

ONE-HALF AMPERE RINGING MACHINES KS-5133 AND KS-5133-01 REPLACEMENT PARTS AND PROCEDURES

1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of the Holtzer-Cabot 1/2-ampere ringing machines per KS-5133 and KS-5133-01. It also covers approved procedures for replacing these parts.

Note: The KS-5133 machine has oil ring type bearings and the speed regulator on the DC machine is outboard mounted. The generator and motor of the KS-5133-01 machine has wool-packed sleeve bearings, arranged for the admission of oil through a hole in the coverplate, with an open overflow hole below the shaft, or in earlier models, provided with a combined oil cup and gauge on each bearing, located below the shaft. The speed regulator on the DC machine is mounted in the coupling. AC machines are not equipped with speed regulators. In addition, the later AC driven machines have a centrifugal cutout switch located in the motor bearing bracket for disconnecting the starting winding after starting.

1.02 This section is reissued to include the KS-5133-01 ringing machine. Detailed reasons for reissue will be found at the end of the section. Since this reissue covers a general revision, the arrows used to indicate changes have been omitted.

1.03 Part 2 of this section covers the various parts which it is practicable to replace in the field in the maintenance of this equipment. No attempt should be made to replace parts not designated. Part 2 also contains explanatory figures showing the different replacement parts. This information is called Replacement Parts.

1.04 Part 3 of this section covers the approved procedures for the replacement of the parts covered in 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 together with their corresponding names.

2.02 When ordering parts for replacement purposes give the name of the part as shown in the figures and also the complete nameplate data of the machine including the serial number and "KS" number. For example: "Speed regulator contact assembly" for the speed regulator used with the Holtzer-Cabot ringing generator having the following nameplate data, "type ; KS-5133-01, List 3, amperes 0.5; volts 20-26, rpm 1100-1200; serial no. 45678." Do not refer to the BSP number or to any information in parentheses following the name of the part.

2.03 Orders for interrupter spring packs should indicate specific location by designating spring pack number. These numbers are stamped on the top member of the spring pack. Springs are not furnished separately.

2.04 Brushes shall be ordered in accordance with Section 171-110-802.

2.05 Miscellaneous parts such as screws, which are not named in the figures and which cannot be obtained locally, should be ordered by describing the part.

