

A343F AUTOMATIC TRANSMISSION

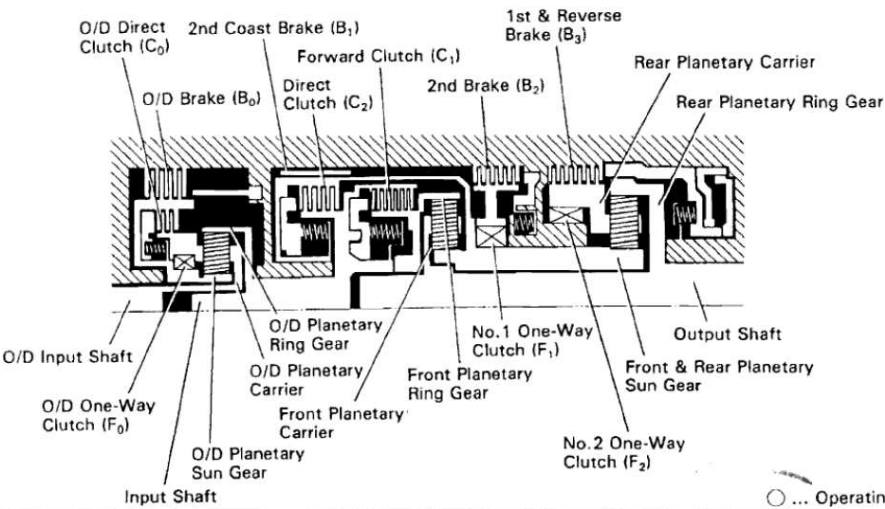
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AT

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OPERATION

AT11M-02



AT2157

○ ... Operating

Shift lever range	Gear position	C ₀	C ₁	C ₂	B ₀	B ₁	B ₂	B ₃	F ₀	F ₁	F ₂
P	Parking	○									
R	Reverse	○		○				○	○		
N	Neutral	○									
D	1st	○	○						○		○
	2nd	○	○				○		○	○	
	3rd	○	○	○			○		○		
	O/D		○	○	○		○				
2	1st	○	○						○		○
	2nd	○	○			○	○		○	○	
	*1 3rd	○	○	○			○		○		
L	1st	○	○					○	○		○
	*2 2nd	○	○			○	○		○	○	

*1 Down-shift only in the 2 range and 3rd gear — no up-shift.
*2 Down-shift only in the L range and 2nd gear — no up-shift.

PRECAUTION

When working with FIPG material, you must observe the following.

AX0VH-0A

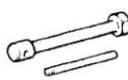
- Using a razor blade and a gasket scraper, remove all old FIPG material from the gasket surfaces.
- Thoroughly clean all components to remove all loose material.
- Clean both sealing surfaces with a non-residue solvent.
- Apply FIPG in an approx. 1 mm (0.04 in.) wide bead along the sealing surface.
- Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.

If the vehicle is equipped with a mobile communication system, refer to the precautions in the IN section.

PREPARATION

SST (SPECIAL SERVICE TOOLS)

AX01C-0W

	09032-00100 Oil Pan Seal Cutter	
	09350-30020 TOYOTA Automatic Transmission Tool Set	
	(09351-32010) One-way Clutch Test Tool	
	(09351-32020) Stator Stopper	
	09843-18020 Diagnosis Check Wire	
	09992-00094 Automatic Transmission Oil Pressure Gauge Set	Line pressure

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RECOMMENDED TOOLS

AX01D-1B

	09040-00010 Hexagon Wrench Set.	
	09082-00040 TOYOTA Electrical Tester.	

EQUIPMENT

AX01E - 0Y

Straight edge	Check torque converter installation.
Vernier calipers	Check torque converter installation.
Dial indicator or dial indicator with magnetic base	Measure drive plate runout.
Hexagon Wrench (12 mm)	
Torque wrench	

LUBRICANT

AX01G - 0W

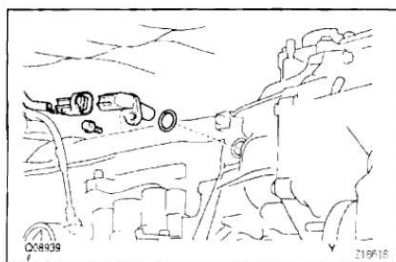
Item	Capacity	Classification
ATF		
Dry fill	10.1 liters (10.7 US qts, 8.9 Imp. qts)	ATF D - II or DEXRON® III (DEXRON® II)
Drain and refill	2.0 liters (2.1 US qts, 1.8 Imp. qts)	

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SSM (SPECIAL SERVICE MATERIALS)

AX01F - 0M

08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIG)	Oil pan
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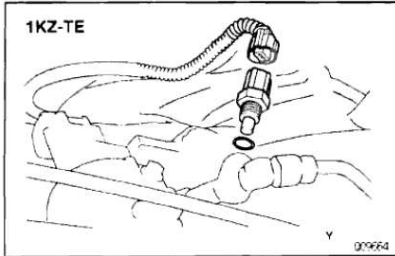
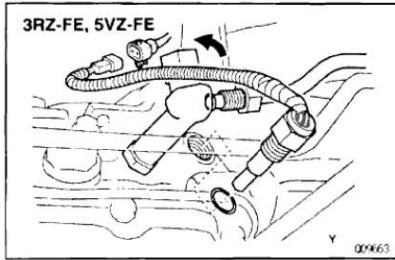
ON-VEHICLE REPAIR

AT01L - 0N

NO.2 SPEED SENSOR REPLACEMENT

1. DISCONNECT NO.2 SPEED SENSOR CONNECTOR
2. REMOVE NO.2 SPEED SENSOR
 - (a) Remove the bolt and No.2 speed sensor.
 - (b) Remove the O-ring from the No.2 speed sensor.
3. INSTALL NO.2 SPEED SENSOR
 - (a) Coat a new O-ring with ATF and install it to the No.2 speed sensor.
 - (b) Install the No.2 speed sensor to the transfer adaptor and torque the bolt.
Torque: 5.4 N·m (55 kgf·cm, 48 in.-lbf)
4. CONNECT NO.2 SPEED SENSOR CONNECTOR

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ATF TEMPERATURE SENSOR REPLACEMENT

1. DISCONNECT ATF TEMPERATURE SENSOR CONNECTOR

2. 3RZ-FE, 5VZ-FE:

DISCONNECT OIL COOLER PIPE

- (a) Remove the 3 bolts and oil cooler pipe clamps.
- (b) Disconnect the front oil cooler pipe.
- (c) Loosen the elbow.

3. REMOVE ATF TEMPERATURE SENSOR

- (a) Remove the ATF temperature sensor.
- (b) Remove the O-ring from the ATF temperature sensor.

4. INSTALL ATF TEMPERATURE SENSOR

- (a) Coat a new O-ring with ATF and install it to the ATF temperature sensor.

- (b) Install the ATF temperature sensor.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

5. 3RZ-FE, 5VZ-FE:

CONNECT OIL COOLER PIPE

- (a) Tighten the elbow.
- (b) Connect the front oil cooler pipe.
- (c) Install the 3 oil cooler pipe clamps and bolts.

Torque:

10 mm head bolt: 5.0 N·m (51 kgf·cm, 44 in·lbf)

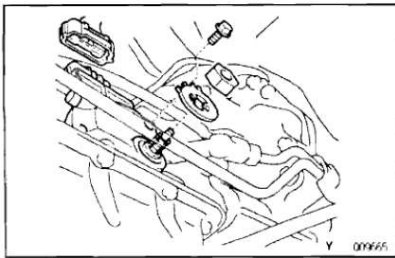
12 mm head bolt: 12 N·m (120 kgf·cm, 9 ft·lbf)

6. CONNECT ATF TEMPERATURE SENSOR CONNECTOR

INSTALLATION NOTICE: Be careful not to twist the wire harness.

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NEUTRAL START SWITCH REPLACEMENT

1. DISCONNECT NEUTRAL START SWITCH CONNECTOR

2. REMOVE NEUTRAL START SWITCH

- (a) Pry off the lock washer and remove the nut.
- (b) Remove the bolt and neutral start switch.

3. INSTALL NEUTRAL START SWITCH

- (a) Install the neutral start switch with bolt.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

- (b) Install a new lock plate and the nut.

Torque: 3.9 N·m (40 kgf·cm, 35 in·lbf)

- (c) Stake the nut with the lock plate.
 (d) Adjust the neutral start switch.
 (See page AT-29)

4. CONNECT NEUTRAL START SWITCH CONNECTOR

THROTTLE CABLE REMOVAL

AT124-55

1. DISCONNECT THROTTLE CABLE

- (a) Disconnect the cable from the throttle linkage.
 (b) Disconnect the cable from the cable clamps in the engine compartment.

(c) 3RZ-FE:

Remove the front exhaust pipe. (See page AT-9)

(d) 1KZ-TE:

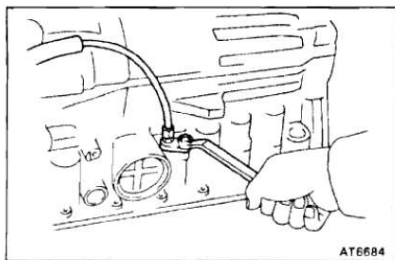
Lower the transmission rear side, and remove the cable clamp bolt. (See page AT-11)

- (e) Remove the bolt and disconnect the cable clamp from the torque converter housing.

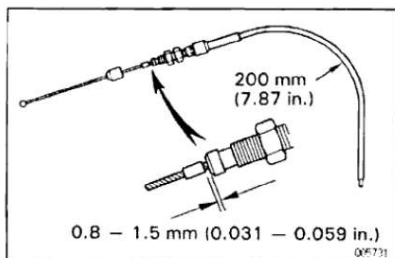
2. REMOVE VALVE BODY (See page AT-7)

3. REMOVE THROTTLE CABLE

Remove the retaining bolt and pull out the throttle cable.



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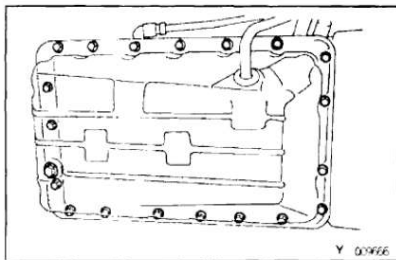
THROTTLE CABLE INSTALLATION

AT124V-55

Installation is in the reverse order of removal.

INSTALLATION HINT:

- If throttle cable is new, stake the stopper on the inner cable.
- (a) Bend the cable so there is a radius of about 200 mm (7.87 in.).
- (b) Pull the inner cable lightly until slight resistance is felt, and hold it there.
- (c) Stake the stopper, 0.8-1.5 mm (0.031-0.059 in.) from the end of the outer cable.
- After installation, fill ATF and check the fluid level. (See page AT-27)
 - Adjust the throttle cable. (See page AT-28)



VALVE BODY REMOVAL

1. DRAIN ATF

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

2. REMOVE OIL PAN

REMOVAL NOTICE: Some fluid will remain in the oil pan.

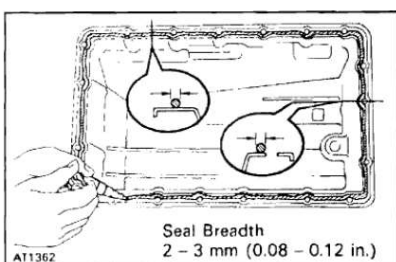
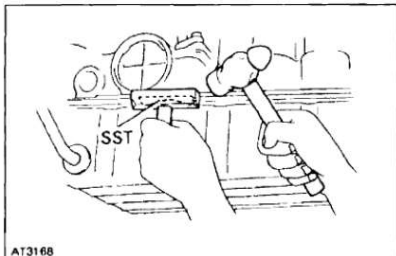
(a) Remove the 19 bolts.

Torque: 7.4 N·m (75 kgf·cm, 65 in·lbf)

(b) Install the blade of SST between the transmission case and oil pan, cut off applied sealer, and remove the oil pan.

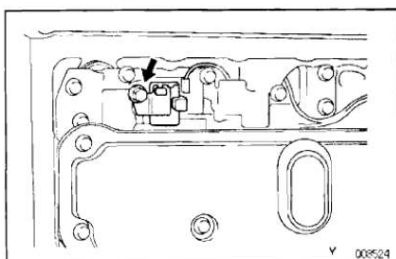
SST 09032-00100

REMOVAL NOTICE: When removing the oil pan, be careful not to damage the oil pan flange.



INSTALLATION HINT: Apply FIPG to the oil pan, as shown in the illustration.

FIPG: Part No. 08826-00090, THREE BOND 1281 or equivalent



3. WHEN REPLACING 3 SOLENOID VALVES

(a) Disconnect the connectors from the solenoid valves.

(b) Remove the 3 solenoid valve mounting bolts.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

(c) Remove the 3 solenoid valves.

INSTALLATION HINT: Replace the used O - rings with new ones.

4. REMOVE OIL STRAINER

Remove the 4 bolts, oil strainer and gaskets.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

NOTICE: Be careful as some fluid will come out with the oil strainer.

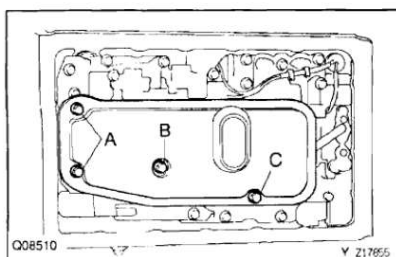
Bolt length:

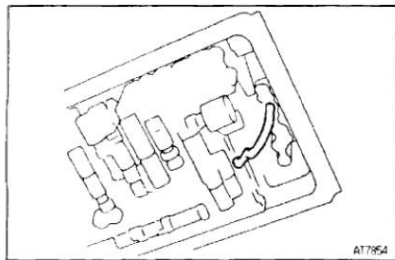
Bolt A: 16 mm (0.63 in.)

Bolt B: 20 mm (0.79 in.)

Bolt C: 28 mm (1.10 in.)

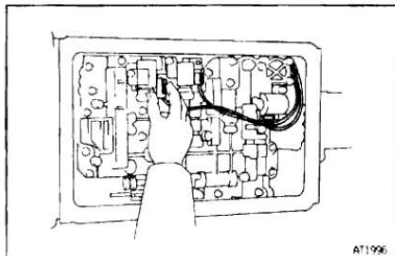
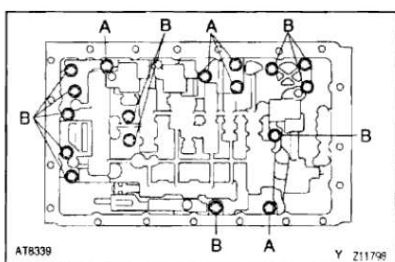
INSTALLATION HINT: Replace the used gaskets with new ones.



**5. REMOVE OIL PIPE**

Pry up both pipe ends with a large screwdriver and remove the pipe.

INSTALLATION NOTICE: Make sure that the oil pipe or the magnet do not interfere with the oil pan.

**6. DISCONNECT CONNECTOR FROM EACH SOLENOID VALVE****7. REMOVE VALVE BODY**

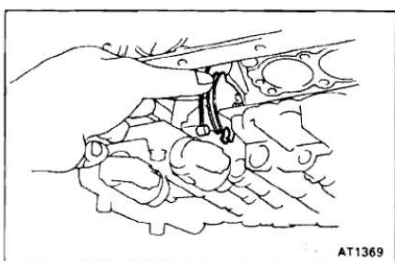
- (a) Remove the 17 bolts.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

Bolt length:

Bolt A: 23 mm (0.91 in.)

Bolt B: 32 mm (1.26 in.)



- (b) Disconnect the throttle cable from the cam.

- (c) Remove the valve body.

REMOVAL NOTICE: Be careful not to drop the check ball body and spring.

INSTALLATION HINT:

- Install the body together with the check ball body and spring.
- Align the groove of the manual valve to the pin of the lever.

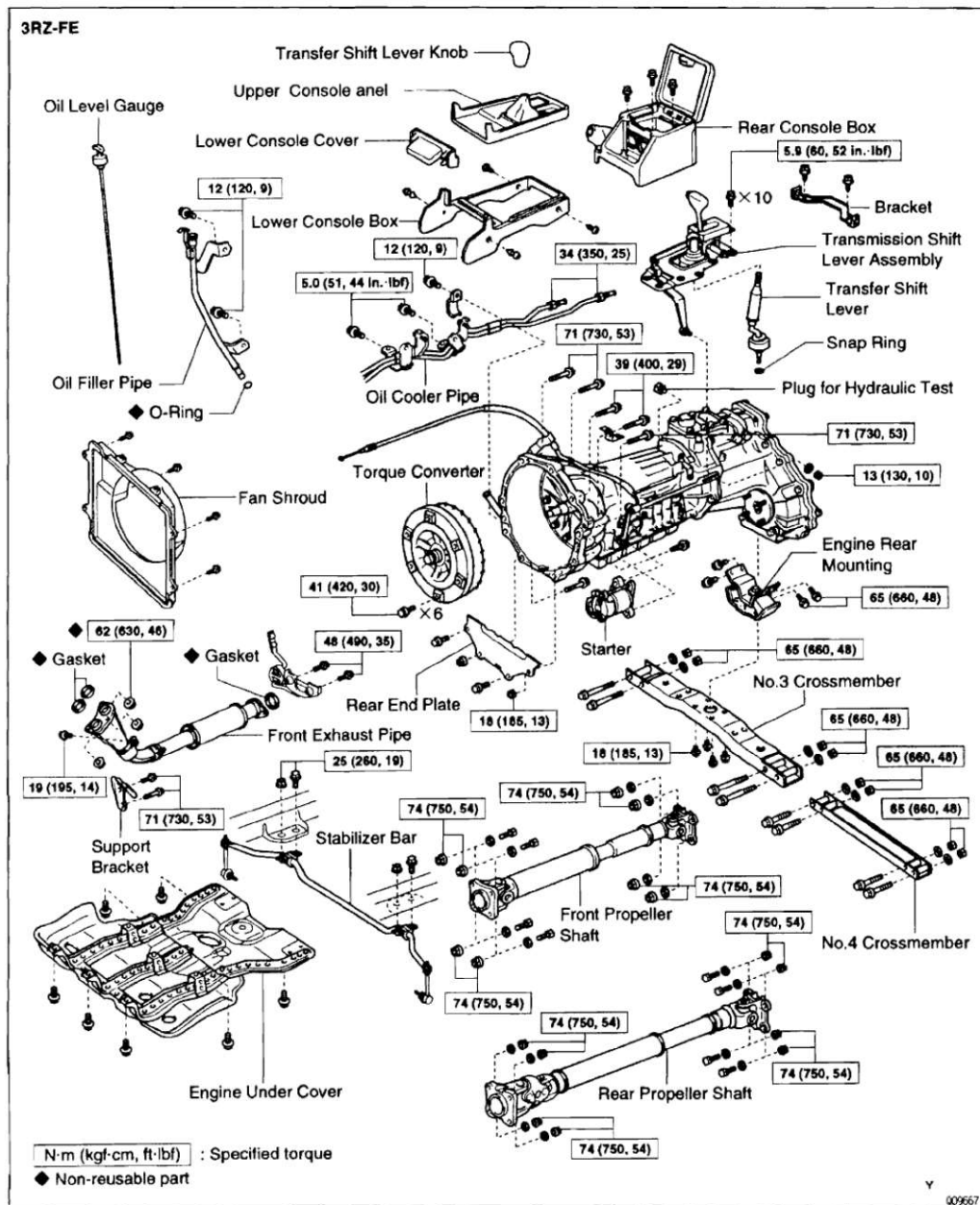
VALVE BODY INSTALLATION

Installation is in the reverse order of removal.

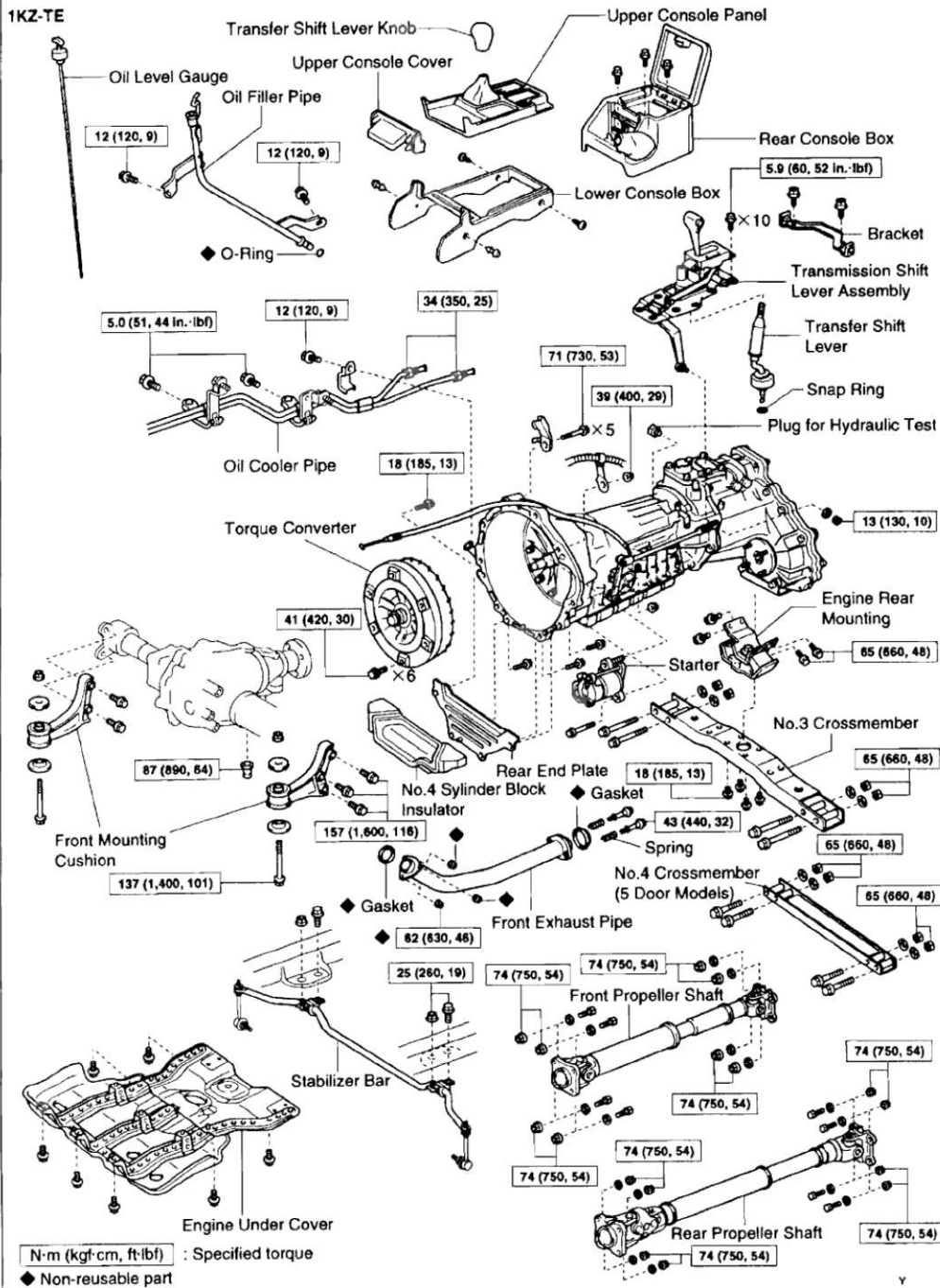
INSTALLATION HINT: After installation, fill ATF and check the fluid level. (See page AT-27)

ASSEMBLY REMOVAL AND INSTALLATION COMPONENTS

AT100-01







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TRANSMISSION REMOVAL

1. DISCONNECT THROTTLE CABLE

- (a) Loosen the 2 nuts and disconnect the throttle cable.
- (b) Disconnect the throttle cable from cable clamps in the engine compartment.

