

# ALTERNATOR & REGULATOR - SELF-DIAGNOSIS

## Article Text

1995 Cadillac Concours  
For Ace Mechanics 123 Main Street San Diego Ca 92126  
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Friday, November 28, 2003 07:31PM

### ARTICLE BEGINNING

#### 1995 STARTING & CHARGING SYSTEMS

General Motors Corp. - Alternators & Regulators

Cadillac 4.6L: Concours, Eldorado, Seville

**NOTE:** This article covers the electronic Powertrain Control Module (PCM) portion of the charging system. For bench testing information and overhaul procedures, see the ALTERNATOR & REGULATOR - TESTING & OVERHAUL article.

### DESCRIPTION

The CS144, 140-amp generator is used along with the Instrument Panel Cluster (IPC) and Powertrain Control Module (PCM). CS stands for charging system; 144 denotes the outside diameter (in millimeters) of the generator stator laminations.

The generator and related charging system circuitry has self-diagnostic capability. A communication process has been incorporated between the IPC, PCM and CS144 generator. When the generator circuit voltage passes outside of programmed limits (10-16 volts), Codes I041, I042 and/or P016 will set. The malfunction may also be indicated by BATTERY VOLTS LOW, BATTERY VOLTS HIGH or SERVICE ENGINE SOON message on the Driver Information Center (DIC). Codes I041, I042 and P016 will remain in PCM memory until cleared. See MANUAL OPERATION OF SELF-DIAGNOSTICS under SELF-DIAGNOSTICS.

The IPC will also cause BATTERY NO CHARGE message to be displayed on DIC if the generator regulator internally grounds the "L" terminal. The PCM will set Code P110.

The voltage regulator is enclosed in a solid mold, mounted inside the generator. A capacitor, mounted in the end frame, protects the rectifier bridge from high voltage and suppresses radio noise.

### OPERATION

The voltage regulator controls the field using a Pulse Width Modulated (PWM) signal, measured in duty cycles. A PWM signal continuously cycles on and off. On-time can vary within each cycle.

When the ignition switch is turned to the RUN position, the PCM applies voltage to the regulator before engine is started. The regulator, now in field strobe function, applies a small percentage of the duty cycle to the field windings, which produce a magnetic field. As generator RPM increases, the field strobe function is disabled and normal regulation occurs.

When field current is on, the regulator switches the field current on and off at a fixed frequency of about 400 cycles per

second. By varying the overall time on and off, correct average field current for proper system voltage control is achieved. At high speeds, the on-time may be 10 percent. At low speeds with a heavy electrical load, the on-time may be as much as 90 percent.

The PCM monitors the regulator from the "L" terminal of the generator. The regulator will internally ground the "L" terminal when it detects an internal fault. When this ground condition is sensed, the IPC will cause BATTERY NO CHARGE message to be displayed on DIC. The PCM will set Code P110.

## SELF-DIAGNOSTICS

**NOTE:** Vehicle is equipped with elaborate self-diagnostics which covers many on-vehicle systems. This article only covers the portion of those systems which relates to charging system diagnosis.

**CAUTION:** Accessing self-diagnostics for 30 minutes without running engine will discharge battery, resulting in a possible no-start condition. To ensure proper operation, attach battery charger to battery.

## ENTERING SELF-DIAGNOSTICS

**NOTE:** Diagnosis should not be attempted unless all IPC segments illuminate, as it could lead to misdiagnosis. If any segment is inoperative, affected display panel should be replaced.

1) Turn ignition on. Simultaneously push OFF and WARMER buttons on Climate Control Center (CCC). Continue pushing OFF and WARMER buttons until segment check appears (about 3 seconds) on Instrument Panel Control (IPC).

**NOTE:** Failure of any segment to glow may result in inaccurate test results. Replace any inoperative segment display before proceeding with self-diagnostic process.

2) When segment check appears (all segments glow), system has entered into self-diagnostic mode. Release both buttons. Driver Information Center (DIC) will display diagnostic trouble codes. Diagnostic trouble code level displays PCM codes first, followed by IPC, ACP, SIR and TCS codes (if so prompted).

3) To proceed to desired level, press and release CCC HI (fan up) button for "yes" or LO (fan down) button for "no". Press LO button to go to next test level (i.e., IPC?, ACP?, SIR? or TCS?) or press OFF button to return to next selection in previous test level.

4) At any time during display of diagnostic trouble codes, system will exit self-diagnostic service mode and return to normal. **ALTERNATOR & F**

vehicle operation if AUTO or DEFOG button on CCC is pressed.

#### DISPLAYING TROUBLE CODES

1) After self-diagnostics is entered, any diagnostic trouble code stored in memory will be displayed. Diagnostic trouble codes appear in ascending (3-digit) numerical order and are prefixed by "P" (PCM), "I" (IPC), "A" (ACP), "R" (SIR) or "T" (TCS). A final digit of either a "C" (current) or "H" (history)" will also be indicated on every code. Diagnostic trouble code level displays PCM codes first, followed by IPC, ACP, SIR or TCS (if so prompted).

2) If no codes are present for a system, a "NO X CODE" message (with X being system, i.e. "P", "I", etc.) will be displayed. If communication line to a component is not operating, a "NO X DATA" message will be displayed, indicating that IPC could not communicate with that system.

3) At any time during display of diagnostic trouble codes, to exit from service mode and go back to normal vehicle operation, press AUTO or DEFOG button on CCC.

#### PCM CHARGING SYSTEM TROUBLE CODES

- \* Code P016  
This code sets if generator voltage measured is less than 10 volts or greater than 16 volts for more than 5 seconds and engine speed is equal to or greater than 500 RPM.
- \* Code P110  
This code sets if PCM commands generator on and generator feedback indicates that it is off for 15 seconds.

NOTE: After system completes diagnostic trouble code display cycle, system can test charging system components and/or circuitry indicated by trouble codes. See MANUAL OPERATION OF SELF-DIAGNOSTICS under SELF-DIAGNOSTICS.

#### IPC CHARGING SYSTEM TROUBLE CODES

- \* Code I041  
This code sets when engine is running at a speed greater than 800 RPM and IPC voltage is less than 10.6 volts for more than 2 seconds.
- \* Code I042  
This code sets when engine is running at a speed greater than 800 RPM and IPC voltage is greater than 16 volts for more than 2 seconds.

Code I041 will cause BATTERY VOLTS LOW message to be displayed. Code I042 will cause BATTERY VOLTS HIGH message to be displayed. IPC will cause message BATTERY NO CHARGE to be displayed if **ALTERNATOR**

generator regulator internally grounds terminal "L". The PCM will set Code P0110.

#### MANUAL OPERATION OF SELF-DIAGNOSTICS

NOTE: Manual operation of self-diagnostic system is intended for use with TROUBLE CODE CHARTS. Before using flow charts, become completely familiar with procedures in MANUAL OPERATION OF SELF-DIAGNOSTICS.

