Applies To: **All OBD II-equipped models except Passport** **April 2, 2010**

OBD II DTCs and Their Associated Monitors

(Supersedes 03-020, dated March 29, 2003, to revise the information marked by the black bars)

REVISION SUMMARY

Numerous DTCs were added. Refer to the list for details.

Following is a list of all OBD II DTCs and their associated monitors for all Honda automobiles with OBD II. No one model has every DTC in the list.

DTC	Detection Item	Associated Monitor
P0AA6	High Voltage Short Circuit	Comprehensive
P0AA7	Motor Control Module (MCM) Internal Circuit Malfunction	Comprehensive
P0AB6	Rear Engine Mount Actuator Circuit Malfunction	Comprehensive
P0AB7	Rear Engine Mount Actuator Control Circuit Low Current	Comprehensive
P0AB8	Rear Engine Mount Actuator Control Circuit High Current	Comprehensive
P0A14	Front Engine Mount Actuator Circuit Malfunction	Comprehensive
P0A15	Front Engine Mount Actuator Control Circuit Low Current	Comprehensive
P0A16	Front Engine Mount Actuator Control Circuit High Current	Comprehensive
P0ACC	Battery Module Temperature Sensor 3 Circuit Low Voltage	Comprehensive
P0AC0	Battery Current Sensor Circuit Malfunction	Comprehensive
P0AC4	IMA System Malfunction	Comprehensive
P0AC7	Battery Module Temperature Sensor 2 Circuit Low Voltage	Comprehensive
P0AC8	Battery Module Temperature Sensor 2 Circuit High Voltage	Comprehensive
P0ACD	Battery Module Temperature Sensor 3 Circuit High Voltage	Comprehensive
P0AEE	MCM Internal Circuit Malfunction	Comprehensive
P0AEF	MCM Internal Temperature Sensor Circuit Low Voltage	Comprehensive
P0AE1	Bypass Contactor Malfunction	Comprehensive
P0AF0	MCM Internal Temperature Sensor Circuit High Voltage	Comprehensive
P0A1B	Motor Control Module (MCM) Internal Circuit Malfunction	Comprehensive
P0A1F	F-CAN Malfunction (BCM Module-MCM)	Comprehensive
P0A27	High Voltage Contactor/Bypass Contactor Stays Activated	Comprehensive
P0A3C	Motor Power Inverter (MPI) Module Overheating	Comprehensive
P0A3F	Motor Rotor Position Sensor Circuit Malfunction	Comprehensive
P0A5E	U Phase Motor Current Sensor Circuit Low Voltage	Comprehensive
P0A5F	U Phase Motor Current Sensor Circuit High Voltage	Comprehensive
P0A61	V Phase Motor Current Sensor Circuit Low Voltage	VTC (VVT)
P0A62	V Phase Motor Current Sensor Circuit High Voltage	Comprehensive
P0A64	W Phase Motor Current Sensor Circuit Low Voltage	Comprehensive
P0A65	W Phase Motor Current Sensor Circuit High Voltage	VTC (VVT)
P0A7E	Battery Module Overheating	Comprehensive
P0A7F	Battery Module Deterioration	Comprehensive
P0A9D	Battery Module Temperature Sensor 1 Circuit Low Voltage	Comprehensive
P0A9E	Battery Module Temperature Sensor 1 Circuit High Voltage	Comprehensive

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DTC	Detection Item	Associated Monitor
P0A94	DC-DC Converter Output Low Voltage	Comprehensive
P0010	Variable Valve Timing Control (VTC) Oil Control Solenoid Valve Malfunction	Comprehensive
P0011	Variable Valve Timing Control (VTC) System Malfunction	VTC (VVT)
P0096	IAT Sensor 2 Circuit Range/Performance Problem	Comprehensive
P0097	IAT Sensor 2 Circuit Low Voltage	Comprehensive
P0098	IAT Sensor 2 Circuit High Voltage	VTC (VVT)
P0101	Mass Airflow (MAF) Sensor Range/Performance Problem	Comprehensive
P0102	Mass Airflow (MAF) Sensor Circuit Low Voltage	Comprehensive
P0103	Mass Airflow (MAF) Sensor Circuit High Voltage	Comprehensive
P0106	Manifold Absolute Pressure (MAP) Sensor Range/Performance Problem	Comprehensive
P0107	Manifold Absolute Pressure (MAP) Sensor Circuit Low Voltage	Comprehensive
P0108	Manifold Absolute Pressure (MAP) Sensor Circuit High Voltage	Comprehensive
P0111	Intake Air Temperature (IAT) Sensor Circuit Range/Performance Problem	Comprehensive
P0112	Intake Air Temperature (IAT) Sensor Circuit Low Voltage	Comprehensive
P0113	Intake Air Temperature (IAT) Sensor Circuit High Voltage	Comprehensive
P0116	Engine Coolant Temperature (ECT) Sensor Circuit Range/Performance Problem	Comprehensive
P0117	Engine Coolant Temperature (ECT) Sensor Circuit Low Input	Comprehensive
P0118	Engine Coolant Temperature (ECT) Sensor Circuit High Input	Comprehensive
P0122	Throttle Position (TP) Sensor Circuit Low Input	Comprehensive
P0123	Throttle Position (TP) Sensor Circuit High Input	Comprehensive
P0125	Engine Coolant Temperature (ECT) Sensor Slow Response	Comprehensive
P0128	Cooling System Malfunction	Comprehensive (Thermostat)
P0131	Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) Circuit Low Voltage	Comprehensive (HO2S)
P0132	Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) Circuit High Voltage	Comprehensive (HO2S)
P0133	Rear Air/Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) Circuit Slow Response	A/F sensor
P0134	Air/Fuel Ratio (A/F) Sensor (Sensor 1) No Activity Detected	A/F sensor
P0135	Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) Heater Circuit Malfunction	Comprehensive (HO2S)
P0137	Secondary Heated Oxygen Sensor (Secondary HO2S) Circuit Low Voltage	Secondary HO2S
P0138	Secondary Heated Oxygen Sensor (Secondary HO2S) Circuit High Voltage	Secondary HO2S
P0139	Secondary Heated Oxygen Sensor (Secondary HO2S) Slow Response	Secondary HO2S
P0141	Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) Heater Circuit Malfunction	Comprehensive (HO2S)
P0143	Third Heated Oxygen Sensor (Third HO2S) (Sensor 3) Circuit Low Voltage	Comprehensive (HO2S)
P0144	Third Heated Oxygen Sensor (Third HO2S) (Sensor 3) Circuit High Voltage	Comprehensive (HO2S)
P0145	Third Heated Oxygen Sensor (Third HO2S) (Sensor 3) Circuit Slow Response	Comprehensive (HO2S)
P0147	Third Heated Oxygen Sensor (Third HO2S) (Sensor 3) Heater Circuit Malfunction	Comprehensive (HO2S)
P0153	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) Circuit Slow Response	A/F sensor
P0154	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) Heater System Malfunction	A/F sensor heater
P0155	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) Heater Circuit Malfunction	A/F sensor heater
P0157	Front Secondary Heated Oxygen Sensor (Secondary HO2S) (Bank 2, Sensor 2) Circuit Low Voltage	Secondary HO2S

DTC	Detection Item	Associated Monitor
P0158	Front Secondary Heated Oxygen Sensor (Secondary HO2S) (Bank 2, Sensor 2) Circuit High Voltage	Secondary HO2S
P0159	Front Secondary Heated Oxygen Sensor (Secondary HO2S) (Bank 2, Sensor 2) Circuit Slow Response	Secondary HO2S
P0161	Front Secondary Heated Oxygen Sensor (Secondary HO2S) (Bank 2, Sensor 2) Heater Circuit Malfunction	Comprehensive (HO2S)
P0171	Fuel System Too Lean	Fuel system
P0172	Fuel System Too Rich	Fuel system
P0174	Front Bank (Bank 2) Fuel System Too Lean	Fuel system
P0175	Front Bank (Bank 2) Fuel System Too Rich	Fuel system
P0181	Fuel Temperature Sensor Circuit Range/Performance Problem	Comprehensive
P0182	Fuel Temperature Sensor Circuit Low Voltage	Comprehensive
P0183	Fuel Temperature Sensor Circuit High Voltage	Comprehensive
P0191	Fuel Pressure Sensor Range/Performance Problem	Comprehensive
P0192	Fuel Pressure Sensor Circuit Low Voltage	Comprehensive
P0193	Fuel Pressure Sensor Circuit High Voltage	Comprehensive
P0196	EOT Sensor/Range Performance Problem	Comprehensive
P0197	EOT Sensor Circuit Low Voltage	Comprehensive
P0198	EOT Sensor Circuit High Voltage	Comprehensive
P0222	Throttle Position (TP) Sensor 2 Circuit Low Voltage	Comprehensive
P0223	Throttle Position (TP) Sensor 2 Circuit High Voltage	Comprehensive
P0300	Random Misfire	Misfire
P0301	No. 1 Cylinder Misfire	Misfire
P0302	No. 2 Cylinder Misfire	Misfire
P0303	No. 3 Cylinder Misfire	Misfire
P0304	No. 4 Cylinder Misfire	Misfire
P0305	No. 5 Cylinder Misfire	Misfire
P0306	No. 6 Cylinder Misfire	Misfire
P0325	Knock Sensor Circuit Malfunction	Comprehensive
P0335	Crankshaft Position (CKP) Sensor Circuit No Signal	Comprehensive
P0336 P0339	Crankshaft Position (CKP) Sensor Circuit Intermittent Interruption	Comprehensive
P0340	Camshaft Position (CMP) Sensor No Signal	Comprehensive
P0341	Camshaft Position (CMP) Sensor A Intermittent Interruption	Comprehensive
P0344	Camshaft Position (CMP) Sensor Intermittent Interruption	Comprehensive
P0351	No. 1 Cylinder Ignition Coil Circuit Malfunction	Comprehensive
P0352	No. 2 Cylinder Ignition Coil Circuit Malfunction	Comprehensive
P0353	No. 3 Cylinder Ignition Coil Circuit Malfunction	Comprehensive
P0354	No. 4 Cylinder Ignition Coil Circuit Malfunction	Comprehensive
P0355	No. 5 Cylinder Ignition Coil Circuit Malfunction	Comprehensive
P0356	No. 6 Cylinder Ignition Coil Circuit Malfunction	Comprehensive
P0365	Camshaft Position (CMP) Sensor B No Signal	Comprehensive
P0366 P0369	Camshaft Position (CMP) Sensor B Intermittent Interruption	Comprehensive
P0385	Crankshaft Position (CKP) Sensor B No Signal	Comprehensive
P0389	Crankshaft Position (CKP) Sensor B Intermittent Interruption	Comprehensive
P0400	EGR System Leak Detected	EGR

DTC	Detection Item	Associated Monitor
P0401	Exhaust Gas Recirculation (EGR) Insufficient Flow	EGR
P0404	Exhaust Gas Recirculation (EGR) Control Circuit Range/Performance Problem	EGR
P0406	Exhaust Gas Recirculation (EGR) Valve Position Sensor Circuit High Voltage	Comprehensive (EGR)
P0410	Air Pump Circuit Malfunction	Comprehensive (Air system)
P0411	Secondary Air Injection System Incorrect Flow	Comprehensive (Air system)
P0420	Catalyst System Efficiency Below Threshold	Catalytic converter
P0430	Front Bank Catalyst System Efficiency Below Threshold (Bank 2)	Catalytic converter
P0441	Evaporative Emission (EVAP) Control System Incorrect Purge Flow	EVAP
P0442	Evaporative Emission (EVAP) System Small Leak Detected	EVAP (0.04 in)
P0443	Evaporative Emission (EVAP) Canister Purge Valve Circuit Malfunction	Comprehensive
P0451	Fuel Tank Pressure (FTP) Sensor Range/Performance Problem	Comprehensive
P0452	Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage	Comprehensive
P0453	Fuel Tank Pressure (FTP) Sensor Circuit High Voltage	Comprehensive
P0455	EVAP System Large Leak Detected	EVAP
P0456	Evaporative Emission (EVAP) System Very Small Leak Detected	EVAP (0.04 in)
P0457	Evaporative Emission (EVAP) System Leak Detected Fuel Fill Cap Loose/Off	EVAP
P0461	Fuel Gauge Sending Unit Range/Performance Problem	Comprehensive
P0462	Fuel Gauge Sending Unit Circuit Low Voltage	Comprehensive
P0463	Fuel Gauge Sending Unit Circuit High Voltage	Comprehensive
P0496	Evaporative Emission (EVAP) System High Purge Flow	EVAP
P0497	Evaporative Emission (EVAP) System Low Purge Flow	EVAP
P0498	Evaporative Emission (EVAP) Canister Vent Shut Valve Control Circuit Low Voltage	Comprehensive
P0499	Evaporative Emission (EVAP) Canister Vent Shut Valve Control Circuit High Voltage	Comprehensive
P050A	Cold Start Idle Air Control System Performance Problem	Comprehensive
P050B	Cold Start Ignition Timing Control System Performance Problem	Comprehensive
P0500	Vehicle Speed Sensor (VSS) Circuit Malfunction	Comprehensive
P0501	Vehicle Speed Sensor (VSS) Range/Performance Problem	Comprehensive
P0502	Problem in CVT Speed Sensor Circuit	Comprehensive
P0505	Idle Control System Malfunction	Comprehensive
P0506	Idle Control System RPM Lower Than Expected	Comprehensive
P0507	Idle Control System RPM Higher Than Expected	Comprehensive
P0511	Idle Air Control (IAC) Valve Circuit Malfunction	Comprehensive
P0521	EOP Sensor Range/Performance Problem	Comprehensive
P0522	EOP Sensor Circuit Low Voltage	Comprehensive
P0523	EOP Sensor Circuit High Voltage	Comprehensive
P0532	A/C Pressure Sensor Circuit Low Voltage	Comprehensive
P0533	A/C Pressure Sensor Circuit High Voltage	Comprehensive
P0557	Brake Booster Pressure Sensor Circuit Low Voltage	Comprehensive
P0558	Brake Booster Pressure Sensor Circuit High Voltage	Comprehensive
P0560	ECM Back-up Circuit Low Voltage	Comprehensive
P0562	Charging System Low Voltage	Comprehensive

DTC	Detection Item	Associated Monitor
P0563	Engine Control Module (ECM)/Powertrain Control Module (PCM) Power Source Circuit Unexpected Voltage	Comprehensive
P060A	PCM (A/T system) Internal Control Module Malfunction	Comprehensive
P0600	Multiplex Control System Troubleshooting	Comprehensive
P0602	ECM Programming Error	Comprehensive
P0603	ECM/PCM Internal Control Module Keep Alive Memory (KAM) Error	Comprehensive
P0606	ECM/PCM Processor Malfunction	Comprehensive
P0615	Starter Cut Relay STRLD Circuit Malfunction	Comprehensive
P062F	PCM Internal Control Module Keep Alive Memory (KAM) Error	Comprehensive
P0627	FPC System Malfunction	Comprehensive
P0630	VIN Not Programmed or Mismatch	Comprehensive
P0641	Sensor Reference Voltage A Malfunction	Comprehensive
P0651	Sensor Reference Voltage B Malfunction	Comprehensive
P0661	Intake Manifold Runner Control (IMRC) Valve Position Sensor Circuit Low Voltage	Comprehensive
P0662	Intake Manifold Runner Control (IMRC) Valve Position Sensor Circuit High Voltage	Comprehensive
P0685	ECM/PCM Power Relay Control Circuit Malfunction	Comprehensive
P0700	Automatic Transmission Control System	Comprehensive
P0705	Short in Transmission Range Switch Circuit (Multiple Shift-position Input)	Comprehensive
P0706	Open in Transmission Range Switch Circuit	Comprehensive
P0710 P0711	Problem in ATF Temperature Sensor Circuit	Comprehensive
P0712	Short in ATF Temperature Sensor Circuit	Comprehensive
P0713	Open in ATF Temperature Sensor Circuit	Comprehensive
P0714	ATF Temperature Sensor Intermittent Failure	Comprehensive
P0715 P0716	Problem in Mainshaft Speed Sensor Circuit	Comprehensive
P0717	Problem in Mainshaft Speed Sensor Circuit (No Signal Input)	Comprehensive
P0718	Mainshaft Speed Sensor Intermittent Failure	Comprehensive
P0720	Countershaft Speed Sensor Circuit Malfunction	Comprehensive
P0721	Problem in Countershaft Speed Sensor Circuit	Comprehensive
P0722	Problem in Countershaft Speed Sensor Circuit (No Signal Input)	Comprehensive
P0723	Countershaft Speed Sensor Intermittent Failure	Comprehensive
P0725	Engine Speed Input Circuit Malfunction	Comprehensive
P0730	Problem in Shift Control System	Comprehensive
P0731	Problem in 1st Clutch and 1st Clutch Hydraulic Circuit	Comprehensive
P0732	Problem in 2nd Clutch and 2nd Clutch Hydraulic Circuit	Comprehensive
P0733	Problem in 3rd Clutch and 3rd Clutch Hydraulic Circuit	Comprehensive
P0734	Problem in 4th Clutch and 4th Clutch Hydraulic Clutch	Comprehensive
P0735	Problem in 5th Clutch and 5th Clutch Hydraulic Circuit	Comprehensive
P0740	Problem in Lock-up Control System	Comprehensive
P0741	Torque Converter Clutch Hydraulic Clutch Stuck OFF	Comprehensive
P0743	Problem in Torque Converter Clutch Solenoid Valve Circuit	Comprehensive
P0745	Problem in Hydraulic Control System of A/T Clutch Pressure Control Solenoid Valve A Circuit	Comprehensive
P0746	A/T Clutch Pressure Control Solenoid Valve A Stuck OFF	Comprehensive
P0747	A/T Clutch Pressure Control Solenoid Valve A Stuck ON	Comprehensive
P0748	Problem in A/T Clutch Pressure Control Solenoid Valve A Circuit	Comprehensive

DTC	Detection Item	Associated Monitor
P0750	Problem in Hydraulic Control System of Shift Solenoid Valve A Circuit	Comprehensive
P0751	Shift Solenoid Valve A Stuck OFF	Comprehensive
P0752	Shift Solenoid Valve A Stuck ON	Comprehensive
P0753	Problem in Shift Solenoid Valve A Circuit	Comprehensive
P0756	Shift Solenoid Valve B Stuck OFF	Comprehensive
P0757	Shift Solenoid Valve B Stuck ON	Comprehensive
P0758	Problem in Shift Solenoid Valve B Circuit	Comprehensive
P0761	Shift Solenoid Valve C Stuck OFF	Comprehensive
P0762	Shift Solenoid Valve C Stuck ON	Comprehensive
P0763	Problem in Shift Solenoid Valve C Circuit	Comprehensive
P0766	Shift Solenoid Valve D Stuck OFF	Comprehensive
P0767	Shift Solenoid Valve D Stuck ON	Comprehensive
P0771	Shift Solenoid Valve E Stuck OFF	Comprehensive
P0773	Problem in Shift Solenoid Valve E Circuit	Comprehensive
P0775	Problem in the Hydraulic Control System of A/T Clutch Pressure Control Solenoid Valve B Circuit	Comprehensive
P0776	A/T Clutch Pressure Control Solenoid Valve B Stuck OFF	Comprehensive
P0777	A/T Clutch Pressure Control Solenoid Valve B Stuck ON	Comprehensive
P0778	Problem in A/T Clutch Pressure Control Solenoid Valve B Circuit	Comprehensive
P0780	Problem in Shift Control System	Comprehensive
P0795	Problem in Hydraulic Control System of A/T Clutch Pressure Control Solenoid Valve C Circuit	Comprehensive
P0796	A/T Clutch Pressure Control Solenoid Valve C Stuck OFF	Comprehensive
P0797	A/T Clutch Pressure Control Solenoid Valve C Stuck ON	Comprehensive
P0798	Problem in A/T Clutch Pressure Control Solenoid Valve C Circuit	Comprehensive
P0812	Open in Transmission Range Switch ATP RVS Switch Circuit	Comprehensive
P0842	Short in 2nd Clutch Transmission Fluid Pressure Switch Clutch, or 2nd Clutch Transmission Fluid Pressure Switch (Clutch) Stuck ON	Comprehensive
P0843	Open in 2nd Clutch Transmission Fluid Pressure Switch Circuit, or 2nd Clutch Transmission Fluid Pressure Switch Stuck OFF	Comprehensive
P0845	Problem in 3rd Clutch Pressure Switch Circuit	Comprehensive
P0847	Short in 3rd Clutch Transmission Fluid Pressure Switch Circuit, or 3rd Clutch Transmission Fluid Pressure Switch Stuck ON	Comprehensive
P0848	Open in 3rd Clutch Transmission Fluid Pressure Switch Circuit, or 3rd Clutch Transmission Fluid Pressure Switch Stuck OFF	Comprehensive
P0872	Short in 4th Clutch Transmission Fluid Pressure Switch Circuit, or 4th Clutch Transmission Fluid Pressure Switch Stuck ON	Comprehensive
P0873	Open in 4th Clutch Transmission Fluid Pressure Switch Circuit, or 4th Clutch Transmission Fluid Pressure Switch Stuck OFF	Comprehensive
P0962	Problem in A/T Clutch Pressure Control Solenoid Valve A Circuit	Comprehensive
P0963	Problem in A/T Clutch Pressure Control Solenoid Valve A	Comprehensive
P0966	Problem in A/T Clutch Pressure Control Solenoid Valve B Circuit	Comprehensive
P0967	Problem in A/T Clutch Pressure Control Solenoid Valve B	Comprehensive
P0970	Problem in A/T Clutch Pressure Control Solenoid Valve C Circuit	Comprehensive
P0971	Problem in A/T Clutch Pressure Control Solenoid Valve C	Comprehensive
P0973	Short in Shift Solenoid Valve A Circuit	Comprehensive
P0974	Open in Shift Solenoid Valve A Circuit	Comprehensive
P0976	Short in Shift Solenoid Valve B Circuit	Comprehensive
P0977	Open in Shift Solenoid Valve B Circuit	Comprehensive

DTC	Detection Item	Associated Monitor
P0979	Short in Shift Solenoid Valve C Circuit	Comprehensive
P0980	Open in Shift Solenoid Valve C Circuit	Comprehensive
P0982	Short in Shift Solenoid Valve D Circuit	Comprehensive
P0983	Open in Shift Solenoid Valve D Circuit	Comprehensive
P0985	Short in Shift Solenoid Valve E Circuit	Comprehensive
P0986	Open in Shift Solenoid Valve E Circuit	Comprehensive
P1009	VTC Advance Malfunction	VTC (VVC)
P1020	Valve Pause System Stuck Off	Comprehensive
P1021	Valve Pause System Stuck On	Comprehensive
P1024	Valve Pause System (VPS) Sticking On	Comprehensive
P1025	Valve Pause System Sticking Off	Comprehensive
P1026	Valve Pause System Sticking On	Comprehensive
P1077	Intake Manifold Runner Control (IMRC) System Malfunction (Low rpm)	Comprehensive
P1078	Intake Manifold Runner Control (IMRC) System Malfunction (High rpm)	Comprehensive
P1106	Barometric Pressure (BARO) Sensor Circuit Range/Performance Problem	Comprehensive
P1107	Barometric Pressure (BARO) Sensor Circuit Low Voltage	Comprehensive
P1108	Barometric Pressure (BARO) Sensor Circuit High Voltage	Comprehensive
P1109	BARO Sensor Circuit Out of Range High	Comprehensive
P1116	ECT Sensor 1 Circuit Range/Performance Problem	Comprehensive
P1121	Throttle Position (TP) Sensor Lower Than Expected	Comprehensive
P1122	Throttle Position (TP) Sensor Higher Than Expected	Comprehensive
P1128	Manifold Absolute Pressure (MAP) Sensor Circuit Lower Than Expected	Comprehensive
P1129	Manifold Absolute Pressure (MAP) Sensor Circuit Higher Than Expected	Comprehensive
P1130	Demand for Changing Both Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) and Third Heated Oxygen Sensor (Third HO2S) (Sensor 3)	Comprehensive (HO2S)
P1149	Air/Fuel Ratio (A/F) Sensor (Sensor 1) Range/Performance Problem	A/F sensor
P1157	Air/Fuel Ratio (A/F) Sensor (Sensor 1) Range/Performance Problem	Comprehensive
P1158	Air/Fuel Ratio (A/F) Sensor (Sensor 1) AFS- Terminal Low Voltage	Comprehensive
P1159	Air/Fuel Ratio (A/F) Sensor (Sensor 1) AFS+ Terminal Low Voltage	Comprehensive
P1162	Air/Fuel Ratio (A/F) Sensor (Sensor 1) Slow Response	A/F sensor
P1163	Air/Fuel Ratio (A/F) Sensor (Sensor 1) Slow Response	A/F sensor
P1164	Air/Fuel Ratio (AF) Sensor (Sensor 1) Circuit Range/Performance	A/F sensor
P1165	Air/Fuel Ratio (A/F) Sensor (Sensor 1) Range/Performance Problem	A/F sensor
P1166	Heated Oxygen Sensor 1 (Primary HO2S) Heater Circuit Malfunction	Comprehensive (HO2S)
P1167	Heated Oxygen Sensor 1 (Primary LAF HO2S) Heater System Malfunction	A/F sensor heater
P1168	Air/Fuel Ratio (A/F) Sensor (Sensor 1) LABEL Low Voltage	Comprehensive
P1169	Air/Fuel Ratio (A/F) Sensor (Sensor 1) LABEL High Voltage	Comprehensive
P1172	A/F Sensor (Sensor 1) Circuit Out of Range High	A/F sensor
P1174	Front A/F Sensor (Bank 2, Sensor 1) Circuit Out of Range High	A/F sensor
P1182	Fuel Temperature Sensor Circuit Low Voltage	Comprehensive
P1183	Fuel Temperature Sensor Circuit High Voltage	Comprehensive
P1187	FTT Sensor Circuit Low Voltage	Comprehensive
P1188	FTT Sensor Circuit High Voltage	A/F sensor
P1192	FTP Sensor Circuit Low Voltage	Comprehensive
P1193	FTP Sensor Circuit High Voltage	Comprehensive

DTC	Detection Item	Associated Monitor
P1253 P1259	VTEC System Malfunction	Comprehensive
P128A	Valve Pause System (VPS) Stuck OFF	Comprehensive
P128B	Valve Pause System (VPS) Malfunction	Comprehensive
P1286	Rocker Arm Oil Pressure Sensor Stuck Low	Misfire
P1287	Rocker Arm Oil Pressure Switch Circuit High Voltage	Comprehensive
P1288	Rocker Arm Oil Pressure Switch Circuit Low Voltage	Comprehensive
P1289	Rocker Arm Oil Pressure Sensor Stuck High	Comprehensive
P1297	Electric Load Detector (ELD) Circuit Low Voltage	Comprehensive
P1298	Electric Load Detector (ELD) Circuit High Voltage	Comprehensive
P1300	Random Misfire	Misfire
P1324	Knock Sensor Power Source Circuit Low Voltage	Comprehensive
P1336	Engine Speed (RPM) Fluctuation Sensor Intermittent Interruption	Comprehensive
P1337	Engine Speed (RPM) Fluctuation Sensor No Signal	Comprehensive
P1355	Front Ignition Coil Power Circuit Malfunction	Comprehensive
P1359	Crankshaft Position (CKP)/Top Dead Center (TDC) Sensor Circuit Malfunction	Comprehensive
P1361	Camshaft Position (CMP) Sensor A (Top Dead Center (TDC) Sensor) Intermittent Interruption	Comprehensive
P1362	Camshaft Position (CMP) Sensor A (Top Dead Center (TDC) Sensor) No Signal	Comprehensive
P1366	Camshaft Position (CMP) Sensor B (Top Dead Center (TDC) Sensor) Intermittent Interruption	Comprehensive
P1367	Camshaft Position (CMP) Sensor B (Top Dead Center (TDC) Sensor) No Signal	Comprehensive
P1381	Cylinder Position (CYP) Sensor Intermittent Interruption	Comprehensive
P1382	Cylinder Position (CYP) Sensor No Signal	Comprehensive
P1410	Air Pump Malfunction	Comprehensive (Air system)
P1415	Air Pump Electric Current Sensor Circuit Low Voltage	Comprehensive (Air system)
P1416	Air Pump Electric Current Sensor Circuit High Voltage	Comprehensive (Air system)
P1420	Nox Adsorptive Catalyst System Efficiency Below Threshold	Catalytic converter
P1432	Battery Cell Overheating	Catalytic converter
P1434	Voltage Converter Module High Voltage	Comprehensive
P1435	Charge/Discharge Balance Malfunction	Comprehensive
P1437	Motor Power Inverter (MPI) Module Short Circuit	Comprehensive
P1438	Motor Drive Module (MDM) Overheating Signal Circuit	Comprehensive
P1439	Motor Drive Module (MDM) Short Circuit Sensor Problem	Comprehensive
P1440	IMA System Problem	Comprehensive
P1445	Bypass Control Problem	Comprehensive
P1446	Battery Module Individual Voltage Input Deviation	Comprehensive
P1448 P1449	Battery Module Overheating	Comprehensive
P145C	EVAP System Purge Flow Malfunction	EVAP
P1454	Fuel Tank Pressure (FTP) Sensor Range/Performance Problem	Comprehensive
P1456	Evaporative Emissions (EVAP) Control System Leakage (Fuel Tank System)	EVAP
P1457	Evaporative Emissions (EVAP) Control System Leakage (EVAP Canister System)	EVAP
P1459	Evaporative Emission (EVAP) Purge Flow Switch Malfunction	Comprehensive

DTC	Detection Item	Associated Monitor
P1486	Cooling System Malfunction	Comprehensive (Thermostat)
P1491	Exhaust Gas Recirculation (EGR) Valve Insufficient Lift	EGR
P1498	Exhaust Gas Recirculation (EGR) Valve Position Sensor Circuit High Voltage	Comprehensive
P15A4	A/C Compressor Driver Relay Stays Activated	Comprehensive
P15A5	Motor Current Sensor Circuit Malfunction	Comprehensive
P15A6	U Phase Motor Current Sensor Circuit Malfunction	Comprehensive
P15A7	V Phase Motor Current Sensor Circuit Malfunction	Comprehensive
P15A8	W Phase Motor Current Sensor Circuit Malfunction	Comprehensive
P15AA	Motor Rotor Position Not Learned	Comprehensive
P15AB	Engine Mount Control Unit Power Source Circuit Low Voltage	Comprehensive
P15AC	Engine Mount Control Unit Internal Circuit Malfunction	Comprehensive
P15AD	Engine Mount Control Unit Internal Circuit Malfunction	Comprehensive
P15AE	Cylinder Pause Signal 1 Malfunction	Comprehensive
P15BD	Cylinder Pause Signal 2 Malfunction	Comprehensive
P15BE	CMP Sensor Signal Malfunction	Comprehensive
P15BF	CMP Sensor Signal Intermittent Interruption	Comprehensive
P15B0	CKP Sensor Signal Malfunction	Comprehensive
P15B1	CMP/CKP Signal Incorrect Correlation	Comprehensive
P15C0	CKP Sensor Signal Intermittent Interruption	Comprehensive
P1505	Positive Crankcase Ventilation (PCV) Air Leakage	Comprehensive
P1508	Idle Air Control Valve (IACV) Circuit Malfunction	Comprehensive
P1509	Idle Air Control Valve (IACV) Circuit Failure	Comprehensive
P1519	Idle Air Control Valve (IACV) Circuit Malfunction	Comprehensive
P1522	Brake Booster Pressure Sensor Circuit Low Voltage	Comprehensive
P1523	Brake Booster Pressure Sensor Circuit High Voltage	Comprehensive
P1524	Brake Booster Pressure Sensor Range/Performance Problem	Comprehensive
P1541	Climate Control Unit Signal Circuit Low Voltage	Comprehensive
P1542	Climate Control Unit Signal Circuit High Voltage	Comprehensive
P1549	Charging System High Voltage	Comprehensive
P1565	Motor Commutation Signal Problem	Comprehensive
P1568	Battery Cell Temperature Signal Circuit Problem	Comprehensive
P1569	Battery Cell Temperature Signal Circuit Malfunction	Comprehensive
P1570	Battery Module Individual Voltage Problem	Comprehensive
P1572	Motor Drive Module (MDM) Temperature Signal Circuit Low/High Input	Comprehensive
P1574	Battery Module Temperature Signal Circuit Malfunction	Comprehensive
P1575	Motor Power Inverter (MPI) Module Voltage Malfunction	Comprehensive
P1576	Motor Drive Module (MDM) Volute Signal Circuit Low Input	Comprehensive
P1577	High Voltage Detection Signal Circuit Problem	Comprehensive
P1580	Battery Current Circuit Problem	Comprehensive
P1581	Motor Power Inverter (MPI) Module Current Signal Circuit Low/High Input	Comprehensive
P1582	Motor Current U Phase Signal Circuit Low/High Input	Comprehensive
P1583	Motor Current V Phase Signal Circuit Low/High Input	Comprehensive
P1584	Motor Current W Phase Signal Circuit Low/High Input	Comprehensive
P1585	Motor Current Signal Circuit Problem	Comprehensive

DTC	Detection Item	Associated Monitor
P1586	Motor Power Inverter (MPI) Module Current Signal/Battery Current Signal Circuit Problem	Comprehensive
P16BB	Alternator B Terminal Circuit Low Voltage	Comprehensive
P16BC	Alternator FR Terminal Circuit/IGP Circuit Low Voltage	Comprehensive
P16BD	Starter Cut Relay 2 Malfunction	Comprehensive
P16BE	Starter Cut Relay 1 Malfunction	Comprehensive
P16BF	Starter Cut Relay STRLY Circuit Malfunction	Comprehensive
P16C0	PCM A/T Control System Incomplete Update	Comprehensive
P16C1	Motor Control Module (MCM) Program Not Installed (Motor Control Program)	Comprehensive
P16C2	Motor Control Module (MCM) Program Not Installed (Battery Condition Monitor Program)	Comprehensive
P16C3	DC-DC Converter Temperature Sensor Circuit Malfunction	Comprehensive
P16C4	Engine Mount Actuator Control Power Circuit Stuck OFF	Comprehensive
P16C5	Engine Mount Actuator Control Power Circuit Stuck ON	Comprehensive
P16C6	Engine Mount Actuator High Voltage During Function Test	Comprehensive
P16C7	Rear Engine Mount Actuator Control Circuit High Current	Comprehensive
P16C8	Front Engine Mount Actuator Control Circuit High Current	Comprehensive
P16C9	Engine Mount Control Unit Internal Circuit Malfunction	Comprehensive
P16D5	F-CAN Malfunction (Internal Malfunction)	Comprehensive
P16D6	IMA-CAN Malfunction (Internal Malfunction)	Comprehensive
P16D7	PCM Internal F-CAN Communication Circuit Malfunction	Comprehensive
P16D8	PCM Internal IMA CAN Communication Circuit Malfunction	Comprehensive
P1601	IMA System Malfunction	Comprehensive
P1607	Engine Control Module (ECM)/Powertrain Control Module (PCM) Internal Circuit Malfunction	Comprehensive
P1629	Battery Current Sensor Circuit Malfunction	Comprehensive
P1630	Transmission Control Module	Comprehensive
P1634	Motor Power Inverter (MPI) Module Signal Circuit Malfunction	Comprehensive
P1635	Battery Condition Monitor (BCM) Module Problem	Comprehensive
P1636	Motor Power Inverter (MPI) Module Internal Circuit Malfunction	Comprehensive
P1639	MOTB Signal Circuit Malfunction	Comprehensive
P1640	ACTTRQ Motor Torque Signal Circuit Low Input	Comprehensive
P1641	ACTTRQ Motor Torque Signal Circuit High Input	Comprehensive
P1642	QBATT Battery Signal Circuit Low Input	Comprehensive
P1643	QBATT Battery Signal Circuit High Input	Comprehensive
P1644	MOTFSA Signal Malfunction	Comprehensive
P1645	MOTFSB Signal Malfunction	Comprehensive
P1646	MOTSTB Signal Malfunction	Comprehensive
P1647	Mode Signal Circuit 1 High Input/Mode Signal Circuit 2 Problem	Comprehensive
P1648	Battery Condition Monitor (BCM) Module/Motor Control Module (MCM) Communication Signal Circuit Problem	Comprehensive
P1655	CVT-FI TMA/TMB Signal Line Failure	Comprehensive
P1656	Problem in PCM-to VTM-4 Control Unit Communications Circuit	Comprehensive
P1658	ETCS Control Relay ON Malfunction	Comprehensive
P1659	ETCS Control Relay OFF Malfunction	Comprehensive
P1660	A/T-FI Data Line Failure/TCM - ECM Halt	Comprehensive
P1673	Motor Control Module (MCM) Relay Stays Activated	Comprehensive
P1676 P1678	FPTDR Signal Line Failure	Comprehensive

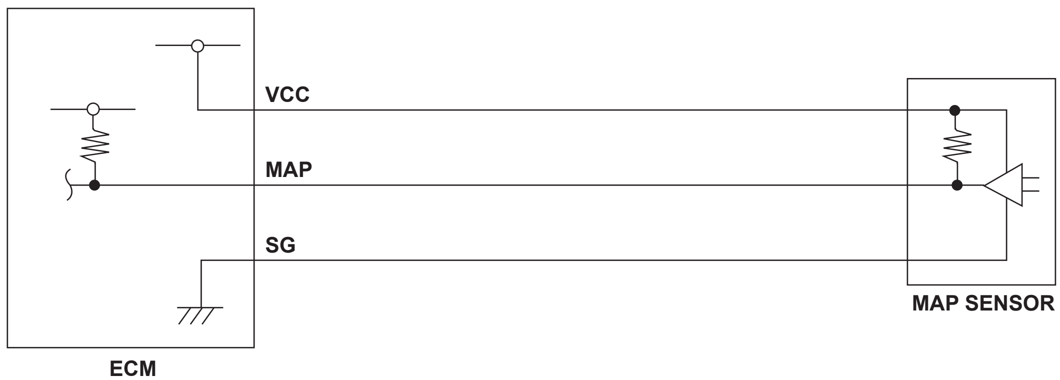
DTC	Detection Item	Associated Monitor
P1679	RSCD Signal Circuit Malfunction	Comprehensive
P1681	A/T FI Signal A Circuit Low Voltage	Comprehensive
P1682	A/T FI Signal A Circuit High Voltage	Comprehensive
P1683	Throttle Valve Default Position Spring Performance Problem	Comprehensive
P1684	Throttle Valve Return Spring Performance Problem	Comprehensive
P1686	A/T FI Signal B Circuit Low Voltage	Comprehensive
P1687	A/T FI Signal B Circuit High Voltage	Comprehensive
P1705	Short in Transmission Range Switch Circuit (More than one range position is on at the same time)	Comprehensive
P1706	Open in Transmission Range Switch Circuit	Comprehensive
P1709	Problem Transmission Gear Selection Switch Circuit	Comprehensive
P1717	Open in Transmission Range Switch ATPRVS Switch Circuit	Comprehensive
P1730	Problem in Shift Control System: Shift Solenoid Valve A and D Stuck OFF Shift Solenoid Valve B Stuck ON Shift Valves A, B, and D Stuck	Comprehensive
P1731	Problem in Shift Control System: Shift Solenoid Valve E Stuck ON Shift Valve E Stuck A/T Clutch Pressure Control Solenoid Valve A Stuck OFF	Comprehensive
P1732	Problem in Shift Control System: Shift Solenoid Valve B and C Stuck ON Shift Valves B and C Stuck	Comprehensive
P1733	Problem in Shift Control System: Shift Solenoid Valve D Stuck ON Shift Valve D Stuck A/T Clutch Pressure Control Solenoid Valve C Stuck OFF	Comprehensive
P1734	Problem in Shift Control System: Shift Solenoid Valves B and C Stuck ON Shift Valves B and C Stuck	Comprehensive
P1738	Problem in 2nd Clutch Pressure Switch Circuit	Comprehensive
P1739	Problem in 3rd Clutch Pressure Switch Circuit	Comprehensive
P1740	Problem in 4th Clutch Pressure Switch Circuit	Comprehensive
P1743	Problem in Shift Control System; Shift Valve E Stuck OFF	Comprehensive
P1744	Problem in Shift Control System; Shift Valve E Stuck ON	Comprehensive
P1745	Problem in Shift Control System; Servo Control Valve Stuck OFF or Servo Valve Stuck OFF	Comprehensive
P1746	Problem in Shift Control System; Cut Valve A Stuck OFF, or Cut Valve B Stuck ON	Comprehensive
P1747	Problem in Shift Control System; Cut Valve A Stuck ON, or Cut Valve B Stuck OFF	Comprehensive
P1750	Mechanical Problem in Hydraulic Control System of A/T Clutch Pressure Control Solenoid Valve Assemblies A and B, or Problem in the Hydraulic Control System	Comprehensive
P1751	Mechanical Problem in Hydraulic Control System of Shift Solenoid Valve B and A/T Clutch Pressure Control Solenoid Valves A and B, or Problem in the Hydraulic Control System	Comprehensive
P1753	Problem in Torque Converter Clutch Solenoid Valve Circuit	Comprehensive
P1768	Problem in Torque Converter Clutch Solenoid Valve B Circuit	Comprehensive
P1773	Problem in A/T Clutch Pressure Control Solenoid Valve B Circuit	Comprehensive
P1780	Problem in Shift Control System	Comprehensive
P1790	Throttle Position (TP) Sensor Circuit Malfunction	Comprehensive
P1791	Vehicle Speed Sensor (VSS) Range/Performance Problem	Comprehensive
P1792	Problem in Engine Coolant Temperature (ECT) Sensor Circuit	Comprehensive
P1793	Manifold Absolute Pressure Sensor Circuit	Comprehensive
P1860	Inhibitor Solenoid Circuit Low Voltage	Comprehensive

DTC	Detection Item	Associated Monitor
P1861	Inhibitor Solenoid Circuit High Voltage	Comprehensive
P1870	Problem in CVT Speed Change Control Valve Assembly Circuit	Comprehensive
P1873	Problem in CVT Pulley Pressure Control Valve Assembly Circuit	Comprehensive
P1879	Problem in CVT Start Clutch Pressure Control Valve Assembly Circuit	Comprehensive
P1882	Problem in Inhibitor Solenoid Circuit	Comprehensive
P1884	Secondary Gear Speed Sensor 2 Circuit Malfunction	Comprehensive
P1885	CVT Drive Pulley Speed Sensor Circuit	Comprehensive
P1886	CVT Driven Pulley Speed Sensor Circuit	Comprehensive
P1888	CVT Speed Sensor	Comprehensive
P1889	Problem in CVT Speed Sensor 2 Circuit	Comprehensive
P1890	Shift Control System	Comprehensive
P1891	Problem in Start Clutch System	Comprehensive
P1894	CVT Speed Change Control Valve Circuit	Comprehensive
P1895	CVT Pulley Pressure Control Valve Circuit	Comprehensive
P1898	CVT Drive Pulley Pressure Control Valve Stuck ON or CVT Driven Pulley Pressure Control Valve Stuck OFF	Comprehensive
P1899	CVT Drive Pulley Pressure Control Valve Stuck OFF or CVT Driven Pulley Pressure Control Valve Stuck ON	Comprehensive
P1900	Short in Auxiliary Transmission Fluid Pump (ATFP) Relay Circuit or ATFP Relay Stuck ON	Comprehensive
P1901	Open in Auxiliary Transmission Fluid Pump (ATFP) Relay Circuit or ATFP Relay Stuck OFF	Comprehensive
P1902	Open in Auxiliary Transmission Fluid Pump (ATFP) Motor U-phase Circuit	Comprehensive
P1903	Open in Auxiliary Transmission Fluid Pump (ATFP) Motor V-phase Circuit	Comprehensive
P1904	Open in Auxiliary Transmission Fluid Pump (ATFP) Motor W-phase Circuit	Comprehensive
P2A00	A/F Sensor (Sensor 1) Circuit Range/Performance Problem	A/F Sensor
P2A03	Front A/F Sensor (Bank 2, Sensor 1) Circuit Range/Performance Problem	A/F Sensor
P2101	Throttle Actuator System Malfunction	Comprehensive
P2108	Throttle Actuator Control Module Problem	Comprehensive
P2118	Throttle Actuator Current Range/Performance Problem	Comprehensive
P2122	Accelerator Pedal Position (APP) Sensor 1 (Throttle Position Sensor D) Circuit Low Voltage	Comprehensive
P2123	Accelerator Pedal Position (APP) Sensor 1 (Throttle Position Sensor D) Circuit High Voltage	Comprehensive
P2127	Accelerator Pedal Position (APP) Sensor 2 (Throttle Position Sensor E) Circuit Low Voltage	Comprehensive
P2128	Accelerator Pedal Position (APP) Sensor 2 (Throttle Position Sensor E) Circuit High Voltage	Comprehensive
P2135	Throttle Position (TP) Sensor 1/2 Incorrect Voltage Correlation	Comprehensive
P2138	Accelerator Pedal Position (APP) Sensor 1/2 (Throttle Position Sensor D/E) Incorrect Voltage Correlation	Comprehensive
P2176	Throttle Actuator Control System Idle Position Not Learned	Comprehensive
P2183	ECT Sensor 2 Circuit Range/Performance Problem	Comprehensive
P2184	ECT Sensor 2 Circuit Low Voltage	Comprehensive
P2185	ECT Sensor 2 Circuit High Voltage	Comprehensive
P2195	Air/Fuel Ratio (A/F) Sensor (Sensor 1) Signal Stuck Lean	A/F sensor
P2197	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) Signal Stuck Lean	A/F sensor
P2227	Barometric Pressure (BARO) Sensor Circuit Range/Performance Problem	Comprehensive
P2228	Barometric Pressure (BARO) Sensor Circuit Low Voltage	Comprehensive
P2229	Barometric Pressure (BARO) Sensor Circuit High Voltage	Comprehensive
P2237	Rear Air/Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) IP Line High Voltage	Comprehensive
P2238	Air/Fuel Ratio (A/F) Sensor (Sensor 1) AFS+ Line Low Voltage	Comprehensive

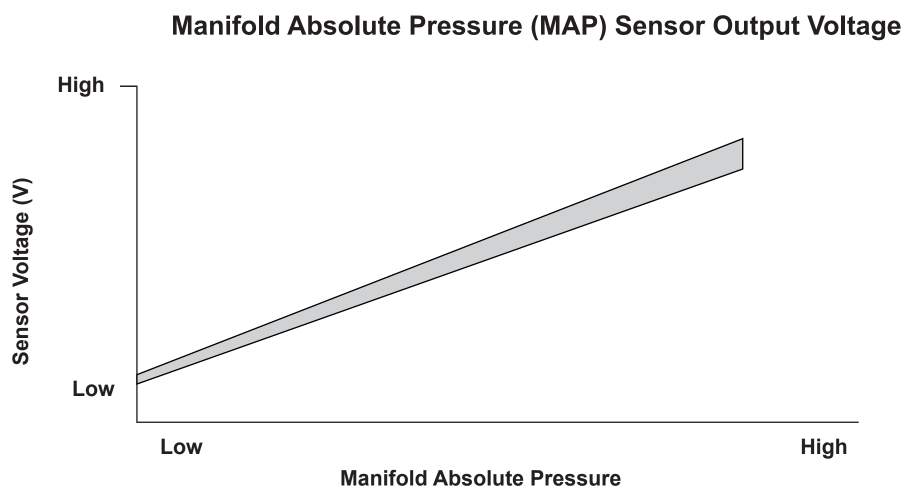
DTC	Detection Item	Associated Monitor
P2240	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) IP Line High Voltage	Comprehensive
P2241	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) IP Line Low Voltage	Comprehensive
P2243	Rear Air/Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) VCENT Line High Voltage	Comprehensive
P2245	Rear Air/Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) VCENT Line Low Voltage	Comprehensive
P2247	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) VCENT Line High Voltage	Comprehensive
P2249	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) VCENT Line Low Voltage	Comprehensive
P2251	Rear Air/Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) VS Line High Voltage	Comprehensive
P2252	Air/Fuel Ratio (A/F) Sensor (Sensor 1) AFS- Line Low Voltage	Comprehensive
P2254	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) VS Line High Voltage	Comprehensive
P2255	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) VS Line Low Voltage	Comprehensive
P2270	Secondary HO2S (Sensor 2) Circuit Signal Stuck Lean	Secondary HO2S
P2271	Secondary HO2S (Sensor 2) Circuit Signal Stuck Rich	Secondary HO2S
P2272	Front Secondary HO2S (Bank 2, Sensor 2) Circuit Signal Stuck Lean	Secondary HO2S
P2273	Front Secondary HO2S (Bank 2, Sensor 2) Circuit Signal Stuck Rich	Secondary HO2S
P2279	Intake Air System Leak	Comprehensive
P2413	Exhaust Gas Recirculation (EGR) System Range/Performance Problem	EGR
P2422	Evaporative Emission (EVAP) System Vent Shut Valve Close Malfunction	Comprehensive
P2552	Throttle Actuator Control Module Relay Malfunction	Comprehensive
P2610	ECM/PCM Ignition Off Internal Timer Malfunction	Comprehensive
P2627	Rear Air/Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) LABEL Circuit Low Voltage	Comprehensive
P2628	Rear Air/Fuel Ratio (A/F) Sensor (Bank 1, Sensor 1) LABEL Circuit High Voltage	Comprehensive
P2630	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) LABEL Circuit Low Voltage	Comprehensive
P2631	Front Air/Fuel Ratio (A/F) Sensor (Bank 2, Sensor 1) LABEL Circuit High Voltage	Comprehensive
P2646	VTEC Oil Pressure Switch Circuit Low Voltage	Comprehensive
P2647	VTEC Oil Pressure Switch Circuit High Voltage	Comprehensive
P2648	VTEC Solenoid Valve Circuit Low Voltage	Comprehensive
P2649	VTEC Solenoid Valve Circuit High Voltage	Comprehensive
P2651	Valve Pause System (VPS) Stuck OFF	Comprehensive
P2652	Valve Pause System (VPS) Stuck ON	Comprehensive
P2653	Rocker Arm Oil Control Solenoid B (Bank 1) Circuit Low Voltage	Comprehensive
P2654	Rocker Arm Oil Control Solenoid B (Bank 1) Circuit High Voltage	Comprehensive
P2658	Rocker Arm Oil Control Solenoid A (Bank 2) Circuit Low Voltage	Comprehensive
P2659	Rocker Arm Oil Control Solenoid A (Bank 2) Circuit High Voltage	Comprehensive
P2769	Short in Torque Converter Clutch Solenoid Valve Circuit	Comprehensive
P2770	Open in Torque Converter Clutch Solenoid Valve Circuit	Comprehensive
P2797	Auxiliary Transmission Fluid Pump (ATFP) Motor Rotor or Auxiliary Transmission Fluid Pump Stuck	Comprehensive
P2798	Short in Auxiliary Transmission Fluid Pump (ATFP) Motor U-phase Circuit, V-phase Circuit, or W-phase Circuit	Comprehensive
P3400	VPS Stuck Off Bank 1	Comprehensive
P3497	VPS Stuck Off Bank 2	Comprehensive
U0028	F-CAN Malfunction (BUS-OFF (ECM))	Comprehensive
U0029	F-CAN Malfunction (BUS-OFF (PCM))	Comprehensive
U0037	IMA-CAN Malfunction (BUS-OFF)	Comprehensive
U0038	IMA-CAN Malfunction (BUS-OFF)	Comprehensive
U0073	F-CAN Malfunction (BUS-OFF)	Comprehensive

DTC	Detection Item	Associated Monitor
U0100	F-CAN Malfunction (Powertrain Control Module (PCM)-Motor Control Module (MCM))	Comprehensive
U0107	Lost Communication With Throttle Actuator Control Module	Comprehensive
U0110	F-CAN Malfunction (Powertrain Control Module (PCM)-Motor Control Module (MCM))	Comprehensive
U0111	F-CAN Malfunction (BCM Module-MCM)	Comprehensive
U0114	F-CAN Malfunction (PCM-VTM-4 Control Unit)	Comprehensive
U0121	F-CAN Malfunction (TCS-PCM)	Comprehensive
U0122	F-CAN Malfunction (ECM-VSA Modulator-Control Unit)	Comprehensive
U0127	Gauge Control Module Lost Communication With TPMS Control Unit (TPMS message)	Comprehensive
U0129	F-CAN Malfunction (PCM-Servo Unit)	Comprehensive
U0131	F-CAN Malfunction (ECM-EPS Control Unit)	Comprehensive
U0151	Gauge Control Module Lost Communication With SRS Unit (SRS message)	Comprehensive
U0155	F-CAN Malfunction (Gauge Control Module-ECM/PCM)	Comprehensive
U0164	Door Multiplex Control Unit Lost Communication With Climate Control Unit	Comprehensive
U0180	Lost Communication With Auto Light Module (AUTOLT frame)	Comprehensive
U0199	Immobilizer-Keyless Control Unit Lost Communication With Door Multiplex Control Unit	Comprehensive
U0300	PGM-FI System and A/T System Program Version Mismatch	Comprehensive
U0301	Software Incompatibility with ECM/PCM	Comprehensive
U0302	Software Incompatibility with Transmission Control Module	Comprehensive
U0312	Software Incompatibility with Battery Energy Control Module A	Comprehensive
U1101	F-CAN Malfunction (PCM-ACM)	Comprehensive
U1201	IMA-CAN Malfunction (PCM-MCM-(Motor Control CPU))	Comprehensive
U1202	Motor Control Module (MCM) Internal Circuit Malfunction	Comprehensive
U1203	Motor Control Module (MCM) Internal Circuit Malfunction	Comprehensive
U1204	IMA-CAN Malfunction (Powertrain Control Module (PCM)- Motor Control Module (MCM))	Comprehensive
U1205	IMA-CAN Malfunction (Powertrain Control Module (PCM)-Motor Control Module (MCM))	Comprehensive
U1206	IMA-CAN Malfunction (BCM Module-MCM)	Comprehensive
U1207	IMA-CAN Malfunction (A/C Compressor Driver-BCM Module)	Comprehensive
U1220	DC-DC Converter Lost Communication with Motor Control Module (MCM)	Comprehensive
U1221	Motor Control Module (MCM) Lost Communication with DC-DC Converter	Comprehensive
U1260	Problem in PCM-to-ATFP Control Unit Communication Circuit	Comprehensive
U128D	Lost Communication With Gauge Control Module (VSP/NE Frame)	Comprehensive
U1280	Communication Bus Line Error (BUS-OFF)	Comprehensive
U1281	Lost Communication With MICU (MICU frame)	Comprehensive
U1282	Gauge Control Module Lost Communication With Driver's MICU	Comprehensive
U1283	Gauge Control Module Lost Communication With Passenger's MICU	Comprehensive
U1288	Lost Communication With PARKSR	Comprehensive

DTC P0106: Manifold Absolute Pressure (MAP) Sensor Vacuum Connection Problem



P0106-9602



P0107-9671

General Description

The manifold absolute pressure (MAP) sensor senses manifold absolute pressure (vacuum) and converts it into electrical signals. The MAP sensor outputs low signal voltage at high-vacuum (throttle valve closed) and high signal voltage at low-vacuum (throttle valve wide open).

The engine control module (ECM) compares a predetermined MAP value at a given throttle position and manifold absolute pressure with the output voltage value of the MAP sensor. If the difference between the value from the MAP sensor before start-up (right after turning the ignition switch ON) and the current value is still a set value or less while the engine is running, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine speed	400 rpm	—
Throttle position	—	9.8º
No active DTCs	MAP, BARO	

Malfunction Threshold

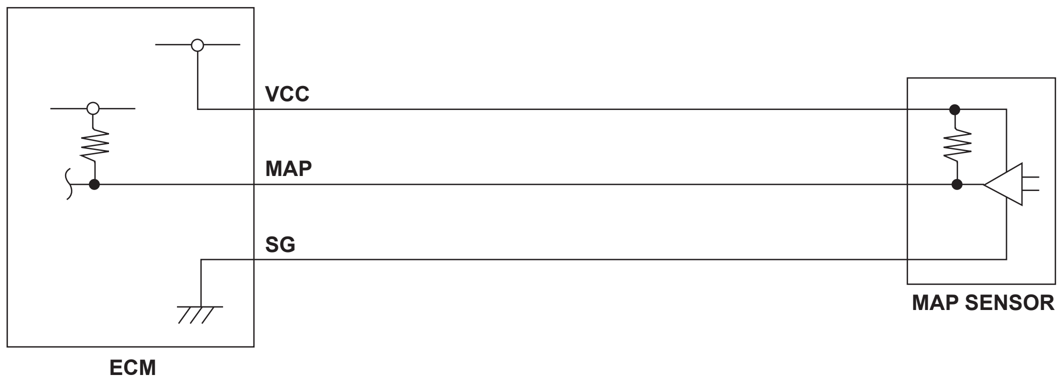
The difference between the MAP sensor value measured before start-up (immediately after the ignition is turned ON) and the voltage is 40 mV or less for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

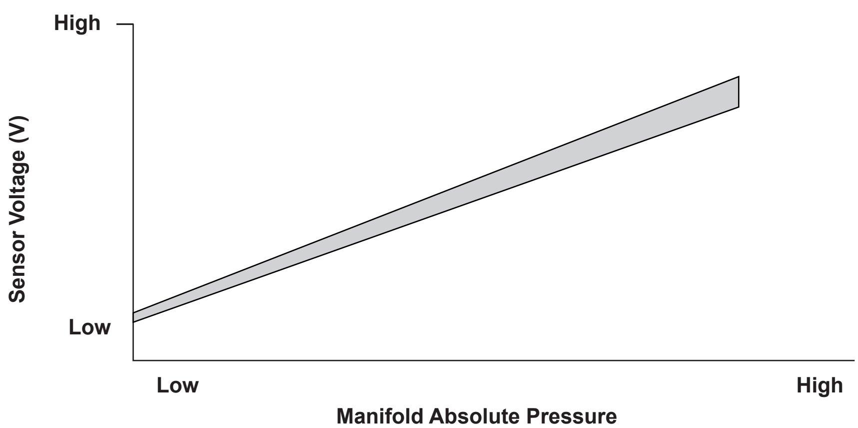
Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0107: Manifold Absolute Pressure (MAP) Sensor Circuit Low Voltage



P0106-9602

Manifold Absolute Pressure (MAP) Sensor Output Voltage



P0107-9671

General Description

The manifold absolute pressure (MAP) sensor senses manifold absolute pressure (vacuum) and converts it into electrical signals. The MAP sensor outputs low signal voltage at high-vacuum (throttle valve closed) and high signal voltage at low-vacuum (throttle valve wide open).
If a signal voltage from the MAP sensor is a set value or less, the engine control module (ECM) detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
State of the engine	Running
No active DTCs	MAP

Malfunction Threshold

The MAP sensor output voltage value is 0.23 V or less for at least 2 seconds.

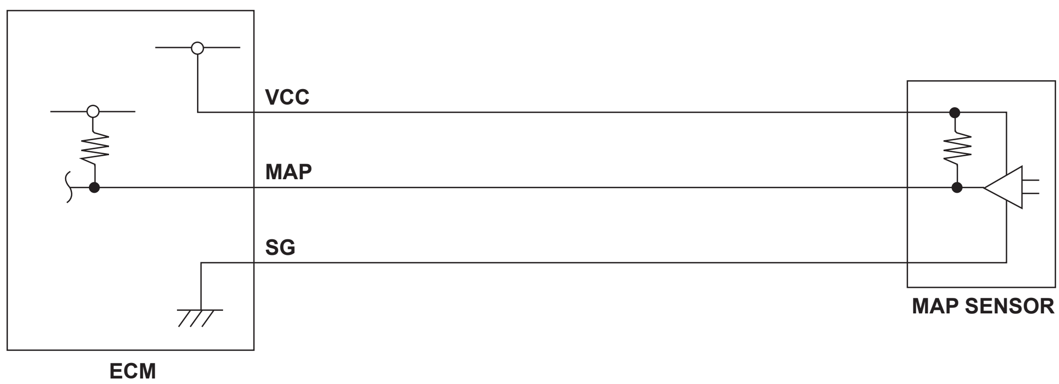
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

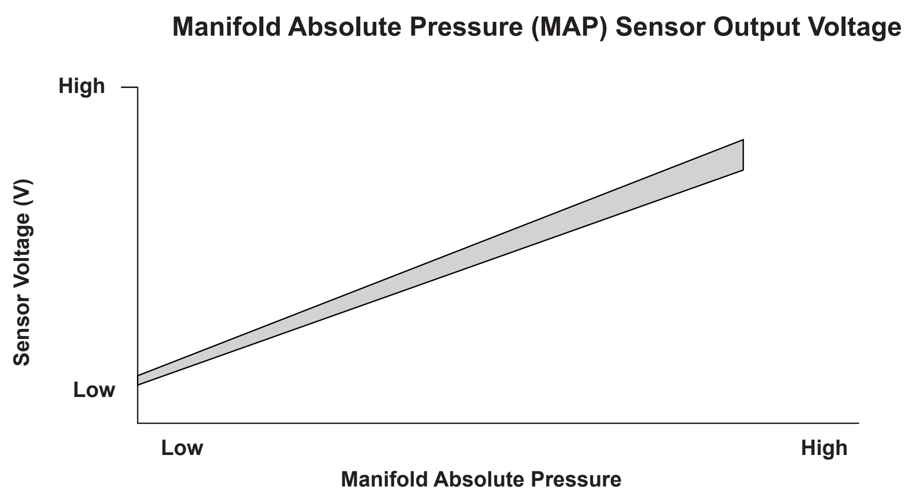
Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0108: Manifold Absolute Pressure (MAP) Sensor Circuit High Voltage



P0106-9602



P0107-9671

General Description

The manifold absolute pressure (MAP) sensor senses manifold absolute pressure (vacuum) and converts it into electrical signals. The MAP sensor outputs low signal voltage at high-vacuum (throttle valve closed) and high signal voltage at low-vacuum (throttle valve wide open). If a signal voltage from the MAP sensor is a set value or more, the engine control module (ECM) detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
State of the engine	Running
No active DTCs	MAP

Malfunction Threshold

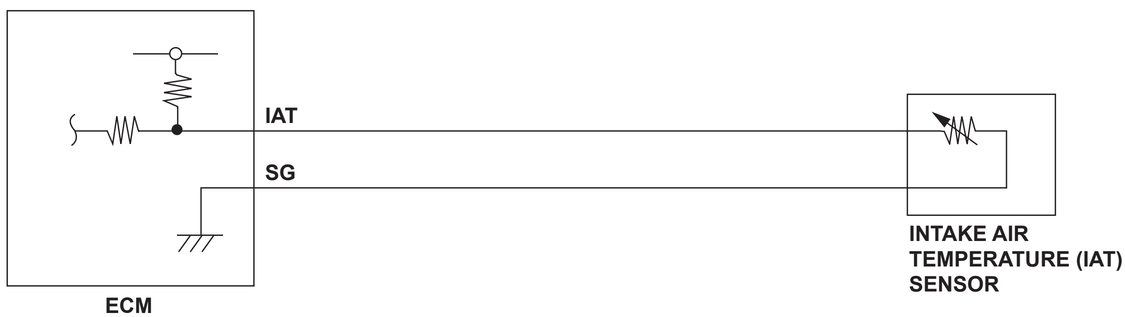
The MAP sensor output voltage value is 4.49 V or more for at least 2 seconds.

Diagnosis Details

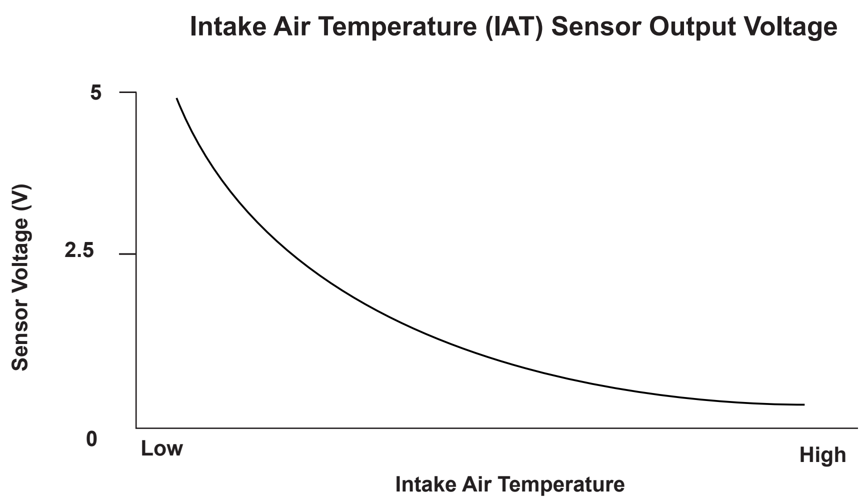
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0112: Intake Air Temperature (IAT) Sensor Circuit Low Voltage



P0112-9602



P0112-9671

General Description

The intake air temperature (IAT) sensor is a thermistor that detects intake air temperature, and it is used for A/F feedback control to compensate for the atmospheric density fluctuations that accompany changes in intake air temperature.
The IAT sensor resistance varies depending on temperature. The output voltage and the sensor resistance increase as the intake air temperature decreases. Conversely, the output voltage and the sensor resistance decrease as the intake air temperature increases. If the IAT sensor output voltage is excessively low, the engine control module (ECM) detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
Ignition switch	ON
No active DTCs	IAT

Malfunction Threshold

The IAT sensor output voltage is 0.08 V or less for at least 2 seconds.

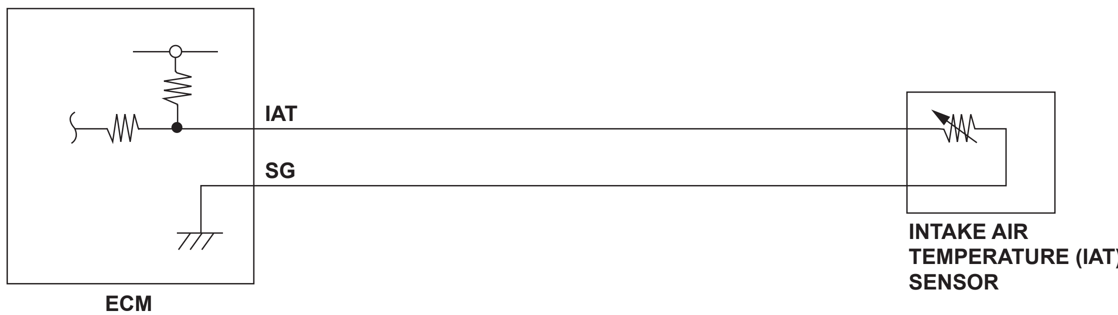
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

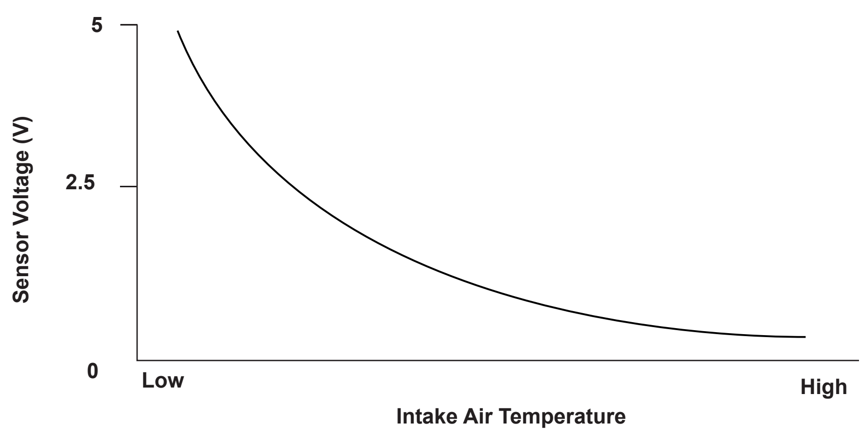
Advanced Diagnostics

DTC P0113: Intake Air Temperature (IAT) Sensor Circuit High Voltage



P0112-9602

Intake Air Temperature (IAT) Sensor Output Voltage



P0112-9671

General Description

The intake air temperature (IAT) sensor is a thermistor that detects intake air temperature, and it is used for A/F feedback control to compensate for the atmospheric density fluctuations that accompany changes in intake air temperature.
The IAT sensor resistance varies depending on temperature. The output voltage and the sensor resistance increase as the intake air temperature decreases. Conversely, the output voltage and the sensor resistance decrease as the intake air temperature increases. If the IAT sensor output voltage is excessively high, the engine control module (ECM) detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
Ignition switch	ON
No active DTCs	IAT

Malfunction Threshold

The IAT sensor output voltage is 4.92 V or more for at least 2 seconds.

Diagnosis Details

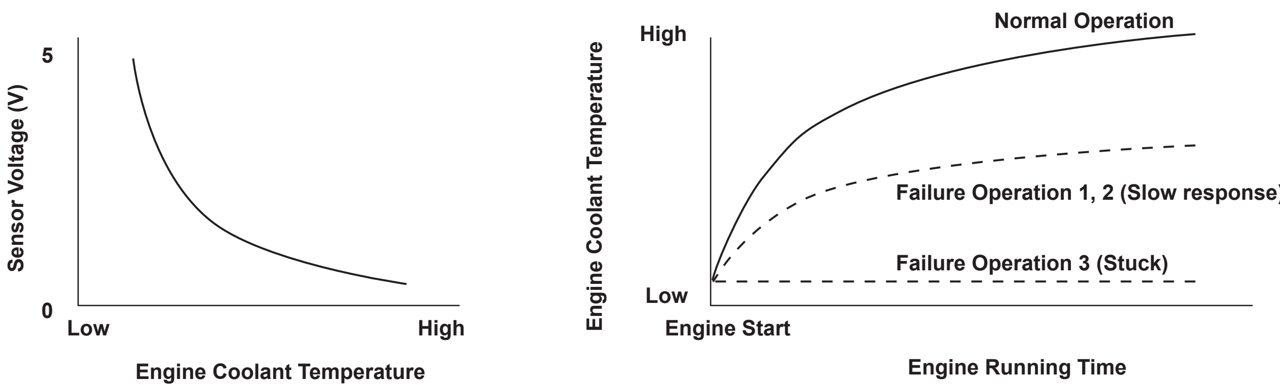
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0116: Engine Coolant Temperature (ECT) Sensor Circuit Range/ Performance Problem

Engine Coolant Temperature Sensor



P0116-9772

General Description

The engine control module (ECM) supplies voltage to the engine coolant temperature (ECT) signal circuit (about 5 V) through a pull-up resistor. As the engine coolant cools, the ECT sensor resistance increases, and the ECM detects a high signal voltage. As the engine coolant warms, the ECT sensor resistance decreases, and the ECM detects a low signal voltage. The ECM detects a malfunction if either of these conditions is met.

Malfunction determination 1, 2: Slow response
If the ECT output voltage does not reach a specified temperature at which the closed-loop control for stoichiometric air/fuel ratio starts within a predetermined time period depending on the initial coolant temperature after starting the engine, the ECM detects a malfunction and a DTC is stored.

Malfunction determination 3: Stuck
If the change of the ECT output voltage within a set time period after starting the engine is less than a specified value, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	1,200 seconds or less
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Malfunction determination 1 (slow response)

Condition	Minimum	Maximum
Initial engine coolant temperature	20ºF (-7ºC)	50ºF (10ºC)
Initial intake air temperature	20ºF (-7ºC)	—
Fuel feedback	Other than fuel cut-off operation	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, MAP, CKP, ECT, TP, IAT, EGR, BARO, IAC, VTEC System, Fuel System	
Other	Other than while the auto idle stop system is in operation	

Malfunction determination 2 (slow response)

<table>
<tr><th colspan="3">Condition</th><th>Minimum</th><th>Maximum</th></tr>
<tr><td colspan="2">Initial engine coolant temperature</td><td>A*</td><td>—</td><td>19ºF (-7ºC)</td></tr>
<tr><td colspan="2" rowspan="2">Initial engine coolant temperature and initial intake air temperature</td><td rowspan="2">B*</td><td rowspan="2">—</td><td>50ºF (10ºC)**</td></tr>
<tr><td>19ºF (-7ºC)***</td></tr>
<tr><td rowspan="3">MAP value</td><td colspan="2">800 rpm</td><td>101 kPa (760 mmHg, 30.0 in.Hg)</td><td rowspan="3">—</td></tr>
<tr><td colspan="2" rowspan="2">1,500 rpm</td><td>32 kPa (240 mmHg, 9.5 in.Hg)*1</td></tr>
<tr><td>34 kPa (250 mmHg, 9.9 in.Hg)*2</td></tr>
<tr><td colspan="3">Fuel feedback</td><td colspan="2">Other than fuel cut-off operation</td></tr>
<tr><td colspan="3">No active DTCs</td><td colspan="2">ECM, A/F Sensor, A/F Sensor Heater, MAP, CKP, ECT, TP, IAT, EGR, BARO, IAC, VTEC System, Fuel System</td></tr>
<tr><td colspan="3">Other</td><td colspan="2">Other than while the auto idle stop system is in operation</td></tr>
</table>

* : Either A or B must be met.
** : Initial engine coolant temperature.
*** : Initial intake air temperature.
*1: CVT
*2: M/T

Enable Conditions (cont’d)

Malfunction determination 3 (stuck)

Condition		Minimum	Maximum
Initial engine coolant temperature****	C	—	19ºF (-7ºC)
	D	50ºF (10ºC)	68ºF (20ºC)
Initial intake air temperature	E	—	19ºF (-7ºC)
MAP value	800 rpm	—	101 kPa (760 mmHg, 29.9 in.Hg)
	1,500 rpm		31 kPa (240 mmHg, 9.4 in.Hg)*1
			33 kPa (250 mmHg, 9.8 in.Hg)*2
Fuel feedback		Other than fuel cut-off operation	
No active DTCs		ECM, A/F Sensor, A/F Sensor Heater, MAP, CKP, ECT, TP, IAT, EGR, BARO, IAC, VTEC System, Fuel System	
Other		Other than while the auto idle stop system is in operation	

**** : Any of conditions C, D and E must be met.

Malfunction Threshold

Malfunction determination 1 (slow response):
The engine running time until the engine coolant temperature reaches 50ºF (10ºC) is as shown in the table.
MAP value is 80 kPa (600 mmHg, 23.7 in.Hg) at an engine speed of 800 rpm.

