

2002 STARTING & CHARGING SYSTEMS

Generators & Regulators - C & K Utility Models

MODEL IDENTIFICATION

WARNING: Vehicles are equipped with air bag supplemental restraint system. Before attempting any repairs involving steering column, instrument panel or related components, see DISABLING & ACTIVATING AIR BAG SYSTEM in AIR BAG RESTRAINT SYSTEMS article in RESTRAINTS.

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

MODEL IDENTIFICATION

Model	Body Code (1) (2)
Cadillac	
Escalade	"C" Or "K"
Chevrolet	
Avalanche	"C" Or "K"
Suburban	"C" Or "K"
Tahoe	"C" Or "K"
GMC	
Yukon	"C" Or "K"
(1) Vehicle body code is 5th. character of VIN.	
(2) All "C" series trucks are rear wheel drive, and all "K" series trucks are 4-wheel drive.	

DESCRIPTION & OPERATION

NOTE: Models equipped with diesel engines use dual generators.

AD-230 and AD-244 generators are non-repairable. They are electrically similar to earlier models. Generators feature these following major components: a delta stator, rectifier bridge, rotor with slip rings and brushes, conventional pulley, Dual internal fans, and voltage regulator. Pulley and fan cool slip ring and frame. AD stands for Air-cooled Dual internal fan; "2" is an electrical design designator; "30/44" denotes outside diameter of stator laminations in millimeters, over 100 millimeters. Generators is rated at 102 and 130 amperes respectively. Generator features permanently lubricated bearings. Service should only include tightening of mounting components. Generator is replaced as a complete unit.

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Voltage regulator controls field current of rotor in order to limit system voltage. Regulator switches current on and off at a rate of 400 cycles per second in order to perform these following functions: radio noise control, and obtain correct average current needed for proper system voltage control. At high speeds, on-time may be 10 percent with off-time at 90 percent. At low speeds, on-time may be 90 percent and off-time 10 percent.

Instrument Panel Cluster (IPC) illuminates charge indicator on Driver's Information Center (DIC) message center when this occurs:

- Powertrain Control Module (PCM) detects that generator output is 11 volts or less or greater than 16 volts. IPC receives a class 2 message from PCM requesting illumination.
- IPC determines that system voltage is 11 volts or less or greater than 16 volts. IPC receives a class 2 message from Body Control Module (BCM) indicating system voltage.
- IPC performs displays test at start of each ignition cycle. Indicator illuminates for approximately 3 seconds.

COMPONENT LOCATIONS

For component locations, see **ELECTRICAL COMPONENT LOCATOR** article in ELECTRICAL.

ADJUSTMENTS

BELT ADJUSTMENT

NOTE: Drive belt tension is controlled by a belt tensioner. No adjustment is required.

TROUBLE SHOOTING

NOTE: For additional information, see **CHARGING SYSTEM - GENERAL TROUBLE SHOOTING** article in **GENERAL INFORMATION**.

Verify customer complaint by operating system. Visually inspect for obvious signs of mechanical and electrical damage. Inspect for blown fuses. Inspect for loose or corroded connections, damaged wiring harnesses and/or switches. Check for a broken or partially broken wire inside insulation, which could cause system malfunction but prove good in a continuity/voltage check with system disconnected. Ensure any aftermarket electronic equipment is properly installed. If fault is found, repair as necessary. If no fault is found, perform self-diagnostics. See **SELF-DIAGNOSTIC SYSTEM**.

PRELIMINARY INSPECTION

Verify customer complaint by operating suspected system. Ensure battery is fully charged and passes load test. See **BATTERY TESTING & INSPECTION** under ON-VEHICLE TESTING. Visually inspect for obvious signs of mechanical and electrical damage. Inspect for blown fuses. See **COMPONENT LOCATIONS**. Inspect for loose or corroded connections, damaged wiring harnesses and/or switches. Check for a broken or partially broken wire inside insulation, which could cause system malfunction but prove good in a continuity/voltage check with system disconnected. Ensure any aftermarket electronic equipment is properly

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installed. If fault is found, repair as necessary. If no fault is found, perform self-diagnostics. See **SELF DIAGNOSTIC SYSTEM** .

SYSTEM OPERATION CHECK

NOTE: Before making electrical checks, visually inspect all terminals for clean, tight connections. Ensure all charging system related fuses are okay. Check generator mounting bolts and drive belt tension. Ensure battery is fully charged and in good condition prior to testing charging system. See **BATTERY TESTING & INSPECTION** under ON-VEHICLE TESTING. Ensure battery cable connections are in good condition and free of corrosion. Ensure starting system is okay. See **STARTERS** article in ELECTRICAL.

SELF DIAGNOSTIC SYSTEM

NOTE: Diagnostic trouble code tests are written specifically for use with GM Tech I or Tech II scan tools. Generic scan tool can be used but may have limited functions. This article only covers the portion of those systems which relates to charging system diagnosis. For further information, see appropriate **SELF-DIAGNOSTICS** article in ENGINE PERFORMANCE.

