

Computers and Control Systems: Pinpoint Tests

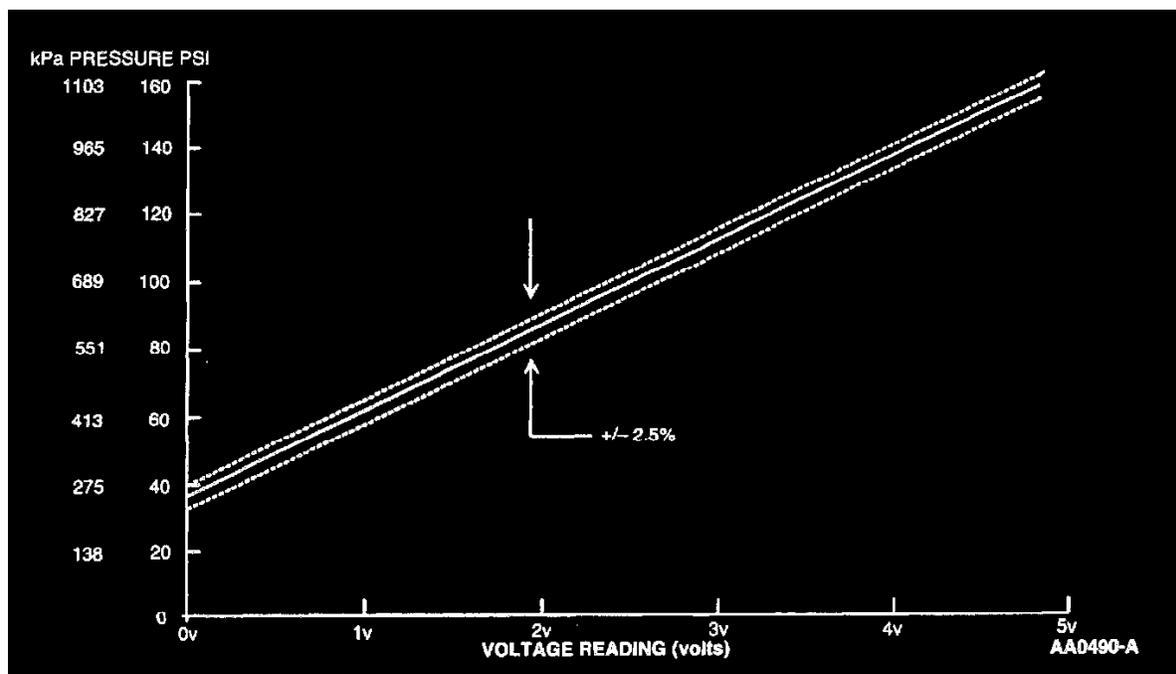
Test DD: Fuel Rail Pressure (FRP) Sensor

NOTE

This Pinpoint Test is intended to diagnose the following:

- Fuel Rail Pressure (FRP) Sensor
- Harness Circuits: FRP and SIG RTN
- powertrain Control Module (PCM)

