

DELCO-REMY WITH INTEGRAL REGULATOR

Chevrolet
GMC
International Harvester
Jeep

DESCRIPTION

The Delcotron SI integral regulator alternator features a solid state regulator mounted inside the alternator. General Motors vehicles use the 15 SI model, Jeep and International Harvester use the 10 SI model. These alternators are available with different outputs at idle and different maximum outputs. Delcotrons consist of two end frame assemblies, rotor, stator, brushes, slip rings and diodes. Rotor is supported in drive end frame by ball bearings and in slip ring end frame by roller bearings. Bearings contain enough lubrication to eliminate periodic lubricating.

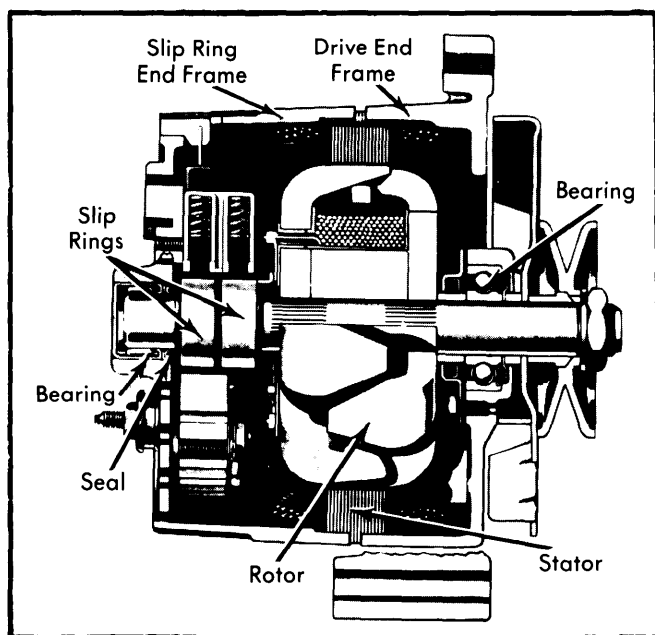


Fig. 1 Cross Sectional View Showing Internal Components of Delcotron Integral Regulator Alternator

IDENTIFICATION

Alternator rated ampere output is stamped on alternator case ("42A", "61A", etc.).

OPERATION

Two brushes carry current through the slip rings to the field coil mounted on the rotor. The stator windings are assembled on the inside of a laminated core that forms part of the alternator frame. A rectifier bridge connected to the stator windings contains 6 diodes (three positive and three negative) molded into an assembly. This rectifier bridge changes stator a.c. voltage into d.c. voltage which appears at output terminal. The blocking action of the diodes prevents battery discharge back through the alternator. Because of this blocking action the need for a cutout relay is eliminated. Generator field current is supplied through a diode trio which is also connected to the stator windings. A capacitor is mounted in the end frame and protects rectifier bridge and diodes from high voltages.

ADJUSTMENTS

No periodic adjustments or maintenance of any kind is required on entire generator assembly. Regulator voltage is preset and no adjustment facility is provided.

CAUTION — Do not attempt to polarize alternator. Do not short or ground any terminals except as instructed. Never operate alternator with battery out of circuit or output terminal open. Alternator and battery must share same ground polarity.

TESTING

NOTE — Before making electrical checks, visually inspect all terminals for clean and tight connections. Check alternator mounting bolts and drive belt tension. Do not ground No. 2 lead wire. Battery must be in good condition to test charging system.

UNDERCHARGED BATTERY

1) With ignition switch "ON", connect a voltmeter from alternator "BAT" terminal to ground, then from No. 1 terminal to ground, and last, No. 2 terminal to ground. A zero reading indicates an open between connection and battery. Opens in the No. 2 lead may be between terminals at the crimp between harness wire and terminal, or in wire.

NOTE — If preceding test is satisfactory, continue to next step.

