. Install companion flange.

NOTE:

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



10. Temporarily tighten drive pinion lock nut to drive pinion, using flange wrench (A).



A: Flange wrench (commercial service tool)

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

CAUTION:
- **Apply anti-corrosion oil to the thread and seat of the drive pinion lock nut**
- **Never reuse drive pinion lock nut.**

11. 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 : Refer to DLN-198, "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.**

12. Install differential case assembly. Refer to DLN-181, "Assembly".

CAUTION:
Never install carrier cover yet.

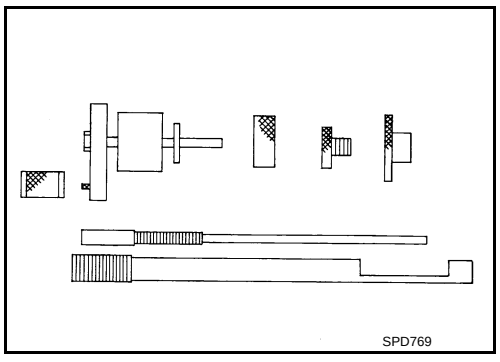
13. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash. Refer to DLN-183, "Adjustment".
14. Install side shaft. Refer to DLN-178, "Assembly".
15. Check and adjust companion flange runout. Refer to DLN-193, "Adjustment".
16. Check total preload torque. Refer to DLN-183, "Adjustment".
17. Install carrier cover. Refer to DLN-181, "Assembly".

Adjustment

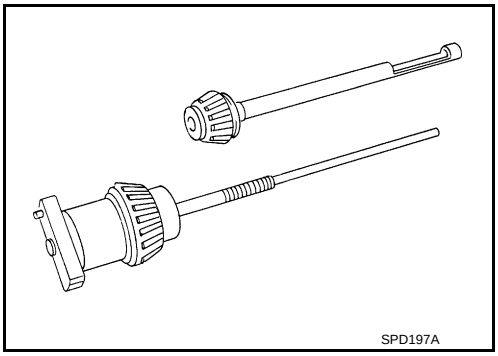
INFOID:0000000009008387

PINION GEAR HEIGHT

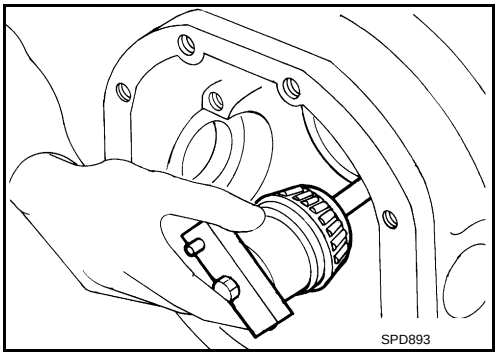
1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the differential shim selector tool [SST: — (J-34309)].



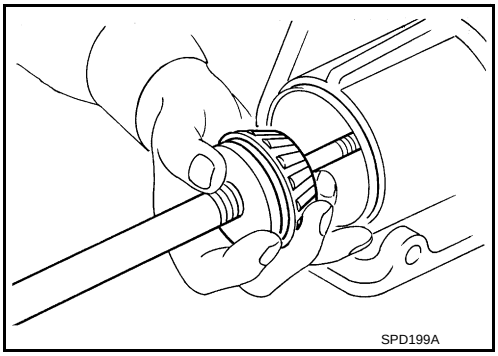
- **Pinion front bearing;** make sure the J-34309-3 pinion front bearing seat is secured tightly against the J-34309-2 gauge anvil. Then turn the pinion front bearing pilot, J-34309-7, to secure the bearing in its proper position.
- **Pinion rear bearing;** the pinion rear bearing pilot, J-34309-8, is used to center the pinion rear bearing only. The pinion rear bearing locking seat, J-34309-4, is used to lock the bearing to the assembly.
- **Installation of J-34309-9 and J-34309-16;** place a suitable 2.5 mm (0.098 in) thick plain washer between J-34309-9 and J-34309-16. Both surfaces of J-34309-9 and J-34309-16 must be parallel with a clearance of 2.5 mm (0.098 in).


SPD197A

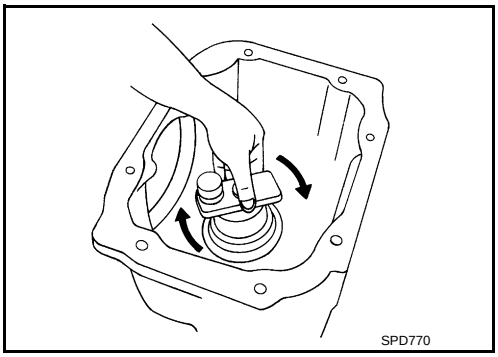
3. Install the pinion rear bearing inner race into gear carrier. Then place the pinion preload shim selector tool, J-34309-1, gauge screw assembly.


SPD893

4. Assemble the pinion front bearing inner race and the J-34309-2 gauge anvil. Assemble them together with the J-34309-1 gauge screw in gear carrier. Make sure that the pinion height gauge plate, J-34309-16, turns a full 360 degrees. Tighten the two sections together by hand.

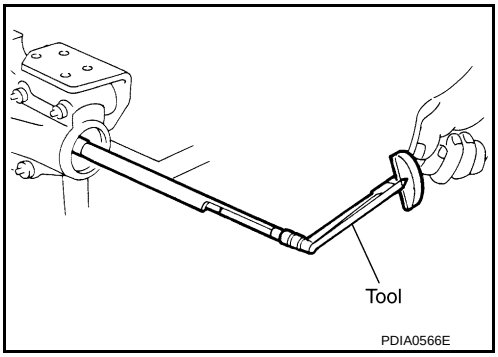

SPD199A

5. Turn the assembly several times to seat the bearings.


SPD770

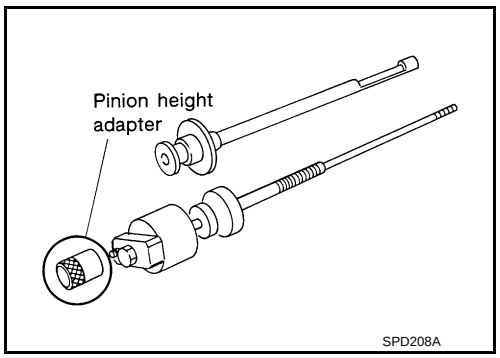
6. Measure the turning torque at the end of the J-34309-2 gauge anvil using preload gauge [SST: ST3127S000 (J-25765-A)].

Turning torque specification : 1.08 – 1.66 N·m (0.11 – 0.16 kg-m, 10 – 14 in-lb)

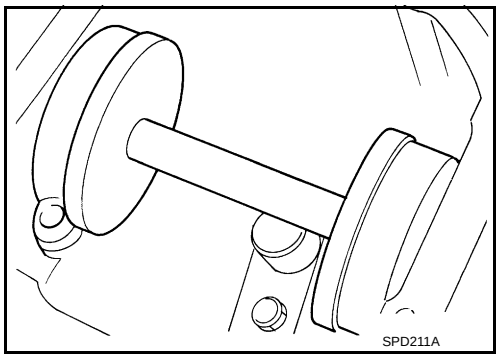


PDIA0566E

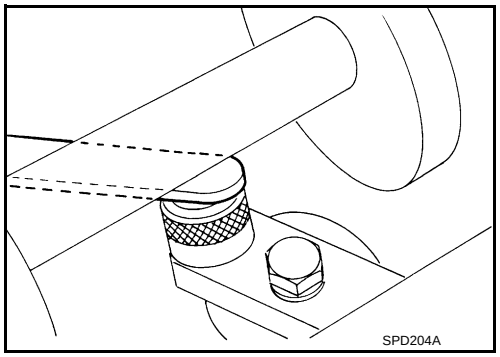
7. Place the J-34309-10 “R180A” pinion height adapter onto the gauge plate and tighten it by hand.
CAUTION:
Make sure all machined surfaces are clean.



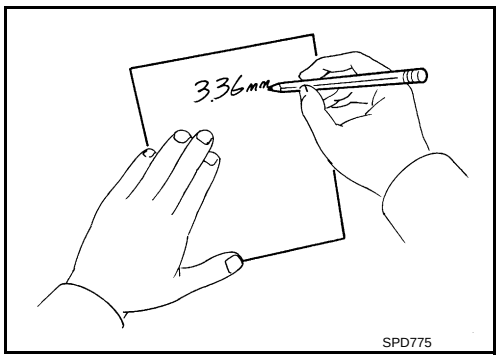
8. Position the side bearing discs, J-25269-18, and arbor firmly into the side bearing bores. Install the bearing caps and tighten bearing cap mounting bolts to the specified torque. Refer to DLN-188, "Exploded View".



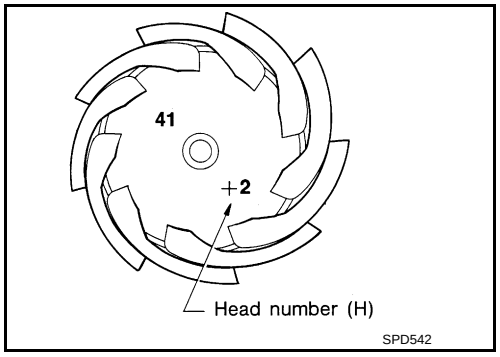
9. Select the correct standard pinion height adjusting washer thickness. Select by using a standard gauge of 3 mm (0.12 in) and J-34309-101 feeler gauge. Measure the distance between the J-34309-11 pinion height adapter including the standard gauge and the arbor.



10. Write down exact measurement (the value of feeler gauge).

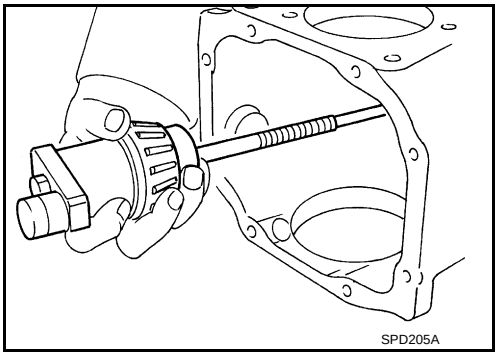


11. Correct the pinion height washer size by referring to the “pinion head number”.
There are two numbers painted on the drive pinion. The first one refers to the drive pinion and drive gear as a matched set. This number should be the same as the number on the drive gear. The second number is the “pinion head height number”. It refers to the ideal pinion height from standard for quietest operation. Use the following chart to determine the correct pinion height washer.



Pinion head height number	Add or remove from the standard pinion height adjusting washer thickness measurement
– 6	Add 0.06 mm (0.0024 in)
– 5	Add 0.05 mm (0.0020 in)
– 4	Add 0.04 mm (0.0016 in)
– 3	Add 0.03 mm (0.0012 in)
– 2	Add 0.02 mm (0.0008 in)
– 1	Add 0.01 mm (0.0004 in)
0	Use the selected washer thickness
+1	Subtract 0.01 mm (0.0004 in)
+2	Subtract 0.02 mm (0.0008 in)
+3	Subtract 0.03 mm (0.0012 in)
+4	Subtract 0.04 mm (0.0016 in)
+5	Subtract 0.05 mm (0.0020 in)
+6	Subtract 0.06 mm (0.0024 in)

12. Select the correct pinion height adjusting washer. For selecting adjusting washer, refer to the latest parts information.
13. Remove the J-34309 differential shim selector tool from the final drive housing. Then disassemble to retrieve the pinion bearings.


SPD205A

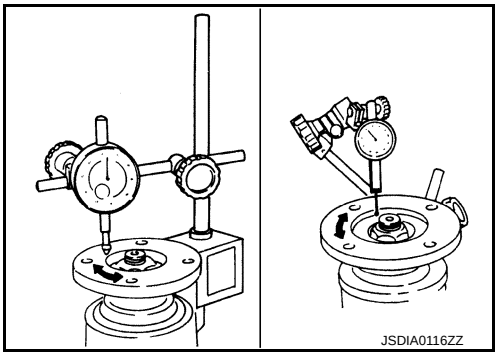
COMPANION FLANGE RUNOUT

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

Companion flange runout **: Refer to DLN-198, "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.

Companion flange runout **: Refer to DLN-198, "Companion Flange Runout".**


JSDIA0116ZZ

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:0000000009008388

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:0000000009008389

Applied model	4WD
	VK56VD
	A/T
Final drive model	R180A
Gear ratio	2.937
Number of teeth (Drive gear/Drive pinion)	47/16
Oil capacity (Approx.) ℓ (US pt, Imp pt)	0.75 (1-5/8, 1-3/8)
Number of pinion gears	4
Drive pinion adjustment spacer type	Collapsible

Drive Gear Runout

INFOID:0000000009008390

Unit: mm (in)

Item	Limit
Drive gear back face runout	0.05 (0.0020)

Preload Torque

INFOID:0000000009008391

Unit: N·m (kg-m, in-lb)

Item	Standard
Pinion bearing (P_1)	1.08 – 1.66 (0.11 – 0.16, 10 – 14)
Side bearing (P_2)	0.59 – 1.08 (0.06 – 0.11, 6 – 9)
Side bearing to pinion bearing (Total preload) (Total preload = P_1 + P_2)	1.67 – 2.74 (0.17 – 0.27, 15 – 24)

Backlash

INFOID:0000000009008392

Unit: mm (in)

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

Companion Flange Runout

INFOID:0000000009008393

Unit: mm (in)

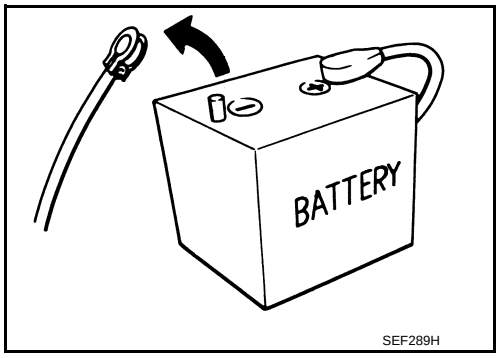
Item	Limit
Companion flange face	0.10 (0.004)
Inner side of the companion flange	0.10 (0.004)

PRECAUTION

PRECAUTIONS

Precautions for Removing of Battery Terminal

INFOID:0000000009864148



- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
  NOTE:
  ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  NOTE:
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  NOTE:
  The removal of 12V battery may cause a DTC detection error.

