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Service Category: Drivetrain	**Section:** Automatic Transmission/Transaxle	
Model Year: 2007	**Model:** 4Runner	**Doc ID:** RM000000W8503ZX
Title: A750E AUTOMATIC TRANSMISSION: AUTOMATIC TRANSMISSION SYSTEM (for 2UZ-FE): P0710: Transmission Fluid Temperature Sensor "A" Circuit (2007 4Runner)		

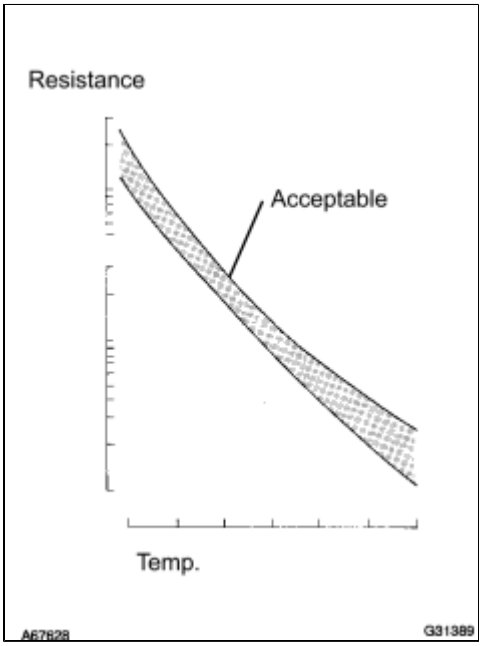
DTC	**P0710**	**Transmission Fluid Temperature Sensor "A" Circuit**

DTC	**P0712**	**Transmission Fluid Temperature Sensor "A" Circuit Low Input**

DTC	**P0713**	**Transmission Fluid Temperature Sensor "A" Circuit High Input**

DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.



The ECM applies a voltage to the temperature sensor through ECM terminal THO1.

The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.

One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.

The ECM calculates the fluid temperature based on the voltage signal.

DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA
P0710	(a) and (b) are detected momentarily within 0.5 sec. when neither P0712 nor P0713 is detected (1-trip detection logic) (a) ATF temperature sensor No. 1 resistance is less than 79 Ω. (b) ATF temperature sensor No. 1 resistance is more than 156 kΩ. **HINT:** **Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a)**	• Open or short in ATF temperature sensor No. 1 circuit • Transmission wire (ATF temperature sensor No. 1) • ECM
P0712	ATF temperature sensor No. 1 resistance is less than 79 Ω for 0.5 sec. or more (1-trip detection logic)	• Short in ATF temperature sensor No. 1 circuit • Transmission wire (ATF temperature sensor No. 1) • ECM
P0713	ATF temperature No. 1 sensor resistance is more than 156 kΩ when 15 minutes or more have elapsed after the engine start DTC is detected for 0.5 sec. or more (1-trip detection logic)	• Open in ATF temperature sensor No. 1 circuit • Transmission wire (ATF temperature sensor No. 1) • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the automatic transmission fluid (ATF) temperature sensor (TFT sensor) circuit. The automatic transmission fluid (ATF) temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω *1 or more than 156 kΩ *2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

*1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.

*2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.

HINT:

The ATF temperature can be checked on the intelligent tester display.

MONITOR STRATEGY

	P0710: ATF temperature sensor/Range check (Chattering)

Related DTCs	P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0710:

Range check (Chattering)

The monitor will run whenever this DTC is not present.	None
The typical enabling condition is not available.	-

P0712:

Range check (Low resistance)

The monitor will run whenever this DTC is not present.	None
The typical enabling condition is not available.	-

P0713:

Range check (High resistance)

The monitor will run whenever this DTC is not present.	None
Time after engine start	15 min. or more

TYPICAL MALFUNCTION THRESHOLDS

P0710:

Range check (Chattering)

TFT (transmission fluid temperature) sensor resistance	Less than 79 Ω or more than 156 kΩ

P0712:

Range check (Low resistance)

TFT sensor resistance.	Less than 79 Ω

P0713:

