

RINGING MACHINES—QD TYPE

PIECE-PART DATA AND REPLACEMENT PROCEDURES

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1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of KS-5159, KS-5159-01, KS-5319, KS-5319-01, KS-5319-02, KS-5319-04, and KS-5352 QD-type ringing machines manufactured by Holtzer-Cabot. It also covers the KS-5319-03 inverted rotary converter manufactured by Eicor, Inc, and equipped by Holtzer-Cabot with a tone commutator, spring-type interrupter, and KS-5319-01 output transformer. In addition, the KS-5319-04 ringing machine manufactured by the Electric Specialty Company and the Commercial Electric Products Corporation is covered. It also covers the approved procedures for replacing these parts.

1.02 This section is reissued to include the KS-5319-04 machine manufactured by the Commercial Electric Products Corporation. Change arrows are used to emphasize the more important changes. This reissue does not affect the Equipment Test List.

1.03 Part 2 of this section covers ordering information for those parts which it is practicable to replace in the field in the maintenance of this apparatus. No attempt should be made to replace parts, except small items such as screws, not designated. Part 2 also covers explanatory figures showing the different 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 with their corresponding names in their proper relation to other parts of the apparatus.

2.02 When ordering replacement parts, give the name of each part as shown in the figures of this section and also the complete nameplate data of the machine, including the KS number, the serial number, and manufacturer's name. For example: Interrupter Spring Pack No. 3 for Electric Specialty Co. KS-5319-04, L1 ringing machine having the following nameplate data, Type NC73P, dc Volts 44-52, Amps 1.7, Cycles 17/23, RPM 1020-1380, Serial Number 40Z60. Do not refer to the BSP number or to any information in parentheses following the name of the part.

2.03 When ordering a replacement bearing, always order a bearing of the double-sealed type. When replacing any type of bearing by a new type, it must be so stated in the order and the old type of bearing noted so that suitable washers can be furnished to compensate for the difference in bearing thickness.

Note: The manufacturer is authorized to substitute single-sealed bearings on double-sealed bearing orders when shortages exist.

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

2.05 Orders for interrupter spring packs shall indicate the specific location by designating the spring pack number and giving the complete nameplate data as referred to in 2.02. These location numbers are stamped on the top member

NOTICE

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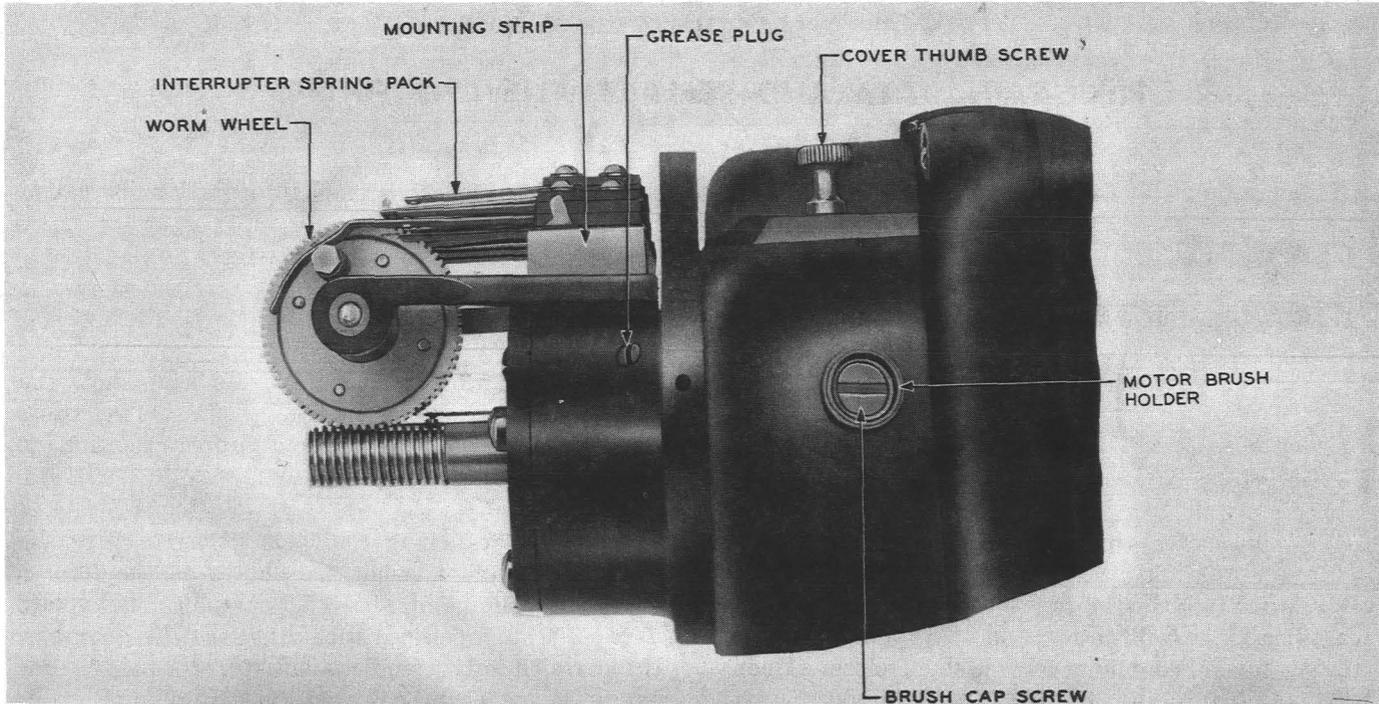


