

System & Component Testing - 3.4L Aztek & Rendezvous

INTRODUCTION

Before testing separate components or systems, follow proper workflow. See **DIAGNOSTIC STARTING POINT - ENGINE CONTROLS** under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. If no Diagnostic Trouble Codes (DTC) are present and a no-start condition exists, proceed to **NO-START DIAGNOSIS** in BASIC DIAGNOSTIC PROCEDURES - 3.4L AZTEK & RENDEZVOUS article. If no DTCs are present and a driveability condition exists, proceed to **SYMPTOMS** in TROUBLE SHOOTING - NO CODES - 3.4L AZTEK & RENDEZVOUS article for diagnosis by symptom (i.e., ROUGH IDLE, ENGINE STALLS, etc.).

NOTE: Testing individual components does not isolate shorts or opens. Perform all voltage tests with a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohm input impedance, unless stated otherwise in test procedure. Use ohmmeter to isolate wiring harness shorts or opens.

COMPONENT LOCATIONS

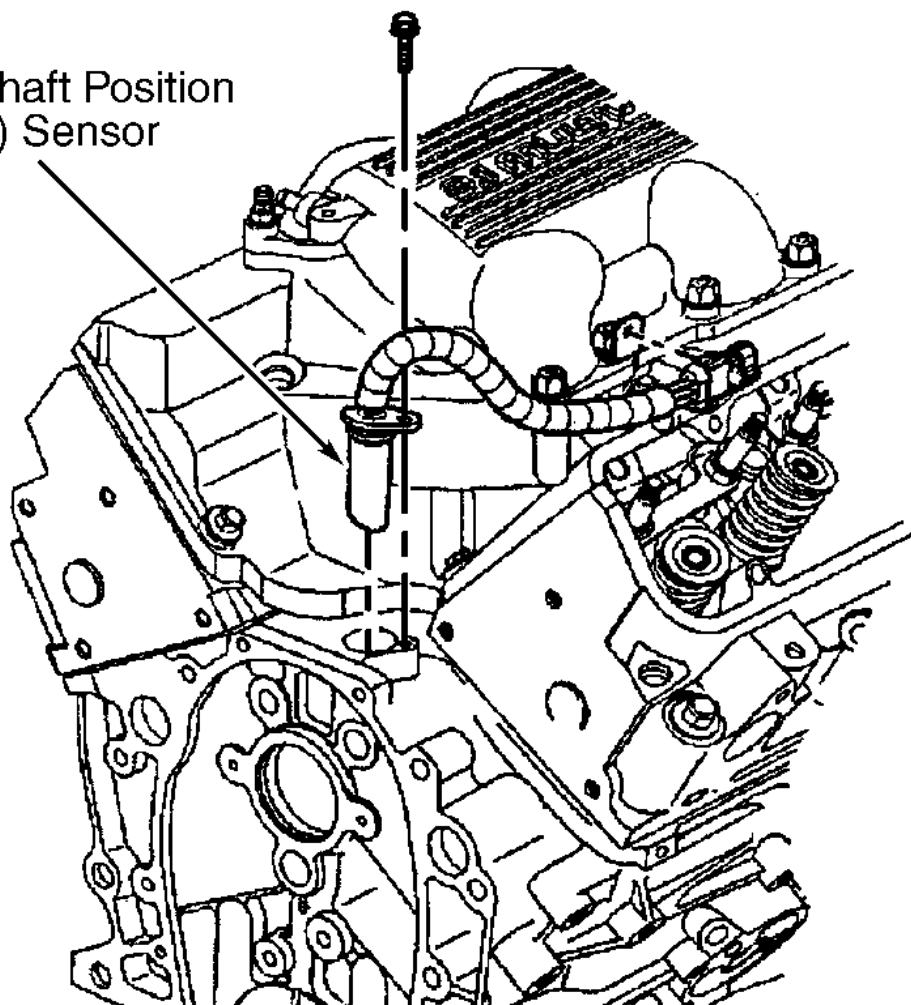
NOTE: For component locations, refer to **COMPONENT LOCATIONS** table or illustrations. See Fig. 1 -Fig. 11 .

COMPONENT LOCATIONS

Component	Location
Body Control Module	Inside Center Console, Above Fuse Block
Camshaft Position Sensor	Right Side Of Engine, Above A/C Compressor Clutch
Crankshaft Position Sensor (7x)	Lower Rear Of Engine
Crankshaft Position Sensor (24x)	Right Front Side Of Engine, Behind Harmonic Balancer
Data Link Connector	Below Steering Column, Bottom Of Knee Bolster
Engine Coolant Temperature Sensor	Top Left Of Engine
Engine Oil Level Switch	Right Side Of Engine Oil Pan
Engine Oil Pressure Indicator Switch	Front Of Engine, Above Starter
EVAP Canister Purge Solenoid	Top Rear Of Engine, Between EGR Valve & Throttle Body Assembly
EVAP Canister Vent Solenoid	Below Center Of Vehicle, Near Fuel Tank
Exhaust Gas Recirculation Valve	Top Left Side Of Engine, Left Of Manifold
Fuel Injectors	Top Of Engine, At Each Cylinder Intake Port
Fuel Pump Relay	In Underhood Fuse Block
Fuel Tank Pressure Sensor	Inside Fuel Tank
Heated Oxygen Sensor No. 1	Rear Of Engine, In Exhaust Manifold
Heated Oxygen Sensor No. 2	In Exhaust System, Rear Of Catalytic Converter

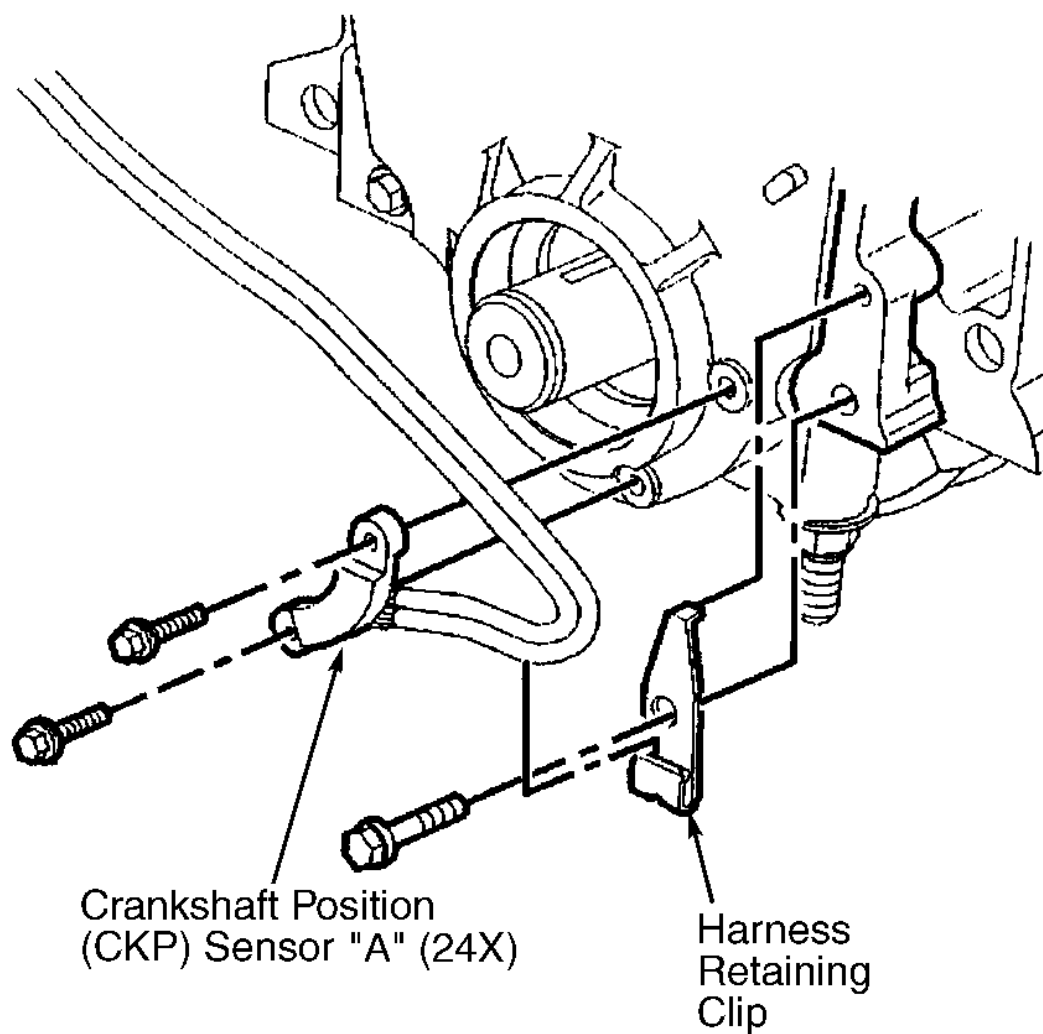
Idle Air Control Valve	Top Of Engine, Top Of Throttle Body
Ignition Control Module	Top Center Rear Of Engine
Intake Air Temperature Sensor	Left Side Of Engine Compartment, On Air Intake Duct, Near Throttle Body
Knock Sensor	Front Of Engine, Above Starter
Manifold Absolute Pressure Sensor	Right Top Of Engine
Mass Airflow Sensor	In Air Cleaner Duct, Left Front Side Of Engine Compartment
Powertrain Control Module	Engine Compartment, Secured In Air Cleaner Assembly
Secondary AIR Injection Pump	Front Of Vehicle, Behind Left Fog Light, Below Horn
Secondary AIR Injection Solenoid	Lower Rear Of Engine
Throttle Position Sensor	Top Of Engine, On Rear Side Of Throttle Assembly
Vehicle Speed Sensor	Lower Right Rear Of Engine Compartment, Mounted To Right Side Of Transaxle

Camshaft Position
(CMP) Sensor



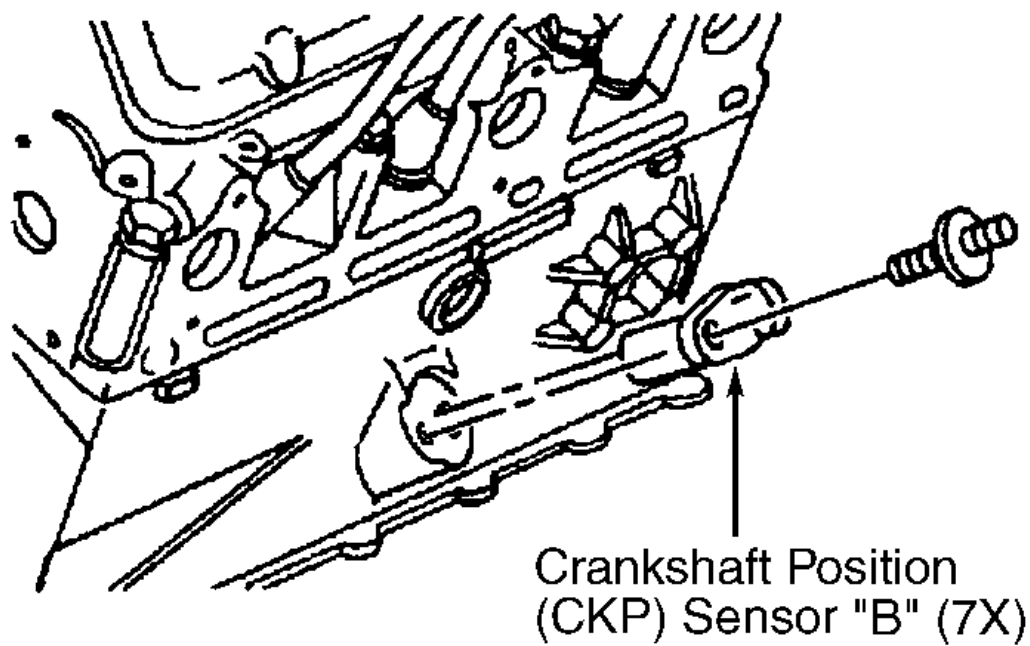
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Fig. 1: Locating Camshaft Position Sensor
Courtesy of GENERAL MOTORS CORP.



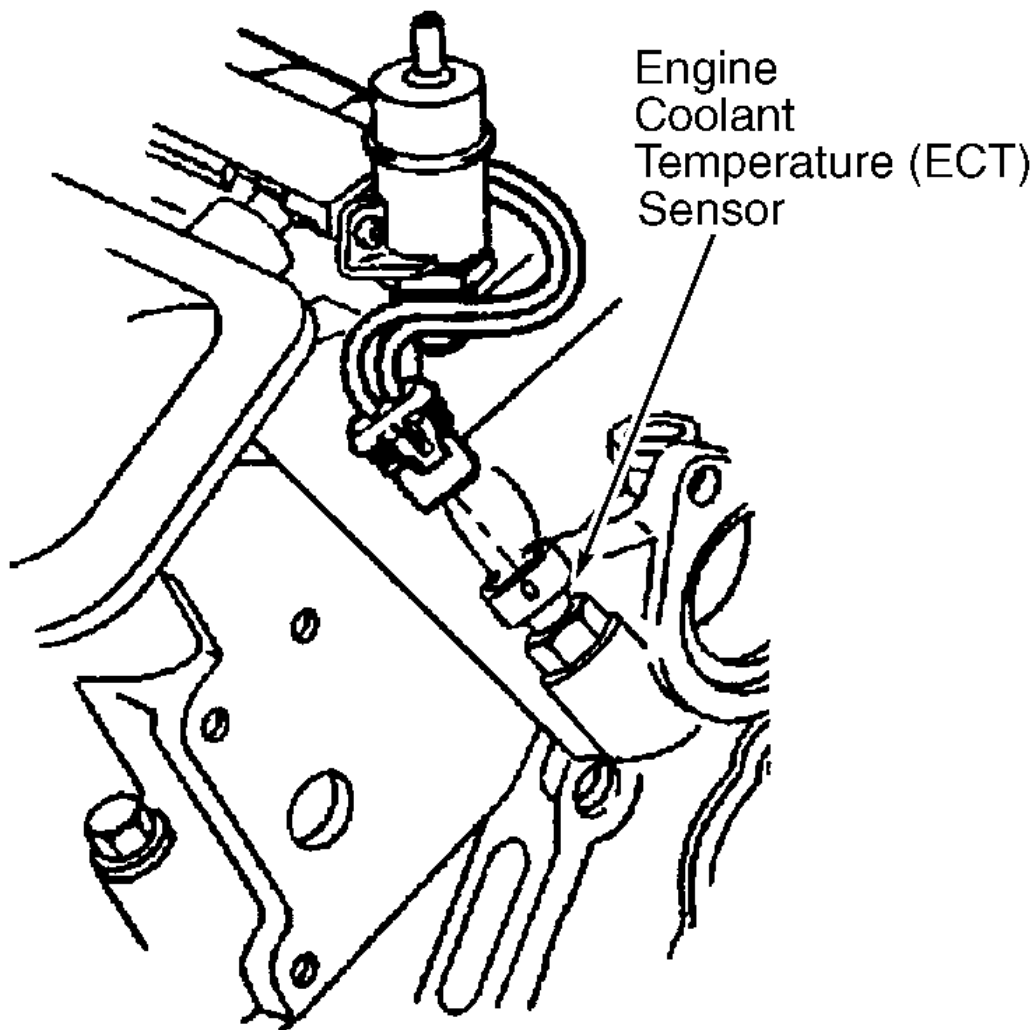
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Fig. 2: Locating Crankshaft Position Sensor "A" (24X)
Courtesy of GENERAL MOTORS CORP.



