

2001 STARTING & CHARGING SYSTEMS**Generators & Regulators - Catera****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 **SERVICE PRECAUTIONS** and **DISABLING & ACTIVATING AIR BAG SYSTEM** in appropriate **AIR BAG RESTRAINT SYSTEMS** article.

Vehicle is equipped with a Bosch generator rated at 120 amps. Generator includes a stator, rectifier bridge, and rotor with slip rings and brushes. Generator operates with 2 wire connections and a ground path through mounting bracket. First wire connection is C1 (output) terminal. This terminal must be connected to battery during operation. Second wire connection is at terminal C2 of the generator. A built-in regulator incorporates fault detection circuitry, supplying ground at terminal C2 through circuit PM1 and connector C102 to charge indicator light when high or low voltage is detected. Normal range is 9.5-15.0 volts. See **GENERATOR SPECIFICATIONS**.

ADJUSTMENTS**BELT TENSION**

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

TROUBLE SHOOTING

NOTE: For additional trouble shooting information, see **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**.

ON-VEHICLE TESTING

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.

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** table. If battery meets or exceeds specifications, go to next step. If battery does not meet or exceed specifications, go to step 19 .

BATTERY SPECIFICATIONS

Application	Specification
Cold Cranking Amps	600 Amps
Reserve Capacity Rating	100 Minutes

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 next step.
5. Turn switch to LOCK 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. If problem exists, repair as necessary. After repair, 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 less than 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. If problem exists, 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.

SELF-DIAGNOSTIC SYSTEM

NOTE: Diagnostic procedures are written specifically for use with GM Tech 1 or Tech 2 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.

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 BODY CONTROL MODULES - CATERA article.
3. Turn ignition switch to RUN position. Using scan tool, attempt communication with Body Control Module (BCM), Instrument Panel Module (IPM), Memory Seat Module (MSM), OnStar (ONS), Radio (IRC) and Powertrain Control Module (PCM). If scan tool communicates with all modules, go to next step. If scan tool does not communicate with all modules, repair communications concern. See BODY CONTROL MODULES - CATERA article.
4. Using scan tool, select DISPLAY DTCs function for each module. Record all displayed DTCs, DTC status, and module which set the DTC. If scan tool displays any DTCs, go to next step. If scan tool does not any display DTCs, repair charging system by symptom. See **SYMPTOM INDEX** table under SYSTEM TESTS.
5. If scan tool does not display DTCs which begin with "U", go to next step. If scan tool displays DTCs which begin with "U", repair communications concern. See BODY CONTROL MODULES - CATERA article.
6. If scan tool displays DTCs 055, B1556 or B1558, perform appropriate test. See BODY CONTROL MODULES - CATERA article. If scan tool does not display DTCs 055, B1556 or B1558, perform appropriate test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS**.

DIAGNOSTIC TROUBLE CODE DEFINITIONS

DIAGNOSTIC TROUBLE CODE DEFINITIONS

DTC ⁽¹⁾	Description
B1982	Battery/Source Voltage High
B1983	Battery/Source Voltage Low
P0560	Voltage Out Of Range

(1) Code listed in this table are only for testing covered in this article. For a complete list of DTCs, see BODY CONTROL MODULES - CATERA article.

DIAGNOSTIC TESTS

DTC B1982: BATTERY/SOURCE VOLTAGE HIGH

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 Battery Voltage parameter in affected module data list. If Battery Voltage parameter is greater than 15.5 volts, go to **TEST A: CHARGING SYSTEM TEST** under SYSTEM TESTS. If Battery Voltage parameter is 15.5 volts or less, go to next step.
3. Replace affected module. See appropriate REMOVAL & INSTALLATION in BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT. Perform setup procedure for affected module, if necessary. After repair, go to next step.

- Using scan tool, clear DTCs. Start engine. If DTC B1982 resets, repeat test beginning at step 2 . If DTC B1982 does not reset, system is okay.