Service Notice or Precautions for Rear Final Drive

INFOID:0000000009008394

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

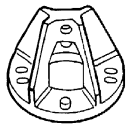
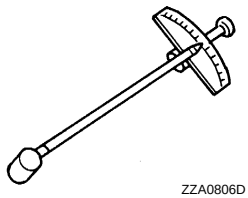
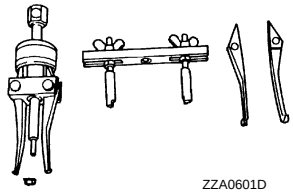
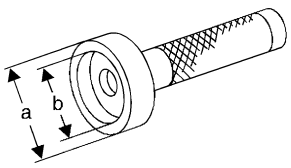
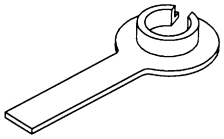
PREPARATION

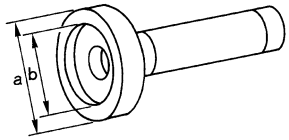
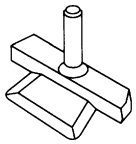
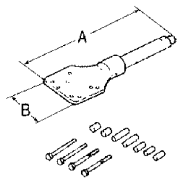
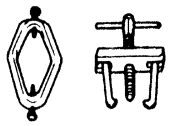
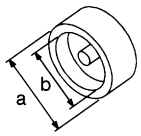
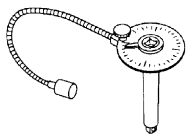
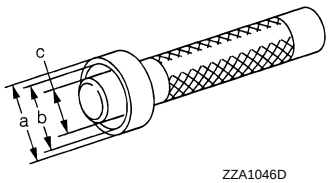
PREPARATION

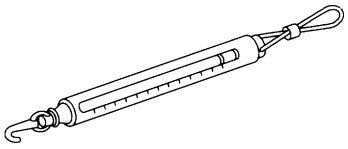
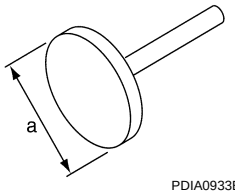
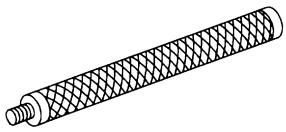
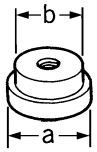
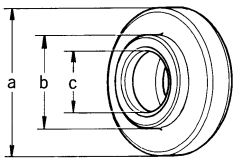
Special Service Tool

INFOID:0000000009008395

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

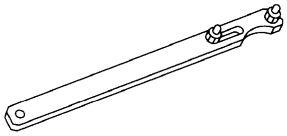
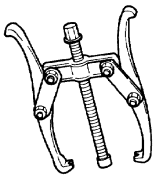
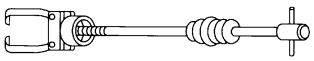
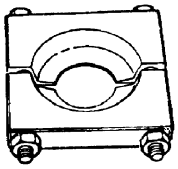
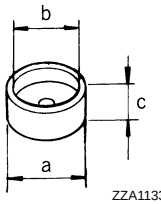
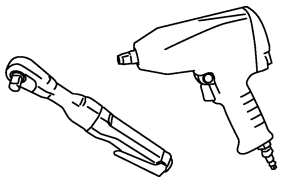
Tool number (Kent-Moore No.) Tool name	Description
KV40104100 (—) Attachment  ZZA0804D	Removing side flange
ST36230000 (J-25840-A) Sliding hammer  ZZA0803D	Removing side flange
ST3127S000 (J-25765-A) Preload gauge  ZZA0806D	Measuring pinion bearing preload and total preload
KV381054S0 (J-34286) Puller  ZZA0601D	Removing front oil seal
ST15310000 (J-25640-B) Drift a: 96 mm (3.78 in) dia. b: 84 mm (3.31 in) dia.  S-NT673	Installing front oil seal
KV38108000 (—) Protector  S-NT129	Installing side flange

Tool number (Kent-Moore No.) Tool name	Description
ST35271000 (J26091) Drift a: 72 mm (2.83 in) dia. b: 63 mm (2.48 in) dia.  ZZA1143D	Installing side oil seal
KV10111100 (J-37228) Seal cutter  S-NT046	Removing carrier cover
KV38100800 (J-25604-01) Attachment A: 541 mm (21.30 in) B: 200 mm (7.87 in)  SDIA0267E	Securing unit assembly
ST33051001 (J-22888-20) Puller  PDIA0747J	Removing side bearing inner race
KV40104730 (—) Drift a: 53.7 mm (2.11 in) dia. b: 47 mm (1.85 in) dia.  S-NT108	Removing and installing side bearing inner race
KV10112100 (BT-8653-A) Angle wrench  ZZA0120D	Tightening the drive gear mounting bolt
ST01550002 (—) Drift a: 65 mm (2.56 in) dia. b: 56 mm (2.20 in) dia. c: 40 mm (1.57 in) dia.  ZZA1046D	Installing side bearing inner race

Tool number (Kent-Moore No.) Tool name	Description
— (J-8129) Spring gauge  NT127	Measuring turning torque
KV38103300 (—) Drift a: 99 mm (3.90 in) dia.  PDIA0933E	Installing drive pinion rear bearing outer race
ST30611000 (J-25742-1) Drift bar  S-NT090	Installing drive pinion front bearing outer race
ST30621000 (J-25742-5) Drift a: 79 mm (3.11 in) dia. b: 59 mm (2.32 in) dia.  ZZA1000D	Installing drive pinion front bearing outer race
ST30022000 (—) Drift a: 110 mm (4.33 in) dia. b: 56 mm (2.20 in) dia. c: 46 mm (1.81 in) dia.  ZZA0978D	Installing pinion rear bearing inner race

Commercial Service Tool

INFOID:0000000009008396

Tool name	Description
Flange wrench  NT035	Removing and installing drive pinion lock nut
Puller  ZZA0119D	Removing companion flange
Sliding hammer  NT125	Removing differential case assembly
Puller  ZZA0700D	Removing drive 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 drive pinion front bearing inner race
Power tool  PBIC0190E	Loosing nuts and bolts

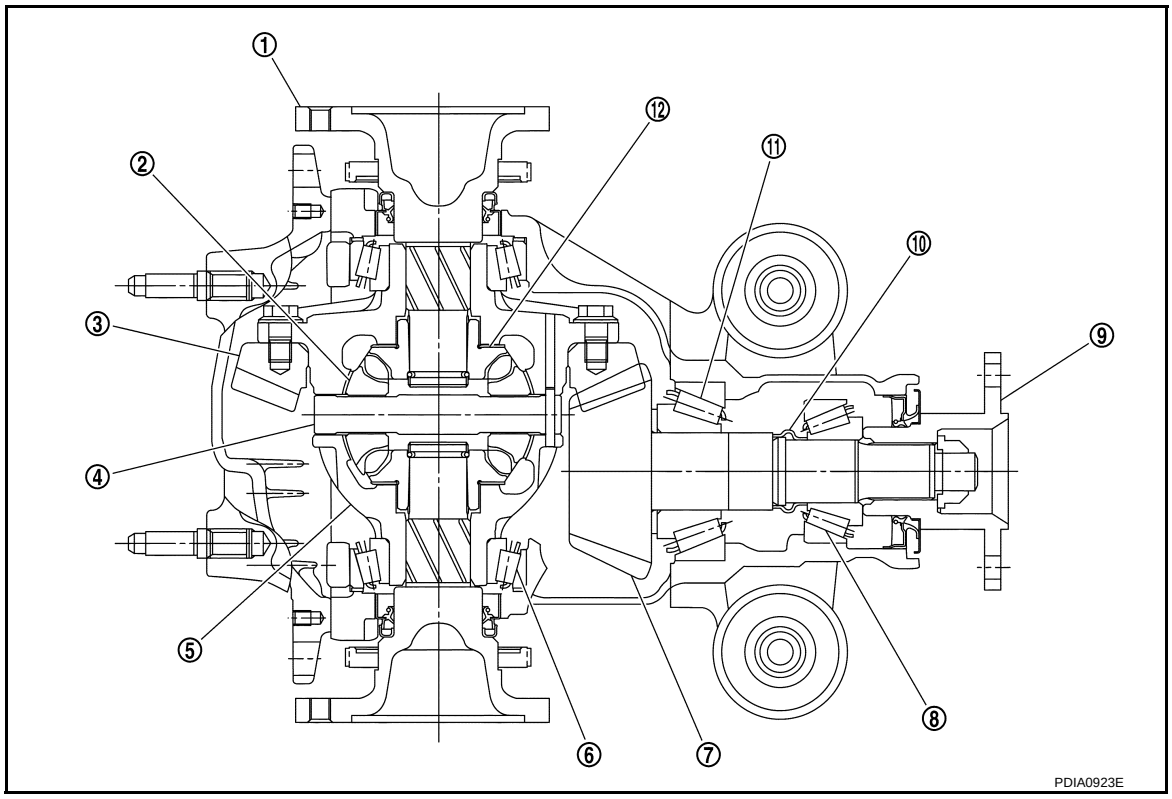
SYSTEM DESCRIPTION

STRUCTURE AND OPERATION

Sectional View

INFOID:0000000009008397

CROSS-SECTIONAL VIEW



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

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009008398

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

Reference page		DLN-228, "Inspection"	DLN-223, "Adjustment"	DLN-228, "Inspection"	DLN-223, "Adjustment"	DLN-223, "Adjustment"	DLN-206, "Inspection"	NVH of FRONT PROPELLER SHAFT in this section. NVH of REAR PROPELLER SHAFT in this section.	NVH in FAX, RAX, and RSU sections.	NVH in WT section.	NVH in WT section.	NVH in RAX section.	NVH in BR section.	NVH in ST section.
Possible cause and 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	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES	STEERING
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×

×: Applicable

PERIODIC MAINTENANCE

REAR DIFFERENTIAL GEAR OIL

Inspection

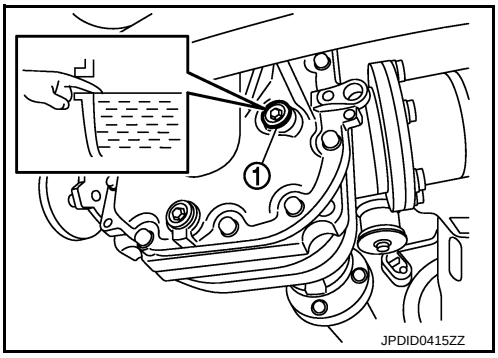
INFOID:0000000009008399

OIL LEAKAGE

Check that differential gear oil is not leaking from the rear final drive assembly or around it.

OIL LEVEL

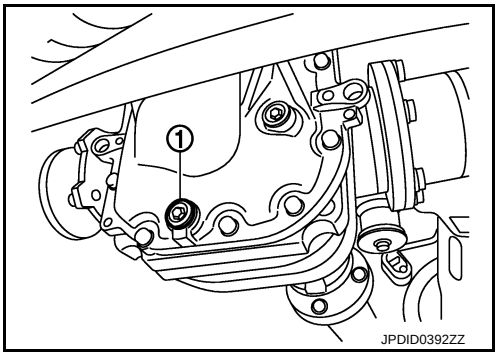
- Remove filler plug (1) and check oil level from filler plug mounting hole as shown in the figure.
  CAUTION:
  Never start engine while checking oil level.
- Set a gasket on filler plug and install it on final drive assembly. Refer to DLN-216, "Exploded View".
  CAUTION:
  Never reuse gasket.



Draining

INFOID:0000000009008400

1. Stop the 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-216, "Exploded View".
   CAUTION:
   Never reuse gasket.

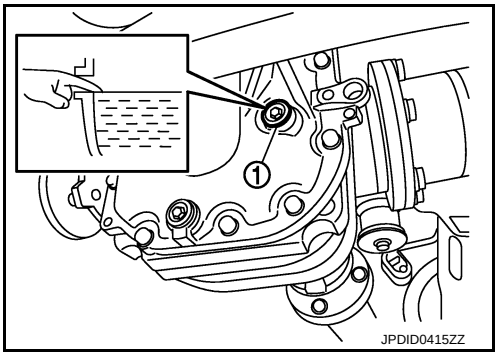


Refilling

INFOID:0000000009008401

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

Oil grade and viscosity	**: Refer to MA-15, "FOR NORTH AMERICA : Fluids and Lubricants" (for NORTH AMERICA), MA-16, "FOR MEXICO : Fluids and Lubricants" (for MEXICO).**
Oil capacity	**: Refer to DLN-235, "General Specification".**



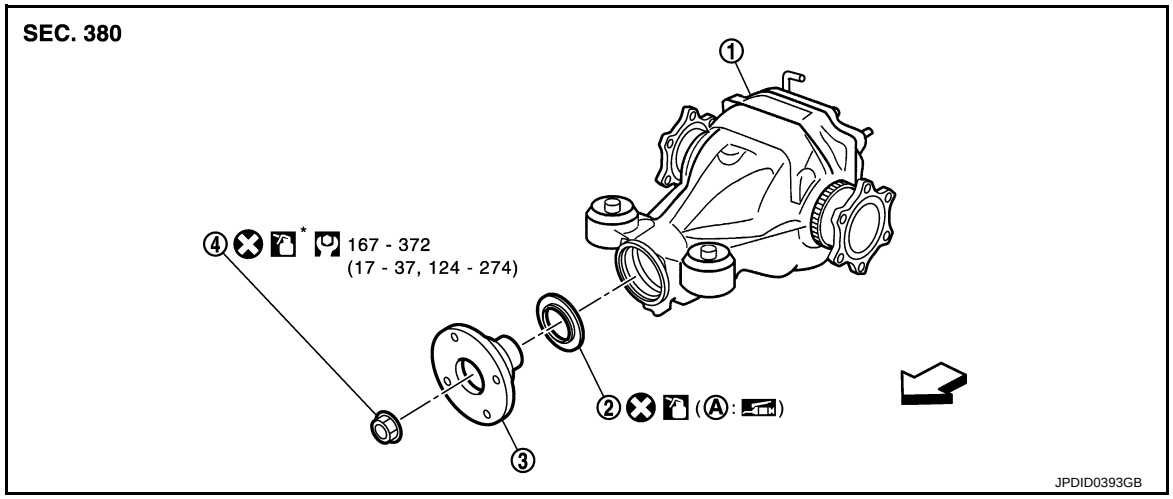
2. After refilling oil, check oil level. Set a gasket to filler plug, then install it to final drive assembly. Refer to DLN-216, "Exploded View".
   CAUTION:
   Never reuse gasket.