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Fig. 3: Locating Crankshaft Position Sensor "B" (7X)
Courtesy of GENERAL MOTORS CORP.



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Fig. 4: Locating Engine Coolant Temperature Sensor
Courtesy of GENERAL MOTORS CORP.

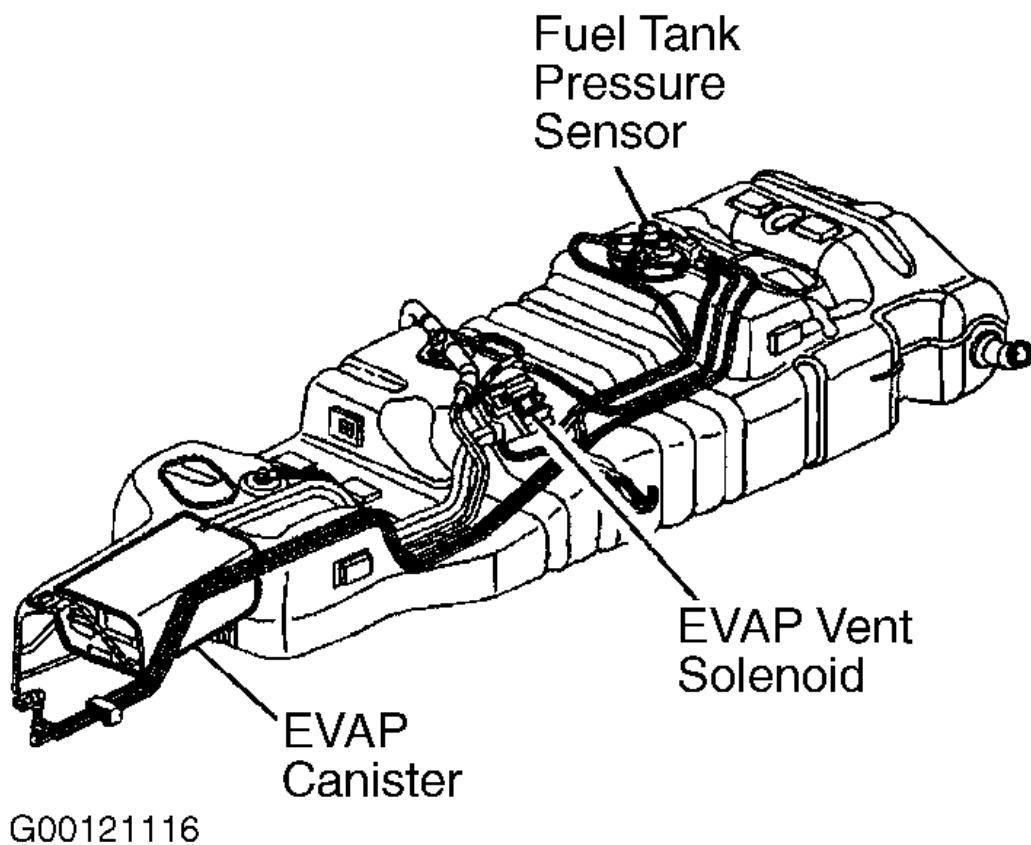
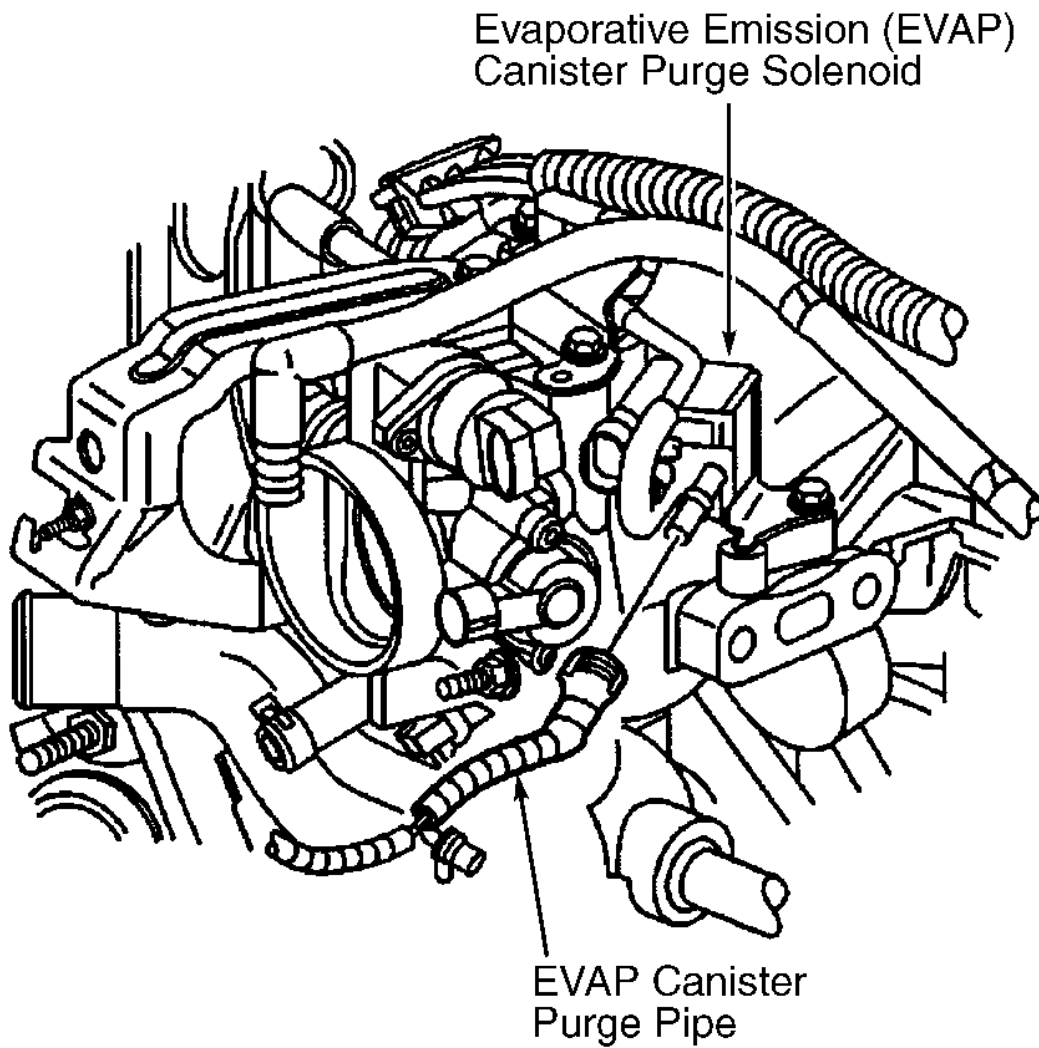
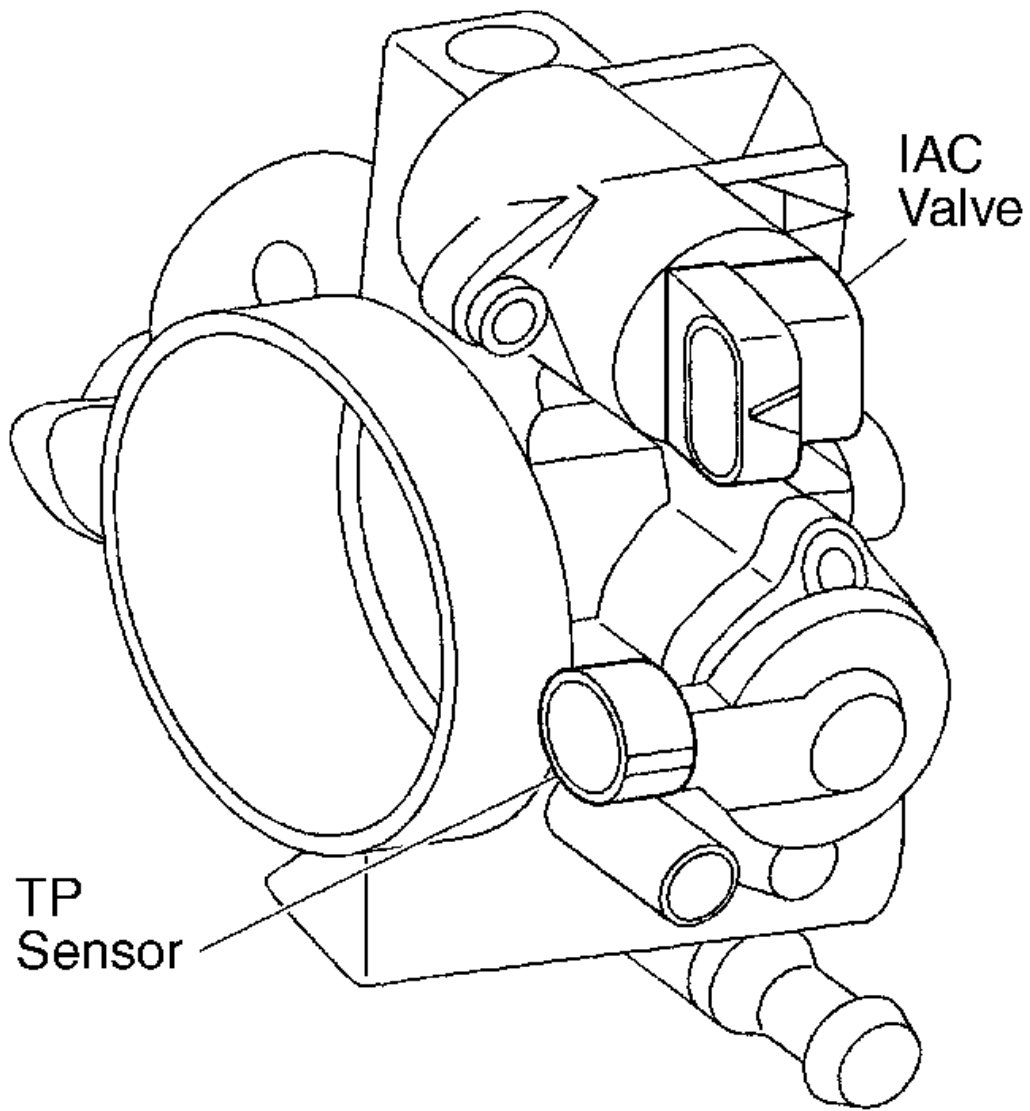


Fig. 5: Locating EVAP Canister, EVAP Vent Solenoid & Fuel Tank Pressure Sensor
Courtesy of GENERAL MOTORS CORP.



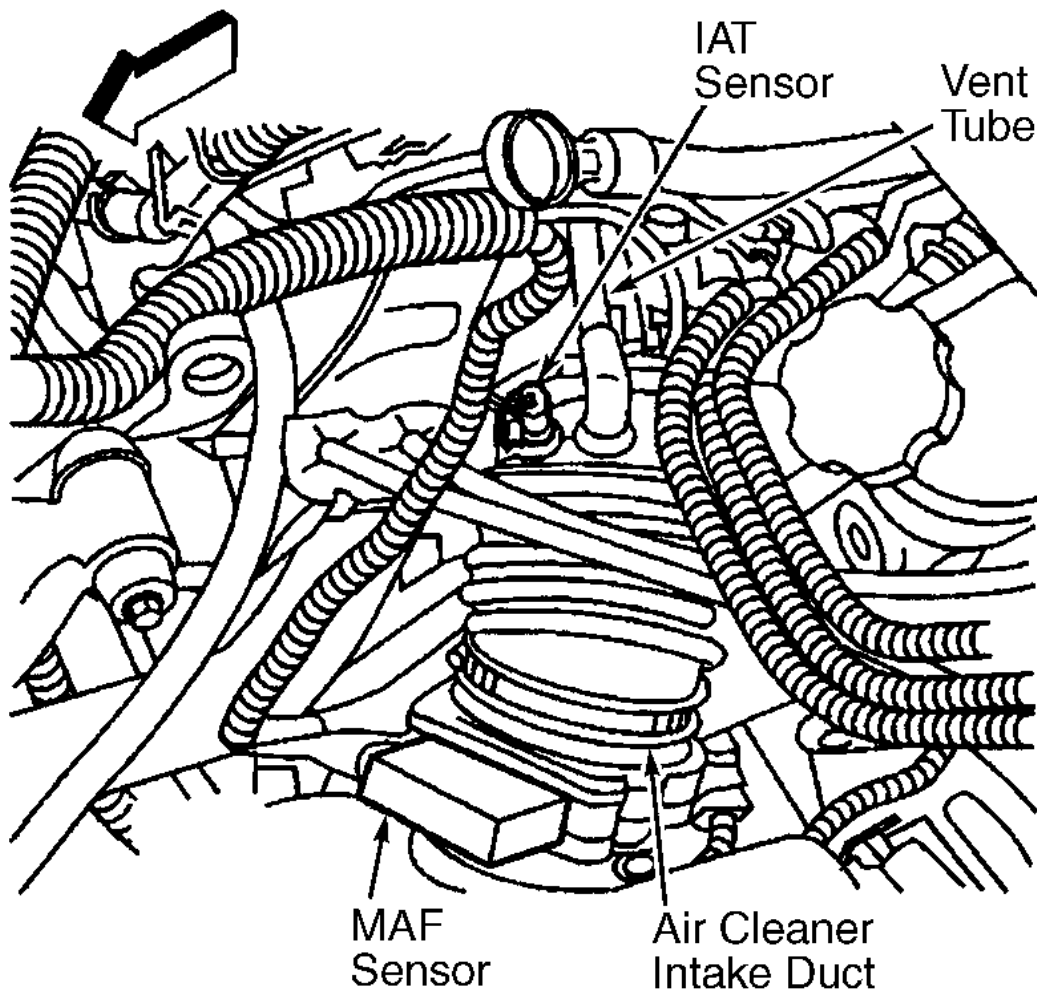
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Fig. 6: Locating EVAP Purge Solenoid
Courtesy of GENERAL MOTORS CORP.



