INTERRUPTERS
PRECISION TYPE
PIECE-PART DATA AND REPLACEMENT PROCEDURES

1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of Nos. 168B, 170A and 171A precision type interrupters. It also covers approved procedures for replacing these parts.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 Part 2 of this section covers the piece-part numbers and the corresponding names of the parts which it is practicable to replace in the field in the maintenance of Nos. 168B, 170A and 171A precision type interrupters. The interrupter shall be returned to the Western Electric Company for replacement of any parts not designated. No attempt should be made to replace such parts in the field. Part 2 also contains explanatory figures showing the different parts. This information is called ***"Piece-Part Data."***

1.04 Part 3 of this section covers the approved procedures for the replacement of the piece-parts listed in Part 2. This information is called ***"Replacement Procedures."***

1.05 No piece-part data and replacement procedures are given for the interrupter drive motor and its associated resistance (or rheostat). For this information refer to Sections 159-416-801 and 159-424-801 covering piece-part data and replacement procedures for the KS-5072, KS-5109, KS-5224 and KS-5407 motors.

1.06 Before replacing any of the cams on the camshaft assemblies of No. 168B, 170A, or 171A interrupters, give consideration to conditioning the cams as covered in Section 163-607-802.

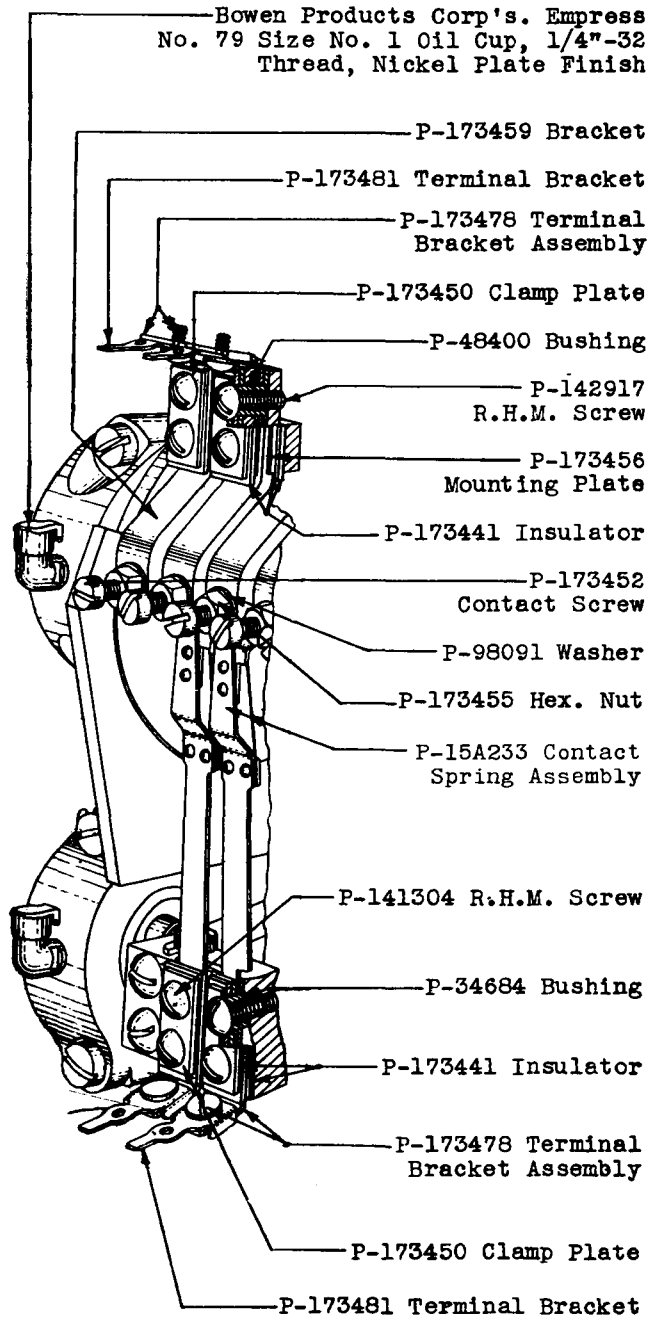


Fig. 1 – Oil Cup and Contact Spring Assembly Parts (Nos. 168B, 170A and 171A Interrupters)

TABLE A
PARTS OF CAMSHAFT ASSEMBLIES

INTERRUPTER CODE	CAMSHAFT ASSEMBLY	PIECE-PART DATA
168B (See Fig. 2)	P-290127 (Upper Assembly)	P-173460 Nut (Clamping Nut) (4) P-173419 Disc (Indicating Disc) †P-173461 Collar (Spacing Collar) ±P-173340 Cam (No. 1 Cam) Through P-173349 Cam (No. 10 Cam) P-173268 Shaft P-173296 Key ΔBall Bearings (2) — See Fig. 5
	P-290128 (Lower Assembly)	P-173460 Nut (Clamping Nut) (4) P-173420 Disc (Indicating Disc) †P-173461 Collar (Spacing Collar) ±P-173340 Cam (No. 1 Cam) Through P-173349 Cam (No. 10 Cam) P-173261 Shaft P-173296 Key ΔBall Bearings (2) — See Fig. 5
170A (See Fig. 3)	P-290130 (Upper Left Assembly)	P-173460 Nut (Clamping Nut) (4) P-173416 Disc (Indicating Disc) †P-173461 Collar (Spacing Collar) ±P-173350 Cam (No. 1 Cam) Through P-173352 Cam (No. 3 Cam) P-173265 Shaft P-173297 Key ΔBall Bearings (2) — See Fig. 5
	P-290131 (Upper Right Assembly)	P-173460 Nut (Clamping Nut) (4) P-173417 Disc (Indicating Disc) †P-173461 Collar (Spacing Collar) ±P-173353 Cam (No. 4 Cam) Through P-173365 Cam (No. 16 Cam) P-173263 Shaft P-173298 Key ΔBall Bearings (2) — See Fig. 5
	P-290132 (Lower Assembly)	P-173460 Nut (Clamping Nut) (4) P-173418 Disc (Indicating Disc) †P-173461 Collar (Spacing Collar) ±P-173366 Cam (No. 17 Cam) Through P-173383 Cam (No. 34 Cam) P-173262 Shaft P-173299 Key ΔBall Bearings (2) — See Fig. 5
171A (See Fig. 4)	P-290133	P-173460 Nut (Clamping Nut) (4) P-173421 Disc (Indicating Disc) †P-173461 Collar (Spacing Collar) ±P-173384 Cam (No. 1 Cam) Through P-173388 Cam (No. 5 Cam) P-173264 Shaft P-173304 Key ΔBall Bearings (2) — See Fig. 5

† Spacing collar is between indicating disc and first cam. Δ One bearing is at each end of shaft.
± Cam numbers start at indicating disc and number consecutively toward the right.

2. PIECE-PART DATA

2.01 The figures included in this part show the construction of the apparatus and the piece-part numbers of the various parts together with their corresponding names.

2.02 When ordering parts, the piece-part number as well as the name of the part should be given. For example: "P-141304 R.H.M. Screw." When ordering parts where no "P" number is given, give the name of the part as indicated in the figure in this section and the code number of the interrupter. For example: "Bowen Products Corp.'s Empress No. 79, size No. 1. Oil Cup, 1/4-32" Thread, Nickel Plate Finish for No. 168B Interrupter." Do not refer to the B.S.P. number.

