DELCO-REMY STARTER

SERVICE INSTRUCTIONS

DELCO-REMY NO. 1109656, AIRCRAFT 12-VOLT STARTER
CONTINENTAL NO. 50309

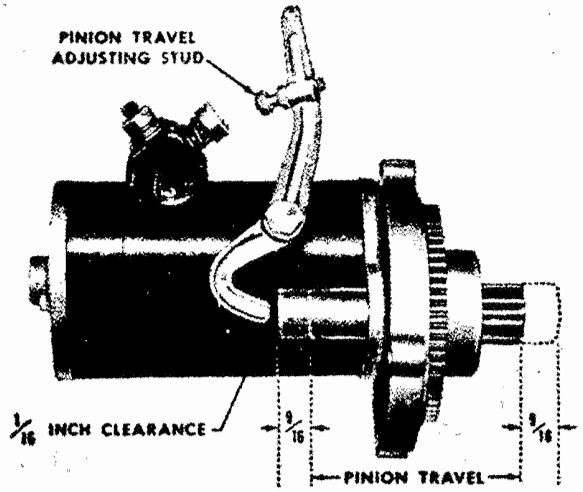

Figure 33. Starter.

(a) General.

The starting motors used on the A100, C115 and C125 engines are designed to give maximum cranking performance with minimum weight.

The Delco-Remy Model 1109656 is a special 12-volt, 4 field unit with manual operation overrunning clutch type drive. The armature is supported by oil-less bushings in both the drive end and the commutator end. An oil seal in the drive end protects the cranking motor from oil in the flywheel housing. The drive pinion is manually engaged with the flywheel ring gear by the shift lever movement when the cranking motor switch is closed and the cranking motor armature begins to rotate. When the engine starts, the overrunning action of the clutch protects the drive pinion until the shift lever can be released to disengage the pinion from the flywheel.

Cranking motor specifications are:

Clockwise rotation viewing drive end. (Clutch rotation)

Brush spring tension — 24-28 ounces.

No load — 1200 r.p.m. at 65 amperes at 11.35 volts.

Lock torque — 60 lbs. ft. at 450 amperes at 3.9 volts.

(b) Installation.

With the pinion pivot well oiled, remove clutch and gear assembly from starter adapter housing and insert over pinion pivot. Place the .006 inch thick gasket over the three 5/16 studs being careful that the top end of gasket is kept in place. Assemble starter and adapter over 3/16 studs and clutch gear, making sure the leather washer between clutch gear shaft and adapter housing is in place.

(c) Assemble the two 5/16 x 3-3/8 drilled head bolts with plain washers thru the crankcase and crankcase cover into the starter. Tighten nuts and bolts evenly, secure nuts with palnuts and bolts with safety wire.

(d) Adjustment of Starter Shift Lever.

It is very important that the cable or wire control return spring should have sufficient tension to bring lever to fully released position when control is released. It is also necessary that there be 1/16 inch minimum clearance between clutch shaft end and starter shift lever when control is released. There is 9/16 in. of travel at the starter gear pinion. It is very important that the starter lever compresses the starter pinion gear 7/16 in. of its travel before contacting the starter switch, the remaining 1/8 in. of travel will be used in making the electric contact of the starter switch.

(e) It is important that No. 2 wire be used between starter motor and battery to avoid any excessive

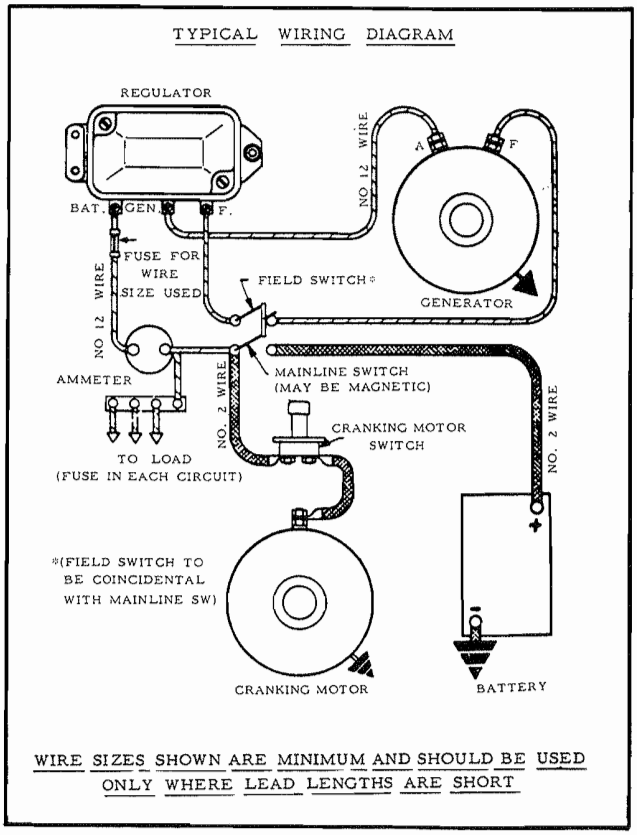

Figure 34. Typical Wiring Diagram.

voltage drop.

