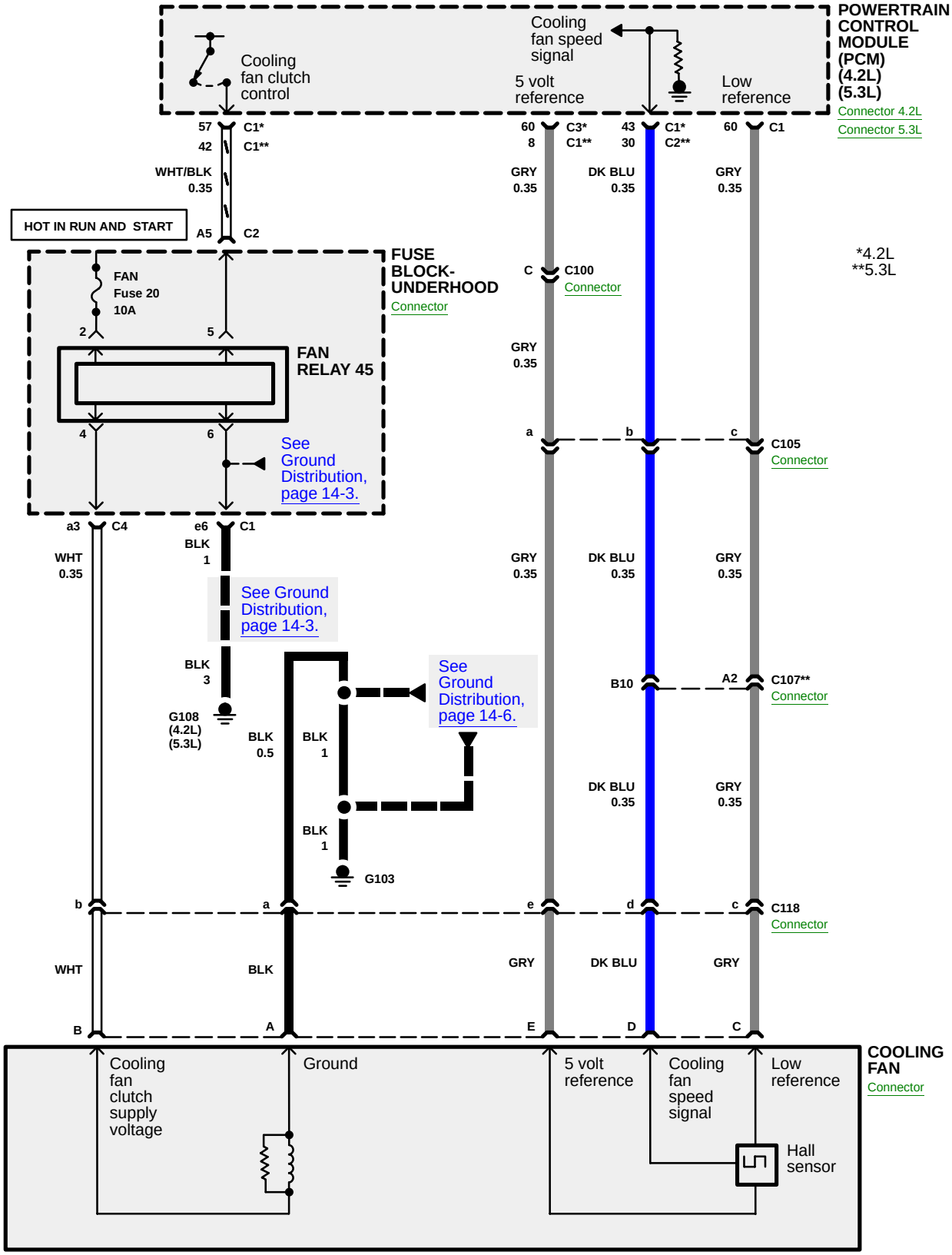
ENGINE COOLING FANS

Component Index

Cooling Fan
Fan Relay 45
Powertrain Control Module (PCM) (4.2L)
Powertrain Control Module (PCM) (5.3L)