2.03 Table A covers replacement information for the parts of the camshaft assemblies of precision-type interrupters.

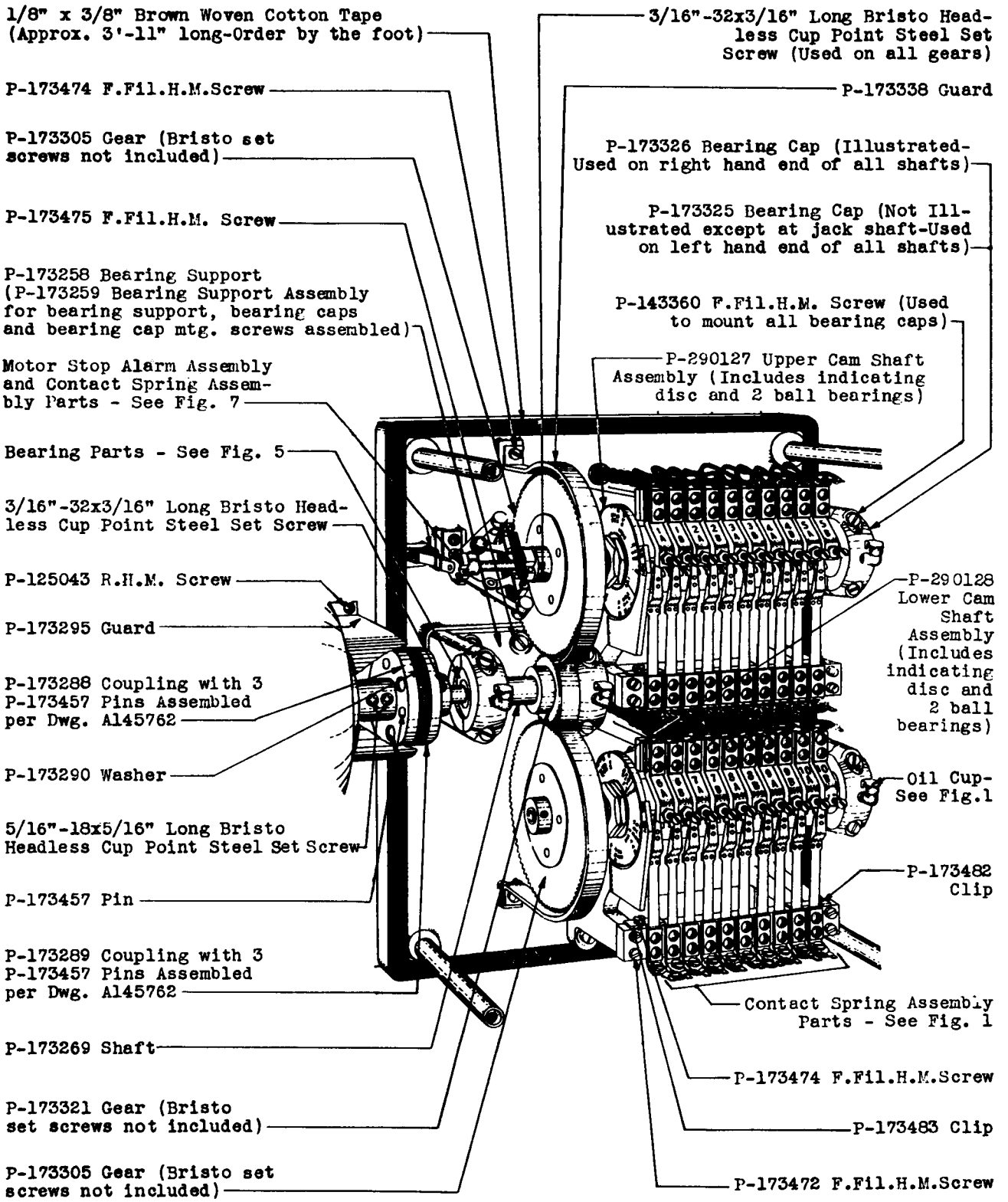


Fig. 2 – Parts for No. 168B Interrupter

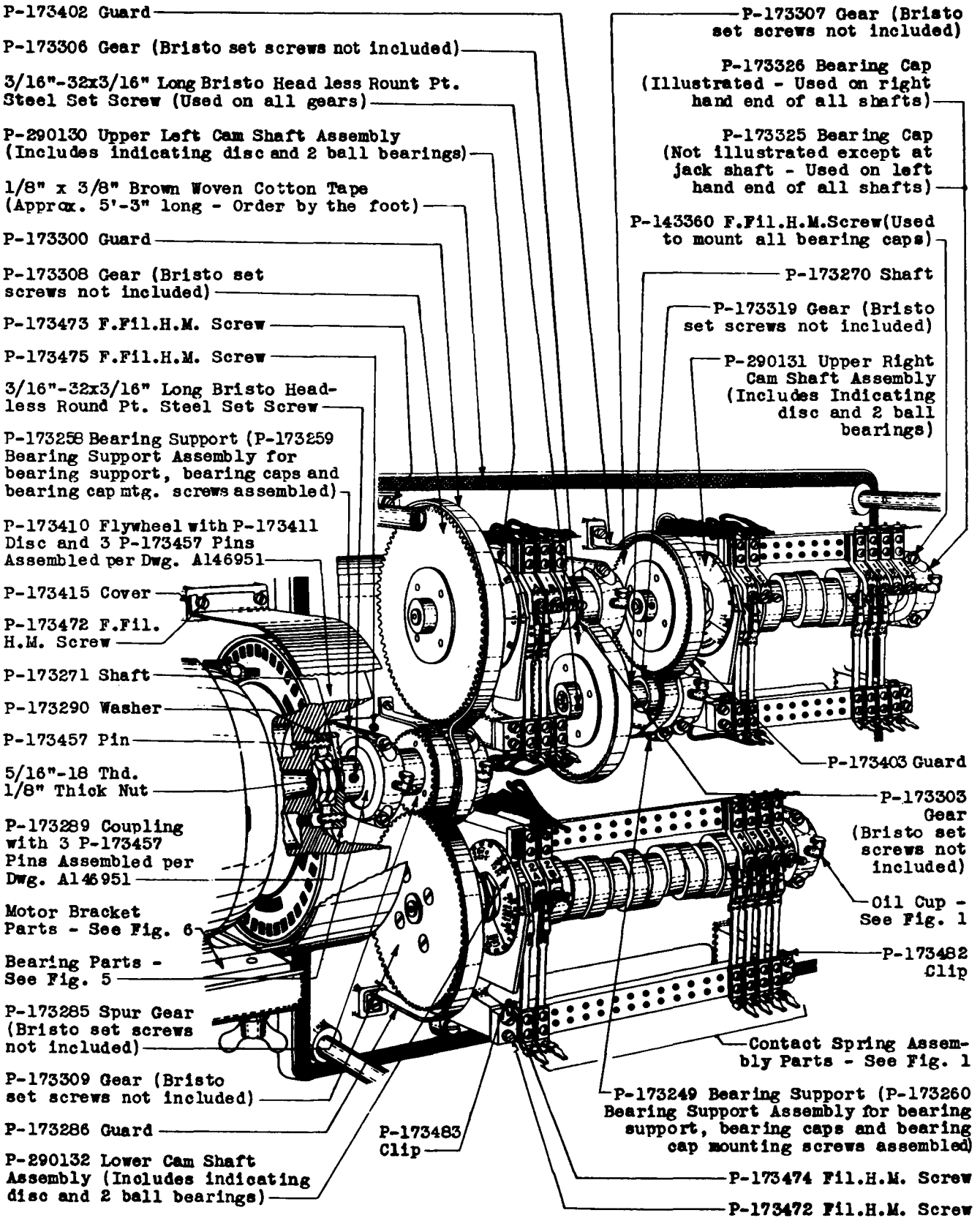


Fig. 3 – Parts for No. 170A Interrupter

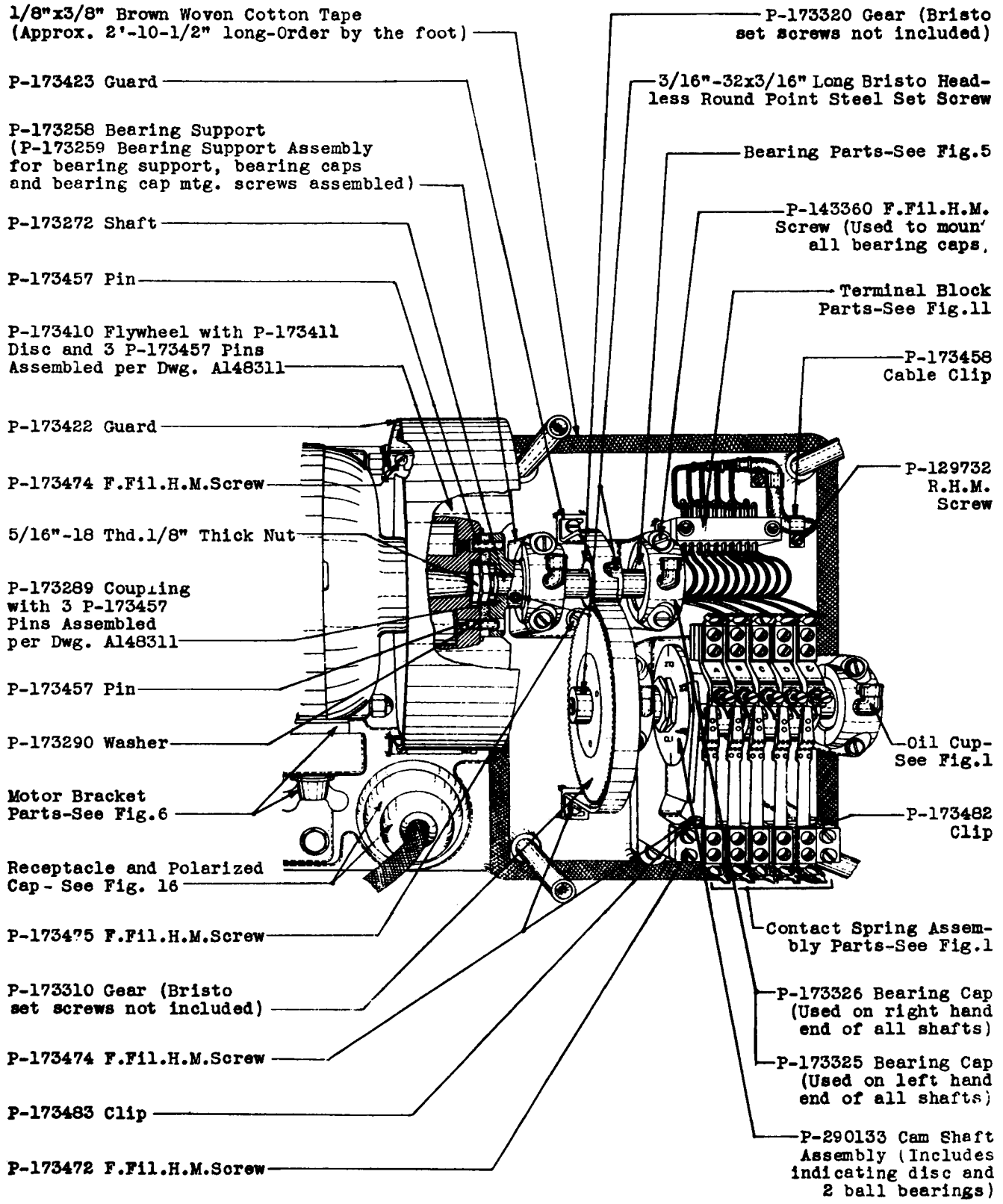


Fig. 4 – Parts for No. 171A Interrupter

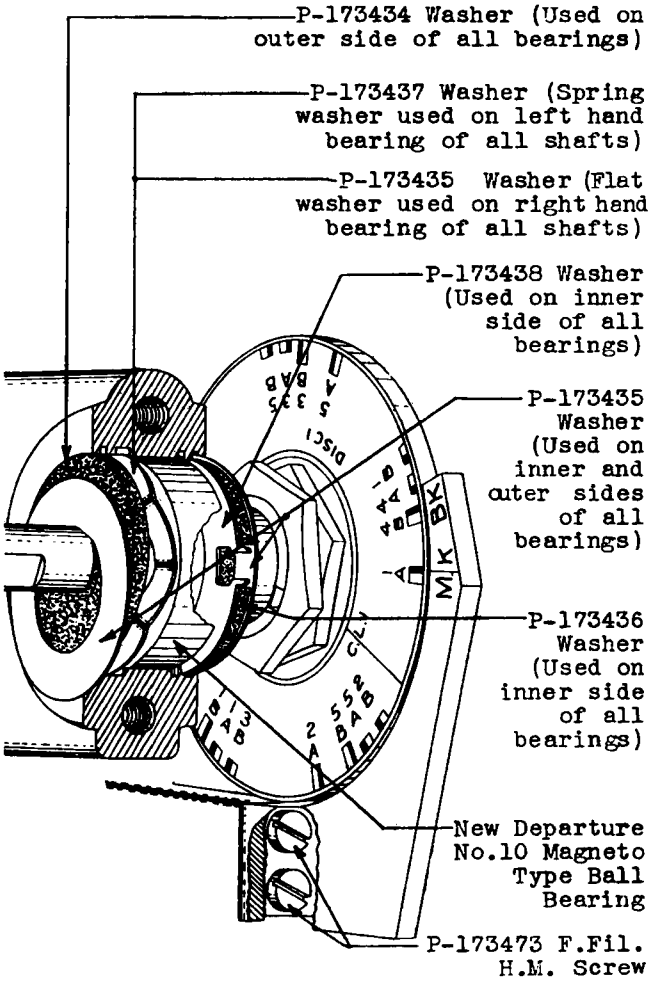