REMOVAL AND INSTALLATION

FRONT OIL SEAL

Exploded View

INFOID:0000000009008402



1. Final drive assembly
2. Front oil seal
3. Companion flange
4. Drive pinion lock nut
A. Oil seal lip

⇦: Vehicle front

: Apply gear oil.

*: Apply anti-corrosion oil.

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

Removal and Installation

INFOID:0000000009008403

REMOVAL

CAUTION:

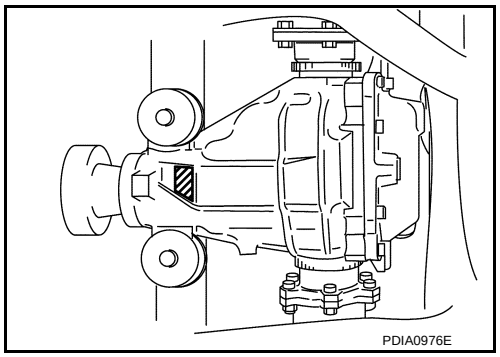
Verify identification stamp of replacement frequency put in the lower part of gear carrier to determine replacement for collapsible spacer when replacing front oil seal. Refer to “Identification stamp of replacement frequency of front oil seal”. If collapsible spacer replacement is necessary, remove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

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-230, "Disassembly".



Stamp	collapsible spacer replacement
No stamp	Not required

Stamp	collapsible spacer replacement
“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.

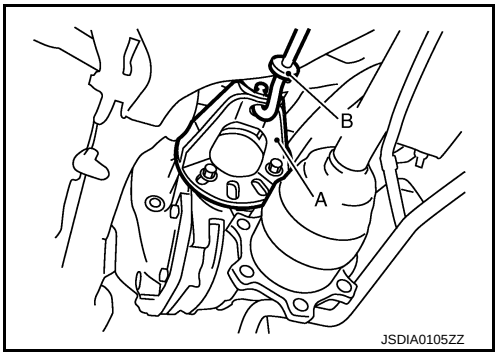
CAUTION:
Make a stamping from left to right.

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

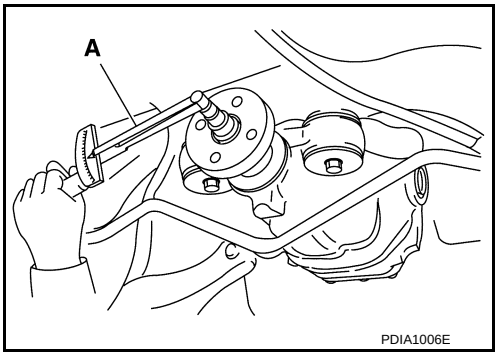
1. Make a judgment if a collapsible spacer replacement is required.
2. Drain gear oil. Refer to DLN-206, "Draining".
3. Remove the drive shafts from final drive. Then suspend it by wire, etc. Refer to RAX-11, "Removal and Installation".
4. Remove the side flange using attachment (A) and sliding hammer (B).

   A : Attachment [SST: KV40104100 (—)]
   B : Sliding hammer [SST: ST36230000 (J-25840-A)]

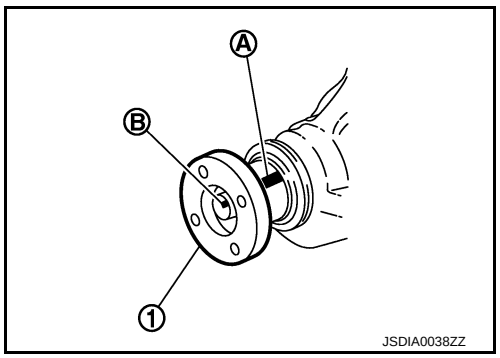
   NOTE:
   Circular clip installation position: Side flange



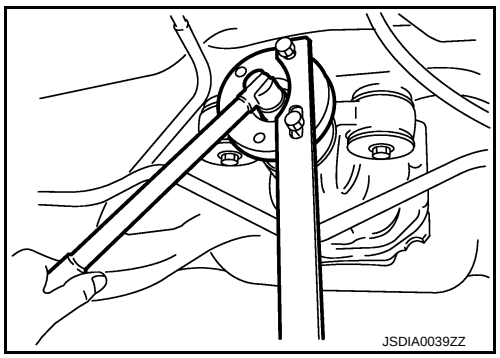
5. Remove the rear propeller shaft. Refer to DLN-155, "Removal and Installation" (2WD), DLN-146, "Removal and Installation" (4WD).
6. Measure the total preload torque with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].
   NOTE:
   Record the total preload torque measurement.



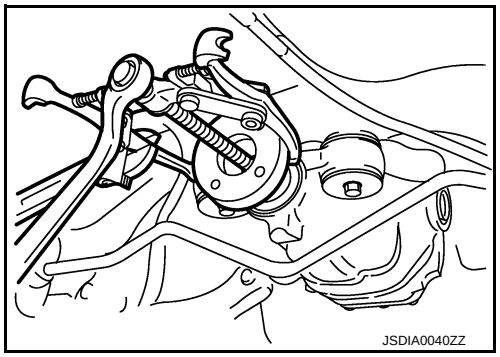
7. Put matching mark (B) on the end of the drive pinion. The matching mark (A) on companion flange (1).
CAUTION:
For matching mark, use paint. Never damage companion flange and drive pinion.



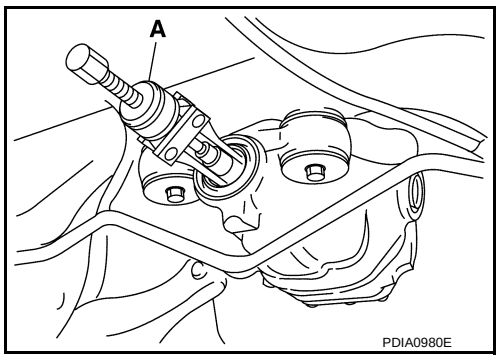
8. Remove the drive pinion lock nut using a flange wrench (commercial service tool).



9. Remove the companion flange using a puller (commercial service tool).



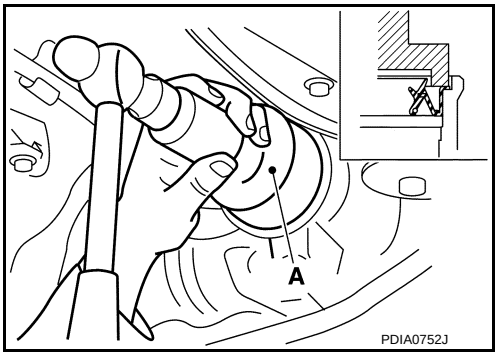
10. Remove the front oil seal using the puller (A) [SST: KV381054S0 (J-34286)].



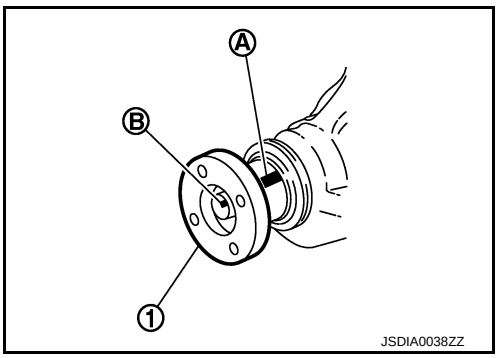
INSTALLATION

1. Apply multi-purpose grease to the lips of the new front oil seal. Then drive the new front oil seal in evenly until it becomes flush with the gear carrier using the drift (A) [SST: ST15310000 (J-25640-B)].

CAUTION:
- **Never reuse front oil seal.**
- **Never incline the new front oil seal when installing.**



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



3. 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 a flange wrench (commercial service tool).

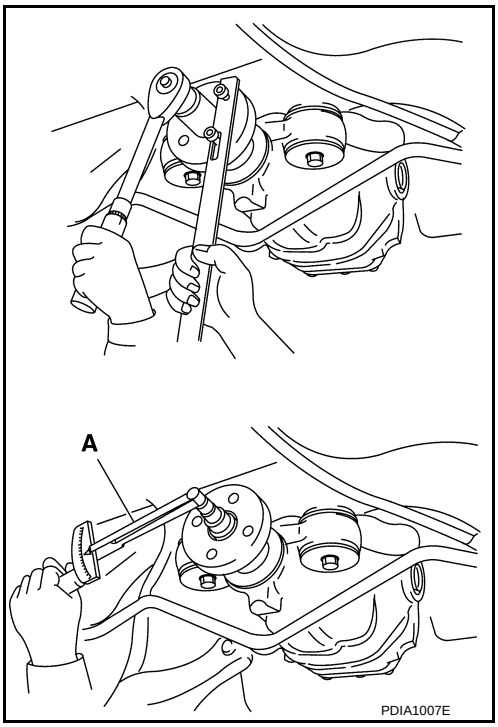
A : Preload gauge [SST: ST3127S000 (J-25765-A)]

CAUTION:
Never reuse drive pinion lock nut.

4. Tighten drive pinion lock nut within the limits of specified torque so as to keep the pinion bearing preload within a standard values, using the 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, 0.9 – 3.5 in-lb) to the measured value before removing.

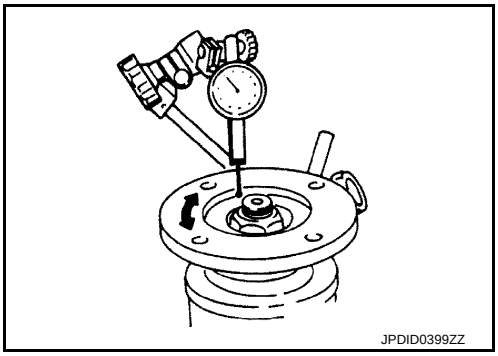
CAUTION:
- **Adjust to the lower limit of the drive pinion lock nut tightening torque first.**
- **If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.**



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

Companion flange runout : Refer to DLN-235, "Companion Flange Runout".

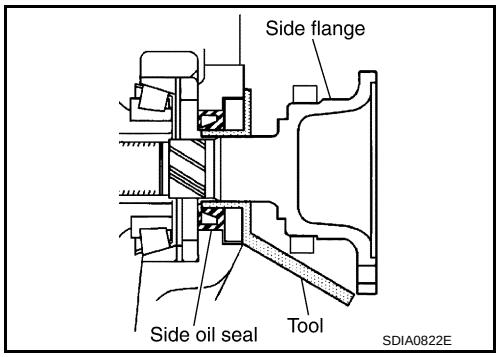
- If the runout value is outside the runout limit, follow the procedure below to adjust.
- Check for runout while changing the phase between companion flange and drive pinion by 90° step, and search for the position where the runout is the minimum.



- If the runout value is still outside of the limit after the phase has been changed, possible cause will be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.
- If the runout value is still outside of the limit after the check and repair, replace companion flange.

7. 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.
8. Install rear propeller shaft. Refer to DLN-155, "Removal and Installation" (2WD), DLN-146, "Removal and Installation" (4WD).
9. Install side flange with the following procedure.

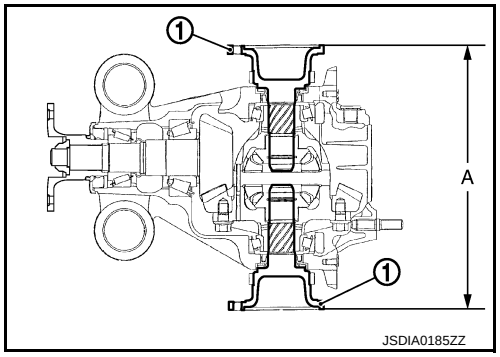
a. Attach the protector [SST: KV38108000 (—)] to side oil seal.
b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
c. Put a suitable drift on the center of side flange, then drive it until sound changes.
   NOTE:
   When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.



