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1.6L DTC Code to SPN:FMI Code Cross Reference

DTC Code	Description	SPN Code	FMI Code	DTC Code	Description	SPN Code	FMI Code
16	Crank Never Synced at Start	636	8	604	RAM Failure	630	12
91	Fuel Pump Low Voltage	94	4	606	COP Failure	629	31
92	Fuel Pump High Voltage	94	3	642	External 5V Reference Low	1079	4
107	MAP Low Voltage	106	4	643	External 5V Reference High	1079	3
108	MAP High Pressure	106	16	685	Power Relay Open	1485	5
111	IAT Higher Than Expected 1	105	15	686	Power Relay Shorted	1485	4
112	IAT Low Voltage	105	4	687	Power Relay Short to Power	1485	3
113	IAT High Voltage	105	3	1111	Fuel Rev Limit	515	16
116	ECT Higher Than Expected 1	110	15	1112	Sparl Rev Limit	515	0
117	ECT Low Voltage	110	4	1151	Closed Loop Multiplier High LPG	520206	0
118	ECT High Voltage	110	3	1152	Closed Loop Multiplier Low LPG	520206	1
121	TPS 1 Lower Than TPS 2	51	1	1155	Closed Loop Multiplier High Gasoline	520204	0
122	TPS 1 Signal Voltage Low	51	4	1156	Closed Loop Multiplier Low Gasoline	520204	1
123	TPS 1 Signal Voltage High	51	3	1161	Adaptive Learn High LPG	520202	0
127	IAT Higher Than Expected 2	105	0	1162	Adaptive Learn Low LPG	520202	1
129	BP Low Pressure	108	1	1165	LPG Cat Monitor	520213	10
134	EGO 1 Open/Inactive	724	10	1171	LPG Pressure Higher Than Expected	520260	0
154	EGO 2 Open/Inactive	520208	10	1172	LPG Pressure Lower Than Expected	520260	1
171	Adaptive Learn High Gasoline	520200	0	1173	EPR Comm Lost	520260	31
172	Adaptive Learn Low Gasoline	520200	1	1175	EPR Voltage Supply High	520260	3
182	Fuel Temp Gasoline Low Voltage	174	4	1175	EPR Voltage Supply Low	520260	4
183	Fuel Temp Gasoline High Voltage	174	3	1176	EPR Internal Actuator Fault	520260	12
187	Fuel Temp LPG Low Voltage	520240	4	1170	EPR Internal Circuitry Fault	520260	12
188	Fuel Temp LPG High Voltage	520240	3	1178	EPR Internal Comm Fault	520260	12
217	ECT Higher Than Expected 2	110	0	1612	RTI 1 loss	629	31
219	Max Govern Speed Override	515	15	1613	RTI 2 Loss	629	31
221	TPS 2 Signal Voltage Low	51	0	1614	RTI 3 Loss	629	31
222	TPS 2 Signal Low Voltage	520251	4	1615	A/D Loss	629	31
223	TPS 2 Signal High Voltage	520251	3	1616	Invalid Interupt	629	31
336	Crank Sync Noise	636	2	1626	CAN Tx Failure	639	12
337	Crank Loss	636	4	1627	CAN Rx Failure	639	12
420	Gasoline Cat Monitor	520211	10	1628	CAN Address Conflict Failure	639	13
524	Oil Pressure Low	100	1	2111	Unable to Reach Lower TPS	51	7
562	System Voltage Low	168	17	2112	Unable to Reach Higher TPS	51	7
563	System Voltage High	168	15	2229	BP Pressure High	108	0
601	Flash Checksum Invalid	628	13	1	L I		1







OBD System Check/ MIL (Malfunction Indicator Lamp)

Circuit Description

The Spectrum Fuel system is equipped with OBD (On-Board Diagnostics). The system has a dash mounted MIL (Malfunction Indicator Lamp) for the indication of system problems. Engine control system problems that affect exhaust emissions of the vehicle will set a DTC (Diagnostic Trouble Code). The ECM will then provide a path to ground and illuminate the MIL.

The MIL serves as notification of an emissions related problem. The MIL also has the ability to flash DTC codes in what is referred to the blink code mode. It will display DTC's that have been stored due to a system malfunction. The following DTC charts in this manual will instruct the technician to perform the OBD system check. This simply means to verify the operation of the MIL. The lamp should illuminate when the key is in the ON position, and the engine is not running. This feature verifies that the lamp is in proper working order. If the lamp does not come on with the vehicle key on/engine off, repair it as soon as possible. Once the engine is in start or run mode, the lamp should go off. If the lamp stays on while the engine is in the start or run mode, a current diagnostic trouble code may be set or a problem may exist with the MIL electrical wiring.





Step	Action	Value(s)	Yes	No
	Key ON Engine OFF		Go to Step (2)	Go to Step (3)
1	Does the MIL illuminate?			
	Start the engine		MIL is working	Go to Step (10)
2	Does the MIL lamp turn off?		properly. OBD	
2			System Check	
	Key ON engine OFF		is complete Go to Step (4)	Repair MIL
				voltage source.
	Check for voltage between MIL power source			
3	and engine ground			Refer to OEM
	Do you have voltage?			body and
				chassis wiring
				diagrams Go to Step (5)
	Replace MIL lamp		Go to step (1)	Go to Step (5)
4	Did that solve the problem?			
	·			
	Key OFF		Go to Step (6)	Go to Step (8)
	Disconnect ECM wire harness connector			,
-	C001			
5				
	 Using a DVOM check for continuity between 			
	MIL side of connector C011 and ECM pin 80			
	Do you have continuity?			
	 Do you have continuity? Inspect the MIL lamp socket, connector C011 		Repair the	Go to Step (7)
6	and ECM pin 80 for damage, corrosion or		circuit as	
	contamination		necessary.	
	Did you find a problem?		Refer to	
	Did you find a problem?		Wiring Repairs	
			- ·	
			in Engine	
	Replace ECM		Electrical. Go to Step (1)	-
7	Is the replacement complete?			
1	is the replacement complete:			
	Back probe both MIL and ECM side of		Co to Stop (0)	Repair open
			Go to Step (9)	
	terminal G in connector C011			circuit in
8	 Using a DVOM check for continuity through 			connector
	connector C011			C022
	Do you have continuity?			
	 Inspect the MIL lamp socket, connector C011 		Repair the	Repair the
1	and ECM terminal 80 for damage, corrosion		damaged	wire harness
	or contamination		socket or	open circuit
0				
9	Did you find a problem?		terminal as	as necessary.
			required.	Refer to
			Refer to	Wiring Repairs
			Wiring Repairs	in Engine
			in Engine	Electrical.
			Electrical.	
	Active DTC (Diagnostic trouble code) is stored in		-	-
10	memory. Proceed with DTC diagnosis. If no active			
	DTC is found in ECM memory return to this page			
	Step (11)			
L		I	1	

OBD System Check





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DIAGNOSTIC TROUBLE CODES 7-7

Step	Action	Value(s)	Yes	No
11	 Key OFF Disconnect ECM wire harness connector C001 Using a DVOM check for continuity between ECM terminal 80 and battery voltage Do you have continuity? 		Repair the shorted to ground circuit as necessary. Refer to Wiring Repairs in Engine Electrical.	Go to Step (7)





DTC 16-Never Crank Synced At Start SPN/FMI 636:8



Conditions for setting the DTC

- Crankshaft Position sensor
- Check Condition- Engine cranking
- Fault Condition- Cranking RPM above 90 and more than 4 cranking revolutions without sync
- MIL Command-ON

Circuit Description

The CKP (crankshaft position sensor) is a magnetic transducer mounted on the engine block adjacent to a pulse wheel located on the crankshaft. It determines crankshaft position by monitoring the pulse wheel. The Crankshaft Position sensor is used to measure engine RPM and its signal is used to synchronize the ignition and fuel systems. This fault will set one or more crank re-sync occur within 800 ms.





by IMPCO

	DIC 16- Never Crank Synce			
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes	
		-	Go to Step (2)	Go to OBD
				System Check
				Section
2	Check to be sure that the ECM ground		Go to Step (3)	Repair the
	terminals C014 and C023 are clean and tight.			circuit as
	Are terminals C014 and C023 clean and tight?			necessary.
	Ĭ			Refer to
				Wiring Repairs
				in Engine
				Electrical.
3	Key OFF	Over .5 volts	Go to Step (4)	Go to Step (11)
	Disconnect the CKP sensor connector C017			/
	Using a DVOM check for voltage output			
	directly from pins 1 & 2 from the CKP sensor			
	while cranking the engine			
	Do vou have voltage output?			
4	Key OFF		Go to Step (5)	Repair the
	Disconnect ECM connector C001			circuit as
	Using a DVOM check for continuity between CKP			necessary.
				Refer to
	connector pin 1 and ECM connector pin 21			Wiring Repairs
	Do you have continuity between them?			in Engine
				Electrical.
5	Using a DVOM check for continuity between CKP		Go to Step (6)	Repair the
-	connector pin 2 and ECM connector pin 22			circuit as
				necessary.
	Do you have continuity between them?			
				Refer to
				Wiring Repairs
				in Engine
6	I nonoct the CKD connector C017 nine for demose		Donoir tho	Electrical.
6	Inspect the CKP connector C017 pins for damage,		Repair the	Go to Step (7)
	corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
			Electrical. Repair the	
7	Inspect the ECM connector C001 pins 21 and 22			Go to step (8)
	for damage, corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
			Electrical.	
8	Using a DVOM check for continuity between ECM		Repair the	Go to Step (10)
	connector pins 21 and 22 to engine ground		shorted circuit	
	Do you have continuity?		as necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
9	Replace CKP sensor		Electrical. Go to Step (12)	_
Ŭ				
10	Is the replacement complete? • Replace ECM		Go to Step (12)	_
	Is the replacement complete?	L		DCI
	SPECTRUM			

DTC 16- Never Crank Synced At Start SPN/FMI 636:8

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DIAGNOSTIC TROUBLE CODES 7-10

Step	Action	Value(s)	Yes	No
11	 Key OFF Inspect the pulse wheel and CKP sensor for mechanical damage, corrosion or contamination. Did you find a problem? 		Repair the component as necessary. Refer to Engine Repairs in Engine Section	Go to Step (9)
12	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-16 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 91-Gasoline Fuel Pressure Sensor Low Voltage SPN/FMI 94:4



Conditions for Setting the DTC

- Gasoline fuel pressure sensor voltage
- Fuel pressure sensor voltage less than .2v for 1s
- MIL-On for active fault and for 2 seconds after active fault
- Adaptive-disabled for the remainder of key cycle

Circuit Description

Note: The fuel pressure and temperature sensor is wired via Equipment Manufacturer supplied harness jumper. The terminals A, B, C, D & 19, 20, 48, 54 are engine wiring harness terminals at the fuel sensor interface connector C002 and the ECM header connector C001. You may need to consult additional wiring information supplied by the OEM. The fuel pump pressure sensor voltage is read at less than .2v. This indicates abnormally low fuel pressure or a low voltage fault from the sensor or circuit.





DTC 91- Gasoline Fuel Pressure Sensor Low Voltage SPN/FMI 94:4

Step	Action	Value(s)	Yes	
1	Did you perform the On-Board (OBD) System		Go to Step (2)	Go to OBD
	Check?			System Check
				Section
2			Go to Step (3)	Intermittent
	 Key On, Engine running. 			problem
	DST (Diagnostic Scan Tool) connected in			Go to
	System Data Mode			Intermittent
	System Data Mode			section
	Using a DVOM, check for voltage at connector			
	C002 terminal D by back probing to ground. Is			
	voltage 0.2v or less with the engine idling?			
	Key OFF		Go to Step (4)	Go to step (8)
3				
3	 Disconnect the gasoline fuel pressure sensor jumper harness connector C002 from the 			
	engine wiring harness			
	• Key On			
	Using a DVOM, check for voltage between			
	connector C002 terminal C and ground.			
	Is voltage 4.5 volts or greater?			
			Densinths	Co to stop (E)
4	 Inspect fuel pressure and temperature sensor connector and pins for corrosion, 		Repair the circuit as	Go to step (5)
	contamination or mechanical damage. Check		necessary.	
	for opens or shorts in OEM supplied jumper		Refer to	
	harness to sensor		Wiring	
			Repairs	
	Any problems found?		in Engine	
5	Key OFF		Electrical. Go to Step (6)	Repair the
	Disconnect ECM connector C001			circuit as
	Check for continuity between gasoline			necessary.
	pressure sensor connector terminal D and			Refer to
	ECM pin 54.			Wiring
	Do you have continuity between them?			Repairs
	,			in Engine
6	Check for continuity between fuel pressure		Go to step (7)	Electrical. Repair the
	sensor connector terminal C and ECM pin 19			circuit as
				necessary.
	De you have continuity between them?			Refer to
	Do you have continuity between them?			Wiring
				Repairs
				in Engine
		1	1	





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DIAGNOSTIC TROUBLE CODES 7-13

Step	Action	Value(s)	Yes	No
7	Check for continuity between fuel pressure		Go to step	Repair the
	sensor connector terminal A and ECM pin 20		(11)	circuit as
				necessary.
	Do you have continuity between them?			Refer to
				Wiring
				Repairs
				in Engine
				Electrical.
8	Key Off		Go to Step (9)	Repair the
	Disconnect ECM header connector C001			circuit as
	Check for continuity between pressure			necessary.
	sensor connector C002 terminal C and ECM			Refer to
	connector terminal 19.			Wiring
				Repairs
				in Engine
	Do you have continuity?			Electrical. Go to Step
9	Inspect ECM and gasoline pressure		Repair the	
	sensor connector (C002) terminals for		circuit as	(10)
	corrosion, contamination or mechanical		necessary.	
	damage		Refer to	
	Any problems found?		Wiring	
			Repairs	
			in Engine	
- 10			Electrical.	
10	Replace ECM. Refer to ECM replacement		Go to step	-
	in the Engine Controls Section.		(12)	
	Is the replacement complete?			
11	Replace fuel pressure and temperature		Go to step	-
	sensor		(12)	
	Is the replacement complete?			
12	Remove all test equipment except the DST.		System OK	Go to OBD
	Connect any disconnected components,			System Check
	fuses, etc.			
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	• Start the engine and operate the vehicle to full			
	operating temperature			
	Cheerice the Mill			
	Observe the MIL Observe angline performance and drives bility			
	Observe engine performance and driveability			
	• After operating the engine within the test			
	parameters of DTC-91 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			
			l	





DTC 92-Gasoline Fuel Pressure Sensor High Voltage SPN/FMI 94:3



Conditions for Setting the DTC

- Gasoline fuel pressure sensor voltage
- Fuel pressure sensor voltage greater than 4.8v for 1s
- MIL-On for active fault and for 2 seconds after active fault
- Adaptive-disabled for the remainder of key cycle

Circuit Description

Note: The fuel pressure and temperature sensor is wired via Equipment Manufacturer supplied harness jumper. The terminals A, B, C, D & 19, 20, 48, 54 are engine wiring harness terminals at the fuel sensor interface connector C002 and the ECM header connector C001. You may need to consult additional wiring information supplied by the OEM. The fuel pressure sensor voltage is read at greater than 4.8v. This indicates abnormally high fuel pressure or a high voltage fault from the sensor or circuit.





L	DTC 92- Gasoline Fuel Pressure	Sensor	High Voltag	ge SPN/FI
Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System	-	Go to Step (2)	Go to OBD
	Check?			System Check
2				Section
Ζ			Go to Step (3)	Intermittent
	Key On, Engine running.			problem
	DST (Diagnostic Scan Tool) connected in			Go to
	System Data Mode			Intermittent
				section
	Using a DVOM, check for voltage at connector			
	C002 terminal D by back probing to ground. Is			
	voltage 4.8v or higher with the engine idling?			
	Key OFF		Go to Step (4)	Go to step (8)
3	Disconnect the gasoline fuel pressure sensor			
	jumper harness connector C002 from the			
	engine wiring harness			
	Key On			
	• Using a DVOM, check for voltage between			
	connector C002 terminals C and A.			
	Is voltage 4.5 volts or greater?			
_	Inspect fuel pressure and temperature		Repair the	Go to step (5)
	sensor connector and pins for corrosion,		circuit as	
	contamination or mechanical damage. Check		necessary.	
	for opens or shorts in OEM supplied jumper		Refer to	
	harness to sensor		Wiring	
	Any problems found?		Repairs	
			in Engine	
			Electrical.	Densir the
5	Key OFF		Go to Step (6)	Repair the
	Disconnect ECM connector C001			circuit as
	Check for continuity between gasoline			necessary.
	pressure sensor connector terminal D and			Refer to
	ECM pin 54.			Wiring
	Do you have continuity between them?			Repairs
				in Engine Electrical.
3	Check for continuity between fuel pressure		Go to step (7)	Repair the
	sensor connector terminal C and ECM pin 19			circuit as
				necessary.
	Do you have continuity between them?			Refer to
				Wiring
				Repairs
				in Engine





Step	Action	Value(s)	Yes	No
7	Check for continuity between fuel pressure	(- /	Go to step	Repair the
	sensor connector terminal A and ECM pin 20		(11)	circuit as
				necessary. Refer to
	Do you have continuity between them?			Wiring
				Repairs
				in Engine
				Electrical.
8	Key Off		Go to Step (9)	Repair the
	Disconnect ECM header connector C001			circuit as
	Check for continuity between pressure			necessary. Refer to
	sensor connector C002 terminal A and ECM			Wiring
	connector terminal 20.			Repairs
				in Engine
	Do you have continuity?		Densinths	Electrical. Go to Step
9	 Inspect ECM and gasoline pressure sensor connector (C002) terminals for 		Repair the circuit as	(10)
	corrosion, contamination or mechanical		necessary.	(10)
	damage		Refer to	
	Any problems found?		Wiring	
			Repairs	
			in Engine	
10	Replace ECM. Refer to ECM replacement		Electrical. Go to step	
10	in the Engine Controls Section.		(12)	
	Is the replacement complete?			
	n n n n n n n n n n n n n n n n n n n			
11	Replace fuel pressure and temperature		Go to step	-
	sensor		(12)	
	Is the replacement complete?			
12	Remove all test equipment except the DST.		System OK	Go to OBD
	Connect any disconnected components,			System Check
	fuses, etc.			
	Using the DST clear DTC information from the			
	ECM.Turn the ignition OFF and wait 30 seconds.			
	 Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full 			
	operating temperature			
	 Observe the MIL Observe engine performance and driveability 			
	 After operating the engine within the test 			
	parameters of DTC-92 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 107- MAP Low Voltage SPN/FMI 106:4



Conditions for Setting the DTC

- Manifold Absolute Pressure Sensor
- Check Condition-Engine cranking or running
- Fault Condition-MAP voltage less than 0.05 with throttle position greater than 2% and engine RPM less than 7000.
- MIL-ON
- Adaptive-Disabled for the remainder of key on cycle
- Fueling is based on RPM and TPS Limp-Home Condition during this fault.

Circuit Description

The Manifold Absolute Pressure sensor is a pressure transducer connected to the intake manifold. It is used to measure the pressure of air in the manifold prior to induction. The pressure reading is used in conjunction with other inputs to estimate the airflow rate to the engine, which determines the fuel flow rate. This fault will set when the MAP reading is lower than the sensor should normally produce. When this fault is set the Adaptive Learn will be disabled for the remainder of the key on cycle and the MIL will be on.





Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System	-	Go to Step (2)	Go to OBD
	Check?	_	00 10 0160 (2)	System Check
	OTECK!			Section
2			Go to Step (3)	Intermittent
_	Key On, Engine running.		0010010000000	problem
				Go to
	DST (Diagnostic Scan Tool) connected in			Intermittent
	System Data Mode			section
				Section
	Does DST display MAP voltage of 0.05 or less			
	with the engine idling?			
	Key OFF		Go to Step (4)	Go to step (8)
3	Disconnect the TMAP sensor connector C007			
5	from the wiring harness			
	5			
	• Jump the 5 volt reference pin 3 and MAP			
	signal circuit pin 4 together			
	Key ON			
	Does the DST display MAP voltage of 4.5 volts or			
	greater?			
4	Inspect TMAP connector and pins for		Repair the	Go to step (5)
	corrosion, contamination or mechanical		circuit as	
	damage		necessary.	
	Any problems found?		Refer to	
			Wiring	
			Repairs	
			in Engine	
			Electrical.	
5	Key OFF		Go to Step (6)	Repair the
	Disconnect ECM connector C001		,	circuit as
	Check for continuity between TMAP sensor			necessary.
	connector signal pin 4 and ECM MAP signal			Refer to
				Wiring Repairs
	pin 7.			in Engine
	Do you have continuity between them?			Electrical.
6	Check for continuity between TMAP sensor		Go to step (7)	Repair the
	connector 5 volt supply signal pin 3 and ECM		···· ·· · · · · · · · · · · · · · · ·	circuit as
	5 volt supply pin 19			necessary.
	Do you have continuity between them?			Refer to
				Wiring Repairs
				in Engine
				Electrical.
		l		1

DTC 107- MAP Low Voltage SPN/FMI 106:4





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Step	Action	Value(s)	Yes	No
7	Check for continuity between TMAP sensor		Go to step	Repair the
	connector ground pin 1 and ECM sensor		(17)	circuit as
	ground pin 20		()	necessary.
	Do you have continuity between them?			Refer to
	be yea have continuity between them.			Wiring Repairs
				in Engine
8	Probe MAP connector signal circuit pin 4 with		Go to Step (9)	Electrical. Go to step (13)
	a test light connected to battery voltage			
	Does the DST display MAP voltage of 4.0 or			
	greater?			
9	Key OFF		Go to step	Repair the
Ŭ	Disconnect ECM connector		(10)	circuit as
			(,	necessary.
	Check for continuity between TMAP sensor			Refer to
	connector pin 3 and ECM 5 volt reference pin			Wiring Repairs
	19.			in Engine
	Do you have continuity between them?			Electrical.
10	Check for continuity between TMAP sensor		Repair the	Go to Step
	connector 5 volt reference pin 3 and engine		circuit as	(11)
	ground		necessary.	
	Do you have continuity?		Refer to	
			Wiring	
			Repairs	
			in Engine	
11	Inspect ECM and TMAP wire harness		Electrical. Repair the	Go to Step
	connector and terminals for corrosion,		circuit as	(16)
	contamination or mechanical damage		necessary.	(10)
	Any problems found?		Refer to	
	Any problems round?		Wiring	
			Repairs	
			in Engine	
			Electrical.	
12	 Replace ECM. Refer to ECM replacement 		Go to step	-
	in the Engine Controls Section.		(17)	
	Is the replacement complete?			
13	Disconnect ECM connector		Go to Step	Repair the
	Check for continuity between TMAP sensor		(14)	circuit as
	connector signal circuit pin 4 and ECM signal			necessary.
	pin 7			Refer to
				Wiring Repairs
	Do you have continuity between them?			in Engine
				Electrical.





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DIAGNOSTIC TROUBLE CODES 7-20

Step	Action	Value(s)	Yes	No
14	 Check for continuity between TMAP sensor connector signal pin 4 and engine ground Do you have continuity? Inspect ECM connector and wire harness 		Repair the circuit as necessary. Refer to Wiring Repairs in Engine <u>Electrical.</u> Repair the	Go to step (15) Go to Step
13	Connector terminals for corrosion, contamination or mechanical damage Any problems found?		circuit as necessary. Refer to Wiring Repairs in Engine Electrical.	(16)
16	 Replace ECM. Refer to ECM replacement in the Engine Controls Section. Is the replacement complete? 		Go to Step (18)	-
17	Replace TMAP sensor Is the replacement complete?		Go to step (18)	-
18	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-107 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 108-MAP High Pressure SPN/FMI 106:16



Conditions for Setting the DTC

- Barometric pressure check •
- •
- Check condition-engine running and greater than 1800 RPM Fault Condition-MAP greater than 16 psia withTPS less than 10% and RPM greater than 1800 •
- MIL-On for active fault and for 4 seconds after active fault
- Adaptive-disabled for the remainder of key cycle •

Circuit Description

The MAP (Manifold Absolute Pressure) is estimated from the TMAP sensor. The MAP pressure value is used for fuel, airflow and spark calculations. This fault will set in the event the MAP value is greater than 16 psia when the TPS is less than 10% with engine speed greater than 1800.