Fig. 1—Interrupter End (Holtzer-Cabot Machines)

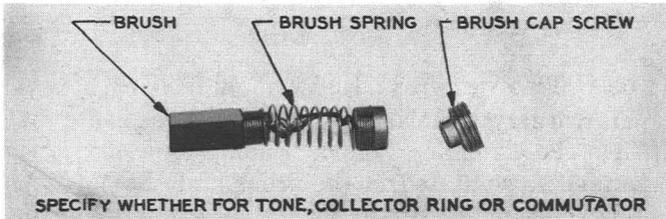


Fig. 2—Brush Details

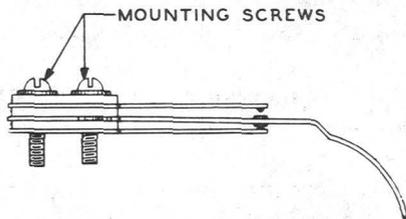


Fig. 3—Ringing Interrupter Spring Pack (Holtzer-Cabot)

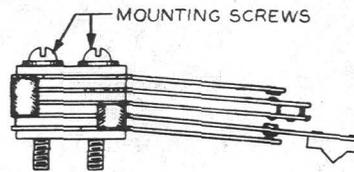
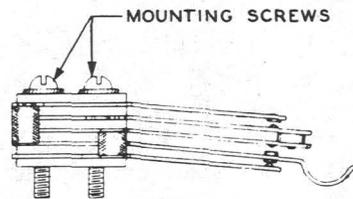
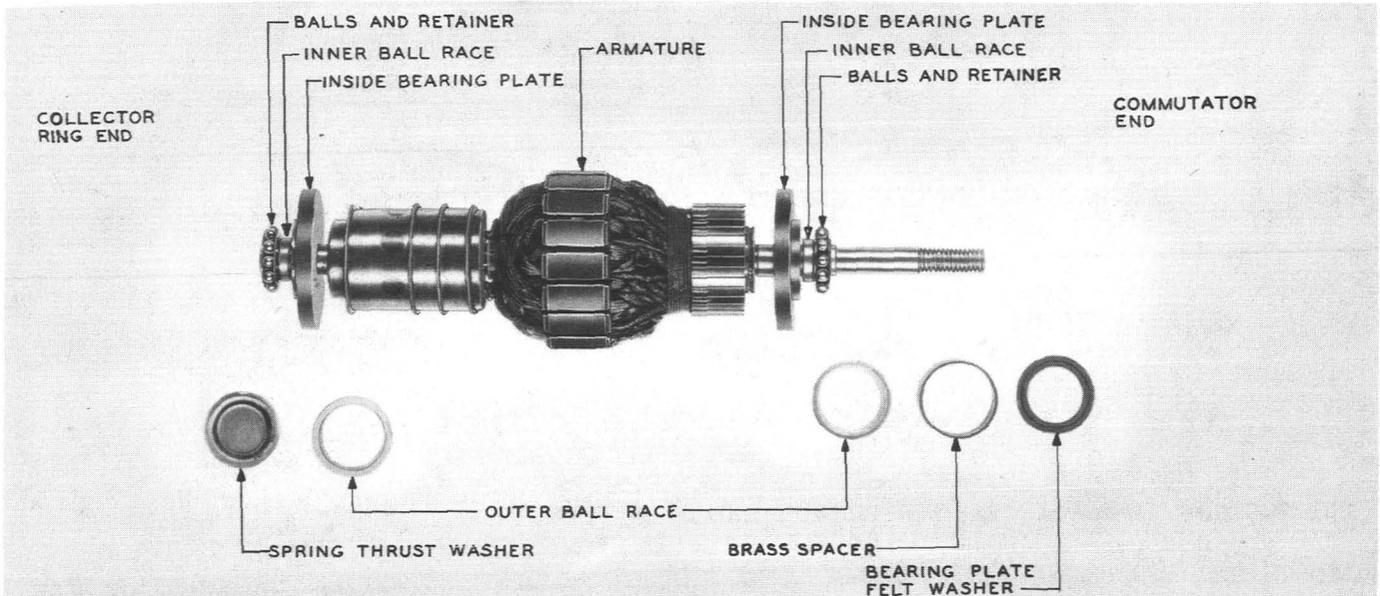


Fig. 4—60- and 120-ipm Interrupter Spring Pack

of the spring pack near the mounting screws. Springs are not furnished separately.

