SECTION TM
TRANSAXLE & TRANSMISSION

CONTENTS

5AT: RE5R05A

PRECAUTION

PRECAUTIONS

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

INFOID:0000000006750099

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

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

WARNING:

- **When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precautions for On Board Diagnosis (OBD) System of A/T and Engine

INFOID:0000000006750100

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

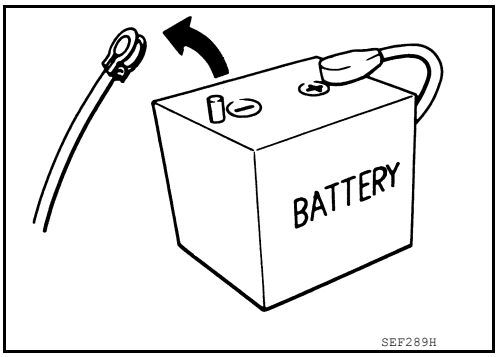
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery cable from the negative terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to an open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Be sure to route and secure the harnesses properly after work. Interference of the harness with a bracket, etc. may cause the MIL to light up due to a short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to a malfunction of the EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the TCM and ECM before returning the vehicle to the customer.**

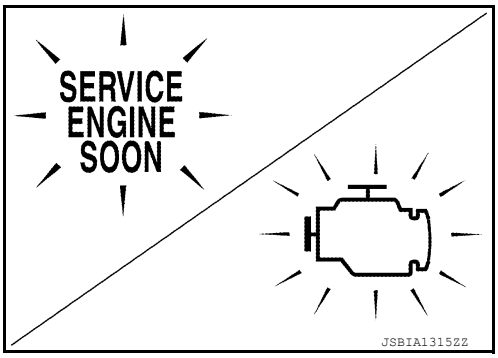
General Precautions

INFOID:0000000006750101

- **Before connecting or disconnecting the A/T assembly harness connector, turn ignition switch “OFF” and disconnect negative battery cable. Because battery voltage is applied to TCM even if ignition switch is turned “OFF”.**



- **After performing each TROUBLE DIAGNOSIS, perform “DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE”.**
  If the repair is completed the DTC should not be displayed in the “DTC CONFIRMATION PROCEDURE”.



- Always use the specified brand of ATF. Refer to MA-13, "Fluids and Lubricants".
- Use paper rags not cloth rags during work.
- After replacing the ATF, dispose of the waste oil using the methods prescribed by law, ordinance, etc.
- Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transmission.
- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transmission is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place disassembled valve body parts in order for easier and proper assembly. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along bores in valve body under their own weight.
- Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, or hold bearings and washers in place during assembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Clean or replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to TM-70, "A/T Fluid Cooler Cleaning".
- After overhaul, refill the transmission with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.
  Always follow the procedures under “Changing A/T Fluid” in the TM section when changing A/T fluid. Refer to TM-68, "Changing A/T Fluid".

Service Notice or Precautions

INFOID:0000000006750102

ATF COOLER SERVICE

If A/T fluid contains frictional material (clutches, bands, etc.), or if an A/T is repaired, overhauled, or replaced, inspect and clean the A/T fluid cooler mounted in the radiator or replace the radiator. Flush cooler lines using

cleaning solvent and compressed air after repair. For A/T fluid cooler cleaning procedure, refer to TM-70, "A/T Fluid Cooler Cleaning". For radiator replacement, refer to CO-49, "Removal and Installation".

CHECKING AND CHANGING A/T FLUID SERVICE

Increase ATF temperature by 80°C (176°F) once, and then check ATF level in 65°C (149°F) when adjusting ATF level.

NOTE:

JA60 uses both systems of a water-cooling and of an air-cooling. Air-cooling system has a by-pass valve. When ATF temperature is not over 50°C (122°F) with water-cooling system OFF, it does not flow to air-cooling system. If ATF level is set without the flow of ATF, the level will be 10mm lower than the standard. Therefore, piping should be filled with ATF when adjusting level.

OBD-II SELF-DIAGNOSIS

- A/T self-diagnosis is performed by the TCM in combination with the ECM. Refer to the table on TM-39, "CONSULT Function" for the indicator used to display each self-diagnostic result.
- The self-diagnostic results indicated by the MIL are automatically stored in both the ECM and TCM memories.
  Always perform the procedure on TM-37, "OBD-II Diagnostic Trouble Code (DTC)" to complete the repair and avoid unnecessary blinking of the MIL.

For details of OBD-II, refer to TM-37, "OBD-II Function for A/T System".

- **Certain systems and components, especially those related to OBD, may use the new style slide-locking type harness connector. For description and how to disconnect, refer to PG-80, "Description".**

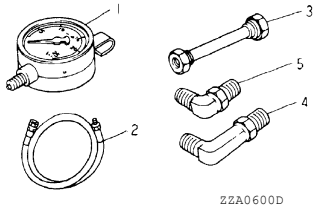
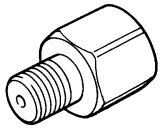
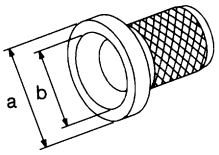
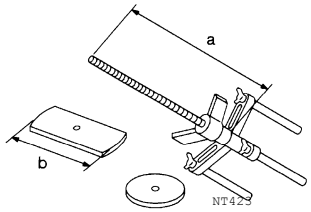
PREPARATION

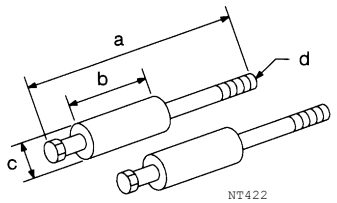
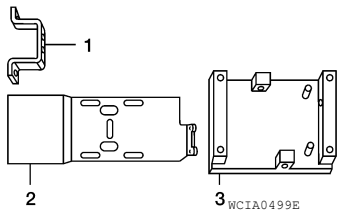
PREPARATION

Special Service Tool

INFOID:0000000006750103

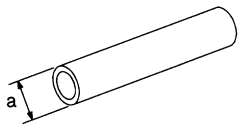
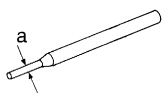
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST2505S001 (J-34301-C) Oil pressure gauge set 1. ST25051001 (—) Oil pressure gauge 2. ST25052000 (—) Hose 3. ST25053000 (—) Joint pipe 4. ST25054000 (—) Adapter 5. ST25055000 (—) Adapter  ZZA0600D	Measuring line pressure
KV31103600 (J-45674) Joint pipe adapter (With ST25054000)  ZZA1227D	Measuring line pressure
ST33400001 (J-26082) Drift a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.  NT086	• Installing rear oil seal • Installing oil pump housing oil seal
KV31102400 (J-34285 and J-34285-87) Clutch spring compressor a: 320 mm (12.60 in) b: 174 mm (6.85 in)  NT423	Installing reverse brake return spring retainer

Tool number (Kent-Moore No.) Tool name	Description
ST25850000 (J-25721-A) Sliding hammer a: 179 mm (7.05 in) b: 70 mm (2.76 in) c: 40 mm (1.57 in) d: M12×1.75P  NT422	Remove oil pump assembly
— (J-47002) Transmission jack adapter kit 1. — (J-47002-2) Center bracket 2. — (J-47002-3) Adapter plate 3. — (J-47002-4) Adapter block  WCIA0499E	Assist in removal of transmission and transfer case as one assembly using only one transmission jack.

Commercial Service Tool

INFOID:0000000006750104

Tool name	Description
Power tool  PIIB1407E	Loosening nuts, screws and bolts
Drift a: 22 mm (0.87 in) dia.  NT083	Installing manual shaft seals
Pin punch a: 4 mm (0.16 in) dia.  NT410	Remove retaining pin

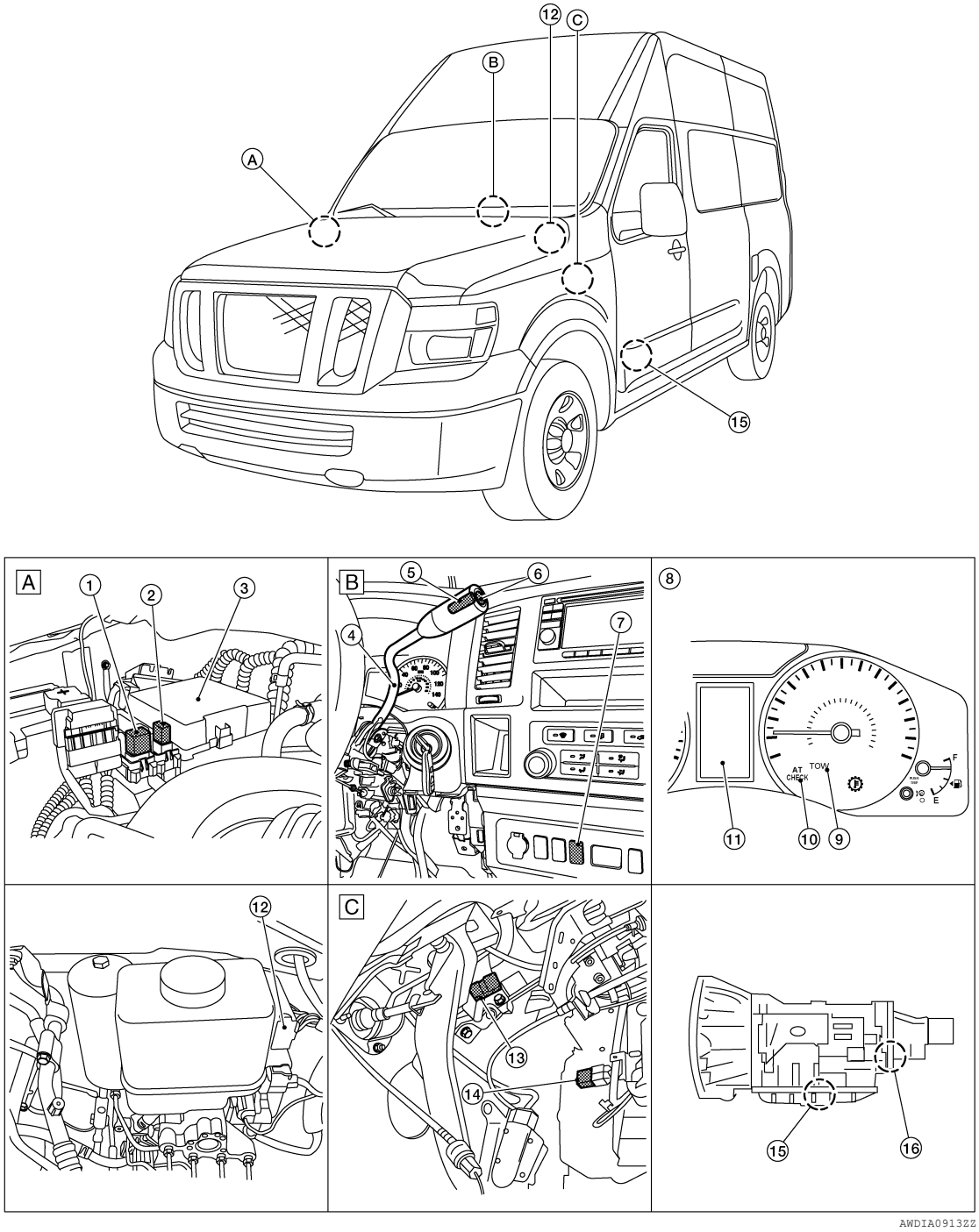
SYSTEM DESCRIPTION

COMPONENT PARTS

A/T CONTROL SYSTEM

A/T CONTROL SYSTEM : Component Parts Location

INFOID:0000000006749906



1. Back-up lamp relay
2. Stop lamp relay
3. IPDM E/R
4. A/T shift selector
5. Manual position select switch
6. Maunal mode switch
7. Tow mode switch
8. Combination meter
9. Tow mode indicator lamp

10. A/T CHECK indicator lamp
11. Shift position indicator
12. ABS actuator and electric unit (control unit)
13. Stop lamp switch
14. TCM (transmission control module) relay
15. A/T assembly (control valve and TCM)*1
16. Output speed sensor

*1: The following components are included in the control valve and TCM.

- TCM (transmission control module)
- Input speed sensor 1
- Input speed sensor 2
- Low coast brake solenoid valve
- Front brake solenoid valve
- High and low reverse clutch solenoid valve
- Input clutch solenoid valve
- Direct clutch solenoid valve
- Line pressure solenoid valve
- Torque converter clutch solenoid valve
- Pressure switch 2 (LC/B)

A/T CONTROL SYSTEM : Component Description

INFOID:0000000006822182

Name	Function
TCM	TM-12, "A/T CONTROL SYSTEM : TCM"
Transmission range switch	TM-12, "A/T CONTROL SYSTEM : Transmission Range Switch"
Output speed sensor	TM-12, "A/T CONTROL SYSTEM : Output Speed Sensor"
Input speed sensor 1	TM-12, "A/T CONTROL SYSTEM : Input Speed Seneor"
Input speed sensor 2	
A/T fluid temperature sensor	TM-12, "A/T CONTROL SYSTEM : A/T Fluid Temperature Sensor"
Input clutch solenoid valve	TM-13, "A/T CONTROL SYSTEM : Input Clutch Solenoid Valve"
Front brake solenoid valve	TM-13, "A/T CONTROL SYSTEM : Front Brake Solenoid Valve"
Direct clutch solenoid valve	TM-13, "A/T CONTROL SYSTEM : Direct Clutch Solenoid Valve"
High and low reverse clutch solenoid valve	TM-13, "A/T CONTROL SYSTEM : High and Low Reverse Clutch Solenoid Valve"
Low coast brake solenoid valve	TM-13, "A/T CONTROL SYSTEM : Low Coast Brake Solenoid Valve"
ATF pressure switch 2 (LC/B)	Detects any malfunction in the low coast brake hydraulic pressure. When it detects any malfunction, it puts the system into fail-safe mode.
Torque converter regulator valve	In order to prevent the pressure supplied to the torque converter from being excessive, the line pressure is adjusted to the optimum pressure (torque converter operating pressure).
Pressure regulator valve Pressure regulator plug Pressure regulator sleeve	Adjusts the oil discharged from the oil pump to the optimum pressure (line pressure) for the driving state.
Front brake control valve	When the front brake is coupled, adjusts the line pressure to the optimum pressure (front brake pressure) and supplies it to the front brake. (In 1GR, 2GR, 3GR, and 5GR, adjusts the clutch pressure.)
Accumulator control valve	Adjusts the pressure (accumulator control pressure) acting on the accumulator piston and low coast reducing valve to the pressure appropriate to the driving state.
Pilot valve A	Adjusts the line pressure and produces the constant pressure (pilot pressure) required for line pressure control, shift change control, and lock-up control.
Pilot valve B	Adjusts the line pressure and produces the constant pressure (pilot pressure) required for shift change control.
Low coast brake switching valve	During engine braking, supplies the line pressure to the low coast brake reducing valve.
Low coast brake reducing valve	When the low coast brake is coupled, adjusts the line pressure to the optimum pressure (low coast brake pressure) and supplies it to the low coast brake.

Name	Function
N-R accumulator	Produces the stabilizing pressure for when N-R is selected.
Direct clutch piston switching valve	Operates in 4GR and switches the direct clutch coupling capacity.
High and low reverse clutch control valve	When the high and low reverse clutch is coupled, adjusts the line pressure to the optimum pressure (high and low reverse clutch pressure) and supplies it to the high and low reverse clutch. (In 1GR, 3GR, 4GR and 5GR, adjusts the clutch pressure.)
Input clutch control valve	When the input clutch is coupled, adjusts the line pressure to the optimum pressure (input clutch pressure) and supplies it to the input clutch. (In 4GR and 5GR, adjusts the clutch pressure.)
Direct clutch control valve	When the direct clutch is coupled, adjusts the line pressure to the optimum pressure (direct clutch pressure) and supplies it to the direct clutch. (In 2GR, 3GR, and 4GR, adjusts the clutch pressure.)
TCC control valve TCC control plug TCC control sleeve	Switches the lock-up to operating or released. Also, by performing the lock-up operation transiently, lock-up smoothly.
Torque converter lubrication valve	Operates during lock-up to switch the torque converter, cooling, and lubrication system oil passage.
Cool by-pass valve	Allows excess oil to bypass cooler circuit without being fed into it.
Line pressure relief valve	Discharges excess oil from line pressure circuit.
N-D accumulator	Produces the stabilizing pressure for when N-D is selected.
Manual valve	Transmits line pressure to each circuit according to the select position. The circuits to which the line pressure is not transmitted drain.
Accelerator pedal position sensor	EC-25, "Accelerator Pedal Position Sensor" (VQ40DE), EC-463, "Accelerator Pedal Position Sensor" (VK56DE)
Throttle position sensor	EC-33, "Throttle Position Sensor" (VQ40DE), EC-463, "Electric Throttle Control Actuator" (VK56DE)
Manual mode switch	TM-13, "A/T CONTROL SYSTEM : Manual Mode Switch"
Starter relay	TM-83, "Description"
ECM	EC-28, "ECM" (VQ40DE), EC-462, "ECM" (VK56DE)
BCM	BCS-6, "BODY CONTROL SYSTEM : System Description"
Combination meter	MWI-7, "METER SYSTEM : Component Description"
ABS actuator and electric unit (control unit)	BRC-9, "ABS Actuator and Electric Unit (Control Unit)"

A/T CONTROL SYSTEM : TCM

INFOID:0000000006822183

The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The TCM controls the A/T.

A/T CONTROL SYSTEM : Transmission Range Switch

INFOID:0000000006822184

The transmission range switch detects the selector lever position and transmits a signal to the TCM.

A/T CONTROL SYSTEM : Input Speed Seneor

INFOID:0000000006822185

The input speed sensor detects input shaft rpm (revolutions per minute). It is located on the input side of the A/T. Monitors revolution of sensor 1 and sensor 2 for non-standard conditions.

A/T CONTROL SYSTEM : Output Speed Sensor

INFOID:0000000006822186

The output speed sensor detects the revolution of the parking gear and emits a pulse signal. The pulse signal is transmitted to the TCM which converts it into vehicle speed.

A/T CONTROL SYSTEM : A/T Fluid Temperature Sensor

INFOID:0000000006822187

The A/T fluid temperature sensor detects the A/T fluid temperature and transmits a signal to the TCM.

A/T CONTROL SYSTEM : Input Clutch Solenoid Valve

INFOID:0000000006822188

- The Input clutch solenoid valve is controlled by the TCM in response to signals transmitted from the transmission range switch, output speed speed sensor and accelerator pedal position sensor (throttle position sensor). Gears will then be shifted to the optimum position.
- The Input clutch solenoid valve controls the input clutch control valve in response to a signal transmitted from the TCM.

A/T CONTROL SYSTEM : Front Brake Solenoid Valve

INFOID:0000000006822189

- The front brake solenoid valve is controlled by the TCM in response to signals transmitted from the transmission range switch, output speed speed sensor and accelerator pedal position sensor (throttle position sensor). Gears will then be shifted to the optimum position.
- The front brake solenoid valve controls the front brake control valve in response to a signal transmitted from the TCM.

A/T CONTROL SYSTEM : Direct Clutch Solenoid Valve

INFOID:0000000006822190

- The direct clutch solenoid valve is controlled by the TCM in response to signals transmitted from the transmission range switch, output speed sensor and accelerator pedal position sensor (throttle position sensor). Gears will then be shifted to the optimum position.
- The direct clutch solenoid valve controls the direct clutch control valve in response to a signal transmitted from the TCM.

A/T CONTROL SYSTEM : High and Low Reverse Clutch Solenoid Valve

INFOID:0000000006822191

- The high and low reverse clutch solenoid valve is controlled by the TCM in response to signals transmitted from the PNP switch, vehicle speed sensor and accelerator pedal position sensor (throttle position sensor). Gears will then be shifted to the optimum position.
- The high and low reverse clutch solenoid valve controls the high and low reverse clutch control valve in response to a signal transmitted from the TCM.

A/T CONTROL SYSTEM : Low Coast Brake Solenoid Valve

INFOID:0000000006822192

- The low coast brake solenoid valve is turned ON or OFF by the TCM in response to signals transmitted from the transmission range switch, output speed sensor and accelerator pedal position sensor (throttle position sensor). Gears will then be shifted to the optimum position.
- The low coast brake solenoid valve controls the low coast brake switching valve in response to a signal transmitted from the TCM.

A/T CONTROL SYSTEM : Torque Converter Clutch Solenoid Valve

INFOID:0000000006822193

- The torque converter clutch solenoid valve is activated, with the gear in D_3, D_4, D_5, M4 and M5 by the TCM in response to signals transmitted from the output speed sensor and accelerator pedal position sensor (throttle position sensor). Torque converter clutch piston operation will then be controlled.
- Lock-up operation, however, is prohibited when A/T fluid temperature is too low.
- When the accelerator pedal is depressed (less than 1.0/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up.

A/T CONTROL SYSTEM : Line Pressure Solenoid Valve

INFOID:0000000006822194

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal transmitted from the TCM.

A/T CONTROL SYSTEM : Manual Mode Switch

INFOID:0000000006822196

- The manual mode switch and manual position select switch are installed in the A/T shift selector assembly.
- The manual mode switch transmits a manual mode signal or a not manual mode signal to the combination meter. Then, the TCM receives a manual mode signal or non-manual mode signal from the combination meter.
- The position select switch transmits manual mode shift up signal or manual mode shift down signal to the combination meter. Then, the TCM receives a manual mode shift up signal or manual mode shift down signal from the combination meter.

A/T CONTROL SYSTEM : Tow Mode Switch

INFOID:0000000007151220

- Tow mode switch is installed to cluster lid C.BRC-8, "Component Parts Location"
- When tow mode switch is pressed while tow mode indicator lamp on combination meter is OFF, the tow mode turns ON and tow mode indicator lamp turns ON.
- When tow mode switch is pressed while tow mode indicator lamp on combination meter is ON, the tow mode turns OFF and tow mode indicator lamp turns OFF.

A/T CONTROL SYSTEM : Tow Mode Indicator Lamp

INFOID:0000000007151221

- Tow mode indicator lamp is positioned on the combination meter.
- Tow mode indicator lamp is ON when set to the tow mode.

Condition (status)	Tow mode indicator lamp
Ignition switch OFF.	OFF
When ignition switch turns ON.	OFF
Press tow mode switch while tow mode indicator lamp is OFF.	ON
Press tow mode switch while tow mode indicator lamp is ON.	OFF

A/T CONTROL SYSTEM : A/T CHECK Indicator Lamp

INFOID:0000000007151222

- A/T CHECK indicator lamp is positioned on the combination meter.
- A/T CHECK indicator lamp turns on for a certain period of time when the ignition switch turns ON, and then turns OFF.

Condition (status)	A/T CHECK indicator lamp
Ignition switch OFF.	OFF
Ignition switch ON (approx. 2 seconds).	ON

A/T CONTROL SYSTEM : Shift Position Indicator

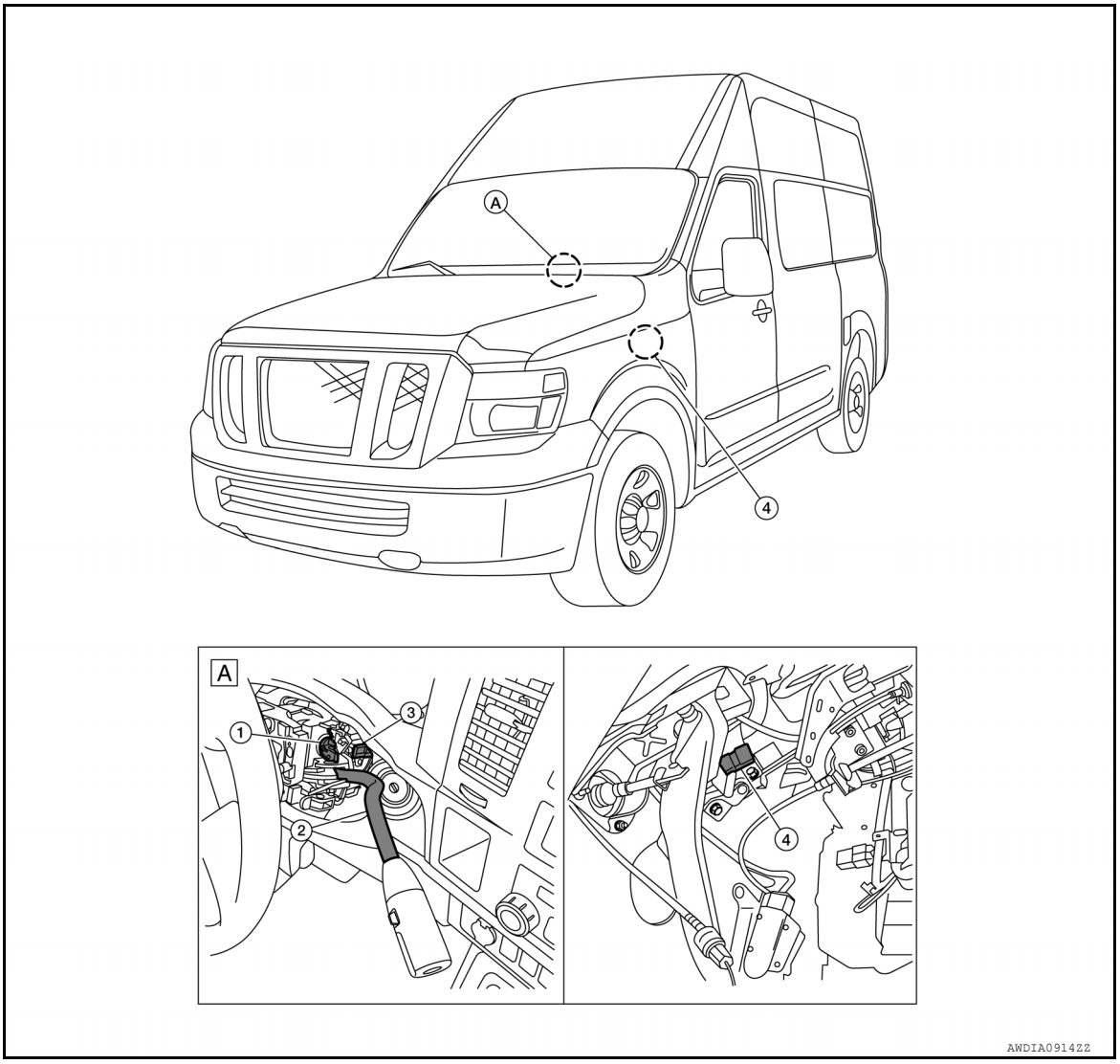
INFOID:0000000007151224

TCM transmits shift position signal to combination meter via CAN communication. The actual shift position is displayed to on combination meter according to the signal.

A/T SHIFT LOCK SYSTEM

A/T SHIFT LOCK SYSTEM : Component Parts Location

INFOID:0000000006822236



1. Park position switch
2. A/T shift selector
3. Shift lock solenoid
4. Stop lamp switch

A/T SHIFT LOCK SYSTEM : Component Description

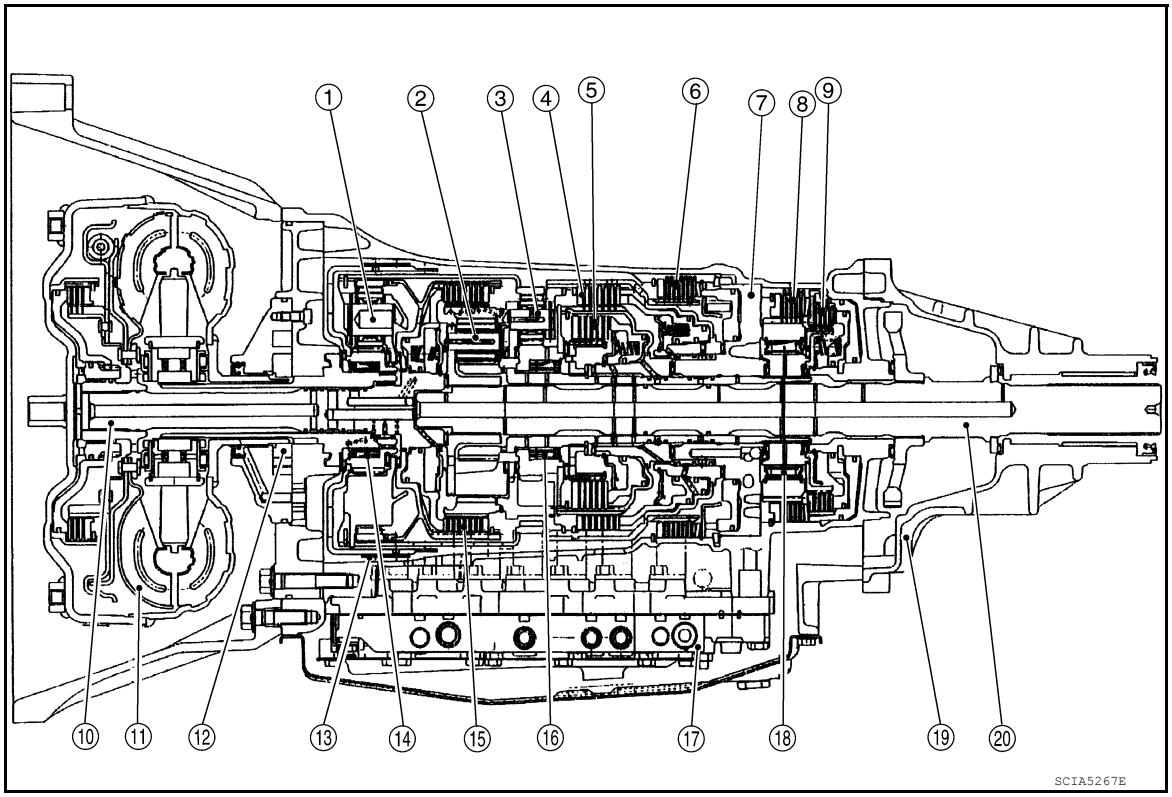
INFOID:0000000006822237

Component	Function
Shift lock solenoid	It operates according to the signal from the stop lamp switch and moves the lock lever.
Lock lever	It moves according to the operation of the shift lock solenoid and performs the release of the shift lock.
Detent rod	It links with the selector button and restricts the selector lever movement.
Park position switch	It detects that the selector lever is in “P” position.
Shift lock release button	Manually releases the lock lever.

STRUCTURE AND OPERATION
TRANSMISSION

TRANSMISSION : Cross-Sectional View

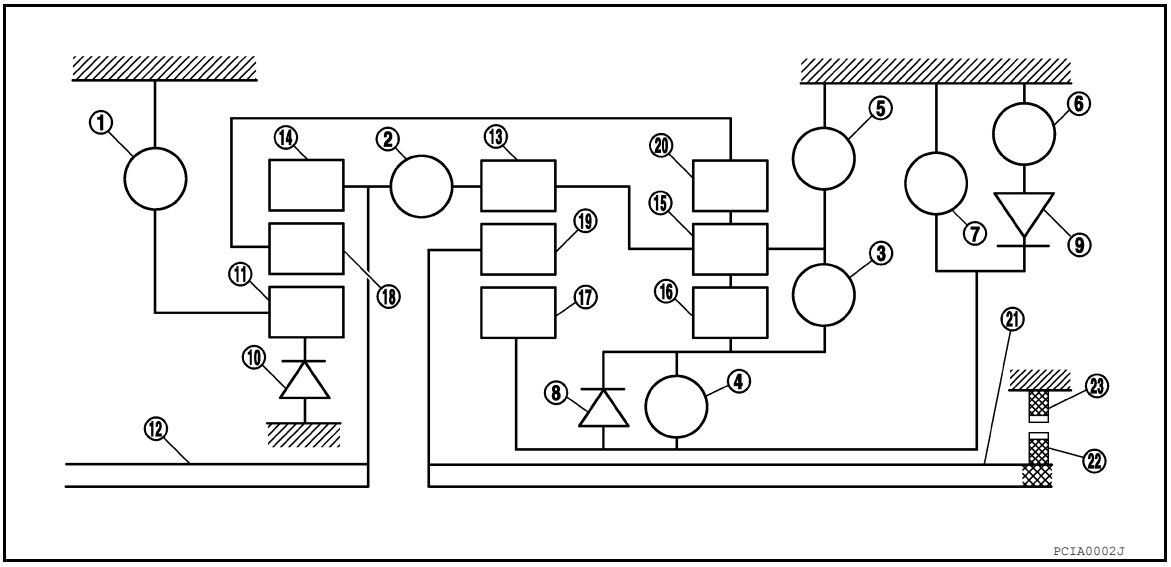
INFOID:0000000006749895



1. Front planetary gear
2. Mid planetary gear
3. Rear planetary gear
4. Direct clutch
5. High & low reverse clutch
6. Reverse brake
7. Drum support
8. Forward brake
9. Low coast brake
10. Input shaft
11. Torque converter
12. Oil pump
13. Front brake
14. 3rd one-way clutch
15. Input clutch
16. 1st one-way clutch
17. Control valve with TCM
18. Forward one-way clutch
19. Rear extension
20. Output shaft

TRANSMISSION : System Diagram

INFOID:0000000006822239



1. Front brake
2. Input clutch
3. Direct clutch
4. High and low reverse clutch
5. Reverse brake
6. Forward brake
7. Low coast brake
8. 1st one-way clutch
9. Forward one-way clutch
10. 3rd one-way clutch
11. Front sun gear
12. Input shaft
13. Mid internal gear
14. Front internal gear
15. Rear carrier
16. Rear sun gear
17. Mid sun gear
18. Front carrier
19. Mid carrier
20. Rear internal gear
21. Output shaft
22. Parking gear
23. Parking pawl

TRANSMISSION : System Description

INFOID:0000000006822240

DESCRIPTION

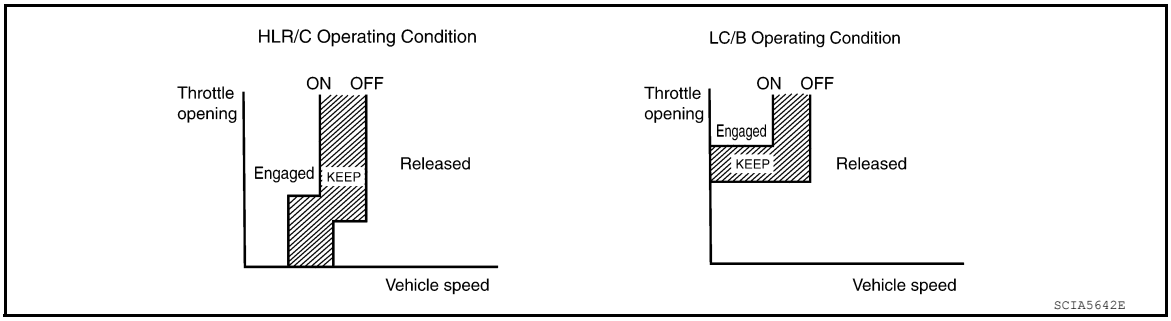
With the use of 3 sets of planetary gears, A/T enables 5-speed transmission for forward and 1-speed transmission for backward, depending on the combination of 3 sets of multiple-disc clutches, 3 sets of multiple-disc brakes, a brake band, and 3 sets of one-way clutches.

CLUTCH AND BAND CHART

Shift position		I/C	HLR/C	D/C	R/B	FR/B	LC/B	Fwd/B	1st OWC	Fwd OWC	3rd OWC	Remarks
P			△			△						PARK POSITION
R			○		○	○			☆		☆	REVERSE POSITION
N			△			△						NEUTRAL POSITION
D	1st		△✻			△	△✻✻	○	☆	☆	☆	Automatic shift 1⇔2⇔3⇔4⇔5
	2nd			○		△		○		☆	☆	
	3rd		○	○		○		△	★		☆	
	4th	○	○	○				△	★			
	5th	○	○			○		△	★		★	

Shift position		I/C	HLR/C	D/C	R/B	FR/B	LC/B	Fwd/B	1st OWC	Fwd OWC	3rd OWC	Remarks
M5	1st		△✻			△	△✻✻	○	☆	☆	☆	Automatic shift 1⇔2⇔3⇔4⇔5
	2nd			○		△		○		☆	☆	
	3rd		○	○		○		△	★		☆	
	4th	○	○	○				△	★			
	5th	○	○			○		△	★		★	
M4	1st		△✻			△	△✻✻	○	☆	☆	☆	Automatic shift 1⇔2⇔3⇔4
	2nd			○		△		○		☆	☆	
	3rd		○	○		○		△	★		☆	
	4th	○	○	○				△	★			
M3	1st		△✻			△	△✻✻	○	☆	☆	☆	Automatic shift 1⇔2⇔3
	2nd			○		△		○		☆	☆	
	3rd		○	○		○		△	★		☆	
M2	1st		△✻			△	△✻✻	○	☆	☆	☆	Automatic shift 1⇔2
	2nd			○		○	○	○		☆	☆	
M1	1st		○			○	○	○	☆	☆	☆	Locks (held stationary in 1GR)
	2nd			○		○	○	○		☆	☆	

- ○—Operates
- ☆—Operates during “progressive” acceleration.
- ★—Operates and effects power transmission while coasting.
- △—Line pressure is applied but does not affect power transmission.
- △✻—Operates under conditions shown in HLR/C Operating Condition
- △✻✻—Operates under conditions shown in LC/B Operating Condition. Delay control is applied during D (4,3,2,1) ⇒N shift.



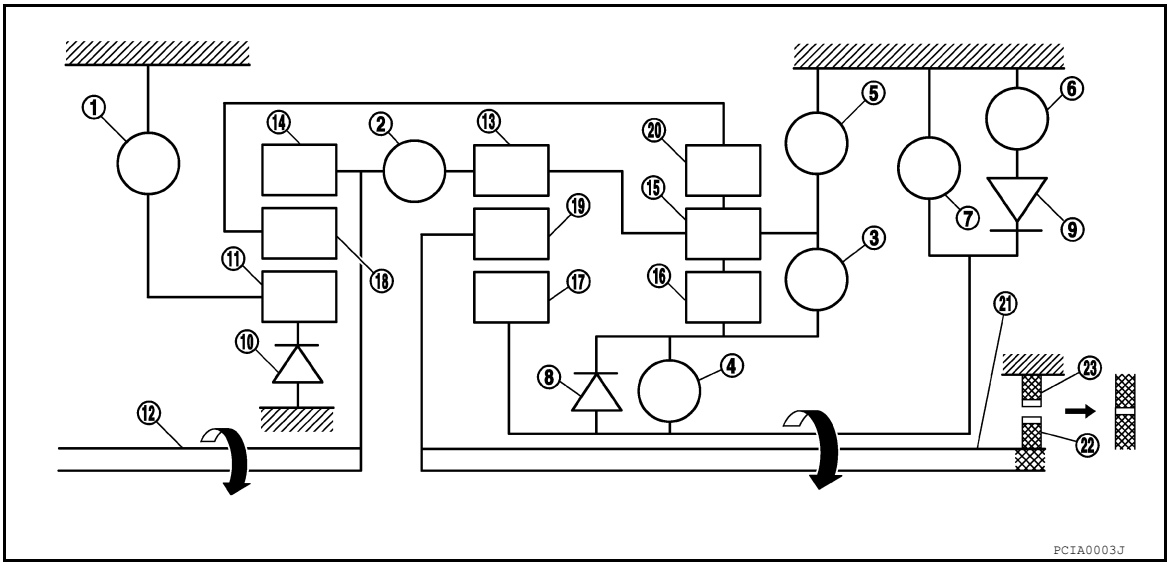
POWER TRANSMISSION

“N” Position

Since both the forward brake and the reverse brake are released, torque from the input shaft drive is not transmitted to the output shaft.

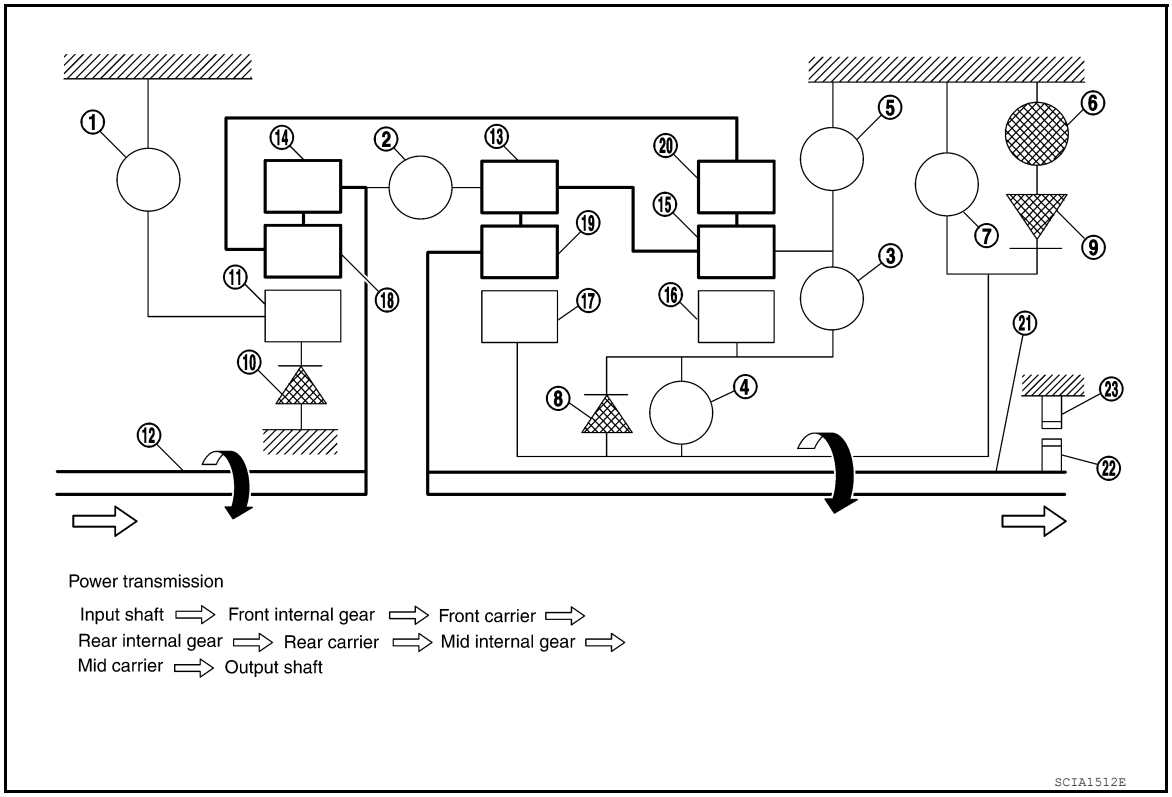
“P” Position

- The same as for the “N” position, both the forward brake and the reverse brake are released, so torque from the input shaft drive is not transmitted to the output shaft.
- The parking pawl linked with the selector lever meshes with the parking gear and fastens the output shaft mechanically.



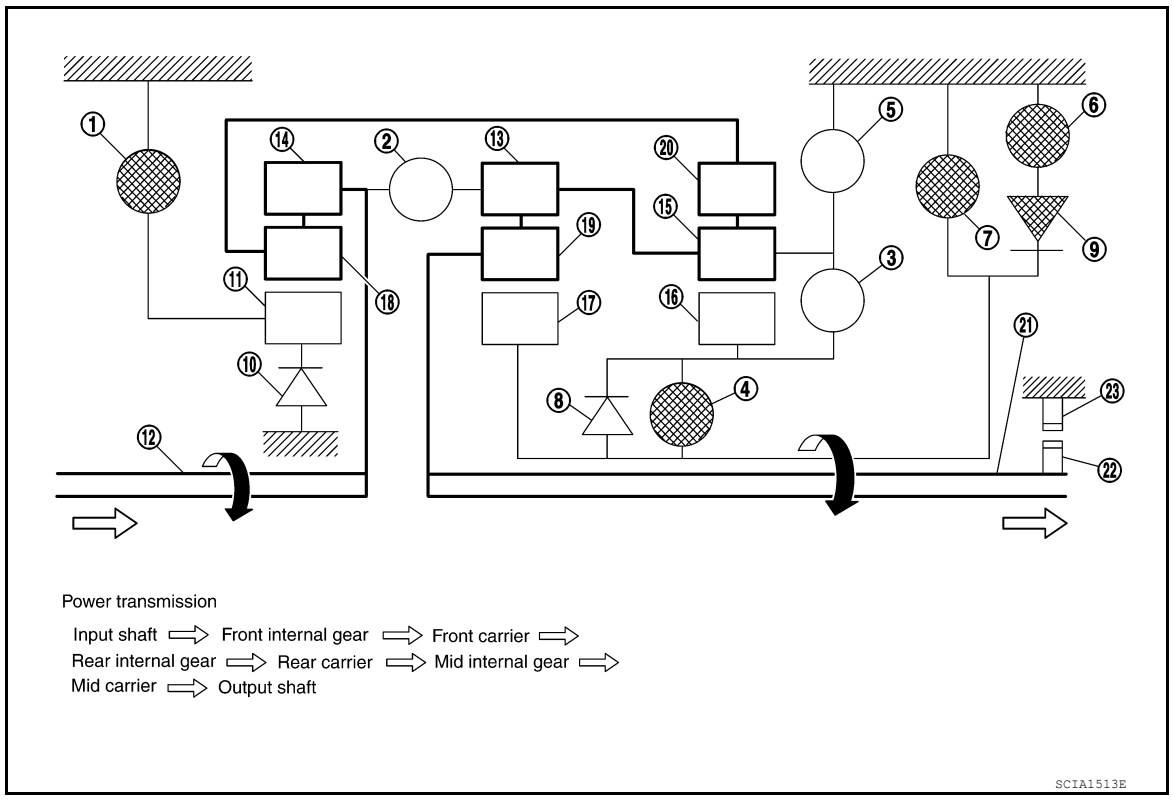
1. Front brake
2. Input clutch
3. Direct clutch
4. High and low reverse clutch
5. Reverse brake
6. Forward brake
7. Low coast brake
8. 1st one-way clutch
9. Forward one-way clutch
10. 3rd one-way clutch
11. Front sun gear
12. Input shaft
13. Mid internal gear
14. Front internal gear
15. Rear carrier
16. Rear sun gear
17. Mid sun gear
18. Front carrier
19. Mid carrier
20. Rear internal gear
21. Output shaft
22. Parking gear
23. Parking pawl

"D_1" Position
- The forward brake and the forward one-way clutch regulate reverse rotation of the mid sun gear.
- The 1st one-way clutch regulates reverse rotation of the rear sun gear.
- The 3rd one-way clutch regulates reverse rotation of the front sun gear.
- During deceleration, the mid sun gear turns forward, so the forward one-way clutch idles and the engine brake is not activated.



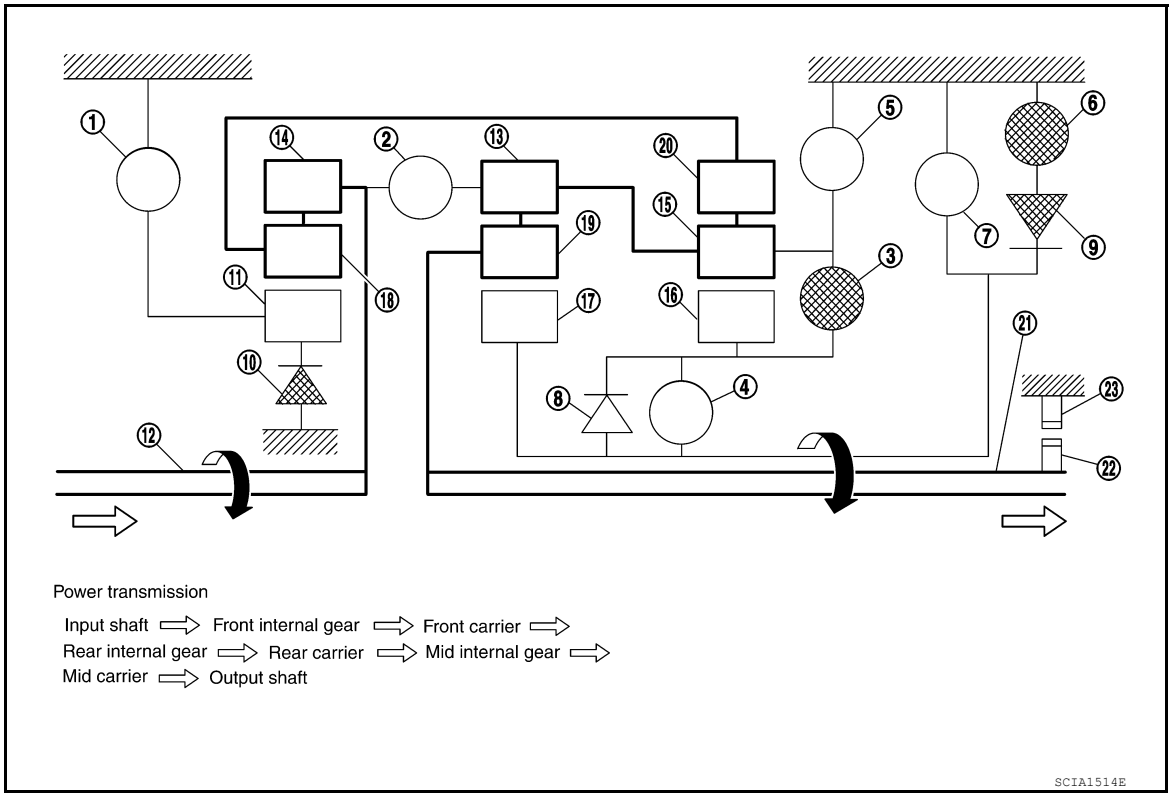
1. Front brake
2. Input clutch
3. Direct clutch
4. High and low reverse clutch
5. Reverse brake
6. Forward brake
7. Low coast brake
8. 1st one-way clutch
9. Forward one-way clutch
10. 3rd one-way clutch
11. Front sun gear
12. Input shaft
13. Mid internal gear
14. Front internal gear
15. Rear carrier
16. Rear sun gear
17. Mid sun gear
18. Front carrier
19. Mid carrier
20. Rear internal gear
21. Output shaft
22. Parking gear
23. Parking pawl

“M1” Position
- The front brake fastens the front sun gear.
- The forward brake and the forward one-way clutch regulate reverse rotation of the mid sun gear.
- High and low reverse clutch connects the rear sun gear and the mid sun gear.
- The low coast brake fastens the mid sun gear.
- During deceleration, the low coast brake regulates forward rotation of the mid sun gear and the engine brake functions.



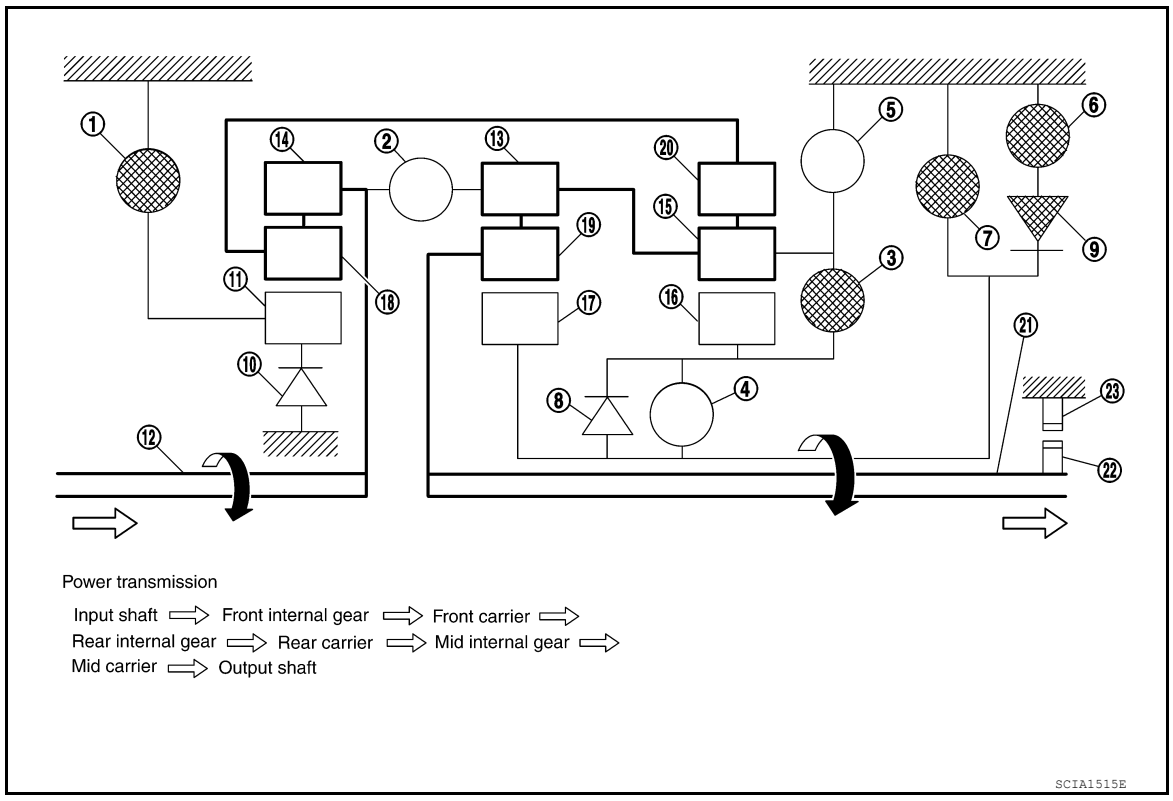
1. Front brake
2. Input clutch
3. Direct clutch
4. High and low reverse clutch
5. Reverse brake
6. Forward brake
7. Low coast brake
8. 1st one-way clutch
9. Forward one-way clutch
10. 3rd one-way clutch
11. Front sun gear
12. Input shaft
13. Mid internal gear
14. Front internal gear
15. Rear carrier
16. Rear sun gear
17. Mid sun gear
18. Front carrier
19. Mid carrier
20. Rear internal gear
21. Output shaft
22. Parking gear
23. Parking pawl

"D_2" Position
- The forward brake and the forward one-way clutch regulate reverse rotation of the mid sun gear.
- The 3rd one-way clutch regulates reverse rotation of the front sun gear.
- The direct clutch is coupled, and the rear carrier and rear sun gear are connected.
- During deceleration, the mid sun gear turns forward, so the forward one-way clutch idles and engine brake is not activated.



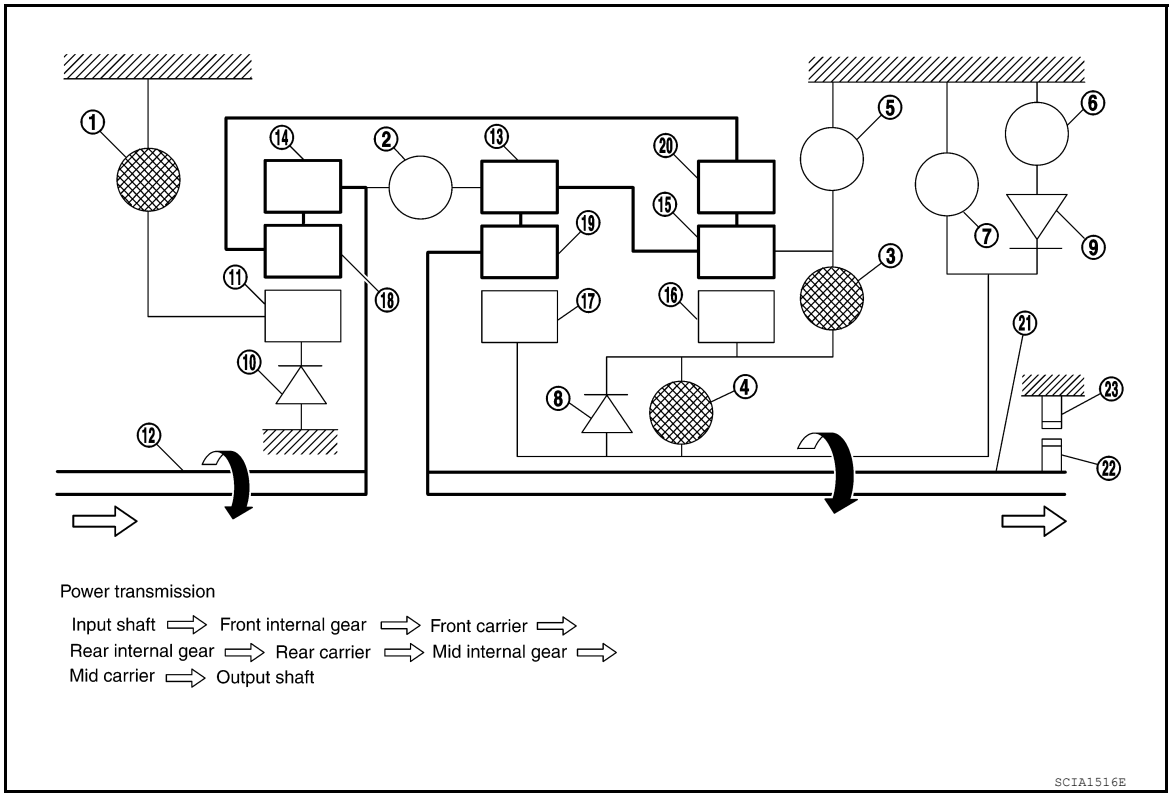
1. Front brake
2. Input clutch
3. Direct clutch
4. High and low reverse clutch
5. Reverse brake
6. Forward brake
7. Low coast brake
8. 1st one-way clutch
9. Forward one-way clutch
10. 3rd one-way clutch
11. Front sun gear
12. Input shaft
13. Mid internal gear
14. Front internal gear
15. Rear carrier
16. Rear sun gear
17. Mid sun gear
18. Front carrier
19. Mid carrier
20. Rear internal gear
21. Output shaft
22. Parking gear
23. Parking pawl

“M2” Position
- The front brake fastens the front sun gear.
- The forward brake and the forward one-way clutch regulate reverse rotation of the mid sun gear.
- The direct clutch is coupled, and the rear carrier and rear sun gear are connected.
- The low coast brake fastens the mid sun gear.
- During deceleration, the low coast brake regulates forward rotation of the mid sun gear and the engine brake functions.



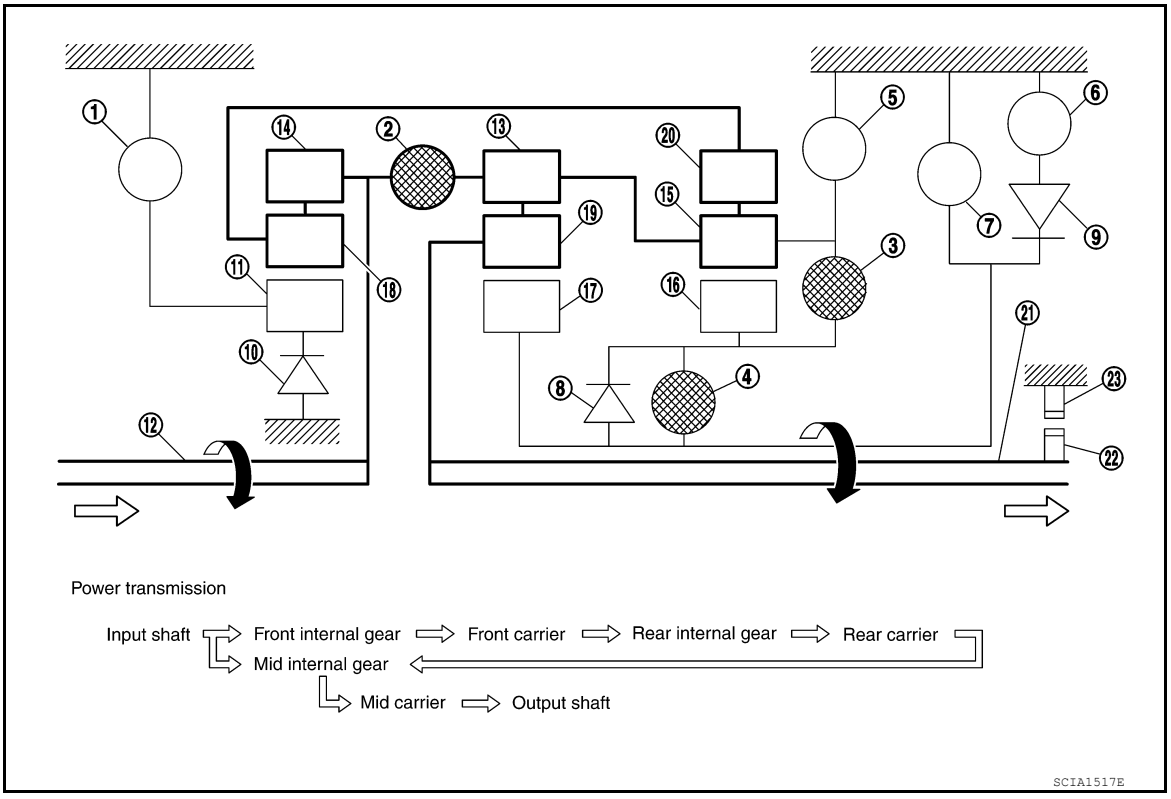
1. Front brake
2. Input clutch
3. Direct clutch
4. High and low reverse clutch
5. Reverse brake
6. Forward brake
7. Low coast brake
8. 1st one-way clutch
9. Forward one-way clutch
10. 3rd one-way clutch
11. Front sun gear
12. Input shaft
13. Mid internal gear
14. Front internal gear
15. Rear carrier
16. Rear sun gear
17. Mid sun gear
18. Front carrier
19. Mid carrier
20. Rear internal gear
21. Output shaft
22. Parking gear
23. Parking pawl

"D3" and "M3" Positions
- The front brake fastens the front sun gear.
- The direct clutch is coupled, and the rear carrier and rear sun gear are connected.
- The high and low reverse clutch is coupled, and the mid sun gear and rear sun gear are connected.



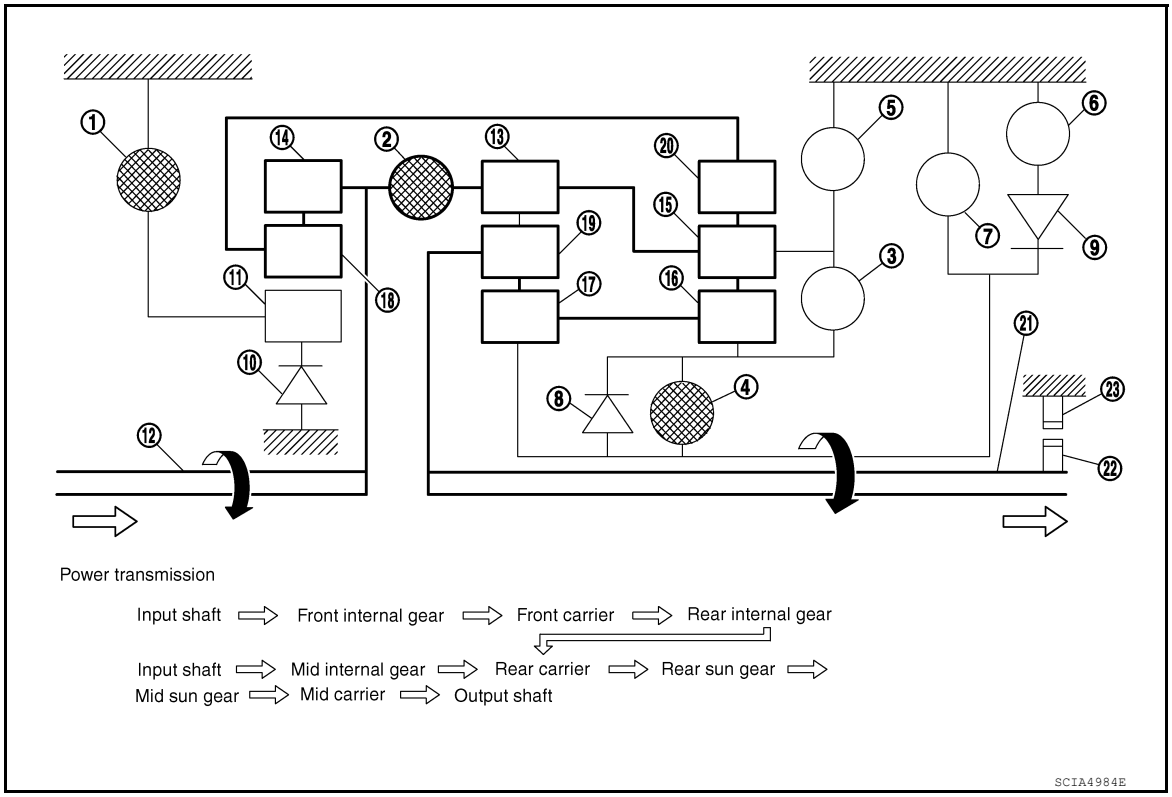
1. Front brake
2. Input clutch
3. Direct clutch
4. High and low reverse clutch
5. Reverse brake
6. Forward brake
7. Low coast brake
8. 1st one-way clutch
9. Forward one-way clutch
10. 3rd one-way clutch
11. Front sun gear
12. Input shaft
13. Mid internal gear
14. Front internal gear
15. Rear carrier
16. Rear sun gear
17. Mid sun gear
18. Front carrier
19. Mid carrier
20. Rear internal gear
21. Output shaft
22. Parking gear
23. Parking pawl

"D4" and "M4" Positions
- The direct clutch is coupled, and the rear carrier and rear sun gear are connected.
- The high and low reverse clutch is coupled, and the mid sun gear and rear sun gear are connected.
- The input clutch is coupled, and the front internal gear and mid internal gear are connected.
- The drive power is conveyed to the front internal gear, mid internal gear, and rear carrier and the three planetary gears rotate forward as one unit.



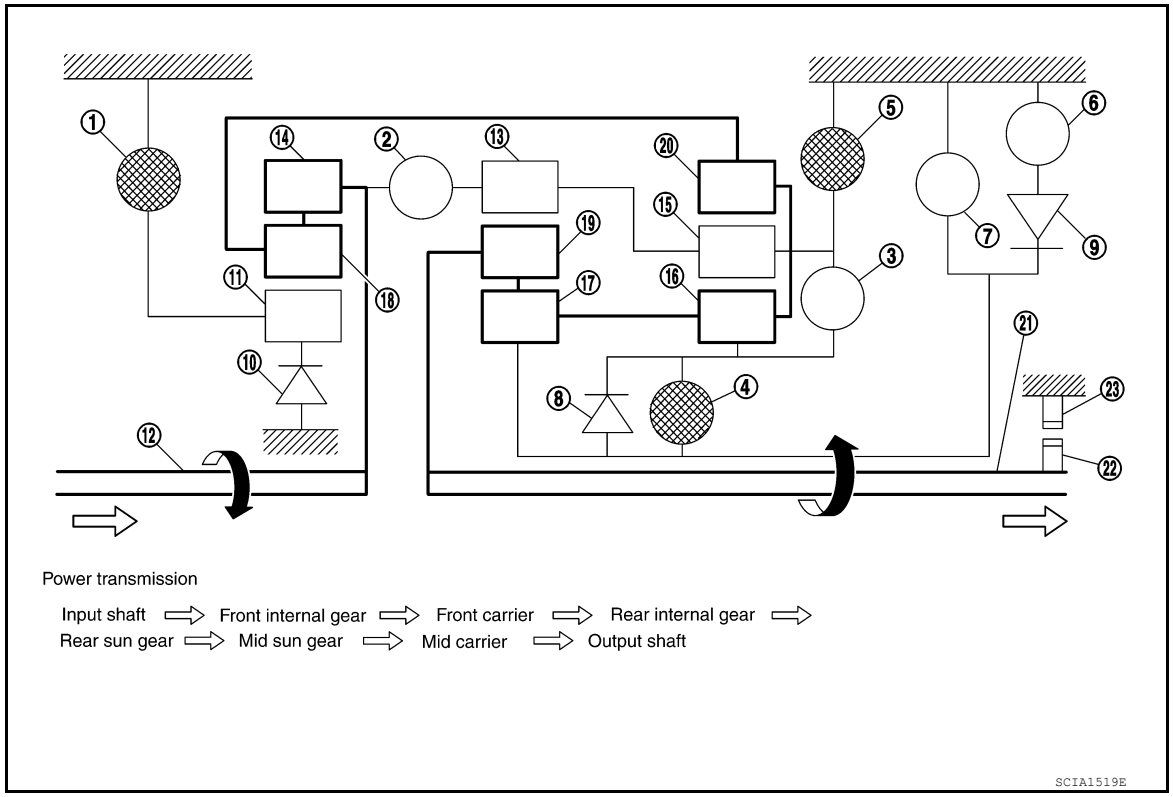
1. Front brake
2. Input clutch
3. Direct clutch
4. High and low reverse clutch
5. Reverse brake
6. Forward brake
7. Low coast brake
8. 1st one-way clutch
9. Forward one-way clutch
10. 3rd one-way clutch
11. Front sun gear
12. Input shaft
13. Mid internal gear
14. Front internal gear
15. Rear carrier
16. Rear sun gear
17. Mid sun gear
18. Front carrier
19. Mid carrier
20. Rear internal gear
21. Output shaft
22. Parking gear
23. Parking pawl

"D5" and "M5" Positions
- The front brake fastens the front sun gear.
- The input clutch is coupled, and the front internal gear and mid internal gear are connected.
- The high and low reverse clutch is coupled, and the mid sun gear and rear sun gear are connected.



1. Front brake
2. Input clutch
3. Direct clutch
4. High and low reverse clutch
5. Reverse brake
6. Forward brake
7. Low coast brake
8. 1st one-way clutch
9. Forward one-way clutch
10. 3rd one-way clutch
11. Front sun gear
12. Input shaft
13. Mid internal gear
14. Front internal gear
15. Rear carrier
16. Rear sun gear
17. Mid sun gear
18. Front carrier
19. Mid carrier
20. Rear internal gear
21. Output shaft
22. Parking gear
23. Parking pawl

“R” Position
- The front brake fastens the front sun gear.
- The high and low reverse clutch is coupled, and the mid sun gear and rear sun gear are connected.
- The reverse brake fastens the rear carrier.



1. Front brake
2. Input clutch
3. Direct clutch
4. High and low reverse clutch
5. Reverse brake
6. Forward brake
7. Low coast brake
8. 1st one-way clutch
9. Forward one-way clutch
10. 3rd one-way clutch
11. Front sun gear
12. Input shaft
13. Mid internal gear
14. Front internal gear
15. Rear carrier
16. Rear sun gear
17. Mid sun gear
18. Front carrier
19. Mid carrier
20. Rear internal gear
21. Output shaft
22. Parking gear
23. Parking pawl

TRANSMISSION : Component Description

INFOID:0000000006822241

Name of the Part (Abbreviation)	Function
Front brake (FR/B)	Fastens the front sun gear.
Input clutch (I/C)	Connects the input shaft, the front internal gear and the mid internal gear.
Direct clutch (D/C)	Connects the rear carrier and the rear sun gear.
High and low reverse clutch (HLR/C)	Connects the mid sun gear and the rear sun gear.
Reverse brake (R/B)	Fastens the rear carrier.
Forward brake (Fwd/B)	Fastens the mid sun gear.
Low coast brake (LC/B)	Fastens the mid sun gear.
1st one-way clutch (1st OWC)	Allows the rear sun gear to turn freely forward relative to the mid sun gear but fastens it for reverse rotation.
Forward one-way clutch (Fwd OWC)	Allows the mid sun gear to turn freely in the forward direction but fastens it for reverse rotation.
3rd one-way clutch (3rd OWC)	Allows the front sun gear to turn freely in the forward direction but fastens it for reverse rotation.

Name of the Part (Abbreviation)	Function
Torque converter	Amplifies driving force the engine, and transmits it to transmission input shaft.
Oil pump	Driven by the engine, oil pump supplies oil to torque converter, control valve assembly, and each lubricating system.

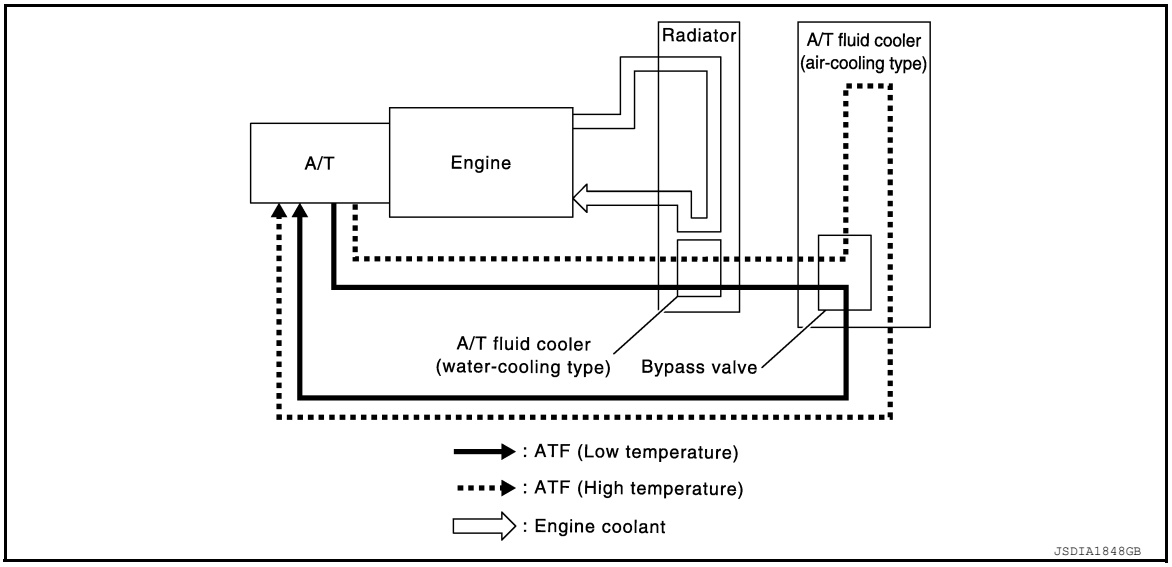
FLUID COOLER SYSTEM

FLUID COOLER SYSTEM : System Description

INFOID:0000000006822362

The A/T fluid temperature is controlled to an appropriate level by the A/T fluid cooler.

