DTC	P3190	Poor Engine Power

DTC	P3191	Engine dose not Start

DTC	P3193	Fuel Run Out

DESCRIPTION

From the HV ECU, the ECM receives data such as power output required for the engine (required output), estimated torque produced by the engine (estimated torque), engine RPM of control target (target RPM), whether the engine is in start mode or not. Then, based on the required output and target RPM, the ECM calculates a target torque that is to be produced by the engine and compares it with the estimated torque. If the estimated torque is very low compared with the target torque, or the engine start mode continues for the specific duration calculated by water temperature, an abnormal condition is detected.

ES

DTC No.	DTC Detection Condition	Trouble Area
PP3190	Following conditions continue at a fixed engine RPM or a fixed length of time: • Communication with HV ECU is normal • Engine RPM is a fixed value or more • Engine start mode is not active • Target torque is a fixed value • Ratio of estimated torque against target torque is less than 20%	• Air induction system • Throttle body • Fuel pressure • Engine • Mass Air flow meter • Out of fuel • Engine coolant temperature sensor • Crankshaft position sensor • Camshaft position sensor • ECM
PP3191	Following conditions continue at a fixed engine RPM or a fixed length of time: • Communication with HV ECU is normal • Engine RPM is a fixed value or more • Engine start mode is not active	• Air induction system • Throttle body • Fuel pressure • Engine • Mass Air flow meter • Out of fuel • Engine coolant temperature sensor • Crankshaft position sensor • Camshaft position sensor • ECM
PP3193	Following conditions are met: • Fuel low level signal input into ECM • Detection condition for P3190 or P3191 is satisfied	• Out of fuel • ECM

MONITOR DESCRIPTION

The ECM and HV control ECU are connected by a communication line called CAN. The ECM sends information on the engine speed and other data to the HV control ECU while the HV control ECU sends the information such as a requirement for the engine power to the ECM using the CAN communication line.
When the communication between the ECM and HV control ECU is normal and the following items becomes specific condition, the ECM will illuminates the MIL and sets a DTC.
(a) Engine speed
(b) Power switch
(c) Target torque
(d) Ratio of target torque against estimated torque
(e) Fuel level

MONITOR STRATEGY

Related DTCs	P3190: Poor engine power P3191: Engine does not start P3193: Fuel run out

Required sensors/components	Main sensors: Crankshaft position sensor Related sensors: HV control ECU
Frequency of operation	Continuous
Duration	100 engine revolutions and 6 seconds
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	None
Fuel cut operation	Not operated
Engine speed	750 rpm or more (varies with engine coolant temperature)

ES

TYPICAL MALFUNCTION THRESHOLDS

Case1: P3190

Time for low engine torque	100 engine revolutions or more, or 6 seconds or more (varies with engine coolant temperature)

Case2: P3191

Engine start no-determination time (receive from HV ECU)	100 engine revolutions or more, and 6 seconds or more (varies with engine coolant temperature)

Case3: P3193

Time for low engine torque or Engine start no-determination time	100 engine revolutions or more, and 6 seconds or more (varies with engine coolant temperature)

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, 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 OTHER DTC OUTPUT (IN ADDITION TO DTC P3190, P3191 AND/OR P3193)

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

Result

Display (DTC output)	Proceed to
P3190, P3191 and/or P3193	A
P3190, P3191 and/or P3193, and other DTCs	B

HINT:
If any other codes besides P3190, P3191 and/or P3193 are output, perform troubleshooting for those DTCs first.

B	GO TO RELEVANT DTC CHART

A

2	CHECK SHORTAGE OF FUEL

NG → REFILL FUEL

OK

3	CHECK AIR INDUCTION SYSTEM

ES

OK:
The air induction system has no leakage and blockages.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

4	CHECK FOR UNUSUAL NOISE OR VIBRATION WHEN STARTING ENGINE OR REVVING UP

OK:
Unusual noise and vibration do not occur.

