

2-17. REPLACING BRUSHES D-C END. This procedure is practically identical to brush replacing on the a-c end, except that brushes need not be sanded nor run in for fit. The brushes are not interchangeable with those on the a-c end and should not require replacement as often. If the yoke has been moved, reset the brush location as described in paragraph 2-21.

2-18. COMMUTATOR AND COLLECTOR RINGS. Occasionally it may be necessary to clean the commutator or collector rings. Touch them up lightly with No. 0000 sandpaper. Never use emery cloth. If burning or pitting is severe, it is permissible to take a light lathe cut. Afterward it will be necessary to undercut the commutator mica $1/32$ -inch. Commutator smoothness can be checked by lightly holding a small wood or other insulator stick on top of a brush while dynamotor is running.

2-19. BEARINGS. If the bearings are binding, they must be removed from the shaft with a bearing puller and replaced, or the rotor assembly must be replaced. It is not necessary to rebalance after replacing bearings. When replacing bearings, exert force only on the inner race.

Note

The bearings are sealed and need not be lubricated during the life of the dynamotor.

2-20. COILS. Rewinding of rotor or field circuits is not recommended. The assemblies should be replaced.

2-21. RESETTING BRUSH LOCATION. Brush location on the d-c end must be set if the brush yoke has been moved. The procedure is to connect selsyns and a servo-amplifier to the dynamotor, simulating actual load conditions. Shift the brush yoke (normally against rotation) until the position of best sparking is obtained. Care must be taken to see that the brush yoke is not shifted too far against rotation, as the dynamotor will run backwards, overheat the armature and throw solder. After the brushes have been shifted to a new position, the dynamotor should be started several times at reduced applied voltage (approximately ten volts if available) to make certain the dynamotor will run counterclockwise, viewed from the commutator end. If it does not, too much brush shift is indicated. Ascertain if, using rated input voltage, the frequency and output voltage are within allowable limits of 400 cycles, plus or minus ten percent and 105 to 125 volts.

2-22. AMPLIDYNE MOTOR-GENERATORS. (See figure 2-10.)

2-23. DESCRIPTION. This unit is a special motor-generator with a very high amplification and quick response to small voltages in the generator-control field. The output is connected directly to the drive motor armature. One amplidyne motor-generator is required for each system (azimuth and elevation) of

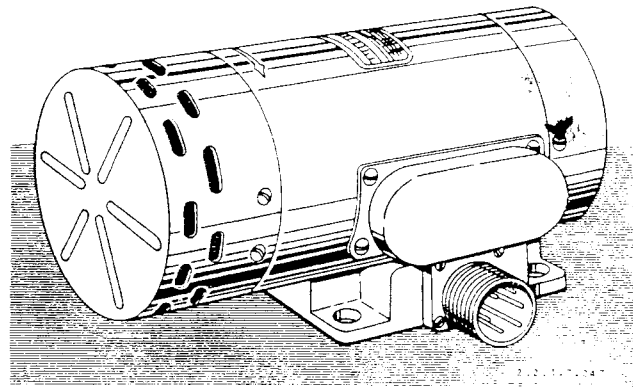


Figure 2-10. Turret Amplidyne

each turret. The two amplidynes for the upper turret are installed on the left-hand side of the aft fuselage above the lower turret. The two amplidynes for the lower turret are installed on the right-hand side of the aft fuselage above the lower turret. The amplidyne is similar to any ordinary separately-excited generator in the general shape of its characteristics and in that it is a rotating machine which converts mechanical energy into electrical energy. Removal and installation of the amplidyne motor-generator is made with four bolts. The electrical plug must also be removed and installed.

2-24. MINOR REPAIR.

2-25. REPLACING BRUSHES.

Note

Brushes should be replaced when they are worn to within $1/16$ -inch of the metal brush holder. It is desirable to change all brushes if one or two are worn.

a. Remove safety wire, loosen screws and remove brushes.

b. Install new brushes.

c. Adjust shim washers so that, when screws are tightened, the safety wire holes will be aligned for safety wiring.

d. Safety wire screws.

CAUTION

Do not over-tighten screws, or brushes will break.

e. Apply a strip of No. 0000 sandpaper to the commutator with water-soluble glue, being sure no overlap is evident.

f. Hold brushes up and reassemble armature to end shield.

g. Release brushes onto sandpaper and turn armature until brushes are sanded into as close a fit as possible.