A/T FLUID COOLER SCHEMATIC

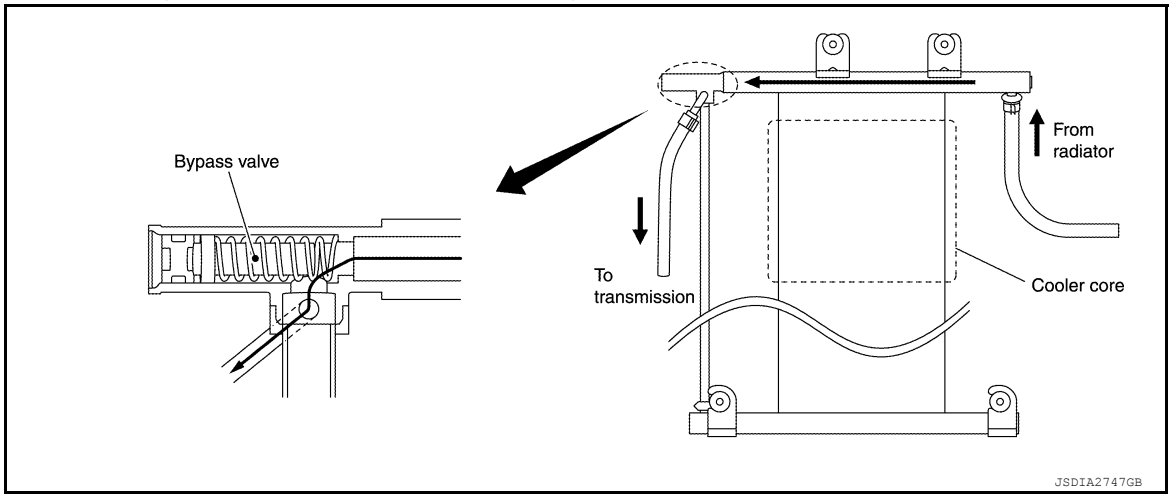


COMPONENT DESCRIPTION

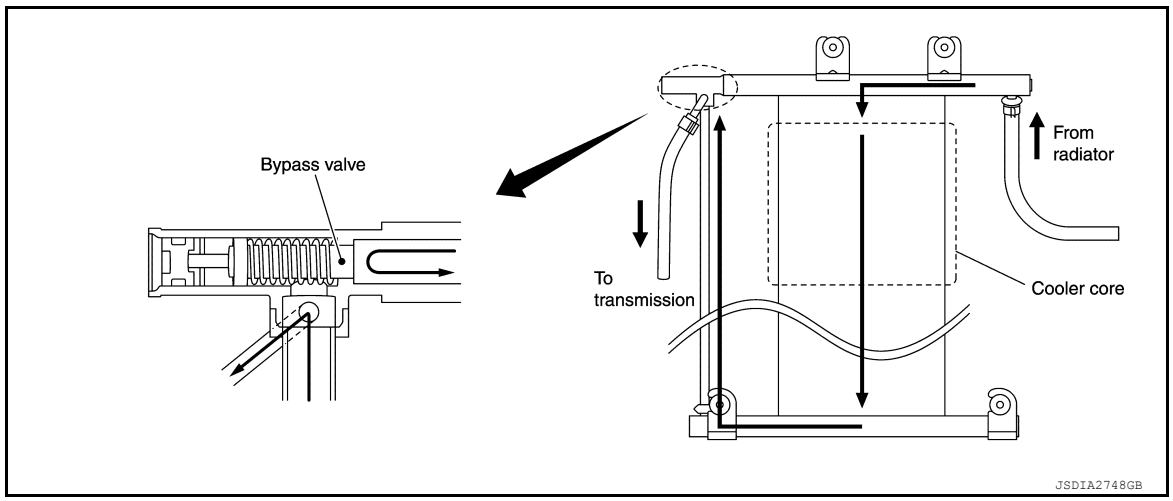
A/T fluid cooler (water-cooling type)
- A/T fluid cooler (water-cooling type) is mounted at the lower part of the radiator.
- ATF flowing in the A/T fluid cooler (water-cooling type) is cooled by the engine coolant cooled by the radiator.

A/T fluid cooler (air-cooling type)
- A/T fluid cooler (air-cooling type) is installed in the front of radiator and condenser.
- A/T fluid cooler is provided with a bypass valve that controls ATF flow. Bypass valve operates by thermo wax and a return spring. Bypass valve fully opens when A/T fluid temperature is approximately 54°C (129°F) and fully closes when A/T fluid temperature is approximately 71°C (160°F).

- When A/T fluid temperature is low, the bypass valve is open. Most of ATF therefore returns to the transmission without flowing into the cooler core that has larger flow resistance.



- When A/T fluid temperature rises [to approximately 71°C (160°F)], bypass valve closes and allows ATF to flow into cooler core. ATF flowing into cooler core is cooled by air stream caused by vehicle travel and returned to transmission.

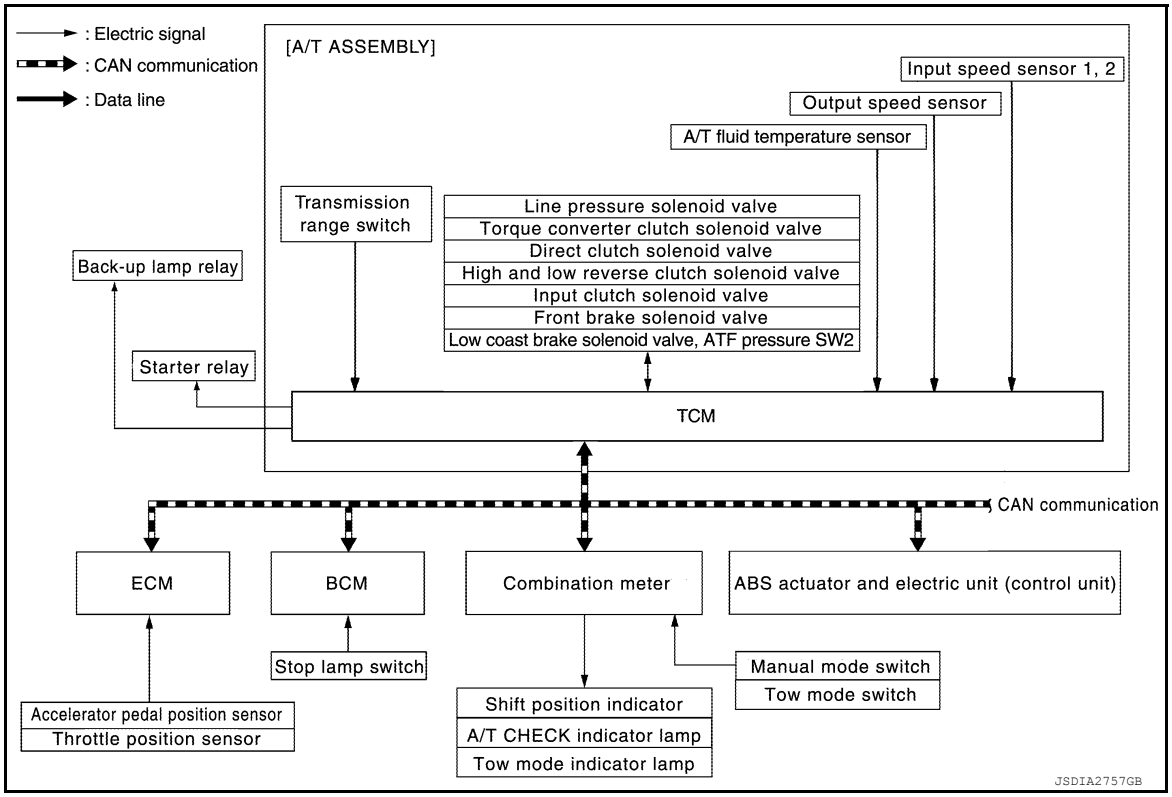


SYSTEM

A/T CONTROL SYSTEM

A/T CONTROL SYSTEM : System Diagram

INFOID:0000000006822242



A/T CONTROL SYSTEM : System Description

INFOID:0000000006822243

The A/T senses vehicle operating conditions through various sensors or signals. It always controls the optimum shift position and reduces shifting and lock-up shocks.

TCM FUNCTION

The function of the TCM is to:

- Receive input signals transmitted from various switches and sensors.
- Determine required line pressure, shifting point, lock-up operation, engine brake operation, etc.
- Transmit required output signals to the respective solenoids.

SENSORS (or SIGNALS)		TCM		ACTUATORS
Transmission range switch Accelerator pedal position signal Closed throttle position signal Wide open throttle position signal Engine speed signal A/T fluid temperature sensor Output speed sensor Vehicle speed signal Manual mode switch signal Stop lamp switch signal Input speed sensor ATF pressure switch Tow mode switch	⇒	Shift control Line pressure control Lock-up control Engine brake control Timing control Fail-safe control Self-diagnosis CONSULT communication line Duet-EA control CAN system	⇒	Input clutch solenoid valve Direct clutch solenoid valve Front brake solenoid valve High and low reverse clutch solenoid valve Low coast brake solenoid valve Torque converter clutch solenoid valve Line pressure solenoid valve A/T CHECK indicator lamp A/T fluid temperature warning lamp Tow mode indicator lamp Back-up lamp relay Starter relay

Input/Output Signal of TCM

Control item			Line pressure control	Vehicle speed control	Shift control	Lock-up control	Engine brake control	Fail-safe function *3	Self-diagnostics function
Input	Accelerator pedal position signal *5		X	X	X	X	X	X	X
	Output speed sensor		X	X	X	X	X	X	X
	Vehicle speed signal *1, *5							X	
	Closed throttle position signal *5			X *2	X	X		X	X *4
	Wide open throttle position signal *5							X	X *4
	Input speed sensor 1			X		X	X	X	X
	Input speed sensor (for 4th speed only)			X		X	X	X	X
	Engine speed signals *5		X	X	X	X	X	X	X
	Stop lamp switch signal *5			X	X	X			X *4
	A/T fluid temperature sensors		X	X	X	X		X	X
	ASCD or ICC sensor integrated unit	Operation signal *5		X	X	X			
		Overdrive cancel signal *5		X					
Output	Direct clutch solenoid			X	X			X	X
	Input clutch solenoid			X	X			X	X
	High and low reverse clutch solenoid			X	X			X	X
	Front brake solenoid			X	X			X	X
	Low coast brake solenoid (ATF pressure switch 2)			X	X		X	X	X
	Line pressure solenoid		X	X	X	X	X	X	X
	TCC solenoid					X		X	X
	A/T CHECK indicator lamp *6								X *4
	Starter relay							X	X

*1: Spare for output speed sensor

*2: Spare for accelerator pedal position signal

*3: If these input and output signals are different, the TCM triggers the fail-safe function.

*4: Used as a condition for starting self-diagnostics; if self-diagnostics are not started, it is judged that there is some kind of error.

*5: Input by CAN communications.

*6: Output by CAN communications.

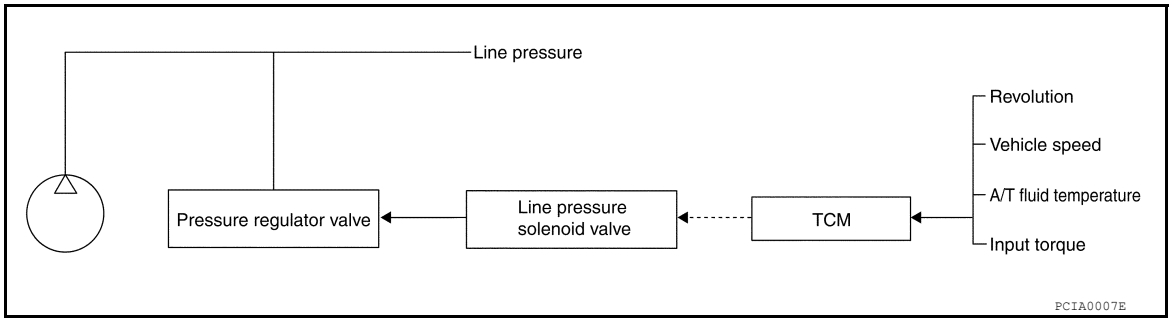
CAN COMMUNICATION

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 independently). 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. Refer to LAN-28, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

LINE PRESSURE CONTROL

- When an input torque signal equivalent to the engine drive force is transmitted from the ECM to the TCM, the TCM controls the line pressure solenoid valve.

- This line pressure solenoid controls the pressure regulator valve as the signal pressure and adjusts the pressure of the operating oil discharged from the oil pump to the line pressure most appropriate to the driving state.

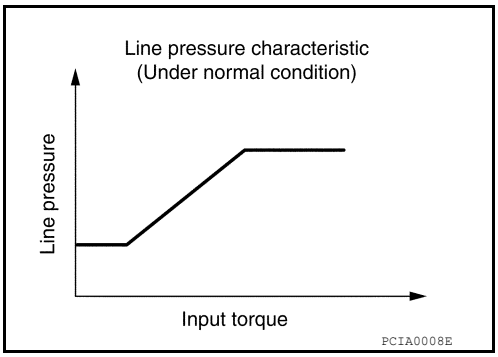


Line Pressure Control is Based On The TCM Line Pressure Characteristic Pattern

- The TCM has stored in memory a number of patterns for the optimum line pressure characteristic for the driving state.
- In order to obtain the most appropriate line pressure characteristic to meet the current driving state, the TCM controls the line pressure solenoid current value and thus controls the line pressure.

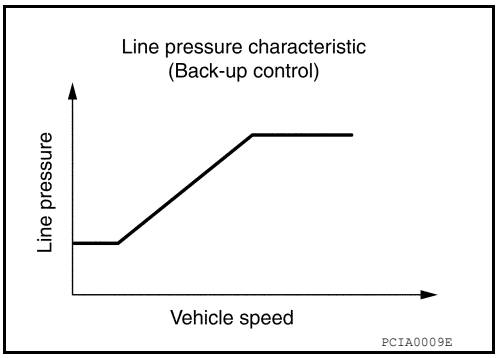
Normal Control

- Each clutch is adjusted to the necessary pressure to match the engine drive force.



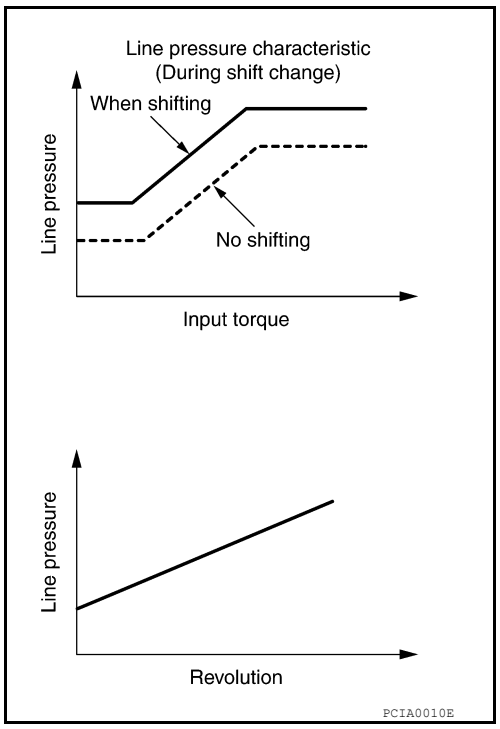
Back-up Control (Engine Brake)

- When the select operation is performed during driving and the A/T is shifted down, the line pressure is set according to the vehicle speed.



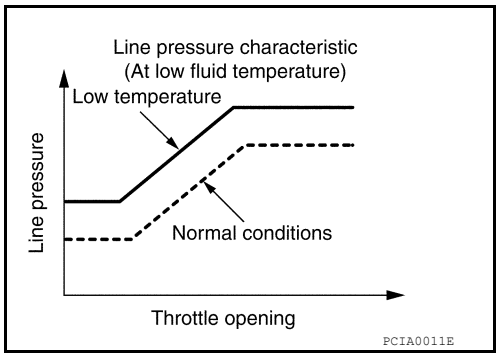
During Shift Change

- The necessary and adequate line pressure for shift change is set. For this reason, line pressure pattern setting corresponds to input torque and gearshift selection. Also, line pressure characteristic corresponds to engine speed, during engine brake operation.



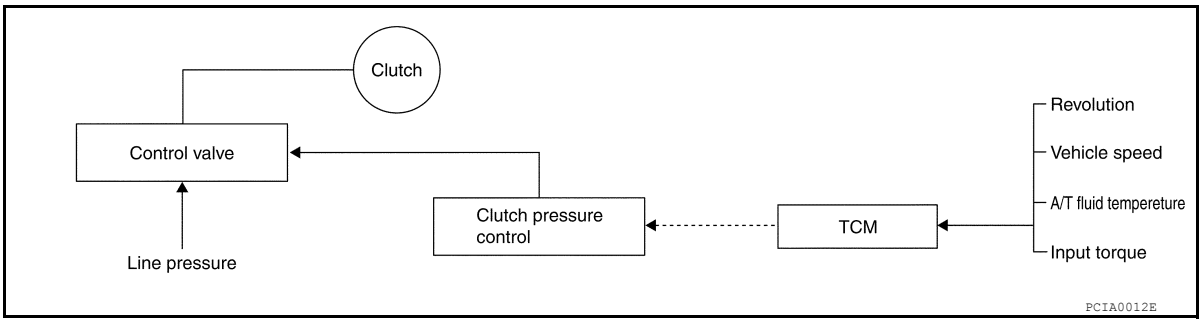
At Low Fluid Temperature

- When the A/T fluid temperature drops below the prescribed temperature, in order to speed up the action of each friction element, the line pressure is set higher than the normal line pressure characteristic.



SHIFT CONTROL

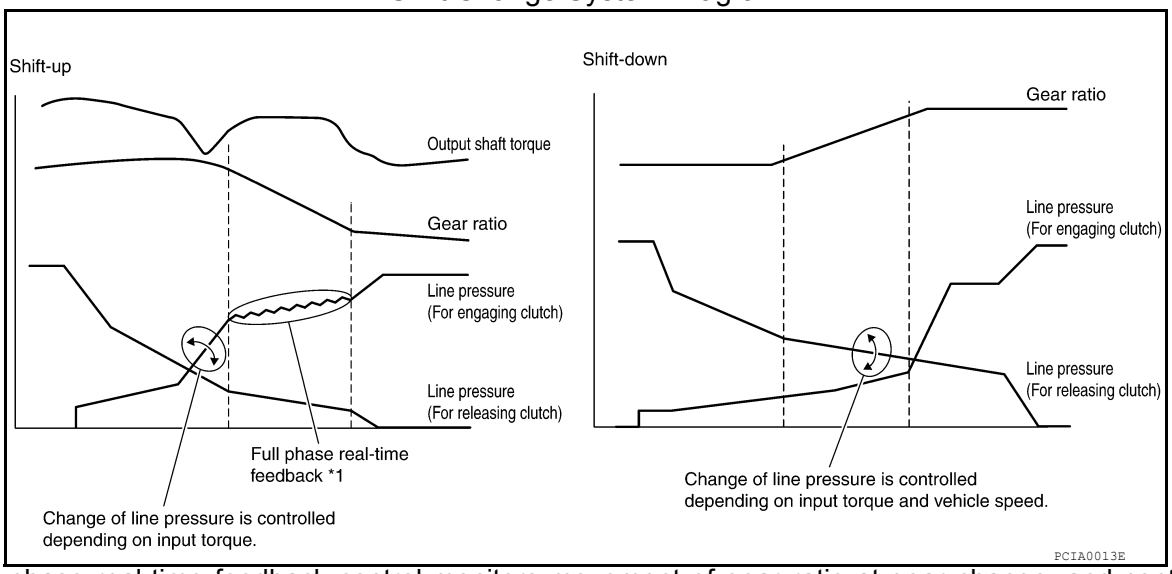
The clutch pressure control solenoid is controlled by the signals from the switches and sensors. Thus, the clutch pressure is adjusted to be appropriate to the engine load state and vehicle driving state. It becomes possible to finely control the clutch hydraulic pressure with high precision and a smoother shift change characteristic is attained.



Shift Change

The clutch is controlled with the optimum timing and oil pressure by the engine speed, engine torque information, etc.

Shift Change System Diagram



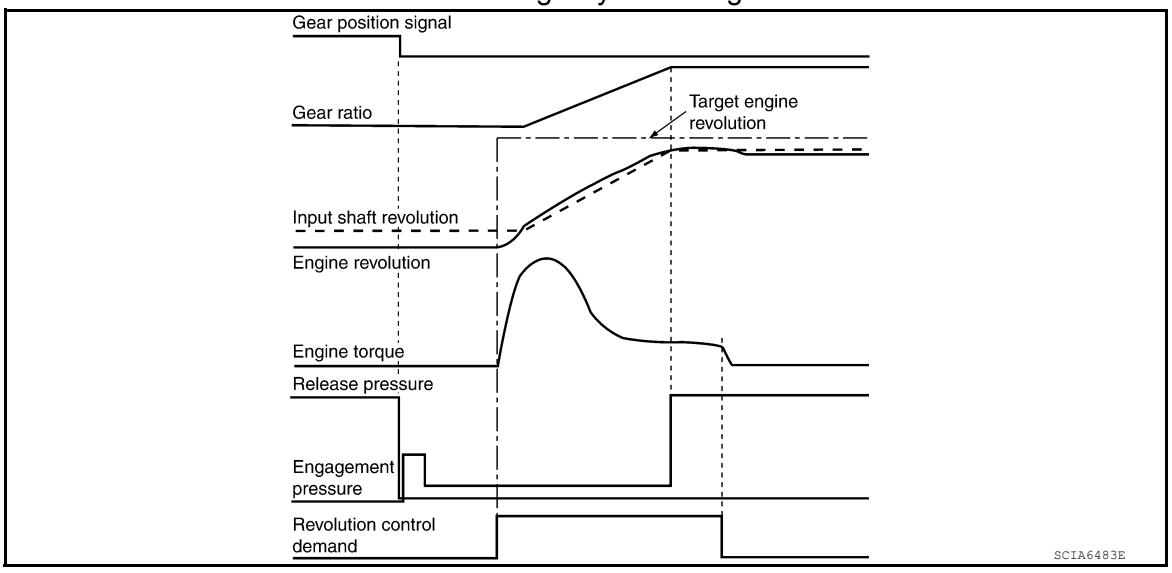
*1: Full phase real-time feedback control monitors movement of gear ratio at gear change, and controls oil pressure in real-time to achieve the best gear ratio.

Blipping Control

This system makes transmission clutch engage readily by controlling (synchronizing) engine revolution according to the (calculation of) engine revolution after shifting down.

- "BLIPPING CONTROL" functions.
- When downshifting by accelerator pedal depression at "D" position.
- When downshifting under the manual mode.
- TCM selects "BLIPPING CONTROL" or "NORMAL SHIFT CONTROL" according to the gear position, the selector lever position, the engine torque and the speed when accelerating by pedal depression.
- Revolution control demand signal is transmitted from TCM to ECM under "BLIPPING CONTROL".
- TCM synchronizes engine revolution according to the revolution control demand signal.

Shift Change System Diagram



Tow Mode

- High driving torque is required for towing a heavy load. The tow mode enables torque-oriented driving by changing the shift schedule to that of delaying A/T gear shift timing (compared to normal driving).
- During downhill driving, the transmission assists deceleration by changing gear in cooperation with brake operation, according to driving conditions.
- TCM receives tow mode switch signal from combination meter via CAN communication.

LOCK-UP CONTROL

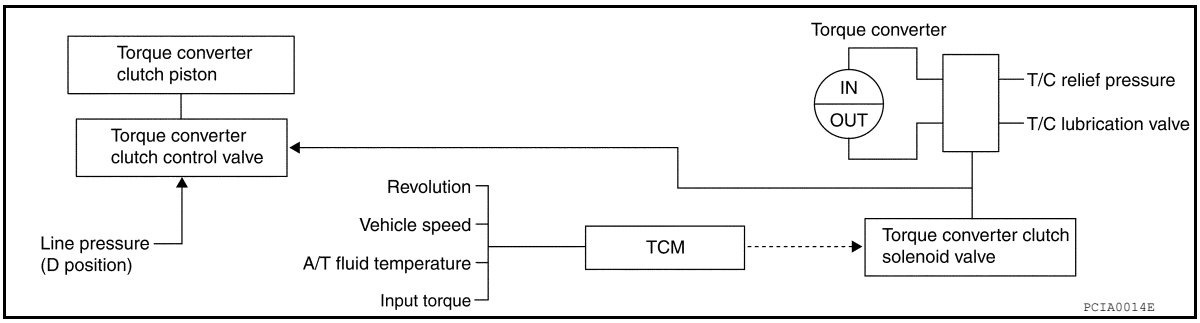
The torque converter clutch piston in the torque converter is engaged to eliminate torque converter slip to increase power transmission efficiency.
The torque converter clutch control valve operation is controlled by the torque converter clutch solenoid valve, which is controlled by a signal from TCM, and the torque converter clutch control valve engages or releases the torque converter clutch piston.

Lock-up operation condition table

Shift position indicator	"D" position/"M5" position					"M4" position			
Gear position	5	4	3	2	1	4	3	2	1
Lock-up	×	×	–	–	–	×	–	–	–
Slip lock-up	–	–	×	–	–	–	–	–	–

NOTE:
Lock-up is not done in "M3", "M2" and "M1" position.

Torque Converter Clutch Control Valve Control
Lock-up control system diagram



Lock-up Released
- In the lock-up released state, the torque converter clutch control valve is set into the unlocked state by the torque converter clutch solenoid and the lock-up apply pressure is drained.
  In this way, the torque converter clutch piston is not coupled.

Lock-up Applied
- In the lock-up applied state, the torque converter clutch control valve is set into the locked state by the torque converter clutch solenoid and lock-up apply pressure is generated.
  In this way, the torque converter clutch piston is pressed and coupled.

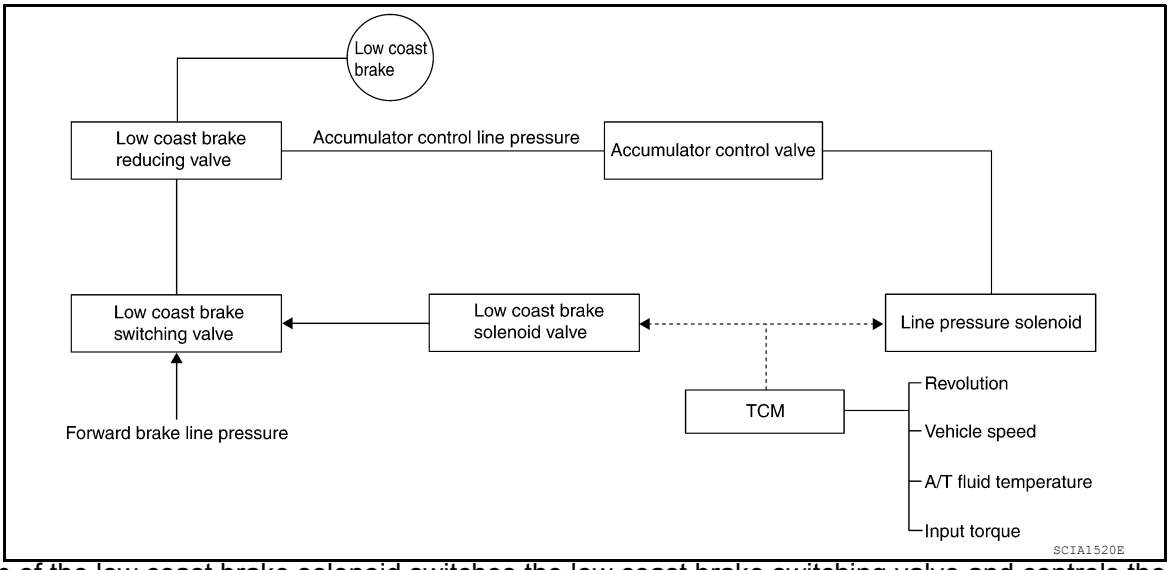
Smooth Lock-up Control
When shifting from the lock-up released state to the lock-up applied state, the current output to the torque converter clutch solenoid is controlled with the TCM. In this way, when shifting to the lock-up applied state, the torque converter clutch is temporarily set to the half-clutched state to reduce the shock.

Half-clutched State
- The current output from the TCM to the torque converter clutch solenoid is varied to steadily increase the torque converter clutch solenoid pressure.
  In this way, the lock-up apply pressure gradually rises and while the torque converter clutch piston is put into half-clutched states, the torque converter clutch piston operating pressure is increased and the coupling is completed smoothly.

Slip Lock-up Control
- In the slip region, the torque converter clutch solenoid current is controlled with the TCM to put it into the half-clutched state. This absorbs the engine torque fluctuation and lock-up operates from low speed.
  This raises the fuel efficiency for 3GR, 4GR and 5GR at both low speed and when the accelerator has a low degree of opening.

ENGINE BRAKE CONTROL

- The forward one-way clutch transmits the drive force from the engine to the rear wheels. But the reverse drive from the rear wheels is not transmitted to the engine because the one-way clutch is idling.
  Therefore, the low coast brake solenoid is operated to prevent the forward one-way clutch from idling and the engine brake is operated in the same manner as conventionally.



- The operation of the low coast brake solenoid switches the low coast brake switching valve and controls the coupling and releasing of the low coast brake.
  The low coast brake reducing valve controls the low coast brake coupling force.

A/T SHIFT LOCK SYSTEM

A/T SHIFT LOCK SYSTEM : System Description

INFOID:0000000006749907

- The selector lever cannot be shifted from “P” (Park) unless the brake pedal is applied and the ignition switch is turned to the “ON” position.
- The ignition switch cannot be returned to the “OFF” position and the key removed unless the selector lever is placed in “P” (Park).
- The shift lock mechanism is controlled by the ON-OFF operation of the shift lock solenoid.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Introduction

INFOID:0000000006749909

The A/T system has two self-diagnostic systems.
The first is the emission-related on board diagnostic system (OBD-II) performed by the TCM in combination with the ECM. The malfunction is indicated by the MIL (malfunction indicator lamp) and is stored as a DTC in the ECM memory but not the TCM memory.
The second is the TCM original self-diagnosis indicated by the A/T CHECK indicator lamp. The malfunction is stored in the TCM memory. The detected items are overlapped with OBD-II self-diagnostic items. For detail, refer to TM-39, "CONSULT Function".

OBD-II Function for A/T System

INFOID:0000000006749910

The ECM provides emission-related on board diagnostic (OBD-II) functions for the A/T system. One function is to receive a signal from the TCM used with OBD-related parts of the A/T system. The signal is sent to the ECM when a malfunction occurs in the corresponding OBD-related part. The other function is to indicate a diagnostic result by means of the MIL (malfunction indicator lamp) on the instrument panel. Sensors, switches and solenoid valves are used as sensing elements.
The MIL automatically illuminates in One or Two Trip Detection Logic when a malfunction is sensed in relation to A/T system parts.

One or Two Trip Detection Logic of OBD-II

INFOID:0000000006749911

ONE TRIP DETECTION LOGIC

If a malfunction is sensed during the first test drive, the MIL will illuminate and the malfunction will be stored in the ECM memory as a DTC. The TCM is not provided with such a memory function.

TWO TRIP DETECTION LOGIC

When a malfunction is sensed during the first test drive, it is stored in the ECM memory as a 1st trip DTC (diagnostic trouble code) or 1st trip freeze frame data. At this point, the MIL will not illuminate. — 1st Trip
If the same malfunction as that experienced during the first test drive is sensed during the second test drive, the MIL will illuminate. — 2nd Trip
The “Trip” in the “One or Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation.

OBD-II Diagnostic Trouble Code (DTC)

INFOID:0000000006749912

HOW TO READ DTC AND 1ST TRIP DTC

DTC and 1st trip DTC can be read by the following methods.
(with CONSULT or GST) CONSULT or GST (Generic Scan Tool) Examples: P0705, P0720 etc.
These DTC are prescribed by SAE J2012.
(CONSULT also displays the malfunctioning component or system.)

- **1st trip DTC No. is the same as DTC No.**
- **Output of the diagnostic trouble code indicates that the indicated circuit has a malfunction. However, in case of the Mode II and GST, they do not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.**
  CONSULT can identify them as shown below, therefore, CONSULT (if available) is recommended.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM has a memory function, which stores the driving condition such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed and vehicle speed at the moment the ECM detects a malfunction.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data, and the data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen, not on the GST. For detail, refer to TM-37.
Only one set of freeze frame data (either 1st trip freeze frame data of freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no

longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

Both 1st trip freeze frame data and freeze frame data (along with the DTC) are cleared when the ECM memory is erased.

HOW TO ERASE DTC

The diagnostic trouble code can be erased by CONSULT, GST or ECM DIAGNOSTIC TEST MODE as described following.

- **If the battery cable is disconnected, the diagnostic trouble code will be lost within 24 hours.**
- **When you erase the DTC, using CONSULT or GST is easier and quicker than switching the mode selector on the ECM.**

The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC-64, "On Board Diagnosis Function" (VQ40DE), EC-502, "On Board Diagnosis Function" (VK56DE).

- **Diagnostic trouble codes (DTC)**
- **1st trip diagnostic trouble codes (1st trip DTC)**
- **Freeze frame data**
- **1st trip freeze frame data**
- **System readiness test (SRT) codes**
- **Test values**

HOW TO ERASE DTC (WITH CONSULT)

1. The emission related diagnostic information in the TCM and ECM can be erased by selectioning "ALL ERASE" in the "Description" of "FINAL CHECK" mode with CONSULT.

HOW TO ERASE DTC (WITH GST)

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.
2. Select Mode 4 with the Generic Scan Tool (GST). For details refer to EC-55, "GST (Generic Scan Tool)" (VQ40DE), EC-494, "GST (Generic Scan Tool)" (VK56DE)..

HOW TO ERASE DTC (NO TOOLS)

1. Disconnect battery for 24 hours.
2. Reconnect battery.

Malfunction Indicator Lamp (MIL)

INFOID:0000000006749913

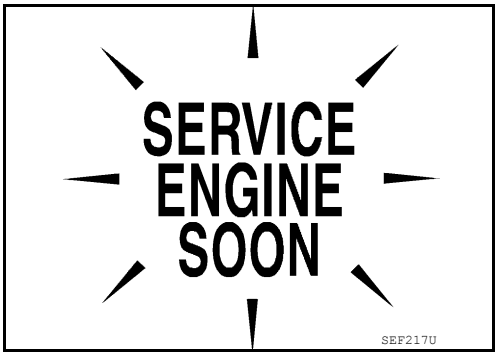
DESCRIPTION

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned “ON” without the engine running. This is a bulb check.

- If the MIL does not light up, refer to EC-424, "Component Function Check" (VQ40DE), EC-867, "Component Function Check" (VK56DE).

2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



DIAGNOSIS SYSTEM (TCM)

CONSULT Function

INFOID:0000000006749914

CONSULT can display each diagnostic item using the diagnostic test modes shown following.

TCM diagnostic mode	Description
Self Diagnostic Result	Retrieve DTC from ECU and display diagnostic items.
Data Monitor	Monitor the input/output signal of the control unit in real time.
CAN Diagnosis	The condition of CAN communication can be indicated by a topology.
CAN Diagnosis Support Monitor	It monitors the status of CAN communication.
DTC & SRT Confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
Ecu Identification	Display the ECU identification number (part number etc.) of the selected system.

SELF-DIAGNOSTIC RESULT MODE

Refer to TM-49, "DTC Index".

DATA MONITOR MODE

Display Items List

X: Standard, —: Not applicable

Monitored item (Unit)	Monitor Item Selection			Remarks
	ECU INPUT SIGNALS	MAIN SIGNALS	SELECTION FROM MENU	
VHCL/S SE-A/T (km/h or mph)	X	X	X	Output speed sensor
VHCL/S SE-MTR (km/h or mph)	X	—	X	
ACCELE POSI (0.0/8)	X	—	X	Accelerator pedal position signal
THROTTLE POSI (0.0/8)	X	X	X	Degree of opening for accelerator recognized by the TCM For fail-safe operation, the specific value used for control is displayed.
CLSD THL POS (ON-OFF display)	X	—	X	Signal input with CAN communications
W/O THL POS (ON-OFF display)	X	—	X	
BRAKESW (ON-OFF display)	X	—	X	Stop lamp switch
GEAR	—	X	X	Gear position recognized by the TCM updated after gear-shifting
ENGINE SPEED (rpm)	X	X	X	
INPUT SPEED (rpm)	X	X	X	
OUTPUT REV (rpm)	X	X	X	
GEAR RATIO	—	X	X	
TC SLIP SPEED (rpm)	—	X	X	Difference between engine speed and torque converter input shaft speed
F SUN GR REV (rpm)	—	—	X	
F CARR GR REV (rpm)	—	—	X	
ATF TEMP SE 1 (V)	X	—	X	
ATF TEMP 1 (°C or °F)	—	X	X	
ATF TEMP 2 (°C or °F)	—	X	X	
BATTERY VOLT (V)	X	—	X	
ATF PRES SW 1 (ON-OFF display)	X	X	X	Not mounted but displayed.
ATF PRES SW 2 (ON-OFF display)	X	X	X	(for LC/B solenoid)

Monitored item (Unit)	Monitor Item Selection			Remarks
	ECU INPUT SIGNALS	MAIN SIGNALS	SELECTION FROM MENU	
ATF PRES SW 3 (ON-OFF display)	X	X	X	Not mounted but displayed.
ATF PRES SW 5 (ON-OFF display)	X	X	X	
ATF PRES SW 6 (ON-OFF display)	X	X	X	
RANGE SW 1 (ON-OFF display)	X	—	X	
RANGE SW 2 (ON-OFF display)	X	—	X	
RANGE SW 3 (ON-OFF display)	X	—	X	
RANGE SW 4 (ON-OFF display)	X	—	X	
SLCT LVR POSI	—	X	X	Selector lever position is recognized by the TCM. For fail-safe operation, the specific value used for control is displayed.
1 POSITION SW (ON-OFF display)	X	—	X	1st position switch
OD CONT SW (ON-OFF display)	X	—	X	4th position switch
POWERSHIFT SW (ON-OFF display)	X	—	X	Not mounted but displayed.
HOLD SW (ON-OFF display)	X	—	X	
DS RANGE (ON-OFF display)	X	—	X	Not mounted but displayed.
MANU MODE SW (ON-OFF display)	X	—	X	
NON M-MODE SW (ON-OFF display)	X	—	X	
UP SW LEVER (ON-OFF display)	X	—	X	
DOWN SW LEVER (ON-OFF display)	X	—	X	
SFT UP ST SW (ON-OFF display)	X	—	X	Not mounted but displayed.
SFT DWN ST SW (ON-OFF display)	X	—	X	
ASCD-OD CUT (ON-OFF display)	X	—	X	
ASCD-CRUISE (ON-OFF display)	X	—	X	
ABS SIGNAL (ON-OFF display)	X	—	X	
ACC OD CUT (ON-OFF display)	X	—	X	Not mounted but displayed.
ACC SIGNAL (ON-OFF display)	X	—	X	
TCS GR/P KEEP (ON-OFF display)	X	—	X	
TCS SIGNAL 2 (ON-OFF display)	X	—	X	
TCS SIGNAL 1 (ON-OFF display)	X	—	X	
TCC SOLENOID (A)	—	X	X	
LINE PRES SOL (A)	—	X	X	
I/C SOLENOID (A)	—	X	X	
FR/B SOLENOID (A)	—	X	X	
D/C SOLENOID (A)	—	X	X	
HLR/C SOL (A)	—	X	X	
ON OFF SOL (ON-OFF display)	—	—	X	LC/B solenoid
TCC SOL MON (A)	—	—	X	
L/P SOL MON (A)	—	—	X	
I/C SOL MON (A)	—	—	X	
FR/B SOL MON (A)	—	—	X	
D/C SOL MON (A)	—	—	X	
HLR/C SOL MON (A)	—	—	X	

Monitored item (Unit)	Monitor Item Selection			Remarks
	ECU INPUT SIGNALS	MAIN SIGNALS	SELECTION FROM MENU	
ONOFF SOL MON (ON-OFF display)	—	—	X	LC/B solenoid
P POSI IND (ON-OFF display)	—	—	X	
R POSI IND (ON-OFF display)	—	—	X	
N POSI IND (ON-OFF display)	—	—	X	
D POSI IND (ON-OFF display)	—	—	X	
4TH POSI IND (ON-OFF display)	—	—	X	
3RD POSI IND (ON-OFF display)	—	—	X	
2ND POSI IND (ON-OFF display)	—	—	X	
1ST POSI IND (ON-OFF display)	—	—	X	
MANU MODE IND (ON-OFF display)	—	—	X	
POWER M LAMP (ON-OFF display)	—	—	X	Not mounted but displayed.
F-SAFE IND/L (ON-OFF display)	—	—	X	
ATF WARN LAMP (ON-OFF display)	—	—	X	
BACK-UP LAMP (ON-OFF display)	—	—	X	
STARTER RELAY (ON-OFF display)	—	—	X	
RANGE SW 3M (ON-OFF display)	—	—	X	
C/V CLB ID1	—	—	X	
C/V CLB ID2	—	—	X	
C/V CLB ID3	—	—	X	
UNIT CLB ID1	—	—	X	
UNIT CLB ID2	—	—	X	
UNIT CLB ID3	—	—	X	
TRGT GR RATIO	—	—	X	
TRGT PRES TCC (kPa, kg/cm^2 or psi)	—	—	X	
TRGT PRES L/P (kPa, kg/cm^2 or psi)	—	—	X	
TRGT PRES I/C (kPa, kg/cm^2 or psi)	—	—	X	
TRGT PRE FR/B (kPa, kg/cm^2 or psi)	—	—	X	
TRGT PRES D/C (kPa, kg/cm^2 or psi)	—	—	X	
TRG PRE HLR/C (kPa, kg/cm^2 or psi)	—	—	X	
SHIFT PATTERN	—	—	X	
DRV CST JUDGE	—	—	X	
START RLY MON	—	—	X	
NEXT GR POSI	—	—	X	
SHIFT MODE	—	—	X	
MANU GR POSI	—	—	X	
VEHICLE SPEED (km/h or mph)	—	X	X	Vehicle speed recognized by the TCM.

DTC & SRT CONFIRMATION

DTC Work Support Mode

Item name	Description	Check item
1ST GR FNCTN P0731	Following items for “1GR incorrect ratio” be confirmed. • Self-diagnosis status (whether the diagnosis is being performed or not) • Self-diagnosis result (OK or NG)	• Input clutch solenoid valve • Front brake solenoid valve • Direct clutch solenoid valve • High and low reverse clutch solenoid valve • Each clutch • Hydraulic control circuit valve
2ND GR FNCTN P0732	Following items for “2GR incorrect ratio” be confirmed. • Self-diagnosis status (whether the diagnosis is being performed or not) • Self-diagnosis result (OK or NG)	
3RD GR FNCTN P0733	Following items for “3GR incorrect ratio” be confirmed. • Self-diagnosis status (whether the diagnosis is being performed or not) • Self-diagnosis result (OK or NG)	
4TH GR FNCTN P0734	Following items for “4GR incorrect ratio” be confirmed. • Self-diagnosis status (whether the diagnosis is being performed or not) • Self-diagnosis result (OK or NG)	
5TH GR FNCTN P0735	Following items for “5GR incorrect ratio” be confirmed. • Self-diagnosis status (whether the diagnosis is being performed or not) • Self-diagnosis result (OK or NG)	

Diagnosis Procedure without CONSULT

INFOID:0000000006749916

OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

Refer to EC-64, "On Board Diagnosis Function" (VQ40DE), EC-502, "On Board Diagnosis Function" (VK56DE).

TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

Description

When the ignition switch is switched “ON”, the A/T CHECK indicator lamp lights up for 2 seconds. As a method for locating the suspect circuit, when the self-diagnostics start signal is input, the memory for the malfunction location is output and the A/T CHECK indicator lamp flashes to display the corresponding DTC.

Diagnostic Procedure

1.CHECK A/T CHECK INDICATOR LAMP

1. Start the engine with selector lever in “P” position. Warm engine to normal operating temperature.
2. Turn ignition switch ON and OFF at least twice, then leave it in the OFF position.
3. Wait 10 seconds.
4. Turn ignition switch ON. (Never start engine.)

Does A/T CHECK indicator lamp come on for about 2 seconds?

YES >> GO TO 2.
NO >> Go to TM-137, "Symptom Table".

2.JUDGMENT PROCEDURE STEP 1

1. Turn ignition switch OFF.
2. Keep pressing shift lock release button.
3. Move selector lever from “P” to “D” position.
4. Release accelerator pedal. (Set the closed throttle position signal “ON”.)
5. Depress brake pedal. (Stop lamp switch signal “ON”.)
6. Turn ignition switch ON. (Never start engine.)
7. Wait 3 seconds.
8. Press the manual mode switch. (Manual mode “ON”.)
9. Release brake pedal. (Stop lamp switch signal “OFF”.)
10. Press the manual mode switch. (Manual mode “OFF”.)
11. Depress brake pedal. (Stop lamp switch signal “ON”.)
12. Release brake pedal. (Stop lamp switch signal “OFF”.)
13. Depress accelerator pedal fully and release it.

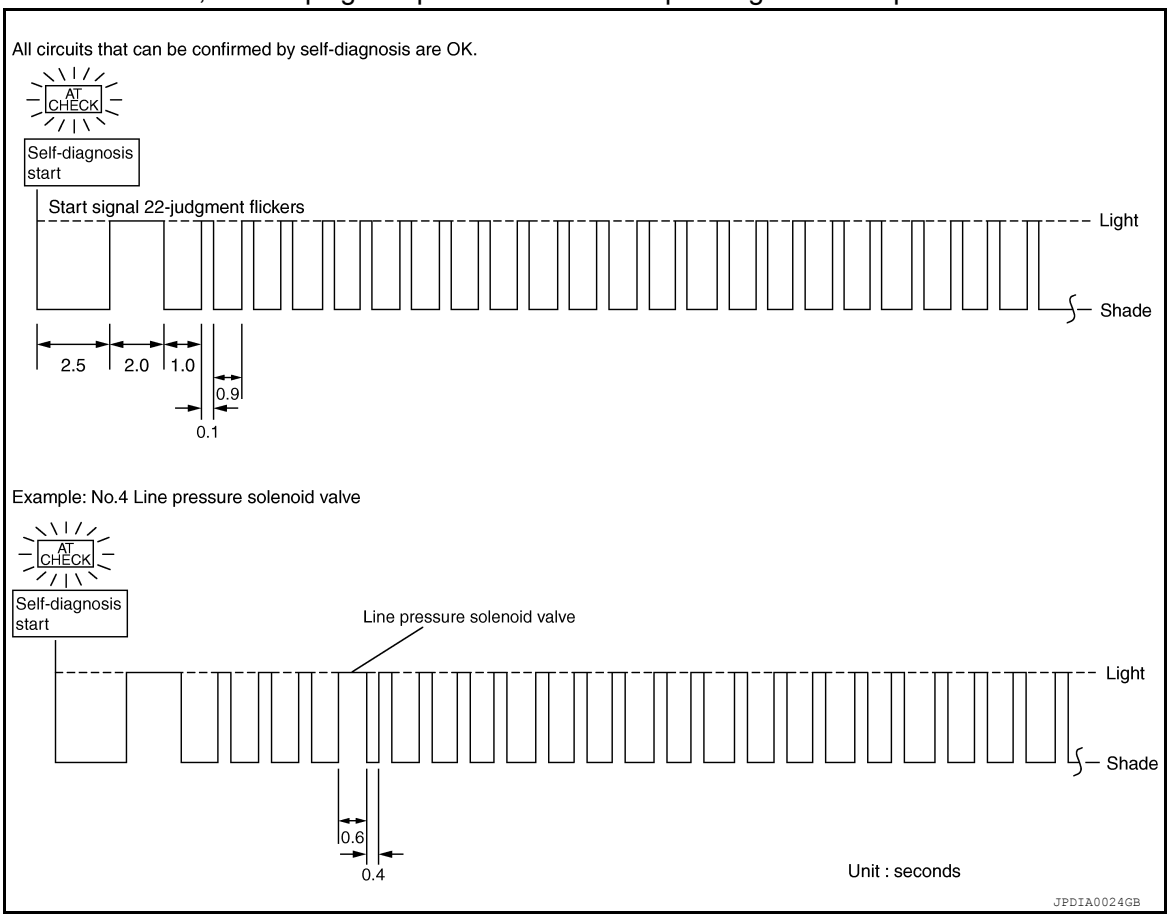
>> GO TO 3.

3. CHECK SELF-DIAGNOSIS CODE

Check A/T CHECK indicator lamp.
Refer to "Judgment Self-diagnosis Code".
If the system does not go into self-diagnostics. Refer to TM-86, "Diagnosis Procedure", TM-109, "Diagnosis Procedure", TM-125, "Diagnosis Procedure", BRC-69, "Diagnosis Procedure".

>> **DIAGNOSIS END**

Judgment Self-diagnosis Code
If there is a malfunction, the lamp lights up for the time corresponding to the suspect circuit.



No.	Malfunctioning item	No.	Malfunctioning item
1	Output speed sensor TM-90	12	Interlock TM-114
2	Direct clutch solenoid TM-119	13	1st engine braking TM-116
3	Torque converter TM-105, TM-106	14	Starter relay TM-83
4	Line pressure solenoid TM-108	15	TP sensor TM-109
5	Input clutch solenoid TM-117	16	Engine speed TM-93
6	Front brake solenoid TM-118	17	CAN communication line TM-82
7	Low coast brake solenoid TM-122, TM-123	18	1GR incorrect ratio TM-95
8	High and low reverse clutch solenoid TM-121	19	2GR incorrect ratio TM-97
9	Transmission range switch TM-86	20	3GR incorrect ratio TM-99
10	Transmission fluid temperature sensor TM-110	21	4GR incorrect ratio TM-101
11	Input speed sensor TM-88	22	5GR incorrect ratio TM-103

Erase Self-diagnosis

- In order to make it easier to find the cause of hard-to-duplicate malfunctions, malfunction information is stored into the control unit as necessary during use by the user. This memory is not erased no matter how many times the ignition switch is turned ON and OFF.
- However, this information is erased by turning ignition switch OFF after executing self-diagnostics or by erasing the memory using the CONSULT.

ECU DIAGNOSIS INFORMATION

TCM

Reference Value

INFOID:0000000006750091

VALUES ON THE DIAGNOSIS TOOL

NOTICE:

1. The CONSULT electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
   Check for time difference between actual shift timing and the CONSULT display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
2. Shift schedule (which implies gear position) displayed on CONSULT and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:

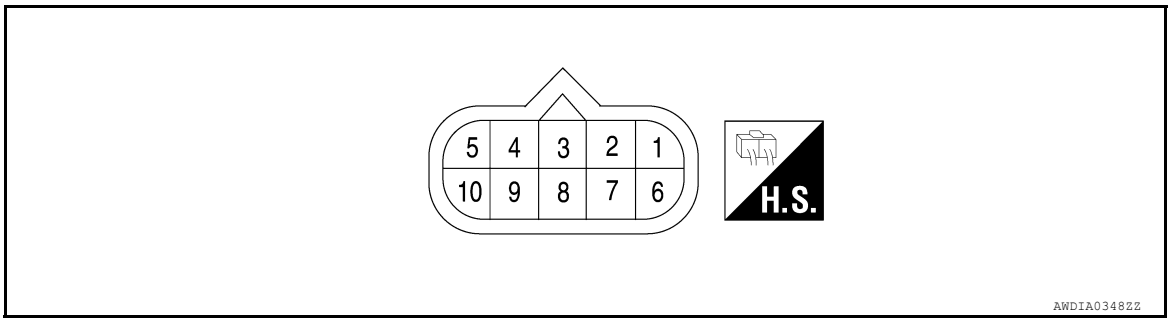
- Actual shift schedule has more or less tolerance or allowance,
- Shift schedule indicated in Service Manual refers to the point where shifts start, and
- Gear position displayed on CONSULT indicates the point where shifts are completed.

3. Display of solenoid valves on CONSULT changes at the start of shifting, while gear position is displayed upon completion of shifting (which is computed by TCM).

Item name	Condition	Display value (Approx.)
VHCL/S SE-A/T	During driving	Approximately matches the speedometer reading.
VHCL/S SE·MTR	During driving	Approximately matches the speedometer reading.
ACCELE POSI	Released accelerator pedal	0.0/8
	Fully depressed accelerator pedal	8.0/8
CLSD THL POS	Released accelerator pedal	ON
	Fully depressed accelerator pedal	OFF
W/O THL POS	Fully depressed accelerator pedal	ON
	Released accelerator pedal	OFF
BRAKESW	Depressed brake pedal	ON
	Released brake pedal	OFF
GEAR	During driving	1, 2, 3, 4, 5
ENGINE SPEED	Engine running	Closely matches the tachometer reading.
INPUT SPEED	During driving (lock-up ON)	Approximately matches the engine speed.
ATF TEMP SE 1	0°C (32° F) – 20°C (68°F) – 80°C (176°F)	3.3 – 2.7 – 0.9 V
ATF TEMP 1	Ignition switch ON	Temperature of ATF in the oil pan is indicated.
ATF PRES SW 2	Low coast brake engaged. Refer to TM-17	ON
	Low coast brake disengaged. Refer to TM-17	OFF

Item name	Condition	Display value (Approx.)
SLCT LVR POSI	Selector lever in “N” and “P” position	N/P
	Selector lever in “R” position	R
	• Selector lever in “D” position • Manual mode OFF	D
	• Selector lever in “D” position • Manual mode ON • Shift position indicator: 5	D
	• Selector lever in “D” position • Manual mode ON • Shift position indicator: 4	4
	• Selector lever in “D” position • Manual mode ON • Shift position indicator: 3	3
	• Selector lever in “D” position • Manual mode ON • Shift position indicator: 2	2
	• Selector lever in “D” position • Manual mode ON • Shift position indicator: 1	1
MANU MODE SW	Press manual mode select switch	On
	Other than the above	Off
NON M-MODE SW	Press manual mode select switch	Off
	Other than the above	On
UP SW LEVER	Press manual mode position select switch to + side	On
	Other than the above	Off
DOWN SW LEVER	Press manual mode position select switch to − side	On
	Other than the above	Off
TCC SOLENOID	When perform slip lock-up	0.2 – 0.4 A
	When perform lock-up	0.4 – 0.6 A
LINE PRES SOL	During driving	0.2 – 0.6 A
FR/B SOLENOID	Front brake engaged. Refer to TM-17	0.6 – 0.8 A
	Front brake disengaged. Refer to TM-17	0 – 0.05 A
I/C SOLENOID	Input clutch disengaged. Refer to TM-17	0.6 – 0.8 A
	Input clutch engaged. Refer to TM-17	0 – 0.05 A
D/C SOLENOID	Direct clutch disengaged. Refer to TM-17	0.6 – 0.8 A
	Direct clutch engaged. Refer to TM-17	0 – 0.05 A
HLR/C SOL	High and low reverse clutch disengaged. Refer to TM-17	0.6 – 0.8 A
	High and low reverse clutch engaged. Refer to TM-17	0 – 0.05 A
ON OFF SOL	Low coast brake engaged. Refer to TM-17	ON
	Low coast brake disengaged. Refer to TM-17	OFF
STARTER RELAY	Selector lever in “N”,“P” position.	ON
	Selector lever in other position.	OFF
VEHICLE SPEED	During driving	Approximately matches the speedometer reading.

TERMINAL LAYOUT



PHYSICAL VALUES

Terminal (Wire color)		Description		Condition		Value (Approx.)
+	–	Signal name	Input/ Output			
1 (P)	Ground	Power supply (Memory back-up)	Input	Always		Battery voltage
2 (P)	Ground	Power supply (Memory back-up)	Input	Always		Battery voltage
3 (L)	—	CAN-H	Input/ Output	—		—
4 (O)	—	K-line (CONSULT signal)	Input/ Output	—		—
5 (B)	Ground	Ground	Output	Always		0 V
6 (V)	Ground	Power supply	Input	Ignition switch ON		Battery voltage
				Ignition switch OFF		0 V
7 (R)	Ground	Back-up lamp relay	Input	Ignition switch ON	Selector lever in “R” position.	0 V
					Selector lever in other positions.	Battery voltage
8 (P)	—	CAN-L	Input/ Output	—		—
9 (BR)	Ground	Starter relay	Output	Ignition switch ON	Selector lever in “N”,“ P” positions.	Battery voltage
					Selector lever in other positions.	0 V
10 (B)	Ground	Ground	Output	Always		0 V

Fail-Safe

INFOID:0000000006750092

The TCM has an electrical fail-safe mode. This mode makes it possible to operate even if there is an error in a main electronic control input/output signal circuit.
The TCM has an electrical fail-safe mode. This mode makes it possible to operate even if there is an error in a main electronic control input/output signal circuit. In fail-safe mode the transmission is fixed in 2GR, 4GR or 5GR (depending on the breakdown position), so the customer should feel “slipping” or “poor acceleration”.
Even when the electronic circuits are normal, under special conditions (for example, when slamming on the brake with the wheels spinning drastically and stopping the tire rotation), the transmission can go into fail-safe mode. If this happens, switch “OFF” the ignition switch for 10 seconds, then switch it “ON” again to return to the normal shift pattern. Therefore, the customer's vehicle has returned to normal, so handle according to the “diagnostics flow” (Refer to TM-63, "Work Flow").

FAIL-SAFE FUNCTION

If any malfunction occurs in a sensor or solenoid, this function controls the A/T to mark driving possible.

Output Speed Sensor

- Signals are input from two systems - from output speed sensor installed on the transmission and from combination meter so normal driving is possible even if there is a malfunction in one of the systems. And if output speed sensor has unusual cases, 5GR is prohibited.

Accelerator Pedal Position Sensor
- If there is a malfunction in one of the systems, the accelerator opening angle is controlled by ECM according to a pre-determined accelerator angle to make driving possible. And if there are malfunctions in tow systems, the engine speed is fixed by ECM to a pre-determined engine speed to make driving possible.

Throttle Position Sensor
- If there is a malfunction in one of the systems, the accelerator opening angle is controlled by ECM according to a pre-determined accelerator angle to make driving possible. And if there are malfunctions in tow systems, the accelerator opening angle is controlled by the idle signal sent from the ECM which is based on input indicating either idle condition or off-idle condition (pre-determined accelerator opening) in order to make driving possible.

Transmission Range Switch
- In the unlikely event that a malfunction signal enters the TCM, the position indicator is switched “OFF”, the starter relay is switched “OFF” (starter starting is disabled), the back-up lamp relay switched “OFF” (back-up lamp is OFF) and the position is fixed to the “D” range to make driving possible.

Starter Relay
- The starter relay is switched “OFF”. (Starter starting is disabled.)

Interlock
- If there is an interlock judgment malfunction, the transmission is fixed in 2GR to make driving possible.
  NOTE:
  When the vehicle is driven fixed in 2GR, a input speed sensor malfunction is displayed, but this is not a input speed sensor malfunction.
- When the interlock is detected at the 3GR or more, it is locked at the 2GR.

1st Engine Braking
- When there is an 1st engine brake judgment malfunction, the low coast brake solenoid is switched “OFF” to avoid the engine brake operation.

Line Pressure Solenoid
- The solenoid is switched “OFF” and the line pressure is set to the maximum hydraulic pressure to make driving possible.

Torque Converter Clutch Solenoid
- The solenoid is switched “OFF” to release the lock-up.

Low Coast Brake Solenoid
- When a (electrical or functional) malfunction occurs, in order to make driving possible, the engine brake is not applied in 1GR and 2GR.

Input Clutch Solenoid
- If a (electrical or functional) malfunction occurs with the solenoid either “ON” or “OFF”, the transmission is held in 4GR to make driving possible.

Direct Clutch Solenoid
- If a (electrical or functional) malfunction occurs with the solenoid either “ON” or “OFF”, the transmission is held in 4GR to make driving possible.

Front Brake Solenoid
- If a (electrical or functional) malfunction occurs with the solenoid “ON”, in order to make driving possible, the A/T is held in 5GR; if the solenoid is OFF, 4GR.

High and Low Reverse Clutch Solenoid
- If a (electrical or functional) malfunction occurs with the solenoid either “ON” or “OFF”, the transmission is held in 4GR to make driving possible.

Input Speed Sensor 1 or 2
- The control is the same as if there were no input speed sensors, 5GR is prohibited.

DTC Inspection Priority Chart

INFOID:0000000006750093

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

NOTE:
If DTC U1000 is displayed with other DTCs, first perform the trouble diagnosis for DTC U1000. Refer to TM-82, "Diagnosis Procedure".

Priority	Detected items (DTC)
1	U1000 CAN COMM CIRCUIT
2	Except above

DTC Index

INFOID:0000000006750094

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to TM-82, "Diagnosis Procedure".

DTC		Items (CONSULT screen terms)	Reference page
OBD-II	Except OBD-II		
"ENGINE" with CONSULT or GST (*1)	CONSULT only "TRANSMISSION"		
—	P0615	STARTER RELAY	TM-83
P0700	P0700	TRANSMISSION CONT	TM-85
P0705	P0705	T/M RANGE SENSOR A	TM-86
P0710	P1710	TRANS FLUID TEMP SEN	TM-110
P0717	P0717	INPUT SPEED SENSOR A	TM-88
P0720	P0720	OUTPUT SPEED SENSOR	TM-91
—	P0725	ENGINE SPEED	TM-93
P0731	P0731	1GR INCORRECT RATIO	TM-96
P0732	P0732	2GR INCORRECT RATIO	TM-98
P0733	P0733	3GR INCORRECT RATIO	TM-100
P0734	P0734	4GR INCORRECT RATIO	TM-102
P0735	P0735	5GR INCORRECT RATIO	TM-104
P0740	P0740	TORQUE CONVERTER	TM-105
P0744	P0744	TORQUE CONVERTER	TM-106
P0745	P0745	PC SOLENOID A	TM-108
—	P1705	TP SENSOR	TM-109
—	P1721	VEHICLE SPEED SIGNAL	TM-112
P1730	P1730	INTERLOCK	TM-114
—	P1731	1GR E/BRAKING	TM-116
P1752	P1752	INPUT CLUTCH SOL	TM-117
P1757	P1757	FR BRAKE SOLENOID	TM-118
P1762	P1762	DRCT CLUTCH SOL	TM-119
P1767	P1767	HLR CLUTCH SOLENOID	TM-121
P1772	P1772	L C BRAKE SOLENOID	TM-122
P1774 (2*)	P1774	L C BRAKE SOLENOID	TM-123
—	P1815	M-MODE SWITCH	TM-125
U1000	U1000	CAN COMM CIRCUIT	TM-82

*1: These numbers are prescribed by SAE J2012.

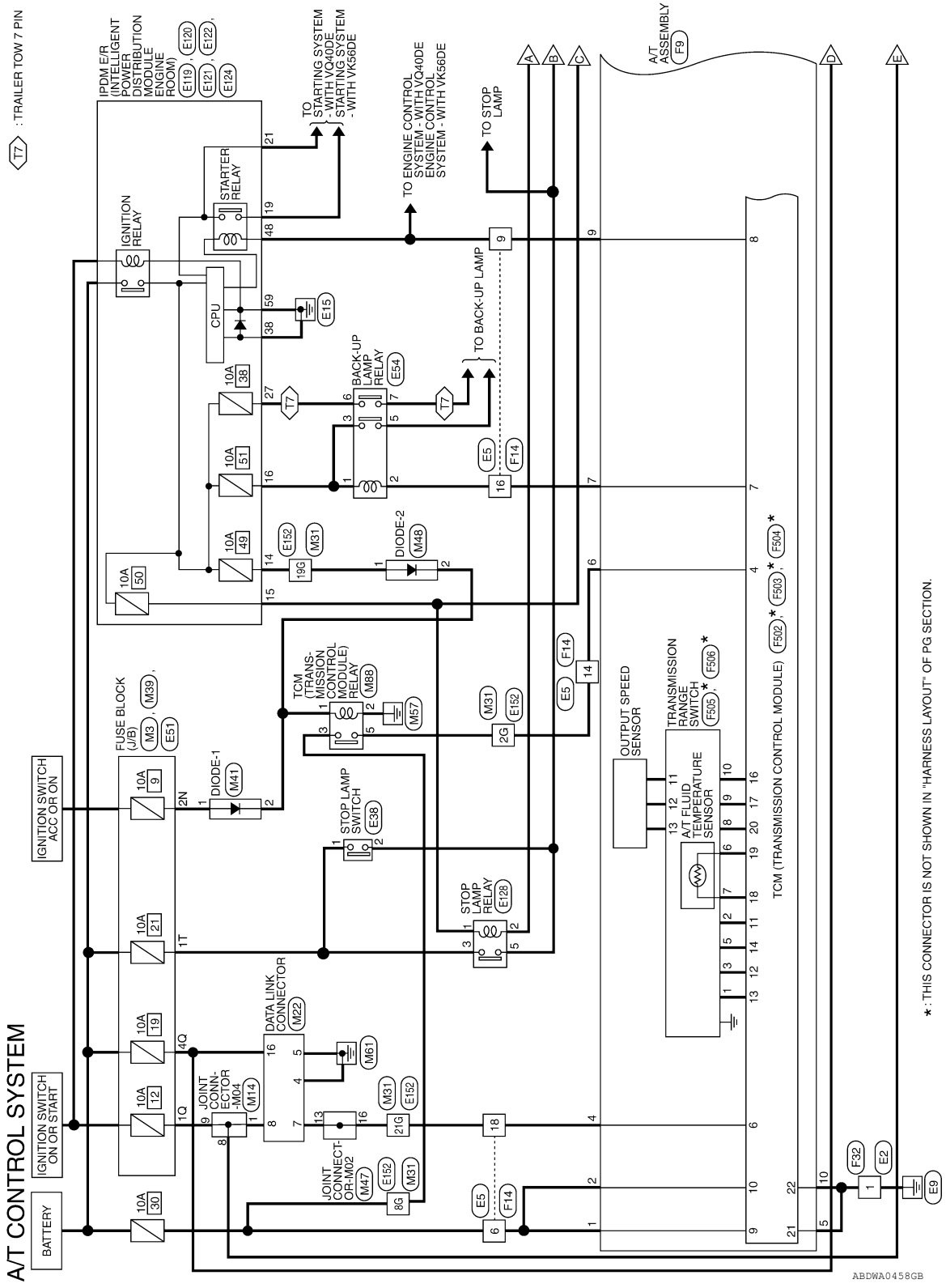
*2: These malfunctions cannot be displayed MIL if another malfunction is assigned to MIL.

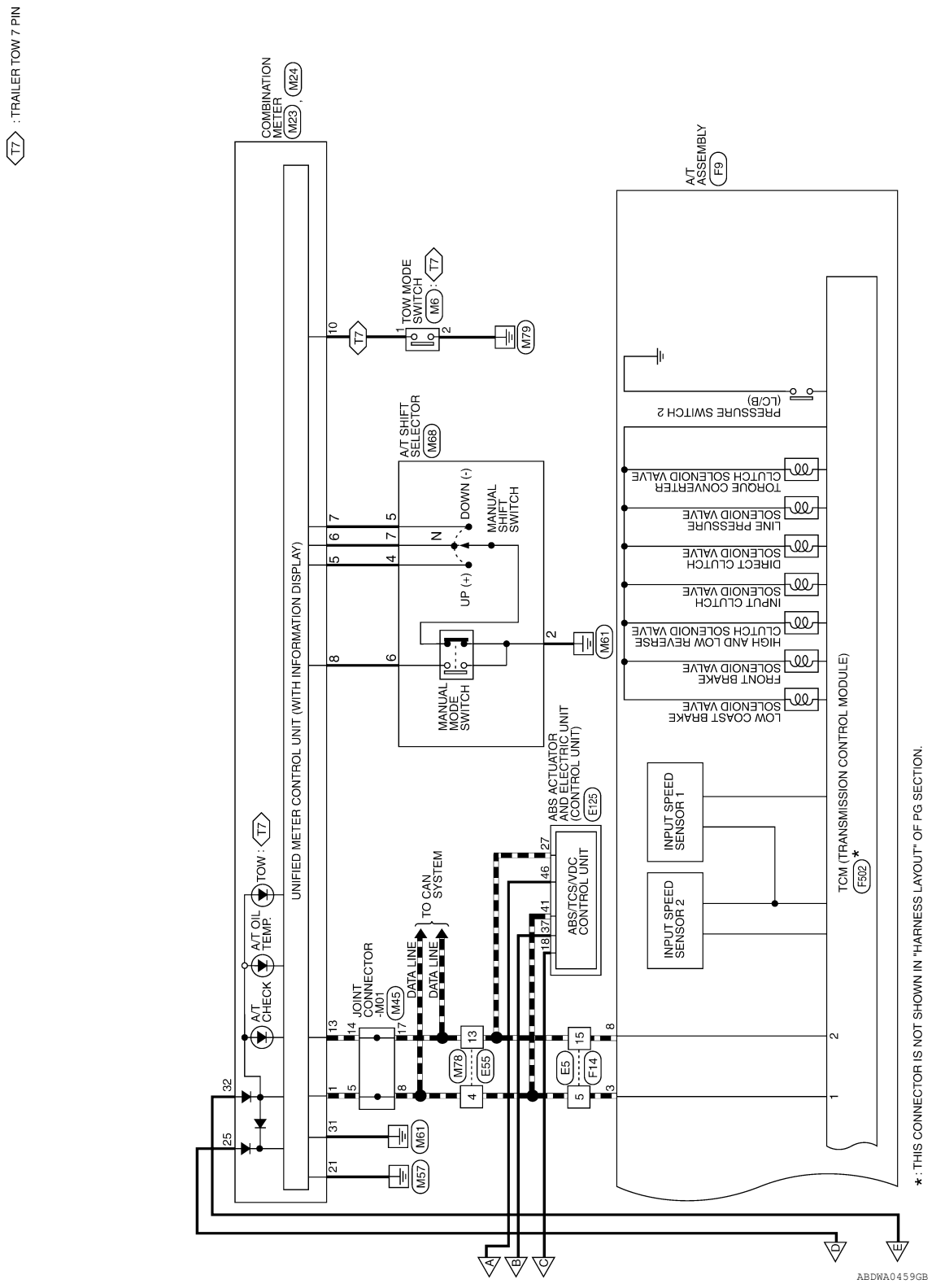
WIRING DIAGRAM

A/T CONTROL SYSTEM

Wiring Diagram

INFOID:0000000006750095




T7 : TRAILER TOW 7 PIN
COMBINATION METER (M23), (M24)
UNIFIED METER CONTROL UNIT (WITH INFORMATION DISPLAY)
TOW : T7
A/T OIL TEMP.
A/T CHECK
JOINT CONNECTOR -M01 (M45)
DATA LINE
DATA LINE
TO CAN SYSTEM
TOW MODE SWITCH (M6) : T7
A/T SHIFT SELECTOR (M68)
DOWN (-)
UP (+)
N
MANUAL SHIFT SWITCH
MANUAL MODE SWITCH
ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) (E125)
ABS/TCS/VDC CONTROL UNIT
A/T ASSEMBLY (F9)
PRESSURE SWITCH 2 (LC/B)
TORQUE CONVERTER CLUTCH SOLENOID VALVE
LINE PRESSURE SOLENOID VALVE
DIRECT CLUTCH SOLENOID VALVE
INPUT CLUTCH SOLENOID VALVE
HIGH AND LOW REVERSE CLUTCH SOLENOID VALVE
FRONT BRAKE SOLENOID VALVE
LOW COAST BRAKE SOLENOID VALVE
INPUT SPEED SENSOR 1
INPUT SPEED SENSOR 2
TCM (TRANSMISSION CONTROL MODULE) (F502)*
*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.
ABDWA0459GB

A/T CONTROL SYSTEM CONNECTORS

Connector No.	M3
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
2N	O	–

Connector No.	M6
Connector Name	TOW MODE SWITCH
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	B	–

Connector No.	M14
Connector Name	JOINT CONNECTOR-M04
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
8	R	–
9	R	–

Connector No.	M22
Connector Name	DATA LINK CONNECTOR
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
4	B	–
5	B	–
7	O	–
8	R	–
16	Y	–

Connector No.	M23
Connector Name	COMBINATION METER
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
25	Y	BATTERY
31	B	GND (POWER)
32	R	RUN START

Connector No.	M24
Connector Name	COMBINATION METER
Connector Color	WHITE

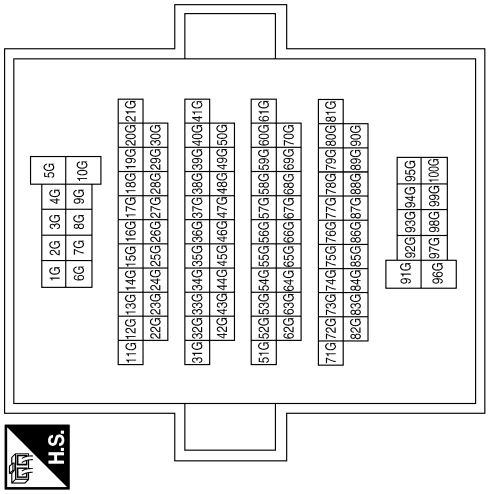
H.S.

Terminal No.	Color of Wire	Signal Name
1	L	CAN-H
5	R	MANUAL MODE : UP
6	Y	MANUAL MODE : MONITOR
7	G	MANUAL MODE : DOWN
8	BR	MANUAL MODE : M-MODE
10	SB	TOW MODE SWITCH
13	P	CAN-L
21	B	GND (ILL)

ABDIA0706GB

Connector No.	M31
Connector Name	WIRE TO WIRE
Connector Color	WHITE

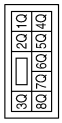
H.S.



Terminal No.	Color of Wire	Signal Name
2G	V	–
8G	P	–
19G	Y	–
21G	O	–

Connector No.	M39
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
1Q	R	–
4Q	Y	–

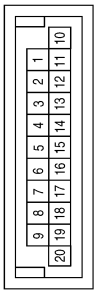
Connector No.	M41
Connector Name	DIODE-1
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	BR	–

Connector No.	M45
Connector Name	JOINT CONNECTOR-M01
Connector Color	BLUE

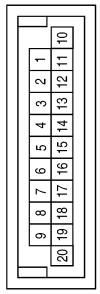
H.S.



Terminal No.	Color of Wire	Signal Name
5	L	–
8	L	–
14	P	–
17	P	–

Connector No.	M47
Connector Name	JOINT CONNECTOR-M02
Connector Color	GREEN

H.S.



Terminal No.	Color of Wire	Signal Name
13	O	–
16	O	–

ABDIA0707GB

Connector No.	M78
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
4	L	–
13	P	–

Connector No.	M68
Connector Name	A/T SHIFT SELECTOR
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
2	B	–
4	R	–
5	G	–
6	BR	–
7	Y	–

Connector No.	M48
Connector Name	DIODE-2
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	BR	–

Connector No.	E5
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
5	L	–
6	P	–
9	BR	–
14	V	–
15	P	–
16	R	–
18	O	–

Connector No.	E2
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	–

Connector No.	M88
Connector Name	TCM (TRANSMISSION CONTROL MODULE) RELAY
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	B	–
3	P	–
5	V	–

ABDIA0708GB

Connector No.	E38
Connector Name	STOP LAMP SWITCH
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	LG	–

Connector No.	E51
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1T	O	–

Connector No.	E54
Connector Name	BACK-UP LAMP RELAY
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	–
2	R	–
3	G	–
5	O	–
6	SB	–
7	Y	–

Connector No.	E55
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
4	L	–
13	P	–

Connector No.	E119
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
14	Y	A/T ECU IGN
15	GR	ABS ECU IGN
16	G	REVERSE LAMP IGN

Connector No.	E120
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
19	W	STARTER MOTOR
21	Y	IGN SW(ST)

ABDIA0709GB

Connector No.	E121
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN

H.S.

29	28		27	26	25
36	35	34	33	32	31	30

Terminal No.	Color of Wire	Signal Name
27	SB	T TOW REV LAMP

Connector No.	E122
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

42	41	40	39	38	37
48	47	46	45	44	43

Terminal No.	Color of Wire	Signal Name
38	B	GND (SIGNAL)
48	BR	NPSW

Connector No.	E124
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

H.S.

59	58	57
62	61	60

Terminal No.	Color of Wire	Signal Name
59	B	GND (POWER)

Connector No.	E125
Connector Name	ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)
Connector Color	BLACK

H.S.

1		3																
		5	6	7	8	9	10	11	12	13	14	15	16	17	18			
2	4	19	20	21	22	23	24	25	26	27	28	29	30	31	32			
		33	34	35	36	37	38	39	40	41	42	43	44	45	46			

Terminal No.	Color of Wire	Signal Name
18	GR	IGN-1
27	P	CAN-L
37	LG	STP
41	L	CAN-H
46	W	STPO

Connector No.	E128
Connector Name	STOP LAMP RELAY
Connector Color	BLUE

H.S.

