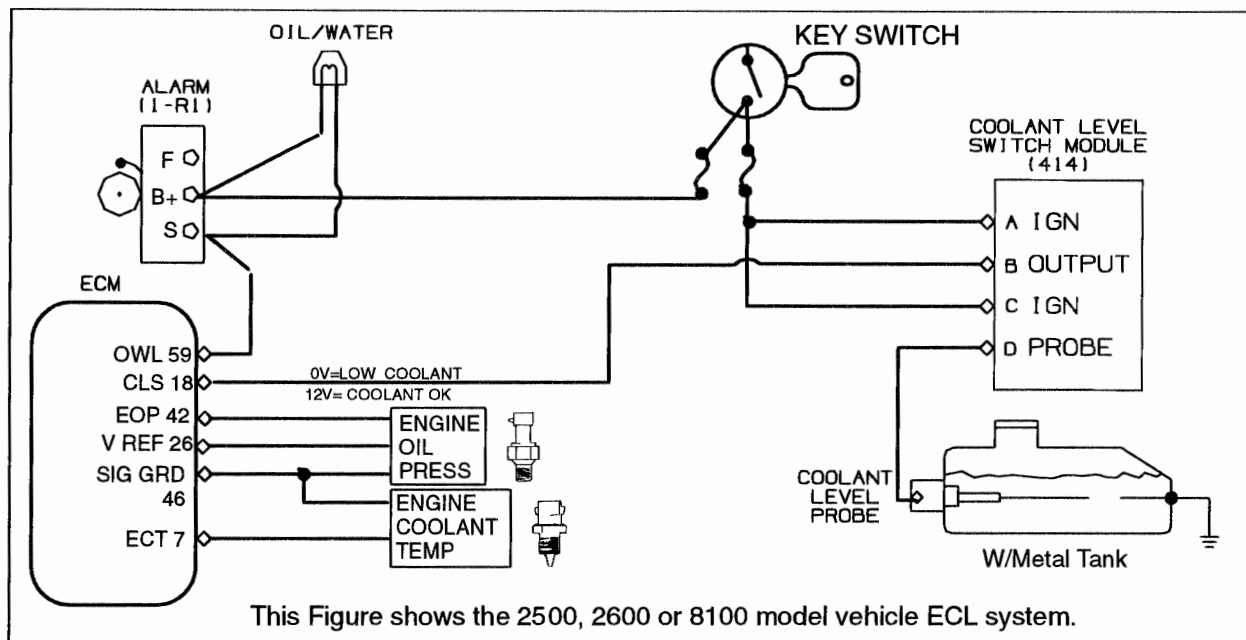


ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

ENGINE COOLANT LEVEL SYSTEM (ECL)

ENGINE COOLANT LEVEL SYSTEM (ENGINE PROTECTION)



SIGNAL FUNCTION

With the optional engine protection system, the ECM monitors inputs from the Engine Oil Pressure sensor, Engine Coolant Temperature sensor and Low Coolant switch (or module). If any of these sensors detect out of range conditions beyond the warning level, ECM OWL terminal 59 goes LOW (grd) causing the alarm to sound and the oil/water warning light to turn ON. If the engine shutdown feature has been selected, and the out of range conditions go beyond the critical level, the ECM will initiate the shutdown process.

LOW COOLANT LEVEL SYSTEM

The 2500, 2600, 8100 models have a metal surge tank and use low coolant module and low coolant probe. All other models with a plastic composite surge tank utilize a magnetic low coolant switch in the surge tank instead of the module and probe.

2500, 2600, 8100 Models – The low coolant module outputs a 12V signal to ECM terminal when coolant levels are at specified levels and 0V when coolant is below the probe.

Models With Plastic Surge Tank – The low coolant switch is open when coolant is OK and closed when coolant is LOW. When this switch is OPEN, 12V is present at ECM terminal 18. When the switch is closed, voltage is pulled to zero at ECM terminal 18.

ENGINE OIL PRESSURE SENSOR

The Engine Oil Pressure (EOP) sensor sends a linear analog signal to ECM terminal 42. If the ECM detects oil pressure below the warning level the OWL is turned on. If oil pressure goes below the critical level, engine shutdown is initiated. Refer to Engine Oil Pressure (EOP) Sensor diagnostics for additional information and sensor circuit troubleshooting.

