2002 STARTING & CHARGING SYSTEMS

Generators & Regulators - Corvette

DESCRIPTION & OPERATION

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.

Valeo A14VI generator has high amperage output. See **GENERATOR SPECIFICATIONS** . Generator includes a delta stator, rectifier bridge, and rotor with slip rings and brushes. A built-in regulator incorporates fault detection circuitry.

Generator operates with 4 wire connections and a ground path through mounting bracket. First wire connection is the BAT (output) terminal. This terminal must be connected to battery during operation. Second wire connection is connected from generator terminal "L" (harness connector terminal "B") internal regulator lamp driver to Powertrain Control Module (PCM). This circuit monitors and controls generator operation. PCM controls charge indicator light function. Third wire connection is connected from generator terminal "F" (harness connector terminal "C") to PCM. PCM also monitors this circuit. Fourth wire is connected from generator terminal "S" (harness connector terminal "D") to starter. This provides internal regulator with an external voltage reading. If this circuit is interrupted, regulator will default to internal voltage reading for control.

Regulated voltage varies with temperature. System limits voltage by controlling rotor field current while field current is on. Regulator switches rotor field current on and off at a fixed frequency of 400 cycles per second to help control radio noise. By varying overall on/off time, correct average field current for proper system voltage control is obtained. At high speeds, with lower electrical loads, on-time may be 10 percent. At low speeds, with higher electrical loads, on-time may be as much as 90 percent.

COMPONENT LOCATIONS

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

ELECTRICAL.

TROUBLESHOOTING

NOTE: For further trouble shooting information. See CHARGING SYSTEM - GENERAL TROUBLE SHOOTING article in GENERAL INFORMATION.

PRELIMINARY INSPECTION

Verify customer complaint by operating suspected system. Visually inspect for obvious signs of mechanical and electrical damage. Ensure battery is fully charged and passes load test. See **BATTERY TESTING & INSPECTION** under ON-VEHICLE TESTING. 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 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 SELF-DIAGNOSTICS - 5.7L CORVETTE article in ENGINE PERFORMANCE.

RETRIEVING DIAGNOSTIC TROUBLE CODES

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

CLEARING DIAGNOSTIC TROUBLE CODES

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

DIAGNOSTIC TROUBLE CODE DEFINITIONS

DIAGNOSTIC TROUBLE CODE DEFINITIONS

DTC (1)	Description
B0846	Left Seat Control Module Battery 2 Out Of Range
B0851	Left Seat Control Module Battery 1 Out Of Range
B2282	Left Door Control Module Battery 1 Circuit
B2283	Right Door Control Module Battery 1 Circuit
B2284	Left Door Control Module Battery 2 Circuit
B2285	Right Door Control Module Battery 2 Circuit
P0562	Low System Voltage
P0563	High System Voltage
P1637	Generator Turn-On Signal Circuit Voltage Out Of Range
P1638	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 BODY CONTROL MODULES - CORVETTE article in ACCESSORIES & EQUIPMENT.

DIAGNOSTIC TESTS

DTC B0846: LEFT SEAT CONTROL MODULE BATTERY 2 OUT OF RANGE

Circuit Description

The LH Seat Control Module (SCM) has two main power feeds (high and low), and one main ground. The low power feed (battery 1) is used to provide power for the SCM logic and internal driver operation. The high power feed (battery 2) is used to provide power for systems that draw higher amounts of current (motors, lights etc.). For most functions, the SCM will operate properly when vehicle system voltage is between 9.0-16.0 volts. The SCM also monitors the voltage level at battery 1 and battery 2 circuits and can determine if the voltage level received is out of range. If the voltage level is out of range in either circuit, then a malfunction is present and a DTC will set.

Conditions For Setting DTC

- The SCM detects battery 2 voltage range under 8.5 volts or over 16.3 volts.
- Condition must be present for 2 seconds.

