

CIRCUIT OPERATION

When all of the above conditions are met, the ground path for the air conditioning request signal is completed. The ECM then registers receipt of the request signal and will issue an Air Conditioning Grant Signal when the necessary changes have been made to idle speed. Similarly, when the Air Conditioning Request signal is removed, the ECM will delay disengagement of the compressor clutch until the correct conditions are met. The purpose of this Request/Grant process is to ensure that idle speed remains as near constant as possible during engagement & disengagement of the compressor clutch.

AIR CONDITIONING GRANT

When the GEMS ECM decides that the necessary conditions have been met to allow engagement of the Air Conditioning (A/C) Compressor Clutch, and hence, grant operation of the air conditioning system, it applies a ground (C634-1) on the black and slate wire. At the A/C harness connector (C47-4), the wire color changes to blue and black, where it continues to the Air Conditioning Compressor Clutch Relay (C60-2). The relay coil (C60-4) is fed from fuse 17 (C581-14) on a green wire when the Ignition Switch is at position II.

With the clutch relay energized, a battery feed from Fuse 16 (C581-12) passes to the compressor clutch relay (C60-1) on a brown and white wire. The feed passes to the compressor clutch (C49-1) through the closed relay contacts (C60-3) on a brown and pink wire. The compressor clutch is grounded on a black wire.

High Temperature Disable

The ECM can disable compressor clutch operation to reduce engine load during high engine temperatures. The purpose of this system is to prevent engine overheat.

When the ECM senses a high coolant temperature (above 112 deg C - 234 deg F) via the Engine Coolant Temperature (ECT) sensor (C636-14), Air Conditioning Grant is overridden by removing the ground signal from C634-1. The Air Conditioning Compressor Clutch Relay is then de-energized, disabling the Air Conditioning Compressor Clutch. This condition will remain until coolant temperature drops to acceptable levels.

CONDENSER FAN REQUEST

Operation of the condenser fan is controlled by the GEMS ECM using a Request/Grant process, similar to that used in Air Conditioning Compressor Clutch circuit. The request signal is received as a ground applied to the ECM (C636-29) through the medium pressure switch contacts in the Trinary Switch (C51-3 & C51-4). The Trinary Switch medium pressure contacts close at pressures greater than 21 Bar (305 psi) and reopen when pressure falls below 17 Bar (247 psi).

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CONDENSER FAN GRANT

On receipt of the Condenser Fan Request signal, the GEMS ECM applies a ground (C634-3) for the Condenser Fan Relay coil (C59-4). Provided that a battery feed is available at the relay coil (C59-2) from the Main Relay within the Engine Management Relay Module (C157-3), the Condenser Fan Relay will energize.

With the Condenser Fan Relay energized, a feed from Fuse 16 (C581-12) passes to the relay (C59-1) on a brown and white wire, through the closed relay contacts (C59-3) to the Condenser Fan (C48-1) on a blue and purple wire. The Condenser Fan is grounded on a black wire.

Condenser Fan - High Engine Temperature Grant

The ECM can override the Condenser Fan Request routine and operate the fan during high engine temperatures to assist engine cooling, regardless of whether the air-conditioning system is operating.

When the ECM senses a high coolant temperature (above 107 deg C - 225 deg F) via the Engine Coolant Temperature (ECT) sensor (C636-14), the ECM will provide the grant signal at C634-3, energizing the Condenser Fan Relay.

Condenser Fan - Hot Restart Grant

The ECM monitors engine coolant temperature when the engine is first switched off. If a high temperature is sensed, the ECM will continue to run the fan until temperature drops, or a pre-set time has elapsed.