Step	Action	Value(s)	Yes	No
1	Action Did you perform the On-Board (OBD) System	<u>- value(s)</u>	Go to Step (2)	Go to OBD
	Check?			System Check
				Section
2			Go to step (3)	Intermittent
	Key On, Engine running at full operating			problem
	temperature.			Go to
	DST (Diagnostic Scan Tool) connected in			Intermittent
	· · · · · · · · · · · · · · · · · · ·			section
	System Data Mode			
	Does DST display MAP pressure of 17.0 psia or			
	greater with the engine running above 1800 RPM?			
	Key OFF		Go to step (4)	Go to step (6)
3	Disconnect the TMAP sensor connector C007			
	Key ON			
	Does the DST display MAP pressure less than 0.05			
	 psia? Probe TMAP connector ground pin 1 with a test light connected to battery voltage 		Go to step (5)	Go to step (8)
	light connected to battery voltage.			/
4				
4 5	 Does the test light come on? Check TMAP mechanical vacuum connection for 		Go to step (6)	Go to Step
	correct mounting or possible damage causing			(10)
	leakage.			~ /
	Is the TMAP_sensor mechanical connection Ok?			
	Key OFF		Go to step (7)	Repair the
6	Disconnect ECM connector and inspect			circuit as
	terminals for damage corrosion or contamination.			necessary.
	Is the connection Ok?			Refer to
				Wiring Repairs
				in Engine
				Electrical.
7	Replace TMAP sensor. Is the repair complete?			-
			Go to step (11)	
8	Disconnect ECM connector and check for		Go to step (9)	Repair the
	continuity between TMAP connector sensor			circuit as
	ground pin 1 and ECM sensor ground pin 20.			necessary.
	Do you have continuity between them?			Refer to
				Wiring Repairs
				in Engine
				Electrical.
9	Replace ECM. Refer to ECM replacement in the		Go to step (11)	-
	Engine Controls Section.			
	Is the replacement complete? Correct TMAP mechanical connection			
10	Correct TMAP mechanical connection		System OK	Go to OBD
				System Check
	Has the TMAP mechanical connection problem been			
	corrected?			





DTC 111-IAT Higher Than Expected 1 SPN/FMI 105:15



Conditions for Setting the DTC

- Intake Air Temperature
- Check Condition-Engine Running
- Fault Condition-Intake Air Temperature greater than 200 degrees F. and engine RPM greater than 1000 for more than 60 seconds
- MIL-On
- Adaptive-Disabled during active fault
- Power Derate (Level 1)

Circuit Description

The TMAP is a combined IAT (Intake Air Temperature) and MAP (Manifold Absolute Pressure) sensor. A temperature sensitive resistor is used in the TMAP located in the intake manifold of the engine. It is used to monitor incoming air temperature, and the output in conjunction with other sensors is used to determine the airflow to the engine. The ECM provides a voltage divider circuit so that when the air is cool, the signal reads higher voltage, and lower when warm. The IAT is a calculated value based mainly on the IAT sensor at high airflow, and influenced more by the ECT (Engine Coolant Temperature) at low airflow. This fault will set if the Intake Air Temperature is greater than 200 degrees F. and engine rpm is greater than 1000 for more than 60 seconds. Power derate level one will be enforced during this fault limiting the maximum throttle position to50%.

Diagnostic Aid

* This fault will set when inlet air is much hotter than normal. The most common cause of high inlet air temperature is a problem with the inlet air system. Ensure that the air inlet is not obstructed, modified or damaged.

* Inspect the air inlet system for cracks or breaks that may allow unwanted under hood air in to the air inlet system.





DTC 111-IAT Higher Than Expected 1 SPN/FMI 105:15

This fault will set when inlet air is much hotter than normal. The most common cause of high inlet air temperature is a problem with the inlet air system. Ensure that the air inlet is not obstructed, modified or damaged.

- Inspect the air inlet system for cracks or breaks that may allow unwanted under hood air in to the air inlet system
- Use the chart below to check resistance accross pins 1 and 2 at TMAP sensor and compare resistance to air temperature.
- If none of the above can be found, Follow the diagnostic steps for DTC 112-IAT Low Voltage

Temp (° F)	Ohms
248	110
239	125
221	162
203	214
185	284
167	383
149	522
131	721
104	1,200
77	2,063
50	3,791
23	7,419
-4	15,614
-22	26,854
-31	35,763
-40	48,153







DTC 112-IAT Low Voltage SPN/FMI 105:4

Conditions for Setting the DTC

- Intake Air Temperature
- Check Condition Engine Cranking or Running
- Fault Condition-IAT Sensor Voltage less than 0.05 for greater than 1 second
- MIL-On during active fault and for 2 seconds after active fault
- Adaptive-Disabled during active fault

Circuit Description

The TMAP is a combined IAT (Intake Air Temperature) and MAP (Manifold Absolute Pressure) sensor. A temperature sensitive resistor is used in the TMAP located in the intake manifold of the engine. It is used to monitor incoming air temperature, and the output in conjunction with other sensors is used to determine the airflow to the engine. The ECM provides a voltage divider circuit so that when the air is cool, the signal reads higher voltage, and lower when warm.

The IAT is a calculated value based mainly on the IAT sensor at high airflow, and influenced more by the ECT (Engine Coolant Temperature) at low airflow. This fault will set if the signal voltage is less than 0.05 volts for 1 second anytime the engine is cranking or running. The ECM will use the default value for the IAT sensor in the event of this fault.





Step	Action	Value(s)	Yes	No
1	Action Did you perform the On-Board (OBD) System		Yes Go to Step	No Go to OBD
	Check?		(2)	System
				Check
				Section Intermittent
2			Go to step	
	Key On		(3)	problem
	DST (Diagnostic Scan Tool) connected in			Go to
	System Data Mode			Intermittent
				section
	 Does DST display IAT voltage of 0.05 or less? Key Off 		Go to step	Go to step
3	 Disconnect the TMAP sensor connector 		(4)	(5)
5	C007			(-)
	Key ON			
	Does the DST display IAT voltage of 4.9 volts			
	or greater?			
4	Replace TMAP sensor.		Go to Step	_
	Is the replacement complete?		(9)	
	Key OFF		Repair the	Go to step
5	 Disconnect ECM wire harness connector 		circuit as	(6)
Ĭ	C001		necessary.	. ,
	 Check for continuity between TMAP sensor 		Refer to	
	connector ground pin 1 and TMAP sensor		Wiring	
	connector signal pin 2		Repairs	
	Do you have continuity between them?		in Engine	
	5		Electrical.	
6	Check for continuity between TMAP		Demointh	Go to step
	sensor connector signal circuit pin 2		Repair the	(7)
	and engine ground.		circuit as	
	Do you have continuity?		necessary.	
			Refer to	
			Wiring	
			Repairs	
			in Engine	
			Electrical.	
7	Replace ECM. Refer to ECM		Go to step	
.	replacement in the Engine Controls	—	(8)	-
	Section.			
	Is the replacement complete?			
L			L	J

DTC 112- IAT VOLTAGE LOW SPN/FMI 105:4





01			No	
Step 8	 Action Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-112 check for any stored codes. Does the engine operate normally with no stored codes? 	Value(s)	Yes System OK	No Go to OBD System Check





DTC 113-IAT High Voltage SPN/FMI 105:3



Conditions for Setting the DTC

- Intake Air Temperature
- Check Condition-Engine Running
- Fault Condition-IAT Sensor Voltage greater than 4.95 for more than 1 second
- MIL-On during active fault and for 2 seconds after active fault
- Adaptive-Disabled during active fault

Circuit Description

The TMAP is a combined IAT (Intake Air Temperature) and MAP (Manifold Absolute Pressure) sensor. A temperature sensitive resistor is used in the TMAP located in the intake manifold of the engine. It is used to monitor incoming air temperature, and the output in conjunction with other sensors is used to determine the airflow to the engine. The ECM provides a voltage divider circuit so that when the air is cool, the signal reads higher voltage, and lower when warm.

The IAT is a calculated value based mainly on the IAT sensor at high airflow, and influenced more by the ECT (Engine Coolant Temperature) at low airflow. This fault will set if the signal voltage is greater than 4.95 volts for more than 1 second anytime the engine is running. The ECM will use a default value for the IAT sensor in the event of this fault.





Ston		Value(s)		
<u>Step</u>	Action Did you perform the On-Board (OBD) System Check?		Yes Go to Step (2)	Go to OBD
				System Check
				Section
2			Go to step (3)	Intermittent
	Key On			problem
	DST (Diagnostic Scan Tool) connected in			Go to
	System Data Mode			Intermittent
				section
	 Does DST display IAT voltage of 4.95 or greater? Key Off 		Go to step (9)	Go to step (4)
3	Disconnect the TMAP sensor connector C007			
5	and jump pins 1 and 2 together			
	Does the DST display IAT voltage of 0.1 volts or less?			
	Key OFF		Go to Step (7)	Go to Step (6)
	Jumper TMAP sensor connector signal pin 2 to			
4	engine ground			
	Key ON			
	 Does DST display IAT voltage of 0.1 volts or 			
5	less? Replace TMAP sensor.		Co to Stop (11)	
5	•		Go to Step (11)	—
	 Is the replacement complete? Key OFF 		Go to step (10)	Repair the
6	Disconnect the ECM wire harness connector			circuit as
Ŭ	C001.			necessary.
	Check for continuity between TMAP sensor			Refer to
	connector signal pin 2 and ECM IAT signal pin 39			Wiring Repairs
				in Engine
	Do you have continuity between them?			Electrical.
7	Check for continuity between TMAP sensor			Repair the
	connector ground circuit pin 1 and ECM		Go to step (10)	circuit as
	sensor ground circuit pin 20			necessary.
	Do you have continuity between them?			Refer to
				Wiring Repairs
				in Engine
8	Replace ECM.		Go to step (11)	Electrical.
	Refer to ECM replacement in the Engine Controls	_	r \ -7	_
	Section.			
9	 Is the replacement complete? Re-check wire harness and TMAP sensor 		Repair the	Go to Step (5)
	connector for damage corrosion or contamination		circuit as	
	Any problems found?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
			Electrical	

DTC 113- IAT VOLTAGE HIGH SPN/FMI 105:3





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DIAGNOSTIC TROUBLE CODES 7-30

Step	Action	Value(s)	Yes	No
10	Re-check wire harness and TMAP sensor connectors for damage corrosion or contamination Any problems found?	Value(S)	Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical	Go to Step (8)
11	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-113 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 116-ECT Higher Than Expected 1 SPN/FMI 110:15



Conditions for Setting the DTC

- Engine Coolant Temperature
- Check Condition-Engine Running
- Fault Condition-Engine Coolant Temperature reading or estimate greater than 215 degrees F. for greater than 5 seconds
- MIL-On
- Power derate (level 1)
- Adaptive-Disabled during active fault

Circuit Description

The ECT (Engine Coolant Temperature) sensor is a temperature sensitive resistor located in the engine coolant. sensor that is located in the coolant passage. The ECT is used for engine airflow calculation, fuel enrichment, ignition timing control and to enable certain other temperature dependant operations. This code set is designed to help prevent engine damage from overheating. The ECM provides a voltage divider circuit so when the sensor reading is cool the sensor reads higher voltage, and lower when warm. This fault will set when the coolant exceeds 225 degrees F. for more than 5 seconds with the engine speed over 600 rpm. Power derate level one will be enforced during this fault limiting the maximum throttle position to 50%.





Warm Engine to normal operating temperature,

Does DST display ECT temperature of 225 degrees <u>F. or greater with the engine running over 1200 rpm?</u> • Verify with a temperature gauge that the

engine coolant is over 225 degrees F.

Does the temperature gauge indicate 225 degrees F. or greater? Verify ECT circuit function. Follow diagnostic test

procedure for DTC117 ECT Low Voltage

then run the engine above 1200 rpm for at least

•

3

4

60 seconds

Intermittent

Go to step (4)

_

section

Repair Cooling

system.

_

	DTC 116- ECT HIGHER THAN E	EXPECTE	0 1 SPN/FI	MI 110:15
Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	- ` `	Go to Step (2)	Go to OBD
				System Check
				Section
2	Key On		Go to Step (3)	Intermittent
	DST (Diagnostic Scan Tool) connected in			problem
	System Data Mode			Go to

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DTC 117-ECT Low Voltage SPN/FMI 110:4



Conditions for Setting the DTC

- Engine Coolant Temperature
- Check Condition-Engine Running
- Fault Condition- ECT sensor voltage less than 0.05
- MIL-On during active fault and for 2 seconds after active fault
- Adaptive-Disabled during active fault

Circuit Description

The ECT (Engine Coolant Temperature) sensor is a temperature sensitive resistor located in the engine coolant passage. It is used for the engine airflow calculation, gasoline cold enrichment and to enable other temperature dependant features. The ECM provides a voltage divider circuit so that when the coolant is cool, the signal reads higher voltage, and lower when warm. This fault will set if the signal voltage is less than 0.05 volts anytime the engine is running. The ECM will use a default value for the ECT sensor in the event of this fault.

Temp (°F)	Ohms
242	101
231.9	121
211.6	175
201.4	209
181.9	302
163.1	434
144.9	625
127.4	901
102.4	1,556
78.9	2,689
49.9	5,576
23.5	11,562
-5.7	28,770
-21.7	49,715
-30.8	71,589
-40	99,301





DTC 117- ECT VOLTAGE LOW SPN/FMI 110:4

Ctore				
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Go to Step (2)	No Go to OBD
		_		System Check Section
2	 Key On DST (Diagnostic Scan Tool) connected in System Data Mode Does DST display ECT voltage of 0.05 or less? 		Go to step (3)	Intermittent problem Go to Intermittent section
3	 Key Off Disconnect the ECT wire harness connector Key ON Does the DST display ECT voltage of 4.9 volts or greater? 		Go to step (4)	Go to step (5)
4	Replace ECT sensor. Is the replacement complete?		Go to Step (8)	_
5	 Key OFF Disconnect ECM wire harness connector Check for continuity between ECT sensor connector signal pin A and ECT sensor ground pin B Do you have continuity between them? 		Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.	Go to step (6)
6	 Check for continuity between ECT sensor connector signal circuit pin A and engine ground. Do you have continuity? 		Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.	Go to step (7)
7	Replace ECM. Refer to ECM replacement in the Engine Controls Section.	_	Go to step (8)	-
8	 Is the replacement complete? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-117 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 118-ECTHigh Voltage SPN/FMI 110:3



Conditions for Setting the DTC

- Engine Coolant Temperature
- Check Condition-Engine Running
- Fault Condition-ECT sensor voltage exceeds 4.95 volts for greater than 1 second
- MIL-On during active fault and for 2 seconds after active fault
- Adaptive-Disabled during active fault

Circuit Description

The ECT (Engine Coolant Temperature) sensor is a temperature sensitive resistor located in the engine coolant passage. It is used for the engine airflow calculation, gasoline cold enrichment and to enable other temperature dependant features. The ECM provides a voltage divider circuit so that when the coolant is cool, the signal reads higher voltage, and lower when warm. This fault will set if the signal voltage is greater than 4.95 volts for one second anytime the engine is running. The ECM will use a default value for the ECT sensor in the event of this fault.

Temp	Ohms	
(° F)		
242.4	101	
231.9	131	
211.6	175	
201.4	209	
181.9	302	
163.1	434	
144.9	625	
127.4	901	
102.4	1,556	
78.9	2,689	
49.9	5,576	
23.5	11,562	
-5.7	28,770	
-21.2	49,715	
-30.8	71,589	
-40.0	99,301	





DTC 118- ECT VOLTAGE HIGH SPN/FMI 110:3

	DTC 118- ECT VOLTAGE			
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to step (2)	Go to OBD
				System Check
				Section Intermittent
2			Go to step (3)	
	Key On			problem
				Go to
				Intermittent
	Data Mode			section
	Does DST display ECT voltage of 4.95 or greater?			Section
	Key Off		Go to step (4)	Go to Step (8)
3	Disconnect the ECT sensor connector C008 and			
5				
	Jump terminals A and B together			
	Key On			
	Does the DST display ECT voltage of 0.05 volts or			
	less?			
4	Using a DVOM check the resistance between the	See	Go to step (6)	Go to step (5)
	two terminals of the ECT sensor and compare the	resistance		/
	resistance reading to the chart	chart vs.		
	Is the resistance value correct?	temperature		
		in the DTC		
		118 circuit		
		description		
5	Replace ECT sensor		Go to step (14)	-
	 Is the replacement complete? Inspect the ECT wire harness connector terminals 			
6			Repair the	Go to step (7)
	A and B for damage, corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
7	Key OFF		Electrical. Repair the	Intermittent
'			circuit as	problem
	Inspect ECM connector pins 20 and 40 for		necessary.	Go to
	damage corrosion or contamination		Refer to	Intermittent
	Did you find a problem?		Wiring Repairs	section
			in Engine	
			Electrical.	
8	Jumper the ECT signal pin A at the ECT		Go to step (9)	Go to step (12)
	connector to engine ground			
	Does DST display ECT voltage of 0.05 or less?			
9	● Key OFF		Go to step (10)	Repair the
				circuit as
				necessary.
	Using a DVOM check for continuity between ECT			5
	sensor ground pin B and ECM connector pin 20			Refer to
	Do you have continuity between them?			Wiring Repairs
				in Engine
10			Densinths	Electrical.
10	Inspect ECM connector pins 20 and 40 for		Repair the	Go to Step (11)
	damage, corrosion or contamination		circuit as	
			necessary.	
	Did you find a problem?		Refer to	
			Wiring Repairs	
			in Engine	
	1		Electrical.	




Step	Action	Value(s)	Yes	No
11	Replace ECM		Go to step (14)	-
10	Is the replacement complete?			
12	Key OFF		Go to step (13)	Repair the
	Disconnect ECM wire harness connector			circuit as
	Using A DVOM check for continuity between			necessary.
	ECT connector signal pin A and ECM connector			Refer to
	terminal 40			Wiring Repairs
	Do you have continuity between them?			in Engine
10	Increase FCM compositor pipe 20 and 40 for		Densinthe	Electrical.
13	Inspect ECM connector pins 20 and 40 for		Repair the	Go to Step (11)
	damage, corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
	Remove all test equipment except the DST.		Electrical. System OK	Go to OBD
14	 Connect any disconnected components, fuses, 			System Check
14	etc.			System Check
	 Using the DST clear DTC information from the ECM. 			
	 Turn the ignition OFF and wait 30 seconds. 			
	 Start the engine and operate the vehicle to full 			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-118 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 121-TPS 1 Lower Than TPS 2 SPN/FMI 51:1



Conditions for Setting the DTC

- Throttle Position Sensor 1 & 2
- Check Condition-Key On
- Fault Condition-TPS 1 20% lower than TPS 2
- MIL-On for remainder of key on cycle
- Power Derate 1

Circuit description

There are two Throttle Position Sensors located within the throttle which use variable resistors to determine signal voltage based on throttle plate position. TPS 1 will read low voltage when closed and TPS 2 will read high voltage when closed. The TPS 1 and TPS 2 percentages are calculated from these voltages. Although the voltages are different, the calculated values for the throttle position percentages should be very close to the same. The TPS values are used by the ECM to determine if the throttle is opening as commanded.

This fault will set if TPS 1 is 20% (or more) lower than TPS 2. At this point the throttle is considered to be out of specification, or there is a problem with the TPS signal circuit. Power derate 1 will be enforced limiting the throttle to 50% maximum. Low rev limit and forced idle will also be enforced during this fault.





Cton				No
<u>Step</u>	Action Did you perform the On-Board (OBD) System Check?	Value(s)	<u>Yes</u> Go to Step (2)	Go to OBD
				System Check
				Section
2	Key ON, Engine OFF		Go to Step (3)	Intermittent
	DST (Diagnostic Scan Tool) connected in			problem
	System Data Mode			Go to
				Intermittent
	Does the DST display more than a 20% difference			section
3	 between TPS 1 and TPS 2 voltage? Key OFF 		Go to Step (5)	Go to Step (4)
	Disconnect electronic throttle connector C025			
	Key ON			
	-			
	Change DST mode to DBW (drive by wire) test			
	mode			
	Is the voltage for TPS 1 less than 0.1 volts?			
4	Key OFF		Repair the	Go to Step (9)
	Disconnect ECM wiring harness connector C001		TPS 1 circuit	
	Key ON		shorted to	
	Using a DVOM check for voltage between ECM		voltage as	
	connector TPS 1 signal pin 5 and engine ground		necessary.	
	Do you have voltage?		Refer to	
			Wiring Repairs	
			in Engine	
5	Jump TPS 1 signal pin 6 to the 5 volt reference		Electrical. Go to Step (6)	Go to Step (8)
Ŭ	pin 3 at connector C025			
6	Does DST display TPS 1 voltage over 4.95 volts Inspect wire terminals at throttle connector for		Repair the	Go to Step (7)
	damage corrosion or contamination		circuit as	
	Any problems found?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
	Deplese the electropic Threttle		Electrical.	
7	Replace the electronic Throttle		Go to Step (12)	-
8	Is the replacement complete? • Key OFF		Go to Step (9)	Repair the
	 Disconnect ECM wire harness connector C001 			open circuit
				as necessary.
	Using a DVOM check for continuity between			Refer to
	throttle connector TPS 1 signal pin 6 and ECM			Wiring Repairs
	connector TPS 1 signal pin5			in Engine
	Do you have continuity between them?			Electrical.
9	Using a DVOM check for continuity between		Go to Step (10)	Repair the
	throttle connector signal ground pin 2 and ECM			open circuit
	connector signal ground pin 20			as necessary.
	Do you have continuity between them?			Refer to
				Wiring Repairs
				in Engine
				Electrical.





DIAGNOSTIC TROUBLE CODES 7-40

Step	Action	Value(s)	Yes	No
10	 Inspect ECM connector terminals for damage corrosion or contamination. Any problems found? 	<u>vanue(3)</u>	Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical	Go to Step (11)
11	Replace ECM		Go to Step (12)	-
12	 Is the replacement complete? Remove all test equipment except the DST. 		Svotom OK	
12	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-121 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 122-TPS 1 Signal Voltage Low SPN/FMI 51:4

Electronic Throttle			ECM
	4	PNK000HT 82	DBW +
	1	TAN/ORN 83	DBW -
	6	PP L/LT BLU 5	TPS 1 Signal
	2 .	BLKALTG RN 20	SensorGipind
	5		TPS 2 Signal
	3 C025	LTG RN/RED 19	<u>5 Volts</u>

Conditions for Setting the DTC

- Throttle Position Sensor 1
- Check Condition-Cranking or Running
- Fault Condition-TPS sensor voltage less than 0.20 for more than .50 seconds
- MIL-On during active fault
- Power Derate 1

Circuit Description

There are 2 Throttle Position Sensors located within the throttle which use variable resistors to determine signal voltage based on throttle plate position. TPS1 will read lower voltage when closed and TPS2 will read higher voltage when closed. The TPS1 and TPS2 percentages are calculated from these voltages. Although the voltages are different, the calculated values for the throttle position percentages should be very close to the same. The TPS values are used by the ECM to determine if the throttle is opening as commanded. The TPS is not serviceable and in the event of a failure the electronic throttle assembly must be replaced.

This fault will set if the TPS 1 voltage is less than 0.20 volts for more than .50 seconds. The MIL command in ON and power derate level 1 will be enforced limiting maximum throttle to 50%.





DTC 122 TPS 1 Signal Voltage Low SPN/FMI 51:4

Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD
				System Check Section
2	Key ON, Engine OFF		Go to Step (4)	Go to Step (3)
	DST (Diagnostic Scan Tool) connected in			
	DBW (Drive by Wire) throttle test mode			
	Does the DST display TPS 1 voltage of 0.20 volts or			
3	 less with the throttle closed? Slowly depress Foot Pedal while observing TPS 1 		Go to Step (4)	Intermittent
	voltage			problem
	Does TPS 1 voltage ever fall below 0.20 volts?			Go to
				Intermittent
4	Key OFF		Go to Step (7)	section Go to Step (5)
	Disconnect the electronic throttle connector C025			,
	• Jump the 5 volt reference circuit pin 3 and TPS			
	1 signal circuit pin 6 together at the throttle			
	connector			
	Key ON			
	Does DST display TPS 1voltage of 4.0 volts or			
5	greater? • Key OFF		Go to Step (6)	Repair the
	Disconnect ECM wire harness connector C001			circuit as
	Using a DVOM check continuity between TPS 1			necessary.
	connector C025 signal pin 6 and ECM connector TPS			Refer to
	1 signal pin 5			Wiring Repairs
	Do have continuity between them?			in Engine Electrical.
6	Replace ECM		Go to Step (9)	
	Is the replacement complete? Inspect the throttle wire harness connector		Poncir tha	Co to Stop (9)
7	Inspect the throttle wire namess connector terminals for damage, corrosion or contamination		Repair the circuit as	Go to Step (8)
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
8	Replace the electronic throttle		Electrical. Go to Step (9)	
	Is the replacement complete?			
			8	





Step	Action	Value(s)	Yes	No
	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-122 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 123-TPS 1 Signal Voltage High SPN/FMI 51:3



Conditions for Setting the DTC

- Throttle Position Sensor 1
- Check Condition-Cranking or Running
- Fault Condition-TPS sensor voltage exceeds 4.80 volts for more than .50 seconds
- MIL-On during active fault
- Power derate level 1

Circuit Description

There are 2 Throttle Position Sensors located within the throttle which use variable resistors to determine signal voltage based on throttle plate position. TPS1 will read lower voltage when closed and TPS2 will read higher voltage when closed. The TPS1 and TPS2 percentages are calculated from these voltages. Although the voltages are different, the calculated values for the throttle position percentages should be very close to the same. The TPS values are used by the ECM to determine if the throttle is opening as commanded. The TPS is not serviceable and in the event of a failure the electronic throttle assembly must be replaced. This fault will set if the TPS 1 voltage exceeds 4.80 volts for more than .50 seconds. The MIL command in ON and power derate level 1 will be enforced limiting maximum throttle to 50%.





