

GENERAL ELECTRIC MOTOR GENERATOR

General Electric Company's G.M.G. 150-A-4, Cat. No. KE 13269 motor generator is used on all cars to provide battery charging for both road and yard operation. The generator is a 20 - 25 K.W., 75 V, 4-pole D.C. machine. The A.C. motor is 25 H.P., 220 V., 60 cycle induction type, carried in a common housing. General Electric generator relay panel 17 FM 49 E 4, Cat. No. KE 14199 and regulator type 17 LH 2 K 22, Cat. No. KE 13470 are used to control operation of the generator. The A.C. motor is controlled by G.E. C.B. 7006-D 53 C-1 A.C. starter switch.

MOTOR GENERATOR: General Electric motor generators are built in various types and sizes to fit the application where they are used. All units have name plates giving model and manufacturer's number. Figure 35 shows a typical motor generator and Figure 36 shows a cut of the 150 type. The motor generator is a direct current generator and 25 H.P., 220 V. alternating current induction motor in a common housing. Anti-friction bearings are used, ball bearings at commutator end and roller bearings at motor end. Bearing cartridges are used on both ends, permitting their renewal without removing the armature. Standard Alemite grease fittings are provided for lubricating these bearings.

FRAME: The alternating current stator is wound on a removable core which is pressed into the frame head and bolted to direct current magnet frame to form the common housing. Four lugs for supporting the motor generator, two on each side, are welded to the frame and designed to fit special Lord Manufacturing Company rubber resilient mountings, Cat. No. KE 12639, shown in Figure 37. It is not necessary to remove the machine from the car in order to renew the A.C. end.

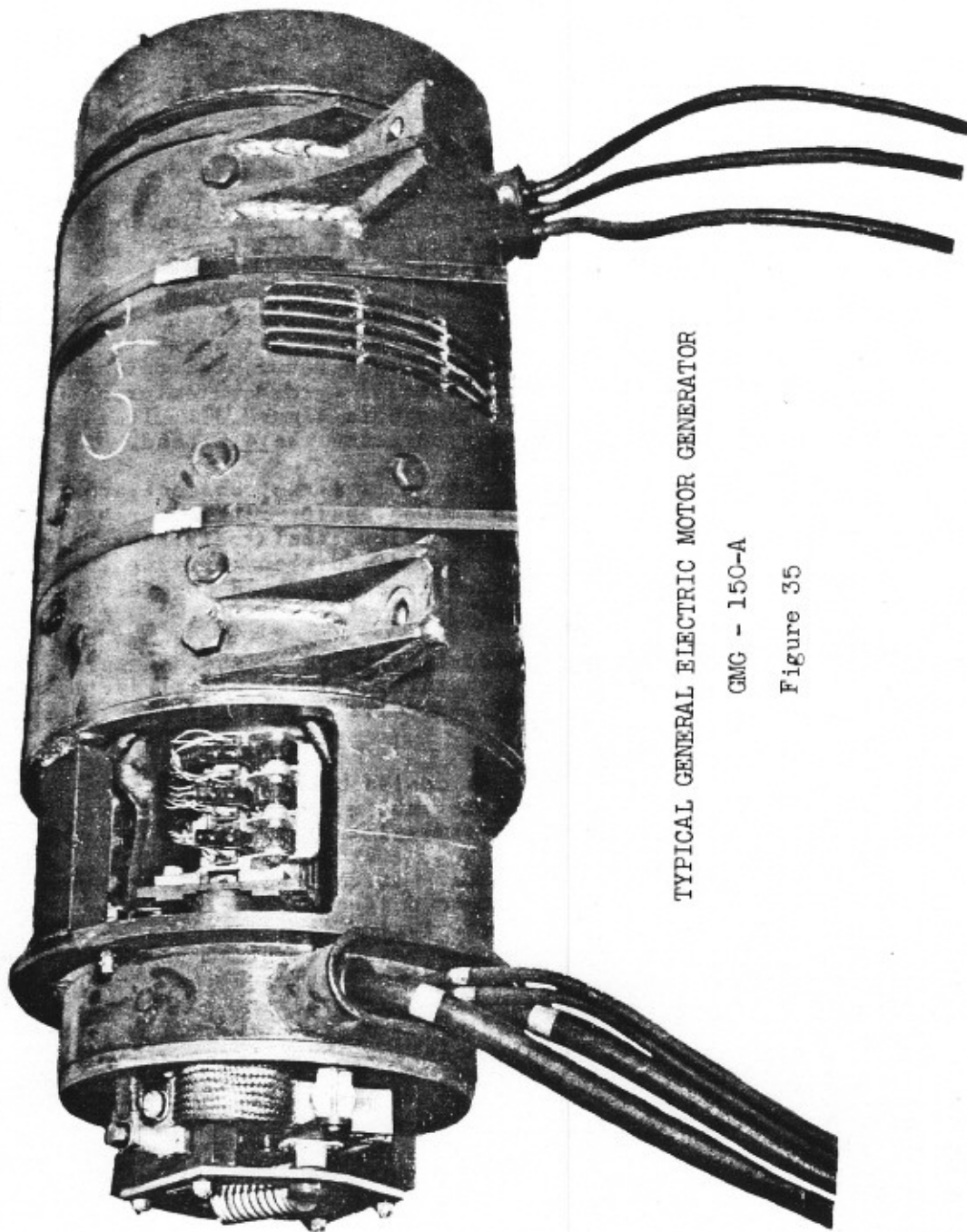
ARMATURES: The complete armature consists of a direct current armature, alternating current rotor and ventilating fan on a common shaft. The rotor and fan can be removed from the shaft in the usual way. However, the armature stampings are stacked on the shaft and extreme care should be exercised when removing the shaft in order not to disturb the stampings as they are only held together by band wires and varnish.