Action Taken When DTC Sets

- Stores a history DTC B0846 in the SCM memory.
- This DTC can only be set as a history code even if the malfunction is current.
- No driver warning message will be displayed for this DTC.

Conditions For Clearing DTC

- The SCM detects battery 2 voltage range between 8.5-16.3 volts for longer than 2 seconds.
- Use the IPC clearing DTCs feature.
- Using a 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. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. Turn ignition switch to RUN position. Using scan tool, observe Battery 2 parameter in Left Seat Control Module (SCM) data list. If scan tool indicates Battery 2 parameter is 8.5-16.3 volts, problem is intermittent. Check wiring and connections. If scan tool does not indicate Battery 2 parameter is 8.5-16.3 volts, go to next step.
3. Turn ignition switch to OFF position. Disconnect SCM harness connector C3. SCM is located below driver's seat. Turn ignition switch to RUN position. Measure voltage from Battery 2 positive voltage circuit to a good ground. If voltage is 8.5-16.3 volts, go to next step. If voltage is not 8.5-16.3 volts, go to step 5 .
4. Inspect SCM harness connector and instrument panel fuse block 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 high resistance in Battery 2 positive voltage circuit. After repair, go to next step.
6. Replace SCM. See POWER SEATS - CORVETTE article in ACCESSORIES & EQUIPMENT. After repair, go to next step.
7. Using scan tool, clear DTCs. Start engine. If DTC B0846 resets, repeat test beginning at step 2 . If DTC B0846 does not reset, system is okay.

DTC B0851: LEFT SEAT CONTROL MODULE BATTERY 1 OUT OF RANGE

Circuit Description

The LH Seat Control Module (SCM) has two main power feeds (high and low), and one main ground. The low power feed (battery 1) is used to provide power for the SCM logic and internal driver operation. The high power feed (battery 2) is used to provide power for

systems that draw higher amounts of current (motors, lights etc.). For most functions, the SCM will operate properly when vehicle system voltage is 9.0-16.0 volts. The SCM also monitors the voltage level at battery 1 and battery 2 circuits and can determine if the voltage level received is out of range. If the voltage level is out of range in either circuit, then a malfunction is present and a DTC will set.

Conditions For Setting DTC

- The SCM detects battery 1 voltage range under 9.0 volts or over 16.3 volts.
- Condition must be present for 2 seconds.

Action Taken When DTC Sets

- Stores a history DTC B0851 in the SCM memory.
- This DTC can only be set as a history code even if the malfunction is current.
- No driver warning message will be displayed for this DTC.

Conditions For Clearing DTC

- The SCM detects battery 1 voltage range between 9.0-16.3 volts for longer than 2 seconds.
- Use the IPC clearing DTCs feature.
- Using a 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. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. Turn ignition switch to RUN position. Using scan tool, observe Battery 1 parameter in Left Seat Control Module (SCM) data list. If scan tool indicates Battery 1 parameter is 9.0-16.3 volts, problem is intermittent. Check wiring and connections. If scan tool does not indicate Battery 1 parameter is 9.0-16.3 volts, go to next step.
3. Test SCM Battery 1 positive voltage circuit for high resistance. If problem exists, repair circuit as necessary. After repair, go to step 6 . If problem does not exist, go to next step.
4. Inspect SCM harness connector and instrument panel fuse block for poor connections. If problem exists, repair as necessary. After repair, go to step 6 . If problem does not exist, go to next step.
5. Replace SCM. See POWER SEATS - CORVETTE article in ACCESSORIES & EQUIPMENT. Go to next step.

6. Using scan tool, clear DTCs. Start engine. If DTC B0846 resets, repeat test beginning at step 2 . If DTC B0846 does not reset, system is okay.