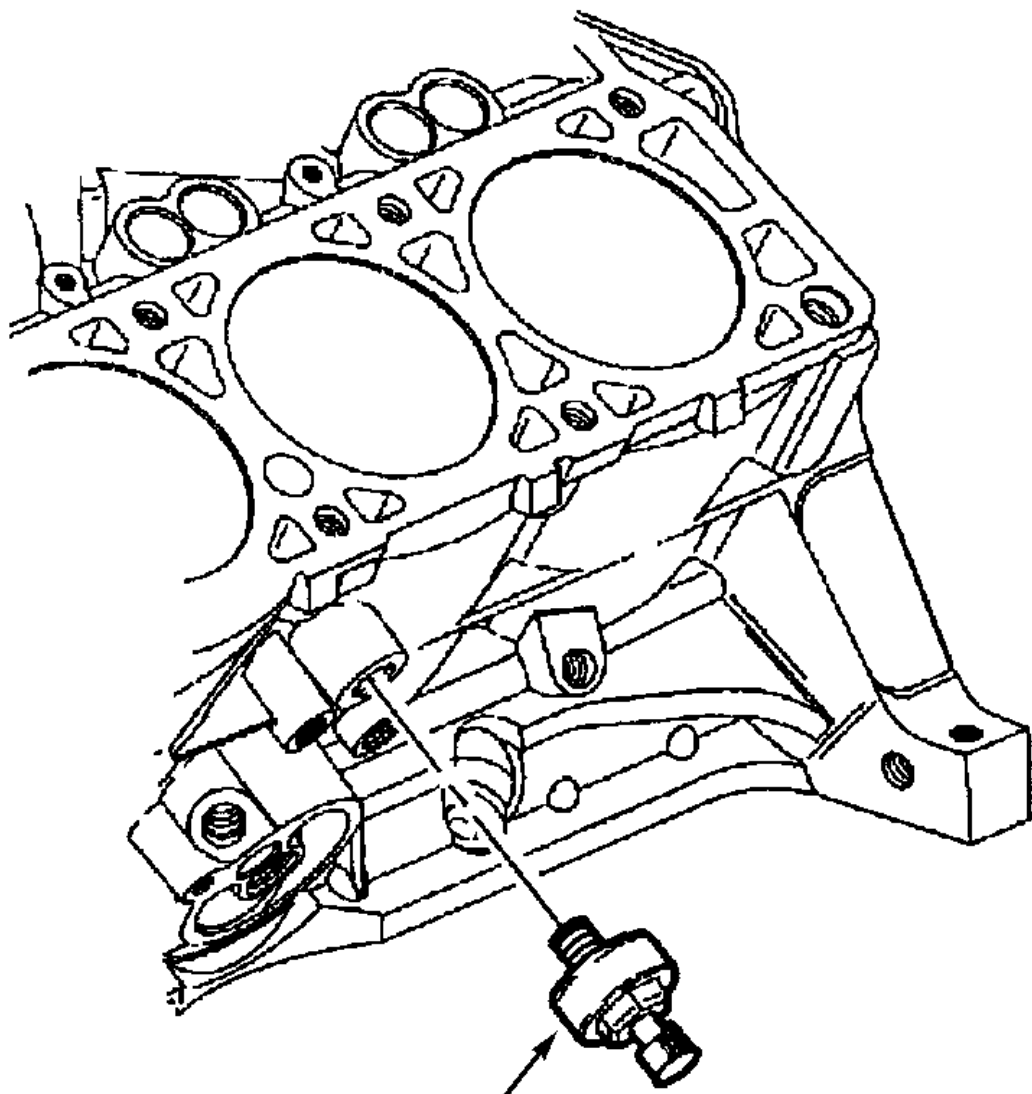
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Fig. 7: Locating Idle Air Control Valve & TP Sensor
Courtesy of GENERAL MOTORS CORP.



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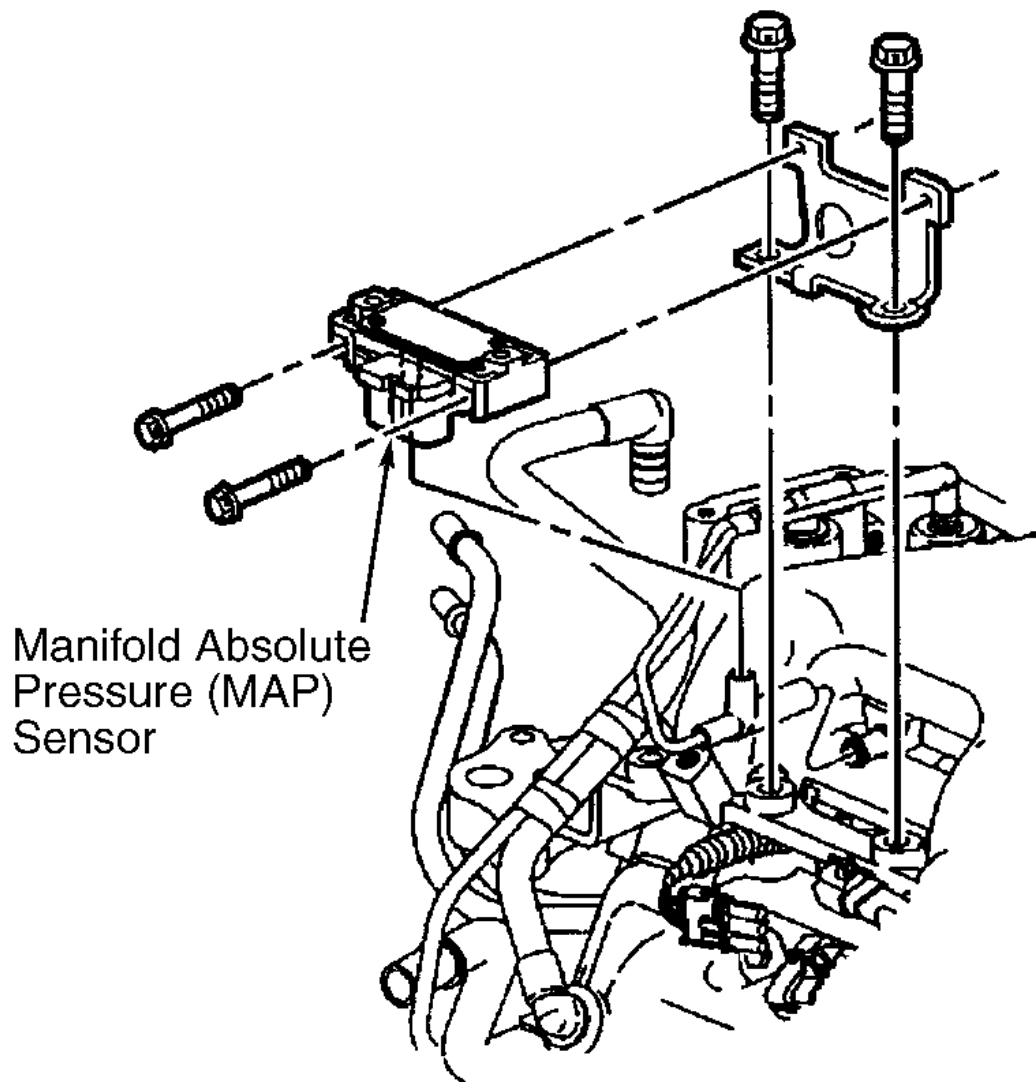
Fig. 8: Locating Intake Air Temperature & Mass Airflow Sensors
Courtesy of GENERAL MOTORS CORP.



Knock Sensor (KS)

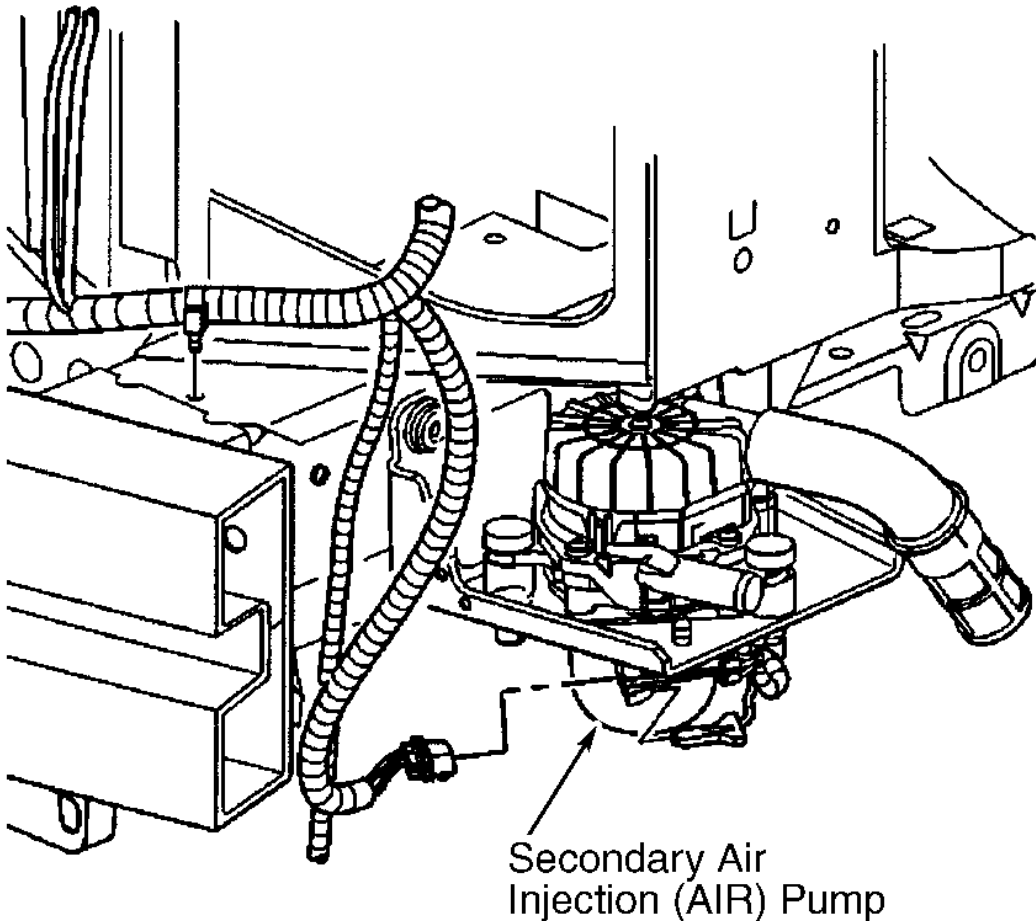
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Fig. 9: Locating Knock Sensor
Courtesy of GENERAL MOTORS CORP.



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Fig. 10: Locating MAP Sensor
Courtesy of GENERAL MOTORS CORP.



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Fig. 11: Locating Secondary Air Injection Pump
Courtesy of GENERAL MOTORS CORP.

COMPUTERIZED ENGINE CONTROLS

NOTE: For component locations, see COMPONENT LOCATIONS .

POWERTRAIN CONTROL MODULE

NOTE: To identify circuits referenced in the following ground and power tests, see WIRING DIAGRAMS or Fig. 12 -Fig. 17 .

Ground Circuits

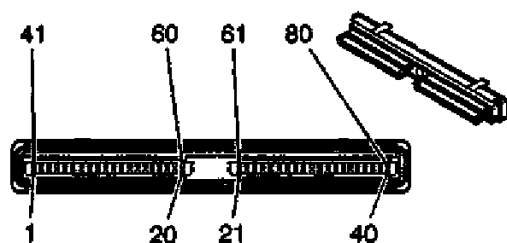
Check PCM connectors for corroded or loose connections. Repair as necessary. Disconnect PCM connectors. Using DVOM, measure resistance between negative battery terminal and ground terminals at PCM harness connector. If resistance is more than 5 ohms, repair open in affected ground circuit. If resistance is 5 ohms or less, ground circuits are okay.

Power Circuits

1. Check PCM connectors for corroded or loose connections. Repair as necessary. Disconnect PCM connectors. Using DVOM, check for battery voltage between chassis ground and continuous power terminal(s) at PCM harness connector(s). See **WIRING DIAGRAMS** . If battery voltage is present, go to next step. If battery voltage is not present, check for open fuse or fusible link. If fuse or fusible link is okay, check for open in wire between PCM terminal and power source.
2. Turn ignition switch to RUN position. Using DVOM, check for battery voltage between chassis ground and ignition power terminals at PCM harness connector(s). If battery voltage is present, power circuits are okay. If battery voltage is not present, check IGN fuse. If fuse is okay, check for an open in wire between battery and ignition switch, and between ignition switch and PCM terminal. If wiring is okay, check for a defective ignition switch.

PCM Harness Resistance

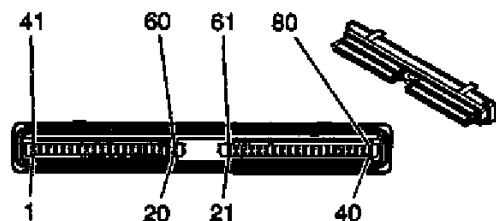
Turn ignition switch to LOCK position. Disconnect PCM and appropriate component harness connectors. Check for open or short circuits between appropriate PCM harness connector terminal and appropriate component harness connector terminal. See **WIRING DIAGRAMS** . If harness is open or shorted, repair as necessary.



