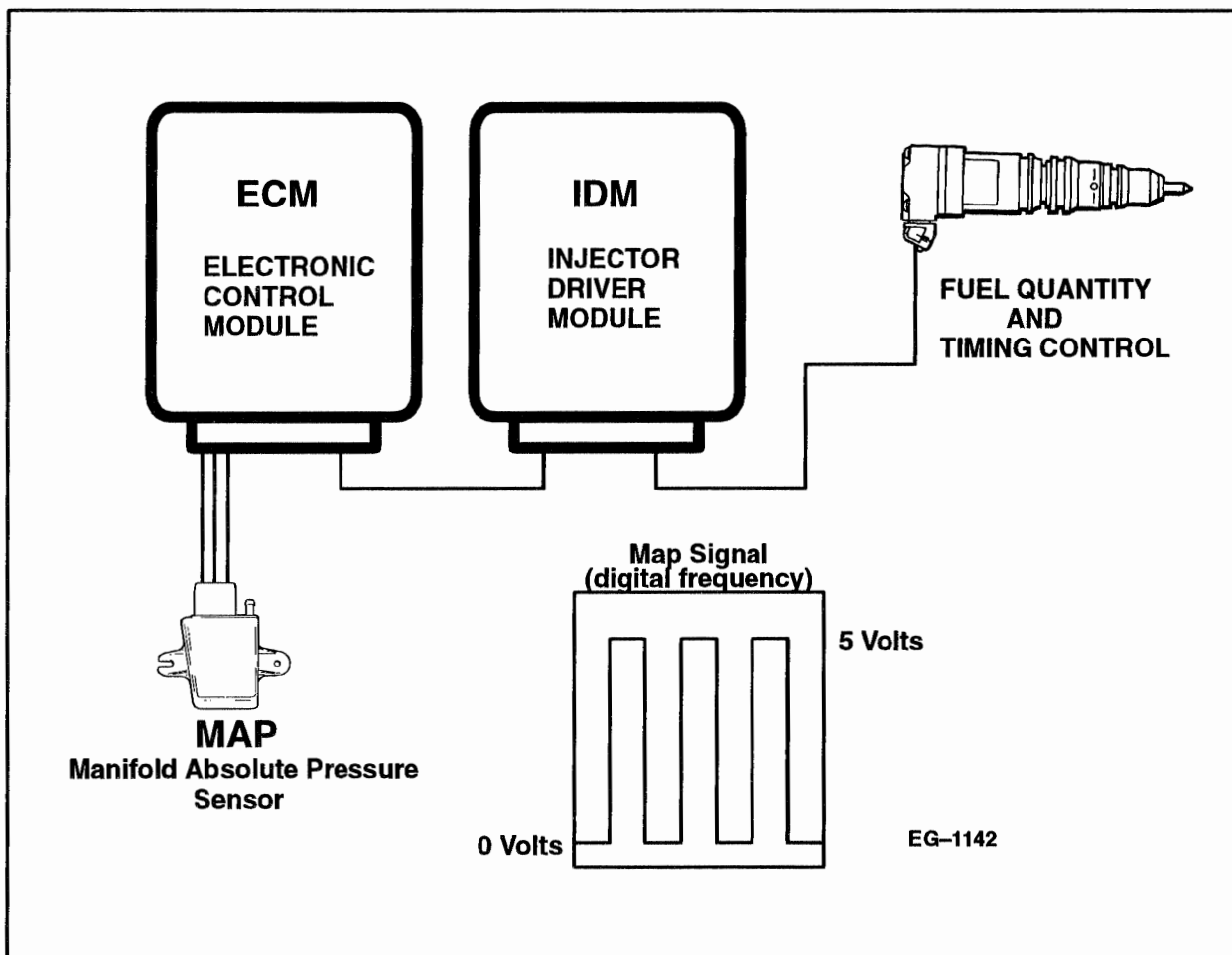


ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP)