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

Standard

A : 342.2 mm (13.47 in)

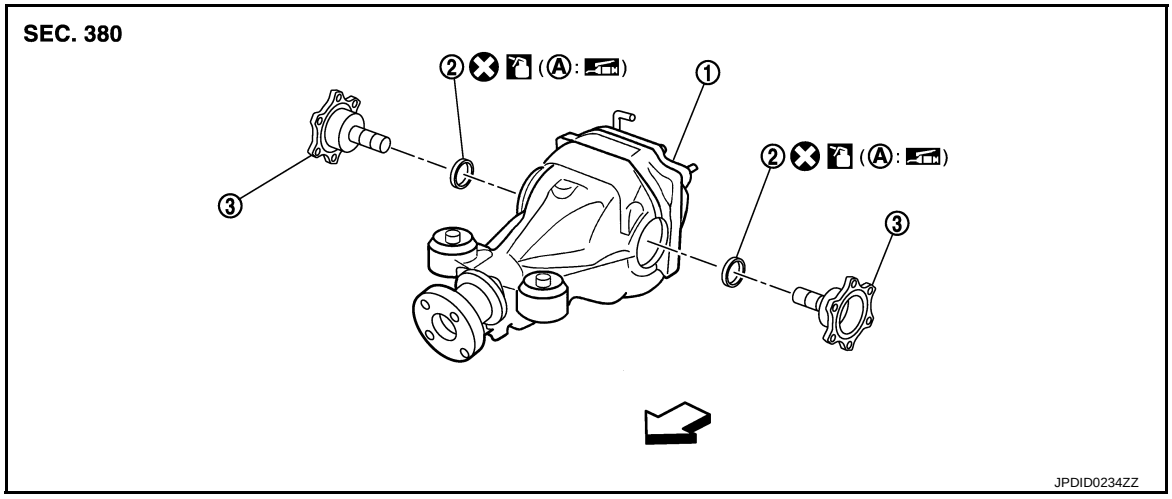


10. Install drive shaft. Refer to RAX-11, "Removal and Installation".
11. Refill gear oil to the final drive and check oil level. Refer to DLN-206, "Refilling".
12. Check the final drive for oil leakage. Refer to DLN-206, "Inspection".

SIDE OIL SEAL

Exploded View

INFOID:0000000009008404



1. Final drive assembly
2. Side oil seal
3. Side flange

A. Oil seal lip

⇦: Apply anti-corrosion oil.

: Apply gear oil.

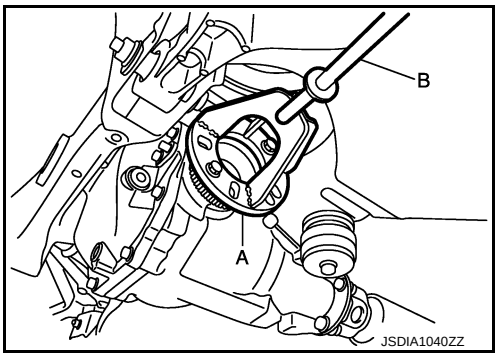
Refer to GI-4, "Components" for symbols not described above.

Removal and Installation

INFOID:0000000009008405

REMOVAL

1. Drain gear oil. Refer to DLN-206, "Draining".
2. Remove the drive shaft from the rear final drive assembly. Refer to RAX-11, "Removal and Installation".
3. Remove the side flange using attachment (A) and sliding hammer (B).



A : Attachment [SST: KV40104100 (—)]
B : Sliding hammer [SST: ST36230000 (J-25840-A)]

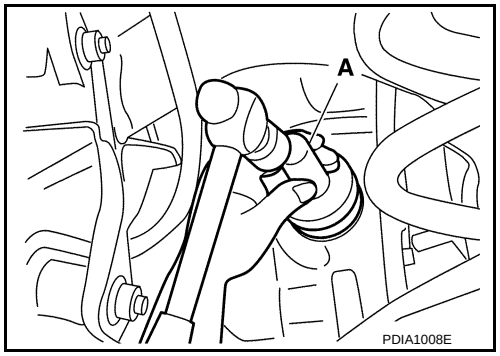
NOTE:
Circular clip installation position: Side flange side

4. Remove the side oil seal using a suitable tool.
CAUTION:
Never damage gear carrier.

INSTALLATION

1. Install side oil seal until it becomes flush with the case end, using the drift (A) [SST: ST35271000 (J-26091)].

CAUTION:
- **Never reuse side oil seal.**
- **Never incline the new side oil seal when installing.**
- **Apply multi-purpose grease to the lips of the new side oil seal.**



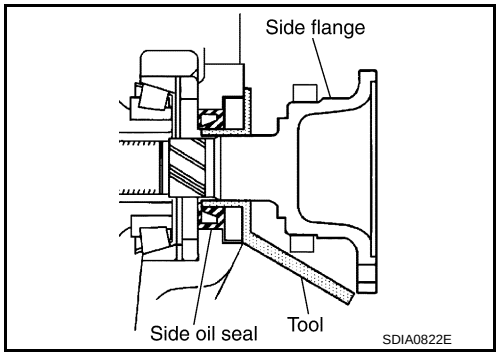
2. Install the side flange with the following procedure.

a. Install the protector [SST: KV38108000 (—)] to the side oil seal as shown.

b. Insert the side flange until the serrated part of the side flange has engaged the serrated part of the side gear and remove the Tool.

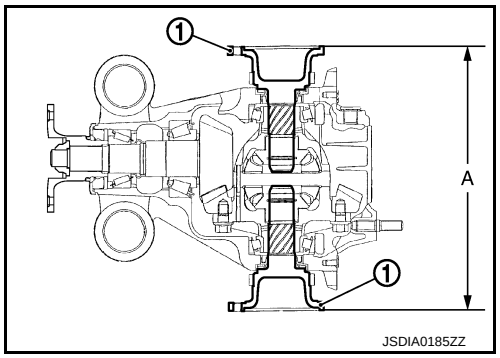
c. Drive in the side flange using suitable tool.

NOTE:
Installation is completed when the driving sound of the side flange turns into a sound which seems to affect the whole rear final drive assembly.



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

A : 342.2 mm (13.47 in)



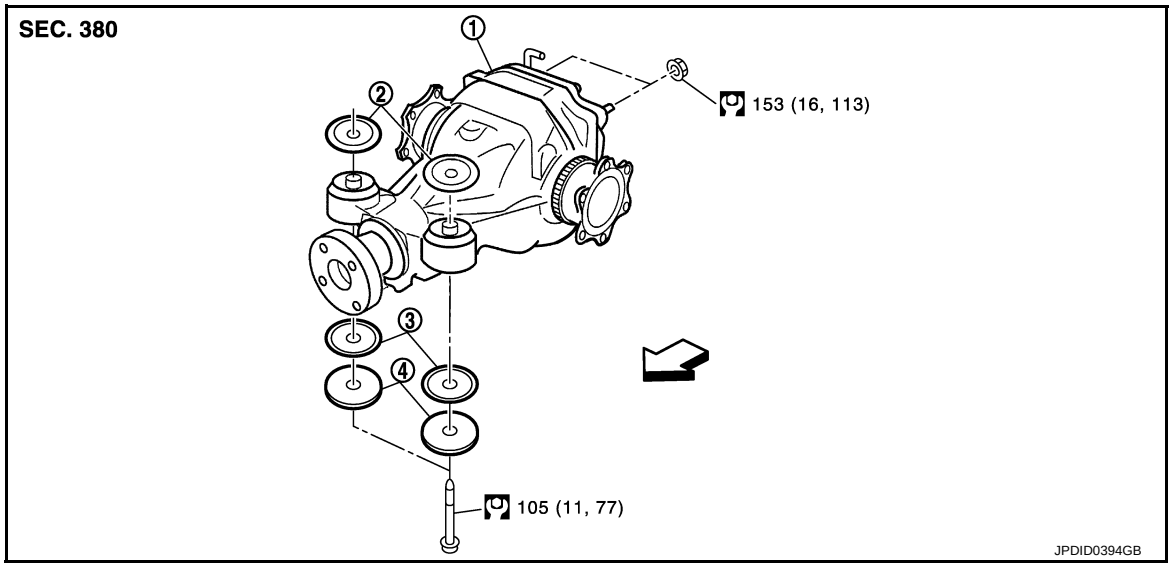
3. Install drive shaft. Refer to RAX-11, "Removal and Installation".
4. Refill gear oil to final drove and check oil level. Refer to DLN-206, "Refilling".
5. When oil leaks while removing, check oil level after the installation. Refer to DLN-206, "Inspection".

UNIT REMOVAL AND INSTALLATION

REAR FINAL DRIVE

Exploded View

INFOID:0000000009008406



1. Rear final drive assembly
2. Upper stopper
3. Lower stopper
4. Washer

⇦: Vehicle front

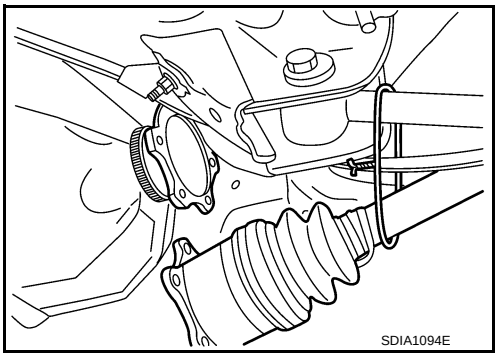
Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

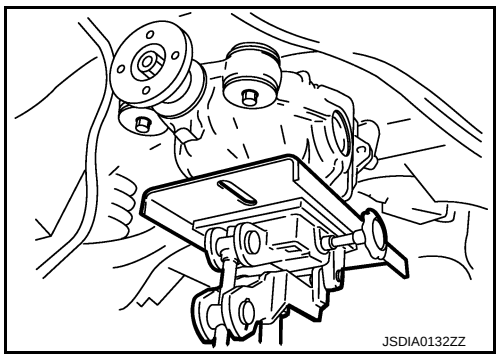
INFOID:0000000009008407

REMOVAL

1. Remove spare tire.
2. Remove rear propeller shaft from the final drive. Refer to DLN-155, "Removal and Installation" (2WD), DLN-146, "Removal and Installation" (4WD).
3. Remove drive shaft from final drive with power tool. Then suspend it by wire, etc. Refer to RAX-11, "Removal and Installation".
4. Remove breather hose from the final drive.



5. Set a suitable jack to rear final drive assembly.
   CAUTION:
   Never place a jack under the rear cover (aluminum case).
6. Remove the mounting bolts and nuts connecting to the suspension member with power tool. And then, remove rear final drive assembly.
   CAUTION:
   Secure rear final drive assembly to a suitable jack while removing it.

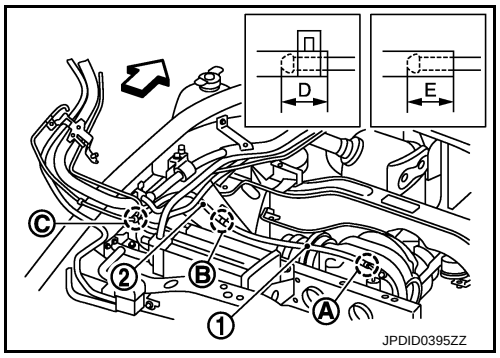


INSTALLATION

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

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

- In (A) position, install the breather hose (1) until dimension (D) shown as follows.



⇦: Vehicle front

D : 20 mm (0.79 in)

CAUTION:
- **Never reuse hose clamp.**
- **Install the hose clamp, with the tab facing downward.**

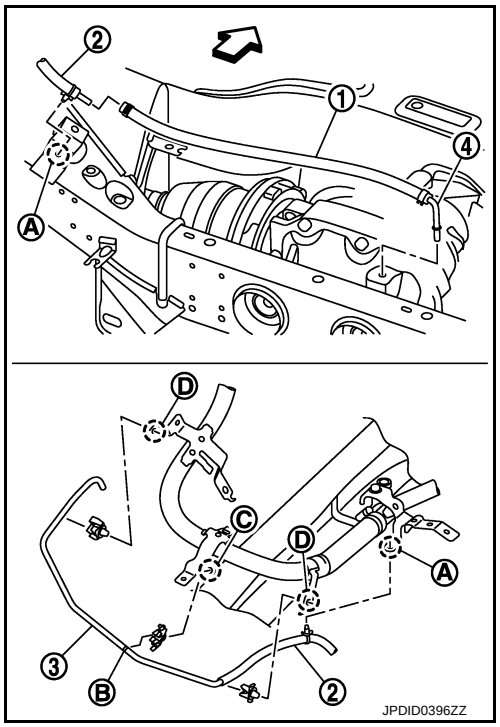
- In (B) position, install the breather hose (2) until hose reaches the plane tube surface connector.

CAUTION:
- **Never reuse hose clamp.**
- **Install the hose clamp, with the tab facing rightward and upward direction of the vehicle at 45°.**

- In (C) position, install the breather hose (2) until dimension (E) shown as follows.

E : 20 mm (0.79 in)

- Install breather hose (1) and (2), breather tube (3) and metal connector (4) as shown in the figure.



⇦: Vehicle front

- Fix breather hose (2) with clip in (A) position
  CAUTION:
  Never reuse clip.
- Install metal connector (4) to rear cover with a part to insert breather hose with facing vehicle left.
  CAUTION:
  Never reuse metal connector.
- Fix a point with paint mark (B) of breather tube (3) in (C) position.
- Fix breather tube (3) in (D) position.

