GENERATORS
RINGING AND COIN CONTROL
P TYPE
REPLACEMENT PARTS AND PROCEDURES

1. GENERAL

1.01 This section covers information necessary for ordering parts to be used in the maintenance of "P" type ringing and coin control generators, KS-5028, KS-5028-01, KS-5028-02, KS-5030, KS-5030-01, KS-5030-02, KS-5222. It also covers the associated high speed and low speed interrupters of the split ring type. Replacement information on tone alternators and mercury type interrupters is covered in separate sections of these practices.

1.02 This section is reissued to include reference to repaired sets per KS-5222, to refer to Section 024-480-701 for voltage regulator replacement information, to refer to Section 171-110-802 for brush replacement information, to give revised code numbers for interrupter brush holder assemblies and to include catalog numbers of the more commonly used interrupter parts.

1.03 Part 2 of this section is called Replacement Parts and covers the various parts which may be replaced in the field in the maintenance of this equipment. Aside from screws, nuts, bolts and other small parts, which can be obtained locally, the parts not designated herein are of a character which should ordinarily not be replaced by the regular maintenance forces. Part 2 also contains explanatory figures showing the different parts.

1.04 Part 3 of this section covers the approved procedures for the replacement of parts listed under Part 2. This information is called Replacement Procedures.

2. REPLACEMENT PARTS

2.01 The figures included in this part show the various replacement parts in their proper relation to the other parts of the apparatus with their corresponding names.

2.02 When ordering replacement parts give the name of the part as shown in the figures of this section together with any code or catalog number indicated, and also the complete nameplate data of the machine including the serial and KS number, e.g. (1) Bearing lining for commutator end of generator having the following nameplate data: Serial No. 1561094, Type P-1/2, volts 155 a-c., volts 200 d-c., amperes .68 a-c., amperes .25 d-c., 1200 rpm. KS-5028.