ENGINE COOLANT TEMPERATURE SENSOR

The Engine Coolant Temperature (ECT) sensor sends a 0-5 volt analog signal to ECM terminal 7. If the ECM detects coolant temperature above the warning level the OWL is turned on. If coolant temperature goes above the critical level, engine shutdown is initiated. Refer to Engine Coolant Temperature (ECT) Sensor diagnostics for additional information and sensor circuit troubleshooting.

FAULT DETECTION MANAGEMENT

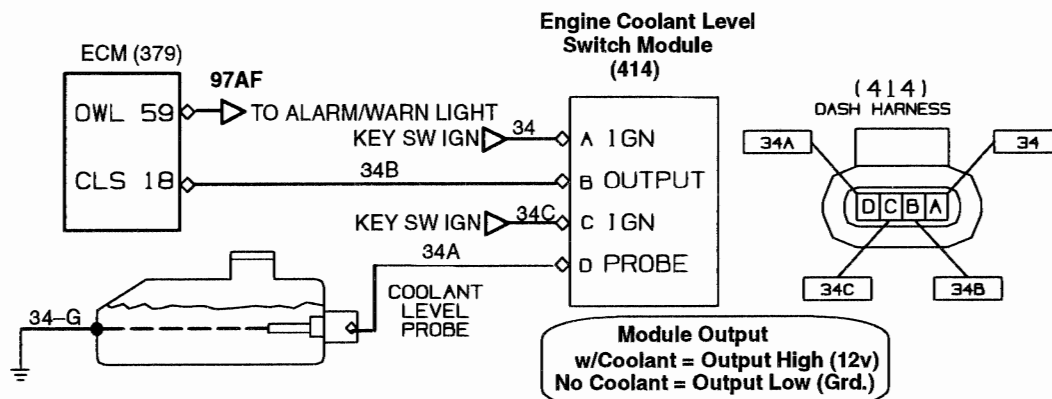
There are no ECM diagnostics for the Engine Coolant Level system. Flash Code 323 will be active when a low coolant situation is present and the ProLink will indicate COOLANT LOW. After the coolant has been restored to proper levels, Flash code 323 will remain as an inactive code and the ECM will log the engine hours of the occurrence.

MODELS WITH METAL SURGE TANK

**Engine Coolant Level
(ECL)**

Fault Codes:

323 Engine Coolant Below Warning Critical Level

ENGINE COOLANT LEVEL MODULE**Connector Voltage Checks**

Connector (414) with key ON, probe submerged in coolant and coolant module disconnected

Test Points	Spec.	Comments
A to grd	12 ± 1.5 volts	< than 10.5 v check connections, if 0 volts check for open/short to ground.
C to grd	12 ± 1.5 volts	< than 10.5 v check connections, if 0 volts check for open/short to ground.
C to D	5 to 10 volts min.	0 volts check for open in probe circuit < less than 5V check connections and check probe for clean condition.
C to B	12 ± 1.5 volts	< than 10.5 volts check connections. 0 volts check for open circuit 34B.

Operational Check

ECM Connector (379) with breakout box installed, probe submerged in coolant and key ON

Test Points	Spec.	Comments
#18 to grd	12 ± 1.5 volts	< than 10.5 v check connections, if 0 volts check for open/short to grd in circuit 34B.

Fault Code Descriptions

323 = Indicates low coolant level. If coolant level full with code present, troubleshoot circuit.

ENGINE COOLANT LEVEL SYSTEM (ECL)