2. 3RZ-FE, 5VZ-FE:

REMOVE 4 FAN SHROUD SET BOLTS

HINT: Removing the fan shroud from the vehicle is not necessary.

3. REMOVE TRANSMISSION SHIFT LEVER ASSEMBLY AND TRANSFER SHIFT LEVER

- (a) Remove the transfer shift lever knob.
- (b) Remove the 3 bolts and rear console box and disconnect the connectors.
- (c) Remove the upper console panel and disconnect the connectors.
- (d) Remove the upper console cover.
- (e) Remove the 2 clips, screws and lower console box.
- (f) Remove the nut and washer, and disconnect the shift control rod.

Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

- (g) Remove the 2 screws and bracket.
- (h) Disconnect the connector and remove the 10 screws and transmission shift lever assembly.

Torque: 5.9 N·m (60 kgf·cm, 52 in·lbf)

- (i) Using pliers, remove the snap ring and pull out the shift lever from the transfer.

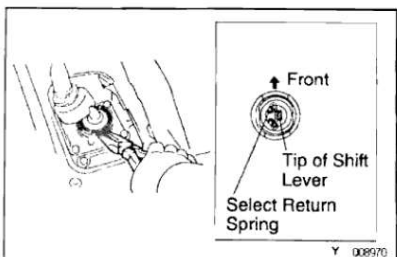
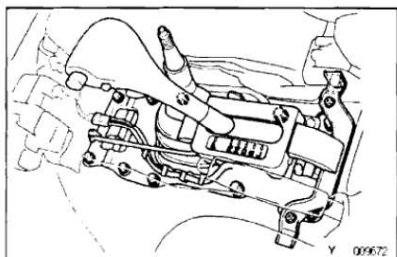
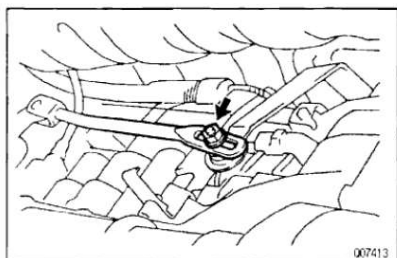
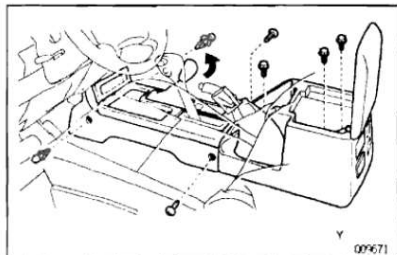
INSTALLATION HINT: Apply MP grease to the transfer shift lever.

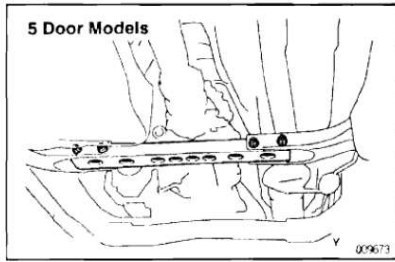
4. REMOVE ATF LEVEL GAUGE

5. REMOVE OIL FILLER PIPE WITH O-RING

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

INSTALLATION HINT: Replace the used O-ring with a new one.

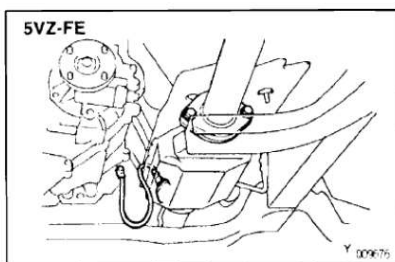




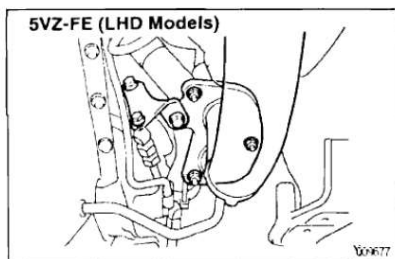
6. REMOVE ENGINE UNDER COVER
7. REMOVE FRONT AND REAR PROPELLER SHAFT
(See page PR-3)
8. DISCONNECT STABILIZER BAR
(See page SA-60)
9. 5 DOOR MODELS:
REMOVE NO.4 CROSSMEMBER
Torque: 65 N·m (660 kgf·cm, 48 ft·lbf)



10. REMOVE FRONT EXHAUST PIPE
3RZ-FE:
 - (a) Remove the 2 bolts.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)
 - (b) Loosen the clamp bolt and disconnect the clamp from the support bracket.
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)
 - (c) Remove the 2 bolts and support bracket.
Torque: 71 N·m (730 kgf·cm, 53 ft·lbf)
 - (d) Remove the 3 nuts, front exhaust pipe and 3 gaskets.
Torque: 62 N·m (630 kgf·cm, 40 ft·lbf)
- INSTALLATION HINT: Replace the used nuts and gaskets with new ones.



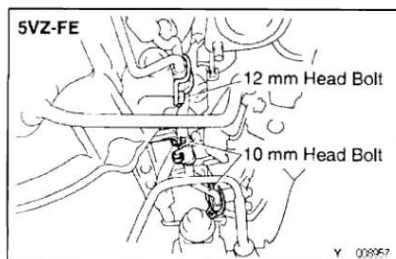
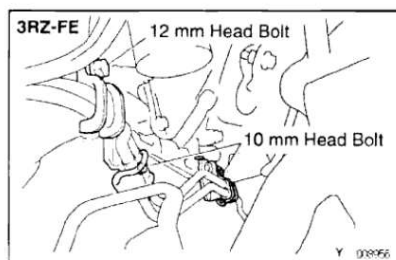
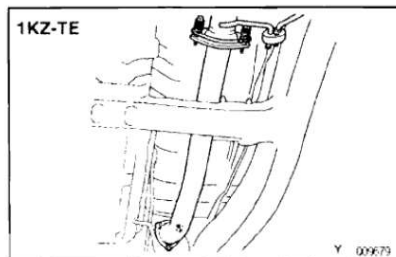
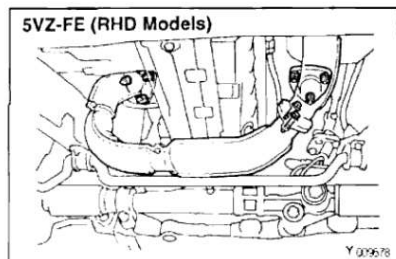
- 5VZ-FE:
- (a) Europe models:
Disconnect the oxygen sensor connector.
 - (b) Remove the 2 bolts and retainer.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)



- LHD models:
- (a) Remove the 3 bolts and support bracket.
Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)
 - (b) Remove the 3 nuts, front exhaust pipe and 3 gaskets.
Torque: 62 N·m (630 kgf·cm, 40 ft·lbf)
- INSTALLATION HINT: Replace the used nuts and gaskets with new ones.

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RHD models:

- (a) Remove the 3 nuts, 2 bolts, No.2 front exhaust pipe and 2 gaskets.

Torque:

Nut: 62 N·m (630 kgf·cm, 40 ft·lbf)

Bolt: 48 N·m (490 kgf·cm, 35 ft·lbf)

INSTALLATION HINT: Replace the used nuts and gaskets with new ones.

- (b) Remove the 3 nuts, No.1 front exhaust pipe and 2 gaskets.

Torque: 62 N·m (630 kgf·cm, 40 ft·lbf)

INSTALLATION HINT: Replace the used nuts and gaskets with new ones.

1KZ-TE:

- (a) Remove the 2 bolts and springs.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

- (b) Remove the 3 nuts, front exhaust pipe and 2 gaskets.

Torque: 62 N·m (630 kgf·cm, 40 ft·lbf)

INSTALLATION HINT: Replace the used nuts and gaskets with new ones.

DISCONNECT FOLLOWING CONNECTOR FROM TRANSMISSION

- Solenoid connector
- ATF temperature sensor connector
- Neutral start switch connector
- No.2 speed sensor connector

12. DISCONNECT FOLLOWING CONNECTOR FROM TRANSFER

- No.1 speed sensor connector
- LOW position switch connector
- Transfer neutral position switch connector
- Center differential lock indicator switch connector

13. SEPARATE WIRE HARNESS FROM TRANSMISSION AND TRANSFER

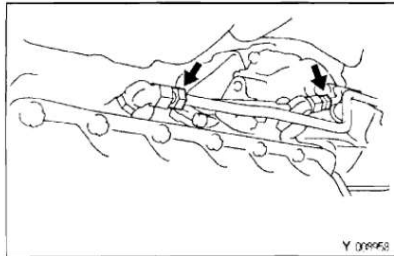
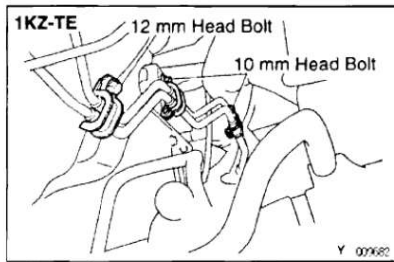
14. DISCONNECT 2 OIL COOLER PIPES

- (a) Remove the 3 bolts and oil cooler pipe clamps.

Torque:

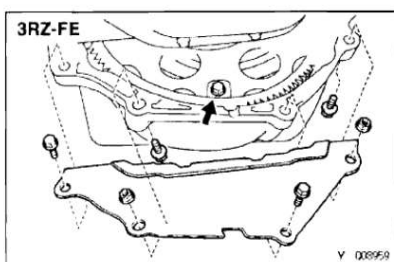
10 mm head bolt: 5.0 N·m (51 kgf·cm, 44 in·lbf)

12 mm head bolt: 12 N·m (120 kgf·cm, 9 ft·lbf)



- (b) Disconnect the 2 oil cooler pipes.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

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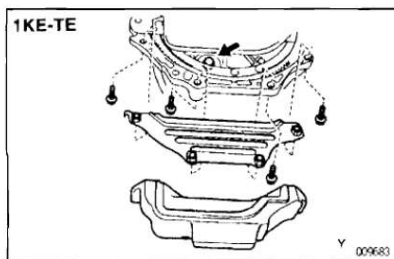
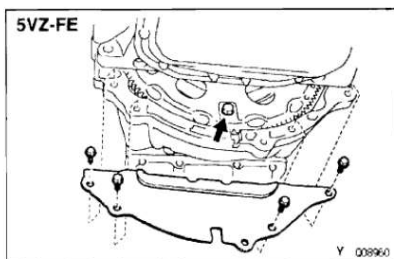


15. REMOVE REAR END PLATE AND TORQUE CONVERTER MOUNTING BOLT

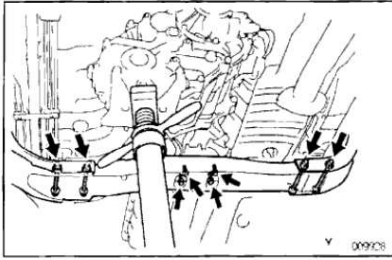
- (a) Remove the 4 bolts (and 2 nuts).
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
- (b) 1KZ-TE:
Remove the No.4 cylinder block insulator.
- (c) Remove the rear end plate.
- (d) Turn the crankshaft to gain access and remove the 6 bolts with holding the crankshaft pulley set bolt by a wrench.

Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

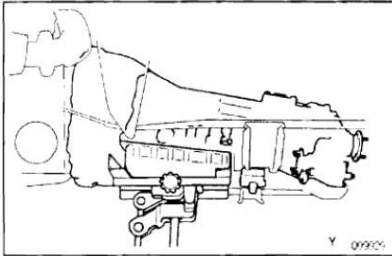
INSTALLATION HINT: First install green colored bolt and 5 other bolts.



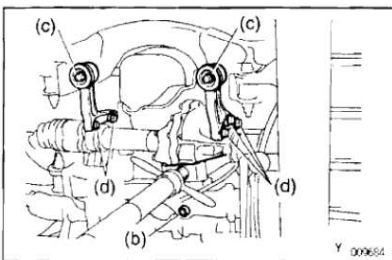
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**16. REMOVE NO.3 CROSSMEMBER**

- (a) Support the transmission rear side with a support stand.
- (b) Remove the 4 engine rear mounting bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
- (c) Remove the 4 nuts, bolts and No.3 crossmember.
Torque: 65 N·m (660 kgf·cm, 48 ft·lbf)



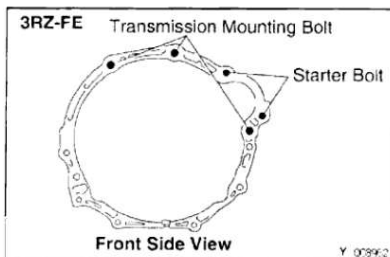
- (d) Support the transmission with a transmission jack.
- (e) Remove a support stand from the transmission rear side.

**17. 1KZ-TE:****REMOVE FRONT DIFFERENTIAL MOUNTING BOLT**

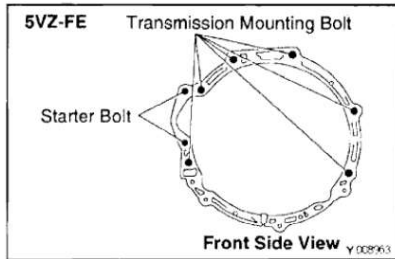
- (a) Support the front differential with a support stand.
- (b) Using a hexagon wrench (12 mm), loosen the rear mounting nut.
Torque: 87 N·m (890 kgf·cm, 64 ft·lbf)
- (c) Remove the 2 front mounting bolts and nuts.
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)
- (d) Remove the 5 bolts and 2 front mounting cushions.
Torque: 157 N·m (1,600 kgf·cm, 116 ft·lbf)

18. REMOVE STARTER

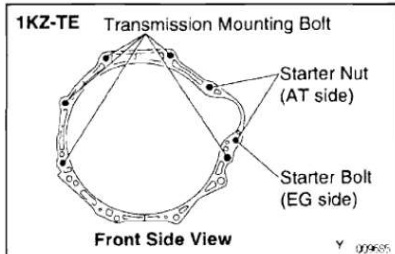
- (a) Remove the nut and disconnect the starter wire and connector.
- (b) Lower the transmission rear side.
NOTICE: Be careful not to touch the front differential and engine oil pan.
- (c) Remove the 2 bolts (or 2 nuts and bolt) and starter.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

**19. REMOVE TRANSMISSION****3RZ-FE:**

- (a) Remove the 3 bolts.
Torque: 71 N·m (730 kgf·cm, 53 ft·lbf)
- (b) Pull out the transmission toward the rear.

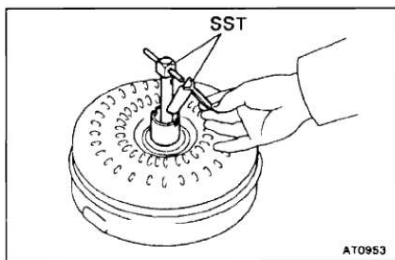
**5VZ—FE:**

- (a) Remove the 6 bolts.
Torque: 71 N·m (730 kgf·cm, 53 ft·lbf)
- (b) Pull out the transmission toward the rear.

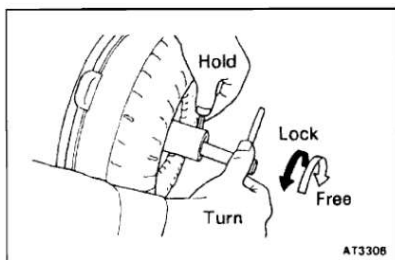
**1KZ—TE:**

- (a) Remove the 5 bolts.
Torque: 71 N·m (730 kgf·cm, 53 ft·lbf)
- (b) Slid the front differential being careful not to touch the front differential companion flange with the torque converter housing.
- (c) Pull out the transmission toward the rear.

AT

**TORQUE CONVERTER AND DRIVE PLATE^{AT128-02} INSPECTION****1. INSPECT ONE-WAY CLUTCH**

- (a) Install SST in the inner race of one-way clutch.
SST 09350-30020 (09351-32010)
- (b) Install SST so that it fits in the notch of the converter hub and outer race of the one-way clutch.
SST 09350-30020 (09351-32020)
- (c) With the torque converter standing on its side, the clutch locks when turned counterclockwise, and rotate freely and smoothly clockwise.
If necessary, clean the converter and retest the clutch.
Replace the converter if the clutch still fails the test.

**2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR**

Set up a dial indicator, measure the drive plate runout.
Maximum runout: 0.20 mm (0.0079 in.)

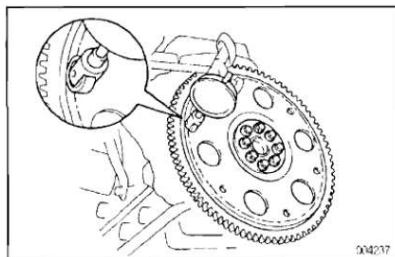
If the runout is not within the specification, replace the drive plate. If installing a new drive plate, note the orientation of spacers and tighten the bolts.

Torque:

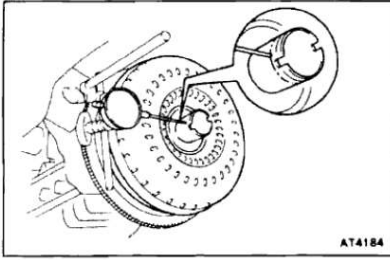
3RZ—FE: 74 N·m (750 kgf·cm, 54 ft·lbf)

5VZ—FE: 83 N·m (850 kgf·cm, 62 ft·lbf)

1KZ—TE: 178 N·m (1,820 kgf·cm, 132 ft·lbf)



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3. MEASURE TORQUE CONVERTER SLEEVE RUNOUT

- (a) Temporarily mount the torque converter to the drive plate. Set up a dial indicator.

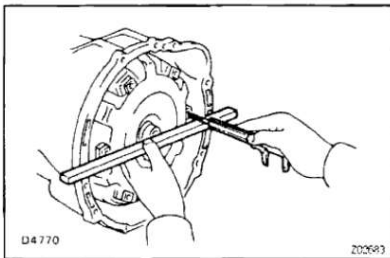
Maximum runout: 0.30 mm (0.0118 in.)

If the runout is not within the specification, try to correct by reorienting the installation of the converter. If the excessive runout cannot be corrected, replace the torque converter.

HINT: Mark the position of the converter to ensure the correct installation.

- (b) Remove the torque converter.

AT



TORQUE CONVERTER INSTALLATION

AT01L-04

CHECK TORQUE CONVERTER INSTALLATION

Using calipers and a straight edge, measure the distance from the installed surface of the transmission housing.

Correct distance:

3RZ-FE: More than 31.75 mm (1.2500 in.)

5VZ-FE: More than 17.95 mm (0.7067 in.)

1KZ-TE: More than 44.67 mm (1.7587 in.)

AT01Z-08

TRANSMISSION INSTALLATION

Installation is in the reverse order of removal.

INSTALLATION HINT:

- Adjust the shift lever range.
(See page AT-28)
- Fill ATF and check the fluid level.
(See page AT-27)
- Adjust the throttle cable.
(See page AT-28)
- Test drive the vehicle.

TROUBLESHOOTING

HOW TO PROCEED WITH

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Indicator Light Circuit	AT-65
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(Power Mode Switch)	AT-69

Pattern Select Switch Circuit (2nd

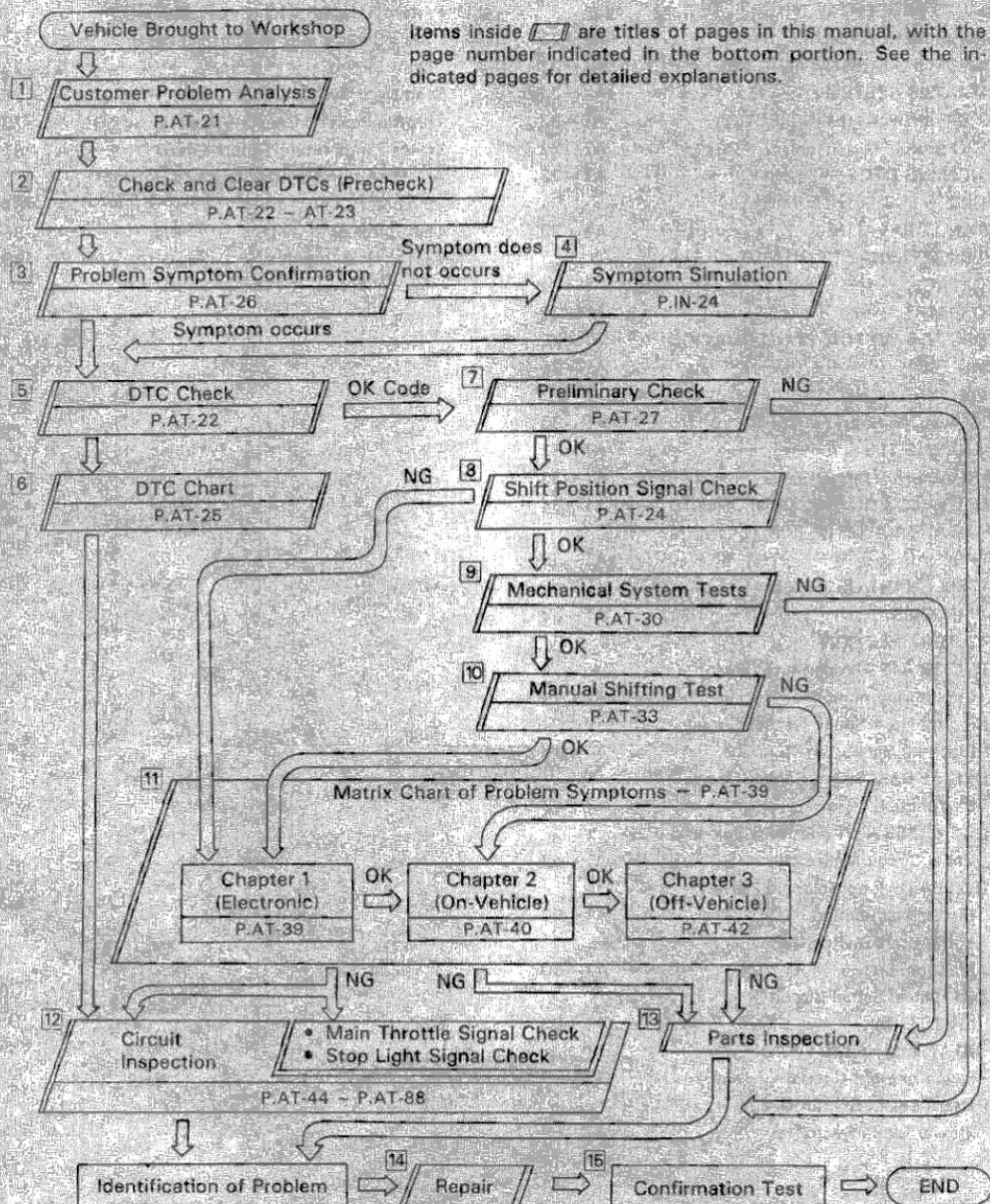
Start Switch) & 2nd Start Indicator	
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AT

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HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.