A double finned fan is mounted between rotor and armature; air enters at bottom of band hole cover, part is drawn through longitudinal ducts in armature punchings and part over armature and field coils, and is discharged through slots in magnet frame.

The alternating current end is cooled by air entering openings in the bottom of the frame head and is drawn over the outside of the starter to the other side of the fan and discharged through same slots in magnet frame.

BRUSHES AND BRUSH BOXES: The brush boxes, Cat. No. KE 14180, and brushes, Cat. No. KE 13319 are standard General Electric design. There are four brush boxes and twelve brushes per generator. The brush rigging is adjustable and clearance of $3/32$ - $1/8$ " between the commutator and the bottom of brush box should be maintained. Sticking brushes will damage the commutator and cause the coil connection to the commutator to become unsoldered. Proper spring pressure is important and should be maintained at 125 to 150 ounces with new brushes. As unequal brush pressure will cause uneven wear and current distribution, brushes should be renewed when the pigtail rivet is $1/4$ " off the commutator. Method of checking brush tension is shown in Figure 38. Connection diagram for generator is shown in Figure 39 which includes General Electric parts number for components.

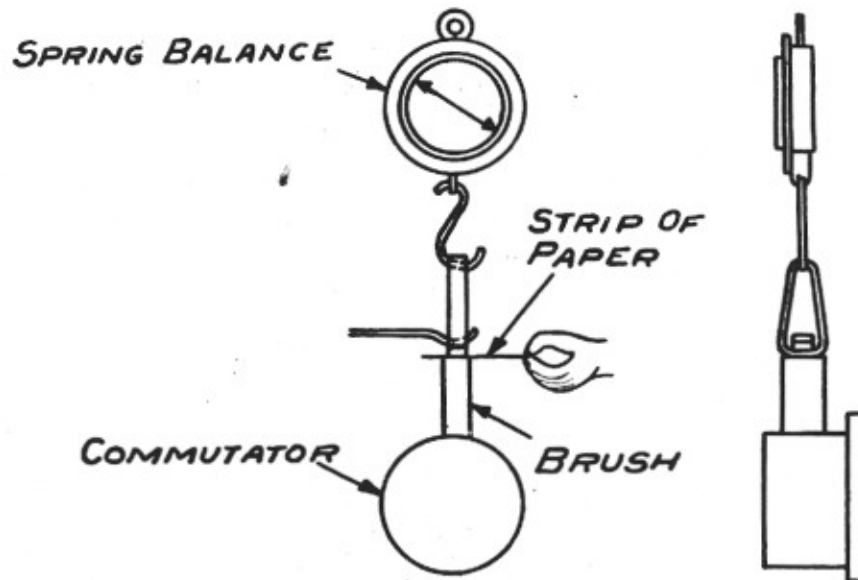
POLARITY: is maintained through use of two single pole, center hinged, double contact switch bars and toggle mechanism assembled on a carriage which is mounted on the end of the generator frame. Contact pressure, wipe and gap are fixed and require no adjustment. The rotor (trip carrier) is mounted on flange at end of generator shaft where it is secured by three $7/16$ " cap screws. See Figure 40.



