

ALTERNATOR & REGULATOR - TESTING & OVERHAUL

Article Text

1995 Cadillac Concours

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Friday, November 28, 2003 07:32PM

ARTICLE BEGINNING

1995 STARTING & CHARGING SYSTEMS

General Motors Corp. - Alternators & Regulators

"E" Body - Cadillac: Eldorado

"K" Body - Cadillac: Concours, DeVille, Seville

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 the COMPUTER RELEARN PROCEDURES article in the GENERAL INFORMATION section before disconnecting battery.

DESCRIPTION

Charging System (CS) series generators include a delta stator, rectifier bridge, and rotor with slip rings and brushes. A built-in regulator incorporates fault detection circuitry. A conventional pulley and external fan are used to cool slip ring end frame, rectifier bridge and regulator.

Most CS series generators operate with 2 wire connections and a ground path through the mounting bracket. The first wire connection is the BAT (output) terminal. This terminal must be connected to the battery during operation. The second wire connection is through the charge indicator light or an external resistor to terminal "L" of the regulator. This connection provides initial excitation at start-up.

Three other regulator terminals, "P", "F/I" and "S", are provided for optional use. Terminal "P" is connected to the stator and may be connected to a tachometer. Terminal "F/I" provides an alternative method for turning on the generator without going through the charge indicator light or external resistor. Terminal "S" may be used to sense electrical system voltage at a remote point on the vehicle. If terminal "S" is not used, the regulator senses internal generator voltage.

Some CS144 models have 3 auxiliary phase terminals which supply current to operate heated windshields if equipped.

No periodic maintenance is necessary. CS144 generators, except for those with 3 auxiliary phase terminals, can be disassembled and repaired. CS144 generators with 3 auxiliary phase terminals, are serviced by replacement only.

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 of off-time. At low speeds, with higher electrical loads, on-time may be 90 percent of off-time. See GENERATOR USAGE/AMP OUTPUT RATING table.

GENERATOR USAGE/AMP OUTPUT RATING TABLE

Application	Generator	Generator RPO Code	Rated AMP Output
4.6L & 4.9L .. (1) CS144 GEN II	KG9	140	

(1) - Heated windshield (RPO C50) and 4.6L engine generators are serviced by replacement of complete assembly.

TROUBLE SHOOTING

NOTE: See the TROUBLE SHOOTING - BASIC PROCEDURES article in the GENERAL INFORMATION section.

ADJUSTMENTS

NOTE: No adjustment or maintenance is required on generator assembly. Regulator voltage is preset and no adjustment is possible. Drive belt tension is controlled by a belt tensioner.

ON-VEHICLE TESTING

NOTE: Generators are controlled by Powertrain Control Module (PCM) or Instrument Panel Cluster (IPC). For system and related trouble code diagnosis, see the appropriate ALTERNATORS & REGULATORS - SELF-DIAGNOSTICS article.

ALTERNATOR & REGULATOR - SELF-DIAGNOSIS - DeVille
ALTERNATOR & REGULATOR - SELF-DIAGNOSIS - All Others

NOTE: Only CS144 generators without auxiliary phase terminals are repairable. CS144 generators with auxiliary phase terminals are serviced as a complete assembly only.

CHARGE INDICATOR LIGHT

NOTE: Perform this test only if charge indicator light does not illuminate when ignition is turned on, or does not go out after engine is started.

CAUTION: DO NOT run engine with generator output terminal disconnected from battery.

1) Ensure battery is fully charged. Visually check generator belt and wiring. Turn ignition switch to ON position (engine not running). Charge indicator light should illuminate. If charge indicator light does not illuminate, go to next step. If charge indicator light illuminates, go to step 4).

2) Turn ignition off. Disconnect generator harness connector. Using a fused (5-amp) jumper wire, connect terminal "L" of generator harness connector to ground. Turn ignition on (engine not running). If charge indicator light illuminates, replace or repair generator.

3) If charge indicator light still does not illuminate, check for open in circuit between generator terminal "L" and ignition switch. Also check charge indicator light bulb. See WIRING DIAGRAM.

4) Start engine and run at 1500 RPM. Charge indicator light should go off. If charge indicator light remains illuminated, turn ignition off. Disconnect generator harness connector. If charge indicator light goes out, replace or repair generator. If charge indicator light remains illuminated, check for short to ground in generator terminal "L" circuit wiring harness.

