SECTION TF
TRANSFER

CONTENTS

PRECAUTIONS

PFP:00001

Caution

EDS0004O

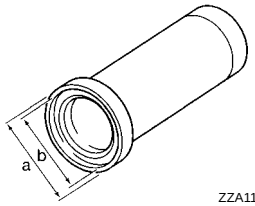
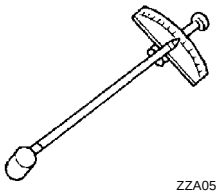
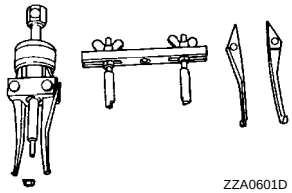
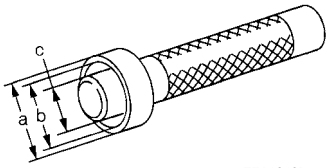
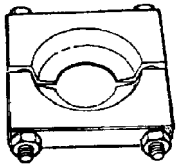
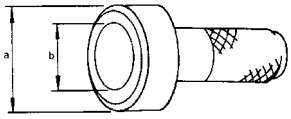
- Do not reuse the drained transfer oil.
- Check the oil level with the vehicle on the level ground.
- During removal and installation, be careful not to allow foreign material such as dust or dirt to enter into the transfer unit.
- Before starting diagnosis of the vehicle, understand trouble symptoms well. Perform correct and systematic operations.
- Check for the correct installation status prior to removal or disassembly. If mating marks are required, be certain they do not interfere with the function of the parts they are applied to.
- Carry out the work in a clean work place. Using a dust proof room is recommended.
- 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 abnormal wear. If a malfunction is detected, replace it with a new one.
- Normally replace O-rings, oil seals, bearings, and lock nuts with new ones every time they are removed.
- 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 them dry.
- Be careful not to damage sliding surfaces and mating surfaces.
- Always use shop paper for cleaning the inside of components.
- Do not use cotton gloves or a shop cloth. Using them may leave lint on the surface of the parts.
- During assembly always tighten bolts and screws to specified torque. New transfer oil a petroleum jelly such as "Vaseline", or multi-purpose grease as appropriate.
- Discard waste oil after oil changes or part treatment in accordance with local laws and regulations.

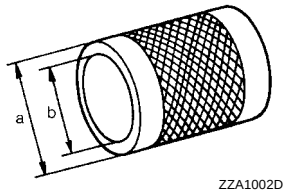
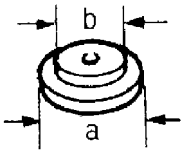
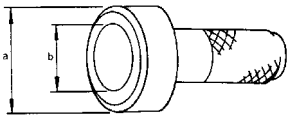
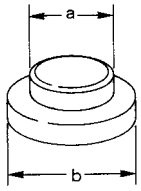
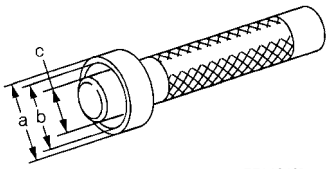
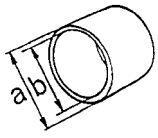
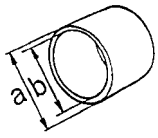
PREPARATION

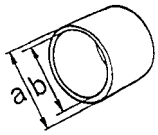
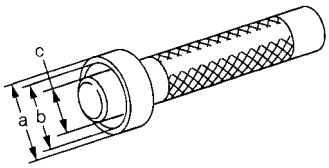
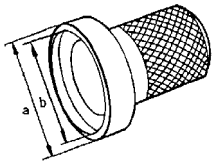
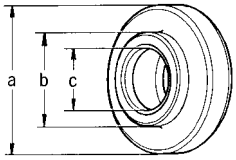
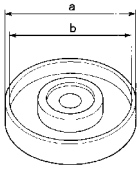
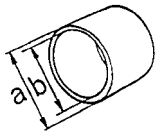
PFP:00002

Special Service Tools

EDS0004P

Tool name Tool number		Description
Drift KV38101700 a: 82 mm (3.23 in) dia. b: 78 mm (3.07 in) dia.	 ZZA1149D	Side oil seal installation (adapter case oil seal installation)
Preload gauge ST3127S000	 ZZA0503D	Measuring preload torque
Puller KV381054S0	 ZZA0601D	● Removing pinion bearing outer race ● Removing gear ring oil seals
Drift ST33220000 a: 37 mm (1.46 in) dia. b: 31 mm (1.22 in) dia. c: 22 mm (0.87 in) dia.	 ZZA1046D	Removing drive pinion gear assembly
Removing bearing replacer ST30031000	 ZZA0700D	Removing pinion bearing inner race
Drift ST30720000 a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.	 ZZA0811D	● Removing gear ring bearing outer race on adapter case ● Installing gear ring bearing outer race on transfer case ● Installing gear bearing inner race on transfer case ● Installing gear ring bearing inner race on adapter case ● Installing gear ring bearing outer race on adapter case ● Installing transfer case oil seals

Tool name Tool number		Description
Drift ST33200000 a: 60 mm (2.36 in) dia. b: 44.5 mm (1.75 in) dia.	 ZZA1002D	● Removing gear ring bearing inner race on adapter case ● Installing companion flange
Drift ST33061000 a: 38 mm (1.50 in) dia. b: 28.5 mm (1.122 in) dia.	 ZZA0810D	● Removing gear ring bearing inner race on transfer case ● Removing speedometer drive gear
Drift KV38100500 a: 80 mm (3.15 in) dia. b: 60 mm (2.36 in) dia.	 ZZA0811D	Installing speedometer drive gear
Drift KV40101840 a: 77 mm (3.03 in) dia. b: 85 mm (3.35 in) dia.	 ZZA0881D	Installing gear ring bearing outer race on transfer case
Drift ST33230000 a: 51 mm (2.01 in) dia. b: 41 mm (1.61 in) dia. c: 28.5 mm (1.122 in) dia.	 ZZA1046D	Installing gear ring oil seals
Drift KV40104710 a: 76.3 mm (3.004 in) dia. b: 67.9 mm (2.673 in) dia.	 ZZA1003D	Installing speedometer drive gear
Drift ST27863000 a: 74.5 mm (2.933 in) dia. b: 62.5 mm (2.461 in) dia.	 ZZA1003D	Installing gear bearing inner race on transfer case

Tool name Tool number	Description
Drift KV40101630 a: 68 mm (2.68 in) dia. b: 60 mm (2.36 in) dia.  ZZA1003D	Installing gear bearing inner race on transfer case
Drift KV38100300 a: 54 mm (2.13 in) dia. b: 46 mm (1.81 in) dia. c: 32 mm (1.26 in) dia.  ZZA1046D	Installing pinion rear bearing outer race
Drift ST33400001 a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.  ZZA0814D	● Installing pinion front bearing outer race ● Installing pinion sleeve oil seals
Drift ST30901000 a: 79 mm (3.11 in) dia. b: 45 mm (1.77 in) dia. c: 35.2 mm (1.386 in) dia.  ZZA0978D	● Installing pinion front bearing outer race ● Installing pinion front bearing inner race
Drift KV40105230 a: 92 mm (3.62 in) dia. b: 86 mm (3.39 in) dia.  ZZA1141D	Installing gear ring bearing outer race on adapter case
Drift KV38102510 a: 71 mm (2.80 in) dia. b: 65 mm (2.56 in) dia.  ZZA1003D	Installing gear ring bearing inner race on adapter case

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EDS000I4

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

Reference page			Refer to MA section("Checking Transfer Fluid" ("CHASSIS AND BODY MAINTENANCE").		TF-13	TF-13	TF-22	TF-22
Possible cause and Suspected parts		FLUID (Level low)	FLUID (Wrong)	FLUID (Level too high)	LIQUID GASKET (Damaged)	OIL SEAL (Worn or damaged)	GEAR (Worn or damaged)	BEARING (Worn or damaged)
Symptom	Noise	1	2				3	3
	Fluid leakage		3	1	2	2		
	jumps out of gear						1	

TRANSFER FLUID

PFP:KLD30

Replacement

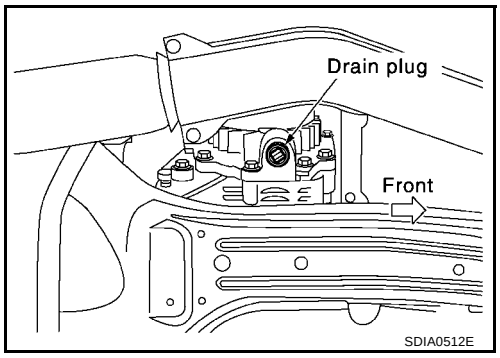
EDS0004Q

DRAINING

1. Run the vehicle to warm up the transfer body sufficiently.
2. Stop the engine, and remove the drain plug to drain the transfer oil.
3. Apply recommended sealant to drain plug. Position drain plug on transfer and tighten to the specified torque.

Drain plug tightening torque

: 9.8 - 19.6 N·m (1.0 - 1.9 kg-m, 87 -173 in-lb)



FILLING

1. Remove filler plug and add gear oil until oil level reaches the specified limit near filler plug mounting hole.

Oil capacity : Approx. 0.31 ℓ (1/2 Imp pt)

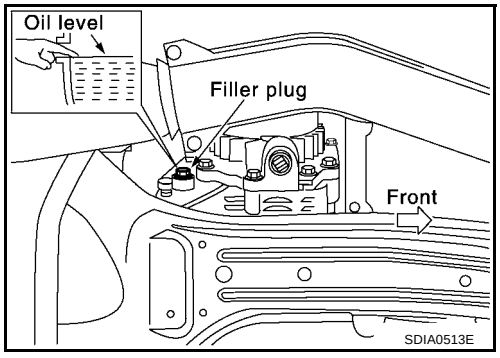
CAUTION:

Carefully fill the oil. (Fill up for approx. 3 minutes.)

2. Leave the vehicle for 3 minutes, and check the oil level again.
3. Apply recommended sealant to filler plug. Position filler plug on transfer and tighten to the specified torque.

Drain plug tightening torque

: 9.8 - 19.6 N·m (1.0 - 1.9 kg-m, 87 -173 in-lb)



Inspection

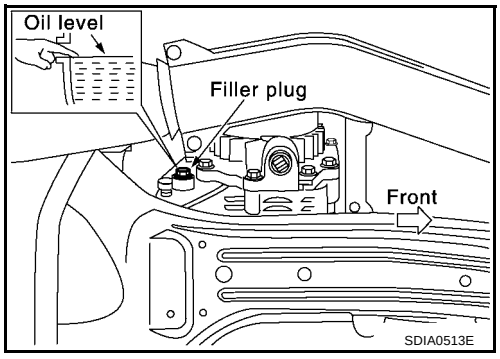
EDS0004R

OIL LEAKAGE AND OIL LEVEL

1. Check oil level from filler plug mounting hole as shown in the figure.
2. Before installing filler plug, apply recommended sealant. Position filler plug on transfer and tighten to the specified torque.

Filler plug tightening torque

: 9.8 - 19.6 N·m (1.0 - 1.9 kg-m, 87 -173 in-lb)



SIDE OIL SEAL

PFP:33142

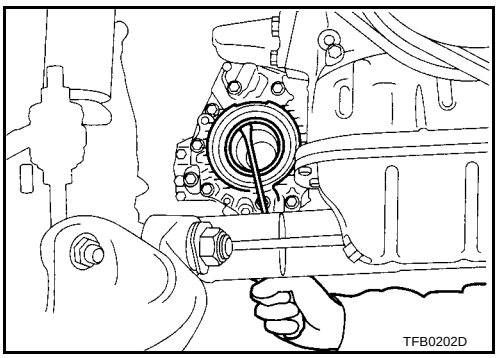
Removal and Installation

EDS0004S

REMOVAL

1. Remove the drive shaft.
2. Remove the side shaft.
3. Remove oil seal with a flat-bladed screwdriver.

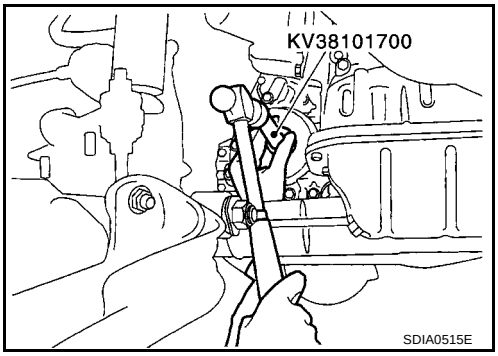
CAUTION:
Be careful not to damage the adapter case.



INSTALLATION

1. Apply multi-purpose grease to oil seal lips. As shown in the figure, using a drift, install the oil seal so that it becomes flush with the case end surface.

CAUTION:
- **Discard old oil seals; replace with new ones.**
- **When installing, do not incline the oil seal.**



2. Install the side shaft.

CAUTION:
Be careful not to damage the oil seal lips.

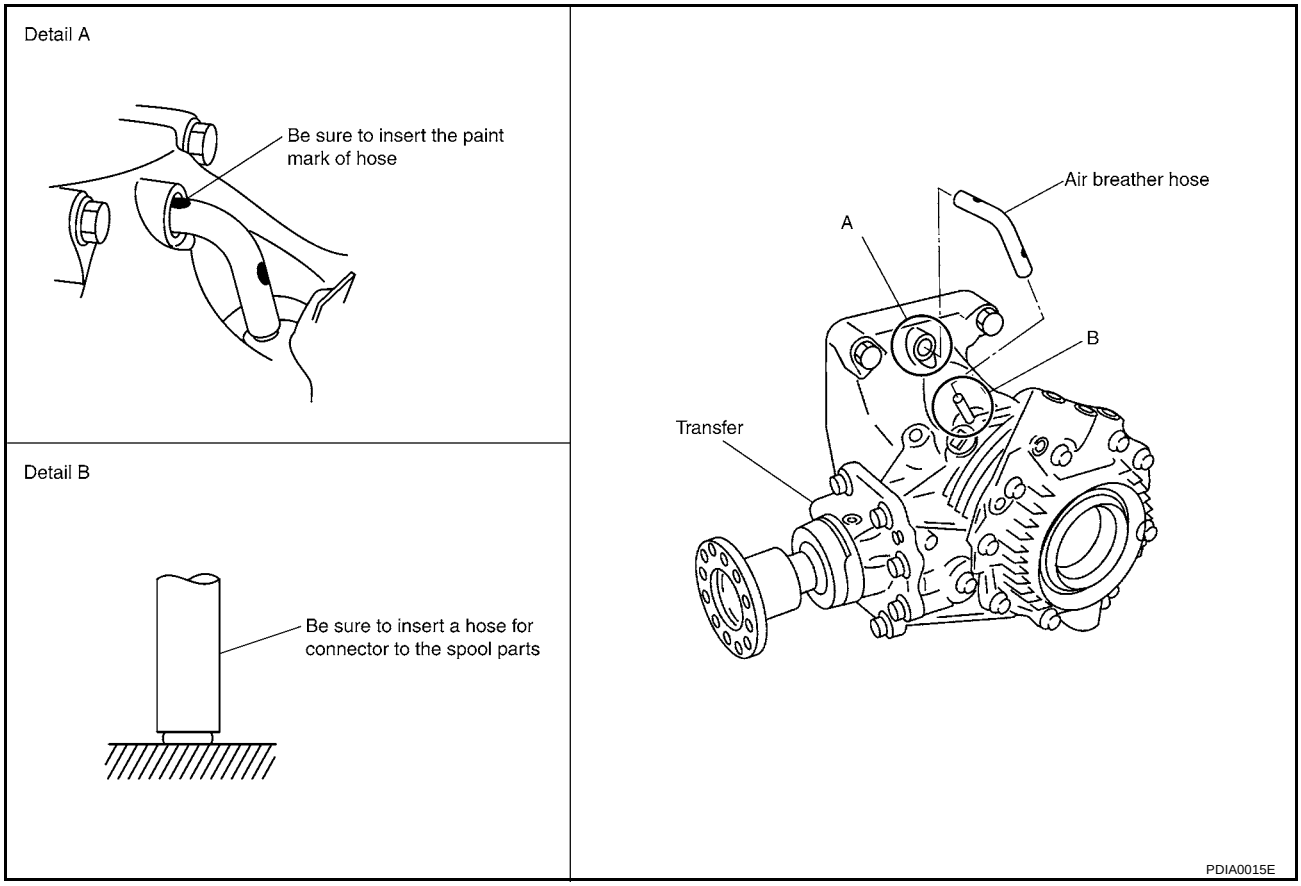
3. Install the drive shaft.
4. Check oil level.

AIR BREATHER HOSE

PFP:31098

Removal and Installation

EDS0004T



- Refer to the figure for air breather hose removal and installation information.

CAUTION:

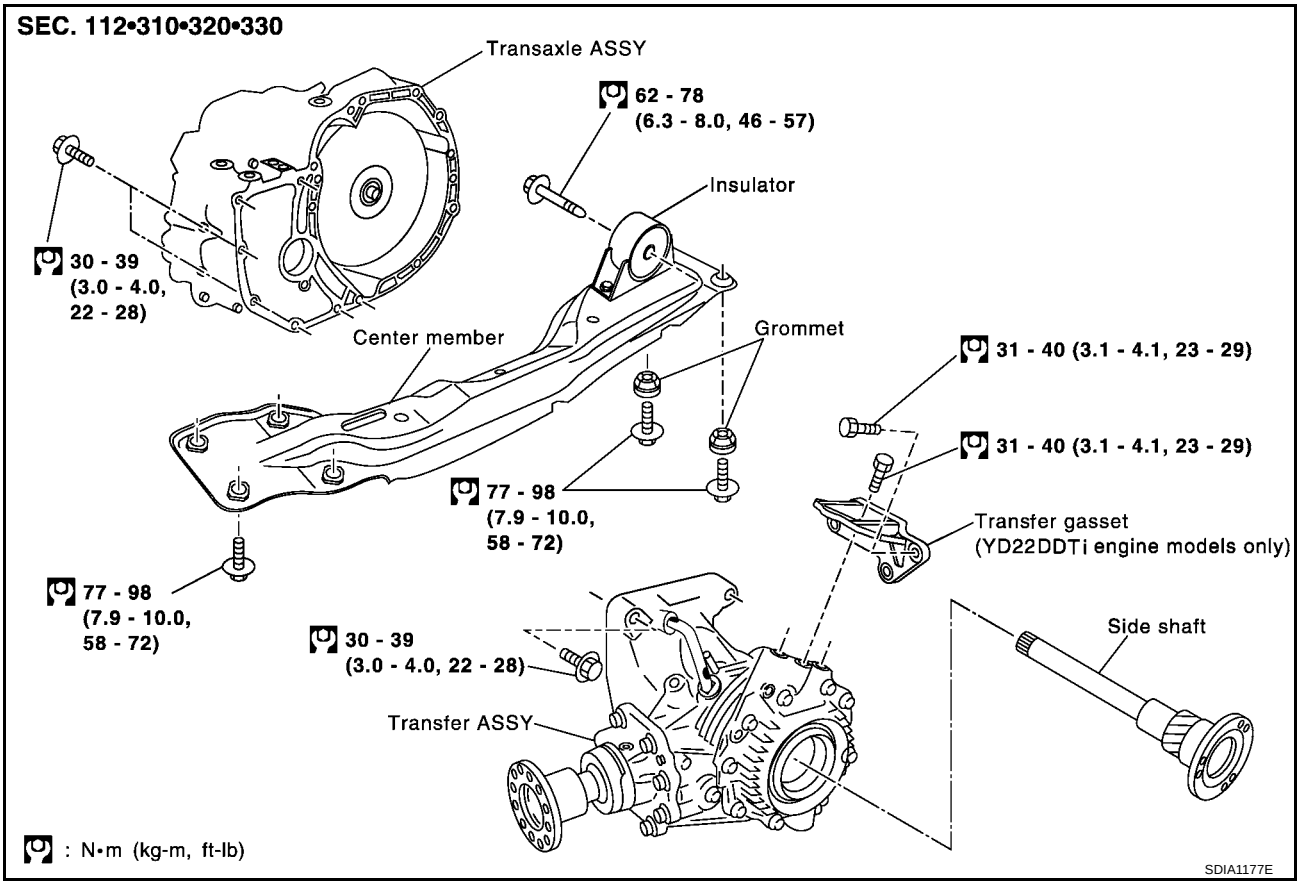
- **Be sure to insert air breather hose into transfer tube (metal connector) until hose end reaches the tube's base.**
- **Make sure there are no pinched or restricted areas on the air breather hose caused by bending or winding when installing it.**

TRANSFER ASSEMBLY

PFP:33100

Removal and Installation from Vehicle

EDS0004U



REMOVAL

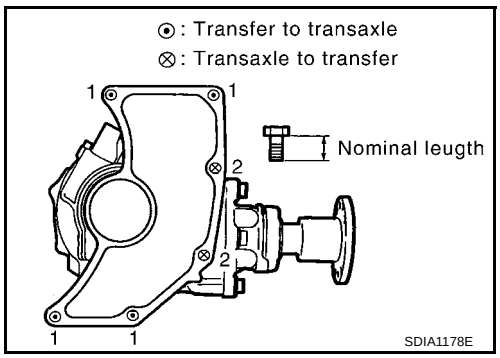
1. Remove the exhaust front tube, propeller shaft, and RH drive shaft.
2. Remove the side shaft.
3. Remove the air breather hose.
4. Remove transfer gusset (vehicle with YD22ET engine only).
5. Place a transmission jack onto the transaxle.
6. Remove the center member.
7. Remove suspension members.
   - Refer to FSU-12, "Removal and Installation" in FUS Front Suspension.
8. Remove rear engine mounting bracket.
9. Place a transmission jack onto the transfer unit.
10. Remove the mounting bolts fastening the transaxle and transfer unit.
11. Remove the transfer unit from the vehicle.