RETRIEVING DIAGNOSTIC TROUBLE CODES

See **RETRIEVING DIAGNOSTIC TROUBLE CODES** in SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

CLEARING DIAGNOSTIC TROUBLE CODES

See **CLEARING DIAGNOSTIC TROUBLE CODES** in SELF-DIAGNOSTIC SYSTEM in SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

DIAGNOSTIC TROUBLE CODE DEFINITIONS

DIAGNOSTIC TROUBLE CODE DEFINITIONS

DTC ⁽¹⁾	Description
<u>P0562</u>	Low System Voltage
<u>P0563</u>	High System Voltage
<u>P0615</u>	Improper Voltage Level On The Output Circuit That Controls The Starter Relay
<u>P1637</u>	Generator Turn-On Signal Circuit Voltage Out Of Range
<u>P1638</u>	Pulse Width Modulation Signal Out Of Range

(1) Codes listed in this table are only for testing covered in this article. For complete DTC listing, see appropriate **BODY CONTROL MODULES** article in ACCESSORIES & EQUIPMENT.

DIAGNOSTIC TESTS

DTC P0562: LOW SYSTEM VOLTAGE

Circuit Description

The PCM monitors the system voltage to make sure that the voltage stays within the proper range. If the PCM detects an excessively low system voltage, DTC P0562 will set.

When the charging system detects a fault, the instrument panel cluster (IPC) displays a message or the charge indicator will light.

Conditions For Running DTC

- Engine run time more than 20 seconds and above 1200 RPM.
- Vehicle speed above 5 MPH.

Conditions For Setting DTC

The PCM detects an improper voltage below 11 volts for 5 seconds.

Action Taken When DTC Sets

- The PCM stores the DTC information into memory when the diagnostic runs and fails.
- The PCM will store conditions which were present when the DTC set as Failure Records data only.
- The PCM disables most outputs.
- The transmission defaults to a predetermined gear.
- The Torque Converter Clutch (TCC) operation is inhibited.
- The Instrument Panel Cluster (IPC) displays a message.
- The Malfunction Indicator Lamp (MIL) will not illuminate.

Conditions For Clearing DTC

- The Conditions for Setting the DTC are no longer present.
- A history DTC will clear after 40 malfunction free ignition cycles.
- The Powertrain Control Module (PCM) receives the clear code command from the scan tool.

Diagnostic Procedure

1. If diagnostic system check was not performed, perform **ENGINE ELECTRICAL DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. If diagnostic system check was performed, go to next step.
2. Using scan tool, observe Ignition 1 Signal voltage in Powertrain Control Module (PCM) data list. If voltage is 10.5 volts or less, go to next step. If voltage is greater than 10.5 volts, go to step 4 .

3. Test ignition feed circuit to PCM for high resistance or an open. If problem exists, repair as necessary. After repair, go to step 7 . If problem does not exist, go to step 5 .
4. Inspect PCM harness connectors for poor connections. If problem exists, repair as necessary. After repair, go to step 7 . If problem does not exist, go to step 6 .
5. Repair ignition feed circuit to PCM for an open or short to ground. After repair, go to step 7 .
6. Replace PCM. See **REMOVAL, OVERHAUL & INSTALLATION** article in ENGINE PERFORMANCE. Program PCM. After repair, go to next step.
7. Using scan tool, clear DTCs. Operate vehicle at more than 5 MPH, for 20 seconds at 1200 RPM. Check for DTC. If DTC P0562 resets, repeat test beginning at step 2 . If DTC P0562 does not reset, system is okay.

DTC P0563: HIGH SYSTEM VOLTAGE

Circuit Description

The powertrain control module (PCM) continuously monitors that the system voltage stays within the proper range. If the PCM detects an excessively high system voltage, DTC P0563 will set. A high voltage condition may cause a stalling condition or other driveability concerns.

Conditions For Running DTC

- The engine run time is more than 20 seconds.
- Engine running above 1200 RPM.
- Vehicle speed above 5 MPH.

Conditions For Setting DTC

- The PCM senses the system voltage is above 19 volts.
- All of the conditions are present for 5 seconds.

Action Taken When DTC Sets

- The PCM stores DTC P0563 in the PCM memory when the diagnostic runs and fails.
- The PCM will record the operating conditions at the time the diagnostic fails. The PCM stores this information in Failure Records.
- The PCM disables most outputs.
- The transmission defaults to a predetermined gear.
- The Torque Converter Clutch (TCC) operation is inhibited.
- The Instrument Panel Cluster (IPC) displays a message.
- The Malfunction Indicator Lamp (MIL) will not illuminate.

Conditions For Clearing DTC

- The Conditions for Setting the DTC are no longer present.

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- A history DTC will clear after 40 malfunction free ignition cycles.
- The Powertrain Control Module (PCM) receives the clear code command from the scan tool.

Diagnostic Procedure

1. If diagnostic system check was not performed, perform **ENGINE ELECTRICAL DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. If diagnostic system check was performed, go to next step.
2. Turn off all accessories. Using a DVOM, measure battery voltage while operating engine above 2000 RPM. If battery voltage is 19 volts or less, go to step 4 . If battery voltage is greater than 19 volts, go to next step.
3. Replace generator. See **REMOVAL & INSTALLATION** . After repair, go to step 5 .
4. Replace PCM. See **REMOVAL, OVERHAUL & INSTALLATION** article in ENGINE PERFORMANCE. Program PCM. After repair, go to next step.
5. Using scan tool, clear DTCs. Operate vehicle at more than 5 MPH, for 20 seconds at 1200 RPM. Check for DTC. If DTC P0563 resets, repeat test beginning step 2 . If DTC P0563 does not reset, system is okay.