(f) Cranking Motor Maintenance

Cranking motor maintenance may be divided into two sections – the normal maintenance required to assure continued operation of the cranking motor and the checking and repair of an inoperative unit.

(1) Normal Maintenance

Lubrication – Oilless bushings are used in this motor and require no lubrication

Inspection – The cover band should be removed and the commutator and brushes inspected at regular intervals. If the commutator is dirty, it may be cleaned with No. 00 sandpaper. Blow out dust. Never use emery cloth to clean commutator. If the commutator is rough, out of round, or has high mica, it should be turned down in a lathe. The mica should be undercut to a depth of 1/32 of an inch. Worn brushes should be replaced. If brushes wear rapidly, check for excessive brush spring tension and roughness or high mica on the commutator.

Cranking Motor Disassembly

At regular intervals, the actual time depending on the type of operation, the cranking motor should be disassembled for a thorough cleaning and inspection of all parts. Never clean the armature or fields in any degreasing tank, or with grease dissolving materials, since these may damage the insulation. Never wash bearings in gasoline or other solvent since this would remove the grease and ruin the bearings. The commutator should be trued in a lathe if necessary. Replace all parts showing excessive wear. All wiring and connections should be checked. Rosin flux should be used in making soldered connections. Acid flux must never be used on electrical connections. Submit reassembled unit to NO-LOAD and LOCK tests.

(2) Checking of Improperly Operating Cranking Motor

The shift lever on the cranking motor, whether operated by a cable or wire control, should have a return spring with sufficient tension to bring the lever to the fully released position when the control is released. This action should be checked occasionally to make sure that the spring is returning the lever to its fully released position.

In this position, there should be 1/16 inch clearance between the lower end of the shift lever and the button on the back of the overrunning clutch drive (See Fig. 33.)

If the cranking motor does not develop rated torque and cranks the engine slowly or not all, check the battery, battery terminals and connections, and battery cables. Corroded, frayed, or broken cables should be replaced and loose or dirty connections corrected. The cranking motor switch should be checked for burned contacts and the switch contacts cleaned or replaced if necessary.

If all these are in order, remove the cover band of the cranking motor and inspect the brushes and commutator. The brushes should form good contact with the correct brush spring tension. A dirty commutator can be cleaned with a strip of No. 00 sandpaper held against the commutator with a stick while the cranking motor is operated. NEVER OPERATE MORE THAN 30 SECONDS AT A TIME TO AVOID OVERHEATING, AND NEVER USE EMERY CLOTH TO CLEAN COMMUTATOR. If the commutator is very dirty or burned, or has high mica, remove the armature from the cranking motor and take a cut off the commutator in a lathe. The mica should be under cut to a depth of 1/32 inch. If there are burned bars on the commutator, it may indicate open circuited armature coils which will prevent proper cranking. Inspect the soldered connections at the commutator riser bars. An open armature will show excessive arcing at the commutator bar which is open, on the no-load test.

Tight or dirty bearings will reduce armature speed or prevent the armature from turning. A bent shaft, or loose field pole screws, will allow the armature to drag on the pole shoes, causing slow speed or failure of the armature to revolve. Check for these conditions.

If the brushes, brush spring tension and commutator appear in good condition, and the battery and external circuit found satisfactory, and the cranking motor still does not operate correctly, it will be necessary to remove the cranking motor for no-load and torque checks.

No-Load Test

Connect the cranking motor in series with a battery of sufficient voltage, a heavy variable resistance and an ammeter capable of reading several hundred amperes. If an r.p.m. indicator is available, read the armature r.p.m. in addition to the current draw. Be sure to adjust the resistance to obtain the proper voltage.

Torque Test

It is advisable to use in the circuit a high current carrying variable resistance so that the specified voltage at the motor can be obtained. A small variation of the voltage will produce a marked difference in the torque developed.

Interpreting results of NO-LOAD and TORQUE TESTS.