DTC 123 TPS 1 Signal Voltage High SPN/FMI 51:3

Step	Action	Value(s)	Yes	No
1	Action Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD
			· · · · · · · · · · · · · · · · · · ·	System Check
2	Key ON, Engine OFF		Go to Step (4)	Section Go to Step (3)
	DST (Diagnostic Scan Tool) connected			
	Does the DST display TPS 1 voltage of 4.8 volts or			
3	greater with the throttle closed? • Slowly depress Foot Pedal while observing TPS 1	ĺ	Go to Step (4)	Intermittent
	voltage			problem
	Does TPS 1 voltage ever exceed 4.8 volts?			Go to
	-			Intermittent
				section
4	Key OFF		Go to Step (7)	Go to Step (5)
	Disconnect electronic throttle connector C025			
	Key ON			
	Does DST display TPS 1 voltage less than 0.2 volts?			
5	Key OFF		Repair the	Go to Step (6)
	Disconnect ECM wire harness connector C001		circuit as	
	Key ON		necessary.	
	 Using a DVOM check for voltage between TPS 		Refer to	
	1 signal at the ECM connector pin 5 and engine		Wiring Repairs	
	ground		in Engine	
	giodila		Electrical.	
6	Do you have voltage? Replace ECM		Go to Step (11)	
7	 Is the replacement complete? Back probe sensor ground circuit at the ECM 		Go to Step (8)	Go to Step (10)
	side of the wire harness pin 20 with a test light			,
	connected to battery voltage			
	, ,			
8	 Does the test light come on? Inspect the electronic throttle connector terminals 		Repair the	Go to Step (9)
	for damage, corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
	Deplese the electronic threttle		Electrical. Go to Step (11)	
9	Replace the electronic throttle		Go to Step (11)	-
10	Is the replacement complete?		Go to Step (6)	Repair the
	Disconnect ECM connector C001		00 to 0tep (0)	circuit as
				necessary.
	Using a DVOM check for continuity between the			Refer to
	electronic throttle connector C025 sensor ground			Wiring Repairs
	pin 2 and ECM connector TPS 1 sensor ground			in Engine
1	pin 20			
	Do have continuity between them?	1		Electrical.





DIAGNOSTIC TROUBLE CODES 7-46

			L NI
 Action Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-123 check for any stored codes. 	Value(s)	Yes System OK	No Go to OBD System Check
After operating the engine within the test parameters of DTC-123 check for any stored			
	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-123 check for any stored codes. Does the engine operate normally with no stored 	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-123 check for any stored codes. Does the engine operate normally with no stored 	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-123 check for any stored codes. Does the engine operate normally with no stored





DTC 127-IAT Higher Than Expected 2 SPN/FMI 105:0



Conditions for Setting the DTC

- Intake Air Temperature
- Check Condition-Engine Running
- Fault Condition-Intake Air Temperature greater than 210 degrees F. for more than 120 seconds with engine speed greater than 1000 RPM
- MIL-On for active fault and for 15 seconds after active fault
- Engine Shut Down

Circuit Description

The TMAP is a combined IAT (Intake Air Temperature) and MAP (Manifold Absolute Pressure) sensor. A temperature sensitive resistor is used in the TMAP located in the intake manifold of the engine. It is used to monitor incoming air temperature, and the output in conjunction with other sensors is used to determine the airflow to the engine. The ECM provides a voltage divider circuit so that when the air is cool, the signal reads higher voltage, and lower when warm.

This fault will set if the Intake Air Temperature is greater than 210 degrees F. for more than 120 seconds with engine RPM greater than 1000. The MIL light command is on during this active fault and the engine will shut down.





DTC 127-IAT Higher Than Expected 2 SPN/FMI 105:0

Diagnostic Aid

This fault will set when inlet air is much hotter than normal. The most common cause of high inlet air temperature is a problem with the inlet air system. Ensure that the air inlet is not obstructed, modified or damaged.

- Inspect the air inlet system for cracks or breaks that may allow unwanted under hood air in to the air inlet system
- Use the chart below to check resistance accross pins 1 and 2 at TMAP sensor and compare resistance to air temperature.
- If none of the above can be found, follow the diagnostic steps for DTC 112-IAT Low Voltage.

Temp (° F)	Ohms
248	110
239	125
221	162
203	214
185	284
167	383
149	522
131	721
104	1,200
77	2,063
50	3,791
23	7,419
-4	15,614
-22	26,854
-31	35,763
-40	48,153





DTC 129-BP Low Pressure SPN/FMI 108:1



Conditions for Setting the DTC

- Barometric pressure check •
- Check condition-engine off and key on Fault Condition-BP less than 8.3 PSIA •
- •
- MIL-On for active fault and for 2 seconds after active fault
- Adaptive-disabled for the remainder of key cycle •

Circuit Description

The BP (Barometric Pressure) is estimated from the TMAP sensor. The barometric pressure value is used for fuel and airflow calculations. This fault sets in the event the BP value is out of the normal operating range.





DTC 129- BP Low Pressure SPN/FMI 108:1

Step	Action	Value(s)	Yes	No
1.	Did you perform the On-Board (OBD) System Check?	,	Go to Step (2)	Go to OBD
				System Check
				Section
2			Go to step (3)	Intermittent
	Key On			problem
	DST (Diagnostic Scan Tool) connected in			Go to
	System Data Mode			Intermittent
				section
	Does DST display MAP pressure of 8.3 PSIA or less?			
3	Replace TMAP sensor.		Go to Step (4)	-
	Is the repair complete?			
4	Demove all test equipment except the DCT		Custom Ok	
4	Remove all test equipment except the DST.		System Ok	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-129 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 134-EGO 1 Open/Lazy SPN/FMI 724:10



Conditions for Setting the DTC

- Heated Oxygen Sensor
- Check condition- Engine running
- Fault condition- EGO 1 cold persistently more than 120 seconds
- MIL- On during active fault and for 1 second after active fault
- Adaptive- Disabled during active fault
- Closed Loop- Disabled during active fault

Circuit Description

The EGO 1 sensor is used to determine if the fuel flow to the engine is correct by measuring the oxygen content in the exhaust gas. The ECM uses this information to correct the fuel flow with the Closed Loop multiplier and the Adaptive multiplier.

This fault will set if EGO 1 is cold, non-responsive, or inactive for more than 120 seconds.





	DTC 134-EGO 1 Open/In			
Step	Action	Value(s)	Yes	No Co to OPD
	Did you perform the On-Board (OBD) System Check?	-	Go to step (2)	Go to OBD
				System Check
2			Go to Step (3)	Section Intermittent
	Key ON, Engine Running			problem. See
				Electrical
	DST (Diagnostic Scan Tool) connected in			Section
	System Data Mode			Intermittent
	 Run engine to full operating temperature and 			Electrical
	then idle for a minimum of 2 minutes			Diagnosis
	Does DST display EGO 1 voltage fixed between 0.4			
	and 0.5 volts after at least 2 minutes of idle run time?			
3	Key OFF		Go to step (8)	Go To Step (4)
	Disconnect EGO 1 connector C006			
	Key ON			
	 Using a DVOM check for voltage between 			
	EGO 1 connector pins B and D			
	(Check must be made within 30 seconds or before			
	power relay shuts down)			
	Do you have voltage?			
	Key OFF	System	Go to step (5)	Repair system
4	 Using a DVOM check for voltage between 	Voltage		power relay
	EGO 1 connector pin B and engine ground			open circuit
	Key ON			
	(Check must be made within 30 seconds or before			
	power relay shuts down)			
	, , , , , , , , , , , , , , , , , , , ,			
	Do you have voltage?			
	Do you have voltage!			
5	Disconnect ECM connector C001		Go to step (6)	Repair open
	 Using a DVOM check for continuity between 			heater ground
	EGO 1 connector pin D and ECM connector			circuit
	pin 72			
6	 Do you have continuity? Inspect wire harness connector C006 pins A 		Correct the	Go to step (7)
	and D and C001 pins 1 and 72 for damage,		problem as	
	corrosion or contamination		required see	
	Did You find a problem?		Electrical	
	Did You find a problem?		Section wire	

....





DIAGNOSTIC TROUBLE CODES 7-53

Step	Action	Value(s)	Yes	NO
7	Replace ECM		Go to step (11)	-
	Is the replacement complete?			
8	Key OFF		Go to step (9)	Repair open
	Disconnect ECM wire harness connector			EGO 1 circuit
	C001			
	Using a DVOM check for continuity between			
	EGO 1 pin A and ECM connector pin 1			
9	 Do you have continuity? Using a DVOM check for continuity between 		Co to otop (10)	Danairanan
9			Go to step (10)	Repair open
	EGO 1 pin C and ECM connector pin 20			EGO 1 signal
				ground
	Do you have continuity?			
10	Replace EGO 1 sensor		Go to step (11)	-
	 Is the replacement complete? Remove all test equipment except the DST. 			
11			System Ok	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-134 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			
L		1	1	1





DTC 154-EGO 2 Open/Inactive SPN/FMI 520208:10

EGO 2



Conditions for Setting the DTC

- Heated Oxygen Sensor
- Check condition- Engine running
- Fault condition- EGO 2 cold persistently more than 120 seconds
- MIL- On during active fault and for 2 second after active fault
- Adaptive- Disabled during active fault
- Closed Loop- Disabled during active fault

Circuit Description

The EGO 2 sensor is used to monitor the efficiency of the catalytic converter. The ECM compares the EGO 1 and EGO 2 voltage signals to determine this. This fault will set if EGO 2 is cold, non-responsive, or inactive for more than 120 seconds.





Step	Action	Value(s)	Yes	No
1	Action Did you perform the On-Board (OBD) System Check?		Go to step (2)	Go to OBD
	,		(=)	System Check
				Section
2			Go to Step (3)	Intermittent
	Key ON, Engine Running		,	problem. See
				Electrical
	DST (Diagnostic Scan Tool) connected in			Section
	System Data Mode			Intermittent
	 Run engine to full operating temperature and 			Electrical
	then idle for a minimum of 2 minutes			Diagnosis
	Deep DST display ECO 2 voltage fixed between 0.4			
	Does DST display EGO 2 voltage fixed between 0.4			
	and 0.5 volts after at least 2 minutes of idle run time?			
0				Co To Stop (4)
3	Key OFF		Go to step (8)	Go To Step (4)
	 Disconnect EGO 2 connector C005 			
	Key ON			
	Using a DVOM check for voltage between			
	EGO 2 connector pins C and D			
	(Check must be made within 30 seconds or before			
	power relay shuts down)			
	Do you have voltage?			
	Do you havo voltago:			
	Key OFF	System	Go to step (5)	Repair system
4	 Using a DVOM check for voltage between 	Voltage		power relay
⁻	EGO 2 connector pin C and engine ground			open circuit
	Key ON			
	(Check must be made within 30 seconds or before			
	power relay shuts down)			
	······			
	Do you have voltage?			
5	 Disconnect ECM connector C001 		Go to step (6)	Repair open
	Using a DVOM check for continuity between			heater ground
	EGO 2 connector pin D and ECM connector			circuit
	pin 73			
	Do you have continuity?			
6	Inspect wire harness connector C005 pins C		Correct the	Go to step (7)
-	and D and C001 pins 2 and 73 for damage,		problem as	
	corrosion or contamination		required see	
			Electrical	
	Did You find a problem?		Section wire	
			harness repair	1

DTC 154-EGO 2 Open/Inactive SPN/FMI 520208:10





Step	Action	Value(s)	Yes	No
7.	Replace ECM		Go to step (11)	-
	Is the replacement complete?			
				Danaiaan
8	Key OFF		Go to step (9)	Repair open
	Disconnect ECM wire harness connector			EGO 2 circuit
	C001			
	 Using a DVOM check for continuity between 			
	EGO 2 connector pin B and ECM connector			
	pin 2			
	 Do you have continuity? Using a DVOM check for continuity between 			
9			Go to step (10)	Repair open
	EGO 2 pin A and ECM connector pin 20			EGO 2 signal
				ground
	Do you have continuity?			
10	Replace EGO 2 sensor		Go to step (11)	
10				-
	Is the replacement complete?			
11	 Is the replacement complete? Remove all test equipment except the DST. 		System Ok	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			,
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	 After operating the engine within the test 			
	parameters of DTC-154 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			
			l	





DTC 171-Adaptive Learn High Gasoline SPN/FMI 520200:0



Conditions for Setting the DTC

- Heated Oxygen Sensor
- Functional Fault-Adaptive multiplier out of range (greater than 30%)
- MIL-On during active adaptive limit condition

Circuit Description

The EGO 1 sensor is used to determine if the fuel flow to the engine is correct by measuring the oxygen content in the exhaust gas. The ECM uses this information to correct the fuel flow with the Closed Loop multiplier and the Adaptive multiplier. This fault sets if the Adaptive multiplier exceeds the limits of normal operation.

Diagnostic Aid

<u>Check for other DTC codes</u> that may be set. Correct those starting with the lowest code set number before proceeding with the diagnostic chart.

Oxygen Sensor Wire Heated Oxygen sensor wires may be mis-routed and contacting the exhaust manifold.

Vacuum Leaks Large vacuum leaks and crankcase leaks can cause a lean exhaust condition at especially at light load. **Injectors** System will be lean if an injector driver or driver circuit fails open. The system will also be lean if an injector fails in a closed manner or is dirty.

Fuel Pressure Low fuel pressure, faulty fuel injector or damaged fuel pump assembly can cause the fuel system to run lean

Exhaust Leaks If there is an exhaust leak, outside air can be pulled into the exhaust and past the 02 sensor causing a false lean condition.

Fuel Quality Contaminated or spoiled fuel can cause the fuel system to be lean.

Ground Problem Check ECM grounds.





DTC 171 Adaptive Learn High Gasoline SPN/FMI 520200:0

	DIC 171 Adaptive Learn High			
Step	Action Perform the On-Board (OBD) System Check?	Value(s)	Go to Step (3)	No Go to Step (2)
	Are any other DTCs present?			
2	Visually and physically check the following items:		Go to Step (8)	Go to Step (4)
_	The air intake duct for being collapsed or restricted			
	 The air filter for being plugged 			
	 The EGO 1 sensor installed securely and the wire leads not contacting the exhaust manifold or 			
	ignition wires			
	 ECM grounds must be clean and tight. Refer to 			
	Engine Electrical Power and Ground Distribution			
	 Fuel System Diagnostics. Refer to Fuel System 			
	Diagnostics			
	Was a repair made?			
3	 Diagnose any other DTC codes before 		Go to Step (8)	Go to step (4)
	proceeding with this chart. Always repair			
	existing codes starting with the lowest numerical code set first.			
	Have any other DTC codes been detected, diagnosed and repaired?			
4	Disconnect EGO1 connector C006	System	Go to Step (5)	Repair the
	 Using a DVOM check for voltage between 	voltage		circuit as
	EGO 1 connector pins A and B			necessary.
	Key ON			Refer to
				Wiring Repairs
	(CHECK MUST BE MADE WITHIN 30 SECONDS			in Engine Electrical.
	OR BEFORE POWER RELAY SHUTS DOWN)			Electrical.
	Do you have voltage?			
5	Key OFF		Repair the	Go to Step (6)
	 Disconnect EGO 1 sensor wire harness 		shorted circuit	
	connector C006		as necessary.	
			Refer to	
	Disconnect ECM wire harness connector C001		Wiring Repairs	
	Key ON		in Engine	
	Using a high impedance DVOM check for continuity between ECO 1 connector signal pin C		Electrical.	
	continuity between EGO 1 connector signal pin C and engine ground			
	Do vou have continuity?			
6	Using a high impedance DVOM check for		Repair the	Go to Step (7)
	continuity between EGO 1 connector signal ground		shorted circuit	
	pin D and EGO 1 signal pin C		as necessary.	
	Do you have continuity?		Refer to	
			Wiring Repairs	
			in Engine Electrical.	
7	Replace EGO 1 sensor	L	Go to Step (8)	-
	Is the replacement complete?			
	• • •			





Step	Action	<u>Value(s)</u>		
Step 8	 Action Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature 	Value(s)	Yes System OK	No Go to OBD System Check
	 Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-171 check for any stored codes. Does the engine operate normally with no stored codes? 			





DTC 172-Adaptive Learn Low Gasoline SPN/FMI 520200:1



Conditions for Setting the DTC

- Heated Oxygen Sensor
- Functional Fault-Adaptive multiplier out of range (at limit of -30%)
- MIL-On during active adaptive limit condition

Circuit Description

The EGO 1 sensor is used to determine if the fuel flow to the engine is correct by measuring the oxygen content in the exhaust gas. The ECM uses this information to correct the fuel flow with the Closed Loop multiplier and the Adaptive multiplier. This fault sets if the Adaptive multiplier exceeds the limits of normal operation.

Diagnostic Aid

<u>Check for other DTC codes</u> that may be set. Correct those starting with the lowest code set number before proceeding with the diagnostic chart

Fuel System The system will be rich if an injector fails in an open manner. High fuel pressure due to a faulty fuel regulator or obstructed fuel return line will cause the system to run rich.

Ignition noise open or poor ground circuit to or in the ignition system or ECM may cause EMI (Electromagnetic interference). This noise could be interpreted by the ECM as ignition pulses, and the sensed RPM becomes higher than the actual speed. The ECM then delivers too much fuel, causing the system to go rich.

TMAP Sensor A higher manifold pressure than normal can cause the system to go rich. Temporarily disconnecting the MAP Sensor will allow the ECM to set a default value for MAP.

<u>IAT Sensor</u> Check for a shifted sensor that could cause the ECM to sense lower than actual temperature of incoming air. This can cause a rich exhaust condition.

<u>ECT Sensor</u> Check for a skewed sensor that could cause the ECM to sense engine temperature cooler than it actually is. This could also cause a rich exhaust condition.





	DTC 172 Adaptive Learn Low (Gasoline	SPN/FMI 5	20200:1
Step	Action Perform the On-Board (OBD) System Check?	Value(s)	Go to Step (3)	No
1	Perform the On-Board (OBD) System Check? Are any other DTCs present?		Go to Step (3)	Go to Step (2)
2	 Visually and physically check the following items: The air intake duct for being collapsed or restricted The air filter for being plugged The EGO 1 sensor installed securely and the wire leads not contacting the exhaust manifold or ignition wires ECM grounds for being clean and tight. Refer to Engine Electrical Power and Ground Distribution Fuel System Diagnostics. Refer to Fuel System Diagnostics Was a repair made? 		Go to Step (6)	Go to Step (4)
3	 Diagnose any other DTC codes before proceeding with this chart. Have any other DTC codes been detected, diagnosed and repaired? 		Go to Step (6)	Go to step (4)
4	 Key OFF Disconnect EGO 1 sensor wire harness connector Disconnect ECM wire harness connector C001 Key ON Using a DVOM check for voltage at EGO 1 connector C006 signal pin C and engine ground 		Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.	Go to Step (5)
5	Do you have voltage? Replace EGO 1 sensor		Go to Step (6)	-
6	 Is the replacement complete? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-172 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check

DTC 172 Adaptiva Loarn Low Gasolina SDN/EMI 520200-1





DTC 182-Gasoline Fuel Temperature Sensor Low Voltage SPN/FMI 174:4



Conditions for Setting the DTC

- Gasoline fuel temperature sensor voltage
- Fuel temperature sensor voltage greater than 0.05v for 1s
- MIL-On for active fault and for 2 seconds after active fault

Circuit Description

Note: The fuel pressure and temperature sensor is wired via Equipment Manufacturer supplied harness jumper. The terminals A, B, C, D & 19, 20, 48, 54 are engine wiring harness terminals at the fuel sensor interface connector C002 and the ECM header connector C001. You may need to consult additional wiring information supplied by the OEM. The gasoline fuel temperature sensor voltage is read at less than 0.05v. This indicates a low voltage fault from the sensor or circuit.





DTC 182- Gasoline Fuel Temperature Sensor Low Voltage SPN/FMI 174:4

	———————————————————————————————————————	/11 1/4.4		
Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System	-	Go to Step (2)	Go to OBD
	Check?			System Check
				Section
2			Go to Step (3)	Intermittent
	Key On, Engine running.			problem
	DST (Diagnostic Scan Tool) connected in			Go to
	System Data Mode			Intermittent
	Check voltage for AUX_PU3 raw on the Raw			section
	Volts Page			
	voits rage			
	Is voltage 0.050 volts or lower?			
	Key OFF		Go to Step (4)	Go to step (8)
3	Disconnect the gasoline fuel pressure sensor			
	jumper harness connector C002 from the			
	engine wiring harness			
	Key On			
	-			
	Using a DVOM, check for voltage between			
	connector C002 terminal B and engine			
	ground.			
	Is voltage 4.95 volts or higher?			
4	Using a DVOM check for voltage between fuel		Go to Step (5)	Go to Step (7)
	pressure sensor connector C002 terminals A &			,
	B.			
	Is voltage of 4.95 volts or higher			
	is voltage of 4.00 volto of higher			
5	Jumper fuel pressure sensor connector C002		Go to Step (6)	Go to Step 7
	terminals A & B together.			
	Is voltage for AUX_PU3 raw .050 volts or less?			
6	Inspect fuel pressure and temperature		Repair the	Go to step
0	- Provense Prove			(11)
	sensor connector and pins for corrosion,		circuit as	
	contamination or mechanical damage. Check		necessary.	
	for opens or shorts in OEM supplied jumper		Refer to	
	harness to sensor		Wiring	
	Any problems found?		Repairs	
			in Engine	
7	Key OFF		Electrical. Go to Step (8)	Repair the
'	-			circuit as
	Disconnect ECM connector C001			necessary.
	Check for continuity between gasoline			Refer to
	pressure sensor connector terminal A and			
	ECM pin 20.			Wiring
	Do you have continuity between them?			Repairs
	, , , , , , , , , , , , , , , , , , , ,			in Engine
				Electrical.





Step	Action	Value(s)	Yes	No
8	Check for continuity between fuel pressure		Go to step (9)	Repair the
Ŭ	sensor connector terminal B and ECM pin 48			circuit as
				necessary.
	Do you have continuity between them?			Refer to
				Wiring
				Repairs
				in Engine
				Electrical. Go to Step
9	Inspect ECM and gasoline pressure		Repair the	
	sensor connector (C002) terminals for		circuit as	(10)
	corrosion, contamination or mechanical		necessary.	
	damage		Refer to	
	Any problems found?		Wiring	
			Repairs	
			in Engine	
			Electrical.	
10	Replace ECM. Refer to ECM replacement		Go to step	-
	in the Engine Controls Section.		(12)	
	Is the replacement complete?		(/	
11	Replace fuel pressure and temperature		Go to step	-
	sensor		(12)	
	Is the replacement complete?			
10	Demons all test as view and avecant the DOT		Quetere OK	
12	Remove all test equipment except the DST.		System OK	Go to OBD
	Connect any disconnected components,			System Check
	fuses, etc.			
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	After operating the engine within the test			
	parameters of DTC-91 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 183-Gasoline Fuel Temperature Sensor High Voltage SPN/FMI 174:3



Conditions for Setting the DTC

- Gasoline fuel temperature sensor voltage
- Fuel temperature sensor voltage greater than 4.95v for 1s
- MIL-On for active fault and for 2 seconds after active fault

Circuit Description

Note: The fuel pressure and temperature sensor is wired via Equipment Manufacturer supplied harness jumper. The terminals A, B, C, D & 19, 20, 48, 54 are engine wiring harness terminals at the fuel sensor interface connector C002 and the ECM header connector C001. You may need to consult additional wiring information supplied by the OEM. The fuel temperature sensor voltage is read at greater than 4.95v. This indicates a high voltage fault from the sensor or circuit.





Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System	-	Go to Step (2)	Go to OBD
	Check?			System Check
				Section Intermittent
2			Go to Step (3)	
	Key On, Engine running.			problem
	 DST (Diagnostic Scan Tool) connected in 			Go to
	System Data Mode			Intermittent
	Check voltage for AUX_PU3 raw on the Raw			section
	Volts Page			
	Is voltage 4.95 volts or higher?			
	Key OFF		Go to Step (4)	Go to step (8)
3	Disconnect the gasoline fuel pressure sensor			
	jumper harness connector C002 from the			
	engine wiring harness			
	Key On			
	 Using a DVOM, check for voltage between 			
	connector C002 terminal B and engine			
	ground.			
	Is voltage 4.95 volts or higher?			
4	 Using a DVOM check for voltage between fuel 		Go to Step (5)	Go to Step (7)
	pressure sensor connector C002 terminals A &			
	В.			
	Is voltage of 4.95 volts or higher			
5	Jumper fuel pressure sensor connector C002		Go to Step (6)	Go to Step (7)
Ŭ	terminals A & B together.			
	terminale / a D together.			
	Is voltage for AUX_PU3 raw .050 volts or less?			
			Densisting	Oo to stars
6	Inspect fuel pressure and temperature		Repair the	Go to step
	sensor connector and pins for corrosion,		circuit as	(11)
	contamination or mechanical damage. Check		necessary.	
	for opens or shorts in OEM supplied jumper		Refer to	
	harness to sensor		Wiring	
	Any problems found?		Repairs	
			in Engine	
			Electrical.	

DTC 183- Gasoline Fuel Temperature Sensor High Voltage SPN/FMI 174:3





Step	Action	Value(s)	Yes	No
7	Key OFF		Yes Go to Step (8)	Repair the
	Disconnect ECM connector C001			circuit as
	Check for continuity between gasoline			necessary.
	pressure sensor connector terminal A and			Refer to
	ECM pin 20.			Wiring
	Do you have continuity between them?			Repairs
	Do you have continuity between them?			in Engine
				Electrical.
8	Check for continuity between fuel pressure		Go to step (9)	Repair the
	sensor connector terminal B and ECM pin 48			circuit as
				necessary.
	Do you have continuity between them?			Refer to
				Wiring
				Repairs
				in Engine
9	 Inspect ECM and gasoline pressure 		Repair the	Electrical. Go to Step
	sensor connector (C002) terminals for		circuit as	(10)
	corrosion, contamination or mechanical		necessary.	· · ·
	damage		Refer to	
	Any problems found?		Wiring	
			Repairs	
			in Engine	
10			Electrical. Go to step	
10	Replace ECM. Refer to ECM replacement			-
	in the Engine Controls Section.		(12)	
	Is the replacement complete?			
11	Replace fuel pressure and temperature		Go to step	-
	sensor		(12)	
	Is the replacement complete?			
12	Remove all test equipment except the DST.		System OK	Go to OBD
	Connect any disconnected components,			System Check
	fuses, etc.			
	• Using the DST clear DTC information from the			
	ECM.			
	 Turn the ignition OFF and wait 30 seconds. 			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	 After operating the engine within the test 			
	parameters of DTC-91 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 187-LPG Fuel Temperature Sensor Voltage Low SPN/FMI 520240:4



Conditions for Setting the DTC	Temperature Sensor Temperature Degrees F. -40 -20 0 20	Resistance Tolerance ± 10% Ohms 99318 48300 24705 13214
 Fuel Temperature Check Condition-Engine Running Fault Condition-FT sensor voltage less than 0.050 volts MIL-On during active fault and for 2 seconds after active fault Adaptive-Disabled during active fault and for the remainder of the key cycle 	40 60 70 80 100 120 140 160 170 180 190 200	7357 4259 3284 2554 1582 1008 660.6 444.1 367.3 305.5 255.4 214.6

Circuit Description

The FT (Fuel Temperature) sensor is a temperature sensitive resistor located near the fuel outlet of the electronic pressure regulator. It is used to help determine fuel charge density for accurate fuel mixture control. The ECM provides a voltage divider circuit so that when the sensor is cool the signal reads a higher voltage, and lower when warm. This fault will set if the signal voltage is less than 0.050 volts anytime the engine is running.

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153.7

DTC 187- LPG Fuel Temperature Sensor Voltage Low
SPN/FMI 520240:4

1 Did you perform the On-Board (OBD) System Check? Go to Step (2) Go to Cobo Section 2 Key On Go to step (3) Intermittent problem 0 DST (Diagnostic Scan Tool) connected in Go to step (3) Intermittent problem 0 DST (Diagnostic Scan Tool) connected in Go to step (4) Go to step (5) 3 Disconnect the FT wire harness connector C003 Go to Step (8)	Step	Action	Value(s)	Yes	No
2 Key On Go to step (3) Intermittent problem • DST (Diagnostic Scan Tool) connected in System Data Mode Intermittent problem Go to step (3) Intermittent problem 0 Does DST display FT voltage of 0.050 or less? Go to step (4) Go to step (5) • Key Off • Disconnect the FT wire harness connector C003 Go to step (4) Go to step (5) • Key ON Does the DST display FT voltage of 4.9 volts or greater? Go to Step (8)	1-	Did you perform the On-Board (OBD) System Check?	_	Go to Step (2)	Go to OBD System Check
3 • Disconnect the FT wire harness connector C003 • Key ON Does the DST display FT voltage of 4.9 volts or greater? Go to Step (8) _ 4 Replace FT sensor. Go to Step (8) _ 5 • Key OFF Repair the shorted circuit as Repairs in Engine Electrical. Go to step (6) 5 • Check for continuity between FT sensor connector signal pin A and FT sensor ground pin B _ Repair the circuit as Repairs in Engine Electrical. 6 • Check for continuity between Hem? _ _ Go to step (7) 6 • Check for continuity between Hem? _ _ Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical. Go to step (7) 7 Replace ECM. Refer to ECM replacement in the Engine Controls Section. _ _ _ _	2	DST (Diagnostic Scan Tool) connected inSystem Data Mode		Go to step (3)	Intermittent problem Go to Intermittent
Is the replacement complete? Repair the shorted circuit as Repairs in Engine Electrical. 5 Disconnect ECM wire harness connector C001 - 6 Check for continuity between FT sensor connector signal pin A and FT sensor ground pin B - 7 Replace ECM. Refer to ECM replacement in the Engine Controls Section. - Go to step (8)		 Disconnect the FT wire harness connector C003 Key ON Does the DST display FT voltage of 4.9 volts or greater? 			Go to step (5)
5 Disconnect ECM wire harness connector C001	4	Is the replacement complete?			_
connector signal circuit pin A and engine ground. Do you have continuity?Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.7Replace ECM. Refer to ECM replacement in the Engine Controls SectionGo to step (8) 	5	 Disconnect ECM wire harness connector C001 Check for continuity between FT sensor connector signal pin A and FT sensor ground pin B 	_	shorted circuit as Repairs in Engine	Go to step (6)
Engine Controls Section.	6	connector signal circuit pin A and engine ground.		circuit as necessary. Refer to Wiring Repairs in Engine	Go to step (7)
Is the replacement complete?	7		_	Go to step (8)	_





DIAGNOSTIC TROUBLE CODES 7-70

			<u> </u>	
Step	Action	Value(s)	Yes	NO
8	Remove all test equipment except the DST.		System OK	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	- Observe the Mill			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-187 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 188-LPG Fuel Temperature Sensor Voltage High SPN/FMI 520240:3



	Temperature Sensor Temperature Degrees F.	 Resistance Tolerance ± 10% Ohms
	-40	99318
	-20	48300
Conditions for Setting the DTC	0	24705
	20	13214
	40	7357
Fuel Temperature	60	4259
Check Condition-Engine Running	70	3284
 Fault Condition-FT sensor voltage exceeds 4.950 	80	2554
 MIL-On during active fault and for 2 seconds after active fault 	100	1582
 Adaptive-Disabled during active fault and for the remainder of 	120	1008
the key cycle	140	660.6
	160	444.1
	170	367.3
	180	305.5
	190	255.4
	200	214.6

Circuit Description

The FT (Fuel Temperature) sensor is a temperature sensitive resistor located near the fuel outlet of the electronic pressure regulator. It is used to help determine fuel charge density for accurate fuel mixture control. The ECM provides a voltage divider circuit so that when the sensor is cool the signal reads a higher voltage, and lower when warm. This fault will set if the signal voltage is greater than 4.950 volts anytime the engine is running.

220





153.7

DTC 188- FT Voltage High SPN/FMI 520240:3

Ct	A offere	0240.3	Vee	N-
<u>Step</u>	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Go to Step (2)	No Go to OBD
				System Check
				Section
2			Go to step (3)	Intermittent
	Key On			problem
	 DST (Diagnostic Scan Tool) connected in System 			Go to
	Data Mode			Intermittent
				section
	Does DST display FT voltage of 4.95 or greater?			
	Key Off		Go to step (4)	Go to Step (8)
3	 Disconnect the FT sensor connector C003 and 			
5	jump connector terminals A and B together			
	Key On			
	Does the DST display FT voltage of 0.05 volts or			
4	 Using a DVOM check the resistance between the 	See	Go to Step (6)	Go to step (5)
+	two terminals of the FT sensor and compare the	temperature		
	resistance reading to the chart			
	-	VS.		
	Is the resistance value correct?	resistance		
		chart in		
		the DTC		
		188 circuit		
5	Replace FT sensor	description	Go to Step (14)	_
Ĭ	Is the replacement complete?			
6	 Inspect the FT sensor connector terminals for 		Repair the	Go to Step (7)
	damage, corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
			Electrical.	Into you the set
7	Key OFF Disconnect FOM wire borness connector		Repair the	Intermittent
	Disconnect ECM wire harness connector		circuit as	problem
	Inspect ECM connector pins 20 and 41 for demage correction or contamination		necessary.	Go to
	damage corrosion or contamination		Refer to	Intermittent
	Did you find a problem?		Wiring Repairs	section
			in Engine Electrical.	
8	Jump the FT signal pin A at the FT connector		Go to Step (9)	Go to Step (12)
	C003 to engine ground			/
	Does DST display FT voltage of 0.05 or less?			
9	Key OFF		Go to Step (10)	Repair the
	Disconnect ECM wire harness connector C001			circuit as
	Using a DVOM check for continuity between FT			necessary.
	sensor ground pin B and ECM connector pin 20			Refer to
	Do you have continuity between them?			Wiring Repairs
	Do you have continuity between them?			in Engine
				Electrical.




Step 10	Action	Value(s)	Yes	No
10	 Inspect ECM connector pins 20 and 41 for 		Repair the	Go to Step (11)
	damage, corrosion or contamination		circuit as	
			necessary.	
	Did you find a problem?		Refer to	
			Wiring Repairs	
			in Engine	
			Electrical. Go to Step (14)	
11	Replace ECM		Go to Step (14)	-
10	Is the replacement complete?Key OFF			Densinths
12			Go to Step (13)	Repair the
	Disconnect ECM wire harness connector C001			circuit as
	Using a DVOM check for continuity between			necessary.
	FT connector signal pin A and ECM connector			Refer to
	terminal 41			Wiring Repairs
	Do you have continuity between them?			in Engine
10	Increase ECM composition mine 20 and 44 for		Densinths	Electrical.
13	Inspect ECM connector pins 20 and 41 for		Repair the	Go to Step (11)
	damage, corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
	Remove all test equipment except the DST.		Electrical.	Go to OBD
14			System OK	
14	Connect any disconnected components, fuses,			System Check
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	•			
	Observe the MIL			
	Observe engine performance and driveability			
	 After operating the engine within the test 			
	parameters of DTC-188 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 217-ECT Higher Than Expected 2 SPN/FMI 110:0



Conditions for Setting the DTC

- Engine Coolant Temperature
- Check Condition-Engine Running
- Fault Condition-Engine Coolant temperature reading or estimate greater than 225 deg. F for more than 15 seconds with the engine speed greater than 600 rpm
- MIL-On
- Engine Shut Down

Circuit Description

The ECT (Engine Coolant Temperature) sensor is a temperature sensitive resistor located in the engine coolant passage. The ECT is used for engine airflow calculation, fuel enrichment, ignition timing control and to enable certain other temperature dependant operations. This code set is designed to help prevent engine damage from overheating. The ECM provides a voltage divider circuit so when the sensor reading is cool the sensor reads higher voltage, and lower when warm. This fault will set when the coolant exceeds 225 degrees F. for more than 15 seconds with the engine speed over 600 rpm. The engine will then shut down.





DTC 217 ECT Higher than expected 2 SPN/FMI 110:0

Step	Action	Value(s)	Yes	No
	Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD System Check Section
2	 Key On DST (Diagnostic Scan Tool) connected in System Data Mode Operate the engine to attempt to recreate the failure running the engine above 1000 rpm for at least 60 seconds Does DST display ECT temperature of 250 degrees F. or greater with the engine running over 1000 rpm. and then shut down? 		Go to Step (3)	Intermittent problem Go to Intermittent section
3	 Verify with a temperature gauge that the engine coolant is over 250 degrees F. Does the temperature gauge indicate 250 degrees F. 		Repair Cooling system.	Go to step (4)
4	or greater? Verify ECT circuit function. Follow diagnostic test procedure for DTC-117 ECT Low Voltage		-	-





DTC 219-Max Govern Speed Override SPN/FMI 515:15

Electronic Throttle			ECM
	4	PN KOUHT 82	
[⁻ "	1	TAN/ORN 83	DBW
	6	PP L/LT BLU S	TPS 1 Signal
	2	BLKATGRN 20	Sensor Gip and
	5		TPS 2 Signal
	3 C025	LTG RN/RED 19	<u>SVonts</u>

Conditions for Setting the DTC

- Max Govern Speed Override
- Check Condition- Engine Running
- Fault Condition- Engine RPM greater than 3300 for 2 seconds continuously
- MIL- On during active fault

Circuit description

This fault will set anytime the engine RPM exceeds 3300 for 2 seconds or more continuously. The MIL command is ON during this active fault.

Diagnostic Aid

Always check for other stored DTC codes before using the following DTC chart for this code set. Repair any existing codes starting with the lowest numerical code first.





	DIC 219- Wax Govern Speed			
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes Go to Step (2)	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD
				System Check
				Section Go to Step (4)
2	Key ON, Engine OFF		Go to Step (3)	Go to Step (4)
	DST connected			
	Are any other DTC codes present with DTC 219?			
	Are any other DTC codes present with DTC 219?			
3	Diagnose and repair any other DTC codes stored		Go to step (4)	
3				-
	before proceeding with this chart.			
	Have any other DTC codes been diagnosed and			
	repaired?			
4	 Check the service part number on the ECM to 		Go to Step (6)	Go to Step 5
	ensure the correct calibration is in use			
	Is the Service Part Number Correct?			
5	 Is the Service Part Number Correct? Replace ECM with correct service part number 		Go to Step (9)	-
	Is the replacement complete?			
6	 Is the replacement complete? Check the mechanical operation of the throttle 		Go to Step (8)	Go to Step (7)
	Is the mechanical operation of the throttle OK?			
7	 Is the mechanical operation of the throttle OK? Correct mechanical operation of the throttle. Refer 		Go to step (9)	-
	to Engine & Component section			
	Has the mechanical operation of the throttle been			
	corrected?			
8	 Check engine for large manifold vacuum leaks. 		Go to Step (9)	Go to OBD
	Refer to Symptom Diagnostic section			System Check
				Section
9	 Did you find and correct the vacuum leak? Remove all test equipment except the DST. 		System OK	Go to OBD
Ŭ	 Connect any disconnected components, fuses, etc. 			System Check
				System Check
	Using the DST clear DTC information from the			
	ECM.			
	 Turn the ignition OFF and wait 30 seconds. 			
	 Start the engine and operate the vehicle to full 			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	 After operating the engine within the test 			
	parameters of DTC-219 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			

DTC 219- Max Govern Speed Override SPN/FMI 515:15





DTC 221-TPS 1 Higher Than TPS 2 SPN/FMI 51:0

Electronic Throttle			ECM
	4	PN KWUHT 82	
[] Ē	1	TAN/ORN 83	
	6	PP L/LT BLU S	TPS 1 Signal
	2	BLKALTGRN 20	SensorGipind
	5		TPS 2 Signal
	з	LTGRN/RED 19	5 Vonte
	C025	5	

Conditions for Setting the DTC

- Throttle Position Sensor 1 & 2
- Check Condition-Key On
- Fault Condition-TPS 1 20% higher than TPS2
- MIL-On for remainder of key on cycle
- Engine Shutdown

Circuit Description

There are two Throttle Position Sensors located within the throttle which use variable resistors to determine signal voltage based on throttle plate position. TPS 1 will read lower voltage when closed and TPS 2 will read higher voltage when closed. The TPS 1 and TPS 2 percentages are calculated from these voltages. Although the voltages are different, the calculated values for the throttle position percentages should be very close to the same. The TPS values are used by the ECM to determine if the throttle is opening as commanded. The TPS is not serviceable and in the event of a failure the electronic throttle assembly must be replaced. This fault will set if TPS 1 is 20% (or more) higher than TPS 2. At this point the throttle is considered to be out of specification, or there is a problem with the TPS signal circuit. The MIL command is ON and Power derate 1 will be enforced limiting the throttle to 50% maximum





DTC 221 TPS 1	Higher Than TPS 2	SDN/EMI 51.0
DICZZIIPS		3FIN/FIVII 31.U

Stop				
<u>Step</u>	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes Go to Step (2)	No Go to OBD
				System Check
2	Key ON, Engine OFF		Go to Step (3)	Section Intermittent
	DST (Diagnostic Scan Tool) connected in			problem
	System Data Mode			Go to
				Intermittent
	Does the DST display more than a 20% difference			section
3	between TPS 1 and TPS 2? Key OFF		Go to Step (5)	Go to Step (4)
	Disconnect electronic throttle connector C025			
	• Key ON			
	Change DST mode to DBW (drive by wire) test			
	mode			
	Is the voltage for TPS 1 less than 0.1 volts?			
4	Key OFF		Repair the	Go to Step (9)
	Disconnect ECM wiring harness connector C001		TPS 1 circuit	
	Key ON		shorted to	
			voltage as	
	Using a DVOM check for voltage between ECM		necessary.	
	connector TPS 1 signal pin 5 and engine ground		Refer to	
	Do you have voltage?		Wiring Repairs	
			in Engine	
			Electrical.	
5	Jump TPS 1 signal pin 6 to the 5 volt reference		Go to Step (6)	Go to Step (8)
	pin 3 at connector C025			
6	Does DST display TPS 1 voltage over 4.95 volts Inspect wire terminals at throttle connector for		Donoir tho	Co to Stop (7)
0			Repair the circuit as	Go to Step (7)
	damage corrosion or contamination			
	Any problems found?		necessary. Refer to	
			Wiring Repairs	
			in Engine	
			Electrical.	
7	Replace the electronic Throttle		Go to Step (12)	-
	Is the replacement complete?			
8	Key OFF		Go to Step (9)	Repair the
	Disconnect ECM wire harness connector C001			open circuit
	Using a DVOM check for continuity between			as necessary.
	throttle connector TPS 1 signal pin 6 and ECM			Refer to
	connector TPS 1 signal pin5			Wiring Repairs
	Do you have continuity between them?			in Engine
9	Using a DVOM check for continuity between		Go to Step (10)	Electrical. Repair the
	throttle connector signal ground pin 2 and ECM			open circuit
	connector signal ground pin 2 and 2000			as necessary.
				Refer to
	Do you have continuity between them?			Wiring Repairs
				in Engine
				Electrical.
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Step	Action	Value(s)	Yes	No
10	Inspect ECM connector terminals for damage		Repair the	Go to Step (11)
	corrosion or contamination.		circuit as	
	Any problems found?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
11	Replace ECM		Electrical Go to Step (12)	_
12	 Is the replacement complete? Remove all test equipment except the DST. 		System OK	Go to OBD
	Connect any disconnected components, fuses,		,	System Check
	etc.			·
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	• Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-221 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 222-TPS 2 Signal Voltage Low SPN/FMI 520251:4



Conditions for Setting the DTC

- Throttle Position Sensor 2
- Check Condition-Cranking or Running
- Fault Condition-TPS 2 sensor voltage less than 0.200 volts for more than .500 seconds
- MIL-ON during active fault
- Engine Shutdown

Circuit Description

There are 2 Throttle Position Sensors located within the throttle which use variable resistors to determine signal voltage based on throttle plate position. TPS1 will read lower voltage when closed and TPS2 will read higher voltage when closed. The TPS1 and TPS2 percentages are calculated from these voltages. Although the voltages are different, the calculated values for the throttle position percentages should be very close to the same. The TPS values are used by the ECM to determine if the throttle is opening as commanded. The TPS is not serviceable and in the event of a failure the electronic throttle assembly must be replaced.

This fault will set if the TPS 2 voltage is less than 0.200 volts for more than .500 seconds. The MIL command is ON and the engine will shutdown.





DTC 222 TPS 2 Signal Voltage Low SPN/FMI 520251:4

	DIC 222 IPS 2 Signal Volta			
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Go to Step (2)	Ro to OBD
	Did you perform the On-Board (OBD) System Check?	-	G0 10 Step (2)	System Check
2	Key ON, Engine OFF		Go to Step (4)	Go to Step (3)
	 DST (Diagnostic Scan Tool) connected in 			
	DBW (Drive by Wire) throttle test mode			
	Does the DST display TPS 2 voltage of 0.2 volts or			
3	 less with the throttle closed Slowly depress Foot Pedal while observing TPS 2 		Go to Step (4)	Intermittent
	voltage			problem
	Does TPS 2 voltage ever fall below 0.2 volts?			Go to
				Intermittent
4	Key OFF		Go to Step (7)	section Go to Step (5)
	Disconnect electronic throttle connector C025			
	 Jumper the 5 volt reference circuit pin 3 and 			
	TPS 2 signal circuit pin 5 together at the throttle			
	connector			
	Key ON			
	Does DST display TPS 2 voltage of 4.0 volts or			
	greater?			
5	Key OFF		Go to Step (6)	Repair the
	 Disconnect ECM wire harness connector C001 			circuit as
	Using a DVOM check continuity between TPS 2			necessary.
	connector signal pin 5 and ECM connector TPS 2			Refer to
	Signal pin 6			Wiring Repairs
	Do have continuity between them?			in Engine Electrical.
6	Replace ECM		Go to Step (9)	
	 Is the replacement complete? Inspect the electronic throttle wire harness 			
7			Repair the	Go to Step (8)
	connector terminals for damage, corrosion or		circuit as	
	contamination		necessary.	
	Did you find a problem?		Refer to Wiring Repairs	
			in Engine	
8	Replace the electronic throttle		Electrical. Go to Step (9)	-
	Is the replacement complete?		0	
9	Remove all test equipment except the DST.		System OK	Go to OBD
	 Connect any disconnected components, fuses, etc. 			System Check
	 Using the DST clear DTC information from the 			
	ECM.			
	 Turn the ignition OFF and wait 30 seconds. 			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	 After operating the engine within the test 			
	parameters of DTC-222 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			
			I	





DTC 223-TPS 2 Signal Voltage High SPN/FMI 520251:3



Conditions for Setting the DTC

- Throttle Position Sensor 2
- Check Condition-Cranking or Running
- Fault Condition-TPS 2 sensor exceeds 4.80 volts for more than .50 seconds
- MIL-On during active fault
- Engine Shutdown

Circuit Description

There are 2 Throttle Position Sensors located within the throttle which use variable resistors to determine signal voltage based on throttle plate position. TPS1 will read lower voltage when closed and TPS2 will read higher voltage when closed. The TPS1 and TPS2 percentages are calculated from these voltages. Although the voltages are different, the calculated values for the throttle position percentages should be very close to the same. The TPS values are used by the ECM to determine if the throttle is opening as commanded. The TPS is not serviceable and in the event of a failure the electronic throttle assembly must be replaced.

This fault will set if the TPS 2 voltage is greater than 4.80 volts for more than .50 seconds. The MIL command is ON and the engine will shutdown.