INSTALLATION

Paying attention to the following items, install in the reverse order of removal.

- When installing the transfer to the transaxle, install the mounting bolts following the standard below.

Bolt No.	1	2
Quantity	4	2
Nominal length mm (in)	65 (2.56)	40 (1.57)
Tightening torque [N·m (kg·mfg.-lb.)]	30 - 39 (3.0 - 4.0,22-28)	



CAUTION:
When installing the transfer to the transaxle, be careful not to damage the oil seals.

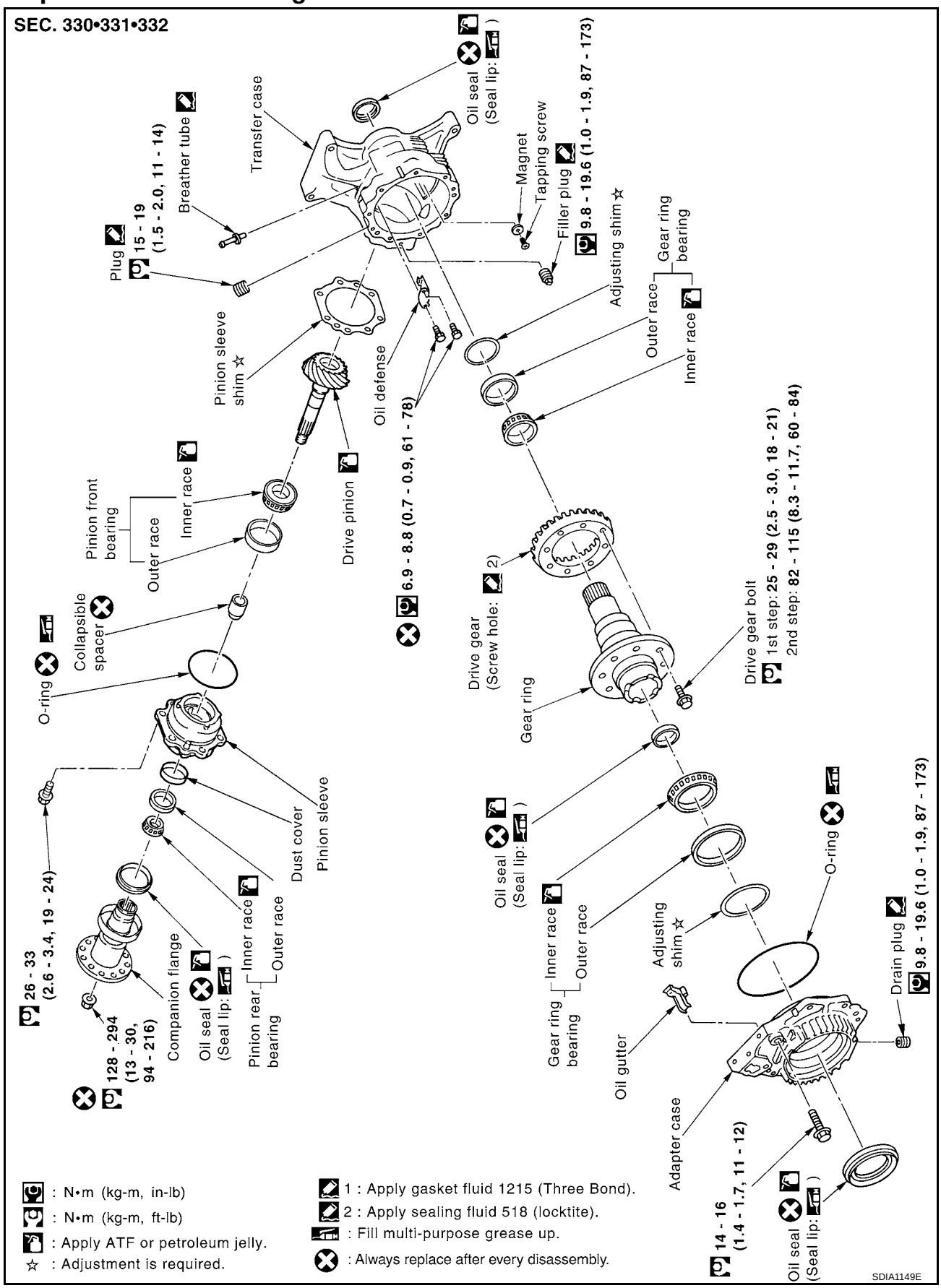
- When installing transfer gusset, tighten mounting bolts to the following torque (vehicles with YD22ET engine only):

Tightening torque : 31 - 40 N·m (3.1 - 4.1 kg-m, 23 - 29 ft.-lb.)

- After the installation, check the oil level and oil leakage.

Component Parts Drawing

EDS0004V



Assembly Inspection

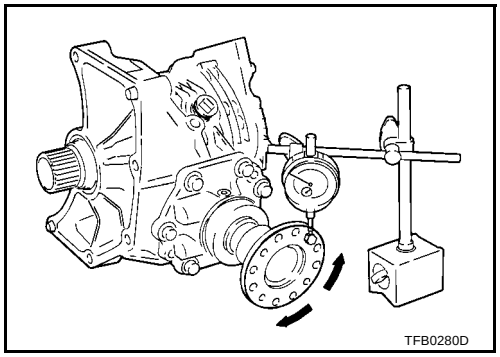
EDS0004W

BACKLASH

1. Install a bolt to the companion flange.
2. Fit a dial gauge onto the bolt.
3. Measure the circumference backlash of the companion flange, and check that it satisfies the standard below.

   Backlash : 0.13 - 0.19 mm (0.0051 - 0.0075 in)

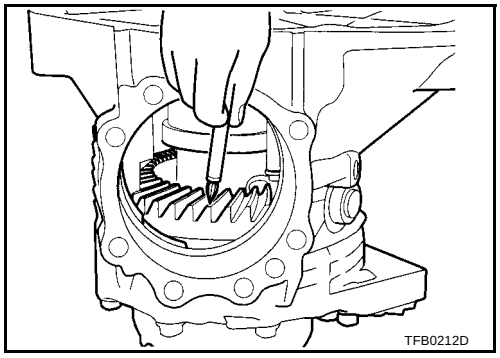
   - If outside the standard, disassemble it to check and adjust each part.



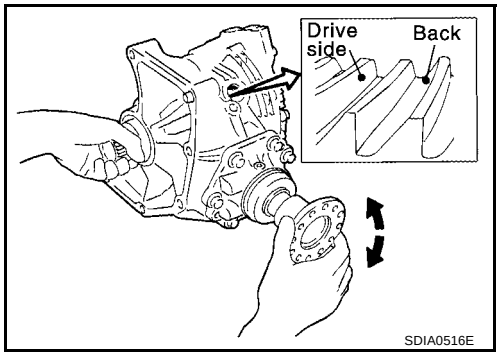
TOOTH CONTACT

1. Remove the pinion sleeve assembly, and apply red lead to the drive gear.

   CAUTION:
   Apply red lead to the both faces of 3 to 4 gears at 4 locations evenly spaced on the drive gear.
2. Install the pinion sleeve shims and pinion sleeve assembly.
3. Remove the plug on the upper side of the transfer case.



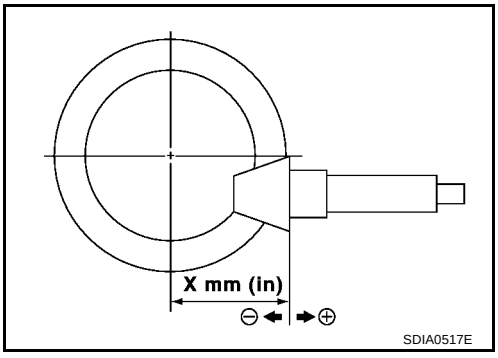
4. Rotate the companion flange back and forth several times, and check the drive pinion gear to drive gear tooth contact by viewing from the plug hole.



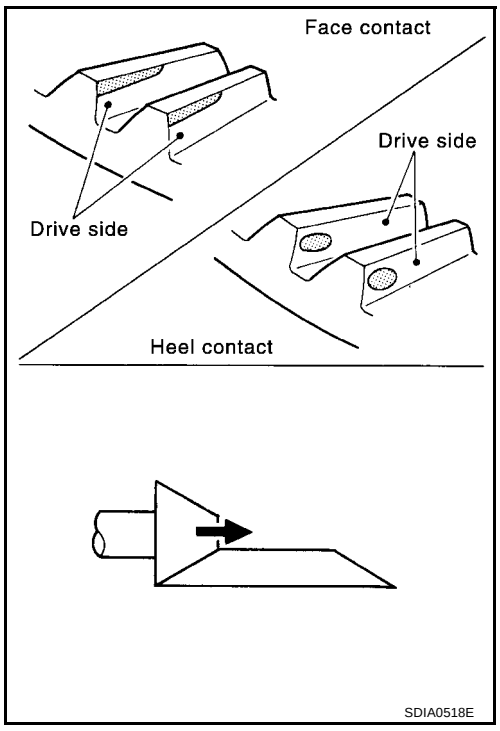
Pinion sleeve shim selection value mm (in)		Tooth contact condition		Need for adjustment
		Drive side	Back	
↑ Thicker	+0.12 (+0.0047)	Heel side / Toe side		Yes
	+0.09 (+0.0035)			
	+0.06 (+0.0024)			
	+0.03 (+0.0012)			No
	0 (0.0)			
Thinner ↓	−0.03 (−0.0012)			
	−0.06 (−0.0024)			Yes
	−0.09 (−0.0035)			
	−0.12 (−0.0047)			

5. If tooth contact is poorly adjusted, adjust pinion height (dimension X) in the following manner:

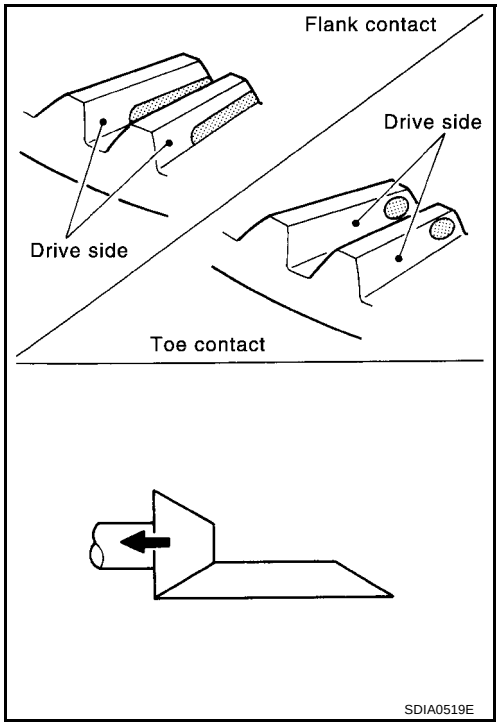
SDIA0520E



- If the tooth contact is near the face (face contact), or near the heal (heal contact), thin the pinion sleeve shims to move the drive pinion gear closer to the drive gear.



- If the tooth contact is near the flank (flank contact), or near the toe (toe contact), thicken the pinion sleeve shims to move the drive pinion gear farther from the drive gear.

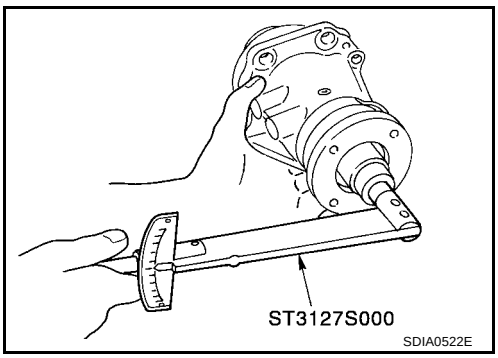


PRELOAD TORQUE

Pinion bearing preload torque

1. Remove the pinion sleeve assembly, and rotate the companion flange back and forth in 2 to 3 times. Check for abnormal noise, rotation malfunction, and other malfunctions.
2. Rotate the companion flange at least 20 times to check for smooth operation of the bearing.

3. Using a preload gauge, measure the preload torque of the pinion bearing.



Preload torque

: 0.10 - 0.39 N·m (0.01 - 0.04 kg-m,1 - 3 in-lb)

CAUTION:

Every rotational part shall rotate smoothly with the specified gear oil.

- If outside the standard, disassemble the pinion sleeve assembly to check and adjust each part.

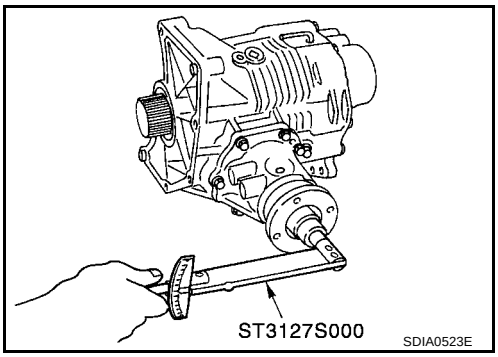
Overall preload torque

1. Measure pinion bearing preload torque (P_1).

Pinion bearing preload torque (P1)

: 0.10 - 0.39 N·m (0.01 - 0.04 kg-m, 1 - 3 in-lb)

2. Install the pinion sleeve shims and pinion sleeve assembly.
3. Rotate the companion flange at least 20 times to check for smooth operation of the bearing.
4. Using a preload gauge, measure the overall preload torque.



Overall preload torque

When all oil seals are installed:

: P_1 +0.16 - 0.22 N·m (0.016 - 0.023 kg-m, 1.4 - 1.9 in-lb)

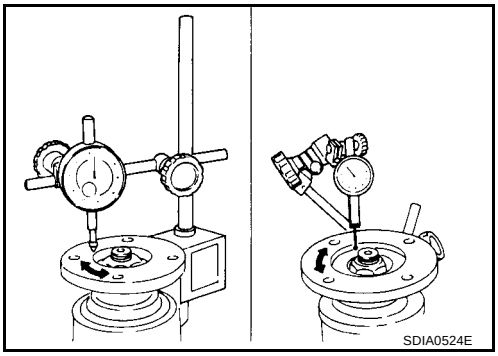
Transfer case oil seals and
When no gear ring oil seal:

: P_1 +0.06 - 0.12 N·m (0.006 - 0.013 kg-m, 0.6 - 1.1 in-lb)

- If outside of the standard, disassemble it to check and adjust each part. If measuring the overall preload torque after the disassembly, measure it with the transfer case oil seals and gear ring oil seals removed, then install the oil seals.

COMPANION FLANGE RUNOUT

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



Runout limit : 0.08 mm (0.0031 in)

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

Runout limit : 0.08 mm (0.0031 in)

5. If the runout value is outside the repair limit, follow the procedure below to adjust.

a. While changing the phase between companion flange and drive pinion gear by 90° at a time, check runout and determine which phase angle minimizes the runout.

b. If the runout value is still outside of the limit after the phase has been changed, replace the companion flange.

c. If the runout is outside the standard after the companion flange is replaced, adjust the assembly status of the pinion bearings and drive pinion gear, or replace the pinion bearings.

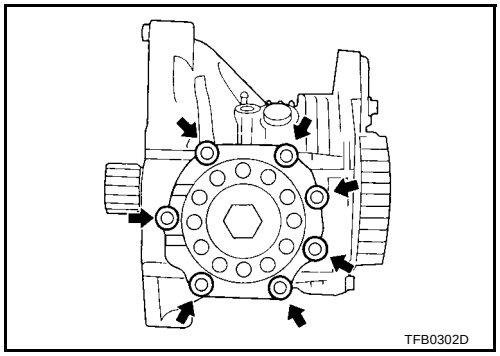
Disassembly and Assembly

EDS0004X

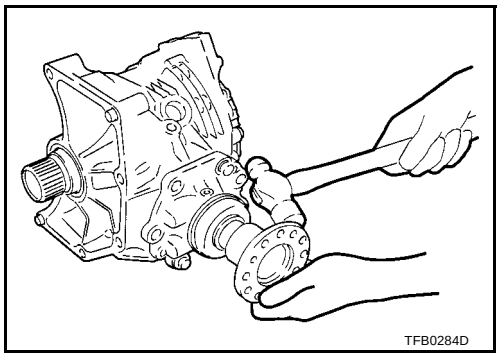
DISASSEMBLY

Pinion sleeve assembly

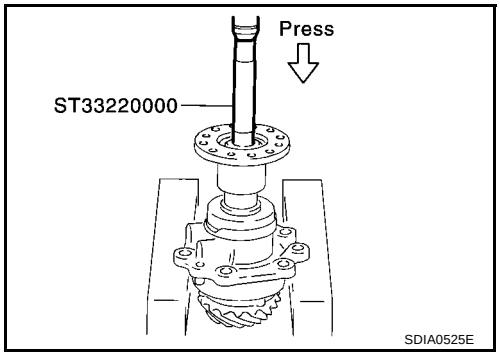
1. Remove 7 pinion sleeve mounting bolts.



2. Temporarily tighten 2 bolts. Using a plastic hammer, tap companion flange to remove pinion sleeve assembly.
3. Remove the pinion sleeve shim.
4. Remove the pinion nut.

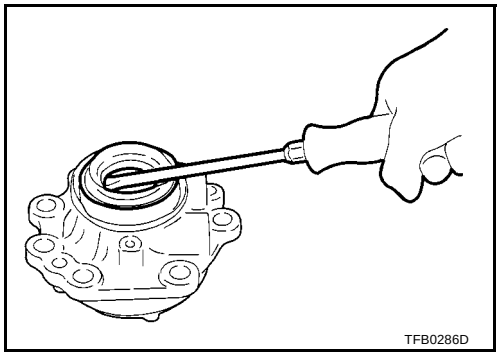


5. Using a drift, remove drive pinion from pinion sleeve with a press.
6. Remove the drive pinion gear assembly.
7. Remove the O-ring.

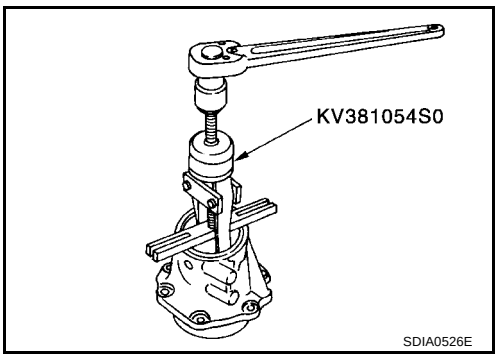


8. Using a flat-bladed screwdriver, remove the oil seal.

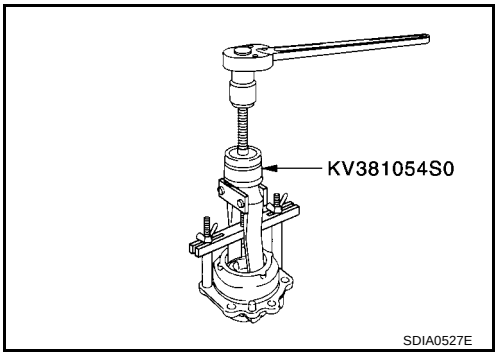
   CAUTION:
   Be careful not to damage the pinion sleeve.
9. Remove the pinion rear bearing inner race.



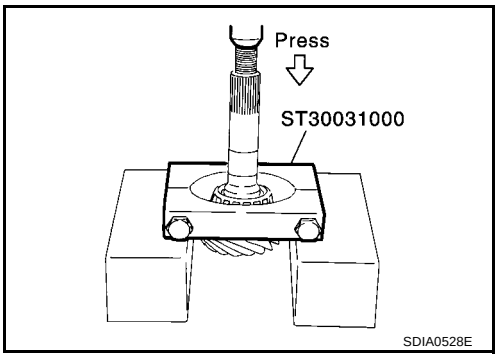
10. Using a puller, remove the pinion rear bearing outer race.