##### Making Selection Choices

During manual operating mode of self-diagnostics, buttons on CCC function in following manners:

- \* LO  
LO button is used to cycle through selection choices. In all instances, continued use of this button will cause choices to repeatedly cycle through all available choices.
- \* HI  
HI button is used to confirm system/test selection choices. Press this button when desired test or system is displayed.
- \* OFF  
OFF button is used to back up (or escape) during selection process. Continued pressing of this button will back up manual operating mode to display of diagnostic trouble codes.
- \* AUTO or DEFOG  
AUTO or DEFOG button may be pressed at any time during display of diagnostic trouble codes or manual operating mode to exit self-diagnostics service mode and return to normal vehicle operation.

##### System Selection

1) After all trouble codes have been displayed (see DISPLAYING TROUBLE CODES under SELF-DIAGNOSTICS), each available system can be accessed for further specific diagnostic tests. First system available for testing automatically displays. For example: PCM? should now be present on display.

2) Pressing HI button on CCC will select displayed system for testing. Pressing LO button on CCC will display next available system selection.

3) This allows display to be cycled through all system choices. List of systems will be repeated following end of system list. Pressing OFF button on CCC will stop system selection process and return display to beginning of diagnostic trouble code sequence.

NOTE: Test type selections are also available for Instrument Panel Cluster (IPC) and are preceded with IPC (i.e. IPC DATA?, IPC INPUTS?).

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### Test Type Selection

After a specific system has been selected for testing, select desired test type. Available test types include PCM DATA?, PCM INPUTS?, PCM OUTPUTS?, PCM OVERRIDE?, PCM CLEAR CODES? and PCM SNAPSHOT?. System may now display any of these 6 test types:

- \* PCM DATA?  
PCM DATA selection allows viewing of inputs PCM uses to control powertrain functions. Each data parameter is displayed on the DIC and is the actual value, not default value of PCM.
- \* PCM INPUTS?  
PCM INPUT selection provides testing of switches that input to PCM. Input status is shown on display as HI or LO. Input cycle status is shown as "0" until PCM sees input cycled from LO to HI, or HI to LO since selected input was first displayed. After PCM has seen input cycle, status then changes from "0" to "X", indicating input being tested has cycled and passed the input test.
- \* PCM OUTPUTS?  
PCM OUTPUTS selection provides ability to cycle PCM -controlled outputs. DIC display identifies solenoid or relay, and state PCM is commanding that device. HI indicates solenoid or relay is energized, and LO indicates solenoid or relay is de-energized. PCM OUTPUT tests can only be performed with engine not running.
- \* PCM OVERRIDES?  
PCM OVERRIDES selection performs 2 functions. First, it displays a component's current operational status as a percentage of its full range. Second, it permits a component's present functional status to be overridden and controlled by technician. This is represented as an override percentage from zero to 99.
- \* PCM CLEAR CODES?  
When PCM CLEAR CODES selection is chosen, PCM will clear all stored PCM diagnostic trouble codes. PCM CLEAR CODES selection displays PCM CODES CLEAR after diagnostic trouble codes are erased.
- \* PCM SNAPSHOT?  
PCM SNAPSHOT selection recalls all data and input values for selected system from a specific point in time. These values may be retrieved for either a snapshot which was manually triggered by technician, a snapshot prompted by the customer during condition or a snapshot stored during setting of a diagnostic trouble code (referred to as a code-set snapshot).

1) Following system (PCM?, IPC?, etc.) and test type selection (PCM DATA?, PCM INPUT?, PCM OVERRIDES?, etc.), first of many specific tests becomes available for selection. Characters of display represent a specific test code.

2) First 2 characters of test code are letters which identify both system and test type selected. For example: if PCM? system and PCM DATA? test type are selected, PD are first 2 characters of display. PD stands for PCM DATA. Last 2 characters numerically identify specific test selection. For example: PD10 designates PCM/PCM DATA/FUEL PUMP FEEDBACK VOLTAGE. Current battery voltage will be displayed on Driver Information Center (DIC).

3) Pressing HI button on CCC will display next higher test number for selected test type. If this button is pressed with highest test number displayed, display will cycle to lowest test number.

4) Pressing LO button on CCC will display next lower test number for selected test type. If this button is pressed with lowest test number displayed, display will cycle to highest test number.

5) Pressing OFF button on CCC will stop specific test selection process and return display to next available test type for selected system. Pressing OFF button on CCC a second time will stop test type selection process and return display to beginning of system selection sequence.

## PCM OVERRIDES

1) PCM OVERRIDES selection displays a component's current operation status, represented as a percentage of its full range. PCM OVERRIDES selection also permits a component's present functional status to be overridden and controlled by technician. To enter PCM OVERRIDES:

- \* Enter self-diagnostics by pressing OFF and WARMER buttons on CCC.
- \* After segment check has occurred and all stored diagnostic trouble codes have been displayed, select PCM? system for testing by pressing HI button on CCC when PCM? is displayed as system choice.
- \* Cycle through test types by pressing LO button on CCC. Select PCM OVERRIDES? test type by pressing HI button on CCC with PCM OVERRIDES? displayed as test type choice.

2) After selecting PCM OVERRIDES?, select a specific test by scrolling through available override tests using LO button on CCC.

3) Display now alternates between selected system's present operating specification and normal specification for system. All values for comparison are displayed on CCC.

4) With selected override test displayed, pressing WARMER or COOLER button on CCC begins over ~~ALTERNATOR & REGULATOR SELF-DIAGNOSIS~~ Article Te

stopping alternating display of present and normal system operating values. Pressing WARMER button increases a value. Pressing COOLER button decreases a value.

5) Upon releasing WARMER or COOLER button, display may remain at an override value or automatically return to normal program control. If display remains at override value, normal program control resumes by:

- \* Selecting another PCM OVERRIDES? test using LO button on CCC, canceling current override.
- \* Selecting another system by pressing OFF button and then HI or LO button on CCC, canceling current override.
- \* Overriding a value beyond extremes (zero or 99) will display "--" momentarily and then jump to opposite extreme. If button is released while "--" is displayed, normal program control resumes.

NOTE: While in PCM OVERRIDE?, another test type within selected system may also be active. After selecting a PCM OVERRIDES? test, press OFF button to select another test type. CCC, however, continues to display selected override. Pressing WARMER or COOLER button allows monitoring effect of PCM OVERRIDES? on different vehicle parameters.

#### PCM SNAPSHOT

1) PCM SNAPSHOT is used to assist in the diagnosis of intermittent or unrepeatable malfunctions. PCM SNAPSHOT recalls system operating specifications present at exact time a PCM malfunction code was set. PCM SNAPSHOTS are taken when most codes are set, when prompted by the customer during condition or when TAKE PCM SNAPSHOT? is selected during self-diagnostics. Snapshot data will be saved to PCM memory for the 3 most recent codes set. To enter PCM SNAPSHOT:

- \* Enter self-diagnostics by pressing OFF and WARMER buttons on CCC.
- \* After segment check of IPC and all diagnostic trouble codes are displayed, cycle through system choices by pressing LO button on CCC. Select PCM? system for testing by pressing HI button on CCC when PCM? is displayed as system choice.
- \* Cycle through test choices using LO button on CCC. Select PCM SNAPSHOT? test type by pressing HI button on CCC when PCM SNAPSHOT? is displayed as test choice.