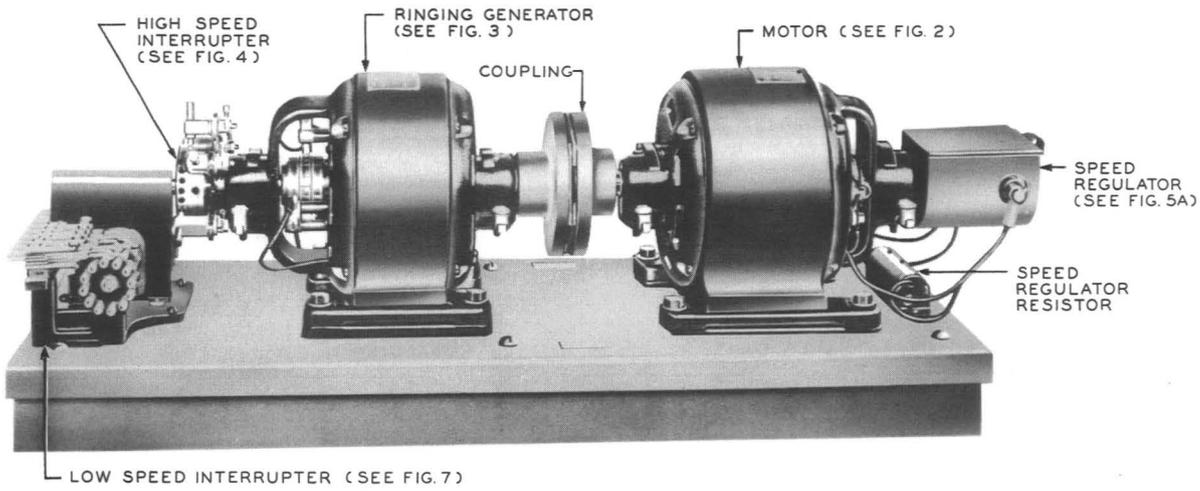


Fig. 1A - General Assembly KS-5133 DC Motor-driven Machine

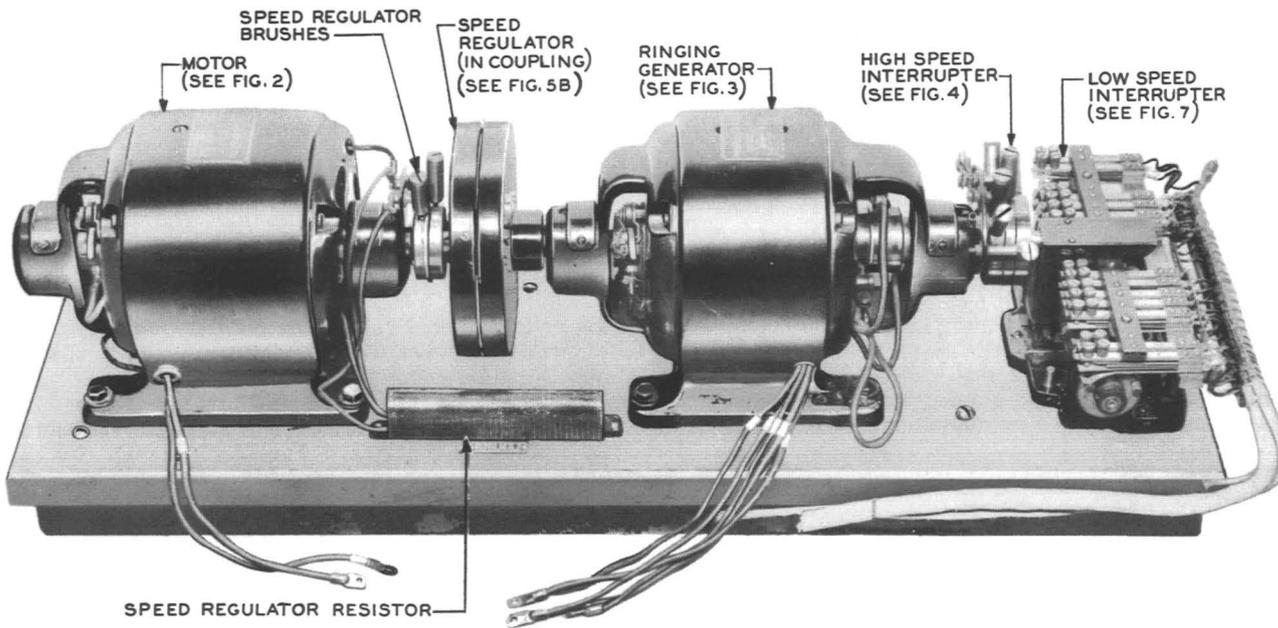


Fig. 1B - General Assembly KS-5133-01 DC Motor-driven Machine

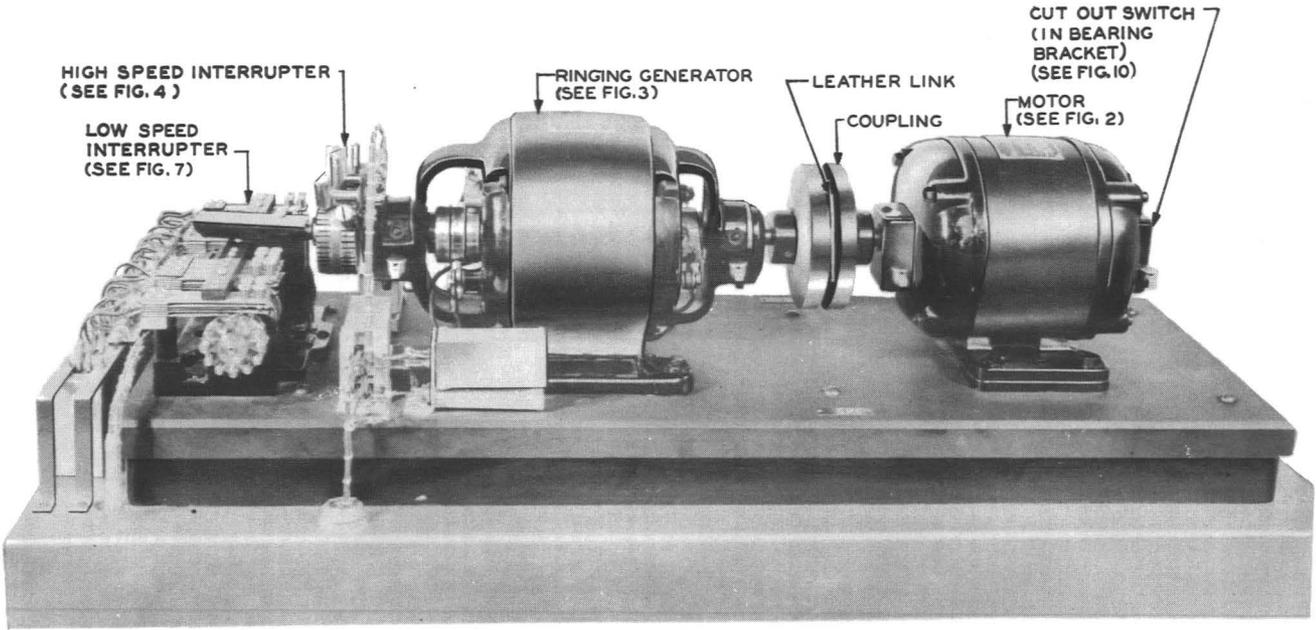


Fig. 1C - General Assembly KS-5133-01 AC Motor-driven Machine

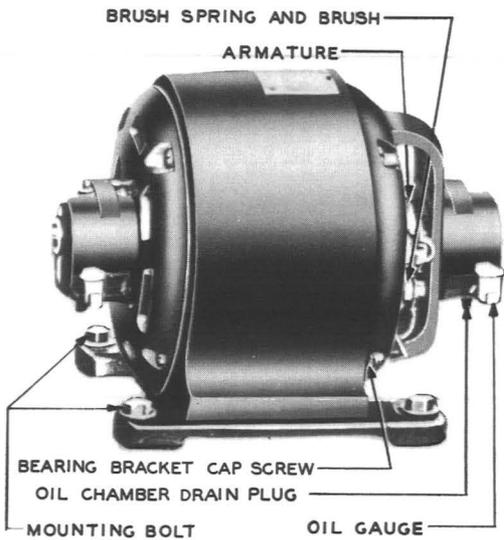


Fig. 2 - Motor

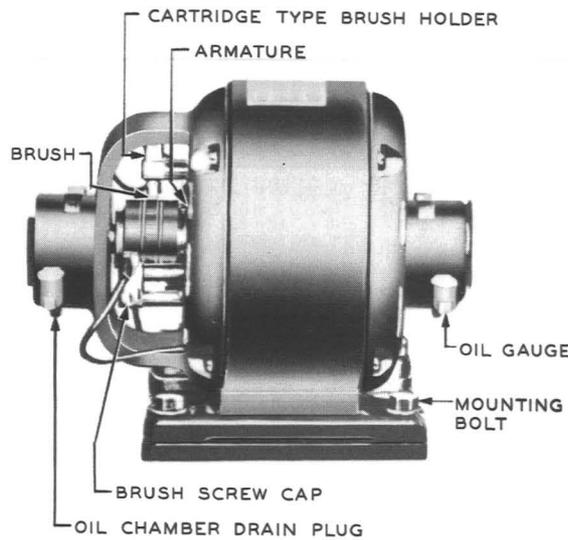
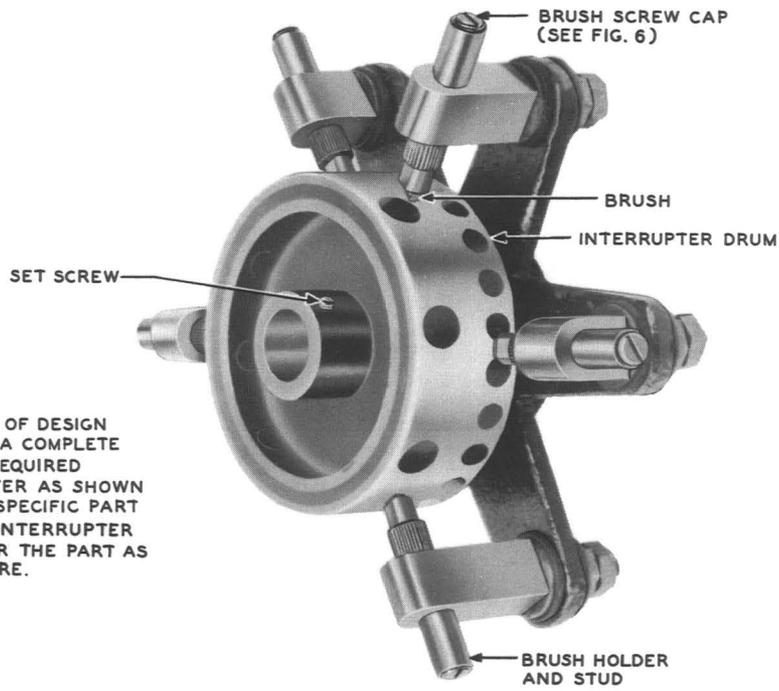


