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# **CONTENTS**

TRANSFER: ETX13C	C1210 ECM20
BASIC INSPECTION	Description20 DTC Logic20
	Diagnosis Procedure
DIAGNOSIS AND REPAIR WORK FLOW	7
Work Flow	
SYSTEM DESCRIPTION	Description21
STSTEW DESCRIPTION	DTC Logic21
AWD SYSTEM	Diagnosis Procedure21
System Diagram	
System Description	
Component Parts Location	
Component Description	
	21ag110010 1 10000a10
DIAGNOSIS SYSTEM (AWD CONTROL	P1826 TRANSFER FLUID TEMPERATURE23
UNIT)	
CONSULT Function	_ · · ·
DTC/CIRCUIT DIAGNOSIS	Diagnosis Procedure23
DIC/CIRCUIT DIAGNOSIS	Component Inspection25
C1201 AWD CONTROL UNIT	14 U1000 CAN COMM CIRCUIT26
Description	U 1000 CAN COMMUCINCUIT20
DTC Logic	Description20
Diagnosis Procedure	
· ·	Diagnosis Procedure20
C1203 ABS ACTUATOR AND ELECTRIC	U1010 CONTROL UNIT (CAN)27
UNIT (CONTROL UNIT)	15 Description27
Description	<sup>15</sup> DTC Logic27
DTC Logic	<sup>15</sup> Diagnosis Procedure 27
Diagnosis Procedure	15
C1204 AWD SOLENOID	POWER SUPPLY AND GROUND CIRCUIT28
Description	Description20
DTC Logic	Diagnosis i 1000auto20
Diagnosis Procedure	
Component Inspection	
Component inspection	Component Function Check
C1205 AWD ACTUATOR RELAY	18 Diagnosis Procedure31
Description	18
DTC Logic	18 ECU DIAGNOSIS INFORMATION33

AWD CONTROL UNIT33	TRANSFER FLUID	56
Reference Value	VO37VHB	
Wiring Diagram - AWD SYSTEM35	VQ37VHRVQ37VHR : Inspection	
Fail-Safe39		
DTC Inspection Priority Chart40	VQ37VHR: Draining	
DTC Index40	VQ37VHR : Refilling	50
SYMPTOM DIAGNOSIS42	VK50VE	56
3 TWF TOW DIAGNOSIS42	VK50VE : Inspection	56
AWD WARNING LAMP DOES NOT TURN ON	VK50VE : Draining	57
42	VK50VE : Refilling	57
Description	DEMOVAL AND INSTALLATION	
Diagnosis Procedure42	REMOVAL AND INSTALLATION	58
•	AWD CONTROL UNIT	58
AWD WARNING LAMP DOES NOT TURN	Exploded View	
OFF43	Removal and Installation	
Description43		
Diagnosis Procedure43	FRONT OIL SEAL	59
HEAVY TIGHT-CORNER BRAKING SYMP-	Exploded View	
	Removal and Installation	59
TOM OCCURS44	DEAD OIL OFAL	
Description	REAR OIL SEAL	60
Diagnosis Procedure44	VQ37VHR	60
VEHICLE DOES NOT ENTER AWD MODE 45	VQ37VHR : Exploded View	
Description	VQ37VHR: Removal and Installation	
Diagnosis Procedure		
	VK50VE	62
AWD WARNING LAMP BLINKS QUICKLY 46	VK50VE : Exploded View	
Description46	VK50VE : Removal and Installation	62
AWD WARNING LAMP BLINKS SLOWLY 47 Description 47	UNIT REMOVAL AND INSTALLATION	
Diagnosis Procedure47	TRANSFER ASSEMBLY	65
NOISE, VIBRATION AND HARSHNESS	VQ37VHR	65
(NVH) TROUBLESHOOTING48	VQ37VHR : Exploded View	
NVH Troubleshooting Chart	VQ37VHR: Removal and Installation	
NVH Troubleshooting Chart40		
PRECAUTION49	VK50VE	
	VK50VE : Exploded View	
PRECAUTIONS49	VK50VE : Removal and Installation	66
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TEN-	UNIT DISASSEMBLY AND ASSEMBLY.	68
SIONER" 49 Precautions for Removing Battery Terminal 49	FRONT CASE AND REAR CASE	68
Service Notice or Precautions for Transfer 49	VQ37VHR	68
	VQ37VHR : Exploded View	68
PREPARATION51	VQ37VHR : Disassembly	69
DDEDADATION 54	VQ37VHR : Assembly	72
PREPARATION51	VQ37VHR: Inspection	76
VQ37VHR51	VK50VE	77
VQ37VHR : Special Service Tools51	VK50VE : Exploded View	
VQ37VHR : Commercial Service Tools 52	VK50VE : Exploded ViewVK50VE : Disassembly	
	VK50VE : Assembly	
VK50VE53	VK50VE : Inspection	
VK50VE : Special Service Tools		
VK50VE : Commercial Service Tools 54	MAIN SHAFT	88
PERIODIC MAINTENANCE56	VQ37VHR	ጸጸ
	VQ37VHR : Exploded View	

VO27VHD : Disassambly			
VQ37VHR : Disassembly		VK50VE : Exploded View	
VQ37VHR : Assembly		VK50VE : Removal and Installation	
VQ37VHR : Inspection	91	VK50VE : Inspection	114
VK50VE	92	SERVICE DATA AND SPECIFICATIONS	2
VK50VE : Exploded View			
VK50VE : Disassembly		(SDS)	118
VK50VE : Assembly	94	SERVICE DATA AND SPECIFICATIONS	
VK50VE : Inspection		(SDS)	11
		General Specifications	
FRONT DRIVE SHAFT AND DRIVE CHAIN	97	Propeller Shaft Runout	
VQ37VHR	97	Journal Axial Play	
VQ37VHR : Exploded View		REAR PROPELLER SHAFT: 3S80A-	
VQ37VHR : Disassembly			
VQ37VHR : Assembly		SYMPTOM DIAGNOSIS	110
VQ37VHR : Inspection		NOISE VIRRATION AND HARSHNESS	
		NOISE, VIBRATION AND HARSHNESS	44.
VK50VE		(NVH) TROUBLESHOOTING	
VK50VE : Exploded View		NVH Troubleshooting Chart	110
VK50VE: Disassembly		PRECAUTION	11
VK50VE : Assembly			
VK50VE : Inspection	103	PRECAUTIONS	
SERVICE DATA AND SPECIFICATIONS	S	Precautions for Removing Battery Terminal	11
(SDS)		PREPARATION	118
SERVICE DATA AND SPECIFICATIONS			
(SDS)	105	PREPARATION	
General Specifications		Commercial Service Tools	11
FRONT PROPELLER SHAFT: 2S56		PERIODIC MAINTENANCE	11
SYMPTOM DIAGNOSIS	106	REAR PROPELLER SHAFT	119
OTHER TOM DIAGNOSIS	100	Inspection	
NOISE, VIBRATION AND HARSHNESS			
(NIVE) TRAILEI EQUANTING	400	REMOVAL AND INSTALLATION	12
(NVH) IKOUDLESHOUTING	106		
(NVH) TROUBLESHOOTINGNVH Troubleshooting Chart		DEAD DOODELLED QUAET	40
NVH Troubleshooting Chart	106	REAR PROPELLER SHAFT	
NVH Troubleshooting Chart	106	Exploded View	120
NVH Troubleshooting Chart  PRECAUTION	106 107	Exploded ViewRemoval and Installation	120 120
NVH Troubleshooting Chart  PRECAUTION  PRECAUTIONS	106 107	Exploded View	120 120
NVH Troubleshooting Chart  PRECAUTION	106 107	Exploded ViewRemoval and Installation	120 120 123
NVH Troubleshooting Chart  PRECAUTION  PRECAUTIONS  Precautions for Removing Battery Terminal	106 107 107	Exploded View	120 120 123
NVH Troubleshooting Chart  PRECAUTION  PRECAUTIONS  Precautions for Removing Battery Terminal  PREPARATION	106 107 107 107 108	Exploded View Removal and Installation Inspection SERVICE DATA AND SPECIFICATIONS (SDS)	120 120 123
NVH Troubleshooting Chart  PRECAUTION  PRECAUTIONS  Precautions for Removing Battery Terminal  PREPARATION	106 107 107 107 108	Exploded View	120 123 <b> 12</b> 9
NVH Troubleshooting Chart  PRECAUTION  PRECAUTIONS  Precautions for Removing Battery Terminal	106 107 107 107 108	Exploded View	120 123 125 125
PRECAUTION  PRECAUTIONS  Precautions for Removing Battery Terminal  PREPARATION  PREPARATION  Commercial Service Tools	106 107 107 107 108 108	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications	129 3 129 129
NVH Troubleshooting Chart  PRECAUTION  PRECAUTIONS  Precautions for Removing Battery Terminal  PREPARATION  PREPARATION	106 107 107 107 108 108	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout	12: 3 12: 12: 12: 12: 12:
PRECAUTION  PRECAUTIONS  Precautions for Removing Battery Terminal  PREPARATION  PREPARATION  Commercial Service Tools  PERIODIC MAINTENANCE	106 107 107 107 108 108 108	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout Journal Axial Play	12: 3 3 12: 12: 12: 12:
PRECAUTION  PRECAUTIONS  Precautions for Removing Battery Terminal  PREPARATION  PREPARATION  Commercial Service Tools  PERIODIC MAINTENANCE	106 107 107 107 108 108 108 109	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout	12: 3 3 12: 12: 12: 12:
PRECAUTION	106 107 107 107 108 108 108 109	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout Journal Axial Play	12 12 12 12 12 12 12 L10
PRECAUTION	106 107 107 107 108 108 108 109 109 110	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout Journal Axial Play REAR PROPELLER SHAFT: 3F80A-1V SYMPTOM DIAGNOSIS	12 12 <b>3</b> 12 12 12 12 L10
PRECAUTION PRECAUTIONS Precautions for Removing Battery Terminal PREPARATION PREPARATION Commercial Service Tools PERIODIC MAINTENANCE FRONT PROPELLER SHAFT	106 107 107 107 108 108 108 109 109 110	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout Journal Axial Play REAR PROPELLER SHAFT: 3F80A-1V SYMPTOM DIAGNOSIS  NOISE, VIBRATION AND HARSHNESS	12:  5 12:  12:  12:  12:  12:  12:  12:
PRECAUTION	106 107 107 107 108 108 108 109 109 110 110	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout Journal Axial Play REAR PROPELLER SHAFT: 3F80A-1V SYMPTOM DIAGNOSIS  NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING	12: 5 12: 5 12: 12: 12: 12: 12: 12:
PRECAUTION	106 107 107 107 108 108 108 109 109 110 110	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout Journal Axial Play REAR PROPELLER SHAFT: 3F80A-1V SYMPTOM DIAGNOSIS  NOISE, VIBRATION AND HARSHNESS	12: 5 12: 5 12: 12: 12: 12: 12: 12:
PRECAUTION	106 107 107 107 108 108 109 109 110 110 110	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout Journal Axial Play REAR PROPELLER SHAFT: 3F80A-1V SYMPTOM DIAGNOSIS  NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING	120 12: 5 12: 12: 12: 12: 12: 12: 12: 12: 12: 12:
PRECAUTION	106 107 107 107 108 108 109 109 110 110 110	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout Journal Axial Play REAR PROPELLER SHAFT: 3F80A-1V SYMPTOM DIAGNOSIS  NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart  PRECAUTION	129 129 129 129 129 129 129 129 129
PRECAUTION	106 107 107 107 108 108 109 109 110 110 110 110	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout Journal Axial Play REAR PROPELLER SHAFT: 3F80A-1V SYMPTOM DIAGNOSIS  NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING  NVH Troubleshooting Chart	129 129 129 129 129 129 129 129 129
PRECAUTION	106 107 107 107 108 108 109 109 110 110 110 110	Exploded View Removal and Installation Inspection  SERVICE DATA AND SPECIFICATIONS (SDS)  SERVICE DATA AND SPECIFICATIONS (SDS)  General Specifications Propeller Shaft Runout Journal Axial Play REAR PROPELLER SHAFT: 3F80A-1V SYMPTOM DIAGNOSIS  NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING NVH Troubleshooting Chart  PRECAUTION	129 129 129 129 129 129 129 129 129

Revision: 2015 February DLN-3 2015 QX70

Precautions for Removing Battery Terminal127	General Specifications	
PREPARATION128	Propeller Shaft RunoutFRONT FINAL DRIVE: F160A	145
PREPARATION128	SYSTEM DESCRIPTION	146
Commercial Service Tools128	FRONT FINAL DRIVE ASSEMBLY	440
PERIODIC MAINTENANCE129	System Diagram	
REAR PROPELLER SHAFT         129           Inspection         129	SYMPTOM DIAGNOSIS	147
REMOVAL AND INSTALLATION130	NOISE, VIBRATION AND HARSHNESS	
	(NVH) TROUBLESHOOTING  NVH Troubleshooting Chart	
REAR PROPELLER SHAFT	•	
Exploded View130 Removal and Installation130	PRECAUTION	148
Inspection	PRECAUTIONS	1/18
	Service Notice or Precautions for Front Final Dri	
SERVICE DATA AND SPECIFICATIONS		. 148
(SDS)135	Precautions for Removing Battery Terminal	148
SERVICE DATA AND SPECIFICATIONS	PREPARATION	1/10
(SDS) 135	TILL ANATION	143
General Specifications135	PREPARATION	
Propeller Shaft Runout135	Special Service Tools	
Journal Axial Play135	Commercial Service Tools	151
REAR PROPELLER SHAFT: 3F-R-2VL107	PERIODIC MAINTENANCE	153
SYMPTOM DIAGNOSIS136		
	FRONT DIFFERENTIAL GEAR OIL	
NOISE, VIBRATION AND HARSHNESS	Inspection	
(NVH) TROUBLESHOOTING 136	Draining	
NVH Troubleshooting Chart136	Refilling	153
PRECAUTION137	REMOVAL AND INSTALLATION	154
PRECAUTIONS 137	SIDE OIL SEAL	154
Precautions for Removing Battery Terminal137	RIGHT SIDE	15/
DDED A D A TION	RIGHT SIDE : Exploded View	
PREPARATION138	RIGHT SIDE : Removal and Installation	
PREPARATION 138		
Commercial Service Tools138	LEFT SIDE	
DEDIODIO MAINTENANOE	LEFT SIDE: Exploded ViewLEFT SIDE: Removal and Installation	
PERIODIC MAINTENANCE139		
REAR PROPELLER SHAFT139	UNIT REMOVAL AND INSTALLATION	157
Inspection139	FRONT FINAL DRIVE ASSEMBLY	157
REMOVAL AND INSTALLATION140	VQ37VHR	
DEAD BRODELLED QUART	VQ37VHR : Exploded View	
REAR PROPELLER SHAFT140	VQ37VHR : Removal and Installation	
Exploded View140 Removal and Installation140		
Inspection	VK50VE	
	VK50VE : Exploded ViewVK50VE : Removal and Installation	
SERVICE DATA AND SPECIFICATIONS	VNOUVE . Nemoval and installation	158
(SDS)145	UNIT DISASSEMBLY AND ASSEMBLY	160
SERVICE DATA AND SPECIFICATIONS	SIDE SHAFT	160
(SDS) 145	Exploded View	160

Disassembly16	2 REMOVAL AND INSTALLATION 201
Assembly	3 EDONT OIL SEAL
Inspection After Disassembly16	3 FRONT OIL SEAL201
DIFFERENTIAL ASSEMBLY16	
Exploded View16	2WD : Exploded View201
Disassembly16	
Assembly16	9 AMD
Adjustment17	,, AVVD205
Inspection After Disassembly17	
DRIVE PINION18	0
Exploded View18	SIDE OIL SEAL 211 ■
Disassembly	
Assembly	
Adjustment	
Inspection After Disassembly	
inspection Aiter bisassembly10	AWD212
SERVICE DATA AND SPECIFICATIONS	AWD : Exploded View213
(SDS)19	·
,	
SERVICE DATA AND SPECIFICATIONS	UNIT REMOVAL AND INSTALLATION 215
(SDS)	
General Specifications	
Drive Gear Runout	
Differential Side Gear Clearance	ZVD : Exploded view
Preload Torque	ZVD . Nemoval and installation
Backlash	
Companion Flange Runout	0 AWD
REAR FINAL DRIVE: R200	AWD : Exploded View217 AWD : Removal and Installation217
SYSTEM DESCRIPTION19	1
	UNIT DISASSEMBLY AND ASSEMBLY . 219
REAR FINAL DRIVE ASSEMBLY19	
System Diagram19	1 DITTERENTIAL AGGEMBET219
SYMPTOM DIAGNOSIS19	3 2WD219
	2WD : Exploded View219
NOISE, VIBRATION AND HARSHNESS	2WD : Disassembly220
(NVH) TROUBLESHOOTING19	3 2WD : Assembly222
NVH Troubleshooting Chart19	2WD : Adjustment226
<u>-</u>	2WD : Inspection After Disassembly231
PRECAUTION 19	5
DDECAUTIONS	AWD : Exploded View 233
PRECAUTIONS19	
Service Notice or Precautions for Rear Final Drive. 19	A1A/D A 11
Precautions for Removing Battery Terminal 19	AWD: Assembly
DDEDADATION :-	AWD : Adjustment
PREPARATION19	AWD : Inspection After Disassembly244
PREPARATION19	6 DRIVE PINION245
Special Service Tools19	6
Commercial Service Tools19	<sub>8</sub> 2WD245
	2WD : Exploded View245
PERIODIC MAINTENANCE20	
	2WD : Assembly247
REAR DIFFERENTIAL GEAR OIL20	2772 . 7 (a) doctrion (
Inspection	-1
Draining20	A \ A \ \ D \ \ \ \ \ \ \ \ \ \ \ \ \ \
Refilling20	AWD
	AWD : Exploded View252

AWD : Disassembly	53 Drainin	g	270
AWD : Assembly		· }	270
AWD : Adjustment		AL AND INCTALLATION	
AWD : Inspection After Disassembly	59 REIVIOV	AL AND INSTALLATION	271
SERVICE DATA AND SPECIFICATIONS	FRONT	OIL SEAL	271
(SDS)	Explode	ed View	271
	Remov	al and Installation	271
SERVICE DATA AND SPECIFICATIONS	SIDE OI	L SEAL	276
(SDS)	51 Evolode	ed View	
General Specification	Pomov	al and Installation	
Drive Gear Runout	51		
Differential Side Gear Clearance	<b>O</b> 1111 11	EMOVAL AND INSTALLATION	278
Preload Torque		INAL DOME	
Backlash		INAL DRIVE	
Drive Pinion Runout (2WD)		ed View	
Companion Flange Runout (AWD)  REAR FINAL DRIVE: R230	n Remov	al and Installation	278
REAR FINAL DRIVE: R230	UNIT D	ISASSEMBLY AND ASSEMBLY	280
SYSTEM DESCRIPTION	_		200
01012m 22001tm 1101t	" DIFFER	ENTIAL ASSEMBLY	280
REAR FINAL DRIVE ASSEMBLY	3 Explode	ed View	280
System Diagram	3 Disasse	embly	281
0\/45704 514 614 614		oly	
SYMPTOM DIAGNOSIS	, tajaoti i	nent	
NOISE, VIBRATION AND HARSHNESS	Inspect	ion After Disassembly	291
(NVH) TROUBLESHOOTING	A DRIVE	PINION	203
NVH Troubleshooting Chart		ed View	
14V11 Troubleshooting Chart		embly	
PRECAUTION		oly	
	Δdiuetn	nent	
PRECAUTIONS	Inspect	ion After Disassembly	
Service Notice or Precautions for Rear Final Drive.	55	•	
Precautions for Removing Battery Terminal	SERVIC	CE DATA AND SPECIFICATIONS	3
PREPARATION	<sub>se</sub> (SDS) .		299
	CED///C	E DATA AND SPECIFICATIONS	
PREPARATION	(CDC)		200
Special Service Tool	Camara	I Specification	
Commercial Service Tool		ear Runout	
PERIODIC MAINTENANCE		ear Clearance	
FLIXIODIC IVIAINTLINAINCE		I Torque	
REAR DIFFERENTIAL GEAR OIL		sh	
Inspection	Daomac	nion Flange Runout	
p	- Compa	mon riange raneat	200

### DIAGNOSIS AND REPAIR WORK FLOW

[TRANSFER: ETX13C] < BASIC INSPECTION > BASIC INSPECTION Α DIAGNOSIS AND REPAIR WORK FLOW Work Flow INFOID:0000000010580340 **DETAILED FLOW** 1.INTERVIEW FROM THE CUSTOMER Clarify customer complaints before inspection. First of all, reproduce symptoms, and understand them fully. Ask customer about his/her complaints carefully. Check symptoms by driving vehicle with customer, if neces-DLN sary. **CAUTION:** Customers are not professional. Never guess easily like "maybe the customer means that...," or "maybe the customer mentions this symptom". Е >> GO TO 2. 2.CHECK AWD WARNING LAMP F Start the engine and drive at 30 km/h (19 MPH) or more for approximately 1 minute. Does AWD warning lamp turn ON? YES >> GO TO 3. NO >> GO TO 6. 3.PERFORM SELF-DIAGNOSIS Н (P)With CONSULT 1. Perform self-diagnosis for "ALL MODE AWD/4WD". Check malfunction detected by self-diagnosis. 3. Erase self-diagnostic results for "ALL MODE AWD/4WD". >> GO TO 4. f 4.CHECK TERMINALS AND HARNESS CONNECTORS Check pin terminals for damage or loose connection with harness connector. >> GO TO 5. 5.CHECK SYMPTOM REPRODUCTION L (P)With CONSULT Perform DTC reproduction procedure for the error system. Is any error detected? YES >> GO TO 2. NO >> GO TO 6. N O.PERFORM SYMPTOM DIAGNOSIS Perform the symptom diagnosis for each system. 0 Is any malfunction present? YES >> GO TO 2. NO >> GO TO 7. Р 7. FINAL CHECK (P)With CONSULT Check input/output signal standard of "ALL MODE AWD/4WD". Is the input/output the standard value?

YES

NO

>> INSPECTION END

>> GO TO 2.

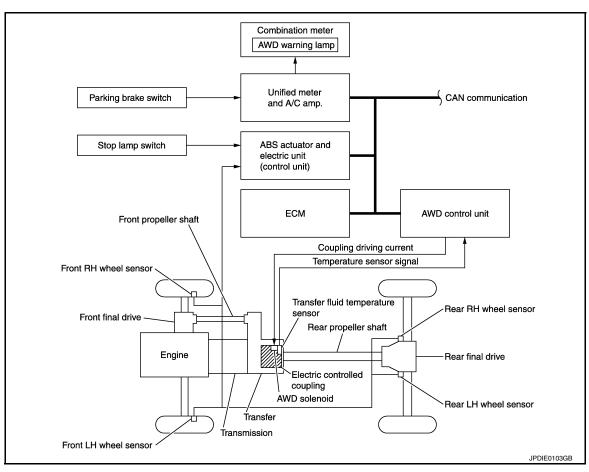
[TRANSFER: ETX13C]

# SYSTEM DESCRIPTION

### **AWD SYSTEM**

System Diagram

**CONTROL DIAGRAM** 



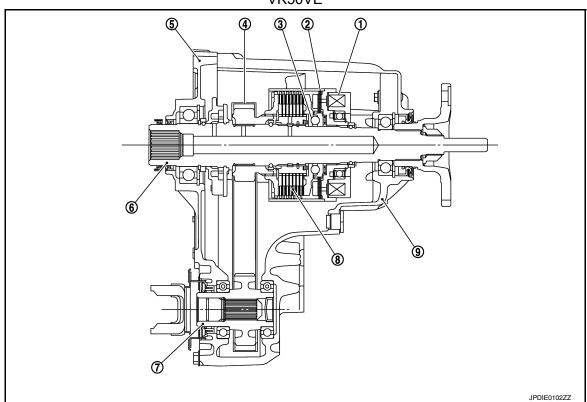
**CROSS-SECTIONAL VIEW** 

# 

- 1. Electromagnet
- 4. Drive chain
- 7. Front drive shaft
- 2. Control clutch
- 5. Front case
- 8. Main clutch

- 3. Cam
- 6. Main shaft
- 9. Rear case

### VK50VE



1. Electromagnet

2. Control clutch

3. Cam

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### AWD SYSTEM

### < SYSTEM DESCRIPTION >

4. Drive chain

5. Front case

Main shaft

7. Front drive shaft

8. Main clutch

9. Rear case

### System Description

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[TRANSFER: ETX13C]

#### DESCRIPTION

- Electronic control allows optimal distribution of torque to front/rear wheels to match road conditions.
- Makes possible stable driving, with no wheel spin, on snowy roads or other slippery surfaces.
- On roads which do not require AWD, it contributes to improved fuel economy by driving in conditions close to rear-wheel drive.
- Sensor inputs determine the vehicle's turning condition, and in response tight cornering/braking are controlled by distributing optimum torque to front wheels.
- It transmits/receives each signal from the following control unit via CAN communication line.

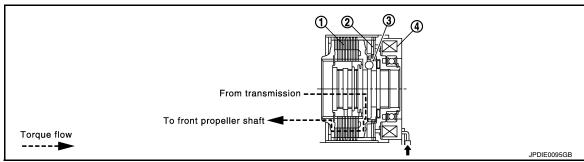
Component parts	Function	
ABS actuator and electric unit (control unit)	Transmits the following signals via CAN communication to AWD control unit.  • Vehicle speed signal  • Stop lamp switch signal (brake signal)	
ECM	Transmits the following signals via CAN communication to AWD control unit.  • Accelerator pedal position signal  • Engine speed signal	
Unified meter and A/C amp.	Transmits conditions of parking brake switch via CAN communication to AWD control unit.	

#### NOTE:

- When driving, if there is a large difference between front and rear wheel speed which continues for a long time, fluid temperature of drive system parts becomes too high and AWD warning lamp blinks quickly. (When AWD warning lamp blinks, vehicle changes to rear-wheel drive conditions.) Also, optional distribution of torque sometimes becomes rigid before lamp blinks quickly, but it is not a malfunction.
- If AWD warning lamp is blinking quickly, stop vehicle and allow it to idle for some time. Blinking will stop and AWD system will be restored.
- When driving, AWD warning lamp may blink slowly if there is a significant difference in diameter of the tires.
  At this time, vehicle performance is not fully available and cautious driving is required. (Continues until the engine is turned OFF.)
- If the warning lamp blinks slowly during driving but remains OFF after the engine is restarted, the system is normal. If it again blinks slowly after driving for some time, vehicle must be inspected.
- When there is a difference of revolution speed between the front and rear wheel the shift occasionally changes to direct 4-wheel driving conditions automatically. This is not a malfunction.

### **OPERATION PRINCIPLE**

#### ELECTRIC CONTROLLED COUPLING



1. Main clutch

2. Control clutch

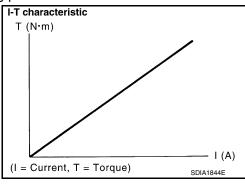
3. Cam

- 4. Electromagnet
- : Current commanded from AWD control unit.
- 1. AWD control unit supplies command current to electric controlled coupling (AWD solenoid).
- Control clutch is engaged by electromagnet and torque is detected in control clutch.
- 3. The cam operates in response to control clutch torque and applies pressure to main clutch.

### **AWD SYSTEM**

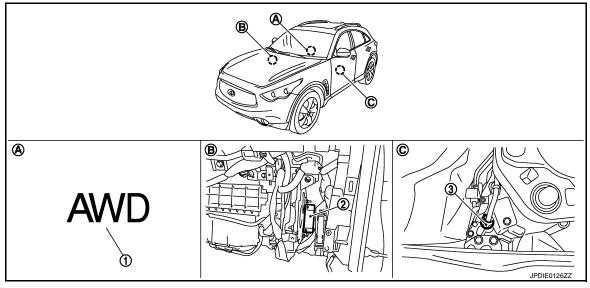
### < SYSTEM DESCRIPTION >

- [TRANSFER: ETX13C] Main clutch transmits torque to front wheels according to pressing power.
  - Transmission torque to front wheels is determined according [I-T characteristic to command current.



### Component Parts Location

INFOID:0000000010580343



- AWD warning lamp
- AWD control unit

AWD solenoid harness connector

A. Combination meter

Unified meter and A/C amp.

- B. Glove box assembly removed
- C. Transfer assembly

### **Component Description**

Component parts Reference/Function AWD control unit DLN-14, "Description" Wheel sensors BRC-37, "Description" AWD solenoid DLN-16, "Description" Transfer fluid temperature sensor DLN-23, "Description" Electric controlled coupling Transmits driving force to rear final drive. AWD warning lamp DLN-31, "Description" ABS actuator and electric unit (control unit) DLN-15, "Description" DLN-20, "Description"

DLN-31, "Description"

**DLN-11 Revision: 2015 February** 2015 QX70 В

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### **DIAGNOSIS SYSTEM (AWD CONTROL UNIT)**

[TRANSFER: ETX13C]

< SYSTEM DESCRIPTION >

### DIAGNOSIS SYSTEM (AWD CONTROL UNIT)

### CONSULT Function

### **FUNCTION**

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

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

#### **ECU IDENTIFICATION**

AWD control unit part number can be read.

#### SELF DIAGNOSTIC RESULT

Before performing the self-diagnosis, start the engine and drive vehicle at 30 km/h (19 MPH) or more for approximately 1 minute.

Display Item List

Refer to DLN-40, "DTC Index".

How to Erase Self-Diagnostic Results

Before erasing DTC memory, start the engine and drive at 30 km/h (19 MPH) or more for approximately 1 minute. Check that ABS warning lamp turns OFF.

#### NOTE:

When AWD warning lamp is ON with system malfunction of DTC "C1203", run the vehicle at 30 km/h (19MPH) or more for a minute and check that ABS warning lamp is turned OFF. Then turn ignition switch OFF, and start the engine again. Otherwise AWD warning lamp may not turned OFF even if it is normal.

#### DATA MONITOR

#### NOTE:

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

Monitor item (Unit)	Remarks
STOP LAMP SW [On/Off]	Stop lamp switch signal status via CAN communication line is displayed.
ENG SPEED SIG [Run/Stop]	Engine status is displayed.
ETS ACTUATOR [On/Off]	Operating condition of AWD actuator relay (integrated in AWD control unit) is displayed.
4WD WARN LAMP [On/Off]	Control status of AWD warning lamp is displayed.
4WD MODE SW [##]	Mode switch is not equipped, but displayed.
4WD MODE MON [AUTO]	Control status of AWD is displayed.
DIS-TIRE MONI [mm]	Improper size tire installed condition is displayed.
P BRAKE SW [On/Off]	Parking brake switch signal status via CAN communication line is displayed.
BATTERY VOLT [V]	Power supply voltage for AWD control unit
THRTL POS SEN [%]	Throttle opening status is displayed.
ETS SOLENOID [A]	Monitored value of current at AWD solenoid
FR RH SENSOR [km/h] or [mph]	Wheel speed calculated by front RH wheel sensor signal is displayed.
FR LH SENSOR [km/h] or [mph]	Wheel speed calculated by front LH wheel sensor signal is displayed.
RR RH SENSOR [km/h] or [mph]	Wheel speed calculated by rear RH wheel sensor signal is displayed.
RR LH SENSOR [km/h] or [mph]	Wheel speed calculated by rear LH wheel sensor signal is displayed.

### **ACTIVE TEST**

### **DIAGNOSIS SYSTEM (AWD CONTROL UNIT)**

### < SYSTEM DESCRIPTION >

Description

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

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Test Item

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

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#### **CAUTION:**

Never energize continuously for a long time.

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### C1201 AWD CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

# DTC/CIRCUIT DIAGNOSIS

### C1201 AWD CONTROL UNIT

Description INFOID:000000010580346

• Controls driving force distribution by signals from each sensor from rear wheel driving mode (0:100) to 4-wheel driving mode (50:50).

• Rear wheel driving conditions is available by fail-safe function if malfunction is detected in AWD system.

DTC Logic

### DTC DETECTION LOGIC

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

#### DTC CONFIRMATION PROCEDURE

### 1.DTC REPRODUCTION PROCEDURE

### (P)With CONSULT

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

### Is DTC "C1201" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>DLN-14, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000010580348

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### 1.PERFORM SELF-DIAGNOSIS

### (I) With CONSULT

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

### Is DTC "C1201" detected?

YES >> Replace AWD control unit. Refer to <u>DLN-58</u>, "Exploded View".

NO >> Check AWD control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace error-detected parts.

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

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INFOID:0000000010580351

< DTC/CIRCUIT DIAGNOSIS >

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

Description INFOID:000000010580349

Transmits the following signals via CAN communication to AWD control unit.

- Vehicle speed signal
- Stop lamp switch signal (brake signal)

DTC Logic

#### DTC DETECTION LOGIC

DTC Display items Malfunction detected condition Possible cause  Malfunction related to wheel sensor has been detected by ABS actuator and electric unit (control unit).  ABS SYSTEM ABS malfunction  • Vehicle speed signal error				
C1203 ABS SYSTEM been detected by ABS actuator and ABS malfunction  • Vehicle speed signal error	DTC	Display items	Malfunction detected condition	Possible cause
	C1203	ABS SYSTEM	been detected by ABS actuator and	
			_	

### ${\sf 1.}$ DTC REPRODUCTION PROCEDURE

### (P)With CONSULT

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

### Is DTC "C1203" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>DLN-15, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

### Diagnosis Procedure

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

### (P)With CONSULT

Perform self-diagnosis for "ABS".

### Is any DTC detected?

YES >> Check the DTC.

NO >> GO TO 2.

### 2. PERFORM SELF-DIAGNOSIS

#### (P)With CONSULT

- Erase results for "ALL MODE AWD/4WD".
- 2. Start the engine and drive vehicle at 30 km/h (19 MPH) or more for approximately 1 minute.
- 3. Make sure that ABS warning lamp turns OFF.
- 4. Perform self-diagnosis for "ALL MODE AWD/4WD".

### Is DTC "C1203" detected?

YES >> Replace AWD control unit. Refer to <u>DLN-58</u>, "Exploded View".

NO >> Check AWD control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace error-detected parts.

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Revision: 2015 February DLN-15 2015 QX70

### C1204 AWD SOLENOID

< DTC/CIRCUIT DIAGNOSIS >

### C1204 AWD SOLENOID

Description INFOID:000000010580352

Controls electric controlled coupling by command current from AWD control unit.

DTC Logic

### DTC DETECTION LOGIC

DTC	Display items	Malfunction detected condition	Possible cause
C1204	4WD SOLENOID	Malfunction related to AWD solenoid has been detected.	Internal malfunction of electronic controlled coupling     Malfunction of AWD solenoid power supply circuit (open or short)     Malfunction of AWD solenoid command current

### DTC CONFIRMATION PROCEDURE

### 1.DTC REPRODUCTION PROCEDURE

### (P)With CONSULT

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

#### Is DTC "C1204" detected?

YES >> Proceed to diagnosis procedure. Refer to <a href="DLN-16">DLN-16</a>, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:0000000010580354

[TRANSFER: ETX13C]

# 1. CHECK AWD SOLENOID POWER SUPPLY

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

AWD co	ntrol unit		Voltage
Connector	Connector Terminal		voltage
M105	9	Ground	Battery voltage

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit. Refer to <u>DLN-28</u>, "<u>Diagnosis Procedure</u>".

### 2.CHECK AWD CONTROL UNIT GROUND

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

AWD co	ntrol unit		Continuity	
Connector Terminal		_	Continuity	
M105	10	Ground	Existed	
W 105	11	Giodila	LAISIEU	

### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

# 3.CHECK AWD SOLENOID CIRCUIT

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

### C1204 AWD SOLENOID

#### < DTC/CIRCUIT DIAGNOSIS >

AWD co	ntrol unit	AWD solenoid		Continuity
Connector	Terminal	Connector Terminal		Continuity
M105	1	F57	1	Existed
IVITOS	2	1 37	2	LAISIGU

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

AWD co	ntrol unit		Continuity	
Connector Terminal		_	Continuity	
M105	1	Ground	Not existed	
W103	2	Glound	Not existed	

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

### 4. CHECK AWD SOLENOID

Check the resistance between AWD solenoid harness connector terminals. Refer to DLN-17, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> AWD solenoid is malfunctioning. Replace electric controlled coupling. Refer to DLN-88. "VQ37VHR: Exploded View" (VQ37VHR), DLN-92, "VK50VE: Exploded View" (VK50VE).

# 5. CHECK TERMINALS AND HARNESS CONNECTORS

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

### Is the inspection result normal?

YES >> Replace AWD control unit. Refer to <a href="DLN-58">DLN-58</a>, "Exploded View".

NO >> Repair or replace error-detected parts.

### Component Inspection

# 1. CHECK AWD SOLENOID

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

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

### Is the inspection result normal?

YES >> INSPECTION END

NO >> AWD solenoid is malfunctioning. Replace electric controlled coupling. Refer to DLN-88, "VQ37VHR: Exploded View" (VQ37VHR), DLN-92, "VK50VE: Exploded View" (VK50VE).

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### **C1205 AWD ACTUATOR RELAY**

< DTC/CIRCUIT DIAGNOSIS >

### C1205 AWD ACTUATOR RELAY

Description

AWD solenoid is supplied with voltage by the internal circuit of AWD control unit.

DTC Logic

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1205	4WD ACTUATOR RLY	Malfunction has been detected from AWD actuator relay integrated with AWD control unit, or malfunction related to AWD solenoid has been detected.	Internal malfunction of AWD control unit     Malfunction of AWD solenoid power supply circuit (open or short)

#### DTC CONFIRMATION PROCEDURE

### 1.DTC REPRODUCTION PROCEDURE

#### (P)With CONSULT

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

### Is DTC "C1205" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>DLN-18</u>, "<u>Diagnosis Procedure</u>".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000010580358

[TRANSFER: ETX13C]

# 1. CHECK AWD SOLENOID CIRCUIT (1)

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

AWD co	ntrol unit		Continuity	
Connector Terminal		_	Continuity	
M105	1	Ground	Not existed	
WITOS	2	Giodila	Not existed	

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

### 2.CHECK TERMINALS AND HARNESS CONNECTORS

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

#### Is the inspection result normal?

YES >> After connecting each harness connector, perform DTC confirmation procedure again. When DTC "C1205" is detected, replace AWD control unit. Refer to <a href="DLN-58">DLN-58</a>, "Exploded View".

NO >> Repair or replace damaged parts.

### 3.CHECK AWD SOLENOID

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

### C1205 AWD ACTUATOR RELAY

### < DTC/CIRCUIT DIAGNOSIS >

AWD solenoid		Continuity
Terminal	_	Continuity
1	Ground	Not existed
2	Oround	Not existed

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace electric controlled coupling. Refer to <u>DLN-88, "VQ37VHR : Exploded View"</u> (VQ37VHR), DLN-92, "VK50VE: Exploded View" (VK50VE).

### 4. CHECK AWD SOLENOID CIRCUIT

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

AWD co	ntrol unit		Continuity	
Connector Terminal		_	Continuity	
M105	1	Cround	Not existed	
M105	2	Ground	Not existed	

### Is the inspection result normal?

>> GO TO 5. YES

NO >> Repair or replace damaged parts.

### 5. CHECK TERMINALS AND HARNESS CONNECTORS

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

### Is the inspection result normal?

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

NO >> Repair or replace damaged parts. DLN

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### C1210 ECM

Description

Transmits the following signals via CAN communication to AWD control unit.

- Accelerator pedal position signal
- Engine speed signal

DTC Logic

#### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
C1210	ENGINE SIGNAL 1	Malfunction related to engine signal has been detected.	Malfunction of engine control system

### DTC CONFIRMATION PROCEDURE

### 1.DTC REPRODUCTION PROCEDURE

### (P)With CONSULT

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

#### Is DTC "C1210" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>DLN-20, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:0000000010580361

[TRANSFER: ETX13C]

### 1.PERFORM ECM SELF-DIAGNOSIS

### (P)With CONSULT

Perform self-diagnosis for "ENGINE".

### Is any DTC detected?

YES >> Check the DTC.

NO >> GO TO 2.

### 2. PERFORM SELF-DIAGNOSIS

### (P)With CONSULT

- Erase self-diagnostic results for "ALL MODE AWD/4WD".
- Turn the ignition switch OFF.
- Start the engine. Drive the vehicle for a while.
- 4. Stop the vehicle. Perform self-diagnosis for "ALL MODE AWD/4WD".

#### Is DTC "C1210" detected?

YES >> Replace AWD control unit. Refer to <u>DLN-58</u>, "Exploded View".

NO >> Check AWD control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace error-detected parts.

### P1804 TRANSFER CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

### P1804 TRANSFER CONTROL UNIT

Description INFOID:000000010580362

• Controls driving force distribution by signals from each sensor from rear wheel driving mode (0:100) to 4-wheel driving mode (50:50).

• Rear wheel driving conditions is available by fail-safe function if malfunction is detected in AWD system.

DTC Logic

#### DTC DETECTION LOGIC

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

### DTC CONFIRMATION PROCEDURE

### 1.DTC REPRODUCTION PROCEDURE

#### (P)With CONSULT

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

### Is DTC "P1804" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>DLN-21, "Diagnosis Procedure"</u>.

NO >> INSPECTION END.

### Diagnosis Procedure

1. REPLACE AWD CONTROL UNIT

#### CALITION

Replace AWD control unit when self-diagnostic results show items other than this DTC simultaneously, too.

>> Replace AWD control unit. Refer <u>DLN-58</u>, "Exploded View".

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### P1809 TRANSFER CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

### P1809 TRANSFER CONTROL UNIT

Description INFOID:000000010580365

• Controls driving force distribution by signals from each sensor from rear wheel driving mode (0:100) to 4-wheel driving mode (50:50).

• Rear wheel driving conditions is available by fail-safe function if malfunction is detected in AWD system.

DTC Logic

### DTC DETECTION LOGIC

DTC	Display item	Malfunction detected condition	Possible cause
P1809	CONTROL UNIT 4	Malfunction has occurred inside AWD control unit.	AD converter system of transfer control unit is malfunctioning.

### DTC CONFIRMATION PROCEDURE

### 1.DTC REPRODUCTION PROCEDURE

#### (P)With CONSULT

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

#### Is DTC "P1809" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>DLN-22</u>, "<u>Diagnosis Procedure</u>".

NO >> INSPECTION END.

### Diagnosis Procedure

INFOID:0000000010580367

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1.REPLACE AWD CONTROL UNIT

#### CAUTION:

Replace AWD control unit when self-diagnostic results show items other than this DTC simultaneously, too.

>> Replace AWD control unit. Refer <u>DLN-58</u>, "Exploded View".

### P1826 TRANSFER FLUID TEMPERATURE

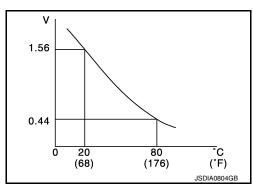
< DTC/CIRCUIT DIAGNOSIS >

[TRANSFER: ETX13C]

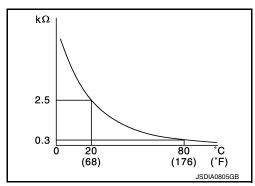
### P1826 TRANSFER FLUID TEMPERATURE

Description INFOID:0000000010580368

 Transfer fluid temperature sensor detects the transfer fluid temperature and transmits a signal to AWD control unit.



 The electrical resistance of the sensor decreases as temperature increases.



DTC Logic INFOID:0000000010580369

#### DTC DETECTION LOGIC

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

### DTC CONFIRMATION PROCEDURE

### 1.DTC REPRODUCTION PROCEDURE

### (P)With CONSULT

Turn the ignition switch ON.

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

### Is DTC "P1826" detected?

YES >> Proceed to diagnosis procedure. Refer to <a href="DLN-23">DLN-23</a>, "Diagnosis Procedure".

>> INSPECTION END. NO

### Diagnosis Procedure

1.CHECK TRANSFER FLUID TEMPERATURE SENSOR SIGNAL (1)

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

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### P1826 TRANSFER FLUID TEMPERATURE

[TRANSFER: ETX13C]

#### < DTC/CIRCUIT DIAGNOSIS >

	Voltage		
Connector	Teri	(Approx.)	
F57	6	7	2.5 V

### Is the inspection result normal?

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

# 2.CHECK TRANSFER FLUID TEMPERATURE SENSOR

Check the resistance between transfer fluid temperature sensor harness connector terminals. Refer to <u>DLN-25</u>, "Component Inspection".

### Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace transfer fluid temperature sensor. Refer to <a href="DLN-88">DLN-88</a>, <a href=""UVQ37VHR">"VVQ37VHR</a> : <a href="Exploded View" (VK50VE)</a>. <a href="Exploded View">Exploded View</a> (VK50VE).

# $3. {\sf CHECK}$ TRANSFER FLUID TEMPERATURE SENSOR SIGNAL (2)

Check the voltage between AWD solenoid harness connector and ground.

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

### Is the inspection result normal?

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

### 4. CHECK AWD CONTROL UNIT GROUND

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

AWD co	ntrol unit		Continuity	
Connector	Terminal	_	Continuity	
M105	10	Ground	Existed	
WITOS	11	Ground	LXISIEU	

### Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

### 5. CHECK TRANSFER FLUID TEMPERATURE SENSOR CIRCUIT

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

	AWD control unit		AWD solenoid		Continuity
	Connector	Terminal	Connector	Terminal	Continuity
	M105	13	F57	6	Existed
_	WHOS	3	1 37	7	LAISIEU

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

### P1826 TRANSFER FLUID TEMPERATURE

### < DTC/CIRCUIT DIAGNOSIS >

AWD co	ntrol unit		Continuity	
Connector	Terminal	_	Continuity	
M105	13	Ground	Not existed	
101103	3	Ground	Not existed	

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### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace error-detected parts.

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### 6. CHECK TERMINALS AND HARNESS CONNECTORS

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

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

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### Is the inspection result normal?

YES >> Replace AWD control unit. Refer to <u>DLN-58</u>, "Exploded View".

NO >> Repair or replace error-detected parts.

### INFOID:0000000010580371

[TRANSFER: ETX13C]

### Component Inspection

1. CHECK TRANSFER FLUID TEMPERATURE SENSOR

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

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

### Is inspection result normal?

YES >> INSPECTION END

NO >> Transfer fluid temperature sensor is malfunctioning. Replace electric controlled coupling. Refer to <a href="DLN-88">DLN-88</a>, "VQ37VHR : Exploded View" (VQ37VHR), <a href="DLN-92">DLN-92</a>, "VK50VE : Exploded View" (VK50VE).

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Revision: 2015 February DLN-25 2015 QX70

### **U1000 CAN COMM CIRCUIT**

< DTC/CIRCUIT DIAGNOSIS >

### U1000 CAN COMM CIRCUIT

Description INFOID:000000010580372

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

#### DTC DETECTION LOGIC

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

### DTC CONFIRMATION PROCEDURE

### 1.DTC REPRODUCTION PROCEDURE

### (I) 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 <u>DLN-26, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:0000000010580374

[TRANSFER: ETX13C]

Proceed to LAN-25, "Trouble Diagnosis Flow Chart".

### **U1010 CONTROL UNIT (CAN)**

< DTC/CIRCUIT DIAGNOSIS >

### U1010 CONTROL UNIT (CAN)

Description INFOID:000000010580375

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

#### 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 AWD control unit.	Malfunction of AWD control unit

#### DTC CONFIRMATION PROCEDURE

### 1.DTC REPRODUCTION PROCEDURE

### (P)With CONSULT

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

#### Is DTC "U1010" detected?

YES >> Proceed to diagnosis procedure. Refer to <u>DLN-27</u>, "<u>Diagnosis Procedure</u>".

NO >> INSPECTION END

### Diagnosis Procedure

CHECK AWD CONTROL UNIT
 Check AWD control unit harness connector for disconnection and deformation.

### Is the inspection result normal?

YES >> Replace AWD control unit. Refer to DLN-58, "Exploded View".

NO >> Repair or replace error-detected parts.

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### POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

### POWER SUPPLY AND GROUND CIRCUIT

Description INFOID:000000010580378

Supplies power to AWD control unit.

