SECTION TF

CONTENTS

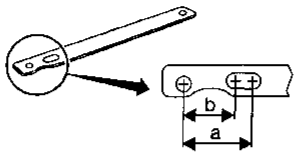
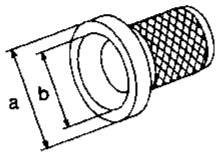
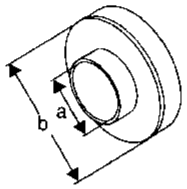
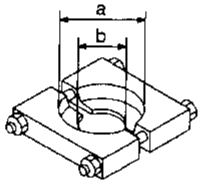
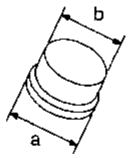
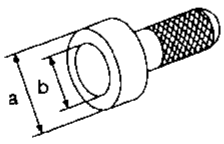
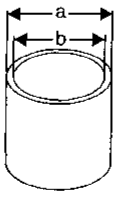
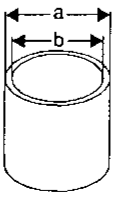
CONTENTS (Cont'd)

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

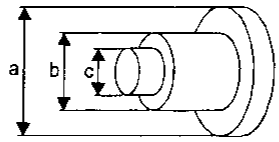
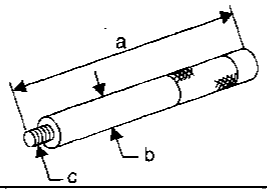
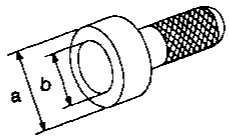
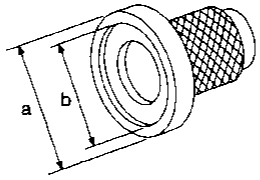
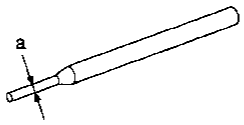
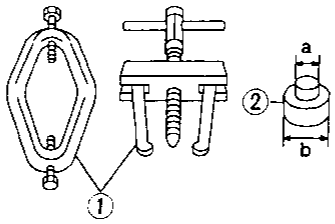
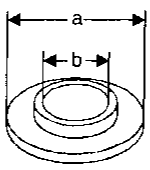
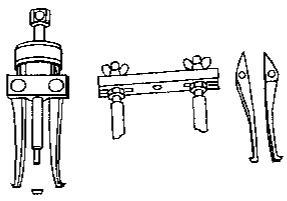
When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

Special Service Tools

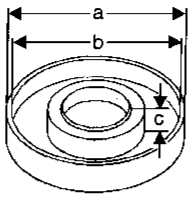
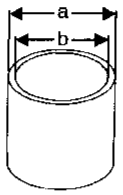
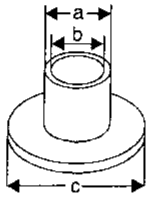
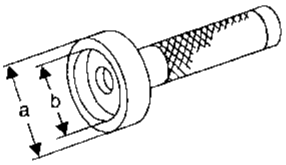
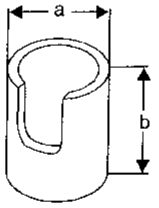
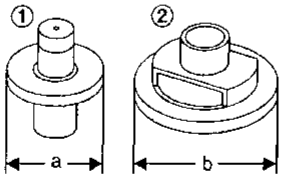
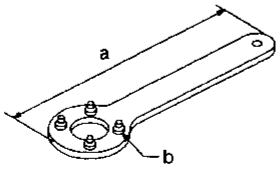
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV40104000 (—) Hub lock nut wrench	 NT659	Removing companion flange **a: 85 mm (3.35 in)** **b: 65 mm (2.56 in)**
KV40100621 (J26091) Drift	 NT086	Installing front drive shaft bearing **a: 76 mm (2.99 in) dia.** **b: 69 mm (2.72 in) dia.**
ST30032000 (—) Base	 NT660	Installing front drive shaft bearing **a: 38 mm (1.50 in) dia.** **b: 80 mm (3.15 in) dia.**
ST30031000 (J22912-01) Puller	 NT411	Removing front drive shaft bearing **a: 110 mm (4.33 in) dia.** **b: 68 mm (2.68 in) dia.**
ST33052000 (—) Adapter	 NT431	Removing front drive shaft bearing **a: 28 mm (1.10 in) dia.** **b: 22 mm (0.87 in) dia.**
ST35271000 (J26091) Drift	 NT115	Installing rear oil seal Removing and installing press flange snap ring **a: 72 mm (2.83 in) dia.** **b: 63 mm (2.48 in) dia.**
ST27863000 (—) Support ring	 NT661	Removing and installing press flange snap ring **a: 74.5 mm (2.933 in) dia.** **b: 62.5 mm (2.461 in) dia.**
KV40104710 (—) Support ring	 NT661	Removing and installing press flange snap ring **a: 76.3 mm (3.004 in) dia.** **b: 67.9 mm (2.673 in) dia.**

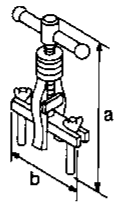
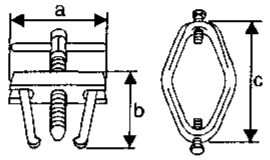
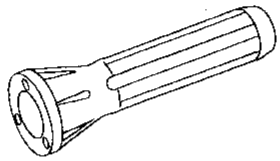
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST35291000 (—) Remover	 NT662	Removing mainshaft rear bearing **a: 40 mm (1.57 in) dia.** **b: 29.5 mm (1.161 in) dia.** **c: 22.5 mm (0.886 in) dia.**
ST30090010 (—) Remover	 NT663	Removing mainshaft rear bearing **a: 165 mm (6.50 in)** **b: 25 mm (0.98 in) dia.** **c: M16 x P2.0**
KV38100500 (—) Drift	 NT115	Installing front drive shaft oil seal **a: 80 mm (3.15 in) dia.** **b: 60 mm (2.36 in) dia.**
KV40100621 (J25273) Drift	 NT104	Installing mainshaft rear bearing **a: 76 mm (2.99 in) dia.** **b: 69 mm (2.72 in) dia.**
KV32101100 (—) Pin punch	 NT410	Removing and installing L-H fork, 2-4 fork **a: 6 mm (0.24 in) dia.**
ST3306S001 (J22888-D) Differential side bearing puller set ① ST33051001 (—) Puller ② ST33061000 (J8107-2) Adapter	 NT072	Installing mainshaft Removing sun gear assembly **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**
ST30911000 (—) Puller	 NT664	Installing mainshaft and planetary carrier assembly **a: 98 mm (3.86 in) dia.** **b: 40.5 mm (1.594 in) dia.**
KV381054S0 (—) Outer race puller	 NT665	Removing rear oil seal

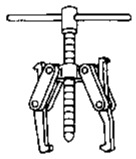
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
KV40105230 (—) Adapter	 NT666	Installing planetary carrier assembly **a: 92 mm (3.62 in) dia.** **b: 86 mm (3.39 in) dia.** **c: 12mm (0.47 in)**
KV40105310 (—) Support ring	 NT661	Installing planetary carrier assembly **a: 89.1 mm (3.508 in) dia.** **b: 80.7 mm (3.177 in) dia.**
KV40105500 (—) Support	 NT667	Installing planetary carrier assembly **a: 69 mm (2.72 in) dia.** **b: 52 mm (2.05 in) dia.** **c: 120 mm (4.72 in) dia.**
KV38100200 (—) Drift	 NT673	Installing transfer cover oil seal **a: 65 mm (2.56 in) dia.** **b: 49 mm (1.93 in) dia.**
KV31103300 (—) Drift	 NT668	Removing and installing press flange snap ring **a: 76.3 mm (3.004 in) dia.** **b: 130 mm (5.12 in)**
KV31103400 (—) Clutch piston attachment ① Shaft-drift ② Guide-cylinder	 NT669	Installing clutch piston **a: 88.5 mm (3.484 in) dia.** **b: 158 mm (6.22 in) dia.**
ST38060002 (J34311) Flange wrench	 NT428	Removing companion flange nut Installing companion flange nut **a: 480 mm (18.90 in)** **b: Pitch dia.: 75 mm (2.95 in)** **Pin dia.: 12 mm (0.47 in)**

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST33290001 (J25810-A) Puller	 NT414	Removing center case oil seal Removing rear oil seal **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST33051001 (J22888) Puller	 NT670	Removing companion flange **a: 135 mm (5.31 in)** **b: 100 mm (3.94 in)** **c: 170 mm (6.69 in)**
(J35864) Drift	 NT671	Installing oil seal

Commercial Service Tool

Tool name	Description	
Puller	 NT077	Removing companion flange, clutch gear and mainshaft gear bearing

Supplemental Restraint System (SRS) "AIR BAG"

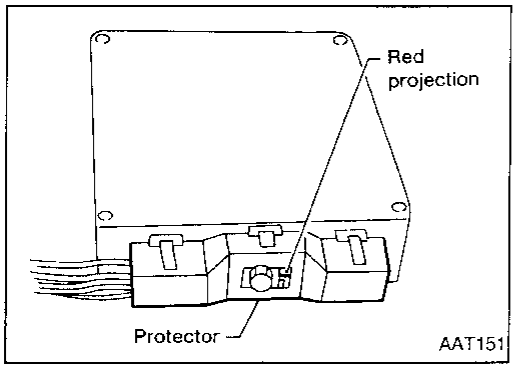
The Supplemental Restraint System "Air Bag", used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS 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 INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation either just before the harness connectors or for the complete harness, for easy identification.**

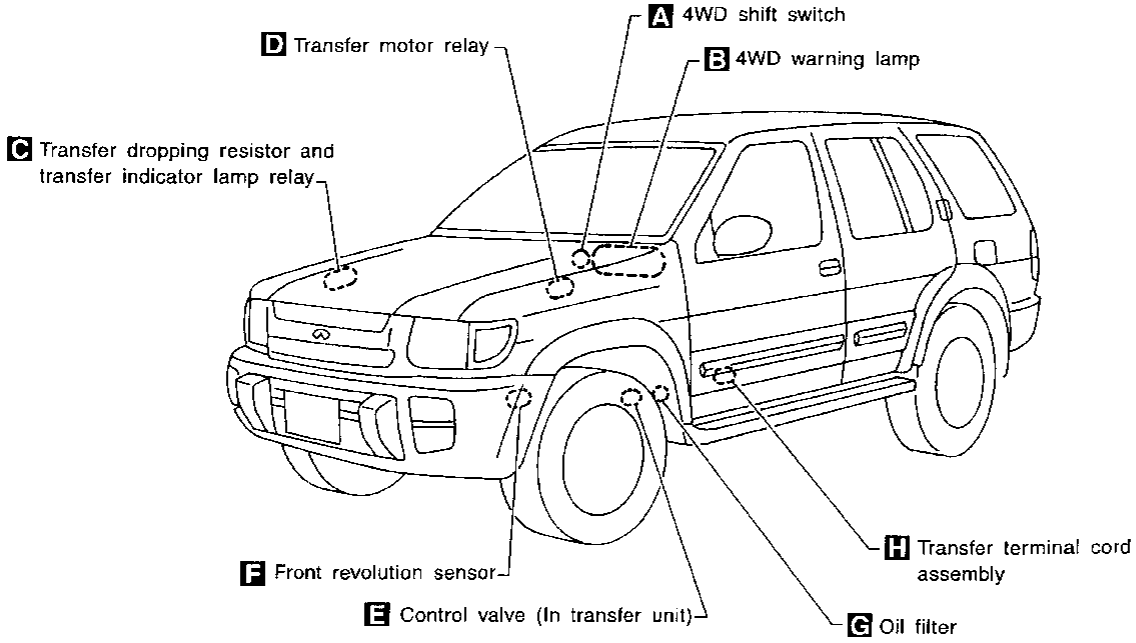
Service Notice

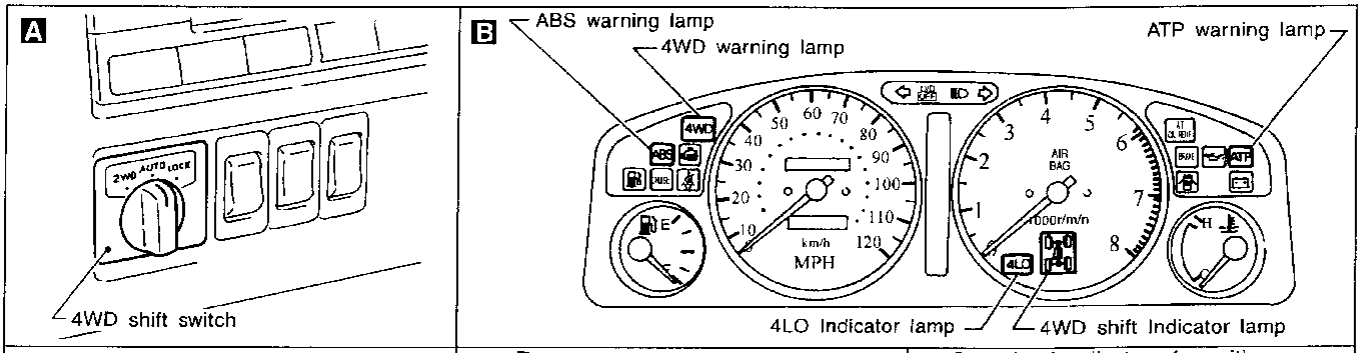
- Before proceeding with disassembly, thoroughly clean the outside of the all-mode 4WD transfer. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the all-mode 4WD transfer.
- 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 all-mode 4WD transfer is disassembled.
- When connecting A/T control unit harness connector, tighten bolt until red projection is in line with connector.

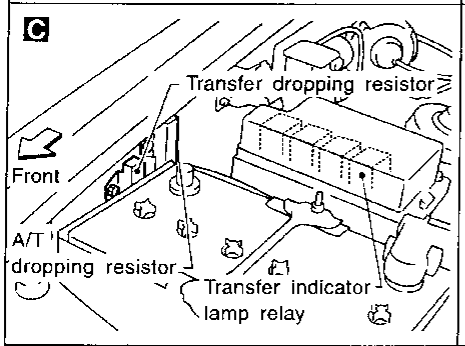


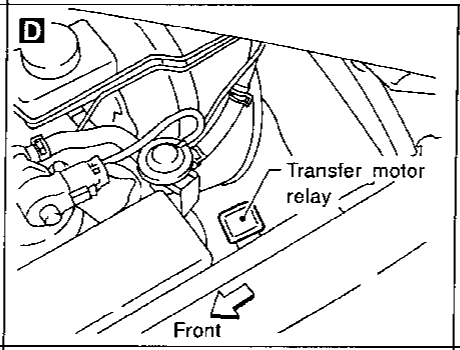
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in a parts rack in order to replace them in correct positions and sequences. Care will also prevent 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, and to 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.
- After overhaul, refill the transfer with new ATF.
- When the all-mode 4WD transfer drain plug is removed, only some of the fluid is drained. Old all-mode 4WD transfer fluid will remain in torque converter and ATF cooling system.
  Always follow the procedures under "Changing All-mode 4WD Transfer Fluid" in the MA section when changing all-mode 4WD transfer fluid.

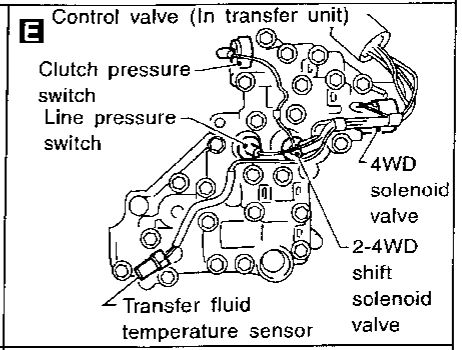
Location of Electrical Parts

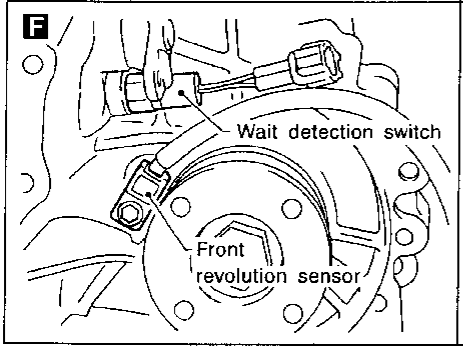


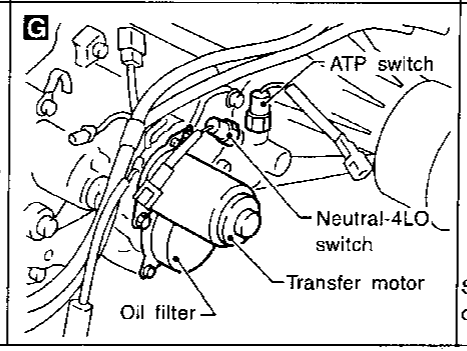


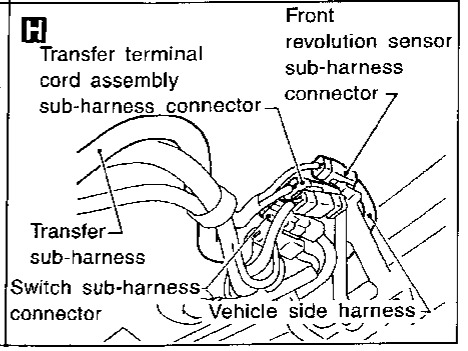






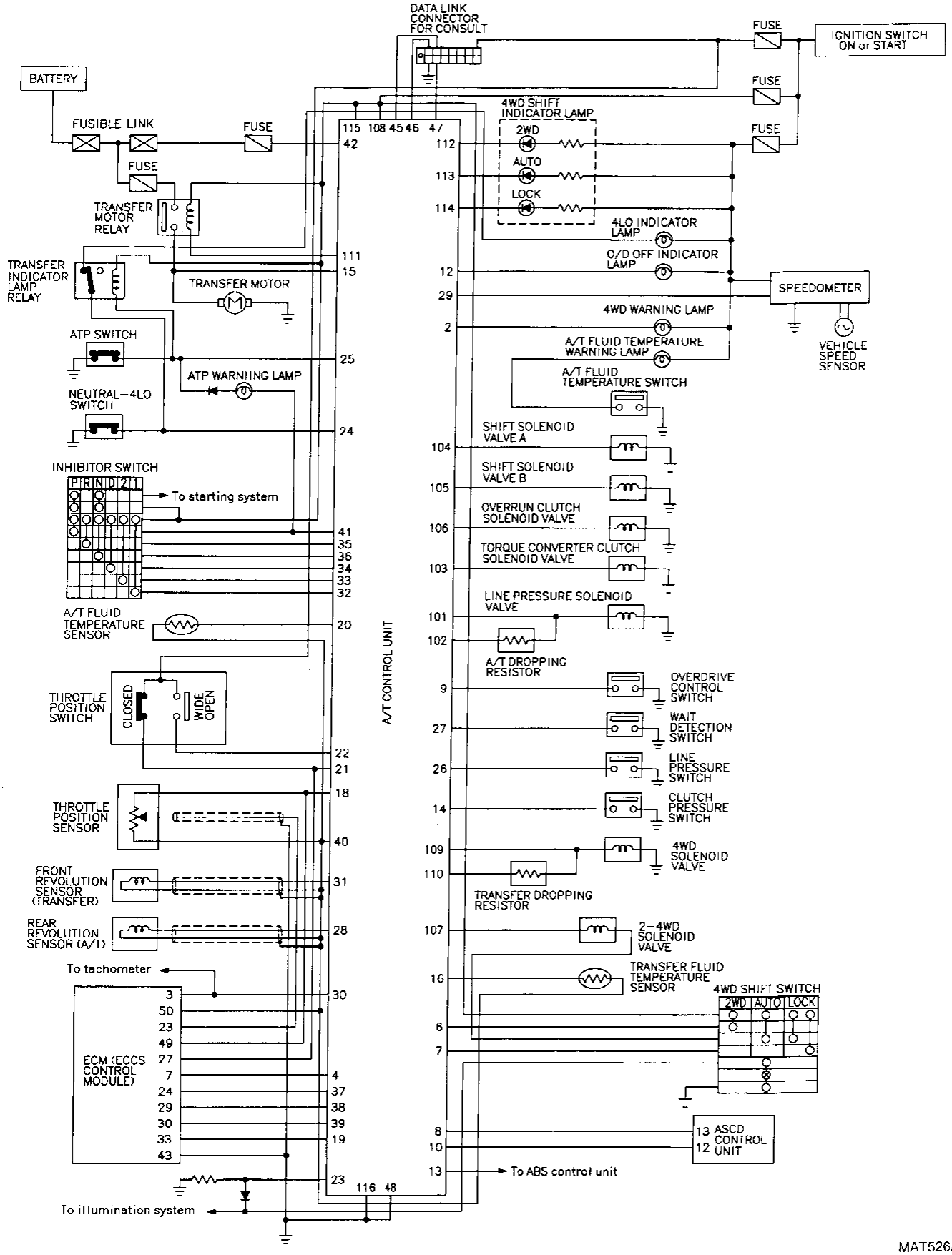






SMT041D

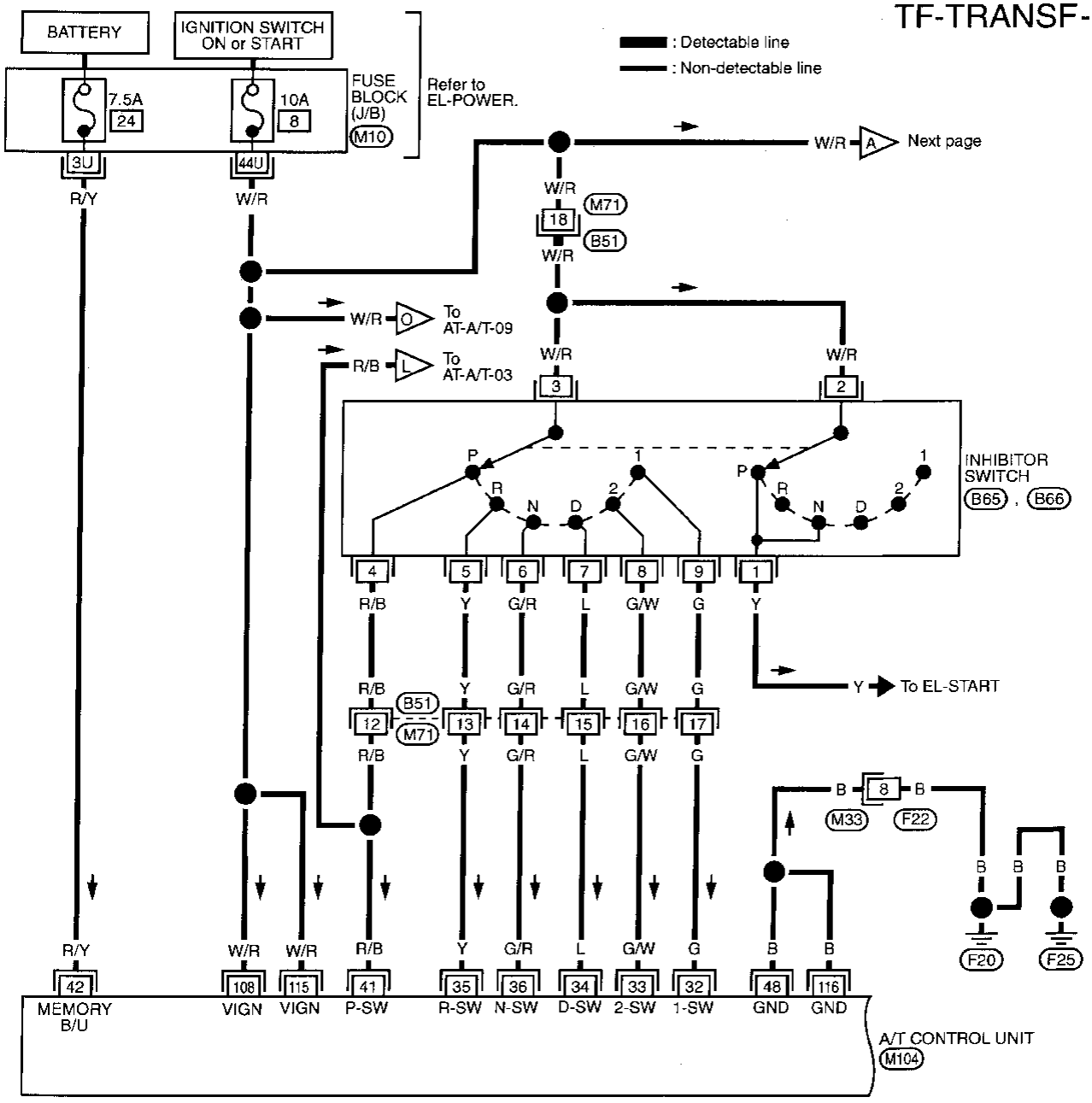
Circuit Diagram for Quick Pinpoint Check

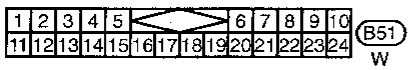


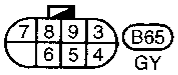
MAT526A

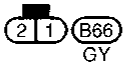
Wiring Diagram — TF —

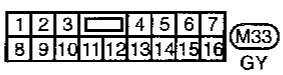
TF-TRANSF-01

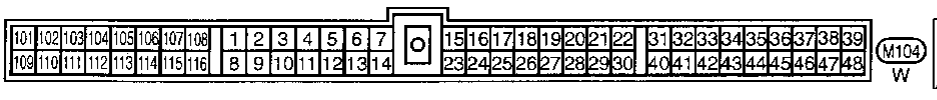










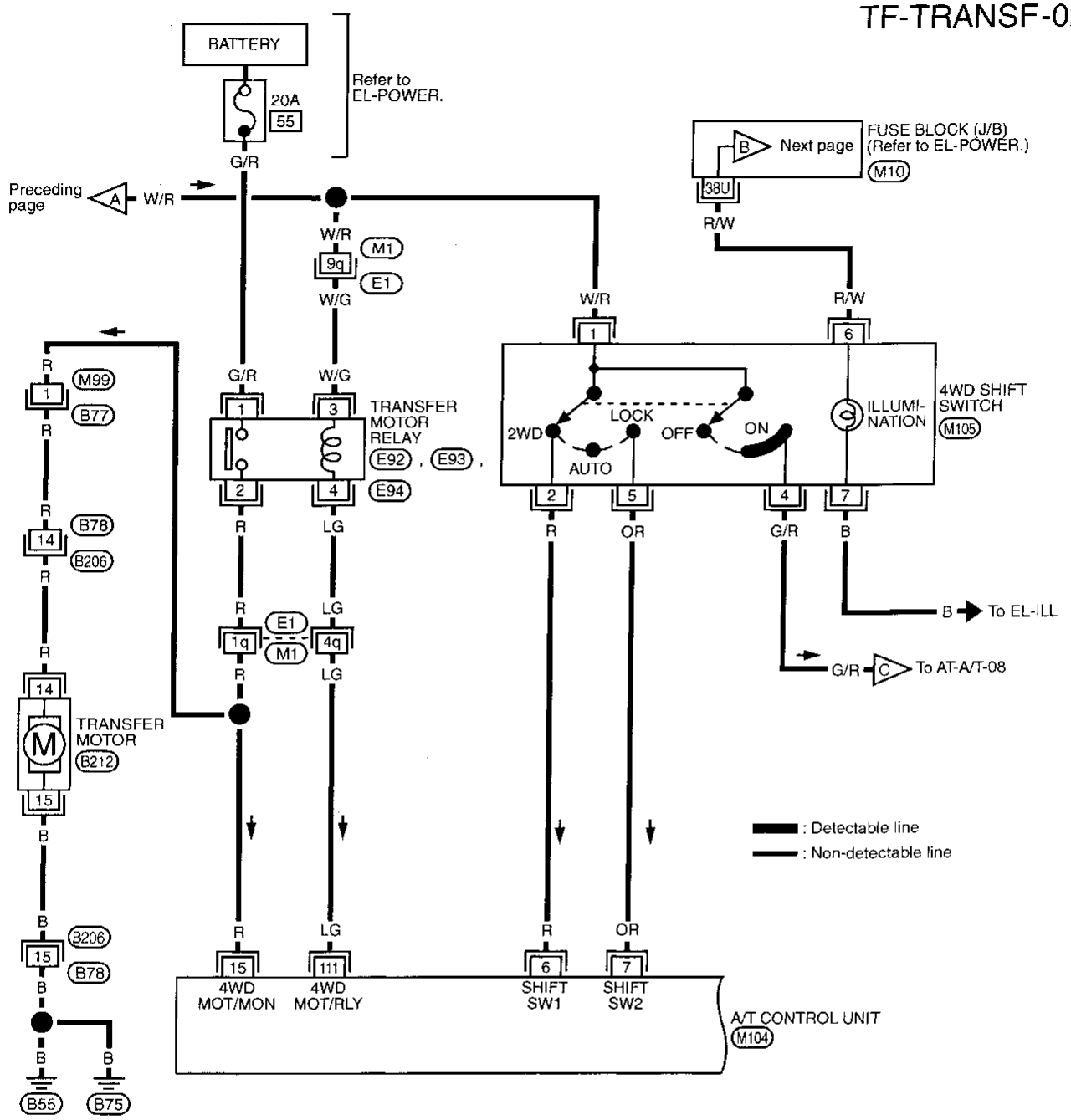


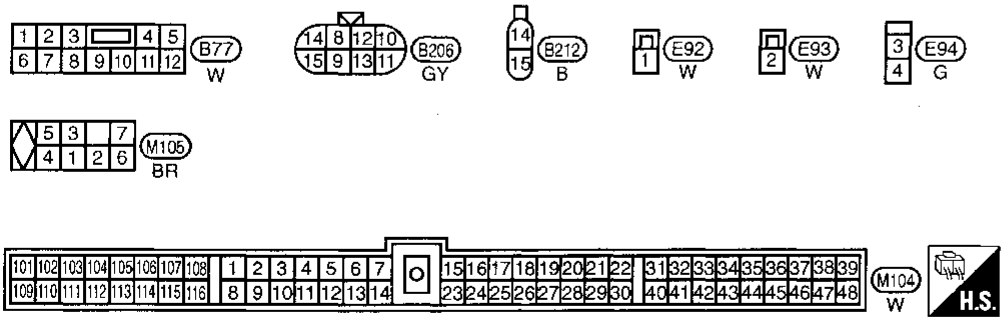
Refer to last page (Foldout page).
M10

MTF001A

Wiring Diagram — TF — (Cont'd)

TF-TRANSF-02



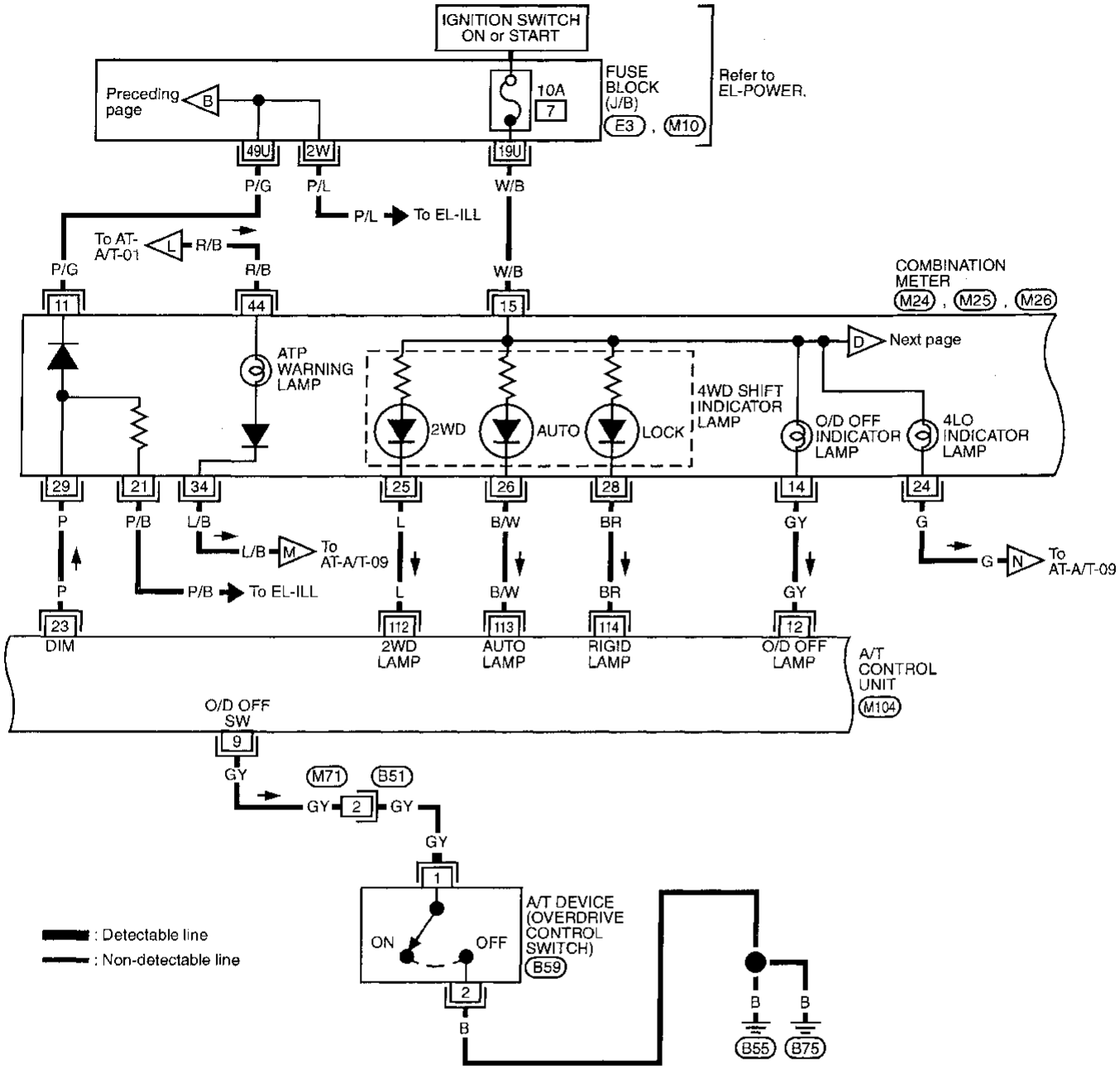


Refer to last page (Foldout page).
E1 , M1

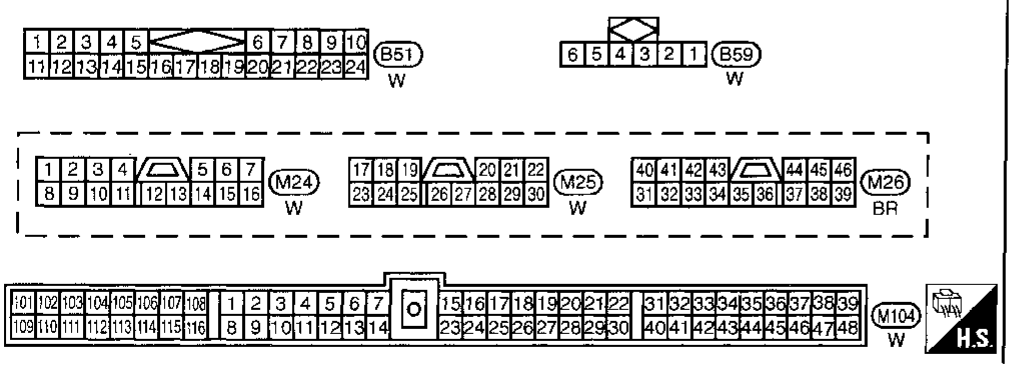
MTF002A

Wiring Diagram — TF — (Cont'd)

TF-TRANSF-03



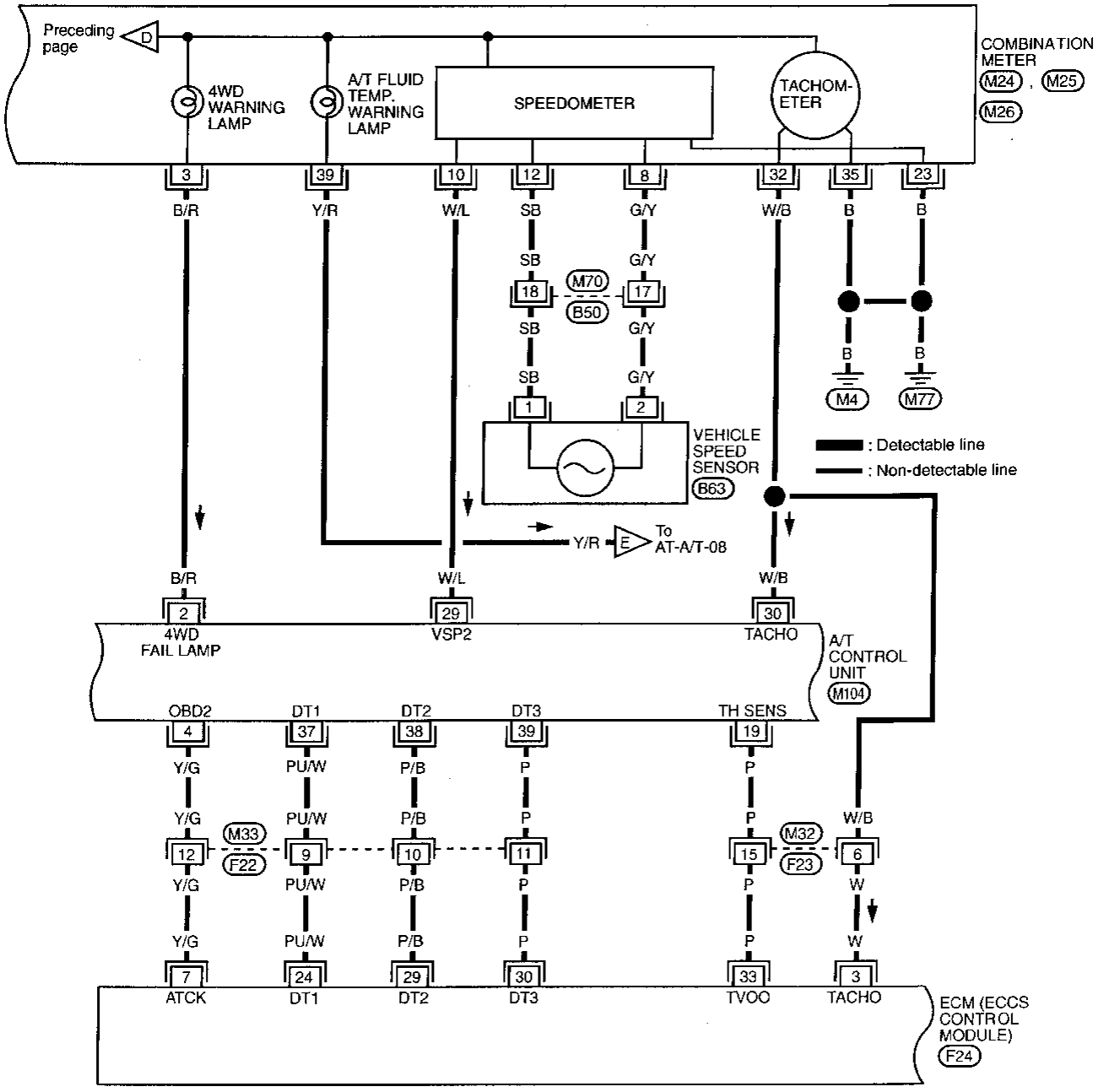
Refer to last page (Foldout page).
E3 , M10

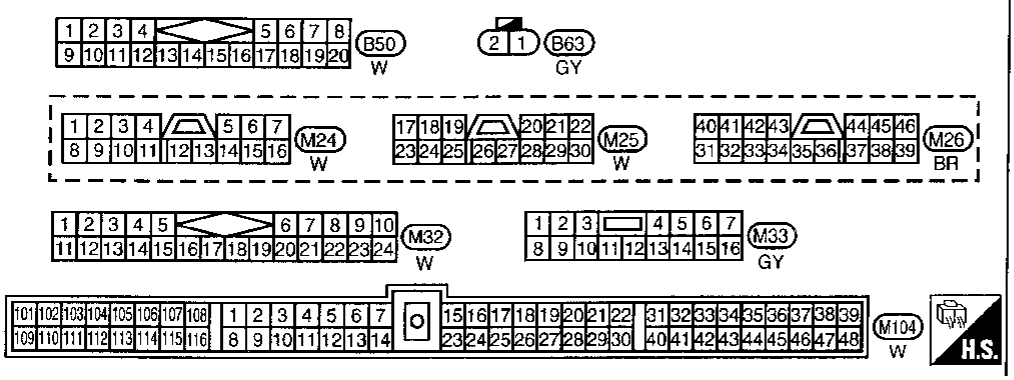


MTF003A

Wiring Diagram — TF — (Cont'd)

TF-TRANSF-04



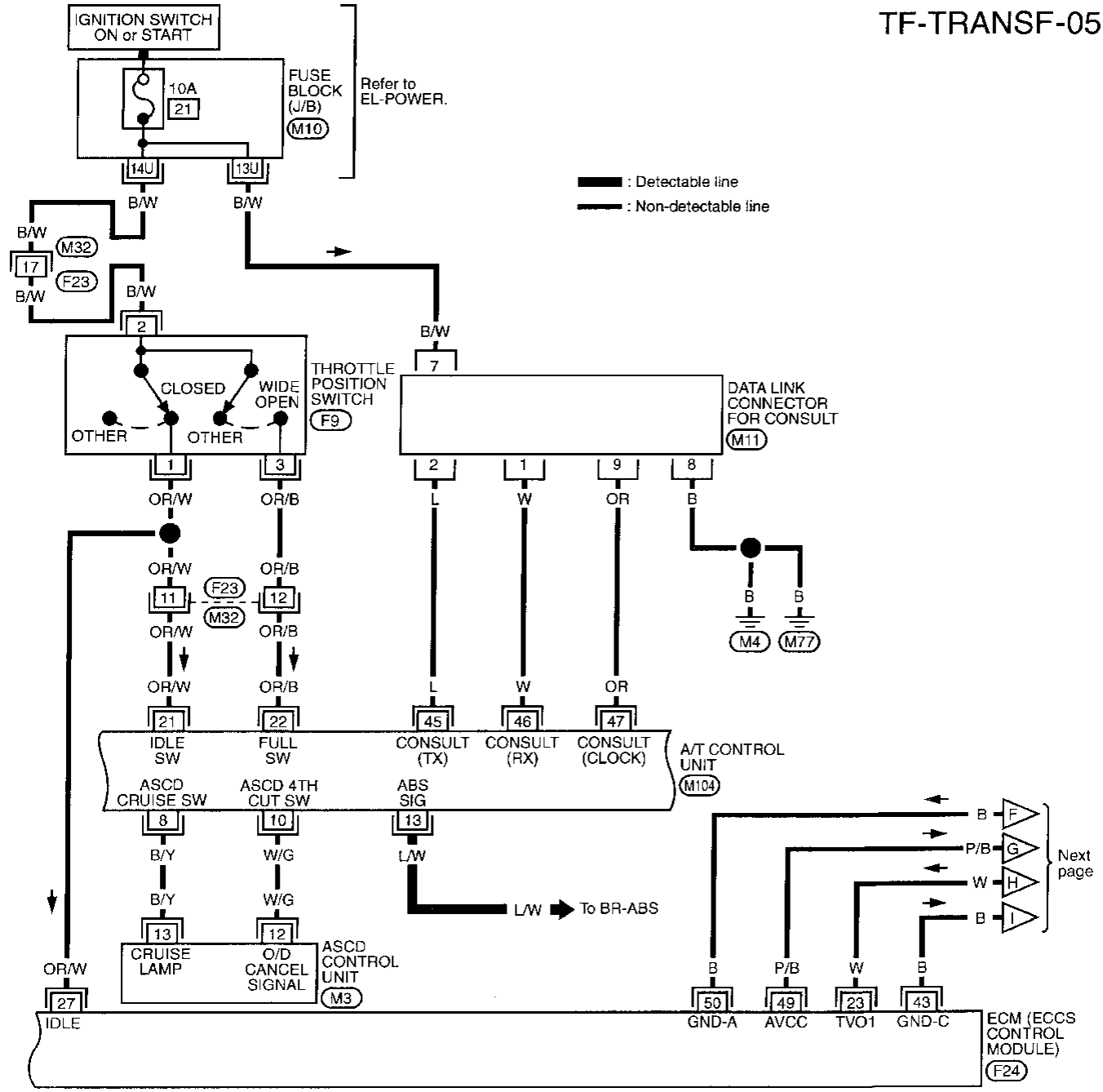


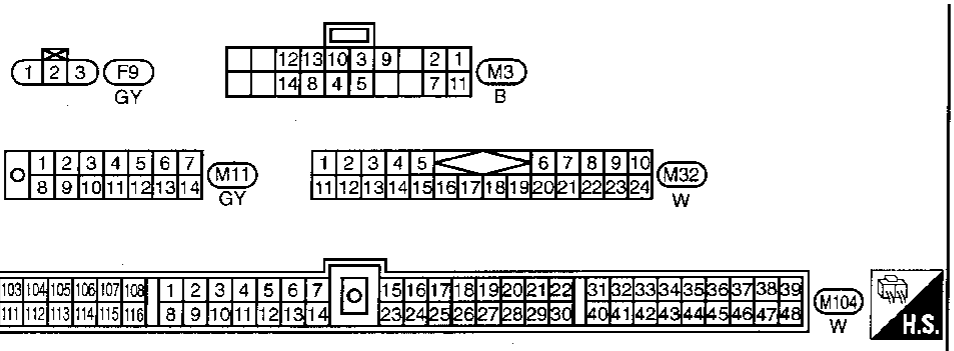
Refer to last page (Foldout page).
F24

MTF004A

Wiring Diagram — TF — (Cont'd)

TF-TRANSF-05





Refer to last page (Foldout page).