TYPICAL GENERAL ELECTRIC MOTOR GENERATOR

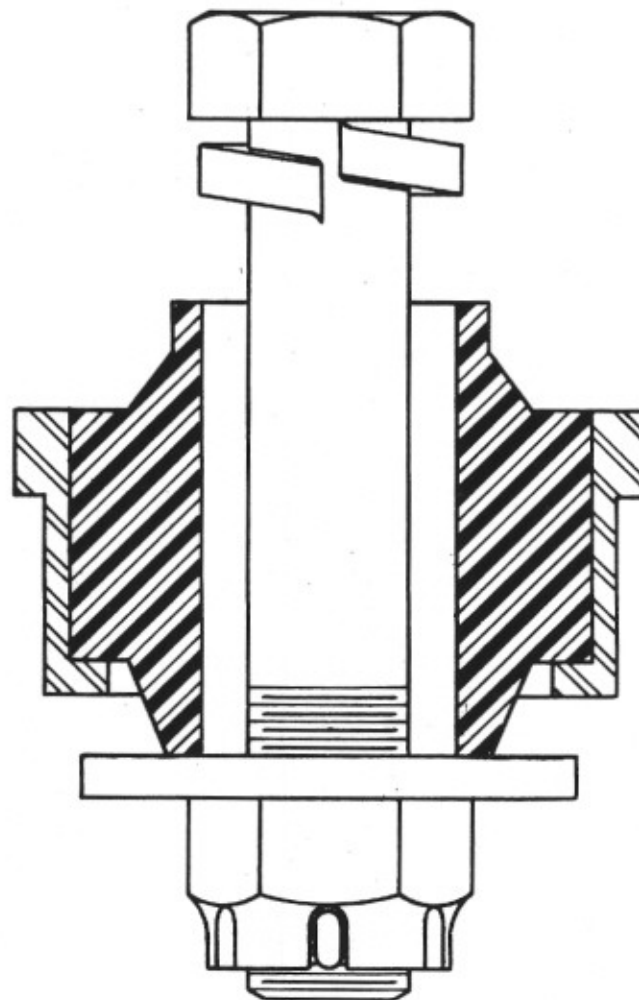
GMG - 150-A

Figure 35



METHOD OF OBTAINING BRUSH PRESSURE

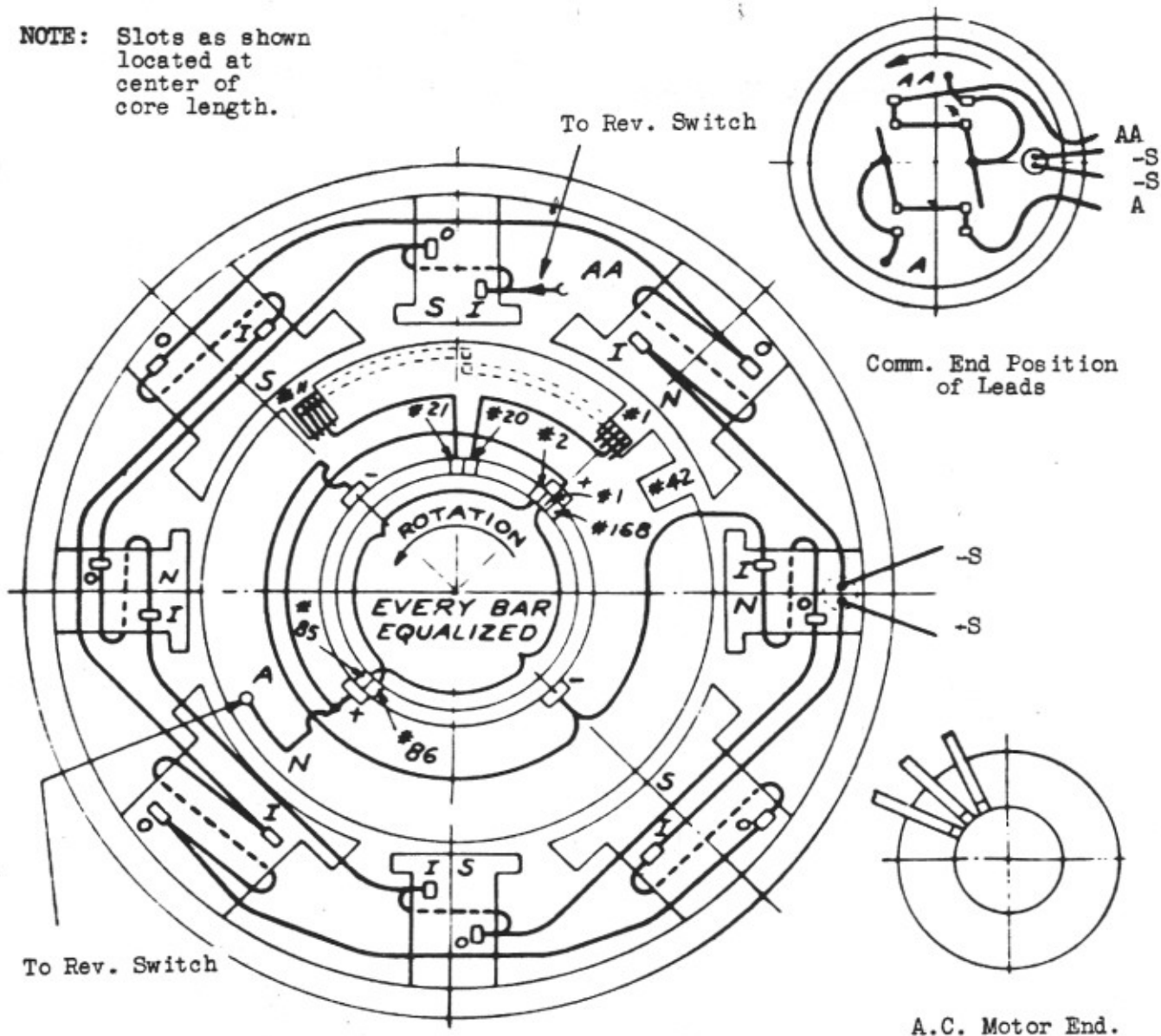
Figure 38



RESILIENT MOUNTING FOR G.E. MOTOR- GENERATOR

Figure 37

NOTE: Slots as shown
located at
center of
core length.



CONNECTION DIAGRAM
FOR 150 A4 MOTOR GENERATOR

Figure 39

GEN.	TURNS	ARMATURE COIL	EXCITING FIELD	COMMUTATING FIELD
GMG 150-A 4	1	F-6746059G-1	Cat. 6746049 G - 1 (Bottom left Side) Cat. 6746049 G - 2 (Top left Side) Cat. 6746049 G - 3 (Top right Side) Cat. 6746049 G - 4 (Bottom right Side)	Cat. 6746061 G - 1 (Top & Bottom) Cat. 6746061 G - 2 (Left & right Side)

DIS-ASSEMBLY OF MOTOR GENERATOR:

Outline drawings. Figure 41 shows tools required.

Remove armature reversing switch cover by unfastening the holding clamps, shown on outline drawing Figure 42.

Disconnect the four cable connections to the switch.

Remove the tie wires and three cap screws and lockwashers which fasten the switch to retaining ring.

Dismount the switch.

Unscrew three cap screws and remove switch rotor (trip carrier) from flange.

Remove the inner row of cap screws and lockwashers (17 and 18) Figure 43, fastening the retaining ring to bearing cap and housing on the generator end.

Remove the eight bolts fastening alternating current end frame head to the magnet frame.

The complete alternating current end bearing assembly may be removed from the shaft with the frame head by removing shaft nut and lockwasher. It is preferable to place the machine in vertical position, alternating current end up, remove frame head using the three ejecting bolts in the frame head.

If it is not desirable to remove bearing assembly with the A.C. frame head, remove outer and inner rows of screws which fasten end plate to frame head, bearing cap and bearing housing. Do not remove bearing nut and lockwasher at this time.

