SECTION C12
COOLING FAN CONTROL

CONTENTS

GENERAL DESCRIPTION

This vehicle utilizes an electric cooling fan for engine and A/C condenser cooling. The fan operates under certain conditions as outlined below.

OPERATION

The engine coolant fan is controlled by the PCM via the coolant fan relay. A calibrated set of criteria programmed into the PCM will energize the fan relay. The following conditions control the fan:

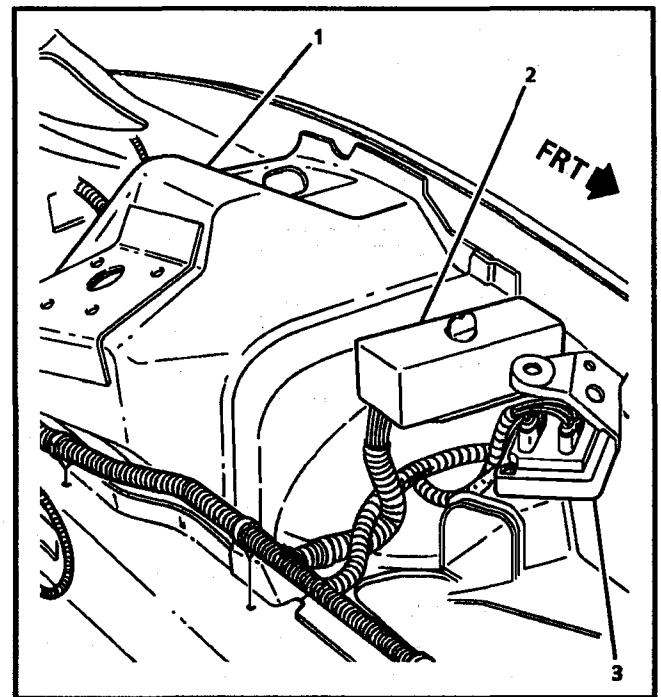
- Engine Coolant Temperature (ECT) sensor signal indicating 109°C (228°F) or greater will turn the coolant fan "ON."
- Engine Coolant Temperature (ECT) sensor signal indicating 98°C or less will turn the fan "OFF."
- The fan will turn "ON" if A/C is requested and vehicle speed is less than 56 km/h (35 mph).
- If vehicle speed is greater than 113 km/h (70 mph) the fan is disabled and will not turn "ON."
- If A/C is requested and refrigerant pressure sensor indicates approximately 20 psi or greater the fan is turned "ON."
- When the PCM is operating in backup the fan will be "ON."
- When any A/C DTC is set the fan will be "ON."

DIAGNOSIS

The following C-12 circuits charts will diagnose the PCM controlled cooling fans.

ON-VEHICLE SERVICE

Cooling system component replacement can be found in SECTION 6B.