DTC B2282: LEFT DOOR CONTROL MODULE BATTERY 1 CIRCUIT

Circuit Description

The LH Door Control Module (LDCM) has two main power feeds (high and low), and one main ground. The low power feed (battery 1) is used to provide power for the LDCM logic and internal driver operation. The high power feed (battery 2) is used to provide power for systems that draw higher amounts of current (motors, lights etc.). For most functions, the LDCM will operate properly when vehicle system voltage is between 9.0-16.0 volts. The LDCM also monitors the voltage level at battery 1 and battery 2 circuits and can determine if the voltage level received is out of range. If the voltage level is out of range in either circuit, then a malfunction is present and a DTC will set.

Conditions For Setting DTC

- The LDCM detects battery 1 voltage range under 9.0 volts or over 16.3 volts.
- Condition must be present for 2 seconds.

Action Taken When DTC Sets

- Stores a history DTC B2282 in the LDCM memory.
- This DTC can only be set as a history code even if the malfunction is current.
- No driver warning message will be displayed for this DTC.

Conditions For Clearing DTC

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. Turn ignition switch to RUN position. Using scan tool, observe Battery 1 parameter in Left Door Control Module (LDCM) data list. If scan tool indicates Battery 1 parameter is 9.0-16.3 volts, problem is intermittent. Check wiring and connections. If scan tool does not indicate Battery 1 parameter is 9.0-16.3 volts, go to next step.
3. Test LDCM Battery 1 positive voltage circuit for high resistance. If problem exists, repair as necessary. After repair, go to step 6 . If problem does not exist, go to next step.
4. Inspect LDCM harness connector for poor connections. If problem exists, repair as necessary. After repair, go to step 6 . If problem does not exist, go to next step.

5. Replace LDCM. Reprogram LDCM, if necessary. See POWER DOOR LOCKS - CORVETTE article in ACCESSORIES & EQUIPMENT. After repair, go to next step.
6. Using scan tool, clear DTCs. Start engine. If DTC B2282 resets, repeat test beginning at step 2 . If DTC B2282 does not reset, system is okay.

DTC B2283: RIGHT DOOR CONTROL MODULE BATTERY 1 CIRCUIT

Circuit Description

The RH Door Control Module (RDCM) has two main power feeds (high and low), and one main ground. The low power feed (battery 1) is used to provide power for the RDCM logic and internal driver operation. The high power feed (battery 2) is used to provide power for systems that draw higher amounts of current (motors, lights etc.). For most functions, the RDCM will operate properly when vehicle system voltage is between 9.0-16.0 volts. The RDCM also monitors the voltage level at battery 1 and battery 2 circuits and can determine if the voltage level received is out of range. If the voltage level is out of range in either circuit, then a malfunction is present and a DTC will set.

Conditions For Setting DTC

- The RDCM detects battery 1 voltage range under 8.5 volts or over 16.3 volts.
- Condition must be present for 2 seconds.

Action Taken When DTC Sets

- Stores a history DTC B2283 in the RDCM memory.
- This DTC can only be set as a history code even if the malfunction is current.
- No driver warning message will be displayed for this DTC.

Conditions For Clearing DTC

- The RDCM detects battery 1 voltage range between 8.5-16.3 volts for longer than 2 seconds.
- Use the IPC clearing DTCs feature.
- Use a 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. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. Turn ignition switch to RUN position. Using scan tool, observe Battery 1 parameter in Right Door Control Module (RDCM) data list. If scan tool indicates Battery 1 parameter is 8.5-16.3 volts, problem is intermittent. Check wiring

and connections. If scan tool does not indicate Battery 1 parameter is 8.5-16.3 volts, go to next step.

3. Test RDCM Battery 1 positive voltage circuit for high resistance. If problem exists, repair as necessary. After repair, go to step 6 . If problem does not exist, go to next step.
4. Inspect RDCM harness connector and instrument panel fuse block for poor connections. If problem exists, repair as necessary. After repair, go to step 6 . If problem does not exist, go to next step.
5. Replace RDCM. Reprogram RDCM, if necessary. See POWER DOOR LOCKS - CORVETTE article in ACCESSORIES & EQUIPMENT. After repair, go to next step.
6. Using scan tool, clear DTCs. Start engine. If DTC B2283 resets, repeat test beginning at step 2 . If DTC B2283 does not reset, system is okay.