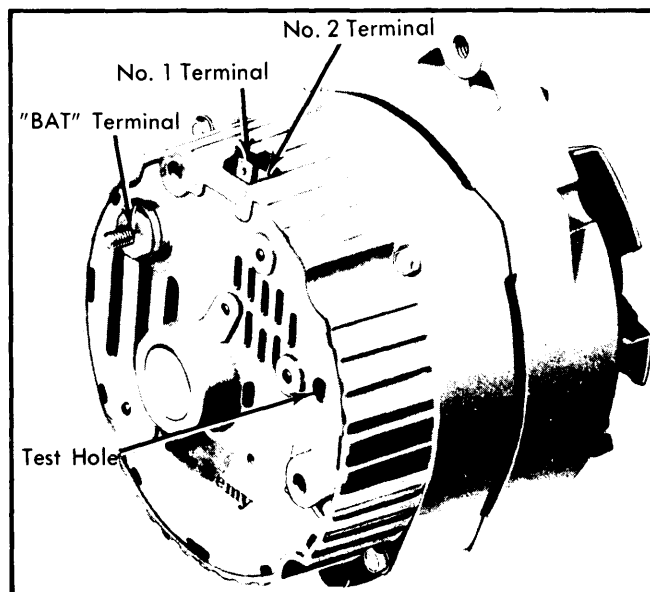


Fig. 2 Identification of Delcotron Terminal Locations

2) Disconnect battery ground cable. Connect an ammeter in the circuit at the "BAT" terminal of alternator. Reconnect battery ground cable. Turn on all available accessories. Connect a carbon pile across battery. Operate engine at moderate speed and adjust carbon pile as required to obtain maximum current output. If ampere output is within 10 amps of rated output as stamped on alternator case, alternator is

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good. If output is not within 10 amps of rated output, ground the field winding by inserting a screwdriver into test hole. See Fig. 3.

CAUTION — Tab is within $\frac{3}{4}$ " of casting surface. Do not force screwdriver deeper than 1" into end frame. If test hole is not accessible, perform "Tests (On Bench)" as described under OVERHAUL.

3) Operate engine at moderate speed as required and adjust carbon pile for maximum output. If output is now within 10 amps of rated output with fields grounded, regulator is defective and requires replacement. If output is still not within 10 amps of rated output, check field winding, diode trio, rectifier bridge, and stator.

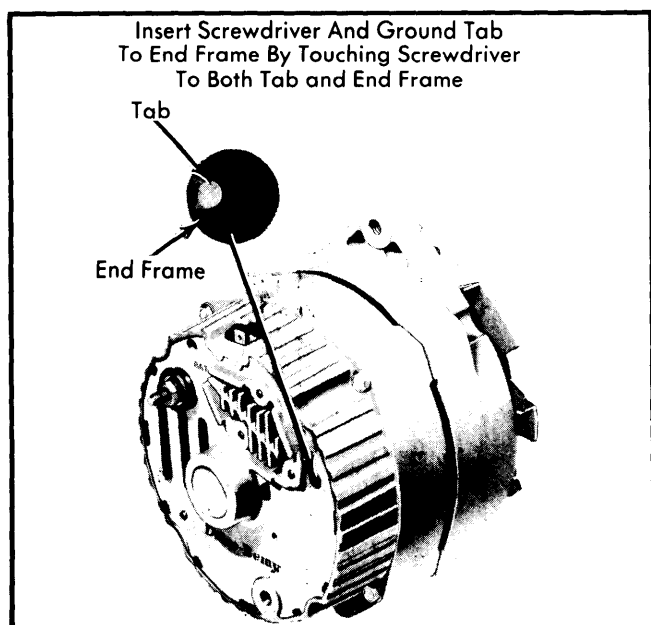


Fig. 3 View Showing Field Ground Tab Accessible Through Hole in End Frame

OVERCHARGED BATTERY

Connect a voltmeter from alternator No. 2 terminal to ground. If reading is zero, No. 2 lead circuit is open. If No. 2 lead circuit checks out good, alternator will have to be disassembled for further checks (see OVERHAUL).