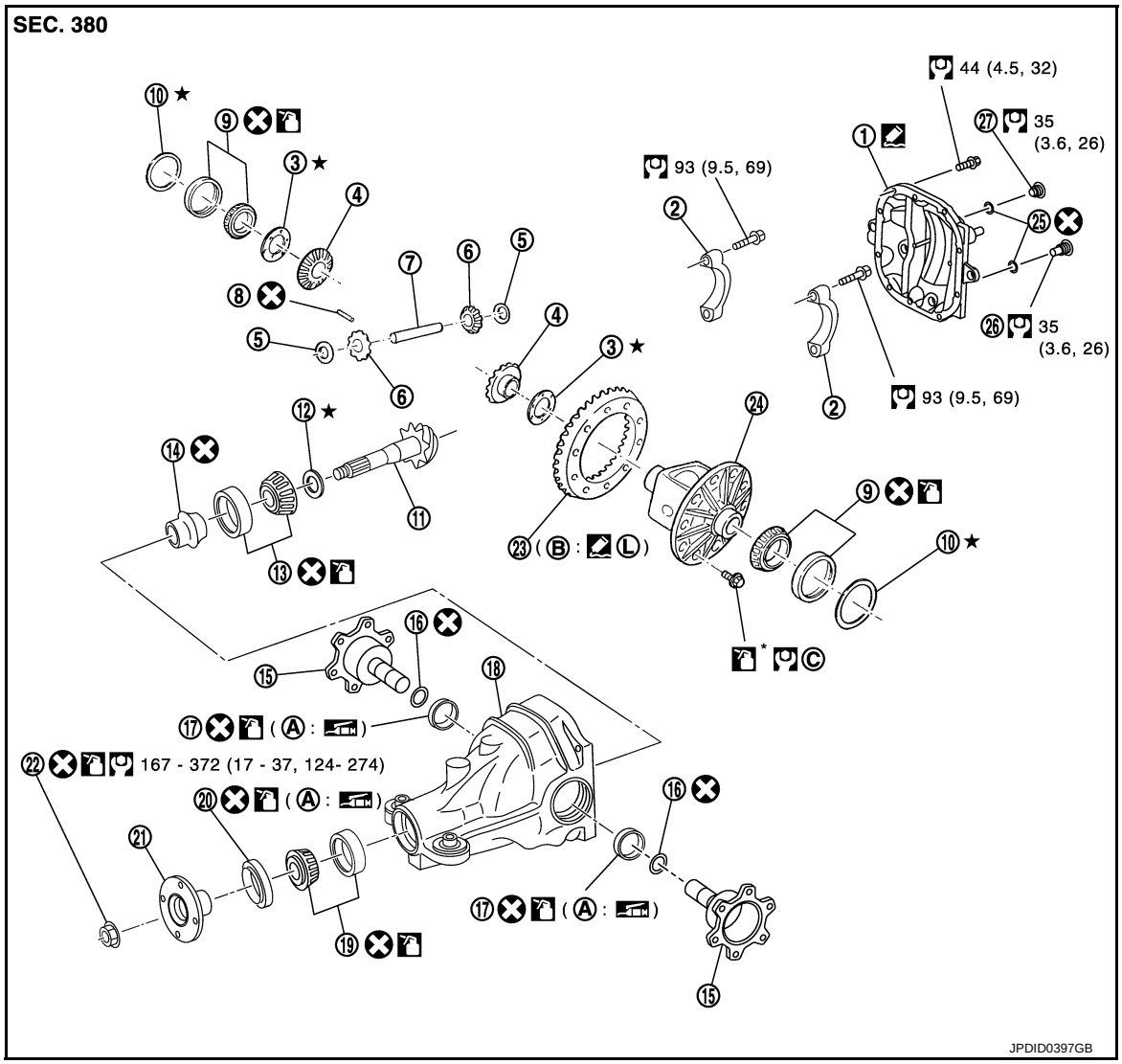
- When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-206, "Inspection".

UNIT DISASSEMBLY AND ASSEMBLY

DIFFERENTIAL ASSEMBLY

Exploded View

INFOID:0000000009008408



1. Rear cover
2. Bearing cap
3. Side gear thrust washer
4. Side gear
5. Pinion mate thrust washer
6. Pinion mate gear
7. Pinion mate shaft
8. Lock pin
9. Side bearing
10. Side bearing adjusting washer
11. Drive pinion
12. Pinion height adjusting washer
13. Pinion rear bearing
14. Collapsible spacer
15. Side flange
16. Circlip
17. Side oil seal
18. Gear carrier
19. Pinion front bearing
20. Front oil seal
21. Companion flange
22. Drive pinion lock nut
23. Drive gear
24. Differential case
25. Gasket
26. Drain plug
27. Filler plug
A. Oil seal lip
B. Screw hole
C. Comply with the assembly procedure when tightening. Refer to DLN-219, "Assembly".

: Apply gear oil.

*: Apply anti-corrosion oil.

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

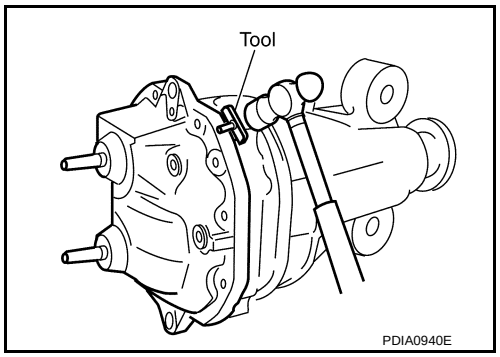
: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

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

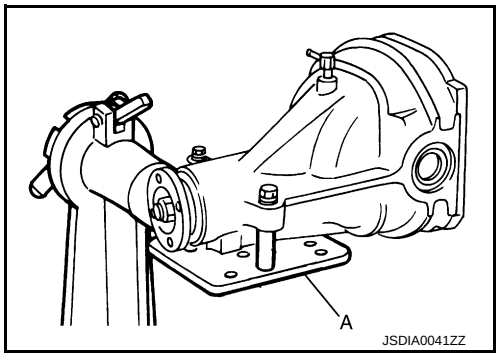
Disassembly

INFOID:0000000009008409

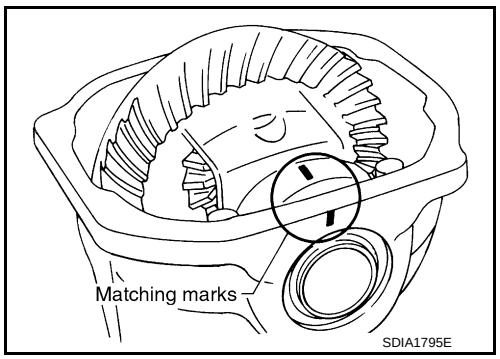
1. Drain gear oil, if necessary.
2. Remove side flanges.
3. Remove rear cover mounting bolts.
4. Remove rear cover to insert the seal cutter [SST: KV10111100 (J-37228)] between gear carrier and rear cover.
   CAUTION:
   - **Never damage the mating surface.**
   - **Never insert flat-bladed screwdriver,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



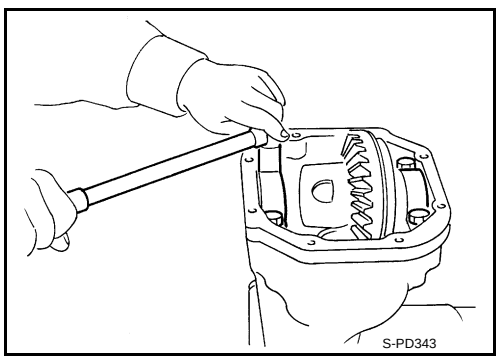
5. Using spacers, mount carrier on the attachment (A) [SST: KV38100800 (J-25604-01)].



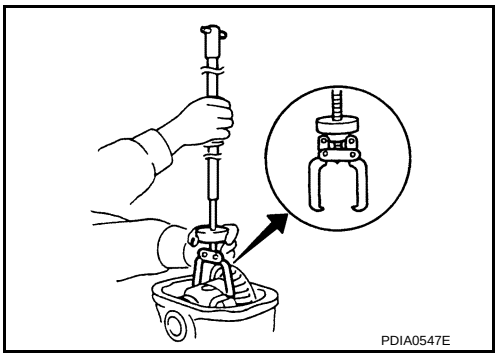
6. For proper reinstallation, paint matching marks on one side of the bearing cap.
   CAUTION:
   - **For matching marks, use paint. Never damage bearing caps and gear carrier.**
   - **Bearing caps are manufactured as integral molding. Use the matching marks to them in their original positions.**



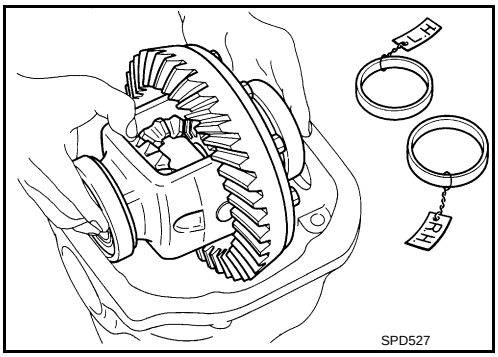
7. Remove bearing caps.



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



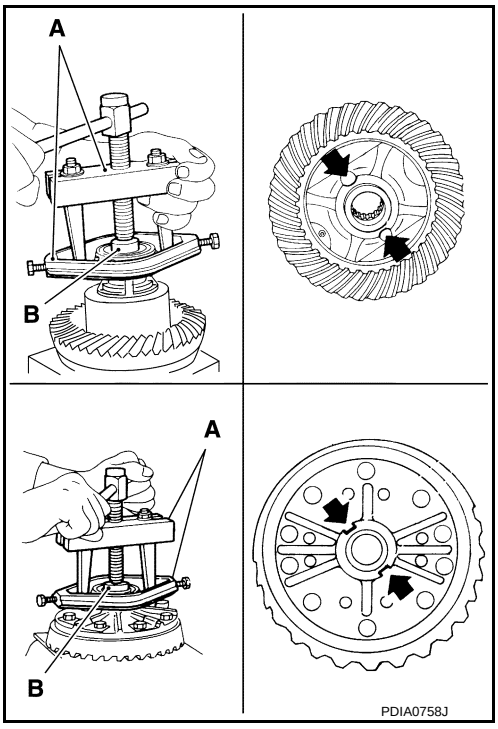
- Keep side bearing outer races together with inner race. Never mix them up.
  Also, keep side bearing adjusting washers together with bearings.



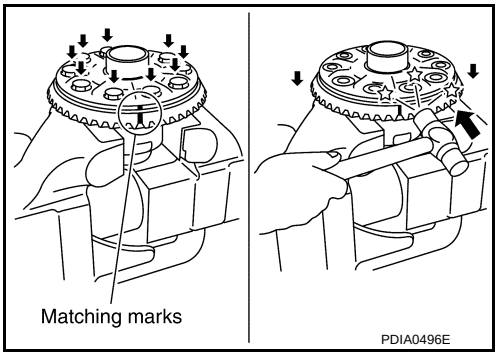
9. Remove side bearing inner race with puller (A) and base (B).
   To prevent damage to bearing, engage puller jaws in groove (⬅).

   A : Puller [SST: ST33051001 (J-22888-20)]
   B : Base [SST: KV40104730 (—)]

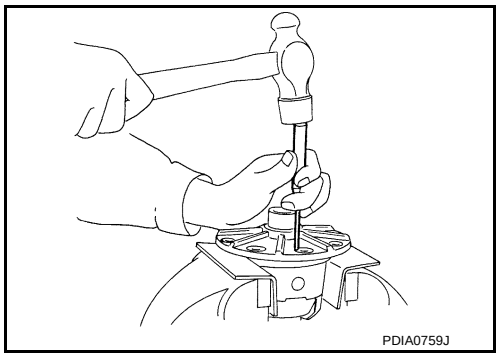
   CAUTION:
   - **To prevent damage to the side bearing and drive gear, place copper plates between these parts and vise.**
   - **It is not necessary to remove side bearing inner race except when it is replaced.**



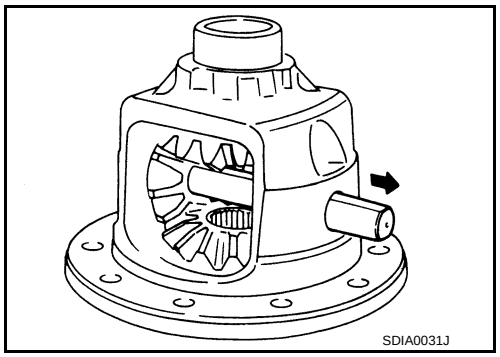
10. For proper reinstallation, paint matching marks on one differential case assembly.
    CAUTION:
    For matching marks, use paint. Never damage differential case and drive gear.
11. Remove drive gear mounting bolts.
12. Tap drive gear off differential case assembly with a soft hammer.
    CAUTION: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



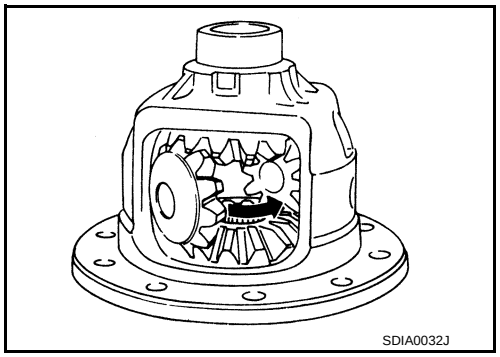
13. Remove lock pin of pinion mate shaft with a punch from drive gear side.


PDIA0759J

14. Remove pinion mate shaft.


SDIA0031J

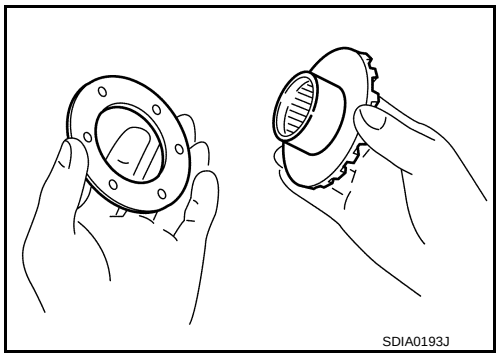
15. Turn pinion mate gear, then remove pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from differential case.
16. Perform inspection after disassembly. Refer to DLN-228, "Inspection".


SDIA0032J

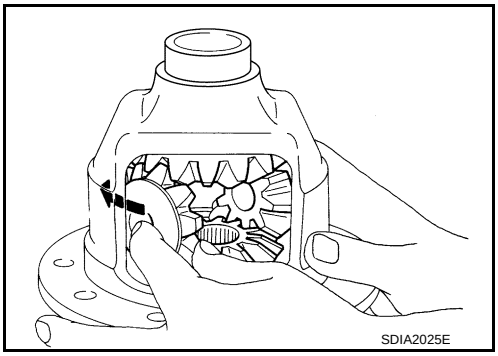
Assembly

INFOID:0000000009008410

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.