11. Using a puller, remove the pinion front bearing outer race.

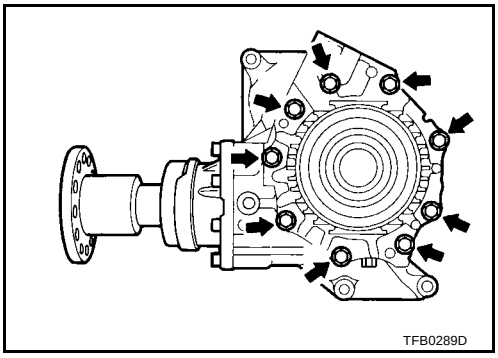


12. Remove the collapsible spacer from the drive pinion gear.
13. Using a replacer, press the pinion front bearing inner race out of the drive pinion gear.

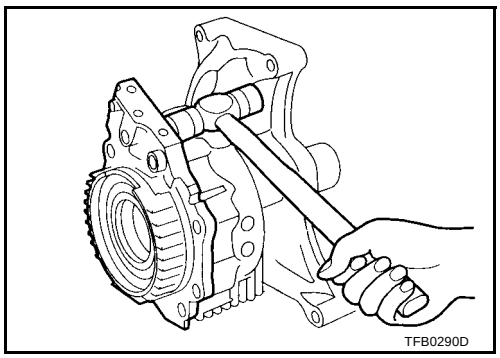


Adapter case

1. Remove the adapter case mounting bolts.

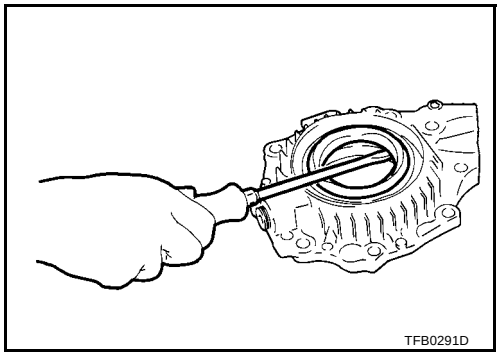


2. Using a plastic hammer, tap the adapter case to remove.
3. Remove the O-ring.

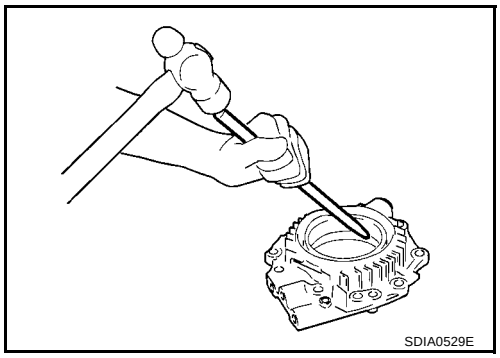


4. Using a flat-bladed screwdriver, remove the oil seal.

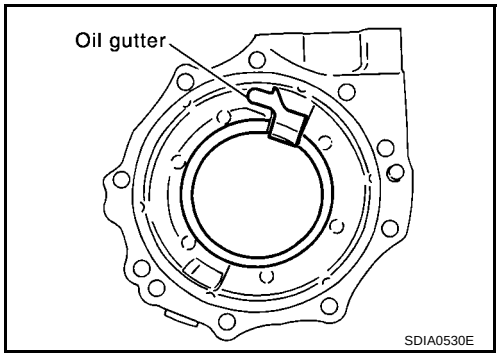
CAUTION:
Be careful not to damage the adapter case.



5. Using a brass rod, tap the adjusting shim from the cutout on the adapter case to remove the adjusting shim and gear ring bearing outer race.



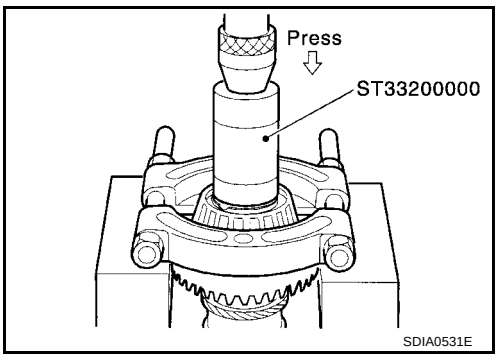
6. Remove the oil gutter.
7. Remove the drain plug.



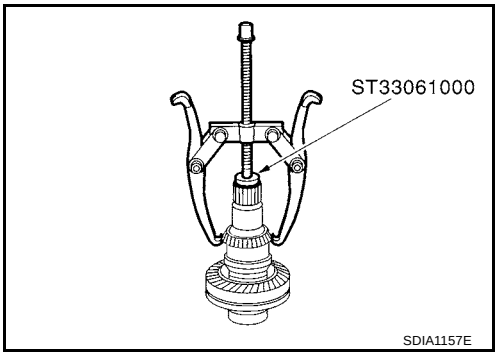
Drive gear assembly

1. Remove the adapter case.
2. Remove the drive gear assembly from the transfer case.

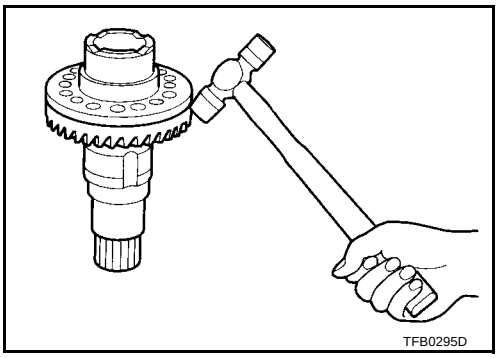
3. Using a drift and replacer, remove the gear ring bearing inner race on the adapter case.



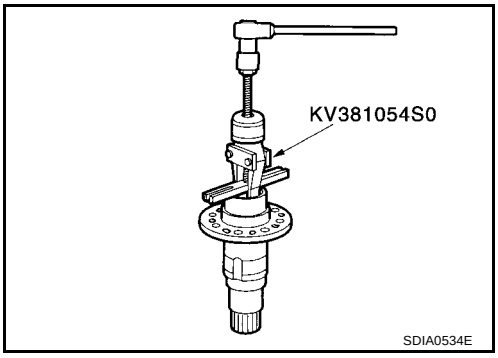
4. Using a drift and puller, remove the gear ring bearing inner race on the transfer case.



5. Remove the drive gear mounting bolts.
6. Using a plastic hammer, tap the drive gear to remove the drive gear from the gear ring.



7. Using a puller, remove the oil seal from the gear ring.

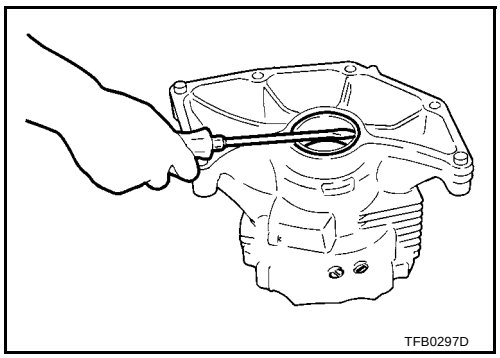


Transfer case

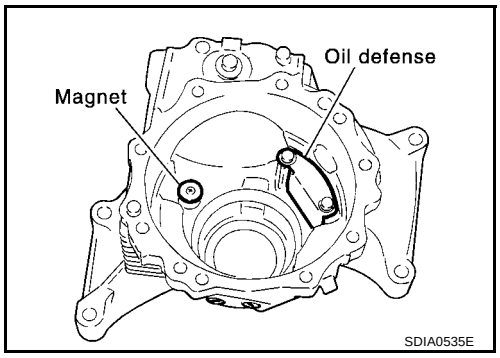
1. Remove the pinion sleeve assembly.
2. Remove the adapter case.
3. Remove the drive gear assembly from the transfer case.

4. Using a flat-bladed screwdriver, remove the oil seal.

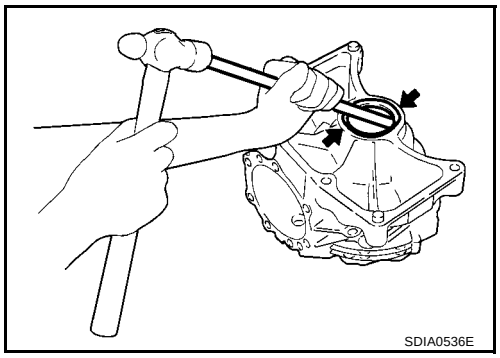
CAUTION:
Be careful not to damage the transfer case.



5. Remove the oil defense.



6. Using a brass rod, tap the adjusting shim evenly from the 2 cut-outs on the transfer case to remove the adjusting shim and gear ring bearing outer race.
7. Remove the filler plug, and breather tube.



INSPECTION AFTER DISASSEMBLY

Gears

- Check the gear faces and shaft for wear, cracks, damage, and seizure.

CAUTION:
If a malfunction is detected on the drive gear or drive pinion gear, replace the drive gear and drive pinion gear as a set.

Bearings

- Check for seizure, peeling, wear, corrosion, sticking/abnormal noise/roughness in hand turning, and other damage.

CAUTION:
When replacing the bearing, always replace the inner race and outer race as a pair.

Washers and shims

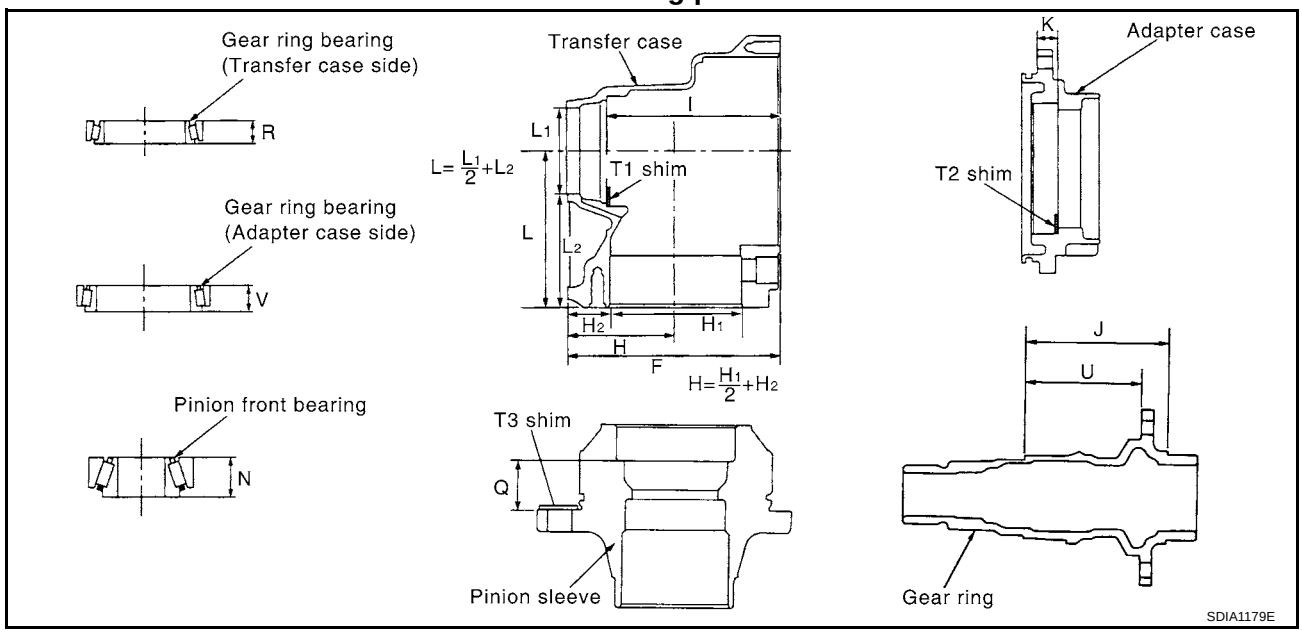
- Check for seizure, damage, and abnormal wear.

Oil seals

- Discard old oil seals; replace with new ones.
- If wear, deterioration of adherence (sealing force of lips), or damage is detected on the lips, replace them.

SELECTIONG ADJUSTING SHIMS

Measuring point



At gear ring bearing on transfer case

1. Measure the points F, H, I, R, and U shown in the measurement points.
2. Convert the values F, H, I, R, and U according to the standards below.

F : Value obtained by subtracting 163.00 mm (6.42 in) from the reading [in increments of 0.01 mm (0.0004 in)].

H : Value obtained by subtracting 83.00 mm (3.27 in) from the reading [in increments of 0.01 mm (0.0004 in)].

I : Value obtained by subtracting 131.90 mm (5.19 in) from the reading [in increments of 0.01 mm (0.0004 in)].

R : Value obtained by subtracting 17.00 mm (0.67 in) from the reading [in increments of 0.01 mm (0.0004 in)].

U : Value obtained by subtracting 89.50 mm (3.524 in) from the reading [in increments of 0.01 mm (0.0004 in)].

3. Check dimension Z on the drive gear side face.

NOTE:
Dimension Z indicates the difference between the optimum engagement and the standard dimensions in increments of 0.01 mm (0.0004 in) written on the drive gear side face.

4. Use the formula below to calculate adjusting shim thickness T_1 at the ring gear bearing on the transfer case.

$$T_1 = (I-F+H+Z-U-R) \times 0.01 \text{ mm } (0.0004 \text{ in}) + 1.49 \text{ mm } (0.0587 \text{ in})$$

5. Select the adjusting shim.
   - For information on selecting an adjusting shim, refer to TF-59, "SELECTIVE PARTS" .

CAUTION:
- **Only one adjusting shim can be selected.**
- **If no adjusting shim with the calculated value is available, select the thicker and closest one.**

At the gear bearing on the adapter case

1. Measure the points F, H, J, K, U, and V shown in the measurement points.
2. Convert the values F, H, J, K, U, and V according to the standards below.

F : Value obtained by subtracting 163.00 mm (6.42 in) from the reading [in increments of 0.01 mm (0.0004 in)].

H : Value obtained by subtracting 83.00 mm (3.27 in) from the reading [in increments of 0.01 mm (0.0004 in)].

J : Value obtained by subtracting 109.50 mm (4.31 in) from the reading [in increments of 0.01 mm (0.0004 in)].

K : Value obtained by subtracting 14.40 mm (0.5669 in) from the reading ([n increments of 0.01 mm (0.0004 in)].

U : Value obtained by subtracting 89.50 mm (3.524 in) from the reading [in increments of 0.01 mm (0.0004 in)].

V : Value obtained by subtracting 17.00 mm (0.67 in) from the reading [in increments of 0.01 mm (0.0004 in)].

3. Check dimension Z on the drive gear side face.

   NOTE:
   Dimension Z indicates the difference between the optimum engagement and the standard dimensions in increments of 0.01mm (0.0004 in) written on the drive gear side face.

4. Use the formula below to calculate the thickness of adjusting shim T_2 at the ring gear bearing on the adapter case.

   T_2 = (K+F-H-Z+U-J-V) × 0.01 mm (0.0004 in) + 1.49 mm (0.0587 in)

5. Select the adjusting shim.
   - For information on selecting an adjusting shim, refer to TF-59, "SELECTIVE PARTS" .

   CAUTION:
   - **Only one adjusting shim can be selected.**
   - **If no adjusting shim with the calculated value is available, select the thicker and closest one.**

Pinion sleeve shim

1. Measure the points L, N and Q shown in the measurement points.
2. Check the dimension S written on the gear end of the drive pinion gear.

   NOTE:
   The dimension S indicates the difference between the optimum engagement and the standard dimensions in increments of 0.01 mm (0.0004 in) written on the gear end of the drive pinion gear.

3. Use the formula below to calculate pinion sleeve shim thickness T_3 .

   T_3 = (74.6 mm (2.937 in) + S) +N+Q-L

4. Select the pinion sleeve shim.
   - For information on selecting a pinion sleeve shim, refer toTF-59, "SELECTIVE PARTS" .

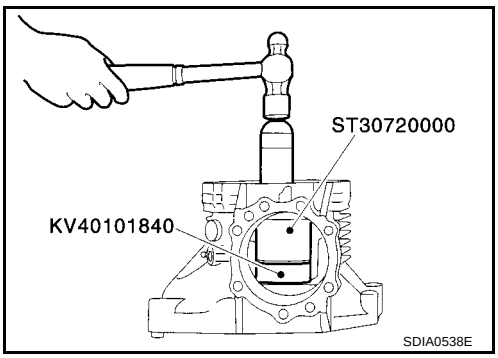
   CAUTION:
   Only one pinion sleeve shim can be selected.

ASSEMBLY

Transfer case

1. Select the adjusting shim on the gear ring bearing.
   - TF-23, "SELECTIONG ADJUSTING SHIMS".

2. Using a drift, install the selected adjusting shim and gear ring bearing outer race.



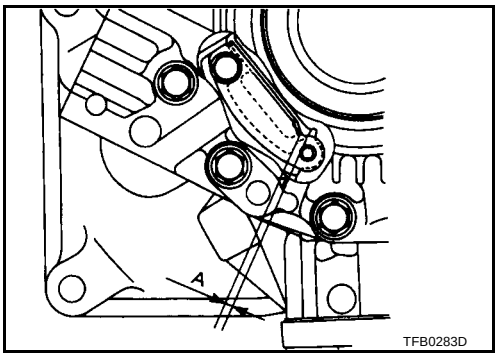
3. Install the oil defense, and tighten the mounting bolts to the specified torque. The clearance between the oil defense and transfer case (dimension A) should be the following.

Tightening torque

: 6.9 - 8.8 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

Clearance between oil defense and transfer case

Dimension A : 1.0 - 3.5 mm (0.04 - 0.138 in)



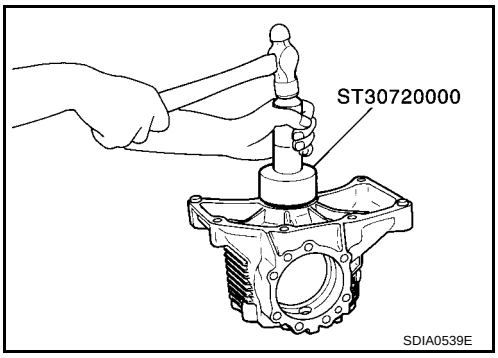
CAUTION:

Do not reuse the mounting bolts.

4. Install the magnet.
5. Using a drift, drive the oil seal until it becomes flush with the case end.

CAUTION:

- **When checking the overall preload torque, measure it without the oil seal, then install the oil seal.**
- **Discard old oil seals; replace with new ones.**
- **Apply onto oil seal lips, and gear oil onto the circumference of the oil seal.**



6. Apply recommended sealant to filler plug and its threads before installing it to the transfer case.

Filler plug tightening torque : 9.8 - 19.6 N·m (1.0 - 1.9 kg-m, 87 - 173 in-lb)

Plug tightening torque : 15 - 19 N·m (1.5 - 2.0 kg-m, 11 - 14 ft-lb)

7. Apply recommended sealant to breather tube and install it to the transfer case.
8. Install the drive gear assembly.
9. Install the adapter case.
10. Install the pinion sleeve assembly.
11. Check backlash, preload torque, tooth contact, and companion flange runout.

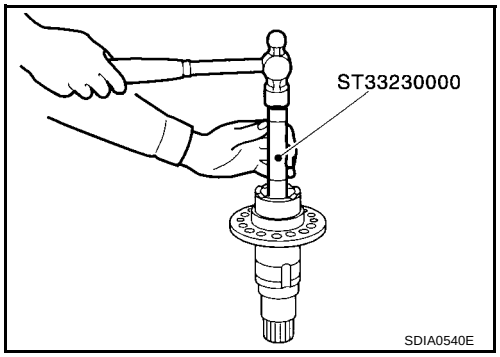
- TF-14, "Assembly Inspection"

CAUTION:

Measure the overall preload torque without the oil seal.

Drive gear assembly

1. Using a drift, drive the oil seal into the gear ring.



CAUTION:

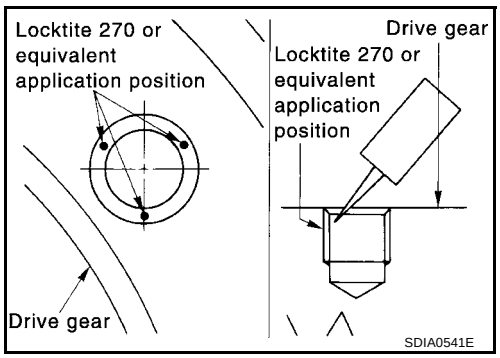
- **When checking the overall preload torque, measure it without the oil seal, then install the oil seal.**
- **Discard old oil seals; replace with new ones.**
- **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of the oil seal.**
- **The oil seal back position after the installation shall be 56.5 mm (2.22 in) from the gear ring end.**

2. Apply a thread locking adhesive into the thread hole for the drive gear.

a. Completely clean and de grease the drive gear back face, thread holes, and drive gear mounting bolts. (Use a gasket remover to remove the thread locking adhesive.)

b. Apply a thread locking adhesive onto the first and second threads under the thread hole chamfering of the drive gear, on 3 or more different points.

3. Install the drive gear to gear ring, and apply anti-corrosive oil onto threads and seats on the mounting bolts, and then tighten to the specified torque.