RENEW STATOR: The alternating current stator is mounted in the frame head and will come out complete with the frame head. The alternating current stator may be removed from the frame head by taking out the eight fastening screws. Since no provision is made to press this assembly from the frame, it is best done by using two crow bars and prying on the spacer lugs directly opposite and rotating as required to bring the winding out as evenly as possible. Be sure that the alternating current motor cables are free to slide through the cable bushings and holes in the frame head before starting to remove the stator from the frame head.

With the machine still in a vertical position, if so arranged, raise all the brushes in their holders and lift the armature vertically from the direct current magnet frame. The direct current end bearing assembly will come out complete on the armature shaft. Figure 43.

DIS-ASSEMBLY OF DIRECT CURRENT BEARING ASSEMBLY:

Remove bearing nut and lockwasher.

With a Channon pulley puller, (Red Devil) remove flange.

NOTE: Match mark parts for assembly.

Remove flat head screws.

Remove bearing cap and gasket.

Using a 1740 Puller and bolts in the four tapped holes in bearing housing, remove housing.

The ball bearing and flinger retainer ring will come off with the bearing housing.

DIS-ASSEMBLY OF ALTERNATING CURRENT END BEARING ASSEMBLY:

To disassemble alternating current end bearing assembly when left complete on shaft.

Remove bearing nut and lockwasher.

Remove flat head screws.

Remove bearing cap.

Remove bearing housing using a 1740 puller and bolts in the four tapped holes in the housing. Roller bearing and flinger will be removed with bearing housing.