Initial engine coolant temperature	19ºF (-7ºC)	41ºF (5ºC)
Engine running time	180 seconds or more	90 seconds or more

MAP value is 33 kPa (250 mmHg, 9.8 in.Hg) at an engine speed of 1,500 rpm.

Initial engine coolant temperature	19ºF (-7ºC)	41ºF (5ºC)
Engine running time	130 seconds or more	80 seconds or more

Malfunction determination 2 (slow response):
The ECT sensor output does not exceed an engine coolant temperature of 50ºF (10ºC) within 20 minutes.

Malfunction determination 3 (stuck):
The ECT sensor output does not vary by 60 mV or more within 20 minutes.

Driving Pattern

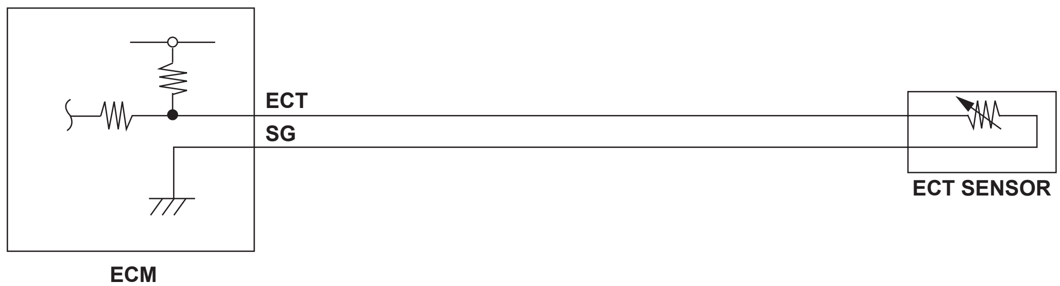
Start the engine at an engine coolant temperature and intake air temperature as specified under Enable Conditions, then let it idle until the engine coolant temperature reaches a set value or for at least 20 minutes.

Diagnosis Details

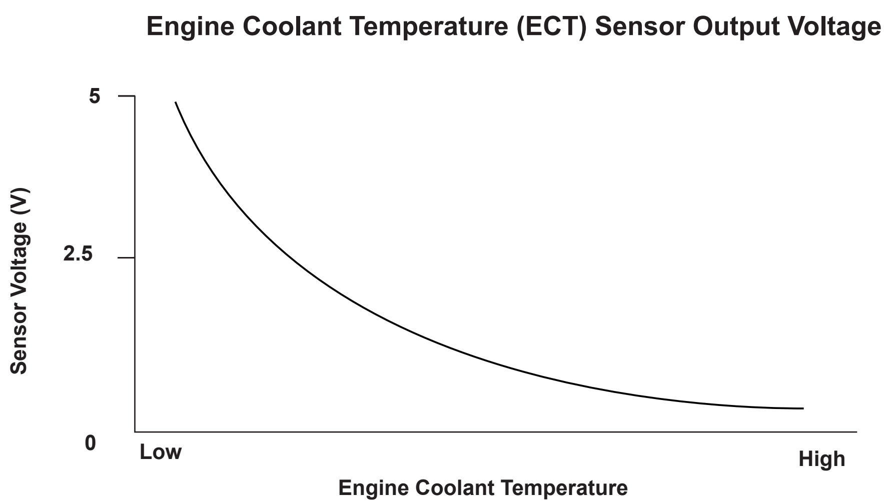
Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle with the ECT and IAT at engine start-up within the specified temperature range, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle with the ECT and IAT at engine start-up within the specified temperature range, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0117: Engine Coolant Temperature (ECT) Sensor Circuit Low Voltage



P0116-9602



P0116-9672

General Description

The engine coolant temperature (ECT) sensor is used for the air/fuel ratio feedback control, the ignition timing control, the idle speed control, and other functions. The ECT sensor resistance varies depending on the engine coolant temperature. As the engine coolant cools, the ECT sensor resistance increases, and the engine control module (ECM) detects a high signal voltage. As the engine coolant warms, the ECT sensor resistance decreases, and the ECM detects a low signal voltage. If the ECT sensor output voltage is less than a set value when the engine coolant temperature is high, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
Ignition switch	ON
No active DTCs	ECT

Malfunction Threshold

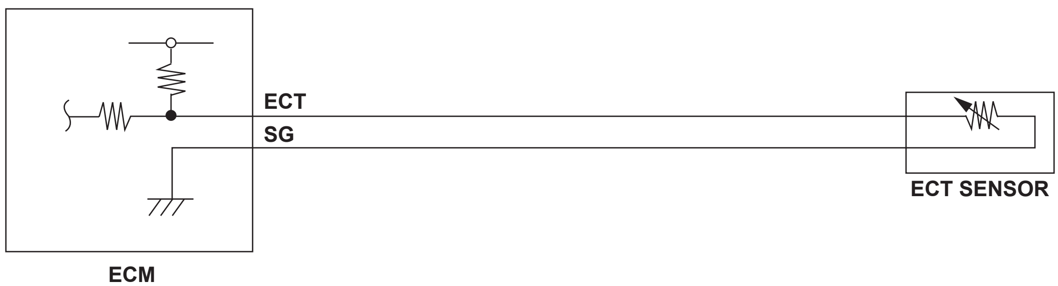
The output voltage from the ECT sensor is 0.08 V or less for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

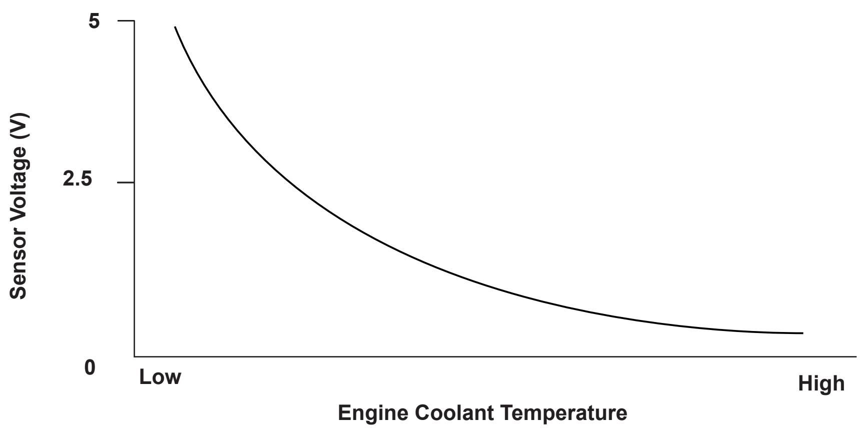
Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0118: Engine Coolant Temperature (ECT) Sensor Circuit High Voltage



P0116-9602

Engine Coolant Temperature (ECT) Sensor Output Voltage



P0116-9672

General Description

The engine coolant temperature (ECT) sensor is used for the air/fuel ratio feedback control, the ignition timing control, the idle speed control, and other functions. The ECT sensor resistance varies depending on the engine coolant temperature. As the engine coolant cools, the ECT sensor resistance increases, and the engine control module (ECM) detects a high signal voltage. As the engine coolant warms, the ECT sensor resistance decreases, and the ECM detects a low signal voltage. If the ECT sensor output voltage is more than a set value when the engine coolant temperature is low, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
Ignition switch	ON
No active DTCs	ECT

Malfunction Threshold

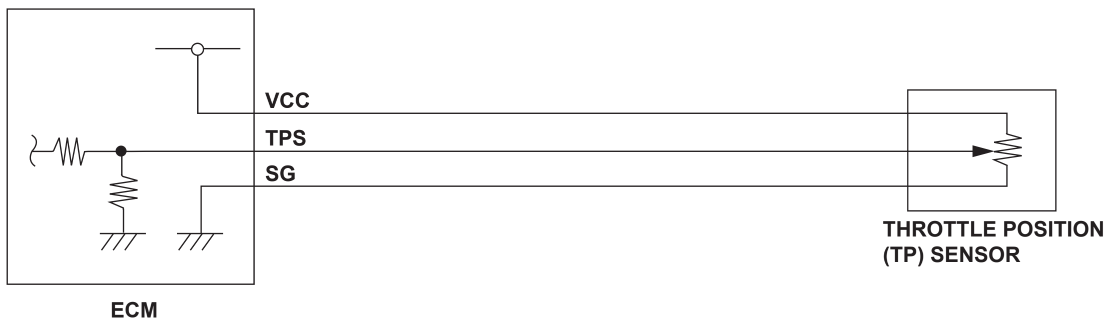
The output voltage from the ECT sensor is 4.92 V or more for at least 2 seconds.

Diagnosis Details

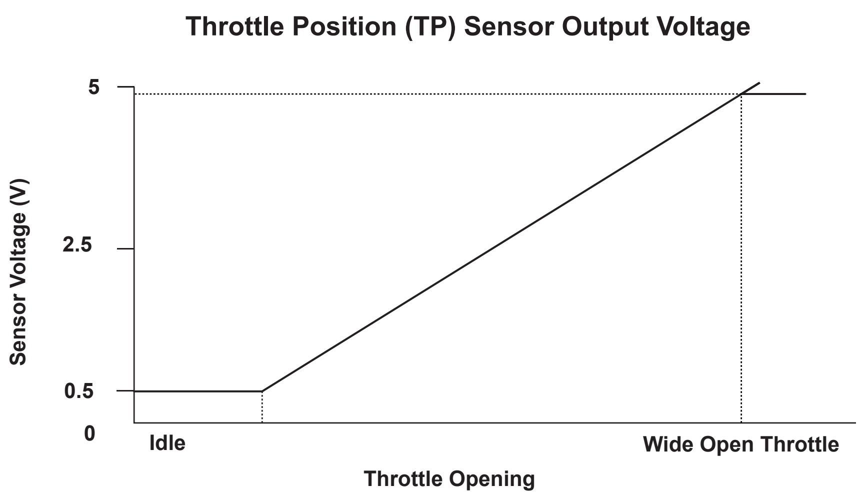
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0122: Throttle Position (TP) Sensor Circuit Low Voltage



P0122-9602



P0122-9672

General Description

The throttle position (TP) sensor is installed in the throttle body, and it detects the position of the throttle valve. This sensor includes a brush that moves with the throttle valve. The brush outputs voltage to the engine control module (ECM) that varies linearly with throttle position by sliding on a resistor. When accelerating or decelerating, the detected amount of intake airflow by the MAP sensor tends to be inaccurate due to rapid changes in throttle position. The TP sensor is used to correct the amount of airflow as it detects the throttle position. Also, the sensor is used for fuel cut-off operation to improve fuel economy and exhaust emissions when the throttle is fully closed during deceleration. The ECM monitors the throttle position (in degrees). If the output signal voltage from the TP sensor is excessively low, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
State of the engine	Running
No active DTCs	TP

Malfunction Threshold

The output voltage from the TP sensor is 0.1 V or less for at least 2 seconds.

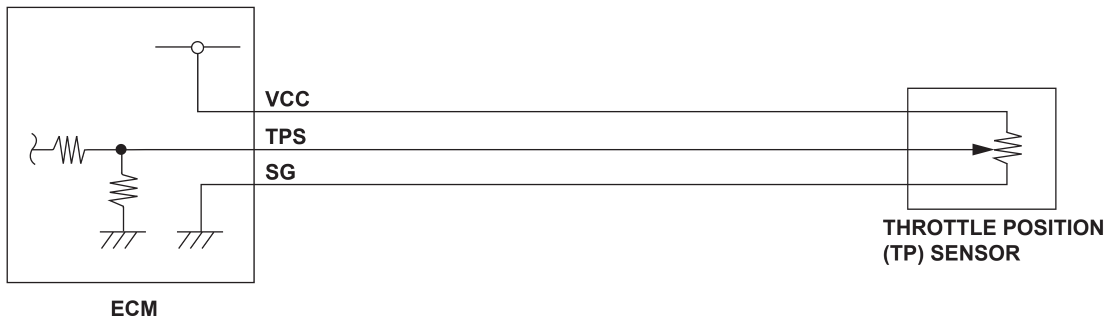
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

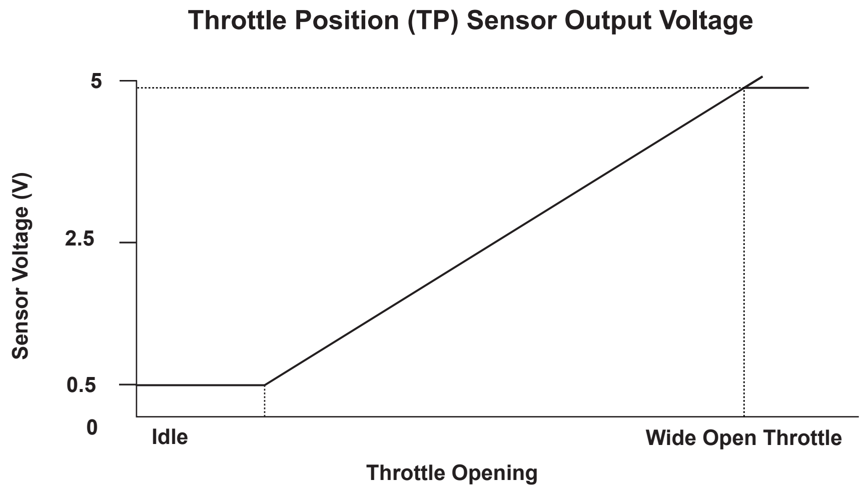
Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0123: Throttle Position (TP) Sensor Circuit High Voltage



P0122-9602



P0122-9672

General Description

The throttle position (TP) sensor is installed in the throttle body, and it detects the position of the throttle valve. This sensor includes a brush that moves with the throttle valve. The brush outputs voltage to the engine control module (ECM) that varies linearly with throttle position by sliding on a resistor. When accelerating or decelerating, the detected amount of intake airflow by the MAP sensor tends to be inaccurate due to rapid changes in throttle position. The TP sensor is used to correct the amount of airflow as it detects the throttle position. Also, the sensor is used for fuel cut-off operation to improve fuel economy and exhaust emissions when the throttle is fully closed during deceleration. The ECM monitors the throttle position (in degrees). If the output signal voltage from the TP sensor is excessively high, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
State of the engine	Running
No active DTCs	TP

Malfunction Threshold

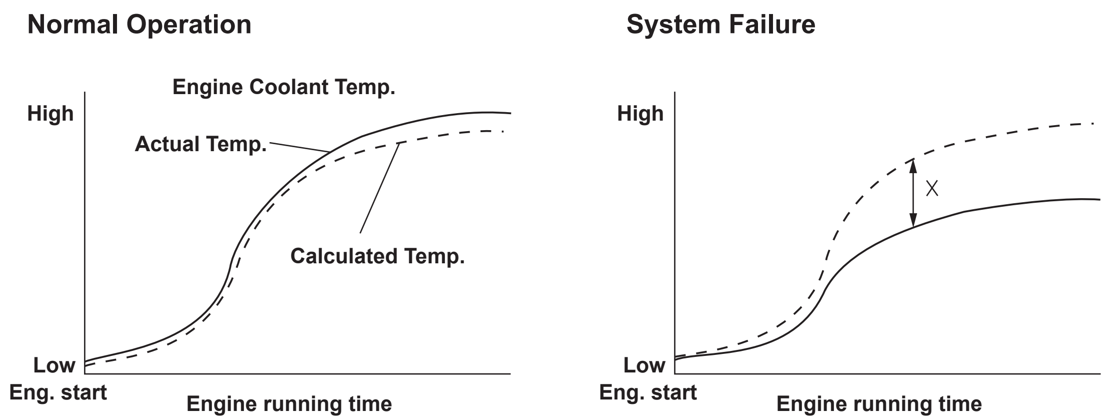
The output voltage from the TP sensor is 4.90 V or more for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0128: Cooling System Malfunction



P0128-0071

General Description

The thermostat valve is closed when the engine coolant temperature is low, and it stops the circulation of engine coolant to speed engine warm up. When the engine coolant temperature increases, the thermostat valve opens and circulates engine coolant to control its temperature. On the other hand, when the engine coolant temperature decreases, the opening area of the thermostat valve is reduced to regulate the engine coolant temperature. If the thermostat valve sticks open, engine warm up is delayed, and exhaust emissions are adversely affected. The engine control module (ECM) estimates the engine coolant temperature after starting the engine from the initial engine coolant temperature and driving conditions, and compares it with the actual engine coolant temperature that is detected by the engine coolant temperature (ECT) sensor.
If the actual engine coolant temperature is below the estimated engine coolant temperature (when x shown in the graph is large), a malfunction in the thermostat valve is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	Depending on driving conditions
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Initial engine coolant temperature	20ºF (-7ºC)	95ºF (35ºC)
Initial intake air temperature	20ºF (-7ºC)	95ºF (35ºC)
The difference between initial engine coolant temperature and initial intake air temperature	—	10ºF (6ºC)
Fuel feedback	Other than during fuel cut-off operation and while the auto idle stop system is operating	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, MAP, CKP, ECT, TP, IAT, EGR, BARO, IAC, VSS, VTEC System, Fuel System	
Others	Intake air temperature 2 seconds after starting the engine must be nearly equal to initial intake air temperature [e.g.: Intake air temperature 2 seconds after starting the engine must be greater than 75ºF (24ºC) when initial intake air temperature is 77ºF (25ºC)]	
	Estimated engine coolant temperature reaches 172ºF (78ºC)	
	Test-drive on flat road	

Malfunction Threshold

- The ECT sensor output is 158ºF (70ºC) or less, and the estimated engine coolant temperature is 172ºF (78ºC) or more.
- The difference between the engine coolant temperature estimated by the ECM and the ECT sensor output is 27ºF (15ºC) or more.

Driving Pattern

1. Start the engine at an engine coolant temperature and intake air temperature as specified under Enable Conditions, and let it idle.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 10 minutes.

- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

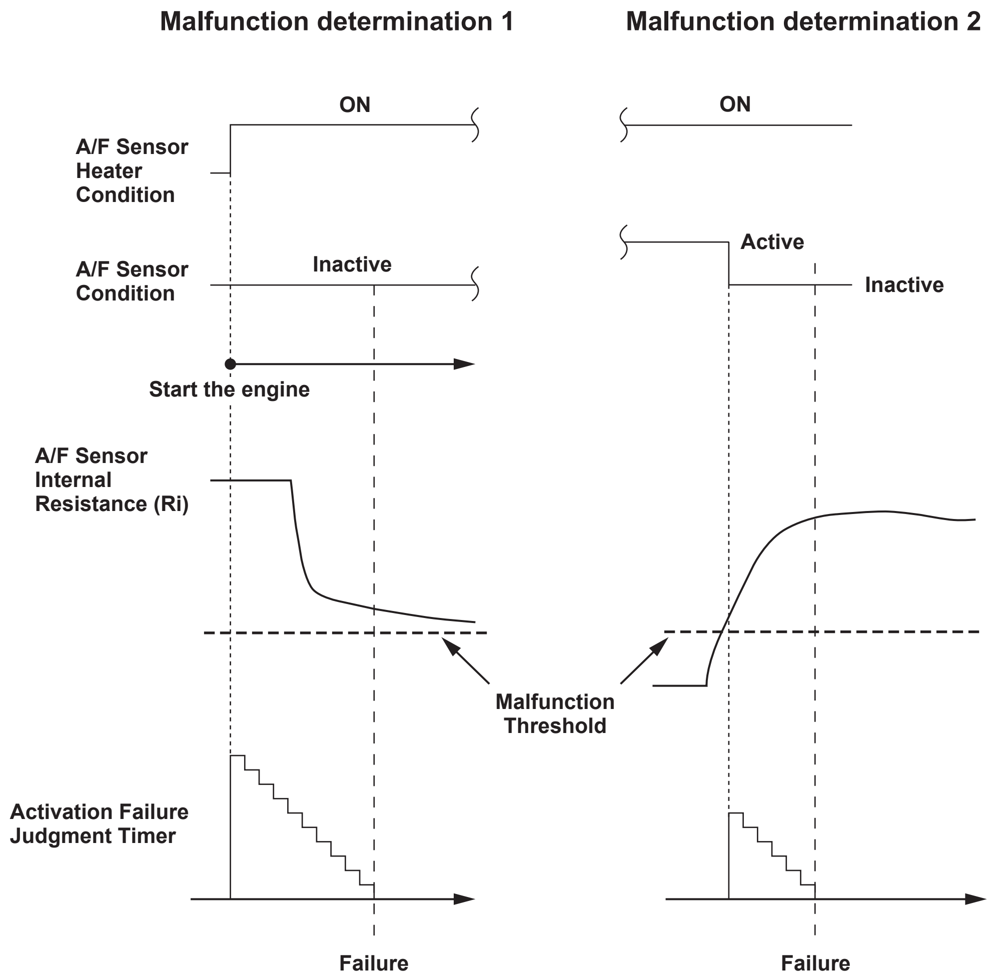
Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0134: Air/Fuel Ratio (A/F) Sensor (Sensor 1) No Activity Detected



P0134-0370

General Description

The air/fuel ratio (A/F) sensor is activated by warming the element with the heater and by maintaining it at a steady high temperature to accurately calculate the air/fuel (A/F) ratio. The A/F sensor does not become active when the element is not heated enough due to a heater malfunction, etc., and the exhaust emissions deteriorate. The engine control module (ECM) monitors the A/F sensor activity by the A/F sensor internal resistance.

1. When the A/F sensor does not activate in a fixed time after the A/F sensor heater starts to operate (during high A/F sensor internal resistance), a malfunction of the A/F sensor heater is detected, and a DTC is stored.
2. When the A/F sensor heater does not reactivate within a fixed time as indicated by a change from high A/F sensor internal resistance to low A/F sensor internal resistance though the heater is ON, a malfunction in the A/F sensor heater is detected, and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	90 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	14ºF (-10ºC)	—
Battery voltage	10.5 V	—
Fuel feedback	Other than during fuel cut-off operation	
No active DTCs	A/F Sensor, ECT	

Malfunction Threshold

Malfunction determination 1
The A/F sensor internal resistance value is 40 Ω or more for at least 90 seconds right after the engine starts.

Malfunction determination 2
The A/F sensor internal resistance value is 40 Ω or more for at least 16 seconds.

Driving Pattern

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Let the engine idle for at least 2 minutes.

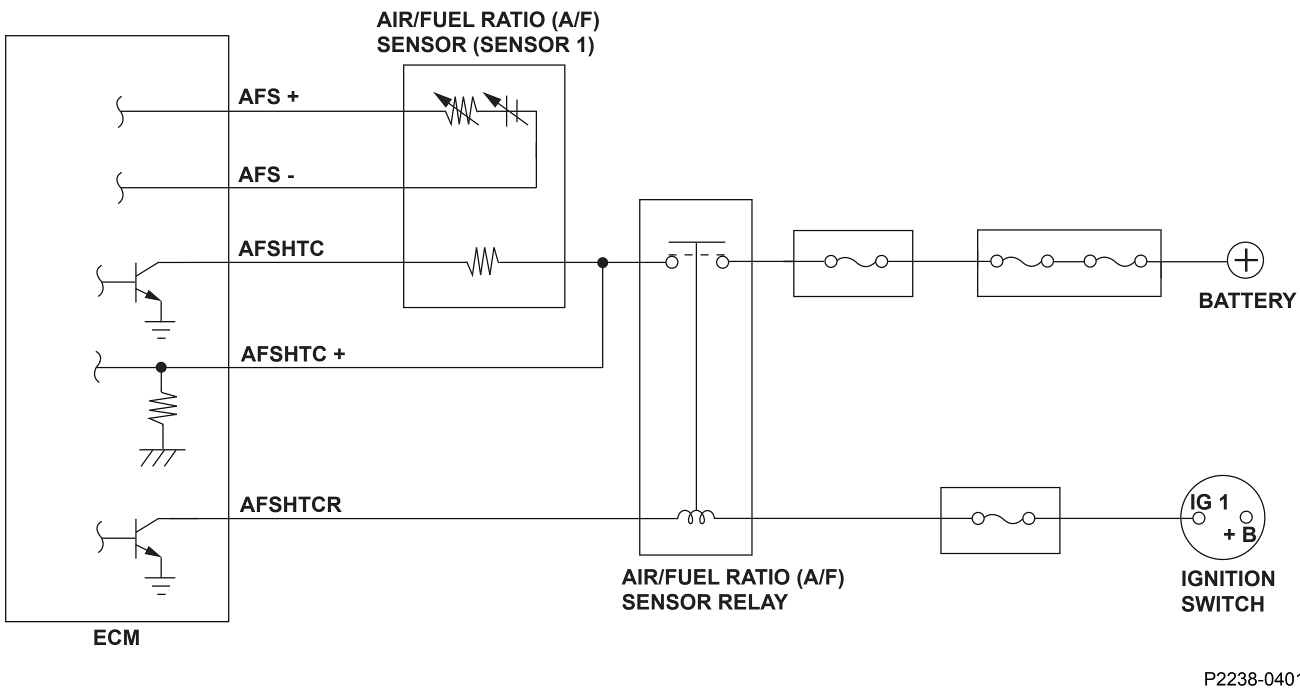
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0135: Air/Fuel Ratio (A/F) Sensor (Sensor 1) Heater Circuit Malfunction



General Description

A heater for the sensor element is embedded in the air/fuel ratio (A/F) sensor (Sensor 1), and it is controlled by the engine control module (ECM). It heats the sensor to stabilize and speed the detection of oxygen content when the exhaust gas temperature is cold.
If the A/F sensor (Sensor 1) heater current is not a set value, or the heater is overheated, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	-4ºF (-20ºC)	—
Battery voltage (IGP terminal of ECM)	10.5 V	16.0 V
State of the engine	Running	
No active DTCs	A/F CPU, ECT, A/F sensor (sensor 1), A/F sensor (sensor 1) heater	
Other	A/F sensor (sensor 1) heater is activated	

Malfunction Threshold

One of these conditions must be met.

- The heater current is 0.8 A or less for at least 4 seconds while the heater is activated, and the heater current is 0.8 A or less for at least 4 seconds while the heater is not activated.
- The heater current is 0.8 A or more for at least 4 seconds while the heater is activated, and the heater current is 0.8 A or more for at least 4 seconds while the heater is not activated.
- The heater current is 15.2 A or more for at least 0.6 second.

Driving Pattern

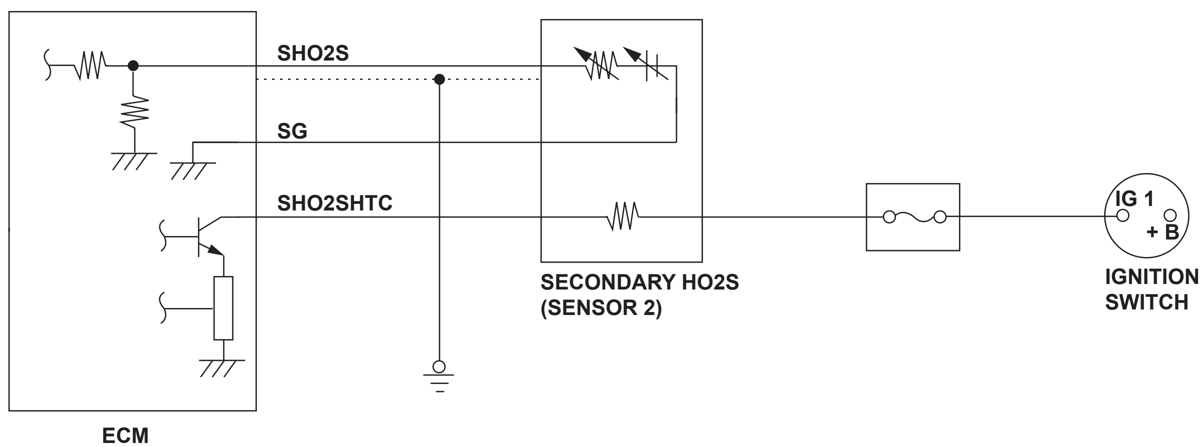
Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.

Diagnosis Details

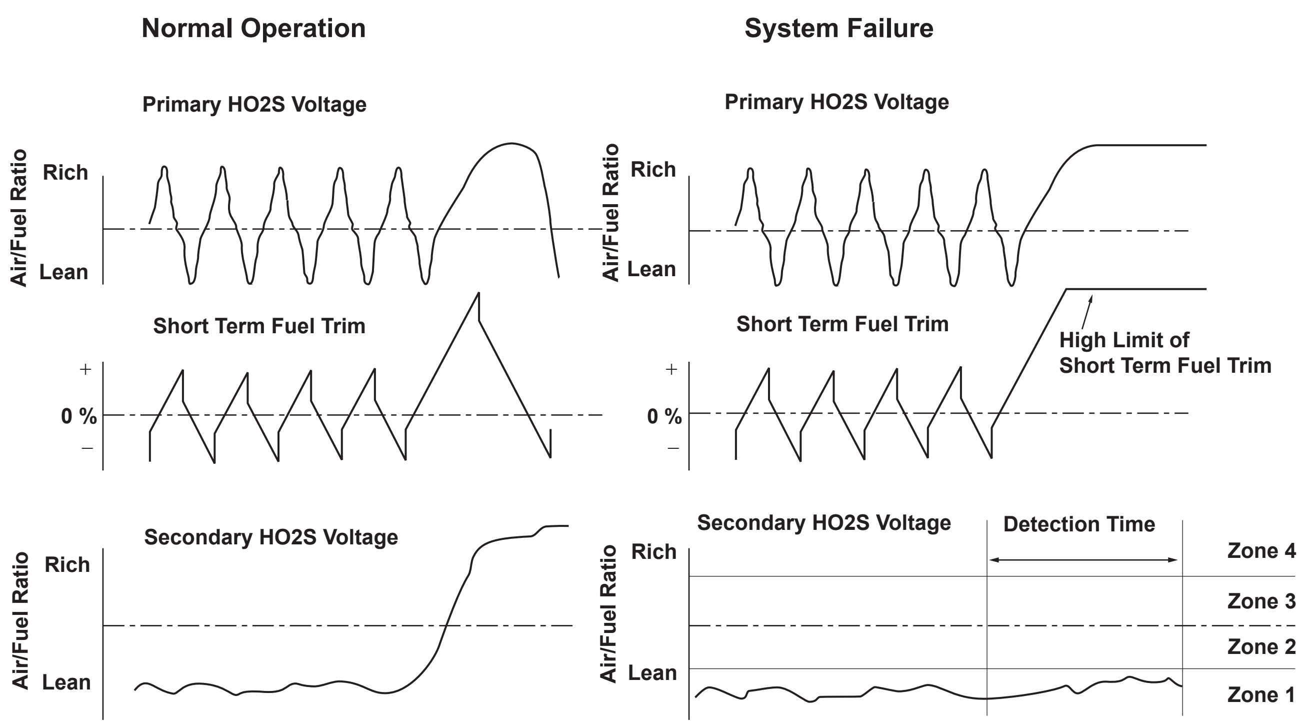
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0137: Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) Circuit Low Voltage (M/T)



P0137-0001



P0137-9671

General Description

The secondary heated oxygen sensor (HO2S) (Sensor 2) is installed downstream of the three way catalytic converter (TWC). The HO2S detects the oxygen content in the exhaust gas downstream of the TWC during stoichiometric air/fuel ratio feedback control by the engine control module (ECM) from the primary heated oxygen sensor (HO2S) (Sensor 1) output voltage, and its output voltage is used to control the air/fuel ratio so that the TWC efficiency is optimized. The secondary HO2S output voltage range is divided into four zones. If the secondary HO2S output voltage remains in the same zone for a set time period during air/fuel ratio feedback control, the ECM controls the amount of injected fuel by changing the short term fuel trim.
If the secondary HO2S output voltage remains in Zone 1 after the ECM commands an increase in the short term fuel trim, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	77 seconds or less
DTC Type	Two drive cycles, MIL ON

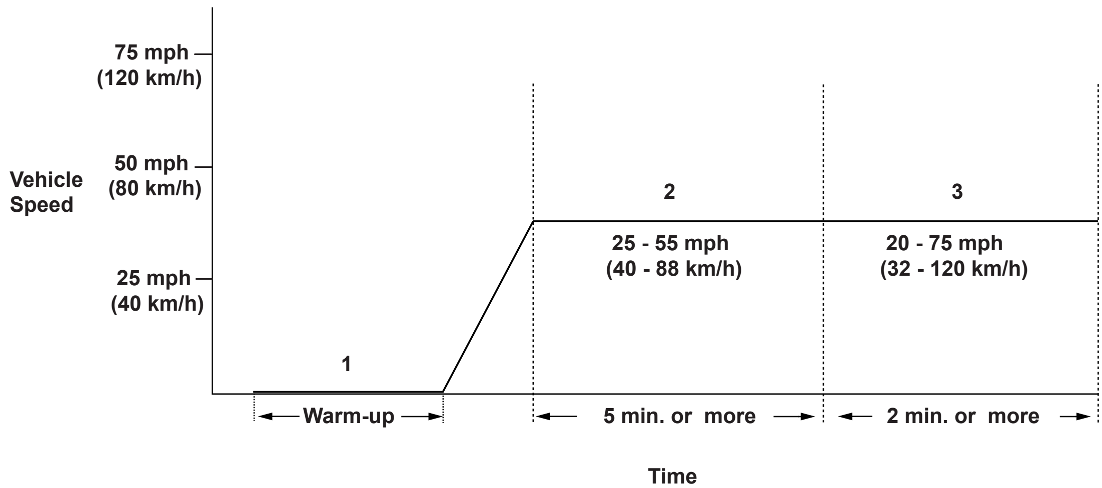
Enable Conditions

Condition	Minimum	Maximum
Elapsed time after starting the engine	120 seconds	—
Engine coolant temperature	122ºF (50ºC)	—
Intake air temperature	-14ºF (-25ºC)	—
Engine speed	1,300 rpm	3,300 rpm
MAP value	26 kPa (190 mmHg, 7.5 in.Hg)	—
Vehicle speed	19 mph (30 km/h)	—
Fuel trim	0.71	1.35
Fuel feedback	Closed loop at stoichiometric	
Monitoring priority	A/F Sensor, EVAP, Catalyst System	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S Heater, MAP, ECT, TP, IAT, VSS, EGR, VSS, VTEC System, Fuel System, ECM Back-up	

Malfunction Threshold

Secondary HO2S output voltage remains in Zone 1 (0.29 V or less) for no more than 77 seconds.

Driving Pattern



P0137-0054

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Then, drive immediately at a steady speed between 20 - 75 mph (32 - 120 km/h) for at least 2 minutes.

- If the EVAP monitor runs instead of the HO2S monitor, turn the engine off, then restart it, and the HO2S monitor will restart.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL

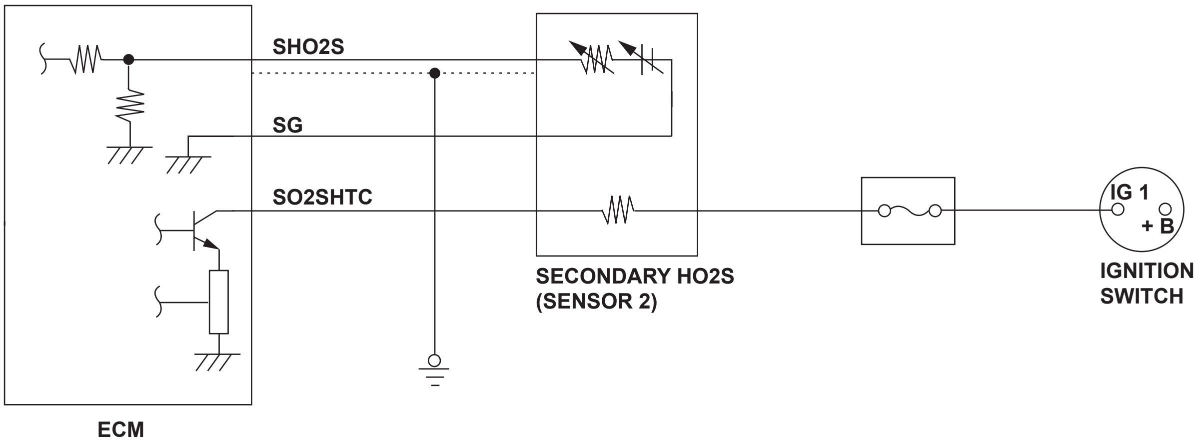
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

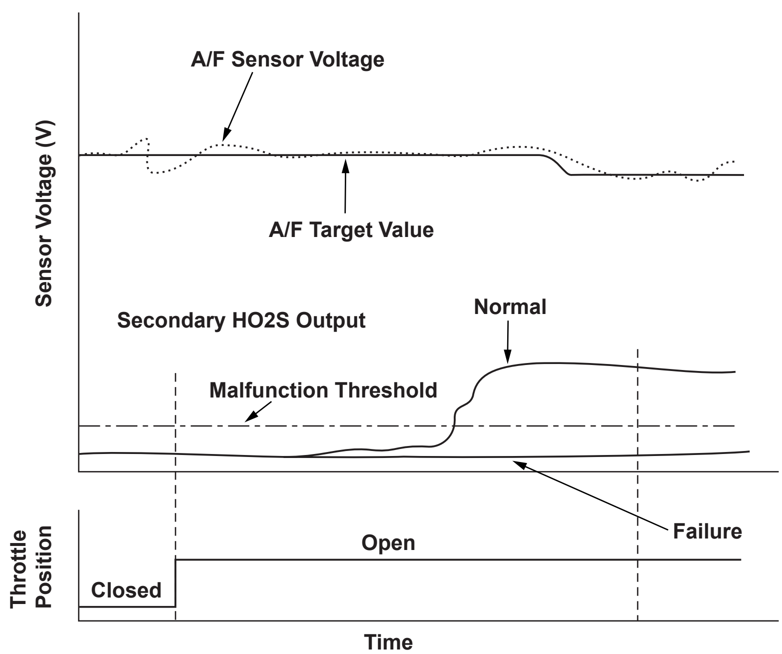
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0137: Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) Circuit Low Voltage (CVT)



P0139-9601



P0137-0071

General Description

The secondary heated oxygen sensor (HO2S) (Sensor 2) detects the oxygen content in the exhaust gas downstream of the TWC during stoichiometric air/fuel ratio feedback control based on the primary heated oxygen sensor (HO2S) (Sensor 1) output voltage. The secondary HO2S controls the air/fuel ratio from the primary HO2S output voltage so that the TWC efficiency is optimized. The characteristics of the secondary HO2S output voltage are identical to the primary HO2S output voltage. The oxygen content in the exhaust gas decreases if the throttle valve is open for a certain time period after returning to normal driving after deceleration, and the secondary HO2S outputs high voltage. Therefore, if the secondary HO2S outputs low voltage (lean) after returning to normal driving after deceleration, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	40 seconds or less
DTC Type	Two drive cycles, MIL ON

Enable Conditions

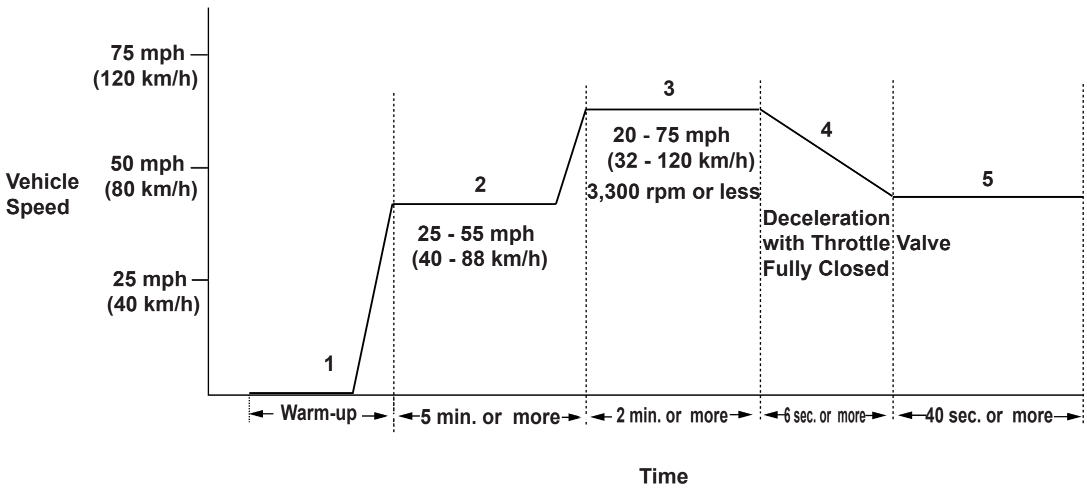
Condition	Minimum	Maximum
Elapsed time after starting the engine	128 seconds	—
Engine coolant temperature	140ºF (60ºC)	—
Intake air temperature	-13ºF (-25ºC)	—
Engine speed	*	3,300 rpm
Fuel trim	0.71	1.35
Fuel feedback	Closed loop control at stoichiometric ratio during or after deceleration	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S Heater, MAP, ECT, TP, IAT, EGR, VSS, VTEC System, Fuel System, ECM Back-up, A/T System	

* : Not more than 2 seconds have elapsed since the engine speed reached 0 rpm, or the auto idle stop system is in operation.

Malfunction Threshold

The secondary HO2S output voltage is 0.30 V or less for no more than 40 seconds.

Driving Pattern



P0137-0150

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Then, drive at a steady speed between 20 - 75 mph (32 - 120 km/h) with an engine speed of 3,300 rpm or less for at least 2 minutes.
4. Decelerate with the throttle valve fully closed for at least 6 seconds.
5. Accelerate gradually or drive at a steady speed (do not decelerate) for at least 40 seconds.

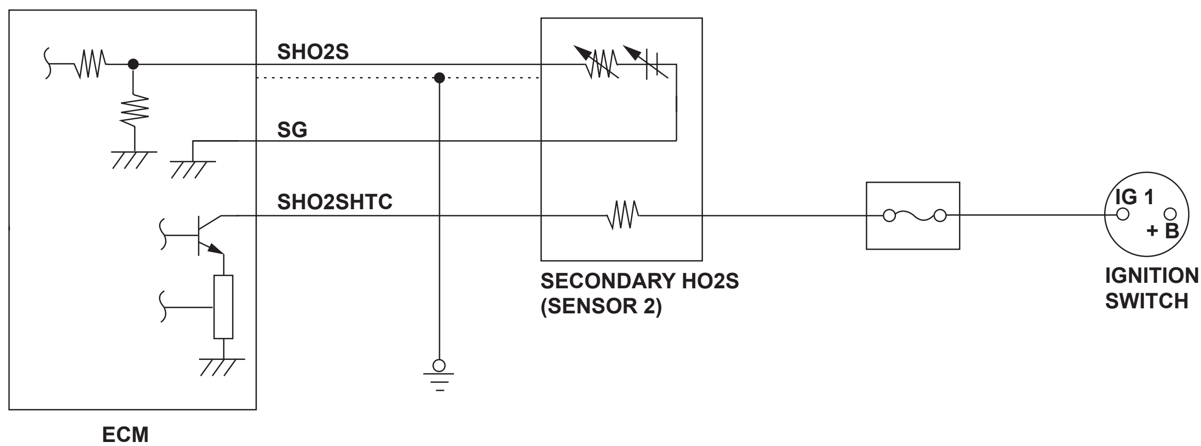
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

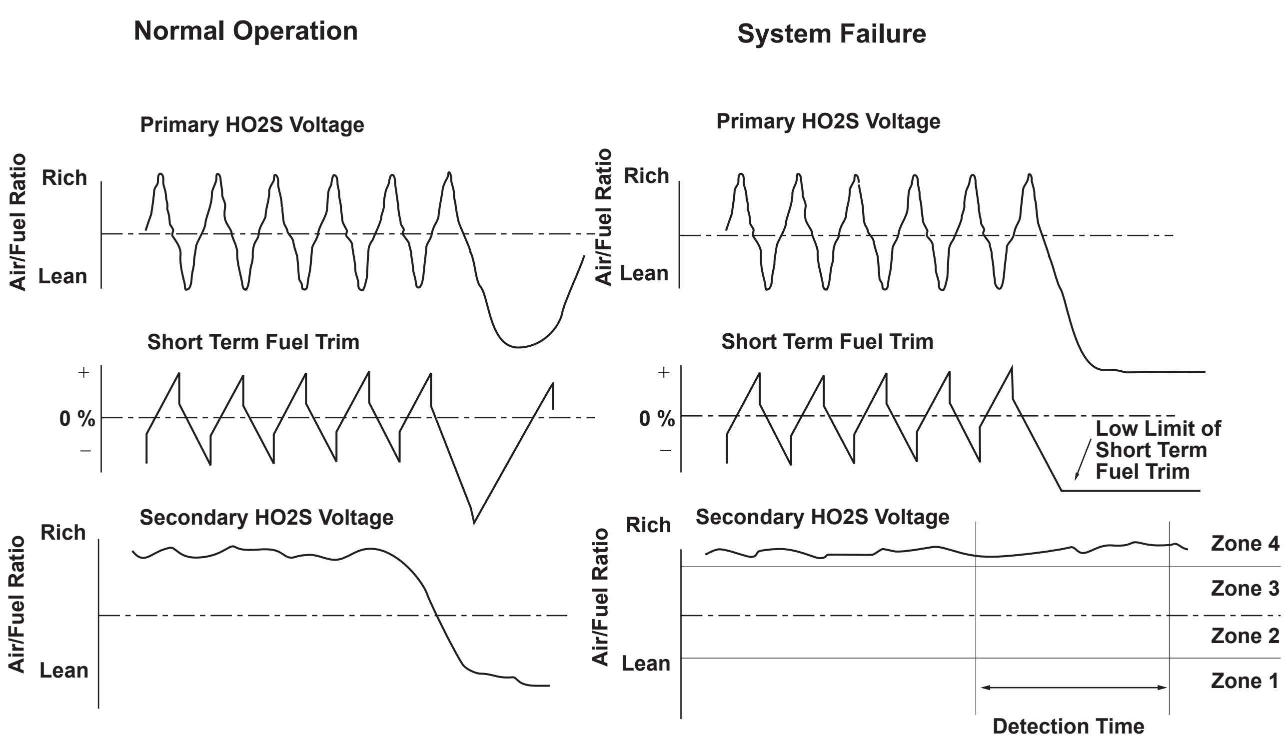
Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0138: Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) Circuit High Voltage (M/T)



P0137-0001



P0138-9671

General Description

The secondary heated oxygen sensor (HO2S) (Sensor 2) is installed downstream of the three way catalytic converter (TWC). The HO2S detects the oxygen content in the exhaust gas downstream of the TWC during stoichiometric air/fuel ratio feedback control by the engine control module (ECM) from the primary heated oxygen sensor (HO2S) (Sensor 1) output voltage, and its output voltage is used to control the air/fuel ratio so that the TWC efficiency is optimized. The secondary HO2S output voltage range is divided into four zones. If the secondary HO2S output voltage remains in the same zone for a set time period during air/fuel ratio feedback control, the ECM controls the amount of injected fuel by changing the short term fuel trim. If the secondary HO2S output voltage remains in Zone 4 after the ECM commands a decrease in the short term fuel trim, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	77 seconds or less
DTC Type	Two drive cycles, MIL ON

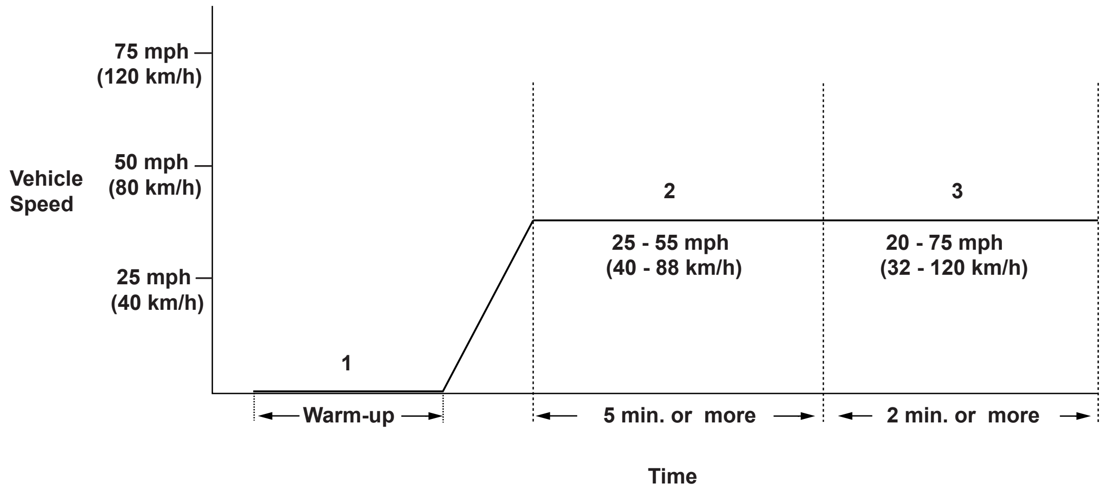
Enable Conditions

Condition	Minimum	Maximum
Elapsed time after starting the engine	120 seconds	—
Engine coolant temperature	122ºF (50ºC)	—
Intake air temperature	-14ºF (-25ºC)	—
Engine speed	1,300 rpm	3,300 rpm
MAP value	26 kPa (190 mmHg, 7.5 in.Hg)	—
Vehicle speed	19 mph (30 km/h)	—
Fuel trim	0.71	1.35
Fuel feedback	Closed loop at stoichiometric	
Monitoring priority	A/F Sensor, EVAP, Catalyst System	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S Heater, MAP, ECT, TP, IAT, VSS, EGR, VTEC System, Fuel System, ECM Back-up	

Malfunction Threshold

Secondary HO2S output voltage remains in Zone 4 (0.80 V or more) for no more than 77 seconds.

Driving Pattern



P0137-0054

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Then, drive immediately at a steady speed between 20 - 75 mph (32 - 120 km/h) for at least 2 minutes.

- If the EVAP monitor runs instead of the HO2S monitor, turn the engine off, then restart it, and the HO2S monitor will restart.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL

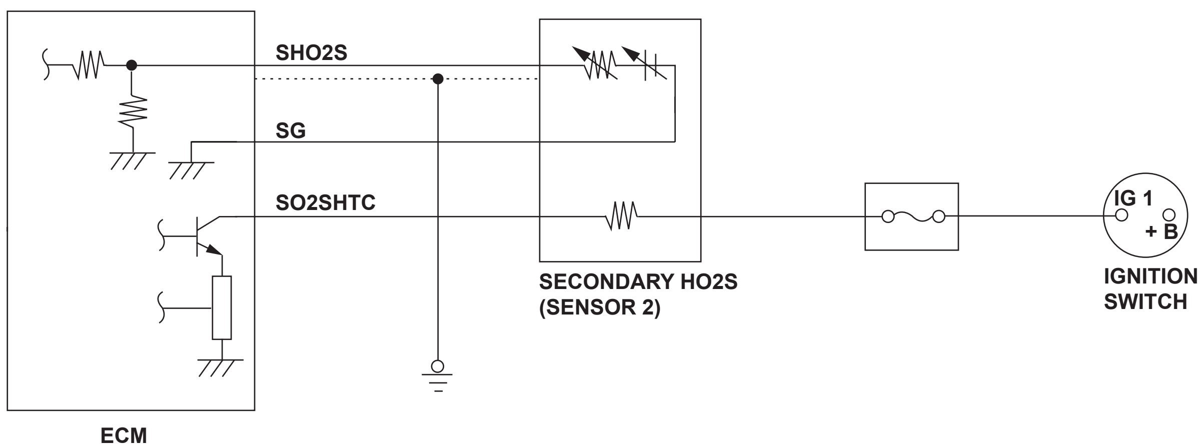
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

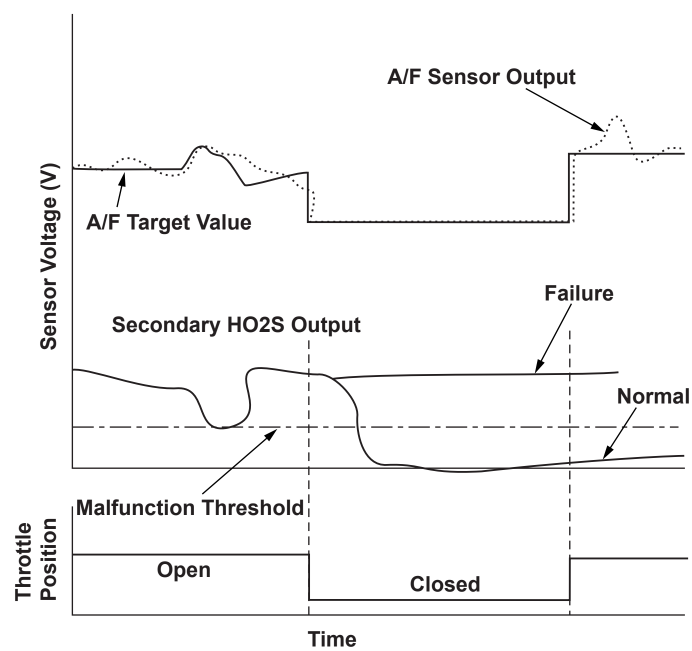
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

P0138-2WW0-00

DTC P0138: Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) Circuit High Voltage (CVT)



P0139-9601



P0138-0071

General Description

The secondary heated oxygen sensor (HO2S) (Sensor 2) detects the oxygen content in the exhaust gas downstream of the three way catalytic converter (TWC) during stoichiometric air/fuel ratio feedback control based on the primary heated oxygen sensor (HO2S) (Sensor 1) output voltage. The secondary HO2S controls the air/fuel ratio from the primary HO2S output voltage, so that the TWC efficiency is optimized. The characteristics of the secondary HO2S output voltage are identical to the primary HO2S output voltage.
The oxygen content in the exhaust gas increases when decelerating with the throttle valve fully closed (lean), and the secondary HO2S outputs low voltage. Therefore, if the secondary HO2S outputs high voltage (rich) during deceleration with the throttle valve fully closed, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	6 seconds or less
DTC Type	Two drive cycles, MIL ON

Enable Conditions

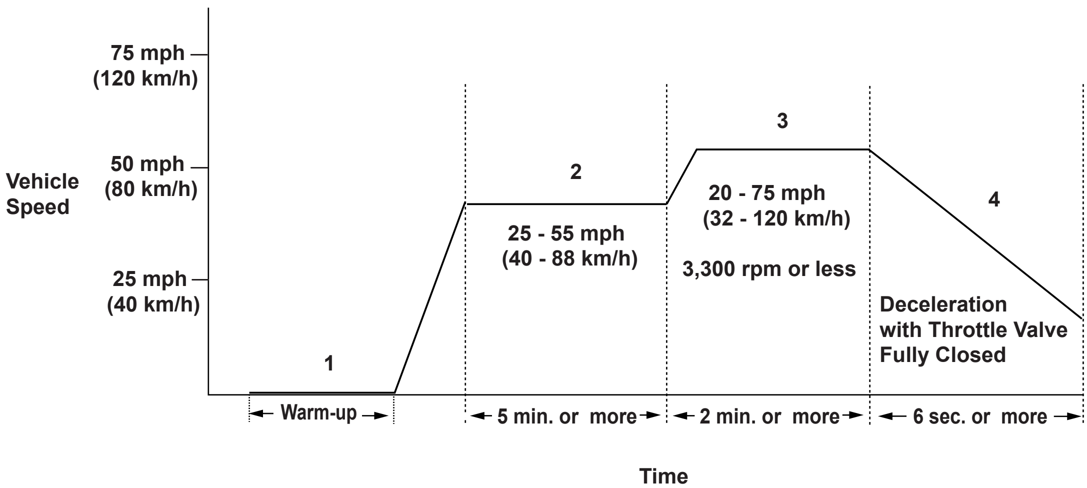
Condition	Minimum	Maximum
Elapsed time after starting the engine	128 seconds	—
Engine coolant temperature	140ºF (60ºC)	—
Intake air temperature	-13ºF (-25ºC)	—
Engine speed	*	3,300 rpm
Fuel trim	0.71	1.35
Fuel feedback	Closed loop control at stoichiometric ratio during or after deceleration	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S Heater, MAP, ECT, TP, IAT, EGR, VSS, VTEC System, Fuel System, ECM Back-up, A/T System	

* : Not more than 2 seconds have elapsed since the engine speed reached 0 rpm, or the auto idle stop system is in operation.

Malfunction Threshold

The secondary HO2S output voltage is 0.80 V or more for no more than 6 seconds.

Driving Pattern



P0137-0151

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Then, drive immediately at a steady speed between 20 - 75 mph (32 - 120 km/h) with an engine speed of 3,300 rpm or less for at least 2 minutes.
4. Decelerate with the throttle valve fully closed for at least 6 seconds.

- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

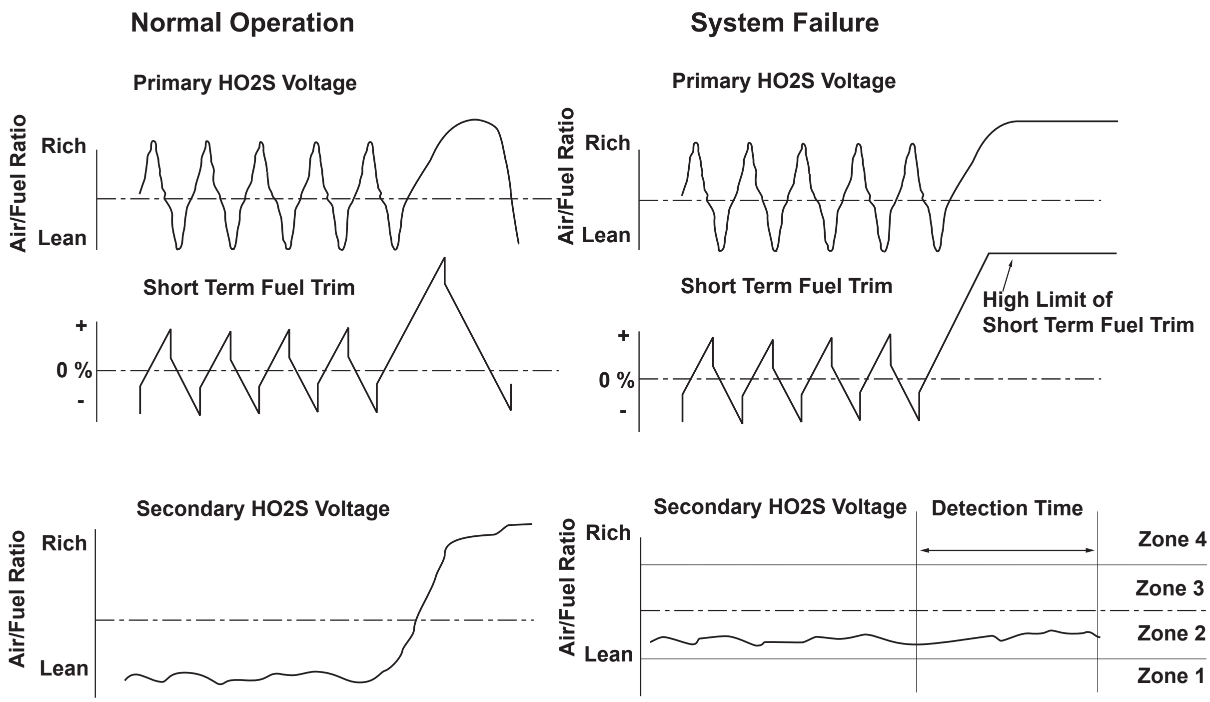
Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

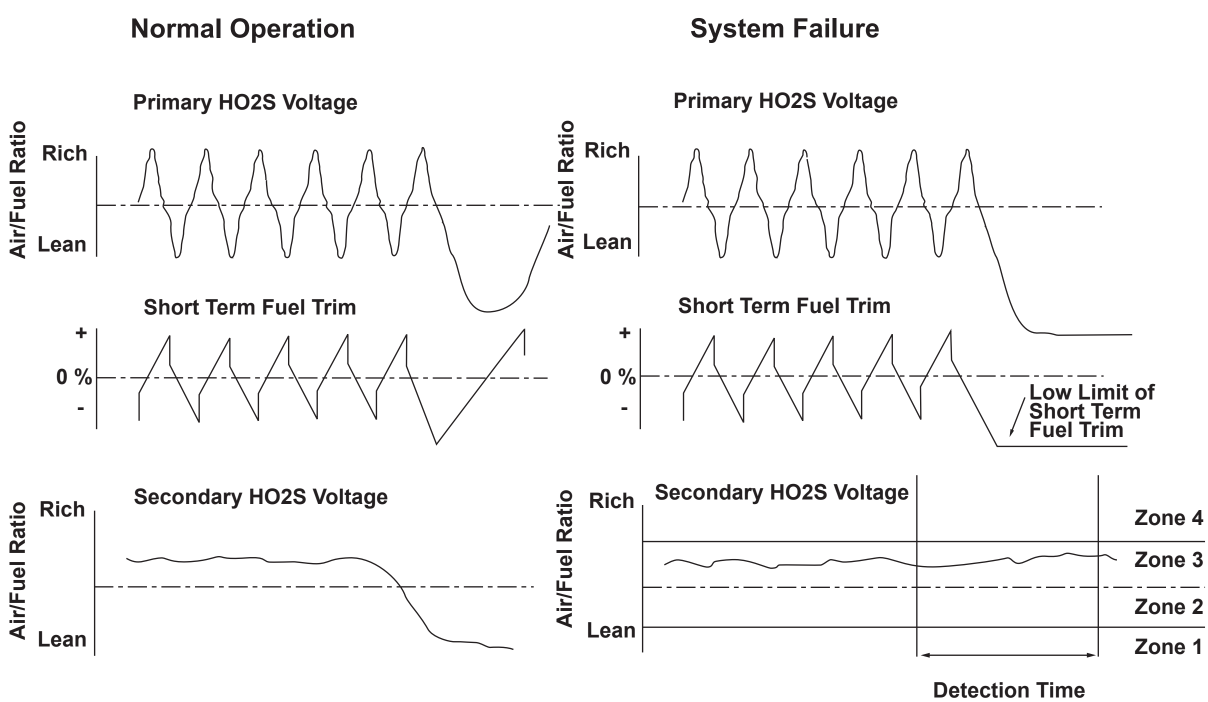
Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0139: Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) Slow Response (M/T)



P0139-9671



P0139-9672

General Description

The secondary heated oxygen sensor (HO2S) (Sensor 2) is installed downstream of the three way catalytic converter (TWC). The HO2S detects the oxygen content in the exhaust gas downstream of the TWC during stoichiometric air/fuel ratio feedback control by the engine control module (ECM) from the primary heated oxygen sensor (HO2S) (Sensor 1) output voltage, and its output voltage is used to control air/fuel ratio so that the TWC efficiency is optimized.
The secondary HO2S output voltage range is divided into four zones. If the secondary HO2S output voltage remains in the same zone during the air/fuel ratio feedback control, the ECM controls the amount of injected fuel by changing the short term fuel trim.
If the secondary HO2S output voltage remains in Zone 2 or Zone 3 after the ECM commands an increase or a decrease in the short term fuel trim, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	77 seconds or less
DTC Type	Two drive cycles, MIL ON

Enable Conditions

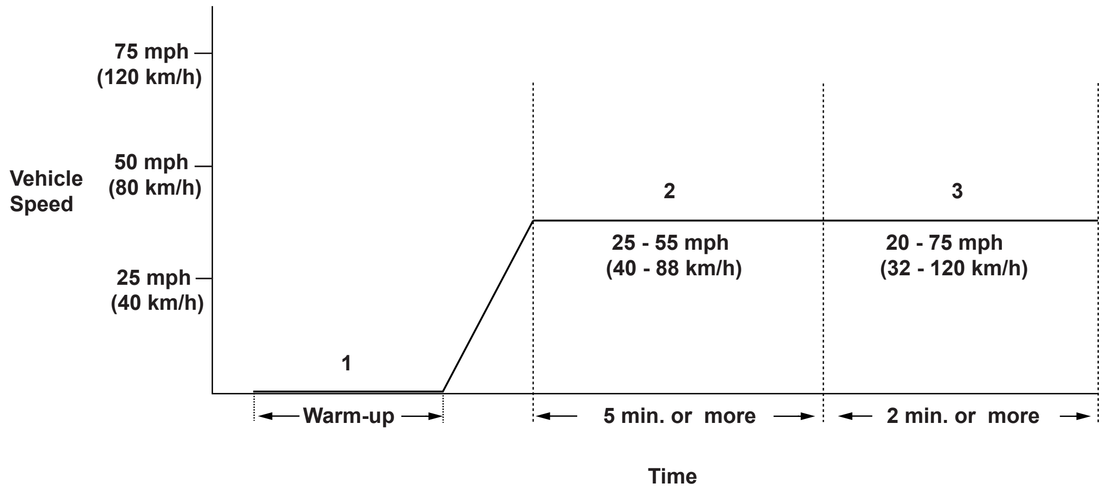
Condition	Minimum	Maximum
Elapsed time after starting the engine	120 seconds	—
Engine coolant temperature	122ºF (50ºC)	—
Intake air temperature	-14ºF (-25ºC)	—
Engine speed	1,300 rpm	3,300 rpm
MAP value	26 kPa (190 mmHg, 7.5 in.Hg)	—
Vehicle speed	19 mph (30 km/h)	—
Fuel trim	0.71	1.35
Fuel feedback	Closed loop at stoichiometric	
Monitoring priority	A/F Sensor, EVAP, Catalyst System	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S Heater, MAP, ECT, TP, IAT, VSS, EGR, VTEC System, Fuel System, ECM Back-up	

Malfunction Threshold

Secondary HO2S output voltage (x) remains in Zone 2 or Zone 3.

ZONE 2	0.29 V < x < 0.61 V
ZONE 3	0.61 V < x < 0.80 V

Driving Pattern



P0137-0054

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Then, drive immediately at a steady speed between 20 - 75 mph (32 - 120 km/h) for at least 2 minutes.

- If the EVAP monitor runs instead of the HO2S monitor, turn the engine off, then restart it, and the HO2S monitor will restart.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

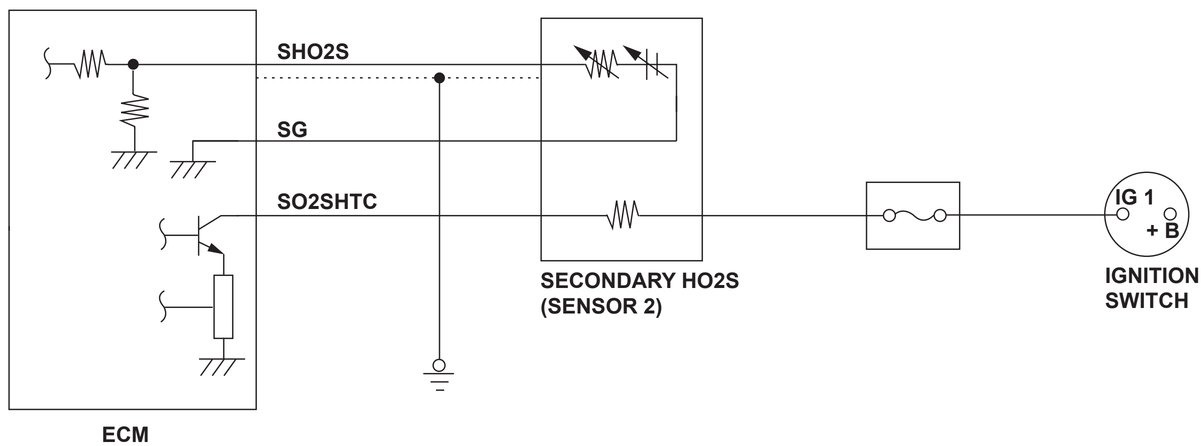
Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

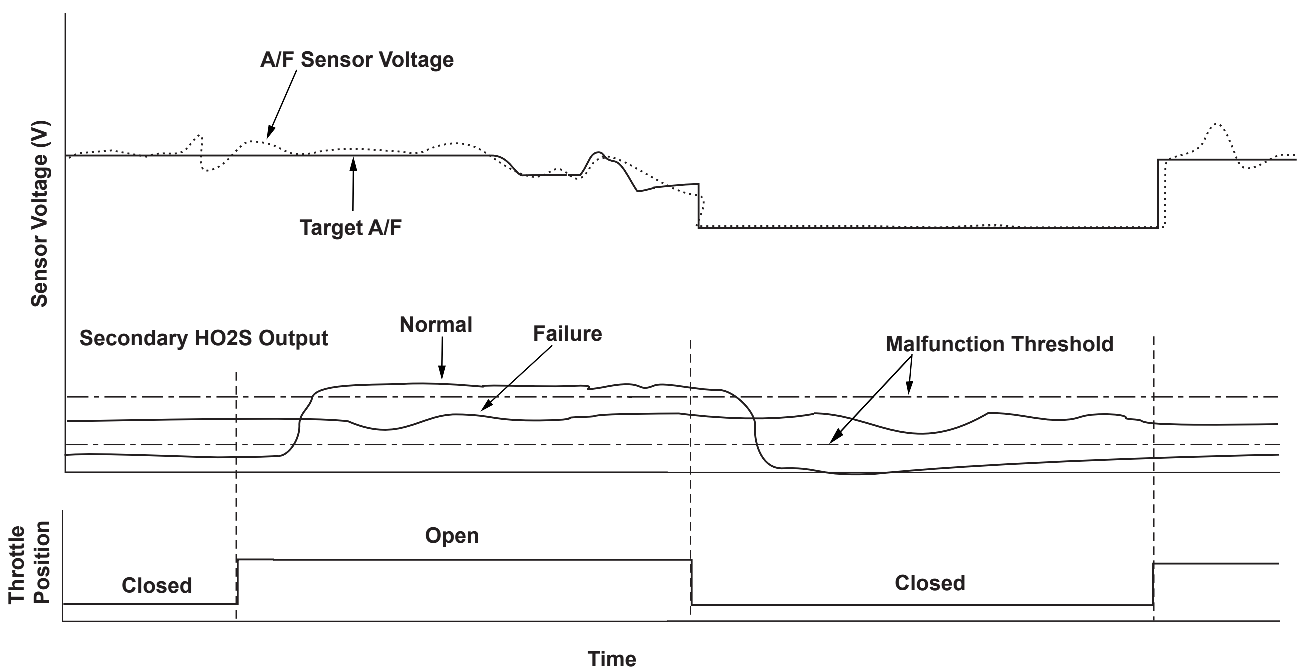
Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0139: Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) Circuit Slow Response (CVT)



P0139-9601



P0139-0071

General Description

The secondary heated oxygen sensor (HO2S) (Sensor 2) detects the oxygen content in the exhaust gas downstream of the three way catalytic converter (TWC) during stoichiometric air/fuel ratio feedback control based on the primary heated oxygen sensor (HO2S) (Sensor 1) output voltage. The secondary HO2S controls the air/fuel ratio from the primary HO2S output voltage, so the TWC efficiency is optimized. The characteristics of the secondary HO2S output voltage are identical to the primary HO2S output voltage.
If the HO2S output remains in the middle range under normal driving conditions after deceleration with the throttle valve fully closed, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	6*, 40** seconds or less
DTC Type	Two drive cycles, MIL ON

* : At the time of the deceleration test.
** : At the time of the gradual acceleration or the test-drive at a constant speed.