1. Rated torque, current draw and no-load speed indicates normal condition of cranking motor.
2. Low free speed and high current draw with low developed torque may result from:
   a. Tight or dirty bearings, bent armature shaft or loose field pole screws which allow the armature to drag.
   b. Shorted armature. Check armature further on growler.
   c. A grounded armature or field. Check by raising the grounded brushes and insulating them from the commutator with cardboard and then checking with a test lamp between the insulated terminal and the frame. If test lamp lights, raise other brushes from the commutator and check field and commutator separately to determine whether it is the fields or armature that is grounded
3. Failure to operate with high current draw:
   a. A direct ground in the switch, terminal or fields.
   b. Frozen shaft bearings which prevent the armature from turning.
4. Failure to operate with no current draw:
   a. Open field circuit. Inspect internal connections and trace circuit with a test lamp.
   b. Open armature coils. Inspect the commutator for badly burned bars. Running free speed, an open armature will show excessive arcing at the commutator bar which is

open.

c. Broken or weakened brush springs, worn brushes, high mica on the commutator, or other causes which would prevent good contact between the brushes and commutator. Any of these conditions will cause burned commutator bars.

5. Low no-load speed, with low torque and low current draw indicates:

a. An open field winding. Raise and insulate ungrounded brushes from commutator and check fields with test lamp.

b. High internal resistance due to poor connections, defective leads, dirty commutator and causes listed under 4c above

6. High free speed with low developed torque and high current draw indicates shorted fields. There is no easy way to detect shorted fields, since the field resistance is already low. If shorted fields are suspected, replace the fields and check for improvement in performance.

Section 18

DELCO-REMY GENERATOR

DELCO-REMY NO. 1101876
CONTINENTAL NO. 40435

SERVICE INSTRUCTIONS

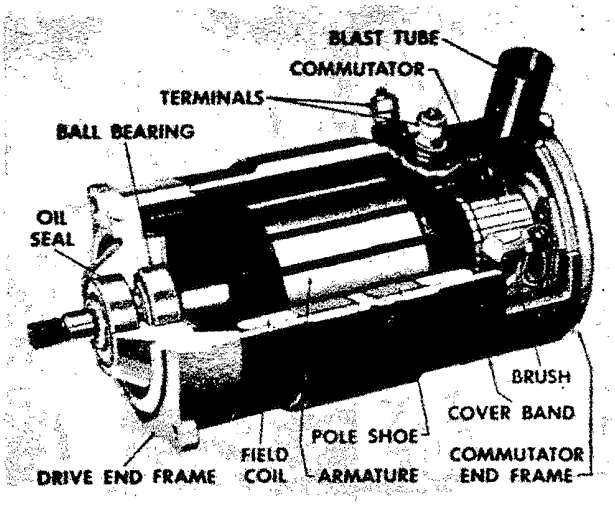

Figure 35. Generator.

(a) General.

The generator used on the A100, C115 and C125 Continental Engine is of the direct drive 12 volt shunt wound type, and is so designed as to give maximum performance with minimum weight.

The Delco-Remy Model 1101876 Generator is a special aircraft type, 12-volt, 12 ampere unit. The armature is supported at both the drive end and commutator end by sealed ball bearings which require no lubrication. The drive end has windows and the cover band is provided with a fitting for connection with a blast tube. The blast tube must be connected to a source which will maintain a minimum of 1.5 inches of water pressure differential across the generator. This will assure an adequate flow of air through the generator and proper generator ventilation.

Specifications are as follows:

Clockwise rotation viewing drive end.

Cold output 13 amperes at 15.0 volts at 3650 r.p.m. (Maximum output controlled by current regulator)

Field current at 12 volts – 1.62-1.69 amperes.

Brush spring tension 25 ounces.

(b) Installation

Generators are received from Delco-Remy less oil-seal, hub coupling rubber drive disc, and drive gear. To prepare for assembly to engine, assemble the following parts.

(1) Drive oil seal in place (lip facing engine), make sure Woodruff key is in place.

(2) Drive generator hub coupling to where it bottoms on shoulder of generator shaft. While driving hub on, check to see that key stays in place.

(3) Assemble rubber disc with groove side up.

(4) Assemble generator drive gear on shaft, fitting lug on gear into rubber groove.

(5) Insert special 5/16 washer over generator shaft, screw on 5/16 shear nut and secure with 1/16 x 3/4 cotter pin.

(6) When generator drive gear is in place trim off excess rubber from drive disc.

NOTE

Generator and Tachometer drive housing both use the same gasket. It is recommended tachometer housing be assembled last and removed first, when removing generator.

(7) Assemble generator to crankcase housing, with the generator terminals facing toward 2-4 cylinder side of motor (9 o'clock position).

(8) Place 5/16 plain washers over the three studs, tighten the three nuts and secure with palnuts.

(c) Generator Maintenance.

Generator maintenance may be divided into two sections – the normal maintenance required to assure continued operation and the checking and repair of an inoperative unit.

(1) Normal Generator Maintenance

Lubrication – Since the armature is supported at