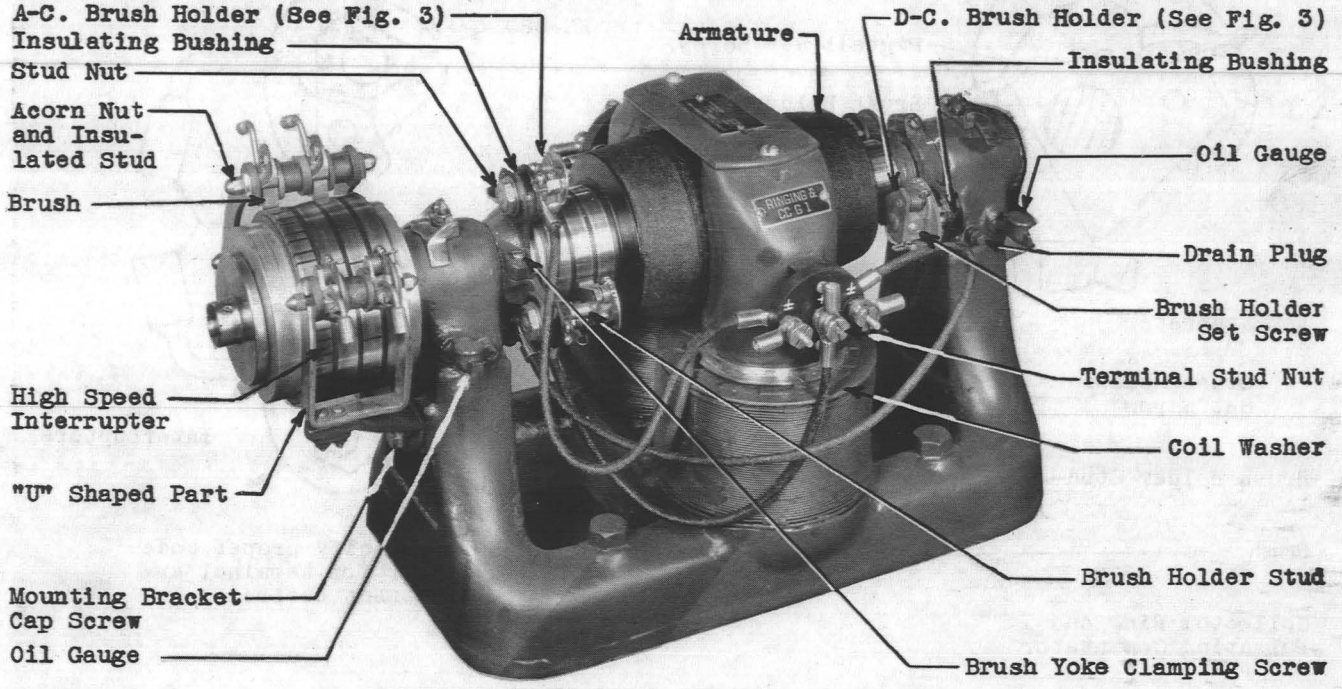


Fig. 1 - Generator with Split Ring Type High Speed Interrupter