2) Immediately following selection of PCM SNAPSHOT?, system displays PXXX SNAPSHOT. PXXX represents diagnostic trouble code which triggered storing of snapshot. Code-set snapshot will appear first in order the codes were set with most recent code first. This snapshot

may be selected by pressing HI button on CCC. Pressing LO button will cycle to TAKE PCM SNAPSHOT?. See MANUAL PCM SNAPSHOT for TAKE PCM SNAPSHOT? procedures. If P001 SNAPSHOT is displayed, customer has manually recorded snapshot data to memory during driving condition. See CUSTOMER PCM SNAPSHOT.

3) Once snapshot selection is made, PXXX DATA is displayed. Press HI button to choose this snapshot option or press LO button to cycle to PXXX INPUTS. Press HI button to choose this snapshot option or press LO button to return to PXXX DATA. Continue selection process until all available stored codes with snapshot information (DATA and INPUTS) are displayed (3 maximum).

#### CUSTOMER PCM SNAPSHOT

1) A PCM snapshot can be recorded by the customer during the driving condition by simultaneously pressing the OFF and FRONT DEFROST buttons on the CCC. The customer by taking a snapshot during the driving condition can alleviate the problem of trying to reproduce the driving condition by the technician. To record a customer PCM snapshot:

- \* With ignition on and vehicle not in self-diagnostic mode, during driving condition, press OFF and FRONT DEFROST buttons on CCC simultaneously for one second.
- \* Malfunction Indicator Light (MIL) (SERVICE ENGINE SOON light) will illuminate for 2 seconds to confirm snapshot data has been recorded.

2) Customer snapshot will be overwritten if another customer snapshot is recorded or if a PCM snapshot is taken while in self-diagnostics. Enter self-diagnostics and read customer PCM snapshot data. To enter PCM SNAPSHOT:

- \* Enter self-diagnostics by pressing OFF and WARMER buttons on CCC.
- \* After segment check of IPC and all diagnostic trouble codes are displayed, cycle through system choices by pressing LO button on CCC. Select PCM? system for testing by pressing HI button on CCC when PCM? is displayed as system choice.
- \* Cycle through test choices using LO button on CCC. Select PCM SNAPSHOT? test type by pressing HI button on CCC when PCM SNAPSHOT? is displayed as test choice.

3) Immediately following selection of PCM SNAPSHOT?, system displays P001 SNAPSHOT. P001 represents snapshot data that customer manually recorded to memory during driving condition. This snapshot may be selected by pressing HI button on CCC. Pressing LO button will cycle to TAKE PCM SNAPSHOT?. See MANUAL PCM SNAPSHOT for TAKE PCM ALTERNATO

## SNAPSHOT? procedures.

4) Once snapshot selection is made, P001 DATA is displayed. Press HI button to choose this snapshot option or press LO button to cycle to P001 INPUTS. Press HI button to choose this snapshot option or press LO button to return to P001 DATA.

## MANUAL PCM SNAPSHOT

1) If no code-set or customer snapshots are available, or stored code with snapshot and customer snapshot information is bypassed, TAKE PCM SNAPSHOT? will be displayed. A manually triggered snapshot may be taken by pressing HI button.

2) This will result in SNAPSHOT TAKEN being displayed. After a snapshot has been taken, display will change to PCM SNAP DATA.

3) Pressing HI button on CCC will select data values for snapshot. Display is now controlled as it would be for non-snapshot data displays. All values represent memorized vehicle conditions.

4) Pressing LO button on CCC will cycle to PCM SNAP INPUTS. Pressing HI button on CCC will select snap input values to be displayed. Pressing LO button on CCC will cycle back to PCM SNAP DATA.

## EXITING SELF-DIAGNOSTICS

To exit self-diagnostics and return to normal system operation, press AUTO or DEFOG button on CCC, or turn ignition off. Diagnostic trouble codes will not be erased.

## GENERATOR NOISE DIAGNOSIS

Generator noise may be caused by a loose drive pulley, loose mounting bolts, worn or dirty bearings, defective diode, or defective stator. It is normal to hear a high frequency whine or magnetic noise at full output. An output test should be performed to distinguish bearing noise from a magnetic noise. See GENERATOR FUNCTIONAL CHECK.

A shorted bridge diode will reduce output by 1/3 of the rating and will have a growling noise when at high load. Listening to generator with a moderate load (engine cooling fans or headlights on) can also assist in determining if a bearing or magnetic noise is present.

## GENERATOR FUNCTIONAL CHECK

1) Ensure battery is good and fully charged. If messages or codes are present, perform MESSAGE DIAGNOSIS chart or appropriate diagnostic trouble code chart. See TROUBLE CODE CHARTS. If no messages or codes are present, check connections at battery and generator. Repair as necessary. Turn off all electrical loads. Connect voltmeter to generator output. Run engine at 2500 RPM for 30 seconds. Check **ALTERNATOR**

voltage output.

2) With engine at normal operating temperature, voltage should be 13-15 volts. With cold engine, voltage should be 14-16 volts. If voltage is not as specified, replace generator. If voltage is as specified, connect inductive ammeter to battery charging cable from generator at underhood junction block. Connect carbon pile (VAT 40) across battery.

3) Run engine at 2500 RPM. Adjust carbon pile to obtain maximum output from generator. If value is within 15 amps of rated output, generator is okay. If value is not within 15 amps of rated output, replace generator.

## BENCH TESTING

See ALTERNATOR & REGULATOR - TESTING & OVERHAUL article.

## OVERHAUL

See ALTERNATOR & REGULATOR - TESTING & OVERHAUL article.

## TROUBLE CODE CHARTS

MESSAGE DIAGNOSIS (BATTERY NO CHARGE, BATTERY VOLTS HIGH/  
LOW OR SERVICE ENGINE SOON MESSAGE)

### Battery Message Diagnosis

The generator voltage regulator will ground the "L" terminal when a fault is detected. When the PCM detects the ground, the generator BATTERY NO CHARGE message is commanded on. The message is displayed when the following conditions are detected.

- \* Open rotor or field control circuit.
- \* Output voltage too high or too low.
- \* Shorted positive or negative bridge diode at the regulator phase terminal.
- \* Open internal phase connection at the regulator phase terminal.

BATTERY VOLTS LOW, BATTERY VOLTS HIGH and SERVICE ENGINE SOON messages are turned on when the PCM or IPC detect abnormal system voltages.

### Note On Message Diagnosis

NOTE: Test numbers refer to numbers on diagnostic chart.