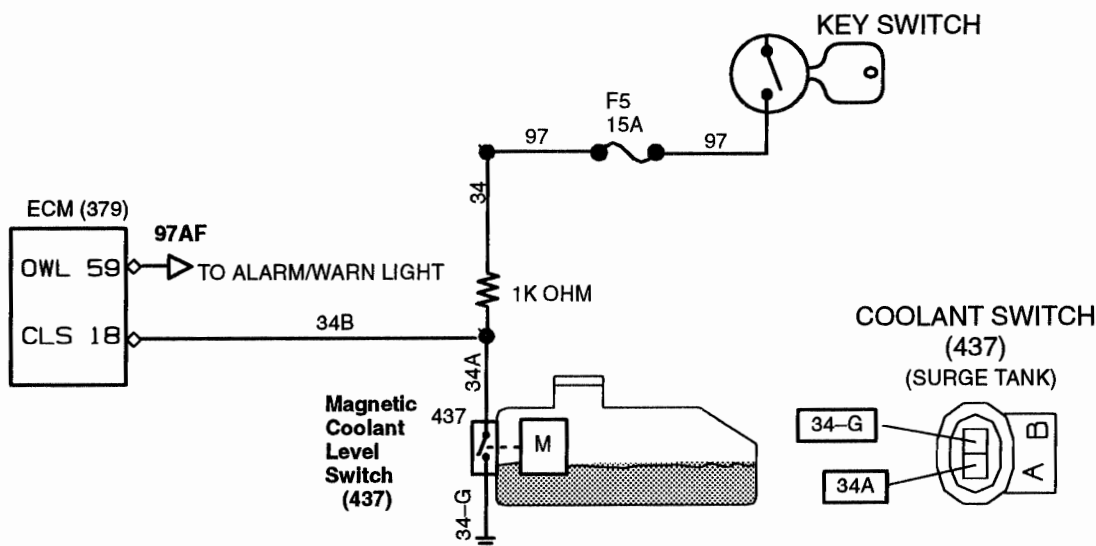
ENGINE COOLANT LEVEL SYSTEM (ECL)

MODELS WITH PLASTIC SURGE TANK

**Engine Coolant Level
(ECL)**

Fault Codes:

323 Engine Coolant Below Warning Critical Level



Harness side of connector (437) – disconnected with key ON

Test Points	Spec.	Comments
A to grd.	6 ± 1.5 volts	< than 10.5 v check connections, if 0 volts check for open/short to ground or blown fuse
A to B	6 ± 1.5 volts	< than 10.5 v check connections, if 0 volts check for open in ground path.

Switch side of connector (437) – disconnected with key OFF and coolant at proper level

Test Points	Spec.	Comments
A to B	>1000 ohms	< than 1000 ohms replace the switch (s/b less than 5 ohms with low coolant level)

Connector (379) with breakout box installed and key ON and coolant at proper level with (437) connected to ECL switch.

Test Points	Spec.	Comments
#18 to grd.	6 ± 1.5 volts	< than 10.5v check connections, if 0 volts check for open/short to ground or blown fuse or defective resistor.

Fault Code Descriptions

323 = Indicates low coolant level. If coolant level full with code present, troubleshoot circuit.

ENGINE COOLANT LEVEL SYSTEM (ECL)**DESCRIPTION**

The Engine Coolant Level (ECL) System is part of the optional Engine Protection Package.

The purpose of the ECL system is to monitor the engine coolant level and alert the driver when a low coolant condition is present by turning on the Oil/Water Warning Light and the alarm buzzer. If the vehicle is programmed for Engine Shutdown as part of the Engine Protection Package, a low coolant signal will shut down the engine.

**ENGINE COOLANT LEVEL (ECL)
MODULE AND PROBE**

Refer to the circuit diagram on page 80 for the following discussion.

The ECL module (414) receives 12V ignition power from 15A fuse F4 (G1 fuse w/FBC) at terminals A and C. ECL Module, Terminal B is connected (circuit 34B) through connector (379) to ECM terminal 18 (ECL).

ECL module (414) terminal D is connected to the Coolant Level Probe located in the surge tank. A very low current signal from ECL module terminal D goes through the probe, then through the coolant (using coolant as a conductor) to ground (circuit 34-G). When the coolant level is above the probe, ECL module terminal B will be HIGH (12V), and Oil/Water Warning Light is OFF.

With coolant level below the probe for more than 7 consecutive seconds (7 second delay prevents intermittent splashing signals), the ground path through the probe from ECL Module terminal D will be open. This causes the ECL module terminal B to go LOW (0 volts). With ECL terminal B at 0 volts, ECM terminal 18 is at 0 volts causing the ECM to turn on the Engine Warning Light and Alarm.

DIAGNOSTIC CODES

The ECM does not check the ECL circuits. Flash Code 323 is set indicating that a "low coolant" condition was detected.

FLASH CODE 323

PID 111 FMI 1

**ECM: ENGINE COOLANT BELOW WARNING/
CRITICAL LEVEL**

Flash Code 323 will be active when a low coolant situation is present and the Prolink will indicate COOLANT LOW. After the coolant has been restored to proper levels, Flash code 323 will remain as an inactive code and the ECM will log the engine hours of the occurrence.

TROUBLESHOOTING

Use the Prolink 9000 to monitor the ECL system operation. Prolink will indicate that the coolant level is FULL or LOW.

