COLT 2310, 2510, AND 2712 COMPACT TRACTORS

CHAPTER 3

STARTER GENERATORS

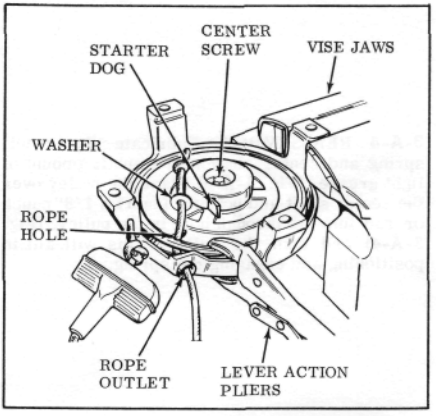


Figure 3-A-1

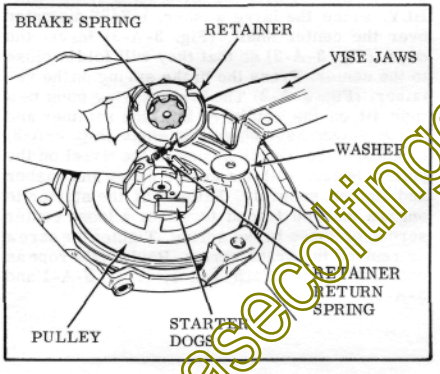


Figure 3-A-2

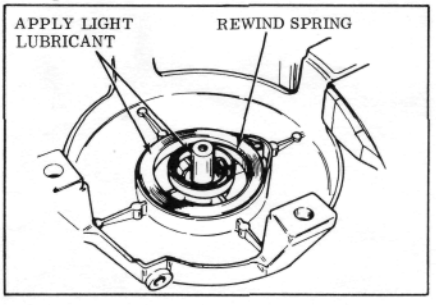


Figure 3-A-3

3-A-1 ROPE REPLACEMENT. Prepare the rope, place a thin 3/4" diameter washer with 1/4" hole on the rope and tie a knot. (Fig. 3-A-1) The other end of the rope should be thinned to a point for easier threading.

Clamp the starter in a vise, upside down, (Fig. 3-A-1) by one leg opposite the rope outlet. Place a screw driver in the rope hole of the pulley and turn counter clockwise, (Fig. 3-A-5) approximately seven turns. Position the rope hole in the pulley opposite the rope outlet in the housing. Clamp the pulley in this position with lever action pliers. (Fig. 3-A-1) Clamp over starter housing and pulley, protect the painted surface. (Fig. 3-A-1)

Insert the rope into the pulley hole and guide it with needle nose pliers through the rope outlet in the housing. Secure the handle with a double knot. Hold the rope taunt, release the pliers and allow the rope to wind on the pulley.

3-A-2 DISASSEMBLY. Clamp the starter in a vise. (Fig. 3-A-1) Pull the rope out completely and clamp the pulley in this position with lever action pliers. (Fig. 3-A-1) Remove the handle and pull out the rope. Hold the pulley with a cloth, release the pliers, allow the pulley to unwind slowly.

Remove the center screw holding the retainer. (Fig. 3-A-1) Lift off the retainer, return spring, brake spring, dogs and washer. (Fig. 3-A-2) Inspect and replace as required. The brake spring must be a tight fit on the retainer, replace if a loose fit. Turn the pulley clockwise a turn or two to release from the rewind spring. Lift the pulley out carefully.

3-A-3 SPRING REPLACEMENT. Disassemble the starter completely. (Figs. 3-A-1, 3-A-2 Paragraphs 3-A-2). New springs are enclosed in retainers. Be sure spring is positioned with wrapping in directions as illustrated. (Fig. 3-A-3) Position new spring and retainer over housing and press the spring out of the retainer into the starter housing.