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR



SIGNAL FUNCTIONS

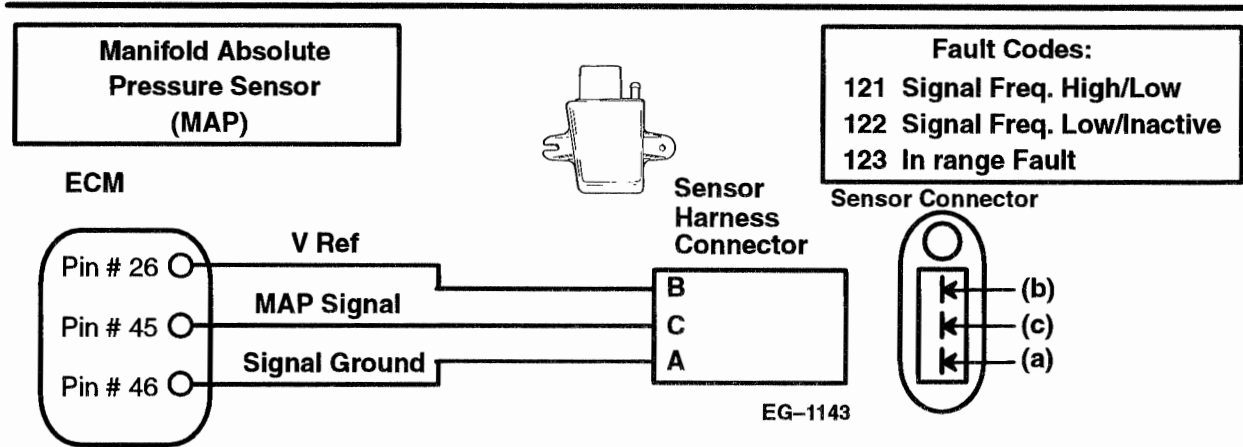
The Manifold Absolute Pressure (MAP) sensor is a variable capacitance sensor which operates on a 5 volt reference signal from the ECM to produce a digital frequency signal that indicates pressure.

Smoke Control – The MAP signal is used to control smoke by limiting fuel quantity during acceleration until a specified boost pressure is obtained.

Dynamic Injection Timing – Optimizes injection timing for boost pressure measured.

FAULT DETECTION/MANAGEMENT

A MAP signal that is detected by the ECM to be out of range or at an incorrect value for specific conditions will cause the ECM to ignore the MAP signal and will operate the engine with the values from estimated MAP. (Operate from a calculated boost pressure signal)



After removing connectors always check for damaged pins, corrosion, loose terminals etc.

Connector Checks to Chassis Ground

(Check with sensor Connector Disconnected and Ignition key off, all accessories off)

Test Points	Spec.	Comments
A to Grd.	< 5 ohms	Resistance to chassis ground check with key off, if > than 5 ohms harness is open.
B to Grd.	> 1000 ohms	Resistance less than 1000 ohms indicates a short to ground.
C to Grd.	> 1000 ohms	Resistance less than 1000 ohms indicates a short to ground.

Connector Voltage Checks

(Check with sensor Connector Disconnected and Ignition Key On)

Test Points	Spec.	Comments
B to Grd.	5 volts \pm .5	V Ref. check with key ON, if voltage not in spec, see V REF circuit.
C to Grd.	4.8 – 5.0 v	Pull up voltage, if no or low voltage circuit has open or high resistance or short to grd.

Harness Resistance Checks

(Check with breakout box installed on engine harness only)

Test Points	Spec.	Comments
#46 to A	< 5 ohms	Resistance from sensor connector to 60 pin connector – Signal ground
#26 to B	< 5 ohms	Resistance from sensor connector to 60 pin connector – V Ref
#45 to C	< 5 ohms	Resistance from sensor connector to 60 pin connector – MAP signal

Test Points		Operational Voltage Checks	
(+) #45 to (–) #46		(Check with breakout box installed in line with the ECM)	
Frequency	PSI	kPAG	Comments
90 Hz.	N/A	N/A	Out of range low limit.
108–114 Hz.	0	0	Freq. with key on engine off, Atmospheric pressure dependent on altitude and BARO psi.
145 Hz.	25.4	175	Frequency expected at 25 psi.
256 Hz.	45	267	Out of range high limit

Fault Code Descriptions

Circuit Faults:

121 = Signal frequency was greater than 256 Hz. for more than 0.1 seconds.

