

The Shade Tree Corner

In restoring your Corvette, you may have problems with the starter or generator operating properly. I thought I would cover some information so that you could understand how important clearance and polarizing are.

Fig. 6 is a wiring circuit of a typical solenoid switch. There are two windings in the solenoid; a pull-in winding (shown as dashes) and a hold-in winding (shown dotted). Both windings are energized when the external control switch is closed. They produce a magnetic field which pulls the plunger in so that the drive pinion is shifted into mesh, and the main contacts in the solenoid switch are closed to connect the battery directly to the cranking motor. Closing the main switch contacts shorts out the pull-in winding since this winding is connected across the main contacts. The magnetism produced by the hold-in winding is sufficient to hold the plunger in, and shorting out the pull-in winding reduces strain on the battery. When the control switch is opened, it disconnects the hold-in winding from the battery. When the hold-in winding is disconnected from the battery, the shift lever spring withdraws the plunger from the solenoid, opening the solenoid switch contracts and at the same time withdrawing the drive pinion from mesh. Proper operation of the switch depends on maintaining a definite balance between the magnetic strength of the pull-in and hold-in windings.

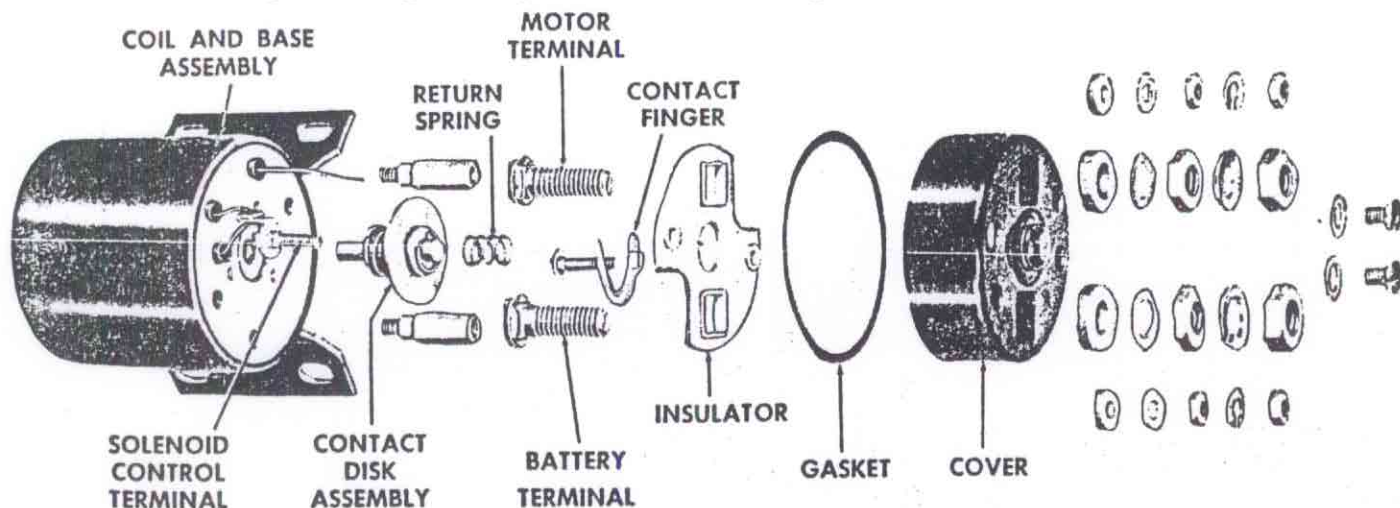


Fig. 5 Exploded view of solenoid switch shown in Fig. 4

This balance is established in the design by the size of the wire and the number of turns specified. An open circuit in the hold-in winding or attempts to crank with a discharged battery will cause the switch to chatter.

To disassemble the solenoid, remove nuts, washers and insulators from the switch terminal and battery terminal. Remove cover and take out the contact disk assembly.

When the solenoid has been removed from the starter motor for repair or replacement, the linkage must be adjusted to provide the correct pinion clearance or pinion travel when the solenoid is remounted on the motor. Some solenoids equipped with relays have an adjustable plunger stud as on '57-'62, but others must be moved on the motor frame to adjust pinion travel as on '55-'56.