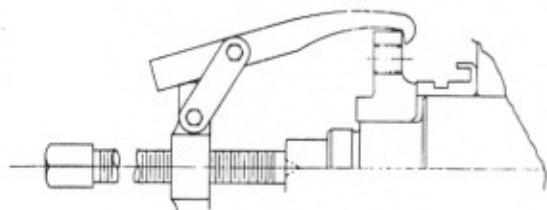


FIG. A
CAT. 6756389G2
FLANGE PULLER
D.C. END

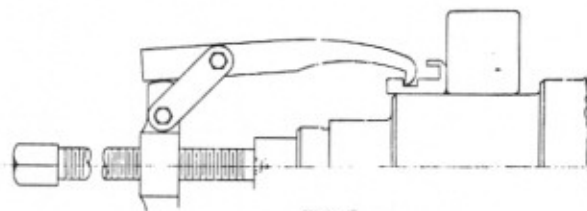


FIG. B
CAT. 6756389G2
RETAINING RING PULLER
D.C. END

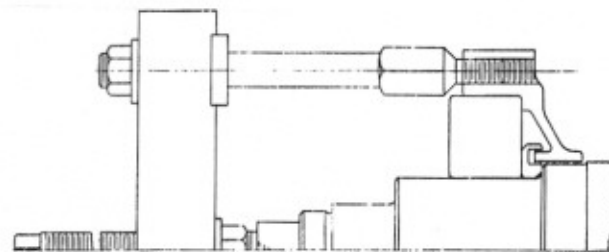


FIG. C
CAT. 6756389G3
BEARING PULLER
BOTH ENDS

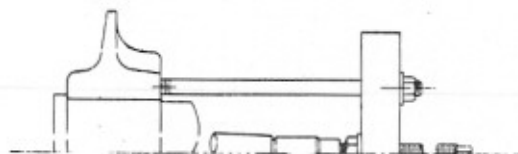