DTC 223 TPS 2 Signal Voltage High SPN/FMI 520251:3

Step	DIC 223 IFS 2 Signal Voltag	Value(s)		No
1	Action Did you perform the On-Board (OBD) System Check?	<u>value(5)</u> -	Go to Step (2)	Go to OBD
				System Check
				Section
2	Key ON, Engine OFF		Go to Step (4)	Go to Step (3)
	DST (Diagnostic Scan Tool) connected in			
	DBW (Drive by Wire) throttle test mode			
	Does the DST display TPS 2 voltage of 4.8 volts or			
	greater with the throttle closed? Slowly depress Foot Pedal while observing TPS 2			
3			Go to Step (4)	Intermittent
	voltage			problem
	Does TPS 2 voltage ever exceed 4.8 volts?			Go to
				Intermittent
4	Key OFF		Go to Step (7)	section Go to Step (5)
•	Disconnect electronic throttle connector C025			
	Key ON Dees DOT disclose TDO 2 welfage lass than 2 2 welfage			
5	 Does DST display TPS 2 voltage less than 0.2 volts? Key OFF 		Repair the	Go to Step (6)
· ·	Disconnect ECM wire harness connector C001		circuit as	
			necessary.	
			Refer to	
	Using a DVOM check for voltage between		Wiring Repairs	
	electronic throttle connector TPS 2 signal pin 5 and engine ground		in Engine	
			Electrical.	
6	Do you have voltage? Replace ECM		Go to Step (11)	-
-				
7	 Is the replacement complete? Probe sensor ground circuit at the ECM side of 		Go to Step (8)	Go to Step (10)
	the wire harness pin 20 with a test light connected			
	to battery voltage			
	Does the test light come on? Inspect the electronic throttle wire harness		Den ein the	
8			Repair the circuit as	Go to Step (9)
	connector and terminals for damage, corrosion or contamination			
			necessary. Refer to	
	Did you find a problem?		Wiring Repairs	
			in Engine	
9	Replace electronic throttle		Electrical. Go to Step (11)	-
10	Is the replacement complete?			
10	Key OFF		Go to Step (6)	Repair the
	Disconnect ECM connector C001			circuit as
	Using a DVOM check for continuity between			necessary.
	throttle connector C025 sensor ground pin 2 and			Refer to
	ECM connector sensor ground pin 20			Wiring Repairs
	Do have continuity between them?			in Engine Electrical.
	<u> </u>		1	





Step	Action	Value(s)	Yes	No
11	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-223 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 336-Crank Sync Noise SPN/FMI 636:2



Conditions for setting the DTC

- Crankshaft Position sensor
- Check Condition- Engine cranking or running
- Fault Condition- one or more invalid crank re-sync within 800 ms
- MIL Command-ON

Circuit Description

The CKP (crankshaft position sensor) is a magnetic transducer mounted on the engine block adjacent to a pulse wheel located on the crankshaft. It determines crankshaft position by monitoring the pulse wheel. The Crankshaft Position sensor is used to measure engine RPM and its signal is used to synchronize the ignition and fuel systems. This fault will set one or more crank re-sync occur within 800 ms.





	DTC 336- Crank Sync I			
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Go to Step (2)	
1	Did you perform the On-Board (OBD) System Check?	-		Go to OBD
				System Check
2	Check to be sure that the ECM ground		Go to Step (3)	Section Repair the
	terminals C014 and C023 are clean and tight.			circuit as
	Are terminals C014 and C023 clean and tight?			necessary.
				Refer to
				Wiring Repairs
				in Engine
				Electrical.
3	Key OFF	Over .5 volts	Go to Step (4)	Go to Step (11)
	Disconnect the CKP sensor connector C017			
	 Using a DVOM check for voltage output 			
	directly from the CKP sensor while cranking			
	the engine			
	Do you have voltage output?			·
4	Key OFF		Go to Step (5)	Repair the
	Disconnect ECM connector C001			circuit as
	Using a DVOM check for continuity between CKP			necessary. Refer to
	connector pin A and ECM connector pin 21			Wiring Repairs
	Do you have continuity between them?			in Engine
				Electrical.
5	Using a DVOM check for continuity between CKP		Go to Step (6)	Repair the
	connector pin B and ECM connector pin 22			circuit as
	Do you have continuity between them?			necessary.
				Refer to
				Wiring Repairs
				in Engine
6	 Inspect the CKP connector C017 pins for damage, 		Repair the	Electrical. Go to Step (7)
	corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
	Increat the ECM compactor COO4 size of and CO		Electrical.	
7	 Inspect the ECM connector C001 pins 21 and 22 for damage, corresion or contamination 		Repair the	Go to step (8)
	for damage, corrosion or contamination		circuit as	
	Did you find a problem?		necessary. Refer to	
			Wiring Repairs	
			in Engine	
			Electrical.	
8	Using a DVOM check for continuity between ECM		Repair the	Go to Step (10)
	connector pins 21 and 22 to engine ground		shorted circuit	
	Do you have continuity?		as necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
9	Replace CKP sensor		Electrical. Go to Step (12)	_
10	Is the replacement complete? • Replace ECM		Go to Step (12)	-
	Is the replacement complete?			

DTC 336- Crank Sync Noise SPN/FMI 636:2





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Step	Action	Value(s)	Yes	No
11	 Key OFF Inspect the pulse wheel and CKP sensor for mechanical damage, corrosion or contamination. Did you find a problem? 		Repair the component as necessary. Refer to Engine Repairs in Engine Section	Go to Step (9)
12	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-336 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 337-Crank Loss SPN/FMI 636:4



Conditions for setting the DTC

- Crankshaft Position sensor
- Check Condition- Engine cranking or running
- Fault Condition- Three or more cam pulses without crank activity
- MIL Command-ON

Circuit Description

The CKP (crankshaft position sensor) is a magnetic transducer mounted on the engine block adjacent to a pulse wheel located on the crankshaft. It determines crankshaft position by monitoring the pulse wheel. The Crankshaft Position sensor is used to measure engine RPM and its signal is used to synchronize the ignition and fuel systems. This fault will set if three or more cam pulse signals are present without any crankshaft signal.





DTC 337-	Crank Loss	SPN/FMI	636:4

	DIC 337- Crank Los			
Step	Action Did you perform the On-Board (OBD) System Check?	<u>Value(s)</u>	Go to Step (2)	No Co to OPD
	Did you perform the On-Board (OBD) System Check?	-		Go to OBD
				System Check
2	Check to be sure that the ECM ground		Go to Step (3)	Section Repair the
2	terminals C014 and C023 are clean and tight.			circuit as
	Are terminals C014 and C023 clean and tight?			necessary.
				Refer to
				Wiring Repairs
				in Engine
3		Over .5 volts	Co to Stop (4)	Electrical.
5	Key OFF		Go to Step (4)	Go to Step (11)
	Disconnect the CKP sensor connector C017			
	Using a DVOM check for voltage output			
	directly from the CKP sensor while cranking			
	the engine			
	Do you have voltage output?			
4	Key OFF		Go to Step (5)	Repair the
	Disconnect ECM connector C001		,	circuit as
				necessary.
	Using a DVOM check for continuity between CKP connector pin A and ECM connector pin 21			Refer to
	connector pin A and ECM connector pin 21			Wiring Repairs
	Do you have continuity between them?			in Engine
				Electrical.
5	Using a DVOM check for continuity between CKP		Go to Step (6)	Repair the
	connector pin B and ECM connector pin 22			circuit as
	Do you have continuity between them?			necessary.
				Refer to
				Wiring Repairs
				in Engine
				Electrical.
6	• Inspect the CKP connector C017 pins for damage,		Repair the	Go to Step (7)
	corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
			Electrical.	
7	Inspect the ECM connector C001 pins 21 and 22		Repair the	Go to step (8)
	for damage, corrosion or contamination		circuit as	, /
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
8	Using a DVOM check for continuity between ECM		Electrical. Repair the	Go to Step (10)
	connector pins 21 and 22 to engine ground		shorted circuit	/
	Do you have continuity?		as necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
			Electrical.	
9	Replace CKP sensor		Go to Step (12)	-
_				
10	Is the replacement complete? • Replace ECM		Go to Step (12)	-
	Is the replacement complete?			
L		L	1	





Step	Action	Value(s)	Yes	No
11	 Key OFF Inspect the pulse wheel and CKP sensor for mechanical damage, corrosion or contamination. Did you find a problem? 	tuluo(o)	Repair the component as necessary. Refer to Engine Repairs in Engine Section	Go to Step (9)
12	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-337 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 420 Gasoline Catalyst Monitor SPN/FMI 520211:10



Conditions for Setting the DTC

- Catalyst Function
- Check condition- Engine running
- Fault condition- EGO 1 signal = EGO 2 signal for 100 updates
- MIL- On during active fault and for 1 second after active fault
- Adaptive- Disabled during active fault

Circuit Description

The ECM uses EGO 1 and EGO 2 sensor signals to diagnose problems with the catalyst muffler. When the signals for EGO 1 & EGO 2 are similar it may indicate a problem with the catalyst.

Diagnostic Aids

Always diagnose any other troubles, stored along with DTC 420 first. Check for and eliminate any exhaust leaks prior to replacing catalyst muffler. Look for exhaust leaks at the catalyst muffler inlet and tail pipes. Clear this trouble code after repairing exhaust leaks, and recheck for code.





DTC 524-Oil Pressure Low SPN/FMI 100:1



Conditions for Setting the DTC

- Engine Oil Pressure low
- Check Condition-Engine running for 30 seconds with RPM greater than 600
- Fault Condition- closed circuit/voltage low less than 2.5 volts
- MIL-On during active fault and for 3 seconds after active fault
- Engine Shut Down

Circuit Description

The Oil Pressure Switch is used to communicate a low oil pressure condition to the ECM. Engine damage can occur if the engine is operated with low oil pressure. The ECM uses an analog voltage input with an internal 5 volt reference. If the oil pressure circuit is grounded, the input voltage will be near zero. If it is open, the input will be near 5 volts. The switch is normally closed. This fault will set if the switch remains closed with the engine running. The MIL command is ON and the engine will shut down in the event of this fault to help prevent possible engine damage.





Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD
	,			System Check
				Section
2	Verify that the engine has oil pressure using a		Go to Step (3)	Repair faulty
	mechanical oil pressure gauge before proceeding			Oiling System
	with this chart. See Engine Specifications Section			
	1F.			
	Deep the engine have all pressure shave 2 paid			
	 Does the engine have oil pressure above 2 psi? Key On, Engine Running DST connected in 		Go to Step (4)	Intermittent
3	System Data Mode			problem
5	Clear DTC 524			Go to
				Intermittent
	Warm the engine by idling until the ECT			section
	temperature is above 160 degrees F. and has			Section
	been running for at least one minute			
	 Increase engine speed above 600 RPM 			
	Does DTC 524 reset and cause the engine to shut			
	down?			
	Key OFF		Go to Step (6)	Go to Step (5)
	Disconnect oil pressure switch harness connector			
4	C005			
	Clear DTC 524			
	 Start engine, let idle for at least one minute with 			
	ECT over 160 degrees F.			
	3			
	Increase engine speed above 600 RPM			
	Does DTC 524 reset?			
5	Replace oil pressure switch		Go to Step (9)	-
	Is the replacement complete? Key OFF		Repair the	Go to Step (7)
6	5		circuit as	
6	Disconnect ECM harness connector C001		necessary.	
	Using a DVOM check for continuity between oil		Refer to	
	pressure switch connector LT GRN/BLK wire and		Wiring Repairs	
	engine ground.		in Engine	
	Do you have continuity between them?		Electrical.	
7	Inspect ECM connector pin 37 for damage		Repair the	Go to Step (8)
	corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
			Electrical.	
8	Replace ECM		Go to Step (9)	-
	 Is the replacement complete? 			

DTC 524- Oil Pressure Low SPN/FMI 100:1





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Step	Action	Value(s)	Yes	No
9	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-524 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 562-System Voltage Low SPN/FMI 168:17



Conditions for Setting the DTC

- System Voltage to ECM
- Check Condition-Key on with engine speed greater than 1500 RPM
- Fault Condition-Battery voltage at ECM less than 9.0 volts for more than 5 seconds
- MIL-On for active fault and for 10 seconds after active fault
- Adaptive-Disabled and for the for remainder of key ON cycle

Circuit Description

The battery voltage powers the ECM and must be measured to correctly operate injector drivers, fuel trim valves and ignition coils. This fault will set if the ECM detects system voltage less than 9.0 for 5 seconds or longer while the alternator should be charging. The adaptive learn is disabled during this fault for the remainder of the key cycle.





.	DIC 562- System vonag			
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes Go to Step (2)	Go to OBD
'		-		System Check
2		_	Intermittent	Section Go to Step (3)
_	Key On, Engine Running		problem	
			Go to Engine	
	DST (Diagnostic Scan Tool) connected in		Electrical	
	System Data Mode		Intermittent	
	Does DST display system voltage greater than 9.0		section	
	volts?			
3	Check battery condition	-	Go to Step (4)	Replace
	Is it OK?			Battery
4	Check charging system	-	Go to Step (5)	Repair
	Is it Ok?			charging
5	Chook the voltage at ECM connector COO1 mine			System
5	Check the voltage at ECM connector C001 pins	-	Repair ECM Ground circuit.	Go to Step (6)
	60 and 79		Go to Power	
	Measure voltage with DVOM between each pin		and Ground	
	and engine ground			
	Is the voltage greater than 9.0 volts?		section	
			in engine	
6		_	Electrical Repair ECM	Go to step (7)
	Check the voltage at ECM connector pins		power circuit.	
			Go to Power	
	69 and 81		and Ground	
	Measure voltage with DVOM between each pin		section	
	and battery positive		in engine	
	Is the voltage greater than 9.0 volts?		Electrical	
7	Replace ECM	-	Go to Step (8)	-
	 Is the replacement complete? Remove all test equipment except the DST. 			
8		-	System OK	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-562 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			

DTC 562- System Voltage Low SPN/FMI 168:17





DTC 563-System Voltage High SPN/FMI 168:15



Conditions for Setting the DTC

- System Voltage to ECM
- Check Condition-Cranking or Running
- Fault Condition-System battery voltage at ECM greater than 18 volts for 3 seconds
- MIL-On for active fault and for 5 seconds after active fault
- Adaptive-Disabled for remainder of key cycle

Circuit Description

The battery voltage powers the ECM and must be measured to correctly operate injector drivers, trim valves and ignition coils. This fault will set if the ECM detects voltage greater than 18 volts for 3 seconds or more anytime the engine is cranking or running. The adaptive learn function is disabled during this fault and for the remainder of the key cycle. The ECM will shut down with internal protection if the system voltage ever exceeds 26 volts.





DTC 563- System Voltage High SPN/FMI 168:15

Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD System Check
2	Key On, Engine Running		Go To Step (3)	Section Intermittent problem
	 DST (Diagnostic Scan Tool) connected in System Data Mode 			Go to Engine Electrical Intermittent
	Run engine greater than 1500 rpm.			section
	Does DST display system voltage greater than 18 volts?			
3	 Check voltage at battery terminals with DVOM with engine speed greater than 1500 rpm ls it greater than 18 volts? 	-	Go to Step (4)	Go to Step (5)
4	 Repair the charging system 	-	Go to Step (6)	-
5	Has the charging system been repaired? Replace ECM Is the replacement complete?		Go to Step (6)	-
6	 Is the replacement complete? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-563 check for any stored codes. Does the engine operate normally with no stored codes? 	-	System OK	Go to OBD System Check





DTC 601-Flash Checksum Invalid SPN/FMI 628:13



Conditions for Setting the DTC

- Engine Control Module
- Check Condition- Key on
- Fault Condition- Internal microprocessor error
- MIL- On
- Adaptive- Disabled for the remainder of the key-ON cycle
- Power Derate level 2

Circuit Description

The ECM has several internal checks that must be satisfied each time an instruction is executed. Several different things can happen within the microprocessor that will cause this fault. The ECM will attempt to reset itself in the event this fault is set. The MIL command is on and will remain on until the code is cleared using the DST. Power Derate level 2 will be enforced limiting maximum throttle position to 20%.





DTC 601- Flash Checksum Invalid SPN/FMI 628:13

Step	Action	Value(s)	Yes	No
	Action Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD
				System Check
				Section
2	Key On, Engine Running		Go to Step (3)	Intermittent
	DST (Diagnostic Scan Tool) connected in			problem
	System Data Mode			Go to
	Clear system fault code			Intermittent
				section
3	 Does DTC 601 reset with the engine idling? Check ECM power and ground circuits 		Go to Step (4)	Repair the
	Are the power and ground circuits Ok?			circuit as
				necessary.
				Refer to
				Wiring Repairs
				in Engine
				Electrical.
4	Replace ECM		Go to Step (5)	-
5	 Is the replacement complete? Remove all test equipment except the DST. 		Sustam OK	Go to OBD
Э			System OK	System Check
	 Connect any disconnected components, fuses, etc. 			System Check
	 Using the DST clear DTC information from the 			
	FCM.			
	 Turn the ignition OFF and wait 30 seconds. 			
	 Start the engine and operate the vehicle to full 			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-601 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 604-RAM Failure SPN/FMI 630:12



Conditions for Setting the DTC

- Engine Control Module
- Check Condition- Key on
- Fault Condition- Internal microprocessor error
- MIL- On
- Adaptive- Disabled for the remainder of the key-ON cycle
- Power Derate level 2

Circuit Description

The ECM has several internal checks that must be satisfied each time an instruction is executed. Several different things can happen within the microprocessor that will cause this fault. The ECM will attempt to reset itself in the event this fault is set. The MIL command is on and will remain on until the code is cleared using the DST. Power Derate level 2 will be enforced limiting maximum throttle position to 20%.





DTC 604- RAM Failure SPN/FMI 630:12

Ctore	A ation		Vee	N-
Step	Action Did you perform the On-Board (OBD) System Check?	<u>Value(s)</u>	Go to Step (2)	No Go to OBD
		-		System Check
				System Check Section
2	Key On, Engine Running		Go to Step (3)	Intermittent
	 DST (Diagnostic Scan Tool) connected in 			problem
				Go to
	System Data Mode			Intermittent
	Clear system fault code			section
3	 Does DTC 604 reset with the engine idling? Check ECM power and ground circuits 			
3			Go to Step (4)	Repair the circuit as
	Are the power and ground circuits Ok?			
				necessary. Refer to
				Wiring Repairs in Engine
				Electrical.
4	Replace ECM		Go to Step (5)	
5	 Is the replacement complete? Remove all test equipment except the DST. 		System OK	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			
	 Using the DST clear DTC information from the 			
	ECM.			
	 Turn the ignition OFF and wait 30 seconds. 			
	 Start the engine and operate the vehicle to full 			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	 After operating the engine within the test 			
	parameters of DTC-604 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 606-COP Failure SPN/FMI 629:31



Conditions for Setting the DTC

- Engine Control Module
- Check Condition- Key on
- Fault Condition- Internal microprocessor error
- MIL- On
- Adaptive- Disabled for the remainder of the key-ON cycle
- Power Derate level 2

Circuit Description

The ECM has several internal checks that must be satisfied each time an instruction is executed. Several different things can happen within the microprocessor that will cause this fault. The ECM will attempt to reset itself in the event this fault is set. The MIL command is on and will remain on until the code is cleared using the DST. Power Derate level 2 will be enforced limiting maximum throttle position to 20%.





Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD
				System Check
				Section
2	Key On, Engine Running		Go to Step (3)	Intermittent
	DST (Diagnostic Scan Tool) connected in			problem
	System Data Mode			Go to
	Clear system fault code			Intermittent
	Does DTC 606 reset with the engine idling?			section
3	 Does DTC 606 reset with the engine idling? Check ECM power and ground circuits 		Go to Step (4)	Repair the
	Are the power and ground circuits Ok?			circuit as
				necessary.
				Refer to
				Wiring Repairs
				in Engine
4	Replace ECM		Go to Step (5)	Electrical.
-				-
5	 Is the replacement complete? Remove all test equipment except the DST. 		System OK	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			- ,
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-606 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			

DTC 606- COP Failure SPN/FMI 629:31





DTC 642-External 5 Volt Reference Low SPN/FMI 1079:4



Conditions for Setting the DTC

- External 5 volt reference
- Check Condition-Cranking with battery voltage greater than 8 volts and engine running
- Fault Condition-5 volt reference voltage lower than 4.6 volts for more than 1 second
- MIL-On during active fault and for 2 seconds after active fault
- Adaptive-Disabled during active fault

Circuit Description

The External 5 volt supply powers many of the sensors and other components of the fuel system. The accuracy of the 5 volt supply is very important to the accuracy of the powered sensors and fuel control by the ECM. The ECM is able to determine if they are overloaded, shorted, or otherwise out of specification by monitoring the 5 volt supply. This fault will set if the 5 volt reference is below 4.6 volts for one second. Adaptive Learn will be disabled during this fault





	DTC 642 External 5V Refere	nce Low	SPN/FIMI 1	079:4
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Go to Step (2)	No
	Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD System Check Section
2	 Key ON, Engine Running DST (Diagnostic Scan Tool) connected in System Fault Mode Does DST display DTC 642? 		Go to Step (3)	Intermittent problem Go to Intermittent
3	 Key OFF Disconnect ECM connector C001 Using DVOM check for continuity between ECM 5 volt reference pin 19 and engine ground Do you have continuity? 		Go to Step (5)	section Go to Step (4)
4	Replace ECM Is the replacement complete?		Go to Step (7)	-
5	 Is the replacement complete? While monitoring DVOM for continuity between ECM 5 volt reference and engine ground disconnect each sensor (below) one at a time to find the shorted 5 volt reference. When continuity to ground is lost the last sensor disconnected is the area of suspicion. Inspect the 5 volt reference supply wire leads for shorts before replacing the sensor. IAT ECT TMAP Electronic Throttle Gasoline Sensor FPP TPS 1 TPS 2 Crankshaft Sensor Camshaft Sensor While disconnecting each sensor one at a time did you loose continuity? 		Go to Step (6)	Repair shorted wire harness
6	Replace Sensor Is the replacement complete?		Go to step (7)	-

DTC 6/2 External 5V Poference Low SPN/EMI 1079-4





Step	Action	Value(s)	Yes	No
	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-642 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check




DTC 643-External 5 Volt Reference High SPN/FMI 1079:3



Conditions for Setting the DTC

- External 5 volt reference
- Check Condition-Cranking with battery voltage greater than 8 volts or engine running
- Fault Condition-5 volt reference higher than 5.4 volts for more than 1 second
- MIL-On during active fault and for 2 seconds after active fault
- Adaptive-Disabled during active fault

Circuit Description

The External 5 volt supply powers many of the sensors and other components in the fuel system. The accuracy of the 5 volt supply is very important to the accuracy of the powered sensors and fuel control by the ECM. The ECM is able to determine if they are overloaded, shorted, or otherwise out of specification by monitoring the 5volt supply. This fault will set if the 5 volt reference is above 5.4 volts for more than one second. Adaptive Learn will be disabled during this fault





	DIC 043 External 5 Volt Refer			
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes Go to Step (2)	No Co to OPD
1	Dia you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD
				System Check
2	Key ON, Engine running		Go to Step (3)	Section Intermittent
2			00 to Step (3)	problem
	DST (Diagnostic Scan Tool) connected in			Go to
	System Data Mode			Intermittent
	Does DST display DTC 643?			section
3	Check all ECM ground connections		Go to Step (4)	Repair the
	Refer to Engine electrical power and ground			circuit as
	distribution.			necessary.
				Refer to
	Are the ground connections Ok?			Wiring Repairs
				in Engine
				Electrical.
4	Key OFF		Repair the	Go to Step (5)
-			circuit as	
			necessary.	
	Key ON		Refer to	
	Using DVOM check for Voltage between ECM		Wiring Repairs	
	harness wire pin 19 and engine ground		in Engine	
	Do you have voltage?		Electrical.	
5	Replace ECM		Go to Step (6)	-
	 Is the replacement complete? Remove all test equipment except the DST. 			
6			System OK	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-643 check for any stored			
	codes.			
	Does the vehicle engine normally with no stored			
	codes?			

DTC 643 External 5 Volt Reference High SPN/FMI 1079:3





DTC 685-Relay Coil Open SPN/FMI 1485:5



Conditions for Setting the DTC

- Power relay check
- Check Condition-Key ON
- Fault Condition- Relay coil open

Circuit Description

The power relay switches power out to various sensors, actuators and solenoids in the fuel system. This fault will set if the ECM detects an open circuit on the relay control output.