DTC B2284: LEFT DOOR CONTROL MODULE BATTERY 2 CIRCUIT

Circuit Description

The LH Door Control Module (LDCM) has two main power feeds (high and low), and one main ground. The low power feed (battery 1) is used to provide power for the LDCM logic and internal driver operation. The high power feed (battery 2) is used to provide power for systems that draw higher amounts of current (motors, lights etc.). For most functions, the LDCM will operate properly when vehicle system voltage is between 9.0-16.0 volts. The LDCM also monitors the voltage level at battery 1 and battery 2 circuits and can determine if the voltage level received is out of range. If the voltage level is out of range in either circuit, then a malfunction is present and a DTC will set.

Conditions For Setting DTC

- The LDCM detects battery 1 voltage range under 9.0 volts or over 16.3 volts.
- Condition must be present for 2 seconds.

Action Taken When DTC Sets

- Stores a history DTC B2284 in the LDCM memory.
- This DTC can only be set as a history code even if the malfunction is current.
- No driver warning message will be displayed for this DTC.

Conditions For Clearing DTC

- The LDCM detects battery 2 voltage range between 9.0-16.3 volts for longer than 2 seconds.
- Use the IPC clearing DTCs feature.
- Use a 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. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. Turn ignition switch to RUN position. Using scan tool, observe Battery 1 parameter in Left Door Control Module (LDCM) data list. If scan tool indicates Battery 1 parameter is 9.0-16.3 volts, problem is intermittent. Check wiring and connections. If scan tool does not indicate Battery 1 parameter is 9.0-16.3 volts, go to next step.
3. Test LDCM Battery 1 positive voltage circuit for high resistance. If problem exists, repair as necessary. After repair, go to step 6 . If problem does not exist, go to next step.
4. Inspect LDCM harness connector and instrument panel fuse block for poor connections. If problem exists, repair as necessary. After repair, go to step 6 . If problem does not exist, go to next step.
5. Replace LDCM. Reprogram LDCM, if necessary. See POWER DOOR LOCKS - CORVETTE article in ACCESSORIES & EQUIPMENT. After repair, go to next step.
6. Using scan tool, clear DTCs. Start engine. If DTC B2284 resets, repeat test beginning at step 2 . If DTC B2284 does not reset, system is okay.

DTC B2285: RIGHT DOOR CONTROL MODULE BATTERY 2 CIRCUIT

Circuit Description

The RH Door Control Module (RDCM) has two main power feeds (high and low), and one main ground. The low power feed (battery 1) is used to provide power for the RDCM logic and internal driver operation. The high power feed (battery 2) is used to provide power for systems that draw higher amounts of current (motors, lights etc.). For most functions, the RDCM will operate properly when vehicle system voltage is between 9.0-16.0 volts. The RDCM also monitors the voltage level at battery 1 and battery 2 circuits and can determine if the voltage level received is out of range. If the voltage level is out of range in either circuit, then a malfunction is present and a DTC will set.

Conditions For Setting DTC

- The RDCM detects battery 1 voltage range under 9.0 volts or over 16.3 volts.
- Condition must be present for 2 seconds.

Action Taken When DTC Sets

- Stores a history DTC B2285 in the RDCM memory.
- This DTC can only be set as a history code even if the malfunction is current.

- No driver warning message will be displayed for this DTC.

