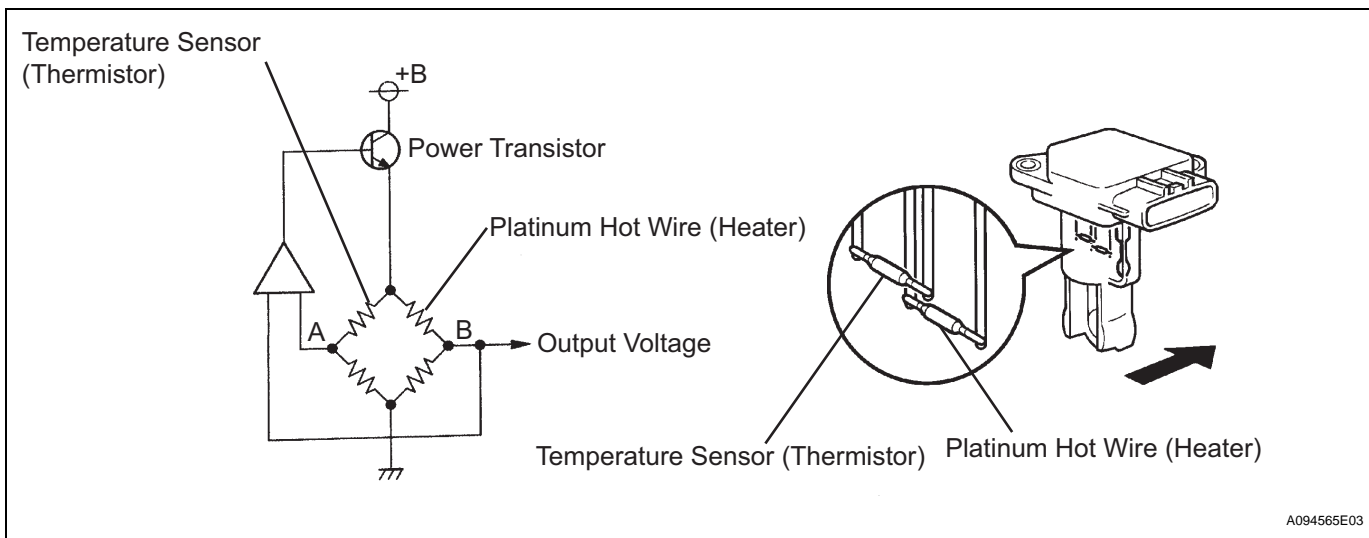| DTC	P0101	Mass Air Flow Circuit Range / Performance Problem

DESCRIPTION

The Mass Air Flow (MAF) meter is a sensor that measures the amount of air flowing through the valve. The ECM uses this information to determine the fuel injection time and to prove appropriate air-fuel ratio. Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air.

By applying a specific electrical current to the wire, the ECM heats it to a given temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume.

The circuit is constructed so that the platinum hot wire and the temperature sensor provide a bridge circuit, and the power transistor is controlled so that the potentials of A and B remain equal to maintain the predetermined temperature.

HINT:

When any of these DTCs are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is calculated by the ECM, according to the engine RPM and throttle valve position. Fail-safe mode continues until a pass condition is detected.

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DTC No.	DTC Detection Condition	Trouble Area
P0101	• High voltage: Conditions (a) and (b) continue for more than 10 seconds (2 trip detection logic): (a) Engine speed less than 2,000 rpm (b) Engine coolant temperature 70°C (158°F) or higher • Low voltage: Condition (a) continues for more than 10 seconds (2 trip detection logic): (a) Engine speed more than 300 rpm	MAF meter

MONITOR DESCRIPTION

The MAF meter is a sensor that measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and to provide an appropriate air-furl ratio. Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a specific temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components of the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume .If there is a defect in the sensor, or an open or short in the circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the MAF meter and sets the DTC.
Example:
If the voltage is more than 2.2 V, or less than 0.83 V while idling, the ECM determines that there is a malfunction in the MAF meter and sets the DTC.

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MONITOR STRATEGY

Related DTCs	P0101: Mass air flow meter rationality
Required Sensors/Components (Main)	Mass air flow meter
Required Sensors/Components (Related)	Crankshaft position sensor, engine coolant temperature sensor and throttle position sensor
Frequency of Operation	Continuous
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs not present	P0115, P0116, P0117, P0118 (ECT sensor), P0120, P0122, P0123, P0222, P0223, P2135 (TP sensor), P0125 (Insufficient ECT for closed loop), P0335 (CKP sensor), P0340, P0341 (CMP sensor), P0385 (CKP sensor 2)

Mass Air Flow Meter Rationality (High Voltage):

Engine speed	Less than 2,000 rpm
Engine coolant temperature	70°C (158°F) or more

Mass Air Flow Meter Rationality (Low Voltage):

Engine speed	More than 300 rpm
Fuel cut	OFF

TYPICAL MALFUNCTION THRESHOLDS

Mass Air Flow Meter Rationality (High Voltage):

Mass air flow meter voltage	More than 2.2 V (varies with throttle position sensor voltage)

Mass Air Flow Meter Rationality (Low Voltage):

Mass air flow meter voltage	Less than 0.54 V (varies with throttle position sensor voltage)

WIRING DIAGRAM

Refer to DTC P0100 (See page).

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0101)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON.
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0101 and other DTCs	A
P0101	B

HINT:
If any other DTCs besides P0101 are output, troubleshoot those DTCs first.

B	REPLACE MASS AIR FLOW METER

A

GO TO RELEVANT DTC CHART