122 = Signal frequency was less than 90 Hz. or inactive for more than 0.25 seconds.

System Faults:

123 = Detected high boost signal at low idle. (Restricted MAP line.)

ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP)

MANIFOLD ABSOLUTE PRESSURE SENSOR EXTENDED SYSTEM DESCRIPTION

FUNCTION

The Navistar engine control system includes a Manifold Absolute Pressure (MAP) sensor. The ECM measures the signal from the MAP sensor to determine intake manifold (Boost) pressure. From this information, the ECM can optimize control of fuel rate and injection timing for all engine operating conditions.

OPERATION

The Manifold Absolute Pressure sensor is a variable capacitance sensor that produces a digital frequency signal output. The MAP sensor is supplied 5 volts from the ECM at terminal 26 to terminal B of the sensor. A return circuit (ground) is supplied from ECM terminal 46 to terminal A of the sensor. The sensor receives intake manifold boost pressure via a hose which connects to a tap on the intake manifold to the map sensor. Pressure applied to the MAP sensor changes the capacitance of the sensor which varies the digital frequency of the signal sent to the ECM. As boost pressure increases the frequency increases.

ECM DIAGNOSTICS

The ECM monitors the MAP sensor output signal for expected values. If the ECM detects the MAP signal is greater than or less than the desired value, the ECM will set a fault code.

If an active MAP sensor fault code is set, the ECM will ignore the MAP signal. It will operate the engine using programmed default values. Active faults for the MAP sensor will cause the ECM to illuminate the Engine Warning light. These faults can be retrieved using the Self Test Input diagnostic switch located on the vehicle dash or the Electronic Service Tool. If the ignition key is turned off, the fault code will be stored as an Inactive code.

FIGURE 7 FLASH CODE 121

ATA CODE PID 102 FMI 8

MAP FREQUENCY OUT OF RANGE HIGH

Code 121 will be set, if the ECM detects a frequency greater than 256 Hz for more than 0.1 seconds in the MAP signal.

If code 121 is active, the ECM will ignore the MAP signal and operate the engine using programmed default values. The ECM will illuminate the Engine Warning light when this code is active.

Excessive high frequency noise in the MAP signal will cause this code to be set.

FLASH CODE 122

ATA CODE PID 102 FMI 11

MAP SIGNAL IS INACTIVE

Code 122 will be set, if the ECM detects a frequency less than 90 Hz or an inactive MAP signal for more than 0.25 seconds.

When code 122 is active, the ECM will ignore the MAP signal and operate the engine using programmed default values. The ECM will illuminate the Engine Warning light when this code is set.

Possible causes: A defective MAP sensor or MAP sensor signal circuits may be open or shorted to ground.