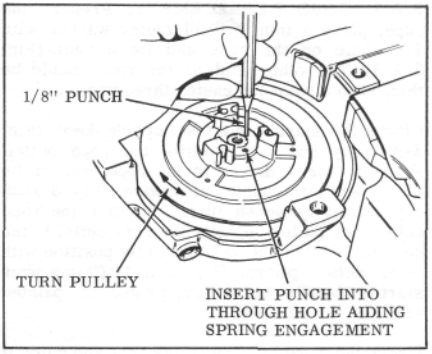


Figure 3-A-4

3-A-4 REASSEMBLY. Lubricate the recoil spring and center shaft with a small amount of light grease. (Fig. 3-A-3) Place the pulley over the center shaft and bottom. Insert a 1/8" punch or rod into the through hole in the pulley, (Fig. 3-A-4) and turn the pulley. This will aid in positioning and engaging the spring.

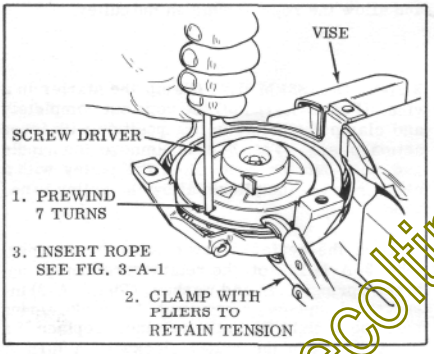


Figure 3-A-5

3-A-5 REWINDING SPRING AND REASSEMBLY. Place the large washer, 1-3/8" diameter over the center shaft. (Fig. 3-A-2) Insert the dogs, (Fig. 3-A-2) so that they will fold in close to the center. Press the brake spring on the retainer. (Fig. 3-A-2) The brake spring must be a tight fit on the retainer. Hold the retainer and brake spring assembly at an angle (Fig. 3-A-2) to engage the return spring to the dowel on the pulley. Secure with the center screw and washer and tighten securely. Failure of the starter to engage may be traced to either a loose center screw, or loose brake spring. Tighten the screw or replace the brake spring. Replace the rope as outlined in paragraph 3-A-1, (Figs. 3-A-1 and 3-A-5.)

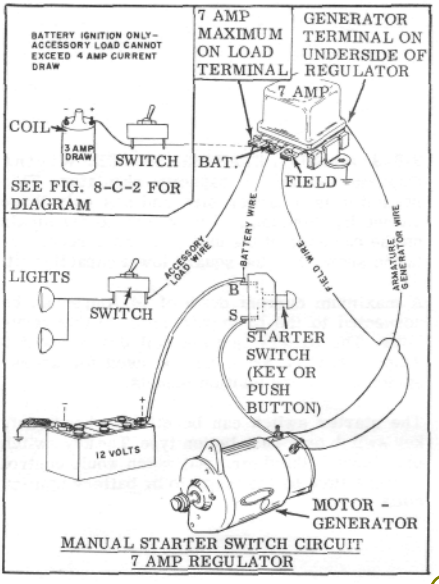


Figure 3-B-1

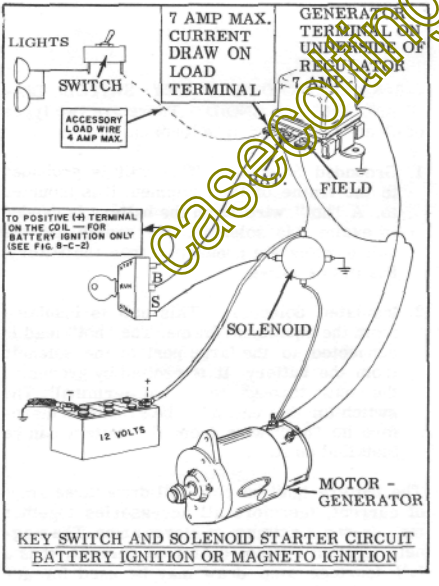


Figure 3-B-2

3-B-1 MOTOR GENERATOR WIRING DIAGRAM. Two types of regulators are used with the motor generator. One is a low output unit used to deliver a maximum of seven (7) Amps. The number of lights, and other electric appliances that may be used with this regulator is limited. Four (4) Amps plus the ignition coil (3 Amps) is the maximum current draw that can be put on the load terminal. DO NOT connect any appliance on wire leads of the battery, use only the LOAD terminal. The larger capacity regulator is explained in Paragraphs 3-B-3.