DTC B1983: BATTERY/SOURCE VOLTAGE LOW

- 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.
- 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 Voltage parameter in affected module data list. If scan tool indicates Battery Voltage parameter is 9.5 volts, go to step 7 . If scan tool indicates Battery Voltage parameter is not 9.5 volts, go to next step.
- Turn ignition off. Disconnect affected module harness connector. See COMPONENT LOCATIONS in BODY CONTROL MODULES - CATERA article in ACCESSORIES & EQUIPMENT. Measure voltage from battery voltage circuit to ground circuit of affected module. If voltage is about 9.5 volts, perform **TEST A: CHARGING SYSTEM TEST** under SYSTEM TESTS. If voltage is not about 9.5 volts, go to next step.
- Measure voltage from battery circuit of affected module to a good ground. If voltage is about 9.5 volts, go to step 6 . If voltage is not about 9.5 volts, go to next step.
- Test battery voltage circuit of affected module for high resistance or an open. If problem exists, repair as necessary. After repair, go to step 9 . If problem does not exist, go to step 7 .
- Test ground circuit of affected module for high resistance or an open. If problem exists, repair as necessary. After repair, go to step 9 . If problem does not exist, go to step 8 .
- Inspect harness connector of affected module for poor connections. Repair as necessary, then go to step 9 . If connections are okay, go to next step.
- Replace affected module. See appropriate REMOVAL & INSTALLATION in BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT. Perform setup procedure for affected module, if necessary. After repair, go to next step.
- Using scan tool, clear DTCs. Start engine. If DTC B1983 resets, repeat test beginning at step 2 . If DTC B1983 does not reset, system is okay.

DTC P0560: VOLTAGE OUT OF RANGE

- 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.
- 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 Voltage parameter in Engine Control Module (ECM) data list. If scan tool indicates parameter is greater than 11 volts, go to step 6 . If scan tool indicates parameter is 11 volts or less, go to next step.
- Using scan tool, compare Battery Voltage parameter in ECM data list with Battery Voltage parameter in BCM data list. If values differ by greater than .8 volt, go to next step. If values do not differ by greater than .8 volt, perform **TEST A: CHARGING SYSTEM TEST** under SYSTEM TESTS.
- Test ECM battery positive circuit for high resistance. See appropriate POWER DISTRIBUTION article. If problem exists, repair circuit as necessary. After repair, go to step 7 . If problem does not exist, go to next step.
- Inspect ECM 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.
- Replace ECM. See REMOVAL, OVERHAUL & INSTALLATION - CARS article in ENGINE PERFORMANCE. Program ECM. After repair, go to next step.
- Review and record scan tool Fail Records data. Using scan tool, clear DTCs. Operate vehicle at less than 25

MPH with engine speed greater than 1500 RPM. Using scan tool, observe Specific DTC Information for DTC P0560 until test runs. If scan tool indicates DTC P0560 failed this ignition cycle, repeat test beginning at step 2 . If scan tool indicates DTC P0560 passed this ignition cycle, 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

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 electrical loads. Connect scan tool to DLC. DLC is located under driver's side of instrument panel. Start engine. Using scan tool, observe Battery Voltage parameter in Electronic Control Module (ECM) data list. If voltage is 11-15.5 volts, problem is intermittent. Check wiring and connections. If voltage is not 11-15.5 volts, go to next step.
3. Turn ignition switch to OFF position. Connect charging system tester to battery. Operate engine at 2500 RPM. Adjust carbon pile as necessary in order to obtain maximum current output. If current output is not 74-94 amps, go to next step. If current output is 74-94 amps, go to step 9 .
4. Maintain engine speed at 2500 RPM and continue to operate generator at load test value. Measure voltage drop between generator output terminal and battery positive 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 6 .
5. Maintain engine speed at 2500 RPM and continue to operate generator at load test value. Measure voltage drop between battery negative terminal and generator metal housing. If voltage drop is 0.5 volt or less, go to step 8 . If voltage drop is greater than 0.5 volt, go to step 7 .
6. Check Red wire between generator output terminal and battery positive terminal for high resistance or poor connections. See **WIRING DIAGRAMS** . If problem exists, repair as necessary. After repair, go to step 9 . If problem does not exist, go to next step.
7. Repair high resistance or poor connection in ground circuit between battery negative terminal and generator housing. See **WIRING DIAGRAMS** . After repair, go to step 9 .
8. Replace generator. See **GENERATOR** under REMOVAL & INSTALLATION.
9. 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 indicator light remains illuminated, go to next step. If charge indicator light does not remain illuminated, problem is intermittent. Check wiring and connections.
3. Turn ignition switch to OFF position. Disconnect charge indicator light circuit from generator. Turn ignition switch to RUN position. If charge indicator light remains illuminated, go to next step. If charge indicator light does not remain illuminated, perform **TEST A: CHARGING SYSTEM TEST** .
4. Test charge indicator light circuit for a short to ground. See **WIRING DIAGRAMS** . If problem exists,

repair as necessary. After repair, go to step 7 . If problem does not exist, go to next step.