NG → REPAIR OR REPLACE

OK

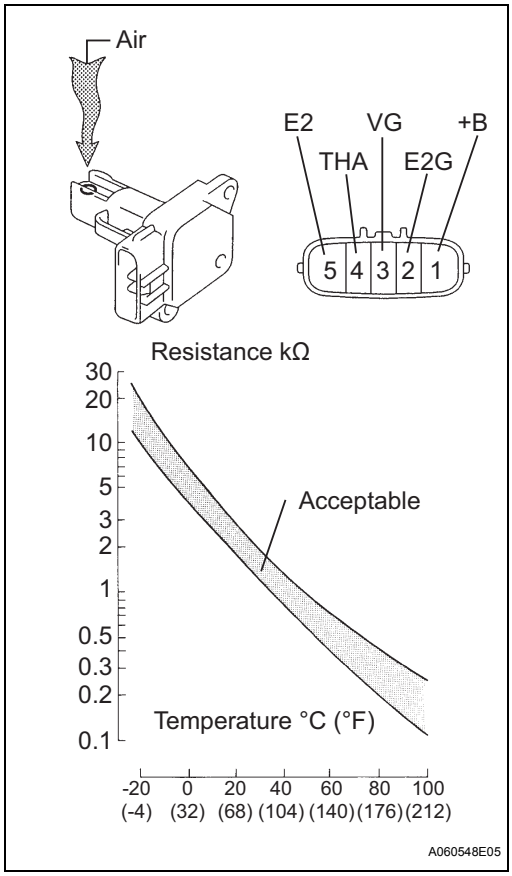
5	CHECK FUEL PRESSURE

OK:
Fuel pressure: 304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 50 psi)

NG → CHECK AND REPAIR FUEL SYSTEM

OK

6	INSPECT MASS AIR FLOW METER



(a) Remove the mass air flow meter.

(b) Inspect output voltage.

(1) Apply battery voltage across terminals +B and E2G.

(2) Connect the positive (+) tester probe to terminal VG, and negative (-) tester probe to terminal E2G.

(3) Blow air into the mass air flow meter, and check that the voltage fluctuates.

Standard voltage

Tester Connection	Specified Condition
3 (VG) - 2 (E2G)	Sensor output voltage fluctuates between 0.3 V and 4.8 V

(c) Inspect resistance.

(1) Measure the resistance between the terminals of the mass air flow meter.

Standard resistance

Tester Connection	Specified Condition
4 (THA) - 5 (E2)	13.6 to 18.4 kΩ at -20°C (-4°F)
4 (THA) - 5 (E2)	2.21 to 2.69 kΩ at 20°C (68°F)
4 (THA) - 5 (E2)	0.49 to 0.67 kΩ at 60°C (140°F)

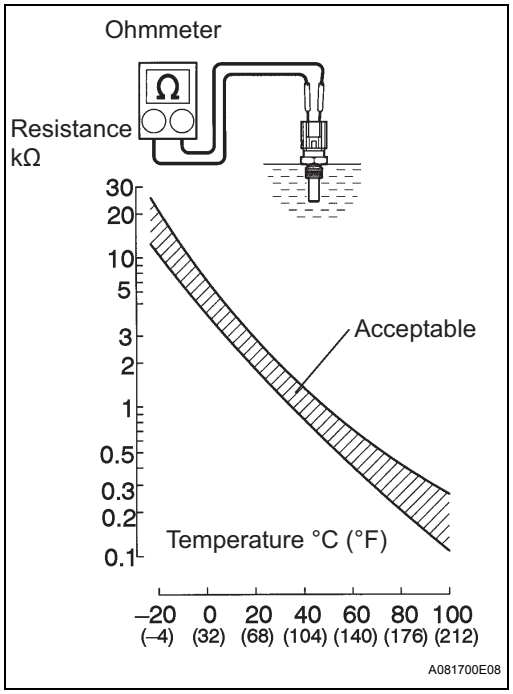
(d) Reinstall the mass air flow meter.

NG → **REPLACE MASS AIR FLOW METER**

OK

ES

7 INSPECT ENGINE COOLANT TEMPERATURE SENSOR



(a) Remove the engine coolant temperature sensor.
(b) Measure the resistance between the terminals of the engine coolant temperature sensor.
Standard resistance

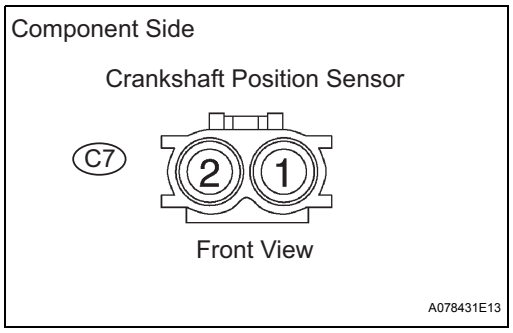
Tester Connection	Specified Condition
1 - 2	2 to 3 kΩ at 20°C (68°F)
1 - 2	0.2 to 0.4 kΩ at 80°C (176°F)

NOTICE:
When checking the engine coolant temperature sensor in water, be careful not to allow water to contact the terminals. After checking, dry the sensor.
HINT:
Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.
(c) Reinstall the engine coolant temperature sensor.