Note

The brush fit is extremely important in the case of the generator end because of its critical effect upon amplification.

h. Remove sandpaper and glue with a damp cloth.

i. Thoroughly clean armature, commutators, both brush riggings and field frame with compressed air, carbon tetrachloride, or both.

j. Run the machine at light load for 5 hours, or until generator end brushes fit perfectly. Use of brush-seating stones is not recommended.

k. If brush yokes have not been moved, it will not be necessary to set a new brush position.

2-26. **COMMUTATORS.** It will be necessary to clean the commutator by sanding lightly with No. 0000 sandpaper. Do not use emery cloth. Blow out all dust after cleaning. If a commutator is badly scarred or burned, it is permissible to take a light lathe cut. Following this, it will be necessary to undercut the mica $1/32$ -inch between segments. After this, the machine must operate for several hours to reshape brushes. If necessary, reset brush position. Do not oil or lubricate commutator.

Note

Commutator sparking should not cause alarm, unless it is excessive. When the brushes are set on the position of best commutation some sparking will occur.

2-27. **BEARINGS.** If bearings are binding, they must be removed with a bearing puller and replaced, or the whole armature replaced. It is not necessary to balance armature after replacing bearings.

Note

When replacing bearings exert force on inner race only. The bearings are sealed and need not be lubricated during the life of the machine.

2-28. **COILS.** Rewinding of faulty armatures or fields is not recommended. The assemblies should be replaced.

2-29. **ADJUSTMENTS.** If yokes have been moved since factory setting, the brush setting must be adjusted.

2-30. **ADJUSTING MOTOR END.**

a. Set brush mechanism so that the retaining screws are in the center of the elongated slots.

b. Move brush yoke against the direction of rotation approximately $3/32$ -inch, measured on the outer diameter.

c. Tighten retaining screws.

Note

If this is an unsatisfactory setting, shift the brush yoke until sparking is at a minimum when rated load is applied to the generator.

2-31. **ADJUSTING GENERATOR END.** These brushes should be shifted until 60 volts output can be obtained with 5 to 10 net milliamperes in the control field. The output is open-circuit voltage, meaning to be measured with voltmeter across the terminals only. The test must be performed for both polarities of output.

2-32. **SERVO-AMPLIFIERS.** (See figure 2-11.)

2-33. **DESCRIPTION.** The servo-amplifier is a two-channel, two-stage amplifier which amplifies and rectifies the signal voltage from the selsyn control transformer on a turret to provide the required field control for the amplidynes. The servo-amplifier consists of a base assembly, cover assembly, a tube unit containing ten electronic tubes, four resistor units, four capacitors, five transformers and two potentiometers. The servo-amplifier for the lower turret is located in the aft fuselage, aft of the lower turret; the servo-amplifier for the upper turret is located in the gunner's compartment on the forward right-hand wall.

2-34. **REMOVAL.**

- a. Remove electrical plug.
- b. Remove servo cover.
- c. Remove attaching screws.

2-35. **MINOR REPAIR.** Replacement rather than repair will be necessary.

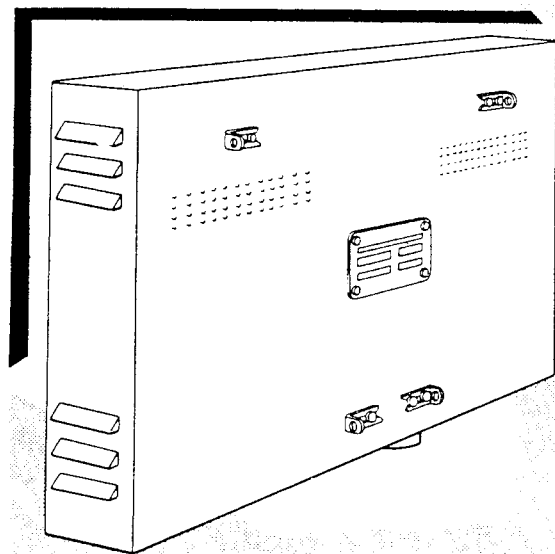


Figure 2-11. Turret Servo-Amplifier