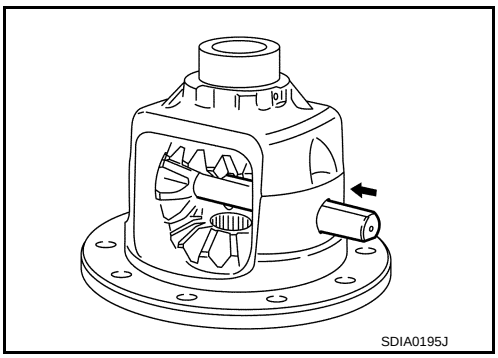

SDIA0193J

2. Install side gears and thrust washers into differential case.
CAUTION:
Make sure that the circular clip is installed to side gears.


SDIA2025E

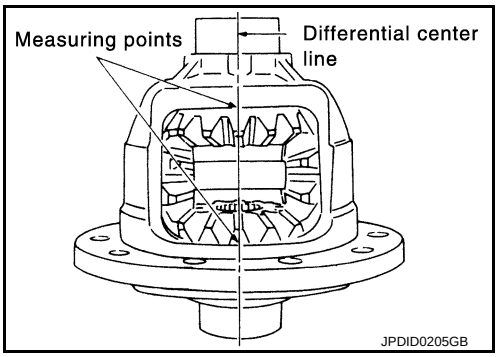
3. Align 2 pinion mate gears in diagonally opposite positions, then rotate and install them into differential case after installing thrust washer to pinion mate gear.

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


SDIA0195J

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.



JPDID0205GB

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.

Standard

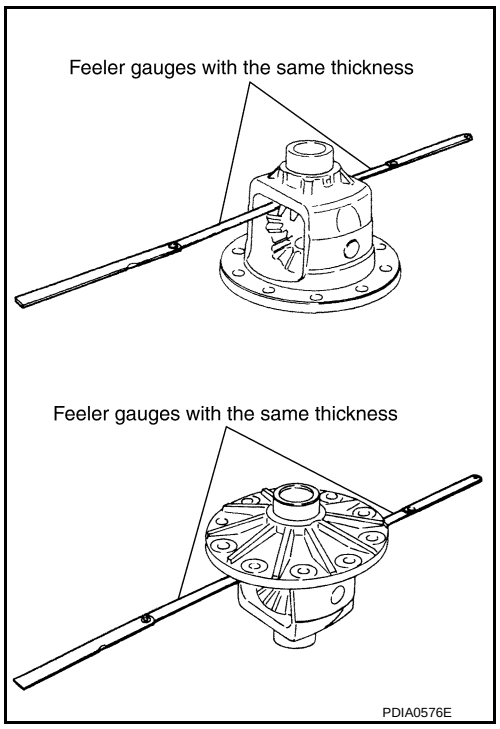
Side gear back clearance **: Refer to DLN-235, "Side Gear Clearance".**

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

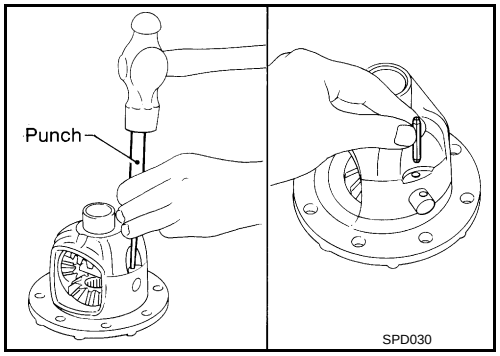
c. If the back clearance is outside the specification, use a thicker/thinner side gear thrust washer to adjust. For selecting thrust washer, refer to the latest parts information.

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.



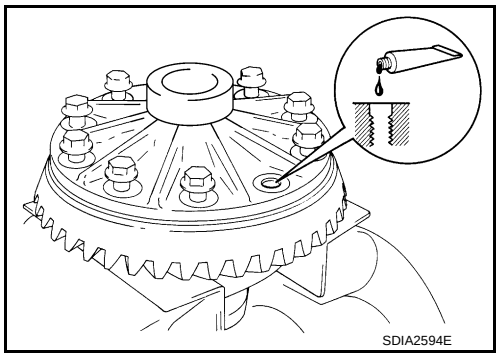
6. Drive a lock pin into pinion mate shaft, using a punch. Make sure lock pin is flush with differential case.
CAUTION:
Never reuse lock pin.



7. Apply thread locking sealant into the thread hole of drive gear.
- Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

CAUTION:
Clean and degrease drive gear back and threaded holes sufficiently.

8. Install drive gear to differential case.
CAUTION:
Align the matching marks of differential case and drive gear.

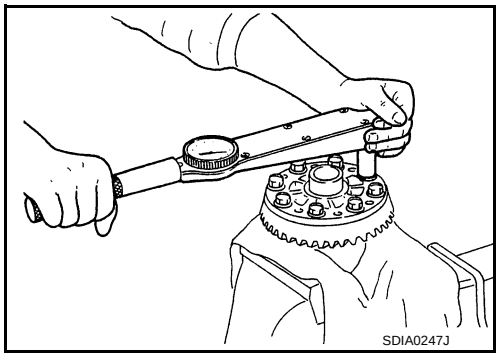


9. Tighten the mounting bolts with the following procedure.
CAUTION:
Apply anti-corrosin oil to the thread and seat of mounting bolts.

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.



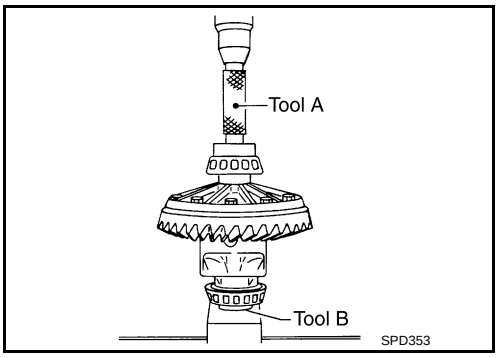
Drive gear mounting bolts tightening angle : 31 to 36 degree

CAUTION:
Check the tightening angle using the angle wrench [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.

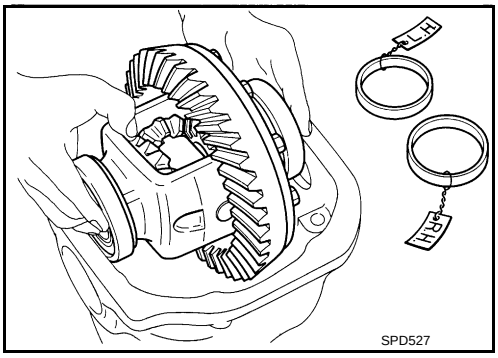
10. Press side bearing inner races to differential case, using the drifts (A and B).

    A : Drift [SST: ST01550002 (—)]
    B : Drift [SST: KV40104730 (—)]

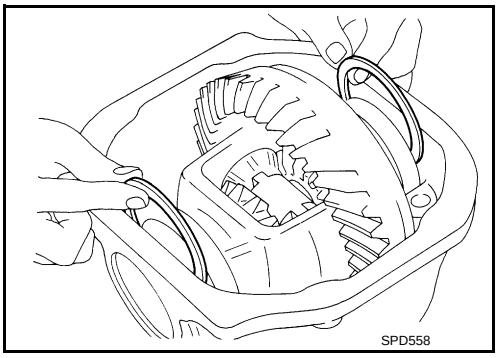
CAUTION:
Never reuse side bearing inner race.



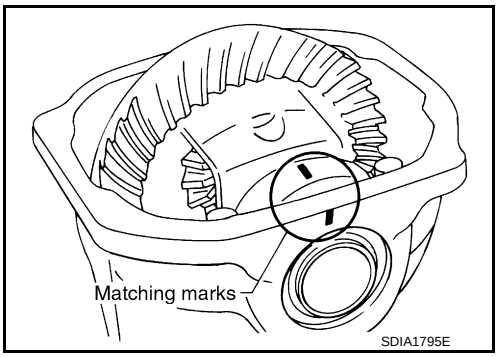
11. Install differential case assembly with side bearing outer races into gear carrier.
12. Measure side bearing preload. If necessary, select the appropriate side bearing adjusting washers. Refer to DLN-223, "Adjustment".



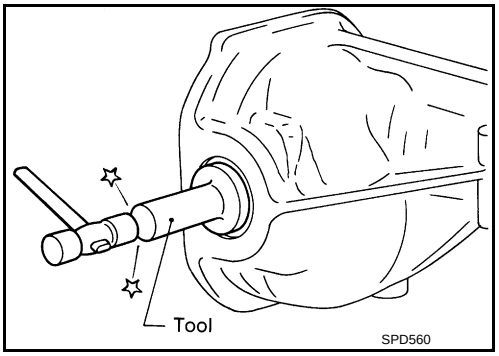
13. Insert selected left and right side bearing adjusting washers in place between side bearings and gear carrier. Refer to DLN-223, "Adjustment".



14. Align matching marks on bearing cap with that on gear carrier.
15. Install bearing caps and tighten bearing cap mounting bolts.

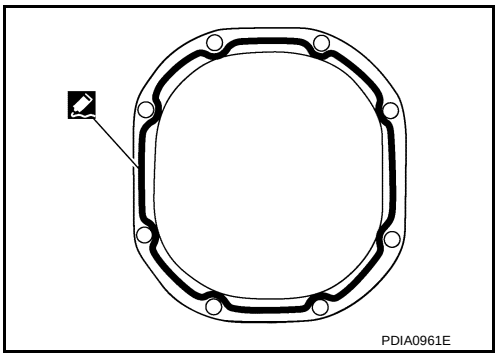


16. Using the drift [SST: ST35271000 (J-26091)], drive side oil seals until it becomes flush with the case end.
CAUTION:
- **Never reuse oil seal.**
- **When installing, never incline oil seal.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**

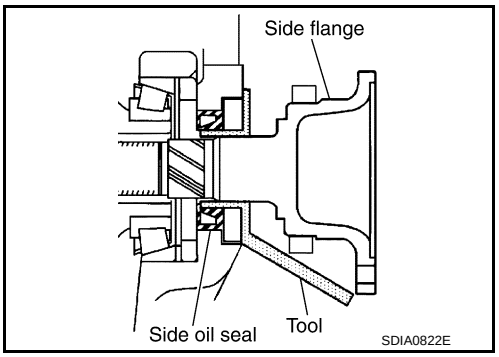


17. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to DLN-223, "Adjustment".
Recheck above items. Readjust the above description, if necessary.
18. Apply sealant to mating surface of rear cover.
- Use Genuine Silicone RTV or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

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



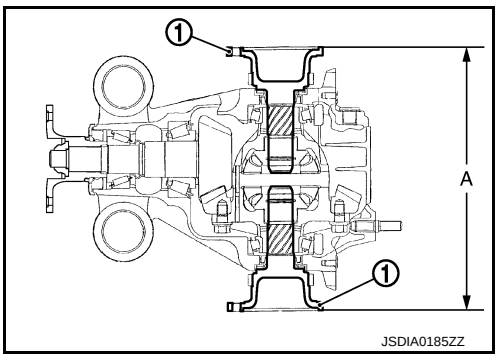
19. Install rear cover on gear carrier and tighten mounting bolts.
20. Install side flange with the following procedure.
a. Attach the protector [SST: KV38108000 (—)] to side oil seal.
b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
c. Insert the side flange until the serrated part of the side flange has engaged the serrated part of the side gear and remove the protector.
NOTE:
When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.



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

Standard

A : 342.2 mm (13.47 in)



Adjustment

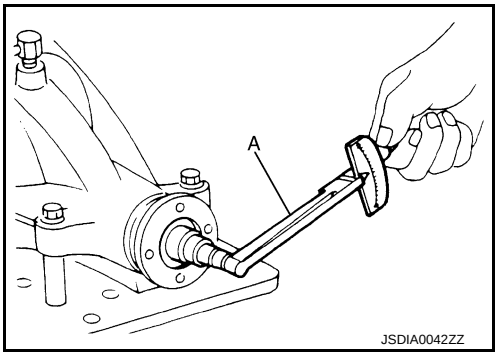
INFOID:0000000009008411

TOTAL PRELOAD TORQUE

Before inspection and adjustment, drain gear oil.

1. Secure final drive assembly onto an attachment [SST: KV38100800 (—)].
2. Remove side flanges.
3. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
4. Rotate drive pinion at least 20 times to check for smooth operation of the bearing.

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



Total preload torque : Refer to DLN-235, "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

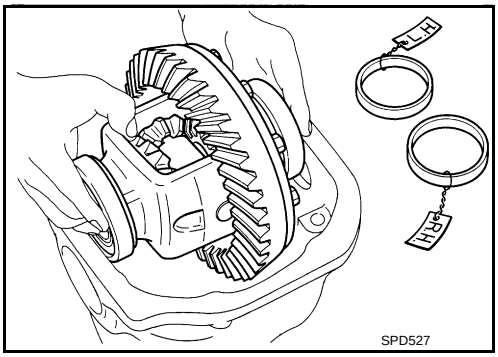
On pinion bearings: Tighten the drive pinion lock nut.

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.

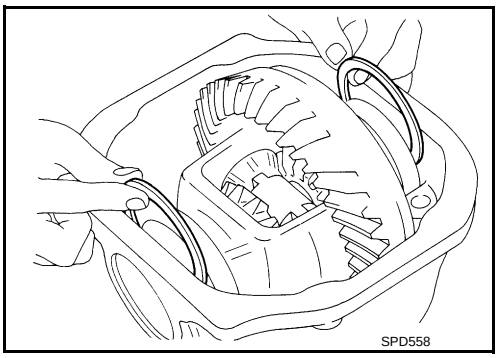
SIDE BEARING PRELOAD

Before inspection and adjustment, drain gear oil.