DTC P0615: IMPROPER VOLTAGE LEVEL ON THE OUTPUT CIRCUIT THAT CONTROLS THE STARTER RELAY

Circuit Description

The PCM uses Output Driver Modules (ODM) to control many functions of the engine. The ODMs supply the ground path for the PCM controlled device when the PCM commands the device ON. Each ODM is able to control several outputs. The PCM monitors the ODMs for circuit conditions that are incorrect for the commanded state of the ODM. If the PCM detects an improper circuit condition in the ODM that controls the starter relay, DTC P0615 will set.

Conditions For Running DTC

System voltage is 8-16 volts.

Conditions For Setting DTC

The PCM detects an improper voltage level on the output circuit that controls the starter relay. The condition exists for at least 2 seconds.

Action Taken When DTC Sets

- The PCM will not illuminate the malfunction indicator lamp (MIL).
- The PCM will store the conditions present when the DTC set as Failure Records data only.

Conditions For Clearing DTC

The history DTC will clear after 40 consecutive warm-up cycles have occurred without a malfunction. The DTC can be cleared by using the scan tool Clear DTC Information function.

Diagnostic Aids

Ignition system DTCs set with the ignition switch in the START position if the starter relay or the starter is inoperative. When the PCM enables starter operation, the PCM also initiates the diagnostic test routines for DTCs P0335, P0340, and P0385. If a condition exists which prevents the engine from cranking, the PCM will not receive signal input from the CKP and CMP sensors, and the DTCs will set.

Reviewing the Failure Records vehicle mileage since the diagnostic test last failed may assist in diagnosing the condition. The information may help determine how often the condition that set the DTC occurs.

Test Description

The numbers below refer to the step numbers on the diagnostic procedure.

- **2** - Listen for an audible click when the Start 1 relay operates. Turn the ignition switch back and forth from the ON to START positions. Repeat this as necessary.
- **3** - Tests for voltage at the coil side of the Start 1 relay. The PCM IGN fuse supplies power to the coil side of the Start 1 relay.
- **4** - Verifies that the PCM is providing ground to the Start 1 relay.
- **5** - Tests if ground is constantly being applied to the Start 1 relay.

Diagnostic Procedure

1. If diagnostic system check was not performed, perform **ENGINE ELECTRICAL DIAGNOSTIC SYSTEM CHECK** under ON-VEHICLE TESTING. If diagnostic system check was performed, go to next step.
2. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. Install a scan tool. See **COMPONENT LOCATIONS** . Turn ON the ignition, with the engine OFF. Turn the ignition back and forth from the ON to START positions. If Start 1 relay turns ON and OFF with each command, problem is intermittent. Check wiring and connections. If problem is detected, go to next step.
3. Turn OFF the ignition. Disconnect the Start 1 relay. Turn ON the ignition, with the engine OFF. Probe the battery positive voltage of the Start 1 relay coil circuit with a test light that is connected to a good ground. If test light illuminates, go next step. If test light does not illuminate, go to step 8 .
4. Connect a test light between the control circuit of the Start 1 relay and the battery positive voltage of the Start 1 relay coil circuit. Turn the ignition back and forth from the ON to START positions. If test light turns ON and OFF with each command, go to step 6 . If test light does not turn ON and OFF with each command, go next step.
5. Test the control circuit of the Start 1 relay for a short to voltage or an open. See **WIRING DIAGRAMS** . When repair is complete, go to step 11 . If problem is not detected, go to step 7 .
6. Inspect for poor connections at the Start 1 relay. Check for intermittent and poor connections and possible connector defects. When repair is complete, go to step 11 . If problem is not detected, go to step 9 .
7. Inspect for poor connections at the PCM. Check for intermittent and poor connections and possible connector defects. When repair is complete, go to step 11 . If problem is not detected, go to step 10 .
8. Repair the battery positive voltage circuit of the Start 1 relay as necessary. See **WIRING DIAGRAMS** . When repair is complete, go to step 11 .

9. Replace the Start 1 relay. See **COMPONENT LOCATIONS** . When replacement is complete, go to step 11 .
10. Replace PCM. See **REMOVAL, OVERHAUL & INSTALLATION** article in ENGINE PERFORMANCE. Program PCM. After repair, go to next step.
11. Review and record the scan tool Fail Records data. Use the scan tool in order to clear the DTC. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. See **CONDITIONS FOR RUNNING THE DTC** . Using the scan tool, observe the Specific DTC Information for DTC P0615 until the test runs. If the scan tool indicates that DTC P0615 is set, go to step 2 and retest. If DTC does not set, system is OK.

DTC P1637: GENERATOR TURN-ON SIGNAL CIRCUIT VOLTAGE OUT OF RANGE

Circuit Description

The Powertrain Control Module (PCM) uses the generator turn on signal circuit to control the generator. A high side driver within the PCM allows the PCM to turn the generator ON and OFF. When Generator operation is desired, the PCM sends a 10 volt signal to the voltage regulator via the generator turn on signal circuit. This causes the voltage regulator to begin controlling the generator field circuit. Once the Generator is enabled by the PCM, the voltage regulator controls generator output independently of the PCM. Under certain operating conditions, the PCM can turn Off the generator by turning Off the 10 volt signal on the generator turn on signal circuit. The PCM has fault detection circuitry which monitors the state of the generator turn on signal circuit. If the fault detection circuit senses a voltage other than what is expected, this DTC will set. The voltage regulator also contains fault detection circuitry. If the regulator detects a problem, the regulator will ground the generator turn on signal circuit, pulling the voltage low. This also causes the PCM to set the DTC.