1) Always diagnose Codes I041 and I042 before performing **ALTERNATOR**

**BATTERY OVERCHARGED/UNDERCHARGED** chart. Codes I041 and I042 will check IPC's ability to detect generator faults and to control generator operation.

2) IPC monitors Red wire circuit between IPC and generator for opens or shorts to ground. BATTERY NO CHARGE message will be commanded on by PCM when a fault is detected for 2 or more seconds.

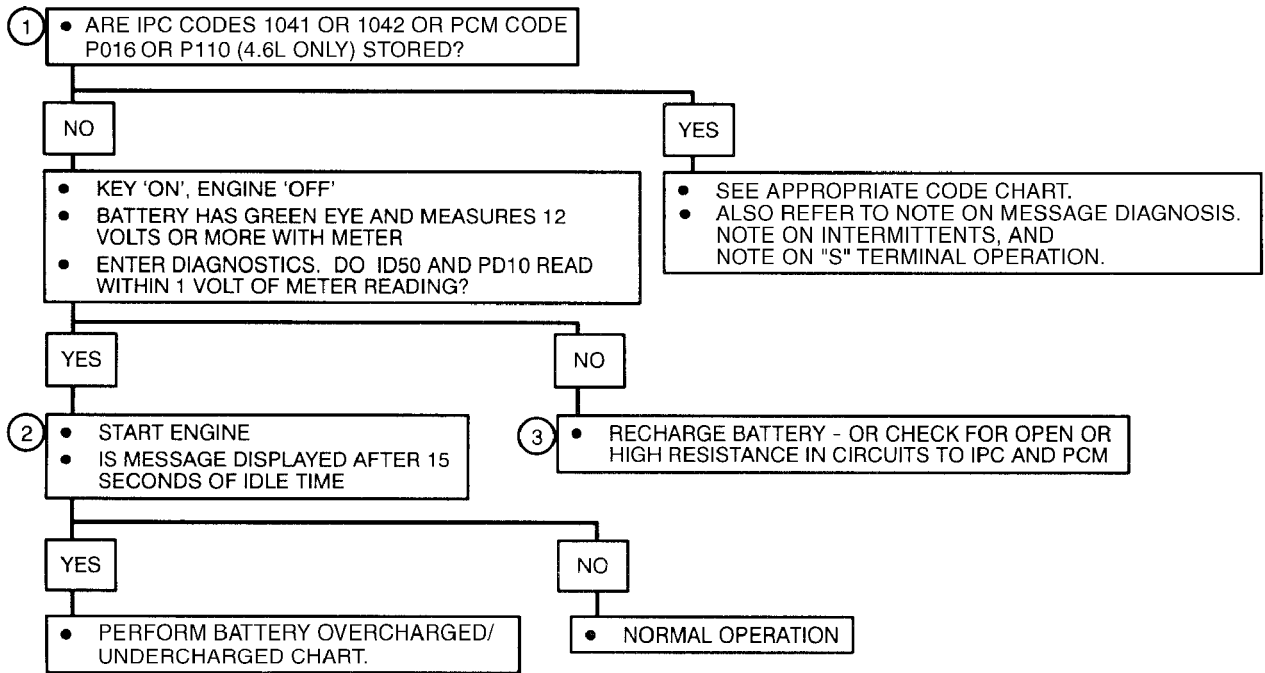
3) Diagnose IPC and/or message faults.

**Note On Intermittents**

If codes are set indicating system voltages are too low, inspect all connections in affected circuit and ensure idle speed is not too low. Check battery state of charge and condition. A low battery state of charge may have caused history codes to set. Regulator may be cause for intermittent conditions.

**Note On "S" Terminal Operation**

The "S" terminal is not used on 4.6L engine.



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**Fig. 1: Message Diagnosis Flow Chart**  
Courtesy of General Motors Corp.

**BATTERY OVERCHARGED/UNDERCHARGED**

**NOTE:** Test numbers refer to numbers on diagnostic chart.

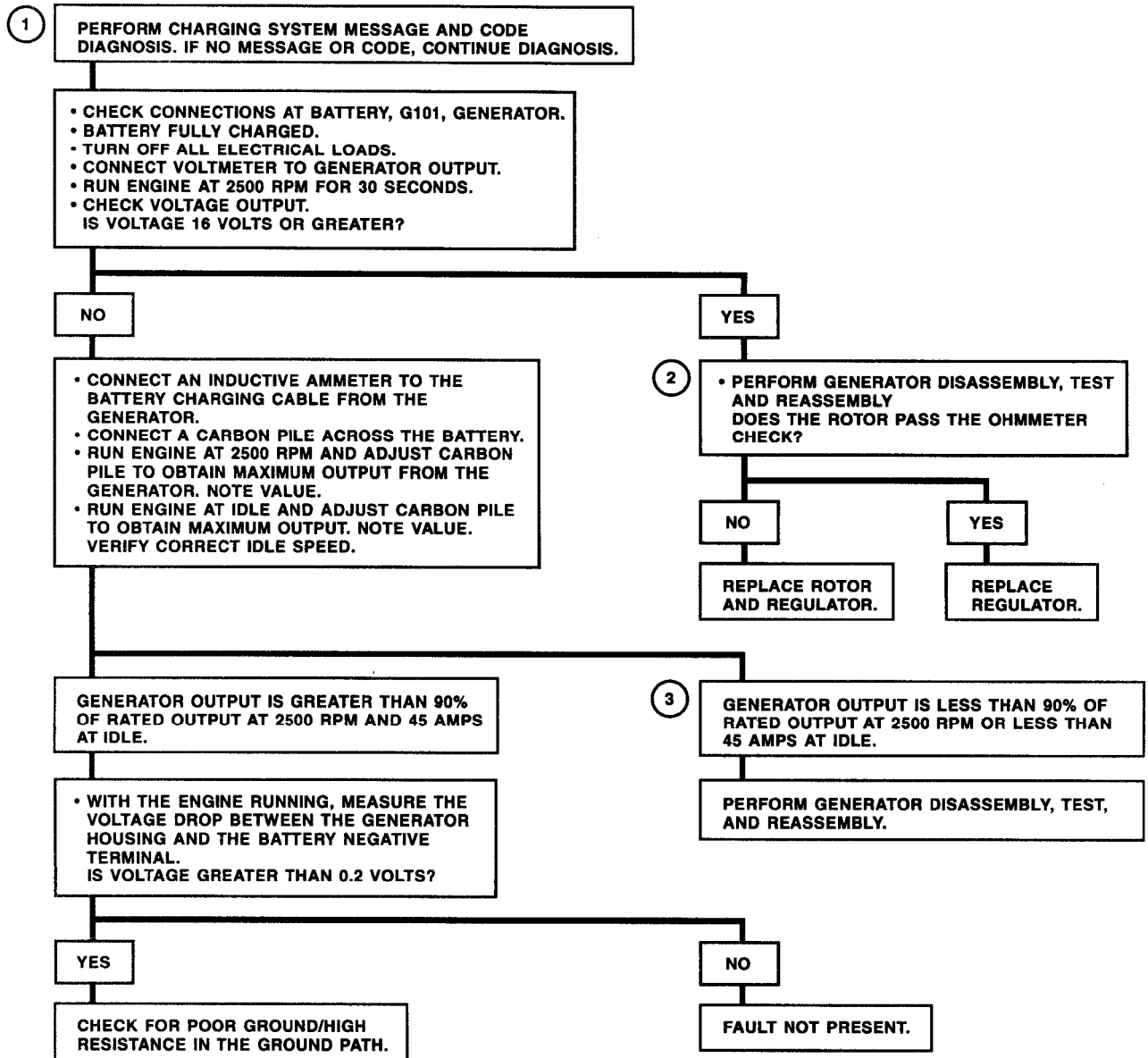
1) Always diagnose codes before performing BATTERY OVERCHARGED/UNDERCHARGED chart. This will test PCM's ability to detect generator faults and out of range voltage conditions.