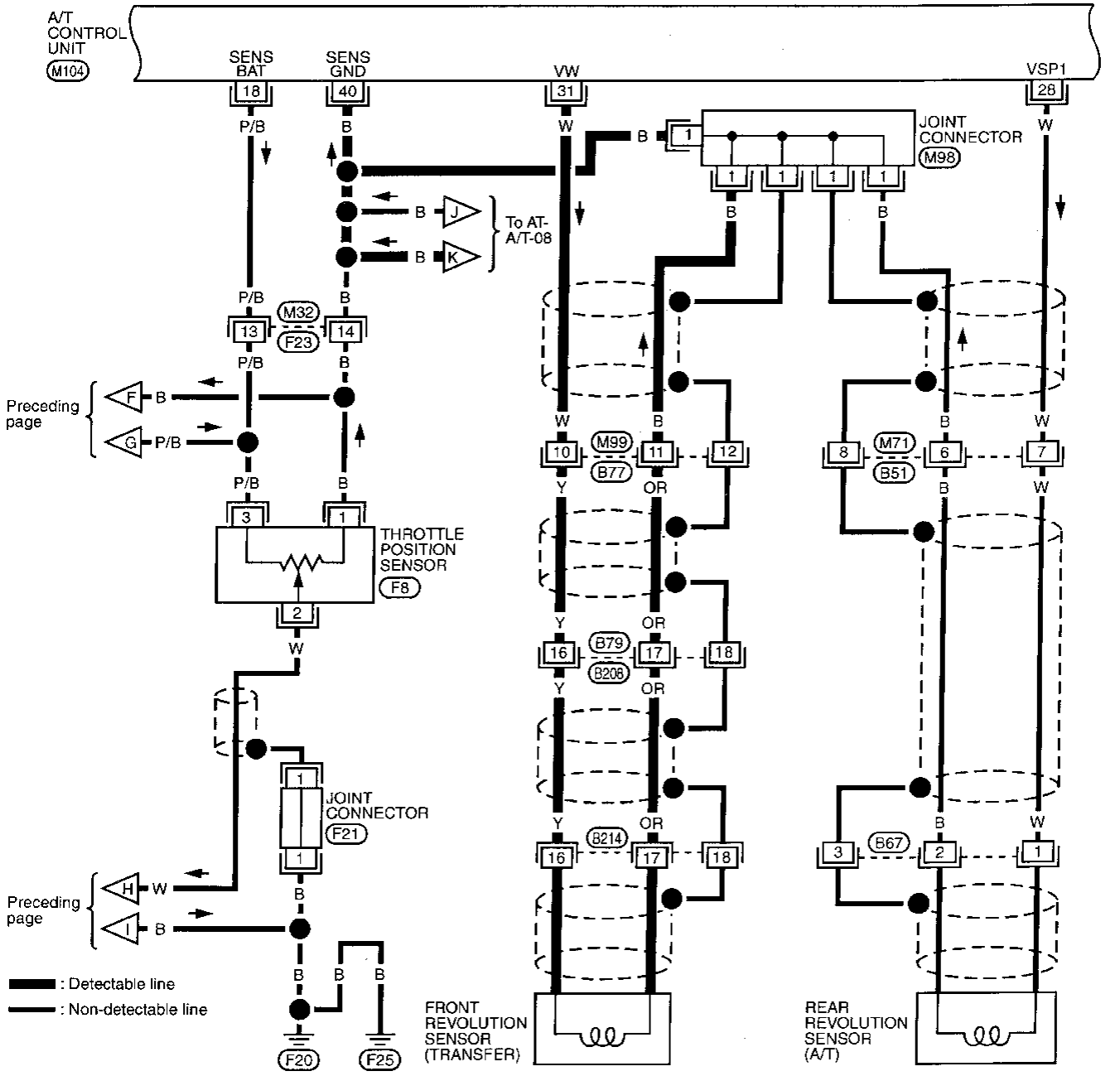
F24

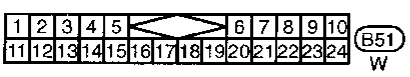
M10

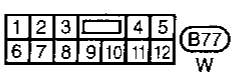
MTF005A

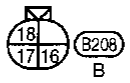
Wiring Diagram — TF — (Cont'd)

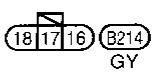
TF-TRANSF-06

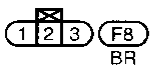


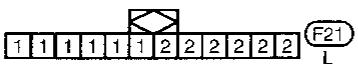


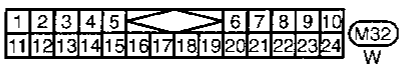


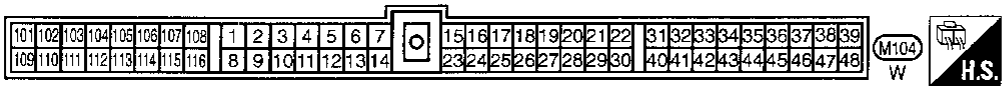










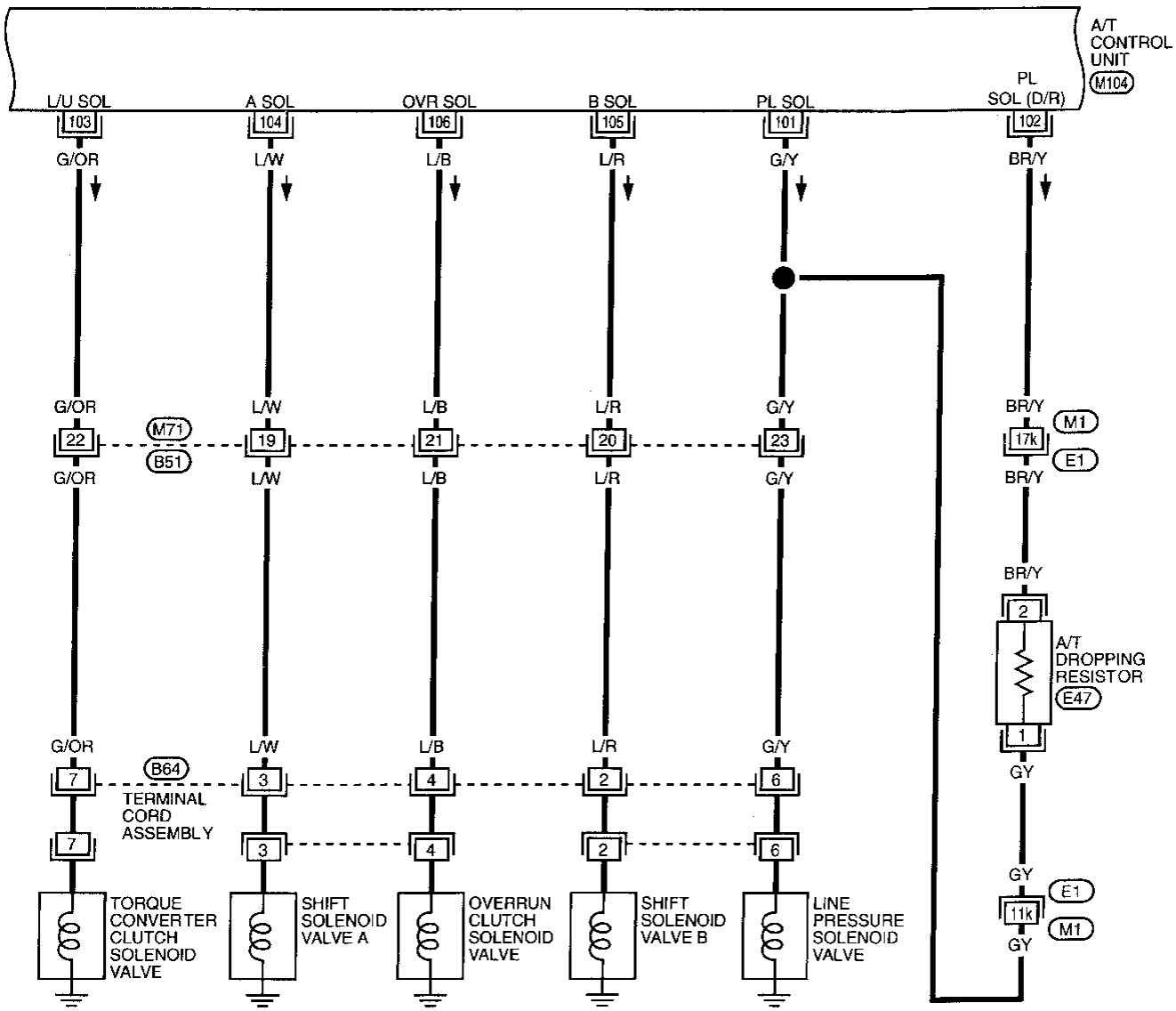


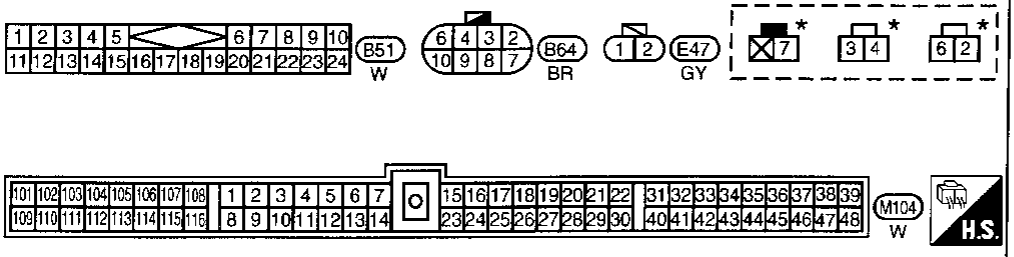
MTF006A

Wiring Diagram — TF — (Cont'd)

TF-TRANSF-07

: Detectable line
: Non-detectable line





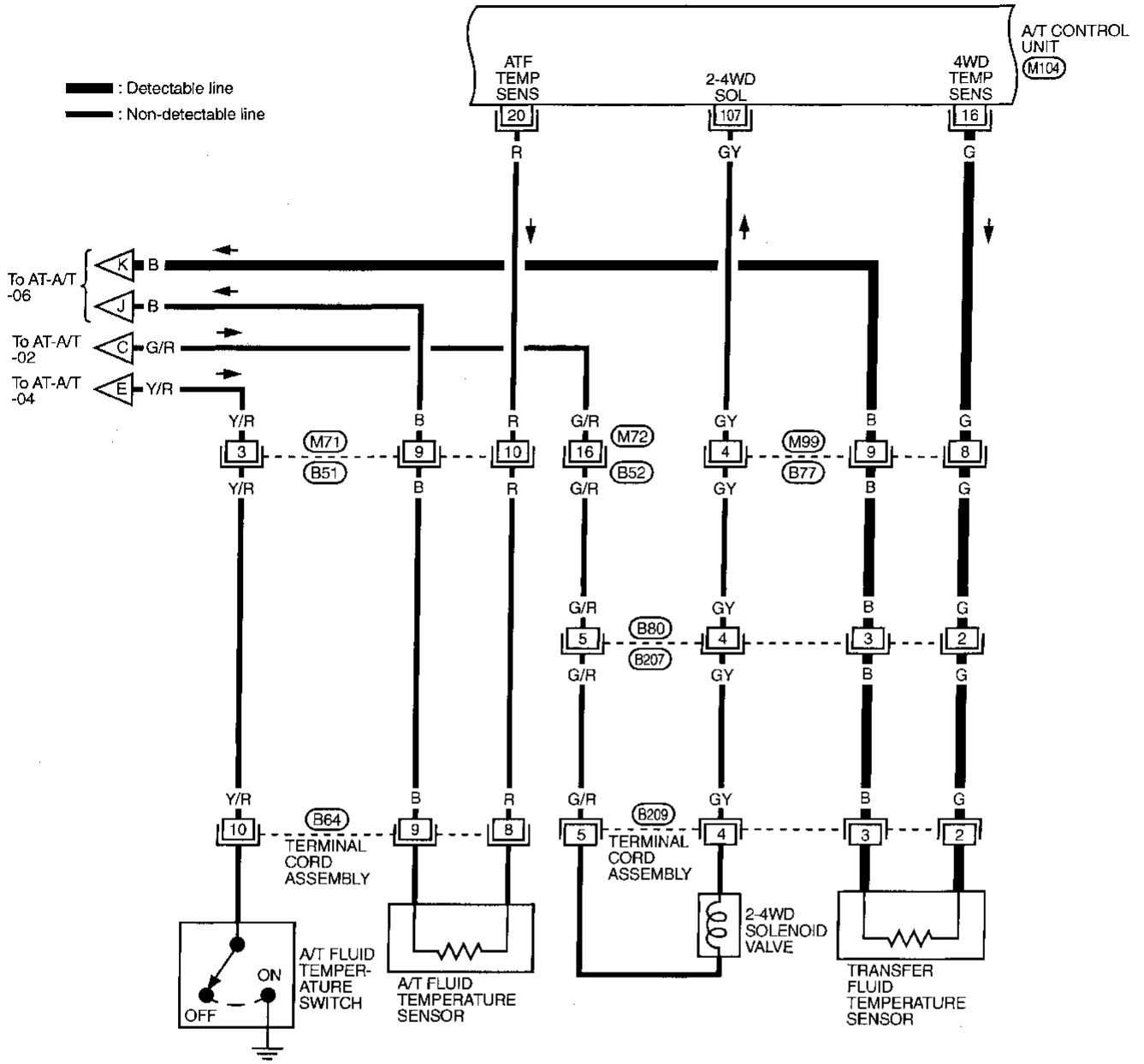
Refer to last page (Foldout page).
E1 , M1

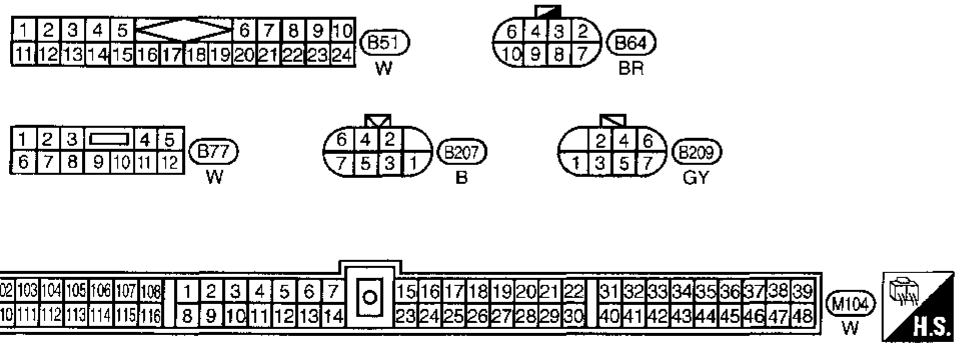
∗ : This connector is not shown in "HARNESS LAYOUT", EL section.

MTF007A

Wiring Diagram — TF — (Cont'd)

TF-TRANSF-08

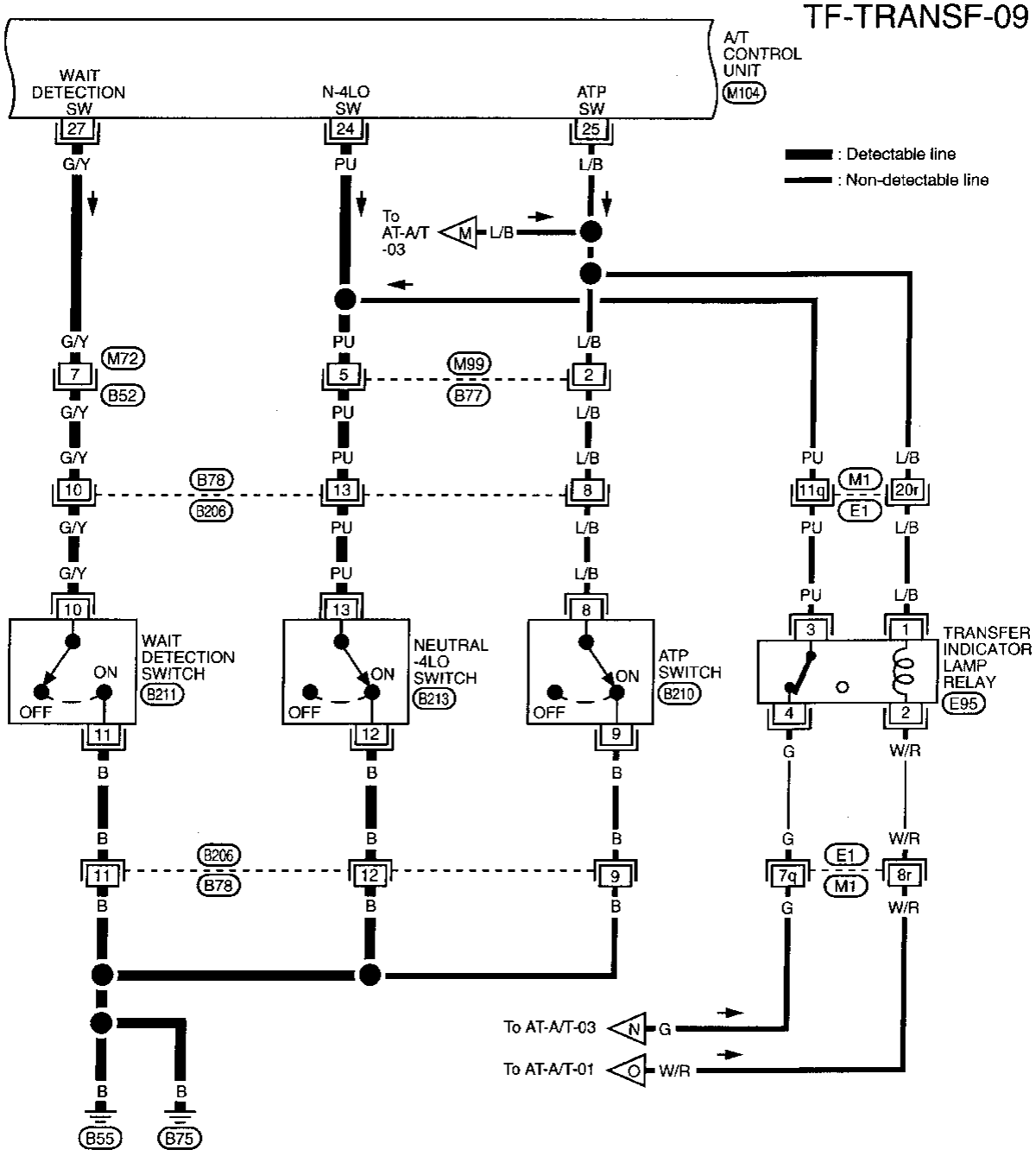


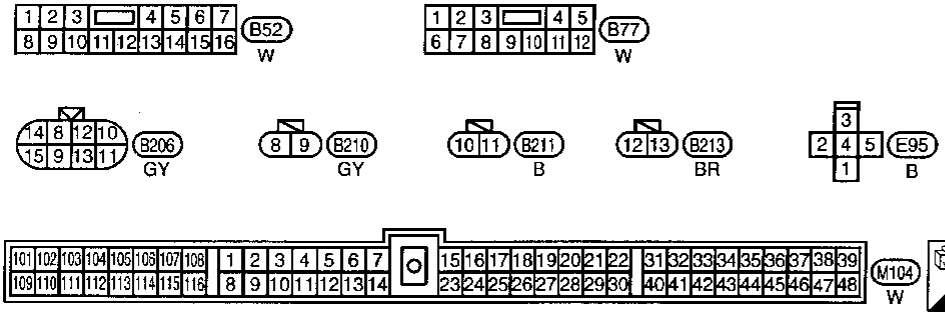


MTF008A

Wiring Diagram — TF — (Cont'd)

TF-TRANSF-09

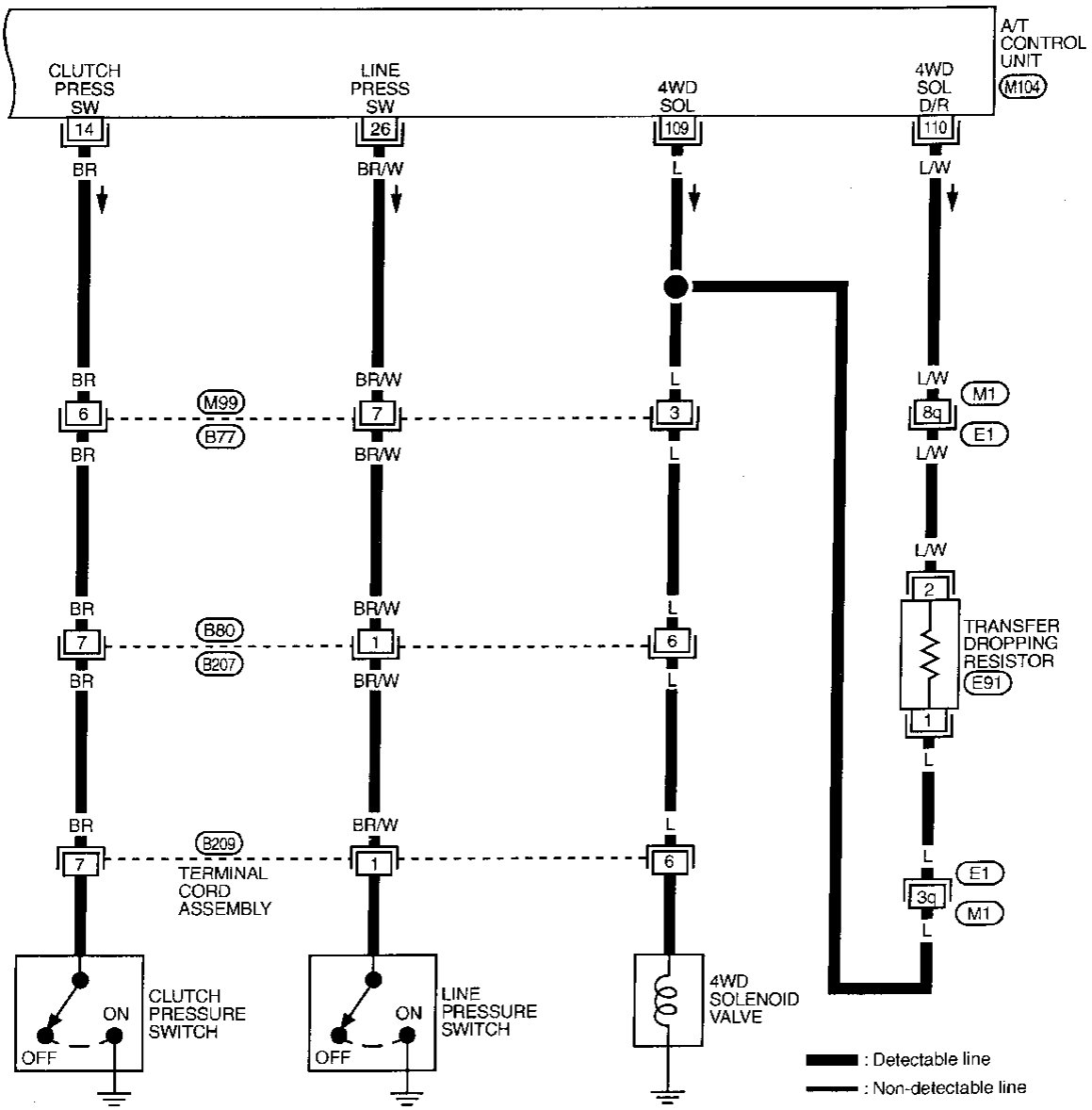


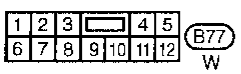


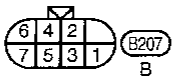
Refer to last page (Foldout page).
(E1), (M1)

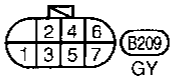
Wiring Diagram — TF — (Cont'd)

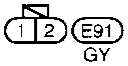
TF-TRANSF-10

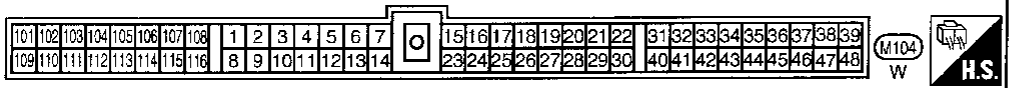








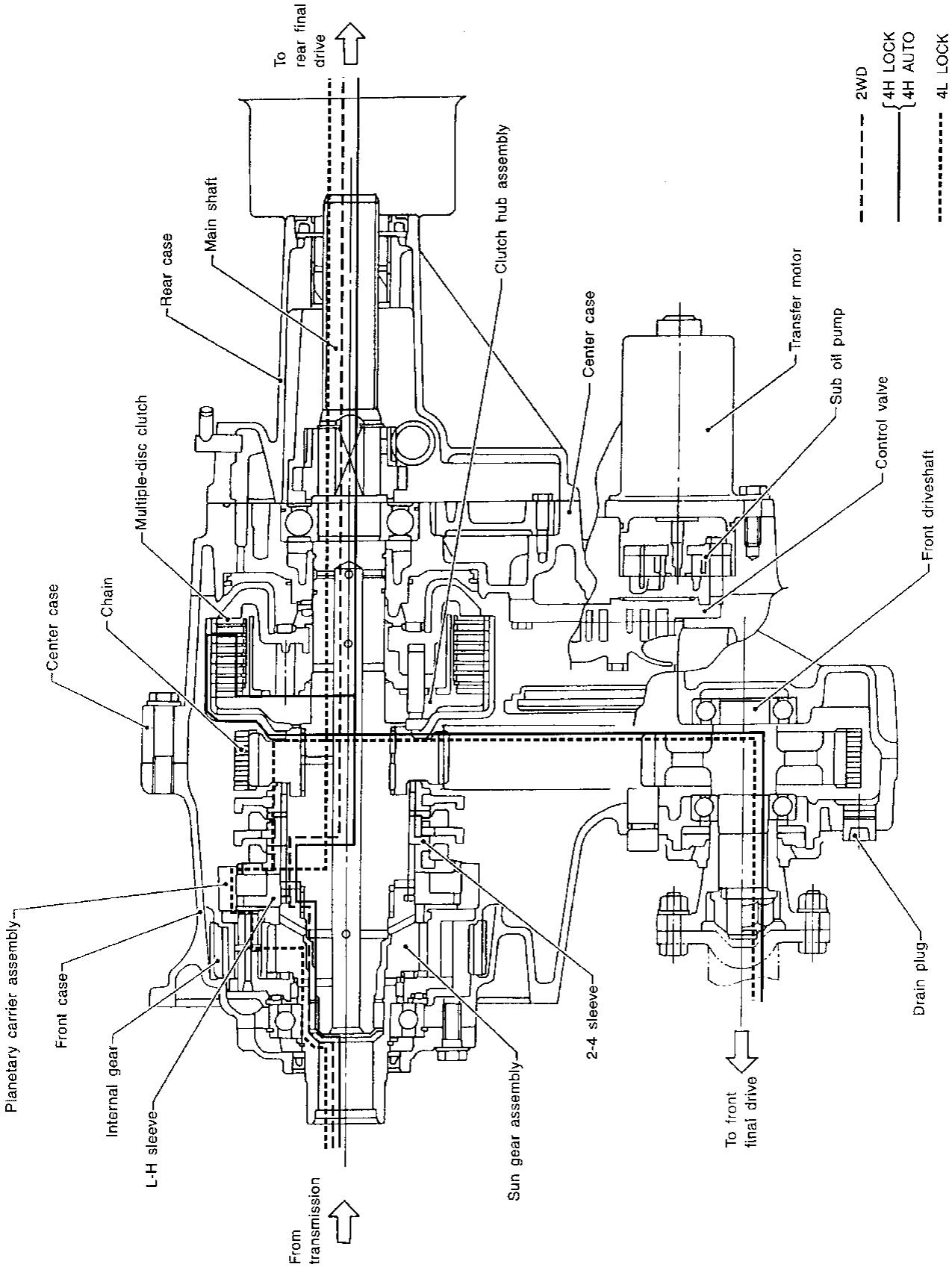




Refer to last page (Foldout page).
E1 , M1

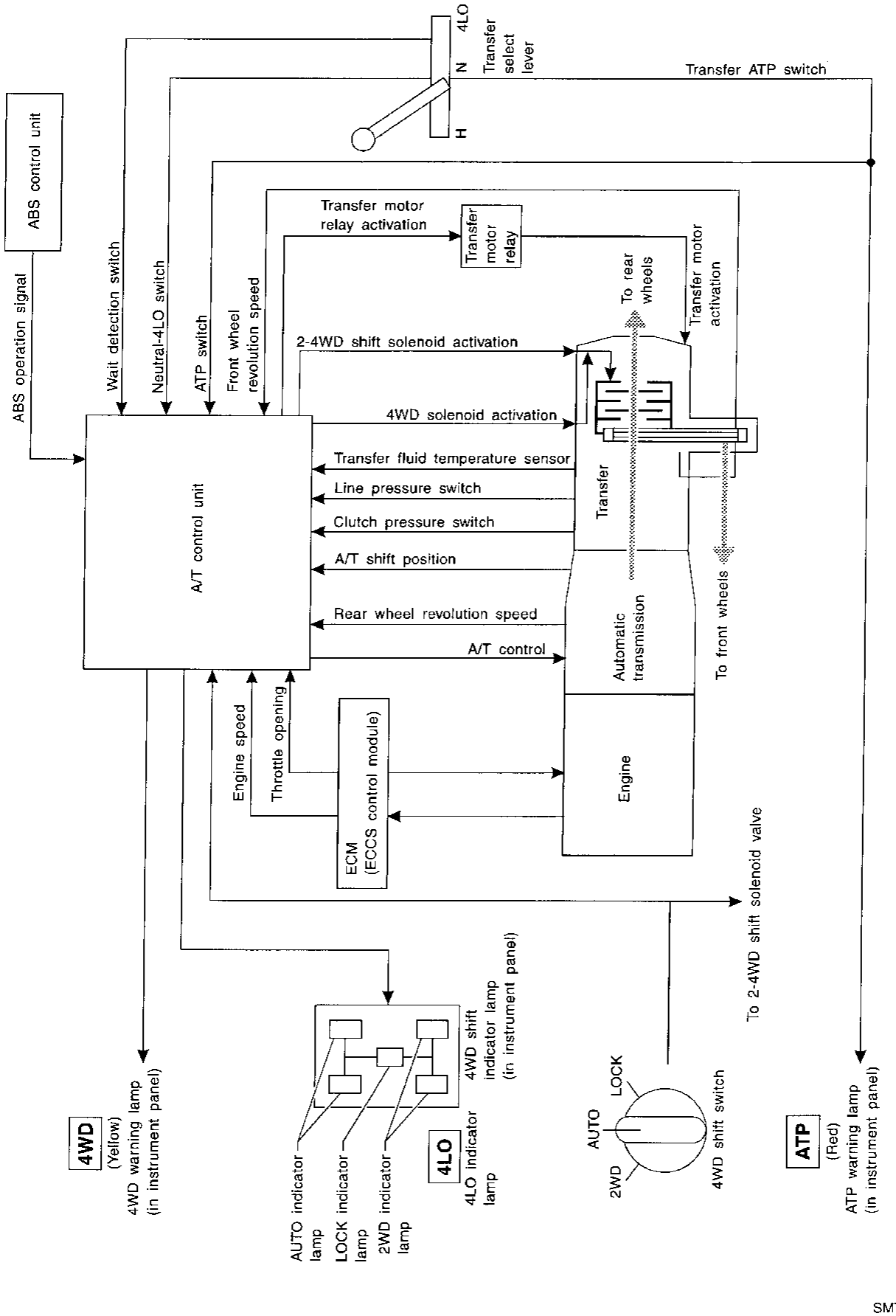
MTF010A

Cross-sectional View



SMT953C

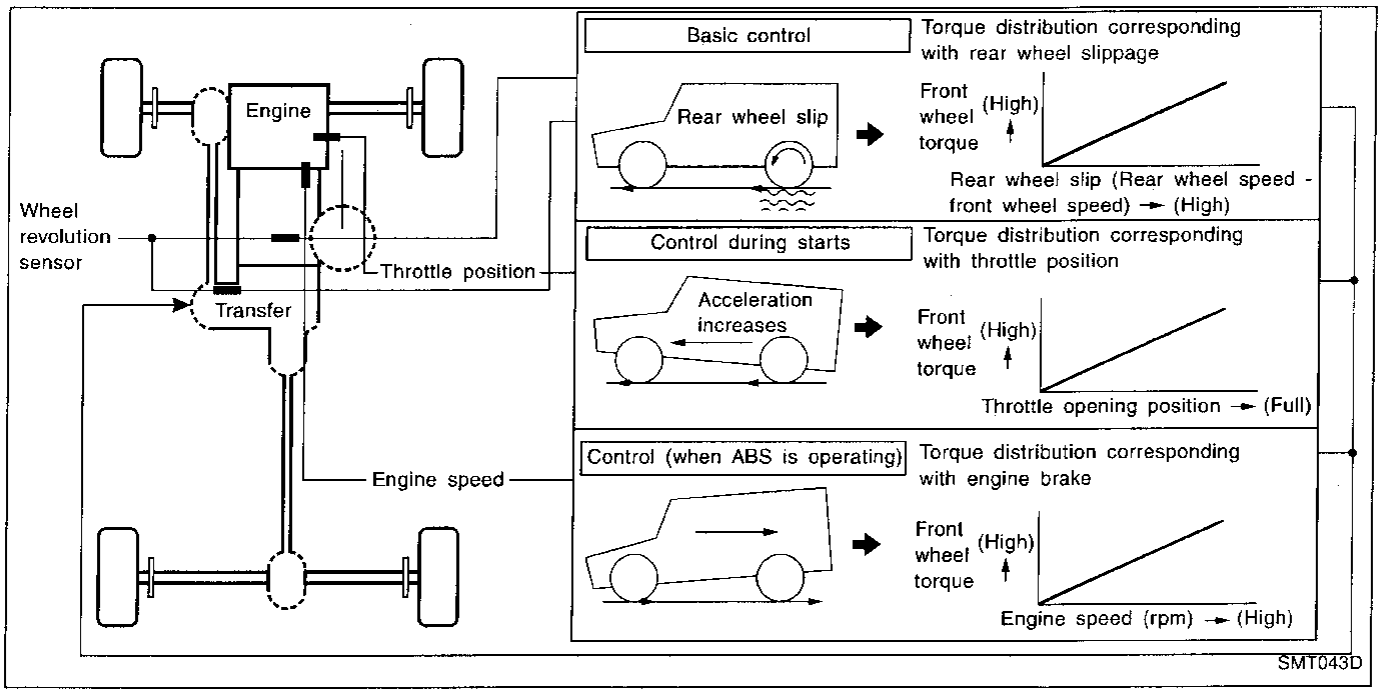
Control System



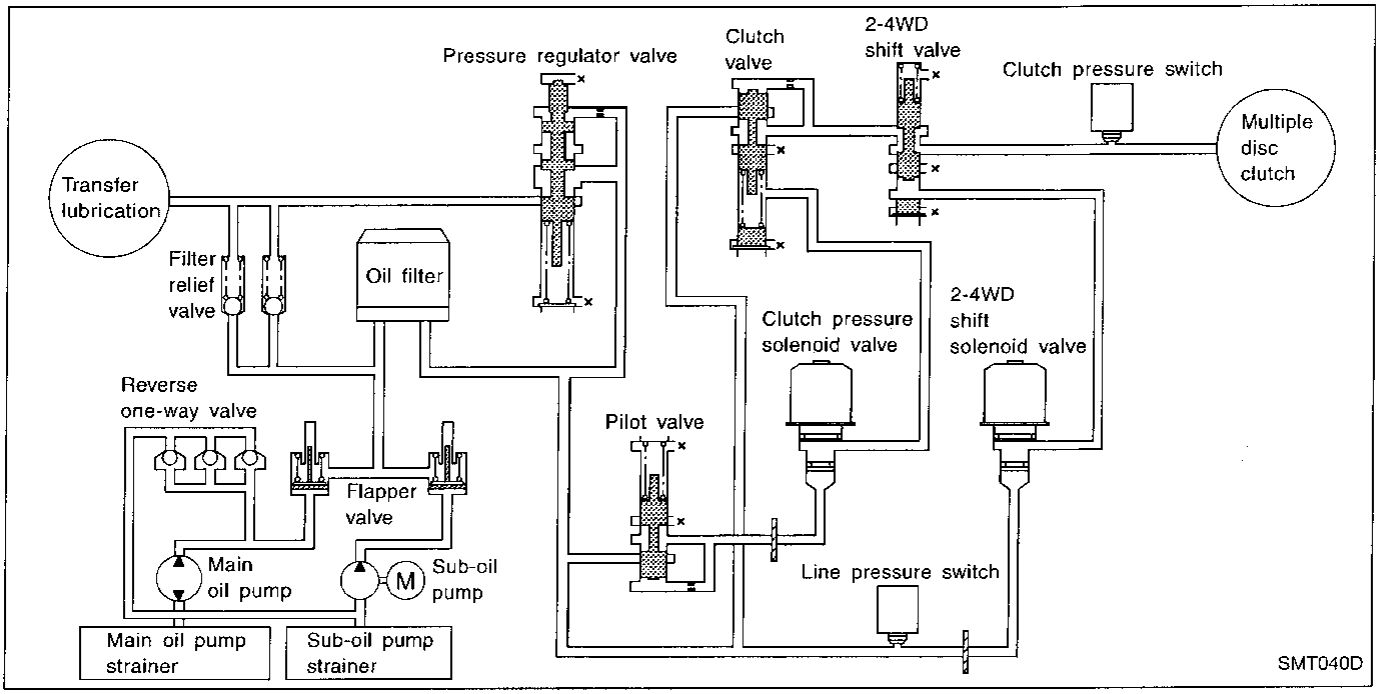
SMT044D

Control System (Cont'd)

ALL-MODE 4WD TRANSFER BASIC CONTROL



HYDRAULIC CONTROL CIRCUITS



Control System (Cont'd)

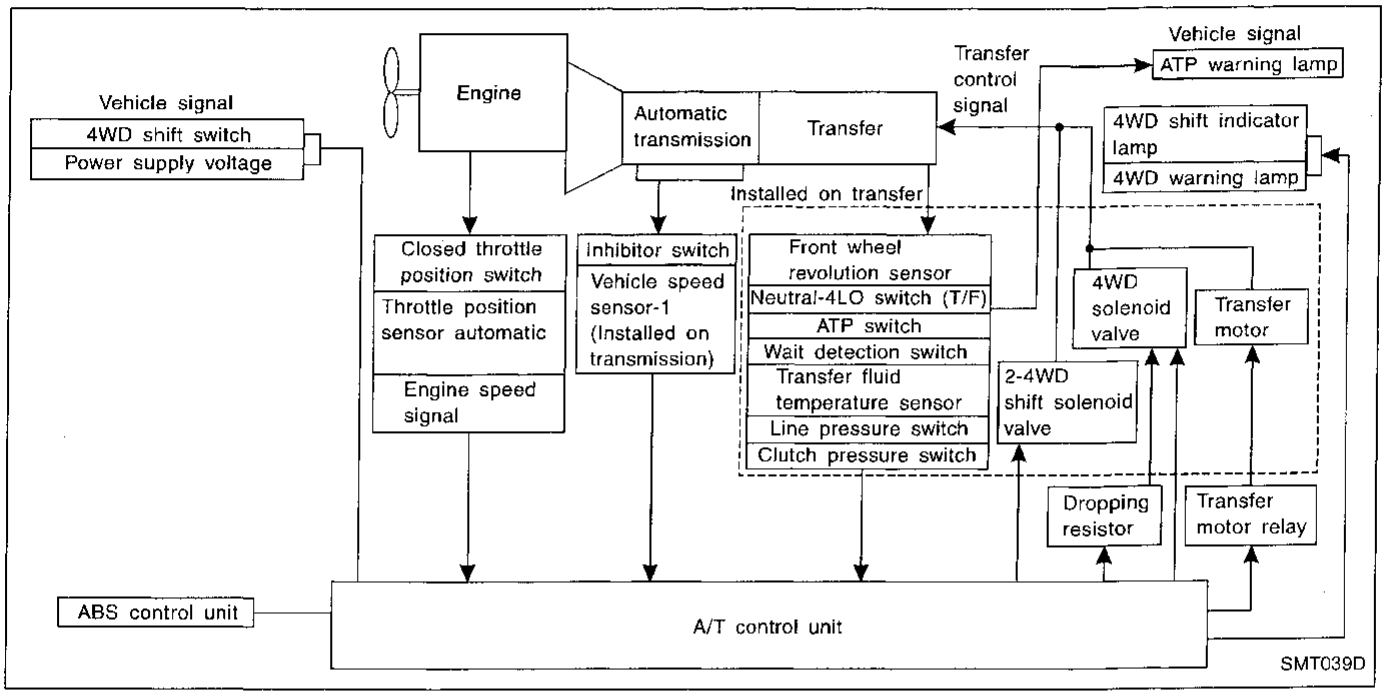
OUTLINE

All-mode 4WD transfer and A/T are controlled by the same control unit and sensors.

If a malfunction occurs in the all-mode 4WD system, the 4WD warning lamp lights up to indicate the system malfunction. There are two ways to identify the cause of the malfunction.

1. Performing the self-diagnosis. (The 4WD warning lamp will indicate what kind of malfunction has occurred by flickering.)
2. Performing diagnosis using CONSULT.

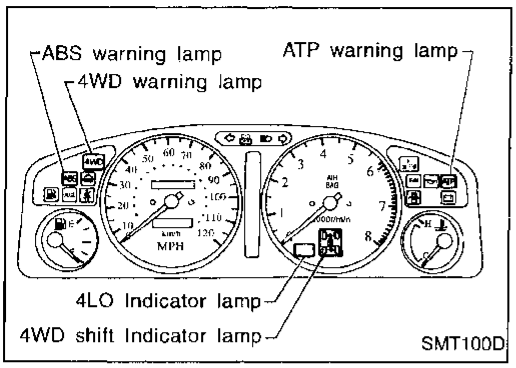
CONTROL SYSTEM DIAGRAM

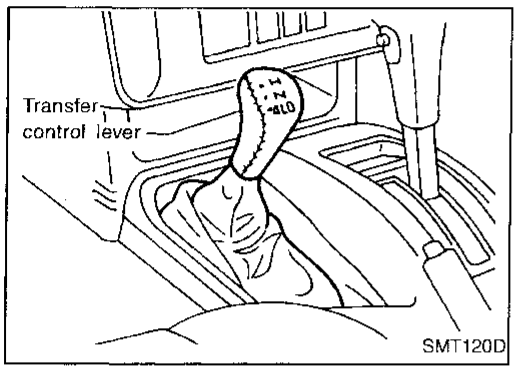


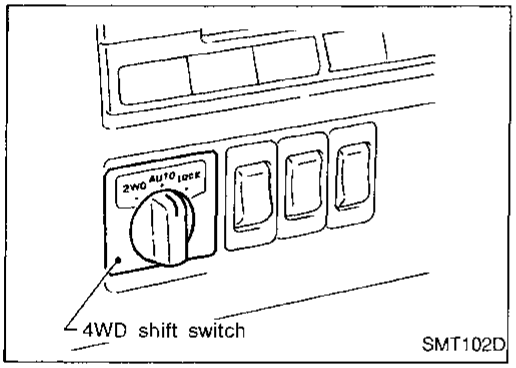
INDICATIONS OF 4WD WARNING LAMP

Condition	Content	4WD warning lamp
During self-diagnosis	Indicates the malfunction position by number of flickers.	Flickers at malfunction mode.
Lamp check*	Checks the lamp by turning ON during engine starting. After engine starts, it turns OFF if there are no malfunctions.	ON
Malfunction in 4WD system.*	Turns ON to indicate malfunction. When ignition switch is turned to "OFF" or the malfunction is corrected, it turns OFF.	ON
When vehicle is driven with different diameters of front and rear tires.	Flickers once every 2 seconds. Turns OFF when ignition switch is "OFF".	Flickers once every 2 seconds.
High fluid temperature in transfer unit	When fluid temperature is high or fluid temperature sensor circuit is shorted, it flickers twice every second. It turns OFF when fluid temperature becomes normal.	Flickers twice a second.
Other than above (System is normal.)	Lamp is OFF.	OFF

*: When 4WD warning lamp is ON, all the 4WD shift indicator lamps turn OFF.







Trouble Diagnosis without CONSULT

DESCRIPTION

- If the engine starts when there is something wrong with the all-mode 4WD system, the 4WD warning lamp turns ON or flickers in the combination meter. When the system functions properly, the warning lamp turns ON when the ignition switch is turned to "ON", and it turns OFF after engine starts.
  To locate the cause of a problem, start the self-diagnosis function. The 4WD warning lamp in the combination meter will indicate the problem area by flickering according to the self-diagnostic results. As for the details of the 4WD warning lamp flickering patterns, refer to TF-22.

SELF-DIAGNOSTIC PROCEDURE

SELF-DIAGNOSIS START

↓

Warm up engine.

↓

Turn ignition switch "ON" and "OFF" at least twice, and then turn ignition switch "OFF".

↓

Move A/T selector lever to "P" position.

↓

Move T/F control lever to "H" position.

↓

Turn 4WD shift switch to "AUTO" position.

↓

Turn ignition switch to "ON" position. (Do not start engine.)

↓

Is 4WD warning lamp ON? — No → Go to SYMPTOM 2. Refer to TF-65.

↓ Yes

Move A/T selector lever to "R" position.

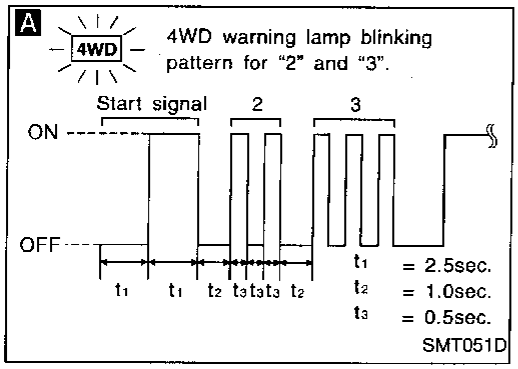
↓

Turn 4WD shift switch to "AUTO", "2WD", "AUTO", "2WD" and "AUTO" in order.

↓

Ⓐ

Trouble Diagnosis without CONSULT (Cont'd)



Ⓐ

Move A/T selector lever to "D" position.

Turn 4WD shift switch to "AUTO", "LOCK", "AUTO", "LOCK" and "AUTO" in order.

Move A/T selector lever to "N" position.

Move A/T selector lever to "P" position.

A

Read the flickering of 4WD warning lamp.
Refer to next page.

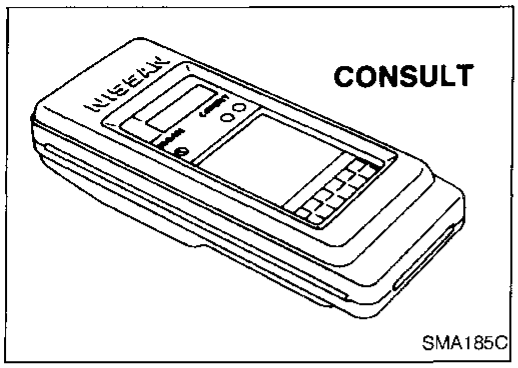
INSPECTION END

Trouble Diagnosis without CONSULT (Cont'd)

INDICATIONS OF 4WD WARNING LAMP

Flickering pattern or flickering condition	Malfunction	Check items
1	Front revolution sensor circuit is shorted or open.	Revolution sensor (front) circuit, TF-48.
2	Rear revolution sensor circuit is shorted or open.	Revolution sensor (rear) (Vehicle speed sensor·A/T) (Refer to AT-68.)
3	4WD solenoid valve circuit is shorted or open.	4WD solenoid valve circuit, TF-49.
4	2-4WD shift solenoid valve circuit is shorted or 2WD switch of 4WD shift switch is shorted.	2-4WD shift solenoid valve circuit or 4WD shift switch circuit, TF-50.
5	Transfer motor relay circuit is shorted or open.	Transfer motor relay circuit, TF-52.
8	Power supply voltage of throttle position sensor is improper. Or A/D converter of A/T control unit functions improperly.	Throttle position sensor (Refer to AT-101.)
9	Transfer fluid temperature sensor circuit is open.	Transfer fluid temperature sensor circuit, TF-54.
10	Neutral-4LO switch circuit is shorted or open.	Neutral-4LO switch circuit, TF-55.
11	Clutch pressure switch circuit, 2-4WD shift solenoid valve circuit or 2WD switch of 4WD shift switch is shorted or open.	Clutch pressure switch circuit, 2-4WD shift solenoid valve circuit or 4WD shift switch circuit, TF-50, 56
12	Line pressure switch circuit is shorted or open.	Line pressure switch circuit, TF-57.
13	Engine speed signal circuit is shorted or open.	Engine speed signal (Refer to AT-70.)
14	Throttle position sensor circuit is shorted or open.	Throttle position sensor (Refer to AT-101.)
15	Failure in power supply circuit of A/T control unit.	Power supply of A/T control unit (Refer to AT-65.)
16	4WD shift switch circuit is shorted.	4WD shift switch circuit, TF-50.
17	ABS operation signal circuit is shorted.	ABS operation signal circuit, TF-58.
18	Wait detection switch, ATP switch or neutral-4LO switch circuit is shorted or open.	Wait detection switch, ATP switch, neutral-4LO switch circuit*, TF-55.
Repeats flickering every 2 to 5 sec.	Circuits that the self-diagnosis covers have no malfunction.	—
Repeats flickering every 0.25 sec.	Power supply failure of memory back-up Battery is disconnected for a long time. Battery performance is poor.	Data erase/display circuit, TF-59.
No flickering	Inhibitor switch or 4WD shift switch circuit is shorted or open.	Inhibitor switch (Refer to AT-59.) or 4WD shift switch circuit, TF-50.

*: If revolution sensor malfunction is simultaneously detected, check revolution sensor first.

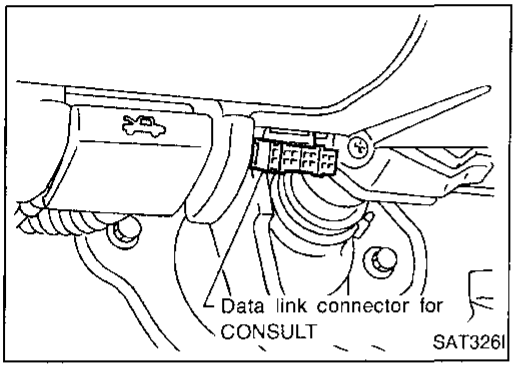


Trouble Diagnosis by CONSULT

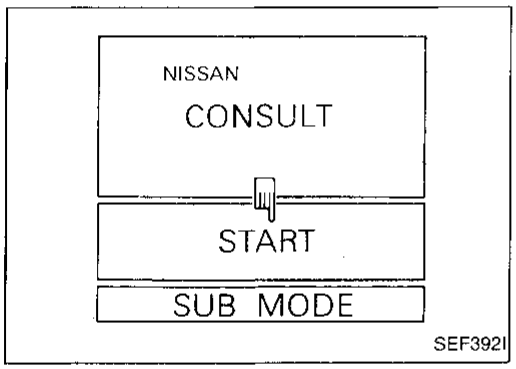
SELF-DIAGNOSIS

CONSULT setting procedure

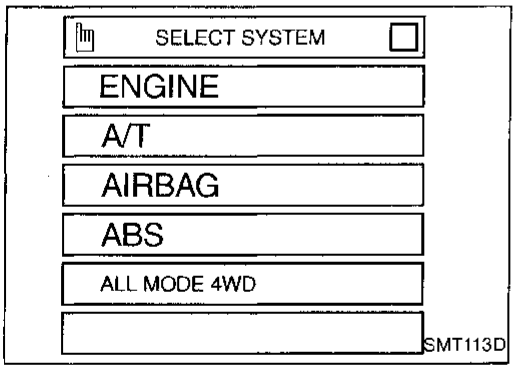
1. Turn ignition switch to "OFF" position.
2. Connect CONSULT to data link connector for CONSULT. Data link connector for CONSULT is located in instrument lower panel on driver side.