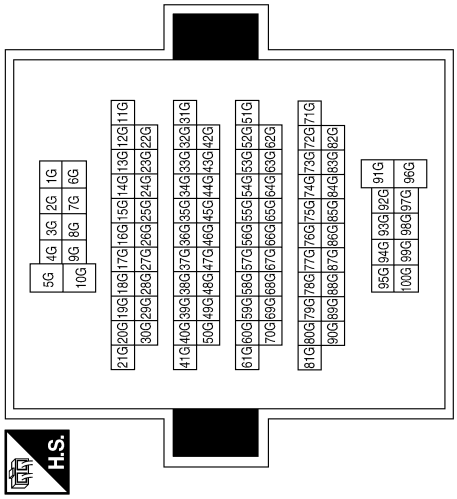
3		
	5	
2		1

Terminal No.	Color of Wire	Signal Name
1	GR	–
2	W	–
3	O	–
5	LG	–

ABDIA0710GB

Connector No.	E152
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
2G	V	–
8G	P	–
19G	Y	–
21G	O	–

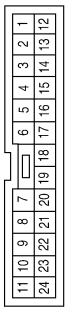
Connector No.	F9
Connector Name	A/T ASSEMBLY
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	P	–
2	P	–
3	L	–
4	O	–
5	B	–
6	V	–
7	R	–
8	P	–
9	BR	–
10	B	–

Connector No.	F14
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
5	L	–
6	P	–
9	BR	–
14	V	–
15	P	–
16	R	–
18	O	–

ABDIA0711GB

Connector No.	F32
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

4	3		2	1
10	9	8	7	6	5

Terminal No.	Color of Wire	Signal Name
1	B	–

Connector No.	F502
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Color	GRAY

H.S.

10	9	8	7	6	5	4	3	2	1

Terminal No.	Color of Wire	Signal Name
1	BR	CAN-H
2	L/Y	CAN-L
3	–	–
4	R	VIGN
5	–	–
6	L	K-LINE
7	O	REV LAMP RLY
8	G	START-RLY
9	W	STAND BY SUPPY-1
10	GR	STAND BY SUPPY-2

Connector No.	F503
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Color	GREEN

H.S.

20	19	18	17	16	15	14	13	12	11

Terminal No.	Color of Wire	Signal Name
11	W	TR SW4
12	GR	TR SW2
13	BR	TR SW1
14	L	TR SW3
15	–	–

Terminal No.	Color of Wire	Signal Name
16	B	OUTPUT SPEED SEN GND
17	R	OUTPUT SPEED SEN
18	O	ATF SENS
19	G	ATF SENS
20	Y	OUTPUT SPEED SEN POWER

Connector No.	F504
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Color	WHITE

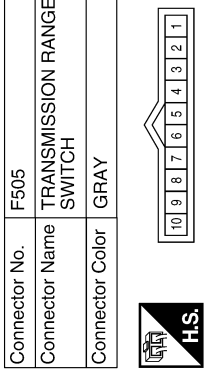
H.S.

22	21

Terminal No.	Color of Wire	Signal Name
21	B	POWER GND-1
22	Y	POWER GND-2

ABDIA0712GB

Connector No.	F505
Connector Name	TRANSMISSION RANGE SWITCH
Connector Color	GRAY



Terminal No.	Color of Wire	Signal Name
1	BR	S1
2	W	S4
3	GR	S2
4	–	–
5	L	S3
6	G	–
7	O	–
8	Y	C2
9	R	C1
10	B	C3

Connector No.	F506
Connector Name	TRANSMISSION RANGE SWITCH
Connector Color	GRAY

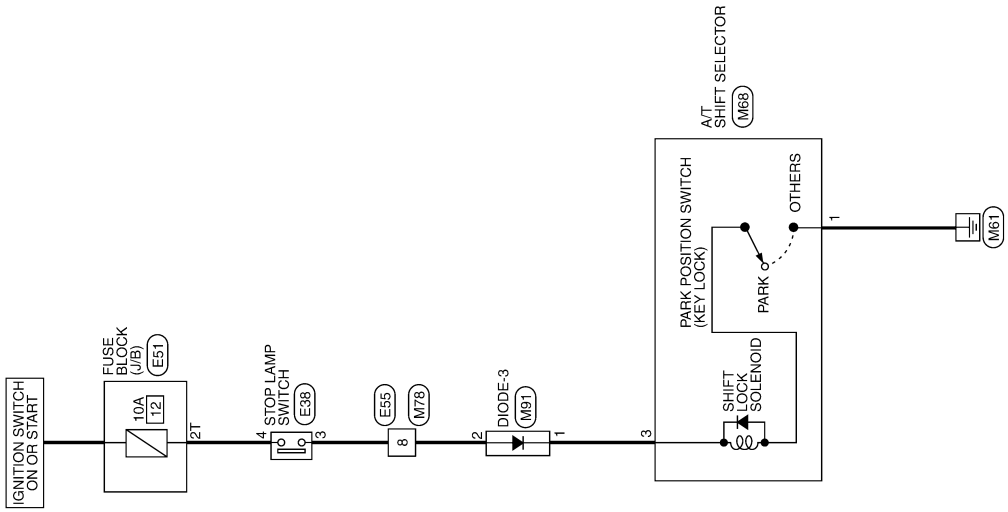
Terminal No.	Color of Wire	Signal Name
11	L	C3 (GND)
12	W	C2 (VOUT)
13	R	C1 (VIN)

ABDIA0713GB

A/T SHIFT LOCK SYSTEM

Wiring Diagram

INFOID:0000000006750096



A/T SHIFT LOCK SYSTEM

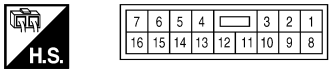
ABDWA0460GB

A/T SHIFT LOCK SYSTEM CONNECTORS

Connector No.	M68
Connector Name	A/T SHIFT SELECTOR
Connector Color	WHITE

Terminal No.	Color of Wire	Signal Name
1	B	–
3	L	–

Connector No.	M78
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
8	BR	–

Connector No.	M91
Connector Name	DIODE-3
Connector Color	WHITE

Terminal No.	Color of Wire	Signal Name
1	L	–
2	BR	–

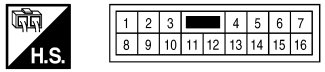
Connector No.	E38
Connector Name	STOP LAMP SWITCH
Connector Color	WHITE

Terminal No.	Color of Wire	Signal Name
3	BR	–
4	R	–

Connector No.	E51
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

Terminal No.	Color of Wire	Signal Name
2T	W	–

Connector No.	E55
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
8	BR	–

ABDIA0714GB

BASIC INSPECTION

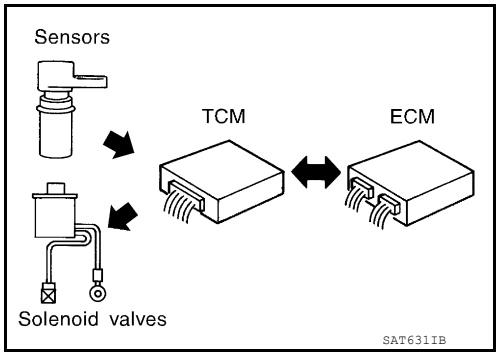
DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

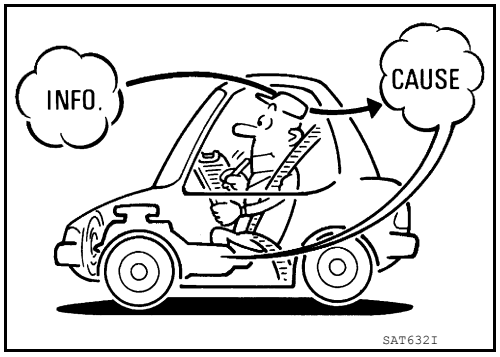
INFOID:0000000006749893

INTRODUCTION

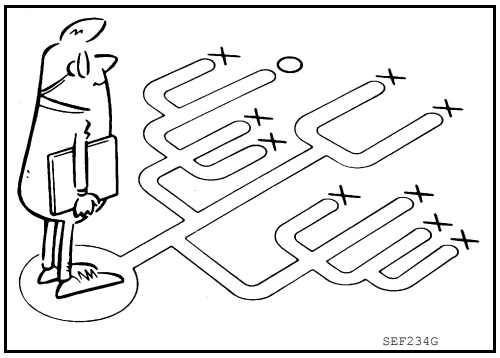
The TCM receives a signal from the output speed sensor, accelerator pedal position sensor (throttle position sensor) or transmission range switch. Then provides shift control or lock-up control via A/T solenoid valves.
Input and output signals must always be correct and stable in the operation of the A/T system. The A/T system must be in good operating condition and be free of valve seizure, solenoid valve malfunction, etc.



It is much more difficult to diagnose an error that occurs intermittently rather than continuously. Most intermittent errors are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.
A visual check may not find the cause of the errors. A road test with CONSULT or a circuit tester connected should be performed. Follow the “DETAILED FLOW”.



Before undertaking actual checks, take a few minutes to talk with the customer who has the driveability complaint. The customer can supply good information about such errors, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic work sheet” as shown in the example (Refer to TM-64) should be used.
Start your diagnosis by looking for “conventional” errors first. This will help troubleshoot driveability errors on an electronically controlled engine vehicle.
Also check related Service bulletins.



DETAILED FLOW

1. COLLECT THE INFORMATION FROM THE CUSTOMER

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using diagnosis worksheet. Refer to TM-64, "Diagnostic Work Sheet".

>> GO TO 2.

2. CHECK SYMPTOM 1

Check the following items based on the information obtained from the customer.
- Fail-safe. Refer to TM-47, "Fail-Safe".
- A/T fluid leakage.
- Stall test. Refer to TM-73, "Inspection and Judgment".
- Line pressure test. Refer to TM-75, "Inspection and Judgment".

>> GO TO 3.

3.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is detected.

- Record DTC.
- Erase DTC.

Is any DTC detected?

YES >> GO TO 4.
NO >> GO TO 6.

4.PERFORM DTC CONFIRMATION PROCEDURE

Perform “DTC CONFIRMATION PROCEDURE” of the apropriate DTC to check if DTC is detected again.

Is any DTC detected?

YES >> GO TO 5.
NO >> Check according to GI-39, "Intermittent Incident".

5.REPAIR OR REPLACE THE MALFUNCTIONIONG PARTS

Repair or replace the detected malfunctioning parts.
Reconnect parts or connector after repairing or replacing, and then erase DTC if necessary.

>> GO TO 8.

6.REPRODUCE MALFUNCTION SYMPTOM

Check the malfunction described by the customer on the vehicle.
Verify the relationship between the symptom and the conditions in which the malfunction described by the customer occurs.

>> GO TO 7.

7.IDENTIFY MALFUNCTIONING SYSTEM WITH “DIAGNOSIS CHART BY SYMPTOM”

Use TM-137, "Symptom Table" from the symptom inspection result in step 6. Then identify where to start performing the diagnosis based on possible causes and symptoms.

>> GO TO 8.

8.FINAL CHECK

Perform “DTC CONFIRMATION PROCEDURE” again to make sure that the repair is correctly performed.
Check that malfunctions are not reproduced when obtaining the malfunction information from the customer.

Is DTC or malfunction symptom reproduced?

YES-1 >> DTC is reproduced: GO TO 4.
YES-2 >> Malfunction symptom is reproduced: GO TO 7.
NO >> Before delivering the vehicle to the customer, make sure that DTC is erased.

Diagnostic Work Sheet

INFOID:0000000006749894

INFORMATION FROM CUSTOMER

KEY POINTS

- **WHAT**..... Vehicle and A/T model
- **WHEN**..... Date, Frequencies
- **WHERE**..... Road conditions
- **HOW**..... Operating conditions, Symptoms

Customer name MR/MS	Model and Year	VIN
Trans. Model	Engine	Mileage

Malfunction Date	Manuf. Date	In Service Date
Frequency	☐ Continuous ☐ Intermittent (times a day)	
Symptoms	☐ Vehicle does not move. (☐ Any position ☐ Particular position)	
	☐ No up-shift (☐ 1GR → 2GR ☐ 2GR → 3GR ☐ 3GR → 4GR ☐ 4GR → 5GR)	
	☐ No down-shift (☐ 5GR → 4GR ☐ 4GR → 3GR ☐ 3GR → 2GR ☐ 2GR → 1GR)	
	☐ Lock-up malfunction	
	☐ Shift point too high or too low.	
	☐ Shift shock or slip (☐ N → D ☐ N → R ☐ Lock-up ☐ Any drive position)	
	☐ Noise or vibration	
	☐ No kick down	
	☐ No pattern select	
	☐ Others ( )	
A/T CHECK indicator lamp	☐ Continuously lit	☐ Not lit

DIAGNOSTIC WORK SHEET

1	☐ Read the item on cautions concerning fail-safe and understand the customer's complaint.			TM-47
2	☐ A/T fluid inspection, stall test and line pressure test			
		☐ A/T fluid leakage		
		☐ Stall test		TM-73
		☐ Torque converter one-way clutch ☐ Front brake ☐ High and low reverse clutch ☐ Low coast brake ☐ Forward brake ☐ Reverse brake ☐ Forward one-way clutch	☐ 1st one-way clutch ☐ 3rd one-way clutch ☐ Engine ☐ Line pressure low ☐ Except for input clutch and direct clutch, clutches and brakes OK	
		☐ Line pressure test - Suspected part:		TM-75
3	☐ Perform self-diagnosis. — Check detected items to repair or replace malfunctioning part.			TM-39
4	☐ Perform road test.			
	4-1	☐ Check before engine is started		TM-77
	4-2	☐ Check at idle		TM-77
	4-3	Cruise test	☐ Part 1	TM-78
			☐ Part 2	TM-80
			☐ Part 3	TM-80
	☐ Check malfunction phenomena to repair or replace malfunctioning part after completing all road tests. Refer to TM-137, "Symptom Table".			
5	☐ Drive vehicle to check that the malfunction phenomenon has been resolved.			
6	☐ Erase the results of the self-diagnosis from the TCM and ECM.			TM-39, TM-42

A/T FLUID

Checking A/T Fluid

INFOID:0000000006750105

CAUTION:
If using the vehicle for towing, the A/T fluid must be replaced as specified.

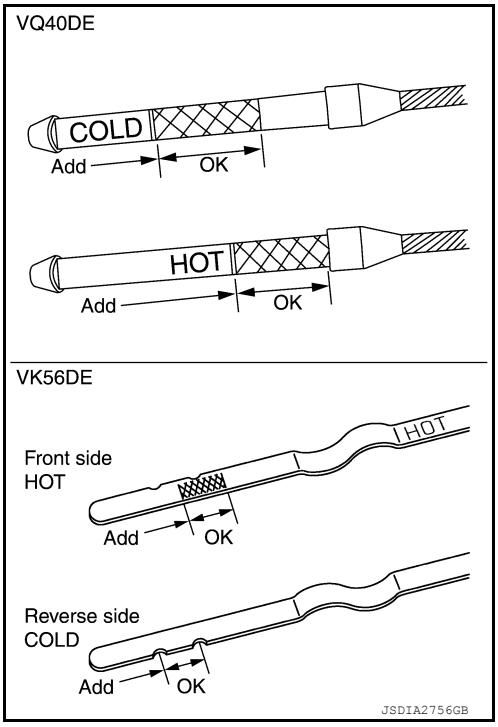
1. Before driving, the A/T fluid level can be checked at A/T fluid temperatures of 30 – 50°C (86 – 122°F) using the “COLD” range on the A/T fluid level gauge as follows:

a. Park the vehicle on a level surface and set the parking brake.

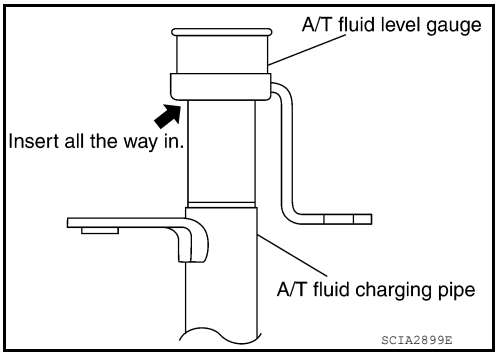
b. Start the engine and move the selector lever through each gear position. Shift the selector lever into the “P” position.

c. Check the A/T fluid level with the engine idling.

d. Remove the A/T fluid level gauge and wipe it clean with a lint-free paper.
CAUTION:
When wiping the A/T fluid from the A/T fluid level gauge, always use a lint-free paper, not a cloth.



e. Re-insert the A/T fluid level gauge into the A/T fluid charging pipe until the cap contacts the top of the A/T fluid charging pipe as shown.
CAUTION:
To check A/T fluid level, insert the A/T fluid level gauge until the cap contacts the top of the A/T fluid charging pipe, with the gauge reversed from the normal inserted position.



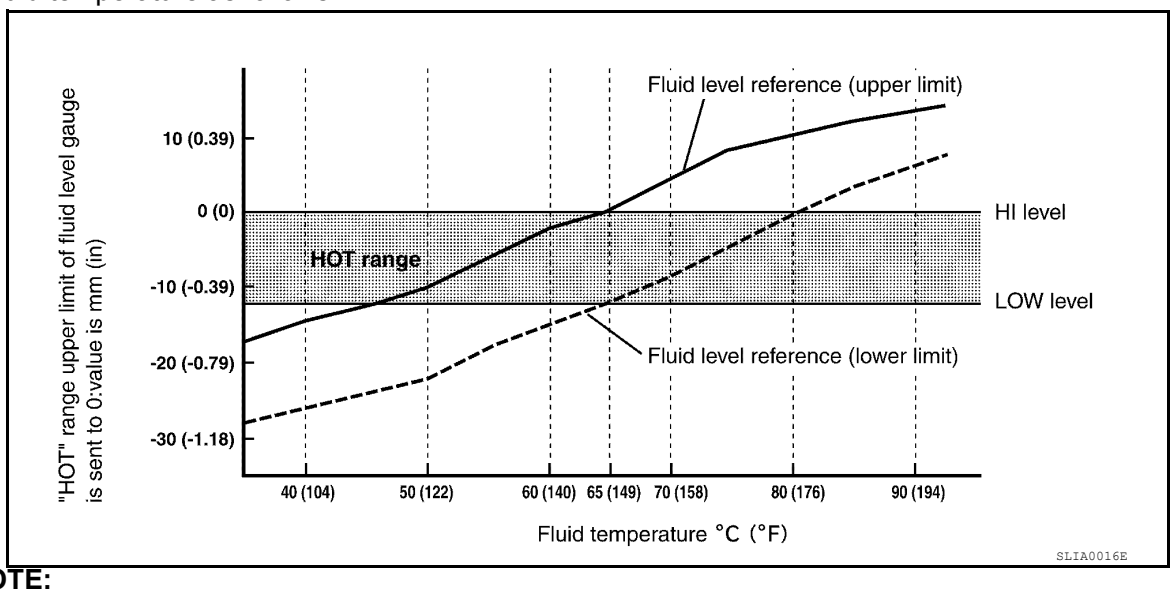
f. Remove the A/T fluid level gauge and note the A/T fluid level. If the A/T fluid level is at low side of range, add A/T fluid to the transmission through the A/T fluid charging pipe.
CAUTION:
Do not overfill the transmission with A/T fluid.

g. Install the A/T fluid level gauge and the A/T fluid level gauge bolt.

A/T fluid level gauge bolt : Refer to TM-188, "Exploded View".

2. Warm up the engine and transmission.
3. Check for any A/T fluid leaks.
4. Drive the vehicle to increase the A/T fluid temperature to 80°C (176°F).

5. Allow the A/T fluid temperature to fall to approximately 65°C (149°F). Use the CONSULT to monitor the A/T fluid temperature as follows:



NOTE:
The A/T fluid level will be significantly affected by the A/T fluid temperature as shown. Therefore monitor the A/T fluid temperature data using the CONSULT.

a. Connect CONSULT to data link connector.

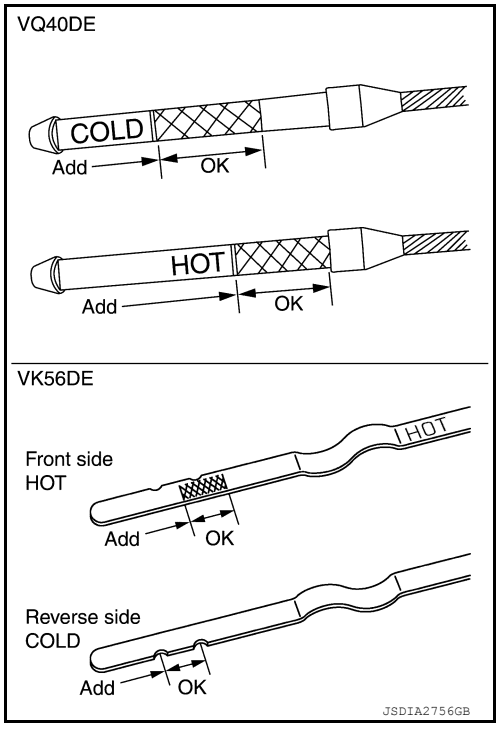
b. Select “ATF TEMP 1” in “Data Monitor” mode for “TRANSMISSION” with CONSULT.

c. Read out the value of “ATF TEMP 1”.

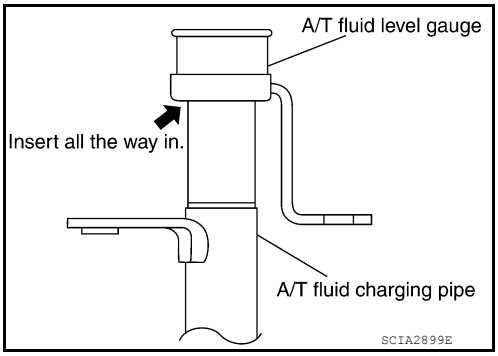
6. Re-check the A/T fluid level at A/T fluid temperatures of approximately 65°C (149°F) using the “HOT” range on the A/T fluid level gauge as shown. The HOT range is between 50° – 80° C (122° – 176°F).

CAUTION:

- **When wiping the A/T fluid from the A/T fluid level gauge, always use lint-free paper, not a cloth.**



- **To check the A/T fluid level, insert the A/T fluid level gauge until the cap contacts the top of the A/T fluid charging pipe, with the gauge reversed from the normal inserted position as shown.**



7. Check the A/T fluid condition.
   - If the A/T fluid is very dark or has some burned smell, there may be an internal problem with the transmission. Refer to TM-70, "A/T Fluid Cooler Cleaning". Flush the transmission cooling system after repairing the transmission.
   - If the A/T fluid contains frictional material (clutches, bands, etc.), replace the radiator and flush the transmission cooler lines using cleaning solvent and compressed air after repairing the transmission.
8. Install the A/T fluid level gauge in the A/T fluid charging pipe.
9. Tighten the A/T fluid level gauge bolt to specification.

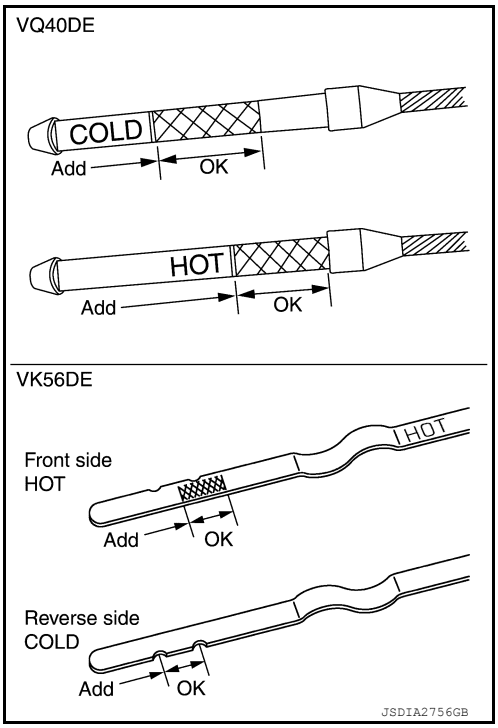
A/T fluid level gauge bolt : Refer to TM-188, "Exploded View".

Changing A/T Fluid

INFOID:0000000006750106

CAUTION:
If using the vehicle for towing, the A/T fluid must be replaced as specified.

1. Drive the vehicle to warm up the A/T fluid to approximately 80°C (176°F).
2. Stop the engine.
3. Remove the A/T fluid level gauge.
4. Drain the A/T fluid from the drain plug hole, then install the drain plug with a new gasket. Refill the transmission with new A/T fluid. Always refill with the same volume as the drained A/T fluid. Use the A/T fluid level gauge to check the A/T fluid level as shown. Add A/T fluid as necessary.



Drain plug : Refer to TM-166, "Exploded View".

   - To flush out the old A/T fluid from the transmission oil coolers, pour new A/T fluid into the A/T fluid charging pipe with the engine idling and at the same time drain the old A/T fluid from the auxiliary transmission oil cooler hose return line.
   - When the color of the A/T fluid coming out of the auxiliary transmission oil cooler hose return line is about the same as the color of the new A/T fluid, flushing out the old A/T fluid is complete. The amount of new A/T fluid used for flushing should be 30 – 50% increase of the specified capacity.

A/T fluid grade and capacity : Refer to MA-13, "Fluids and Lubricants".

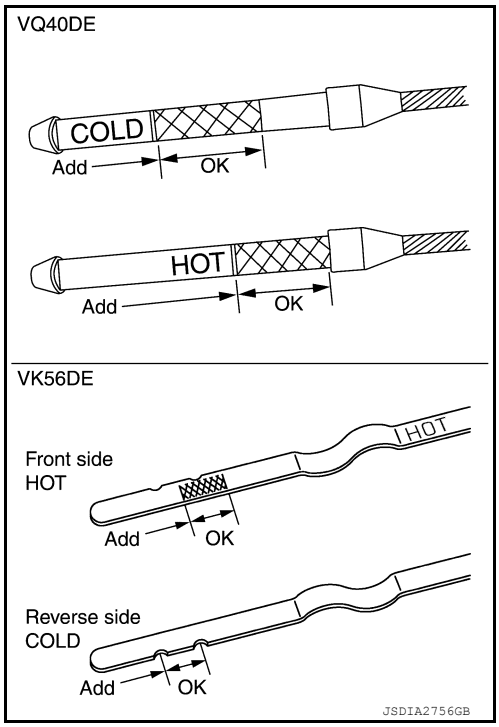
CAUTION:
- **If Genuine NISSAN Matic S ATF is not available, Genuine NISSAN Matic J ATF may also be used.**
- **Using ATF fluid other than Genuine NISSAN Matic S ATF or Matic J ATF will cause deterioration in driveability and A/T durability, and may damage the A/T, which is not covered by the warranty.**
- **When filling the transmission with A/T fluid, do not spill the A/T fluid on any heat generating parts such as the exhaust parts.**
- **Do not reuse the drain plug gasket.**

5. Install the A/T fluid level gauge and tighten the A/T fluid level gauge bolt to specification.

A/T fluid level gauge bolt : Refer to TM-188, "Exploded View".

6. Drive the vehicle to warm up the A/T fluid to approximately 80°C (176°F).
7. Check the fluid level and condition. If the A/T fluid is still dirty, repeat steps 2 through 6.
8. Install the A/T fluid level gauge in the A/T fluid charging pipe and install the A/T fluid level gauge bolt.
9. Tighten the A/T fluid level gauge bolt to specification.

A/T fluid level gauge bolt : **Refer to TM-188, "Exploded View".**



A/T FLUID COOLER

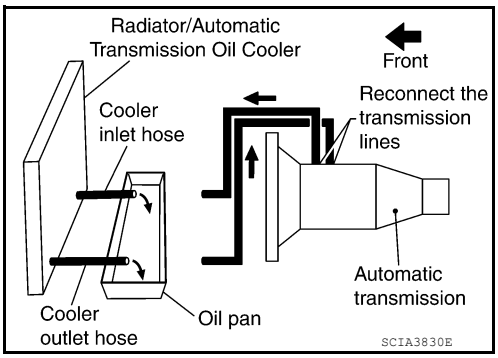
A/T Fluid Cooler Cleaning

INFOID:0000000006750107

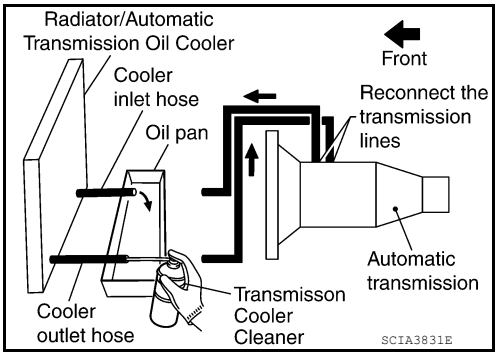
Whenever an A/T is repaired, overhauled, or replaced, the A/T fluid cooler mounted in the radiator must be inspected and cleaned.
Metal debris and friction material, if present, can become trapped in the A/T fluid cooler. This debris can contaminate the newly serviced A/T or, in severe cases, can block or restrict the flow of A/T fluid. In either case, malfunction of the newly serviced A/T may result.
Debris, if present, may build up as A/T fluid enters the cooler inlet. It will be necessary to back flush the cooler through the cooler outlet in order to flush out any built up debris.

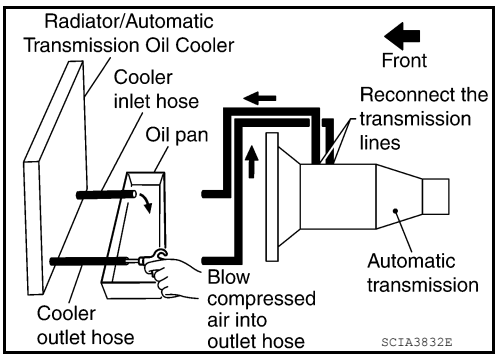
A/T FLUID COOLER CLEANING PROCEDURE

1. Position a drain pan under the A/T inlet and outlet fluid cooler tube to cooler hose connection.
2. Put a different color matching mark on each cooler tube to cooler hose connection to aid in assembly.
   CAUTION:
   Use paint to make the matching mark. Do not damage the tubes or hose.
3. Disconnect the fluid cooler inlet and outlet rubber hoses from the steel cooler tubes.
   NOTE:
   Replace the cooler hoses if rubber material from the hose remains on the tube fitting.
4. Drain any A/T fluid from the cooler hose.



5. Insert the extension adapter hose of a can of Transmission Cooler Cleaner (Nissan P/N 999MP-AM006) into the cooler outlet hose.
   CAUTION:
   - **Wear safety glasses and rubber gloves when spraying the Transmission Cooler Cleaner.**
   - **Spray cooler cleaner only with adequate ventilation.**
   - **Avoid contact with eyes and skin.**
   - **Do not breath vapors or spray mist.**
6. Hold the hose and can as high as possible and spray Transmission Cooler Cleaner in a continuous stream into the cooler outlet hose until fluid flows out of the cooler inlet hose for 5 seconds.
7. Insert the tip of an air gun into the end of the cooler outlet hose.
8. Wrap a shop rag around the tip of the air gun and the cooler outlet hose.





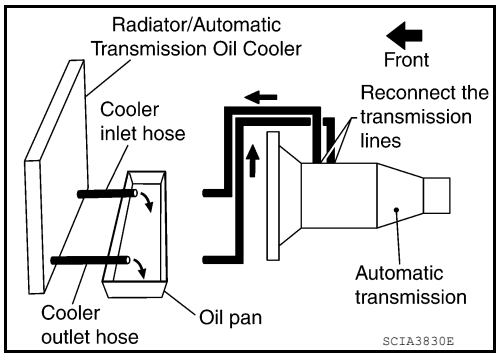
9. Blow compressed air regulated to 490 - 883 kPa (5 - 9 kg/cm^2, 71 - 128 psi) through the cooler outlet hose for 10 seconds to force out any remaining fluid.
10. Repeat steps 5 through 9 three additional times.
11. Position an oil pan under the banjo bolts that connect the fluid cooler tubes to the A/T.
12. Remove the banjo bolts.

13. Flush each steel line from the cooler side back toward the A/T by spraying Transmission Cooler Cleaner in a continuous stream for 5 seconds.
14. Blow compressed air regulated to 490 - 883 kPa (5 - 9 kg/cm^2, 71 - 128 psi) through each steel line from the cooler side back toward the A/T for 10 seconds to force out any remaining fluid.
15. Ensure all debris is removed from the steel cooler lines.
16. Ensure all debris is removed from the banjo bolts and fittings.
17. Perform A/T fluid cooler diagnosis.

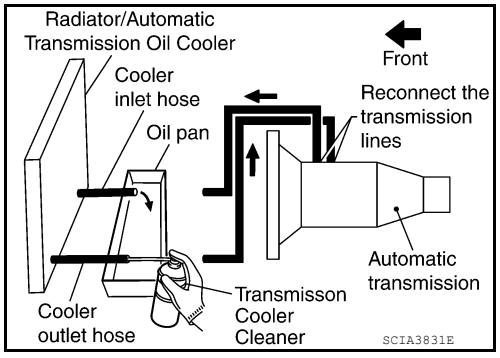
A/T FLUID COOLER DIAGNOSIS PROCEDURE

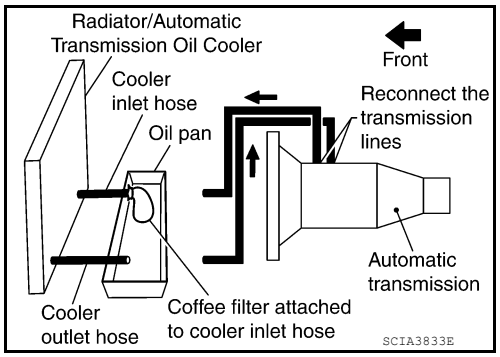
NOTE:
Insufficient cleaning of the cooler inlet hose exterior may lead to inaccurate debris identification.

1. Position a drain pan under the A/T inlet and outlet fluid cooler tube to cooler hose connection.
2. Clean the exterior and tip of the cooler inlet hose.
3. Put a different color matching mark on each cooler tube to cooler hose connection to aid in assembly.
   CAUTION:
   Use paint to make the matching mark. Do not damage the tubes or hose.
4. Disconnect the fluid cooler inlet and outlet rubber hoses from the steel cooler tubes.
   NOTE:
   Replace the cooler hoses if rubber material from the hose remains on the tube fitting.

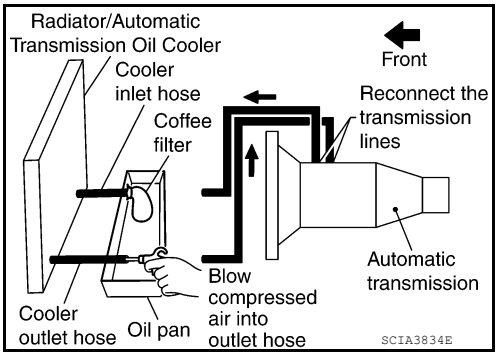


5. Insert the extension adapter hose of a can of Transmission Cooler Cleaner (Nissan P/N 999MP-AM006) into the cooler outlet hose.
   CAUTION:
   - **Wear safety glasses and rubber gloves when spraying the Transmission Cooler Cleaner.**
   - **Spray cooler cleaner only with adequate ventilation.**
   - **Avoid contact with eyes and skin.**
   - **Do not breath vapors or spray mist.**
6. Hold the hose and can as high as possible and spray Transmission Cooler Cleaner in a continuous stream into the cooler outlet hose until fluid flows out of the cooler inlet hose for 5 seconds.
7. Tie a common white, basket-type coffee filter to the end of the cooler inlet hose.





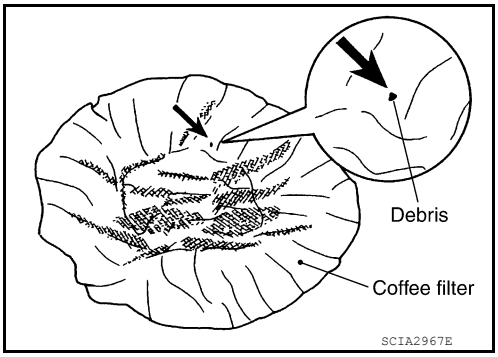
8. Insert the tip of an air gun into the end of the cooler outlet hose.
9. Wrap a shop rag around the air gun tip and end of cooler outlet hose.
10. Blow compressed air regulated to 490 - 883 kPa (5 - 9 kg/cm^2, 71 - 128 psi) through the cooler outlet hose to force any remaining A/T fluid into the coffee filter.
11. Remove the coffee filter from the end of the cooler inlet hose.
12. Perform A/T fluid cooler inspection.



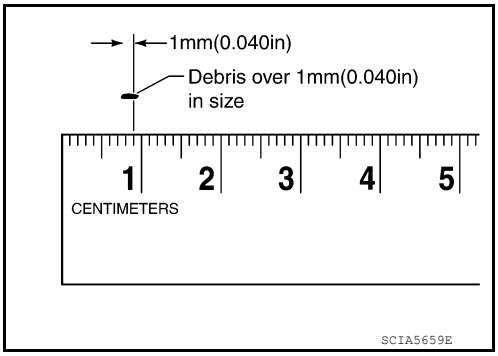
A/T FLUID COOLER INSPECTION PROCEDURE

1. Inspect the coffee filter for debris.

a. If small metal debris less than 1mm (0.040 in) in size or metal powder is found in the coffee filter, this is normal. If normal debris is found, the A/T fluid cooler/radiator can be re-used and the procedure is ended.



b. If one or more pieces of debris are found that are over 1mm (0.040 in) in size and/or peeled clutch facing material is found in the coffee filter, the fluid cooler is not serviceable. The A/T fluid cooler/radiator must be replaced and the inspection procedure is ended. Refer to CO-18, "Removal and Installation" (VQ40DE models), CO-49, "Removal and Installation" (VK56DE models).



A/T FLUID COOLER FINAL INSPECTION

After performing all procedures, ensure that all remaining oil is cleaned from all components.

Inspection

INFOID:0000000006750108

After performing all procedures, ensure that all remaining oil is cleaned from all components.

STALL TEST

Inspection and Judgment

INFOID:0000000006750109

A/T FLUID CHECK

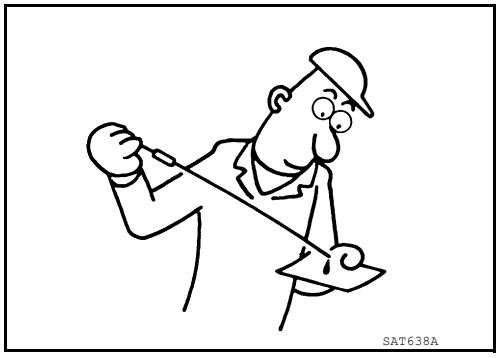
Fluid Leakage and Fluid Level Check

- Inspect for fluid leakage and check the fluid level. Refer to TM-66, "Checking A/T Fluid".

Fluid Condition Check

Inspect the fluid condition.

Fluid condition	Conceivable Cause	Required Operation
Varnished (viscous varnish state)	Clutch, brake scorched	Replace the ATF and check the A/T main unit and the vehicle for malfunctions (wire harnesses, cooler pipes, etc.)
Milky white or cloudy	Water in the fluid	Replace the ATF and check for places where water is getting in.
Large amount of metal powder mixed in	Unusual wear of sliding parts within A/T	Replace the ATF and check for improper operation of the A/T.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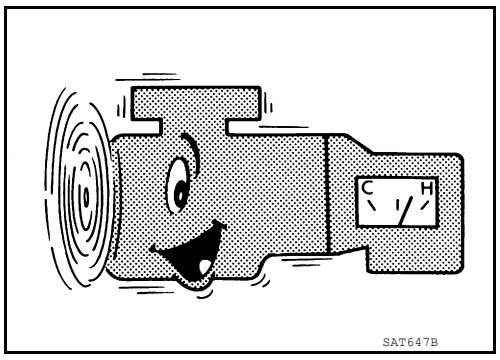
STALL TEST

Stall Test Procedure

1. Inspect the amount of engine oil. Replenish the engine oil if necessary.
2. Drive for about 10 minutes to warm up the vehicle so that the A/T fluid temperature is 50 to 80°C (122 to 176°F). Inspect the amount of ATF. Replenish if necessary.



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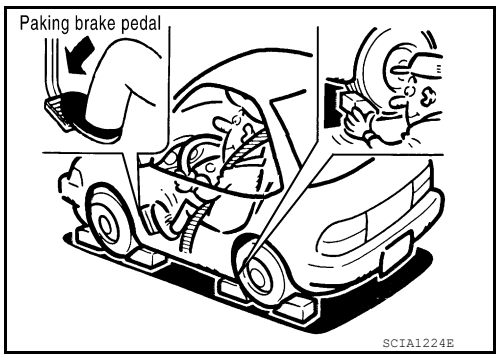
3. Securely engage the parking brake so that the tires do not turn.



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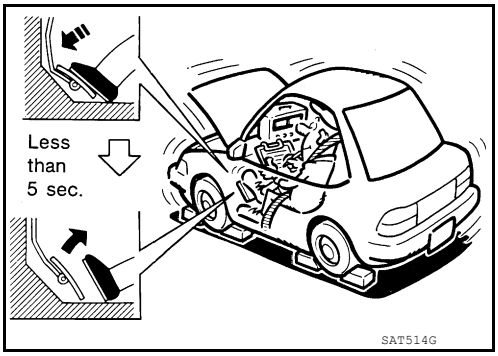
4. Engine start, apply foot brake, and place selector lever in “D” position.
5. While holding down the foot brake, gradually press down the accelerator pedal.
6. Quickly read off the stall speed, then quickly remove your foot from the accelerator pedal.
   CAUTION:
   Do not hold down the accelerator pedal for more than 5 seconds during this test.



Stall speed : **Refer to TM-257, "Stall Speed".**

7. Move the selector lever to the “N” position.
8. Cool down the ATF.
   CAUTION:
   Run the engine at idle for at least one minute.

Judgment of Stall Test

	Selector lever position		Expected problem location
	D	R	
Stall rotation	H	O	• Forward brake • Forward one-way clutch • 1st one-way clutch • 3rd one-way clutch
	O	H	• Reverse brake
	L	L	• Engine and torque converter one-way clutch
	H	H	• Line pressure low

O: Stall speed within standard value position

H: Stall speed higher than standard value

L: Stall speed lower than standard value

Stall test standard value position

Does not shift-up D position 1 → 2	Slipping in 2GR, 3GR, 4GR	Direct clutch slippage
Does not shift-up D position 2 → 3	Slipping in 3GR, 4GR, 5GR	High and low reverse clutch slippage
Does not shift-up D position 3 → 4	Slipping in 4GR, 5GR	Input clutch slippage
Does not shift-up D position 4 → 5	Slipping in 5GR	Front brake slippage

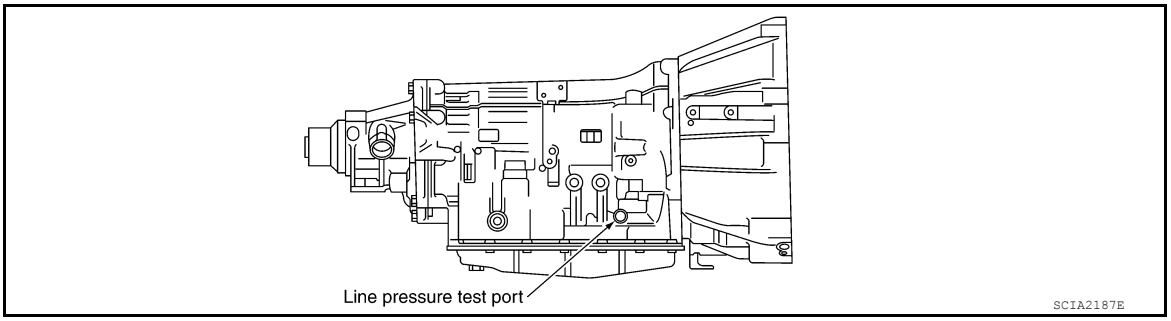
LINE PRESSURE TEST

Inspection and Judgment

INFOID:0000000006750110

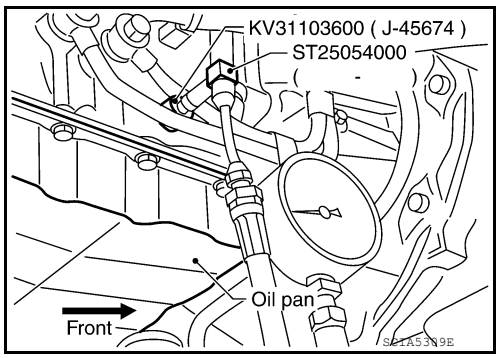
LINE PRESSURE TEST

Line Pressure Test Port

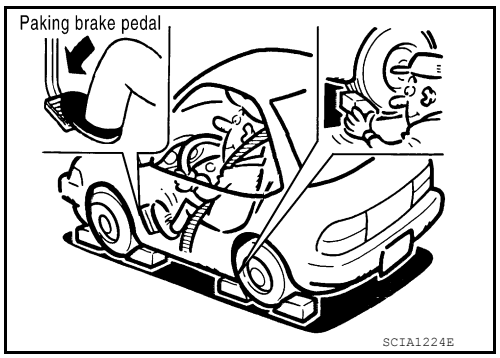


Line Pressure Test Procedure

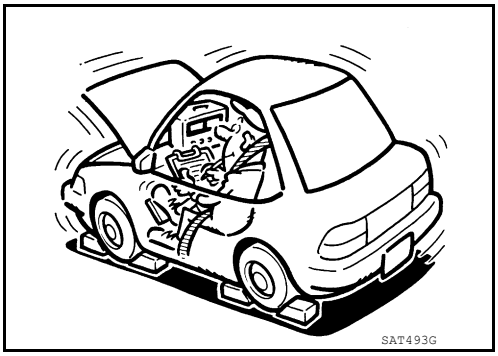
1. Inspect the amount of engine oil and replenish if necessary.
2. Drive the car for about 10 minutes to warm it up so that the ATF reaches in range of 50 to 80°C (122 to 176°F), then inspect the amount of ATF and replenish if necessary.
   NOTE:
   The automatic fluid temperature rises in range of 50 to 80°C (122 to 176°F) during 10 minutes of driving.
3. After warming up remove the oil pressure detection plug and install the Tool.
   CAUTION:
   When using the oil pressure gauge, be sure to use the O-ring attached to the oil pressure detection plug.



4. Securely engage the parking brake so that the tires do not turn.



5. Start the engine, then measure the line pressure at both idle and the stall speed.
   CAUTION:
   - **Keep the brake pedal pressed all the way down during measurement.**
   - **When measuring the line pressure at the stall speed, refer to "STALL TEST".**



Line pressure : Refer to TM-257, "Line Pressure".

6. After the measurements are complete, install the oil pressure detection plug and tighten to the regulation torque below.

Oil pressure detection plug :7.3 N·m (0.74 kg-m, 65 in-lb)

CAUTION:
Do not reuse the O-ring.

Judgment of Line Pressure Test

Judgment		Possible cause
Idle speed	Low for all positions (P, R, N, D)	Possible causes include malfunctions in the pressure supply system and low oil pump output. For example • Oil pump wear • Pressure regulator valve or plug sticking or spring fatigue • Oil strainer ⇒ oil pump ⇒ pressure regulator valve passage oil leak • Engine idle speed too low
	Only low for a specific position	Possible causes include an oil pressure leak in a passage or device related to the position after the pressure is distributed by the manual valve.
	High	Possible causes include a sensor malfunction or malfunction in the line pressure adjustment function. For example • Accelerator pedal position signal malfunction • ATF temperature sensor malfunction • Line pressure solenoid malfunction (sticking in "OFF" state, filter clog, cut line) • Pressure regulator valve or plug sticking
Stall speed	Oil pressure does not rise higher than the oil pressure for idle.	Possible causes include a sensor malfunction or malfunction in the pressure adjustment function. For example • Accelerator pedal position signal malfunction • TCM breakdown • Line pressure solenoid malfunction (shorting, sticking in" ON" state) • Pressure regulator valve or plug sticking • Pilot valve sticking or pilot filter clogged
	The pressure rises, but does not enter the standard position.	Possible causes include malfunctions in the pressure supply system and malfunction in the pressure adjustment function. For example • Accelerator pedal position signal malfunction • Line pressure solenoid malfunction (sticking, filter clog) • Pressure regulator valve or plug sticking • Pilot valve sticking or pilot filter clogged
	Only low for a specific position	Possible causes include an oil pressure leak in a passage or device related to the position after the pressure is distributed by the manual valve.

ROAD TEST

Description

INFOID:0000000006750111

ROAD TEST

- The road test inspects overall performance of the A/T and analyzes possible malfunction causes.
- The road test is carried out in the following three stages.

1. Check before engine is started. Refer to TM-77, "Check Before Engine Is Started".
2. Check at idle. Refer to TM-77, "Check At Idle".
3. Cruise test
   - Inspect all the items from Part 1 to Part 3. Refer to TM-78, "Cruise Test - Part 1", TM-80, "Cruise Test - Part 2", TM-80, "Cruise Test - Part 3".

- Before beginning the road test, check the test procedure and inspection items.
- Test all inspection items until the symptom is uncovered. Diagnose NG items when all road tests are complete.

Check Before Engine Is Started

INFOID:0000000006750112

1.CHECK AT CHECK INDICATOR LAMP

1. Park vehicle on level surface.
2. Move selector lever to “P” position.
3. Turn ignition switch to “OFF” position and wait at least 10 seconds.
4. Turn ignition switch to “ON” position. (Do not start engine.)

Does AT CHECK indicator lamp light up for about 2 seconds?

YES >> 1. Turn ignition switch to “OFF” position.
2. Carry out the self-diagnostics and record all NG items on the diagnostics worksheet. Refer to TM-39, "CONSULT Function".
3. Go to TM-77, "Check At Idle".

NO >> Stop the road test and go to TM-137, "Symptom Table".

Check At Idle

INFOID:0000000006750113

1.CHECK STARTING THE ENGINE

1. Park vehicle on level surface.
2. Move selector lever to “P” or “N” position.
3. Turn ignition switch to “OFF” position.
4. Turn ignition switch to “START” position.

Does the engine start?

YES >> GO TO 2.
NO >> Stop the road test and go to TM-137, "Symptom Table".

2.CHECK STARTING THE ENGINE

1. Turn ignition switch to “ON” position.
2. Move selector lever in “D”,“4”, “3”, “2”, “1” or “R” position.
3. Turn ignition switch to “START” position.

Does the engine start in either position?

YES >> Stop the road test and go to TM-137, "Symptom Table".
NO >> GO TO 3.

3.CHECK “P” POSITION FUNCTIONS

1. Move selector lever to “P” position.
2. Turn ignition switch to “OFF” position.
3. Release the parking brake.
4. Push the vehicle forward or backward.
5. Engage the parking brake.

When you push the vehicle with disengaging the parking brake, does it move?

YES >> Record the malfunction, GO TO 4.
NO >> GO TO 4.

4.CHECK “N” POSITION FUNCTIONS

1. Start the engine.
2. Move selector lever to “N” position.
3. Release the parking brake.

Does vehicle move forward or backward?

YES >> Record the malfunction, GO TO 5.
NO >> GO TO 5.

5.CHECK SHIFT SHOCK

1. Engage the brake.
2. Move selector lever to “D” position.

When the transmission is shifted from “N” to “D”, is there an excessive shock?

YES >> Record the malfunction, GO TO 6.
NO >> GO TO 6.

6.CHECK “R” POSITION FUNCTIONS

1. Engage the brake.
2. Move selector lever to “R” position.
3. Release the brake for 4 to 5 seconds.

Does the vehicle creep backward?

YES >> GO TO 7.
NO >> Record the malfunction, GO TO 7.

7.CHECK “D” POSITION FUNCTIONS

Inspect whether the vehicle creeps forward when the transmission is put into the “D” position.

Does the vehicle creep forward in the “D” positions?

YES >> Go to TM-78, "Cruise Test - Part 1".
NO >> Record the malfunction and go to TM-78, "Cruise Test - Part 1".

Cruise Test - Part 1

INFOID:0000000006750114

1.CHECK STARTING OUT FROM D1

1. Drive the vehicle for about 10 minutes to warm up the engine oil and ATF.
   Appropriate temperature for the ATF: 50 – 80°C (122 – 176°F)
2. Park the vehicle on a level surface.
3. Move selector lever to “P” position.
4. Start the engine.
5. Move selector lever to “D” position.
6. Press the accelerator pedal about half way down to accelerate the vehicle.

With CONSULT

Read off the gear positions.

Starts from D1?

YES >> GO TO 2.
NO >> Record the malfunction, GO TO 2.

2.CHECK SHIFT-UP D1 → D2

Press down the accelerator pedal about half way and inspect if the vehicle shifts up (D1 → D2) at the appropriate speed.

- Refer to TM-256, "Vehicle Speed at Which Gear Shifting Occurs".

With CONSULT

Read the gear position, throttle degree of opening, and vehicle speed.

Does the A/T shift-up D1 → D2 at the correct speed?

YES >> GO TO 3.

NO >> Record the malfunction, GO TO 3.

3. CHECK SHIFT-UP D2 → D3

Press down the accelerator pedal about half way and inspect if the vehicle shifts up (D2 → D3) at the appropriate speed.
• Refer to TM-256, "Vehicle Speed at Which Gear Shifting Occurs".

With CONSULT
Read the gear position, throttle degree of opening, and vehicle speed.
Does the A/T shift-up D2 → D3 at the correct speed?

YES >> GO TO 4.
NO >> Record the malfunction, GO TO 4.

4. CHECK SHIFT-UP D3 → D4

Press down the accelerator pedal about half way and inspect if the vehicle shifts up (D3 → D4) at the appropriate speed.
• Refer to TM-256, "Vehicle Speed at Which Gear Shifting Occurs".

With CONSULT
Read the gear position, throttle degree of opening, and vehicle speed.
Does the A/T shift-up D3 → D4 at the correct speed?

YES >> GO TO 5.
NO >> Record the malfunction, GO TO 5.

5. CHECK SHIFT-UP D4 → D5

Press down the accelerator pedal about half way and inspect if the vehicle shifts up (D4 → D5) at the appropriate speed.
• Refer to TM-256, "Vehicle Speed at Which Gear Shifting Occurs".

With CONSULT
Read the gear position, throttle degree of opening, and vehicle speed.
Does the A/T shift-up D4 → D5 at the correct speed?

YES >> GO TO 6.
NO >> Record the malfunction, GO TO 6.

6. CHECK LOCK-UP

When releasing accelerator pedal from D5, check lock-up from D5 to L/U.
• Refer to TM-256, "Vehicle Speed at Which Lock-up Occurs/Releases".

With CONSULT
Select “TCC SOLENOID” with the “MAIN SIGNAL” mode for “TRANSMISSION”.
Does it lock-up?

YES >> GO TO 7.
NO >> Record the malfunction, GO TO 7.

7. CHECK LOCK-UP HOLD

Check hold lock-up.

With CONSULT
Select “TCC SOLENOID” with the “MAIN SIGNAL” mode for “TRANSMISSION”.
Does it maintain lock-up status?

YES >> GO TO 8.
NO >> Record the malfunction, GO TO 8.

8. CHECK LOCK-UP RELEASE

Check lock-up cancellation by depressing brake pedal lightly to decelerate.

With CONSULT
Select “TCC SOLENOID” with the “MAIN SIGNAL” mode for “TRANSMISSION”.
Does lock-up cancel?

YES >> GO TO 9.
NO >> Record the malfunction, GO TO 9.

9. CHECK SHIFT-DOWN D5 → D4

Decelerate by pressing lightly on the brake pedal.

With CONSULT

Read the gear position and engine speed.

When the A/T shift-down D5 → D4, does the engine speed drop smoothly back to idle?

YES >> 1. Stop the vehicle.
2. Go to TM-80, "Cruise Test - Part 2".

NO >> Record the malfunction, Go to TM-80, "Cruise Test - Part 2".

Cruise Test - Part 2

INFOID:0000000006750115

1. CHECK SHIFT-UP D1 → D2

Press the accelerator pedal down all the way and inspect whether or not the transmission shifts up (D1 → D2) at the correct speed.

- Refer to TM-256, "Vehicle Speed at Which Gear Shifting Occurs".

With CONSULT

Read the gear position, throttle position and vehicle speed.

Does the A/T shift-up D1 → D2 at the correct speed?

YES >> GO TO 2.

NO >> Record the malfunction, GO TO 2.

2. CHECK SHIFT-UP D2 → D3

Press the accelerator pedal down all the way and inspect whether or not the transmission shifts up (D2 → D3) at the correct speed.

- Refer to TM-256, "Vehicle Speed at Which Gear Shifting Occurs".

With CONSULT

Read the gear position, throttle position and vehicle speed.

Does the A/T shift-up D2 → D3 at the correct speed?

YES >> GO TO 3.

NO >> Record the malfunction, GO TO 3.

3. CHECK SHIFT-UP D3 → D4 AND ENGINE BRAKE

When the transmission changes speed D3 → D4, return the accelerator pedal.

Does the A/T shift-up D3 → D4 and apply the engine brake?

YES >> 1. Stop the vehicle.
2. See TM-80, "Cruise Test - Part 3".

NO >> Record the malfunction and go to TM-80, "Cruise Test - Part 3".

Cruise Test - Part 3

INFOID:0000000006750116

1. MANUAL MODE FUNCTION

Press the manual mode switch when selector lever in “D” position.

Does it switch to manual mode?

YES >> GO TO 2.

NO >> Record the malfunction, GO TO 2.

2. CHECK SHIFT-DOWN

During manual mode driving, move gear selector from M5 → M4 → M3 → M2 → M1.

With CONSULT

Read the gear position.

Is downshifting correctly performed?

YES >> GO TO 3.

NO >> Record the malfunction, GO TO 3.

3. CHECK ENGINE BRAKE

Check engine brake.

Does engine braking effectively reduce speed in M1 position?

YES >> Check malfunction phenomena to repair or replace malfunctioning part. Refer to TM-137, "Symptom Table".

NO >> 1. Record the malfunction.
2. Check malfunction phenomena to repair or replace malfunctioning part. Refer to TM-137, "Symptom Table".

DTC/CIRCUIT DIAGNOSIS

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000007205492

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 malfunction 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 independently). 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.

DTC Logic

INFOID:0000000007205493

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
U1000	CAN COMM CIRCUIT	17th	TCM is not transmitting or receiving CAN communication signal for 2 seconds or more.	• Harness or connectors (CAN communication line is open or shorted.) • TCM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Run engine for at least 6 consecutive seconds at idle speed.
3. Perform “Self Diagnostic Results” in “TRANSMISSION”.

With GST

Follow the procedure “With CONSULT”.

Is “U1000” detected?

YES >> Go to TM-82, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749921

Go to LAN-15, "Trouble Diagnosis Flow Chart".

P0615 STARTER RELAY

Description

INFOID:0000000007205494

TCM prohibits cranking other than at “P” or “N” position.

DTC Logic

INFOID:0000000007205495

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0615	STARTER RELAY	14th	If this signal is ON other than in “P” or “N” position, this is judged to be a malfunction. (And if it is OFF in “P” or “N” position, this too is judged to be a malfunction.	• Harness or connectors (Starter relay and TCM circuit is open or shorted.) • Starter relay circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Shift the selector lever in “P” or “N” position.
2. Turn ignition switch ON and wait for at least 2 seconds.
3. Perform “Self Diagnostic Results” in “TRANSMISSION”.

Is “P0615” detected?

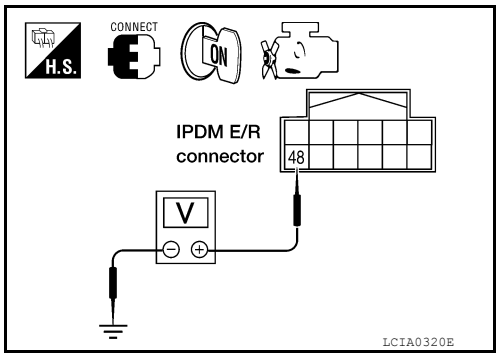
YES >> Go to TM-83, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749927

1.CHECK STARTER RELAY

1. Turn ignition switch ON. (Never start engine.)
2. Check voltage between the IPDM E/R connector terminal and ground.



IPDM E/R		Ground	Condition	Voltage
Connector	Terminal			
E122	48	Ground	Selector lever: "N" and "P"	Battery voltage
			Selector lever: "R" and "D"	Approx. 0 V

Is the inspection results normal?

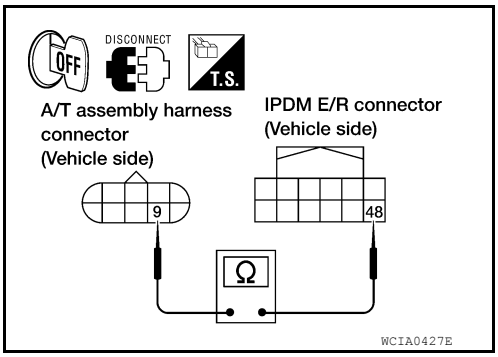
YES >> Check starter relay circuit. Refer to STR-9, "Wiring Diagram - With VQ40DE" (VQ40DE) or STR-13, "Wiring Diagram - With VK56DE" (VK56DE).
NO >> GO TO 2.

2.CHECK HARNESS BETWEEN A/T ASSEMBLY AND IPDM E/R

1. Turn ignition switch OFF.

2. Disconnect A/T assembly connector and IPDM E/R connector.
3. Check continuity between A/T assembly harness connector terminal and IPDM E/R harness connector terminal.

A/T assembly		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F9	9	E122	48	Existed



4. If OK, check harness for short to ground and short to power.

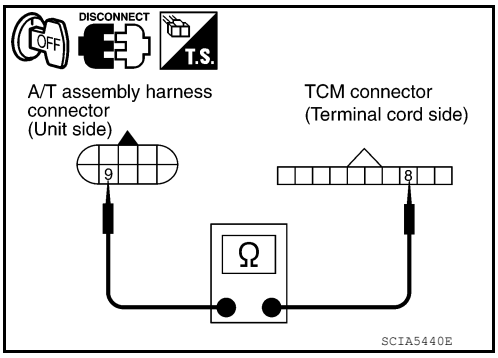
Is the inspection results normal?

YES >> GO TO 3.
NO >> Repair or replace damaged parts.

3. CHECK TERMINAL CORD ASSEMBLY

1. Remove control valve with TCM. Refer to TM-169, "Exploded View".
2. Disconnect A/T assembly connector and TCM connector.
3. Check continuity between A/T assembly harness connector terminal and TCM connector terminal.

A/T assembly		TCM		Continuity
Connector	Terminal	Connector	Terminal	
F9	9	F502	8	Existed



4. If OK, check harness for short to ground and short to power.
5. Reinstall any part removed.

Is the inspection results normal?

YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4. DETECT MALFUNCTIONING ITEM

Check the following items:
- Starter relay, Refer to STR-8, "System Description".
- IPDM E/R, Refer to PCS-13, "Physical Values".

Is the inspection results normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P0700 TRANSMISSION CONTROL

DTC Logic

INFOID:0000000007205496

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0700	TRANSMISSION CONTROL	—	TCM is malfunctioning.	TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT
1. Start the engine.
2. Run engine for at least 2 consecutive seconds at idle speed.
3. Perform “Self Diagnostic Results” in “TRANSMISSION”.

With GST
Follow the procedure “With CONSULT”.

Is “P0700” detected?

YES >> Go to TM-85, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749932

1.CHECK DTC

With CONSULT
1. Turn ignition switch “ON”. (Never start engine.)
2. Select “Self Diagnostic Results” in “TRANSMISSION”.
3. Touch “Erase”.
4. Turn ignition switch “OFF” and wait at least 10 seconds.
5. Perform DTC Confirmation Procedure, TM-85, "DTC Logic".

Is “P0700” displayed again?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> **INSPECTION END**

P0705 TRANSMISSION RANGE SWITCH A

DTC Logic

INFOID:0000000007205497

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0705	T/M RANGE SENSOR A	9th	• Transmission range switch 1 – 4 signals input with impossible pattern. • “P” position is detected from “N” position without any other position being detected in between.	• Harness or connectors (Transmission range switches 1, 2, 3, 4 and TCM circuit is open or shorted.) • Transmission range switches 1, 2, 3 and 4

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for least 2 consecutive seconds.

ACCELE POSI : More than 1.0/8

With GST

Follow the procedure “With CONSULT”.

Is “P0705” detected?

YES >> Go to TM-86, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749938

1.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Perform TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.DETECT MALFUNCTIONING ITEM

Check the following items:

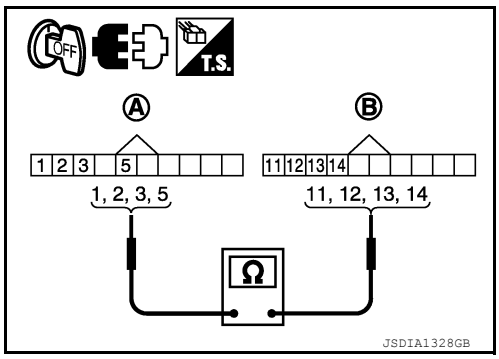
• A/T assembly harness connector pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace damaged parts.

3.CHECK SUB-HARNESS

1. Remove control valve with TCM. Refer to TM-169, "Exploded View".
2. Disconnect transmission range switch connector and TCM connector.
3. Check continuity between transmission range switch connector (A) terminals and TCM connector (B) terminals.



Item	Connector	Terminal	Continuity
Transmission range switch connector	F505	1	Yes
TCM connector	F503	13	
Transmission range switch connector	F505	2	Yes
TCM connector	F503	11	
Transmission range switch connector	F505	3	Yes
TCM connector	F503	12	
Transmission range switch connector	F505	5	Yes
TCM connector	F503	14	

4. If OK, check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P0717 INPUT SPEED SENSOR A

DTC Logic

INFOID:0000000007205498

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0717	INPUT SPEED SENSOR A	11th	• TCM does not receive the proper voltage signal from the sensor. • TCM detects an irregularity only at position of 4GR for input speed sensor 2.	• Harness or connectors (Sensor circuit is open or shorted.) • Input speed sensor 1 and/or 2

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

VHCL/S SE-A/T	**: 40 km/h (25 MPH) or more**
ACCELE POSI	**: More than 0.5/8**
ENGINE SPEED	**: 1,500 rpm or more**
SLCT LVR POSI	**: “D” position**
GEAR (Input speed sensor 1)	**: “4” or “5” position**
GEAR (Input speed sensor 2)	**: All positions**
Driving location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

With GST

Follow the procedure “With CONSULT”.

Is “P0717” detected?

YES >> Go to TM-88, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006749944

1.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.DETECT MALFUNCTIONING ITEM

Check the following items:

• The A/T assembly harness connector pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P0720 OUTPUT SPEED SENSOR

DTC Logic

INFOID:0000000007205499

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0720	OUTPUT SPEED SENSOR	1st	• Signal from output speed sensor not input due to cut line or the like. • Unexpected signal input during running. • After ignition switch is turned ON, unexpected signal input from vehicle speed signal of combination meter before the vehicle starts moving.	• Harness or connectors (Sensor circuit is open or shorted.) • Output speed sensor • Vehicle speed signal (from combination meter.)

DTC CONFIRMATION PROCEDURE

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:

If "DTC CONFIRMATION PROCEDURE" has been previously performed, always turn ignition switch OFF. Then wait at least 10 seconds before performing the next test.

1. CHECK OUTPUT SPEED SENSOR AND VEHICLE SPEED SIGNAL

With CONSULT

1. Start the engine.
2. Select "Data Monitor" in "TRANSMISSION".
3. Drive vehicle and check for an increase of "VHCL/S SE-A/T" value in response to "VHCL/S SE-MTR" value.

VHCL/S SE-A/T : Approximately matches the speedometer reading.
VHCL/S SE-MTR : Approximately matches the speedometer reading.

Are "VHCL/S SE-A/T" and "VHCL/S SE-MTR" values correct?

YES >> GO TO 2.
NO >> Go to TM-91, "Diagnosis Procedure".

2. CHECK DTC DETECTION (PART 1)

With CONSULT

1. Select "Data Monitor" in "TRANSMISSION".
2. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

VHCL/S SE-A/T	**: 30 km/h (19 MPH) or more**
ACCELE POSI	**: More than 1.0/8**
SLCT LVR POSI	**: "D" position**
Drive location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

Without CONSULT

1. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	**: 30 km/h (19 MPH) or more**
Accelerator opening	**: More than 1.0/8**

Selector lever position	**: "D" position**
Drive location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

2. Perform the self-diagnosis.

Is "P0720" detected? / Is "A/T CHECK indicator lamp judgment flicker: 1st" detected?

YES >> Go to TM-91, "Diagnosis Procedure".
NO >> GO TO 3.

3. CHECK DTC DETECTION (PART 2)

With CONSULT

1. Select "Data Monitor" in "TRANSMISSION".
2. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

ACCELE POSI	**: More than 1.0/8**
ENGINE SPEED	**: 3,500 rpm or more**
SLCT LVR POSI	**: "D" position**
Drive location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

Without CONSULT

1. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

Accelerator opening	**: More than 1.0/8**
Engine speed	**: 3,500 rpm or more**
Selector lever position	**: "D" position**
Drive location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

2. Perform the self-diagnosis.

Is "P0720" detected? / Is "A/T CHECK indicator lamp judgment flicker: 1st" detected?

YES >> Go to TM-91, "Diagnosis Procedure".
NO >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".

Diagnosis Procedure

INFOID:0000000006749950

1. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

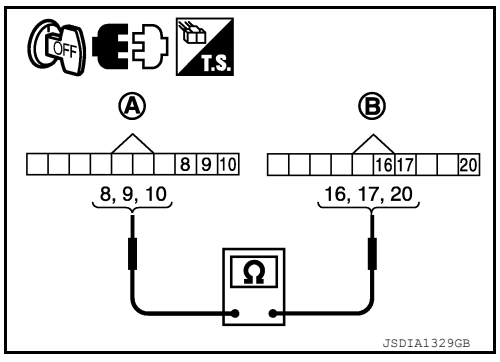
Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2. CHECK SUB-HARNESS

1. Remove control valve with TCM. Refer to TM-169, "Exploded View".
2. Disconnect transmission range switch connector and TCM connector.
3. Check continuity between transmission range switch harness connector (A) terminals and TCM harness connector (B) terminals.



Transmission range switch		TCM		Continuity
Connector	Terminal	Connector	Terminal	
F505	8	F503	20	Existed
	9		17	
	10		16	

4. If OK, check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace damaged parts.

3. DETECT MALFUNCTIONING ITEM

Check the following items:

- The harness connector pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4. REPLACE THE OUTPUT SPEED SENSOR AND CHECK DTC

1. Replace the output speed sensor. Refer to TM-193, "Exploded View".
2. Reinstall any parts removed.
3. Perform “DTC CONFIRMATION PROCEDURE”. Refer to TM-90, "DTC Logic".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".

P0725 ENGINE SPEED

Description

INFOID:0000000007205500

The engine speed signal is transmitted from the ECM to the TCM with CAN communication line.

DTC Logic

INFOID:0000000007205501

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0725	ENGINE SPEED	16th	TCM does not receive the CAN communication signal from the ECM.	Harness or connectors (ECM to TCM circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 10 consecutive seconds.

VHCL/S SE-A/T	**: 10 km/h (6 MPH) or more**
ACCELE POSI	**: More than 1.0/8**
SLCT LVR POSI	**: “D” position**

Is “P0725” detected?

YES >> Go to TM-93, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749956

1. CHECK DTC OF ECM

With CONSULT

1. Turn ignition switch ON.
2. Perform “Self Diagnostic Results” in “ENGINE”.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check DTC detected item. Refer to EC-91, "DTC Index" (VQ40DE) or EC-528, "DTC Index" (VK56DE).

2. CHECK DTC OF TCM

With CONSULT

Perform “Self Diagnostic Results” in “TRANSMISSION”.

Is any DTC other than “P0725” detected?

YES >> Check DTC detected item. Refer to TM-49, "DTC Index".
NO >> GO TO 3.

3.CHECK THE IGNITION SIGNAL CIRCUIT

With CONSULT
1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Check for engine speed change corresponding to “ACCELE POSI” while monitoring “ENGINE SPEED”.

Item name	Condition	Value
ENGINE SPEED	Engine running	Closely matches the tachometer reading.
ACCELE POSI	Released accelerator pedal.	0.0/8
	Fully depressed accelerator pedal	8.0/8

Is the inspection result normal?

YES >> GO TO 4.
NO >> Check ignition signal circuit. Refer to EC-419, "Component Function Check" (VQ40DE) or EC-862, "Component Function Check" (VK56DE).

4.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P0731 1GR INCORRECT RATIO

Description

INFOID:0000000007205502

This malfunction is detected when the A/T does not shift into 1GR position as instructed by TCM. This is not only caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

DTC Logic

INFOID:0000000007205503

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0731	1GR INCORRECT RATIO	18th	TCM detects any inconsistency in the actual gear ratio.	• Input clutch solenoid valve • Front brake solenoid valve • Direct clutch solenoid valve • High and low reverse clutch solenoid valve • Each clutch and brake • Hydraulic control circuit

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK ATF TEMPERATURE

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Check ATF temperature is in the following range.

ATF TEMP 1 : 20°C (68°F) – 140°C (284°F)

With GST

1. Start the engine.
2. Drive vehicle for approximately 5 minutes in urban areas, GO TO 3.

Is ATF temperature within specified range?

YES >> GO TO 3.
NO >> Drive vehicle to warm ATF or stop engine to cool ATF.

3.CHECK SYMPTOM (PART 1)

With CONSULT

1. Select “1ST GR FNCTN P0731” in “DTC & SRT confirmation” in “TRANSMISSION”.
2. Drive vehicle and maintain the following conditions.

MANU MODE SW : ON
GEAR : “1” position
ACCELE POSI : 0.6/8 or more

VEHICLE SPEED	**: 10 km/h (6 MPH) or more**
ENGINE SPEED	**: INPUT SPEED – 50 rpm or more**
INPUT SPEED	**: 300 rpm or more**

3. Keep the current driving status for at least 5 consecutive seconds if CONSULT screen changes from "OUT OF CONDITION" to "TESTING".
   CAUTION:
   When "TESTING" is not indicated on CONSULT for a long time, check "Self Diagnostic Results" mode for "TRANSMISSION". When a DTC other than "P0731" is detected, check the DTC. Refer to TM-49, "DTC Index".

With GST

1. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

Manual mode switch	**: ON**
Gear position	**: "1" position**
Accelerator opening	**: 0.6/8 or more**
Vehicle speed	**: 10 km/h (6 MPH) or more**

2. Check DTC.

Is "STOP VEHICLE" or "COMPLETED RESULT NG" displayed? / Is "P0731" detected?

YES-1 (STOP VEHICLE)>>GO TO 4.
YES-2 (COMPLETED RESULT NG)>>Go to TM-96, "Diagnosis Procedure".
YES-3 ("P0731" is detected)>>Go to TM-96, "Diagnosis Procedure".
NO >> GO TO 4.

4. CHECK SYMPTOM (PART 2)

1. Stop vehicle.
2. Drive vehicle in "D" position allowing it to shift from 1GR to 5GR and check shift timing and shift shock.

>> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749961

1. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2. DETECT MALFUNCTIONING ITEM

Disassembly the A/T assembly to check component parts. Refer to TM-200, "Disassembly".

NOTE:
Check the component parts, referring to "Possible cause" in "DTC DETECTION LOGIC". Refer to TM-95, "DTC Logic".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NG >> Repair or replace damaged parts.

P0732 2GR INCORRECT RATIO

Description

INFOID:0000000007205504

This malfunction is detected when the A/T does not shift into 2GR position as instructed by TCM. This is not only caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

DTC Logic

INFOID:0000000007205505

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0732	2GR INCORRECT RATIO	19th	TCM detects any inconsistency in the actual gear ratio.	• Input clutch solenoid valve • Front brake solenoid valve • Direct clutch solenoid valve • High and low reverse clutch solenoid valve • Each clutch and brake • Hydraulic control circuit

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2. CHECK ATF TEMPERATURE

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Check ATF temperature is in the following range.