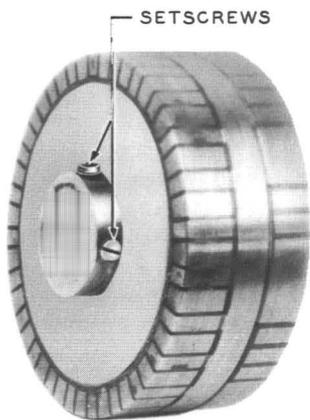
Fig. 3 - Generator



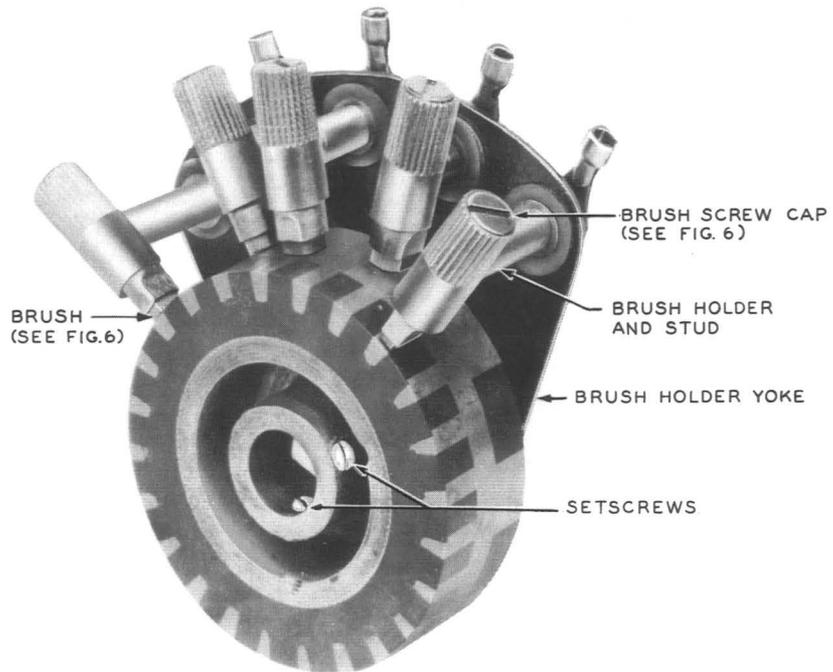
IF THE INTERRUPTER IS OF DESIGN SHOWN IN FIG. 4A AND A COMPLETE NEW INTERRUPTER IS REQUIRED ORDER THE INTERRUPTER AS SHOWN IN FIG. 4B. IF ONLY A SPECIFIC PART IS REQUIRED FOR THE INTERRUPTER SHOWN IN FIG. 4A ORDER THE PART AS INDICATED IN THE FIGURE.

Fig. 4A - Circular Segment Type High-speed Interrupter

NOTE: THE COMMUTATOR TYPE HIGH SPEED INTERRUPTER DRUM, BRUSH HOLDER YOKE, BRUSH HOLDER AND STUD OR BRUSHES WILL BE FURNISHED UNLESS OTHERWISE SPECIFIED IN THE ORDER.