FIG. D
CAT. 6756389G4
FAN PULLER

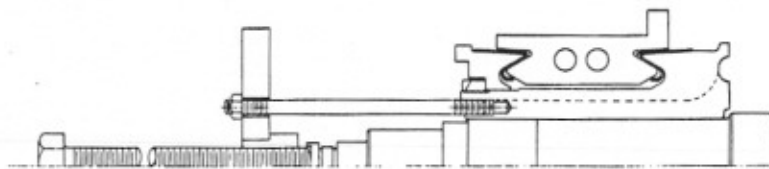
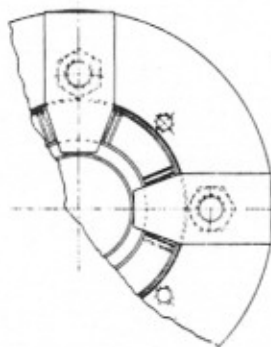


FIG. E
CAT. 6756389G5
COMMUTATOR PULLER



PULLER TOOLS

Figure 41

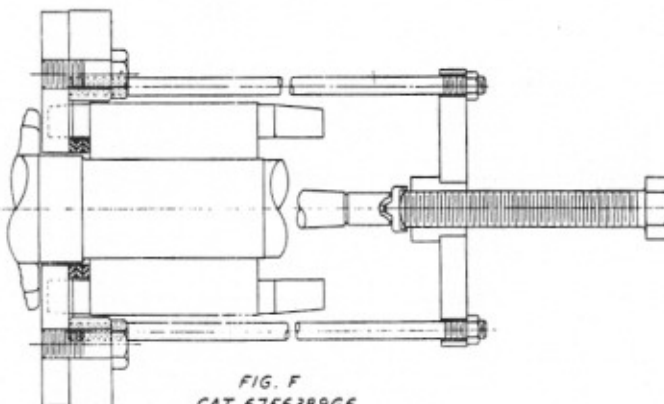
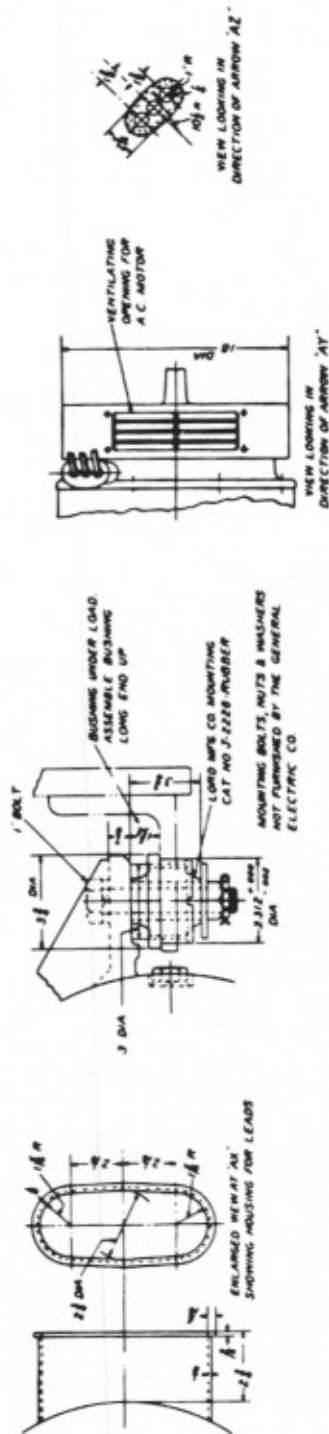
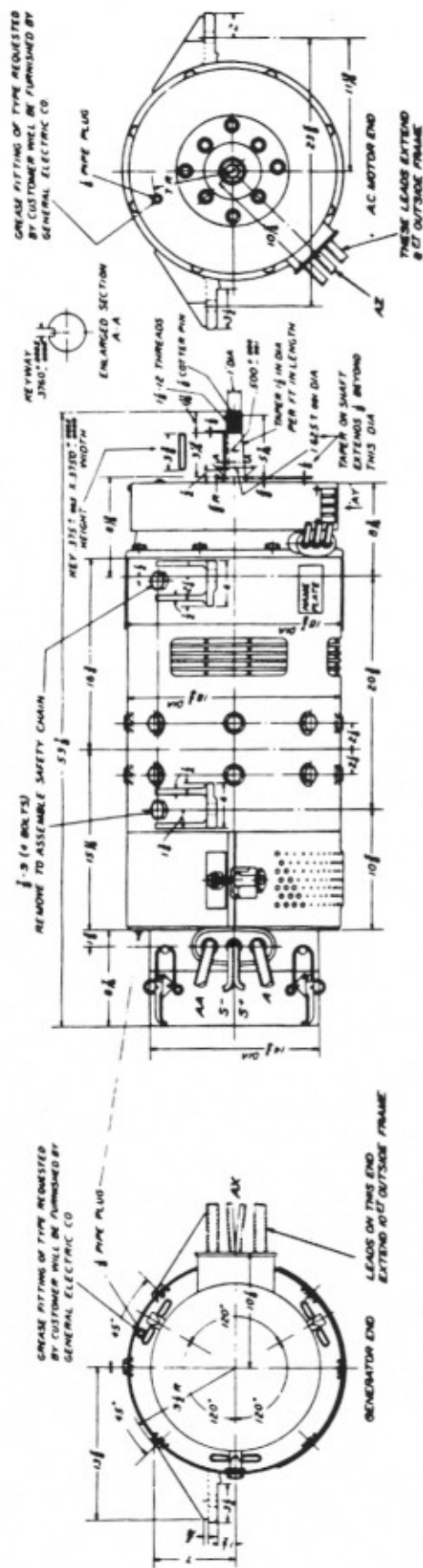