Tightening torque

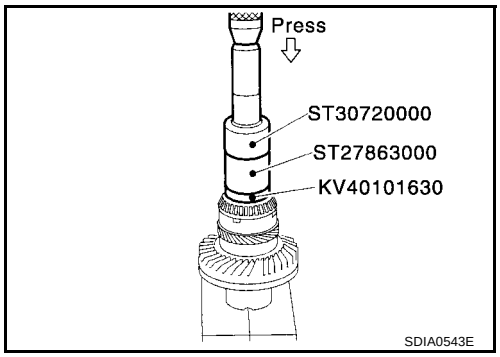
First (temporary tightening) : 25 - 29 N·m (2.5 - 3.0 kg-m, 18 - 21 ft-lb)

Second (final tightening) : 82 - 115 N·m (8.3 - 11.7 kg-m,60 - 84 ft-lb)

CAUTION:

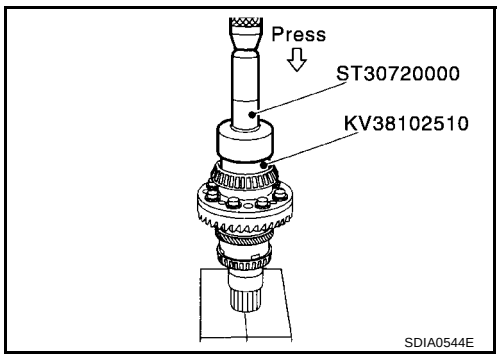
- **Temporary installation before tightening the bolts through the completion of the tightening should be within 90 seconds.**
- **If the thread locking adhesive is applied aside, quickly wipe it off.**

4. Apply gear oil to ring gear bearing inner race on the transfer case. Using a drift, install gear bearing inner race.



5. Apply gear oil to ring gear bearing inner race on the adapter case. Using a drift, install ring gear bearing inner race.
6. Assemble the drive gear assembly to the transfer case.
7. Install the adapter case.
8. Check backlash, preload torque, tooth contact, and companion flange runout.

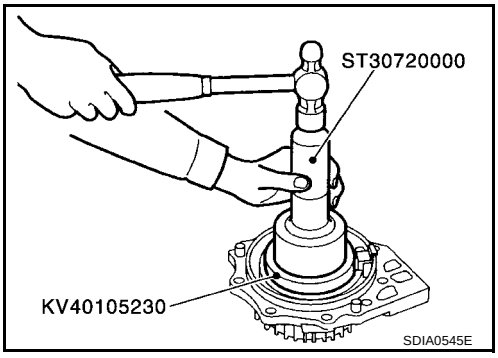
- TF-14, "Assembly Inspection".



CAUTION:
Measure the overall preload torque without the oil seal.

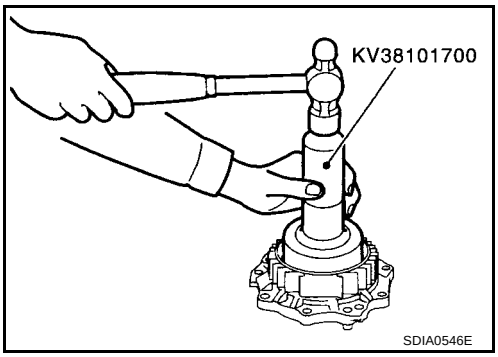
Adapter case

1. Select the adjusting shim on the gear ring bearing.
   - TF-23, "SELECTIONG ADJUSTING SHIMS".
2. Install the oil gutter.
3. Using a drift, install the selected adjusting shim and gear ring bearing outer race to the adapter case.



4. Using a drift, drive the oil seal until it becomes flush with the case end.

   CAUTION:
   - **When checking the overall preload torque, measure it without the oil seal, then install the oil seal.**
   - **Discard old oil seals; replace with new ones.**
   - **Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of the oil seal.**



5. Apply recommended sealant on drain plug and install it to the adapter case.

   Drain plug tightening torque

   : 9.8 - 19.6 N·m (1.0 -1.9 kg-m, 87 - 173 in-lb)

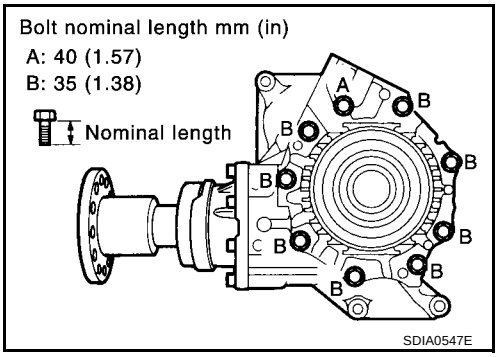
6. Apply multi-purpose grease lightly and evenly onto an O-ring, and install it to the adapter case.

   CAUTION:
   Do not reuse the O-ring.

7. Install the adapter case to the transfer case, and apply anti-corrosive oil onto threads and seats on the mounting bolts. Tighten to the specified torque.

   Tightening torque

   : 14 - 16 N·m (1.4 -1.7 kg-m, 11 - 12 ft-lb)



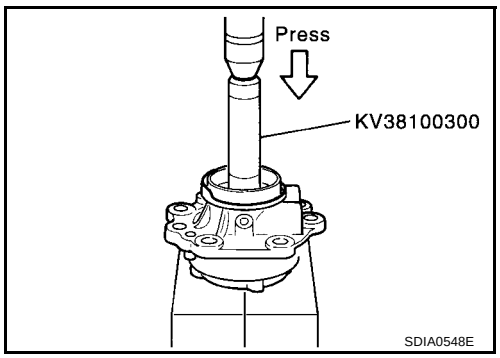
8. Check backlash, preload torque, tooth contact, and companion flange runout.
   - TF-14, "Assembly Inspection".

   CAUTION:
   Measure the overall preload torque without the oil seal.

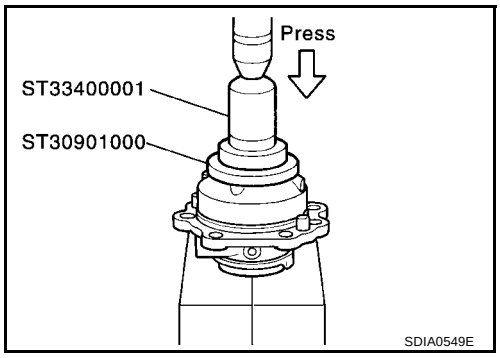
Pinion sleeve assembly

1. Select the pinion sleeve shim.
   - TF-23, "SELECTIONG ADJUSTING SHIMS".

2. Using a drift, install the pinion rear bearing outer race.



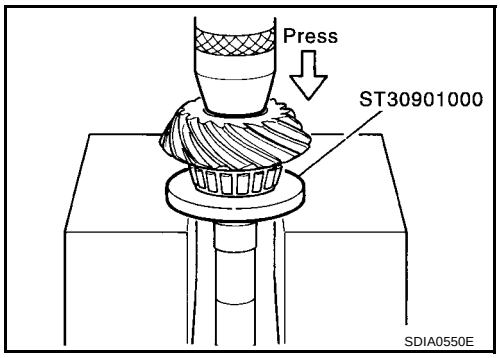
3. Using a drift, install the pinion front bearing outer race.



4. Apply gear oil to pinion front bearing inner race and mating position on the drive pinion gear. Using a drift, install pinion front bearing inner race to the drive pinion gear.
5. Install a collapsible spacer to the drive pinion gear.

   CAUTION:

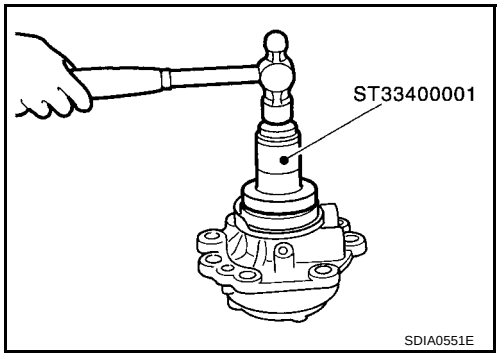
   Do not reuse the collapsible spacer.
6. Apply gear oil to pinion rear bearing inner race and install it to the pinion sleeve.



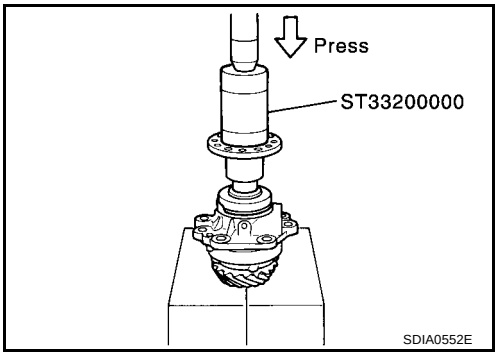
7. Using a drift, install an oil seal to the pinion sleeve.

   CAUTION:

   - **Discard old oil seals; replace with new ones.**
   - **Apply multi purpose grease onto oil seal lips, and gear oil onto the circumference of the oil seal.**



8. Using a drift and press, press in the companion flange.



9. Apply anti-corrosion oil onto threads and seat of the pinion nut and adjust the pinion nut tightening torque and pinion bearing preload torque (P'1).

Pinion nut tightening torque

: 128 - 294 N·m (13 - 30 kg-m, 94 - 216 ft-lb)

Pinion bearing preload torque (P'1)

: 0.40 - 0.78 N·m (0.04 - 0.08 kg-m, 4 - 6 in-lb)

CAUTION:

- **Discard the old pinion nut; replace with new ones.**
- **Adjust the lower limit of the pinion nut tightening torque first.**
- **If specified preload torque is exceeded, replace the collapsible spacer and tighten again. Never loosen the pinion nut for further preload torque adjustment.**
- **After the adjustment, rotate the companion flange back and forth in 2 to 3 times to check for abnormal noise, rotation malfunction, and other malfunctions.**

10. Apply multi-purpose grease lightly and evenly onto an O-ring, and install it to the pinion sleeve.

CAUTION:

Discard the old O-ring; replace with new one.

11. Assemble the selected pinion sleeve shim.
12. Install the pinion sleeve assembly, and apply anti-corrosive oil onto threads and seats on the mounting bolts. Tighten to the specified torque.

Tightening torque : 26 - 33 N·m (2.6 - 3.4 kg-m, 19 - 24 ft-lb)

13. Check backlash, preload torque, tooth contact, and companion flange runout.
    - TF-14, "Assembly Inspection".

The overall preload torque is as follows:

Overall preload torque

With all oil seals installed : P'1 +0.45 - 0.47 N·m (0.045 - 0.048 kg-m, 3.9- 4.1 in-lb)

Without transfer case oil seal and ring gear oil seal

: P'1 +0.35 - 0.37 N·m (0.035 - 0.038 kg-m, 3.1 - 3.2 in-lb)

ALL MODE 4X4 SYSTEM

PFP:47850

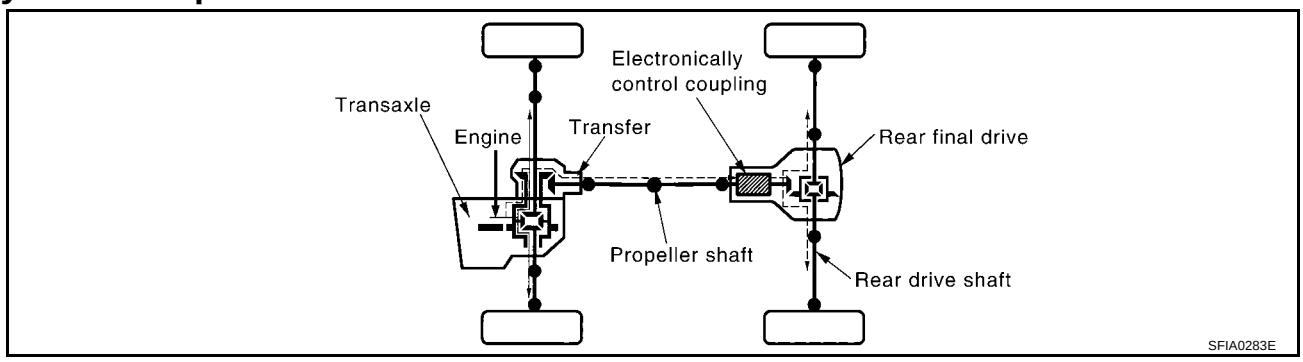
Precautions

EDS000IV

- This section describes ESP/TCS/ABS model.
- Refer to the BRC section for model without ESP/TCS/ABS.Refer toBRC-6, "ALL MODE 4X4 SYSTEM"

System Component

EDS000IJ

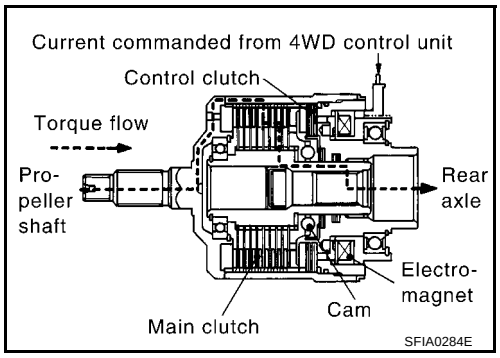


System Description

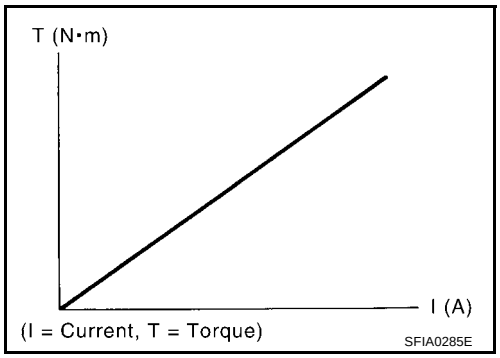
EDS000IK

ELECTRONIC COUPLING

- In response to command current from 4WD control unit, control clutch pull-in force is generated at the electromagnet and torque is generated at the control clutch.
- The cam operates in response to control clutch torque and applies pressure to main clutch.
- Main clutch transmits torque from input shaft to output shaft, according to the amount of pressure.

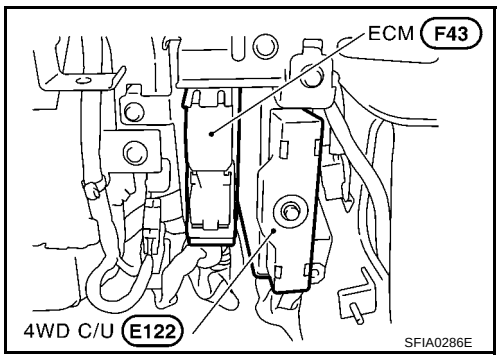


- The actual amount of torque transfer is determined by control current as shown in figure below (I-T characteristics figure).



4WD CONTROL UNIT

- Controls distribution of drive power between front-wheel drive (100:0) and 4WD (50:50) conditions circuit according to signals from sensors.
- If malfunction occurs in 4WD system, 4WD warning lamp turns ON and vehicle changes to front-wheel drive.
- Self-diagnosis can be done with CONSULT-II.



4WD MODE SWITCH

AUTO mode (AUTO indicator lamp ON)

- 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 4WD, it contributes to improved fuel economy by driving in conditions close to front-wheel drive.
- Sensors determine the vehicle's turning condition, and in response tight cornering/braking are controlled by distributing optimum torque to rear wheels.

NOTE:

- When driving in AUTO mode or LOCK mode, if there is a large difference between front and rear wheel speed which continues for a long time, oil temperature of drive system parts becomes too high and 4WD warning lamp flashes rapidly. (When 4WD warning lamp flashes, vehicle changes to front-wheel drive conditions.)
- When driving in AUTO mode, 4WD warning lamp may flash slowly if there is a significant difference in pressure or wear between tires. At this time, vehicle performance is not fully available and cautious driving is required. (Continues until engine is turned OFF.)
- If 4WD warning lamp is flashing rapidly, stop vehicle and allow it to idle for some time. Flashing will stop and AUTO mode will be restored.
- If the warning lamp flashes slowly during driving but remains OFF after engine is restarted, the system is normal. If it again flashes slowly after driving for some time, vehicle must be inspected.
- When the difference of revolution speed between the front and rear wheel with AUTO mode the shift switch occasionally changes to LOCK mode automatically. This is not malfunction.

LOCK mode (LOCK indicator lamp and AUTO indicator lamp ON)

- Front/rear wheel torque distribution is fixed, ensuring stable driving when climbing slopes.
- When LOCK mode is selected, vehicle will switch automatically to AUTO mode if vehicle speed increases. If vehicle speed then decreases, the vehicle automatically returns to direct 4-wheel driving conditions.

NOTE:

If there is a significant difference in pressure or wear between tires, full vehicle performance is not available. Tire conditions are detected, and LOCK mode may be prohibited, or else speeds at which LOCK mode is enabled may be restricted.

2WD mode (indicator lamps OFF)

Vehicle is in front-wheel drive.

NOTE:

- If front wheels are slipping in 2WD mode, do not switch to AUTO or LOCK. This can cause difficulties for the system.
- The shift switch even if the shift switch is in 2WD mode, the sift switch occasionally automatically change to 4WD mode depending on the driving condition (For example; Depressing the acceleration firmly). this is not malfunction. How ever, 4WD mode indicator lamp dose not illuminate.

4WD WARNING LAMP

Turns ON when there is a malfunction in 4WD system. It indicates that fail-safe mode is engaged and vehicle is in 2WD.
Also turns ON when ignition switch is turned ON, for purpose of bulb check. Turns OFF approximately for 3 seconds after the engine starts if system is normal.

4WD waning lamp indiction

Condition	Display	4WD warning lamp
Self-diagnosis	When self-diagnosis is performed, indicates location of malfunction by number of flashes.	-
Lamp check	Turns ON when engine is started to check for burned-out lamps.	Turns ON when ignition switch is turned ON. Turns OFF approximately 3 seconds after engine start.
4WD system malfunction	Turns ON if there is malfunction in 4WD system.	ON

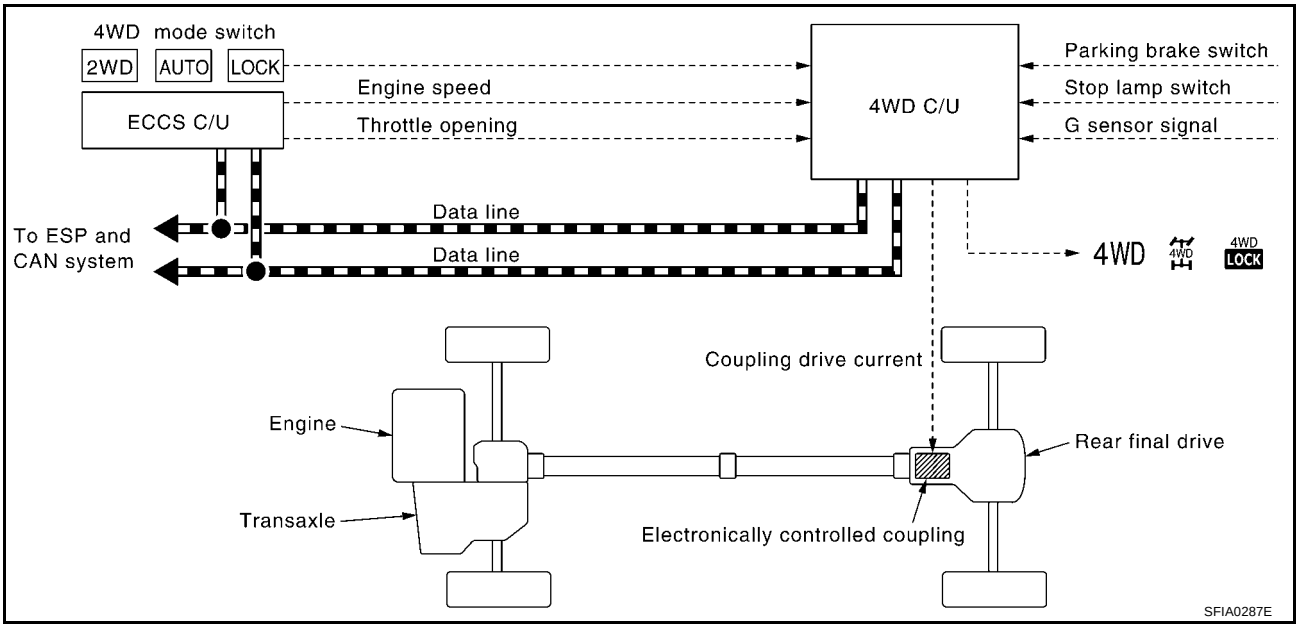
Condition	Display	4WD warning lamp
Large difference in diameter of front/ rear tires	4WD warning lamp flashes slowly.	Flashes once every 2 seconds.
Difference in front/rear wheel speed continues and oil temperature of drive system has increased.	4WD warning lamp flashes rapidly.	Flashes twice each second.
Other than above (system normal)	OFF	OFF

FAIL- SAFE FUNCTION

- If a malfunction occurs in 4WD electrical system, and control unit detects the malfunction, 4WD warning lamp on gauge turns ON to inform driver of system malfunction.
- When 4WD warning lamp is ON, vehicle is in 2WD.