CUSTOMER PROBLEM ANALYSIS

Electronically-Controlled Automatic
Transmission Check SheetInspector's
Name

Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

AT

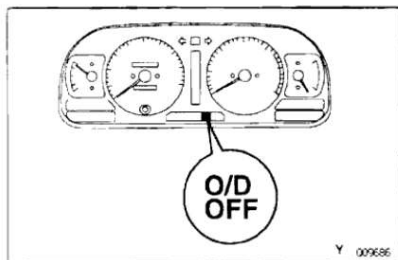
Date Problem Occurred	/ /
How Often does Problem Occur	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move. (☐ Any range ☐ Particular range)
	☐ No up-shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → O/D)
	☐ No down-shift (☐ O/D → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)
	☐ Lock-up malfunction
	☐ Shift point too high or too low.
	☐ Harsh engagement (☐ N → D ☐ Lock-up ☐ Any drive range)
	☐ Slip or shudder
	☐ No Kick-down
☐ Others ()	

Check Item	Condition of MIL	☐ Normal ☐ Remains ON
------------	------------------	---

DTC Check (O/D OFF Indicator Light)	1st Time	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

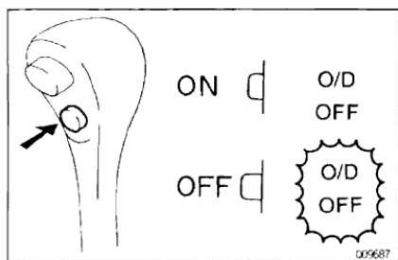
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DIAGNOSIS SYSTEM

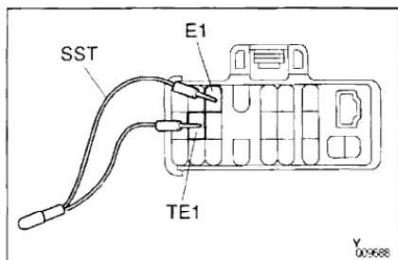
The automatic transmission has built-in self-diagnostic functions. If a malfunction occurs in the system, the ECM stores the trouble code in memory and the O/D OFF indicator light blinks to inform the driver. The DTC stored in memory can be read out by the following procedure.

HINT: Warning and DTC can be read only when the O/D main switch is ON. If OFF, the O/D OFF indicator light will light up continuous and will not blink.



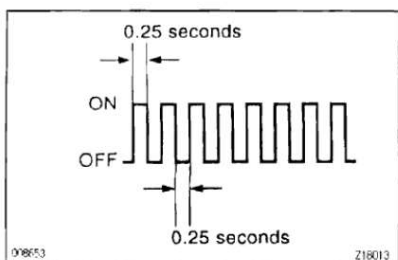
O/D OFF INDICATOR LIGHT INSPECTION

1. Turn the ignition switch ON.
2. Check if the O/D OFF indicator light lights up when the O/D main switch is pushed out to OFF and goes off when the O/D main switch is pushed in to ON.
HINT: If the O/D OFF indicator light does not light up or stay on all the time, carry out the check for "O/D OFF Indicator Light Circuit" on page AT-66.

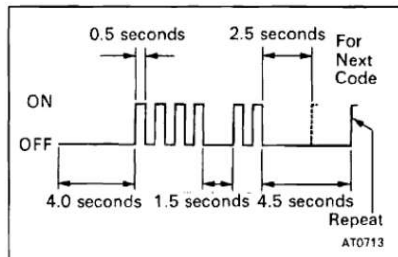


DTC CHECK

1. Turn the ignition switch ON, but do not start the engine.
2. Push in the O/D main switch to ON.
HINT: Warning and DTCs can be read only when the O/D main switch is ON. If it is OFF, the O/D OFF indicator light up will light continuously and will not blink.
3. Using SST, connect terminals TE1 and E1 of the check connector.
SST 09843-18020
4. Read the DTC indicated by the number of times the O/D OFF indicator light blinks.
HINT: If the system is operating normally, the light will blink 2 times per second.



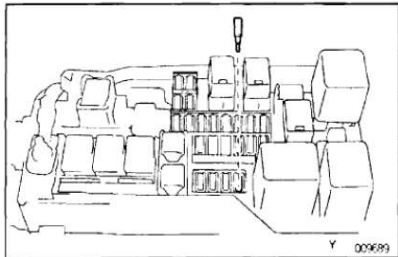
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The DTC is indicated as shown in the illustration at left (DTC "42" is shown as an example).

HINT: When 2 or more DTCs are stored in memory, the lower-numbered code is displayed first.

If no DTC is output, or if a DTC is output even though no DTC output operation is performed, check the TE1 terminal circuit on page AT-89.



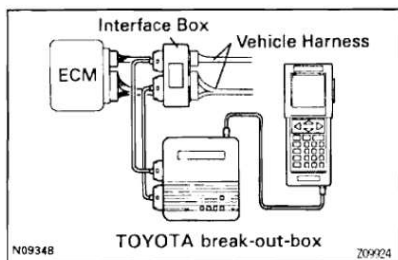
CANCELING DTC

AX087-90

After repairing of the trouble area, the DTC retained in the ECM memory must be canceled out by removing the EFI fuse (3RZ-FE, 5VZ-FE) or ECD fuse (1KZ-TE) for 10 seconds or more, with the ignition switch OFF.

Check that the normal code is output after connecting the fuse.

AT



ENGINE & ECT ECU TERMINALS STANDARD VALUE

AX184-02

ENGINE & ECT ECU TERMINAL VALUES

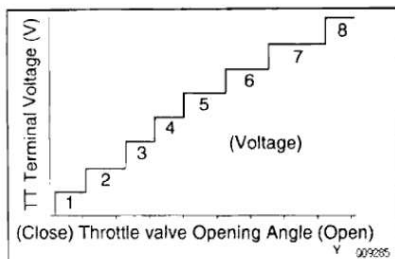
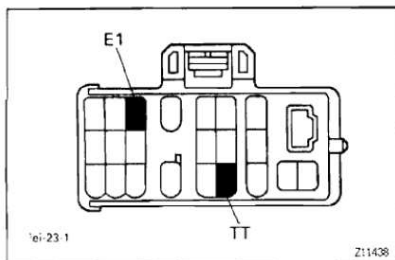
MEASUREMENT BY USING BREAK-OUT-BOX AND HAND-HELD TESTER

1. Hook up the brake-out-box and hand-held tester to the vehicle.
2. Read the Engine & ECT ECU input/output values by following the prompts on the tester screen.

HINT: hand-held tester has "Snapshot" function. This record the measured values and is effective in the diagnosis of intermittent problems.

Please refer to the hand-held tester/break-out-box operator's manual for further details.

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CHECK TERMINAL TT OUTPUT VOLTAGE^{AT107-01}

When a voltmeter is connected to the check connector, the following items can be checked.

1. Throttle position sensor signal
2. Brake signal
3. Shift position signal

1. VOLTMETER CONNECTION

Connect the positive (+) probe of the voltmeter to terminal TT and the negative (−) probe to terminal E1 of the check connector.

HINT: If a voltmeter with small internal resistance is used, the correct voltage will not be indicated, so use a voltmeter with an internal resistance of at least 10 k Ω /V.

2. TURN IGNITION SWITCH TO ON (DO NOT START ENGINE)

3. CHECK THROTTLE POSITION SENSOR SIGNAL

Check if the voltage changes from approximately 0 V to approximately 8 V when the accelerator pedal is gradually depressed from the fully closed position.

4. CHECK BRAKE SIGNAL (LOCK — UP CUT SIGNAL)

- (a) Open the throttle valve fully to apply approximately 8 V to terminal TT.
- (b) In this condition, check terminal TT voltage when the brake pedal is depressed and released.

TT terminal voltage:

0 V (When brake pedal is depressed)

8 V (When brake pedal is released)

5. START ENGINE

6. CHECK SHIFT POSITION SIGNAL (VEHICLE SPEED ABOVE 60 KM/H OR 37 MPH)

Check up—shifting together with terminal TT voltage.

HINT: Check for light shocks from up—shifting and for changes in the tachometer.

Gear Position	TT Terminal Voltage (V)
1st	0
2nd	2
3rd	4
3rd Lock—up	5
O/D	6
O/D Lock—up	7

If terminal TT output voltage check cannot be done, check TT terminal circuit. (See page AT—88)

DTC CHART

If a DTC is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the page given.

DTC No. (See page)	Detection Item	Trouble Area	O/D OFF Light Blinks	Memory
38 (AT-44)	ATF Temperature Sensor Circuit Malfunction	• Open or short in ATF temperature sensor circuit • ATF temperature sensor faulty • Engine & ECT ECU faulty	○	○
42 (AT-46)	No.1 Speed Sensor Circuit (Back-up Sensor) Malfunction	• Open or short in No.1 speed sensor circuit • No.1 speed sensor faulty • Combination meter faulty • Engine & ECT ECU faulty	○	○
61 (AT-49)	No.2 Speed Sensor Circuit Malfunction	• Open or short in No.2 speed sensor circuit • No.2 speed sensor (in ATM) faulty • Engine & ECT ECU faulty	○	○
62 (AT-52)	No.1 Solenoid Valve Circuit Malfunction	• Open or short in No.1 solenoid valve circuit • No.1 solenoid valve faulty • Engine & ECT ECU faulty	○	○
63 (AT-52)	No.2 Solenoid Valve Circuit Malfunction	• Open or short in No.2 solenoid valve circuit • No.2 solenoid valve faulty • Engine & ECT ECU faulty	○	○
64 (AT-56)	Lock-up Solenoid Valve Circuit Malfunction	• Open or short in lock-up solenoid valve circuit • Lock-up solenoid valve faulty • Engine & ECT ECU faulty	×	○

PROBLEM SYMPTOM CONFIRMATION

Taking into consideration the results of the customer problem analysis, try to reproduce the symptoms of the trouble. If the problem is that the transmission does not up-shift, does not down-shift, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and simulate the problem symptoms.

AT102-08

ROAD TEST

NOTICE: Do the test at normal ATF operating temperature 50 — 80 °C (122 — 176 °F).

1. D RANGE TEST (NORM AND PWR PATTERN)

Shift into the D range and fully depress the accelerator pedal and check the following points:

HINT: When the 2nd start switch is on, there is no 1→2 up-shift and 2→1 down-shift.

- (a) Check to see that the 1→2, 2→3 and 3→O/D up-shift take place at the shift point shown in the automatic shift schedule. (See page AT-90)

HINT:

(1) O/D Gear Up-shift Prohibition Control

- O/D main switch is OFF (During O/D OFF indicator light lights up.)
- Water temperature (3RZ-FE, 5VZ-FE only)
 - 3RZ-FE: 55°C (131°F) or less
 - 5VZ-FE: 75°C (167°F) or less
- Vehicle speed (3RZ-FE, 5VZ-FE only)
 - 3RZ-FE, 5VZ-FE: 80km/h (50 mph) or less
- Throttle valve opening (5VZ-FE only)
 - 5VZ-FE: 30 % or less

(2) O/D Gear Lock-up Prohibition Control

- Throttle valve fully opened.
- Brake light switch ON.

(3) 3rd Gear Up-shift Prohibition Control (5VZ-FE only)

- Water temperature is 60 °C (140 °F) or less, and vehicle speed is 40 km/h (25 mph) or less.

(b) Check for shift shock and slip.

Check for shock and slip at the 1→2, 2→3 and 3→O/D up-shifts.

(c) Check for abnormal noises and vibration.

Run at the D position lock-up or O/D gear and check for abnormal noises and vibration.

HINT: The check for the cause of abnormal noises and vibration must be done very thoroughly as it could also be due to loss of balance in the differential and torque converter, etc.

(d) Check kick-down operation.

While running in the D position, 2nd, 3rd and O/D gears, check to see that the possible kick-down vehicle speed limits for 2→1, 3→2 and O/D→3 kick-downs conform to those indicated on the automatic shift schedule. (See page AT-90)

(e) Check abnormal shock and slip at kick-down.

(f) Check the lock-up mechanism.

- (1) Drive in O/D gear of the D position, at a steady speed (lock-up ON) of about 60 km/h (37 mph).

- (2) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, there is no lock-up.

2. 2 RANGE TEST

Shift into the 2 range, fully depress the accelerator pedal and check the following points:

HINT: When the 2nd start switch is on, there is no 1→2 up-shift and 2→1 down-shift.

(a) Check up-shift operation.

Check to see that the 1→2 up-shift takes place and that the shift point conforms to the automatic shift schedule. (See page AT-90)

HINT: There is no O/D up-shift and lock-up in the 2 range.

(b) Check engine braking.

While running in the 2 range and 2nd gear, release the accelerator pedal and check the engine braking effect.

(c) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

3. L RANGE TEST

Shift into the 2 range and fully depress the accelerator pedal and check the following points:

(a) Check no up-shift.

While running in the L range, check that there is no up-shift to 2nd gear.

(b) Check engine braking.

While running in the L range, release the accelerator pedal and check the engine braking effect.

(c) Check for abnormal noises during acceleration and deceleration.

4. R RANGE TEST

Shift into the R range and fully depress the accelerator pedal and check for slipping.

CAUTION: Before conducting this test, ensure that the test area is free from personnel and obstruction.

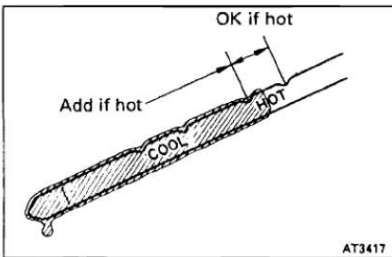
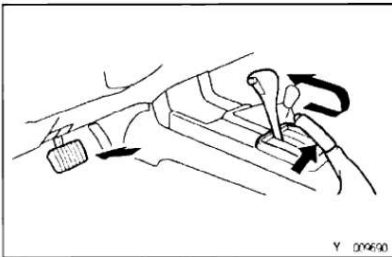
5. P RANGE TEST

Stop the vehicle on a gradient (more than 5°) and after shifting into the P range, release the parking brake.

Then, check to see that the parking lock pawl holds the vehicle in place.

AT

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PRELIMINARY CHECK

AT18U-01

1. CHECK FLUID LEVEL

HINT: The vehicle must have been driven so that the engine and transmission are at normal operating temperature.

ATF temperature: 70 – 80 °C (158 – 176 °F)

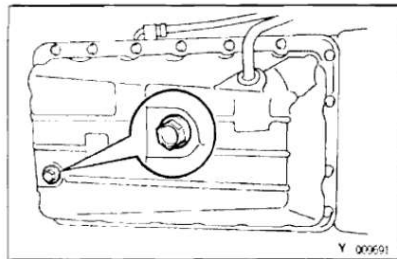
- (a) Park the vehicle on a flat surface, set the parking brake.
- (b) With the engine idling, shift into each gear from P range to L range and return to P range.
- (c) Pull out the transmission dipstick and wipe it clean.
- (d) Push it back fully into the pipe.
- (e) Pull it out and check that the fluid level is in the HOT range.

If the level is at the low side of the hot range, add new ATF.

Fluid type: ATF D-II or DEXRON® III (DEXRON® II)

NOTICE: Do not overfill.

AT3417



2. CHECK FLUID CONDITION

If the fluid smells burnt or is black, replace it.

3. REPLACE ATF

NOTICE: Do not overfill.

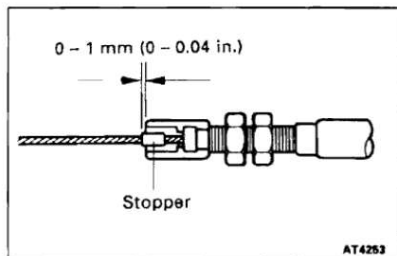
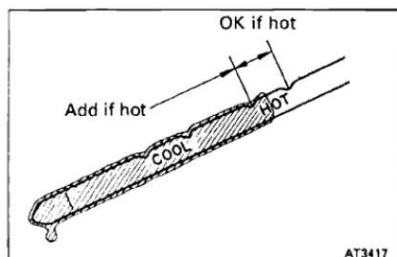
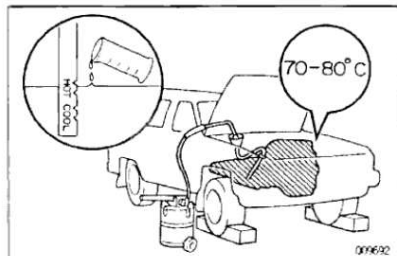
- Remove the drain plug, the gasket and drain the ATF.
- Install a new gasket the drain plug securely.
- Add new ATF through the filler pipe.

Fluid type: ATF D- II or DEXRON® III (DEXRON® II)

Capacity:

Drain and refill: 2.0 liters (2.1 US qts, 1.8 Imp.qts)

- Start the engine and shift into all ranges from P through L and then shift into P.
- With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.



- Check the fluid level with the normal ATF temperature 70 - 80 °C (158 - 176 °F) and add as necessary.
- NOTICE:** Do not overfill.

- Do the road test.

- Recheck the fluid level and add as necessary.

4. CHECK FLUID LEAKS

Check for leaks in the transmission.

If there are leaks, it is necessary to replace O-ring, FIPG, oil seals, plugs or other parts.

5. INSPECT AND ADJUST THROTTLE CABLE

- Check that the accelerator pedal is fully released.
- Check that the inner cable is not slack.
- Measure the distance between the outer cable end and stopper on the cable.

Standard distance: 0 - 1 mm (0 - 0.04 in.)

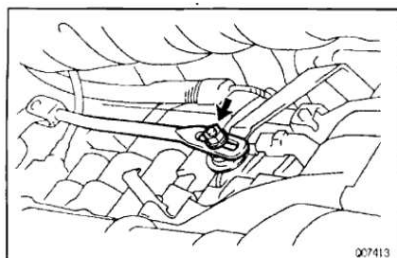
If the distance is not within the standard, adjust the cable by the adjusting nuts.

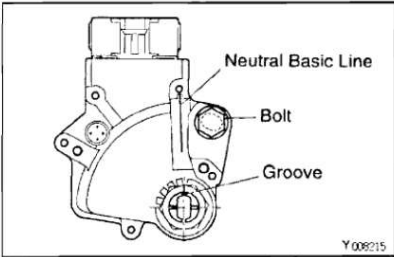
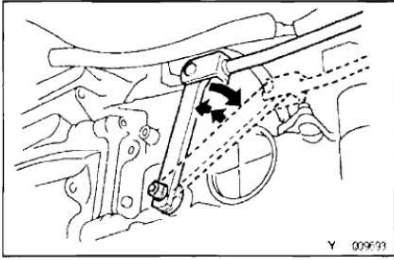
6. INSPECT AND ADJUST SHIFT LEVER POSITION

When shifting the shift lever from the N range to other ranges, check that the lever can be shifted smoothly and accurately to each range and that the range indicator correctly indicates the range.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.

- Loosen the swivel nut on the manual shift lever.





- (b) Push the manual lever fully toward the right side of the vehicle.
- (c) Return the lever 2 notches to the N range.
- (d) Set the shift lever to the N range.
- (e) While holding the shift lever lightly toward the R range side, tighten the swivel nut.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)
- (f) Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to D range and reverse when shifting it to the R range.

7. INSPECT AND ADJUST NEUTRAL START SWITCH

Check that the engine can be started with the shift lever only in the N or P range, but not in other ranges. If not as stated above, carry out the following adjustment procedure.

- (a) Loosen the neutral start switch bolt and set the shift lever to the N range.
- (b) Align the groove and neutral basic line.
- (c) Hold in range and tighten the bolt.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

8. INSPECT IDLE SPEED

Idle speed (3RZ—FE, 5VZ—FE, 1KZ—TE):

700 ± 50 rpm (In N range and A/C OFF)

AT

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MECHANICAL SYSTEM TESTS

STALL TEST

The object of this test is to check the overall performance of the transmission and engine by measuring the stall speeds in the D and R ranges.

NOTICE:

- Do the test at normal operating ATF temperature 50 — 80 °C (122 — 176 °F).
- Do not continue running this test longer than 5 seconds.
- To ensure safety, conduct this test in a wide, clear, level area which provides good traction.
- The stall test should always be carried out in pairs. One technician should observe the conditions of the wheels or wheel stoppers outside the vehicle while the other is doing the test.

MEASURE STALL SPEED

- (a) Chock the 4 wheels.
- (b) Connect a tachometer to the engine.
- (c) Fully apply the parking brake.
- (d) Keep your left foot pressed firmly on the brake pedal.
- (e) Start the engine.
- (f) Shift into the D range. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed.

Stall speed:

3RZ—FE: 2,000 ± 150 rpm

5VZ—FE: 2,250 ± 150 rpm

1KZ—TE: 2,350 ± 150 rpm

- (g) Do the same test in the R range. Quickly read the stall speed.

Stall speed:

3RZ—FE: 2,000 ± 150 rpm

5VZ—FE: 2,250 ± 150 rpm

1KZ—TE: 2,350 ± 150 rpm

EVALUATION

Problem	Possible cause
(a) Stall speed low in D and R ranges	• Engine output may be insufficient • Stator one-way clutch is operating properly HINT: If more than 600 rpm below the specified value, the torque converter could be faulty.
(b) Stall speed high in D range	• Line pressure too low • Forward clutch slipping • No.2 one-way clutch not operating properly • O/D one-way clutch not operating properly
(c) Stall speed high in R range	• Line pressure too low • Direct clutch slipping • 1st and reverse brake slipping • O/D one-way clutch not operating properly
(d) Stall speed high in D and R ranges	• Line pressure too low • Improper fluid level • O/D one-way clutch not operating properly

TIME LAG TEST

When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the O/D direct clutch, forward clutch, direct clutch, and 1st and reverse brake.

NOTICE:

- Do the test at normal operating ATF temperature 50 — 80 °C (122 — 176 °F).
- Be sure to allow 1 minute interval between tests.
- Take 3 measurements and take the average value.

MEASURE TIME LAG

- Fully apply the parking brake.
- Start the engine and check idle speed.
Idle speed (3RZ—FE, 5VZ—FE, 1KZ—TE):
700 ± 50 rpm (In N range and A/C OFF)
- Shift the shift lever from the N to D range. Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.
Time lag: N → D Less than 1.2 seconds
In the same way, measure the time lag for N → R.
Time lag: N → R Less than 1.5 seconds

AT

EVALUATION

If N → D or N → R time lag is longer than specified:

Problem	Possible cause
N→D time lag is longer	• Line pressure too low • Forward clutch worn • O/D one-way clutch not operating properly
N→R time lag is longer	• Line pressure too low • Direct clutch worn • 1st and reverse brake worn • O/D one-way clutch not operating properly

HYDRAULIC TEST**MEASURE LINE PRESSURE****NOTICE:**

- Do the test at normal operating ATF temperature 50 — 80 °C (122 — 176 °F).
 - The line pressure test should always be carried out in pairs. One technician should observe the conditions of the wheels or wheel stoppers outside the vehicle while the other is doing the test.
 - Be careful to prevent SST's hose from interfering with the exhaust pipe.
- Warm up the ATF.
 - Remove the test plug on the transmission case left side and connect SST.
SST 09992—00094 (09992—00150, 09992—00270)
(See page AT—9, 10, 11 for the location to connect SST)
 - Fully apply the parking brake and chock the 4 wheels.
 - Start the engine and check idling speed.
 - Keep your left foot pressed firmly on the brake pedal and shift into the D range.
 - Measure the line pressure when the engine is idling.
 - Press the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.
 - In the same way, do the test in the R range.