ATF TEMP 1 : 20°C (68°F) – 140°C (284°F)

With GST

1. Start the engine.
2. Drive vehicle for approximately 5 minutes in urban areas, GO TO 3.

Is ATF temperature within specified range?

YES >> GO TO 3.
NO >> Drive vehicle to warm ATF or stop engine to cool ATF.

3. CHECK SYMPTOM (PART 1)

With CONSULT

1. Select “2ND GR FNCTN P0732” in “DTC & SRT confirmation” in “TRANSMISSION”.
2. Drive vehicle and maintain the following conditions.

MANU MODE SW : ON
GEAR : “2” position
ACCELE POSI : 0.6/8 or more

VEHICLE SPEED	**: 10 km/h (6 MPH) or more**
ENGINE SPEED	**: INPUT SPEED – 50 rpm or more**
INPUT SPEED	**: 300 rpm or more**

3. Keep the current driving status for at least 5 consecutive seconds if CONSULT screen changes from "OUT OF CONDITION" to "TESTING".
   CAUTION:
   When "TESTING" is not indicated on CONSULT for a long time, check "Self Diagnostic Results" mode for "TRANSMISSION". When a DTC other than "P0732" is detected, check the DTC. Refer to TM-49, "DTC Index".

With GST

1. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

Manual mode switch	**: ON**
Gear position	**: "2" position**
Accelerator opening	**: 0.6/8 or more**
Vehicle speed	**: 10 km/h (6 MPH) or more**

2. Check DTC.

Is "STOP VEHICLE" or "COMPLETED RESULT NG" displayed? / Is "P0732" detected?

YES-1 (STOP VEHICLE)>>GO TO 4.
YES-2 (COMPLETED RESULT NG)>>Go to TM-98, "Diagnosis Procedure".
YES-3 ("P0732" is detected)>>Go to TM-98, "Diagnosis Procedure".
NO >> GO TO 4.

4. CHECK SYMPTOM (PART 2)

1. Stop vehicle.
2. Drive vehicle in "D" position allowing it to shift from 1GR to 5GR and check shift timing and shift shock.

>> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749966

1. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2. DETECT MALFUNCTIONING ITEM

Disassembly the A/T assembly to check component parts. Refer to TM-200, "Disassembly".

NOTE:
Check the component parts, referring to "Possible cause" in "DTC DETECTION LOGIC". Refer to TM-97, "DTC Logic".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NG >> Repair or replace damaged parts.

P0733 3GR INCORRECT RATIO

Description

INFOID:0000000007205506

This malfunction is detected when the A/T does not shift into 3GR position as instructed by TCM. This is not only caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

DTC Logic

INFOID:0000000007205507

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0733	3GR INCORRECT RATIO	20th	TCM detects any inconsistency in the actual gear ratio.	• Input clutch solenoid valve • Front brake solenoid valve • Direct clutch solenoid valve • High and low reverse clutch solenoid valve • Each clutch and brake • Hydraulic control circuit

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK ATF TEMPERATURE

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Check ATF temperature is in the following range.

ATF TEMP 1 : 20°C (68°F) – 140°C (284°F)

With GST

1. Start the engine.
2. Drive vehicle for approximately 5 minutes in urban areas, GO TO 3.

Is ATF temperature within specified range?

YES >> GO TO 3.
NO >> Drive vehicle to warm ATF or stop engine to cool ATF.

3.CHECK SYMPTOM (PART 1)

With CONSULT

1. Select “3RD GR FNCTN P0733” in “DTC & SRT confirmation” in “TRANSMISSION”.
2. Drive vehicle and maintain the following conditions.

MANU MODE SW : ON
GEAR : “3” position
ACCELE POSI : 0.6/8 or more

VEHICLE SPEED	**: 10 km/h (6 MPH) or more**
ENGINE SPEED	**: INPUT SPEED – 50 rpm or more**
INPUT SPEED	**: 300 rpm or more**

3. Keep the current driving status for at least 5 consecutive seconds if CONSULT screen changes from "OUT OF CONDITION" to "TESTING".
   CAUTION:
   When "TESTING" is not indicated on CONSULT for a long time, check "Self Diagnostic Results" mode for "TRANSMISSION". When a DTC other than "P0733" is detected, check the DTC. Refer to TM-49, "DTC Index".

With GST

1. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

Manual mode switch	**: ON**
Gear position	**: "3" position**
Accelerator opening	**: 0.6/8 or more**
Vehicle speed	**: 10 km/h (6 MPH) or more**

2. Check DTC.

Is "STOP VEHICLE" or "COMPLETED RESULT NG" displayed? / Is "P0733" detected?

YES-1 (STOP VEHICLE)>>GO TO 4.
YES-2 (COMPLETED RESULT NG)>>Go to TM-100, "Diagnosis Procedure".
YES-3 ("P0733" is detected)>>Go to TM-100, "Diagnosis Procedure".
NO >> GO TO 4.

4. CHECK SYMPTOM (PART 2)

1. Stop vehicle.
2. Drive vehicle in "D" position allowing it to shift from 1GR to 5GR and check shift timing and shift shock.

>> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749971

1. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2. DETECT MALFUNCTIONING ITEM

Disassembly the A/T assembly to check component parts. Refer to TM-200, "Disassembly".

NOTE:
Check the component parts, referring to "Possible cause" in "DTC DETECTION LOGIC". Refer to TM-99, "DTC Logic".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NG >> Repair or replace damaged parts.

P0734 4GR INCORRECT RATIO

Description

INFOID:0000000007205508

This malfunction is detected when the A/T does not shift into 4GR position as instructed by TCM. This is not only caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

DTC Logic

INFOID:0000000007205509

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0734	4GR INCORRECT RATIO	21st	TCM detects any inconsistency in the actual gear ratio.	• Input clutch solenoid valve • Front brake solenoid valve • Direct clutch solenoid valve • High and low reverse clutch solenoid valve • Each clutch and brake • Hydraulic control circuit

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK ATF TEMPERATURE

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Check ATF temperature is in the following range.

ATF TEMP 1 : 20°C (68°F) – 140°C (284°F)

With GST

1. Start the engine.
2. Drive vehicle for approximately 5 minutes in urban areas, GO TO 3.

Is ATF temperature within specified range?

YES >> GO TO 3.
NO >> Drive vehicle to warm ATF or stop engine to cool ATF.

3.CHECK SYMPTOM (PART 1)

With CONSULT

1. Select “4TH GR FNCTN P0734” in “DTC & SRT confirmation” in “TRANSMISSION”.
2. Drive vehicle and maintain the following conditions.

MANU MODE SW : ON
GEAR : “4” position
ACCELE POSI : 0.6/8 or more

VEHICLE SPEED	**: 10 km/h (6 MPH) or more**
ENGINE SPEED	**: INPUT SPEED – 50 rpm or more**
INPUT SPEED	**: 300 rpm or more**

3. Keep the current driving status for at least 5 consecutive seconds if CONSULT screen changes from "OUT OF CONDITION" to "TESTING".
   CAUTION:
   When "TESTING" is not indicated on CONSULT for a long time, check "Self Diagnostic Results" mode for "TRANSMISSION". When a DTC other than "P0734" is detected, check the DTC. Refer to TM-49, "DTC Index".

With GST

1. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

Manual mode switch	**: ON**
Gear position	**: "4" position**
Accelerator opening	**: 0.6/8 or more**
Vehicle speed	**: 10 km/h (6 MPH) or more**

2. Check DTC.

Is "STOP VEHICLE" or "COMPLETED RESULT NG" displayed? / Is "P0734" detected?

YES-1 (STOP VEHICLE)>>GO TO 4.
YES-2 (COMPLETED RESULT NG)>>Go to TM-102, "Diagnosis Procedure".
YES-3 ("P0734" is detected)>>Go to TM-102, "Diagnosis Procedure".
NO >> GO TO 4.

4. CHECK SYMPTOM (PART 2)

1. Stop vehicle.
2. Drive vehicle in "D" position allowing it to shift from 1GR to 5GR and check shift timing and shift shock.

>> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749976

1. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2. DETECT MALFUNCTIONING ITEM

Disassembly the A/T assembly to check component parts. Refer to TM-200, "Disassembly".

NOTE:
Check the component parts, referring to "Possible cause" in "DTC DETECTION LOGIC". Refer to TM-101, "DTC Logic".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NG >> Repair or replace damaged parts.

P0735 5GR INCORRECT RATIO

Description

INFOID:0000000007205510

This malfunction is detected when the A/T does not shift into 5GR position as instructed by TCM. This is not only caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

DTC Logic

INFOID:0000000007205511

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0735	5GR INCORRECT RATIO	22nd	TCM detects any inconsistency in the actual gear ratio.	• Input clutch solenoid valve • Front brake solenoid valve • Direct clutch solenoid valve • High and low reverse clutch solenoid valve • Each clutch and brake • Hydraulic control circuit

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2. CHECK ATF TEMPERATURE

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Check ATF temperature is in the following range.

ATF TEMP 1 : 20°C (68°F) – 140°C (284°F)

With GST

1. Start the engine.
2. Drive vehicle for approximately 5 minutes in urban areas, GO TO 3.

Is ATF temperature within specified range?

YES >> GO TO 3.
NO >> Drive vehicle to warm ATF or stop engine to cool ATF.

3. CHECK SYMPTOM (PART 1)

With CONSULT

1. Select “5TH GR FNCTN P0735” in “DTC & SRT confirmation” in “TRANSMISSION”.
2. Drive vehicle and maintain the following conditions.

MANU MODE SW : ON
GEAR : “5” position
ACCELE POSI : 0.6/8 or more

VEHICLE SPEED	**: 10 km/h (6 MPH) or more**
ENGINE SPEED	**: INPUT SPEED – 50 rpm or more**
INPUT SPEED	**: 300 rpm or more**

3. Keep the current driving status for at least 5 consecutive seconds if CONSULT screen changes from "OUT OF CONDITION" to "TESTING".
   CAUTION:
   When "TESTING" is not indicated on CONSULT for a long time, check "Self Diagnostic Results" mode for "TRANSMISSION". When a DTC other than "P0735" is detected, check the DTC. Refer to TM-49, "DTC Index".

With GST

1. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

Manual mode switch	**: ON**
Gear position	**: "5" position**
Accelerator opening	**: 0.6/8 or more**
Vehicle speed	**: 10 km/h (6 MPH) or more**

2. Check DTC.

Is "STOP VEHICLE" or "COMPLETED RESULT NG" displayed? / Is "P0735" detected?

YES-1 (STOP VEHICLE)>>GO TO 4.
YES-2 (COMPLETED RESULT NG)>>Go to TM-104, "Diagnosis Procedure".
YES-3 ("P0735" is detected)>>Go to TM-104, "Diagnosis Procedure".
NO >> GO TO 4.

4. CHECK SYMPTOM (PART 2)

1. Stop vehicle.
2. Drive vehicle in "D" position allowing it to shift from 1GR to 5GR and check shift timing and shift shock.

>> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749981

1. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2. DETECT MALFUNCTIONING ITEM

Disassembly the A/T assembly to check component parts. Refer to TM-200, "Disassembly".

NOTE:
Check the component parts, referring to "Possible cause" in "DTC DETECTION LOGIC". Refer to TM-103, "DTC Logic".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NG >> Repair or replace damaged parts.

P0740 TORQUE CONVERTER

DTC Logic

INFOID:0000000007205512

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0740	TORQUE CONVERTER	3rd	Normal voltage not applied to solenoid due to cut line, short, or the like.	• Harness or connectors (Solenoid circuit is open or shorted.) • Torque converter clutch solenoid valve

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

VHCL/S SE-A/T	**: 80 km/h (50 MPH) or more**
ACCELE POSI	**: 0.5/8 – 1.0/8**
SLCT LVR POSI	**: “D” position**
Drive location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

With GST

Follow the procedure “With CONSULT”.

Is “P0740” detected?

YES >> Go to TM-105, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749987

1. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection reslut normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P0744 TORQUE CONVERTER

Description

INFOID:0000000007205513

This malfunction is detected when the A/T does not lock-up. This is not only caused by electrical malfunction (circuits open or shorted) but also by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

DTC Logic

INFOID:0000000007205514

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0744	TORQUE CONVERTER	3rd	• A/T cannot perform lock-up even if electrical circuit is good. • TCM detects as irregular by comparing difference value with slip rotation.	• Harness or connectors (Sensor circuit is open or shorted.) • Torque converter clutch solenoid valve • Hydraulic control circuit

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 30 consecutive seconds.

ACCELE POSI	**: More than 1.0/8**
SLCT LVR POSI	**: “D” position**
TCC SOLENOID	**: 0.4 – 0.6 A**
VEHICLE SPEED	**: 80 km/h (50 MPH) or more**
Driving location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

With GST

Follow the procedure “With CONSULT”.

Is “P0744” detected?

YES >> Go to TM-106, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749993

1.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".

NO >> Repair or replace damaged parts.

P0745 PRESSURE CONTROL SOLENOID A

DTC Logic

INFOID:0000000007205515

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P0745	PC SOLENOID A	4th	• Normal voltage not applied to solenoid due to cut line, short, or the like. • TCM detects as irregular by comparing target value with monitor value.	• Harness or connectors (Sensor circuit is open or shorted.) • Line pressure solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Start the engine and wait for at least 5 seconds.
2. Select “Self Diagnostic Results” in “TRANSMISSION”.

With GST

Follow the procedure “With CONSULT”.

Is “P0745” detected?

YES >> Go to TM-108, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006749999

1.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection results normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P1705 TP SENSOR

DTC Logic

INFOID:0000000007205516

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1705	TP SENSOR	15th	TCM does not receive the proper accelerator pedal position signals (input via CAN communication) from ECM.	Harness or connectors (Sensor circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT
1. Start the engine and let it idle for 1 second.
2. Perform “Self Diagnostic Results” in “TRANSMISSION”.

Is “P1705” detected?

YES >> Go to TM-109, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006750005

1.CHECK DTC OF ECM

With CONSULT
1. Turn ignition switch ON.
2. Perform “Self Diagnostic Results” in “ENGINE”.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check DTC detected item. Refer to EC-91, "DTC Index" (VQ40DE) or EC-528, "DTC Index" (VK56DE).

2.CHECK DTC OF TCM

With CONSULT

Perform “Self Diagnostic Results” in “TRANSMISSION”.

Is any DTC other than “P1705” detected?

YES >> Check DTC detected item. Refer to TM-49, "DTC Index".
NO >> GO TO 3.

3.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P1710 TRANSMISSION FLUID TEMPERATURE SENSOR

DTC Logic

INFOID:0000000007205517

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1710	FLUID TEMP SENSOR	10th	• While running, the A/T fluid temperature sensor signal voltage is excessively high or low. • A/T fluid temperature does not rise to the specified temperature while driving.	• Harness or connectors (Sensor circuit is open or shorted.) • A/T fluid temperature sensors

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 14 minutes (total). (It is not necessary to maintain continuously.)

VHCL/S SE-A/T	**: 10 km/h (6 MPH) or more**
ACCELE POSI	**: More than 1.0/8**
SLCT LVR POSI	**: “D” position**

With GST

Follow the procedure “With CONSULT”.

Is “P1710” detected?

YES >> Go to TM-110, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006750011

1.CHECK A/T FLUID TEMPERATURE SENSOR

1. Remove the control valve with TCM. Refer to TM-169, "Exploded View".
2. Disconnect transmission range switch connector.
3. Check A/T fluid temperature sensor. Refer to TM-111, "Component Inspection".

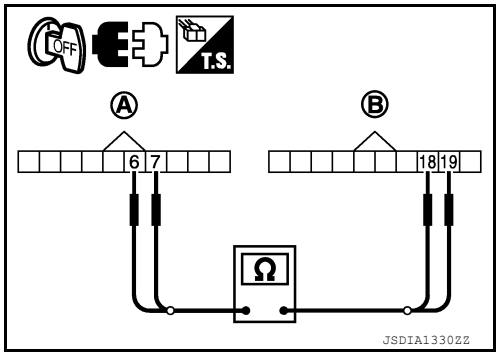
Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK SUB-HARNESS

1. Disconnect TCM connector.

2. Check continuity between transmission range switch harness connector (A) terminals and TCM harness connector (B) terminals.



Transmission range switch		TCM		Continuity
Connector	Terminal	Connector	Terminal	
F505	6	F503	19	Existed
	7		18	

3. If OK, check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace damaged parts.

3.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

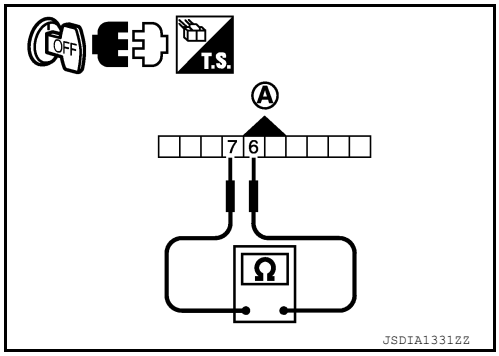
YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

Component Inspection

INFOID:0000000006750012

1.CHECK A/T FLUID TEMPERATURE SENSOR

Check resistance between transmission range switch connector terminals.



Transmission range switch connector		Temperature °C (°F)	Resistance (Approx.)
Terminal			
6	7	0 (32)	15 kΩ
		20 (68)	6.5 kΩ
		80 (176)	0.9 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace control valve with TCM. Refer to TM-169, "Exploded View".

P1721 VEHICLE SPEED SIGNAL

Description

INFOID:0000000007205518

The vehicle speed signal is transmitted from combination meter to TCM via CAN communication line. The signal functions as an auxiliary device to the output speed sensor when it is malfunctioning. The TCM will then use the vehicle speed signal.

DTC Logic

INFOID:0000000007205519

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1721	VEHICLE SPEED SIGNAL	—	• Vhiecle speed signal (CAN communication) from combination meter not input due to cut line or the like. • Unexpected signal input during running.	Harness or connectors (Sensor circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

VHCL/S SE-MTR	**: 30 km/h (19 MPH) or more**
ACCELE POSI	**: 1.0/8 or less**

Is “P1721” detected?

YES >> Go to TM-112, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006750018

1.CHECK DTC OF COMBINATION METER

With CONSULT

Perform “Self Diagnostic Results” in “METER/M&A”.

Is any DTC detected?

YES >> Check DTC detected item. Refer to MWI-22, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC OF TCM

With CONSULT

Perform “Self Diagnostic Results” in “TRANSMISSION”.

Is any DTC other than “P1721” detected?

YES >> Check DTC detected item. Refer to TM-49, "DTC Index".
NO >> GO TO 3.

3. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P1730 INTERLOCK

Description

INFOID:0000000007205520

Fail-safe function to detect interlock conditions.

DTC Logic

INFOID:0000000007205521

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1730	INTERLOCK	12th	Except during shift change, the gear position and ATF pressure switch states are monitored and comparative judgment made.	• Harness or connectors (Solenoid and switch circuit is open or shorted.) • Low coast brake solenoid valve • ATF pressure switch 2

NOTE:
When the vehicle is driven fixed in 2GR, a input speed sensor malfunction is displayed, but this is not a input speed sensor malfunction.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT
1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 2 consecutive seconds.

SLCT LVR POSI : “D” position

With GST
Follow the procedure “With CONSULT”.

Is “P1730” detected?

YES >> Go to TM-114, "Diagnosis Procedure".
NO >> **INSPECTION END**

Judgment of Interlock

INFOID:0000000006750023

- When Interlock is judged to be malfunctioning, the vehicle should be fixed in 2GR, and should be set in a condition in which it can travel.

NOTE:
When the vehicle is driven fixed in 2GR, a input speed sensor malfunction is displayed, but this is not a input speed sensor malfunction.
- When interlock is detected at the 3GR or more, it is locked at the 2GR.

Diagnosis Procedure

INFOID:0000000006750024

1.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P1731 1ST ENGINE BRAKING

Description

INFOID:0000000007205538

Fail-safe function to prevent sudden decrease in speed by engine brake other than at M1 position.

DTC Logic

INFOID:0000000007205539

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1731	1ST E/BRAKING	13th	ATF pressure switch 2 and solenoid current is monitor and if a pattern is detected having engine braking 1GR other than in the M1 position, a malfunction is detected.	• Harness or connectors (Sensor circuit is open or shorted.) • Low coast brake solenoid valve • ATF pressure switch 2

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 2 consecutive seconds.

ENGINE SPEED	**: 1,200 rpm**
GEAR	**: “1” position**
MANU MODE SW	**: ON**

Is “P1731” detected?

YES >> Go to TM-116, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006750030

1.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P1752 INPUT CLUTCH SOLENOID

DTC Logic

INFOID:0000000007205540

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1752	INPUT CLUTCH SOLENOID	5th	• Normal voltage not applied to solenoid due to cut line, short, or the like. • TCM detects as irregular by comparing target value with monitor value.	• Harness or connectors (Solenoid circuit is open or shorted.) • Input clutch solenoid valve

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

ACCELE POSI	**: 1.5/8 – 2.0/8**
GEAR	**: “3”⇒“4” (I/C ON/OFF)**
SLCT LVR POSI	**: “D” position**
Driving location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

With GST

Follow the procedure “With CONSULT”.

Is “P1752” detected?

YES >> Go to TM-117, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006750036

1. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P1757 FRONT BRAKE SOLENOID

DTC Logic

INFOID:0000000007205541

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1757	FR BRAKE SOLENOID	6th	• Normal voltage not applied to solenoid due to cut line, short, or the like. • TCM detects as irregular by comparing target value with monitor value.	• Harness or connectors (Solenoid circuit is open or shorted.) • Front brake solenoid valve

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

ACCELE POSI	**: 1.5/8 – 2.0/8**
GEAR	**: “3”⇒“4” (FR/B ON/OFF)**
SLCT LVR POSI	**: “D” position**
Drive location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

With GST

Follow the procedure “With CONSULT”.

Is “P1757” detected?

YES >> Go to TM-118, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006750042

1.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P1762 DIRECT CLUTCH SOLENOID

DTC Logic

INFOID:0000000007205543

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1762	DRCT CLUTCH SOLENOID	2nd	• Normal voltage not applied to solenoid due to cut line, short, or the like. • TCM detects as irregular by comparing target value with monitor value.	• Harness or connectors (Solenoid circuit is open or shorted.) • Direct clutch solenoid valve

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC CONFIRMATION PROCEDURE" has been previously performed, always turn ignition switch OFF. Then wait at least 10 seconds before performing the next test.

1. CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select "Data Monitor" in "TRANSMISSION".
3. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

ACCELE POSI	**: 1.5/8 – 2.0/8**
GEAR	**: "1"⇒"2" (D/C ON/OFF)**
SLCT LVR POSI	**: "D" position**
Driving location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

Without CONSULT

1. Start the engine.
2. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

Accelerator opening	**: 1.5/8 – 2.0/8**
Gear position	**: "1"⇒"2"**
Selector lever position	**: "D" position**
Driving location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

3. Perform the self-diagnosis.

Is "P1762" detected? / Is "A/T CHECK indicator lamp judgment flicker: 2nd" detected?

YES >> Go to TM-119, "Diagnosis Procedure".
NO >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".

Diagnosis Procedure

INFOID:0000000006750048

1. CHECK INPUT SIGNAL

With CONSULT

1. Turn ignition switch "ON".
2. Select "MAIN SIGNALS" in "DATA MONITOR" mode for "TRANSMISSION" with CONSULT.
3. Start the engine.
4. Read out the value of "D/C SOLENOID" while driving.

Item name	Condition	Display value (Approx.)
D/C SOLENOID	Direct clutch disengaged. Refer to TM-17	0.6 - 0.8 A
	Direct clutch engaged. Refer to TM-17	0 - 0.05 A

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

2.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3.DETECT MALFUNCTIONING ITEM

Check the following items:
- The A/T assembly harness connector pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> Replace the control valve with TCM. Refer to TM-169, "Removal and Installation".
NG >> Repair or replace damaged parts.

4.CHECK DTC

Perform “DTC Confirmation Procedure”.
- Refer to TM-119, "DTC Logic".

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

P1767 HIGH AND LOW REVERSE CLUTCH SOLENOID

DTC Logic

INFOID:0000000007205544

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1767	HLR CLUTCH SOLENOID	8th	• Normal voltage not applied to solenoid due to cut line, short, or the like. • TCM detects as irregular by comparing target value with monitor value.	• Harness or connectors (Solenoid circuit is open or shorted.) • High and low reverse clutch solenoid valve

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

ACCELE POSI	**: 1.5/8 – 2.0/8**
GEAR	**: “2”⇒“3” (HLR/C ON/OFF)**
SLCT LVR POSI	**: “D” position**
Driving location	**: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.**

With GST

Follow the procedure “With CONSULT”.

Is “P1767” detected?

YES >> Go to TM-121, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006750054

1. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P1772 LOW COAST BRAKE SOLENOID

DTC Logic

INFOID:0000000007205547

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1772	L C BRAKE SOLENOID	7th	Normal voltage not applied to solenoid due to cut line, short, or the like.	• Harness or connectors (Solenoid circuit is open or shorted.) • Low coast brake solenoid valve

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 5 consecutive seconds.

GEAR	**: “1” or “2” (LC/B ON/OFF)**
MANU MODE SW	**: ON**

With GST

Follow the procedure “With CONSULT”.

Is “P1772” detected?

YES >> Go to TM-122, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006750060

1.CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P1774 LOW COAST BRAKE SOLENOID

Description

INFOID:0000000007205548

- Low coast brake solenoid valve is turned ON or OFF by the TCM in response to signals transmitted from the transmission range switch, output speed sensor and accelerator pedal position sensor (throttle position sensor). Gears will then be shifted to the optimum position.
- This is not only caused by electrical malfunction (circuits open or shorted) but also by mechanical malfunction such as control valve sticking, improper solenoid valve operation.

DTC Logic

INFOID:0000000007205549

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1774	L C BRAKE SOLENOID	7th	• TCM detects an improper voltage drop when it tries to operate the solenoid valve. • Condition of ATF pressure switch 2 is different from monitor value, and relation between gear position and actual gear ratio is irregular.	• Harness or connectors (Solenoid and switch circuit is open or shorted.) • Low coast brake solenoid valve • ATF pressure switch 2

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions.

GEAR : “1” or “2” (LC/B ON/OFF)
MANU MODE SW : ON

4. Stop vehicle and perform step 3 again.
5. Stop vehicle.
6. Turn ignition switch OFF, then perform step 1 to 4 again.

With GST

Follow the procedure “With CONSULT”.

Is “P1774” detected?

YES >> Go to TM-123, "Diagnosis Procedure".
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006750066

1. CHECK TCM POWER SUPPLY AND GROUND CIRCUIT

Check TCM power supply and ground circuit. Refer to TM-128, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace the control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Repair or replace damaged parts.

P1815 M-MODE SWITCH

DTC Logic

INFOID:0000000007205550

DTC DETECTION LOGIC

DTC	Item (CONSULT screen terms)	A/T CHECK indicator lamp judgment flicker	Diagnostic item is detected when...	Possible cause
P1815	M-MODE SWITCH	—	TCM monitors manual mode, non-manual mode, up or down switch signal, and detects as irregular when impossible input pattern occurs 2 second or more.	• Harness or connectors (These switches circuit is open or shorted.) • Manual mode switch (Into A/T shift selector) • Manual mode position select switch (Into A/T shift selector)

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE is previously conducted, always turn ignition switch OFF and wait at least 10 seconds before performing the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Start the engine.
2. Select “Data Monitor” in “TRANSMISSION”.
3. Drive vehicle and maintain the following conditions for at least 2 consecutive seconds.

MANU MODE SW : ON

Is “P1815” detected?

YES >> Go to TM-125, "Diagnosis Procedure".

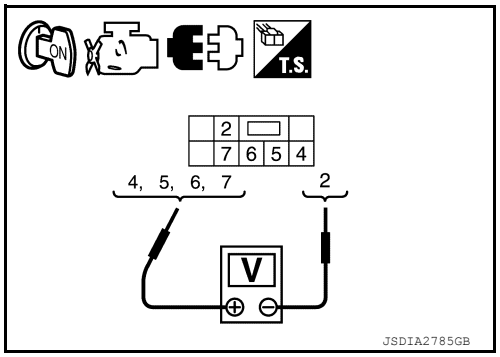
NO >> **INSPECTION END**

Diagnosis Procedure

INFOID:0000000006750072

1.CHECK MANUAL MODE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/T shift selector connector.
3. Turn ignition switch ON.
4. Check voltage between A/T shift selector harness connector terminals.



A/T shift selector			Voltage
Connector	+	–	
	Terminal		
M68	4	2	Approx. 12 V
	5		
	6		
	7		

Is the inspection result normal?

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

2. CHECK MANUAL MODE SWITCH

1. Turn ignition switch OFF.
2. Check manual mode switch. Refer to TM-127, "Component Inspection".

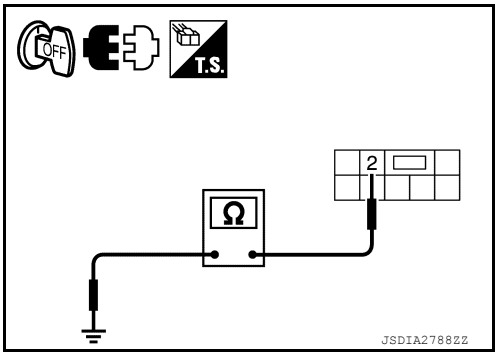
Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace damaged parts.

3. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check continuity between A/T shift selector harness connector terminal and ground.

A/T shift selector		Ground	Continuity
Connector	Terminal		
M68	2	Ground	Existed



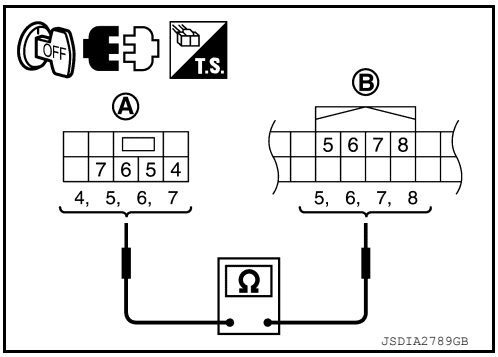
Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4. CHECK HARNESS BETWEEN A/T SHIFT SELECTOR AND COMBINATION METER

1. Disconnect combination meter connector.
2. Check continuity between A/T shift selector harness connector terminals and combination meter harness connector terminals.

A/T shift selector		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	
M68	4	M24	5	Existed
	5		7	
	6		8	
	7		6	



3. If OK, check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace damaged parts.

5. DETECT MALFUNCTIONING ITEM

Check the following items:
- Pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace damaged parts.

6. CHECK COMBINATION METER

1. Reconnect all the connectors.
2. Turn ignition switch ON.
3. Select “M RANGE SW”, “NM RANGE SW”, “AT SFT UP SW” and “AT SFT DWN SW” in “Data Monitor” in “METER/M&A”.
4. Check the ON/OFF operations of each monitor item. Refer to MWI-20, "Reference Value".

Is the inspection result normal?

YES >> Replace control valve with TCM. Refer to TM-169, "Exploded View".
NO >> Replace combination meter. Refer to MWI-64, "Exploded View".

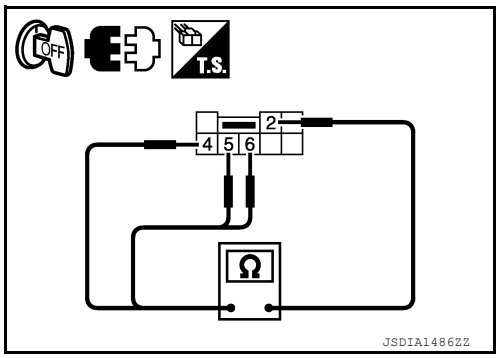
Component Inspection

INFOID:0000000006750073

MANUAL MODE SWITCH

Check continuity between A/T shift selector connecotr terminals.

Item	Position	Terminal No. (Unit side)	Continuity
Manual mode switch	Manual	2 - 6	Yes
Manual shift switch	UP	2 - 4	
	DOWN	2 - 5	



Position Indicator Lamp

INFOID:0000000006750074

DIAGNOSTIC PROCEDURE

1.CHECK INPUT SIGNALS (WITH CONSULT)

With CONSULT

1. Start engine.
2. Select “MAIN SIGNALS” in “DATA MONITOR” mode for A/T with CONSULT and read out the value of “GEAR”.
3. Drive vehicle in the manual mode, and confirm that the actual gear position and the meter's indication of the position mutually coincide when the manual shift switch is pushed to the “+ (up)” or “– (down)” side (1GR ⇔ 5GR).

OK or NG

OK >> **INSPECTION END**
NG >> Check the following items.

Position Indicator Lamp Symptom Chart

Items	Presumed Location of Trouble
The actual gear position does not change, or shifting into the manual mode is not possible (no gear shifting in the manual mode possible). The position indicator lamp is not indicated.	Manual mode switch Refer to TM-125, "Diagnosis Procedure". A/T main system (Fail-safe function actuated) • Refer to GI-47, "Description".
The actual gear position changes, but the position indicator lamp is not indicated.	Perform the self-diagnosis function. • Refer to GI-47, "Description".
The actual gear position and the indication on the position indicator lamp do not coincide.	Perform the self-diagnosis function. • Refer to GI-47, "Description".
Only a specific position or positions is/are not indicated on the position indicator lamp.	Check the combination meter. • Refer to MWI-8, "METER SYSTEM : System Description".

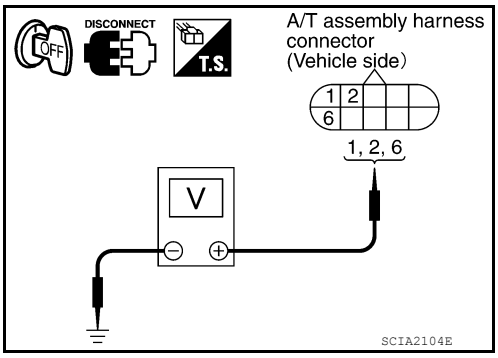
MAIN POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000006750075

1.CHECK TCM POWER SOURCE (PART 1)

1. Turn ignition switch OFF.
2. Disconnect A/T assembly connector.
3. Check voltage between A/T assembly harness connector terminals and ground.



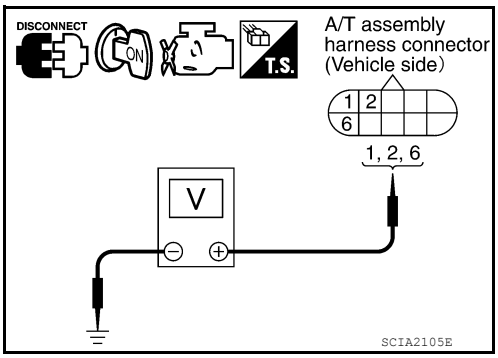
A/T assembly		Ground	Voltage
Connector	Terminal		
F9	1	Ground	Battery voltage
	2		
	6		0 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 7.

2.CHECK TCM POWER SOURCE (PART 2)

1. Turn ignition switch ON.
   CAUTION:
   Never start engine.
2. Check voltage between A/T assembly harness connector terminals and ground.



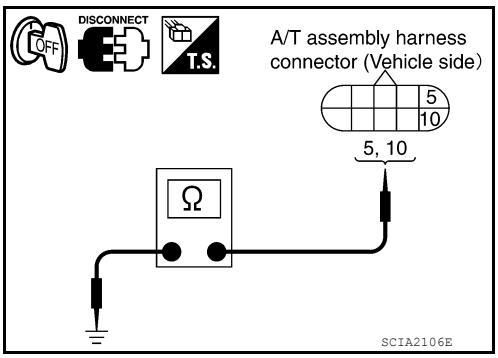
A/T assembly		Ground	Voltage
Connector	Terminal		
F9	1	Ground	Battery voltage
	2		
	6		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 8.

3.CHECK TCM GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check continuity between A/T assembly harness connector terminals and ground.



A/T assembly		Ground	Continuity
Connector	Terminal		
F9	5	Ground	Existed
	10		

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4.DETECT MALFUNCTIONING ITEM

Check the following items:
- The A/T assembly harness connector terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES >> GO TO 5.
NG >> Repair or replace damaged parts.

5. PERFORM SELF-DIAGNOSIS

Perform self-diagnosis. Refer to TM-39, "CONSULT Function".

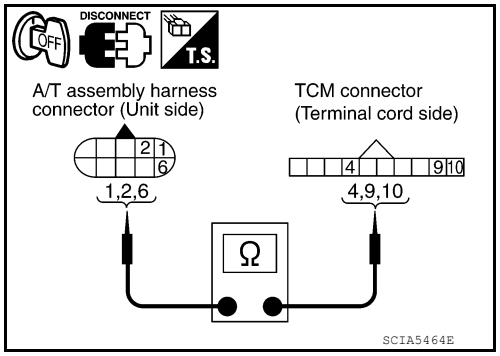
Is the inspection result normal?

YES >> **INSPECTION END**
NO-1 (Self-diagnosis does not activate)>>GO TO 6.
NO-2 (DTC is displayed)>>Check the malfunctioning system. Refer to TM-39, "CONSULT Function".

6. CHECK TERMINAL CORD ASSEMBLY

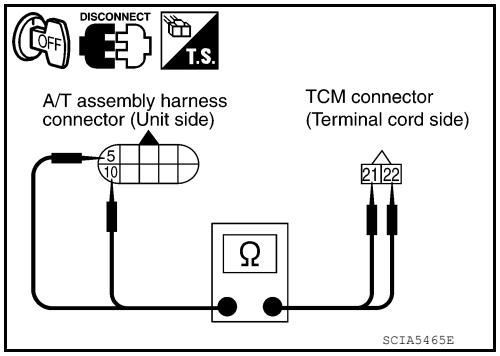
1. Remove control valve with TCM. Refer to TM-169, "Removal and Installation".
2. Disconnect A/T assembly connector and TCM connector.
3. Check continuity between A/T assembly harness connector terminals and TCM harness connector terminals.

A/T assembly		TCM		Continuity
Connector	Terminal	Connector	Terminal	
F9	1	F502	9	Existed
	2		10	
	6		4	



4. Check continuity between A/T assembly harness connector terminals and TCM connector terminals.

A/T assembly		TCM		Continuity
Connector	Terminal	Connector	Terminal	
F9	5	F504	21	Existed
	10		22	



5. If OK, check harness for short to ground and short to power.

OK or NG

YES >> Replace the control valve with TCM. Refer to TM-169, "Removal and Installation".
NO >> Replace open circuit or short to ground and short to power in harness or connectors.

7. DETECT MALFUNCTIONING ITEM (STEP 1)

Check the following items:
- Harness for short or open between battery and A/T assembly harness connector terminals 1, 2
- 10A fuse [No. 30]
- Battery

Is the inspection result normal?

OK >> GO TO 2.
NO >> Repair or replace damaged parts.

8. CHECK TCM (TRANSMISSION CONTROL MODULE) RELAY

1. Disconnect TCM relay.
2. Check TCM relay. Refer to TM-131, "Component Inspection (TCM Relay)".

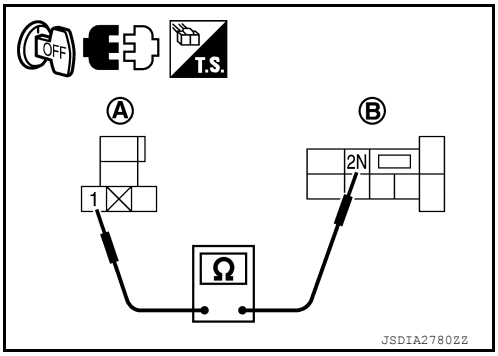
Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace damaged parts.

9. CHECK HARNESS BETWEEN TCM RELAY AND FUSE BLOCK (J/B)/IPDM E/R

1. Disconnect fuse block (J/B) connector M3 and IPDM E/R connector E119.

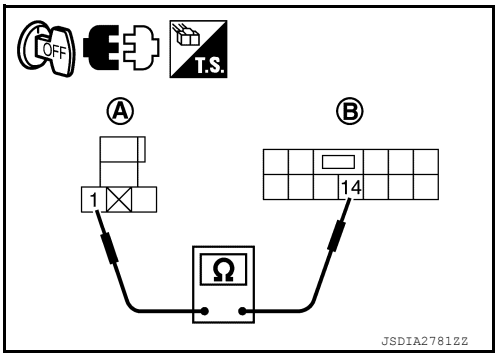
2. Check continuity between TCM relay harness connector (A) terminal and fuse block (J/B) harness connector (B) terminal.
NOTE:
- A diode is located between fuse block (J/B) and TCM relay.
- To check diode, refer to TM-131, "Component Inspection (Diode)".



Fuse block (J/B)		TCM relay		Continuity
+		–		
Connector	Terminal	Connector	Terminal	
M3	2N	M88	1	Existed

Fuse block (J/B)		TCM relay		Continuity
–		+		
Connector	Terminal	Connector	Terminal	
M3	2N	M88	1	Not existed

3. Check continuity between TCM relay harness connector (A) terminal and IPDM E/R harness connector (B) terminal.
NOTE:
- A diode is located between fuse block (J/B) and TCM relay.
- To check diode, refer to TM-131, "Component Inspection (Diode)".



IPDM E/R		TCM relay		Continuity
+		–		
Connector	Terminal	Connector	Terminal	
E119	14	M88	1	Existed

IPDM E/R		TCM relay		Continuity
–		+		
Connector	Terminal	Connector	Terminal	
E119	14	M88	1	Not existed

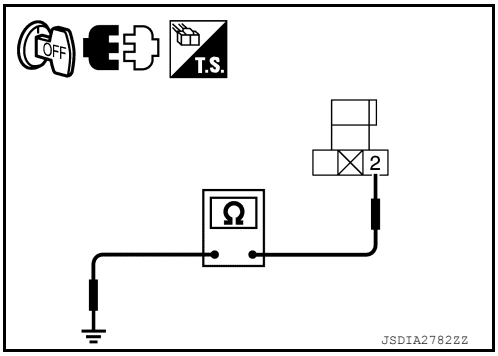
4. If OK, check harness for short to ground and short to power.

Is the inspection result normal?

OK >> GO TO 10.
NO >> Repair or replace damaged parts.

10. CHECK GROUND CIRCUIT

Check continuity between TCM relay harness connector terminal and ground.



TCM relay		Ground	Continuity
Connector	Terminal		
M88	3	Ground	Existed

Is the inspection result normal?

OK >> GO TO 11.
NO >> Repair or replace damaged parts.

11. DETECT MALFUNCTIONING ITEM (STEP 3)

Check the following items:

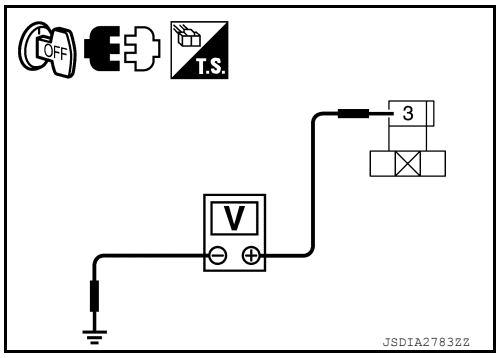
- Harness for short or open between ignition switch and fuse block (J/B) connector M3 terminal 2N
- Harness for short or open between battery and IPDM E/R connector E119 terminal 14
- 10A fuse [No. 9, located in the fuse block (J/B)] and 10A fuse (No. 49, located in the IPDM E/R)
- IPDM E/R (Ignition relay)
- Ignition switch

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace damaged parts.

12. CHECK TCM RELAY POWER CIRCUIT

Check voltage between TCM relay harness connector terminal and ground.



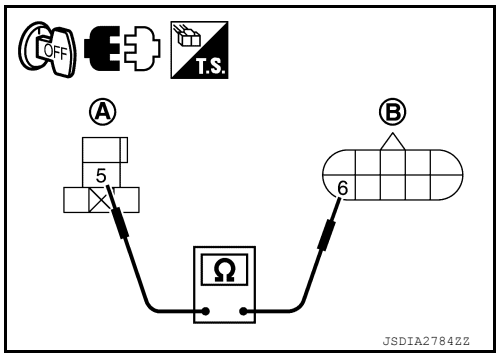
TCM relay		Ground	Condition	Voltage
Connector	Terminal			
M88	3	Ground	Always	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace open circuit or short to ground in harness or connector.

13. CHECK HARNESS BETWEEN TCM RELAY AND A/T ASSEMBLY

1. Check continuity between TCM relay harness connector (A) terminal and A/T assembly harness (B) connector.



TCM relay		A/T assembly		Continuity
Connector	Terminal	Connector	Terminal	
M88	5	F9	6	Existed

2. If OK, check harness for short to ground and short to power.

Is the inspection result normal?

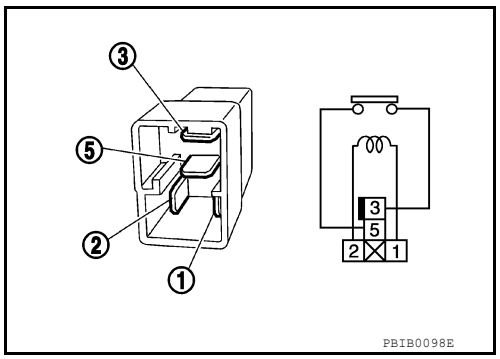
YES >> GO TO 4.
NO >> Repair or replace damaged parts.

Component Inspection (TCM Relay)

INFOID:0000000006750076

1. TCM (TRANSMISSION CONTROL MODULE) RELAY

Check the continuity between TCM relay terminals as per the following conditions.



TCM relay		Conditions	Continuity
+	–		
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Yes
		No current supply	No

OK or NG

OK >> INSPECTION END
NG >> Replace the TCM relay.

Component Inspection (Diode)

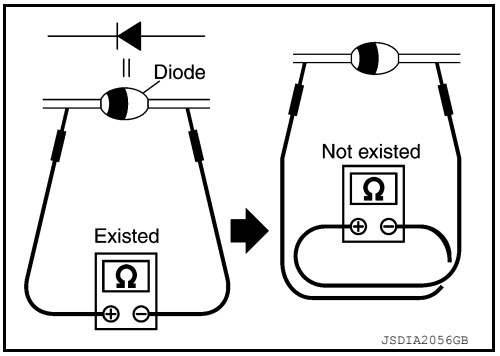
INFOID:0000000007231731

- Check continuity with a tester.

- The diode is normal if the result is as shown in the figure when the polarity is reversed.

NOTE:

Tester specifications may vary depending on the tester type. Refer to the handling manual of the tester before checking continuity.



TOW MODE SWITCH

Component Function Check

INFOID:0000000007205628

1.CHECK TOW MODE INDICATOR LAMP FUNCTION

1. Turn ignition switch ON.
2. Check that tow mode indicator lamp turns ON/OFF when tow mode switch is operated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to TM-133, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007205629

1.CHECK DTC OF TCM

With CONSULT
1. Turn ignition switch ON.
2. Perform “Self-Diagnostic Results” in “TRANSMISSION”.

Is any DTC detected?

YES >> Check DTC detected item. Refer to TM-49, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC OF COMBINATION METER

With CONSULT
Perform “Self-Diagnostic Results” in “METER/M&A”.

Is any DTC detected?

YES >> Check DTC detected item. Refer to MWI-22, "DTC Index".
NO >> GO TO 3.

3.CHECK COMBINATION METER

With CONSULT
1. Select “TOW MODE SW” in “Data Monitor” in “METER/M&A”.
2. Check that “TOW MODE SW” turns ON/OFF when tow mode switch is operated.

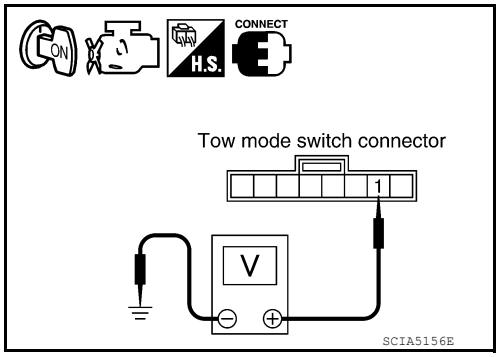
Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-64, "Exploded View".
NO >> GO TO 4.

4.CHECK TOW MODE SWITCH CIRCUIT

1. Turn ignition switch ON.
   CAUTION:
   Never start engine.
2. Check voltage between tow mode switch harness connector terminal and ground.

Tow mode switch		Ground	Condition	Voltage
Connector	Terminal			
M6	1	Ground	When tow mode switch is pressed	0 V
			Other than the above	Approx. 12 V



Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-64, "Exploded View".
NO >> GO TO 5.

5.CHECK TOW MODE SWITCH

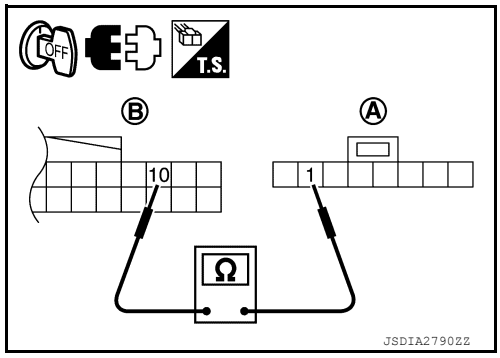
1. Turn ignition switch OFF.
2. Disconnect tow mode switch connector.
3. Check tow mode switch. Refer to TM-134, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace damaged parts.

6. CHECK HARNESS BETWEEN TOW MODE SWITCH AND COMBINATION METER

1. Disconnect combination meter connector.
2. Check continuity between tow mode switch harness connector (A) terminal and combination meter harness connector (B) terminal.



Tow mode switch		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	
M6	1	M24	10	Existed

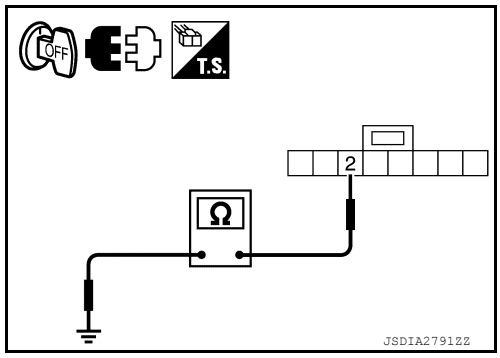
3. If OK, check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace damaged parts.

7. CHECK HARNESS BETWEEN TOW MODE SWITCH AND COMBINATION METER

Check continuity between tow mode switch harness connector terminal and ground.



Tow mode switch		Ground	Continuity
Connector	Terminal		
M6	2	Ground	Existed

Is the inspection result normal?

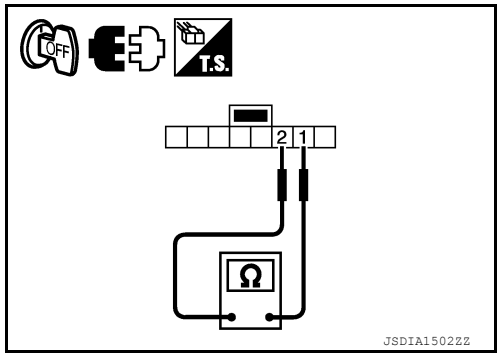
YES >> Check intermittent incident. Refer to GI-39, "Intermittent Incident".
NO >> Repair or replace damaged parts.

Component Inspection

INFOID:0000000007205630

1. CHECK TOW MODE SWITCH

Check continuity between tow mode switch connector terminals.



Tow mode switch		Condition	Continuity
Terminal			
1	2	Tow mode switch ON	Existed
		Tow mode switch OFF	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace tow mode switch. Refer to TM-10, "A/T CONTROL SYSTEM : Component Parts Location".

SHIFT POSITION INDICATOR CIRCUIT

Description

INFOID:0000000007205631

TCM transmits a shift position signal to the combination meter via CAN communication line. While the vehicle is running, the combination meter displays a shift position in the information display, according to this signal.

Component Function Check

INFOID:0000000007205632

1.CHECK A/T INDICATOR

CAUTION:
Always drive vehicle at a safe speed.

1. Start the engine.
2. Check the actual selector lever position (“P”, “R”, “N” and “D”) and the indication of the shift position indicator mutually coincide.
3. Drive vehicle in the manual mode, and then check that the actual gear position and the indication of the shift position indicator mutually coincide when the selector lever is shifted to “UP (+ side)” or “DOWN (– side)” side (1GR ⇔ 7GR).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to TM-135, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007205633

1.CHECK INPUT SIGNALS

With CONSULT

1. Start the engine.
2. Select “SLCT LVR POSI” in “Data Monitor” in “TRANSMISSION”.
3. Check the actual selector lever position (“P”, “R”, “N” and “D”) and the indication of the “SLCT LVR POSI” mutually coincide. Refer to TM-45, "Reference Value".
4. Drive vehicle in the manual mode, and then check that the actual gear position and the indication of the “SLCT LVR POSI” mutually coincide when the selector lever is shifted to the “UP (+ side)” or “DOWN (– side)” side (1GR ⇔ 7GR). Refer to TM-45, "Reference Value".

Is the inspection result normal?

YES >> INSPECTION END
NO-1 [The actual gear position does not change, or shifting into the manual mode is not possible (no gear shifting in the manual mode possible). Or the shift position indicator is not indicated.]>>•Check manual mode switch. Refer to TM-127, "Component Inspection".
- Check A/T main system (Fail-safe function actuated).
- Perform “Self Diagnostic Results” in “TRANSMISSION”. Refer to TM-49, "DTC Index".

NO-2 (The actual gear position changes, but the shift position indicator is not indicated.)>>Perform “Self Diagnostic Results” in “TRANSMISSION”. Refer to TM-49, "DTC Index".
NO-3 (The actual gear position and the indication on the shift position indicator do not coincide.)>>Perform “Self Diagnostic Results” in “TRANSMISSION”. Refer to TM-49, "DTC Index".
NO-4 (Only a specific position or positions is/are not indicated on the shift position indicator.)>>Check the combination meter. Refer to MWI-20, "Reference Value".

A/T SHIFT LOCK SYSTEM

Component Inspection

INFOID:0000000006750086

SHIFT LOCK SOLENOID

Check operation by applying battery voltage to A/T shift selector terminal 3 and ground to terminal 1.

CAUTION:

Be sure to apply voltage of the correct polarity to the respective terminals. Otherwise, the part may be damaged.

PARK POSITION SWITCH (KEY LOCK)

Check continuity between terminals of the A/T shift selector.

Condition	Terminal No.	Continuity
Selector lever in “P” position.	3 - 1	No
Selector lever not in “P” position.		Yes

STOP LAMP SWITCH

- Check continuity between terminals of the stop lamp switch.

Condition	Terminal No.	Continuity
Brake pedal depressed	4 -3	Yes
Brake pedal released		No

Check stop lamp switch after adjusting brake pedal.

SYMPTOM DIAGNOSIS

SYSTEM SYMPTOM

Symptom Table

INFOID:0000000006750098

- **The diagnostics item numbers show the sequence for inspection. Inspect in order from item 1.**
- **Overhaul and inspect inside the A/T only if A/T fluid condition is NG. Refer to** TM-66, "Checking A/T Fluid".

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
1	Shift Shock	Large shock. (“N”→“D” position)	ON vehicle	1. Engine idle speed	EC-443 (VQ40DE), EC-879 (VK56DE)
				2. Engine speed signal	TM-93
				3. Accelerator pedal position sensor	TM-109
				4. Control cable adjustment	TM-161
				5. ATF temperature sensor	TM-110
				6. Front brake solenoid valve	TM-118
				7. CAN communication line	TM-82
				8. Fluid level and state	TM-66
				9. Line pressure test	TM-75
				10. Control valve with TCM	TM-169
			OFF vehicle	11. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
2		Shock is too large when changing D_1→ D_2.	ON vehicle	1. Accelerator pedal position sensor	TM-109
				2. Control cable adjustment	TM-161
				3. Direct clutch solenoid valve	TM-119
				4. CAN communication line	TM-82
				5. Engine speed signal	TM-93
				6. Input speed sensor	TM-88
				7. Output speed sensor and vehicle speed signal	TM-90, TM-112
				8. Fluid level and state	TM-66
				9. Control valve with TCM	TM-169
			OFF vehicle	10. Direct clutch	TM-254
3		Shock is too large when changing D_2→ D_3.	ON vehicle	1. Accelerator pedal position sensor	TM-109
				2. Control cable adjustment	TM-161
				3. High and low reverse clutch solenoid valve	TM-121
				4. CAN communication line	TM-82
				5. Engine speed signal	TM-93
				6. Input speed sensor	TM-88
				7. Output speed sensor and vehicle speed signal	TM-90, TM-112
				8. Fluid level and state	TM-66
				9. Control valve with TCM	TM-169
			OFF vehicle	10. High and low reverse clutch	TM-252

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
4	Shift Shock	Shock is too large when changing D3→D4.	ON vehicle	1. Accelerator pedal position sensor	TM-109
				2. Control cable adjustment	TM-161
				3. Input clutch solenoid valve	TM-117
				4. CAN communication line	TM-82
				5. Engine speed signal	TM-93
				6. Input speed sensor	TM-88
				7. Output speed sensor and vehicle speed signal	TM-90, TM-112
				8. Fluid level and state	TM-66
				9. Control valve with TCM	TM-169
			OFF vehicle	10. Input clutch	TM-242
5		Shock is too large when changing D4→D5.	ON vehicle	1. Accelerator pedal position sensor	TM-109
				2. Control cable adjustment	TM-161
				3. Front brake solenoid valve	TM-118
				4. CAN communication line	TM-82
				5. Engine speed signal	TM-93
				6. Input speed sensor	TM-88
				7. Output speed sensor and vehicle speed signal	TM-90, TM-112
				8. Fluid level and state	TM-66
				9. Control valve with TCM	TM-169
			OFF vehicle	10. Front brake (brake band)	TM-193
				11. Input clutch	TM-242
6		Shock is too large for downshift when accelerator pedal is pressed.	ON vehicle	1. Accelerator pedal position sensor	TM-109
				2. Control cable adjustment	TM-161
				3. CAN communication line	TM-82
				4. Engine speed signal	TM-93
				5. Input speed sensor	TM-88
				6. Output speed sensor and vehicle speed signal	TM-90, TM-112
				7. Fluid level and state	TM-66
				8. Control valve with TCM	TM-169
			OFF vehicle	9. Front brake (brake band)	TM-193
				10. Input clutch	TM-242
				11. High and low reverse clutch	TM-252
				12. Direct clutch	TM-254

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
7	Shift Shock	Shock is too large for upshift when accelerator pedal is released.	ON vehicle	1. Accelerator pedal position sensor	TM-109
				2. Control cable adjustment	TM-161
				3. Engine speed signal	TM-93
				4. CAN communication line	TM-82
				5. Input speed sensor	TM-88
				6. Output speed sensor and vehicle speed signal	TM-90, TM-112
				7. Fluid level and state	TM-66
				8. Control valve with TCM	TM-169
			OFF vehicle	9. Front brake (brake band)	TM-193
				10. Input clutch	TM-242
				11. High and low reverse clutch	TM-252
				12. Direct clutch	TM-254
8		Shock is too large for lock-up.	ON vehicle	1. Accelerator pedal position sensor	TM-109
				2. Control cable adjustment	TM-161
				3. Engine speed signal	TM-93
				4. CAN communication line	TM-82
				5. Input speed sensor	TM-88
				6. Output speed sensor and vehicle speed signal	TM-90, TM-112
				7. Torque converter clutch solenoid valve	TM-105
				8. Fluid level and state	TM-66
				9. Control valve with TCM	TM-169
			OFF vehicle	10. Torque converter	TM-200
9		Shock is too large during engine brake.	ON vehicle	1. Accelerator pedal position sensor	TM-109
				2. Control cable adjustment	TM-161
				3. CAN communication line	TM-82
				4. Fluid level and state	TM-66
				5. Control valve with TCM	TM-169
			OFF vehicle	6. Front brake (brake band)	TM-193
				7. Input clutch	TM-242
				8. High and low reverse clutch	TM-252
				9. Direct clutch	TM-254

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
10	No Up Shift	Gear does not change from D → D2.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Direct clutch solenoid valve	TM-119
				4. Line pressure test	TM-75
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Direct clutch	TM-254
11		Gear does not change from D → D3.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. High and low reverse clutch solenoid valve	TM-121
				4. Line pressure test	TM-75
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. High and low reverse clutch	TM-252
12		Gear does not change from D → D4.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Input clutch solenoid valve	TM-117
				4. Front brake solenoid valve	TM-118
				5. Line pressure test	TM-75
				6. CAN communication line	TM-82
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Input clutch	TM-242
13		Gear does not change from D → D5.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Front brake solenoid valve	TM-118
				4. Direct clutch solenoid valve	TM-119
				5. Input speed sensor	TM-88
				6. Line pressure test	TM-75
				7. CAN communication line	TM-82
				8. Control valve with TCM	TM-169
			OFF vehicle	9. Front brake (brake band)	TM-193
				10. Input clutch	TM-242

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
14	No Down Shift	In “D” or "4" range, does not downshift to 4GR.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Front brake solenoid valve	TM-118
				4. Direct clutch solenoid valve	TM-119
				5. CAN communication line	TM-82
				6. Line pressure test	TM-75
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Front brake (brake band)	TM-193
				9. Input clutch	TM-242
15		In “D” or "3" range, does not downshift to 3GR.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Input clutch solenoid valve	TM-117
				4. Front brake solenoid valve	TM-118
				5. CAN communication line	TM-82
				6. Line pressure test	TM-75
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Input clutch	TM-242
16		In “D” or "2" range, does not downshift to 2GR. .	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. High and low reverse clutch solenoid valve	TM-121
				4. CAN communication line	TM-82
				5. Line pressure test	TM-75
				6. Control valve with TCM	TM-169
			OFF vehicle	7. High and low reverse clutch	TM-252
17		In “D” or "1" range, does not downshift to 1GR.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Direct clutch solenoid valve	TM-119
				4. CAN communication line	TM-82
				5. Line pressure test	TM-75
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Direct clutch	TM-254

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
18	Slips/Will Not engage	When “D” position, remains in 1GR.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Direct clutch solenoid valve	TM-119
				4. Line pressure test	TM-75
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. 3rd one-way clutch	TM-240
				8. 1st one-way clutch	TM-247
				9. Gear system	TM-193
				10. Reverse brake	TM-200
				11. Forward one-way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				12. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
19		When “D” position, remains in 2GR.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Low coast brake solenoid valve	TM-122
				4. Line pressure test	TM-75
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. 3rd one-way clutch	TM-240
				8. Gear system	TM-193
				9. Direct clutch	TM-254
				10. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
20	Slips/Will Not engage	When “D” position, remains in 3GR.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Line pressure test	TM-75
				4. CAN communication line	TM-82
				5. Control valve with TCM	TM-169
			OFF vehicle	6. 3rd one-way clutch	TM-240
				7. Gear system	TM-193
				8. High and low reverse clutch	TM-252
				9. Forward one-way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				10. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
21		When “D” position, remains in 4GR.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Input clutch solenoid valve	TM-117
				4. Direct clutch solenoid valve	TM-119
				5. High and low reverse clutch solenoid valve	TM-121
				6. Low coast brake solenoid valve	TM-122
				7. Front brake solenoid valve	TM-118
				8. Line pressure test	TM-75
				9. CAN communication line	TM-82
				10. Control valve with TCM	TM-169
			OFF vehicle	11. Input clutch	TM-242
				12. Gear system	TM-193
				13. High and low reverse clutch	TM-252
				14. Direct clutch	TM-254

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
22	Slips/Will Not Engage	When “D” position, remains in 5GR.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Front brake solenoid valve	TM-118
				4. Line pressure test	TM-75
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Front brake (brake band)	TM-193
				8. Input clutch	TM-242
				9. Gear system	TM-193
				10. High and low reverse clutch	TM-252
23		Vehicle cannot be started from D_1.	ON vehicle	1. Fluid level and state	TM-66
				2. Accelerator pedal position sensor	TM-109
				3. Line pressure test	TM-75
				4. CAN communication line	TM-82
				5. Control valve with TCM	TM-169
			OFF vehicle	6. Torque converter	TM-200
				7. Oil pump assembly	TM-237
				8. 3rd one-way clutch	TM-240
				9. 1st one-way clutch	TM-247
				10. Gear system	TM-193
				11. Reverse brake	TM-200
				12. Forward one-way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				13. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
24		Does not lock-up.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Engine speed signal	TM-93
				4. Input speed sensor	TM-88
				5. Torque converter clutch solenoid valve	TM-105
				6. CAN communication line	TM-82
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Torque converter	TM-200
				9. Oil pump assembly	TM-237

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
25	Slips/Will Not engage	Does not hold lock-up condition.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Engine speed signal	TM-93
				4. Input speed sensor	TM-88
				5. Torque converter clutch solenoid valve	TM-105
				6. CAN communication line	TM-82
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Torque converter	TM-200
				9. Oil pump assembly	TM-237
26		Lock-up is not released.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Engine speed signal	TM-93
				4. Input speed sensor	TM-88
				5. Torque converter clutch solenoid valve	TM-105
				6. CAN communication line	TM-82
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Torque converter	TM-200
				9. Oil pump assembly	TM-237
27		No shock at all or the clutch slips when vehicle changes speed $D_1 \rightarrow D_2$.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Direct clutch solenoid valve	TM-119
				4. CAN communication line	TM-82
				5. Line pressure test	TM-75
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Torque converter	TM-200
				8. Oil pump assembly	TM-237
				9. 3rd one-way clutch	TM-240
				10. Gear system	TM-193
				11. Direct clutch	TM-254
				12. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
28	Slips/Will Not engage	No shock at all or the clutch slips when vehicle changes speed D_2 → D_3.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. High and low reverse clutch solenoid valve	TM-121
				4. CAN communication line	TM-82
				5. Line pressure test	TM-75
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Torque converter	TM-200
				8. Oil pump assembly	TM-237
				9. 3rd one-way clutch	TM-240
				10. Gear system	TM-193
				11. High and low reverse clutch	TM-252
				12. Forward one- way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				13. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
29		No shock at all or the clutch slips when vehicle changes speed D_3 → D_4.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Input clutch solenoid valve	TM-117
				4. Front brake solenoid valve	TM-118
				5. CAN communication line	TM-82
				6. Line pressure test	TM-75
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Torque converter	TM-200
				9. Oil pump assembly	TM-237
				10. Input clutch	TM-242
				11. Gear system	TM-193
				12. High and low reverse clutch	TM-252
				13. Direct clutch	TM-254

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
30	Slips/Will Not engage	No shock at all or the clutch slips when vehicle changes speed $D_4 \rightarrow D_5$.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Front brake solenoid valve	TM-118
				4. Direct clutch solenoid valve	TM-119
				5. CAN communication line	TM-82
				6. Line pressure test	TM-75
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Torque converter	TM-200
				9. Oil pump assembly	TM-237
				10. Front brake (brake band)	TM-193
				11. Input clutch	TM-242
				12. Gear system	TM-193
				13. High and low reverse clutch	TM-252
31		When you press the accelerator pedal and shift speed $D_5 \rightarrow D_4$ the engine idles or the transmission slips.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Front brake solenoid valve	TM-118
				4. Direct clutch solenoid valve	TM-119
				5. CAN communication line	TM-82
				6. Line pressure test	TM-75
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Torque converter	TM-200
				9. Oil pump assembly	TM-237
				10. Input clutch	TM-242
				11. Gear system	TM-193
				12. High and low reverse clutch	TM-252
				13. Direct clutch	TM-254

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
32	Slips/Will Not engage	When you press the accelerator pedal and shift speed D4→ D3 the engine idles or the transmission slips.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Input clutch solenoid valve	TM-117
				4. Front brake solenoid valve	TM-118
				5. CAN communication line	TM-82
				6. Line pressure test	TM-75
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Torque converter	TM-200
				9. Oil pump assembly	TM-237
				10. 3rd one-way clutch	TM-240
				11. Gear system	TM-193
				12. High and low reverse clutch	TM-252
				13. Forward one- way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				14. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
33		When you press the accelerator pedal and shift speed D3→ D2 the engine idles or the transmission slips.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. High and low reverse clutch solenoid valve	TM-121
				4. Direct clutch solenoid valve	TM-119
				5. CAN communication line	TM-82
				6. Line pressure test	TM-75
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Torque converter	TM-200
				9. Oil pump assembly	TM-237
				10. 3rd one-way clutch	TM-240
				11. Gear system	TM-193
				12. Direct clutch	TM-254
				13. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
34	Slips/Will Not Engage	When you press the accelerator pedal and shift speed $D_2 \rightarrow D_1$ the engine idles or the transmission slips.	ON vehicle	1. Fluid level and state	TM-66
				2. Output speed sensor and vehicle speed signal	TM-90, TM-112
				3. Direct clutch solenoid valve	TM-119
				4. CAN communication line	TM-82
				5. Line pressure test	TM-75
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Torque converter	TM-200
				8. Oil pump assembly	TM-237
				9. 3rd one-way clutch	TM-240
				10. 1st one-way clutch	TM-247
				11. Gear system	TM-193
				12. Reverse brake	TM-200
				13. Forward one- way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				14. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
35		With selector lever in “D” position, acceleration is extremely poor.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Accelerator pedal position sensor	TM-109
				4. CAN communication line	TM-82
				5. Transmission range switch	TM-86
				6. Control cable adjustment	TM-161
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Torque converter	TM-200
				9. Oil pump assembly	TM-237
				10. 1st one-way clutch	TM-247
				11. Gear system	TM-193
				12. Reverse brake	TM-200
				13. Forward one- way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				14. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
36	Slips/Will Not Engage	With selector lever in “R” position, acceleration is extremely poor.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Accelerator pedal position sensor	TM-109
				4. High and low reverse clutch solenoid valve	TM-121
				5. CAN communication line	TM-82
				6. Transmission range switch	TM-86
				7. Control cable adjustment	TM-161
				8. Control valve with TCM	TM-169
			OFF vehicle	9. Gear system	TM-193
				10. Output shaft	TM-200
				11. Reverse brake	TM-200
37		While starting off by accelerating in 1st, engine races or slippage occurs.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Accelerator pedal position sensor	TM-109
				4. CAN communication line	TM-82
				5. Control valve with TCM	TM-169
			OFF vehicle	6. Torque converter	TM-200
				7. Oil pump assembly	TM-237
				8. 3rd one-way clutch	TM-240
				9. 1st one-way clutch	TM-247
				10. Gear system	TM-193
				11. Reverse brake	TM-200
				12. Forward one- way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				13. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
38		While accelerating in 2nd, engine races or slippage occurs.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Accelerator pedal position sensor	TM-109
				4. CAN communication line	TM-82
				5. Direct clutch solenoid valve	TM-119
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Torque converter	TM-200
				8. Oil pump assembly	TM-237
				9. 3rd one-way clutch	TM-240
				10. Gear system	TM-193
				11. Direct clutch	TM-254
				12. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
39	Slips/Will Not Engage	While accelerating in 3rd, engine races or slippage occurs.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Accelerator pedal position sensor	TM-109
				4. CAN communication line	TM-82
				5. High and low reverse clutch solenoid valve	TM-121
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Torque converter	TM-200
				8. Oil pump assembly	TM-237
				9. 3rd one-way clutch	TM-240
				10. Gear system	TM-193
				11. High and low reverse clutch	TM-252
				12. Forward one- way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16	TM-200
				13. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
40		While accelerating in 4th, engine races or slippage occurs.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Accelerator pedal position sensor	TM-109
				4. CAN communication line	TM-82
				5. Input clutch solenoid valve	TM-117
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Torque converter	TM-200
				8. Oil pump assembly	TM-237
				9. Input clutch	TM-242
				10. Gear system	TM-193
				11. High and low reverse clutch	TM-252
				12. Direct clutch	TM-254

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
41	Slips/Will Not Engage	While accelerating in 5th, engine races or slippage occurs.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Accelerator pedal position sensor	TM-109
				4. CAN communication line	TM-82
				5. Front brake solenoid valve	TM-118
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Torque converter	TM-200
				8. Oil pump assembly	TM-237
				9. Front brake (brake band)	TM-193
				10. Input clutch	TM-242
				11. Gear system	TM-193
				12. High and low reverse clutch	TM-252
42		Slips at lock-up.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Engine speed signal	TM-93
				4. Input speed sensor	TM-88
				5. Torque converter clutch solenoid valve	TM-105
				6. CAN communication line	TM-82
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Torque converter	TM-200
				9. Oil pump assembly	TM-237
43		No creep at all.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Accelerator pedal position sensor	TM-109
				4. Direct clutch solenoid valve	TM-119
				5. Transmission range switch	TM-86
				6. CAN communication line	TM-82
				7. Control cable adjustment	TM-161
				8. Control valve with TCM	TM-169
			OFF vehicle	9. Torque converter	TM-200
				10. Oil pump assembly	TM-237
				11. 1st one-way clutch	TM-247
				12. Gear system	TM-193
				13. Reverse brake	TM-200
				14. Direct clutch	TM-254
				15. Forward one- way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16	TM-200
				16. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
44	Slips/Will Not Engage	Vehicle cannot run in all positions.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Transmission range switch	TM-161
				4. Control cable adjustment	TM-161
				5. Control valve with TCM	TM-169
			OFF vehicle	6. Oil pump assembly	TM-237
				7. Gear system	TM-193
				8. Output shaft	TM-200
45		With selector lever in “D” position, driving is not possible.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Transmission range switch	TM-86
				4. Control cable adjustment	TM-161
				5. Control valve with TCM	TM-169
			OFF vehicle	6. Torque converter	TM-200
				7. Oil pump assembly	TM-237
				8. 1st one-way clutch	TM-247
				9. Gear system	TM-193
				10. Reverse brake	TM-200
				11. Forward one- way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				12. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
46		With selector lever in “R” position, driving is not possible.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Transmission range switch	TM-86
				4. Control cable adjustment	TM-161
				5. Control valve with TCM	TM-169
			OFF vehicle	6. Gear system	TM-193
				7. Output shaft	TM-200
				8. Reverse brake	TM-200
47	Does not change	Does not change M_5 → M_4.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Manual mode switch	TM-125
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Front brake (brake band)	TM-193

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
48	Does not change	Does not change M_4 → M_3.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Manual mode switch	TM-125
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Front brake (brake band)	TM-193
				8. Input clutch	TM-242
49		Does not change M_3 → M_2.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Manual mode switch	TM-125
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Front brake (brake band)	TM-193
				8. Input clutch	TM-242
				9. High and low reverse clutch	TM-252
50		Does not change M_2 → M_1.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Manual mode switch	TM-125
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Input clutch	TM-242
				8. High and low reverse clutch	TM-252
				9. Direct clutch	TM-254
51		Cannot be changed to manual mode.	ON vehicle	1. Manual mode switch	TM-125
				2. Input speed sensor	TM-88
				3. CAN communication line	TM-82
52	Others	Shift point is high in “D” position.	ON vehicle	1. Output speed sensor and vehicle speed signal	TM-90, TM-112
				2. Accelerator pedal position sensor	TM-109
				3. CAN communication line	TM-82
				4. ATF temperature sensor	TM-110
				5. Control valve with TCM	TM-169

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
53	Others	Shift point is low in “D” position.	ON vehicle	1. Output speed sensor and vehicle speed signal	TM-90, TM-112
				2. Accelerator pedal position sensor	TM-109
				3. CAN communication line	TM-82
				4. Control valve with TCM	TM-169
54		Judder occurs during lock-up.	ON vehicle	1. Fluid level and state	TM-66
				2. Engine speed signal	TM-93
				3. Input speed sensor	TM-88
				4. Output speed sensor and vehicle speed signal	TM-90, TM-112
				5. Accelerator pedal position sensor	TM-109
				6. CAN communication line	TM-82
				7. Torque converter clutch solenoid valve	TM-105
				8. Control valve with TCM	TM-169
			OFF vehicle	9. Torque converter	TM-200
55		Strange noise in “R” position.	ON vehicle	1. Fluid level and state	TM-66
				2. Engine speed signal	TM-93
				3. CAN communication line	TM-82
				4. Control valve with TCM	TM-169
			OFF vehicle	5. Torque converter	TM-200
				6. Oil pump assembly	TM-237
				7. Gear system	TM-193
				8. High and low reverse clutch	TM-252
				9. Reverse brake	TM-200
56		Strange noise in “N” position.	ON vehicle	1. Fluid level and state	TM-66
				2. Engine speed signal	TM-93
				3. CAN communication line	TM-82
				4. Control valve with TCM	TM-169
			OFF vehicle	5. Torque converter	TM-200
				6. Oil pump assembly	TM-237
				7. Gear system	TM-193
57		Strange noise in “D” position.	ON vehicle	1. Fluid level and state	TM-66
				2. Engine speed signal	TM-93
				3. CAN communication line	TM-82
				4. Control valve with TCM	TM-169
			OFF vehicle	5. Torque converter	TM-200
				6. Oil pump assembly	TM-237
				7. Gear system	TM-193
				8. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
58	Others	Vehicle dose not decelerate by engine brake.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Manual mode switch	TM-125
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Input clutch	TM-242
				8. High and low reverse clutch	TM-252
				9. Direct clutch	TM-254
59		Engine brake does not operate in “2” position.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Front brake (brake band)	TM-193
				8. Input clutch	TM-242
				9. High and low reverse clutch	TM-252
60		Engine brake does not operate in “1” position.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. CAN communication line	TM-82
				5. Control valve with TCM	TM-169
			OFF vehicle	6. Input clutch	TM-242
				7. High and low reverse clutch	TM-252
				8. Direct clutch	TM-254
61		Engine brake does not work $M_5 \rightarrow M_4$.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Manual mode switch	TM-125
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Front brake (brake band)	TM-193
				8. Input clutch	TM-242

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
62	Others	Engine brake does not work $M_4 \rightarrow M_3$.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Manual mode switch	TM-125
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Front brake (brake band)	TM-193
				8. Input clutch	TM-242
63		Engine brake does not work $M_3 \rightarrow M_2$.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Manual mode switch	TM-125
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Front brake (brake band)	TM-193
				8. Input clutch	TM-242
				9. High and low reverse clutch	TM-252
64		Engine brake does not work $M_2 \rightarrow M_1$.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Manual mode switch	TM-125
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Input clutch	TM-242
				8. High and low reverse clutch	TM-252
				9. Direct clutch	TM-254

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
65	Others	Maximum speed low.	ON vehicle	1. Fluid level and state	TM-66
				2. Line pressure test	TM-75
				3. Accelerator pedal position sensor	TM-109
				4. CAN communication line	TM-82
				5. Direct clutch solenoid valve	TM-119
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Torque converter	TM-200
				8. Oil pump assembly	TM-237
				9. Input clutch	TM-242
				10. Gear system	TM-193
				11. High and low reverse clutch	TM-252
				12. Direct clutch	TM-254
				13. Forward one- way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				14 Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
66		Extremely large creep.	ON vehicle	1. Engine idle speed	TM-93
				2. CAN communication line	TM-82
			OFF vehicle	3. Torque converter	TM-200
67		With selector lever in “P” position, vehicle does not enter parking condition or, with selector lever in another position, parking condition is not cancelled.	ON vehicle	1. Transmission range switch	TM-86
				2. Control cable adjustment	TM-161
			OFF vehicle	3. Parking pawl components	TM-200
68		Vehicle runs with transmission in “P” position.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Control valve with TCM	TM-169
				5. Parking pawl components	TM-200
			OFF vehicle	6. Gear system	TM-193

No.	Items	Symptom	Condition	Diagnostic Item	Reference page
69	Others	Vehicle runs with transmission in “N” position.	ON vehicle	1. Transmission range switch	TM-86
				2. Fluid level and state	TM-66
				3. Control cable adjustment	TM-161
				4. Control valve with TCM	TM-169
			OFF vehicle	5. Input clutch	TM-242
				6. Gear system	TM-193
				7. Direct clutch	TM-254
				8. Reverse brake	TM-200
				9. Forward one- way clutch (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
				10. Forward brake (Parts behind drum support is impossible to perform inspection by disassembly. Refer to TM-16.	TM-200
70		Engine does not start in “N” or “P” position.	ON vehicle	1. Ignition switch and starter	
				2. Control cable adjustment	TM-161
				3. Transmission range switch	TM-86
71		Engine starts in positions other than “N” or “P”.	ON vehicle	1. Ignition switch and starter	
				2. Control cable adjustment	TM-161
				3. Transmission range switch	TM-86
72		Engine stall.	ON vehicle	1. Fluid level and state	TM-66
				2. Engine speed signal	TM-93
				3. Input speed sensor	TM-88
				4. Torque converter clutch solenoid valve	TM-105
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Torque converter	TM-200
73		Engine stalls when select lever shifted “N”→ “D”, “R”.	ON vehicle	1. Fluid level and state	TM-66
				2. Engine speed signal	TM-93
				3. Input speed sensor	TM-88
				4. Torque converter clutch solenoid valve	TM-105
				5. CAN communication line	TM-82
				6. Control valve with TCM	TM-169
			OFF vehicle	7. Torque converter	TM-200

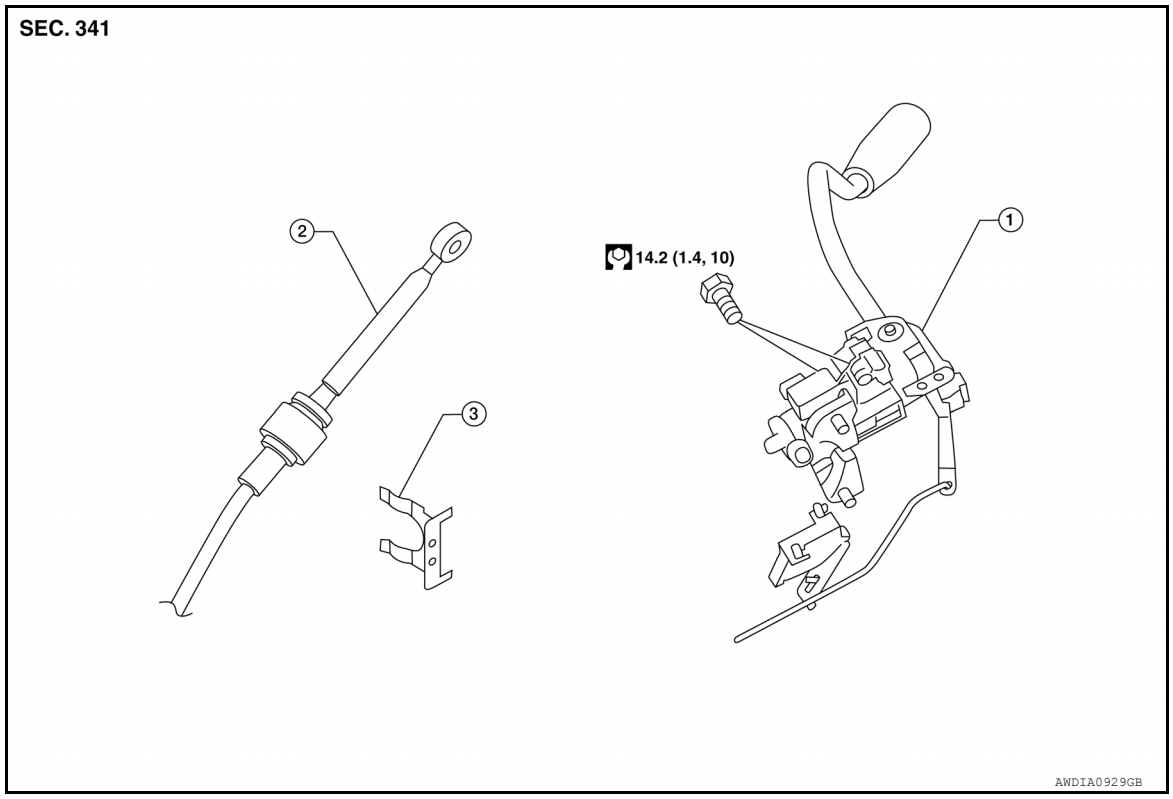
No.	Items	Symptom	Condition	Diagnostic Item	Reference page
74	Others	Engine speed does not return to idle.	ON vehicle	1. Fluid level and state	TM-66
				2. Direct clutch solenoid valve	TM-119
				3. Front brake solenoid valve	TM-118
				4. Accelerator pedal position sensor	TM-109
				5. Output speed sensor and vehicle speed signal	TM-90, TM-112
				6. CAN communication line	TM-82
				7. Control valve with TCM	TM-169
			OFF vehicle	8. Front brake (brake band)	TM-193
				9. Direct clutch	TM-254
75		A/T CHECK indicator lamp does not come on.	ON vehicle	1. CAN communication line	TM-82
				2. Combination meter	MWI-20
				3. TCM power supply	TM-128

REMOVAL AND INSTALLATION

A/T SHIFT SELECTOR

Exploded View

INFOID:0000000006822263



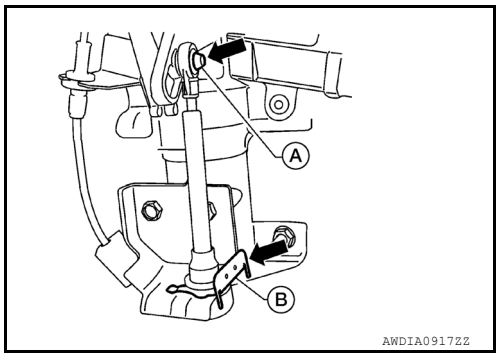
1. A/T shift selector
2. Control cable
3. Lock plate

Removal and Installation

INFOID:0000000006750119

REMOVAL

1. Remove the steering column covers. Refer to IP-20, "Removal and Installation".
2. Remove the lock plate (B) and remove the control cable from A/T shift selector pin (A).
3. Disconnect the shift lock electrical connector.
4. Disconnect key interlock cable from A/T shift selector. Refer to TM-165, "Removal and Installation".
5. Remove the A/T shift selector bolts then remove A/T shift selector.



