



# Tech Articles

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## Air Conditioning System: Electrical

For this issue of Fiero Focus, we're going to continue our electrical circuit path discussion topic; this time of the Air Conditioning (A/C) system. The wiring for the A/C system differs depending on year and what engine your Fiero came with, so all configurations will be discussed in this article.

In all 1984 Fieros, constant battery power comes from fusible link A and travels along a large red wire to terminal E4 of the C500 connector; then continues on to terminals B2 and B3 of the ignition switch. Terminal I-3 of the ignition switch gets power only when the key is in the run position (this is known as the Ignition 3 circuit). Terminal I-3 of the ignition switch connects to one side of the following circuits in the fuse box via a large orange wire: Power Window Circuit Breaker, HTR A/C fuse, and C-H fuse. Two brown wires connect to the other side of the HTR A/C fuse, one of these wires connects to the N terminal of the Heater, Ventilation, and Air conditioning Control (HVAC) panel. The other brown wire connects to terminal N of the C203 connector and then travels out to terminal E of the A/C Compressor Clutch Relay in 84-'85 model year Fieros. When MAX A/C, NORM A/C, BI-LEVEL, or DEFROST is selected on the HVAC control panel and the ignition key is in the run position, 12v+ battery power travels out thru terminal G of the HVAC control panel connector along a light green wire to terminal A2 of the C100 connector. Connected to the other side of terminal A2 of the C100 connector in the spare tire compartment is a brown wire that connects to one terminal of the A/C pressure cycling switch, which mounts to the A/C Accumulator. The pressure cycling switch looks at the pressure in the low side of the A/C system and opens below 24 psi and closes above 48 psi. When closed, 12v+ power goes out from the switch on the light blue wire to terminal A3 of the C100 connector then to terminal D of the C203 connector. From there, it goes to both terminal A of the A/C compressor clutch relay and terminal 21 of the white ECM connector. The ECM uses this input to determine when A/C operation is "requested".

When A/C operation is requested, the ECM reads certain engine operating parameters to determine whether or not to activate the A/C compressor clutch relay (ie: RPM, coolant temp, throttle position, etc). If the ECM decides to activate the A/C relay, it will ground the dark blue wire, which connects terminal 7 of the ECM's black connector which runs to terminal C of the A/C compressor clutch relay. This turns on the relay, which closes its contacts, connecting the 12v+ power coming in from terminal E to output terminal B that connects to a dark green wire that travels through terminal K of the C203 connector and then through terminal A1 of the C500 where it travels out to the A/C compressor clutch connector. The other terminal of the A/C compressor clutch connector connects to a black wire that travels to a high pressure cut-out switch mounted on the back of the compressor that is normally closed to ground. This switch monitors the high side pressure in the A/C system and will open above about 425 psi which will cut the ground supply to the clutch circuit, deactivating the clutch to protect the system from an overpressure condition.

The A/C compressor clutch engages the A/C pulley when the electromagnet under the pulley is energized by 12v+ power and ground. Like all electromagnets, a voltage spike is produced when the circuit is de-energized (turned off), and some sort of device must be installed to absorb this spike. GM used a simple diode, which they installed in the A/C compressor clutch connector to do the job. If your diode is missing or damaged, you should replace it using a suitable replacement part. All Fiero A/C compressors used this diode. Ground supply to the A/C clutch coil is provided by either the A/C high pressure cutout switch (1984-'85 4-cylinder Fieros & 1985-'88 V6 Fieros) or an engine block ground (1986-'88 4-cylinder Fieros). 12v+ power supply to the A/C clutch coil is provided by the A/C clutch control relay's terminal B, and this is usually a dark green wire.

Nineteen eight-five and newer Fieros all have power supply to the ignition switch that comes directly from fusible link A and no longer goes thru the C500 connector like in 1984 models. The ignition switch supplies power with the key in the RUN position to the HTR A/C fuse (and other fuses) similar to 1984 models. One brown wire coming from the HTR A/C fuse connects to the same terminal (N) of the HVAC control panel in '85-'88 Fieros, the same as it did in '84 Fieros. The other brown wire coming from the HTR A/C fuse connects differently depending on