### Diagnosis Procedure

INFOID:0000000010580379

[TRANSFER: ETX13C]

# 1. CHECK AWD CONTROL UNIT POWER SUPPLY (1)

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

AWD co	ntrol unit		Voltage (Approx.)
Connector	Terminal		voltage (Approx.)
M105	7	Ground	0 V

4. Turn the ignition switch ON.

### **CAUTION:**

### Never start the engine.

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

AWD co	ntrol unit		Voltage
Connector	Terminal	Terminal	voltage
M105	7	Ground	Battery voltage

### Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

### 2. CHECK AWD CONTROL UNIT POWER SUPPLY (2)

- Turn the ignition switch OFF.
- 2. Check the 10A fuse (#45).
- 3. Disconnect IPDM E/R harness connector.
- 4. Check the continuity between AWD control unit harness connector and IPDM E/R harness connector.

•	AWD control unit		IPDN	Continuity	
	Connector	Terminal	Connector	Terminal	Continuity
	M105	7	E5	25	Existed

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

۰	AWD co	ntrol unit		Continuity	
•	Connector Terminal		_	Continuity	
	M105	7	Ground	Not existed	

### Is the inspection result normal?

YES >> Perform the trouble diagnosis for ignition power supply circuit. Refer to <u>PG-50, "Wiring Diagram - IGNITION POWER SUPPLY -".</u>

NO >> Repair or replace error-detected parts.

# 3.CHECK AWD CONTROL UNIT POWER SUPPLY (3)

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

### POWER SUPPLY AND GROUND CIRCUIT

### < DTC/CIRCUIT DIAGNOSIS >

AWD co	entrol unit	_	Voltage (Approx.)	
Connector	Terminal	_	Voltage (Approx.)	
M105	15	Ground	Battery voltage	

Turn the ignition switch ON.

#### **CAUTION:**

### Never start the engine.

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

AWD co	entrol unit		Voltage	
Connector	Connector Terminal		voitage	
M105	15	Ground	Battery voltage	

### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

# 4. CHECK AWD CONTROL UNIT POWER SUPPLY (4)

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

AWD control unit		Fuse bl	Continuity	
Connector	Terminal	Connector Terminal		Continuity
M105	15	M1	1A	Existed

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

AWD co	ntrol unit		Continuity
Connector	Terminal	_	Continuity
M105	15	Ground	Not existed

#### Is the inspection result normal?

>> Perform the trouble diagnosis for power supply circuit. Refer to PG-7, "Wiring Diagram - BAT-TERY POWER SUPPLY -".

NO >> Repair or replace error-detected parts.

# 5. CHECK AWD SOLENOID POWER SUPPLY (1)

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

AWD co	ntrol unit		Voltage	
Connector	Terminal	_	voltage	
M105	9	Ground	Battery voltage	

Turn the ignition switch ON.

#### **CAUTION:**

### Never start the engine.

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

AWD co	ntrol unit	_	Voltage	
Connector	Terminal		voitage	
M105	9	Ground	Battery voltage	

**DLN-29** Revision: 2015 February 2015 QX70 DLN

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### POWER SUPPLY AND GROUND CIRCUIT

[TRANSFER: ETX13C]

### < DTC/CIRCUIT DIAGNOSIS >

### Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

# 6. CHECK AWD SOLENOID POWER SUPPLY (2)

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

#### Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to <u>PG-7, "Wiring Diagram - BAT-TERY POWER SUPPLY -"</u>.

NO >> Repair or replace error-detected parts.

# 7.check awd control unit ground

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

AWD co	ntrol unit		Continuity	
Connector	Terminal	_		
M105	10	Ground	Existed	
WITOS	11	Ground	LXISIEU	

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

### AWD WARNING LAMP

Description INFOID:0000000010580380

 Turns ON when there is a malfunction in AWD system. AWD warning lamp indicates the vehicle is in fail-safe mode and shifting to rear-wheel drive or 4-wheel drive (front-wheels still have some driving torque).

 Also turns ON when ignition switch is turned ON, for the purpose of lamp check. Turns OFF approximately for 1 second after the engine starts if system is normal.

#### AWD WARNING LAMP INDICATION

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

#### **CAUTION:**

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

### Component Function Check

### 1. CHECK AWD WARNING LAMP FUNCTION

- Turn the ignition switch ON.
- Make sure that AWD warning lamp lights up.

### Is the inspection result normal?

YES >> INSPECTION END

>> Proceed to diagnosis procedure. Refer to <u>DLN-31, "Diagnosis Procedure".</u> NO

### Diagnosis Procedure

### ${f 1}.$ CHECK POWER SUPPLY AND GROUND CIRCUIT

Perform the trouble diagnosis for power supply and ground circuit. Refer to DLN-28, "Diagnosis Procedure".

### Is the inspection result normal?

YES >> GO TO 2.

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

### 2.PERFORM SELF-DIAGNOSIS

#### (P)With CONSULT

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

#### Is any DTC detected?

YES >> Check the DTC.

NO >> GO TO 3.

### 3.CHECK AWD WARNING LAMP SIGNAL

#### (P)With CONSULT

Turn the ignition switch ON.

#### **CAUTION:**

#### Never start the engine.

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

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

YES >> GO TO 4.

**DLN-31 Revision: 2015 February** 2015 QX70 DLN

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### AWD WARNING LAMP

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### < DTC/CIRCUIT DIAGNOSIS >

NO >> Replace AWD control unit. Refer to <a href="DLN-58">DLN-58</a>, "Exploded View".

4. CHECK COMBINATION METER POWER SUPPLY CIRCUIT

Perform the trouble diagnosis for combination meter power supply circuit. Refer to <a href="MWI-58">MWI-58</a>, "COMBINATION METER: Diagnosis Procedure".

### Is the inspection result normal?

YES >> INSPECTION END

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

### **AWD CONTROL UNIT**

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< ECU DIAGNOSIS INFORMATION >

# **ECU DIAGNOSIS INFORMATION**

### AWD CONTROL UNIT

Reference Value

### VALUES ON THE DIAGNOSIS TOOL

### NOTE:

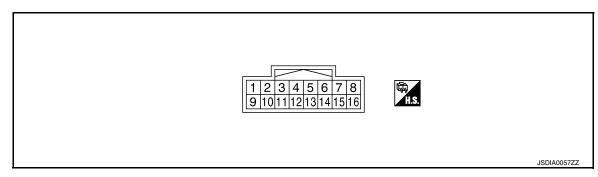
The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

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

[TRANSFER: ETX13C] < ECU DIAGNOSIS INFORMATION >

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

### **TERMINAL LAYOUT**



### PHYSICAL VALUES

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

<sup>\*:</sup> The values are changed by throttle opening and engine speed.

### **CAUTION:**

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

Wiring Diagram - AWD SYSTEM -

[TRANSFER: ETX13C] < ECU DIAGNOSIS INFORMATION >

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⟨VQ⟩: With VQ engine ⟨VK⟩: With VK engine В С M55 COMBINATION METER (AWD) (M53) \*1 114: (VQ) \*2 113: (VK) 101: (VK) DLN To CAN system

To CAN system

To CAN system

To CAN system

(VG37VHR without around view
monitor or VK50VE) Е UNIFIED METER AND A/C AMP. (M66), (M67)  $\mathbb{R}^{\mathbb{R}}$ F FUSE BLOCK (J/B) (M1), (M2) M164: G 3 TOA 10A Н DATA LINK CONNECTOR (M24) 10 4 J AWD SOLENOID (F57) ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) (E41) K M116 F103 AWD CONTROL UNIT 36 34 IPDM E/R
(INTELLIGENT
POWER
DISTRIBUTION
MODULE
ENGINE ROOM)
(E5) 37 35 M IGNITION SWITCH ON or START 10A 72 Ν M95 AWD SYSTEM M6 M6 33 33 BATTERY 2014/03/18 0 JRDWC2935GB

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Revision: 2015 February DLN-37 2015 QX70

AWDS	AWD SYSTEM								
96		Jal		Sional Name [Specification]	20	_	ION SENSOR SIGNAL	Connector No.	M105
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Н		-	BG BATTEI	BATTERY POWER SUPPLY	. 52	V MAN	MANUAL MODE SHIFT DOWN SIGNAL		
	SHIELD -	2	LG COMMUNICAT	COMMUNICATION SIGNAL (METER->AMP.)	56 (	G PAI	PADDLE SHIFTER DOWN SIGNAL	Connector Type	TH16FW-NH
100	·	e	GR COMMUNICAT	COMMUNICATION SIGNAL (AMP>METER)	F	LG COMM	COMMUNICATION SIGNAL (METER->AMP.)		
		2	В	GROUND	28	R VEH	VEHICLE SPEED SIGNAL (8-PULSE)	C C	
		9	W ALTE	ALTERNATOR SIGNAL	30	V PAF	PARKING BRAKE SWITCH SIGNAL		_[ / \ 
Connector No.	o. M24	7	-A	AIR BAG SIGNAL	34	Y COMM	COMMUNICATION SIGNAL (AMP>LCD)	Ź	1001
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9	- · · · · · · · · · · · · · · · · · · ·	36	-G	SELECT SWITCH SIGNAL				┞	GROUND
4		H		ENTER SWITCH SIGNAL				F	FIUD TEMP (+)
· vc		+	ł	TRIP A/R RESET SWITCH SIGNAL	Terminal Color Of	r Of		╀	BATTERY
9 6		8 8	NOTANIMITIES OF	(-) IMMATION CONTROL SWITCH SIGNAL (-)	No.	Wire	Signal Name [Specification]	╁	CANEL
t	do	╁	t	(+) INDICHOLING COMPACTION (+)	t	,	V Iddi IS BOWED OUT	-	
α	5 0	+	┨		. 42		FILE LEVEL SENSOR SIGNAL		
+	2 8				+	- a	INTAKE SENSOR SIGNAL	Connector No	M116
+	25 0	Connector No	MAG		╀	+	INLYEHIOLE SENSOR SIGNAL	000000	_
4 6		000000	Π		1	-	AMBIENT SENSOR SIGNAL	Connector Name	WIRE TO WIRE
2 2		Connector Name		UNIFIED METER AND A/C AMP.	+	+	SUNI DAD SENSOR SIGNAL	Compositor Tuno	Connector Time TK36MM NS10
+	- 0	Connector Type	THANEW.NH		+	1	GAS SENSOD SIGNAL	ndf lowering	
┨		COLLECTO	٦.		$^{+}$	, (	GAS SENSON SIGNAL	<b>4</b>	
		<b>1</b>			+	1	BATTERY POWER SUPPLY	至于	
Connector No	MR3	全			+		CBO IND	Si Si	1 2 3 4 5 N 124 N
		S		7	╀		CANEH		9
Connector N	Connector Name   COMBINATION METER		5 6 7	8 9 10 11	╁	W BRAK	BRAKE FLUID LEVEL SWITCH SIGNAL		
Connector T	Connector Type TH40FW-NH		23 25 27	28 30 34 38	┞	H	FUEL LEVEL SENSOR GROUND		]
۵					S9 G	GR	INTAKE SENSOR GROUND		
F					09		IN-VEHICLE SENSOR GROUND	Terminal Color Of	Of Signal Nama (Specification)
Ę		a E		Signal Name [Specification]	61 E		AMBIENT SENSOR GROUND	No. Wire	
ē E	4 2 2 5 6 7 40	O	Wire	tame [obcompania]	62 S	SB S	SUNLOAD SENSOR GROUND	2 W	
	00 00 00 00 00 00 00 00 00 00 00 00 00	2	L MANUAL N	MANUAL MODE SHIFT UP SIGNAL	63	В	ION MODE SIGNAL	3 L	
	[2] [2] [2] [2] [2] [2] [2] [2] [2] [2]	9	BG PADDLE	PADDLE SHIFTER UP SIGNAL	Н	BG	ECV SIGNAL	4 B	- [With VK engine]
		7 (	GR COMMUNICAT	COMMUNICATION SIGNAL (AMP>METER)	69		A/C LAN SIGNAL	4 R	- [With VQ engine]
		$\dashv$	┪	VEHICLE SPEED SIGNAL (2-PULSE)	$\dashv$	┪	EACH DOOR MOTOR POWER SUPPLY	5 B	- [With VQ engine]
		-	+	SEAT BELT BUCKLE SWITCH SIGNAL (DRIVER SIDE)		В	GROUND	5 R	- [With VK engine]
		+	1	MANUAL MODE SIGNAL	72	<u> </u>	CAN-L	7 B	
		+	┪	NON-MANUAL MODE SIGNAL				+	- [With VK engine]
		14	BR COMMUNICA	COMMUNICATION SIGNAL (LCD->AMP.)				6	- [With VQ engine]

JRDWC2938GB

[TRANSFER: ETX13C]

JRDWC2939GB

INFOID:0000000010580385

# Fail-Safe

AWD system

• If any malfunction occurs in AWD electrical system, and control unit detects the malfunction, AWD warning lamp on combination meter turns ON to indicate system malfunction.

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

Revision: 2015 February DLN-39 2015 QX70

# **AWD CONTROL UNIT**

#### < ECU DIAGNOSIS INFORMATION >

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

Mode	Warning lamp	DTC	Detected area (Error area)	Error area and root cause
Protection	Blinking*1	_	AWD control unit	Transfer assembly in protection mode. It is not malfunction. (Internal temperature rise of electronic controlled coupling)
function	Blinking*2	_	Outer diameters of front and rear wheel tires	Malfunction in each tire or different tire diameter
		C1201	AWD control unit	Internal malfunction of AWD control unit
		C1203	ABS actuator and electric unit (control unit)	ABS malfunction  • Vehicle speed signal error
Fail-safe ON	C120	C1204	AWD solenoid	Internal malfunction of electronic controlled coupling     Malfunction of AWD solenoid power supply circuit (open or short)     Malfunction of AWD solenoid command current
		ON	C1205	AWD control unit     AWD solenoid
		C1210	ECM	Malfunction of engine control system
		P1804	AWD control unit	Internal malfunction of AWD control unit
		P1809	AWD control unit	Internal malfunction of AWD control unit
		P1826	Transfer fluid temperature sensor	Internal malfunction of electric controlled coupling
		U1000	CAN communication line	CAN communication error     Malfunction of AWD control unit
		U1010	AWD control unit	Malfunction of AWD control unit

<sup>\*1:</sup> Quick blinking: 2 times/second (blinking for approximately 1 minute and then turned OFF)

# **DTC Inspection Priority Chart**

INFOID:0000000010580386

[TRANSFER: ETX13C]

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

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

# **DTC Index**

INFOID:0000000010580387

DTC	Display Items	Reference
C1201	CONTROLLER FAILURE	DLN-14, "DTC Logic"
C1203	ABS SYSTEM	DLN-15, "DTC Logic"
C1204	4WD SOLENOID	DLN-16, "DTC Logic"

<sup>\*2:</sup> Slow blinking: 1 time/2 seconds (continuing to blink until ignition switch is turned OFF)

# **AWD CONTROL UNIT**

# < ECU DIAGNOSIS INFORMATION >

DTC	Display Items	Reference
C1205	4WD ACTUATOR RLY	DLN-18, "DTC Logic"
C1210	ENGINE SIGNAL 1	DLN-20, "DTC Logic"
P1804	CONTROL UNIT 3	DLN-21, "DTC Logic"
P1809	CONTROL UNIT 4	DLN-22, "DTC Logic"
P1826	OIL TEMP SEN	DLN-23, "DTC Logic"
U1000	CAN COMM CIRCUIT	DLN-26, "DTC Logic"
U1010	CONTROL UNIT (CAN)	DLN-27, "DTC Logic"

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# AWD WARNING LAMP DOES NOT TURN ON

< SYMPTOM DIAGNOSIS >

# SYMPTOM DIAGNOSIS

# AWD WARNING LAMP DOES NOT TURN ON

Description INFOID:000000010580388

AWD warning lamp does not turn ON when the ignition switch is turned to ON.

Diagnosis Procedure

INFOID:0000000010580389

[TRANSFER: ETX13C]

1. CHECK AWD WARNING LAMP

Perform the trouble diagnosis for AWD warning lamp. Refer to <u>DLN-31, "Diagnosis Procedure"</u>. <u>Is the inspection result normal?</u>

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

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

# AWD WARNING LAMP DOES NOT TURN OFF

AWD WARNING LAMP DOES NOT TURN O	
< SYMPTOM DIAGNOSIS > AWD WARNING LAMP DOES NOT TURN OFF	[TRANSFER: ETX13C]
	А
Description	INFOID:000000010580390
AWD warning lamp does not turn OFF several seconds after the engine started.	В
Diagnosis Procedure	INFOID:000000010580391
1.PERFORM SELF-DIAGNOSIS	С
With CONSULT Perform self-diagnosis for "ALL MODE AWD/4WD".      Is any DTC detected?     YES >> Check the DTC.     NO >> GO TO 2.  2 OUTSUK AMERICAN ARREST.	DLN
2.CHECK AWD WARNING LAMP	ala Davida della
Perform the trouble diagnosis of the AWD warning lamp. Refer to <u>DLN-31</u> , <u>"Diagnosts the inspection result normal?</u>	osis Procedure". F
YES >> GO TO 3.	
NO >> Repair or replace the error-detected parts.  3. CHECK AWD CONTROL UNIT POWER SUPPLY AND GROUND CIRCUIT	G
Perform the trouble diagnosis of the power supply and ground circuit. Refer to [	DLN-28, "Diagnosis Proce-
dure".  Is the inspection result normal?	Н
YES >> Check each harness connector pin terminal for malfunction or disconn NO >> Repair or replace the error-detected parts.	ection.
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# **HEAVY TIGHT-CORNER BRAKING SYMPTOM OCCURS**

< SYMPTOM DIAGNOSIS >

# HEAVY TIGHT-CORNER BRAKING SYMPTOM OCCURS

Description INFOID:000000010580392

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:0000000010580393

[TRANSFER: ETX13C]

# 1.PERFORM ECM SELF-DIAGNOSIS

# (P)With CONSULT

Perform self-diagnosis for "ENGINE".

#### Is any DTC detected?

YES >> Check the DTC.

NO >> GO TO 2.

# 2.PERFORM SELF-DIAGNOSIS

### (A) With CONSULT

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

# Is DTC "U1000" detected?

YES >> Proceed to LAN-25, "Trouble Diagnosis Flow Chart".

NO >> GO TO 3.

# 3.CHECK TRANSFER FLUID TEMPERATURE SENSOR

Perform the trouble diagnosis of the transfer fluid temperature sensor. Refer to <u>DLN-23</u>, "<u>Diagnosis Procedure</u>".

### Is the inspection result normal?

YES >> GO TO 4.

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

# 4. CHECK AWD SOLENOID

Perform the trouble diagnosis of the AWD solenoid. Refer to DLN-16, "Diagnosis Procedure".

### Is the inspection result normal?

YES >> GO TO 5.

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

# ${f 5}$ . CHECK ELECTRIC CONTROLLED COUPLING

- 1. Turn the ignition switch OFF.
- 2. Set the transmission to neutral. Release the parking brake.
- Lift up the vehicle.
- Rotate the rear propeller shaft.
- Hold the front propeller shaft lightly.

#### Does the front propeller shaft rotate?

- YES >> Replace electric controlled coupling for mechanical malfunction (clutch sticking etc.). Refer to <a href="DLN-88">DLN-88</a>, "VQ37VHR: Exploded View" (VQ37VHR), <a href="DLN-92">DLN-92</a>, "VK50VE: Exploded View" (VK50VE).
- NO >> Check each harness connector pin terminal for disconnection.

**VEHICLE DOES NOT ENTER AWD MODE** [TRANSFER: ETX13C] < SYMPTOM DIAGNOSIS > VEHICLE DOES NOT ENTER AWD MODE Α Description INFOID:0000000010580394 Vehicle does not enter 4-wheel drive mode even though AWD warning lamp turned to OFF. В Diagnosis Procedure INFOID:0000000010580395 1. CHECK AWD WARNING LAMP Turn the ignition switch ON. Does AWD warning lamp turn ON? DLN YES >> GO TO 2. NO >> Proceed to diagnosis procedure. Refer to DLN-31, "Diagnosis Procedure". 2.CHECK PARKING BRAKE SWITCH SIGNAL Е (P)With CONSULT Check "P BRAKE SW" of CONSULT "DATA MONITOR" for "ALL MODE AWD/4WD". Monitor Item Condition Status When the parking brake pedal is operation. ON P BRAKE SW OFF When the parking brake pedal is not operation. Is the inspection result normal? YES >> GO TO 3. Н NO >> Proceed to diagnosis procedure. Refer to <a href="BRC-99">BRC-99</a>, "Diagnosis Procedure". CRUISE TEST Drive the vehicle for a period of time. Does any symptom occur? YES >> Replace electric controlled coupling for mechanical malfunction (mechanical engagement of clutch is not possible). Refer to DLN-88. "VQ37VHR: Exploded View" (VQ37VHR), DLN-92. "VK50VE: Exploded View" (VK50VE). NO >> Check each harness connector pin terminal for disconnection. K

Revision: 2015 February DLN-45 2015 QX70

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# AWD WARNING LAMP BLINKS QUICKLY

[TRANSFER: ETX13C]

< SYMPTOM DIAGNOSIS >

# AWD WARNING LAMP BLINKS QUICKLY

Description INFOID:000000010580396

While driving, AWD 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.

AWD WARNING LAMP BLINKS SLOWLY	
< SYMPTOM DIAGNOSIS > [TRANSFER: ETX13C]	]
AWD WARNING LAMP BLINKS SLOWLY	
Description INFOID:0000000105803	97
AWD warning lamp blinks at approximately 2 seconds intervals while driving.	
Diagnosis Procedure	98
1.CHECK TIRE	
Check the following.	-
Tire pressure Wear condition	
Front and rear tire size (There is no difference between front and rear tires.)	ļ
s 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 MPF	i)
or more for 5 seconds or more. Improper size information is initialized accordingly.	
CHECK INPUT SIGNAL OF TIRE DIAMETER	_
With CONSULT  Start the engine.	
2. Drive at 20 km/h (12 MPH) or more for approximately 4 minutes.	
B. Check "DIS-TIRE MONI" of CONSULT "DATA MONITOR" for "ALL MODE AWD/4WD".  Does the item on "DATA MONITOR" indicate "0 - 4 mm"?	
YES >> INSPECTION END	
NO >> GO TO 3.	
3. TERMINAL INSPECTION	_
Check AWD control unit harness connector for disconnection.  s the inspection result normal?	
YES >> Replace AWD control unit. Refer to <u>DLN-58, "Exploded View"</u> .	
NO >> Repair or replace the error-detected parts.	

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

# **NVH Troubleshooting Chart**

INFOID:0000000010580399

[TRANSFER: ETX13C]

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-56, "VQ37VHR: Inspection" DLN-56, "VK50VE: Inspection"		DLN-68, "VQ37VHR : Exploded View" DLN-78, "VK50VE : Exploded View"	DLN-68, "VQ37VHR: Exploded View" DLN-78, "VK50VE: Exploded View"	DLN-91, "VQ37VHR: Inspection" DLN-95, "VK50VE: Inspection"	DLN-91, "VQ37VHR: Inspection" DLN-95, "VK50VE: Inspection"	DLN-76, "VQ37VHR: Inspection" DLN-86, "VK50VE: Inspection"
SUSPECTED P/ (Possible cause)		TRANSFER FLUID (Level low)	TRANSFER FLUID (Wrong)	TRANSFER FLUID (Level too high)	LIQUID GASKET (Damaged)	OIL SEAL (Worn or damaged)	GEAR (Wom or damaged)	BEARING (Worn or damaged)	TRANSFER CASE (Damaged)
Symptom	Noise	1	2				3	3	3
Cymptom	Transfer fluid leakage		4	1	2	2			3

[TRANSFER: ETX13C] < PRECAUTION >

# **PRECAUTION**

# **PRECAUTIONS**

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRF-TFNSIONER"

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

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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 Battery Terminal

INFOID:0000000011009305

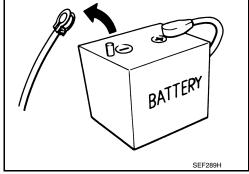
 When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.

#### 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.

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 Transfer

INFOID:0000000010580401

#### **CAUTION:**

- 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.

**DLN-49 Revision: 2015 February** 2015 QX70

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### **PRECAUTIONS**

< PRECAUTION > [TRANSFER: ETX13C]

- 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 > [TRANSFER: ETX13C]

# **PREPARATION**

# PREPARATION VQ37VHR

VQ37VHR : Special Service Tools

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'Q37VHR : Special Servic	ce Tools	INFOID:000000	00010580402
Tool number (TechMate No.)	iffer from those of special service tools illust	Description	— _
Tool name ST27862000		Installing front oil seal	
( — ) Drift a: 62.5 mm (2.461 in) dia. b: 42 mm (1.65 in) dia.	a b		
KV381054S0	ZZA0194D	Removing rear oil seal	
(J-34286) Puller		Tremoving real on seal	
	ZZA0601D		
ST30720000 (J-25405) Drift		Installing rear oil seal     Installing main shaft oil seal	
a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.			
KV40104830	ZZA0811D	Installing rear oil seal	
Drift a: 70 mm (2.76 in) dia. b: 63.5 mm (2.500 in) dia.	ablo		
	ZZA1003D		
ST33052000 ( — ) Drift a: 28 mm (1.10 in) dia.	<del>-</del> b→	Removing main shaft assembly	
b: 22 mm (0.87 in) dia.			
ST35321000	ZZA1000D	Installing main shaft assembly	
( — ) Drift a: 49 mm (1.93 in) dia. b: 41 mm (1.61 in) dia.	-b-		
	ZZA1000D		

< PREPARATION > [TRANSFER: ETX13C]

Tool number (TechMate No.) Tool name		Description
ST31214000 (J-25269-B) Drift a: 34 mm (1.34 in) dia. b: 25.5 mm (1.004 in) dia.	a   b   0	Removing front drive shaft front bearing     Removing front drive shaft rear bearing
ST33200000	ZZA0534D	locatelling from drive about from the original
(J-26082)  Drift a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.	a b ZZA1002D	Installing front drive shaft front bearing
KV38104010 ( — ) Drift a: 67 mm (2.64 in) dia. b: 49 mm (1.93 in) dia.	-b→ -a→	Installing front drive shaft rear bearing
	ZZA1000D	

# VQ37VHR: Commercial Service Tools

INFOID:0000000010580403

Tool name		Description
Puller		Removing companion flange
	NT077	
Flange wrench		Removing and installing self-lock nut
	. 9	
	NT771	

< PREPARATION > [TRANSFER: ETX13C]

Description  Removing front drive shaft front bearing Removing front drive shaft rear bearing
ZZB0823D  Loosening bolts and nuts
PBIC0190E
INFOID:0000000105804
ervice tools illustrated here.
Description
Installing front oil seal
ZZA0194D Removing rear oil seal
Installing rear oil seal     Installing main shaft oil seal
moduling main orial on ood
The same of the sa
ZZA0811D
Installing rear oil seal
ZZA1003D

< PREPARATION > [TRANSFER: ETX13C]

< PREPARATION >		[TRANSFER. ETATSO]
Tool number (TechMate No.) Tool name		Description
ST35321000 ( — ) Drift a: 49 mm (1.93 in) dia. b: 41 mm (1.61 in) dia.	-b→ -a→	Installing main shaft assembly
ST31214000 (J-25269-B) Drift a: 34 mm (1.34 in) dia. b: 25.5 mm (1.004 in) dia.	ZZA1000D	Removing front drive shaft front bearing     Removing front drive shaft rear bearing
ST33200000 (J-26082) Drift a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.	ZZA1002D	Installing front drive shaft front bearing
KV38104010 ( — ) Drift a: 67 mm (2.64 in) dia. b: 49 mm (1.93 in) dia.	ZZA1000D	Installing front drive shaft rear bearing

# VK50VE : Commercial Service Tools

INFOID:0000000010580405

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

[TRANSFER: ETX13C] < PREPARATION >

Tool name		Description	_
Replacer		Remove companion flange     Removing front drive shaft front bearing     Removing front drive shaft rear bearing	— <i>)</i>
	ZZB0823D		
Power tool		Loosening bolts and nuts	
			DI
	PBICO190E		[

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**DLN-55 Revision: 2015 February** 2015 QX70

# PERIODIC MAINTENANCE

# TRANSFER FLUID

VQ37VHR

VQ37VHR: Inspection

INFOID:0000000010580406

[TRANSFER: ETX13C]

#### FLUID LEAKAGE

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

#### FLUID LEVEL

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

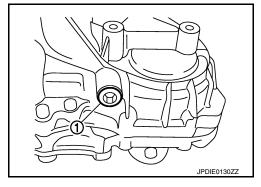
VQ37VHR: Draining

INFOID:0000000010580407

- 1. Run the vehicle to warm up the transfer unit sufficiently.
- 2. Stop the engine, and remove the drain plug (1) to drain the transfer fluid.
- Set a new gasket onto the drain plug, and install it on the transfer and tighten to the specified torque. Refer to <u>DLN-68</u>.
   <u>"VQ37VHR: Exploded View"</u>.

**CAUTION:** 

Never reuse gasket.



# VQ37VHR: Refilling

INFOID:0000000010580408

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

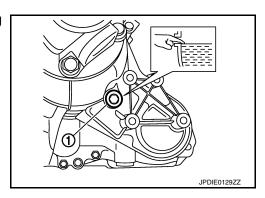
Fluid and viscosity : Refer to MA-17, "FOR

NORTH AMERICA: Fluids and Lubricants" (For North America), MA-18, "FOR MEXICO: Fluids and Lubri-

cants" (For Mexico).

Fluid capacity : Refer to <u>DLN-105, "Gen-</u>

eral 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. Refer to <a href="DLN-68">DLN-68</a>, "VQ37VHR: Exploded View".

**CAUTION:** 

Never reuse gasket.

VK50VE

VK50VE: Inspection

# FLUID LEAKAGE

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

### TRANSFER FLUID

#### < PERIODIC MAINTENANCE >

**FLUID LEVEL** 

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

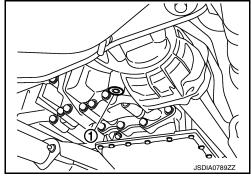
VK50VE : Draining

1. Run the vehicle to warm up the transfer unit sufficiently.

- 2. Stop the engine, and remove the drain plug (1) to drain the transfer fluid.
- 3. Set a new gasket onto the drain plug, and install it on the transfer and tighten to the specified torque. Refer to <u>DLN-78</u>, <u>"VK50VE: Exploded View"</u>.

**CAUTION:** 

Never reuse gasket.



[TRANSFER: ETX13C]

VK50VE : Refilling

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

Fluid and viscosity : Refer to MA-18, "FOR

**MEXICO: Fluids and Lubri-**

cants".

Fluid capacity : Refer to <u>DLN-105, "Gen-</u>

eral Specifications".

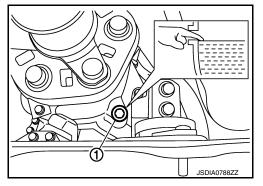
#### **CAUTION:**

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. Refer to <u>DLN-78, "VK50VE : Exploded View"</u>.

**CAUTION:** 

Never reuse gasket.



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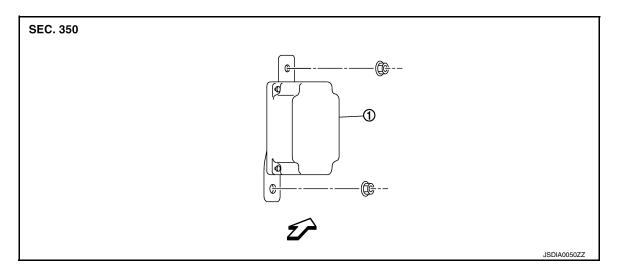
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# REMOVAL AND INSTALLATION

# AWD CONTROL UNIT

Exploded View



1. AWD control unit

∀
 : Vehicle front

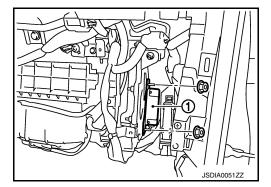
# Removal and Installation

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[TRANSFER: ETX13C]

### **REMOVAL**

- 1. Remove the glove box assembly. Refer to IP-12, "Exploded View".
- 2. Disconnect AWD control unit harness connector.
- 3. Remove AWD control unit (1) mounting nuts.
- 4. Remove AWD control unit.

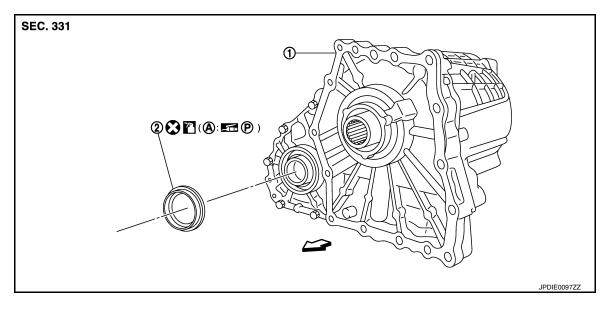


### **INSTALLATION**

Install in the reverse order of removal.

# FRONT OIL SEAL

Exploded View



- Transfer assembly
- 2. Front oil seal

- A. Oil seal lip
- : Vehicle front

Apply transfer fluid. Refer to MA-17, "FOR NORTH AMERICA: Fluids and Lubricants" (For North America), MA-18, "FOR MEXICO: Fluids and Lubricants" (For Mexico).

P: Apply petroleum jelly.

Refer to  $\underline{\mbox{GI-4, "Components"}}$  for symbols not described above.

#### Removal and Installation

REMOVAL

- Remove the drain plug to drain the transfer fluid. Refer to <u>DLN-56, "VQ37VHR : Draining"</u> (VQ37VHR), <u>DLN-57, "VK50VE : Draining"</u> (VK50VE).
- 2. Remove the front propeller shaft. Refer to <u>DLN-110</u>, "VQ37VHR: Removal and Installation" (VQ37VHR), <u>DLN-113</u>, "VK50VE: Removal and Installation" (VK50VE).
- 3. Remove front oil seal.

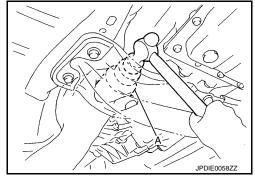
#### **CAUTION:**

Never damage the front case and front drive shaft.

#### INSTALLATION

- Apply transfer fluid to outside of front oil seal, install it with a drift

   (A) [SST: ST27862000 ( )] until the end face of front case.
   CAUTION:
  - · Never reuse front oil seal.
  - Apply petroleum jelly to oil seal lip.
  - When installing, never incline front oil seal.
- Install front propeller shaft. Refer to <u>DLN-110</u>, <u>"VQ37VHR : Exploded View"</u> (VQ37VHR), <u>DLN-112</u>, <u>"VK50VE : Exploded View"</u> (VK50VE).
- Fill with new transfer fluid, check fluid level and for fluid leakage. Refer to <u>DLN-56</u>, "VQ37VHR: Inspection" (VQ37VHR), <u>DLN-56</u>, "VK50VE: Inspection" (VK50VE).



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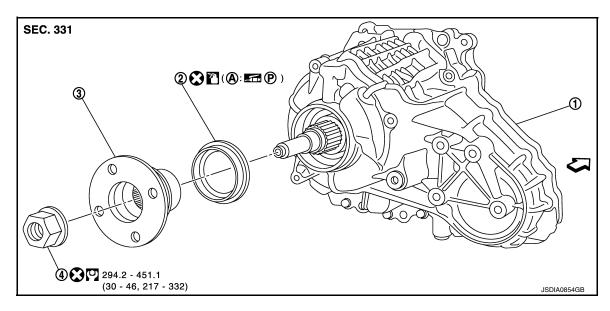
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VQ37VHR

VQ37VHR : Exploded View

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[TRANSFER: ETX13C]



- 1. Transfer assembly
- 2. Rear oil seal

3. Companion flange

- 4. Self-lock nut
- A. Oil seal lip
- ∀ : Vehicle front

Apply transfer fluid. Refer to MA-17, "FOR NORTH AMERICA: Fluids and Lubricants" (For North America), MA-18, "FOR MEXICO: Fluids and Lubricants" (For Mexico).

■®: Apply petroleum jelly.

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

### VQ37VHR: Removal and Installation

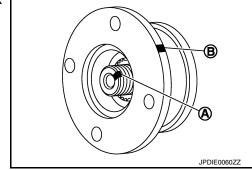
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# **REMOVAL**

- 1. Remove the rear propeller shaft. Refer to <u>DLN-130, "Exploded View"</u>.
- 2. Remove self-lock nut of companion flange with a flange wrench (commercial service tool).
- 3. Put matching mark (A) on the end of the main shaft. The mark should be in line with the mark (B) on the companion flange.

  CAUTION:

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

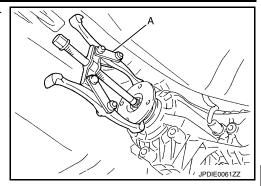


#### < REMOVAL AND INSTALLATION >

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

### **CAUTION:**

Never damage the companion flange.

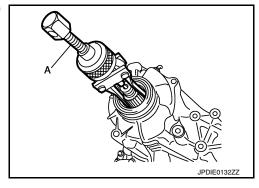


[TRANSFER: ETX13C]

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

### **CAUTION:**

Never damage the rear case.



#### INSTALLATION

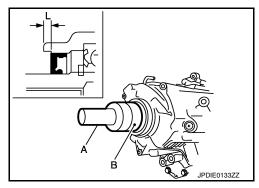
 Apply transfer fluid to rear oil seal, install it with the drifts (A and B) within the dimension (L) shown as follows.

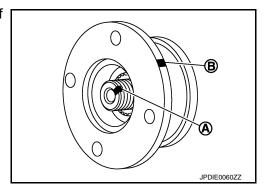
A : Drift [SST: ST30720000 (J-25405)]
B : Drift [SST: KV40104830 ( — )]

L : 6.7 – 7.3 mm (0.264 – 0.287 in)

#### **CAUTION:**

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





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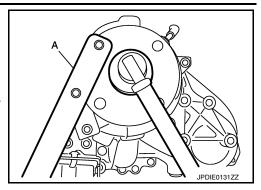
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#### < REMOVAL AND INSTALLATION >

 Using a flange wrench (A) (commercial service tool), install the self-lock nut of companion flange and tighten to the specified torque. Refer to <u>DLN-60</u>, "VQ37VHR: <u>Exploded View"</u>.
 CAUTION:

#### Never reuse self-lock nut.

- 4. Install the rear propeller shaft. Refer to <a href="DLN-130">DLN-130</a>, "Exploded <a href="View"</a>.
- 5. Check fluid level. Refer to <u>DLN-56</u>, "VQ37VHR: Inspection".



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# VK50VE

VK50VE : Exploded View

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- Transfer assembly
- 2. Rear oil seal

3. Companion flange

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- 4. Self-lock nut
- A. Oil seal lip
- ∀
   □: Vehicle front

?: Apply transfer fluid. Refer to MA-18, "FOR MEXICO: Fluids and Lubricants".

■®: Apply petroleum jelly.

Refer to  $\underline{\text{GI-4}}$ , "Components" for symbols not described above.

#### VK50VE: Removal and Installation

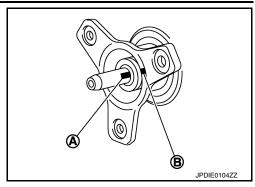
### **REMOVAL**

- Remove the rear propeller shaft. Refer to <u>DLN-140, "Exploded View"</u>.
- 2. Remove self-lock nut of companion flange with a flange wrench (commercial service tool).

#### < REMOVAL AND INSTALLATION >

 Put a matching mark (A) on the end of the main shaft. The mark should be in line with the mark (B) on the companion flange.
 CAUTION:

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



[TRANSFER: ETX13C]

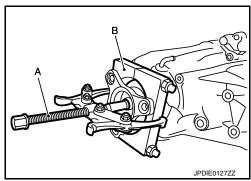
4. Remove the companion flange with a puller (A) and a replacer (B).

A : Puller (commercial service tool)

B : Replacer (commercial service tool)

#### **CAUTION:**

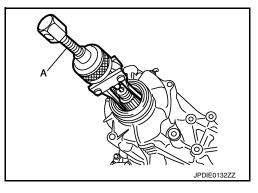
Never damage the companion flange.



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

#### **CAUTION:**

Never damage the rear case.



### **INSTALLATION**

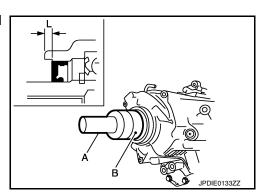
1. Apply transfer fluid to rear oil seal, install it with the drifts (A and B) within the dimension (L) shown as follows.

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

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

#### **CAUTION:**

- Never reuse rear oil seal.
- Apply petroleum jelly to oil seal lip.
- When installing, never incline rear oil seal.



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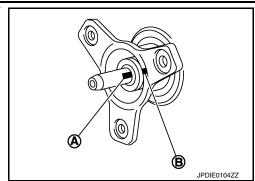
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### < REMOVAL AND INSTALLATION >

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

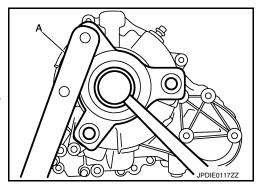


[TRANSFER: ETX13C]

 Using a flange wrench (A) (commercial service tool), install the self-lock nut of companion flange and tighten to the specified torque. Refer to <u>DLN-62</u>, "VK50VE: Exploded View".
 CAUTION:

#### Never reuse self-lock nut.

- 4. Install the rear propeller shaft. Refer to <u>DLN-140, "Exploded View"</u>.
- 5. Check fluid level. Refer to DLN-56, "VK50VE: Inspection".

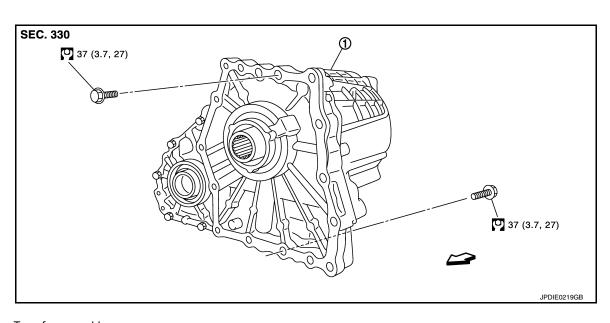


# UNIT REMOVAL AND INSTALLATION

# TRANSFER ASSEMBLY

VQ37VHR

VQ37VHR: Exploded View



Transfer assembly

⟨□: Vehicle front

Refer to  $\underline{\mbox{GI-4},\mbox{"Components"}}$  for symbols in the figure.

# VQ37VHR: Removal and Installation

**REMOVAL** 

- Remove rear propeller shaft. Refer to <u>DLN-130, "Exploded View"</u>.
- Remove front propeller shaft. Refer to <u>DLN-110, "VQ37VHR: Exploded View"</u>.
- 3. Disconnect AWD solenoid harness connector and separate harness from transfer assembly.
- 4. Remove transfer air breather hose.
- 5. Remove control rod. Refer to TM-185, "Exploded View".
- 6. Support transfer assembly and transmission assembly with a jack.
- 7. Remove rear engine mounting member and engine mounting insulator with power tool. Refer to <u>EM-77</u>, <u>"AWD : Exploded View"</u>.
- 8. Lower jack to the position where the top transfer mounting bolts can be removed.
- Remove transfer mounting bolts with power tool 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.

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# TRANSFER ASSEMBLY

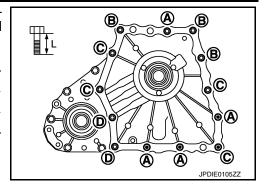
### < UNIT REMOVAL AND INSTALLATION >

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

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

Transfer to transmission.

:Transmission to transfer.

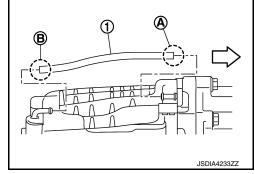


[TRANSFER: ETX13C]

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

: Vehicle front

After the installation, check the fluid level, fluid leakage and the A/T positions. Refer to <u>DLN-56</u>, "VQ37VHR: Inspection".

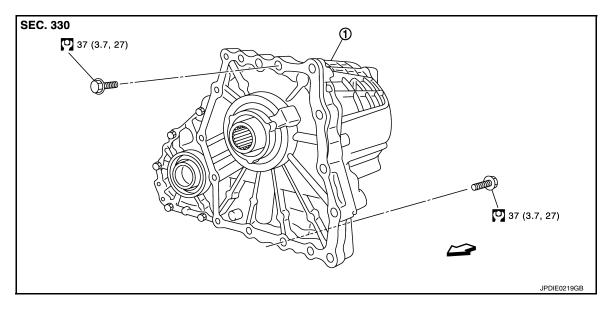


VK50VE

VK50VE : Exploded View

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1. Transfer assembly

∀
 □: Vehicle front

Refer to GI-4, "Components" for symbols in the figure.

#### VK50VE: Removal and Installation

#### **REMOVAL**

- 1. Remove transmission assembly from the vehicle. Refer to TM-496, "Removal and Installation".
- Remove transfer air breather hose.

# TRANSFER ASSEMBLY

### < UNIT REMOVAL AND INSTALLATION >

- Remove rear engine mounting member and engine mounting insulator with power tool. Refer to <u>EM-207</u>. "Exploded View".
- 4. Support transfer assembly with a jack.
- 5. Remove transfer mounting bolts with power tool and separate transfer from transmission. **CAUTION:**

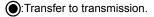
Secure transfer assembly and transmission assembly to a jack.

#### INSTALLATION

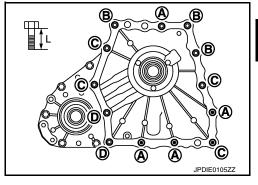
Note the following, and install in the reverse order of removal.

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

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



:Transmission to transfer.

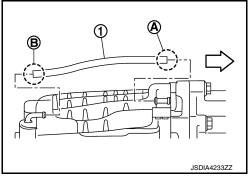


[TRANSFER: ETX13C]

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

⟨⇒ : Vehicle front

After the installation, check the fluid level, fluid leakage and the A/T positions. Refer to <u>DLN-56</u>, "VQ37VHR: Inspection".



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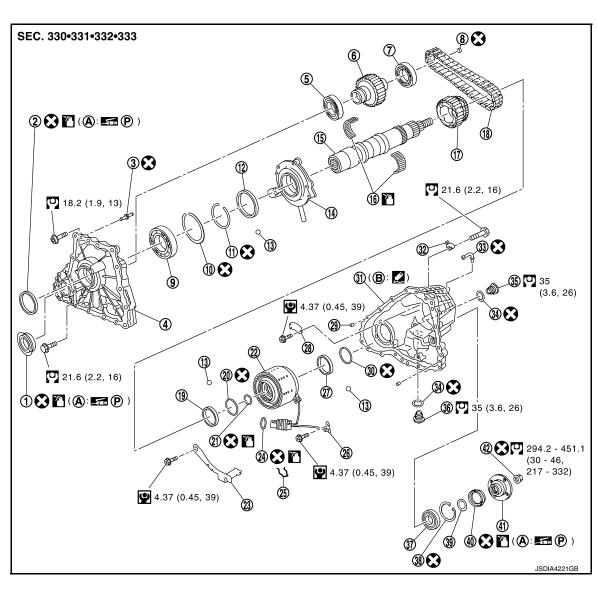
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# UNIT DISASSEMBLY AND ASSEMBLY

# FRONT CASE AND REAR CASE

VQ37VHR

VQ37VHR: Exploded View



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

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

Breather tube

[TRANSFER: ETX13C]

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

# FRONT CASE AND REAR CASE

### < UNIT DISASSEMBLY AND ASSEMBLY >

40. Rear oil seal

41. Companion flange

42. Self-lock nut

A. Oil seal lip

B. Matching surface

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

[TRANSFER: ETX13C]

■®: Apply petroleum jelly.

Apply transfer fluid. Refer to MA-17, "FOR NORTH AMERICA: Fluids and Lubricants" (For North America), MA-18, "FOR MEXICO: Fluids and Lubricants" (For Mexico).

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

# VQ37VHR: Disassembly

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1. Remove drain plug and filler plug.

- 2. Remove harness brackets.
- 3. Remove main shaft oil seal from front case.

Remove front oil seal from front case.

#### **CAUTION:**

Never damage the front case and main shaft.

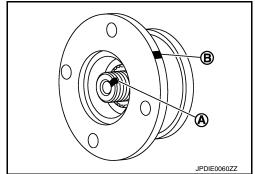
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#### **CAUTION:**

Never damage the front case and front drive shaft.

- 5. Remove self-lock nut.
- 6. Put a matching mark (A) on the end of main shaft. The mark should be in line with the mark (B) on the companion flange.