DTC 685- Relay Coil Open SPN/FMI 1485:5

Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD
				System Check
	 DST connected and in the system data mode 		Go to step (4)	Section Go to step (3)
2	Key OFF			
	Remove the power relay from the fuse block			
	 Using a DVOM check the resistance of the 			
	relay coil between terminals 85 and 86			
	Is the resistance value less than 100 ohms? Replace the power relay			
			Go to step (9)	_
3	Is the replacement complete? • Check fuse F2			
4			Replace fuse	Go to step (5)
5	Is the fuse open? Disconnect ECM connector C001		F2 Go to step (6)	Repair the
5				open circuit as
	Using a DVOM check for continuity between			required. See
	ECM pin 71 and fuse block cavity for relay			
	terminal 85			wiring harness
	Do you have continuity? ● Remove fuse F2			repairs
6			Go to step (7)	Repair the
	 Using a DVOM check for continuity between 			open circuit as
	fuse block cavity for relay terminal 86 and the			required. See
	power out of the F2 fuse holder			wiring harness
	Do you have continuity?			repairs
7	Check all system fuses.		Go to step (9)	Go to step (8)
	Check all relay placement positions in fuse			
	block.			
	Run complete pin to pin checks on chassis			
	wiring to fuel system harness.			
	See complete fuel system schematic for			
	• See complete ruer system schematic for			
	Did you find the problem? Replace the ECM		Go to step (9)	
8				–
0	Is the replacement complete?			l









DTC 686-Relay Control Ground Short SPN/FMI 1485:4



Conditions for Setting the DTC

- Power relay ground control
- Check Condition-Key ON
- Fault Condition- Relay control shorted to ground

Circuit Description

The power relay switches power out to various sensors, actuators and solenoids in the fuel system. This fault will set if the ECM detects a direct short to ground on the relay control output.





Ctor	Action			1403.4
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes Go to Step (2)	No Go to OBD
	Did you perform the On-Board (OBD) System Check?	-	30 to Step (2)	
				System Check
	Key On, DST connected in the System Data		Go to Step (4)	Section Intermittent
3	mode			problem
5	Clear DTC 686			Go to
				Intermittent
	Start the engine			section
	Does DTC 686 re-set?			3001011
	Disconnect ECM connector C001		Go to step (5)	Go to step (7)
	 Using a DVOM check the resistance value 			
4	between ECM pin 71 and engine ground			
	 Is the resistance less than 60 ohms? Remove the power relay from the fuse block 		Develoption	
5			Repair the	Go to step (6)
	Using a DVOM check the resistance value		shorted to	
	again between ECM pin 71 and engine		ground relay	
	ground		control circuit	
	Is the resistance less than 60 ohms?		as necessary.	
			See wiring	
	Replace the power relay		harness repairs Go to step (8)	
6			1 ()	—
<u>6</u> 7	Is the replacement complete? • Replace ECM		Go to step (8)	_
	 Is the replacement complete? Remove all test equipment except the DST. 			
8			System OK	Go to OBD
	 Connect any disconnected components, fuses, etc. 			System Check
	Using the DST clear DTC information from the			
	ECM.			
	 Turn the ignition OFF and wait 30 seconds. 			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-686 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			

DTC 686- Relay Control Ground Short SPN/FMI 1485:4





DTC 687-Relay Coil Short to Power SPN/FMI 1485:3



Conditions for Setting the DTC

- Power relay check
- Check Condition-Key ON
- Fault Condition- Relay coil shorted to power

Circuit Description

The power relay switches power out to various sensors, actuators and solenoids in the fuel system. This fault will set if the ECM detects a short circuit to power on the relay control output.





DTC 687- Relay Coil Short to Power SPN/FMI 1485:3

Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD
				System Check
				Section
	DST connected and in the system data mode		Go to step (3)	Go to step (4)
2	Key OFF			
	Remove the power relay from the fuse block			
	Using a DVOM check the resistance of the			
	relay coil between terminals 85 and 86			
	Is the resistance value less than 60 ohms?			
	 Is the resistance value less than 60 ohms? Replace the power relay 		Go to step (9)	_
3	 Is the replacement complete? Using a DVOM check for continuity between 			
4			Go to step (3)	Go to step (5)
	relay terminals 85 and 30			
5	 Do you have continuity between them? Disconnect ECM wire harness connector 	System	Repair the	Go to step (6)
5	C001	battery	short to power.	GO IO SIEP (O)
		voltage	See wiring	
	 Using a DVOM check for power between ECM pin 71 and engine ground with the key 	voltage	harness repair.	
	ON			
6	Do you have power?		Go to step (7)	
				_
7	 Is the replacement complete? Remove all test equipment except the DST. 		Go to step (8)	Go to step (9)
	Connect any disconnected components, fuses,			
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	• Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-687 check for any stored codes.			
	Does DTC 687 still re-set?			
	Replace the ECM		Go to step (9)	_
8	Is the replacement complete?			





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DTC 1111-Fuel Rev Limit SPN/FMI 515:16



Conditions for Setting the DTC

- Fuel Rev Limit
- Check Condition- Engine Running
- Fault Condition- Engine RPM greater than 3500 for 2 seconds continuously
- MIL- On during active fault

Circuit Description

This fault will set anytime Engine RPM is greater than 3500 for 2 seconds continuously. When these conditions are met the ECM cuts off fueling. This is to help prevent engine or equipment damage. The MIL will be on during this active fault.

Diagnostic Aid

Always check for other stored DTC codes before using the following DTC chart for this code set. Repair any existing codes starting with the lowest numerical code first.





DTC 1111-Fuel Rev Limit S	PN/FMI 515:16
---------------------------	---------------

Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD
				System Check
				Section Go to Step (4)
2	Key ON, Engine OFF		Go to Step (3)	Go to Step (4)
	DST in Active Fault Mode			
	Are any other DTC codes present with DTC 1111?			
3	Diagnose and repair any other DTC codes before		Go to step (4)	-
	proceeding with this chart.			
	Have any other DTC codes been diagnosed and			
	repaired?			
4	Check the service part Number on the ECM to		Go to Step (6)	Go to Step 5
	ensure correct calibration is in use			
	 Is the service part Number Correct? Replace ECM with the correct service part number 			
5			Go to Step (9)	-
6	 Is the replacement complete? Check the mechanical operation of the throttle 		Go to Step (8)	Go to Step (7)
0				
7	 Is the mechanical operation of the throttle OK? Correct mechanical operation of the throttle. Refer 		Go to step (9)	-
,	to Engine & Component section			
	Has the mechanical operation of the throttle been			
	corrected?			
8	Check engine for large manifold vacuum leaks.		Go to Step (9)	Go to OBD
	Refer to Fuel Systems symptom diagnostics			System Check
				Section
9	 Did you find and correct the vacuum leak? Remove all test equipment except the DST. 		System OK	Go to OBD
	Connect any disconnected components, fuses, etc.			System Check
	Using the DST clear DTC information from the			
	ECM.			
	 Turn the ignition OFF and wait 30 seconds. 			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	 After operating the engine within the test 			
	parameters of DTC-1111 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 1112-Spark Rev Limit SPN/FMI 515:0

Electronic Throttle			ECM
	4	PN KWUHT 82	
	1	TAN/ORN 83	D8W-
	6	PPL/LT BLU S	TPS 1 Signal
	2	BLKATGRN 20	SensorGip and
	5		TPS 2 Signal
	з	LTG RN/RED 19	5 Vonts
	C025	ō	

Conditions for Setting the DTC

- Spark Rev Limit
- Check Condition- Engine running
- Fault Condition- Engine RPM greater than 3700
- MIL- On during active fault
- Engine Shut Down

Circuit description

This fault will set anytime the engine RPM exceeds 3700. During this condition the ECM will shut off spark to the engine. This is to help prevent engine or equipment damage. The MIL command is ON during this active fault and the engine will shut down.

Diagnostic Aid

Always check for other stored DTC codes before using the following DTC chart for this code set. Repair any existing codes starting with the lowest numerical code first.





	DIC 1112- Spark Rev Limit SPN/FMI 515:0					
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes Go to Step (2)	No		
1	Did you perform the On-Board (OBD) System Check?	- ` `	Go to Step (2)	Go to OBD		
				System Check		
				Section Go to Step (4)		
2	Key ON, Engine OFF		Go to Step (3)	Go to Step (4)		
	DST connected					
	Are any other DTC codes present with DTC 1112?					
	Are any other DTC codes present with DTC TTZ?					
3	Diagnose any other DTC codes before proceeding		Go to step (4)			
5	· · ·		G0 10 Step (4)	-		
	with this chart.					
	Have any other DTC codes been diagnosed and					
	repaired?					
4	 Check the service part number on the ECM to 		Go to Step (6)	Go to Step 5		
	ensure correct calibration is in use					
	Is the service part number Correct?					
5	 Is the service part number Correct? Replace ECM with correct service part Number 		Go to Step (9)	-		
	Is the replacement complete?					
6	 Is the replacement complete? Check the mechanical operation of the throttle 		Go to Step (8)	Go to Step (7)		
	Is the mechanical operation of the throttle OK?					
7	 Is the mechanical operation of the throttle OK? Correct mechanical operation of the throttle. Refer 		Go to step (9)	-		
	to Engine & Component section					
	Has the mechanical operation of the throttle been					
	corrected?					
8	Check engine for large manifold vacuum		Go to Step (9)	Go to OBD		
	leaks. Refer to Fuel Systems section Symptom			System Check		
	Diagnostics			Section		
	-					
9	 Did you find and correct the vacuum leak? Remove all test equipment except the DST. 		System OK	Go to OBD		
Ũ	 Connect any disconnected components, fuses, etc. 		eyetem ert	System Check		
	 Using the DST clear DTC information from the 					
	ECM.					
	• Turn the ignition OFF and wait 30 seconds.					
	 Start the engine and operate the vehicle to full 					
	operating temperature					
	Observe the MIL					
	Observe engine performance and driveability					
	After operating the engine within the test					
	parameters of DTC-1112 check for any stored					
	codes.					
	Does the engine operate normally with no stored					
	codes?					

DTC 1112- Spark Rev Limit SPN/FMI 515:0





DTC 1151- Closed Loop Multiplier High LPG SPN/FMI 520206:0



Conditions for Setting the DTC

- Heated Oxygen Sensor
- Check Condition- Engine running
- Fault Condition- Closed Loop multiplier out of range (greater than 35%)
- MIL- ON

Circuit description

The HO2S sensor is used to determine if the fuel flow to the engine is correct by measuring the oxygen content in the exhaust gas. The ECM uses this information to correct the fuel flow with the Closed Loop multiplier and the adaptive multiplier. This fault sets if the Closed Loop multiplier exceeds the limits of normal operation and cannot correctly modify the fuel flow within its limits

Diagnostic Aid

Oxygen Sensor Wire Heated Oxygen sensor wires may be mis-routed and contacting the exhaust manifold.

Vacuum Leaks Large vacuum leaks and crankcase leaks can cause a lean exhaust condition at especially at light load.

Fuel Mixer System can be lean due to faulty EPR (Electronic Pressure Regulator) or faulty fuel mixer.

<u>Fuel Pressure</u> Low secondary fuel pressure, faulty EPR (Electronic Pressure Regulator) or contaminated fuel filter can cause fuel the system to run lean. Perform LPG Fuel System Diagnosis Diagnosis (Section 5).

Exhaust Leaks If there is an exhaust leak, outside air can be pulled into the exhaust and past the 02 sensor causing a false lean condition.

Fuel Quality Contaminated or spoiled fuel can cause the fuel system to be lean.

<u>Ground Problem</u> ECM grounds must be clean, tight and in the proper location.





DTC 1151- Closed Loop Multiplier High LPG SPN/FMI 520206:0

04.0.10				
Step 1	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes Go to Step (2)	No Go to OBD
				System Check
2			Go to step (3)	Section Intermittent
2	Key On, Engine Running		00 10 3160 (0)	problem
	 DST (Diagnostic Scan Tool) connected in 			Go to
				Intermittent
	System Data ModeRun engine to full operating temperature and then			section
	idle for a minimum of 2 minutes			
	Does DST display EGO 1 voltage fixed below 0.35			
	volts after 2 minutes of idle run time?			
3	Key OFF		Repair the	Go to Step (4)
	Disconnect ECM connector C001		circuit as	
	Disconnect EGO 1 wire harness connector C006		necessary. Refer to	
	 Using a high impedance DVOM check for 		Wiring Repairs	
	continuity between EGO 1 connector signal pin C		in Engine	
	and engine ground		Electrical.	
4	 Do you have continuity? Using a high impedance DVOM check for 		Repair the	Go to Step (5)
	continuity between EGO 1 connector signal pin C		circuit as	
	and EGO 1 connector signal ground pin D		necessary.	
	• Do you have continuity between them?		Refer to	
			Wiring Repairs	
			in Engine	
5	Refer to Diagnostic aids for DTC 1151		Electrical. Go to Step (6)	
	Did you check the diagnostic Aids for DTC 1151? • Replace EGO 1 sensor		,	
6			Go to Step (7)	
7	 Is the replacement complete? Remove all test equipment except the DST. 		System OK	Go to OBD
	 Connect any disconnected components, fuses, 		Oystern Ort	System Check
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	 Turn the ignition OFF and wait 30 seconds. 			
	Start the engine and operate the vehicle to full			
	operating temperatureObserve the MIL			
	 Observe the MiL Observe engine performance and driveability 			
	 After operating the engine within the test 			
	parameters of DTC-1151 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 1152- Closed Loop Multiplier Low LPG SPN/FMI 520206:1





Conditions for Setting the DTC

- Heated Oxygen Sensor
- Functional Fault-Closed Loop multiplier out of range (at limit of -35%)
- MIL Disabled

Circuit Description

The EGO 1 sensor is used to determine if the fuel flow to the engine is correct by measuring the oxygen content in the exhaust gas. The ECM uses this information to correct the fuel flow with the Closed Loop multiplier and the adaptive multiplier. This fault sets if the Closed Loop multiplier exceeds the limits of normal operation. When the multiplier cannot correctly modify the fuel flow within its limits, it is limited at -35%.

Diagnostic Aid

Fuel System High secondary fuel pressure may cause the system to run rich. A worn fuel mixer, faulty EPR (Electronic Pressure Regulator) may also cause the system to run rich. Perform LPG Fuel System Diagnosis Diagnosis (Section 5).

Fuel Quality A drastic variation in fuel quality (very high butane content) may cause the fuel system to run rich. Be sure that the specified HD-5 or HD-10 motor fuel grade propane is used

Air Filter A plugged, damaged or modified air filter may cause the system to run rich.





Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	- ` ´	Go to Step (2)	Go to OBD
				System Check
				Section
2			Go to step (3)	Intermittent
	Key On, Engine Running			problem
	DST (Diagnostic Scan Tool) connected in			Go to
	System Data Mode			Intermittent
	 Run engine to full operating temperature and then 			section
	idle for a minimum of 2 minutes			
	Does DST display HO2S voltage fixed above 0.7 volts			
	after 2 minutes of idle run time?		Donoir wiro	Defer to
	Key OFF		Repair wire	Refer to
3	Disconnect HO2S wire harness connector		harness	Diagnostic Aids
	Disconnect ECM wiring harness connector		shorted signal	for DTC 1152
	Key ON		to voltage	
	Using a high impedance DVOM check for voltage		Refer to	
			Wiring Repairs	
	between HO2S connector signal pin C and		in Engine	
	engine ground		Electrical.	
	Do you have voltage?			

DTC 1152- Closed Loop Multiplier Low LPG SPN/FMI 520206:1





DTC 1155 -Closed Loop Multiplier High Gasoline SPN/FMI 520204:0



Conditions for Setting the DTC

- Heated Oxygen Sensor
- Functional Fault-Closed Loop multiplier out of range (at limit of 35%)
- MIL-On during active fault

Circuit Description

The HO2S sensor is used to determine if the fuel flow to the engine is correct by measuring the oxygen content in the exhaust gas. The ECM uses this information to correct the fuel flow with the Closed Loop multiplier and the Adaptive multiplier. This fault will set if the Closed Loop multiplier exceeds 35%. The MIL command is ON

Diagnostic Aid

Oxygen Sensor Wire Heated Oxygen sensor wires may be mis-routed and contacting the exhaust manifold.

Vacuum Leaks Large vacuum leaks and crankcase leaks can cause a lean exhaust condition at especially at light load. Fuel Pressure Low fuel pressure, faulty fuel regulator or contaminated fuel filter can cause fuel the system to run lean

Exhaust Leaks If there is an exhaust leak, outside air can be pulled into the exhaust and past the 02 sensor causing a false lean condition.

<u>Fuel Quality</u> Contaminated or spoiled fuel can cause the fuel system to be lean. <u>Ground Problem</u> ECM grounds must be clean, tight and in the proper location.





DTC 1155- Closed Loop Multiplier High Gasoline SPN/FMI 520204:0

Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD System Check Section
2	 Key On, Engine Running DST (Diagnostic Scan Tool) connected in System Data Mode Run engine to full operating temperature and then idle for a minimum of 2 minutes Does DST display EGO 1 voltage fixed below 0.35 volts after 2 minutes of idle run time? 		Go to step (3)	Intermittent problem Go to Intermittent section
3	 Key OFF Disconnect EGO 1 sensor connector C006 Disconnect ECM connector C001 Using a high impedance DVOM Check for continuity between EGO 1 connector signal pin C and engine ground 		Repair the circuit as required Refer to Wiring Repairs in Engine Electrical.	Go to Step (4)
4	 Do you have continuity? Using a high impedance DVOM Check for continuity between EGO 1 connector signal pin C and EGO 1 sensor ground pin D Do you have continuity? 		Repair the circuit as required Refer to Wiring Repairs in Engine Electrical.	Go to Step (5)
5	Refer to Diagnostic aids for DTC 1155 Did you check the diagnostic Aids for DTC 1155?		Go to Step (6)	-
6	 Did you check the diagnostic Aids for DTC 1155? Replace EGO 1 sensor Is the replacement complete? 		Go to Step (7)	Refer to Diagnostic Aids for DTC 1155





DIAGNOSTIC TROUBLE CODES 7-129

Step	Action	Value(s)	Yes	NO	1
7	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-1155 check for any stored codes. Does the engine operate normally with no stored codes? 				





DTC 1156- Closed Loop Multiplier Low Gasoline SPN/FMI 520204:1



Conditions for Setting the DTC

- Heated Oxygen Sensor
- Functional Fault-Closed Loop multiplier out of range (at limit of -35%)
- MIL-On during active fault and for one update after active fault

Circuit Description

The HO2S (Heated Oxygen Sensor) sensor is used to determine if the fuel flow to the engine is correct by measuring the oxygen content in the exhaust gas. The ECM uses this information to correct the fuel flow with the Closed Loop multiplier and the adaptive multiplier. This fault will set if the Closed Loop multiplier is less than -35%. The MIL command is ON.

Diagnostic Aid

<u>Check for other DTC codes</u> Correct those starting with the lowest code set number before proceeding with the diagnostic chart. <u>Fuel System</u> The system will be rich if an injector fails in an open manner. High fuel pressure due to a faulty fuel regulator or obstructed fuel return line will cause the system to run rich.

Ignition noise open or poor ground circuit to or in the ignition system or ECM may cause EMI (Electromagnetic interference). This noise could be interpreted by the ECM as ignition pulses, and the sensed RPM becomes higher than the actual speed. The ECM then delivers too much fuel, causing the system to run rich.

TMAP Sensor A higher manifold pressure than normal can cause the system to go rich. Temporarily disconnecting the MAP Sensor will allow the ECM to set a default value for MAP.

<u>IAT Sensor</u> Check for a shifted sensor that could cause the ECM to sense lower than actual temperature of incoming air. This can cause a rich exhaust condition.

<u>ECT Sensor</u> Check for a skewed sensor that could cause the ECM to sense engine temperature colder than it actually is. This could also cause a rich exhaust condition.





DTC 1156- Closed Loop Multiplier Low Gasoline SPN/FMI: 520204:1

Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD System Check
				Section
2			Go to step (3)	Intermittent
	Key On, Engine Running			problem
	DST (Diagnostic Scan Tool) connected in			Go to
	System Data Mode			Intermittent
	• Run engine to full operating temperature and then idle for a minimum of 2 minutes			section
	Does DST display EGO 1 voltage fixed above 0.7 volts after 2 minutes of idle run time?			
3	Key OFF		Repair the	Refer to
	Disconnect EGO 1 wire connector C006		circuit as	Diagnostic Aid
	Disconnect ECM wiring harness connector C001		required	for DTC 1156
	Key ON		Refer to	
	Using a high impedance DVOM check for voltage		Wiring Repairs	
	between EGO 1 connector signal pin C and		in Engine	
	engine ground		Electrical.	
	Do you have voltage?			





DTC 1161-Adaptive Learn High LPG SPN/FMI 520202:0



Conditions for Setting the DTC

- Heated Oxygen Sensor
- Check Condition- Engine Running
- Fault Condition- Adaptive multiplier out of range (greater than +30%)
- MIL- On

Circuit Description

The EGO 1 sensor is used to determine if the fuel flow to the engine is correct by measuring the oxygen content in the exhaust gas. The ECM uses this information to correct the fuel flow with the Closed Loop multiplier and Adaptive multiplier. This fault will set if the adaptive multiplier exceeds the limits of normal operation.

Diagnostic Aid

Oxygen Sensor Wire Heated Oxygen sensor wires may be mis-routed and contacting the exhaust manifold.

Vacuum Leaks Large vacuum leaks and crankcase leaks can cause a lean exhaust condition at especially at light load. **Fuel Mixer** System can be lean due to faulty EPR (Electronic Pressure Regulator) or faulty fuel mixer.

Fuel Pressure Low secondary fuel pressure, faulty low pressure regulator or contaminated fuel filter can cause fuel the system to run lean. Perform LPG Fuel System Diagnosis (Section 5).

Exhaust Leaks If there is an exhaust leak, outside air can be pulled into the exhaust and past the 02 sensor causing a false lean condition.

Fuel Quality Contaminated or spoiled fuel can cause the fuel system to be lean.

<u>Ground Problem</u> ECM grounds must be clean, tight and in the proper location.





DTC 1161 Adaptive Learn High LPG SPN/FMI 520202:0

Step		Value(s)		No
1	Action Perform the On-Board (OBD) System Check?	<u></u>	Yes Go to Step (3)	Go to Step (2)
	Are any other DTCs present?			
2	Visually and physically check the following items:		Go to Step (8)	Go to Step (4)
	The air intake duct for being collapsed or restricted			
	The air filter for being plugged			
	The EGO 1 sensor installed securely and the			
	wire leads not contacting the exhaust manifold or ignition wires			
	 ECM grounds must be clean and tight. Refer to Engine Electrical Power and Ground Distribution 			
	 Fuel System Diagnostics. Refer to Fuel System Diagnostics 			
	Was a repair made? Diagnose any other DTC codes before 			
3	 Diagnose any other DTC codes before proceeding with this chart. Always repair 		Go to Step (8)	Go to step (4)
	existing codes starting with the lowest			
	numerical code set first.			
	Have any other DTC codes been detected, diagnosed			
	and repaired? • Disconnect EGO1 connector C006	0t		. David in the s
4		System voltage	Go to Step (5)	Repair the circuit as
	 Using a DVOM check for voltage between EGO 1 connector pins A and B 	voltage		necessary.
	Key ON			Refer to
				Wiring Repairs
	(CHECK MUST BE MADE WITHIN 30 SECONDS OR BEFORE POWER RELAY SHUTS DOWN)			in Engine Electrical.
	Do you have voltage?			
5	Key OFF		Repair the	Go to Step (6)
	Disconnect EGO 1 sensor wire harness		shorted circuit	
	connector C006		as necessary.	
	Disconnect ECM wire harness connector C001		Refer to Wiring Repairs	
	Key ON		in Engine	
	 Using a high impedance DVOM check for continuity between EGO 1 connector signal pin C and engine ground 		Electrical.	
	Do you have continuity?			
6	Using a high impedance DVOM check for		Repair the	Go to Step (7)
	continuity between EGO 1 connector signal ground pin D and EGO 1 signal pin C		shorted circuit as necessary.	
	 Do you have continuity? 		Refer to	
	• Do you have continuity :		Wiring Repairs	
			in Engine	
			Electrical.	





PSI 1.6L PFI CERTIFIED ENGINE SERVICE MANUAL

DIAGNOSTIC TROUBLE CODES 7-134

01	A = 41 =			
Step	Action	Value(s)	Yes	
	Replace EGO 1 sensor		Go to Step (8)	Refer to
	Is the replacement complete?			Diagnostic Aids
				for DTC 1161
8	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability 		System OK	Go to OBD System Check
	 After operating the engine within the test parameters of DTC-1161 check for any stored codes. Does the engine operate normally with no stored codes? 			





DTC 1162-Adaptive Learn Low (LPG) SPN/FMI 520202:1



Conditions for Setting the DTC

- Heated Oxygen Sensor
- Check Condition- Engine running
- Fault Condition- Adaptive multiplier out of range (at limit of -30%)
- MIL-On

Circuit Description

The EGO1 sensor is used to determine if the fuel flow to the engine is correct by measuring the oxygen content in the exhaust gas. The ECM uses this information to correct the fuel flow with the Closed Loop multiplier and Adaptive multiplier. This fault will set if the adaptive multiplier exceeds the limits of normal operation.