Connector Part Information		• 12191110 • 80-Way F Micro-Pack 100 Series Sealed (BLU)	
Pin	Wire Color	Circuit No.	Function
1	BLK	2762	Low Reference
2-3	—	—	Not Used
4	LT GRN	1222	1-2 Shift Solenoid Valve Control
5	DK BLU	473	High Speed Cooling Fan Control
6	DK GRN	335	Low Speed Cooling Fan Control
7	BRN/WHT	633	CMP Sensor Signal
8	PPL/WHT	430	Low Resolution Engine Speed Signal
9	LT BLU/BLK	647	Medium Resolution Engine Speed Signal
10	GRY	2704	5 Volt Reference
11	—	—	Not Used
12	TAN	413	HO2S 1 Low Signal
13	ORN/BLK	469	Low Reference
14-15	—	—	Not Used
16	BLK/WHT	451	Ground
17	BLK	2760	Low Reference
18	—	—	Not Used
19	DK GRN	500	Ignition 0 Voltage
20	ORN	540	Battery Positive Voltage
21	—	—	Not Used
22	PNK	1224	Transmission Fluid Pressure Switch Signal A
23-27	—	—	Not Used
28	TAN/WHT	1669	HO2S 2 Low Signal
29	BLK	808	Low Reference
30	PPL	420	TCC Brake Switch/Cruise Control Release Signal

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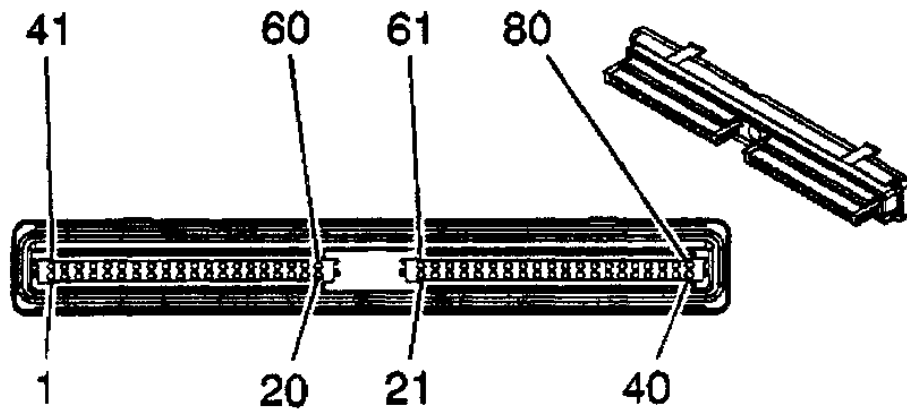
Fig. 12: Identifying PCM Connector C1 Terminals (1 Of 3)
Courtesy of GENERAL MOTORS CORP.



Connector Part Information		• 12191110 • 80-Way F Micro-Pack 100 Series Sealed (BLU)	
Pin	Wire Color	Circuit No.	Function
31	BLK	2753	Low Reference
32	GRY	435	EGR Valve Low Control
33	DK BLU	496	Knock Sensor Signal
34-37	—	—	Not Used
38	LT GRN/ WHT	1749	IAC Coil B High Control
39-42	—	—	Not Used
43	BLK	1744	Fuel Injector 1 Control
44	YEL/BLK	1223	2-3 Shift Solenoid Valve Control
45	PNK/BLK	429	AIR Solenoid Control (NC8)
46	PNK/BLK	1746	Fuel Injector 3 Control
47	LT GRN/ BLK	1745	Fuel Injector 2 Control
48	RED/BLK	453	Low Reference
49-52	—	—	Not Used
53	TAN/BLK	424	IC Timing Signal
54	WHT	423	IC Timing Control
55	DK GRN	389	Vehicle Speed Signal
56	BLK/WHT	451	Ground
57	BLK/WHT	451	Ground
58	DK GRN	1049	PCM Class 2 Serial Data
59	—	—	Not Used
60	BLK/WHT	451	Ground
61	BLK	2752	Low Reference
62	DK BLU/ WHT	1231	A/T ISS Low Signal
63	RED/BLK	1230	A/T ISS High Signal
64	YEL	400	VSS Signal High
65	PPL	401	VSS Signal Low
66-67	—	—	Not Used
68	YEL	772	Transmission Range Switch Signal B

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Fig. 13: Identifying PCM Connector C1 Terminals (2 Of 3)
Courtesy of GENERAL MOTORS CORP.

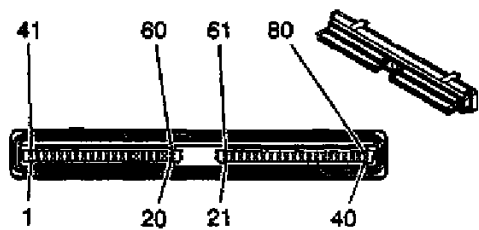


Connector Part Information		• 12191110 • 80-Way F Micro-Pack 100 Series Sealed (BLU)	
Pin	Wire Color	Circuit No.	Function
69	YEL	492	MAF Sensor Signal
70	—	—	Not Used
71	ORN/BLK	463	Requested Torque Signal (NW9)
72	DK GRN	83	Cruise Control Inhibit Signal
73	BLK/WHT	845	Fuel Injector 5 Control
74	LT BLU	1296	Axle Actuator Control
75	—	—	Not Used
76	DK GRN/ WHT	428	EVAP Canister Purge Solenoid Control
77-78	—	—	Not Used
79	YEL/BLK	846	Fuel Injector 6 Control
80	BLK	2751	Low Reference

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Fig. 14: Identifying PCM Connector C1 Terminals (3 Of 3)

Courtesy of GENERAL MOTORS CORP.

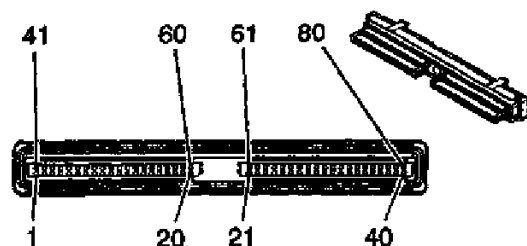


Connector Part Information		• 12191110 • 80-Way F Micro-Pack 100 Series Sealed (CLR)	
Pin	Wire Color	Circuit No.	Function
1	—	—	Not Used
2	WHT	1310	EVAP Canister Vent Solenoid Control
3	DK GRN/ WHT	465	Fuel Pump Relay Control
4	RED	1676	EGR Valve High Control
5	BRN/WHT	419	MIL Control
6	—	—	Not Used
7	LT BLU/ WHT	1747	IAC Coil A High Control
8	WHT	121	Engine Speed Signal (W/NW9)
9	TAN/BLK	464	Delivered Torque Signal (NW9)
10	PPL	412	HO2S 1 High Signal
11	PPL/WHT	1668	HO2S 2 High Signal
12–15	—	—	Not Used
16	WHT	776	Transmission Range Switch Signal P
17	RED	1226	Transmission Fluid Pressure Switch Signal C
18	BLK/WHT	771	Transmission Range Switch Signal A
19	TAN/BLK	231	Oil Pressure Switch Signal
20–22	—	—	Not Used
23	YEL	5	Crank Voltage
24	PNK	439	Ignition 1 Voltage
25	LT GRN	432	MAP Sensor Signal
26	YEL	410	ECT Sensor Signal
27	RED/BLK	380	A/C Refrigerant Pressure Sensor Signal
28	BRN	1456	EGR Valve Position Signal
29	GRY	23	Generator Field Duty Cycle Signal

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Fig. 15: Identifying PCM Connector C2 Terminals (1 Of 3)
Courtesy of GENERAL MOTORS CORP.

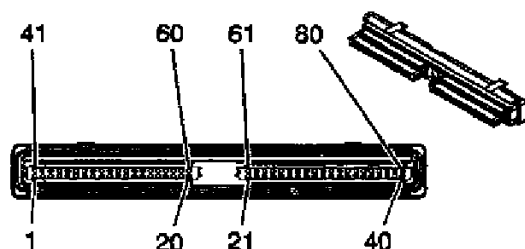
cardiagn.com



Connector Part Information		• 12191110 • 80-Way F Micro-Pack 100 Series Sealed (CLR)	
Pin	Wire Color	Circuit No.	Function
30	GRY	2702	5 Volt Reference
31	—	—	Not Used
32	GRY	2709	5 Volt Reference
33	GRY	2701	5 Volt Reference
34	GRY	2700	5 Volt Reference
35	BLK	2759	Low Reference
36	—	—	Not Used
37	BLK/WHT	3113	HO2S 1 Heater Low Control
38	—	—	Not Used
39	DK GRN/ WHT	459	A/C Compressor Clutch Relay Control
40-41	—	—	Not Used
42	LT BLU/ BLK	844	Fuel Injector 4 Control
43	—	—	Not Used
44	LT BLU/ BLK	1748	IAC Coil A Low Control
45	RED/BLK	1228	PC Solenoid Valve High Control
46	LT BLU/ WHT	1229	PC Solenoid Valve Low Control
47-48	—	—	Not Used
49	LT GRN/ BLK	444	IAC Coil B Low Control
50	TAN	472	IAT Sensor Signal
51-54	—	—	Not Used
55	DK GRN	890	Fuel Tank Pressure Sensor Signal
56	GRY	773	Transmission Range Switch Signal C

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Fig. 16: Identifying PCM Connector C2 Terminals (2 Of 3)
Courtesy of GENERAL MOTORS CORP.



Connector Part Information		• 12191110 • 80-Way F Micro-Pack 100 Series Seated (CLR)	
Pin	Wire Color	Circuit No.	Function
57	DK BLU	1225	Transmission Fluid Pressure Switch Signal B
58	BRN	1174	Oil Level Switch Signal
59	WHT	85	Cruise Control Engaged Signal
60	—	—	Not Used
61	RED	225	Generator Turn On Signal
62	—	—	Not Used
63	YEL	657	TCC Release Switch Signal
64–65	—	—	Not Used
66	DK BLU	417	TP Sensor Signal
67	—	—	Not Used
68	YEL/BLK	1227	TFT Sensor Signal
69	PPL	1589	Fuel Level Sensor Signal
70	LT GRN	1867	12 Volt Reference
71	—	—	Not Used
72	RED/WHT	812	12 Volt Reference
73	BLK	407	Low Reference
74	YEL/BLK	1868	Low Reference
75	BRN	436	AIR Pump Relay Control (NC8)
76	YEL/BLK	625	Crank Relay Control
77	—	—	Not Used
78	BRN	418	TCC PWM Solenoid Valve Control
79	—	—	Not Used
80	BLK	808	Low Reference

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Fig. 17: Identifying PCM Connector C2 Terminals (3 Of 3)
 Courtesy of GENERAL MOTORS CORP.

SENSORS & SWITCHES

NOTE: For component locations, see COMPONENT LOCATIONS .

NOTE: For additional sensor testing specifications, see SENSOR OPERATING RANGE CHARTS - TRUCKS article.

Manufacturer does not provide testing procedures for many individual systems and components. For sensor and switch testing not listed, perform related DTC testing procedure. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

BAROMETRIC PRESSURE SENSOR

A malfunction in Barometric Pressure (BARO) sensor can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

CAMSHAFT POSITION SENSOR

A malfunction in Camshaft Position (CMP) sensor can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

CRANKSHAFT POSITION SENSOR

A malfunction in Crankshaft Position (CKP) sensor can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

ENGINE COOLANT TEMPERATURE SENSOR

A malfunction in Engine Coolant Temperature (ECT) sensor circuit can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. An out-of-calibration ECT sensor may not set a DTC. Use the following procedure to test sensor calibration.

Disconnect ECT sensor harness connector. See COMPONENT LOCATIONS . Using DVOM, measure resistance of ECT sensor at specified temperatures. See **SENSOR TEMPERATURE VS RESISTANCE** table. Resistance should be high when engine is cold and drop as engine warms. With vehicle sitting overnight, IAT sensor and ECT sensor should have close to the same resistance reading. If resistance is not within specification, replace ECT sensor.

SENSOR TEMPERATURE VS RESISTANCE

Temperature - °F (°C)	(1) Ohms
302 (150)	47
284 (140)	60
266 (130)	77

248 (120)	100
230 (110)	132
212 (100)	177
194 (90)	241
176 (80)	332
158 (70)	467
140 (60)	667
122 (50)	973
113 (45)	1188
104 (40)	1459
95 (35)	1802
86 (30)	2238
77 (25)	2796
68 (20)	3520
59 (15)	4450
50 (10)	5670
41 (5)	7280
32 (0)	9420
23 (-5)	12,300
14 (-10)	16,180
5 (-15)	21,450
-4 (-20)	28,680
-22 (-30)	52,700
-40 (-40)	100,700
(1) Measure resistance across sensor terminals.	

FUEL LEVEL SENSOR

A malfunction in fuel level sensor circuit can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

FUEL TANK PRESSURE SENSOR

A Fuel Tank Pressure (FTP) sensor circuit can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

HEATED OXYGEN SENSOR

A malfunction in Heated Oxygen Sensor (HO2S) circuit can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in

SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

INTAKE AIR TEMPERATURE SENSOR

A malfunction in IAT sensor circuit can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. An out-of-calibration IAT sensor may not set a DTC. Use the following procedure to test sensor calibration.

Disconnect IAT sensor harness connector. See **COMPONENT LOCATIONS** . Using DVOM, measure resistance of IAT sensor at specified temperatures. See **SENSOR TEMPERATURE VS RESISTANCE** table. Resistance should be high when air temperature is cold and drop as air temperature warms. With vehicle sitting overnight, ECT sensor and IAT sensor should have close to the same resistance reading. If resistance is not within specification, replace IAT sensor.

KNOCK SENSOR

A malfunction in Knock Sensor (KS) circuit can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

MANIFOLD ABSOLUTE PRESSURE SENSOR

A malfunction in Manifold Absolute Pressure (MAP) sensor circuit can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

MASS AIRFLOW SENSOR

A malfunction in Mass Airflow (MAF) sensor circuit can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

THROTTLE POSITION SENSOR

NOTE: Throttle Position (TP) sensor is not adjustable. Replace TP sensor as necessary.