The low capacity regulator can easily be identified by its small square shape and size. It is the only unit with the lone connecting terminal on the back side of the regulator. This unit has four (4) connecting terminals, three of which can easily be seen on one side of the unit.

Figure 3-B-1 shows the wiring diagram for a manually activated starting switch. It also shows how the optional battery ignition system is connected into the electrical circuit. For units with magneto ignition just eliminate the second load lead wire as shown by hidden lines. See Paragraph 8-C-1 for magneto ignition diagram. See Paragraph 8-C-2 for battery ignition diagram.

3-B-2 WIRING DIAGRAM FOR KEY SWITCH AND SOLENOID. The key switch in figure 3-B-2 supplies the current to activate the solenoid when turned to start position. It also allows the current to flow to the battery ignition coil if present.

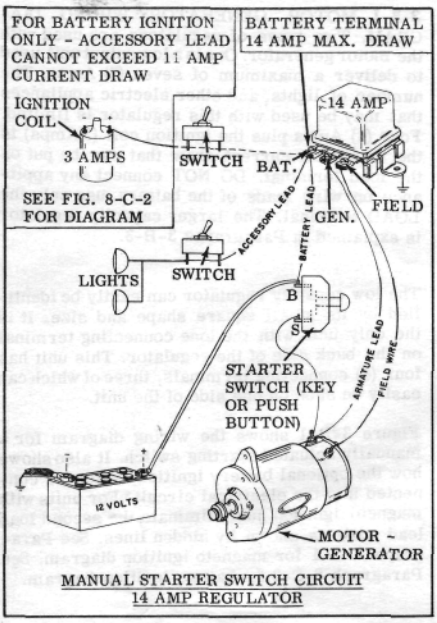


Figure 3-B-3

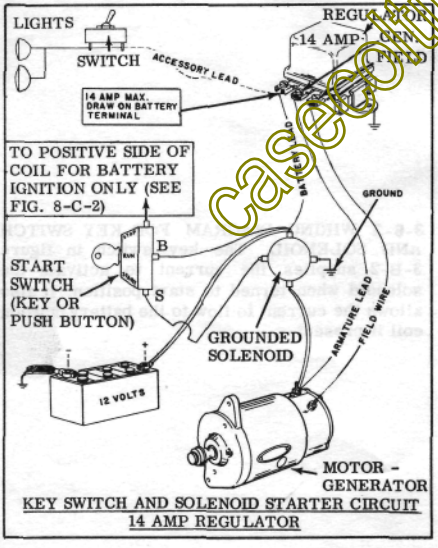


Figure 3-B-4

3-B-3 MANUAL STARTER SWITCH. Wiring diagram for larger capacity regulator. This regulator is a larger size and has only three connecting terminals. There are no terminals on the backside of the unit. It is more rectangular in shape than the square lower capacity unit.

A maximum current draw of 14 Amps can be connected to the battery terminal of this regulator. The battery ignition coil draws about 3 Amps. Only 11 Amps can be used for accessories on battery ignition models.

The starter switch can be either a heavy duty key switch or a push button type. The key switch may have a third terminal which would control current flow to the magneto or battery ignition coils.

3-B-4 SOLENOID AND KEY SWITCH DIAGRAM. *THE SOLENOID* - There are two types of electric switches or solenoids.

1. Grounded Solenoid - This unit is grounded to the frame of the equipment it is mounted to. A "hot" wire from the battery is needed to excite this solenoid. The switch for this unit must have a connection from the battery. See figure 3-B-4.