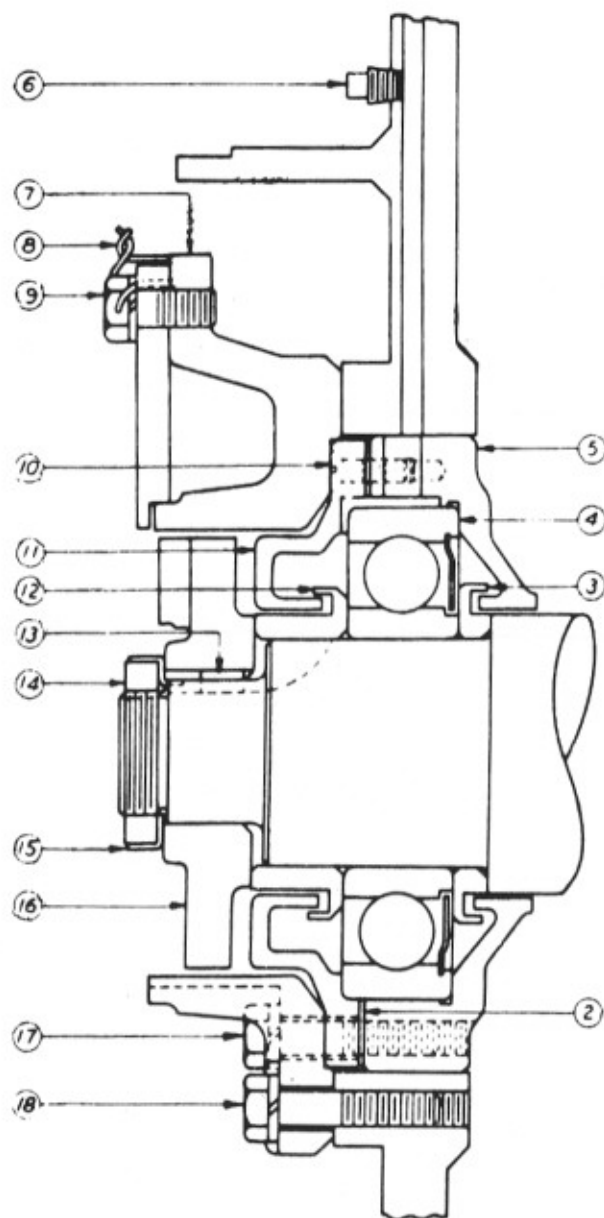
FIG. F
CAT. 6756389G6
ARMATURE PULLER



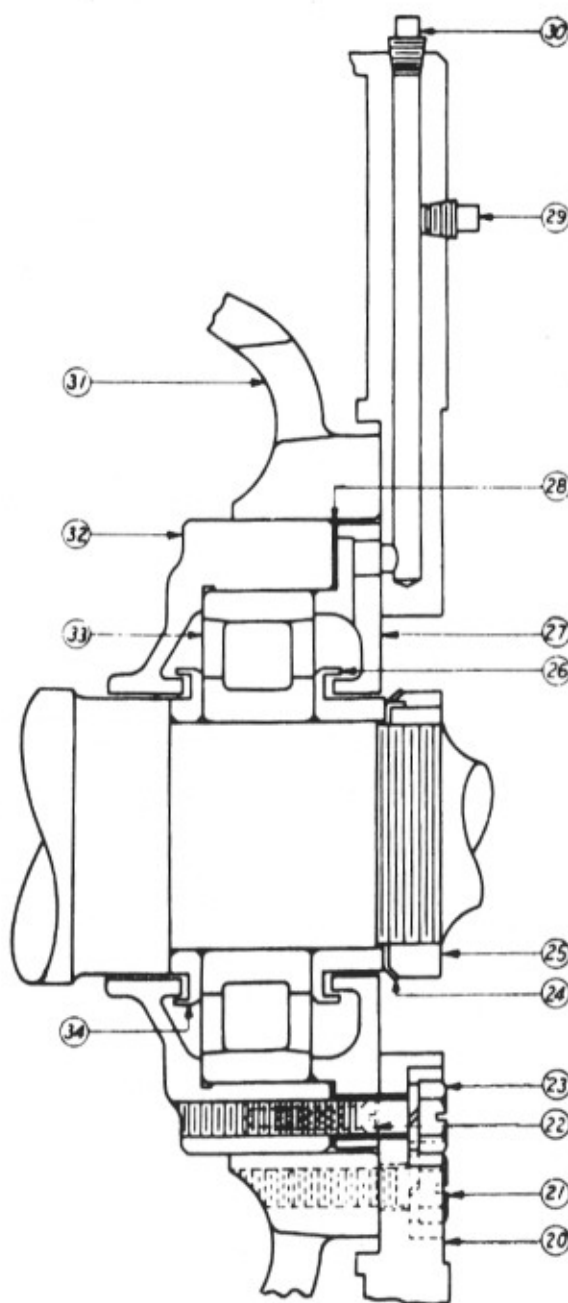
GENERAL ELECTRIC MOTOR GENERATOR

GMG 150 - A

Figure 42



D.C. End



A.C. End

1. Assembly (generator end)
2. Gasket
3. Flinger
4. Ball bearing
5. Bearing housing
6. Pipe plug
7. Retaining ring
8. Wire
9. Cap Screw & Lockwasher
10. Flat head screw
11. Bearing cap
12. Flinger
13. Key
14. Nut
15. Cup lockwasher
16. Flange
17. Cap screw and Lockwasher
18. Cap screw and Lockwasher
19. Assembly (a-c motor end)
20. Cover (frame head)
21. Cap screw (slotted) & Lockwasher
22. Flat head screw
23. Cap screw (slotted) & Lockwasher
24. Plate lockwasher
25. Nut
26. Flinger
27. Bearing cap
28. Gasket
29. Pipe plug
30. Pipe plug
31. Frame head
32. Bearing housing
33. Roller bearing
34. Flinger

MOTOR GENERATOR GMG-150
Bearing Assembly

Figure 43

TO APPLY NEW SHAFT: See Figure 44.