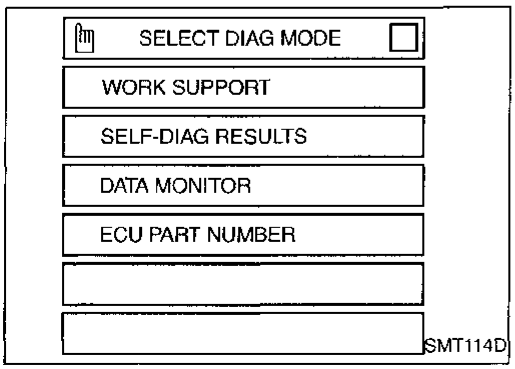
3. Start engine.
4. On CONSULT screen, touch "START".



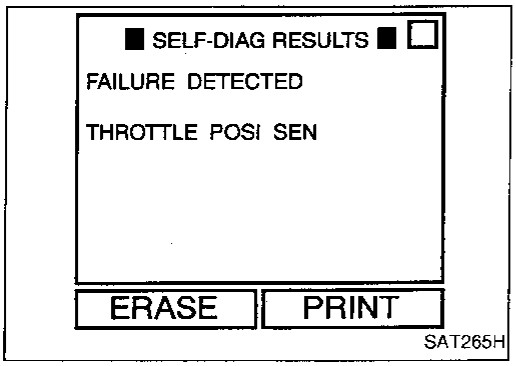
5. Touch "ALL MODE 4WD" on SELECT SYSTEM screen.



6. Touch "SELF-DIAG RESULTS" on SELECT DIAG MODE screen.



Trouble Diagnosis by CONSULT (Cont'd)



7. Self-diagnostic results are displayed.

Trouble Diagnosis by CONSULT (Cont'd)

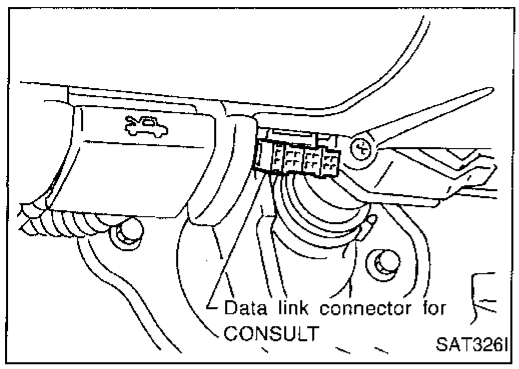
SELF-DIAGNOSTIC ITEMS

Detected items (Screen terms for CONSULT, "SELF-DIAG RESULT" mode)	Malfunction is detected when...	Check items
Revolution sensor (front) (Note 3) (VHCL SPEED SEN·FR)	• Front revolution sensor (installed on T/F) signal is not input due to open circuit. • Improper signal is input while driving.	Revolution sensor (front) circuit, TF-48.
Revolution sensor (rear) (VHCL SPEED SEN·RR)	• Signal from vehicle speed sensor 1 (installed on A/T) is not input due to open circuit. • Improper signal is input while driving.	Revolution sensor (rear) (vehicle speed sensor A/T) (Refer to AT-68.)
4WD solenoid valve (DUTY SOLENOID)	• Proper voltage is not applied to solenoid valve due to open or short circuit.	4WD solenoid valve, TF-49.
2-4WD solenoid valve (2-4WD SOLENOID)		2-4WD shift solenoid valve or 4WD shift switch circuit, TF-50.
Transfer motor relay (MOTOR RELAY)	• Motor does not operate properly due to open or short circuit in transfer motor or motor relay.	Transfer motor relay circuit, TF-52.
Transfer fluid temperature sensor (FLUID TEMP SENSOR)	• Signal voltage from fluid temperature sensor is abnormally high (T/F fluid temperature is abnormally low) while driving.	Transfer fluid temperature sensor circuit, TF-54.
Neutral-4LO switch (N POSI SW TF)	• Improper signal is input while driving.	Neutral-4LO switch, TF-55.
Clutch pressure (CLUTCH PRESSURE)	• Improper signal is input due to open or short circuit. • Malfunction occurs in clutch pressure hydraulic circuit.	Clutch pressure switch circuit (*1), TF-56.
Line pressure (LINE PRESSURE)	• Improper signal is input due to open or short circuit. • Malfunction occurs in line pressure hydraulic circuit.	Line pressure switch circuit (*1), TF-57.
Engine speed signal (Note 1) (ENGINE SPEED SIG)	• Engine speed is abnormally low while driving.	Engine speed signal (Refer to AT-70.)
Throttle position sensor (THRTL POSI SEN)	• Signal voltage from throttle position sensor is abnormally high. • Signal voltage from throttle position sensor is abnormally low when closed throttle position switch is OFF.	Throttle position sensor (Refer to AT-101.)
Control unit (ADC) C/U (ADC)/THRTL SEN	• Power supply voltage for throttle position sensor is improper or A/D converter system of control unit is faulty.	Throttle position sensor (Refer to AT-101.)
Battery voltage (Note 1) (BATTERY VOLTAGE)	• Power supply voltage for control unit is abnormally low while driving.	Power supply circuit (Refer to AT-65.)
4WD shift switch (4WD MODE SW)	• More than two switch inputs are simultaneously detected due to short circuit of 4WD shift switch.	4WD shift switch circuit, TF-50.
ABS operation signal (ABS OPER SIGNAL)	• ABS operation signal is continuously input due to short circuit in ABS operation signal line.	ABS operation signal circuit, TF-58.
Wait detection switch (Note 2) (WAIT DETECT SWITCH)	• Improper signal is input due to open or short circuit.	ATP switch, wait detection switch and neutral-4LO switch circuits (*2), TF-55.
Memory power supply stop	• Due to removal of battery which cuts off power supply to A/T control unit, self-diagnosis memory function is suspended.	Data erase/display circuit, TF-59.
Control unit (RAM) [CONTROL UNIT (RAM)]	• Failure is detected in the memory (RAM) system of A/T control unit.	
Control unit (ROM) [CONTROL UNIT (ROM)]	• Failure is detected in the memory (ROM) system of A/T control unit.	
Control unit (EEPROM) [CONTROL UNIT (EEPROM)]	• Failure is detected in the memory (EEPROM) system of A/T control unit.	

Note 1: When a malfunction occurs, it is only displayed and not stored in the memory.
Note 2: When the wait detection switch has been properly fixed, malfunction information is erased from the memory.
Note 3: If T/F control lever is left between H and 4LO for a while, this indication may be displayed.
(*1): If the malfunction is detected only while driving in reverse, check the continuity of A/T inhibitor "R" position switch. When there is nothing wrong with the electrical system, check the hydraulic system.
(*2): If a revolution sensor malfunction is detected at the same time, check the revolution sensor circuit first.

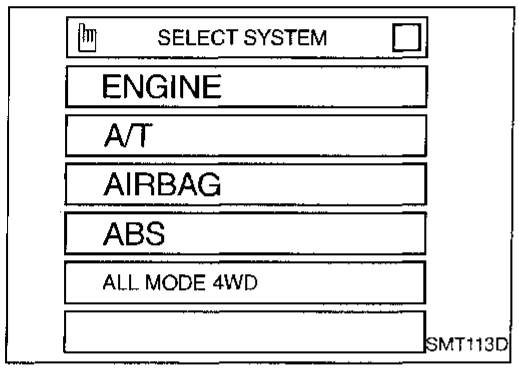
Trouble Diagnosis by CONSULT (Cont'd)

DATA MONITOR

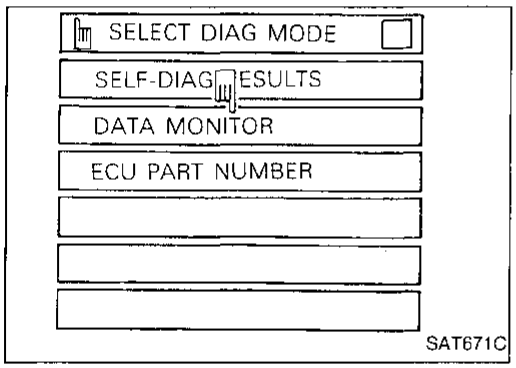


CONSULT setting procedure

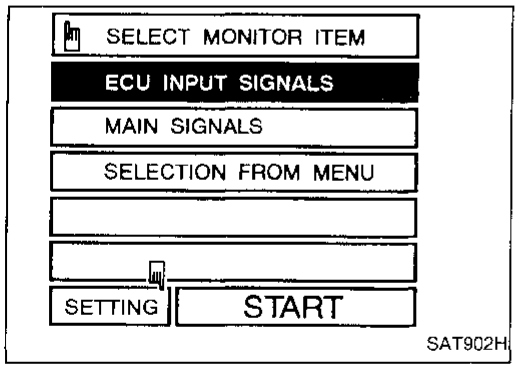
1. Turn ignition switch to "OFF" position.
2. Connect CONSULT to data link connector for CONSULT.
3. Turn ignition switch to "ON" position.
4. Touch "START".



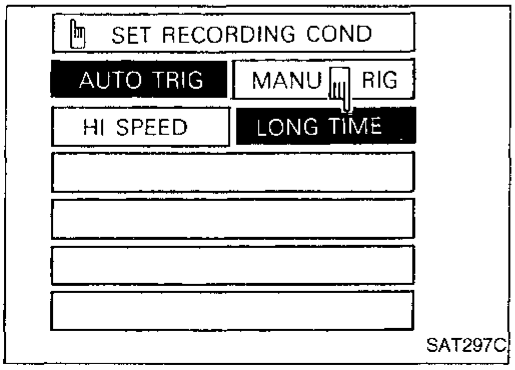
5. Touch "ALL MODE 4WD".



6. Touch "DATA MONITOR".



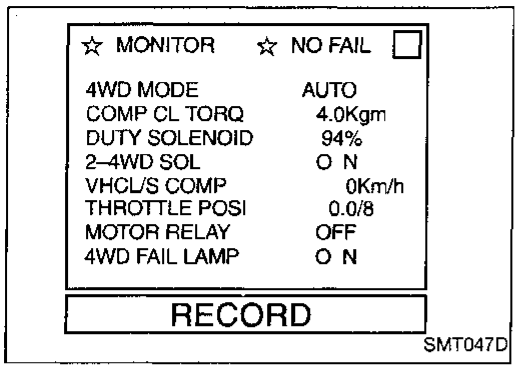
7. Touch "SETTING" to set record conditions.



8. Touch "LONG TIME" and then "ENTER" key.
9. Return to SELECT MONITOR ITEM screen and touch "MAIN SIGNALS".
10. Touch "START".

Trouble Diagnosis by CONSULT (Cont'd)

11. Monitored data are displayed.



Trouble Diagnosis by CONSULT (Cont'd)

DATA MONITOR ITEMS

○: Standard ▼: Option

Item [Unit]	Monitor item			Remarks
	ECU input signals	Main signals	Item menu selection	
Revolution sensor-front [km/h (MPH)]	○		▼	Revolution sensor installed on T/F
Revolution sensor-rear [km/h (MPH)]	○		▼	Vehicle speed sensor A/T
Engine speed [rpm]	○		▼	
Throttle position sensor [V]	○		▼	
Transfer fluid temperature sensor [V]	○		▼	
Battery voltage [V]	○		▼	
2WD switch [ON-OFF]	○		▼	2WD switch of 4WD shift switch
Lock switch [ON-OFF]	○		▼	LOCK switch of 4WD shift switch
Neutral-4LO switch [ON-OFF]	○		▼	T/F neutral-4LO switch
Line pressure switch [ON-OFF]	○		▼	Line pressure switch
Clutch pressure switch [ON-OFF]	○		▼	Clutch pressure switch
ATP switch [ON-OFF]	○		▼	
N position switch [ON-OFF]	○		▼	A/T inhibitor "N" position switch
R position switch [ON-OFF]	○		▼	A/T inhibitor "R" position switch
P position switch [ON-OFF]	○		▼	A/T inhibitor "P" position switch
Closed throttle position switch [ON/OFF]	○		▼	Idle contact of throttle position switch
ABS operation switch [ON-OFF]	○		▼	ABS operation switch
Wait detection switch [ON-OFF]	○		▼	
Throttle opening		○	▼	Throttle opening recognized by control unit
4WD-mode		○	▼	4WD-mode recognized by control unit (AUTO, 2WD & lock)
Vehicle speed [km/h (MPH)]		○	▼	Vehicle speed recognized by control unit
*Control torque [N·m (kg-m, ft-lb)]		○	▼	Calculated torque recognized by control unit
Transfer 4WD solenoid valve [%]		○	▼	Control signal outputs of control unit
2-4WD solenoid valve [ON-OFF]		○	▼	
Transfer motor relay [ON-OFF]		○	▼	
2-4WD solenoid valve monitor [ON-OFF]			▼	Check signal (re-input signal) of control unit control signal output is displayed. If circuit is shorted or open, ON/OFF state does not change.
Transfer motor relay monitor [ON-OFF]			▼	
ABS control operation [ON-OFF]			▼	ABS control status of control unit
4WD FAIL lamp [ON-OFF]		○	▼	Control unit control signal output for 4WD warning lamp
2WD indicator lamp [ON-OFF]			▼	Control unit control signal output for 4WD shift indicator lamp (rear)
AUTO indicator lamp [ON-OFF]			▼	Control unit control signal output for 4WD shift indicator lamp (front)
LOCK indicator lamp [ON-OFF]			▼	Control unit control signal output for 4WD shift indicator lamp (center)
Offset at starting			▼	Starting torque offset value set in WORK SUPPORT
Clutch limit [N·m (kg-m, ft-lb)]			▼	Clutch force release limit value set in WORK SUPPORT
Voltage [V]			▼	Value measured by voltage probe is displayed.
Pulse [ms, Hz or %]			▼	Value measured by pulse probe is displayed. If measurement is impossible, "#" sign is displayed. "#" sign is also displayed at the final data value until the measurement result is obtained.

* This item is indicated as "COMP CL TORQ".

Trouble Diagnosis by CONSULT (Cont'd)

REFERENCE VALUE IN DATA MONITOR MODE

Indicated items (Screen terms for CONSULT, "DATA MONITOR" mode)	Display	Conditions
Throttle position sensor (THRTL POS SEN)	Approx. 0.5V - 4.0V	Throttle valve fully closed to fully open
Transfer fluid temperature sensor (FLUID TEMP SE)	Approx. 1.1V - 0.3V	Transfer fluid temperature approx. 20°C - 80°C (68 - 176°F)
Closed throttle position switch (CLOSED THL/SW)	ON	After engine warm-up, accelerator pedal is released.
	OFF	After engine warm-up, accelerator pedal is depressed.
ABS operation switch (ABS OPER SW)	OFF	ABS is not operating.
	ON	ABS is operating.
ABS control operation (ABS CONT OPER)	ON	ABS OPER SW is "ON". Control operation is accomplished in combination with ABS.
	OFF	ABS is not operating. When a message such as "improper ABS operation signal" appears on the display and ABS OPER SW is "ON", control operation is not accomplished in combination with ABS.
2WD position (2WD SW)	ON	4WD shift switch is in "2WD".
	OFF	Except the above condition
Lock position (LOCK SWITCH)	ON	4WD shift switch is in "LOCK".
	OFF	Except the above condition

Neutral-4LO switch (N POSI SW TF)
ATP switch (ATP SWITCH)
Wait detection switch (WAIT DETCT SW)

Transfer control lever position	H	N	4LO
ATP switch	OFF	ON	OFF
Neutral-4LO switch	OFF		ON
Wait detection switch	OFF		ON
	See Note.		

Note: When shifting from "4LO" to "H", it turns ON when "Wait" function is operating (and it turns OFF when "Wait" function is canceled).

Transfer motor relay (MOTOR RELAY)

Throttle valve	Transfer control lever	4WD shift switch	A/T selector lever	Motor relay	Remarks
Fully closed	H	2WD	—	OFF	
		AUTO	P, N	OFF	ON for approx. 2 sec. after shifting to "P" and "N"
			Others	ON	
		LOCK	P	OFF	ON for approx. 2 sec. after shifting to "P"
			Others	ON	

Line pressure switch (LINE PRES SW)	OFF	The vehicle has been left at room temperature for 5 minutes and more with ignition switch in "OFF" position.
	ON	Ignition switch in "ON", T/F control lever in "H", 4WD shift switch in "AUTO" or "LOCK" and A/T selector lever in "D".
Clutch pressure switch (CL PRES SW)	OFF	Ignition switch in "ON", T/F control lever in "H" and 4WD shift switch in "2WD". ("Wait" function is not operating.)
	ON	Ignition switch in "ON", T/F control lever in "H" and 4WD shift switch in "AUTO" or "LOCK" and A/T selector lever in "D". ("Wait" function is not operating.)

Trouble Diagnosis by CONSULT (Cont'd)

Indicated items (Screen terms for CONSULT, "DATA MONITOR" mode)	Display	Conditions	
Control torque (COMP CL TORQ)	0 kg-m	4WD shift switch (Transfer control lever is in "H" and "wait" function is not operating.)	In "2WD" position
	39 - 1,079 N·m (4 - 110 kg-m, 29 - 796 ft-lb)		In "AUTO" position
	1,079 N·m (110 kg-m, 796 ft-lb)		In "LOCK" position
4WD Solenoid (DUTY SOLENOID)	4%		In "2WD" position
	94 - 4%		In "AUTO" position
	4%		In "LOCK" position
2-4WD solenoid valve (2-4WD SOL)	OFF		In "2WD" position
	ON		In "AUTO"/"LOCK" position
2-4WD shift solenoid valve (2-4WD SOL)	OFF	4WD shift switch (Transfer control lever is in "H" or "4LO".)	In "2WD" position
	ON ("Wait" function is operating.)		In "AUTO" position
	OFF ("Wait" function is not operating.)		
	ON ("Wait" function is operating.)		In "LOCK" position
	OFF ("Wait" function is not operating.)		
	OFF	4WD shift switch (Transfer control lever is between "H" and "4LO".)	In "2WD" position
	ON		In "AUTO"/"LOCK" position

Trouble Diagnosis by CONSULT (Cont'd)

WORK SUPPORT

Purpose

When there is no problem with transfer and 4WD system, following symptoms in "AUTO" mode may be claimed by a customer.

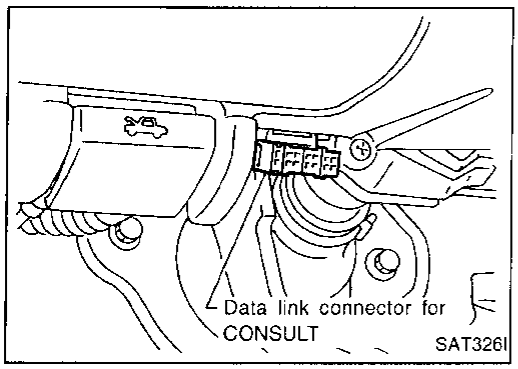
- Tight corner braking symptom after accelerator (throttle) opening (Note 1)
- Vibration when accelerating on a low μ road (snow-covered or icy road) (Note 2)

  It is possible to deal with these symptoms by changing "CLUTCH FORCE RELEASE LIMIT VALUE" and "STARTING TORQUE OFFSET VALUE". However, be careful when changing the values because it may adversely affect driving performance.

  (Priority of change is placed first on "CLUTCH FORCE RELEASE LIMIT VALUE", and then "STARTING TORQUE OFFSET VALUE".)

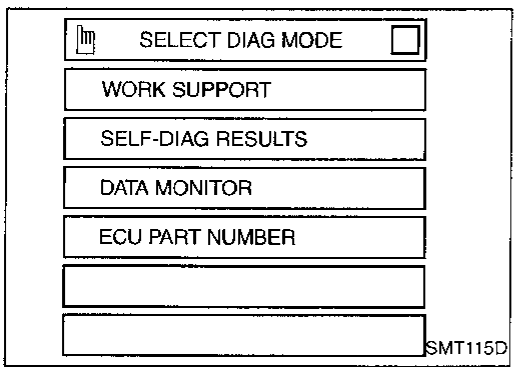
NOTE:

1. **When the accelerator is slightly open (approx. 1/8) or fully closed after being opened. The tight corner braking symptom during idle creep driving with accelerator fully closed cannot be solved by this method. Refer to SYMPTOM 8, TF-69.**
2. **A slight shock is felt at a few hertz as if it were being pushed lightly from behind.**



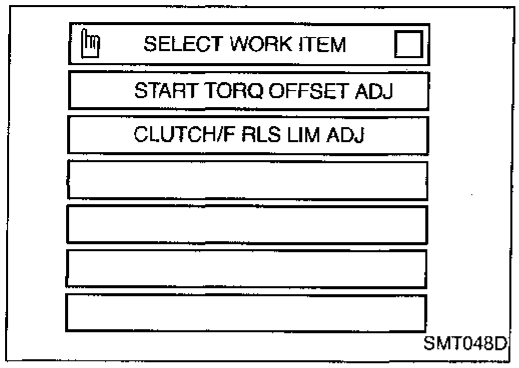
CONSULT setting procedure

1. Turn ignition switch to "OFF" position.
2. Connect CONSULT to data link connector for CONSULT.
3. Turn ignition switch to "ON" position.
4. Touch "START".
5. Touch "ALL MODE 4WD".



6. Touch "WORK SUPPORT".

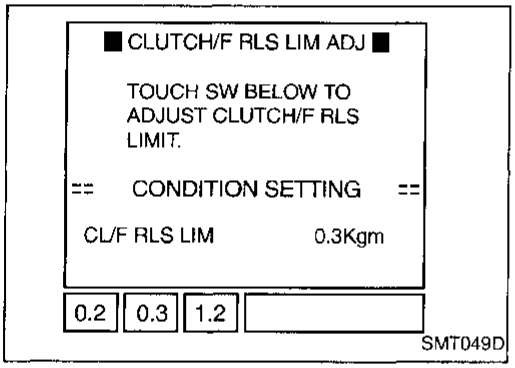
Trouble Diagnosis by CONSULT (Cont'd)



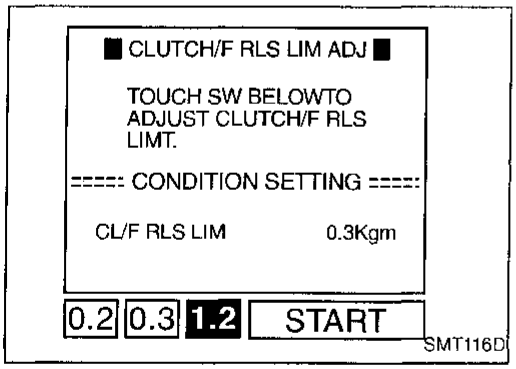
7. Select WORK ITEM by touching "CLUTCH/F RLS LIM ADJ".

CLUTCH FORCE RELEASE LIMIT ADJUSTMENT

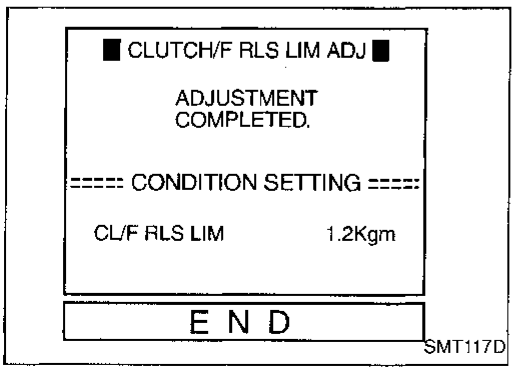
1.2 kg-m: Tight corner braking symptom is alleviated. However, vibration may occur when accelerating on a low μ road (icy road, etc.).
0.3 kg-m: Initial set value
0.2 kg-m: Do not set to this value because the tight corner braking symptom will get worse.



1. Current CLUTCH FORCE RELEASE LIMIT value "0.3 kg-m" appears under "CONDITION SETTING" on CONSULT display.



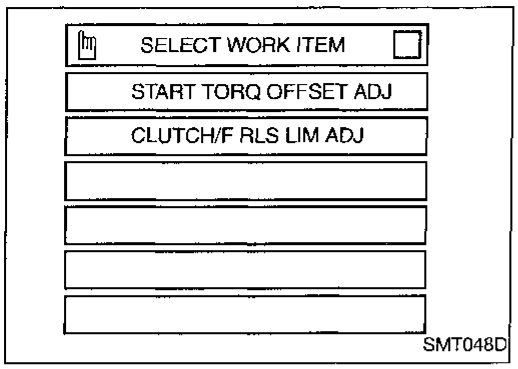
2. Touch "1.2", then "START".



3. When clutch force release limit value is set to "1.2 kg-m", current value "0.3 kg-m" shown on display will be replaced by "1.2 kg-m" and "END" will appear at the same time. Clutch force release limit value setting is now complete.

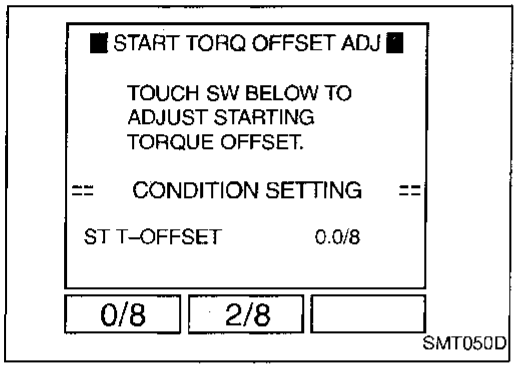
Trouble Diagnosis by CONSULT (Cont'd)

STARTING TORQUE OFFSET ADJUSTMENT

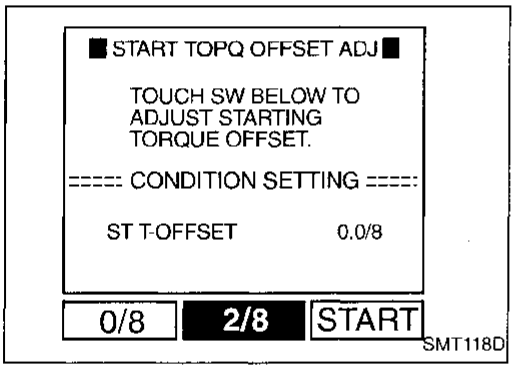


0.0/8: Initial set value
2/8: Tight corner braking symptom is alleviated. However, vehicle acceleration performance from standstill will get worse on a low μ road (snow-covered or icy road).

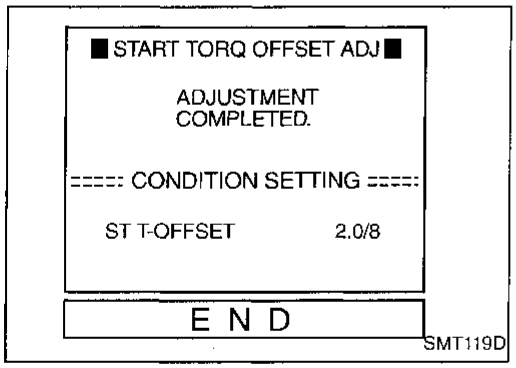
1. Return to "SELECT WORK ITEM" on CONSULT display. Touch "START TORQ OFFSET ADJ".



2. Current START TORQUE OFFSET value "0.0/8" appears under "CONDITION SETTING" on display.



3. Touch "2/8" to adjust the starting torque offset from "0.0/8" to "2.0/8".



4. When start torque offset value is set to "2.0/8", current value "0.0/8" will be replaced by "2.0/8" and "END" will appear at the same time. Start torque offset value setting is now complete.

Precautions

When a malfunction (indicated by the 4WD warning lamp illumination) occurs, collect information first from the customer about how the malfunction occurs. Then, proceed with the diagnosis presuming it is the cause. Also inspect the electrical system, paying close attention to other possibilities such as fluid level and leaks.

System Description

DESCRIPTION

All-mode 4WD transfer and A/T are controlled by one and the same control unit and common sensors.
If a malfunction occurs in the all-mode 4WD system, the 4WD warning lamp lights up to inform of the system malfunction. There are two ways to identify the cause of the malfunction.

1. Performing the self-diagnosis. (The 4WD warning lamp will indicate what kind of malfunction has occurred by flickering.)
2. Performing diagnosis using CONSULT.

Diagnostic Worksheet

INFORMATION FROM CUSTOMER

KEY POINTS
WHAT ..... Vehicle model
WHEN ..... Date, Frequencies
WHERE ..... Road conditions
HOW ..... Operating conditions, Symptoms

Customer name MR/MS	Model & Year	VIN
Transfer model ATX14A	Engine	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	☐ Continuous ☐ Intermittent (times a day)	
Symptoms	☐ 4WD shift indicator lamp does not turn on.	
	☐ 4WD warning lamp does not turn on.	
	☐ 4WD shift indicator lamp does not turn off.	
	☐ ATP warning lamp does not turn on.	
	☐ 4LO indicator lamp does not turn on.	
	☐ 4WD shift indicator lamp does not indicate "LOCK".	
	☐ 4WD shift indicator lamp repeats flicking.	
	☐ Tight corner braking symptom occurs.	
	☐ 4WD system does not operate.	
	☐ Others.	
4WD warning lamp	☐ Continuously lit	☐ Not lit

Diagnostic Worksheet (Cont'd)

DIAGNOSTIC WORKSHEET

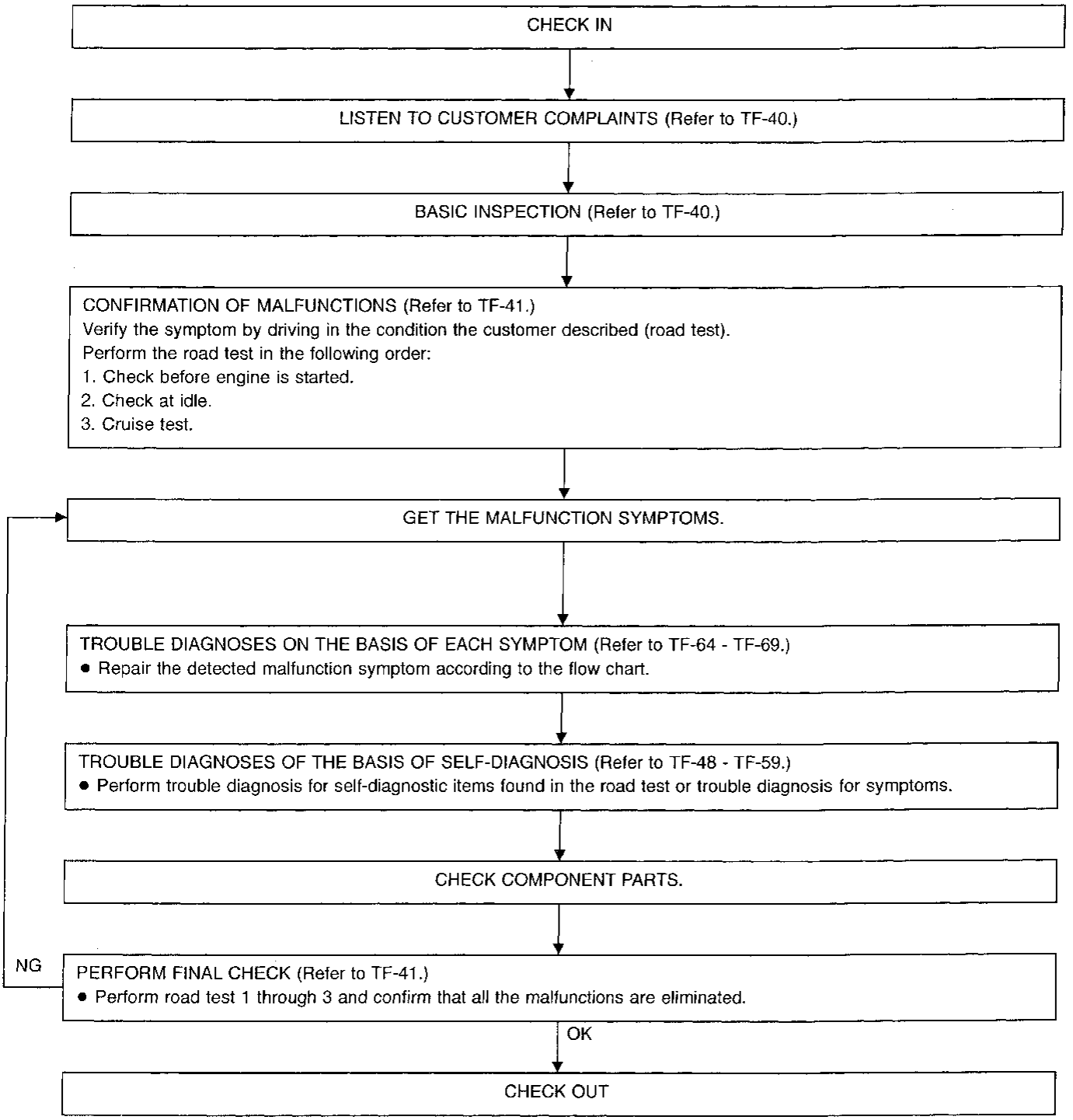
1.	☐ Listen to customer complaints.	TF-40
2.	☐ Check transfer fluid.	TF-40
	☐ Leakage ☐ Fluid condition ☐ Fluid level	
3.	☐ Road testing	TF-41
	☐ ① Check before engine is started. ☐ ② Check at idle. ☐ ③ Cruise test	
4.	☐ Perform self-diagnosis NG items.	TF-26
5.	☐ Check component. Repair or replace the damaged parts.	TF-60
6.	☐ Perform final check. Perform road test 3 (① through ③).	TF-41

Work Flow

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Make good use of the two sheets provided, "INFORMATION FROM CUSTOMER" (Refer to TF-37.) and "DIAGNOSTIC WORKSHEET" (Refer to TF-38.), to perform the best troubleshooting possible.



Listen to Customer Complaints

- Each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.
- Listen to the customer about how and when the malfunction occurs, and make good use of it when performing the road test.

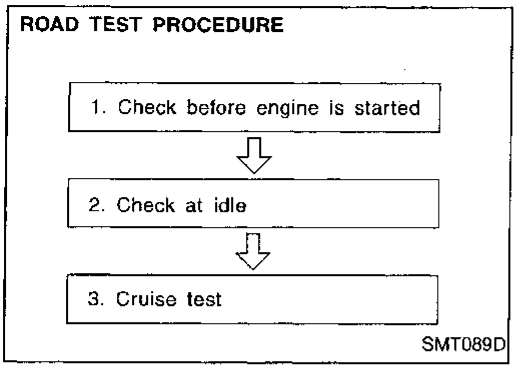
Preliminary Check

BASIC INSPECTION

Transfer fluid

- Check fluid for leaks and fluid level. (Refer to MA section "CHASSIS AND BODY MAINTENANCE".)

Preliminary Check (Cont'd)



ROAD TESTING

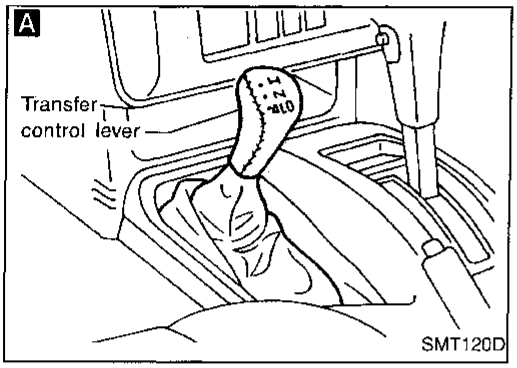
Preparation for road test

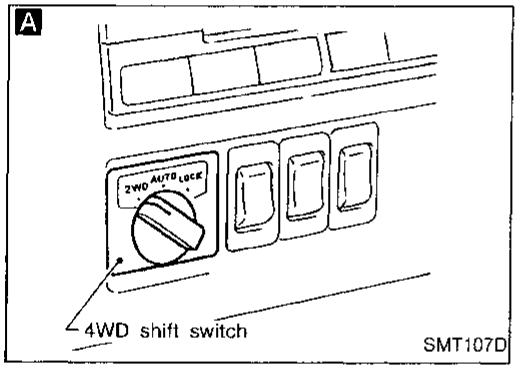
- The purpose of the test is to determine overall performance of transfer and analyze causes of problems.
- The road test consists of the following three parts:
- When a malfunction is found in any part of transfer, perform the road test to locate the malfunction area and repair the malfunction parts.

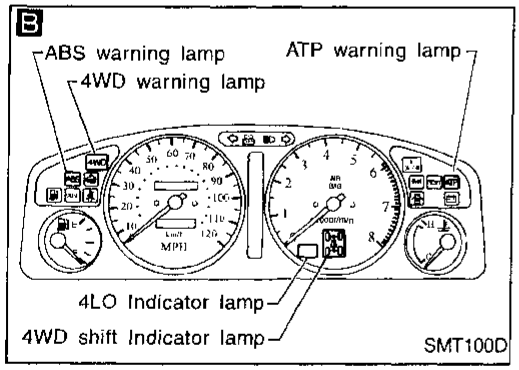
1. Check before engine is started
2. Check at idle
3. Cruise test

- Perform road test and place checks for NG items on the diagnostic worksheet. Refer to TF-38.

1. Check before engine is started







A

1. Park vehicle on flat surface.
2. Turn ignition switch to "OFF" position.
3. Move A/T selector lever to "P" position.
4. Move T/F control lever to "H" position.
5. Set 4WD shift switch to "2WD" position.

↓

Turn ignition switch to "ON" position. (Do not start engine.)

↓

B

Does 4WD shift indicator lamp turn ON for approx. 1 second? — No → Go to SYMPTOM 1. Refer to TF-64.

↓ Yes

B

Is 4WD warning lamp turned ON? — No → Go to SYMPTOM 2. Refer to TF-65.

↓ Yes

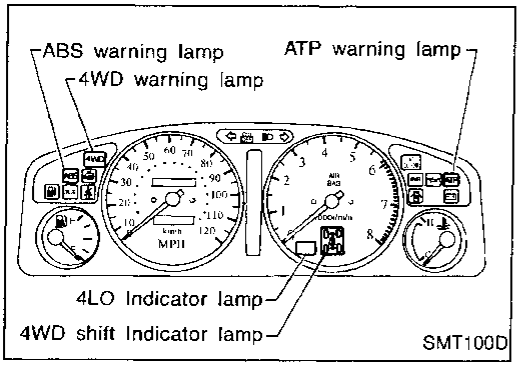
1. Turn ignition switch to "OFF" position.
2. Perform self-diagnosis.
   Refer to "Trouble Diagnosis by Self-diagnosis", TF-23.

↓

Go to "Check at idle". Refer to TF-42.

Preliminary Check (Cont'd)

2. Check at idle



1. Park vehicle on flat surface.
2. Turn ignition switch to "OFF" position.
3. Move A/T selector lever to "P" or "N" position.
4. Move T/F control lever to "H" position.
5. Set 4WD shift switch to "2WD" position.

↓

Start engine.

↓

Is 4WD indicator lamp turned OFF? — Yes → Go to ATP SWITCH CIRCUIT CHECK. Refer to TF-55.

No ↓

Is 4WD warning lamp turned OFF? — No → Perform self-diagnosis. Refer to "Trouble Diagnosis by Self-diagnosis", TF-23.

Yes ↓

Set 4WD shift switch to "2WD", "AUTO", "LOCK", "AUTO" and "2WD" in order. (Stay at each switch position for at least 1 second.)

↓

A

Does 4WD indicator lamp change properly or does buzzer sound? — No →
- Go to 4WD SHIFT SWITCH CIRCUIT CHECK. Refer to TF-50.
- Go to 2-4WD SHIFT SOLENOID VALVE CIRCUIT CHECK. Refer to TF-50.

Yes ↓

4WD warning lamp turns ON. — Yes → Perform self-diagnosis. (Refer to "Trouble Diagnosis by Self-diagnosis", TF-23.)

No ↓

Move A/T selector lever to "P" position.

↓

B

1. Move T/F control lever from "H" to "4LO".
2. While shifting from "H" to "4LO", does 4WD shift indicator lamp turn OFF and ATP warning lamp turn ON? (*1)

No → Go to SYMPTOMS 3 and 4. Refer to TF-66.

*1: After ATP warning lamp is turned ON, when it is hard to shift to "4LO", move A/T selector lever to "N" position.

Yes ↓

B

Does 4WD indicator lamp indicate "LOCK" and 4LO indicator lamp turn ON when T/F control lever is set in "4LO"? — No → Go to SYMPTOM 6. Refer to TF-68.

Yes ↓

1. Move T/F control lever from "4LO" to "H".
2. Does 4WD indicator lamp flicker? (*2)

No → Go to "Cruise test". Refer to TF-43.

*2: While "Wait" function is operating, 4WD shift indicator lamp flashes.

Yes ↓

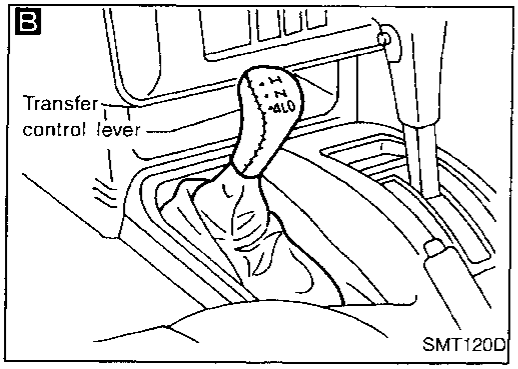
Go to SYMPTOM 7. Refer to TF-68.

A

4WD shift switch operation	4WD shift indicator lamp	4WD warning lamp	Buzzer sound
2WD		4WD OFF	
			"Pip"
AUTO		4WD OFF	
			"Pip"
LOCK		4WD OFF	
			"Pip"
AUTO		4WD OFF	
			"Pip"
2WD		4WD OFF	

SMT090D

B



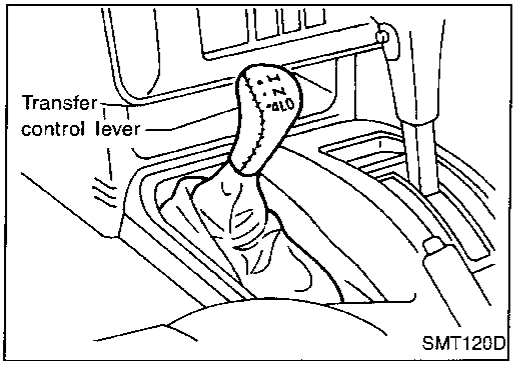
B

TF control lever operation	4WD shift indicator lamp	4WD warning lamp
4LO		4WD OFF

4LO indicator lamp

SMT121D

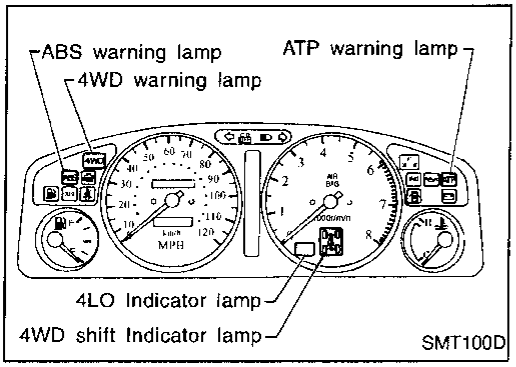
Preliminary Check (Cont'd)



3. Cruise test

1. Warm up engine sufficiently.
2. Park vehicle on flat surface.
3. Move A/T selector lever to "P" position.
4. Move T/F control lever to "H" position.
5. Set 4WD shift switch to "AUTO" position.
6. Start engine.

A

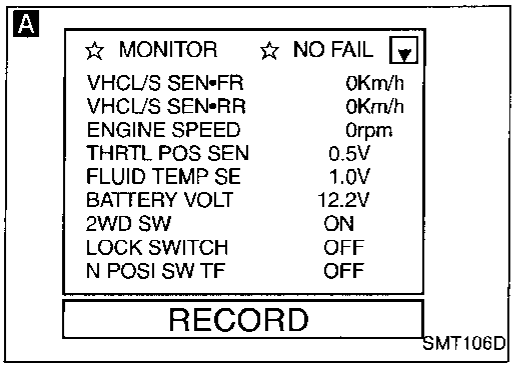


Drive for at least 30 seconds at a speed higher than 20km/h (12 MPH).
(Drive vehicle until "FLUID TEMP SE" exceeds 0.9V.)

Park vehicle on flat surface.

1. Move A/T selector lever to "P" position.
2. Set 4WD shift switch to "2WD" position.

A



Leave vehicle for at least 80 seconds with "FLUID TEMP SE" at 0.9V or less.

4WD warning lamp turns ON. — Yes → Perform self-diagnosis. Refer to "Trouble Diagnosis without CONSULT", TF-23.

No

1. Set 4WD shift switch to "AUTO" position.
2. Drive vehicle at speed lower than 20km/h (12 MPH) with steering wheel fully turned.

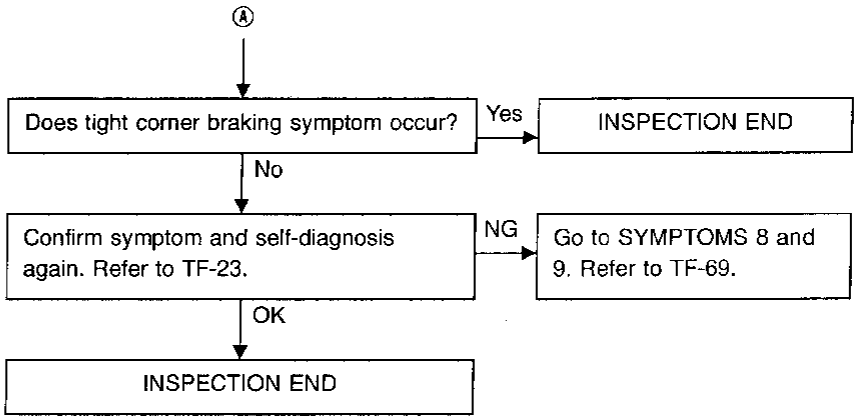
Does tight corner braking symptom occur? — Yes → Confirm symptom and self-diagnosis again. Refer to TF-23. — NG → Go to SYMPTOMS 8 and 9. Refer to TF-69.

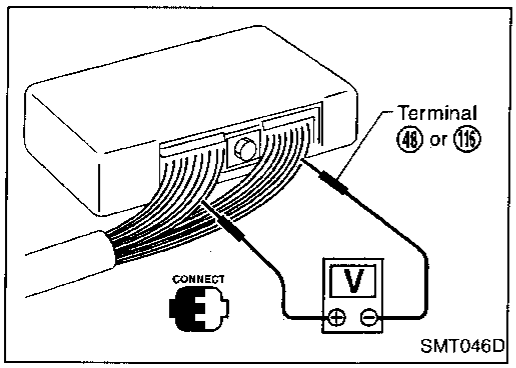
No

1. Set 4WD shift switch to "LOCK" position.
2. Drive vehicle at speed lower than 20km/h (12 MPH) with steering wheel fully turned.