Enable Conditions

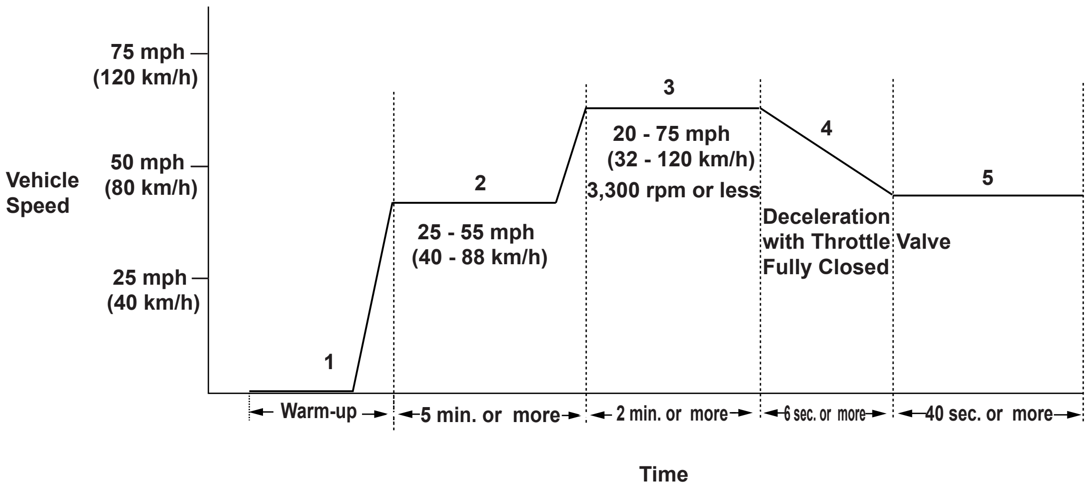
Condition	Minimum	Maximum
Elapsed time after starting the engine	128 seconds	—
Engine coolant temperature	140ºF (60ºC)	—
Intake air temperature	-13ºF (-25ºC)	—
Engine speed	*	3,300 rpm
Fuel trim	0.71	1.35
Fuel feedback	During deceleration or closed loop at stoichiometric after deceleration	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S Heater, MAP, ECT, TP, IAT, EGR, VTEC System, Fuel System, ECM Back-up, A/T System	

* : Not more than 2 seconds have elapsed since the engine speed reached 0 rpm, or the auto idle stop system is in operation.

Malfunction Threshold

The secondary HO2S output voltage is between 0.30 V and 0.80 V.

Driving Pattern



P0137-0150

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Then, drive immediately at a steady speed between 20 - 75 mph (32 - 120 km/h) with an engine speed of 3,300 rpm or less for at least 2 minutes.
4. Decelerate with the throttle valve fully closed for at least 6 seconds.
5. Accelerate gradually or drive at a steady speed (do not decelerate) for at least 40 seconds.

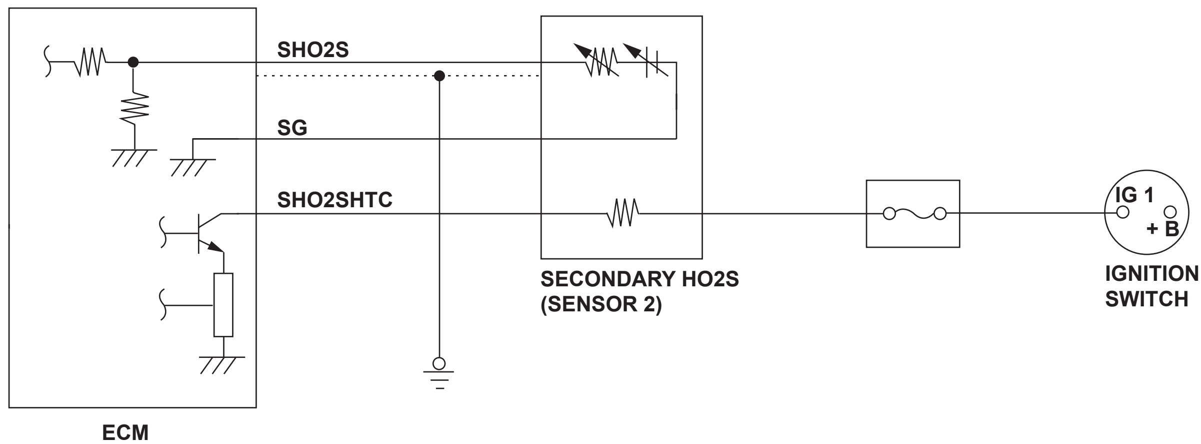
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0141: Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) Heater Circuit Malfunction



P0137-0001

General Description

A heater for the zirconia element is embedded in the secondary heated oxygen sensor (secondary HO2S), and it is controlled by the engine control module (ECM). When activated, it heats the sensor to stabilize and speed up the detection of oxygen content when the exhaust gas temperature is cold.
If the secondary HO2S heater draws more or less than a specified amperage, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	41ºF (5ºC)	—
Battery voltage (IGP terminal of ECM)	10.5 V	16 V
State of the engine	Running	
No active DTCs	Secondary HO2S Heater, ECT	
Other	During secondary HO2S heater operation	

Malfunction Threshold

The current is 0.4 A*1, 0.2 A*2 or less, or 6.0 A*1, 3.4 A*2 or more, for at least 5 seconds when the heater is on.
*1: CVT
*2: M/T

Driving Pattern

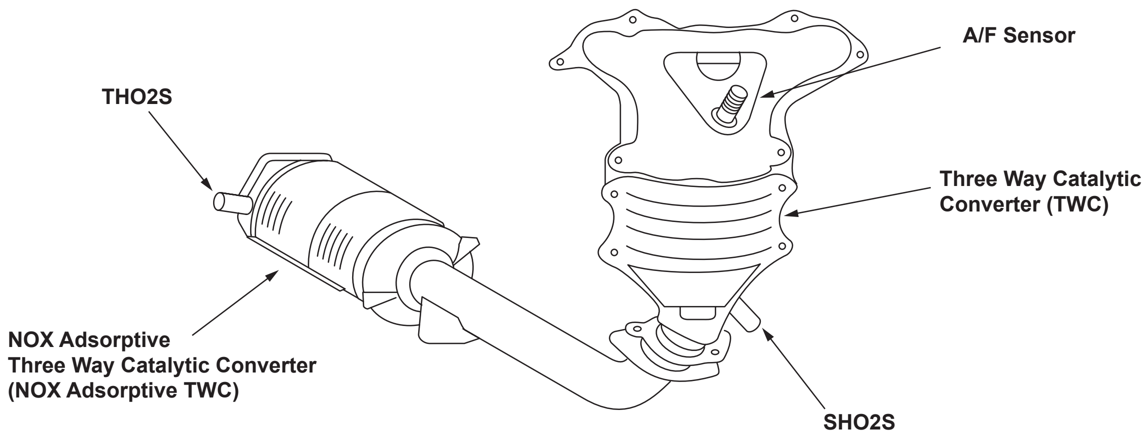
Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.

Diagnosis Details

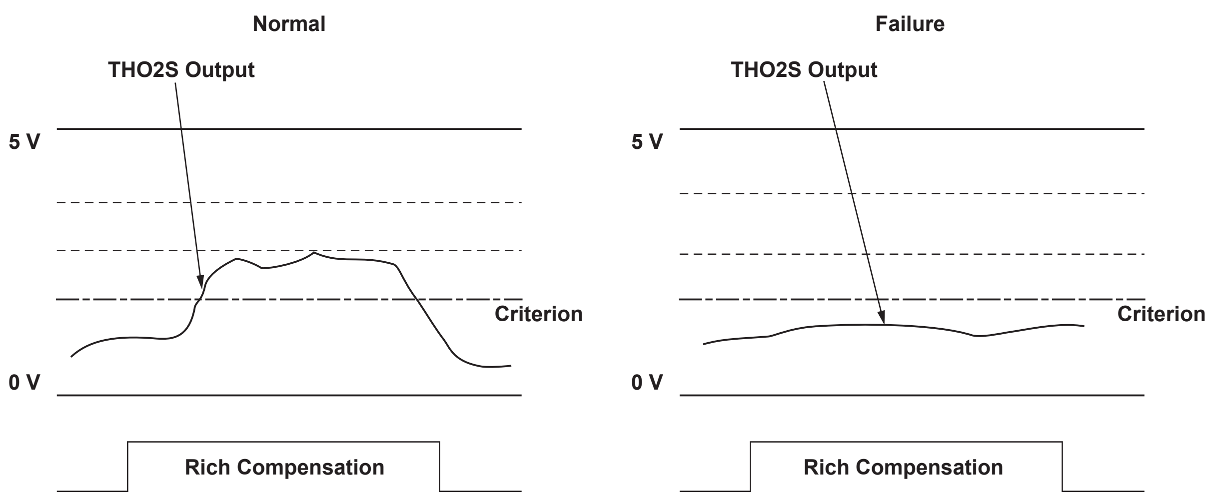
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0143: Third Heated Oxygen Sensor (Third HO2S) (Sensor 3) Circuit Low Voltage (M/T)



P0143-0271



P0143-0272

General Description

The third heated oxygen sensor (THO2S) is installed downstream of the NOX adsorptive three way catalyst (TWC) and is used only to determine a malfunction in the NOX adsorptive TWC. If the THO2S output is not on the rich side during a rich running mode, a malfunction is detected and a DTC is stored. If the THO2S output stays on the low side, it may be caused by a sensor failure or a short in the THO2S circuit.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	50 seconds* or less
DTC Type	Two drive cycles, MIL ON

* : At 2,000 rpm

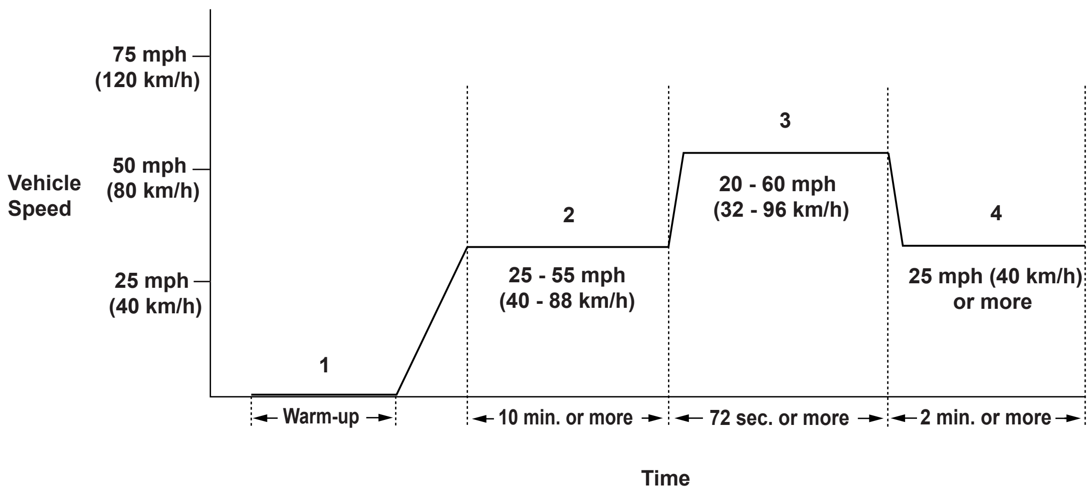
Enable Conditions

<table>
<tr><th colspan="2">Condition</th><th>Minimum</th><th>Maximum</th></tr>
<tr><td colspan="2">Elapsed time after starting the engine</td><td>605 seconds</td><td>—</td></tr>
<tr><td colspan="2">Engine coolant temperature</td><td>168ºF (76ºC)</td><td>—</td></tr>
<tr><td colspan="2">Engine speed</td><td>1,500 rpm</td><td>2,600 rpm</td></tr>
<tr><td colspan="2">MAP value</td><td>35 kPa (260 mmHg, 10.3 in.Hg)</td><td>99 kPa (736 mmHg, 29.0 in.Hg)</td></tr>
<tr><td rowspan="2">The difference between atmospheric pressure and MAP value</td><td>1,500 rpm</td><td>8 kPa (54 mmHg, 2.2 in.Hg)</td><td rowspan="2">—</td></tr>
<tr><td>2,600 rpm</td><td>11 kPa (81 mmHg, 3.2 in.Hg)</td></tr>
<tr><td colspan="2">Vehicle speed</td><td>25 mph (40 km/h)</td><td>—</td></tr>
<tr><td colspan="2">Short term fuel trim</td><td>—</td><td>0.98</td></tr>
<tr><td colspan="2">Fuel feedback</td><td colspan="2">During lean burn running</td></tr>
<tr><td colspan="2">Monitoring priority</td><td colspan="2">Catalyst System, A/F Sensor, EVAP</td></tr>
<tr><td colspan="2">No active DTCs</td><td colspan="2">ECM, A/F Sensor, A/F Sensor Heater, Third HO2S Heater, MAP, CKP, ECT, TP, EGR, BARO, VSS, VTEC System, Fuel System, EVAP</td></tr>
<tr><td colspan="2" rowspan="3">Others</td><td colspan="2">Must be in 3rd, 4th, or 5th gear</td></tr>
<tr><td colspan="2">The duration of lean burn running must be sufficient (at least 1 minute)</td></tr>
<tr><td colspan="2">The IMA battery indicates at least 25%</td></tr>
</table>

Malfunction Threshold

The third HO2S output is 0.29 V or less during a rich running mode for no more than 50 seconds.

Driving Pattern



P0143-0251

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 10 minutes to warm up the engine and the NOX adsorptive TWC.
3. Drive the vehicle at a speed between 20 - 60 mph (32 - 96 km/h) for at least 72 seconds.
4. Then, drive at a steady speed of 25 mph (40 km/h) or more in the lean burn running mode for at least 2 minutes.

- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

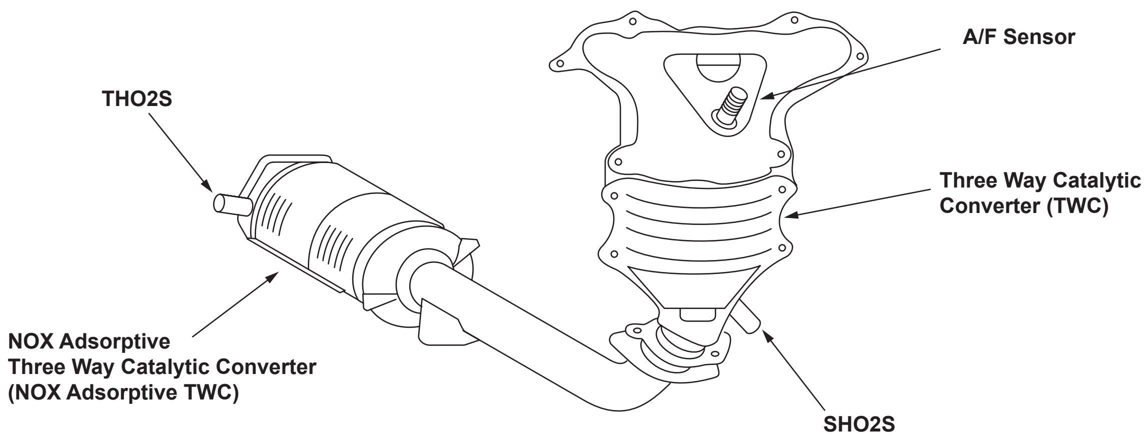
Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

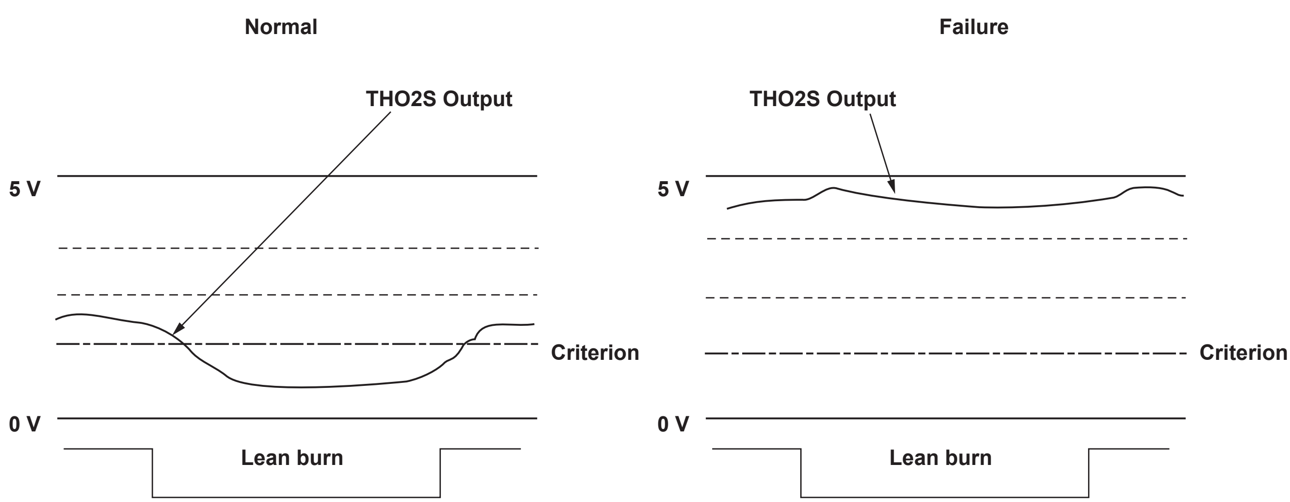
Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0144: Third Heated Oxygen Sensor (Third HO2S) (Sensor 3) Circuit High Voltage (M/T)



P0143-0271



P0144-0271

General Description

The third heated oxygen sensor (THO2S) is installed downstream of the NOX adsorptive three way catalyst (TWC) and is used only to determine a malfunction in the NOX adsorptive TWC. If the THO2S output is not on the lean side during lean burn running, a malfunction is detected and a DTC is stored. If the THO2S output stays on the high side, it may be caused by a sensor failure or a short in the THO2S circuit.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	50 seconds* or less
DTC Type	Two drive cycles, MIL ON

* : At 2,000 rpm

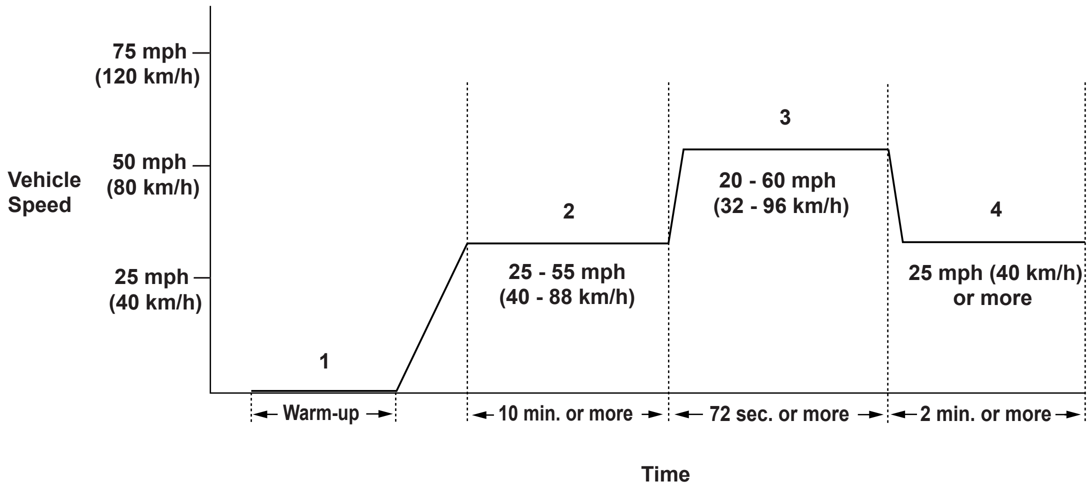
Enable Conditions

Condition		Minimum	Maximum
Elapsed time after starting the engine		605 seconds	—
Engine coolant temperature		168ºF (76ºC)	—
Engine speed		1,500 rpm	2,600 rpm
MAP value		35 kPa (260 mmHg, 10.3 in.Hg)	99 kPa (736 mmHg, 29.0 in.Hg)
The difference between atmospheric pressure and MAP value	1,500 rpm	8 kPa (54 mmHg, 2.2 in.Hg)	—
	2,600 rpm	11 kPa (81 mmHg, 3.2 in.Hg)	
Vehicle speed		25 mph (40 km/h)	—
Short term fuel trim		—	0.98
Fuel feedback		During lean burn running	
Monitoring priority		Catalyst System, A/F Sensor, EVAP	
No active DTCs		ECM, A/F Sensor, A/F Sensor Heater, Third HO2S Heater, MAP, CKP, ECT, TP, EGR, BARO, VSS, VTEC System, Fuel System, EVAP	
Others		Must be in 3rd, 4th, or 5th gear	
		The duration of lean burn running must be sufficient (at least 1 minute)	
		The IMA battery indicates at least 25%	

Malfunction Threshold

The third HO2S output is 2.50 V or more during a lean burn running mode for no more than 50 seconds.

Driving Pattern



P0143-0251

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 10 minutes to warm up the engine and the NOX adsorptive TWC.
3. Drive the vehicle at a speed between 20 - 60 mph (32 - 96 km/h) for at least 72 seconds.
4. Then, drive at a steady speed of 25 mph (40 km/h) or more in the lean burn running mode for at least 2 minutes.

- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL

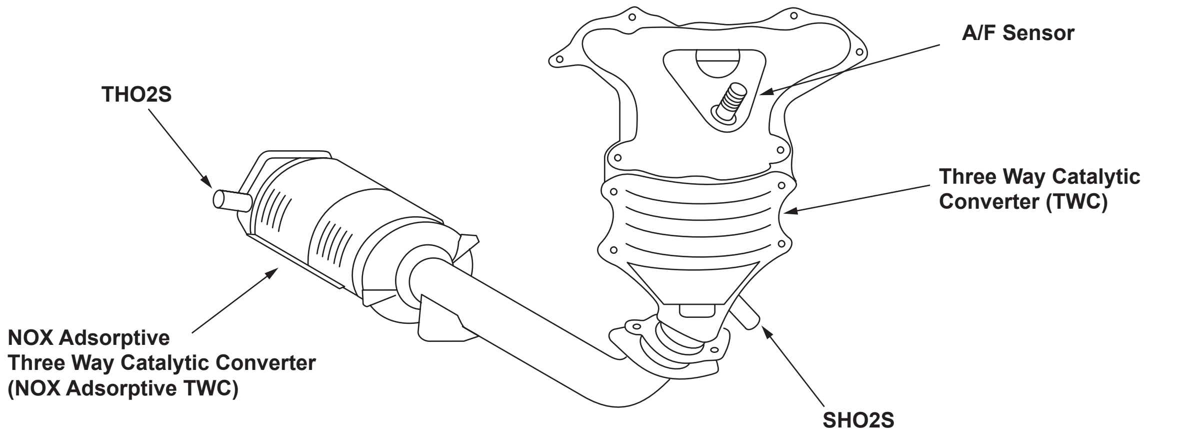
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

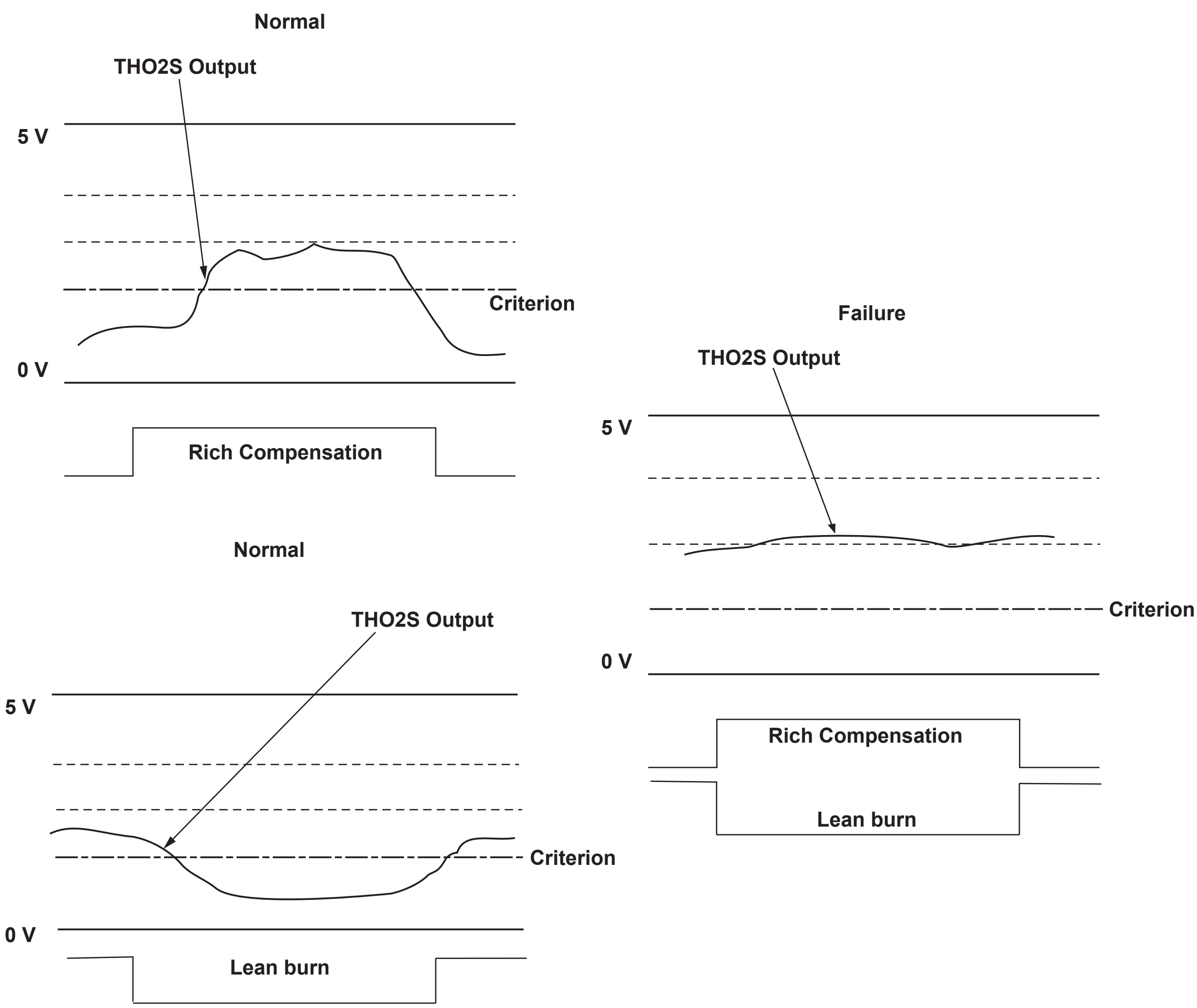
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0145: Third Heated Oxygen Sensor (Third HO2S) (Sensor 3) Circuit Slow Response (M/T)



P0143-0271



P0145-0271

General Description

The third heated oxygen sensor (THO2S) is installed downstream of the NOX adsorptive three way catalyst (TWC) and is used only to determine a malfunction in the NOX adsorptive TWC. If the THO2S output is not on the lean side during lean burn running, a malfunction is detected and a DTC is stored. That is, if the THO2S output does not change to the lean side nor rich side during enrichment (during lean burn running), a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	50 seconds* or less
DTC Type	Two drive cycles, MIL ON

* : At 2,000 rpm

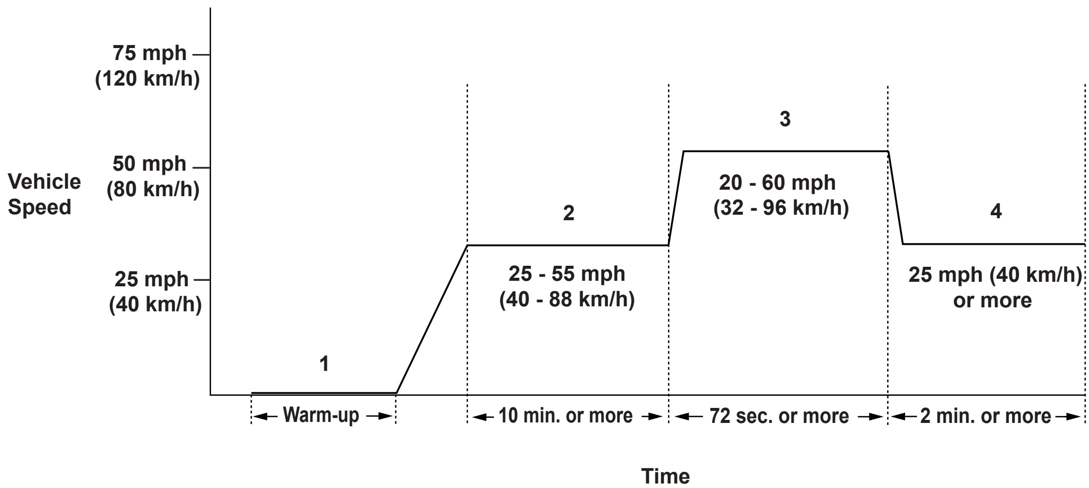
Enable Conditions

Condition		Minimum	Maximum
Elapsed time after starting the engine		605 seconds	—
Engine coolant temperature		168°F (76°C)	—
Engine speed		1,500 rpm	2,600 rpm
MAP value		35 kPa (260 mmHg, 10.3 in.Hg)	99 kPa (736 mmHg, 29.0 in.Hg)
The difference between atmospheric pressure and MAP value	1,500 rpm	8 kPa (54 mmHg, 2.2 in.Hg)	—
	2,600 rpm	11 kPa (81 mmHg, 3.2 in.Hg)	
Vehicle speed		25 mph (40 km/h)	—
Short term fuel trim		—	0.98
Fuel feedback		During lean burn running	
Monitoring priority		Catalyst System, A/F Sensor, EVAP	
No active DTCs		ECM, A/F Sensor, A/F Sensor Heater, Third HO2S Heater, MAP, CKP, ECT, TP, EGR, BARO, VSS, VTEC System, Fuel System, EVAP	
Others		Must be in 3rd, 4th, or 5th gear	
		The duration of lean burn running must be sufficient (at least 1 minute)	
		The IMA battery indicates at least 25%	

Malfunction Threshold

The third HO2S output is between 0.29 V and 0.6 V during enrichment, or between 0.6 V and 2.5 V during lean burn running, for no more than 50 seconds.

Driving Pattern



P0143-0251

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 10 minutes to warm up the engine and the NOX adsorptive TWC.
3. Drive the vehicle at a speed between 20 - 60 mph (32 - 96 km/h) for at least 72 seconds.
4. Then, drive at a steady speed of 25 mph (40 km/h) or more in the lean burn running mode for at least 2 minutes.

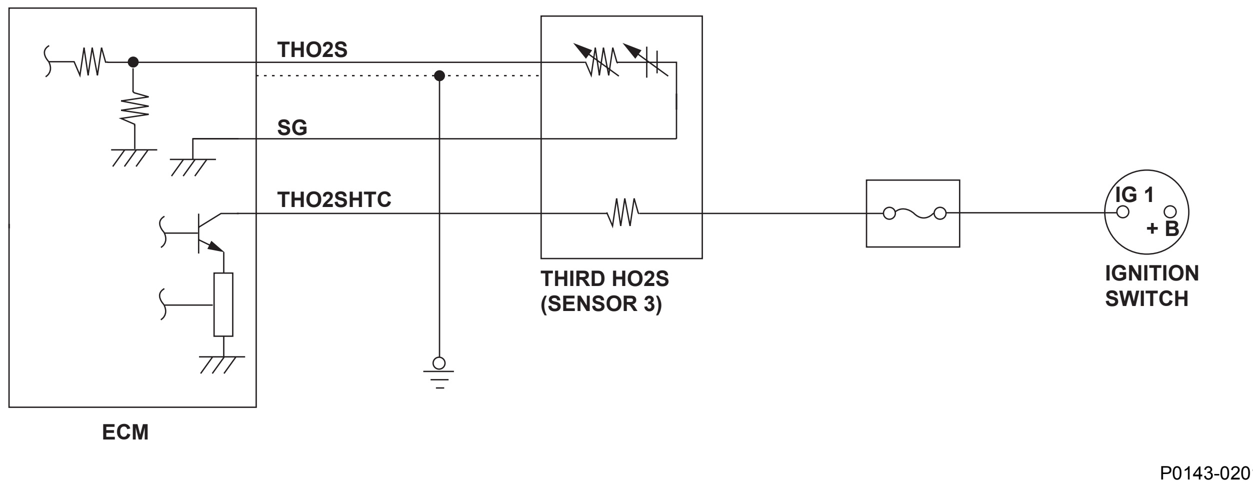
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0147: Third Heated Oxygen Sensor (Third HO2S) (Sensor 3) Heater Circuit Malfunction (M/T)



General Description

A heater for the zirconia element is embedded in the third heated oxygen sensor (third HO2S) and is controlled by the engine control module (ECM). It is activated and heats the sensor to stabilize and speed the detection of oxygen content when the exhaust gas temperature is cold.
If the third HO2S heater draws more or less than a specified amperage, the ECM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	41ºF (5ºC)	—
Battery voltage (IGP terminal of ECM)	10.5 V	16 V
State of the engine	Running	
No active DTCs	Third HO2S Heater, ECT	
Other	During third HO2S heater operation	

Malfunction Threshold

The current is 0.1 A or less, or 3.5 A or more, for at least 5 seconds when the heater is on.

Driving Pattern

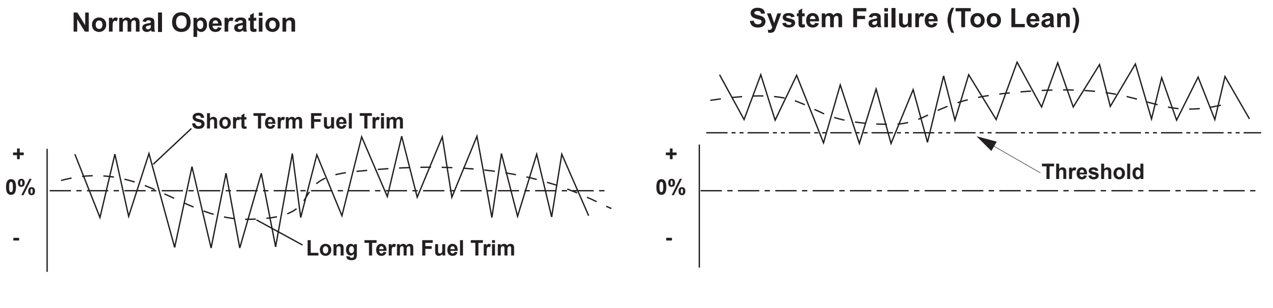
Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0171: Fuel System Too Lean



P0171-9671

General Description

The engine control module (ECM) detects the oxygen content in the exhaust gas from the primary heated oxygen sensor (HO2S) (Sensor 1) signal voltage, and it performs fuel feedback control to maintain the optimal air/fuel ratio. The air/fuel ratio coefficient for correcting the amount of injected fuel is the short term fuel trim. The ECM varies short term fuel trim continuously to keep the air/fuel ratio close to the stoichiometric ratio for all driving conditions.

Long term fuel trim is computed from short term fuel trim and is used to regulate long term deviation from the stoichiometric air/fuel ratio, which occurs when fuel metering components deteriorate with age or system failures occur. In addition, long term fuel trim is stored in the ECM memory and is used to determine when fuel metering components malfunction. When long term fuel trim is higher than normal, which is about 1.0 (0%), the amount of injected fuel must be increased, and when lower than normal, it must be decreased. If long term fuel trim is higher than normal (too lean), a malfunction in the fuel metering components is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	Two drive cycles, MIL ON

Enable Conditions

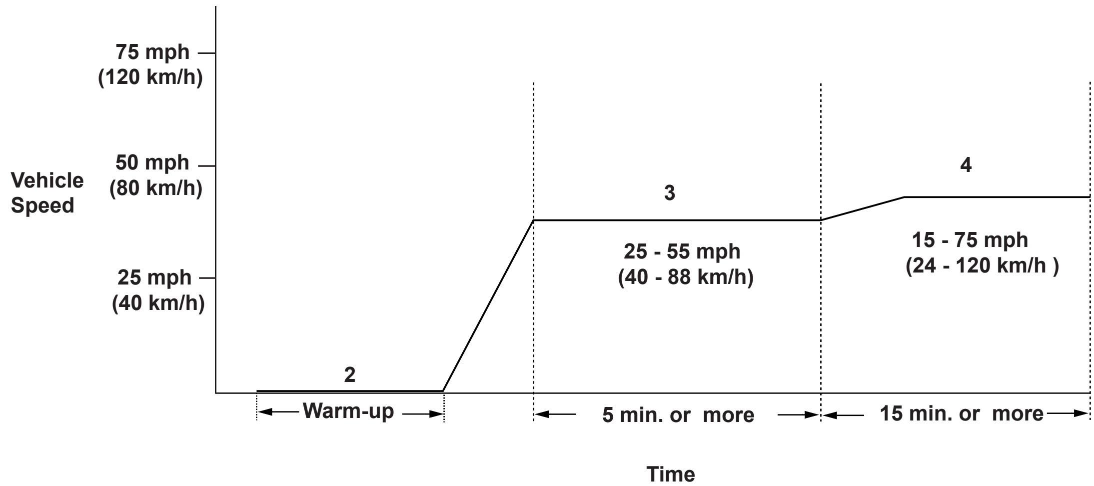
Condition	Minimum	Maximum
Engine coolant temperature	158ºF (70ºC)	—
Intake air temperature	20ºF (-7ºC)	—
Engine speed	800 rpm	4,000 rpm
MAP value	20 kPa (150 mmHg, 5.9 in.Hg)	—
Fuel feedback	Closed loop	
Monitoring priority	Catalyst System, EVAP	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, MAP, ECT, TP*1, IAT, EGR, BARO, VTEC System	
Other	Other than when there is excessive vapor generation (fuel level is 40 - 80%)	

*1: CVT

Malfunction Threshold

Long term fuel trim is higher than 1.17 (+17%).

Driving Pattern



P0171-9651

1. Connect a scan tool to the vehicle.
2. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
3. Drive at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
4. Then, drive at a steady speed between 15 - 75 mph (24 - 120 km/h) for at least 15 minutes, and watch the long term fuel trim. If the long term fuel trim stays at about 1.0, the vehicle is OK or it is a very minor problem. If a significant fault is still present, the long term fuel trim will move up or down while driving.

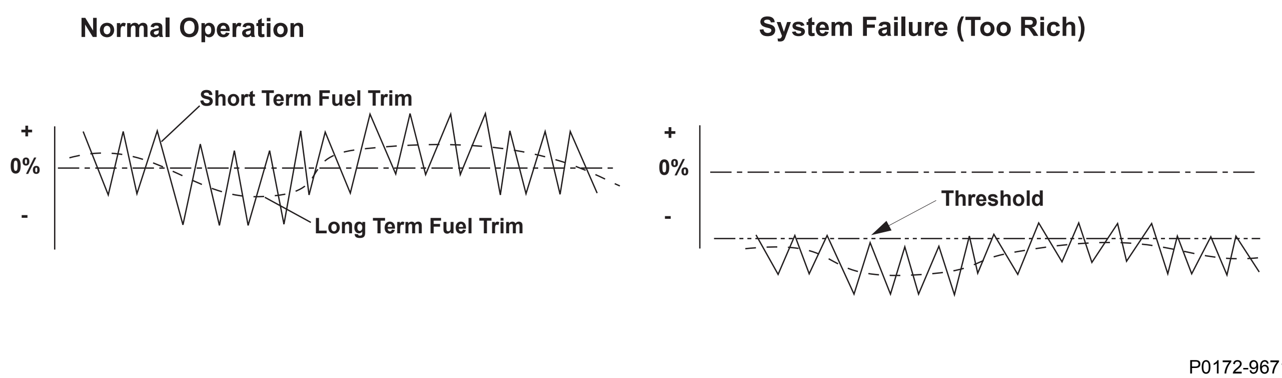
- When freeze frame data is stored, drive the vehicle under those conditions instead of Driving Pattern 4.
- If the EVAP monitor runs instead of the HO2S monitor, turn the engine off, then restart it, and the HO2S monitor will restart.
- After clearing the DTC by disconnecting the battery or using the scan tool, drive at a speed between 25 - 55 mph (40 - 88 km/h) instead of Driving Pattern 3 for 40 minutes or longer to allow time for long term fuel trim to recover.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive drive cycles in which the engine conditions are similar to the first time the malfunction was detected.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0172: Fuel System Too Rich



General Description

The engine control module (ECM) detects the oxygen content in the exhaust gas from the primary heated oxygen sensor (HO2S) (Sensor 1) signal voltage, and it performs fuel feedback control to maintain the optimal air/fuel ratio. The air/fuel ratio coefficient for correcting the amount of injected fuel is the short term fuel trim. The ECM varies short term fuel trim continuously to keep the air/fuel ratio close to the stoichiometric ratio for all driving conditions. Long term fuel trim is computed from short term fuel trim and is used to regulate long term deviation from the stoichiometric air/fuel ratio, which occurs when fuel metering components deteriorate with age or system failures occur. In addition, long term fuel trim is stored in the ECM memory and is used to determine when fuel metering components malfunction. When long term fuel trim is higher than normal, which is about 1.0 (0%), the amount of injected fuel must be increased, and when lower than normal, it must be decreased. If long term fuel trim is lower than normal (too rich), a malfunction in the fuel metering components is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	Two drive cycles, MIL ON

Enable Conditions

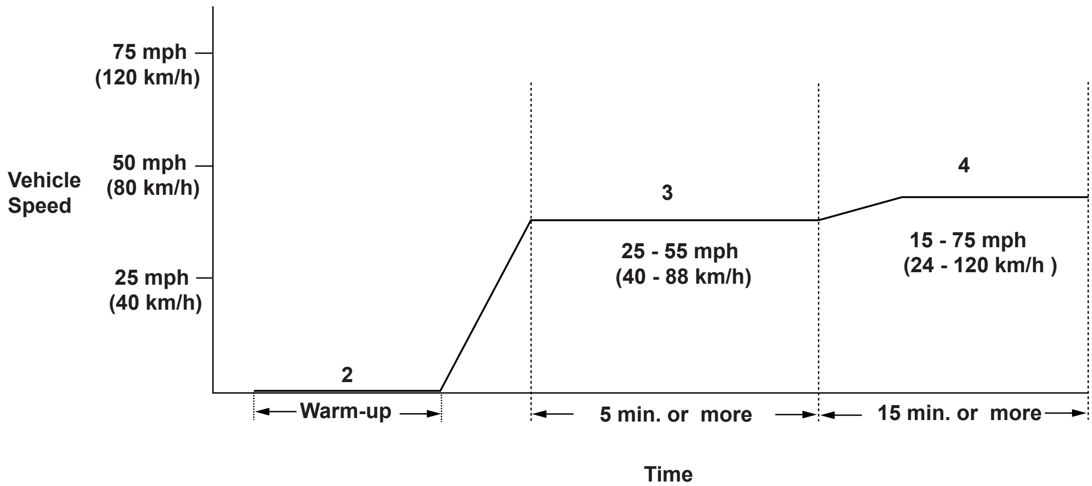
Condition	Minimum	Maximum
Engine coolant temperature	158ºF (70ºC)	—
Intake air temperature	20ºF (-7ºC)	—
Engine speed	800 rpm	4,000 rpm
MAP value	20 kPa (150 mmHg, 5.9 in.Hg)	—
Fuel feedback	Closed loop	
Monitoring priority	Catalyst System, EVAP	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, MAP, ECT, TP*1, IAT, EGR, BARO, VTEC System	
Other	Other than when there is excessive vapor generation (fuel level is 40 - 80%)	

*1: CVT

Malfunction Threshold

Long term fuel trim is lower than 0.82 (-18%).

Driving Pattern



P0171-9651

1. Connect a scan tool to the vehicle.
2. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
3. Drive at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
4. Then, drive at a steady speed between 15 - 75 mph (24 - 120 km/h) for at least 15 minutes, and watch the long term fuel trim. If the long term fuel trim stays at about 1.0, the vehicle is OK or it is a very minor problem. If a significant fault is still present, the long term fuel trim will move up or down while driving.

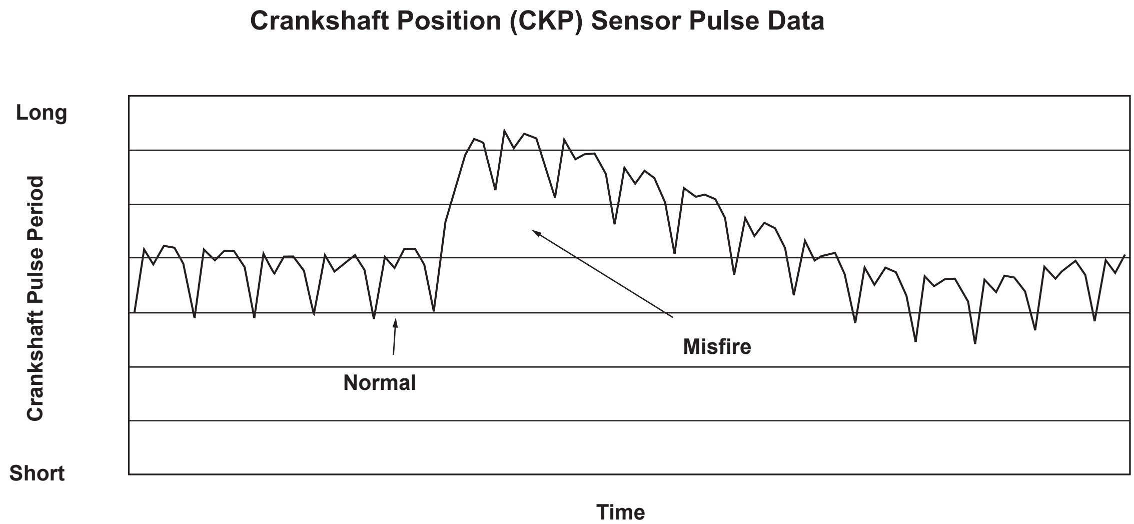
- When freeze frame data is stored, drive the vehicle under those conditions instead of Driving Pattern 4.
- If the EVAP monitor runs instead of the HO2S monitor, turn the engine off, then restart it, and the HO2S monitor will restart.
- After clearing the DTC by disconnecting the battery or using the scan tool, drive at a speed between 25 - 55 mph (40 - 88 km/h) instead of Driving Pattern 3 for 40 minutes or longer to allow time for long term fuel trim to recover.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive drive cycles in which the engine conditions are similar to the first time the malfunction was detected.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0300: Random Misfire



P0301-9671

General Description

The crankshaft vibrates slightly when each cylinder fires. If a misfire occurs, the crankshaft rotation speed changes rapidly. The engine control module (ECM) monitors the crankshaft rotation speed based on the output pulses from the crankshaft position (CKP) sensor. By monitoring changes in the crankshaft rotation speed, the ECM counts the number of misfires and determines which cylinder is misfiring. If more than one DTC from P0301 through P0303 has been stored simultaneously while misfires in multiple cylinders are detected, a malfunction is detected and a DTC is stored.
There are two types of misfire detection.
Type 1 (1 drive cycle): When the number of misfires per 200 engine revolutions reaches the level that damages the three way catalyst (TWC), a DTC is stored and the MIL blinks. When the misfire ceases, the MIL remains on steady instead of blinking.
Type 2 (2 drive cycles): When the number of misfires per 1,000 engine revolutions reaches the level that affects exhaust emissions, a DTC is stored and the MIL illuminates.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One or two drive cycles, MIL ON*

* : See diagnosis details.

Enable Conditions

<table>
<tr><th colspan="3">Condition</th><th>Minimum</th><th>Maximum</th></tr>
<tr><td colspan="3">Engine coolant temperature</td><td>14ºF (-10ºC)</td><td>—</td></tr>
<tr><td colspan="3">Intake air temperature</td><td>14ºF (-10ºC)</td><td>—</td></tr>
<tr><td colspan="3" rowspan="2">Engine speed</td><td>500 rpm*1</td><td rowspan="2">6,000 rpm</td></tr>
<tr><td>750 rpm*2</td></tr>
<tr><td rowspan="10">MAP value</td><td rowspan="4">Stopped</td><td rowspan="2">500 rpm</td><td>22 kPa (161 mmHg, 6.4 in.Hg)*1</td><td rowspan="4">—</td></tr>
<tr><td>26 kPa (191 mmHg, 7.6 in.Hg)*2</td></tr>
<tr><td rowspan="2">3,000 rpm</td><td>20 kPa (148 mmHg, 5.9 in.Hg)*1</td></tr>
<tr><td>24 kPa (175 mmHg, 6.9 in.Hg)*2</td></tr>
<tr><td rowspan="4">Driving (other than lean burn)</td><td rowspan="2">500 rpm</td><td>51 kPa (376 mmHg, 14.8 in.Hg)*1</td><td rowspan="4">—</td></tr>
<tr><td>25 kPa (188 mmHg, 7.4 in.Hg)*2</td></tr>
<tr><td rowspan="2">3,000 rpm</td><td>30 kPa (220 mmHg, 8.7 in.Hg)*1</td></tr>
<tr><td>34 kPa (253 mmHg, 10.0 in.Hg)*2</td></tr>
<tr><td rowspan="2">Driving (lean burn)</td><td>500 rpm</td><td>51 kPa (376 mmHg, 14.8 in.Hg)*1</td><td rowspan="2">—</td></tr>
<tr><td>2,500 rpm</td><td>51 kPa (379 mmHg, 15.0 in.Hg)*1</td></tr>
<tr><td colspan="3">Fuel feedback</td><td colspan="2">Other than during fuel cut-off operation</td></tr>
<tr><td colspan="3">No active DTCs</td><td colspan="2">ECM, MAP, ECT, CKP, TP, IAT, BARO</td></tr>
<tr><td colspan="3" rowspan="2">Others</td><td colspan="2">Test-drive on a flat road to avoid misdetection</td></tr>
<tr><td colspan="2">Avoid abrupt acceleration, deceleration and turns</td></tr>
</table>

*1: M/T
*2: CVT

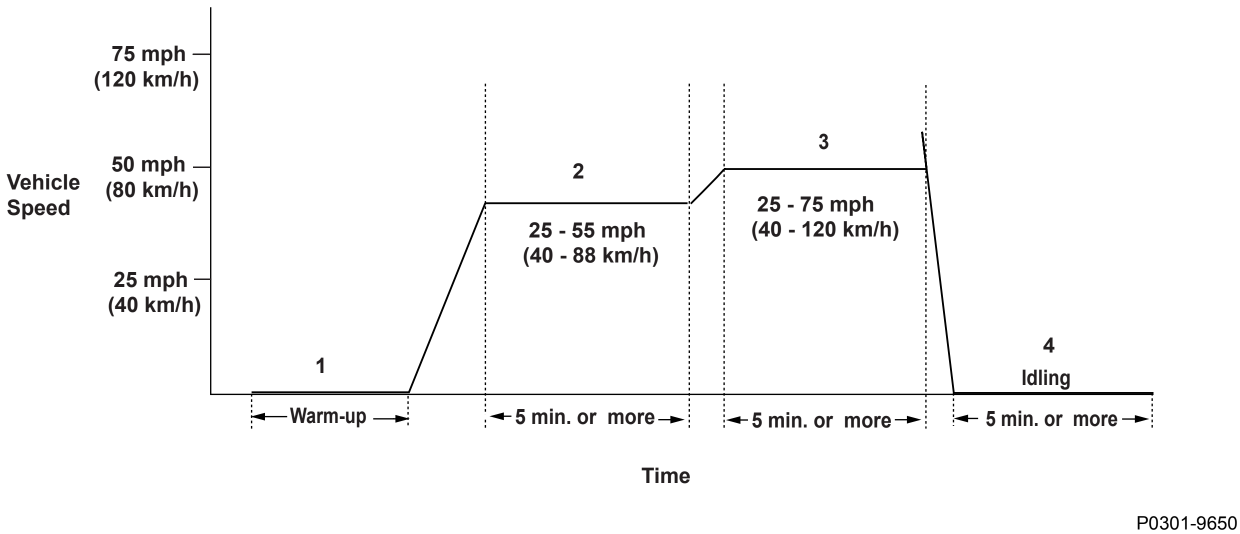
Malfunction Threshold

The number of misfires versus the number of engine revolutions is equal to or greater than the value in the table.

Misfire Type	The number of engine revolutions	The number of misfires
Misfire Type 1	Per 200 revolutions	20*1, 23*2 - 90*2, 95*1 times**
Misfire Type 2	Per 1,000 revolutions	30*2, 50*1 times

** : Depending on engine speed and load.

Driving Pattern



1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. To test while driving, drive at a steady speed between 25 - 75 mph (40 - 120 km/h) for at least 5 minutes.
4. To test at idle, stop the vehicle after step 2, and let the engine idle for at least 5 minutes.

- When freeze frame data is stored, drive the vehicle under those conditions instead of Driving Patterns 3 or 4.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL

Misfire Type 1: Under high rpm or high load conditions: The MIL blinks once per second if a type 1 misfire (catalyst damaging) occurs, and a Temporary DTC is stored. If the type 1 misfire ceases, the MIL goes off. If a type 1 misfire occurs during the next (second) drive cycle, the MIL blinks at the first misfire occurrence, and the DTC and the freeze frame data are stored. The MIL remains on steady if the type 1 misfire ceases.

Under normal driving conditions: The MIL blinks once per second if a type 1 misfire occurs the third time, and a Temporary DTC is stored. If a type 1 misfire occurs during the next (second) drive cycle, the MIL blinks during the third time of the type 1 misfire occurrence, and the DTC and the freeze frame data are stored. If the type 1 misfire ceases, the MIL remains on steady.

Misfire Type 2: When a type 2 misfire (emission-related but not severe enough to immediately damage the TWC) occurs within the first 1,000 crankshaft revolutions of engine start-up, a Temporary DTC is stored.

If a type 2 misfire occurs after the first 1,000 crankshaft revolutions of engine start-up, a Temporary DTC is stored during the fourth time of the type 2 misfire occurrence.

If a type 2 misfire occurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

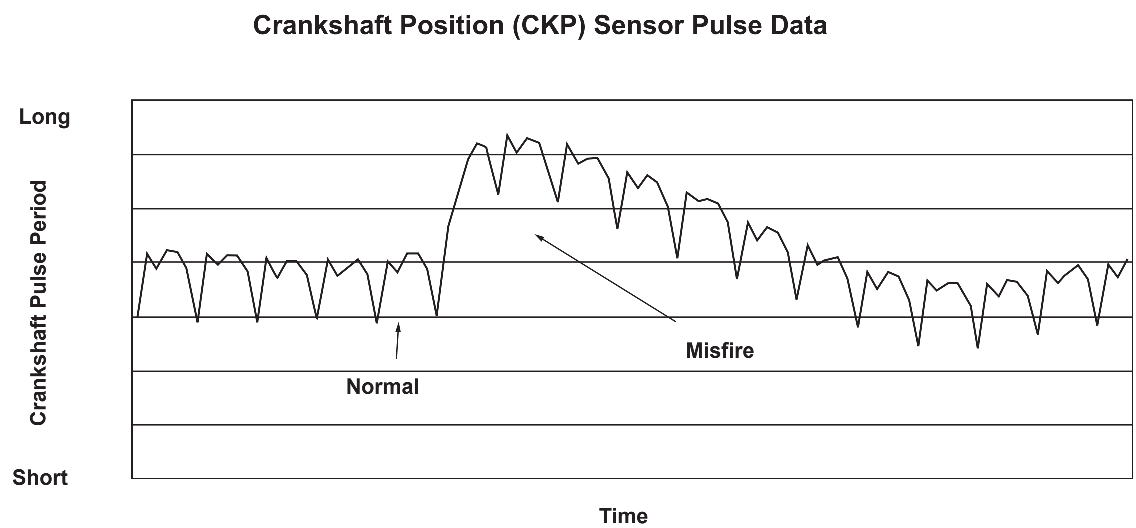
Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive drive cycles in which the engine conditions are similar to the first time the malfunction was detected.

The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0301: No. 1 Cylinder Misfire
DTC P0302: No. 2 Cylinder Misfire
DTC P0303: No. 3 Cylinder Misfire



P0301-9671

General Description

The crankshaft vibrates slightly when each cylinder fires. If a misfire occurs, the crankshaft rotation speed changes rapidly. The engine control module (ECM) monitors engine misfiring based on the output pulses from the crankshaft position (CKP) sensor, counts the number of misfires, and determines which cylinder is misfiring. If a misfire is detected, a DTC is stored. There are two types of misfire detection.

Type 1 (1 drive cycle): When the number of misfires per 200 engine revolutions reaches the level that damages the three way catalyst (TWC), a DTC is stored and the MIL blinks. When the misfire ceases, the MIL remains on steady instead of blinking.

Type 2 (2 drive cycles): When the number of misfires per 1,000 engine revolutions reaches the level that affects exhaust emissions, a DTC is stored and the MIL illuminates.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One or two drive cycles, MIL ON*

* : See diagnosis details.

Enable Conditions

Condition			Minimum	Maximum
Engine coolant temperature			14ºF (-10ºC)	—
Intake air temperature			14ºF (-10ºC)	—
Engine speed			500 rpm*1	6,000 rpm
			750 rpm*2	
MAP value	Stopped	500 rpm	22 kPa (161 mmHg, 6.4 in.Hg)*1	—
			26 kPa (191 mmHg, 7.6 in.Hg)*2	
		3,000 rpm	20 kPa (148 mmHg, 5.9 in.Hg)*1	
			24 kPa (175 mmHg, 6.9 in.Hg)*2	
	Driving (other than lean burn)	500 rpm	51 kPa (376 mmHg, 14.8 in.Hg)*1	—
			25 kPa (188 mmHg, 7.4 in.Hg)*2	
		3,000 rpm	30 kPa (220 mmHg, 8.7 in.Hg)*1	
			34 kPa (253 mmHg, 10.0 in.Hg)*2	
	Driving (lean burn)	500 rpm	51 kPa (376 mmHg, 14.8 in.Hg)*1	—
		2,500 rpm	51 kPa (379 mmHg, 15.0 in.Hg)*1	
Fuel feedback			Other than during fuel cut-off operation	
No active DTCs			ECM, MAP, ECT, CKP, TP, IAT, BARO	
Others			Abrupt acceleration or deceleration is not allowed	
			Test-drive on a flat road to avoid misdetection	

*1: M/T
*2: CVT

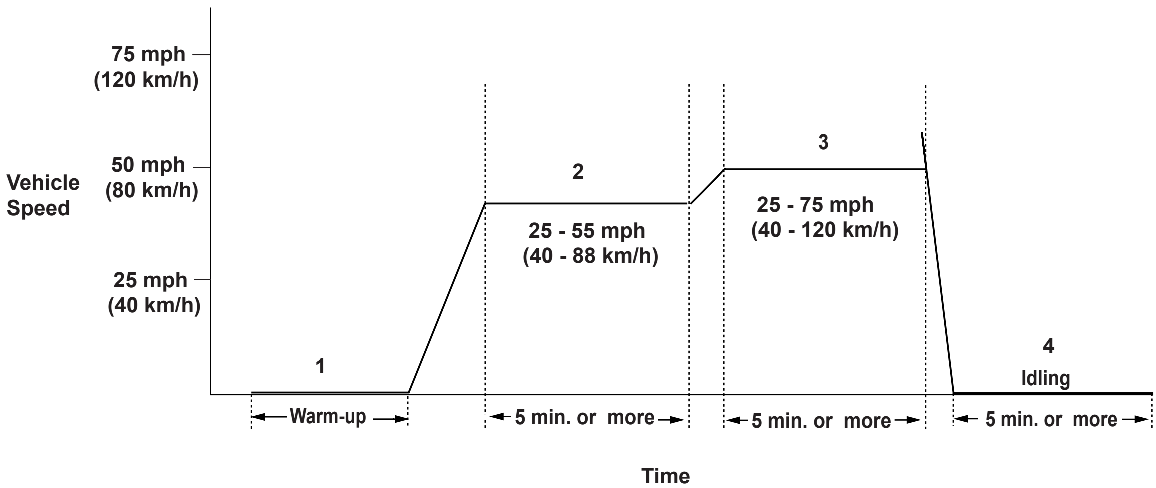
Malfunction Threshold

The number of misfires versus the number of engine revolutions is equal to or greater than the value in the table.

Misfire Type	The number of engine revolutions	The number of misfires
Misfire Type 1	Per 200 revolutions	20*1, 23*2 - 90*2, 95*1 times**
Misfire Type 2	Per 1,000 revolutions	30*2, 50*1 times

** : Depending on engine speed and load.

Driving Pattern



P0301-9650

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. To test while driving, drive at a steady speed between 25 - 75 mph (40 - 120 km/h) for at least 5 minutes.
4. To test at idle, stop the vehicle after step 2, and let the engine idle for at least 5 minutes.

- When freeze frame data is stored, drive the vehicle under those conditions instead of Driving Patterns 3 or 4.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL

Misfire Type 1: Under high rpm or high load conditions: The MIL blinks once per second if a type 1 misfire (catalyst damaging) occurs, and a Temporary DTC is stored. If the type 1 misfire ceases, the MIL goes off. If a type 1 misfire occurs during the next (second) drive cycle, the MIL blinks at the first misfire occurrence, and the DTC and the freeze frame data are stored. The MIL remains on steady if the type 1 misfire ceases.

Under normal driving conditions: The MIL blinks once per second if a type 1 misfire occurs the third time, and a Temporary DTC is stored. If a type 1 misfire occurs during the next (second) drive cycle, the MIL blinks during the third time of the type 1 misfire occurrence, and the DTC and the freeze frame data are stored. If the type 1 misfire ceases, the MIL remains on steady.

Misfire Type 2: When a type 2 misfire (emission-related but not severe enough to immediately damage the TWC) occurs within the first 1,000 crankshaft revolutions of engine start-up, a Temporary DTC is stored.

If a type 2 misfire occurs after the first 1,000 crankshaft revolutions of engine start-up, a Temporary DTC is stored during the fourth time of the type 2 misfire occurrence.

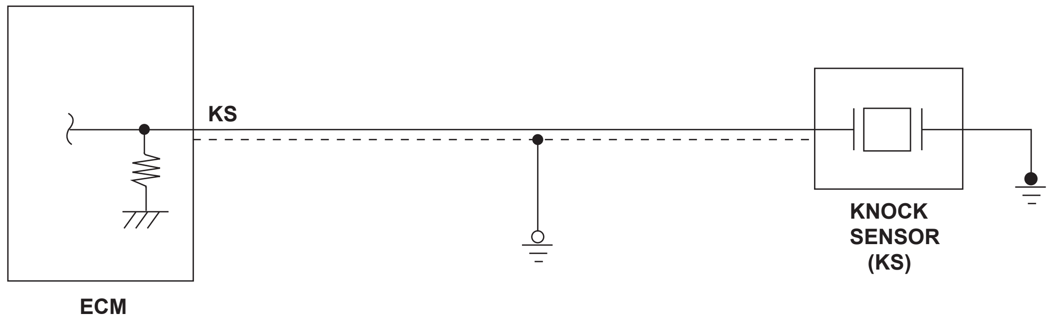
If a type 2 misfire occurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive drive cycles in which the engine conditions are similar to the first time the malfunction was detected.

The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0325: Knock Sensor (KS) Circuit Malfunction



P0325-0001

General Description

The knock sensor is mounted on the cylinder block and detects engine knocking. The vibration caused by knocking are converted into electrical signals through the piezo ceramic element. The engine control module (ECM) controls the ignition timing based on the electrical signals. If the signal from the knock sensor do not vary for a set time period, the ECM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine speed	1,700 rpm	—
Engine coolant temperature	—	140ºF (60ºC)
No active DTCs	KS, CKP, TDC, MAP, ECT, CYP, IAT, VTEC System	

Malfunction Threshold

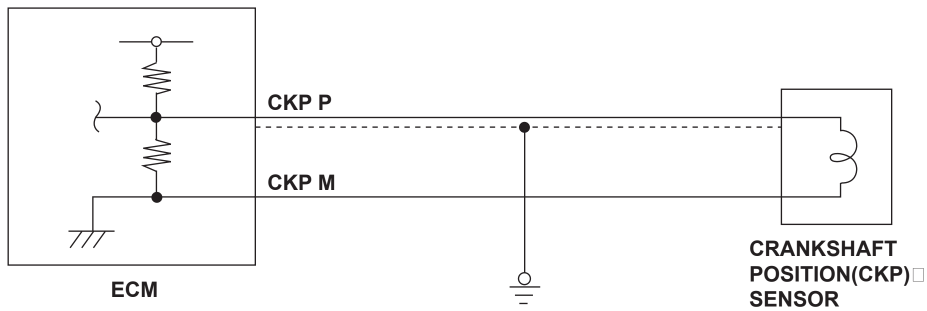
No signals from the KS are detected for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0335: Crankshaft Position (CKP) Sensor No Signal



P0335-0001

General Description

The crankshaft position (CKP) sensor consists of a rotor and a pick-up coil that detect rotor position. When the engine starts, the rotor turns and the magnetic flux in the pick-up coil changes. The changes of magnetic flux are converted into pulsing signals to the engine control module (ECM). The CKP sensor detects injection/ignition timing for each cylinder and the engine speed.
If no pulsing signals from the CKP sensor are detected, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
State of the engine	Running
No active DTCs	CKP, TDC

Malfunction Threshold

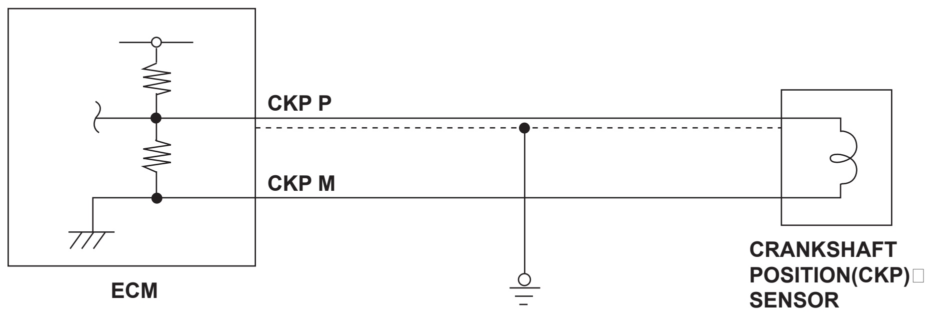
No CKP signal is detected 37 times in succession.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0336: Crankshaft Position (CKP) Sensor Intermittent Interruption



P0335-0001

General Description

The crankshaft position (CKP) sensor consists of a rotor and a pick-up coil that detect rotor position. When the engine starts, the rotor turns and the magnetic flux in the pick-up coil changes. The changes of magnetic flux are converted into pulsing signals to the engine control module (ECM). The CKP sensor detects injection/ignition timing for each cylinder and the engine speed.
If an abnormal amount of pulsing signals from the CKP sensor are detected, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine speed	500 rpm	—
No active DTCs	CKP, TDC	

Malfunction Threshold

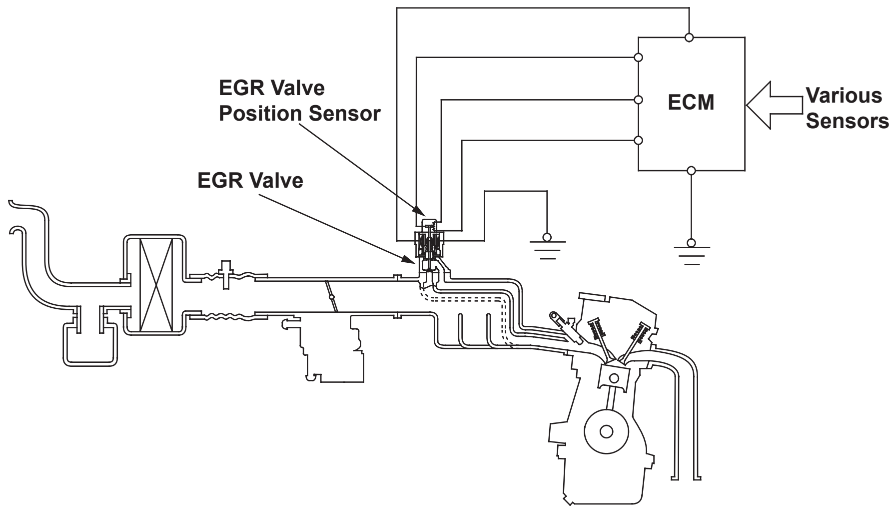
Other than eight CKP signals for each TDC signal are detected 30 times in succession.

Diagnosis Details

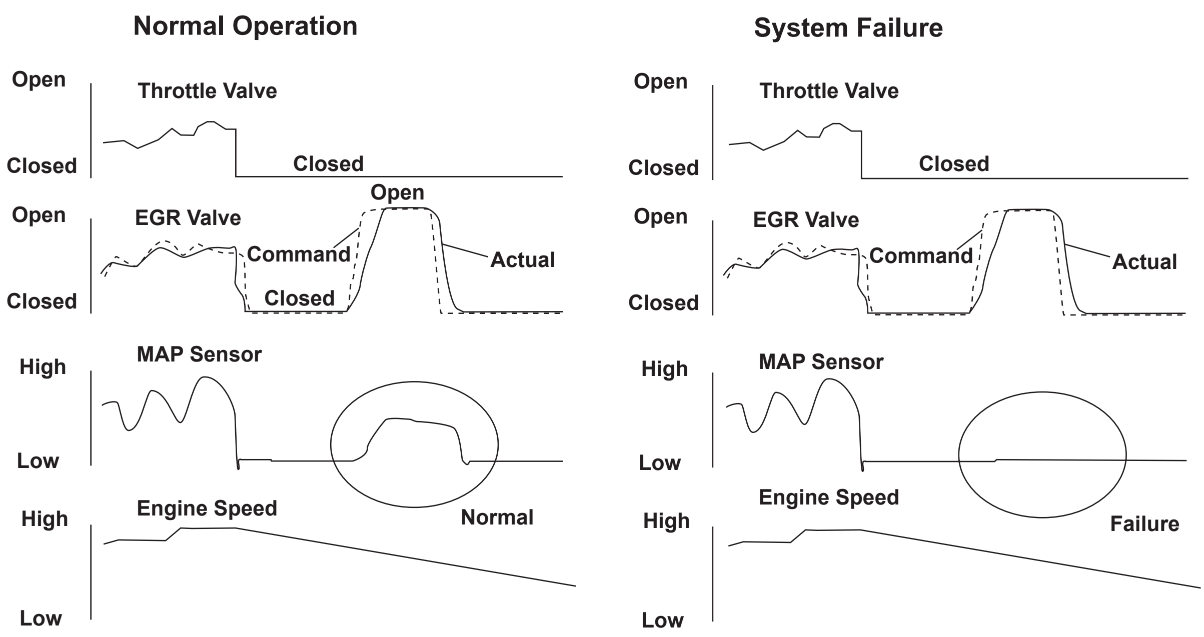
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0401: Exhaust Gas Recirculation (EGR) Insufficient Flow



P0401-9877



P0401-9672

General Description

The exhaust gas recirculation (EGR) system reduces oxides of nitrogen (NOx). NOx is generated by high combustion temperatures. The EGR system lowers peak combustion temperatures by recirculating exhaust gas into the air/fuel mixture, thus reducing NOx. The manifold absolute pressure (MAP) sensor detects the intake manifold pressure (vacuum) and the engine control module (ECM) determines if the amount of exhaust gas recirculation is sufficient. When starting to decelerate with the throttle valve closed, the EGR valve is closed. If the intake manifold pressure changes only slightly while the EGR valve opens fully and closes again within a specified time period, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	“EGR feedback monitor” is OK
Duration	4 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

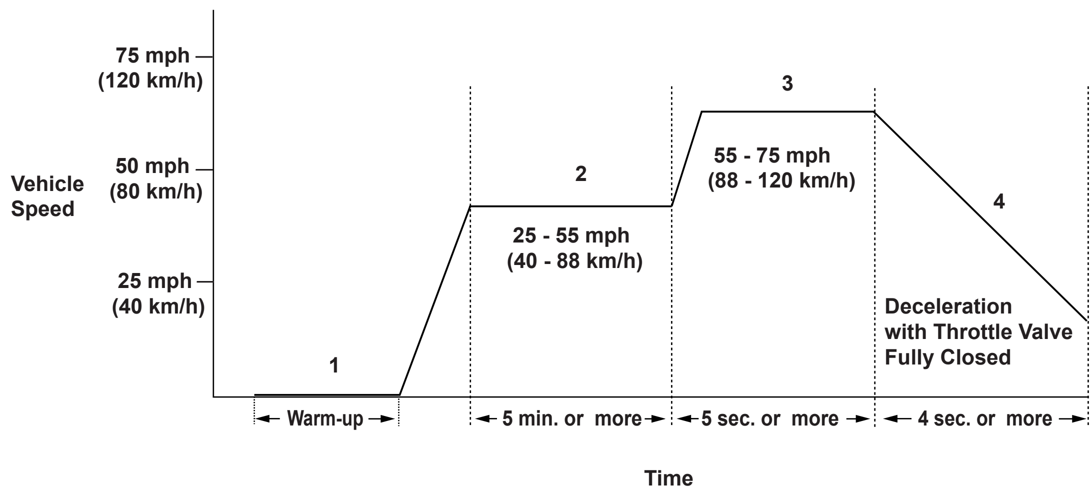
Condition	Minimum	Maximum
Engine coolant temperature	158ºF (70ºC)	—
Engine speed	1,300 rpm	2,700 rpm
MAP value	13 kPa (94 mmHg, 3.8 in.Hg)	—
Vehicle speed	30 mph (48 km/h)	—
Battery voltage	10.5 V	—
Throttle position	Fully closed	
Fuel feedback	During deceleration	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, MAP, CKP, ECT, TP, EGR, BARO, IAC, VSS, VTEC System, A/T System*1	
Other	Test-drive on a flat road	

*1: CVT

Malfunction Threshold

The MAP sensor output fluctuates by 2 kPa (20 mmHg, 0.7 in.Hg) or less for at least 4 seconds.

