

E – **Control** Training Programm













The Fuel System

- •Computer controlled
- •Adaptive Learn
- •Closed Loop
- •Drive By Wire
- •Multi Port (MPFI)
- •LPG Fuel Options
- •On Board Diagnostics
- •Speed options



















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PTV = Pressure Trim Valve = Control vacuum to the atmospheric side of the LPR to increase or decrease fuel flow to the mixer

FTV = <u>Fuel Trim Valve</u> = Allows fuel to by mixer to richen the fuel mixture



















ECM Non Volatile Memory

Diagnostic Trouble Codes will be cleared from the system ECM memory by moving the ignition key to the OFF position and removing the (F1) system battery fuse for at least 15 seconds.

This will erase all of the Diagnostic codes stored in the computer memory including the adaptive learn.

•It will not erase the fuel calibration.

•It will not erase the computer serial identification

•It will not erase the internal hour meter









Closed Loop Fuel Control







Adaptive Learn







MIL (Malfunction Indicator Lamp)



Notifies the driver of a problem with the emission control system.







Most engine control system related problems that affect emissions or driveability of the vehicle will set a (DTC) Diagnostic Trouble Code and illuminate the Malfunction Indicator Lamp.

The lamp should come on when the key is in the ON position and the engine is not running (Bulb Check Function). Once the engine is in start or run mode, the lamp should go off. If the lamp illuminates while the engine is in the start or run mode, there is a current Diagnostic Trouble Code.







Power is supplied to the bulb through the ignition switch. The ECM provides ground to illuminate the lamp. It will also display DTC's that have been stored due to a system malfunction. (Blink Code Function)









TMAP SENSOR

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.

Manifold Absolute Pressure (MAP) Sensor

The Manifold Absolute Pressure Sensor monitors the changes in intake manifold vacuum which result from engine load variations. These pressure changes are relayed to the electronic control unit in the form of electrical signals. The sensor also indicates the changes in atmospheric pressure due to changes in altitude. The manifold air pressure sensor is mounted to the intake manifold.

Air Inlet Temperature

The Air Temperature Sensor is variable temperature sensitive resistor. The IAT sensor monitors the manifold air temperature which is a factor in air density measurement. The engine air/fuel ratio is maintained constant even though the engine air density varies.



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ECT (Engine Coolant Temperature)



The ECT (Engine Coolant Temperature) sensor is a temperature sensitive resistor located in the engine coolant. It is used for the engine airflow calculation, gasoline cold enrichment, spark advance and to enable other temperature dependent features.









TPS (Throttle Position Sensor)



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The Throttle Position Sensor is connected to the throttle shaft. Movement of the shaft causes the throttle shaft to rotate (opening or closing the throttle blades). The sensor tracks the shaft movement and position (closed throttle, wide open throttle, or any position in between), and transmits an electrical signal to the electronic control module. The electronic control module monitors the (throttle position) to aid in determining the fuel requirement for the particular situation (idle, acceleration, etc.)

The drive by wire system utilizes **2 Throttle Position Sensors** located **within** the electronic throttle. The TPS is a variable resistor. **TPS1** will read low voltage when closed and **TPS2** will read high 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 is not serviceable or replaceable. In the event of a TPS failure, the electronic throttle must be replaced.



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FPP (Foot Pedal Position)



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The Foot Pedal Position sensor uses a variable resistor to determine signal voltage based on pedal position. Less depression of pedal results in lower voltage, and greater depression results in higher voltage.





Camshaft Position Sensor (CMP)

The CMP (Camshaft Position Sensor) is used to synchronize the fuel and ignition timing systems.



DETROIT DIESE









Crankshaft Position Sensor (CKP)

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 system.





Allison GM





Heated Oxygen Sensor (HO2S)

The H O2 sensor is used to determine if the fuel flow to the engine is correct by measuring the oxygen content in the exhaust gas. The sensor generates voltage in the absence of oxygen, when the sensor reaches an operating temperature of above 600 degrees F. The output voltage is zero to approximately one volt. The ECM uses this voltage information to correct the air fuel fuel mixture. The system uses a 4 wire sensor that includes a built in 12 volt heating element. This allows the sensor to operate independently of the exhaust gas temperature.