Ⓐ

Preliminary Check (Cont'd)

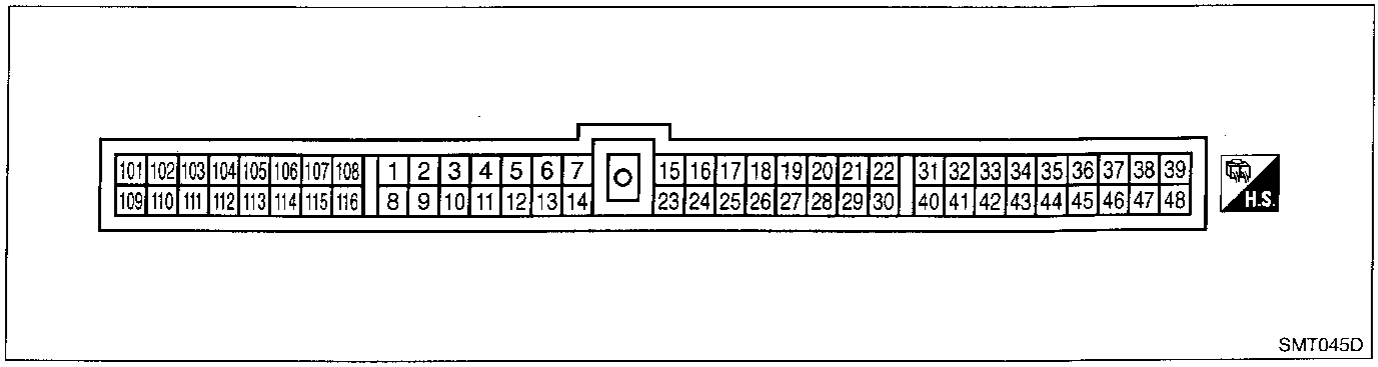




Electrical Components Inspection

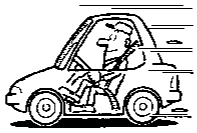
INSPECTION OF A/T CONTROL UNIT

- Measure voltage between each terminal and terminal 48 or 116 by following "A/T CONTROL UNIT INSPECTION TABLE".
- Pin connector terminal layout



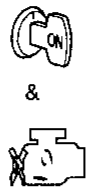
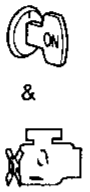
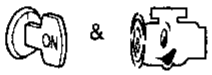
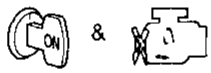
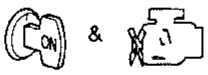
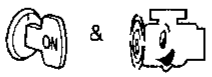
A/T CONTROL UNIT INSPECTION TABLE

(Data are reference values.)

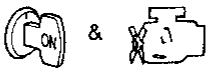
Terminal No.	Item	Condition		Judgement standard
2	4WD warning lamp	 & 	After IGN. ON (more than 2 seconds)	1V or less
			Except above	Battery voltage
6	4WD shift switch (2WD)		When 4WD shift switch is set to "2WD".	Battery voltage
			Except "2WD"	1V or less
7	4WD shift switch (LOCK)		When 4WD shift switch is set to "LOCK".	Battery voltage
			Except "LOCK"	1V or less
13	ABS signal		When ABS is being operated.	1V or less
			ABS is not operated.	4.5 - 5.5V
14	Clutch pressure switch	 & 	When 4WD shift switch is set to "2WD", "AUTO" or "LOCK" in D position and waiting mechanism is not operated.	Battery voltage
			When 4WD shift switch is set to "2WD", "AUTO" or "LOCK" in D position and waiting mechanism is being operated.	
15*1	Transfer motor relay monitor		When transfer motor relay is turned "ON". (more than 2 seconds)	Battery voltage
			When transfer motor relay is turned "OFF".	1V or less

*1: Refer to TF-47.

Electrical Components Inspection (Cont'd)

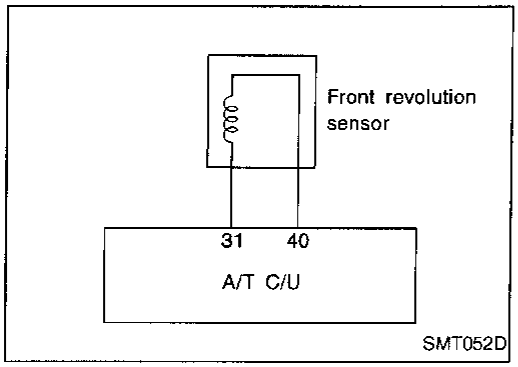
Terminal No.	Item	Condition		Judgement standard
16	Transfer fluid temperature sensor		At 20°C	Approx. 1.5V
			At 80°C	Approx. 0.5V
23	Dim terminal		When tail lamp is turned OFF.	1V or less
			When tail lamp is turned ON.	Battery voltage
24	Neutral-4LO switch		When transfer control lever is set to "4LO" position.	0V
			When transfer control lever is set to "H" position.	Battery voltage
25	Transfer ATP SWITCH		When transfer control lever is set to "H" or "4LO" position.	Battery voltage
			When transfer control lever is set to between "H" and "4LO" position.	1V or less
26	Transfer line pressure switch		When 4WD shift switch is set to "2WD", "AUTO" or "LOCK" in D position and waiting mechanism is not operated.	Battery voltage
			When 4WD shift switch is set to "2WD", "AUTO" or "LOCK" in D position and waiting mechanism is being operated.	1V or less
27	Transfer waiting detection switch		When transfer control lever is shifted to "H" position.	Battery voltage
			When transfer control lever is shifted to "4LO" position.	1V or less
31	Front revolution sensor		A/T, D position and brake ON	0V
			Driving at 30 km/h in D position	Voltage is inproportion to vehicle speed [more than 1V at 30 km/h (19 MPH)]
48	Ground	—	—	—
107	2-4WD shift solenoid valve		When 4WD shift switch is set to "2WD".	1V or less
			When 4WD shift switch is set to "LOCK".	Battery voltage
108	Power source	—	—	—
109	4WD solenoid valve		When 4WD shift switch is set to "AUTO".	Approximately 2.8V
			When 4WD shift switch is set to "2WD".	Less than 1V
110	Transfer dropping resistor		When 4WD shift switch is set to "AUTO".	Battery voltage
			When 4WD shift switch is set to "2WD".	Less than 1V

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
111*1	Transfer motor relay		When transfer motor relay is turned ON. (more than 2 seconds)	1V or less
			When transfer motor relay is turned OFF.	Battery voltage
112	2WD indicator lamp		After engine is turned ON and 4WD shift switch is set to "2WD".	1V or less
			4WD shift switch is set except "2WD".	Battery voltage
113	AUTO indicator lamp		After engine is turned ON and 4WD shift switch is set to "AUTO".	1V or less
			4WD shift switch is set except "AUTO".	Battery voltage
114	LOCK indicator lamp		After engine is turned ON and 4WD shift switch is set to "LOCK".	1V or less
			4WD shift switch is set except "AUTO".	Battery voltage
115	Power source	—	—	—
116	Ground	—	—	—

*1: Operation for transfer motor relay

Throttle valve	Transfer control lever	4WD shift SW	A/T selector lever	Motor/Motor relay	Note
Full-open	H	2WD	—	OFF	—
		AUTO	P, N	OFF	After selected P or N
			Except P, N	ON	ON time is about two seconds.
		LOCK	P, N	OFF	After selected P or N
			Except P, N	ON	ON time is about two seconds.



Vehicle Speed Sensor (Front revolution sensor)

DIAGNOSTIC PROCEDURE

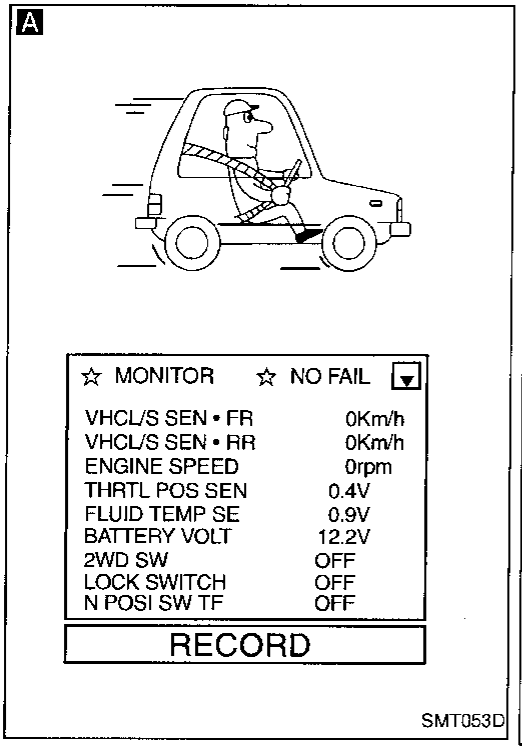
REVOLUTION SENSOR (FRONT)
Refer to "Component Inspection", TF-61.

NG → Check the following.
- Continuity of transfer sub-harness.
  Refer to "Component Inspection", TF-62.

If OK, repair or replace front revolution sensor.

OK ↓

A



CHECK INPUT SIGNAL.
1. Start engine.

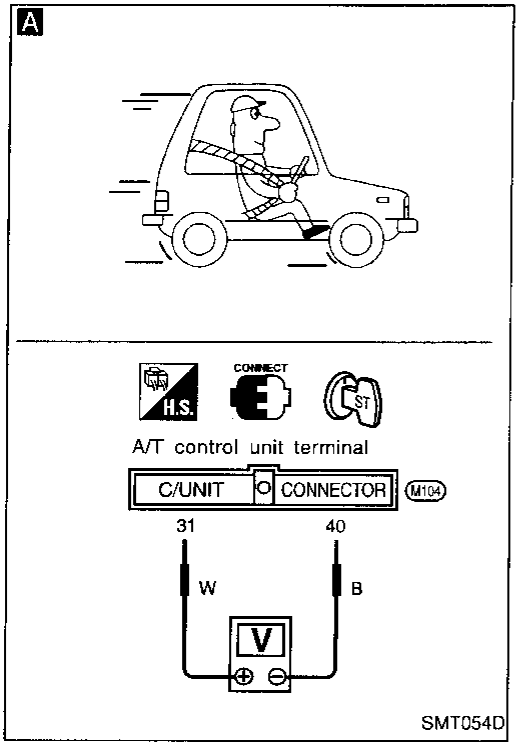
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "VEHICLE SPEED SENSOR (FRONT)" while driving.
4. Check if the value changes according to accelerating and decelerating the vehicle.

NG → Check harness continuity between A/T control unit and revolution sensor sub-harness connector.

2. Check voltage between A/T control unit harness connector terminals ㉛ and ㊵.
(Measure it in AC range.)
Voltage:
0 km/h (0 MPH): 0V
30 km/h (19 MPH):
More than 1V
(Voltage rises gradually in response to vehicle speed.)

OK ↓

A

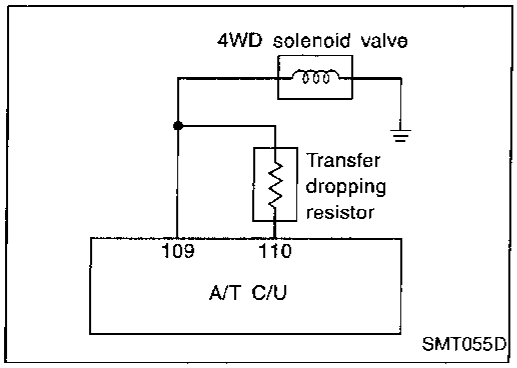


After driving for a while, perform self-diagnosis again. Refer to TF-23.

NG →
1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END



4WD Solenoid Valve

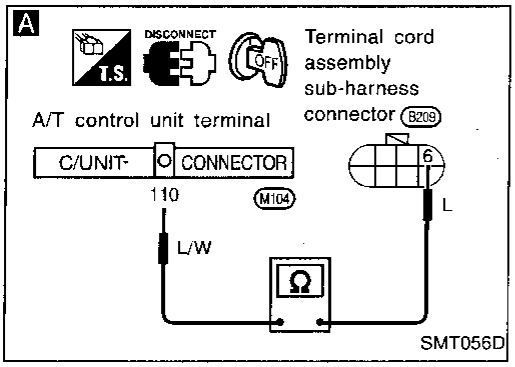
DIAGNOSTIC PROCEDURE

CHECK 4WD SOLENOID VALVE.
Refer to "Component Inspection", TF-60.

NG → Check the following.
- Continuity of transfer sub-harness.
  Refer to "Component Inspection", TF-62.
- If OK, repair or replace 4WD solenoid valve.

OK ↓

A

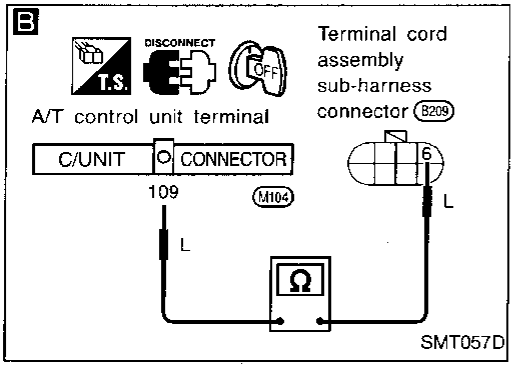


CHECK POWER SOURCE CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between transfer terminal cord assembly sub-harness connector terminal ⑥ and A/T control unit harness connector terminal (110).
   Resistance: 11.2 - 12.8Ω

NG → Check the following.
- Transfer dropping resistor
  Refer to "Component Inspection", TF-61.
- Continuity between transfer terminal cord assembly sub-harness connector terminal ⑥ and A/T control unit harness connector terminal (110).

OK ↓

B



CHECK POWER SOURCE CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Check continuity between transfer terminal cord assembly sub-harness connector terminal ⑥ and A/T control unit harness connector terminal (109).
   Continuity should exist.

NG → Check the following.
- Repair or replace harness between transfer terminal cord assembly sub-harness connector terminal ⑥ and A/T control unit harness connector terminal (109).

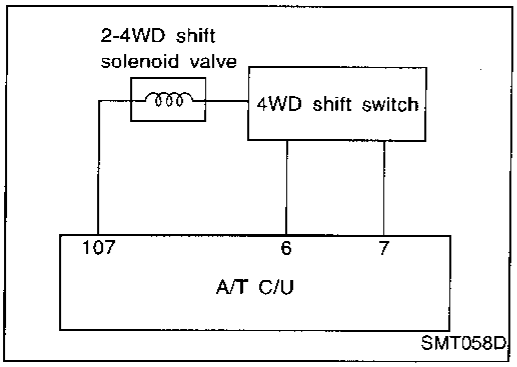
OK ↓

After driving for a while, perform self-diagnosis. Refer to TF-23.

NG → 1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END



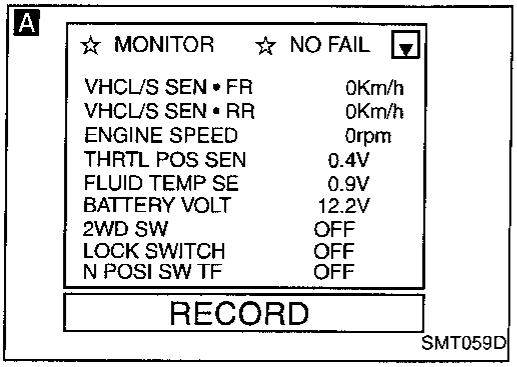
2-4WD Shift Solenoid Valve and 4WD Shift Switch

DIAGNOSTIC PROCEDURE

CHECK 2-4WD SHIFT SOLENOID VALVE AND 4WD SHIFT SWITCH.
Refer to "Component Inspection", TF-60.

NG → Check the following.
- Continuity of transfer sub-harness
  Refer to "Component Inspection", TF-62.
- If OK, repair or replace 2-4WD solenoid valve and 4WD shift switch.

OK ↓



A

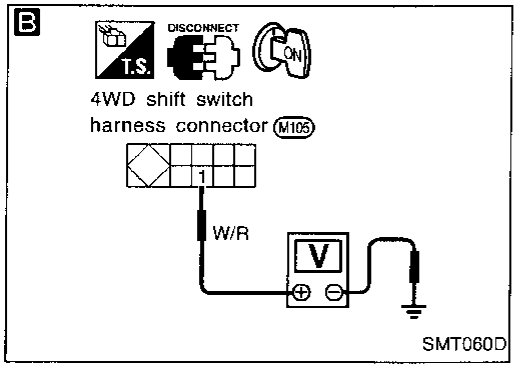
CHECK INPUT SIGNAL.

1. Select "ECU INPUT SIGNALS" in Data Monitor.
2. Read out ON/OFF status of "2WD SW" and "LOCK SWITCH".
   Refer to TF-32.

OK → 1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

- For 2-4WD shift solenoid valve
  Check voltage between A/T control unit harness connector terminals (107) and body ground. Refer to TF-45.
- For 4WD shift switch
  Check voltage between A/T control unit harness connector terminals ⑥ and body ground, and A/T control unit harness connector terminals ⑦ and body ground. Refer to TF-45.

NG ↓



B

CHECK 4WD SHIFT SWITCH POWER SOURCE.

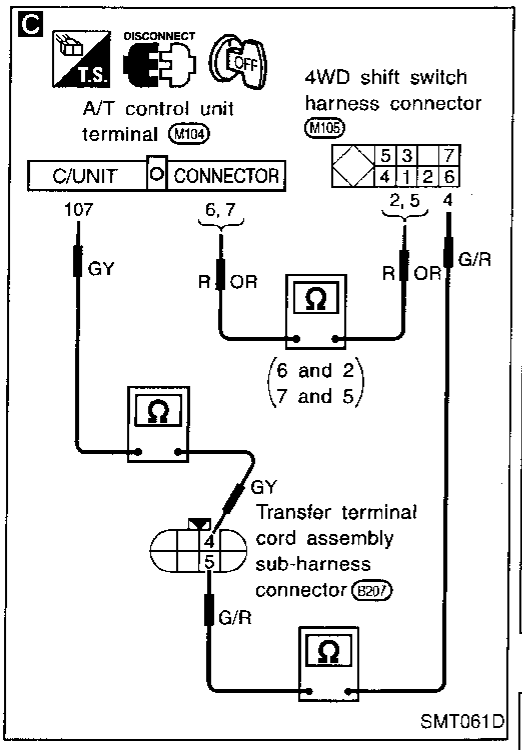
1. Disconnect 4WD shift switch harness connector.
2. Turn ignition switch to "ON" position.
3. Check voltage between 4WD shift switch harness connector terminal ① and body ground.
   Voltage: Battery voltage

NG → Check the following.
- No. 8 fuse (10A)
- Continuity between ignition switch 4WD shift switch

OK ↓

Ⓐ

2-4WD Solenoid Valve and 4WD Shift Switch (Cont'd)



Ⓐ

C

CHECK HARNESS CONTINUITY.
1. Turn ignition switch to "OFF" position.
2. Check continuity between the following terminals:
   A/T control unit ⑥ and 4WD shift switch ②
   A/T control unit ⑦ and 4WD shift switch ⑤
   A/T control unit (107) and Transfer terminal cord assembly sub-harness connector ④
   4WD shift switch ④ and Transfer terminal cord assembly sub-harness connector ⑤
   Continuity should exist.

NG → Repair harness or connector.

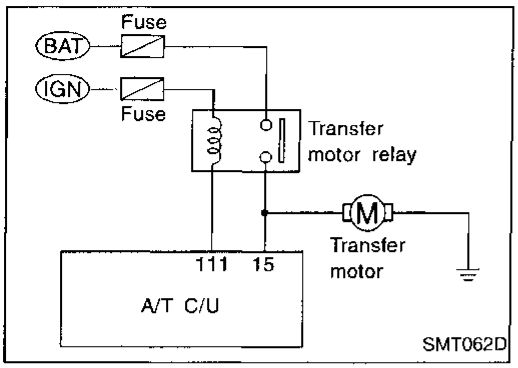
OK ↓

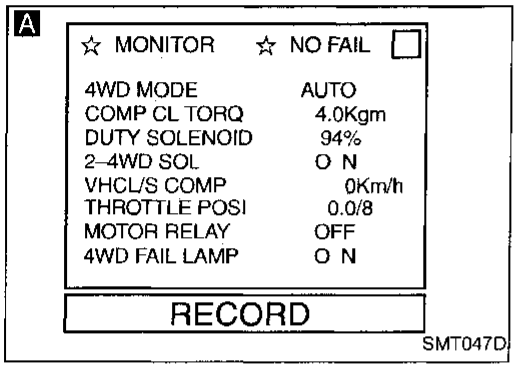
After driving for a while, perform self-diagnosis again. Refer to TF-23.

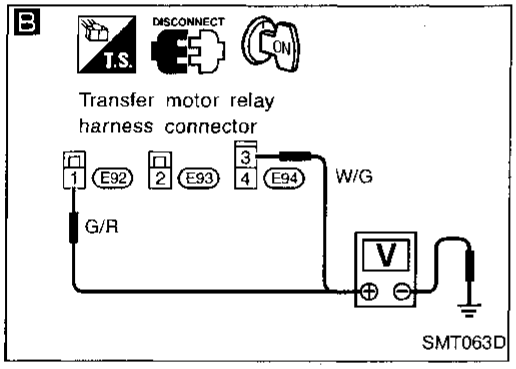
NG →
1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END







Transfer Motor and Transfer Motor Relay

DIAGNOSTIC PROCEDURE

CHECK TRANSFER MOTOR AND TRANSFER MOTOR RELAY.
Refer to "Component Inspection", TF-61, TF-62.

NG → Check the following.
- Continuity of transfer sub-harness
  Refer to "Component Inspection", TF-62.

If OK, repair or replace transfer motor and transfer motor relay.

OK ↓

A

CHECK INPUT SIGNAL.

1. Select "ECU INPUT SIGNALS" in Data Monitor.
2. Read out ON/OFF status of "MOTOR RELAY".
   Refer to TF-32.
3. When the value is different from standard value although ON/OFF switching occurs, check the following items.

- Inhibitor switch, throttle position sensor, closed throttle position switch circuits (Refer to "TROUBLE DIAGNOSES" in AT section.)

NG → 1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

- For transfer motor
  Check voltage between A/T control unit harness connector terminal (111) and body ground. Refer to TF-45.
- For transfer relay
  Check voltage between A/T control unit harness connector terminal ⑮ and body ground. Refer to TF-45.

OK ↓

B

CHECK TRANSFER MOTOR RELAY POWER SOURCE.

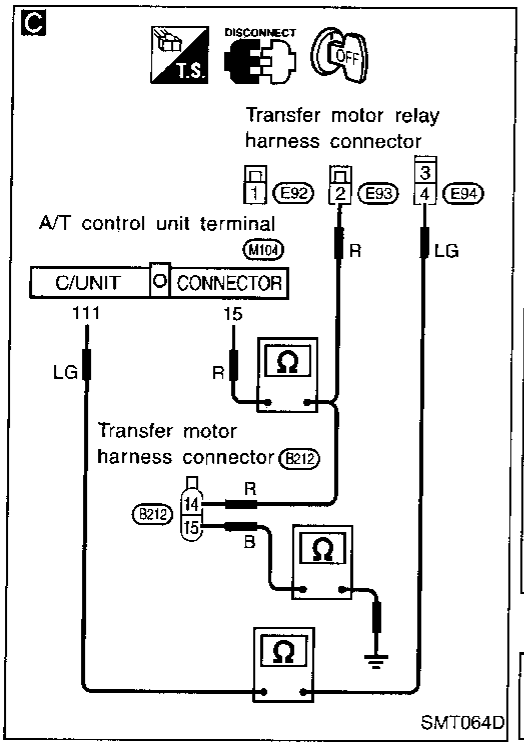
1. Disconnect transfer motor relay harness connector.
2. Turn ignition switch to "ON" position.
3. Check voltage between transfer motor relay harness connector terminals ①, ③ and body ground.
   Voltage: Battery voltage

NG → Check the following.
- No. 55 fuse (20A)
- No. 8 fuse (10A)
- Harness continuity between fuse and transfer motor relay

OK ↓

Ⓐ

Transfer Motor and Transfer Motor Relay (Cont'd)



Ⓐ

C

CHECK HARNESS CONTINUITY.
1. Turn ignition switch to "OFF" position.
2. Check continuity between the following terminals.
   A/T control unit ⑮ and Transfer motor ⑭
   A/T control unit ⑮ and Transfer motor relay ②
   A/T control unit (111) and Transfer motor relay ④
   Transfer motor ⑮ and body ground
   Continuity should exist.

NG → Repair or replace harness or connector.

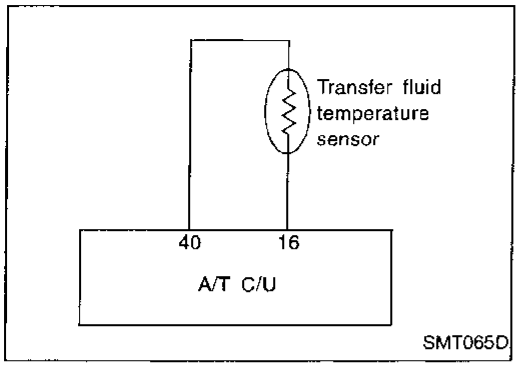
OK ↓

After driving for a while, perform self-diagnosis again. Refer to TF-23.

NG → 1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END



Transfer Fluid Temperature Sensor

DIAGNOSTIC PROCEDURE

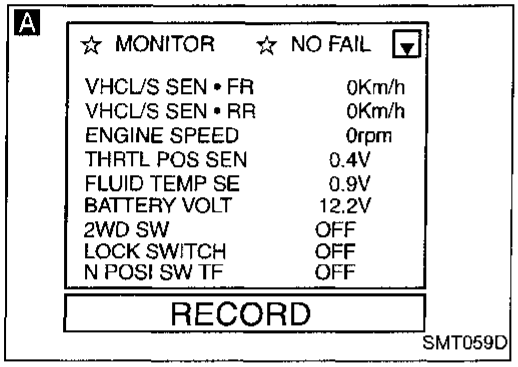
CHECK TRANSFER FLUID TEMPERATURE SENSOR.
Refer to "Component Inspection", TF-60.

NG → Check the following.
- Continuity of transfer sub-harness. Refer to TF-62.

If OK, repair or replace fluid temperature sensor.

OK ↓

A



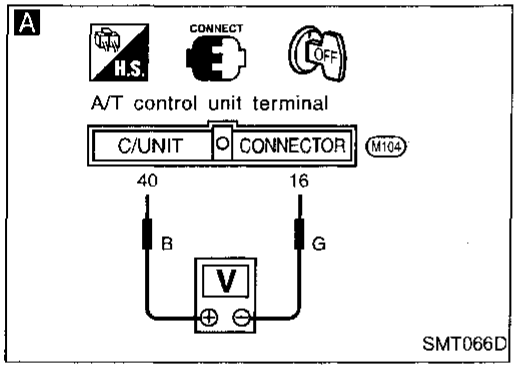
CHECK TRANSFER FLUID TEMPERATURE SENSOR INPUT SIGNAL CIRCUIT.

1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "FLUID TEMP SE". Refer to TF-32.

Voltage:
80°C (176°F): Approx. 0.5V
20°C (68°F): Approx. 1.5V

NG → Check the following.
- Continuity between A/T control unit and transfer terminal cord assembly sub-harness connector.

A



1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check voltage between A/T control unit harness connector terminals ⑯ and ㊵.

Voltage:
80°C (176°F): Approx. 0.5V
20°C (68°F): Approx. 1.5V

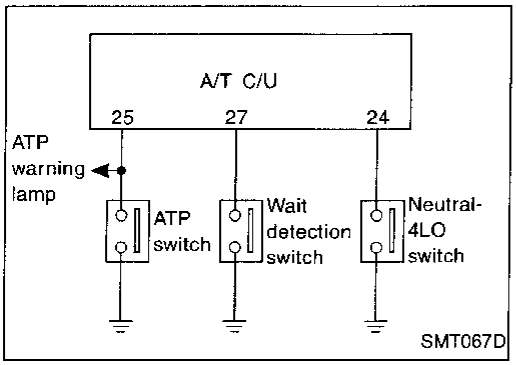
OK ↓

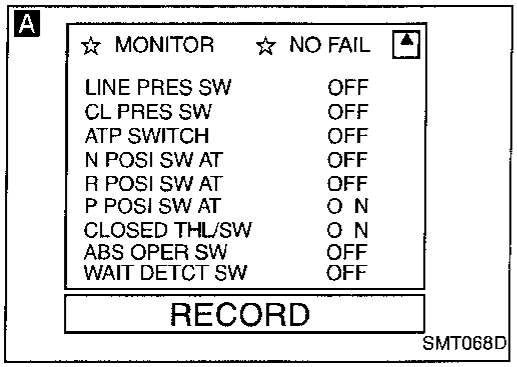
After driving for a while, perform self-diagnosis again. Refer to TF-23.

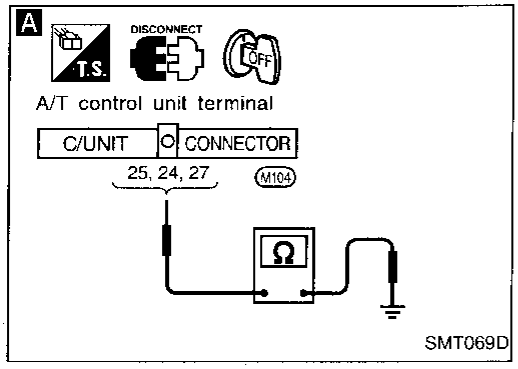
NG →
1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

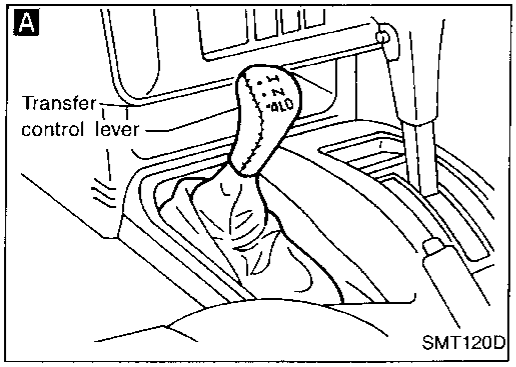
OK ↓

INSPECTION END









ATP Switch, Wait Detection Switch and Neutral-4LO Switch

DIAGNOSTIC PROCEDURE

CHECK ATP SWITCH, WAIT DETECTION SWITCH AND NEUTRAL-4LO SWITCH.
Refer to "Component Inspection", TF-61.

NG → Check the following.
- Continuity of transfer sub-harness
  Refer to "Component Inspection", TF-62.

If OK, repair or replace ATP switch, wait detection switch or neutral-4LO switch.

OK ↓

A

CHECK INPUT SIGNAL.

NG → Check the following.
- Harness continuity between transfer switch assembly sub-harness connector and A/T control unit
- Continuity between transfer switch assembly sub-harness connector and body ground

1. Select "ECU INPUT SIGNALS" in Data Monitor.
2. Read out the ON/OFF status of "ATP SW", "WAIT DETCT SW" and "NEUTRAL SW".
   Refer to TF-32.

1. Turn ignition switch to "OFF" position.
2. Operate T/F shift lever and check continuity between the following terminals.

Continuity:

Terminal ㉕ (ATP switch) and body ground
- **"H" position: No continuity should exist.**
- **Between "H" and "4LO": Continuity should exist.**
- **"4LO" position: No continuity should exist.**

Terminal ㉔ (Neutral-4LO switch) and body ground
- **"H" position: No continuity should exist.**
- **"4LO" position: Continuity should exist.**

Terminal ㉗ (Wait detection switch) and body ground
- **"H" position: No continuity should exist. (*1)**
- **"4LO" position: Continuity should exist.**

*1: After shifting from "4LO" to "H", continuity exists while "Wait" function is operating in "H" position. (No continuity exists when "Wait" function is canceled.)

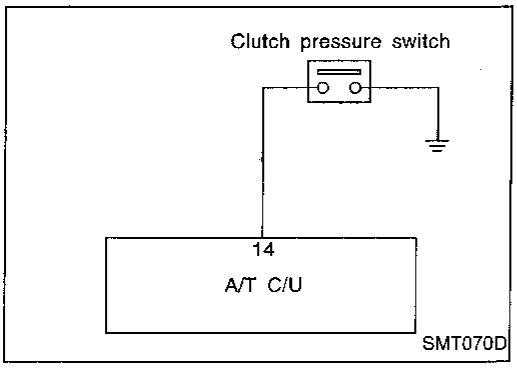
OK ↓

After driving for a while, perform self-diagnosis again. Refer to TF-23.

NG → 1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END



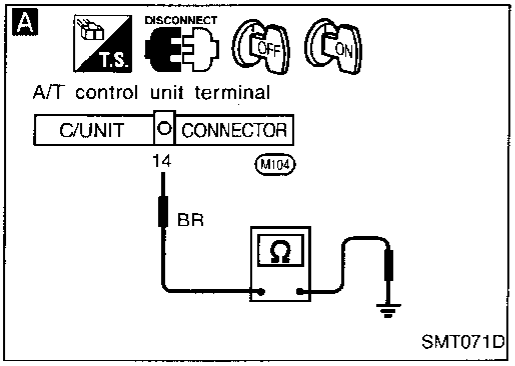
A

☆ MONITOR	☆ NO FAIL
LINE PRES SW	OFF
CL PRES SW	OFF
ATP SWITCH	OFF
N POSI SW AT	OFF
R POSI SW AT	OFF
P POSI SW AT	O N
CLOSED THL/SW	O N
ABS OPER SW	OFF
WAIT DETCT SW	OFF

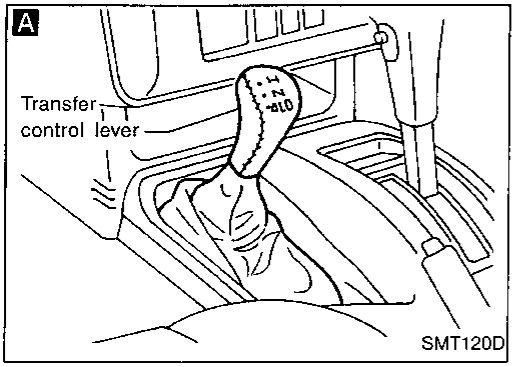
RECORD

SMT068D

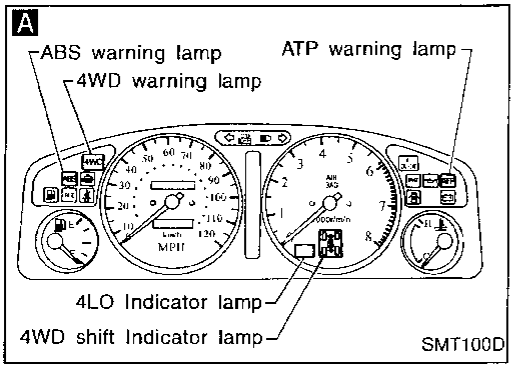
A



A



A



Clutch Pressure Switch

DIAGNOSTIC PROCEDURE

Is this malfunction detected only while driving in reverse?

Yes → **CHECK A/T INHIBITOR "R" POSITION SWITCH.** (Refer to "TROUBLE DIAGNOSES" in AT section.)

No ↓

Are other malfunctions also detected by self-diagnosis and CONSULT?

Yes → **CHECK FOR OTHER MALFUNCTIONS.** (When other malfunctions are eliminated, clutch pressure switch malfunction display may disappear.)

No ↓

Check 2-4WD shift solenoid valve and 4WD shift switch circuits.

NG → Check, repair or replace faulty parts.

OK ↓

A

CHECK INPUT SIGNAL.

1. Turn ignition switch to "ON" position.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out ON/OFF status of "CL PRES SW". Refer to TF-32.

NG → Check the following.
- Continuity between A/T control unit and transfer terminal cord assembly sub-harness connector.
- Transfer sub-harness
- Clutch pressure switch Refer to "Component Inspection", TF-60.

1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Turn ignition switch to "ON" position and set T/F control lever to "H" position.
4. Check continuity between A/T control unit harness connector terminal ⑭ and body ground.
   When 4WD shift switch is in "2WD": No continuity should exist.
   When 4WD shift switch is in "AUTO" or "LOCK" and A/T selector lever is in "D":
   "Wait" not operating: Continuity should exist.
   "Wait" not operating: No continuity should exist.

OK ↓

Check hydraulic parts.

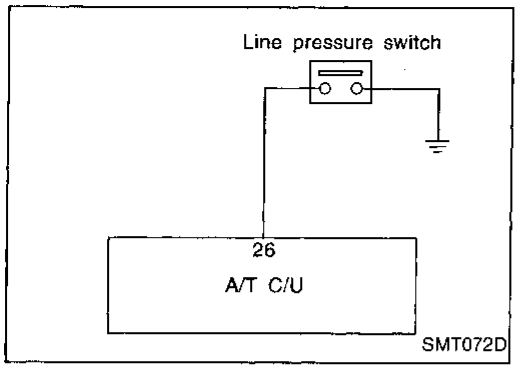
OK ↓

After driving for a while, perform self-diagnosis again. Refer to TF-23.

NG → 1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END

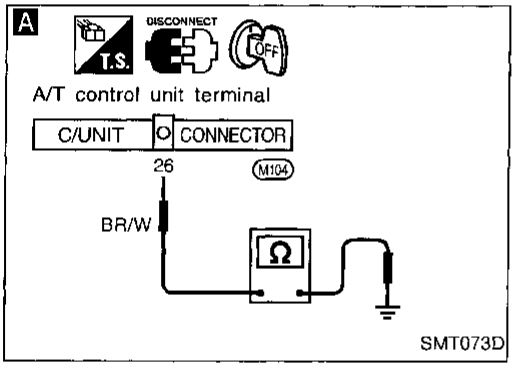


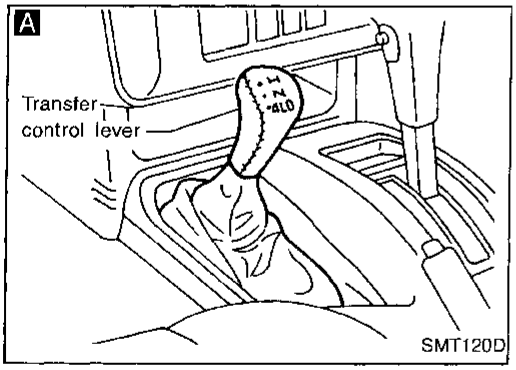
A

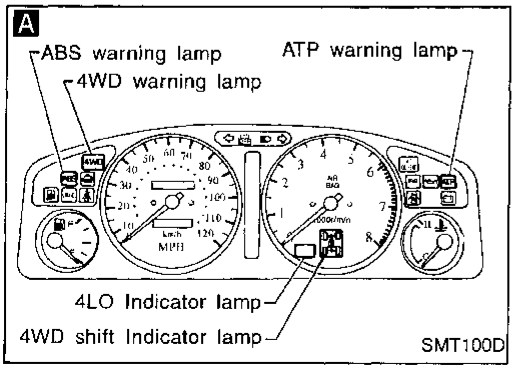
☆ MONITOR	☆ NO FAIL
LINE PRES SW	OFF
CL PRES SW	OFF
ATP SWITCH	OFF
N POSI SW AT	OFF
R POSI SW AT	OFF
P POSI SW AT	O N
CLOSED THL/SW	O N
ABS OPER SW	OFF
WAIT DETCT SW	OFF

RECORD

SMT068D







Line Pressure Switch

DIAGNOSTIC PROCEDURE

Is this malfunction detected only while driving in reverse?

Yes → **CHECK A/T INHIBITOR "R" POSITION SWITCH.** (Refer to "TROUBLE DIAGNOSES" in AT section.)

No ↓

Are other malfunctions also detected by self-diagnosis and CONSULT?

Yes → **CHECK FOR OTHER MALFUNCTIONS.** (When other malfunctions are eliminated, line pressure switch malfunction display may disappear.)

No ↓

A

CHECK INPUT SIGNAL.

NG → Check the following.
- Continuity between A/T control unit and transfer terminal cord assembly sub-harness connector.
- Transfer sub-harness
- Line pressure switch Refer to "Component Inspection", TF-60.

1. Select "ECU INPUT SIGNALS" in Data Monitor.
2. Read out the ON/OFF status of "LINE PRES SW". Refer to TF-32.

1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check continuity between A/T control unit harness connector terminal ㉖ and body ground.
   After the vehicle has been left for at least 5 minutes in a room temperature with ignition switch "OFF":
   No continuity should exist.
   With ignition switch in "ON", T/F control lever in "H", 4WD shift switch in "AUTO" or "LOCK" and A/T selector lever in "D":
   Continuity should exist.

OK ↓

Check hydraulic parts.

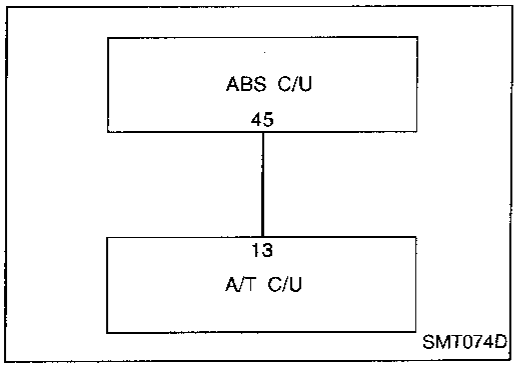
OK ↓

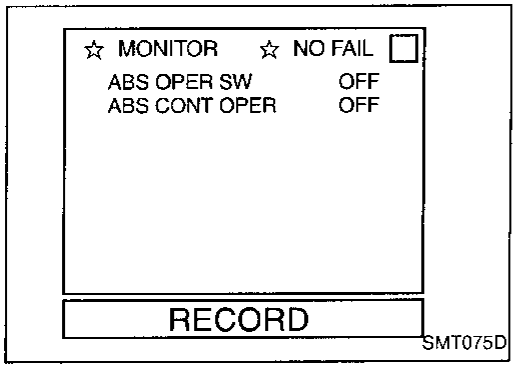
After driving for a while, perform self-diagnosis again. Refer to TF-23.

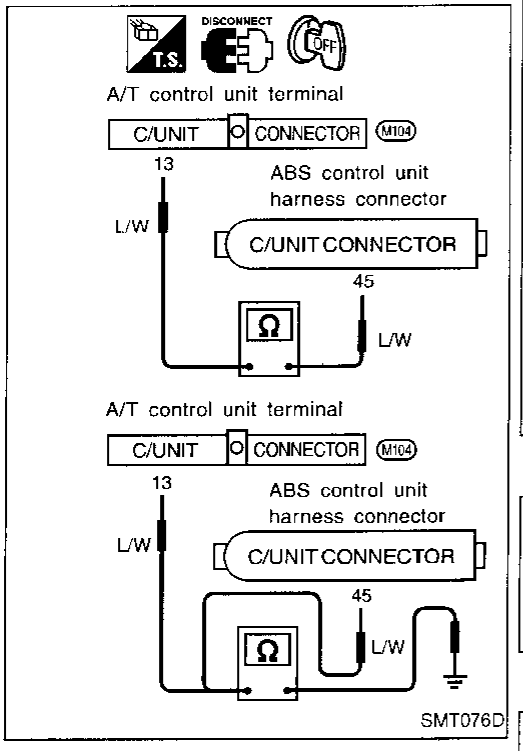
NG → 1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END







ABS Operation Signal

DIAGNOSTIC PROCEDURE

A

CHECK INPUT SIGNAL.
1. Turn ignition switch to "OFF" position.
2. Disconnect ABS control unit harness connector.

NG → Repair or replace harness or connector between ABS control unit and A/T control unit.

1. Turn ignition switch to "ON" position.
2. Move T/F control lever to "H" position.
3. Set 4WD shift switch to "AUTO" position.
4. Read out the status of "ABS OPER SW" and "ABS CONTROL OPERATION".
   ABS operation switch: OFF
   ABS control operation: OFF
5. Connect ABS control unit harness connector terminal ㊺ to ground and confirm the displayed status.
   ABS operation switch: ON
   ABS control operation: ON

1. Turn ignition switch to "OFF" position.
2. Disconnect ABS control unit and A/T control unit harness connectors.
3. Check continuity between A/T control unit harness connector terminal ⑬ and ABS control unit harness connector terminal ㊺.
   Continuity should exist.
4. Check continuity between A/T control unit harness connector terminal ⑬, ABS control unit harness connector terminal ㊺ and body ground.
   No continuity should exist.

OK ↓

Check communication line between ABS control unit and A/T control unit. (Refer to "Diagnostic Procedure 15", TROUBLE DIAGNOSES FOR SYMPTOMS in BR section.)

NG → Check, repair or replace faulty parts.

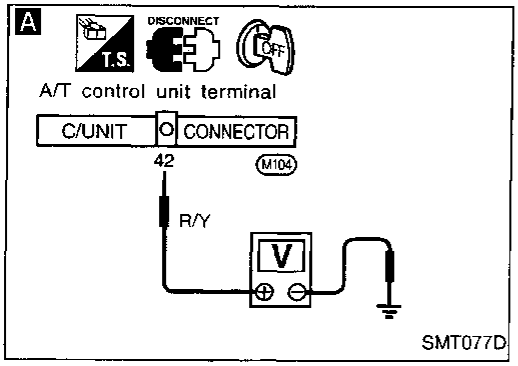
OK ↓

After driving for a while, perform self-diagnosis again. Refer to TF-23.

NG →
1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END



Data Erase/Display

DIAGNOSTIC PROCEDURE

Turn ignition switch to "OFF" position and perform self-diagnosis again. Refer to TF-23.

A

CHECK A/T CONTROL UNIT POWER SOURCE.
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check voltage between A/T control unit harness connector terminal ㊷ and body ground.
   Voltage: Battery voltage

NG → Check the following.
- No. 24 fuse (7.5A)
- Harness continuity between fuse and A/T control unit

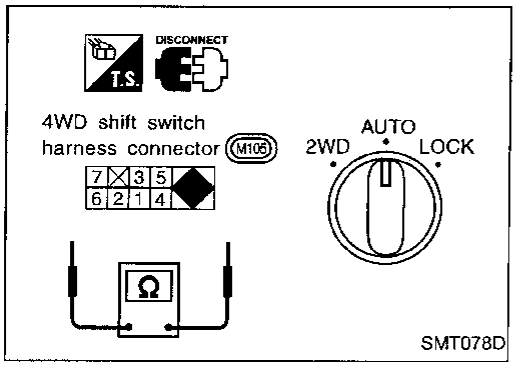
OK ↓

After driving for a while, perform self-diagnosis again. Refer to TF-23.

NG → 1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END

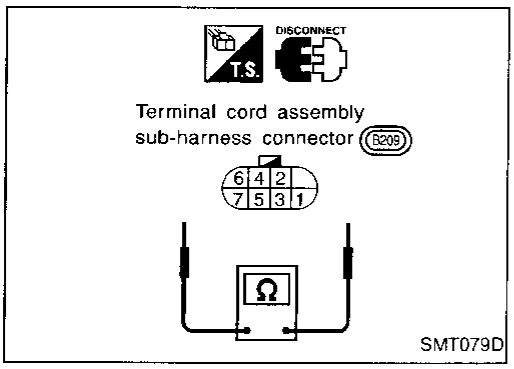


Component Inspection

4WD SHIFT SWITCH

1. Check continuity between each terminal.

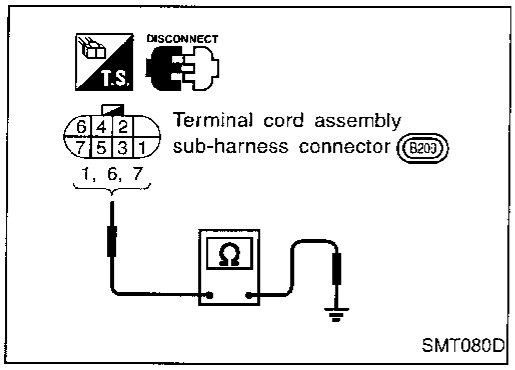
Terminals	Switch position	Continuity
① - ②	2WD	Yes
	Except 2WD	No
① - ④	AUTO	Yes
	Except AUTO	No
① - ⑤, ① - ④	LOCK	Yes
	Except LOCK	No



2-4WD SHIFT SOLENOID VALVE AND TRANSFER FLUID TEMPERATURE SENSOR

Measure resistance between terminals of transfer terminal cord assembly sub-harness connector located on rear-right of transfer unit.

Component parts	Terminals	Resistance
2-4WD solenoid valve	④ - ⑤	Approx. 20°C (68°F): Approx. 22.8 - 25.2Ω
Transfer fluid temperature sensor	② - ③	Approx. 20°C (68°F): Approx. 2.5 kΩ Approx. 80°C (176°F): Approx. 0.3 kΩ

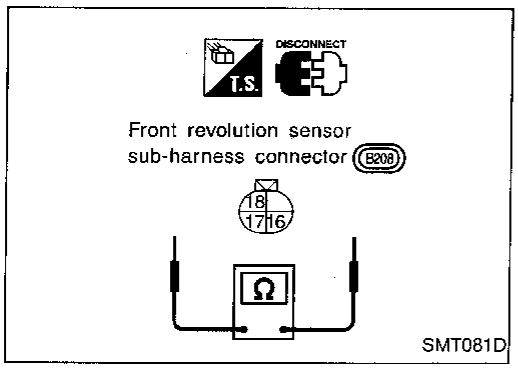


4WD SOLENOID VALVE, CLUTCH PRESSURE SWITCH AND LINE PRESSURE SWITCH

Measure resistance between terminals of transfer terminal cord assembly sub-harness connector located on rear-right of transfer unit.