UNDERCHARGED OR OVERCHARGED BATTERY

NOTE: Ensure battery is fully charged and in good condition before performing the following steps. If battery is not at (or near) a fully charged condition, or if condition is questionable, substitute a known good battery before proceeding.

1) Ensure battery is fully charged. Turn ignition and all accessories off. Using a voltmeter, measure and record battery voltage for use in step 4). Disconnect generator harness connector. Turn ignition switch to ON position (engine not running).

2) Connect negative lead of a voltmeter to a good engine ground. Connect positive voltmeter lead to terminal "L" of generator harness connector. On models with gauges, also connect positive voltmeter lead to terminal F/I of generator harness connector. See WIRING DIAGRAM.

3) On all models, near battery voltage should be present at terminal "L" or F/I (gauges only). If battery voltage is not present, repair open circuit between generator connector terminal and battery. If battery voltage is present, reconnect generator harness connector and go to next step.

4) Start engine and slowly increase speed to approximately 1500 RPM. Using a voltmeter, measure voltage between battery terminals. If voltage is greater than 16 volts, or less than voltage

As measured in step 1), replace or repair generator. If voltage is

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less than 16 volts, or greater than voltage as measured in step 1), go to next step.

CAUTION: To prevent injury and/or damage to vehicle, disconnect negative battery cable before connecting or disconnecting a series type ammeter to generator.

CAUTION: Carbon pile testing is part of this procedure. To avoid battery explosion, turn carbon pile OFF before connecting to or disconnecting from vehicle battery.

5) Disconnect negative battery cable. Install ammeter to voltmeter. Connect voltmeter to generator output (BAT) terminal. Connect negative battery cable. With load off, connect carbon pile load tester across battery terminals. Run engine at approximately 1500 RPM, turn accessories on and load battery with carbon pile load until maximum generator output is reached. Adjust carbon pile to maintain 13 volts or more. Measure amp output.

6) If amp output is within 15 amps of rated output, generator is okay. If amp output is not within 15 amps of rated output, repair or replace generator. See GENERATOR USAGE/AMP OUTPUT RATING table.

BENCH TESTING

NOTE: After repairs, use bench testing to verify operation of CS144 generator without auxiliary phase terminals.

GENERATOR OUTPUT TEST

CAUTION: Carbon pile testing is part of this procedure. To avoid battery explosion, turn carbon pile OFF before connecting to or disconnecting from test stand battery.

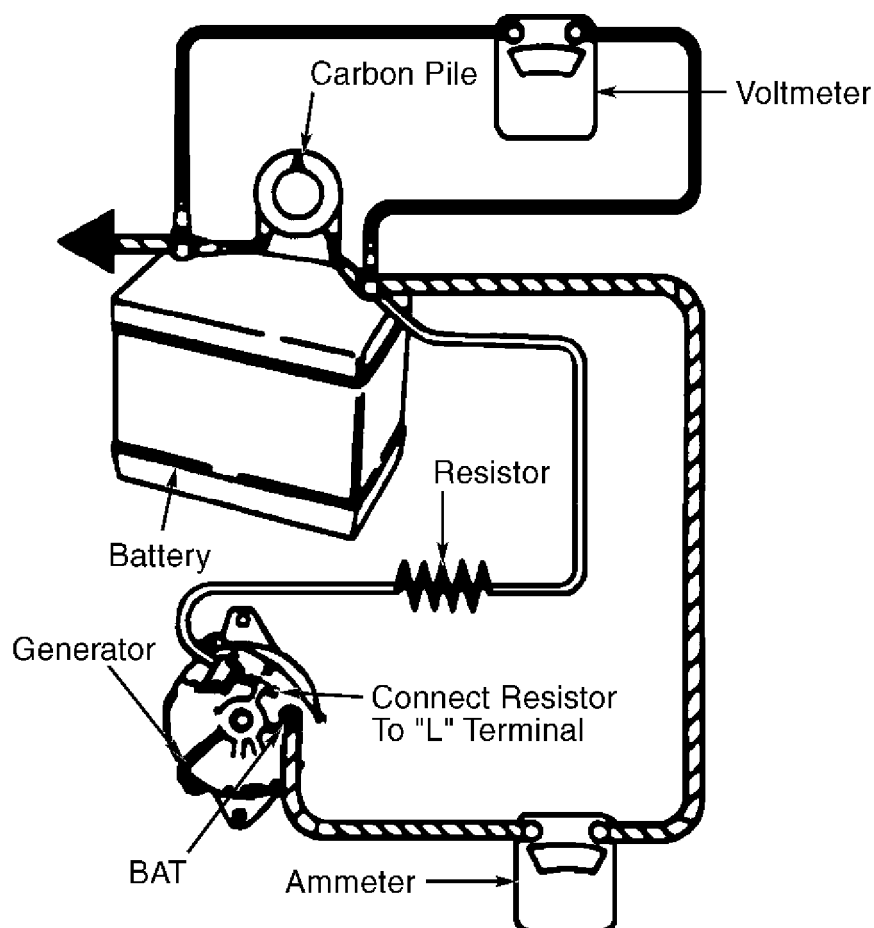
CS144 (Without Auxiliary Phase Terminals)