INSTALLATION

Installation is in the reverse order of removal.

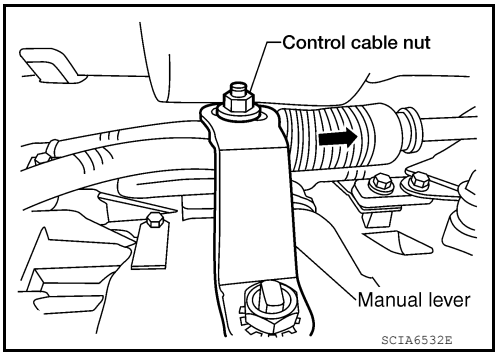
- After installation is completed, be sure to check A/T position. Adjust if necessary. Refer to TM-161, "Inspection and Adjustment".

Inspection and Adjustment

INFOID:0000000006750117

ADJUSTMENT OF A/T POSITION

1. Set the parking brake.
   CAUTION:
   Make sure the vehicle cannot move with parking brake set.
2. Loosen control cable nut.
3. Place the manual lever and shift selector in “P” position.
4. Push the control cable in the direction shown with a force of 9.8 N (1kg, 2.2 lb), then release the cable and temporarily tighten control cable nut.
   CAUTION:
   Do not apply any load to the manual lever.
   NOTE:
   Make sure the manual lever stays in "P" position.
5. Tighten the control cable nut to the specified torque.



Control cable nut : 14.5 N·m (1.5 kg-m, 11 ft-lb)

6. Check the operation of the A/T.

CHECKING OF A/T POSITION

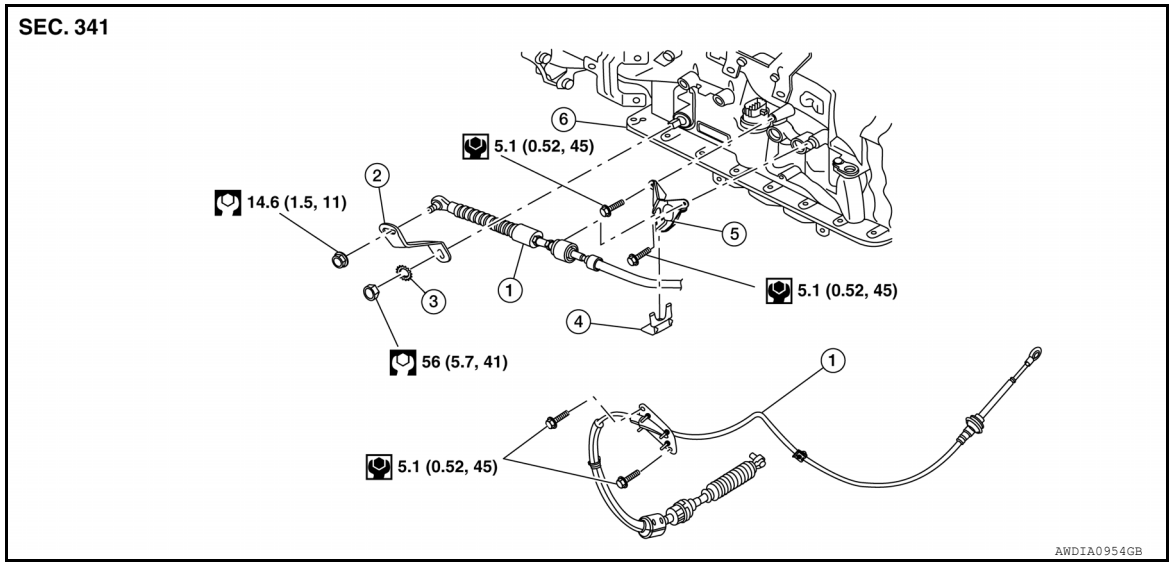
With the shift selector in the “P” position, turn the ignition switch to the ON position with the engine OFF. Confirm that the following conditions apply.

- The shift selector can be moved from the “P” position only when the brake pedal is depressed.
- The shift selector stops at each position with the feel of engagement when it is moved through all the positions.
- There is no excessive effort, sticking, noise or rattle.
- The actual position of the shift selector matches the position shown by the shift position indicator and the A/T body.
- The back-up lamps illuminate only when the shift selector is placed in the “R” position.
- The back-up lamps do not illuminate when the shift selector is pushed against the “R” position when in the “P” or “N” position.
- The engine can only be started with the shift selector in the “P” and “N” positions.
- The A/T is locked completely when the shift selector is in the “P” position.

CONTROL CABLE

Exploded View

INFOID:0000000007095144



1. Control cable
2. Manual lever
3. Washer
4. Lock plate
5. Control cable bracket
6. A/T assembly

Removal and Installation

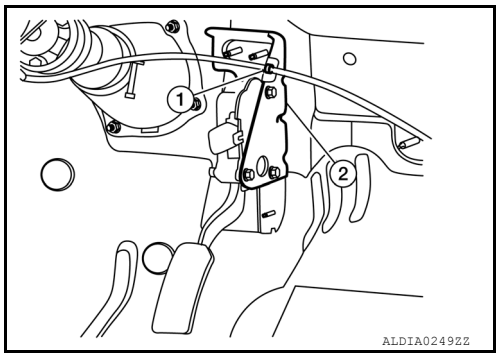
INFOID:0000000006822329

REMOVAL

CAUTION:

- **Do not bend or twist control cable over 180°.**
- **Do not twist control cable boot over 90°.**
- **Do not cut control cable boot.**

1. Remove front wheel and tire assembly RH using power tools.
2. Remove fender protector RH. Refer to EXT-33, "Removal and Installation".
3. Remove instrument lower panel LH. Refer to IP-18, "Removal and Installation".
4. Remove instrument center finisher LH. Refer to IP-26, "Exploded View".
5. Remove steering column covers. Refer to IP-20, "Removal and Installation".
6. Remove control cable from A/T shift selector. Refer to TM-161, "Exploded View".
7. Remove the lock plate from control cable bracket
8. Remove control cable from the manual lever and control cable bracket.
9. Remove control cable retainer clip (1) from accelerator pedal bracket (2).

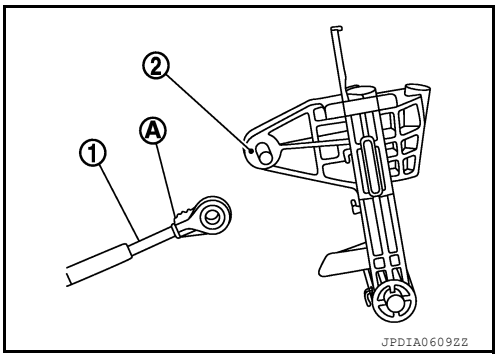


10. Remove control cable bolts on lower dash.
11. Remove control cable from the vehicle engine compartment through the passenger side wheel well opening.

INSTALLATION

Installation is in the reverse order of removal.

When installing control cable (1) to A/T shift selector (2), check that control cable eye (A) is fully installed.

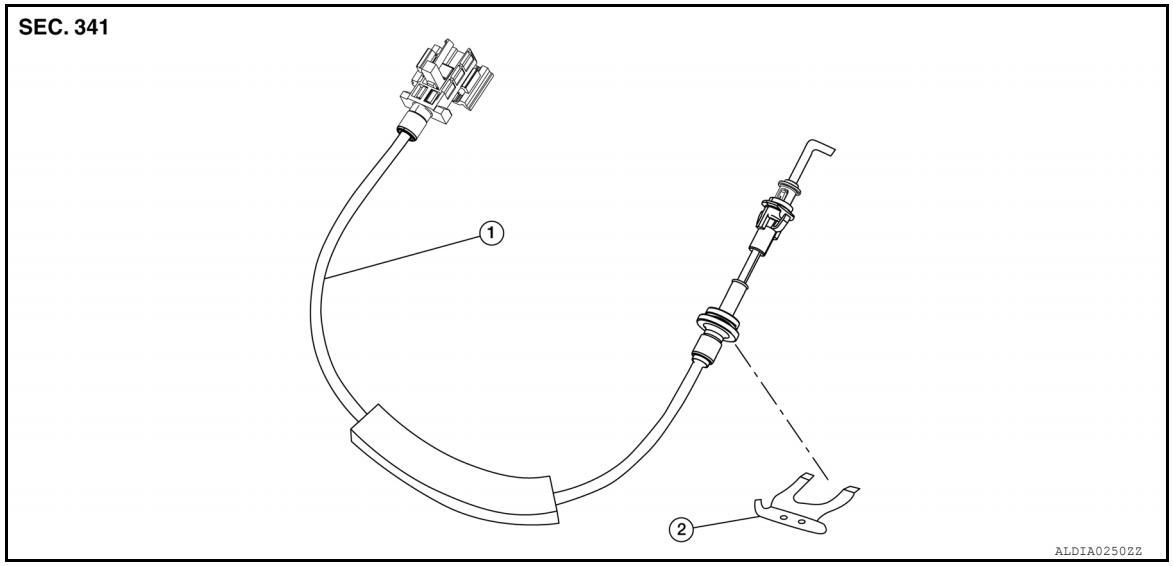


After installation is completed, be sure to check A/T position. Adjust if necessary. Refer to TM-161, "Inspection and Adjustment".

KEY INTERLOCK CABLE

Exploded View

INFOID:0000000007258553



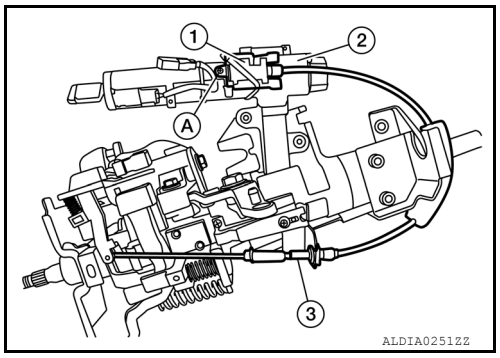
1. Key interlock cable
2. Lock clip

Removal and Installation

INFOID:0000000006750123

REMOVAL

1. Remove the instrument lower panel LH. Refer to IP-18, "Removal and Installation".
2. Remove steering column covers. Refer to IP-20, "Removal and Installation".
3. Remove the screw (A) and disconnect key interlock lock cable (1) from ignition key cylinder (2).
4. Remove the key interlock cable (1) from the key interlock cable bracket (3) and remove key interlock cable (1) from the steering column.



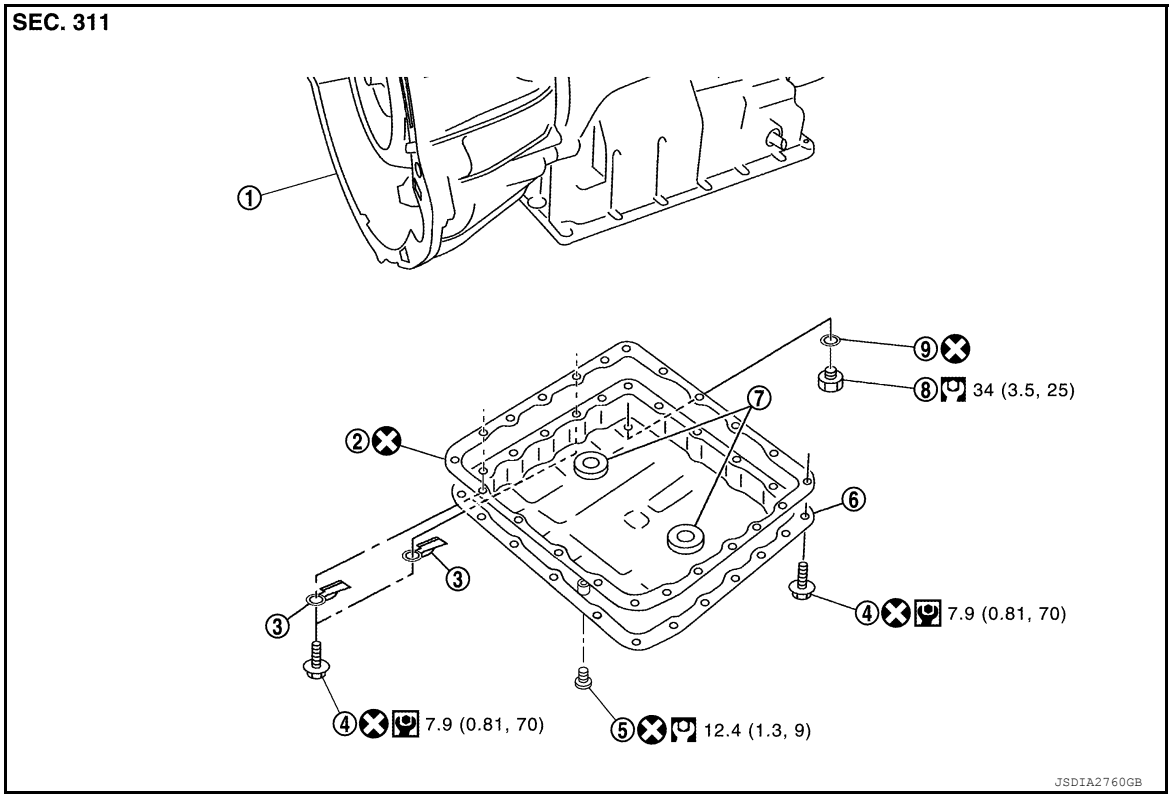
INSTALLATION

1. Connect the key interlock cable to steering column and key interlock cable bracket.
2. Install key interlock cable to ignition key cylinder.
   CAUTION:
   - **Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts.**
   - **After installing key interlock cable to A/T shift selector, make sure that casing cap and bracket are firmly secured in their positions. If casing cap can be removed with an external load of less than 39 N (4.0 kg, 8.8 lb), replace key interlock cable with new one.**
3. Install steering column covers. Refer to IP-20, "Removal and Installation".
4. Install instrument lower panel LH. Refer to IP-18, "Removal and Installation".

OIL PAN

Exploded View

INFOID:0000000006822324



1. A/T assembly
2. Oil pan gasket
3. Clip
4. Oil pan mounting bolt
5. Overflow plug
6. Oil pan
7. Magnets
8. Drain plug
9. Drain plug gasket

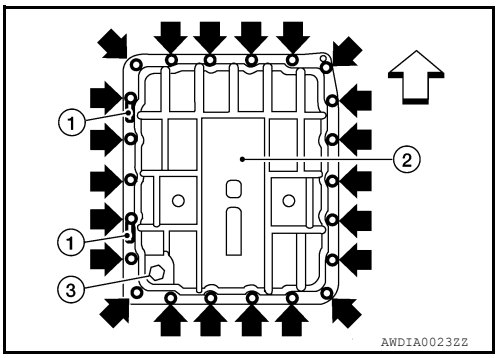
Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

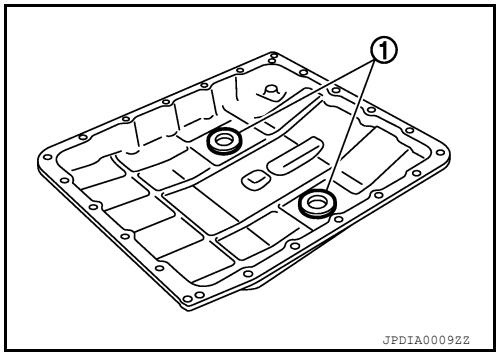
INFOID:0000000006822325

REMOVAL

1. Drain A/T fluid. Refer to TM-68, "Changing A/T Fluid".
2. Remove oil pan bolts and clips (1).
   - ⇦: Vehicle front
   - ⬅: Oil pan bolt
   - Drain plug (3)
3. Remove oil pan (2) and oil pan gasket.

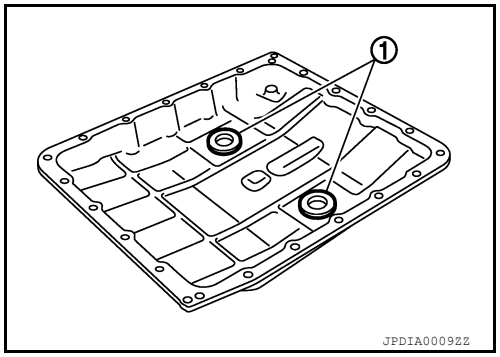


4. Remove magnets (1) from oil pan.



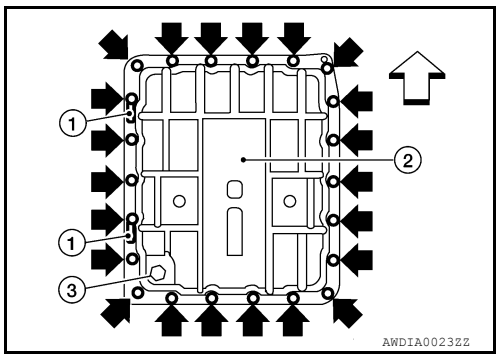
INSTALLATION

1. Install magnets (1) as shown.



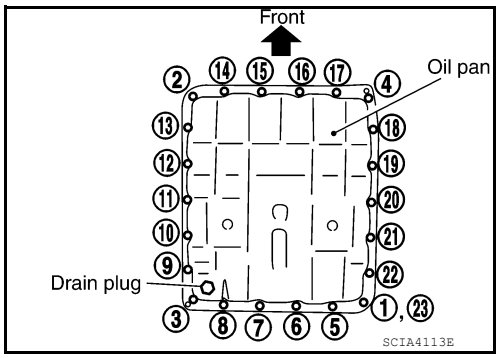
2. Install oil pan (2) with a new oil pan gasket and clips (1).
Partially install the oil pan bolts to secure the oil pan.
   - ⇦: Vehicle front
   - ⬅: Oil pan bolt
   - Drain plug (3)

CAUTION:
- **Be sure the oil drain plug is located to the rear of the transmission assembly.**
- **Before installing oil pan bolts, remove any traces of sealant from sealing surface and threaded holes.**
- **Do not reuse old gasket, replace with a new one.**
- **Always replace oil pan bolts as they are self-sealing.**
- **Partially install the oil pan bolts in a criss-cross pattern to prevent dislocation of the gasket.**



3. Tighten oil pan bolts to specification in numerical order as shown.
4. Install drain plug with a new drain plug gasket to oil pan and tighten to specification.

CAUTION:
Do not reuse drain plug gasket. Replace with a new one.



5. Refill A/T with fluid and check for leaks. Refer to TM-66, "Checking A/T Fluid".

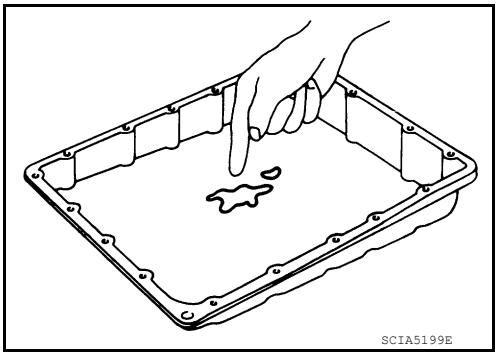
Inspection and Adjustment

INFOID:0000000006822326

INSPECTION AFTER REMOVAL

Check foreign materials in oil pan to help determine causes of malfunction. If the ATF is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, servo, and clutches to stick and can inhibit pump pressure.

- **If frictional material is detected, perform A/T fluid cooler cleaning. Refer to TM-70, "A/T Fluid Cooler Cleaning".**



INSPECTION AFTER INSTALLATION

Check A/T fluid leakage.

ADJUSTMENT AFTER INSTALLATION

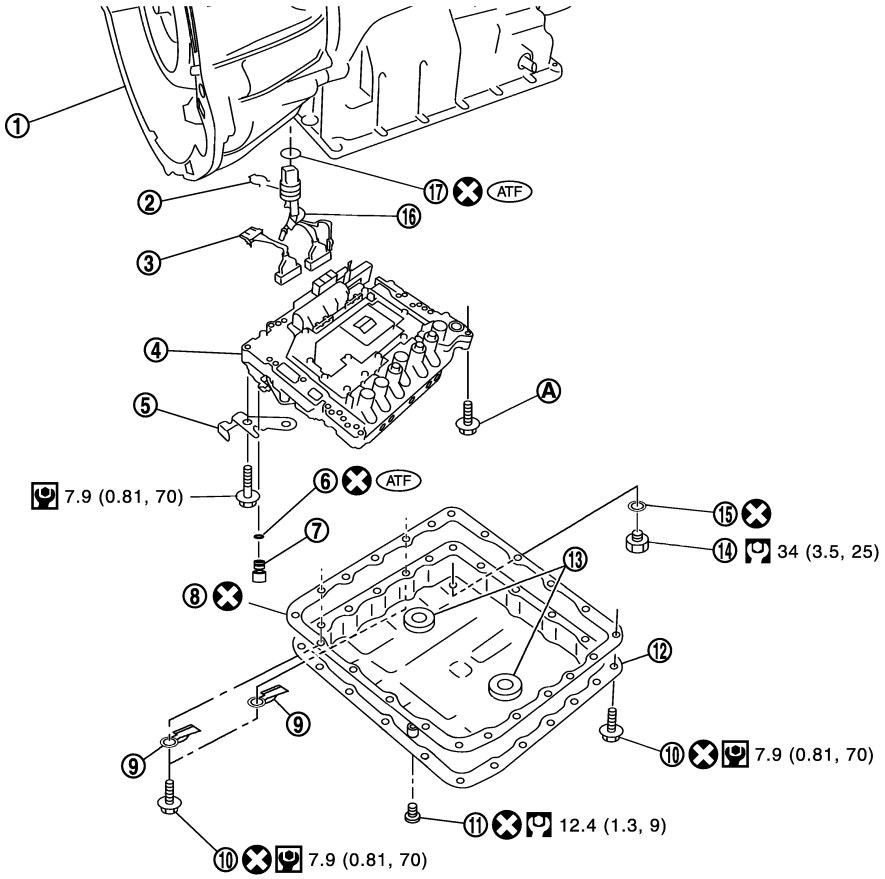
Adjust A/T fluid level. Refer to TM-66, "Checking A/T Fluid".

CONTROL VALVE WITH TCM

Exploded View

INFOID:0000000006822321

SEC. 313•314•315•316•317•319



1. A/T assembly
2. Snap ring
3. Sub-harness
4. Control valve with TCM
5. Bracket
6. O-ring
7. Plug
8. Oil pan gasket
9. Clip
10. Oil pan mounting bolt
11. Overflow plug
12. Oil pan
13. Magnets
14. Drain plug
15. Drain plug gasket
16. Terminal cord assembly
17. O-ring

A. For tightening torque, refer to “Installation”.

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

Removal and Installation

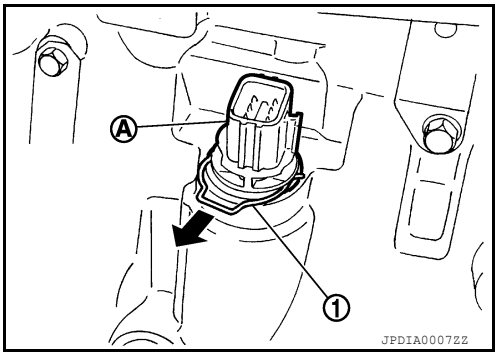
INFOID:0000000006822322

REMOVAL AND INSTALLATION OF CONTROL VALVE WITH TCM

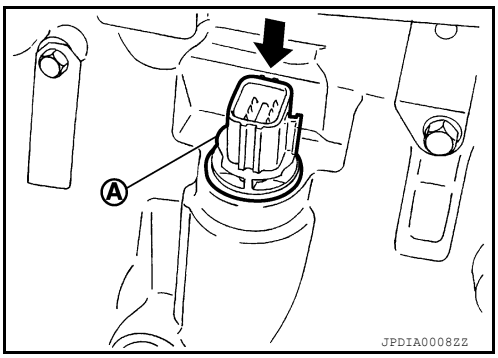
Removal

1. Drain A/T fluid. Refer to TM-68, "Changing A/T Fluid".
2. Disconnect A/T assembly harness connector.

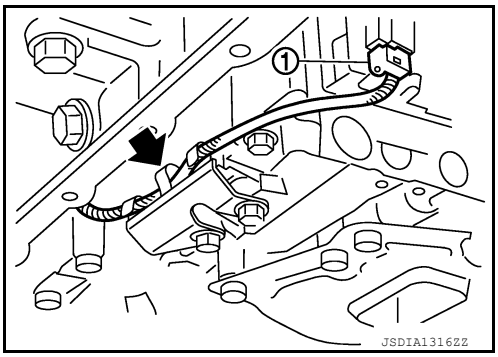
3. Remove snap ring (1) from terminal cord assembly connector (A) in the direction shown.



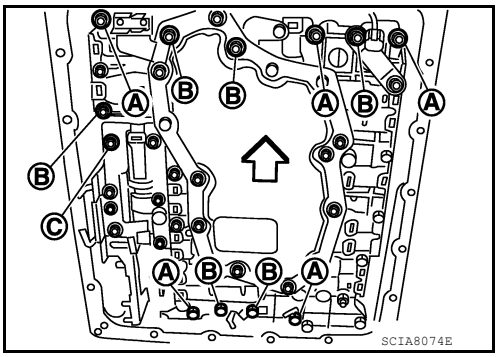
4. Push terminal cord assembly connector (A) downward.
CAUTION:
Do not damage connector.



5. Remove oil pan and oil pan gasket. Refer to TM-166, "Removal and Installation".
6. Straighten terminal clip (⬅) to free the output speed sensor harness.
7. Disconnect output speed sensor connector (1).
CAUTION:
Do not damage connector.

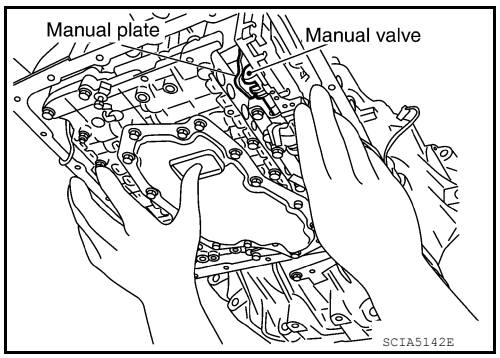


8. Remove bolts (A), (B) and (C) from control valve with TCM.
• ⇦: Front

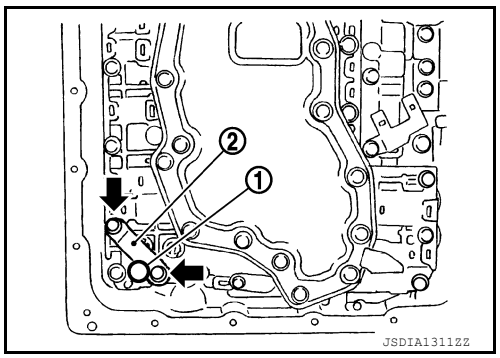


Bolt symbol	Length mm (in)	Number of bolts
(A)	42 (1.65)	5
(B)	55 (2.17)	6
(C)	40 (1.57)	1

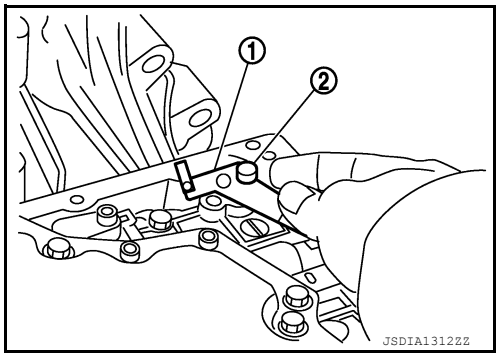
9. Remove control valve with TCM from transmission case.
CAUTION:
When removing, be careful with the manual valve notch and manual plate height. Remove it vertically.



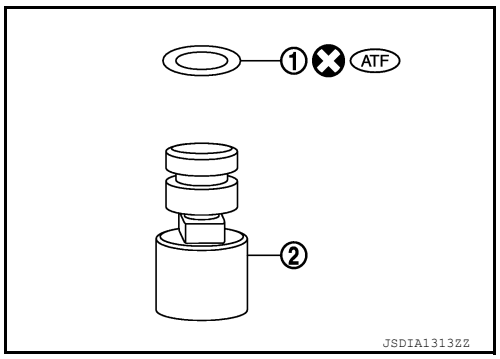
10. Remove plug (1) with bracket (2) from control valve with TCM.
• ⬅:Bolt



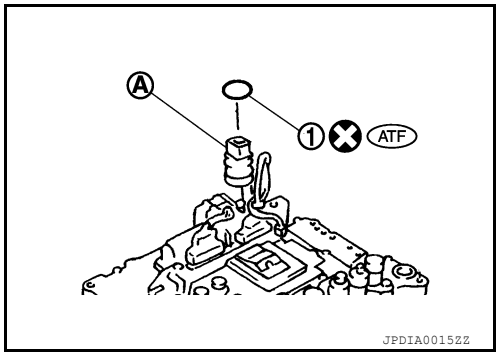
11. Remove the bracket (1) from plug (2).



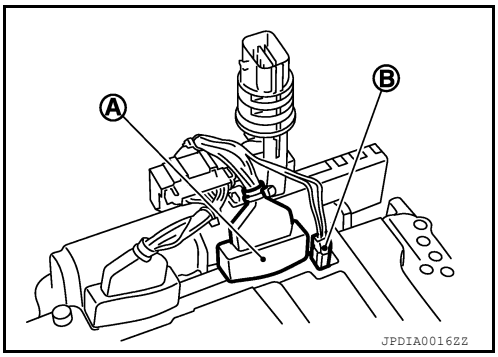
12. Remove O-ring (1) from plug (2).
CAUTION:
Do not reuse O-ring.



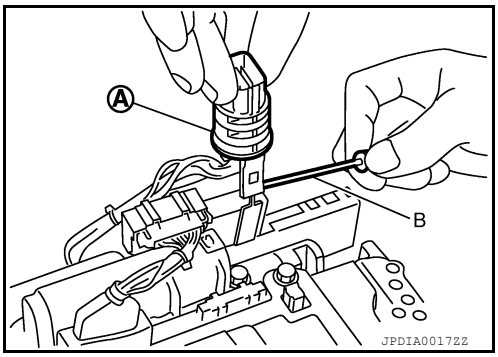
13. Remove O-ring (1) from terminal cord assembly connector (A).
CAUTION:
Do not reuse O-ring.



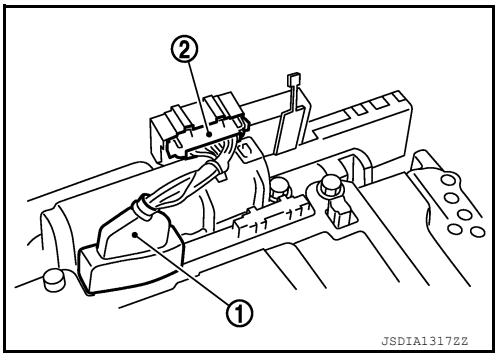
14. Disconnect terminal cord assembly connectors (A) and (B).
CAUTION:
Do not damage connectors.



15. Remove terminal cord assembly connector (A) from control valve with TCM using suitable tool (B).

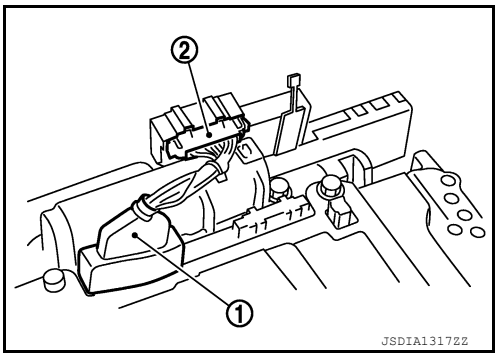


16. Disconnect sub-harness connector (1) and transmission range switch connector (2).
CAUTION:
Do not damage connectors.

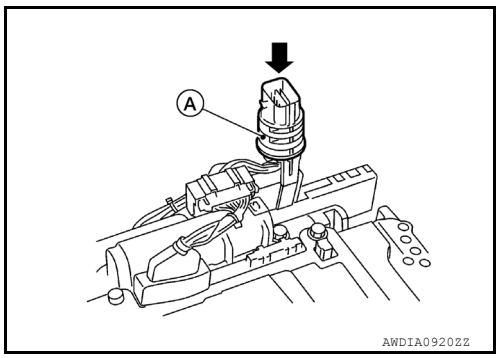


Installation

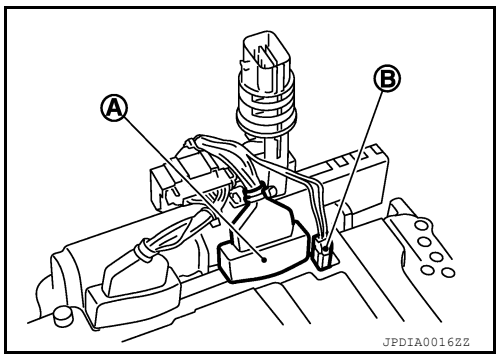
1. Connect sub-harness connector (1) and transmission range switch connector (2).
CAUTION:
Do not damage connectors.



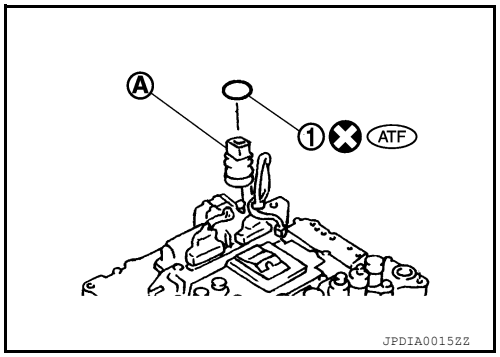
2. Install terminal cord assembly connector (A) to control valve with TCM.



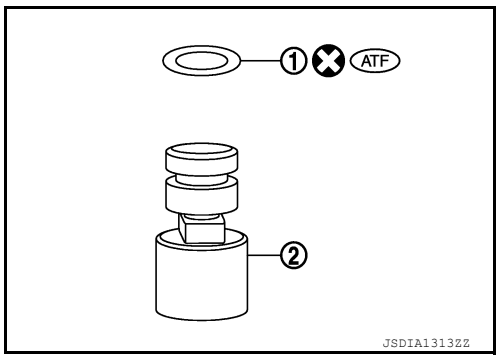
3. Connect terminal cord assembly connectors (A) and (B).
CAUTION:
Do not damage connectors.



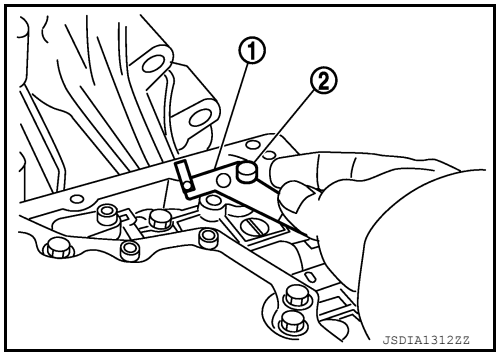
4. Install new O-ring (1) to terminal cord assembly connector (A).
CAUTION:
- **Do not reuse O-ring.**
- **Apply ATF to O-ring.**



5. Install new O-ring (1) to plug (2).
CAUTION:
- **Do not reuse O-ring.**
- **Apply ATF to O-ring.**
- **O-ring should be free of contamination.**

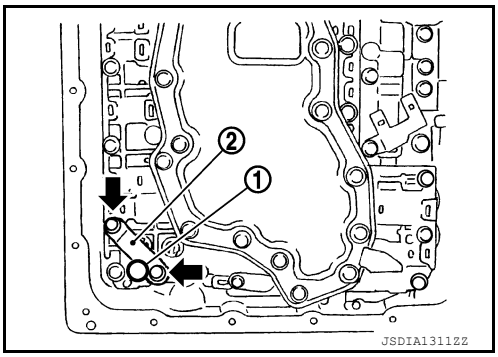


6. Install plug (2) to bracket (1).



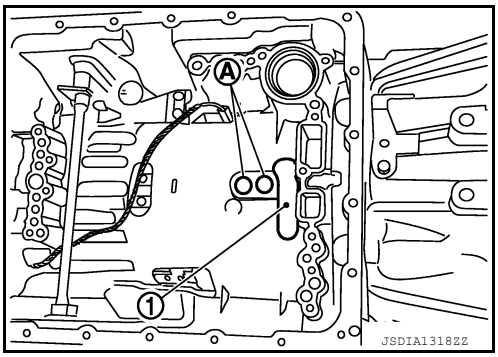
7. Install plug (1) with bracket (2) to control valve with TCM.
   - ⬅:Bolt

   CAUTION:
   Adjust bolt hole of bracket to bolt hole of control valve with TCM.

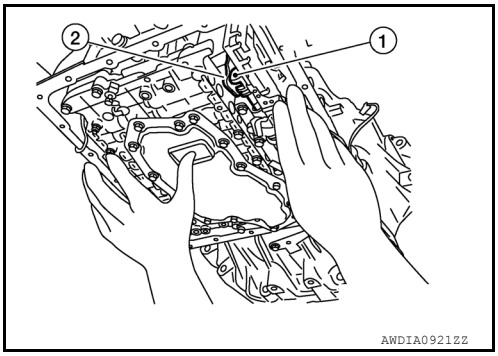


8. Install control valve with TCM in transmission case.
   - :Brake band (1)

   CAUTION:
   - **Make sure that input speed sensor is securely installed into input speed sensor hole (A).**
   - **Hang down output speed sensor harness toward outside so as not to disturb installation of control valve with TCM.**
   - **Align the A/T assembly connector of the control valve with TCM to the connector hole in the transmission case.**

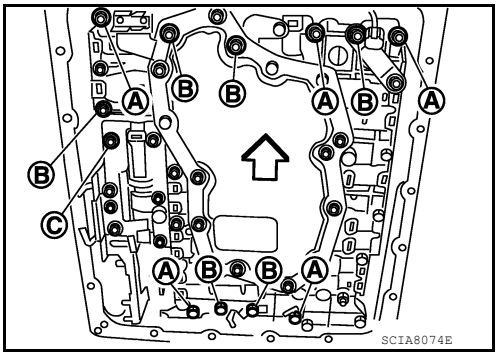


   - **Assemble it so that manual valve (1) cutout is engaged with manual plate projection (2).**

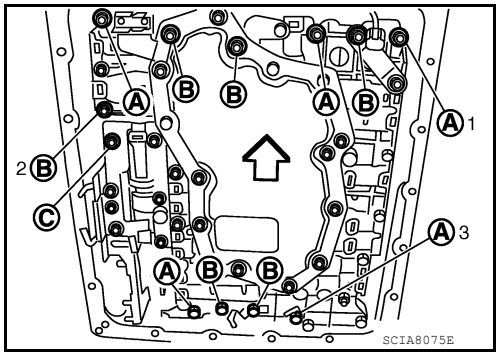


9. Install bolts (A), (B) and (C) in control valve with TCM.
   - ⇦:Front

Bolt symbol	Length mm (in)	Number of bolts
(A)	42 (1.65)	5
(B)	55 (2.17)	6
(C)	40 (1.57)	1

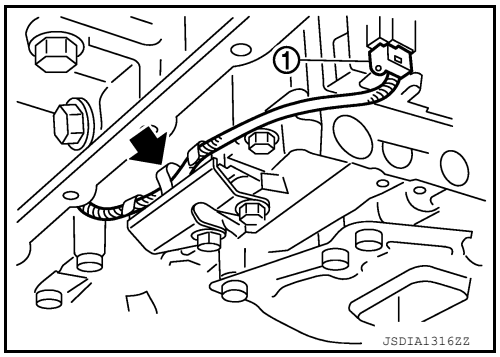


10. Tighten bolt (1A), (2B) and (3A) temporarily to prevent dislocation. After that tighten them in order (1 → 2 → 3). Then tighten other bolts.Tighten control valve with TCM bolts to the specified torque.
    - ⇦:Front

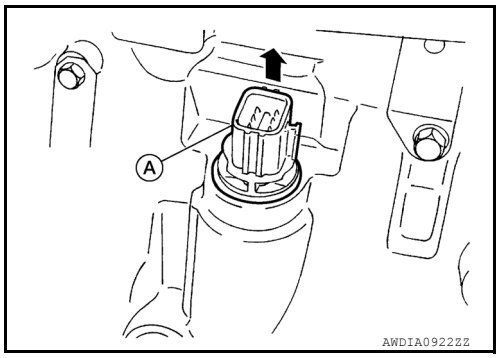


Bolt symbol	(A)	(B)	(C)
Number of bolts	5	6	1
Length mm (in)	42 (1.65)	55 (2.17)	40 (1.57)
Tightening torque N·m (kg-m, in-lb)	7.9 (0.81, 70)		With ATF applied
			7.9 (0.81, 70)

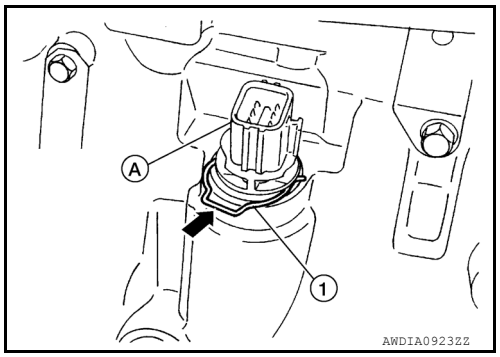
11. Connect output speed sensor connector (1).
12. Securely fasten output speed sensor (1) harness with terminal clip (⬅).



13. Install oil pan to transmission case. Refer to TM-166, "Removal and Installation".
14. Pull up terminal cord assembly connector (A).
    CAUTION:
    Do not damage connector.



15. Install snap ring (1) to terminal cord assembly connector (A) in the direction shown.



16. Connect A/T assembly harness connector to the terminal cord assembly connector.
    CAUTION:
    After completing installation, check A/T for fluid leaks and fluid level. Refer to TM-66, "Checking A/T Fluid".

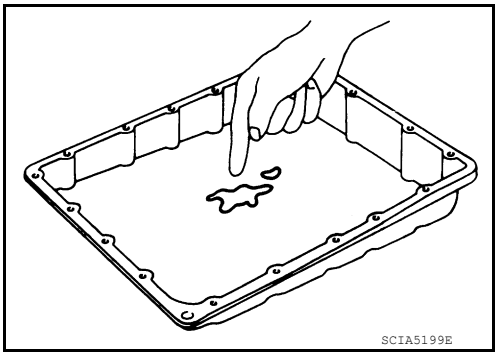
Inspection and Adjustment

INFOID:0000000006822323

INSPECTION AFTER REMOVAL

Check foreign materials in oil pan to help determine causes of malfunction. If the ATF is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, servo, and clutches to stick and can inhibit pump pressure.

- **If frictional material is detected, perform A/T fluid cooler cleaning. Refer to TM-70, "A/T Fluid Cooler Cleaning".**



INSPECTION AFTER INSTALLATION

Check for A/T fluid leakage.

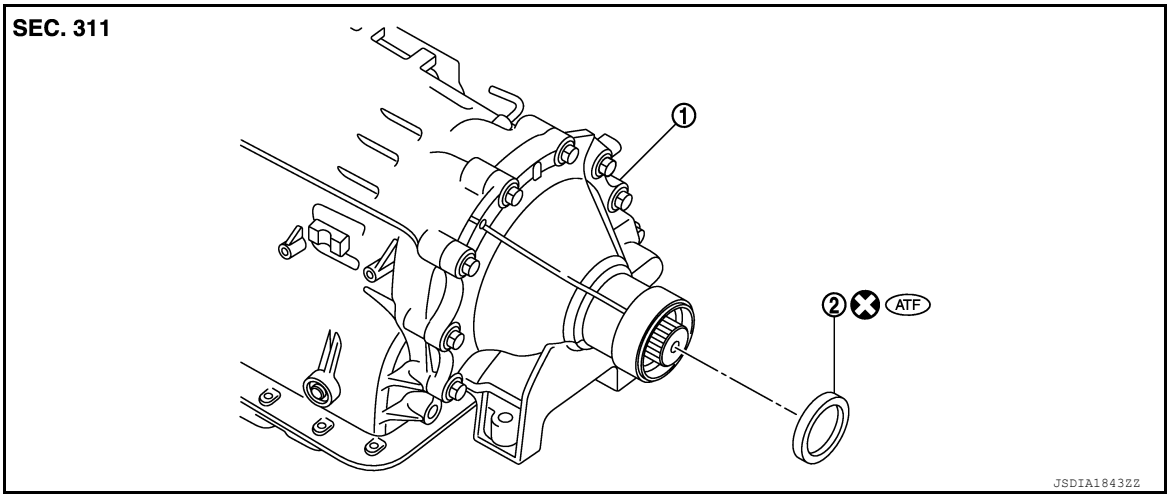
ADJUSTMENT AFTER INSTALLATION

Adjust A/T fluid level. Refer to TM-66, "Checking A/T Fluid".

REAR OIL SEAL

Exploded View

INFOID:0000000006822314



1. A/T assembly
2. Rear oil seal

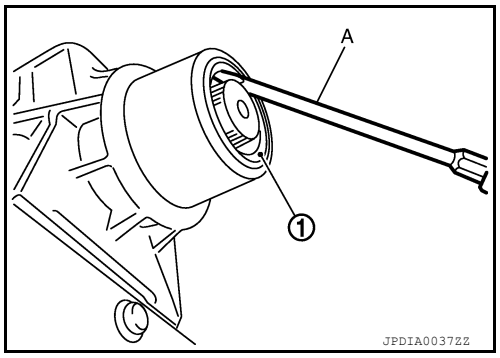
Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

INFOID:0000000006822315

REMOVAL

1. Remove propeller shaft assembly. Refer to DLN-7, "Removal and Installation" (3S1355) or DLN-20, "Removal and Installation" (3S1415).
2. Remove rear oil seal (1) using a suitable tool (A).
   CAUTION:
   Be careful not to scratch rear extension assembly.

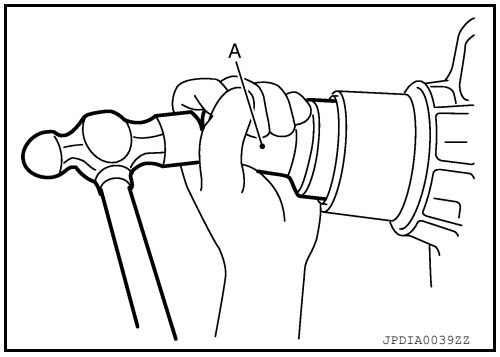


INSTALLATION

1. Install the new rear oil seal into the rear extension until it is flush, using Tool (A) as shown.

   Tool number : ST33400001 (J-26082)

   CAUTION:
   - **Do not reuse rear oil seal.**
   - **Apply ATF to rear oil seal.**
2. Install the propeller shaft assembly. Refer to DLN-7, "Removal and Installation" (3S1355) or DLN-20, "Removal and Installation" (3S1415).
3. Check the A/T fluid level and for fluid leaks. Refer to TM-66, "Checking A/T Fluid".



Inspection

INFOID:0000000006822316

INSPECTION AFTER INSTALLATION

Check A/T fluid leakage. Refer to TM-66, "Checking A/T Fluid".

ADJUSTMENT AFTER INSTALLATION

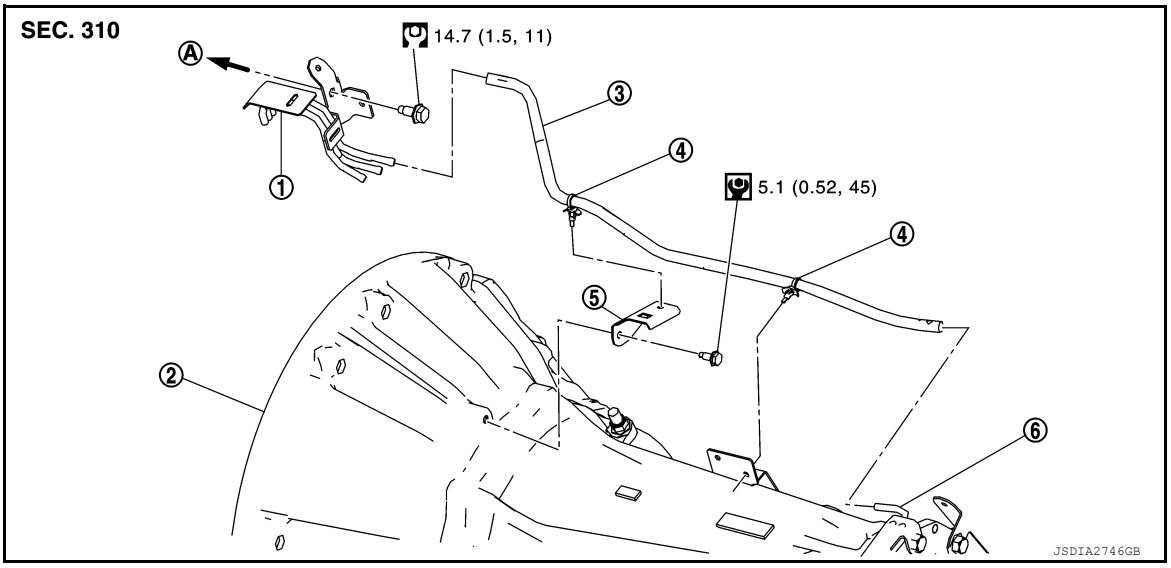
Adjust A/T fluid level. Refer to TM-66, "Checking A/T Fluid".

AIR BREATHER HOSE

VQ40DE

VQ40DE : Exploded View

INFOID:0000000006822305



1. Air breather tube
2. A/T assembly
3. A/T air breather hose
4. Clip
5. Bracket
6. A/T air breather tube

A. To water outlet

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

VQ40DE : Removal and Installation

INFOID:0000000006822306

REMOVAL

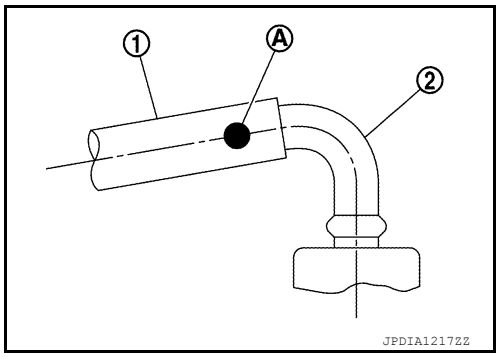
1. Disconnect A/T air breather hose from air breather tube.
2. Release clips from brackets.
3. Disconnect A/T air breather hose from A/T air breather tube and remove A/T air breather hose.

INSTALLATION

CAUTION:

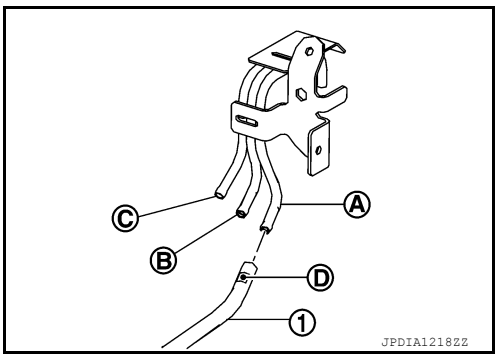
- **Make sure clips are securely installed to the brackets.**
- **Do not bend or crush the A/T air breather hose.**

1. Insert A/T air breather hose (1) to A/T air breather tube (2) until it reaches the curve of the A/T air breather tube.
2. Insert the A/T air breather hose (1) to the A/T air breather tube (2) with the paint mark (A) in the upward direction.



3. Insert clips in brackets.

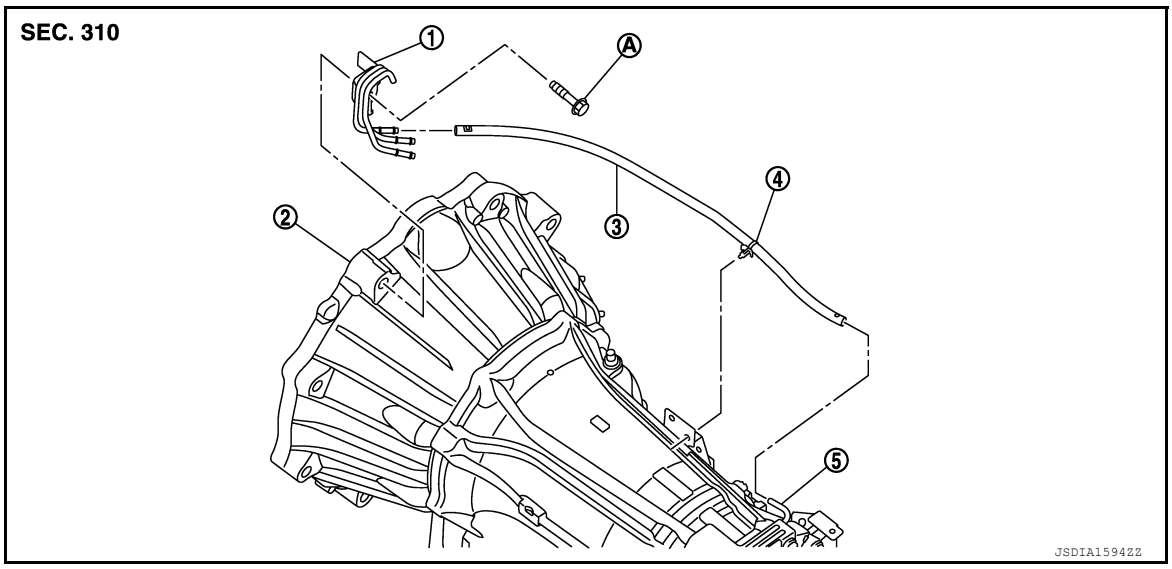
4. Insert A/T air breather hose (1) to air breather tube (A) until it reaches the curve of the air breather tube.
   - (B): Not used
   - (C): Not used
5. Insert A/T air breather hose (1) to air breather tube (A) with the paint mark (D) in the upward direction.



VK56DE

VK56DE : Exploded View

INFOID:0000000006822302



1. Air breather tube
2. A/T assembly
3. A/T air breather hose
4. Clip
5. A/T air breather tube

A. Tightening must be done following the installation procedure. Refer to TM-189, "Removal and Installation".

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

VK56DE : Removal and Installation

INFOID:0000000006822303

REMOVAL

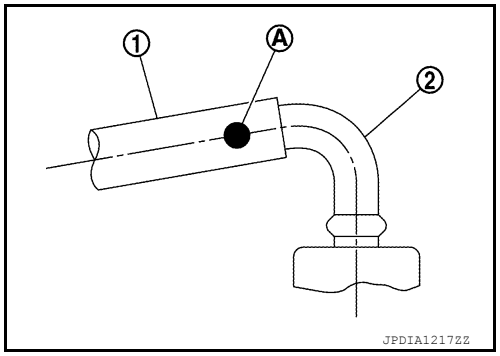
1. Disconnect A/T air breather hose from air breather tube.
2. Release clip from bracket.
3. Disconnect A/T air breather hose from A/T air breather tube and remove A/T air breather hose.

INSTALLATION

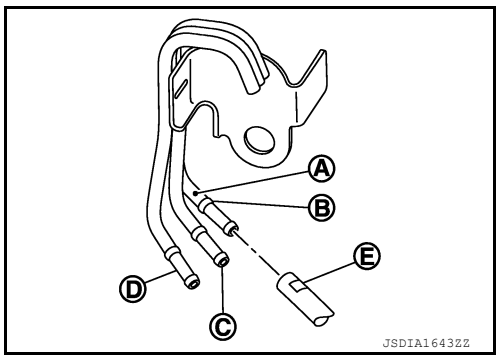
CAUTION:

- **Make sure clip is securely installed to the brackets.**
- **Do not bend or crush the A/T air breather hose.**

1. Insert A/T air breather hose (1) to A/T air breather tube (2) until it reaches the curve of the A/T air breather tube.
2. Insert the A/T air breather hose (1) to the A/T air breather tube (2) with the paint mark (A) in the upward direction.



3. Insert clip in bracket.
4. Insert A/T air breather hose to air breather tube (A) until it reaches the spool portion (B) of the air breather tube.
   - (D): Not used
   - (C): Not used
5. Insert A/T air breather hose to the air breather tube (A) with the paint mark (E) in the upward direction.

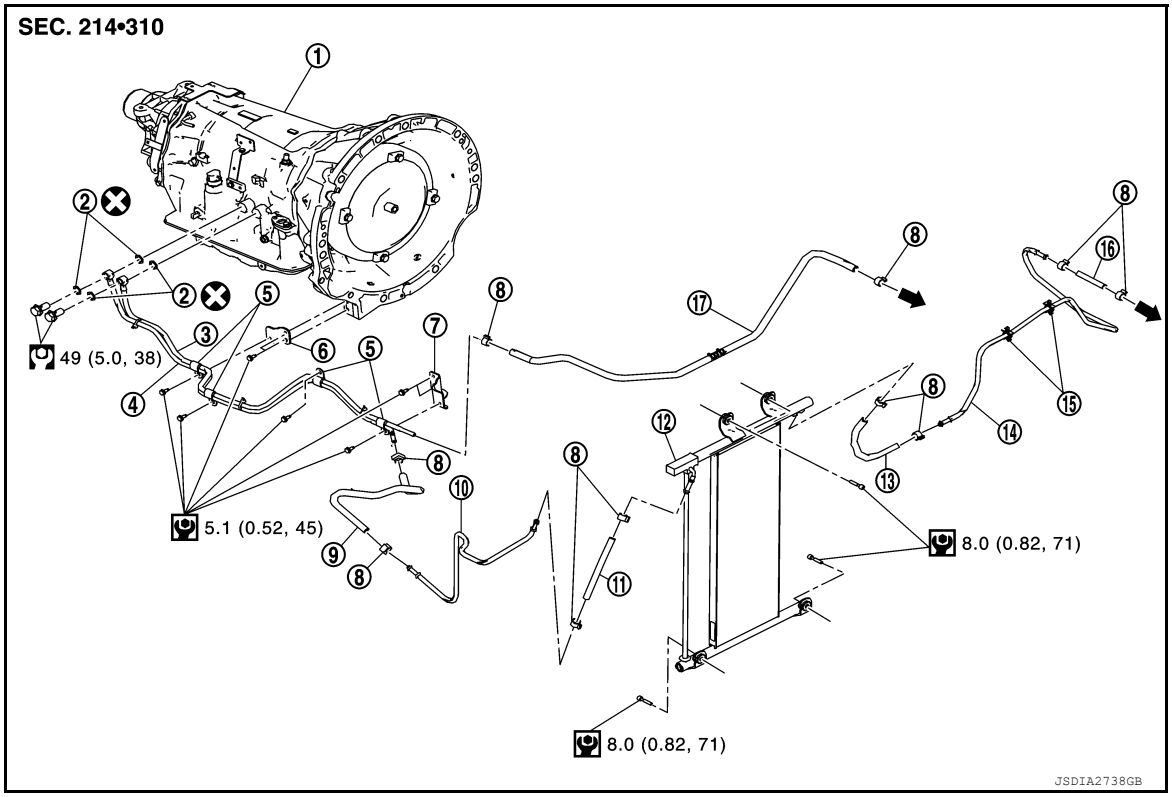


FLUID COOLER SYSTEM

VQ40DE

VQ40DE : Exploded View

INFOID:0000000006822307



1. A/T assembly
2. Copper sealing washers
3. A/T fluid cooler tube A
4. A/T fluid cooler tube D
5. Clips
6. Bracket
7. Bracket
8. Hose clamp
9. A/T fluid cooler hose E
10. A/T fluid cooler tube C
11. A/T fluid cooler hose D
12. A/T fluid cooler
13. A/T fluid cooler hose C
14. A/T fluid cooler tube B
15. Clip
16. A/T fluid cooler hose B
17. A/T fluid cooler hose A

⬅: To radiator

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

VQ40DE : Removal and Installation

INFOID:0000000006822308

REMOVAL

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

1. Remove front grille. Refer to EXT-28, "Exploded View".
2. Remove air guide seal (LH and RH).
3. Remove A/T fluid cooler hoses from A/T fluid cooler.
4. Remove A/T fluid cooler bolts.
5. Remove A/T fluid cooler from the vehicle.
   CAUTION:
   Be careful not to damage A/T fluid cooler core.
6. Remove front under cover using power tool. Refer to EXT-15, "Exploded View - Front Bumper".

7. Remove A/T control cable and A/T control cable bracket from A/T assembly. Refer to TM-163, "Exploded View".
8. Remove A/T fluid cooler hoses and A/T fluid cooler tubes.
   CAUTION:
   - **Do not reuse copper sealing washers.**
   - **Be careful not to bend A/T fluid cooler tubes.**

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:
- **Do not reuse copper sealing washers.**
- **Be careful not to damage A/T fluid cooler core.**
- Refer to the following when installing A/T fluid cooler hoses.

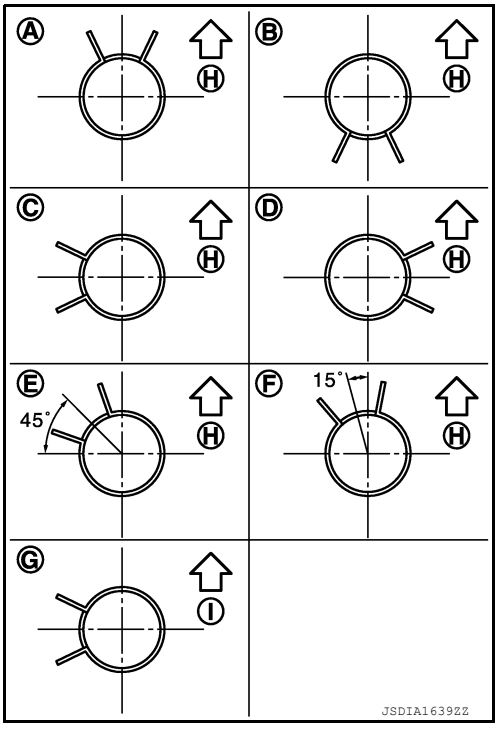
Hose name	Hose end	Paint mark	Position of hose clamp*
A/T fluid cooler hose A	A/T fluid cooler tube A side	Facing upward	(A)
	A/T fluid warmer side	Facing upward	(C)
A/T fluid cooler hose B	A/T fluid warmer side	Facing leftward	(E)
	A/T fluid cooler tube B side	Facing downward	(B)
A/T fluid cooler hose C	A/T fluid cooler tube B side	Facing rightward	(G)
	A/T fluid cooler side	Facing upward	(F)
A/T fluid cooler hose D	A/T fluid cooler side	—	(C)
	A/T fluid cooler tube C side	—	(G)
A/T fluid cooler hose E	A/T fluid cooler tube C side	Facing downward	(B)
	A/T fluid cooler tube D side	Facing rightward	(D)

*: Refer to the illustrations for the specific position each hose clamp tab.

- The illustrations indicate the view from the hose ends.

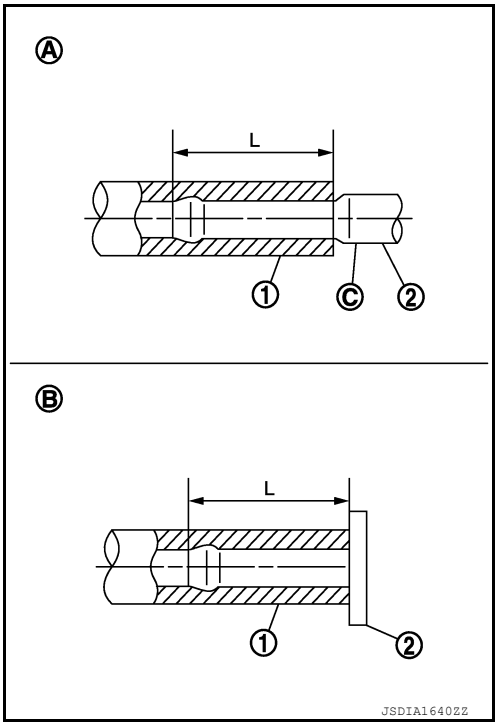
  ⇦(H) : Vehicle upper
  ⇦(I) : Vehicle front

- When installing hose clamps center line of each hose clamp tab should be positioned as shown in the figure.



- Insert A/T fluid cooler hoses according to dimension (L) described below.

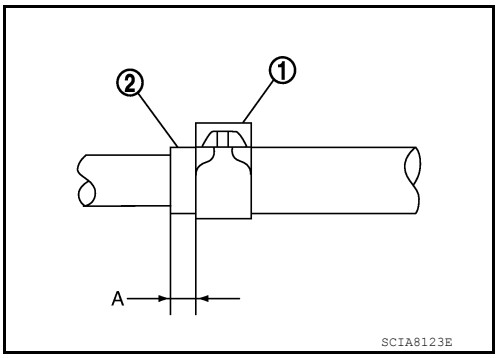
A/T fluid cooler hose (1)	Insertion side tube (2)	Tube type	Dimension (L)
A/T fluid cooler hose A	A/T fluid cooler tube A	(A)	30 mm (1.18 in) [End reaches the 2-stage bulge (C).]
	A/T fluid warmer tube		
A/T fluid cooler hose B	A/T fluid warmer tube	(B)	Insert the hose until the hose touches the A/T fluid warmer.
	A/T fluid cooler tube B	(A)	30 mm (1.18 in) [End reaches the 2-stage bulge (C).]
A/T fluid cooler hose C	A/T fluid cooler tube B		
	A/T fluid cooler tube		
A/T fluid cooler hose D	A/T fluid cooler tube		
	A/T fluid cooler tube C		
A/T fluid cooler hose E	A/T fluid cooler tube C		
	A/T fluid cooler tube D		



- Set hose clamps (1) at the both ends of A/T fluid cooler hoses (2) with dimension (A) from the hose edge.