OVERHAUL

DISASSEMBLY

- 1) Scribe marks on housings for reassembly reference. Remove through bolts connecting housings. Separate front and rear housings by prying apart with screwdriver.
- 2) Place a piece of tape over slip ring end frame bearing to prevent entry of dirt. At this point brushes may drop onto rotor shaft and become contaminated with bearing lubricant, clean brushes as soon as possible with a suitable cleaner (acetone) to keep them from becoming grease soaked.
- 3) Place rotor in vise and tighten vise only enough to permit removal of shaft nut. Remove shaft nut, washer, pulley, fan

and collar. Separate front housing from rotor shaft. Remove 3 stator lead attaching nuts and remove stator leads from bridge terminal.

4) Separate stator from rear housing. Remove diode trio lead clip attaching screw and remove diode trio. Remove capacitor attaching screw and remove capacitor lead from bridge rectifier.

5) Remove bridge rectifier and battery terminal attaching screws and remove bridge rectifier. Remove 2 brush holder screws and 1 diode trio lead strap screw. Remove brush holder and brushes. Note location of brushes for reassembly.

6) Remove voltage regulator. Remove front bearing retaining plate screws. Press front bearing out of housing with suitable collar. Press out rear bearing from housing by inserting collar inside housing and pressing bearing toward the outside.

INSPECTION

Wash all metal parts except bearings and stator, and rotor. Inspect rotor slip rings, they may be cleaned with 400 grain polishing cloth. Slip rings may be lathe turned to a .002" indicator reading. Slip rings are not replaceable, excessive damage will require rotor replacement. Inspect brushes for wear, if they are worn halfway replace them.

TESTING (ON BENCH)

Rotor Field Winding — Check rotor for grounds or an open circuit with a 110 volt test lamp or ohmmeter (see illustration). Test for grounds between slip ring and rotor shaft; no continuity should exist. Test for an open field by connecting test leads across slip rings, continuity should be obtained. Test for shorts by connecting a 12 volt battery and ammeter in series with both slip rings, or an ohmmeter may be used. Current draw should be 4-4.5 amps., or resistance should be about 2.5-3.0 ohms. Excessive amperage draw or low resistance indicates shorted windings. If rotor tests okay, but alternator output is low, continue with tests.

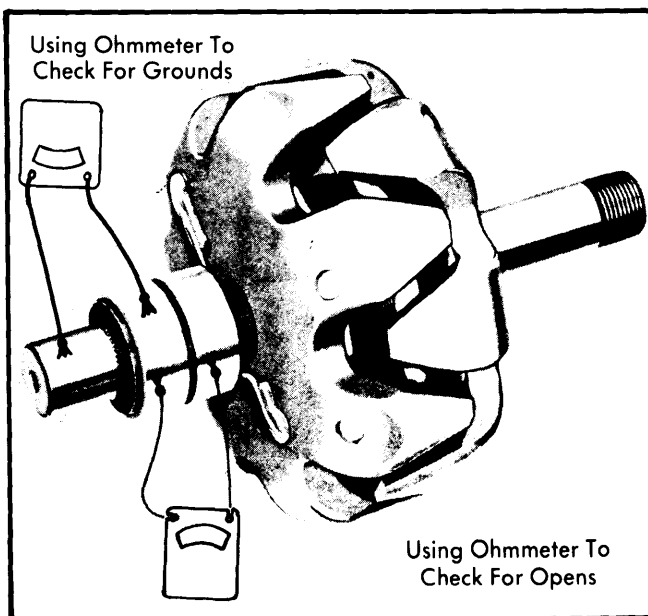


Fig. 4 Bench Testing Rotor For Opens or Grounds Using an Ohmmeter

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Stator Checks For Grounds — Connect a 110 volt test lamp or an Ohmmeter from any stator lead to stator frame. If test lamp lights or if resistance is low, windings are grounded.