A malfunction in TP sensor circuit can set a DTC. For testing procedures and specifications, perform appropriate diagnostic test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

TRANSMISSION RANGE SWITCH

See appropriate DIAGNOSIS article in AUTOMATIC TRANSMISSIONS.

VEHICLE SPEED SENSOR

See appropriate DIAGNOSIS article in AUTOMATIC TRANSMISSIONS.

MODULES, MOTORS, RELAYS & SOLENOIDS

NOTE: Manufacturer does not provide testing procedures for many individual systems and components. For module, motor, relay and solenoid testing not listed, perform related DTC testing procedure. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

NOTE: For component locations, see **COMPONENT LOCATIONS** .

A/C COMPRESSOR CLUTCH RELAY

See appropriate AUTOMATIC A/C-HEATER SYSTEMS or MANUAL A/C-HEATER SYSTEMS article in AIR CONDITIONING & HEATING.

FUEL PUMP RELAY

See **FUEL PUMP ELECTRICAL CIRCUIT DIAGNOSIS** under FUEL SYSTEMS.

IDLE AIR CONTROL VALVE

See **IDLE AIR CONTROL SYSTEM DIAGNOSIS** under IDLE CONTROL SYSTEM.

IGNITION RELAY

Circuit Description

The ignition relay is normally an open relay. The relay armature is held in the open position by spring tension. When the ignition switch is turned to the RUN or START position, current will flow through the relay coil. A wire connected to the other end of the relay coil completes the path to ground. The electromagnetic field created by the relay coil overcomes the spring tension and moves the armature, allowing the relay contacts to close.

The closed relay contacts allow current to flow from the battery to the ENG CONTROLS fuse, Fuel INJ fuse, ELEC ENG fuse, O2 Sensors fuse, TRANS SOL fuse, ABS fuse and AWD fuse. Fuses are located in underhood fuse/relay block. See **Fig. 18** .

When the ignition switch is turned off, the electromagnetic field collapses. This action allows the spring tension to move the armature away from the relay contacts, which interrupts current flow to the fuses.

If ignition relay fails to close, the engine will crank but will not run. The class 2 communications will be available with the use of a scan tool.

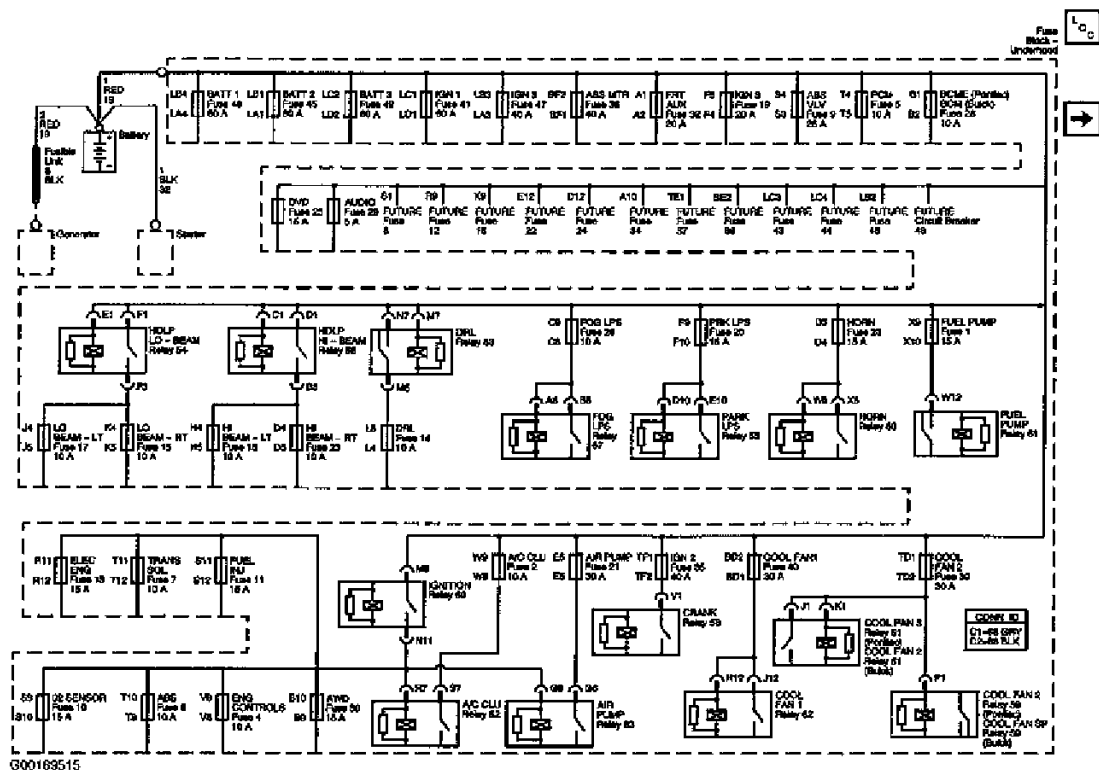


Fig. 18: Identifying Underhood Fuse/Relay Block
 Courtesy of GENERAL MOTORS CORP.

Diagnostic Procedures

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK - ENGINE CONTROLS under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. After performing diagnostic system check, go to next step.
2. Turn ignition on, with engine off. Remove the underhood junction block cover. Probe the following fuses with a test light that is connected to a good ground; ENG CONTROLS fuse, FUEL INJ fuse, ELEC ENG fuse, O2 SENSORS fuse, TRANS SOL fuse, ABS fuse and AWD fuse. See **Fig. 18** . Does the test light illuminate on at least one test point of each fuse? If yes, go to next step. If no, go to step 11 .
3. Turn ignition off. Probe both test points of the FUEL INJ fuse with a test light that is connected to a good ground. Does the test light illuminate on either test point of the fuse? If yes, go to next step. If no, go to step 43 .
4. Turn ignition off. Remove ignition relay from the underhood junction block. Probe both test points of the 10-amp IGN 1 fuse in the underhood junction block with a test light connected to a good ground. Does the test light illuminate on any of the fuse test points? If yes, go to step 7 . If no, go to next step.
5. Test the ignition relay load circuit bus bar of the underhood junction block between the ignition relay and the fuses to the circuit components for a short to battery positive voltage. Did you find and correct the condition? If yes, go to step 42 . If no, go to next step.
6. Turn ignition off. Remove the following fuses from the underhood junction block: ENG CONTROLS

fuse, FUEL INJ fuse, ELEC ENG fuse, O2 SENSORS fuse, TRANS SOL fuse, ABS fuse and AWD fuse. Probe all these fuse terminals in the underhood junction block with a test light that is connected to a good ground. Does the test light illuminate at any of the fuse terminals? If yes, diagnose engine electrical system. If no, go to step 39 .

7. Turn ignition off. Disconnect the ignition switch electrical connector. Connect a 20-amp fused jumper wire from the battery positive voltage wire terminal at the ignition switch harness connector to the battery positive voltage terminal at the ignition switch. Probe the ignition 1 voltage terminal of the ignition switch with a test light that is connected to a good ground. Does the test light illuminate? If yes, go to step 40 . If no, go to next step.
8. Turn ignition off. Disconnect negative battery cable at the battery. Disconnect the console junction block electrical connector that contains the ignition 1 voltage circuit from the ignition switch. Connect the negative battery cable to the battery. Probe the ignition 1 voltage circuit between the ignition switch and the console junction block at the console junction block electrical connector with a test light that is connected to a good ground. Does the test light illuminate? If yes, go to step 35 . If no, go to next step.
9. Turn ignition off. Disconnect negative battery cable at the battery. Disconnect the underhood junction block electrical connector that contains the ignition 1 voltage circuit for the ignition relay. Connect the negative battery cable to the battery. Probe the ignition 1 voltage circuit of the ignition relay at the underhood junction block electrical connector with a test light that is connected to a good ground. Does the test light illuminate? If yes, go to step 38 . If no, go to next step.
10. Test the ignition 1 voltage bus bar circuit for the ignition relay in the console junction block for a short to battery positive voltage. Did you find a condition? If yes, go to step 41 . If no, go to step 42 .
11. Turn ignition off. Probe both test points of the 20-amp IGN 3 fuse in the underhood junction block with a test light that is connected to a good ground. See **Fig. 18** . Does the test light illuminate on both test points of the fuse? If yes, go to step 19 . If no, go to next step.
12. Does the test light illuminate on one test point of the 20-amp IGN 3 fuse? If yes, go to next step. If no, go to step 28 .
13. Test the battery positive voltage circuit between the underhood junction block and the ignition switch for a short to ground. Did you find and correct the condition? If yes, go to step 43 . If no, go to next step.
14. Test the ignition 1 voltage circuit between the ignition switch and the console junction block for a short to ground. Did you find and correct the condition? If yes, go to step 43 . If no, go to next step.
15. Test the ignition 1 voltage circuit between the console junction block and the underhood junction block for a short to ground. Did you find and correct the condition? If yes, go to step 43 . If no, go to next step.
16. Test the ignition 1 voltage bus bar circuit of the console junction block between the ignition switch and the underhood junction block for a short to ground. Did you find a condition? If yes, go to step 41 . If no, go to next step.
17. Test the ignition 1 voltage bus bar circuit of the underhood junction block up to the 10-amp IGN 1 fuse for a short to ground. Did you find a condition? If yes, go to step 42 . If no, go to next step.
18. Test the battery positive voltage bus bar circuit of the underhood junction block from the 20-amp IGN 3 fuse for a short to ground. Did you find a condition? If yes, go to step 42 . If no, go to step 40 .
19. Turn ignition on, with engine off. Probe both test points of the 10-amp IGN 1 fuse in the underhood junction block with a test light that is connected to a good ground. Does the test light illuminate on both test points of the fuse? If yes, go to step 29 . If no, go to next step.
20. Does the test light illuminate on one test point of the 10-amp IGN 1 fuse? If yes, go to step 27 . If no, go to next step.

21. Turn ignition on, with engine off. Probe the ignition 1 voltage circuit at the ignition switch electrical connector with a test light that is connected to a good ground. Does the test light illuminate? If yes, go to step 24 . If no, go to next step.
22. Test the battery positive voltage circuit between the underhood junction block and the ignition switch for a high resistance or an open. Did you find and correct a condition? If yes, go to step 43 . If no, go to next step.
23. Turn ignition off. Probe the mounting stud for the battery positive terminal at the underhood junction block with a test light that is connected to a good ground. Does the test light illuminate? If yes, go to step 40 . If no, diagnose engine electrical system.
24. Turn ignition on, with engine off. Probe the ignition 1 voltage circuit for the ignition relay at the console junction block electrical connector that leads from the ignition switch with a test light that is connected to a good ground. Does the test light illuminate? If yes, go to next step. If no, go to step 36 .
25. Turn ignition on, with engine off. Probe the ignition 1 voltage circuit for the ignition relay at the console junction block electrical connector that leads to the underhood junction block with a test light that is connected to a good ground. Does test light illuminate? If yes, go to next step. If no, go to step 41 .
26. Turn ignition off. Disconnect the negative battery cable at the battery. Disconnect the underhood junction block electrical connector that contains the ignition 1 voltage circuit for the ignition relay. Connect the negative battery cable at the battery. Turn ignition on, with engine off. Probe the ignition 1 voltage circuit at the underhood junction block electrical connector with a test light that is connected to a good ground. Does the test light illuminate? If yes, go to step 42 . If no, go to step 37 .
27. Test the ignition 1 voltage bus bar circuit of the underhood junction block between the 10-amp IGN 1 fuse and the ignition relay for a short to ground. Did you find a condition? If yes, go to step 42 . If no, go to step 39 .
28. Turn ignition off. Probe the mounting stud for the battery positive cable at the underhood junction block with a test light that is connected to a good ground. Does the test light illuminate? If yes, go to step 42 . If no, diagnose engine electrical system.
29. Turn ignition off. Remove the ignition relay with the J 43244 from the underhood junction block. Probe the battery positive voltage circuit of the ignition relay at the underhood junction block with a test light that is connected to a good ground. Does the test light illuminate? If yes, go to next step. If no, go to step 42 .
30. Turn ignition on, with engine off. Probe the ignition 1 voltage circuit of the ignition relay at the underhood junction block with a test light that is connected to a good ground. Does the test light illuminate? Is yes, go to next step. If no, go to step 42 .
31. Turn ignition on, with engine off. Probe the coil ground circuit of the ignition relay at the underhood junction block with a test light that is connected to battery voltage. Does the test light illuminate? If yes, go to step 33 . If no, go to next step.
32. Turn ignition off. Disconnect the negative battery cable at the battery. Disconnect the underhood junction block electrical connectors. Test the coil ground circuit wire of the ignition relay at the underhood junction block electrical connector for a high resistance or an open. Did you find and correct the condition? If yes, go to step 43 . If no, go to step 42 .
33. Turn ignition off. Jumper the ignition relay battery positive voltage circuit and the ignition relay load circuit together at the underhood junction block with a 20-amp fused jumper wire. Probe the following fuses with a test light that is connected to a good ground: ENG CONTROLS fuse, FUEL INJ fuse, O2 SENSORS fuse, TRANS SOL fuse, ABS fuse and AWD fuse. Does the test light illuminate on at least

one test point of each fuse? If yes, go to next step. If no, go to step 42 .

34. Test for an intermittent and for a poor connection at the underhood junction block, ignition relay connector location. Did you find a condition? If yes, go to step 42 . If no, go to step 39 .
35. Repair the short to battery positive voltage in the ignition 1 voltage circuit between the ignition switch and the console junction block. After repairs, go to step 43 .
36. Repair the high resistance or an open in the ignition 1 voltage circuit between the console junction block and the ignition switch. After repairs, go to step 43 .
37. Repair the high resistance or an open in the ignition 1 voltage circuit between the console junction block and the underhood junction block. After repairs, go to step 43 .
38. Repair the short to battery positive voltage in the ignition 1 voltage circuit between the console junction block and the underhood junction block electrical connector. After repairs, go to step 43 .
39. Replace ignition relay. After replacing relay, go to step 43 .
40. Replace ignition switch. After replacing ignition switch, go to step 43 .
41. Replace console junction block. After replacing junction block, go to step 43 .
42. Replace the underhood junction center. After replacing junction center, go to next step.
43. Replace any open fuses. Turn ignition off for 30 seconds. Attempt to start the engine. Does the engine start and run? If yes, go to next step. If no, go to **NO-START - ENGINE CRANKS OKAY** under NO-START in BASIC DIAGNOSTIC PROCEDURES - 3.4L AZTEK & RENDEZVOUS article.
44. Using scan tool, clear DTCs. Operate the vehicle for 5 minutes. Does a DTC set during this ignition cycle? If yes, diagnose affected DTC(s). See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. If no DTCs are set, system is okay.