Diagnostic Aid

Fuel System High secondary fuel pressure will cause the system to run rich. A worn fuel mixer, faulty EPR (Electronic Pressure Regulator) may also cause the system to run rich. Perform LPG Fuel System Diagnosis (Section 5).

Fuel Mixer System can be rich due to faulty EPR (Electronic Pressure Regulator) or a worn fuel mixer.

Fuel Quality A drastic variation in fuel quality (very high butane content) may cause the fuel system to run rich. Be sure that the specified HD-5 or HD-10 motor fuel grade propane is used.

Air Filter A plugged, damaged or modified air filter may cause the system to run rich.





Step	Action	Value(s)	Yes	No
1	Perform the On-Board (OBD) System Check?	<u>value(3)</u>	Yes Go to Step (3)	Go to Step (2)
	Are any other DTCs present?			
	5			
2	Visually and physically check the following items:		Go to Step (8)	Go to Step (4)
	• The air intake duct for being collapsed or restricted			
	The air filter for being plugged			
	• The EGO 1 sensor installed securely and the			
	wire leads not contacting the exhaust manifold or			
	ignition wires			
	ECM grounds must be clean and tight. Refer to			
	Engine Electrical Power and Ground Distribution			
	Fuel System Diagnostics. Refer to Fuel System			
	Diagnostics			
	Was a repair made?			
3	 Diagnose any other DTC codes before 		Go to Step (8)	Go to step (4)
	proceeding with this chart. Always repair			
	existing codes starting with the lowest numerical code set first.			
	Have any other DTC codes been detected, diagnosed			
4	 and repaired? Disconnect EGO1 connector C006 	System	Go to Step (5)	Repair the
	 Using a DVOM check for voltage between 	voltage	,	circuit as
	EGO 1 connector pins A and B			necessary.
	Key ON			Refer to
				Wiring Repairs
	(CHECK MUST BE MADE WITHIN 30 SECONDS			in Engine
	OR BEFORE POWER RELAY SHUTS DOWN)			Electrical.
	Do you have voltage?			
	Do you have voltage?			
5	Key OFF		Repair the	Go to Step (6)
	Disconnect EGO 1 sensor wire harness		shorted circuit	,
	connector C006		as necessary.	
	 Disconnect ECM wire harness connector C001 		Refer to	
	Key ON		Wiring Repairs	
	 Using a high impedance DVOM check for 		in Engine	
	continuity between EGO 1 connector signal pin C		Electrical.	
	and engine ground			
	Do you have continuity?			
L	i Do you nave continuity:		L	

DTC 1162-Adaptive Learn Low LPG SPN/FMI 520202:1





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DIAGNOSTIC TROUBLE CODES 7-137

Step	Action	Value(s)	Yes	No
6.	 Using a high impedance DVOM check for continuity between EGO 1 connector signal ground pin D and EGO 1 signal pin C Do you have continuity? 		Repair the shorted circuit as necessary. Refer to Wiring Repairs in Engine Electrical.	Go to Step (7)
7	Replace EGO 1 sensor		Go to Step (8)	Refer to
	Is the replacement complete?			Diagnostic Aids for DTC 1162 Go to OBD
8	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-1162 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 1165 LPG Catalyst Monitor SPN/FMI 520213:10



Conditions for Setting the DTC

- Catalyst Function
- Check condition- Engine running
- Fault condition- EGO 1 signal = EGO 2 signal for 100 updates
- MIL- On during active fault and for 1 second after active fault
- Adaptive- Disabled during active fault

Circuit Description

The ECM uses EGO 1 and EGO 2 sensor signals to diagnose problems with the catalyst muffler. When the signals for EGO 1 & EGO 2 are similar it may indicate a problem with the catalyst.

Diagnostic Aids

Always diagnose any other troubles, stored along with DTC 420 first. Check for and eliminate any exhaust leaks prior to replacing catalyst muffler. Look for exhaust leaks at the catalyst muffler inlet and tail pipes. Clear this trouble code after repairing exhaust leaks, and recheck for code.





DTC1171- EPR Pressure Higher Than Expected SPN/FMI 520260:0



Conditions for Setting the DTC

- EPR delivery pressure
- Check condition-Engine running or cranking
- MIL-On during active fault
- Fault condition-EPR actual pressure greater than 4.0 inches H2O above commanded pressure
- Adaptive disabled
- Power derate level 1

Circuit Description

The EPR (Electronic Pressure Regulator) unit measures and controls the amount of fuel that is able to pass to the fuel mixer. Pressure readings are sent over the CAN to the ECM and in return the ECM sends back a control signal to the EPR to increase or decrease pressure for precise mixture control. This code will set in the event the actual pressure is 4.0 inches water pressure higher than the actual commanded pressure. The MIL command is on. Adaptive and closed loop are disabled with power derate level 1 enforced limiting throttle position to 70% maximum.

Diagnostic Aid

Always run the fuel system diagnostic pressure check before proceeding with the following diagnostic chart. High secondary fuel pressure due to a worn or damaged primary or secondary seat may cause this fault to set





DTC 1171-EPR Pressure Higher Than Expected SPN/FMI 520260:0

Step	Action	Value(s)	Yes	Νο
1	Did you perform the On-Board (OBD) System Check?	<u></u>	Go to Step (2)	Go to OBD System
2	 Did you run the fuel pressure diagnostic test in the fuel system diagnostic section with no problems found? 		Go to step (4)	Go to step 3
3	 Run the EPR pressure test in the LPG Fuel System Diagnosis procedure (Section 5) Did the EPR pass the fuel pressure test specifications? 		Go to step (4)	Follow the EPR service recommendations from the fuel pressure test chart.
4	Inspect the EPR electrical connector C026 for damage, corrosion or contamination. Did you find a problem?		Repair the circuit as necessary. Refer to wire harness repair section.	Go to step (5)
5	Replace the EPR		Go to step (6)	-
6	 Is the replacement complete? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1171 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC1172- EPR Pressure Lower Than Expected SPN/FMI 520260:1



Conditions for Setting the DTC

- EPR delivery pressure
- Check condition-Engine running or cranking
- MIL-On during active fault
- Fault condition-EPR actual pressure less than 4.0 inches H2O below commanded pressure
- Adaptive disabled
- Power derate level 1

Circuit Description

The EPR (Electronic Pressure Regulator) unit measures and controls the amount of fuel that is able to pass to the fuel mixer. Pressure readings are sent over the CAN to the ECM and in return the ECM sends back a control signal to the EPR to increase or decrease pressure for precise mixture control. This code will set in the event the actual pressure is 4.0 inches water pressure lower than the actual commanded pressure. The MIL command is on. Adaptive and closed loop are disabled with power derate level 1 enforced limiting throttle position to 70% maximum.

Diagnostic Aid

Always run the fuel system diagnostic pressure check before proceeding with the following diagnostic chart. Low secondary fuel pressure due to a fuel restriction or faulty regulator may cause this fault.





DTC 1172-EPR Pressure Lower Than Expected SPN/FMI 520260:1

Step	Action	Value(s)	Yes	No
1.	Did you perform the On-Board (OBD) System Check?	<u> </u>	Go to Step (2)	Go to OBD System Check Section Go to step 3
2	 Did you run the fuel pressure diagnostic test in the fuel system diagnostic section with no problems found? 		Go to step (4)	
3	 problems found? Run the EPR pressure test in the LPG Fuel System Diagnosis (Section 5). Did the EPR pass the fuel pressure test specifications? 		Go to step (4)	Follow the EPR service recommendations from the fuel pressure test chart.
4	Inspect the EPR electrical connector C026 for damage, corrosion or contamination. Did you find a problem?		Repair the circuit as necessary. Refer to wire harness repair section.	pressure test chart. Go to step (5)
5	 Replace the EPR Is the replacement complete? Remove all test equipment except the DST. 		Go to step (6)	_
6	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1172 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC1173- EPR Communication Lost SPN/FMI 520260:31



Conditions for Setting the DTC

- EPR CAN communication
- Check condition-Engine running or cranking
- MIL-On during active fault
- Fault condition-No packets received within 500 ms
- Adaptive disabled

Circuit Description

The EPR (Electronic Pressure Regulator) unit measures and controls the amount of fuel that is able to pass to the fuel mixer. Pressure readings are sent over the CAN to the ECM and in return the ECM sends back a control signal to the EPR to increase or decrease pressure for precise mixture control. This code will set in the event communication with the ECM is lost. The MIL command is on.





SPECTRUM

by IMPCO

DTC 1173-EPR Communication Lost SPN/FMI 520260:31

Ston	Action	Value(s)	Vaa	No
<u>Step</u>	Action Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD
· ·				System Check
				Section
2	Key ON		Go to step (3)	Intermittent
	DST (Diagnostic Scan Tool) connected in the			problem. Go
	system data mode			to Intermittent
	Clear DTC1173			Problem
				section in
	Key OFF			the electrical
	Key ON, and attempt to start the engine			section of this
	Does DTC1173 re-set			manual.
3	Key OFF	System	Go to step (7)	Go to step (4)
	Disconnect EPR electrical connector C026	battery		
	Key ON	voltage		
	Using a DVOM check for system power			
	between EPR connector pin 7 and engine			
	· · ·			
	ground			
	(Be sure to activate relay control ON using the DST			
	function or check before ECM relay control times out)			
	Do you have power? Check the 10A (EPR) fuse			Co to star (C)
4			Go to step (5)	Go to step (6)
5	 Is the fuse open? Replace EPR fuse 		Go to step (17)	
				–
6	 Is the replacement complete? Using a DVOM check for system power at 		Repair the	Repair the
_	power relay terminal 87	System	open circuit	power relay
	(Be sure to activate relay control ON using the DST	battery	between power	circuit as
	function or check before ECM relay control times out)	voltage	relay pin 87	required
	, ,	voltage	and EPR pin 7	
	Do you have power?			
			C_{0} to stop (17)	
7	Using a DVOM check for continuity between		Go to step (17) Go to step (8)	Go to step (17) Repair the
'	EPR connector pin 6 and engine ground			open ground
				circuit as
	Do you have continuity?			necessary.
				Refer to
				wiring repairs
				in engine
				electrical
8	Key OFF		Go to step (9)	Repair the
	Disconnect the EPR connector C026			open circuit
	Disconnect the ECM connector C001			as necessary.
				Refer to
	Using a DVOM check for continuity between EDB pin 1 and ECM pin 15			wiring repairs
	EPR pin 1 and ECM pin 15			in engine
	Do you have continuity?			electrical
9	Using a DVOM check for continuity between		Go to step (10)	Repair the
	EPR pin 2 and ECM pin 14			open circuit
	Do you have continuity?			as necessary.
				Refer to
				wiring repairs
				in engine
				electrical


Step	Action	Value(s)	Yes	No
10	Using a DVOM check for continuity between		Go to step (11)	Repair the
	EPR pin 3 and ECM pin 14			open circuit
	Do you have continuity?			as necessary.
				Refer to
				wiring repairs
				in engine
				electrical
11	Using a DVOM check for continuity between		Go to step (12)	Repair the
	EPR pin 6 and ECM pin 69			open circuit
	Do you have continuity?			as necessary.
				Refer to
				wiring repairs
				in engine
12	Using a DVOM check for continuity between		Go to step (13)	electrical Repair the
	EPR pin 6 and ECM pin 81			open circuit
	Do you have continuity?			as necessary.
	Do you have continuity!			Refer to
				wiring repairs
				in engine
13	 Disconnect vehicle interface connector 		Repair the	electrical Go to step (14)
	C011		shorted to	
	 Disconnect DST from the DLC connector 		ground CAN	
	C016		circuit as	
	Using a DVOM check for continuity between		necessary.	
	engine ground and EPR pins 1 and 3		Refer to	
	Do you have continuity?		wiring repairs	
			in engine	
14	Replace the EPR		electrical Go to step (15)	
				—
15	 Is the replacement complete? Remove all test equipment and reconnect the 		Go to step (16)	System OK
	DST.			
	 Connect any disconnected components, 			
	fuses, etc.			
	 Using the DST clear DTC information from 			
	the ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to			
	full operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC1173 check for any stored			
	codes.			
	Does DTC1173 still re-set?			
16	Replace the ECM		Go to step (17)	
	Is the replacement complete?			-





Step	Action	Value(s)	Yes	No
17	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1173 check for any stored codes. Does the engine operate normally with no stored codes? 	<u><u><u></u></u></u>	System OK	Go to OBD System Check





DTC1174- EPR Supply Voltage High SPN/FMI 520260:3



Conditions for Setting the DTC

- EPR supply voltage
- Check condition-Engine running or cranking
- MIL-On during active fault
- Fault condition- internal EPR supply voltage too high
- Adaptive disabled
- Closed loop disabled

Circuit Description

The EPR (Electronic Pressure Regulator) unit measures and controls the amount of fuel that is able to pass to the fuel mixer. Pressure readings are sent over the CAN to the ECM and in return the ECM sends back a control signal to the EPR to increase or decrease pressure for precise mixture control. This code will set if the EPR internal supply voltage is too high.

Diagnostic Aid

This DTC indicates abnormal EPR internal voltages that are not measurable externally. Check the system charging voltage to be sure this DTC and other over voltage DTC's are not present. Repair the charging system if it is found to be out of specification for high charge voltage. In the event of multiple code sets, always start the diagnostic repair with the lowest numerical value DTC first.





DTC 1174-EPR Voltage Supply High SPN/FMI 520260:3

1 Did you perform the On-Board (OBD) System Check?	Step	Action	Value(s)	Yes	No
2 • DST connected and in the system data mode Go to step (3) Repair the charging system the system battery voltage. 3 Lising a DVOM compare the system battery voltage to the DST display. Is the charging voltage within specifications? 1 volt Go to step (4) Go to step (5) 3 Using a DVOM compare the system battery voltage to the DST display. Is the voltage reading within 1 volt between the two of them? Go to step (6)	1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD
2 • DST connected and in the system data mode Go to step (3) Repair the charging system • Engine running • Check the system battery voltage. system system 3 Using a DVOM compare the system battery voltage to the DST display. 1 volt Go to step (4) Go to step (5) 4 • Replace the EPR Go to step (6)					System Check
mode Engine running charging system • Engine running • Check the system battery voltage. system 3 Using a DVOM compare the system battery voltage to the DST display. 1 volt Go to step (4) Go to step (5) 4 • Replace the EPR Go to step (6) _ 5 • Replace the ECM Go to step (6) _ 6 • Replace the text equipment except the DST. System OK Go to OBD 6 • Remove all test equipment except the DST. System OK Go to OBD 6 • Remove all test equipment except the DST. System OK So to OBD 6 • Remove all test equipment except the DST. System OK So to OBD 7 • Using the DST clear DTC information from the ECM. System OK So to OBD 9 • Using the DST clear DTC information from the ECM. • Using the engine and operate the vehicle to full operating temperature Observe the MIL Observe the MIL • Observe the MIL • Observe the MIL • Observe the MIL • Observe engine performance and driveability • After operating the engine within the test parameters of DTC1174 check for any stored codes. • Observe dual codes. • Observe dual codes.					Section
Engine running Check the system battery voltage. Is the charging voltage within specifications? Using a DVOM compare the system battery voltage to the DST display. Is the voltage reading within 1 volt between the two of them? Replace the EPR Go to step (4) Go to step (6) Is the replacement complete? Section 2 (1) System OK Go to step (6) System OK Go to other (6) System OK System OK Go to OBD System Check etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1174 check for any stored codes.	2	5		Go to step (3)	
Check the system battery voltage. Is the charging voltage within specifications? Using a DVOM compare the system battery voltage to the DST display. Is the voltage reading within 1 volt between the two of them? Go to step (4) Go to step (5) Go to step (6)		mode			
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to the DST display. Is the voltage reading within 1 volt between the two of them? 4 Replace the EPR Go to step (6) 5 Replace the ECM Go to step (6) 5 Replace the ECM Go to step (6) 6 Remove all test equipment except the DST. System OK 6 Remove all test equipment except the DST. System OK 6 Remove all test equipment except the DST. System OK 9 Connect any disconnected components, fuses, etc. System OK 9 Using the DST clear DTC information from the ECM. System Check 9 Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature 9 Observe the MIL Observe the MIL Observe the MIL 9 Observe engine performance and driveability After operating the engine within the test parameters of DTC1174 check for any stored codes.		, , ,			
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Is the voltage reading within 1 volt between the two of them? Go to step (6)	3		1 volt	Go to step (4)	Go to step (5)
4 • Replace the EPR Go to step (6)					
4 • Replace the EPR Go to step (6)		Is the voltage reading within 1 volt between the two of			
Is the replacement complete? Go to step (6) 5 • Replace the ECM Is the replacement complete? 6 • Remove all test equipment except the DST. • Connect any disconnected components, fuses, etc. • Using the DST clear DTC information from the ECM. • Turn the ignition OFF and wait 30 seconds. • Start the engine and operate the vehicle to full operating temperature • Observe the MIL • Observe the MIL • After operating the engine within the test parameters of DTC1174 check for any stored codes.		them?			
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Is the replacement complete? 6 Remove all test equipment except the DST. • Connect any disconnected components, fuses, etc. System OK • Using the DST clear DTC information from the ECM. • Turn the ignition OFF and wait 30 seconds. • Start the engine and operate the vehicle to full operating temperature • Observe the MIL • Observe engine performance and driveability • After operating the engine within the test parameters of DTC1174 check for any stored codes.		Is the replacement complete?			
 Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1174 check for any stored codes. 	5	·			-
 Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1174 check for any stored codes. 	6	Is the replacement complete?		Svotom OK	
 etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1174 check for any stored codes. 	0			System OK	
 Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1174 check for any stored codes. 					System Check
 ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1174 check for any stored codes. 					
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 operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1174 check for any stored codes. 					
 Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1174 check for any stored codes. 					
 Observe engine performance and driveability After operating the engine within the test parameters of DTC1174 check for any stored codes. 					
After operating the engine within the test parameters of DTC1174 check for any stored codes.		Observe the MIL			
parameters of DTC1174 check for any stored codes.		Observe engine performance and driveability			
codes.		 After operating the engine within the test 			
		parameters of DTC1174 check for any stored			
Does the engine operate normally with no stored		codes.			
		Does the engine operate normally with no stored			
codes?					





DTC1175- EPR Supply Voltage Low SPN/FMI 520260:4



Conditions for Setting the DTC

- EPR supply voltage
- Check condition-Engine running or cranking
- MIL-On during active fault
- Fault condition-EPR internal supply voltage low
- Adaptive disabled
- Closed loop disabled

Circuit Description

The EPR (Electronic Pressure Regulator) unit measures and controls the amount of fuel that is able to pass to the fuel mixer. Pressure readings are sent over the CAN to the ECM and in return the ECM sends back a control signal to the EPR to increase or decrease pressure for precise mixture control. This code will set if the internal EPR supply voltage is low.

Diagnostic Aid

This DTC indicates abnormal EPR internal voltages that are not measurable externally. Check the system charging voltage to be sure this DTC and other low voltage DTC's are not present. Repair the charging system if it is found to be out of specification for low charge voltage. In the event of multiple code sets, always start the diagnostic repair with the lowest numerical value DTC first.





DTC 1175-EPR Voltage Supply Low SPN/FMI 520260:4

Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD
				System Check
				Section
2	DST connected and in the system data mode		Go to step (3)	Repair the
	Engine running			charging
	Check the system battery voltage.			system
	Is the charging voltage within specifications?			
3	Key OFF		Go to step (6)	Go to step (4)
	 Disconnect the EPR electrical connector C026 			
	 Using a DVOM check for power between the EPR connector pin 7 and engine ground. 			
	Key ON			
	Record the voltage reading.			
	5 5			
	(Be sure to activate relay control ON using the DST			
	function or check before ECM relay control times out)			
	Using a DVOM check the system battery			
	power at the battery terminals and record the			
	voltage reading.			
	Are the recorded voltage readings within 1 volt of			
	each other?			
4	Inspect the EPR connector and F3 fuse		Correct the	Go to step (5)
	holder terminals for damage corrosion or		problem as	
	contamination		necessary.	
	Did you find a problem?		See wiring	
			harness repair	
			in the electrical	
			section of this	
5	Check the power relay circuit. Check		manual Correct the	
	the power relay connections for damage		problem as	-
	corrosion or contamination		necessary. See	
			wiring harness	
	Did you find a problem?		schematic in	
			the electrical	
			section of this	
			manual	
]]		IIIdiiudi	





Step	Action	Value(s)	Yes	No
Step 6	 Action Key OFF Disconnect the ECM connector C001 Using a DVOM check the resistance reading between EPR connector pin 6 and ECM connector pin 69 and 81. (Do not forget to subtract any resistance value that may be present in you test cables) Is the resistance reading less than .5 ohms? 	<u>Value(s)</u> Less thân .5 Ohms	Yes Go to step (7)	No Repair the poor EPR power ground circuit. See wiring harness repair in the electrical section of this manual
7	Replace the EPR		Go to step (8)	
	· ·			-
8	 Is the replacement complete? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1175 check for any stored codes. Does DTC 1175 still re-set? 		Go to step (9)	System OK
9	Replace the ECM		Go to step (10)	_
10	 Is the replacement complete? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1175 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC1176- EPR Internal Actuator Fault SPN/FMI 520260:12



Conditions for Setting the DTC

- EPR internal actuator test
- Check condition-Engine running or cranking
- MIL-On during active fault
- Fault condition- Failed actuator
- Adaptive disabled
- Closed loop disabled

Circuit Description

The EPR (Electronic Pressure Regulator) unit measures and controls the amount of fuel that is able to pass to the fuel mixer. Pressure readings are sent over the CAN to the ECM and in return the ECM sends back a control signal to the EPR to increase or decrease pressure for precise mixture control. This code will set if the ECM detects an internal actuator fault with the EPR. In the event of multiple code sets, always start the diagnostic repair with the lowest numerical value DTC first. In most instances the EPR will need to be replaced in the event of this code set.





DTC 1176-EPR Internal Actuator Fault SPN/FMI 520260:12

Step	Action	Value(s)	Yes	No
1	Action Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD
				System Check
2	DST connected and in the system data		Go to step (3)	Section Go to step (6)
2	-			
	mode			
	 Check for any other current or active 			
	DTCs			
	Does the DST show any other codes set?			
3	 Does the DST show any other codes set? Repair any other DTC's set starting with the 		Go to step (4)	Repair Other
Ū	lowest DTC number first			DTC's
				DICS
4	 Have the other DTC's set been corrected? Remove all test equipment except the DST. 		Go to step (5)	Svotom OK
4				System OK
	Connect any disconnected components, fuses,			
	etc.			
	 Using the DST clear DTC information from the 			
	ECM.			
	 Turn the ignition OFF and wait 30 seconds. 			
	 Start the engine and operate the vehicle to full 			
	e i			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	 After operating the engine within the test 			
	parameters of DTC1176 check for any stored			
	codes.			
	Does DTC 1176 still re-set?			
	Does DTC TT70 still te-set?			
5	Replace the EPR		Go to step (6)	
5				—
6	 Is the replacement complete? Remove all test equipment except the DST. 		System OK	Go to OBD
Ŭ				System Check
				System Check
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	 After operating the engine within the test 			
	parameters of DTC1176 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			
				1





DTC1177- EPR internal Circuitry Fault SPN/FMI 620260:12



Conditions for Setting the DTC

- EPR internal circuitry test
- Check condition-Engine running or cranking
- MIL-On during active fault
- Fault condition-
- Adaptive disabled
- Closed loop disabled

Circuit Description

The EPR (Electronic Pressure Regulator) unit measures and controls the amount of fuel that is able to pass to the fuel mixer. Pressure readings are sent over the CAN to the ECM and in return the ECM sends back a control signal to the EPR to increase or decrease pressure for precise mixture control. This code will set if the ECM detects an internal circuitry fault in the EPR. In the event of multiple code sets, always start the diagnostic repair with the lowest numerical value DTC first. In most instances the EPR will need to be replaced in the event of this code set.