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SPECIFIED LINE PRESSURE

3RZ—FE:

Line pressure	D range kPa (kgf/cm ² , psi)	R range kPa (kgf/cm ² , psi)
Idling	363–421 (3.7–4.3, 53–61)	609–706 (6.2–7.2, 88–102)
Stall	932–1,176 (9.5–12.0, 135–171)	1,570–1,912 (16.0–19.5, 228–277)

5VZ—FE:

Line pressure	D range kPa (kgf/cm ² , psi)	R range kPa (kgf/cm ² , psi)
Idling	363–421 (3.7–4.3, 53–61)	609–696 (6.2–7.1, 88–101)
Stall	903–1,147 (9.2–11.7, 131–166)	1,432–1,941 (14.6–19.8, 208–282)

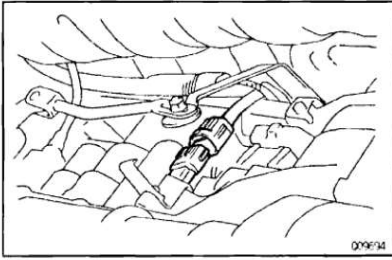
1KZ—TE:

Line pressure	D range kPa (kgf/cm ² , psi)	R range kPa (kgf/cm ² , psi)
Idling	363–421 (3.7–4.3, 53–61)	609–696 (6.2–7.1, 88–101)
Stall	883–1,186 (9.0–12.1, 128–172)	1,442–1,951 (14.7–19.9, 209–283)

If the measured pressures are not up to the specified values, recheck the throttle cable adjustment and do a retest.

EVALUATION

Problem	Possible cause
If the measured value at all ranges are higher.	• Throttle cable out of adjustment • Throttle valve defective • Regulator valve defective
If the measured value at all ranges are lower.	• Throttle cable out of adjustment • Throttle valve defective • Regulator valve defective • Oil pump defective • O/D direct clutch defective
If pressure is low only in the D range.	• D range circuit fluid leakage • Forward clutch defective
If pressure is low only in the R range.	• R range circuit fluid leakage • Direct clutch defective • 1st and reverse brake defective

**MANUAL SHIFTING TEST**

AT10W-01

HINT: With this test, it can be determined whether the trouble is within the electrical circuit or is a mechanical problem in the transmission.

- 1. DISCONNECT SOLENOID WIRE**
- 2. INSPECT MANUAL DRIVING OPERATION**

Check that the shift and gear positions correspond with the table below.

Shift range	Gear position
D	O/D
2	3rd
L	1st
R	Reverse
P	Pawl Lock

AT

HINT: If the L, 2 and D range gear positions are difficult to distinguish, do the following road test.

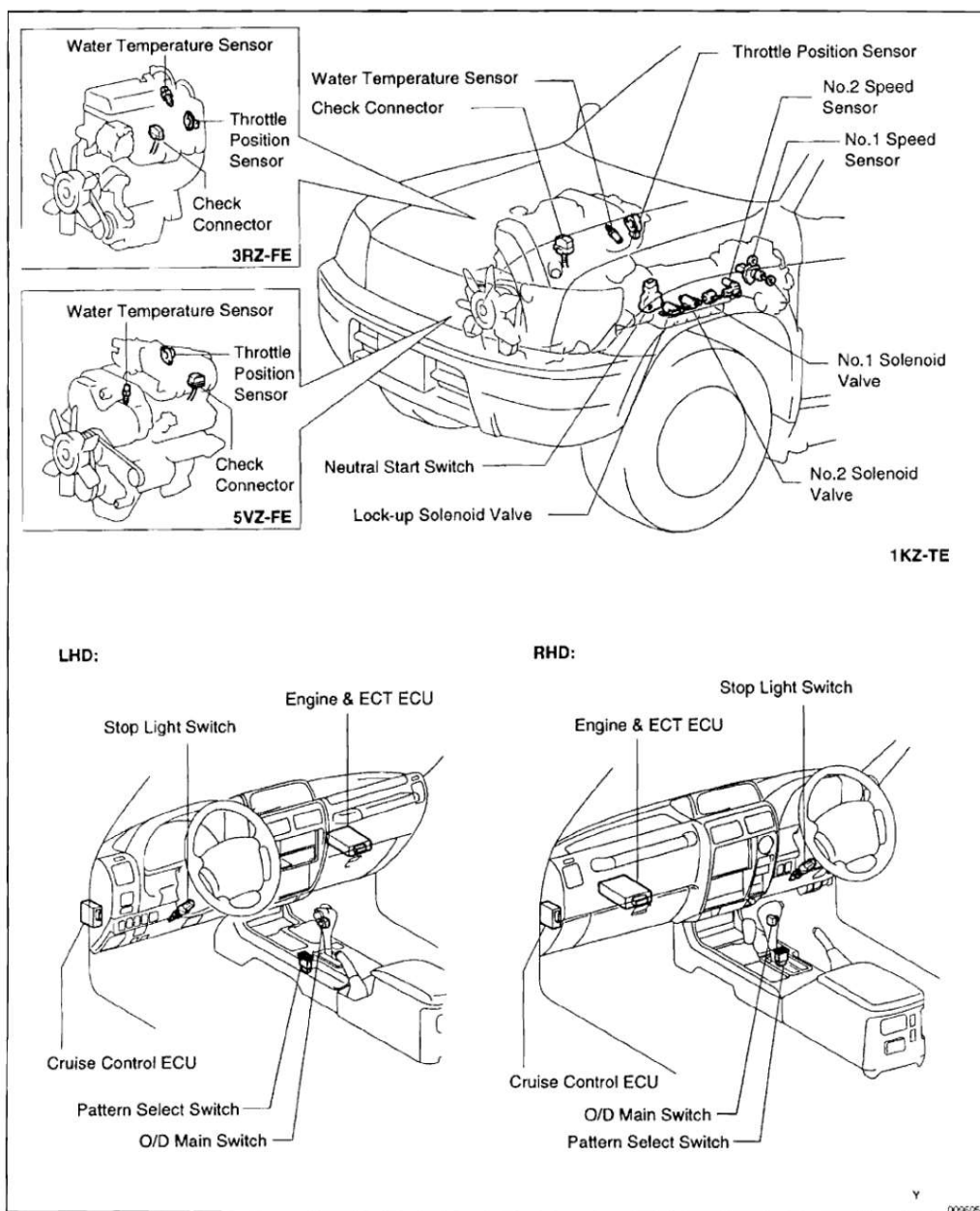
- While driving, shift through the L, 2 and D ranges.

Check that the gear change corresponds to the shift range.

If any abnormality is found in the above test, the problem lies in transmission itself.

- 3. CONNECT SOLENOID WIRE**
- 4. CANCEL OUT DTC (See page AT-23)**

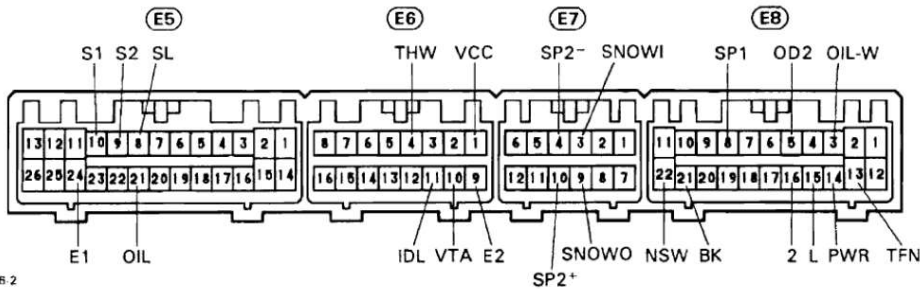
ELECTRONIC CONTROL COMPONENTS



STANDARD VALUE OF ECM TERMINAL

AT10Y-01

3RZ-FE
Engine & ECT ECU Terminals



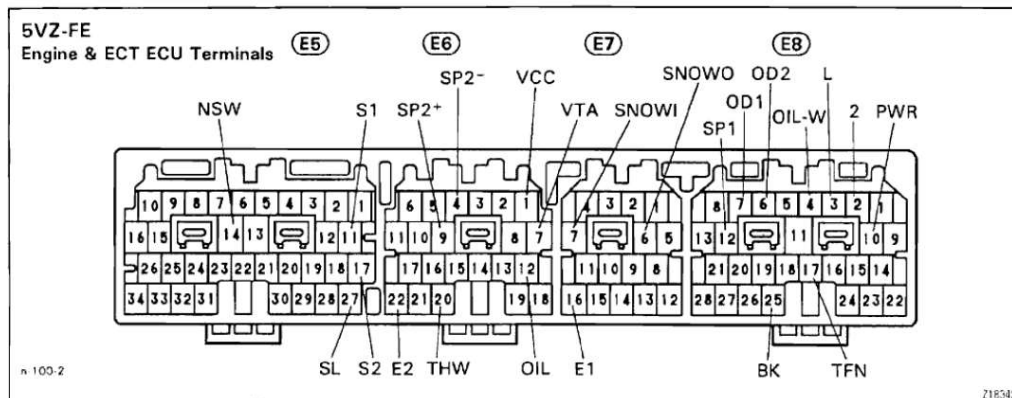
Vd-7B-2

Z18341

Symbols	Condition	Standard Value
S1 – E1	IG ON	9 – 14 V
	1st and 2nd gear	9 – 14 V
	3rd and O/D gear	Below 1.5 V
S2 – E1	IG ON	Below 1.5 V
	2nd and 3rd gear	9 – 14 V
	1st and O/D gear	Below 1.5 V
SL – E1	IG ON	Below 1.5 V
	Vehicle driving under lock-up range	9 – 14 V
SP1 – E1	IG ON	Stationary
	Turn one rear wheel slowly	Below 1.5 or 4 – 6 V
		Pulse signal is output
SP2* – SP2*	Engine is running	Below 1.5 ↔ 4 – 6 V
		Pulse signal is output
OD2 – E1	IG ON	O/D main switch ON (O/D ON)
		O/D main switch OFF (O/D OFF)
L – E1	IG ON	Shift lever L range
		Shift lever other than L range
2 – E1	IG ON	Shift lever 2 range
		Shift lever other than 2 range
NSW – E1	IG ON	Shift lever P and N range
		Shift lever other than P and N range
TFN – E1	IG ON	Transfer shift lever N range
		Transfer shift lever other than N range
BK – E1	IG ON	Brake pedal is depressed
		Brake pedal is released
SNOWO – E1	IG ON	"2nd STRT" indicator light lights up
		"2nd STRT" indicator light goes off

SNOWI — E1	IG ON	Pattern select switch "2nd" ON	Below 3 V
		Pattern select switch "2nd" OFF	9 — 14 V
PWR — E1	IG ON	Pattern select switch "PWR" ON	7.5 — 14 V
		Pattern select switch "PWR" OFF	Below 1.5 V
OIL — W — E1	IG ON	Engine is idling ("A/T OIL TEMP" indicator light goes off)	Below 1.5 V
		Engine idling after warmed up	9 — 14 V
OIL — E2		Engine idling after warmed up	0.1 — 0.9 V
THW — E2	IG ON	Water temperature 80 °C (176 °F)	Below 1.5 V
VTA — E2	IG ON	Accel. pedal is released	Below 0.3 — 0.8 V
		Accel. pedal is depressed	3.2 — 4.9 V
IDL — E2	IG ON	Accel. pedal is released	Below 1.5 V
		Accel. pedal is depressed	9 — 14 V
VCC — E2	IG ON		4.5 — 5.5 V

AT



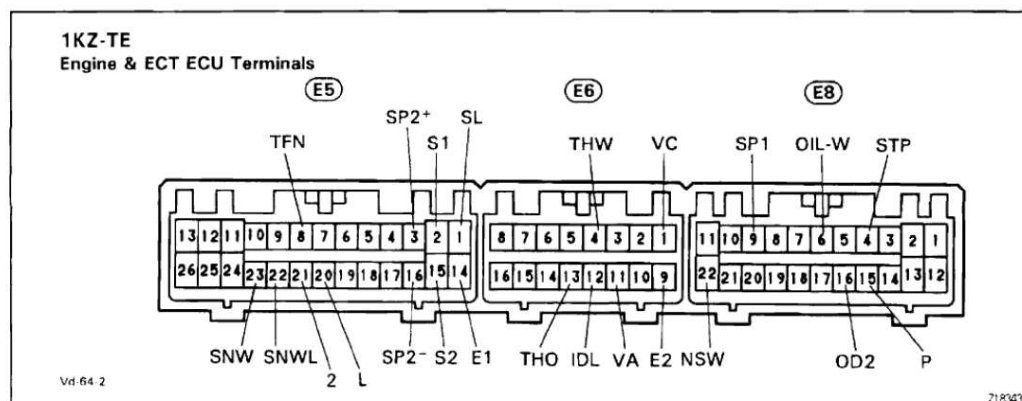
Symbols	Condition	Standard Value
S1 — E1	IG ON	9 — 14 V
	1st and 2nd gear	9 — 14 V
	3rd and O/D gear	Below 1.5 V
S2 — E1	IG ON	Below 1.5 V
	2nd and 3rd gear	9 — 14 V
	1st and O/D gear	Below 1.5 V
SL — E1	IG ON	Below 1.5 V
	Vehicle driving under lock-up range	9 — 14 V
SP1 — E1	IG ON	Stationary
	Turn one rear wheel slowly	Below 1.5 or 4 — 6 V
		Pulse signal is output
SP2+ — SP2-	Engine is running	Below 1.5 ↔ 4 — 6 V
		Pulse signal is output
OD2 — E1	IG ON	O/D main switch ON (O/D ON)
		O/D main switch OFF (O/D OFF)
OD1 — E1	IG ON	9 — 14 V

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L – E1	IG ON	Shift lever L range	7.5 – 14 V
		Shift lever other than L range	Below 1.5 V
2 – E1	IG ON	Shift lever 2 range	7.5 – 14 V
		Shift lever other than 2 range	Below 1.5 V
NSW – E1	IG ON	Shift lever P and N range	Below 3 V
		Shift lever other than P and N range	9 – 14 V
TFN – E1	IG ON	Transfer shift lever N range	Below 1.5 V
		Transfer shift lever other than N range	9 – 14 V
BK – E1	IG ON	Brake pedal is depressed	7.5 – 14 V
		Brake pedal is released	Below 1.5 V
SNOWO – E1	IG ON	"2nd STRT" indicator light lights up	Below 3 V
		"2nd STRT" indicator light goes off	9 – 14 V
SNOWI – E1	IG ON	Pattern select switch "2nd" ON	Below 3 V
		Pattern select switch "2nd" OFF	9 – 14 V
PWR – E1	IG ON	Pattern select switch "PWR" ON	7.5 – 14 V
		Pattern select switch "PWR" OFF	Below 1.5 V
OIL-W – E1	IG ON	Engine is idling ("A/T OIL TEMP" indicator light goes off)	Below 1.5 V
			9 – 14 V
OIL – E2		Engine idling after warmed up	0.1 – 0.9 V
THW – E2	IG ON	Water temperature 80 °C (176 °F)	Below 1.5 V
VTA – E2	IG ON	Accel. pedal is released	Below 0.3 – 0.8 V
		Accel. pedal is depressed	3.2 – 4.9 V
VCC – E2	IG ON		4.5 – 5.5 V

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Symbols	Condition	Standard Value
S1 – E1	IG ON	9 – 14 V
	1st and 2nd gear	9 – 14 V
	3rd and O/D gear	Below 1.5 V
S2 – E1	IG ON	Below 1.5 V
	2nd and 3rd gear	9 – 14 V
	1st and O/D gear	Below 1.5 V

SL — E1	IG ON Vehicle driving under lock-up range	Below 1.5 V 9 — 14 V
SP1 — E1	IG ON Stationary Turn one rear wheel slowly	Below 1.5 or 4–6 V Pulse signal is output Below 1.5 ↔ 4–6 V
SP2* — SP2-	Engine is running	Pulse signal is output Below 1.5 ↔ 4–6 V
OD2 — E1	O/D main switch ON (O/D ON) O/D main switch OFF (O/D OFF)	9 — 14 V Below 3 V
L — E1	IG ON Shift lever L range Shift lever other than L range	7.5 — 14 V Below 1.5 V
2 — E1	IG ON Shift lever 2 range Shift lever other than 2 range	7.5 — 14 V Below 1.5 V
NSW — E1	IG ON Shift lever P and N range Shift lever other than P and N range	Below 3 V 9 — 14 V
TFN — E1	IG ON Transfer shift lever N range Transfer shift lever other than N range	Below 1.5 V 9 — 14 V
STP — E1	IG ON Brake pedal is depressed Brake pedal is released	7.5 — 14 V Below 1.5 V
SNWI — E1	IG ON "2nd STRT" indicator light lights up "2nd STRT" indicator light goes off	Below 3 V 9 — 14 V
SNW — E1	IG ON Pattern select switch "2nd" ON Pattern select switch "2nd" OFF	Below 3 V 9 — 14 V
P — E1	IG ON Pattern select switch "PWR" ON Pattern select switch "PWR" OFF	7.5 — 14 V Below 1.5 V
OIL-W — E1	IG ON Engine is idling ("A/T OIL TEMP" indicator light goes off)	Below 1.5 V 9 — 14 V
THO — E2	Engine idling after warmed up	0.1 — 0.9 V
THW — E2	IG ON Water temperature 80 °C (176 °F)	Below 1.5 V
VA — E2	IG ON Accel. pedal is released Accel. pedal is depressed	Below 0.3 — 0.8 V 3.2 — 4.9 V
IDL — E2	IG ON Accel. pedal is released Accel. pedal is depressed	Below 1.5 V 9 — 14 V
VC — E2	IG ON	4.5 — 5.5 V

MATRIX CHART OF PROBLEM SYMPTOMS

If a normal code is displayed during the DTC check but the trouble still occurs, check the circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for troubleshooting.

The Matrix Chart is divided into 3 chapters.

Chapter 1: Electronic Circuit Matrix Chart

Chapter 2: On—Vehicle Repair Matrix Chart

Chapter 3: Off—Vehicle Repair Matrix Chart

When troubleshooting, check Chapter 1 first. If instructions are given in Chapter 1 to proceed to Chapter 2 or 3, proceed as instructed.

1. If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
2. If the trouble still occurs even though there are no abnormalities in any of the other circuits, then check or replace the ECM.

AT

Chapter 1. Electronic Circuit

See Page		AT-60	AT-63	AT-65	AT-69	AT-75	AT-78	AT-81	AT-35
Suspect Area		Neutral start switch circuit	O/D cancel signal circuit (5VZ-FE only)	O/D main switch & O/D OFF indicator light circuit	Pattern select switch circuit	Stop light switch circuit	Throttle position sensor circuit	Water temperature sensor circuit	ECM
No up-shift	A particular gear, from 1st to 3rd gear, is not up-shifted	1							2
	3rd → O/D			3			2	1	4
No down-shift	O/D → 3rd		2	1					3
	A particular gear, from 1st to 3rd gear, is not down-shifted	1							2
No lock-up						1			2
No lock-up off						1			2
Shift point too high or too low					1				2
Up-shift to O/D from 3rd while O/D main switch is OFF				1					2
Up-shift to O/D from 3rd while engine is cold								1	2
No kick-down									1
No pattern select					1				2
Engine stalls when starting off or stopping									1

V88J2

Chapter 2. On—Vehicle Repair

★ : A343F AUTOMATIC TRANSMISSION Repair Manual (Pub.No.RM528E)

See Page		AT-28	AT-28	AT-7	★	★	★	★	★
Suspect Area		Throttle cable	Transmission control rod	Oil strainer	Parking lock pawl	Manual valve	Throttle valve	1-2 shift valve	2-3 shift valve
Symptom									
Vehicle does not move in any forward range and reverse range		1	2		5	3			
Vehicle does not move in R range									
Vehicle does not move in a particular range or ranges (except R range)									
No up-shift	1st → 2nd							1	
	2nd → 3rd								1
	3rd → O/D								
No down-shift	O/D → 3rd								
	3rd → 2nd								1
	2nd → 1st						1		
Lock-up does not engage or Lock-up does not disengage									
Harsh engagement	N → D								
	Lock-up								
	N → R								
	N → L								
	1st → 2nd (D range)								
	1st → 2nd (2 range)								
	1st → 2nd → 3rd → O/D					1			
	2nd → 3rd								
	3rd → O/D								
	O/D → 3rd								
Slip or Shudder	Forward and Reverse	1	2	3					
	Particular range	1	2						
No engine braking	1st								
	2nd								
No kick-down								1	2

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Chapter 3. Off – Vehicle Repair

★ : A343F AUTOMATIC TRANSMISSION Repair Manual (Pub.No.RM528E)

See Page		★	★	★	★	AT-17	★
Suspect Area		O/D one-way clutch (F ₀)	O/D brake (B ₀)	O/D direct clutch (C ₀)	O/D planetary gear unit	Torque converter	1st and reverse brake (B ₃)
Symptom							
Vehicle does not move in any forward range and reverse range		1	2	3	4	5	
Vehicle does not move in R range				5			4
Vehicle does not move in	D, 2 and L ranges						
	D and 2 ranges						
	2 range						1
	L range						
No up-shift	1st → 2nd						
	2nd → 3rd						
	3rd → O/D		1				
No down-shift	2nd → 1st						
Lock-up does not engage or Lock-up does not disengage						1	
Harsh engagement	N → D						
	N → R						2
	2nd → 3rd						
	3rd → O/D		2	1	3		
	O/D → 3rd		1				
	Lock-up					1	
Slip or Shudder	Forward and Reverse (After warm-up)	2		3		1	
	Forward and Reverse (Just after engine starts)					1	
	R range						2
	1st						
	2nd						
	3rd						
No engine braking	O/D		1				
	1st ~ 3rd			1			
	1st						1
Poor acceleration	2nd						
	All ranges					1	
	O/D			1	2		
	Other than O/D		1				
	Other than 2nd						
	1st and 2nd						
	L and R ranges						1
Engine stalls when starting off or stopping						1	

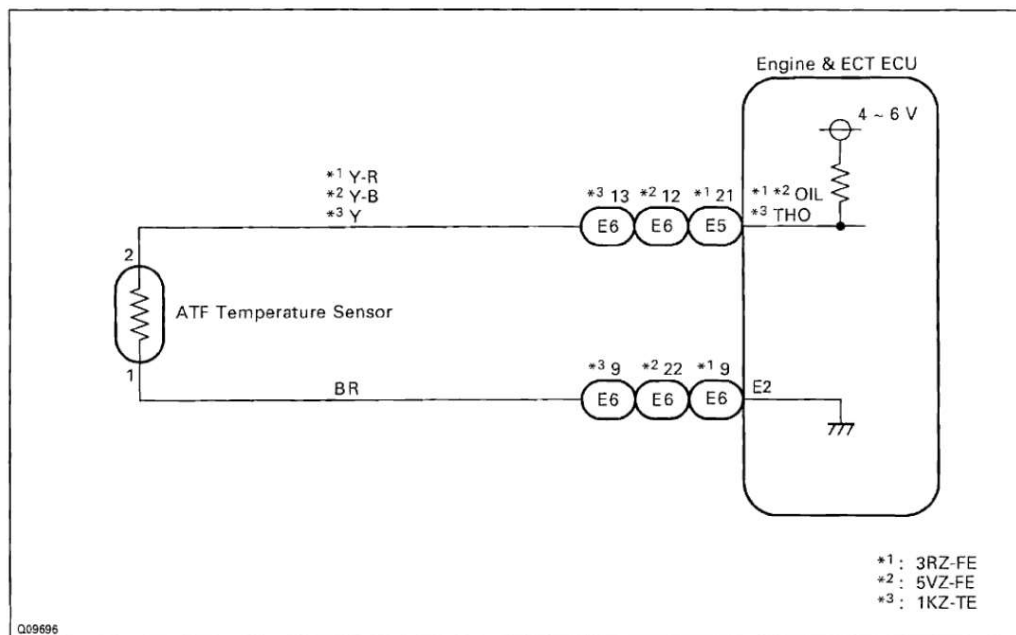
AT

[illegible]

DTC**38****ATF Temperature Sensor Circuit Malfunction****CIRCUIT DESCRIPTION**

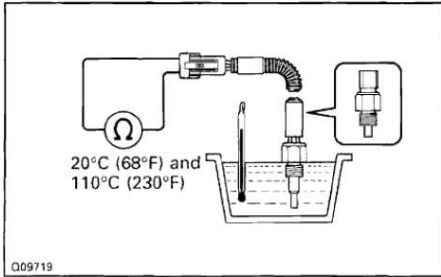
The ATF temperature sensor converts fluid temperature into a resistance value which is input into the Engine & ECT ECU.