TORQUE CONVERTER CLUTCH SOLENOID

See appropriate DIAGNOSIS article in AUTOMATIC TRANSMISSIONS.

FUEL SYSTEMS

NOTE: For component locations, see **COMPONENT LOCATIONS** .

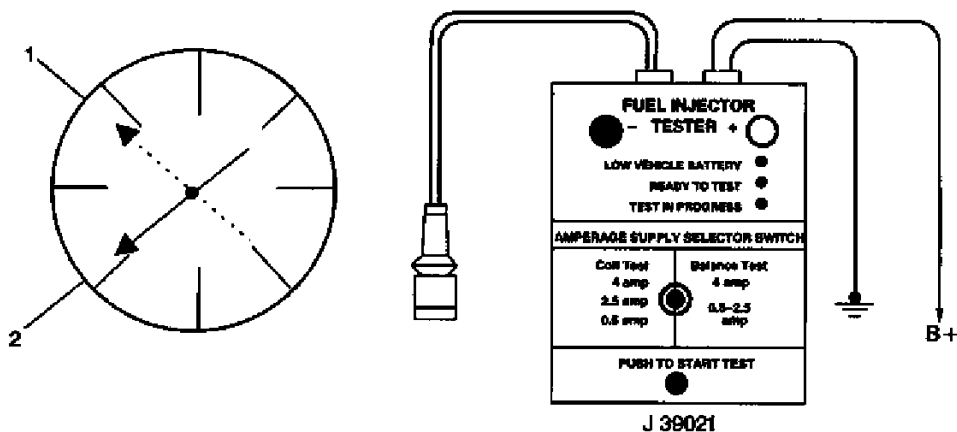
FUEL INJECTOR BALANCE TEST WITH SPECIAL TOOL

Test Description

The numbers below refer to step numbers in diagnostic procedure.

3 - Engine Coolant Temperature (ECT) must be below operating temperature in order to avoid irregular fuel pressure readings due to hot soak fuel boiling.

6 - If pressure drop value for each fuel injector is within 1.5 psi (10 kPa) of average pressure drop value, fuel injectors are flowing properly. Calculate pressure drop value for each fuel injector by subtracting second pressure reading from first pressure reading. See **Fig. 19** .



- (1) First Reading
(2) Second Reading

Cylinder No.	1	2	3	4
1st Reading	43 psi (296 kPa)	43 psi (296 kPa)	43 psi (296 kPa)	43 psi (296 kPa)
2nd Reading	19 psi (131 kPa)	17 psi (117 kPa)	18 psi (124 kPa)	21 psi (145 kPa)
Amount Of Drop (1)	24 psi (165 kPa)	26 psi (179 kPa)	25 psi (172 kPa)	22 psi (151 kPa)
Test Results	Injector Okay	Replace Fuel Injector - Too Much Fuel Drop	Injector Okay	Replace Fuel Injector - Too Little Fuel Drop

(1) Average range of drop should be 22.5-25.5 psi (156-176 kPa)

G00011502

Fig. 19: Injector Balance Test Example
Courtesy of GENERAL MOTORS CORP.

Diagnostic Procedure

1. Perform Diagnostic System Check - Engine Controls. See **DIAGNOSTIC SYSTEM CHECK - ENGINE CONTROLS** under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. After performing Diagnostic System Check - Engine Controls, go to next step.
2. Perform **FUEL INJECTOR COIL TEST** . After performing Fuel Injector Coil Test, go to next step.

NOTE: DO NOT perform this test if ECT is greater than 201°F (94°C).

3. Observe ECT parameter with scan tool. Does scan tool indicate ECT parameter is less than 201°F (94°C)? If yes, go to next step. If no, allow engine to cool before proceeding.

NOTE: Verify there is adequate fuel in fuel tank before proceeding with this step. Fuel pump may need to be commanded ON a few times, in order to obtain highest possible fuel pressure reading. DO NOT allow engine to start.

4. Turn ignition off. Turn off all accessories. Install fuel pressure gauge. Turn ignition on, with engine off. Command fuel pump ON with scan tool. Observe fuel pressure gauge, with fuel pump commanded ON. Is fuel pressure within 52-59 psi (358-405 kPa)? If yes, go to next step. If no, go to **FUEL SYSTEM PRESSURE TEST** under FUEL SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 3.4L AZTEK

& RENDEZVOUS article.

NOTE: Fuel pressure may vary slightly when fuel pump stops operating. After fuel pump stops operating, fuel pressure should stabilize and remain constant.

5. Monitor fuel pressure gauge for one minute. Does fuel pressure decrease by more than 5 psi (34 kPa)? If yes, go to **FUEL SYSTEM PRESSURE TEST** under FUEL SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 3.4L AZTEK & RENDEZVOUS article. If no, go to next step.

NOTE: Fuel pressure may rise after fuel injector stops pulsing. Record fuel pressure value immediately after fuel injector stops pulsing. DO NOT record higher fuel pressure value.

6. Connect Fuel Injector Coil/Balance Tester (J-39021), Injector Test Adapter Box (J-39021-210), and Fuel Injector Test Harness (J-39021-410) to fuel injector multi-way connector. Set amperage supply selector switch on fuel injector tester to Balance Test .5-2.5-amp position. Command fuel pump ON and then OFF with scan tool. Record fuel pressure indicated by fuel pressure gauge after fuel pressure stabilizes. This is first pressure reading. Energize fuel injector by depressing "Push to Start Test" button on fuel injector tester. Record fuel pressure indicated by fuel pressure gauge after fuel injector has stopped pulsing. This is second pressure reading. Repeat this step for each fuel injector. Subtract second pressure reading from first pressure reading for one fuel injector. Result is pressure drop value. See **Fig. 19** . Obtain a pressure drop value for each fuel injector. Add all individual pressure drop values. This is total pressure drop. Divide total pressure drop by number of fuel injectors. This is average pressure drop. Does any fuel injector have a pressure drop value more than average pressure drop or less than average pressure drop by 1.5 psi (10 kPa)? If yes, go to next step. If no, go to **SYMPTOMS** in TROUBLE SHOOTING - NO CODES - 3.4L AZTEK & RENDEZVOUS article.
7. Replace affected fuel injectors. After repairs, go to next step.
8. Operate system in order to verify repair. Does a driveability condition still exist? If yes, go to **SYMPTOMS** in TROUBLE SHOOTING - NO CODES - 3.4L AZTEK & RENDEZVOUS article. If no, system is okay.

FUEL INJECTOR BALANCE TEST WITH TECH 2

Circuit Description

Scan tool first energizes fuel pump and then injectors for a precise amount of time allowing a measured amount of fuel into manifold. This causes a drop in system fuel pressure that can be recorded and used to compare each injector.

Test Description

The numbers below refer to step numbers in diagnostic procedure.

3 - Engine Coolant Temperature (ECT) must be below operating temperature in order to avoid irregular fuel pressure readings due to hot soak fuel boiling.

4 - Fuel pressure should be within specified range. If fuel pressure is not within specified range, see

FUEL SYSTEM PRESSURE TEST under FUEL SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 3.4L AZTEK & RENDEZVOUS article.

5 - Fuel pressure should reach a steady value. If fuel pressure does not stabilize, see **FUEL SYSTEM PRESSURE TEST** under FUEL SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 3.4L AZTEK & RENDEZVOUS article.

6 - If pressure drop value for each fuel injector is within 1.5 psi (10 kPa) of average pressure drop value, fuel injectors are flowing properly. Calculate pressure drop value for each fuel injector by subtracting second pressure reading from first pressure reading. See **Fig. 19** .

Diagnostic Procedure

1. Perform Diagnostic System Check - Engine Controls. See **DIAGNOSTIC SYSTEM CHECK - ENGINE CONTROLS** under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. After performing Diagnostic System Check - Engine Controls, go to next step.
2. Perform **FUEL INJECTOR COIL TEST** . After performing Fuel Injector Coil Test, go to next step.

NOTE: **DO NOT perform this test if ECT is above 201°F (94°C).**

3. Observe ECT parameter with scan tool. Does scan tool indicate ECT parameter is less than 201°F (94°C)? If yes, go to next step. If no, allow engine to cool before proceeding.

NOTE: **Verify there is adequate fuel in fuel tank before proceeding with this step. Fuel pump may need to be commanded ON a few times, in order to obtain highest possible fuel pressure reading. DO NOT allow engine to start.**

4. Turn ignition off. Turn off all accessories. Install fuel pressure gauge. Turn ignition on, with engine off. Command fuel pump ON with scan tool. Observe fuel pressure gauge, with fuel pump commanded ON. Is fuel pressure within 52-59 psi (358-405 kPa)? If yes, go to next step. If no, go to **FUEL SYSTEM PRESSURE TEST** under FUEL SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 3.4L AZTEK & RENDEZVOUS article.

NOTE: **Fuel pressure may vary slightly when fuel pump stops operating. After fuel pump stops operating, fuel pressure should stabilize and remain constant.**

5. Monitor fuel pressure gauge for one minute. Does fuel pressure decrease by more than 5 psi (34 kPa)? If yes, go to **FUEL SYSTEM PRESSURE TEST** under FUEL SYSTEMS in BASIC DIAGNOSTIC PROCEDURES - 3.4L AZTEK & RENDEZVOUS article. If no, go to next step.

NOTE: **Fuel pressure may rise after fuel injector stops pulsing. Record fuel pressure value immediately after fuel injector stops pulsing. DO NOT record higher fuel pressure value.**

6. With scan tool, select Fuel Injector Balance Test function, within Special Functions menu. Select an injector to be tested. Press Enter. This will prime fuel system. Record fuel pressure indicated by fuel pressure gauge after fuel pressure stabilizes. This is first pressure reading. Energize fuel injector by

depressing Pulse Injector button on scan tool. This will energize injector and decrease fuel pressure. Record fuel pressure indicated by fuel pressure gauge after fuel injector has stopped pulsing. This is second pressure reading. Press Enter again to bring you back to Select Injector screen. Repeat this step for each fuel injector. Subtract second pressure reading from first pressure reading for one fuel injector. Result is pressure drop value. Obtain a pressure drop value for each fuel injector. Add all individual pressure drop values. This is total pressure drop. Divide total pressure drop by number of fuel injectors. This is average pressure drop. Does any fuel injector have a pressure drop value that is more than average pressure drop or less than average pressure drop by 1.5 psi (10 kPa)? If yes, go to next step. If no, go to **SYMPTOMS** in TROUBLE SHOOTING - NO CODES - 3.4L AZTEK & RENDEZVOUS article.

7. Replace affected fuel injectors. After repairs, go to next step.
8. Operate system in order to verify repair. Does a driveability condition still exist? If yes, go to **SYMPTOMS** in TROUBLE SHOOTING - NO CODES - 3.4L AZTEK & RENDEZVOUS article. If no, system is okay.

FUEL INJECTOR COIL TEST

Circuit Description

The PCM enables appropriate fuel injector on intake stroke for each cylinder. A voltage is supplied directly to fuel injectors. PCM controls each fuel injector by grounding Control circuit via a solid state device called a driver. A fuel injector coil winding resistance that is too high or too low, will affect engine driveability. A Fuel Injector Control circuit DTC may not set, but a misfire may be apparent. Fuel injector coil windings are affected by temperature. Resistance of fuel injector coil windings will increase as temperature of fuel injector increases.

Diagnostic Aids

- Monitoring misfire current counters or misfire graph, may help isolate fuel injector that is causing condition.
- Operating vehicle over a wide temperature range may help isolate fuel injector that is causing condition.
- Perform fuel injector coil test within conditions of customer's concern. A fuel injector condition may only be apparent at a certain temperature, or under certain conditions.
- If fuel injector coil test does not isolate condition, perform fuel injector balance test. See **FUEL INJECTOR BALANCE TEST WITH SPECIAL TOOL** or **FUEL INJECTOR BALANCE TEST WITH TECH 2**.

Test Description

The numbers below refer to step numbers in diagnostic procedure.

- 3 - This step tests each fuel injector resistance within a specific temperature range. If any fuel injectors display a resistance outside of specified value, replace fuel injector.
- 4 - This step determines if all fuel injectors are within 3 ohms of each other. If highest resistance value is within 3 ohms of lowest resistance value, then all fuel injector coil windings are okay.
- 6 - This step determines if the ignition 1 voltage circuit under the intake plenum is causing the concern.
- 8 - This step determines which fuel injector is faulty. After subtracting highest and lowest resistance

values from average value, replace fuel injector that has greatest resistance difference from average.

Diagnostic Procedure

1. Perform Diagnostic System Check - Engine Controls. See **DIAGNOSTIC SYSTEM CHECK - ENGINE CONTROLS** under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. After performing Diagnostic System Check - Engine Controls, go to next step.
2. Observe Engine Coolant Temperature (ECT) parameter with scan tool. Is ECT value within 50-90°F (10-32°C)? If yes, go to next step. If no, go to step 4 .
3. Disconnect fuel injector multi-way harness connector. With DVOM, measure resistance of each fuel injector between Ignition Feed circuit and Fuel Injector Control circuit, at multi-way connector. See **WIRING DIAGRAMS** . Do any fuel injectors display a resistance outside 11-14 ohms? If yes, go to step 5 . If no, go to **DIAGNOSTIC AIDS** .
4. Disconnect fuel injector multi-way harness connector. With DVOM, measure resistance of each fuel injector between Ignition Feed circuit and Fuel Injector Control circuit, at multi-way connector. Record each fuel injector value. Subtract lowest resistance value from highest resistance value. Is difference 3 ohms or less? If yes, go to **FUEL INJECTOR BALANCE TEST WITH SPECIAL TOOL** or **FUEL INJECTOR BALANCE TEST WITH TECH 2** . If no, go to step 8 .
5. Remove upper intake manifold. After removing upper intake manifold, go to next step.
6. Using a DVOM, measure resistance of the ignition 1 voltage circuit between the multi-way connector and affected fuel injector connector. Is resistance more than 5 ohms? If yes, go to next step. If no, go to step 9 .
7. Repair open or high resistance in the ignition 1 voltage circuit. After repairs, go to step 11 .
8. Add all of the fuel injector resistance values to obtain a total resistance value. Divide the total resistance value by the number of fuel injectors to obtain an average resistance value. Subtract the lowest and the highest individual fuel injector resistance values from the average resistance value. Replace fuel injector that displays the greatest resistance difference, above or below the average. After replacing injector(s), go to step 11 .
9. Test for an intermittent and for a poor connection at the affected fuel injector. Did you find and correct the condition? If yes, go to step 11 . If no, go to next step.
10. Replace any fuel injectors that are out of the specified range of 11-14 ohms. After replacing injector(s), go to next step.
11. Operate the system in order to verify the repair. Did you correct the condition? If yes, system is okay. If no, go to step 2 .