Conditions For Clearing DTC

- The RDCM detects battery 2 voltage range between 9.0-16.3 volts for longer than 2 seconds.
- Use the IPC clearing DTCs feature.
- Use a 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. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. Turn ignition switch to RUN position. Using scan tool, observe Battery 1 parameter in Right Door Control Module (RDCM) data list. If scan tool indicates Battery 1 parameter is 9.0-16.3 volts, problem is intermittent. Check wiring and connections. If scan tool does not indicate Battery 1 parameter is 9.0-16.3 volts, go to next step.
3. Test RDCM Battery 1 positive voltage circuit for high resistance. If problem exists, repair as necessary. After repair, go to step 6 . If problem does not exist, go to next step.
4. Inspect RDCM harness connector and instrument panel fuse block for poor connections. If problem exists, repair as necessary. After repair, go to step 6 . If problem does not exist, go to next step.
5. Replace RDCM. Reprogram RDCM, if necessary. See appropriate POWER DOOR LOCKS article in ACCESSORIES & EQUIPMENT. After repair, go to next step.
6. Using scan tool, clear DTCs. Start engine. If DTC B2285 resets, repeat test beginning at step 2 . If DTC B2285 does not reset, system is okay.

DTC P0562: LOW SYSTEM VOLTAGE

Circuit Description

The PCM checks the system voltage to make sure that the voltage stays within the proper range. Damage to components, and incorrect input can occur when the voltage is out of range. The PCM monitors the system voltage over an extended length of time. If the PCM detects an excessively low system voltage, DTC P0562 will set.

Conditions For Running DTC

- System voltage 9.5-18 volts.
- Vehicle speed is above 5 MPH.

- Engine speed above 1500 RPM.

Conditions For Setting DTC

The PCM detects a system voltage below 10 volts for 5 seconds.

Action Taken When DTC Sets

- The PCM will command a message to be displayed.
- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).
- The PCM will store conditions which were present when the DTC set as Fail Records data only.

Conditions For Clearing DTC

- The PCM will command the message OFF after one trip in which the diagnostic test has been run and passed.
- 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 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. Turn ignition switch to RUN position. Using scan tool, observe Ignition 1 Signal parameter in Powertrain Control Module (PCM) data list. If scan tool indicates Ignition 1 Signal parameter is greater than 10.5 volts, go to step 6 . If scan tool does not indicate Ignition 1 Signal parameter is greater than 10.5 volts, go to next step.
3. Measure voltage at battery, and compare voltage with Ignition 1 Signal parameter. If values differ by greater than 0.5 volt, go to next step. If values differ by 0.5 volt or less, perform **TEST A: CHARGING SYSTEM TEST** under SYSTEM TESTS.
4. Test PCM battery positive voltage circuit for high resistance. See appropriate POWER DISTRIBUTION article. If problem exists, repair as necessary. After repair, go to step 7 . If problem does not exist, go to next step.
5. Inspect PCM harness connector for poor connections. If problem exists, repair as necessary. After repair, go to step 7 . If problem does not exist, go to next step.
6. Replace PCM. See **REMOVAL, OVERHAUL & INSTALLATION - CORVETTE** article in ENGINE PERFORMANCE. Program PCM. After repair, go to next step.
7. Review and record scan tool Fail Records data. Using scan tool, clear DTCs. Operate

vehicle above 5 MPH with engine speed greater than 1500 RPM. Using scan tool, observe specific information for DTC P0562 until test runs. If scan tool indicates DTC P0562 failed this ignition, repeat test beginning at step 2 . If scan tool indicates DTC P0562 passed this ignition, system is okay.

DTC P0563: HIGH SYSTEM VOLTAGE

Circuit Description

The PCM checks the system voltage to make sure that the voltage stays within the proper range. Damage to components, and incorrect input can occur when the voltage is out of range. The PCM monitors the system voltage over an extended length of time. If the PCM detects an excessively high system voltage, DTC P0563 will set.

Conditions For Running DTC

- Engine speed above 1500 RPM.
- System voltage is 9.5-18 volts.
- Vehicle speed is above 5 MPH.

Conditions For Setting DTC

The PCM detects a system voltage above 16 volts for less than 1 second.

Action Taken When DTC Sets

- The PCM will command a message to be displayed.
- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).
- The PCM will store conditions which were present when the DTC set as Fail Records data only.