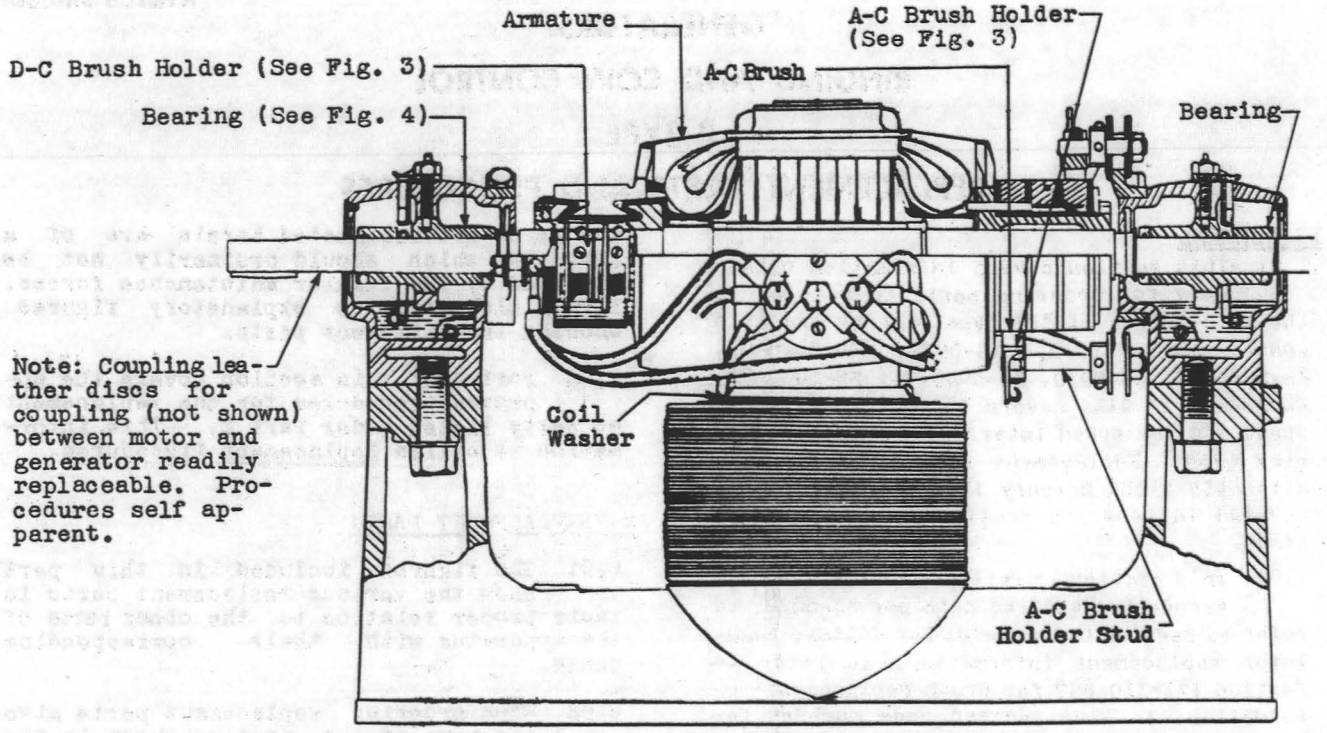


*Fig. 2 - Section View of Generator

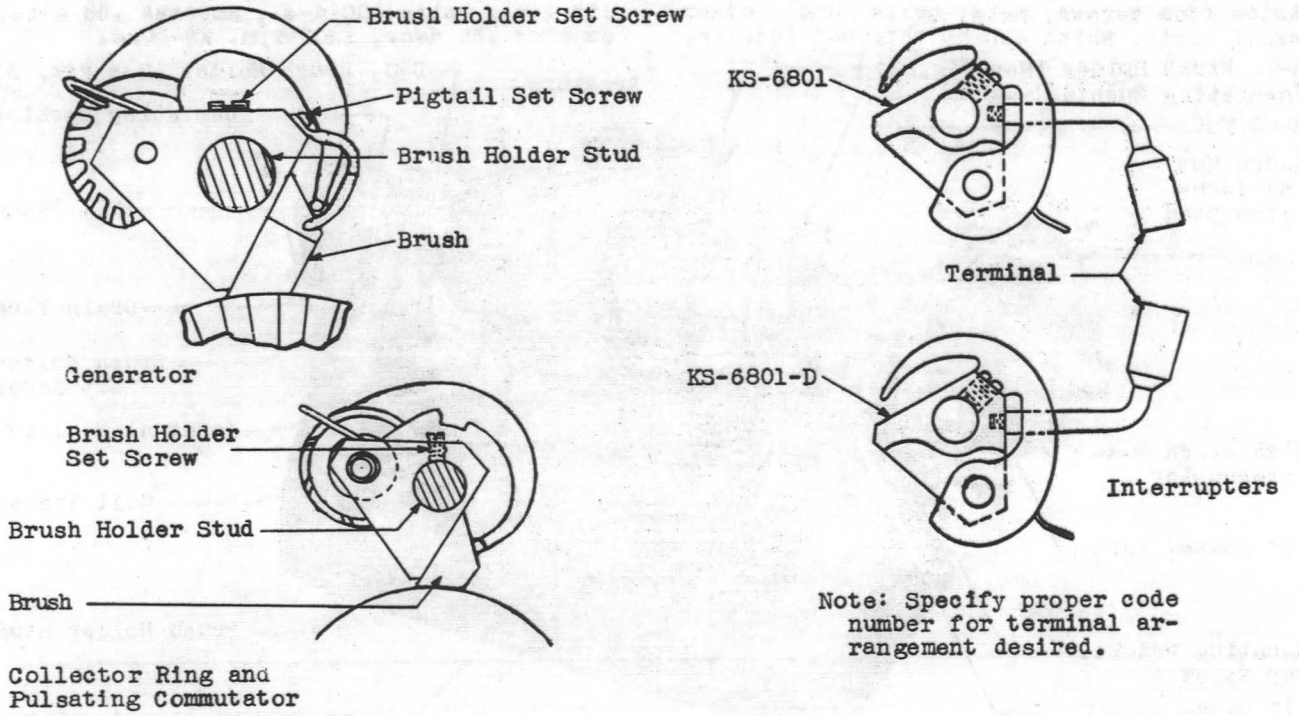