DTC No.	DTC Detecting Condition	Trouble Area
38	Either a) or b) is detected for 0.5 sec. or more. a) Temp. sensor resistance is less than 79 Ω b) After the engine has been operating for 15 minutes or more, the resistance at the temp. sensor is more than 156 k Ω	• Open or short in ATF temperature sensor circuit • ATF temperature sensor • Engine & ECT ECU

WIRING DIAGRAM

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INSPECTION PROCEDURE

1 Check ATF Temperature Sensor.**PREPARATION:**

Remove the ATF temperature sensor.

CHECK:

Measure resistance between terminals of ATF temperature sensor at 20°C (68°F) and 110°C (230°F).

OK:

Resistance (Approx.):

20°C (68°F): 12 kΩ

110°C (230°F): 770 Ω

AT

OK

NG

Replace the ATF temperature sensor.

2

Check harness and connector between ATF temperature sensor and Engine & ECT ECU (See page IN-30).

OK

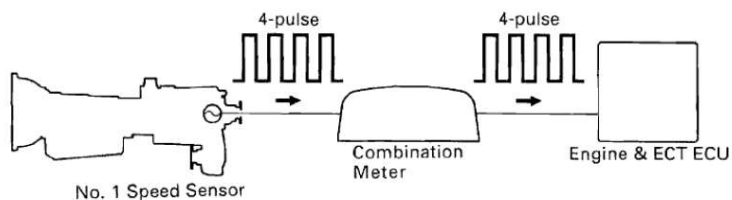
NG

Repair or replace the harness or connector.

Check and replace the Engine & ECT ECU.

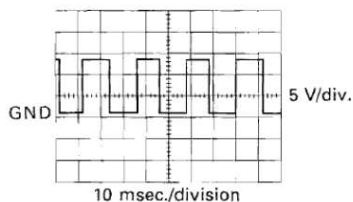
DTC**42****No. 1 Speed Sensor Circuit (Back-up Sensor) Malfunction****CIRCUIT DESCRIPTION**

The No. 1 speed sensor outputs a 4-pulse signal for every revolution of the transmission output shaft. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the Engine & ECT ECU.



Q09697

DTC No.	DTC Detecting Condition	Trouble Area
42	All conditions below are detected 500 times or more continuously. (2 trip detection logic) a) No signal from No. 1 speed sensor is input to ECM while 16 pulses of No. 2 speed sensor signal is sent. b) Vehicle speed: 5 km/h (3.1 mph) or more for as least 4 seconds c) Neutral start switch: OFF (Other than P or N) d) Transfer range: Other than N range	• Open or short in No. 1 speed sensor circuit • No. 1 speed sensor • Combination meter • Engine & ECT ECU



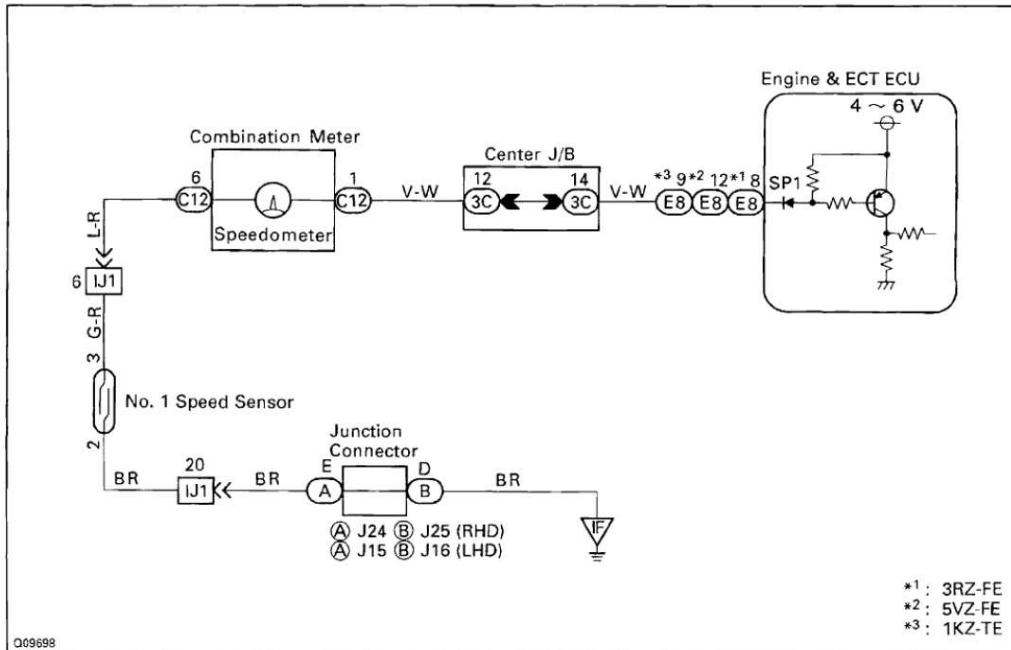
Q09346

Reference

Wave from between terminals SP1 and E1 when vehicle speed is approx. 60 km/h (37 mph).

HINT: The faster the vehicle speed, the greater the number of No. 1 speed sensor signals produced.

WIRING DIAGRAM



INSPECTION PROCEDURE

1

Check operation of speedometer.

CHECK:

Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.

HINT: The No. 1 speed sensor is operating normally if the speedometer display is normal.

OK

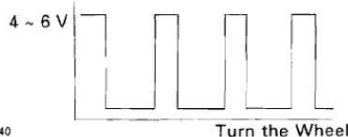
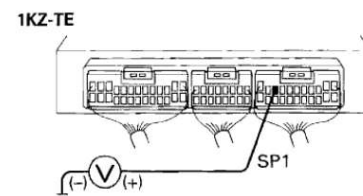
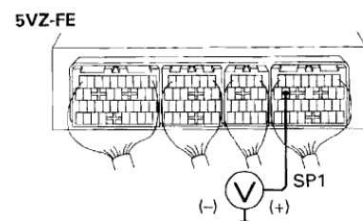
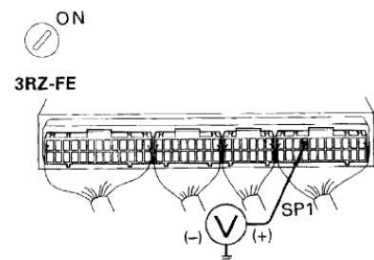
NG

Check the speedometer circuit (BE-48).

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2 Check voltage between terminal SP1 of Engine & ECT ECU and body ground.



9E3840
P24205
P24324
Q09699
AT7809

PREPARATION:

- Remove the glove compartment.
- Disconnect the cruise control ECU connector.
- Shift the shift lever to the N range.
- Jack up a rear wheels on one side.
- Turn the ignition switch ON.

CHECK:

Measure voltage between terminal SP1 of Engine & ECT ECU and body ground when the wheel is turned slowly.

OK:

Voltage is generated intermittently.

OK

Check and replace the Engine & ECT ECU.

NG

Check and repair the harness and connector between combination meter and Engine & ECT ECU (See page IN-30).

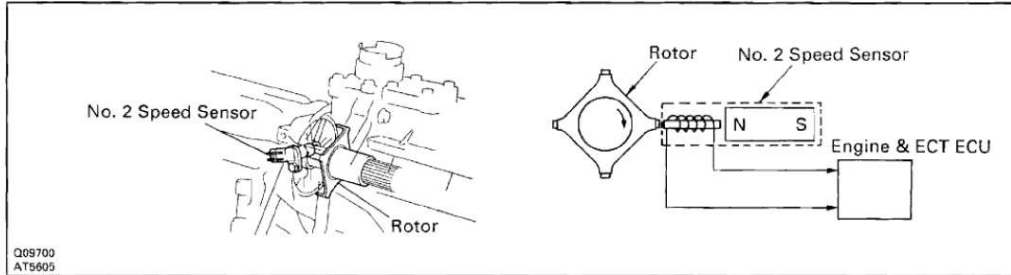
DTC**61****No. 2 Speed Sensor Circuit Malfunction****CIRCUIT DESCRIPTION**

The No. 2 speed sensor detects the rotation speed of the transmission output shaft and sends signals to the Engine & ECT ECU. The Engine & ECT ECU determines the vehicle speed based on these signals.

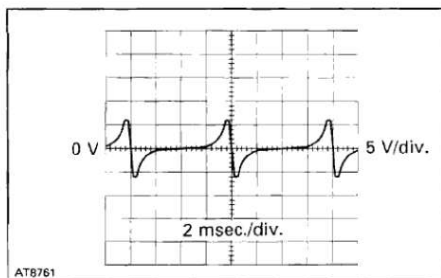
An AC voltage is generated in the No. 2 speed sensor coil as the rotor mounted on the output shaft rotates, and this voltage is sent to the Engine & ECT ECU.

The gear shift point and lock-up timing are controlled by the Engine & ECT ECU based on the signals from this speed sensor and the throttle position sensor signal.

If the No. 2 speed sensor malfunctions, the Engine & ECT ECU uses input signals from the No. 1 speed sensor as a back-up signal.



DTC No.	DTC Detecting Condition	Trouble Area
61	All conditions below are detected 500 times or more continuously. (2 trip detection logic) a) No signal from No. 2 speed sensor is input to ECM while 4 pulses of No. 1 speed sensor signal is sent. b) Vehicle speed: 5 km/h (3.1 mph) or more for as least 4 seconds c) Neutral start switch: OFF (Other than P or N) d) Transfer range: Other than N range	• Open or short in No. 2 speed sensor circuit • No. 2 speed sensor • Engine & ECT ECU

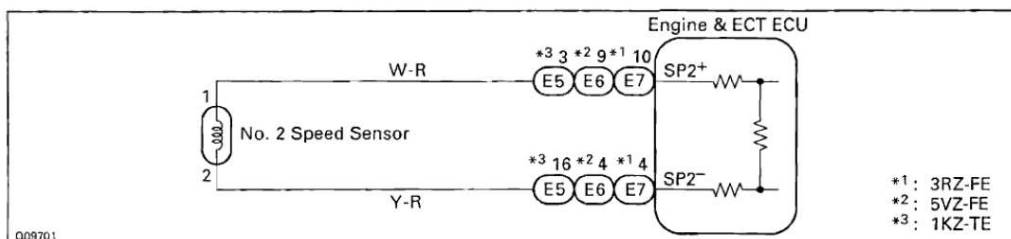
**Reference**

Wave from between terminals SP2+ and SP2- when vehicle speed is approx. 60 km/h (37 mph).

AT

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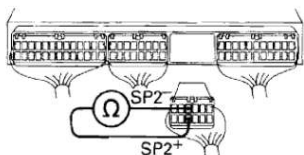
WIRING DIAGRAM



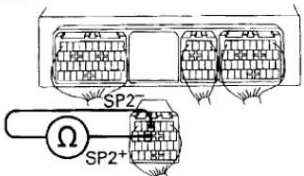
INSPECTION PROCEDURE

- 1** Check resistance between terminals SP2+ and SP2- of Engine & ECT ECU.

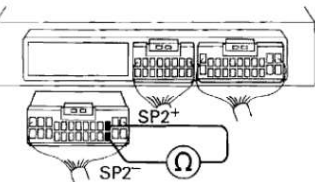
3RZ-FE



5VZ-FE



1KZ-TE

Q08458
Q08457
Q09702**PREPARATION:**

Disconnect the connector from Engine & ECT ECU.

CHECK:

Check resistance between terminals SP2+ and SP2- of Engine & ECT ECU.

OK:Resistance: 560 ~ 680 Ω

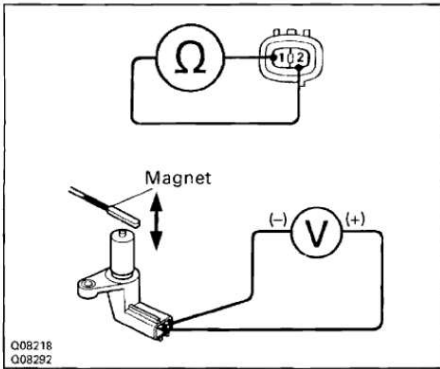
NG

OK

Check and replace the Engine & ECT ECU.

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2 Check No. 2 speed sensor.

**PREPARATION:**

Remove the No. 2 speed sensor from the transmission.

CHECK:

- (a) Measure resistance between terminals 1 and 2 of speed sensor.
- (b) Check voltage between terminals 1 and 2 of No. 2 speed sensor when a magnet is put close to the front end of No. 2 vehicle speed sensor then taken away quickly.

OK:

(a) Resistance: 560 ~ 680 Ω

(b) Voltage is generated intermittently.

HINT: The voltage generated is extremely low.

AT

OK

NG

Replace the No. 2 speed sensor.

Check and repair the harness and connector between Engine & ECT ECU and No. 2 speed sensor (See page IN-24).

DTC	62, 63	No.1, No.2 Solenoid Valve Circuit Malfunction
-----	--------	---

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ON and OFF of the No. 1 and No. 2 solenoid valves controlled by Engine & ECT ECU. If an open or short circuit occurs in either of the solenoid valves, the Engine & ECT ECU controls the remaining normal solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

Fail Safe Function:

If either of the shift solenoid valve circuits develops an open or short, the Engine & ECT ECU turns the other solenoid ON and OFF to shift to the gear positions shown in the table below. The Engine & ECT ECU also turns the Lock-up solenoid valve OFF at the same time. If both solenoids are malfunction, hydraulic control cannot be performed electronically and must be done manually.

Manual shifting as shown in the following table must be done (In the case of a short circuit, the Engine & ECT ECU stops sending current to the short circuited solenoid).

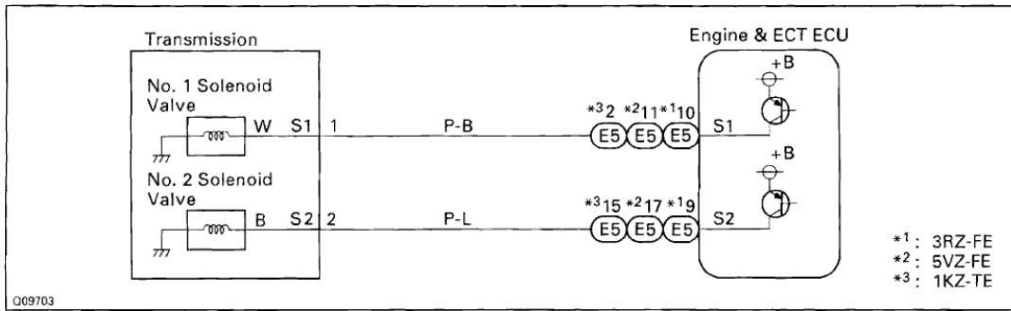
Range	NORMAL			NO. 1 SOLENOID MALFUNCTIONING			NO. 2 SOLENOID MALFUNCTIONING			BOTH SOLENOIDS MALFUNCTIONING
	Solenoid valve		Gear	Solenoid valve		Gear	Solenoid valve		Gear	Gear when shift selector is manually operated
	No. 1	No. 2		No. 1	No. 2		No. 1	No. 2		
D	ON	OFF	1st	X	ON	3rd	ON	X	1st	O/D
	ON	ON	2nd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	ON	3rd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	OFF	O/D	X	OFF	O/D	OFF	X	O/D	O/D
2	ON	OFF	1st	X	ON	3rd	ON	X	1st	3rd
	ON	ON	2nd	X	ON	3rd	OFF	X	3rd	3rd
	OFF	ON	3rd	X	ON	3rd	OFF	X	3rd	3rd
L	ON	OFF	1st	X	OFF	1st	ON	X	1st	1st
	ON	ON	2nd	X	ON	2nd	ON	X	1st	1st

X: Malfunctions

Check the No. 1 solenoid valve when DTC 62 is output and check the No. 2 solenoid valve when DTC 63 is output.

DTC No.	DTC Detecting Condition	Trouble Area
62, 63	The Engine & ECT ECU checks for an open or short circuit in the No. 1 and No. 2 solenoid valves circuit when it changes. The Engine & ECT ECU records DTC 62 or 63 if condition a) or b) is detected once, but it does not blink the O/D OFF indicator light. After Engine & ECT ECU detects condition a) or b) continuously 8 times or more in one-trip, it causes the O/D OFF indicator light to blink until condition a) or b) disappears. After that, if the Engine & ECT ECU detects condition a) or b) once, it starts blinking the O/D OFF indicator light again. a) Solenoid resistance is 8 Ω or less (short circuit) when the solenoid is energized. b) Solenoid resistance is 100 kΩ or more (open circuit) when the solenoid is not energized.	- Open or short in No. 1/ No. 2 solenoid valve circuit - No. 1/No. 2 solenoid valve - Engine & ECT ECU

WIRING DIAGRAM

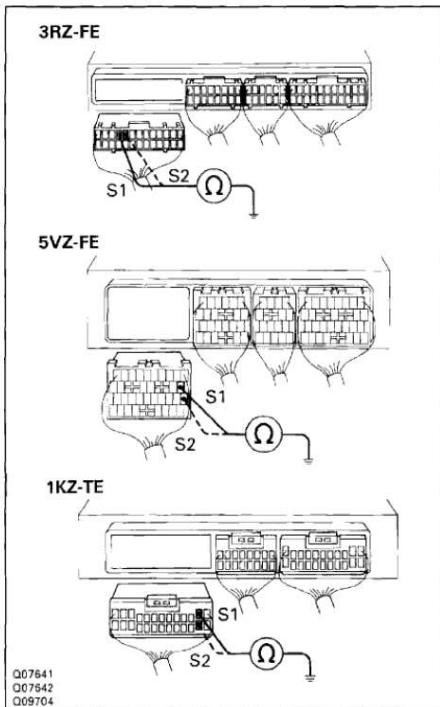


INSPECTION PROCEDURE

AT

1

Measure resistance between terminal S1 or S2 of Engine & ECT ECU and body ground.

**PREPARATION:**

Disconnect the connector from Engine & ECT ECU.

CHECK:

Measure resistance between terminal S1 or S2 of Engine & ECT ECU and body ground.

OK:

Resistance: 11 ~ 15 Ω

NG

OK

Check and replace the Engine & ECT ECU.

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2 Check harness and connector between Engine & ECT ECU and automatic transmission solenoid connector.

PREPARATION:

Disconnect the solenoid connector on the automatic transmission.

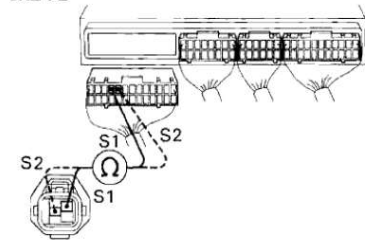
CHECK:

Check harness and connector between terminal S1 or S2 of Engine & ECT ECU and terminal S1 or S2 of solenoid connector.

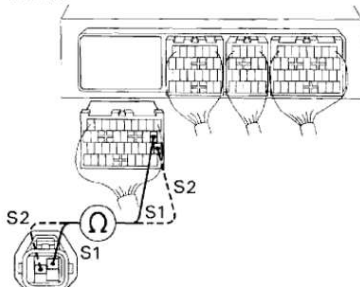
OK:

There is no open and no short circuit.

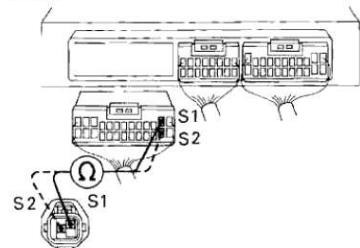
3RZ-FE



5VZ-FE



1KZ-TE



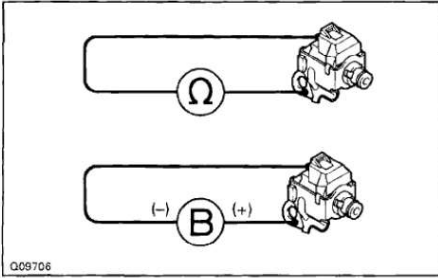
Q07643
Q07644
Q09705

OK

NG

Repair or replace the harness or connector.

3 Check No. 1 or No. 2 solenoid valve.



PREPARATION:

- Jack up the vehicle.
- Remove the oil pan.
- Disconnect the solenoid connector.
- Remove the No. 1 or No. 2 solenoid valve.

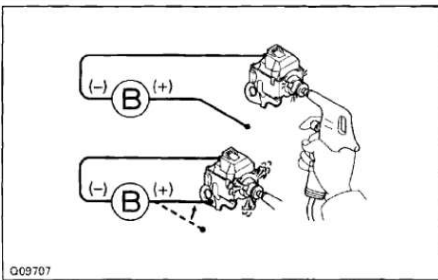
ELECTRICAL CHECK:

- Measure resistance between solenoid connector and solenoid body.
- Connect positive $\oplus$ lead to terminal of solenoid connector, negative $\ominus$ lead to solenoid body.

OK:

- Resistance: 11 ~ 15 Ω
- The solenoid makes an operating noise.

AT



MECHANICAL CHECK:

- Applying 490 kPa (5 kgf/cm², 71 psi) of compressed air, check that solenoid valve does not leak air.
- When battery positive voltage is supplied to solenoid valve, check that the solenoid valve opens.

OK

NG

Replace the solenoid valve.

Repair or replace the solenoid wire.