2) Over-voltage conditions may be caused by a defective rotor

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or regulator. Overcharging may be evidenced by low electrolyte level in battery.

3) Insufficient amperage output may not set codes but result in marginal battery charging id driving habits involve short trips and prolonged idling, especially in warmer weather. Low output may be caused by a defective regulator, an open or shorted diode, or contaminated brushes. No output condition may be caused by a defective regulator, an open or shorted rotor, damaged stator or worn brushes.



WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR CODES AND VERIFY OPERATION.

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**Fig. 2: Battery Overcharged/Undercharged Flow Chart**  
 Courtesy of General Motors Corp.

PCM monitors ignition voltage on circuit No. 539 (Pink wire) to PCM. With engine speed greater than 500 RPM, Code P016 sets if ignition voltage is less than 10 volts or greater than 16 volts. If ignition voltage goes to zero (open circuit), vehicle will not run since PCM does not receive ignition signal.

When a failure is present, PCM turns on MIL and the PCM disables cruise control and EVAP control solenoid, Torque Converter Clutch (TCC) solenoid and transaxle pressure control solenoid. PCM also allows only second gear operation when any forward gear is selected. Transaxle and garage shift adapts are maintained at current levels.

NOTE: Test numbers refer to numbers on diagnostic chart.

1) Checks if PCM DATA parameter PD15 (ignition 1 voltage) and IPC DATA parameter ID50 (battery volts) are within .5 volt of each other, then system voltage problem may exist. If voltages are not within .5 volt, check PCM voltage for malfunction.

2) Checks if PCM DATA parameter PD15 (ignition 1 voltage) is actually displaying system voltage.

Note On Intermittents

Code P016 may be set intermittently if generator terminal "L" connection is loose or faulty.

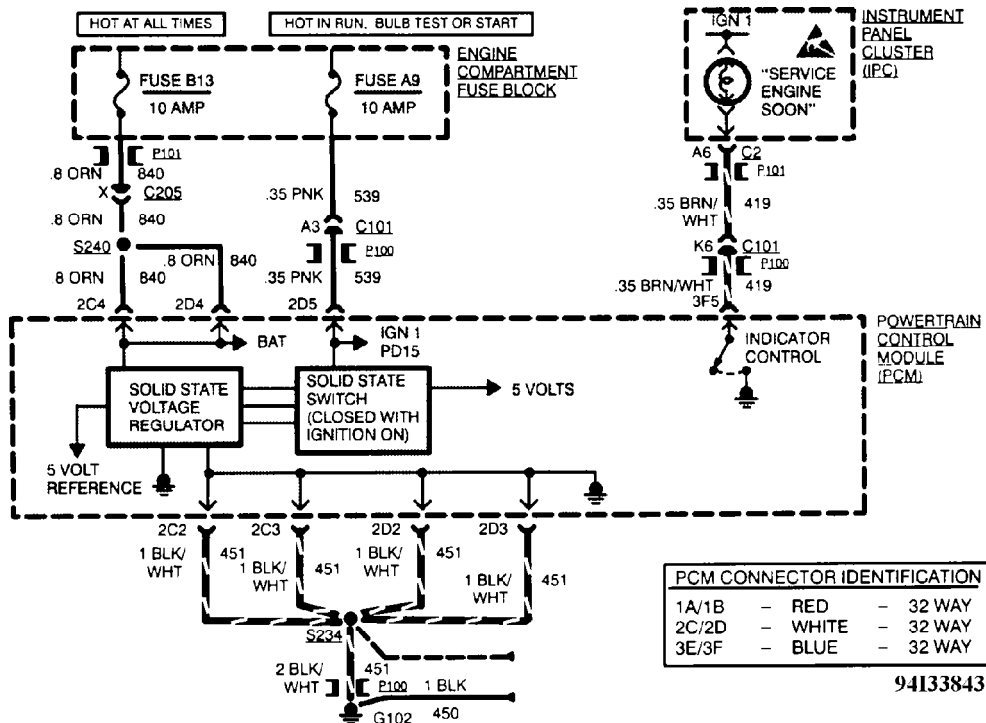
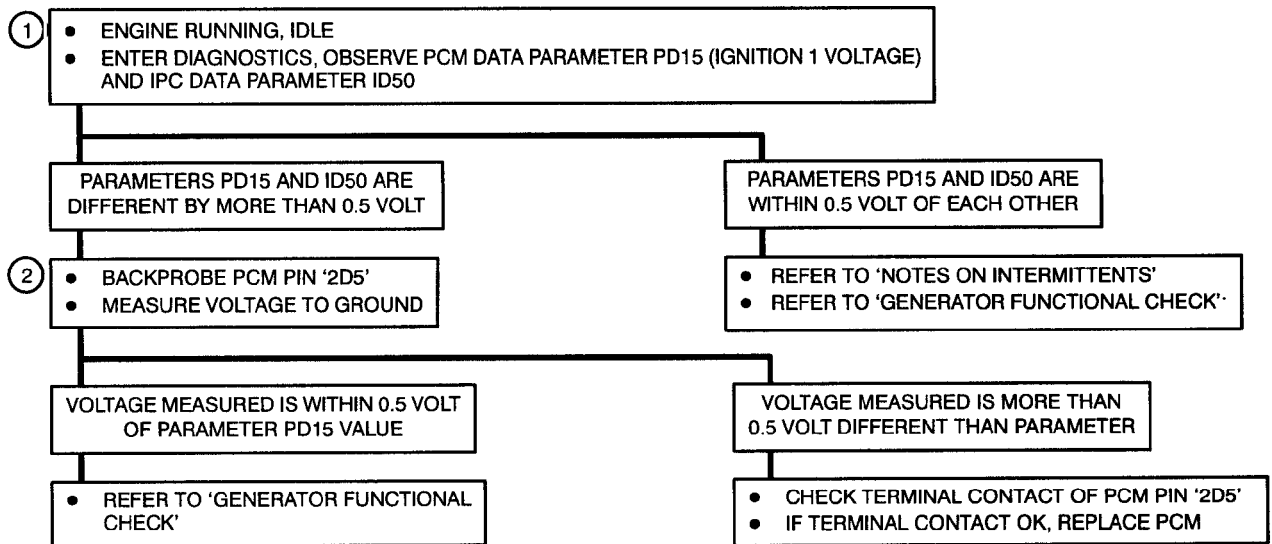


Fig. 3: Code P016 Wiring Diagram  
Courtesy of General Motors Corp.