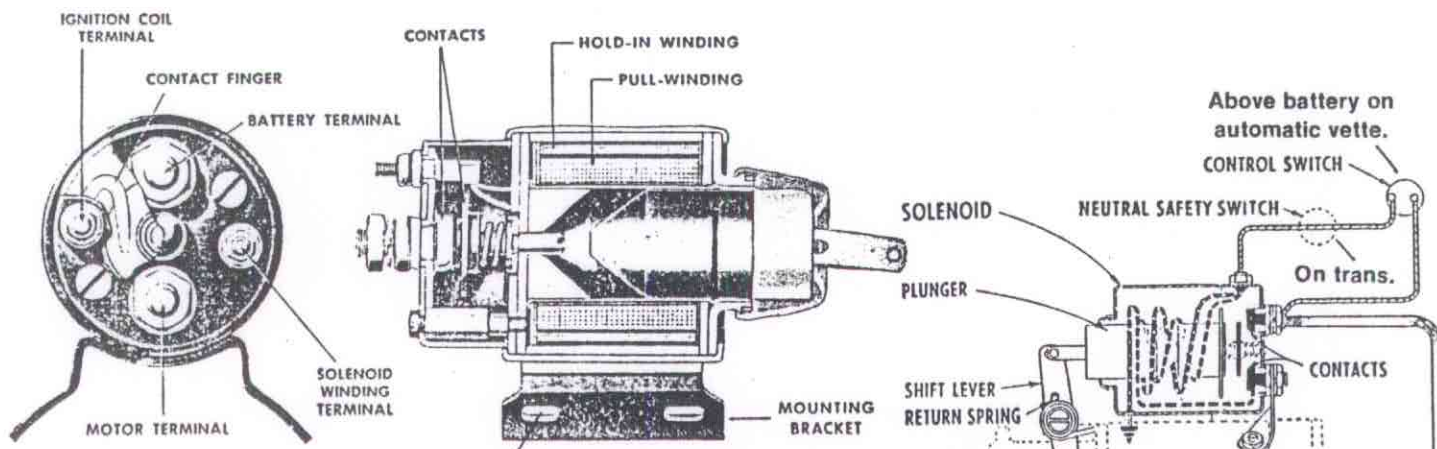


Fig. 4 End and sectional views of a typical solenoid switch. The additional terminal and contact finger are used on 12-volt passenger car applications

Fram has elongated slots for pinion clearance on '55-'56 Corvette.

Fig. 6 Wiring circuit of a typical solenoid switch

The Shade Tree Corner continued:

ASSEMBLING STARTER

Soak bronze bearings and felts in SAE 10 engine oil and apply a light film of oil to the shaft bearing surfaces. Remove the excess oil as too much lubrication may deposit on the brushes, commutator, fields or armature, impairing their operation and possibly causing failure.

On gear reduction motors, add ½ ounce of high temperature, non-fibre gear grease to the gear chamber.

When assembling the yoke on over-running clutch type motors, be sure the yoke shoes are installed with the curved edge toward the pinion end of the clutch, Fig. 25.

Install the switch and its linkage, making sure all linkage operates freely and the clutch shifts to its full mesh position. Also make sure the armature turns easily with only the brush drag restricting its movement.

When assembling the commutator end head on some motors, it is possible to have the head rotated from its correct position. This changes the brush position and on some types causes the motor to turn in the wrong direction. On other types the motor may not operate in either direction. The safest way of insuring against this difficulty is to mark the head and frame before disassembling so that they can be installed in their original position.

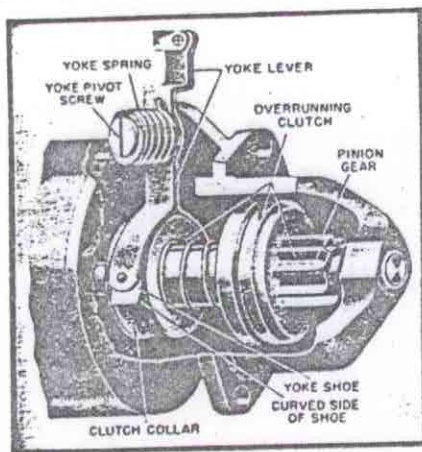


Fig. 25 Assembly of overrunning clutch and yoke shifting lever. Make sure curved sides of yoke shoes are toward gear end of clutch. Reversed yoke shoes can cause improper meshing of pinion

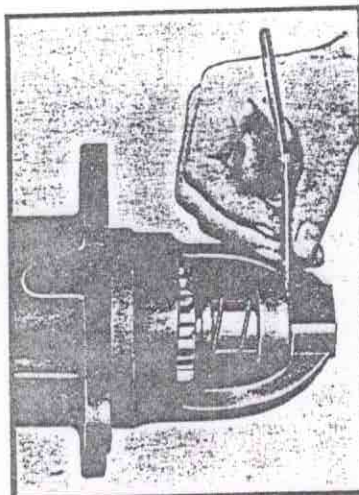


Fig. 26 Measuring Bendix drive stop clearance which must be 1/16". Do not compress Bendix spring as this will give an incorrect reading