Conditions For Running DTC

- The ignition is ON.
- System voltage is 9.0-18.0 volts.

Conditions For Setting DTC

- An improper voltage level has been detected on the generator L-terminal circuit.
- The above conditions are present for at least 30 seconds.

Action Taken When DTC Sets

The PCM stores conditions which were present when the DTC set as Failure Records only. This information will not be stored as Freeze Frame Records.

Conditions For Clearing DTC

- The Conditions for Setting the DTC are no longer present.
- A history DTC will clear after 40 malfunction free ignition cycles.
- The PCM receives the clear code command from the scan tool.

Diagnostic Procedure

1. If diagnostic system check was not performed, perform **ENGINE ELECTRICAL DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. If diagnostic system check was performed, go to next step.
2. Install a scan tool. Start the engine. With a scan tool, monitor the DTC information for DTC P1637 in Engine Controls. If the scan tool indicates that DTC P1637 has passed, problem is intermittent. Check wiring and connections. If the scan tool does not indicate that DTC P1637 has passed, go to next step.
3. Turn OFF the ignition. Disconnect the generator harness connector. Start the engine and let idle. Measure the voltage between the generator turn on signal circuit and ground. See **WIRING DIAGRAMS** . If voltage measures 10.0-11.0 volts, go to step 5 . If voltage does not measure near 5.0 volts, go to next step.
4. Using DVOM, test Brown wire for short or open between generator harness connector terminal "B" and battery ground. If problem does not exist, go to step 6 . If problem exists, repair as necessary. After repair, go to step 8 .
5. Inspect generator harness connector for poor connections. If problem exists, repair as necessary. After repair, go to step 8 . If problem does not exist, go to **TEST A: CHARGING SYSTEM TEST** .
6. Inspect PCM harness connector for poor connections. If problem exists, repair as necessary. After repair, go to step 8 . If problem does not exist, go to next step.
7. Replace PCM. See **REMOVAL, OVERHAUL & INSTALLATION** article in ENGINE PERFORMANCE. Program PCM. After repair, go to next step.
8. Using scan tool, clear DTCs. Operate vehicle at more than 1000 RPM. Check for DTC. If DTC P1637 resets, repeat test beginning at step 2 . If DTC P1637 does not reset, system is okay.

DTC P1638: PULSE WIDTH MODULATION SIGNAL OUT OF RANGE

Circuit Description

The PCM uses the generator field duty cycle signal circuit to monitor the duty cycle of the generator. The generator field duty cycle signal circuit connects to the high side of the field winding in the generator. A pulse width modulated (PWM) high side driver in the voltage regulator turns the field winding ON and OFF. The PCM uses the PWM signal input to determine the generator load on the engine. This allows the PCM to adjust the idle speed to compensate for high electrical loads.

The PCM monitors the state of the generator field duty cycle signal circuit. When the key is in the RUN position and the engine is OFF, the PCM should detect a duty cycle near 0 percent. However, when the engine is running, the duty cycle should be between 5 percent and 100 percent. The PCM monitors the PWM signal using a key ON test and a RUN test. During the tests, if the PCM detects an out of range PWM signal, DTC P1638 will set. When the DTC sets, the PCM will send a class 2 serial data message to the IPC to illuminate the charge indicator.

Conditions For Running DTC

Key ON Test

- No generator, CKP sensors, or CMP sensor DTCs are set.

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- The key is in the RUN position.
- The engine is not running.

Run Test

- No generator, CKP sensors, or CMP sensor DTCs are set.
- The engine is less than 3000 RPM.

Conditions For Setting DTC

- During the ignition ON test, the PCM detects a PWM signal is out of range.
- During the RUN test, the PCM detects a PWM signal less than 5 percent for more than 6 seconds.

Conditions For Clearing DTC

- A last test failed, or current DTC, clears when the diagnostic runs and does not fail.
- A history DTC will clear after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Use a scan tool in order to clear the DTC.

Diagnostic Aids

- DTCs P1637 and P1638 may set at the same time depending on the failure.
- Use a scan tool in order to diagnosis the generator circuits. The scan tool should display Inactive for the L terminal and 10-40 percent for the F terminal when the ignition is ON. When the engine is operating, the display should indicate that the L terminal is Active and the F terminal is more than 10 percent.
- A generator fault, such as a shorted output diode, malfunctioning regulator, open or shorted rotor, or open sense lead or battery feed may cause a low battery charge. See **TEST A: CHARGING SYSTEM TEST** for further information and generator diagnosis.

Diagnostic Procedure

1. If diagnostic system check was not performed, perform **ENGINE ELECTRICAL DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. If diagnostic system check was performed, go to next step.
2. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. Start engine. Observe GEN F-Terminal parameter in Powertrain Control Module (PCM) data list. If scan tool indicates GEN F-Terminal parameter is 5-95 percent, problem is intermittent. Check wiring and connections. If scan tool does not indicate GEN F-Terminal parameter is 5-95 percent, go to next step.
3. Turn ignition switch to RUN position. Connect a test light to battery positive voltage. Repeatedly probe generator harness connector terminal "C" (Gray wire), while observing Generator Pulse Width Modulation (PWM) on scan tool. If Generator PWM display is affected, go to step 8 . If Generator PWM display is not affected, go to next step.
4. Test Gray wire for a short or an open between generator harness connector terminal "C" and PCM harness connector C2 terminal No. 52. See **WIRING DIAGRAMS** . If problem exists, repair as necessary. After

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repair, go to step 8 . If problem does not exist, go to step 6 .