2. Insulated Solenoid - This unit is insulated from the equipment frame. The "hot" lead is connected to the large post of the solenoid from the battery. It is excited by grounding the unit through the third terminal. The switch for this unit must be grounded, therefore no "hot" wire from the battery can be installed on it.

The battery ignition coil will draw three amps of current, therefore all accessories together may draw a maximum of eleven amps. The magneto ignition system draws no current, thus a full fourteen amp draw may be used for accessories.

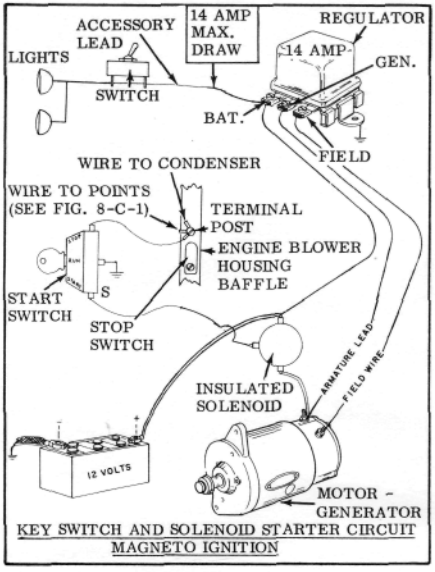


Figure 3-B-5

3-B-5 SERVICE STARTER KIT WITH SOLENOID DIAGRAM. This unit utilizes the "insulated solenoid" see paragraph 3-B-4. With some modification the grounded solenoid may be adapted.

The grounded key switch (3-B-4) is connected to the solenoid and also the primary wires of the magneto. The magneto points are bypassed to ground at the switch when it is in the stop position, thus it turns off the engine.

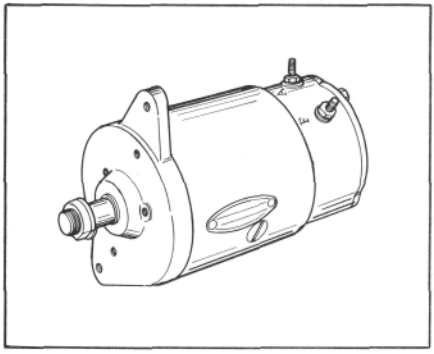


Figure 3-C-1

3-C-1 At periodic intervals, the motor-generator should be inspected to determine its condition. The frequency with which this should be done will be determined by the type of service in which it is used.

3-C-2 CAUTION: Never operate the motor-generator during cranking for more than 30 seconds at a time without pausing to allow it to cool off for at least two minutes. Overheating, caused by excessively long cranking periods, may seriously damage it.

3-C-3 The inspection procedure should include not only a check of the motor operation but should include also a check of the mounting, wiring and connections, all of which should be CLEAN, tight and in good condition. USE A FINE ABRASIVE TO CLEAN ALL CONTACTS.

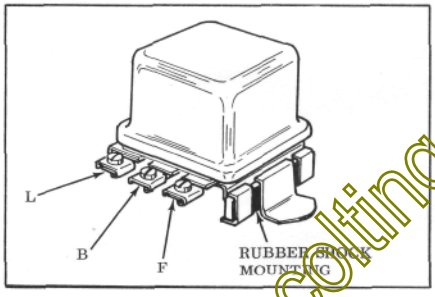


Figure 3-C-2

3-C-4 Current Voltage Regulator is a device which provides control of the generator output and circuit voltage so as to meet various battery and operating requirements.

3-C-5 For Service refer to the local Delco Remy Service outlet.

3-C-6 See paragraphs 3-B-1 to 3-B-5, see also Figures 3-B-1 to 3-B-5.