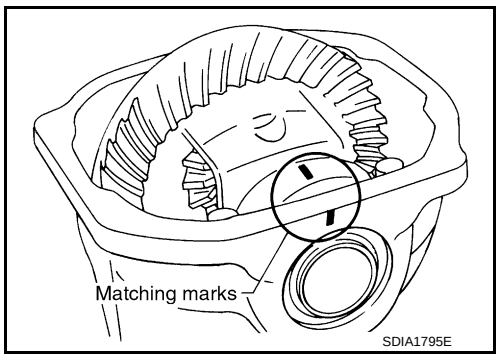
1. Remove rear cover. Refer to DLN-217, "Disassembly".
2. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.
3. Place the differential case, with side bearings and bearing races installed, into gear carrier.



4. Insert left and right original side bearing adjusting washers in place between side bearings and gear carrier.

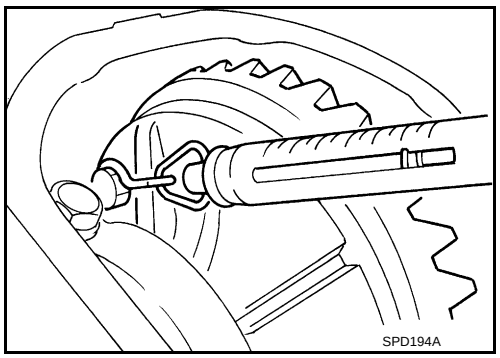


5. Install bearing caps in their correct locations and tighten bearing cap mounting bolts.
6. Turn the carrier several times to seat the bearings.



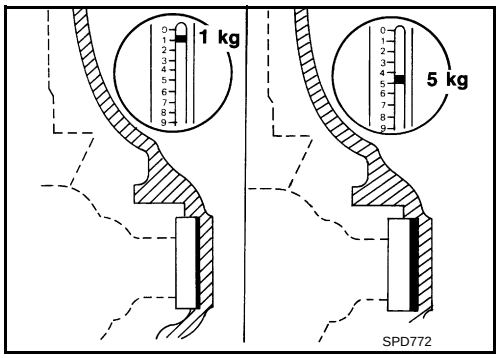
7. Measure the turning torque of the carrier at the drive gear mounting bolts with a spring gauge [SST: — (J-8129)].

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



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

If the turning torque is less than the specified range:	**Use a thicker thrust washer.**
If the turning torque is greater than the specification:	**Use a thinner thrust washer.**



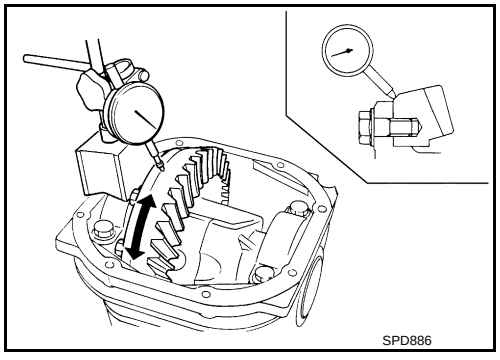
CAUTION:
Select a side bearing adjusting washer for right and left individually.

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

DRIVE GEAR RUNOUT

1. Remove rear cover. Refer to DLN-217, "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-235, "Drive Gear Runout".**



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

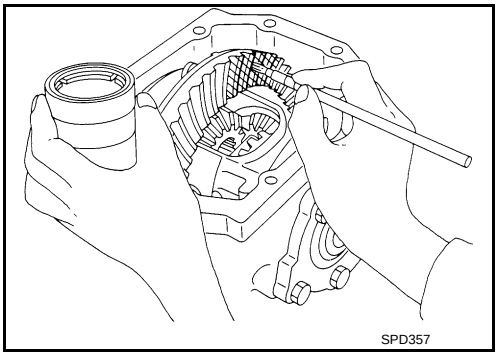
CAUTION:
Replace drive gear and drive pinion gear as a set.

TOOTH CONTACT

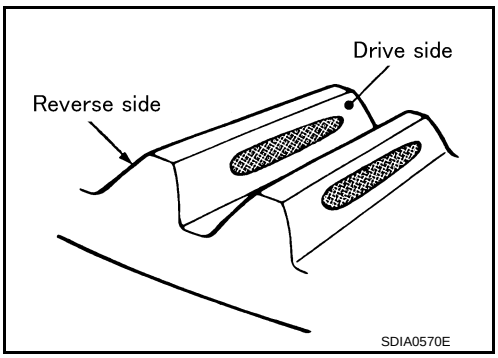
Before inspection and adjustment, drain gear oil.

1. Remove rear cover. Refer to DLN-217, "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.


SPD357

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.

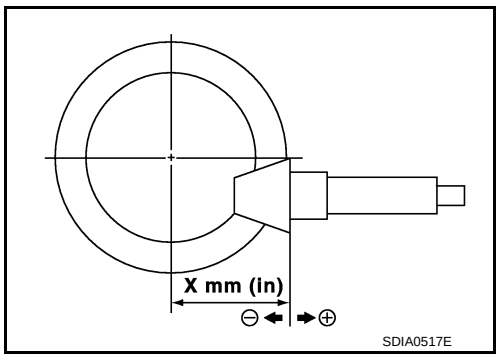


SDIA0570E

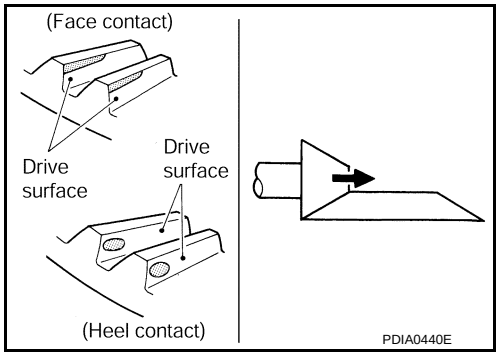
Tooth contact condition		Pinion height adjusting washer selection value [mm (in)]		Adjustment (Yes/No)	Possible cause
Drive side	Back side				
Heel side Toe side	Toe side Heel side	Thicker ↑	+0.06 (+0.0024)	Yes	Occurrence of noise and scoring sound in all speed ranges.
			+0.04 (+0.0016)		Occurrence of noise when accelerating.
			+0.02 (+0.0008)	No	–
			0		
			-0.02 (-0.0008)		
		Thinner ↓	-0.04 (-0.0016)	Yes	Occurrence of noise at constant speed and decreasing speed.
			-0.06 (-0.0024)		Occurrence of noise and scoring sound in all speed ranges.

JPDID0398GB

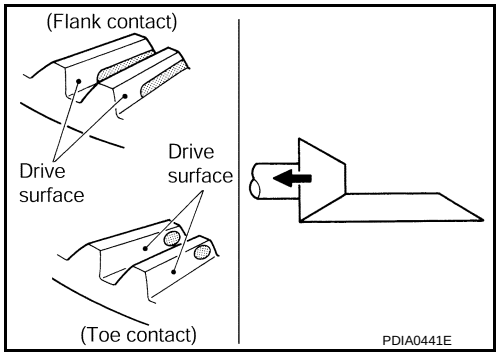
4. If tooth contact is improperly adjusted, follow the procedure below to adjust the pinion height [dimension (X)].



- 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.

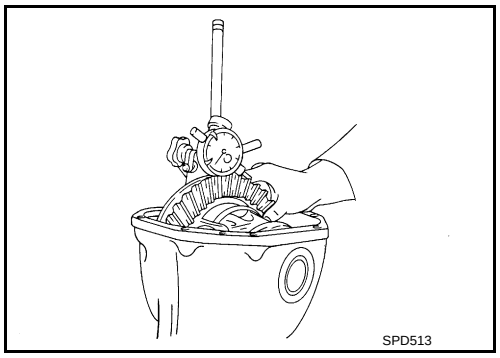


BACKLASH

Before inspection and adjustment, drain gear oil.

1. Remove rear cover. Refer to DLN-217, "Disassembly".
2. Fit a dial indicator to the drive gear face to measure the backlash.

Backlash : Refer to DLN-235, "Backlash".



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

When the backlash is large:

Make drive gear back side adjusting washer thicker, and drive gear tooth side adjusting washer thinner by the same amount. For selecting adjusting washer, refer to the latest parts information.

When the backlash is small:

Make drive gear back side adjusting washer thinner, and drive gear tooth side adjusting washer thicker by the same amount. For selecting adjusting washer, refer to the latest parts information.

CAUTION:
Never change the total amount of washers as it changes the bearing preload.

Inspection

INFOID:0000000009008412

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.

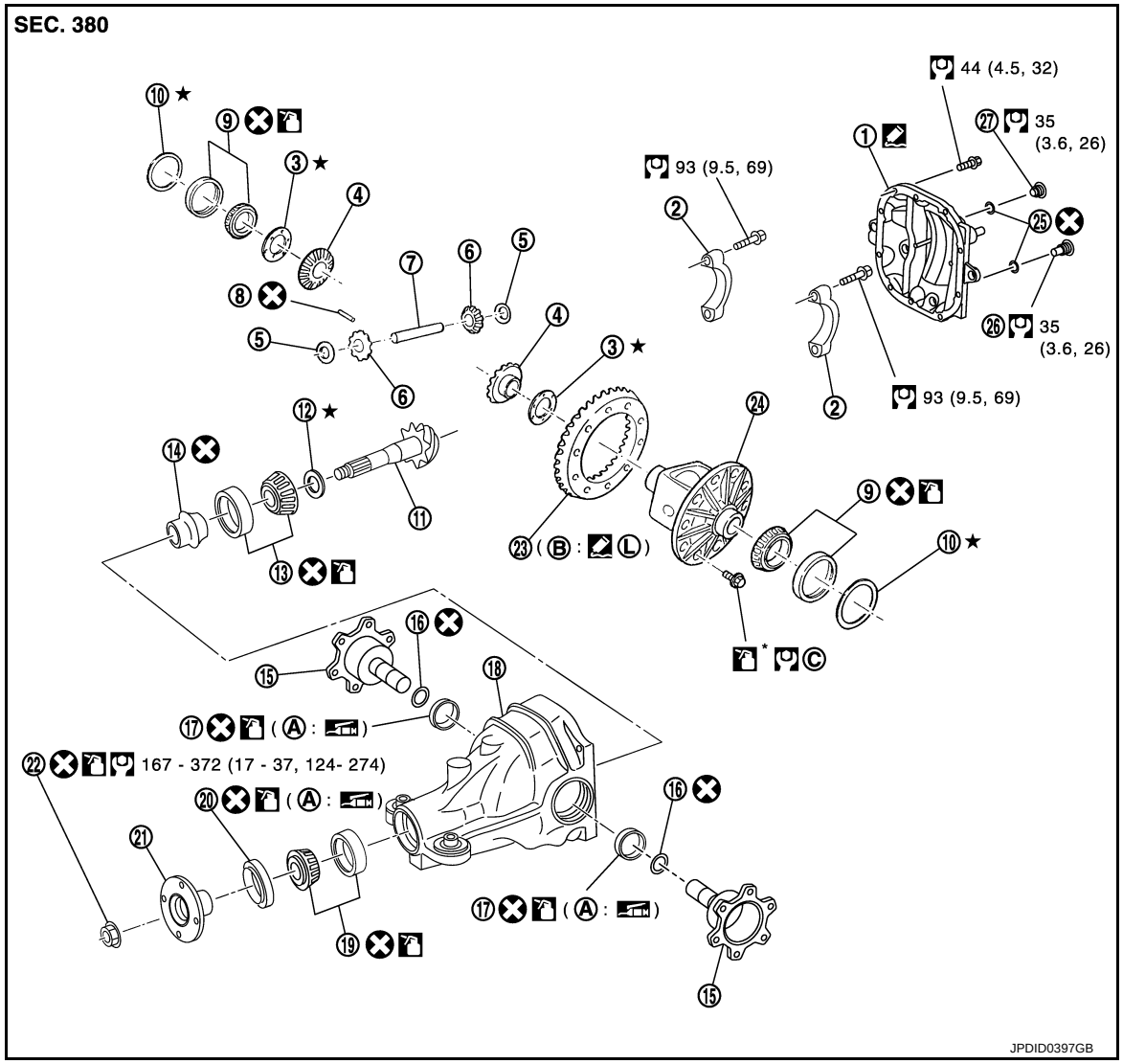
Oil Seal
- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

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:0000000009008413



1.	Rear cover	2.	Bearing cap	3.	Side gear thrust washer
4.	Side gear	5.	Pinion mate thrust washer	6.	Pinion mate gear
7.	Pinion mate shaft	8.	Lock pin	9.	Side bearing
10.	Side bearing adjusting washer	11.	Drive pinion	12.	Pinion height adjusting washer
13.	Pinion rear bearing	14.	Collapsible spacer	15.	Side flange
16.	Circlip	17.	Side oil seal	18.	Gear carrier
19.	Pinion front bearing	20.	Front oil seal	21.	Companion flange
22.	Drive pinion lock nut	23.	Drive gear	24.	Differential case
25.	Gasket	26.	Drain plug	27.	Filler plug
A.	Oil seal lip	B.	Screw hole	C.	Comply with the assembly procedure when tightening. Refer to DLN-219, "Assembly".

: Apply gear oil.

*: Apply anti-corrosion oil.