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ECM Provides an external 5 volt reference to engine sensors







ECM also provides an internal 5 volt reference

Sensor load creates a voltage drop at the internal resistor

Voltage drop is used by the ECM to determine sensor value



- * Internal reference shown pin 32
- * External reference shown pin 50



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Using a Laptop Computer to Diagnose the Spectrum System

Minimum System Requirements

Pentium Processor

Win95, 98, 2000 and XP Operating Systems

32 Megs Ram

Serial Port (RS232) Connection











Diagnostic Trouble Codes (DTC)

Diagnostic Trouble Codes are set when the Spectrum ECM (Electronic Control Module) runs a diagnostic self-test and the test fails. If the system continues to fail the test, the lamp will stay illuminated and the DTC is current (Active). All DTC's are stored as (Historical Faults) until they are cleared.

All DTC's except the ECM related DTC's will automatically clear from memory if the DTC does not reset within 50 consecutive engine run cycles. While a Diagnostic Trouble Code is current for a sensor, the ECM may assign a default "limp home" value and use that value in its control strategy.









Blink Code Function



Diagnostic Link Connector

If you do not have access to a laptop computer, it is still possible to ac Codes stored in the memory of the Spectrum system ECM using a diat With the key off connect diagnostic pins **A** and **D**. Turn the ignition on but do not start the vehicle.

The Malfunction Indicator Lamp (MIL) will begin to flash. The MIL displays three digit codes by flashing the first digit, pausing, then flashing the second digit, pausing, and then flashing the third digit.

The MIL will first display a 166 three times. Code 166 indicates that the ECM based diagnostic routines are functioning. Then, any Diagnostic Trouble Codes stored in memory will display three times each. The MIL will then start over with the code 166.







RS 232

Diagnostic Link

Diagnostic Link Connector (DLC)





Pin	Wire Color	Function				
A	Orange	RS232 RX				
В	Dark Green	RS232 TX				
С	Lt Green/Red	5 Volt Ref				
D	Black/Lt Green	Ana Rtn				







EDIS ECI Serial Communications _ 8 × Page Flash Comm Port Plot/Log Help File response. Toggle Page - F9 Gauges EControls, Inc. Link error - attempting reconnect. --Not Connected PSI ECM Interface MIL System Variables Coolant Temperature Intake Air Temperature Manifold Pressure 250-250-Engine Speed 0 rpm 200-200-121416 Min Governor Selpoint 11 rpm 150-150-Max Governor Selpoint () rpm 100-100-50-50-0.00 ms 2FPulse width 0-0-0.000 EG01 volts -50--50-EGO2 0.000 volts 0 psia 0 deg F 0 deg F **DST Screen 1** 0.000 Hour meter hours Cumulative starts 0 starts Foot Pedal Position **Throttle Position** 100-100-Battery Voltage System State 80-80-5.0 10.0 15.0 Run Mode Stopped 60-60-20.0 0.0 40-Power Mode 40-Sleep 20-20-Fuel Type Gasoline 0.0 volts 0-0-Fuel Control Mode Open Loop 0 % 0 % Governor switch state None Active governor type None Active governor mode Disabled 0000000 Serial number 0 Software model Current cal model 0000000 0K Oil pressure state 0000000 Hardware model 0000000 Init cal model Current cal date 0-0-0 Manufacture date 0.0.0 Init cal date 0-0-0 Make ScreenShot Prtscr Edit Setup Information/Order End 🏽 🕄 者 🕼 🖉 👋 🕹 Citrix Program Nei... 🛛 🕄 Standard Desktop ... 🖓 🔂 Citrix Program Nei... E PSI Display Local Disk (C:) 🕙 🖤 🥑 🍼 🖬 🛛 11:59 AM