COMMUTATOR TYPE DRUM



RECTANGULAR SEGMENT TYPE DRUM

Fig. 4B - High-speed Interrupter

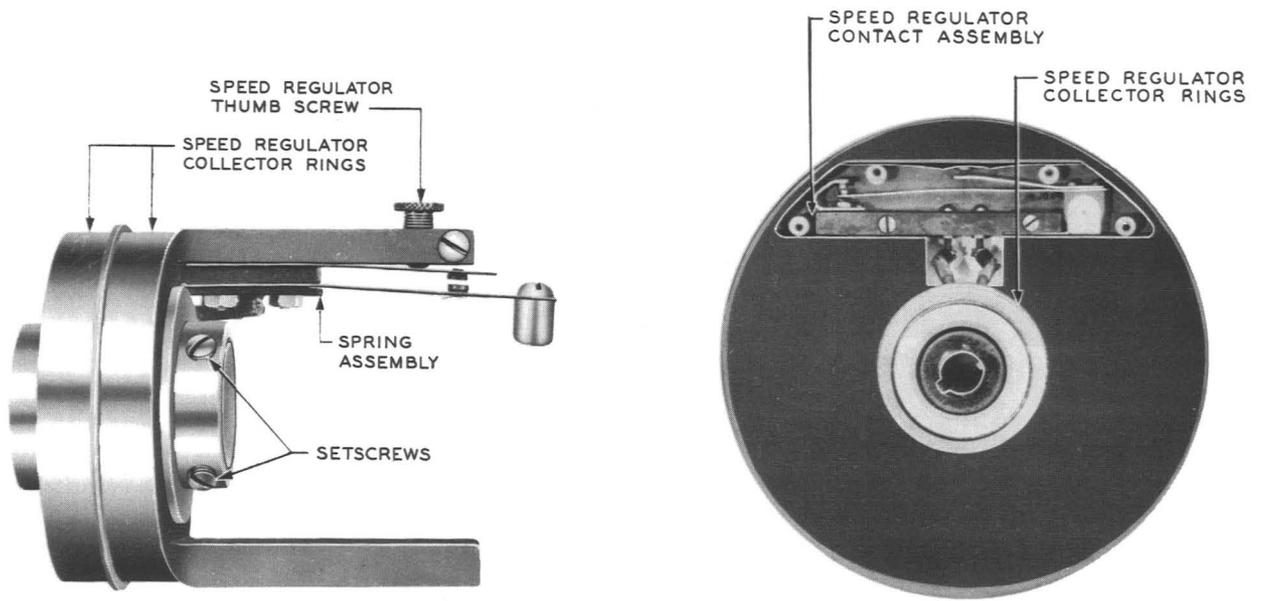


Fig. 5A - Speed Regulator (KS-5133 Machine)

Fig. 5B - Speed Regulator (KS-5133-01 Machine)

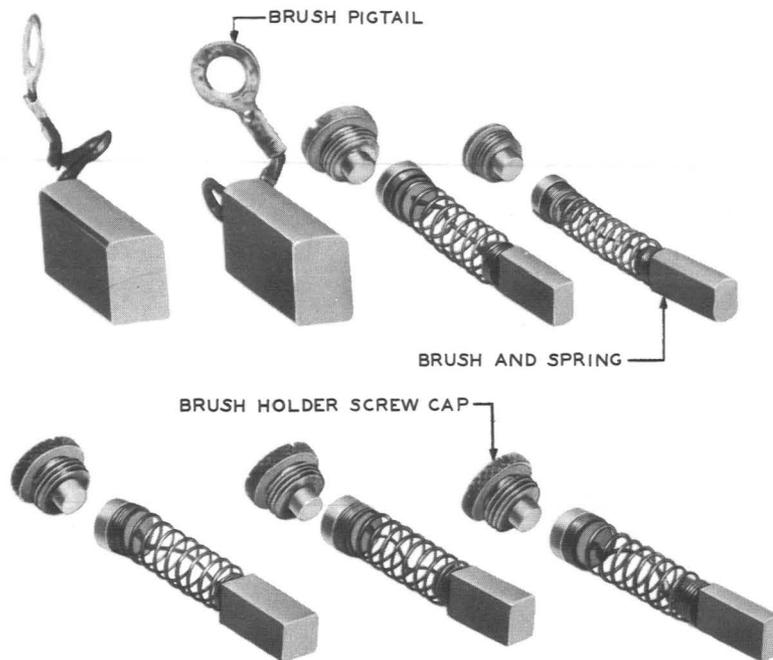


Fig. 6 - Brushes and Brush Details
See Section 171-110-802

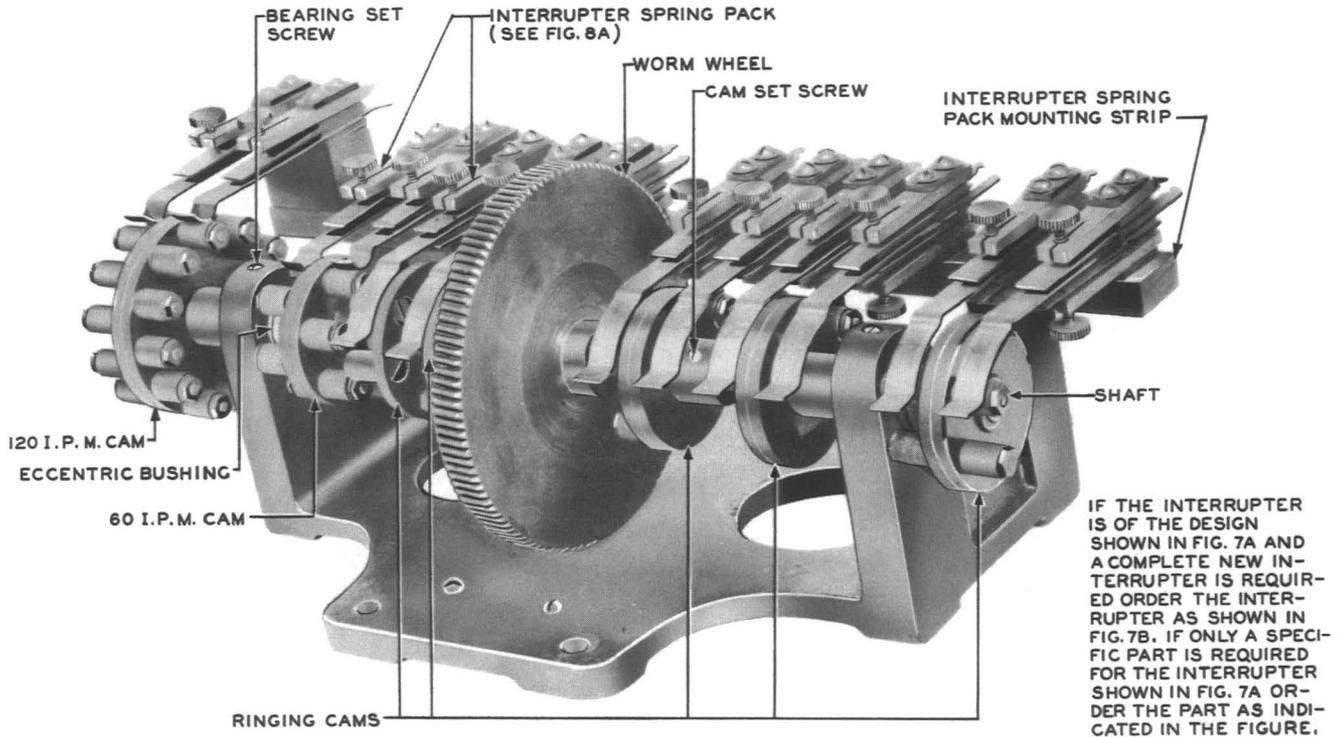


Fig. 7A - Insulated Cam Type Low-speed Interrupter (KS-5133)