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WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR CODES AND VERIFY OPERATION.

**Fig. 4: Code P016 Flow Chart**  
Courtesy of General Motors Corp.

#### CODE P110 - GENERATOR TERMINAL "L" CIRCUIT PROBLEM

This diagnostic monitors generator feedback and compares it to generator control in the PCM. Code P110 will set when the PCM commands the generator on and the feedback indicates that generator is off for 15 seconds.

PCM supplies 12 volts to generator terminal "L" and initiates generator operation. The generator regulator applies voltage to the rotor as a Pulse Width Modulated (PWM) signal to energize field windings.

Generator can detect internal faults and PCM will set Code P110 if fault occurs for 15 seconds. Generator can self-diagnose a shorted output diode, malfunctioning regulator, an open or shorted rotor, an over or under voltage condition, shaft not rotating, or open sense lead. BATTERY NO CHARGE message is displayed on DIC.

**NOTE:** Test numbers refer to numbers on diagnostic chart.

1) Checks PCM's ability to cycle generator control output. If voltage cycles, replace battery.

2) Checks if circuit No. 225 (Red wire) is open or shorted to ground, or for faulty PCM.

#### Note On Intermittents

Code P110 may be set intermittently if generator terminal "L" connection is loose or faulty.

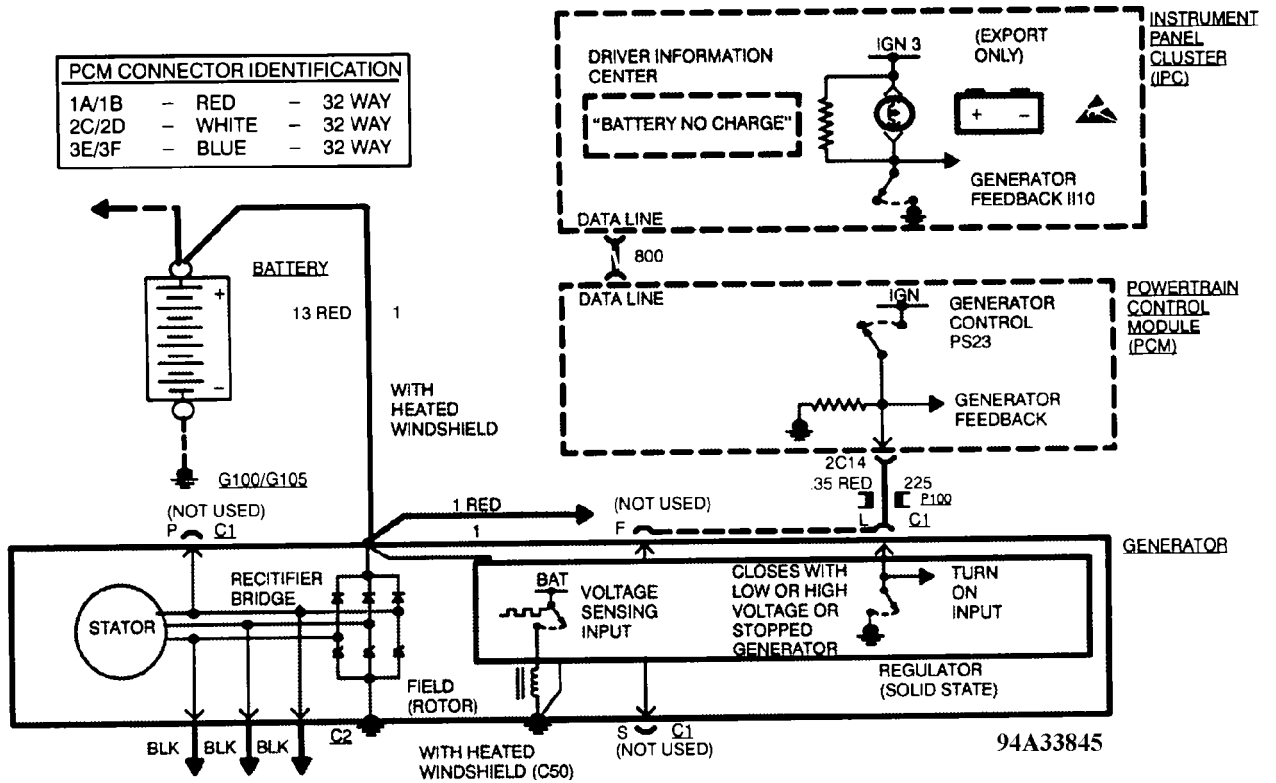
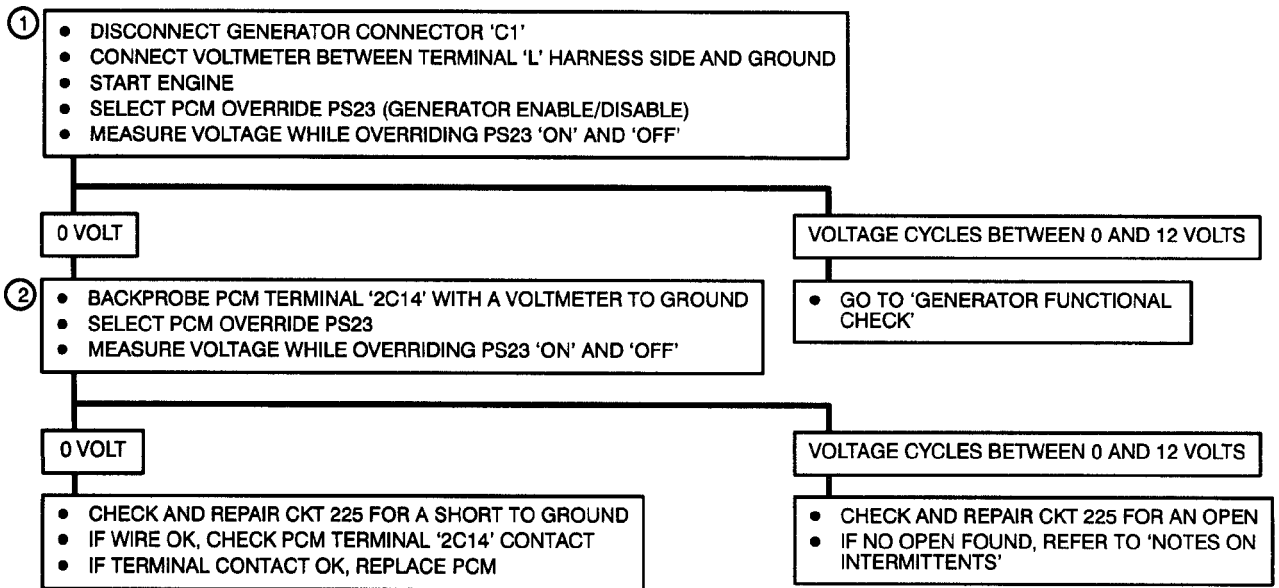


Fig. 5: Code P110 Wiring Diagram  
Courtesy of General Motors Corp.