Conditions For Clearing DTC

- The PCM will command the message OFF after one trip in which the diagnostic test has been run and passed.
- 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 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. Turn ignition switch to RUN position. Using scan tool, observe Ignition 1 Signal parameter in Powertrain Control Module (PCM) data list. If scan tool indicates parameter is 16 volts or less, go to step 4 . If scan tool indicates parameter is greater than 16 volts, go to next step.

3. Measure voltage at battery, and compare voltage with Ignition 1 Signal parameter. If values differ by greater than 0.5 volt, go to next step. If values differ by 0.5 volt or less, perform **TEST A: CHARGING SYSTEM TEST** under SYSTEM TESTS.
4. Replace PCM. See **REMOVAL, OVERHAUL & INSTALLATION - CORVETTE** article in ENGINE PERFORMANCE. Program PCM. After repair, go to next step.
5. Review and record scan tool Fail Records data. Using scan tool, clear DTCs. Operate vehicle above 5 MPH with engine speed greater than 1500 RPM. Using scan tool, observe specific information for DTC P0563 until test runs. If scan tool indicates DTC P0563 failed this ignition, repeat test beginning at step 2 . If scan tool indicates DTC P0563 passed this ignition, system is okay.

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 5 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 by monitoring the battery positive voltage sense circuit. Under certain operating conditions, the PCM can turn Off the generator by turning Off the 5 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 Key is in the ON position for 5 seconds.
- The engine is OFF.
- The engine is running.
- The engine speed is less than 3000 RPM.

Conditions For Setting DTC

Key ON Test

- The ECM detects a high signal voltage on the generator turn on signal circuit for at least 5 seconds.
- The engine must be started.

During the RUN test, the ECM detects a low signal voltage on the generator turn on signal circuit for at least 5 seconds.

Action Taken When DTC Sets

- The ECM sends a class 2 message to the IPC to illuminate the charge indicator and/or turn on a message.
- The ECM will not illuminate the Malfunction Indicator Lamp (MIL).
- The ECM will store the conditions present when the DTC set as Fail 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 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. Using scan tool, observe information for DTC P1637 in Engine Controls. If scan tool indicates DTC P1637 passed this ignition, problem is intermittent. Check wiring and connections. If scan tool indicates DTC P1637 failed this ignition, go to next step.
3. Turn ignition switch to OFF position. Disconnect generator harness connector. Turn ignition switch to RUN position. Measure voltage between ground and generator harness connector terminal "B" (Red wire). See **WIRING DIAGRAMS** . If voltage measures about 5 volts, go to step 5 . If voltage does not measure about 5 volts, go to next step.
4. Test Red wire for a short or an open between generator harness connector terminal "B" and Powertrain Control Module (PCM) harness connector C2 terminal No. 15. See **WIRING DIAGRAMS** . If problem exists, repair as necessary. After 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 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 - CORVETTE** article in ENGINE PERFORMANCE. Program PCM. After repair, go to next step.
8. Using scan tool, clear DTCs. Turn ignition on. Check for DTC P1637. 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 System Fault message.

Conditions For Running DTC

- No generator, CKP sensors, or CMP sensor DTCs are set.
- The key is in the RUN position.
- The engine is not running.

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

Conditions For Setting DTC

- During the key ON test, the PCM detects a PWM signal greater than 65 percent for at least 5 seconds.
- Or, during the RUN test, the PCM detects a PWM signal less than 5 percent for at least 15 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 Fail 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 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. Using scan tool, observe information for DTC P1638 in Engine Controls. If scan tool indicates DTC P1638 passed this ignition, problem is intermittent. Check wiring and connections. If scan tool indicates DTC P1638 failed this ignition, go to next step.
3. Turn ignition switch to OFF position. Disconnect generator harness connector. 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 GEN F-Terminal Signal on scan tool. If Generator Pulse Width Modulation (PWM) display is affected, go to step 5 . If Generator PWM Signal 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 Powertrain Control Module (PCM) harness connector C2 terminal No. 52. See **WIRING DIAGRAMS** . If problem exists, repair as necessary. After 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 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 - CORVETTE** 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 scan tool indicates DTC P1638 passed this ignition, system is okay.