DTC 1177-EPR Internal Circuitry Failure SPN/FMI 520260:12

Step	Action	Value(s)	Yes	No
1	Action Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD
			,	System Check
				Section
2	 DST connected and in the system data 		Go to step (3)	Go to step (6)
	mode			1 ()
	Check for any other current or active			
	DTCs			
	 Does the DST show any other codes set? Repair any other DTC's set starting with the 			<u> </u>
3			Go to step (4)	Repair Other
	lowest DTC number first			DTC's
	 Have the other DTC's set been corrected? Remove all test equipment except the DST. 			
4	 Remove all test equipment except the DST. 		Go to step (5)	System OK
	 Connect any disconnected components, fuses, 			
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	e e e e e e e e e e e e e e e e e e e			
	• Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	 Observe engine performance and driveability 			
	 After operating the engine within the test 			
	parameters of DTC1177 check for any stored			
	codes.			
	Does DTC 1177 still re-set?			
5	Replace the EPR		Go to step (6)	
Ŭ				-
6	 Is the replacement complete? Remove all test equipment except the DST. 		System OK	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			- ,
	 Using the DST clear DTC information from the 			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC1177 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	a . ,			
	codes?			





DTC1178- EPR Internal Communication Error SPN/FMI 520260:12



Conditions for Setting the DTC

- EPR internal communication test
- Check condition-Engine running or cranking
- MIL-On during active fault
- Fault condition-
- Adaptive disabled
- Closed loop disabled

Circuit Description

The EPR (Electronic Pressure Regulator) unit measures and controls the amount of fuel that is able to pass to the fuel mixer. Pressure readings are sent over the CAN to the ECM and in return the ECM sends back a control signal to the EPR to increase or decrease pressure for precise mixture control. This code will set if the ECM detects an internal communication error in the EPR. In the event of multiple code sets, always start the diagnostic repair with the lowest numerical value DTC first. In most instances the EPR will need to be replaced in the event of this code set.





	DIC 11/8-EPR Internal Com			
Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD System Check Section
2	 DST connected and in the system data mode Check for any other current or active DTCs 		Go to step (3)	Go to step (6)
3	Does the DST show any other codes set? Repair any other DTC's set starting with the lowest DTC number first		Go to step (4)	Repair Other DTC's
4	 Have the other DTC's set been corrected? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1178 check for any stored codes. Does DTC 1178 still re-set? 		Go to step (5)	System OK
5	Replace the EPR Is the replacement complete?		Go to step (6)	_
6	 Is the replacement complete? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC1178 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check

DTC 1178-EPR Internal Comm Fault SPN/FMI 520260:12





DTC 1612-RTI 1 Loss SPN/FMI 629:31



Conditions for Setting the DTC

- Engine Control Module
- Check Condition- Key on
- Fault Condition- Internal microprocessor error
- MIL- On
- Adaptive- Disabled for the remainder of the key-ON cycle
- Power Derate level 2

Circuit Description

The ECM has several internal checks that must be satisfied each time an instruction is executed. Several different things can happen within the microprocessor that will cause this fault. The ECM will attempt to reset itself in the event this fault is set. The MIL command is on and will remain on until the code is cleared using the DST. Power Derate level 2 will be enforced limiting maximum throttle position to 20%.





PSI 1.6L PFI CERTIFIED ENGINE SERVICE MANUAL

	DTC 1612- RT 1 Los	s SPN/FN	MI 629:31	
Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD System Check Section
2	 Key On, Engine Running DST (Diagnostic Scan Tool) connected in System Data Mode Clear system fault code Does DTC 1612 reset with the engine idling? 		Go to Step (3)	Intermittent problem Go to Intermittent section
3	 Does DTC 1612 reset with the engine idling? Check ECM power and ground circuits Are the power and ground circuits Ok? 		Go to Step (4)	Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.
4	Replace ECM		Go to Step (5)	-
5	 Is the replacement complete? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-1612 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 1613-RTI 2 Loss SPN/FMI 629:31



Conditions for Setting the DTC

- Engine Control Module
- Check Condition- Key on
- Fault Condition- Internal microprocessor error
- MIL- On
- Adaptive- Disabled for the remainder of the key-ON cycle
- Power Derate level 2

Circuit Description

The ECM has several internal checks that must be satisfied each time an instruction is executed. Several different things can happen within the microprocessor that will cause this fault. The ECM will attempt to reset itself in the event this fault is set. The MIL command is on and will remain on until the code is cleared using the DST. Power Derate level 2 will be enforced limiting maximum throttle position to 20%.





Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD
				System Check
				Section
2	Key On, Engine Running		Go to Step (3)	Intermittent
	DST (Diagnostic Scan Tool) connected in			problem
	System Data Mode			Go to
	Clear system fault code			Intermittent
	Does DTC 1613 reset with the engine idling?			section
3	 Does DTC 1613 reset with the engine idling? Check ECM power and ground circuits 		Go to Step (4)	Repair the
	Are the power and ground circuits Ok?			circuit as
				necessary.
				Refer to
				Wiring Repairs
				in Engine
4	Replace ECM		Go to Step (5)	Electrical.
-				
5	 Is the replacement complete? Remove all test equipment except the DST. 		System OK	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			-
	Using the DST clear DTC information from the			
	ECM.			
	Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-1613 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			

DTC 1613- RTI 2 Loss SPN/FMI 629:31





DTC 1614-RTI 3 Loss SPN/FMI 629:31



Conditions for Setting the DTC

- Engine Control Module
- Check Condition- Key on
- Fault Condition- Internal microprocessor error
- MIL- On
- Adaptive- Disabled for the remainder of the key-ON cycle
- Power Derate level 2

Circuit Description

The ECM has several internal checks that must be satisfied each time an instruction is executed. Several different things can happen within the microprocessor that will cause this fault. The ECM will attempt to reset itself in the event this fault is set. The MIL command is on and will remain on until the code is cleared using the DST. Power Derate level 2 will be enforced limiting maximum throttle position to 20%.





PSI 1.6L PFI CERTIFIED ENGINE SERVICE MANUAL

	DTC 1614- RTI 3 Los	s SPN/Fl	MI 629:31	
Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD System Check Section
2	 Key On, Engine Running DST (Diagnostic Scan Tool) connected in System Data Mode Clear system fault code Does DTC 1614 reset with the engine idling? Check ECM power and ground circuits 		Go to Step (3)	Intermittent problem Go to Intermittent section
3	Are the power and ground circuits Ok?		Go to Step (4)	Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.
4	Replace ECM		Go to Step (5)	-
5	 Is the replacement complete? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-1614 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 1615-A/D Loss SPN/FMI 629:31



Conditions for Setting the DTC

- Engine Control Module
- Check Condition- Key on
- Fault Condition- Internal microprocessor error
- MIL- On
- Adaptive- Disabled for the remainder of the key-ON cycle
- Power Derate level 2

Circuit Description

The ECM has several internal checks that must be satisfied each time an instruction is executed. Several different things can happen within the microprocessor that will cause this fault. The ECM will attempt to reset itself in the event this fault is set. The MIL command is on and will remain on until the code is cleared using the DST. Power Derate level 2 will be enforced limiting maximum throttle position to 20%.





PSI 1.6L PFI CERTIFIED ENGINE SERVICE MANUAL

	DTC 1615- A/D Los	SPN/FM	629:31	
Step	Action	Value(s)	Yes	No
1.	Action Did you perform the On-Board (OBD) System Check?	_	Go to Step (2)	Go to OBD System Check Section
2	 Key On, Engine Running DST (Diagnostic Scan Tool) connected in System Data Mode Clear system fault code Does DTC 1615 reset with the engine idling? Check ECM power and ground circuits 		Go to Step (3)	Intermittent problem Go to Intermittent section
3	Are the power and ground circuits Ok?		Go to Step (4)	Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.
4	Replace ECM Is the replacement complete?		Go to Step (5)	-
5	 Is the replacement complete? Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-1615 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 1616-Invalid Interrupt SPN/FMI 629:31



Conditions for Setting the DTC

- Engine Control Module
- Check Condition- Key on
- Fault Condition- Internal microprocessor error
- MIL- On
- Adaptive- Disabled for the remainder of the key-ON cycle
- Power Derate level 2

Circuit Description

The ECM has several internal checks that must be satisfied each time an instruction is executed. Several different things can happen within the microprocessor that will cause this fault. The ECM will attempt to reset itself in the event this fault is set. The MIL command is on and will remain on until the code is cleared using the DST. Power Derate level 2 will be enforced limiting maximum throttle position to 20%.





DTC 1616- Invalid Interrupt SPN/FMI 629:31

Ctor	Action			
Step	Action Did you perform the On-Board (OBD) System Check?	<u>Value(s)</u>	Go to Step (2)	No Go to OBD
		-		System Check
				Section
2	Key On, Engine Running		Go to Step (3)	Intermittent
	DST (Diagnostic Scan Tool) connected in			problem
	System Data Mode			Go to
	-			Intermittent
	Clear system fault code			section
3	 Does DTC 1616 reset with the engine idling? Check ECM power and ground circuits 		Go to Step (4)	Repair the
U U	Are the power and ground circuits Ok?			circuit as
	Are the power and ground circuits OK?			necessary.
				Refer to
				Wiring Repairs
				in Engine
				Electrical.
4	Replace ECM		Go to Step (5)	-
5	 Is the replacement complete? Remove all test equipment except the DST. 		Sustem OK	Go to OBD
5			System OK	System Check
	 Connect any disconnected components, fuses, etc. 			System Check
	 Using the DST clear DTC information from the 			
	ECM.			
	 Turn the ignition OFF and wait 30 seconds. 			
	 Start the engine and operate the vehicle to full 			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	 After operating the engine within the test 			
	parameters of DTC-1616 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			





DTC 1626-CAN Tx Failure SPN/FMI 639:12



Conditions for Setting the DTC

- CAN Tx
- Check Condition- Engine running
- Fault Condition- CAN Tx error 100 packets lost within 1 second
- MIL- ON

Circuit description

The CAN bus (controller area network) is used by the ECM to communicate with other digital devices used throughout the fuel system. Information is sent over the CAN bus in digital information "packets" that contain information for various control functions. This fault will set if the ECM detects 100 packets lost within a one second time period. The MIL command is ON.





DTC 1626- CAN Tx Failure SPN/FMI 639:12

Step		Value(s)		No
1	Action Did you perform the On-Board (OBD) System Check?	<u>value(s)</u> -	Go to Step (2)	Go to OBD
				System Check
				Section
2	Key On, Engine Running		Go to Step (3)	Intermittent
	DST (Diagnostic Scan Tool) connected in			problem
	System Data Mode			Go to
	-			Intermittent
	Clear system fault code			section
3	 Does DTC1626 reset with the engine idling? Check that the ECM power connections C020, 		Go to Step (4)	Repair the
5	C021 and C024 are clean and tight.			circuit as
	3			
	Check that the ECM ground connections C014			necessary. Refer to
	and C023 are clean and tight.			
				Wiring Repairs
	Are the power and ground circuits Ok?			in Engine
				Electrical.
4	Key OFF		Go to step (5)	Repair the
	Disconnect ECM harness connector C001			open circuit
	Using a DVOM check for continuity between			as necessary.
	ECM connector pin 13 and 14			Refer to
				Wiring Repairs
				in Engine
	Do you have continuity?			Electrical.
5	Using a DVOM check for continuity between		Repair the	Go to step (6)
	ECM pins 14 and 15		shorted circuit	
			as necessary.	
	Do you have continuity between them?		Refer to	
			Wiring Repairs	
			in Engine	
6	Ising a DVOM check for continuity to ongine		Electrical.	Go to step (7)
0	Using a DVOM check for continuity to engine ground on pipe 14 and 16		Repair the shorted to	
	ground on pins 14 and 16			
			ground circuit	
	Do have continuity to engine ground?		as necessary. Refer to	
			Wiring Repairs	
			in Engine	
7	Using a DVOM check for continuity to battery		Electrical. Repair the	Go to step (8)
	positive on pins 14 and 16		shorted to	
			ground circuit	
	De heure continuity them?		as necessary.	
	Do have continuity them?		Refer to	
			Wiring Repairs	
			in Engine	
			Electrical	
8	Replace the ECM		Go to step (9)	
	is the replacement complete?			
			1	1





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Stop	Action		Vee	No
9 9	 Action Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-1626 check for any stored codes. Does the engine operate normally with no stored codes? 	<u>Value(s)</u>	Yes System OK	No Go to OBD System Check





DTC 1627-CAN Rx Failure SPN/FMI 639:12



Conditions for Setting the DTC

- CAN Rx
- Check Condition- Engine running
- Fault Condition- CAN Rx error 100 packets lost within 1 second
- MIL- ON

Circuit description

The CAN bus (controller area network) is used by the ECM to communicate with other digital devices used throughout the fuel system. Information is sent over the CAN bus in digital information "packets" that contain information for various control functions. This fault will set if the ECM detects 100 packets lost within a one second time period. The MIL command is ON.





Ston	DIC 1027-CAN KX Fal			
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes Go to Step (2)	No Go to OBD
.			30 10 010p (2)	System Check
				Section
2	Key On, Engine Running		Go to Step (3)	Intermittent
	 DST (Diagnostic Scan Tool) connected in 		/	problem
	System Data Mode			Go to
	-			Intermittent
	Clear system fault code			section
3	 Does DTC1627 reset with the engine idling? Check that the ECM power connections C020, 		Go to Step (4)	Repair the
5	Co21 and Co24 are clean and tight.		G0 10 Step (4)	circuit as
	6			
	Check that the ECM ground connections C014			necessary. Refer to
	and C023 are clean and tight.			
				Wiring Repairs
	Are the power and ground circuits Ok?			in Engine
				Electrical.
4	Key OFF		Go to step (5)	Repair the
	 Disconnect ECM harness connector C001 			open circuit
	Using a DVOM check for continuity between			as necessary.
	ECM connector pin 13 and 14			Refer to
				Wiring Repairs
	Do you have continuity?			in Engine
5	 Do you have continuity? Using a DVOM check for continuity between 		Repair the	Electrical.
5	• Using a DVOM check for continuity between ECM pins 14 and 15		shorted circuit	Go to step (6)
			as necessary.	
			Refer to	
	Do you have continuity between them?		Wiring Repairs	
			in Engine	
			Electrical.	
6	Using a DVOM check for continuity to engine		Repair the	Go to step (7)
	ground on pins 14 and 16		shorted to	/
			ground circuit	
	Do have continuity to engine ground?		as necessary.	
	Do have continuity to engine ground:		Refer to	
			Wiring Repairs	
			in Engine	
			Electrical. Repair the	
1	Using a DVOM check for continuity to battery			Go to step (8)
	positive on pins 14 and 16		shorted to	
			ground circuit	
	Do have continuity them?		as necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
8	Replace the ECM		Electrical. Go to step (9)	
5			00 i0 3iep (9)	—
	Is the replacement complete?			

DTC 1627- CAN Rx Failure SPN/FMI 639:12





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	Step	Action	Value(s)	Yes	NO
 etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-1627 check for any stored 	<u> </u>	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test 	<u>value(s)</u>	System OK	





DTC 1628-CAN Address Conflict SPN/FMI 639:13



Conditions for Setting the DTC

- CAN Rx
- Check Condition- Engine running
- Fault Condition- 5 or more address conflict errors
- MIL- ON

Circuit description

The CAN bus (controller area network) is used by the ECM to communicate with other digital devices used throughout the fuel system. Information is sent over the CAN bus in digital information "packets" that contain information for various control functions. Individual devices are assigned network addresses. This fault will set if the ECM detects an address conflict, such as two devices with the same address. This is usually not due to an in field failure and may be the results of "add on" CAN devices





DTC 1628- CAN Address Conflict SPN/FMI 639:13

Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD System Check Section
2	 Key On, Engine Running DST (Diagnostic Scan Tool) connected in System Data Mode Clear system fault code 		Go to Step (3)	Intermittent problem Go to Intermittent section
3	 Does DTC1628 reset with the engine idling? Key OFF Disconnect one CAN device Clear DTC 1628 Key ON (start engine if possible if not continue cranking for at least 3 seconds) Wait 5 seconds Does DTC 1628 re-set Has the CAN device been replaced or address conflict resolved 		Repeat step 3 until all CAN devices have been disconnected one at a time Go to step (5)	Contact the CAN device manufacturer for additional CAN address information Go to Step (4)
5	 conflict resolved Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-1628 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 2111- Unable To Reach Lower TPS SPN/FMI 51:7

Electronic Throttle			ECM
	4	PNK/00HT 82	D8W+
⁻ E	1	TANORN 83	DBW -
	6	PPL/LT BLU 5	TPS 1 Signal
	2	BLKALTGRN 20	Sensor Gip and
	5	LT BLUÆKBLU 6	TPS 2 Signal
	3 C025	LTGRN/RED 19	SVobbs

Conditions for Setting the DTC

- Throttle Position Sensor
- Check Condition-Cranking or Running
- Fault Condition- Actual throttle position is 20% greater than the throttle command
- MIL-On during active fault
- Engine Shut Down

Circuit Description

There are two Throttle Position Sensors located within the throttle which use variable resistors to determine signal voltage based on throttle plate position. TPS 1 will read low voltage when closed and TPS 2 will read high voltage when closed. The TPS 1 and TPS 2 percentages are calculated from these voltages. Although the voltages are different, the calculated values for the throttle position percentages should be very close to the same. The TPS values are used by the ECM to determine if the throttle is opening as commanded.

This fault will set if the actual throttle position is 20% greater than the throttle command. During this active fault the MIL command is ON and the engine will shut down.





DTC 2111	Unable To	Reach Lower	TPS	SPN/FMI 51:7
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Ctore	DIC 2111 Unable TO Reach			-
<u>Step</u>	Action Did you perform the On-Board (OBD) System Check?	Value(s)	<u>Yes</u> Go to Step (2)	No Go to OBD
			0010010000	System Check
				Section
2	Key ON, Engine OFF		Go to Step (3)	Intermittent
	DST (Diagnostic Scan Tool) connected in			problem
	DBW (Drive By Wire) test mode			Go to
	Depress Foot Pedal until theThrottle Command is			Intermittent
	between 63%-68%			section
3	Is the TPS 1 voltage greater than 2.0 volts? Key OFF		Go to Step (6)	Go to Step (4)
_	Disconnect electronic throttle connector C025			
	Probe TPS 1 signal pin 6 with a test light connected to battery voltage			
	Key ON			
4	 Does DST display TPS 1 voltage less than 0.2 volts Key OFF 		Repair the	Go to Step (5)
т	 Disconnect ECM wire harness connector C001 		circuit as	
			necessary.	
	Key ON		Refer to	
	• Using a DVOM check for voltage between throttle		Wiring Repairs	
	connector TPS 1 signal pin 6 and engine ground		in Engine	
	Do you have voltage?		Electrical.	
5	Replace ECM		Go to Step (13)	-
6	 Is the replacement complete? Probe sensor ground circuit at ECM connector 		Co to Stop (0)	Co to Stop (7)
0			Go to Step (9)	Go to Step (7)
	C001 with a test light connected to battery voltage			
7	Does the test light come on? Key OFF		Go to Step (8)	Repair the
	Disconnect ECM wire harness connector C001		00 10 010p (0)	circuit as
				necessary.
	Using a DVOM check for continuity between throttle connector signal ground pin 2 and ECM			Refer to
	signal ground circuit pin 20			Wiring Repairs
				in Engine
	Do you have continuity between them?			Electrical.
8	Replace ECM		Go to Step (13)	-
9	 Is the replacement complete? Check throttle for foreign object in bore 		Go to Step (10)	Go to Step (11)
3			30 10 Step (10)	
10	Did you find a foreign object in the bore? Remove foreign object		Go to Step (13)	-
_				
11	 Is the removal complete? Inspect the throttle wire harness connector 		Repair the	Go to Step (12)
	terminals for damage, corrosion or contamination		circuit as	
	Did you find the problem?		necessary.	
	· ·		Refer to	
			Wiring Repairs	
			in Engine	
10	- Poplago throttla		Electrical.	
12	Replace throttle		Go to Step (13)	-
	Is the replacement complete?			





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Step	Action	Value(s)	Yes	No
13	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-2111 check for any stored codes. Does the engine operate normally with no stored codes? 		System OK	Go to OBD System Check





DTC 2112-Unable To Reach Higher TPS SPN/FMI 51:7



Conditions for Setting the DTC

- Throttle Position Sensor
- Check Condition-Cranking or Running
- Fault Condition- Actual throttle position is 20% less than the throttle command
- MIL-On during active fault
- Engine Shut Down

Circuit Description

There are two Throttle Position Sensors located within the throttle which use variable resistors to determine signal voltage based on throttle plate position. TPS 1 will read low voltage when closed and TPS 2 will read high voltage when closed. The TPS 1 and TPS 2 percentages are calculated from these voltages. Although the voltages are different, the calculated values for the throttle position percentages should be very close to the same. The TPS values are used by the ECM to determine if the throttle is opening as commanded.

This fault will set if the actual throttle position is 20% less than the throttle command. During this active fault the MIL command is ON and the engine will shut down.





DTC 2112- Throttle Unable to Open SPN/FMI 51:7

04				
Step	Action Did you perform the On-Board (OBD) System Check?	Value(s)	Yes Go to Step (2)	No Go to OBD
		-	50 to 5tep (2)	System Check
				System Check
2	Key ON, Engine OFF		Go to Step (3)	Intermittent
	DST (Diagnostic Scan Tool) connected in		• • • •	problem
	DBW (Drive By Wire) test mode			Go to
				Intermittent
	 Depress Foot Pedal until the Throttle Command is 63%-68% 			section
3	Is the TPS voltage less than 2.0 volts? • Key OFF		Go to Step (4)	Go to Step (8)
	Disconnect electronic throttle connector C025			1 ()
	Probe TPS 1 signal circuit pin 6 with test light			
	connected to battery voltage			
	Key ON			
4	Is TPS voltage 4.0 volts or greater? Check throttle bore for foreign object		Go to Step (5)	Go to step (6)
5	Did you find a problem? Remove the foreign object		Go to Step (11)	-
	Has the object been removed? Check electronic throttle connector terminals for			
6			Repair the	Go to Step (7)
	damage corrosion or contamination		circuit as	
	Did you find a problem?		necessary.	
			Refer to	
			Wiring Repairs	
			in Engine Electrical.	
7	Replace throttle		Go to Step (11)	-
	Is the replacement complete?			
8	• Key OFF		Go to Step (9)	Repair the
	Disconnect ECM wire harness connector C001			circuit as
	Using a DVOM check for continuity between			necessary.
	throttle connector TPS 1 signal pin 6 and ECM			Refer to
	TPS 1 signal pin 5			Wiring Repairs
	Do you have continuity between them?			in Engine Electrical.
9	Using a DVOM check for continuity between		Repair the	Go to Step (10)
	throttle connector TPS 1 signal pin 6 and engine		shorted to	,
	ground		ground circuit	
	Do you have continuity between them?		as necessary.	
			Refer to	
			Wiring Repairs	
			in Engine	
10	Replace ECM		Electrical.	
	-		Go to step (11)	-
	Is the replacement complete?			





Step	Action	Valuo(c)	Yes	No
11	 Remove all test equipment except the DST. Connect any disconnected components, fuses, etc. Using the DST clear DTC information from the ECM. Turn the ignition OFF and wait 30 seconds. Start the engine and operate the vehicle to full operating temperature Observe the MIL Observe engine performance and driveability After operating the engine within the test parameters of DTC-2112 check for any stored codes. Does the engine operate normally with no stored codes? 	<u>Value(s)</u>	System OK	Go to OBD System Check





DTC 2229-BP High Pressure SPN/FMI 108:0



Conditions for Setting the DTC

- Barometric pressure check
- Check condition-engine off and key on
- Fault Condition-BP greater than 16 PSIA
- MIL-On for active fault and for 2 seconds after active fault
- Adaptive-disabled for the remainder of key cycle

Circuit Description

The BP (Barometric Pressure) is estimated from the TMAP sensor. The barometric pressure value is used for fuel and airflow calculations. This fault sets in the event the BP value is out of the normal operating range.





DTC 2229- BP High Pressure SPN/FMI 108:0

Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?		Go to Step (2)	Go to OBD
				System Check
				Section
2			Go to step (3)	Intermittent
	Key On			problem
	DST (Diagnostic Scan Tool) connected in			Go to
	System Data Mode			Intermittent
				section
	Does DST display MAP pressure of 16 PSIA or			
	greater?			
3	Replace TMAP sensor.		Go to Step (4)	-
	Is the repair complete?			
4	Remove all test equipment except the DST.		System Ok	Go to OBD
	Connect any disconnected components, fuses,			System Check
	etc.			
	Using the DST clear DTC information from the			
	ECM.			
	• Turn the ignition OFF and wait 30 seconds.			
	Start the engine and operate the vehicle to full			
	operating temperature			
	Observe the MIL			
	Observe engine performance and driveability			
	After operating the engine within the test			
	parameters of DTC-2229 check for any stored			
	codes.			
	Does the engine operate normally with no stored			
	codes?			
	1			