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DTC	64	Lock-up Solenoid Valve Circuit Malfunction
-----	----	--

CIRCUIT DESCRIPTION

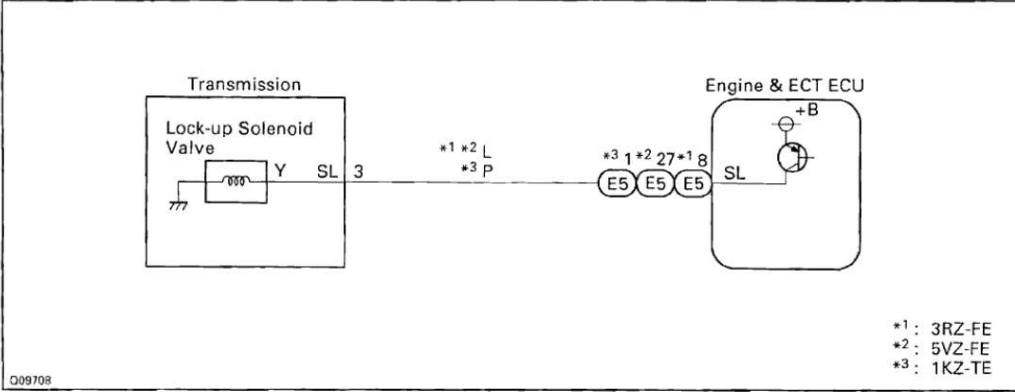
The lock-up solenoid valve is turned ON and OFF by signals from the Engine & ECT ECU to control the hydraulic pressure acting on the lock-up relay valve, which then controls operation of the lock-up clutch. If a malfunction occurs in this circuit and DTC 64 is stored in memory, the O/D OFF indicator light does not blink.

Fail safe function

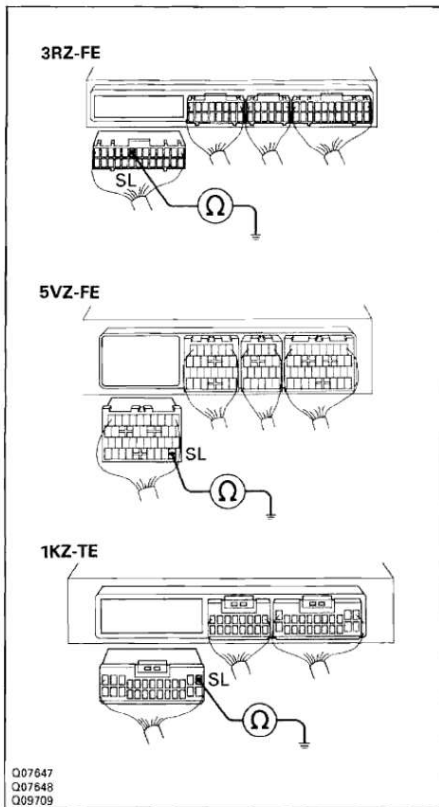
If the Engine & ECT ECU detects a malfunction, it turns the lock-up solenoid valve OFF.

DTC No.	DTC Detecting Condition	Trouble Area
64	The Engine & ECT ECU memorizes DTC 64, but Engine & ECT ECU does not start O/D OFF indicator light blinking. Either a) or b) is detected for 1 time. (2 trip detection logic) a) Solenoid resistance is 8 Ω or less (short circuit) when the solenoid is energized. b) Solenoid resistance is 100 kΩ or more (open circuit) when the solenoid is not energized.	• Open or short in Lock-up solenoid valve circuit • Lock-up solenoid valve • Engine & ECT ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1 Measure resistance between terminal SL of Engine & ECT ECU and body ground.**PREPARATION:**

Disconnect the connector from Engine & ECT ECU.

CHECK:

Measure resistance between terminal SL of Engine & ECT ECU and body ground.

OK:

Resistance: 11 ~ 15 Ω

AT

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NG

OK

Check and replace the Engine & ECT ECU.

2

Check harness and connector between Engine & ECT ECU and automatic transmission solenoid connector (See page IN-30).

PREPARATION:

Disconnect the solenoid connector from the transmission.

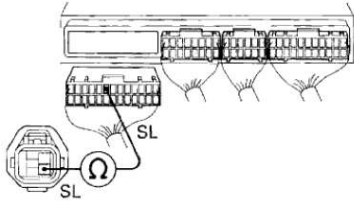
CHECK:

Check harness between terminal SL of Engine & ECT ECU and terminal SL of transmission solenoid connector.

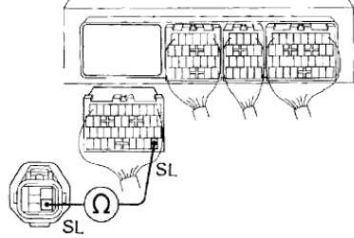
OK:

There is no open or short circuit.

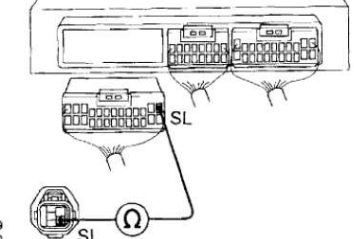
3RZ-FE



5VZ-FE



1KZ-TE



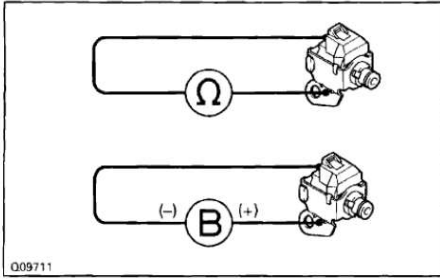
Q07649
Q07650
Q09710

OK**NG**

Repair or replace the harness or connector.

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3 Check lock-up solenoid valve.



PREPARATION:

- Jack up the vehicle.
- Remove the oil pan.
- Disconnect the lock-up solenoid valve connector.
- Remove the lock-up solenoid valve.

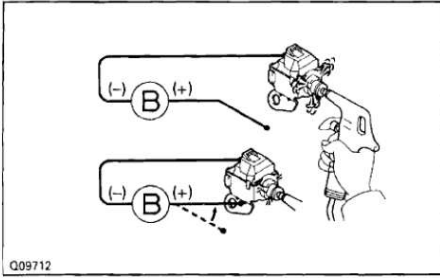
ELECTRICAL CHECK:

- Measure resistance between solenoid connector and solenoid body.
- Connect positive $\oplus$ lead to terminal of solenoid connector, negative $\ominus$ lead to solenoid body.

OK:

- Resistance: 11 ~ 15 Ω
- The solenoid makes an operating noise.

AT



MECHANICAL CHECK:

- Applying 490 kPa (5 kgf/cm², 71 psi) of compressed air, check that solenoid valve opens.
- When battery positive voltage is supplied to the solenoid valve, check that solenoid valve does not leak air.

OK

NG

Replace the solenoid valve.

Repair or replace the solenoid wire.

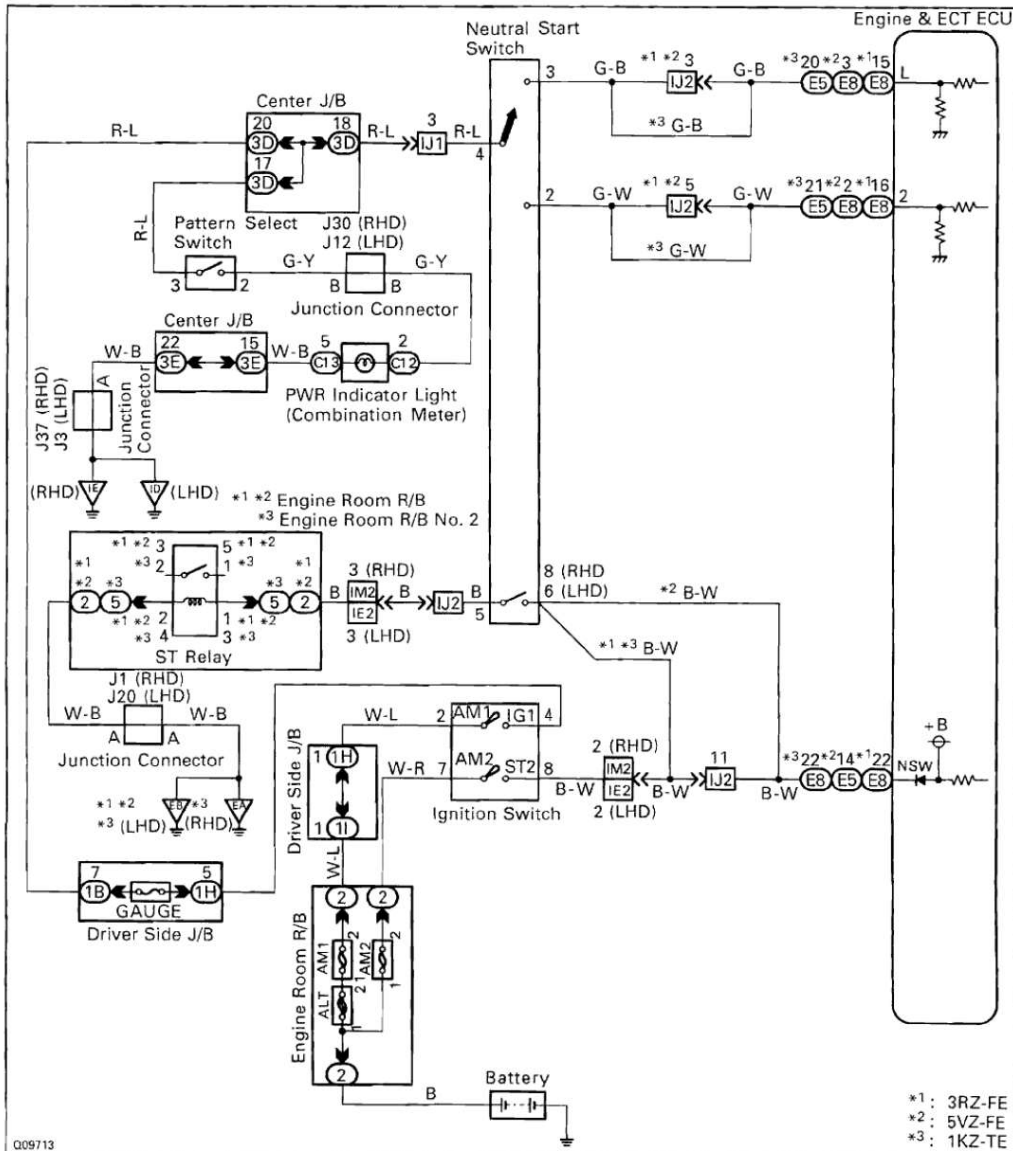
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Neutral Start Switch Circuit

CIRCUIT DESCRIPTION

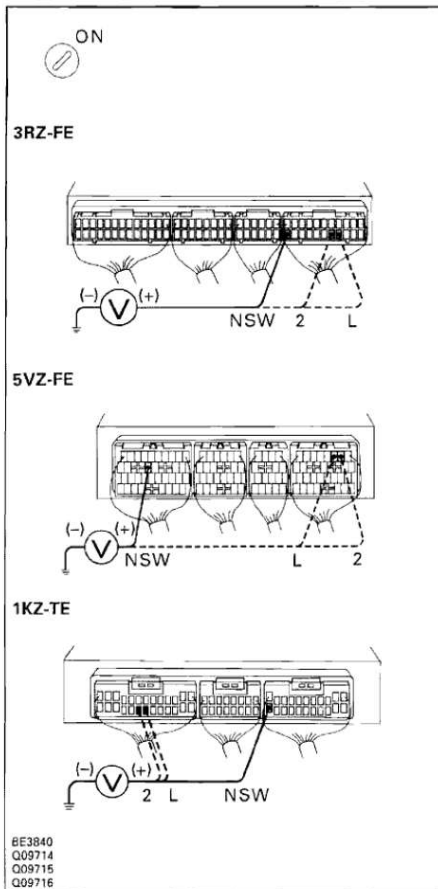
The neutral start switch detects the shift lever position and sends signals to the Engine & ECT ECU. The Engine & ECT ECU receives signals (NSW, 2 and L) from the neutral start switch. When the signal is not sent to the Engine & ECT ECU from the neutral start switch, the Engine & ECT ECU judges that the shift lever is in D range.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1 Check voltage between terminals NSW, 2, L of Engine & ECT ECU and body ground.**PREPARATION:**

Turn the ignition switch ON.

CHECK:

Measure voltage between terminals NSW, 2, and L of Engine & ECT ECU and body ground when the shift lever is shifted to the following ranges.

OK:

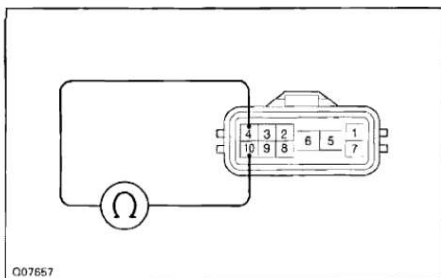
Range	NSW-Body ground	2-Body ground	L-Body ground
P, N	0 V	0 V	0 V
R	9 ~ 14 V*	0 V	0 V
D	9 ~ 14 V	0 V	0 V
2	9 ~ 14 V	7.5 ~ 14 V	0 V
L	9 ~ 14 V	0 V	7.5 ~ 14 V

HINT*: The voltage will drop slightly due to lighting up of the back up light.

AT

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NG

2 Check neutral start switch.**PREPARATION:**

- (a) Jack up the vehicle.
- (b) Disconnect the neutral start switch connector.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved to each range.

Shift Range	Terminal No. to continuity	
P	4 - 7	5 - 6
R	4 - 8	-
N	4 - 10	5 - 6
D	4 - 9	-
2	4 - 2	-
L	4 - 3	-

OK**NG**

Replace the neutral start switch.

3 Check harness and connector between battery and neutral start switch, neutral start switch and Engine & ECT ECU (See page IN-30).**OK****NG**

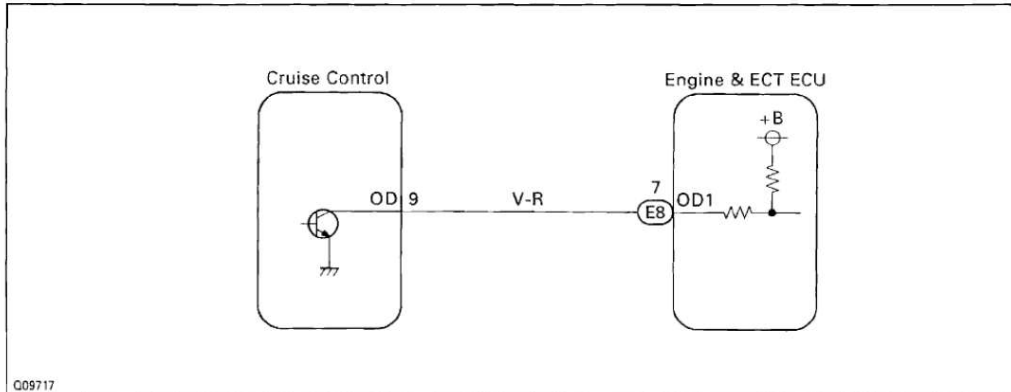
Repair or replace the harness or connector.

Check and replace the Engine & ECT ECU.

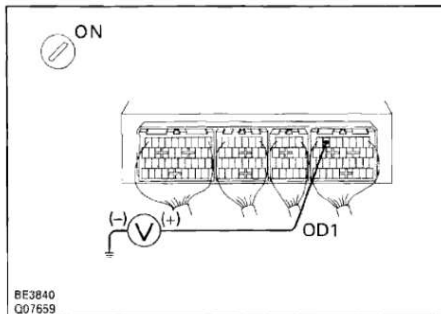
O/D Cancel Signal Circuit (5VZ-FE Only)**CIRCUIT DESCRIPTION**

While driving uphill with cruise control activated, in order to minimize gear shifting and provide smooth cruising overdrive may be prohibited temporarily under some condition.

The cruise control ECU sends O/D cut signals to the Engine & ECT ECU as necessary and the Engine & ECT ECU cancels O/D shifting until these signals are discontinued.

WIRING DIAGRAM**INSPECTION PROCEDURE**

- 1 Check voltage between terminal OD1 of Engine & ECT ECU and body ground.

**PREPARATION:**

Turn the ignition switch ON.

CHECK:

Measure voltage between terminal OD1 of Engine & ECT ECU and body ground.

OK:

Voltage: 9 ~ 14 V

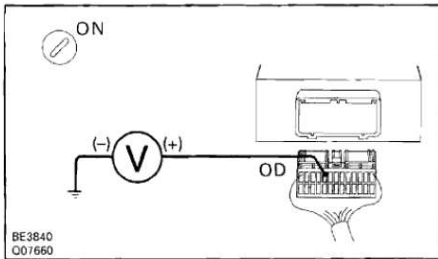
NG

OK

Proceed to next circuit inspection shown on matrix chart (See page AT-39).

AT

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2 Check voltage between terminal OD of cruise control ECU harness side connector and body ground.**PREPARATION:**

- (a) Disconnect the cruise control ECU connector.
- (b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal OD of cruise control ECU harness side connector and body ground.

OK:

Voltage: 9 ~ 14 V

AT

NG

OK

Check and replace the cruise control ECU.

3 Check harness and connector between cruise control ECU and Engine & ECT ECU (See page IN-30).

OK

NG

Repair or replace the harness or connector.

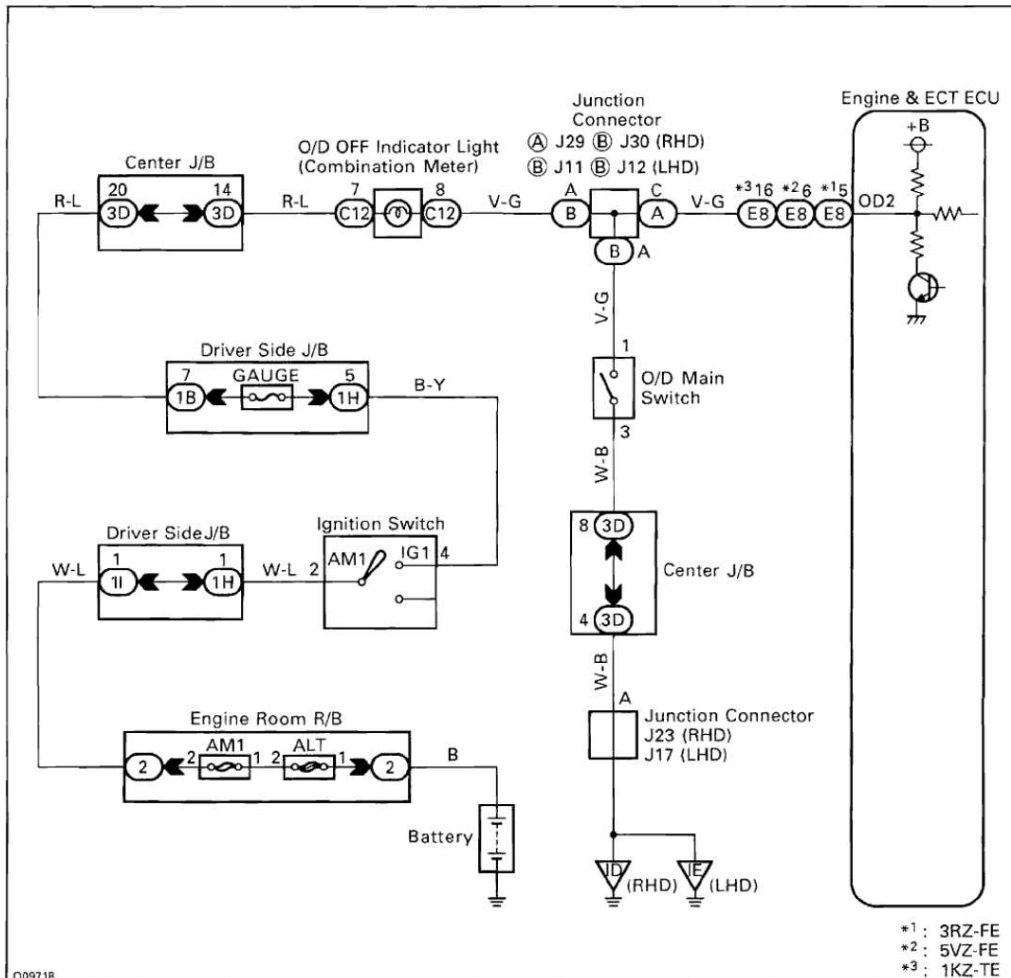
Check and replace the Engine & ECT ECU.

O/D Main Switch & O/D OFF Indicator Light Circuit

CIRCUIT DESCRIPTION

The O/D main switch contacts go open when the switch is pushed in and go closed when it is pushed out. In O/D main switch at OFF position, the O/D OFF indicator light lights up, and the Engine & ECT ECU prohibits shifting O/D.

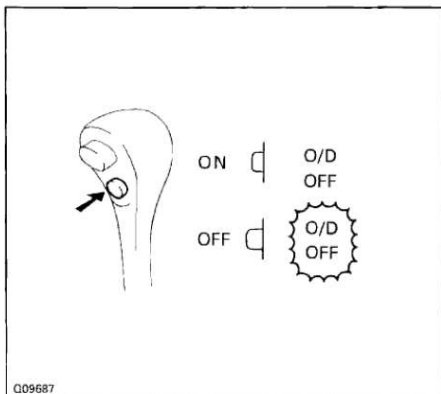
WIRING DIAGRAM



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AT

*1 : 3RZ-FE
*2 : 5VZ-FE
*3 : 1KZ-TE

INSPECTION PROCEDURE**O/D OFF indicator light does not light up****1** Check operation of O/D main switch.**PREPARATION:**

Turn the ignition switch ON.

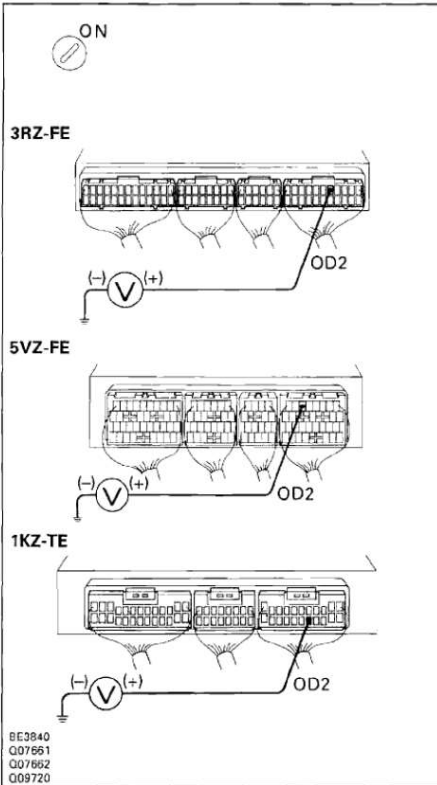
CHECK:

- (a) Check the O/D OFF indicator light when O/D main switch is pushed in to ON.
- (b) Check the O/D OFF indicator light when O/D main switch is pushed again to OFF.

OK:

- (a) O/D OFF indicator light goes off.
- (b) O/D OFF indicator light lights up.

OK**NG**Go to step **4**.

2**Check voltage between terminal OD2 of Engine & ECT ECU and body ground.****PREPARATION:**

Turn the ignition switch ON.

CHECK:

Check voltage between terminal OD2 of Engine & ECT ECU and body ground.

OK:

O/D main switch	Voltage
OFF	Below 1.5 V
ON	9 ~ 14 V

AT

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NG

OK

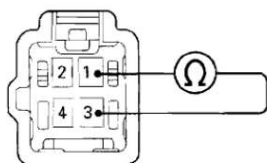
Proceed to next circuit inspection shown on matrix chart (See page AT-39).

3**Check harness and connector between O/D OFF indicator light and Engine & ECT ECU (See page IN-30).**

OK

NG

Repair or replace the harness or connector.