EDIS ECI Serial Communications _ 8 × File Page Flash Comm Port Plot/Log Help . response.. Toggle Page - F9 RawVolts EControls, Inc. Link error - attempting reconnect.. Not Connected Control and Instrumentation Specialists -Raw Volts Display MIL 0.000 TPS1_raw volts Fuel select voltage 0.0 volts Engine Speed 0 rpm TPS2_raw 0.000 volts Manifold Pressure Gov1 select voltage 0.0 volts 0.00 psia MAP_raw 0.000 volts Gov2 select voltage **Coolant Temperature** 0.0 0.0 volts deg F FPP1_raw 0.000 volts Oil pressure voltage 0.0 volts **DST Screen 2** Cylinder Head Temp 0.0 deg F IVS/FPP2_raw 0.000 volts Manifold Temperature 0.0 deg F KNK_raw 0.000 volts Intake Air Temperature 0.0 deg F EGO1_raw 0.000 volts ECT_raw 0.000 volts Vbat 0.0 volts IAT_raw 0.000 volts Vsw 0.0 volts AUX_PD1_raw 0.000 volts AUX_PD2_raw 0.000 volts AUX_PD3_raw 0.000 volts AUX_PU1_raw 0.000 volts AUX_PU2_raw 0.000 volts AUX_PU3_raw 0.000 volts 🏽 🔀 Start 🔢 🧀 🖾 🔌 🕹 Citrix Program... 🗱 Standard Des... 🚫 🗐 🧭 🏂 🍕 🏜 12:00 PM DTC632 E PSI Display Local Disk (C:)







_ 8 × EDIS ECI Serial Communications Flash Comm Port Plot/Log Help Page response.. Toggle Page - F9 EControls, Inc. Faults Link error - attempting reconnect.. Not Connected Control and Instrumentation Specialists • Fault Access MIL System States DBW Variables Closed-Loop Control EG01 Engine Speed 0 TPS command 0.0 0.000 volts rpm Run Mode Stopped % Manifold Pressure % 0.00 psia **TPS** position 0.0 % Closed-loop 1 0.0 Fuel Type Gasoline **Coolant Temperature** FPP command % 0.0 % 0.0 Adaptive 1 0.0 deg F Fuel Control Mode Open Loop Cylinder Head Temp 0.0 deg F FPP position 0.0 % Governor switch state None EGO2 0.000 volts Manifold Temperature 0.000 0.0 deg F Active governor type None TPS1 voltage volts Closed-loop 2 0.0 % Intake Air Temperature 0.0 deg F TPS2 voltage 0.000 volts Active governer mode Disabled Adaptive 2 0.0 % volts FPP1 voltage 0.000 Vbat 0.0 volts Oil pressure state OK 0.0 volts FPP2 voltage 0.000 volts Vsw Carburetor Adjustment Controls Rich 0.000 volts Hour meter 0.000 hours IVS voltage 0 starts Cumulative starts Force CL inactive Normal Digital Input Voltages Diagnostic Modes PN/M tan mode Auto. -----Fuel select voltage PWM trim duty-cycle 0.0 % 0.0 volts Spark kill Normal Gov1 select voltage 0.0 volts Injector kill Normal Gov2 select voltage 0.0 DBW test mode Off volts Oil pressure voltage 0.0 volts Extensi power Automatic 💌 Lear SnapShot Base SnapShot Flight Data Base Custom Definitions Definitions Definitions 0 0 0 0 0 0 Historic Faults Active Faults 0 Flight Data -0 🔇 🖓 🐨 🤝 🚽 12:01 PM 🏽 🔀 Start 🛛 🗹 🥔 🍰 🔣 👋 Citrix Program... I Citrix Program... DTC632 E PSI Display Local Disk (C:)

C Allison M Conn Deere





DST Screen 3









DTC 122-ECT Low Voltage

Using the DTC Schematic:

Pin numbers, connector letters and wire colors



Provides additional test criteria for the DTC

What function the DTC is designed to indicate

When the ECM runs the diagnostic sensor test

MIL reaction to the DTC

How the ECM will react during the fault

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.
- Closed Loop-Enabled

Circuit Description

The ECT (Engine Coolant Temperature) sensor is a temperature sensitive resistor located in the engine coolant. 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 wann 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.











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Using the DTC chart:

The chart starts with the MIL check to validate the MIL function.

The chart ends with the instruction to remove any test equipment (except the DST) Diagnostic Scan Tool. Additional specific instructions are provided depending on the DTC to verify a successful repair.