Component parts	Terminals		Resistance
4WD solenoid valve	⑥	Ground terminal	Approx. 20°C (68°F): Approx. 3.0Ω - 3.4Ω
Clutch pressure switch	⑦		In room temperature • 2-4WD shift solenoid valve "OFF": No continuity • 2-4WD shift solenoid valve and transfer motor "ON": Continuity exists
Line pressure switch	①		In room temperature • Turn ignition switch to "OFF" position and leave vehicle for more than 5 minutes. (OFF): No continuity • Transfer motor "ON": Continuity exists

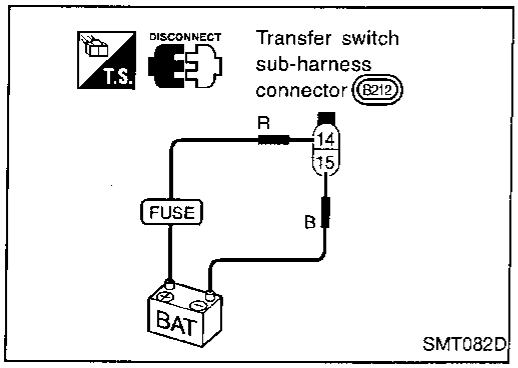
Component Inspection (Cont'd)



FRONT REVOLUTION SENSOR

Measure resistance between terminals of front revolution sensor sub-harness connector located on rear-right of transfer unit.

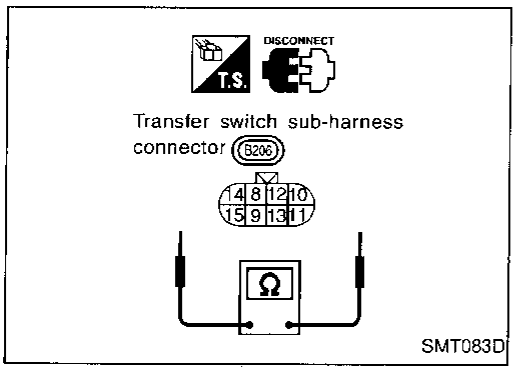
Terminals	Resistance
⑯ - ⑰	500 - 650Ω
⑱ - ⑰	No continuity
⑱ - ⑯	No continuity



TRANSFER MOTOR

Apply battery voltage directly to transfer motor assembly sub-harness connector located on rear-right of transfer unit. (Positive: Terminal ⑭, Negative: Terminal ⑮)

Transfer motor should operate.

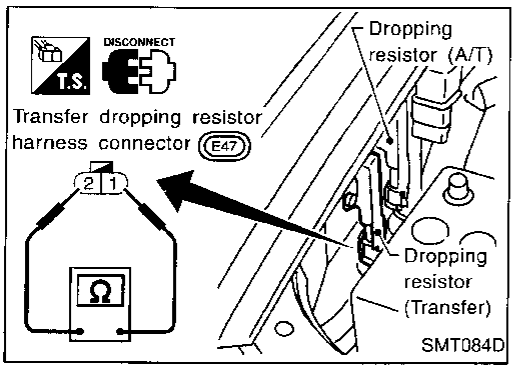


ATP SWITCH, NEUTRAL-4LO SWITCH AND WAIT DETECTION SWITCH

Measure resistance between terminals of transfer switch assembly sub-harness connector located on rear-right of transfer unit.

Switch	Terminals	Transfer control lever position		
		H	N	4LO
ATP switch	⑧ - ⑨	No continuity	Continuity	No continuity
Neutral-4LO switch	⑫ - ⑬	No continuity		Continuity
Wait detection switch	⑩ - ⑪	No continuity		Continuity
		(Note 1) ←		Continuity

Note 1: When shifting from "4LO" to "H", continuity exists while "Wait" function is operating. (No continuity exists when "Wait" function is canceled.)



TRANSFER DROPPING RESISTOR

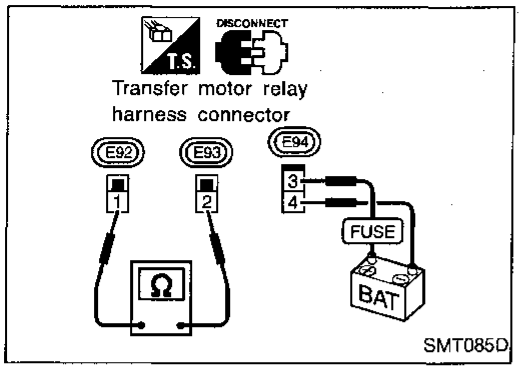
- Check resistance between terminals.
  Resistance: 11.2 - 12.8 Ω

Component Inspection (Cont'd)

TRANSFER MOTOR RELAY

1. Apply battery voltage directly to terminals ③ and ④.
2. Check continuity between terminals ① and ②.

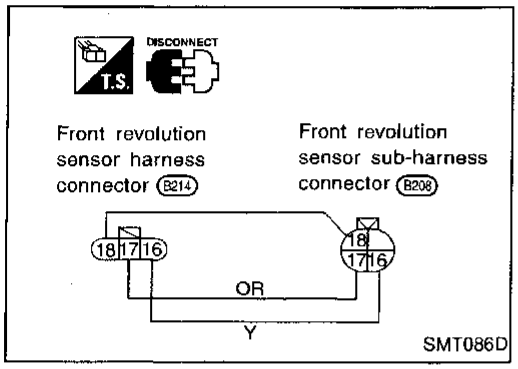
Condition	Continuity (① - ②)
Battery voltage is applied	Yes
No voltage is applied	No



TRANSFER SUB-HARNESS

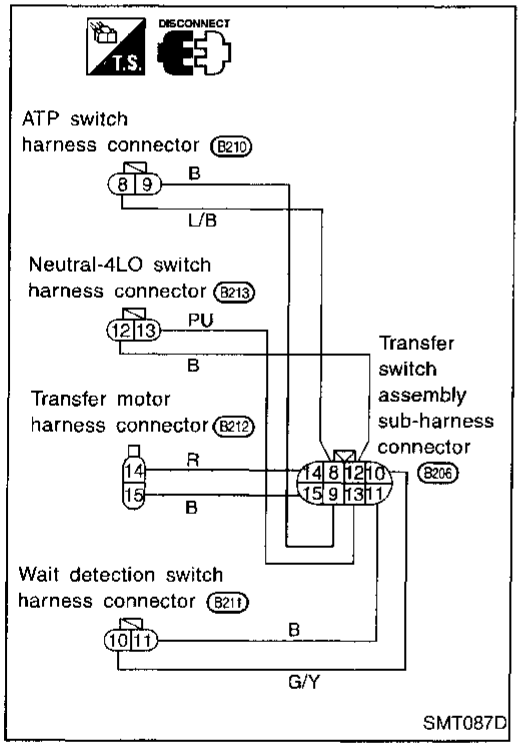
Front revolution sensor sub-harness connector

Check continuity between terminals shown in the figure.

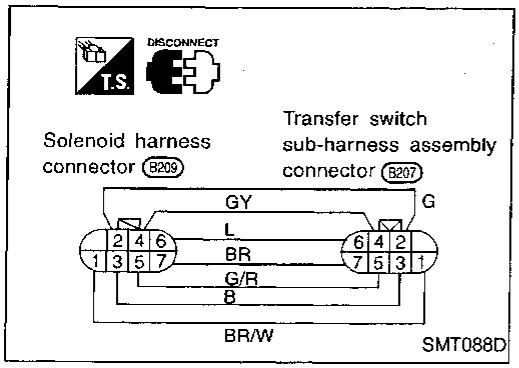


Transfer switch assembly sub-harness connector

Check continuity between terminals shown in the figure.



Component Inspection (Cont'd)

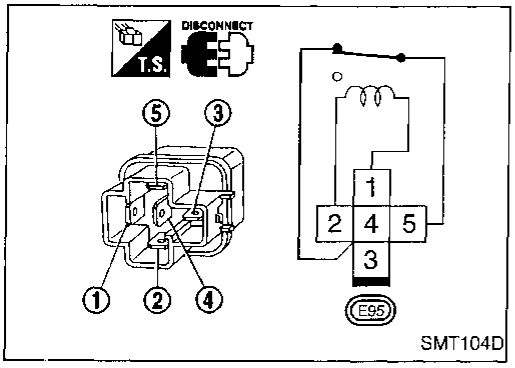


Transfer terminal cord assembly sub-harness connector

Check continuity between terminals shown in the figure.

Terminals on solenoid valve

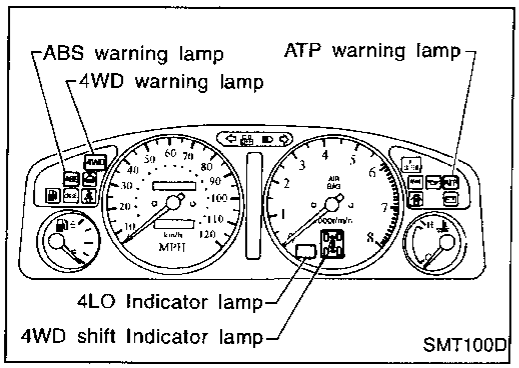
Terminals	Components
⑥	4WD solenoid valve
④ - ⑤	2-4WD shift solenoid valve
② - ③	Transfer fluid temperature sensor
⑦	Clutch pressure switch
①	Line pressure switch

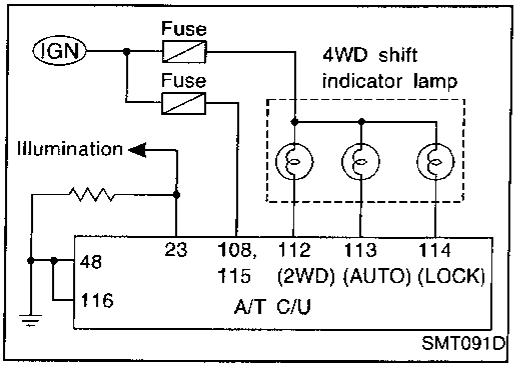


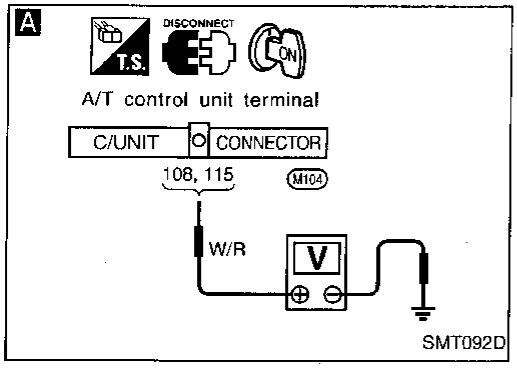
TRANSFER INDICATOR LAMP RELAY

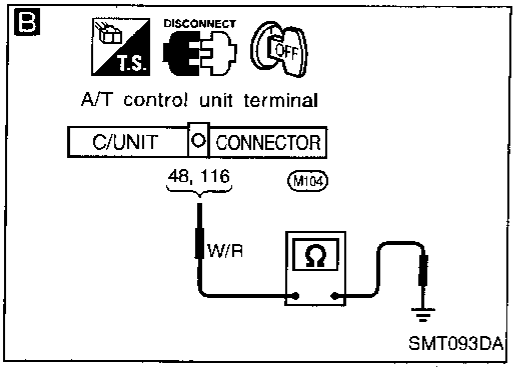
Check continuity between terminals ③ and ④.

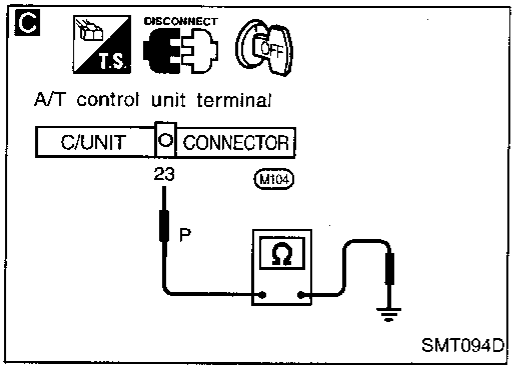
Condition	Continuity
12V direct current supply between terminals ① and ②	No
No current supply	Yes











1. 4WD Shift Indicator Lamp Does Not Turn ON.

SYMPTOM: Although ignition switch is turned "ON", all the 4WD shift indicator lamps do not turn ON for 1 second.

A

CHECK A/T CONTROL UNIT POWER SOURCE.
1. Turn ignition switch to "OFF" position and disconnect A/T control unit harness connector.
2. Turn ignition switch to "ON" position. (Do not start engine.)
3. Check voltage between A/T control unit harness connector terminals (108), (115) and body ground.
Voltage: Battery voltage

NG → Check the following.
- Continuity between ignition switch and A/T control unit
- Ignition switch and fuse

OK ↓

B

CHECK A/T CONTROL UNIT GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Measure resistance between A/T control unit harness connector terminals (48), (116) and body ground.
Resistance: 0Ω

NG → Check continuity between A/T control unit and body ground.

OK ↓

C

CHECK 4WD SHIFT INDICATOR LAMP CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check continuity between A/T control unit harness connector terminal (23) and body ground.
Continuity should exist.

NG → Check the following.
- 4WD shift indicator lamp
- Continuity between ignition switch and 4WD shift indicator lamp
- Continuity between 4WD shift indicator lamp and A/T control unit

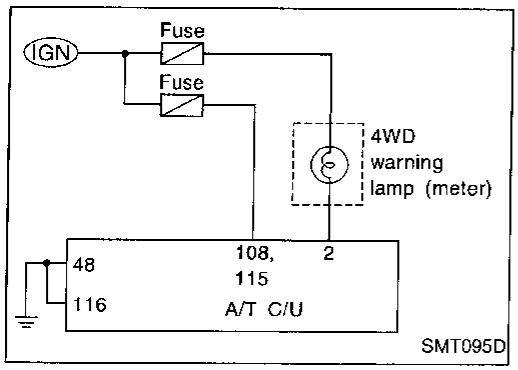
OK ↓

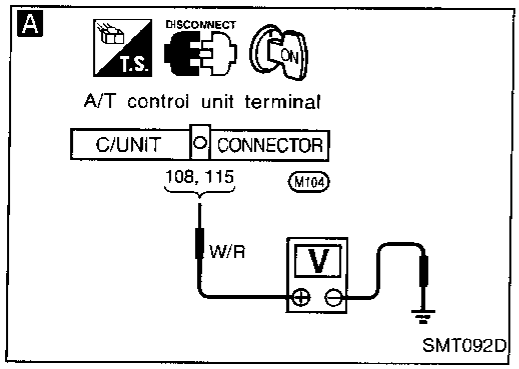
Check again.

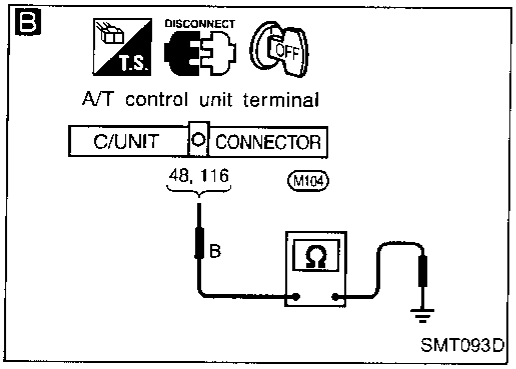
NG → 1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END







2. 4WD Warning Lamp Does Not Turn ON.

SYMPTOM: Although ignition switch is turned "ON", 4WD warning lamp does not turn ON.

A

CHECK A/T CONTROL UNIT POWER SOURCE.
1. Turn ignition switch to "OFF" position and disconnect A/T control unit harness connector.
2. Turn ignition switch to "ON" position. (Do not start engine.)
3. Check voltage between A/T control unit harness connector terminals (108), (115) and body ground.
Voltage: Battery voltage

NG → Check the following.
- Continuity between ignition switch and A/T control unit
- Ignition switch and fuse

OK ↓

B

CHECK A/T CONTROL UNIT GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Measure resistance between A/T control unit harness connector terminals (48), (116) and body ground.
Resistance: 0Ω

NG → Check continuity between A/T control unit and body ground.

OK ↓

CHECK 4WD WARNING LAMP CIRCUIT.
Check the following.
- 4WD warning lamp
- Continuity between ignition switch and 4WD warning lamp
- Continuity between 4WD warning lamp and A/T control unit

NG →
- Repair or replace harness or connector.
- Replace 4WD warning lamp.

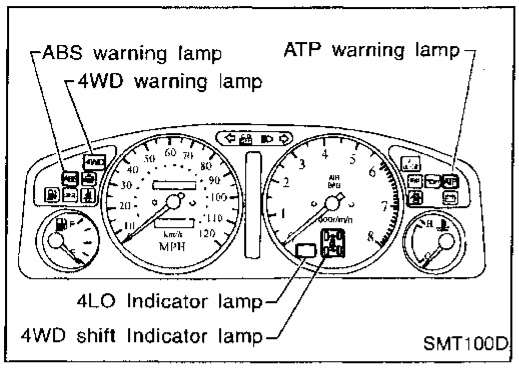
OK ↓

Check again.

NG →
1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

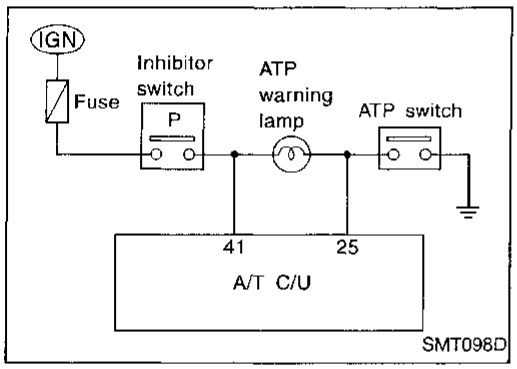
INSPECTION END



3. 4WD Shift Indicator Lamp Does Not Turn OFF.

SYMPTOM: When T/F control lever is moved from "H" to "4LO", all the 4WD shift indicator lamps do not turn OFF.

Check ATP switch circuit. Refer to TF-55. — NG → Check, repair or replace faulty parts.
↓ OK
Check again. — NG → Recheck each connector's pin terminals for damage or loose connection.
↓ OK
INSPECTION END

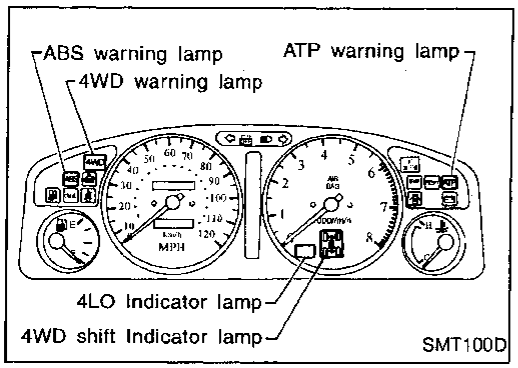


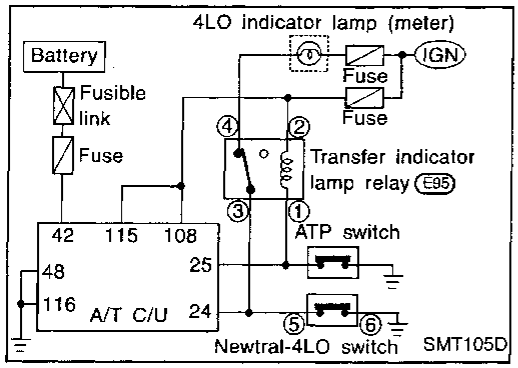
4. ATP Warning Lamp Does Not Turn ON.

SYMPTOM: When T/F control lever is moved from "H" to "4LO" with A/T selector lever in "P" position, ATP warning lamp does not turn ON.

Check ATP switch circuit. Refer to TF-55. — NG → Check, repair or replace faulty parts.
↓ OK
Check the following.
- ATP warning lamp
- Continuity between inhibitor ("P" position) switch terminal ④ and ATP warning lamp
- Continuity between ATP warning lamp and ATP switch

— NG → Repair or replace ATP warning lamp, harness or connector.
↓ OK
Check inhibitor switch circuit. Refer to AT section ("Inhibitor Switch", "TROUBLE DIAGNOSES FOR DTC P0705"). — NG → Check, repair or replace faulty parts.
↓ OK
Check again. — NG → Recheck each connector's pin terminals for damage or loose connection.
↓ OK
INSPECTION END





5. 4LO Indicator Lamp Does Not Turn ON.

SYMPTOM: When T/F control lever is moved from "H" to "4LO" position, 4LO warning lamp does not turn ON.

CHECK A/T C/U POWER SUPPLY CIRCUIT.
1. Disconnect battery negative terminal ⊖, then A/T control unit connector.
2. Connect battery negative terminal ⊖ and turn ignition switch "ON" (with engine stopped).
3. Check voltage across A/T control unit body-side connector terminals ㊷, (115), (108) and ground.

Voltage: Battery voltage

NG → Check the following items:
1. Check for continuity between battery and A/T control unit.
2. Ignition switch (Refer to EL section.)
3. Fusible link and fuses

OK ↓

CHECK A/T C/U GROUND CIRCUIT.
1. Turn ignition switch "OFF," and disconnect A/T control unit connector.
2. Check for continuity between A/T control unit body-side connector terminals ㊽, (116) and ground.

Continuity should exist.

NG → Check the following item:
1. Check for continuity between A/T control unit and ground.

OK ↓

CHECK 4LO INDICATOR LAMP CIRCUIT.
Disconnect battery negative terminal ⊖ and check the following items:
1. Check condition of 4LO indicator lamp.
2. Check for continuity between battery and 4LO indicator lamp.
3. Check for continuity between 4LO indicator lamp and a point of contact ④ of transfer relay (E95).
4. Check condition of transfer indicator lamp relay.
5. Check for continuity between battery and coil winding ② of transfer indicator lamp relay.
6. Check for continuity between a point of contact ③ of transfer indicator lamp relay ground and A/T control unit connector terminal ㉔, neutral-4LO switch terminal ⑤.
7. Check for continuity between transfer indicator lamp relay ground contact point ① of coil winding and A/T control unit connector terminal ㉕.
8. Check condition of neutral-4LO switch.
9. Check for continuity between neutral-4LO switch ground terminal ⑥ and ground.

NG → Check the following items:
1. 4LO indicator lamp
2. Transfer indicator lamp relay
3. Neutral-4LO switch

Refer to TF-61.

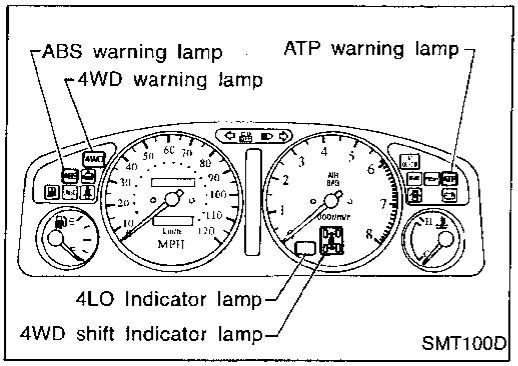
OK ↓

Check again.

NG → 1. Perform A/T control unit input/output signal inspection. Refer to TF-45.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

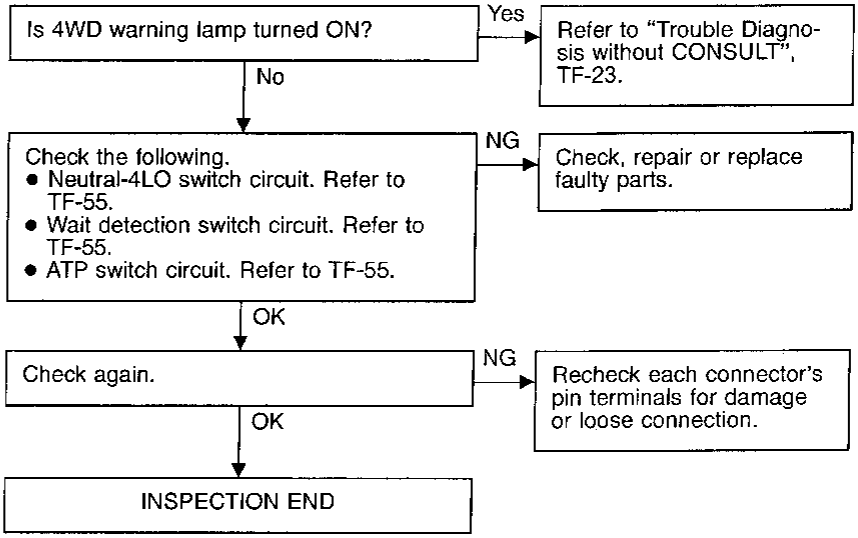
OK ↓

INSPECTION END



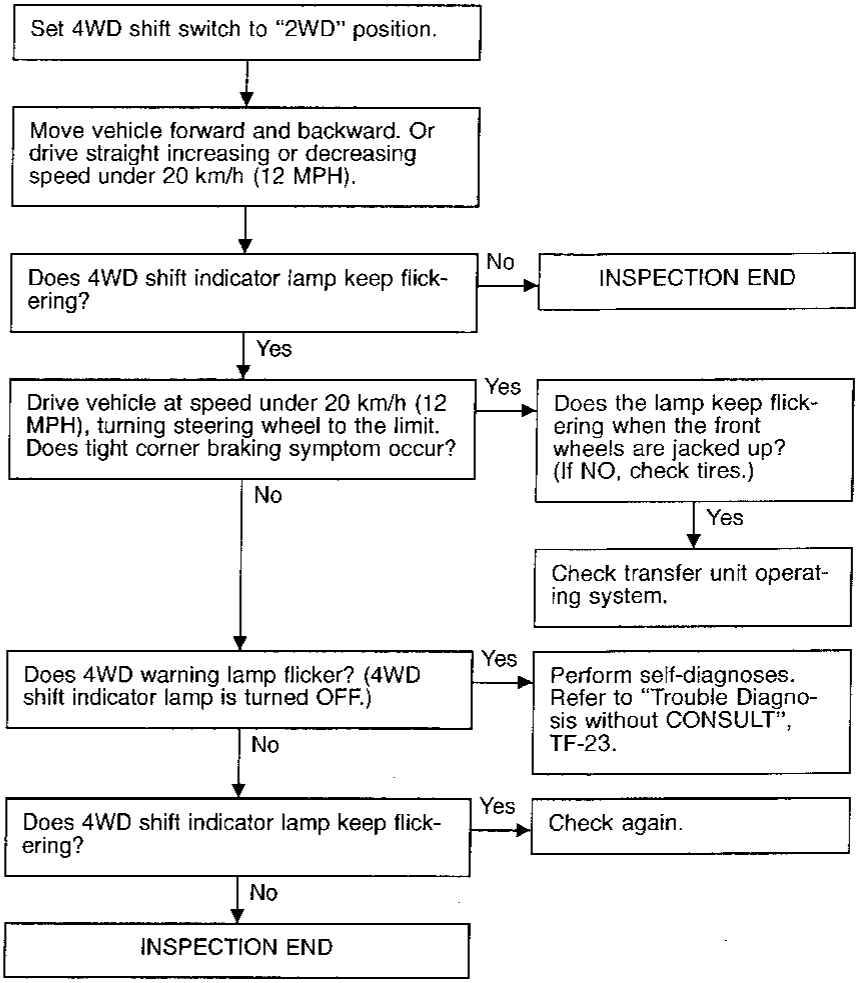
6. 4WD Shift Indicator Lamp Does Not Indicate "LOCK".

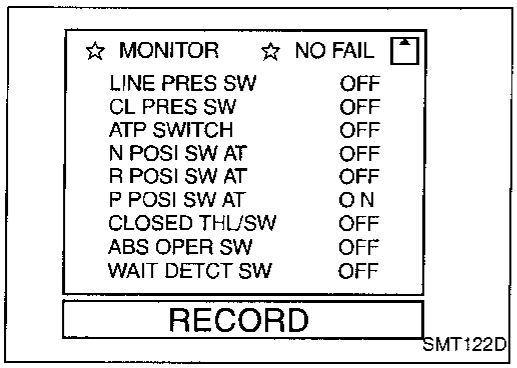
SYMPTOM: When T/F control lever is moved to "4LO", 4WD shift indicator lamp does not indicate "LOCK".



7. 4WD Shift Indicator Lamp Repeats Flickering.

SYMPTOM: 4WD shift indicator lamp keeps flickering.





8. Tight Corner Braking Symptom

SYMPTOM: Tight corner braking symptom occurs. (Hydraulic system failure)

1. Select "ECU INPUT SIGNALS" in Data Monitor.
2. Read out the ON/OFF status of "CLUTCH PRES SW". Refer to "reference value" in data monitor mode TF-32.

OK → Disassemble transfer unit and check the following.
- Control valve assembly
- 4WD solenoid valve
- 2-4WD shift solenoid valve
- Clutch piston
- Clutch assembly

Check voltage between A/T control unit harness connector terminal ⑭ and body ground. Refer to TF-45.

NG ↓

Check clutch pressure switch circuit. Refer to TF-56.

NG → Check, repair or replace faulty parts.

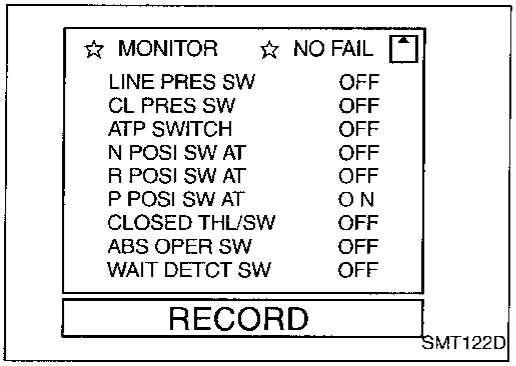
OK ↓

Check again.

NG → Recheck each connector's pin terminals for damage or loose connection.

OK ↓

INSPECTION END



9. 4WD System Does Not Operate.

SYMPTOM: The vehicle cannot be put into 4WD mode. (Hydraulic system failure)

1. Select "ECU INPUT SIGNALS" in Data Monitor.
2. Read out the ON/OFF status of "CLUTCH PRES SW". Refer to TF-32.

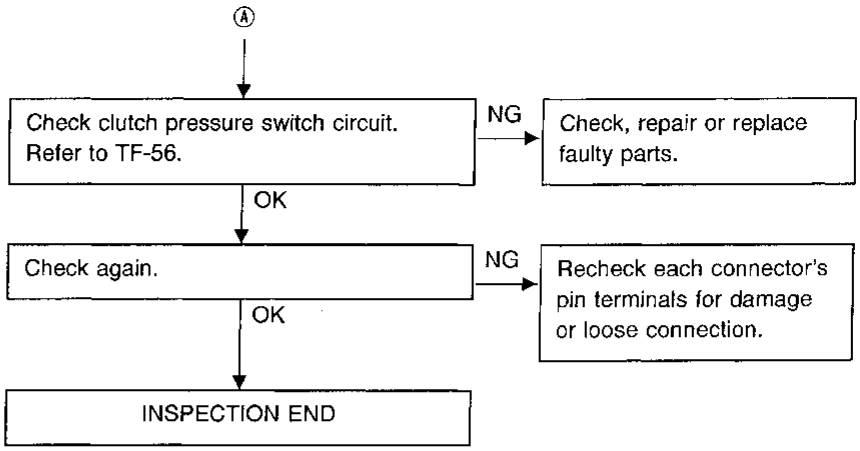
OK →
1. Check transfer fluid level.
2. Disassemble transfer unit and check the following.
- Transfer motor
- Main oil pump assembly
- Sub-oil pump assembly
- Oil strainer
- Control valve assembly
- 2-4WD shift solenoid valve
- Oil filter element
- Lip seal
- Strainer O-ring
- Main oil pump drive gear
- Seal ring
- D-ring
- Clutch piston
- Clutch assembly

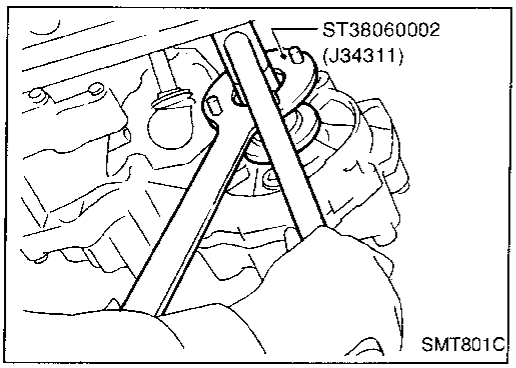
Check voltage between A/T control unit harness connector terminal ⑭ and body ground. Refer to TF-45.

NG ↓

Ⓐ

9. 4WD System Does Not Operate. (Cont'd)



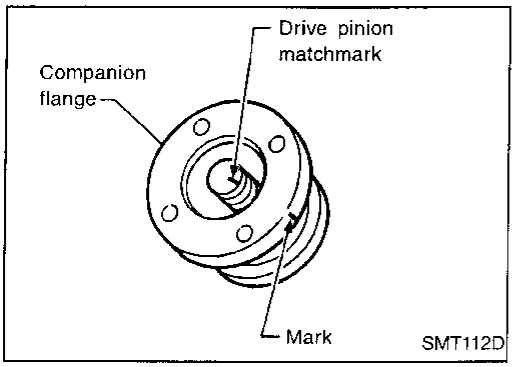


Replacing Oil Seal

FRONT CASE OIL SEAL

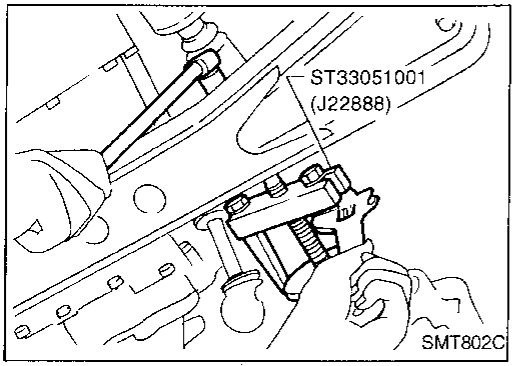
1. Drain transfer fluid.
2. Remove exhaust front tube and heat insulator. Refer to "Removal", TF-74.
3. Remove front propeller shaft. Refer to PD section ("Removal and Installation", "PROPELLER SHAFT").
4. Remove companion flange lock nut.

- **Do not reuse lock nut.**

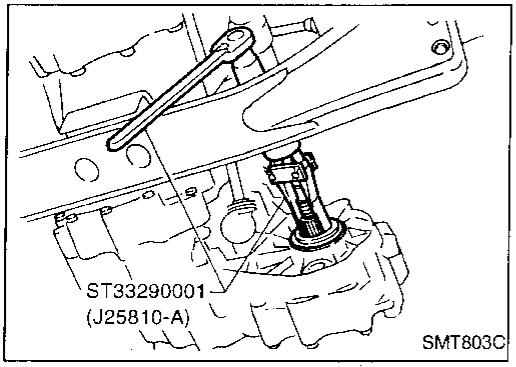


5. Put a matchmark on top of drive pinion thread. The mark should be in line with the mark on the companion flange.

- **Always mark top of drive pinion screw using paint.**



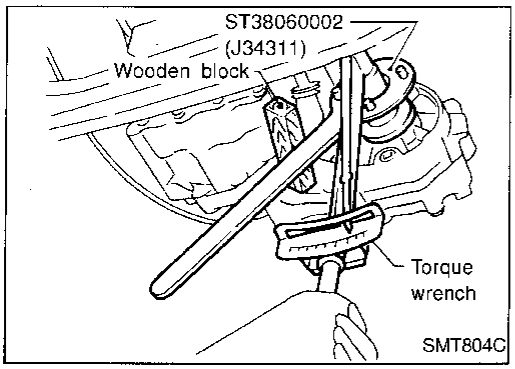
6. Remove companion flange.



7. Remove front case oil seal.
8. Install front case oil seal.

- **Before installing, apply multi-purpose grease to seal lip.**

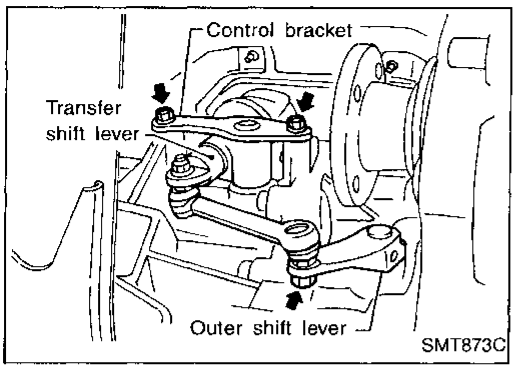
9. Install companion flange.



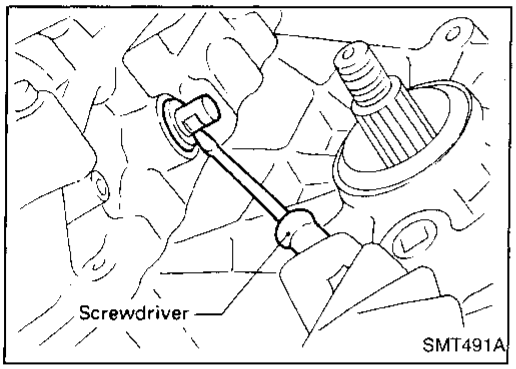
10. Tighten nut to the specified torque. Refer to TF-76.
11. Install front propeller shaft.

Replacing Oil Seal (Cont'd)

SHIFT SHAFT OIL SEAL

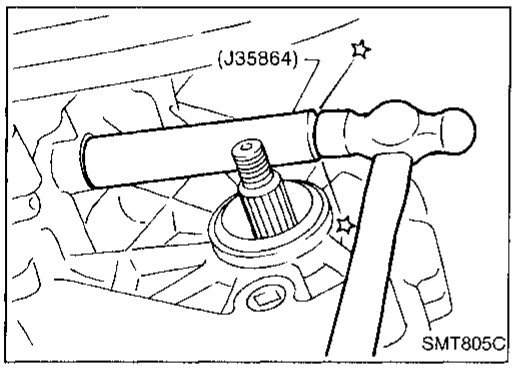


1. Remove front propeller shaft. Refer to PD section ("Removal and Installation", "PROPELLER SHAFT").
2. Remove companion flange. Refer to "FRONT CASE OIL SEAL", TF-71.
3. Remove transfer control lever from transfer outer shift lever. Then remove outer shift lever.



4. Remove shift shaft oil seal.

- **Be careful not to damage cross shaft.**

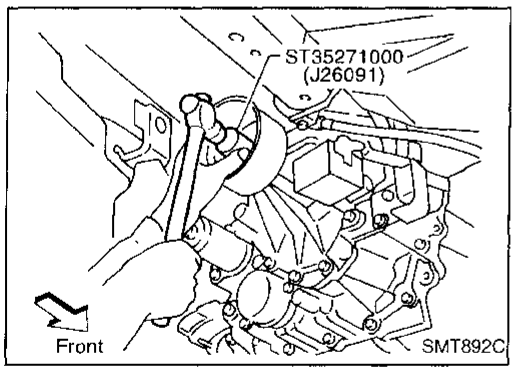


5. Install shift shaft oil seal.

- **Before installing, apply multi-purpose grease to seal lip.**

6. Install transfer control linkage.
7. Install companion flange. Refer to front case oil seal, TF-71.
8. Install front propeller shaft.

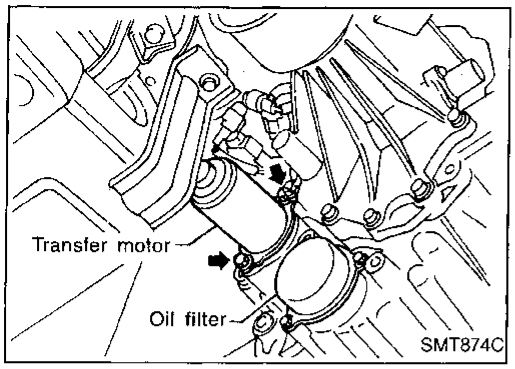
REAR OIL SEAL



1. Remove rear propeller shaft. Refer to PD section ("Removal and Installation", "PROPELLER SHAFT").
2. Remove rear oil seal.
3. Install rear oil seal.

- **Before installing apply multi-purpose grease to seal lip.**

4. Install rear propeller shaft.



Transfer Motor

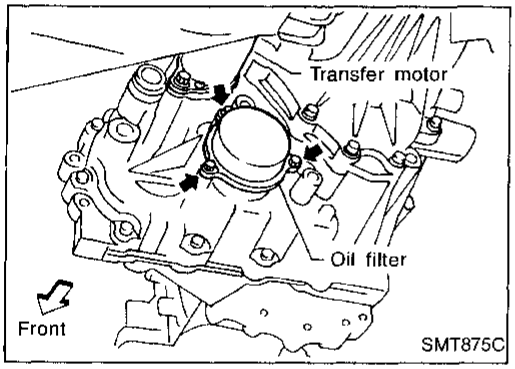
REMOVAL

1. Disconnect transfer motor harness connector.
2. Remove breather pipe from transfer motor.
3. Remove bolts to detach transfer motor.

- **After removing transfer motor, be sure to replace O-ring with new one.**

INSTALLATION

1. Apply petroleum jelly or ATF to O-ring.
2. Align width across flat-notch with oil pump groove, and install transfer motor.
3. Tighten bolts.
   : 41 - 48 N·m (4.2 - 4.9 kg-m, 30 - 35 ft-lb)
4. Install breather pipe to transfer motor.
5. Connect transfer motor harness connector.



Transfer Oil Filter

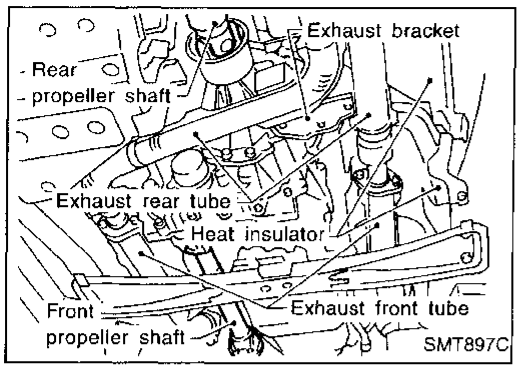
REMOVAL

- Remove bolts to detach oil filter.
- **When removing oil filter from transfer, avoid damaging it. Be sure to loosen bolts evenly.**
- **When removing oil filter, be sure to replace O-ring with new one.**

INSTALLATION

1. Apply petroleum jelly or ATF to O-ring.
2. Tighten bolts evenly to install oil filter.
   : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

- **Be sure not to damage oil filter.**

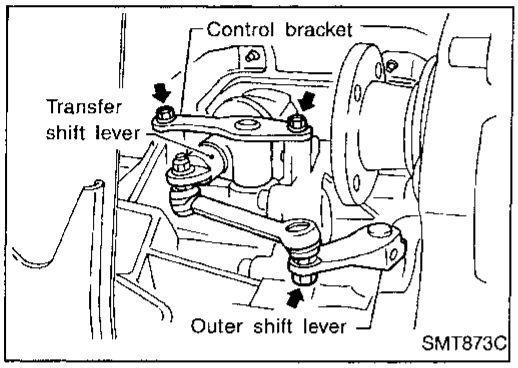


Removal

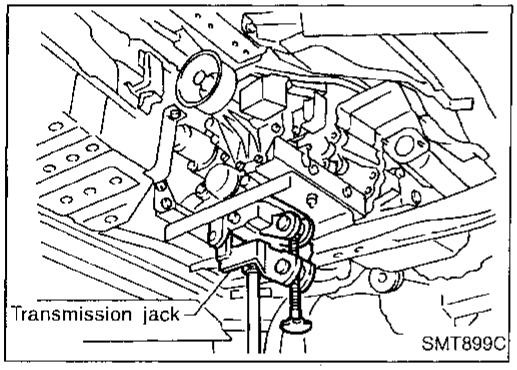
1. Remove exhaust front and rear tubes. Refer to FE section ("EXHAUST SYSTEM").
2. Remove front and rear propeller shaft. Refer to PD section ("Removal and Installation", "PROPELLER SHAFT").
3. Insert plug into rear oil seal after removing propeller shaft.

- **Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.**

4. Disconnect neutral-4LO switch, front revolution sensor, ATP switch, transfer motor and 4WD switch harness connectors.

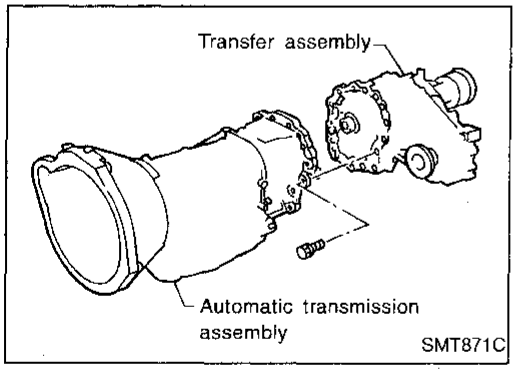


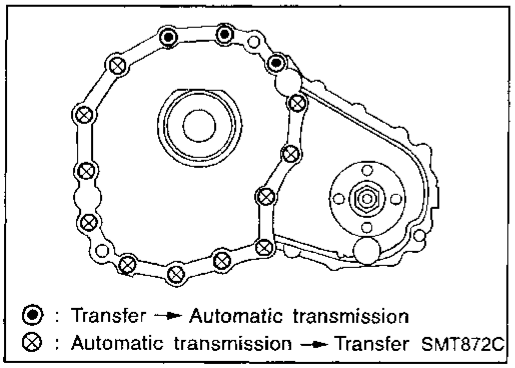
5. Remove transfer control lever from transfer outer shift lever.



6. Remove transfer from transmission.

WARNING:
Support transfer while removing it.