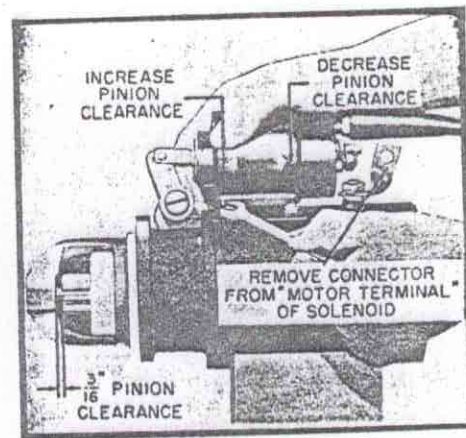


Fig. 27 Adjusting pinion clearance on over-running clutch motor equipped with solenoid having a non-adjustable plunger stud

Bendix Drive Motors

Check the clearance between the Bendix drive stop and the inside of the pinion housing as shown in Fig. 26. Measure the clearance with a feeler gauge and if it is not 1/16" first make sure the motor and drive are correctly assembled. Then install thrust washers just inside either the intermediate bearing (if used) or the commutator as required to establish this clearance. This affects the end play which should be checked at the same time.

Measure the clearance between the drive stop and housing as described above with the armature pressed to its two extreme positions. The end play will be the difference between the two readings and should be at least .005". Do not compress the Bendix spring when measuring clearance.

If the end play is less than .005", inspect for improper assembly and make sure all washers are in their correct location. If end play is excessive it can be reduced by installing thrust washers just inside the intermediate bearing (if used) or commutator end head. When installing washers, be sure that the brushes are centered on the commutator and the pinion "at rest" or demeshed position is correct (this adjustment is given later on).

Overrunning Clutch Motors

Thrust the armature toward the commutator end and measure the clearance between the shoulder on the shaft and the drive end thrust washer. This clearance is the same as the end play which should be .005" to .030" and is adjusted by installing thrust washers on the shaft just inside the commutator end head. These washers may be steel, fibre or leather and should be placed with the hardest material next to the head.

Install the switch on the motor. Connect the yoke linkage to the plunger screw on solenoid-operated clutches but do not install the lock pin. Shift the pinion into full mesh position by pressing on the solenoid core on electrically-operated shifts, or by pressing the yoke lever on manually-operated shifts.

Measure the clearance between the outer edge of the pinion to the thrust washer just inside the drive end bearing, Fig. 27. If the clearance is more or less than 3/16", adjust as follows:

1953 to early 1956 - on solenoid-operating clutch motors not having an adjustable plunger stud, Fig. 27, loosen the switch mounting screws and shift the switch forward or backward as required to establish the 3/16" clearance.

Late 1956 to 1965 - on solenoid-operated clutch motors equipped with an adjustable plunger stud, Fig. 28, turn the plunger stud in or out as required to establish the 3/16" clearance.

CAUTION - Failure to establish this clearance may result in a broken drive housing.

The Shade Tree Corner continued:

Generator Requirements

In 1935 or thereabouts, passenger car generators were designed to produce about 20 amperes. In 1952, generator capacity was increased to over 50 amperes in some cases and even this high output was found to be insufficient to supply the electrical needs of all the accessories used on some cars.

For all practical purposes, the limit of generator output was reached in 1952 with a 6 volt system as generators had become clumsy. With a 12 volt system, the same amount of electrical power can be delivered with half the amperage, because power is measured in watts, which are simply amperes multiplied by volts. In other words, when a generator is required to deliver 600 watts, this amount of power can be delivered in two ways: 100 amperes at 6 volts or 50 amperes at 12 volts. In each case the amperes multiplied by the volts produces the same number of watts (600).

As it is the current in amperes flowing through a conductor that determines the required size or gauge of the wire, it is obvious that with a 12 volt system, smaller size wires can be used to deliver the same amount of power as the larger sizes would deliver in a six volt system.

Polarizing Generator

After a generator has been repaired and reinstalled on a vehicle or at any time after a generator has been tested, it must be repolarized to make sure that it has the correct polarity with respect to the battery it is to charge. Failure to do this may result in burned circuit breaker contacts, a run-down battery and possibly serious damage to the generator itself. Polarizing should be done before connecting wires to regulator.

CAUTION - On cars equipped with the new Delco-Remy regulator having dual contacts on the voltage regulator, insulate the brushes from the commutator before polarizing the generator.