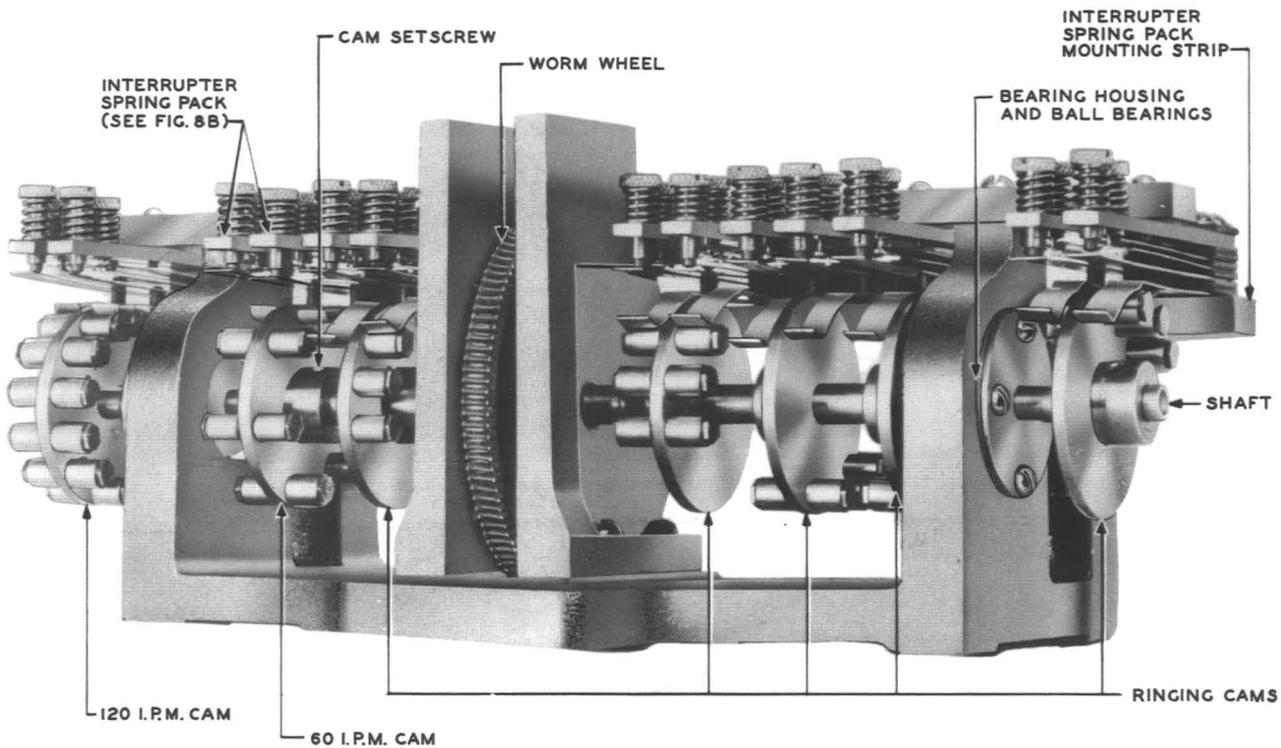


Fig. 7B - Metal Cam Type Low-speed Interrupter (KS-5133 and KS-5133-01)