4 Check O/D main switch.

Q09721

PREPARATION:

Disconnect the O/D main switch connector.

CHECK:

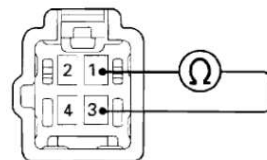
Check continuity between terminals 1 and 3 of O/D main switch connector.

OK:

O/D main switch	Specified condition
ON	No continuity
OFF	Continuity

OK**NG**

Replace the O/D main switch.

Check and replace the combination meter
(See page BE-50).**O/D OFF indicator light remains ON****1 Check O/D main switch.**

Q09721

PREPARATION:

Disconnect the O/D main switch connector.

CHECK:

Check continuity between terminals 1 and 3 of O/D main switch connector.

OK:

O/D main switch	Specified condition
ON	No continuity
OFF	Continuity

OK**NG**

Replace the O/D main switch.

2 Check harness and connector between O/D OFF indicator light and O/D main switch, O/D OFF indicator light and Engine & ECT ECU (See page IN-30).**OK****NG**

Repair or replace the harness or connector.

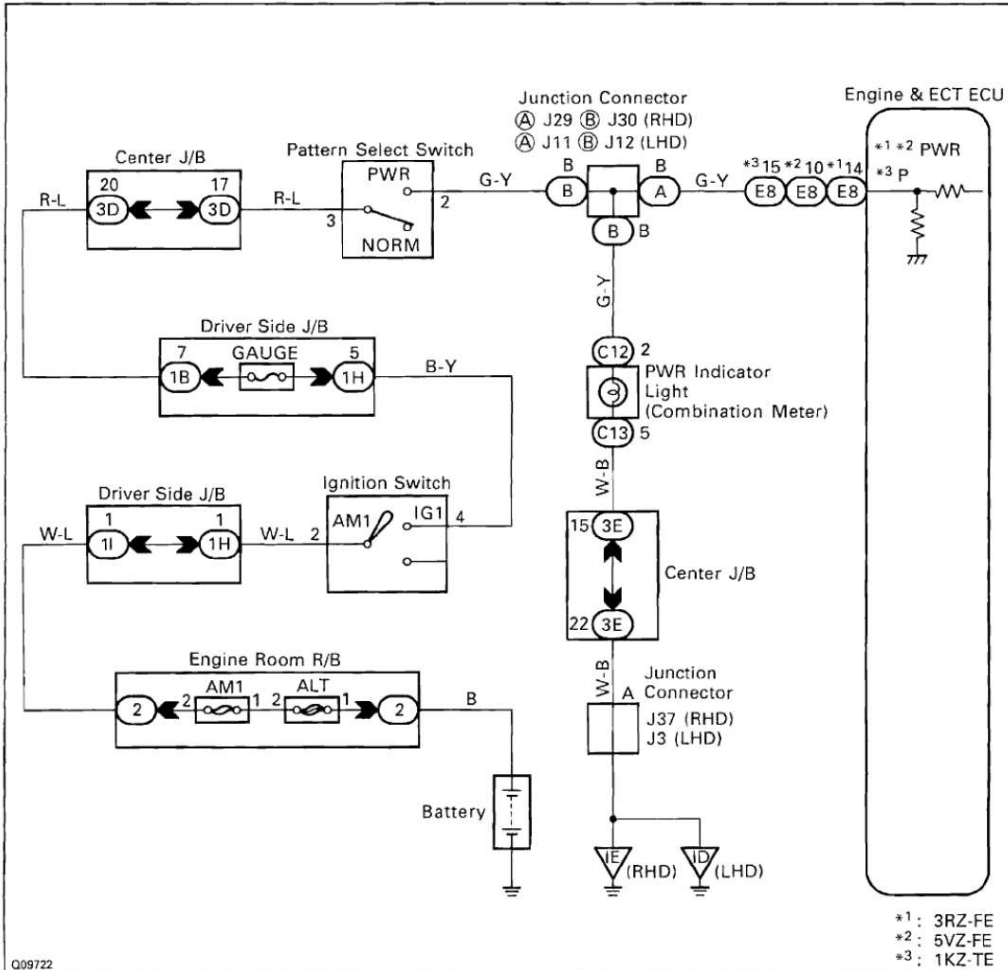
Check and replace the Engine & ECT ECU.

Pattern Select Switch Circuit (Power Mode Switch)

CIRCUIT DESCRIPTION

The Engine & ECT ECU memory contains the shift programs for the NORMAL and POWER patterns, 2 range, L range and the lock-up patterns. Following the programs corresponding to the signals from the pattern select switch, the neutral start switch and other various sensors, the Engine & ECT ECU switches the solenoid valves ON and OFF, and controls the transmission gear change and the lock-up clutch operation.

WIRING DIAGRAM

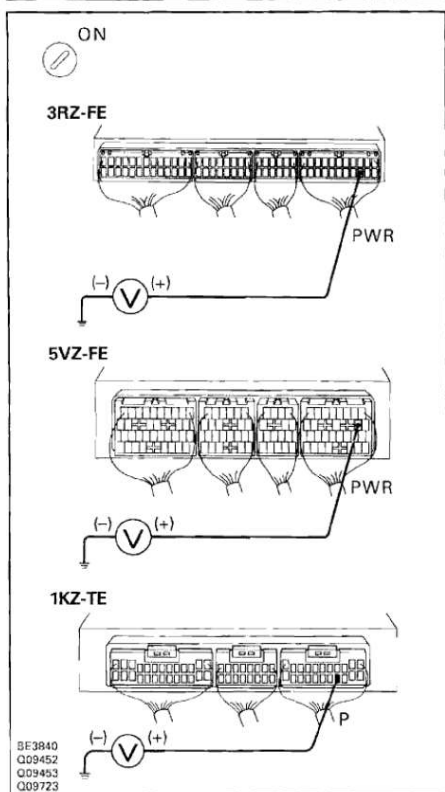


Q09722

AT

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INSPECTION PROCEDURE

1 Check voltage between terminal PWR or P of Engine & ECT ECU and body ground.**PREPARATION:**

Turn the ignition switch ON.

CHECK:

Measure voltage between terminal PWR or P of Engine & ECT ECU and body ground when the pattern select switch set to the PWR (POWER) position and NORM (NORMAL) position.

OK:

Pattern select switch	Voltage
PWR	7.5 ~ 14 V
NORM	Below 1.5 V

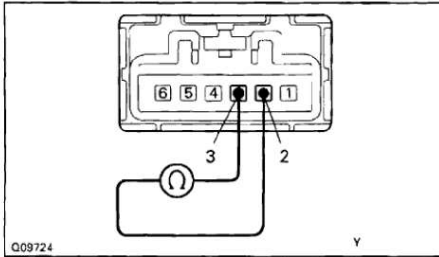
HINT: The Engine & ECT ECU uses the normal pattern signal if the PWR signal is not input.

NG

OK

Proceed to next circuit inspection shown on matrix chart (See page AT-39).

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2 Check pattern select switch.**PREPARATION:**

Disconnect the pattern select switch connector.

CHECK:

Check continuity between terminals 2 and 3 of pattern select switch connector when pattern select switch is set to PWR and NORM positions.

OK:

Pattern select switch	Specified condition
PWR	Continuity
NORM	No continuity

OK**NG****Replace the pattern select switch.****3 Check harness and connector between battery and pattern select switch, pattern select switch and Engine & ECT ECU (See page IN-30).****OK****NG****Repair or replace harness or connector.****Check and replace the Engine & ECT ECU.**

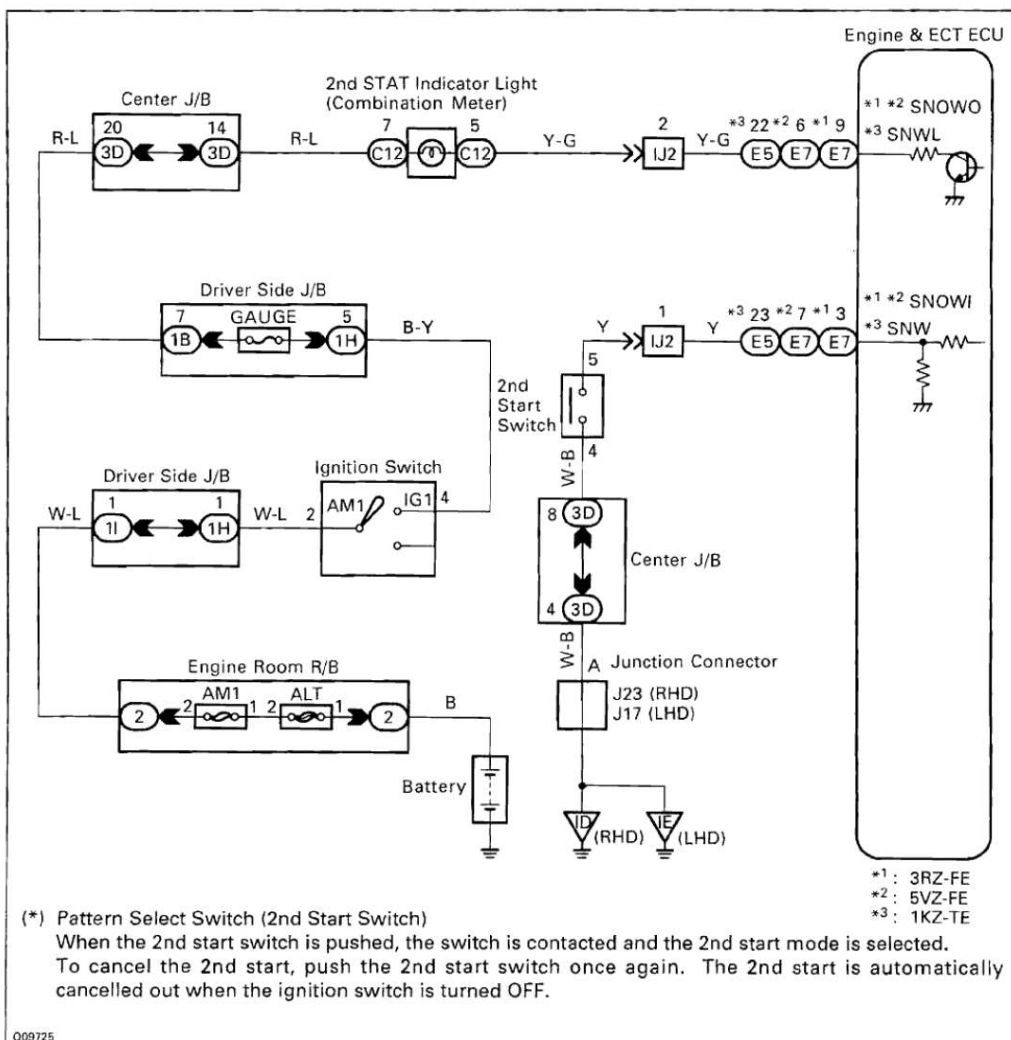
AT

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CIRCUIT DESCRIPTION

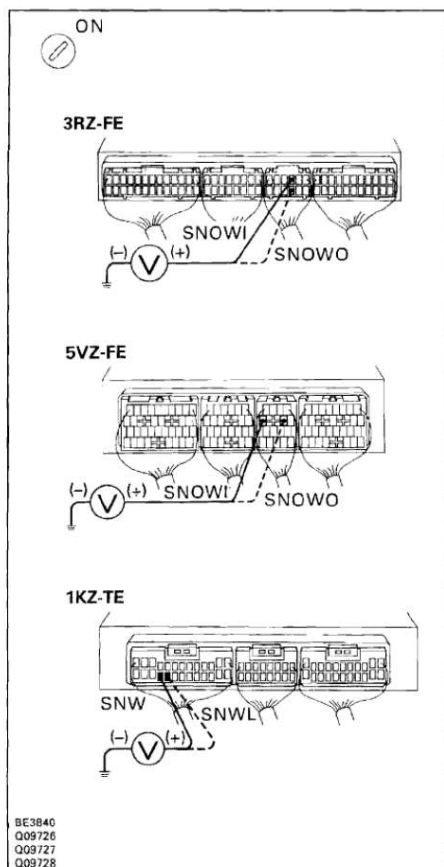
In 2 range, the transmission is held in 2nd gear.

WIRING DIAGRAM



INSPECTION PROCEDURE

- 1** Check voltage between terminal SNOWI or SNW of Engine & ECT ECU and body ground, SNOWO or SNWL of Engine & ECT ECU and body ground.

**PREPARATION:**

Turn the ignition switch ON.

CHECK:

- (a) Measure voltage between terminal SNOWI or SNW of ECM and body ground when the pattern select switch is pushed.
- (b) Measure voltage between terminal SNOWO or SNWL of Engine & ECT ECU and body ground when the "2nd STRT" indicator light light up and goes off.

OK:

(a)

Pattern select switch	Voltage
Press continuously "2nd" switch	Below 3 V
"NORM" switch not pushed	9 ~ 14 V

(b)

"2nd STRT" indicator light	Voltage
Light up	Below 3 V
Goes off	9 ~ 14 V

AT

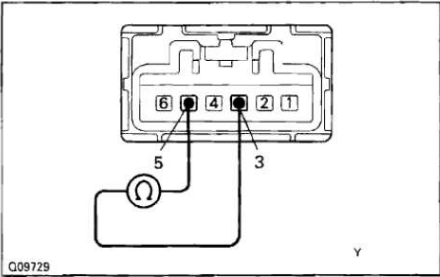
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NG

OK

Proceed to next circuit inspection shown on matrix chart (See page AT-39).

2 Check pattern select switch.



PREPARATION:
Disconnect the pattern select switch connector.

CHECK:
Check continuity between terminals 3 and 5 of pattern select switch connector when pattern select switch is set to 2nd and NORM positions.

Pattern select switch	Specified condition
Press continuously "2nd" switch	Continuity
Release "2nd" switch	No continuity

AT

OK

NG

Replace the pattern select switch.

Check and replace the Engine & ECT ECU.

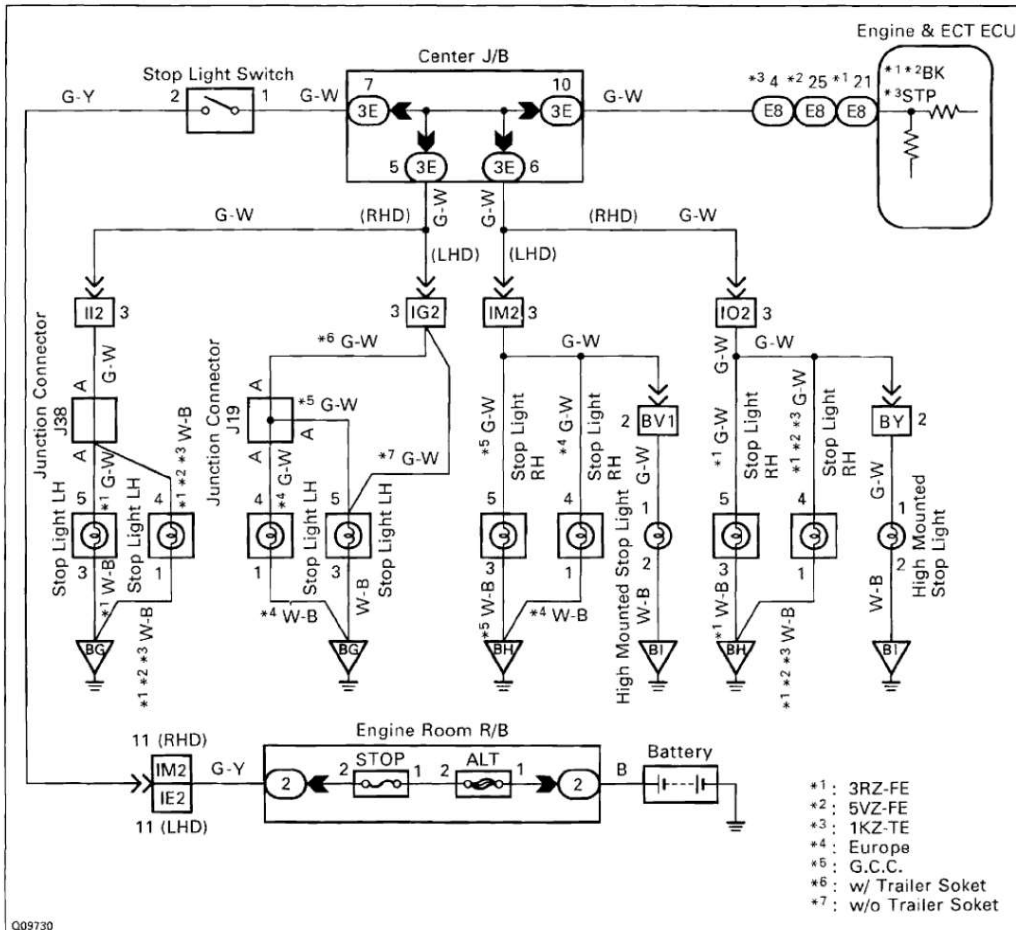
Stop Light Switch Circuit

CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling, while driving in lock-up condition, when brakes are suddenly applied.

When the brake pedal is operated, this switch sends a signals to Engine & ECT ECU. Then the Engine & ECT ECU cancels operation of the lock-up clutch while braking is in progress.

WIRING DIAGRAM



Q09730

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INSPECTION PROCEDURE

1 Check operation of stop light.**CHECK:**

Check if the stop lights go on and off normally when the brake pedal is operated and released.

OK**NG**

Check and repair the stop light circuit.

2 Check voltage between terminal BK or STP and body ground.**PREPARATION:**

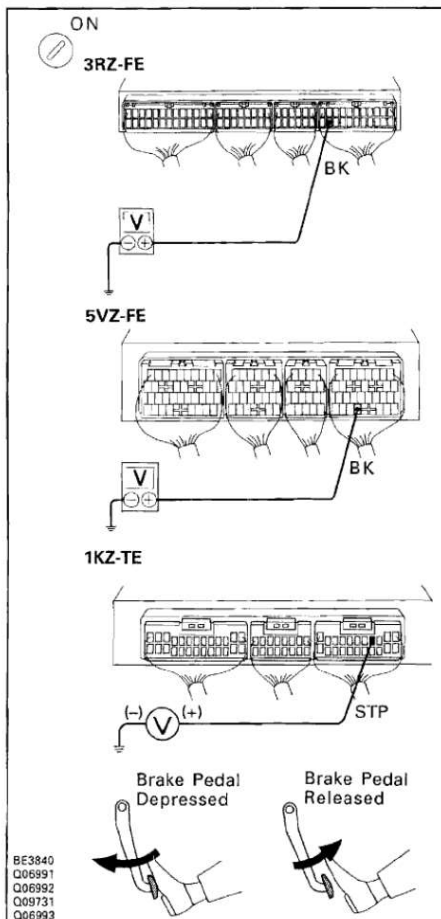
Turn the ignition switch ON.

CHECK:

Check voltage between terminal BK or STP of Engine & ECT ECU and body ground.

OK:

Brake pedal	Voltage
Depressed	7.5 ~ 14 V
Released	Below 1.5 V

**NG****OK**

Proceed to next circuit inspection shown on matrix chart (See page AT-39).

3

Check harness and connector between stop light switch and Engine & ECT ECU (See page IN-30).

OK**NG**

Repair or replace the harness or connector.

Check and replace the Engine & ECT ECU.

AT

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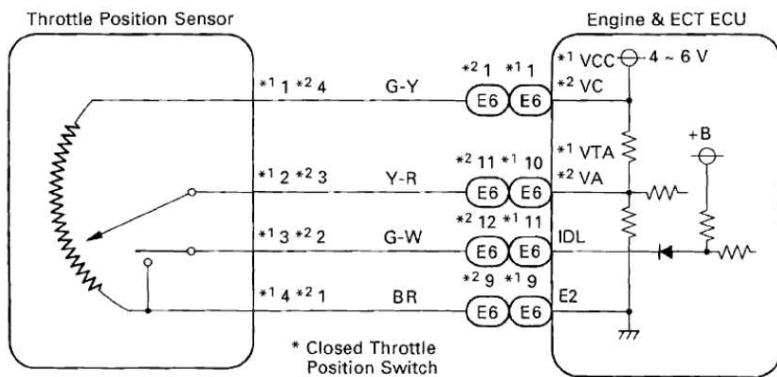
Throttle Position Sensor Circuit

CIRCUIT DESCRIPTION

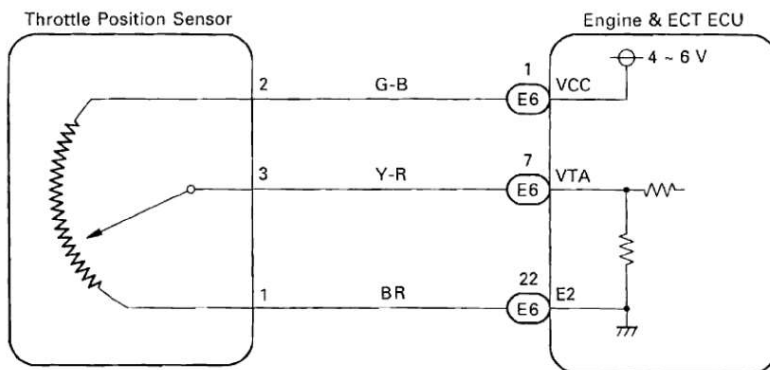
The throttle position sensor detects the throttle valve opening angle and sends signals to Engine & ECT ECU.

WIRING DIAGRAM

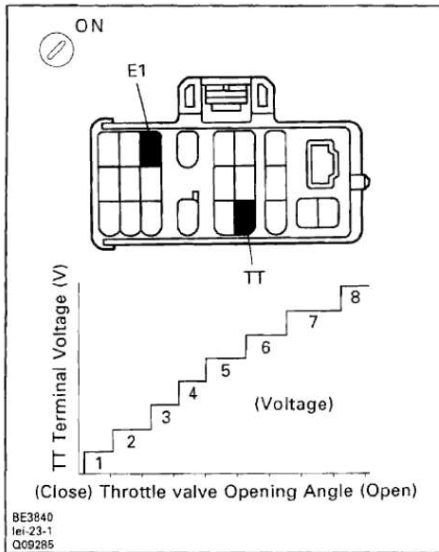
3RZ-FE, 1KZ-TE



5VZ-FE



INSPECTION PROCEDURE

1 Check throttle position signal.**PREPARATION:**

Turn the ignition switch ON.

CHECK:

Check voltage at the terminal TT of the check connector while gradually depressing the accelerator pedal from the fully closed position to the fully opened position.

OK:

Voltage changes from 0 V to 8 V by stages.

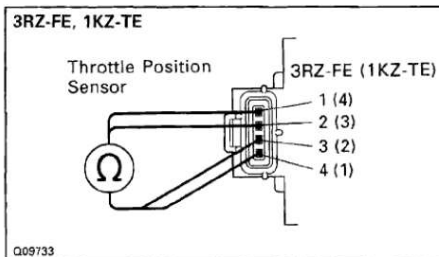
HINT: Do not depress the brake pedal during this test. The voltage will stay at 0 V if depressed.

AT

NG

OK

Proceed to next circuit inspection shown on matrix chart (See page AT-39).

2 Check throttle position sensor.**PREPARATION:**

Disconnect the throttle position sensor connector.