SYSTEM TESTS

SYMPTOM INDEX

Symptom	Perform Test

Charging System Test	A
Charge Indicator Always On	B
Charge Indicator Inoperative	C
Generator Noise Diagnosis	D

TEST A: CHARGING SYSTEM TEST

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 on Driver's Information Center (DIC). If charge indicator illuminates or DIC displays a charging system message, go to next step. If charge indicator does not illuminate or DIC does not display a charging system message, problem is intermittent. Check wiring and connections.

NOTE: Green POWER light 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 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 of generator and generator metal housing. If battery voltage exists, go to step 14 . If battery voltage does not exist, go to next step.
5. Using a DVOM, measure voltage between output terminal of generator 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. Start engine and allow to idle for 30 seconds. 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 .
8. Maintain engine speed at 2500 RPM. Turn on load of carbon pile tester and increase

load until load is 85 amps. If Red DIAGNOSTIC light does not illuminate, go to next step. If Red DIAGNOSTIC light illuminates, go to step 15 .

9. Maintain engine speed at 2500 RPM and continue to operate generator at 85 amps. 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 85 amps. 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 high resistance or open in generator output circuit. See **WIRING DIAGRAMS** . After repair, go to step 16 .
12. Repair high resistance or open in ground circuit of generator. See **WIRING DIAGRAMS** . After repair, go to step 16 .
13. Disconnect J-41450-B tester harness connector from generator, but leave alligator clips connected so Green POWER light remains illuminated. Connect a jumper wire with an in-line 100-ohm resister between CS Generator Tester harness connector terminal "B" and a good 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 Electronic 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 **GENERATOR** under 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 2 .

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. Start engine. If Charge System Fault message remains on, go to next step. If Charge System Fault message does not remain on, problem is intermittent. Check wiring and connections.
3. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. Using scan tool, observe Ignition 1 Signal parameter in Powertrain Control Module (PCM) data list. If voltage is 11-15.5 volts, go to next step. If voltage is not 11-15.5 volts, perform **TEST A: CHARGING SYSTEM TEST** .
4. Turn ignition switch to OFF position. Disconnect PCM harness connector. Turn ignition switch to RUN position. If Charge System Fault message is on, go to next step. If Charge System Fault message is off, go to step 7 .

5. Inspect Instrument Panel Cluster (IPC) harness connector for poor connections. If problem exists, repair as necessary. After repair, go to step 9 . If connections are okay, go to next step.
6. Replace IPC. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repair, go to step 9 .
7. Inspect PCM harness connector for poor connections. If problem exists, repair as necessary. After repair, go to step 9 . If problem does not exist, go to next step.
8. Replace PCM. See **REMOVAL, OVERHAUL & INSTALLATION - CORVETTE** article in ENGINE PERFORMANCE. Program PCM. After repair, go to next step.
9. Operate system to verify repair. If system is not operating correctly, repeat test beginning at step 2 .

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 OFF position. Disconnect generator harness connector. Start engine. If Charge System Fault message is displayed, system is okay. If Charge System Fault message is not displayed, go to next step.
3. Replace Instrument Panel Cluster (IPC). See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.

TEST D: GENERATOR NOISE DIAGNOSIS

1. Test generator for proper operation. See **TEST A: CHARGING SYSTEM TEST** . After inspection, go to next step.
2. Start engine. Verify that generator noise can be heard. Turn ignition 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 exists, go to next step.
3. Turn ignition 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 generator 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 definite generator problems do not exist, ensure all other possible sources of noise are eliminated. If all possibilities have been eliminated, replace generator. See **GENERATOR** under 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.