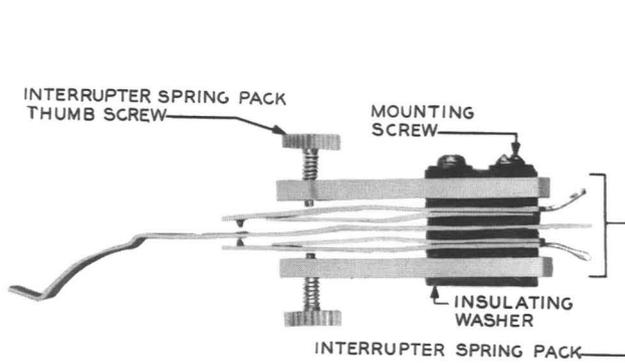


Fig. 8A - Insulated Cam Type Low-speed Interrupter Spring Pack

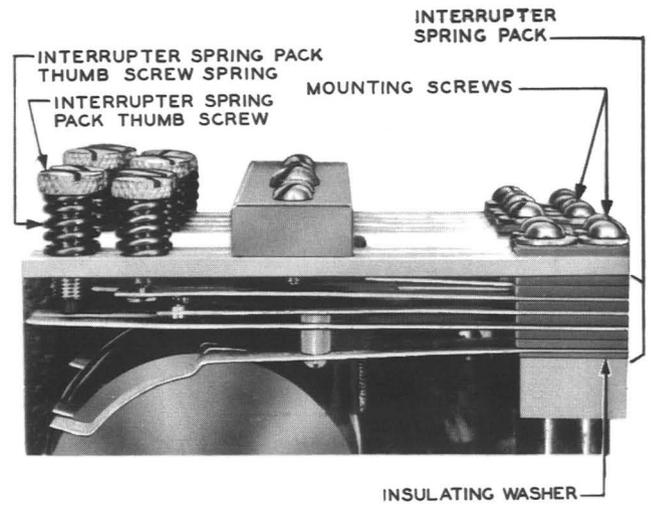


Fig. 8B - Metal Cam Type Low-speed Interrupter Spring Pack

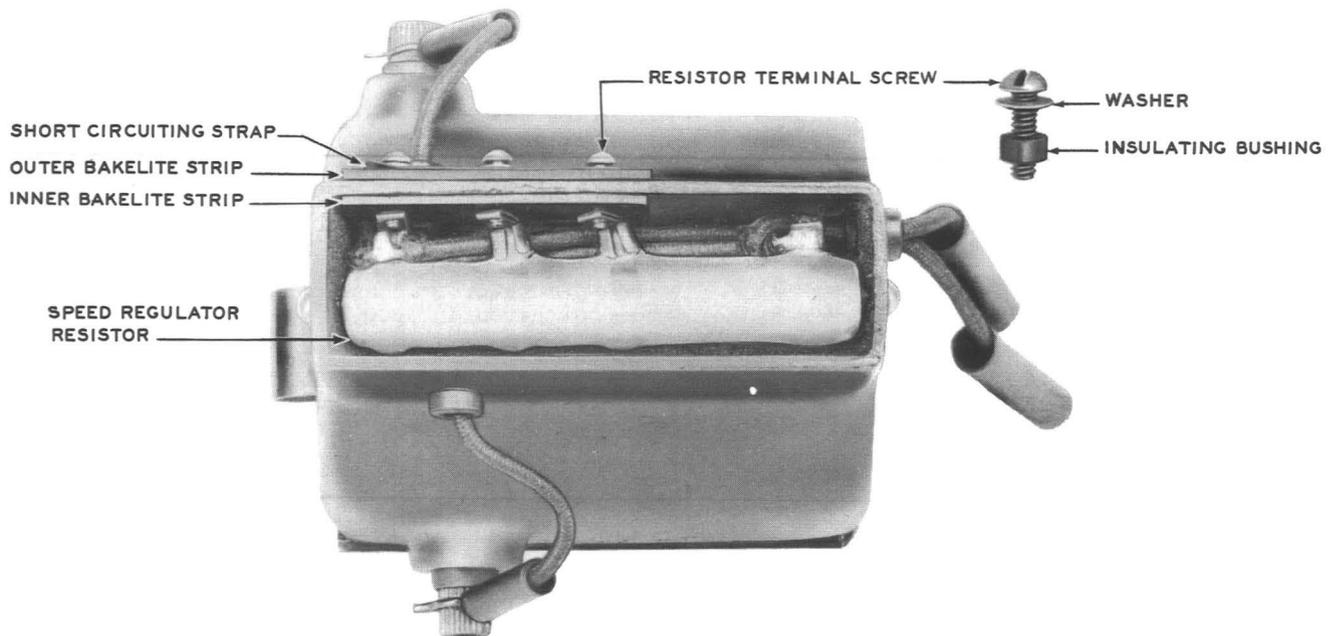


Fig. 9 - Speed Regulator Resistor - Assembly (KS-5133)

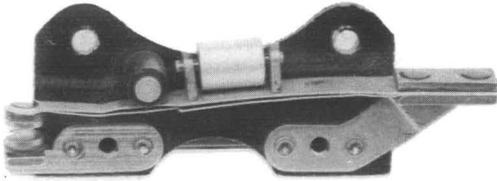


Fig. 10 - Cutout Switch

3. REPLACEMENT PROCEDURES

3.01 List of Tools and Materials

(Equivalents may be substituted if desired)

<u>Code or Spec No.</u>	<u>Description</u>
<u>Tools</u>	
40	Double-end Offset Screwdriver
R-1005	Jewelers Screwdriver
R-2969	Brush
R-3040	Open Double-end Flat Wrench - 5/8 Inch and 3/4 Inch
KS-6854	Screwdriver
-	Regular Screwdriver 5-inch Blade
-	1-lb Ball Peen Hammer

Materials

KS-6824	Sealing Compound
KS-14666	Cleaning Cloth
-	Petroleum Spirits
-	Pail for oil
-	Sandpaper 4/0
-	Wool Yarn Waste
-	Bare Copper Wire No. 12 or 14, 18 Inch Length

3.02 Before making any replacement of parts make sure that service will be maintained by transfer to a spare machine. Remove any fuses necessary to insure that machine being worked on is not connected to power.

3.03 After making any replacement of parts, the apparatus should be checked and where necessary, readjusted to meet the requirements specified in Section 163-701-701.

3.04 No replacement procedures are specified for screws or other parts where the replacement consists of a simple operation.

3.05 When using petroleum spirits for cleaning purposes in the power room, provide as much ventilation as practicable. After using the petroleum spirits, the commutators

of all DC machines in the power room should be burnished, in accordance with approved procedures for the machines involved, since the fumes from the petroleum spirits may soften commutator film and thus adversely affect commutation.

Brushes

3.06 Motor Brushes (See Fig. 6)

(1) To replace a brush, remove the screw which fastens the pigtail to the holder, raise the brush spring and withdraw the old brush with its pigtail. Insert a new brush, and connect the pigtail.

(2) To fit a brush, "sand in" the brush in the following manner. Cut a strip of 4/0 sandpaper slightly wider than the width of the brush and at least as long as the circumference of the commutator, place this strip of sandpaper under the brush with the sanded side next to the brush. Hold the paper so that it will bear on approximately 180 degrees of the commutator surface. Draw the sandpaper back and forth under the brush until the brush has the same general curvature as the commutator. The final cut shall be made in the direction of rotation. After sanding, the commutator and coils shall be cleaned with air or wiped with the cleaning cloth.

3.07 Ringing Generator Brushes (See Fig. 6)

(1) To replace a generator collector ring brush, remove the screw cap holding the brush and coil spring in the holder, remove the old brush and spring, insert a new brush and spring and replace the screw cap. "Sand in" the new brush in a manner similar to that given in 3.06(2) for motor brushes.

(2) Replace and "sand in" the generator commutator brushes in a manner similar to that given in 3.06.

3.08 High-speed Interrupter Brushes (See Fig. 6)

(1) Replace and "sand in" the high-speed interrupter brushes in a manner similar to that given in 3.07(1).

3.09 Speed Regulator Brushes (See Fig. 6)

(1) To remove the speed regulator brushes of the KS-5133 machine, remove the leads to the regulator brush holders and the brushes from the brush holders. Replace and "sand in" the speed regulator brushes in a manner similar to that given in 3.06.

(2) Replace and "sand in" the speed regulator brushes of the KS-5133-01 DC machine in a manner similar to that given in 3.07.

Speed Regulator3.10 Speed Regulator (See Fig. 5A and 5B)

(1) To remove the speed regulator of the KS-5133 machine, remove the brushes as in 3.09(1). Loosen the setscrews which secure the speed regulator to the motor armature shaft and the regulator housing to the motor bearing bracket. Remove the regulator and the housing. Replace the regulator with a new one and reassemble in the reverse order.