FUEL PUMP ELECTRICAL CIRCUIT DIAGNOSIS

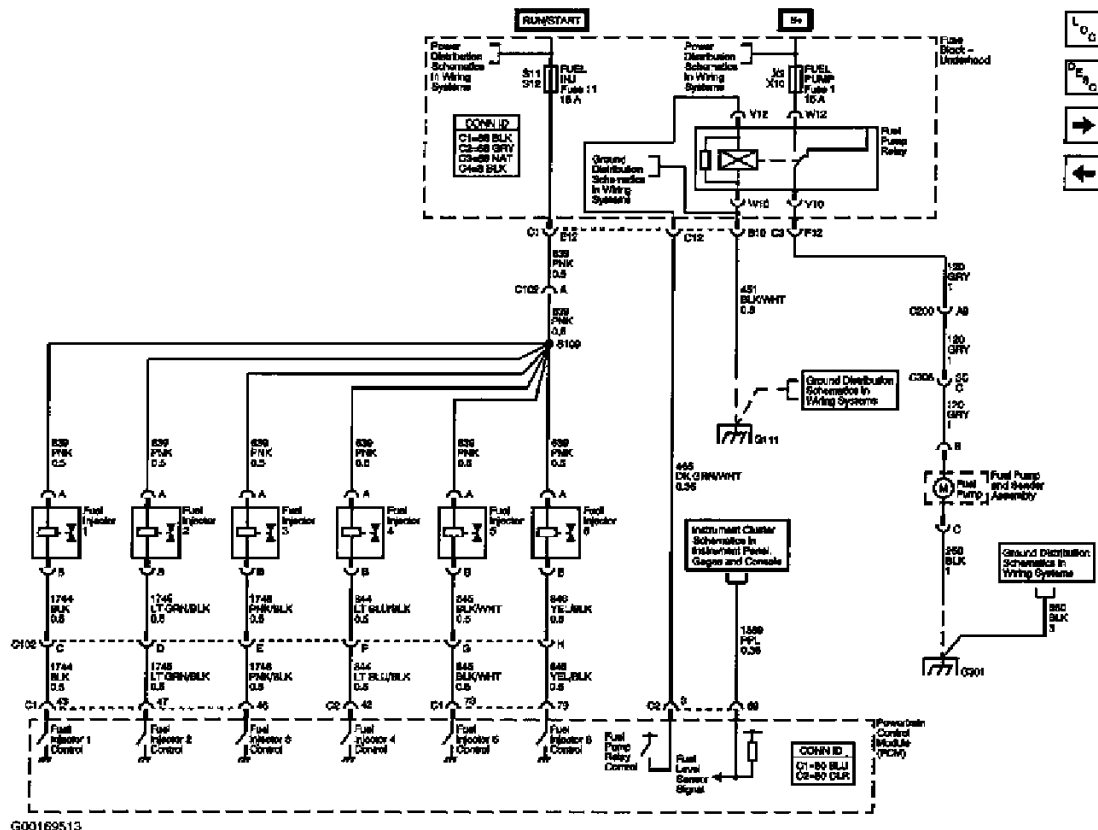


Fig. 20: Fuel System Electrical Schematic
 Courtesy of GENERAL MOTORS CORP.

Circuit Description

When ignition is turned on, the control module enables the fuel pump relay to turn on. The fuel pump remains on as long as engine is cranking or running and control module receives ignition reference pulses. If there are no ignition reference pulses, the control module shuts the fuel pump off within 2 seconds after ignition was turned on or if engine stops.

Diagnostic Aids

Listen for an audible hiss from fuel pump when fuel pump relay is commanded on. A vibration in the fuel feed line when fuel pump relay is commanded on indicates that the fuel pump is operating.

Test Description

The numbers below refer to the step numbers on the diagnostic procedure.

- 2 - Command both the ON and OFF states. Repeat the commands as necessary.
- 3 - This step determines if the condition is located on the coil side or the switch side of the circuit.

- 4 - This step verifies that the PCM is providing voltage to the fuel pump relay.
- 5 - This step tests for an open in the fuel pump relay ground circuit.
- 6 - This step determines if a voltage is constantly being applied to the fuel pump relay.
- 12 - This tests for a grounded fuel pump supply voltage circuit. The fuel pump fuse supplies power to fuel pump. Disconnecting the fuel pump in-line harness connector isolates the fuel pump supply voltage circuit.
- 15 - This step jumps the fuel pump relay in order to activate the fuel pump.
- 16 - This step tests for an open in the fuel pump feed circuit between the in-line connector and the fuel pump relay.
- 17 - This step tests for an open or high resistance in the fuel pump ground circuit.
- 20 - This step determines if the condition with the circuit is intermittent. If the fuse does not open, inspect the supply voltage circuit between the fuse and the fuel pump for an intermittent condition.

Diagnostic Procedures

1. Perform diagnostic system check. See **DIAGNOSTIC SYSTEM CHECK - ENGINE CONTROLS** under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. After performing diagnostic system check, go to next step.
2. Turn ignition on, with engine off. Using scan tool, command the fuel pump relay ON and OFF. Does the fuel pump turn ON and OFF? If yes, problem is intermittent. If yes, go to next step.
3. Using scan tool, command fuel pump relay ON and OFF. Do you hear a click when you command the fuel pump relay ON and OFF? If yes, go to step 9 . If no, go to next step.
4. Turn ignition off. Disconnect fuel pump relay, located in underhood fuse/relay block. Turn ignition on, with engine off. Probe control circuit of the fuel pump relay with a test light that is connected to a good ground. See [Fig. 20](#) . With scan tool, command the fuel pump ON and OFF. Does the test light turn ON and OFF? If yes, go to next step. If no, go to step 6 .
5. Connect the test light between the control circuit of the fuel pump relay and the ground circuit of the fuel pump relay. With a scan tool, command the fuel pump ON and OFF. Does test light turn ON and OFF? If yes, go to step 21 . If no, go to step 24 .
6. Does the test light remain illuminated with each command? If yes, go to next step. If no, go to step 8 .
7. Test the control circuit of the fuel pump relay for a short to voltage. Did you find and correct the condition? If yes, go to step 29 . If no, go to step 28 .
8. Test control circuit of the fuel pump relay for a short to ground or an open. Did you find and correct the condition? If yes, go to step 29 . If no, go to step 22 .
9. Turn ignition on, with engine off. Does the fuel pump operate continuously? If yes, go to next step. If no, go to step 11 .
10. Turn ignition off. Disconnect fuel pump relay, located in underhood fuse/relay block. Turn ignition on, with engine off. Does the fuel pump operate continuously? If yes, go to step 23 . If no, go to step 27 .
11. Is the fuel pump fuse open? If yes, go to next step. If no, go to step 14 .
12. Disconnect the fuel pump harness in-line connector, located near fuel tank. Test the fuel pump supply voltage circuit for a short to ground. See [Fig. 20](#) . Replace fuel pump fuse, if necessary. Did you find and correct the condition? If yes, go to step 29 . If no, go to next step.

13. Lower fuel tank, if necessary. Test or inspect the fuel tank electrical harness for damage or grounded circuit. Replace the fuel pump fuse, if necessary. Did you find and correct the condition? If yes, go to step 29 . If no, go to step 20 .
14. Turn ignition off. Disconnect fuel pump relay. Turn ignition on, with engine off. Probe the battery positive voltage circuit of the fuel pump relay with a test light connected to a good ground. Does the test light illuminate? If yes, go to next step. If no, go to step 25 .
15. Connect a 10-amp fused jumper wire between the battery positive voltage circuit and fuel pump supply voltage circuit in the fuel pump cavity. Does the fuel pump operate? If yes, go to step 21 . If no, go to next step.
16. Disconnect the fuel pump harness in-line connector located near the fuel tank. Test the fuel pump supply voltage circuit for an open or high resistance between the fuel pump relay and the in-line connector. Did you find and correct the condition? If yes, go to step 29 . If no, go to next step.
17. Test the ground circuit of the fuel pump for an open or high resistance between the body pass-through connector and the ground. Did you find and correct the condition? If yes, go to step 29 . If no, go to next step.
18. Inspect for poor connections at the fuel pump in-line connector to the body pass-through connector. Did you find and correct the condition? If yes, go to step 29 . If no, go to next step.
19. Lower fuel tank. Test or inspect the fuel tank electrical harness for damage or open circuit. Did you find and correct the condition? If yes, go to step 29 . If no, go to step 26.
20. Connect all disconnected components. Install a new fuel pump fuse. With a scan tool, command the fuel pump ON. Is the fuel pump fuse open? If yes, go to step 26 . If no, problem is intermittent.
21. Inspect for poor connections at the fuel pump relay. Did you find and correct the condition? If yes, go to step 29 . If no, go to step 27 .
22. Inspect for poor connections at PCM harness. Did you find and correct the condition? If yes, go to step 29 . If no, go to step 28 .
23. Repair fuel pump supply voltage circuit for a short to voltage. After repairs, go to step 29 .
24. Repair fuel pump relay ground circuit for an open ground. After repairs, go to step 29 .
25. Repair battery positive voltage circuit of the fuel pump relay for an open. After repairs, go to step 29 .
26. Replace fuel pump. After replacing fuel pump, go to step 29 .
27. Replace fuel pump relay. After replacing relay, go to step 29 .
28. Replace PCM. See appropriate REMOVAL & INSTALLATION article. Perform PCM programing. After replacing PCM, go to next step.
29. Operate the system in order to verify the repair. Did you correct the condition? If yes, system is okay. If no, go to step 2 .

FUEL SYSTEM PRESSURE TEST

NOTE: For fuel system pressure testing, see **FUEL SYSTEM PRESSURE TEST** under **FUEL SYSTEMS** in **BASIC DIAGNOSTIC PROCEDURES - 3.4L AZTEK & RENDEZVOUS** article.

FUEL TANK LEAK TEST

Description

Fuel Tank Leak Test is used to locate any fuel or fuel vapor escaping fuel tank area. Fuel vapors escaping above fuel level will be detected when Evaporative (EVAP) emission diagnostics complete one test cycle. Malfunction Indicator Light (MIL) will illuminate after EVAP diagnostics complete 2 test cycles.

Diagnostic Aids

- Operate vehicle under condition of customer's concern. Under high temperature conditions fuel vapors may increase to a point of EVAP canister vapor saturation. Fuel vapors would then be released into atmosphere. Once engine is running and EVAP purge is enabled, all fuel vapor release would be eliminated.
- Test for fuel leaking in fuel tank, rear tank if equipped, and fuel feed and return pipes.
- Test for fuel vapor leaks in fuel tank, fill limiter vent valve and rollover valves, fuel fill pipe, hose and fuel fill cap, fuel sender housing and seal, Fuel Tank Pressure (FTP) sensor seal and EVAP vapor pipe.
- Movement of EVAP pipes or fuel pipes may help find an intermittent condition.

Test Description

The numbers below refer to step numbers in diagnostic procedures.

- 1 - Perform this procedure in order to determine that no EVAP diagnostic DTC is present.
- 3 - This test is to locate fuel leakage in fuel lines.
- 4 - This tests for fuel leaks below fuel tank fuel level.
- 5 - This test is to locate fuel vapors escaping above fuel level in fuel tank.

Diagnostic Procedures

1. Perform Diagnostic System Check - Engine Controls. See **DIAGNOSTIC SYSTEM CHECK - ENGINE CONTROLS** under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

NOTE: Before performing this procedure, place a dry chemical (class B) fire extinguisher near work area.

2. Raise vehicle. Inspect fuel tank and fuel pipes for damage or external leaks. Did you find fuel leaking from fuel tank? If yes, go to step 7 . If no, go to next step.
3. Turn ignition on, with engine off. Using scan tool, command fuel pump ON. Inspect for fuel leaking from fuel pipes. Did fuel leak from fuel pipes? If yes, go to step 8 . If no, go to next step.
4. Install Fuel Tank Cap Adapter (J-41415-40). Connect EVAP Pressure/Purge Diagnostic Station (J-41413) to fuel tank cap adapter. With scan tool, seal EVAP system. DO NOT exceed 15 in. H2O. With EVAP pressure/purge diagnostic station, pressurize fuel tank. Did fuel leak from fuel tank? If yes, go to step 7 . If no, go to next step.

NOTE: Fuel tank may need to be partially lowered during this step.

5. With EVAP pressure/purge diagnostic station, maintain pressure in fuel tank. With Ultrasonic Leak Detector (J-41416), test for leaks above fuel level in following locations:
 - Fuel tank, fill limiter vent valve, pressure relief valve and rollover valves.
 - Fuel sender housing and fuel sender seal.
 - Fuel Tank Pressure (FTP) sensor seal.
 - EVAP vapor pipes.
 - Fuel fill pipe and hose.

Did you locate a fuel leak? If yes, go to next step. If no, see **DIAGNOSTIC AIDS** .

6. Repair system as necessary. After repairs, system is okay.
7. Replace fuel tank. After repairs, system is okay.
8. Replace leaking fuel pipe. After repairs, system is okay.

IDLE CONTROL SYSTEM

NOTE: For component locations, see **COMPONENT LOCATIONS** .