1) Mount generator on test stand. Set test stand controls to turn generator clockwise. Ensure ground polarity of generator and battery are the same. Ensure battery is fully charged. Connect voltmeter, ammeter and carbon pile (in OFF position). Connect 30-500 ohm resistor between battery and terminal "L" of generator. See Fig. 1.

2) Slowly increase generator speed while observing voltmeter. If output is uncontrolled and increases to greater than 16 volts, rotor field coil is shorted and/or regulator is defective. A shorted rotor field coil can cause regulator failure. Replace or repair generator.

3) If voltage is less than 16 volts, increase speed and adjust carbon pile to obtain maximum generator output. Maintain voltage greater than 13 volts. If amp output is within 15 amps of ALTERNATOR

rated output, generator is okay. If amp output is not within 15 amps of rated output, replace or repair generator. See GENERATOR USAGE/AMP OUTPUT RATING table.



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Fig. 1: Bench Testing Generator (CS144)
Courtesy of General Motors Corp.

ROTOR TEST

NOTE: Install NEW bearing at slip ring end whenever generator is reassembled. When disassembling generator, carefully note locations of insulated and uninsulated screws.

CS144 (Without Auxiliary Phase Terminals)

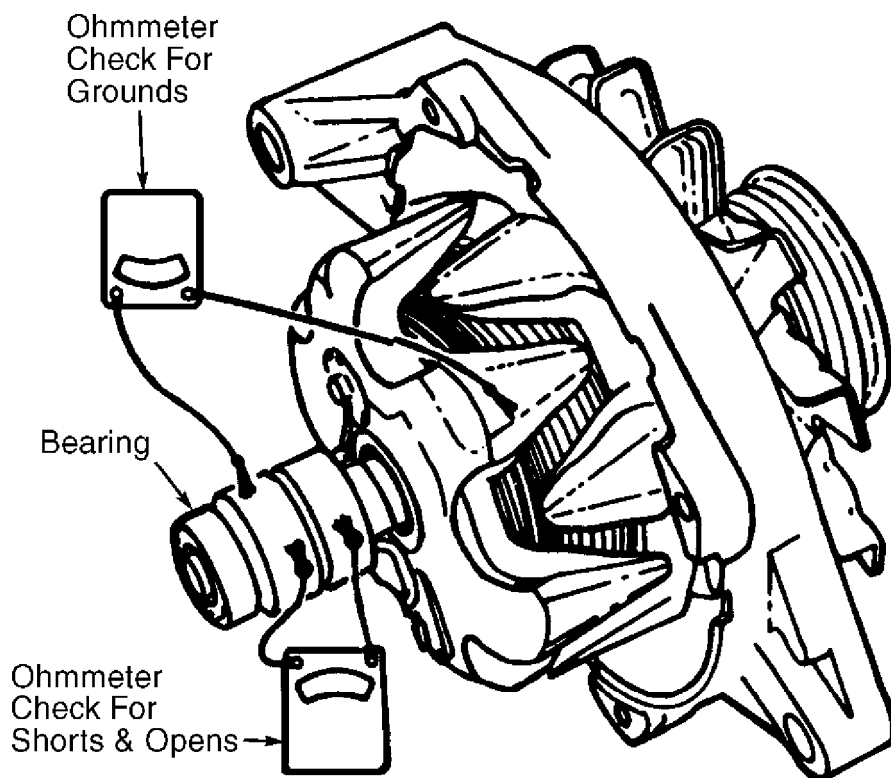
1) Scribe end frames to facilitate reassembly. Remove through-bolts and separate end frames.

2) With ohmmeter set to its lowest range, measure coil resistance between slip rings. See Fig. 2. Replace rotor if coil resistance is not 1.7-2.1 ohms at 70°F (21°C).