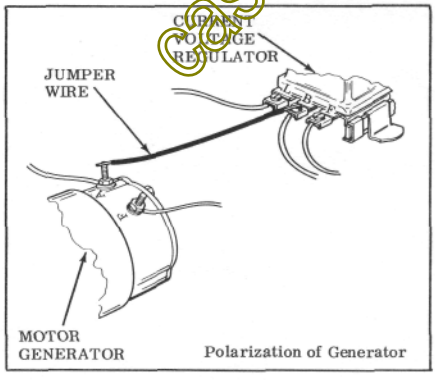


Figure 3-C-3

3-C-7 After replacing the current-voltage regulator, CLEAN and reconnect the leads. After reconnecting the leads, momentarily touch a jumper lead between the "BATTERY" terminal of regulator and "ARMATURE" terminal of generator. This allows a momentary surge of current to flow through the generator which correctly polarizes it. Reversed polarity may result in vibration, arcing, and burning of the relay contact points.

IMPORTANT: Connect jumper wire for a short instant only or damage to unit may occur.

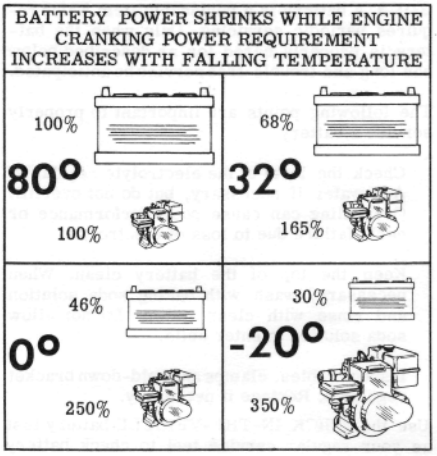


Figure 3-D-1

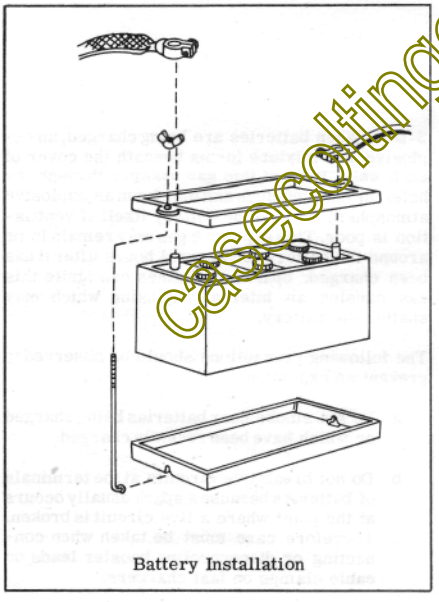


Figure 3-D-2

3-D-1 It is always good practice to select a replacement battery of an electrical size at least equal to the battery originally engineered for the vehicle by the manufacturer.

Battery power shrinks while the need for engine cranking power increases with falling temperature. Subzero cold reduces battery capacity of a fully charged battery to 30% of its normal power and at the same time increases cranking load beyond the normal warm weather load.

Hot weather will place excessive electrical loads on batteries. Difficulty in starting may occur when cranking is attempted shortly after a hot engine has been turned off.

If the capacity rating for the original equipment battery cannot be determined, a 35 amp or greater rated replacement battery would be sufficient. IMPORTANT – For subzero temperatures, a 44 amp or greater rating is recommended.

3-D-2 While the battery is built to satisfactorily withstand the conditions under which it will normally operate, excessive mechanical abuse leads to early failure.

The following points are important to properly install a battery:

Be sure the battery carrier is clean and that the new battery rests level when installed.

Tighten the hold-down evenly until snug. Do not draw down tight enough to distort or crack battery case.

Be sure the cables are in good condition and the terminal clamps are CLEAN. Grease battery terminals lightly with petroleum jelly before attaching cable clamps. Make sure the ground cable is CLEAN and TIGHT at engine block or frame.

Check polarity to be sure battery is not reversed with respect to the generating system.

Connect "grounded" terminal of the battery last to avoid short circuits which will damage the battery.