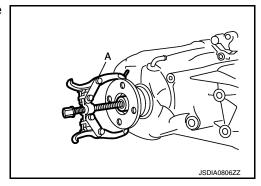
For the matching mark, use paint. Never damage main shaft.



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

#### **CAUTION:**

Never damage the companion flange.

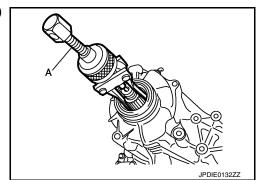


8. Remove rear oil seal from rear case with the puller (A) [SST:KV381054S0 (J-34286)].

#### **CAUTION:**

Never damage the rear case.

Remove spacer from main shaft.



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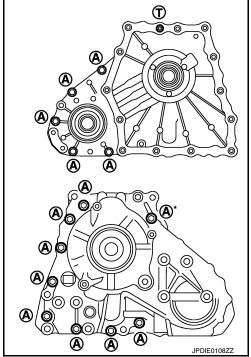
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[TRANSFER: ETX13C]

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

Bolts symbol	Quantity
A	14
T (TORX bolt)	1

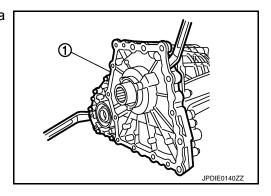
<sup>\*:</sup> With harness bracket.



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

# **CAUTION:**

Never damage the mating surface.



12. Remove snap ring (1) from front case.

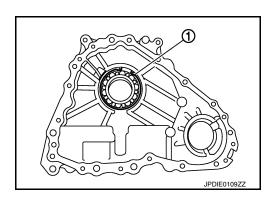
# **CAUTION:**

Never damage front case.

13. Remove main shaft bearing from front case.

### **CAUTION:**

Never use tools. Always remove by hand.



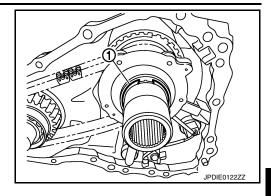
# FRONT CASE AND REAR CASE

### < UNIT DISASSEMBLY AND ASSEMBLY >

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

**CAUTION:** 

Never damage main shaft.



[TRANSFER: ETX13C]

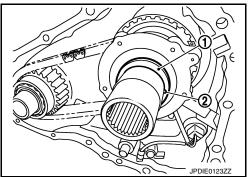
15. Remove spacer (1) and steel ball (2) from main shaft. CAUTION:

Be careful not to drop the steel ball.

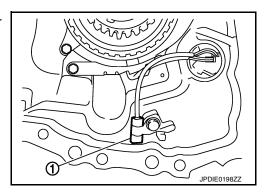
- 16. Remove Oil pump from main shaft.
- 17. Remove drive chain and front drive shaft.

**CAUTION:** 

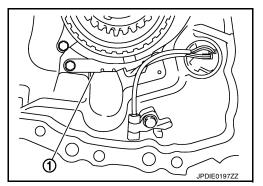
Never use tools. Always remove by hand.



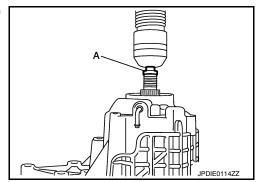
18. Remove transfer fluid temperature sensor bolt from rear case. And then, remove transfer fluid temperature sensor (1).



- 19. Remove oil cover bolts from rear case. And then, remove oil cover (1).
- 20. Remove retainer from AWD solenoid harness connector.
- 21. Remove AWD solenoid harness connector from rear case.
- 22. Remove O-ring from AWD solenoid harness connector.



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



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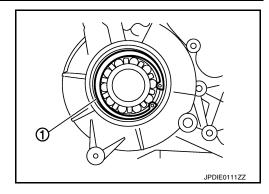
# FRONT CASE AND REAR CASE

### < UNIT DISASSEMBLY AND ASSEMBLY >

- 24. Remove snap ring (1) from rear case.
- 25. Remove rear bearing from rear case.

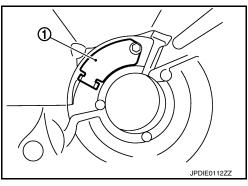
#### **CAUTION:**

Never use tools. Always remove by hand.



[TRANSFER: ETX13C]

- 26. Remove baffle plate (1) from rear case.
- 27. Remove breather tube from rear case.
- 28. Remove breather tube from front case.



INFOID:0000000010580426

# VQ37VHR: Assembly

1. Install breather tube to front case.

#### **CAUTION:**

Never reuse breather tube.

2. Install breather tube to rear case within the angle (A) shown as follows.

**Angle (A)** : 80 – 100°

#### **CAUTION:**

Never reuse breather tube.

- 3. Install baffle plate to rear case.
- 4. Install rear bearing to rear case.

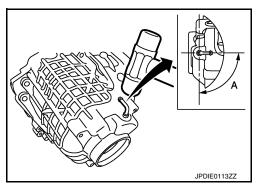
#### **CAUTION:**

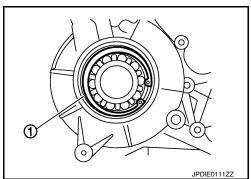
Never use tools. Always install by hand.

5. Install snap ring (1) to rear case.

### **CAUTION:**

Never reuse snap ring.





### < UNIT DISASSEMBLY AND ASSEMBLY >

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

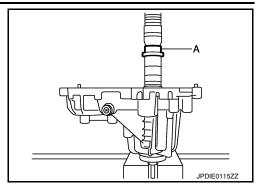
#### **CAUTION:**

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

7. Install O-ring to AWD solenoid harness connector.

#### **CAUTION:**

- Never reuse O-ring.
- · Apply transfer fluid to O-ring.
- 8. Install AWD solenoid harness connector into rear case.
- 9. Install retainer to AWD solenoid harness connector.
- 10. Hold electric controlled coupling harness (1) with oil cover hold plate (2), install oil cover (3) to rear case (4).



[TRANSFER: ETX13C]

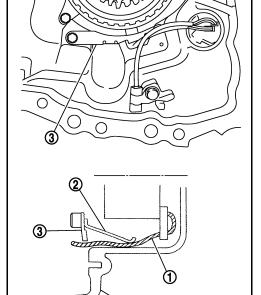
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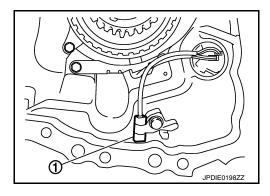
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11. Install transfer fluid temperature sensor (1) to rear case.



(4)

JPDIE0199ZZ

12. Set drive chain to front drive shaft. **CAUTION:** 

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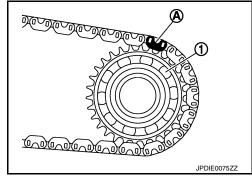
Revision: 2015 February DLN-73 2015 QX70

Identification mark (A) of drive chain should be in the side of front bearing (1) of front drive shaft.

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

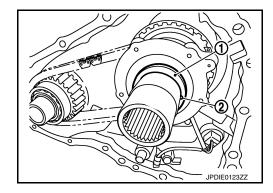
Never use tools. Always install by hand.

14. Install oil pump to main shaft.



[TRANSFER: ETX13C]

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



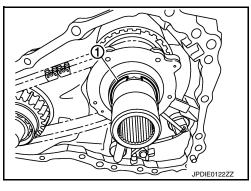
16. Install snap ring (1) to main shaft.

#### **CAUTION:**

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

#### **CAUTION:**

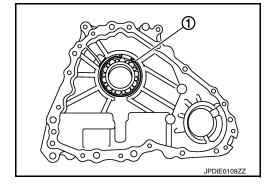
Never use tools. Always install by hand.



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

#### **CAUTION:**

- · Never reuse snap ring.
- · Never damage front case.



 Apply liquid gasket (1) to mating surface of rear case.
 Use Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

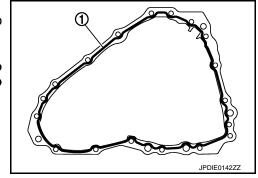
#### **CAUTION:**

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

20. Set front case to rear case.

#### **CAUTION:**

Never damage the mating surface transmission side.



#### < UNIT DISASSEMBLY AND ASSEMBLY >

21. Tighten front case and rear case fixing bolts.

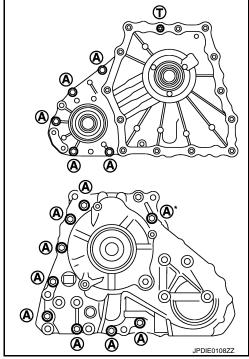
Bolts symbol	Quantity
A	14
T (TORX bolt)	1

\*: With harness bracket.

22. Install spacer to main shaft.

#### **CAUTION:**

Apply transfer fluid to spacer.



[TRANSFER: ETX13C]

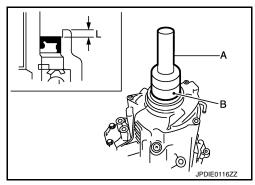
 Apply transfer fluid to outside of rear oil seal, and install rear oil seal to rear case with the drifts (A and B) within the dimension (L) shown as follows.

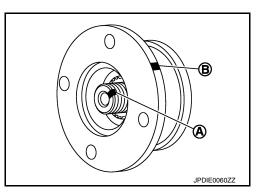
A : Drift [SST: ST30720000 (J-25405)]
B : Drift [SST: KV40104830 ( — )]

L : 6.7 – 7.3 mm (0.264 – 0.287 in)

#### **CAUTION:**

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





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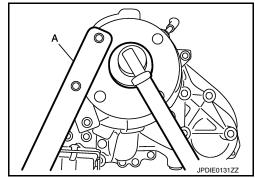
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

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

#### **CAUTION:**

Never reuse self-lock nut.

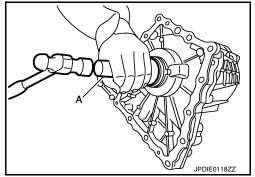


[TRANSFER: ETX13C]

26. Apply transfer fluid to outside of main shaft oil seal, and install main shaft oil seal until it is flush with the end face of front case with the drift (A) [SST: ST30720000 (J-25405)].

#### **CAUTION:**

- · Never reuse main shaft oil seal.
- Apply petroleum jelly to oil seal lip.
- When installing, never incline main shaft oil seal.



Apply transfer fluid to outside of front oil seal, and install front oil seal until it is flush with the end face of front case with the drift (A) [SST: ST27862000 ( — )].

#### **CAUTION:**

- Never reuse front oil seal.
- · Apply petroleum jelly to oil seal lip.
- When installing, never incline front oil seal.
- 28. Set gasket to drain plug. Install it to rear case.

#### **CAUTION:**

Never reuse gasket.

29. Set gasket to filler plug. Install it to rear case.

#### **CAUTION:**

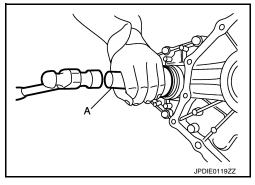
- Never reuse gasket.
- · After oil is filled, tighten filler plug to specified torque.

#### VQ37VHR: Inspection

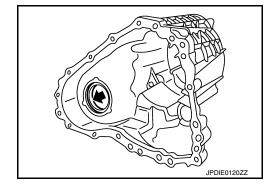
Check items below. If necessary, replace them with new ones.

#### **CASES**

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



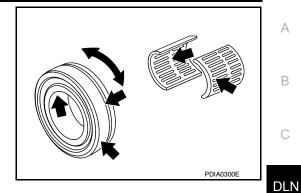
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**BEARING** 

# < UNIT DISASSEMBLY AND ASSEMBLY >

Damage and rough rotation of bearing.



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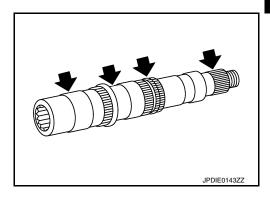
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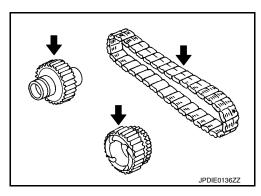
SHAFT

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



**GEARS AND CHAIN** 

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



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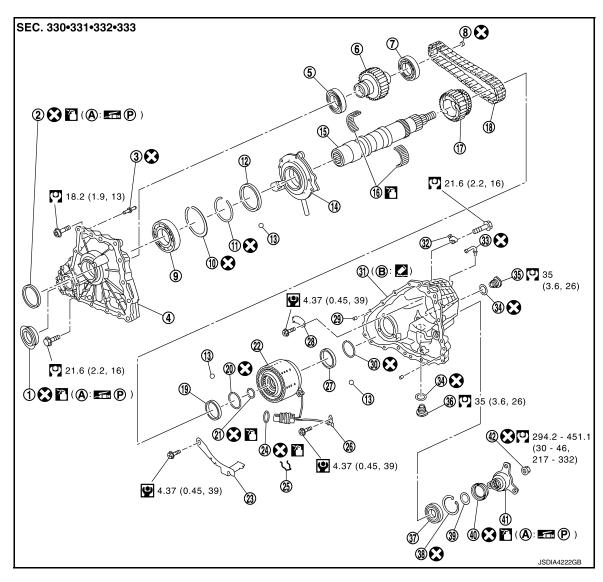
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VK50VE: Exploded View

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[TRANSFER: ETX13C]



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

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

Matching surface

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

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

■®: Apply petroleum jelly.

#### < UNIT DISASSEMBLY AND ASSEMBLY >

Apply transfer fluid. Refer to MA-18, "FOR MEXICO: Fluids and Lubricants". Refer to GI-4, "Components" for symbols not described above.

VK50VE : Disassembly

- 1. Remove drain plug and filler plug.
- Remove harness brackets.
- 3. Remove main shaft oil seal from front case.

#### **CAUTION:**

Never damage the front case and main shaft.

4. Remove front oil seal from front case.

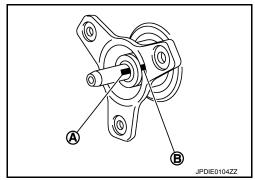
#### **CAUTION:**

Never damage the front case and front drive shaft.

- 5. Remove self-lock nut.
- 6. Put a matching mark (A) on main shaft. The mark should be in line with the mark (B) on the companion flange.

  CAUTION:

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



[TRANSFER: ETX13C]

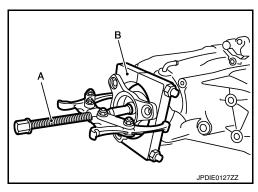
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Remove the companion flange with a puller and a replacer. CAUTION:

Never damage the companion flange.

A : Puller (commercial service tool)

B : Replacer (commercial service tool)

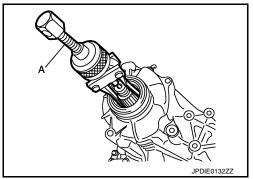


8. Remove rear oil seal from rear case with the replacer (A) [SST:KV381054S0 (J-34286)].

#### **CAUTION:**

Never damage the rear case.

Remove spacer from main shaft.



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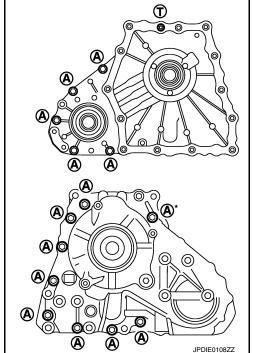
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[TRANSFER: ETX13C]

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

Bolts symbol	Quantity		
A	14		
T (TORX bolt)	1		

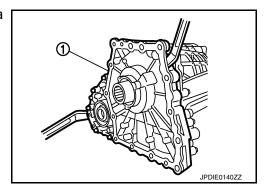
<sup>\*:</sup> With harness bracket.



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

#### **CAUTION:**

Never damage the mating surface.



12. Remove snap ring (1) from front case.

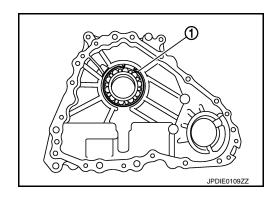
#### **CAUTION:**

Never damage front case.

13. Remove main shaft bearing from front case.

#### **CAUTION:**

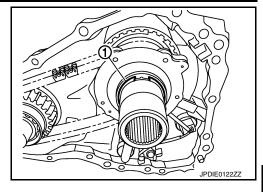
Never use tools. Always remove by hand.



#### < UNIT DISASSEMBLY AND ASSEMBLY >

14. Remove snap ring (1) from main shaft. **CAUTION:** 

Never damage main shaft.



[TRANSFER: ETX13C]

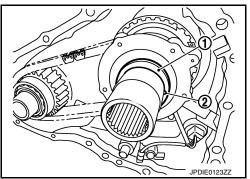
Remove spacer (1) and steel ball (2) from main shaft.
 CAUTION:

Be careful not to drop the steel ball.

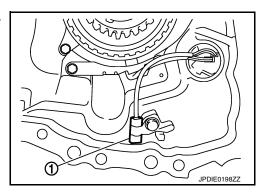
- 16. Remove Oil pump from main shaft.
- 17. Remove drive chain and front drive shaft.

**CAUTION:** 

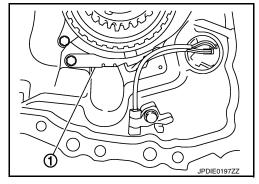
Never use tools. Always remove by hand.



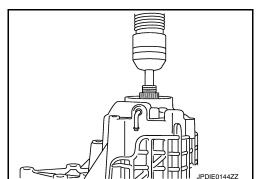
18. Remove transfer fluid temperature sensor bolt from rear case. And then, remove transfer fluid temperature sensor (1).



- 19. Remove oil cover bolts from rear case. And then, remove oil cover (1).
- 20. Remove retainer from AWD solenoid harness connector.
- 21. Remove AWD solenoid harness connector from rear case.
- 22. Remove O-ring from AWD solenoid harness connector.



23. Using a press, remove main shaft assembly from rear case.



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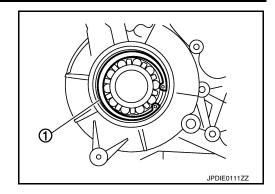
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

- 24. Remove snap ring (1) from rear case.
- 25. Remove rear bearing from rear case.

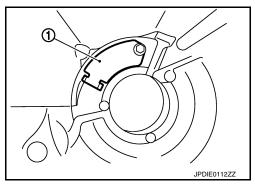
#### **CAUTION:**

Never use tools. Always remove by hand.



[TRANSFER: ETX13C]

- 26. Remove baffle plate (1) from rear case.
- 27. Remove breather tube from rear case.
- 28. Remove breather tube from front case.



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# VK50VE : Assembly

1. Install breather tube to front case.

#### **CAUTION:**

Never reuse breather tube.

2. Install breather tube to rear case within the angle (A) shown as follows.

**Angle (A)** : 80 – 100°

#### **CAUTION:**

Never reuse breather tube.

- 3. Install baffle plate to rear case.
- 4. Install rear bearing to rear case.

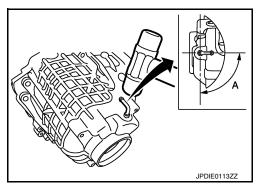
#### **CAUTION:**

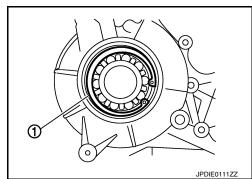
Never use tools. Always install by hand.

5. Install snap ring (1) to rear case.

#### **CAUTION:**

Never reuse snap ring.





### < UNIT DISASSEMBLY AND ASSEMBLY >

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

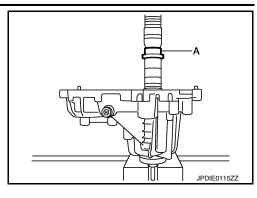
#### **CAUTION:**

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

7. Install O-ring to AWD solenoid harness connector.

#### **CAUTION:**

- Never reuse O-ring.
- Apply transfer fluid to O-ring.
- 8. Install AWD solenoid harness connector into rear case.
- 9. Install retainer to AWD solenoid harness connector.
- 10. Hold electric controlled coupling harness (1) with oil cover hold plate (2), install oil cover (3) to rear case (4).



[TRANSFER: ETX13C]

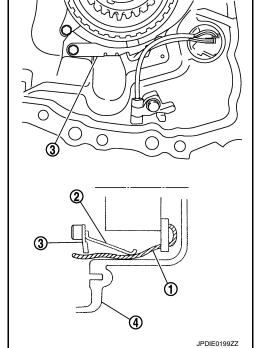
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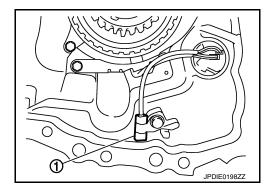
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11. Install transfer fluid temperature sensor (1) to rear case.



12. Set drive chain to front drive shaft. **CAUTION:** 

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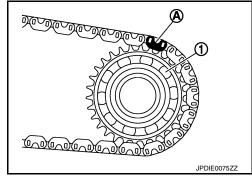
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Identification mark (A) of drive chain should be in the side of front bearing (1) of front drive shaft.

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

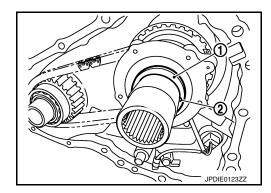
Never use tools. Always install by hand.

14. Install Oil pump to main shaft.



[TRANSFER: ETX13C]

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



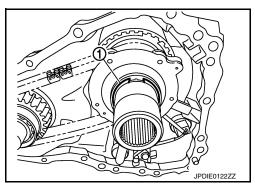
16. Install snap ring (1) to main shaft.

#### **CAUTION:**

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

#### **CAUTION:**

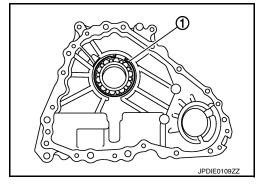
Never use tools. Always install by hand.



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

#### **CAUTION:**

- · Never reuse snap ring.
- · Never damage front case.



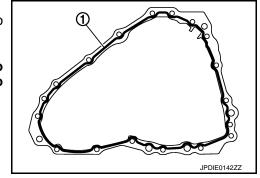
 Apply liquid gasket (1) to mating surface of rear case.
 Use Genuine Anaerobic Liquid Gasket or equivalent. Refer to <u>GI-24</u>, "Recommended Chemical Products and Sealants".
 CAUTION:

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

20. Set front case to rear case.

#### **CAUTION:**

Never damage the mating surface transmission side.



#### < UNIT DISASSEMBLY AND ASSEMBLY >

21. Tighten front case and rear case fixing bolts.

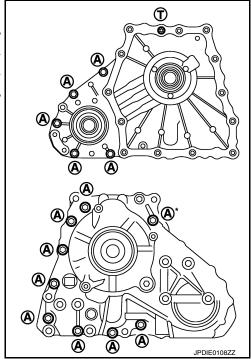
Bolts symbol	Quantity		
A	14		
T (TORX bolt)	1		

\*: With harness bracket.

22. Install spacer to main shaft.

#### **CAUTION:**

Apply transfer fluid to spacer.



[TRANSFER: ETX13C]

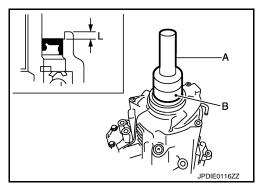
 Apply transfer fluid to outside of rear oil seal, and install rear oil seal to rear case with the drifts (A and B) within the dimension (L) shown as follows.

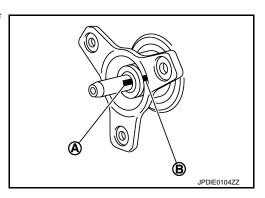
A : Drift [SST: ST30720000 (J-25405)]
B : Drift [SST: KV40104830 ( — )]

L : 6.7 – 7.3 mm (0.264 – 0.287 in)

#### **CAUTION:**

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





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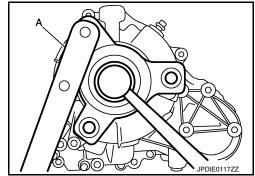
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

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

#### **CAUTION:**

Never reuse self-lock nut.

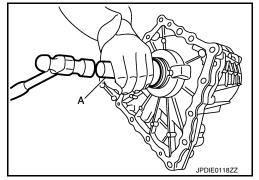


[TRANSFER: ETX13C]

26. Apply transfer fluid to outside of main shaft oil seal, and install main shaft oil seal until it is flush with the end face of front case with the drift (A) [SST: ST30720000 (J-25405)].

#### **CAUTION:**

- Never reuse main shaft oil seal.
- · Apply petroleum jelly to oil seal lip.
- When installing, never incline main shaft oil seal.



27. Apply transfer fluid to outside of front oil seal, and install front oil seal until it is flush with the end face of front case with the drift (A) [SST: ST27862000 ( — )].

#### **CAUTION:**

- Never reuse front oil seal.
- · Apply petroleum jelly to oil seal lip.
- When installing, never incline front oil seal.
- 28. Set gasket to drain plug. Install it to rear case.

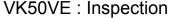
#### **CAUTION:**

Never reuse gasket.

29. Set gasket to filler plug. Install it to rear case.

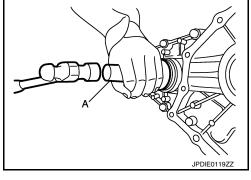
#### **CAUTION:**

- Never reuse gasket.
- · After oil is filled, tighten filler plug to specified torque.

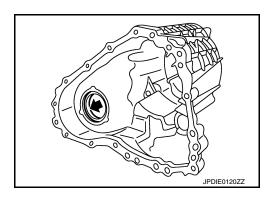


Check items below. If necessary, replace them with new ones.

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



INFOID:0000000010580431

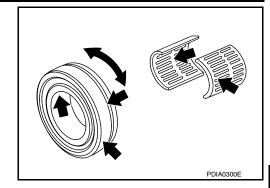


**BEARING** 

**CASES** 

# < UNIT DISASSEMBLY AND ASSEMBLY >

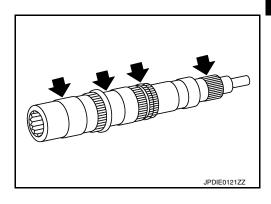
Damage and rough rotation of bearing.



[TRANSFER: ETX13C]

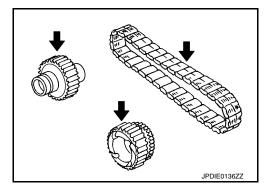
SHAFT

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



**GEARS AND CHAIN** 

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



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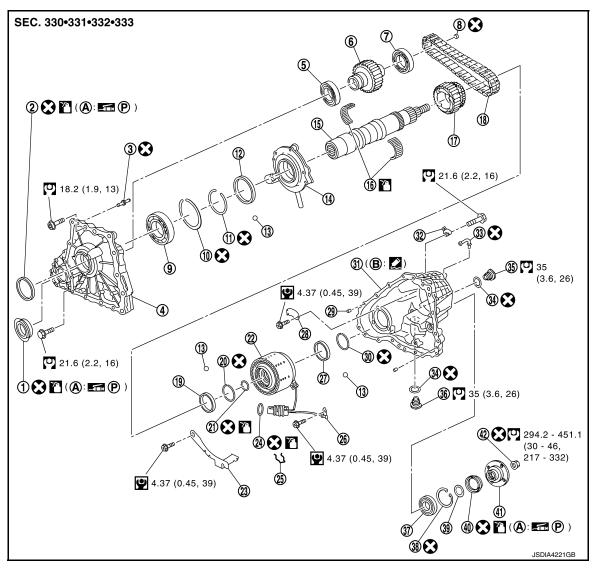
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# MAIN SHAFT VQ37VHR

VQ37VHR: Exploded View

INFOID:0000000010580432

[TRANSFER: ETX13C]



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

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

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

[TRANSFER: ETX13C] Apply Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-24. "Recommended Chemical Products and Sealants".

Apply petroleum jelly.

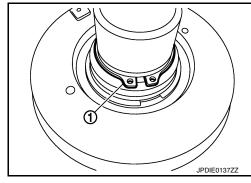
Apply transfer fluid. Refer to MA-17, "FOR NORTH AMERICA: Fluids and Lubricants" (For North America), MA-18, "FOR MEXICO: Fluids and Lubricants" (For Mexico).

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

# VQ37VHR: Disassembly

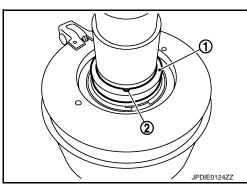
1. Separate front case and rear case, then remove main shaft assembly. Refer to DLN-69, "VQ37VHR: Disassembly".

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

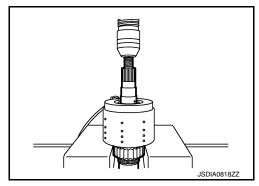


Remove spacer (1) and steel ball (2) from main shaft. CAUTION:

Be careful not to drop the steel ball.



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

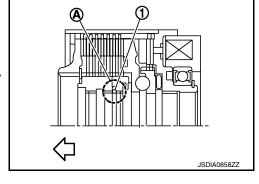


Remove circlip (1) from notch (A) of electric controlled coupling.

⟨□: Front side

#### CAUTION:

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



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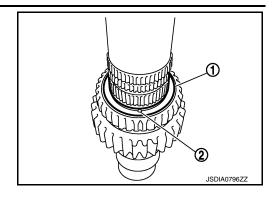
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#### < UNIT DISASSEMBLY AND ASSEMBLY >

Remove spacer (1) and steel ball (2) from main shaft. CAUTION:

Be careful not to drop the steel ball.

- 8. Remove sprocket from main shaft.
- 9. Remove needle bearing from main shaft.



[TRANSFER: ETX13C]

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# VQ37VHR: Assembly

1. Install needle bearing to main shaft.

#### **CAUTION:**

Apply transfer fluid to the periphery of needle bearing.

- 2. Install sprocket to main shaft.
- 3. Install spacer (1) and steel ball (2) to main shaft.

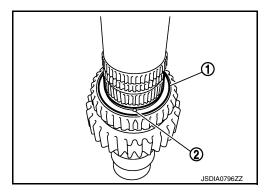
#### **CAUTION:**

Be careful not to drop the steel ball.

4. Install snap ring to main shaft.

#### **CAUTION:**

Never reuse snap ring.



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

←:Front side

#### **CAUTION:**

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

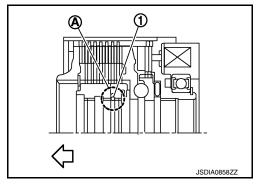
#### **CAUTION:**

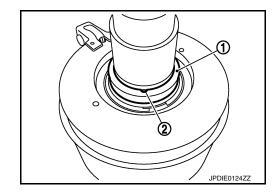
Securely insert it until locked.

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

#### **CAUTION:**

Be careful not to drop the steel ball.





#### **MAIN SHAFT**

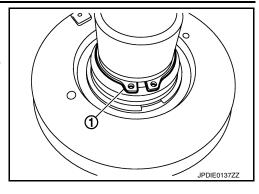
#### < UNIT DISASSEMBLY AND ASSEMBLY >

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

#### **CAUTION:**

#### Never reuse snap ring.

9. Install main shaft assembly to rear case, then install front case and rear case. Refer to <u>DLN-72</u>, "VQ37VHR: Assembly".



[TRANSFER: ETX13C]

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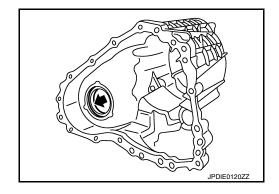
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VQ37VHR: Inspection

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

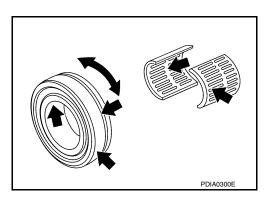
#### **CASES**

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



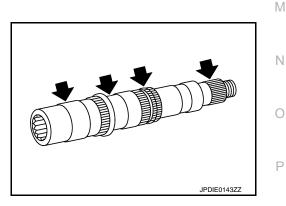
#### **BEARING**

Damage and rough rotation of bearing.



#### **SHAFT**

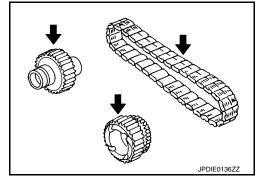
Damage, peeling, dent, uneven wear, bending, etc. of shaft.



**GEARS AND CHAIN** 

Revision: 2015 February DLN-91 2015 QX70

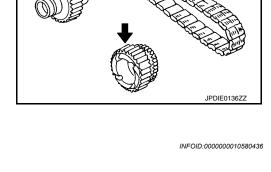
- Excessive wear, damage, peeling, etc. of gear and chain.
- · Cracks, damage, wear, etc of drive chain.

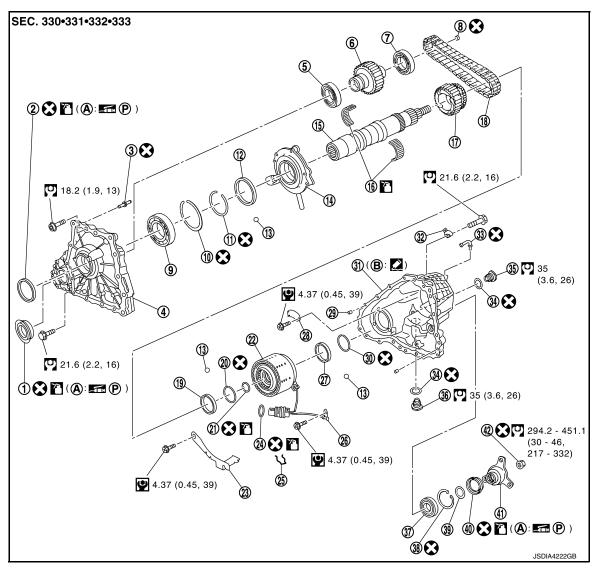


[TRANSFER: ETX13C]

VK50VE

VK50VE: Exploded View





- Front oil seal
- 4. Front case
- Front drive shaft rear bearing 7.
- 10. Snap ring
- 13. Steel ball
- 16. Needle bearing
- 19. Spacer

- 2. Main shaft oil seal
- 5. Front drive shaft front bearing
- 8. Plug
- 11. Snap ring
- 14. Oil pump
- 17. Sprocket
- 20. Snap ring

- Breather tube
- 6. Front drive shaft
- 9. Main shaft bearing
- 12. Spacer
- 15. Main shaft
- 18. Drive chain
- 21. Circlip

### **MAIN SHAFT**

#### < UNIT DISASSEMBLY AND ASSEMBLY >

22.	Electric controlled coupling	23.	Oil cover	24.	O-ring	
25.	Retainer	26.	Transfer fluid temperature sensor	27.	Spacer	
28.	Baffle plate	29.	Dowel pin	30.	Snap ring	
31.	Rear case	32.	Harness bracket	33.	Breather tube	
34.	Gasket	35.	Filler plug	36.	Drain plug	
37.	Rear bearing	38.	Snap ring	39.	Spacer	
40.	Rear oil seal	41.	Companion flange	42.	Self-lock nut	
A.	Oil seal lip	B.	Matching surface			(

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

■®: Apply petroleum jelly.

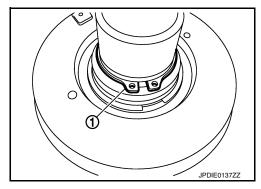
Apply transfer fluid. Refer to MA-18, "FOR MEXICO: Fluids and Lubricants".

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

# VK50VE : Disassembly

1. Separate front case and rear case, then remove main shaft assembly. Refer to <u>DLN-79</u>, "VK50VE : <u>Disassembly"</u>.

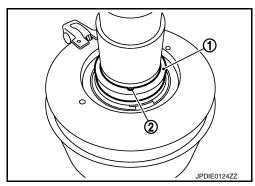
2. Remove snap ring (1) from main shaft.



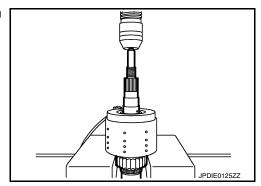
[TRANSFER: ETX13C]

3. Remove spacer (1) and steel ball (2) from main shaft. CAUTION:

Be careful not to drop the steel ball.



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



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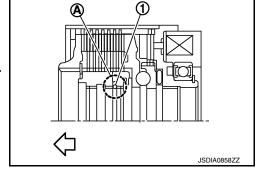
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5. Remove circlip (1) from notch (A) of electric controlled coupling.



#### **CAUTION:**

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

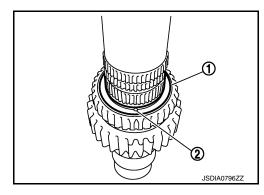


[TRANSFER: ETX13C]

Remove spacer (1) and steel ball (2) from main shaft. CAUTION:

Be careful not to drop the steel ball.

- 8. Remove sprocket from main shaft.
- 9. Remove needle bearing from main shaft.



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# VK50VE : Assembly

Install needle bearing to main shaft.

#### **CAUTION:**

Apply transfer fluid to the periphery of needle bearing.

- Install sprocket to main shaft.
- 3. Install spacer (1) and steel ball (2) to main shaft.

#### **CAUTION:**

Be careful not to drop the steel ball.

4. Install snap ring to main shaft.

#### **CAUTION:**

Never reuse snap ring.

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

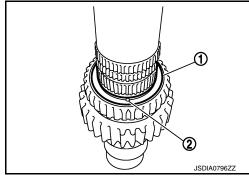
⟨□:Front side

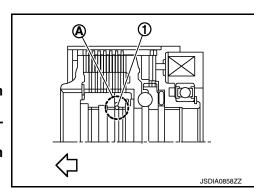
#### **CAUTION:**

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

#### **CAUTION:**

Securely insert it until locked.



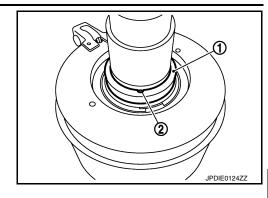


### **MAIN SHAFT**

### < UNIT DISASSEMBLY AND ASSEMBLY >

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

Be careful not to drop the steel ball.

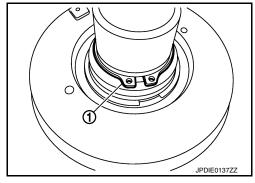


[TRANSFER: ETX13C]

Install snap ring (1) to main shaft. CAUTION:

Never reuse snap ring.

9. Install main shaft assembly to rear case, then install front case and rear case. Refer to <u>DLN-82</u>, "VK50VE: Assembly".



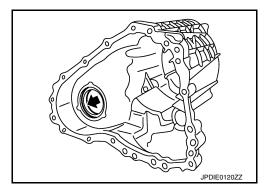
INFOID:0000000010580439

VK50VE: Inspection

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

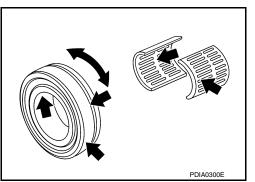
#### **CASES**

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



**BEARING** 

Damage and rough rotation of bearing.



**SHAFT** 

Revision: 2015 February DLN-95 2015 QX70

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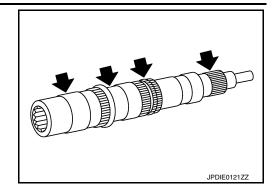
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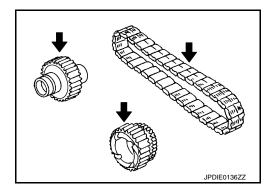
Damage, peeling, dent, uneven wear, bending, etc. of shaft.



[TRANSFER: ETX13C]

#### **GEARS AND CHAIN**

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



< UNIT DISASSEMBLY AND ASSEMBLY >

# FRONT DRIVE SHAFT AND DRIVE CHAIN

VQ37VHR

VQ37VHR: Exploded View



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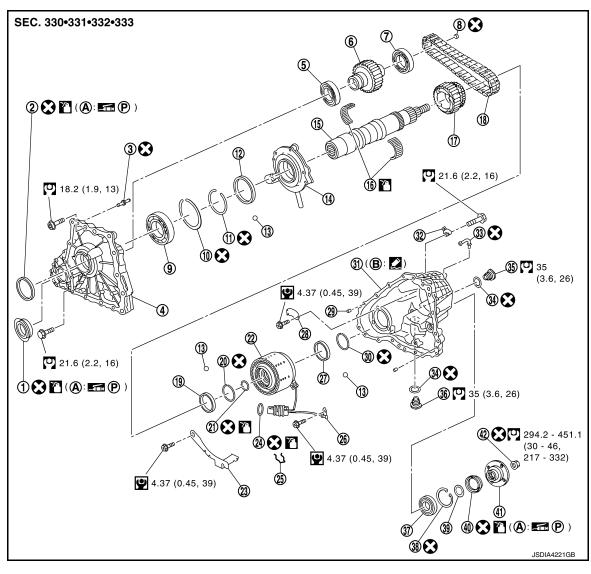
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[TRANSFER: ETX13C]



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

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

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

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#### < UNIT DISASSEMBLY AND ASSEMBLY >

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

P: Apply petroleum jelly.

: Apply transfer fluid. Refer to MA-17, "FOR NORTH AMERICA: Fluids and Lubricants" (For North America), MA-18, "FOR MEXICO: Fluids and Lubricants" (For Mexico).

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

# VQ37VHR: Disassembly

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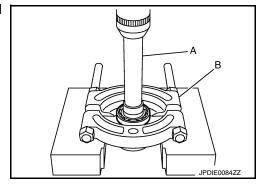
[TRANSFER: ETX13C]

- Separate front case and rear case. Refer to <u>DLN-69</u>, "VQ37VHR: <u>Disassembly</u>".
- 2. Remove drive chain and front drive shaft.

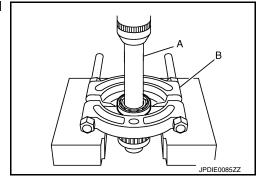
#### **CAUTION:**

Never use tools. Always remove by hand.

- Remove front drive shaft front bearing with the drift (A) and replacer (B).
  - A: Drift [SST: ST31214000 (J-25269-B)]
  - B: Replacer (commercial service tool)



- 4. Remove front drive shaft rear bearing with the drift (A) and replacer (B).
  - A: Drift [SST: ST31214000 (J-25269-B)]
  - B: Replacer (commercial service tool)
- 5. Remove plug from front drive shaft.



# VQ37VHR: Assembly

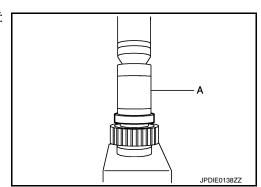
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1. Install plug to front drive shaft.

#### **CAUTION:**

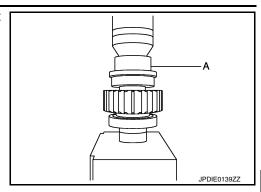
Never reuse plug.

2. Install front drive shaft front bearing with the drift (A) [SST: ST33200000 (J-26082)].



# < UNIT DISASSEMBLY AND ASSEMBLY >

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



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4. Set drive chain to front drive shaft.

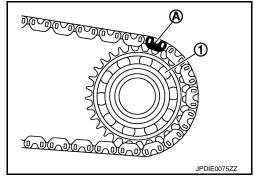
#### **CAUTION:**

Identification mark (A) of drive chain should be in the side of front bearing (1) of front drive shaft.

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

Never use tools. Always install by hand.

Install front case to rear case. Refer to <u>DLN-72</u>, "VQ37VHR : <u>Assembly"</u>.



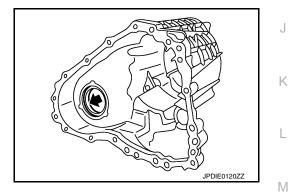
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# VQ37VHR: Inspection

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

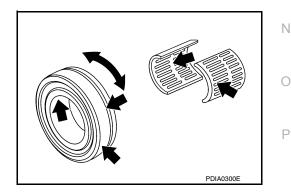
#### **CASES**

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



#### **BEARING**

Damage and rough rotation of bearing.

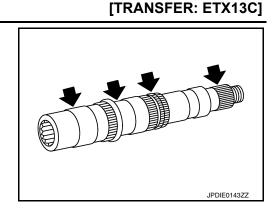


**SHAFT** 

Revision: 2015 February DLN-99 2015 QX70

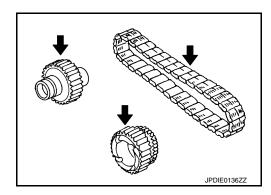
< UNIT DISASSEMBLY AND ASSEMBLY >

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



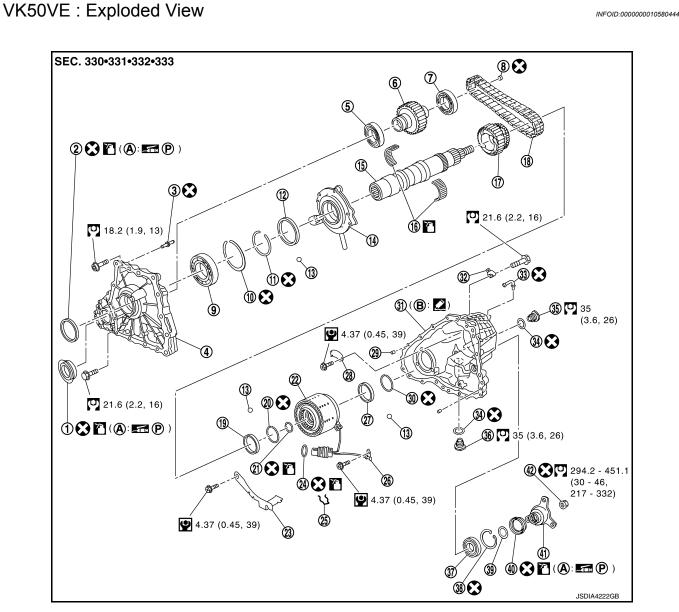
#### **GEARS AND CHAIN**

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



VK50VE

[TRANSFER: ETX13C]



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

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

- Matching surface

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

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

**Revision: 2015 February** 

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#### < UNIT DISASSEMBLY AND ASSEMBLY >

? Apply transfer fluid. Refer to MA-18, "FOR MEXICO: Fluids and Lubricants".

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

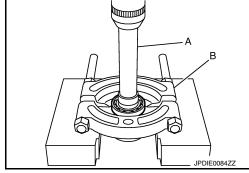
# VK50VE : Disassembly

- 1. Separate front case and rear case. Refer to <u>DLN-79</u>, "VK50VE : <u>Disassembly"</u>.
- Remove drive chain and front drive shaft.

#### **CAUTION:**

Never use tools. Always remove by hand.

- 3. Remove front drive shaft front bearing with the drift (A) and replacer (B).
  - Drift [SST: ST31214000 (J-25269-B)]
  - B: Replacer (commercial service tool)

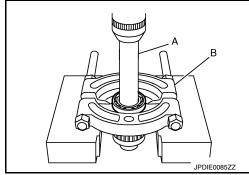


[TRANSFER: ETX13C]

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- Remove front drive shaft rear bearing with the drift (A) and replacer (B).
  - Drift [SST: ST31214000 (J-25269-B)] A:
  - Replacer (commercial service tool)
- Remove plug from front drive shaft.



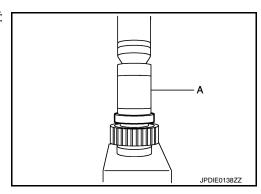
VK50VE : Assembly

Install plug to front drive shaft.

#### **CAUTION:**

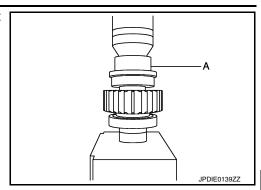
#### Never reuse plug.

2. Install front drive shaft front bearing with the drift (A) [SST: ST33200000 (J-26082)].



# < UNIT DISASSEMBLY AND ASSEMBLY >

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



[TRANSFER: ETX13C]

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Set drive chain to front drive shaft.

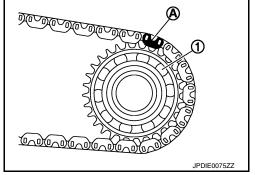
#### **CAUTION:**

Identification mark (A) of drive chain should be in the side of front bearing (1) of front drive shaft.

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

Never use tools. Always install by hand.

Install front case to rear case. Refer to <u>DLN-82, "VK50VE : Assembly"</u>.



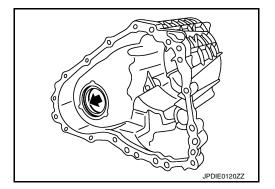
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# VK50VE: Inspection

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

#### **CASES**

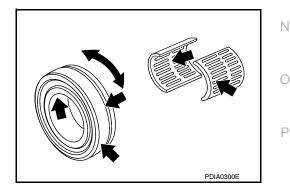
- · Contact surfaces of bearing for wear, damage, etc.
- Damage and cracks of case.



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### **BEARING**

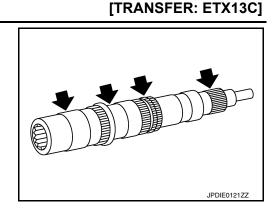
Damage and rough rotation of bearing.