1 LEFT SIDE WHEELHOUSE
2 RELAY CENTER
3 HEADLAMP ACTUATOR MODULE
NS 15935

Figure C12-1 - Cooling Fan Relay

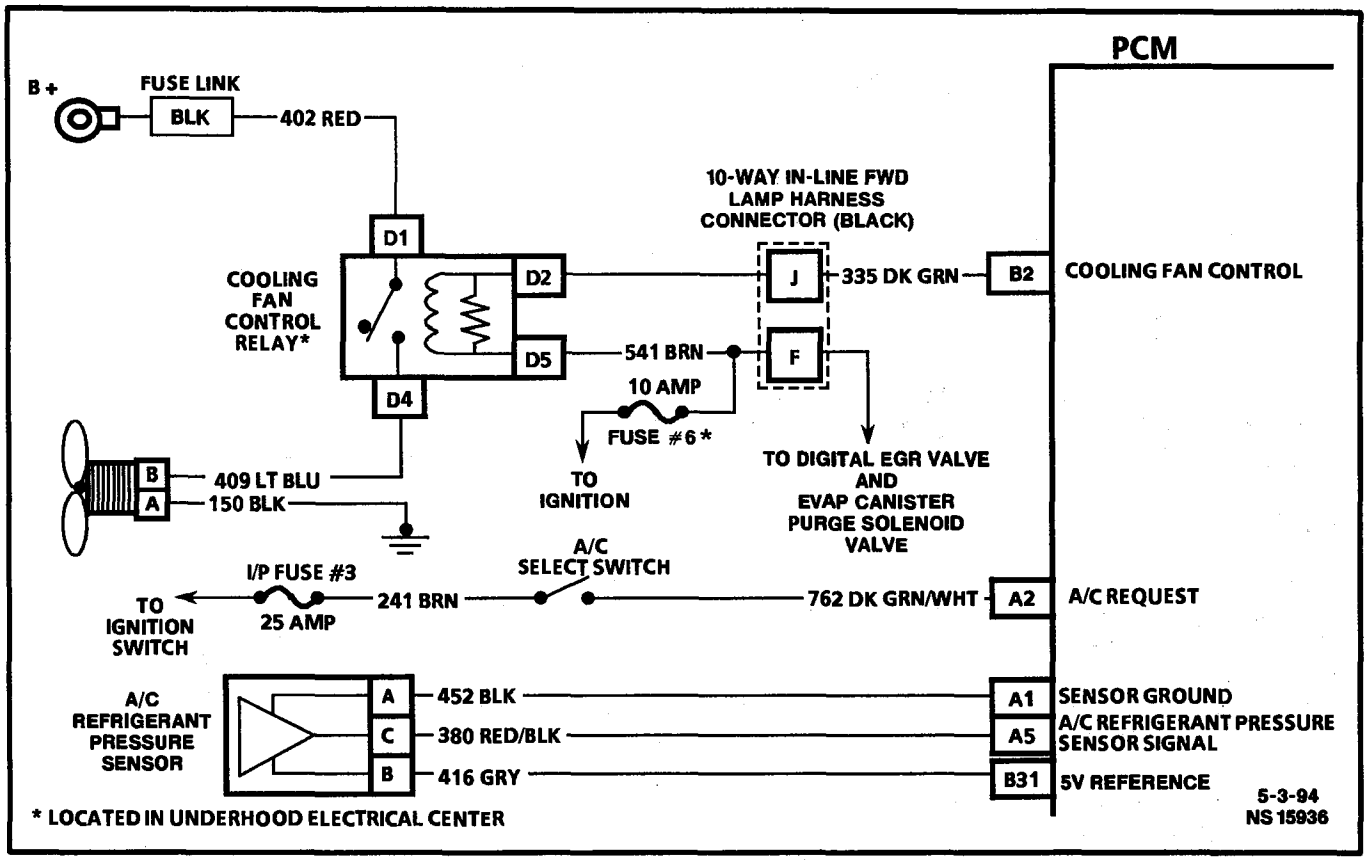


CHART C-12

(Page 1 of 2)

COOLING FAN CONTROL CIRCUIT DIAGNOSIS
3.4L (VIN S) "F" CARLINE (SFI)

Circuit Description:

The electric cooling fan is controlled by the PCM, based on inputs from the Engine Coolant Temperature (ECT) sensor, the A/C control switches, vehicle speed, and state of the A/C refrigerant pressure sensor. The PCM controls the fan by grounding CKT 335 which energizes the fan control relay. Battery voltage is then supplied to the fan motor.

The PCM grounds CKT 335 when engine coolant temperature is over about 109°C (228°F), or when A/C has been requested and the A/C refrigerant pressure is about 1655 kPa (240 psi). Once the PCM turns the relay "ON," it will keep it "ON" for a minimum of 30 seconds, or until vehicle speed exceeds 113 km/h (70 mph).

Also, if DTC 14 or 15 sets or the PCM is in backup, the primary fan will run at all time.

Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. With the diagnostic terminal grounded, the cooling fan control driver(s) will close, which should energize the fan control relay(s).
2. If the A/C pressure is above 240 psi (1655 kPa) or circuit is open, the fan would run whenever A/C is requested.
3. With A/C clutch engaged and the A/C refrigerant pressure sensor is functioning properly, the fan should come "ON" when pressure exceeds about 20 psi. Under very cold ambient conditions, the fan will remain "OFF." This signal should cause the PCM to energize the cooling fan control relay.
4. This will determine if the A/C refrigerant pressure sensor is faulty or if the PCM or circuitry is faulty.

Diagnostic Aids: If the owner complained of an overheating problem, it must be determined if the complaint was due to an actual boilover, a hot light or temp. gage indicated over heating.

If the gage or light indicates overheating, but no boilover is detected, the gage circuit should be checked.

CHART C-12

(Page 1 of 2)

COOLING FAN CONTROL CIRCUIT DIAGNOSIS 3.4L (VIN S) "F" CARLINE (SFI)

- ENGINE COOLANT TEMPERATURE SENSOR INDICATING LESS THAN 98°C (208°F).
- IGNITION "ON," ENGINE "OFF," A/C "OFF."
- COOLING FAN SHOULD BE "OFF." IS IT?

YES

(1) • GROUND DIAGNOSTIC TEST TERMINAL, OR SELECT COOLING FAN "OUTPUT" TEST ON TECH 1. FAN SHOULD TURN "ON." DOES IT?

YES

- UNGROUND DIAGNOSTIC TEST TERMINAL OR EXIT OUTPUT TEST.
- START AND IDLE ENGINE.
- A/C "OFF."
- FAN SHOULD BE "OFF" WHILE TEMPERATURE IS UNDER 98°C (208°F)]. IS IT?

FAN "OFF"

WITHOUT A/C

NO TROUBLE FOUND. REFER TO "DIAGNOSTIC AIDS" OF FACING PAGE.

WITH A/C

(2) • ENGINE IDLING, A/C "OFF."
- USE A TECH 1 SCAN TOOL AND CHECK A/C REFRIGERANT PRESSURE SENSOR. DOES TECH 1 SCAN TOOL DISPLAY PRESSURE GREATER THAN 240 psi (1655 kPa)?

NO

(3) • ENGINE IDLING, A/C "ON." IF A/C IS INOPERATIVE SEE CHART C-10. FAN SHOULD TURN "ON" WHEN A/C IS REQUESTED AND HEAD PRESSURE EXCEEDS ABOUT 20 psi. DOES IT?

YES

NO

- DISCONNECT A/C REFRIGERANT PRESSURE SENSOR .
- MEASURE VOLTAGE BETWEEN CONNECTOR TERMINAL "B" AND "A". VOLTMETER SHOULD DISPLAY ABOUT 5 VOLTS. DOES IT?

YES

- MEASURE VOLTAGE BETWEEN CONNECTOR TERMINAL "B" AND "C." VOLTMETER SHOULD READ 5 VOLTS. DOES IT?

YES

FAULTY SENSOR.

NO

CKT 380 OPEN OR SHORTED TO GROUND OR FAULTY PCM CONNECTION OR PCM.

NO

- MEASURE VOLTAGE BETWEEN CONNECTOR TERMINAL "B" AND GROUND. VOLTMETER SHOULD DISPLAY ABOUT 5 VOLTS. DOES IT?

YES

CKT 452 OPEN OR FAULTY PCM CONNECTION OR PCM.

NO

CKT 416 OPEN OR SHORTED TO GROUND OR FAULTY PCM CONNECTION OR PCM.

YES

(4) • DISCONNECT A/C REFRIGERANT PRESSURE SENSOR. DOES SCAN INDICATE ZERO A/C PRESSURE?

YES

OPEN CKT 452 OR FAULTY SENSOR CONNECTOR OR FAULTY SENSOR.

NO

CKT 380 SHORTED TO VOLTAGE OR FAULTY PCM.

NO

REFER TO CHART C-12 (2 OF 2)

FAN "ON"

FAULTY CALIBRATION OR PCM.

NO

- REMOVE COOLING FAN CONTROL RELAY. FAN SHOULD STOP. DOES IT?

YES

PROBE CKT 335 WITH A TEST LIGHT TO B+.