2.06 Miscellaneous parts such as screws which are not named in the figures and which cannot be obtained locally should be ordered by



When a bearing part is required, for example, the inner or outer ball race, balls, or brass spacer, order a complete double-sealed bearing. See 2.03.

Fig. 5—Armature and Separable Bearing Assembly

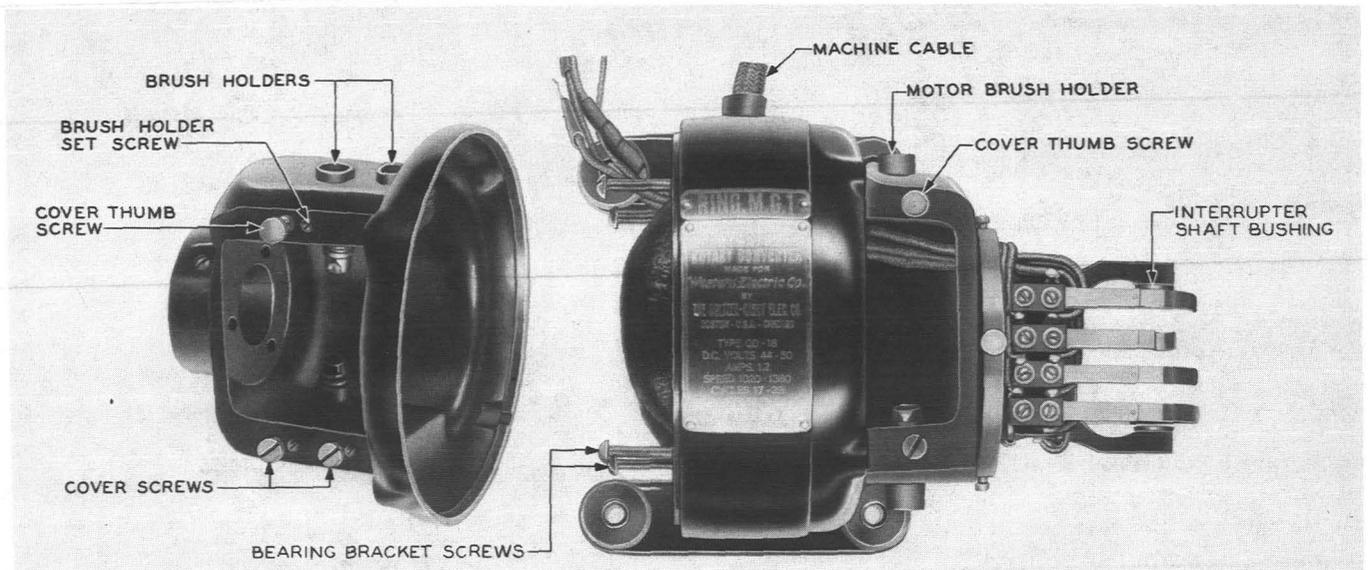


Fig. 6—Ringing Machine Frame Assembly (Holtzer-Cabot Machines)

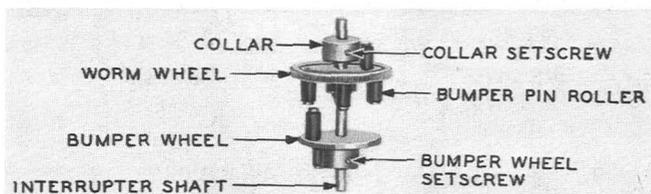


Fig. 7—Interrupter Shaft Detail (Holtzer-Cabot Machines)

describing the parts and giving the complete nameplate data as referred to in 2.02.