Dimension (A) : 5 – 9 mm (0.20 – 0.35 in)

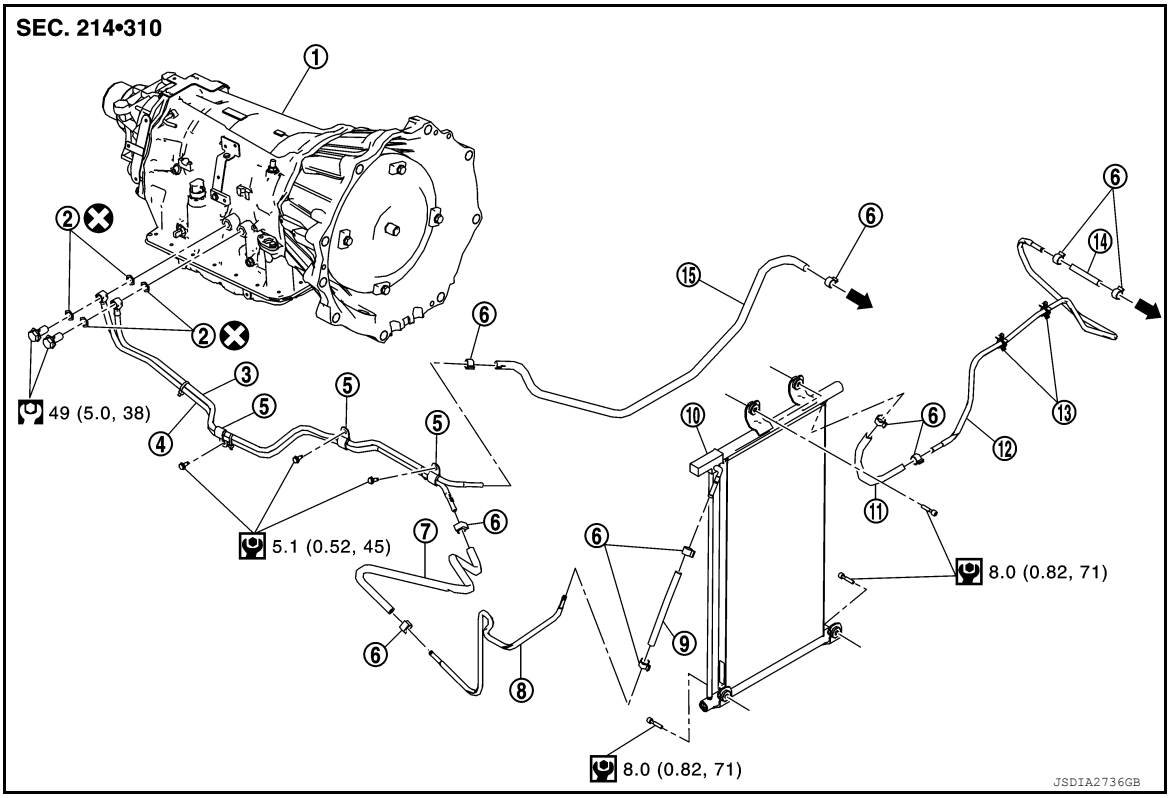
- Hose clamp should not interfere with the bulge of fluid cooler tube.



VK56DE

VK56DE : Exploded View

INFOID:0000000006822310



1. A/T assembly
2. Copper sealing washers
3. A/T fluid cooler tube A
4. A/T fluid cooler tube D
5. Clip
6. Hose clamp
7. A/T fluid cooler hose E
8. A/T fluid cooler tube C
9. A/T fluid cooler hose D
10. A/T fluid cooler
11. A/T fluid cooler hose C
12. A/T fluid cooler tube B
13. Clips
14. A/T fluid cooler hose B
15. A/T fluid cooler hose A

⬅: To radiator

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

VK56DE : Removal and Installation

INFOID:0000000006822311

REMOVAL

NOTE:
When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

1. Remove front grille. Refer to EXT-28, "Exploded View".
2. Remove air guide seal (LH and RH).
3. Remove A/T fluid cooler hoses from A/T fluid cooler.
4. Remove A/T fluid cooler bolts.
5. Remove A/T fluid cooler from the vehicle.
   CAUTION:
   Be careful not to damage A/T fluid cooler core.
6. Remove front under cover using power tool. Refer to EXT-15, "Exploded View - Front Bumper".
7. Remove A/T control cable and A/T control cable bracket from A/T assembly. Refer to TM-163, "Exploded View".
8. Remove A/T fluid cooler hoses and A/T fluid cooler tubes.
   CAUTION:
   - **Do not reuse copper sealing washers.**
   - **Be careful not to bend A/T fluid cooler tubes.**

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

- **Do not reuse copper sealing washers.**
- **Be careful not to damage A/T fluid cooler core.**
- Refer to the following when installing A/T fluid cooler hoses.

Hose name	Hose end	Paint mark	Position of hose clamp*
A/T fluid cooler hose A	A/T fluid cooler tube A side	Facing upward	(A)
	A/T fluid warmer side	Facing upward	(C)
A/T fluid cooler hose B	A/T fluid warmer side	Facing leftward	(E)
	A/T fluid cooler tube B side	Facing downward	(B)
A/T fluid cooler hose C	A/T fluid cooler tube B side	Facing rightward	(G)
	A/T fluid cooler side	Facing upward	(F)
A/T fluid cooler hose D	A/T fluid cooler side	—	(C)
	A/T fluid cooler tube C side	—	(G)
A/T fluid cooler hose E	A/T fluid cooler tube C side	Facing downward	(B)
	A/T fluid cooler tube D side	Facing rightward	(D)

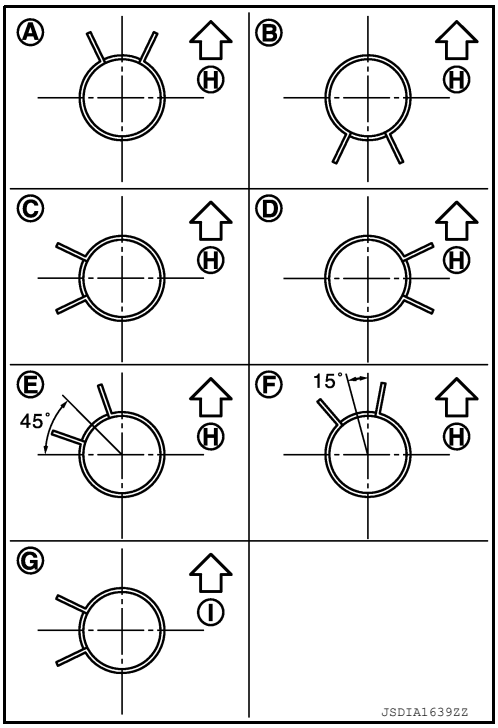
*: Refer to the illustrations for the specific position each hose clamp tab.

- The illustrations indicate the view from the hose ends.

⇦(H) : Vehicle upper

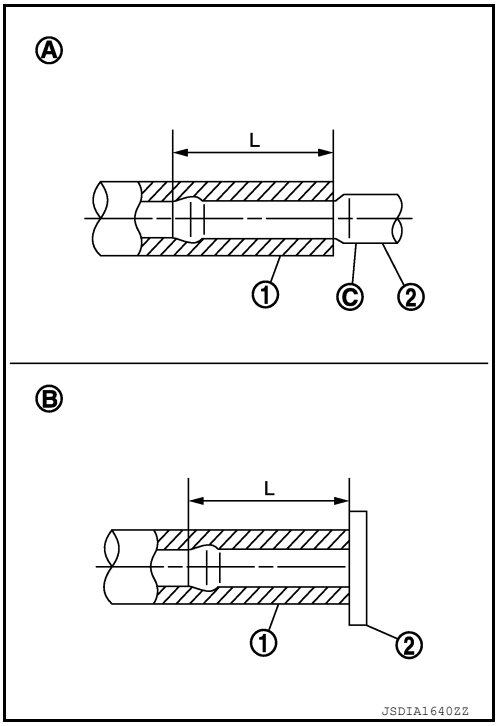
⇦(I) : Vehicle front

- When installing hose clamps center line of each hose clamp tab should be positioned as shown in the figure.



- Insert A/T fluid cooler hoses according to dimension (L) described below.

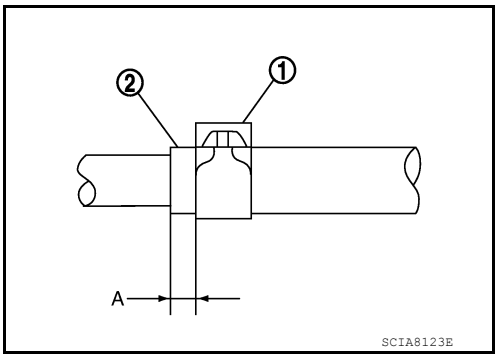
A/T fluid cooler hose (1)	Insertion side tube (2)	Tube type	Dimension (L)
A/T fluid cooler hose A	A/T fluid cooler tube A	(A)	30 mm (1.18 in) [End reaches the 2-stage bulge (C).]
	A/T fluid warmer tube		
A/T fluid cooler hose B	A/T fluid warmer tube	(B)	Insert the hose until the hose touches the A/T fluid warmer.
	A/T fluid cooler tube B	(A)	30 mm (1.18 in) [End reaches the 2-stage bulge (C).]
A/T fluid cooler hose C	A/T fluid cooler tube B		
	A/T fluid cooler tube		
A/T fluid cooler hose D	A/T fluid cooler tube		
	A/T fluid cooler tube C		
A/T fluid cooler hose E	A/T fluid cooler tube C		
	A/T fluid cooler tube D		



- Set hose clamps (1) at the both ends of A/T fluid cooler hoses (2) with dimension (A) from the hose edge.

Dimension (A) : 5 – 9 mm (0.20 – 0.35 in)

- Hose clamp should not interfere with the bulge of fluid cooler tube.



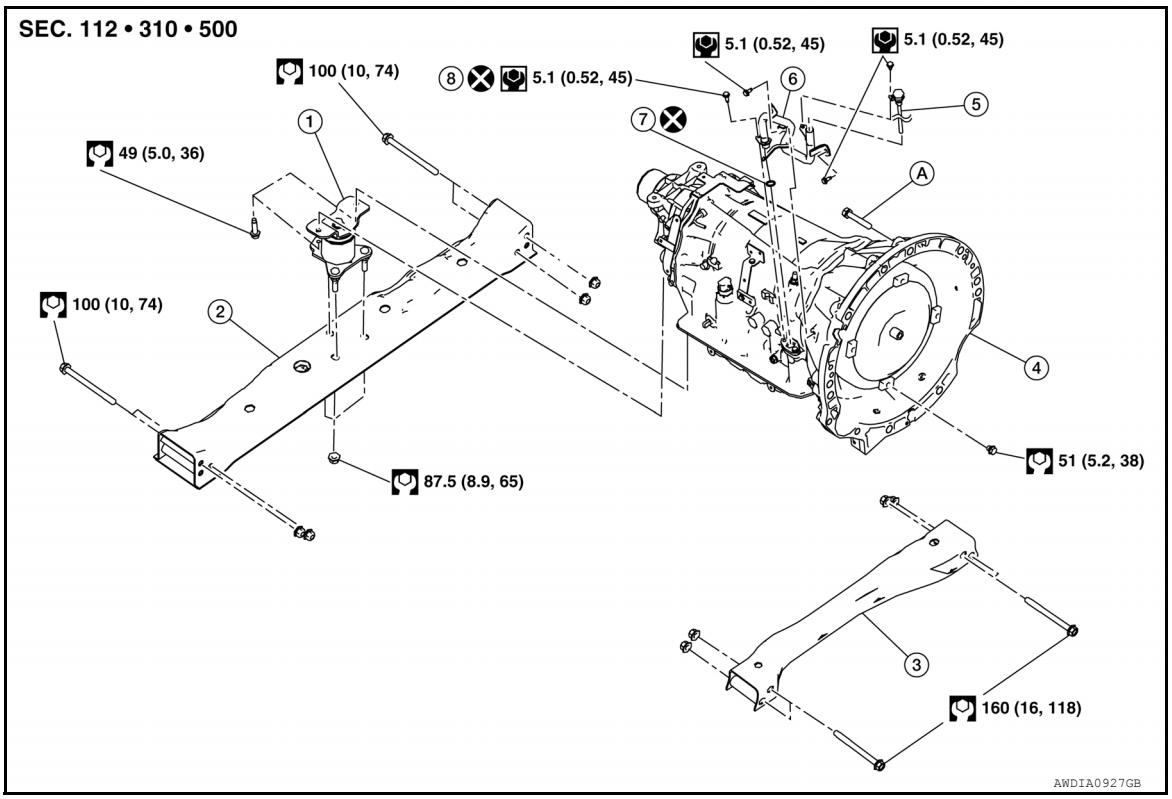
UNIT REMOVAL AND INSTALLATION

TRANSMISSION ASSEMBLY

Exploded View

INFOID:0000000006830309

VQ40DE MODELS

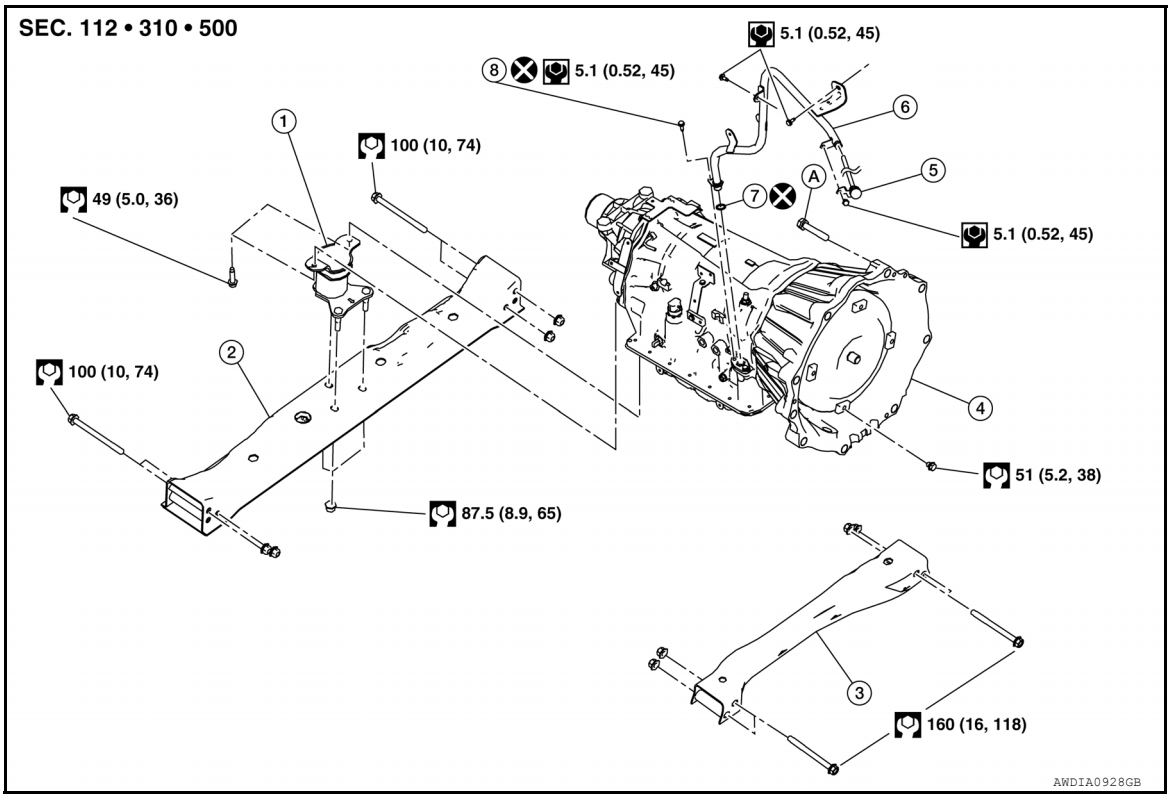


1. Rear engine mounting insulator
2. A/T crossmember
3. Front crossmember
4. A/T assembly
5. A/T fluid level gauge
6. A/T fluid charging pipe
7. O-ring
8. Self-sealing bolt

A. Tightening must be done following the installation procedure. Refer to TM-189, "Removal and Installation".

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

VK56DE MODELS



1. Rear engine mounting insulator
2. A/T crossmember
3. Front crossmember
4. A/T assembly
5. A/T fluid level gauge
6. A/T fluid charging pipe
7. O-ring
8. Self-sealing bolt

A. Tightening must be done following the installation procedure. Refer to TM-189, "Removal and Installation".

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

Removal and Installation

INFOID:0000000006750128

REMOVAL

CAUTION:

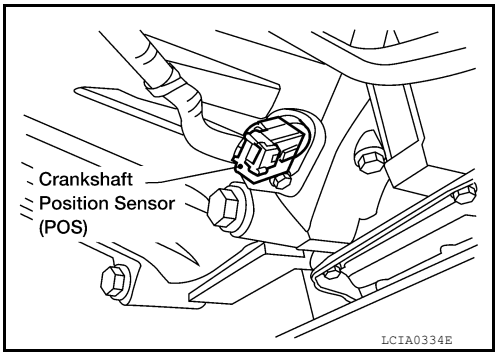
When removing the A/T assembly from engine, first remove the crankshaft position sensor (POS) from the A/T assembly.
Be careful not to damage sensor edge.

NOTE:

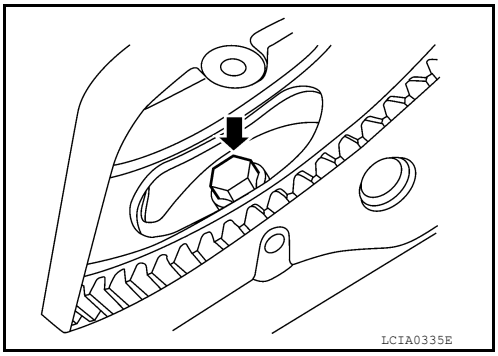
When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

1. Disconnect the negative battery terminal. Refer to PG-90, "Removal and Installation".
2. Remove A/T fluid level gauge.
3. Remove center exhaust tube and main muffler using power tool. Refer to EX-5, "Exploded View".
4. Remove propeller shaft. Refer to DLN-7, "Removal and Installation" (3S1355) or DLN-20, "Removal and Installation" (3S1415).

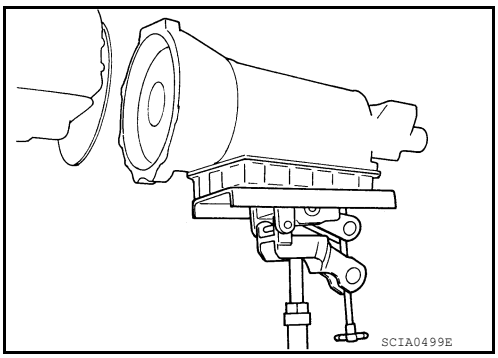
5. Remove crankshaft position sensor (POS) from A/T assembly.
CAUTION:
- **Do not subject it to impact by dropping or hitting it.**
- **Do not disassemble.**
- **Do not allow metal filings or foreign material to get on the sensor front edge magnetic area.**
- **Do not place in an area affected by magnetism.**



6. Remove harness from retainer clips.
7. Disconnect A/T harness connector.
8. Remove front under cover using power tool. Refer to EXT-38, "Removal and Installation".
9. Remove A/T control cable and A/T control cable bracket from the A/T assembly. Refer to TM-161, "Removal and Installation".
10. Remove A/T fluid cooler tube. Refer to TM-182, "VQ40DE : Exploded View" (VQ40DE), TM-185, "VK56DE : Exploded View" (VK56DE).
CAUTION:
Do not reuse copper sealing washers.
11. Remove the starter assembly (VQ40DE). Refer to STR-24, "VQ40DE : Removal and Installation".
12. Remove dust cover from converter housing.
13. Turn crankshaft to access and remove the four bolts for drive plate and torque converter.
CAUTION:
When turning crankshaft, turn it clockwise as viewed from the front of the engine.



14. Support engine and A/T assembly with a transmission jack.
CAUTION:
When setting the transmission jack, be careful not to allow it to collide against the drain plug.
15. Remove A/T crossmember using power tool.
16. Remove A/T fluid charging pipe from A/T assembly.
CAUTION:
Do not reuse O-ring.
17. Tilt the A/T assembly downward to access A/T assembly to engine bolts.
18. Remove the A/T assembly to engine bolts using power tool.
19. Remove A/T assembly from vehicle using transmission jack.
CAUTION:
- **Secure torque converter to prevent it from dropping.**
- **Secure A/T assembly to a transmission jack.**

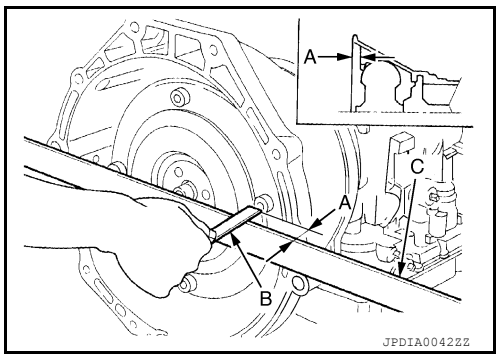


INSPECTION

Installation and Inspection of Torque Converter

- After inserting a torque converter to a transmission, be sure to check dimension (A) to ensure it is within specifications.
- Ruler (B)
- Straight edge (C)

Dimension (A) :TM-258, "Torque Converter"



INSTALLATION

Installation is in the reverse order of removal, while paying attention to the following:

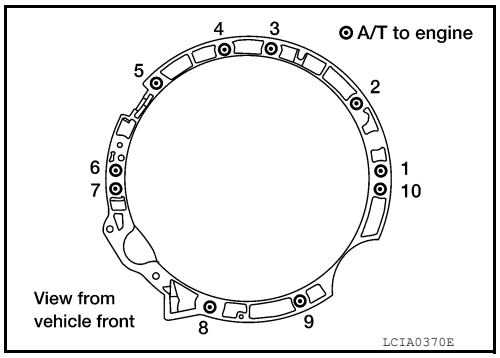
CAUTION:

- **When replacing an engine or transmission you must make sure the dowels are installed correctly during re-assembly.**
- **Improper alignment caused by missing dowels may cause vibration, oil leaks or breakage of drivetrain components.**
- **Do not reuse O-rings or copper sealing washers.**

When installing transmission to the engine, attach the bolts in the order as shown.

- For VQ40DE

Transmission to engine bolts : 75 N·m (7.6 kg-m, 55 ft-lb)

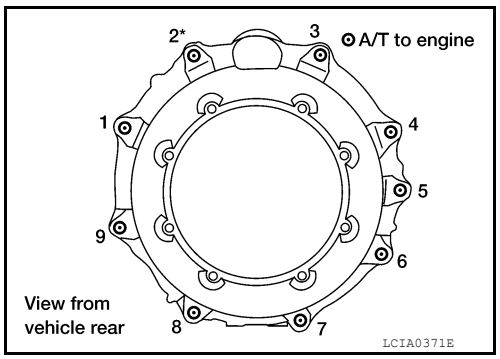


- For VK56DE

Transmission to engine bolts : 113 N·m (12 kg-m, 83 ft-lb)

NOTE:

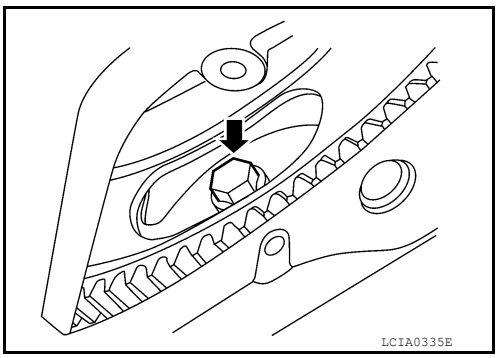
*: No. 2 bolt also secures air breather tube.



CAUTION:

- **When turning crankshaft, turn it clockwise as viewed from the front of the engine.**
- **After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**

- Align the positions of bolts for drive plate with those of the torque converter, and temporarily tighten the bolts. Then tighten the bolts with the specified torque.



After completing installation check fluid leaks, fluid level and the positions of A/T. Refer to TM-66, "Checking A/T Fluid" and TM-161, "Inspection and Adjustment".

Inspection and Adjustment

INFOID:0000000006830310

INSPECTION AFTER INSTALLATION

- Check A/T fluid leaks.
- Check A/T position after adjusting A/T position. Refer to TM-161, "Inspection and Adjustment".

ADJUSTMENT AFTER INSTALLATION

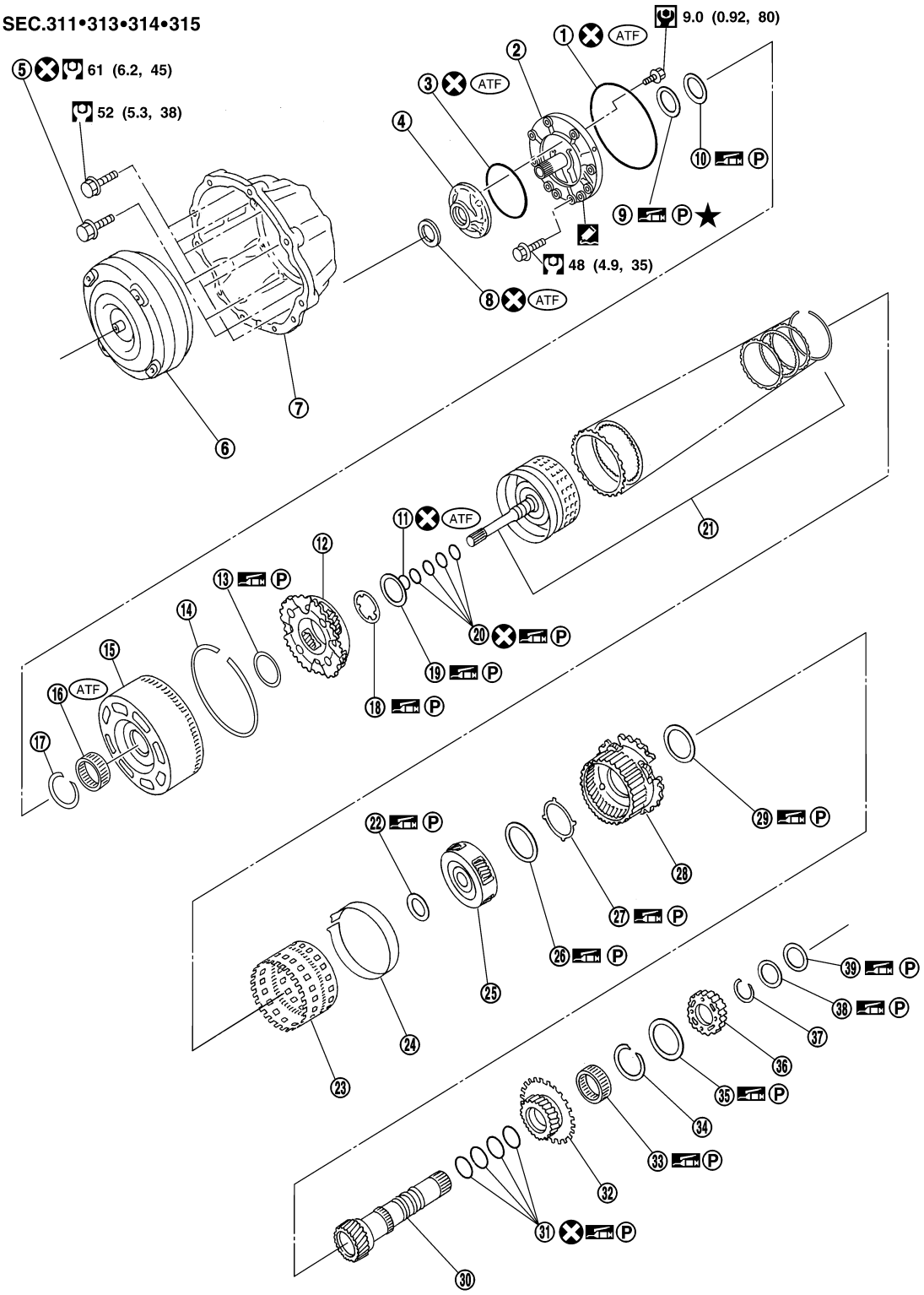
- Adjust A/T fluid level. Refer to TM-66, "Checking A/T Fluid".
- Adjust A/T position. Refer to TM-161, "Inspection and Adjustment".

UNIT DISASSEMBLY AND ASSEMBLY

TRANSMISSION ASSEMBLY

Exploded View

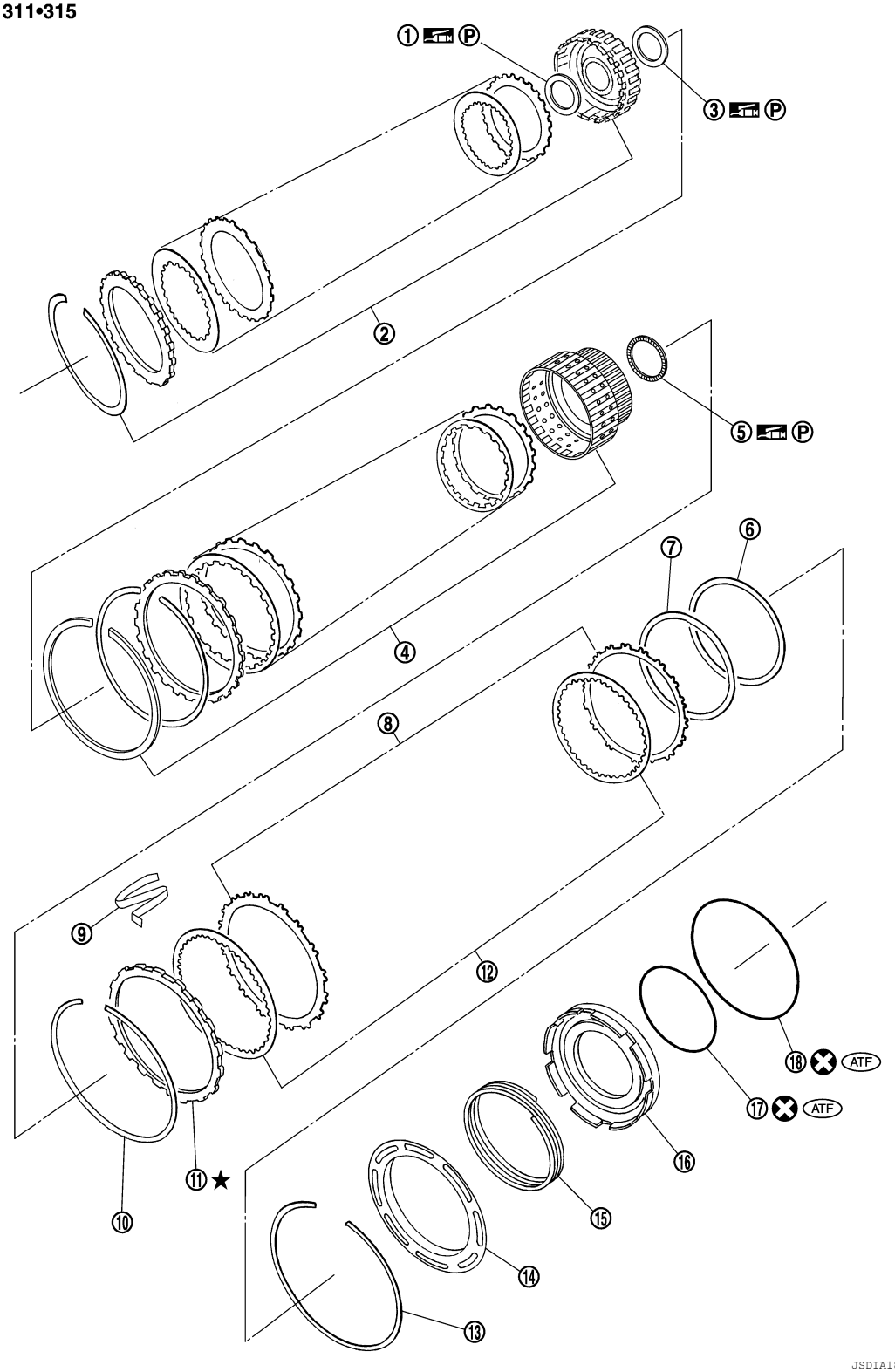
INFOID:0000000006822333



1. O-ring	2. Oil pump cover	3. O-ring
4. Oil pump housing	5. Self-sealing bolts	6. Torque converter
7. Converter housing	8. Oil pump housing oil seal	9. Bearing race
10. Needle bearing	11. O-ring	12. Front carrier assembly
13. Needle bearing	14. Snap ring	15. Front sun gear
16. 3rd one-way clutch	17. Snap ring	18. Bearing race
19. Needle bearing	20. Seal rings	21. Input clutch assembly
22. Needle bearing	23. Rear internal gear	24. Brake band
25. Mid carrier assembly	26. Needle bearing	27. Bearing race
28. Rear carrier assembly	29. Needle bearing	30. Mid sun gear
31. Seal rings	32. Rear sun gear	33. 1st one-way clutch
34. Snap ring	35. Needle bearing	36. High and low reverse clutch hub
37. Snap ring	38. Bearing race	39. Needle bearing

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

SEC. 311•315

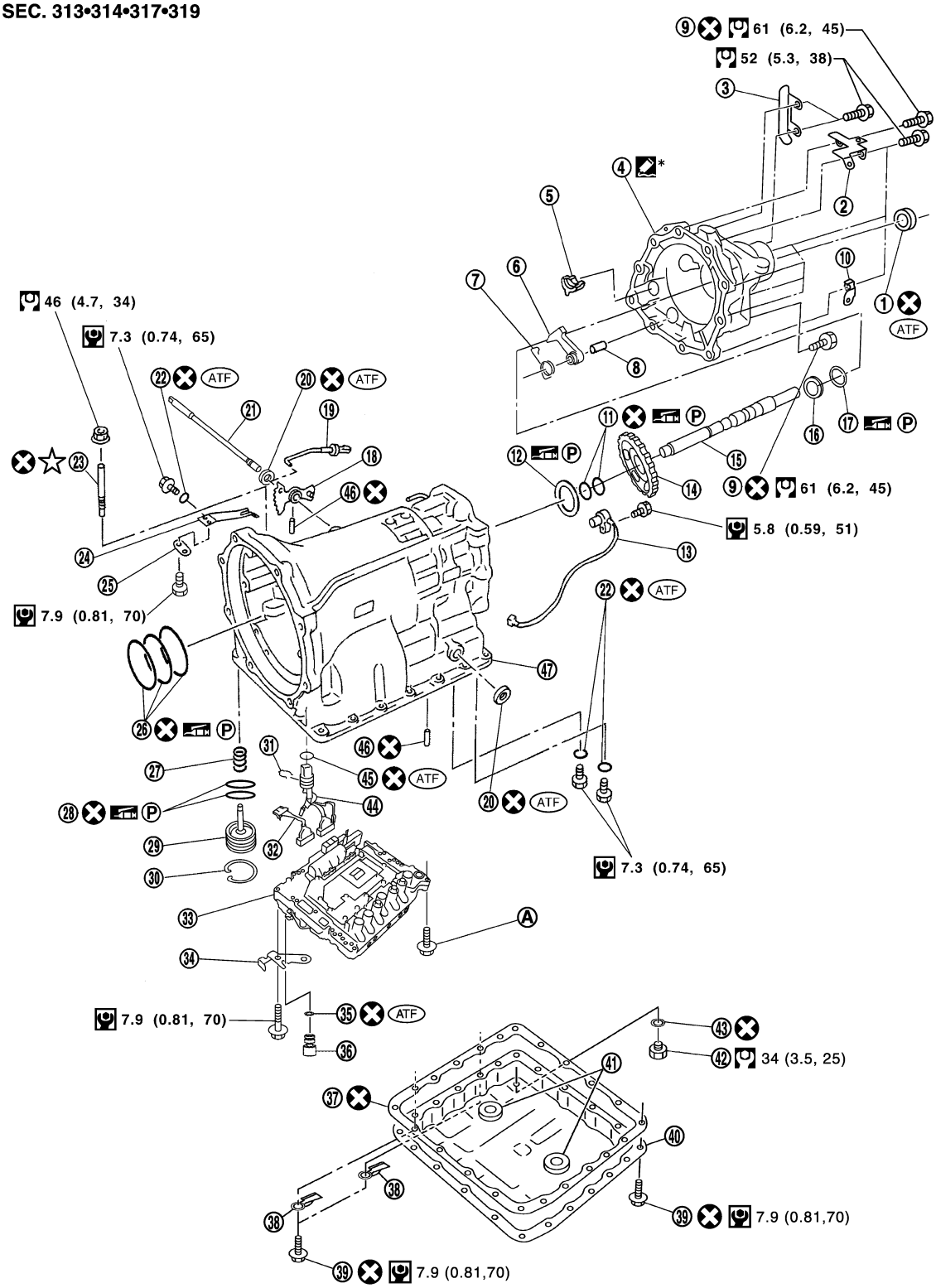


1. Bearing race	2. High and low reverse clutch assembly	3. Needle bearing
4. Direct clutch assembly	5. Needle bearing	6. Reverse brake dish plate
7. Reverse brake dish plate	8. Reverse brake driven plate	9. N-spring
10. Snap ring	11. Reverse brake retaining plate	12. Reverse brake drive plate
13. Snap ring	14. Spring retainer	15. Return spring

16. Reverse brake piston 17. D-ring 18. D-ring

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

SEC. 313•314•317•319



JSDIA1972GB

1. Rear oil seal
2. Bracket (for VK56DE)
3. Bracket
4. Adapter case
5. Parking actuator support
6. Parking pawl
7. Return spring
8. Pawl shaft
9. Self-sealing bolt
10. Bracket (for VK56DE)
11. Seal rings
12. Needle bearing

13. Output speed sensor	14. Parking gear	15. Output shaft
16. Bearing race	17. Needle bearing	18. Manual plate
19. Parking rod	20. Manual shaft oil seal	21. Manual shaft
22. O-ring	23. Band servo anchor end pin	24. Detent spring
25. Spacer	26. Seal rings	27. Return spring
28. O-rings	29. Servo assembly	30. Snap ring
31. Snap ring	32. Sub-harness	33. Control valve with TCM
34. Bracket	35. O-ring	36. Plug
37. Oil pan gasket	38. Brackets	39. Oil pan bolt
40. Oil pan	41. Magnets	42. Drain plug
43. Drain plug gasket	44. A/T assembly harness connector	45. O-ring
46. Retaining pin	47. Transmission case	

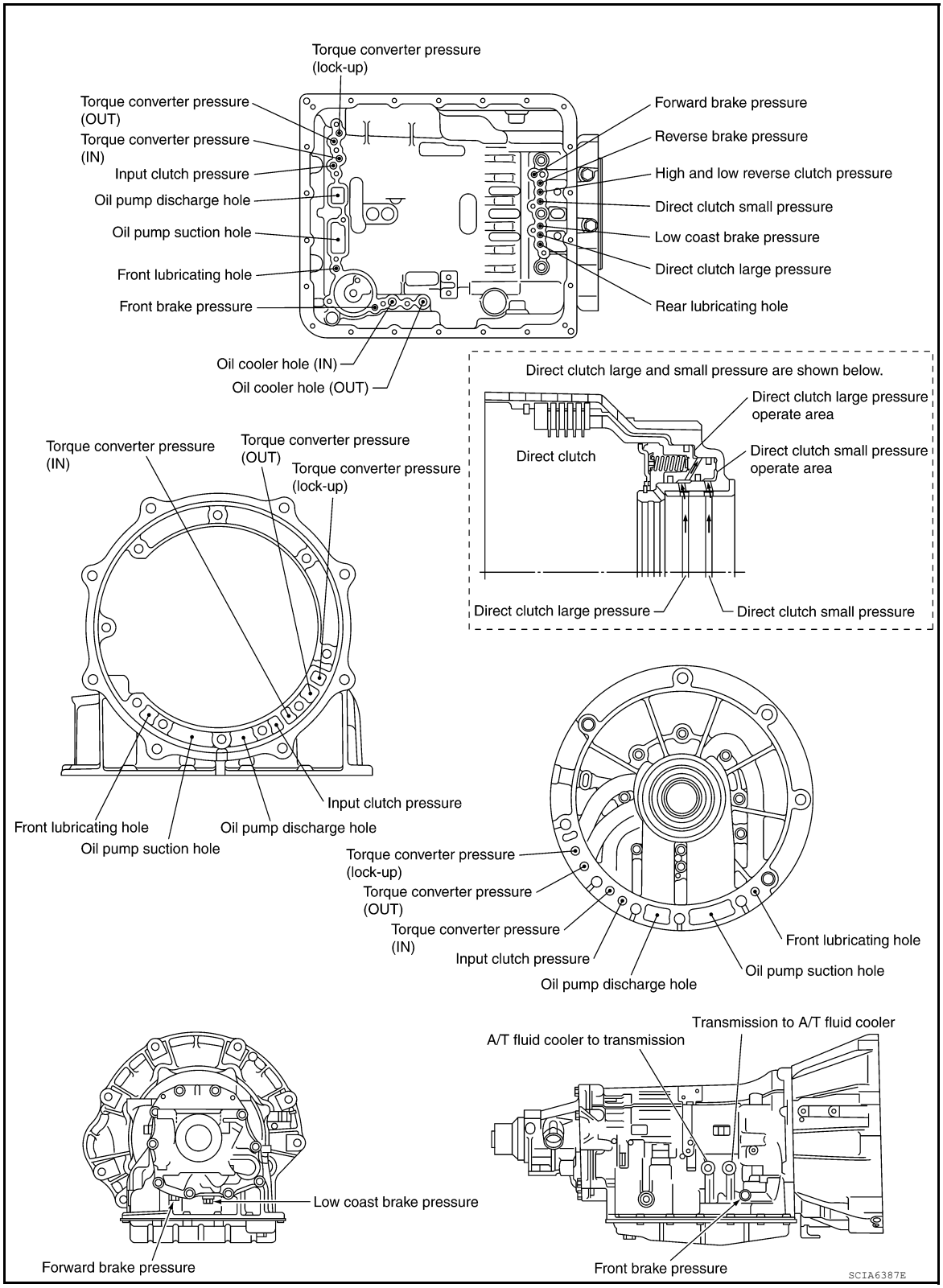
A. Tightening must be done following the assembly procedure. Refer to TM-215, "Assembly".

: Apply Genuine Anaerobic Liquid Gasket or equivalent.

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

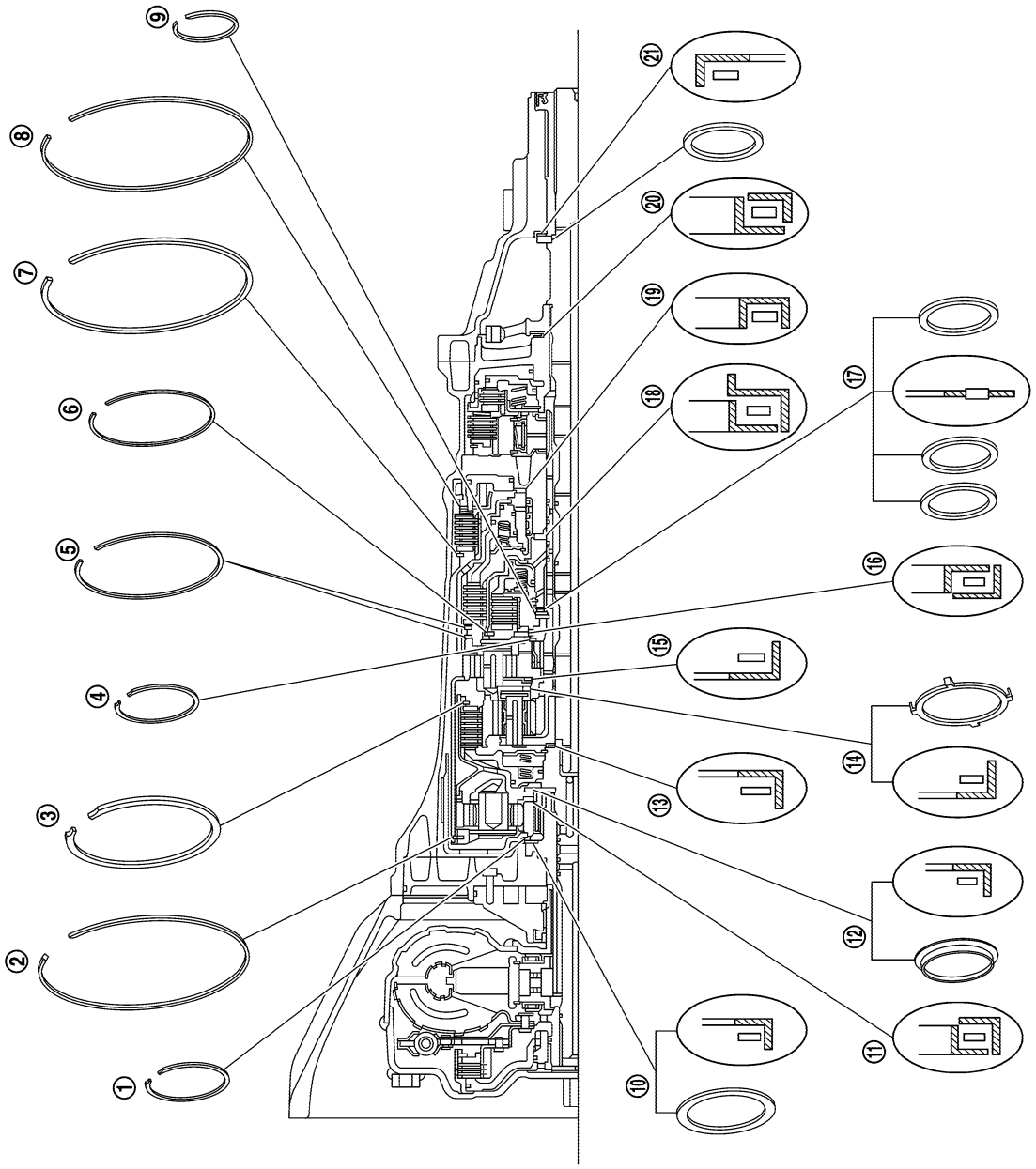
Oil Channel

INFOID:0000000006822334



Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings

INFOID:0000000006822335



JSDIA2771ZZ

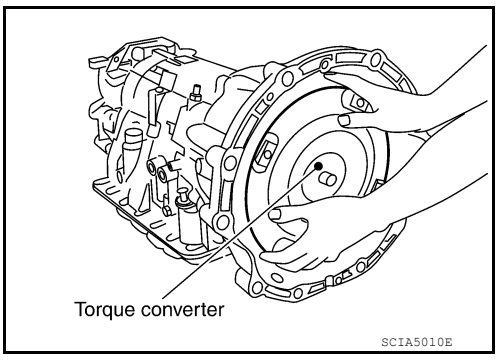
Snap ring		Needle bearing	
Item number	Outer diameter mm (in)	Item number	Outer diameter mm (in)
1	67.5 (2.657)	10	80 (3.149)
2	180.4 (7.102)	11	77 (3.031)
3	171.5 (6.751)	12	77 (3.031)
4	70.5 (2.776)	13	47 (1.850)
5	169 (6.653)	14	84 (3.307)
6	135 (5.315)	15	84 (3.307)
7	180.5 (7.106)	16	92 (3.622)
8	181 (7.125)	17	60 (2.362)
9	48.4 (1.906)	18	62.8 (2.472)
—	—	19	92 (3.622)
—	—	20	65 (2.559)
—	—	21	60 (2.362)

Disassembly

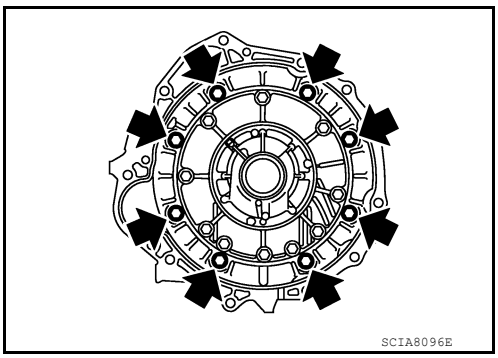
INFOID:0000000006822336

CAUTION:
Do not disassemble parts behind Drum Support. Refer to TM-16, "TRANSMISSION : Cross-Sectional View".

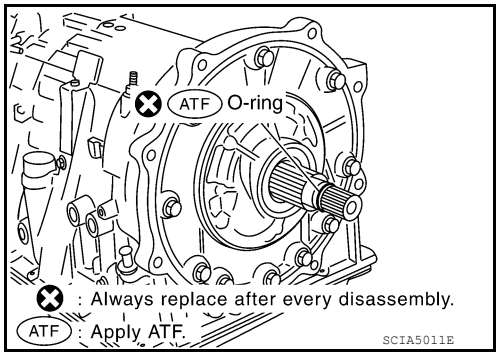
1. Drain ATF through drain plug.
2. Remove torque converter by holding it firmly and turning while pulling straight out.



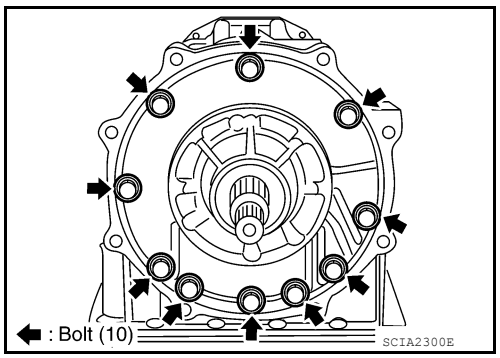
3. Remove tightening bolts (⬅) for converter housing and transmission case.
4. Remove converter housing from transmission case.
   CAUTION:
   Be careful not to scratch converter housing.



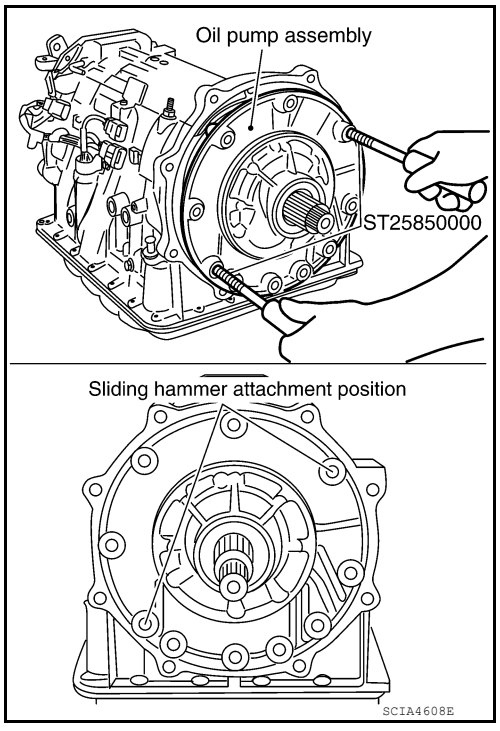
5. Remove O-ring from input clutch assembly.
CAUTION:
Do not reuse O-ring.



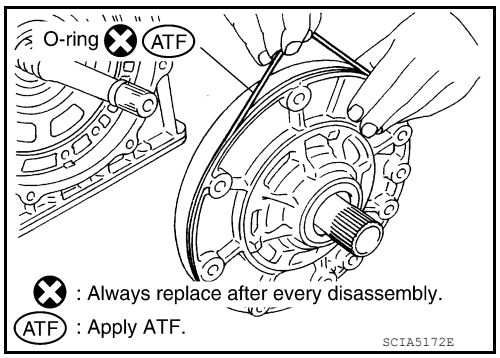
6. Remove tightening bolts for oil pump assembly and transmission case.



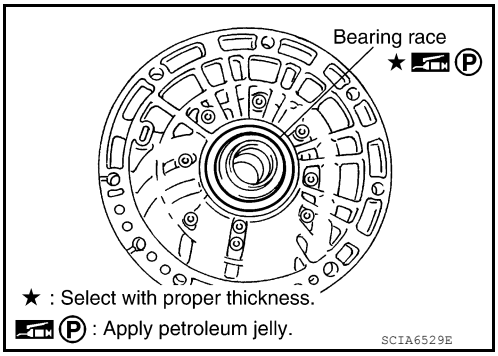
7. Attach the sliding hammers to oil pump assembly and extract it evenly from transmission case.
CAUTION:
- **Fully tighten the sliding hammer screws.**
- **Make sure that bearing race is installed to the oil pump assembly edge surface.**



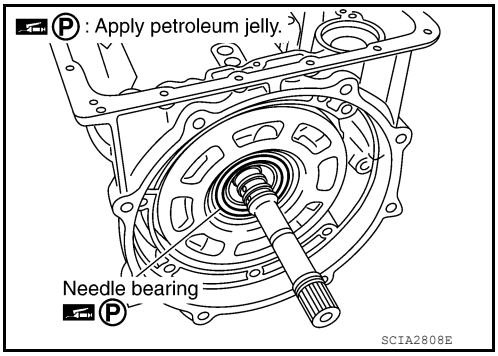
8. Remove O-ring from oil pump assembly.
CAUTION:
Do not reuse O-ring.



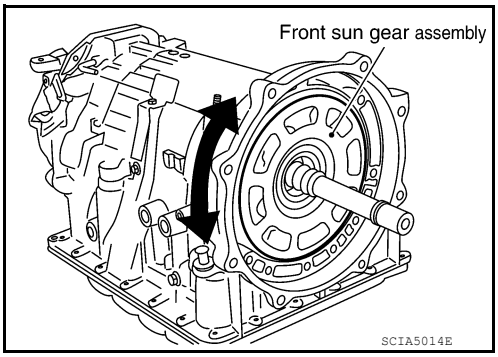
9. Remove bearing race from oil pump assembly.



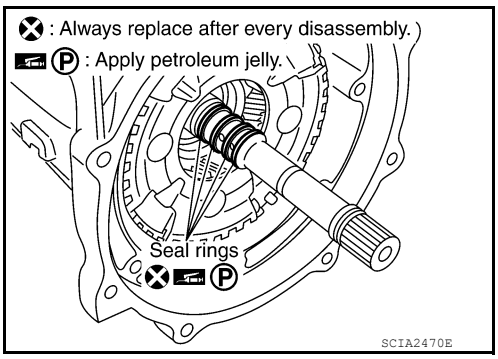
10. Remove needle bearing from front sun gear.



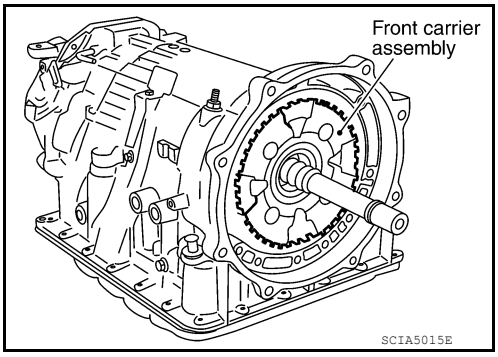
11. Remove front sun gear assembly from front carrier assembly.
NOTE:
Remove front sun gear by rotating left/right.



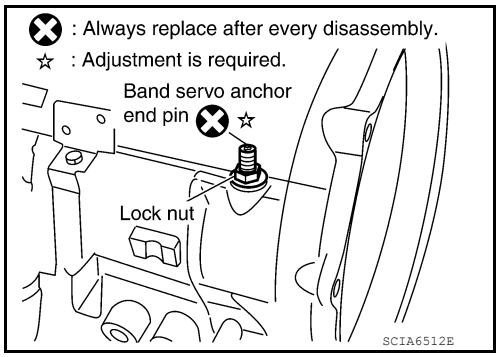
12. Remove seal rings from input clutch assembly.
CAUTION:
Do not reuse seal rings.



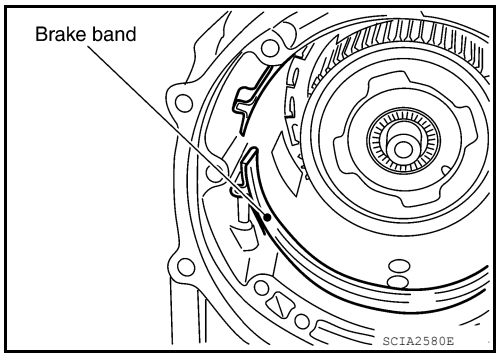
13. Remove front carrier assembly from rear carrier assembly. (With input clutch assembly and rear internal gear.)
CAUTION:
Be careful to remove it with needle bearing.



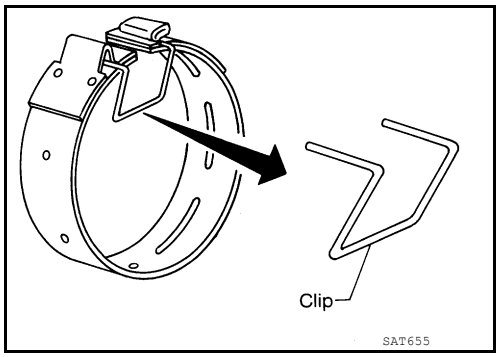
14. Loosen lock nut and remove band servo anchor end pin from transmission case.



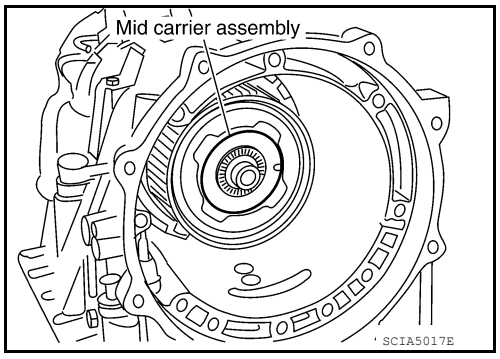
15. Remove brake band from transmission case.



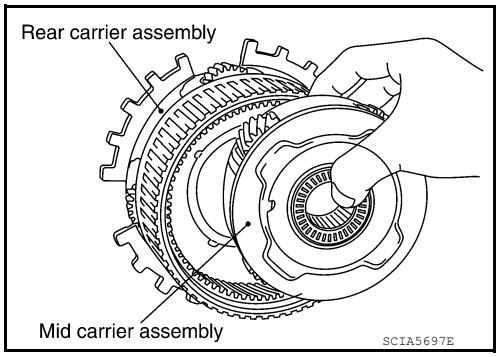
- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at right.**
  Leave the clip in position after removing the brake band.
- **Check brake band facing for damage, cracks, wear or burns.**



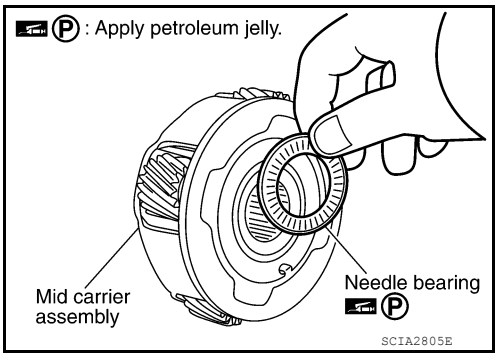
16. Remove mid carrier assembly and rear carrier assembly as a unit.



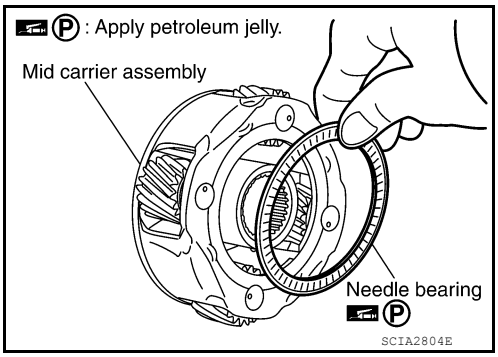
17. Remove mid carrier assembly from rear carrier assembly.



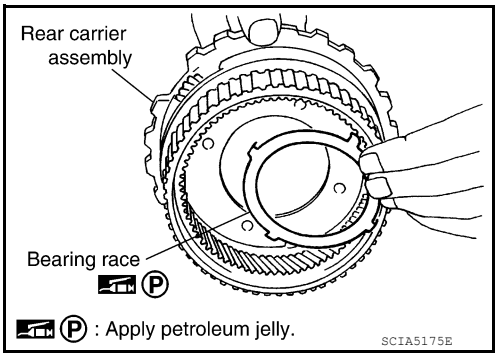
18. Remove needle bearing (front side) from mid carrier assembly.



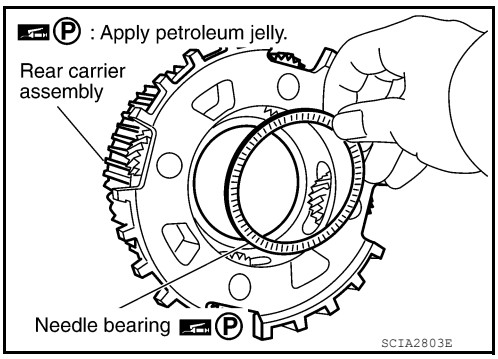
19. Remove needle bearing (rear side) from mid carrier assembly.



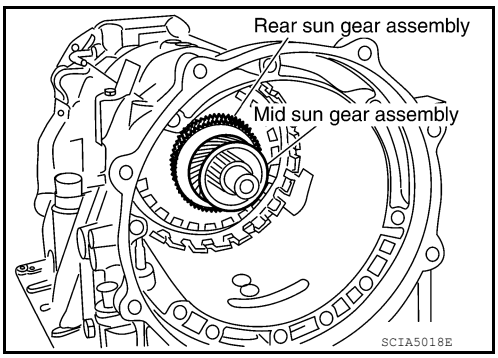
20. Remove bearing race from rear carrier assembly.



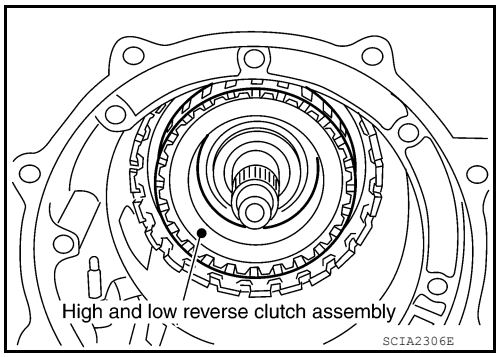
21. Remove needle bearing from rear carrier assembly.



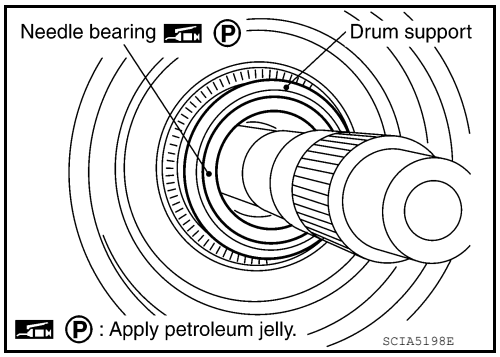
22. Remove mid sun gear assembly, rear sun gear assembly and high and low reverse clutch hub as a unit.
CAUTION:
Be careful to remove then with bearing race and needle bearing.



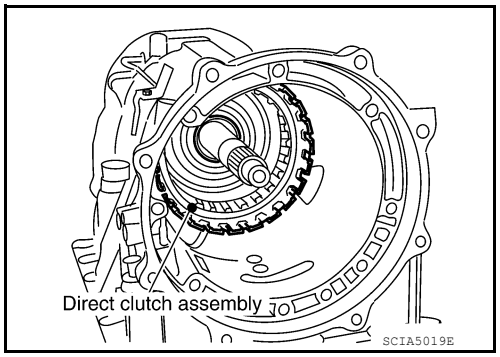
23. Remove high and low reverse clutch assembly from direct clutch assembly.
CAUTION:
Make sure that needle bearing is installed to the high and low reverse clutch assembly edge surface.



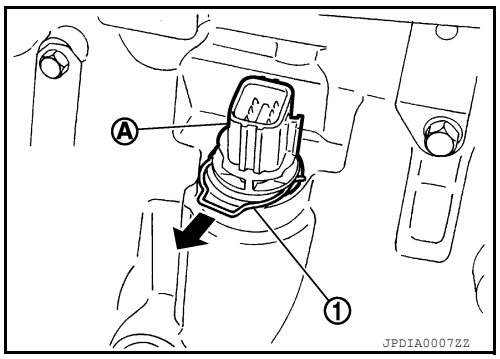
24. Remove needle bearing from drum support.



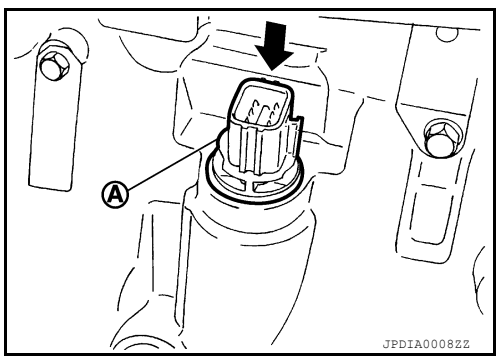
25. Remove direct clutch assembly from reverse brake.



26. Remove snap ring (1) from A/T assembly connector (A).



27. Push A/T assembly connector (A).
CAUTION:
Be careful not to damage connector.

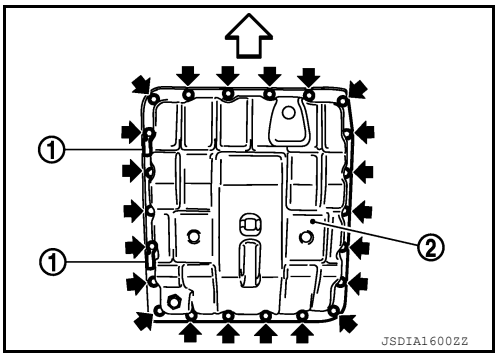


28. Remove clips (1).

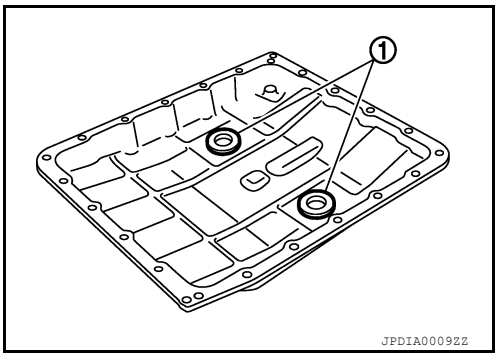
⇦ : Front

⬅ : Oil pan mounting bolt

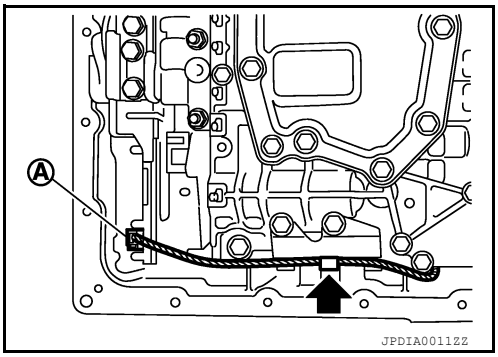
29. Remove oil pan (2) and oil pan gasket.



30. Remove magnets (1) from oil pan.

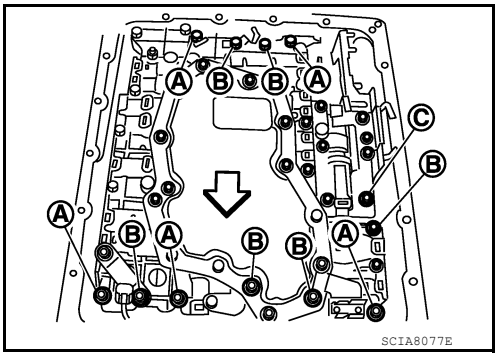


31. Disconnect output speed sensor connector (A).
CAUTION:
Be careful not to damage connector.
32. Disengage terminal clip (⬅).

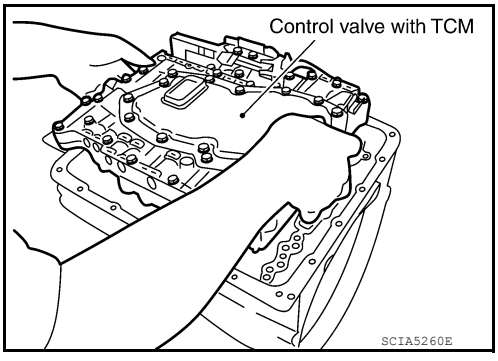


33. Remove bolts (A), (B) and (C) from control valve with TCM.

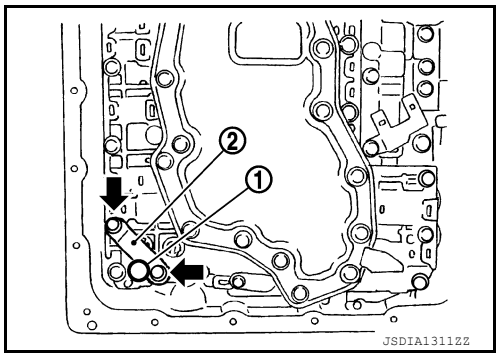
⇦ : Front



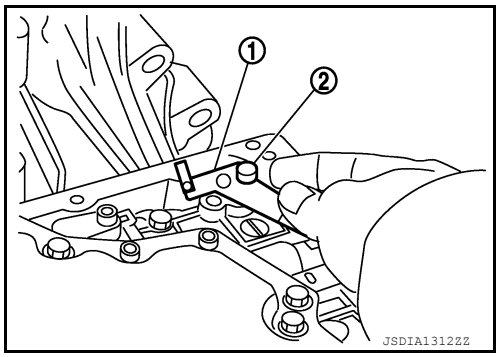
34. Remove the control valve with TCM from transmission case.
CAUTION:
When removing, be careful with the manual valve notch and manual plate height. Remove it vertically.



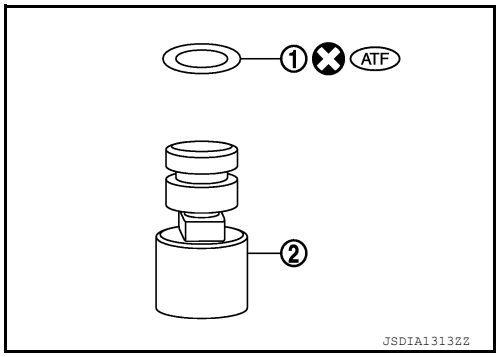
35. Remove plug (1) with bracket (2) from control valve with TCM.



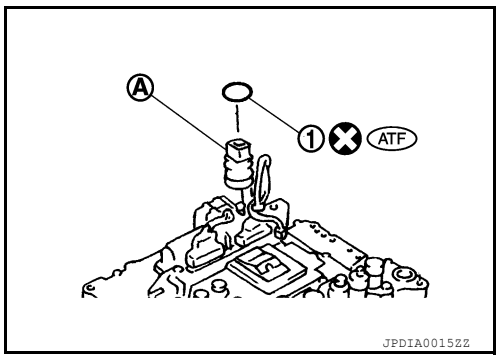
36. Remove bracket (1) from plug (2).



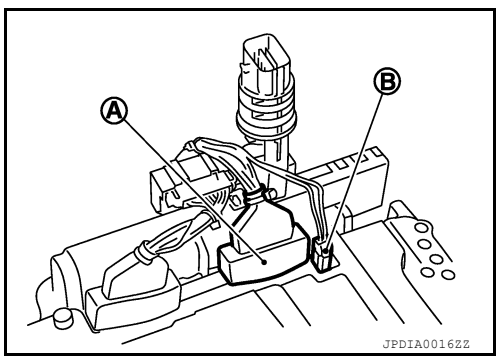
37. Remove O-ring (1) from plug (2).
CAUTION:
Do not reuse O-ring.



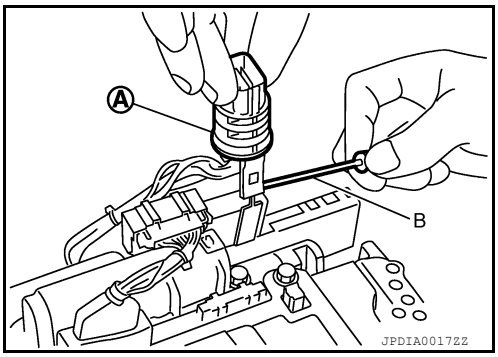
38. Remove O-ring (1) from A/T assembly connector (A).
CAUTION:
Do not reuse O-ring.



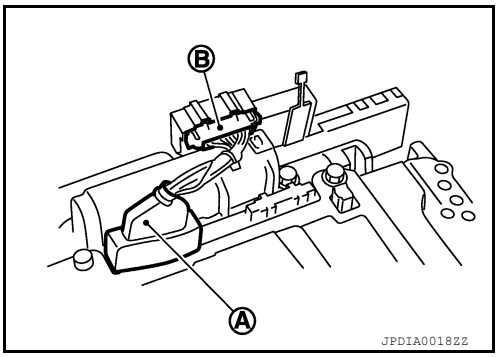
39. Disconnect TCM connectors (A) and (B).
CAUTION:
Be careful not to damage connectors.



40. Remove A/T assembly connector (A) from control valve with TCM with a flat-bladed screwdriver (B).



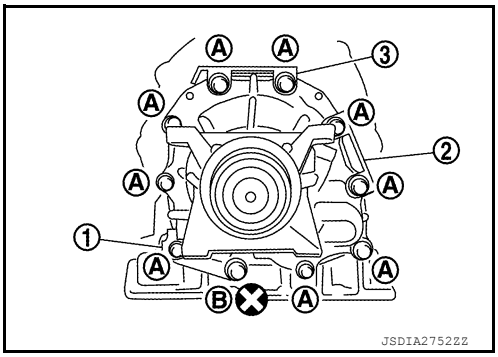
41. Disconnect TCM connector (A) and transmission range switch connector (B).
CAUTION:
Be careful not to damage connectors.



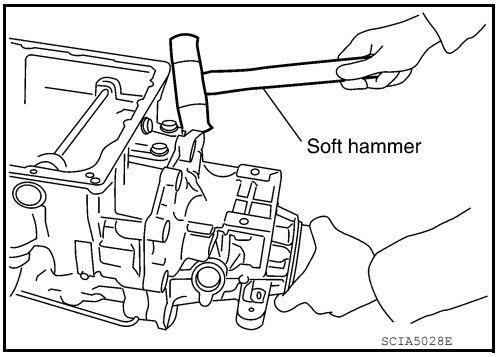
42. Remove tightening bolts for rear extension assembly and transmission case.

1 : Bracket (for VK56DE models)
2 : Bracket
3 : Bracket (for VK56DE models)
A : Bolt
B : Self-sealing bolt

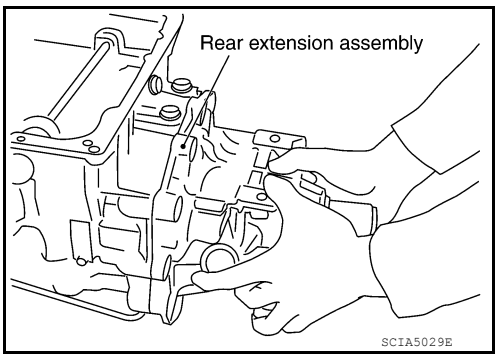
CAUTION:
Do not reuse self-sealing bolt.



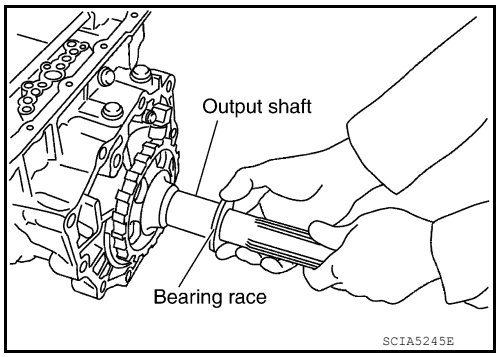
43. Tap rear extension assembly with soft hammer.



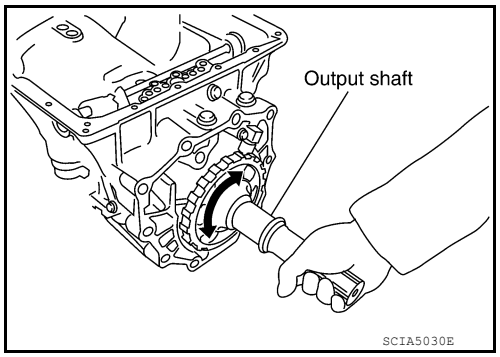
44. Remove rear extension assembly (with needle bearing) from transmission case.