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 18 .
2. Compare battery Cold Cranking Amperage (CCA) and Reserve Capacity (RC) rating to Original Equipment (OE) See **BATTERY SPECIFICATIONS** table. If battery meets or exceeds specifications, go to next step. If battery does not meet or exceed specifications, go to step 18 .
3. 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 5 .
4. 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 6 . If torque is less than 88 INCH lbs. (10 N.m), go to next step.
5. Disconnect negative battery cable and go to step 9 .
6. Disconnect negative battery cable. Inspect battery and cable terminals for corrosion and defects. If problem exists, repair as necessary. After repair, go to next step.
7. 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 9 .
8. 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 10 . If torque is less than 88 INCH lbs. (10 N.m), go to step 11 .
9. Disconnect positive battery cable and go to step 11 .
10. 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.
11. 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. If problem exists, repair or replace as necessary. If battery and cables terminals are clean and in good condition, go to next step.
12. Connect positive battery cable to battery and tighten bolt to 13 ft. lbs. (18 N.m). After repair, go to next step.
13. Connect negative battery cable to battery and tighten bolt to 13 ft. lbs. (18 N.m). After repair, go to next step.
14. Ensure all electrical loads are off. Follow manufacturers instructions and install Battery Tester (J-42000) to vehicle battery. Follow any instructions displayed on Battery Tester, EXCEPT add 100 to AGM Battery's CCA rating when prompted to enter CCA into tester. DO NOT make this modification for other battery types. If Battery Tester passed battery, go to next step. If Battery Tester did not pass battery, go to step 16 .
15. Press CODE button on Battery Tester. Record displayed code on vehicle repair order for warranty purposes. Go to next step.
16. If J-42000 battery tester displayed result of GOOD-RECHARGE or CHARGE & RETEST, charge battery. If J-42000 battery tester did not display result of GOOD-

RECHARGE or CHARGE & RETEST, go to next step.

NOTE: If battery was tested in vehicle with battery cables connected, disconnect cables and install proper adapters. Repeat test according to tester instructions for testing out of vehicle. Replace battery only if the second test shows a REPLACE or BAD CELL-REPLACE result. Use test code from second test.

17. Press CODE button on Battery Tester. Record displayed code on vehicle repair order for warranty purposes. Replace battery.
18. Replace battery.

BATTERY SPECIFICATIONS

BATTERY SPECIFICATIONS

Application	Specification
Cold Cranking Amps	500
Reserve Capacity Rating	80 Minutes

ENGINE ELECTRICAL DIAGNOSTIC SYSTEM CHECK

1. Perform battery inspection test. See **BATTERY TESTING & INSPECTION** under ON-VEHICLE TESTING. After inspection, 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 to 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. Using scan tool, attempt communication with each module on class 2 serial data circuit. If scan tool communicates with all modules, go to next step. If scan tool does not communicate with all modules, perform appropriate test. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
4. Using scan tool, select DISPLAY DTCs function for each module. Record all displayed DTCs, DTC status, and module which set DTC. If scan tool displays DTCs, go to next step. If scan tool does not display DTCs, repair by charging system by symptom. See **SYMPTOM INDEX** table under SYSTEM TESTS.
5. If scan tool displays DTCs which begin with "U", perform appropriate test. 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 displays DTC B1000, perform appropriate test. See appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT. If scan tool does not display DTC B1000, perform appropriate test in accordance with DTC 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 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

Removal & Installation

Remove drive belt. Disconnect negative battery cable. Disconnect generator harness connector. Slide boot back along cable, and remove engine harness cable nut. Remove engine harness terminal from generator. Remove mounting bolts. Remove generator. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

OVERHAUL

NOTE: Generator is serviced by replacement only.

GENERATOR SPECIFICATIONS

GENERATOR OUTPUT RATING

Generator	Rated AMP Output	Load Test AMP Output
A14VI	110	85

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Generator Bolt	37 (50)
Generator Bracket Bolt	37 (50)
Generator Shaft Nut	55 (75)
	INCH Lbs. (N.m)
Engine Harness Cable Nut	124 (14)

WIRING DIAGRAMS

For system wiring diagrams, see **SYSTEM WIRING DIAGRAMS** in ELECTRICAL.