System Diagram

EDS000IL



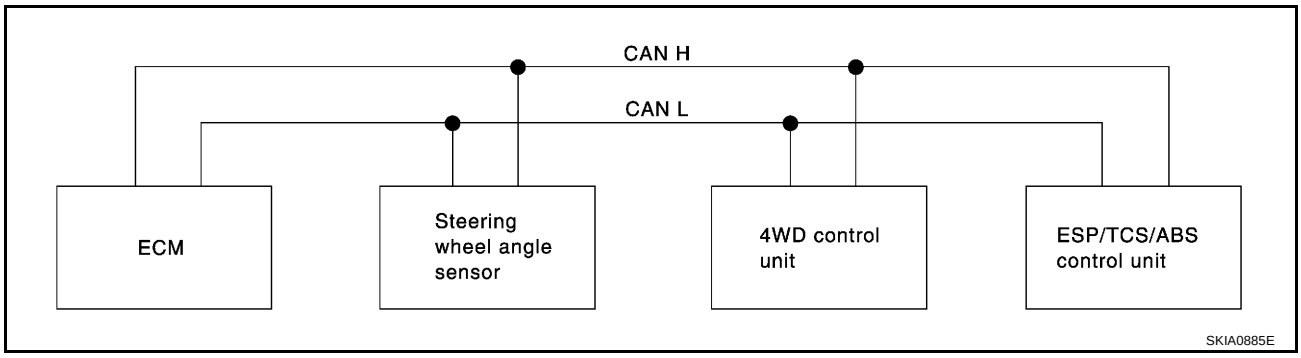
CAN Communication

EDS000IP

SYSTEM DESCRIPTION

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

SYSTEM DIAGRAM



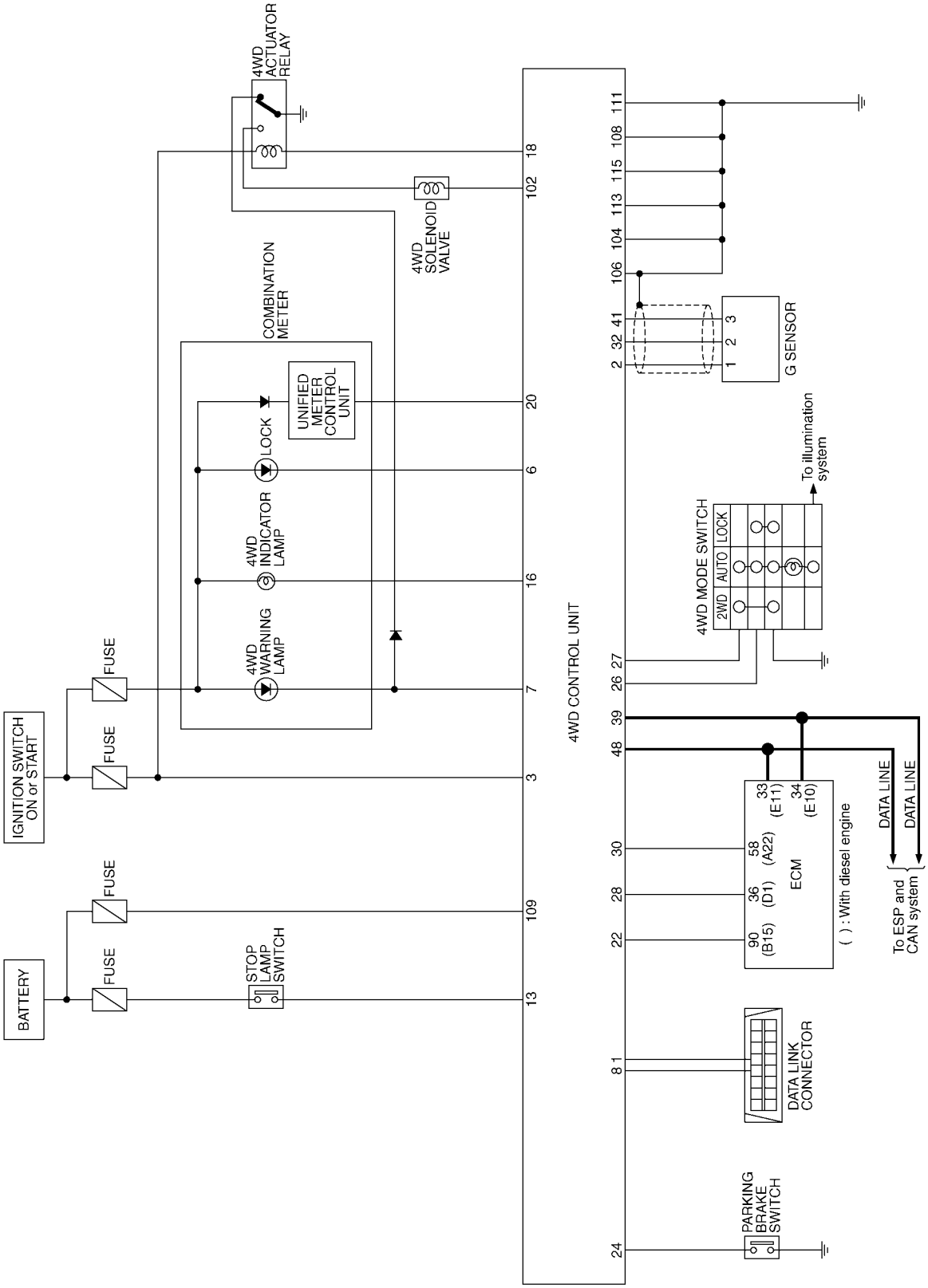
INPUT/OUTPUT SIGNAL

T: Transmit R: Receive

Signals	ECM	Steering wheel angle sensor	4WD control unit	ESP/ TCS / ABS control unit
Engine speed signal	T		R	R
Accelerator pedal position signal	T			R
ESP operation signal	R		R	T
TCS operation signal	R		R	T
ABS operation signal	R		R	T
Stop lamp switch signal			R	T
Steering wheel angle sensor signal		T		R
ESP-OFF SW signal			R	T
Wheel speed sensor signal			R	T
4WD Mode signal			T	R

Circuit Diagram

EDS000IM



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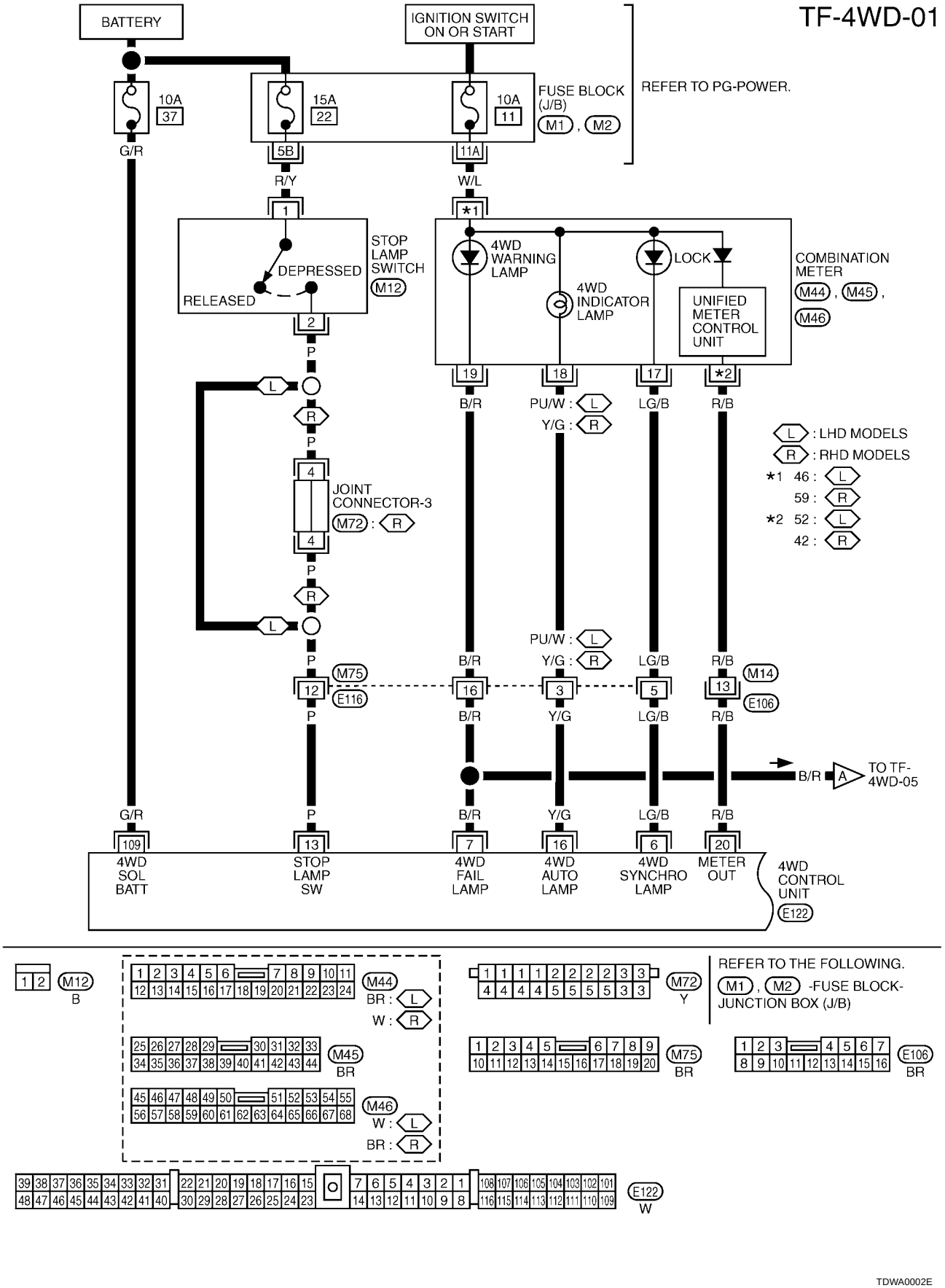
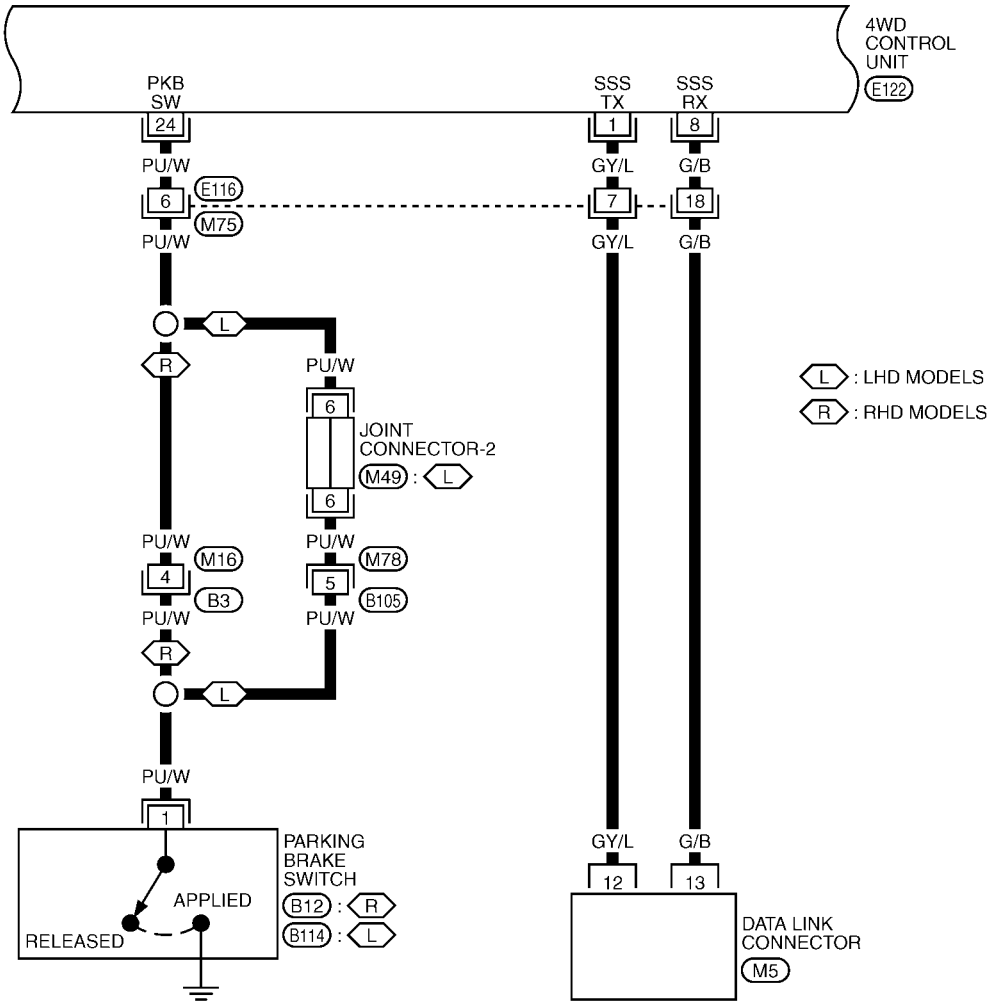
Wiring Diagram

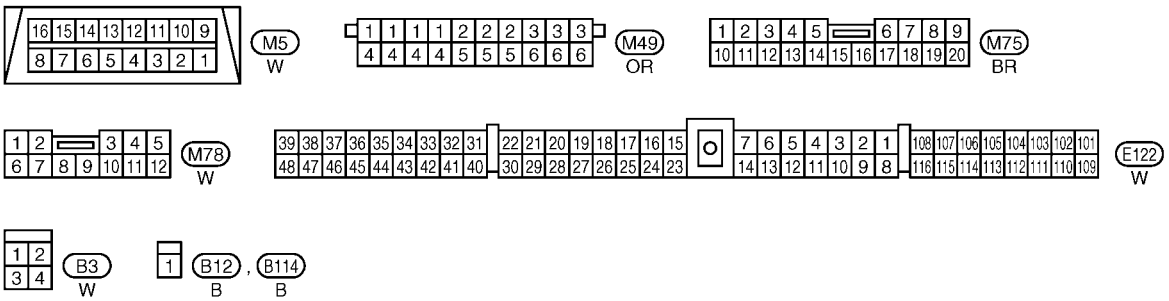
EDS000IN



TDWA0002E

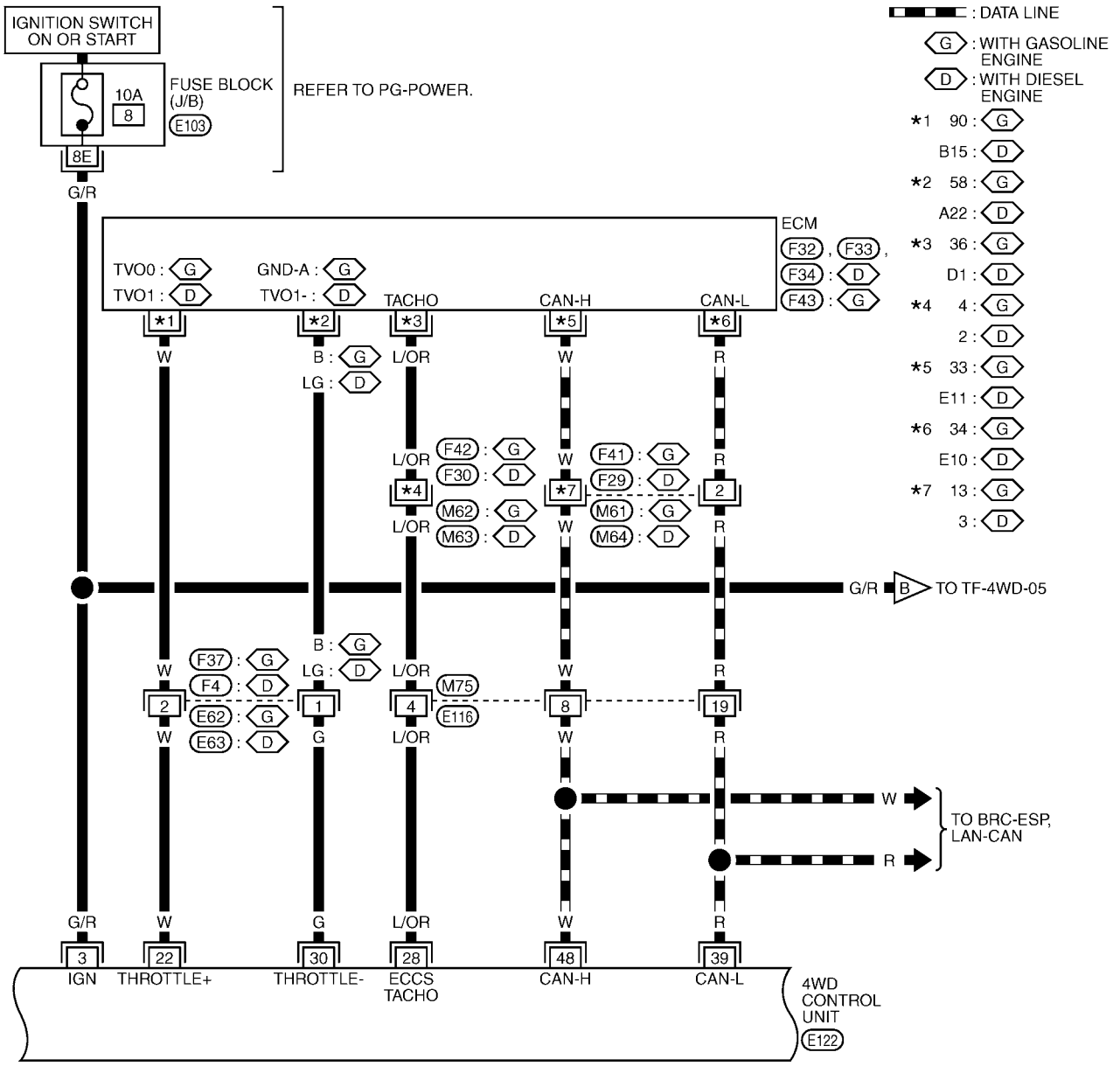
TF-4WD-02

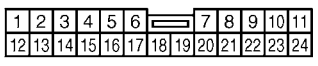


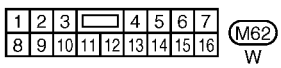


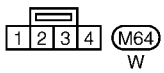
TDWA0003E

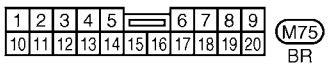
TF-4WD-03



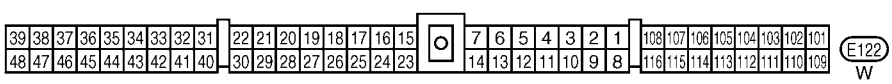


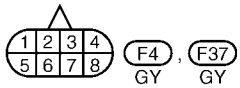






REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)
F32 , F33 , F34 , F43 -ELECTRICAL UNITS