BEFORE TROUBLESHOOTING

- A. Before troubleshooting, make sure that the batteries are fully charged! Check battery connections and grounds for clean, tight connections free of damage. Voltage tests will give misleading readings if batteries are not fully charged.
- B. Before troubleshooting a particular circuit, inspect connectors for pushed back, loose or damaged (spread or bent) terminals, or wires with cut strands, etc. The wires and connections must be free of damage or corrosion. When some connectors corrode, a light white residue will be present that must be removed.
- C. Before troubleshooting, inspect suspect circuit grounds for clean, tight connections free of damage.

**ENGINE COOLANT LEVEL MODULE
AND PROBE TEST**

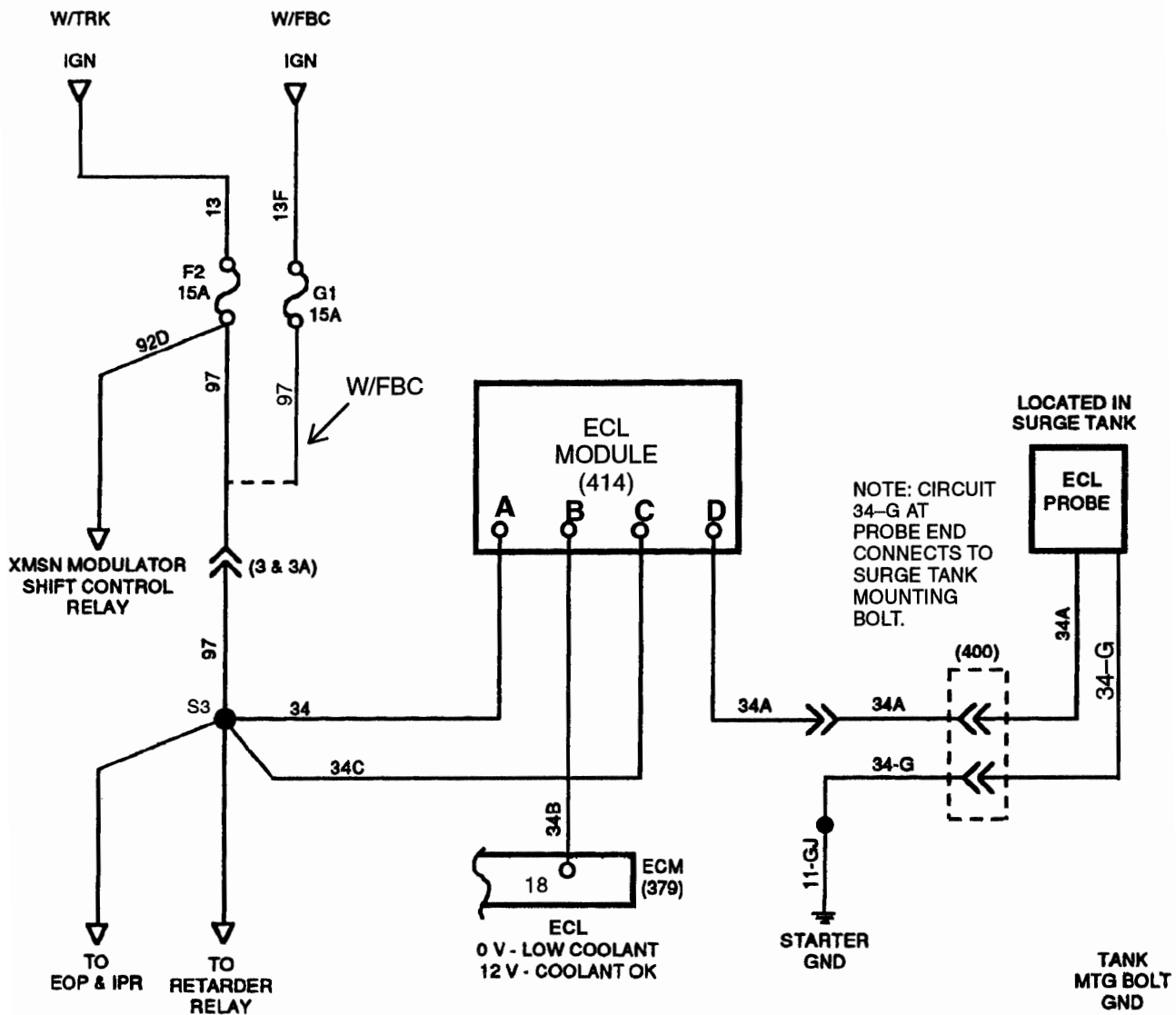
Perform Testing For False Low Coolant Signal on page 81, if Prolink indicates COOLANT LOW when coolant level is above the probe.