3) With ohmmeter set to its highest range, check for grounds between either slip ring and rotor pole piece. See Fig. 2. If reading is not close to infinite, replace rotor.

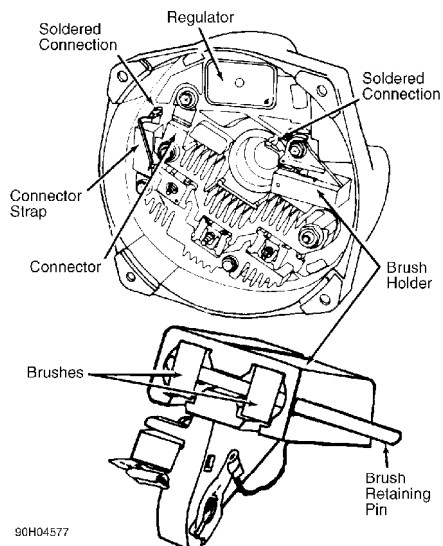
ALTERNATOR

4) To reassemble generator, reverse disassembly procedure. Retain brushes with brush retaining pin during reassembly. See Fig. 3. Remove retaining pin after tightening through-bolts.



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Fig. 2: Testing Generator Rotor (CS144)
Courtesy of General Motors Corp.



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Fig. 3: Removing Brushes (CS144)
Courtesy of General Motors Corp.

STATOR TEST

NOTE: Install NEW bearing at slip ring end whenever generator is reassembled.

CS144 (Without Auxiliary Phase Terminals)

1) Scribe end frames to facilitate reassembly. Remove through-bolts and separate end frames. Remove stator lead attaching nuts and remove stator.

2) With ohmmeter set to its highest range, ensure coil is not grounded to stator core. See Fig. 4. Ohmmeter should indicate infinite resistance. If ohmmeter does not indicate infinity, replace stator. Stator cannot be checked for opens or shorts with ohmmeter.

3) To reassemble generator, reverse disassembly procedure. Retain brushes with brush retaining pin during reassembly. See Fig. 3. Remove retaining pin after tightening through-bolts.

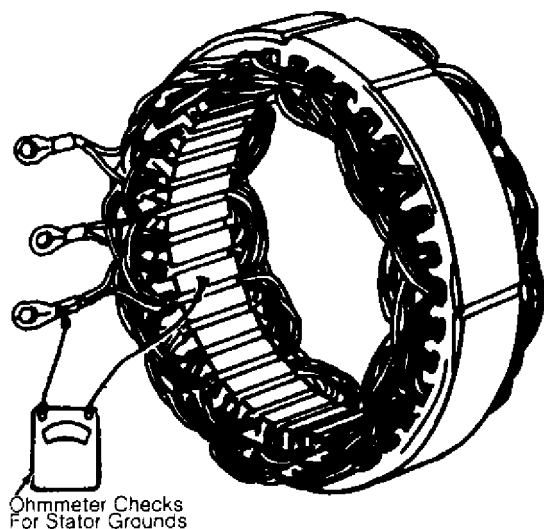


Fig. 4: Testing Generator Stator (CS144)
Courtesy of General Motors Corp.

RECTIFIER BRIDGE TEST

NOTE: Install NEW bearing at slip ring end whenever generator is reassembled.

CS144 (Without Auxiliary Phase Terminals)

1) Scribe end frames to facilitate reassembly. Remove through-bolts and separate end frames. Remove stator. Connect ohmmeter between grounded heat sink and any of 3 grounded flat metal rectifier bridge terminal connectors and note reading. See Fig. 5.

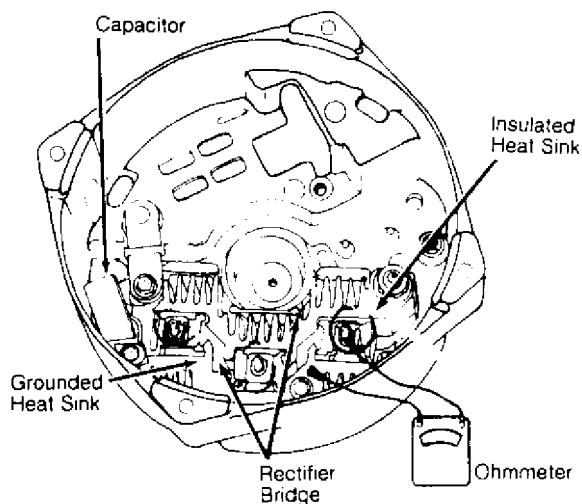


Fig. 5: Testing Generator Rectifier Bridge (CS144)
Courtesy of General Motors Corp.