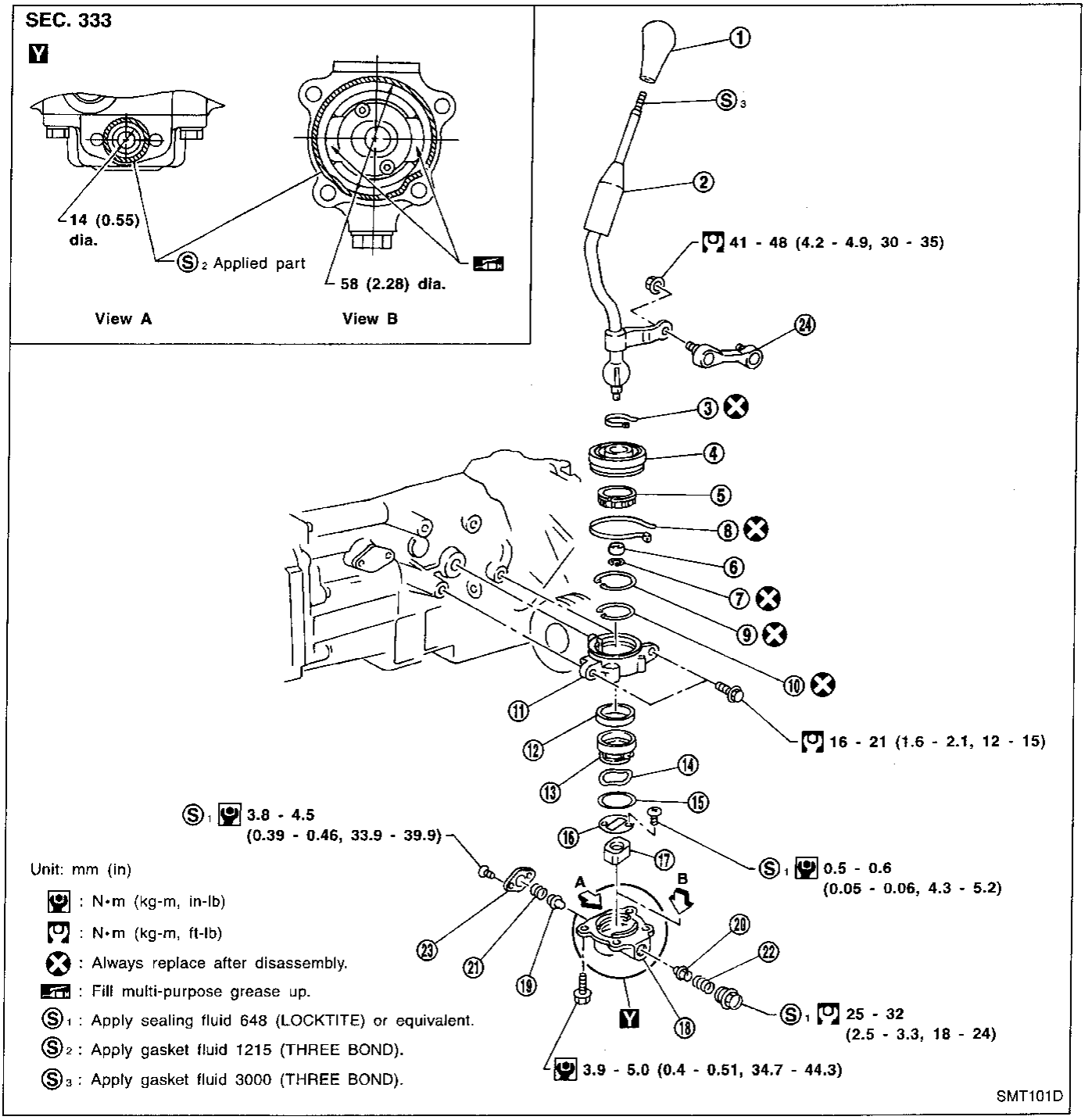




Installation

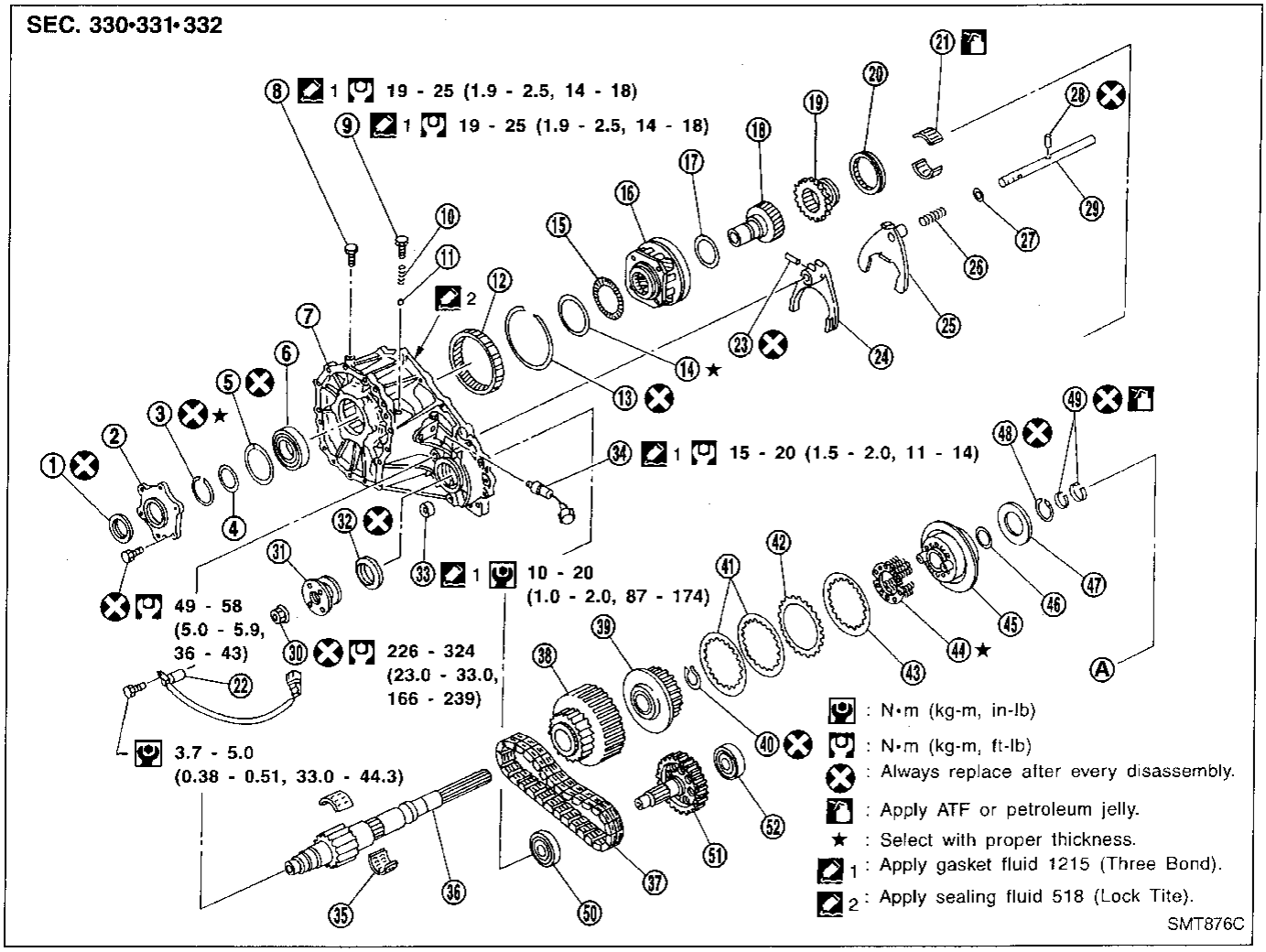
- Tighten bolts securing transfer.

Bolt length:
45 mm (1.77 in)
Tightening torque:
: 31 - 42 N·m (3.2 - 4.3 kg-m, 23 - 31 ft-lb)



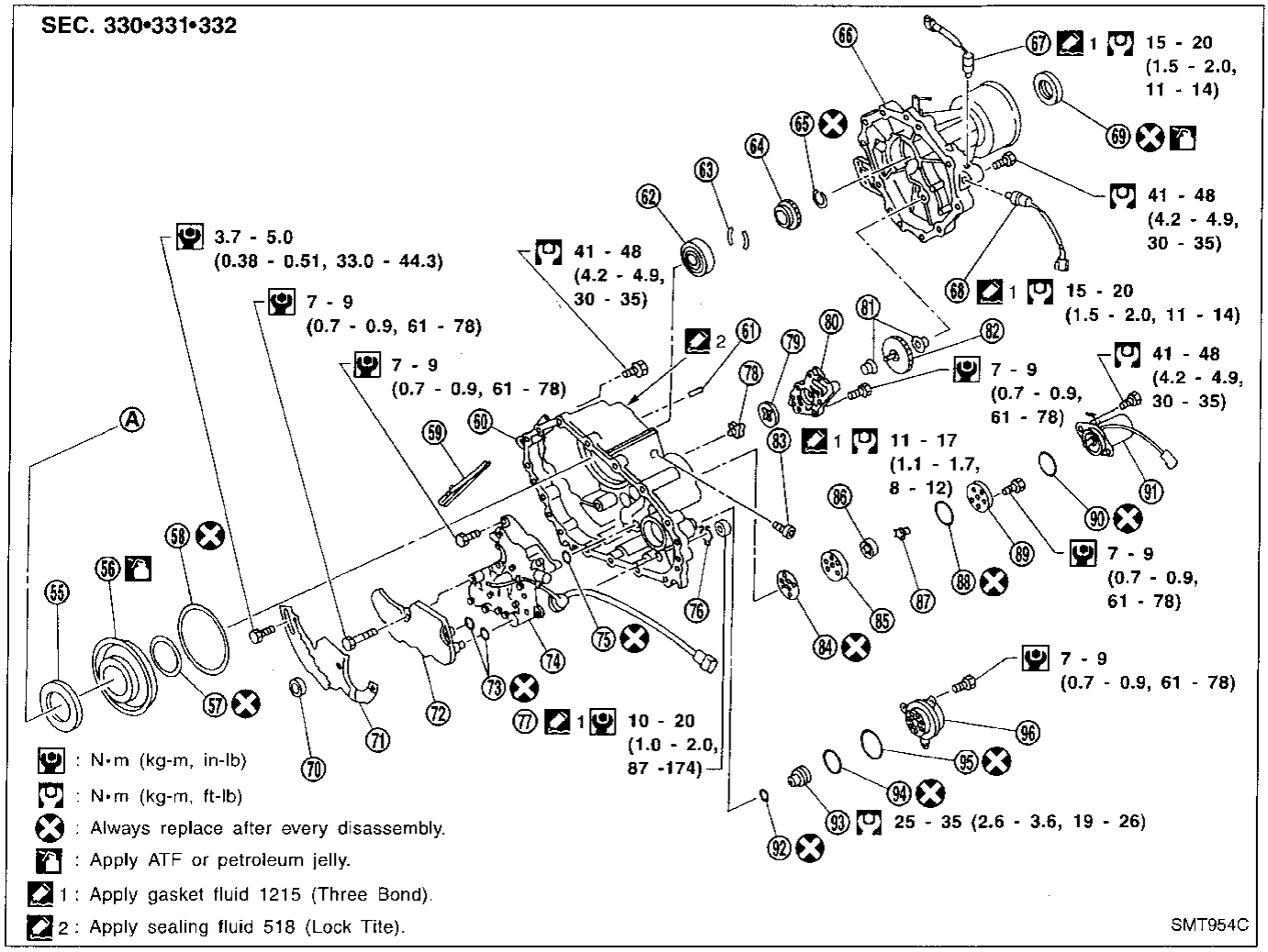
① Control knob
② Transfer control lever
③ Tie cable
④ Boot
⑤ Seat
⑥ Bush
⑦ Snap ring
⑧ Boot band
⑨ Snap ring
⑩ Snap ring
⑪ Shift cover, low & high
⑫ Socket-shift rod
⑬ Socket
⑭ Wave washer
⑮ Plain washer
⑯ Shift cover
⑰ Bush
⑱ Control cover
⑲ Plunger
⑳ Plunger
㉑ Check ball spring (long)
㉒ Check ball spring (short)
㉓ Bracket control lever
㉔ Ball joint linkage

Transfer Components

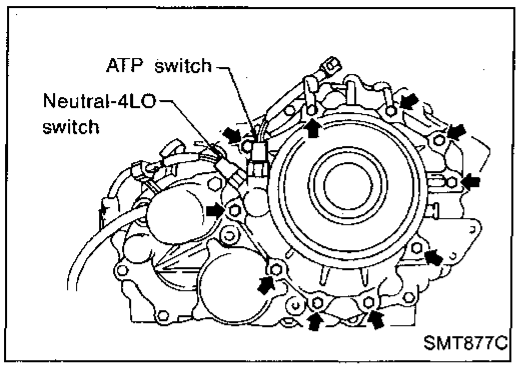


① Oil seal
② Transfer cover
③ Snap ring
④ Washer
⑤ Snap ring
⑥ Main gear bearing
⑦ Front case
⑧ Plug bolt
⑨ Check plug
⑩ Check spring
⑪ Check ball
⑫ Internal gear
⑬ Snap ring
⑭ Bearing race
⑮ Thrust needle bearing
⑯ Planetary carrier
⑰ Thrust needle bearing
⑱ Sun gear
⑲ L-H sleeve
⑳ 2-4 sleeve
㉑ Radial needle bearing
㉒ Front revolution sensor
㉓ Roll pin
㉔ L-H fork
㉕ 2-4 fork
㉖ Shift fork spring
㉗ Fork guide
㉘ Roll pin
㉙ Shift rod
㉚ Self-lock nut
㉛ Companion flange
㉜ Oil seal
㉝ Drain plug
㉞ Wait detection switch
㉟ Needle bearing
㊱ Mainshaft
㊲ Drive chain
㊳ Clutch drum
㊴ Clutch hub
㊵ Snap ring
㊶ Driven plate
㊷ Drive plate
㊸ Retaining plate
㊹ Return spring assembly
㊺ Press flange
㊻ Washer
㊼ Thrust needle bearing
㊽ Snap ring
㊾ Seal ring
㊿ Front bearing
51 Front drive shaft
52 Rear bearing

Transfer Components (Cont'd)



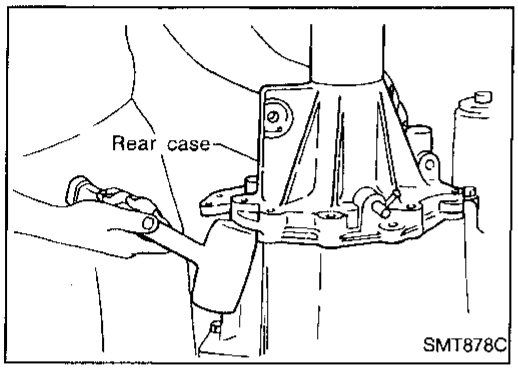
⑤⑤	Thrust needle bearing race	⑥⑨	Oil seal	⑧③	Oil pressure check plug
⑤⑥	Clutch piston	⑦⓪	Magnet	⑧④	Oil pump gasket
⑤⑦	D-ring	⑦①	Buffle plate	⑧⑤	Sub oil pump housing
⑤⑧	Lip seal	⑦②	Oil strainer	⑧⑥	Outer gear
⑤⑨	Oil gutter	⑦③	O-ring	⑧⑦	Inner gear
⑥⓪	Center case	⑦④	Control valve assembly	⑧⑧	O-ring
⑥①	Stem bleeder	⑦⑤	Lip seal	⑧⑨	Sub oil pump cover
⑥②	Mainshaft rear bearing	⑦⑥	Snap ring	⑨⓪	O-ring
⑥③	Thrust washer	⑦⑦	Filler plug	⑨①	Transfer motor
⑥④	Speedometer drive gear	⑦⑧	Inner gear	⑨②	O-ring
⑥⑤	Snap ring	⑦⑨	Outer gear	⑨③	Oil filter stud
⑥⑥	Rear case	⑧⓪	Oil pump housing	⑨④	O-ring
⑥⑦	ATP switch	⑧①	Bushing	⑨⑤	O-ring
⑥⑧	Neutral-4LO switch	⑧②	Oil pump shaft	⑨⑥	Oil filter



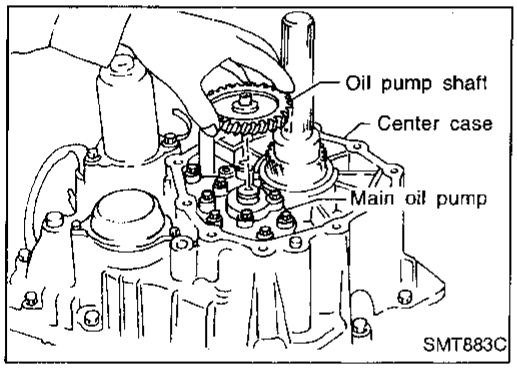
Rear Case

DISASSEMBLY

1. Remove neutral-4LO switch and ATP switch.
2. Remove bolts.



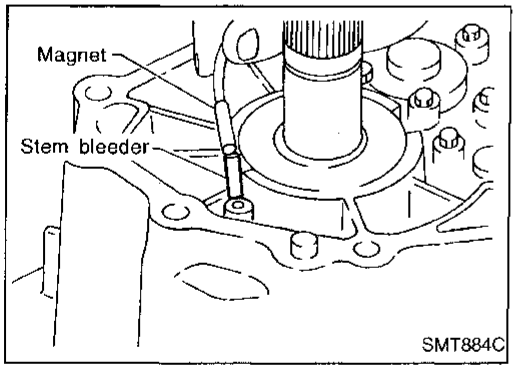
3. Remove rear case from center case by tapping it lightly with a plastic hammer.



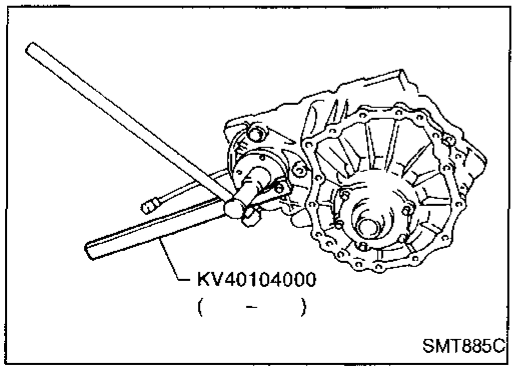
Center Case

DISASSEMBLY

1. Remove oil pump shaft from main oil pump.

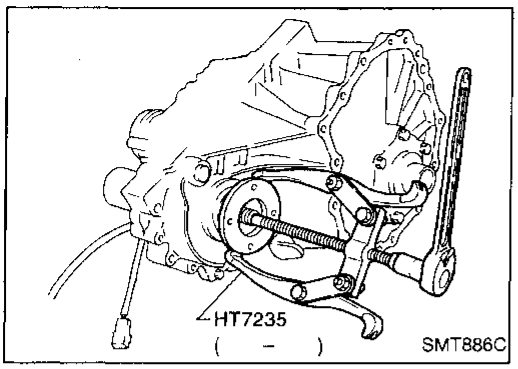


2. Remove stem bleeder from bleeder hole.

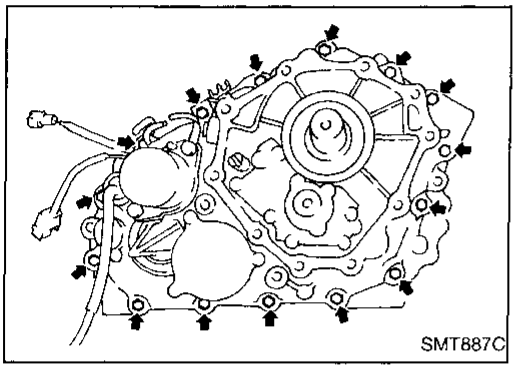


3. Remove lock nut from companion flange.
- **Do not reuse lock nut.**

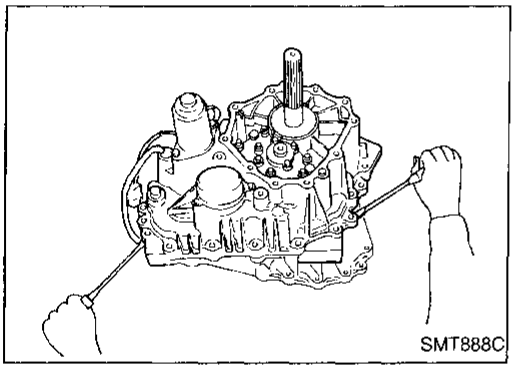
Center Case (Cont'd)



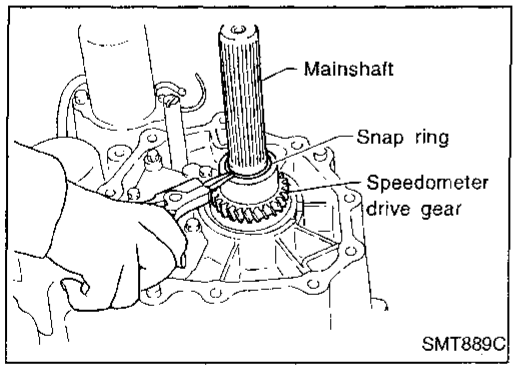
4. Remove companion flange.



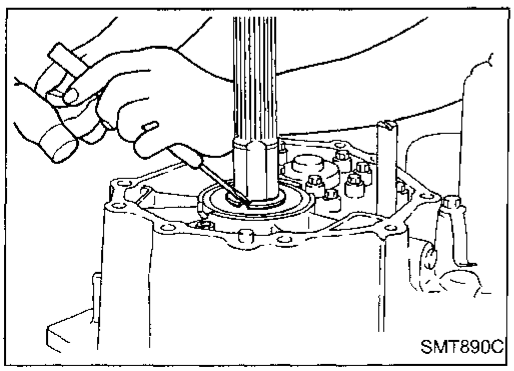
5. Remove bolts.



6. Insert screwdrivers as shown in the figure, and separate center case from front case. Then, remove center case by levering it up with a tire lever or the like.



7. Remove snap ring from mainshaft.
- **Do not reuse snap ring.**

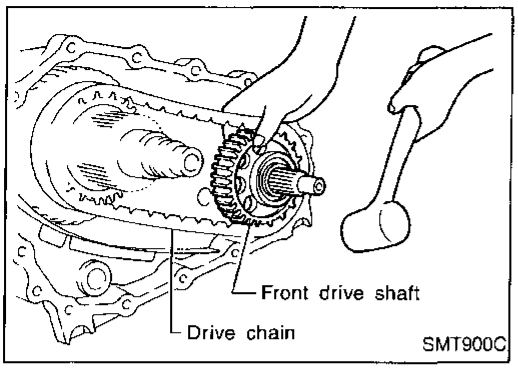


8. Remove C-rings from mainshaft bearing.

Center Case (Cont'd)

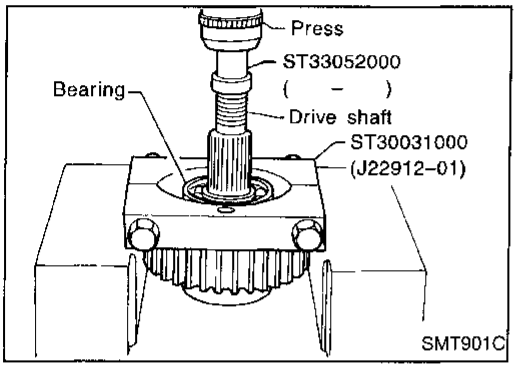
FRONT DRIVE SHAFT AND DRIVE CHAIN

Disassembly

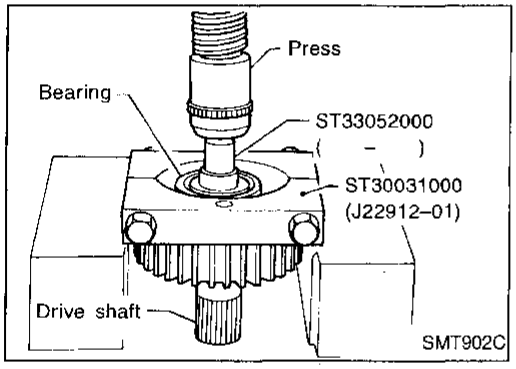


1. Remove oil gutter from center case.
2. With front drive shaft held by one hand as shown in the figure, tap center case with a plastic hammer to remove it with drive chain.

- **Do not tap drive chain with a plastic hammer.**



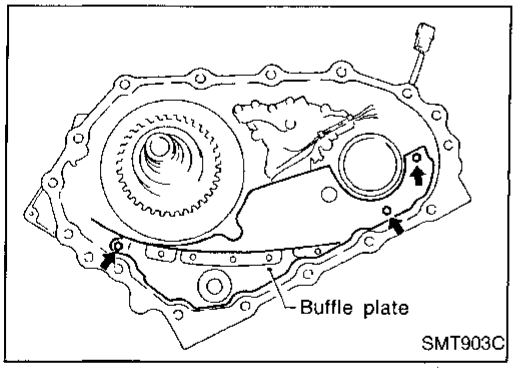
3. Set a puller (ST30031000) and an adapter (ST33052000). Remove front drive shaft front bearing.



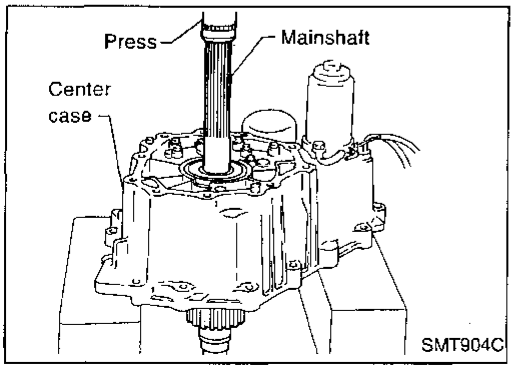
4. Set the puller (ST30031000) and the adapter (ST33052000). Remove front drive shaft rear bearing.

MAINSHAFT AND CLUTCH DRUM

Disassembly

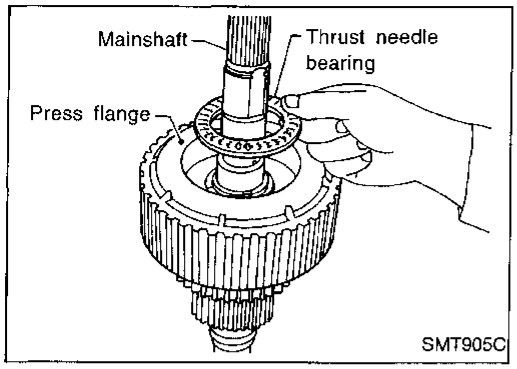


1. Remove mounting bolts to detach baffle plate.

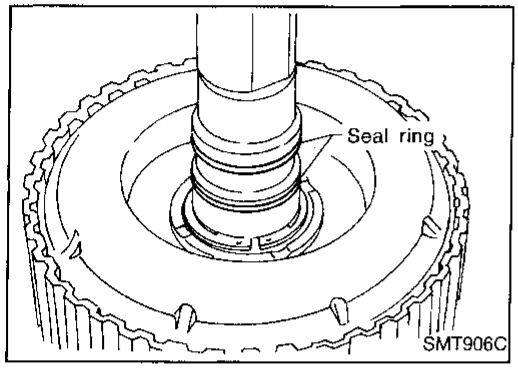


2. Set center case to press stand. Remove mainshaft from center case.

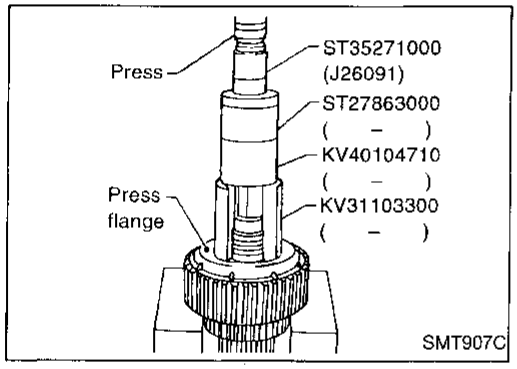
Center Case (Cont'd)



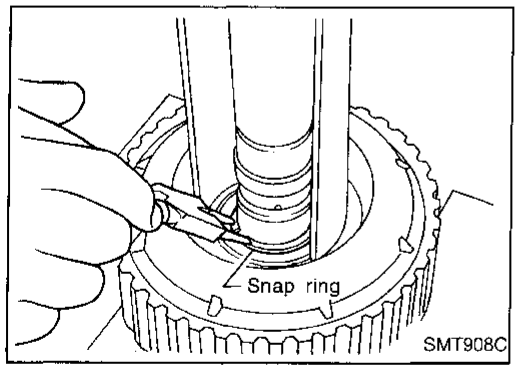
3. Remove thrust needle bearing from press flange.



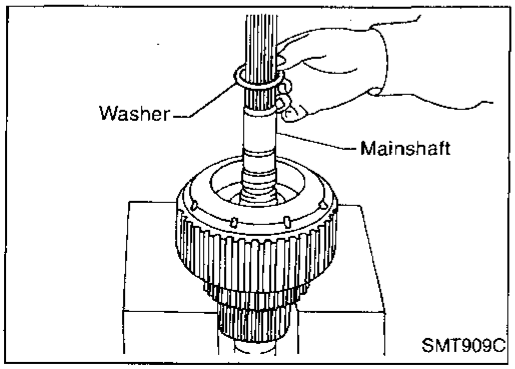
4. Remove seal ring from mainshaft.
- **Do not reuse seal ring.**



5. Set a drift (KV31103300), a support ring (KV40104710), a support ring (ST27863000) and a drift (ST35271000) to press flange as shown in the figure. Press drift until snap ring is out of place.

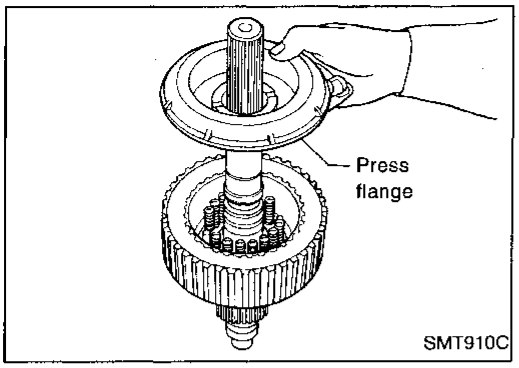


6. Remove snap ring from mainshaft.
- **Do not reuse snap ring.**

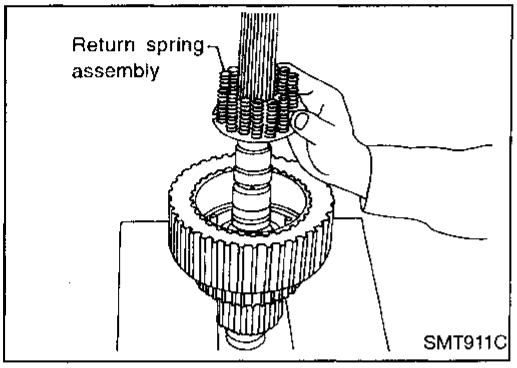


7. Remove washer.

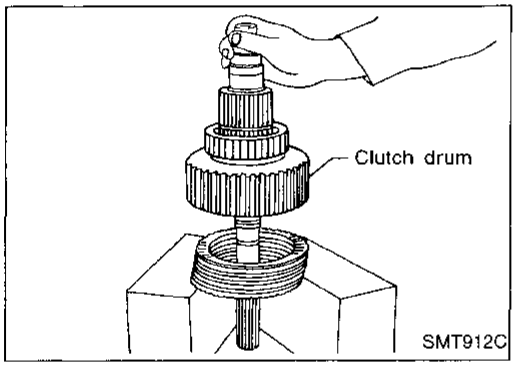
Center Case (Cont'd)



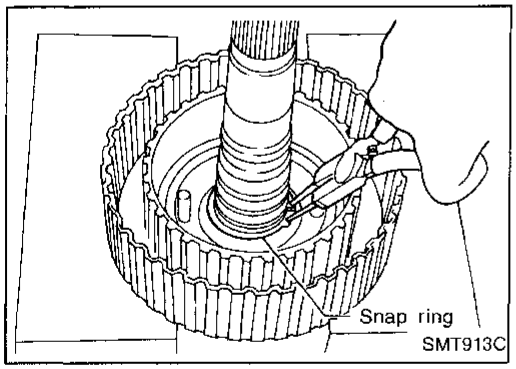
8. Remove press flange from mainshaft.



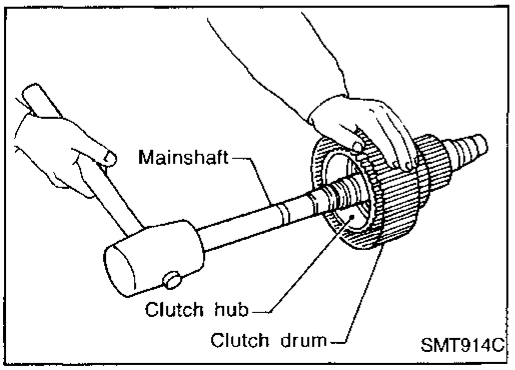
9. Remove return spring assembly from clutch hub.



10. Remove each plate from clutch drum.



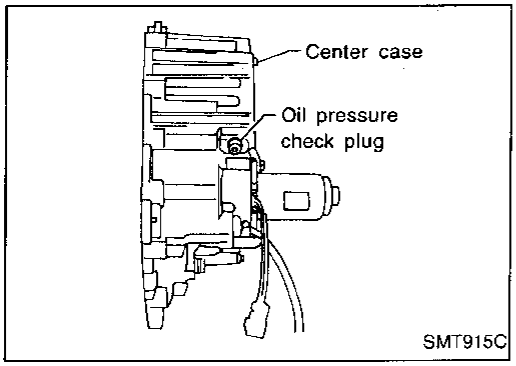
11. Remove snap ring from mainshaft.
- **Do not reuse snap ring.**



12. Tap mainshaft with a plastic hammer to remove it from clutch drum and clutch hub.
13. Remove needle bearing from mainshaft.

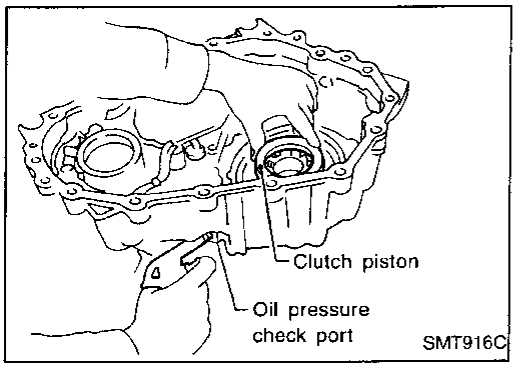
Center Case (Cont'd)

CLUTCH PISTON

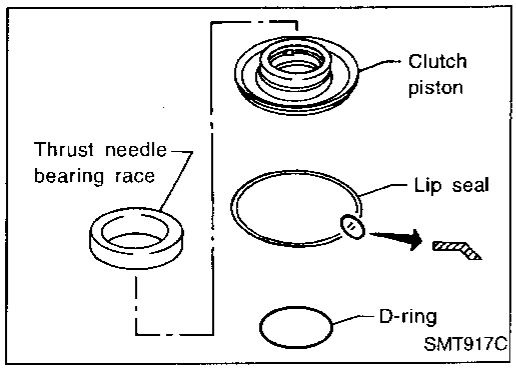


Disassembly

1. Remove oil pressure check plug from oil pressure check port.



2. Apply air gradually from oil pressure check port, and remove clutch piston from center case.



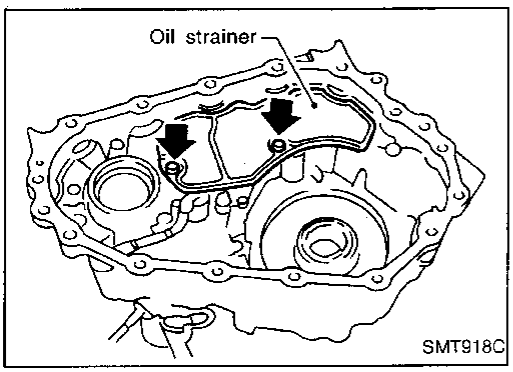
3. Remove lip seal and D-ring from clutch piston.
- **Do not reuse lip seal and D-ring.**

4. Remove thrust needle bearing race from clutch piston by hooking a screwdriver edge into 4 notches of thrust needle bearing race.

CONTROL VALVE

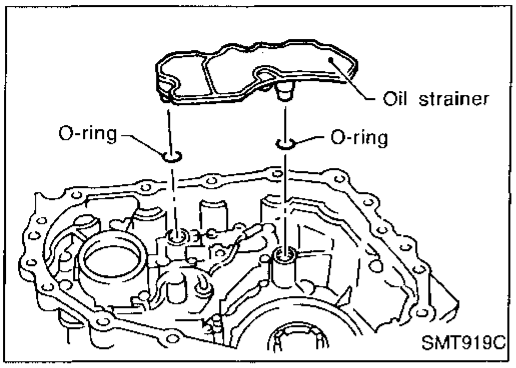
Disassembly

CAUTION:
- **Do not reuse any part that has been dropped or damaged.**
- **Make sure valve is assembled in the proper direction.**
- **Do not use a magnet because residual magnetism stays during disassembly.**

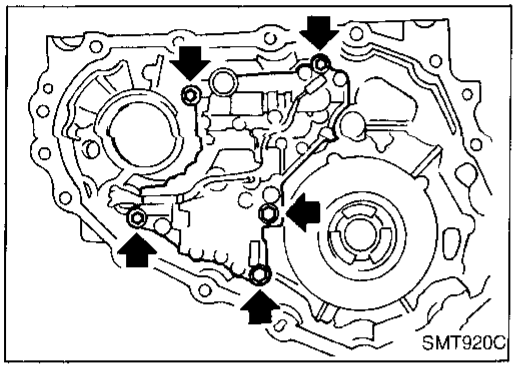


1. Remove bolts, and detach oil strainer.

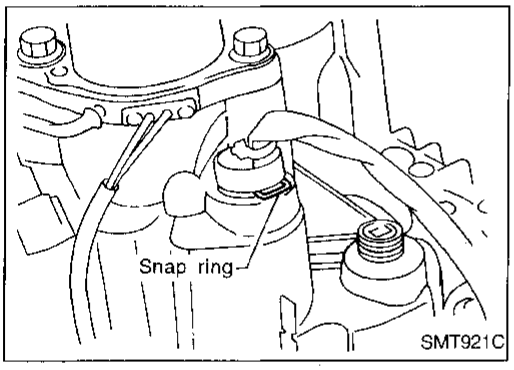
Center Case (Cont'd)



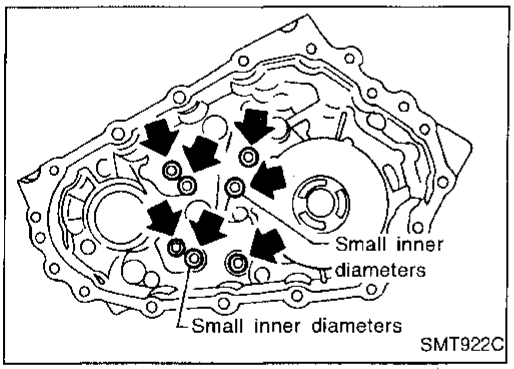
2. Remove O-rings from oil strainer.
- **Do not reuse O-rings.**



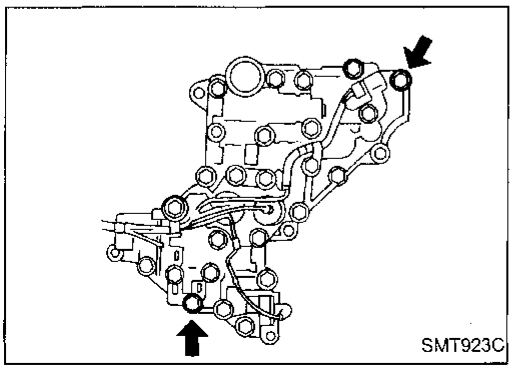
3. Remove bolts for control valve.



4. Remove snap ring. Then push terminal assembly into center case to remove control valve assembly.

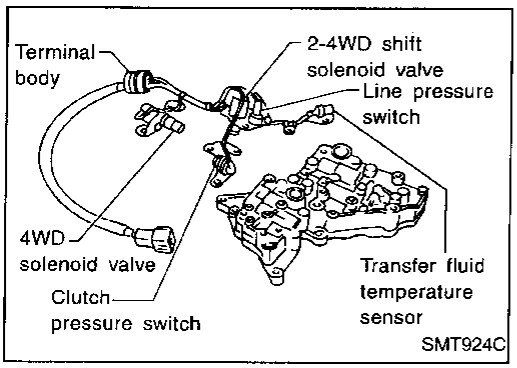


5. Remove lip seals from center case.
- **Do not reuse lip seals.**



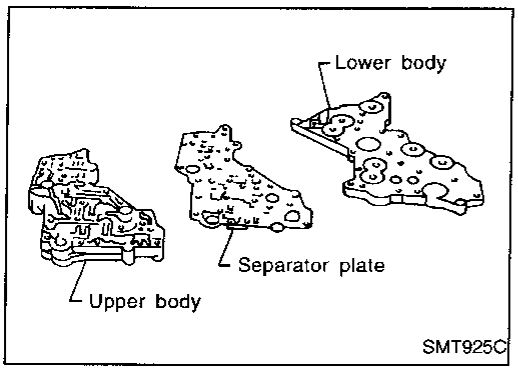
6. Remove bolts except for two bolts.

Center Case (Cont'd)



7. Remove 4WD solenoid valve, clutch pressure switch, 2-4WD shift solenoid valve, line pressure switch, and transfer fluid temperature sensor from control valve assembly.
8. Remove O-rings from each solenoid valve, switch and terminal body.

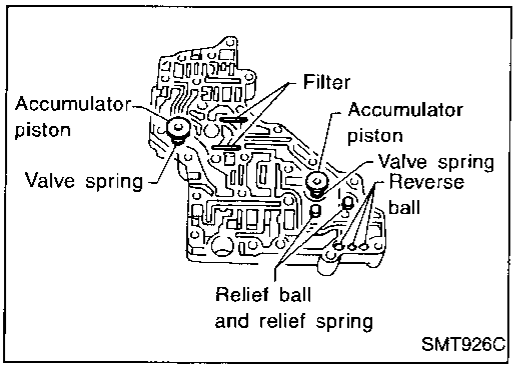
- **Do not reuse O-rings.**



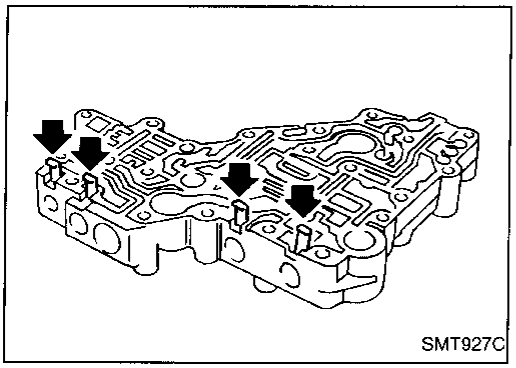
9. Place control valve with lower body face up, remove two mounting bolts, and then remove lower body and separator plate from upper body.

CAUTION:

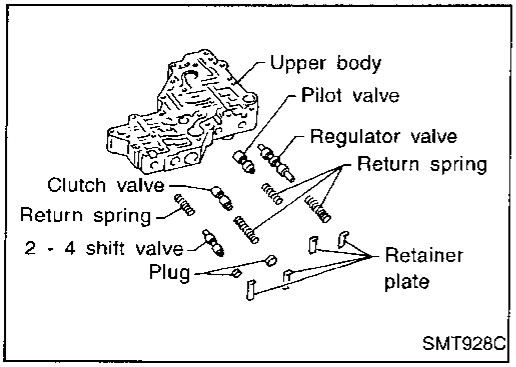
- **Be careful not to drop relief balls. Detach lower body carefully.**
- **Do not reuse separator plate.**



10. Make sure reverse balls, relief balls and relief springs, accumulator pistons, valve springs, and filters are securely installed as shown in the figure, and remove them.

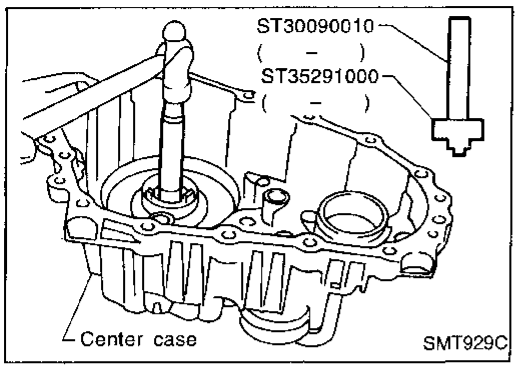


11. Remove retainer plates.



12. Remove each control valve, spring and plug.

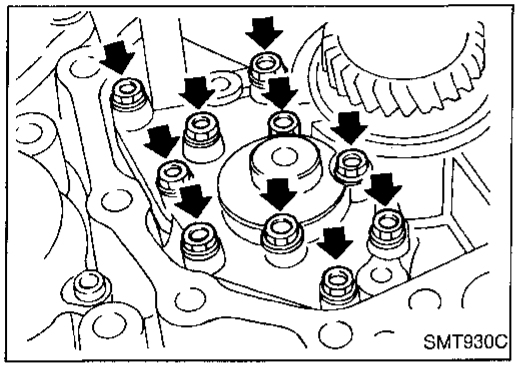
Center Case (Cont'd)



MAINSHAFT REAR BEARING

Disassembly

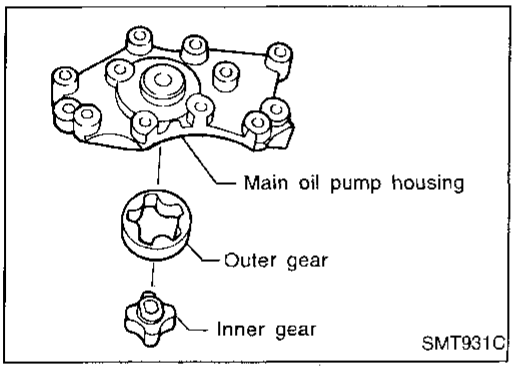
1. Remove mainshaft rear bearing from center case using a remover (ST35291000) and a remover (ST30090010).



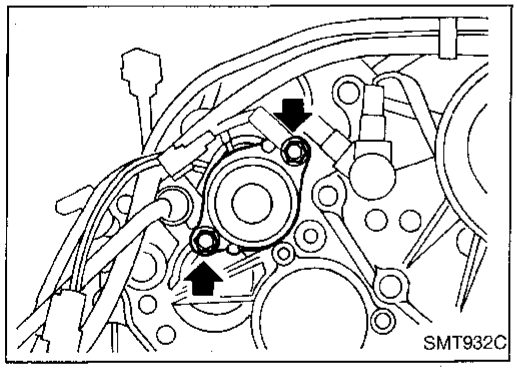
MAIN OIL PUMP

Disassembly

1. Remove bolts as shown in figure to detach main oil pump.



2. Remove outer gear and inner gear.

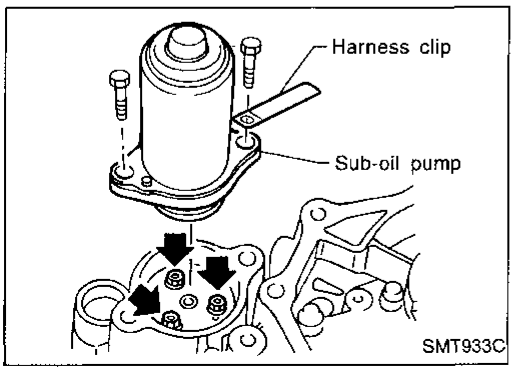


SUB-OIL PUMP

Disassembly

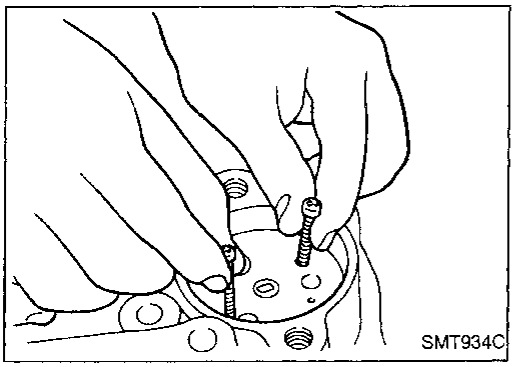
1. Remove bolts to detach transfer motor from center case. Then remove O-ring from the transfer motor.

- **Do not reuse O-ring.**

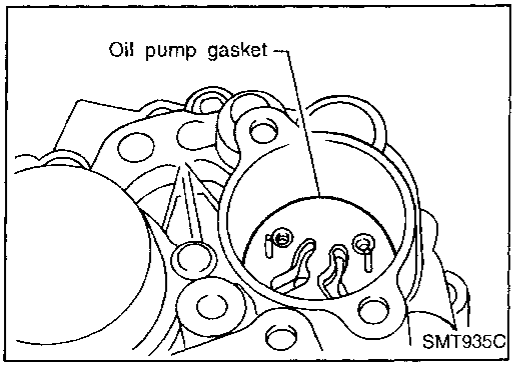


2. Remove sub-oil pump mounting bolts.

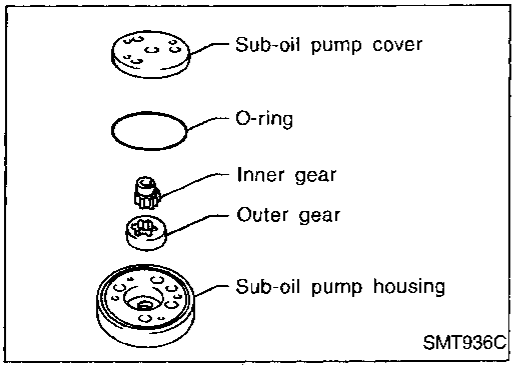
Center Case (Cont'd)



3. Thread two bolts (M4 x 0.8) into the holes of sub-oil pump as shown in the figure, and pull out to remove sub-oil pump.