3. REPLACEMENT PROCEDURES

3.01 List of Tools and Materials

SECTION 163-320-801

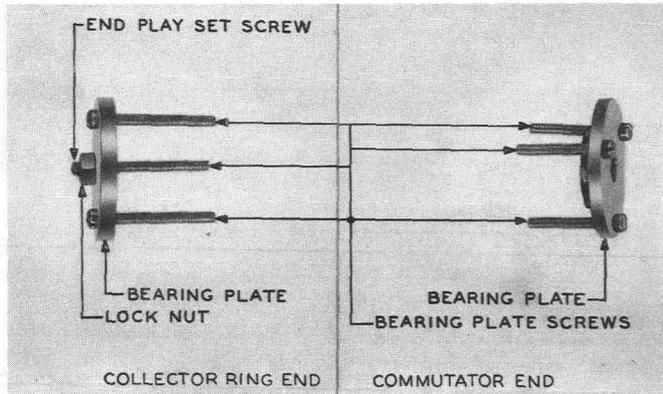
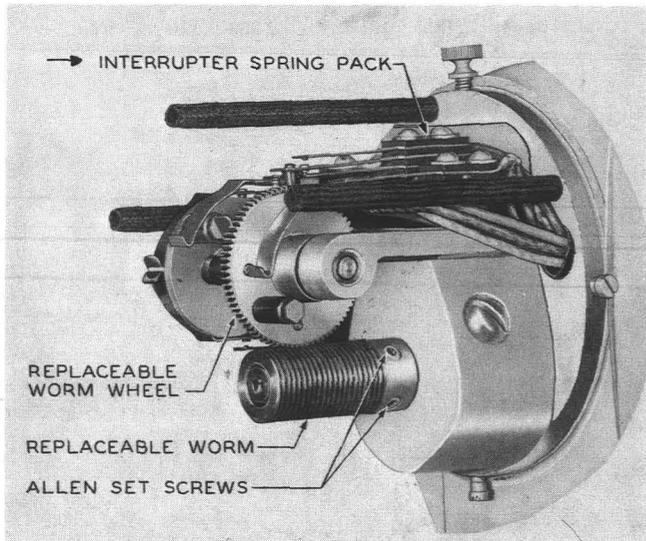


Fig. 8—Outer Separable Bearing Plate Details (Holtzer-Cabot Machines)



Note 1: In the past, when replacing the drive worm on KS-5319-01 and KS-5319-02 machines, it was necessary to replace the entire armature shaft because the worm was cut on the shaft. A replaceable worm has been designed which will slide on the present shaft over the worm cut into it. However, it is necessary to change the worm wheel at the same time, as the diametrical pitch of the replaceable worm is not the same as that of the older type. The manufacturer will supply a replaceable worm and a worm wheel to fit it, together with instructions for installation, whenever either a worm or worm wheel is ordered.

Fig. 9—Replaceable Worm and Worm Wheel Details—Holtzer-Cabot KS-5319-01 Ringing Machine (See Note 1)

Code or Spec No.	Description
Tools	
129B	1/4-inch Hex. Open Double-end Offset Wrench
246	1/2-inch Hex. Open Single-end Flat Wrench
KS-6015	Pliers
R-1005	Jeweler's Screwdriver
R-1542	6-inch Adjustable Single-end Wrench
R-2670	3/32-inch Allen Setscrew Wrench
R-2958	5/64-inch Allen Setscrew Wrench
—	Grip-O-Matic Puller, No. 1000-1/2 L Owatonna Tool Co.
—	1-lb Ball Peen Hammer
—	3-inch \blacklozenge C \blacklozenge Screwdriver
—	5-inch \blacklozenge E \blacklozenge Screwdriver

Materials (See Sections 065-330-101 and 065-370-101)

KS-14666 (or the replaced D-98063)	Cleaning Cloth
\blacklozenge KS-7471 \blacklozenge	Grease
—	Petroleum Spirits
—	Pipe, small length as required

3.02 Before making any replacements of parts, make sure that service will be maintained by transfer to a spare machine.

Danger: Remove any fuses necessary to insure that the machine being worked on is not connected to power. \blacklozenge Also deactivate any automatic transfer feature. \blacklozenge

3.03 After making any replacement of parts, the part or parts replaced shall meet the readjust requirements involved as specified in Section