2) Reverse meter leads. If both readings are the same, replace rectifier bridge. Repeat test between grounded heat sink and other 2 flat metal terminal connectors. If readings are the same when leads are reversed at either connection, replace rectifier bridge.

3) Repeat test between insulated heat sink and its 3 flat rectifier bridge metal connectors. Replace rectifier bridge if test readings are the same when leads are reversed at any test connection.

4) To reassemble generator, reverse disassembly procedure. Retain brushes with brush retaining pin during reassembly. See Fig. 3. Remove retaining pin after tightening through-bolts.

OVERHAUL

NOTE: Replacement parts are not available for CS144 generators with auxiliary phase terminals. If generator is defective, install a NEW unit. CS144 generators without auxiliary terminals may be disassembled for repair.

BRUSHES & REGULATOR

NOTE: Install new bearing at slip ring end whenever generator is reassembled.

CS144 (Without Auxiliary Phase Terminals)

1) Scribe end frames to facilitate reassembly. Remove through-bolts and separate end frames. Unsolder brush connections. Remove attaching screws and connectors. Remove regulator and brush holder. Clean NEW brushes with soft dry cloth.

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2) Put brushes in holder and hold with brush retaining pin.

See Fig. 3. Install brush holder into generator by reversing removal procedure. To reassemble generator, reverse disassembly procedure. Remove brush retainer pin after tightening through-bolts.

DRIVE-END BEARING

NOTE: Install NEW bearing at slip ring end whenever generator is reassembled.

CS144 (Without Auxiliary Phase Terminals)

1) Scribe end frames to facilitate reassembly. Remove through-bolts and separate end frames. Remove shaft nut while holding rotor with hex wrench inserted into shaft end. Push rotor from housing. Remove retainer plate and press bearing out. On some generators, drive end bearing cannot be replaced.

2) To install NEW bearing, press against outer race until bearing seats. Bearing is sealed; no added lubricant is required. Assemble retainer and press rotor into end frame. Tighten shaft nut to 75 ft. lbs. (102 N.m).

3) To reassemble generator, reverse disassembly procedure. Retain brushes with brush retaining pin during reassembly. See Fig. 3. Remove retaining pin after tightening through-bolts.

WIRING DIAGRAM

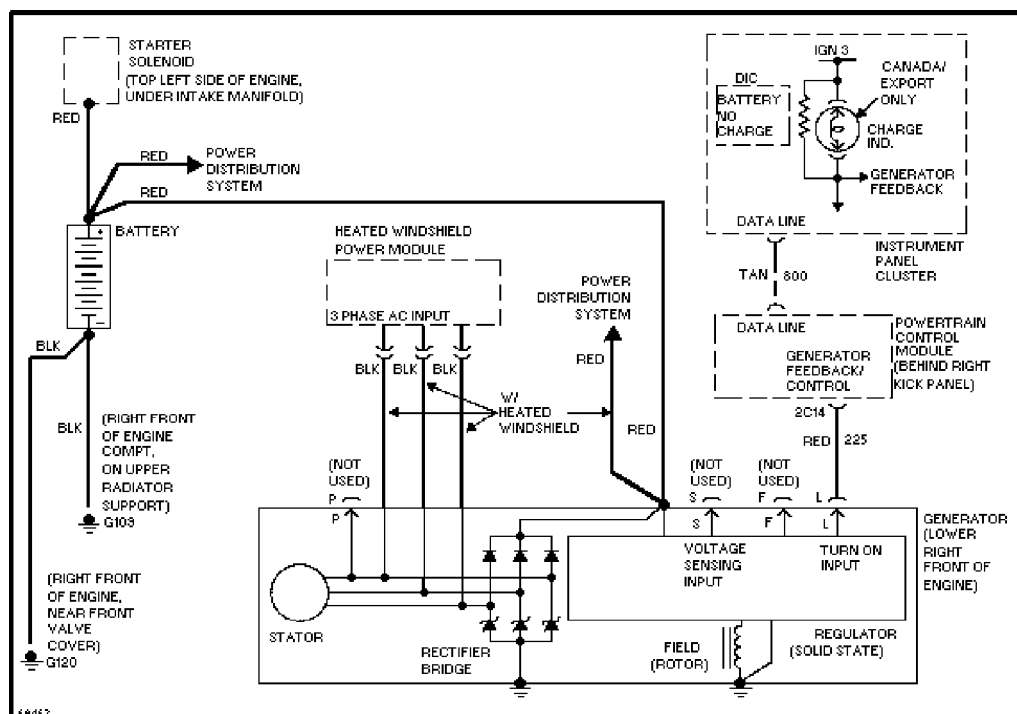


Fig. 6: Charging System Wiring Diagram (Concours, Eldorado, Seville)