Fig. 5 – Bearing Parts (Nos. 168B, 170A and 171A Interrupters)

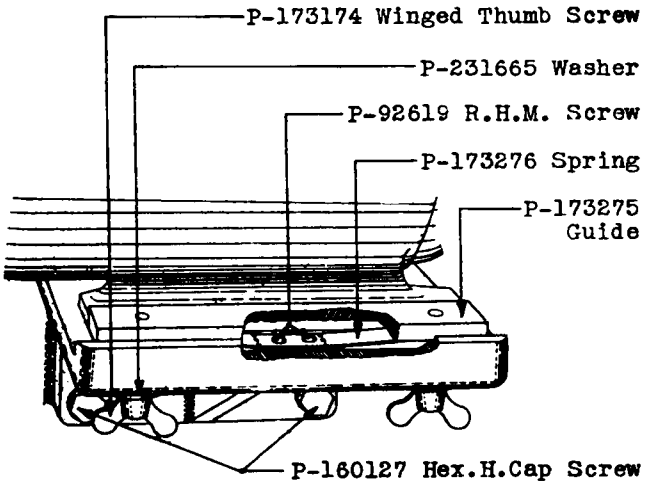


Fig. 6 – Motor Bracket Parts (Nos. 168B, 170A and 171A Interrupters)

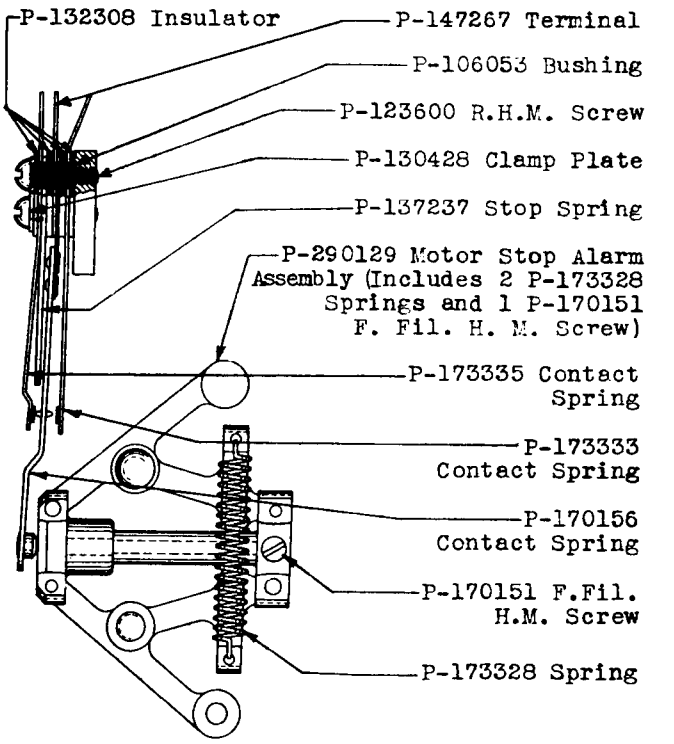


Fig. 7 – Motor Stop Alarm and Associated Parts (No. 168B Interrupter)

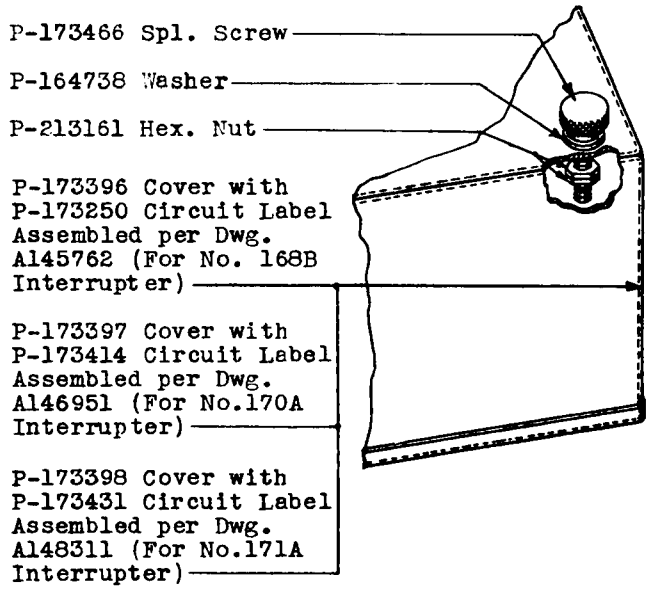


Fig. 8 – Interrupter Cover and Cover Mounting Parts (Nos. 168B, 170A and 171A Interrupters)