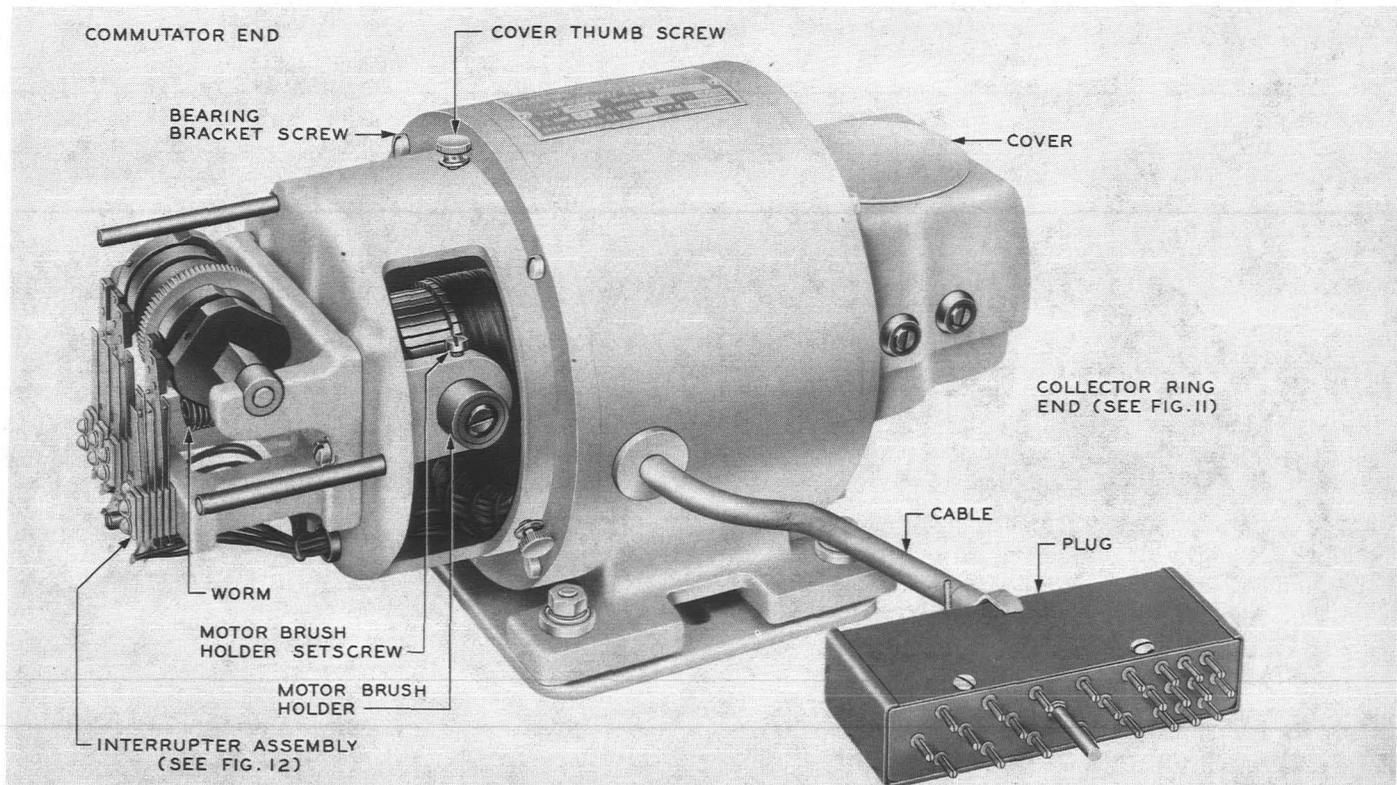


Fig. 10—Assembly (Electric Specialty Co KS-5319-04)

163-320-701. Other parts whose adjustments may have been directly disturbed by the replacing operations shall be checked to the readjust requirements and an overall operation check shall be made of the ringing machine before restoring it to service.

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, Collector Ring Brushes, and Tone Commutator Brushes: To

replace a motor brush, collector ring brush, or tone commutator brush, remove the brush cap screw which holds the brush and spring in place. Withdraw the old brush and spring, insert the new brush and spring, and replace the cap screw.

Brush Holders

3.07 Motor Brush Holders, Collector Ring Brush Holders, and Tone Commutator Brush Holders: To replace a motor brush holder, collector ring brush holder, or tone commutator brush holder, take off the cover over the particular holder to be replaced and remove the brush as outlined in 3.06. Disconnect the lead to the brush holder. Loosen the brush-holder setscrew and withdraw the brush holder. Replace with a new brush holder and reassemble in the reverse order, making sure that the holder is so aligned that the brush will line up with the shaft squarely and tighten the brush-holder setscrew. The replacement of collector ring brush holders on machines manufactured in accordance with Fig. 13 will require the removal of the armature as outlined in 3.08.