**SHAFT** 

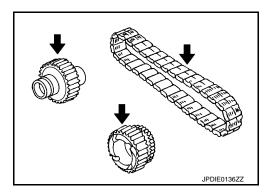
< UNIT DISASSEMBLY AND ASSEMBLY >

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



#### **GEARS AND CHAIN**

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



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

< SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS)

# **General Specifications**

Applied model		AWD		
		VQ37VHR	VK50VE	
		A	/T	
Transfer model		ETX13C		
Fluid capacity (Approx.)	$\ell$ (US pt, Imp pt)	1.0 (2-1/8, 1-3/4)		

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[TRANSFER: ETX13C]

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# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

# **SYMPTOM DIAGNOSIS**

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

# **NVH Troubleshooting Chart**

INFOID:0000000010580449

[FRONT PROPELLER SHAFT: 2S56A]

Excessive center bearing axial end play  Center bearing improper installation  Excessive center bearing axial end play  Center bearing mounting (insulator) cracks, damage or deterioration  Excessive point angle  Excessive point angle  Excessive runout  Excessive r
DLN-109, "Inspection"  DLN-109, "Inspection"  ———————————————————————————————————

x: Applicable

# **PRECAUTION**

# **PRECAUTIONS**

# **Precautions for Removing Battery Terminal**

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

#### NOTE:

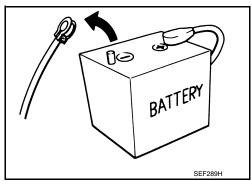
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

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

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

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

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



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# **PREPARATION**

< PREPARATION >

[FRONT PROPELLER SHAFT: 2S56A]

# **PREPARATION**

# **PREPARATION**

**Commercial Service Tools** 

INFOID:0000000010580450

Tool name		Description
Power tool		Loosening bolts and nuts
	PBIC0190E	

[FRONT PROPELLER SHAFT: 2S56A]

# PERIODIC MAINTENANCE

## FRONT PROPELLER SHAFT

Inspection INFOID:0000000010580451 B

#### **NOISE**

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

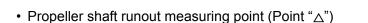
#### **VIBRATION**

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

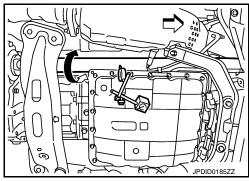
Propeller shaft runout : Refer to <u>DLN-115, "Propeller Shaft Runout"</u>.

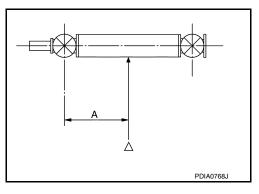


#### **Dimension A**

VQ37VHR : 381.5 mm (15.02 in) VK50VE : 386.5 mm (15.22 in)

- 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.





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[FRONT PROPELLER SHAFT: 2S56A]

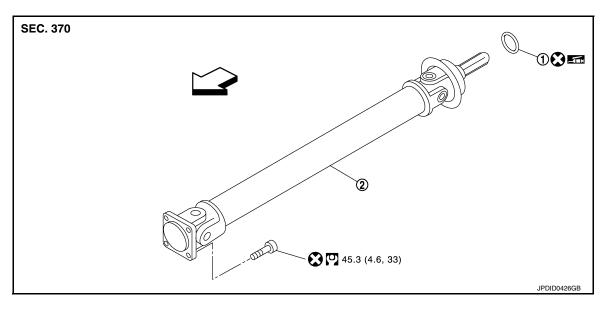
# REMOVAL AND INSTALLATION

## FRONT PROPELLER SHAFT

VQ37VHR

VQ37VHR: Exploded View

INFOID:0000000010580452



1. O-ring

2. Propeller shaft assembly

Apply multi-purpose grease.

∀
 : Vehicle front

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

#### VQ37VHR: Removal and Installation

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#### **REMOVAL**

- Shift the transmission to the neutral position, and then release the parking brake.
- 2. Remove engine undercover with a power tool.
- Remove exhaust front tube and three-way catalyst (bank 1) with a power tool. Refer to <a href="EX-5">EX-5</a>, "Exploded View".
- 4. Put matching mark on propeller shaft flange yoke and final drive companion flange.

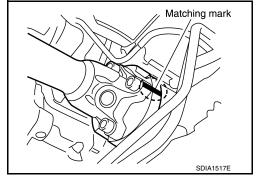
#### **CAUTION:**

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

- 5. Remove the propeller shaft assembly fixing bolts.
- 6. Move steering hydraulic line not to interfere with work. Refer to ST-48, "VQ37VHR: Exploded View".

#### CAUTION:

Wrap power steering piping interference area with shop cloth or equivalent to protect power steering piping from breakage.



7. Support transfer assembly with a jack, remove rear engine mounting member. Refer to <u>EM-77</u>, "AWD : <u>Exploded View"</u>.

### FRONT PROPELLER SHAFT

#### < REMOVAL AND INSTALLATION >

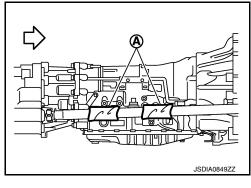
[FRONT PROPELLER SHAFT: 2S56A]

8. Remove propeller shaft assembly from the front final drive and transfer.

⟨□: Vehicle front

#### **CAUTION:**

- Never damage the transfer front oil seal.
- Wrap transmission interference area (A) with shop cloth or equivalent to protect propeller shaft from breakage.
- 9. Remove propeller shaft assembly from O-ring.



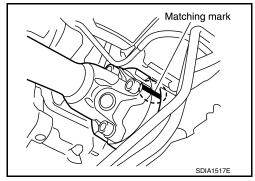
#### **INSTALLATION**

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

- Align matching mark to install propeller shaft assembly to final drive companion flange.
- Preform inspection after installation. Refer to <u>DLN-111, "VQ37VHR</u> : Inspection".

#### **CAUTION:**

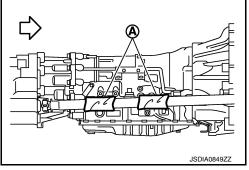
- Never damage the transfer front oil seal.
- Wrap power steering piping interference area with shop cloth or equivalent to protect power steering piping from breakage.



 Wrap transmission interference area (A) with shop cloth or equivalent to protect propeller shaft from breakage.

∀
 □: Vehicle front

- · Never reuse O-ring.
- Apply multi-purpose grease onto O-ring.



VQ37VHR: Inspection

#### INSPECTION AFTER REMOVAL

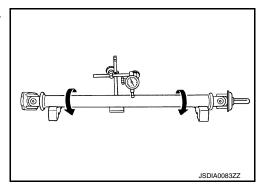
**Appearance** 

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

Propeller Shaft Runout

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

Propeller shaft runout : Refer to <u>DLN-115, "Propeller Shaft Runout"</u>.



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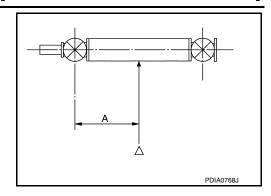
#### FRONT PROPELLER SHAFT

#### < REMOVAL AND INSTALLATION >

[FRONT PROPELLER SHAFT: 2S56A]

Propeller shaft runout measuring point (Point "△")

Dimension A: 381.5 mm (15.02 in)



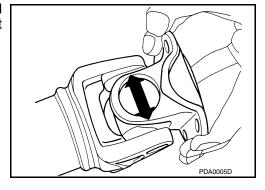
Journal Axial Play

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

Journal axial play : Refer to <u>DLN-115, "Journal Axial Play"</u>.



Never disassemble joints.



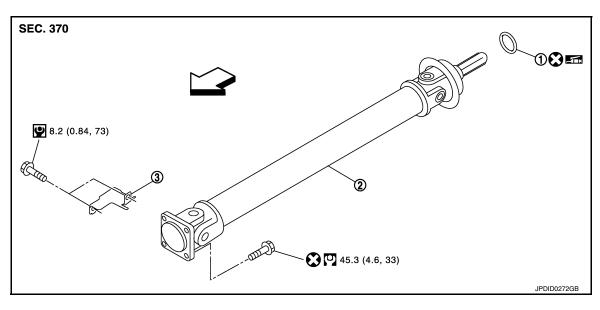
#### INSPECTION AFTER INSTALLATION

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

VK50VE

VK50VE : Exploded View





1. O-ring

2. Propeller shaft assembly

3. Heat bracket

: Apply multi-purpose grease.

∀
 □: Vehicle front

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

### VK50VE: Removal and Installation

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#### **REMOVAL**

- 1. Shift the transmission to the neutral position, and then release the parking brake.
- 2. Remove engine undercover with a power tool.
- Remove exhaust front tube and three-way catalyst. Refer to <u>EX-10</u>, "Exploded View".
- 4. Put matching mark onto propeller shaft flange yoke and final drive companion flange.

#### **CAUTION:**

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

- 5. Remove heat insulator.
- 6. Remove the propeller shaft assembly fixing bolts.
- 7. Hang steering hydraulic line not to interfere with work. Refer to ST-49, "VK50VE: Exploded View".

#### **CAUTION:**

Wrap power steering piping interference area with shop cloth or equivalent to protect power steering piping from breakage.

8. Remove propeller shaft assembly from the front final drive and transfer.

∀
 : Vehicle front

#### **CAUTION:**

- Never damage the transfer front oil seal.
- Wrap transmission interference area (A) with shop cloth or equivalent to protect propeller shaft from breakage.
- 9. Remove propeller shaft assembly from O-ring.
- 10. Remove heat bracket.

#### INSTALLATION

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

- Align matching mark to install propeller shaft assembly to final drive companion flange.
- Preform inspection after installation. Refer to <u>DLN-114</u>, "VK50VE: Inspection".

#### **CAUTION:**

- Never damage the transfer front oil seal.
- Wrap power steering piping interference area with shop cloth or equivalent to protect power steering piping from breakage.

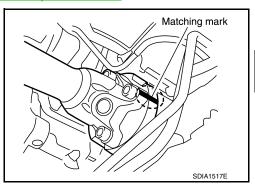
Wrap transmission interference area (A) with shop cloth or

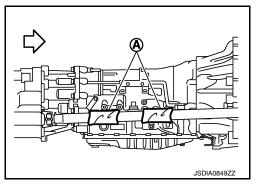
**DLN-113** 

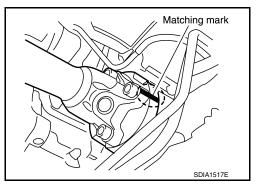
equivalent to protect propeller shaft from breakage.

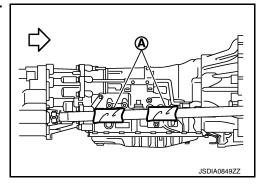


- Never reuse O-ring.
- Apply multi-purpose grease onto O-ring.









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[FRONT PROPELLER SHAFT: 2S56A]

VK50VE: Inspection

#### INSPECTION AFTER REMOVAL

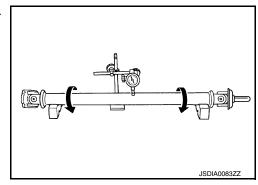
Appearance

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

Propeller Shaft Runout

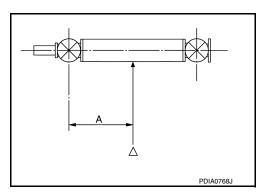
Check propeller shaft runout at measuring point with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly.

Propeller shaft runout : Refer to <u>DLN-115, "Propeller Shaft Runout".</u>



Propeller shaft runout measuring point (Point "△")

Dimension A: 386.5 mm (15.22 in)



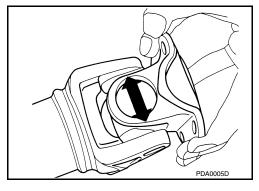
Journal Axial Play

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

Journal axial play : Refer to <u>DLN-115, "Journal Axial Play".</u>



Never disassemble joints.



#### INSPECTION AFTER INSTALLATION

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

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

< SERVICE DATA AND SPECIFICATIONS (SDS)

[FRONT PROPELLER SHAFT: 2S56A]

# SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

# **General Specifications**

	AV	VD			
Applied model	VQ37VHR	VK50VE			
	A	/T			
Propeller shaft model	28	56A			
Number of joints	2				
Type of journal bearings (Non-disassembly type)	Shell type				
Coupling method with transfer	Sleev	Sleeve type			
Coupling method with front final drive	Flange type				
Shaft length (Spider to spider)	763 mm (30.04 in)	773 mm (30.43 in)			
Shaft outer diameter	42.7 mm	(1.681 in)			

# Propeller Shaft Runout

	Unit: mm (in)
Item	Limit
Propeller shaft runout	0.8 (0.031)

## Journal Axial Play

	Unit: mm (in)
Item	Standard
Journal axial play	0 (0)

**DLN-115 Revision: 2015 February** 2015 QX70 Α

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## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

# SYMPTOM DIAGNOSIS

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

# **NVH Troubleshooting Chart**

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[REAR PROPELLER SHAFT: 3S80A-R]

Use the chart below to find the ca	use of the symptom. It	neces	ssary, ı	epair	or repl	ace th	ese pa	ırts.							
Reference		DLN-119, "Inspection"	DLN-123, "Inspection"	I	DLN-123, "Inspection"	I	DLN-119, "Inspection"	DLN-119, "Inspection"	NVH of REAR FINAL DRIVE in this section.	NVH in FAX, RAX, FSU and RSU section.	NVH in WT section.	NVH in WT section.	NVH in RAX section.	NVH in BR section.	NVH in ST section.
Possible cause and SUSPECT	ED PARTS	Uneven rotating torque	Center bearing improper installation	Excessive center bearing axial end play	Center bearing mounting (insulator) cracks, damage or deterioration	Excessive joint angle	Rotation imbalance	Excessive runout	DIFFERENTIAL	AXLE AND SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Symptom	Shake		×			×				×	×	×	×	×	×
v. Applicable	Vibration	×	×	×	×	×	×	×		×	×		×		×

x: Applicable

[REAR PROPELLER SHAFT: 3S80A-R]

# **PRECAUTION**

## **PRECAUTIONS**

## **Precautions for Removing Battery Terminal**

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

#### NOTE:

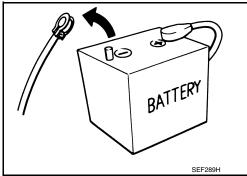
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

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

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

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

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



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### **PREPARATION**

< PREPARATION >

[REAR PROPELLER SHAFT: 3S80A-R]

# **PREPARATION**

# **PREPARATION**

**Commercial Service Tools** 

INFOID:0000000010580462

Tool name		Description
Power tool		Loosening bolts and nuts
	PBIC0190E	

< PERIODIC MAINTENANCE >

[REAR PROPELLER SHAFT: 3S80A-R]

# PERIODIC MAINTENANCE

## REAR PROPELLER SHAFT

Inspection INFOID:000000010580463

#### **NOISE**

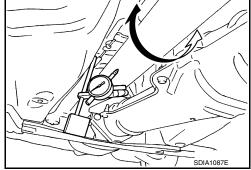
- Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace propeller shaft assembly.

#### **VIBRATION**

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

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

Propeller shaft runout : Refer to <u>DLN-125, "Propeller Shaft Runout"</u>.



Propeller shaft runout measuring point (Point "△")

∀ : Vehicle front

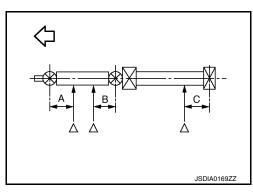
**Dimension** A: 192 mm (7.56 in)

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

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.



4. Check the vibration by driving vehicle.



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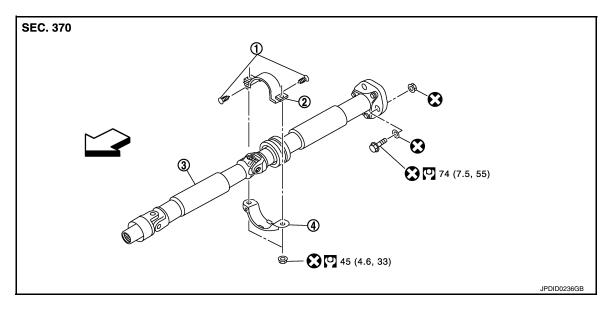
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[REAR PROPELLER SHAFT: 3S80A-R]

# REMOVAL AND INSTALLATION

## REAR PROPELLER SHAFT

Exploded View



1. Clip

- Center bearing mounting bracket (upper)
- 3. Propeller shaft assembly

4. Center bearing mounting bracket (lower)

∀
 □: Vehicle front

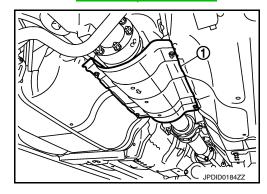
Refer to GI-4, "Components" for symbols in the figure.

### Removal and Installation

INFOID:0000000010580465

#### **REMOVAL**

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



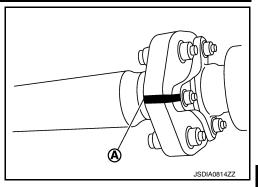
#### < REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 3S80A-R]

4. Put matching marks (A) on propeller shaft rubber coupling and final drive companion flange.

#### **CAUTION:**

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

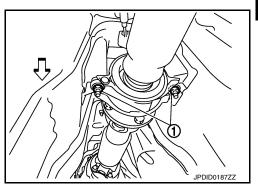


5. Loosen mounting nuts (1) of center bearing mounting brackets (upper/lower).

⟨⇒ : Vehicle front

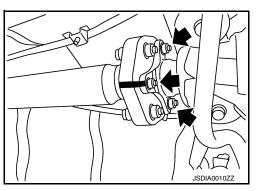
#### **CAUTION:**

Tighten mounting nuts temporarily.



6. Remove propeller shaft assembly fixing bolts and nuts (←). CAUTION:

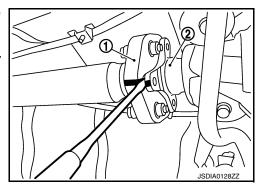
Never remove the rubber coupling from the propeller shaft assembly.



7. Slightly separate the rubber coupling (1) from the final drive companion flange (2).

#### **CAUTION:**

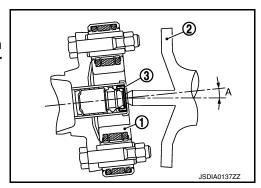
Never damage the final drive companion flange and rubber coupling.



- Remove center bearing mounting bracket fixing nuts.
   CAUTION:
  - The angle (A) is third axis rubber coupling (1) forms with the final drive companion flange (2). Never bend rubber coupling above the angle (A).

A : 0 - 4°

- Never damage the grease seal (3).
- Never damage the rubber coupling.



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9. Slide the propeller shaft in the vehicle forward direction slightly. Separate the propeller shaft from the final drive companion flange.

#### **CAUTION:**

- · Never damage the grease seal.
- Never damage the rubber coupling.
- 10. Remove the propeller shaft assembly from the vehicle.

#### **CAUTION:**

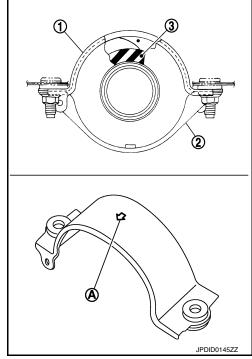
Never damage the rear oil seal of transmission.

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

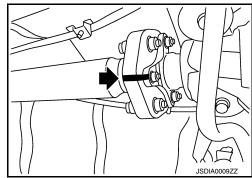
#### **INSTALLATION**

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

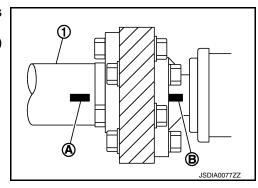
- Install center bearing mounting bracket (upper) (1) with its arrow mark (A) facing forward.
- Adjust position of center bearing mounting bracket (upper), center bearing mounting bracket (lower) (2) sliding back and forth to prevent play in thrust direction of center bearing insulator (3). Install center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



- Align matching marks to install propeller shaft rubber coupling to final drive companion flange.
- Preform inspection after installation. Refer to <u>DLN-123</u>, "Inspection".



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

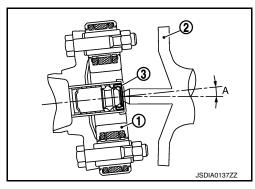


#### **CAUTION:**

 The angle (A) is third axis rubber coupling (1) forms with the final drive companion flange (2). Never bend rubber coupling above the angle (A).

A :  $0 - 4^{\circ}$ 

- Never damage the grease seal (3).
- Never damage the rubber coupling.
- Never damage the rear oil seal of transmission.
- Never damage the rubber coupling, protect it with a shop towel or equivalent.



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Inspection

#### INSPECTION AFTER REMOVAL

**Appearance** 

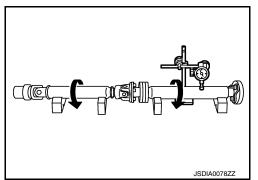
Check propeller shaft for bend and damage. If damage is detected, replace propeller shaft assembly.

Propeller Shaft Runout

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

**Propeller shaft runout** 

: Refer to <u>DLN-125</u>, "Propeller <u>Shaft Runout"</u>.

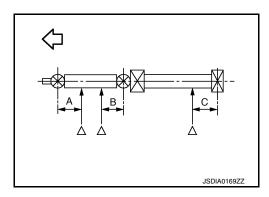


Propeller shaft runout measuring point (Point "△")

⟨□: Vehicle front

**Dimension** A: 192 mm (7.56 in)

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



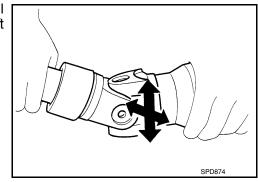
Journal Axial Play

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

Journal axial play : Refer to <u>DLN-125, "Journal Axial Play"</u>.



Never disassemble joints.



**Center Bearing** 

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

< REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 3S80A-R]

#### **CAUTION:**

Never disassemble center bearing.

### INSPECTION AFTER INSTALLATION

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

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

< SERVICE DATA AND SPECIFICATIONS (SDS)

[REAR PROPELLER SHAFT: 3S80A-R]

# SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

# **General Specifications**

		2WD
Applied model		VQ37VHR
		A/T
Propeller shaft model		3S80A-R
Number of joints		3
	1st joint	Shell type
Type of journal bearings (Non-disassembly type)	2nd joint	Rebro joint type
	3rd joint	Rubber coupling type
Coupling method with tran	smission	Sleeve type
Coupling method with rear	final drive	Rubber coupling type
Choff langth	1st (Spider to rebro joint center)	718 mm (28.27 in)
Shaft length	2nd (Rebro joint center to rubber coupling center)	751 mm (29.57 in)
Chaft autor diameter	1st	82.6 mm (3.252 in)
Shaft outer diameter	2nd	75.0 mm (2.953 in)

# Propeller Shaft Runout

	Unit: mm (in)
Item	Limit
Propeller shaft runout	0.8 (0.031)

# Journal Axial Play

_		Unit: mm (in)
_	Item	Standard
_	Journal axial play	0 (0)

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## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

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

# SYMPTOM DIAGNOSIS

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

# **NVH Troubleshooting Chart**

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Reference		DLN-129, "Inspection"	spection"	I	딉	I			R FINAL DRIVE in this se	nd RSU section.					
		DLN-129	DLN-133, "Inspection"		DLN-133, "Inspection"		DLN-129, "Inspection"	DLN-129, "Inspection"	NVH of FRONT and REAR FINAL DRIVE in this section.	NVH in FAX, RAX, FSU and RSU section	NVH in WT section.	NVH in WT section.	NVH in FAX and RAX section.	NVH in BR section.	NVH in ST section.
Possible cause and SUSPECTE	ED PARTS	Uneven rotating torque	Center bearing improper installation	Excessive center bearing axial end play	Center bearing mounting (insulator) cracks, damage or deterioration	Excessive joint angle	Rotation imbalance	Excessive runout	DIFFERENTIAL	AXLE AND SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Symptom	Shake Vibration	×	×	×	×	×	×	×		×	×	×	×	×	×

x: Applicable

# **PRECAUTION**

## **PRECAUTIONS**

## **Precautions for Removing Battery Terminal**

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

#### NOTE:

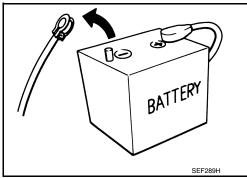
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

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

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

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

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



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## **PREPARATION**

< PREPARATION >

[REAR PROPELLER SHAFT: 3F80A-1VL107]

# **PREPARATION**

# **PREPARATION**

**Commercial Service Tools** 

INFOID:0000000010580471

Tool name		Description
Power tool		Loosening bolts and nuts
	PBIC0190E	

< PERIODIC MAINTENANCE >

[REAR PROPELLER SHAFT: 3F80A-1VL107]

# PERIODIC MAINTENANCE

## REAR PROPELLER SHAFT

Inspection INFOID:0000000010580472

#### **NOISE**

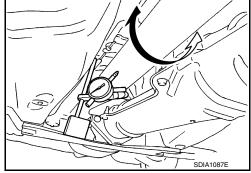
- · Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace propeller shaft assembly.

#### **VIBRATION**

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

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

Propeller shaft runout : Refer to <u>DLN-135, "Propeller Shaft Runout".</u>



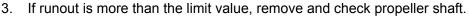
Propeller shaft runout measuring point (Point "△")

∀
 □: Vehicle front

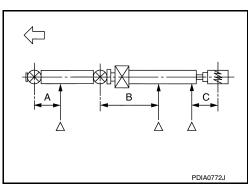
**Dimension** A: 162 mm (6.38 in)

B: 245 mm (9.65 in) C: 185 mm (7.28 in)

 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.



4. Check the vibration by driving vehicle.



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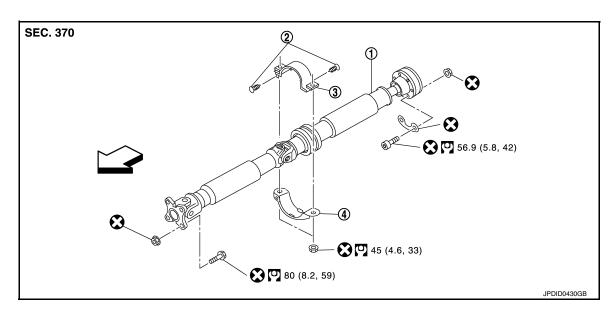
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# REMOVAL AND INSTALLATION

## REAR PROPELLER SHAFT

Exploded View



- 1. Propeller shaft assembly
- 2. Clip

3. Center bearing mounting bracket (upper)

4. Center bearing mounting bracket (lower)

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 □: Vehicle front

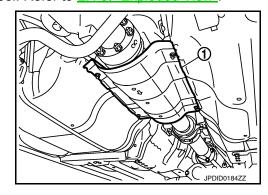
Refer to GI-4, "Components" for symbols in the figure.

### Removal and Installation

INFOID:0000000010580474

#### **REMOVAL**

- 1. Shift the transmission to the neutral position, and release the parking brake.
- 2. Remove the center muffler and exhaust front tube with power tool. Refer to EX-5, "Exploded View".
- 3. Remove the heat plate (1).



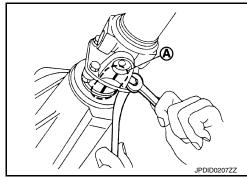
#### < REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 3F80A-1VL107]

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

#### **CAUTION:**

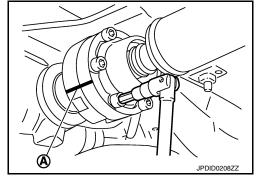
For matching marks, use paint. Never damage propeller shaft flange yoke and transfer companion flange.



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

#### **CAUTION:**

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



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

#### **CAUTION:**

Tighten mounting nuts temporarily.

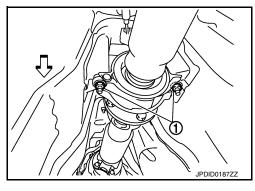
- 7. Remove propeller shaft assembly fixing bolts and nuts.
- 8. Remove center bearing mounting bracket fixing nuts.
- Remove propeller shaft assembly.

#### **CAUTION:**

- Never damage the rear oil seal of transmission.
- If constant velocity joint was bent during propeller shaft assembly removal, installation, or transportation, its boot may be damaged. Wrap boot interference area to metal part with shop cloth or equivalent to protect boot from breakage.
- 10. Remove clip and center bearing mounting bracket (upper/lower).

#### **INSTALLATION**

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



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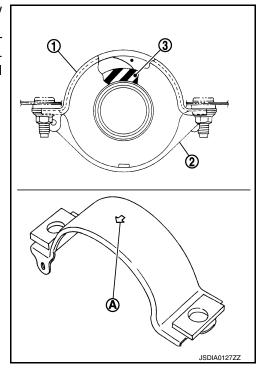
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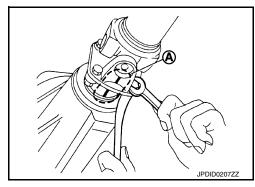
### < REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 3F80A-1VL107]

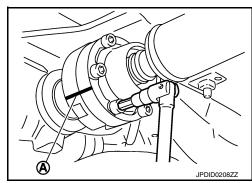
- Install center bearing mounting bracket (upper) (1) with its arrow mark (A) facing forward.
- Adjust position of center bearing mounting bracket (upper), center bearing mounting bracket (lower) (2) sliding back and forth to prevent play in thrust direction of center bearing insulator (3). Install center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



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



• Align matching marks (A) to install propeller shaft rebro joint and final drive companion flange.



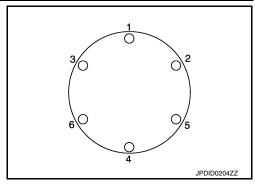
**CAUTION:** 

#### < REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 3F80A-1VL107]

Tighten mounting bolt and nut in the order shown in the figure.

Preform inspection after installation. Refer to <u>DLN-133</u>, "Inspection".



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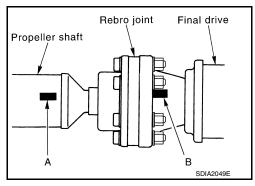
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- If propeller shaft or final drive has been replaced, connect them as follows:
- Install the propeller shaft while aligning its matching mark (A) with the matching mark (B) on the joint as close as possible.

  CAUTION:
  - Avoid damaging the rebro joint boot, protect it with a shop cloth or equivalent.



Inspection H

#### INSPECTION AFTER REMOVAL

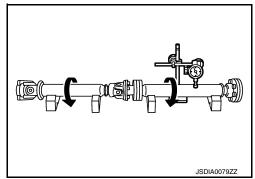
**Appearance** 

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

Propeller Shaft Runout

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

Propeller shaft runout : Refer to <u>DLN-135, "Propeller Shaft Runout".</u>

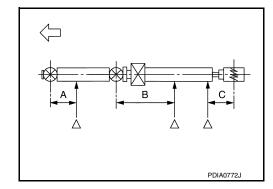


Propeller shaft runout measuring point (Point "△")

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 : Vehicle front

**Dimension** A: 162 mm (6.38 in)

B: 245 mm (9.65 in) C: 185 mm (7.28 in)



Journal Axial Play

Revision: 2015 February DLN-133 2015 QX70

< REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 3F80A-1VL107]

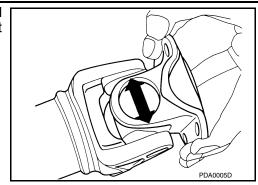
As shown in the figure, while fixing yoke on one side, check axial play of joint. If it is outside the standard, replace propeller shaft assembly.

Journal axial play

: Refer to <u>DLN-135, "Journal Axial Play"</u>.

#### **CAUTION:**

Never disassemble joints.



#### Center Bearing

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

#### Never disassemble center bearing.

#### INSPECTION AFTER INSTALLATION

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

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

< SERVICE DATA AND SPECIFICATIONS (SDS)

[REAR PROPELLER SHAFT: 3F80A-1VL107]

# SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS)

# **General Specifications**

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		AWD	
Applied model		VQ37VHR	
		A/T	
Propeller shaft model		3F80A-1VL107	DLN
Number of joints		3	
	1st joint	Shell type	
Type of journal bearings (Non-disassembly type)	2nd joint	Shell type	E
(Non disassembly type)	3rd joint	Rebro joint type	
Coupling method with transfe	er	Flange type	F
Coupling method with rear fir	nal drive	Rebro joint type	
Ob off long the	1st (Spider to spider)	455 mm (17.91 in)	
Shaft length	2nd (Spider to rebro joint center)	735 mm (28.94 in)	G
Shaft outer diameter	1st	82.6 mm (3.252 in)	
Shart outer diameter	2nd	75.0 mm (2.953 in)	Н

## **Propeller Shaft Runout**

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	Unit: mm (in)
Item	Limit
Propeller shaft runout	0.8 (0.031)

# Journal Axial Play

INFOID:0000000010580478

	Unit: mm (in)
Item	Standard
Journal axial play	0 (0)

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## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING [REAR PROPELLER SHAFT: 3F-R-2VL107]

# SYMPTOM DIAGNOSIS

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

# **NVH Troubleshooting Chart**

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	e cause of the symptom	. 11 110000	, , , , , , , , , , , , , , , , , , ,						ion.						
Reference		DLN-139, "Inspection"	DLN-143, "Inspection"	I	DLN-143, "Inspection"	I	DLN-139, "Inspection"	DLN-139, "Inspection"	NVH of FRONT and REAR FINAL DRIVE in this section.	NVH in FAX, RAX, FSU and RSU section.	NVH in WT section.	NVH in WT section.	NVH in FAX and RAX section.	NVH in BR section.	NVH in ST section.
Possible cause and SUSPI	ECTED PARTS	Uneven rotating torque	Center bearing improper installation	Excessive center bearing axial end play	Center bearing mounting (insulator) cracks, damage or deterioration	Excessive joint angle	Rotation imbalance	Excessive runout	DIFFERENTIAL	AXLE AND SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
		Une	Cer	Ĕ	Ö	Ш	œ	ш		_ ⋖		ľ		B	S
	Noise	×	×	×	×	×	×	×	×	×	×	×	<ul><li>□</li><li>×</li></ul>	×	×
Symptom	Noise Shake Vibration														

x: Applicable

# PRECAUTION

## **PRECAUTIONS**

## **Precautions for Removing Battery Terminal**

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

#### NOTE:

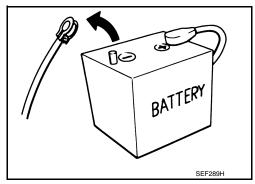
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

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

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

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

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



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## **PREPARATION**

< PREPARATION >

[REAR PROPELLER SHAFT: 3F-R-2VL107]

# **PREPARATION**

# **PREPARATION**

**Commercial Service Tools** 

INFOID:0000000010580480

Tool name		Description
Power tool		Loosening bolts and nuts
	PBIC0190E	

< PERIODIC MAINTENANCE >

[REAR PROPELLER SHAFT: 3F-R-2VL107]

# PERIODIC MAINTENANCE

## REAR PROPELLER SHAFT

Inspection INFOID:000000010580481

#### **NOISE**

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

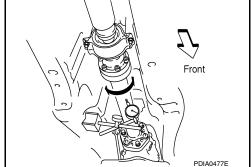
#### **VIBRATION**

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

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

Propeller shaft runout

: Refer to <u>DLN-145</u>, "Propeller Shaft Runout".



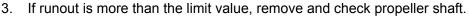
Propeller shaft runout measuring point (Point "△")

⟨□: Vehicle front

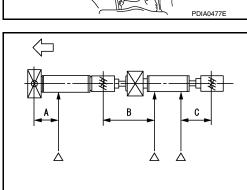
**Dimension** A: 162 mm (6.38 in)

B: 270 mm (10.63 in) C: 185 mm (7.28 in)

 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.



4. Check the vibration by driving vehicle.



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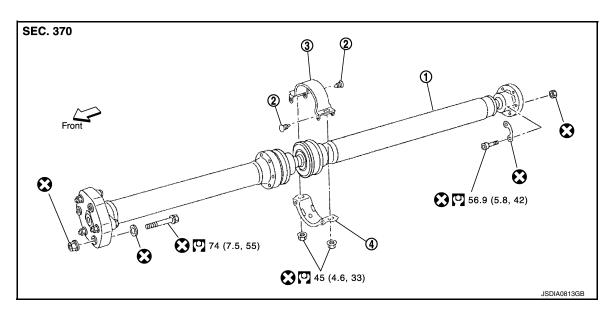
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# REMOVAL AND INSTALLATION

## REAR PROPELLER SHAFT

Exploded View



- 1. Propeller shaft assembly
- 2. Clip

3. Center bearing mounting bracket (upper)

4. Center bearing mounting bracket (lower)

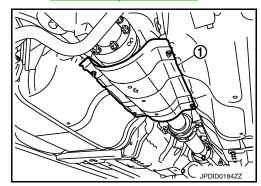
Refer to GI-4, "Components" for symbols in the figure.

#### Removal and Installation

INFOID:0000000010580483

#### **REMOVAL**

- 1. Shift the transmission to the neutral position, and release the parking brake.
- 2. Remove exhaust front tube and center muffler with power tool. Refer to EX-10. "Exploded View".
- 3. Remove the heat plate (1).



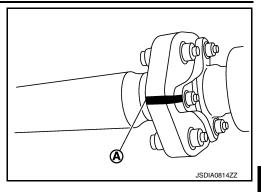
#### < REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 3F-R-2VL107]

4. Put matching marks (A) on propeller shaft rubber coupling and transfer companion flange.

#### **CAUTION:**

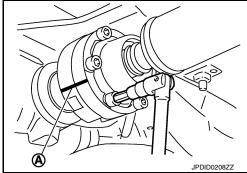
For matching marks, use paint. Never damage propeller shaft rubber coupling and transfer companion flange.



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

#### **CAUTION:**

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



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

#### **CAUTION:**

Tighten mounting nuts temporarily.

7. Remove propeller shaft assembly fixing bolts and nuts.

#### **CAUTION:**

Never remove the rubber coupling from the propeller shaft assembly.

Slightly separate the rubber coupling from transfer companion flange.

#### **CAUTION:**

Never damage transfer companion flange and rubber coupling.

9. Remove center bearing mounting bracket fixing nuts.

#### **CAUTION:**

• The angle (A) is the first axis rubber coupling (1) forms with the transfer companion flange (2). Never bend rubber coupling above the angle (A).



- Never damage grease seal (3).
- Never damage rubber coupling.
- 10. Remove propeller shaft assembly.

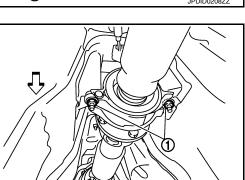
#### **CAUTION:**

If constant velocity joint was bent during propeller shaft assembly removal, installation, or transportation, its boot may be damaged. Wrap boot interference area to metal part with shop cloth or equivalent to protect boot from breakage.

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

#### INSTALLATION

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



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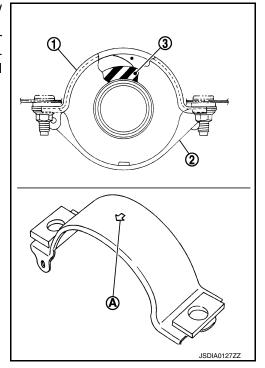
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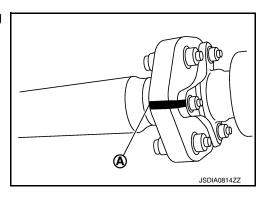
### < REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 3F-R-2VL107]

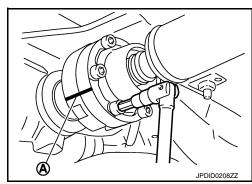
- Install center bearing mounting bracket (upper) (1) with its arrow mark (A) facing forward.
- Adjust position of center bearing mounting bracket (upper), center bearing mounting bracket (lower) (2) sliding back and forth to prevent play in thrust direction of center bearing insulator (3). Install center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



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



 Align matching marks (A) to install propeller shaft rebro joint and final drive companion flange.

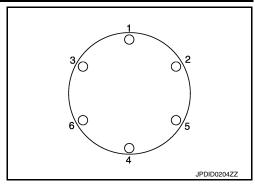


**CAUTION:** 

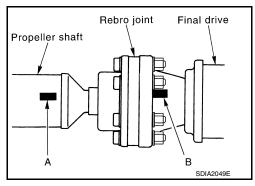
### < REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 3F-R-2VL107]

- Tighten mounting bolt and nut in the order shown in the figure.
- Avoid damaging the rebro joint boot, protect it with a shop towel or equivalent.



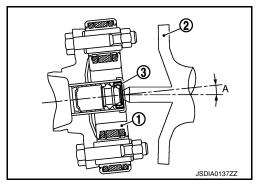
- If propeller shaft or final drive has been replaced, connect them as follows:
- Install the propeller shaft while aligning its matching mark (A) with the matching mark (B) on the joint as close as possible.
- Preform inspection after installation. Refer to <u>DLN-143</u>, "Inspection".



#### **CAUTION:**

 The angle (A) is the first axis rubber coupling (1) forms with the transfer companion flange (2). Never bend rubber coupling above the angle (A).

- Never damage grease seal (3).
- Never damage rubber coupling.



Inspection

### **INSPECTION AFTER REMOVAL**

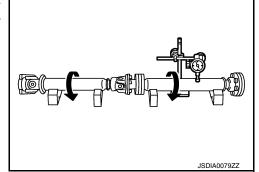
#### **Appearance**

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

#### Propeller Shaft Runout

Check propeller shaft runout at measuring points with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly. For measuring point, refer to <u>DLN-139</u>, "Inspection".

Propeller shaft runout : Refer to <u>DLN-145, "Propeller</u> Shaft Runout".



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#### < REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 3F-R-2VL107]

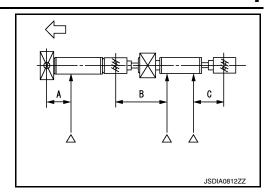
• Propeller shaft runout measuring point (Point "△")

∀
 ∴ Vehicle front

**Dimension** A: 162 mm (6.38 in)

B: 270 mm (10.63 in)

C: 185 mm (7.28 in)



#### Center Bearing

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

#### Never disassemble center bearing.

#### INSPECTION AFTER INSTALLATION

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

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

< SERVICE DATA AND SPECIFICATIONS (SDS)

[REAR PROPELLER SHAFT: 3F-R-2VL107]

# SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS)

# **General Specifications**

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Α

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		AWD		
Applied model		VK50VE		
		A/T		
Propeller shaft model		3F-R-2VL107	DLN	
Number of joints		3		
	1st joint	Rubber coupling type		
Type of journal bearings (Non-disassembly type)	2nd joint	Rebro joint type	type	
(Non diadocombly type)	3rd joint	Rebro joint type		
Coupling method with transfer		Rubber coupling type	F	
Coupling method with rear final drive		Rebro joint type		
Chaft langth	1st (Rubber coupling center to rebro joint center)	444 mm (17.48 in)	G	
Shaft length	2nd (Rebro joint center to rebro joint center)	717 mm (28.23 in)		
Chaft autor diameter	1st	82.6 mm (3.252 in)	Н	
Shaft outer diameter	2nd	82.6 mm (3.252 in)		

# Propeller Shaft Runout

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	Unit: mm (in)
Item	Limit
Propeller shaft runout	0.8 (0.031)

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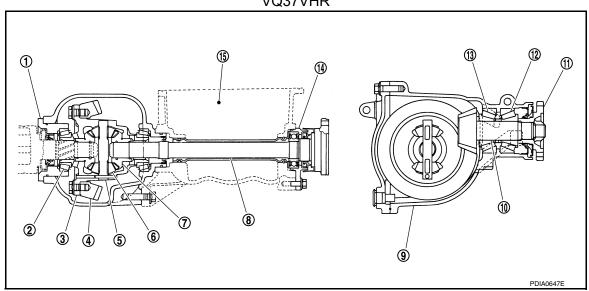
# SYSTEM DESCRIPTION

# FRONT FINAL DRIVE ASSEMBLY

System Diagram

**CROSS-SECTIONAL VIEW** 

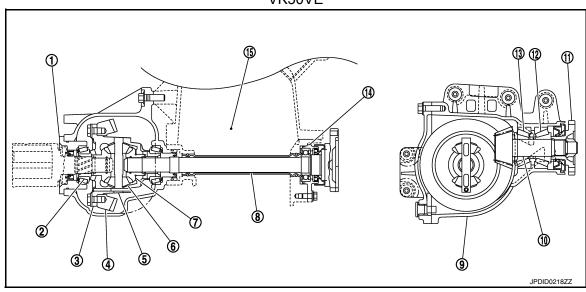
### VQ37VHR



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

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

### VK50VE



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

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

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

[FRONT FINAL DRIVE: F160A]

< SYMPTOM DIAGNOSIS >

# SYMPTOM DIAGNOSIS

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

# **NVH Troubleshooting Chart**

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

Reference		DLN-178, "Inspection After Disassembly"	DLN-174, "Adjustment"	DLN-178, "Inspection After Disassembly"	DLN-174, "Adjustment"	DLN-174, "Adjustment"	DLN-153, "Inspection"	NVH of FRONT and REAR PROPELLER SHAFT in this section.	NVH in FAX, RAX, FSU and RSU sections.	NVH in WT section.	NVH in WT section.	NVH in FAX and RAX section.	NVH in BR section.	NVH in ST section.
Possible cause and SUSPECTED PARTS		Gear tooth rough	Gear contact improper	Tooth surfaces worn	Backlash incorrect	Companion flange excessive runout	Gear oil improper	PROPELLER SHAFT	AXLE AND SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
Symptom	Noise	×	×	×	×	×	×	×	×	×	×	×	×	×

<sup>×:</sup> Applicable

Revision: 2015 February DLN-147 2015 QX70

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### [FRONT FINAL DRIVE: F160A]

# **PRECAUTION**

### **PRECAUTIONS**

### Service Notice or Precautions for Front Final Drive

INFOID:0000000010580489

### **CAUTION:**

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

### NOTE:

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

# Precautions for Removing Battery Terminal

INFOID:0000000011009316

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

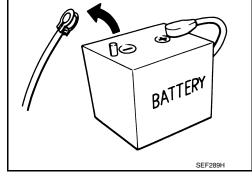
### NOTE:

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.

# [FRONT FINAL DRIVE: F160A]

# **PREPARATION**

# **PREPARATION**

**Special Service Tools** 

INFOID:0000000010580490

Α

Fool number	ay differ from those of special service tools illustr	
TechMate No.) Tool name		Description
V381054S0 J-34286) Puller	ZZA0601D	Removing side oil seal (right side)     Removing side bearing outer race
T33400001 I-26082) rift		Installing side oil seal (right side)     Installing front oil seal
: 60 mm (2.36 in) dia. : 47 mm (1.85 in) dia.	a b	
V38102100	ZZA0702D	Installing side oil seal (left side)
-25803-01) rift 44 mm (1.73 in) dia. 36 mm (1.42 in) dia.		g state on coan (coarses)
24.5 mm (0.965 in) dia.	ZZA1046D	
V38100200 — ) rift : 65 mm (2.56 in) dia. · 49 mm (1.93 in) dia.	ab	Installing side shaft oil seal
T20022000	ZZA1143D	. Installing side shoft
T30032000 -26010-01) rift 80 mm (3.15 in) dia. 38 mm (1.50 in) dia. 31 mm (1.22 in) dia.	a b c	<ul> <li>Installing side shaft</li> <li>Installing pinion rear bearing inner race</li> </ul>
. 01 mm (1.22 m) uia.		
V10111100 I-37228) eal cutter	S-NT107 <b>₽</b>	Removing carrier cover
	S-NT046	

# **PREPARATION**

[FRONT FINAL DRIVE: F160A]

REPARATION >		[ NOW TIMAL DINVE. 1 100A]
Tool number (TechMate No.) Tool name		Description
ST3306S001 (J-22888-D) Differential side bearing puller set 1: ST33051001 (J-22888-20) Puller 2: ST33061000 (J-8107-2) Base a: 28.5 mm (1.122 in) dia. b: 38 mm (1.50 in) dia.	2 a 1 b NT072	Removing and installing side bearing inner race
ST33230000 (J-25805-01) Drift a: 51 mm (2.01 in) dia. b: 41 mm (1.61 in) dia. c: 28.5 mm (1.122 in) dia.	ZZA1046D	Installing side bearing inner race
ST30611000 (J-25742-1) Drift bar	S-NT090	Installing side bearing outer race (Use with KV31103000)
KV31103000 (J-38982) Drift a: 49 mm (1.93 in) dia. b: 70 mm (2.76 in) dia.	a ZZA1113D	Installing side bearing outer race
ST3127S000 (J-25765-A) Preload gauge	ZZAO806D	Measuring pinion bearing preload and total preload
(J-8129) Spring gauge	NT127	Measuring turning torque

# **PREPARATION**

### < PREPARATION >

[FRONT FINAL DRIVE: F160A]

< PREPARATION >		[FRONT FINAL DRIVE: F160A]
Tool number (TechMate No.) Tool name		Description
ST37820000 ( — ) Drift a: 39 mm (1.54 in) dia. b: 72 mm (2.83 in) dia.	b a	Installing pinion front and rear bearing outer race
	ZZA0836D	
KV38102510 ( — ) Drift a: 71 mm (2.80 in) dia. b: 65 mm (2.56 in) dia.	a b	Installing front oil seal
Commercial Service Tools		INFOID:000000010580491
Tool name		Description
Flange wrench		Removing and installing drive pinion lock nut

Tool name		Description
Flange wrench		Removing and installing drive pinion lock nut
	(C)	
Puller	NT035	Removing companion flange
Replacer	ZZA0119D	Removing pinion rear bearing inner race
	ZZA0700D	

# **PREPARATION**

### < PREPARATION >

[FRONT FINAL DRIVE: F160A]

Tool name		Description
Spacer a: 60 mm (2.36 in) dia. b: 36 mm (1.42 in) dia. c: 30 mm (1.18 in)	c c zza1133D	Installing pinion front bearing inner race
Power tool	PBIC0190E	Loosening bolts and nuts

### FRONT DIFFERENTIAL GEAR OIL

< PERIODIC MAINTENANCE >

[FRONT FINAL DRIVE: F160A]

# PERIODIC MAINTENANCE

# FRONT DIFFERENTIAL GEAR OIL

Inspection INFOID:0000000010580492 В

### OIL LEAKAGE

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

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

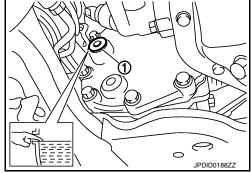
### **CAUTION:**

Never start engine while checking oil level.