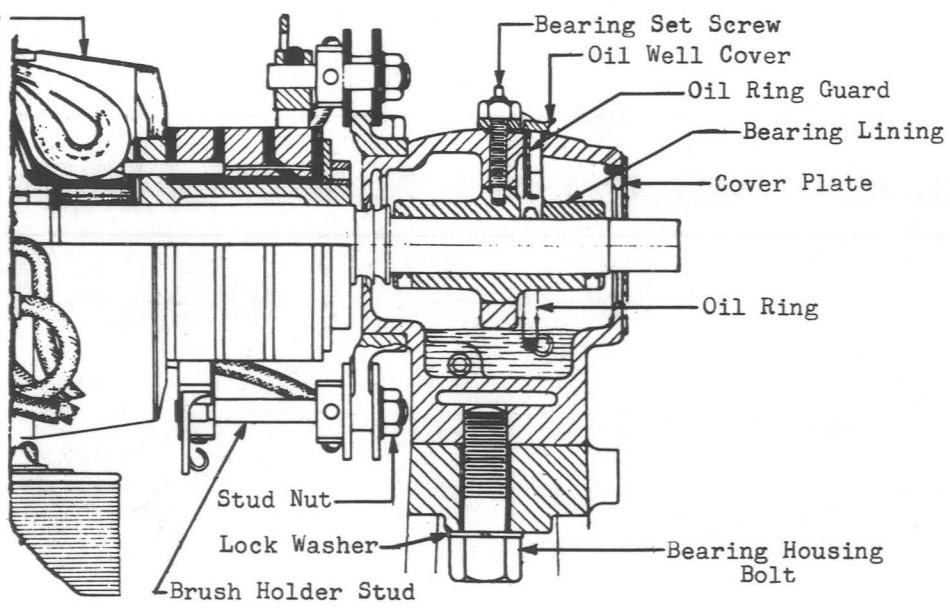
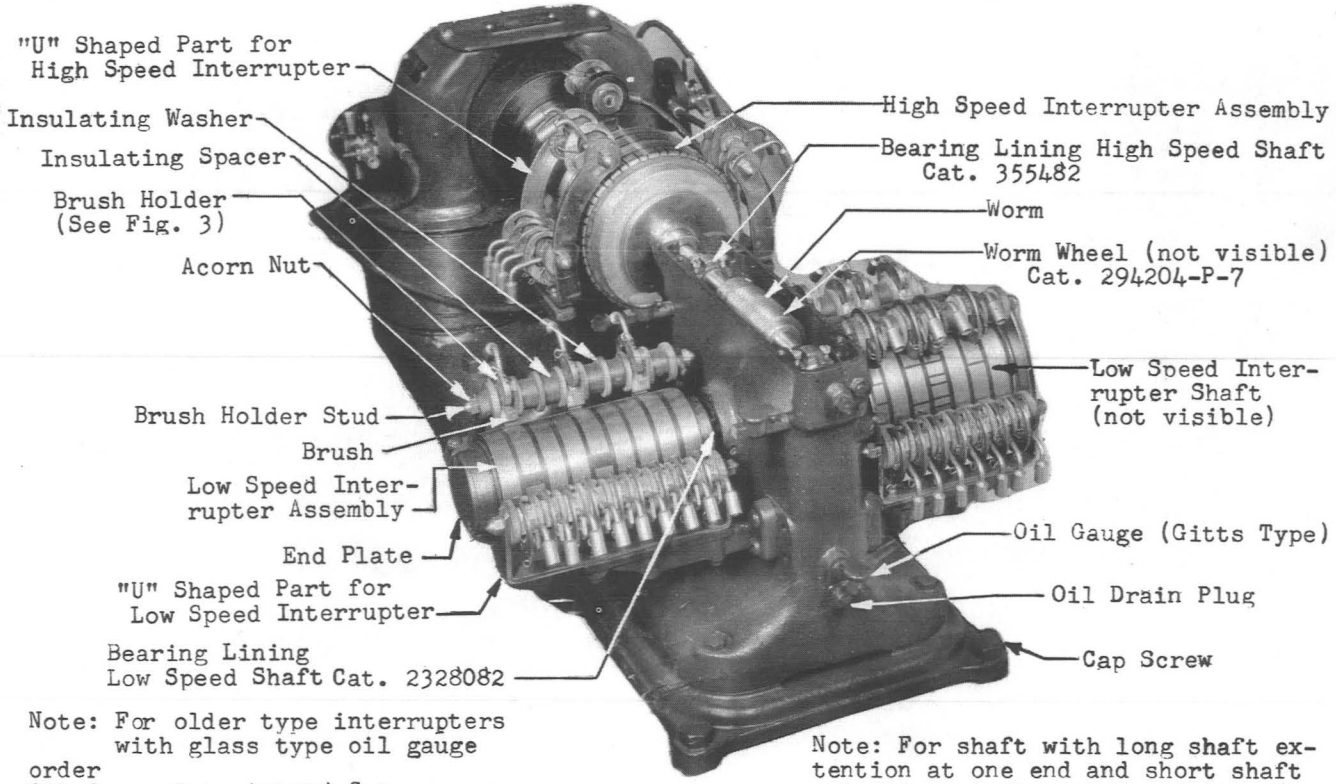