5. Inspect generator harness connector for poor connections. If problem exists, repair as necessary. After repair, go to step 8 . If problem does not exist, perform **TEST A: CHARGING SYSTEM TEST** under SYSTEM TESTS.
6. Inspect PCM harness connectors for poor connections. If problem exists, repair as necessary. After repair, go to step 8 . If problem does not exist, go to next step.
7. Replace PCM. See **REMOVAL, OVERHAUL & INSTALLATION** article in ENGINE PERFORMANCE. Program PCM. After repair, go to next step.
8. Review and record scan tool Fail Records data. Using scan tool, clear DTCs. Operate vehicle within Fail Records conditions as noted. Using scan tool, observe Specific DTC information for DTC P1638. If scan tool indicates DTC P1638 failed this ignition, repeat test beginning at step 2 . If an tool indicates DTC P1638 passed this ignition, system is okay.

SYSTEM TESTS

SYMPTOM INDEX

Symptom	Perform Test
Charging System Test	<u>A</u>
Charge Indicator Always On	<u>B</u>
Charge Indicator Inoperative	<u>C</u>
Generator Noise Diagnosis	<u>D</u>

TEST A: CHARGING SYSTEM TEST

NOTE: Ensure battery is in good condition before proceeding with charging system tests. See **BATTERY TESTING & INSPECTION** under ON-VEHICLE TESTING.

1. If diagnostic system check was not performed, perform **ENGINE ELECTRICAL DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. If diagnostic system check was performed, go to next step.
2. Start engine and observe charge indicator on Instrument Panel Cluster (IPC) or message in Driver's Information Center (DIC). If charge indicator illuminates or DIC displays a charging system message, go to next step. If charge indicator light does not illuminate or DIC does not display a charging system message, repair by symptom. See **SYMPTOM INDEX** table.

NOTE: Green POWER lamp of tester should remain illuminated while tester is being used.

3. Turn ignition switch to OFF position. Using CS Generator Tester (J-41450-B), connect Red lead to generator output terminal (BAT) and Black lead to metal generator housing. If Green POWER light does not illuminate, go to next step. If Green POWER light illuminates, go to step 6 .
4. Using a DVOM, measure voltage between output terminal (BAT) of generator and metal generator housing. If battery voltage exists, go to step 14 . If battery voltage does not exist, go to next step.

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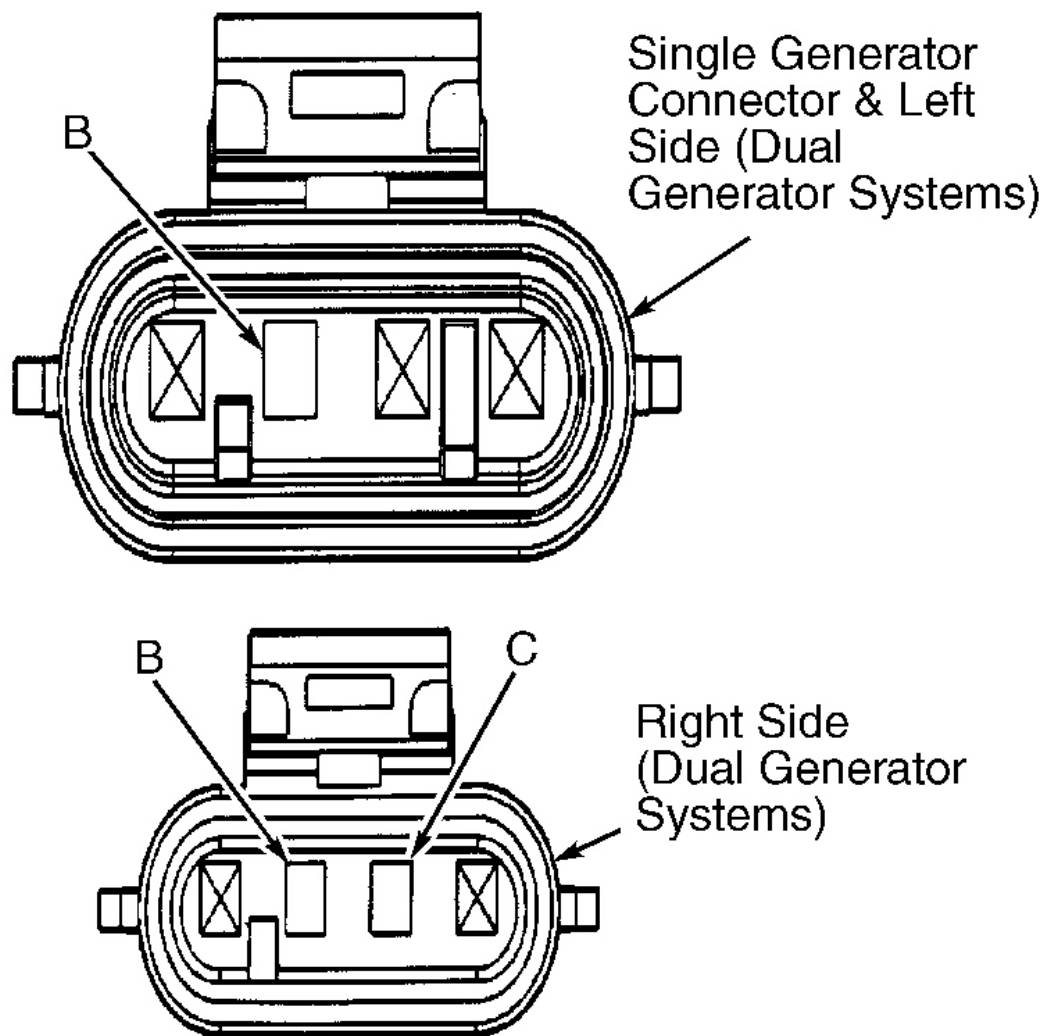
5. Measure voltage between generator output terminal and battery negative terminal. If battery voltage exists, go to step 12 . If battery voltage does not exist, go to step 11 .