Driving Pattern



P0401-0050

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Then, drive at a steady speed between 55 - 75 mph (88 - 120 km/h) for at least 5 seconds.
4. Decelerate with the throttle valve fully closed for at least 4 seconds.

- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL

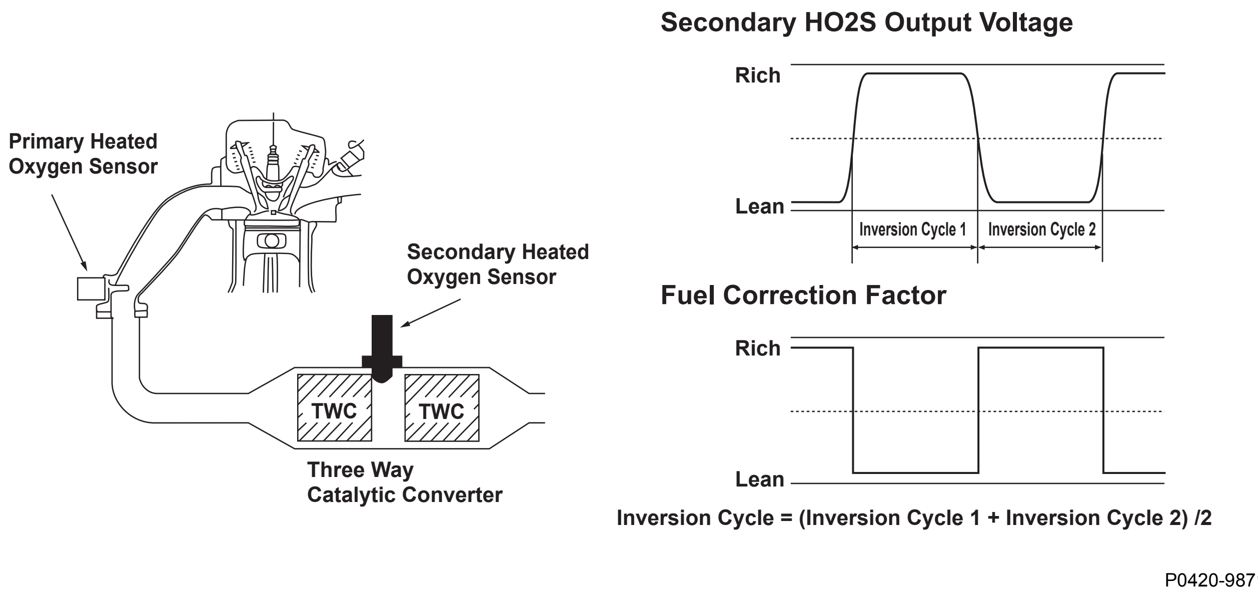
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0420: Catalyst System Efficiency Below Threshold (M/T)



General Description

The three way catalytic converter (TWC) is installed in the exhaust system. The TWC converts hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to water vapor, carbon dioxide (CO2), and dinitrogen (N2) simultaneously. The TWC adsorbs/releases oxygen during this process. This ability to adsorb oxygen deteriorates as the TWC performance deteriorates. The TWC performance correlates with the storage capacity for oxygen, so the TWC deterioration can be detected by monitoring the storage capacity for oxygen. Also, the storage capacity for oxygen can be monitored according to the inversion cycle of the secondary HO2S (Sensor 2) which detects the oxygen content after passing through the TWC.

The engine control module (ECM) determines fuel feedback control by monitoring the secondary HO2S for a set time period, and then calculates the average time of the inversion cycle of the secondary HO2S, whose waveform alternates between rich and lean. This inversion cycle varies by the amount of the exhaust gas entering into the TWC and needs to be regulated by the OSC INDEX (Oxygen Storage Capacity INDEX):

OSC INDEX = The inversion cycle of the secondary HO2S x (times) the amount of exhaust gas during calculation of the inversion cycle.

The ECM calculates the moving average of six drive cycles and compares it to the predetermined threshold in the ECM. If the latest moving average is cleared by resetting the ECM, each threshold is applied according to the number of drive cycles until the moving average of six drive cycles is evaluated. If the calculated value is less than the threshold, the TWC performance is considered to be deteriorated and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	After judged OK for the secondary HO2S
Duration	6 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

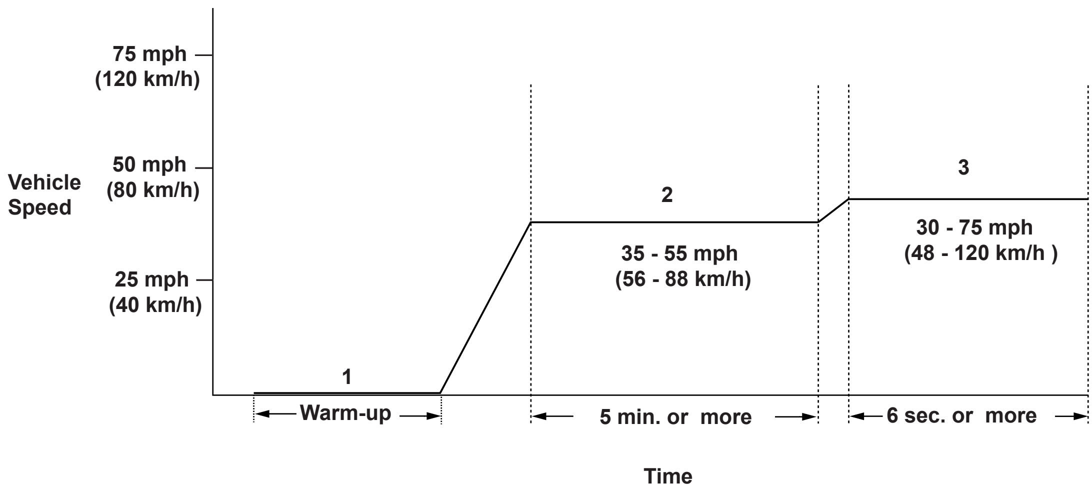
Condition	Minimum	Maximum
Engine coolant temperature	158ºF (70ºC)	—
Intake air temperature	-14ºF (-25ºC)	—
Engine speed	1,300 rpm	2,700 rpm
MAP value	26 kPa (191 mmHg, 7.6 in.Hg)	90 kPa (680 mmHg, 26.7 in.Hg)
Vehicle speed	30 mph (48 km/h)	—
Fuel trim	0.65	1.4
Fuel feedback	Closed loop control at stoichiometric ratio	
Monitoring priority	EVAP, A/F Sensor	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S, Secondary HO2S Heater, MAP, ECT, TP, IAT, EGR, VSS, VTEC System, Fuel System	
Other	The TWC temperature is high enough	

Malfunction Threshold

OSC INDEX is the value shown in the table or less.

The number of detections	OSC INDEX
1 time	3,828
2 times	3,458
3 times	3,284
4 times	3,189
5 times	3,116
6 times or more	3,064

Driving Pattern



P0420-0154

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 35 - 55 mph (56 - 88 km/h) for at least 5 minutes.
3. Then, drive immediately at a steady speed between 30 - 75 mph (48 - 120 km/h) for at least 6 seconds.

- If the EVAP monitor runs instead of the HO2S monitor, turn the engine off, then restart it, and the HO2S monitor will restart.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

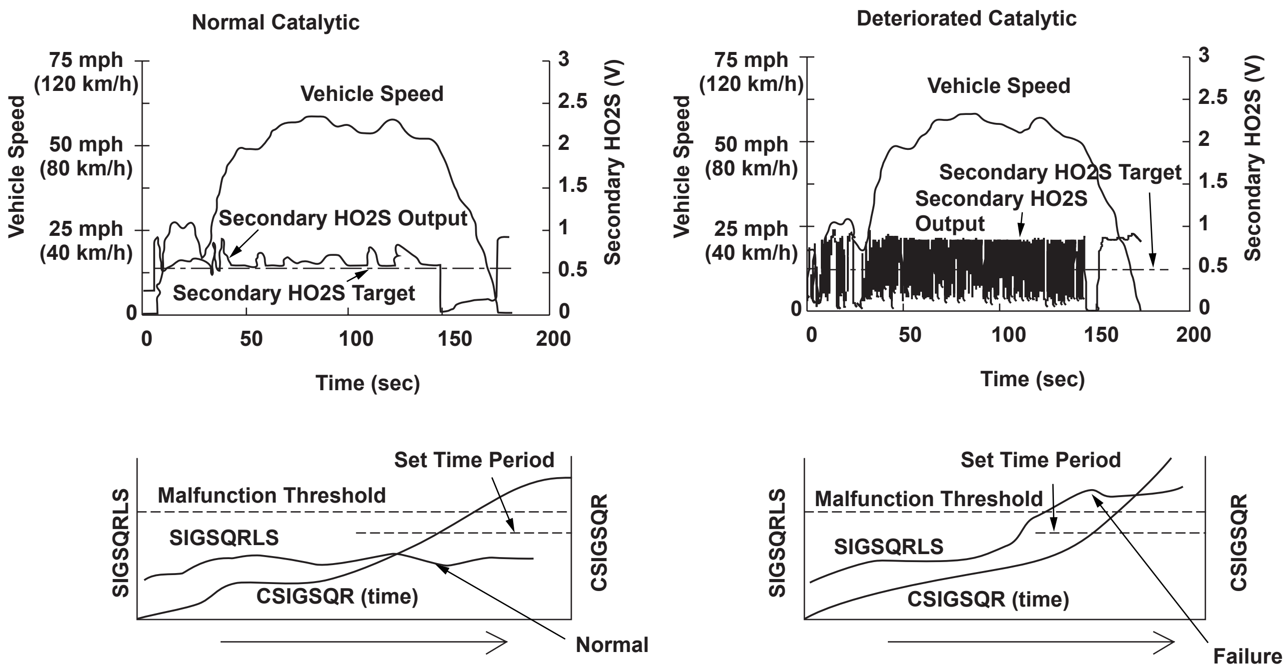
Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0420: Catalyst System Efficiency Below Threshold (CVT)



P0420-0071

General Description

The three way catalytic converter (TWC) converts hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to water vapor, carbon dioxide (CO2), and dinitrogen (N2).
The TWC efficiency does not depend on the engine conditions or the deterioration level of the TWC. It can be optimized by stabilizing the secondary HO2S output.
If the TWC deteriorates, the air/fuel ratio downstream (the secondary HO2S output) often differs from the target secondary HO2S output, and the status is represented by the parameter (SIGSQRLS).
Therefore, if the SIGSQRLS exceeds a specified value for a set time period, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	After judged OK for the secondary HO2S
Duration	50 seconds or more
DTC Type	Two drive cycles, MIL ON

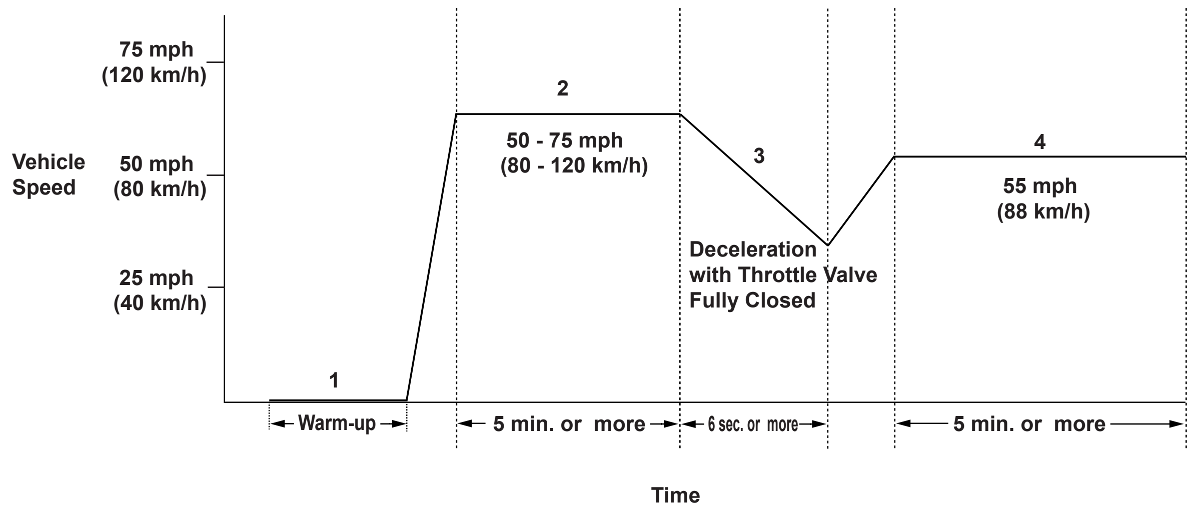
Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	158ºF (70ºC)	—
Intake air temperature	-15ºF (-25ºC)	—
Engine speed	1,200 rpm	2,700 rpm
MAP value	26 kPa (191 mmHg, 7.5 in.Hg)	90 kPa (680 mmHg, 26.7 in.Hg)
Vehicle speed	4 mph (5 km/h)	—
Fuel trim	0.65	1.40
Fuel feedback	Closed loop control at stoichiometric ratio	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S, Secondary HO2S Heater, MAP, ECT, TP, IAT, EGR, VSS, VTEC System, Fuel System	
Others	The TWC temperature is high enough	
	Other than when there is excessive vapor generation (fuel level is 40 - 80%)	

Malfunction Threshold

The number of detections is 200 or more.

Driving Pattern



P0420-0054

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 50 - 75 mph (88 - 120 km/h) for at least 5 minutes.
3. Decelerate with the throttle valve fully closed for at least 6 seconds.
4. Set a vehicle speed of 55 mph (88 km/h) with the cruise control, and drive for at least 5 minutes.

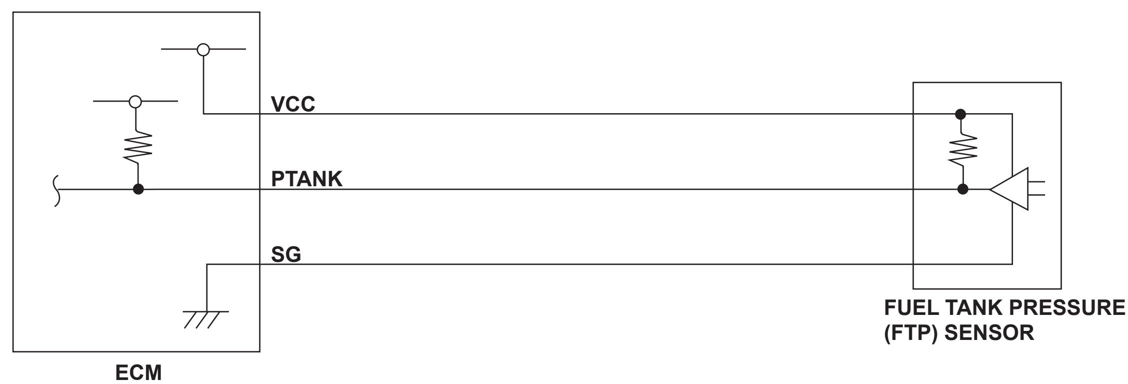
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

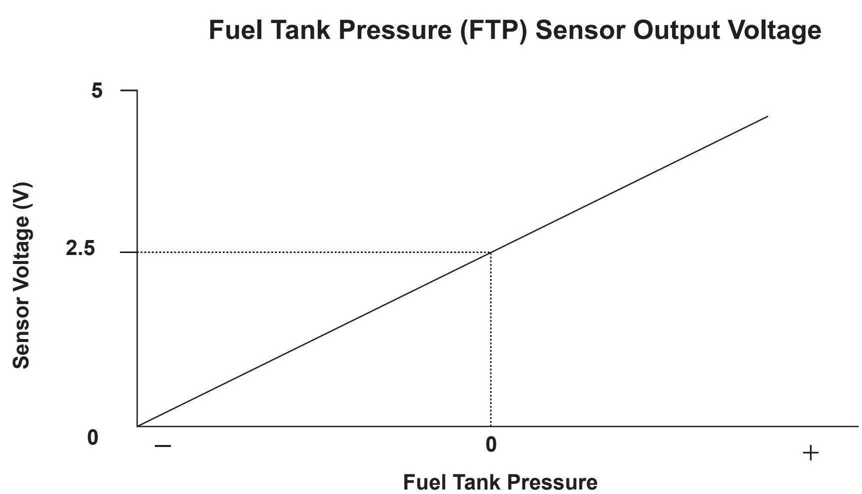
Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

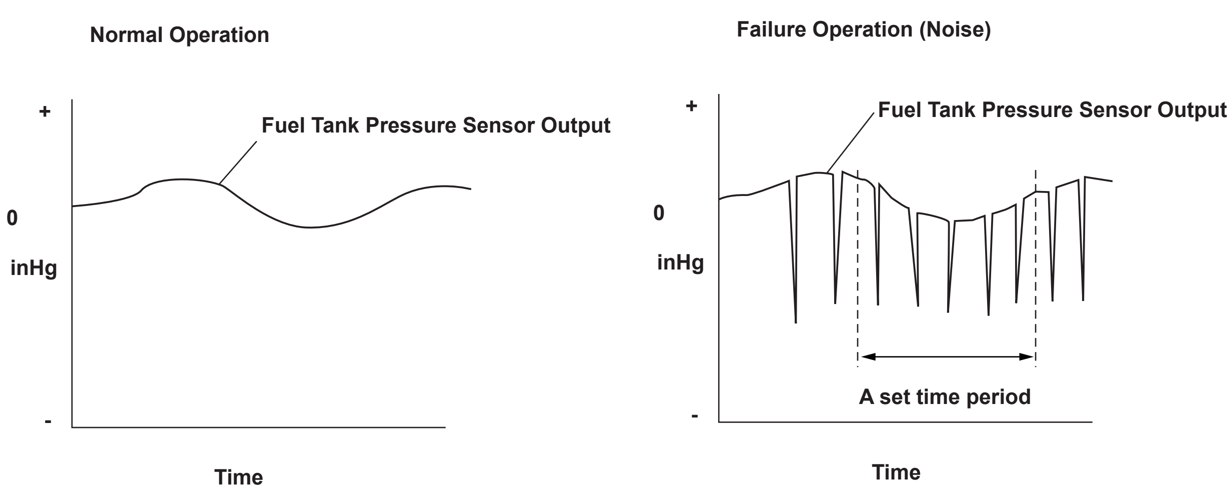
DTC P0451: Fuel Tank Pressure (FTP) Sensor Range/Performance Problem



P0452-9603



P0452-9672



P0451-0071

General Description

The fuel tank pressure (FTP) sensor is installed between the evaporative emission (EVAP) two way valve and the EVAP bypass solenoid valve. The FTP sensor is used to detect leaks in the EVAP system.
The engine control module (ECM) monitors the FTP sensor output voltage. The FTP sensor output voltage rises as the fuel tank pressure increases. Conversely, the FTP sensor output voltage drops as the fuel tank pressure decreases.
Rapid changes in the FTP sensor output voltage due to electrical noise or an intermittent open during the EVAP leak detection may cause an incorrect leak detection, so abnormal output is monitored.
If the FTP sensor output voltage changes a specified number of times or more within a set time period, the ECM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	17 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Elapsed time after starting the engine	2 seconds	—
Initial engine coolant temperature	—	95ºF (35ºC)
No active DTCs	ECM, ECT, FTP, TP*1, VSS, A/T System*2	
Other	At idle	

*1: M/T
*2: CVT

Malfunction Threshold

The FTP sensor output fluctuates by ±0.3 kPa (±2 mmHg, ±0.1 in.Hg) or more five times within 3 seconds.

Driving Pattern

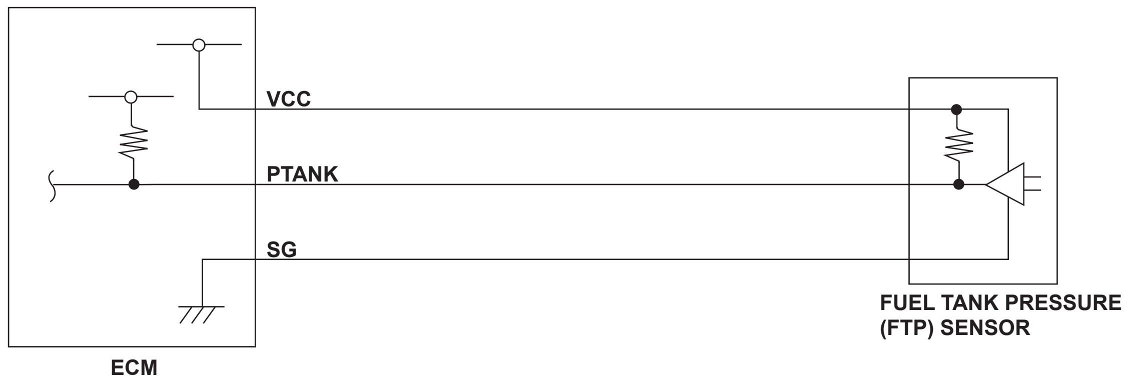
Start the engine at an engine coolant temperature as specified under Enable Conditions, and let it idle.

Diagnosis Details

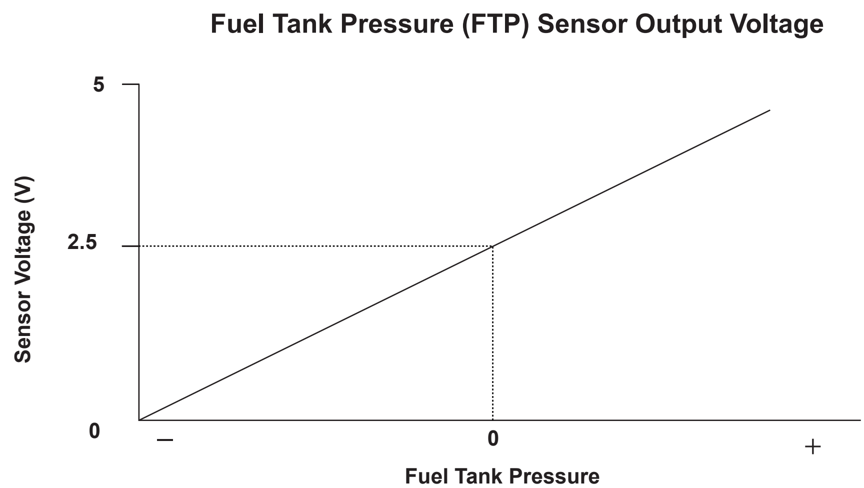
Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle with the ECT at engine start-up within the specified temperature range, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle with the ECT at engine start-up within the specified temperature range, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

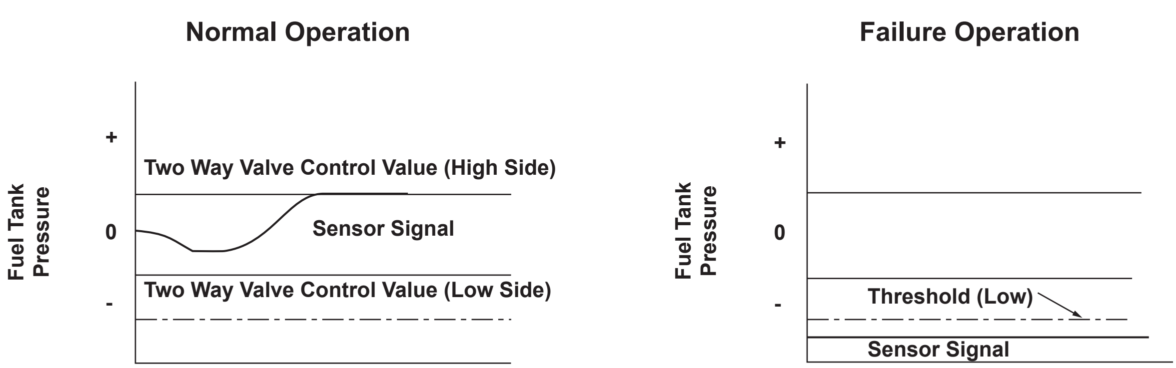
DTC P0452: Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage



P0452-9603



P0452-9672



P0452-9671

General Description

The fuel tank pressure (FTP) sensor is installed between the evaporative emission (EVAP) two way valve and the EVAP bypass solenoid valve. The FTP sensor is used to detect leaks in the EVAP system.
The engine control module (ECM) monitors the FTP sensor output voltage. The FTP sensor output voltage rises as the fuel tank pressure increases. Conversely, the FTP sensor output voltage drops as the fuel tank pressure decreases. If the FTP sensor output voltage does not reach a target value within a set time after starting the engine in a cold condition, the ECM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	7 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Elapsed time after starting the engine	2 seconds	—
Initial engine coolant temperature	—	95ºF (35ºC)
No active DTCs	ECM, ECT	

Malfunction Threshold

The output from the fuel tank pressure sensor is less than -8 kPa (-55 mmHg, -2.2 in.Hg) for at least 7 seconds.

Driving Pattern

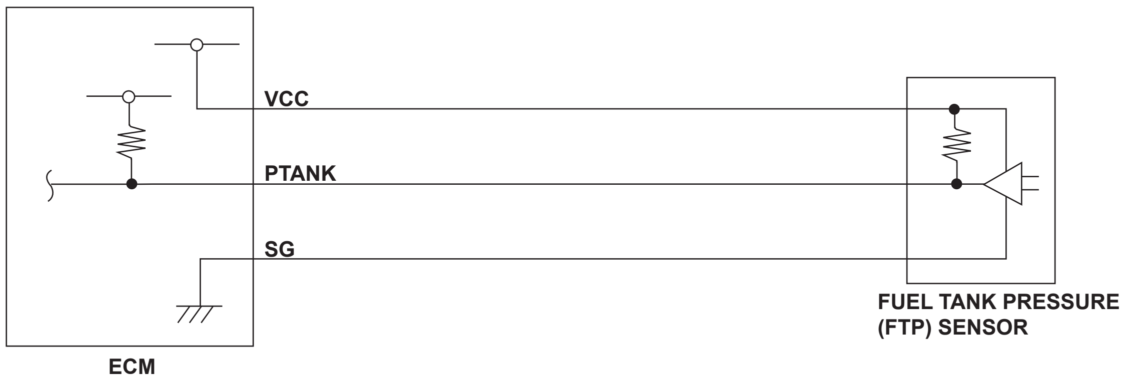
Start the engine at an engine coolant temperature as specified under Enable Conditions, and let it idle.

Diagnosis Details

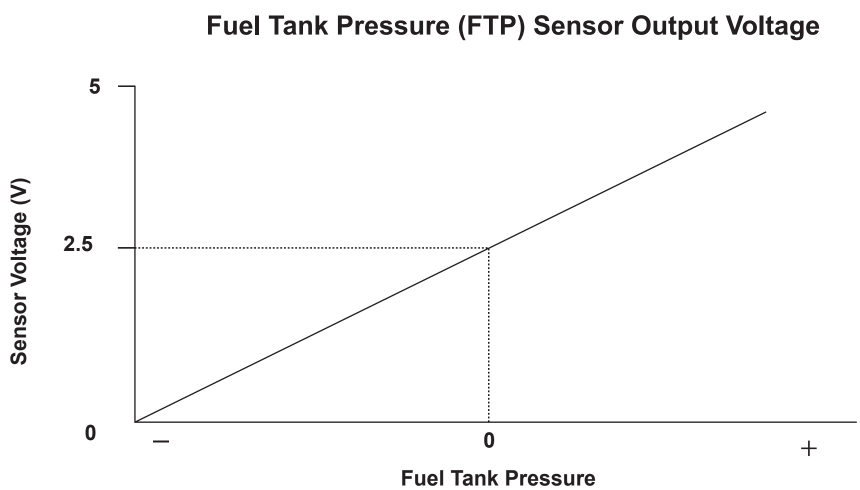
Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle with the ECT at engine start-up within the specified temperature range, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle with the ECT at engine start-up within the specified temperature range, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

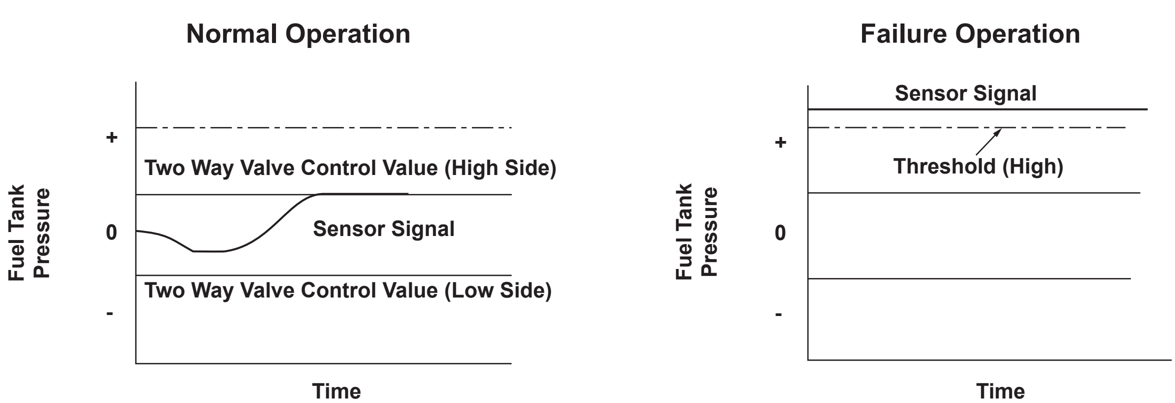
DTC P0453: Fuel Tank Pressure (FTP) Sensor Circuit High Voltage



P0452-9603



P0452-9672



P0453-9671

General Description

The fuel tank pressure (FTP) sensor is installed between the evaporative emission (EVAP) two way valve and the EVAP bypass solenoid valve. The FTP sensor is used to detect leaks in the EVAP system.
The engine control module (ECM) monitors the FTP sensor output voltage. The FTP sensor output voltage rises as the fuel tank pressure increases. Conversely, the FTP sensor output voltage drops as the fuel tank pressure decreases. If the FTP sensor output voltage is higher than a target value within a set time after starting the engine in a cold condition, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	7 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Elapsed time after starting the engine	2 seconds	—
Initial engine coolant temperature	—	95ºF (35ºC)
No active DTCs	ECM, ECT	

Malfunction Threshold

The output from the fuel tank pressure sensor is higher than 8 kPa (55 mmHg, 2.2 in.Hg) for at least 7 seconds.

Driving Pattern

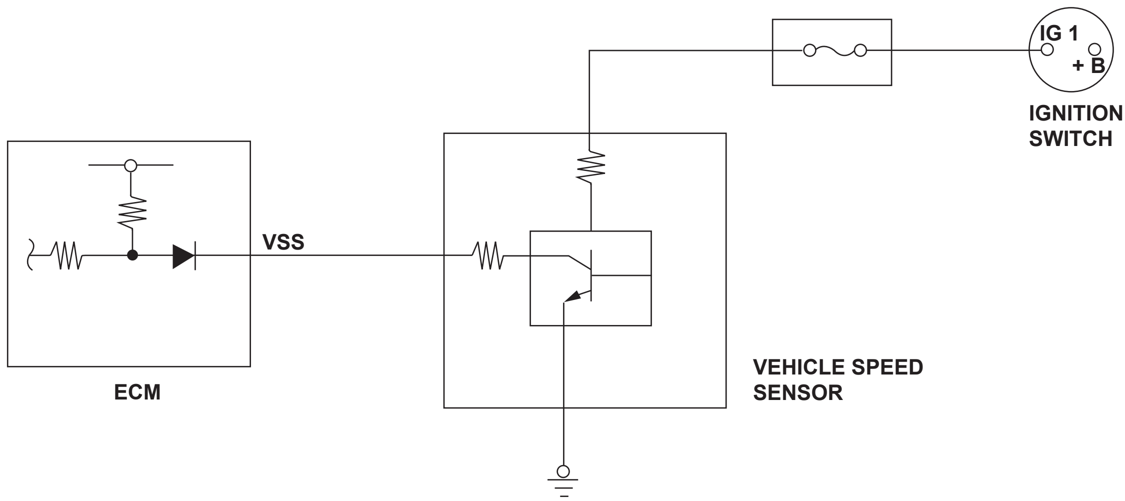
Start the engine at an engine coolant temperature as specified under Enable Conditions, and let it idle.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle with the ECT at engine start-up within the specified temperature range, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle with the ECT at engine start-up within the specified temperature range, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0500: Vehicle Speed Sensor (VSS) Circuit Malfunction



P0500-9601

General Description

The vehicle speed sensor (VSS) is attached to the transmission housing. The VSS outputs a pulsing signal for every revolution of the differential gear via the speedometer gear. The engine control module (ECM) determines the vehicle speed based on the frequency of these signals. If there is a loss of VSS signals to the ECM, the ECM detects a malfunction. If an open, a temporary open, or a short to ground causes a malfunction, a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine speed	—	2,500 rpm
Battery voltage	10.05 V	—
Engine condition	During fuel cut-off operation for deceleration	
No active DTCs	VSS	

Malfunction Threshold

The VSS signal stops for 5 seconds or more while the vehicle is being driven.
However, the failure detection speed is 2,500 rpm or less to avoid misdetection during fuel cut-off operation at high speed.

Driving Pattern

1. Start the engine. Hold the engine at 3,000 rpm with no load (in neutral) until the radiator fan comes on, then let it idle.
2. Drive the vehicle and accelerate once, then close the throttle fully and keep decelerating at a speed of 2,500 rpm or less for at least 5 seconds

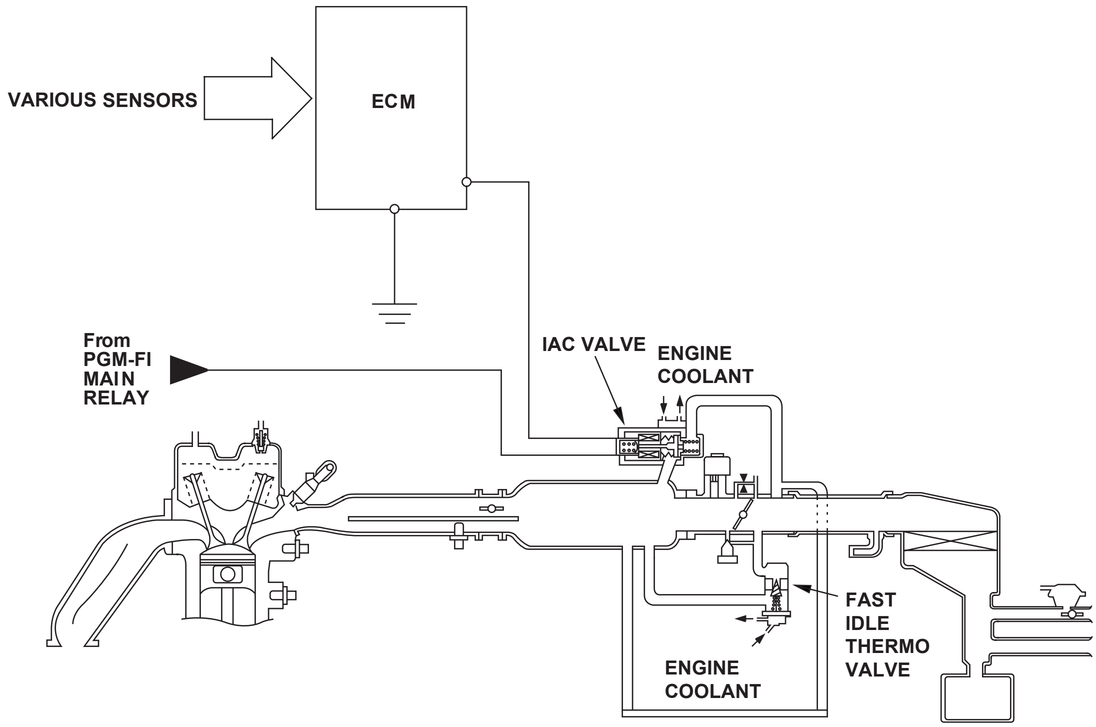
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

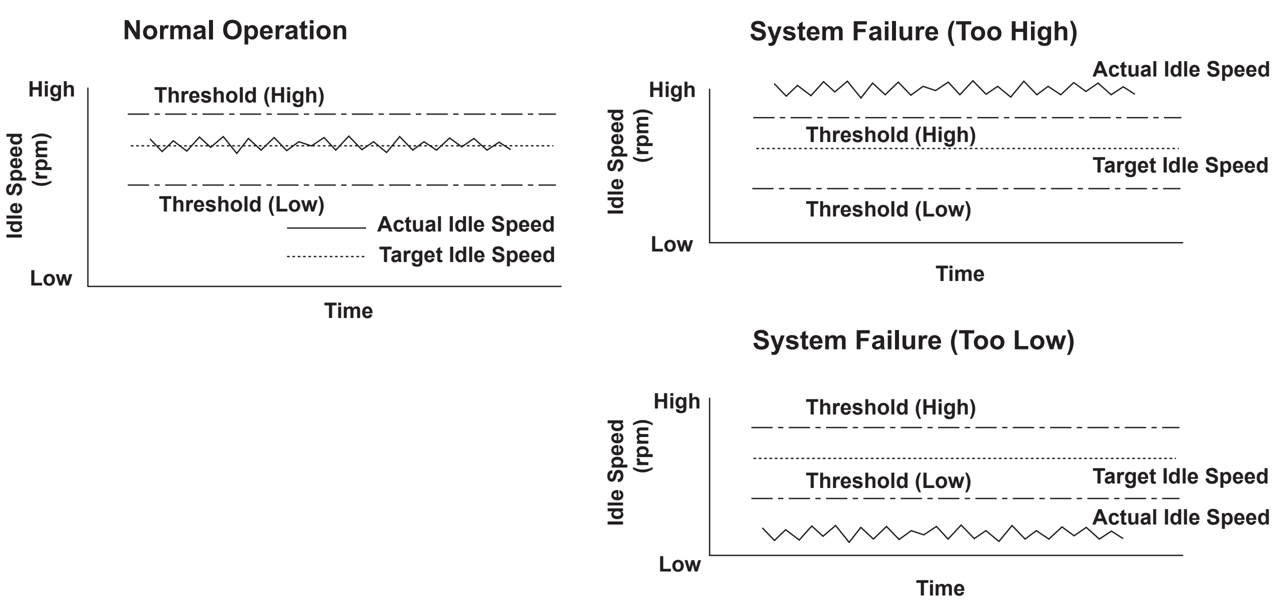
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0505: Idle Control System Malfunction



P0505-9971



P0505-9671

General Description

A target idle speed that meets the engine operating conditions (coolant temperature, A/C ON or OFF, etc.) is stored in the engine control module (ECM). The ECM monitors and controls the idle speed so that the actual idle speed is equal to the target idle speed. If the actual idle speed varies beyond a specified value from the target speed (too low/high) over a certain period of time, the ECM detects a malfunction in the idle speed control system and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	20 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Elapsed time after starting the engine	15 seconds	—
Engine coolant temperature	158ºF (70ºC)	—
Intake air temperature	20ºF (-7ºC)	—
Atmospheric pressure*1	67 kPa (500 mmHg, 20.0 in.Hg)	—
Fuel trim	0.63	1.35
Battery voltage	10.6 V	—
Fuel feedback	Closed loop	
Throttle position	Fully closed	
No active DTCs	ECM, MAP, ECT, TP, IAT, EGR, BARO, IAC, VSS, VTEC System, A/T System*1, Fuel System	
Others	At idle	
	The engine is under no load	

*1: CVT

Malfunction Threshold

The actual idle speed is at least 200 rpm greater than or 100 rpm less than the target idle speed for at least 20 seconds.

Driving Pattern

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Let the engine idle for at least 20 seconds.

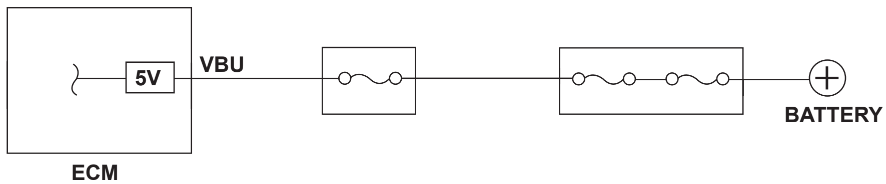
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0560: ECM Back-up Circuit Low Voltage



P0560-0101

General Description

The engine control module (ECM) constantly draws power for the memory to make back-up copies of data such as DTCs, and the freeze frame data. If there is an open or a short in the power supply circuit for backing up the ECM, the data stored in the memory is erased when the ignition switch is turned off.
If the VBU voltage is a set value or less for a specified time period, the ECM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine speed	300 rpm	—
Battery voltage (IGP terminal of the ECM)	10.5 V	—
No active DTCs	ECM Back-up System	

Malfunction Threshold

The back-up power supply voltage (at the VBU terminal of the ECM) is 6.0 V or less for at least 2 seconds when the battery voltage (at the IGP terminal of the ECM) is 10.5 V or more after start-up.

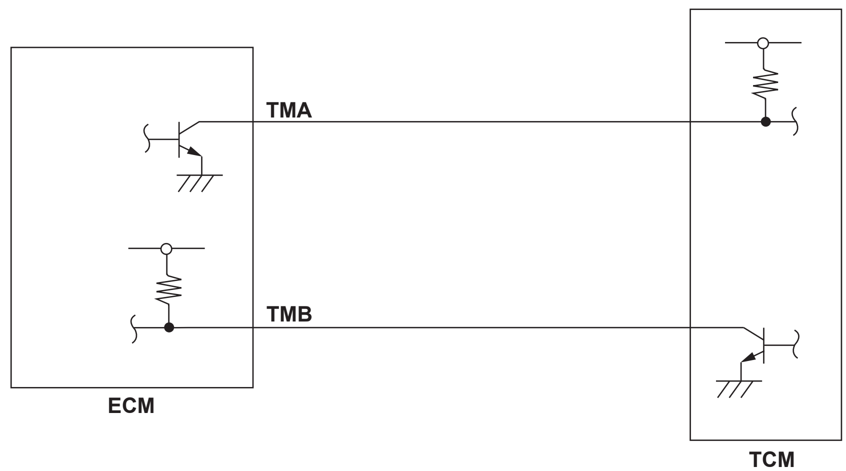
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

P0560-1WV0-00

DTC P0700: Automatic Transaxle System



P1655-9601

General Description

This DTC is used to determine if a malfunction is on the engine side or the A/T side when checking with the HDS. When a device on the A/T side malfunctions, the transmission control module (TCM) signals the engine control module (ECM) to turn on the MIL. If the ECM receives a signal from the TCM to turn on the MIL, the MIL is turned on and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
Ignition switch	ON
No active DTCs	A/T System

Malfunction Threshold

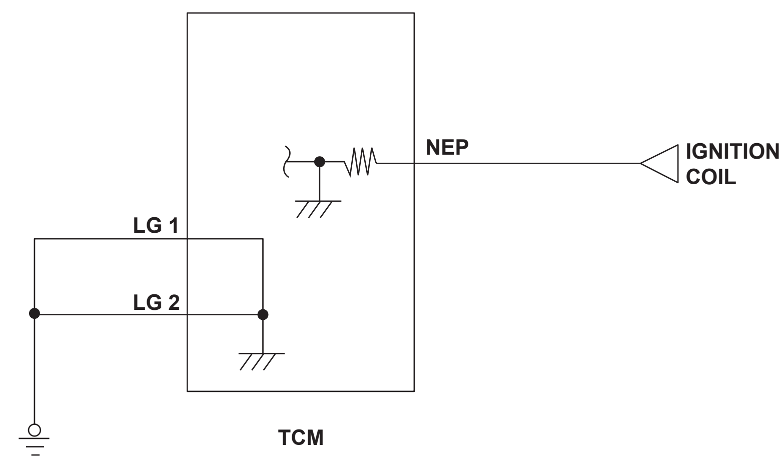
It depends on the “Enable Conditions” on A/T side.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs. The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0725: Engine Speed Input Circuit Malfunction



P0725-0101

General Description

The transmission control module (TCM) converts the engine ignition signal into an engine speed signal. The CVT drive pulley speed sensor detects the number of revolutions of the gear on the drive pulley and outputs a pulsing signal to the TCM. The TCM converts the pulsing signal into the drive pulley speed. If the engine speed is lower than the value estimated based on the drive pulley speed when the shift lever is in D, L, or R position, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	15 seconds
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	Minimum	Maximum
Drive pulley speed	600 rpm*	—
	300 rpm**	
Shift lever position	D, L, or R	

* : When the shift lever is in D or L position.
** : When the shift lever is in R position.

Malfunction Threshold

The drive pulley speed > the engine speed estimated by the TCM by a factor of 1.8 for at least 15 seconds.

Driving Pattern

Start the engine. Hold the engine at 600 rpm or more in D position for at least 15 seconds.

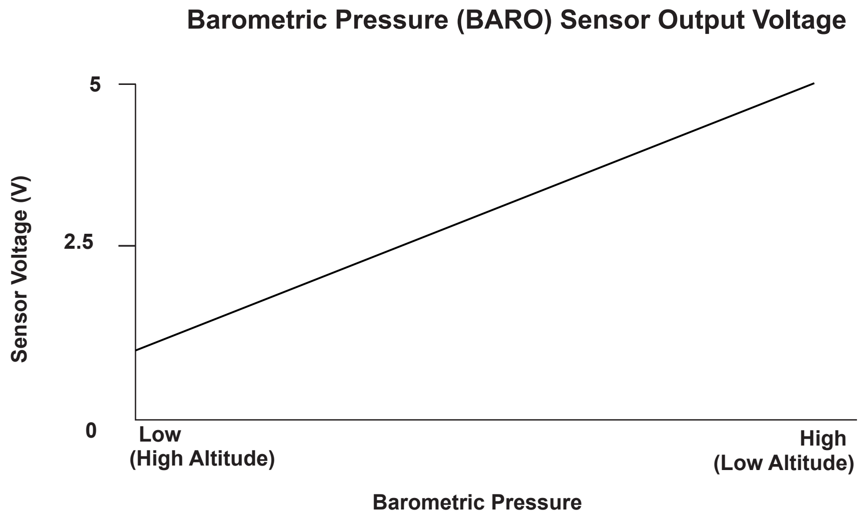
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and the A/C.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

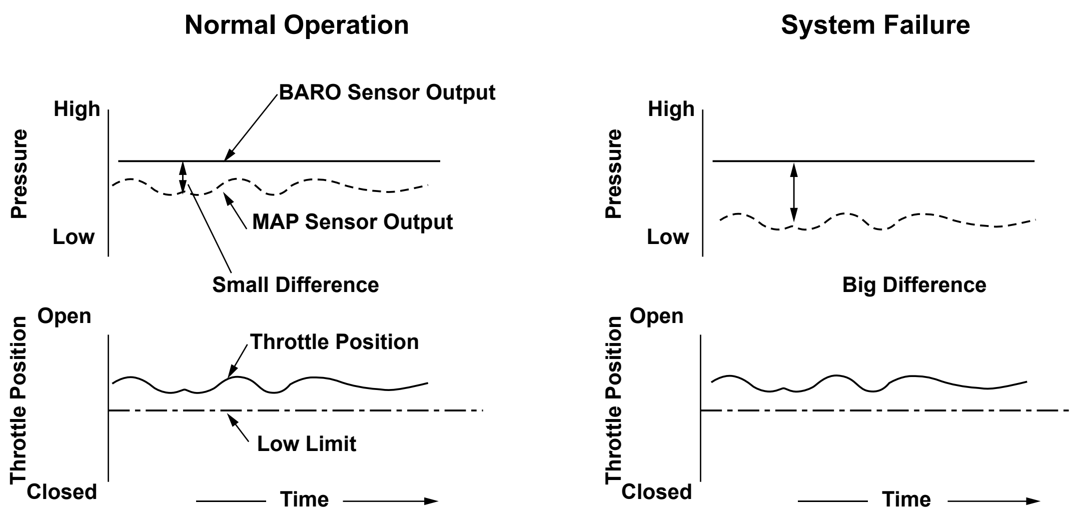
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1106: Barometric Pressure (BARO) Sensor Range/Performance Problem



P1106-9671



P1106-9771

General Description

The barometric pressure (BARO) sensor is built into the engine control module (ECM) and monitors atmospheric pressure. When the throttle valve is wide open, the manifold absolute pressure (MAP) sensor output is nearly equal to the BARO sensor output. Making use of this characteristic, a malfunction can be detected in the BARO sensor output.

If the throttle position is beyond a value stored in the ECM that is used to detect “wide-open throttle,” and if the difference between the MAP sensor output and the BARO sensor output is equal to or greater than a set value, a malfunction in the BARO sensor output is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	3 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Condition		Minimum	Maximum
Throttle position	1,000 rpm	13.4º	—
	3,000 rpm	25.6º	
No active DTCs		ECM, MAP, ECT, TP, EGR, BARO, IAC, VSS, VTEC System, Fuel System, A/T System*1	

*1: CVT

Malfunction Threshold

The difference between the BARO sensor output and the MAP sensor output is 21 kPa (153 mmHg, 6.1 in.Hg) or more for at least 3 seconds.

Driving Pattern

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle with the specified throttle position for at least 3 seconds.

- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

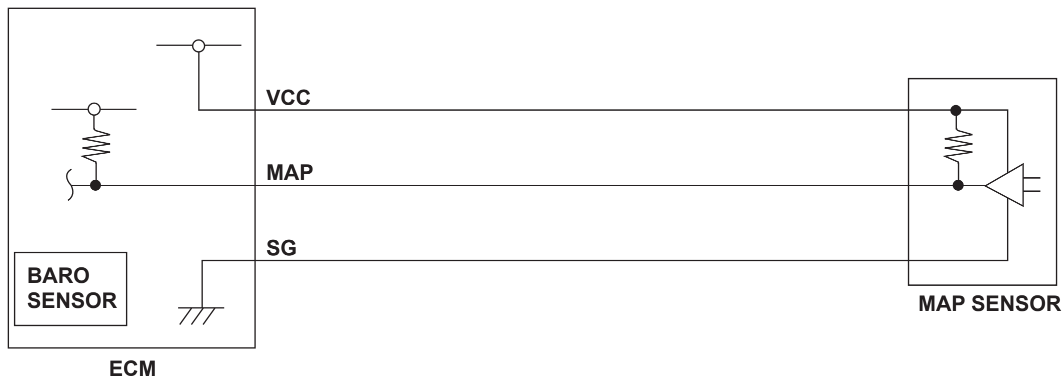
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

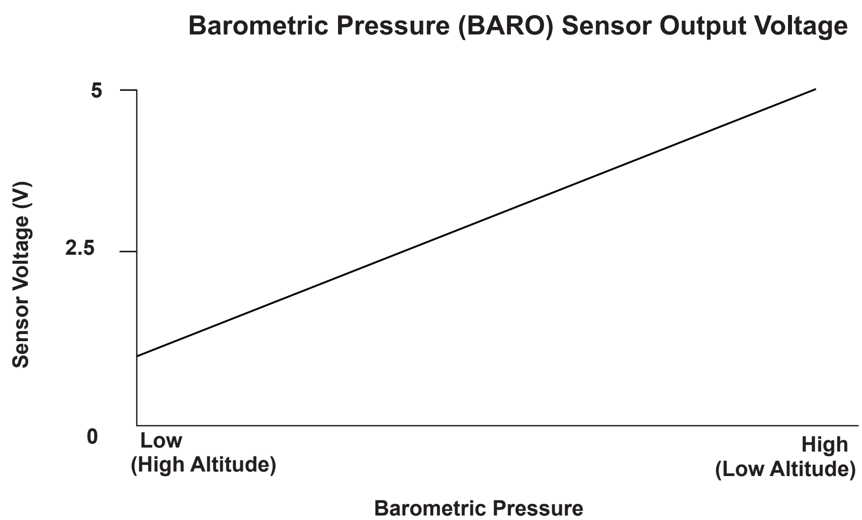
Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P1107: Barometric Pressure (BARO) Sensor Circuit Low Voltage



P1106-9701



P1106-9671

General Description

The barometric pressure (BARO) sensor is built into the engine control module (ECM) and monitors atmospheric pressure. The ECM estimates appropriate intake airflow from the manifold absolute pressure (MAP) sensor output voltage and BARO sensor output voltage. If the BARO sensor output voltage is a specified value or less, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
Ignition switch	ON
No active DTCs	BARO

Malfunction Threshold

The output voltage from the BARO sensor is 1.58 V or less for at least 2 seconds.

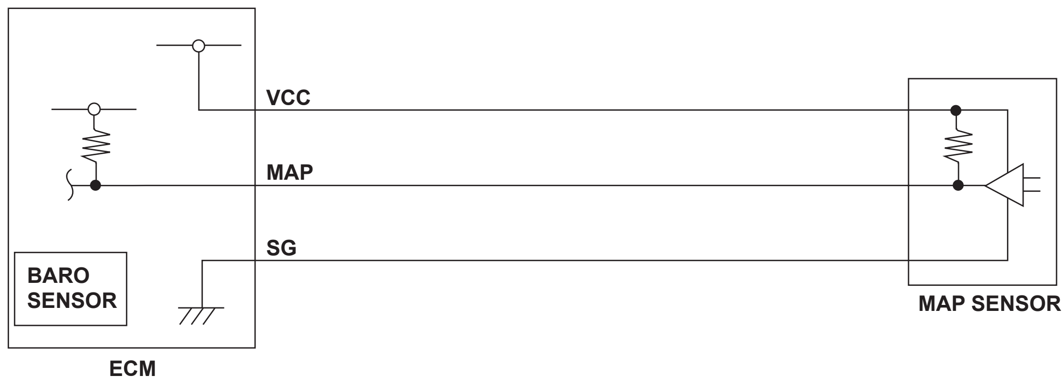
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

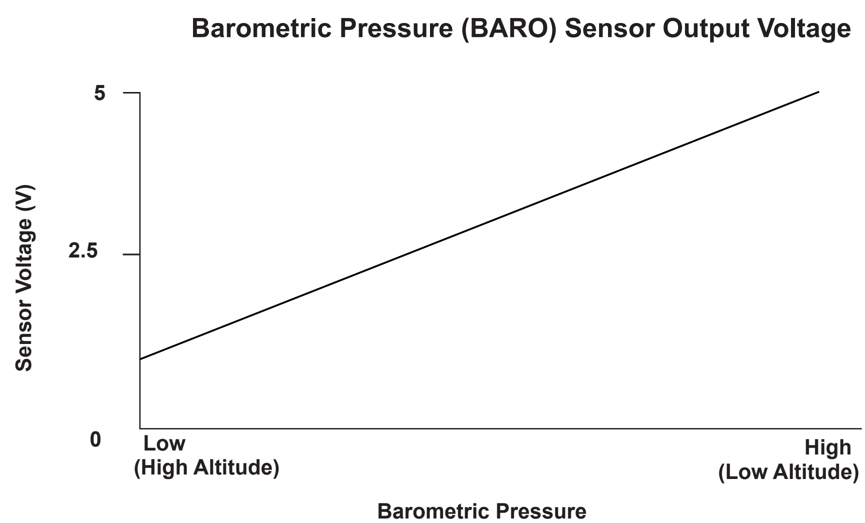
Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P1108: Barometric Pressure (BARO) Sensor Circuit High Voltage



P1106-9701



P1106-9671

General Description

The barometric pressure (BARO) sensor is built into the engine control module (ECM) and monitors atmospheric pressure. The ECM estimates appropriate intake airflow from the manifold absolute pressure (MAP) sensor output voltage and BARO sensor output voltage. If the BARO sensor output voltage is a specified value or more, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
Ignition switch	ON
No active DTCs	BARO

Malfunction Threshold

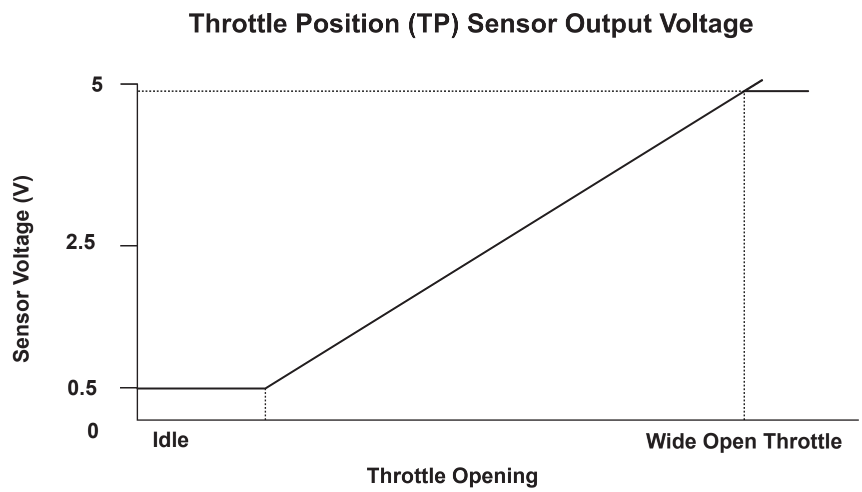
The output voltage from the BARO sensor is 4.5 V or more for at least 2 seconds.

Diagnosis Details

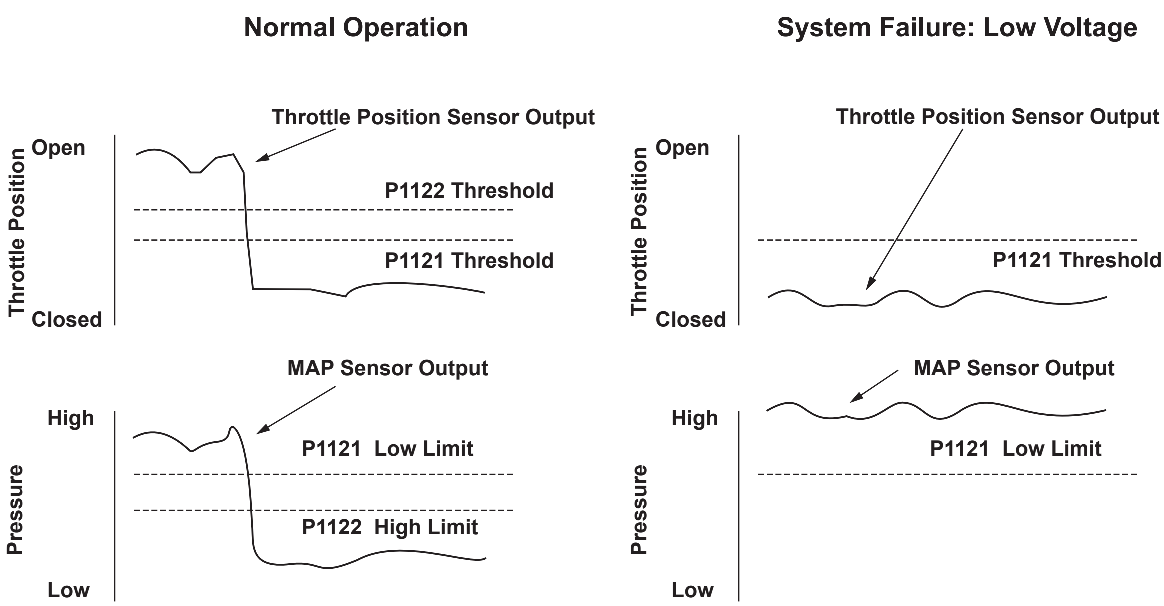
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1121: Throttle Position (TP) Sensor Lower Than Expected



P0122-9672



P1121-9771

General Description

The throttle position (TP) sensor detects the position of the throttle valve. When the throttle valve is open (low-vacuum), the manifold absolute pressure (MAP) sensor outputs a high MAP value, and when the throttle valve is closed (high-vacuum), it outputs a low MAP value.

If the TP sensor detects a throttle position that is less than the set value when the MAP sensor outputs a higher MAP value (higher pressure) than the set value, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	2 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	158ºF (70ºC)	—
Engine speed	1,300 rpm	5,500 rpm
Vehicle speed	15 mph (24 km/h)	—
MAP value	83 kPa (620 mmHg, 24.5 in.Hg)*	—
	50 kPa (370 mmHg, 14.6 in.Hg)**	
No active DTCs	ECM, MAP, ECT, TP, EGR, BARO, IAC, VSS, VTEC System, Fuel System, A/T System*1	

* : Atmospheric pressure is 101 kPa (760 mmHg, 29.9 in.Hg).
** : Atmospheric pressure is 61 kPa (460 mmHg, 18.1 in.Hg).
*1: CVT

Malfunction Threshold

The throttle position is 3.2º or less at 1,300 rpm, or 9.5º or less at 3,000 rpm, for at least 2 seconds.

Driving Pattern

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a steady speed between 15 - 75 mph (25 - 120 km/h) (the set MAP value or more) for at least 2 seconds.

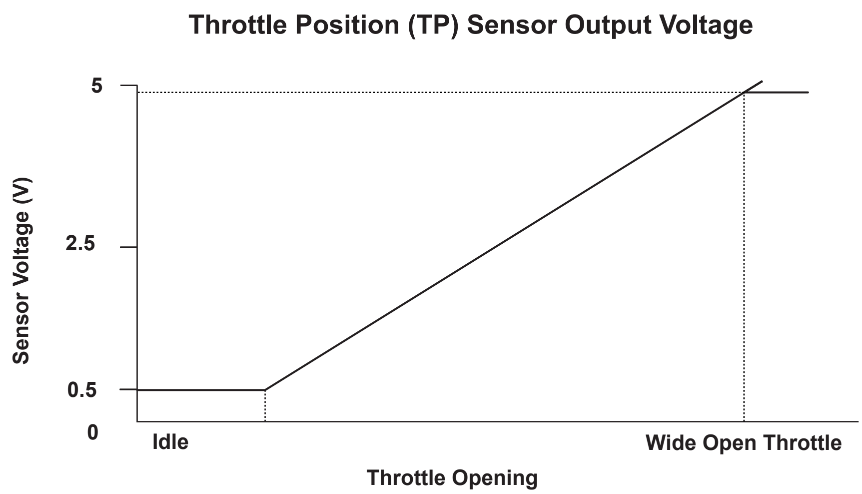
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

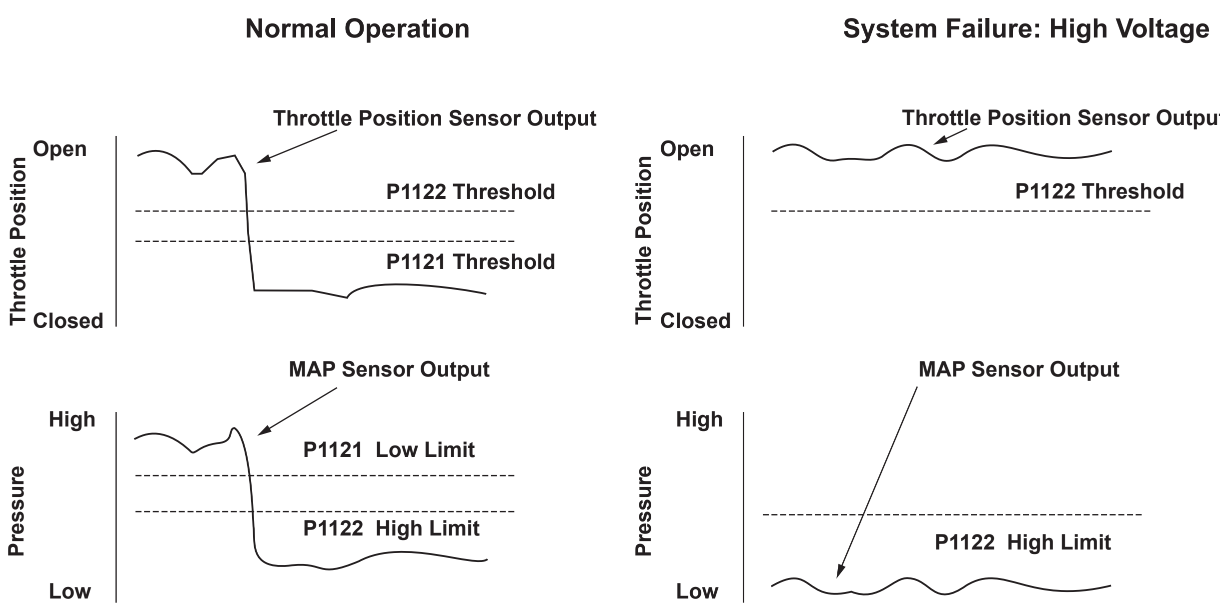
Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1122: Throttle Position (TP) Sensor Higher Than Expected



P0122-9672



P1122-9771

General Description

The throttle position (TP) sensor detects the position of the throttle valve. When the throttle valve is open (low-vacuum), the manifold absolute pressure (MAP) sensor outputs a high MAP value, and when the throttle valve is closed (high-vacuum), it outputs a low MAP value.

If the TP sensor detects a throttle position that is more than the set value when the MAP sensor outputs a lower MAP value (lower pressure) than the set value, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	2 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	158ºF (70ºC)	—
Engine speed	1,300 rpm	5,500 rpm
Vehicle speed	15 mph (24 km/h)	—
MAP value	—	34 kPa (260 mmHg, 10.2 in.Hg)*
		26 kPa (199 mmHg, 7.8 in.Hg)**
No active DTCs	ECM, MAP, ECT, TP, EGR, BARO, IAC, VSS, VTEC System, Fuel System, A/T System*1	

* : Atmospheric pressure is 77 kPa (578 mmHg, 22.8 in.Hg).
** : Atmospheric pressure is 61 kPa (460 mmHg, 18.1 in.Hg).
*1: CVT

Malfunction Threshold

The throttle position is 10.2º or more at 1,300 rpm, or 17.3º or more at 3,000 rpm, for at least 2 seconds.

Driving Pattern

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a steady speed between 15 - 75 mph (25 - 120 km/h) (the set MAP value or less) for at least 2 seconds.

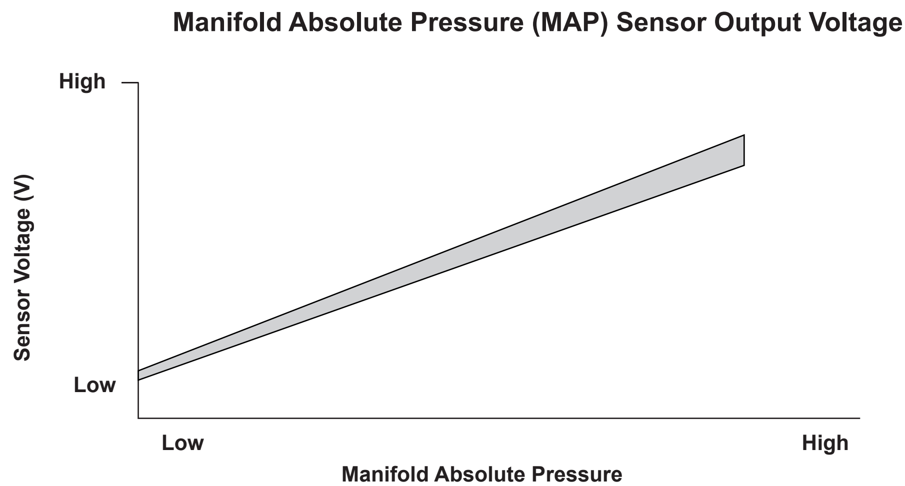
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

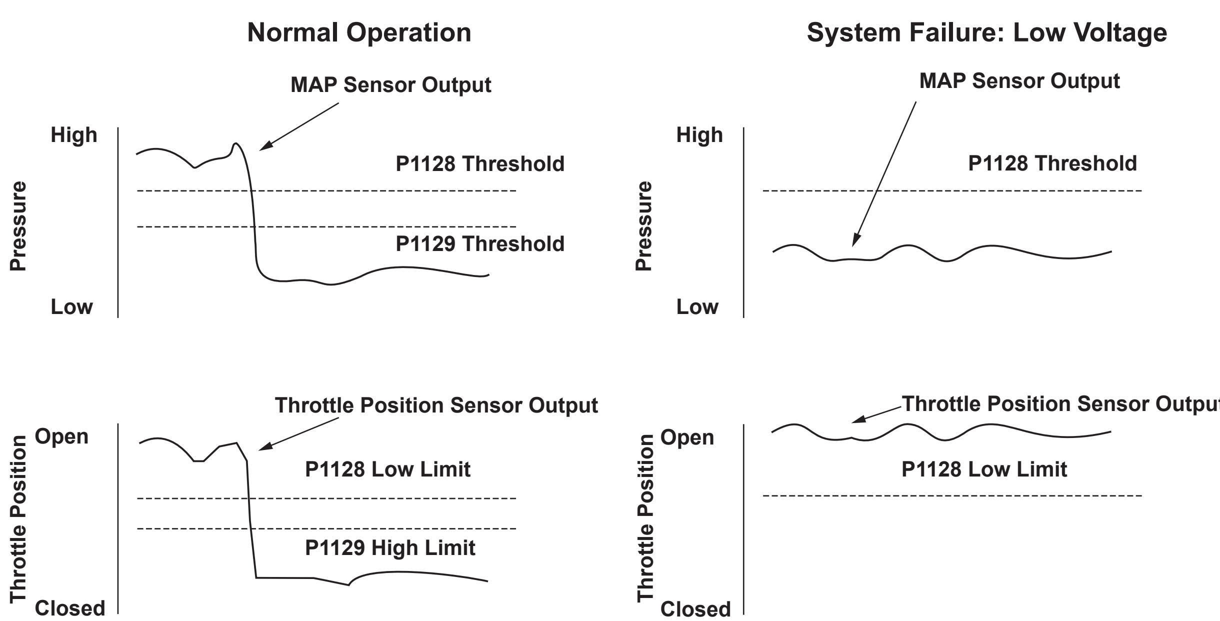
Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1128: Manifold Absolute Pressure (MAP) Sensor Lower Than Expected



P0107-9671



P1128-9771

General Description

The manifold absolute pressure (MAP) sensor senses manifold absolute pressure (vacuum) and converts it into electrical signals. The MAP sensor outputs low signal voltage at high-vacuum (idling) and high signal voltage at low-vacuum (throttle valve wide open).
The engine control module (ECM) compares a predetermined MAP value at a given throttle position and manifold absolute pressure to the output voltage value of the MAP sensor.
If the MAP sensor outputs lower voltage than expected, the ECM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	2 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

<table>
<tr><th colspan="2">Condition</th><th>Minimum</th><th>Maximum</th></tr>
<tr><td colspan="2">Engine coolant temperature</td><td>158ºF (70ºC)</td><td>—</td></tr>
<tr><td colspan="2">Engine speed</td><td>1,300 rpm</td><td>5,500 rpm</td></tr>
<tr><td colspan="2">Vehicle speed</td><td>15 mph (24 km/h)</td><td>—</td></tr>
<tr><td rowspan="2">Throttle position</td><td>1,300 rpm</td><td>10.4º</td><td rowspan="2">—</td></tr>
<tr><td>3,000 rpm</td><td>18.9º</td></tr>
<tr><td colspan="2">No active DTCs</td><td colspan="2">ECM, MAP, ECT, TP, EGR, BARO, IAC, VSS, VTEC System, Fuel System, A/T System*[1]</td></tr>
</table>

*1: CVT

Malfunction Threshold

- The MAP sensor output is 54 kPa (406 mmHg, 15.9 in.Hg) or less for at least 2 seconds when atmospheric pressure is 101 kPa (760 mmHg, 29.9 in.Hg).
- The MAP sensor output is 30 kPa (226 mmHg, 8.8 in.Hg) or less for at least 2 seconds when atmospheric pressure is 61 kPa (460 mmHg, 18.1 in.Hg).

Driving Pattern

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 15 - 75 mph (24 - 120 km/h) with the specified throttle position for at least 2 seconds.