Perform Testing For False Full Coolant Signal on page 83, if Prolink indicates COOLANT FULL when coolant level is below the probe.

ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

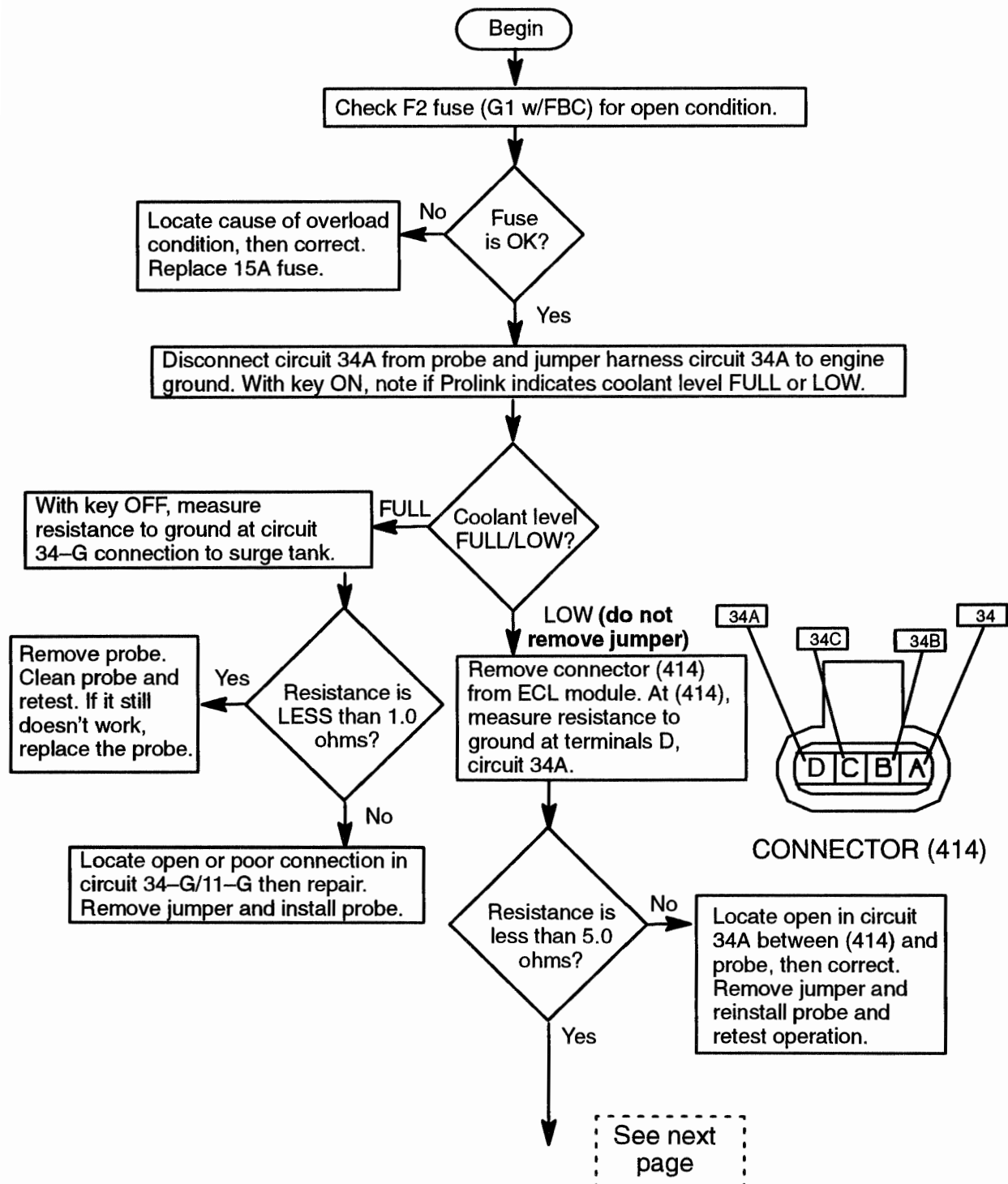
ENGINE COOLANT LEVEL SYSTEM (ECL)