Step	Action	Value(1)	Yes	No	
વે	Didyou perform the Oh-Board (OBD) System Check?	100	Co to 5 tep (2)	Co to OBD System Check Sector	
2	 KeyOt DST (Diagnostic Scan Tool) connected in System Data Mode Does DST display EC7uoltage of D.05 or kss? 		Cotos≱p(3)	internationat problem Goto intermittent section	
3	Key CM Disconnective ECT wile havness connectiv Key CM Does the DST display ECT upitage of 4.9 upits or greater?		Gotostep (4)	Cobos≱p(5)	
4	Replace EC7 se isor. Is the replacement complete?		Co to 5 tep (8)	×	
5	 RevOFF Disconnect ECIN when harvess connector Check for con thirthy between ECT sensor connector signal pla A and ECT sensor growing plat B Do you have continy thy between them? 	9 <u>10</u>	Repair the circuit as necessary: Reter to Wiring Repairs in Engine Electrical.	Gotostep (5)	
6	Cleck for con the thy be live a EC7 sensor connector signal chore typic A and engine ground. Do γου have conthe thy?	(111)	Repair the clicuit as necessary. Refer to Wiring Repairs in Engine Electrical.	0070582p(7)	
-	Replace ECM. Refer to ECM replacement in the Engline Controls Section.	1941	Co to sep (6)	<u>.</u>	
1	 But represent flooting per state state of the DST. Remove all test equipment is components, frees, et: Using the DST charDIC information from the ECM. I run the ignition OFF and wait 30 seconds. Shart the angine and oprach the which is full openting temperature Observe the MIL Observe angine performance and drineability After opracting the angine within the test parameters of DIC-122 chack for any strond codes. Does the angine oprach non-ally within a test parameters of DIC-122 chack for any strond codes. 		Sjøtem OK	Check	









The ECM provides default values for critical sensor inputs to protect the engine system from possible damage. If a DTC for a sensor is current, the gauge screen display value for that sensor may be a default value. The voltage value in the "raw" voltage screen will be the actual sensor voltage. Always use the voltage value when performing diagnostics unless directed otherwise by the diagnostic chart.













ECM Protection Systems

Certain DTC codes that set will result in system power reduction, or complete engine shutdown. The ECM is programmed to do this in the event a failure is determined to cause possible risk to the operator, damage to the engine or catalytic converter. Some code groups will provide a warning to a possible shutdown

Example:

DTC 113-IAT Higher than expected 1

DTC 114-IAT Higher than expected 2











DTC 113-IAT Higher Than Expected 1 (Bosch® TMAP)

Conditions for Setting the DTC

- Intake Air Temperature
- Check Condition-Engine Running
- Fault Condition-Intake Air Temperature greater than 210 degrees F. and engine RPM greater than 1000
- MIL-Will flash at 2 Hz (twice per second) during active fault
- Adaptive-Disabled during active fault
- Closed Loop-Enabled,
- 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 210 degrees F. and engine RPM is greater than 1000, then Power Derate 1 will be enforced. During this fault, maximum throttle position is 50% and the MIL light will flash twice per second.

Diagnostic Aids

* 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 114-IAT Higher Than Expected 2 (Bosch® TMAP)

Conditions for Setting the DTC

- •Intake Air Temperature
- •Check Condition-Engine Running
- •Fault Condition-Intake Air Temperature greater than 220 degrees F. and engine RPM greater than1000
- •MIL-On for active fault and for 15 seconds after active fault
- •Adaptive-Disabled during active fault, Closed Loop-Enabled 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. 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 220 degrees F and engine RPM is greater than 1000. The MIL will be on during this active fault and the engine will shut down









Intermittent problems

Intermittent problems are be the most difficult to resolve. Before starting the diagnostic procedures for intermittent DTC follow these preliminary checks:

- •ECM ground connections must be clean, tight, and in their proper location.
- •Vacuum hoses for splits, kinks and proper connections
- •Air leaks at the throttle body, throttle control unit and intake manifold sealing surfaces
- •Ignition wires for cracking, hardness, proper routing and carbon tracking
- •Wiring for proper connections, pinches, cuts.
- •Sensor connectors for damage, corrosion and contamination









Intermittent problems

EDISECI Sertal Communications	Helo	_ <u>_8</u> ×
Gauges Connected	Controls, Inc. Connected at 19200 bps	
Ford Power Products ECM Interface	ML ()	
50 150 25 43 pria	Codard Temperature Indi A & Temperature System Vanables 250- 250- 250- Engine Speed 100 100- 150- Min Governor Setpoint 1000 rpm 100- 150- Max Governor Setpoint 4500 rpm 00- 50- Pulse width 3.62 me 00- 0- EG01 0.095 volts 124 deg F 81 deg F 124 deg F 124	
EDIS Plot	In Mission Vialue 2000 Sameling Maryal (me) 215.00	
Foot Pedal Position 100- 80- 60-	Single Shot Acquisition Maximum Y Value 4000.00 Time Inerval (s) 10.00 Exclusive Serial Use ECT IAT FPP2_idle	
40- 4000-		
0	M	
2400-		
E		
1600-		
900		
0-2	26 28 30 32 34 36	

Graphing the values and voltages can be a very useful tool in doing intermittent diagnosis.