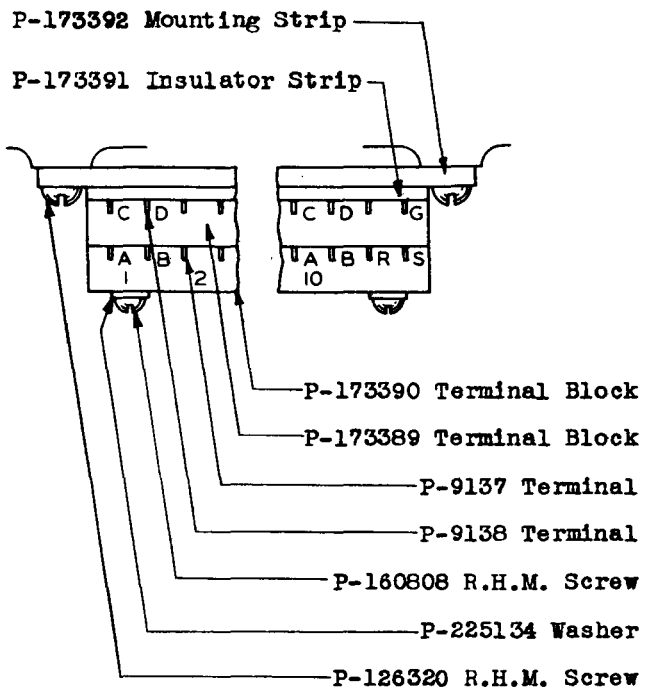


Fig. 9 – Terminal Block Assembly Parts (No. 168B Interrupter)

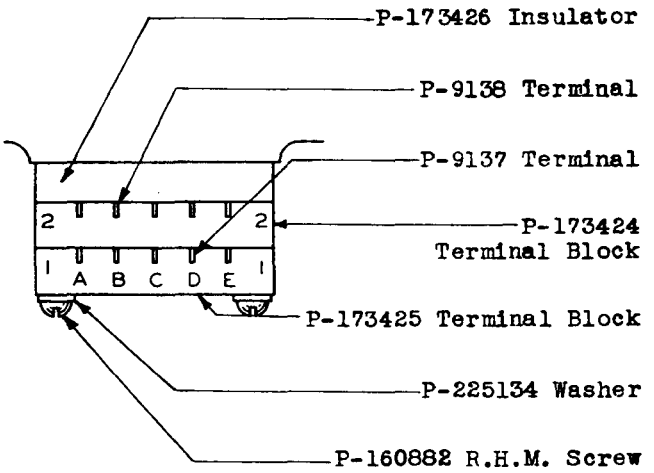


Fig. 11 – Terminal Block Assembly Parts (No. 171A Interrupter)

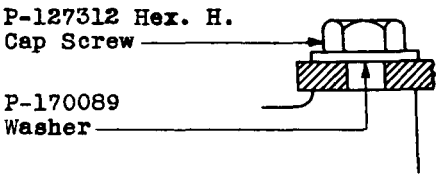


Fig. 12 – Mounting Screw and Washer (Nos. 168B and 170A Interrupters). See Fig. 17 for Corresponding Parts of No. 171A Interrupter

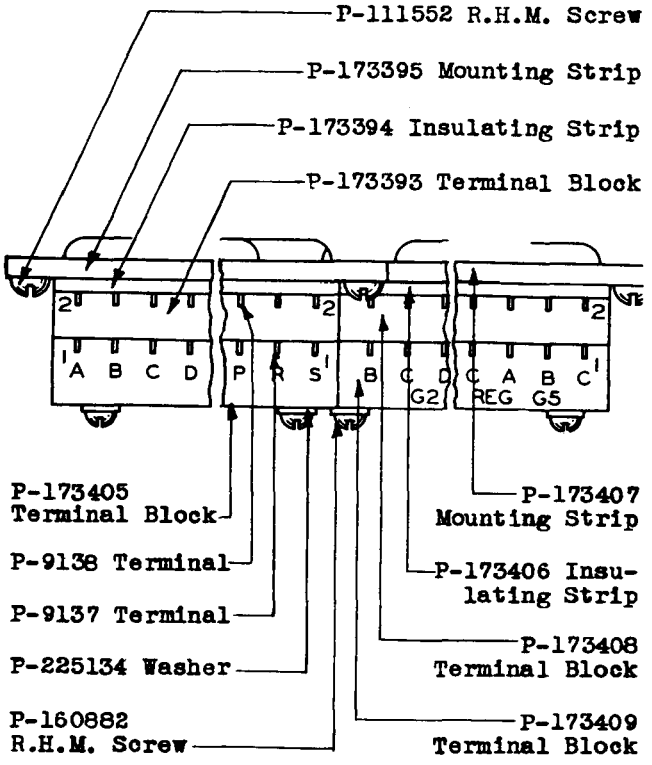


Fig. 10 – Terminal Block Assembly Parts (No. 170A Interrupter)

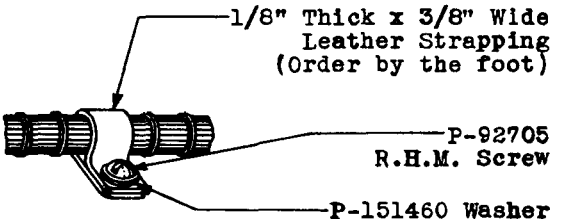


Fig. 13 – Cable Support Parts (Nos. 168B and 170A Interrupters)

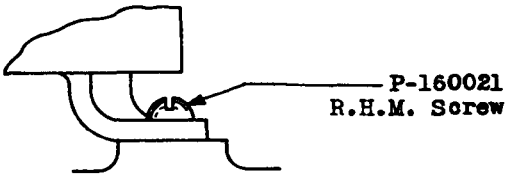


Fig. 14 – Rheostat Mounting Screw (No. 170A Interrupter)

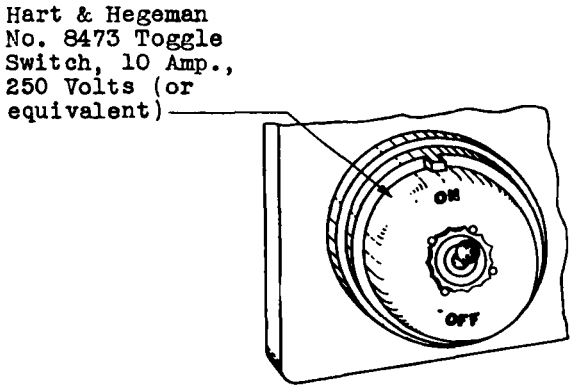


Fig. 15 – Toggle Switch (Nos. 170A and 171A Interrupters)