· Set a gasket on filler plug and install it on final drive assembly. Refer to DLN-164, "Exploded View".

### **CAUTION:**

Never reuse gasket.



Draining

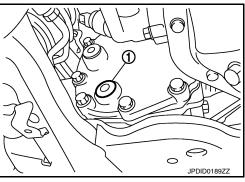
Stop engine.

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-164, "Exploded View".

### **CAUTION:**

Never reuse gasket.



Refilling INFOID:0000000010580494

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-17, "FOR

> > **NORTH AMERICA: Fluids** and Lubricants" (For North America), MA-18, "FOR **MEXICO: Fluids and Lubri**cants" (For Mexico).

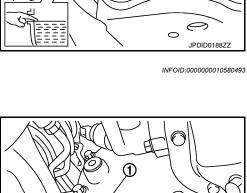
: Refer to DLN-190, "Gen-

Oil capacity eral Specifications". 0 JPDID0188ZZ

2. After refilling oil, check oil level. Set a gasket to filler plug, then install it to final drive assembly. Refer to DLN-164, "Exploded View".

### **CAUTION:**

Never reuse gasket.



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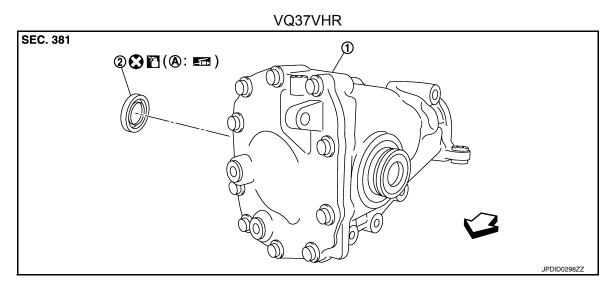
### [FRONT FINAL DRIVE: F160A]

# REMOVAL AND INSTALLATION

SIDE OIL SEAL RIGHT SIDE

RIGHT SIDE: Exploded View

INFOID:0000000010580495



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

- A: Oil seal lip
- ⟨□: Vehicle front
- : Apply gear oil.
- Apply multi-purpose grease.

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

# SEC. 381 ②❸ [A] (A): □ [A]

VK50VE

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

- A: Oil seal lip
- ∀
   : Vehicle front
- : Apply gear oil.
- Apply multi-purpose grease.

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

[FRONT FINAL DRIVE: F160A]

# RIGHT SIDE: Removal and Installation

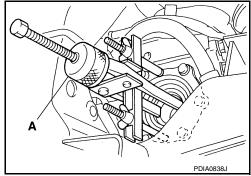
### INFOID:0000000010580496

### **REMOVAL**

- 1. Remove the front drive shaft. Refer to FAX-27, "Exploded View".
- 2. Remove the side oil seal using a puller (A) [SST: KV381054S0 (J-34286)].

### **CAUTION:**

Never damage gear carrier.

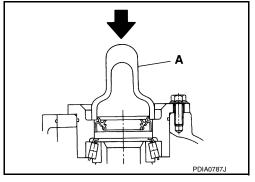


# INSTALLATION

- 1. Apply multi-purpose grease to sealing lips of side oil seal.
- 2. Using the drift (A) [SST: ST33400001 (J-26082)], press-fit side oil seal so that its surface comes face-to-face with the end surface of the side retainer.

### **CAUTION:**

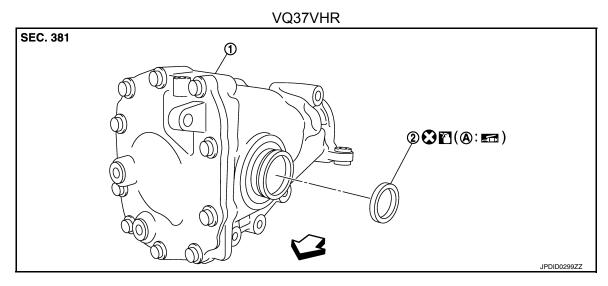
- · Never reuse oil seal.
- · When installing, never incline oil seal.
- 3. Install the front drive shaft. Refer to FAX-27, "Exploded View".
- When oil leaks while removing, check oil level after the installation. Refer to <u>DLN-153</u>, "Inspection".



### LEFT SIDE

### LEFT SIDE: Exploded View

INFOID:0000000010580497



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

- A: Oil seal lip
- ∀ : Vehicle front

?: Apply gear oil.

Revision: 2015 February DLN-155 2015 QX70

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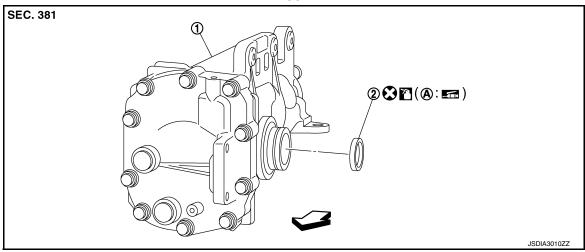
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Apply multi-purpose grease.

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

### VK50VE



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

- A: Oil seal lip
- : Vehicle front
- : Apply gear oil.
- Apply multi-purpose grease.

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

### LEFT SIDE: Removal and Installation

INFOID:0000000010580498

### REMOVAL

 Remove the front final drive assembly from vehicle with power tool. Refer to <u>DLN-157</u>, "VQ37VHR : <u>Exploded View"</u> (VQ37VHR), <u>DLN-158</u>, "VK50VE : <u>Exploded View"</u> (VK50VE).
 NOTE:

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

Remove the side oil seal using a suitable tool.

### **CAUTION:**

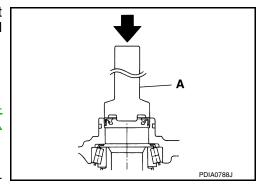
Never damage gear carrier.

### INSTALLATION

- 1. Apply multi-purpose grease to sealing lips of side oil seal.
- Using the drift (A) [SST: KV38102100 (J-25803-01)], press-fit side oil seal so that its surface comes face-to-face with the end surface of the gear carrier.

### **CAUTION:**

- · Never reuse oil seal.
- · When installing, never incline oil seal.
- 3. Install the front final drive assembly on vehicle. Refer to <u>DLN-157</u>, "VQ37VHR : <u>Exploded View"</u> (VQ37VHR), <u>DLN-158</u>, "VK50VE : Exploded View" (VK50VE).
- 4. Install the front drive shaft. Refer to FAX-27, "Exploded View".
- 5. When oil leaks while removing, check oil level after the installation. Refer to <u>DLN-153</u>, "Inspection".



# UNIT REMOVAL AND INSTALLATION

# FRONT FINAL DRIVE ASSEMBLY

VQ37VHR

VQ37VHR: Exploded View

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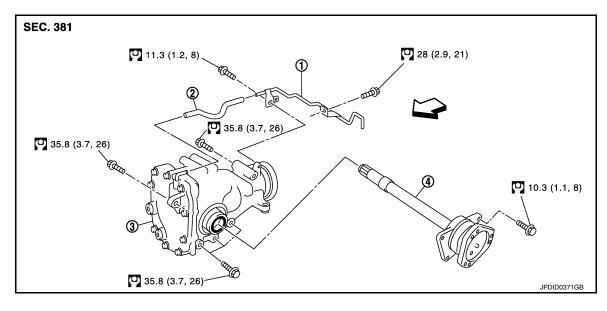
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1. Breather tube

2. Breather hose

3. Front final drive assembly

4. Side shaft

⟨□: Vehicle front

Refer to GI-4, "Components" for symbols in the figure.

# VQ37VHR: Removal and Installation

INFOID:0000000010580500

### **REMOVAL**

- 1. Remove engine assembly from the vehicle. Refer to EM-78, "AWD: Removal and Installation".
- Separate engine assembly and suspension member.
- 3. Remove engine mounting bracket (RH) (lower). Refer to EM-77, "AWD: Exploded View".
- 4. Remove air breather hose and tube.
- Remove side shaft.
- 6. Remove final drive assembly mounting bolts with power tool and separate front final drive assembly from engine.

### INSTALLATION

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

• When installing the side shaft, apply multi-purpose grease to contact surface of side shaft and side shaft oil seal.

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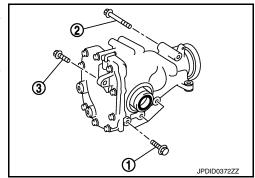
### FRONT FINAL DRIVE ASSEMBLY

### < UNIT REMOVAL AND INSTALLATION >

[FRONT FINAL DRIVE: F160A]

Tighten mounting bolts in the order described below when installing front final drive assembly: side of gear carrier (1), upper side of gear carrier (2), part of carrier cover (3).
 CAUTION:

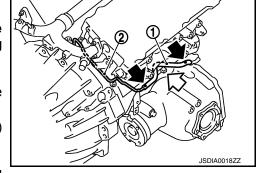
Align the mating faces of gear carrier and oil pan for installation.



Install breather hose (1) and tube (2) as shown in the figure.
 CAUTION:

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

- Make sure the paint mark facing up (-).
- Securely install the hose until it seats the rounded portion of the tube. ( (front final drive assembly side).
- Securely install the hose until it to paint mark of the tube. ( (vehicle rear side).
- Face the bend of the breather hose (<□) to the engine.
- When oil leaks while removing final drive assembly, check oil level after the installation. Refer to <u>DLN-153</u>, "Inspection".



VK50VE

VK50VE: Exploded View

SEC. 381

(7) 5.1
(0.52, 45)

(7) 35.8
(3.7, 26)
(2.9, 21)
(3)
(3.7, 26)
(4)
(5)
(1.1, 8)
(1.1, 8)
(1.1, 8)

- Breather tube
- 4. Breather hose7. Side shaft

- Breather hose
- 5. Front final drive assembly
- 3. Breather tube
- 6. Bushing

∀
 : Vehicle front

Refer to GI-4, "Components" for symbols in the figure.

VK50VE : Removal and Installation

INFOID:0000000010580502

INFOID:0000000010580501

REMOVAL

### FRONT FINAL DRIVE ASSEMBLY

### < UNIT REMOVAL AND INSTALLATION >

[FRONT FINAL DRIVE: F160A]

- Remove engine assembly from the vehicle. Refer to EM-207, "Removal and Installation".
- 2. Separate engine assembly and suspension member.
- 3. Remove air breather hose and tube.
- 4. Remove side shaft.
- 5. Remove final drive assembly mounting bolts with power tool and separate front final drive assembly from engine.

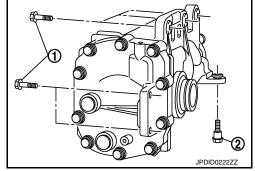
### INSTALLATION

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

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

### **CAUTION:**

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



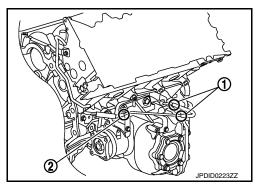
When installing breather hose and tube, refer to the figure.
 CAUTION:

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

- Securely install the hose until it seats the spool position (1) of the tube (front final drive assembly side).
- Be sure to insert transfer air breather hose into breather tube until hose end reaches the breather tube bracket (2) (vehicle rear side).
   CAUTION:

Never reuse air breather hose (vehicle rear side).

 When oil leaks while removing final drive assembly, check oil level after the installation. Refer to <u>DLN-153</u>, "Inspection".



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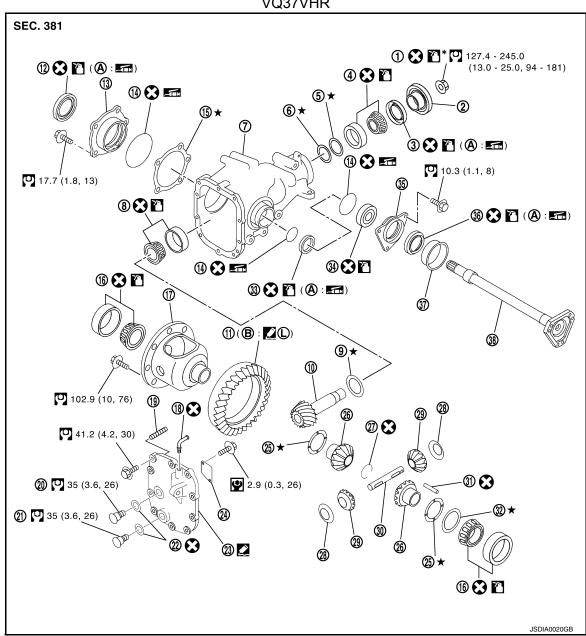
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# **UNIT DISASSEMBLY AND ASSEMBLY**

# SIDE SHAFT

**Exploded View** INFOID:0000000010580503

### VQ37VHR



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

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

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

### SIDE SHAFT

### < UNIT DISASSEMBLY AND ASSEMBLY >

### [FRONT FINAL DRIVE: F160A]

- 31. Lock pin
- 34. Side shaft bearing
- 37. Dust seal
- Oil seal lip

- 32. Side bearing adjusting washer
- 35. Extension tube retainer
- 38. Side shaft
- B: Screw hole

- 33. Side oil seal (left side)
- 36. Side shaft oil seal

: Apply gear oil.

★: Apply anti-corrosion oil.

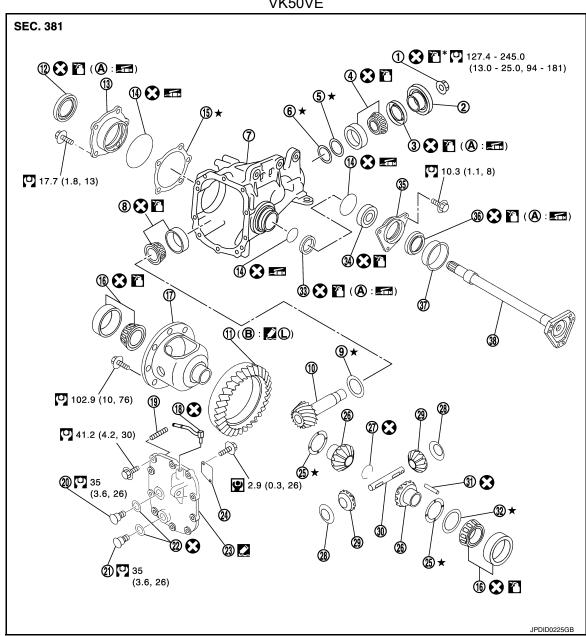
Apply multi-purpose grease.

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

Apply Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

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

### VK50VE



- 1. Drive pinion lock nut
- Pinion front bearing
- 2. Companion flange
- 3. Front oil seal
- Drive pinion bearing adjusting wash- 6. 5.
- Drive pinion adjusting washer

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### SIDE SHAFT

### < UNIT DISASSEMBLY AND ASSEMBLY >

### [FRONT FINAL DRIVE: F160A]

UIVI	JNIT DISASSEMBLT AND ASSEMBLT >					
7.	Gear carrier	8.	Pinion rear bearing			
10.	Drive pinion	11.	Drive gear			
13.	Side retainer	14.	O-ring			
16.	Side bearing	17.	Differential case			
19.	Dowel pin	20.	Filler plug			
22.	Gasket	23.	Carrier cover			
25.	Side gear thrust washer	26.	Side gear			
28.	Pinion mate thrust washer	29.	Pinion mate gear			
31.	Lock pin	32.	Side bearing adjusting washer			
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34. Side shaft bearing
35. Extension tube retainer
37. Dust seal
38. Side shaft
A: Oil seal lip
B: Screw hole

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

: Apply gear oil.

★: Apply anti-corrosion oil.

Apply multi-purpose grease.

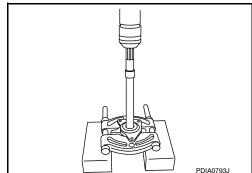
Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

Apply Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

Refer to  $\underline{\text{GI-4.}}$  "Components" for symbols not described above.

Disassembly INFOID:000000010580504

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

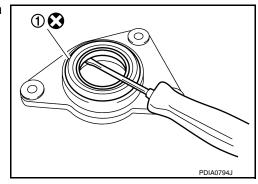


2. Remove side shaft oil seal (1) from extension tube retainer with a suitable tool.

### **CAUTION:**

Never damage extension tube retainer.

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



[FRONT FINAL DRIVE: F160A]

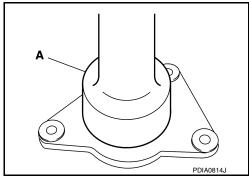
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1. Using the drift (A) [SST: KV38100200 ( — )], install side shaft [

### **CAUTION:**

Assembly

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



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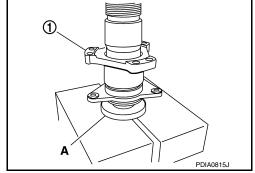
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- Support side shaft bearing with the drift (A) [SST: ST30032000 (J-26010-01)], then press side shaft (1) into the side shaft bearing using a press.
- Apply multi-purpose grease to O-ring, and install it to extension tube retainer.

### **CAUTION:**

Never reuse O-ring.



INFOID:0000000010580506

### Inspection After Disassembly

### DRIVE GEAR AND DRIVE PINION

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

### BEARING

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

### SIDE GEAR AND PINION MATE GEAR

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

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

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

### OIL SEAL

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

### DIFFERENTIAL CASE

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

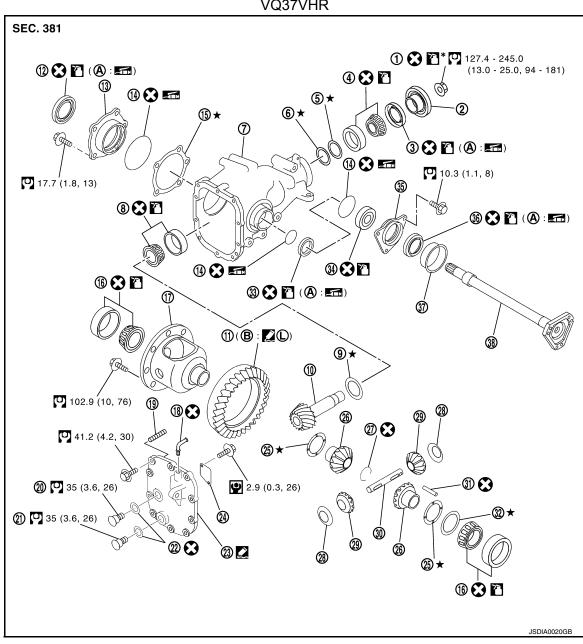
### COMPANION FLANGE

- · Clean up the disassembled parts.
- 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.

Revision: 2015 February DLN-163 2015 QX70

**Exploded View** INFOID:0000000010580507

### VQ37VHR



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

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

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

### < UNIT DISASSEMBLY AND ASSEMBLY >

### [FRONT FINAL DRIVE: F160A]

34. Side shaft bearing

35. Extension tube retainer

36. Side shaft oil seal

37. Dust seal

38. Side shaft

Oil seal lip

B: Screw hole

: Apply gear oil.

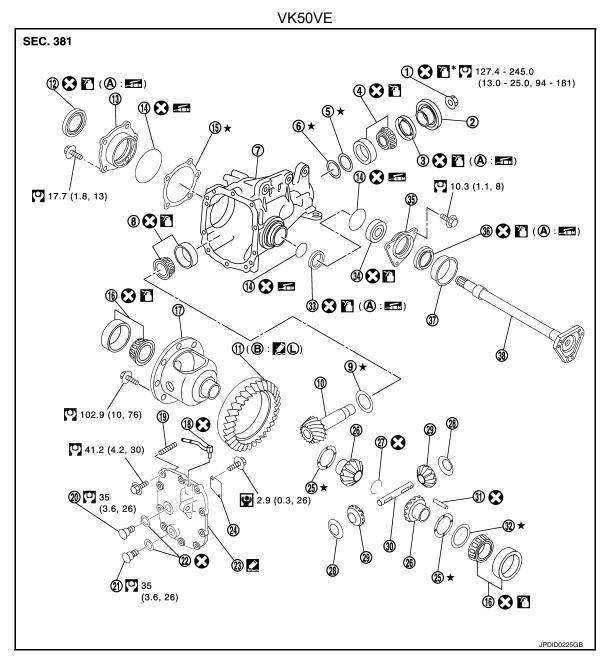
★: Apply anti-corrosion oil.

Apply multi-purpose grease.

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

Apply Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

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



- 1. Drive pinion lock nut
- Pinion front bearing

7.

- 2. Companion flange
- 5. Drive pinion bearing adjusting wash- 6.
- 8. Pinion rear bearing Gear carrier
- 3. Front oil seal
- Drive pinion adjusting washer
- 9. Pinion height adjusting washer

**DLN-165 Revision: 2015 February** 2015 QX70 DLN

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11. Drive gear

20. Filler plug

26. Side gear

38. Side shaft

B: Screw hole

23. Carrier cover

17. Differential case

29. Pinion mate gear

35. Extension tube retainer

14. O-ring

### < UNIT DISASSEMBLY AND ASSEMBLY >

### [FRONT FINAL DRIVE: F160A]

12. Side oil seal (right side) 15. Side bearing adjusting shim

18. Breather connector

24. Gear oil defense

30. Pinion mate shaft

33. Side oil seal (left side) 36. Side shaft oil seal

21. Drain plug

27. Circular clip

10.	Drive pinion
13.	Side retainer
16.	Side bearing
19	Dowel pin

- 19. Dowel pin 22. Gasket 25. Side gear thrust washer
- 28. Pinion mate thrust washer 31. Lock pin 34. Side shaft bearing
- 37. Dust seal A: Oil seal lip
- : Apply gear oil.
- ★: Apply anti-corrosion oil. Apply multi-purpose grease.
- Apply Genuine Silicone RTV or equivalent. Refer to GI-24. "Recommended Chemical Products and Sealants".
- Apply Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-24. "Recommended Chemical Products and Sealants".

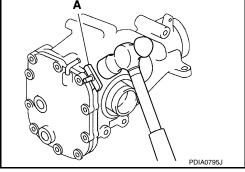
32. Side bearing adjusting washer

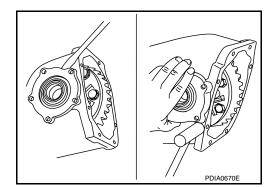
Refer to GI-4, "Components" for symbols not described above.

Disassembly INFOID:0000000010580508

- 1. Drain gear oil, if necessary.
- Remove carrier cover mounting bolts.
- 3. Remove carrier cover to insert the seal cutter (A) [SST: KV10111100 (J-37228)] between gear carrier and carrier cover. **CAUTION:** 
  - Never damage the mating surface.
  - · Never insert flat-bladed screwdriver, this may damage the mating surface.
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- 4. Remove side retainer.
- 5. Remove side bearing adjusting shim.
- Remove O-ring from side retainer.

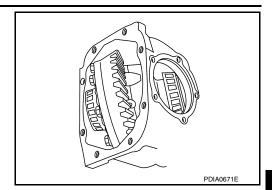




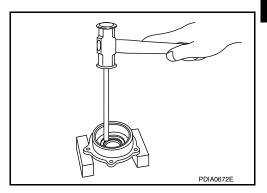
### < UNIT DISASSEMBLY AND ASSEMBLY >

### [FRONT FINAL DRIVE: F160A]

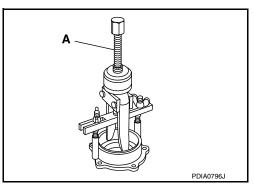
7. Remove differential case assembly from gear carrier.



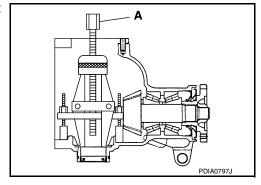
8. Remove side oil seal (right side) from side retainer.



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



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



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### < UNIT DISASSEMBLY AND ASSEMBLY >

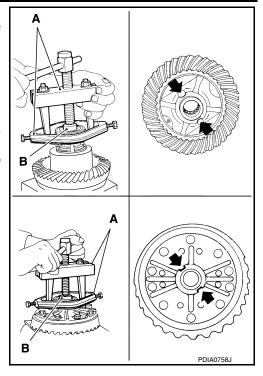
[FRONT FINAL DRIVE: F160A]

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

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

### **CAUTION:**

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



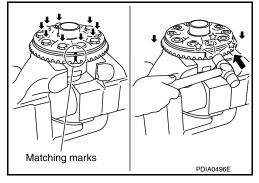
14. For proper reinstallation, paint matching marks on one differential case assembly.

### **CAUTION:**

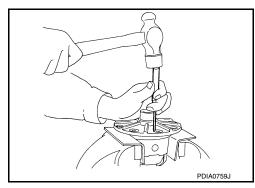
For matching marks, use paint. Never damage differential case and drive gear.

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

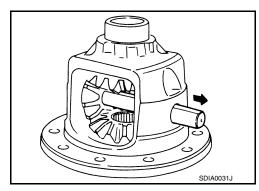
Tap evenly all around to keep drive gear from bending.



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



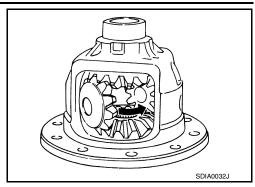
18. Remove pinion mate shaft.



### < UNIT DISASSEMBLY AND ASSEMBLY >

### [FRONT FINAL DRIVE: F160A]

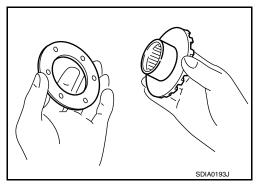
19. Turn pinion mate gear, then remove pinion mate gears, pinion mate thrust washers, side gears and side gear thrust washers from differential case.



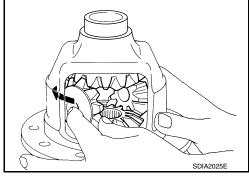
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Assembly

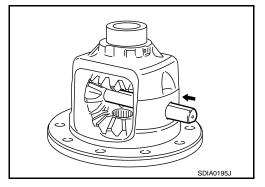
1. Install side gear thrust washers with the same thickness as the ones installed prior to disassembly or reinstall the old ones on the side gears.



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



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



5. Measure side gear end play. If necessary, select the appropriate side gear thrust washers.

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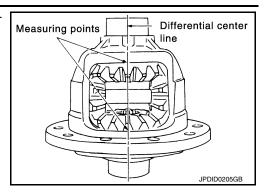
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### < UNIT DISASSEMBLY AND ASSEMBLY >

[FRONT FINAL DRIVE: F160A]

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



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

### **Standard**

Side gear back clearance : Refer to <u>DLN-190, "Differ-</u>

ential Side Gear Clear-

ance".

### **CAUTION:**

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

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

When the back clearance Use

is large:

When the back clearance

is small:

Use a thicker thrust washer.

Use a thinner thrust wash-

er.

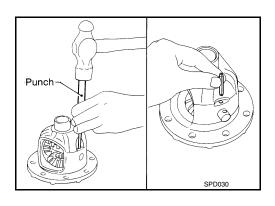
### CAUTION:

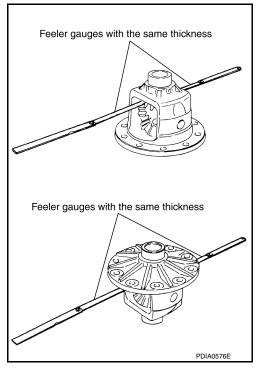
**CAUTION:** 

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.

Never reuse lock pin.

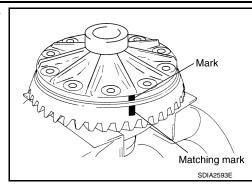




### < UNIT DISASSEMBLY AND ASSEMBLY >

### [FRONT FINAL DRIVE: F160A]

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

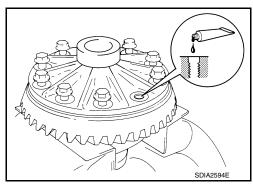


8. Apply thread locking sealant into the thread hole of drive gear.

 Use Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

### **CAUTION:**

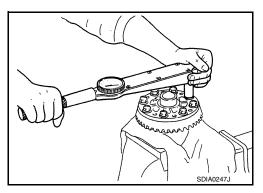
Drive gear back and threaded holes must be cleaned and degreased sufficiently.



9. Install drive gear on the mounting bolts.

### **CAUTION:**

Tighten bolts in a crisscross fashion.

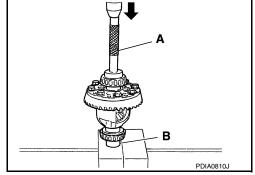


 Press side bearing inner races to differential case, using the drift (A) and the base (B).

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

### **CAUTION:**

Never reuse side bearing inner race.

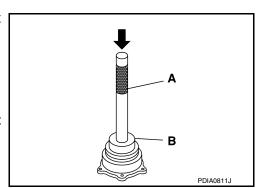


11. Press-fit side bearing outer race into side retainer with the drift bar (A) and the drift (B).

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

### **CAUTION:**

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



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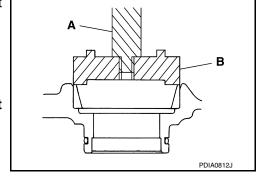
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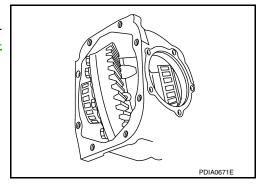
- 12. Press-fit side bearing outer race into gear carrier with the drift bar (A) and the drift (B).
  - A: Drift bar [SST: ST30611000 (J-25742-1)]
  - B: Drift [SST: KV31103000 (J-38982)]

### **CAUTION:**

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



- 13. Place the differential case assembly into gear carrier.
- 14. Measure side bearing preload. If necessary, select the appropriate side bearing adjusting shim. Refer to <a href="DLN-174">DLN-174</a>. "Adjustment".

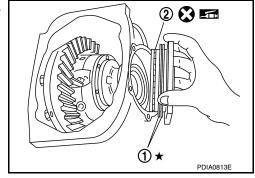


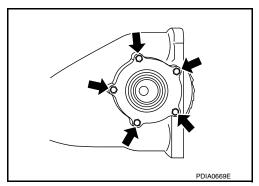
- 15. Install selected side bearing adjusting shim (1). Refer to <u>DLN-174, "Adjustment"</u>.
  - 2 : O-ring
- 16. Apply multi-purpose grease to O-ring, and install it to side retainer.

### **CAUTION:**

### Never reuse O-ring.

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

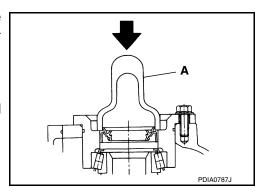




19. Using the drift (A) [SST: ST33400001 (J-26082)], press-fit side oil seal so that its surface comes face-to-face with the end surface of the side retainer.

### **CAUTION:**

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



### < UNIT DISASSEMBLY AND ASSEMBLY >

[FRONT FINAL DRIVE: F160A]

 Using the drift (A) [SST: KV38102100 (J-25803-01)], press-fit side oil seal so that its surface comes face-to-face with the end surface of gear carrier.

### **CAUTION:**

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

# oil r-

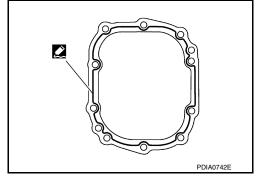
### **CAUTION:**

Never reuse O-ring.

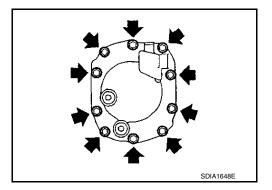
- 22. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to <a href="DLN-174">DLN-174</a>, "Adjustment".
  - Recheck above items. Readjust as described above, if necessary.
- 23. Apply sealant to mating surface of carrier cover.
  - Use Genuine Silicone RTV or equivalent. Refer to <u>GI-24</u>, <u>"Recommended Chemical Products and Sealants"</u>.

### **CAUTION:**

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



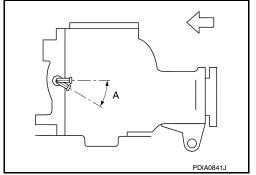
24. Install carrier cover on gear carrier and tighten mounting bolts.



- 25. Set breather connector angle (A) as shown in the figure.
  - VQ37VHR

∀
 : Vehicle front

A :  $0 - 30^{\circ}$ 



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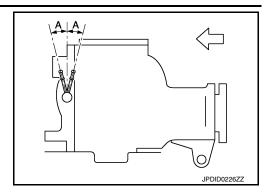
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### < UNIT DISASSEMBLY AND ASSEMBLY >

VK50VE

∀ : Vehicle front

A : 0 - 15°



[FRONT FINAL DRIVE: F160A]

Adjustment INFOID:000000010580510

### TOTAL PRELOAD TORQUE

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

**Standard** 

Total preload torque : Refer to <u>DLN-190, "Preload Torque".</u>

### 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.



On pinion bearings: Decrease the drive pinion bearing adjusting washer and drive pinion

adjusting washer thickness.

On side bearings: Increase the side bearing adjusting shim thickness. For selecting ad-

justing washer, refer to the latest parts information.

When the preload torque is small

On pinion bearings: Increase the drive pinion bearing adjusting washer and drive pinion

adjusting washer thickness.

On side bearings: Decrease the side bearing adjusting shim thickness. For selecting ad-

justing washer, refer to the latest parts information.

### SIDE BEARING PRELOAD

Before inspection and adjustment, drain gear oil.

1. Remove carrier cover and side retainer. Refer to <a href="DLN-166">DLN-166</a>, "Disassembly".

2. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.

### < UNIT DISASSEMBLY AND ASSEMBLY >

[FRONT FINAL DRIVE: F160A]

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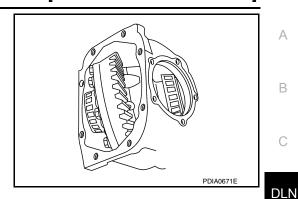
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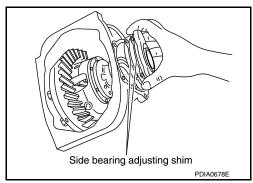
Place the differential case assembly into gear carrier.



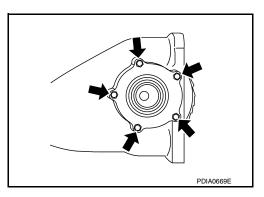
Install side bearing adjusting shim before disassembling or shim which thickness is the same as the one before disassembling.

Install side retainer assembly to gear carrier. CAUTION:

Never install O-ring.



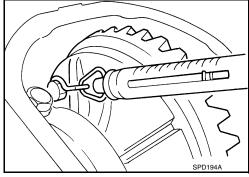
Install side retainer mounting bolts to the specified torque.



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

**Specification** 

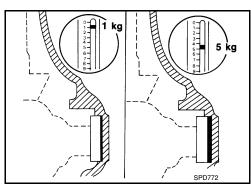
: 34.2 - 39.2 N (3.5 - 4.0 kg, 7.7 - 8.8 lb) of pulling force at the drive gear bolt



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

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

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



2015 QX70

**Revision: 2015 February** 

**DLN-175** 

### < UNIT DISASSEMBLY AND ASSEMBLY >

### **DRIVE GEAR RUNOUT**

- 1. Remove carrier cover. Refer to DLN-166, "Disassembly".
- 2. Fit a dial indicator to the drive gear back face.
- 3. Rotate the drive gear to measure runout.

Limit

Drive gear runout : Refer to <u>DLN-190, "Drive</u> Gear Runout".

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

Replace drive gear and drive pinion gear as a set.

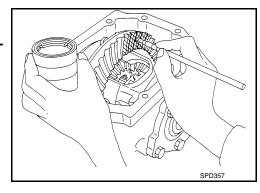
### TOOTH CONTACT

Before inspection and adjustment, drain gear oil.

- 1. Remove carrier cover. Refer to <u>DLN-166</u>, "<u>Disassembly</u>".
- 2. Apply red lead to drive gear.

### **CAUTION:**

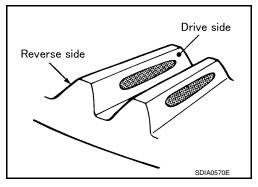
Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on drive gear.

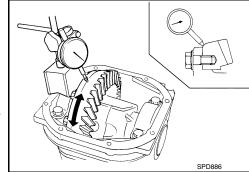


3. Rotate drive gear back and forth several times, check drive pinion gear to drive gear tooth contact.

### **CAUTION:**

Check tooth contact on drive side and reverse side.



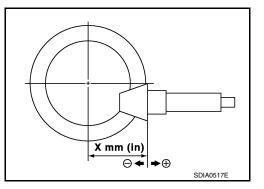


[FRONT FINAL DRIVE: F160A]

### [FRONT FINAL DRIVE: F160A]

Tooth contact pattern						
Back side		Drive		Pinion height adjusting washer selection value [mm(in)]	Adjustment requirement (Yes/No)	
Heel side To	oe side	Toe side	Heel side	SCISSION VALUE (IIIII (111))	(163/110)	
				+0. 15 (+0. 0059)		
				+0. 12 (+0. 0047)	Yes	
	<u></u>			+0. 09 (+0. 0035)		
				+0.06 (+0.0024)		
				+0. 03 (+0. 0012)		
				0	No	
			***	-0. 03 (-0. 0012)		
	»			-0. 06 (-0. 0024)		
	»	- «A	***	-0. 09 (-0. 0035)		
	$\supset$		<b>**</b>	-0. 12 (-0. 0047)	Yes	
- splitte.			****	-0. 15 (-0. 0059)		

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



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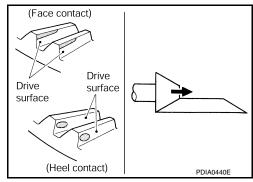
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### < UNIT DISASSEMBLY AND ASSEMBLY >

[FRONT FINAL DRIVE: F160A]

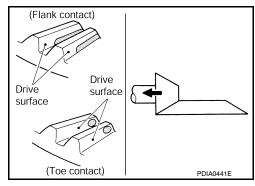
• If the tooth contact is near the face (face contact), or near the heel (heel contact), thicken pinion height adjusting washers to move drive pinion closer to drive gear.

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.

- Remove carrier cover. Refer to <u>DLN-166</u>, "<u>Disassembly</u>".
- Fit a dial indicator to the drive gear face to measure the backlash.

**Standard** 

**Backlash** 

: Refer to DLN-190, "Back-

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



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

When the backlash is small:

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



# Inspection 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).

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### < UNIT DISASSEMBLY AND ASSEMBLY >

[FRONT FINAL DRIVE: F160A]

### SIDE GEAR AND PINION MATE GEAR

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

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

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

### OIL SEAL

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

### DIFFERENTIAL CASE

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

### **COMPANION FLANGE**

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

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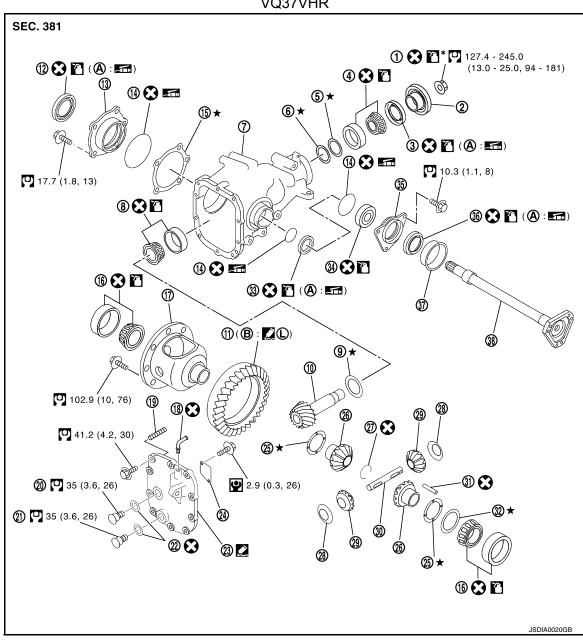
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# **DRIVE PINION**

**Exploded View** INFOID:0000000010580512

### VQ37VHR



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

- 2. Companion flange
- 5. Drive pinion bearing adjusting wash- 6.
- 8. Pinion rear bearing
- 11. Drive gear
- 14. O-ring
- 17. Differential case

29. Pinion mate gear

- 20. Filler plug
- 23. Carrier cover
- 26. Side gear
- 32. Side bearing adjusting washer

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

#### < UNIT DISASSEMBLY AND ASSEMBLY >

[FRONT FINAL DRIVE: F160A]

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34. Side shaft bearing

35. Extension tube retainer

Screw hole

36. Side shaft oil seal

37. Dust seal

38. Side shaft

B:

: Apply gear oil.

Oil seal lip

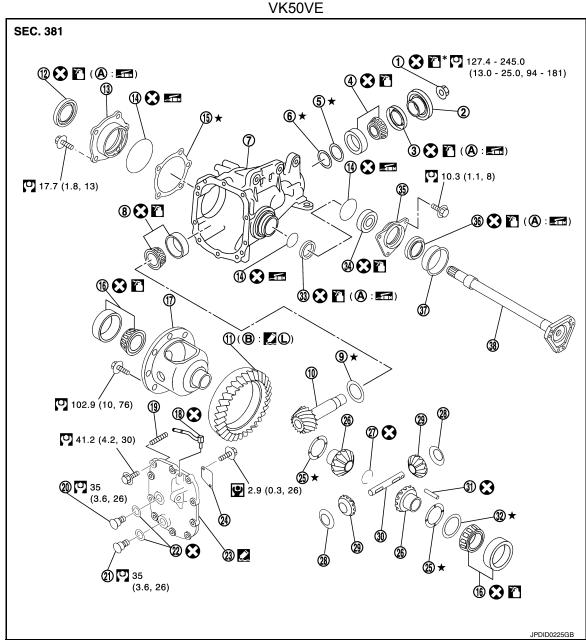
★: Apply anti-corrosion oil.

Apply multi-purpose grease.

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

Apply Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

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



- 1. Drive pinion lock nut
- Pinion front bearing
- Gear carrier

7.

- 2. Companion flange
- 5. Drive pinion bearing adjusting wash- 6.
- 8. Pinion rear bearing
- 3. Front oil seal
- Drive pinion adjusting washer
- 9. Pinion height adjusting washer

#### < UNIT DISASSEMBLY AND ASSEMBLY >

### [FRONT FINAL DRIVE: F160A]

10.	Drive pinion
13.	Side retainer
16.	Side bearing
19.	Dowel pin
22.	Gasket
~ -	

- 11. Drive gear 14. O-ring 17. Differential case 20. Filler plug 23. Carrier cover 25. Side gear thrust washer 26. Side gear 28. Pinion mate thrust washer 29. Pinion mate gear 32. Side bearing adjusting washer
- 34. Side shaft bearing 35. Extension tube retainer 37. Dust seal 38. Side shaft Oil seal lip B: Screw hole

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

: Apply gear oil.

31. Lock pin

★: Apply anti-corrosion oil.

Apply multi-purpose grease.

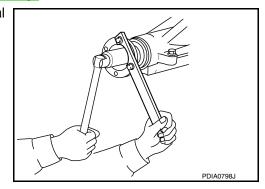
Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

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

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

Disassembly INFOID:0000000010580513

- 1. Remove differential case assembly. Refer to <a href="DLN-166">DLN-166</a>, "Disassembly".
- Remove drive pinion lock nut with a flange wrench (commercial service tool).



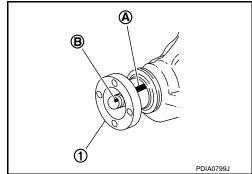
Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).

#### **CAUTION:**

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

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

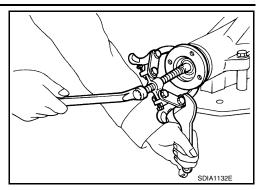
When replacing companion flange, matching mark is not necessary.



### < UNIT DISASSEMBLY AND ASSEMBLY >

#### [FRONT FINAL DRIVE: F160A]

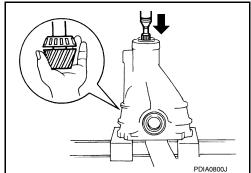
4. Remove companion flange using the suitable puller (commercial service tool).



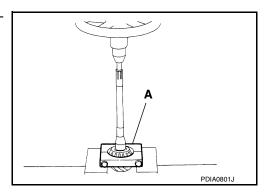
5. Press drive pinion assembly out of gear carrier. **CAUTION:** 

Never drop drive pinion assembly.

- 6. Remove front oil seal.
- 7. Remove pinion front bearing inner race.
- 8. Remove drive pinion bearing adjusting washer and drive pinion adjusting washer.



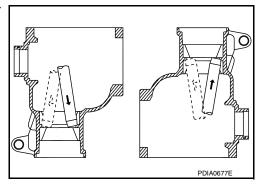
9. Remove pinion rear bearing inner race and pinion height adjusting washer with replacer (A) (commercial service tool).



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

**CAUTION:** 

Never damage gear carrier.



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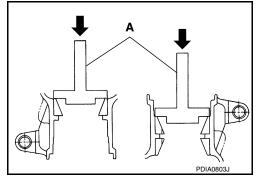
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Assembly

Install pinion front and rear bearing outer races using drift (A) [SST: ST37820000 ( — )].

#### **CAUTION:**

- At first, using a hammer, tap bearing outer race until it becomes flat to gear carrier.
- Never reuse pinion front and rear bearing outer race.



2. Temporarily install pinion height adjusting washer (1).

#### When hypoid gear set has been replaced

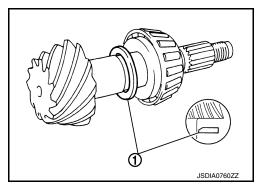
 Select pinion height adjusting washer. Refer to <u>DLN-186</u>, <u>"Adjustment"</u>.

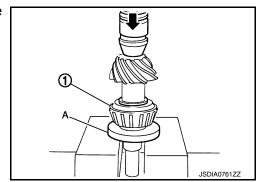
#### When hypoid gear set has been reused

 Temporarily install the removed pinion height adjusting washer or same thickness washer to drive pinion.

#### **CAUTION:**

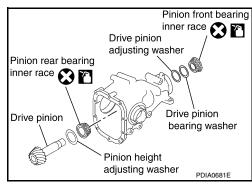
- Pay attention to the direction of pinion height adjusting washer. (Assemble as shown in the figure.)
- Never reuse pinion rear bearing inner race.
- 3. Install pinion rear bearing inner race (1) to drive pinion with the drift (A) [SST: ST30032000 (J-26010-01)].





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

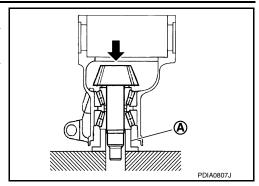
Never reuse pinion front bearing inner race.



#### < UNIT DISASSEMBLY AND ASSEMBLY >

#### [FRONT FINAL DRIVE: F160A]

- Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.
- 8. Adjust pinion bearing preload. If necessary, select the appropriate drive pinion adjusting washer and drive pinion bearing adjusting washer. Refer to <u>DLN-186</u>, "Adjustment".