The system diagnostic monitoring software includes graphing and data logging These features capability. enhance the ability to diagnose and repair intermittent problems with the system. The graphing feature allows sensor inputs and select control output variables to be plotted in real-time while the engine is running.



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Comm Port Plot/Log Help -Link error - attempting reconnect. Toggle Page · F9 Faults EControls, Inc. Connected at 19200 bps Toggle Lest Cell - F10 MII Fault Access DBW Variables Injector-on low-side Injector-off low-side voltage System States Coil Number Spark Coil (firing order) dwell ms Engine Speed 1401 Running TPS command 0.0 voltage Run Mode (firing order) TPS position 0.1 % Manifold Pressure Gasoline 14.0 Fuel Type 0.2 FPP command 0.0 Coolant Temperature 195.0 deg Euel Control Mode 0.1 14.5 Cylinder Head Temp 195.0 deg F Gov3 FPP position 0.0 % 0.1 14.5 Governor switch state TPS1 voltage 0.484 volts Manifold Temperature deg F Active governor type Min 0.2 14.5 Intake Air Tempera 106.7 TPS2 voltage 4.477 volts deg F Active governor mode Droop 0.0 0.0 Vbat volts FPP1 voltage 0.442 volts 0.0 0.0 Brake input level Open Vsw 13.7 volts FPP2 voltage 0.000 volte ΠK. Oil pressure state 2.843 hours 5 000 volts Hour meter IVS voltage Cumulative starts 13 starts Digital Input Voltages Diagnostic Modes Closed-Loop Control EG01 0.592 Eucl select voltage 10.4 volts Spark kill Normal 🔻 volts 12 % Euclinump voltage 13.8 volts Normal 🔻 Closed-loop Injector kill Gov1 voltage 20.6 volts DBW test mode Off Adaptive 1 0.0 % Gov2 voltage 20.6 volts EG02 0.452 SnapShot Base SnapShot Custom Definitions Overspeed voltage 5.0 volts Flight Data Closed-loop 3 5.0 volts Definitions Definition: Adaptive 2 00 % fuel state EMPTY run_tmr_s Historic Faults Active Faults FPP_pct EMPTY rpm TPS_pct Double click fault for information Double click fault for information EMPTY FCT CL BM1 EMPTY MAP voltage low ECT voltage high EMPTY IAT voltage high Vbat CL_BM1 EMPT PW_avg A_BM1 L BM2 ECT voltage high EMPTY A_BM1 A_BM2 A_BM2 Vbat FPP_pcl Flight Data Custom Definitions TPS_pct EG01 volts EMPTY EGO2_volts EMPTY PW_avg TBIM DC HM hours

The System Fault screen is used to view and clear DTC's, which have been set.

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Checking Diagnostic Trouble Codes

The System Fault screen contains a listing of all of the **historic** and **Active** DTC set within the system. If a DTC is stored in memory, the screen will display that fault in the history column. If the fault is active it will also show up in that column.