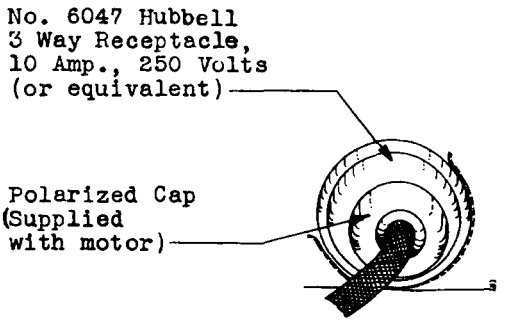
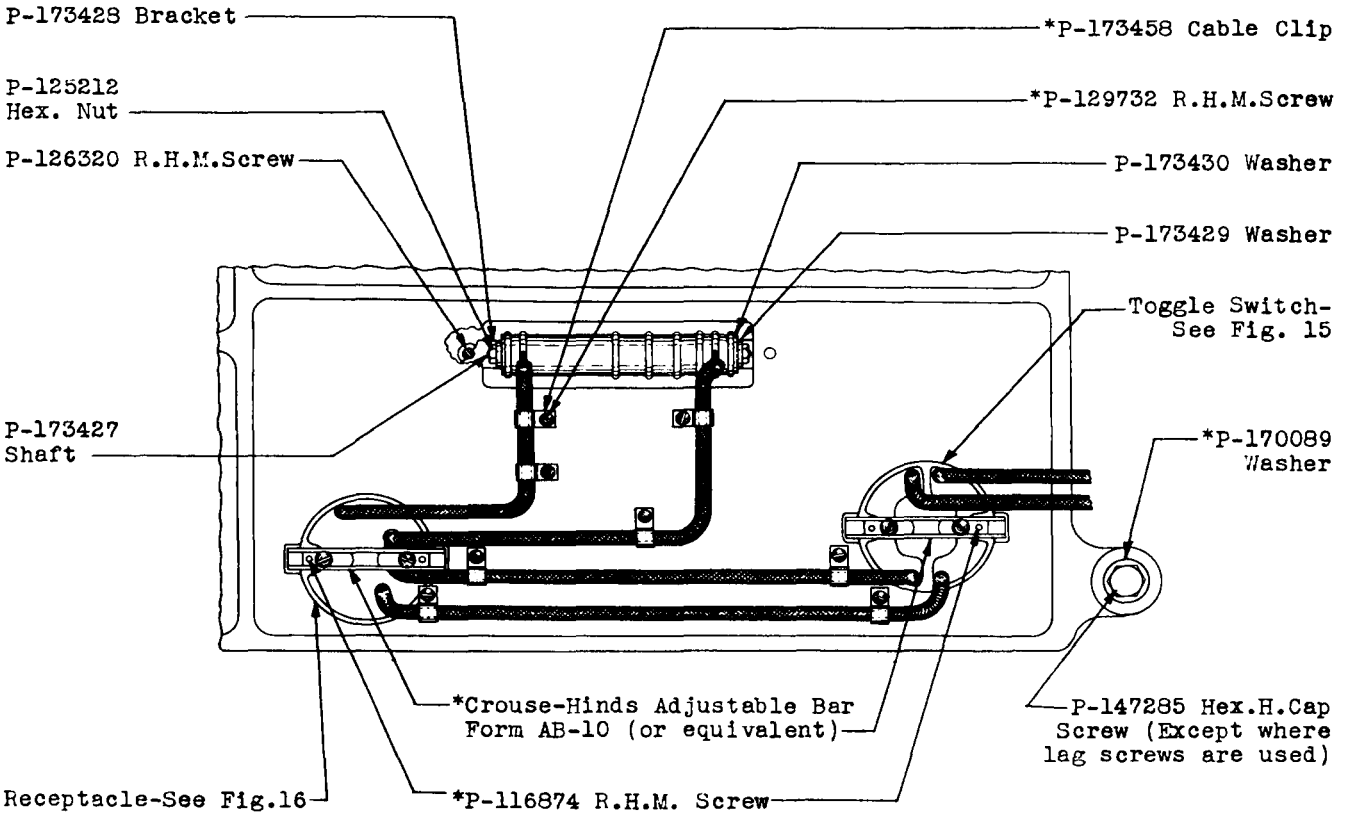


Fig. 16 – Polarized Cap and Receptacle (Nos. 170A and 171A Interrupters)



*Note: This figure shows rear view of No. 171A interrupter. Those parts marked with asterisks (*) are also used for similar purposes on No. 170A interrupters.

Fig. 17 – Parts for Nos. 170A and 171A Interrupters

3. REPLACEMENT PROCEDURES

3.01 *List of Tools and Materials*

CODE NO.	DESCRIPTION
TOOLS	
295	5/16" Bristo Set Screw Wrench
310B	9/32" Hex. Open Double End Offset Wrench
417A (2 Req'd)	1/4" and 3/8" Hex. Open Double End Flat Wrench
418A	5/16" and 7/32" Hex. Open Double End Flat Wrench
424A	Flywheel Puller
—	Brush, Flat, 1/2", R-1021
—	File, Flat, Smooth, 10", R-1776
—	Hammer, Riveting, 4 Oz., per Spec. No. 6258N
—	Hammer, Machinist's Ball Peen, 1 lb., per Spec. No. 6258N
—	Knife, Putty
—	Pliers, P-Long Nose, 6-1/2" per Spec. No. 6267
—	Punch, Pin, 5/32"
—	Screw-driver, Cabinet, 3-1/2" per A.T.&T.Co. Dwg. 46-X-40
—	Screw-driver, Regular, 4", per A.T.&T.Co. Dwg. 46-X-34
—	Screw-driver, Regular, 5", per A.T.&T.Co. Dwg. 46-X-34
—	Wrench, Bristo Set Screw, 5/16"
KS-13816 (or equivalent)	1" and 15/16", Flat, Open, Double-end Wrench (2 Req.)
R-1317	Wrench, 5/8" Hex. Socket, Offset
MATERIALS	
KS-2423	Cloth
KS-2245	Oil
KS-6438	Oil
KS-7860	Petroleum Spirits
—	No. 1/0 Emery Cloth
—	Bell System Record Lacquer
—	Duco Household Cement
—	No. 6 Lock Stitch Lacing
—	Shellac

General

3.02 No replacement procedures are specified for screws and other parts where the procedure consists of a single simple operation.

3.03 Before making replacements of any part of the apparatus covered herein, stop the motor and take the circuit associated with the interrupter out of service in the approved manner.

3.04 After making any replacement of parts of an interrupter, the part or parts replaced shall meet the readjust requirements involved as specified in 163-607-701. Other parts whose adjustments may have been directly disturbed by the replacing operations shall be checked to the readjust requirements, and an over-all operation check shall be made of the interrupter before restoring the circuit to service.

3.05 ***Tightening Bristo Set Screws.*** Before tightening a Bristo set screw make sure that the set screw engages the middle of the flat portion of the shaft. Insert the long end of the Bristo set screw wrench in the set screw. Grasp the short end with the long nose pliers and tighten the set screw until the wrench is observed to distort or twist an appreciable amount, thereby making the screw as tight as possible.

Cover and Thumb Screws

3.06 To remove the interrupter cover, unscrew the four thumb screws sufficiently to disengage them from the cover mounting studs. If the cover or a thumb screw requires replacement, remove the thumb screw lock nuts with the two No. 417A wrenches and remove the thumb screw or screws. In reassembling the parts locate the lock nuts so that the distance between the inner

surface of the cover and the nearest lock nut is about 3/8". Securely tighten the lock nuts with the No. 417A wrenches.

Cover Sealing Tape

3.07 If the cover sealing tape is damaged or worn, remove the old tape. Use the putty knife to remove the old shellac and clean the surfaces of the base on which the old tape was mounted with a KS-2423 cloth slightly moistened with petroleum spirits. Take care not to get the petroleum spirits on the painted surfaces or other parts of the interrupter. Apply a thin coat of shellac, with the R-1021 brush, to the surfaces of the interrupter base on which the tape is to be mounted and also to one side of the new tape and allow it to dry until it becomes tacky. Put the new tape into position, mount the cover and securely tighten the cover mounting thumb screws.

Gears

3.08 Loosen the two Bristo set screws in the hub of the gear with the 3/16" Bristo set screw wrench. In the case of the upper gear on the No. 168B interrupter, remove the motor stop alarm assembly as covered in 3.46. Remove the old gear and substitute the new one. In reassembling the gear, make sure that the gear is in alignment with the associated pinion and that the set screws engage the middle of the flat portions of the shaft. Securely tighten the Bristo set screws as covered in 3.05. If any pinions require replacement follow 3.34 to 3.37 inclusive.

3.09 In replacing gears on the No. 170A interrupter, make sure that the high and low speed cam shafts are geared so as to give the proper relation between these shafts as covered in Section 163-607-701 covering this apparatus.

Gear Guards

Coupling Guard (No. 168B Interrupter Only)

Flywheel Guard (Nos. 170A and 171A Interrupters Only)

3.10 To replace any of the gear guards or the flywheel guard of the No. 170A or the No. 171A interrupter, loosen the guard mounting screws with the 4" regular screw-driver and remove the guard. To remove the coupling guard of the No. 168B interrupter, loosen the guard mounting screws with the 3-1/2" cabinet screwdriver. Substitute the new part and tighten the mounting screws securely, making sure that the guard clears the rotating parts by at least 1/32". Obtain this clearance by raising or lowering the guard as required, not by bending the guard.

Flywheel (Nos. 170A and 171A Interrupters Only)

Flywheel Coupling Pins (Nos. 170A and 171A Interrupters Only)

3.11 To remove the flywheel of the No. 170A or the No. 171A interrupter, remove the motor from the interrupter as follows: Loosen the two motor clamp thumb screws sufficiently to raise the motor clamp bar out of the groove in the motor bracket where it will be supported by the spring underneath. Move the motor to the left sufficiently to disengage the coupling pins and leather washer and remove the motor from the bracket. On interrupters not provided with a depression in the base for the flywheel, remove the flywheel guard as covered in 3.10 and also the motor clamp bar in dismounting the motor. Remove the lock nuts on the motor shaft with the R-1317 wrench. Loosen the flywheel from the motor shaft by means of the No. 424A flywheel puller and remove the flywheel from the shaft. To use the No. 424A flywheel puller, screw the three screws of the flywheel puller into the threaded holes in the flywheel and turn the hexagon head screw with the R-1317 wrench. Remove the flywheel puller.