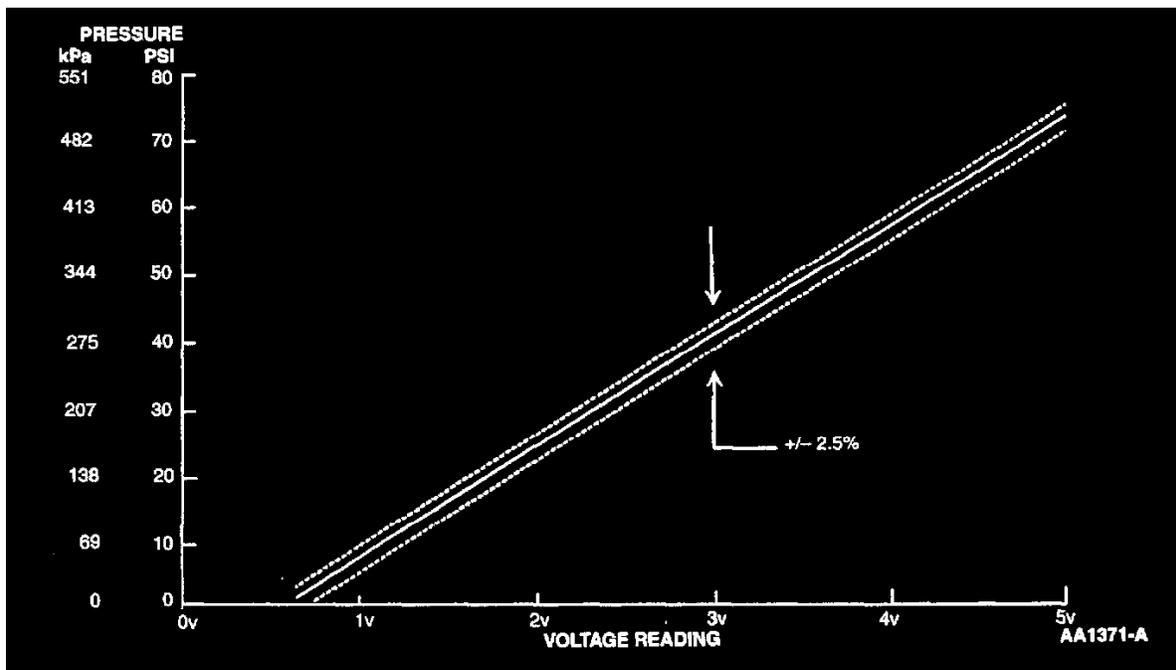
Tables and Graphs



Natural Gas Vehicles (FRP Voltage And Pressure Graph)

Fuel Rail Pressure (FRP) Sensor		
Voltage (dcv)	Pressure (psi)	Pressure (kPa)
4.5	150	1034
4.1	140	965
3.7	130	896
3.3	120	827
2.9	110	758
2.5	100	689
2.1	90	620
1.7	80	551
1.3	70	482
0.9	60	413
0.5	50	344
0.1	40	275
0	37.6	259

Natural Gas Vehicles (FRP Voltage And Pressure Specifications)



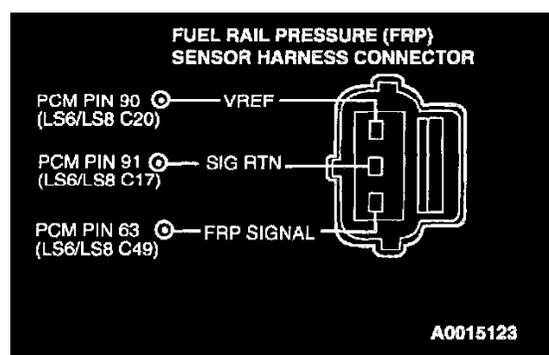
Gasoline Vehicles (FRP Voltage And Pressure Chart)

Voltage (dcv)	Pressure (kPa)	Pressure (psi)
4.5	482	70
3.9	413	60
3.4	344	50
2.8	275	40
2.2	207	30
1.6	138	20
1.1	69	10
0.5	0	0

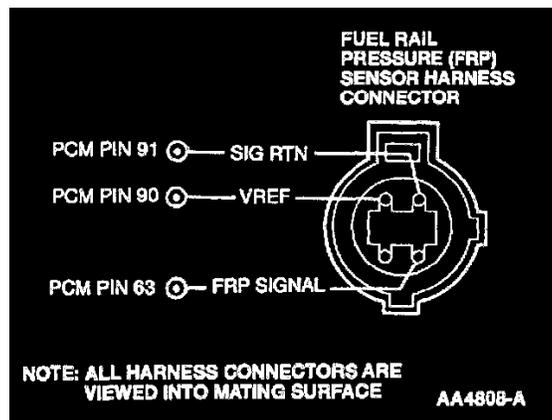
Gasoline Vehicles (FRP Voltage And Pressure Specifications)

Voltage values were calculated for VREF 5.0 volts. These values may vary 15 percent due to sensor and VREF variations.

Pinpoint Test Schematics and Connectors



Gasoline Vehicles (FRP Sensor Connector)



NG Vehicles (FRP Sensor Connector)