CAUTION: Ensure load is completely turned off before connecting or disconnecting carbon pile load tester to battery.

6. Connect carbon pile tester to battery. Connect inductive ammeter to output circuit of generator. Disconnect generator harness connector. Locate matching harness connector on CS Generator Tester (J-41450-B) and connect to generator. If Red DIAGNOSTIC light illuminates, go to next step. If Red DIAGNOSTIC light does not illuminate, go to step 13 .
7. Increase engine speed to 2500 RPM. If Red DIAGNOSTIC light does not illuminate, go to next step. If Red DIAGNOSTIC light illuminates, go to step 15 .

NOTE: If generator is not capable of producing Load Test amps, operate generator at maximum possible output.

8. Maintain engine speed at 2500 RPM. Turn on load of carbon pile tester and increase load until load is equal to test value of generator. See **GENERATOR SPECIFICATIONS** . If Red DIAGNOSTIC light illuminates, go to step 15 . If Red DIAGNOSTIC light does not illuminate, go to next step.
9. Maintain engine speed at 2500 RPM and continue to operate generator at load test value. See **GENERATOR SPECIFICATIONS** . Using a DVOM, measure voltage drop between generator output terminal and positive battery terminal. If voltage drop is 0.5 volt or less, go to next step. If voltage drop is greater than 0.5 volt, go to step 11 .
10. Maintain engine speed at 2500 RPM and continue to operate generator at load test value. See **GENERATOR SPECIFICATIONS** . Using a DVOM, measure voltage drop between generator metal housing and negative battery terminal. If voltage drop is 0.5 volt or less, go to step 16 . If voltage drop is greater than 0.5 volt, go to step 12 .
11. Repair open or high resistance in generator output circuit. See **WIRING DIAGRAMS** . After repair, go to step 16 .
12. Repair open or high resistance in generator ground circuit. See **WIRING DIAGRAMS** . After repair, go to step 16 .
13. Disconnect Generator Tester harness connector, but leave alligator clips connected so Green POWER light remains illuminated. Connect a jumper with a 100 ohm in-line resistor between generator connector terminal "B" and ground. If Red DIAGNOSTIC light illuminates, go to step 15 . If Red DIAGNOSTIC light does not illuminate, go to next step.
14. If a problem exists with CS Generator Tester (J-41450-B). Refer to manufacturer's instructions, how to test J-41450-B for proper operation. If tester has been repaired or replaced, go to step 3 .
15. Replace generator. See **REMOVAL & INSTALLATION** . After repair, go to next step.
16. Operate system to verify repair. If system is not operating correctly, repeat test beginning at step 3 .



G00050227

Fig. 1: Identifying Generator 4-Pin Connector Terminals
Courtesy of GENERAL MOTORS CORP.

TEST B: CHARGE INDICATOR ALWAYS ON

1. If diagnostic system check was not performed, perform **ENGINE ELECTRICAL DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. If diagnostic system check was performed, go to next step.
2. Turn ignition switch to RUN position. If charge indicator illuminates, go to step 3 . If charge indicator does not illuminate, repair by symptom. See **SYMPTOM INDEX** table.

3. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. With scan tool, observe the Battery Voltage parameter in the Instrument Panel Cluster data list. If the voltage measured is within 10.0-15.0 volts, go to next step. If voltage is not as specified, perform **TEST A: CHARGING SYSTEM TEST**.
4. Replace the Instrument Panel Cluster (IPC). See REMOVAL, OVERHAUL & INSTALLATION article under GAUGES & INSTRUMENT PANELS in ACCESSORIES & EQUIPMENT.
5. Operate system to verify repair. If system is not operating correctly, repeat test beginning at step 3.

TEST C: CHARGE INDICATOR INOPERATIVE

1. If diagnostic system check was not performed, perform **ENGINE ELECTRICAL DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. If diagnostic system check was performed, go to next step.
2. Turn ignition switch to RUN position. If charge indicator light does not illuminate, go to next step. If charge indicator light illuminates, problem is intermittent. Check wiring and connections.
3. Replace charge indicator bulb. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repair, go to next step.
4. Operate system to verify repair. If system is not operating correctly, repeat test beginning at step 2.