ENGINE COOLANT LEVEL SYSTEM CIRCUIT DIAGRAM



TESTING FOR FALSE LOW COOLANT SIGNAL

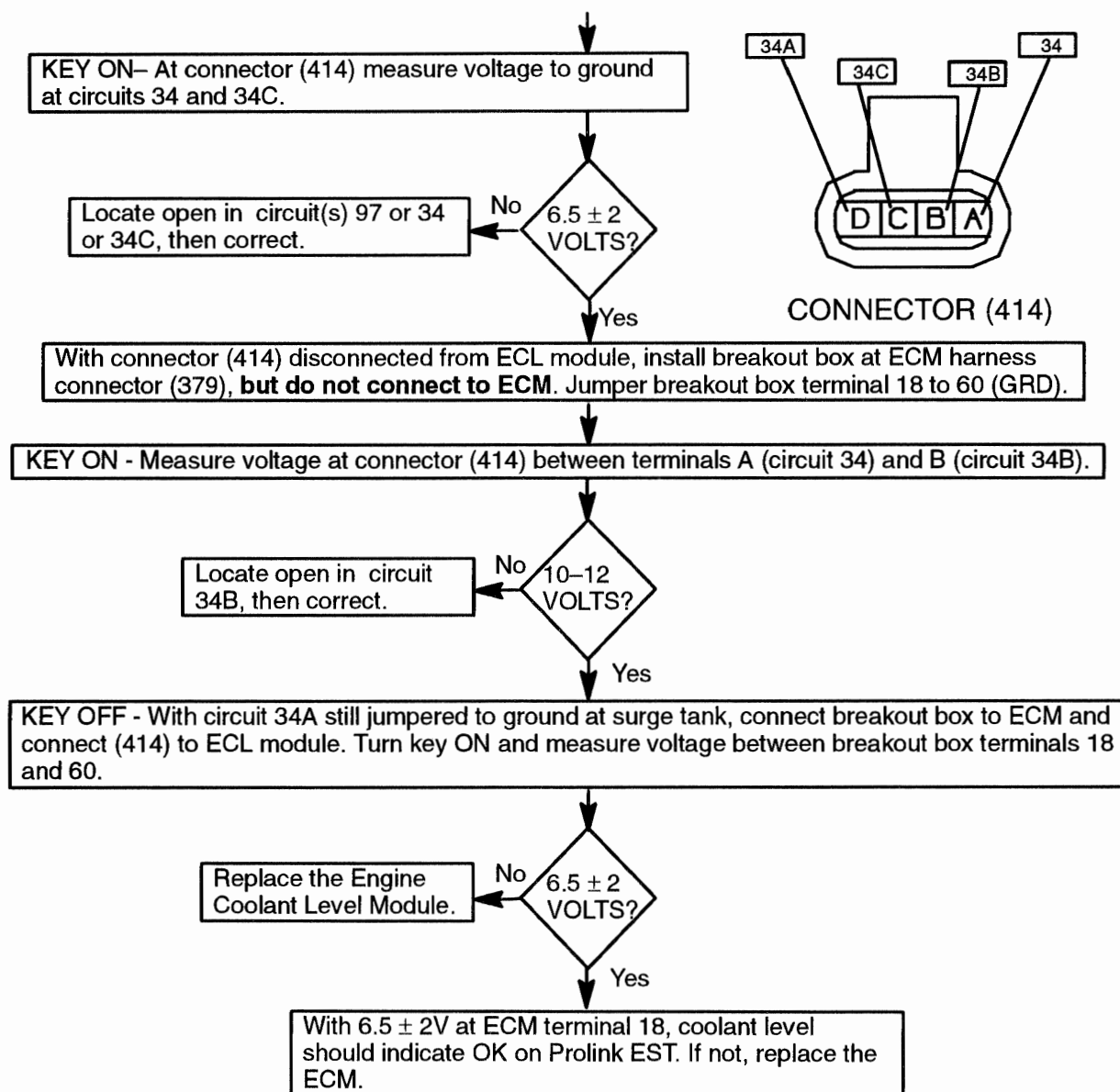
Perform this test if Prolink indicates LOW COOLANT when coolant level is above the probe.



ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

ENGINE COOLANT LEVEL SYSTEM (ECL)

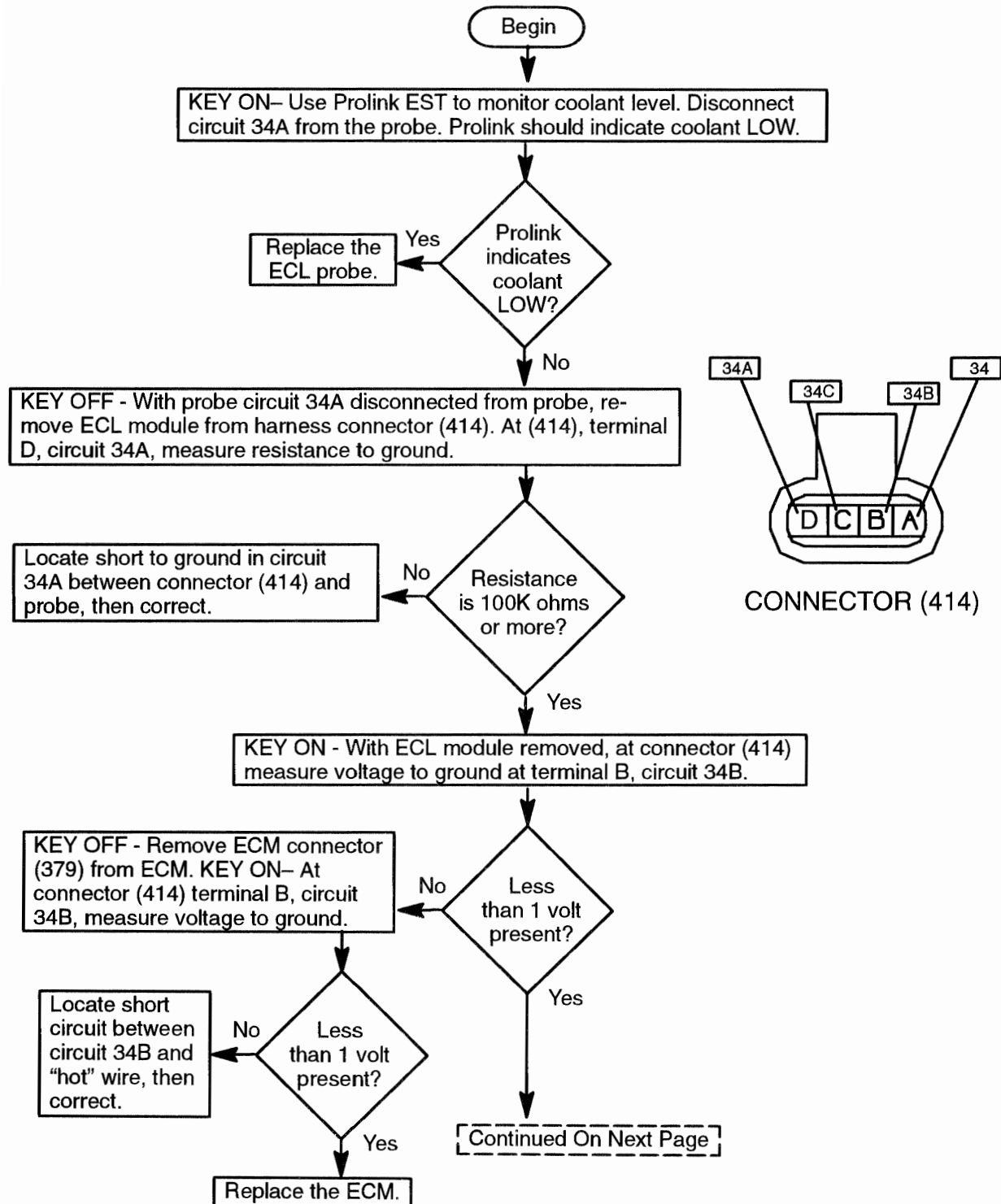
TESTING FOR FALSE LOW COOLANT SIGNAL (Continued)



ENGINE COOLANT LEVEL SYSTEM (ECL)

TESTING FOR FALSE FULL COOLANT SIGNAL

Perform this test if Prolink indicates COOLANT FULL when the coolant level is below the probe.



ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

ENGINE COOLANT LEVEL SYSTEM (ECL)

TESTING FOR FALSE FULL COOLANT SIGNAL (Continued)