Stator Checks For Opens — Connect a 110 volt test lamp or an Ohmmeter from any stator lead to stator frame. If test lamp does not light or if resistance is high, windings are open.

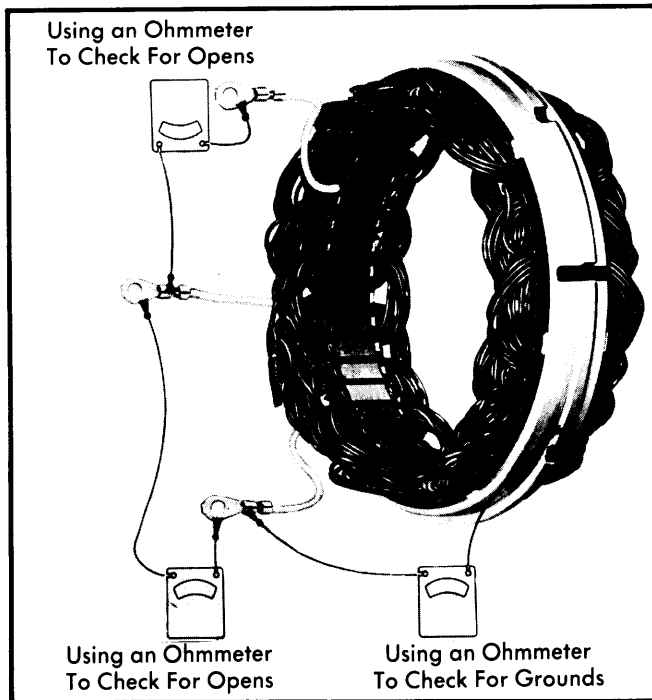


Fig. 5 Bench Testing Stator for Open or Grounded Circuits Using an Ohmmeter

Diode Trio — With diode trio removed from end frame, connect an ohmmeter to the single contact and to one of the 3 connectors. Observe reading, then reverse leads. A good diode trio will give 1 high and 1 low reading. If both readings are the same, replace diode trio. Repeat tests between single connector and each of the other 2 connectors.

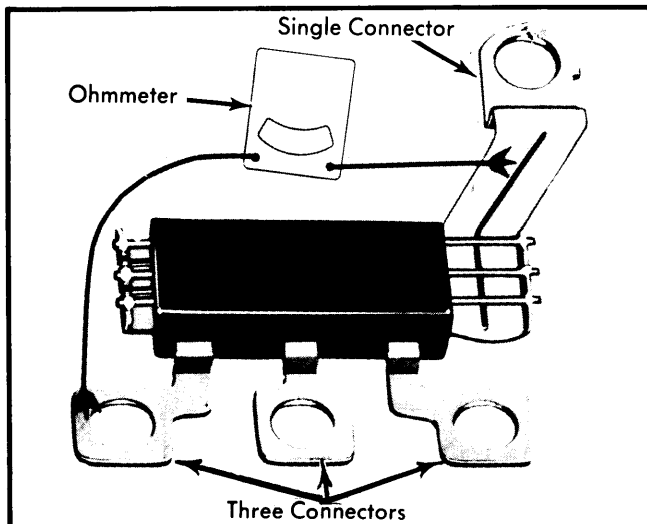


Fig. 6 Bench Testing Diode Trio Using an Ohmmeter

NOTE — Before replacing diode trio, also check rectifier bridge. Do not use high voltage, such as 110 volt test lamp, to test diode trio.

Rectifier Bridge Check — Connect an Ohmmeter to the grounded heat sink and one of the three terminals. Then reverse lead connections to heat sink and same terminal. If both readings are the same replace the bridge. A good rectifier bridge will give one high and one low reading. Repeat test on all terminals. When this is done you will have checked all six diodes with two readings taken for each diode. Do not use high voltage such as a 110 volt test lamp to check bridge.

NOTE — Do not replace diode trio or rectifier bridge unless at least one pair of readings is the same.