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Fig. 6: Code P110 Flow Chart  
Courtesy of General Motors Corp.

Codes I041 and I042 set when ignition is on and engine speed is more than 800 RPM, IPC can communicate with PCM (Code I034 is not set), and IGNITION 1 circuit voltage is outside its normal range for 2 seconds.

Code I041 sets when IGNITION 1 circuit voltage is less than 10.6 volts (DIC will display BATTERY VOLTS LOW message).

Code I042 sets when IGNITION 1 circuit is voltage is greater than 16 volts (DIC will display BATTERY VOLTS HIGH message).

If either code I041 or I042 is current, other IPC codes (except Code I052) will not set. If voltage is less than 9 volts, IPC will temporarily stop functioning.

NOTE: Test numbers refer to numbers on diagnostic chart.

1) If PCM and IPC do not detect same battery voltage, IPC input voltage and grounds could be at fault. Normal battery voltage range is 10.6-16 volts.

2) This checks battery and charging systems ability to maintain proper voltage under a high load condition.

3) This checks for an overvoltage condition at high RPM and low electrical load.

#### Note On Intermittents

If an intermittent Code I041 or I042 is being set, observe IPC I041/I042 snapshot data value ID50. This will show voltage at time code was set. Snapshot information for parameters ID60 (vehicle speed), II94 (parklights on/off), and II10 (generator feedback) may be useful in determining vehicle conditions when code is being set. Verify good connections at IPC terminals A5, C13 and C16. Check for good grounds.

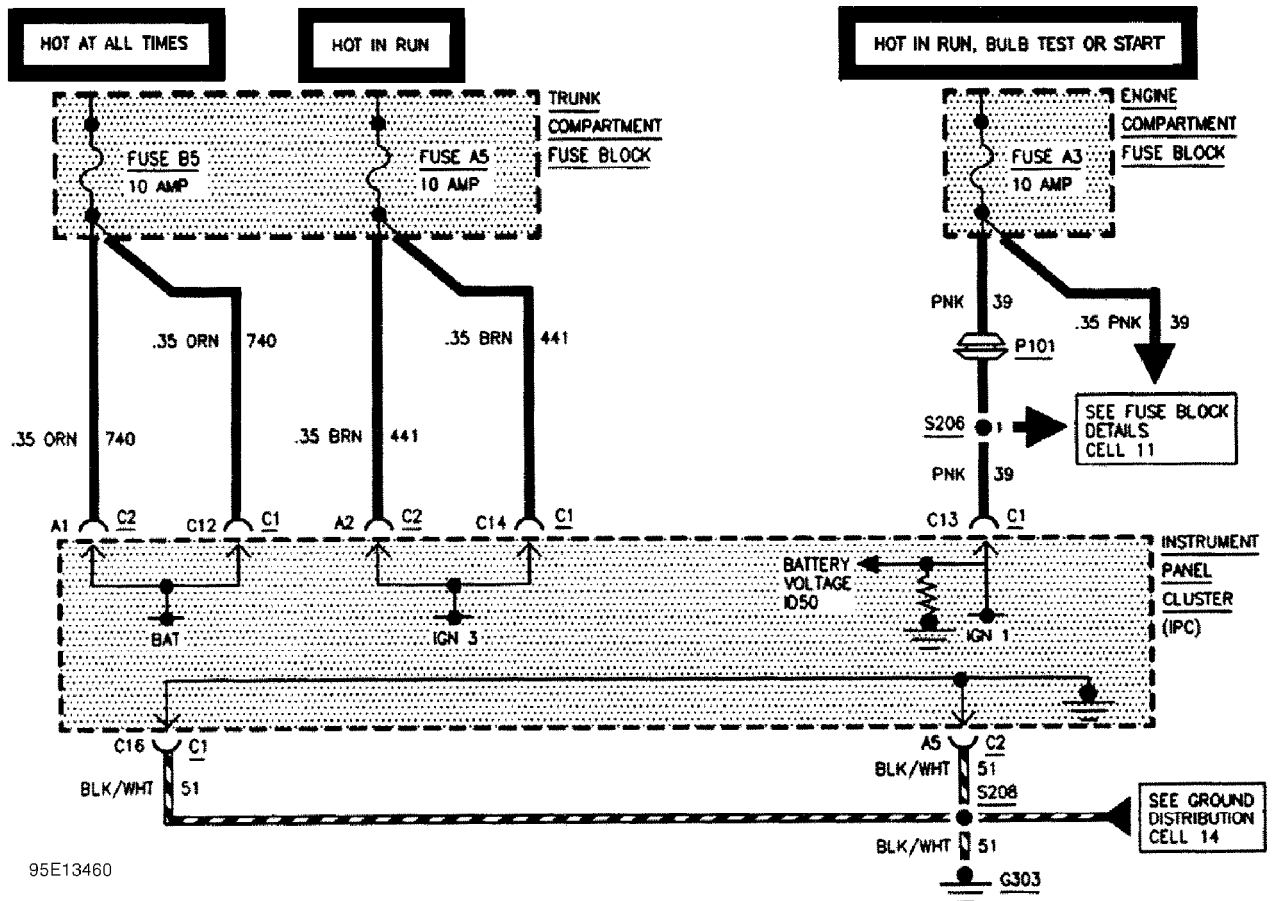
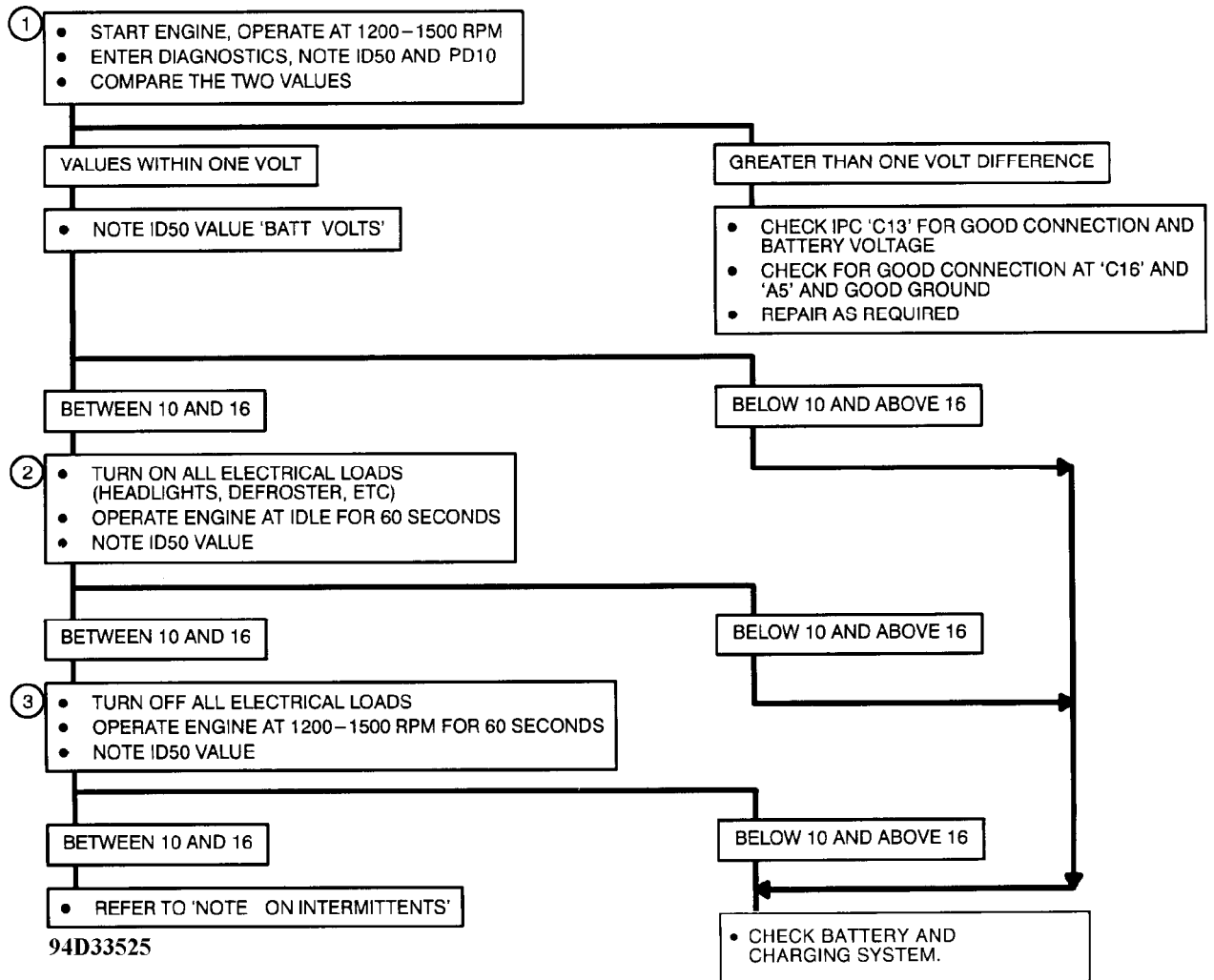