3.12 To replace the flywheel coupling pins drive out the old pins with the 5/32" pin punch and the ball peen hammer. Insert the new pins in the holes and force them into position in the flywheel. In order to force the pins in straight without danger of damaging the pins or the flywheel place a pin in position in front of hole in the flywheel. Then place the flywheel and pin in the vise in such a position that when the vise is closed the pin will be pressed into position. Close the vise slowly taking care that the pin is at right angles to the face of the coupling. Repeat this operation with each pin that is to be replaced.

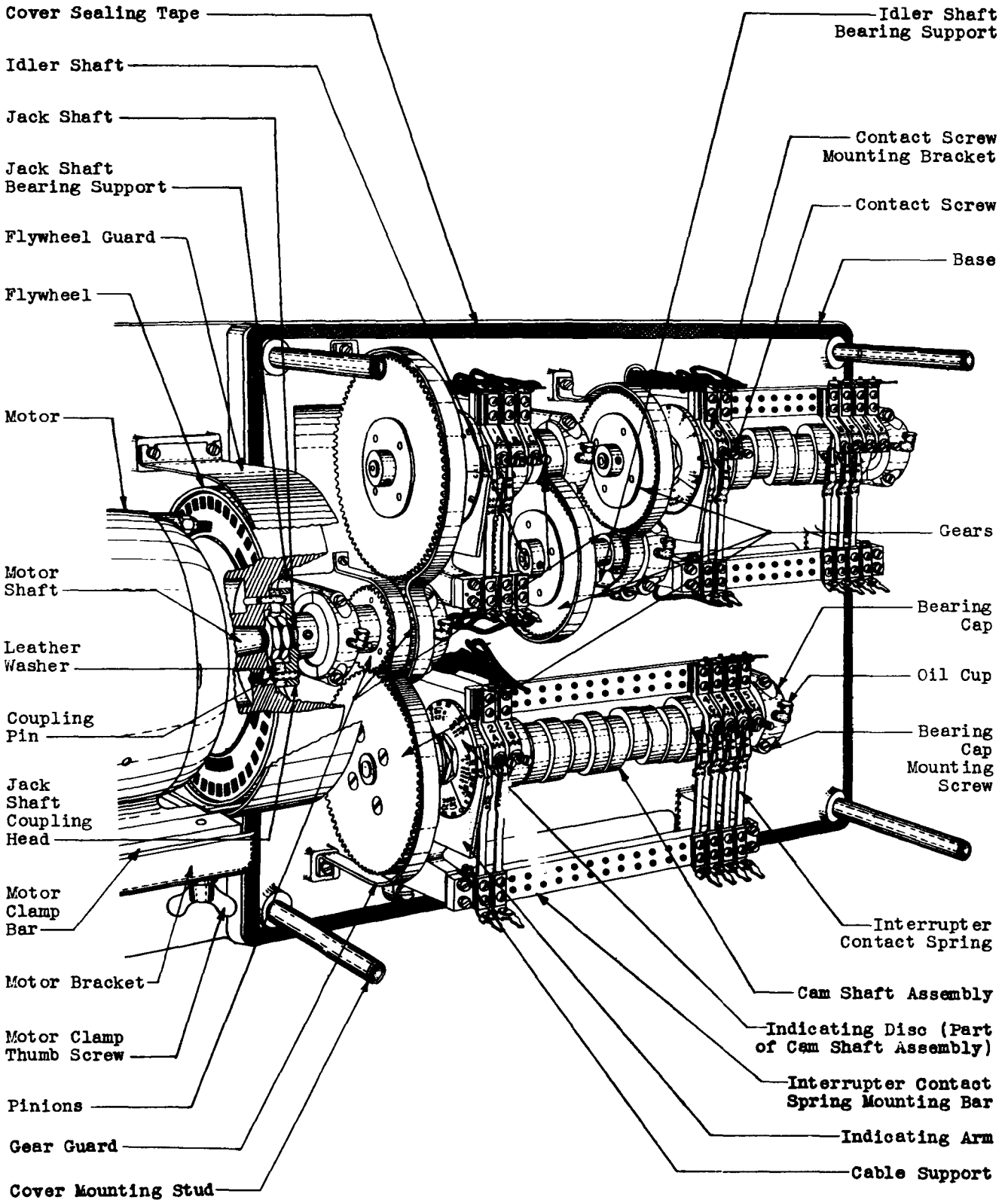


Fig. 18 – Designation of Parts (No. 170A Interrupter)

3.13 Thoroughly clean the surface of the motor shaft on which the flywheel is mounted and also the mounting surface of the flywheel with a KS-2423 cloth dampened with petroleum spirits. In order to prevent corrosion, wipe these surfaces with a KS-2423 cloth which has been partially saturated with KS-2245 oil. Then mount the flywheel on the motor shaft and securely tighten the lock nuts.

3.14 Before remounting the motor, make sure that the mounting surfaces of the base of the motor and the motor bracket are clean and if necessary clean these surfaces with a KS-2423 cloth dampened slightly with petroleum spirits. Then place the motor on the motor bracket and move it to the right against the stop pin in the motor bracket. Make sure that the coupling pins engage the holes in the leather washer properly and also that the leather washer and the coupling head clear each other by the proper amount as specified in Section 163-607-701 covering this apparatus. Reassemble the motor clamp bar and the flywheel guard if they were removed and securely tighten the motor clamp thumb screws.

Coupling Parts

3.15 Loosen the motor as covered in 3.11 and slide it to the left sufficiently to permit the removal and replacement of the part. Use the 5/16" Bristo set screw wrench to loosen the set screws in the hub of the jack shaft coupling head. In removing the motor coupling head of the No. 168B interrupter, use the No. 295 wrench to loosen the Bristo set screws. If the coupling pins are badly worn and the coupling casting is in good condition, replace the coupling pins in the same manner as the flywheel pins are replaced as outlined in 3.12.

3.16 In reassembling the parts, make sure that the leather washer and the coupling head clear each other by the proper amount as specified in Section 163-607-701 covering this apparatus. After the parts have been replaced, ***securely*** tighten any Bristo set screws which were loosened, as covered in 3.05.

Motor Bracket Spring

3.17 To replace the spring beneath the motor clamp bar, remove the motor clamp thumb screws and washers and the motor clamp bar. Remove the spring mounting screws with the 3-1/2" cabinet screw-driver and remove the spring. Make the necessary replacements and reassemble the parts.

Oil Cups

3.18 Remove the oil cup with the No. 310B wrench. Make sure that the threaded portion of the new oil cup is approximately the same length as that of the old oil cup so that the new oil cup will not be screwed in far enough to damage the bearing washers. If necessary, file off the threaded portion so that it is the proper length.

Bearing Parts
Cable Supports
Cam Shaft Assembly
Jack Shaft
Idler Shaft (No. 170A Interrupter Only)
Pinions

3.19 ***Bearing Caps.*** Remove the two bearing cap mounting screws (shown in Fig. 20) with the 4" regular screw-driver and remove the bearing cap. Since the two bearing caps associated with the two bearings of a shaft are slightly different, examine the new bearing cap to make sure that it is like the one being replaced, or like another bearing cap on the corresponding end of another shaft on the interrupter. In reassembling the parts, take care that the bearing washers fit properly into the grooves in the bearing support. In placing the bearing cap over the bearing washers, first engage the upper portions of the metal washers by the proper grooves in the bearing cap and then gradually work the bearing cap into place. Make sure that the bearing cap can be pressed completely into position with the hand and if resistance is felt, do not force the bearing cap into position by means of the bearing cap mounting screws. Insert the bearing cap mounting screws and hold the bearing cap in place with one hand while

tightening the screws. Stamp the number of the bearing onto the new bearing cap. Remove the oil cup from the old bearing cap and transfer it to the new bearing cap as covered in 3.18.

3.20 ***Bearing Washers.*** Remove the bearing cap as covered in 3.19. If parts of the bearing at the left hand end of the shaft are to be replaced, remove the gear as covered in 3.08 or the coupling head as covered in 3.15 depending upon the type of shaft. Work the three outer washers out of the bearing and remove the outer ball race. Force the balls and retainer off of the inner ball race, using a screw-driver, if necessary, taking care not to damage the parts or lose any of the balls in case they come out of the retainer. Then loosen the bearing cap mounting screws of the bearing on the other end of the shaft sufficiently to permit the removal of the remaining three bearing washers.

> ***Note:*** If, for any reason, any part of the ball bearing requires replacement, replace the complete assembly including the outer and inner ball races and balls and retainer.

3.21 Before reassembling the bearing, make sure that all parts of the ball bearing are in good condition. If the ball bearing requires replacement, do this as covered in 3.24 to 3.29 inclusive.