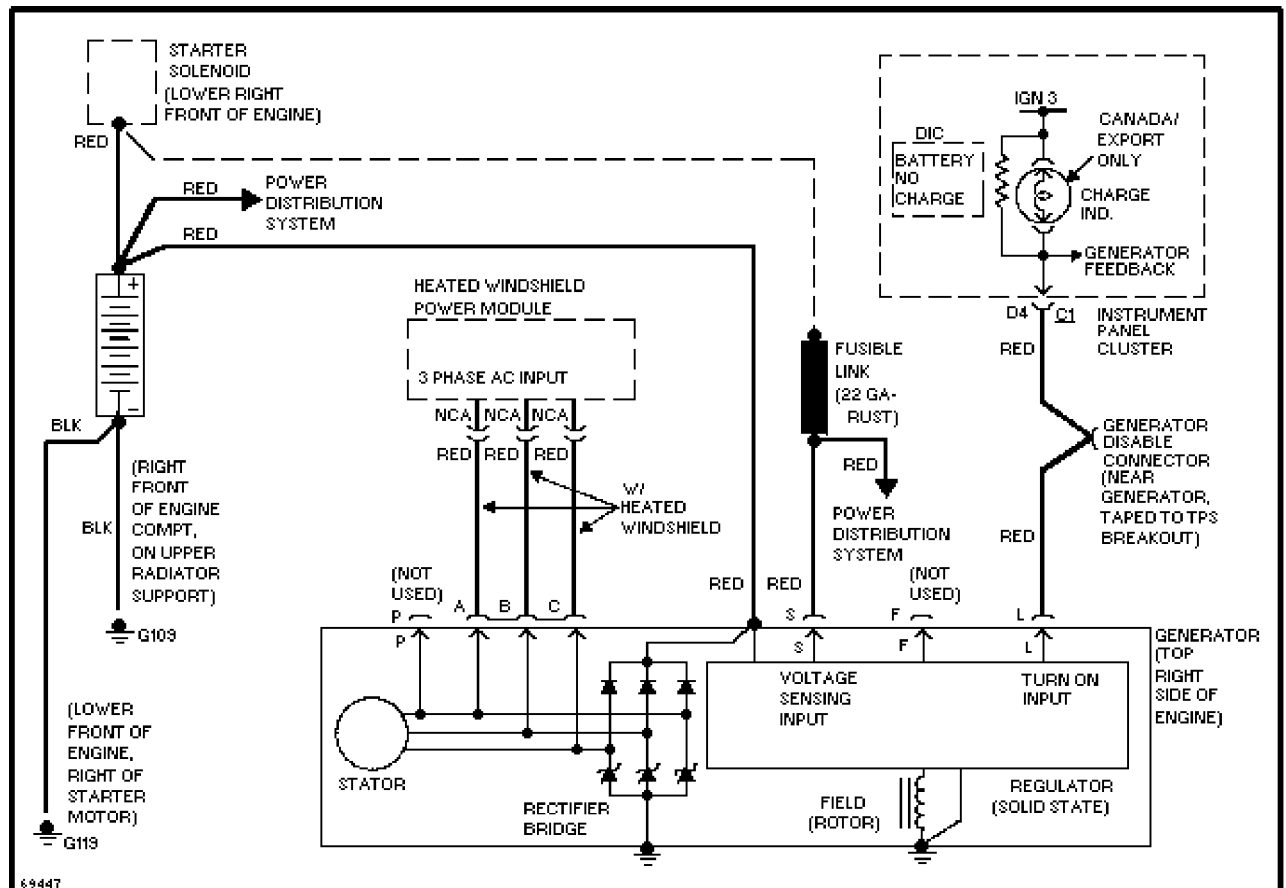


Fig. 7: Charging System Wiring Diagram (DeVille)

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