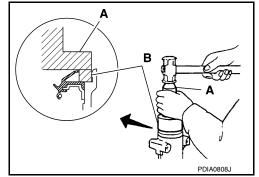


9. Using the drifts (A and B), install front oil seal as shown in figure.

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

#### **CAUTION:**

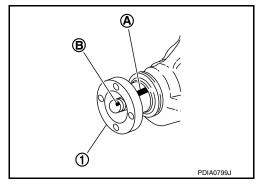
- Never reuse oil seal.
- · When installing, never incline oil seal.
- Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.



10. Install companion flange.

#### NOTE:

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



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

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

#### **CAUTION:**

#### Never reuse drive pinion lock nut.

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

#### **Standard**

Pinion bearing preload : Refer to

: Refer to <u>DLN-190, "Pre-load Torque".</u>

#### **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.
- Install differential case assembly. Refer to <u>DLN-169</u>, "Assembly".



#### Never install carrier cover yet.

- 14. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and companion flange runout. Refer to <a href="DLN-174">DLN-174</a>, "Adjustment" and <a href="DLN-186">DLN-186</a>, "Adjustment". Recheck above items. Readjust the above description, if necessary.
- 15. Check total preload torque. Refer to DLN-174, "Adjustment".
- 16. Install carrier cover. Refer to DLN-169, "Assembly".

Adjustment INFOID:000000010580515

#### PINION GEAR HEIGHT

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

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

## Washer selection equation:

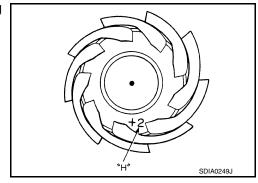
$$T = T_0 + (t_1 - t_2)$$

T: Correct washer thickness

To: Removed washer thickness

t1: Old drive pinion head letter " $H \times 0.01$ " ("H": machined tolerance 1/100 mm  $\times$  100)

t2: New drive pinion head letter "H  $\times$  0.01" ("H": machined tolerance 1/100 mm  $\times$  100)



#### **Example:**

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

To: 3.21 t1: +2 t2: -1

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

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

### **Example:**

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

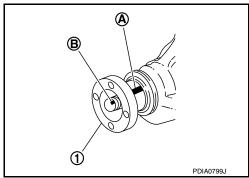
#### PINION BEARING PRELOAD

Assemble the drive pinion parts if they are disassembled. Refer to <u>DLN-184</u>, "Assembly".

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

#### NOTE:

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



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

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

#### NOTE:

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

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

#### **Standard**

Pinion bearing preload

: Refer to <u>DLN-190, "Preload Torque"</u>.

#### **CAUTION:**

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

#### When the preload torque is large:

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

**DLN-187** 

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[FRONT FINAL DRIVE: F160A]

#### When the preload is small:

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

7. Remove companion flange, after adjustment.

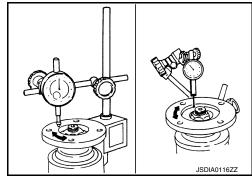
#### COMPANION FLANGE RUNOUT

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

#### Limit

Companion flange runout : Refer to <u>DLN-190, "Companion Flange Runout".</u>

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



#### Limit

Companion flange runout : Refer to <u>DLN-190, "Companion Flange Runout".</u>

- 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 After Disassembly

INFOID:0000000010580516

### 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.

## < UNIT DISASSEMBLY AND ASSEMBLY >

[FRONT FINAL DRIVE: F160A]

• If any wear or crack on the contact sides of the differential case is found, replace.

### **COMPANION FLANGE**

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

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

< SERVICE DATA AND SPECIFICATIONS (SDS)

Item

Companion flange face runout

Inner side of the companion flange runout

# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

[FRONT FINAL DRIVE: F160A]

	Δ	WD
Applied model	VQ37VHR	VK50VE
Applied model		
Final drive model		A/T 160A
Gear ratio	3.692	3.538
Number of teeth (Drive gear/Drive pinion)	48/13	46/13
		3/8, 1-1/8)
Oil capacity (Approx.) $\ell$ (US pt, Imp pt)		
Number of pinion gears		2
Drive pinion adjustment spacer type	S	olid
Drive Gear Runout		INFOID:000000010580518
		Unit: mm (in)
Item		imit
Drive gear back face runout	0.05 (	(0.0020)
Differential Side Gear Clearance		INFOID:000000010580519
ltom	_	` <i>'</i>
Item		ndard
Side gear backlash (Clearance between side gear and differential case)	0.2 (0.00 (Each gear should rotate smooth	` <i>'</i>
Side gear backlash (Clearance between side gear and differential case)	0.2 (0.00 (Each gear should rotate smooth	ndard  O8) or less thly without excessive resistance ential motion.)
Side gear backlash (Clearance between side gear and differential case)	0.2 (0.00 (Each gear should rotate smooth	ndard  08) or less thly without excessive resistance ential motion.)
Side gear backlash (Clearance between side gear and differential case)	0.2 (0.00 (Each gear should rotate smoo during differen	ndard  08) or less thly without excessive resistance ential motion.)
Side gear backlash (Clearance between side gear and differential case)  Preload Torque	0.2 (0.00 (Each gear should rotate smooth during different	ndard  D8) or less thly without excessive resistance ential motion.)  INFOID:000000010580520  Unit: N·m (kg-m, in-lb)
Side gear backlash (Clearance between side gear and differential case)  Preload Torque	0.2 (0.00 (Each gear should rotate smooth during different should rotate smooth during different should be	ndard  D8) or less thly without excessive resistance ential motion.)  INFOID:0000000010580526  Unit: N·m (kg-m, in-lb)
Side gear backlash (Clearance between side gear and differential case)  Preload Torque  Item  Pinion bearing (P1)	0.2 (0.00 (Each gear should rotate smooth during different during duri	ndard  08) or less thly without excessive resistance ential motion.)  **INFOID:000000010580520**  Unit: N·m (kg-m, in-lb)  ndard  08 - 0.16, 7 - 13)
Side gear backlash (Clearance between side gear and differential case)  Preload Torque  Item  Pinion bearing (P1)  Side bearing (P2)  Side bearing to pinion bearing (Total preload) (Total preload = P1 + P2)	0.2 (0.00 (Each gear should rotate smooth during different during duri	ndard  08) or less thly without excessive resistance ential motion.)  **INFCID:0000000010580520**  Unit: N·m (kg-m, in-lb)  ndard  08 - 0.16, 7 - 13)  .08 - 0.11, 7 - 9)  6 - 0.27, 14 - 23)
Side gear backlash (Clearance between side gear and differential case)  Preload Torque  Item  Pinion bearing (P1)  Side bearing (P2)  Side bearing to pinion bearing (Total preload) (Total preload = P1 + P2)	0.2 (0.00 (Each gear should rotate smooth during different during duri	ndard  08) or less thly without excessive resistance ential motion.)  **INFOID:000000010580520**  Unit: N·m (kg-m, in-lb)  ndard  08 - 0.16, 7 - 13)  .08 - 0.11, 7 - 9)  6 - 0.27, 14 - 23)
Side gear backlash (Clearance between side gear and differential case)  Preload Torque  Item  Pinion bearing (P1)  Side bearing (P2)  Side bearing to pinion bearing (Total preload) (Total preload = P1 + P2)	0.2 (0.00 (Each gear should rotate smooth during different during during during different during d	ndard  08) or less thly without excessive resistance ential motion.)  **NFOID:0000000010580520**  Unit: N·m (kg-m, in-lb)  ndard  08 - 0.16, 7 - 13)  08 - 0.11, 7 - 9)  6 - 0.27, 14 - 23)  **INFOID:000000010580520**
Side gear backlash (Clearance between side gear and differential case)  Preload Torque  Item  Pinion bearing (P1)  Side bearing (P2)  Side bearing to pinion bearing (Total preload) (Total preload = P1 + P2)  Backlash	0.2 (0.00 (Each gear should rotate smooth during different during during during different during d	ndard  08) or less thly without excessive resistance ential motion.)  INFOID:000000010580520  Unit: N·m (kg-m, in-lb)  ndard  08 - 0.16, 7 - 13)  08 - 0.11, 7 - 9)  6 - 0.27, 14 - 23)  INFOID:000000010580521  Unit: mm (in)
Side gear backlash (Clearance between side gear and differential case)  Preload Torque  Item  Pinion bearing (P1) Side bearing (P2) Side bearing to pinion bearing (Total preload) (Total preload = P1 + P2)  Backlash	0.2 (0.00 (Each gear should rotate smooth during different during during during different during d	ndard  08) or less thly without excessive resistance ential motion.)  **INFOID:000000010580520**  Unit: N·m (kg-m, in-lb)  ndard  08 - 0.16, 7 - 13)  08 - 0.11, 7 - 9)  6 - 0.27, 14 - 23)  **INFOID:000000010580521**  Unit: mm (in)  ndard

Limit 0.18 (0.0071)

0.13 (0.0051)

## SYSTEM DESCRIPTION

## REAR FINAL DRIVE ASSEMBLY

System Diagram

**CROSS-SECTIONAL VIEW** 

2WD

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

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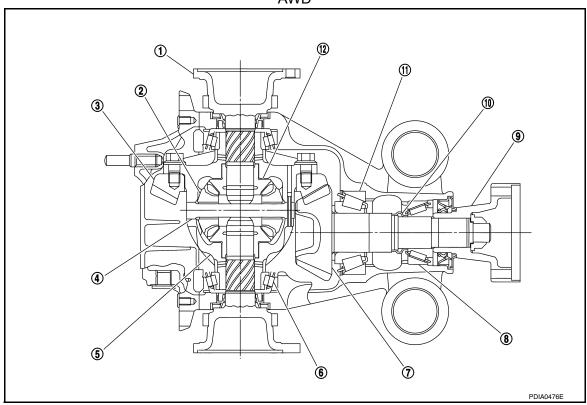
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**AWD** 



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

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

[REAR FINAL DRIVE: R200]

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< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## **NVH Troubleshooting Chart**

2WD

2WD	2VD													
Use the chart below to find the cause	of the symptom. If neces	sary, r	epair c	or repla	ace the	ese pa	rts.		1					
Reference		DLN-231, "2WD: Inspection After Disassembly"	DLN-226, "2WD : Adjustment"	DLN-231, "2WD: Inspection After Disassembly"	DLN-226, "2WD : Adjustment"	DLN-226, "2WD : Adjustment"	DLN-200, "Inspection"	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 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	×	×	×	×	×	×	×	×	×	×	×	×	×

<sup>×:</sup> Applicable

**AWD** 

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

< SYMPTOM DIAGNOSIS >

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts NVH of FRONT and REAR PROPELLER SHAFT in this section "AWD: Inspection After Disassembly" DLN-244, "AWD: Inspection After Disassembly" NVH in FAX, RAX, FSU and RSU sections. Reference DLN-239, "AWD : Adjustment" DLN-239, "AWD: Adjustment" DLN-239, "AWD: Adjustment" NVH in FAX and RAX section DLN-200, "Inspection" NVH in WT section. NVH in WT section. NVH in BR section. NVH in ST section. DLN-244, Companion flange excessive runout AXLE AND SUSPENSION Gear contact improper PROPELLER SHAFT Tooth surfaces worn Possible cause and SUSPECTED PARTS Backlash incorrect Gear oil improper Gear tooth rough ROAD WHEEL DRIVE SHAFT STEERING BRAKE TIRE Symptom Noise ×

x: Applicable

### **PRECAUTIONS**

< PRECAUTION >

## **PRECAUTION**

## **PRECAUTIONS**

## Service Notice or Precautions for Rear Final Drive

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

## Precautions for Removing Battery Terminal

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

### NOTE:

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

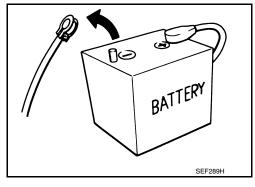
• For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

#### NOTE:

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

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

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



[REAR FINAL DRIVE: R200]

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## **PREPARATION**

## **PREPARATION**

## **Special Service Tools**

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The actual shapes of TechMate tools may of Tool number	differ from those of special service tools illustrate	ted here.
(TechMate No.) Tool name		Description
KV40104100		Removing side flange
( — ) Attachment	~~	
0.70000000	ZZA0804D	
ST36230000 (J-25840-A) Sliding hammer		Removing side flange
	ZZA0803D	
ST3127S000		Measuring pinion bearing preload and total
(J-25765-A) Preload gauge		preload
r reload gadge		
	ZZA0806D	
KV381054S0		Removing front oil seal
(J-34286)	<b>(</b>	
Puller	CAS SAS A A	
	77,00045	
ST30720000	ZZA0601D	Installing front oil seal
(J-25405)		Installing pinion rear bearing outer race
Drift a: 77 mm (3.03 in) dia.		
b: 55.5 mm (2.185 in) dia.		
	ZZA0811D	
KV38107900 (J-39352) Protector		Installing side flange
1 10100101		
	S-NT129	

## **PREPARATION**

[REAR FINAL DRIVE: R200]

PREPARATION >		[REAR FINAL DRIVE: R200
Tool number (TechMate No.) Tool name		Description
(V38100200 (J-26233) Drift a: 65 mm (2.56 in) dia. b: 49 mm (1.93 in) dia.	ZZA1143D	Installing side oil seal
(V10111100 J-37228) Seal cutter	S-NT046	Removing rear cover
(V38100800 J-25604-01) Attachment A: 541 mm (21.30 in) B: 200 mm (7.87 in)	B COODOO SDIA0267E	Fixing unit assembly
ST3306S001 J-22888-D) Differential side bearing puller set I: 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.	2 NT072	Removing and installing side bearing inner race
KV10112100 (BT-8653-A) Angle wrench	ZZA0120D	Tightening the drive gear mounting bolt
KV38100300 (J-25523) Drift a: 54 mm (2.13 in) dia. b: 46 mm (1.81 in) dia. c: 32 mm (1.26 in) dia.	ZZA1046D	Installing side bearing inner race

## **PREPARATION**

## < PREPARATION >

[REAR FINAL DRIVE: R200]

Tool number (TechMate No.) Tool name		Description
(J-8129) Spring gauge		Measuring turning torque
KV40105230	NT127	Installing pinion rear bearing outer race
( — ) Drift a: 92 mm (3.62 in) dia. b: 86 mm (3.39 in) dia. c: 45 mm (1.77 in) dia.	a b C PDIA0591E	
ST30611000 (J-25742-1)		Installing pinion front bearing outer race (Use with ST30613000)
Drift bar		
ST30613000	S-NT090	Installing pinion front bearing outer race
(J-25742-3) Drift a: 72 mm (2.83 in) dia. b: 48 mm (1.89 in) dia.	-b- -a-	
ST30901000	ZZA1000D	Installing pinion rear bearing inner race
(J-26010-01) Drift a: 79 mm (3.11 in) dia. b: 45 mm (1.77 in) dia. c: 35.2 mm (1.386 in) dia.	a b c	and the second s

## **Commercial Service Tools**

INFOID:0000000010580527

Tool name		Description
Flange wrench		Removing and installing drive pinion lock nut
	NT035	

## **PREPARATION**

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[REAR FINAL DRIVE: R200]

FREFARATION >		
Puller		Removing pinion rear bearing inner race
	ZZA0119D	
Sliding hammer		Removing differential case assembly
	NT125	
Replacer		Removing pinion rear bearing inner race
	ZZA0700D	
Spacer a: 60 mm (2.36 in) dia. b: 36 mm (1.42 in) dia. c: 30 mm (1.18 in)	b c c zzA1133D	Installing pinion front bearing inner race
Power tool		Loosening bolts and nuts
	PBIC0190E	

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## PERIODIC MAINTENANCE

## REAR DIFFERENTIAL GEAR OIL

Inspection INFOID:000000010580528

#### OIL LEAKAGE

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

#### OIL LEVEL

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

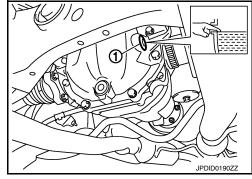
#### **CAUTION:**

Never start engine while checking oil level.

 Set a gasket on filler plug and install it on final drive assembly. Refer to <u>DLN-219</u>, "2WD : <u>Exploded View"</u> (2WD), <u>DLN-232</u>, "AWD : <u>Exploded View"</u> (AWD).

#### **CAUTION:**

Never reuse gasket.



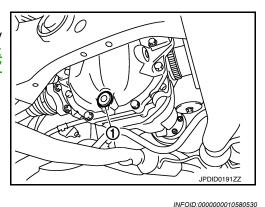
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## Draining

- 1. Stop engine.
- 2. Remove drain plug (1) and drain gear oil.
- Set a gasket on drain plug and install it to final drive assembly and tighten to the specified torque. Refer to <u>DLN-219</u>, "2WD : <u>Exploded View"</u> (2WD), <u>DLN-232</u>, "AWD : <u>Exploded View"</u> (AWD).

#### **CAUTION:**

Never reuse gasket.



## Refilling

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

Oil grade and viscosity : Refer to MA-17, "FOR

NORTH AMERICA: Fluids and Lubricants" (For North America), MA-18, "FOR MEXICO: Fluids and Lubricants" (For Mexico).

Oil capacity : Refer to DLN-261, "Gen-

eral Specification".

JPDID0190ZZ

 After refilling oil, check oil level. Set a gasket to filler plug, then install it to final drive assembly. Refer to <u>DLN-219</u>, "2WD : Exploded View" (2WD), <u>DLN-232</u>, "AWD : Exploded View" (AWD).
 CAUTION:

Never reuse gasket.

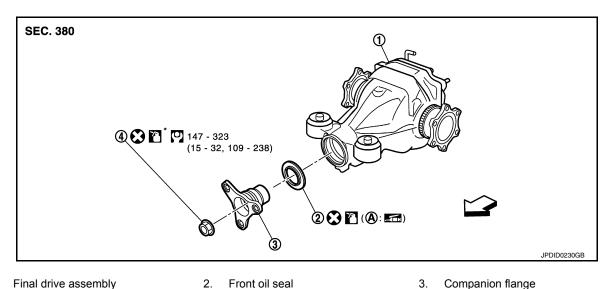
# REMOVAL AND INSTALLATION

FRONT OIL SEAL

2WD

2WD : Exploded View

INFOID:0000000010580531



- Final drive assembly
- Drive pinion lock nut
- Oil seal lip

: Vehicle front

: Apply gear oil.

\*: Apply anti-corrosion oil.

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

## 2WD : Removal and Installation

**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-215, "2WD : Removal and Installation" and DLN-220, "2WD : Disassembly"

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

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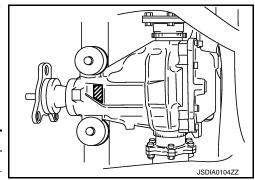
### FRONT OIL SEAL

#### < REMOVAL AND INSTALLATION >

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

When collapsible spacer replacement is required, disassemble final drive assembly to replace collapsible spacer and front oil seal. Refer to <u>DLN-220</u>, "<u>2WD</u>: <u>Disassembly</u>".

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



[REAR FINAL DRIVE: R200]

#### **CAUTION:**

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

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

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

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

- 1. Drain gear oil. Refer to DLN-200, "Draining".
- 2. Make a judgment if a collapsible spacer replacement is required.
- 3. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
- 4. Remove rear wheel sensor. Refer to <u>BRC-134, "REAR WHEEL SENSOR: Exploded View".</u>
- 5. Remove drive shaft from final drive. Then suspend it by wire, etc. Refer to RAX-10, "Exploded View".
- 6. Install attachment (A) to side flange, and then pull out the side flange with the sliding hammer (B).

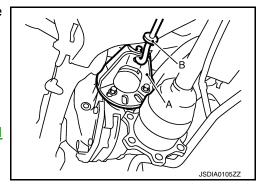
A : Attachment [SST: KV40104100 ( — )]

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

#### NOTE:

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

7. Remove rear propeller shaft. Refer to <a href="DLN-120">DLN-120</a>, "Exploded <a href="View"</a>.



## FRONT OIL SEAL

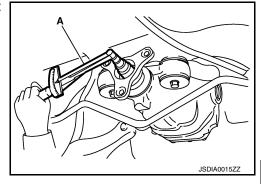
#### < REMOVAL AND INSTALLATION >

[REAR FINAL DRIVE: R200]

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

NOTE:

Record the preload measurement.



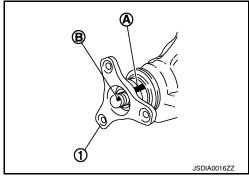
9. Put matching mark (B) on the end of the drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).

#### **CAUTION:**

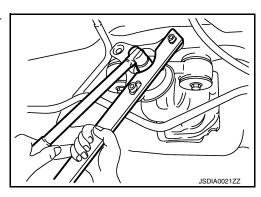
For matching mark, use paint. Never damage companion flange and drive pinion.

NOTE:

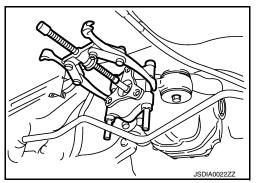
The matching mark on the final drive companion flange indicates the maximum vertical runout position.



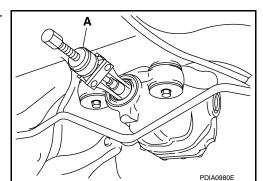
10. Remove drive pinion lock nut using the flange wrench (commercial service tool).



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



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



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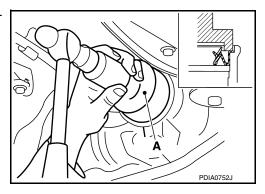
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#### **INSTALLATION**

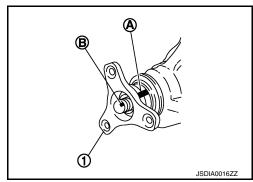
- 1. Apply multi-purpose grease to front oil seal lips.
- 2. Install front oil seal using the drift (A) [SST: ST30720000 (J-25405)] as shown in figure.

#### **CAUTION:**

- Never reuse oil seal.
- · Never incline oil seal when installing.



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



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

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

#### **CAUTION:**

### Never reuse drive pinion lock nut.

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

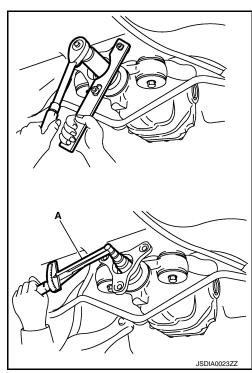
#### **Standard**

**Total preload torque** 

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

#### **CAUTION:**

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



### FRONT OIL SEAL

#### < REMOVAL AND INSTALLATION >

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

Limit

: Refer to DLN-261, "Drive **Drive pinion runout** Pinion Runout (2WD)".

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

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

- 9. Install rear propeller shaft. Refer to DLN-120, "Exploded View".
- 10. Install side flange with the following procedure.
- a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
- b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
- c. Put a suitable drift on the center of side flange, then drive it until sound changes.

#### NOTE:

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

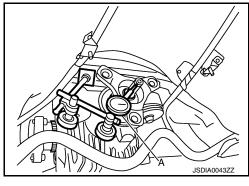
d. Confirm that the dimension of the side flange (1) installation measurement (A) in the figure comes into the following.

#### **Standard**

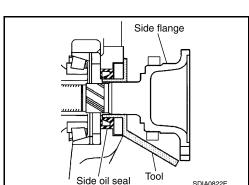
Α : 326 – 328 mm (12.83 – 12.91 in)

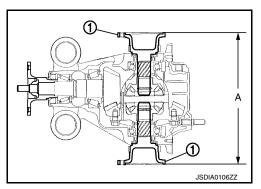
- 11. Install drive shaft. Refer to RAX-10, "Exploded View".
- 12. Install rear wheel sensor. Refer to BRC-134, "REAR WHEEL SENSOR: Exploded View".
- 13. Install center muffler. Refer to EX-5, "Exploded View".
- 14. Refill gear oil to the final drive and check oil level. Refer to DLN-200. "Refilling".
- 15. Check the final drive for oil leakage. Refer to <u>DLN-200</u>, "Inspection".

### **AWD**



[REAR FINAL DRIVE: R200]





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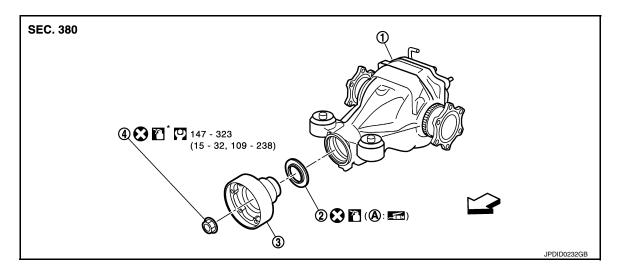
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AWD: Exploded View

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- Final drive assembly
- Front oil seal

Companion flange

- 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.

#### AWD : Removal and Installation

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#### **REMOVAL**

#### **CAUTION:**

Verify identification stamp of replacement frequency put in the lower part of gear carrier to determine replacement for collapsible spacer when replacing front oil seal. Refer to "Identification stamp of replacement frequency of front oil seal". If collapsible spacer replacement is necessary, remove final drive assembly and disassemble it to replace front oil seal and collapsible spacer. Refer to <u>DLN-217</u>, "AWD: Removal and Installation" and <u>DLN-232</u>, "AWD: <u>Disassembly</u>".

#### NOTE:

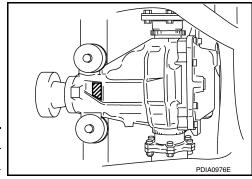
The reuse of collapsible spacer is prohibited in principle. However, it is reusable on a one-time basis only in cases when replacing front oil seal.

Identification stamp of replacement frequency of front oil seal

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

final drive assembly to replace collapsible spacer and front oil seal. Refer to <u>DLN-232</u>, "AWD: <u>Disassembly"</u>.

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.

#### FRONT OIL SEAL

#### < REMOVAL AND INSTALLATION >

[REAR FINAL DRIVE: R200]

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

#### **CAUTION:**

Make a stamping from left to right.

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

- 1. Drain gear oil. Refer to <a href="DLN-200">DLN-200</a>, "Draining".
- Make a judgment if a collapsible spacer replacement is required.
- 3. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
- Remove rear wheel sensor. Refer to BRC-134, "REAR WHEEL SENSOR: Exploded View".
- 5. Remove drive shaft from final drive. Then suspend it by wire, etc. Refer to RAX-10, "Exploded View".
- Install attachment (A) to side flange, and then pull out the side flange with the sliding hammer (B).

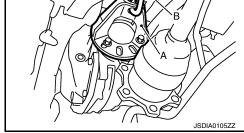
A : Attachment [SST: KV40104100 ( — )]

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

#### NOTE:

### Circular clip installation position: Final drive side

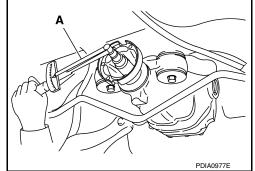
7. Remove rear propeller shaft. Refer to <u>DLN-130</u>, "Exploded View".



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

#### NOTE:

Record the preload measurement.



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

#### CAUTION:

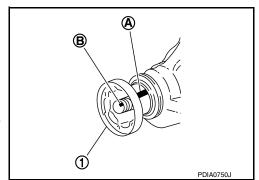
**Revision: 2015 February** 

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

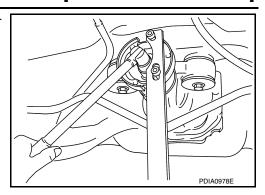
#### NOTE:

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

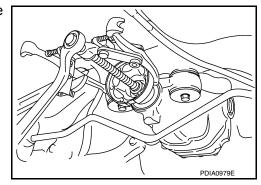
**DLN-207** 



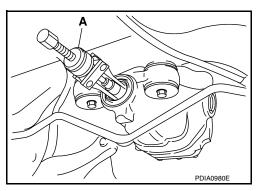
10. Remove drive pinion lock nut using the flange wrench (commercial service tool).



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



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

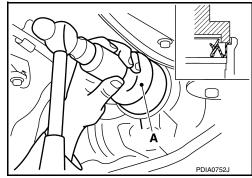


## **INSTALLATION**

- 1. Apply multi-purpose grease to front oil seal lips.
- 2. Install front oil seal using the drift (A) [SST: ST30720000 (J-25405)] as shown in figure.

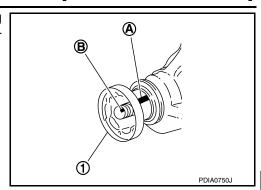
#### **CAUTION:**

- Never reuse oil seal.
- · Never incline oil seal when installing.



#### < REMOVAL AND INSTALLATION >

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



[REAR FINAL DRIVE: R200]

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, flange wrench (commercial service tool).

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

### **CAUTION:**

Never reuse drive pinion lock nut.

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

#### **Standard**

Total preload torque : A value that add 0.1 - 0.4

 $N \cdot m (0.01 - 0.04 \text{ kg-m}, 0.1 -$ 0.3 in-lb) to the measured value before removing.

#### CAUTION:

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

#### Limit

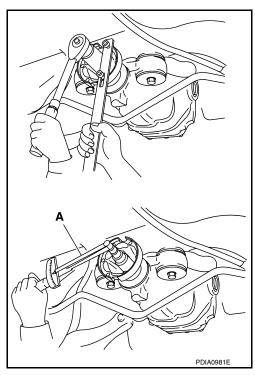
Companion flange runout

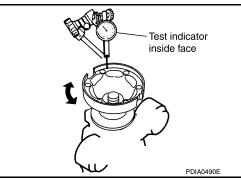
: Refer to DLN-261, "Companion Flange Runout (AWD)".

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

Make a stamping after replacing front oil seal.

Install rear propeller shaft. Refer to <u>DLN-130</u>, "Exploded View".





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### FRONT OIL SEAL

#### < REMOVAL AND INSTALLATION >

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

#### NOTE:

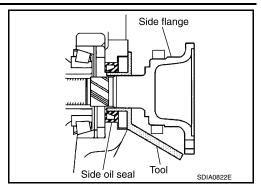
When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.

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

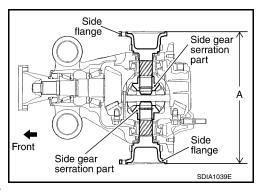
#### **Standard**

A : 326 – 328 mm (12.83 – 12.91 in)

- 11. Install drive shaft. Refer to RAX-10, "Exploded View".
- 12. Install rear wheel sensor. Refer to <a href="BRC-134">BRC-134</a>, "REAR WHEEL SENSOR: Exploded View".
- 13. Install center muffler. Refer to EX-5, "Exploded View".
- 14. Refill gear oil to the final drive and check oil level. Refer to <a href="DLN-200">DLN-200</a>, "Refilling".
- 15. Check the final drive for oil leakage. Refer to <a href="DLN-200">DLN-200</a>, "Inspection".



[REAR FINAL DRIVE: R200]

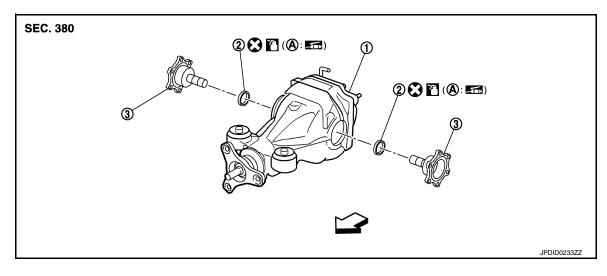


## SIDE OIL SEAL

2WD

2WD: Exploded View

INFOID:0000000010580535



- 1. Final drive assembly
- 2. Side oil seal

3. Side flange

A. Oil seal lip

: Apply gear oil.

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

## 2WD: Removal and Installation

### **REMOVAL**

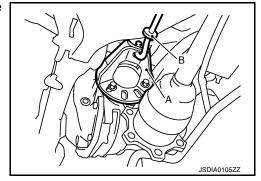
- Remove center muffler with a power tool. Refer to <u>EX-5, "Exploded View"</u>.
- Remove rear wheel sensor. Refer to <u>BRC-134, "REAR WHEEL SENSOR: Exploded View".</u>
- 3. Remove drive shaft from final drive with a power tool. Then suspend it by wire, etc. Refer to <a href="RAX-10">RAX-10</a>, <a href=""">"Exploded View"</a>.
- 4. Install attachment (A) to side flange, and then pull out the side flange with the sliding hammer (B).

A : Attachment [SST: KV40104100 ( — )]

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

#### NOTF:

Circular clip installation position: Final drive side



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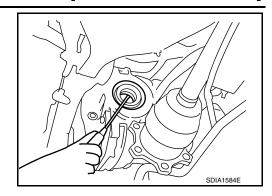
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Remove side oil seal, using a suitable tool.

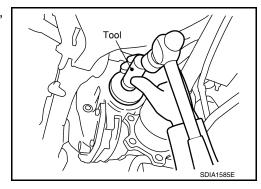
#### **CAUTION:**

Never damage gear carrier.

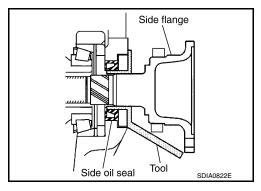


#### INSTALLATION

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



- 3. Install side flange with the following procedure.
- Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
- After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.



c. Put a suitable drift on the center of side flange, then drive it until sound changes.

#### NOTE:

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

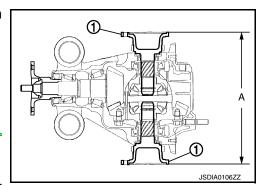
d. Confirm that the dimension of the side flange (1) installation measurement (A) in the figure comes into the following.

#### **Standard**

A : 326 – 328 mm (12.83 – 12.91 in)

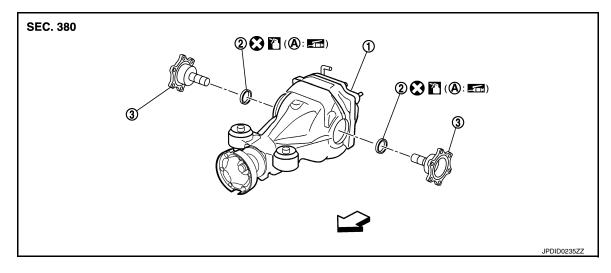
- 4. Install drive shaft. Refer to RAX-10, "Exploded View".
- Install rear wheel sensor. Refer to <u>BRC-134</u>, "<u>REAR WHEEL SENSOR</u>: <u>Exploded View</u>".
- 6. Install center muffler. Refer to EX-5, "Exploded View".
- When oil leaks while removing, check oil level after the installation. Refer to <u>DLN-200</u>, "Inspection".





## AWD: Exploded View

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- 1. Final drive assembly
- Side oil seal

3. Side flange

A. Oil seal lip

⟨□: Vehicle front

: Apply gear oil.

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

## AWD: Removal and Installation

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#### **REMOVAL**

- 1. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
- 2. Remove rear wheel sensor. Refer to BRC-134, "REAR WHEEL SENSOR: Exploded View".
- 3. Remove drive shaft from final drive with a power tool. Then suspend it by wire, etc. Refer to <a href="RAX-10">RAX-10</a>. <a href=""">"Exploded View"</a>.
- 4. Install attachment (A) to side flange, and then pull out the side flange with the sliding hammer (B).

A : Attachment [SST: KV40104100 ( — )]

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

#### NOTE:

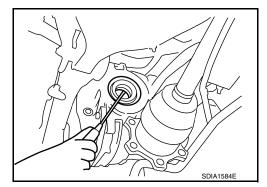
Circular clip installation position: Final drive side

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5. Remove side oil seal, using a suitable tool.

### **CAUTION:**

Never damage gear carrier.



Revision: 2015 February DLN-213 2015 QX70

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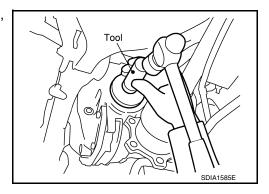
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#### **INSTALLATION**

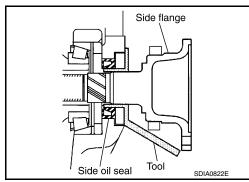
- 1. Apply multi-purpose grease to side oil seal lips.
- Install side oil seal until it becomes flush with the case end, using the drift [SST: KV38100200 (J-26233)].

#### **CAUTION:**

- · Never reuse oil seal.
- · When installing, never incline oil seal.



- 3. Install side flange with the following procedure.
- Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
- After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.



c. Put a suitable drift on the center of side flange, then drive it until sound changes.

#### NOTE:

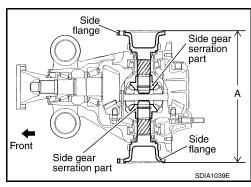
When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.

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

#### **Standard**

A : 326 – 328 mm (12.83 – 12.91 in)

- Install drive shaft. Refer to <u>RAX-10, "Exploded View"</u>.
- 5. Install rear wheel sensor. Refer to <a href="BRC-134">BRC-134</a>, "REAR WHEEL SENSOR: Exploded View".
- 6. Install center muffler. Refer to EX-5, "Exploded View".
- When oil leaks while removing, check oil level after the installation. Refer to <u>DLN-200</u>, "Inspection".



## **REAR FINAL DRIVE ASSEMBLY**

< UNIT REMOVAL AND INSTALLATION >

[REAR FINAL DRIVE: R200]

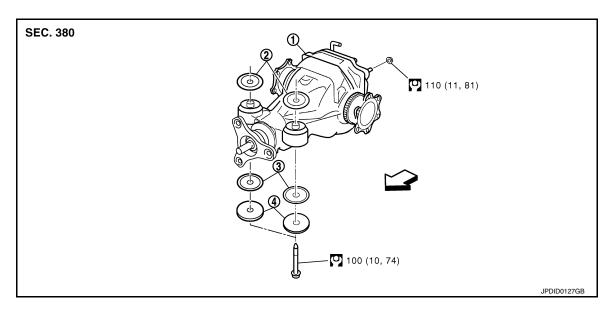
## UNIT REMOVAL AND INSTALLATION

## REAR FINAL DRIVE ASSEMBLY

2WD

2WD: Exploded View

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

Lower stopper

4. Washer

⟨□: Vehicle front

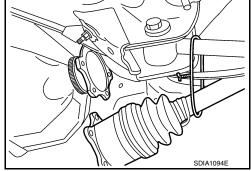
Refer to GI-4, "Components" for symbols in the figure.

## 2WD: Removal and Installation

INFOID:0000000010580540

#### REMOVAL

- 1. Remove center muffler with a power tool. Refer to EX-5, "Exploded View".
- Remove stabilizer bar with a power tool. Refer to RSU-16, "Exploded View".
- 3. Remove rear propeller shaft from the final drive. Refer to DLN-120, "Exploded View".
- 4. Remove drive shaft from final drive with a power tool. Then suspend it by wire, etc. Refer to RAX-10, "Exploded View".
- 5. Remove breather hose from the final drive.
- Remove rear wheel sensor. Refer to <u>BRC-134</u>, "<u>REAR WHEEL SENSOR</u>: <u>Exploded View</u>".



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## **REAR FINAL DRIVE ASSEMBLY**

#### < UNIT REMOVAL AND INSTALLATION >

[REAR FINAL DRIVE: R200]

Set a suitable jack to rear final drive assembly.

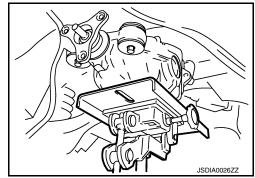
#### **CAUTION:**

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

Remove the mounting bolts and nuts connecting to the suspension member with a 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.

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

A:

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

side

#### **CAUTION:**

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

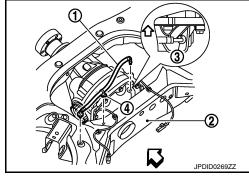


- 3: Metal connector
- 4: Hose clip

∵: Vehicle front

- For installation, insert the resin connector into rear suspension member. Install the metal connector) in rear cover so that a paint mark becomes forward of the vehicle as shown in the figure. Insert

the hose clip into rear suspension member. Arrange the breather hose to pass by over wheel sensor harness.



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#### **CAUTION:**

Never reuse breather connector and hose clip.

 When oil leaks while removing final drive assembly, check oil level after the installation. Refer to <u>DLN-200</u>, "Inspection".

AWD

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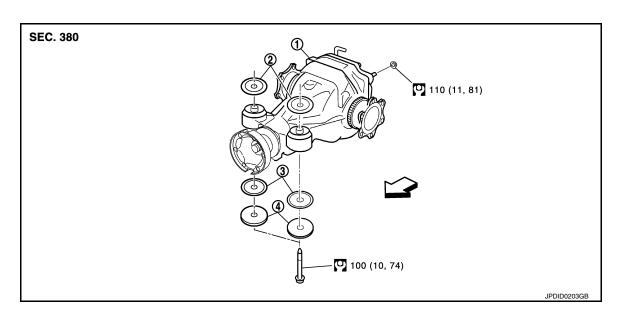
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## AWD: Exploded View



- Rear final drive assembly
- Upper stopper

Lower stopper

4. Washer

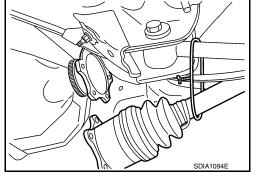
∀: Vehicle front

Refer to GI-4, "Components" for symbols in the figure.

## AWD: Removal and Installation

#### REMOVAL

- 1. Remove center muffler with a power tool. Refer to <a>EX-5</a>, "Exploded View"</a>.
- Remove stabilizer bar with a power tool. Refer to RSU-16, "Exploded View".
- Remove rear propeller shaft from the final drive. Refer to <u>DLN-130, "Exploded View"</u>.
- 4. Remove drive shaft from final drive with a power tool. Then suspend it by wire, etc. Refer to <a href="RAX-10">RAX-10</a>, "Exploded View".
- 5. Remove breather hose from the final drive.
- Remove rear wheel sensor. Refer to <u>BRC-134</u>, "<u>REAR WHEEL SENSOR</u>: <u>Exploded View</u>".



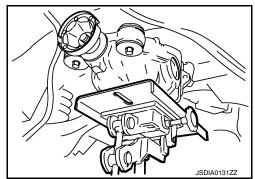
Set a suitable jack to rear final drive assembly. CAUTION:

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

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

## **CAUTION:**

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



INSTALLATION

## **REAR FINAL DRIVE ASSEMBLY**

#### < UNIT REMOVAL AND INSTALLATION >

[REAR FINAL DRIVE: R200]

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) to breather connector until dimension (A) shown as follows.

#### A:

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

side

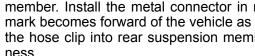
#### **CAUTION:**

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

: Vehicle front

- For installation, insert the resin connector into rear suspension member. Install the metal connector in rear cover so that a paint mark becomes forward of the vehicle as shown in the figure. Insert

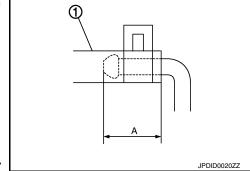
the hose clip into rear suspension member. Arrange the breather hose to pass by over wheel sensor har-





## Never reuse breather connector and hose clip.

• When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-200, "Inspection".



# UNIT DISASSEMBLY AND ASSEMBLY

## DIFFERENTIAL ASSEMBLY

2WD

2WD : Exploded View

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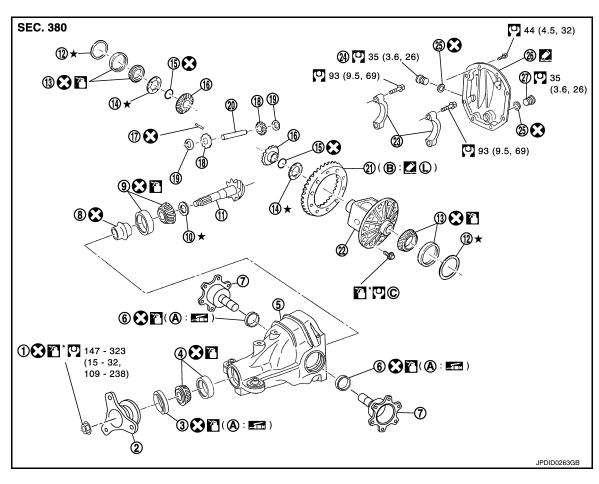
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- Drive pinion lock nut
- Pinion front bearing 4.
- Side flange 7.
- Pinion height adjusting washer 10.
- 13. Side bearing
- 16. Side gear
- Pinion mate thrust washer 19.
- 22. Differential case
- 25. Gasket
- Oil seal lip

- Companion flange 2.
- 5. Gear carrier
- Collapsible spacer
- 11. Drive pinion
- 14. Side gear thrust washer
- 17. Lock pin
- 20. Pinion mate shaft
- 23. Bearing cap
- 26. Rear cover
- В. Screw hole

- 3. Front oil seal
- 6.
- 9.
- 12.
- 24. Filler plug
- 27. Drain plug
- Comply with the assembly procedure when tightening. Refer to DLN-222, "2WD : Assembly".

- : Apply gear oil.
- \*: Apply anti-corrosion oil.
- 2: Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

[REAR FINAL DRIVE: R200]

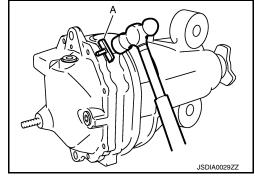
Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

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

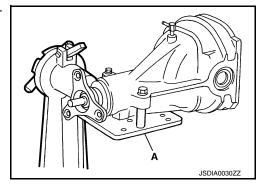
## 2WD : Disassembly

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



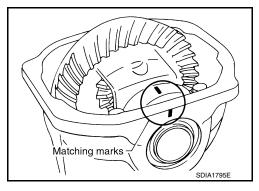
Using two 45 mm (1.77 in) spacers, mount carrier on the attachment (A) [SST: KV38100800 (J-25604-01)].



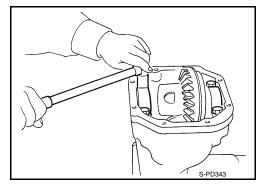
6. For proper reinstallation, paint matching marks on one side of the bearing cap.

#### **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.



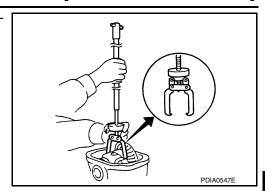
Remove bearing caps.



## < UNIT DISASSEMBLY AND ASSEMBLY >

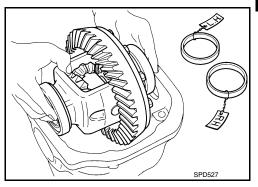
[REAR FINAL DRIVE: R200]

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.

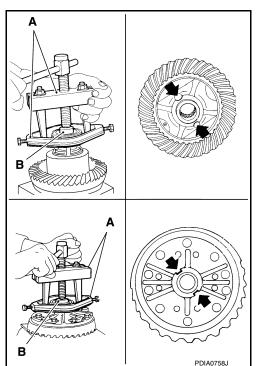


Remove side bearing inner race with puller (A) and base (B).
 To prevent damage to bearing, engage puller jaws in groove (\*).

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

## **CAUTION:**

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



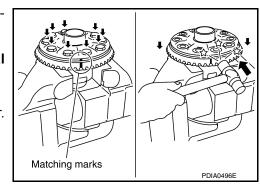
10. For proper reinstallation, paint matching marks on one differential case assembly.

#### **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.



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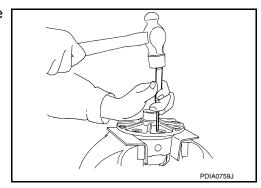
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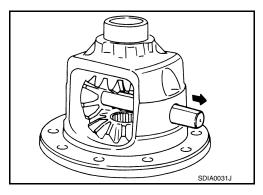
## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

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



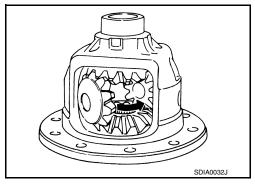
14. Remove pinion mate shaft.



- 15. Turn pinion mate gear, then remove pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from differential case.
- 16. Remove circular clip from side gear.

#### **CAUTION:**

Never damage side gear.



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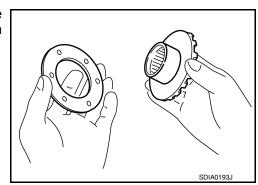
2WD : Assembly

1. Install circular clip to side gear.

#### **CAUTION:**

#### Never damage side gear.

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



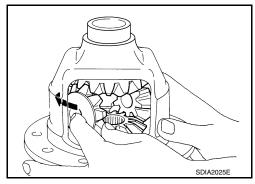
## < UNIT DISASSEMBLY AND ASSEMBLY >

#### [REAR FINAL DRIVE: R200]

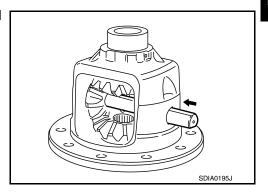
3. Install side gears and thrust washers into differential case. **CAUTION:** 

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

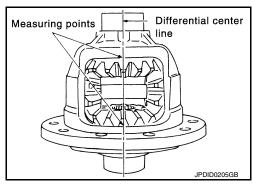
4. Align 2 pinion mate gears in diagonally opposite positions, then rotate and install them into differential case after installing thrust washer to pinion mate gear.