Fig. 3 - Brush Holder Assemblies



Note: In ordering parts specify whether for commutator or collector ring end. A complete new bearing housing assembly is required on the collector ring end when a tone alternator is added. Sufficient washers are furnished with a new housing to limit end play to the required limits.

Fig. 4 - Bearing Detail - Collector Ring End



Note: For older type interrupters with glass type oil gauge order
Oil Gauge Cat. 294138-G-1
Oil Gauge Glass Cat. 355143
Oil Gauge Gasket Cat. 355146
For shaft with long shaft extention at each end specify Cat. 355529
For shaft with short shaft extension at each end specify Cat. 355528.

Note: For shaft with long shaft extention at one end and short shaft extention at the other end specify Cat. 355530.
Some older machines of the smaller sizes had half inch shafts instead of the three quarter inch standard later. In such case, specify shaft size in interrupter parts orders so that bushings may be provided.

Fig. 5 - Split Ring Type High and Low Speed Interrupters with Gear Case

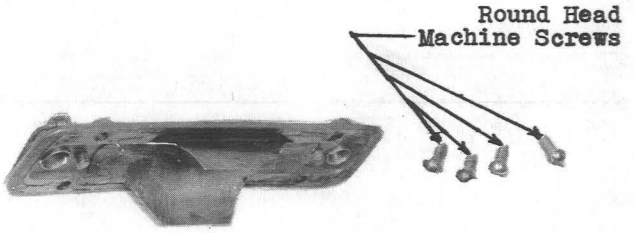


Fig. 6 - Gear Case Cover

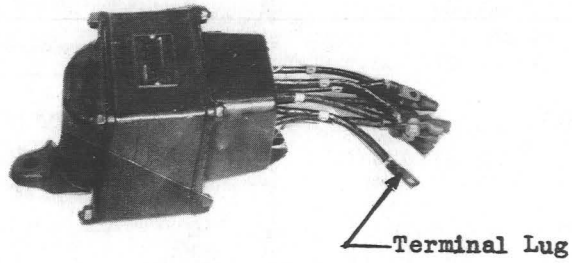


Fig. 7 - Transformer

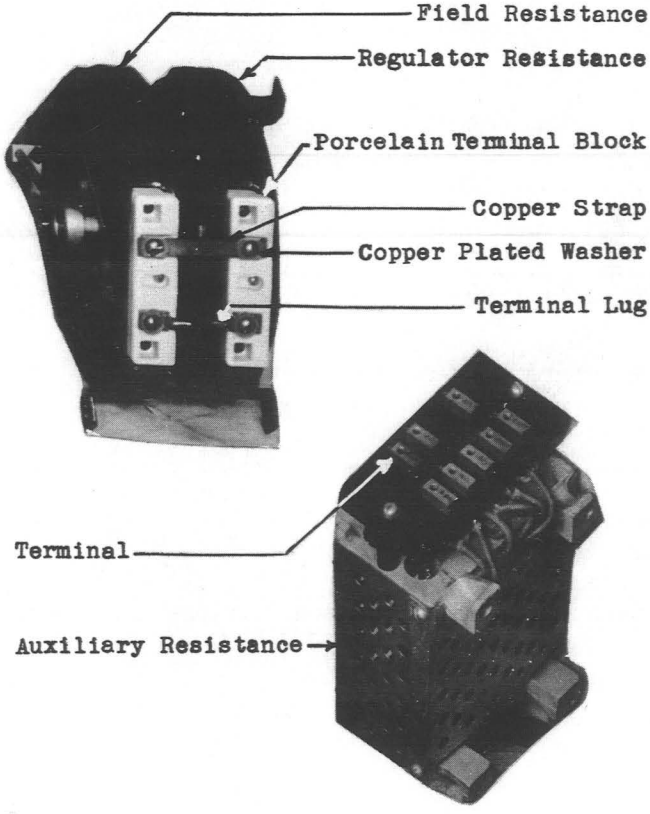


Fig. 8 - Resistor Units

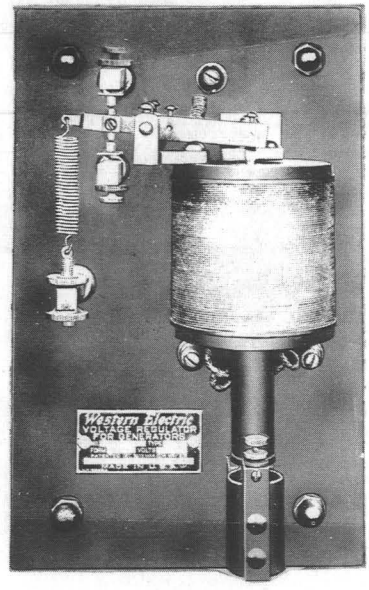


Fig. 9 - Voltage Regulator
(Type TA, Form B shown)

Note: For individual replacement parts refer to Section 024-480-701. No replacement procedures are specified as the procedure to be followed is simple and self-apparent.

3. REPLACEMENT PROCEDURES

3.001 List of Tools and Materials

Tools

Hammer 1 lb. AT&TCo Std. Spec. 6258N
Pliers, P-long nose, 6-1/2 inch
AT&TCo Std. Spec. 6267
Screw-driver, 4 inch (regular) AT&TCo Std. Dwg. 46-X-34
Wrench, Adjustable, Flat 6 inch

Materials

KS-7860 Petroleum Spirits
Cloth, Cleaning, Twill Jean, D-98063
Compound, Sealing KS-6824
Oil, 130-190 S 100 (See 065-330-101)
Measure 1 qt. (funnel attached) or equivalent
Oil, Dashpot, G.E. Co.
Pail, or equivalent receptacle for oil
Wooden block.

3.002 Remove the apparatus from service before making any replacements.

3.003 After making any replacements of parts the apparatus shall be checked and when necessary, readjusted to meet the requirements specified in the Section covering the Apparatus Requirements and Adjusting Procedures for this equipment.

3.004 No replacement procedures are specified for screws or other small parts when the procedure consists of a simple single operation.

Brush Rigging

3.01 Brushes (See Figs. 1 & 3)

(1) A generator brush may be replaced by removing the screw which fastens the pigtail to the brush holder, raising the brush finger and withdrawing the old brush with its pigtail. Insert a new brush, and connect the pigtail.

(2) A pulsating commutator, collector ring or interrupter brush may be replaced by raising the brush finger and withdrawing the old brush. Insert a new brush and see that the brush finger holds the brush firmly in place.

3.02 Brush Holder Assemblies (See Figs. 1, 3 & 5)

(1) To replace a generator brush holder assembly, remove the associated lead. Remove the brush, loosen the hexagonal stud nut sufficiently so that the brush holder stud and brush holder assembly may be removed by sliding the stud out of the slotted jaw of the brush holder yoke. After removing the stud and brush holder assembly, loosen the brush holder set screw and slide the complete brush holder assembly off the brush holder stud. Slip the new complete brush holder assembly (the brush spring, brush finger and ratchet) on the brush holder stud and reassemble in the reverse order, making sure that the stud insulating bushing is in its proper place and the hexagonal nut and brush holder set screw are tight.