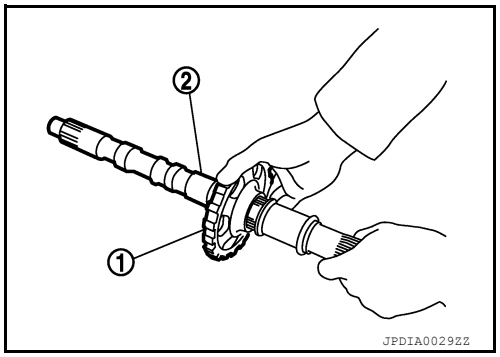
45. Remove bearing race from output shaft.



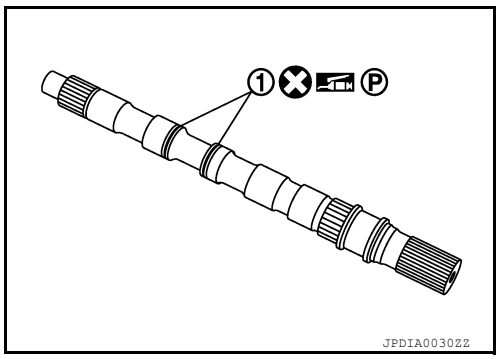
46. Remove output shaft from transmission case by rotating left/ right.



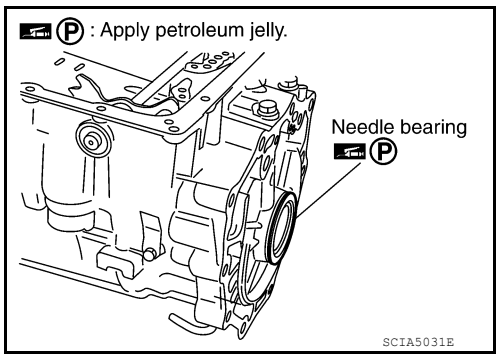
47. Remove parking gear (1) from output shaft (2).



48. Remove seal rings (1) from output shaft.
CAUTION:
Do not reuse seal rings.



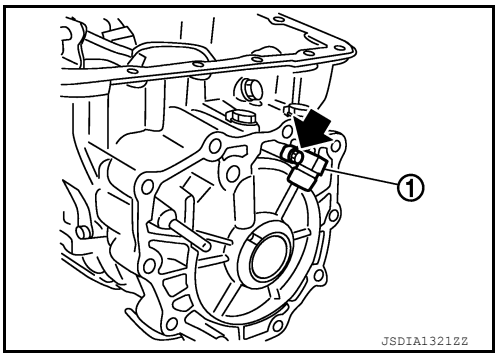
49. Remove needle bearing from transmission case.



50. Remove output speed sensor (1) from transmission case.

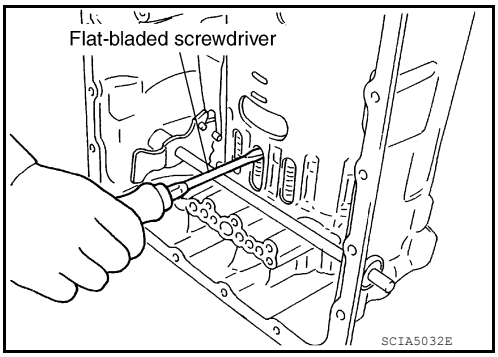
⬅ : Bolt

CAUTION:
- **Never subject it to impact by dropping or hitting it.**
- **Never disassemble.**
- **Never allow metal filings, etc. to get on the sensor's front edge magnetic area.**
- **Never place in an area affected by magnetism.**

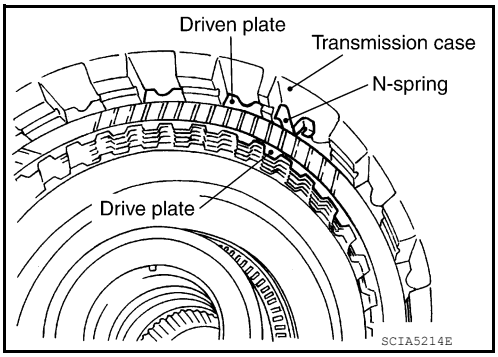


51. Remove reverse brake snap ring (fixing plate) with two flat-bladed screwdrivers.
NOTE:
Press out snap ring from the transmission case oil pan side gap using a flat-bladed screwdriver, and remove it using a another screwdriver.

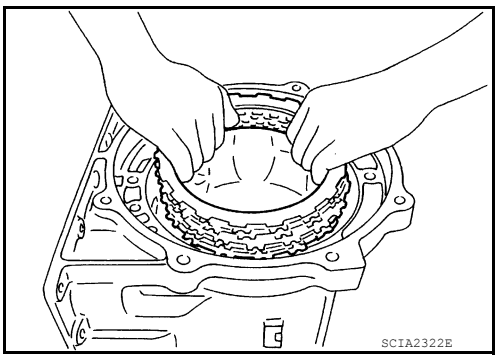
52. Remove reverse brake retaining plate from transmission case.
- **Check facing for burns, cracks or damage. If necessary, replace the plate.**



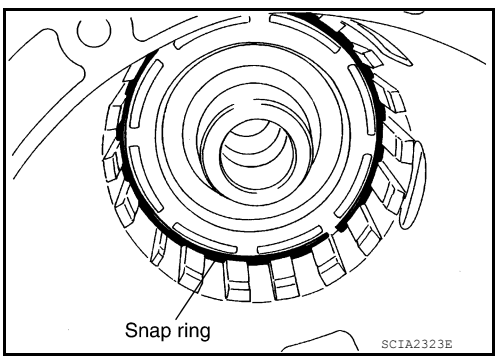
53. Remove N-spring from transmission case.



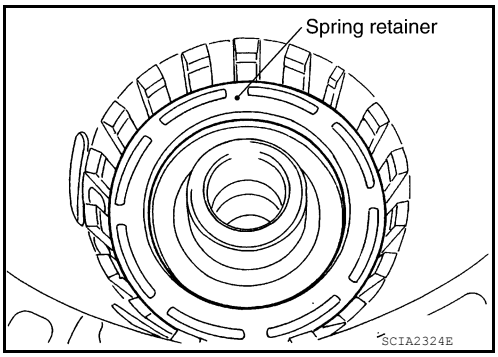
54. Remove reverse brake drive plates, driven plates, dish plates and retaining plate transmission case.
- **Check facing for burns, cracks or damage. If necessary, replace the plate.**



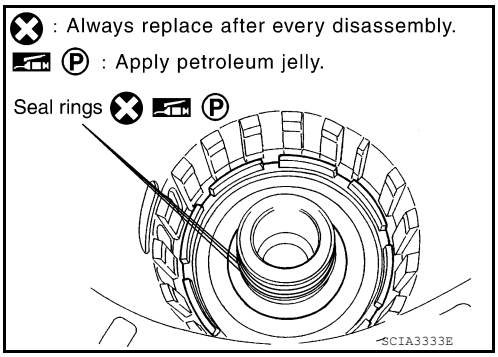
55. Remove snap ring (fixing spring retainer) using a flat-bladed screwdriver.



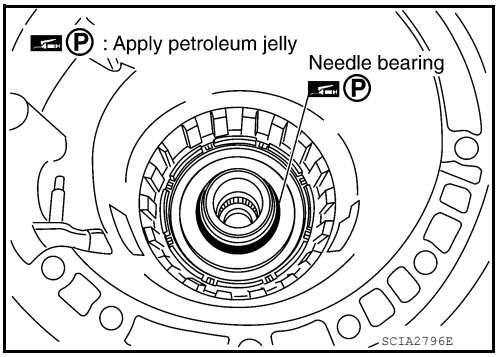
56. Remove spring retainer and return spring from transmission case.



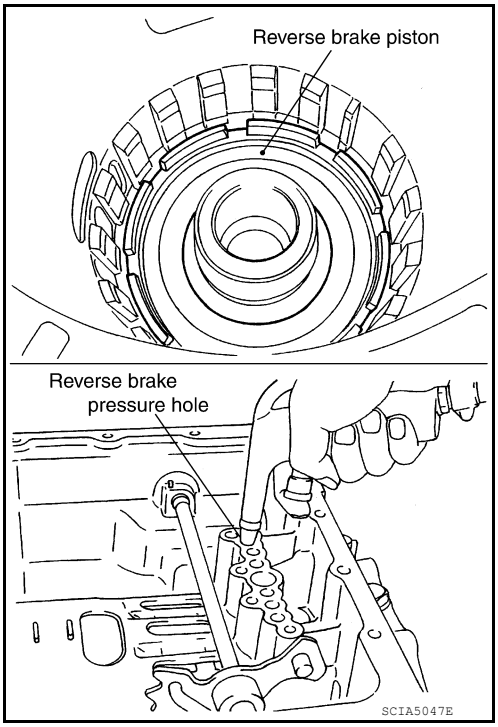
57. Remove seal rings from drum support.
CAUTION:
Do not reuse seal rings.



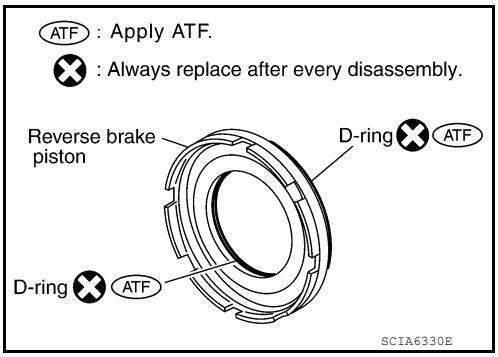
58. Remove needle bearing from drum support edge surface.



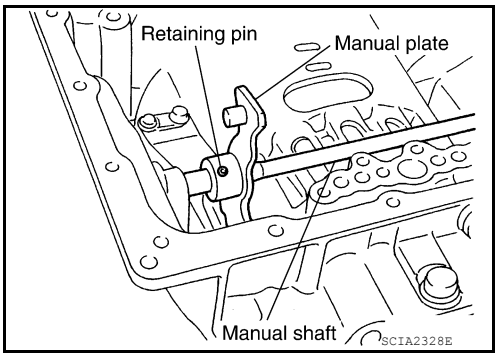
59. Remove reverse brake piston from transmission case with compressed air. Refer to TM-198, "Oil Channel".
CAUTION:
Care should be taken not to abruptly blow air. It makes pistons incline, as the result, it becomes hard to disassemble the pistons.



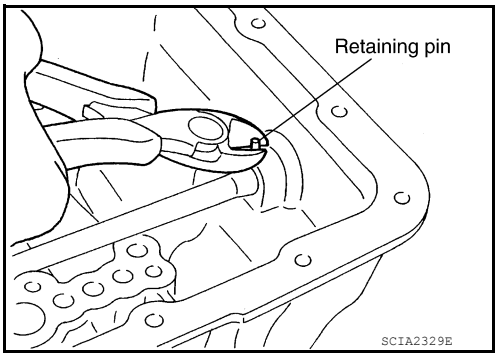
60. Remove D-rings from reverse brake piston.
CAUTION:
Do not reuse D-rings.



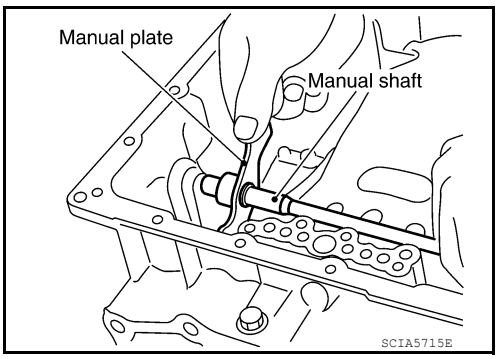
61. Use a pin punch [4 mm (0.16 in) dia. commercial service tool] to knock out retaining pin.



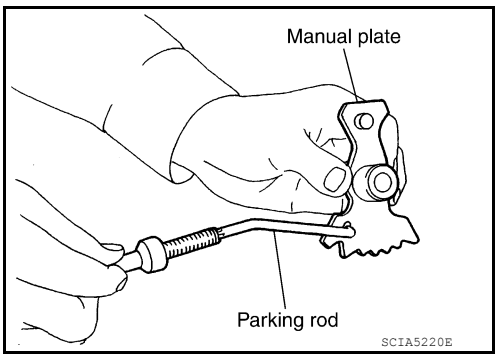
62. Remove retaining pin with pair of nippers.



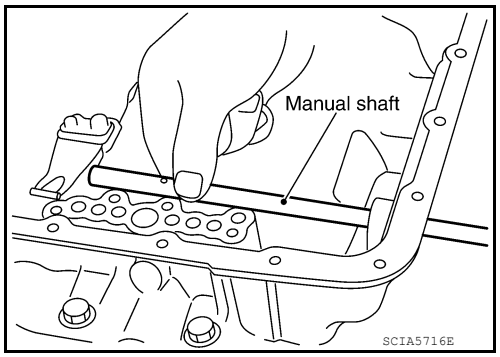
63. Remove manual plate (with parking rod) from manual shaft.



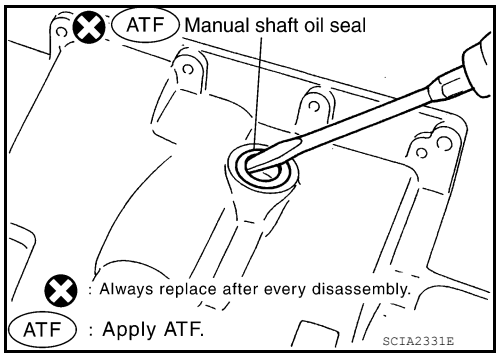
64. Remove parking rod from manual plate.



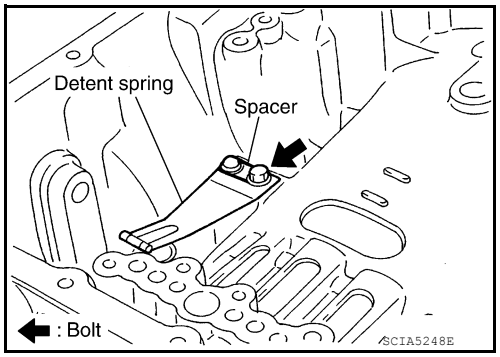
65. Remove manual shaft from transmission case.



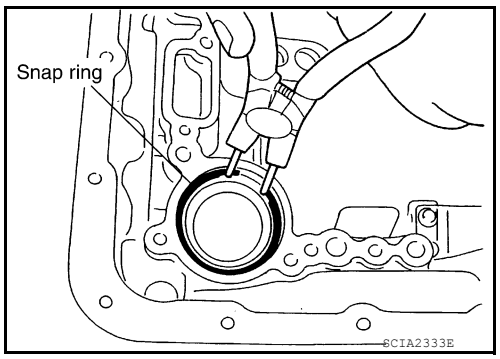
66. Remove manual shaft oil seals with a flat-bladed screwdriver.
CAUTION:
- **Do not reuse oil seals.**
- **Be careful not to scratch transmission case.**



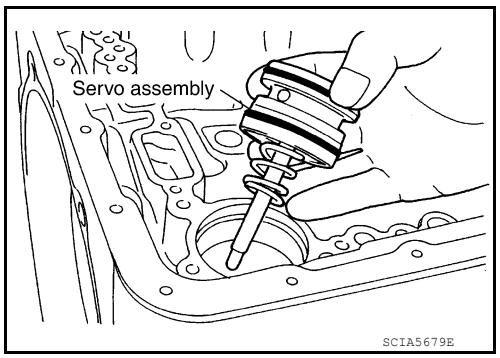
67. Remove detent spring and spacer from transmission case.



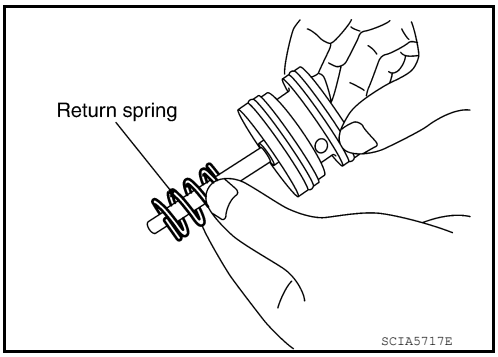
68. Remove snap ring from transmission case with pair of snap ring pliers.



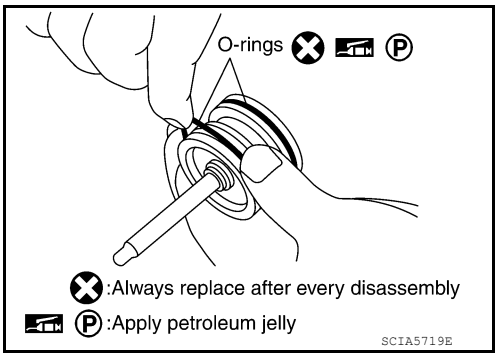
69. Remove servo assembly (with return spring) from transmission case.



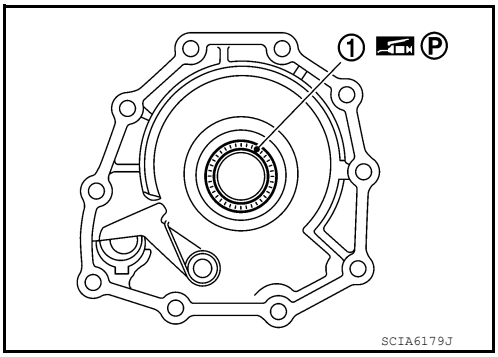
70. Remove return spring from servo assembly.



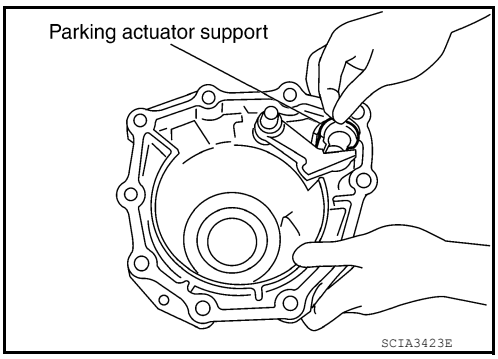
71. Remove O-rings from servo assembly.
CAUTION:
Do not reuse O-rings.



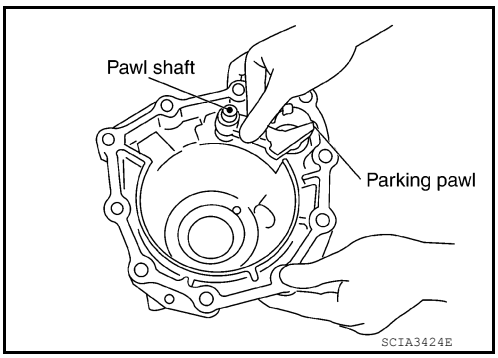
72. Remove needle bearing (1) from rear extension.



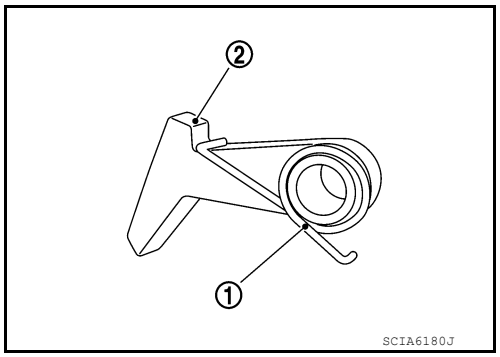
73. Remove parking actuator support from rear extension.



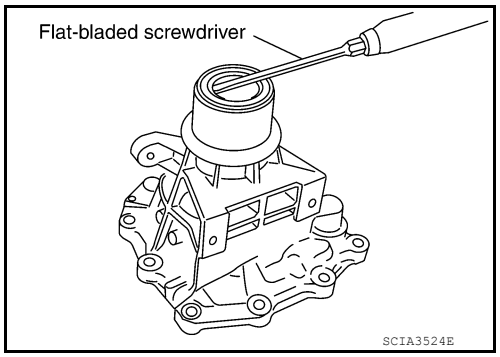
74. Remove parking pawl (with return spring) and pawl shaft from rear extension.



75. Remove return spring (1) from parking pawl (2).



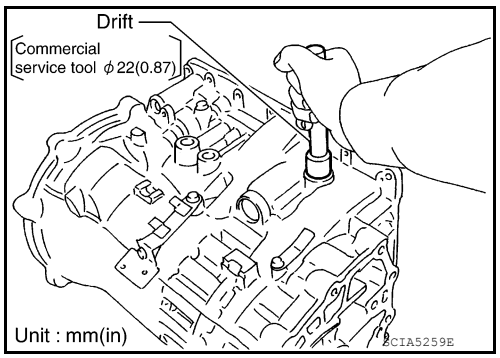
76. Remove rear oil seal from rear extension with a flat-bladed screwdriver.
CAUTION:
Be careful not to scratch rear extension.



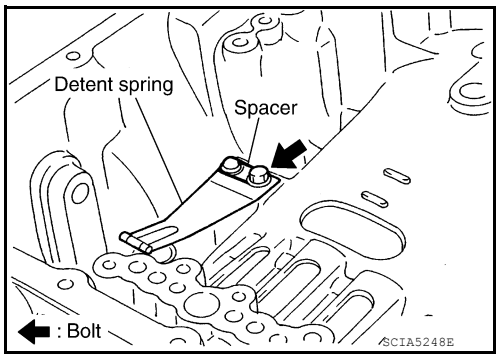
Assembly

INFOID:0000000006822337

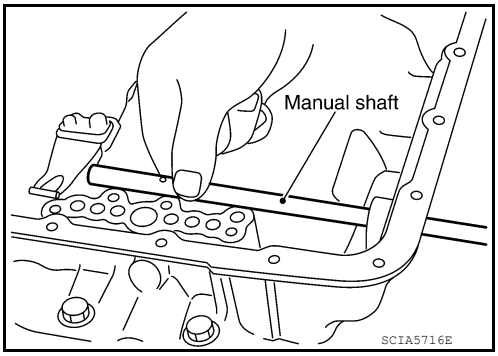
1. Use a drift [22 mm (0.87 in) diameter commercial service tool] to drive the manual shaft oil seals into the transmission case as shown, until the manual shaft oil seals are flush with the case.
CAUTION:
- **Never reuse manual shaft oil seals.**
- **Apply ATF to manual shaft oil seals.**



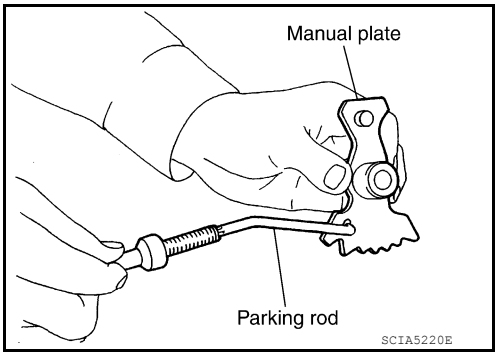
2. Install detent spring and spacer in transmission case. Tighten detent spring and spacer bolt to the specified torque.



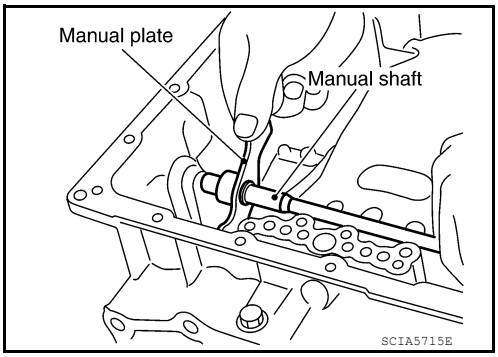
3. Install manual shaft to transmission case.



4. Install parking rod to manual plate.



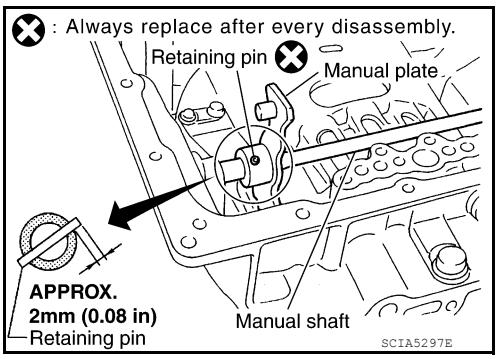
5. Install manual plate (with parking rod) to manual shaft.



6. Install retaining pin into the manual plate and manual shaft.
CAUTION:
Do not reuse retaining pin.

a. Fit pinhole of the manual plate to pinhole of the manual shaft with a pin punch.

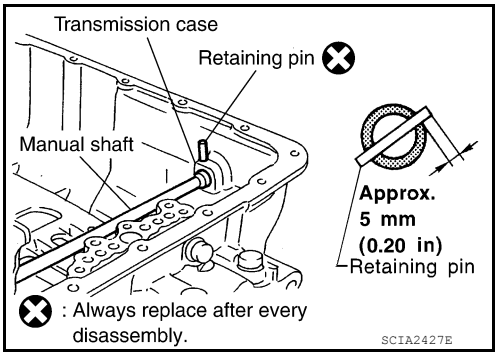
b. Tap the retaining pin into the manual plate, using a suitable tool.
CAUTION:
Drive retaining pin to 2 ±0.5 mm (0.08 ±0.020 in) over the manual plate.



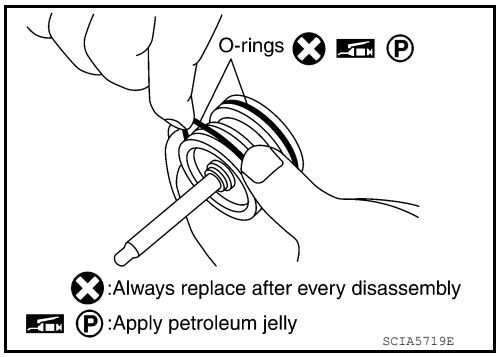
7. Install retaining pin into the transmission case and manual shaft.
CAUTION:
Do not reuse retaining pin.

a. Fit pinhole of the transmission case to pinhole of the manual shaft with a pin punch.

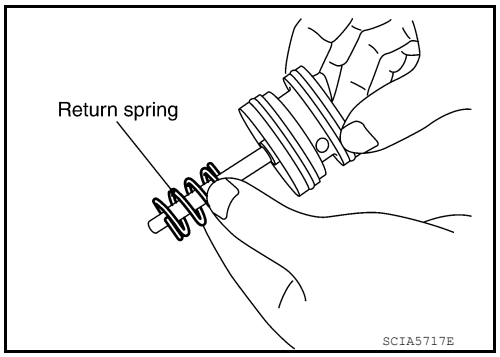
b. Tap the retaining pin into the transmission case, using a suitable tool.
CAUTION:
Drive retaining pin to 5 ±1 mm (0.20 ±0.04 in) over the transmission case.



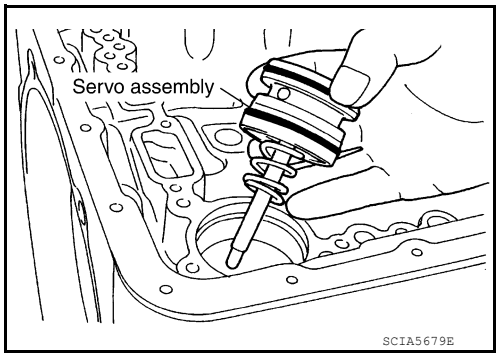
8. Install O-rings to servo assembly.
CAUTION:
Do not reuse O-rings.



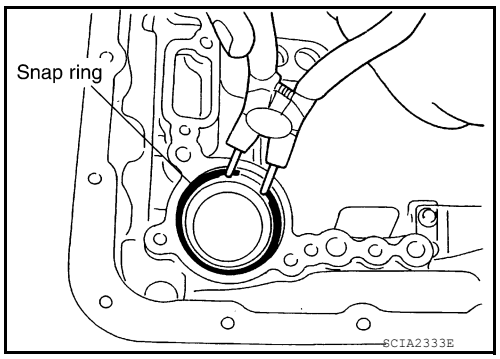
9. Install return spring to servo assembly.



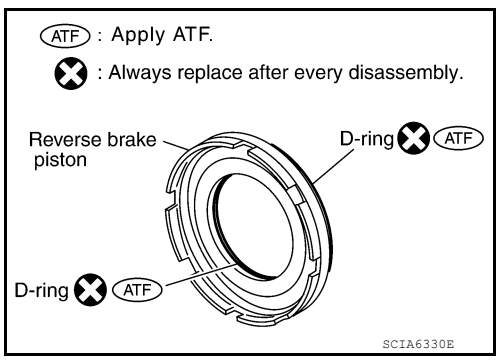
10. Install servo assembly to transmission case.



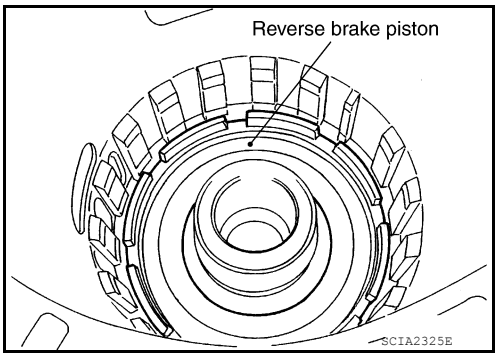
11. Install snap ring to transmission case with a pair of snap ring pliers.



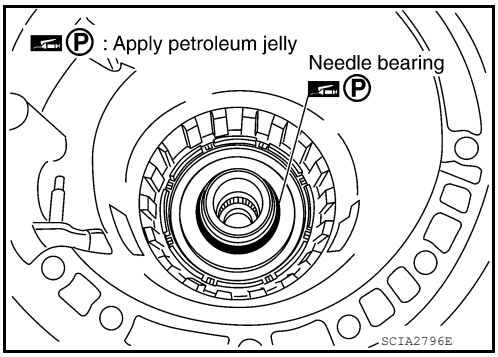
12. Install D-rings to reverse brake piston.
CAUTION:
Do not reuse D-rings.



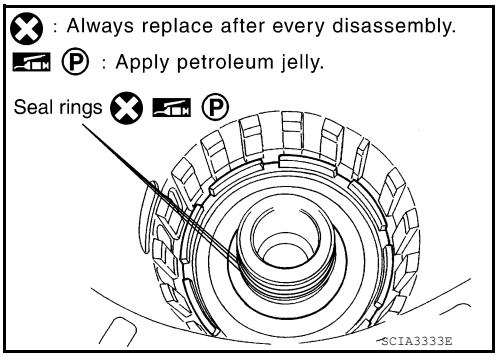
13. Install reverse brake piston to transmission case.



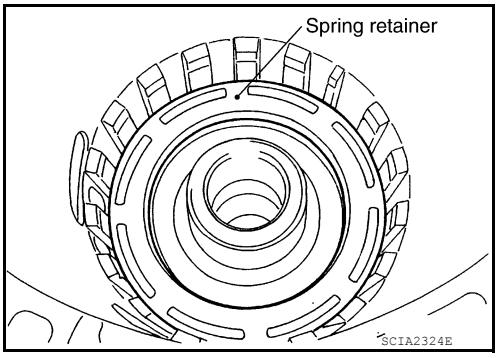
14. Install needle bearing to drum support edge surface.
CAUTION:
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



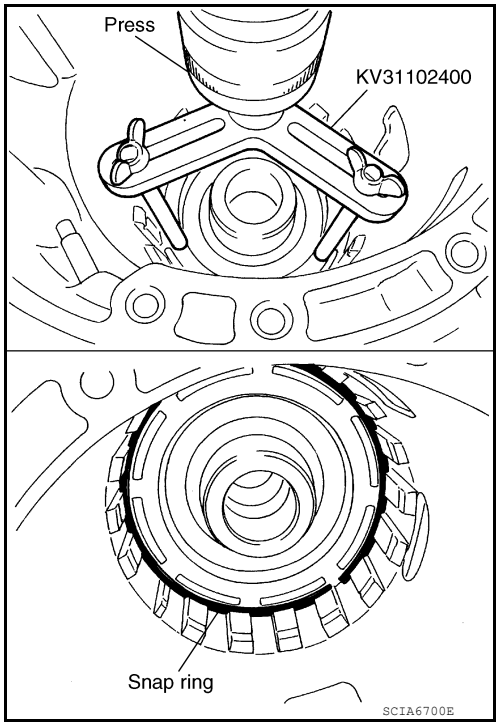
15. Install seal rings to drum support.
CAUTION:
Do not reuse seal rings.



16. Install spring retainer and return spring to transmission case.

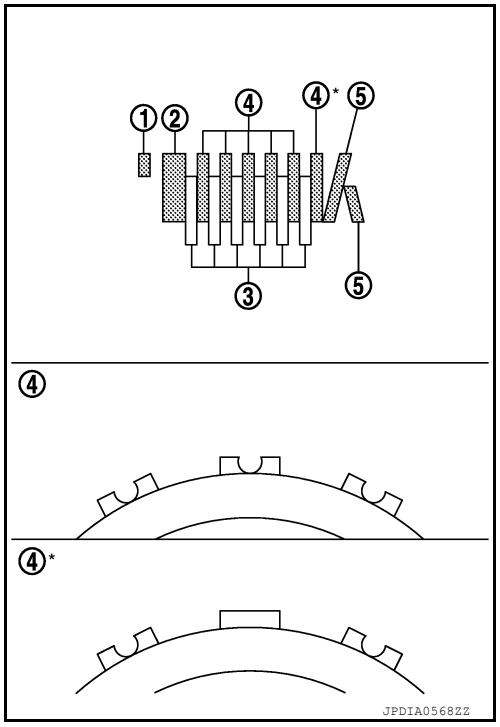


17. Set the SST on spring retainer and install snap ring (fixing spring retainer) to transmission case while compressing return spring.
CAUTION:
Securely assemble them with a flat-bladed screwdriver so that snap ring tension is slightly weak.



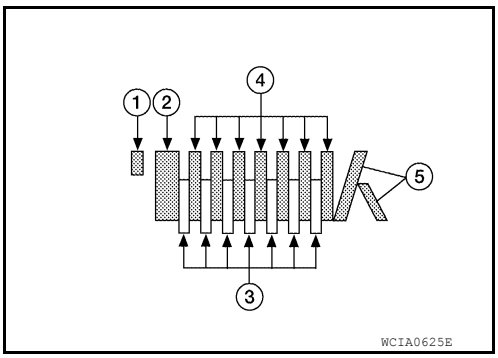
18. Install reverse brake drive plates, driven plates, dish plates, retaining plate and snap ring to transmission case.
CAUTION:
Check order of plates.
• VQ40DE models

1	: Snap ring
2	: Retaining plate
3	: Drive plate
4	: Driven plate
5	: Dish plate
6/6	: Drive plate / Driven plate

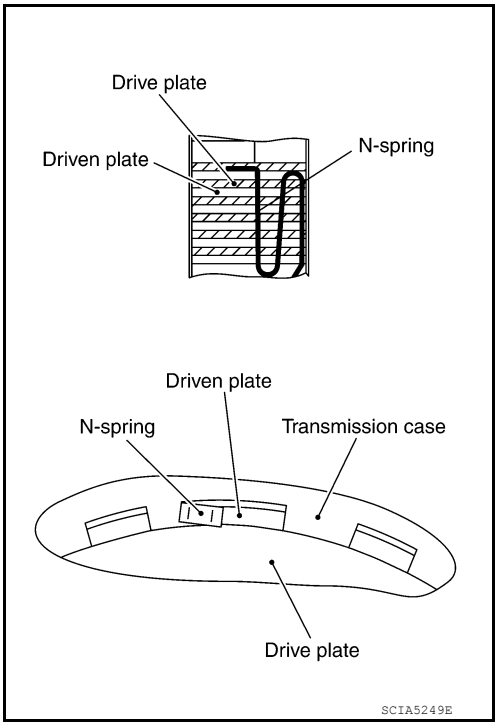


• VK56DE models

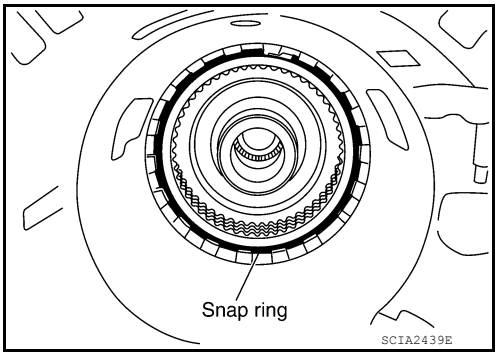
1	: Snap ring
2	: Retaining plate
3	: Drive plate
4	: Driven plate
5	: Dish plate
7/7	: Drive plate / Driven plate



19. Assemble N-spring.
20. Install reverse brake retaining plate to transmission case.



21. Install snap ring to transmission case.

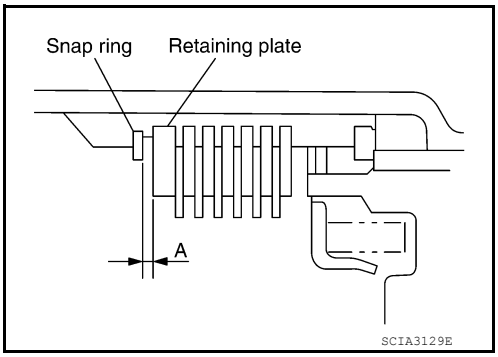


22. Measure clearance between retaining plate and snap ring. If not within specified clearance, select proper retaining plate.

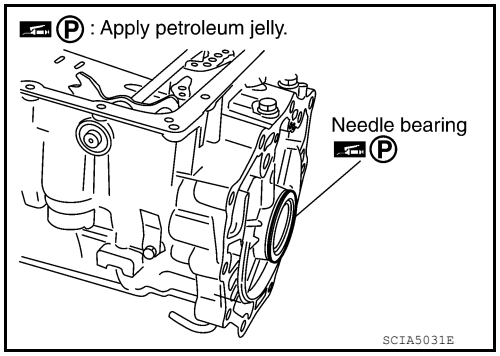
Specified clearance (A)

Standard : **Refer to TM-257, "Reverse Brake".**

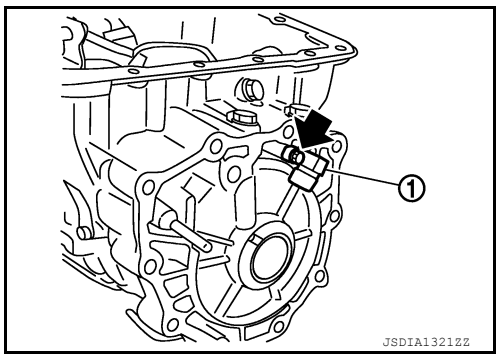
Retaining plate : **Refer to TM-257, "Reverse Brake"**



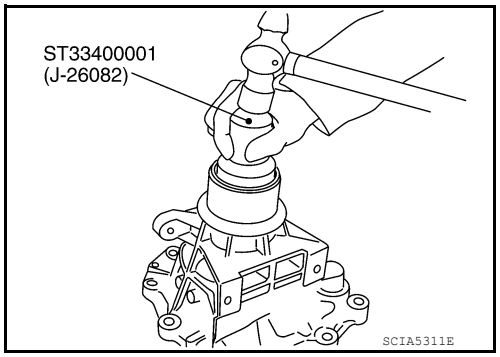
23. Install needle bearing to transmission case.
CAUTION:
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



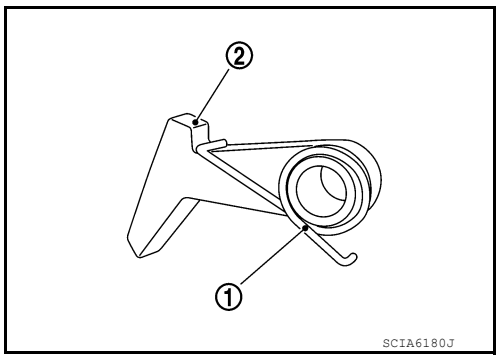
24. Install output speed sensor (1) to transmission case. Tighten output speed sensor bolt (⬅) to the specified torque.
CAUTION:
- **Never subject it to impact by dropping or hitting it.**
- **Never disassemble.**
- **Never allow metal filings, etc. to get on the sensor's front edge magnetic area.**
- **Never place in an area affected by magnetism.**



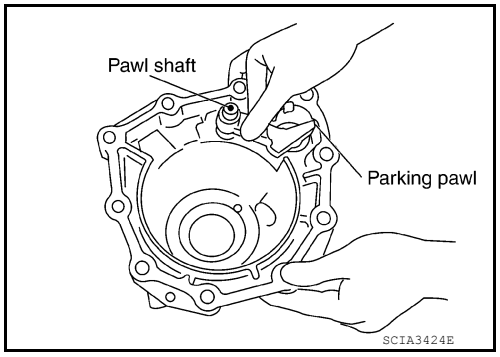
25. As shown in the figure, use the drift to drive rear oil seal into the rear extension until it is flush.
CAUTION:
- **Never reuse rear oil seal.**
- **Apply ATF to rear oil seal.**



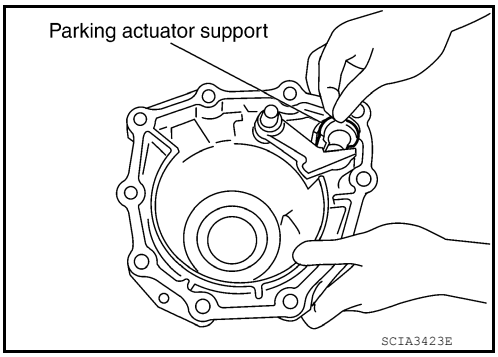
26. Install return spring (1) to parking pawl (2).



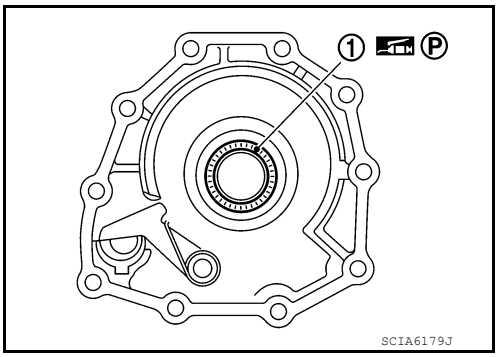
27. Install parking pawl (with return spring) and pawl shaft to rear extension.



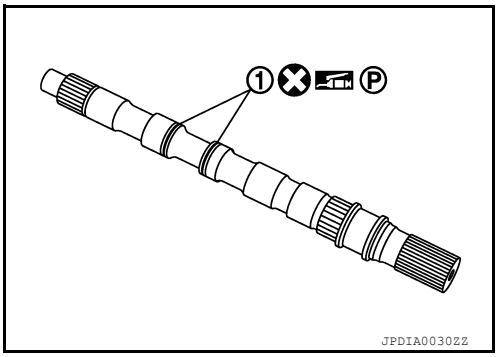
28. Install parking actuator support to rear extension.



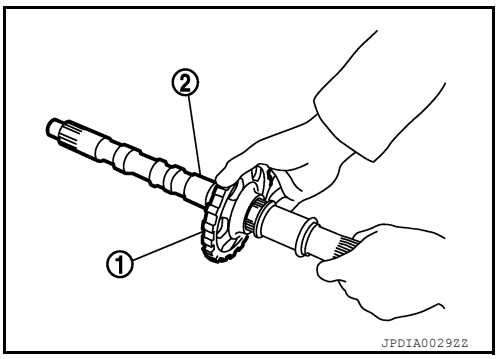
29. Install needle bearing (1) to rear extension.
CAUTION:
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



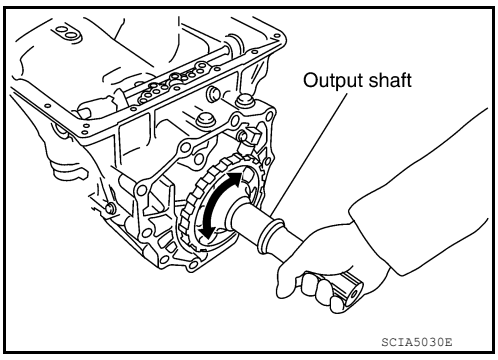
30. Install seal rings (1) to output shaft.
CAUTION:
Do not reuse seal rings.



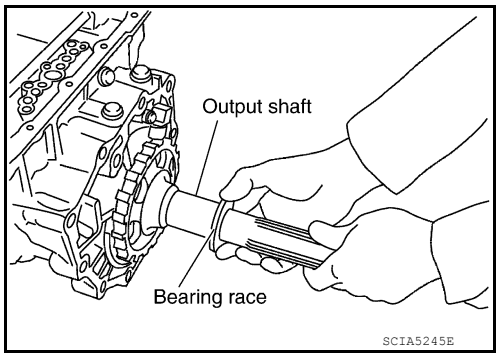
31. Install parking gear (1) to output shaft (2).



32. Install output shaft in transmission case.
CAUTION:
Be careful not to mistake front for rear because both sides looks similar. (Thinner end is front side.)

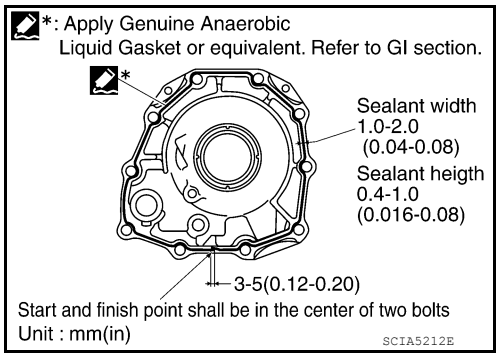


33. Install bearing race to output shaft.



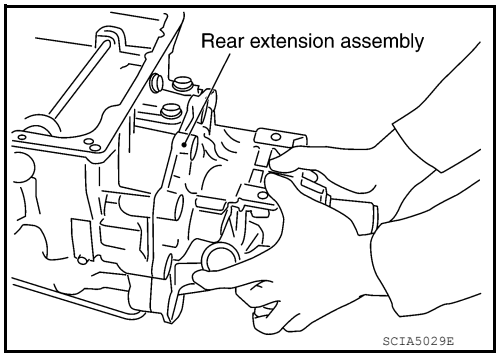
34. Apply recommended sealant (Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-17, "Recommended Chemical Products and Sealants".) to rear extension assembly as shown.

CAUTION:
Completely remove all moisture, oil, old sealant and any foreign material from the transmission case and rear extension assembly mating surfaces.



35. Install rear extension assembly to transmission case.

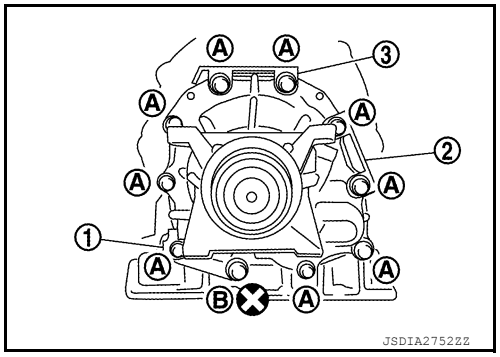
CAUTION:
Insert the tip of parking rod between the parking pawl and the parking actuator support when assembling the rear extension assembly.



36. Tighten rear extension assembly bolts to the specified torque.

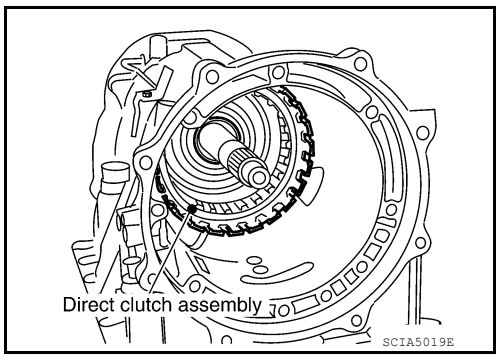
1 : Bracket (for VK56DE models)
2 : Bracket
3 : Bracket (for VK56DE models)
A : Bolt
B : Self-sealing bolt

CAUTION:
Do not reuse self-sealing bolt.

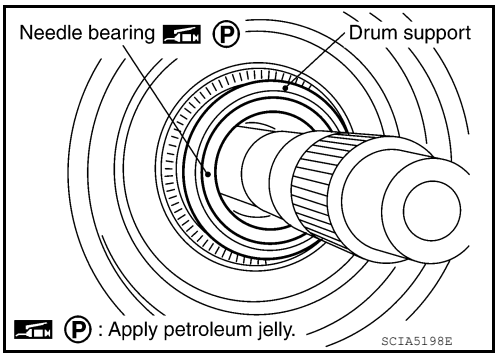


37. Install direct clutch assembly in reverse brake.

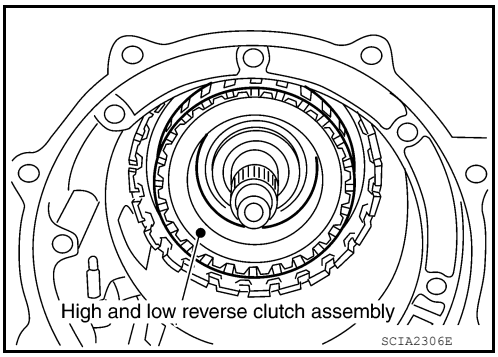
CAUTION:
Make sure that drum support edge surface and direct clutch inner boss edge surface come to almost same place.



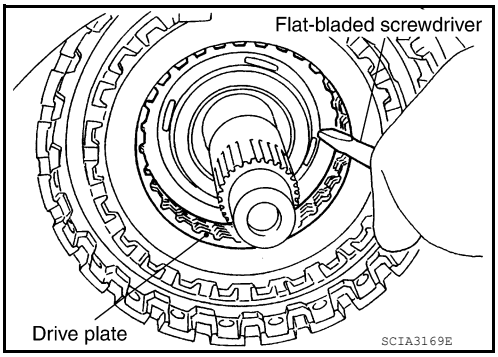
38. Install needle bearing in drum support.
CAUTION:
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



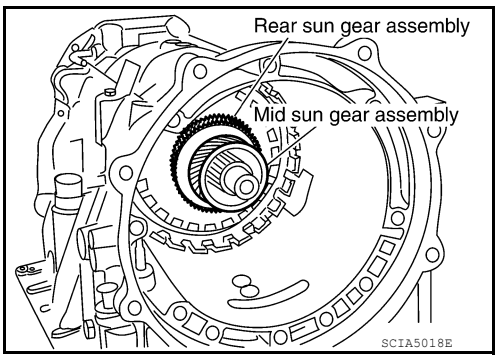
39. Install high and low reverse clutch assembly in direct clutch.



40. Align the drive plate with a flat-bladed screwdriver.

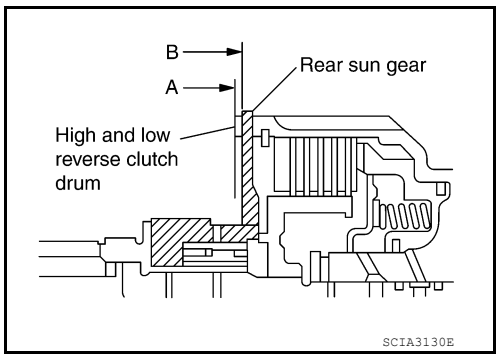


41. Install high and low reverse clutch hub, mid sun gear assembly and rear sun gear assembly as a unit.



CAUTION:

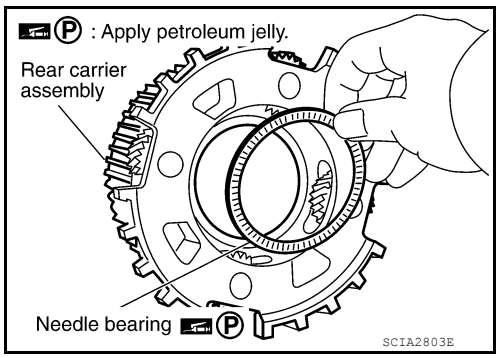
Make sure that portion (A) of high and low reverse clutch drum protrudes approximately 2 mm (0.08 in) beyond portion (B) of rear sun gear.



42. Install needle bearing to rear carrier assembly.

CAUTION:

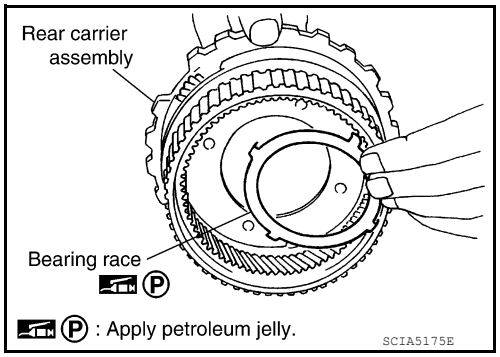
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



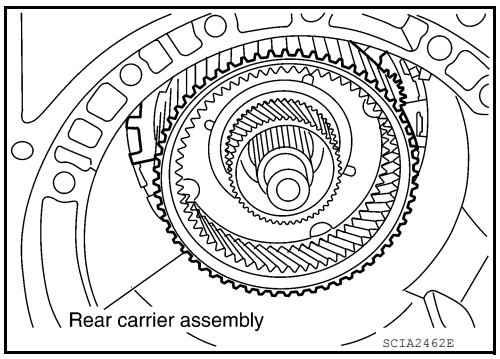
43. Install bearing race to rear carrier assembly.

CAUTION:

Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



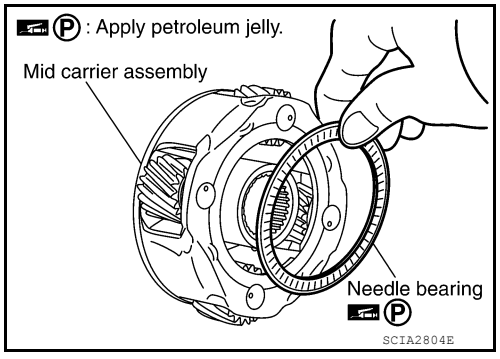
44. Install rear carrier assembly to direct clutch drum.



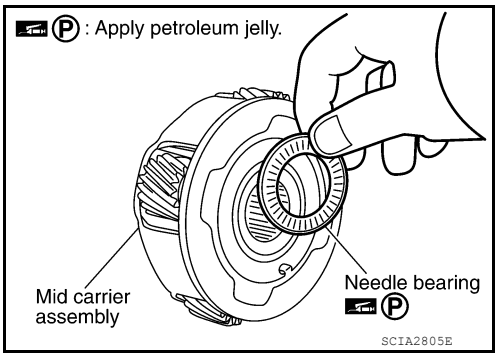
45. Install needle bearing (rear side) to mid carrier assembly.

CAUTION:

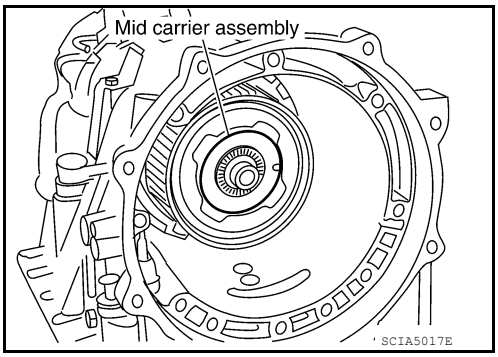
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



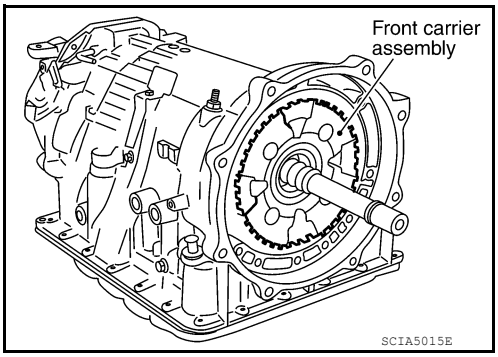
46. Install needle bearing (front side) to mid carrier assembly.
CAUTION:
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



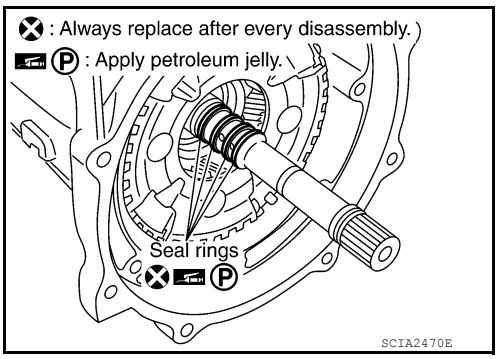
47. Install mid carrier assembly to rear carrier assembly.



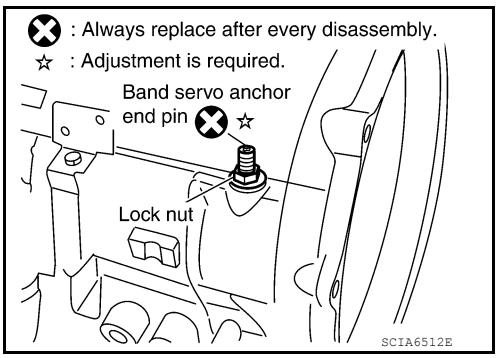
48. Install front carrier assembly, input clutch assembly and rear internal gear as a unit.



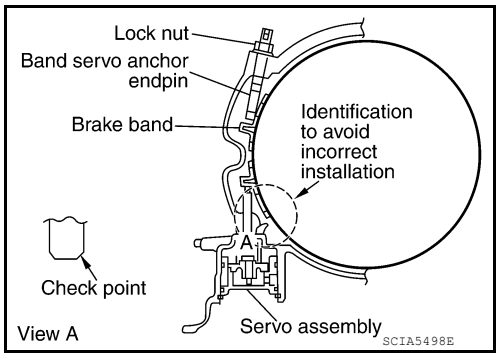
49. Install seal rings to input clutch assembly.
CAUTION:
Do not reuse seal rings.



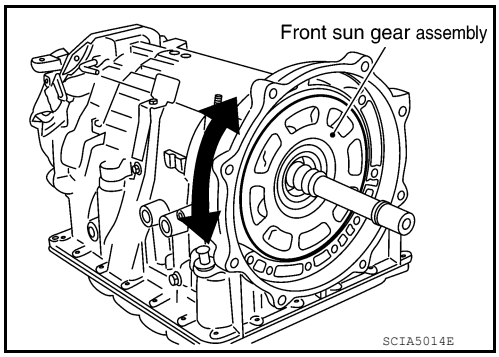
50. Install band servo anchor end pin and lock nut to transmission case.
CAUTION:
Do not reuse band servo anchor end pin.



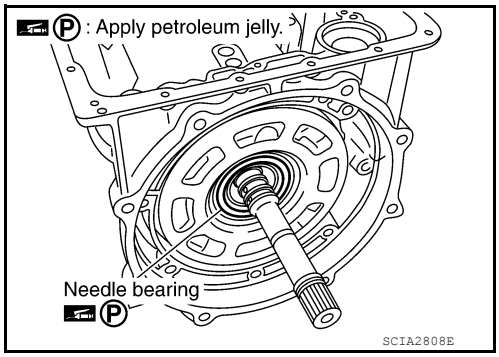
51. Install brake band to transmission case.
CAUTION:
Assemble it so that identification to avoid incorrect installation faces servo side.



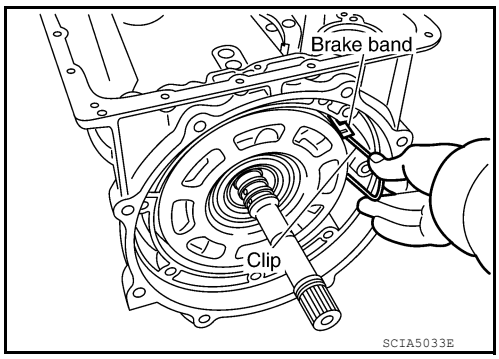
52. Install front sun gear assembly to front carrier assembly.
CAUTION:
Apply ATF to front sun gear bearing and 3rd one-way clutch end bearing.



53. Install needle bearing to front sun gear.
CAUTION:
Check the direction of needle bearing. Refer to **TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings"****.**



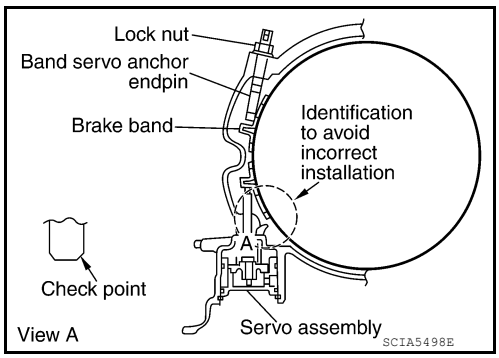
54. Adjust brake band tilting using a clip so that brake band contacts front sun gear drum evenly.



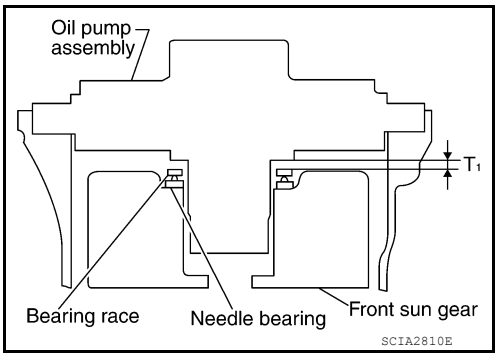
55. Adjust brake band.
a. Loosen lock nut.
b. Tighten band servo anchor end pin to specified torque.

Band servo anchor end pin : 5.0 N·m (0.51 kg-m, 44 in-lb)

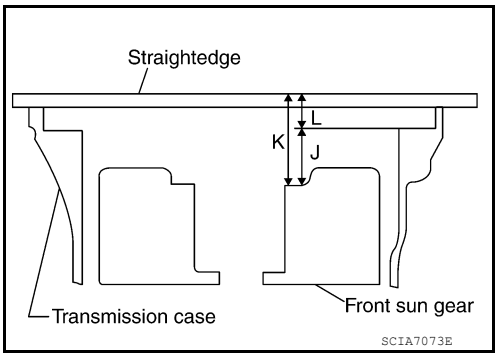
c. Back of band servo anchor end pin three turns.
d. Holding band servo anchor end pin, tighten lock nut to the specified torque.



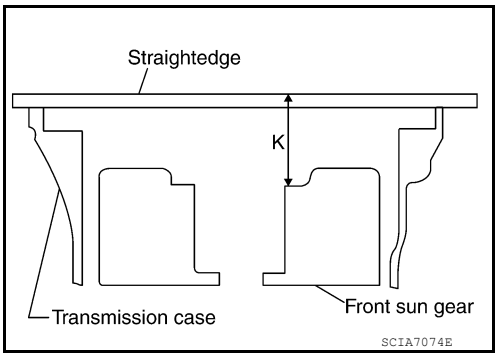
56. Adjustment of total end play.
    - Measure clearance between front sun gear and bearing race for oil pump cover.
    - Select proper thickness of bearing race so that end play is within specifications.



a. Measure dimensions (K) and (L) and then calculate dimension (J).

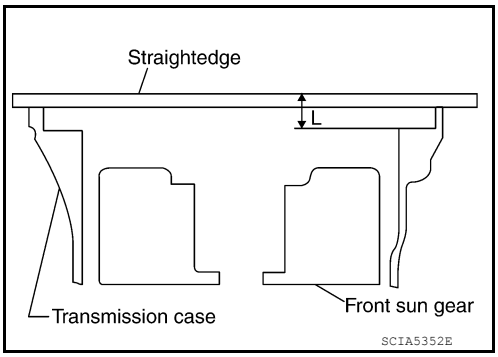


i. Measure dimension (K).



ii. Measure dimension (L).

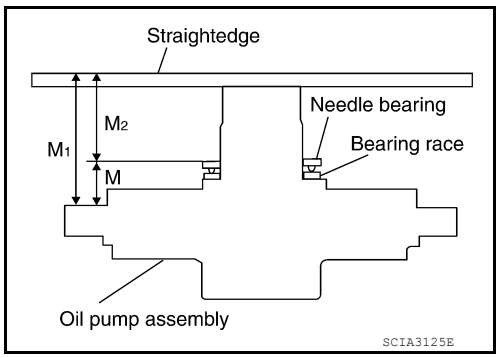
iii. Calculate dimension (J).



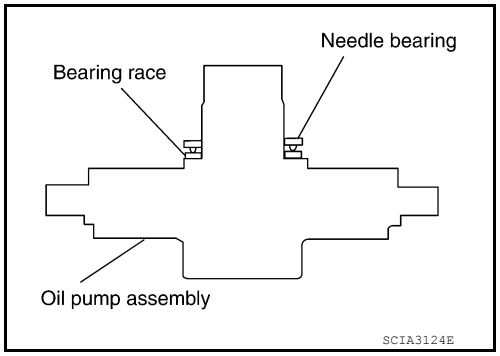
J : Distance between oil pump fitting surface of transmission case and needle bearing mating surface of front sun gear.

J = K – L

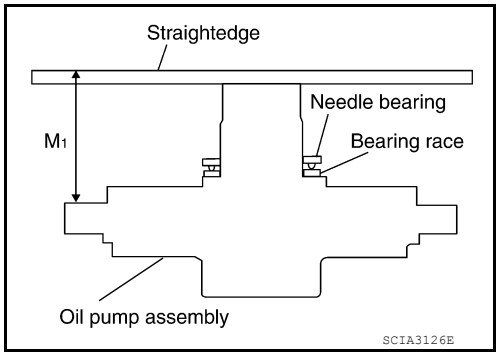
b. Measure dimensions (M_1) and (M_2) and then calculate dimension (M).



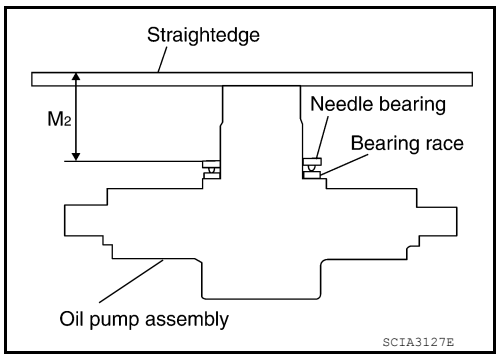
i. Place bearing race and needle bearing on oil pump assembly.



ii. Measure dimension “M_1”.



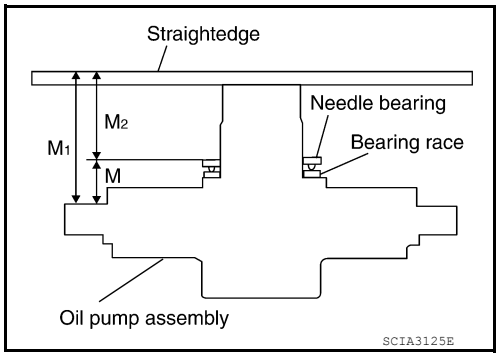
iii. Measure dimension (M_2).



iv. Calculate dimension (M).

M : Distance between transmission case fitting surface of oil pump and needle bearing on oil pump.

$M = M_1 - M_2$



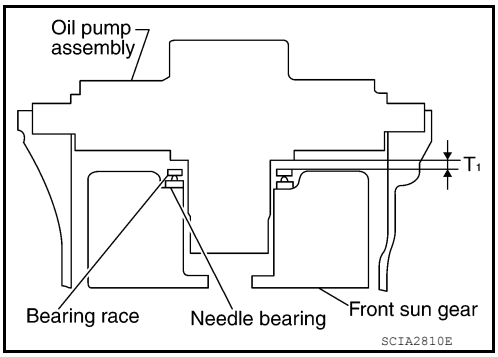
c. Adjust total end play (T_1).

T_1 = J – M

Total end play T_1 : Refer to TM-258, "Total End Play".

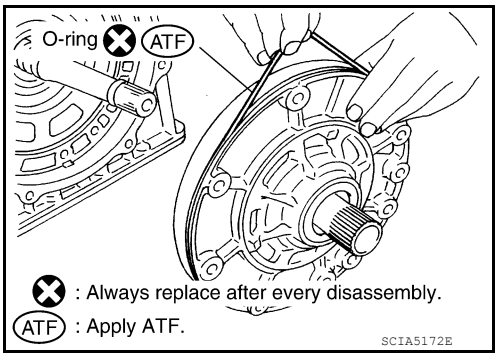
- Select proper thickness of bearing race so that total end play is within specifications.

Bearing races : Refer to TM-258, "Total End Play".

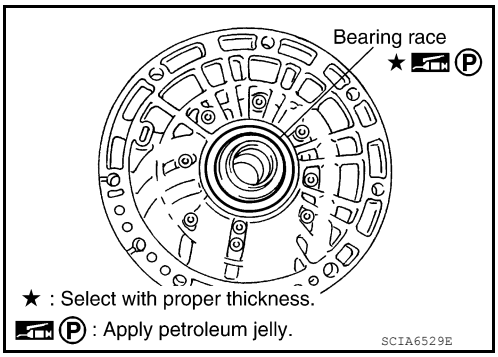


57. Install O-ring to oil pump assembly.

CAUTION:
Do not reuse O-ring.

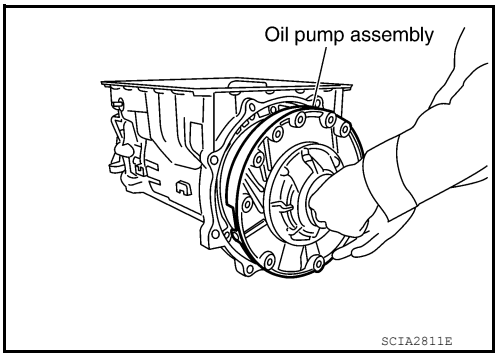


58. Install bearing race to oil pump assembly.



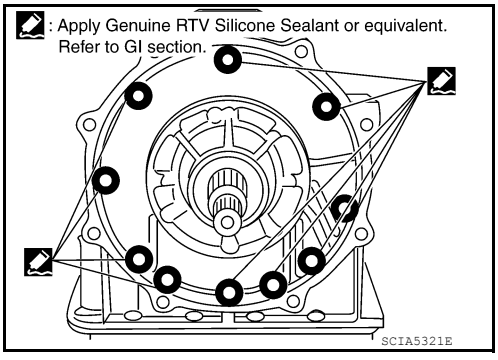
59. Install oil pump assembly to transmission case.

CAUTION:
Apply ATF to oil pump bearing.

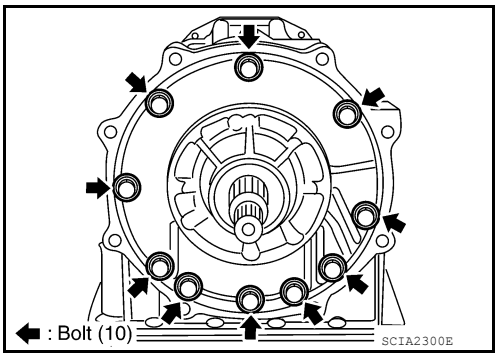


60. Apply recommended sealant (Genuine RTV Silicone Sealant or equivalent. Refer to GI-17, "Recommended Chemical Products and Sealants".) to oil pump assembly as shown.

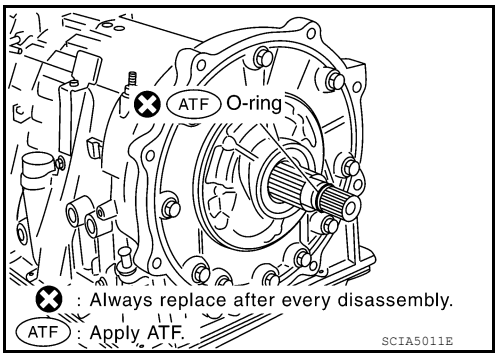
CAUTION:
Completely remove all moisture, oil, old sealant and any foreign material from the oil pump bolts and oil pump bolt mating surfaces.



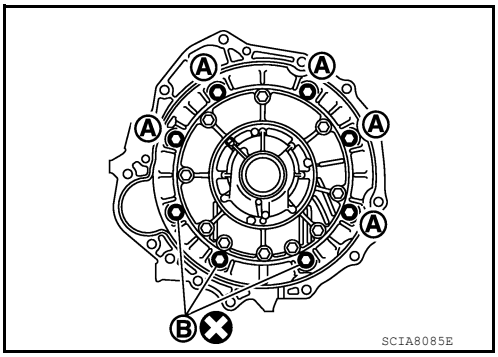
61. Tighten oil pump bolts to the specified torque.
CAUTION:
Apply ATF to oil pump bushing.



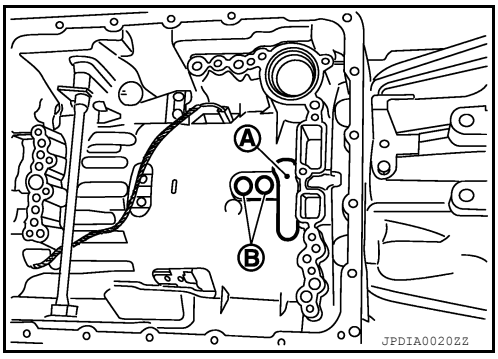
62. Install O-ring to input clutch assembly.
CAUTION:
Do not reuse O-ring.



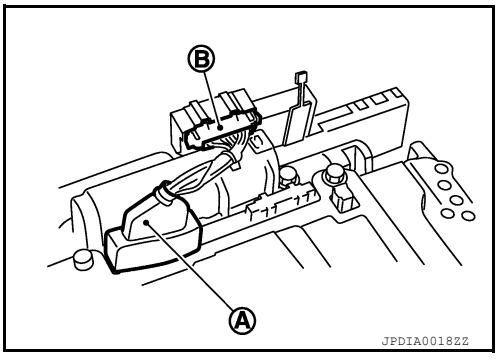
63. Install converter housing to transmission case, and then tighten converter housing bolts (A) and self-sealing bolts (B) to the specified torque.
CAUTION:
Do not reuse self-sealing bolts.



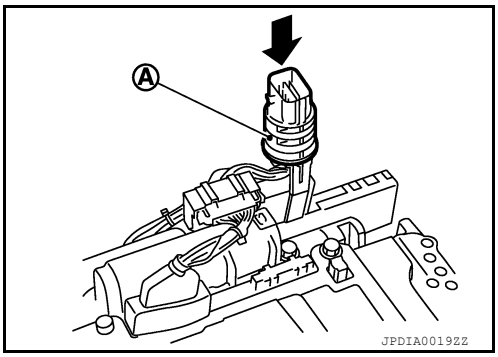
64. Make sure that brake band (A) does not close input speed sensor holes (B).



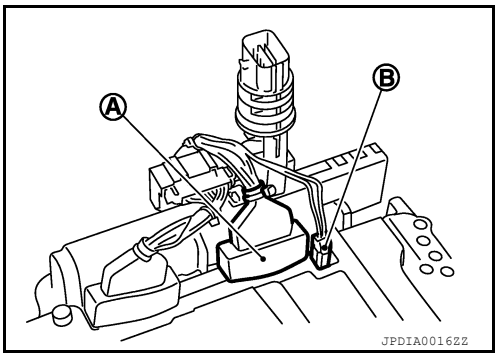
65. Connect TCM connector (A) and transmission range switch connector (B).



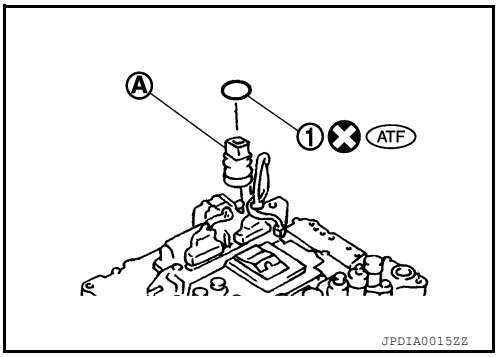
66. Install A/T assembly connector (A) to control valve with TCM.



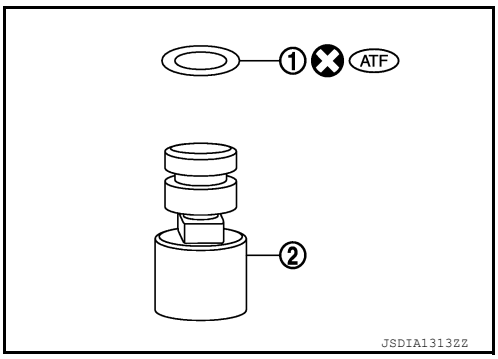
67. Connect TCM connectors (A) and (B).