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

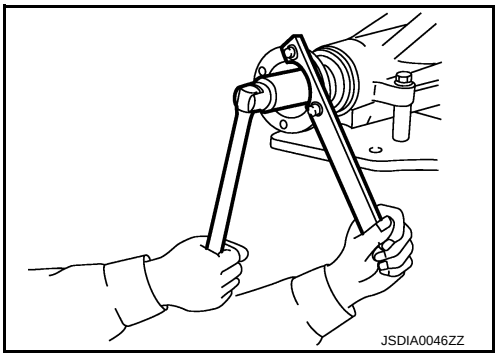
Ⓛ: Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

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

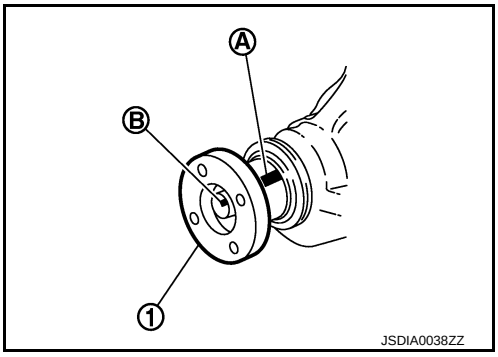
Disassembly

INFOID:0000000009008414

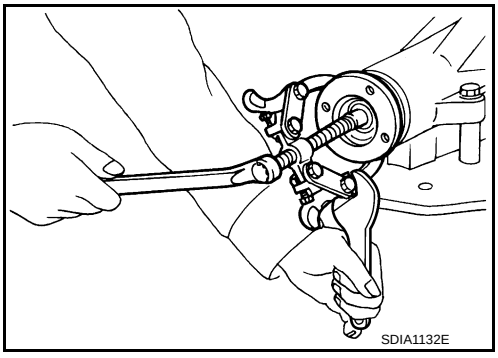
1. Remove differential case assembly. Refer to DLN-217, "Disassembly".
2. Remove drive pinion lock nut with the flange wrench (commercial service tool).



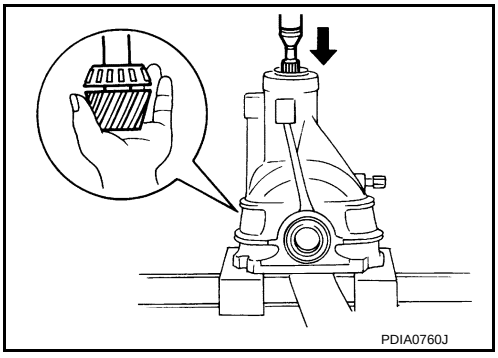
3. Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).
CAUTION:
For matching mark, use paint. Never damage companion flange and drive pinion.
NOTE:
The matching mark on the final drive companion flange indicates the maximum vertical runout position.
When replacing companion flange, matching mark is not necessary.



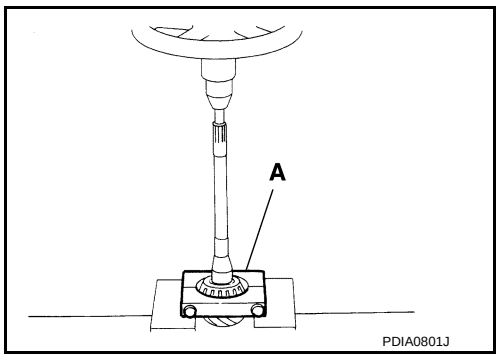
4. Remove companion flange using the suitable puller (commercial service tool).



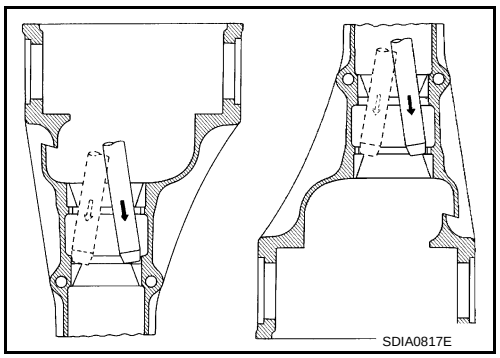
5. Press drive pinion assembly out of gear carrier.
CAUTION:
Never drop drive pinion assembly.
6. Remove front oil seal.
7. Remove side oil seal.
8. Remove pinion front bearing inner race.
9. Remove collapsible spacer.



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



11. Tap pinion front/rear bearing outer races uniformly using a brass rod or equivalent to remove them.
CAUTION:
Never damage gear carrier.
12. Perform inspection after disassembly. Refer to DLN-234, "Inspection".



Assembly

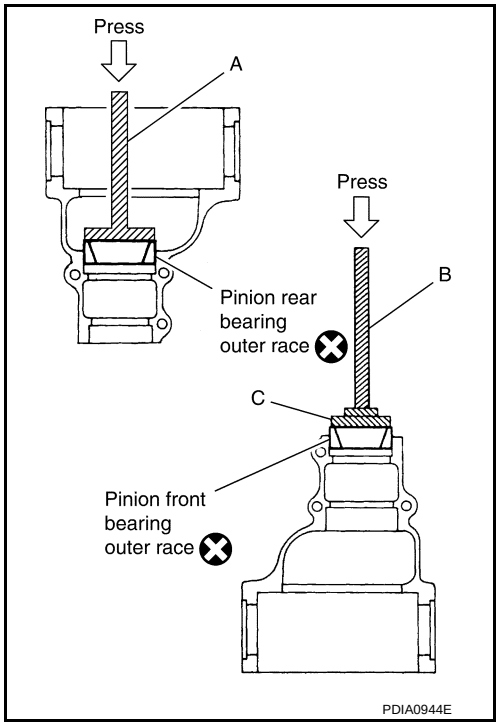
INFOID:0000000009008415

1. Install front bearing outer race and rear bearing outer race using drifts (A and B) and drift bar (C).

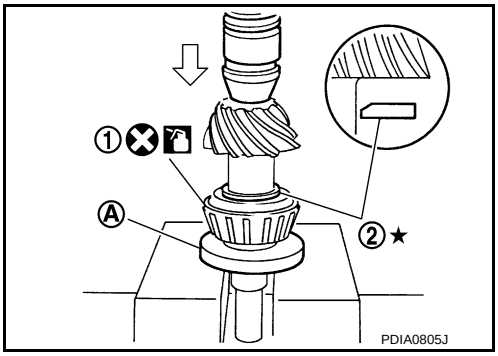
A : Drift [SST: KV38103300 (—)]
B : Drift [SST: ST30611000 (J-25742-1)]
C : Drift bar [SST: ST30621000 (J-25742-5)]

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.**

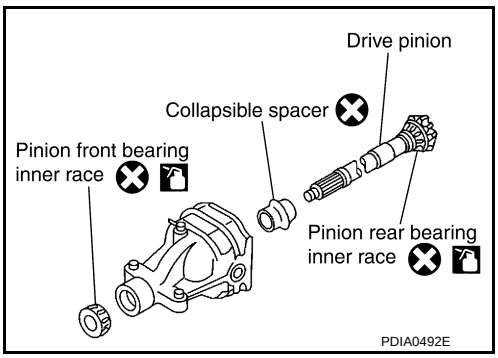
2. Select drive pinion height adjusting washer. For selecting adjusting washer, refer to the latest parts information.



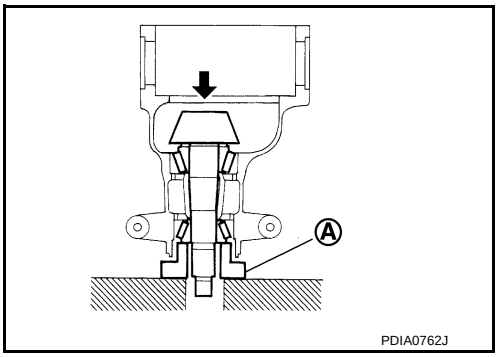
3. Install selected drive pinion height adjusting washer (2) to drive pinion. Press pinion rear bearing inner race (1) to it, using drift (A) [SST: ST30022000 (—)].
CAUTION:
- **Be careful of the direction of pinion height adjusting washer. (Assemble as shown in the figure.)**
- **Never reuse pinion rear bearing inner race.**



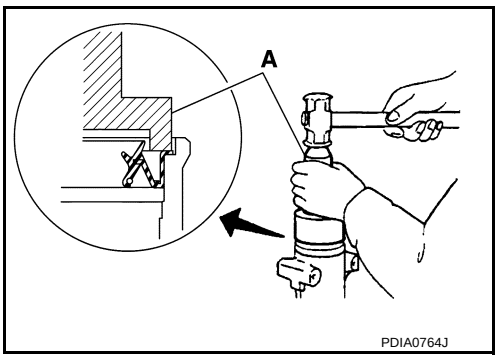
4. Assemble collapsible spacer to drive pinion.
CAUTION:
Never reuse collapsible spacer.
5. Apply gear oil to pinion rear bearing, and assemble drive pinion into gear carrier.
6. Apply gear oil to pinion front bearing, and assemble pinion front bearing inner race to drive pinion assembly.
CAUTION:
Never reuse pinion front bearing inner race.



7. Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.

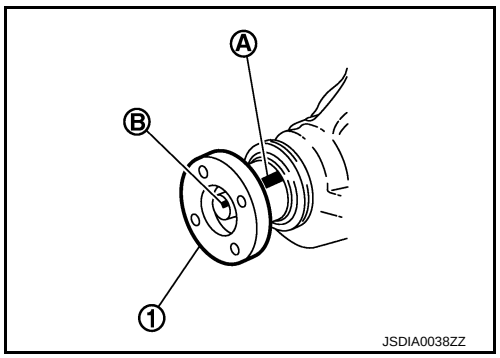


8. Using the drift (A) [SST: ST15310000 (J-25640-B)], install front oil seal in evenly until it becomes flush with the gear carrier.
CAUTION:
- **Never reuse oil seal.**
- **When installing, never incline oil seal.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.**



9. Install companion flange.
NOTE:

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



10. 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).

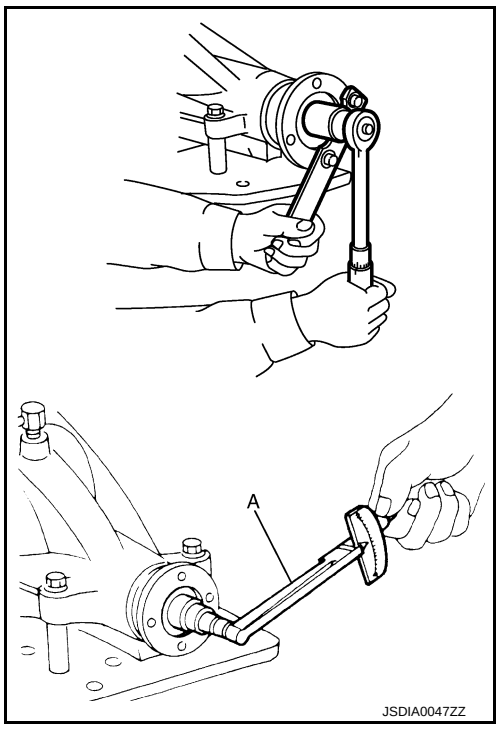
A : Preload gauge [SST: ST3127S000 (J-25765-A)]

CAUTION:
Never reuse drive pinion lock nut.

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

Pinion bearing preload : Refer to DLN-235, "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.**



12. Install differential case assembly. Refer to DLN-219, "Assembly".

CAUTION:
Never install rear cover at this timing.

13. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and companion flange runout. Refer to DLN-223, "Adjustment" and DLN-233, "Adjustment".
Recheck above items. Readjust the above description, if necessary.
14. Check total preload torque. Refer to DLN-223, "Adjustment".
15. Install rear cover. Refer to DLN-219, "Assembly".

Adjustment

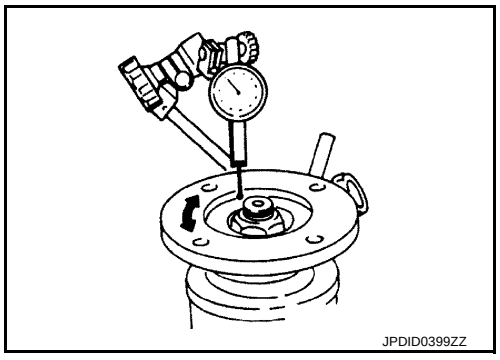
INFOID:0000000009008416

COMPANION FLANGE RUNOUT

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

Inner side of companion flange runout : Refer to DLN-235, "Companion Flange Runout".

3. 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:0000000009008417

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 Specification

INFOID:0000000009008418

Applied model		2WD	4WD
		VK56VD	
		A/T	
Final drive model		R230	
Gear ratio		2.937	
Number of teeth (Drive gear/Drive pinion)		47/16	
Oil capacity (Approx.)	ℓ (US pt, Imp pt)	1.75 (3-3/4, 3-1/8)	
Number of pinion gears		2	
Drive pinion adjustment spacer type		Collapsible	

Drive Gear Runout

INFOID:0000000009008419

Unit: mm (in)

Item	Runout limit
Drive gear back face	0.05 (0.0020) or less

Side Gear Clearance

INFOID:0000000009008420

Unit: mm (in)

Item	Specification
Side gear back clearance (Clearance limit between side gear and differential case for adjusting side gear backlash)	0.20 (0.0079) or less (Each gear should rotate smoothly without excessive resistance during differential motion.)

Preload Torque

INFOID:0000000009008421

Item	Specification
Drive pinion bearing preload torque	1.76 – 2.65 N·m (0.18 – 0.27 kg–m, 16 – 23 in-lb)
Side bearing preload torque (reference value determined by drive gear bolt pulling force)	0.29 – 1.47 N·m (0.03 – 0.14 kg–m, 3 – 13 in-lb)
Total preload torque (Total preload torque = drive pinion bearing preload torque + Side bearing preload torque)	2.06 – 4.12 N·m (0.21 – 0.42 kg–m, 19 – 36 in-lb)

Backlash

INFOID:0000000009008422

Unit: mm (in)

Item	Specification
Drive gear to drive pinion gear	0.13 – 0.18 (0.0051 – 0.0070)

Companion Flange Runout

INFOID:0000000009008423

Unit: mm (in)

Item	Runout limit
Inner side of the companion flange	0.08 (0.0031) or less