FLASH CODE 123

ATA CODE PID 102 FMI 2

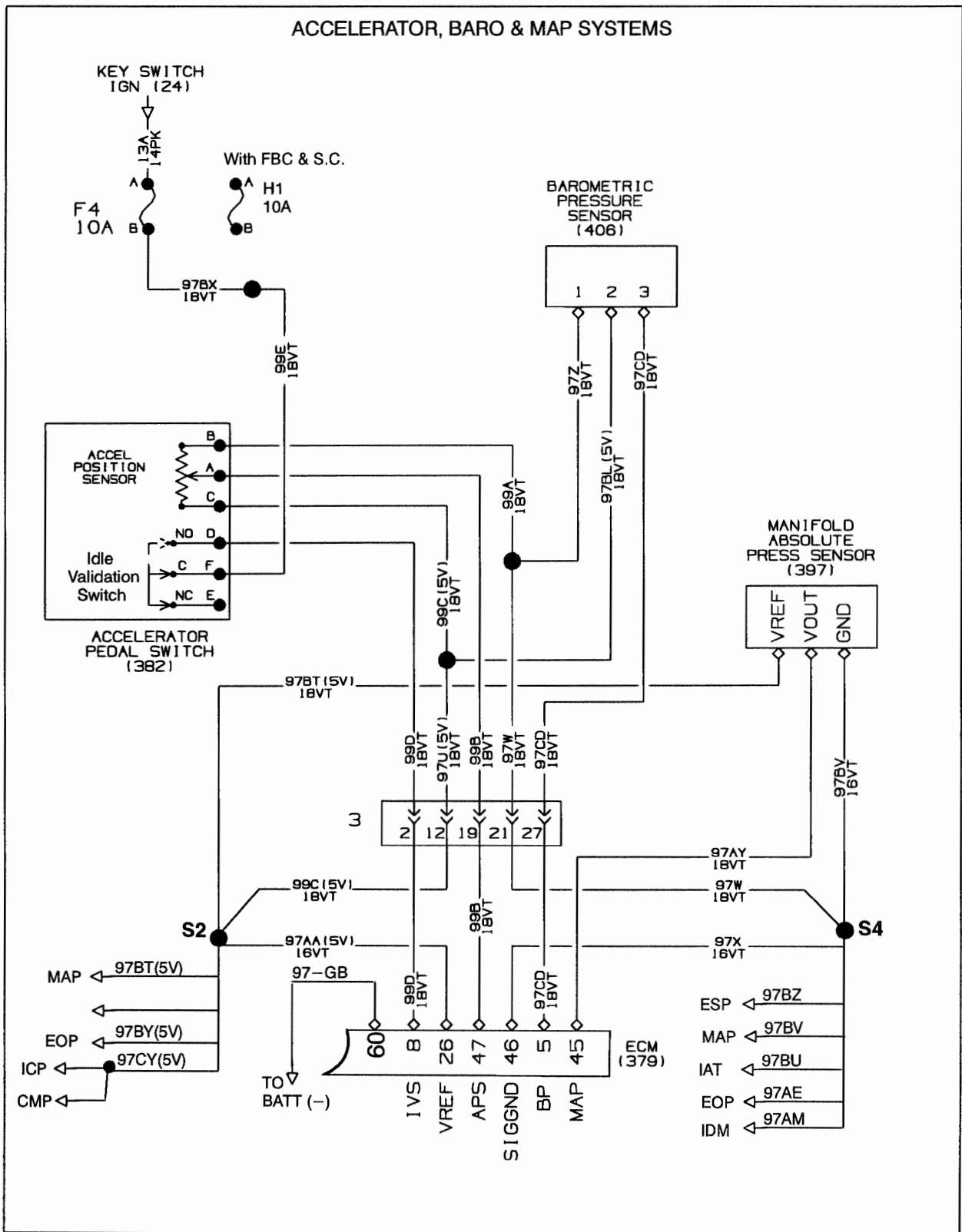
MAP SIGNAL ABOVE SPECIFIED LEVEL AT LOW IDLE

Code 123 is set when the MAP signal is greater than 16.7 PSI (115 kPa) Absolute at low idle.

When code 123 is active, the ECM will ignore the MAP signal and operate the engine using programmed default values. The ECM will illuminate the Engine Warning light when this code is set.

Possible causes: Restricted or plugged hose which supplies intake manifold boost pressure to the MAP sensor or a defective MAP sensor.