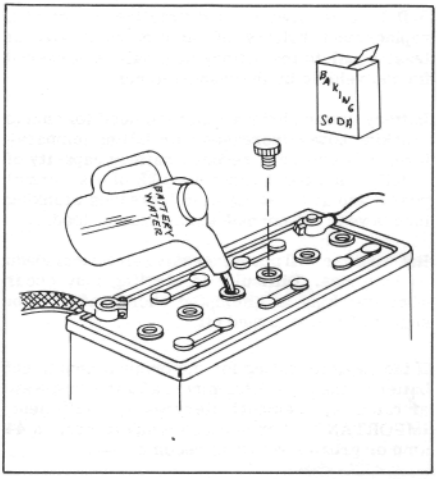


Figure 3-D-3

3-D-3 A battery is a perishable item which requires periodic servicing. Only when the battery is properly cared for as described below can long and trouble-free service be anticipated.

The following points are important to properly service a battery:

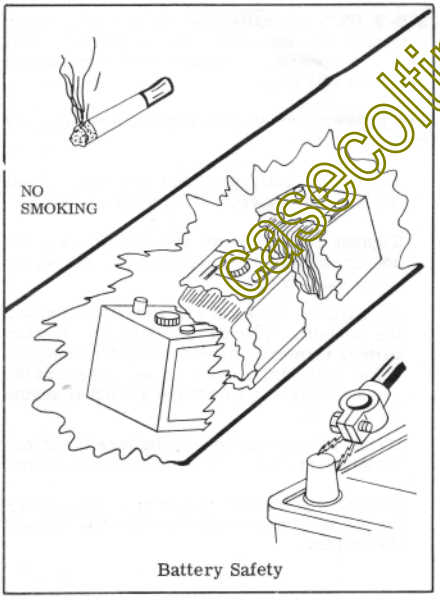
Check the level of the electrolyte regularly. Add water if necessary, but do not overfill. Overfilling can cause poor performance or early failure due to loss of electrolyte.

Keep the top of the battery clean. When necessary, wash with baking soda solution and rinse with clear water. Do not allow soda solution to enter cells.

Inspect cables, clamps and hold-down bracket regularly. Replace if necessary.

Use the QUICK IN-THE-VEHICLE battery test as your regular service test to check battery condition. A procedure booklet will be included with your tester.

Check the electrical system if the battery becomes discharged repeatedly.



Battery Safety

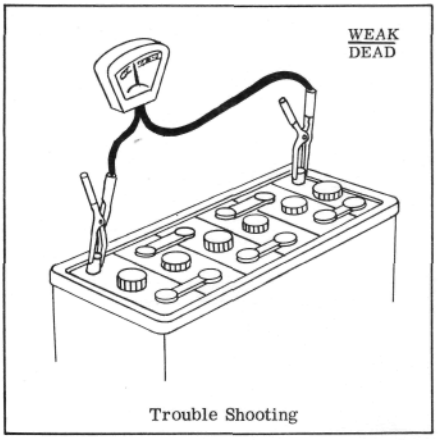
Figure 3-D-4

3-D-4 When batteries are being charged, an explosive gas mixture forms beneath the cover of each cell. Part of this gas escapes through the holes in the vent plugs and may form an explosive atmosphere around the battery itself if ventilation is poor. This explosive gas may remain in or around the battery for several hours after it has been charged. Sparks or flames can ignite this gas causing an internal explosion which may shatter the battery.

The following precautions should be observed to prevent an explosion:

a. Do not smoke near batteries being charged or which have been recently charged.

b. Do not break live circuits at the terminals of batteries because a spark usually occurs at the point where a live circuit is broken. Therefore care must be taken when connecting or disconnecting booster leads on cable clamps on fast chargers.



Trouble Shooting

Figure 3-D-5

3-D-5 What is the battery complaint?

a. How long has the battery been in service (months)?

b. Is this the first incidence of trouble? If not, how long has the battery failed to perform satisfactorily?

c. Were any electrical units left on inadvertently for an extended period of time?

d. If battery has failed previously, how was it recharged (amperes and hours)?

e. Has the voltage and the current regulator setting been checked against specifications?

The more information obtained, the easier the job of trouble-shooting.