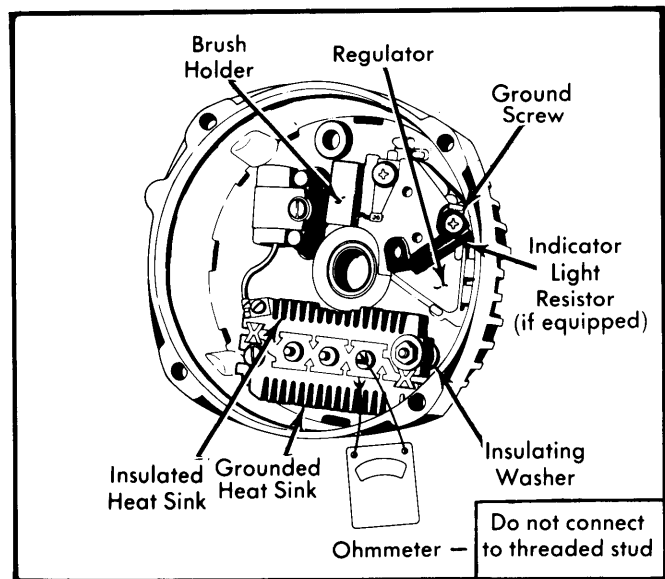


Fig. 7 Bench Testing Rectifier Bridge and Identification of End Frame Components

Alternator/Regulator Circuit Test — Voltage regulator tester CTW-1170 must be used for this check. With alternator in vehicle, turn tester off. Plug the on-vehicle testing cable in place on the tester. Disconnect regulator connector from alternator. Plug the on-vehicle testing cable in its place. Connect ground lead to alternator case. Test circuit using steps 2, 3, 4 and 15 under instructions listed on tester cover. If proper voltage indication is not obtained or lamps flicker off and on when performing test, the regulator must be removed from vehicle for further testing.

REASSEMBLY

1) Fill cavity between retainer plate and bearing $\frac{1}{4}$ full with suitable lubricant (Delco-Remy 1948791 or equivalent). Assemble bearing and slinger in front housing. Press bearing in with suitable collar that fits over outer race.

NOTE — If bearing retainer plate felt seal is hardened, replace retainer plate.

2) Install retainer plate and screws. Position housing, collar, fan, pulley and washer on rotor shaft and install drive pulley nut. Place rotor in vise and tighten only enough to allow tightening of pulley nut.

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3) If rear bearing was removed, support inside of rear housing with hollow cylinder. Place flat plate over bearing and press bearing into housing from outside until bearing is flush with housing. Oil lip of replacement bearing seal and press seal in with lip away from bearing.

4) Install springs and brushes in brush holder. Install wooden toothpick in hole at bottom of holder to retain brushes. Install voltage regulator. Attach brush holder into rear housing, noting stack-up of parts. Allow toothpick to protrude through hole in rear housing.

5) Install diode trio lead strap attaching screw and washer. Tighten brush holder screws. Position bridge rectifier on rear housing with insulator between heat sink and rear housing.

6) Install bridge rectifier and battery terminal screws. Connect capacitor lead to bridge rectifier. Position diode trio on end housing. Install diode trio lead clip screw, making sure insulating washer is over top of diode connector.

7) Install stator on rear housing. Attach stator leads to bridge rectifier terminals. Remove tape covering bearing and join front and rear housings with scribe marks aligned. Install through bolts and tighten. Remove toothpick from brush holder assembly.