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

8 INSPECT CRANKSHAFT POSITION SENSOR



(a) Disconnect the C7 crankshaft position sensor connector.
(b) Measure the resistance between the terminals of the crankshaft position sensor connector.
Standard resistance

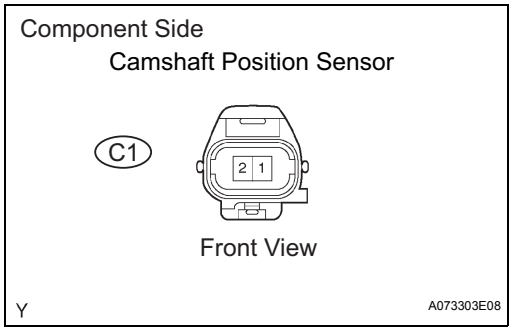
Tester Connection	Specified Condition
1 - 2	985 to 1,600 Ω at cold
1 - 2	1,265 to 1,890 Ω at hot

(c) Reconnect the crankshaft position sensor connector.
NOTICE:
Terms "cold" and "hot" refer to the temperature of the sensor. "Cold" means approximately -10 to 50 °C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).

NG → **REPLACE CRANKSHAFT POSITION SENSOR**

OK

9 INSPECT CAMSHAFT POSITION SENSOR



(a) Disconnect the C1 camshaft position sensor connector.
(b) Measure the resistance between the terminals of camshaft position sensor connector.
Standard resistance

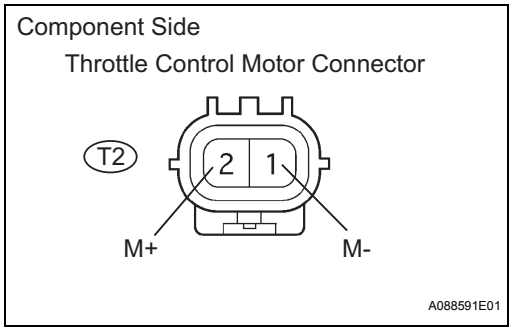
Tester Connection	Specified Condition
1 - 2	1,630 to 2,740 Ω at cold
1 - 2	2,065 to 3,225 Ω at hot

(c) Reconnect the camshaft position sensor connector.
NOTICE:
Terms "cold" and "hot" refer to the temperature of the sensor. "Cold" means approximately -10 to 50 °C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).

NG → **REPLACE CAMSHAFT POSITION SENSOR**

OK

10 INSPECT THROTTLE CONTROL MOTOR



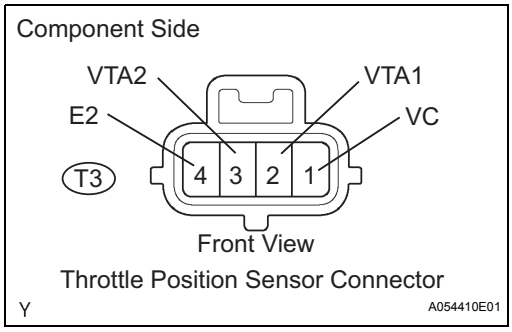
(a) Disconnect the throttle control motor connector.
(b) Using an ohmmeter, measure the motor resistance between terminals 1 (M-) and 2 (M+).
Standard resistance

Tester Connection	Specified Condition
1 - 2	0.3 to 100 Ω at 20°C (68°F)

NG → **REPLACE THROTTLE CONTROL MOTOR**

OK

11 INSPECT THROTTLE POSITION SENSOR



(a) Disconnect the throttle position sensor connector.
(b) Measure the resistance between the terminals of the throttle position sensor.
Standard resistance

Tester Connection	Specified Condition
1 (VC) - 4 (E2)	1.2 to 3.2 kΩ at 20°C (68°F)
2 (VTA1) - 4 (E2)	1.8 to 10.5 kΩ at 20°C (68°F)
3 (VTA2) - 4 (E2)	1.8 to 10.5 kΩ at 20°C (68°F)

NG → **REPLACE THROTTLE POSITION SENSOR**

ES

OK

REPLACE ECM