TEST D: GENERATOR NOISE DIAGNOSIS

1. Test generator for proper operation. See **TEST A: CHARGING SYSTEM TEST**. If generator is operating properly, go to next step. If generator is not operating properly, go to step 11.
2. Start engine. Verify that generator noise can be heard. Turn switch to OFF position. Disconnect generator 4-pin harness connector. Start engine. Listen for generator noise. If noise does not exist, go to step 11. If noise still exist, go to next step.
3. Turn switch to OFF position. Remove drive belt. Spin generator pulley by hand. If pulley rotates smoothly and noise does not exist, go to next step. If pulley rotates roughly and/or noise exists, go to step 11.
4. Inspect pulley for looseness, or loose pulley nut. If pulley and nut are okay, go to next step. If pulley and/or nut is loose, go to step 11.
5. Loosen all generator mounting bolts. Tighten all mounting bolts to specification. See **TORQUE SPECIFICATIONS**. Install drive belt. Start engine and listen for noise. If noise has decreased or stopped, system is okay. If noise still exists, go to next step.
6. Check for stretched generator connections, or hoses or other equipment rubbing on generator. If problem exists, repair as necessary. After repair, go to next step. If problem does not exist, go to step 8.
7. Reroute electrical connections, hoses, etc., away from generator. Start engine and listen for noises. If noise has decreased or stopped, system is okay. If noise still exists, go to next step.
8. Check drive belt for proper tension. If drive belt is loose, go to next step. If drive belt is okay, go to step 10.
9. Replace drive belt tensioner. Start engine and listen for noise. If noise has decreased or stopped, system is okay. If noise still exists, go to step 11.
10. Check comparable vehicle for similar noise. If noise exists in similar vehicle, system is okay. If noise

does not exist in similar vehicle, go to next step.

11. If no definite generator problems were found, ensure all other possible sources of noise are eliminated. If all possibilities have been eliminated, replace generator. See **REMOVAL & INSTALLATION** . After repair, go to next step.
12. Start engine and verify that noise is reduced or eliminated. If noise is still objectionable, go to step 2 .

ON-VEHICLE TESTING

WARNING: Vehicles are equipped with air bag supplemental restraint system. Before attempting any repairs involving steering column, instrument panel or related components, see **DISABLING & ACTIVATING AIR BAG SYSTEM** in **AIR BAG RESTRAINT SYSTEMS** article in **RESTRAINTS**.

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

NOTE: Before making electrical checks, visually inspect all terminals for clean, tight connections. Ensure all charging system related fuses are okay. Check generator mounting bolts and drive belt tension. Ensure battery is in good condition prior to testing charging system. Ensure starting system is okay. See appropriate **STARTERS** article in **ELECTRICAL**.

NOTE: Connector Test Adapter Kit (J-35616-A) must be used whenever a test procedure requires checking or probing terminal. Manufacturer recommends using CS Generator Tester (J-41450-B) to test charging system. Follow instructions provided with tester.

BATTERY TESTING & INSPECTION

NOTE: Manufacturer recommends using Battery Tester (J-42000) for testing battery. Follow instructions provided with tester.

1. Inspect battery for a cracked, broken or damaged case. If battery case is okay, go to next step. If battery case is not okay, go to step 19 .
2. Compare battery Cold Cranking Amperage (CCA) and Reserve Capacity (RC) rating to specifications. See **BATTERY SPECIFICATIONS** . If battery meets or exceeds specifications, go to next step. If battery does not meet or exceed specifications, go to step 19 .
3. Inspect battery hydrometer display. If hydrometer display shows a Yellow dot, go to next step. If hydrometer display does not show a Yellow dot, go to step 5 .
4. Using a small screwdriver, tap top of hydrometer display to dislodge any air bubbles inside. If hydrometer display still shows a Yellow dot, go to step 19 . If hydrometer display does not show a Yellow dot, go to

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next step.

5. Turn ignition switch to OFF position. Attempt to rotate negative battery cable connector clockwise with light finger pressure. If negative connector rotates, go to next step. If negative connector does not rotate, go to step 7 .
6. Using an INCH lb. torque wrench, record torque value while loosening negative battery cable bolt. If torque is equal to or greater than 88 INCH lbs. (10 N.m), go to step 8 . If torque is less than 88 INCH lbs. (10 N.m), go to next step.
7. Disconnect negative battery cable and go to step 9 .
8. Disconnect negative battery cable. Inspect battery and cable terminals for corrosion and defects. Repair as necessary. Go to next step.
9. Attempt to rotate positive battery cable connector clockwise with light finger pressure. If battery cable rotates, go to next step. If battery cable does not rotate, go to step [11](#) .
10. Using an INCH lb. torque wrench, record torque value while loosening positive battery cable bolt. If torque is equal to or greater than 88 INCH lbs. (10 N.m), go to step 12 . If torque is below 88 INCH lbs. (10 N.m), go to next step.
11. Disconnect positive battery cable and go to step 13 .
12. Disconnect positive battery cable. Inspect battery and cable terminals for corrosion and defects. If problem exists, repair as necessary. After repair, go to next step.
13. Clean and wire brush lead face of both battery terminals and metal contact surfaces on both cable connectors. Remove bolts from both battery cable connectors and inspect for corrosion and defects. Repair or replace as necessary. If battery and cables terminals are clean and in good condition, go to next step.
14. Connect positive battery cable to battery and tighten bolt to 11 ft. lbs. (15 N.m). After repair, go to next step.
15. Connect negative battery cable to battery and tighten bolt to 11 ft. lbs. (15 N.m). After repair, go to next step.
16. Ensure all electrical loads are off. Follow manufacturer's instructions and install Battery Tester (J-42000) to vehicle battery. Follow any instructions displayed on Battery Tester. If Battery Tester passed battery, go to next step. If Battery Tester did not pass battery, go to step 18 .
17. Press CODE button on Battery Tester. Record displayed code on vehicle repair order for warranty purposes. Battery is okay.
18. Press CODE button on Battery Tester. Record displayed code on vehicle repair order for warranty purposes. Replace battery.
19. Replace battery.