DELCO-REMY DELCOTRON SPECIFICATIONS					
Stamped Rated Amp. Output	Test Specifications (At 14.0 Volts)				Field Current (Amps.) 12 Volts, 80 F
	Amps.	RPM	Amps.	RPM	
37	33	5000	4.0-4.5
42	38	5000	4.0-4.5
61	57	5000	4.0-4.5
63	59	5000	4.0-5.0
80	76	5000	4.0-4.5

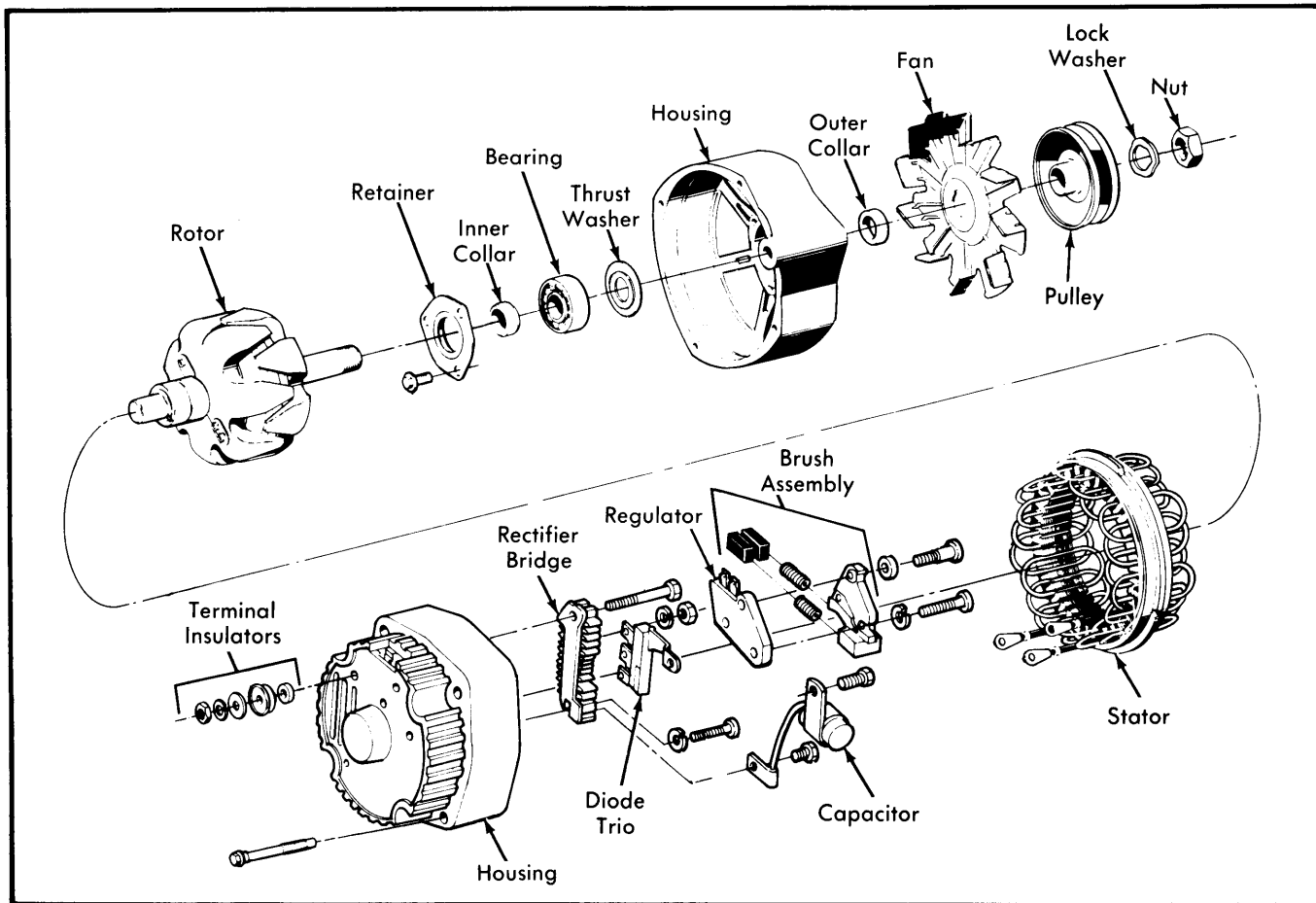


Fig. 8 Exploded View of 10 SI Delcotron Alternator