ACCELERATOR, BARO & MAP CIRCUITS

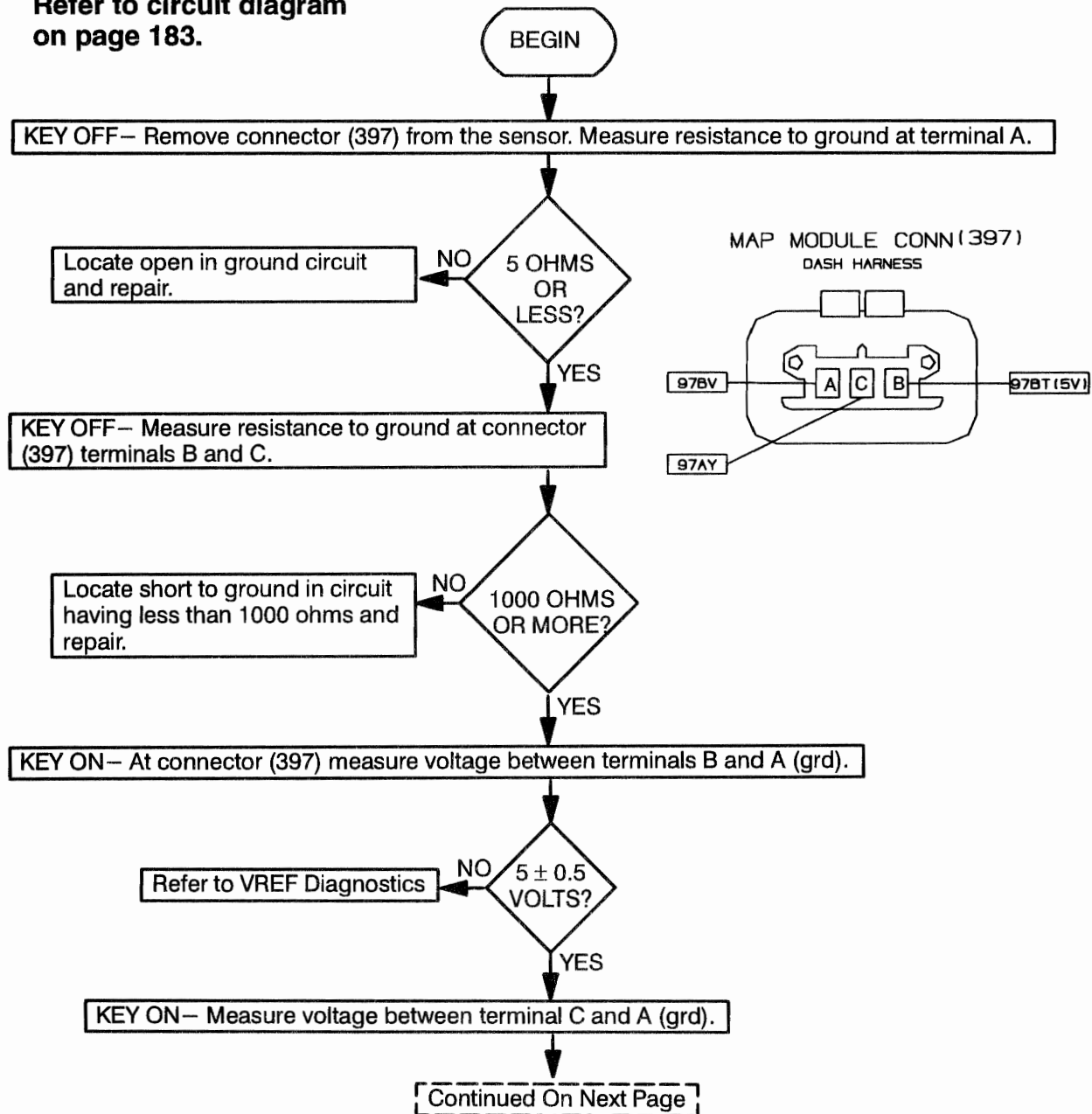


ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP)

MAP MANIFOLD ABSOLUTE PRESSURE SENSOR

Refer to circuit diagram
on page 183.



MAP MANIFOLD ABSOLUTE PRESSURE SENSOR (Continued)