5. Inspect Instrument Panel Cluster (IPC) 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 IPC. See ANALOG INSTRUMENT PANELS - CATERA article. After repair, go to next step.
7. 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 RUN position. If charge indicator light illuminates, problem is intermittent. Check wiring and connections. If charge indicator light does not illuminate, go to next step.
3. Turn switch to OFF position. Disconnect charge indicator light circuit from generator. Turn ignition switch to RUN position. If charge indicator light illuminates, perform **TEST A: CHARGING SYSTEM TEST** . If charge indicator light does not illuminate, go to next step.
4. Test charge indicator light circuit for a high resistance or an open. See **WIRING DIAGRAMS** . If problem exists, repair circuit as necessary. After repair, go to step 7 . If problem does not exist, go to next step.
5. Inspect Instrument Panel Cluster (IPC) harness connector for poor connections. If problem exists, repair as necessary. After repair, go to step 7 . If connections are okay, go to next step.
6. Replace IPC. See ANALOG INSTRUMENT PANELS - CATERA article. After repair, go to next step.
7. 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 ignition switch to OFF position. Disconnect generator 4-pin harness connector. Start engine, and 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. After inspection, go to next step.
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 **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 .

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 SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM in appropriate AIR BAG RESTRAINT SYSTEMS article.

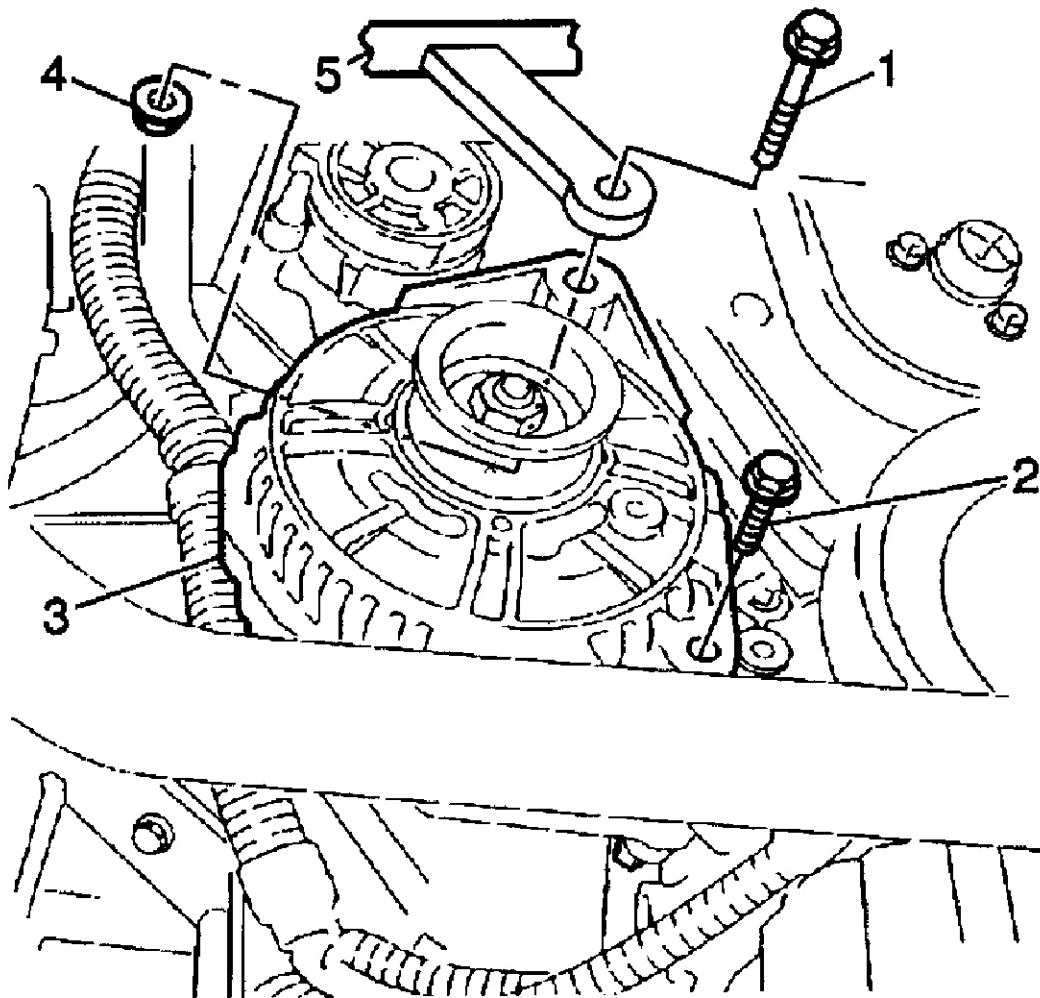
CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