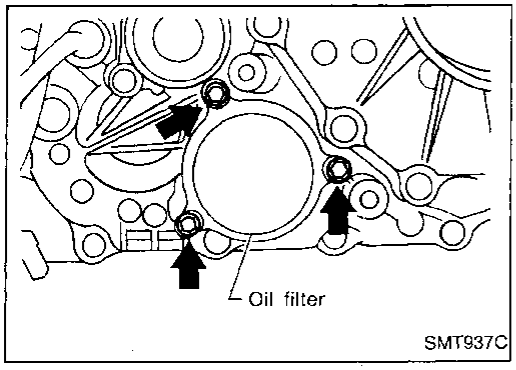
4. Remove oil pump gasket.
- **Do not reuse gasket.**



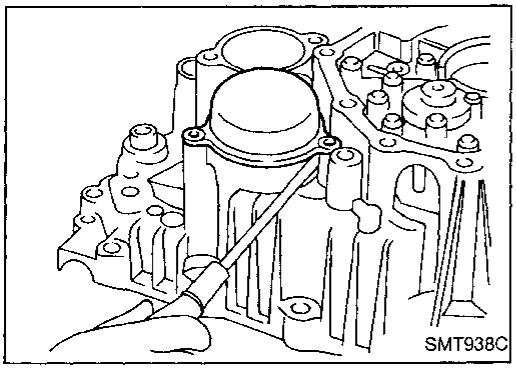
5. Remove sub-oil pump cover, outer gear, inner gear and O-ring from sub-oil pump housing.
- **Do not reuse O-ring.**

OIL FILTER

Disassembly

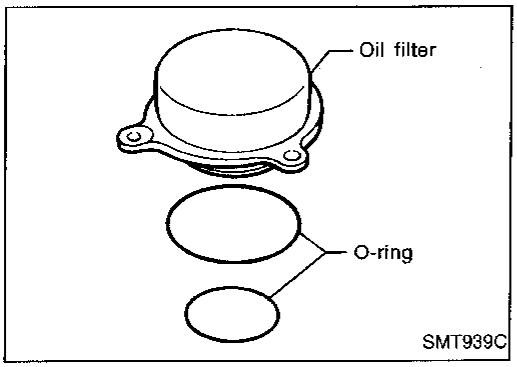


1. Remove bolts for oil filter.

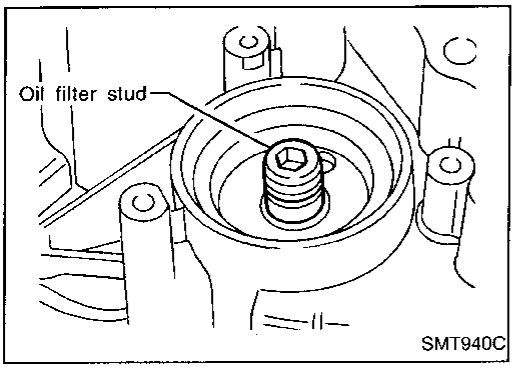


2. Insert a screwdriver as shown in the figure to remove oil filter.

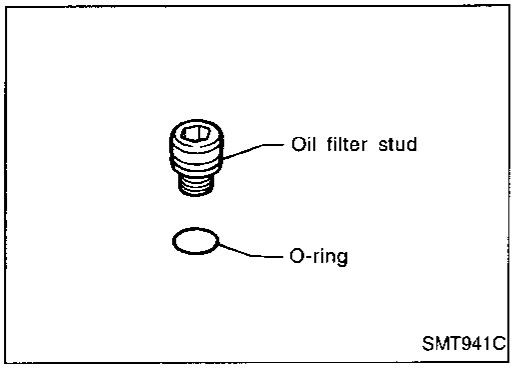
Center Case (Cont'd)



3. Remove O-rings from oil filter.
- **Do not reuse O-rings.**



4. Remove oil filter stud.

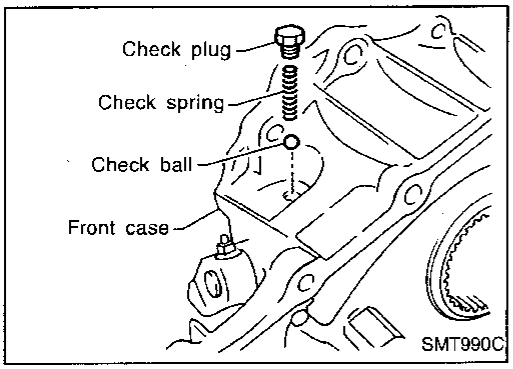


5. Remove O-ring from oil filter stud.
- **Do not reuse O-ring.**

Front Case

Disassembly

1. Remove rear case from center case. Refer to TF-78.
2. Remove front case from center case. Refer to TF-78.

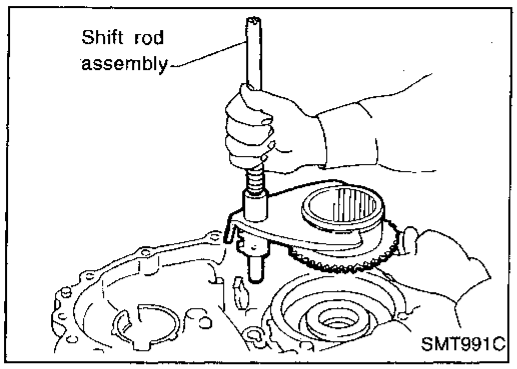


SHIFT ROD COMPONENTS

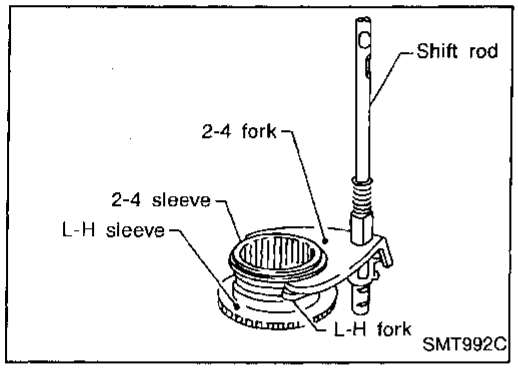
Disassembly

1. Remove check plug, then check spring and check ball.
2. Remove wait detection switch.

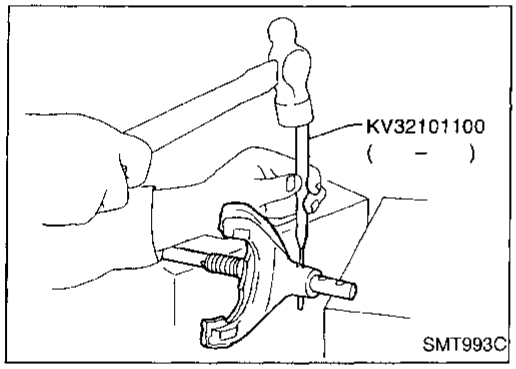
Front Case (Cont'd)



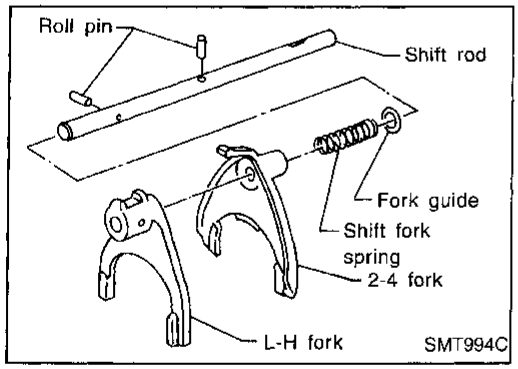
3. Remove shift rod components together with 2-4 sleeve and L-H sleeve.



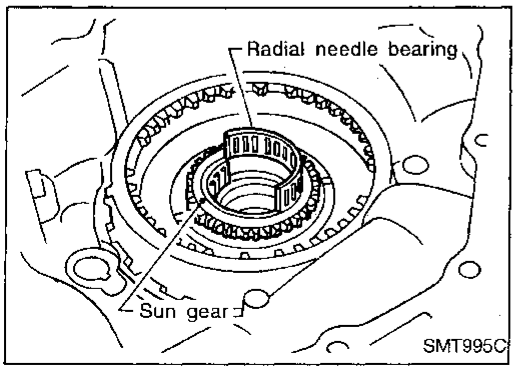
4. Remove 2-4 sleeve and L-H sleeve from 2-4 fork and L-H fork respectively.



5. Drive out roll pin from shift rod.
- **Do not reuse roll pin.**



6. Remove L-H fork, 2-4 fork, shift fork spring and fork guide from shift rod.

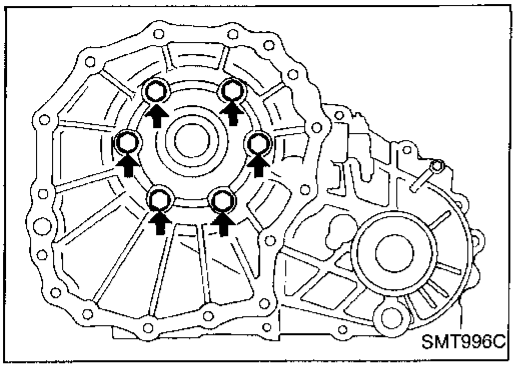


PLANETARY CARRIER, SUN GEAR AND INTERNAL GEAR

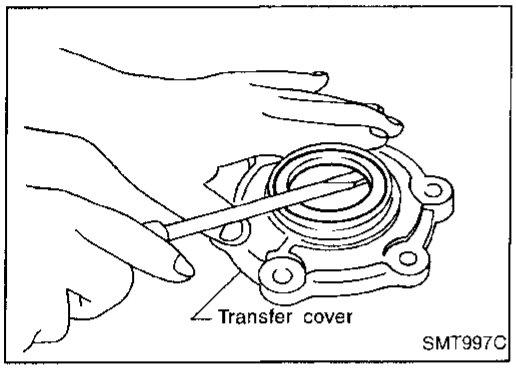
Disassembly

1. Remove radial needle bearing from sun gear.

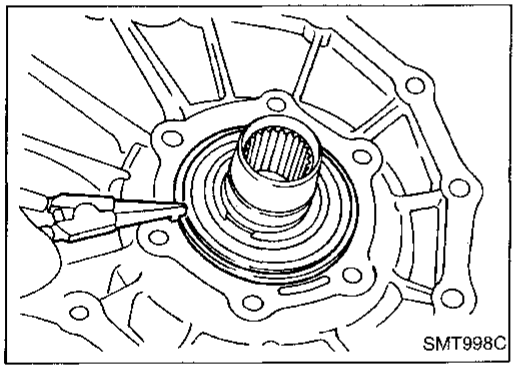
Front Case (Cont'd)



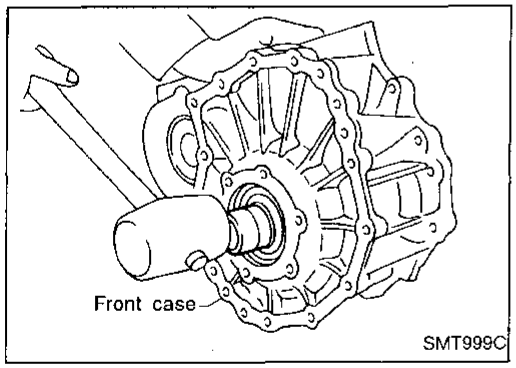
2. Remove bolts to detach transfer cover.
- **Do not reuse bolts.**



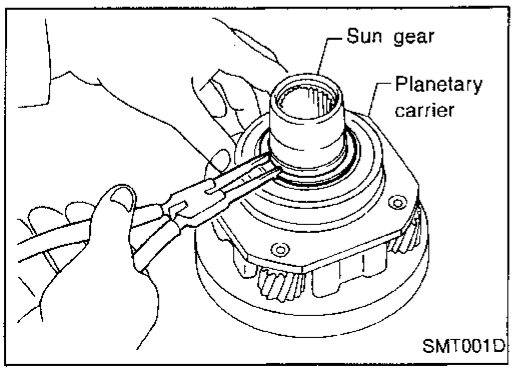
3. Remove oil seal from transfer cover.
- **Do not reuse oil seal.**



4. Remove snap ring from main gear bearing.
- **Do not reuse snap ring.**

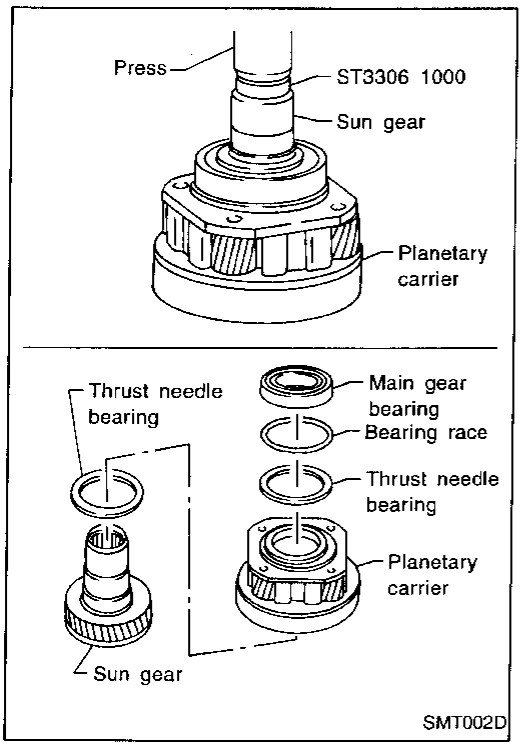


5. Remove sun gear by tapping it lightly.

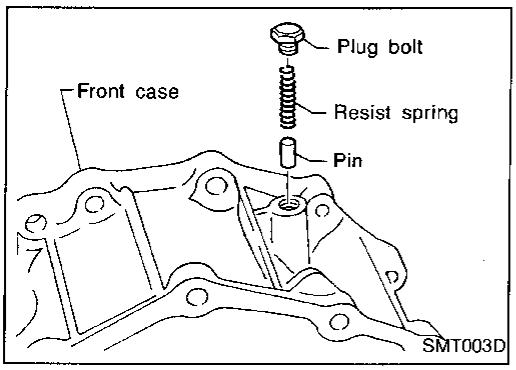


6. Remove snap ring from sun gear.
- **Do not reuse snap ring as it is a selective part.**
7. Remove washer from sun gear.

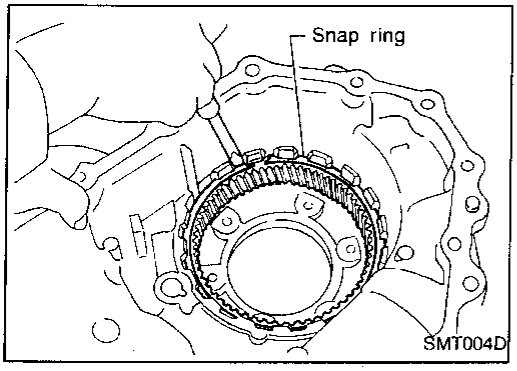
Front Case (Cont'd)



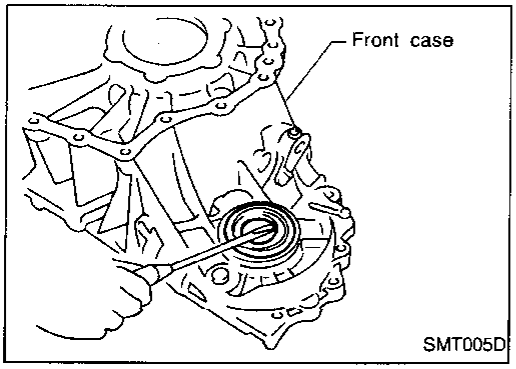
8. Set an adapter to sun gear as shown in the figure. Remove sun gear from planetary carrier. Remove main gear bearing, bearing race and thrust needle bearing (front and rear of planetary carrier) from sun gear.



9. Remove plug bolt, then remove resist spring and pin.

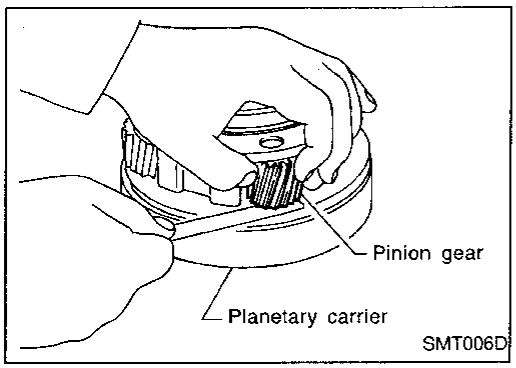


10. Remove snap ring, and remove internal gear.
- **Do not reuse snap ring.**



11. Remove front oil seal.
- **Do not reuse oil seal.**

12. Loosen nut of outer lever assembly to pull out cotter pin, and remove outer lever.
13. Remove inner lever assembly.



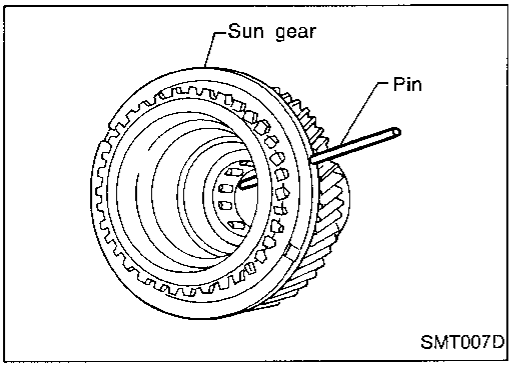
Front Case

INSPECTION

Planetary carrier

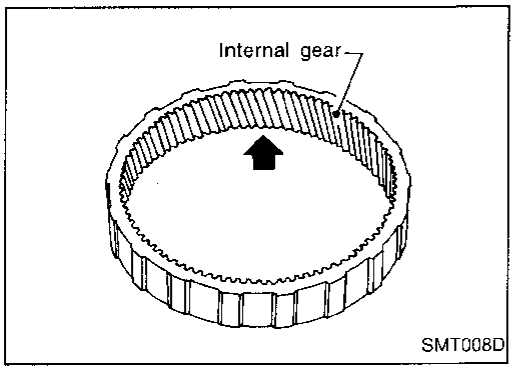
- Measure end play of each pinion gear, and make sure the measurement is within specification shown below. If out of specification, replace planetary carrier with new one.

  Pinion gear end play:
  0.1 - 0.7 mm (0.004 - 0.028 in)
- Check working face of each gear, bearing and others for damage, burrs, partial wear, dents and other abnormality. If any is found, replace planetary carrier with new one.



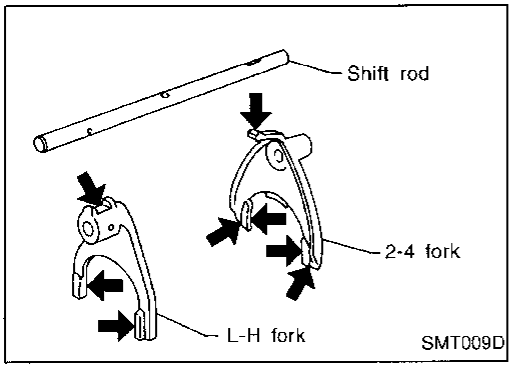
Sun gear

- Check if oil passage of sun gear is clogged. For this, try to pass a 3.6 mm (0.142 in) dia. wire through oil passage as shown in the figure.
- Check sliding/contact surface of each gear, bearing and others for damage, burrs, partial wear, dents, and other abnormality. If any is found, replace sun gear with new one.



Internal gear

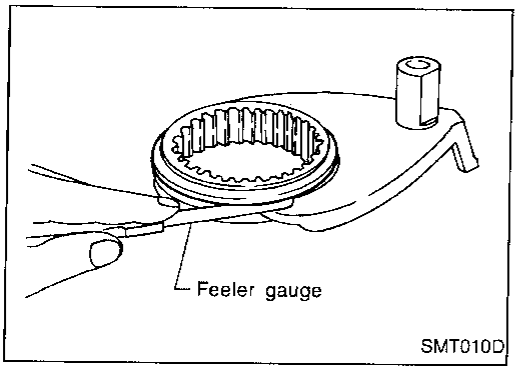
- Check internal gear teeth for damage, partial wear, dents and other abnormality. If any is found, replace internal gear with new one.



Shift rod components

- Check working face of shift rod and fork for wear, partial wear, bending and other abnormality. If any is found, replace with new one.

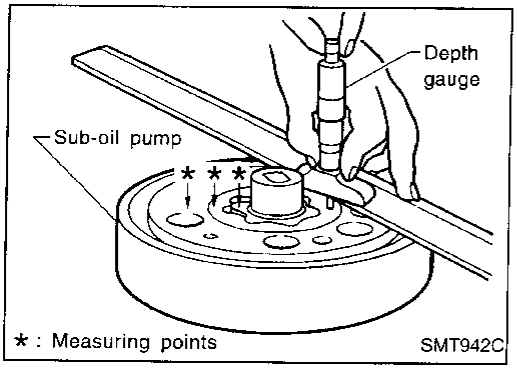
Front Case (Cont'd)



- Measure clearance between shift fork and sleeve. If it is out of specification, replace it with new one.

Standard value:

Less than 0.36 mm (0.0142 in)



Center Case

INSPECTION

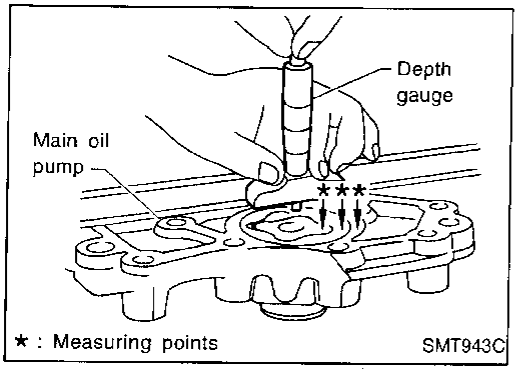
Sub-oil pump

1. Check inner and outer circumference, tooth face, and side-face of inner and outer gears for damage or abnormal wear.
2. Measure side clearance between oil pump housing edge and inner gear/outer gear.
3. Make sure side clearance is within specification. If the measurement is out of specification, replace inner and outer gears together with new ones as a set.

Specification:

0.15 - 0.35 mm (0.0059 - 0.0138 in)

For inner gear and outer gear, refer to SDS, TF-112.



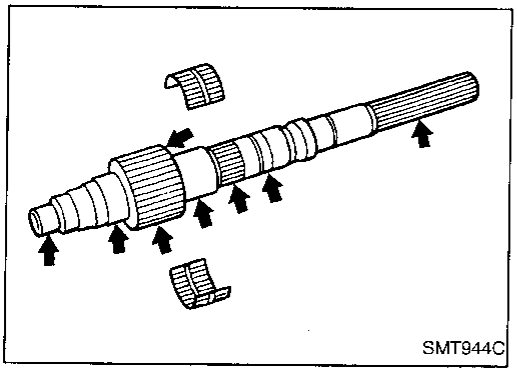
Main oil pump

1. Check inner and outer circumference, tooth face, and side-face of inner and outer gears for damage or abnormal wear.
2. Measure side clearance between oil pump housing edge and inner gear/outer gear.
3. Make sure side clearance is within specification. If the measurement is out of specification, replace inner and outer gears with new ones as a set.

Specification:

0.15 - 0.35 mm (0.0059 - 0.0138 in)

For inner gear and outer gear, refer to SDS, TF-112.

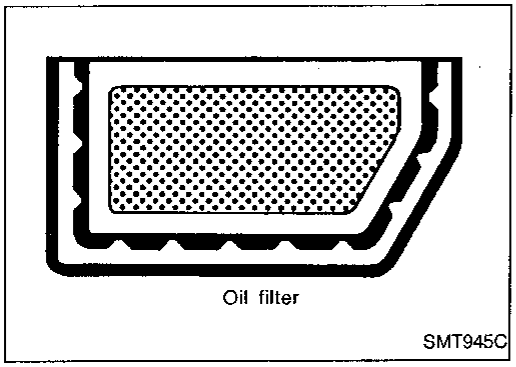


Mainshaft

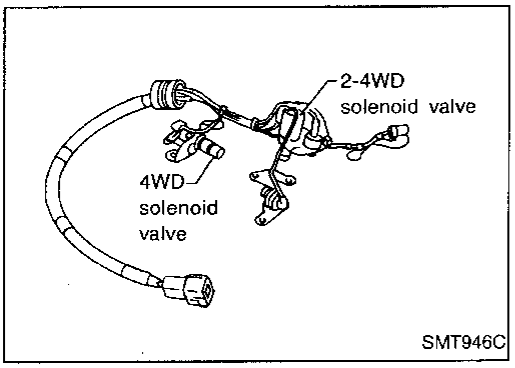
- Check surfaces which contact sun gear, clutch drum, clutch hub, press flange, clutch piston, each bearing, etc. for damage, peel, partial wear, dents, bending, or other abnormal damage. If any is found, replace with new one.

Center Case (Cont'd)

Control valve



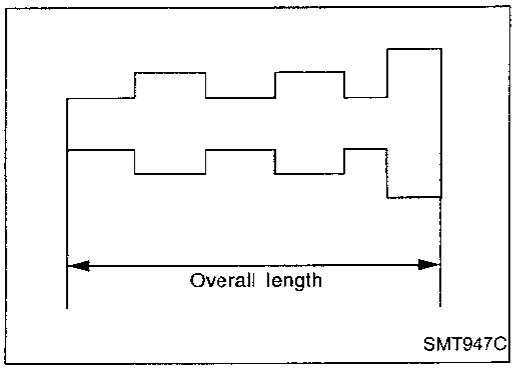
- Check oil filter screen for damage. If any is found, replace with new one.



- Check resistance between terminals of 4WD solenoid valve, 2-4WD solenoid valve and transfer fluid temperature sensor.

  Resistance:

  Refer to Component Inspection, TF-60.



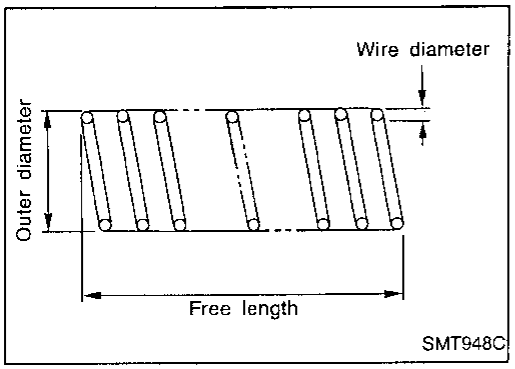
- Check sliding faces of control valves and plugs for abnormality. If any is found, replace the control valve assembly with new one.

CAUTION:

Replace control valve body together with clutch return spring as a set.

Control valve spring:

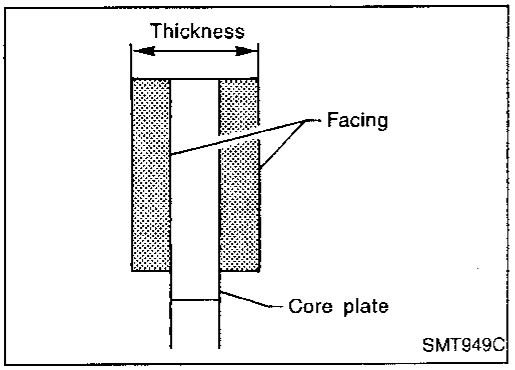
Refer to SDS, TF-112.



- Check each control valve spring for damage or distortion, and also check its free length, outer diameter and wire diameter. If any damage or fatigue is found, replace control valve body with new one.
- **Replace control valve body together with clutch return spring as a set.**

  Inspection standard:

  Refer to SDS, TF-112.



Clutch

- Check drive plate facing for damage, cracks or other abnormality. If any, replace with new one.
- Check the thickness of drive plate facing.

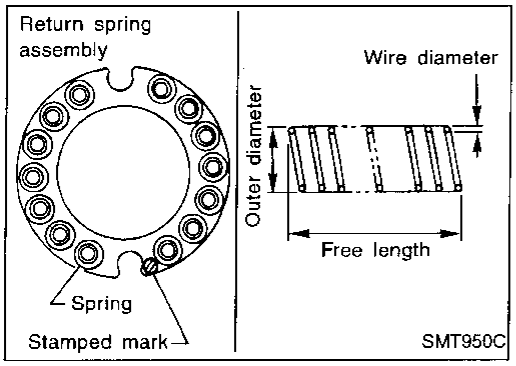
  Inspection standard:

  Refer to SDS, TF-112.

CAUTION:

- **Measure facing thickness at 3 points to take an average.**
- **Check all the drive plates.**
- **Check return spring for damage or deformation.**

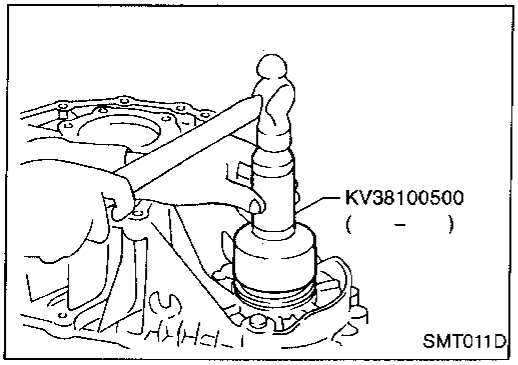
Center Case (Cont'd)



- Check stamped mark shown in the figure. Then, check that free length, outer diameter and wire diameter are within specifications. If any abnormality is found, replace with new return spring assembly of the same stamped number.

  Inspection standard:

  Refer to SDS, TF-113.



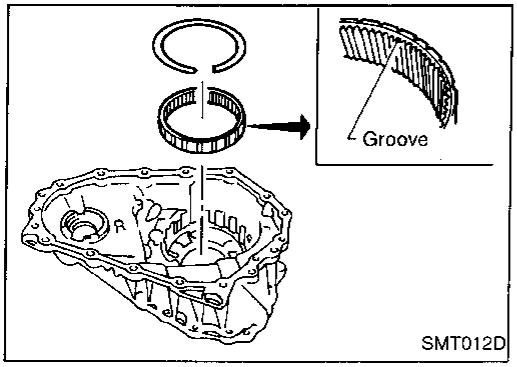
Front Case

ASSEMBLY

Planetary carrier, sun gear and internal gear

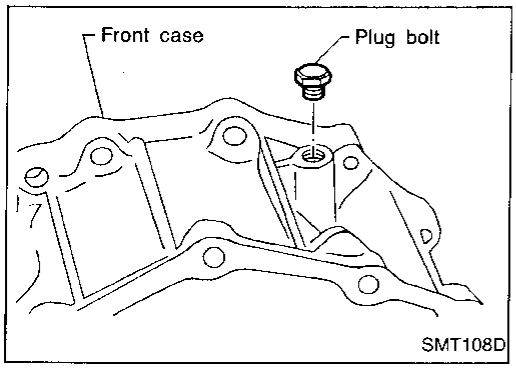
1. Apply ATF to oil seal periphery, and install oil seal so that it is flush with the end face of front case.

- **Do not reuse oil seal.**



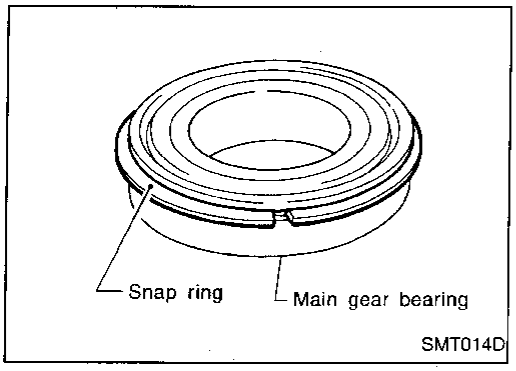
2. Install internal gear with its groove facing snap ring into front case. Then secure it with snap ring.

- **Do not reuse snap ring.**



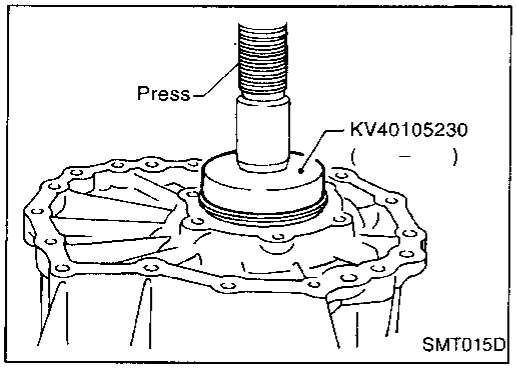
3. Remove all the liquid gasket on plug bolt and front case. Apply locking sealant to plug bolt, install it to front case and tighten it to specified torque.
- With one crest of plug bolt inserted in the hole, apply liquid gasket 1215 to the thread.

: 19 - 25 N·m (1.9 - 2.5 kg-m, 14 - 18 ft-lb)



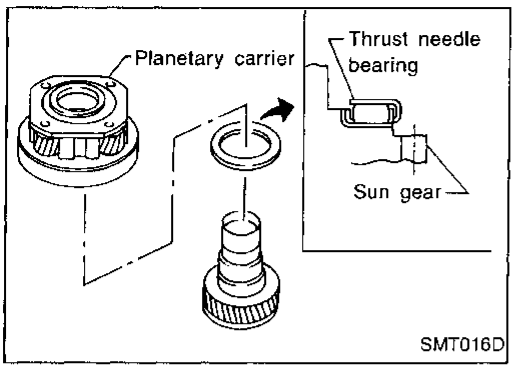
4. Install snap ring to main gear bearing.

- **Do not reuse snap rings.**

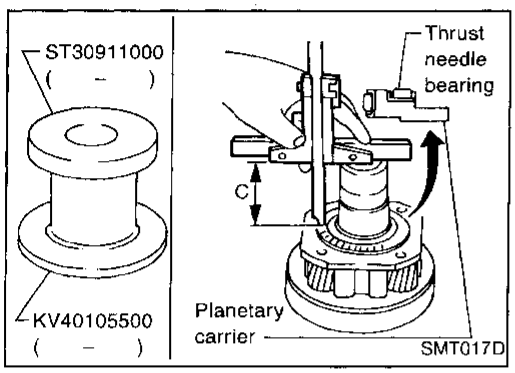


5. Set main gear bearing to front case, then press it.

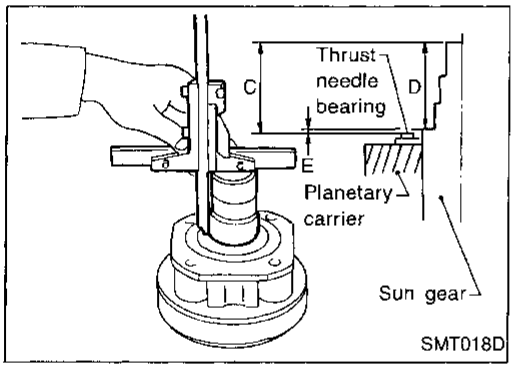
Front Case (Cont'd)



6. Install thrust needle bearing to sun gear.
7. Install sun gear to planetary carrier.

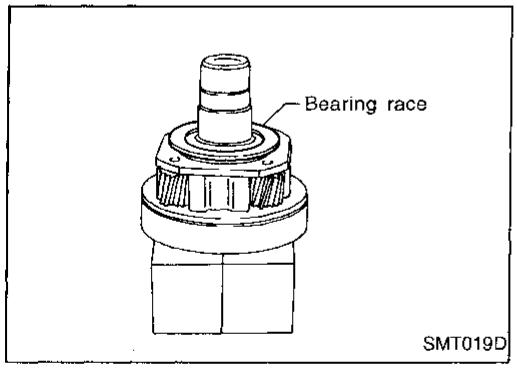


8. Set a support (KV40105500) to bushing replacer puller (ST30911000) as shown in the figure, and place planetary carrier on it.
9. Install thrust needle bearing to planetary carrier with its roller facing front case.
10. Measure "C" from the end of sun gear to the roller surface of thrust needle bearing.

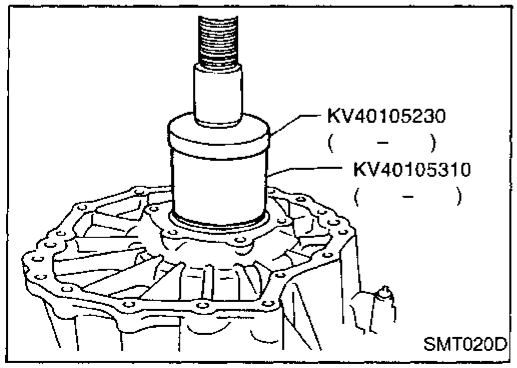


11. Measure "D" from the end of sun gear to the main gear bearing contact surface.
12. Calculate end play "E" using "C" and "D" obtained in steps 10 and 11. Select bearing race so that the end play becomes the standard value.

Calculation formula:
End play "E" = "C" – "D"
Standard end play:
0.1 - 0.25 mm (0.0039 - 0.0098 in)
Bearing race:
Refer to SDS, TF-113.

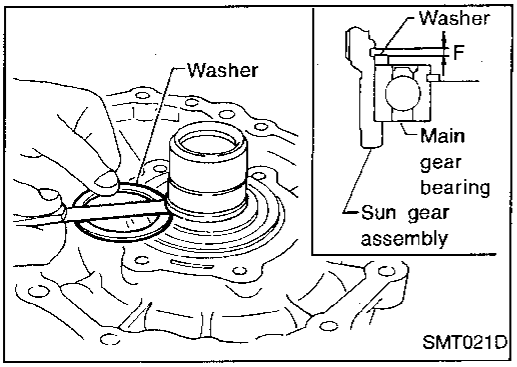


13. Set planetary carrier to press in the status described in step 8. Then install the selected bearing race to planetary carrier.

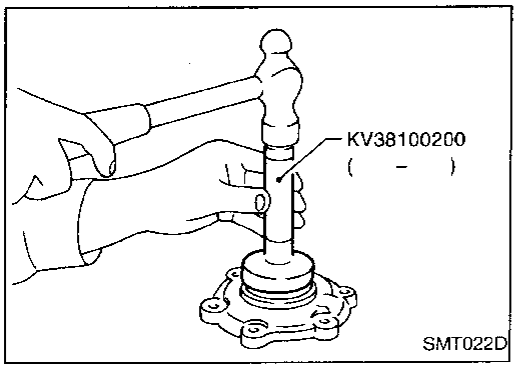


14. Install front case to planetary carrier. Set a support ring (KV40105310) and an adapter B (KV40105230) to main gear bearing inner race, then press it.

Front Case (Cont'd)

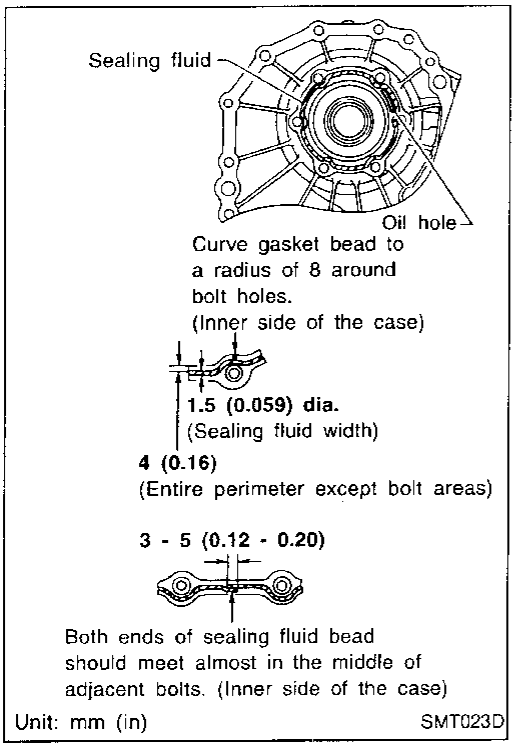


15. Install washer to sun gear assembly, and select proper snap ring so that end play "F" of sun gear is within specifications.
    Standard end play "F":
    0 - 0.15 mm (0 - 0.0059 in)
    Snap ring: Refer to SDS, TF-113.



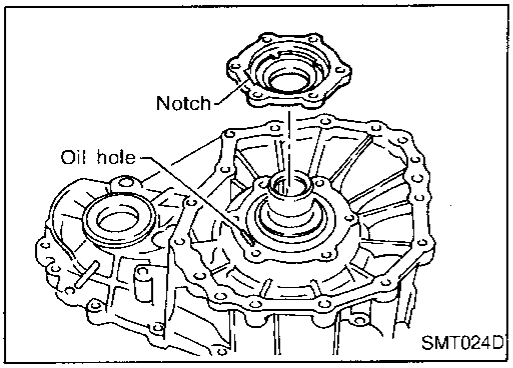
16. Install the selected snap ring.
- **Do not reuse snap rings.**

17. Apply ATF to the periphery of new transfer cover oil seal, and attach it at 1.5 mm (0.059 in) from the transfer cover and face.
- **Do not reuse oil seal.**



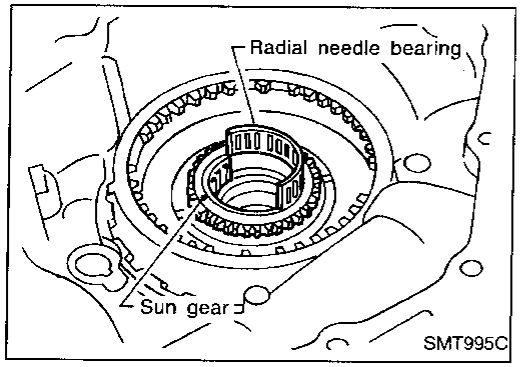
18. Apply sealing fluid (Lock Tite 518·C1335 x 25) to transfer cover mounting surface of front case as shown in the figure.

CAUTION:
- **Remove all foreign materials such as water, oil, and grease from mating surfaces of front case and transfer cover.**
- **Prevent sealing fluid from entering into oil holes of front case.**

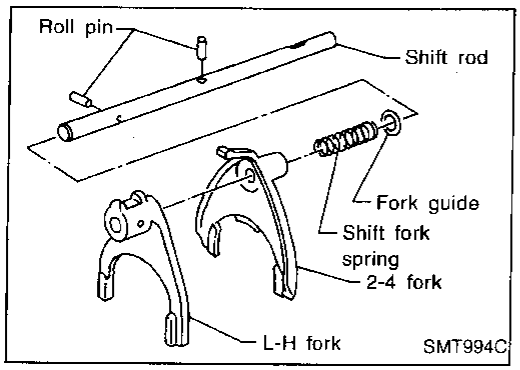


19. Align oil hole of front case with notch of transfer cover, and tighten bolts.
    : 49 - 58 N·m (5.0 - 5.9 kg-m, 36 - 43 ft-lb)
- **Do not reuse bolts.**

Front Case (Cont'd)



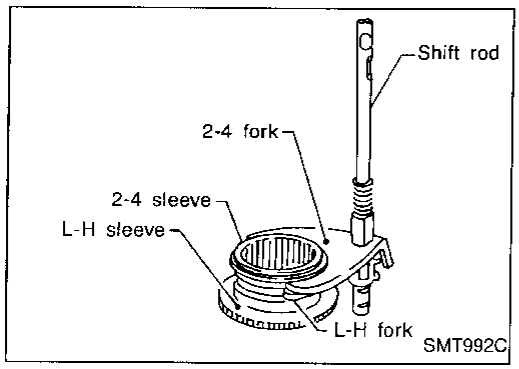
20. Apply petroleum jelly to radial needle bearing, and install it inside sun gear.
21. Install shift rod assembly to front case assembly. Refer to TF-99.
22. Install center case assembly to front case assembly. Refer to "Final Assembly", TF-108.
23. Install rear case assembly to center case. Refer to "Final Assembly", TF-108.



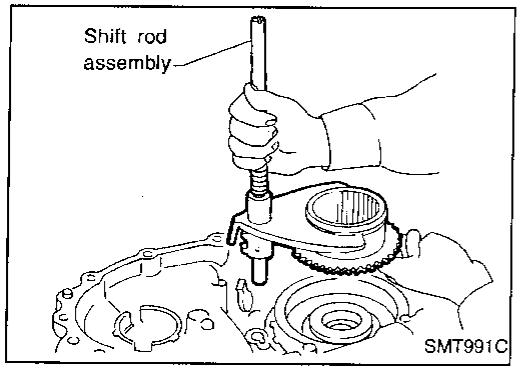
Shift rod assembly

1. Install fork guide, shift fork spring, 2-4 fork, and L-H fork to shift rod, and secure them with roll pins.

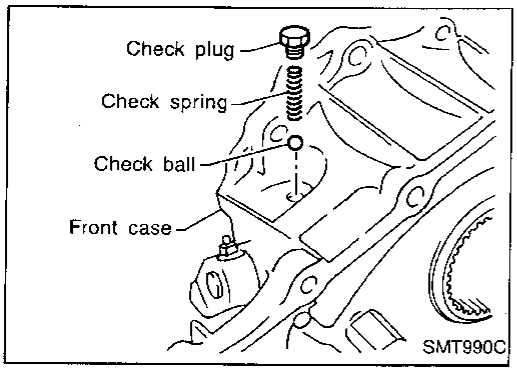
- **Do not reuse roll pins.**



2. Install 2-4 sleeve and L-H sleeve to each fork.



3. While aligning L-H sleeve with planetary carrier, install shift rod assembly to front case.



4. Remove all the liquid gasket on check plug and front case, and install check ball and check spring to front case. Apply gasket fluid 1215 (Three Bond) to check plug, install it to front case, and tighten it to specified torque.

- With plug bolt threaded one pitch into the hole, apply gasket fluid 1215 (Three Bond) to the thread.

: 19 - 25 N·m (1.9 - 2.5 kg-m, 14 - 18 ft-lb)

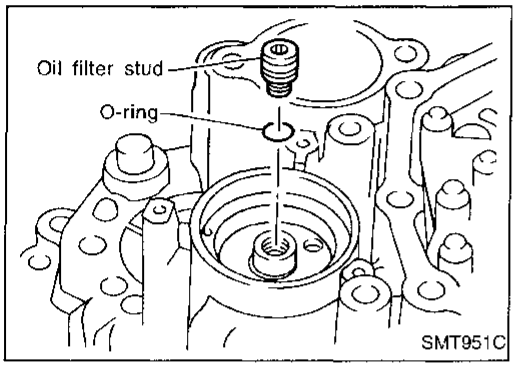
5. Remove all the liquid gasket on the switch fitting and inner side of front case, and with wait detection switch threaded one pitch into the hole, apply gasket fluid 1215 (Three Bond) to the thread, install it, and tighten it to specified torque.

: 15 - 20 N·m (1.5 - 2.0 kg-m, 11 - 14 ft-lb)

Front Case (Cont'd)

- **Wait detection switch harness connector is black.**

6. Install center case assembly to front case assembly. Refer to Final Assembly TF-108.
7. Install rear case assembly to center case. Refer to "Final Assembly", TF-108.



Center Case

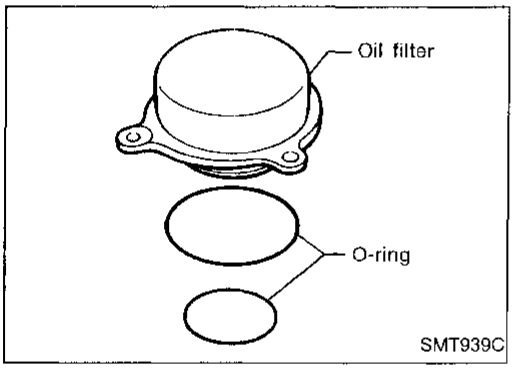
ASSEMBLY

Oil filter

1. Apply ATF or petroleum jelly to new O-ring, and install it to oil filter stud.

- **Do not reuse O-rings.**

2. Install oil filter stud to center case, and tighten it.
   : 25 - 35 N·m (2.6 - 3.6 kg-m, 19 - 26 ft-lb)

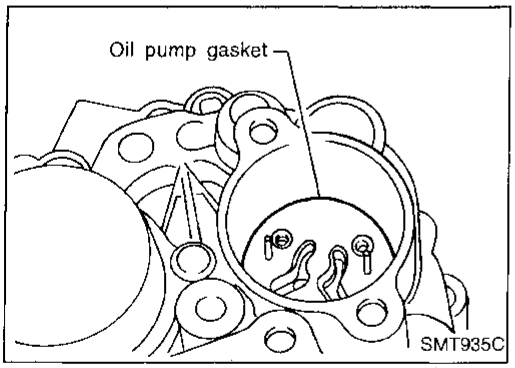


3. Apply ATF or petroleum jelly to two new O-rings, and install them to oil filter.

- **Do not reuse O-rings.**

4. Install oil filter to center case and tighten bolts.
   : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

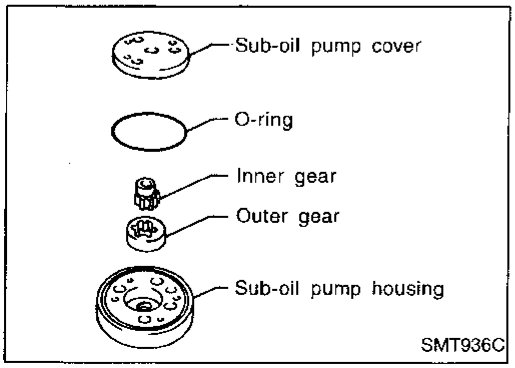
- **Do not knock oil filter with a tool such as a hammer.**



Sub-oil pump

1. Install new oil pump gasket to center case by aligning it with dowel pin inside the center case.

- **Do not reuse gaskets.**

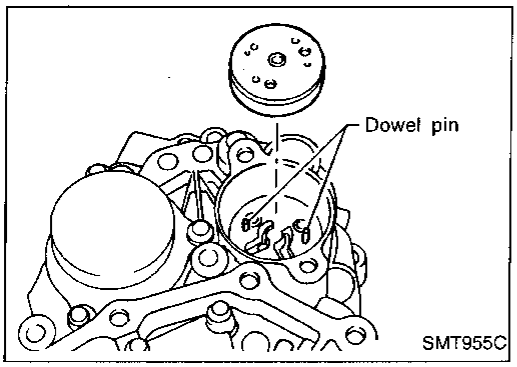


2. Install outer gear* and inner gear to sub-oil pump housing, and measure side clearance. Refer to "Sub-oil pump", "INSPECTION", TF-93.
3. Set new O-ring to sub-oil housing, and install sub-oil pump cover.