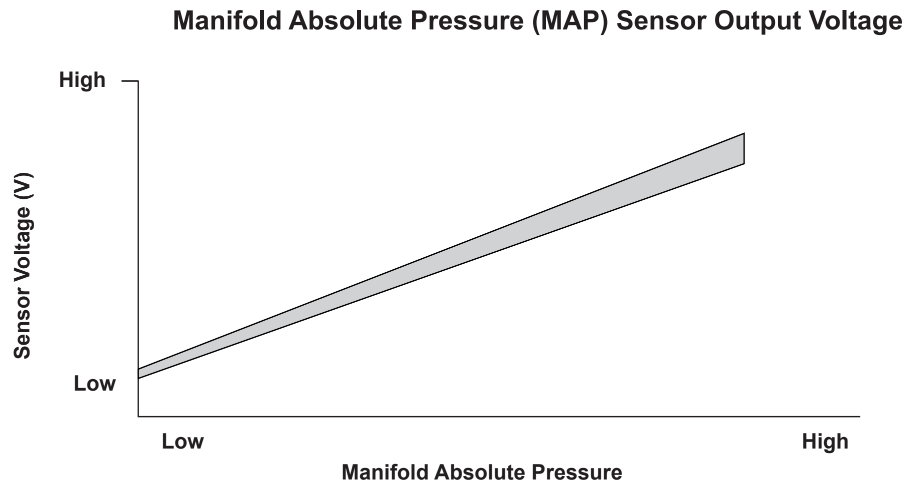
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

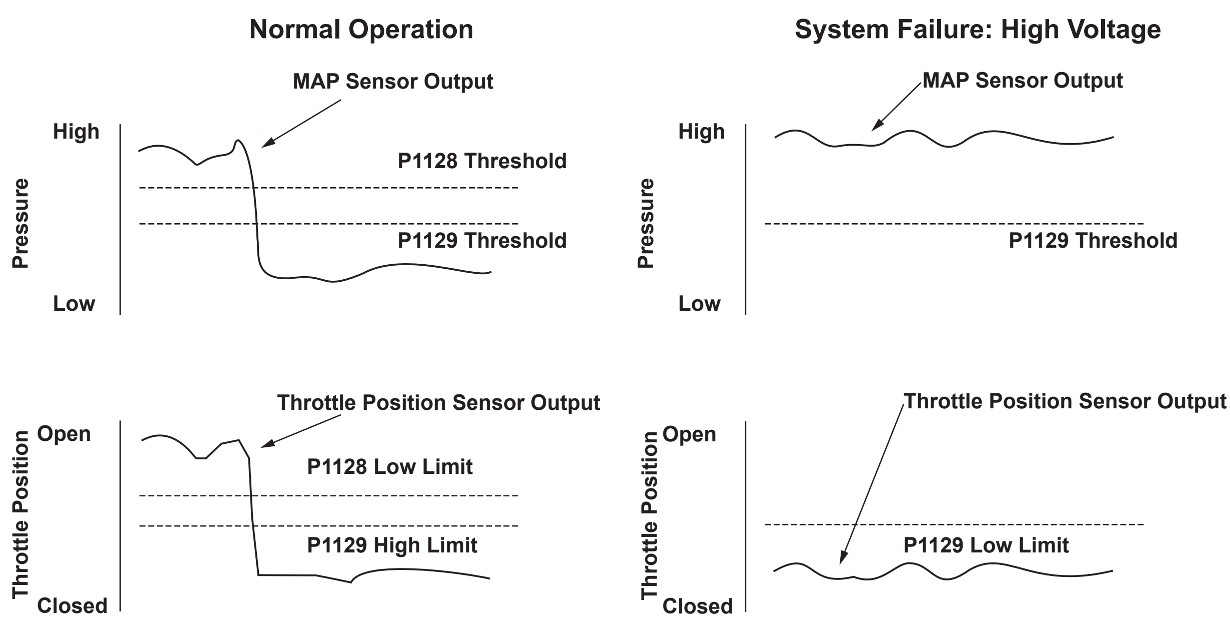
Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1129: Manifold Absolute Pressure (MAP) Sensor Higher Than Expected



P0107-9671



P1129-9771

General Description

The manifold absolute pressure (MAP) sensor senses manifold absolute pressure (vacuum) and converts it into electrical signals. The MAP sensor outputs low signal voltage at high-vacuum (throttle valve closed) and high signal voltage at low-vacuum (throttle valve wide open).
The engine control module (ECM) compares a predetermined MAP value at a given throttle position and manifold absolute pressure to the output voltage value of the MAP sensor.
If the MAP sensor outputs high voltage during fuel cut-off operation for deceleration with the throttle valve fully closed, which should make the manifold absolute pressure lower, the ECM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	2 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

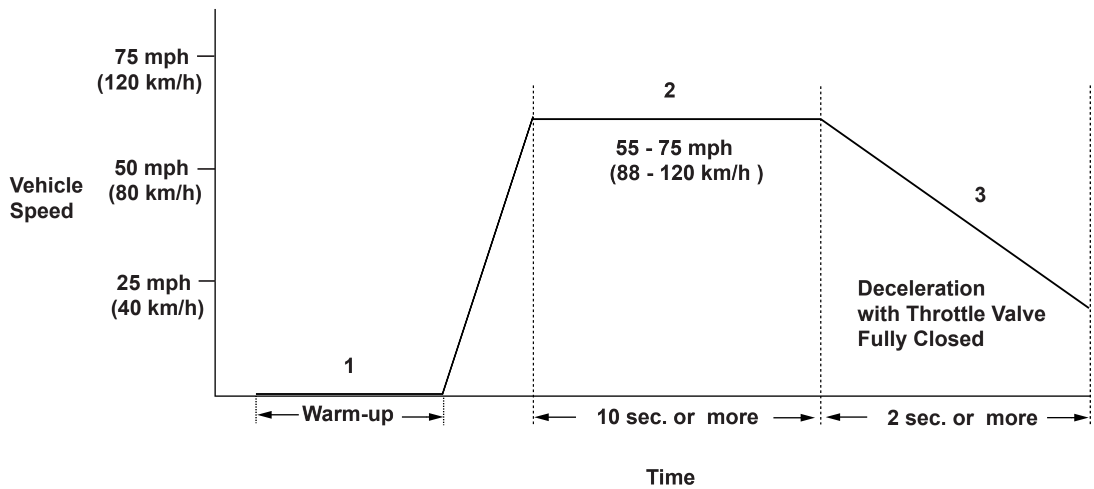
Condition	Minimum	Maximum
Engine coolant temperature	158ºF (70ºC)	—
Engine speed	1,300 rpm	5,500 rpm
Vehicle speed	15 mph (24 km/h)	—
Fuel feedback	During deceleration	
Throttle position	Fully closed	
No active DTCs	ECM, MAP, ECT, TP, EGR, IAC, VSS, VTEC System, Fuel System, A/T System*1	

*1: CVT

Malfunction Threshold

The MAP sensor output is 44 kPa (325 mmHg, 12.8 in.Hg) or more for at least 2 seconds.

Driving Pattern



1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a steady speed between 55 - 75 mph (88 - 120 km/h) for at least 10 seconds.
3. Then, decelerate with the throttle valve fully closed for at least 2 seconds.

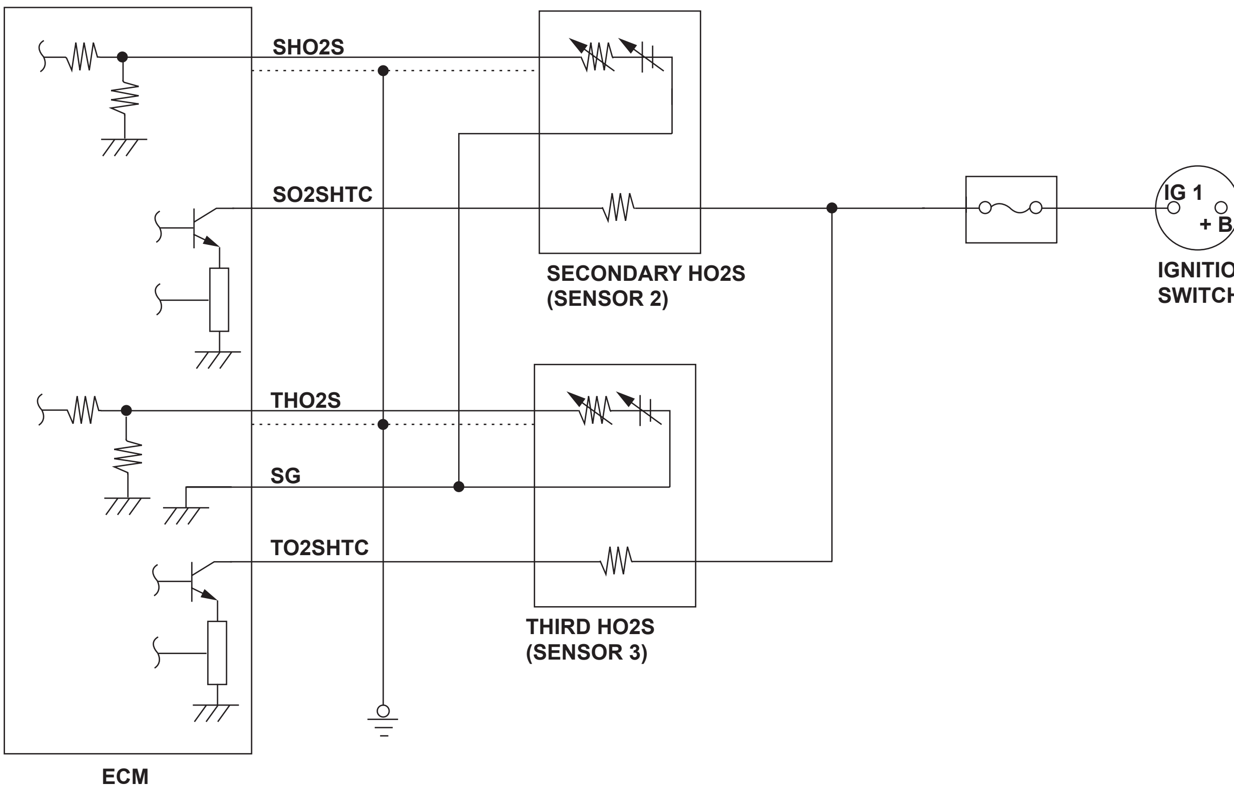
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1130: Demand for Changing Both Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) and Third Heated Oxygen Sensor (Third HO2S) (Sensor 3) (M/T)



P1130-0202

General Description

To prevent a difference in response characteristics from causing false DTCs, both the secondary heated oxygen sensor (HO2S) and the third HO2S must be replaced simultaneously. If a malfunction that is related to the secondary HO2S or the third HO2S (deterioration, a faulty heater) is detected, the DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle*1, Continuous*2
Sequence	None
Duration	—
DTC Type	One drive cycle*2 or Two drive cycles*1, MIL ON

*1: Secondary HO2S, Third HO2S
*2: Secondary HO2S heater, Third HO2S heater

Enable Conditions

Condition	
Other	Refer to Enable Conditions for these malfunctions: the secondary HO2S, the third HO2S, the secondary HO2S heater and the third HO2S heater

Malfunction Threshold

Refer to Malfunction Threshold for these malfunctions: the secondary HO2S, the third HO2S, the secondary HO2S heater, and the third HO2S heater.

Driving Pattern

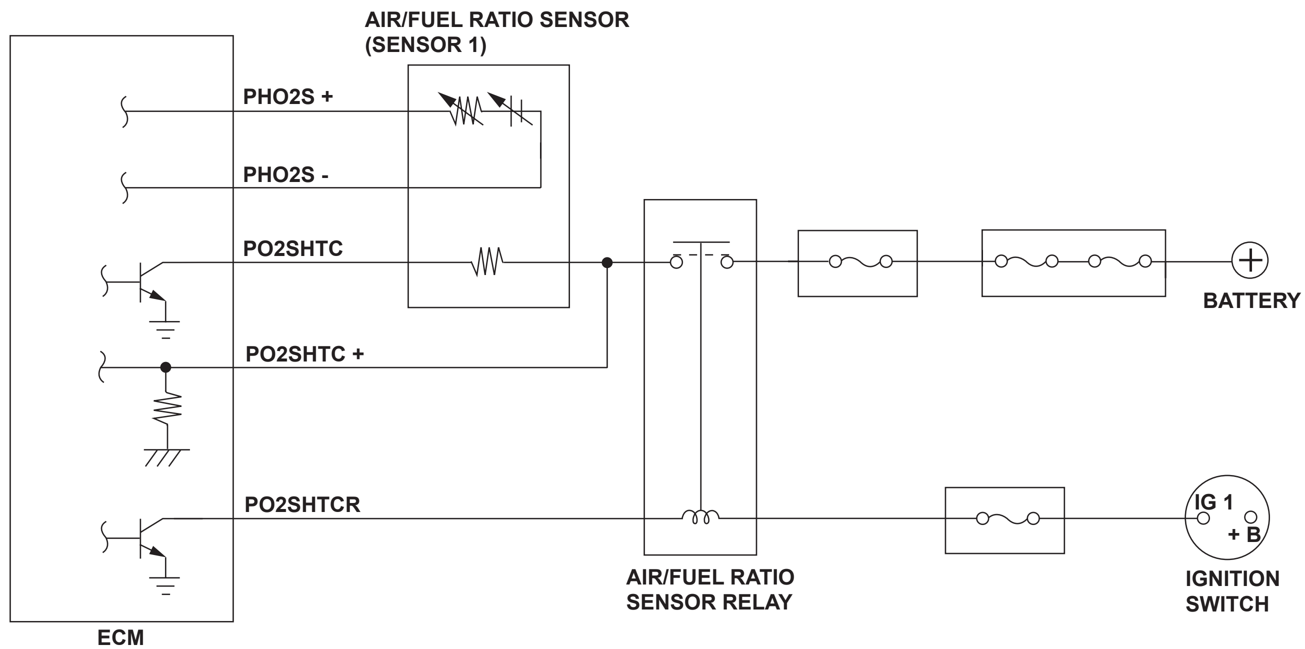
Refer to Driving Patterns for the secondary HO2S (P0137, P0138, P0139) and the third HO2S (P0143, P0144, P0145).

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1157: Air/Fuel Ratio (A/F) Sensor (Sensor 1) Circuit High Voltage



P1149-0101

General Description

The air/fuel ratio (A/F) sensor (Sensor 1) is installed in the exhaust system and detects oxygen content in the exhaust gas. The A/F sensor outputs voltage to the engine control module (ECM). A heater for the sensor element is embedded in the A/F sensor (Sensor 1). When activated, it heats the sensor to stabilize and speed the detection of oxygen content by controlling current flow through the heater. The current diminishes as the voltage applied to the element electrode reaches a certain range because the amount of oxygen that passes through the diffusion layer is limited. The current is proportional to the oxygen content in the exhaust gas, so the air/fuel ratio is detected by the measurement of the current. The ECM compares the set target air/fuel ratio to the detected air/fuel ratio and adjusts the fuel injection duration.

If the A/F sensor (Sensor 1) voltage is low, the air/fuel ratio is lean, and the ECM uses A/F feedback control to issue a Rich command. If the A/F sensor (Sensor 1) voltage is high, the air/fuel ratio is rich, and the ECM uses A/F feedback control to issue a Lean command.

If the element is not activated for a set time period when the power is drawn by the A/F sensor (Sensor 1) heater, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Elapsed time after starting the engine	60 seconds	—
Engine coolant temperature	41ºF (5ºC)	—
Battery voltage	9.5 V	16.0 V
No active DTCs	A/F Sensor (Sensor 1), A/F Sensor Heater (Sensor 1)	

Malfunction Threshold

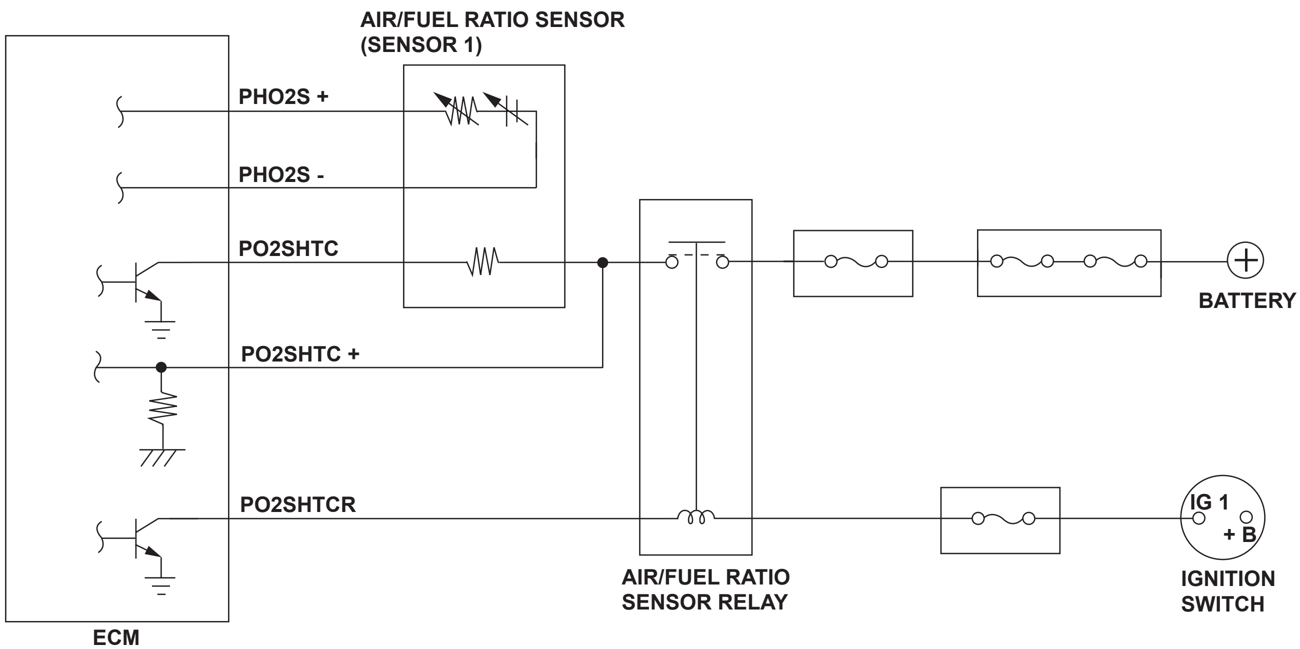
The A/F sensor (Sensor 1) heater power is 25 W or more and the element resistance is 250 Ω or more for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1158: Air/Fuel Ratio (A/F) Sensor (Sensor 1) PHO2S - Circuit Low Voltage



P1149-0101

General Description

The air/fuel ratio (A/F) sensor (Sensor 1) is installed in the exhaust system and detects oxygen content in the exhaust gas. The A/F sensor outputs voltage to the engine control module (ECM). A heater for the sensor element is embedded in the A/F sensor (Sensor 1). When activated, it heats the sensor to stabilize and speed the detection of oxygen content by controlling current flow through the heater. The current diminishes as the voltage applied to the element reaches a certain range because the amount of oxygen that passes through the diffusion layer is limited. The current is proportional to oxygen content in the exhaust gas, so the air/fuel ratio is detected by the measurement of the current. The ECM compares the set target air/fuel ratio with the detected air/fuel ratio and adjusts the fuel injection duration.
If the A/F sensor (Sensor 1) voltage is low, the air/fuel ratio is lean, and the ECM uses A/F feedback control to issue a Rich command. If the A/F sensor (Sensor 1) voltage is high, the air/fuel ratio is rich, and the ECM uses A/F feedback control to issue a Lean command.
If the voltage at the ECM terminal is a set value for a specified time period, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	3.9 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	41ºF (5ºC)	—
Battery voltage	9.5 V	16.0 V
State of the engine	Running	
No active DTCs	A/F Sensor (Sensor 1), A/F Sensor Heater (Sensor 1)	

Malfunction Threshold

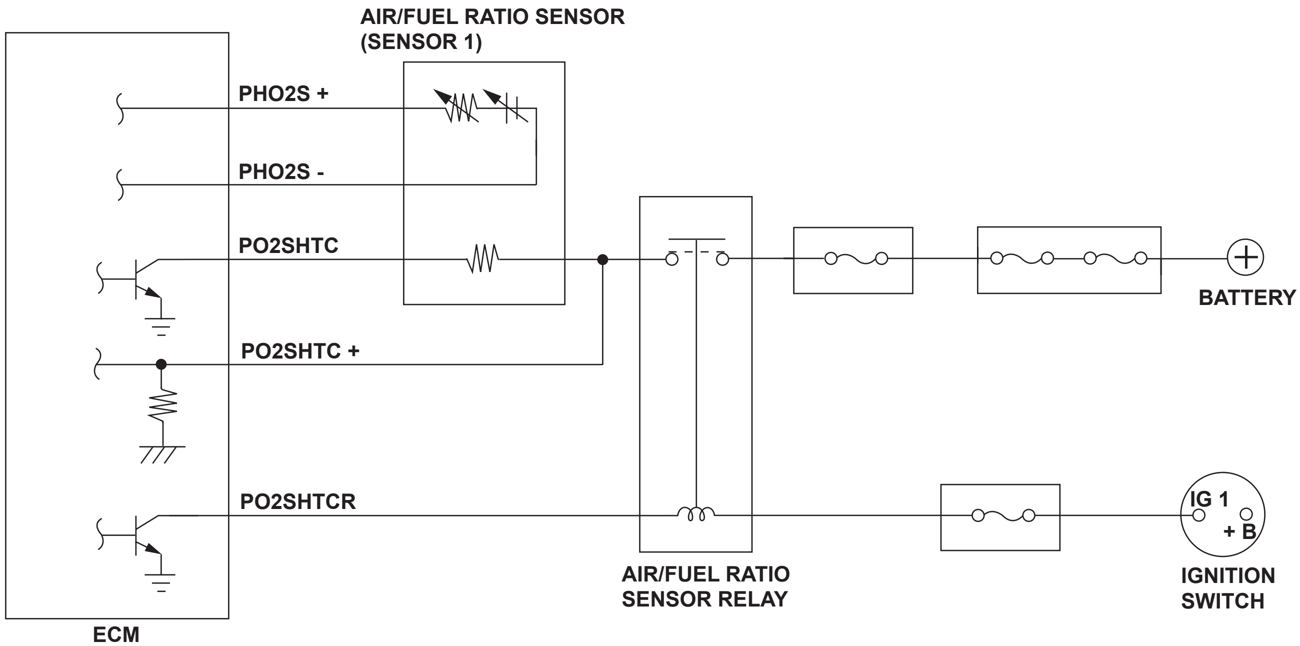
The voltage at the AFS- terminal is 0.3 V or less for at least 3.9 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1159: Air/Fuel Ratio (A/F) Sensor (Sensor 1) PHO2S + Circuit Low Voltage



P1149-0101

General Description

The air/fuel ratio (A/F) sensor (Sensor 1) is installed in the exhaust system and detects oxygen content in the exhaust gas. The A/F sensor outputs voltage to the engine control module (ECM). A heater for the sensor element is embedded in the A/F sensor (Sensor 1). When activated, it heats the sensor to stabilize and speed the detection of oxygen content by controlling current flow through the heater. The current diminishes as the voltage applied to the element reaches a certain range because the amount of oxygen that passes through the diffusion layer is limited. The current is proportional to oxygen content in the exhaust gas, so the air/fuel ratio is detected by the measurement of the current. The ECM compares the set target air/fuel ratio with the detected air/fuel ratio and adjusts the fuel injection duration.
If the A/F sensor (Sensor 1) voltage is low, the air/fuel ratio is lean, and the ECM uses A/F feedback control to issue a Rich command. If the A/F sensor (Sensor 1) voltage is high, the air/fuel ratio is rich, and the ECM uses A/F feedback control to issue a Lean command.
If the voltage at the ECM terminal is a set value for a specified time period, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	3.9 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	41ºF (5ºC)	—
Battery voltage	9.5 V	16.0 V
State of the engine	Running	
No active DTCs	A/F Sensor (Sensor 1), A/F Sensor Heater (Sensor 1)	

Malfunction Threshold

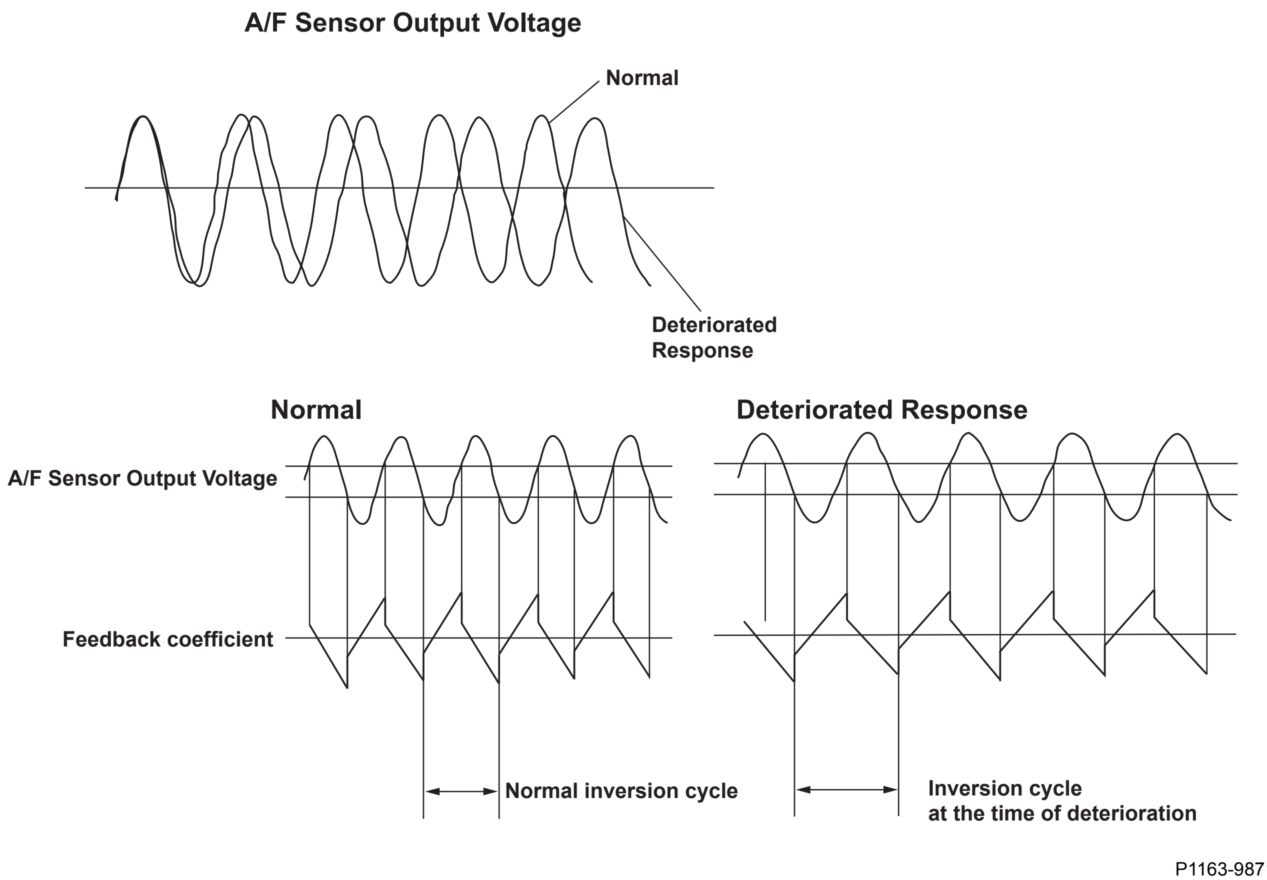
The voltage at the AFS+ terminal is 0.4 V or less for at least 3.9 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1163: Air/Fuel Ratio (A/F) Sensor (Sensor 1) Slow Response



General Description

The air/fuel ratio (A/F) sensor has a linear signal output in relation to the oxygen concentration. The engine control module (ECM) computes the air/fuel ratio from A/F sensor output voltage and uses the fuel feedback control to improve exhaust emissions. The ECM measures the inversion cycle of the A/F sensor output voltage during closed loop control of the stoichiometric ratio, detects a deteriorated response, and stores a DTC if the inversion cycle has extended to a specified time period or more.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	14 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

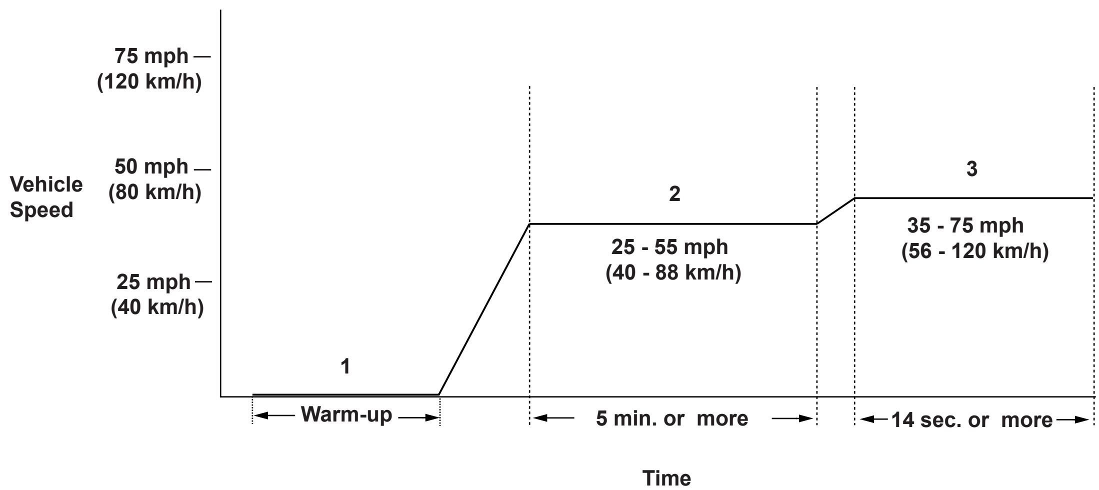
<table>
<tr><th colspan="2">Condition</th><th>Minimum</th><th>Maximum</th></tr>
<tr><td colspan="2">Engine coolant temperature</td><td>140ºF (60ºC)</td><td>—</td></tr>
<tr><td colspan="2">Intake air temperature</td><td>-14ºF (-25ºC)</td><td>—</td></tr>
<tr><td colspan="2">Engine speed</td><td>1,300 rpm</td><td>2,700 rpm</td></tr>
<tr><td rowspan="4">MAP value</td><td rowspan="2">1,300 rpm</td><td>38 kPa (285 mmHg, 11.3 in.Hg)*1</td><td>90 kPa (680 mmHg, 26.7 in.Hg)*1</td></tr>
<tr><td>48 kPa (360 mmHg, 14.2 in.Hg)*2</td><td>94 kPa (710 mmHg, 27.9 in.Hg)*2</td></tr>
<tr><td>2,200 rpm*1</td><td>32 kPa (235 mmHg, 9.3 in.Hg)</td><td rowspan="2">90 kPa (680 mmHg, 26.7 in.Hg)</td></tr>
<tr><td>2,250 rpm*2</td><td>42 kPa (310 mmHg, 12.3 in.Hg)</td></tr>
<tr><td colspan="2">Vehicle speed</td><td>35 mph (55 km/h)</td><td>—</td></tr>
<tr><td colspan="2">Fuel trim</td><td>0.65</td><td>1.40</td></tr>
<tr><td colspan="2">Fuel feedback</td><td colspan="2">Closed loop at stoichiometric</td></tr>
<tr><td colspan="2">Monitoring priority</td><td colspan="2">EVAP, Catalyst System</td></tr>
<tr><td colspan="2">No active DTCs</td><td colspan="2">ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S, Secondary HO2S Heater, MAP, CKP, ECT, TP*2, EGR, BARO, VSS, VTEC System, Fuel System, A/T System*2</td></tr>
<tr><td colspan="2">Other</td><td colspan="2">Other than when there is excessive vapor generation (fuel level is 40 - 80%)</td></tr>
</table>

*1: M/T
*2: CVT

Malfunction Threshold

The average of at least six periods of the A/F sensor inversion cycle is 2.3 seconds or longer, or the average of average six periods of the A/F sensor inversion cycle detected for 10 seconds is 2.3 seconds or longer.

Driving Pattern



P1163-0171

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a steady speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Then, drive immediately at a steady speed between 35 - 75 mph (56 - 120 km/h) for at least 14 seconds.

- If the EVAP monitor runs instead of the HO2S monitor, turn the engine off, then restart it, and the HO2S monitor will restart.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

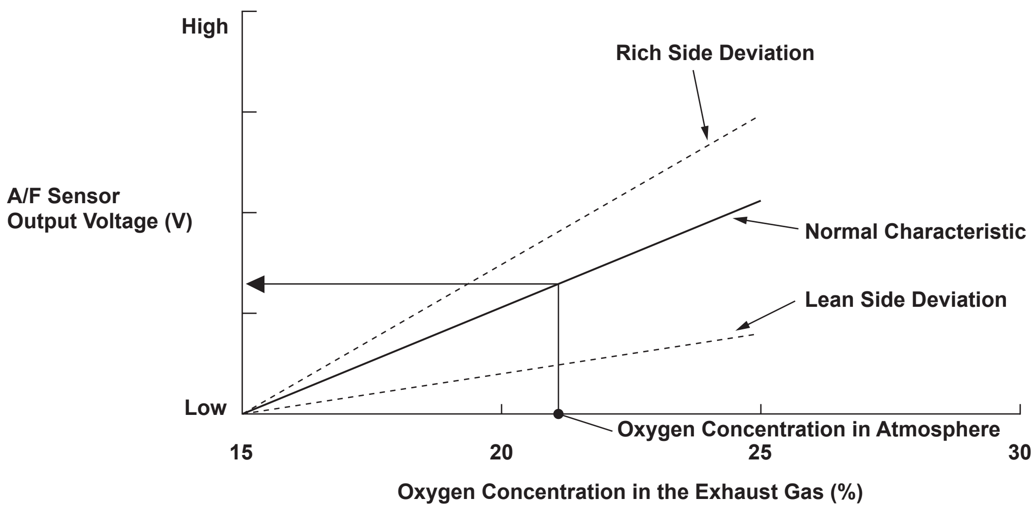
Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1164: Air/Fuel Ratio (A/F) Sensor (Sensor 1) Range/ Performance Problem



P1164-9871

General Description

The air/fuel ratio (A/F) sensor has a linear signal output in relation to the oxygen concentration. The engine control module (ECM) computes the air/fuel ratio from A/F sensor output voltage and uses the fuel feedback control to improve exhaust emissions. The ECM monitors A/F sensor output voltage during deceleration with the throttle fully closed, and it detects a malfunction and stores a DTC if the output voltage deviates greatly from normal oxygen concentration levels.

* Output to the scan tool exhibits a relationship between the A/F sensor output and oxygen concentration, which is opposite to the characteristic shown in the graph. That is, a deviation toward the rich side increases the output voltage and one toward the lean side decreases the output voltage as the stoichiometric ratio is 0.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	2 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

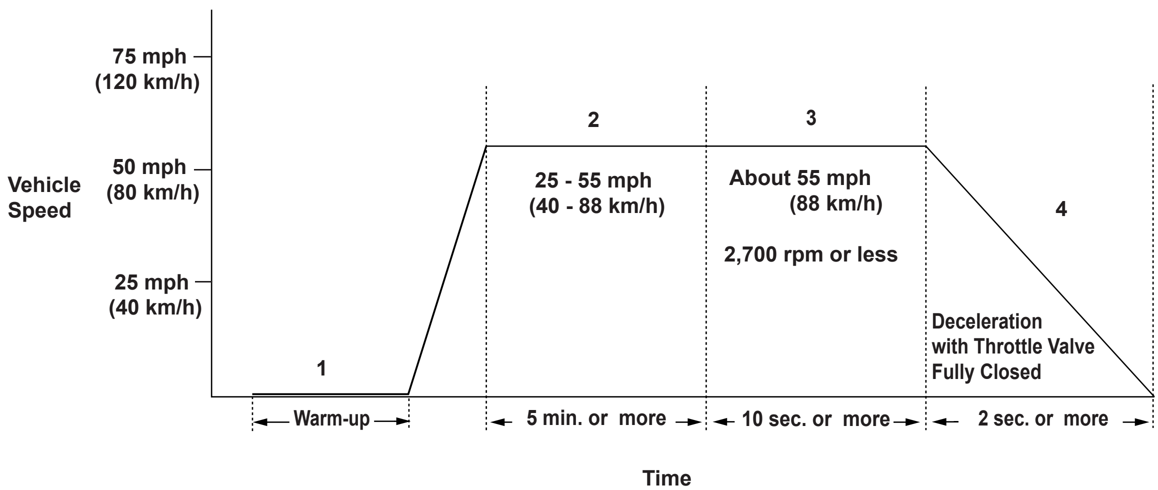
Condition	Minimum	Maximum
Elapsed time after starting the engine	60 seconds	—
Engine coolant temperature	140ºF (60ºC)	—
Intake air temperature	-14ºF (-25ºC)	—
Engine speed	—	2,700 rpm
Vehicle speed	30 mph (48 km/h)	—
Fuel feedback	During deceleration	
Monitoring priority	Catalyst System*1, EVAP*1	
No active DTCs	ECM, A/F Sensor*2, A/F Sensor Heater*2, CKP, TP*1, BARO, VSS, Fuel System, EVAP, A/T System*1	
Other	Other than when there is excessive vapor generation (fuel level is 40 - 80%)	

*1: CVT
*2: M/T

Malfunction Threshold

The A/F sensor output voltage is 3.01 V*2, 3.00 V*1 or less (rich side), or 4.18 V*2, 4.52 V*1 or more (lean side).

Driving Pattern



P1164-0171

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Drive the vehicle at a speed about 55 mph (88 km/h) with an engine speed of 2,700 rpm or less for at least 5 seconds.
4. Decelerate with the throttle fully closed for at least 2 seconds.

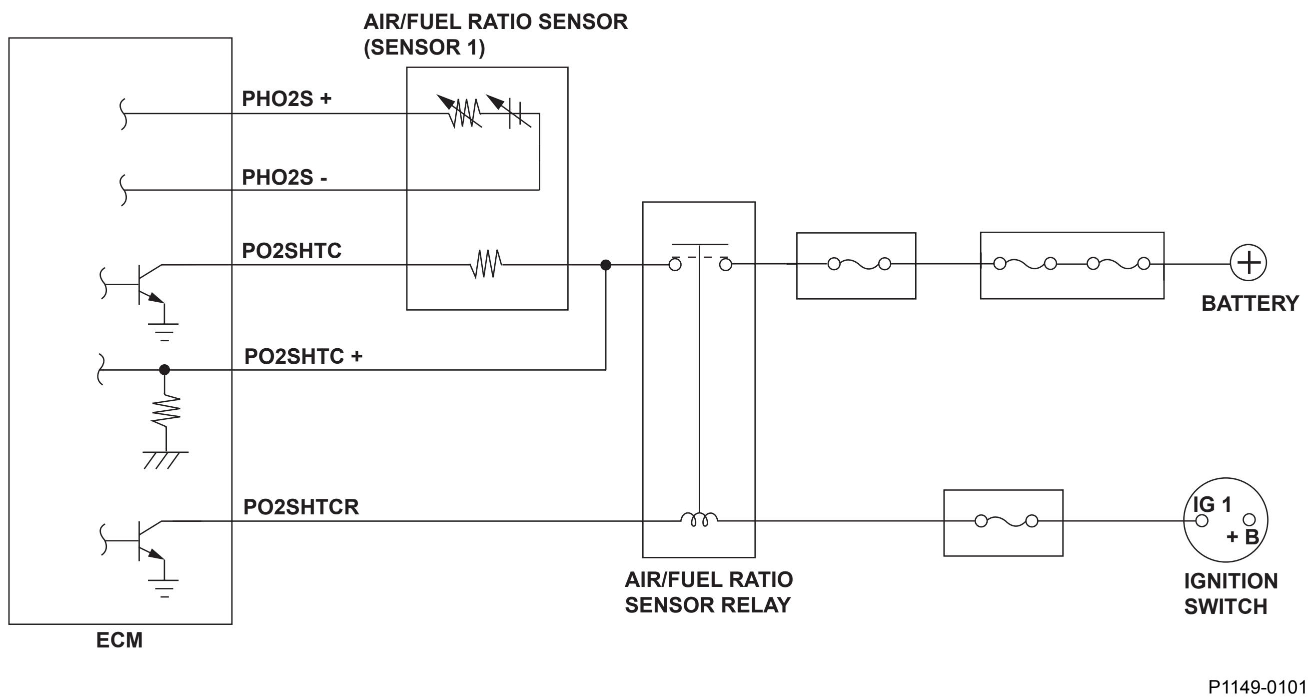
- If the EVAP monitor runs instead of the HO2S monitor, turn the engine off, then restart it, and the HO2S monitor will restart.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1166: Air/Fuel Ratio (A/F) Sensor (Sensor 1) Heater System Electrical Problem (CVT)



General Description

A heater for the sensor element is embedded in the air/fuel ratio (A/F) sensor (Sensor 1) and is controlled by the engine control module (ECM). It is activated and heats the sensor to stabilize and speed the detection of oxygen content when the exhaust gas temperature is cold.
If a combination of A/F sensor (Sensor 1) heater voltage and current is not a set value, or an overheated heater is detected, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	—
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition		Minimum	Maximum
Engine coolant temperature	For 25 seconds after turning the ignition on	14ºF (-10ºC)	—
	Engine run	-4ºF (-20ºC)	
Battery voltage (IGP terminal of ECM)		9.7 V	16 V
State of the engine		Running	
No active DTCs		A/F Sensor (Sensor 1) Heater	
Other		A/F Sensor (Sensor 1) Heater is activated	

Malfunction Threshold

One of these conditions must be met.

- The heater voltage is 5 V or less and current is more than 1.5 A for at least 3.9 seconds while the heater is activated, and the heater voltage is 5 V or less and current is 1.5 A or less for at least 3.9 seconds while the heater is not activated.
- The heater voltage is 5 V or less and current is 1.5 A or less for at least 3.9 seconds while the heater is activated, and the heater voltage is 5 V or less and current is 1.5 A or less for at least 3.9 seconds while the heater is not activated.
- The heater voltage is 5 V or more and current is more than 1.5 A for at least 3.9 seconds while the heater is activated, and the heater voltage is 5 V or more and current is 1.5 A or more for at least 3.9 seconds while the heater is not activated.
- The heater voltage is 5 V or more and current is 1.5 A or less for at least 3.9 seconds while the heater is activated, and the heater voltage is 5 V or more and current is 1.5 A or less for at least 3.9 seconds while the heater is not activated.
- The heater current is 23 A or more for at least 0.4 second.

Driving Pattern

Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.

Diagnosis Details

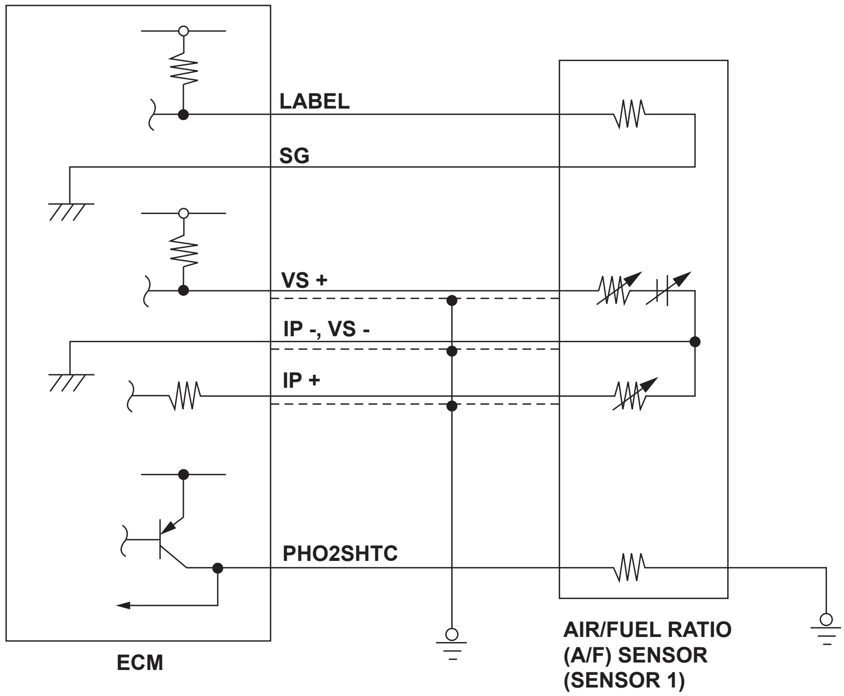
Conditions for illuminating the MIL

When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1166: Air/Fuel Ratio (A/F) Sensor (Sensor 1) Heater System Electrical Problem



P1162-0001

General Description

The heater which heats the sensor element is built into the air/fuel ratio (A/F) sensor. The heater is controlled by the engine control module (ECM) and is energized when the sensor element temperature is low. It heats the sensor to stabilize the detection of oxygen content. The ECM monitors the A/F sensor heater output (return check). A malfunction is detected if the return signals do not meet the command value (for heater activation) in the ECM for a set time period or more and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	40ºF (4ºC)	—
Battery voltage	9 V	—
No active DTCs	A/F Sensor Heater	
Other	The heater is activated	

Malfunction Threshold

The heater return signal is 5 V or less when the command for heater activation in the ECM is ON, or the heater return signal is 5 V or more when the command for heater activation in the ECM is OFF, for at least 5 seconds.

Driving Pattern

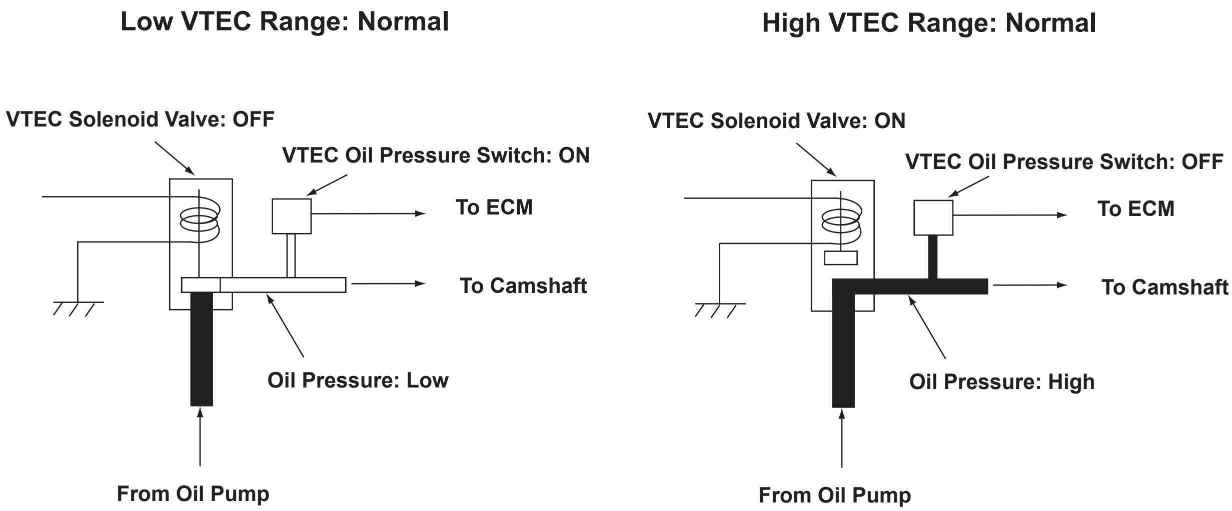
Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1259: VTEC System Malfunction



P1259-9672

Logic decision	VTEC oil pressure switch	
	'ON'	'OFF'
VTEC Solenoid Command 'ON'	Failure	Normal
VTEC Solenoid Command 'OFF'	Normal	Failure

General Description

The VTEC system activates the VTEC solenoid valve by command from the engine control module (ECM), and it charges/discharges the hydraulic circuit of the VTEC mechanism that switches valve timing between Low and High. The ECM monitors oil pressure conditions in the hydraulic circuit of the VTEC mechanism according to the VTEC oil pressure switch downstream of the VTEC solenoid valve. If there is a disparity between the oil pressure condition in the hydraulic circuit that is determined by the ECM command, and the oil pressure condition that is determined by the status of the VTEC oil pressure switch, the system is considered faulty, and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition		Minimum	Maximum
Engine coolant temperature	2,000 rpm	—	204ºF (95ºC)
	3,000 rpm		242ºF (117ºC)
Engine speed	High lift cam operation	3,200 rpm	—
	Low lift cam operation	—	3,200 rpm
Battery voltage		10.1 V	—

Malfunction Threshold

High lift cam operation

- When the VTEC solenoid valve is ON, the VTEC oil pressure switch remains ON. (Stuck judgement for low lift cam operation)

Low lift cam operation

- When the VTEC solenoid valve is OFF, the VTEC oil pressure switch remains OFF. (Stuck judgement for high lift cam operation)

Driving Pattern

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Then, keep the vehicle speed at 10 mph (16 km/h) or more, and hold the engine speed at 3,200 rpm or more in a lower gear for at least 5 seconds.

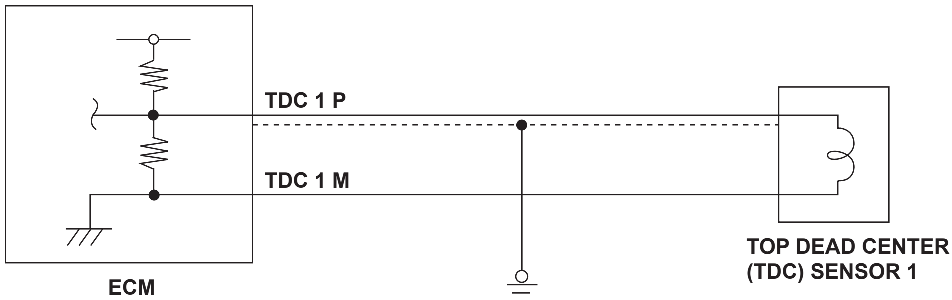
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1361: Top Dead Center (TDC) Sensor 1 Intermittent Interruption



P1361-0002

General Description

The top dead center (TDC) sensor consists of a rotor and a pick-up coil that detects rotor position. When the rotor turns after starting the engine, the changes of magnetic flux in the pick-up coil are converted into pulsing signals to the engine control module (ECM). The TDC sensor detects the top dead center of each cylinder for fuel injection.
If TDC sensor pulsing signals are detected an abnormal number of times due to noise, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine speed	500 rpm	—
No active DTCs	CKP, TDC 1	

Malfunction Threshold

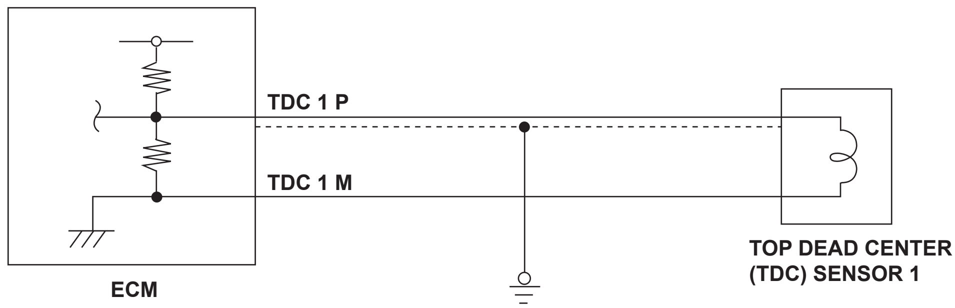
The CKP sensor outputs more or less than eight pulses for each TDC sensor 1 pulse 30 times in succession.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1362: Top Dead Center (TDC) Sensor 1 No Signal



P1361-0002

General Description

The top dead center (TDC) sensor consists of a rotor and a pick-up coil that detects rotor position. When the rotor turns after starting the engine, the changes of magnetic flux in the pick-up coil are converted into pulsing signals to the engine control module (ECM). The TDC sensor detects the top dead center of each cylinder for fuel injection.
If no pulsing signals from the TDC sensor are detected, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
State of the engine	Running
No active DTCs	CKP, TDC

Malfunction Threshold

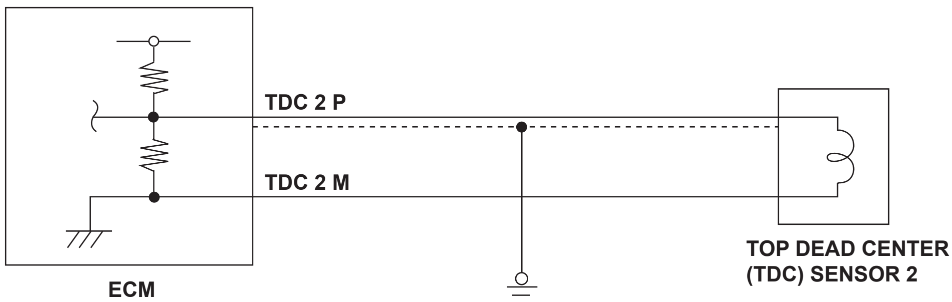
No TDC sensor pulses are detected 37 times in succession.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1366: Top Dead Center (TDC) Sensor 2 Intermittent Interruption



P1366-0001

General Description

The top dead center (TDC) sensor consists of a rotor and a pick-up coil that detects rotor position. When the rotor turns after starting the engine, the changes of magnetic flux in the pick-up coil are converted into pulsing signals to the engine control module (ECM). The TDC sensor detects the top dead center of each cylinder for fuel injection.
If TDC sensor pulsing signals are detected an abnormal number of times due to noise, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine speed	500 rpm	—
No active DTCs	CKP, TDC 2	

Malfunction Threshold

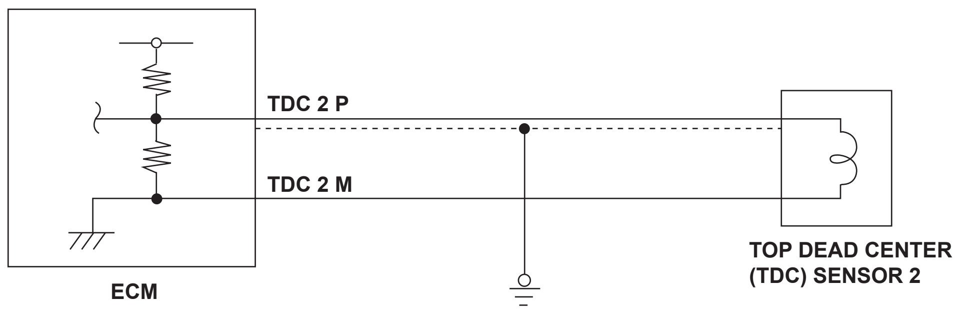
The CKP sensor outputs more or less than eight pulses for each TDC sensor 2 pulse 30 times in succession.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1367: Top Dead Center (TDC) Sensor 2 No Signal



P1366-0001

General Description

The top dead center (TDC) sensor consists of a rotor and a pick-up coil that detects rotor position. When the rotor turns after starting the engine, the changes of magnetic flux in the pick-up coil are converted into pulsing signals to the engine control module (ECM). The TDC sensor detects the top dead center of each cylinder for fuel injection.
If no pulsing signals from the TDC sensor are detected, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
State of the engine	Running
No active DTCs	CKP, CYP

Malfunction Threshold

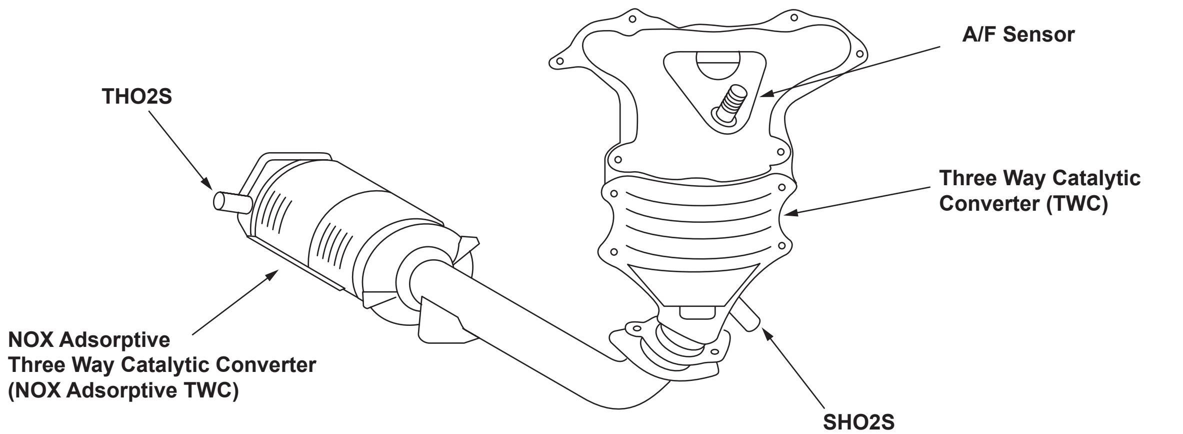
No TDC sensor pulses are detected 37 times in succession.

Diagnosis Details

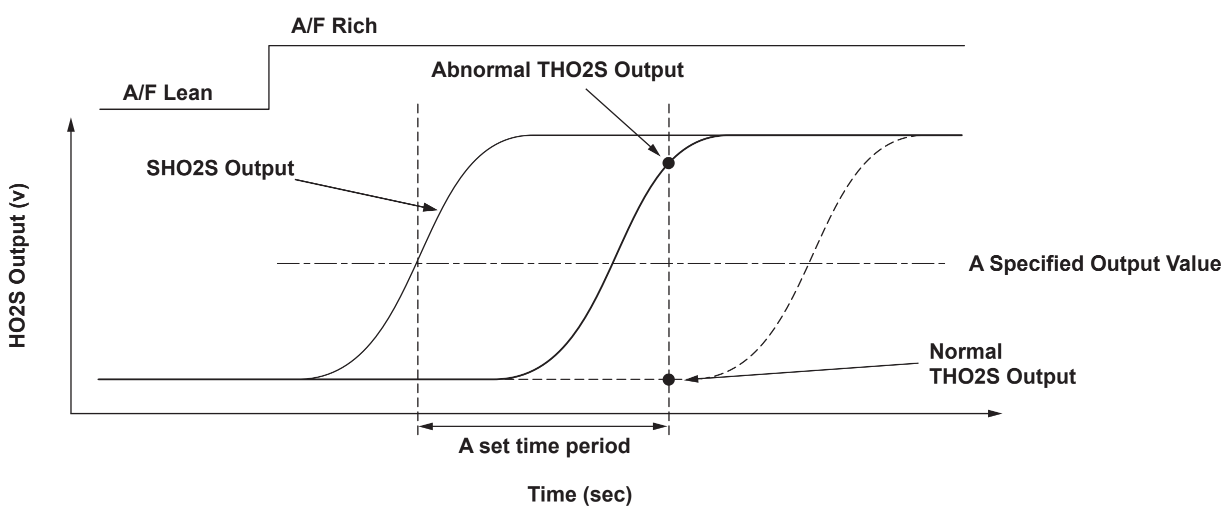
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1420: NOX Adsorptive Three Way Catalyst System Efficiency Below Threshold (M/T)



P0143-0271



P1420-0271

General Description

The NOX adsorptive three way catalyst (TWC) absorbs NO2, when the oxygen concentration is high (lean) and releases absorbed NO2 to oxidize the reduced constituent (HC, CO and so on) in the exhaust gas when the oxygen concentration is low (rich). The NOX adsorptive TWC is considered faulty if the capacity of NOX adsorbent has deteriorated.
The NOX adsorptive TWC absorbs NO2 sufficiently during lean burn running. The absorbed NO2 is released when the air/fuel ratio becomes rich, then eventually, the air/fuel ratio downstream of the NOX adsorptive TWC is rich. Based on the third HO2S output after a set time period has elapsed since the secondary HO2S indicates “rich”, the engine control module (ECM) detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	Secondary HO2S
Duration	50 seconds* or less
DTC Type	Two drive cycles, MIL ON

* : At 2,000 rpm

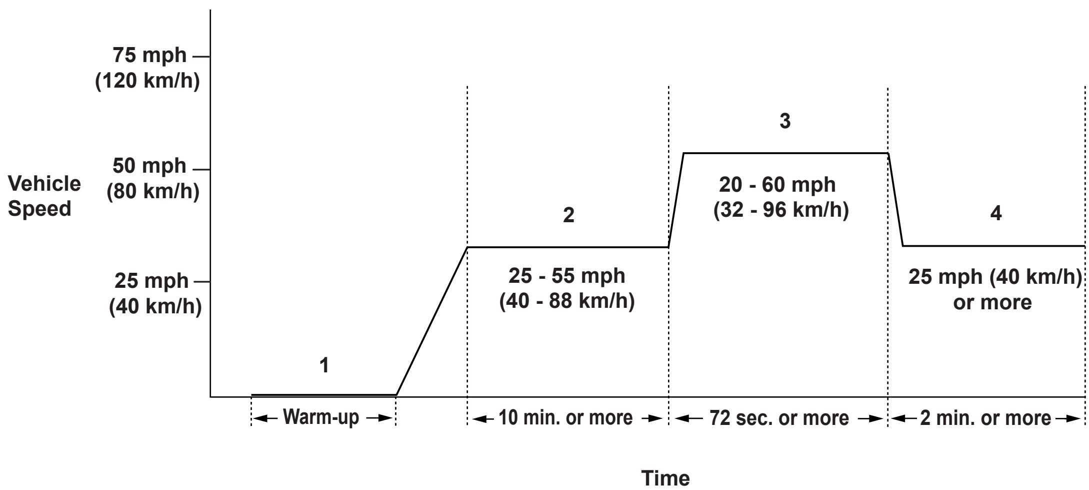
Enable Conditions

Condition		Minimum	Maximum
Elapsed time after starting the engine		605 seconds	—
Engine coolant temperature		168ºF (76ºC)	—
Engine speed		1,500 rpm	2,600 rpm
MAP value		35 kPa (260 mmHg, 10.3 in.Hg)	99 kPa (736 mmHg, 29.0 in.Hg)
The difference between atmospheric pressure and manifold pressure	1,500 rpm	8 kPa (54 mmHg, 2.2 in.Hg)	—
	2,600 rpm	11 kPa (81 mmHg, 3.2 in.Hg)	
Vehicle speed		25 mph (40 km/h)	—
Short term fuel trim		—	0.98
Secondary HO2S output		—	0.29 V
Fuel feedback		During lean burn running	
Monitoring priority		EVAP	
No active DTCs		ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S Heater, Third HO2S Heater, MAP, CKP, ECT, TP, EGR, BARO, VSS, VTEC System, Fuel System, EVAP	
Others		Must be in 3rd, 4th, or 5th gear	
		The duration of lean burn running must be sufficient (at least 1 minute)	
		The IMA battery indicates at least 25%	
		The Nox adsorptive TWC is not contaminated by sulfur in gasoline	

Malfunction Threshold

The third HO2S output is 0.60 V or more during a richer running mode for no more than 50 seconds.

Driving Pattern



P0143-0251

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 10 minutes to warm up the engine and the NOX adsorptive TWC.
3. Drive the vehicle at a speed between 20 - 60 mph (32 - 96 km/h) for at least 72 seconds.
4. Then, drive at a steady speed of 25 mph (40 km/h) or more in the lean burn running mode for at least 2 minutes.

- If the NOX adsorptive TWC is contaminated by sulfur in gasoline, the detection may be incorrect. Therefore, retest after driving with the engine in a richer running mode to counteract the effects of the sulfur (10 minutes) if the detection is not complete in the first driving cycle.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

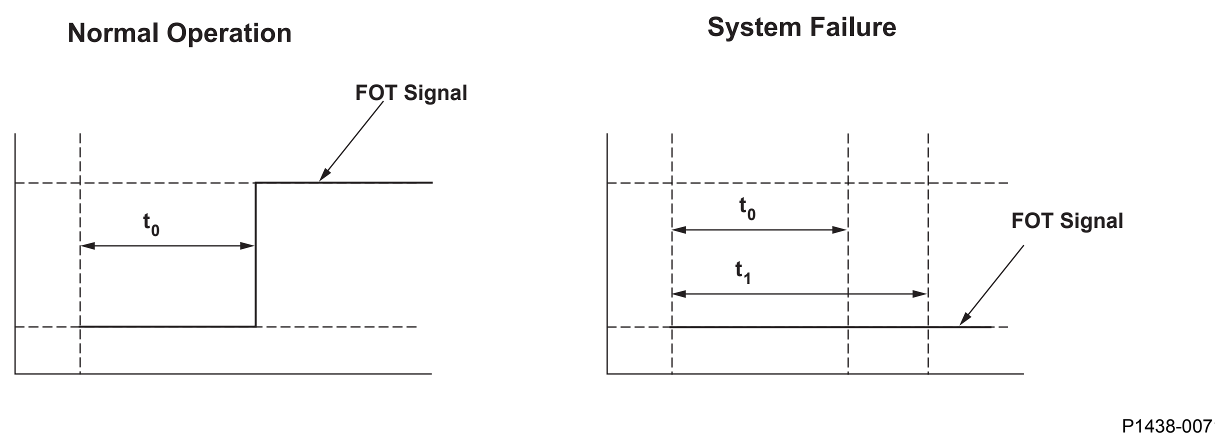
Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1438 (38): Motor Drive Module (MDM) Overheating Signal Circuit Problem



General Description

If the flag over temperature (FOT) signals from the power drive unit (PDU) do not vary from the low voltage level to the high voltage level within a set time period after turning the ignition switch on, a malfunction is detected. The signals vary from a low voltage level to a high voltage level within a set time period (t0) under normal conditions. If a problem occurs in the signal circuit, the signal stays at a low voltage level for at least a set time period (t1) (t1>t0) after turning the ignition switch on, and the motor control module (MCM) detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
No active DTCs	MPI, MCM	

Malfunction Threshold

The FOT signals stay at a low voltage level for at least 2 seconds.

Driving Pattern

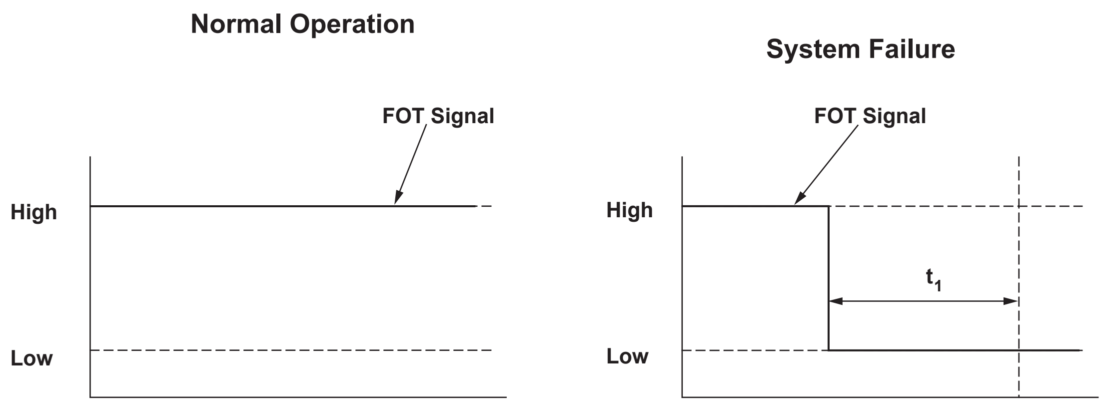
Turn the ignition switch off, and wait for at least 1 minute. Then, turn the ignition switch on.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1438 (39): Motor Drive Module (MDM) Overheating



P1438-0072

General Description

If the motor power inverter (MPI) module temperature increases during a drive, the flag over temperature (FOT) signals from the MPI module change from a high voltage level to a low voltage level for when driving self protection. If the FOT signals stay at a low voltage level for a set time period (t1), the motor control module (MCM) detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.5 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MPI, MCM	

Malfunction Threshold

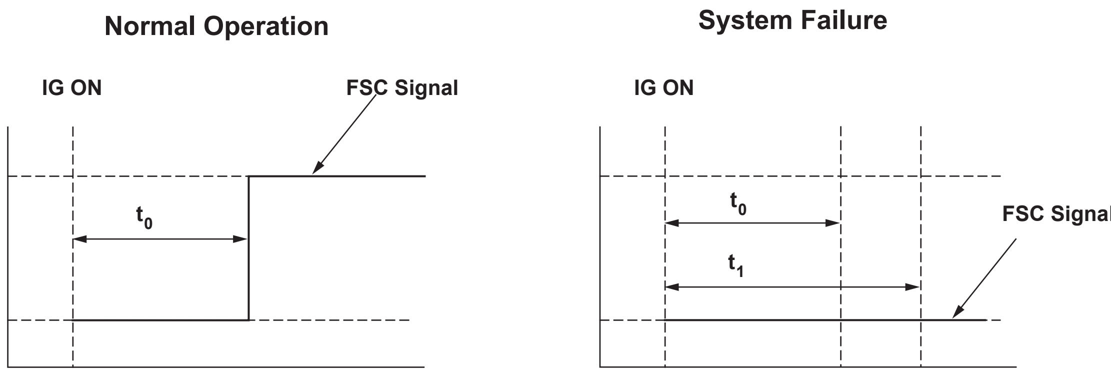
The FOT signals stay at a low voltage level for at least 0.5 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1439 (40): Motor Drive Module (MDM) Short Circuit Sensor Problem



P1439-0071

General Description

If the flag short circuit (FSC) signals from the motor power inverter (MPI) module do not vary from a low voltage level to a high voltage level within a set time period after turning the ignition switch on, a malfunction is detected. The signals vary from a low voltage level to a high voltage level within a set time period (t0) under normal conditions. If a problem occurs in the signal circuit, the signals stay at a low voltage level for at least a set time period (t1) (t1>t0) after turning the ignition switch on, and the motor control module (MCM) detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	0.5 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MPI, MCM	

Malfunction Threshold

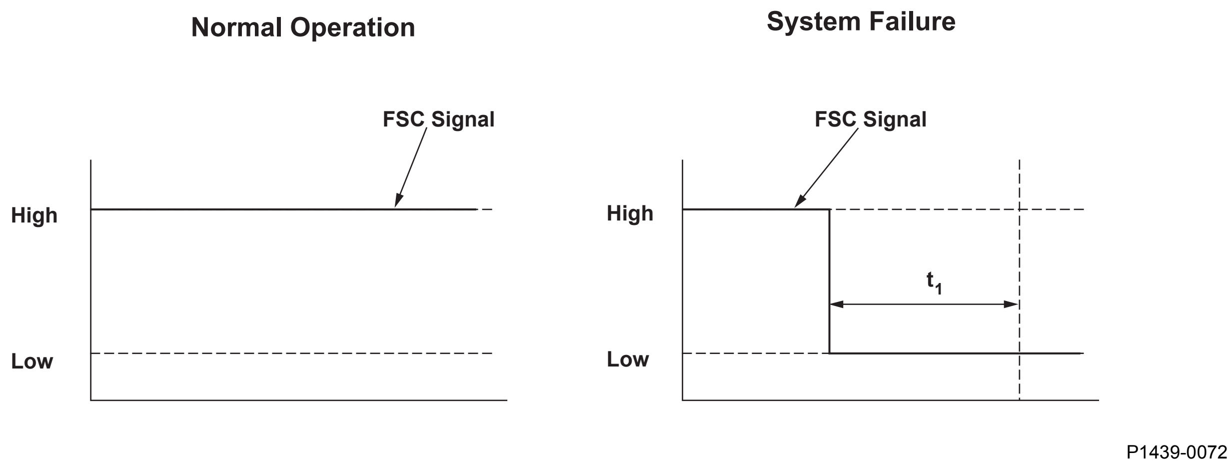
The FSC signals stay at a low voltage level for at least 0.5 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1439 (41): Motor Drive Module (MDM) Short Circuit



General Description

If a short circuit appears in the three-phase coil of the integrated motor assist (IMA) motor when driving, the motor drive module (MDM) stops functioning and varies the flag short circuit (FSC) signals from a high level to a low level to protect itself. If the FSC signals stay at a low voltage level for a set time period (t1), the motor control module (MCM) detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.6 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
No active DTCs	MPI, MCM, U/V/W Phase Signal Circuit, MCM, IMA system, BCM, BC	

Malfunction Threshold

The FSC signals stay at a low voltage level for at least 0.6 second.