(2) To replace a pulsating commutator brush holder assembly or the collector ring brush holder assembly, (farthest from the armature) remove the associated lead. Remove the brush. Loosen the brush holder set screw and slide the complete brush holder assembly off the brush holder stud. Slip the new complete brush holder assembly (the brush spring, brush finger and ratchet) on the brush holder stud and reassemble in the reverse order making sure that the hexagonal nut and brush holder set screw are firm.

(3) To replace a collector ring brush holder assembly, (nearest the armature) remove the associated lead. Remove the brush. Remove the old and insert the new complete brush holder assembly in a similar manner to that outlined in (1).

(4) To replace a high or low speed interrupter brush holder assembly, remove the brushes on the particular stud. Mark and remove the leads to the brush holders by unsoldering the connections.

Note: Remove only those leads that are necessary.

Loosen the two acorn stud nuts sufficiently so that the brush holder stud and brush holder assemblies may be removed by sliding the stud in the jaws of the "U" shaped part. Loosen the brush holder set screws as found necessary. Remove the acorn nut and slide the brush holder assemblies, insulating washers and insulating spacers off the insulated brush holder stud. Slip the new complete brush holder assembly (the brush spring, brush fingers and ratchet) on the brush holder stud and reassemble in the reverse order making sure that the insulating spacers and washers are in their proper positions and the acorn nut and brush holder set screws are firm.

3.03 D-C. Brush Holder Stud Insulating Bushing
Pulsating Commutator and Collector Ring Brush Holder Stud Insulating Bushing
Interrupter Brush Holder Stud Insulating Washer
Interrupter Brush Holder Stud Insulating Spacer
Interrupter Insulated Brush Holder Stud

(1) To replace a d-c. brush holder stud insulating bushing, remove the brush

holder stud and brush holder assembly in a similar manner to that outlined above. Remove the hexagonal nut and brass washer and slide the stud insulating bushing off the brush holder stud. Slip the new bushing on the stud and reassemble in the reverse order. Be sure that the hexagonal nut is firm.

(2) To replace a pulsating commutator or collector ring brush holder stud insulating bushing, remove the brush holder stud and brush holder assembly in a similar manner to that outlined above. Remove the hexagonal nut and brass washer and slide the stud insulating bushing off the brush holder stud. Slip the new bushing on the stud and reassemble in the reverse order. Be sure that the hexagonal nut is firm.

(3) To replace an interrupter brush holder stud insulating washer remove the brush holder assembly as outlined above. Replace the old with a new insulating washer and reassemble in the reverse order.

(4) To replace an interrupter brush holder stud insulating spacer, remove the insulating washer as outlined in procedure (3). Replace the old with a new insulating spacer and reassemble in the reverse order.

(5) To replace an interrupter insulated brush holder stud remove all the insulating spacers and washers in a similar manner to that outlined in procedure (4). Replace with a new insulated stud and reassemble in the reverse order.

(6) After replacing any brush rigging the brush holder angles and clearances with respect to the commutator or collector ring surfaces should be checked to see that the requirements are met.

Frame

3.04 Bearings (See Figs. 1, 2 & 4)

(1) When necessary the generator bearings should be removed as follows: If a bearing to be replaced is located in the collector ring end equipped with the high and low speed interrupters it will be necessary to mark and remove all leads connected to the low speed interrupter brush holders. Then remove the four cap screws at the base of the gear case. Lift off the gear case, observing the position of any shims.

(2) Remove the high speed interrupter in the following manner: Mark and remove all brushes and leads connected to the high speed interrupter brush holders. With a wrench remove the two cap screws which support the supporting bracket and brush rigging to the bearing pedestal and remove the supporting bracket. Loosen the set screw which secures the high speed interrupter to the shaft extension of the ringing generator and slide the interrupter off the shaft extension.

(3) Mark and remove the pulsating commutator and collector ring brushes. Loosen the clamping screw which secures the a-c. brush holder yoke to the bearing housing, and rest the yoke on the collector rings.

(4) The bearing housing may now be removed by placing a hard wood block approximately 1/4 inch by 1 inch by 12 inches across the tops of the field winding spools of the ringing machine, and inserting if necessary wooden wedges between this cross-piece and the armature of the ringing machine. This is done in order to hold the armature in its proper position to prevent injury to the machine windings when the bearing is removed. The drain plug in the bottom of the oil chamber should be taken out and the oil drained into a pail or other receptacle. Remove the bearing housing bolt which secures the bearing housing to the bearing pedestal and remove the housing, taking care that the oil ring is not damaged.