Pinpoint Tests

Test Steps		Results	→	Action to Take
DD1	DTC P0192: VERIFY DTC WITH FRP PID			
	<ul style="list-style-type: none"> • Key on, engine off. • Verify there is sufficient fuel (NG only). • Access FRP PID. • Is the FRP PID voltage less than 0.2 volt? 	Yes	→	KEY OFF. For NG vehicles: GO to DD2.
		No	→	All others: Fault is present, GO to DD3. Fault is intermittent. GO to DD13.
DD2	CHECK FUEL PRESSURE (NATURAL GAS)			
	<ul style="list-style-type: none"> • Install fuel pressure gauge. • Key on engine running. • Obtain a pressure reading. • Is the fuel pressure reading greater than 345 kPa (50 psi)? 	Yes	→	KEY OFF. GO to DD3.
		No	→	GO to HB1.
DD3	GENERATE OPPOSITE SIGNAL			
	<p>Note: Refer to the PCM connector pin numbers in the beginning of this pinpoint test.</p> <ul style="list-style-type: none"> • Disconnect FRP harness connector. • Natural Gas Vehicles: Jumper FRP SIG pin to VREF pin at the FRP sensor harness connector. • Note: If any scan tool communication concern exists, remove jumper and GO to DD24. • Key on, engine off. • Access FRP V PID. • Is the FRP V PID voltage greater than 4.6 volts? 	Yes	→	REPLACE FRP sensor.
		No	→	GO to DD4.
DD4	CHECK VREF VOLTAGE TO FRP SENSOR			
	<ul style="list-style-type: none"> • Measure voltage between VREF and SIG RTN circuits at the FRP sensor harness connector. • Is the voltage between 4.0 and 6.0 volts? 	Yes	→	KEY OFF. GO to DD5.
		No	→	GO to C1.
DD5	CHECK FRP CIRCUIT FOR OPEN IN HARNESS			
	<p>Note: Refer to the PCM connector pin numbers in the beginning of this pinpoint test.</p> <ul style="list-style-type: none"> • Disconnect PCM. • Measure resistance of FRP circuit between PCM harness connector pin and FRP sensor harness connector. • Is the resistance less than 5.0 ohms? 	Yes	→	GO to DD6.
		No	→	REPAIR open circuit.
DD6	CHECK FRP CIRCUIT FOR SHORTS TO SIG RTN AND PWR GND IN HARNESS			
	<ul style="list-style-type: none"> • Measure resistance between FRP and SIG RTN circuits at the PCM harness connector. • Measure resistance of FRP circuit at the PCM harness connector and battery negative post. • Are both resistances greater than 10,000 ohms? 	Yes	→	REPLACE PCM (refer to Flash Electrically Erasable Programmable Read Only Memory (EEPROM)).
		No	→	REPAIR short circuit.
DD7	DTC P0193: CHECK FUEL PRESSURE PID VALUE			
	<ul style="list-style-type: none"> • Key on. • Access and monitor FRP V PID. • Is the FRP V PID voltage greater than 4.5 for NG and 4.8 for all others? 	Yes	→	KEY OFF. For gasoline vehicles: GO to DD8. For NG vehicles: GO to DD9.
		No	→	Fault is intermittent. GO to DD14.

DD1 - DD7

Test Steps		Results →	Action to Take
DD8	CHECK FUEL RAIL PRESSURE SENSOR FOR FUEL LEAKS		
	<ul style="list-style-type: none"> Remove vacuum hose from fuel rail pressure sensor. Inspect sensor and hose for fuel. Is fuel present? 	Yes → No →	REPLACE fuel rail pressure sensor. GO to DD10 .
DD9	CHECK FUEL PRESSURE (NATURAL GAS)		
	<ul style="list-style-type: none"> Install fuel pressure gauge. Key on, engine running. Obtain a pressure reading. Is the fuel pressure reading greater than 1034 kPa (150 psi)? 	Yes → No →	KEY OFF. GO to HB1 . KEY OFF. GO to DD10 .
DD10	ATTEMPT TO INDUCE OPPOSITE FRP SIGNAL		
	Note: Refer to the PCM connector pin numbers in the beginning of this pinpoint test. <ul style="list-style-type: none"> Disconnect FRP sensor. Jumper FRP pin to SIG RTN pin at the FRP sensor harness connector. Key on, engine off. Access FRP V PID. Note: If any scan tool communication concern exists, remove jumper and GO to DD24. Is the FRP V PID voltage less than 0.2 volt? 	Yes → No →	KEY OFF. REPLACE fuel rail pressure (FRP) sensor. KEY OFF. GO to DD12 .
DD11	DTC P0190: CHECK VREF TO FRP SENSOR		
	Note: Before proceeding to the following test step, a complete inspection of the fuel system for external leaks must be completed. Repair any leaks before continuing. Verify fuel level before beginning test steps. <ul style="list-style-type: none"> Key on, engine off. Measure voltage between VREF and SIG RTN circuits at the FRP sensor harness connector. Is the voltage between 4.0 and 6.0 volts? 	Yes → No →	KEY OFF. GO to DD13 . KEY OFF. GO to DD12 .
DD12	CHECK FRP, SIG RTN AND VREF CIRCUITS FOR OPEN IN HARNESS		
	<ul style="list-style-type: none"> Disconnect PCM. Measure resistance of FRP circuit between PCM pin and FRP sensor harness connector. Measure resistance of SIG RTN circuit between PCM harness connector pin and FRP sensor harness connector. Measure resistance of VREF circuit between PCM harness connector pin and FRP sensor harness connector. Is each resistance less than 5.0 ohms? 	Yes → No →	GO to DD13 . REPAIR open circuit.