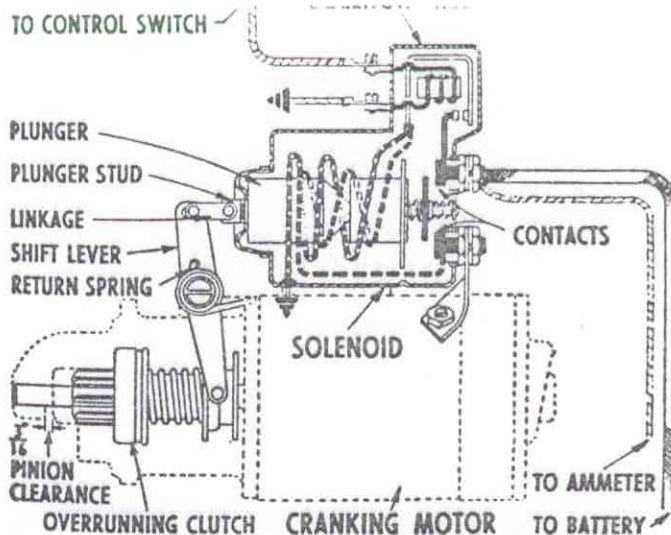


Fig. 28 Overrunning clutch motor equipped with adjustable plunger stud for adjusting pinion clearance (see Fig. 27)

Auto-Lite and Delco-Remy generators used on passenger cars are what is called standard-duty (externally grounded) units. Generators used on Ford Company cars use what is called heavy duty (internally grounded) units. The names "standard-duty" and "heavy-duty", as used here, are only a means of designating the two types of circuits and do not refer to any limitation in design.

A standard-duty generator is one in which the field coil lead is connected to the insulated brush inside the generator. A heavy-duty generator is one in which the generator field is connected to the grounded brush or to the generator field frame.

To polarize standard-duty generators, ground the "F" terminal while touching a "hot" jumper wire to the "A" terminal. On a heavy-duty generator, touch a "hot" jumper wire to the "F" terminal. Bear in mind that it is the generator that determines the proper regulator to be used and not the car model.

Fig. 4 Thrown solder on cover band, caused by excessive heat, indicates an open circuit between armature windings and commutator segments '53 to '54 Corvette

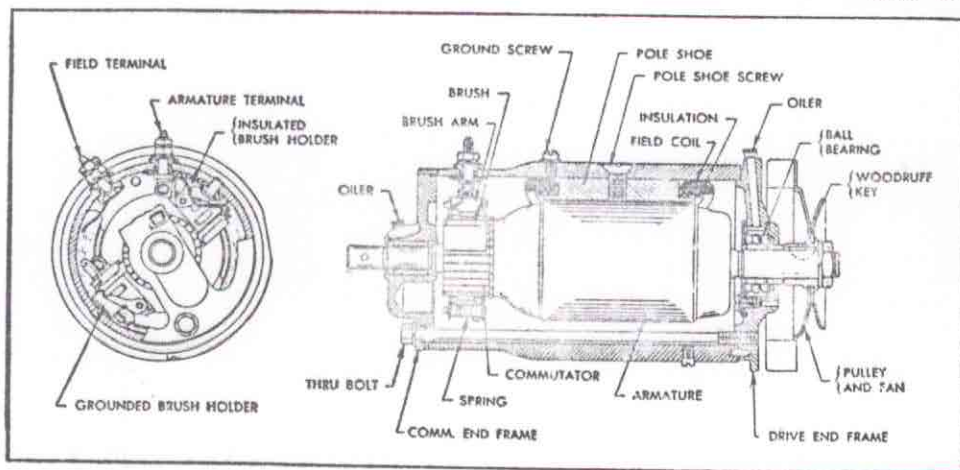
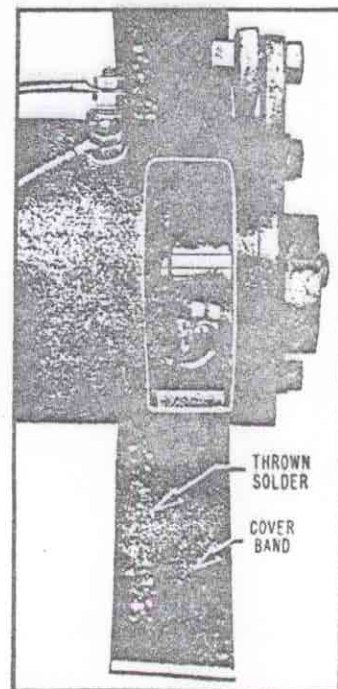


Fig. 5 Construction of new type Delco-Remy generator with an extruded frame. There is no cover band so inspection is made through openings in commutator and frame. The use of a mirror will aid in the inspection '55 and up