(5) The bearing set screw holding the oil ring guard and the oil well cover should be removed and the oil ring lifted out of its groove. Remove the bearing lining. It may be necessary to exert a pressure on the bearing lining or to tap the lining in order to remove the bearing. A wooden block should be used to protect the bearing lining from the direct blow of the hammer.

(6) Replace the new bearing lining in the reverse order from removing the worn one, making certain that the bearing lining is in its correct position, with the slot for the oil ring at the top and with the shoulder of the lining seated against the projection in the bearing housing. Make certain that the oil ring is replaced without being bent or damaged. Fasten all bolts and screws securely in order to prevent excessive noise and vibration. Clean the drain plug and its associated threads in the casting and coat with KS-6824 compound, replace the plug and refill the bearing chamber with oil. Reassemble the machine in the reverse order.

(7) If a bearing to be replaced is located in the collector ring end and equipped with the tone alternator and mercury-type interrupter it will be necessary to remove the tone alternator and mercury-type interrupter as outlined in the Sections covering the Replacement Parts and Procedures for this equipment. Then proceed as outlined in procedures (3), (4), (5) and (6).

(8) If a bearing to be replaced is located in the commutator end, remove the motor and coupling as outlined in the Section covering the Replacement Parts and Procedures for this equipment.

Note: On sets equipped with two motors, remove the motor and coupling nearest the generator.

Mark and remove the commutator brushes. Loosen the clamping screw which secures the d-c. brush holder yoke to the bearing housing and rest the yoke on the commutator. Then proceed as outlined in procedures (4), (5) and (6).

3.05 Armature (See Figs. 1 & 2)

(1) To replace a generator armature remove the bearing housings as outlined in procedures 3.04 (1) to (4), (7) and (8).

Note: Be sure and support the armature on both sides with a hard wood block as outlined in procedure 3.04, (4).

(2) Carefully work the armature clear of the magnet frame. After removing the armature it should be placed with its shaft resting on grooved blocks holding the armature, collector rings and pulsating commutator clear of all other supports.

(3) The armature may be replaced in the same manner, going through the steps given above in the reverse order. Care should be taken to replace any shims in their proper location, and to make certain that the generator shaft lines up with the shaft of the driving and driven agents.

Interrupter Assemblies (See Figs. 1 & 5)

3.06 Split Ring Type Low Speed Interrupter
Same with Outboard Bearing
Split Ring Type High Speed Interrupter
Mercury-Type Interrupter

(1) To replace a split ring type low speed interrupter assembly, mark and remove all brushes from the interrupter to be replaced and also the brush rigging and supporting brackets complete. Remove the key which secures the assembly to the low speed shaft extension. In order to get to the key, it will be necessary to remove the two screws which secure the end plate to the ring assembly. Slip the new interrupter assembly on making sure that the key secures the assembly to the shaft extension. Reassemble in the reverse order.

(2) To replace a split ring type low speed interrupter assembly having an outboard bearing, remove the outboard bearing and then follow the procedure as outlined in (1).

(3) To replace a split ring type high speed interrupter, remove the low speed interrupter gear case and the high speed interrupter as outlined in paragraph 3.04, (1) and (2). Slip the new interrupter on the shaft making sure that the set screw registers on the spot on the shaft provided for that purpose. Reassemble the machine in the reverse order. Lace the flexible belt on as outlined in procedure 3.11.

(4) To replace a mercury-type interrupter follow the Section covering the Replacement Parts and Procedures for this equipment.

3.07 Tone Alternator

(1) To replace a tone alternator follow the Section covering the replacement Parts and Procedures for this equipment.

Oil Gauges (See Figs. 1 & 5)

3.08 Oil Gauge
Oil Drain Plugs

(1) To replace an oil gauge, the drain plug in the bottom of the oil chamber should be taken out and the oil drained into a pail or other receptacle. Remove the oil gauge. Before replacing with a new oil gauge clean the threads and coat the plug and gauge with KS-6824 compound as outlined in 3.04, (6).

(2) To replace a drain plug, remove it and replace with a new one in a manner similar to that outlined in (1).

3.09 Low Speed Interrupter Shaft Bearing
Low Speed Interrupter Shaft

(1) To replace an interrupter shaft bearing on the low speed shaft, remove the brushes, the end plate and the steel washer. The removal of the end plate and the steel washer may require the use of a spanner wrench. Slide the interrupter units from the shaft together with the collar next the bearing. Drain the oil from the bearing housing, loosen the two set screws on the bearing and remove the bearing from the shaft. The new bearing should be pushed in with its drain side down until it just touches the gear wheel but not tight enough to cause binding, the set screws tightened and the interrupter ring assembly replaced and fresh oil added.