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



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



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## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

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 <u>DLN-261, "Differ-</u>

ential Side Gear Clear-

ance".

#### **CAUTION:**

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

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

When the back clearance

Use a thicker thrust washer.

is large:

Use a thinner thrust wash-

When the back clearance is small:

er.

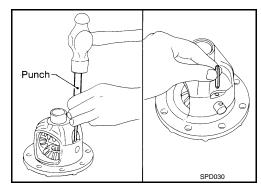
#### **CAUTION:**

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

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

#### **CAUTION:**

Never reuse lock pin.



8. Apply thread locking sealant into the thread hole of drive gear. Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24. "Recommended Chemical Products and Sealants".

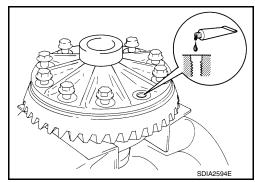
#### **CAUTION:**

Clean and degrease drive gear back and threaded holes sufficiently.

9. Install the drive gear to differential case.

#### **CAUTION:**

Align the matching mark of differential case and drive gear.



## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

10. Tighten the mounting bolts with the following procedure. **CAUTION:** 

Apply anti-corrosin oil to the thread and seat of mounting bolts.

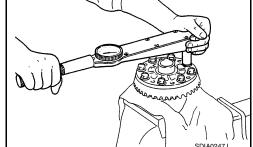
a. Tighten the bolts in a crisscross fashion to the specified torque.

Drive gear mounting : 78.5 N·m (8.0 kg-m, 58 ft-lb) bolts tightening torque

b. Tighten the bolts additionally to the specified angle.

Drive gear mounting : 31 to 36 degree

bolts tightening angle



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#### **CAUTION:**

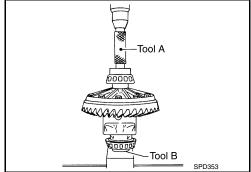
Check the tightening angle using the angle wrench [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.

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

A : Drift [SST: KV38100300 (J-25523)]
B : Base [SST: ST33061000 (J-8107-2)]

#### **CAUTION:**

Never reuse side bearing inner race.

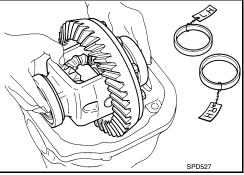


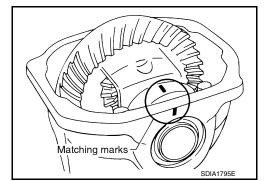
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12. Set bearing outer races to differential case assembly, and install it with removed side bearing adjusting washer or same thickness washer into gear carrier.

#### **CAUTION:**

- Apply differential gear oil to the side bearings.
- Install side bearing and side bearing adjusting washer in correct location. (drive gear tooth side or drive gear back side)
- 13. Measure side bearing preload. If necessary, select the appropriate side bearing adjusting washers. Refer to <a href="DLN-226">DLN-226</a>, "2WD : Adjustment".
- 14. Align matching marks on bearing cap with that on gear carrier.
- 15. Install bearing caps and tighten bearing cap mounting bolts.





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## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

16. Using the drift [SST: KV38100200 (J-26233)], drive side oil seals until it becomes flush with the case end.

#### **CAUTION:**

- · Never reuse oil seal.
- · When installing, never incline oil seal.
- Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.
- 17. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to <u>DLN-226</u>, "2WD: Adjustment".

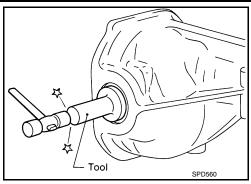
Recheck above items. Readjust the above description, if necessary.

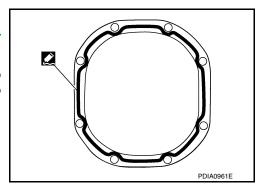
- 18. Apply sealant (A) to mating surface of rear cover.
  - Use Genuine Silicone RTV or equivalent. Refer to <u>GI-24</u>, <u>"Recommended Chemical Products and Sealants"</u>.

#### **CAUTION:**

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

19. Install rear cover on gear carrier and tighten mounting bolts.





Side flange

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

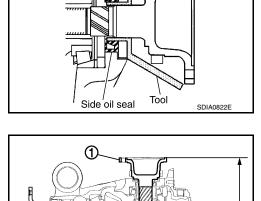
#### NOTE:

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

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



A : 326 – 328 mm (12.83 – 12.91 in)



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## 2WD : Adjustment

#### TOTAL PRELOAD TORQUE

Before inspection and adjustment, drain gear oil.

- 1. Secure final drive assembly onto an attachment [SST: KV38100800 (J-25604-01)].
- Remove side flanges.
- 3. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
- Rotate drive pinion at least 20 times to check for smooth operation of the bearing.

## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

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

**Standard** 

Total preload torque : Refer to <u>DLN-261, "Pre-</u>

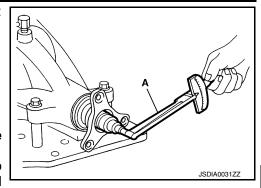
load Torque".

#### NOTE:

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

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

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



## When the preload torque is large

On pinion bearings: Replace the collapsible spacer.

On side bearings: Use thinner side bearing adjusting washers by the same amount to

each side. For selecting adjusting washer, refer to the latest parts in-

formation.

## When the preload is small

On pinion bearings: Tighten the drive pinion lock nut.

On side bearings: Use thicker side bearing adjusting washers by the same amount to

each side. For selecting adjusting washer, refer to the latest parts in-

formation.

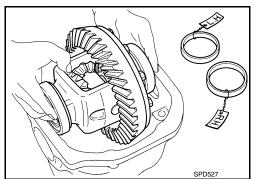
#### SIDE BEARING PRELOAD

Before inspection and adjustment, drain gear oil.

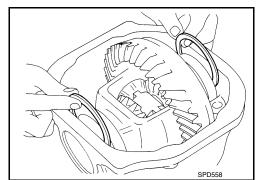
1. Remove rear cover. Refer to DLN-220, "2WD: Disassembly".

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.



 Insert left and right original side bearing adjusting washers in place between side bearings and gear carrier.



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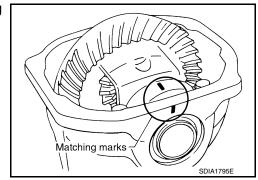
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## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

- 5. Install bearing caps in their correct locations and tighten bearing cap mounting bolts.
- Turn the carrier several times to seat the bearings.

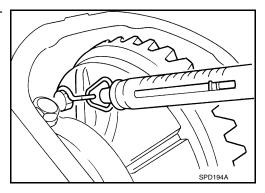


7. Measure the turning torque of the carrier at the drive gear mounting bolts with a spring gauge [SST: — (J-8129)].

**Standard** 

Specification

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



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

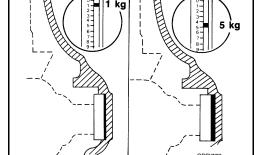
If the turning torque is less

Use a thicker adjusting

than the specified range: washer.

If the turning torque is Use a thinner adjusting greater than the specificawasher.

tion:



#### **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 <a href="DLN-220">DLN-220</a>, "2WD: Disassembly".
- 2. Fit a dial indicator to the drive gear back face.
- 3. Rotate the drive gear to measure runout.

Limit

Drive gear runout : Refer to <u>DLN-261, "Drive</u>

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.

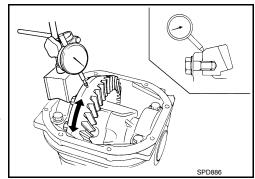
#### **CAUTION:**

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-220, "2WD: Disassembly".



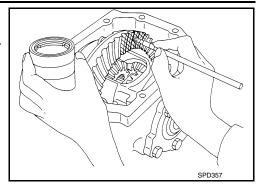
## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

2. Apply red lead to drive gear.

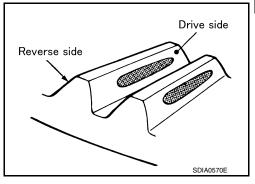
#### **CAUTION:**

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



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

Check tooth contact on drive side and reverse side.



Tooth contact condition		Pinion height adjusting washer selection valve		Adjustment	Possible cause
Drive side	Back side	[ mm (in) ]		(Yes/No)	Fossible cause
Heel side Toe side	Toe side Heel side	Thinner	+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
The state of the s			+0.06 (+0.0024)		Occurrence of noise when accelerating.
79000			+0.03 (+0.0012)	No	-
			0		
~			-0.03 (-0.0012)		
****			-0.06 (-0.0024)	Yes	Occurrence of noise at constant speed and decreasing speed.
.corolilling			-0.09 (-0.0035)		Occurrence of noise and scoring sound in all speed ranges.

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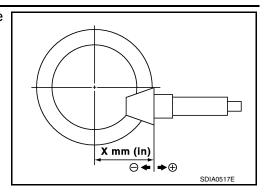
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## < UNIT DISASSEMBLY AND ASSEMBLY >

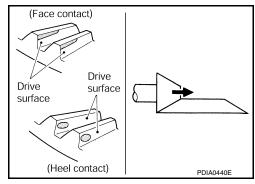
[REAR FINAL DRIVE: R200]

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



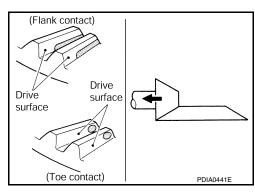
• If the tooth contact is near the face (face contact), or near the heel (heel contact), thicken pinion height adjusting washers to move drive pinion closer to drive gear.

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.

- Remove rear cover. Refer to <u>DLN-220, "2WD : Disassembly"</u>.
- 2. Fit a dial indicator to the drive gear face to measure the backlash.

**Standard** 

Backlash : Refer to <u>DLN-261, "Backlash".</u>

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



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.



# UNIT DISASSEMBLY AND ASSEMBLY > When the backlash is small: Make drive gear back side adjusting

#### [REAR FINAL DRIVE: R200]

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.

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## **CAUTION:**

Never change the total amount of washers as it changes the bearing preload.

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## 2WD: Inspection After Disassembly

#### DRIVE GEAR AND DRIVE PINION

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

#### BEARING

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

#### SIDE GEAR AND PINION MATE GEAR

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

## SIDE GEAR THRUST WASHER AND PINION MATE THRUST WASHER

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

#### OIL SEAL

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

#### DIFFERENTIAL CASE

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

#### COMPANION FLANGE

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

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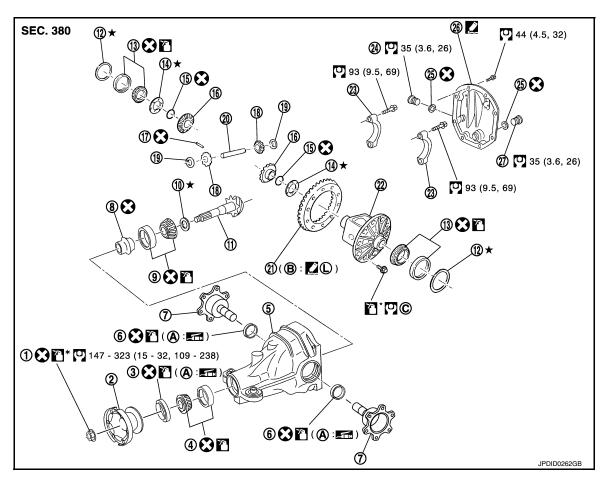
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Revision: 2015 February DLN-231 2015 QX70

[REAR FINAL DRIVE: R200]

AWD: Exploded View

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- 1. Drive pinion lock nut
- 4. Pinion front bearing
- 7. Side flange
- 10. Pinion height adjusting washer
- 13. Side bearing
- 16. Side gear
- 19. Pinion mate thrust washer
- 22. Differential case
- 25. Gasket
- A. Oil seal lip

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

- 3. Front oil seal
- 6. Side oil seal
- 9. Pinion rear bearing
- 12. Side bearing adjusting washer
- 15. Circular clip
- 18. Pinion mate gear
- 21. Drive gear
- 24. Filler plug
- 27. Drain plug
- C. Comply with the assembly procedure when tightening. Refer to <u>DLN-235</u>, "AWD: Assembly".

- : Apply gear oil.
- \*: Apply anti-corrosion oil.
- Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".
- Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

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

## AWD: Disassembly

1. Drain gear oil, if necessary.

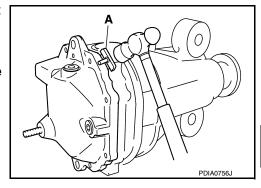
Revision: 2015 February DLN-232 2015 QX70

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## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

- Remove side flange.
- 3. Remove rear cover mounting bolts.
- 4. Remove rear cover to insert the seal cutter (A) [SST: KV10111100 (J-37228)] between gear carrier and rear cover. **CAUTION:** 
  - Never damage the mating surface.
  - · Never insert flat-bladed screwdriver, this may damage the mating surface.



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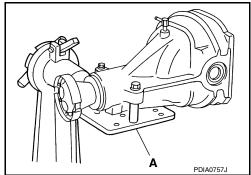
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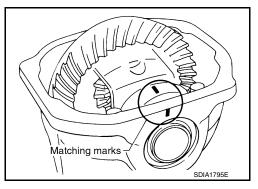
5. Using two 45 mm (1.77 in) spacers, mount carrier on the attachment (A) [SST: KV38100800 (J-25604-01)].



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.

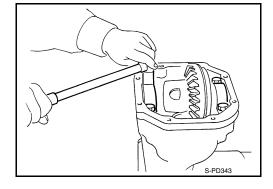


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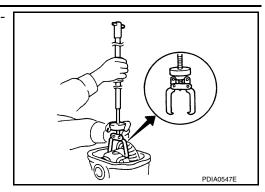
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7. Remove bearing caps.

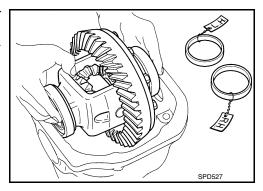


Lift differential case assembly out with a sliding hammer (commercial service tool).



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

Also, keep side bearing adjusting washers together with bearings.

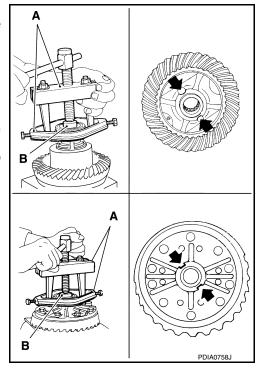


Remove side bearing inner race with puller (A) and base (B).
 To prevent damage to bearing, engage puller jaws in groove (\*).

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

## **CAUTION:**

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



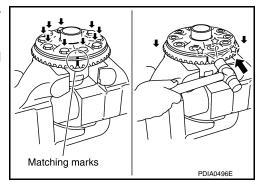
10. For proper reinstallation, paint matching marks on one differential case assembly.

#### **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:

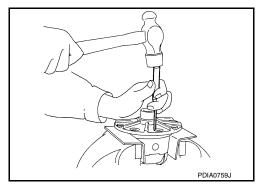
Tap evenly all around to keep drive gear from bending.



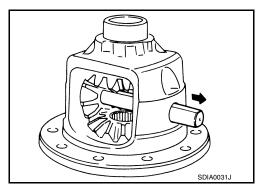
## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

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



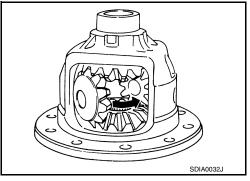
14. Remove pinion mate shaft.



- 15. Turn pinion mate gear, then remove pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from differential case.
- 16. Remove circular clip from side gear.

#### **CAUTION:**

Never damage side gear.



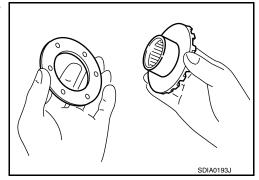
AWD : Assembly

1. Install circular clip to side gear.

#### **CAUTION:**

#### Never damage side gear.

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



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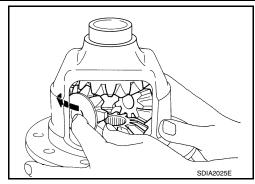
## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

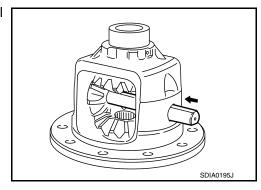
Install side gears and thrust washers into differential case.
 CAUTION:

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

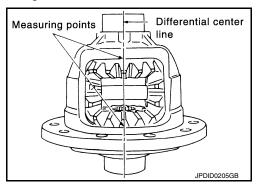
4. Align 2 pinion mate gears in diagonally opposite positions, then rotate and install them into differential case after installing thrust washer to pinion mate gear.



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



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



## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

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 <u>DLN-261</u>, "<u>Differ-ential Side Gear Clear-</u>

ance".

#### **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 wash-

When the back clearance

Use a thinner thrust wash-

er.



is small:

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

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

#### **CAUTION:**

Never reuse lock pin.

Punch SPD030

8. Apply thread locking sealant into the thread hole of drive gear. Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

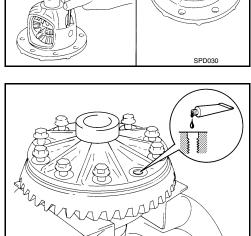
#### **CAUTION:**

Clean and degrease drive gear back and threaded holes sufficiently.

9. Install the drive gear to differential case.

#### **CAUTION:**

Align the matching mark of differential case and drive gear.



Feeler gauges with the same thickness

Feeler gauges with the same thickness

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## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

10. Tighten the mounting bolts with the following procedure. **CAUTION:** 

Apply anti-corrosin oil to the thread and seat of mounting bolts.

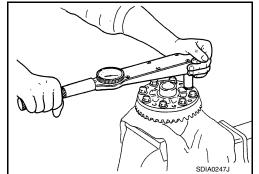
Tighten the bolts in a crisscross fashion to the specified torque.

**Drive gear mounting** : 78.5 N·m (8.0 kg-m, 58 ft-lb) bolts tightening torque

Tighten the bolts additionally to the specified angle.

Drive gear mounting : 31 to 36 degree





#### **CAUTION:**

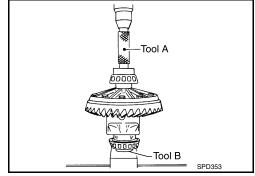
Check the tightening angle using the angle wrench [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.

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

: Drift [SST: KV38100300 (J-25523)] В : Base [SST: ST33061000 (J-8107-2)]

#### **CAUTION:**

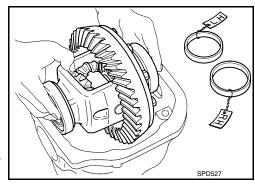
Never reuse side bearing inner race.

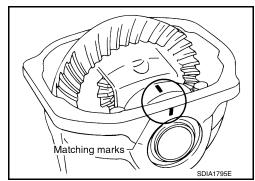


12. Set bearing outer races to differential case assembly, and install it with removed side bearing adjusting washer or same thickness washer into gear carrier.

#### **CAUTION:**

- · Apply differential gear oil to the side bearings.
- Install side bearing and side bearing adjusting washer in correct location. (drive gear tooth side or drive gear back side)
- 13. Measure side bearing preload. If necessary, select the appropriate side bearing adjusting washers. Refer to DLN-239, "AWD : Adjustment".
- 14. Align matching marks on bearing cap with that on gear carrier.
- 15. Install bearing caps and tighten bearing cap mounting bolts.





## < UNIT DISASSEMBLY AND ASSEMBLY >

16. Using the drift (A) [SST: KV38100200 (J-26233)], drive side oil seals until it becomes flush with the case end.

#### CAUTION:

- · Never reuse oil seal.
- · When installing, never incline oil seal.
- Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.
- 17. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to <u>DLN-239</u>, "AWD: Adjustment".

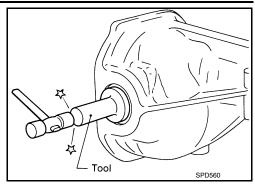
Recheck above items. Readjust the above description, if necessary.

- 18. Apply sealant (A) to mating surface of rear cover.
  - Use Genuine Silicone RTV or equivalent. Refer to <u>GI-24</u>, <u>"Recommended Chemical Products and Sealants"</u>.

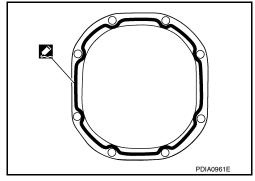
#### **CAUTION:**

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

19. Install rear cover on gear carrier and tighten mounting bolts.



[REAR FINAL DRIVE: R200]



20. Install side flange with the following procedure.

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

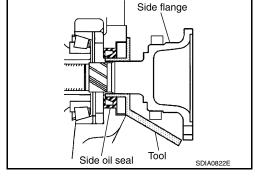
## NOTE:

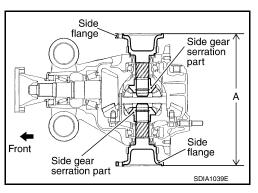
When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.

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



A : 326 – 328 mm (12.83 – 12.91 in)





AWD : Adjustment

#### TOTAL PRELOAD TORQUE

Before inspection and adjustment, drain gear oil.

- 1. Secure final drive assembly onto an attachment [SST: KV38100800 (J-25604-01)].
- Remove side flanges.
- 3. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
- Rotate drive pinion at least 20 times to check for smooth operation of the bearing.

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## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

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

**Standard** 

Total preload torque : Refer to <u>DLN-261, "Preload Torque".</u>

#### 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.



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 in-

formation.

When the preload is small

On pinion bearings: Tighten the drive pinion lock nut.

On side bearings: Use thicker side bearing adjusting washers by the same amount to

each side. For selecting adjusting washer, refer to the latest parts in-

formation.

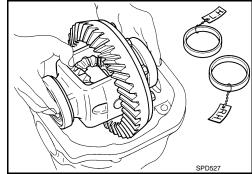
SIDE BEARING PRELOAD

Before inspection and adjustment, drain gear oil.

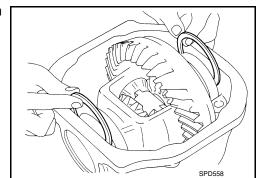
1. Remove rear cover. Refer to <a href="DLN-232">DLN-232</a>, "AWD : Disassembly".

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.



Insert left and right original side bearing adjusting washers in place between side bearings and gear carrier.

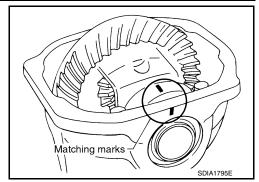


## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

Install bearing caps in their correct locations and tighten bearing cap mounting bolts.

6. Turn the carrier several times to seat the bearings.

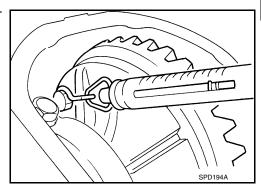


7. Measure the turning torque of the carrier at the drive gear mounting bolts with a spring gauge [SST: — (J-8129)].

**Standard** 

Specification : 34.2 – 39.2 N (3.5 – 4.0 kg, 7.7 – 8.8 lb) of pulling force

at the drive gear bolt



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

If the turning torque is less Use a thicker adjusting than the specified range: washer.

If the turning torque is Use a thinner adjusting

greater than the specifica- washer. tion:

5 kg

#### **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 <a href="DLN-232">DLN-232</a>, "AWD : Disassembly".
- 2. Fit a dial indicator to the drive gear back face.
- 3. Rotate the drive gear to measure runout.

Limit

Drive gear runout : Refer to <u>DLN-261, "Drive</u>

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.

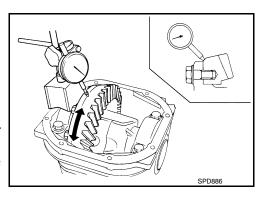
**CAUTION:** 

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 <a href="DLN-232">DLN-232</a>, "AWD: Disassembly".



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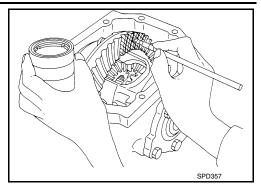
## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

2. Apply red lead to drive gear.

## **CAUTION:**

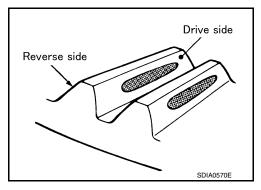
Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on drive gear.



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

## **CAUTION:**

Check tooth contact on drive side and reverse side.



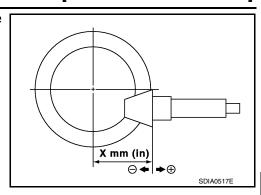
Tooth contact condition			Pinion height adjusting		Adjustment	Possible cause	
Drive si	de	Back side		washer selection valve [ mm (in) ]		(Yes/No)	Fossible cause
Heel side	Toe side	Toe side Hee	el side	Thicker	+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
		Calling	\		+0.06 (+0.0024)		Occurrence of noise when accelerating.
<b></b>			\		+0.03 (+0.0012)	No	_
			\	Thinner	0		
7			\		-0.03 (-0.0012)		
***	<b>&gt;</b>		\		-0.06 (-0.0024)	Yes	Occurrence of noise at constant speed and decreasing speed.
	<b>*****</b>		\		-0.09 (-0.0035)		Occurrence of noise and scoring sound in all speed ranges.

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## < UNIT DISASSEMBLY AND ASSEMBLY >

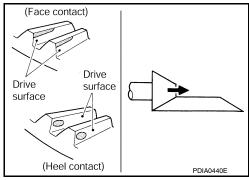
[REAR FINAL DRIVE: R200]

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



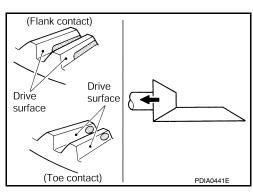
• If the tooth contact is near the face (face contact), or near the heel (heel contact), thicken pinion height adjusting washers to move drive pinion closer to drive gear.

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 <u>DLN-232</u>, "AWD : <u>Disassembly"</u>.
- 2. Fit a dial indicator to the drive gear face to measure the backlash.

**Standard** 

Backlash : Refer to <u>DLN-261, "Back-lash".</u>

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

#### When the backlash is large:

Make drive gear back side adjusting washer thicker, and drive gear tooth side adjusting washer thinner by the same amount. For selecting adjusting washer, refer to the latest parts information.



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#### < UNIT DISASSEMBLY AND ASSEMBLY >

#### When the backlash is small:

Make drive gear back side adjusting washer thinner, and drive gear tooth side adjusting washer thicker by the same amount. For selecting adjusting washer, refer to the latest parts information.

#### **CAUTION:**

Never change the total amount of washers as it changes the bearing preload.

## AWD: Inspection After Disassembly

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[REAR FINAL DRIVE: R200]

#### DRIVE GEAR AND DRIVE PINION

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

#### **BEARING**

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

#### SIDE GEAR AND PINION MATE GEAR

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

## SIDE GEAR THRUST WASHER AND PINION MATE THRUST WASHER

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

#### OIL SEAL

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

#### DIFFERENTIAL CASE

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

#### COMPANION FLANGE

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

## **DRIVE PINION**

2WD

2WD : Exploded View

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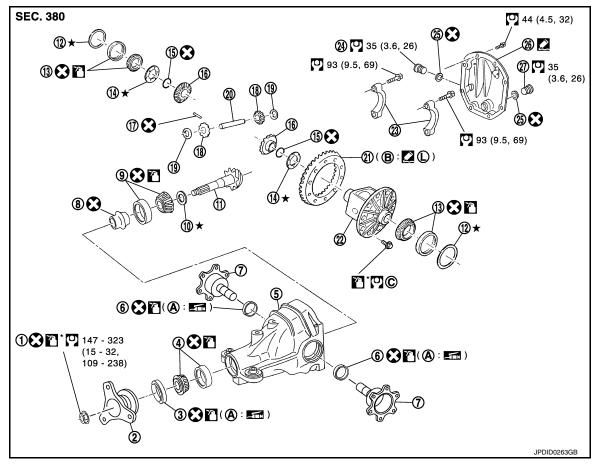
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- 1. Drive pinion lock nut
- 4. Pinion front bearing
- 7. Side flange
- 10. Pinion height adjusting washer
- 13. Side bearing
- 16. Side gear
- 19. Pinion mate thrust washer
- 22. Differential case
- 25. Gasket
- A. Oil seal lip

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

- 3. Front oil seal
- 6. Side oil seal
- 9. Pinion rear bearing
- 12. Side bearing adjusting washer
- 15. Circular clip
- 18. Pinion mate gear
- 21. Drive gear
- 24. Filler plug
- 27. Drain plug
- C. Comply with the assembly procedure when tightening. Refer to <u>DLN-222</u>, "2WD: Assembly".

: Apply gear oil.

★: Apply anti-corrosion oil.

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

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

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

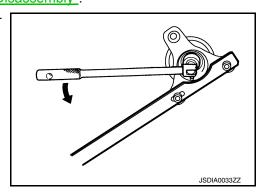
2WD: Disassembly

[REAR FINAL DRIVE: R200]

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# Remove differential case assembly. Refer to <u>DLN-220, "2WD : Disassembly"</u>.

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



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

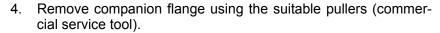
#### **CAUTION:**

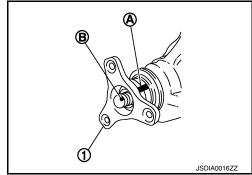
For matching mark, use paint. Never damage companion flange and drive pinion.

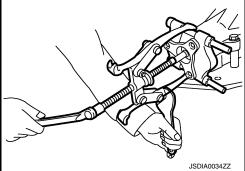
#### NOTE:

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

When replacing companion flange, matching mark is not necessary.



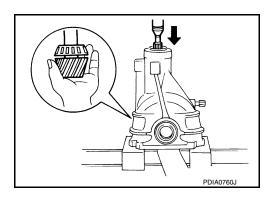




5. Press drive pinion assembly out of gear carrier. **CAUTION:** 

## 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.



## **DRIVE PINION**

## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

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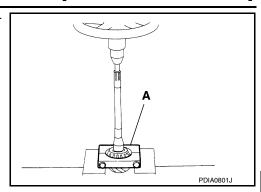
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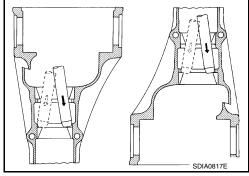
10. Remove pinion rear bearing inner race and pinion height adjusting washer with the replacer (A) (commercial service tool).



11. Tap pinion front/rear bearing outer races uniformly using a brass rod or equivalent to remove them.

## **CAUTION:**

Never damage gear carrier.



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2WD: Assembly

Install front bearing outer race (1) and rear bearing outer race
 using drifts (A, B and D) and drift bar (C).

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

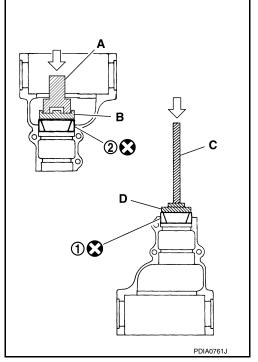
B : Drift [SST: KV40105230 ( — )]

C : Drift bar [SST: ST30611000 (J-25742-1)]

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

#### **CAUTION:**

- At first, using a hammer, tap bearing outer race until it becomes flat to gear carrier.
- Never reuse pinion front and rear bearing outer race.



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[REAR FINAL DRIVE: R200]

Temporarily install pinion height adjusting washer (1).

When hypoid gear set has been replaced

 Select pinion height adjusting washer. Refer to <u>DLN-251</u>, <u>"2WD : Adjustment"</u>.

When hypoid gear set has been reused

 Temporarily install the removed pinion height adjusting washer or same thickness washer to drive pinion.

#### **CAUTION:**

Pay attention to the direction of pinion height adjusting washer. (Assemble as shown in the figure.)

3. Install pinion rear bearing inner race (1) to drive pinion with the drift (A) [SST: ST30901000 (J-26010-01)].

#### **CAUTION:**

Never reuse pinion rear bearing inner race.

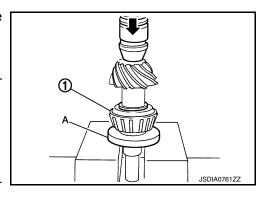
- 4. Check and adjust the tooth contact and back lash of drive gear and drive pinion following the procedure below.
- a. Assemble drive pinion into gear carrier.

#### **CAUTION:**

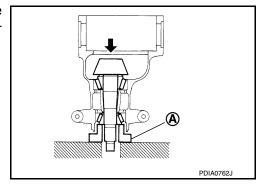
- Do not install collapsible spacer at this time.
- · Apply gear oil to pinion rear bearing.
- b. Assemble pinion front bearing inner race to drive pinion assembly.

## **CAUTION:**

- Never reuse pinion front bearing inner race.
- Apply gear oil to pinion front bearing.
- c. Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.



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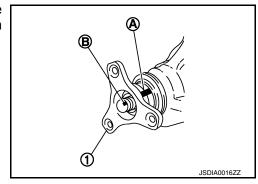
d. Install companion flange.

#### **CAUTION:**

Do not install front oil seal at this time.

#### NOTE:

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



## **DRIVE PINION**

## < UNIT DISASSEMBLY AND ASSEMBLY >

- e. Temporarily tighten removed drive pinion nut to drive pinion, using flange wrench (commercial service tool).
  - A : Preload gauge [SST: ST3127S000 (J-25765-A)]

#### NOTE:

Use removed drive pinion nut only for the preload measurement.

- f. Rotate drive pinion more than 20 times to adjust bearing.
- g. Tighten to drive pinion lock nut using flange wrench (commercial service tool), while adjusting pinion bearing preload torque using preload gauge [SST: ST3127S000 (J-25765-A)].

Pinion bearing preload :  $1.0 - 1.3 \text{ N} \cdot \text{m} (0.11 - 0.13 \text{ kg-m}, 9 - 11 in-lb)$ 

#### **CAUTION:**

Drive pinion nut is tightened with no collapsible spacer. Be careful not to overtighten it. While measuring the preload, tighten drive pinion nut in 5° to 10° increments.

h. Assemble removed drive side bearing adjusting washer or same thickness of it and install differential case assembly. Refer to <a href="DLN-222">DLN-222</a>, "2WD: Assembly".

#### **CAUTION:**

- Apply differential gear oil to the side bearings.
- Install side bearing and side bearing adjusting washer in correct location. (drive gear tooth side or drive gear back side)
- i. Install bearing caps.
- Check and adjust tooth contact and drive gear to drive pinion backlash. Refer to <u>DLN-226, "2WD : Adjust-ment"</u>.
- k. Remove bearing caps and differential case assembly.
- Remove companion flange.
- m. Remove drive pinion assembly from gear carrier.

#### **CAUTION:**

Never drop the drive pinion assembly.

- n. Remove pinion front bearing inner race.
- 5. Assemble collapsible spacer.

#### **CAUTION:**

Never reuse collapsible spacer.

6. Assemble drive pinion into gear carrier.

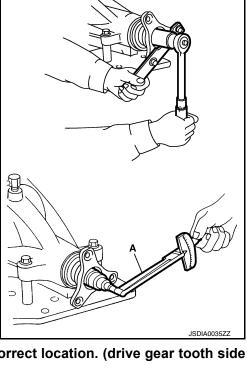
#### **CAUTION:**

Apply gear oil to pinion rear bearing.

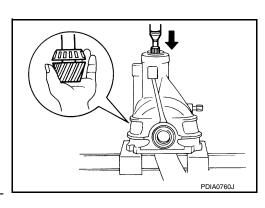
Assemble pinion front bearing inner race to drive pinion assembly.

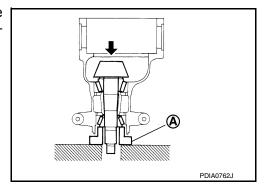
#### **CAUTION:**

- Never reuse pinion front bearing inner race.
- Apply gear oil to pinion front bearing.
- 8. Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.



[REAR FINAL DRIVE: R200]





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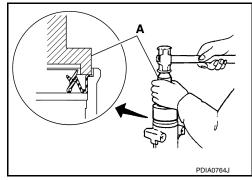
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[REAR FINAL DRIVE: R200]

9. Using the drift (A) [SST: ST30720000 (J-25405)], install front oil seal as shown in figure.

#### **CAUTION:**

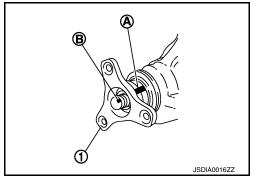
- Never reuse oil seal.
- · When installing, never incline oil seal.
- Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.



10. Install companion flange.

#### NOTE:

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



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

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

#### **CAUTION:**

## Never reuse drive pinion lock nut.

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

Pinion bearing preload : Refer to <u>DLN-261, "Preload Torque".</u>

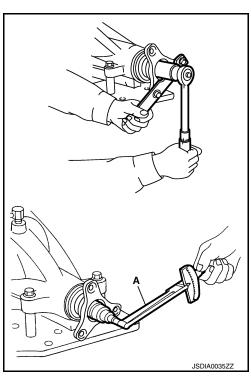
#### **CAUTION:**

- Adjust to the lower limit of the drive pinion lock nut tightening torque first.
- If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.
- After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.
- Install differential case assembly. Refer to <u>DLN-222, "2WD : Assembly"</u>.



#### Do not install rear cover at this time.

- 14. Check and adjust drive gear runout, tooth contact and drive gear to drive pinion backlash, and companion flange runout. Refer to <u>DLN-226</u>, "2WD: Adjustment" and <u>DLN-251</u>, "2WD: Adjustment". Recheck above items. Readjust the above description, if necessary.
- 15. Check total preload torque. Refer to <u>DLN-226, "2WD : Adjustment"</u>.
- Install rear cover. Refer to <u>DLN-222, "2WD : Assembly"</u>.



[REAR FINAL DRIVE: R200]

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# 2WD : Adjustment

# PINION GEAR HEIGHT

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

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



$$T = T_0 + (t_1 - t_2)$$

T: Correct washer thickness

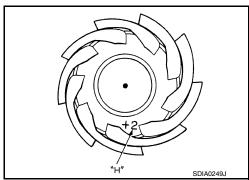
To: Removed washer thickness

t1: Old drive pinion head letter "H × 0.01"

("H": machined tolerance 1/100 mm × 100)

t2: New drive pinion head letter " $H \times 0.01$ "

("H": machined tolerance 1/100 mm × 100)



**Example:** 

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

To: 3.21 t1: +2 t2: -1

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

#### **CAUTION:**

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

#### **Example:**

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

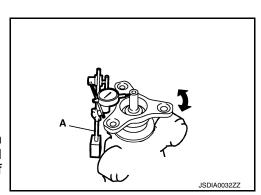
## **DRIVE PINION RUNOUT**

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

Limit

Drive pinion runout : Refer to <u>DLN-261, "Drive</u> Pinion Runout (2WD)".

 If the runout value is outside of the limit, possible causes are an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.



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## 2WD : Inspection After Disassembly

#### DRIVE GEAR AND DRIVE PINION

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

#### **BEARING**

· Clean up the disassembled parts.

Revision: 2015 February DLN-251 2015 QX70

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

#### SIDE GEAR AND PINION MATE GEAR

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

## SIDE GEAR THRUST WASHER AND PINION MATE THRUST WASHER

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

#### OIL SEAL

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

#### DIFFERENTIAL CASE

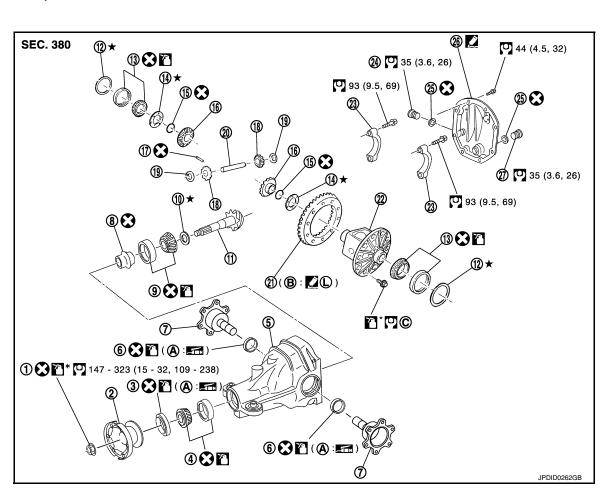
- · Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

#### COMPANION FLANGE

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

#### **AWD**

## AWD : Exploded View



- Drive pinion lock nut
- 4. Pinion front bearing
- 7. Side flange

- Companion flange
- Gear carrier
- Collapsible spacer
- Front oil seal
- Side oil seal
- Pinion rear bearing

Revision: 2015 February DLN-252 2015 QX70

### < UNIT DISASSEMBLY AND ASSEMBLY >

### [REAR FINAL DRIVE: R200]

- 10. Pinion height adjusting washer
- 13. Side bearing
- 19. Pinion mate thrust washer
- 22. Differential case
- 25. Gasket

16. Side gear

Α. Oil seal lip

- 11. Drive pinion
- 14. Side gear thrust washer
- 17. Lock pin
- 20. Pinion mate shaft
- Bearing cap
- 26. Rear cover
- B. Screw hole

- 12. Side bearing adjusting washer
- 15. Circular clip
- 18. Pinion mate gear
- 21. Drive gear
- 24. Filler plug
- 27. Drain plug
- C. Comply with the assembly procedure when tightening. Refer to DLN-235, "AWD: Assembly".

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: Apply gear oil.

\*: Apply anti-corrosion oil.

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

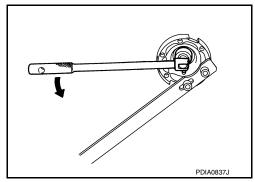
(2): Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

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

## AWD : Disassembly

Remove differential case assembly. Refer to <u>DLN-232</u>, "AWD: <u>Disassembly</u>".

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



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

### **CAUTION:**

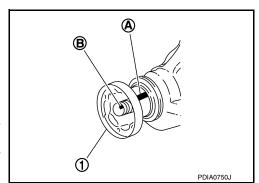
For matching mark, use paint. Never damage companion flange and drive pinion.

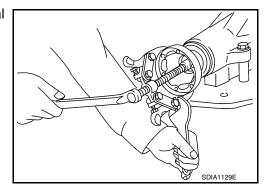
### NOTE:

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

When replacing companion flange, matching mark is not necessary.

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





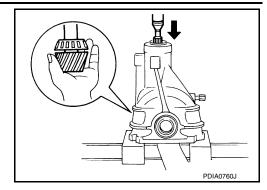
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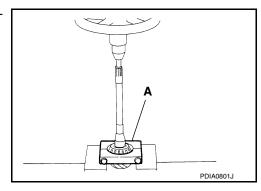
### < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

- 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.



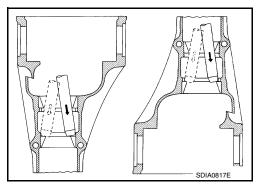
10. Remove pinion rear bearing inner race and pinion height adjusting washer with the replacer (A) (commercial service tool).



11. Tap pinion front/rear bearing outer races uniformly using a brass rod or equivalent to remove them.

### **CAUTION:**

Never damage gear carrier.



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 Install front bearing outer race (1) and rear bearing outer race (2) using drifts (A, B and D) and drift bar (C).

A : Drift [SST: ST30720000 (J-25405)]
B : Drift [SST: KV40105230 ( — )]

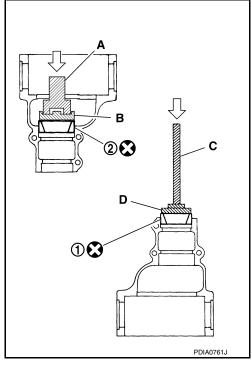
C : Drift bar [SST: ST30611000 (J-25742-1)]

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

### **CAUTION:**

AWD: Assembly

- At first, using a hammer, tap bearing outer race until it becomes flat to gear carrier.
- Never reuse pinion front and rear bearing outer race.



2. Temporarily install pinion height adjusting washer (1).

When hypoid gear set has been replaced

 Select pinion height adjusting washer. Refer to <u>DLN-258</u>. "AWD : Adjustment".

When hypoid gear set has been reused

 Temporarily install the removed pinion height adjusting washer or same thickness washer to drive pinion.

### **CAUTION:**

Pay attention to the direction of pinion height adjusting washer. (Assemble as shown in the figure.)

3. Install pinion rear bearing inner race (1) to drive pinion with the drift (A) [SST: ST30901000 (J-26010-01)].

### **CAUTION:**

Never reuse pinion rear bearing inner race.

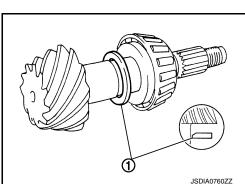
- 4. Check and adjust the tooth contact and back lash of drive gear and drive pinion following the procedure below.
- a. Assemble drive pinion into gear carrier.

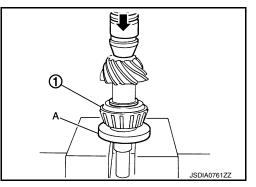
### **CAUTION:**

- Do not install collapsible spacer at this time.
- · Apply gear oil to pinion rear bearing.
- Assemble pinion front bearing inner race to drive pinion assembly.

### **CAUTION:**

- Never reuse pinion front bearing inner race.
- Apply gear oil to pinion front bearing.





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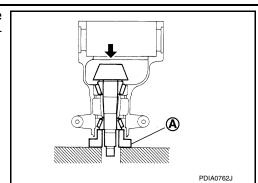
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### < UNIT DISASSEMBLY AND ASSEMBLY >

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.



[REAR FINAL DRIVE: R200]

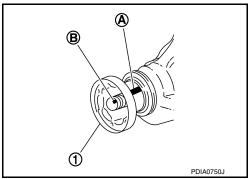
d. Install companion flange.

### **CAUTION:**

Do not install front oil seal at this time.

#### NOTE:

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



- e. Temporarily tighten removed drive pinion nut to drive pinion, using flange wrench (commercial service tool).
  - A : Preload gauge [SST: ST3127S000 (J-25765-A)]

### NOTE:

Use removed drive pinion nut only for the preload measurement.

- f. Rotate drive pinion more than 20 times to adjust bearing.
- g. Tighten to drive pinion lock nut using flange wrench (commercial service tool), while adjusting pinion bearing preload torque using preload gauge [SST: ST3127S000 (J-25765-A)].

Pinion bearing preload :  $1.0 - 1.3 \text{ N} \cdot \text{m} (0.11 - 0.13 \text{ kg-m}, 9 - 11 \text{ in-lb})$ 

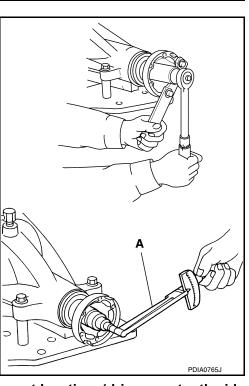
### **CAUTION:**

Drive pinion nut is tightened with no collapsible spacer. Be careful not to overtighten it. While measuring the preload, tighten drive pinion nut in  $5^{\circ}$  to  $10^{\circ}$  increments.

 Assemble removed drive side bearing adjusting washer or same thickness of it and install differential case assembly. Refer to <u>DLN-235</u>, "AWD: Assembly".

#### **CAUTION:**

- Apply differential gear oil to the side bearings.
- Install side bearing and side bearing adjusting washer in correct location. (drive gear tooth side or drive gear back side)
- Install bearing caps.
- j. Check and adjust tooth contact and drive gear to drive pinion backlash. Refer to <u>DLN-239</u>, "AWD : Adjust-ment".
- k. Remove bearing caps and differential case assembly.
- I. Remove companion flange.



### < UNIT DISASSEMBLY AND ASSEMBLY >

m. Remove drive pinion assembly from gear carrier.

### **CAUTION:**

Never drop the drive pinion assembly.

- n. Remove pinion front bearing inner race.
- 5. Assemble collapsible spacer.

#### **CAUTION:**

Never reuse collapsible spacer.

6. Assemble drive pinion into gear carrier.

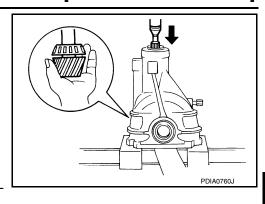
### **CAUTION:**

Apply gear oil to pinion rear bearing.

 Assemble pinion front bearing inner race to drive pinion assembly.