3.22 Reassemble the bearing so that all parts assume their correct position as illustrated in Figs. 19 and 20 and as follows: Put three washers on the shaft in the following order: flat metal washer, cork washer with notch in rim, metal washer with stud. Make sure that the metal washers fit into the grooves provided for them in the bearing support and also that the stud in the latter washer fits into the hole in the cork washer. Rotate the washers until the projections on the washer with the stud are toward the front and so that the two rectangular notches in this washer line up with the edges of the bearing support. Retighten the bearing cap mounting screws of the bearing at the other end of the shaft. Then put the balls and retainer and the outer ball race in position. Put the outer three washers in position in the following order: for bearings at the left-hand end of the shaft — spring (crimped) metal washer, flat cork washer, flat metal washer; for bearings at the right-hand end of the shaft, use a flat metal washer in place of the spring metal washer. Reassemble the bearing cap as outlined in 3.19.

3.23 Relubricate the ball bearings as outlined in Section 163-607-701 covering this apparatus.

3.24 ***Ball Bearings and Cable Supports.*** If any parts of the ball bearing assembly require replacing, replace the entire ball bearing assembly. To remove the inner ball race for replacement it will be necessary to remove the shaft and all parts mounted thereon. Remove the gear guard or guards associated with the shaft as covered in 3.10.

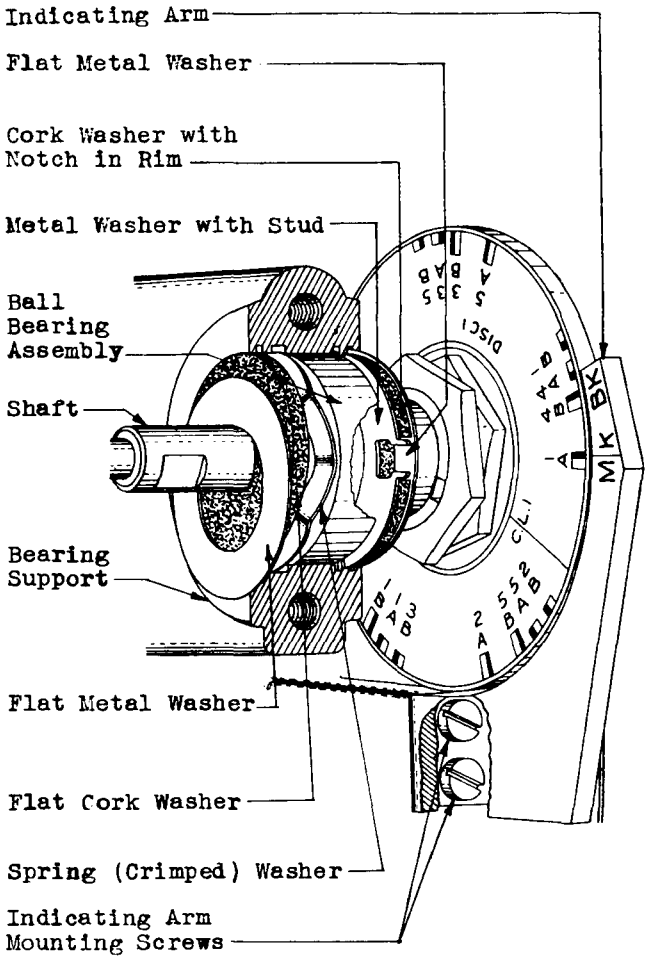


Fig. 19 – Bearing Assembly at Left-Hand End of Shaft

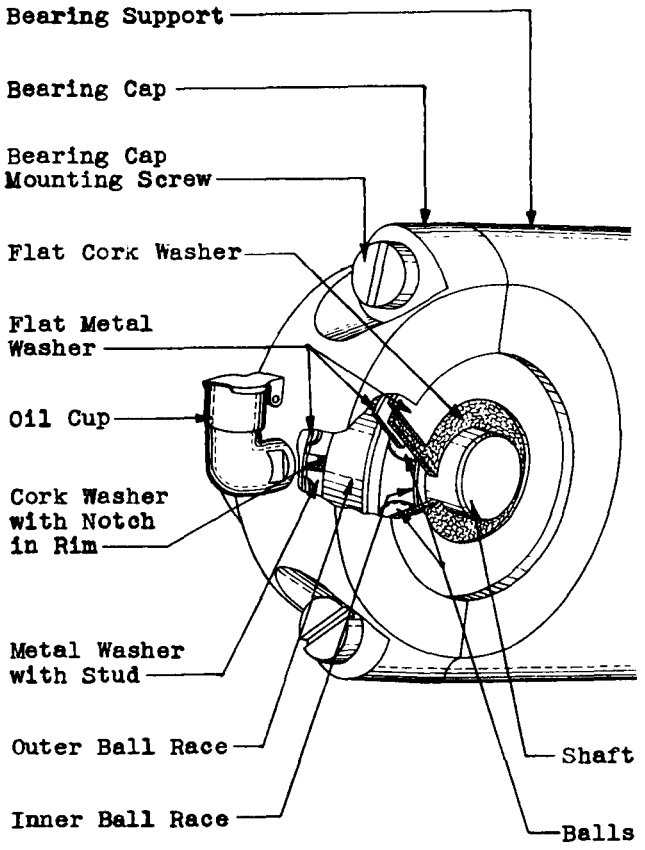


Fig. 20 – Bearing Assembly at Right-Hand End of Shaft

3.25 In the case of a cam shaft, remove the mounting screws of the indicating arm associated with the cam shaft with the 4" regular screw-driver and remove the indicating arm. Remove the cable supports mounted on the interrupter contact spring mounting bar by loosening the cable support mounting screw with the 4" regular screw-driver, taking care not to damage the adjacent contact springs. Remove the four interrupter contact spring mounting bar mounting screws with the 4" regular screw-driver and remove the bar, including the interrupter contact springs mounted thereon. Move the bar and interrupter contact springs downward sufficiently to permit removal of the cam shaft assembly without removing the wires connected to the interrupter contact springs, and support these parts in such a manner as to avoid placing a strain on any of the wires.

3.26 Remove the bearing caps as covered in 3.19, after which the shaft can be removed. Remove the gear, bearing washers etc., if necessary. To remove the inner ball race (which has a press fit on the shaft) clamp the inner ball race in a vise and turn the shaft. Slip the new inner ball race on the shaft. Force the inner ball race carefully into place against the shoulder of the shaft by placing the blade of the 4" regular screw-driver on the edge of the inner ball race and tapping it with the 4 oz. riveting hammer. Move the blade of the screw-driver after each tap of the hammer so that the inner ball race will be driven on the shaft straight, taking care not to damage the inner ball race. Reassemble the parts as follows.

3.27 Make sure that all parts are clean. Dip the outer ball races and the balls and retainers into KS-2245 oil and allow the excess oil to run off and then into KS-6438 oil and allow the excess oil to run off. Put the three inner bearing washers in position on each end of the shaft taking care to place them in proper order as outlined in 3.22. Then put the shaft in position on the shaft support, holding the shaft with one hand while setting the right hand set of washers into their grooves. Mount the bearing cap temporarily at this end of the shaft as covered in 3.19, taking care to use the same bearing cap as was originally assembled on this bearing.

3.28 Set the left hand set of washers in position in the grooves in the bearing support and assemble the balls and retainer and outer ball race. Put the outer 3 washers in place in their proper order as outlined in 3.22. Reassemble the bearing cap which was originally associated with this bearing.

3.29 Remove the right hand bearing cap, which was set temporarily in place, and complete the assembly of the bearing.

3.30 If a cable support is being replaced, do this before reassembling the bar on which the interrupter contact springs are mounted. Cut away the old lacing by which the cable is sewed to the support and sew the cable to the new support with No. 6 lock-stitch lacing. Reassemble the cable support on the bar.

3.31 Reassemble the bar and interrupter contact springs, securely tightening all screws. Reassemble the gear as outlined in 3.08 and 3.09 and gear guard or guards as outlined in 3.10.

3.32 Relubricate the ball bearings as outlined in Section 163-607-701 covering this apparatus.

3.33 ***Cam Shaft Assembly.*** Remove the cam shaft assembly as covered in 3.24 to 3.26 inclusive. Reassemble the parts and lubricate the bearings as covered in 3.27 to 3.32 inclusive except that, since the new cam shaft assembly includes ball bearings which were oil treated before they were shipped, it is not necessary to dip the new outer ball races and the balls and retainers into oil as covered in 3.27.

3.34 ***Jack Shaft, Idler Shaft (No. 170A Interrupter Only) and Pinions.*** To replace any of these parts, remove the shaft on which they are mounted by removing the necessary gear guards and bearing caps. If only the pinion is being replaced, it will be necessary to remove the bearing washers etc from only one end of the shaft. Loosen the pinion set screws with the 3/16" Bristo set screw wrench.