(2) To install a low speed shaft or worm gear wheel, drain the oil from the gear case, remove the low speed interrupter ring assemblies and loosen the set screws on one of the low speed shaft

bearings. Loosen the set screws on the hub of the gear wheel and pull out the shaft and other bearing and ring assemblies of the unit. Reassemble these units on the new shaft. Insert the shaft through the hub of the gear wheel, either the old or a new one. Tighten the set screws in the hub of the gear wheel making certain that the screws register in their respective holes in the shaft. Reassemble the other bearing and interrupter ring assemblies as outlined in (1).

(3) After moving or replacing the low speed shaft bearing clean the surfaces with pertoleum spirits and paint the joint between the bearing and the outside of the gear case with KS-6824 sealing compound to make the joint oil-tight.

3.10 Worm
Worm Bearing

(1) To install a new worm or worm bearing remove the gear case cover, shift the interrupter gear case to free the coupling half and lift out the worm shaft with its two bearings. Remove the worm bearings or worm if necessary and replace the shaft and bearings, carefully meshing the worm with the gear wheel. Clean the edges of the cover and the gear case, with petroleum spirits and replace it, sealing the edges with KS-6824 sealing compound. Care should be taken not to get any of the compound inside the gear case.

Accessories

3.11 Rubberized Interrupter Link (See Fig. 10)

(1) To replace a rubberized interrupter link for the high speed interrupter or tone alternator loosen the coupling set screw, and slide the coupling along the shaft toward the gear case. Then remove the old link. Loop the new link or belt over the upper driving pin. Bring the two sides of the belt together and lace over the coupling pin on the left hand side. Separate the belt and pass one side of the belt on either side of the rotor or interrupter hub. Bring the two sides of the belt together and lace over the other coupling pin. Pass the remaining loop over the remaining driving pin. Replace the coupling half in its original position on the shaft extension of the gear case and tighten the set screw firmly.

Resistor Unit (See Fig. 8)

3.12 Field Resistance
Regulator Resistance
Auxiliary Resistance
Porcelain Terminal Block

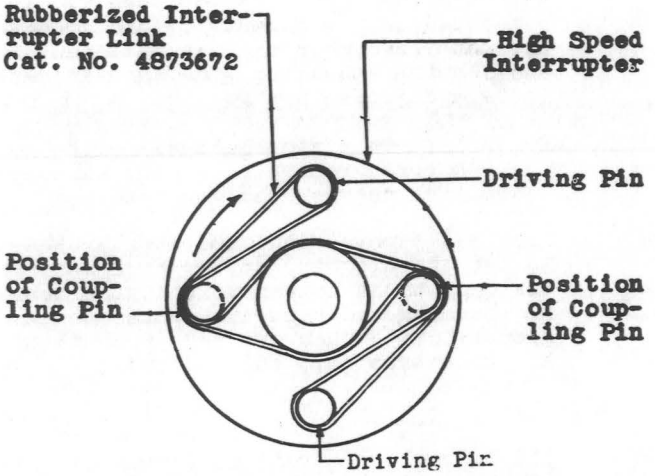
(1) To replace a generator field resistance, mark and disconnect the leads that are secured to the generator field resistance and speed regulator resistance terminals. Remove the resistor unit complete from the rear of the panel.

Note: The generator field resistance is the nearest to the panel, when the resistor unit is mounted on the rear of the panel.

Remove the screws which secure the generator field resistance to the tripod formed by the three panel mounting bars. Remove the porcelain terminal block. The generator field resistance may now be removed. Remove the locking device. Mount the terminal block and locking device on the new resistance. Reassemble and remount the resistor unit in the reverse order.

(2) Replace a regulator resistance in a manner similar to that outlined in (1).

(3) To replace an auxiliary resistance, mark and disconnect the leads that are secured to the auxiliary resistance terminals. Remove the resistance from the rear of the panel board and remount the new resistance. Connect the leads to their proper terminals.



Note: Arrow indicates direction of rotation of the high speed interrupter as viewed from the gear case end. Position of coupling pins on high speed shaft of gear case indicated.

Fig. 10 - Method of Inserting Link in Flexible Coupling

(4) To replace aporcelain terminal block, mark and remove the leads of the resistance whose terminal block is to be renewed. Loosen the screws which hold the terminal block to the resistance and remove it. Replace and connect the new terminal block in the reverse order.

3.13 Transformer (See Fig. 7)

(1) To replace a transformer, mark and disconnect all leads connected to it. Remove the transformer and replace it with a new or reconditioned one. Reconnect all leads.