LIGHT "ON"

CKT 335 SHORTED TO GROUND OR FAULTY PCM.

LIGHT "OFF"

FAULTY RELAY.

NO

CKT 409 SHORTED TO VOLTAGE.

6-22-93
NS 16220

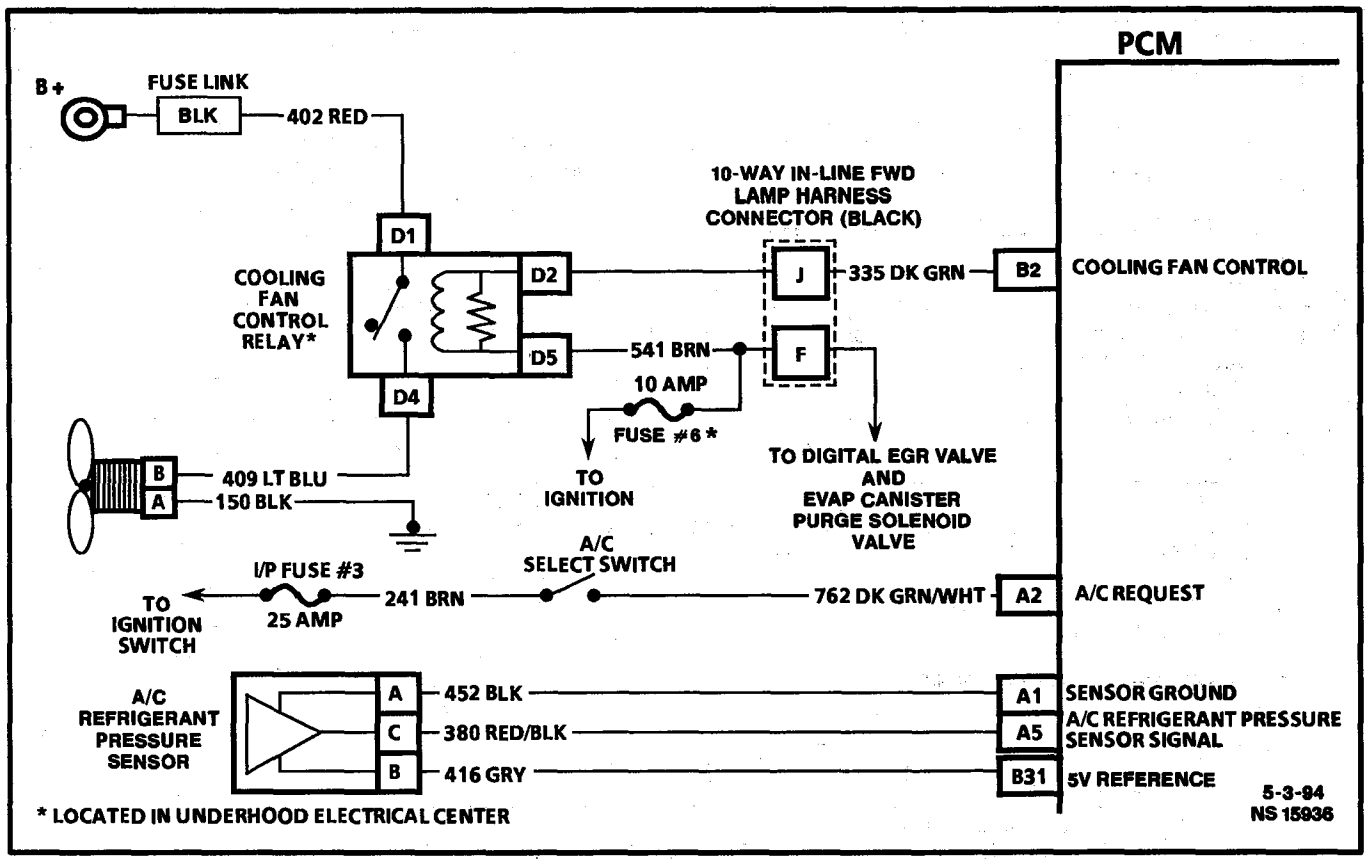


CHART C-12

(Page 2 of 2)

COOLING FAN CONTROL CIRCUIT DIAGNOSIS
3.4L (VIN S) "F" CARLINE (SFI)

Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. 12 volts should be available to CKT 541 and CKT 402 of the relay when the ignition is "ON."
2. This test checks the ability of the PCM to ground CKT 335.
3. If the fan does not turn "ON" at this point, CKT 409 or CKT 150 is open, or the cooling fan motor is faulty.