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ile <u>P</u> age Flash <u>⊊</u> omm Port Plot/Log He	elp				
Faults Connected		⊥ink error - attempting reconnect Connected at 19200 bps		Toggle Page - F9 Toggle Lest Cell - F10	
FaultAccess 🕥 MIL	System States	DBW Variables		Injector Injector-or	n Injector-off
Engine Speed 1027 rpm	Run Mode Running	TPS command 3.8 %	Coil Number Spark Co (firing order) dwell ms	il Number low-side (firing order) voltage	low-side voltage
Manifold Pressure 4.35 psia	Fuel Type Gasoline	TPS position 3.7 %	1 4.2	i <u>0.1</u>	1 14.4
Coolant Temperature 97.6 deg F	Fuel Control Mode CL Active	FPP command 0.0 %	2 4.2	2 0.1	1 14.2
Cylinder Head Temp 97.6 deg F	Governor switch state Gov3	FPP position 0.0 %	3 0.0	3 0.2	2 14.1
Manifold Temperature 78.9 deg F	Active governor type Min	TPS1 voltage 0.696 volts		4 0.4	4 14.1
Intake Air Temperature 78,7 deg F	Active governor mode Droop	TPS2 voltage 4.267 volts		5 0.0	0.0
Vbat 13.8 volts	Brake input level Open	FPP1 voltage 0.434 volts		6 0.0	0.0
Vsw 13.7 volts	Oil pressure state OK	FPP2 voltage 0.000 volts			
Hour meter 12.628 hours		IVS voltage 5.000 volts			
Cumulative starts 39 starts					
Closed-Loop Control	Digital Input Voltages	Diagnostic Modes			
EG01 0.882 volts	Fuel select voltage 10.4 volts	Spark kill Normal 🔻			
Closed-loop 1 0.0 %	Fuel pump voltage 13.6 volts	Injector kill V Normal			
Adaptive 1 0.0 %	Gov1 voltage 20.6 volts	DBW test mode Coil 1 (FO)			
	Gov2 voltage 20.6 volts	Coil 2 (FD)			
	Overspeed voltage 5.0 volts	Coll 4 (ED)	Data Snap!	Shot SnapShot	
Llosed-loop 2 0.0 %	Oil pressure voltage 5.0 volts	Coil 5 (FO)	e Bas bons Defini	e Custom ions Definitions	
Adaptive 2 U.U %		Coil 6 (FO)	fuel	tate EMPTY	
		Ī	MAP run_t	mr_sec EMPTY	
Historic Faults	Acti	ive Faults	PP_pct rpm	EMPTY	
		[TPS_pct rMAF	EMPTY	
			CL_BM1 FECT	EMPTY	
			CL_BM2 rIAT	EMPTY	
			/bat CL_8	M1 EMPTY	
			-W_avg UL_B	M2 JEMPTY	
			A_BM1 A_BM A_BM2 A_BM	11	
			Vhat		
			FPP	pct	
		F	light Data TPS	pot	
		0	efinitions EGO	I_volts	
			EGO:	2_volts	
		1	EMPTY PW_	avg	
			TBIM	_DC	
			[HM_I	nours	

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The Spark Kill diagnostic mode allows the technician to disable the ignition on individual cylinders. If the Spark Kill diagnostic mode is selected with the engine running below 1000 RPM, the **minimum throttle** command will lock into the position it was in when the test mode was entered (similar to IAC disabled in automotive systems. If the Spark System Test mode is selected with the engine running above 1000 RPM, the throttle will continue to operate normally.