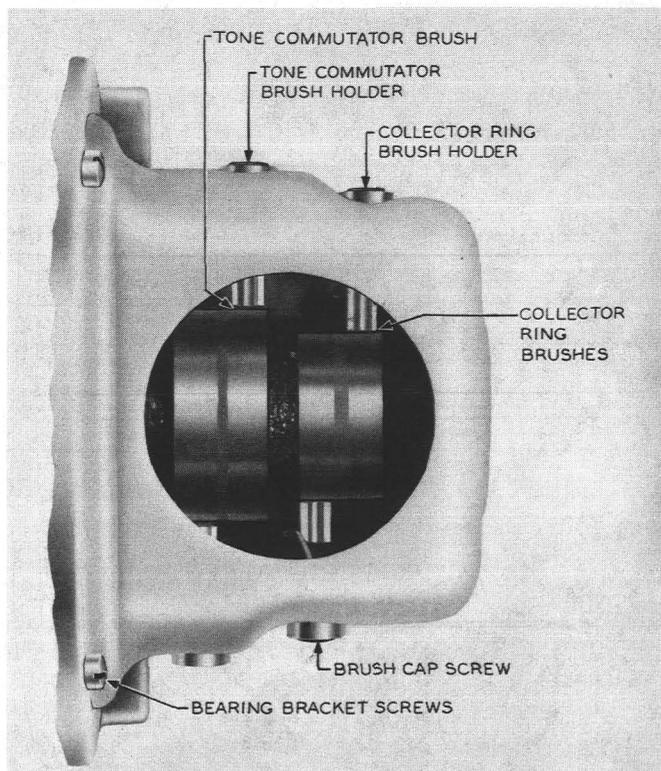


Fig. 11—Collector Ring End (Electric Specialty Co. KS-5319-04)

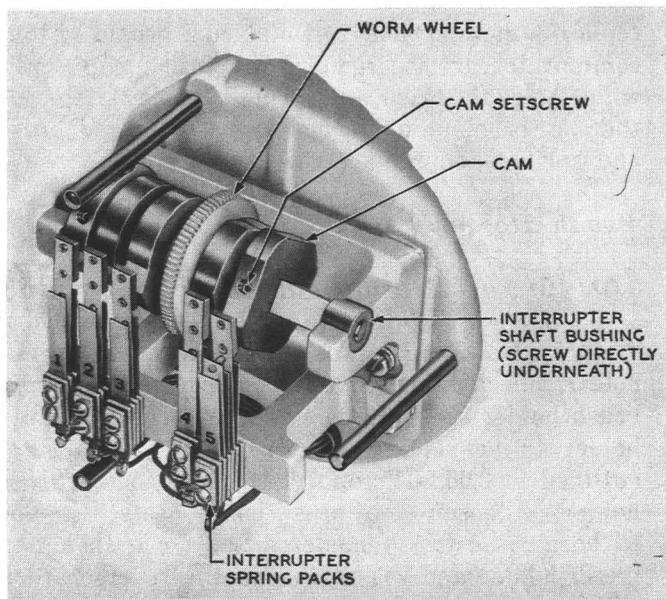


Fig. 12—Interrupter End (Electric Specialty Co. KS-5319-04)

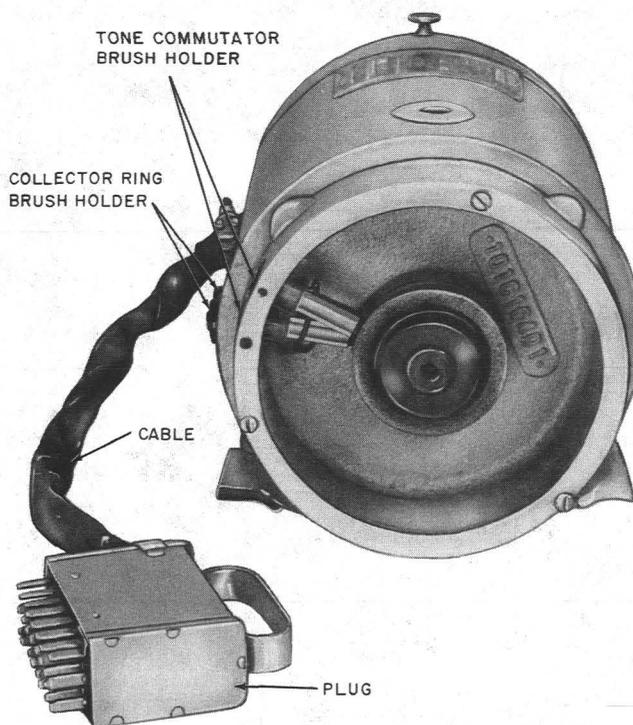


Fig. 13—Collector Ring Brush Holders—KS-5319-04, L3 Manufactured by Commercial Electric Products Corporation

Armature

3.08 Ringing Machine Armature: To remove the armature, take off the covers over the commutator, collector rings, and interrupter spring packs. Remove all brushes, marking them so that they may be replaced in the same holders and in the same position in the holders from which they were removed. Where the machine is equipped with separable bearings, as indicated by the presence of three screws in each of the bearing plates, remove these screws with a small screwdriver. If the machine is equipped with a replaceable worm on the armature shaft, loosen the setscrews and remove the worm. Remove the screws from the bearing bracket on the collector ring end of the machine and carefully remove the bearing bracket. Loosen the brush-holder setscrews on the commutator end and push the brush holders outward sufficiently to allow the inside bearing plate on the motor shaft to slip by when the armature is pulled out of the machine frame. (On some machines the inside bearing plate has been notched to allow it to pass the brush holders without disturbing them.)