Fig. 7: Code I041/I042 Wiring Diagram  
 Courtesy of General Motors Corp.



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WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR CODES AND VERIFY OPERATION

Fig. 8: Code I041/I042 Flow Chart  
Courtesy of General Motors Corp.

WIRING DIAGRAM

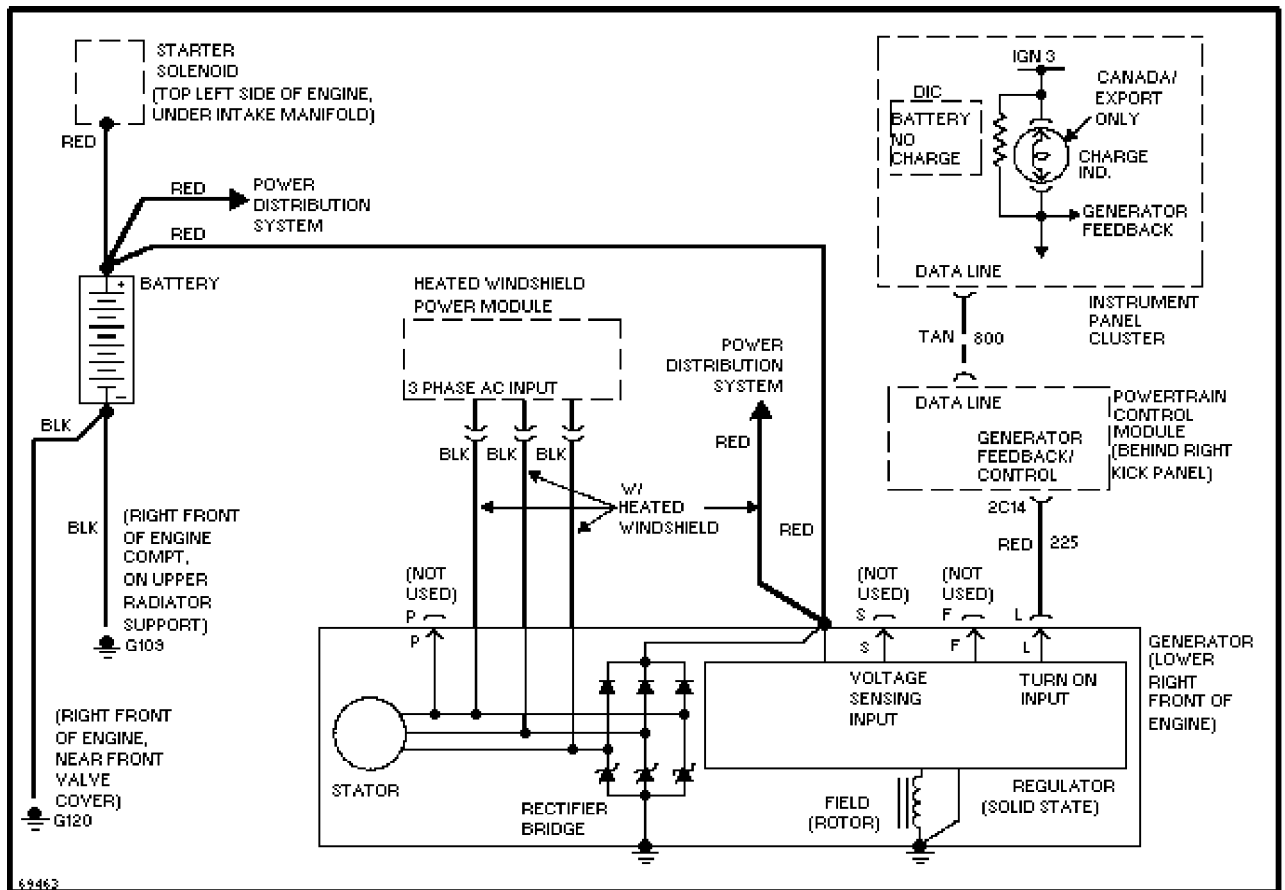


Fig. 9: Charging System Wiring Diagram

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