Driving Pattern

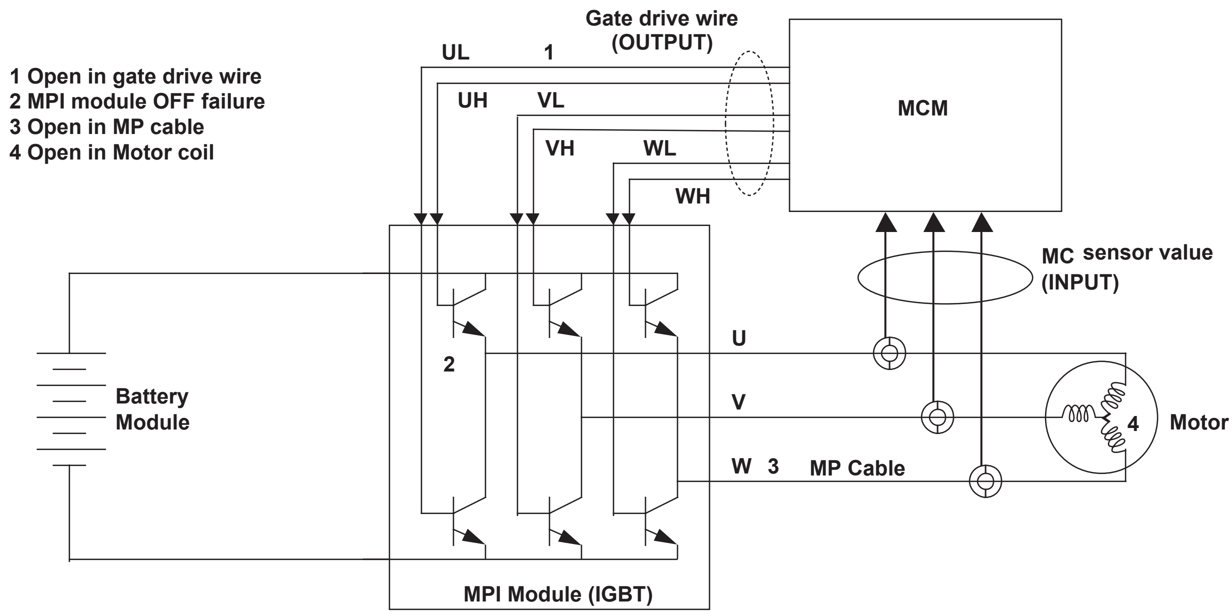
1. Start the engine.
2. Accelerate the vehicle to a speed of 40 mph (64 km/h) under the conditions in which the IMA battery charge gauge indicates 10 through 18 segments, so the IMA motor assist level gauge illuminates.
3. Decelerate gradually by applying the brakes.

Diagnosis Details

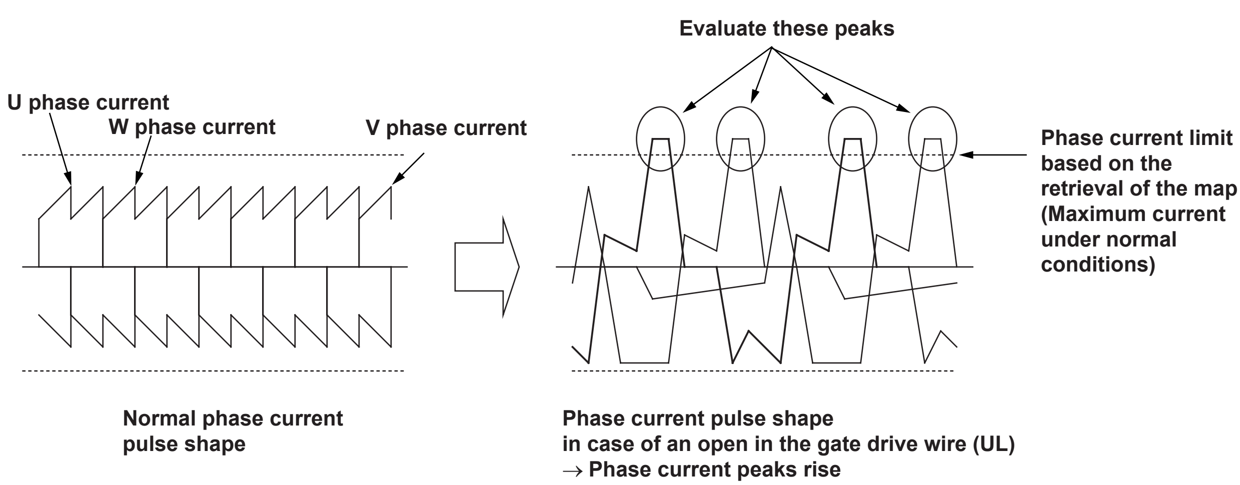
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

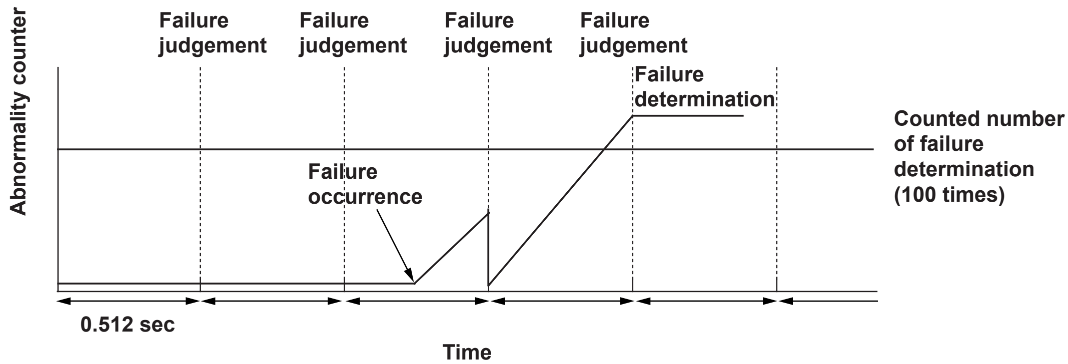
DTC P1440 (57): IMA System Problem



P1440-0071



P1440-0072



P1440-0073

General Description

An open in the gate drive wire, the insulated gate bipolar transistor (IGBT) OFF failure, and an open in the motor power cable or in the motor coil causes deviation from the target value of torque in the integrated motor assist (IMA) system. By monitoring changes in phase current when an abnormality occurs, the function monitor detects a malfunction in the IMA system.
An open in the gate drive wire or in the MP cable causes an increase in two other normal phases' current to compensate for a decrease in the phase when the motor control range is not in the low speed range.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.512 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Motor speed	2,000 rpm	—
Motor driving torque	10 N•m (1 kgf•m, 7.2 lbf•ft)	—
Battery module voltage	120 V	192 V
No active DTCs	MDM, MPI, U/V/W phase signal circuit, MCM, IMA system, BCM, BC	

Malfunction Threshold

The number of times that the three MC sensors output values exceed the value based on the retrieval of the map (current used for failure determination) depending on the demanded motor torque, battery module voltage, and speed while the cycle time is at least 0.512 second has been counted 100 times or more.

Driving Pattern

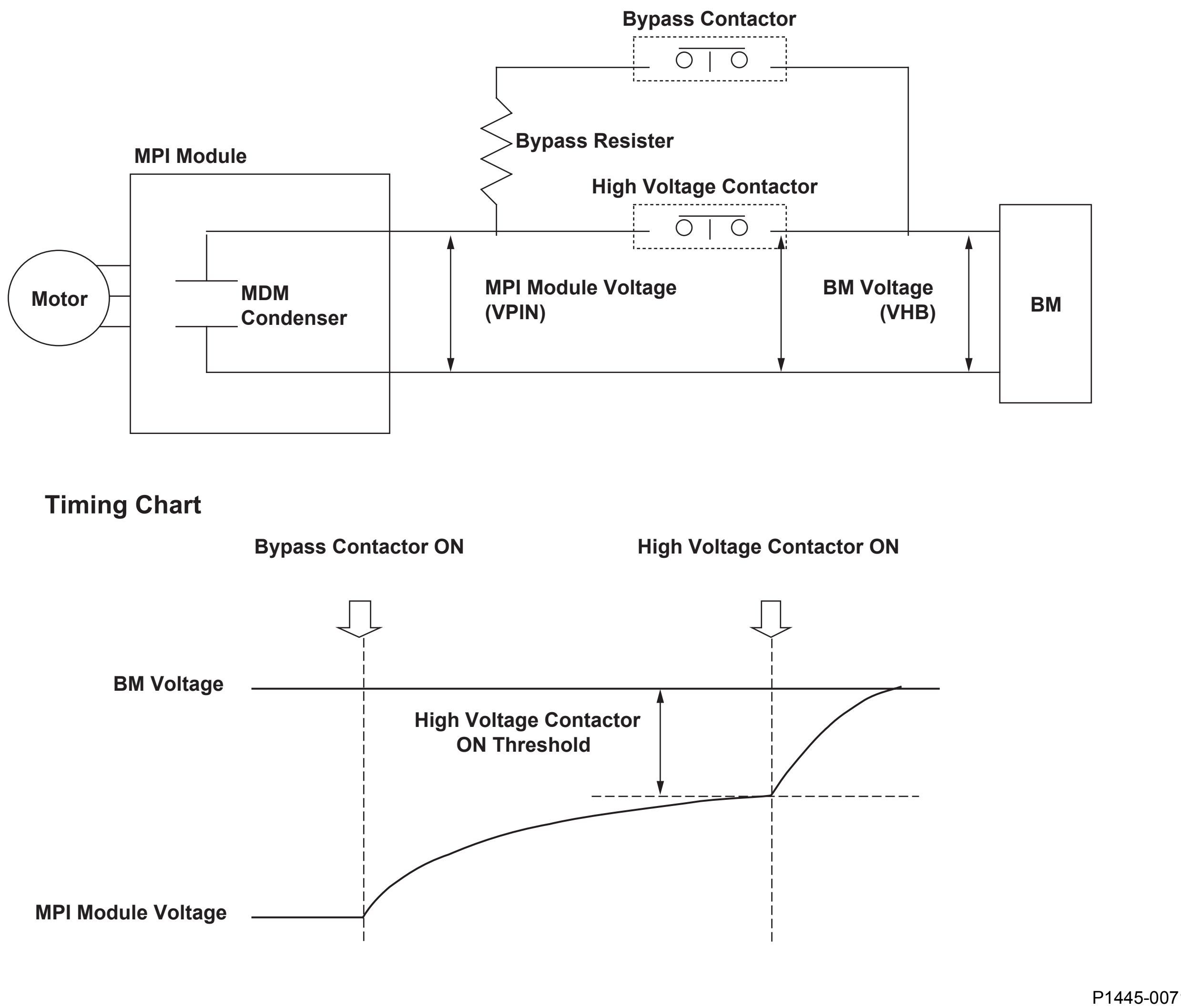
1. Start the engine.
2. Accelerate the vehicle to an engine speed of 2,000 rpm or more with wide open throttle while 10 segments or more on the IMA battery charge gauge are illuminated.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1445 (62): Bypass Contactor Problem



General Description

The high voltage contactor between the battery module (BM) and the motor power inverter (MPI) module is turned on to activate the integrated motor assist (IMA) system after turning the ignition switch on. Before turning the high voltage contactor on, the bypass contactor is turned on and the motor drive module (MDM) condenser is charged gradually by limited current that is determined by the bypass resistor. When the difference between the voltage on the MPI module side and the BM side is within a set range, the high voltage contactor is turned on, then the bypass contactor is turned off.
If the difference between the voltage on the MPI module side and the BM side is out of a set range for a specified time period or more after the bypass contactor is turned on, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
MPI module voltage (ignition switch ON)	—	240 V
Motor speed (ignition switch ON)	—	1,000 rpm
Ignition switch	ON	
No active DTCs	MPI, MDM, BC	

Malfunction Threshold

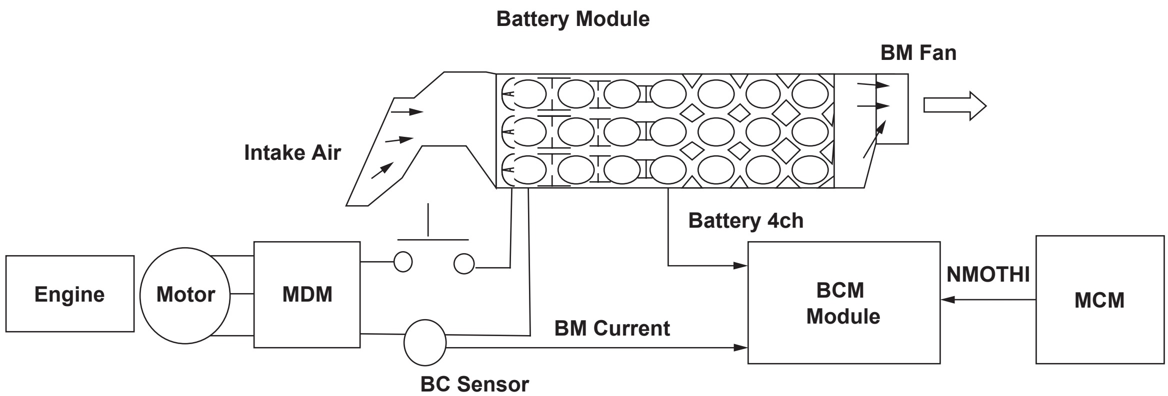
The difference between the voltage on the MPI module side and the BM side is 37 V or more for at least 2 seconds after the bypass contactor is turned on.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1448 (63): Battery Module Overheating



P1448-0071

General Description

To control the BM (battery module) temperature, the IMA (integrated motor assist) system is equipped with a BM fan. The motor assist stops regenerating and the IMA system is shut down by an increase in the BM temperature if the BM fan is malfunctioning. Therefore, a malfunction in the BM fan is detected to avoid problems caused by overheating. If the BM cooling system works normally when the BM temperature is high and the BM is in the power save mode, the BM temperature decreases depending on the input/output current.
If the amount of decrease in the BM temperature is out of a set value when comparing both the input/output current and the BM temperature with their predetermined values, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	30 minutes or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
BCM module power-supply voltage	7.5 V	—
BM fan mode	Low	—
IMA battery module temperature	131ºF (55ºC)	—
Engine speed	1,500 rpm	—
No active DTCs	BM, IMA	

Malfunction Threshold

Battery Current Average (A)	Decreasing Temperature of Battery Module ºF (ºC)
0	2.3 (1.3) or less
2	2.2 (1.2) or less
4	1.6 (0.9) or less
6	1.1 (0.6) or less
8	0.5 (0.3) or less

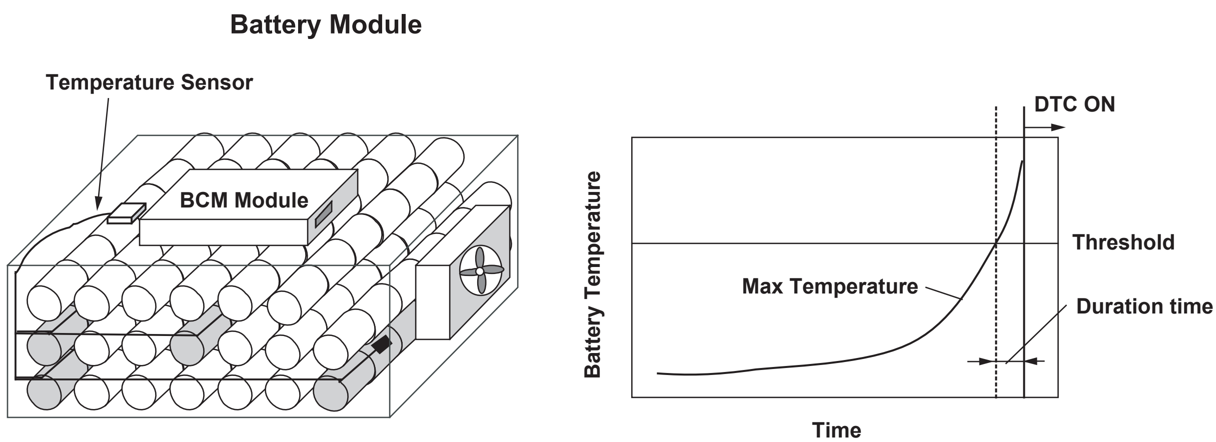
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P1449 (72): Battery Module Overheating



P1449-0071

General Description

The high voltage battery for the IMA (integrated motor assist) system temperature can increase from exposure to high ambient temperature, overcharging, excessive battery drain, or a battery short. If the battery temperature increases beyond a set value, it is difficult to use the battery continuously due to the thermal deformation of the electrical insulating material or the deterioration of the pole plates.

If the battery temperature is out of a set value for at least a specified time period when driving, a malfunction in the battery is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
BCM module power-supply voltage	7.5 V	—
Ignition switch	ON	
No active DTCs	BCM, BM, IMA	

Malfunction Threshold

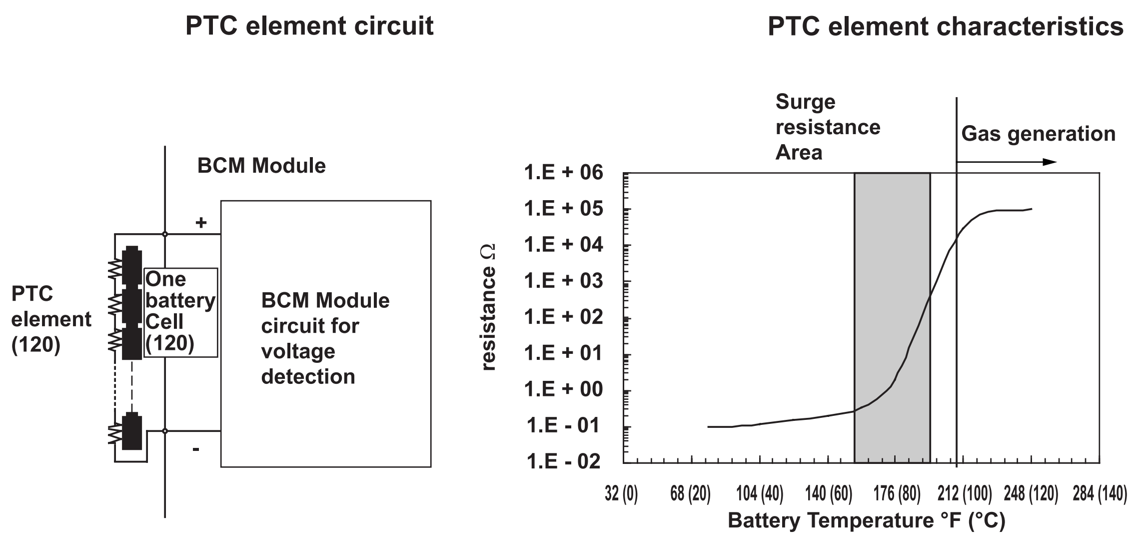
The IMA battery module temperature is 176ºF (80ºC) or more for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1449 (73): Battery Cell Overheating



P1449-0072

General Description

The 120 cells are connected in series in the high voltage battery for the IMA (integrated motor assist) system, and every cell has a PTC element. Serially connected cells enable the BCM (battery condition monitor) module to detect a change in resistance (PTC+side to ground, the BCM module detected voltage) when one or more monitoring cells' temperature is beyond a set value. Consequently, overheating is detected even, if only one of cells is malfunctioning. If the BCM module detected voltage is a set value or more for at least a specified time period, a malfunction in the battery is detected and a DTC is stored.

NOTE: The PTC element has characteristics as shown in the graph (the resistance increases at a faster rate within a certain range), so it is used to detect that a monitored object temperature is beyond a specified value.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
BCM module power-supply voltage	7.5 V	—
No active DTCs	Battery cell temperature signal circuit, BCM	

Malfunction Threshold

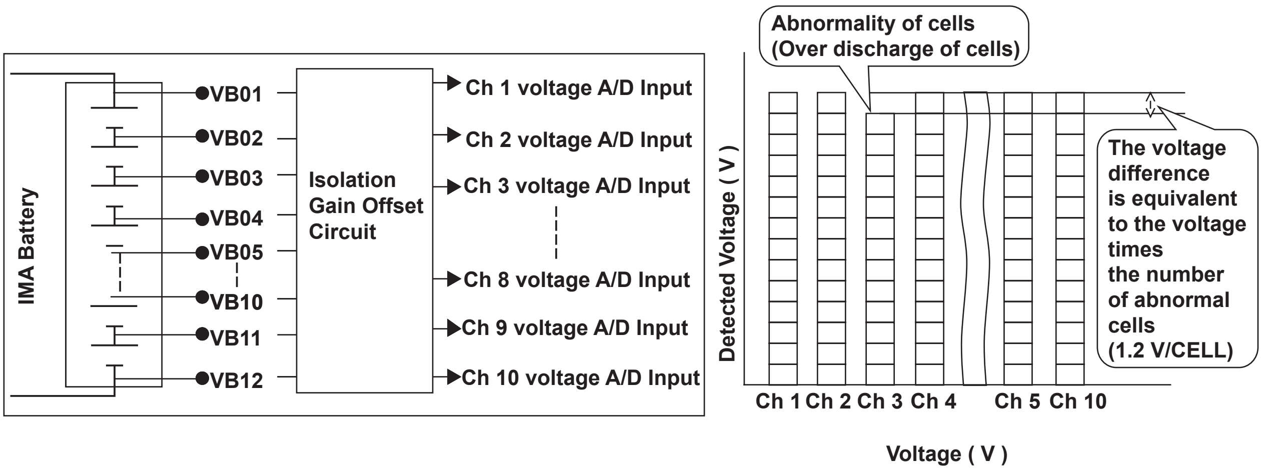
BCM module detected voltage is 3.5 V or more for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1449 (74): Battery Module Individual Voltage Input Deviation



P1449-0073

General Description

The voltage difference between channels (12 cells/channel) is 0.61 V at the maximum within the allowable capacity range (15%). However, if one cell in a channel is abnormal, the voltage difference is 1.2 V.
Also, the voltage detection tolerance for the BCM (battery condition monitor) module is specified as ±0.12 V at 32 - 140° F (0 - 60°C). Therefore, if the difference between channels is 1.2 V or more, at least one cell is considered abnormal. If there is an offset problem or a gain problem in the voltage detection system, and the voltage detection error is out of the tolerance specified, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	25.4 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
Detected individual voltage (at ch1 through ch10)	14.5 V	—
Detected individual temperature (at ch1 through ch4)	77°F (25°C)	—
Battery input/output current amperage	-20 A	11 A
BCM module power-supply voltage	7.5 V	—
No active DTCs	BM, BCM	

Malfunction Threshold

The voltage difference between channels is 1.2 V or more for at least 25.4 seconds.

Driving Pattern

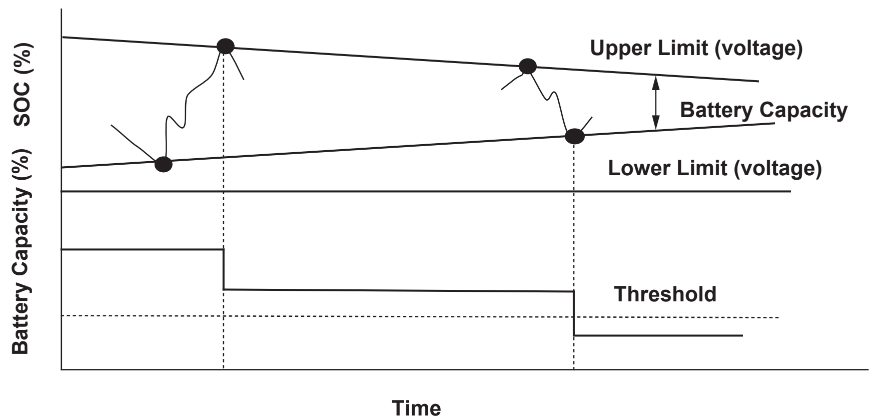
1. Reset the BCM module. (Disconnect the 12 V battery terminal once and reconnect it.)
2. Remove the No. 15 EPS (40 A) fuse from the under-dash fuse/relay box.
3. Raise the engine to a speed between 3,500 - 4,000 rpm in neutral until the IMA battery charge gauge indicates 19 segments.
4. Turn the ignition switch off.
5. Repeat driving Patterns 1 through 4 several times. (Increase the battery temperature and voltage to meet the Enable Conditions.)
6. Install the No. 15 EPS (40 A) fuse in the under-dash fuse/relay box.
7. Start the engine.
8. Let the engine idle for at least 3 minutes.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1449 (78): Battery Module Deterioration



P1447-0071

General Description

The high-voltage battery in the IMA (integrated motor assist) system is designed to operate within the upper and lower limits of the SOC (state of charge) voltage and the battery capacity limits. When the battery deteriorates, the voltage is subject to an increase or a decrease, so the limits of the battery capacity is narrowed. Therefore, if the upper and lower limits of the SOC are detected when driving, the BCM (battery condition monitor) calculates the sum of the current and calculates the battery capacity. If the power is less than a set value, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	Depending on the driving pattern
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
ECU power-supply voltage	7.5 V	—
Battery temperature	50°F (10°C)	—
No active DTCs	Battery current circuit, BM, BCM	
Other	The upper and lower limits are detected while the ignition switch is ON	

Malfunction Threshold

The battery capacity is 10% of 6.5 A or less.

Driving Pattern

1. Keep the battery temperature under 86°F (30°C) for at least 12 hours.
2. Start the engine.
3. Raise the engine speed to 3,500 - 4,000 rpm in neutral until the IMA battery charge gauge indicates 19 segments.
4. Then, drive the vehicle with the accessories on (the blower MAX, the headlights ON, etc.) Without turning the ignition switch off, accelerate and decelerate repeatedly under conditions in which the assist continues until the IMA battery charge gauge indicates one segment.

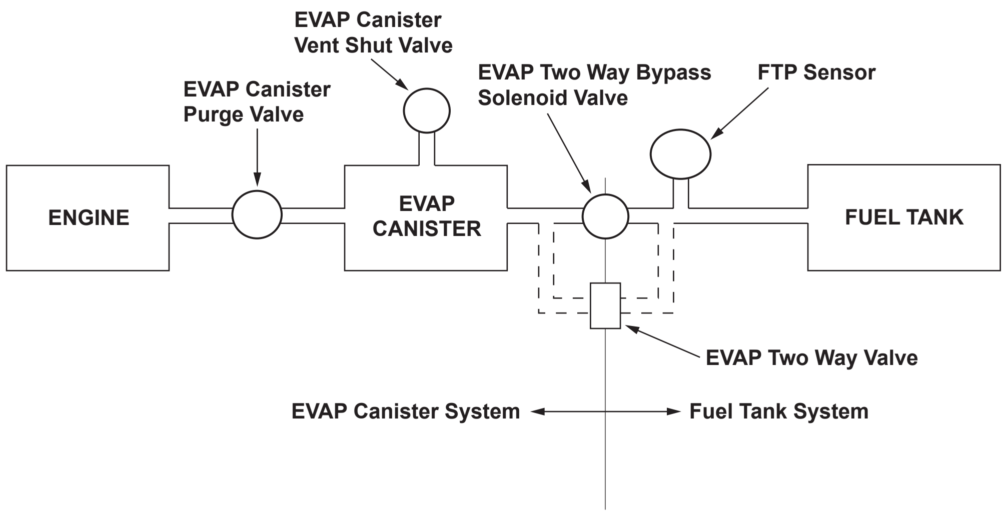
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

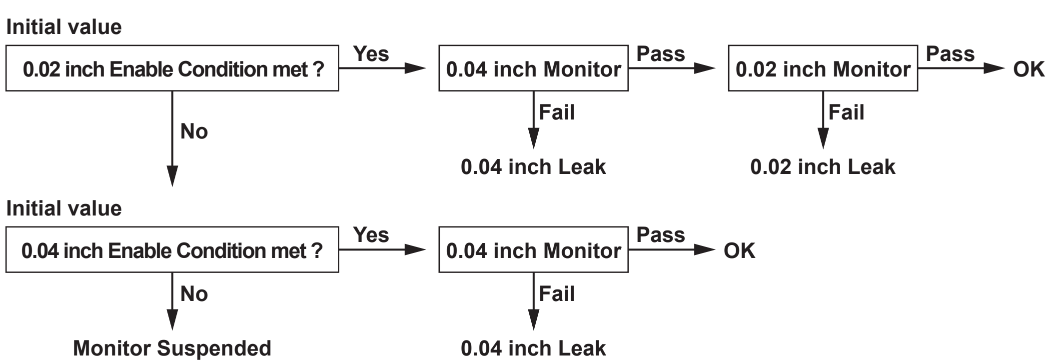
Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1456: Evaporative Emission (EVAP) Control System Leakage (Fuel Tank System)

Evaporative Emission (EVAP) System



P1456-9871



P1456-0071

General Description

The evaporative emission (EVAP) control system stores fuel vapor from the fuel tank in the EVAP canister temporarily to prevent it from escaping to the atmosphere and to enable it to be drawn into the engine by intake manifold vacuum and burned. In addition, the onboard refueling vapor recovery system (ORVR) stores fuel vapor generated when refueling in the EVAP canister.
The EVAP control system leak detection method improves the accuracy and frequency of the detection by determining faulty components and vapor leakage for each part. The EVAP control system (from the purge valve to the fuel tank) is divided into two parts. One is the "EVAP Canister Side" (from the EVAP two way valve to the purge valve) and the other is the "Tank Side" (from the EVAP two way valve to the fuel tank). There is 0.04 inch leak detection and 0.02 inch leak detection. If the 0.04 inch leak detection results are OK, the 0.02 inch leak detection runs.

- Each step is performed for leak detection during a valid drive cycle in which no Temporary DTC is stored.

Step 1: Common to both the 0.02 and 0.04 inch leak detections

Start the engine from the specified engine coolant and intake air temperature. Compare the output value from the fuel tank pressure (FTP) sensor right after start-up with the one after 20 seconds have elapsed. If there is a change between them (different thresholds are applied to the 0.02 inch leak detection and 0.04 inch leak detection), the tank side is considered that free of leaks. The detection is complete and the normal operation is started. If it is considered that there may be a 0.04 inch leak at that time, go to Step 2a or Step 2b. If there may be a 0.02 inch leak, go to Step 2a.

Step 2a: Common to both the 0.02 and 0.04 inch leak detections

Monitor the changes of absolute pressure in the fuel tank for a set time period after starting the engine. If it changes by a specified value (different thresholds are applied to the 0.02 inch leak detection and 0.04 inch leak detection) toward negative pressure, it is interpreted as no leakage in the tank side, detection is complete, and the normal operation starts.

Step 2b: 0.04 inch leak detection

Monitor the changes of absolute pressure in the fuel tank for a set time period after starting the engine. If it changes by a certain value, it is interpreted as no leakage in the tank side, detection is complete, and the normal operation starts.

If there may be a 0.04 inch leak in Step 2a or 2b, go to Step 3.

If there may be a 0.02 inch leak in Step 2a, go to Step 4.

Step 3: 0.04 inch leak detection

If the change of pressure in the fuel tank at the point of a set time period has elapsed after starting the engine is small, it is interpreted as leakage. Then, the detection is complete, and the normal operation starts.

Step 4a: 0.02 inch leak detection

When the monitoring conditions for the 0.02 inch leak detection in the "Tank Side" are met after the leak detection in the "EVAP Canister Side", the change of FTP sensor output is evaluated. If the change is a set value or more, it is interpreted as leakage in the "Tank Side" and a DTC is stored.

Step 4b: Common to both the 0.02 and 0.04 inch leak detections

If the change of fuel tank pressure is small while drawing intake manifold vacuum into the fuel tank, or if the fuel tank pressure does not become negative, it is interpreted as leakage (filler cap off, pipe disconnected, etc.) and a DTC is stored.

Step 5: Allowing the EVAP system to return atmospheric pressure, the normal operation starts, and the detection is complete.

Monitor Execution, Sequence, Duration, DTC Type

0.04 inch Leak Detection

Execution	Once per driving cycle
Sequence	None
Duration	1,223 seconds or more
DTC Type	Two drive cycles, MIL ON

0.02 inch Leak Detection

Execution	Once per driving cycle
Sequence	None
Duration	116 seconds or less
DTC Type	Two drive cycles, MIL ON

Enable Conditions

0.04 inch Leak Detection

Condition	Minimum	Maximum
Initial condition A*	—	18ºF (10ºC)
Initial condition B**	9ºF (5ºC)	—
Initial engine coolant temperature	20ºF (-6ºC)	94ºF (34ºC)
Initial intake air temperature	20ºF (-6ºC)	94ºF (34ºC)
Mileage after starting the engine	6 miles (10 km)	—
Battery voltage	10.6 V	—
No active DTCs	ECM, ECT, IAT, VSS, EVAP, FTP, A/T System*1	
Others	Other than when there is excessive vapor generation (fuel level is 40 - 80%)	
	Test-drive on a flat road to avoid misdetection	
	Avoid abrupt acceleration, deceleration and turns	

* : The difference between initial engine coolant temperature and initial intake air temperature when ambient temperature is about 32°F (0°C).
** : The difference between initial intake air temperature and intake air temperature right after starting the engine when ambient temperature is about 32°F (0°C).
*1: CVT

Enable Conditions (cont’d)

0.02 inch Leak Detection

Condition	Minimum	Maximum
Initial condition A*	—	7ºF (4ºC)
Initial condition B**	—	5ºF (3ºC)
Initial engine coolant temperature	32ºF (0ºC)	94ºF (34ºC)
Initial intake air temperature	32ºF (0ºC)	94ºF (34ºC)
Mileage after starting the engine	6 miles (10 km)	—
Battery voltage	10.5 V	—
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, MAP, ECT, TP, IAT, BARO, VSS, EVAP, FTP, A/T System*[1], ECM Back-up	
Others	Other than when there is excessive vapor generation (fuel level is 40 - 80%)	
	Test-drive on a flat road to avoid misdetection	
	Avoid abrupt acceleration, deceleration and turns	

* : The difference between initial engine coolant temperature and initial intake air temperature when ambient temperature is about 32°F (0°C).

** : The difference between initial intake air temperature and intake air temperature right after starting the engine when ambient temperature is about 32°F (0°C).

Enable Conditions (cont’d)

0.02 inch Leak (Step 4) Detection

Condition		Minimum	Maximum
Initial condition A**		—	7ºF (4ºC)
Initial condition B***		—	5ºF (3ºC)
Initial engine coolant temperature		32ºF (0ºC)	94ºF (34ºC)
Initial intake air temperature		32ºF (0ºC)	94ºF (34ºC)
Mileage after starting the engine		6 miles (10 km)	—
Engine coolant temperature		150ºF (66ºC)	—
Engine speed		1,300 rpm*1	2,900 rpm
		1,500 rpm*2	—
MAP value	1,300 rpm	30 kPa (220 mmHg, 8.7 in.Hg)	95 kPa (714 mmHg, 28.2 in.Hg)
	2,400 rpm		
Vehicle speed		45 mph (72 km/h)	82 mph (132 km/h)
Throttle position		1º	40º *1
			50º *2
Fuel trim		0.65	1.40
Fuel feedback		Closed loop	
Monitoring priority		EVAP	
No active DTCs		ECM, A/F Sensor, A/F Sensor Heater, MAP, ECT, TP, IAT, BARO, VSS, EVAP, FTP, A/T System*1, ECM Back-up	
Others		A certain time period (equivalent to monitoring time for 0.04 inch leak) has elapsed	
		Other than when there is excessive vapor generation (fuel level is 40 - 80%)	
		Test-drive on a flat road to avoid misdetection	
		Avoid abrupt acceleration, deceleration and turns	

* : The difference between initial engine coolant temperature and initial intake air temperature when ambient temperature is about 32°F (0°C).

** : The difference between initial intake air temperature and intake air temperature right after starting the engine when ambient temperature is about 32°F (0°C).

*2: M/T

Malfunction Threshold

• 0.04 inch leak detection

These conditions must all be met:

Step 1: The change of fuel tank pressure is 0.3 kPa (2 mmHg, 0.1 in.Hg) or less.

Step 2a: The change of fuel tank pressure is 0.3 kPa (2 mmHg, 0.1 in.Hg) or less.

Step 2b: The difference between maximum and minimum fuel tank pressure is not 0.4 kPa (3 mmHg, 0.2 in.Hg) - 1 kPa (8 mmHg, 0.3 in.Hg)***,*2.

Step 3: The change of fuel tank pressure is not 0.2 kPa (1 mmHg, 0.03 in.Hg) - 0.2 kPa (1.4 mmHg, 0.05 in.Hg)****,*2.

*** : Depending on initial engine coolant temperature and fuel consumption.

**** : Depending on initial engine coolant temperature.

• 0.02 inch leak detection

These conditions must all be met:

Step 1: The change of fuel tank pressure is 0.6 kPa (4 mmHg, 0.2 in.Hg) or less.

Step 2a: The change of fuel tank pressure is 0.7 kPa (5 mmHg, 0.2 in.Hg) or less.

Step 4a: The change ratio of fuel tank pressure is 00DB (HEX) or more.

Step 4b: If the change of fuel tank pressure is 2 kPa (10 mmHg, 0.4 in.Hg) or less, or fuel tank pressure is -0.6 kPa (-4 mmHg, -0.2 in.Hg) or more, it is considered to be a large leak (filler cap coming off etc.).

Driving Pattern

• 0.04 inch leak detection

1. Start the engine at an engine coolant temperature and intake air temperature as specified under Enable Conditions, and let it idle until the radiator fan comes on.
2. Drive the vehicle immediately at a speed between 35 - 75 mph (56 - 120 km/h) for at least 20 minutes and 6 miles (10 km).

• 0.02 inch leak detection

1. Complete the Driving Pattern for the 0.04 inch leak detection.
2. Then, drive the vehicle at a speed between 40 - 75 mph (64 - 120 km/h) for at least 2 minutes.

- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

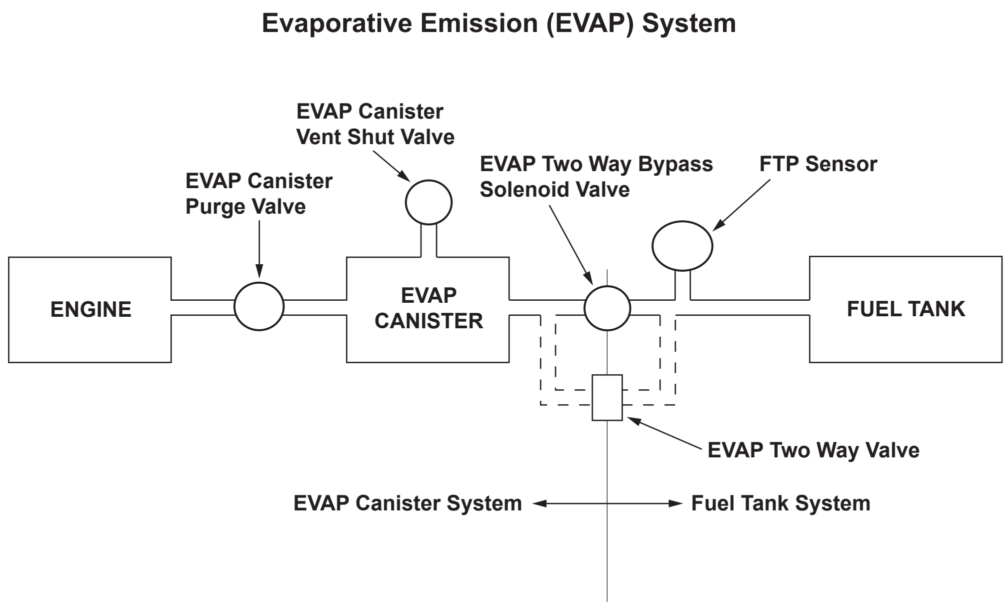
Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle with the ECT at engine start-up within the specified temperature range, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle with the ECT at engine start-up within the specified temperature range, the MIL comes on and the DTC and the freeze frame data are stored.

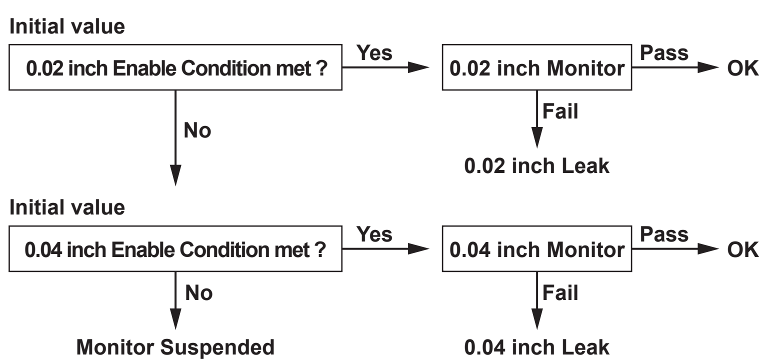
Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1457: Evaporative Emission (EVAP) Control System Leakage (EVAP Canister System)



P1456-9871



P1457-0071

General Description

The evaporative emission (EVAP) control system stores fuel vapor from the fuel tank in the EVAP canister temporarily to prevent it from escaping to the atmosphere and to enable it to be drawn into the engine by intake manifold vacuum and burned. The EVAP control system leak detection method improves the accuracy and frequency of the detection by determining faulty components and vapor leakage for each part. The EVAP control system (from the purge valve to the fuel tank) is divided into two parts. One is the "EVAP Canister Side" (from the EVAP two way valve to the purge valve) and the other is the "Tank Side" (from the EVAP two way valve to the fuel tank). Each side uses different detection principles and methods.

Step 1: If the fuel tank pressure (FTP) sensor indicates a significantly negative pressure value when the fuel tank and the EVAP canister are exposed to atmosphere, a malfunction when the canister vent shut valve (which is fully closed) is detected, and a DTC is stored. The detection is complete.
Step 2: If no malfunction is detected in step 1, and if the FTP sensor output is a specified pressure value or less, or it changes toward negative pressure when exposed to atmosphere, a malfunction when the purge control solenoid valve (which is fully open) is detected, and a DTC is stored. The detection is complete.
Step 3: Draw negative pressure into the canister if no malfunction is detected in Steps 1 and 2. At that time, if the FTP sensor output value is a set value or less, it is interpreted as leakage. A DTC is stored and the detection is complete.
Step 4: If no malfunction is detected in Steps 1 through 3, wait until the fuel tank pressure stabilizes. If there is leakage in the EVAP canister side, negative pressure in the EVAP canister has leaked and become equal to atmospheric pressure. If there is no leak, a certain level of negative pressure remains in the EVAP canister.
Step 5: Draw the negative pressure remaining in the canister into the tank side after performing Step 4. Monitor the FTP sensor output value. If the FTP sensor output changes toward negative pressure considerably, it is interpreted as no leakage in the canister side, and the detection is complete. On the other hand, if the FTP sensor output value does not change, it is interpreted as leakage in the EVAP canister side. Then, go to Step 6.
Step 6: After returning pressure in the EVAP control system to atmospheric level, shift to normal control, then the detection is complete.

Monitor Execution, Sequence, Duration, DTC Type

0.04 inch Leak Detection

Execution	Once per driving cycle
Sequence	None
Duration	45 seconds or less
DTC Type	Two drive cycles, MIL ON

0.02 inch Leak Detection

Execution	Once per driving cycle
Sequence	None
Duration	67 seconds or less
DTC Type	Two drive cycles, MIL ON

Enable Conditions

0.04 inch Leak Detection

Condition		Minimum	Maximum
Initial engine coolant temperature		—	94ºF (35ºC)
Engine coolant temperature		158ºF (70ºC)	212ºF (100ºC)
Intake air temperature		20ºF (-7ºC)	140ºF (60ºC)
Engine speed		1,300 rpm	3,500 rpm
		1,500 rpm*1	
MAP value	1,500 rpm	75 kPa (559 mmHg, 22.0 in.Hg)	91 kPa (684 mmHg, 27.0 in.Hg)
	2,400 rpm	30 kPa (220 mmHg, 8.7 in.Hg)	
Vehicle speed		32 mph (50 km/h)	82 mph (132 km/h)
Fuel tank pressure before starting monitoring		-2 kPa (-15 mmHg, -0.5 in.Hg)	—
Throttle position		1.0º	40.0º
Battery voltage		10.5 V	—
Fuel trim		0.65	1.40
Fuel feedback		Closed loop	
No active DTCs		ECM, A/F Sensor, A/F Sensor Heater, MAP, ECT, TP*1, BARO, IAT, VSS, EVAP, FTP, A/T System*1, ECM Back-up	
Others		Other than when there is excessive vapor generation (fuel level is 40 - 80%)	
		Test-drive on a flat road to avoid misdetection	
		Avoid abrupt acceleration, deceleration and turns	

*1: CVT

Enable Conditions (cont’d)

0.02 inch Leak Detection

Condition		Minimum	Maximum
Initial condition A*		—	7ºF (4ºC)
Initial condition B**		15ºF (8ºC)	—
Initial condition C***		6ºF (3ºC)	—
Initial engine coolant temperature		32ºF (0ºC)	94ºF (34ºC)
Initial intake air temperature		32ºF (0ºC)	94ºF (34ºC)
Engine coolant temperature		158ºF (70ºC)	212ºF (100ºC)
Intake air temperature		20ºF (-7ºC)	140ºF (60ºC)
Engine speed		1,300 rpm	3,500 rpm
		1,500 rpm*[1]	
MAP value	1,500 rpm	75 kPa (559 mmHg, 22.0 in.Hg)	91 kPa (684 mmHg, 27.0 in.Hg)
	2,400 rpm	30 kPa (220 mmHg, 8.7 in.Hg)	
Vehicle speed		32 mph (50 km/h)	82 mph (132km/h)
Fuel tank pressure before starting monitoring		-2 kPa (-15 mmHg, -0.5 in.Hg)	—
Throttle position		1.0º	40.0º
Battery voltage		10.5 V	—
Fuel trim		0.65	1.40
Fuel feedback		Closed loop	
No active DTCs		ECM, A/F Sensor, A/F Sensor Heater, MAP, ECT, TP*[1], BARO, IAT, VSS, EVAP, FTP, A/T System*[1], ECM Back-up*[1]	
Others		Other than when there is excessive vapor generation (fuel level is 40 - 80%)	
		Test-drive on a flat road to avoid misdetection	
		Avoid abrupt acceleration, deceleration and turns	

* : The difference between initial engine coolant temperature and initial intake air temperature when atmospheric temperature is about 32°F (0°C).

** : The difference between initial intake air temperature and the temperature right after start-up when atmospheric temperature is about 32°F (0°C).

***: The difference between intake air temperature right after start-up and initial intake air temperature when atmospheric temperature is about 32°F (0°C).

Malfunction Threshold

Any of these conditions must be met.
Step 1: Fuel tank pressure is -2 kPa (-20 mmHg, -0.7 in.Hg) or less.
Step 2: Fuel tank pressure changes by -6 kPa (-49 mmHg, -1.9 in.Hg) or more with the canister purge control solenoid valve closed (PCS OPEN failure 1). Or fuel tank pressure changes by 3 kPa (20 mmHg, 0.8 in.Hg) or more and fuel tank pressure is -0.6 kPa (-4 mmHg, -0.1 in.Hg) or less (PCS OPEN failure 2).
Step 3: Fuel tank pressure is -4 kPa (-25 mmHg, -1.0 in.Hg) or more.
Step 5: Fuel tank pressure changes by 0.5 kPa (3 mmHg, 0.1 in.Hg) or less.

Driving Pattern

0.04 inch Leak Detection:
1. Start the engine at an engine coolant temperature as specified under Enable Conditions, and let it idle until the radiator fan comes on.
2. Drive the vehicle immediately at a speed between 35 - 75 mph (56 - 120 km/h) for at least 2 minutes and 6 miles (10 km).

0.02 inch Leak Detection:
1. Start the engine using the conditions specified in the enable criteria for engine coolant temperature and intake air temperatures let it idle until the radiator fan comes on.
2. Drive the vehicle immediately at a speed between 35 - 75 mph (56 - 120 km/h) for at least 20 minutes and 6 miles (10 km).

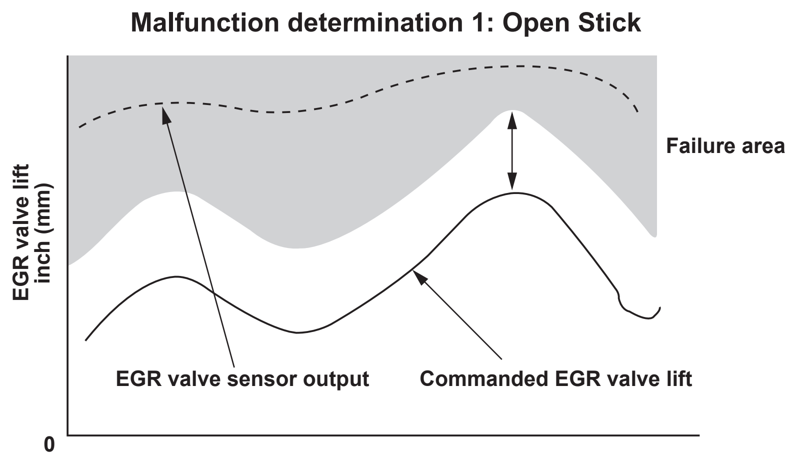
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

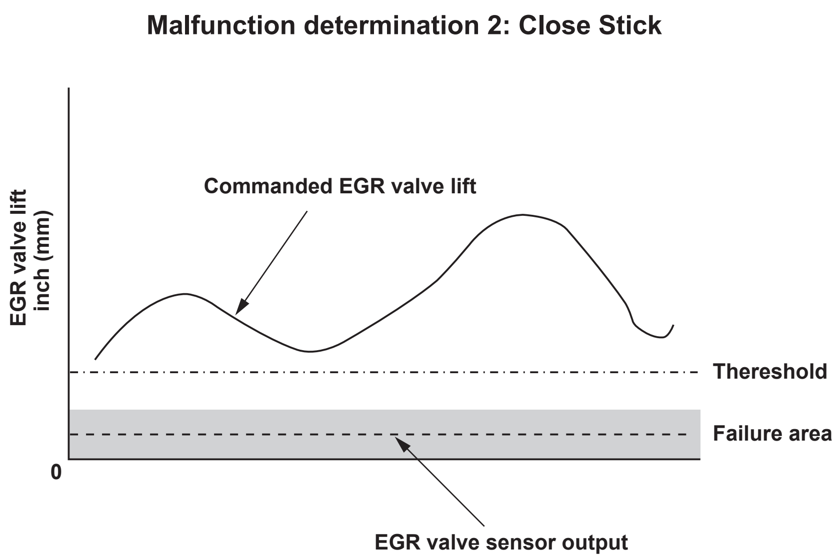
Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle with the ECT at engine start-up within the specified temperature range, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle with the ECT at engine start-up within the specified temperature range, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1491: Exhaust Gas Recirculation (EGR) Valve Insufficient Lift



P1491-0271



P1491-0272

General Description

The exhaust gas recirculation (EGR) valve is opened and the inactive exhaust gas reflows in the intake manifold through the exhaust manifold and the EGR passage while the engine control module (ECM) controls the EGR valve. The inactive exhaust gas is recirculated into the air/fuel mixture and the gas is drawn into the combustion chamber to lower the combustion temperatures, thus reducing oxides of nitrogen (NOx) emissions.
A sensor (lift sensor) is built into the EGR valve and detects the amount of valve lift. The command value for the target valve lift is stored in the ECM so that exhaust gas recirculation can be optimized according to driving conditions.
Comparing this command value with the lift sensor output signal value, the ECM controls the EGR valve to make the amount of actual valve lift equal to the command value.

Malfunction determination 1: Stuck open
If the lift sensor output (actual valve lift) is greater than the commanded valve lift, an abnormality in the EGR valve or the lift sensor output is determined.
Malfunction determination 2: Stuck closed
If the valve sensor output is insufficient for the commanded valve lift, a malfunction is detected.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	—
Duration	5 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine speed	—	4,000 rpm
Battery voltage	10.6 V	—
Monitoring priority	EGR	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, MAP, CKP, ECT, EGR	

Malfunction Threshold

Malfunction determination 1:

If the difference between the commanded valve lift in the ECM and the actual valve lift is 0.781 mm (0.031 in.) or more for at least 5 seconds, it is considered that the valve is stuck open.

Malfunction determination 2:

If the actual valve lift is 0.416 mm (0.016 in.) or less for at least 5 seconds, it is considered that the valve is stuck closed.

Driving Pattern

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a steady speed between 30 - 60 mph (48 - 96 km/h) with the engine speed at 4,000 rpm or less for at least 5 seconds.

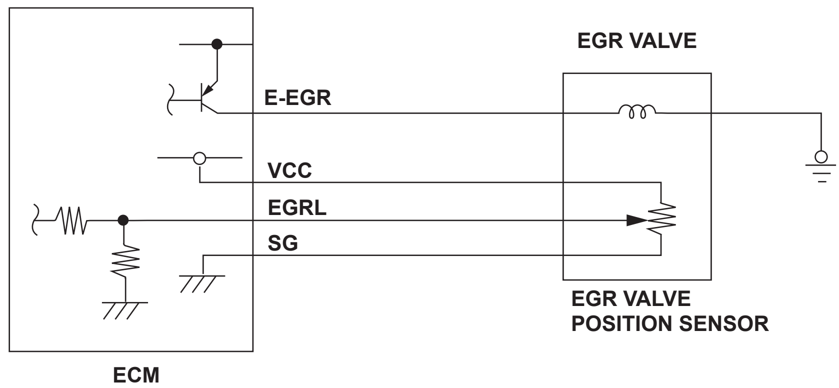
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1498: Exhaust Gas Recirculation (EGR) Valve Position Sensor Circuit High Voltage



General Description

The exhaust gas recirculation (EGR) system reduces oxides of nitrogen (NOx). NOx is generated by high combustion temperatures. The EGR system lowers peak combustion temperature by recirculating inactive exhaust gas into the air/fuel mixture, thus reducing NOx emissions. To determine the optimal amount of recirculating exhaust gas depending on driving conditions, a command value (the amount of valve lift) which is previously stored in the engine control module (ECM) is referred. The EGR valve position sensor estimates the amount of valve lift, and the ECM controls the EGR valve so that the amount of actual valve lift equals the command value by comparing the command value and the actual amount of valve lift. If EGR valve position sensor output signal voltage is not within a specified value, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine speed	—	4,000 rpm
No active DTCs	EGR	

Malfunction Threshold

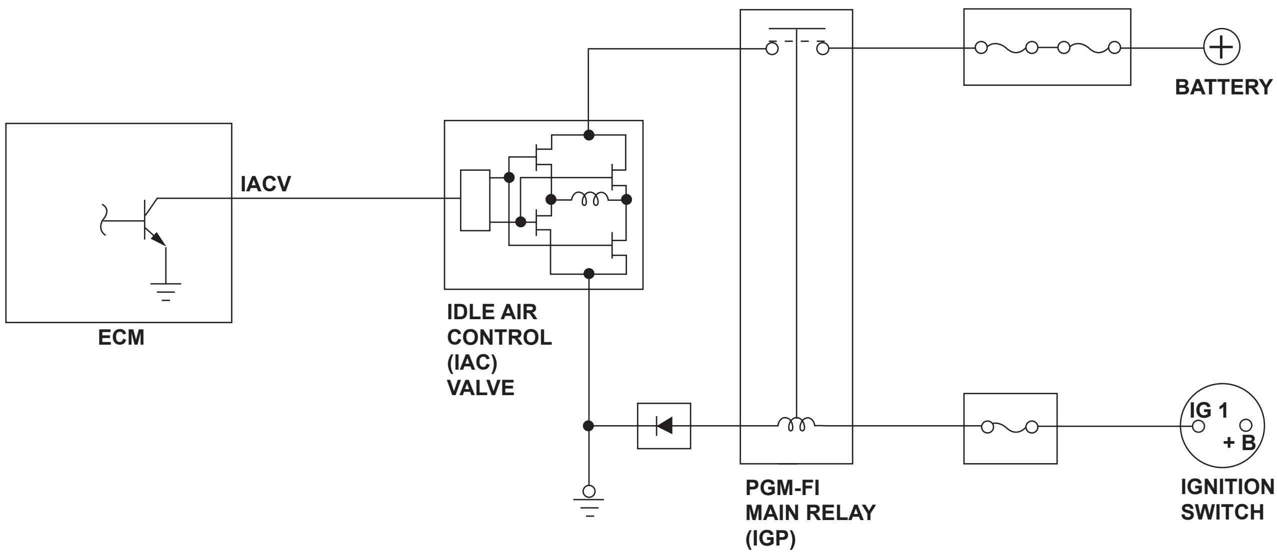
The EGR valve position sensor outputs 4.88 V or more for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1519: Idle Air Control (IAC) Valve Circuit Failure



P0505-0002

General Description

The target idle speed is in the engine control module (ECM) memory for various engine conditions (coolant temperature, A/C operation, and other functions). The ECM keeps the actual idle speed at the target idle speed by switching the idle air control valve (IACV) ON/OFF to control the intake airflow. In addition, the IACV functions as the first idle valve to control the actual speed according to the engine coolant temperature. If the duty cycle signals are not input to a circuit that checks return signals in the ECM, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Battery voltage	10.05 V	—
IACV duty value	5%	95%
State of the engine	Running	
No active DTCs	IACV	

Malfunction Threshold

The return circuit does not return duty signals from the ECM for at least 5 seconds.

Diagnosis Details

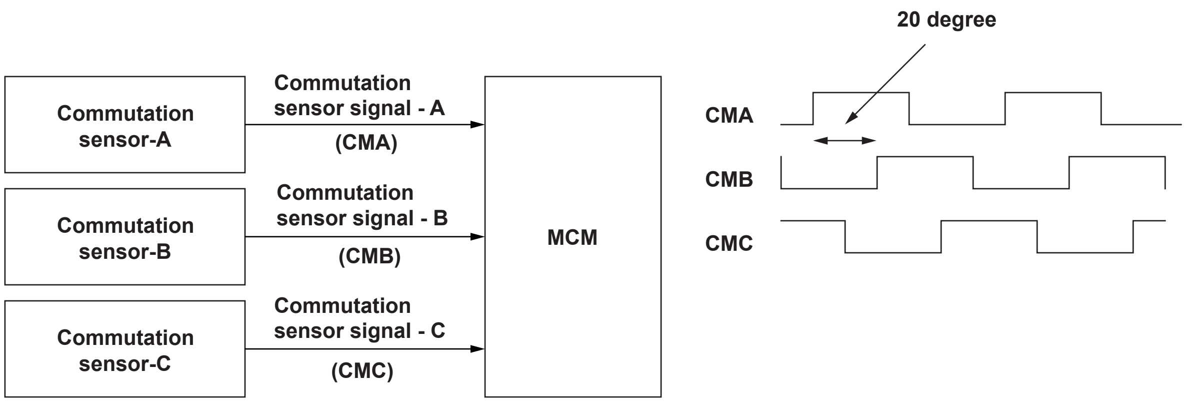
Conditions for illuminating the MIL

When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1565 (42): Motor Commutation Signal Problem



P1565-0071

General Description

The motor control module (MCM) detects rotor polar position based on the Low/High combinations of three commutation sensors signals (CMA, CMB, CMC) to supply power to the motor. The commutation sensor outputs six pulsing signals for each motor revolution, and each signal (CMA, CMB, CMC) phase differs by 20 degrees. The Low/High combination of the signals and its transition state follows a specific pattern, and they are considered to be abnormal when they do not agree. If the MCM detects abnormalities a specific number of times within a set time period, it determinesth commutation sensor signal is faulty and stores a DTC. The abnormalities are defined as these:

1. The transition state of CM[A:B:C] is other than: [L:L:H]→[H:L:H]→[H:L:L]→[H:H:L]→[L:H:L]→[L:H:H]→[L:L:H]→ • • •
   or other than: [L:L:H]→[L:H:H]→[L:H:L]→[H:H:L]→[H:L:L]→[H:L:H]→[L:L:H]→ • • • (H represents High, L represents Low)
2. CMA, CMB and CMC are all "High" or all "Low".
3. A high frequency signal input to commutation sensors A, B or C (20 pulses or more within 10 ms.)

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.5 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

1: The transition state of [CMA: CMB: CMC] is abnormal.

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Motor speed	1,000 rpm	—
No active DTCs	MCM	

2: CMA, CMB and CMC are all High or all Low.

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Motor speed	—	1,000 rpm
No active DTCs	MCM	

3: A high frequency signal input.

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
No active DTCs	MCM	

Malfunction Threshold

1. An abnormality has been detected 20 times within 0.5 second when the transition state of [CMA: CMB: CMC] is abnormal.
2. An abnormality has been detected 25 times within 0.5 second when CMA, CMB and CMC are all “High” or all “Low”.
3. An abnormality has been detected 20 times within 0.5 second during high frequency signal input.

Driving Pattern

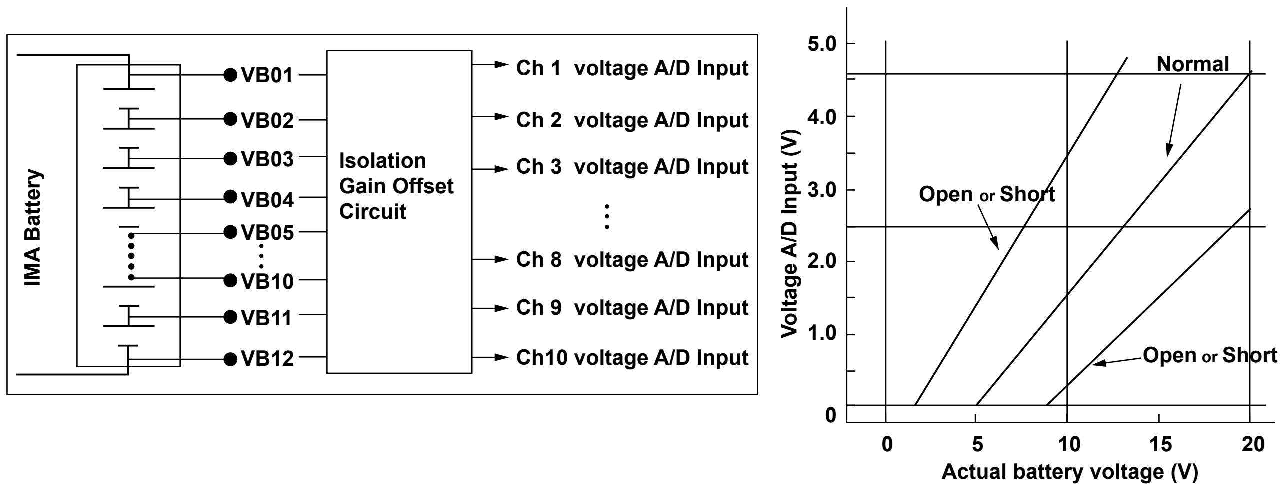
1. If the transition state of [CMA: CMB: CMC] is abnormal, the abnormality will be detected at a motor speed between 0 - 1,000 rpm.
2. If CMA, CMB and CMC are all High or Low, the abnormality will be detected at a motor speed of 1,000 rpm or more.
3. If a high frequency signal is input, the abnormality will be detected continuously regardless of motor speed.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1568 (66): Battery Module Individual Voltage Input Problem



P1568-0071

General Description

The high voltage side resistance of the voltage sensor is divided into two (2 MΩ and 1 MΩ) to measure the voltage that is divided at adjacent channels (individual voltage) when the circuit is open. If the combination of batteries is normal, the voltage hardly varies (about 1 V at the maximum). However, if there is an open in the line shared by adjacent channels, a voltage of four thirds or two thirds is measured, that is, if the individual voltage output from each battery is 12 V, a voltage of 16 V or 8 V is detected. Consequently, judging by the difference between the maximum and minimum voltage, a malfunction is detected and a DTC is stored.
If there are no adjacent channels, the high voltage side is considered to be short to the resistance and the minimum voltage is detected.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
Detected individual voltage (one or more channels between ch1 - ch10)	15 V	—
BCM module power-supply voltage	7.5 V	—
No active DTCs	BCM	

Malfunction Threshold

The difference between the maximum and minimum voltage is 4 V or more for at least 2 seconds.

Driving pattern

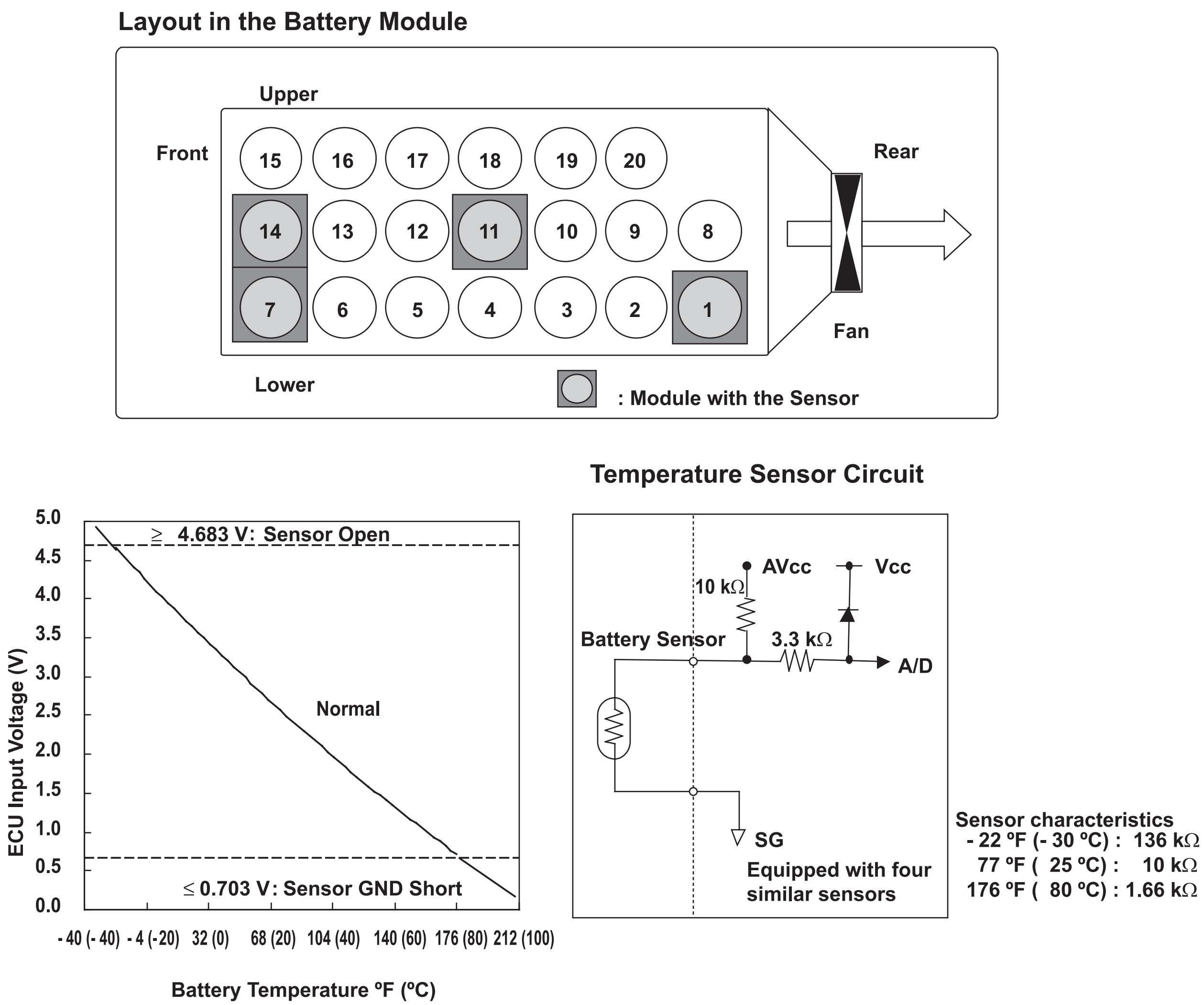
1. Do the BCM module reset procedure. (Disconnect the 12 V battery terminal and reconnect it.)
2. Remove the No.15 EPS (40A) fuse from the under-dash fuse/relay box.
3. Hold the engine at a speed between 3,500 - 4,000 rpm with no load (in neutral) and wait until 14 segments of the indicator on the IMA battery charge gauge are illuminated.
4. Turn the ignition switch OFF.
5. Reinstall the No.15 EPS (40A) fuse.
6. Turn the ignition switch ON.
7. Let it idle for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1568 (67): Battery Module Temperature Signal Circuit Problem



P1568-0072

General Description

The battery module temperature sensor is used for various controls in the IMA (integrated motor assist) system. If the sensor output voltage is out of its normal range, exhaust emissions, fuel economy, or drivability may be adversely affected, and a malfunction in the sensor is detected and the MIL comes on. The battery temperature is measured by the thermistor that is attached to four out of 20 modules in the battery module. By using the temperature sensor builtin the battery, the maximum and minimum temperature in the battery module can be measured to within ±1.8ºF (±1ºC). Monitoring is done through the upper and lower limit of output voltage from four channels in the sensor.

If the voltage is higher than the upper threshold, an open is detected, and if it is less than the lower threshold, a malfunction is detected. If the individual temperature problem is detected in all four channels, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
BCM power-supply voltage	15 V	—
No active DTCs	BCM	
Ignition switch	ON	

Malfunction Threshold

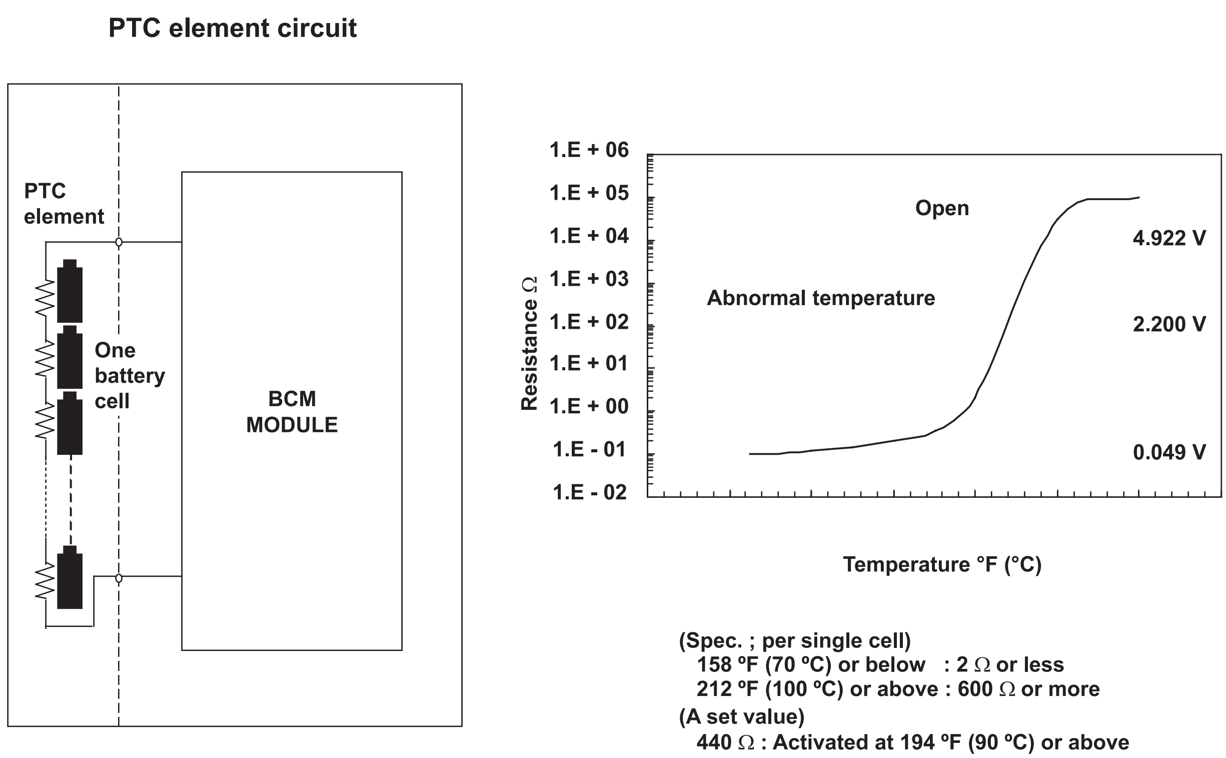
The sensor input voltage is 4.69 V or more, or 0.70 V or less, for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1568 (70): Battery Cell Temperature Signal Circuit Problem



P1568-0073

General Description

A PTC (positive temperature coefficient) element shows the characteristics as shown above (i.e. drastically increases the resistance at a temperature between 158 - 212ºF (70 - 100ºC), and it is used to determine if a monitored object temperature exceeds a set value. The PTC is installed in each of the 120 battery cells to detect overheating, an open, or a short individually. If the PTC input voltage is more than the upper threshold or less than lower threshold, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
BCM power-supply voltage	7.5 V	—
No active DTCs	BCM	
Ignition switch	ON	

Malfunction Threshold

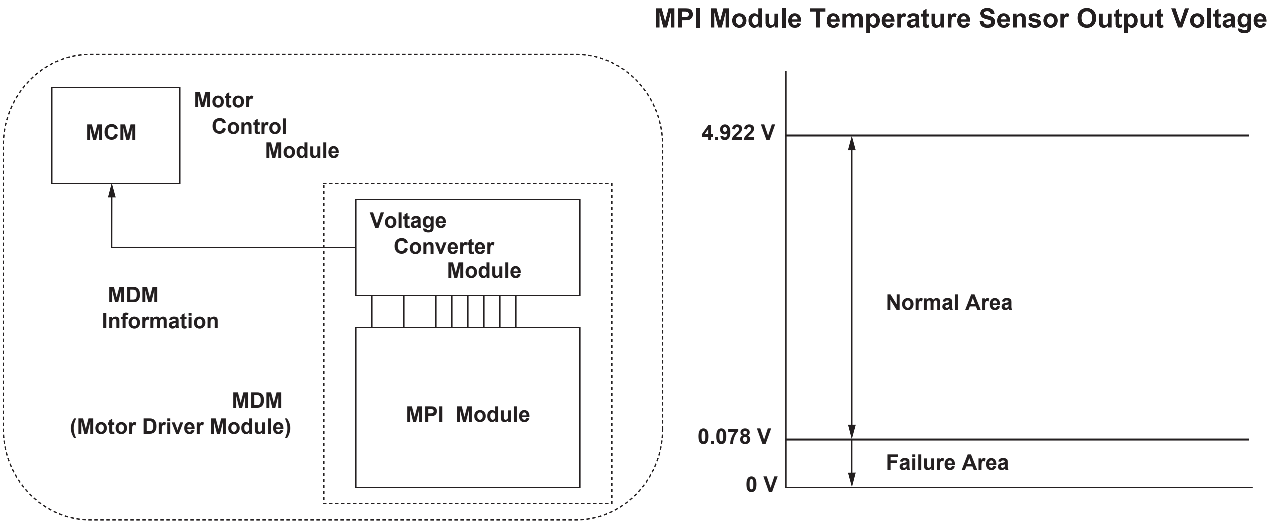
The PTC input voltage is 4.93 V or more, or 0.04 V or less, for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1572 (32): Motor Drive Module (MDM) Temperature Signal Circuit Low Input



P1572-0071

General Description

If the MCM (motor control module) control input voltage from the MPI (motor power inverter) module temperature sensor is beyond the lower limit of a set range, a short to ground in the sensor signals or a malfunction in the MCM input circuit is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
BCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MPI, MCM	

Malfunction Threshold

The MPI module temperature sensor output voltage is less than 0.078 V for at least 2 seconds.