Withdraw the armature through the collector ring end, being careful not to damage the insulation on the windings or to scratch or to dent the commutator or collector ring surfaces. Reassemble the new or reconditioned armature in the reverse order.

Note: When replacing an armature, do not reuse the bearings from the old armature. Order new bearings complete and install on the new or reconditioned armature being used as a replacement.

Interrupters

3.09 Worm, Worm Wheel, Bumper Wheel, and Cam

(1) To replace the worm of the KS-5159, KS-5159-01, and KS-5319 machines will require the removal of the complete armature, as the worm is cut on the armature shaft. Remove the armature as outlined in 3.08 and replace with a new or reconditioned armature with the worm cut on the shaft.

(2) The replaceable worms of KS-5319-01, KS-5319-02, KS-5319-03, and KS-5319-04 machines [see note 1 of Fig. 9 and 3.09(4)] which slip over the armature shaft may be removed by loosening the worm setscrews with the Allen wrench and slipping the worm off the shaft. If interference is encountered, loosen the screws holding the interrupter spring bracket to the bearing bracket. Replace with a new worm, being sure that the worm is fully on the shaft, it meshes properly with the worm wheel, and the setscrews are firmly tightened. On old-style KS-5319-01 and KS-5319-02 machines which have a worm cut on the armature shaft, the replaceable worm may be slipped over the existing worm cut on the armature shaft. Where such a worm is being installed for the first time, the worm wheel will also have to be replaced by one furnished with the replaceable worm.

(3) To replace either the worm wheel or the bumper wheel (see Fig. 7), loosen the setscrews on the worm wheel, the bumper wheel, and the collar. This will allow the interrupter shaft to be removed and the worm wheel or bumper wheel can be slipped off the shaft. Slip the new bumper wheel or worm wheel on the interrupter shaft and reassemble in the reverse order, making sure that the setscrews are in

their original position and tight and that the worm wheel is fully meshed with the drive worm.

(4) For the KS-5319-04 Electric Specialty Co. machine (see Fig. 10), it will be necessary to first loosen the screws located directly under each interrupter shaft bushing (see Fig. 12). In some cases, it will be necessary to remove the bearing cap screws and bearing caps. This will permit the complete interrupter shaft assembly to be lifted out. A pencil line drawn across all the cams before disassembly will help in reassembly. Any replacements of worm wheel or cams to be made should then follow the procedures given in 3.09(2) and (3) after removing the interrupter shaft bushing. The bushing is of the oilless metal type and should be handled carefully. All cams should be remounted so that the mold marks (three round indentations) on the cams are to the right when facing the interrupter spring packs and with interrupter spring pack number one to the left. The worm wheel mounting hub should be to the left. The cam lobes should be in the same relative position to each other as they were before removal.

3.10 Interrupter Spring Pack: To replace an interrupter spring pack, first mark the leads connected to the springs so that they may be resoldered to the new springs in the same position. Remove the screws holding the spring pack to the mounting strip and replace the damaged spring pack. Reassemble in the reverse order.

Bearings

3.11 Separable Bearings, Brass Spacer, Bearing Plate Felt Washer, Inner Ball Race, Outer Ball Race, Balls, and Retainer: Separable-type ball bearings may be identified by the presence of bearing plate screws in the end of the bearing housing. If it is necessary to replace the bearings or any of the parts listed above, a double-sealed bearing should be used. Remove the armature as outlined in 3.08. Slip the miscellaneous parts off the armature shaft and discard them since the proper washers are supplied with the replacing double-sealed bearing. With the No. 1000-1/2 L puller, remove the inner ball race. Slip the washers and the new bearing on the shaft. Using a short piece of clean pipe which will slip over the shaft and push against the inner but not the outer race, tap the bearing gently into place. Clean the inside surface of the bearing

chamber thoroughly with petroleum spirits (see 3.05) and wipe with a slight amount of grease. New bearings of the inseparable type are normally properly lubricated when received. Reassemble the machine in the reverse order from which it was dismantled.

3.12 *Inseparable Bearings, Felt Washer, Spacers, and Single-sealed Bearings*

(1) Machines using inseparable single-sealed bearings have no screws or plate on the end of the bearing housing. To replace either bearing, remove the armature as outlined in 3.08. Remove the miscellaneous parts such as spacers, felt washer, etc, from the armature shaft and lay them out in order so that they may be replaced in their proper position. When replacing an inseparable single-sealed bearing, the felt grease-retaining washer should be replaced with a new felt washer.

(2) Remove the bearing from the armature, using the No. 1000-1/2 L puller. Slip the new bearing on the shaft, and, using a short piece of clean pipe which will slip over the shaft and push against the inner but not the outer race, tape the bearing gently into place against the shoulder on the shaft. New bearings of the inseparable type are normally properly lubricated when received. Clean the inside surface of the bearing chamber thoroughly with petroleum spirits (see 3.05) and wipe with a slight amount of grease. Reassemble the machine in the reverse order from which it was dismantled.