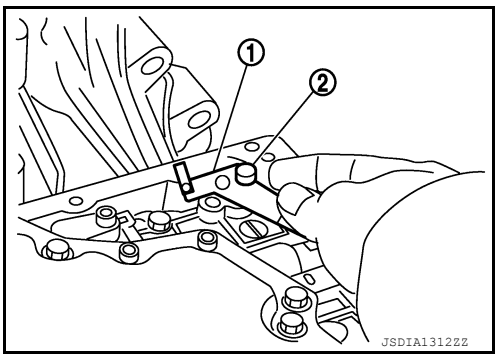
68. Install O-ring (1) to A/T assembly connector (A).
CAUTION:
Do not reuse O-ring.



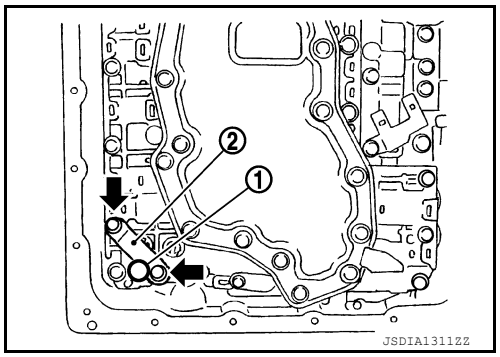
69. Install new O-ring (1) in plug (2).
CAUTION:
- **Do not reuse O-ring.**
- **O-ring should be free of contamination.**



70. Install plug (2) to bracket (1).



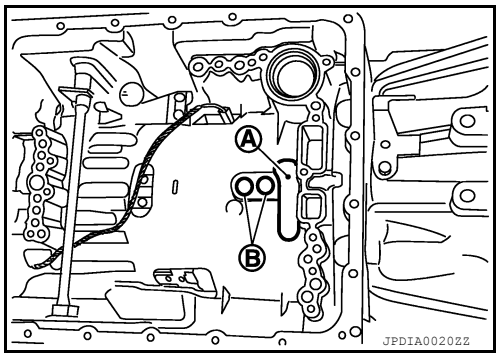
71. Install plug (1) [with bracket (2)] to control valve with TCM and tighten bolt (⬅) to specified torque.
CAUTION:
Adjust bolt hole of bracket to bolt hole of control valve.



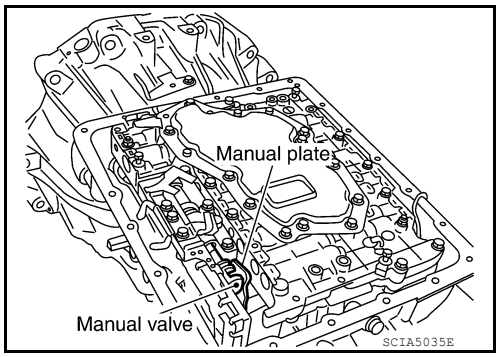
72. Install control valve with TCM to transmission case.
CAUTION:
- **Make sure that input speed sensor securely installs input speed sensor holes (B).**

  A : Brake band

- **Hang down output speed sensor harness toward outside so as not to disturb installation of control valve with TCM.**
- **Adjust A/T assembly harness connector of control valve with TCM to terminal hole of transmission case.**

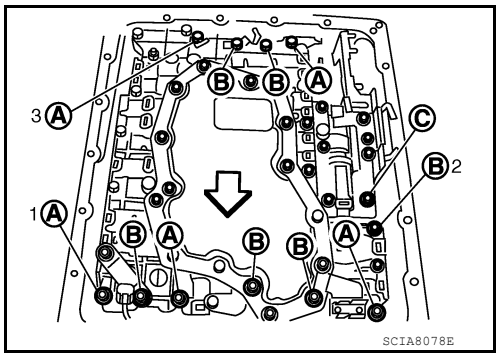


- **Assemble it so that manual valve cutout is engaged with manual plate projection.**



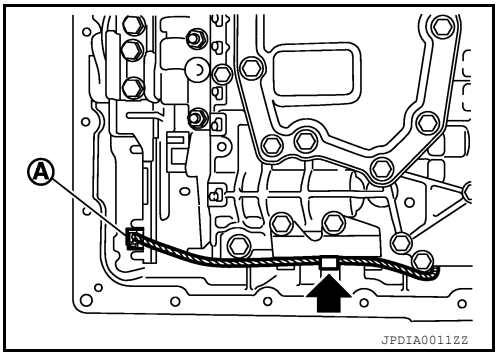
73. Install bolts (A), (B) and (C) in control valve with TCM. Tighten bolt 1, 2 and 3 temporarily to prevent dislocation. After that tighten them in order (1 → 2 → 3), and then tighten other bolts. Tighten control valve with TCM bolts to the specified torque.

⇦ : Front

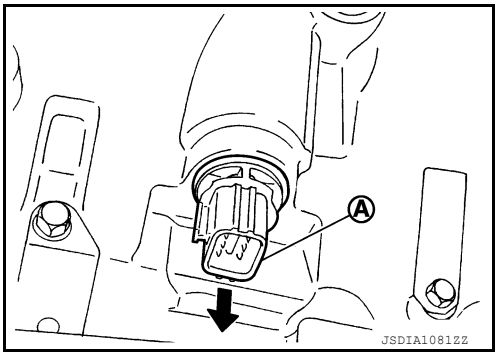


Bolt symbol	A	B	C
Number of bolts	5	6	1
Length mm (in)	42 (1.65)	55 (2.17)	40 (1.57)
Tightening torque N·m (km-g, in-lb)	7.9 (0.81, 70)		With ATF applied
			7.9 (0.81, 70)

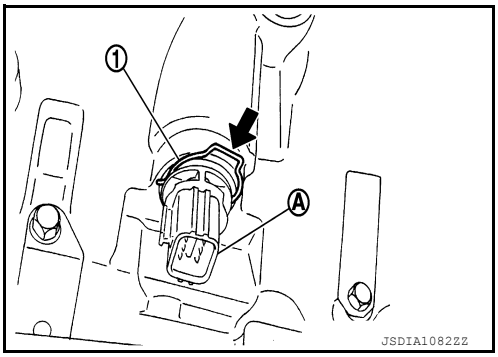
74. Connect output speed sensor connector (A).
75. Engage output speed sensor harness with terminal clip (⬅).



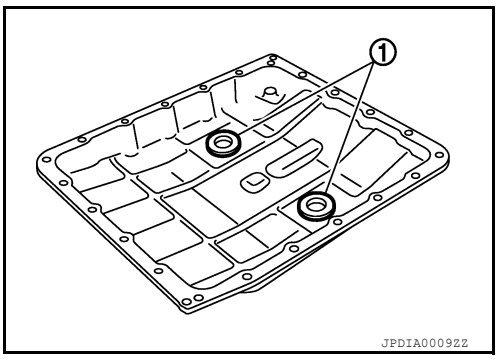
76. Pull down A/T assembly connector (A).
CAUTION:
Be careful not to damage connector.



77. Install snap ring to A/T assembly connector (A).



78. Install magnets (1) to oil pan.



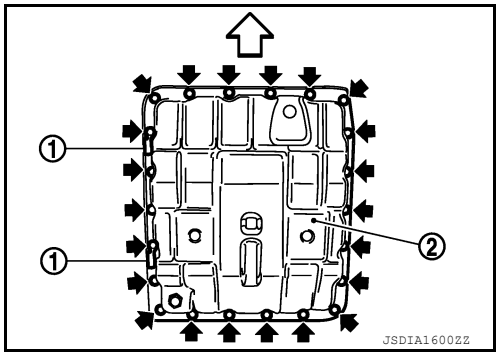
79. Install oil pan gasket to transmission case.
CAUTION:
- **Never reuse oil pan gasket.**
- **Install it in the direction to align hole positions.**
- **Completely remove all moisture, oil and old gasket, etc. from oil pan gasket mounting surface.**

80. Install oil pan (2) and clips (1) to transmission case.

⇦ : Front

⬅ : Oil pan mounting bolt

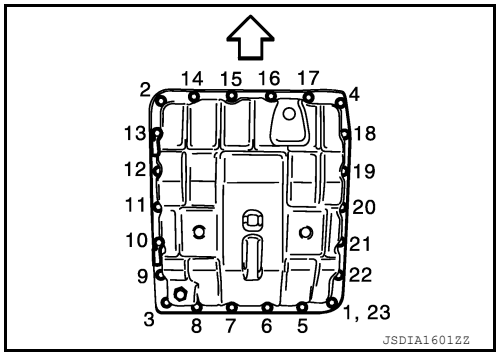
CAUTION:
- **Install it so that drain plug comes to the position as shown in the figure.**
- **Be careful not to pinch harnesses.**
- **Completely remove all moisture, oil and old gasket, etc. from oil pan mounting surface.**



81. Tighten oil pan mounting bolts to the specified torque in numerical order as shown after temporarily tightening them. Tighten oil pan mounting bolts to the specified torque.

⇦ : Front

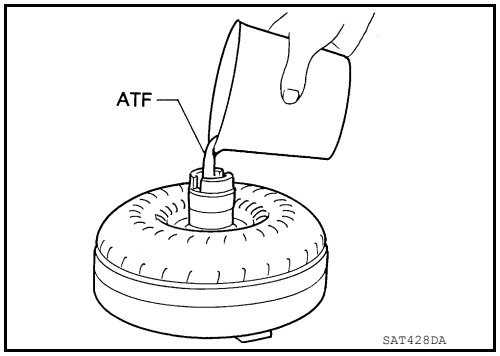
CAUTION:
Never reuse oil pan mounting bolts.



82. Install drain plug to oil pan. Tighten drain plug to the specified torque.

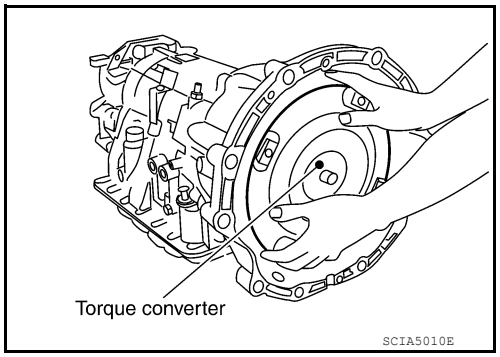
CAUTION:
Never reuse drain plug gasket.

83. Pour ATF into torque converter.
- **Approximately 2 liter (2-1/8 US qt, 1-3/4 Imp qt) of ATF is required for a new torque converter.**
- **When reusing old torque converter, add the same amount of ATF as was drained.**



84. Install torque converter while aligning notches of torque converter with notches of oil pump.

CAUTION:
Install torque converter while rotating it.

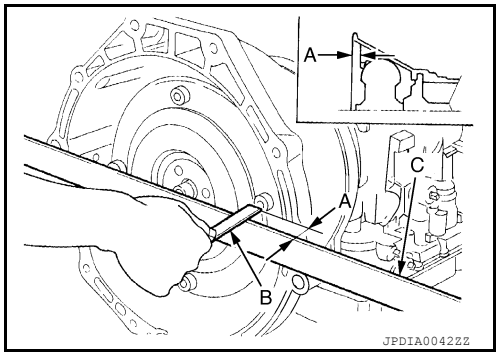


85. Measure dimension (A) to make sure that torque converter is in proper position.

B : Scale

C : Straightedge

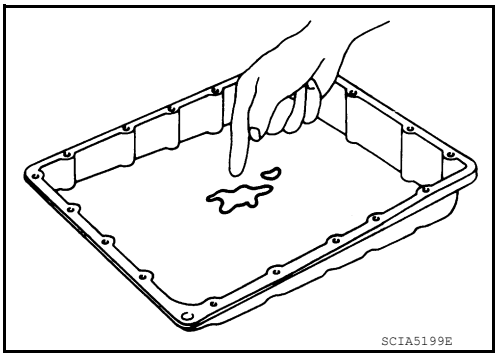
Dimension A **: Refer to TM-258, "Torque Converter".**



Inspection

INFOID:0000000006822338

INSPECTION AFTER REMOVAL

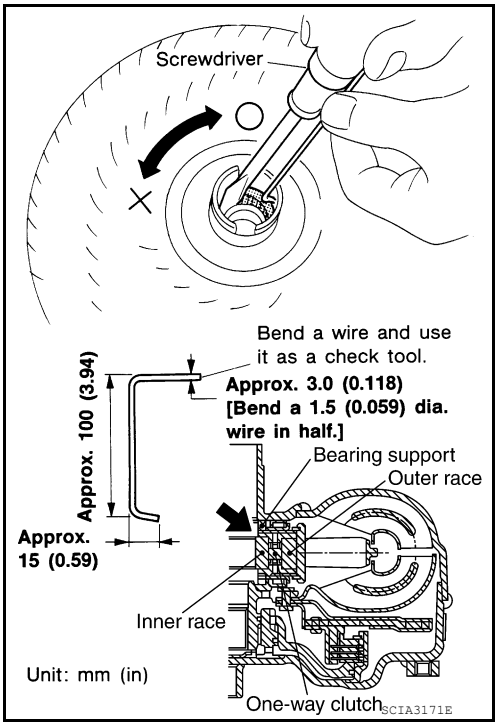


- Check foreign materials in oil pan to help determine causes of malfunction. If the ATF is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, servo, and clutches to stick and can inhibit pump pressure.

- **If frictional material is detected, perform A/T fluid cooler cleaning. Refer to** **TM-70, "A/T Fluid Cooler Cleaning"**.

- Check torque converter one-way clutch using a check tool as shown at figure.

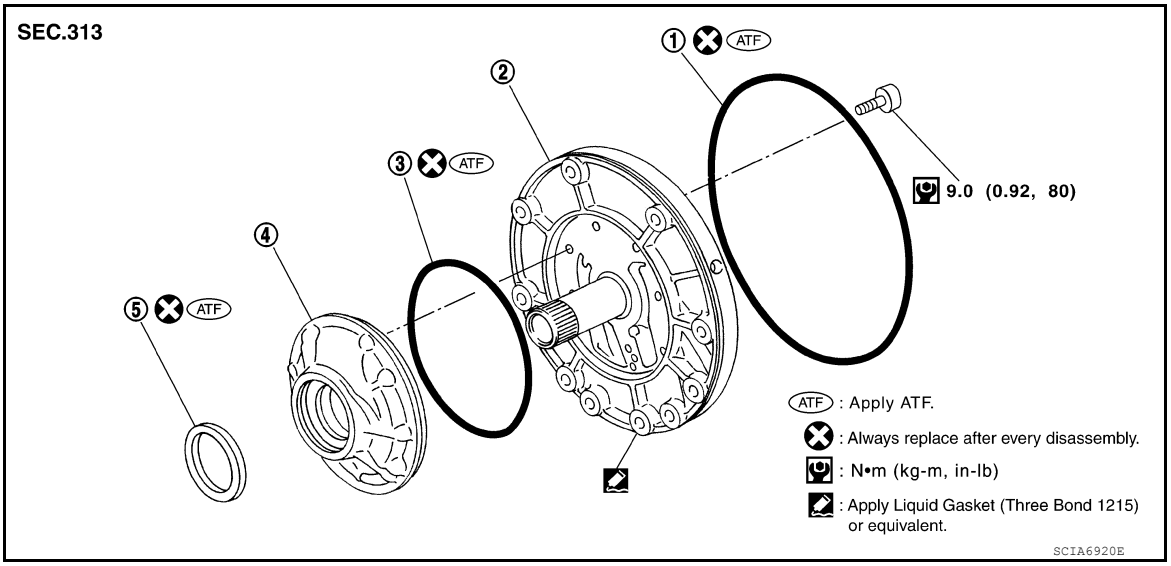
1. Insert a check tool into the groove of bearing support built into one-way clutch outer race.
2. When fixing bearing support with a check tool, rotate one-way clutch spline using a screwdriver.
3. Make sure that inner race rotates clockwise only. If not, replace torque converter assembly.



OIL PUMP

Exploded View

INFOID:0000000006822339

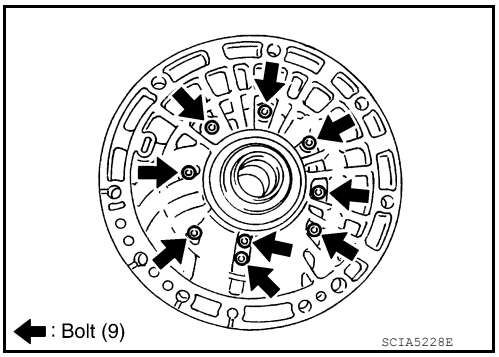


1. O-ring
2. Oil pump cover
3. O-ring
4. Oil pump housing
5. Oil pump housing oil seal

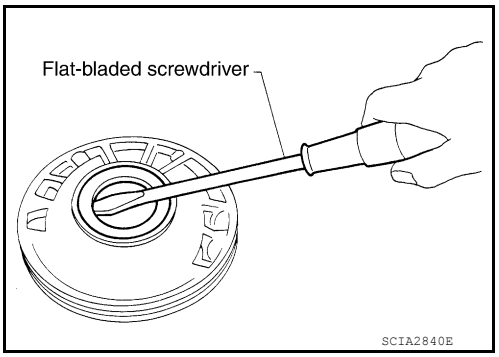
Disassembly

INFOID:0000000006822340

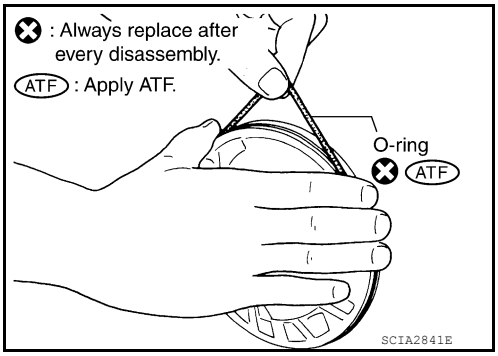
1. Remove oil pump housing from oil pump cover.



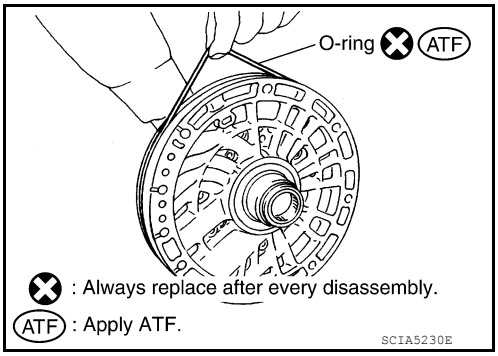
2. Remove oil pump housing oil seal with a flat-bladed screwdriver.
CAUTION:
Be careful not to scratch oil pump housing.



3. Remove O-ring from oil pump housing.
CAUTION:
Do not reuse O-ring.



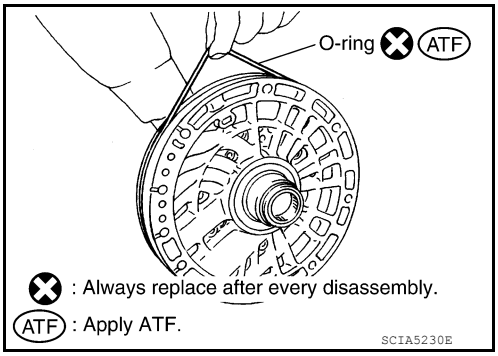
4. Remove O-ring from oil pump cover.
CAUTION:
Do not reuse O-ring.



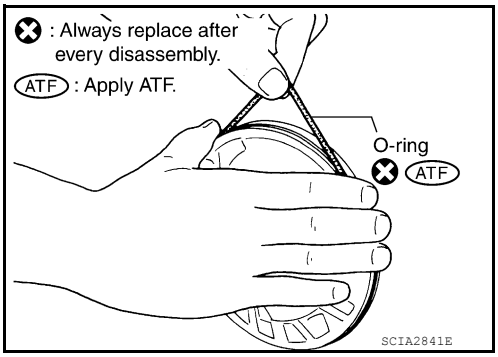
Assembly

INFOID:0000000006822341

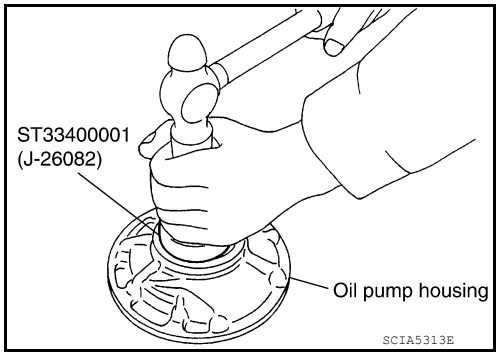
1. Install O-ring to oil pump cover.
CAUTION:
Do not reuse O-ring.



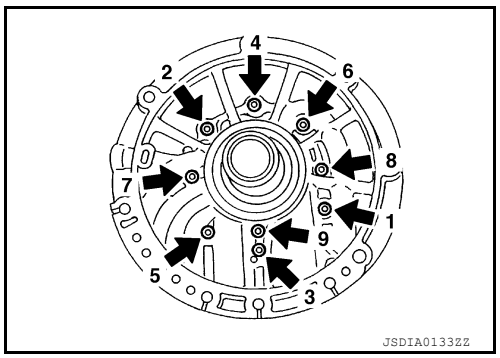
2. Install O-ring to oil pump housing.
CAUTION:
Do not reuse O-ring.



3. Install oil pump housing oil seal to the oil pump housing until it is flush, using the drift.
CAUTION:
- **Never reuse oil seal.**
- **Apply ATF to oil seal.**



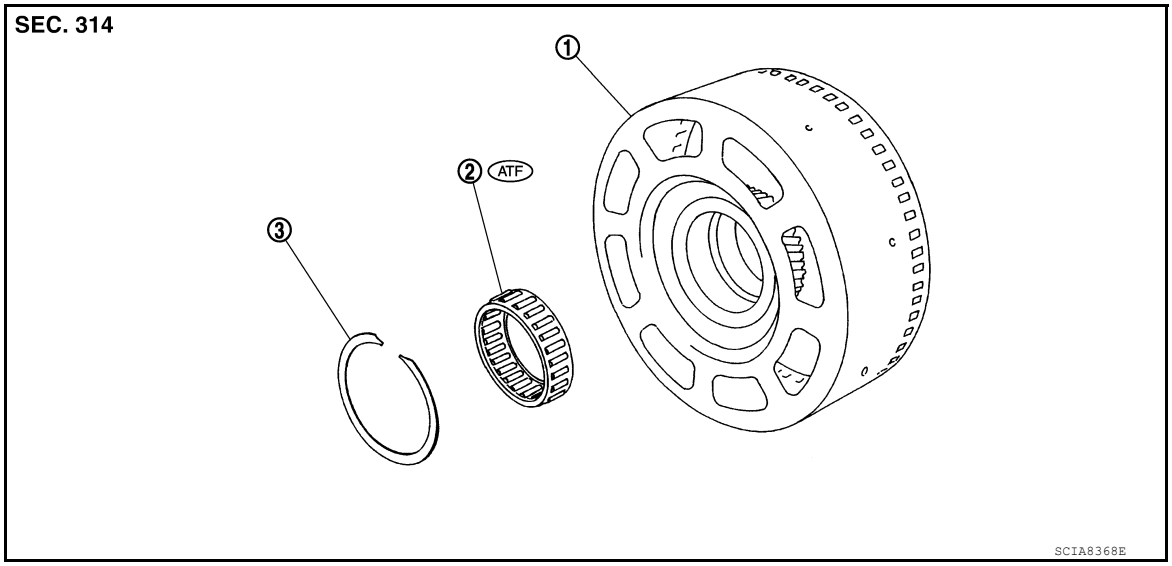
4. Install oil pump housing to oil pump cover.
5. Tighten bolts (⬅) to the specified torque in numerical order shown in the figure after temporarily tightening them.



FRONT SUN GEAR, 3RD ONE-WAY CLUTCH

Exploded View

INFOID:0000000006822342



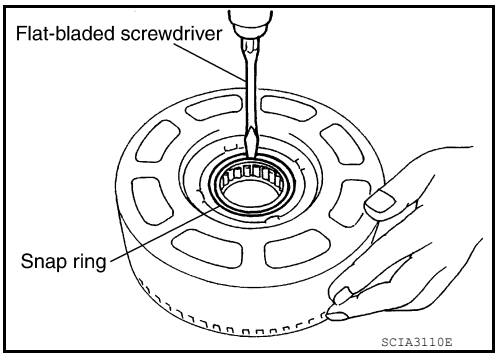
1. Front sun gear
2. 3rd one-way clutch
3. Snap ring

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

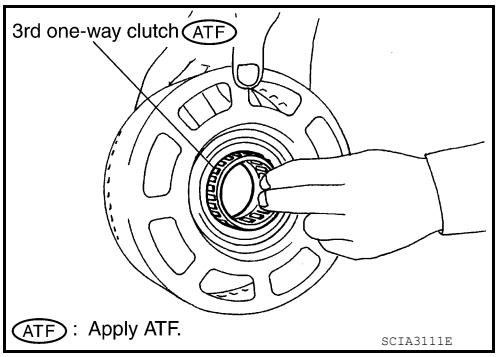
Disassembly

INFOID:0000000006822343

1. Remove snap ring from front sun gear with a flat-bladed screwdriver.



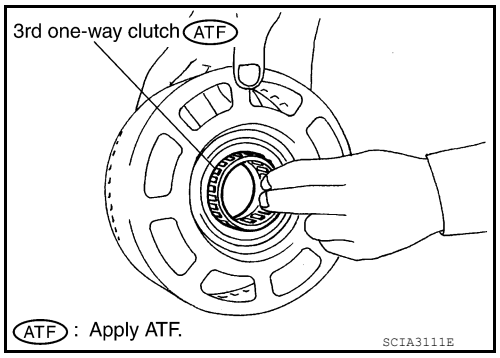
2. Remove 3rd one-way clutch from front sun gear.



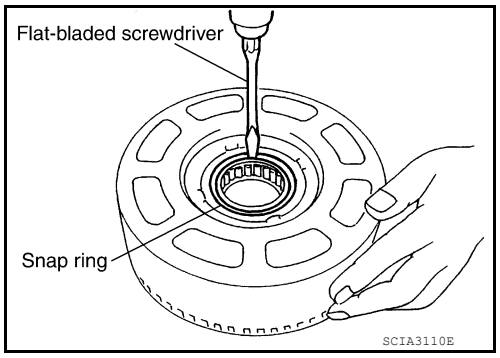
Assembly

INFOID:0000000006822344

1. Install 3rd one-way clutch to front sun gear.



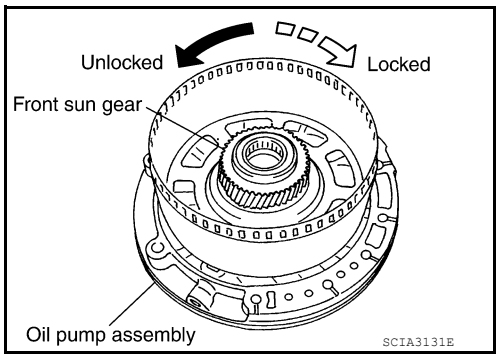
2. Install snap ring to front sun gear with a flat-bladed screwdriver.



3. Check operation of 3rd one-way clutch.

a. Hold oil pump assembly and turn front sun gear.

b. Check 3rd one-way clutch for correct locking and unlocking directions.
CAUTION:
If not as shown in figure, check installation direction of 3rd one-way clutch.



Inspection

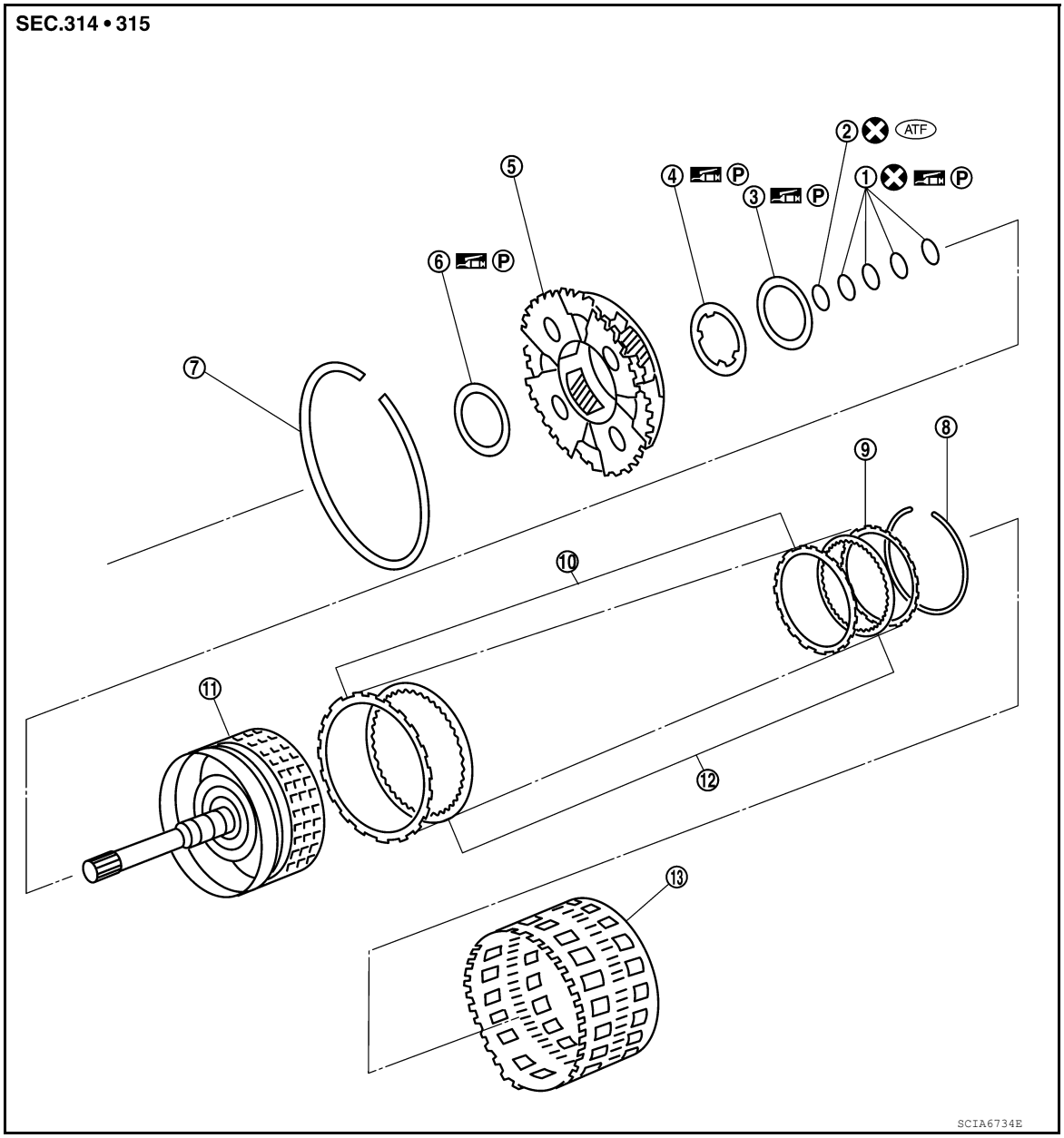
INFOID:0000000006822345

- 3rd One-way Clutch
  Check frictional surface for wear or damage.
  CAUTION:
  If necessary, replace the 3rd one-way clutch.
- Front Sun Gear Snap Ring
  Check for deformation, fatigue or damage.
  CAUTION:
  If necessary, replace the snap ring.
- Front Sun Gear
  Check for deformation, fatigue or damage.
  CAUTION:
  If necessary, replace the front sun gear.

FRONT CARRIER, INPUT CLUTCH, REAR INTERNAL GEAR

Exploded View

INFOID:0000000006822346



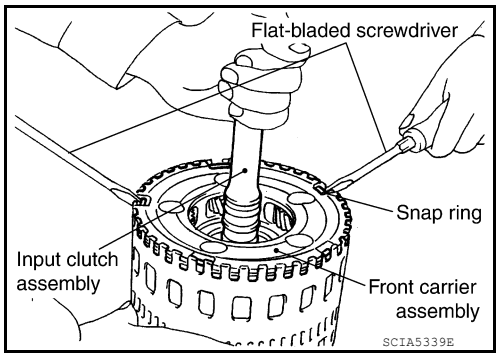
1. Seal rings
2. O-ring
3. Needle bearing
4. Bearing race
5. Front carrier assembly
6. Needle bearing
7. Snap ring
8. Snap ring
9. Retaining plate
10. Driven plate
11. Input clutch drum
12. Drive plate
13. Rear internal gear

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

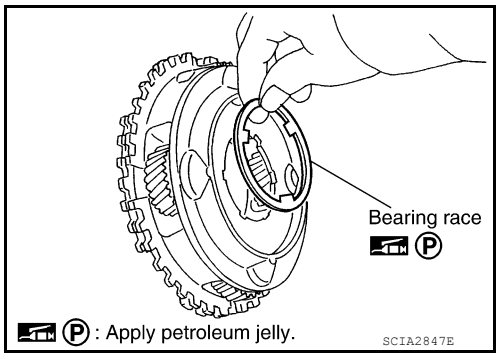
Disassembly

INFOID:0000000006822347

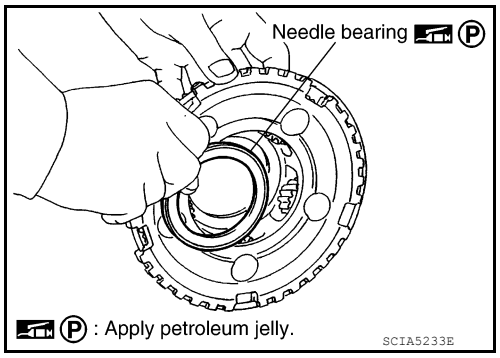
1. Compress snap ring with two flat-bladed screwdrivers.
2. Remove front carrier assembly and input clutch assembly from rear internal gear.
3. Remove front carrier assembly from input clutch assembly.



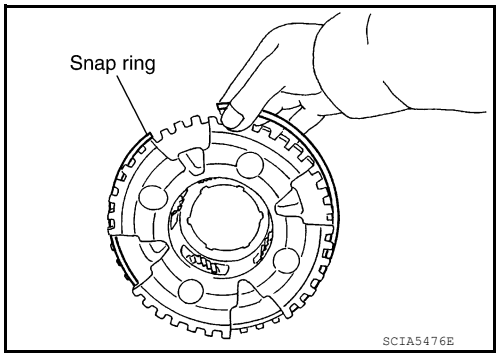
4. Remove bearing race from front carrier assembly.



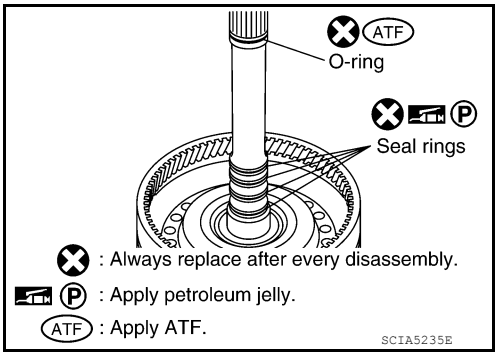
5. Remove needle bearing from front carrier assembly.



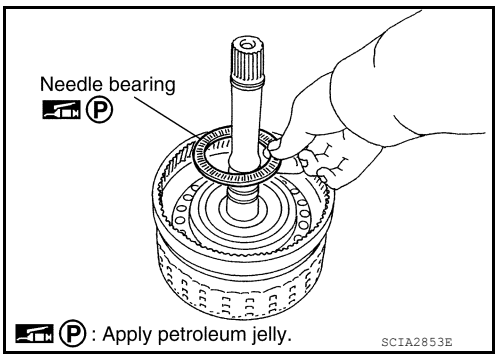
6. Remove snap ring from front carrier assembly.
CAUTION:
Never expand snap ring excessively.



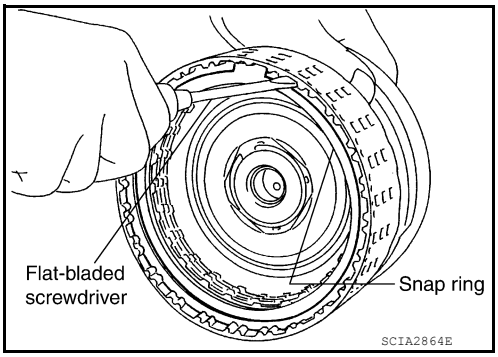
7. Remove O-ring and seal rings from input clutch assembly.
CAUTION:
Do not reuse O-ring or seal rings.



8. Remove needle bearing from input clutch assembly.



9. Remove snap ring from input clutch drum with a flat-bladed screwdriver.
10. Remove drive plates, driven plates, dish plate and retaining plate from input clutch drum.



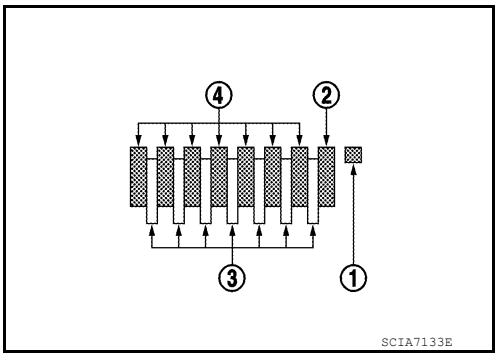
Assembly

INFOID:0000000006822348

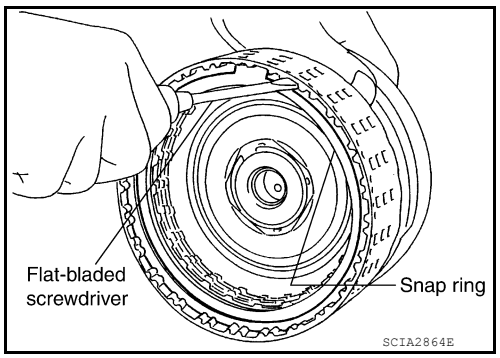
1. Install drive plates, driven plates, retaining plate and snap ring to input clutch drum.

1	: Snap ring
2	: Retaining plate
3	: Drive plate
4	: Driven plate
7 /7	: Drive plate / Driven plate

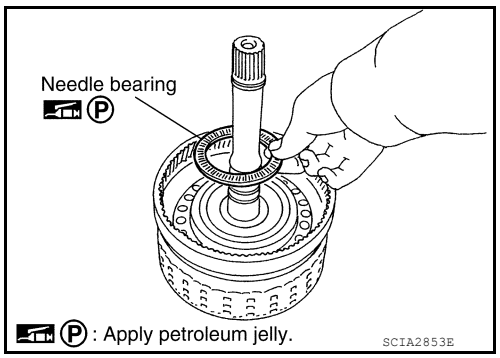
CAUTION:
Check order of plates.



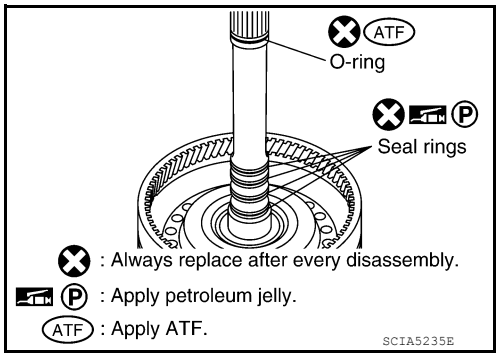
2. Install snap ring to input clutch drum with a flat-bladed screwdriver.



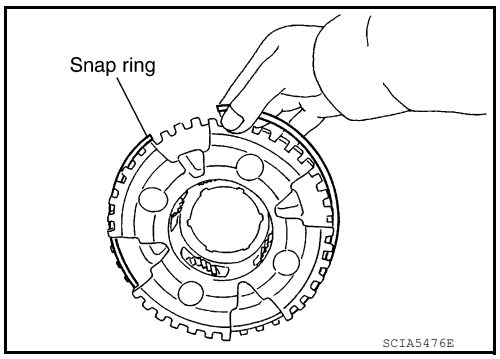
3. Install needle bearing to input clutch assembly.
CAUTION:
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



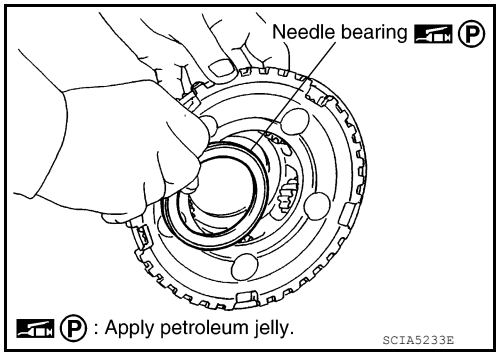
4. Install O-ring and seal rings to input clutch assembly.
CAUTION:
Do not reuse O-ring or seal rings.



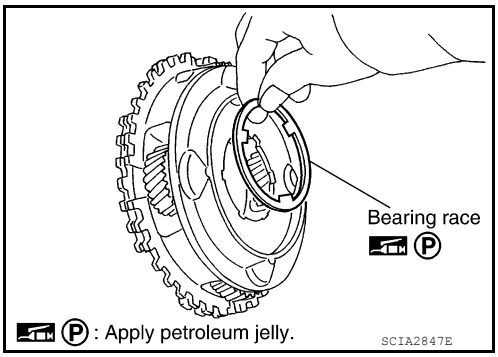
5. Install snap ring to front carrier assembly.
CAUTION:
Never expand snap ring excessively.



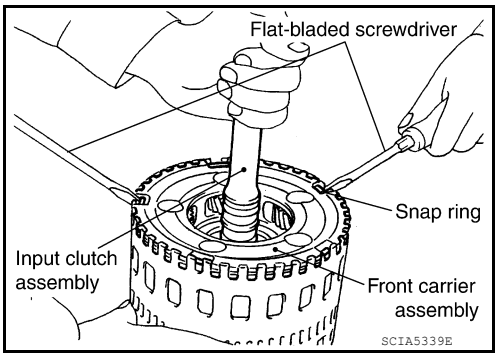
6. Install needle bearing to front carrier assembly.
CAUTION:
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



7. Install bearing race to front carrier assembly.
8. Install front carrier assembly to input clutch assembly.



9. Compress snap ring with two flat-bladed screwdrivers.
10. Install front carrier assembly and input clutch assembly to rear internal gear.



Inspection

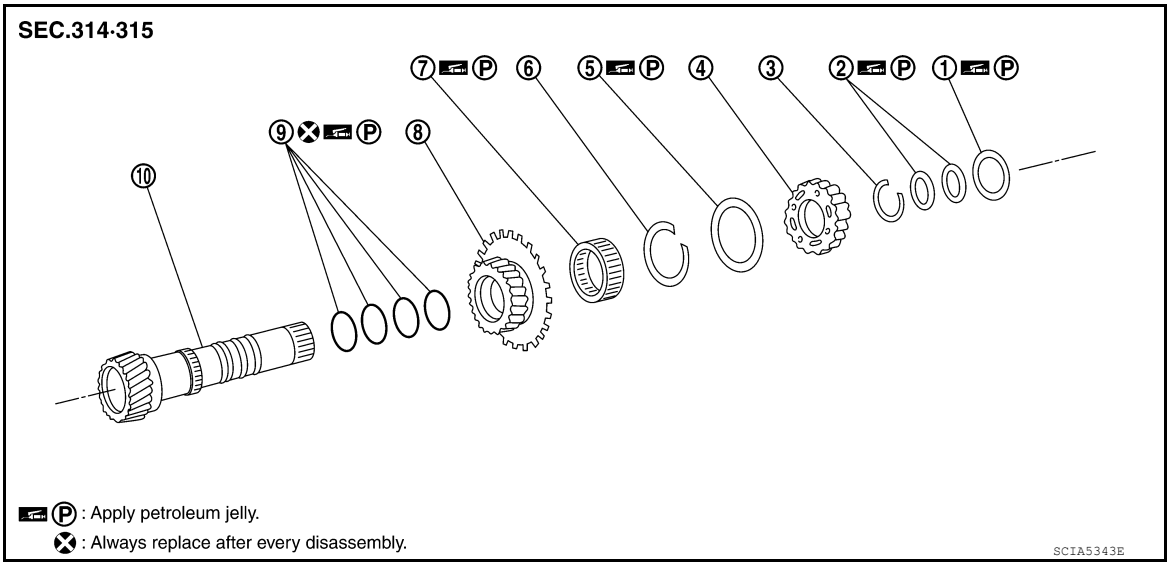
INFOID:0000000006822349

- Front Carrier Snap Ring
  Check for deformation, fatigue or damage.
  CAUTION:
  If necessary, replace the snap ring.
- Input Clutch Snap Ring
  Check for deformation, fatigue or damage.
  CAUTION:
  If necessary, replace the input clutch assembly.
- Input Clutch Drum
  Check for deformation, fatigue or damage or burns.
  CAUTION:
  If necessary, replace the input clutch assembly.
- Input Clutch Drive Plates and Driven Plates
  Check facing for burns, cracks or damage.
  CAUTION:
  If necessary, replace the input clutch assembly.
- Input Clutch Retaining Plate and Dish Plate
  Check facing for burns, cracks or damage.
  CAUTION:
  If necessary, replace the input clutch assembly.
- Front Carrier
  Check for deformation, fatigue or damage.
  CAUTION:
  If necessary, replace the front carrier assembly.
- Rear Internal Gear
  Check for deformation, fatigue or damage.
  CAUTION:
  If necessary, replace the rear internal gear.

MID SUN GEAR, REAR SUN GEAR, HIGH AND LOW REVERSE CLUTCH HUB

Exploded View

INFOID:0000000006822350

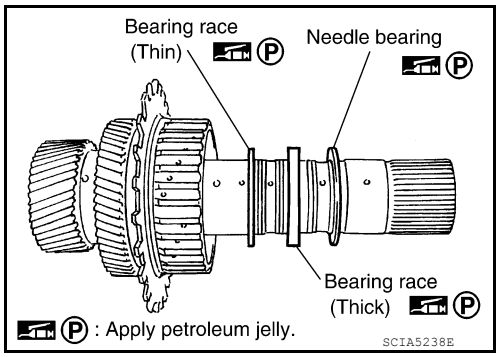


1. Needle bearing
2. Bearing races
3. Snap ring
4. High and low reverse clutch hub
5. Needle bearing
6. Snap ring
7. 1st one-way clutch
8. Rear sun gear
9. Seal rings
10. Mid sun gear

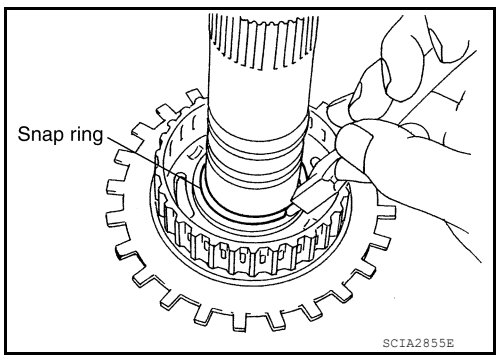
Disassembly

INFOID:0000000006822351

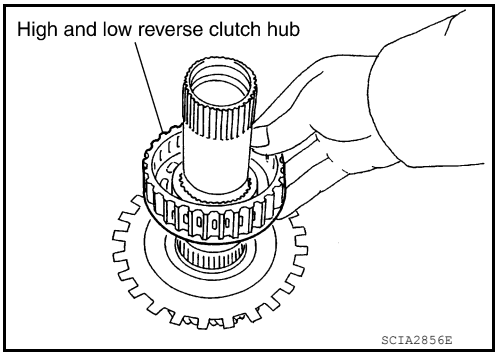
1. Remove needle bearing and bearing race from high and low reverse clutch hub.



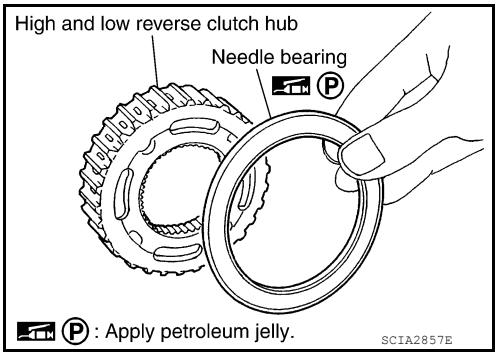
2. Remove snap ring from mid sun gear assembly with pair of snap ring pliers.
CAUTION:
Never expand snap ring excessively.



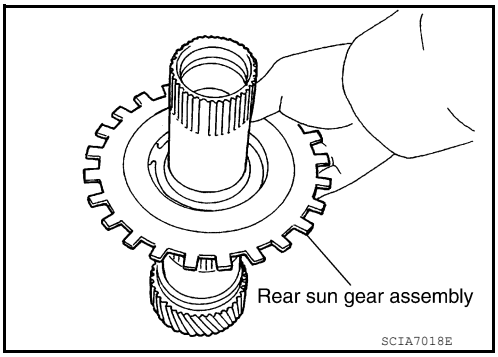
3. Remove high and low reverse clutch hub from mid sun gear assembly.



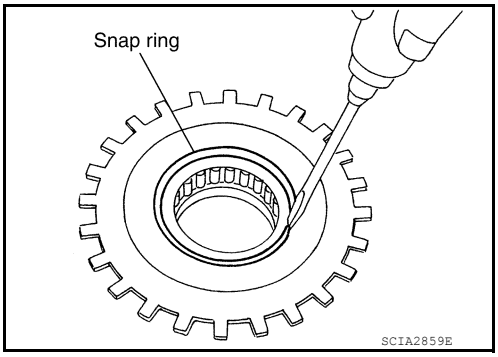
4. Remove needle bearing from high and low reverse clutch hub.



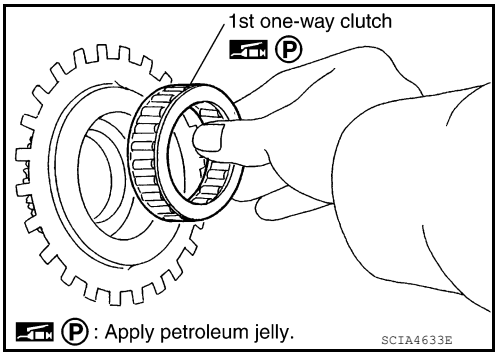
5. Remove rear sun gear assembly from mid sun gear assembly.



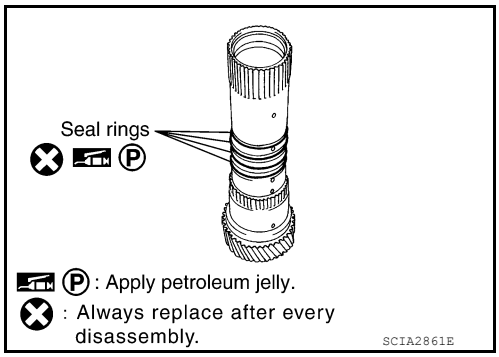
6. Remove snap ring from rear sun gear with a flat-bladed screwdriver.



7. Remove 1st one-way clutch from rear sun gear.



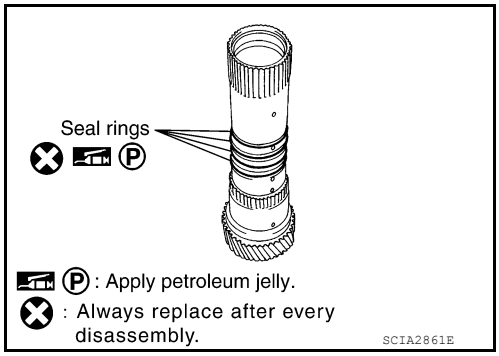
8. Remove seal rings from mid sun gear.
CAUTION:
Do not reuse seal rings.



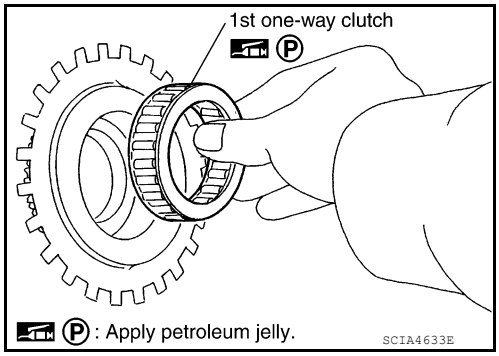
Assembly

INFOID:0000000006822352

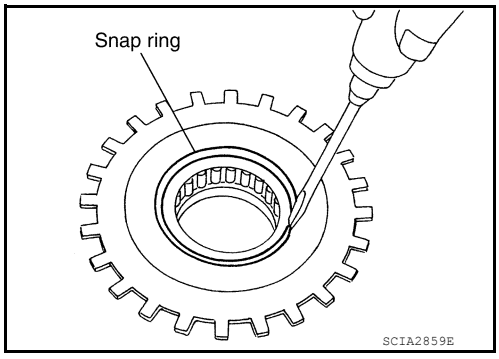
1. Install seal rings to mid sun gear.
CAUTION:
Do not reuse seal rings.



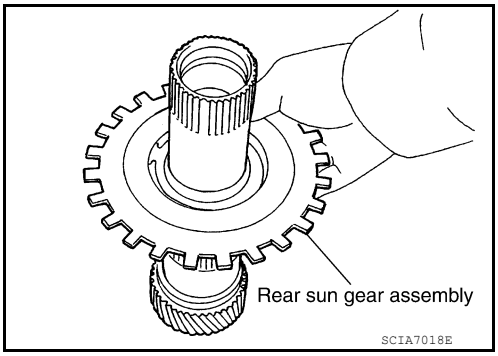
2. Install 1st one-way clutch to rear sun gear.



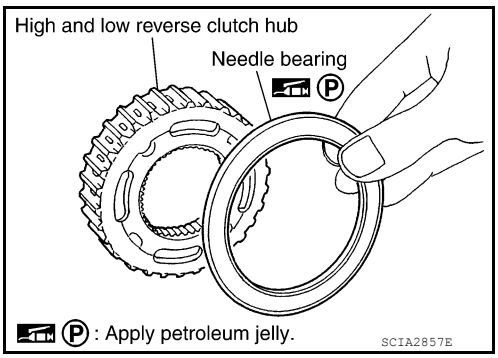
3. Install snap ring to rear sun gear with a flat-bladed screwdriver.



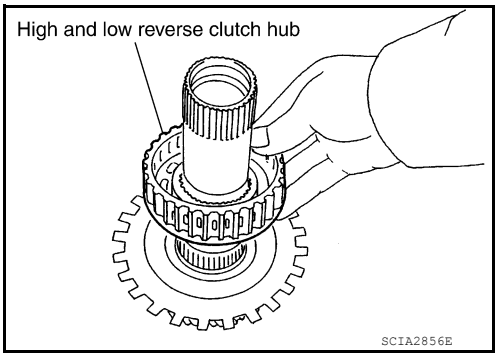
4. Install rear sun gear assembly to mid sun gear assembly.



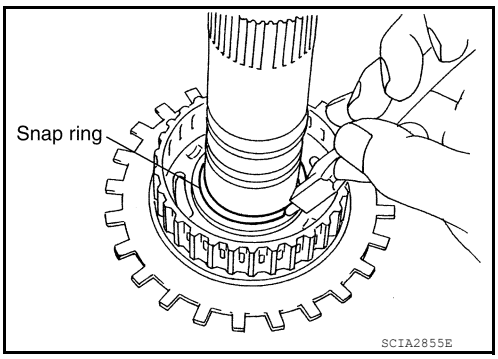
5. Install needle bearing to high and low reverse clutch hub.
CAUTION:
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



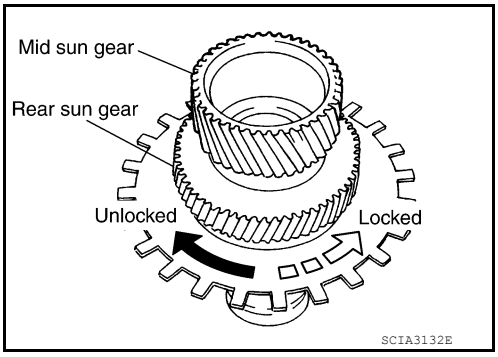
6. Install high and low reverse clutch hub to mid sun gear assembly.



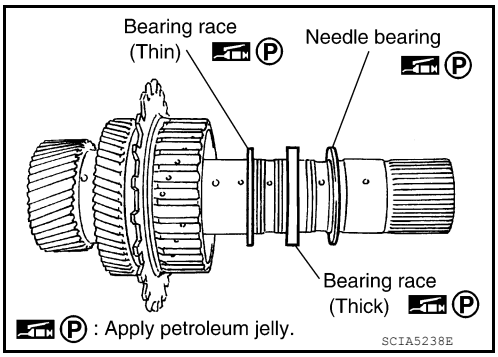
7. Install snap ring to mid sun gear assembly with pair of snap ring pliers.
CAUTION:
Never expand snap ring excessively.



8. Check operation of 1st one-way clutch.
a. Hold mid sun gear and turn rear sun gear.
b. Check 1st one-way clutch for correct locking and unlocking directions.
CAUTION:
If not as shown in the figure, check installation direction of 1st one-way clutch.



9. Install needle bearing and bearing race to high and low reverse clutch hub.
CAUTION:
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



Inspection

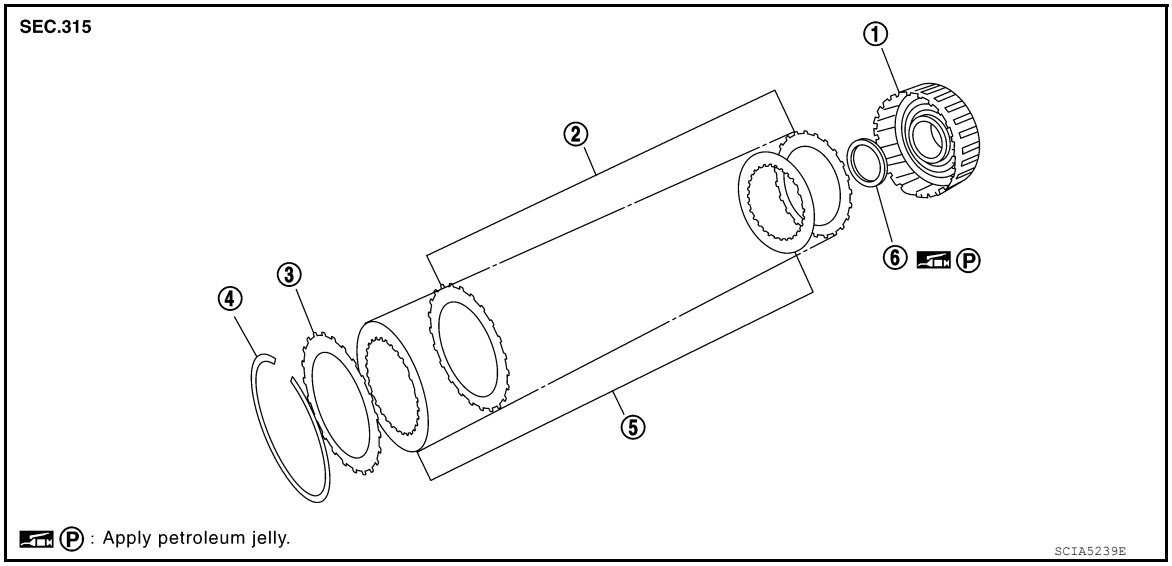
INFOID:0000000006822353

- High and Low Reverse Clutch Hub Snap Ring, Rear Sun Gear Snap Ring
  Check for deformation, fatigue or damage.
  CAUTION:
  If necessary, replace the snap ring.
- 1st One-way Clutch
  Check frictional surface for wear or damage.
  CAUTION:
  If necessary, replace the 1st one-way clutch.
- Mid Sun Gear
  Check for deformation, fatigue or damage.
  CAUTION:
  If necessary, replace the mid sun gear.
- Rear Sun Gear
  Check for deformation, fatigue or damage.
  CAUTION:
  If necessary, replace the rear sun gear.
- High and Low Reverse Clutch Hub
  Check for deformation, fatigue or damage.
  CAUTION:
  If necessary, replace the high and low reverse clutch hub.

HIGH AND LOW REVERSE CLUTCH

Exploded View

INFOID:0000000006822354

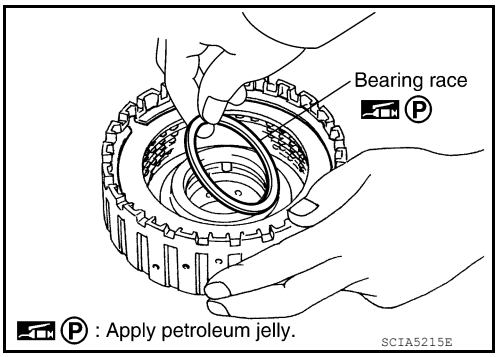


1. High and low reverse clutch drum
2. Driven plate
3. Retaining plate
4. Snap ring
5. Drive plate
6. Bearing race

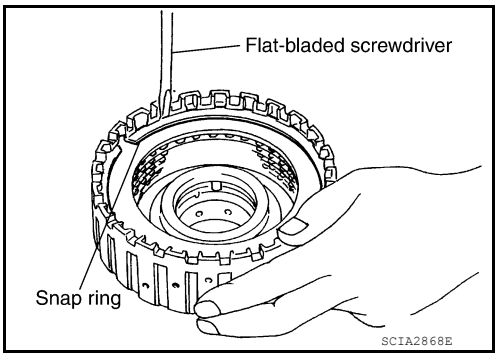
Disassembly

INFOID:0000000006822355

1. Remove bearing race from high and low reverse clutch drum.



2. Remove snap ring from high and low reverse clutch drum with a flat-bladed screwdriver.
3. Remove drive plates, driven plates and retaining plate from high and low reverse clutch drum.



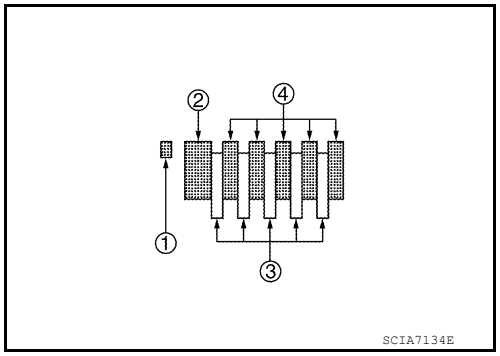
Assembly

INFOID:0000000006822356

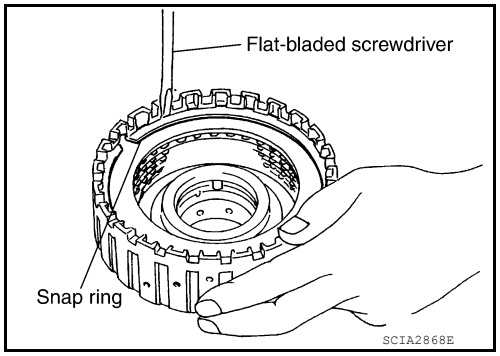
1. Install drive plates, driven plates, retaining plate and snap ring to high and low reverse clutch drum.
CAUTION:

Check the order of plates.

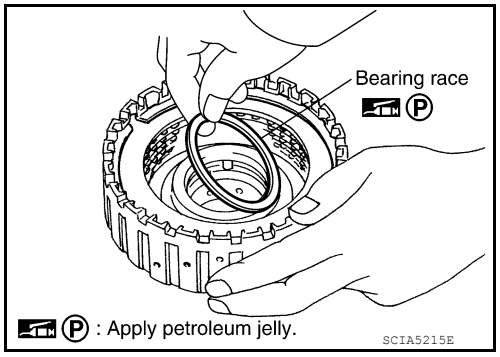
1	: Snap ring
2	: Retaining plate
3	: Drive plate
4	: Driven plate
5/5	: Drive plate / Driven plate



2. Install snap ring to high and low reverse clutch drum with a flat-bladed screwdriver.



3. Install bearing race to high and low reverse clutch drum.
CAUTION:
Check the direction of needle bearing. Refer to TM-199, "Location of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings".



Inspection

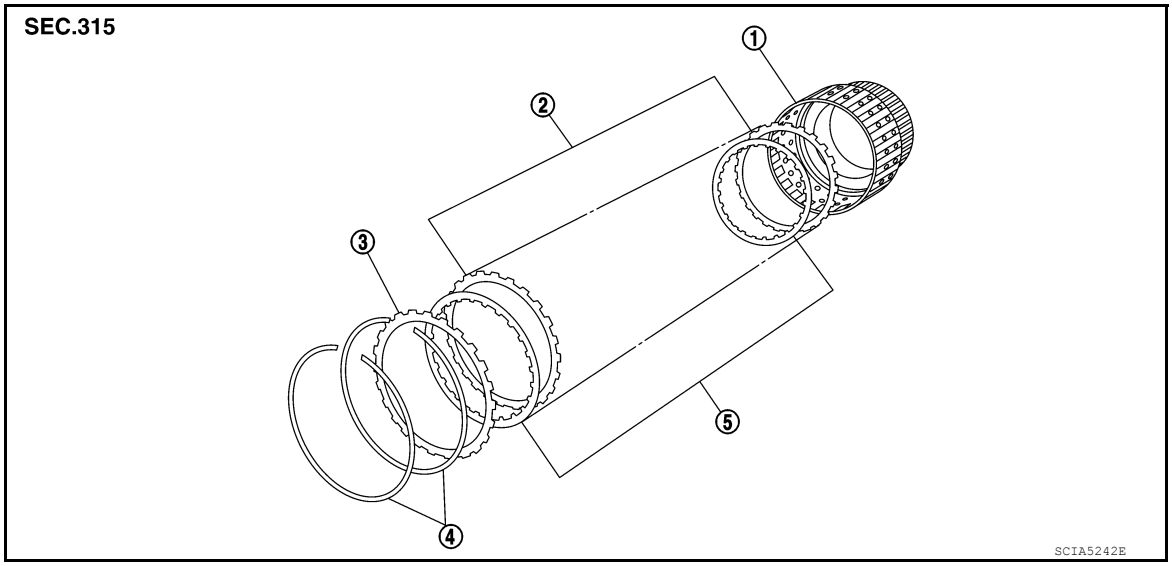
INFOID:0000000006822357

Check the following, and replace transmission assembly if necessary.
- High and Low Reverse Clutch Snap Ring
  Check for deformation, fatigue or damage.
- High and Low Reverse Clutch Drive Plates
  Check facing for burns, cracks or damage.
- High and Low Reverse Clutch Retaining Plate and Driven Plates
  Check facing for burns, cracks or damage.

DIRECT CLUTCH

Exploded View

INFOID:0000000006822358

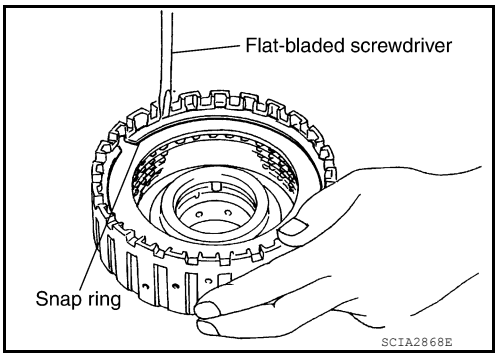


1. Direct clutch drum
2. Driven plate
3. Retaining plate
4. Snap rings
5. Drive plate

Disassembly

INFOID:0000000006822359

1. Remove snap ring from direct clutch drum with a flat-bladed screwdriver.
2. Remove drive plates, driven plates, dish plate and retaining plates from direct clutch drum.

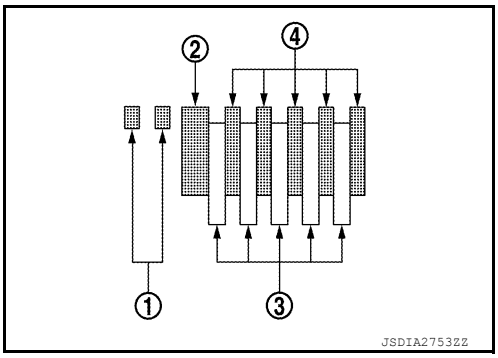


Assembly

INFOID:0000000006822360

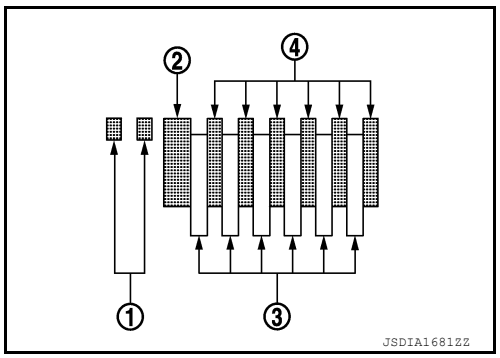
1. Install drive plates, driven plates, retaining plate and snap rings to direct clutch drum.
   CAUTION:
   Check the order of plates.
   • VQ40DE models

1	: Snap ring
2	: Retaining plate
3	: Drive plate
4	: Driven plate
5 / 5	: Drive plate / Driven plate

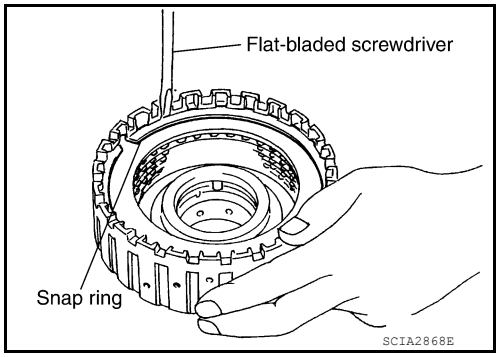


• VK56DE models

1	: Snap ring
2	: Retaining plate
3	: Drive plate
4	: Driven plate
6 / 6	: Drive plate / Driven plate



2. Install snap ring to direct clutch drum with a flat-bladed screwdriver.



Inspection

INFOID:0000000006822361

Check the following, and replace direct clutch assembly if necessary.

- Direct Clutch Snap Ring
  Check for deformation, fatigue or damage.
- Direct Clutch Drive Plates and Driven Plates
  Check facing for burns, cracks or damage.
- Direct Clutch Dish Plate and Retaining Plates
  Check facing for burns, cracks or damage.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specification

INFOID:0000000006750143

Applied model		VQ40DE	VK56DE
Automatic transmission model		RE5R05A	
Transmission model code number		94X7E, 3HX5A	94X7D, 3HX4E
Stall torque ratio		2.0 : 1	
Transmission gear ratio	1st	3.827	
	2nd	2.368	
	3rd	1.519	
	4th	1.000	
	5th	0.834	
	Reverse	2.613	
Recommended fluid		Genuine NISSAN Matic S ATF*1	
Fluid capacity		10.6 liter (11-1/4 US qt, 9-3/8 Imp qt)*2	

CAUTION:

- **If Genuine NISSAN Matic S ATF is not available, Genuine NISSAN Matic J ATF may also be used. Using ATF other than Genuine NISSAN Matic S ATF or Matic J ATF will cause deterioration driveability and A/T durability, and may damage the A/T, which is not covered by the NISSAN new vehicle limited warranty.**

*1: Refer to MA-13, "Fluids and Lubricants".

*2: The fluid capacity is the reference value. Check the fluid level with A/T fluid level gauge.

Vehicle Speed at Which Gear Shifting Occurs

INFOID:0000000006750144

VQ40DE MODELS

Throttle position	Vehicle speed km/h (MPH)							
	$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_5$	$D_5 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$
Full throttle	62 – 66 (36 – 41)	96 – 104 (60 – 65)	149 – 159 (93 – 99)	213 – 223 (132 – 139)	209 – 219 (130 – 136)	131 – 141 (81 – 88)	81 – 89 (50 – 55)	39 – 43 (24 – 27)
Half throttle	49 – 53 (30 – 33)	76 – 82 (47 – 51)	115 – 123 (71 – 76)	144 – 152 (89 – 94)	95 – 103 (59 – 64)	67 – 75 (41 – 46)	32 – 38 (20 – 24)	11 – 15 (7 – 9)

- At half throttle, the accelerator opening is 1/2 of the full opening.

VK56DE MODELS

Throttle position	Vehicle speed km/h (MPH)							
	$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_5$	$D_5 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$
Full throttle	54 – 58 (34 – 36)	86 – 94 (53 – 58)	136 – 146 (85 – 91)	193 – 203 (120 – 126)	190 – 200 (118 – 124)	127 – 137 (79 – 85)	74 – 82 (46 – 51)	35 – 39 (22 – 24)
Half throttle	41 – 45 (25 – 28)	64 – 70 (40 – 43)	96 – 104 (60 – 65)	134 – 142 (83 – 88)	86 – 94 (53 – 58)	58 – 66 (36 – 41)	44 – 50 (27 – 31)	11 – 15 (7 – 9)

- At half throttle, the accelerator opening is 1/2 of the full opening.

Vehicle Speed at Which Lock-up Occurs/Releases

INFOID:0000000006750145

VQ40DE MODELS

Throttle position	Vehicle speed km/h (MPH)	
	Lock-up ON	Lock-up OFF
Closed throttle	50 – 58 (31 – 36)	39 – 47 (24 – 29)
Half throttle	138 – 146 (86 – 91)	106 – 114 (66 – 71)

- Vehicle speed with D5 position.
- At closed throttle, the accelerator opening is less than 1/8 condition. (Closed throttle position signal OFF)
- At half throttle, the accelerator opening is 1/2 of the full opening.

VK56DE MODELS

Throttle position	Vehicle speed km/h (MPH)	
	Lock-up ON	Lock-up OFF
Closed throttle	47 – 55 (29 – 34)	37– 45 (23 – 28)
Half throttle	134 – 142 (83 – 88)	96 – 104 (59 – 65)

- Vehicle speed with D5 position.
- At closed throttle, the accelerator opening is less than 1/8 condition. (Closed throttle position signal OFF)
- At half throttle, the accelerator opening is 1/2 of the full opening.

Stall Speed

INFOID:0000000006750146

Engine model	VQ40DE	VK56DE
Stall speed	2,600 – 2,900 rpm	2,550 – 2,850 rpm

Line Pressure

INFOID:0000000006750147

Engine speed	Line pressure kPa (kg/cm^2, psi)	
	"R" position	"D" position
At idle speed	425 – 465 (4.3 – 4.7, 62 – 67)	379 – 428 (3.9 – 4.4, 55 – 62)
At stall speed	1,605 – 1,950 (16.4 – 19.9, 233 – 283)	1,310 – 1,500 (13.4 – 15.3, 190 – 218)

Input Speed Sensor

INFOID:0000000006750148

Name	Condition	Data (Approx.)
Input speed sensor 1	When running at 50 km/h (31 MPH) in 4th speed witch the closed throttle position signal OFF.	1.3 kHz
Input speed sensor 2	When running at 20 km/h (12 MPH) in 1st speed witch the closed throttle position signal OFF.	

Output Speed Sensor

INFOID:0000000006750149

Name	Condition	Data (Approx.)
Output speed sensor	When running at 20 km/h (12 MPH).	185 Hz

Reverse Brake

INFOID:0000000006750150

Applied model		VQ40DE	VK56DE
Number of drive plates		6	7
Number of driven plates		6	7
Clearance mm (in)	Standard	0.7 – 1.1 (0.028 – 0.043)	

	Thickness mm (in)
Thickness of retaining plates	4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213)

Total End Play

INFOID:0000000006750151

Total end play mm (in)	0.25 – 0.55 (0.0098 – 0.0217)

BEARING RACE FOR ADJUSTING TOTAL END PLAY

Thickness mm (in)
0.8 (0.031)
1.0 (0.039)
1.2 (0.047)
1.4 (0.055)
1.6 (0.063)
1.8 (0.071)

Torque Converter

INFOID:0000000006750152

Engine model	VQ40DE	VK56DE
Distance between end of converter housing and torque converter mm (in)	25.0 (0.98) or more	24.0 (0.94) or more