BATTERY SPECIFICATIONS

BATTERY SPECIFICATIONS

Application	Specification
Standard Battery	
GM Part Number	19001810
Replacement Battery Number	78-6YR

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Cold Cranking Amperage (CCA)	600 Amps
Reserve Capacity Rating	115 Minutes
Optional Battery	
GM Part Number	19001814
Replacement Battery Number	78-7YR
Cold Cranking Amperage (CCA)	770 Amps
Reserve Capacity	115 Minutes

ENGINE ELECTRICAL DIAGNOSTIC SYSTEM CHECK

1. Perform battery inspection test. See **BATTERY TESTING & INSPECTION** under ON-VEHICLE TESTING. Go to next step.
2. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. Turn ignition switch RUN position. If scan tool powers up, go to next step. If scan tool does not power up, perform appropriate test. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
3. Turn ignition switch to RUN position with each module on class 2 serial data circuit. If scan tool communicates with modules, go to next step. If scan tool does not communicate with any module, perform appropriate test. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
4. Using scan tool, select DISPLAY DTCs function for each module on scan tool. Record all DTCs displayed, DTC status and module which set DTC. If scan tool displayed DTCs, go to next step. If scan tool did not display DTCs, repair charging system by symptom. See **SYMPTOM INDEX** table under SYSTEM TESTS.
5. If scan tool displays DTCs which begin with "U", perform appropriate test in accordance with DTC retrieved. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT. If scan tool does not display DTCs which begin with "U", go to next step.
6. If scan tool does not display any DTCs which begin with "P", go to next step. If scan tool displays any DTCs which begin with "P", perform appropriate test in accordance with DTC retrieved. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
7. If scan tool displays DTCs which begin with "B", perform appropriate test in accordance with DTC retrieved. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT. If scan tool does not display DTCs which begin with "B", perform appropriate test in accordance with DTCs retrieved. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS**.

BENCH TESTING

NOTE: Bench testing procedures are not available from manufacturer.

REMOVAL & INSTALLATION

WARNING: Vehicles are equipped with air bag supplemental restraint system. Before attempting any repairs involving steering column, instrument panel or

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related components, see **DISABLING & ACTIVATING AIR BAG SYSTEM** in **AIR BAG RESTRAINT SYSTEMS** article in **RESTRAINTS**.

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

GENERATOR (4.8L, 5.3L & 6.0L ENGINES)

Removal & Installation

Disconnect negative battery cable. Remove drive belt. Remove engine sight shield, if necessary. Disconnect generator harness connector. Slide protective boot down revealing terminal stud. Remove battery output BAT terminal nut. Disconnect battery output BAT cable. Remove generator mounting bolts. Remove generator. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

GENERATOR (8.1L ENGINE)

Removal & Installation

Disconnect negative battery cable. Disconnect generator harness connector. Slide protective boot down revealing terminal stud. Remove battery output BAT terminal nut. Disconnect battery output BAT cable. Remove drive belt. Remove generator mounting bolts. Remove generator. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

OVERHAUL

NOTE: All generators are serviced by replacement only.

GENERATOR SPECIFICATIONS

GENERATOR SPECIFICATIONS

Application	Specification
Standard	
Generator Model	Delphi AD230
Rated Output	102 Amps
Load Test Output	71 Amps
Optional (Dual)	
Generator Model	Delphi AD244
Rated Output	130 Amps
Load Test Output	91 Amps
Optional (Bosch(R) Generator)	

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Generator Model	Bosch(R) 15755900
Rated Output	130 Amps
Load Test Output	91 Amps

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Battery Negative Cable-To-Engine Stud	29 (40)
Battery Negative Cable Terminal Bolt	11 (15)
Battery Positive Cable Terminal Bolt	11 (15)
Battery Retainer Hold Down Bolt	17 (23)
Battery Tray Bolt	18 (25)
Engine Wiring Harness-To-Battery Negative Cable Nut	18 (25)
Engine Wiring Harness Ground Bolt	12 (16)
Engine Wiring Harness Ground/Negative Cable Bolt	18 (25)
Generator Mounting Bolts	37 (50)
Generator Output (BAT) Terminal Nut	13 (18)
Generator Pulley Nut	74 (100)
Negative Battery Cable Bolt	13 (17)
Positive Battery Cable Bolt	13 (17)
Ground Lead-To-Radiator Support Stud	45 (33)
INCH Lbs. (N.m)	
Battery Positive Cable-To-Starter Motor Nut	80 (9)
Battery Positive Cable-To-Underhood Electrical Center Nut	80 (9)
Underhood Electrical Center (UBEC) Mounting Bolt	60 (9)

WIRING DIAGRAMS

NOTE:

- For Avalanche system wiring diagrams, see SYSTEM WIRING DIAGRAMS article in ELECTRICAL.
- For Escalade system wiring diagrams, see SYSTEM WIRING DIAGRAMS article in ELECTRICAL.
- For Escalade EXT system wiring diagrams, see SYSTEM WIRING DIAGRAMS article in ELECTRICAL.
- For Suburban system wiring diagrams, see SYSTEM WIRING DIAGRAMS article in ELECTRICAL.
- For Tahoe system wiring diagrams, see SYSTEM WIRING DIAGRAMS article in ELECTRICAL.
- For Yukon system wiring diagrams, see SYSTEM WIRING DIAGRAMS article in ELECTRICAL.

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- For Yukon XL system wiring diagrams, see [SYSTEM WIRING DIAGRAMS](#) article in ELECTRICAL.