### **CAUTION:**

- Never reuse pinion front bearing inner race.
- Apply gear oil to pinion front bearing.
- 8. Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.



[REAR FINAL DRIVE: R200]

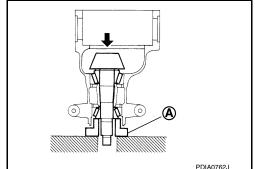
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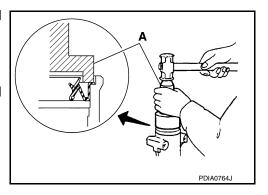
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9. Using the drift (A) [SST: ST30720000 (J-25405)], install front oil seal as shown in figure.

### **CAUTION:**

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

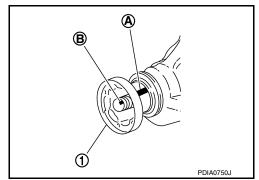


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10. Install companion flange.

### NOTE:

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



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

### **CAUTION:**

### Never reuse drive pinion lock nut.

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

Pinion bearing preload : Refer to <u>DLN-261, "Preload Torque"</u>.

### **CAUTION:**

- Adjust to the lower limit of the drive pinion lock nut tightening torque first.
- If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.
- After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.
- 13. Install differential case assembly. Refer to <a href="DLN-235">DLN-235</a>, "AWD : Assembly".



#### Do not install rear cover at this time.

- 14. Check and adjust drive gear runout, tooth contact and drive gear to drive pinion backlash, and companion flange runout. Refer to <u>DLN-239</u>, "AWD : Adjustment" and <u>DLN-258</u>, "AWD : Adjustment". Recheck above items. Readjust the above description, if necessary.
- 15. Check total preload torque. Refer to DLN-239, "AWD: Adjustment".
- 16. Install rear cover. Refer to <u>DLN-235</u>, "AWD : Assembly".

AWD : Adjustment

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### PINION GEAR HEIGHT

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

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

### Washer selection equation:

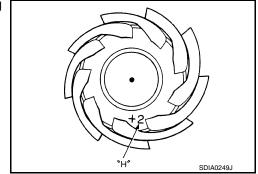
$$T = T_0 + (t_1 - t_2)$$

T: Correct washer thickness

To: Removed washer thickness

t1: Old drive pinion head letter " $H \times 0.01$ " ("H": machined tolerance 1/100 mm  $\times$  100)

t2: New drive pinion head letter "H  $\times$  0.01" ("H": machined tolerance 1/100 mm  $\times$  100)



## Example:

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

To: 3.21 t1: +2 t2: -1

### < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

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

### **CAUTION:**

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

### **Example:**

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

### COMPANION FLANGE RUNOUT

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

### Limit

Companion flange runout

: Refer to DLN-261, "Companion Flange Runout (AWD)".

- 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.
- If the runout value is still outside of the limit after the check and repair, replace companion flange.

## AWD: Inspection After Disassembly

### DRIVE GEAR AND DRIVE PINION

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

### **BEARING**

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

### SIDE GEAR AND PINION MATE GEAR

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

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

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

### OIL SEAL

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

#### DIFFERENTIAL CASE

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

#### COMPANION FLANGE

Test indicator inside face

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## < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R200]

- · 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)

## [REAR FINAL DRIVE: R200] SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

		2WD	AWD
Applied model		VQ3	7VHR
		A	/T
Final drive model		R2	200
Gear ratio		3.357	3.692
Number of teeth (Drive gear/Drive pinion)		47/14	48/13
Oil capacity (Approx.)	ℓ (US pt, Imp pt)	1.4 (3,	2-1/2)
Number of pinion gears		:	2
Drive pinion adjustment spacer type		Colla	psible

## **Drive Gear Runout**

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Item	Limit
Drive gear back face runout	0.05 (0.0020)

## Differential Side Gear Clearance

INFOID:0000000010580565

	Unit: mm (in)
Item	Standard
Side gear backlash (Clearance between side gear and differential case)	0.20 (0.0079) or less (Each gear should rotate smoothly without excessive resistance during differential motion.)

## **Preload Torque**

INFOID:000000010580566 Unit: N·m (kg-m, in-lb)

Item	Standard
Pinion bearing (P1)	2.65 – 3.23 (0.27 – 0.32, 24 – 28)
Side bearing (P2)	0.20 - 0.52 (0.02 - 0.05, 2 - 4)
Side bearing to pinion bearing (Total preload) (Total preload = P1 + P2)	2.85 – 3.75 (0.29 – 0.38, 26 – 33)

## Backlash

INFOID:0000000010580567 Unit: mm (in)

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

## Drive Pinion Runout (2WD)

INFOID:0000000010580568

Unit: mm (in) Item Limit Tip of drive pinion runout 0.8 (0.031)

## Companion Flange Runout (AWD)

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Unit: mm (in)

**DLN-261 Revision: 2015 February** 2015 QX70

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Unit: mm (in)

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

< SERVICE DATA AND SPECIFICATIONS (SDS)

[REAR FINAL DRIVE: R200]

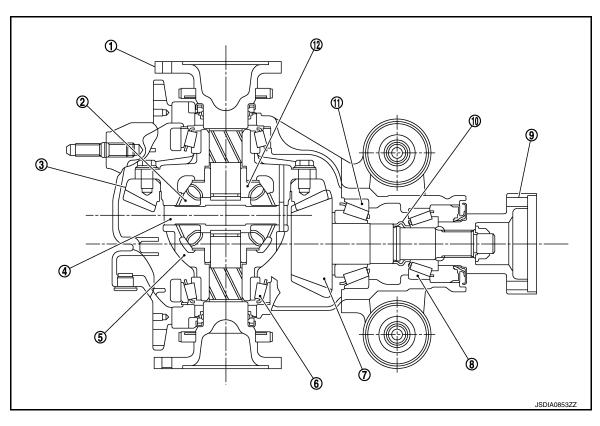
Item	Limit
Inner side of the companion flange runout	0.08 (0.0031)

## SYSTEM DESCRIPTION

## REAR FINAL DRIVE ASSEMBLY

System Diagram

**CROSS-SECTIONAL VIEW** 



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

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## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

## SYMPTOM DIAGNOSIS

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## **NVH Troubleshooting Chart**

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[REAR FINAL DRIVE: R230]

Use the chart below to find the cau	se of the symptom. If ne	cessary	y, repa	ir or re	place	these p	oarts.				I			ı
Reference page		DLN-291, "Inspection After Disassembly"	DLN-287, "Adjustment"	DLN-291, "Inspection After Disassembly"	DLN-287, "Adjustment"	DLN-287, "Adjustment"	DLN-270, "Inspection"	NVH of FRONT and REAR PROPELLER SHAFT in this section.	NVH in FAX, RAX, 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 SUSPECT	ED 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	×	×	×	×	×	×	×	×	×	×	×	×	×

x: Applicable

### **PRECAUTIONS**

< PRECAUTION >

## **PRECAUTION**

## **PRECAUTIONS**

### Service Notice or Precautions for Rear Final Drive

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

## Precautions for Removing Battery Terminal

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

### NOTE:

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

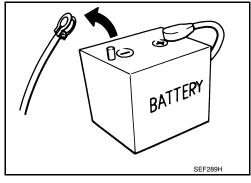
• For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

### NOTE:

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

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

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



[REAR FINAL DRIVE: R230]

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## **PREPARATION**

## **PREPARATION**

Special Service Tool

INFOID:0000000010580573

Tool number (TechMate No.) Tool name		Description
KV381054S0 (J-34286) Puller	ZZAO601D	Removing front oil seal
KV40100621 (J-25273) Drift a: 76 mm (2.99 in) dia. b: 69 mm (2.72 in) dia.	a b ZZA0811D	Installing front oil seal     Installing side bearing inner race     Installing drive pinion rear bearing outer race
ST3127S000 (J-25765-A) Preload gauge	77.100000	Measuring drive pinion bearing preload torque and total preload torque
KV38107900 (J-39352) Protector	ZZA0806D  S-NT129	Installing side flange
KV40104100 ( — ) Attachment	ZZAOBO4D	Removing side flange
ST36230000 (J-25840-A) Sliding hammer		Removing side flange
	ZZA0803D	

## **PREPARATION**

[REAR FINAL DRIVE: R230]

Tool number		Description
TechMate No.) Tool name		
ST35271000 — ) Orift a: 72 mm (2.83 in) dia. o: 63 mm (2.48 in) dia.	ab	Installing side oil seal
(V10111100 J-37228)	ZZA1143D	Removing carrier cover
Seal cutter		
V38100800	S-NT046	Securing unit assembly
J-25604-01) Attachment A: 541 mm (21.30 in) B: 200 mm (7.87 in)	B	Cooling and accomply
ST3306S001	SDIA0267E	Removing and installing side bearing inner
— ) Differential side bearing puller set : ST33051001 (J-22888-20) Puller :: ST33061000 (J-8107-2) Base	2 a b	race
: 28.5 mm (1.122 in) dia. : 38 mm (1.50 in) dia.	1 NT072	
V10112100 BT-8653-A) angle wrench		Tightening the drive gear mounting bolt
	ZZA0120D	
ST30901000	23.0.200	Installing drive pinion rear bearing inner
J-26010-01) Drift a: 79 mm (3.11 in) dia. b: 45 mm (1.77 in) dia. b: 35.2 mm (1.386 in) dia.	a b c	race • Installing side bearing inner race

## **PREPARATION**

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[REAR FINAL DRIVE: R230]

Tool number (TechMate No.) Tool name		Description
(J-8129) Spring gauge		Measuring turning torque
	NT127	
ST15310000 ( — ) Drift a: 96 mm (3.78 in) dia. b: 84 mm (3.31 in) dia.	a b	Installing drive pinion rear bearing outer race
ST35325000	S-NT673	Installing drive pinion front bearing outer race
( — ) Drift bar	S-NT090	
ST30621000 ( — ) Drift a: 79 mm (3.11 in) dia. b: 59 mm (2.32 in) dia.	5-N1090	Installing drive pinion front bearing outer race
ST30022000	ZZA1000D	Installing side bearing inner race
( — ) Drift a: 110 mm (4.33 in) dia. b: 56 mm (2.20 in) dia. c: 46 mm (1.81 in) dia.	a b c ZZA0978D	

**Commercial Service Tool** 

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## **PREPARATION**

[REAR FINAL DRIVE: R230]

PREPARATION >		[REAR FINAL DRIVE: R230
Tool name		Description
lange wrench		Removing and installing drive pinion lock nut
Puller	NT035	Removing companion flange
Sliding hammer	ZZA0119D	Removingdifferential case assembly
	NT125	
Puller		Removing drive pinion rear bearing inner race
	ZZA0700D	
Spacer a: 60 mm (2.36 in) dia.		Installing drive pinion front bearing inner race
1. 00 mm (2.36 m) dia. 13 36 mm (1.42 in) dia. 13 30 mm (1.18 in)	c	
	a ZZA1133D	
Power tool		Loosening nuts and bolts
	PBIC0190E	

## PERIODIC MAINTENANCE

## REAR DIFFERENTIAL GEAR OIL

Inspection INFOID:0000000010580575

### OIL LEAKAGE

Make sure that differential gear oil is not leaking from the rear final drive assembly or around it.

1. Check the differential gear oil level from the filler plug hole as shown.

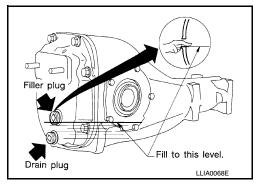
### **CAUTION:**

Never start engine while checking differential gear oil level.

2. Install the filler plug with a new gasket on it to the rear final drive assembly. Tighten to the specified torque. Refer to DLN-280, "Exploded View".

### **CAUTION:**

Never reuse gasket.



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## **Draining**

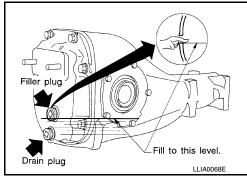
1. Stop the engine.

2. Remove the drain plug and gasket from the rear final drive assembly to drain the differential gear oil.

Install the drain plug with a new gasket to the rear final drive assembly. Tighten to the specified torque. Refer to DLN-280, "Exploded View".

### **CAUTION:**

Never reuse gasket.



## Refilling

Remove the filler plug and gasket from the rear final drive assembly.

Fill the rear final drive assembly with new differential gear oil until the level reaches the specified level near the filler plug hole.

Oil grade and viscosity : Refer to MA-17, "FOR

**NORTH AMERICA: Fluids** and Lubricants" (For North America), MA-18, "FOR **MEXICO: Fluids and Lubri**cants" (For Mexico).

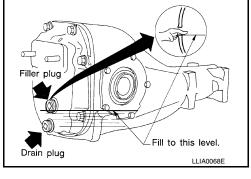
: Refer to DLN-299, "General Oil capacity

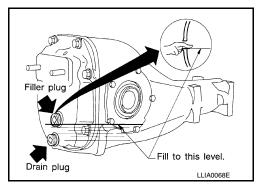
Specification".

Install the filler plug with a new gasket on it to the rear final drive assembly. Tighten to the specified torque. Refer to DLN-280, "Exploded View".

**CAUTION:** 

Never reuse gasket.

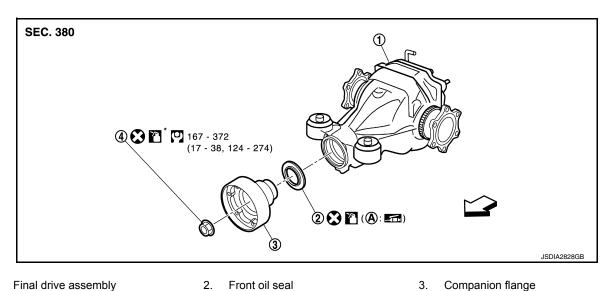




## REMOVAL AND INSTALLATION

## FRONT OIL SEAL

**Exploded View** INFOID:0000000010580578



- Final drive assembly
- Drive pinion lock nut
- 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

### 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-278, "Removal and Installation" and DLN-281, "Disassembly".

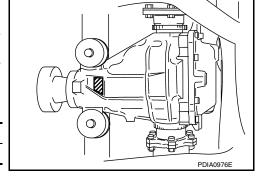
### NOTE:

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-281, "Disassembly".

No stamp Not required	Stamp	collapsible spacer replacement
	No stamp	Not required



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## FRONT OIL SEAL

### < REMOVAL AND INSTALLATION >

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

- Drain gear oil. Refer to <u>DLN-270, "Draining"</u>.
- 2. Remove the drive shafts from the rear final drive assembly. Refer to RAX-10, "Exploded View".
- 3. Remove the side flanges and side oil seals. Refer to DLN-276, "Exploded View".
- 4. Remove the rear propeller shaft. Refer to <a href="DLN-140">DLN-140</a>, "Exploded View".
- 5. Measure the total preload torque. Refer to <a href="DLN-299">DLN-299</a>, "Preload Torque".

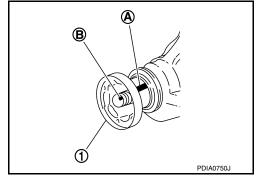
### NOTE:

Record the total preload torque measurement.

6. Put matching mark (B) on the end of the drive pinion. The matching mark (A) on companion flange (1).

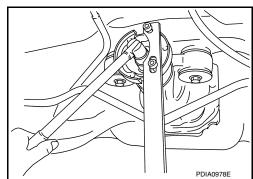
CAUTION:

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



[REAR FINAL DRIVE: R230]

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

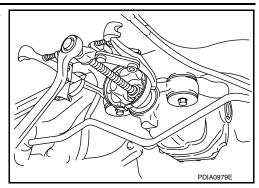


## FRONT OIL SEAL

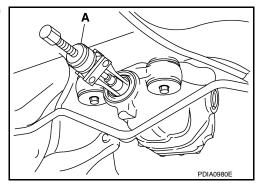
### < REMOVAL AND INSTALLATION >

[REAR FINAL DRIVE: R230]

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



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

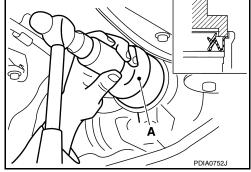


### **INSTALLATION**

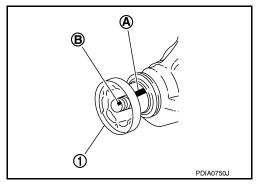
 Apply multi-purpose grease to the lips of the new front oil seal. Then drive the new front oil seal in evenly until it becomes flush with the gear carrier using the drift (A) [SST: KV40100621 (J-25273)].

### **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.



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 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)].

### **Standard**

Total preload torque

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

### **CAUTION:**

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

### Limit

Companion flange runout : Refer to <u>DLN-299, "Companion Flange Runout".</u>

- 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".

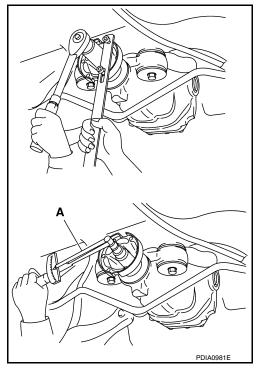
### **CAUTION:**

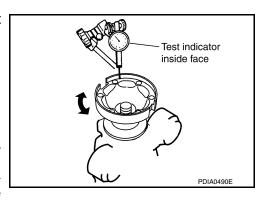
### Make a stamping after replacing front oil seal.

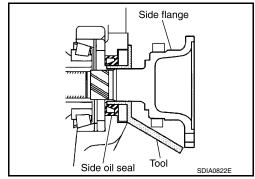
- 8. Install rear propeller shaft. Refer to <a href="DLN-140">DLN-140</a>, "Exploded View".
- 9. Install side flange with the following procedure.
- a. Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
- b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
- Put a suitable drift on the center of side flange, then drive it until sound changes.

### NOTE:

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







## FRONT OIL SEAL

## < REMOVAL AND INSTALLATION >

[REAR FINAL DRIVE: R230]

- 10. Install drive shaft. Refer to RAX-10, "Exploded View".
- 11. Install rear wheel sensor. Refer to BRC-134, "REAR WHEEL SENSOR: Exploded View".
- 12. Install center muffler. Refer to EX-10, "Exploded View".
- 13. Refill gear oil to the final drive and check oil level. Refer to <u>DLN-270</u>, "Refilling".
- 14. Check the final drive for oil leakage. Refer to <u>DLN-270</u>, "Inspection".

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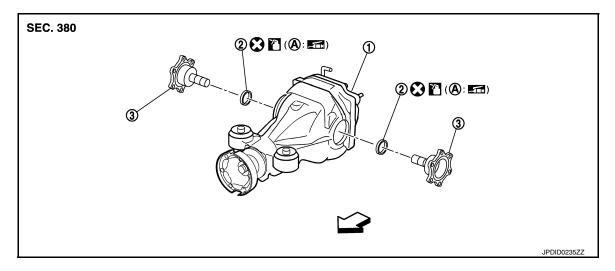
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## SIDE OIL SEAL

Exploded View



- 1. Final drive assembly
- 2. Side oil seal

3. Side flange

- A. Oil seal lip
- ∀
   : Vehicle front
- Apply gear oil.

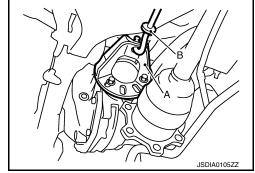
Refer to GI-4, "Components" for symbols not described above.

### Removal and Installation

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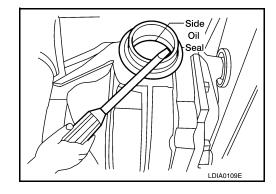
### **REMOVAL**

- 1. Remove center muffler with a power tool. Refer to EX-10, "Exploded View".
- 2. Remove rear wheel sensor. Refer to BRC-134, "REAR WHEEL SENSOR: Exploded View".
- 3. Remove the drive shaft from the rear final drive assembly. Refer to RAX-10, "Exploded View".
- 4. Remove the side flange using attachment (A) sliding hammer (B).
  - A : Attachment [SST: ST36230000 (J-25840–A)]
    B : Sliding hammer [SST: KV40104100 ( )]



5. Remove the side oil seal using suitable tool. **CAUTION:** 

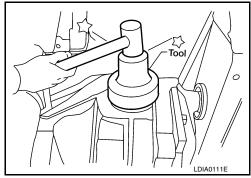
Never damage gear carrier.



### **INSTALLATION**

 Apply multi-purpose grease to the lips of the new side oil seal. Then drive the new side oil seal in evenly until it becomes flush with the gear carrier using the drift [SST: ST35271000 ( — )].
 CAUTION:

- Never reuse side oil seal.
- · Never incline the new side oil seal when installing.



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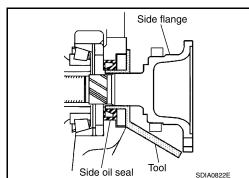
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- 2. Install the side flange using Tool.
- Install the protector [SST: KV38107900 (J-39352)] to the side oil seal as shown.
- Insert the side flange until the serrated part of the side flange has engaged the serrated part of the side gear and remove 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.



Installation of the remaining components is in the reverse order of removal. CAUTION:

Check the differential gear oil level after installation. Refer to DLN-270, "Inspection".

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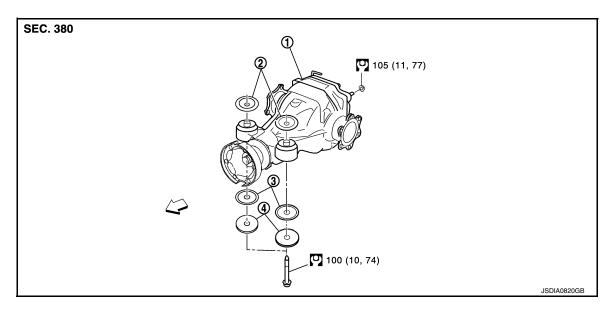
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## **UNIT REMOVAL AND INSTALLATION**

## **REAR FINAL DRIVE**

Exploded View



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

3. Lower stopper

4. Washer

∀ : Vehicle front

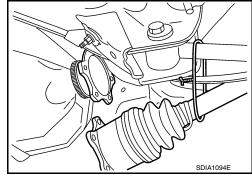
Refer to GI-4, "Components" for symbols in the figure.

### Removal and Installation

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### **REMOVAL**

- 1. Remove center muffler with a power tool. Refer to EX-10, "Exploded View".
- Remove stabilizer bar with a power tool. Refer to RSU-16, "Exploded View".
- 3. Remove rear propeller shaft from the final drive. Refer to DLN-140, "Exploded View".
- 4. Remove drive shaft from final drive with a power tool. Then suspend it by wire, etc. Refer to <a href="RAX-10">RAX-10</a>, "Exploded View".
- 5. Remove breather hose from the final drive.
- Remove rear wheel sensor. Refer to <u>BRC-134</u>, "<u>REAR WHEEL SENSOR</u>: <u>Exploded View</u>".



## **REAR FINAL DRIVE**

### < UNIT REMOVAL AND INSTALLATION >

Set a suitable jack to rear final drive assembly.

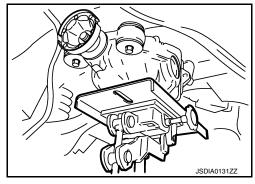
### **CAUTION:**

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

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

#### **CAUTION:**

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



[REAR FINAL DRIVE: R230]

### **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) to breather connector until dimension (A) shown as follows.

### A:

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

side

### **CAUTION:**

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

∵: Vehicle front

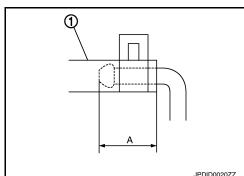
- For installation, insert the resin connector into rear suspension member. Install the metal connector in rear cover so that the hose insertion side faces the left side of the vehicle as shown in the fig-

ure. Insert the hose clip into rear suspension member. Arrange the breather hose to pass by over wheel sensor harness.



Never reuse breather connector and hose clip.

 When oil leaks while removing final drive assembly, check oil level after the installation. Refer to <u>DLN-270</u>, "Inspection".



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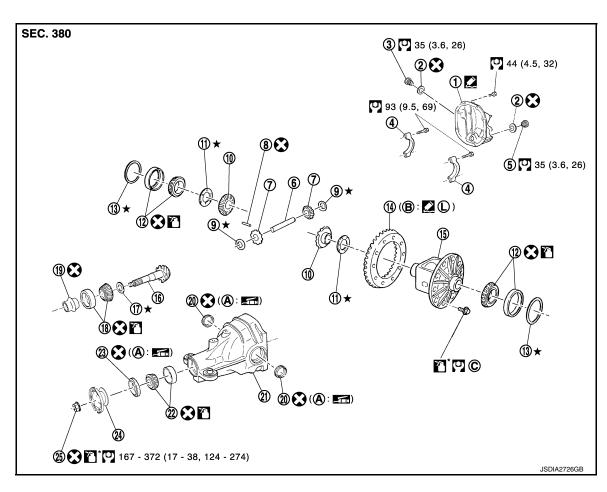
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## UNIT DISASSEMBLY AND ASSEMBLY

## DIFFERENTIAL ASSEMBLY

Exploded View



- 1. Rear cover
- 4. Bearing cap
- 7. Pinion mate gear
- 10. Side gear
- 13. Side bearing adjusting washer
- 16. Drive pinion
- 19. Collapsible spacer
- 22. Pinion front bearing
- 25. Drive pinion lock nut
- A. Oil seal lip

- 2. Gasket
- 5. Drain plug
- 8. Lock pin
- 11. Side gear thrust washer
- 14. Drive gear
- 17. Pinion height adjusting washer
- 20. Side oil seal
- 23. Front oil seal
- B. Screw hole

- Filler plug
- 6. Pinion mate shaft
- 9. Pinion mate thrust washer
- 12. Side bearing
- 15. Differential case
- 18. Pinion rear bearing
- 21. Gear carrier
- Companion flange
- C. Comply with the assembly procedure when tightening. Refer to <u>DLN-283</u>. "Assembly".

- : Apply gear oil.
- \*: Apply anti-corrosion oil.
- Apply Genuine Silicone RTV or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".
- Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

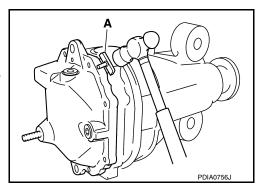
Refer to GI-4, "Components" for symbols not described above.

## < UNIT DISASSEMBLY AND ASSEMBLY >

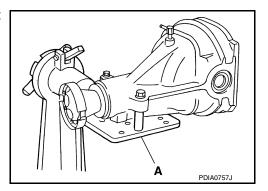
[REAR FINAL DRIVE: R230]

Disassembly

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



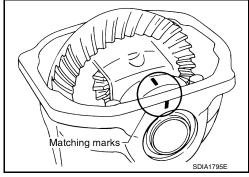
5. Using spacers, mount carrier on the attachment (A) [SST: KV38100800 (J-25604-01)].



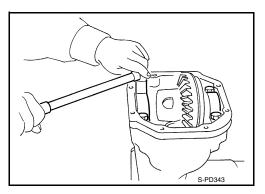
6. For proper reinstallation, paint matching marks on one side of the bearing cap.

### **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.



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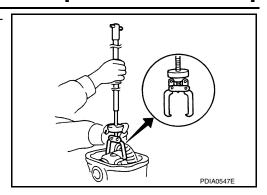
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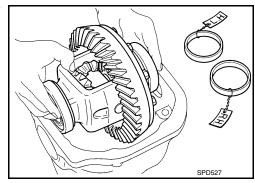
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Lift differential case assembly out with a sliding hammer (commercial service tool).



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

Also, keep side bearing adjusting washers together with bearings.

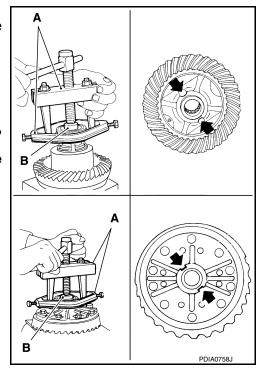


Remove side bearing inner race with puller (A) and base (B).
 To prevent damage to bearing, engage puller jaws in groove ( ).

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

### **CAUTION:**

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



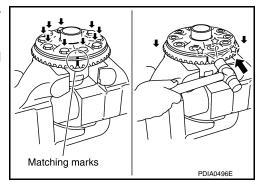
10. For proper reinstallation, paint matching marks on one differential case assembly.

### **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:**

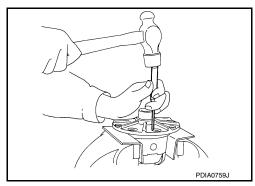
Tap evenly all around to keep drive gear from bending.



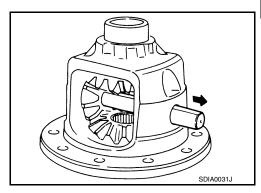
### < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R230]

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



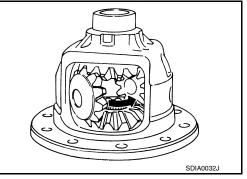
14. Remove pinion mate shaft.



- 15. Turn pinion mate gear, then remove pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from differential case.
- 16. Remove circular clip from side gear.

### **CAUTION:**

Never damage side gear.



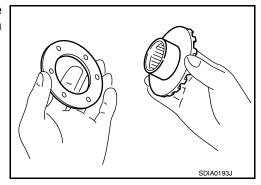
Assembly

1. Install circular clip to side gear.

### **CAUTION:**

### Never damage side gear.

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



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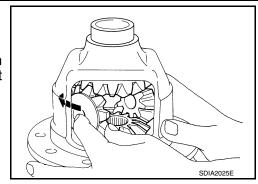
### < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R230]

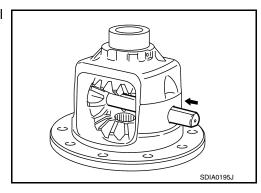
Install side gears and thrust washers into differential case.
 CAUTION:

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

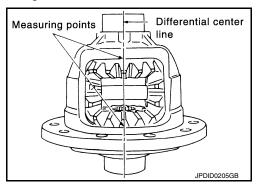
4. Align 2 pinion mate gears in diagonally opposite positions, then rotate and install them into differential case after installing thrust washer to pinion mate gear.



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



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



### < UNIT DISASSEMBLY AND ASSEMBLY >

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 <u>DLN-299, "Side</u>

**Gear Clearance**".

### **CAUTION:**

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

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

When the back clearance Use a thicker thrust washis large: er.

When the back clearance Use a thinner thrust wash-

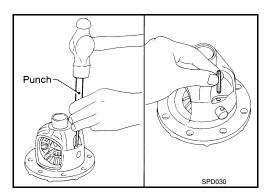
is small:

### **CAUTION:**

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

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

Never reuse lock pin.



8. Apply thread locking sealant into the thread hole of drive gear. Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-24, "Recommended Chemical Products and Sealants".

### **CAUTION:**

Clean and degrease drive gear back and threaded holes sufficiently.

9. Install the drive gear to differential case.

### CAUTION:

Align the matching mark of differential case and drive gear.

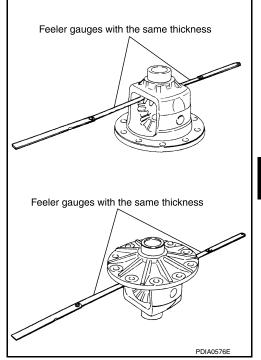
10. Tighten the mounting bolts with the following procedure. **CAUTION:** 

Apply anti-corrosin oil to the thread and seat of mounting bolts.

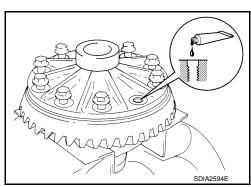
a. Tighten the bolts in a crisscross fashion to the specified torque.

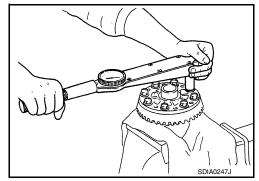
Drive gear mounting : 78.5 N·m (8.0 kg-m, 58 ft-lb) bolts tightening torque

Tighten the bolts additionally to the specified angle.



[REAR FINAL DRIVE: R230]





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Revision: 2015 February

**DLN-285** 

**Drive gear mounting bolts tightening angle** 

: 31 to 36 degree

### **CAUTION:**

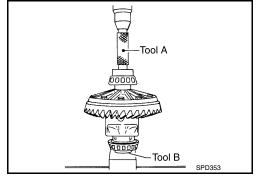
Check the tightening angle using the angle wrench [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.

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

A : Drift [SST: KV40100621 (J-25273)]
B : Base [SST: ST30901000 (J-26010-01)]

#### **CAUTION:**

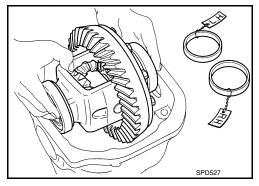
Never reuse side bearing inner race.

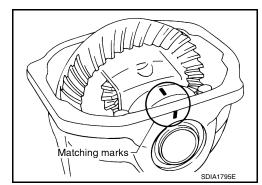


12. Set bearing outer races to differential case assembly, and install it with removed side bearing adjusting washer or same thickness washer into gear carrier.

### **CAUTION:**

- Apply differential gear oil to the side bearings.
- Install side bearing and side bearing adjusting washer in correct location. (drive gear tooth side or drive gear back side)
- Measure side bearing preload. If necessary, select the appropriate side bearing adjusting washers. Refer to <u>DLN-287</u>, "Adjustment".
- 14. Align matching marks on bearing cap with that on gear carrier.
- 15. Install bearing caps and tighten bearing cap mounting bolts.



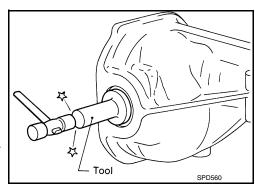


16. Using the drift (A) [SST: ST35271000 ( — )], drive side oil seals until it becomes flush with the case end.

#### **CAUTION:**

- · Never reuse oil seal.
- · When installing, never incline oil seal.
- Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.
- Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to <u>DLN-287</u>, "Adjustment".

Recheck above items. Readjust the above description, if necessary.



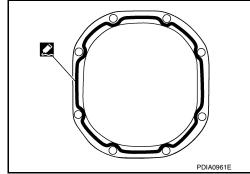
### < UNIT DISASSEMBLY AND ASSEMBLY >

- and a color (A) to motion ourselves of some color
- 18. Apply sealant (A) to mating surface of rear cover.
  - Use Genuine Silicone RTV or equivalent. Refer to <u>GI-24</u>, <u>"Recommended Chemical Products and Sealants"</u>.

### **CAUTION:**

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

19. Install rear cover on gear carrier and tighten mounting bolts.

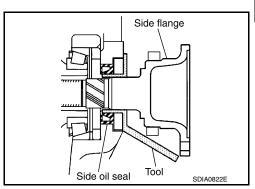


[REAR FINAL DRIVE: R230]

- 20. Install side flange with the following procedure.
- Attach the protector [SST: KV38107900 (J-39352)] to side oil seal.
- 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.



Adjustment

### TOTAL PRELOAD TORQUE

Before inspection and adjustment, drain gear oil.

- Secure final drive assembly onto an attachment [SST: KV38100800 (J-25604-01)].
- Remove side flanges.
- 3. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
- 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)].

### **Standard**

Total preload torque

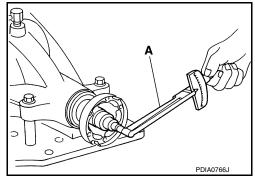
: Refer to <u>DLN-299, "Preload Torque"</u>.

### 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 in-

formation.

When the preload is small

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< UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R230]

On pinion bearings: Tighten the drive pinion lock nut.

On side bearings: Use thicker side bearing adjusting washers by the same amount to

each side. For selecting adjusting washer, refer to the latest parts in-

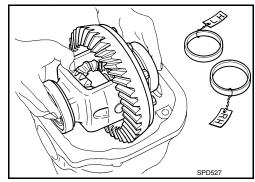
formation.

### SIDE BEARING PRELOAD

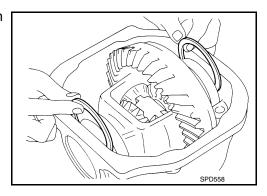
Before inspection and adjustment, drain gear oil.

1. Remove rear cover. Refer to DLN-281, "Disassembly".

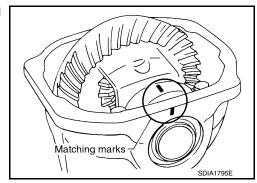
- 2. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.
- 3. Place the differential case, with side bearings and bearing races installed, into gear carrier.



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)].

**Standard** 

Specification : Refer to <u>DLN-299, "Pre-</u>

load Torque".

### < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R230]

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 adjusting washer.

If the turning torque is greater than the specificaUse a thinner adjusting washer.

tion:

### CAUTION:

Select a side bearing adjusting washer for right and left individually.

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-281, "Disassembly".
- Fit a dial indicator to the drive gear back face.
- 3. Rotate the drive gear to measure runout.

Limit

**Drive gear runout** : Refer to DLN-299, "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.

- Remove rear cover. Refer to <u>DLN-281</u>, "<u>Disassembly</u>".
- Apply red lead to drive gear.

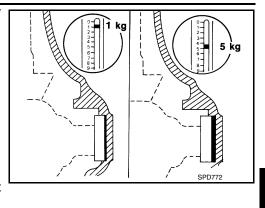
### **CAUTION:**

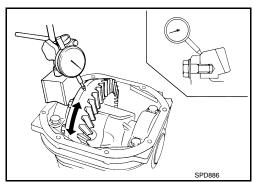
tions evenly spaced on drive gear.

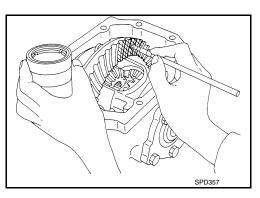
Apply red lead to both the faces of 3 to 4 gears at 4 loca-

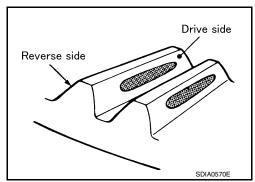
3. Rotate drive gear back and forth several times, check drive pinion gear to drive gear tooth contact. CAUTION:

Check tooth contact on drive side and reverse side.









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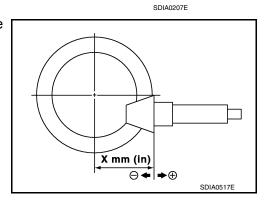
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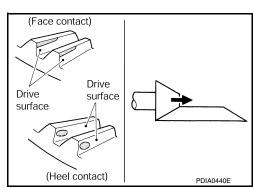
Tooth cont	act condition	Pinion heigh washer sele		Adjustment	Possible cause
Drive side	Back side	washer sele	[ mm (in) ]	(Yes/No)	i ossible cause
Heel side Toe side	Toe side Heel side		+0.09 (+0.0035)	Yes	Occurrence of noise and scoring sound in all speed ranges.
	(discontilling)	Thicker	+0.06 (+0.0024)	165	Occurrence of noise when accelerating.
The state of the s			+0.03 (+0.0012)		
			0	No	-
			-0.03 (-0.0012)		
****		Thinner	-0.06 (-0.0024)	Yes	Occurrence of noise at constant speed and decreasing speed.
			-0.09 (-0.0035)	res	Occurrence of noise and scoring sound in all speed ranges.

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 infor-

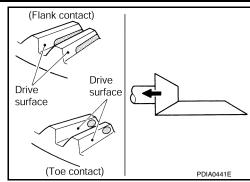
mation.



### < UNIT DISASSEMBLY AND ASSEMBLY >

 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.



[REAR FINAL DRIVE: R230]

### **BACKLASH**

Before inspection and adjustment, drain gear oil.

- Remove rear cover. Refer to <u>DLN-281</u>, "<u>Disassembly</u>".
- Fit a dial indicator to the drive gear face to measure the backlash.

**Standard** 

**Backlash** : Refer to DLN-299, "Back-

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



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 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.

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[REAR FINAL DRIVE: R230]

## < UNIT DISASSEMBLY AND ASSEMBLY >

OIL SEAL

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

### **DIFFERENTIAL CASE**

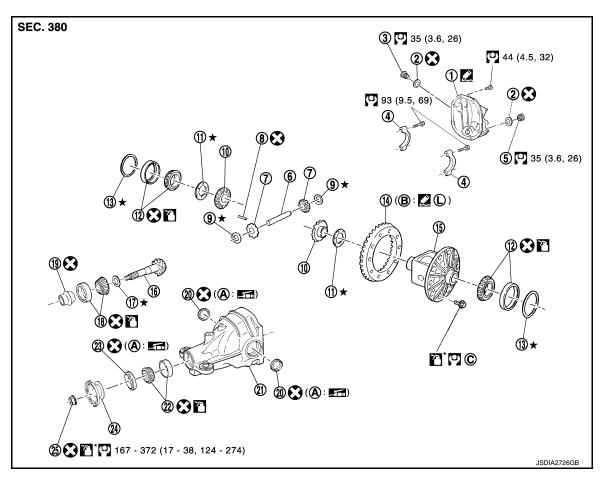
- · Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.

### **COMPANION FLANGE**

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

## **DRIVE PINION**

Exploded View



- 1. Rear cover
- 4. Bearing cap
- 7. Pinion mate gear
- 10. Side gear
- 13. Side bearing adjusting washer
- 16. Drive pinion
- 19. Collapsible spacer
- 22. Pinion front bearing
- 25. Drive pinion lock nut
- A. Oil seal lip

- 2. Gasket
- 5. Drain plug
- 8. Lock pin
- 11. Side gear thrust washer
- 14. Drive gear
- 17. Pinion height adjusting washer
- 20. Side oil seal
- 23. Front oil seal
- B. Screw hole

- 3. Filler plug
- 6. Pinion mate shaft
- 9. Pinion mate thrust washer
- 12. Side bearing
- 15. Differential case
- 18. Pinion rear bearing
- 21. Gear carrier
- 24. Companion flange
- C. Comply with the assembly procedure when tightening. Refer to <u>DLN-283</u>, "Assembly".

: Apply gear oil.

★: Apply anti-corrosion oil.

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

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

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

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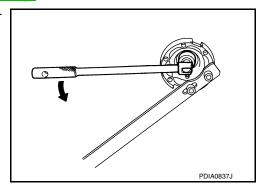
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Disassembly INFOID:000000010580590

- 1. Remove differential case assembly. Refer to <a href="DLN-281">DLN-281</a>, "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).

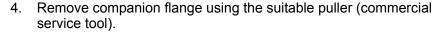
### **CAUTION:**

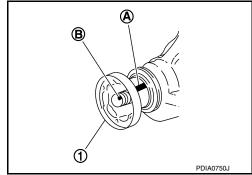
For matching mark, use paint. Never damage companion flange and drive pinion.

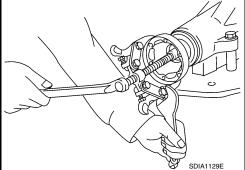
### NOTE:

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

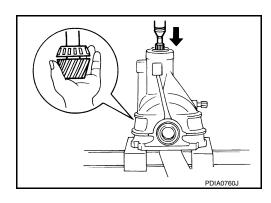
When replacing companion flange, matching mark is not necessary.







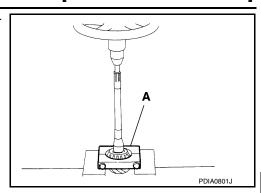
- 5. Press drive pinion assembly out of gear carrier. **CAUTION:** 
  - Never drop drive pinion assembly.
- 6. Remove front oil seal.
- 7. Remove side oil seal.
- 8. Remove pinion front bearing inner race.
- 9. Remove collapsible spacer.



### < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R230]

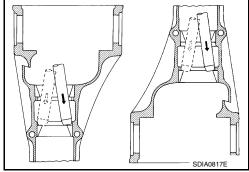
10. Remove pinion rear bearing inner race and pinion height adjusting washer with the replacer (A) (commercial service tool).



11. Tap pinion front/rear bearing outer races uniformly using a brass rod or equivalent to remove them.

### **CAUTION:**

Never damage gear carrier.



Assembly INFOID:000000010580591

 Install front bearing outer race and rear bearing outer race using drifts (A and B) and drift bar (C).

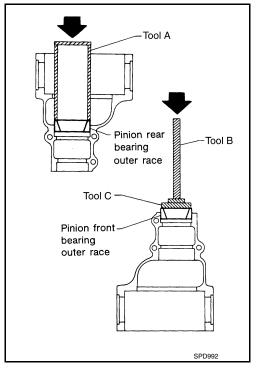
A : Drift [SST: ST15310000 ( — )]

B : Drift [SST: ST35325000 ( — )]

C : Drift bar [SST: ST30621000 ( — )]

### **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. Refer to <a href="DLN-297">DLN-297</a>, <a href=""">"Adjustment"</a>.



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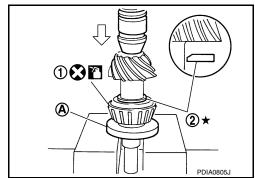
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### < UNIT DISASSEMBLY AND ASSEMBLY >

- [REAR FINAL DRIVE: R230]
- 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.

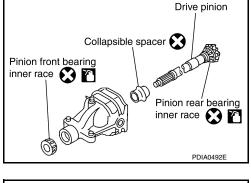
### **CAUTION:**

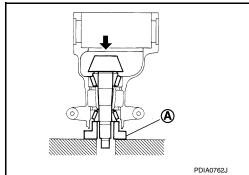
Never reuse collapsible spacer.

- 5. Apply gear oil to pinion rear bearing, and assemble drive pinion into gear carrier.
- 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.

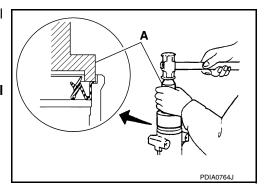
 Using suitable spacer (A) (commercial service tool), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.





- 8. Using the drift (A) [SST: ST15310000 ( )], 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.



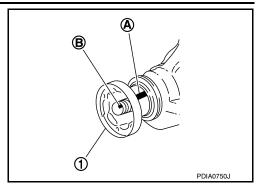
9. Install companion flange.

NOTE:

### < UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R230]

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)].

### **Standard**

Pinion bearing preload : Refer to <u>DLN-299, "Preload Torque"</u>.

### **CAUTION:**

- Adjust to the lower limit of the drive pinion lock nut tightening torque first.
- If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.
- After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.
- Install differential case assembly. Refer to <u>DLN-283, "Assembly"</u>.
   CAUTION:

## Never install rear cover at this timing.

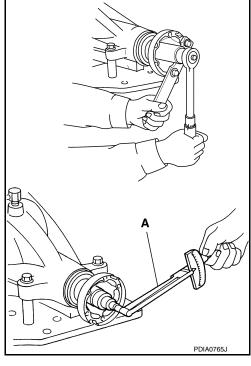
- 13. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and companion flange runout. Refer to <a href="DLN-287">DLN-287</a>, "Adjustment" and <a href="DLN-297">DLN-297</a>, "Adjustment". Recheck above items. Readjust the above description, if necessary.
- 14. Check total preload torque. Refer to <a href="DLN-287">DLN-287</a>, "Adjustment".
- 15. Install rear cover. Refer to <a href="DLN-283">DLN-283</a>, "Assembly".

Adjustment INFOID:000000010580592

TOOTH CONTACT

Refer to <u>DLN-287</u>, "Adjustment".

COMPANION FLANGE RUNOUT



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### < UNIT DISASSEMBLY AND ASSEMBLY >

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

### Limit

Companion flange runout : Refer to <u>DLN-299, "Companion Flange Runout"</u>.

- 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 After Disassembly

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[REAR FINAL DRIVE: R230]

Test indicator

inside face

## DRIVE GEAR AND DRIVE PINION

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

#### **BEARING**

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

### SIDE GEAR AND PINION MATE GEAR

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

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

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

### OIL SEAL

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

### DIFFERENTIAL CASE

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

### **COMPANION FLANGE**

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

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

< SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

## **General Specification**

	AWD
Applied model	VK50VE
	A/T
Final drive model	R230
Gear ratio	3.538
Number of teeth (Drive gear/Drive pinion)	46 / 13
Oil capacity (Approx.) $\ell$ (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**

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[REAR FINAL DRIVE: R230]

Unit: mm (in)

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Item	Runout limit
Drive gear back face	0.05 (0.0020) or less

## Side Gear Clearance

INFOID:0000000010580596

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:0000000010580597

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)
Drive gear bolt pulling force (by spring gauge)	34.2 – 39.2 N (3.5 – 3.9 kg, 7.7 – 8.8 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

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Unit: mm (in)

Item	Specification
Drive gear to drive pinion gear	0.13 – 0.18 (0.0051 – 0.0070)

## Companion Flange Runout

INFOID:0000000010580599

Unit: mm (in)

Item	Runout limit
Outer side of the companion flange	0.08 (0.0031) or less