(2) The speed regulator collector rings of the KS-5133-01 DC machine are part of the coupling and cannot be replaced as such. If necessary to replace these rings, the entire coupling must be replaced since it is a balanced assembly. To replace the coupling, remove the speed regulator brushes. Loosen the setscrews in each half of the coupling and remove the motor mounting bolts. Slide the motor a short distance back from the generator. Remove the coupling. Since both halves of the coupling are keyed to their respective shafts, it may be necessary to tap the coupling lightly to remove it. Clean the keys and keyways with petroleum spirits (see 3.05) to insure that they will line up when reassembling. Replace the coupling as follows. Insert the keys in shaft keyways with the end of the key even with the end of the shaft. Slide the completely assembled coupling on the generator shaft and while holding the two parts of the coupling together, slide the motor shaft into the coupling being sure that the key and keyway line up. Reassemble other parts in reverse order.

3.11 Speed Regulator Contacts (See Fig. 5A and 5B)

(1) To replace the speed regulator contacts of the KS-5133 machine, remove the speed regulator according to 3.10(1). Loosen the screws that hold the spring assembly to the regulator frame. Remove both screws carefully, so as not to lose the associated nuts and washers. Replace and realign the new springs.

(2) To replace the speed regulator contacts of the KS-5133-01 DC machine, remove the speed regulator brushes. Mark the brushes so that the same brush may be inserted in the same position and in the same brush holder when reassembled. Remove the small "T" shaped plate from the coupling. This plate is located on the motor side of the coupling. Remove the two screws holding the speed regulator contact assembly. Remove the leads from the base and attach the leads to the new speed regulator contact assembly. Insert and fasten the assembly in the coupling, align the contacts so they are centered and replace the plate. Replace the brushes.

3.12 Speed Regulator Resistor (See Fig. 1A, 1B, and 9)

(1) To replace the speed regulator resistor located in the speed regulator housing of the earlier KS-5133 machines, remove the speed regulator according to 3.10(1). Loosen the screws that hold the resistor to the regulator housing. Loosen the screws on the terminal block and slip the short-circuiting strap off. Remove these screws and their associated washers. The inner and outer bakelite strips which form the resistance short-circuiting terminal board can now be removed. Before removing the inner strip, remove the insulating bushings, care being taken not to lose any. Remove the resistor from its position in the regulator housing by pushing down on the regulator leads. Remove the resistor supporting stud. Mark the leads before disconnecting. Replace with a new resistor, being careful the leads are resoldered in the same manner as before. Reassemble the resistor in the reverse order.

(2) To replace the speed regulator resistor of the KS-5133-01 DC machine and on some of the later KS-5133 machines, remove the screws holding the cage over the resistor and also the nuts on the end flanges mounting the resistor. Disconnect leads. Mount new resistor and reconnect leads. The slider or short-circuiting strap should be set to short out the same value of resistance as on the old resistor. Make sure the slider or short-circuiting strap is connected to the same end of the resistor as before. Replace the cage.

Interrupters3.13 Low Speed Interrupter Bearing (See Fig. 7A and 7B)

(1) To take down the insulated cam type low-speed interrupter bearing, proceed in the following manner: Remove the worm wheel cover and the screws that secure the interrupter spring pack mounting strip to the frame of the interrupter. Observe the position of the shims between the interrupter spring pack mounting strip and the frame. After observing the position of the outside cam on the shaft, loosen the setscrews which secure the cam and slip it from the shaft. Loosen the setscrew that holds the bearing in place and replace the bearing. See that the worm wheel and worm are fully meshed. This mesh may be adjusted by turning the eccentric bearing bushings in the housing. See Section 163-701-701 for adjustment. Lubricate the bearing, if required, in accordance with Section 163-701-701. Tighten the setscrews firmly and make certain that the low-speed shaft rotates without binding. When replacing the cam, be sure that it is in the same relative position on the shaft as it was when it was removed. See Section 163-701-701 for correct positioning.

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(2) To remove the metal cam type low-speed interrupter bearing, proceed in the following manner: Remove the worm wheel cover and the screws that secure the interrupter spring pack mounting strips to the frame of the interrupter. After observing the position of the outside cams on the shaft, loosen the setscrews that secure them and slip them from the shaft. Remove the screws that hold the bearing housings to the interrupter frame and loosen the bolts on the generator. Raise the generator sufficiently to allow the complete interrupter shaft assembly to slide out of the interrupter frame. Remove the bearing retaining rings being careful not to lose the felt and copper washers, the thrust spring and the felt washer retaining ring. Note the position of the inner ball race before forcing it off so that a new one can be placed in the same position against the shoulder of the shaft. Reassemble in the reverse order. Lubricate the bearing, if required, in accordance with Section 163-701-701. When replacing a cam, be sure that it is in the same relative position on the shaft as it was when it was removed. See Section 163-701-701 for correct positioning.

3.14 Low-speed Interrupter Cams and Worm Wheel (See Fig. 7A and 7B)

(1) To remove only an end cam of the insulated cam type low-speed interrupter, remove the worm wheel cover and loosen the screws that hold the interrupter spring pack mounting strip to the frame. Remove the interrupter spring pack mounting strip. Loosen the setscrews and slide the cam off.

(2) To remove only an end cam of the metal cam type low-speed interrupter, proceed as above.

(3) To remove any other cam or worm wheel of the insulated cam type low-speed interrupter, proceed as in 3.13(1). It will then be necessary to loosen the setscrews on the remaining cams and worm wheel. This will allow the entire shaft to be removed. In reassembling the cams and worm wheel, be sure that they are fastened in their original positions.

(4) To remove any other cam or worm wheel of the metal cam type low-speed interrupter, proceed as in 3.13(2). It will then be necessary to loosen the setscrews on the remaining cams and worm wheel. This will allow the entire shaft to be removed. In reassembling the cams and worm wheel, be sure that they are fastened in their original positions.