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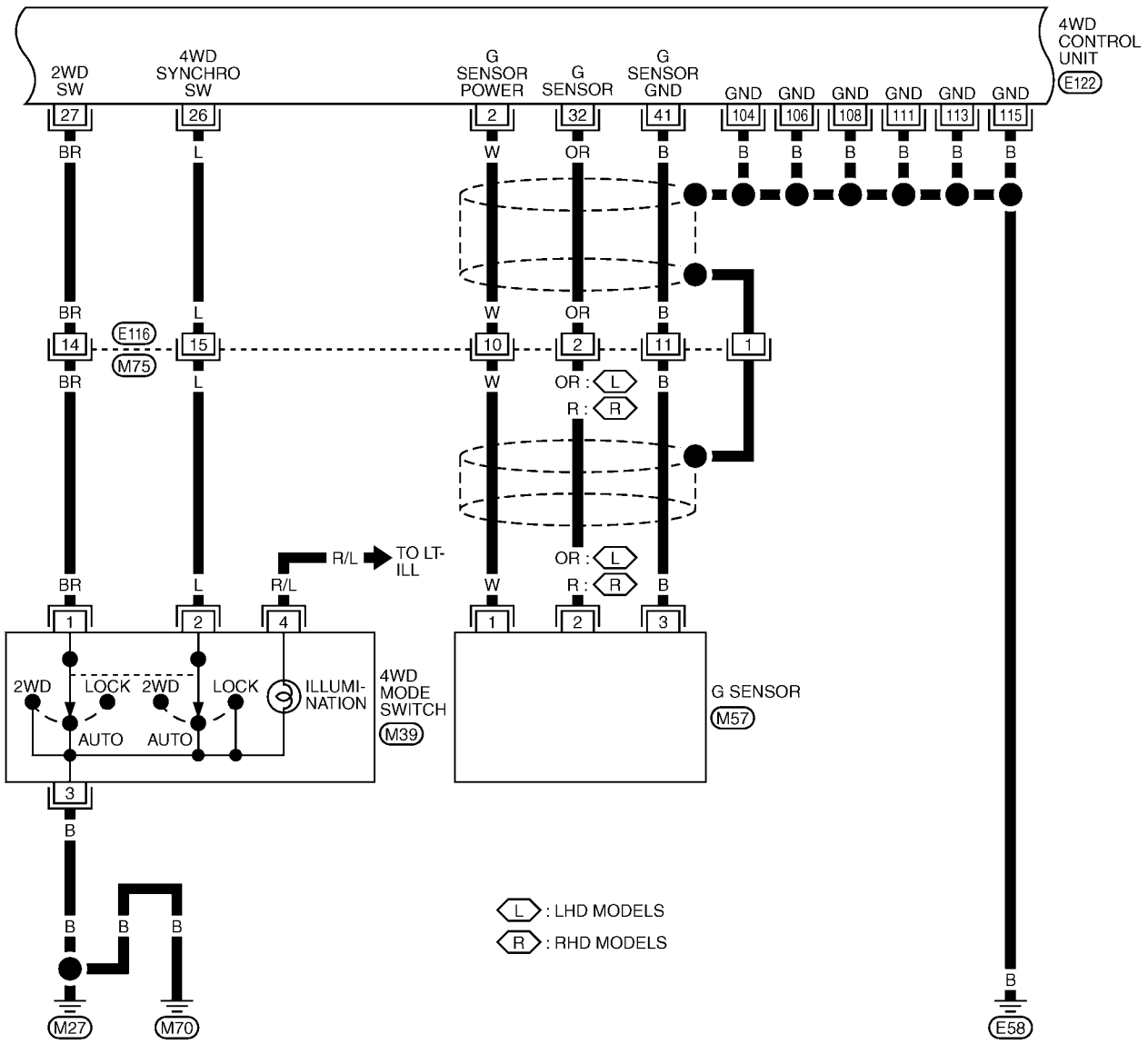
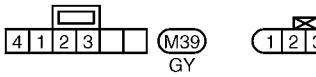
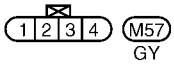
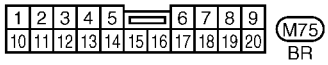
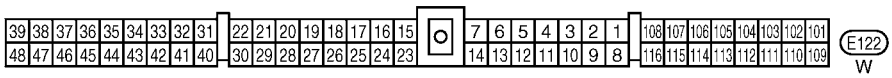
TF-4WD-04











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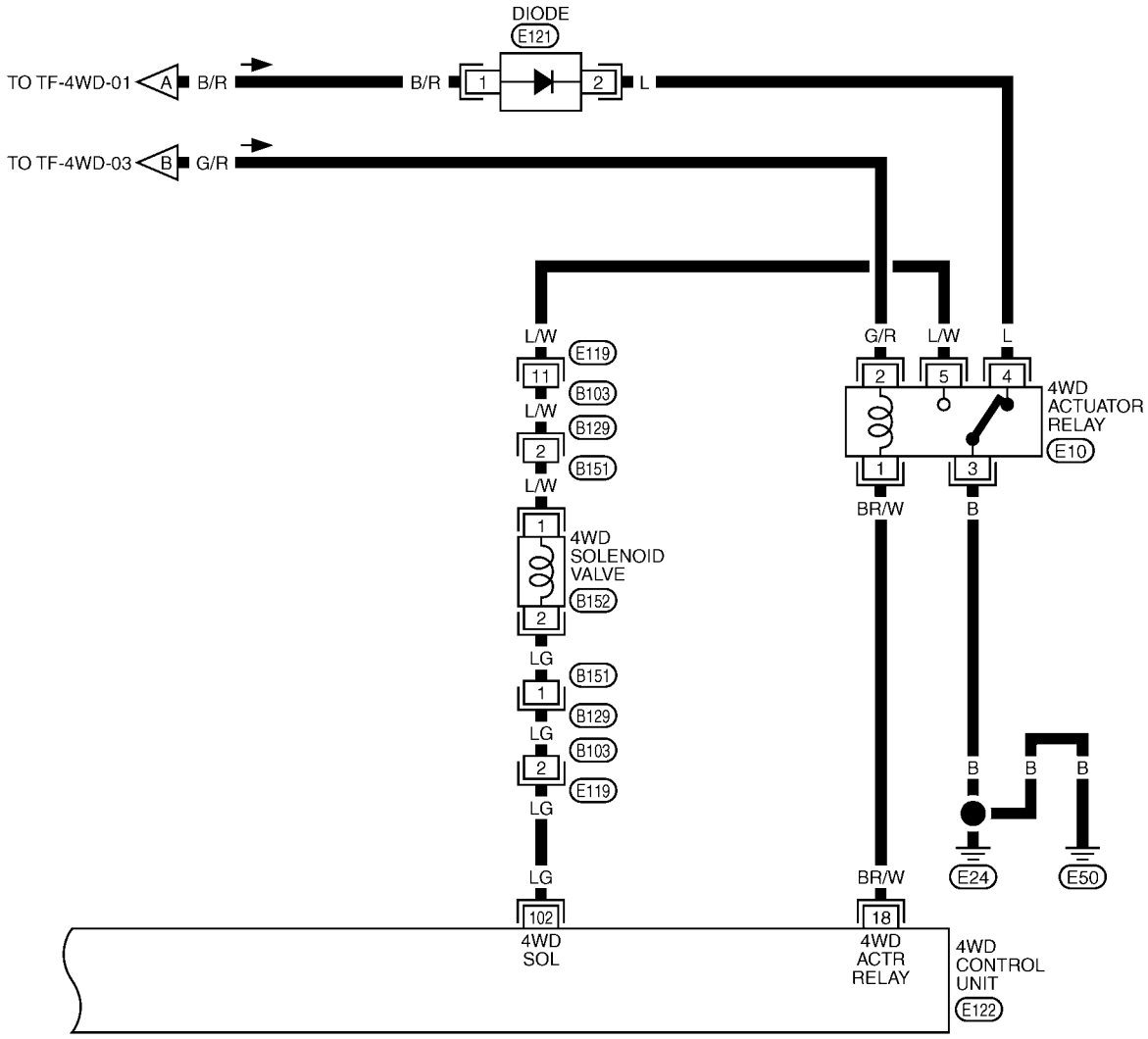
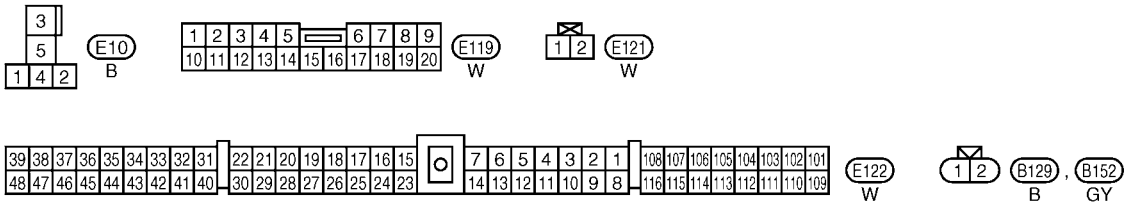
TF-4WD-05





TDWA0006E

TROUBLE DIAGNOSIS

PFP:00004

Fail-safe function

EDS000H4

- If a malfunction occurs in 4WD electrical system, and control unit detects the malfunction, 4WD warning lamp on gauge turns ON to inform driver of system malfunction.
- When 4WD warning lamp is ON, the vehicle is in 2WD.

How to proceed with trouble diagnosis

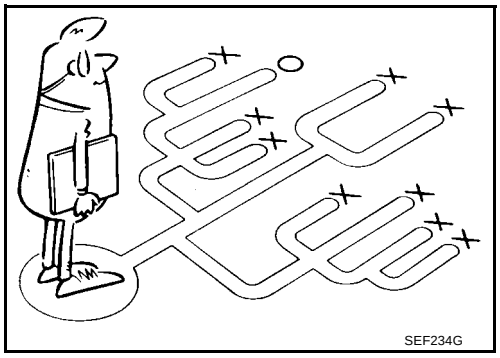
EDS000H5

BASIC CONCEPT

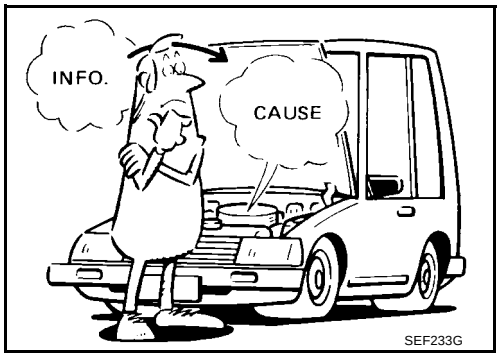
- The most important point to perform trouble diagnosis is to understand vehicle systems (control and mechanism) thoroughly.

- It is also important to clarify customer complaints before inspection.
  First of all, reproduce symptom, and understand it fully.
  Ask customer about his/her complaints carefully. In some cases, it will be necessary to check symptoms by driving vehicle with customer.

  CAUTION:
  Customers are not professional. It is dangerous to make an easy guess like "maybe the customer means that...," or "maybe the customer mentions this symptom".


SEF234G

- It is essential to check symptoms right from the beginning in order to repair a malfunction completely.
  For intermittent malfunction, reproduce symptom based on interview with customer and past examples. Do not perform inspection on ad hoc basis. Most intermittent malfunctions are caused by poor contacts. In this case, it will be effective to shake suspected harness or connector by hand. When repairing without any symptom diagnosis, you cannot judge if malfunction has actually been eliminated.
- After completing diagnosis, always erase diagnostic memory. Refer to TF-45, "Operation procedure" .



SEF233G

- For intermittent malfunction, move harness or harness connector by hand. Then check poor contact or false open circuit.

Trouble diagnosis chart by symptom

EDS000IT

Symptom	Condition	Check items	Reference page
When ignition switch is turned ON, 4WD mode indicator lamp does not illuminate for approx. 1 second (4WD mode lamp check)	IGN-ON	● Blown 4WD mode indicator lamp bulb ● Blown fuse between ignition and 4WD mode indicator lamp ● Open circuit in wiring between ignition and 4WD mode indicator lamp	TF-55, "4WD INDICATOR LAMP DOSE NOT COME ON FOR APPROXIMATELY 1 SECOND WHEN THE IGNITION SWITCH IS TURNED TO ON"
4WD warning lamp does not illuminate with ignition switch ON.	IGN-ON	● Malfunction 4WD warning lamp circuit. ● Blown fuse between ignition and 4WD warning lamp ● Open circuit in wiring between ignition and 4WD warning lamp ● Open circuit in wiring between 4WD warning lamp and 4WD actuator relay ● Disconnected 4WD actuator relay ● Open circuit in wiring between 4WD actuator relay and body ground	TF-55, "4WD WARNING LAMP DOES NOT ILLUMINATE WITH IGNITION ON"
4WD warning lamp does not go out several seconds after engine is started. (4WD mode indicator lamp goes out.)	Engine running	● 4WD control unit connector disconnected ● Malfunction presented in 4WD system	TF-56, "4WD WARNING LAMP DOES NOT GO OUT SEVERAL SECONDS AFTER ENGINE STARTED.(4WD MODE INDICATOR LAMP GOES OUT)"
Heavy tight-corner braking symptom occurs when vehicle is driven in the following conditions: AUTO mode and steering wheel is turned fully to either sides after engine is started (Note 1, Note 2).	● Engine running ● AUTO mode ● Steering wheel fully turned	● Operation is not in AUTO mode (in 2WD or LOCK mode). ● Throttle position signal error ● Mechanical malfunction of electronically controlled coupling ● Malfunction present in 4WD system	TF-56, "HEAVY TIGHT-CORNER BRAKING SYMPTOM OCCURS WHEN THE VEHICLE IS DRIVEN IN AUTO MODE AND THE STEERING WHEEL IS TURNED FULLY TO EITHER SIDE AFTER THE ENGINE IS STARTED"
4WD mode cannot be switched after engine is started (Note 3)	Engine running	● 4WD mode change-over switch is disconnected. ● Open circuit between 4WD mode change-over switch and 4WD control unit ● Open circuit between 4WD mode change-over switch and body ground	TF-57, "4WD MODES CANNOT BE SWITCHED AFTER ENGINE IS STARTED"

Symptom	Condition	Check items	Reference page
While driving, 4WD warning lamp flashes rapidly. (when it flashes for approx. one minute, then does not illuminate.) Rapid flashing: Two times flashing per 1 second	Engine running (to other than 2WD mode)	Protection function was activated due to heavy load to electronically controlled coupling. (4WD system is not malfunctioning.)	TF-57, "WHILE DRIVING, 4WD WARNING LAMP FLASHES RAPIDLY. (WHEN IT FLASHERS FOR APPROX. ONE MINUTE, THEN DOES NOT ILLUMINATE.)"
While driving, 4WD warning lamp flashes slowly. (when it flashes for approx. one minute, then does not illuminate.)Slow flashing: One flashing per 2 seconds	● Engine running ● Driving at vehicle speed 20km/h(12MPH)	Tire size is different for front and rear of vehicle.	TF-57, "WHILE DRIVING, 4WD WARNING LAMP FLASHES SLOWLY. (WHEN IT CONTINUES TO ILLUMINATE UNTIL ENGINE TURNS OFF.)"
Vehicle does not enter 4WD mode even though 4WD warning lamp is off.	Engine running	Mechanical malfunction of electronically controlled coupling (Mechanical engagement of clutch is not possible.)	TF-58, "VEHICLE DOES NOT ENTER 4WD MODE EVEN THOUGH 4WD WARNING LAMP IS OFF."

NOTE:

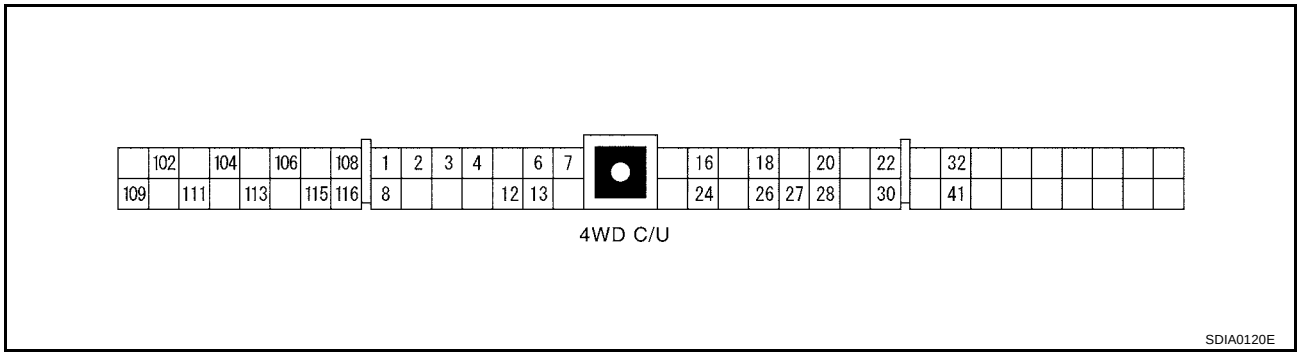
1. Light tight-corner braking symptom may occur depending on driving conditions in AUTO mode. This is not malfunction.
2. Heavy tight-corner braking symptom occurs when vehicle is driven in the following conditions: LOCK mode, steering wheel is turned fully to either sides, and accelerator pedal was depressed.
3. When the difference of revolution speed between the front and the rear wheels is large, the 4WD mode does not change to other mode.this is not a malfunction.

4WD control unit input/output signal standard

EDS000H9

4WD CONTROL UNIT CONNECTOR TERMINAL ARRANGEMENT

When ignition switch is turned to ON with connectors of 4WD control unit connected.



REFERENCE STANDARD TABLE

Specifications defined by circuit tester

Terminal No. +	Terminal No. -	Location	Standard *1		(Note) Check points when result was malfunctioning
3		Power supply	Ignition switch ON	Battery voltage (approx. 12V)	Control unit power supply circuit
115	Body ground	Ground	-		Control unit ground circuit
113					
111					
108					
106					
104					
7		4WD warning lamp*2	4WD warning lamp ON 4WD warning lamp OFF	Approx. 0V Battery voltage (approx. 12V)	4WD warning lamp and harness
16		AUTO indicator lamp	AUTO indicator lamp ON AUTO indicator lamp OFF	Approx. 0V Battery voltage (approx. 12V)	AUTO indicator lamp and harness
6		LOCK indicator lamp	LOCK indicator lamp ON LOCK indicator lamp OFF	Approx. 0V Battery voltage (approx. 12V)	LOCK indicator lamp and harness
102		4WD solenoid valve (E-TS solenoid valve)*3	At vehicle stop engine idling	Battery voltage (approx. 12V)	4WD actuator relay solenoid valve and harness
18		4WD actuator relay	At vehicle stop engine idling	2 V or lower	4WD actuator relay and harness
2		G-sensor power supply1	At ignition switch ON (vehicle horizontal stop condition)	Approx. 8 V	G-sensor and harness
32		Longitudinal G-sensor 1		Approx. 2.5V	
22		Throttle position sensor	Wide open throttle Closed throttle	Approx. 4.0 V Approx. 0.5 V	Throttle position sensor and harness
24		Parking brake switch	In parking position In other than parking position	-	Parking brake switch and harness
26		4WD mode change-over switch LOCK	4WD mode change-over switch: LOCK 4WD mode change-over switch: Other than LOCK	SW ON: Approx. 0 V SW OFF: Approx. 5 V	4WD mode change-over switch and circuit
27		4WD mode change-over switch AUTO	4WD mode change-over switch: 2WD 4WD mode change-over switch: other than 2WD	SW ON: Approx. 0 V SW OFF: Approx. 5 V	4WD mode change-over switch and circuit
39		CAN communication L line	-	-	-
48		CAN communication H line	-	-	-

NOTE:

*1:If a circuit tester for measuring voltage is used for the check, do not forcibly extend any connector terminals.

*2:4WD warning lamp ON/OFF timing

ON: When ignition switch is turned ON (before engine starts) or when malfunction is detected

OFF: After engine is started (When the system is in normal condition)

*3:Unit name is indicated by the one used in circuit diagram (4WD solenoid valve). However, it is "E-TS SOLENOID" in CONSULT-II data.

Specifications defined by CONSULT-II

Items to be monitored	Contents	Data monitor		(Reference) Check points when result was malfunctioning
		Condition	Reference values in normal operation	
DECEL G-SENSOR (G)	G-sensor operating condition	With vehicle stopped on flat road.	± 0.15 G	G-sensor and harness
THRTL POS SEN (V)	Throttle valve open/ close condition	Closed throttle to wide open throttle	When closed throttle: Approx. 0.5V	Throttle position sensor and harness
			When wide open throttle: Approx. 4.0 V	
ENGINE SPEED SIG (STOP/RUN)	With engine running	Engine speed below 400 rpm	STOP	Engine speed signal circuit
		Engine speed 400 rpm or higher	RUN	
E-TS ACTUATOR (ON/OFF)	4WD actuator relay (4WD actuator relay) activation condition	Vehicle stop (Ignition switch ON)	OFF	4WD actuator relay (4WD actuator relay) and harness
		Engine running	ON	
G-SEN VOLT (V)	G-sensor power supply condition	With vehicle stopped on flat road.	Approx. 8V (reference value)	G-sensor and harness
BATTERY VOL (V)	Battery voltage supplied to control unit	Ignition switch ON	Approx. 10 - 16 V	Control unit power supply circuit
4WD WARN LAMP (ON/ OFF)	4WD warning lamp ON condition	4WD warning lamp ON	ON	4WD warning lamp and harness Refer to "4WD Warning Lamp".
		4WD warning lamp OFF	OFF	
4WD MODE SW (AUTO LOCK 2WD)	Input condition of 4WD mode change-over switch	Engine running, vehicle stopped, switch pressed	–	4WD mode change-over switch and circuit
4WD MODE MONI (AUTO, LOCK, 2WD)	Output condition of 4WD mode indicator lamp signal	Engine running, vehicle stopped	Using 4WD mode change-over switch	4WD mode indicator lamp and circuit
DIS-TIRE MONI (mm)	Improper size tire installed condition	–	0 - 4 mm, 4 - 8 mm, 8mm -	Front/Rear tire size difference, wear condition
P BRAKE SW (ON/OFF)	Parking brake switch operating condition	Parking brake depressed	ON	Parking brake switch and harness
		Parking brake not depressed	OFF	
SPEED MTR O/P (km/h)	Output condition of vehicle speed for speedometer	While vehicle is stopped	0 km/h (0 MPH)	Speedometer and harness
		Vehicle running	Almost in accordance with the wheel speed sensor display	
ABS 4WD COMM	EPS/TCS/ABS control unit operating condition	Ignition switch ON	OK	ESP/TCS/ABS control unit and circuit
CAN COMM (OK-NG)	CAN communication signal condition	Ignition switch ON	OK	CAN communication signal (OK-NG) condition is displayed

Check air pressure of tire under normal condition.