year. Starting in 1986, an A/C Power Relay was added in the circuit for the A/C Compressor Clutch (it was used in earlier Fieros but was not wired to the A/C compressor clutch circuit), and was used in all later Fieros. This relay is located in the front spare tire compartment on the right side near the blower relay and has four wires going to it. Terminal B of the HVAC control panel sends 12v+ power out when the key is in the RUN position any time the HVAC control panel is in any ON position (MAX, NORM, BI-LEV, VENT, HEAT, DEF). An orange wire connects to this terminal and travels thru the C100 connector to terminal A of the A/C power relay. One of the brown wires that comes off the HTR A/C fuse goes thru terminal D2 out to terminal E of this relay. Ground to pin C of this relay is supplied from a circuit traveling thru terminal A4 of the C100 connector. When this relay is activated, incoming power (from terminal E) is routed to terminal B, which a pink wire connects to that travels thru terminal A5 of the C100 connector where the wire changes color to black (or black/white), and then splits off to supply power to the blower motor circuit and terminal N of the C203 connector. Connected to terminal N of the C203 is a black (or black/white) wire that travels out to terminal E of the A/C Compressor Clutch relay. The A/C clutch relay may have different color wires connecting to it depending on year and engine, so always check your terminal ID letters/numbers.

The way the ECM connects to the HVAC system differs by year and engine also. The '85-'86 4-cylinder ECMs both have the A/C request (input) circuit pin located at terminal 21 of the white connector, and the A/C Compressor Clutch control (output) circuit connects to pin 7; just like in 1984 ECM applications. The 1985-'88 V6 ECMs all had the same A/C wiring connections: B8 is the A/C request input and C2 is the A/C compressor clutch relay control output. With respect to the ECM's control over the operation of the A/C clutch (and relay), all Fiero ECMs: 4-cylinder and V6, look at RPM, coolant temp, throttle position, etc. to determine when to allow for A/C clutch engagement. If certain trouble codes are set within the ECM, the A/C clutch/compressor operation may be disabled.

Nineteen eight-seven through 1988 4-cylinder Fieros saw a significant change in the way the A/C system was wired because a different ECM was used, and this ECM also controlled the operation of the radiator fan. Concerning the ECM, pin 2 (white connector) is the A/C request connection, pin 3 (black connector) is the A/C compressor clutch relay control output, and two more circuits were added: pin 24 (black connector) for A/C "on" input signal to activate the radiator fan, and pin 21 (black connector) which is the fan control output (goes to the radiator fan relay).

Nineteen eight-six through 1988 4-cylinder Fieros have a variable displacement, constant run A/C compressor. These Fieros did not have a pressure cycling switch mounted up front on the A/C accumulator, but instead had a compressor-mounted low pressure cut-out switch (opens below 8psi to prevent A/C system operation if the refrigerant leaks out) as well as the high pressure cut-out switch that all other Fiero compressors had. On these systems, when MAX A/C, NORM A/C, BI-LEV A/C, or DEF is selected on the HVAC control panel, 12v+ power is sent directly out of pin G of the HVAC control panel on a light green wire to pin A2 of the C100, changes color to light blue then loops back in to pin A3 of the C100 where the wire color changes back to light green and continues on to the A/C low pressure switch. It leaves from the other terminal of the low pressure switch as a grey wire with a red stripe where it goes into the high pressure cutout switch (and also to ECM pin 24 [black connector] in 1987-'88 4-cylinder applications). It leaves this switch on the other pin as a grey / red wire where it travels to factory splice where it splits off and changes wire color to light blue. One wire from this splice goes to pin A of the A/C compressor clutch control relay and the other goes to 1986 4-cylinder ECM pin 21 of the white connector or pin 2 (white connector) of the 1987-'88 4-cylinder ECM (which is the A/C request input). The A/C clutch control relay gets activated by the 1987-'88 4-cylinder ECM's pin 3 (black connector), which grounds the dark blue wire attached to this pin that travels out to the A/C clutch relay's terminal C. The A/C relay is the same for all Fiero applications.

If your A/C clutch does not engage, you should first check system pressure to make sure it is fully charged. Sometimes the pressure in a fully charged system will not be enough to activate the cycling pressure switch if the outside temperatures are too cold (usually below freezing). If the pressure in the system is high enough to allow for A/C operation but it is not working, check to make sure you have 12v+ power coming from the HVAC control panel to all of the switches, relays, and ECM terminals discussed in this article. If that checks out, see if the ECM is providing a ground to the A/C clutch control relay pin C. If so, the relay should be on, which should route 12v+ incoming power from terminal E to output terminal B where it should travel along the dark green wire to the A/C clutch coil connector. Check to make sure the other pin of this connector is getting a good ground signal; either from the wiring harness or from the A/C high pressure cutout switch (whichever method is used in your particular Fiero). If the A/C clutch coil is getting power and ground and is not engaging, then either it is probably bad and will require replacement; or there is a problem with the clutch itself preventing it from being "pulled in" so it can engage with the pulley when the coil is energized.