3.15 Interrupter Spring Pack (See Fig. 8A and 8B)

(1) To remove an interrupter spring pack of the insulated cam type interrupter, remove the worm wheel cover. Loosen the screws that hold the individual spring pack

being worked on to the interrupter spring pack mounting strip. Mark the leads before unsoldering the connections from the contact springs so that they may be reconnected to the same positions. Remove the mounting screws, being careful not to lose the washers. Before removing spring packs, observe their positions so that new ones may be replaced similarly. Replace the old pack with the new and align the springs. Reassemble in the reverse order.

(2) To remove an interrupter spring pack of the metal cam type interrupter, proceed as above.

3.16 High-speed Interrupter (See Fig. 4A and 4B)

(1) To remove the high-speed interrupter, it will be necessary to take down the low-speed interrupter frame by removing the screws that secure it to the subbase. Also loosen the bolts on the generator. Raise the generator sufficiently to allow the low-speed interrupter frame to be removed. Unscrew the brush holder caps, withdraw and mark the brushes and associated springs from the holders of the high-speed interrupter. Loosen the setscrews which secure the high-speed interrupter drum on the ringing generator shaft and slip the interrupter drum from the shaft. Remove the high-speed interrupter brush holder yoke assembly from the ringing generator bearing bracket. Replace the high-speed interrupter drum and yoke assembly in the reverse order.

Armatures and Rotors

3.17 Motor Armature (See Fig. 1A, 1B, and 1C)

(1) To remove the motor armature of the KS-5133 machine, remove the speed regulator as in 3.10. Unscrew the plugs in the bottom of the oil chambers, and drain the oil. Loosen the setscrews which secure the coupling halves to the motor and ringing generator shafts. Mark the frame and bearing bracket (upon which the speed regulator is mounted) to insure proper replacement. Remove the cap screws holding the bearing bracket to the frame and slide the bearing bracket from the shaft.

(2) Remove the coupling half from the motor shaft. The armature may now be withdrawn. Should it be required to remove the motor frame, loosen the motor mounting bolts and in the case of the older machines, where necessary, loosen the screws which secure the slate to the wood mounting, and raise the slate so that the motor mounting bolts can be unscrewed and the motor removed from the slate.

(3) Replace the damaged armature with a new or reconditioned one. Reassemble, going through the steps given above in the reverse order. Care should be taken not to damage

the oil rings in replacing the armature and bearing bracket during the assembly of the motor. After replacing the armature, clean the drain plugs and associated threads in the bearing housings, coat them with KS-6824 sealing compound, and replace the plugs. Allow the compound to dry for at least one hour if practicable after replacing the plugs before lubricating in accordance with Section 163-701-701.

(4) To remove the motor armature of the KS-5133-01 DC machine, first remove the speed regulator brushes and motor brushes in accordance with 3.09(1) and 3.06(1). Loosen the setscrews in the coupling half on the motor end and remove the bearing bracket screws at the brush end. Remove the bearing bracket after marking it and the frame. The armature may now be withdrawn. Replace with the new armature and reassemble in the reverse order.

(5) If the machine is an AC machine (which does not have a speed regulator) it is only necessary to loosen the setscrews in the coupling on the motor end. Remove the cap screws on the outside bearing bracket after marking it and the frame. Remove the bearing bracket and withdraw the rotor. Reassemble in the reverse order.

3.18 Generator Armature (See Fig. 1A, 1B, and 1C)

(1) To remove the generator armature, it will first be necessary to remove the interrupters as outlined in 3.16. Then unscrew the plugs in the bottom of the oil chambers and drain the oil. Loosen the setscrews which secure the coupling half to the ringing generator shaft. Remove and mark all brushes on the generator. Mark the frame and the bearing bracket farthest from the motor. Remove the cap screws holding the bearing bracket to the frame and slide the bracket from the shaft. Withdraw the armature. If necessary, remove the generator frame in a manner similar to that of the removal of the motor frame. Reassemble, going through the steps given above in the reverse order. Care should be taken not to damage the oil rings, if present, in replacing the armature and bearing bracket during the assembly of the ringing generator. After replacing the armature, clean the drain plugs and associated threads in the bearing housings, coat with KS-6824 sealing compound, and replace the plugs. Allow the compound to dry for at least one hour if practicable after replacing the plugs before lubricating in accordance with Section 163-701-701.

3.19 Wool Packing

(1) To replace wool packing on bearings of the KS-5133-01 machine, remove the bearing cover. With a small length of wire, bent hook shape on one end, remove all old wool. Insert the wire, hook end first, through the opening and around the bearing and back out through the opening. Fasten new wool on end of wire. Draw wool around the bearing and out through the opening. The wool should be wound loosely. Repeat until enough wool is wound around the bearing. Remove wire and replace cover. Lubricate the bearing in accordance with Section 163-701-701.

3.20 Centrifugal Cutout Switch (See Fig. 1C and 10)

(1) To replace the cutout switch, mark the outside bearing bracket and frame of the motor and remove the screws from the bracket. Remove the bracket. Remove the screws holding the leads on the switch. Remove the screws holding the switch on the bracket. Replace with a new switch and reassemble in the reverse order.

3.21 Leather Links (See Fig. 1C)

(1) If a leather link needs replacing, all links should be replaced, since any new links used with old links would take most of the load. To replace the leather links in the coupling, loosen the setscrews in each half. Slide each coupling half back on its respective shaft as far as possible. Remove the links. Replace with a new set of four links, placing them in the same positions as the old ones. Move the couplings back to their original positions and tighten all setscrews.

REASONS FOR REISSUE

1. To add the KS-5133-01 machine.
2. To add 2.03, 2.04, 2.05, 3.02, 3.04, 3.05, 3.07(2), 3.09(2), 3.10(2), 3.11(2), 3.12(2), 3.17(4), 3.17(5), 3.19, 3.20, 3.21.
3. To revise Fig. 7A, 7B, 8A, and 8B.
4. To add Fig. 1B, 1C, 5B, 6, and 10.
5. To revise the list of tools and materials (3.01).
6. To revise text [3.13(1), 3.13(2), 3.15].