CHART C-12

(Page 2 of 2)

COOLING FAN CONTROL CIRCUIT DIAGNOSIS 3.4L (VIN S) "F" CARLINE (SFI)

FROM CHART C-12 (1 OF 2)

1. • REMOVE COOLING FAN CONTROL RELAY.
   • IGNITION "ON," ENGINE "OFF."
   • PROBE UNDERHOOD ELECTRICAL CENTER CAVITIES "D1" AND "D5" WITH A TEST LIGHT CONNECTED TO GROUND.

- LIGHT "ON" BOTH
- LIGHT "OFF" ONE OR BOTH

REPAIR OPEN OR SHORT TO GROUND IN CIRCUIT THAT DID NOT LIGHT.

2. • DIAGNOSTIC TEST TERMINAL GROUNDED.
   • PROBE CKT 335 WITH A TEST LIGHT CONNECTED TO B+.

- LIGHT "ON"
- LIGHT "OFF"

OPEN OR SHORT TO VOLTAGE IN CKT 335, OR FAULTY CONNECTION AT PCM OR A FAULTY PCM.

3. • JUMPER CAVITIES "D1" AND "D4" TOGETHER USING A FUSED JUMPER.
   • FAN SHOULD RUN. DOES IT?

- NO
- YES

FAULTY RELAY OR RELAY CONNECTION.

WITH CAVITIES STILL JUMPERED, AS ABOVE, CONNECT A TEST LIGHT ACROSS THE COOLING FAN MOTOR HARNESS CONNECTOR "A" AND "B" TERMINALS.

- LIGHT "OFF"
- LIGHT "ON"

FAULTY MOTOR.

PROBE CKT 409 ON COOLING FAN MOTOR HARNESS CONNECTOR WITH A TEST LIGHT CONNECTED TO GROUND.

- LIGHT "ON"
- LIGHT "OFF"

REPAIR OPEN IN CKT 409 BETWEEN RELAY AND COOLING FAN MOTOR.

OPEN IN GROUND CKT 150.