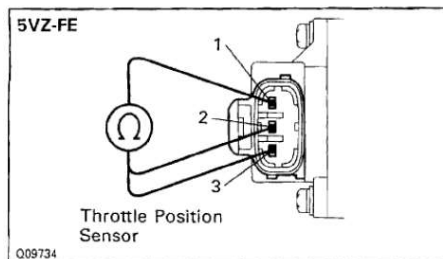
CHECK:

Measure resistance and continuity between terminals 1, 2 3 and 4 of throttle position sensor.

OK:

Terminals 3RZ-FE (1KZ-TE)	Throttle valve	Resistance
1 - 4 (1 - 4)	—	2.5 ~ 5.9 kΩ
2 - 4 (1 - 3)	Fully closed	0.2 ~ 5.7 kΩ
	Fully opened	2.0 ~ 10.2 kΩ

Terminals 3RZ-FE (1KZ-TE)	Throttle valve	Specified condition
3 - 4 (1 - 2)	Fully closed	Continuity
	Fully opened	No continuity

**PREPARATION:**

Disconnect the throttle position sensor connector.

CHECK:

Measure resistance between terminals 1, 2 and 3 of throttle position sensor.

OK:

Terminals	Throttle valve	Resistance
1 - 2	—	2.5 ~ 5.9 kΩ
1 - 3	Fully closed	0.2 ~ 5.7 kΩ
	Fully open	2.0 ~ 10.2 kΩ

OK**NG**

Replace the throttle position sensor.

AT**3**

Check harness and connector between ECM and throttle position sensor (See page IN-30).

OK**NG**

Repair or replace the harness or connector.

Check and replace the Engine & ECT ECU.

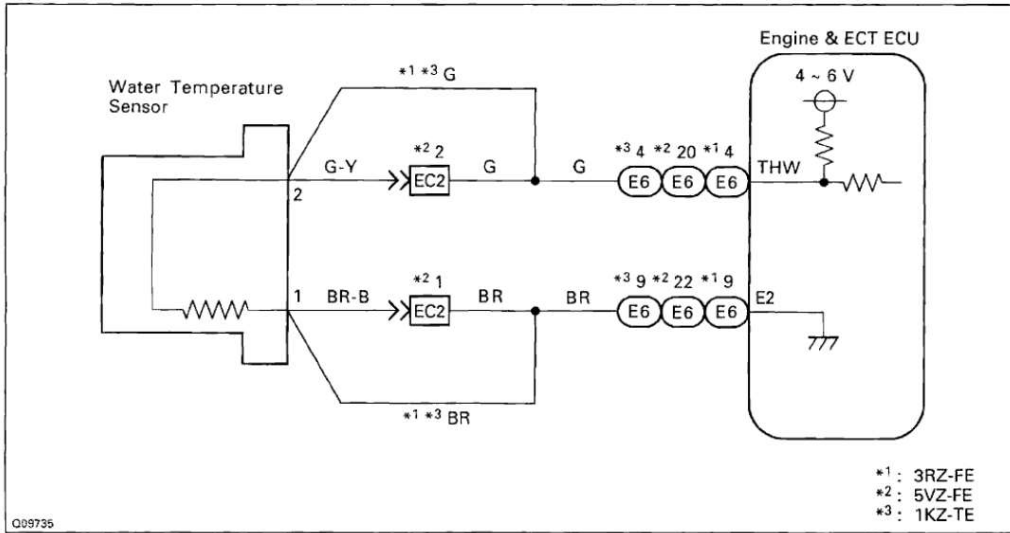
Water Temperature Sensor Circuit

CIRCUIT DESCRIPTION

A thermistor built in the water temperature sensor changes the resistance value according to the engine coolant temperature.

The Engine & ECT ECU senses the engine coolant temperature by the resistance value. When the temperature is low, the Engine & ECT ECU controls that the automatic transmission does not up-shift to the O/D gear or does not lock-up.

WIRING DIAGRAM



AT

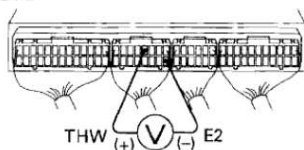
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1**Check voltage between terminals THW and E2 of Engine & ECT ECU connector.**

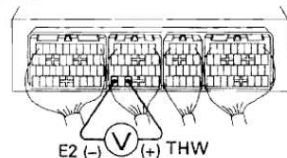
ON



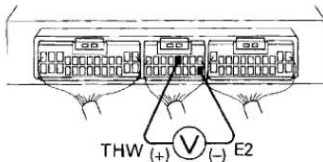
3RZ-FE



5VZ-FE



1KZ-TE



BE3840
Q09736
Q09737
Q09738

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminals THW and E2 of Engine & ECT ECU.

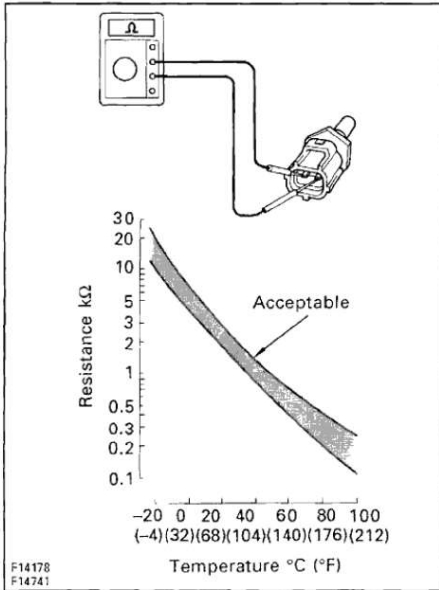
OK:

Water temperature °C (°F)	Voltage
Engine is cool 20 (68)	0.5 – 3.4 V
Engine is hot 80 (176)	0.2 – 1.5 V

OK

Proceed to next circuit inspection shown
on matrix chart (See page AT-39).

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2 Check water temperature sensor.**PREPARATION:**

Disconnect the water temperature sensor connector.

CHECK:

Measure resistance between terminals.

OK:

Resistance is within Acceptable Zone on chart.

OK**NG**

Replace the water temperature sensor.

3 Check harness and connector between water temperature and Engine & ECT ECU (See page IN-30).**OK****NG**

Repair or replace the harness or connector.

Check and replace the Engine & ECT ECU.

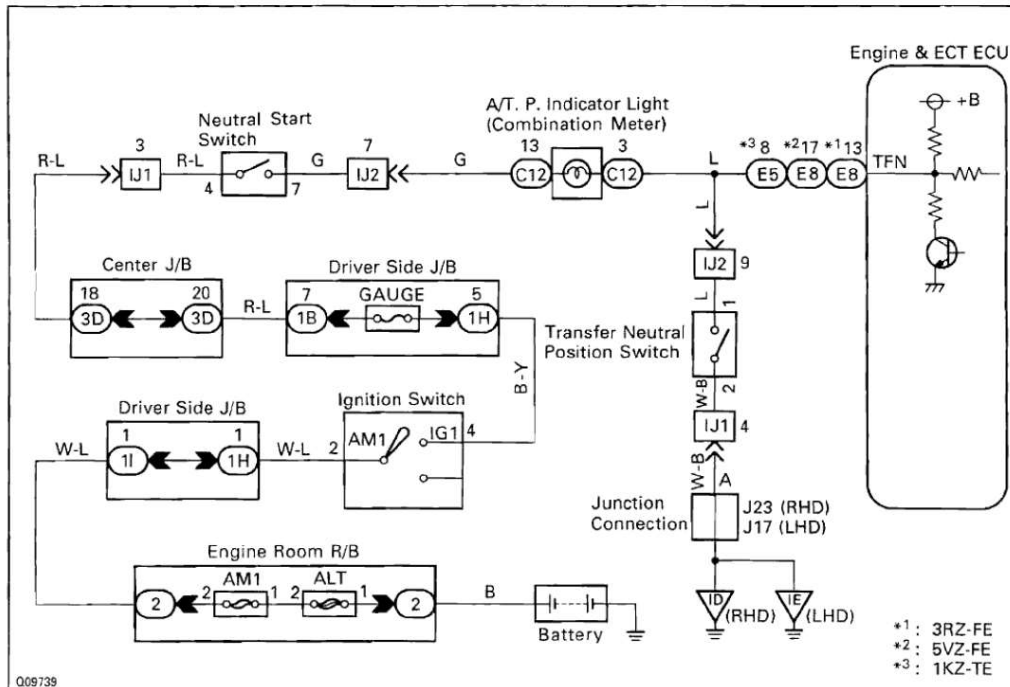
AT

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CIRCUIT DESCRIPTION

If the A/T.P. indicator light goes on, the transfer shift lever should be shifted out of N range.

WIRING DIAGRAM



INSPECTION PROCEDURE

- 1** Check neutral start switch (See page AT-60).

OK

NG

Replace the neutral start switch.

2 Check transfer neutral position switch (See page TR-55).**NG****OK**

Replace the transfer neutral position switch.

3 Check combination meter (See page BE-5).**OK****NG**

Repair or replace the combination meter.

Check and replace the harness and connector (See page IN-30).

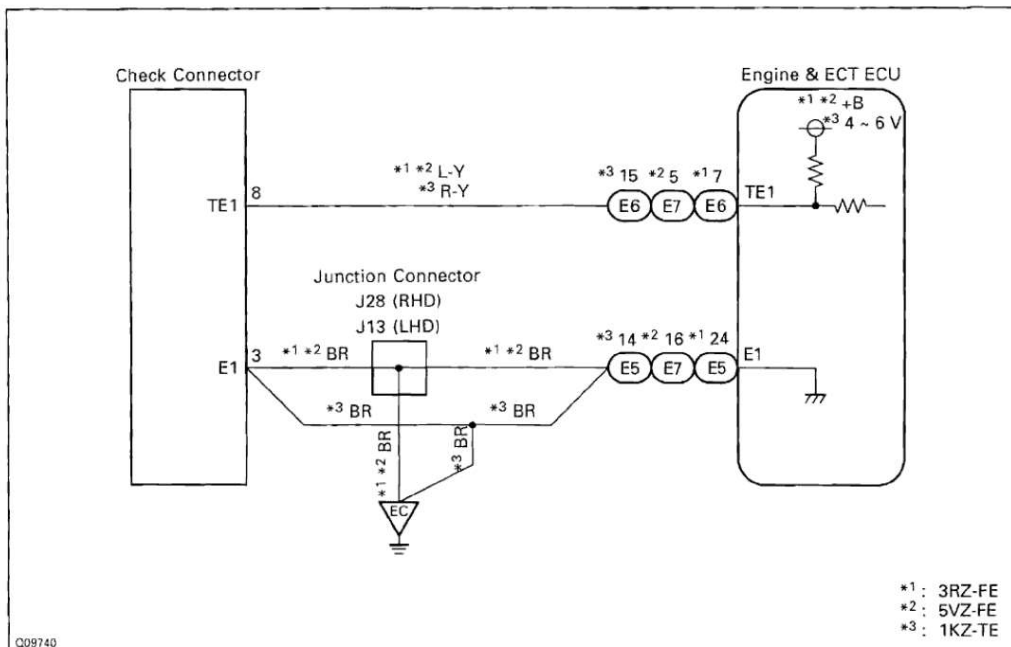
AT

TE1 Terminal Circuit

CIRCUIT DESCRIPTION

The Engine & ECT ECU displays DTCs using the O/D OFF indicator light when terminals TE1 and E1 of the check connector are connected.

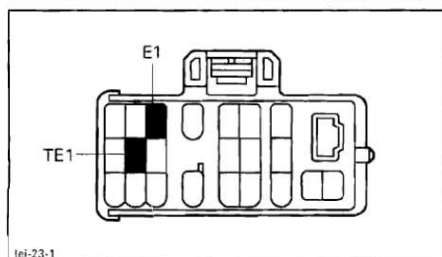
WIRING DIAGRAM



Q09740

INSPECTION PROCEDURE

1 Check voltage between terminals TE1 and E1 of check connector.



CHECK:

- Turn the ignition switch ON.
- Measure voltage between terminals TE1 and E1 of check connector.

OK:

Voltage: 3RZ-FE, 5VZ-FE: 9 ~ 14 V
1KZ-TE: 4 ~ 6 V

NG

OK

Proceed to next circuit inspection shown on matrix chart (See page AT-39).

2

Check harness and connector between body ground and check connector, check connector and Engine & ECT ECU (See page IN-30).

OK**NG**

Repair or replace the harness or connector.

Check and replace the Engine & ECT ECU.

AT

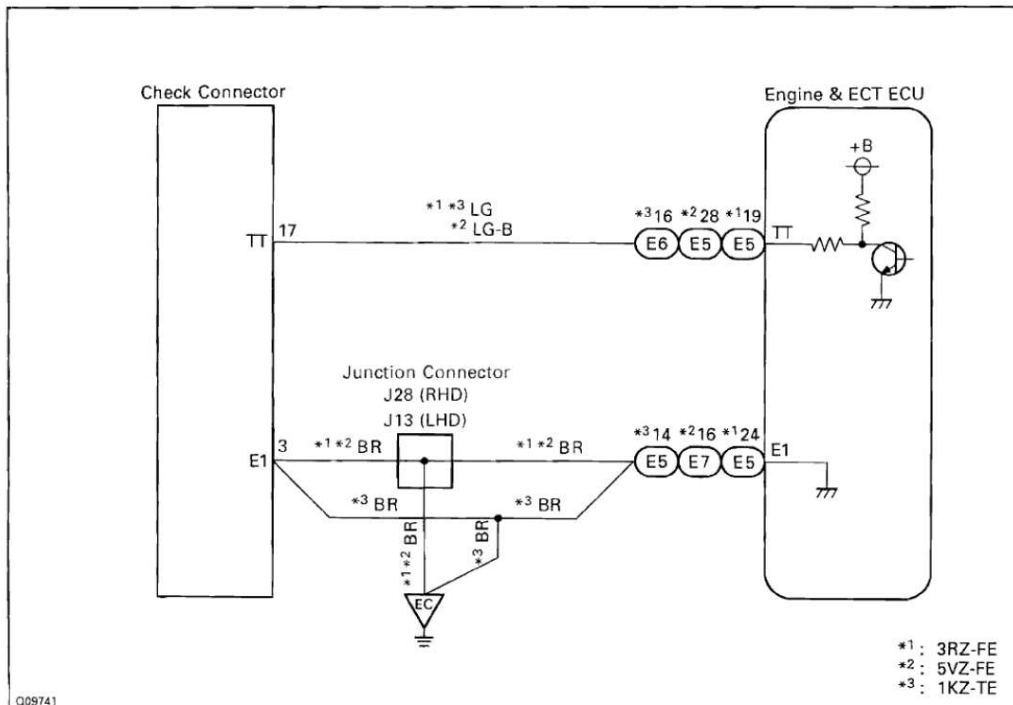
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TT Terminal Circuit

CIRCUIT DESCRIPTION

Checks of Engine & ECT ECU input and output signals related to the throttle position sensor, brakes, shift range and other circuits can be done by measuring the voltages at terminal TT of the check connector.

WIRING DIAGRAM



INSPECTION PROCEDURE

- 1 Check harness and connector between body ground and check connector, check connector and Engine & ECT ECU (See page IN-30).

OK

NG

Repair or replace the harness or connector.

Check and replace the Engine & ECT ECU.

SERVICE SPECIFICATIONS

SERVICE DATA

AXCAS-GY

Line pressure (wheel locked)	3RZ-FE:			
	Engine idling			
	D range	363-421 kPa	3.7-4.3 kgf/cm ²	53-61 psi
	R range	609-706 kPa	6.2-7.2 kgf/cm ²	88-102 psi
	AT stall (Throttle valve fully opened)			
	D range	932-1,176 kPa	9.5-12.0 kgf/cm ²	135-171 psi
	R range	1,570-1,912 kPa	16.0-19.5 kgf/cm ²	228-277 psi
	5VZ-FE:			
	Engine idling			
	D range	363-421 kPa	3.7-4.3 kgf/cm ²	53-61 psi
	R range	609-696 kPa	6.2-7.1 kgf/cm ²	88-101 psi
	AT stall (Throttle valve fully opened)			
	D range	903-1,147 kPa	9.2-11.7 kgf/cm ²	131-166 psi
	R range	1,432-1,941 kPa	14.6-19.8 kgf/cm ²	208-282 psi
	1KZ-TE:			
	Engine idling			
	D range	363-421 kPa	3.7-4.3 kgf/cm ²	53-61 psi
	R range	609-696 kPa	6.2-7.1 kgf/cm ²	88-101 psi
	AT stall (Throttle valve fully opened)			
	D range	883-1,186 kPa	9.0-12.1 kgf/cm ²	128-172 psi
	R range	1,442-1,951 kPa	14.7-19.9 kgf/cm ²	209-283 psi
Engine stall revolution		3RZ-FE	2,000±150 rpm	
		5VZ-FE	2,250±150 rpm	
		1KZ-TE	2,350±150 rpm	
Time lag		N → D range	Less than 1.2 seconds	
		N → R range	Less than 1.5 seconds	
Engine idle speed (In N range and A/C OFF)		3RZ-FE, 5VZ-FE, 1KZ-TE	700±50 rpm	
Throttle cable adjustment (Throttle valve fully closed)		Between boot and face and inner cable stopper		
		0-1 mm	0-0.04 in.	
Drive plate runout		Max.	0.20 mm	0.0079 in.
Torque converter runout		Max.	0.30 mm	0.0118 in.
Torque converter correct distance		3RZ-FE	More than 31.75 mm	More than 1.2500 in.
		5VZ-FE	More than 17.95 mm	More than 0.7067 in.
		1KZ-TE	More than 44.67 mm	More than 1.7587 in.

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3RZ—FE:

SHIFT POINT (NORM and PWR pattern)

Shift range	Shifting point	Vehicle speed km/h (mph)
D	Throttle valve fully opened	1→2 55—59 (34—37)
		2→3 101—108 (63—67)
		3→O/D 133—141 (83—88)
		O/D→3 127—135 (79—84)
		3→2 93—100 (58—62)
	Throttle valve fully closed	2→1 42—46 (26—29)
		3→O/D 32—36 (20—22)
		O/D→3 24—28 (15—17)
2	Throttle valve fully opened	1→2 55—59 (34—37)
		3→2 *105—113 (65—70)
		2→1 42—46 (26—29)
L	Throttle valve fully opened	2→1 *51—55 (32—34)

* Constant regardless of the throttle opening angle.

LOCK—UP POINT (NORM and PWR Pattern)

D range	Throttle valve opening 5%	Lock—up ON km/h (mph)	Lock—up OFF km/h (mph)
O/D Gear		77—82 (48—51)	71—75 (44—47)

5VZ—FE:

SHIFT POINT (NORM and PWR pattern)

Shift range	Shifting point	Vehicle speed km/h (mph)
D	Throttle valve fully opened	1→2 58—62 (36—39)
		2→3 106—114 (66—71)
		3→O/D 141—149 (88—93)
		O/D→3 134—142 (83—88)
		3→2 98—106 (61—66)
	Throttle valve fully closed	2→1 41—45 (25—28)
		3→O/D 41—45 (25—28)
		O/D→3 21—26 (13—16)
2	Throttle valve fully opened	1→2 58—62 (36—39)
		3→2 *111—119 (69—74)
		2→1 41—45 (25—28)
L	Throttle valve fully opened	*54—58 (34—36)

* Constant regardless of the throttle opening angle.

LOCK—UP POINT (NORM and PWR Pattern)

D range	Throttle valve opening 5%	Lock—up ON km/h (mph)	Lock—up OFF km/h (mph)
O/D Gear		57—61 (35—38)	50—55 (31—34)

1KZ-TE:

SHIFT POINT (NORM and PWR pattern)

Shift range	Shifting point	Vehicle speed	km/h (mph)
D	Throttle valve fully opened	1→2	44-48 (27-30)
		2→3	83-88 (52-55)
		3→O/D	122-130 (76-81)
		O/D→3	115-123 (71-76)
		3→2	73-84 (45-52)
	Throttle valve fully closed	2→1	32-37 (20-23)
		3→O/D	NORM: 42-46 (26-29) PWR: 47-52 (29-32)
		O/D→3	31-35 (19-22)
2	Throttle valve fully opened	1→2	44-48 (27-30)
		3→2	*90-94 (56-58)
		2→1	32-37 (20-23)
L	Throttle valve fully opened	2→1	*52-57 (32-35)

* Constant regardless of the throttle opening angle.

LOCK-UP POINT (NORM and PWR Pattern)

D range	Throttle valve opening 5%	Lock-up ON	km/h (mph)	Lock-up OFF	km/h (mph)
O/D Gear (NORM Pattern)		77-81 (48-50)		70-75 (43-47)	
O/D Gear (PWR Pattern)		90-94 (56-58)		83-88 (52-55)	

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TORQUE SPECIFICATIONS

Part tightened		N-m	kgf-cm	ft-lbf
Solenoid valve x Valve body		10	100	7
Valve body x Transmission case		10	100	7
Oil strainer x Valve body		10	100	7
Oil pan		7.4	75	65 in.-lbf
Drain plug		20	205	15
Transmission shift lever assembly		5.9	60	52 in.-lbf
Transmission control rod x Shift lever		13	130	10
Rear mounting insulator x Transfer adapter		65	660	48
Rear mounting insulator x No.3 crossmember		18	185	13
Frame x No.3 crossmember		65	660	48
Frame x No.4 crossmember (5 door models)		65	660	48
Drive plate x Crankshaft (3RZ-FE)		74	750	54
Drive plate x Crankshaft (5VZ-FE)		83	850	61
Drive plate x Crankshaft (1KZ-TE)		178	1,820	132
Torque converter x Drive plate		41	420	30
Oil filler pipe		12	120	9
Oil cooler pipe clamp	10 mm head bolt	5.0	51	44 in.-lbf
	12 mm head bolt	12	120	9
Oil cooler pipe union nut		34	350	25
Transmission x Elbow		29	300	22
Transmission x Engine		71	730	53
Transmission x Starter		39	400	29
Rear end plate x Transmission		18	185	13
Front exhaust pipe x Exhaust manifold		62	630	46
Front exhaust pipe x Tail pipe (3RZ-FE, 5VZ-FE)		48	490	35
Front exhaust pipe x Tail pipe (1KZ-TE)		43	440	32
No.1 front exhaust pipe x No.2 front exhaust pipe (5VZ-FE RHD models)		48	490	35
Stabilizer bar bracket x Frame		25	260	19
Exhaust pipe clamp (3RZ-FE)		19	195	14
Exhaust pipe support bracket x Transmission (3RZ-FE)		71	730	53
Exhaust pipe support bracket x Transmission (5VZ-FE)		44	450	33
Exhaust pipe support bracket x Exhaust pipe (5VZ-FE)		44	450	33
Front differential x Front propeller shaft		74	750	54
Front propeller shaft x Transfer		74	750	54
Propeller shaft x Rear differential		74	750	54
Propeller shaft x Transfer		74	750	54
Differential front mounting cushion x Frame		137	1,400	101
Differential rear mounting cushion x Frame		87	890	64
Differential front mounting cushion x Differential		157	1,600	116
Neutral start switch	Nut	3.9	40	35 in.-lbf
	Bolt	13	130	9
No.2 speed sensor		5.4	55	48 in.-lbf
ATF temperature sensor		15	150	11

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