Diagnosis Details

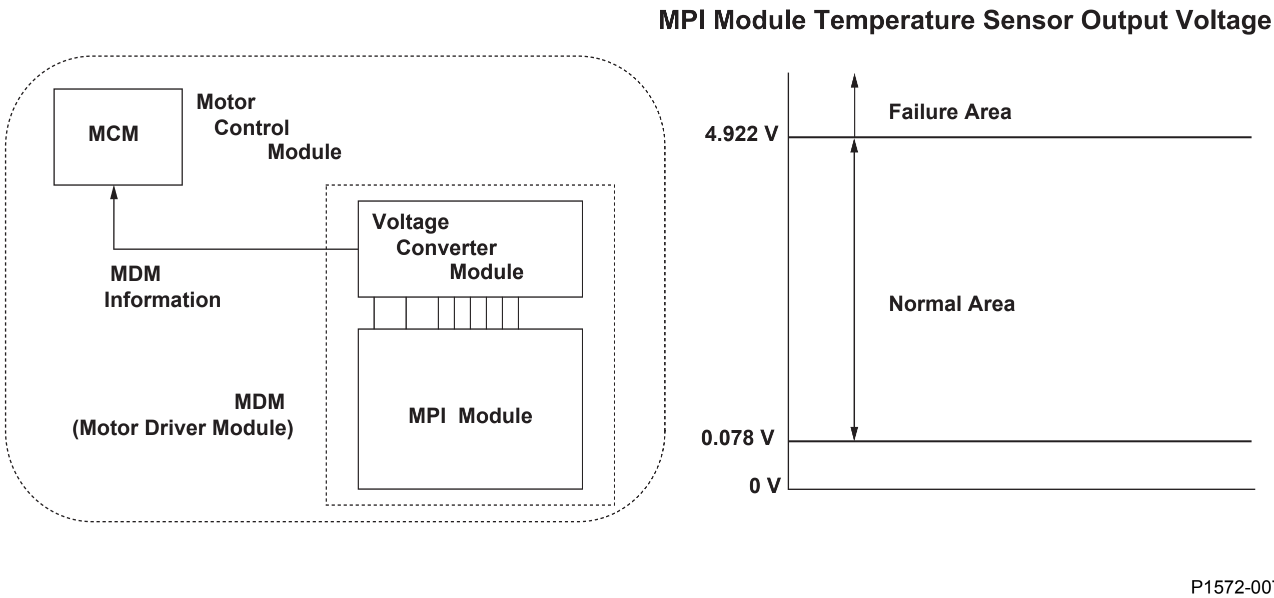
Conditions for illuminating the MIL

When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1572 (33): Motor Drive Module (MDM) Temperature Signal Circuit High Input



General Description

If the MCM (motor control module) control input voltage from the MPI (motor power inverter) module temperature sensor is beyond the upper limit of a set range, an open in the signal wire, an open in the voltage converter module ground or a malfunction in the MCM input circuit is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
BCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MPI, MCM	

Malfunction Threshold

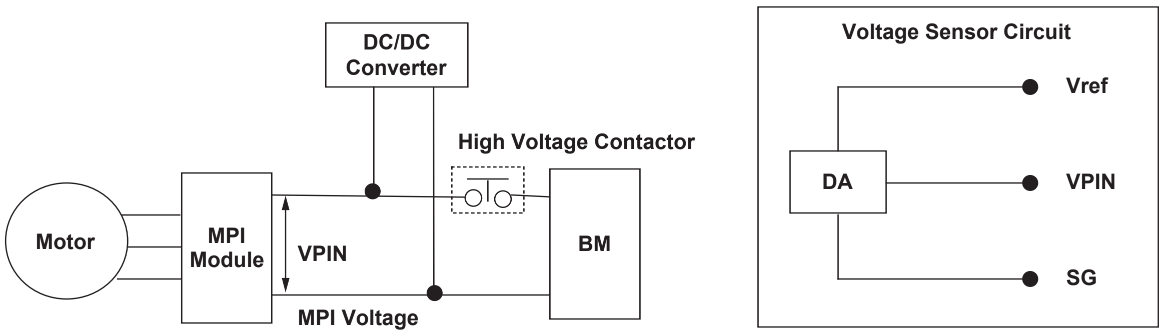
The MPI module temperature sensor output voltage is more than 4.922 V for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1576 (10): Motor Drive Module (MDM) Voltage Signal Circuit Low Input



General Description

The MPI (motor power inverter) module voltage (VPIN) is used for controlling the IMA (integrated motor assist) motor and IMA battery energy management. If the VPIN cannot be detected precisely, the exhaust emissions, fuel economy, or drivability may be adversely affected.
Normally, the sensor output VPIN is more than 0.156 V. If it is beyond the specified range, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MPI, BM	

Malfunction Threshold

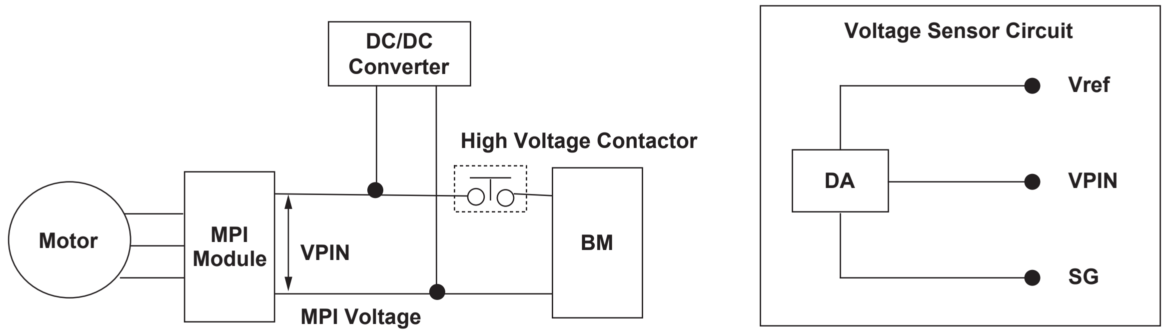
The MPI voltage (VPIN) sensor output is 0.156 V or less for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1576 (11): Motor Drive Module (MDM) Voltage Signal Circuit High Input



P1576-0071

General Description

The MPI (motor power inverter) module voltage (VPIN) is used for controlling the IMA (integrated motor assist) motor and IMA battery energy management. If the VPIN cannot be detected precisely, the exhaust emissions, fuel economy, or drivability may be adversely affected.
Normally, the sensor output VPIN is less than 4.756 V. If it is beyond the specified range, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MPI, BM	

Malfunction Threshold

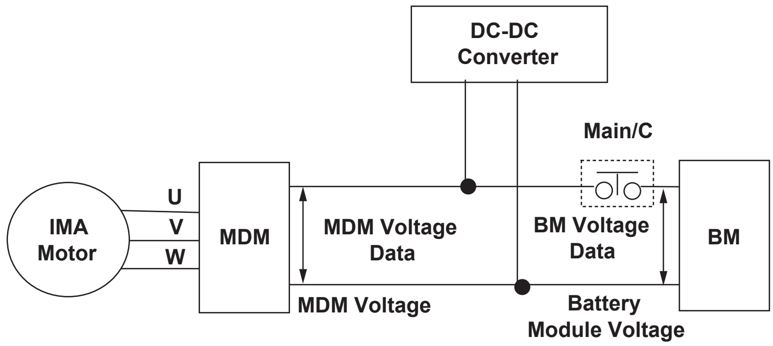
The MPI voltage (VPIN) sensor output is 4.756 V or more for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1576 (12): Motor Drive Module (MDM) Voltage Problem



P1576-0072

General Description

To avoid an increase or a decrease in motor output caused by the voltage sensor malfunctioning, it is necessary to compare voltage transmitted from the BCM (battery condition monitor) module with the MDM (motor driver module) voltage. If the difference between them is more than a set value for a specified time period or longer, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
PDU voltage sensor (VPIN)	100 V	—
High battery voltage sensor (VHB)	100 V	—
Ignition switch	ON	
No active DTCs	Mode signal circuit, MPI, IMA system, Detection signal circuit, Engine speed signal circuit, BCM, MDM	
Other	Other than PDU voltage sensor (VPIN) input voltage that is out of the upper and lower malfunction threshold (failure range)	

Malfunction Threshold

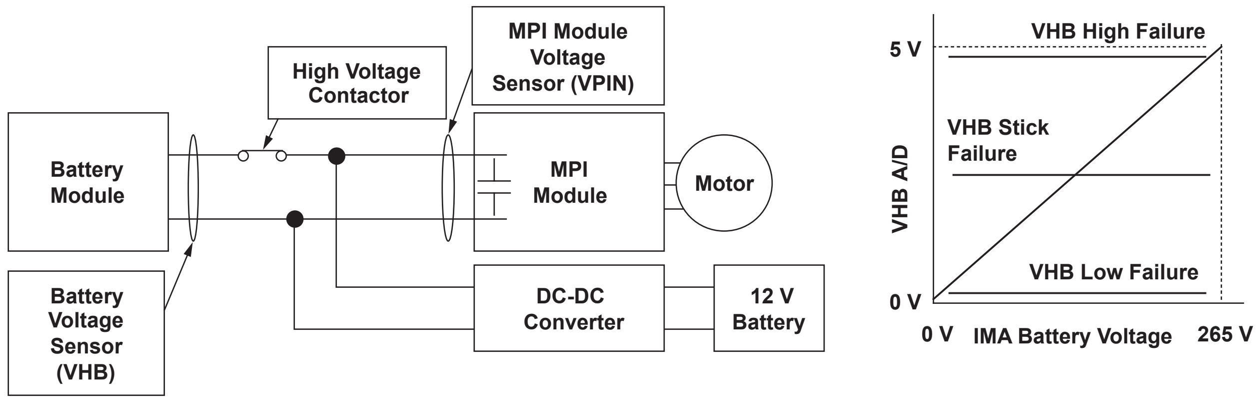
The VPIN (PDU voltage) minus the VES (high battery sensor voltage) equals 10 V or more for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1577 (8): High Voltage Detection Signal Circuit Problem



P1577-0071

General Description

The BCM (battery condition monitor) module voltage (VHB) is used for turning the high voltage contactor in the IMA (integrated motor assist) system on or off. The IMA system is not operable when the high voltage contactor cannot be turned on due to a problem in the VHB. Also, the problem may cause failure in the detection of a short to ground. Comparing both the MPI (motor power inverter) module voltage (VPIN) and the VHB sensor values, various types of detection are possible because the VPIN and the VHB are measured at the same point while applying voltage to the high voltage contactor in the IMA system. If the difference between the VHB and the VPIN is a set value or more for at least a specified time period, a malfunction in the VHB is detected, and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
No active DTCs	MDM, MPI, U/V/W phase signal circuit, MCM, IMA system, BCM, BC	

Malfunction Threshold

The BCM module voltage (VHB) minus the MPI module voltage (VPIN) equals 20 V or more for at least 5 seconds.

Driving Pattern

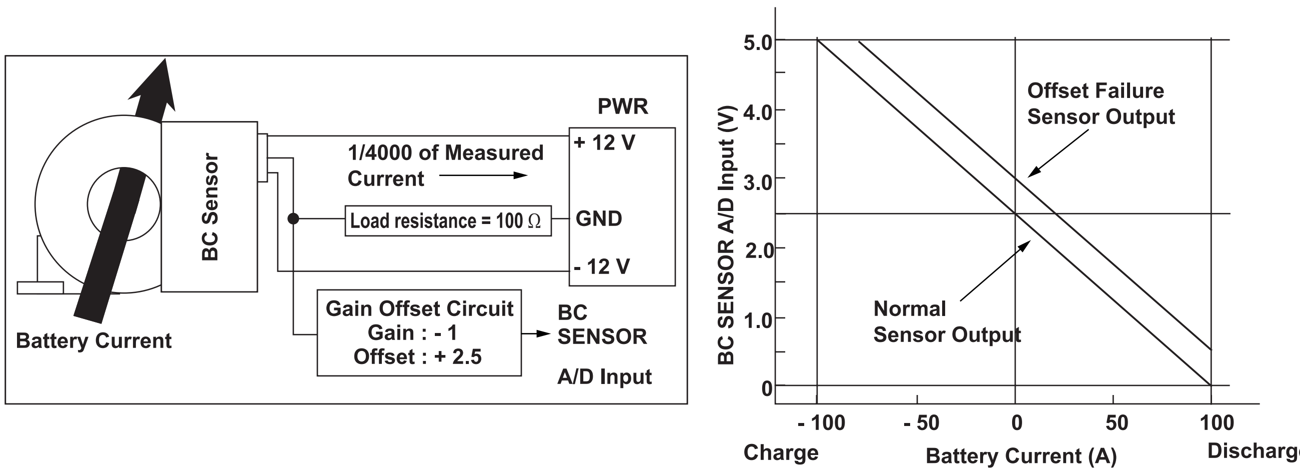
1. Start the engine, and let it idle.
2. Accelerate the vehicle for at least 10 seconds with IMA assist.
3. Apply the brakes, and decelerate the vehicle for at least 10 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1580 (65): Battery Current Circuit Problem



P1580-0071

General Description

The BCM (battery condition monitor) module samples the BC sensor value several times during a set time period until the power supply is stabilized after activation, and determines the amount of offset by using a moving average technique. The offset is at the midpoint (±6.7 A) between the maximum tolerance (±3.4 A) and the maximum offset error that allows the system to work normally (±10.0 A), and it is used as an offset failure threshold.
If the offset is beyond the threshold, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	0.5 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
BCM power-supply voltage	7.5 V	—
Ignition switch	ON	
No active DTCs	BCM	

Malfunction Threshold

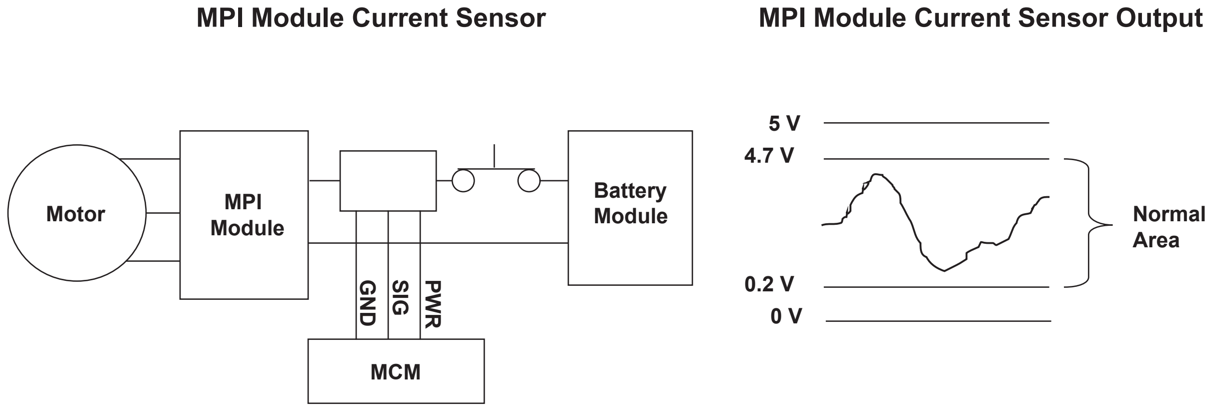
The battery current sensor voltage is more than 167.2 mV, or less than -167.2 mV, for at least 0.5 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1581 (19): Motor Power Inverter (MPI) Module Current Signal Circuit Low Input



P1581-0071

General Description

The MCM (motor control module) controls the motor output based on the MPI (motor power inverter) module current sensor signals. Under ordinary conditions, the MPI module current sensor has these characteristics: if its input current is -200 A or less, the output voltage is between 4.5 - 4.7 V, or if its input current is +200 A or more, the output voltage is between 0.2 - 0.5 V. If an open in the signal wire, a short to ground, or a faulty ground wiring harness or a faulty sensor power source line occurs, the output voltage stays out of range.
If the input voltage to the MCM is excessively lower than the normal range, a malfunction such as an open in the signal wire, a short to ground, or a faulty ground wiring harness or a short to ground is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MCM, MPI	

Malfunction Threshold

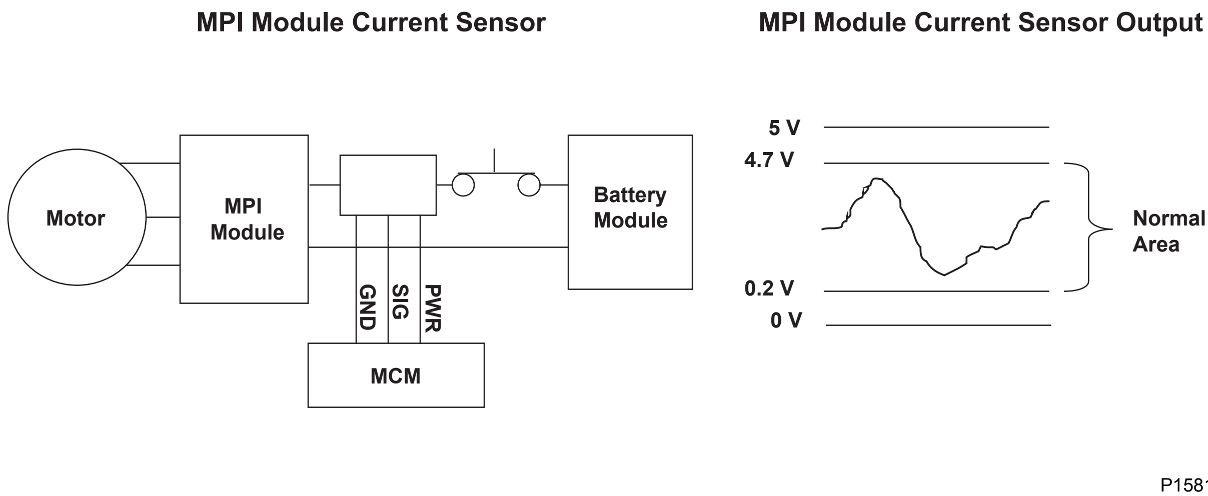
The MCM input voltage is 0.156 V or less for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1581 (20): Motor Power Inverter (MPI) Module Current Signal Circuit High Input



General Description

The motor control module (MCM) controls the integrated motor assist (IMA) motor output based on the motor power inverter (MPI) module current sensor signal. Under ordinary conditions, the MPI module current sensor shows certain characteristics: If its input current is -200 A or less, the output voltage is between 4.5 - 4.7 V, or if its input current is 200 A or more, the output voltage is between 0.2 - 0.5 V. When an open in the signal wire, a short to ground, a faulty sensor power supply cable or a faulty ground wiring harness occurs, the output voltage stays out of the aforementioned range.
If the input signal voltage to the MCM is excessively higher than the normal range, a malfunction in the sensor ground wiring harness is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MCM, MPI	

Malfunction Threshold

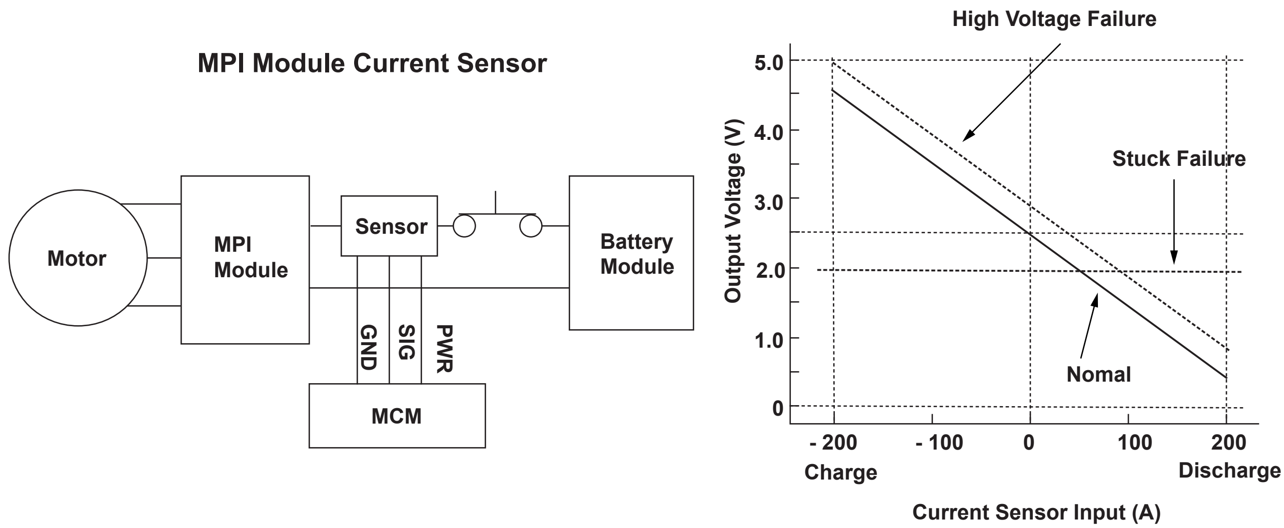
The MCM input voltage is more than 4.85 V for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1581 (21): Motor Power Inverter (MPI) Module Current Signal Circuit Problem



P1581-0072

General Description

The motor output torque may not be properly controlled when the output voltage is drifting or freezing due to a faulty MPI (motor power inverter) module current sensor. The sensor is designed for the output voltage to be 2.5 V ± 50 mV when the input current is 0 A. The current flowing to the MPI module before precharge or while the motor is not turning is 0 A. Therefore, it is possible to detect drifting or freezing from the sensor output voltage at that time.
The MCM (Motor Control Module) samples the current sensor output voltage several times and computes offset voltage at 0 A. If the computed offset voltage is beyond a set value, a malfunction in the sensor is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	0.08 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Motor (engine) speed	At standstill	
Ignition switch	ON	
No active DTCs	MCM, MPI, BCM	

Malfunction Threshold

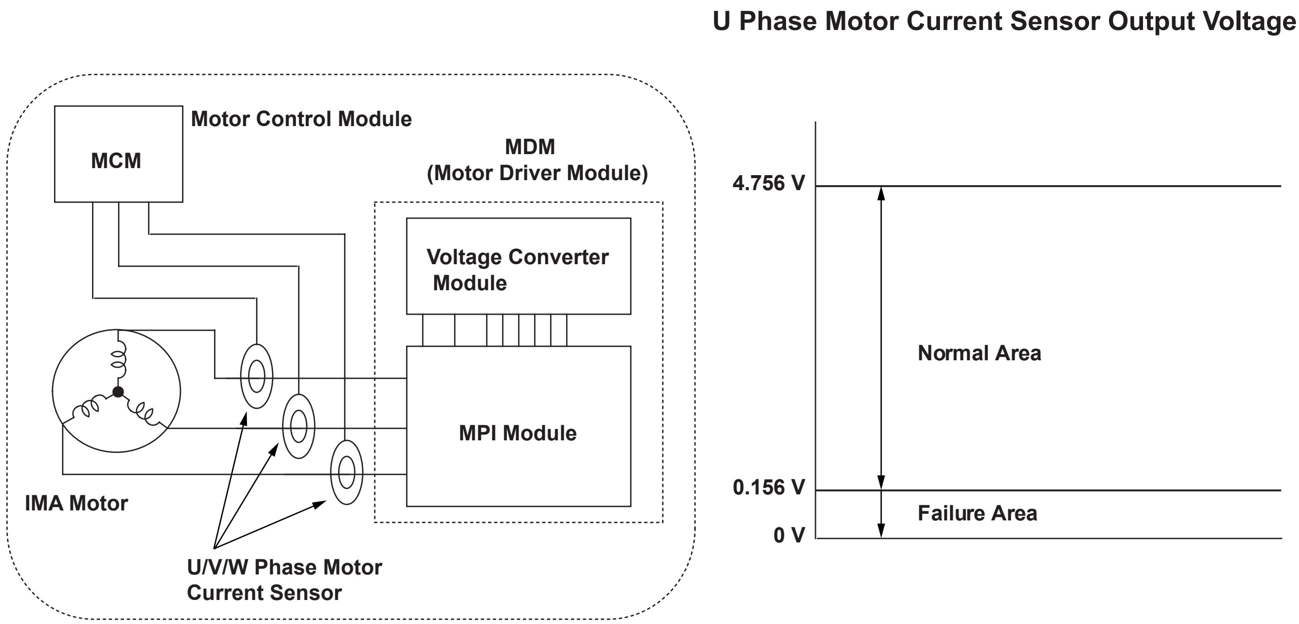
The MCM input voltage is less than 2.4 V or more than 2.6 V for at least 0.08 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1582 (24): Motor Current U Phase Signal Circuit Low Input



P1582-0071

General Description

If the input voltage to the MCM (motor control module) from the U phase motor current sensor is beyond the lower limit of a set value, a faulty sensor, an open in the sensor power supply, an open in the signal wire, a short to ground or the faulty MCM input circuit is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.5 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MCM	

Malfunction Threshold

The input voltage from the U phase motor current sensor is less than 0.156 V for at least 0.5 second.

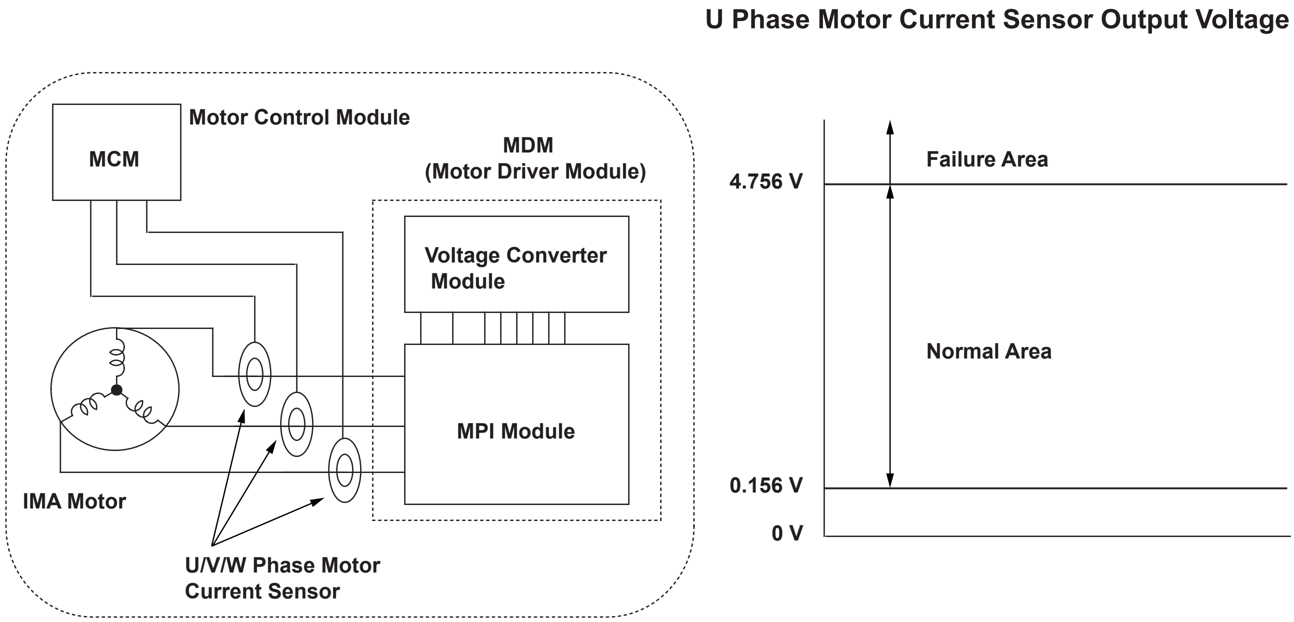
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P1582 (25): Motor Current U Phase Signal Circuit High Input



P1582-0072

General Description

If the input voltage to the MCM (motor control module) from the U phase motor current sensor is beyond the upper limit of a set value, a faulty sensor, an open in the sensor ground or the faulty MCM input circuit is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.5 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MCM	

Malfunction Threshold

The input voltage from the U phase motor current sensor is more than 4.756 V for at least 0.5 second.

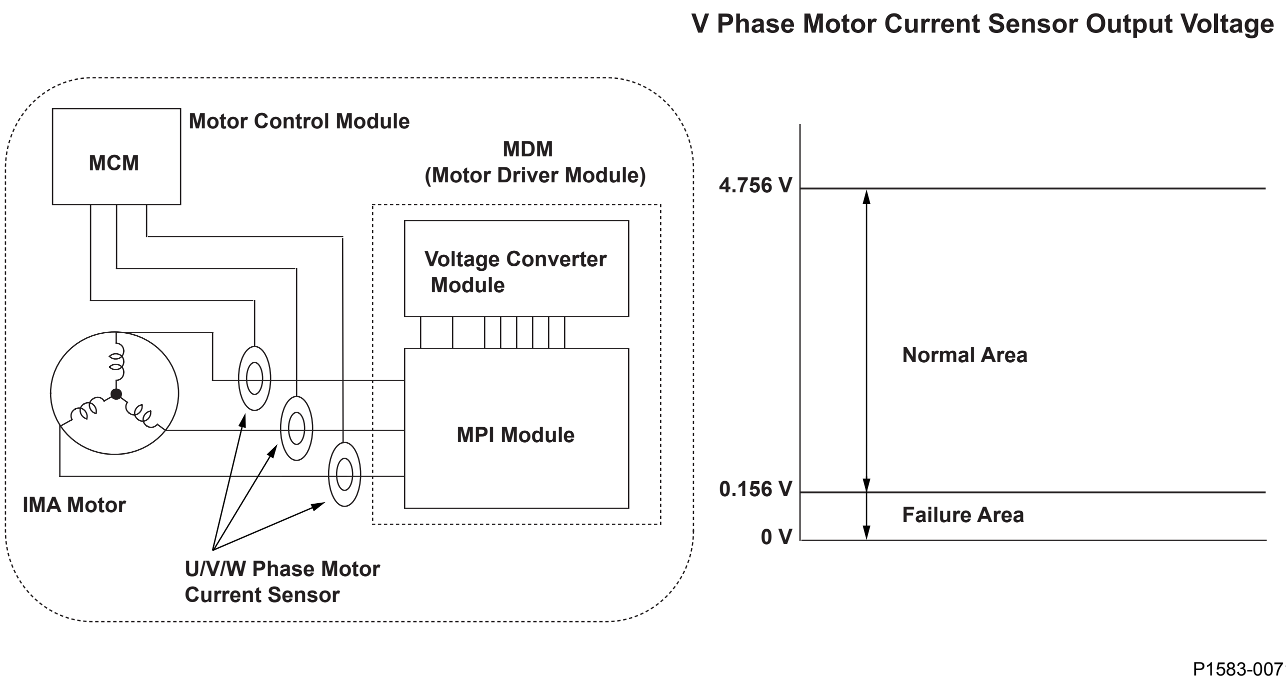
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P1583 (26): Motor Current V Phase Signal Circuit Low Input



General Description

If the input voltage to the MCM (motor control module) from the V phase motor current sensor is beyond the lower limit of a set value, a faulty sensor, an open in the sensor power supply, an open in the signal wire, a short to ground or the faulty MCM input circuit is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.5 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MCM	

Malfunction Threshold

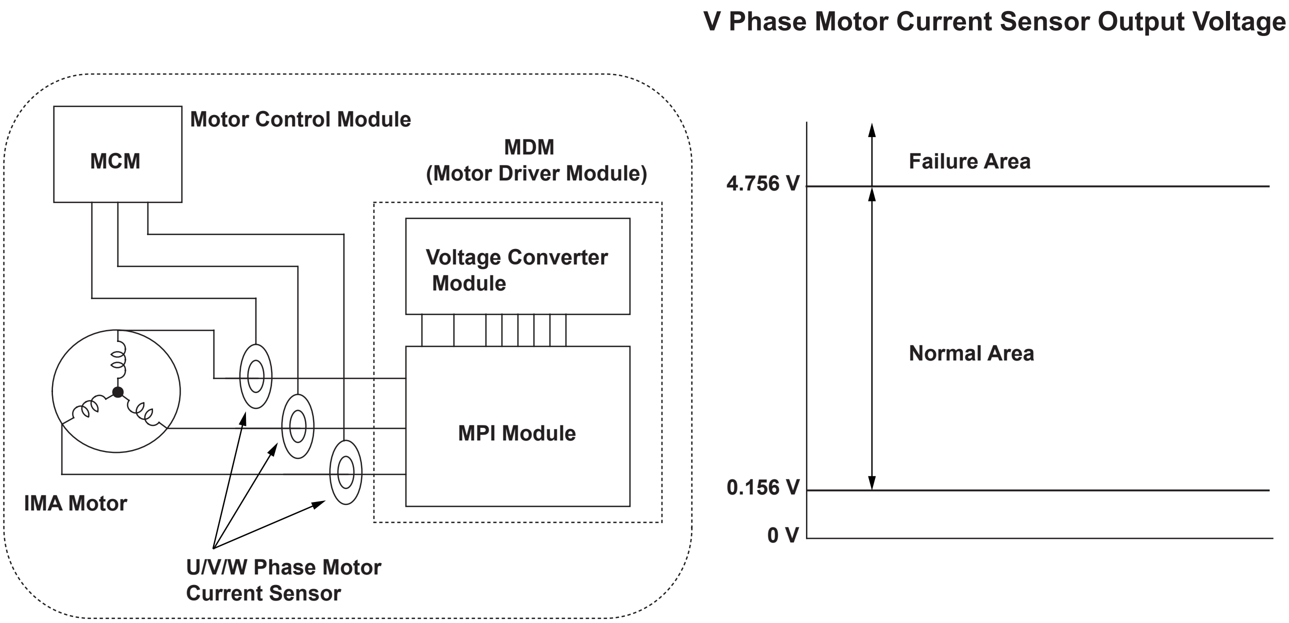
The input voltage from the V phase motor current sensor is less than 0.156 V for at least 0.5 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1583 (27): Motor Current V Phase Signal Circuit High Input



P1583-0072

General Description

If the input voltage to the MCM (motor control module) from the V phase motor current sensor is beyond the upper limit of a set value, a faulty sensor, an open in the sensor power supply or the faulty MCM input circuit is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.5 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MCM	

Malfunction Threshold

The input voltage from the V phase motor current sensor is 4.756 V or more for at least 0.5 second.

Diagnosis Details

Conditions for illuminating the MIL

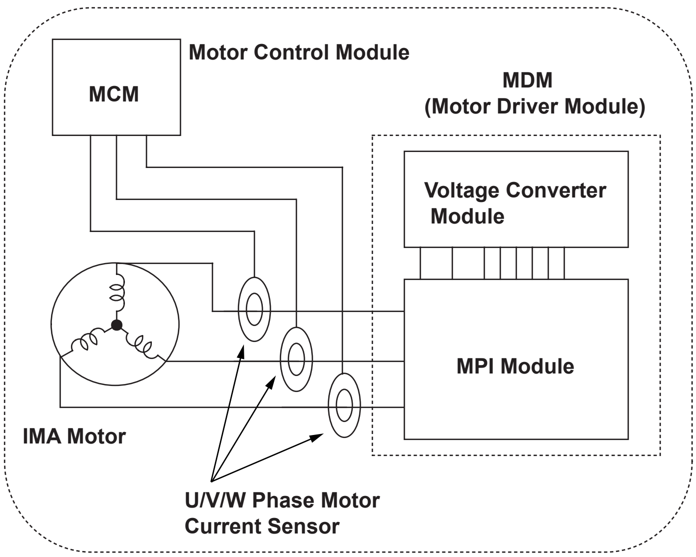
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL

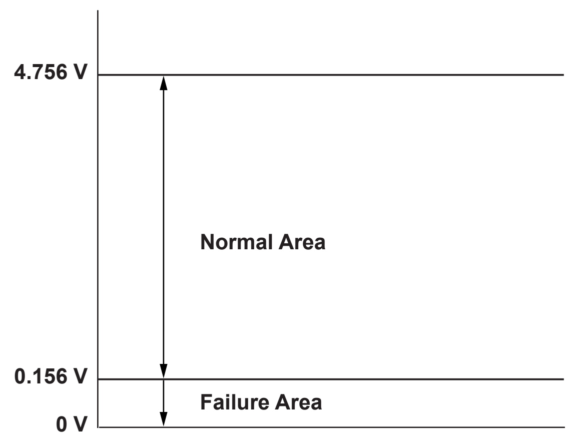
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P1584 (28): Motor Current W Phase Signal Circuit Low Input



W Phase Motor Current Sensor Output Voltage



P1584-0071

General Description

If the input voltage to the MCM (motor control module) from the W phase motor current sensor is beyond the lower limit of a set value, a faulty sensor, an open in the sensor power supply, an open in the signal wires, a short to ground or the faulty MCM input circuit is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.5 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MCM	

Malfunction Threshold

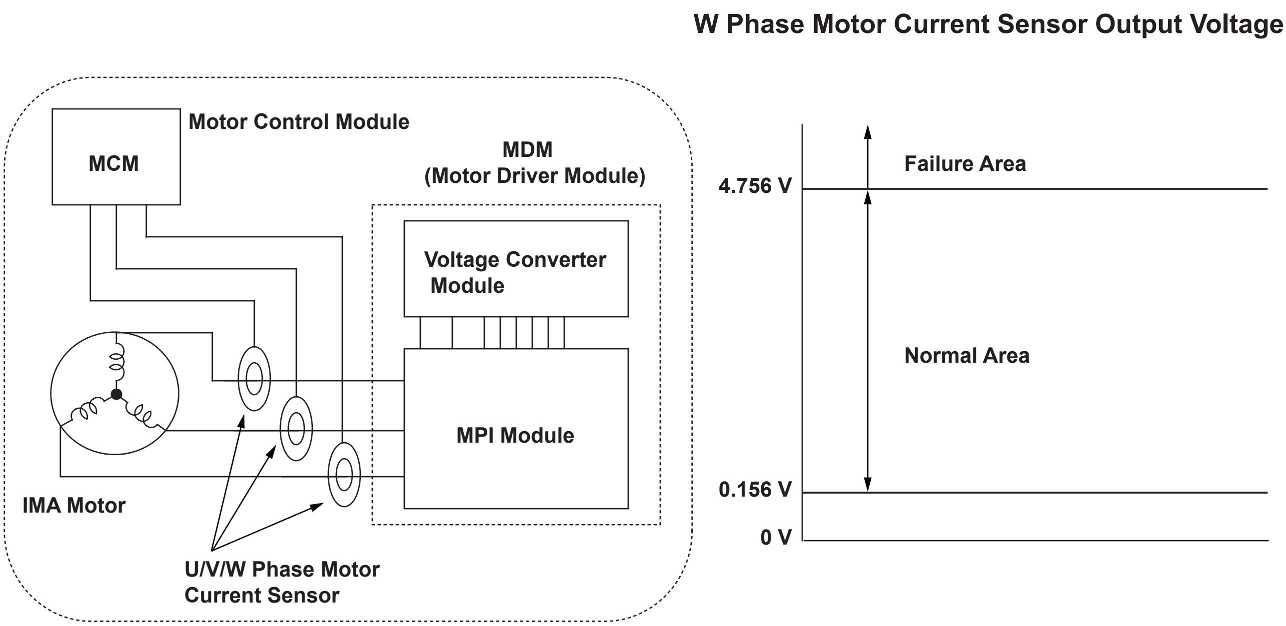
The input voltage from the W phase motor current sensor is less than 0.156 V for at least 0.5 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1584 (29): Motor Current W Phase Signal Circuit High Input



P1584-0072

General Description

If the input voltage to the MCM (motor control module) from the W phase motor current sensor is beyond the upper limit of a set value, a faulty sensor, an open in the sensor power supply or the faulty MCM input circuit is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.5 second or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MCM	

Malfunction Threshold

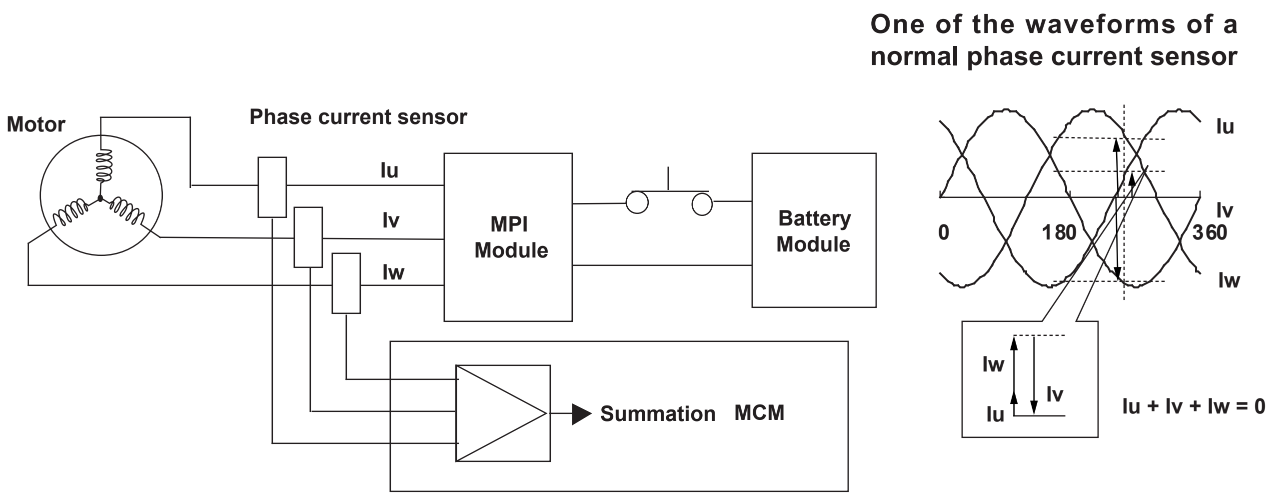
The input voltage from the W phase motor current sensor is 4.76 V or more for at least 0.5 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1585 (30): Motor Current Signal Circuit Problem



P1585-0071

General Description

If the output voltage is drifting or freezing due to a faulty phase current sensor, the motor output torque may not be properly controlled. If three phase current sensors (Iu, Iv, Iw) work normally, the summation value is always 0 A. However, if one of the three sensors is drifting or freezing, the summation is not 0 A. By using a built-in circuit which calculates the sum of the three phase current sensor's amperage in the MCM (motor control module), the output from the counting circuit can be monitored. If the output is beyond a set value, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	0.5 second or more (depending on changes in motor speed)
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	U/V/W phase signal circuit, MPI, BM, MCM	

Malfunction Threshold

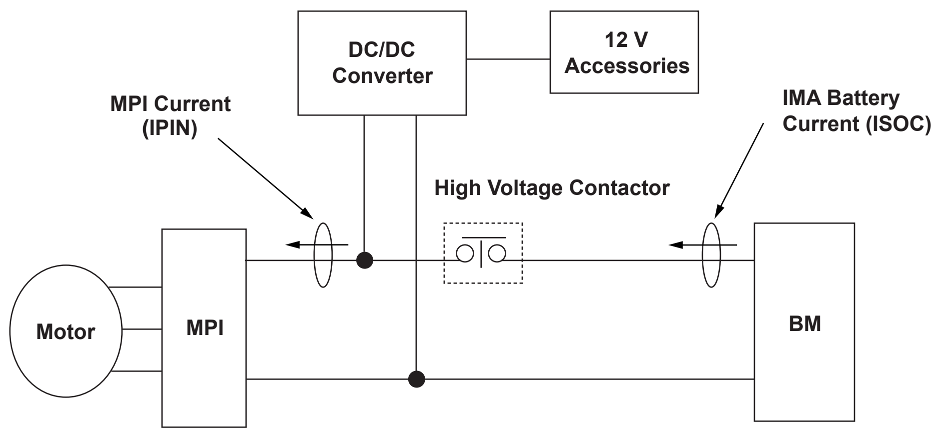
The MCM internal counting circuit output voltage is less than 2.1 V or more than 2.9 V for at least 0.5 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1586 (23): Motor Power Inverter (MPI) Module Current Signal/ Battery Current Signal Circuit Problem



P1586-0071

General Description

The MPI (motor power inverter) current (IPIN) and the battery module (BM) current (ISOC) are used for energy management or motor control in the IMA (integrated motor assist) system, and if the correct current cannot be detected, the exhaust emission, the fuel economy or drivability may be adversely affected.
With the high-voltage contactor is ON, the IPIN and the ISOC are used to monitor current flowing on the same line through the DC-DC converter which supplies power to the accessories. Comparing the IPIN and the ISOC in relation to the DC-DC converter power consumption enables to detect a faulty IPIN or ISOC.
If the difference between the IPIN and the ISOC is a set value or more for at least a specified time period, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
No active DTCs	MDM, MPI, U/V/W phase signal circuit, MCM, IMA system, BCM, BM	

Malfunction Threshold

The MPI current (IPIN) minus the IMA battery current (ISOC) equals -9 A or less, or 23 A or more, for at least 2 seconds.

Driving Pattern

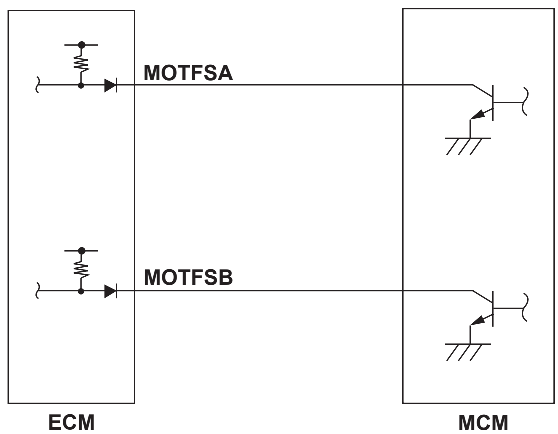
1. Connect the scan tool and start the engine, then turn all accessories (the headlights, the defroster, the blower, the A/C, and the ceiling light) off to minimize the engine load.
2. Let the engine idle for at least 5 seconds.
3. Accelerate the vehicle with wide open throttle for at least 5 seconds.
4. Then, apply the brakes, and decelerate the vehicle for at least 5 seconds, then turn all accessories on to maximize the engine load (the high beam headlights on, the defroster on, the blower on high speed, the A/C on, and the ceiling light on).
5. Repeat the driving cycle from step 2 through 4 again.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1600: IMA System Malfunction



P1600-0601

General Description

This DTC is used to determine if a malfunction is on the engine side or the IMA side when checking with the HDS. When a device on the IMA side malfunctions, the motor control module (MCM) signals the engine control module (ECM) to turn on the MIL. If the ECM receives a signal from the MCM to turn on the MIL, the MIL is turned on and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Battery voltage	10.05 V	—
Ignition switch	ON	
No active DTCs	IMA System	

Malfunction Threshold

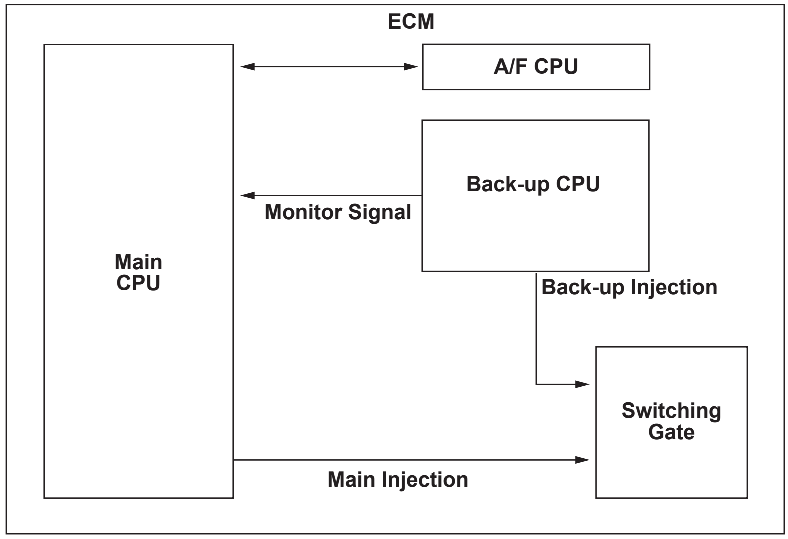
It depends on the “Enable Conditions” on IMA side.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs. The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1607: Engine Control Module (ECM) Internal Circuit Malfunction (CVT)



P1607-0176

General Description

If something is wrong in the engine control module (ECM), and there is a loss of monitor signals from the back-up CPU, or the communication signals from the A/F CPU are abnormal for a set time period, or an abnormality in the communication signals occurs a set number of times continuously, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	
Ignition switch	ON
No active DTCs	ECM

Malfunction Threshold

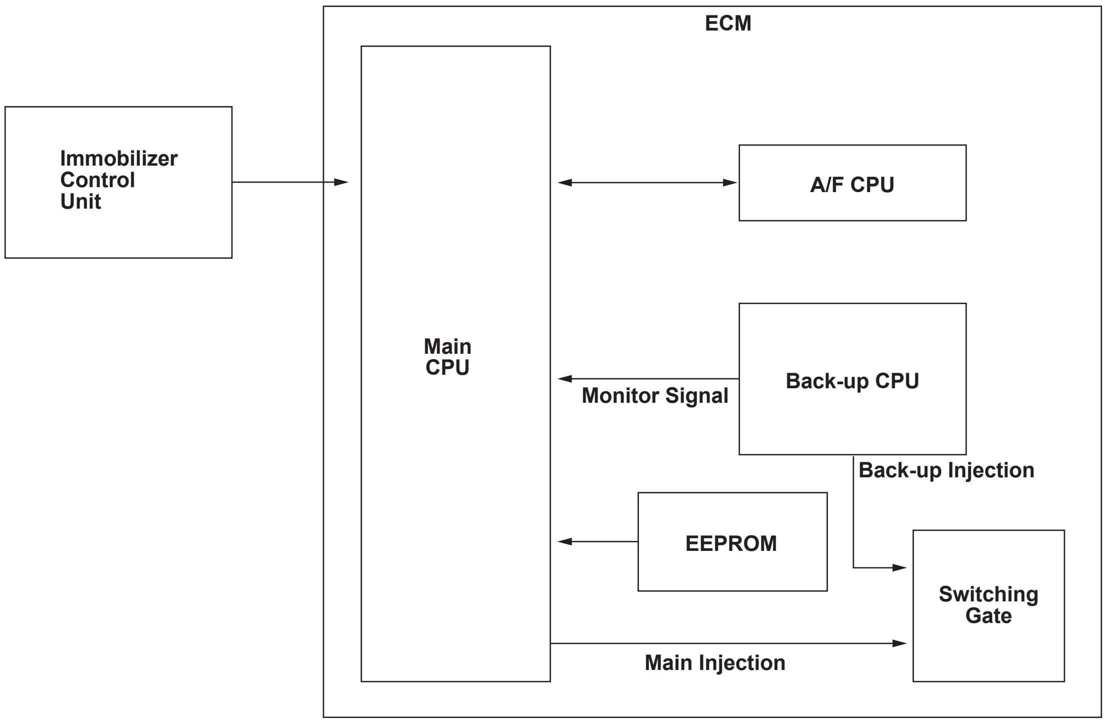
One of the following conditions must be met.
- No signal from the back-up CPU is detected for at least 5 seconds.
- An abnormality in the A/F CPU lasts for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1607: Engine Control Module (ECM) Internal Circuit Malfunction



P1607-0172

General Description

If something is wrong in the engine control module (ECM), and there is a loss of monitor signals from the back-up CPU, or an abnormality in the data that is read from EEPROM is detected a set number of times continuously, or the output from the circuit in the immobilizer is abnormal for at least a set time period, or the communication signals from the A/F CPU are abnormal for at least a set time period, or an abnormality in the communication signals occurs a set number of times continuously, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more*, *** 24 seconds or less** 2.2 seconds or more****
DTC Type	One drive cycle, MIL ON

* : Back-up CPU failure
** : EEPROM data failure
*** : A/F CPU failure
**** : Immobilizer output signals failure

Enable Conditions

Condition	
Ignition switch	ON
No active DTCs	ECM

Malfunction Threshold

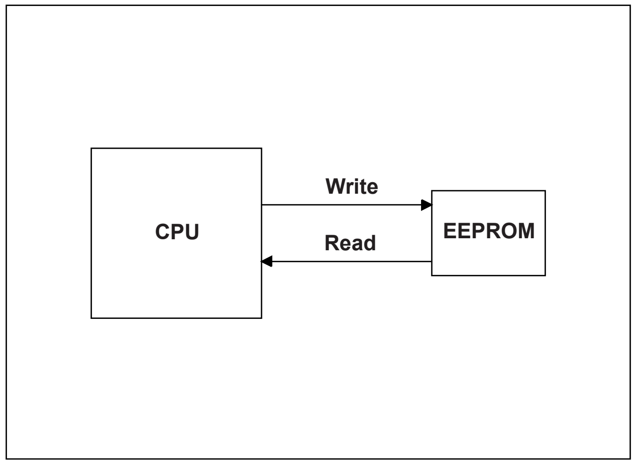
One of these conditions must be met.
- No signal from the back-up CPU is detected for at least 5 seconds.
- Abnormality of the data from EEPROM has been detected 5 times or more within 24 seconds.
- An abnormality in the A/F CPU lasts for at least 5 seconds.
- Output from the circuit in the immobilizer is abnormal for at least 2.2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1630: Problem in Transmission Control Module (TCM)



TCM

P1630-0175

General Description

The electrically erasable programmable read-only memory (EEPROM) is in the transmission control module (TCM), and the data can be read/written from/to the memory. This memory also can hold data even after the battery is disconnected. If an abnormality in the data read from the EEPROM occurs a set number of times, the CPU detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Condition
Sequence	None
Duration	60 seconds or less
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	
No active DTCs	TCM
Other	When disconnecting and reconnecting the battery

Malfunction Threshold

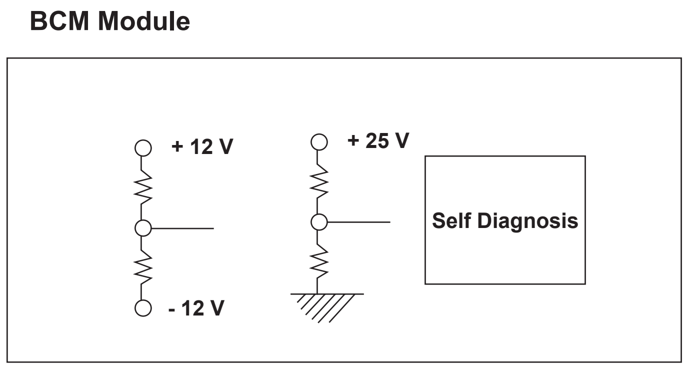
An abnormality in the data read from the EEPROM occurs continuously three times or more for no more than 60 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1635 (79): Battery Condition Monitor (BCM) Module Problem



P1635-0071

General Description

The self-diagnostic function in the BCM (battery condition monitor) module checks if the divided voltage of the ±12 V power-supply resistance and the divided voltage of the 25 V DC-DC converter resistance. If is beyond a set value, a malfunction in the power-supply voltage to the sensor is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	7.5 V	—
Ignition switch	ON	
No active DTCs	BCM	

Malfunction Threshold

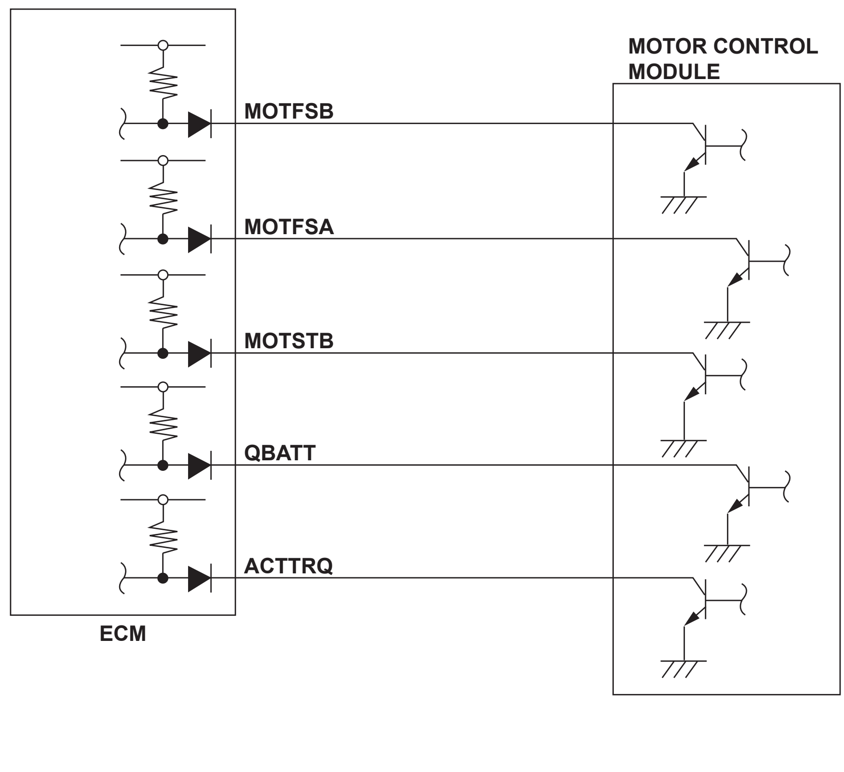
- The A/D value of the ±12 V DC/DC is 1.2 V or less, or 3.7 V or more, for at least 2 seconds.
- The A/D value of the 25 V DC/DC is 2.25 V or less, or 2.7 V or more, for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1640: ACTTRQ Motor Torque Signal Circuit Low Input



General Description

The engine control module (ECM) signals a request for motor torque to the motor control module (MCM). The MCM sends back the motor torque value as duty signals to the MCM. The duty signals are converted into voltage in the ECM and used for various controls. If the ACTTRQ motor torque signal voltage is a set value or less, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Battery voltage	10.05 V	—
Ignition switch	ON	
No active DTCs	IMA ACTTRQ motor	

Malfunction Threshold

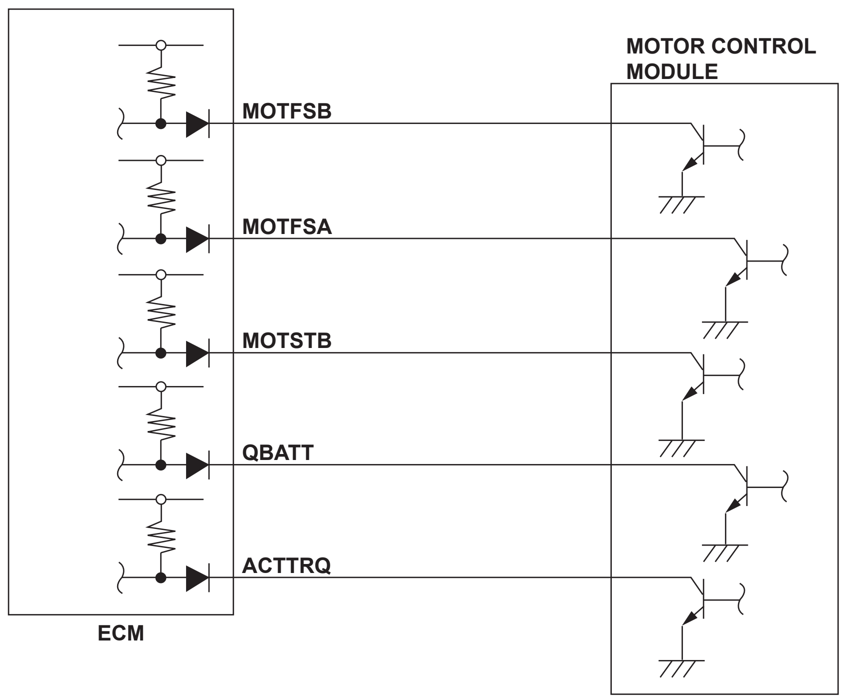
The ACTTRQ motor torque signal voltage is 0.27 V or less for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1641: ACTTRQ Motor Torque Signal Circuit High Input



P1640-0001

General Description

The engine control module (ECM) signals a request for motor torque to the motor control module (MCM). The MCM sends back the motor torque value as duty signals to the MCM. The duty signals are converted into voltage in the ECM and used for various controls. If the ACTTRQ motor torque signal voltage is a set value or more, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Battery voltage	10.05 V	—
Ignition switch	ON	
No active DTCs	IMA ACTTRQ motor	

Malfunction Threshold

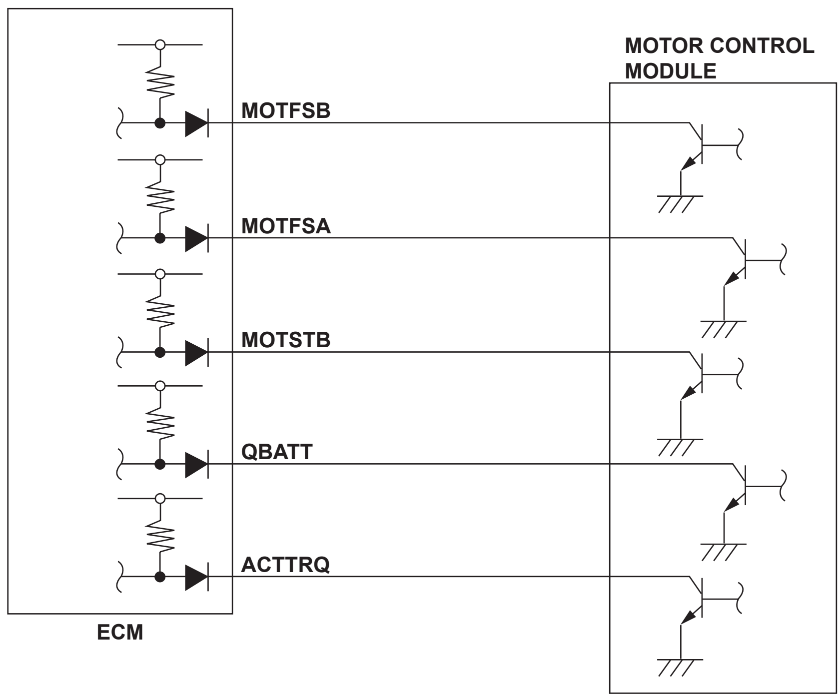
The ACTTRQ motor torque signal voltage is 4.75 V or more for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1642: QBATT Battery Signal Circuit Low Input



P1640-0001

General Description

The motor control module (MCM) signals the information about the battery's state of charge to the engine control module (ECM) via the QBATT signal line. If the QBATT battery signal voltage is a set value or less, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Battery voltage	10.05 V	—
Ignition switch	ON	
No active DTCs	IMA QBATT signal	

Malfunction Threshold

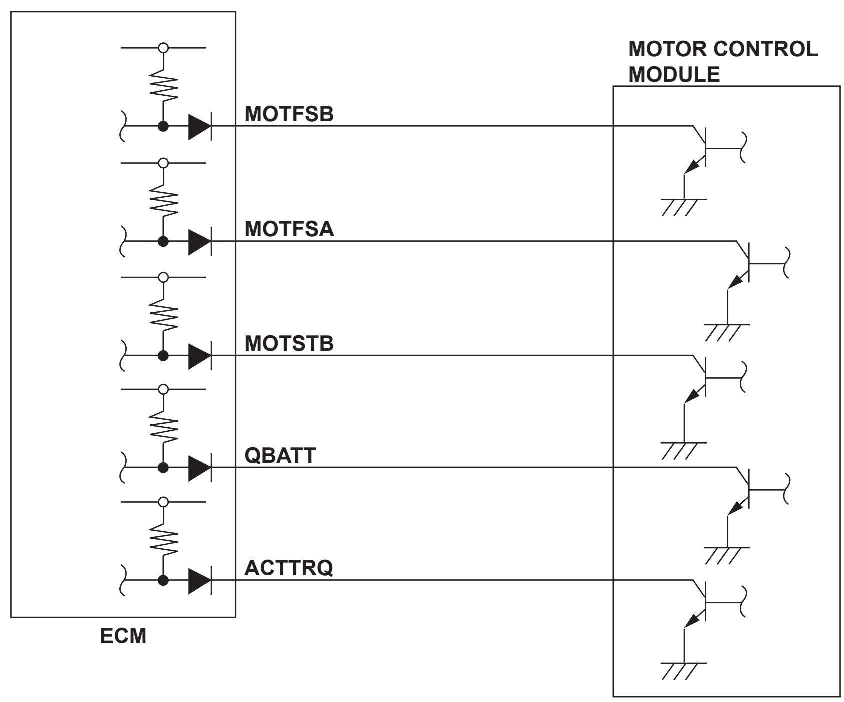
The QBATT battery signal voltage is 0.27 V or less for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1643: QBATT Battery Signal Circuit High Input



P1640-0001

General Description

The motor control module (MCM) signals the information about the battery's state of charge to the engine control module (ECM) via the QBATT signal line. If the QBATT battery signal voltage is a set value or more, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Battery voltage	10.05 V	—
Ignition switch	ON	
No active DTCs	IMA QBATT signal	

Malfunction Threshold

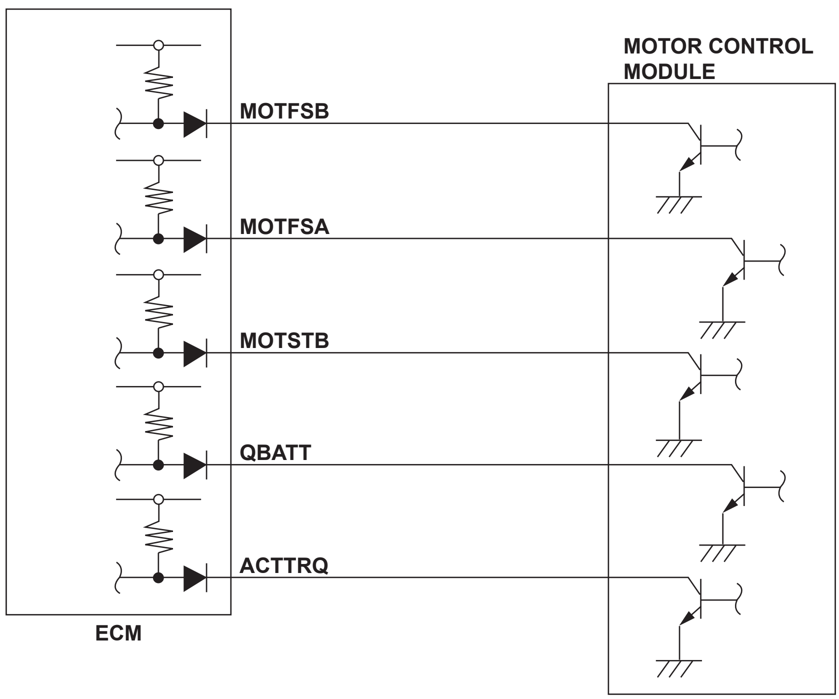
The QBATT battery signal voltage is 4.75 V or more for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1644: MOTFSA Signal Malfunction



P1640-0001

General Description

The motor control module (MCM) signals various information about the IMA system to the engine control module (ECM) via the MOTFSA signal line. If no duty signals are input from the MCM for at least a set time period, the ECM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Battery voltage	10.05 V	—
Ignition switch	ON	
No active DTCs	IMA MOTFSA	

Malfunction Threshold

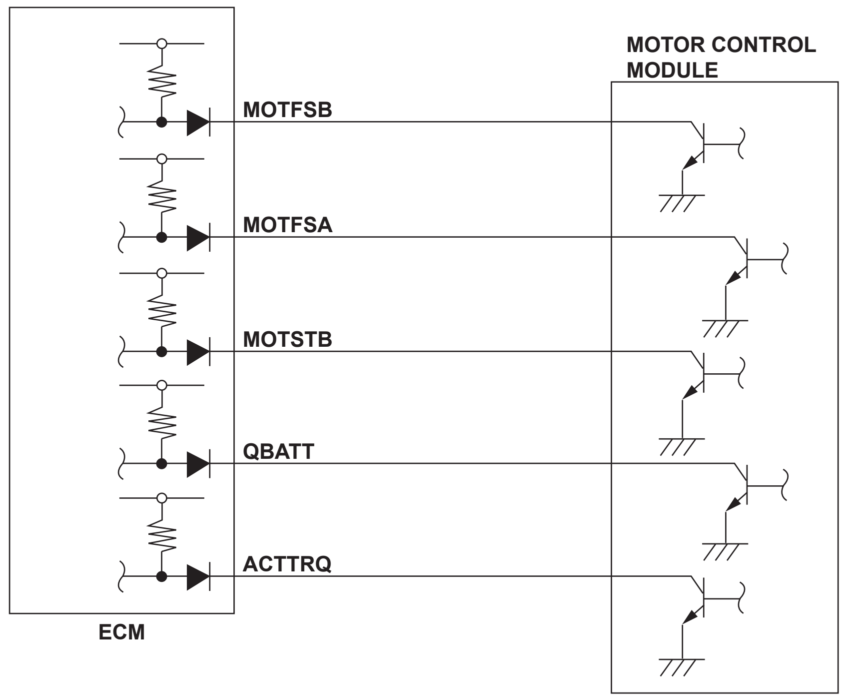
No duty signals are input from the MCM for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1645: MOTFSB Signal Malfunction



P1640-0001

General Description

The motor control module (MCM) signals information about the motor to the engine control module (ECM) via the MOTFSB signal line. If no duty signals are input from the MCM for at least a set time period, the ECM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Battery voltage	10.05 V	—
Ignition switch	ON	
No active DTCs	IMA MOTFSB	

Malfunction Threshold

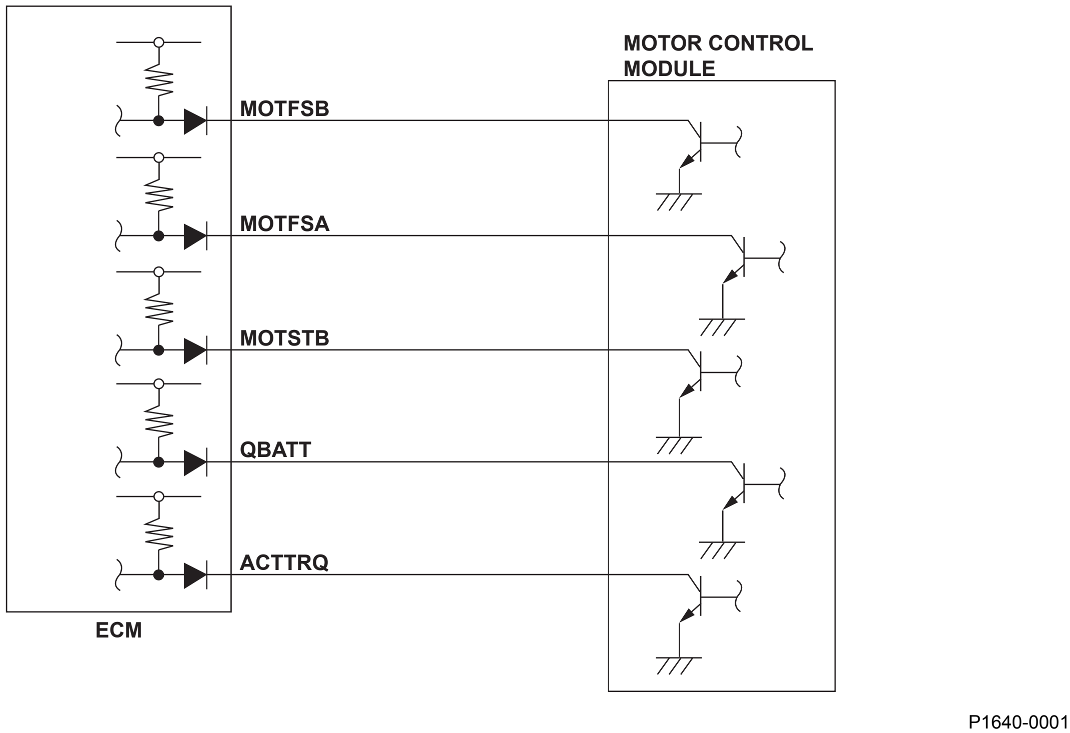
No duty signals from the MCM are input for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1646: MOTSTB Signal Malfunction



General Description

The motor control module (MCM) sends information about the motor to the engine control module (ECM) via the MOTSTB signal line. If no duty signals are input from the MCM for a set time, the ECM detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Battery voltage	10.05 V	—
Ignition switch	ON	
No active DTCs	IMA MOTSTB	

Malfunction Threshold

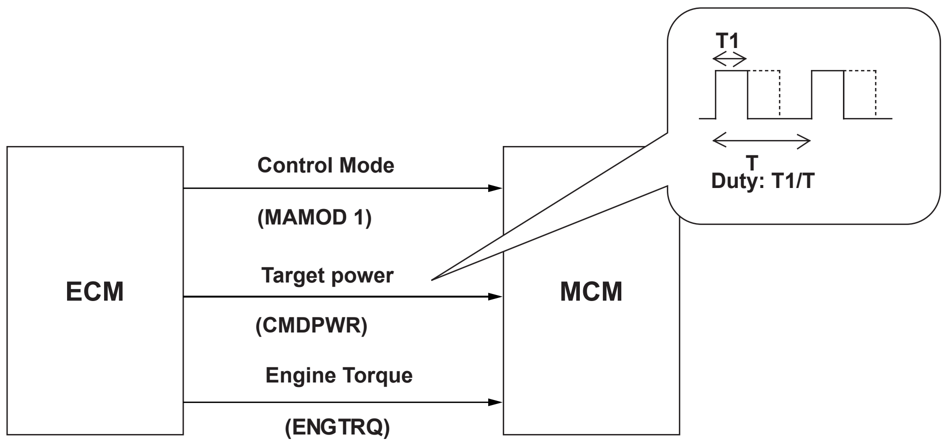
No signals from the MCM are input for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1647 (01): Power Command Signal Circuit Low Input



P1647-0071

General Description

The ECM (engine control module) sends signals that command the motor output (CMDPWR) to the MCM (motor control module) by the PWM signal duty. The signal duty is converted into voltage via an integrator circuit in the MCM, and the CPU reads it as analog. The duty that is used for the control is set between 10% - 90% (equivalent to 0.5 V - 4.5 V), so it stays beyond the range in case of a malfunction such as an open in the signal wire or a short to ground.
If the MCM reads voltage lower than a set range, a short to ground in the signal wire is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	ECM, MCM	

Malfunction Threshold

The voltage converted in the MCM circuit is less than 0.24 V for at least 2 seconds.

