

A/C COMPRESSOR CLUTCH CONTROLS

1998 Pontiac Bonneville

1998 AIR CONDITIONING & HEAT
General Motors Corp. - A/C Compressor Clutch Controls

Buick; LeSabre
Oldsmobile; Eighty Eight
Pontiac; Bonneville

DESCRIPTION & OPERATION

A/C COMPRESSOR CLUTCH CONTROLS

To provide improved idle quality, improved Wide Open Throttle (WOT) performance and A/C system protection, the compressor clutch is controlled by PCM.

For proper control of cooling fans, compressor clutch and Idle Air Control (IAC) valve, a refrigerant pressure sensor is used. PCM uses signal provided by sensor to monitor high and low side refrigerant pressures. If PCM detects a fault in refrigerant pressure circuit, compressor clutch will be disabled.

The A/C clutch relay is controlled by PCM. This allows PCM to raise idle speed before engaging compressor clutch, or disable compressor clutch during WOT, high engine RPM, high power steering loads and hot engine restarts. PCM also disables compressor clutch if coolant temperature becomes excessive.

NOTE: This article ONLY contains those testing procedures required to test A/C compressor clutch control circuit. Other diagnostic information may be referenced while performing A/C compressor clutch control diagnosis. For complete information on General Motors Computerized Engine Control systems, see ENGINE PERFORMANCE section.

A/C CLUTCH RELAY LOCATION TABLE

Application	Location
Bonneville, Eighty-Eight & Lesabre	Center Rear Of Engine Compartment, Below Right Side Maxi-Fuse Block

A/C CLUTCH CIRCUIT DIAGNOSIS

To help save diagnostic time, ALWAYS check for blown fuses or fusible links before proceeding with any testing. If fuses are blown, locate and repair short circuit before replacing fuses.

Ensure all related relay and wire harness connections are clean and tight. Repair as necessary. See WIRING DIAGRAMS.

WARNING: Vehicles may be equipped with a PCM using an Electronically Erasable Programmable Read Only Memory (EEPROM). When replacing PCM, the new PCM must be programmed.

NOTE: Body Function Controller (BFC) may also be known as Body Control Module (BCM).

Description

When A/C mode is selected, a 12-volt signal is supplied to the A/C request input terminal of PCM. A/C clutch relay is controlled

through PCM which also monitors A/C refrigerant pressure. If A/C refrigerant pressure and engine operating conditions are within a specific calibrated acceptable range, PCM will enable A/C clutch relay. This is done by providing a ground path for A/C clutch relay coil through PCM. When A/C clutch relay is enabled, battery voltage is supplied to compressor clutch coil.

PCM will enable compressor clutch whenever engine is running and A/C has been requested, unless:

- * Throttle angle is greater than 90 percent.
- * A/C head pressure is greater than 414 psi (29.1 kg/cm²).
- * A/C head pressure is less than 35 psi (2.5 kg/cm²).
- * Ignition voltage is less than 10.5 volts.
- * Engine speed is greater than 4500 RPM for 5 seconds.
- * Engine coolant temperature is greater than 257°F (125°C).
- * Intake air temperature is less than 41°F (5°C).

Diagnosis

1) If On-Board Diagnostic (OBD) System Check has not been performed, see OBD SYSTEM CHECK in G - TESTS W/CODES article in ENGINE PERFORMANCE. If OBD SYSTEM CHECK has been performed, go to next step.

2) Check for any DTCs that may be set. If any DTCs are set, perform diagnosis for that DTC first. See G - TESTS W/CODES article in ENGINE PERFORMANCE. If no DTCs are set, go to next step.

3) Ensure intake air temperature is greater than 48°F (9°C). Ensure engine coolant temperature is less than 246°F (119°C). Turn A/C off. Start engine and let idle. Observe compressor clutch. If compressor clutch is engaged, go to step 21). If compressor clutch is not engaged, go to next step.

4) Run engine at 1000-1500 RPM. Select A/C mode on A/C control panel. Observe compressor clutch. If compressor clutch is engaged, system is operating correctly. Problem may be intermittent. See DIAGNOSTIC AIDS. If compressor clutch is not engaged, go to next step.