ENGINE COOLING FANS

Circuit Schematic



ENGINE COOLING FANS

Circuit Operation

Cooling Fan Control

The purpose of the electro-viscous (EV) fan clutch is to maintain powertrain cooling requirements. The powertrain control module (PCM) monitors the following sensors to regulate the fan speed;

- Engine coolant temperature sensor
- A/C refrigerant pressure sensor
- Vehicle speed sensor
- Intake air temperature sensor
- Transmission fluid temperature sensor
- Ambient air temperature sensor

The PCM controls the electro-viscous fan clutch engagement. The PCM regulates a 12-volt pulse width modulated signal (PWM) to the cooling fan relay. The PWM signal determines the ON time of the relay. As the commanded state of the fan clutch increases, so does the ON time of the relay. This ON time directly effects the amount of time the solenoid, which is internal to the fan clutch, is energized. When the solenoid in the fan clutch is energized, it opens the spring loaded valve and allows fluid to flow from the storage chamber to the fluid coupling of the cooling fan clutch, increasing the fan speed. When the solenoid is de-energized, the spring loaded valve closes, and blocks the path of the fluid to the fluid coupling of the fan clutch, reducing fan speed.

The fan has the ability to create a feedback signal, so the PCM has an actual fan speed input. This is done with a hall effect sensor internal to the fan clutch. The PCM supplies a 5-volt reference and a low reference to the hall effect sensor. The hall effect sensor returns a signal pulse through the cooling fan speed signal circuit in response to the reluctor track passing by the magnetic field of the hall effect sensor.

The PCM commands the cooling fan to 100% under the following conditions:

- Engine coolant temperature exceeds approximately 129°C (264°F).
- The transmission oil temperature exceeds approximately 151°C (304°F).
- A/C refrigerant pressure exceeds 1655 kPa (240 psi).
- When certain DTC's set. These include P0116, P0117, P0118, P0125, P1481, P1482, and P1484.

The scan tool can engage the cooling fan clutch. This is done with the engine controls special function menu screen. To engage the cooling fan, It can take up to 2 minutes for a 100% command with the engine at 2000 RPM. The lower the engine speed, the longer it will take the fan to engage. To disengage the cooling fan, it can take up to 2 minutes with the engine at 2000 RPM. The lower the engine speed, the longer it will take to disengage. In lower ambient air temperatures the cooling fan will engage in less time, however, it will take longer to disengage due to the properties of the fluid vs. temperature.

Under certain conditions the cooling fan may be engaged at engine restart. They are as follows;

- The cooling fan was engaged at the time the engine was turned off
- The fluid may bleed from the storage chamber into the fluid coupling of the cooling fan

Although the fan is commanded off at this time due to a cold start condition. This is the most likely time a vehicle driver will notice that the fan noise is excessive compared to normal engine starts with out cooling fan engaged. As the engine speed is increased the fan noise will be louder than before. These are normal conditions that can be very intermittent.

ENGINE COOLING FANS

Component Location Index

(Refer to Section 201 for photographs.)

Component		Photo No.
Cooling Fan	Top left side of radiator fan shroud	2
Fan Relay 45	In the Underhood Fuse Block	51
Powertrain Control Module (PCM) (4.2L)	Left front of engine	5
Powertrain Control Module (PCM) (5.3L)	Left front of engine compartment	25
Connector		
C100 (4.2L) (10-BLK)	Left front of engine	5
C105 (10-BLK)	Left side of engine compartment	4
C107 (5.3L) (38-BLK)	Left rear of engine compartment	18
C118 (6-BLK)	Top left side of radiator fan shroud	2
Ground		
G103	Right rear of engine compartment	15
G108 (4.2L)	Lower left side of engine	37
G108 (5.3L)	Lower left side of engine	38