Diagnosis Details

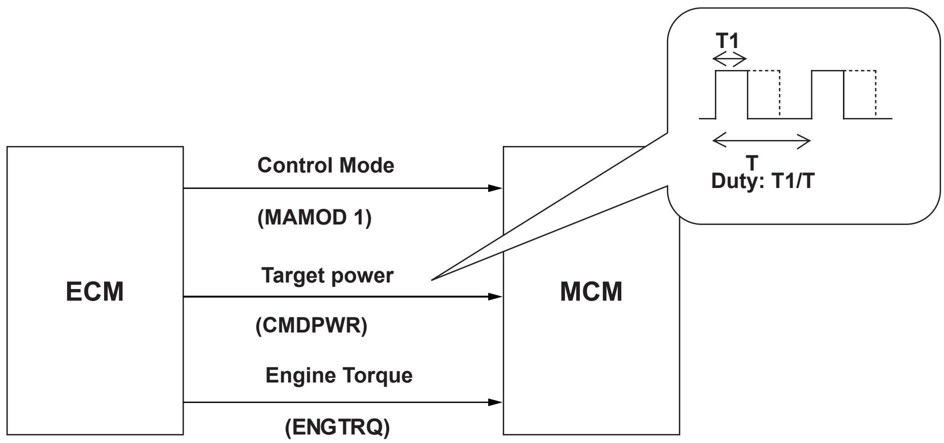
Conditions for illuminating the MIL

When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1647 (02): Power Command Signal Circuit High Input



P1647-0071

General Description

The ECM (engine control module) sends signals that command the motor output (CMDPWR) to the MCM (motor control module) by the PWM signal duty. The signal duty is converted into voltage via an integrator circuit in the MCM, and the CPU reads it as analog. The duty that is used for the control is set between 10% - 90% (equivalent to 0.5 V - 4.5 V), so it stays beyond the range when a malfunction such as an open in the signal wire or a short to ground occurs. If the MCM reads voltage higher than a set range, an open in the signal wire is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	ECM, MCM	

Malfunction Threshold

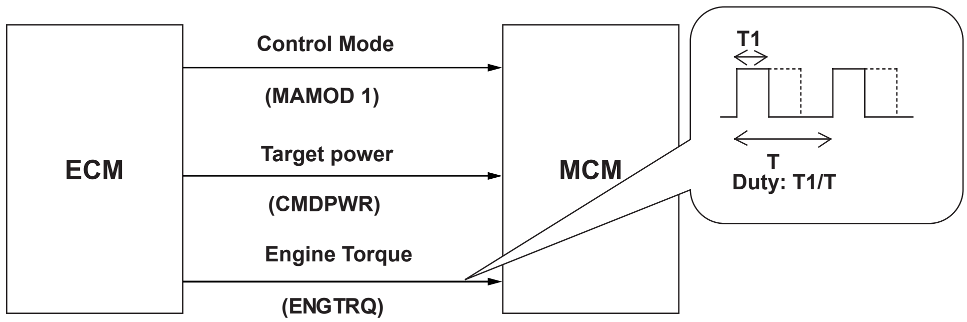
The voltage converted in the MCM circuit is 4.75 V or more for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1647 (03): Engine Torque Signal Circuit Low Input



P1647-0072

General Description

The ECM (engine control module) signals the engine torque to the MCM (motor control module) by the PWM signal duty. The signal duty is converted into voltage via an integrator circuit in the MCM, and the CPU reads it as analog. The duty that is used for the control is set between 10% - 90% (equivalent to 0.5 V - 4.5 V), so it stays beyond the range when a malfunction such as an open in the signal wire or a short to ground occurs. If the MCM reads voltage lower than a set range, a short to ground in the signal wire is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	ECM, MCM	

Malfunction Threshold

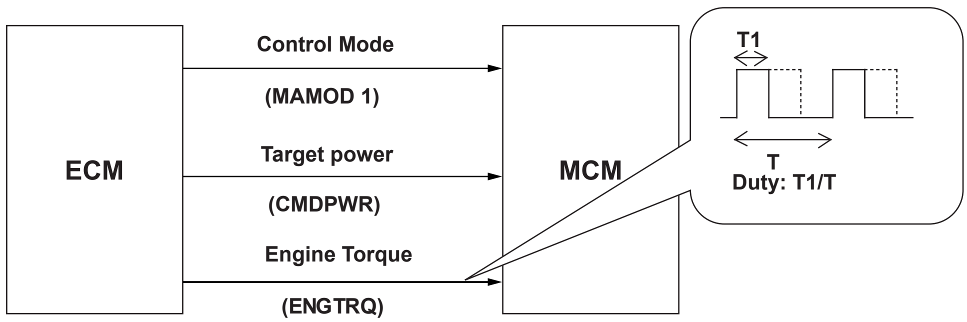
The voltage converted in the MCM circuit is less than 0.24 V for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1647 (04): Engine Torque Signal Circuit High Input



P1647-0072

General Description

The ECM (engine control module) signals the engine torque to the MCM (motor control module) by the PWM signal duty. The signal duty is converted into voltage via an integrator circuit in the MCM, and the CPU reads it as analog. The duty that is used for the control is set between 10% - 90% (equivalent to 0.5 V - 4.5 V), so it stays beyond the range when a malfunction such as an open in the signal wire or a short to ground occurs. If the MCM reads voltage higher than a set range, an open in the signal wire is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	ECM, MCM	

Malfunction Threshold

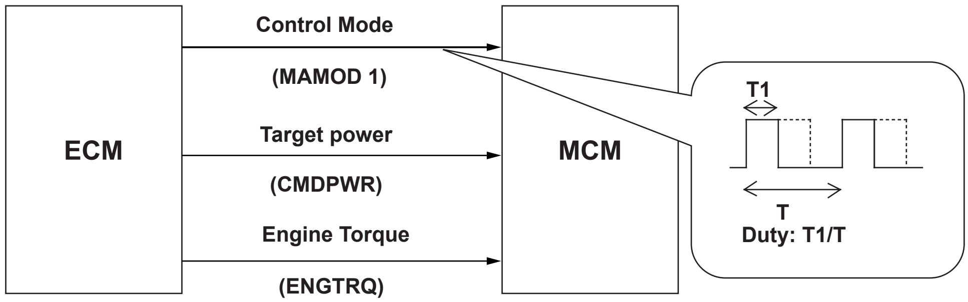
The voltage converted in the MCM circuit is 4.75 V or more for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1647 (05): Mode Signal Circuit 1 Low Input



P1647-0073

General Description

The ECM (engine control module) sends the IMA control mode signals (MAMOD1) to the MCM (motor control module) by the PWM signal duty. The signal duty is converted into voltage via an integrator circuit in the MCM, and the CPU reads it as analog. The duty that is used for the control is set between 10% - 90% (equivalent to 0.5 V - 4.5 V), so it stays beyond the range when a malfunction such as an open in the signal wire or a short to ground occurs. If the MCM reads voltage lower than a set range, a short to ground in the signal wire is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	ECM, MCM	

Malfunction Threshold

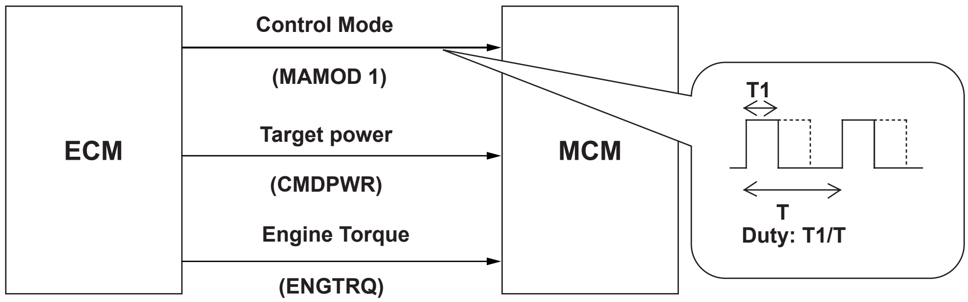
The voltage converted in the MCM circuit is less than 0.24 V for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1647 (06): Mode Signal Circuit 1 High Input



P1647-0073

General Description

The ECM (engine control module) sends the IMA control mode signals (MAMOD1) to the MCM (motor control module) by the PWM signal duty. The signal duty is converted into voltage via an integrator circuit in the MCM, and the CPU reads it as analog. The duty that is used for the control is set between 10% - 90% (equivalent to 0.5 V - 4.5 V), so it stays beyond the range when a malfunction such as an open in the signal wire or a short to ground occurs. If the MCM reads voltage higher than a set range, an open in the signal wire is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	ECM, MCM	

Malfunction Threshold

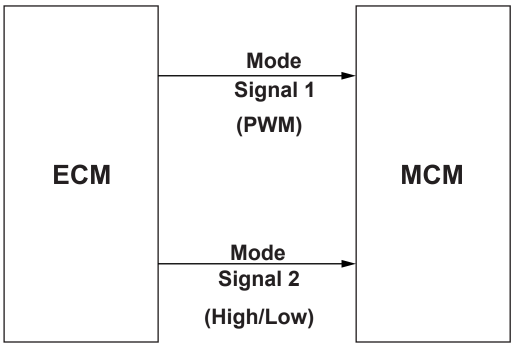
The voltage converted in the MCM circuit is more than 4.75 V for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1647 (07): Mode Signal Circuit 2 Problem



ECM mode control	Mode Signal 1 PWM Duty	Mode Signal 2 (H/L→0/1)
Acceleration	25 %	1
Unused	25 %	0
Deceleration	35 %	0
Unused	35 %	1

P1647-0074

General Description

The MCM (motor control module) determines the motor assist control mode according to the mode signals (Mode signal 1, Mode signal 2) from the engine control module (ECM). The motor assist control mode is determined by the combination of the Mode signal 1 (PWM duty) and Mode signal 2 (High/Low voltage level). When the Mode signal 2 is malfunctioning, it is contrary to the state in the table and stays High or Low. Therefore, the motor assist control mode is not determined if the Mode signal 2 is malfunctioning.
If the combination of the Mode signal 1 and Mode signal 2 differs from one specified for at least a set time period, a malfunction in the Mode signal 2 is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
No active DTCs	MDM, MPI, U/V/W phase signal circuit, MCM, IMA system, BCM, BM	
Other	At the time of motor assist during acceleration or at the time of regenerative motor assist during deceleration	

Malfunction Threshold

Mode Signal 1 = 25% and Mode Signal 2 = Low (1 V or less) for at least 2 seconds.
Mode Signal 1 = 35% and Mode Signal 2 = High (4 V or more) for at least 2 seconds.

Driving Pattern

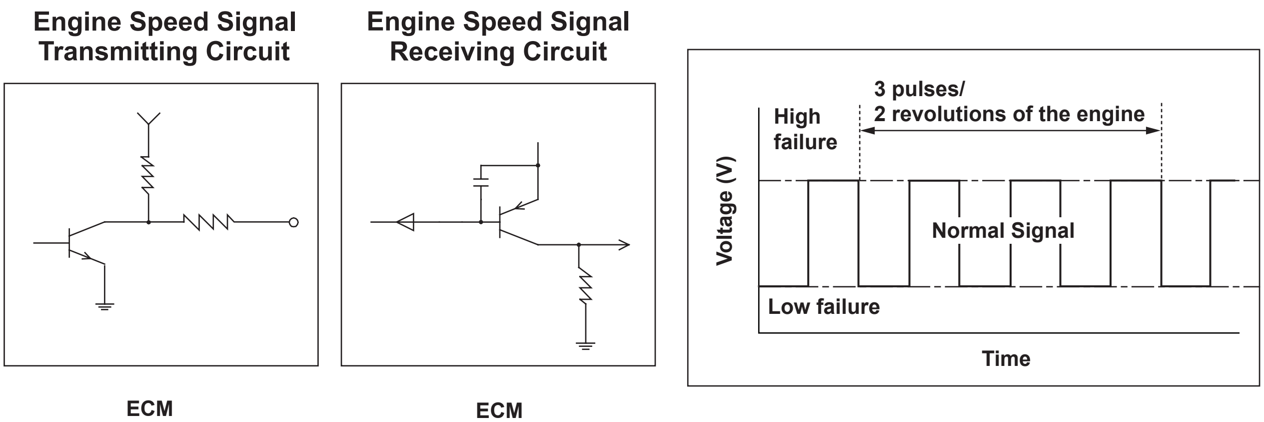
1. Start the engine, and let it idle.
2. Then, accelerate the vehicle with IMA assist for at least 10 seconds.
3. Decelerate by applying the brakes for at least 10 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1647 (43): Engine Speed Signal Circuit Problem



P1647-0075

General Description

The IMA (integrated motor assist) system receives an engine speed signal from the engine control module (ECM), and it produces a torque in the opposite phase of the engine torque to cancel out changes of the engine torque and control the frequencies of vibration created by the engine at idle. If the engine speed signal fails, the IMA stops controlling the frequencies of vibration created by the engine. If the difference between the estimated engine speed, based on the engine speed signal, and the estimated motor speed, based on the assist motor magnetic pole position sensor signal (NMOT), increases, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Motor speed	400 rpm	—
No active DTCs	Mode signal circuit, MPI, IMA system, Detection signal circuit	

Malfunction Threshold

The difference between the estimated engine speed and the estimated motor speed is 500 rpm or more for at least 2 seconds.

Driving Pattern

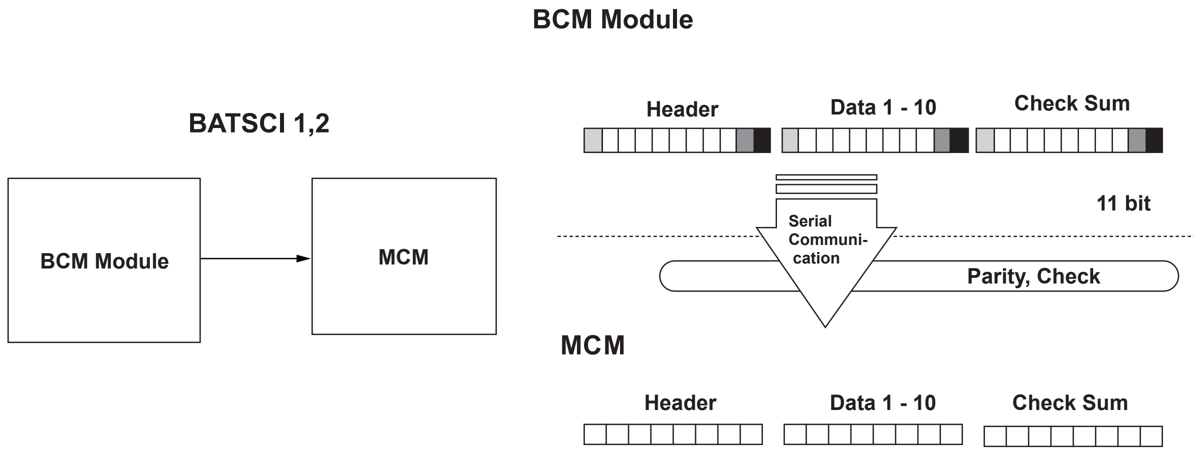
1. Start the engine.
2. Hold the engine at 1,000 rpm for at least 10 seconds.
3. Hold the engine at 3,000 rpm for at least 10 seconds.
4. Stop the engine.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1648 (64): Battery Condition Monitor (BCM) Module Communication Signal Circuit Problem



P1648-0071

General Description

Data is transmitted and received between the MCM (motor control module) and the BCM (battery condition monitor) module. Various commands are included in the stream of data, and some are unable to control without limitation by the final value, which is normal, when there is an open in the line or a faulty circuit for the interface. The MCM confirms the normality of the data received according to the parity and check sum, and it measures a time interval during which the command update has not been executed based on the periodic process by the internal timer. If no data update is executed over a set time period, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	2 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
MCM power-supply voltage	10.5 V	—
Ignition switch	ON	
No active DTCs	MCM, BCM	

Malfunction Threshold

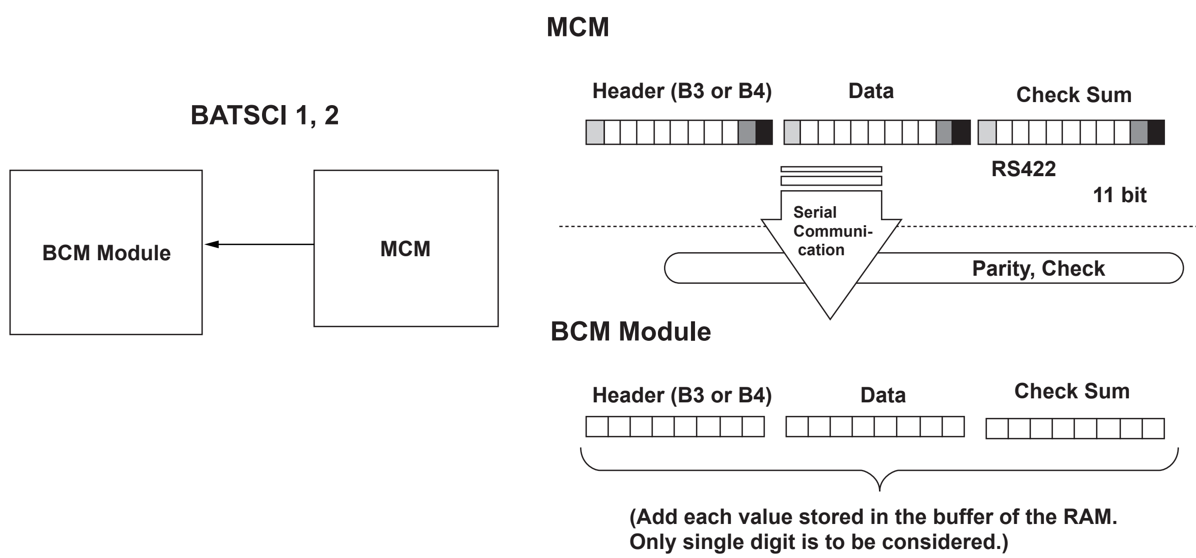
No signals are received for at least 2 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1648 (75): Motor Control Module (MCM) Communication Signal Circuit Problem



P1648-0072

General Description

Data is transmitted and received between the MCM (motor control module) and the BCM (battery condition monitor) module. Various commands are included in the stream of data, and some are unable to control without limitation by the final value, which is normal, when there is an open in the line or a faulty circuit for the interface. The BCM module measures a time interval during which the command update has not been executed based on the periodic process by the internal timer. If the time interval is beyond a set time period, the BCM uses the safe value for the control instead, then provides timing for the MCM to signal the abnormality of the data received from the MCM. The data update is resumed when the normal data is received, and the fail safe maintains the latest value. If no data update is executed over a set time period, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	4 seconds or more
DTC Type	One drive cycle, MIL ON, IMA system indicator ON

Enable Conditions

Condition	Minimum	Maximum
BCM power-supply voltage	7.5 V	—
Ignition switch	ON	
No active DTCs	MCM, BCM	

Malfunction Threshold

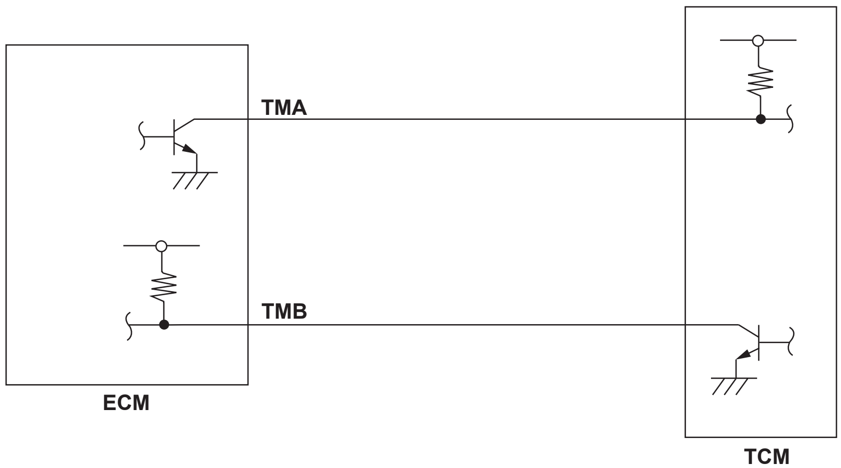
No signals are received for at least 4 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1655: A/T FI Signal A/B Circuit Malfunction (CVT)



P1655-9601

General Description

The engine control module (ECM) sends various signals to the transmission control module (TCM) via the TMA signal line. The TCM sends signals used for engine control to the ECM via the TMB signal line. If no signals to or from the ECM are input or output for a set time, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	5 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Battery voltage	10.05 V	—
No active DTCs	AT-FI signal	

Malfunction Threshold

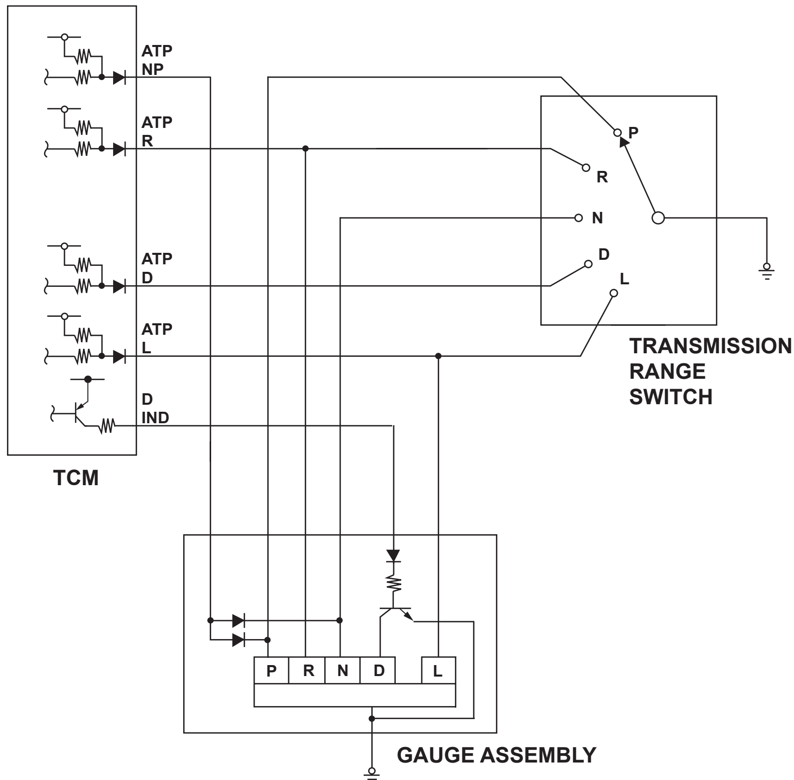
No communication signals from the TCM are detected for at least 5 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs. The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1705: Short in Transmission Range Switch Circuit



P1705-0104

Transmission range switch contact point input matrix

Shift lever position	Input per switch			
	P.N	R	D	L
P	O	X	X	X
R	X	O	X	X
N	O	X	X	X
D	X	X	O	X
L	X	X	X	O

O: Closed X: Open

General Description

The transmission range switch is attached to the control shaft. Operation of the shift lever makes the control shaft rotate via the shift cable. The A/T gear position indicator indicates which position is selected according to the four signal Low/High combinations which vary based on the control shaft rotational angle. The control shaft changes the position of the transmission range switch, activates the manual valve, and switches hydraulic pressure to shift the transmission through forward/neutral/reverse. The transmission range switch signal is used to determine the shift schedule. The voltage is 12 V (High) at the transmission control module (TCM) input terminal when each transmission range switch position is open, and it is 0 V (Low) when each switch is closed. If the TCM detects a different range switch input instead of the correct switch input (see the contact point input matrix) in the selected range at that time, it detects a malfunction and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	1 second
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	
Ignition switch	ON

Malfunction Threshold

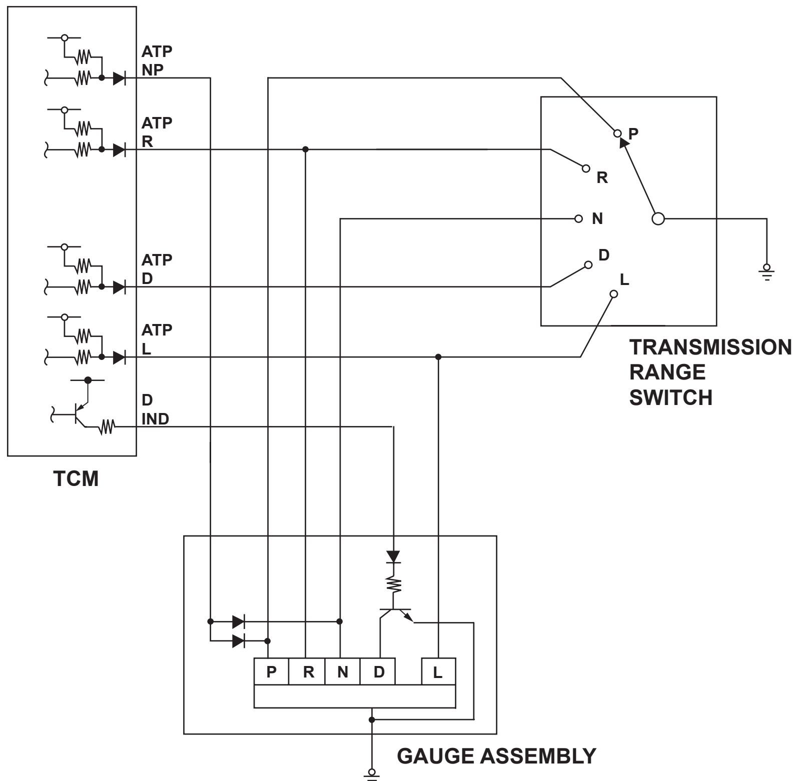
Two or more contact points of the transmission range switch are ON at the same time for at least 1 second. (0 V at two or more switch input terminals.)

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1706: Open in Transmission Range Switch Circuit (no gear position inputs)



P1705-0104

Transmission range switch contact point input matrix

Shift lever position	Input per switch			
	P.N	R	D	L
P	O	X	X	X
R	X	O	X	X
N	O	X	X	X
D	X	X	O	X
L	X	X	X	O

O: Closed X: Open

General Description

The transmission range switch is attached to the control shaft. Operation of the shift lever makes the control shaft rotate via the shift cable. The A/T gear position indicator indicates which position is selected according to the four signal Low/High combinations which vary based on the control shaft rotational angle. The control shaft changes the position of the transmission range switch, activates the manual valve, and switches hydraulic pressure to shift the transmission through forward/neutral/reverse. The transmission range switch signal is used to determine the shift schedule. The voltage is 12 V (High) at the transmission control module (TCM) input terminal when each transmission range switch position is open, and it is 0 V (Low) when each switch is closed. If the D switch stays open while the vehicle repeatedly accelerates to a specified vehicle speed and then stops despite being in the D position, theTCM detects a malfunction in the transmission range switch (open) and stores a DTC.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	Depending on the driving pattern
DTC Type	Two drive cycles, MIL ON, D indicator OFF

Enable Conditions

Condition	
Shift lever position	D

Malfunction Threshold

The D switch is open during acceleration/deceleration.

Driving Pattern

Start the engine, and accelerate to a speed of 30 mph (48 km/h) or more in D position, then stop the vehicle again.

- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and the A/C.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

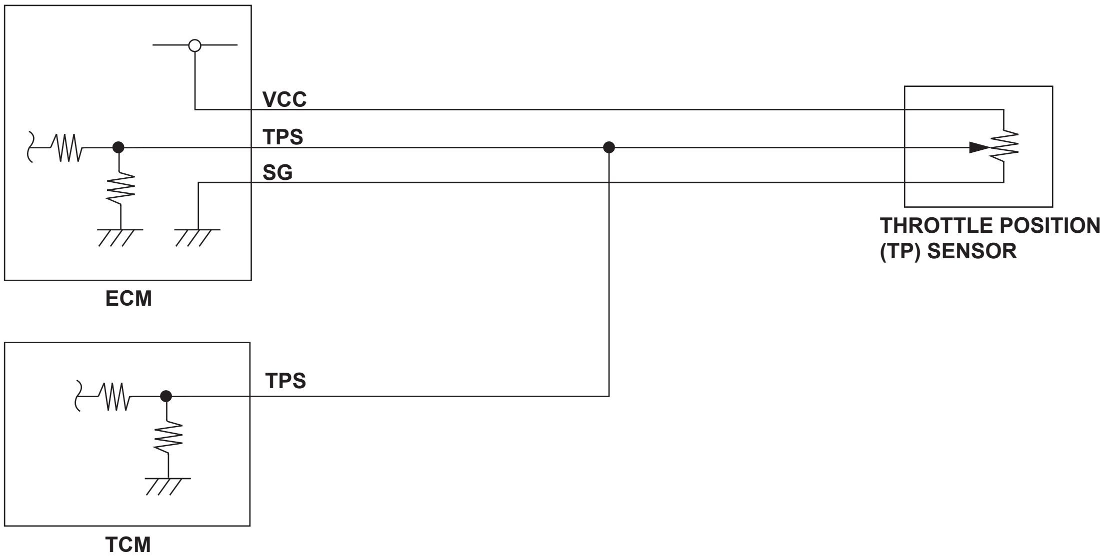
Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

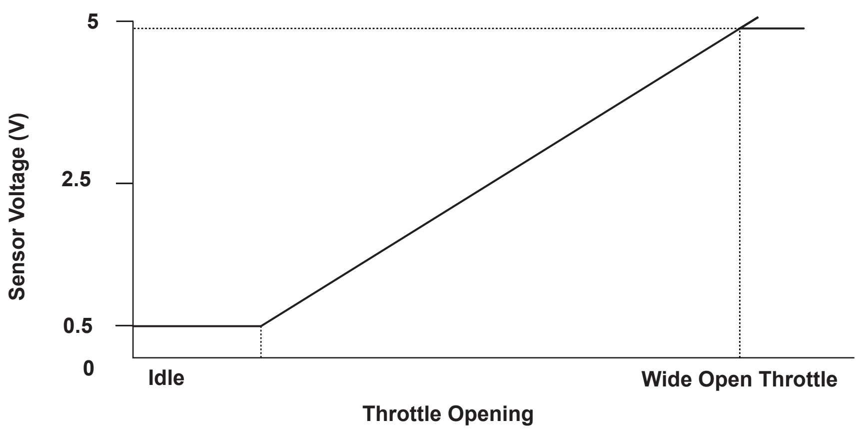
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1790: Throttle Position (TP) Sensor Circuit



P1790-9601

Throttle Position (TP) Sensor Output Voltage



P0122-9672

General Description

The throttle position (TP) sensor is installed in the throttle body, and it detects the position of the throttle valve. This sensor includes a brush that moves with the throttle valve. The brush outputs a voltage to the transmission control module (TCM) that varies linearly with the throttle position by sliding on a resistor.

The TCM monitors the throttle position according to the TP sensor output voltage, and detects an open or a short in the harness and a malfunction in the input circuit.

If the input voltage to the TCM is out of a set value, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	10 seconds
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	
Ignition switch	ON

Malfunction Threshold

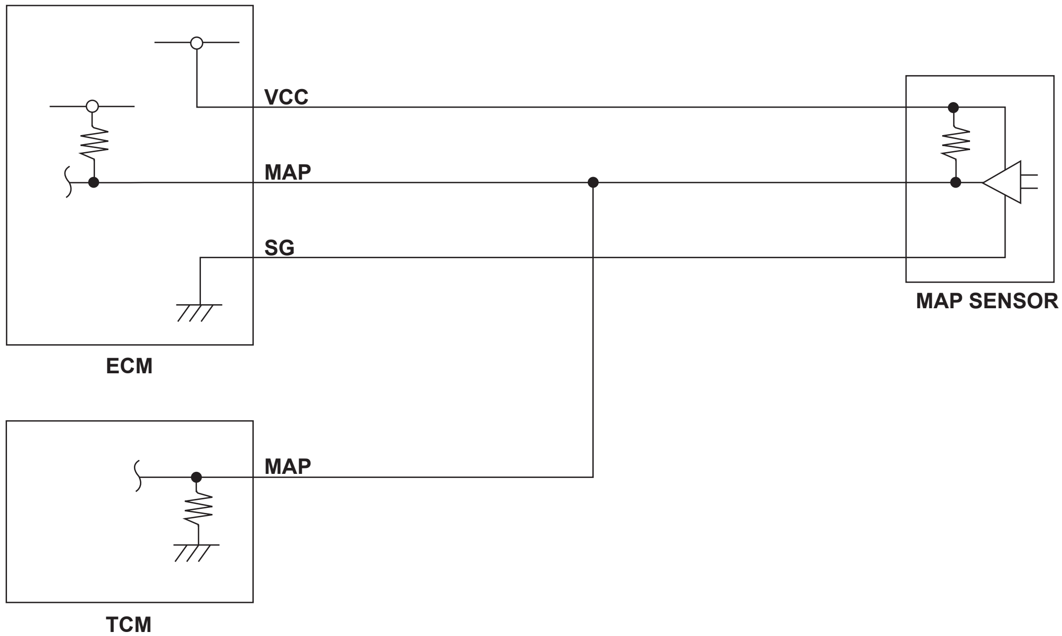
The TP sensor output voltage is 0.09 V or less or 4.93 V or more for at least 10 seconds.

Diagnosis Details

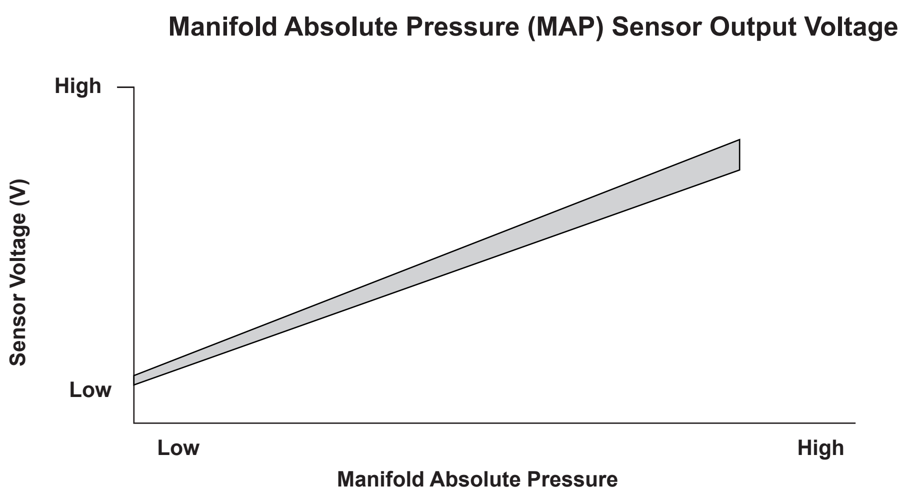
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1793: Problem in Manifold Absolute Pressure (MAP) Sensor Circuit



P1793-9601



P0107-9671

General Description

The manifold absolute pressure (MAP) sensor senses manifold absolute pressure (vacuum) and converts it into electrical signals. The MAP sensor outputs low signal voltage at high-vacuum (throttle valve closed) and high signal voltage at low-vacuum (throttle valve wide open).

The transmission control module (TCM) compares a computed MAP value based on a given throttle position and other information with the output voltage of the MAP sensor. If the input voltage to the TCM is out of a set value, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	10 seconds
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	
Ignition	ON

Malfunction Threshold

The MAP sensor voltage is 0.2 V or less, or 4.5 V or more, for at least 10 seconds.

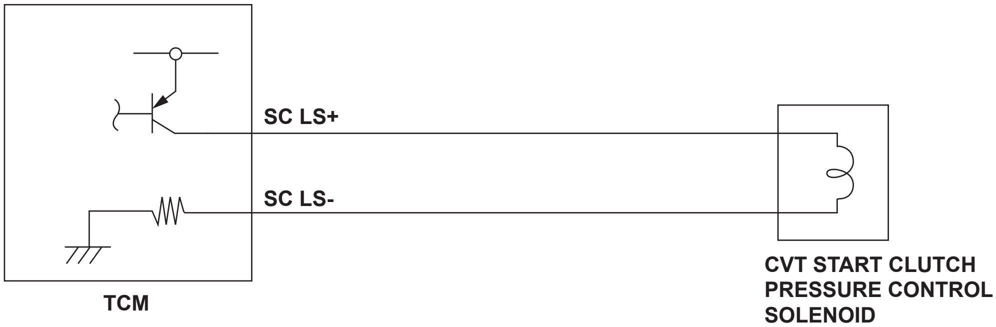
Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

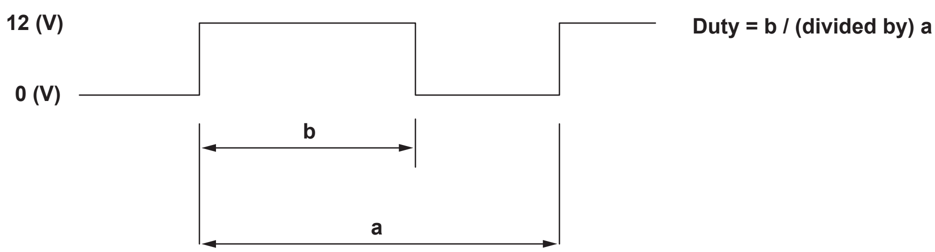
Advanced Diagnostics

DTC P1879: Problem in CVT Start Clutch Pressure Control Solenoid Circuit



P1879-9601

CVT Start Clutch Pressure Control Solenoid Output Waveform



P1879-9675

General Description

The CVT start clutch pressure control solenoid is used to control clutch pressure (hydraulic pressure) so the pressure for the various driving conditions is optimized. The spool in the linear solenoid pushes the valve by the duty cycle, and produces hydraulic pressure in proportion to the current. The CVT start clutch pressure control solenoid measures the current that passes through the linear solenoid and uses feedback control for the differential between the measured current and the commanded value. If the measured current is not equal to the duty cycle command, a malfunction (open, short to ground, short to power on the plus terminal side of linear solenoid) is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	1 second
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	
State of the engine	Running
No active DTCs	Engine speed input circuit, CVT drive pulley speed sensor, CVT driven pulley speed sensor, Shift control system, Start clutch control system, CVT drive pulley pressure control solenoid, CVT driven pulley pressure control solenoid

Malfunction Threshold

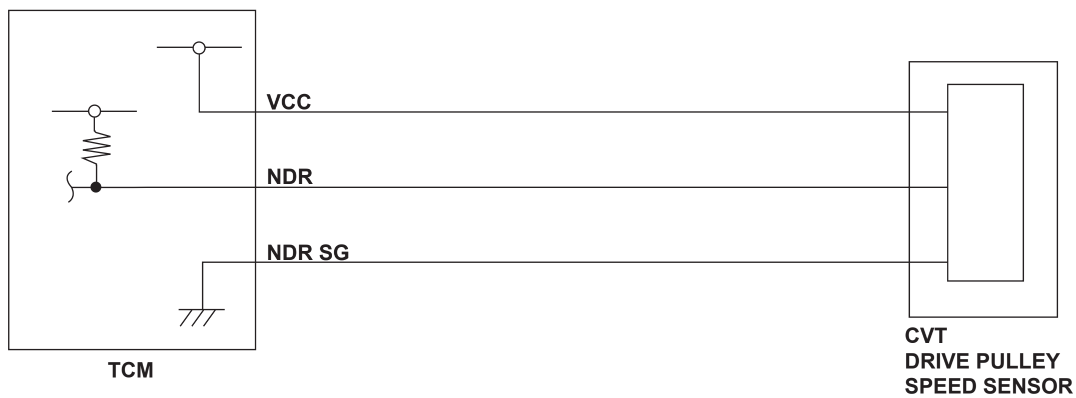
Measured current is not equal to the transmission control module (TCM) duty cycle command for at least 1 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1885: Problem in CVT Drive Pulley Speed Sensor Circuit



P1885-0101

General Description

The CVT drive pulley speed sensor detects the number of revolutions of the gear on the drive pulley and sends a pulsing signal to the transmission control module (TCM). The TCM converts the pulsing signal into drive pulley speed. In addition, the TCM converts the engine ignition signal into the engine speed signal.
If the drive pulley speed is lower than the value that is estimated based on the engine speed in D, L, or R position, a malfunction in the CVT drive pulley speed sensor is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	15 seconds
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	Minimum	Maximum
Engine speed	600 rpm	—
Shift lever position	D, L, or R	

Malfunction Threshold

The drive pulley speed < the engine speed estimated by the TCM by a factor of 0.53 for at least 15 seconds.

Driving Pattern

Start the engine. Hold the engine at 600 rpm or more in D position for at least 15 seconds.

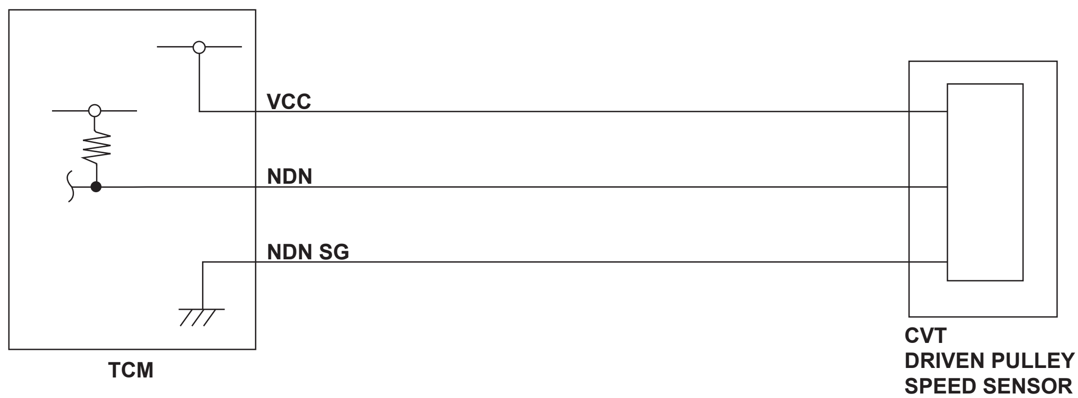
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and the A/C.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

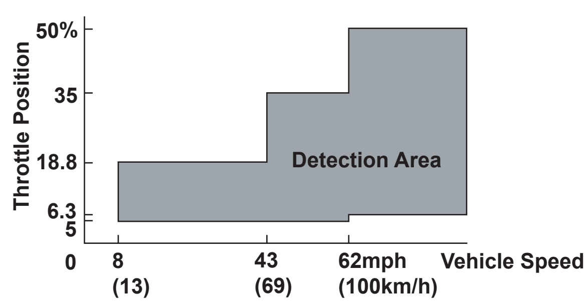
Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1886: Problem in CVT Driven Pulley Speed Sensor Circuit



P1886-0101

Detection Area



P1886-9875

General Description

The CVT driven pulley speed sensor detects the number of revolutions of the gear on the driven pulley and sends a pulsing signal to the transmission control module (TCM). The TCM converts the pulsing signal into driven pulley speed.

Pattern 1

If no signals from the CVT driven pulley speed sensor are detected at a set engine speed or more in D, L, or R position, a malfunction in the CVT driven pulley speed sensor is detected and a DTC is stored.

Pattern 2

If no signals from the CVT driven pulley speed sensor are detected when driving the vehicle at a steady speed (a set value) within a set engine speed range in D or L position (with the start clutch engaged), a malfunction in the driven pulley speed sensor is detected, and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	15 seconds
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Pattern 1

Condition	Minimum	Maximum
Engine speed	600 rpm	—
Shift lever position	D, L, or R	
Other	The engine speed is equal to the drive pulley speed	

Pattern 2

Condition	Minimum	Maximum
Engine speed	600 rpm	6,800 rpm
Shift lever position	D or L	
Others	The vehicle speed measured by the CVT speed sensor is equal to the vehicle speed	
	Both the vehicle speed measured by the CVT speed sensor and the vehicle speed are 8 mph (13 km/h) or more	
	The vehicle speed and the throttle position are in the Detection Area shown in the graph	

Malfunction Threshold

No signals from the driven pulley speed sensor are detected for at least 15 seconds during Pattern 1 or Pattern 2.

Driving Pattern

Pattern 1
Start the engine. Hold the engine at 600 rpm or more in D position for at least 15 seconds.

Pattern 2
Start the engine. Drive the vehicle on a flat road at a steady speed between 43 - 62 mph (69 - 100 km/h) in D position for at least 15 seconds.

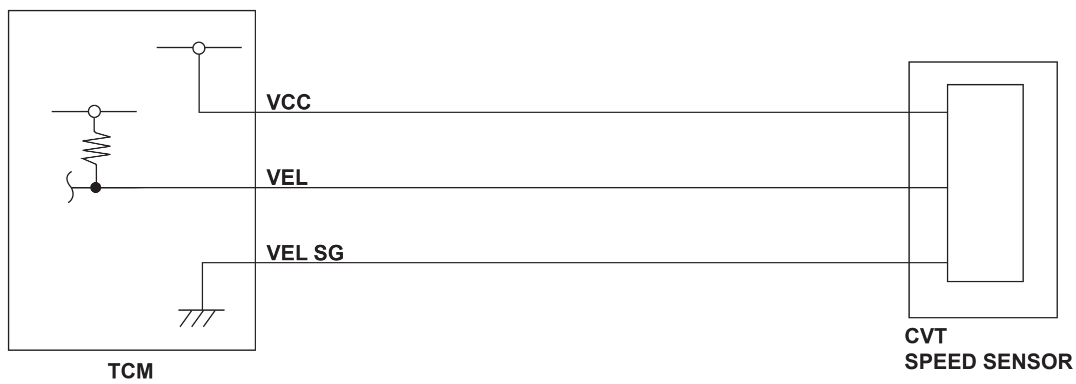
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and the A/C.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1888: Problem in CVT Speed Sensor Circuit



General Description

The CVT speed sensor detects the number of revolutions of the secondary gear and sends a pulsing signal to the transmission control module (TCM). The TCM converts the pulsing signal into CVT speed.
If the vehicle speed measured by the CVT speed sensor is lower than the value that is estimated based on the vehicle speed measured by the vehicle speed sensor (VSS), a malfunction in the CVT speed sensor is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	10 seconds
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	Minimum	Maximum
Vehicle speed	8 mph (13 km/h)	—

Malfunction Threshold

The vehicle speed measured by the VSS > the vehicle speed measured by the CVT speed sensor by a factor of 1.8 for at least 10 seconds.

Driving Pattern

Start the engine. Drive the vehicle at a speed of 8 mph (13 km/h) or more for at least 10 seconds.

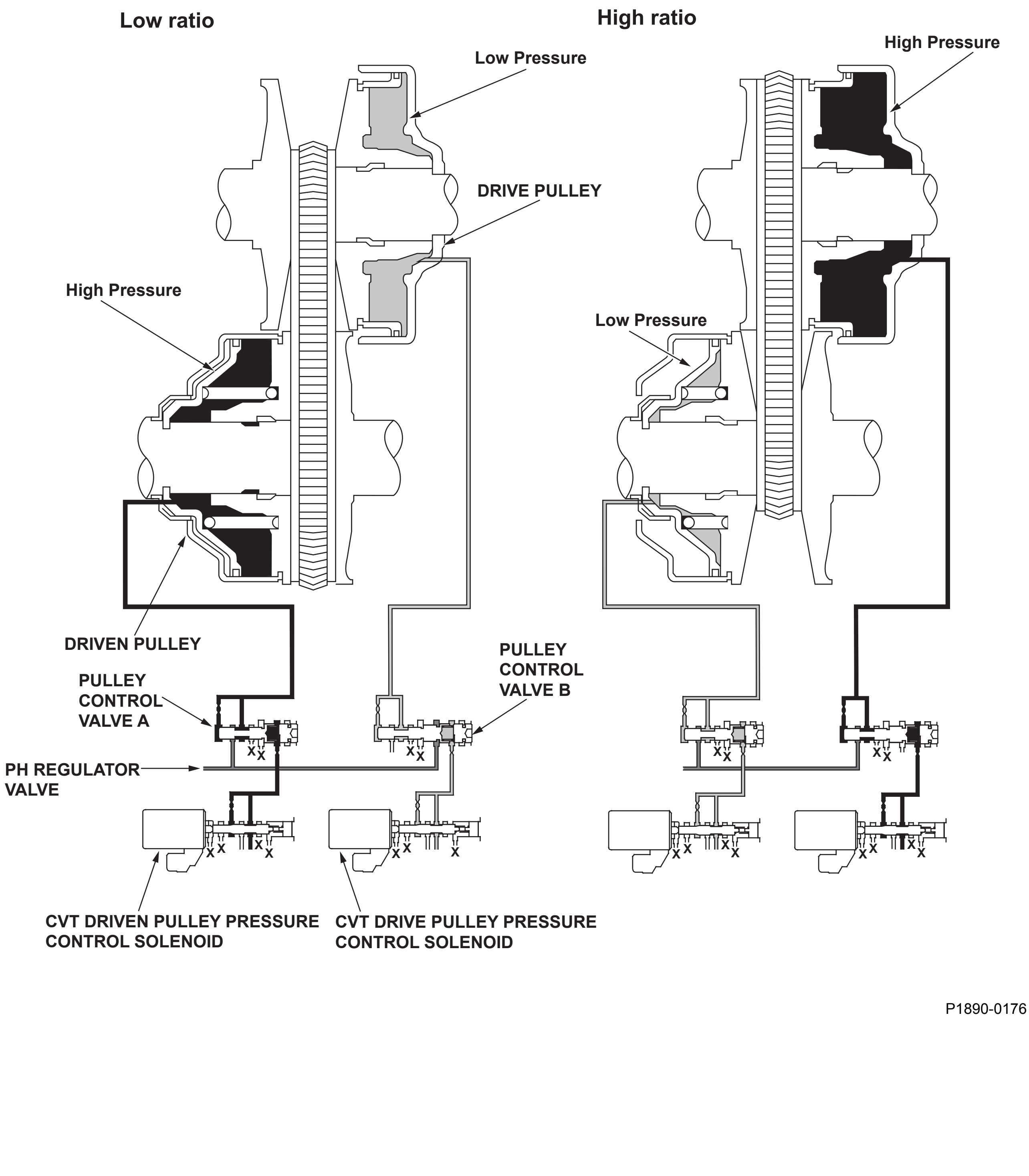
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and the A/C.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1890: Problem in Shift Control System



General Description

The shift control system is used for the shift control based on the each gear position on the map previously stored in the transmission control module (TCM) memory. The shift control system controls the CVT drive pulley pressure control solenoid and the CVT driven pulley pressure control solenoid according to the vehicle speed and the throttle position so the engine speed becomes equal to the target value, i.e., it varies the hydraulic pressure applied to the drive and driven pulley and provides feedback on the difference between the target engine speed and the actual engine speed during a drive.
It supplies high hydraulic pressure to the driven pulley and enlarges the driven pulley belt diameter when shifting to a lower ratio. It supplies high hydraulic pressure to the drive pulley and enlarges the drive pulley belt diameter when shifting to a higher ratio.
If an abnormal shifting is determined from the result of the operation in the TCM when in D, L, or R position, a malfunction in the CVT shift function is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	13 seconds
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	Minimum	Maximum
Engine speed	600 rpm	—
Throttle position	6.3%	—
Vehicle speed measured by CVT speed sensor	8 mph (13 km/h)	—
Shift lever position	D, L, or R	
Other	The engine speed is equal to the drive pulley speed	

Malfunction Threshold

The result obtained from the operation in the TCM is more than a threshold for abnormal shifting for at least 13 seconds.

Driving Pattern

Start the engine. Drive the vehicle at a speed of 8 mph (13 km/h) or more in D position with a constant throttle position for at least 13 seconds.

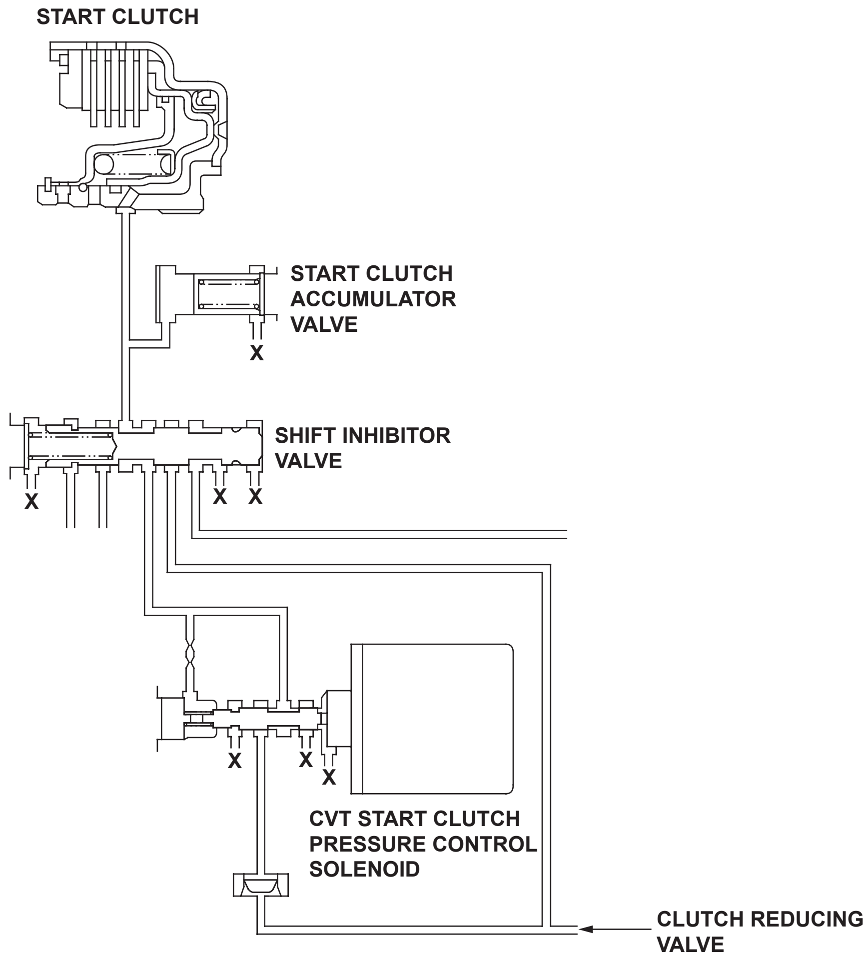
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and the A/C.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

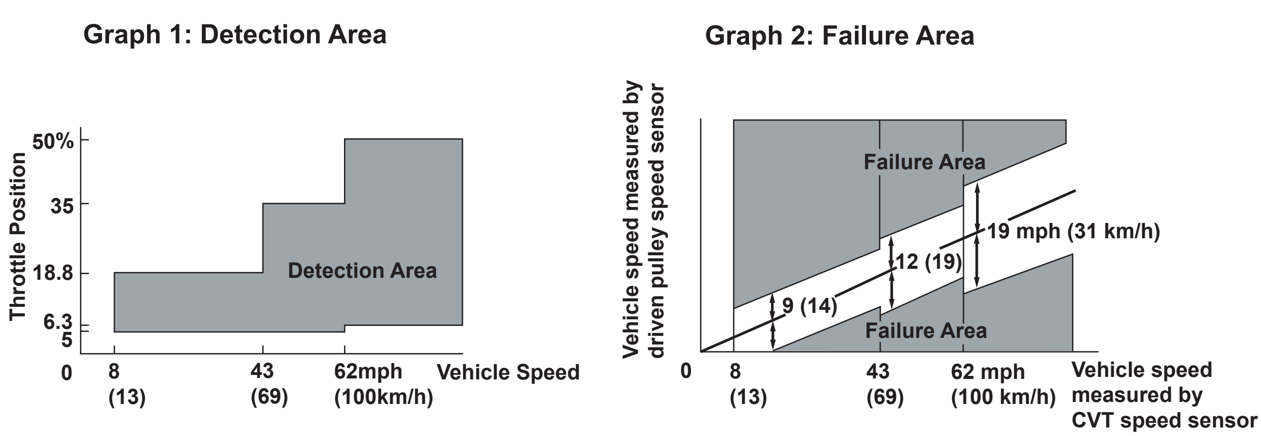
Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1891: Problem in Start Clutch Control System



P1891-0176



P1891-9875

General Description

The start clutch control system controls the clutch piston hydraulic pressure which affects the amount of power transmission by the multiplate wet start clutch on the driven pulley shaft. The transmission control module (TCM) activates the CVT start clutch pressure control solenoid to control the hydraulic pressure that is applied to the start clutch piston in accordance with vehicle conditions. The start clutch control system detects the overslip of the clutch. If the difference between the vehicle speed measured by the driven pulley speed sensor and one measured by the CVT speed sensor is excessive when driving the vehicle under Enable Conditions, a malfunction, excessive clutch slippage is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Under the Enable Conditions
Sequence	None
Duration	10 seconds
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	Minimum	Maximum
Vehicle speed measured by the CVT speed sensor	8 mph (13 km/h)	—
Engine speed	600 rpm	6,800 rpm
Shift lever position	D or L	
Others	The vehicle speed measured by the CVT speed sensor is equal to the vehicle speed	
	Both the vehicle speed and throttle position are in the Detection Area shown in Graph 1	

Malfunction Threshold

The deviation in each vehicle speed measured by the CVT speed sensor and the driven pulley speed sensor is in the Failure Area shown in Graph 2 for at least 10 seconds when the relationship between the vehicle speed and the throttle position is as shown in Graph 1.

Driving Pattern

Start the engine. Drive the vehicle at a speed of 8 mph (13 km/h) or more with the engine speed at 600 - 6,800 rpm in D or L position for at least 10 seconds. In addition, make sure the vehicle speed and the throttle position are in the Detection Area shown in Graph 1.

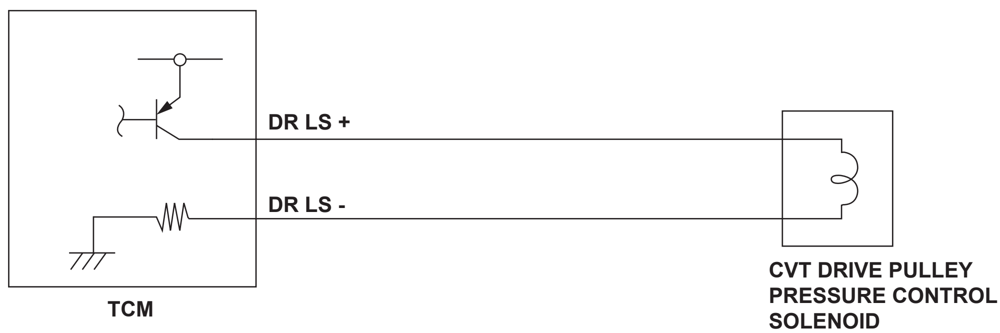
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and the A/C.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

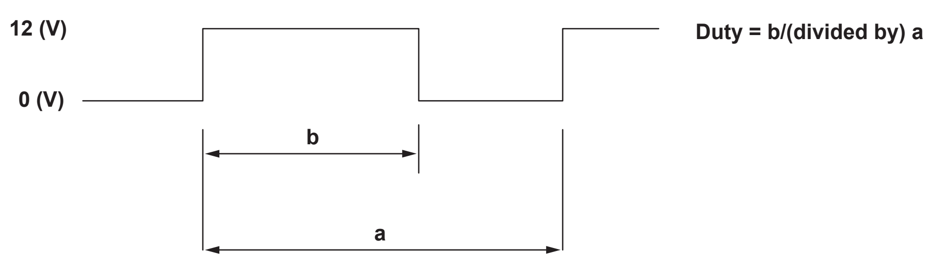
Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1894: Problem in CVT Drive Pulley Pressure Control Solenoid Circuit



P1894-0101

CVT Drive Pulley Pressure Control Solenoid Output Waveform



P1894-0175

General Description

The CVT drive pulley pressure control solenoid is used to control hydraulic pressure. The spool in the linear solenoid pushes the valve by duty cycle according to the current, and produces hydraulic pressure in proportion to the current. The CVT drive pulley pressure control solenoid measures current that passes through the linear solenoid and uses feedback control for the differential between measured current and a commanded value. If the measured current is not equal to the duty cycle command, a malfunction (open, short to ground, short to power on the plus terminal side of linear solenoid) is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	1 second
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	
State of the engine	Running

Malfunction Threshold

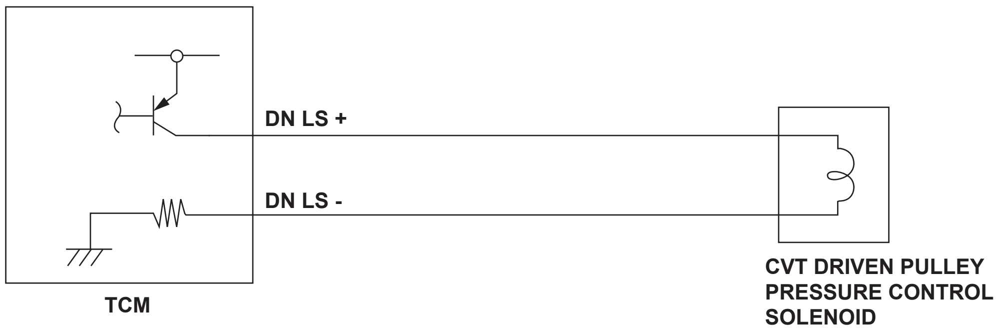
Measured current is not equal to the transmission control module (TCM) duty cycle command for at least 1 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

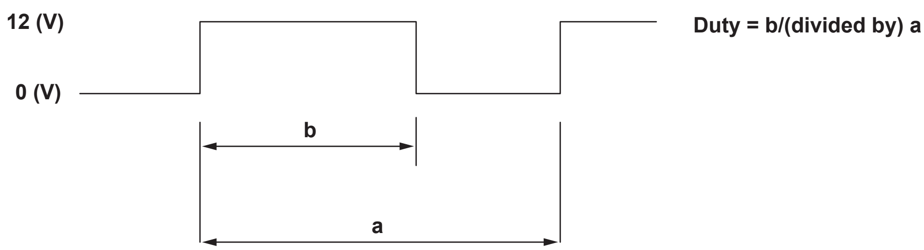
Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P1895: Problem in CVT Driven Pulley Pressure Control Solenoid Circuit



P1895-0101

CVT Driven Pulley Pressure Control Solenoid Output Waveform



P1895-0175

General Description

The CVT driven pulley pressure control solenoid is used to control hydraulic pressure. The spool in the linear solenoid pushes the valve by duty cycle according to the current, and produces hydraulic pressure in proportion to the current. The CVT driven pulley pressure control solenoid measures current that passes through the linear solenoid and uses feedback control for the differential between measured current and a commanded value. If the measured current is not equal to the duty cycle command, a malfunction (open, short to ground, short to power on the plus terminal side of linear solenoid) is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	1 second
DTC Type	One drive cycle, MIL ON, D indicator blinks

Enable Conditions

Condition	
State of the engine	Running

Malfunction Threshold

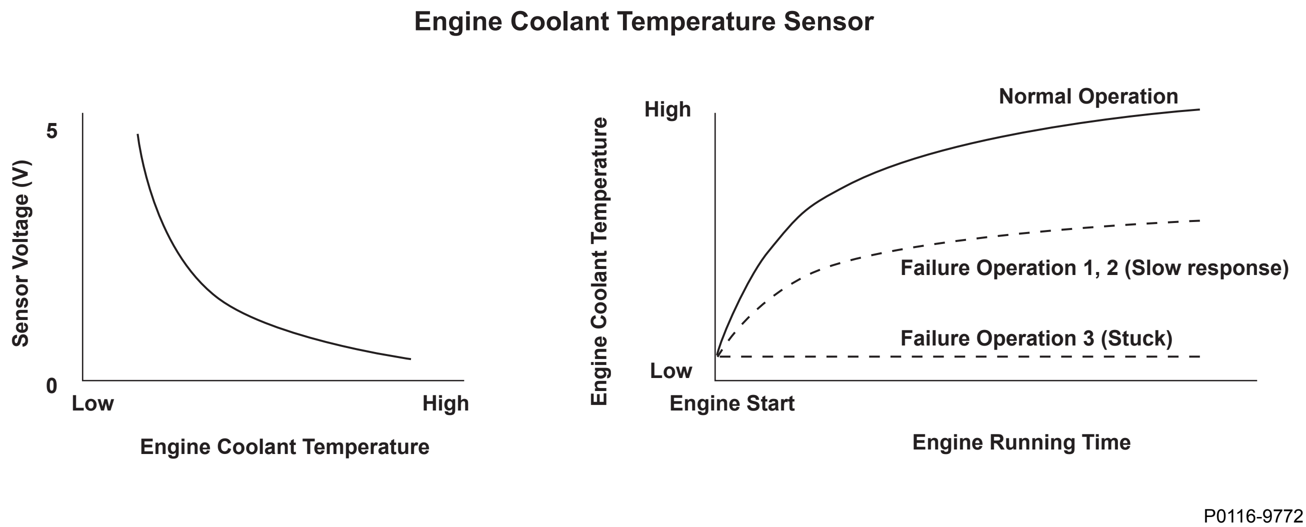
Measured current is not equal to the transmission control module (TCM) duty cycle command for at least 1 second.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL, the DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

DTC P0116: Engine Coolant Temperature (ECT) Sensor Circuit Range/ Performance Problem



General Description

The engine control module (ECM) supplies voltage to the engine coolant temperature (ECT) signal circuit (about 5 V) through a pull-up resistor. As the engine coolant cools, the ECT sensor resistance increases, and the ECM detects a high signal voltage. As the engine coolant warms, the ECT sensor resistance decreases, and the ECM detects a low signal voltage. The ECM detects a malfunction if either of these conditions is met.

Malfunction determination 1, 2: Slow response
If the ECT output voltage does not reach a specified temperature at which the closed-loop control for stoichiometric air/fuel ratio starts within a predetermined time period depending on the initial coolant temperature after starting the engine, the ECM detects a malfunction and a DTC is stored.

Malfunction determination 3: Stuck
If the change of the ECT output voltage within a set time period after starting the engine is less than a specified value, the ECM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	1,200 seconds or less
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Malfunction determination 1 (slow response)

Condition	Minimum	Maximum
Initial engine coolant temperature	20ºF (-7ºC)	50ºF (10ºC)
Initial intake air temperature	20ºF (-7ºC)	—
Fuel feedback	Other than fuel cut-off operation	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, MAP, CKP, ECT, TP, IAT, EGR, BARO, IAC, VTEC System, Fuel System	
Other	Other than while the auto idle stop system is in operation	

Malfunction determination 2 (slow response)

<table>
<tr><th colspan="3">Condition</th><th>Minimum</th><th>Maximum</th></tr>
<tr><td colspan="2">Initial engine coolant temperature</td><td>A*</td><td>—</td><td>19ºF (-7ºC)</td></tr>
<tr><td colspan="2" rowspan="2">Initial engine coolant temperature and initial intake air temperature</td><td rowspan="2">B*</td><td rowspan="2">—</td><td>50ºF (10ºC)**</td></tr>
<tr><td>19ºF (-7ºC)***</td></tr>
<tr><td rowspan="3">MAP value</td><td colspan="2">800 rpm</td><td>101 kPa (760 mmHg, 30.0 in.Hg)</td><td rowspan="3">—</td></tr>
<tr><td colspan="2" rowspan="2">1,500 rpm</td><td>32 kPa (240 mmHg, 9.5 in.Hg)*1</td></tr>
<tr><td>34 kPa (250 mmHg, 9.9 in.Hg)*2</td></tr>
<tr><td colspan="3">Fuel feedback</td><td colspan="2">Other than fuel cut-off operation</td></tr>
<tr><td colspan="3">No active DTCs</td><td colspan="2">ECM, A/F Sensor, A/F Sensor Heater, MAP, CKP, ECT, TP, IAT, EGR, BARO, IAC, VTEC System, Fuel System</td></tr>
<tr><td colspan="3">Other</td><td colspan="2">Other than while the auto idle stop system is in operation</td></tr>
</table>

* : Either A or B must be met.
** : Initial engine coolant temperature.
*** : Initial intake air temperature.
*1: CVT
*2: M/T

Enable Conditions (cont'd)

Malfunction determination 3 (stuck)

Condition		Minimum	Maximum
Initial engine coolant temperature****	C	—	19ºF (-7ºC)
	D	50ºF (10ºC)	68ºF (20ºC)
Initial intake air temperature	E	—	19ºF (-7ºC)
MAP value	800 rpm	—	101 kPa (760 mmHg, 29.9 in.Hg)
	1,500 rpm		31 kPa (240 mmHg, 9.4 in.Hg)*[1]
			33 kPa (250 mmHg, 9.8 in.Hg)*[2]
Fuel feedback		Other than fuel cut-off operation	
No active DTCs		ECM, A/F Sensor, A/F Sensor Heater, MAP, CKP, ECT, TP, IAT, EGR, BARO, IAC, VTEC System, Fuel System	
Other		Other than while the auto idle stop system is in operation	

**** : Any of conditions C, D and E must be met.

Malfunction Threshold

Malfunction determination 1 (slow response):
The engine running time until the engine coolant temperature reaches 50ºF (10ºC) is as shown in the table.
MAP value is 80 kPa (600 mmHg, 23.7 in.Hg) at an engine speed of 800 rpm.

Initial engine coolant temperature	19ºF (-7ºC)	41ºF (5ºC)
Engine running time	180 seconds or more	90 seconds or more

MAP value is 33 kPa (250 mmHg, 9.8 in.Hg) at an engine speed of 1,500 rpm.

Initial engine coolant temperature	19ºF (-7ºC)	41ºF (5ºC)
Engine running time	130 seconds or more	80 seconds or more

Malfunction determination 2 (slow response):
The ECT sensor output does not exceed an engine coolant temperature of 50ºF (10ºC) within 20 minutes.

Malfunction determination 3 (stuck):
The ECT sensor output does not vary by 60 mV or more within 20 minutes.

Driving Pattern

Start the engine at an engine coolant temperature and intake air temperature as specified under Enable Conditions, then let it idle until the engine coolant temperature reaches a set value or for at least 20 minutes.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected during the first drive cycle with the ECT and IAT at engine start-up within the specified temperature range, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle with the ECT and IAT at engine start-up within the specified temperature range, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL
The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.