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EDIS ECI Serial Communications					
Elle Page Flash Comm Port Plot/Log H	lelp				
Faults	EControls. Inc.	Link error - attempting reconnect	<u></u>	Toggle Page - F9	
Connected	Control and Instrumentation Specialiste		<u> </u>	Toggle Lest Cell · F10	
FaultAccess) MIL	System States	DBW Variables		Injector Injector-on	Injector-off
Engine Speed 1027 rpm	Run Mode Running	TPS command 3.8 %	Coil Number Spark Coi (firing order) dwell ms	Number low-side (firing order) voltage	low-side voltage
Manifold Pressure 4.35 psia	Fuel Type Gasoline	TPS position 3.7 %	1 4.26	1 01	14.4
Coolant Temperature 97.6 deg F	Fuel Control Mode CL Active	FPP command 0.0 %	2 4.26	2 01	14.2
Cylinder Head Temp 97.6 deg F	Governor switch state Gov3	FPP position 0.0 %	3 0.00	3 02	14.1
Manifold Temperature 78.9 deg F	Active governor type Min	TPS1 voltage 0.696 volts		4 0.4	14.1
Intake Air Temperature 78,7 deg F	Active governor mode Droop	TPS2 voltage 4.267 volts		5 0.0	0.0
Vbat 13.8 volts	Brake input level Open	FPP1 voltage 0.434 volts		6 0.0	0.0
Vsw 13.7 volts	Oil pressure state OK	FPP2 voltage 0.000 volts			
Hour meter 12.628 hours	,	IVS voltage 5.000 volts			
Cumulative starts 39 starts					
Closed-Loop Control	Digital Input Voltages	Diagnostic Modes			
EG01 0.882 volts	Fuel select voltage 10.4 volt	s Spark kill Normal 🔻			
Closed-loop 1 0.0 %	Fuel pump voltage 13.6 volt	s Injector kill Vormal			
Adaptive 1 0.0 %	Gov1 voltage 20.6 volt	s DBW test mode Coil 1 (FO)			
F000	Gov2 voltage 20.6 volt	Coil 2 (FO)			
Church land 2	Overspeed voltage 5.0 volt	s Coil 4 (FO)	Data SnapS	hot SnapShot	
	Oil pressure voltage 5,0 volt	s Coil 5 (FO)	ie Base tions Definiti	e Custom ons Definitions	
Audpive 2 1 0.0 %		Coil 6 (FO)	fuel_s	tate EMPTY	
			MAP run_tn	IT_SEC EMPTY	_
Historic Faults	A	ctive Faults	PP_pct rpm	EMPTY	
			TPS_pct rMAP	EMPTY	
			L_DMI ILUI		
		F	/bat CL Bt		
		j l	PW_avg CL_BM	12 EMPTY	
		Į į	A_BM1 A_BM	1 .	
		F	A_BM2 A_BM	2	
			Vbat		
		F	light Data TTPC	oct	
		0	Lustom [175_]	uolto	
			EGO2	volts	
		, i i	MPTY PW_a	vg	
			TRIM	DC	
			HM_h	ours	

Disabling Spark Plugs

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Allison GM

To disable the ignition system for an individual cylinder, use the mouse to highlight the "Spark Kill" button and select the desired coil. The spark output can be reenabled by using the mouse to highlight the "Spark Kill" button and selecting "Normal". If the engine is running below 1000 RPM, the spark output will stay disabled for **15 seconds and then re-set.** If the engine is running above 1000 RPM, the spark output will stay disabled for **5 seconds and then reset.** This test mode has a timeout of 10 minutes. Record the rpm drop related to each spark output disabled.

The Spark outputs are arranged in the order which the engine fires, not by cylinder number.

JOHN DEERE

ink error - attempting reconnect. Toggle Page - F9 Faults EControls, Inc. onnected at 19200 bns Toggle Test Cell - F10 trai and bash Fault Access) MIL DBW Variables Injector Number Injector-off Injector-on System States Spark Coil dwell ms Coil Number low-side low-side Engine Speed 1000 rpm TPS command 3.3 % Run Mode Running (firing order) (firing order) voltage voltage Manifold Pressure 4.35 psia Fuel Type Gasoline TPS position 3.5 % 4.25 14.2 0.3 Coolant Temperature 107.3 deg F EPP command 0.0 % 4.25 0.1 14.1 Fuel Control Mode CL Active Cylinder Head Temp 107.3 dea F 0.0 Governor switch state Gov3 FPP position 0.4 14.0 Manifold Temperature 79.6 0.685 degl TPS1 voltage 0.2 14.4 Active advertion type Min 4.275 volts Intake Air Temperature 79.3 dea F Droop TPS2 voltage 0.0 0.0 Active governor mode Vhat 13.8 volts FPP1 voltage 0.448 volts 6 0.0 0.0 Brake input level Open 13.6 volts 0.000 volts Vsw FPP2 voltage Oil pressure state OK 12.642 hours 5.000 volts Hour meter IVS voltage Cumulative starts 39 starts Digital Input Voltages Diagnostic Modes Closed-Loon Control EG01 0.503 Fuel select voltage 10.2 volts Spark kill Normal 🔻 volts Closed-loop 4.5 Fuel pump voltage 13.7 volts Injector kill Normal 🔫 ✓ Normal Adaptive 1 0.0 Gov1 voltage 20.6 volts DBW/test mode 9/ Ini 1 (FO) Gov2 voltage 20.6 volts EG02 0.452 volt Ini 2 (FO) Overspeed voltage 5.0 volts Data SpanShot SnapShot Custom Definitions Closed-loop 2 % Ini 3 (FO) Base Definitions Oil pressure voltage 5.0 volts Ini 4 (EO) Adaptive 2 0.0 Inj 5 (FO) fuel_state EMPTY Inj 6 (FO) run tmr sec Historic Faults Active Fault: FPP_pct rpm TPS_pct EMPTY CL_BM1 rECT TAh CL_BM2 Vbat CL_BM1 EMPTY PW_avg CL_BM2 EMPTY A BM1 A BM1 A BM2 A_BM2 Vbat FPP_pct Flight Data Custom Definitions TPS_pct EG01_volts EMPTY EG02_volts EMPTY PW_avg TRIM_DC HM hours