5) With A/C mode still selected, observe A/C REQUEST display on scan tool. If A/C REQUEST displays YES, go to step 9). If A/C REQUEST does not display YES, go to next step.

6) Turn ignition off. Disconnect PCM harness connectors. Turn ignition on. With A/C mode still selected, use a DVOM and measure voltage on A/C request circuit (Light Green wire or Dark Green/White wire) at PCM harness connector. If reading is near battery voltage, go to step 8). If reading is not as specified, go to next step.

7) Check A/C request circuit (Light Green wire or Dark Green/White wire) for an open, short to ground or poor connection at A/C control panel. Repair as necessary. Go to step 37). If no problem is found, diagnose A/C controls. See appropriate A/C-HEATER SYSTEM article:

- * A/C-HEATER SYSTEM - MANUAL - Bonneville & Eighty Eight
- * A/C-HEATER SYSTEM - AUTOMATIC - Bonneville
- * A/C-HEATER SYSTEM - MANUAL - Lesabre
- * A/C-HEATER SYSTEM - AUTOMATIC - Lesabre

8) Check A/C request circuit (Dark Green/White wire) for a poor connection at PCM. Repair as necessary. Go to step 37). If no problem is found, go to step 35).

9) Observe A/C pressure sensor display on scan tool. If reading is .35-4.27 volts, go to step 12). If reading is not as specified, go to next step.

10) Install A/C manifold gauge set. Observe high-side refrigerant pressure on gauge. If high-side refrigerant pressure is 34-414 psi (2.3-29 kg/cm²), go to next step. If high-side refrigerant pressure is not as specified, charge A/C system using approved A/C

refrigerant recovery/recycling equipment.

11) Turn ignition off. Disconnect PCM and A/C pressure sensor harness connectors. Using a DVOM, measure resistance of the following circuits between PCM and A/C pressure sensor harness connectors:

- * A/C pressure sensor signal circuit.
- * 5-volt reference "B" circuit.
- * Sensor ground circuit.

If any resistance is greater than 5 ohms, locate and repair cause of high resistance in circuit as necessary, then go to step 37). If no resistance is greater than 5 ohms, go to step 18).

12) Disconnect A/C clutch relay harness connector. Using a test light connected to ground, probe ignition feed circuits (Pink wires) at A/C clutch relay harness connector. If test light illuminates, go to next step. If test light does not illuminate, go to step 31).

13) Connect a fused jumper between ignition feed circuit and compressor clutch battery feed circuit (Dark Green wire) at A/C clutch relay harness connector. If compressor clutch engages, go to step 14). If compressor clutch does not engage, leave jumper wire in place and go to step 15).

14) Check for poor connections at A/C clutch relay. Repair as necessary. Go to step 37). If no problem is found, go to step 32).

15) Disconnect compressor clutch harness connector. Connect a test light between compressor clutch battery feed circuit (Dark Green wire) and compressor clutch ground circuit (Black wire). If test light illuminates, go to next step. If test light does not illuminate, go to step 17).

16) Check for poor connections at compressor clutch. Repair as necessary. Go to step 37). If no problem is found, go to step 33).

17) Check for an open or short to ground in compressor clutch battery feed circuit (Dark Green wire). Repair as necessary. Go to step 37). If no problem is found, go to step 34).

18) Leave PCM and A/C pressure sensor harness connectors disconnected. Turn ignition on. Using a DVOM, measure voltage between A/C pressure sensor signal circuit (Red/Black wire) and ground. If reading is near zero volts, go to next step. If reading is not as specified, go to step 20).

19) Check for the following conditions:

- * 5-volt reference "B" circuit for a poor connection at PCM.
- * 5-volt reference "B" circuit (Gray wire) for a poor connection at A/C pressure sensor.
- * A/C pressure sensor signal circuit for a poor connection at PCM.
- * A/C pressure sensor signal circuit for a poor connection at A/C pressure sensor.
- * Sensor ground circuit for a poor connection at A/C pressure sensor.

Repair as necessary and go to step 37). If no problem is found, go to step 36).

20) Locate and repair short to power in A/C pressure signal circuit (Red/Black wire). Go to step 37).