GENERATOR

Removal

NOTE: Before servicing any electrical component, the ignition key must be in the OFF or LOCK position and all electrical loads must be OFF, unless instructed otherwise in these procedures. If a tool or equipment could easily come in contact with a live exposed electrical terminal, also disconnect the negative battery cable. Failure to follow these precautions may cause personal injury and/or damage to the vehicle or its components.

1. Disconnect the battery negative cable.
2. Remove the intake air resonator.
3. Remove the drive belt.
4. Remove the coolant heater, if equipped.
5. Raise and suitably support the vehicle.
6. Remove the generator cooling duct
7. Remove the field coil terminal nut and lead (1). See **Fig. 1** .
8. Remove the battery terminal nut and lead (2).
9. Remove the upper mounting nut (4), lower mounting nut and lower mounting bolt (2).
10. Push out the upper mounting bolt through the generator and the bracket.
11. Lower the vehicle.
12. Remove the generator (3).



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Fig. 1: Removing & Installing Generator
 Courtesy of GENERAL MOTORS CORP.

Installation

1. Position the generator (3) in the mounting position. See **Fig. 1**.
2. Raise the vehicle on a suitable support.
3. Insert the upper mounting bolt (1) into the generator.
4. Install the lower mounting bolt (2).
5. Install the lower mounting nut. Tighten the lower mounting bolt and nut to 35 N.m (26 lb ft).
6. Install the upper mounting nut (4). Tighten the upper mounting bolt and nut to 40 N.m (30 lb ft).
7. Install the generator cooling duct.
8. Install the field coil terminal lead and nut (1). Tighten the nut to 3.5 N.m (31 lb in).
9. Install the battery terminal lead and nut (2). Tighten the nut to 8 N.m (71 lb in).
10. Lower the vehicle.
11. Install the coolant heater, if equipped.
12. Install the drive belt.
13. Install the intake air resonator.
14. Connect the negative battery cable. Tighten the negative battery cable nut to 13 N.m (115 lb in).
15. Reprogram all applicable accessories as required.

2001 Cadillac Catera

2001 STARTING & CHARGING SYSTEMS Generators & Regulators - Catera

OVERHAUL

NOTE: Only regulator/brush kit and rear cover are serviceable. Otherwise, generator is replaced as a unit.

GENERATOR SPECIFICATIONS**GENERATOR USAGE/AMP OUTPUT RATING**

Application	Generator	Rated AMP Output	Load Test AMPS
Catera	Bosch NC	120	84

TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS**

Application	Ft. Lbs. (N.m)
Generator Mounting Nuts	30 (40)
	INCH Lbs. (N.m)
Battery Output BAT Terminal Nut	53 (6)
Generator Cooling Duct Screw	9 (1)
Generator Field Coil Terminal Lead Nut	31 (3.5)
Intake Air Resonator Nut	27 (3)
Positive Battery Cable Nut	71 (8)

WIRING DIAGRAMS

2001 Cadillac Catera

2001 STARTING & CHARGING SYSTEMS Generators & Regulators - Catera

Fig. 2: Charging System Wiring Diagram (Catera)

2001 Cadillac Catera

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