DD8 - DD12

Test Steps		Results	Action to Take
DD13	CHECK FRP SENSOR RESISTANCE		
	Note: Refer to the PCM connector pin numbers in the beginning of this pinpoint test. <ul style="list-style-type: none"> • Measure resistance between FRP pin and VREF pin at the FRP sensor. • Measure resistance between FRP pin and SIG RTN pin at the sensor. • Is each resistance between 30K - 40K ohms? 	Yes →	For continuous memory DTC P0190 only: GO to DD15 . For DTC P0192: REPLACE PCM (refer to Flash Electrically Erasable Programmable Read Only Memory (EEPROM)). DTC P0193: GO to DD14 .
		No →	REPLACE FRP sensor.
DD14	CHECK FRP CIRCUIT FOR SHORT TO VREF AND VPWR IN HARNESS		
	<ul style="list-style-type: none"> • Disconnect PCM. • Measure resistance between FRP and VPWR circuits at the PCM harness connector. • Measure resistance between FRP and VREF circuits at the PCM harness connector. • Are both resistances greater than 10,000 ohms? 	Yes →	REPLACE PCM (refer to Flash Electrically Erasable Programmable Read Only Memory (EEPROM)).
		No →	REPAIR short circuit.
DD15	WIGGLE TEST THE FRP SENSOR CIRCUIT WHILE MONITORING FRP PID FOR SUDDEN VALUE CHANGE		
	<ul style="list-style-type: none"> • Access FRP V PID. • While monitoring FRP V PID, tap on the FRP sensor; then wiggle the wiring while looking for sudden changes in the PID voltage as an indication of an intermittent fault. • Is a fault indicated? 	Yes →	REPAIR as necessary.
		No →	Unable to duplicate/identify fault at this time. GO to Z1 .
DD16	KOEO, KOER DTC P0191 AND CONTINUOUS DTCS P1168 P1169: CHECK FUEL PRESSURE		
	Note: If vehicle is a no-start, GO to HB1 . <ul style="list-style-type: none"> • Key on. • Verify there is sufficient fuel (one eighth tank or greater). • Key off. • Fuel pressure gauge connected. • Key on engine running. • Is the pressure reading within 138 kPa (20 psi) and 413 kPa (60 psi) for gasoline, or 552 kPa (80 psi) and 827 kPa (120 psi) for natural gas vehicles (NG)? 	Yes →	GO to DD17 .
		No →	REMOVE pressure gauge. GO to HC1 for gasoline or GO to HB1 for NG vehicles.

DD13 - DD16

Test Steps		Results	→	Action to Take
DD21	MONITOR FRP V PID WITH SCAN TOOL			
	<ul style="list-style-type: none"> • Key on, engine off. • Access FRP V PID. • Is the FRP V PID value less than 0.2 volt for NG, and greater than 4.8 volts for all others? 	Yes No	→ →	REPLACE FRP sensor. REPLACE PCM (refer to Flash Electrically Erasable Programmable Read Only Memory (EEPROM)).
DD22	CHECK FSV PWR VOLTAGE TO FUEL RAIL SOLENOID SHUT-OFF VALVE HARNESS CONNECTOR			
	<ul style="list-style-type: none"> • Disconnect the fuel rail solenoid shut-off valve at the harness connector. • Key on. • Access and enter Output Test Mode on the scan tool. • Select: ALL ON. • Note: Measurement must be made within 7 seconds of activating test mode. <p>Measure voltage between the FSV PWR circuit at the fuel rail solenoid shut-off valve harness connector and battery negative post.</p> <ul style="list-style-type: none"> • Is the voltage reading greater than 10.5 volts? 	Yes No	→ →	GO to DD23 . KEY OFF. REPAIR open circuit.
DD23	CHECK GROUND CIRCUIT FOR OPEN IN HARNESS			
	<ul style="list-style-type: none"> • Measure resistance between the ground circuit at the fuel rail solenoid shut-off valve harness connector and battery negative post. • Is resistance less than 5.0 ohms? 	Yes No	→ →	REPLACE fuel rail solenoid shut-off valve. REPAIR open circuit.
DD24	CHECK VREF VOLTAGE TO FRP SENSOR			
	<ul style="list-style-type: none"> • Disconnect FRP sensor. • Key on, engine off. • Measure voltage between VREF and SIG RTN circuits at the FRP harness connector. • Is the voltage between 4.0 and 6.0 volts? 	Yes No	→ →	KEY OFF. GO to DD25 . VREF is out of range. GO to C1 .
DD25	CHECK FOR FRP SIGNAL CIRCUIT SHORTED TO SIG RTN VREF OR PWR GND IN HARNESS			
	<p>Note: Refer to the PCM connector pin numbers in the beginning of this pinpoint test.</p> <ul style="list-style-type: none"> • Disconnect PCM. • Disconnect scan tool from DLC. • FRP disconnected. • Measure resistance between FRP and SIG RTN circuits at the PCM harness connector. • Measure resistance between FRP and VREF circuits at the PCM harness connector. • Measure resistance between FRP circuit at the PCM harness connector and battery negative post. • Is the resistance greater than 10,000 ohms? 	Yes No	→ →	REPLACE PCM (refer to Flash Electrically Erasable Programmable Read Only Memory (EEPROM)). REPAIR short.

DD21 - DD25