21) Turn ignition on, A/C off. Observe A/C REQUEST on scan tool display. If A/C REQUEST displays YES, go to next step. If A/C REQUEST does not display YES, go to step 24).

22) Turn ignition off. Disconnect PCM harness connectors. Turn ignition on, A/C off. Using a DVOM, measure voltage between ground and A/C request circuit (Light Green wire or Dark Green/White wire) at PCM harness connector. If reading is near battery voltage, go to next step. If reading is not as specified, go to step 35).

23) Turn ignition off. Disconnect A/C control head/programmer harness connectors. Turn ignition on. Using a DVOM, check A/C request circuit for a short to power. Repair as necessary. Go to step 37). If no problem is found, diagnose A/C controls. See appropriate A/C-HEATER SYSTEM article:

- * A/C-HEATER SYSTEM - MANUAL - Bonneville & Eighty Eight
- * A/C-HEATER SYSTEM - AUTOMATIC - Bonneville
- * A/C-HEATER SYSTEM - MANUAL - Lesabre
- * A/C-HEATER SYSTEM - AUTOMATIC - Lesabre

24) Disconnect A/C clutch relay. Start engine and observe compressor clutch. If compressor clutch is engaged, go to step 29). If compressor clutch is not engaged, go to next step.

25) Using a test light connected to ground, probe A/C compressor clutch ignition feed circuit (Dark Green wire) at A/C relay harness connector. If test light comes on, go to step 27). If test light does not come on, go to next step.

26) Replace A/C clutch relay. Go to step 37).

27) Turn ignition off. Disconnect PCM harness connectors. Using a test light connected to battery positive, probe A/C clutch relay control circuit (Dark Green/White wire) at PCM harness connector. If test light comes on, go to next step. If test light does not come on, go to step 35).

28) Repair short to ground in A/C clutch relay control circuit (Dark Green/White wire). Go to step 37).

29) Turn ignition off. Disconnect compressor clutch harness connector. Start engine and observe compressor clutch. If compressor clutch is engaged, go to step 33). If compressor clutch is not engaged, go to next step.

30) Locate and repair short to power in compressor clutch battery feed circuit (Dark Green wire). Go to step 37).

31) Repair open or short to ground in appropriate ignition feed circuit (Pink wire) to A/C clutch relay. Go to step 37).

32) Replace A/C clutch relay. Go to step 37).

33) Repair compressor clutch or replace compressor clutch coil. Go to step 37).

34) Locate and repair open in compressor clutch ground circuit (Black wire). Go to step 37).

35) Replace PCM. Go to step 37).

36) Replace A/C pressure sensor. Go to step 37).

37) Ensure intake air temperature is greater than 48°F (9°C). Ensure engine coolant temperature is less than 246°F (119°C). With A/C off, start engine and let idle. Observe compressor clutch. If compressor clutch is engaged, go to step 21). If compressor clutch is not engaged, go to next step.

38) Run engine at 1000-1500 RPM. Select A/C mode on control panel. Observe compressor clutch. If compressor clutch is engaged, system is okay. If compressor clutch is not engaged, go to step 5).

Diagnostic Aids

Check for poor harness connections at PCM and A/C control head. Inspect for corrosion, backed-out terminal pins and broken wires inside insulation. Check for damaged wire harness. If harness and connections are okay, disconnect PCM harness connectors. Connect a DVOM between ground and A/C clutch relay control circuit at PCM harness connector. Turn ignition on. Observe DVOM while wiggling harness and connectors. A change in voltage indicates location of fault.