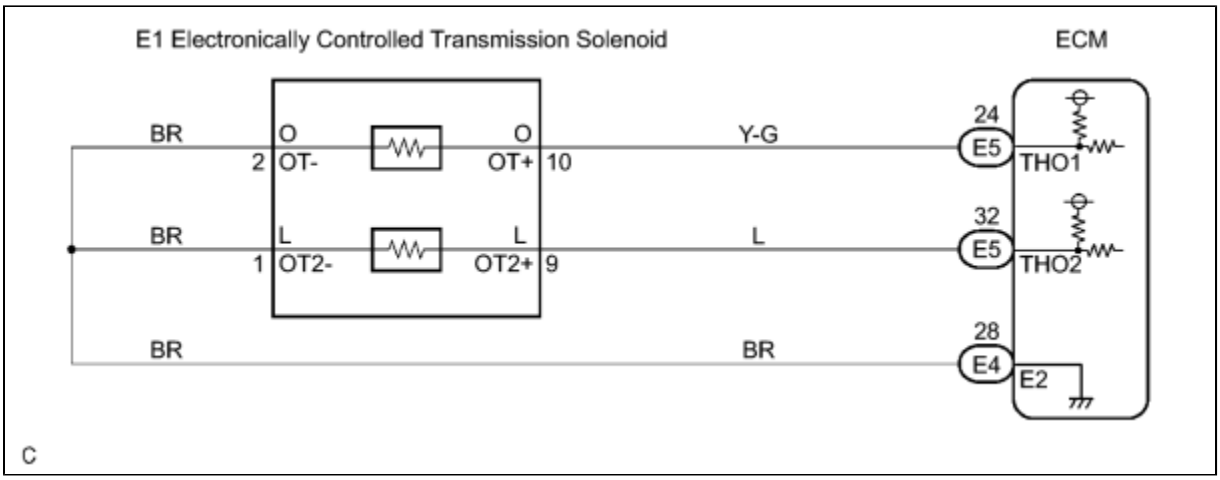
Range check (High resistance)

TFT sensor resistance.	More than 156 kΩ

COMPONENT OPERATING RANGE

TFT sensor.	Atmospheric temperature to approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

HINT:

According to the DATA LIST displayed by the intelligent tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.

(b) Turn the ignition switch off.

(c) Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.

(d) Turn the ignition switch to the ON position.

(e) Turn on the tester.

(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".

(g) According to the display on tester, read the "DATA LIST".

TESTER DISPLAY	MEASUREMENT ITEM/RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
A/T OIL TEMP1	ATF temperature sensor No. 1 value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • Equal to ambient temperature while engine is cold	If value is -40°C (-40°F) or 215°C (419°F), ATF temperature sensor No. 1 circuit is opened or short circuited

HINT:

When DTC P0712 is output and OBD II scan tool or intelligent tester output is 150°C (302°F) or more, there is a short circuit.

When DTC P0713 is output and OBD II scan tool or intelligent tester output is -40°C (-40°F), there is an open circuit.

Measure the resistance between terminal OIL and body ground.

TEMPERATURE DISPLAYED	MALFUNCTION
-40°C (-40°F)	Open circuit
150 °C (302°F) or more	Short circuit

HINT:

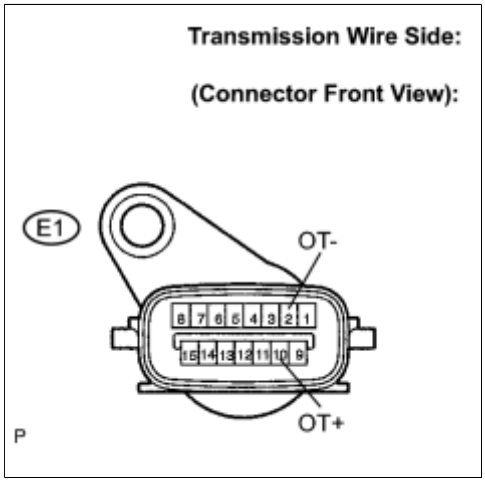
If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 second). When P0713 is set, P0711 cannot be detected.

It is not necessary to inspect the circuit when P0711 is set.

PROCEDURE

1.	**INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)**

(a) Disconnect the transmission wire connector from the transmission.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

TESTER CONNECTION	SPECIFIED CONDITION
2 (OT-) - 10 (OT+)	79 Ω to 156 kΩ
2 (OT-) - Body ground	10 kΩ or higher
10 (OT+) - Body ground	10 kΩ or higher

HINT:

If the resistance is out of the specified range with either the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

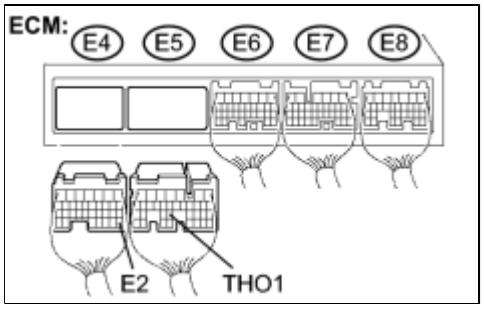
Standard resistance:

ATF TEMPERATURE	SPECIFIED CONDITION
20 °C (68°F)	3 to 4 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG ▶ **REPAIR OR REPLACE TRANSMISSION WIRE**

OK ▼

2.	**CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)**



(a) Connect the transmission wire connector to the transmission.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

TESTER CONNECTION	SPECIFIED CONDITION
E5-24 (THO1) - E4-28 (E2)	79 Ω to 156 kΩ

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check or short):

TESTER CONNECTION	SPECIFIED CONDITION
E5-24 (THO1) - Body ground	10 kΩ or higher
E4-28 (E2) - Body ground	↑

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▶ **REPLACE ECM**