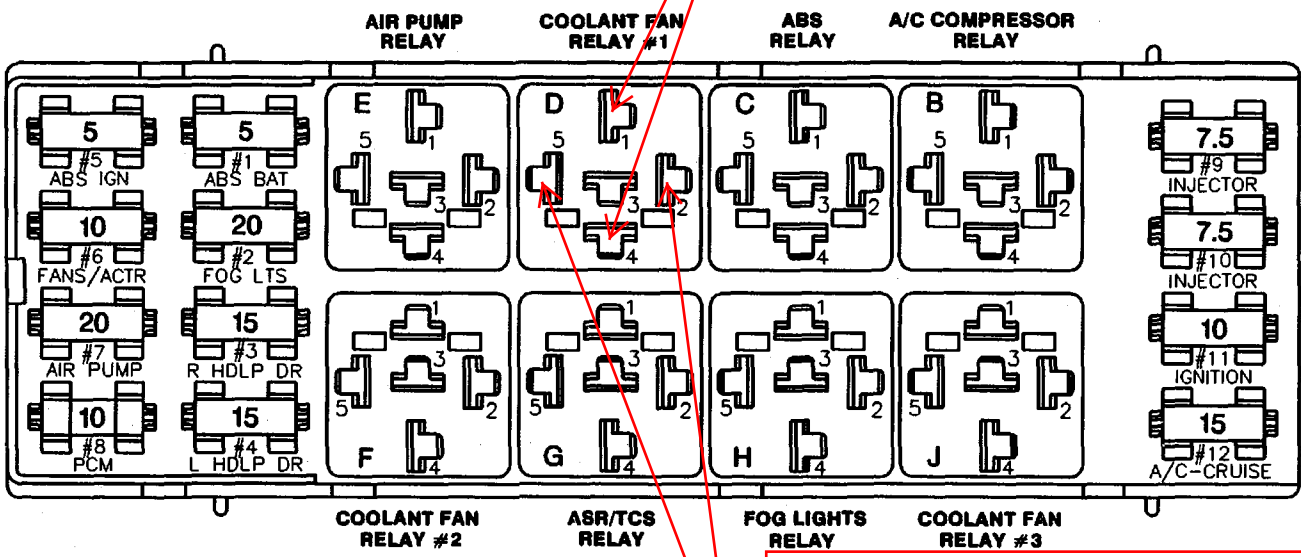
6-22-93
NS 16221

FUSE BLOCK DETAILS
UNDERHOOD ELECTRICAL CENTER

Jumping across these two terminals (D1 & D4) will energize the fan

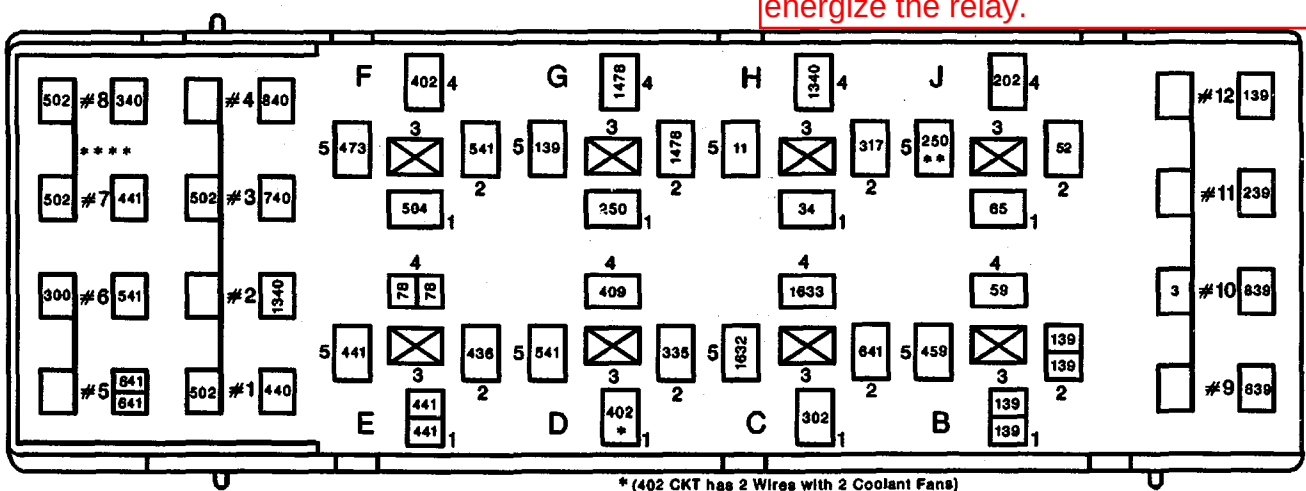
12110396
ASSEMBLY CONVENIENCE CENTER
BLK (BLOCK)

12129351
COVER CONVENIENCE CENTER
BLK (COVER)



With the Ignition On/Engine Off, A/C turned to ON, test for 12V between these two terminals, D5 & D2. If no voltage, check between D5 and body ground. Voltage between D5 & body ground and not between D5 & D2 indicates the relay is not receiving a ground from the PCM to energize the relay.

TOP VIEW



* (402 CKT has 2 Wires with 2 Coolant Fans)
** (641 CKT has 2 Wires NW9 option)
*** (139 CKT has 2 Wires without K34 option)
**** (Fuse #7and Fuse #8 are only tied together on V6 VIN S and V8 VIN P)

BACK VIEW

5-28-94
FS0028A011