CONSULT-II functions

EDS000HA

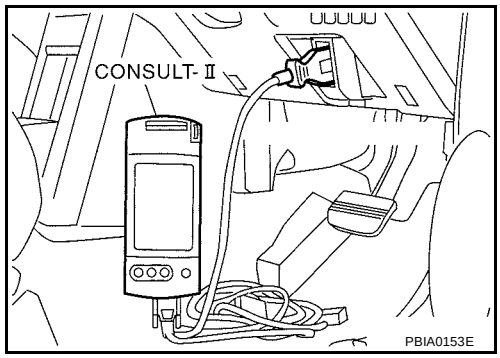
CONSULT-II FUNCTION APPLICATION TABLE

Item	Self-diagnosis	Data monitor	Active test
FR RH SENSOR	×	×	-
FR LH SENSOR	×	×	-
RR RH SENSOR	×	×	-
RR LH SENSOR	×	×	-
ENG SPEED SIG	×	×	-
BATTERY VOLT	×	×	-
G-SEN VOLT	-	×	-
THRTL POS SEN	×	×	-
ETS ACTUATOR	-	×	-
4WD WARN LAMP	-	×	-
ETS SOLENOID	×	×	×
DECEL G-SEN	×	×	-
P BRAKE SW	-	×	-
SPEED MTR O/P	-	×	-
4WD MODE SW	×	×	×
4WD MODE MONI	-	×	-
DIS-TIRE MONI	-	×	-
C/U	×	-	-
ABS FAIL SIG	×	×	×

SELF-DIAGNOSIS

Operation procedure

1. After turning ignition switch OFF, connect CONSULT-II connector to data link connector on vehicle.
2. Start engine and drive at approx. 30 km/h(19MPH) for approx. 1 minute.
3. Stop vehicle. With engine at idle, touch "START", "ALL MODE 4WD", and "SELF-DIAG RESULTS" on CONSULT-II screen in this order.



CAUTION:
"ALL MODE 4WD" may not be displayed on the system selection screen in the following case: When "START" was touched just after engine is started or ignition switch is turned to ON. In this case, repeat procedure from step 1.

4. DTC RESULT is displayed. (If necessary, touch "PRINT" to print self-diagnosis result.)
   - If "NO DTC IS DETECTED FURTHER TESTING MAY BE REQUIRED" is displayed. Check 4WD warning lamp.
5. Check the malfunctioning part indicated by the chart to repair or replace.
6. Start engine and drive at approx. 30km/h(19MPH) for approx. 1minule.

CAUTION:
- **Check again to make sure that there is NO FAILURE on other parts.**
- **If wheel sensor [Short-Circuit] is detected, 4WD warning lamp does not turn off until following conditions: Vehicle is driven at approx. 30km/h(19MPH) for approx. 1minute, even in normal conditions.**

7. Turn OFF ignition switch to prepare for erasing memory.
8. Start engine. Touch "START," "ALL MODE 4WD," "SELF-DIAG RESULTS," and "ERASE" on CONSULT-II screen in this order to erase fault memory.

CAUTION:
If memory cannot be erased, proceed to 5.

9. Drive at approx. 30 km/h (19MPH) for approx. 1 minute. Be sure 4WD warning lamp is OFF.

Display item list

Item	Malfunction detecting condition	Check harness
DECEL G-SENSOR	Longitudinal G-sensor output voltage is outside specification.	G-sensor harness
G-SENSOR VOLTAGE	Power voltage of longitudinal G-sensor remains abnormally high or low for a certain period of time.	
ETS SOLENOID (4WD solenoid valve) (Open)	4WD solenoid valve control terminal is not supplied with proper voltage due to open circuit in 4WD solenoid valve.	4WD actuator relay, solenoid and harness
ETS SOLENOID (4WD solenoid valve) (Short)	4WD solenoid valve control terminal is not supplied with proper voltage due to short circuit in 4WD solenoid valve.	
ETS SOLENOID (4WD solenoid valve) (CURRENT FAILURE)	Current supplied to 4WD solenoid valve is abnormally high or low compared with the specification.	
CONTROL UNIT	Processing function of 4WD control unit is malfunctioning.	4WD control unit, power and ground circuits
DECEL G-SEN MONI	Output voltage of longitudinal G-sensor is outside specification.	G-sensor harness
DECEL G-SEN IN	Input voltage of longitudinal G-sensor is outside specification.	G-sensor harness
3 V POWER SUPLY CHECK	4WD control unit internal 3V power supply is malfunctioning.	Control unit power supply circuit
4WD A/R CHECK	4WD actuator relay turned on while it is controlled OFF.	4WD actuator relay, 4WD solenoid and harness.
4WD SOL/V CHECK	4WD solenoid not supplied with proper voltage due to open circuit in 4WD solenoid valve.	
CAN COMM	● CAN communication function of 4WD control unit is malfunctioning. ● CAN communication function of EPS control unit is malfunctioning.	Control unit power supply circuit
ABS 4WD COMM	Wheel speed sensor system of ESP/TCS/ABS control unit is malfunctioning.	ESP/TCS/ABS control unit and harness

CAUTION:
- **If "ALL MODE 4WD" is not displayed on system selection screen, check the following: 4WD actuator and control unit, data link connector harness, and No. of CONSULT-II program card**
- **When several systems including CAN communication system indicates troubles, perform trouble diagnosis of the CAN communication primarily.**

DATA MONITOR

- For details of data monitor function, refer to CONSULT -II Operation Manual.

Operation procedure

1. Turn the ignition switch to OFF.
2. Connect CONSULT-II connector to data link connector on vehicle.
3. Turn ignition switch ON.
4. Touch "START" on the display.
5. Touch "ALL MODE 4WD" on the display.

   CAUTION:
   "ALL MODE 4WD" may not be displayed on the system selection screen in the following case: When "START" was touched just after engine is started or ignition switch is turned to ON. In this case, repeat procedure from step 2.
6. Touch "DATA MONITOR".
7. Return to monitor item selection screen. Touch any of "ECU INPUT SIGNALS," "MAIN SIGNALS," "CAN DIG SUPPORT MNTR" or "SELECTION FROM MENU".
   Refer to the following "Data monitor item chart".

8. Touch "MONITOR START".
9. Screen of data monitor is displayed.

Display item list

Item (Unit)	Monitor item selection				Remarks
	ECU INPUT SIGNALS	MAIN SIGNALS	CAN DIAG SUPPORT MNTR	SELECTION FROM MENU	
ENG SPEED SIG (STOP/RUN)	×	×	-	×	Condition of engine (STOP/RUN) is displayed.
BATTERY VOLT (V)	×	-	-	×	Indicates voltage supplied by 4WD control unit
G-SEN VOLT (V)	×	-	-	×	G-sensor power supply condition (ON/OFF)
THRTL POS SEN (V)	×	×	-	×	Indicates throttle position sensor signal voltage
ETS ACTUATOR (ON-OFF)	-	×	-	×	4WD actuator relay ON/OFF condition
4WD WARNING LAMP (ON-OFF)	-	×	-	×	Indicates 4WD warning lamp operating condition
ETS SOLENOID (A)	-	×	-	×	Current supplied to 4WD solenoid valve
DECEL G-SEN (G)	×	×	-	×	G-sensor operating condition
4WD MODE SW (AUTO, LOCK, 2WD)	-	×	-	×	4WD mode recognized by control unit
4WD MODE MONI (AUTO, LOCK, 2WD)	-	×	-	×	Output condition of 4WD mode indicator lamp signal
DIS-TIRE MONITOR (mm)	-	×	-	×	Improper size tire installed condition
P BRAKE SW (ON/OFF)	-	×	-	×	Indicates parking brake switch ON/OFF condition
SPEED MTR (O/P) (km/h)	-	×	-	×	Indicates vehicle speed recognized by meter control unit
CAN EFFECT (OK-NG)	-	×	-	×	CAN communication signal (OK/NG) condition is displayed.
TCS FAIL SIG (ON-OFF)	-	-	-	×	TCS fail signal condition is displayed (ON-OFF)
EBD FAIL SIG (ON-OFF)	-	-	-	×	EBD fail signal condition is displayed (ON-OFF)
ABS FAIL SIG (ON-OFF)	-	×	-	×	ABS operation (ON-OFF) condition is displayed.
CAN COMM (OK-NG)	-	-	×	-	CAN communication signal (OK/NG) condition is displayed.

Item (Unit)	Monitor item selection				Remarks
	ECU INPUT SIGNALS	MAIN SIGNALS	CAN DIAG SUPPORT MNTR	SELECTION FROM MENU	
CAN CIRC 1 (OK-UNKWN)	-	-	×	-	CAN communication signal (OK/UNKWN) condition is displayed.
CAN CIRC 2 (OK-UNKWN)	-	-	×	-	
CAN CIRC 3 (OK-UNKWN)	-	-	×	-	
EBD SIGNAL (ON-OFF)	-	-	-	×	EBD operation (ON-OFF) condition is displayed
ABS SIGNAL	-	-	-	×	ABS operation (ON-OFF) status is displayed
AMR SIGNAL	-	-	-	×	TCS engine control operation (ON/OFF) status is displayed
BMR SIGNAL	-	-	-	×	TCS brake control operation (ON/OFF) status is displayed
VDC SIGNAL (ON-OFF)	-	-	-	×	ESP operation (ON-OFF) condition is displayed
VDC FAIL (ON-OFF)	-	-	-	×	ESP fail signal condition is displayed (ON-OFF)
ETS FAIL REQ (ON-OFF)	-	×	-	×	ETS fail request signal condition is displayed* (ON-OFF)

*:In case that the output signal from ESP/TCS/ABS control unit malfunction in wheel speed system.

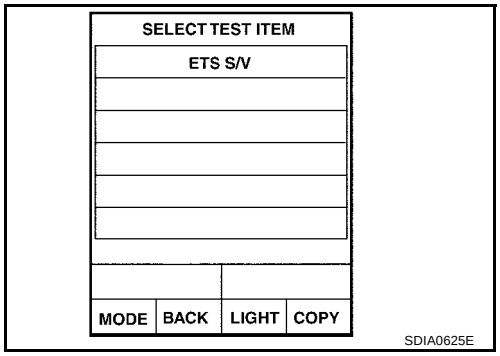
ACTIVE TEST

CAUTION:

- **Do not perform active test while driving.**
- **Active test cannot be performed with 4WD warning lamp on.**

Operation procedure

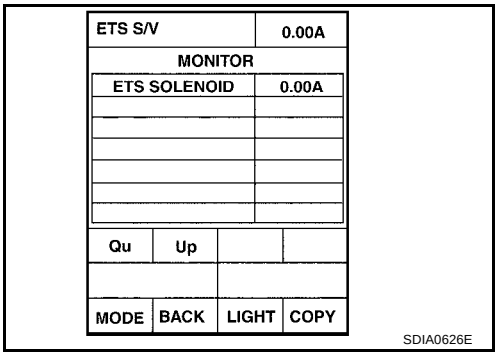
1. Connect CONSULT-II to data link connector and start engine.
2. Touch "START" on the display.
3. Touch "ALL MODE 4WD".
4. Touch "ACTIVE TEST".
5. Test item selection screen is displayed.
6. Touch test item.
7. Touch "START" with "MAIN SIGNALS" line inverted.
8. Active test screen is displayed.



4WD solenoid valve

Under the vehicle stopped with engine ON, touch UP, DOWN on screen. Adjust 4WD solenoid command current.
Check the monitor current at that time. If monitor current is within approx. ±10%, light switch is normal.

CAUTION:
Do not continuously energize solenoid for long period of time.



SDIA0626E

ECU PART NUMBER

Ignore the ECU part number displayed in the ECU PART NUMBER MODE.
Refer to parts catalog to order the ECU.

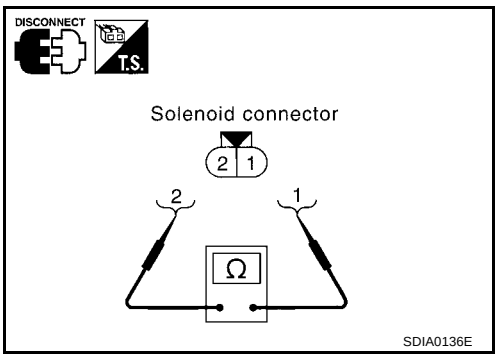
Component Inspection

EDS000HC

4WD SOLENOID VALVE

- Disconnect connector B152 and measure resistance between terminals 1(L/W) and 2(LG).

Resistance : Approx. 2.45Ω



SDIA0136E

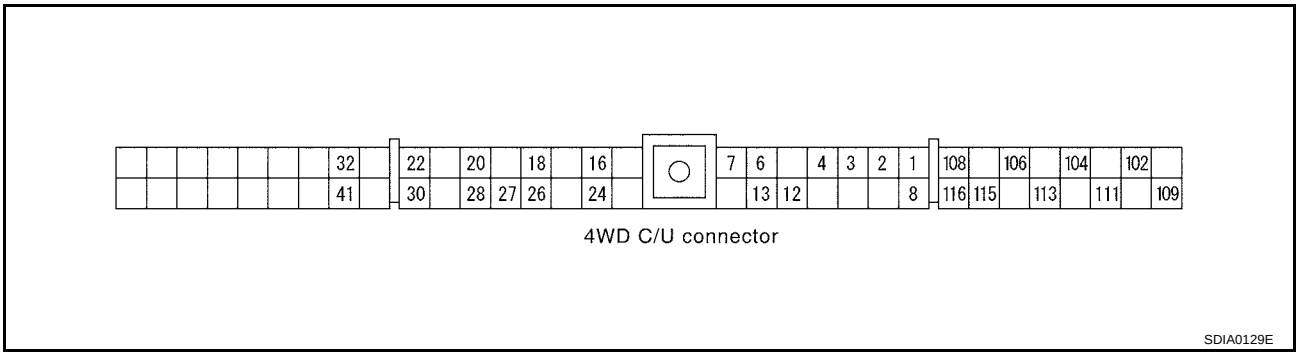
System Inspection

EDS000IO

CONTROL UNIT POWER SUPPLY SYSTEM

Inspection procedure

Disconnect 4WD control unit connector. Check for continuity and voltage between each terminal of vehicle-side connector and body ground.



SDIA0129E

Terminal No.	Signal name	Measuring condition	Measurement value
3, 4, 6, 16, 17, 18, 24, 109	Power supply	Ignition switch ON	Battery voltage
104, 106, 108, 111, 113, 115	Ground	Ignition switch OFF	Continuity should exist.

G-SENSOR SYSTEM

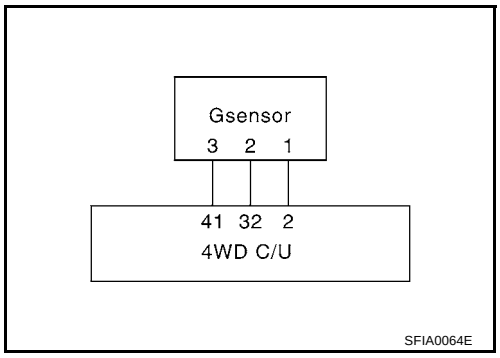
Inspection Procedure

1. INSPECTION START

Using CONSULT-II perform self-diagnosis.

OK or NG

OK >> Diagnosis completed.
NG >> GO TO 2.



2. CONNECTOR INSPECTION

1. Disconnect control unit connector and G-sensor connector. Check the control unit connector terminal for deformation and poor connection. Reconnect the connector.
2. Using CONSULT-II perform self-diagnosis again.

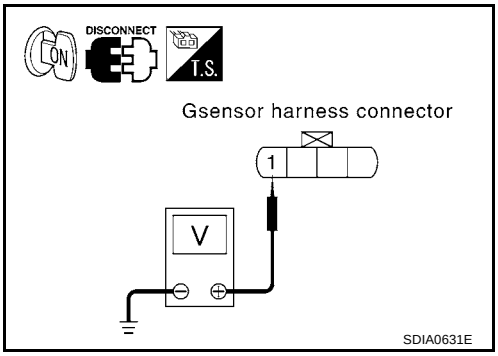
OK or NG

OK >> Diagnosis completed.
NG >> GO TO 3.

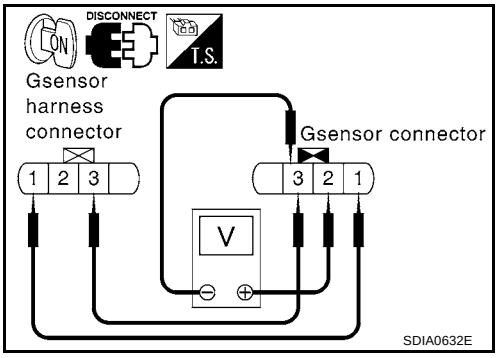
3. G-SENSOR UNIT INSPECTION

1. Disconnect connectors and remove G-sensor from vehicle.
2. Check the voltage under the following condition with the ignition switch ON: G-sensor harness-side connector M57 terminal NO.1(W) and body ground.

1(W) - Body ground : Approx. 8.0V



3. Using a test harness, connect 8.0V from the G-sensor harness connector M57 terminal NO.1(W) to the G-sensor connector terminal 1.
4. Using a test harness, connect from the G-sensor harness connector M57 terminal NO.3(B) to the G-sensor connector terminal NO.3.
5. With ignition switch ON, when the G-sensor is in horizontal, check the output voltage under following condition with tilted forward and backward by 90°: terminal NO. 3(B) and terminal NO. 2(R).



Terminals NO. 2(B) - NO. 3(R) output voltage (V)

Horizontal	**: 2.3 - 2.7**
Tilted forward by 90°	**: 0.80 - 0.86**
Tilted rearward by 90°	**: 3.87 - 4.47**

6. After inspection, install the G-sensor. Erase diagnosis trouble code of the 4WD control unit.

OK or NG

OK >> GO TO 4.
NG >> Replace G-sensor.

4. G-SENSOR HARNESS INSPECTION

1. Disconnect G-sensor connector.
2. Disconnect control unit connector.
3. Check harness between control unit and G-sensor.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace the harness.

5. G-SENSOR CIRCUIT CONNECTOR INSPECTION

Check the G-sensor and the control unit harness connector (including intermediate connector).

OK or NG

OK >> Perform the following.
1. Connect the connector and perform self-diagnosis again.
2. Be sure to drive the vehicle at 30km/h (19MPH) for 1minutes or longer and be sure that the 4WD warning lamp does not come on.

NG >> Repair or replace the connector.

4WD SOLENOID, ACTUATOR RELAY SYSTEM

Checking procedure

1. INSPECTION START

Use CONSULT-II and perform self-diagnosis.

OK or NG

OK >> Drive at 30 km/h (19MPH) for at least 1 minute. Check that 4WD warning lamp does not turn ON.
NG >> GO TO 2.

2. CONNECTOR INSPECTION

1. Disconnect the 4WD control unit connector and the 4WD solenoid connector. Check that terminals are not deformed. Check that the connectors were connected properly. Reconnect connectors.
2. Perform self-diagnosis again.

OK or NG

OK >> Diagnosis completed.
NG >> GO TO 3.

3. INSPECTION OF 4WD SOLENOID UNIT

1. Disconnect connector B152 and check resistance between terminals No.1(L/W) and 2(LG).

1 (L/W) - 2 (LG) : Approx. 2.45 Ω

OK or NG

OK >> GO TO 4.
NG >> Replace 4WD solenoid.

4. INSPECTION OF 4WD SOLENOID CIRCUIT HARNESS

1. Disconnect the 4WD solenoid connector.
2. Disconnect the 4WD control unit.
3. Check circuit continuity between control unit harness connector E122 terminal No.102 (LG) and 4WD solenoid harness connector B152 terminal No.2 (LG).

102 (LG) - 2 (LG) : Continuity should exist.

4. Disconnect the 4WD actuator relay connector.
5. Check circuit continuity between 4WD solenoid harness connector B152 terminal No.1 (L/W) and 4WD actuator relay connector E10 terminal No.5 (L/W).

1 (L/W) - 5 (L/W) : Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace the harness.

5. CHECK 4WD ACTUATOR RELAY AND CONNECTOR

1. Check the 4WD actuator relay and control unit harness connector.
2. Check the 4WD actuator relay unit.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace 4WD actuator relay and connector.

6. CHECK 4WD ACTUATOR RELAY POWER CIRCUIT

1. Disconnect the 4WD control unit connector.
2. Turn the ignition switch ON and check voltage between the 4WD control unit harness connector E122 terminal No.18 (BR/W) and body ground.

18 (BR/W) - Body ground : Battery voltage

OK or NG

OK >> GO TO 7.

NG >> ● Check items below. Perform self-diagnosis again.
- Check fuse 10 A (#8).
- Check harness and connectors between the fuse 10 A (#8), the 4WD actuator relay and the 4WD control unit.

7. CHECK 4WD ACTUATOR RELAY GROUND CIRCUIT

1. Disconnect the 4WD actuator relay connector.
2. Check continuity between the 4WD actuator relay harness connector E10 terminal No.3 (B) and body ground.