Injector Test

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The Injector Kill mode is used to disable individual fuel injectors. If the Injector Kill mode is selected with the engine running below 1000 RPM, the **minimum throttle command will lock into the position it was in when the test mode was entered** (similar to IAC disable in automotive systems) If the Injector Kill mode is selected with the engine running above 1000 RPM, the throttle will continue to operate normally.









Throttle Test

To select this test mode the engine must be off but the key must be in the **ON** position.The DBW (Drive By Wire) test mode allows the technician to control the throttle directly with the foot pedal or throttle input and is used during the diagnostic routines specified for FPP and TPS for Spectrum systems that use DBW.

FPP position displays the current position of the foot pedal as a percentage. FPP volts display the voltage which the ECM is reading from the FPP sensor. TPS Command displays the commanded throttle position expressed as a percentage, which is being sent to the throttle. TPS Position is the actual percent of throttle opening

1 . 1			I ink error - attempting reconnect		- Tooole	Page F9	
	Faults	EControls, Inc.	Connected at 19200 bps			anage ins	
	Connected	Control and Instrumentation Specie				est cell+rio	
uit Access 🧧	MIL	System States	DBW Variables	Collinster C	Injec	tor Injector on Injector off	
jine Speed	0 rpm	Run Mode Stopper	TPS command 0.0	(firing order)	dwell ms (firing o	xder) voltage voltage	
nifold Pressure	14.38 psia	Fuel Type Gasolin	TPS position 0.1	× ι Γ	4.25 1	0.2 13.4	
ant Temperature	113.3 deg F	Fuel Control Mode Open Lo	op FPP command 0.0	× 2 [4.25	0.1 13.4	
nder Head Temp	113.3 deg F	Governor switch state Gov3	FPP position 0.0	× з Г	0.00	0.2 13.4	
nifold Temperatur	e 113.3 deg F	Active governor type Min	TPS1 voltage 0.489 v	valts	4	0.1 13.4	
ike Air Temperatu	re 81.6 deg F	Active governor mode Droop	TPS2 voltage 4.472 v	rolts	ŧ	5 0.0 0.0	
st.	12.8 volts	Brake input level Open	FPP1 vokage 0.451 v	rolts	6	0.0 0.0	
y .	12,5 volts	Oil pressure state Low - Igno	red FPP2 vokage 0.000 v	rolts			
ur meter	12.658 hours		IVS voltage 5.000 V	rolts			
nulative starts	39 starts						
Closed	aan Control	Dialtel Innut Volteges	Disanostic Modes				
	0.000 welte	Fuel select voltage 10.4	volts Spark kill Normal	-			
wed-loop 1	0.000 %0.00	Fuel pump voltage 0.0	volts Injector kill Normal	-			
aptive 1	00 %	Gov1 votage 20.6	volts DBW test model Enabled	-			
		Gov2 voltage 20.6	volts Off				
102	0.452 volts	Overspeed voltage 5.0	volts Cinabled	t Data	SnapShot	SnapShot	
osed-loop 2		Oil pressure voltage 0.0	voks	Base Definitions	Base Definitions	Custom Definitions	
aprive z	1 0.0 ~			rpm	fuel_state	EMPTY	
				IMAP	run_tmr_sec	EMPTY	
	Historic Faults		Active Faults	FPP_pct	rpm	EMPTY	
				TPS_pct	rMAP	EMPTY	
				CL_BM1	rECT	EMPTY	
				DOMA	CL PM1		
				PW ava		EMPTY	
				A BM1	A BM1	- Jean Li	
				A_BM2	A_BM2	-	
					Vbat	-	
				Flight Data	FPP_pct		
				Eustom	TPS_pct		
				EMPTY	EG01_volts		
				EMPTY	EGU2_volts	-	









Final Questions & Comments