A/C refrigerant pressure less than 35 psi (2.5 kg/cm²), or greater than 414 psi (29.1 kg/cm²) will cause PCM to disable compressor clutch. With engine running and A/C on, use scan tool to monitor A/C high-side system pressure for 2 minutes. If pressure goes

out of range, diagnose A/C-heater system. See appropriate A/C-HEATER SYSTEM article:

- * A/C-HEATER SYSTEM - MANUAL - Bonneville & Eighty Eight
- * A/C-HEATER SYSTEM - AUTOMATIC - Bonneville
- * A/C-HEATER SYSTEM - MANUAL - Lesabre
- * A/C-HEATER SYSTEM - AUTOMATIC - Lesabre

WIRING DIAGRAMS

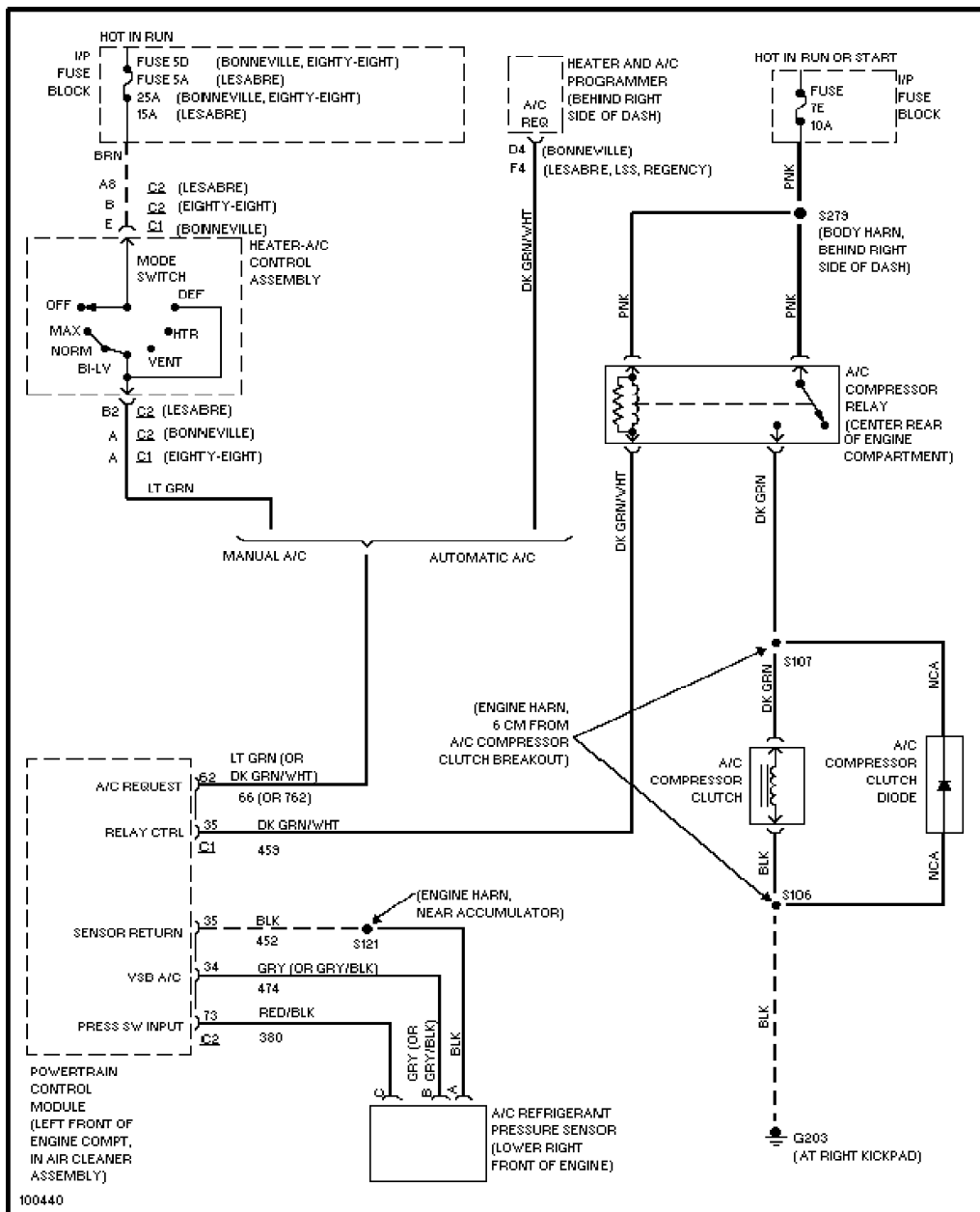


Fig. 1: A/C Compressor Clutch Control Circuit Wiring Diagram