3 (B) - Body ground :Continuity should exist.

OK or NG

OK >> 1. Connect the connector and perform self-diagnosis again.
2. Follow self-diagnosis procedure and, at the end, be sure to drive the vehicle at 30 km/h (19 MPH) for at least 1 minute and check that the 4WD warning lamp does not turn ON.

NG >> Repair or replace harness.

CAN COMMUNICATION SYSTEM

Checking procedure

1. INSPECTION START

Check the self-diagnosis results with CONSULT-II.

Status of "CAN communications" is OK?

YES >> After printing out self-diagnosis results, go to 2.

NO >> Checking is completed.

2. SYMPTOM CHECK

Check "CAN diagnosis support monitor" on data monitor.

Normal operation	Malfunctioning
CAN COMM: OK	CAN COMM: OK
CAN CIRC1: OK	CAN CIRC1: UNKWN
CAN CIRC2: OK	CAN CIRC2: OK
CAN CIRC3: OK	CAN CIRC3: OK

>> After printing out monitor items, GO TOLAN-12, "CAN SYSTEM (FOR M/T MODELS)" "CAN system". (Refer to CAN communication connection unit.)

4WD MODE SWITCH SYSTEM

1. INPUT SIGNAL CHECK

Check using the data monitor function of the CONSULT-II. While monitoring the 4WD mode switch items, press 2WD mode switch. Check the display changes from ## to 2WD. Check the display for AUTO and LOCK just the same. (## indicates when mode SW is not pressed.)

OK or NG

OK >> ● 4WD control unit input/output signal inspection.
● Recheck 4WD control unit connector terminals and connection.

NG >> GO TO 3.

2. INSPECTION OF 4WD MODE SWITCH POWER SUPPLY

- Disconnect 4WD mode switch connector.
- Turn ignition switch ON.
- Measure voltage between 4WD mode change and over switch harness connector M39 terminal No.2 (L), No.1 (BR).

2 (L), 1 (BR) - Body ground : 4V or more.

OK or NG

OK >> GO TO 4.
NG >> Harness malfunction or connector malfunction between ignition switch and 4WD mode switch connector or connector malfunction.

3. HARNESS CONTINUITY INSPECTION

- Turn ignition switch OFF.
- Confirm the continuity between the following terminals.
  - 4WD control unit harness connector E122 terminal No. 26 (L) and 4WD mode switch harness connector M39 terminal No. 2 (L).
  - 4WD control unit harness connector E122 terminal No. 27 (BR) and 4WD mode switch harness connector M39 terminal No. 1 (BR).

26 (L) - 2 (L) : Continuity should exist.
27 (BR) - 1 (BR) : Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> Malfunctioning harness or connector.

4. HARNESS CONTINUITY INSPECTION

Drive the vehicle for a while and the perform self-diagnosis.

OK or NG

OK >> End.
NG >> ● 4WD control unit input/output signal inspection.
● Recheck 4WD control unit connector terminals and connection.

Trouble Diagnoses for Symptoms

EDS000IS

4WD INDICATOR LAMP DOSE NOT COME ON FOR APPROXIMATELY 1 SECOND WHEN THE IGNITION SWITCH IS TURNED TO ON

Inspection Procedure

1. CHECK BLOWN FUSES BETWEEN IGN AND COMBINATION METER

Check that there are no blown fuses between IGN and combination meter.

OK or NG

OK >> GO TO 2.
NG >> Replace fuse and check again.

2. CHECK CONTINUITY BETWEEN COMBINATION METER AND 4WD CONTROL UNIT

1. Disconnect combination meter connector and 4WD control unit connector.
2. Check continuity between combination meter harness connector M46 terminal No.18 (LHD models: PU/W, RHD models: Y/G) and 4WD control unit harness control unit connector E122 terminal No.16 (Y/G).

18 (LHD models: PU/W, RHD models: YG) - 16 (Y/G)

: Continuity should exist.

OK or NG

OK >> GO TO 3.
NG >> Check harness between combination meter and 4WD control unit.

3. CHECK COMBINATION METER POWER CIRCUIT

1. Disconnect combination meter connector.
2. With ignition ON, check the voltage between the combination meter harness connector M44 terminal No.46 (W/L) (LHD models) or No.59 (W/L) (RHD models) and body ground.

LHD models:46 (W/L), RHD models: 59(W/L) 1(W)
- Body ground

: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> Check combination meter circuits.

4. CHECK 4WD AUTO LAMP (ON COMBINATION METER) CIRCUIT

Check continuity between combination meter terminal 46 (LHD models) or 59 (RHD models) and terminal 18.

46 (LHD models) or 59 (RHD models) - 18

: Continuity should exist.

OK or NG

OK >> Using CONSULT-II perform self-diagnosis.
NG >> Check for burned-out bulb in 4WD AUTO lamp.

4WD WARNING LAMP DOES NOT ILLUMINATE WITH IGNITION ON

1. INSPECTION OF BLOWN FUSE BETWEEN IGNITION SWITCH AND COMBINATION METER

Check blown fuse between ignition switch and combination meter.

OK or NG

OK >> GO TO 2 (No blown fuse).
NG >> Replace the fuse and perform the inspection again.

2. COMBINATION METER POWER SUPPLY CIRCUIT INSPECTION

1. Disconnect combination meter connector.
2. Check voltage between the combination meter harness connector M46 terminal No. LHD models: 46 (W/L) RHD models: 59 (W/L) and body ground.

OK or NG

OK >> Malfunctioning combination meter.
NG >> Check fuse 10A [#11] to combination meter harness and connector.

4WD WARNING LAMP DOES NOT GO OUT SEVERAL SECONDS AFTER ENGINE STARTED.(4WD MODE INDICATOR LAMP GOES OUT)

1. PERFORM SELF-DIAGNOSIS

Using CONSULT-II perform self-diagnosis.

OK or NG

OK >> No malfunction detected. Perform inspection again.
NG >>
- Determine the location of the malfunction according to the result of Self-diagnosis using CONSULT-II. (Malfunction is present in the 4WD system.)
- CONSULT-II does not display 4WD system-related trouble codes. GO TO 2.

2. 4WD CONTROL UNIT CONNECTOR CONNECTION INSPECTION

- Check 4WD control unit connector for proper connection.

OK or NG

OK >> Reconnect the 4WD control unit connector properly and perform inspection again.
NG >> Repair or replace the connector.

HEAVY TIGHT-CORNER BRAKING SYMPTOM OCCURS WHEN THE VEHICLE IS DRIVEN IN AUTO MODE AND THE STEERING WHEEL IS TURNED FULLY TO EITHER SIDE AFTER THE ENGINE IS STARTED

1. PERFORM SELF-DIAGNOSIS.

Using CONSULT-II perform self-diagnosis.

OK or NG

OK >> GO TO 2. (No self-diagnosis malfunction indicated.)
NG >> Determine the location of the malfunction according to the result of self-diagnosis using CONSULT-II. (Malfunction is present in the 4WD system.)

2. CHECK USING THE DATA MONITOR FUNCTION OF THE CONSULT- II.

- Perform inspection by the data monitor function of the CONSULT-II.
- Check that the operation is in AUTO mode.
- Measure voltage when the accelerator pedal is not depressed. (Accelerator pedal not depressed: approx. 0.5V or lower)
- Measure the current supplied to the 4WD solenoid valve. (Accelerator pedal not depressed: approx. 0A)

OK or NG

OK >> GO TO 3. (No self-diagnosis malfunction indicated.)
NG >>
- Not in AUTO mode. GO TO 3.
- Voltage when accelerator pedal is not depressed is higher than approximately 0.5V.
- 4WD solenoid valve current when the accelerator pedal is not depressed is other than 0A.
- Countermeasure: Keep the vehicle idling for approximately 15 minutes before checking again. (Voltage when accelerator pedal is not depressed will be automatically reset to zero during this period.)

3. INSPECTION USING 4WD MODE CHANGE-OVER SWITCH

- On data monitor screen of the CONSULT-II, check 4WD mode switch.
- Check if the display changes from ## to 2WD mode when the 2WD switch is pressed.
- Check if the display changes from ## to AUTO mode when the AUTO switch is pressed.
- Check if the display changes from ## to LOCK mode when the LOCK switch is pressed.

OK or NG

OK >> No malfunction detected.

NG >>
- Not in AUTO mode. (In 2WD or LOCK mode)
  Countermeasure: Slightly depress the accelerator pedal and check that the operation mode changes to LOCK mode.
- Check circuit between 4WD mode switch harness connector M39 terminal No.1 (BR) and 4WD control unit harness connector E122 terminal No. 27 (BR).
  (AUTO mode is not available because a malfunction is present in the 2WD mode harness.)

  NOTICE:
  Mechanism of 4WD mode change-over.
- 2WD mode: Operation changes to 2WD mode when 4WD control unit harness connector E122 terminal No. 27 (BR) is shorted to ground.
- AUTO mode: Operation changes to AUTO mode when 4WD control unit harness connector E122 terminals No. 27 (BR) and No. 26 (L) is shorted to ground.
- LOCK mode: Operation changes to LOCK mode when 4WD control unit harness connector E122 terminal No. 26 (L) is shorted to ground.

4WD MODES CANNOT BE SWITCHED AFTER ENGINE IS STARTED

1. INSPECTION USING 4WD MODE CHANGE-OVER SWITCH

- Drive modes cannot be switched after the engine is started.
- On data monitor screen of the CONSULT-II, check 4WD mode switch.
- Check if the display changes from ## to 2WD mode when the 2WD switch is pressed.
- Check if the display changes from ## to AUTO mode when the AUTO switch is pressed.
- Check if the display changes from ## to LOCK mode when the LOCK switch is pressed.

OK or NG

OK >> No malfunction detected.

NG >>
- CONSULT-II display does not change from ## when the 2WD switch is pressed. Check harness of the 2WD switch.
- CONSULT-II display does not change from ## when the AUTO switch is pressed. Check harness of the 2WD switch and LOCK switch.
- CONSULT-II display does not change from ## when the LOCK switch is pressed. Check harness of the LOCK switch.
- Perform 4WD mode change-over switch inspection.

WHILE DRIVING, 4WD WARNING LAMP FLASHES RAPIDLY. (WHEN IT FLASHERS FOR APPROX. ONE MINUTE, THEN DOES NOT ILLUMINATE.)

- While driving, 4WD warning lamp flashes rapidly. (when it flashes for approx. one minute, then does not illuminate.)
  Rapid flashing: 2 times/second
  This phenomenon protects drivetrain parts when a heavy load is applied to the electronically controlled coupling and multiple disc clutch temperature increases. It is not a malfunction.
  When the difference of diameters by or with the front and rear wheel with AUTO mode the shift switch occasionally changes to LOCK mode automatically. This is not a malfunction.
  When the difference of revolution speed between the front and rear wheel with AUTO mode, the shift switch occasionally changes to LOCK mode automatically. This is not a malfunction.

WHILE DRIVING, 4WD WARNING LAMP FLASHES SLOWLY. (WHEN IT CONTINUES TO ILLUMINATE UNTIL ENGINE TURNS OFF.)

1. Check using the data monitor function of the CONSULT-II.

- Perform inspection with the data monitor function of the CONSULT-II.
- Check if the value of IMPROPER SIZE TIRE MONITOR is 8 mm (0.31 in) or more.
- Stop the engine. Restart the engine and drive the vehicle at 20 km/h (12 MPH) or faster for approximately 200 seconds. Confirm the 4WD warning lamp flashes slowly.
  (Check if the value of IMPROPER SIZE TIRE MONITOR is 8 mm (0.31 in) or more.)
  When the tire size is normal, the value of IMPROPER SIZE TIRE MONITOR will change from 8 mm (0.31 in) or more to 0 to 4 mm (0 to 0.16 in) (normal condition) after the vehicle is driven 20 km/h (12 MPH) or faster for approximately 5 seconds.

2. Tire inspection
   - Inspection of tire pressure.
   - Wear condition.
   - Check size of the front and rear tires. (No excessive difference should be observed.)

VEHICLE DOES NOT ENTER 4WD MODE EVEN THOUGH 4WD WARNING LAMP IS OFF.

1. Check using the data monitor function of the CONSULT-II.
   Perform inspection by the data monitor function of the CONSULT-II.

– Check if the vehicle operation changes to 2WD, AUTO, and LOCK modes.

– Check current supplied to the 4WD solenoid valve in AUTO mode.

Accelerator pedal not depressed:	**Approx. 0A**
Accelerator pedal depressed:	**Approx. 2.8A**

2. Check using the active test function of the CONSULT-II.
   Using active test mode of CONSULT-II, supply current to the 4WD solenoid valve and check that the monitor current becomes close to this supply current.

Example) Monitor value becomes approx. 1A for 4WD solenoid current 1A setting.

- The 4WDcontrol unit is normal when the difference between 4WD solenoid valve current and the monitor current is within ±10%.
  It is necessary to inspect the electronically controlled coupling assembly.

TIGHT-CONER BRAKING SYMPTOM OCCURS WHEN THE VEHICLE IS STARTED IN AUTO WARNING LAMP REMAIN OFF).

1. THROTTLE POSITION SENSOR AND HARNESS INSPECTION

Check accelerator pedal stroke.

OK or NG

OK >> Perform self-diagnosis again.
NG >> Malfunctioning throttle position sensor harness.

4WD ACTUATOR RELAY (4WD SOLENOID ACTUATOR RELAY) TURNS ON/OFF FREQUENTLY

1. SELF-DIAGNOSIS RESULT IS 4WD ACTUATOR RELAY (4WD SOLENOID ACTUATOR RELAY) ON ERROR AND OFF ERROR.

Is self-diagnosis result [ON error and OFF error]?

OK or NG

OK >> GO TO 2.
NG >> Repair or replace as necessary.

2. 4WD ACTUATOR RELAY (4WD SOLENOID ACTUATOR RELAY) AND HARNESS INSPECTION

Is self-diagnosis result [ON error and OFF error]?

OK or NG

OK >> Perform self-diagnosis again.
NG >> Malfunctioning 4WD actuator relay (4WD solenoid actuator relay) harness.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

EDS000I6

Applied model		QR20DE	YD22ET
Transfer model		TY20A	
Oil capacity (Approx) ℓ (Imp p t)		0.310(1/2)	
Gear ratio		2.470	
Number of teeth	Drive pinion	17	
	Drive gear	42	

Inspection and Adjustment

EDS0004Y

PRELOAD TORQUE BEFORE DISASSEMBLY

Item		Specification [N·m (kg-m, in-lb)]
Pinion bearing (P_1)		0.10 - 0.39 (0.01 - 0.04, 1 - 3)
Gear ring bearing to pinion bearing (Overall preload)	When all oil seals are installed:	P_1 +0.16 - 0.22 (0.016 - 0.023, 1.4 - 1.9)
	Without transfer case oil seal and gear ring oil seal	P_1 +0.06 - 0.12 (0.006 - 0.013, 0.6 - 1.1)

PRELOAD TORQUE AFTER DISASSEMBLY AND REASSEMBLY

Item		Specification [N·m (kg-m, in-lb)]
Pinion bearing (P'_1)		0.40 - 0.78 (0.04 - 0.08, 4 - 6)
Gear ring bearing to pinion bearing (Overall preload)	When all oil seals are installed:	P'_1 +0.45 - 0.47 (0.045 - 0.048, 3.9 - 4.1)
	Without transfer case oil seal and gear ring oil seal	P'_1 +0.35 - 0.37 (0.035 - 0.038, 1 - 3)

BACKLSH

Unit: mm (in)

Item	Standard
Drive gear to drive pinion gear	0.13 - 0.19 (0.0051 - 0.0075 in)

COMPANION FLANGE RUNOUT

Unit: mm (in)

Runout limit	0.08 (0.0031)

SELECTIVE PARTS

Gear ring bearing adjusting shim

Unit: mm (in)

Selection parts	Transfer case side				
Thickness	Part No.	Thickness	Part No.	Thickness	Part No.
0.80 (0.0315)	33147 AD300	1.22 (0.0480)	33147 AD314	1.64 (0.0646)	33147 AD363
0.83 (0.0327)	33147 AD301	1.25 (0.0492)	33147 AD315	1.67 (0.0657)	33147 AD364
0.86 (0.0339)	33147 AD302	1.28 (0.0504)	33147 AD316	1.70 (0.0669)	33147 AD365
0.89 (0.0350)	33147 AD303	1.31 (0.0516)	33147 AD317	1.73 (0.0681)	33147 AD366
0.92 (0.0362)	33147 AD304	1.34 (0.0528)	33147 AD318	1.76 (0.0693)	33147 AD367
0.95 (0.0374)	33147 AD305	1.37 (0.0539)	33147 AD319	1.79 (0.0705)	33147 AD368
0.98 (0.0386)	33147 AD306	1.40 (0.0551)	33147 AD320	1.82 (0.0717)	33147 AD369
1.01 (0.0398)	33147 AD307	1.43 (0.0563)	33147 AD321	1.85 (0.0728)	33147 AD370
1.04 (0.0409)	33147 AD308	1.46 (0.0575)	33147 AD322	1.88 (0.0740)	33147 AD371
1.07 (0.0421)	33147 AD309	1.49 (0.0587)	33147 AD323	1.91 (0.0752)	33147 AD372
1.10 (0.0433)	33147 AD310	1.52 (0.0598)	33147 AD324	1.94 (0.0764)	33147 AD373
1.13 (0.0445)	33147 AD311	1.55 (0.0610)	33147 AD360	1.97 (0.0776)	33147 AD374
1.16 (0.0457)	33147 AD312	1.58 (0.0622)	33147 AD361	2.00 (0.0787)	33147 AD375
1.19 (0.0469)	33147 AD313	1.61 (0.0634)	33147 AD362	2.03 (0.0799)	33147 AD376

Unit: mm (in)

Selection parts		Adapter case side			
Thickness	Part No.	Thickness	Part No.	Thickness	Part No.
0.80 (0.0315)	33147 5V200	1.25 (0.0492)	33147 5V215	1.70 (0.0669)	33123 5V265
0.83 (0.0327)	33147 5V201	1.28 (0.0504)	33147 5V216	1.73 (0.0681)	33123 5V266
0.86 (0.0339)	33147 5V202	1.31 (0.0516)	33147 5V217	1.76 (0.0693)	33123 5V267
0.89 (0.0350)	33147 5V203	1.34 (0.0528)	33123 5V218	1.79 (0.0705)	33123 5V268
0.92 (0.0362)	33147 5V204	1.37 (0.0539)	33123 5V219	1.82 (0.0717)	33123 5V269
0.95 (0.0374)	33147 5V205	1.40 (0.0551)	33123 5V220	1.85 (0.0728)	33123 5V270
0.98 (0.0386)	33147 5V206	1.43 (0.0563)	33123 5V221	1.88 (0.0740)	33123 5V271
1.01 (0.0398)	33147 5V207	1.46 (0.0575)	33123 5V222	1.91 (0.0752)	33123 5V272
1.04 (0.0409)	33147 5V208	1.49 (0.0587)	33123 5V223	1.94 (0.0764)	33123 5V273
1.07 (0.0421)	33147 5V209	1.52 (0.0598)	33123 5V224	1.97 (0.0776)	33123 5V274
1.10 (0.0433)	33147 5V210	1.55 (0.0610)	33123 5V260	2.00 (0.0787)	33123 5V275
1.13 (0.0445)	33147 5V211	1.58 (0.0622)	33123 5V261	2.03 (0.0799)	33123 5V276
1.16 (0.0457)	33147 5V212	1.61 (0.0634)	33123 5V262	2.06 (0.0811)	33123 5V277
1.19 (0.0469)	33147 5V213	1.64 (0.0646)	33123 5V263	2.09 (0.0811)	33123 5V278
1.22 (0.0480)	33147 5V214	1.67 (0.0657)	33123 5V264		

PINION SLEEVE SHIM

Unit: mm (in)

Thickness	Part No.	Thickness	Part No.	Thickness	Part No.
0.77 (0.0303)	33155 5V214	0.98 (0.0386)	33155 5V206	1.19 (0.0469)	33155 5V213
0.80 (0.0315)	33155 5V200	1.01 (0.0398)	33155 5V207	1.22 (0.0480)	33155 5V215
0.83 (0.0327)	33155 5V201	1.04 (0.0409)	33155 5V208	1.25 (0.0492)	33155 5V216
0.86 (0.0339)	33155 5V202	1.07 (0.0421)	33155 5V209	1.28 (0.0504)	33155 5V217
0.89 (0.0350)	33155 5V203	1.10 (0.0433)	33155 5V210	1.31 (0.0516)	33155 5V218
0.92 (0.0362)	33155 5V204	1.13 (0.0445)	33155 5V211	1.34 (0.0528)	33155 5V219
0.95 (0.0374)	33155 5V205	1.16 (0.0457)	33155 5V212		