3.13 *Inseparable bearings and Double-sealed Bearings:*

Machines using double-sealed bearings have no screws, plate, or grease fittings on the bearing housing. To replace either bearing, remove the armature as outlined in 3.08. Remove the bearing from the armature, using the No. 1000-1/2 L puller. Slip the new bearing on the shaft, and, using a short piece of clean pipe which will slip over the shaft and push against the inner but not the outer race, tape the bearing gently into place against the shoulder on the shaft. Clean the inside surface of the bearing chamber thoroughly with petroleum spirits (see 3.05) and wipe with a slight amount of grease. Reassemble the machine in the reverse order from which it was dismantled.

3.14 *Spring Thrust Washer:* To replace the spring thrust washer or coil spring on

machines which have bearing end plates, it is only necessary to remove the outside bearing plate on the collector ring end. On machines which do not have bearing end plates, it will be necessary to remove the armature as outlined in 3.08. Replace the spring thrust washer or coil spring with the concave or cupped side toward the ball bearing and then replace the outside bearing plate or armature.

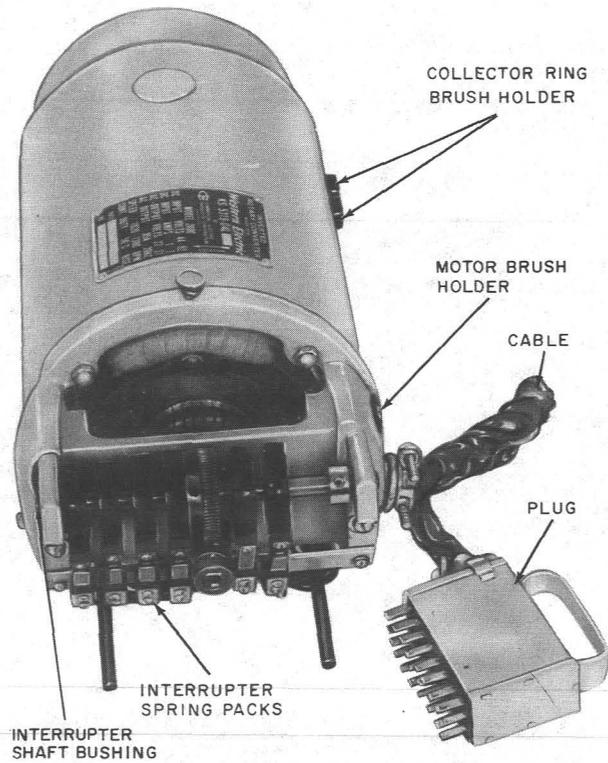
3.15 *Interrupter Shaft Bushings*

(1) The interrupter shaft bushings of the Holtzer-Cabot machines are of either bronze or graphite oilless construction. It is not anticipated that these bearings will require replacement during the life of the machine due to the light duty to which they are subjected. The replacement of these bearings is a difficult procedure and requires special tools not normally available in the field. Should the bearing require replacement due to mechanical failure brought about by shock, or the graphite-type bearing require replacement due to the presence of oil, the matter should be referred to the supervisor for consideration of the possible return of the set for repairs.

(2) To replace an interrupter shaft bushing which is an oilless type on the KS-5319-04 Electric Speciality Co., machine, remove the interrupter shaft assembly as covered in 3.09(4). Remove the old bushing and replace with a new one. Remount the assembly, line up the hole in the bushing with the screw. On machines with bearing caps, remount them and tighten all screws. ♦The replacement of interrupter shaft bushing on machines manufactured in accordance with Fig. 14 is a difficult procedure and requires special tools not normally available in the field. Therefore, it is recommended that the entire interrupter bracket with bearings be replaced.♦

3.16 *Cable and Plug*

(1) To replace the cable and plug as a unit, remove the armature as outlined in 3.08. After identifying and marking the leads, unsolder all wires to the various springs of the interrupter spring packs as well as those to the various brush holders. Work cable back through motor frame. Replace with a new cable and plug, and resolder all wires in proper locations.



(2) To replace the plug, loosen the cable-clamping screws and the screws holding the cover to the plug body. Slide the cover along the cable back away from the plug to expose the various leads. After identifying them, cut or unsolder them from the various terminals. Care should be taken to cut leads close to terminals in order to retain as long a lead as possible. Skin each wire, if necessary. Thread leads through cover of the replacing plug and resolder leads to proper terminals. Reassemble plug cover and cable clamp.

**Fig. 14—Interrupter End of Machine—KS-5319-04, L3
Manufactured by Commercial Electric Products
Corporation**