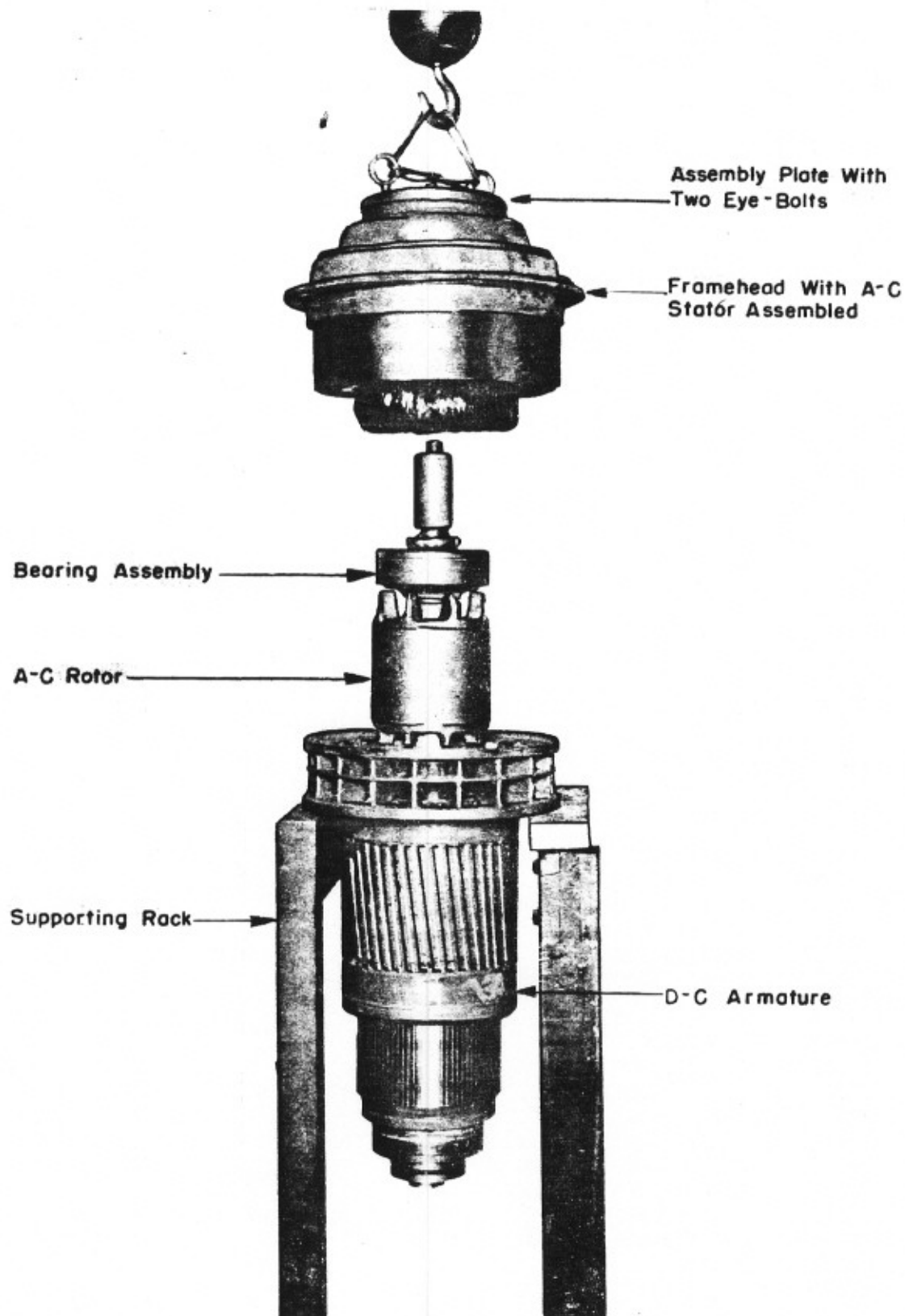
NOTE: Take measurements of each part on old shaft and make record.

1. Remove armature rotor from machine.
2. Remove rotor.
 - a. Attach hydraulic puller (Horizontal press)
 - b. Pack rotor and shaft in dry ice (20 to 30 minutes)
 - c. Remove dry ice.
 - d. Play two (2) large Acetylene torches over rotor.
 - e. When heating, apply pressure gradually (normal 15 ton)
 - f. Remove puller.
3. Remove fan.
 - a. Attach hydraulic puller.
 - b. Play one (1) large Acetylene torch over face hub.
 - c. When heating, apply pressure gradually (normal 10 ton).
 - d. Remove fan and puller.
4. Remove armature (minimum press size 300 ton). NOTE: Armature comes off from armature end of shaft.
 - a. Be sure all blocking collars and press plates are aligned true.
 - b. Set armature under press, collars and press plates in place.
(If pressure cylinder comes up from floor, armature end of shaft is to be down).
 - c. Apply pressure. (Normal 200 to 235 ton).
5. Apply new shaft.
 - a. Place armature, rotor and fan in oven over night to attain temperature of 225° to 250°.
 - b. Clean shaft thoroughly cover with **NO-OXID**.
 - c. Place armature on pressing collar.
 - d. Insert shaft into armature and press.
 - e. Make sure shaft is home (normal 90 ton).
6. Apply fan.
 - a. Heat uniformly with torch.
 - b. Place fan on shaft (right side out) normal -- no press needed.
7. Apply rotor.
 - a. Take at oven temperature.
 - b. Place on shaft.
 - c. Press on (normal 10 ton).

NOTE: Use extreme care to position correctly (not too far, not too near end of shaft. Refer to record taken before removal from old shaft.

8. Test.
 - a. Take meg test.
 - b. Make bar to bar test.
 - c. Check for upset commutator.
 - d. Check for upset rotor.
 - e. Take surface cut on commutator and if necessary undercut.

BALANCING ARMATURE: The armature was given a dynamic balance at the factory and this should also be done when any repairs are made to the armature.



METHOD OF ASSEMBLING STATOR AND FRAMEHEAD ON DRIVE END OF GMG-150 ARMATURE.

Figure 44