3.35 In reassembling the parts, if a pinion was removed, slip this on the shaft first. Make sure that the Bristo set screws engage the flat portions of the shaft and tighten the set screws temporarily. If the jack shaft coupling head was removed, slip the bearing washers, ball bearing parts and the coupling head onto the shaft before starting to reassemble the bearings. Then reassemble the bearing parts as outlined in 3.22.

3.36 Locate the pinion so that it is in alignment with its associated gear. Then securely tighten the Bristo set screws in the hub of the pinion as covered in 3.05. If any gears were removed, reassemble them as outlined in 3.08 and 3.09. Reassemble the gear guards and locate the jack shaft coupling head as outlined in 3.16.

3.37 Relubricate the ball bearings as outlined in Section 163-607-701 covering this apparatus.

Jack Shaft Bearing Support

Idler Shaft Bearing Support (No. 170A Interrupter Only)

3.38 To replace the jack shaft bearing support or the idler shaft bearing support of the No. 170A interrupter, first remove the jack shaft or the idler shaft as covered in 3.34. Then, remove the bearing support mounting screws with the 5" regular screw-driver, and remove the bearing support.

3.39 ***Jack Shaft Bearing Support.*** Make sure that all parts are clean and then reassemble the jack shaft, including the jack shaft coupling head, pinion and associated bearings, on the new jack shaft bearing support as outlined in 3.35. The old jack shaft bearing support was dowelled to the base in original assembly; but do not dowel the new bearing support as this would probably result in improper alignment of the shafts, gears, etc. With the motor in place on the motor bracket, put the new bearing support in position, engaging the leather washer of the coupling. Put the bearing support mounting screws in place and set them up lightly. Rap the jack shaft bearing support up or down as required to align the jack shaft with the motor shaft and also to align the gear or gears. Securely tighten the bearing support mounting screws, then locate the pinion, jack shaft coupling head or motor as required.

3.40 ***Idler Shaft Bearing Support (No. 170A Interrupter Only)*** Reassemble the parts in a manner similar to that outlined above for the jack shaft bearing parts. Make sure that the pinions and gears are in alignment and also that the high and low speed cam shafts are geared so as to give the proper relation between these shafts.

Interrupter Contact Spring Assembly Parts

3.41 To replace insulators, contact springs or brackets of the interrupter contact spring assemblies, remove the mounting screws with the 3-1/2" cabinet screw-driver. Make the necessary replacement of parts, reassemble the assembly and securely tighten the mounting screws. Check the requirements specified in Section 163-607-701 applying to these parts.

3.42 To replace the contact screw, loosen the contact screw lock nut with the No. 417A wrench. Remove the old screw with the 3-1/2" cabinet screw-driver and substitute the new one. Make sure that the contact end of the screw is located properly with respect to the adjacent contact on the feather spring.

3.43 If any contact screw mounting brackets are replaced, stamp designations on the new parts corresponding to the designations on the parts which were removed.

Motor Stop Alarm and Associated Parts (No. 168B Interrupter Only)

3.44 ***Motor Stop Alarm Retractile Spring.*** Remove the retractile spring with the long nose pliers and substitute the new part.

3.45 ***Contact Spring Assembly.*** To replace any part of the contact spring assembly, remove the spring assembly clamping screws with the 3-1/2" cabinet screw-driver. Make the necessary replacement of parts, reassemble the contact spring assembly and securely tighten the mounting screws.

3.46 ***Motor Stop Alarm Assembly.*** Remove the contact spring assembly mounting screws with the 3-1/2" cabinet screw-driver and dismount the assembly, taking care not to damage the wiring to the contact springs. Remove the motor stop alarm assembly, using the 3-1/2" cabinet screw-driver to loosen the mounting screw. Reassemble the parts and check the requirements of Section 163-607-701 applying to these parts.

Motor Resistance Parts (No. 170A Interrupter Only)

3.47 For replacement information on the motor resistance unit refer to Sections 159-416-801 and 159-424-801 covering piece part data and replacement procedures for the KS-5072, KS-5109, KS-5224 and KS-5407 motors. To remove the resistance or to replace any of the parts used in mounting it, remove the motor from the interrupter as covered in 3.11. Remove the resistance mounting bracket mounting screws with the 4" regular screw-driver and remove the resistance and associated parts.

Cable Clips

3.48 To replace a metal clip used to hold the cable to the interrupter base, remove the clip mounting screw with the 3-1/2" cabinet screw-driver, substitute the new clip and tighten the mounting screw securely.

3.49 To replace the leather cable supports used on the Nos. 168B and 170A interrupters, remove the mounting screw with the 3-1/2" cabinet screw-driver. Cut a length of leather strap of the required length and punch holes through each end of the strap. Substitute the new strap and reassemble the parts.

Terminal Block Parts

3.50 To replace any part of the terminal block assembly, remove the assembly clamping screws with the 3-1/2" cabinet screw-driver. If a terminal is to be replaced, unsolder the wires connected to the terminal and remove the old terminal with the long nose pliers. Press the new terminal into place in the terminal block and resolder the wires to the terminal. Substitute any other parts requiring replacement and reassemble the parts.

Toggle Switch (Nos. 170A and 171A Interrupters Only)

3.51 Remove the fuses from the circuit supplying current to the motor. If the switch cover is mounted with two screws, remove these screws with the 3-1/2" cabinet screw-driver. If the switch cover is mounted with a nut, remove the nut with the long nose pliers and remove the cover. Remove the two switch mounting screws with the 3-1/2" cabinet screw-driver. Loosen the terminal screws with the 3-1/2" cabinet screw-driver, and remove the wires, marking them if necessary to insure that they will be replaced on the proper terminals. Put the new switch in place and reconnect the wires. Tighten the mounting screws and reassemble the switch cover.

Receptacle (Nos. 170A and 171A Interrupters Only)

3.52 Pull out the polarized plug and make sure that the toggle switch is turned off. Remove the screw in the center of the receptacle with the 3-1/2" cabinet screw-driver. Remove the receptacle mounting screws and loosen the ter-

minal screws with the 3-1/2" cabinet screwdriver. Remove the leads from the old receptacle and connect them to the new one, taking care to replace the wires on the proper terminals. Mount the receptacle and reassemble the parts.

3.53 ***Parts of Camshaft Assembly:*** Remove the camshaft assembly as covered in 3.25. Remove the camshaft assembly clamping nuts by applying a KS-13816 wrench, or equivalent, at each end of the assembly. Hold the nut at the right end of the assembly with one wrench and loosen the nuts at the left end of the shaft. Remove both nuts and then remove in turn the indicating disc, spacing collar, and cams; removing the cams only as far as necessary to reach the cam or cams requiring replacement. Remove and replace the key if necessary. If necessary, replace the ball bearings as covered in 3.26 to 3.32, inclusive.

3.54 Reassemble the cams on the shaft in proper numerical order (all cams are numbered) by lining up the cam slots with the key. Reassemble the spacing collar and indicating disc, making sure that the indications on the disc are on the left. Tighten the assembly clamping nuts securely, using a KS-13816 wrench on each end as before.

3.55 During a period of low humidity, some time following cam replacement check to see that the clamping nuts still hold the assembly firmly together. This is particularly important if the replacement was made during a period of high humidity, since the cams have a tendency to loosen as shrinkage occurs because of the drying effects of the atmosphere.

3.56 ***Stroboscope Disc (Nos. 170A and 171A Interrupters Only):*** To replace the disc, remove the flywheel as covered in 3.11. Thoroughly clean the surface of the old disc on the flywheel with a KS-2423 cloth moistened with KS-7860 petroleum spirits to remove all grease and oil. Abrade the surface of the old disc with No. 1/0 emery cloth to further insure that the new disc will be mounted on a clean surface. Wipe with a clean KS-2423 cloth.

Caution: Exercise care not to touch the old disc with the hands after it has been cleaned.

Apply a liberal coat of Duco household cement to the surfaces of the old disc and to a new disc. Allow the cement to dry for several minutes and then place the new disc over the old disc and press firmly together, using a clean KS-2423 cloth. Apply one coat of record lacquer over the entire surface of disc and when dry apply a second coat. Allow the second coat to dry. When dry mount the flywheel on the motor shaft as covered in 3.13 and remount the motor on the interrupter as covered in 3.14. Check the motor speed as covered in Section 163-607-701.

Caution: If two discs are already on the flywheel and another new disc is required, then both old discs should be removed, and the new disc should be mounted as specified above.