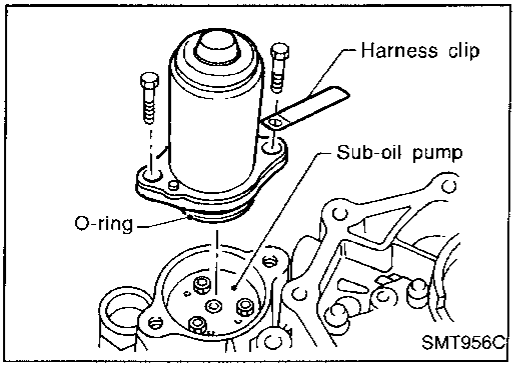
- **Do not reuse O-rings.**

* Identification mark "▼" is placed on the side of sub-oil pump cover.

Center Case (Cont'd)

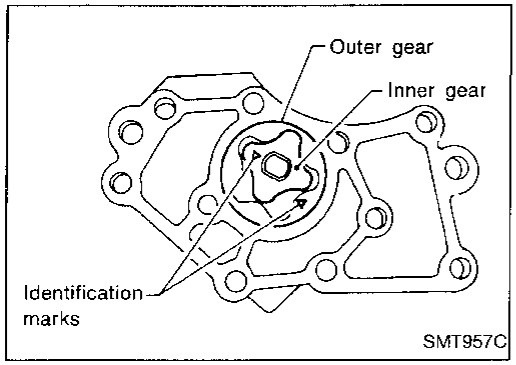


4. Align dowel pin hole and mounting bolt hole of sub-oil pump assembly with center case. Then tighten bolts.
   : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

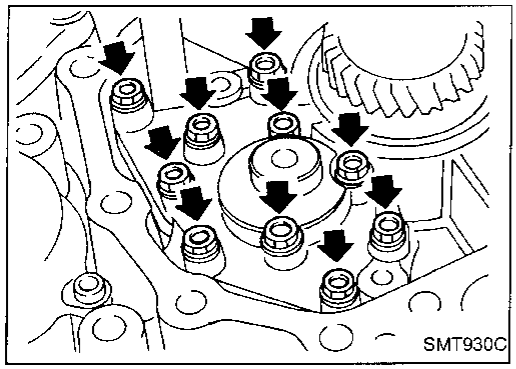


5. Apply ATF or petroleum jelly to new O-ring and install it to transfer motor.
6. Fit double-flat end of transfer motor shaft into slot of sub-oil pump assembly. Then tighten bolts.
   : 41 - 48 N·m (4.2 - 4.9 kg-m, 30 - 35 ft-lb)

Main oil pump



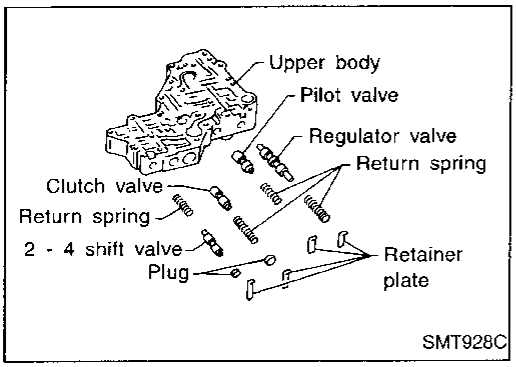
1. Install inner gear and outer gear in the main oil pump housing with their identification marks facing toward center case mounting surface side. Then, measure the side clearance. Refer to "Main oil pump" "INSPECTION", TF-93.



2. Install main oil pump assembly to center case assembly, and tighten bolts.
   : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)
3. Install oil pump shaft to main oil pump, then install rear case assembly to center case.
   Refer to "Final Assembly", "Assembly", TF-108.

Center Case (Cont'd)

Control valve

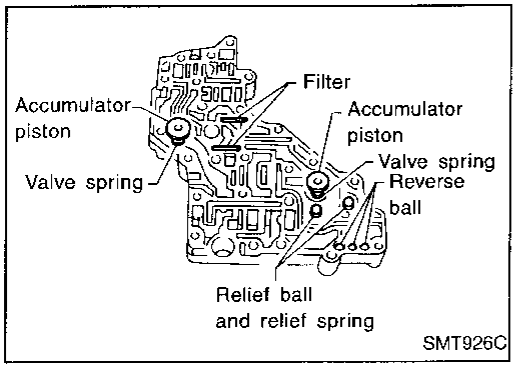


1. Clean upper body, control valves and springs with cleaning agent, and apply air blow.
2. Dip control valves in ATF, and apply ATF to the valve-mounting area of upper body.
3. Install each control valve, spring, and plug to upper body, and fix it with retainer plates.

CAUTION:

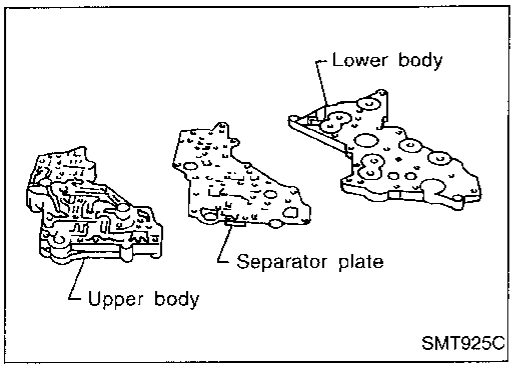
- **To insert control valves into upper body, place upper body on a level surface in order to prevent flaw or damage.**
- **Make sure each control valve is smoothly inserted.**

4. Install reverse balls, relief balls and relief springs, accumulator pistons, valve springs and two filters to upper body.



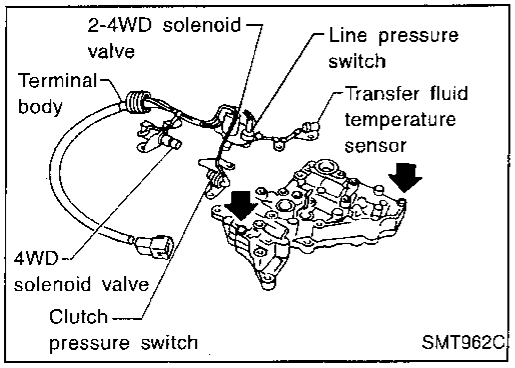
5. Install lower body and separator plate to upper body.

- **Do not reuse separator plates.**



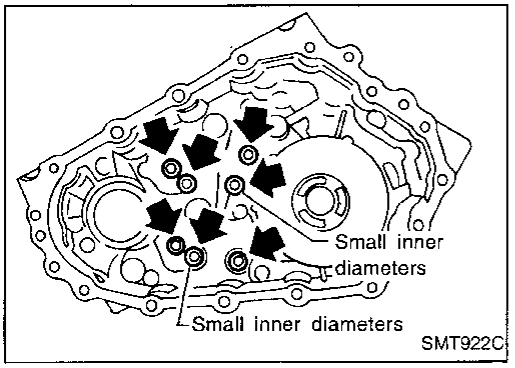
6. With lower body down, tighten two bolts in the position shown in the figure.
7. Apply ATF or petroleum jelly to new O-ring, and install it to 2-4WD solenoid valve, terminal body, line pressure switch and 4WD solenoid valve. Install them to control valve assembly.

- **Do not reuse O-rings.**

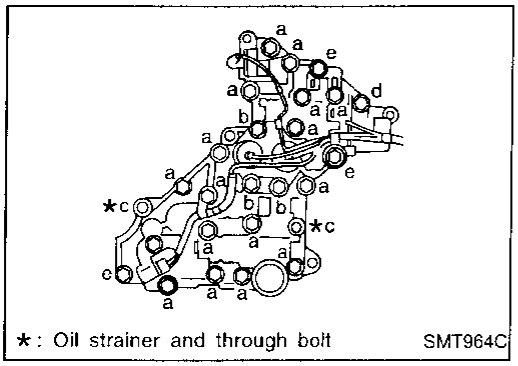


8. Apply ATF or petroleum jelly to lip seals, and install them to center case.

- **Do not reuse lip seals.**
- **There are 2 kinds of lip seals (large inner diameter: 5, small inner diameter: 2). Confirm the position before installation.**



Center Case (Cont'd)

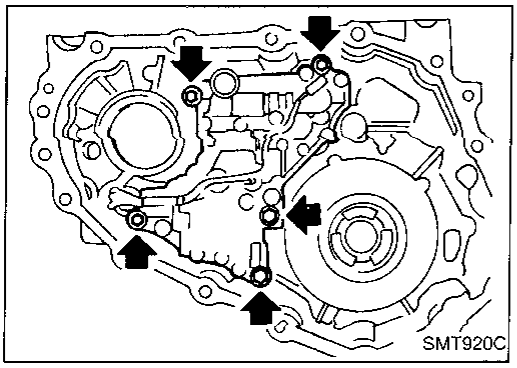


*: Oil strainer and through bolt SMT964C

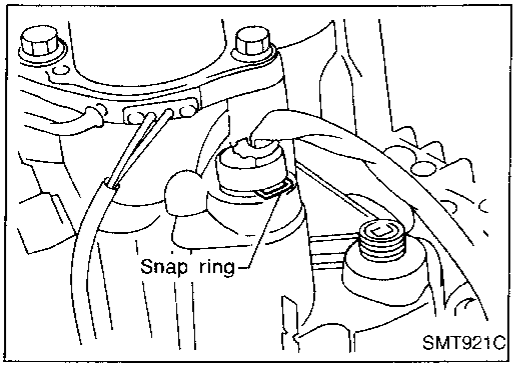
9. Install bolts as shown in the figure, and tighten them to specified torque.

Bolt symbol	a	b	*c	d	e
Length under head mm (in)	38 (1.50)	43.5 (1.713)	62 (2.44)	19 (0.75)	52 (2.05)
Q'ty	17	3	2	1	1
Tightening torque N·m (kg-m, in-lb)	6.9 - 8.8 (0.70 - 0.90, 61.1 - 77.9)				

*: Tighten with oil strainer.

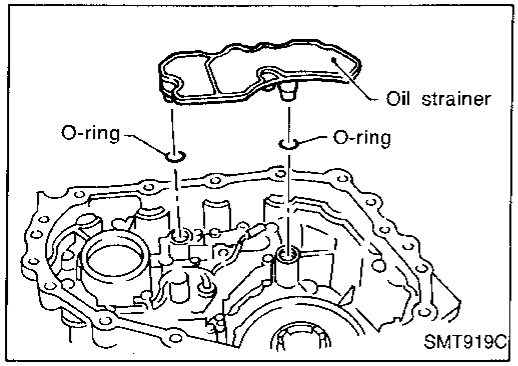

SMT920C

10. Install control valve assembly to center case, and tighten bolts.
: 6.9 - 8.8 N·m (0.70 - 0.90 kg-m, 61.1 - 77.9 in-lb)



SMT921C

11. Secure terminal body with snap ring.

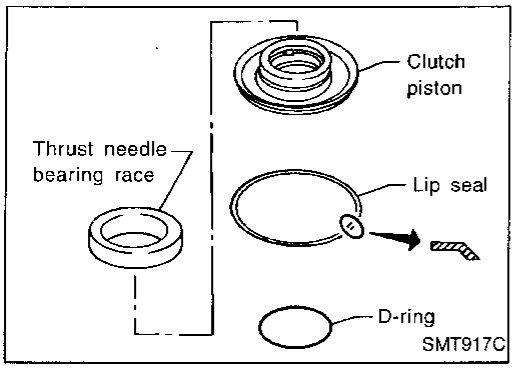


SMT919C

12. Apply ATF or petroleum jelly to O-rings, and install them to oil strainer.

CAUTION:
Do not reuse snap ring.

13. Install oil strainer to control valve assembly.
14. Install mainshaft and clutch drum to center case. Refer to "MAINSHAFT AND CLUTCH DRUM", TF-104.
15. Install front case assembly and rear case assembly. Refer to "Final Assembly", TF-108.

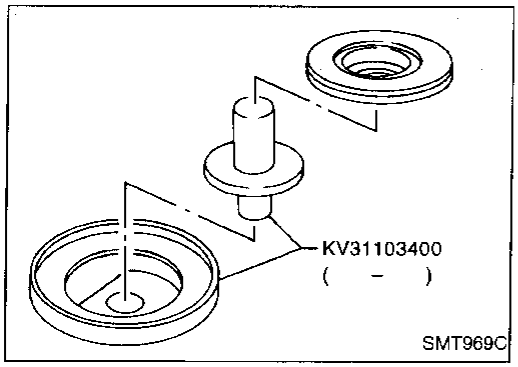


SMT917C

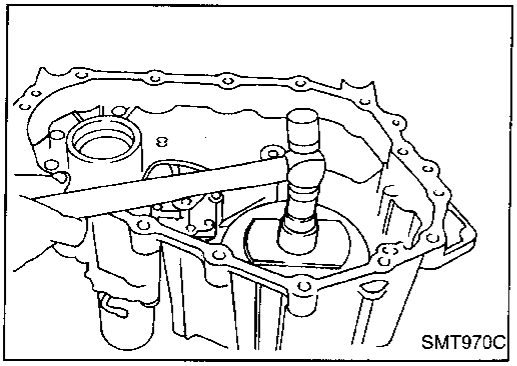
Clutch piston

1. Apply ATF to D-ring and lip seal, and install them to clutch piston.

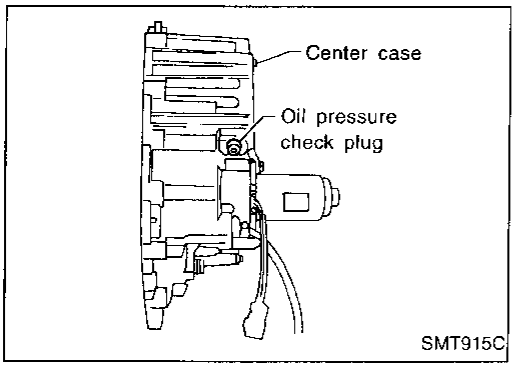
Center Case (Cont'd)



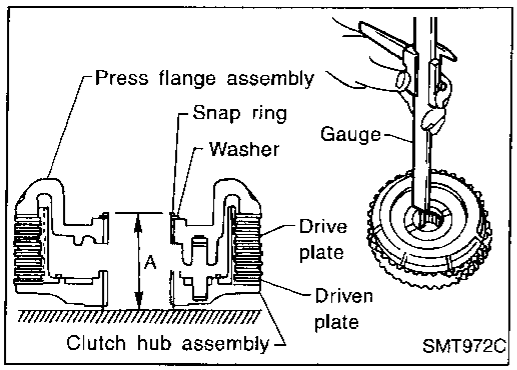
2. Set clutch piston to a clutch piston attachment (KV31103400).



3. Set the clutch piston attachment to center case, and install clutch piston, tap it lightly.
4. Install slide needle bearing race to clutch piston.



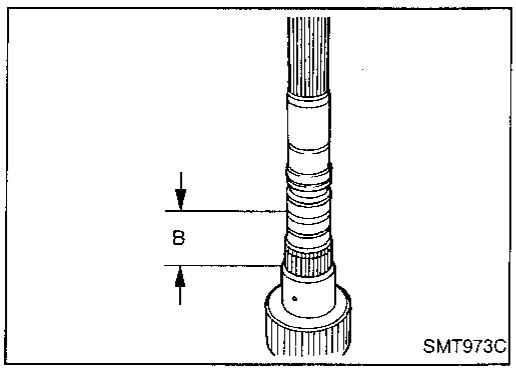
5. Remove all the liquid gasket from oil pressure check port and inside center case. With oil pressure check plug threaded in 1 or 2 pitches, apply locking sealant 1215 to the thread of plug, and tighten.
   : 10 - 17 N·m (1.0 - 1.7 kg-m, 87 - 148 in-lb)
6. Install mainshaft and clutch drum. Refer to "MAINSHAFT AND CLUTCH DRUM", TF-104.
7. Install front case assembly and rear case assembly. Refer to "INSTALLATION" in "Front Case" and "INSTALLATION" in "Center Case".



Mainshaft and clutch drum

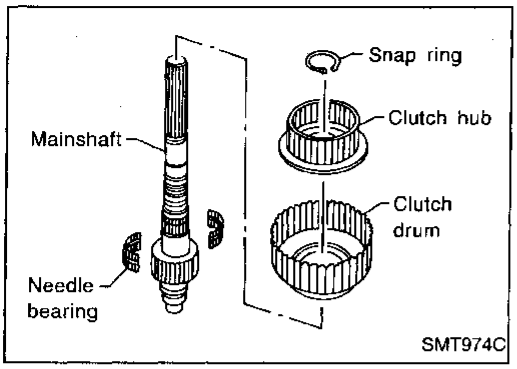
1. Install drive plates, driven plates and press flange to clutch hub.
2. Place clutch hub on a surface plate and measure dimension "A" between snap ring mounting surface of press flange and clutch drum sliding face of clutch hub.

CAUTION:
Measure at least 2 points, and take an average.

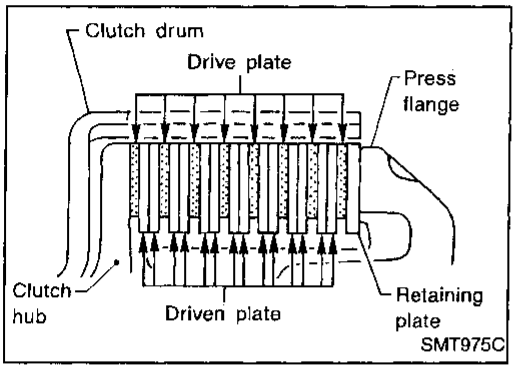


3. Measure dimension "B" between the gear end of mainshaft and the snap ring mounting portion.
4. Calculate end play using dimension "A" and dimension "B" (obtained in steps 2 and 3), and select proper retaining plate so that the end play is within specifications.
   Calculation formula:
   End play = B – A – Retaining plate thickness
   Standard end play:
   0.2 - 0.5 mm (0.008 - 0.020 in)
   Retaining plate:
   Refer to SDS, TF-113.

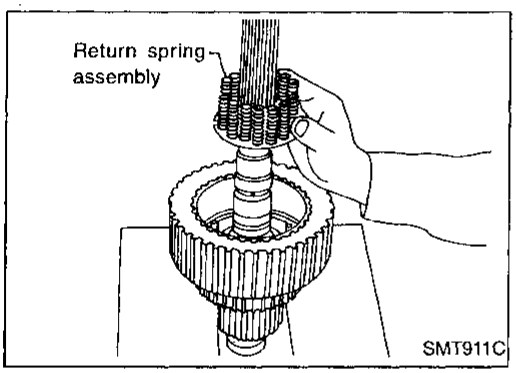
Center Case (Cont'd)



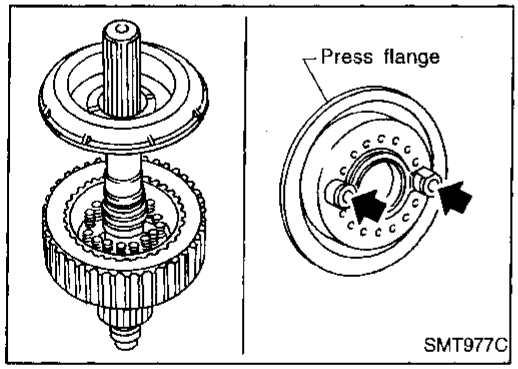
5. Install clutch drum, needle bearing and clutch hub to mainshaft, and secure them with snap ring.
- **Do not reuse snap ring.**



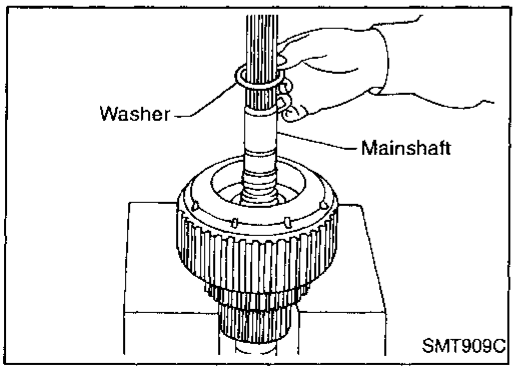
6. Install each clutch to clutch drum.



7. Align the notch of return spring assembly with the pin of clutch hub, and install it.

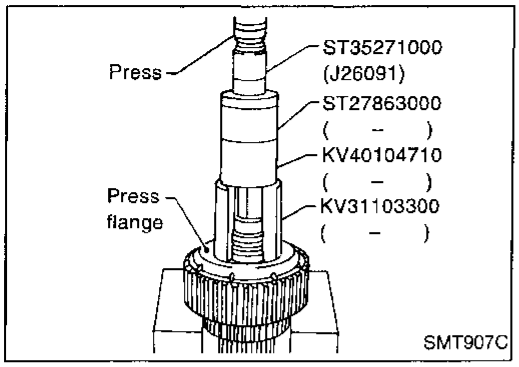


8. Install press flange (with the holes indicated by arrows aligned with pins of clutch hub).

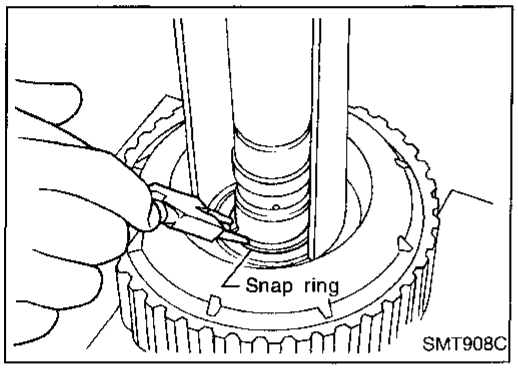


9. Install washer.

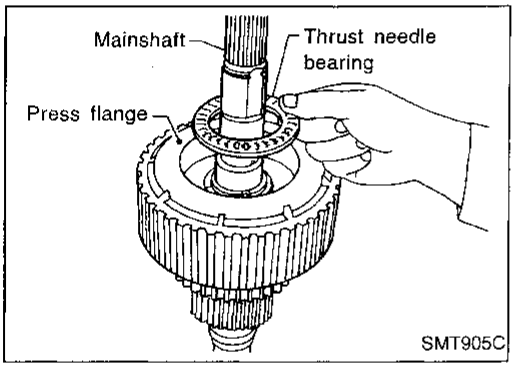
Center Case (Cont'd)



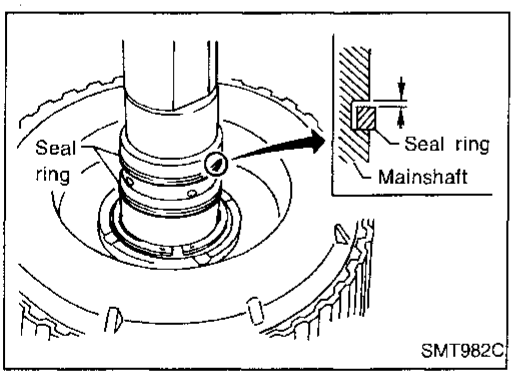
10. Pass mainshaft through snap ring. Set a drift (KV31103300), a support ring (KV40104710), a support ring (ST27863000) and a drift (ST35271000) to press flange at the position shown in the figure, and press snap ring until it fits into snap ring groove on mainshaft.
- **Do not reuse snap ring.**



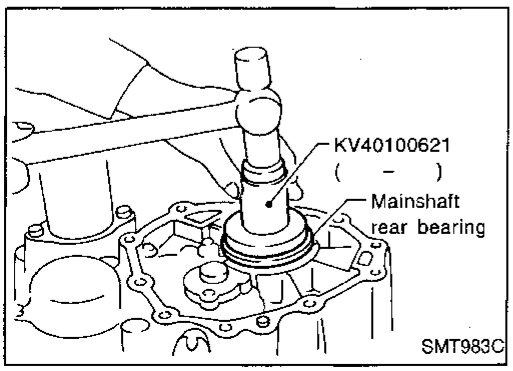
11. Fix snap ring to mainshaft.



12. Install thrust needle bearing to press flange.

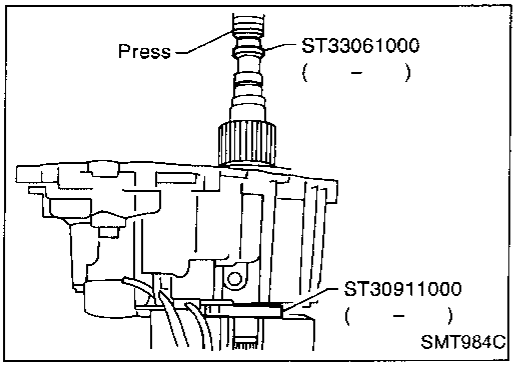


13. Apply petroleum jelly to new seal rings, and install them to mainshaft. Measure clearance between seal ring and groove using feeler gauge.
   Standard:
   0.05 - 0.30 mm (0.0020 - 0.0118 in)
   Limit:
   0.30 mm (0.0118 in)
- Pass seal ring from mainshaft rear end to install it.
   Seal ring dimension:
   Refer to SDS, TF-113.

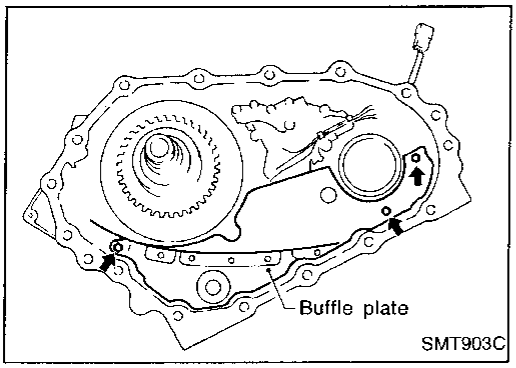


14. Install mainshaft rear bearing to center case.

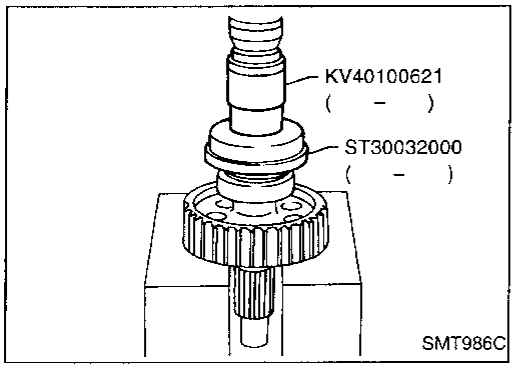
Center Case (Cont'd)



15. Place puller (ST30911000) to mainshaft rear bearing inner race, and set it to press stand.
16. Place adapter (ST33061000) to the tip of mainshaft, and press mainshaft into center case.

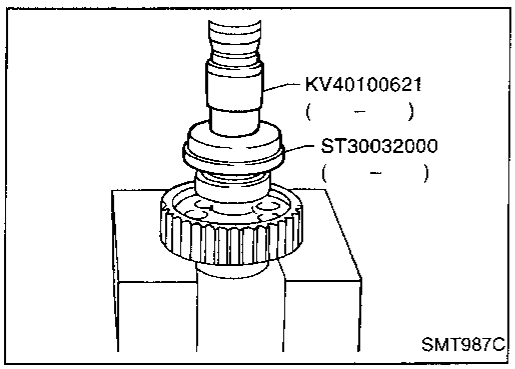


17. Install baffle plate to center case, and tighten bolts.
    : 3.7 - 5.0 N·m (0.38 - 0.51 kg-m, 33.0 - 44.3 in-lb)
18. Install front drive shaft and drive chain. Refer to "FRONT DRIVE SHAFT AND DRIVE CHAIN" below.
19. Install front case assembly and rear case assembly. Refer to "Final Assembly", TF-108.

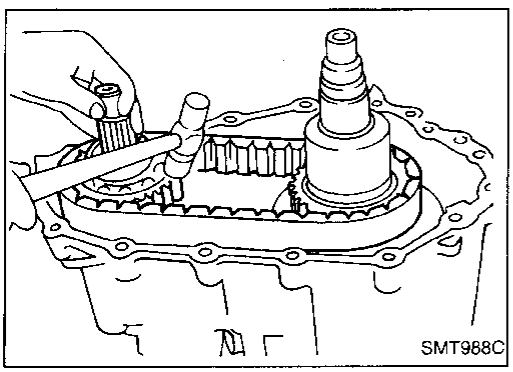


FRONT DRIVE SHAFT AND DRIVE CHAIN

1. Place a base (ST30032000) to front drive shaft rear bearing inner race, and press it using a drift (KV40100621).



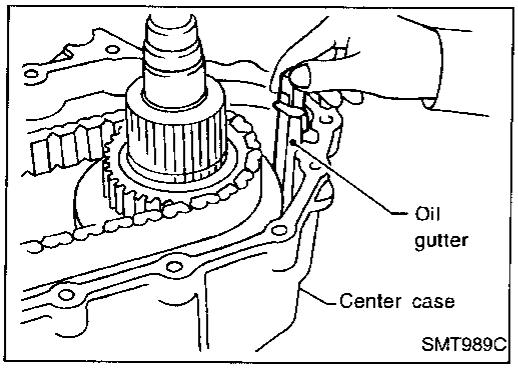
2. Place base (ST30032000) to front drive shaft front bearing inner race, and press it using the drift (KV40100621).



3. Install drive chain temporarily to front drive shaft and drive gear of clutch drum.
4. Tap front drive shaft with a plastic hammer while keeping it upright and press-fit front drive shaft rear bearing.

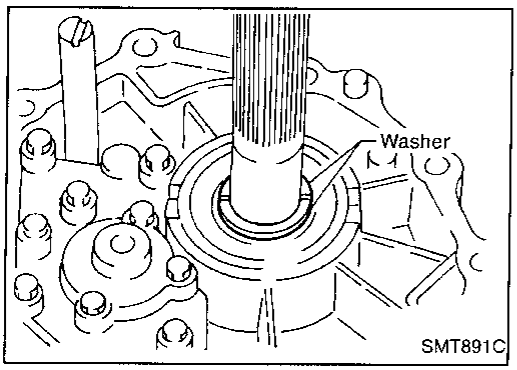
- **Be careful not to tap drive chain with a hammer.**

Center Case (Cont'd)

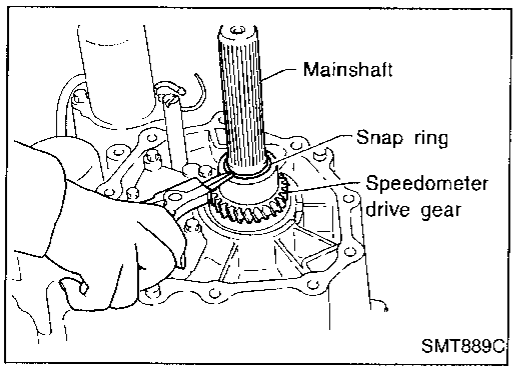


5. Align claw of oil gutter with center case, and install it.
6. Install front case assembly and rear case assembly. Refer to "Final Assembly", TF-108.

Final Assembly

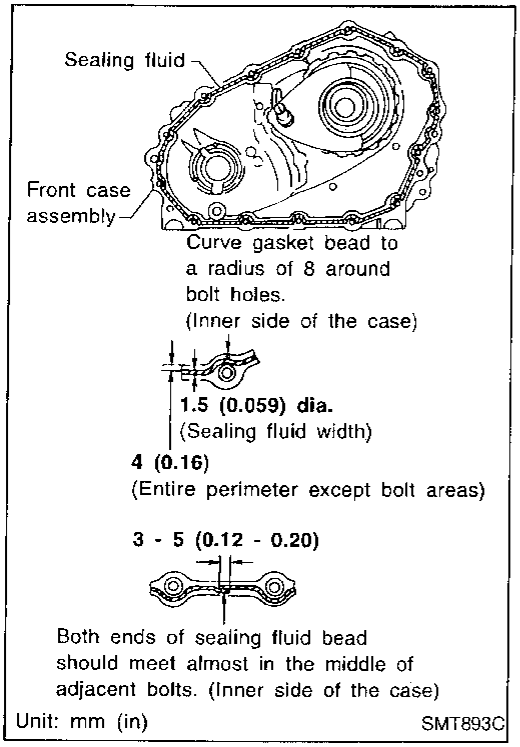


1. Install C-rings to mainshaft rear bearing.



2. Check speedometer drive gear teeth for abnormal wear. Set speedometer drive gear properly on mainshaft, and secure it with snap ring.

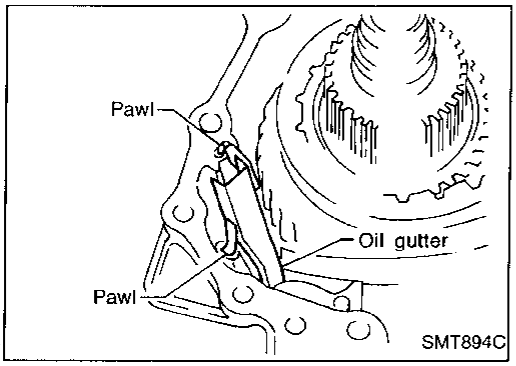
- **Do not reuse snap ring.**



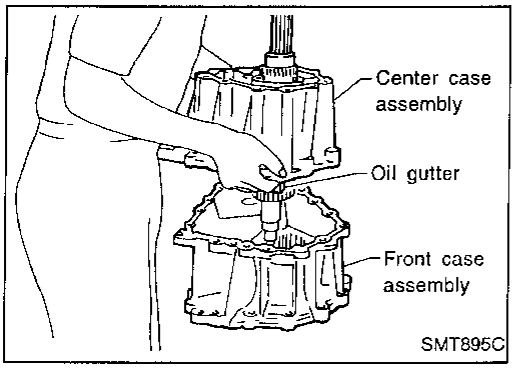
3. Apply sealing fluid 518 (Lock Tite) to the entire center case mounting surface of front case as shown in the figure.

CAUTION:
Remove all foreign materials such as water, oil and grease from center case and front case mating surfaces.

Final Assembly (Cont'd)



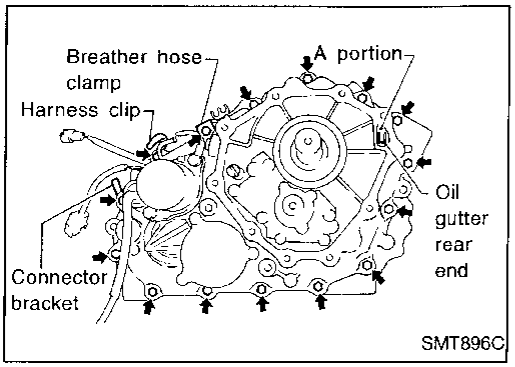
4. Make sure the two claws of oil gutter are securely attached to slots in center case.



5. With the claws of oil gutter held by a finger, install center case assembly to front case assembly.

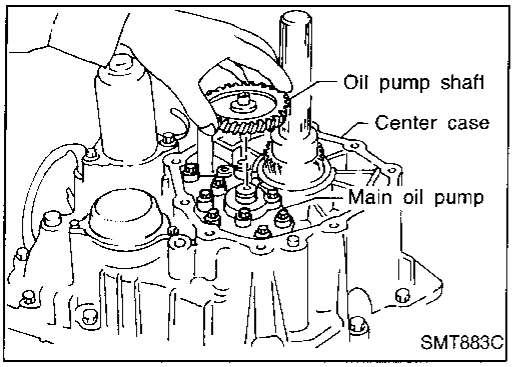
CAUTION:
Pay careful attention so that mainshaft end does not damage radial needle bearing in sun gear assembly.

6. Tap center case lightly with a rubber hammer or the like and press-fit front drive shaft bearing into front case.



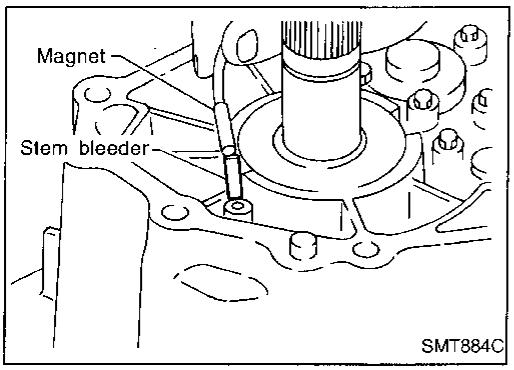
7. Make sure oil gutter rear end protrudes from point "A" in the figure.
8. Tighten bolts to specified torque.
   : 41 - 48 N·m (4.2 - 4.9 kg-m, 30 - 35 ft-lb)

- **Be sure to install air breather hose clamp, connector bracket and harness clip.**



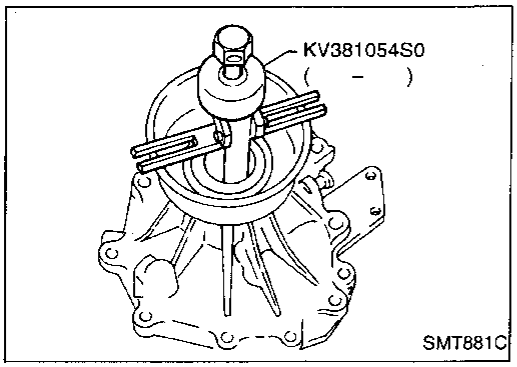
9. Fit double-flat end of oil pump shaft into slot of main oil pump and install it.

NOTE:
When oil pump shaft is rotated slightly, it drops into position where both parts fit.

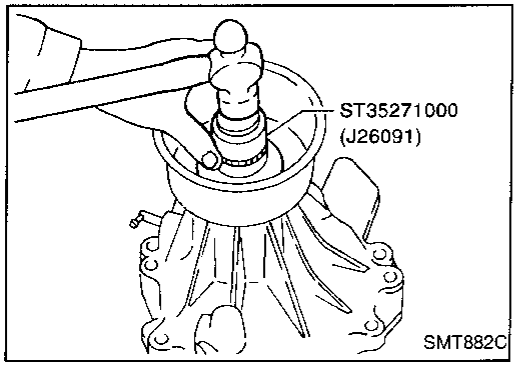


10. Install stem bleeder to center case.

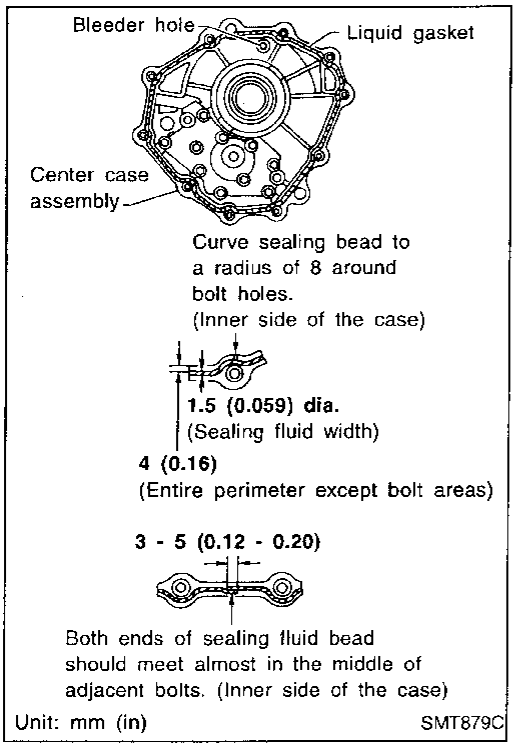
Final Assembly (Cont'd)



11. Remove rear oil seal.
- **Do not reuse oil seal.**



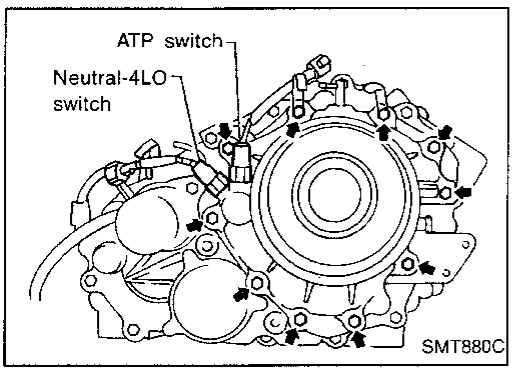
12. Apply ATF to the circumference of new rear oil seal, and tap it using a drift as shown in the figure so that it is aligned with case tip face.
- **Apply multi-purpose grease to oil seal lip.**



13. Apply sealing fluid 518 (Lock Tite) to entire rear case mounting surface of center case as shown in the figure.

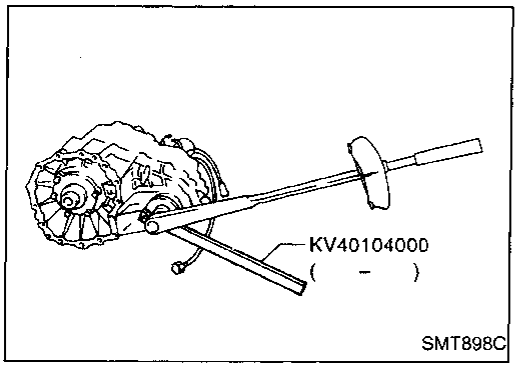
CAUTION:
- **Remove all foreign materials such as water, oil, and grease from center case and rear case mating surfaces.**
- **Be careful not to allow sealing fluid to clog bleeder hole.**

14. Install rear case to center case, and tighten bolts to specified torque.
   : 41 - 48 N·m (4.2 - 4.9 kg-m, 30 - 35 ft-lb)
- **Be sure to attach harness clips.**



15. Remove all the gasket fluid 1215 (Three Bond) from switch mounting area and inside rear case, with ATP switch and neutral-4LO switch threaded in, 1 to 2 pitches apply gasket fluid 1215 (Three Bond) to the thread of the switches and tighten it to specified torque.
   : 15 - 20 N·m (1.5 - 2.0 kg-m, 11 - 14 ft-lb)
16. Install rear case assembly to center case assembly.

Final Assembly (Cont'd)



17. Install companion flange to front drive shaft, and tighten mounting nut.
    : 226 - 324 N·m (23.0 - 33.0 kg-m, 166 - 239 ft-lb)

General Specifications

Transfer model			ATX14A
Gear ratio	High		1.000
	Low		2.596
Number of teeth	Planetary gear	Sun gear	57
		Internal gear	91
	Front drive sprocket		35
	Front drive shaft		35
Oil capacity	ℓ (US qt, Imp qt)		3.0 (3-1/8, 2-5/8)

Inspection and Adjustment

INNER GEAR AND OUTER GEAR

Sub-oil pump

Allowable clearance	0.15 - 0.35 mm (0.0059 - 0.0138 in)	
Gear thickness mm (in)	Part No.	
	Inner gear	Outer gear
9.27 - 9.28 (0.3650 - 0.3654)	31346 0W422	31347 0W422
9.28 - 9.29 (0.3654 - 0.3657)	31346 0W421	31347 0W421
9.29 - 9.30 (0.3657 - 0.3661)	31346 0W420	31347 0W420

Main oil pump

Allowable clearance	0.15 - 0.35 mm (0.0059 - 0.0138 in)	
Gear thickness mm (in)	Part No.	
	Inner gear	Outer gear
14.67 - 14.68 (0.5776 - 0.5780)	31346 0W412	31347 0W412
14.68 - 14.69 (0.5780 - 0.5783)	31346 0W411	31347 0W411
14.69 - 14.70 (0.5783 - 0.5787)	31346 0W410	31347 0W410

CONTROL VALVE

Valve

Mounting position	Part name	Part No.	Outer dia. mm (in)	Overall length mm (in)
L1	2-4 shift valve	31772 21X00	8.0 (0.315)	38.5 (1.516)
L2	Clutch valve	31772 80X11	10.0 (0.394)	40.0 (1.575)
L4	Pilot valve	31772 80X11	10.0 (0.394)	40.0 (1.575)
L5	Regulator valve	31741 0W410	12.0 (0.472)	68.0 (2.677)

Spring

Mounting position	Part name	Part No.	Free length mm (in)	Outer dia. mm (in)	Wire dia. mm (in)	Winding direction
L1	2-4 shift valve spring	31742 0W400	31.85 (1.2539)	7.0 (0.276)	0.6 (0.024)	Clockwise
L2	Clutch valve spring	31742 0W405	40.6 (1.598)	9.0 (0.354)	0.8 (0.031)	Clockwise
L4	Pilot valve spring	31742 0W410	28.1 (1.106)	9.0 (0.354)	1.2 (0.047)	Clockwise
L5	Regulator valve spring	31742 0W415	39.7 (1.563)	11.0 (0.433)	1.3 (0.051)	Clockwise

CLUTCH

Drive plate

Part No.	Initial thickness mm (in)	Limit value mm (in)
31532 0W410	2.0 (0.079)	1.8 (0.071)

Inspection and Adjustment (Cont'd)

Return spring

Stamped mark	Part No.	Free length mm (in)	Outer dia. mm (in)	Wire dia. mm (in)	Winding direction
1	31521 0W401	37.3 (1.496)	12.0 (0.472)	1.8 (0.071)	Clockwise
2	31521 0W402	37.8 (1.488)			
3	31521 0W403	38.4 (1.512)			
4	31521 0W404	38.9 (1.531)			
5	31521 0W405	39.4 (1.551)			
6	31521 0W406	40.0 (1.575)			
7	31521 0W407	36.8 (1.449)			
8	31521 0W408	40.5 (1.594)			

Retaining plate

Measured value mm (in)	Part No.	Thickness mm (in)
2.30 - 2.50 (0.0906 - 0.0984)	31537 0W410	2.1 (0.083)
2.50 - 2.70 (0.0984 - 0.1063)	31537 0W411	2.3 (0.091)
2.70 - 2.90 (0.1063 - 0.1142)	31537 0W412	2.5 (0.098)
2.90 - 3.10 (0.1142 - 0.1220)	31537 0W413	2.7 (0.106)
3.10 - 3.30 (0.1220 - 0.1299)	31537 0W414	2.9 (0.114)
3.30 - 3.50 (0.1299 - 0.1378)	31537 0W415	3.1 (0.122)
3.50 - 3.70 (0.1378 - 0.1457)	31537 0W416	3.3 (0.130)
3.70 - 3.90 (0.1457 - 0.1535)	31537 0W417	3.5 (0.138)
3.90 - 4.10 (0.1535 - 0.1614)	31537 0W418	3.7 (0.146)
4.10 - 4.30 (0.1614 - 0.1693)	31537 0W419	3.9 (0.154)
4.30 - 4.50 (0.1693 - 0.1772)	31537 0W420	4.1 (0.161)
4.50 - 4.70 (0.1772 - 0.1850)	31537 0W421	4.3 (0.169)
4.70 - 4.90 (0.1850 - 0.1929)	31537 0W422	4.5 (0.177)
4.90 - 5.10 (0.1929 - 0.2008)	31537 0W423	4.7 (0.185)

SEAL RING (At mainshaft)

Part No.	Outer dia. mm (in)	Inner dia. mm (in)	Thickness mm (in)
31525 0W410	40.8 (1.606)	36.9 (1.453)	1.97 (0.471)

BEARING RACE (At thrust needle bearing)

End play (Dimension "E") mm (in)	Part No.	Thickness mm (in)
1,785 - 1,800 (0.0703 - 0.0709)	31439 0W410	1.6 (0.063)
1,800 - 1,900 (0.0709 - 0.0748)	31439 0W411	1.7 (0.067)
1,900 - 2,000 (0.0748 - 0.0787)	31439 0W412	1.8 (0.071)
2,000 - 2,100 (0.0787 - 0.0827)	31439 0W413	1.9 (0.075)
2,100 - 2,200 (0.0827 - 0.0866)	31439 0W414	2.0 (0.079)
2,200 - 2,270 (0.0866 - 0.0894)	31439 0W415	2.1 (0.083)

SNAP RING (At sun gear)

End play (Dimension "F") mm (in)	Part No.	Thickness mm (in)
2.30 - 2.40 (0.0906 - 0.0945)	33112 0W410	2.3 (0.091)
2.40 - 2.50 (0.0945 - 0.0984)	33112 0W411	2.4 (0.094)
2.50 - 2.60 (0.0984 - 0.1024)	33112 0W412	2.5 (0.098)
2.60 - 2.70 (0.1024 - 0.1063)	33112 0W413	2.6 (0.102)
2.70 - 2.72 (0.1063 - 0.1071)	33112 0W414	2.7 (0.106)