IDLE AIR CONTROL SYSTEM DIAGNOSIS

Description

Engine idle speed is controlled by Idle Air Control (IAC) valve. IAC valve is on throttle body. IAC valve pintle moves in and out of an idle air passage bore to control air flow around throttle plate. IAC valve consists of a movable pintle, driven by a gear attached to a 2 phase bi-polar permanent magnet electric motor called a stepper motor. The stepper motor is capable of highly accurate rotation, or of movement, called steps. The stepper motor has 2 separate windings that are called coils. Each coil is fed by 2 circuits from PCM. When PCM changes polarity of a coil, stepper motor moves one step. PCM uses a predetermined number of counts to determine IAC pintle position. Observe IAC counts with scan tool. IAC counts will increment up or down as PCM attempts to change IAC valve pintle position. An IAC Reset will occur when ignition key is turned OFF. First, PCM will seat IAC pintle in idle air passage bore. Second, PCM will retract pintle a predetermined number of counts to allow for efficient engine start-up. If engine idle speed is out of range for a calibrated period of time, an idle speed DTC may set.

Diagnostic Aids

Inspect for the following conditions:

- High resistance in an IAC valve control circuit.
- The correct PCV valve, properly installed and proper operation of the PCV valve.
- Proper operation and installation of all air intake components.

- Proper installation and operation of the MAF sensor.
- A tampered with or damaged throttle stop screw.
- A tampered with or damaged throttle plate, throttle shaft, throttle linkage, or cruise control linkage, if equipped.
- A skewed high TP sensor.
- Excessive deposits in IAC passage or on IAC pintle.
- Excessive deposits in the throttle bore or on the throttle plate.
- Vacuum leaks.
- A high or unstable idle condition could be caused by a non-IAC system problem that cannot be overcome by the IAC valve.
- An intermittent condition.

Test Description

The numbers below refer to step numbers in diagnostic procedure.

5 - This test will determine ability of PCM and IAC valve circuits to control IAC valve.

7 - This test will determine ability of PCM to provide IAC valve circuits with ground. On a normally operating system, test light should not flash while IAC counts are incrementing.

Diagnostic Procedure

1. Perform Diagnostic System Check - Engine Controls. See **DIAGNOSTIC SYSTEM CHECK - ENGINE CONTROLS** under SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. After performing Diagnostic System Check - Engine Controls, go to next step.

NOTE: **Ensure engine speed stabilizes with each commanded RPM change to determine if engine speed stays within specifications.**

2. Set parking brake and block drive wheels. Install scan tool. Start engine. Turn all accessories off. Using scan tool RPM control function, slowly increment engine speed to 1700 RPM, then to 600 RPM. Then to 1700 RPM. Exit RPM control function. Did the engine speed stabilize within 100 RPM less than the commanded engine speed or within 150 RPM above the commanded RPM? If yes, see **DIAGNOSTIC AIDS** . If no, go to next step.
3. Turn ignition off. Disconnect IAC valve harness connector. See **WIRING DIAGRAMS** . Connect IAC System Motor Analyzer (J-37027-A) to IAC valve. Start engine. Using IAC system motor analyzer, command IAC valve in until about 600 RPM is reached and then command IAC valve out until about 1700 RPM is reached. Return engine RPM to desired idle as indicated on scan tool data list. Did the engine speed steadily decrease to near 600 RPM and steadily increase to near 1700 RPM when the IAC valve was commanded in and out? If yes, go to step 5 . If no, go to next step.
4. Did you observe an excessively high idle condition that could not be controlled with the IAC motor driver during the last test? If yes, go to step 11 . If no, go to step 12 .
5. Using a test light connected to ground, probe one IAC valve circuit at IAC valve harness connector. See

WIRING DIAGRAMS . Start engine. Using IAC system motor analyzer, command low RPM while observing scan tool until IAC counts start to increment, then command high RPM until IAC counts start to increment. Observe test light while incrementing IAC counts. Return engine to idle as indicated on scan tool data list. Repeat procedure for other three IAC valve circuits. Did the test light remain ON, never flashing, while the IAC counts were incrementing at any of the IAC valve circuits during the above test? If yes, go to step 10 . If no, go to next step.

6. Did the test light remain OFF, never flashing, while the IAC counts were incrementing at any of the IAC valve circuits during the above test? If yes, go to step 9 . If no, go to next step.
7. Using Connector Test Adapter Kit (J-35616-A) connect a test light between IAC coil "A" low circuit and IAC coil "A" high circuit at IAC valve harness connector. Using IAC system motor driver, command low RPM while observing scan tool until IAC counts start to increment, then command high RPM until IAC counts start to increment. Observe test light while incrementing IAC counts. Return engine speed to desired idle as indicated on scan tool data list. Repeat procedure on IAC coil "B" low circuit and IAC coil "B" high circuit. Did the test light stay illuminated, never flashing, while the IAC counts were incrementing during the above test? If yes, go to next step. If no, go to step 17 .
8. Check for poor connection at IAC valve harness connector. Did you find and correct the condition? If yes, go to step 18 . If no, go to step 13 .
9. Turn ignition off. Disconnect PCM harness connectors. With a DVOM, test the circuit where the test light remained off for the following:
 - An open circuit.
 - A short to ground.
 - A short to another IAC valve circuit.

Did you find and correct the condition? If yes, go to step 18 . If no, go to step 13 .

10. Turn ignition on. With a DVOM, test the circuit where the test light remained illuminated for the following:
 - A short to voltage.
 - A short to another IAC valve circuit.

Did you find and correct the condition? If yes, go to step 18 . If no, go to step 13 .

11. Visually and physically inspect for the following:
 - Throttle body damage and tampering.
 - Skewed TP sensor signal.
 - Throttle lever screw tampering (if equipped).
 - Vacuum leaks.
 - Faulty, incorrectly installed PCV valve and hose (if equipped).
 - Throttle shaft binding.
 - Throttle linkage or cruise control linkage binding (if equipped).

Remove IAC valve. Inspect for the following:

- Clogged IAC passage

- Excessive deposits on throttle plate.
- Excessive deposits in throttle bore.
- Excessive deposits on IAC valve pintle.

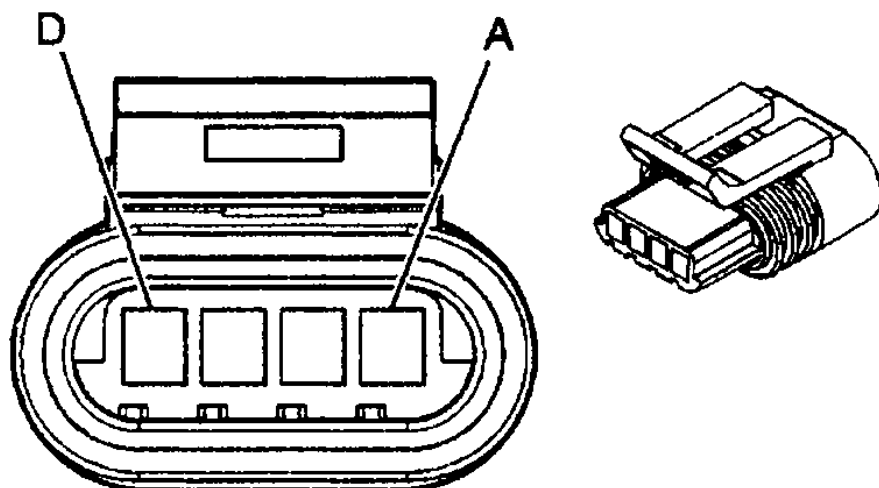
Did you find and correct the condition? If yes, go to step 18 . If no, go to step 15 .

12. Visually and physically inspect for the following:

- Throttle body damage and tampering.
- Throttle lever screw tampering (if equipped).
- Restricted air intake system.
- Excessive deposits on throttle plate.
- Excessive deposits in throttle bore.
- Remove IAC valve and inspect for excessive deposits on IAC valve pintle and in IAC valve passage.

Repair as necessary. Did you find and correct the condition? If yes, go to step 18 . If no, go to step 15 .

13. Check for poor PCM harness connections. Did you find and correct the condition? If yes, go to step 18 . If no, go to next step.
14. Disconnect the PCM harness connectors. With a DVOM, test all IAC valve circuits for high resistance. Did you find and correct the condition? If yes, go to step 18 . If no, go to step 17 .
15. Check for poor IAC valve harness connection. Did you find and correct the condition? If yes, go to step 18 . If no, go to next step.
16. Replace IAC valve. After repairs, go to step 18 .
17. Replace PCM. See appropriate REMOVAL & INSTALLATION article. Perform PCM relearn procedures. After repairs, go to next step.
18. Reconnect any disconnected components. Use the scan tool to clear any DTCs that may have set. Turn OFF the ignition for 30 seconds. Operate the vehicle within conditions to verify the repair. Did you verify the repair? If yes, go to next step. If no, go to step 2 .
19. With a scan tool, observe the stored information in Capture Info. Does the scan tool display any DTCs that you have not diagnosed? If yes, see **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article. If no, system is okay.



Connector Part Information		• 12162189 • 4-Way F 150.2 Series, Sealed, Pull-To-Seat (BLK)	
Pin	Wire Color	Circuit No.	Function
A	LT GRN/ BLK	444	IAC Coil B Low Control
B	LT GRN/ WHT	1749	IAC Coil B High Control
C	LT BLU/ BLK	1748	IAC Coil A Low Control
D	LT BLU/ WHT	1747	IAC Coil A High Control

G00101510

Fig. 21: Identifying Idle Air Control Valve Connector Terminals
 Courtesy of GENERAL MOTORS CORP.

IGNITION SYSTEMS

NOTE: For ignition system testing, perform related DTC testing procedure. See DIAGNOSTIC TROUBLE CODE DEFINITIONS in SELF-DIAGNOSTICS - 3.4L

AZTEK & RENDEZVOUS article.

NOTE: For a no-start problem, refer to **NO-START DIAGNOSIS** in **BASIC DIAGNOSTIC PROCEDURES - 3.4L AZTEK & RENDEZVOUS article.**

CAMSHAFT POSITION SENSOR

See **CAMSHAFT POSITION SENSOR** under **SENSORS & SWITCHES.**

CRANKSHAFT POSITION SENSOR

See **CRANKSHAFT POSITION SENSOR** under **SENSORS & SWITCHES.**

EMISSION SYSTEMS & SUB-SYSTEMS

NOTE: For emission and sub-system testing not listed, perform related DTC testing procedure. **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in **SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.**

AIR INJECTION

Electric AIR Pump

NOTE: For electric AIR pump testing, perform related DTC testing procedure. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in **SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.**

EXHAUST GAS RECIRCULATION

NOTE: For EGR system diagnosis, see appropriate **INSPECTION/MAINTENANCE PROCEDURES** under **DRIVE CYCLES** in **SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.**

FUEL EVAPORATION

NOTE: Ensure all vacuum line and **EVAP** system components are not damaged or missing before proceeding with this test.

EVAP Control System Diagnosis

For EVAP control system diagnosis, see appropriate **INSPECTION/MAINTENANCE PROCEDURES** under **DRIVE CYCLES** in **SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.**

POSITIVE CRANKCASE VENTILATION

Required Service

The PCV system may require service for obstructions if any of the following conditions exist:

- Rough idle.
- Stalling or low idle speed.
- Oil leaks.
- Oil in air cleaner.
- Sludge in engine.

A leaking PCV valve or hose could cause:

- Rough idle.
- Stalling.
- High idle speed.

If engine idles rough, check for clogged PCV valve, or for plugged or broken PCV hoses BEFORE adjusting idle. Check PCV valve application to ensure valve is fitted. Replace PCV valve if required.

Checking PCV Valve Function

1. Disconnect PCV valve vacuum hose from cylinder head cover. Run engine at idle. Place thumb over open end of PCV valve vacuum hose to check for vacuum. If vacuum does not exist, check for obstruction in source vacuum supply. If source vacuum supply is okay, replace PCV valve.
2. Turn ignition off. Remove PCV valve. Shake valve and listen for rattle of check valve inside PCV valve. If a clear rattle is not heard, replace PCV valve.
3. Visually inspect valve for varnish or deposits that may make PCV valve operation sticky or restricted, or cause incomplete seating of valve. Replace as necessary.
4. Engine must be sealed for PCV system to function as designed. If leakage, sludging or dilution of oil is noted and PCV system is functioning properly, check engine for cause and repair as required to ensure PCV system will continue to function properly.
5. An engine operating without any crankcase ventilation can be damaged, so it is important to replace PCV valve and air cleaner breather (if equipped) at regular intervals (at least every 30,000 miles). Check all hoses and clamps for failure or deterioration.

MISCELLANEOUS CONTROLS

NOTE: Although some of the controlled devices listed here are not technically engine performance components, they can affect driveability if they malfunction.

Manufacturer does not provide testing procedures for many individual systems and components. For system and component testing not listed, perform related DTC testing procedure. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** in SELF-DIAGNOSTICS - 3.4L AZTEK & RENDEZVOUS article.

A/C COMPRESSOR CLUTCH CONTROLS

NOTE: For A/C compressor clutch circuit testing, see appropriate **AUTOMATIC A/C-HEATER SYSTEMS** or **MANUAL A/C-HEATER SYSTEMS** article in **AIR CONDITIONING & HEATING**. See appropriate **SYSTEM WIRING DIAGRAMS** article in **ELECTRICAL** for terminal and wire color identification.

ELECTRIC COOLING FAN CONTROL

NOTE: For electric cooling fan circuit testing, see **ELECTRIC COOLING FANS** article in **AIR CONDITIONING & HEATING**. See appropriate **SYSTEM WIRING DIAGRAMS** article in **ELECTRICAL** for terminal and wire color identification.

TRANSMISSION

NOTE: For transmission electronic controls and component testing, see appropriate **DIAGNOSIS** article in **AUTOMATIC TRANSMISSIONS**. For component circuit identification, see appropriate **SYSTEM WIRING DIAGRAMS** article in **ELECTRICAL**.

WIRING DIAGRAMS

AZTEK

For wiring diagrams, see **ENGINE PERFORMANCE** in **SYSTEM WIRING DIAGRAMS** article in **ELECTRICAL**.

RENDEZVOUS

For wiring diagrams, see **ENGINE PERFORMANCE** in **SYSTEM WIRING DIAGRAMS** article in **ELECTRICAL**.