

SEQUENCE SWITCHES A AND B TYPES 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 A- and B-type sequence switches. It also covers approved procedures for replacing these parts.

1.02 This section is reissued to revise piece-part data, to revise the list of tools, gauges, and materials, to delete procedures covering cleaning of "A" cams, and to revise the procedure covering the use of the No. 203 index wheel holder. Detailed reasons for reissue will be found at the end of the section.

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 the above apparatus. No attempt should be made to replace parts not designated. 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 parts listed under Part 2. This information is called Replacement Procedures.

1.05 A red diagonal stripe or red letter on the index tab of a contact spring assembly indicates that the associated cam is silver-surfaced.

1.06 A white diagonal stripe across the upper left-hand corner on the index tab of a contact spring assembly indicates that one or more of the spring tips have No. 1 contact metal tips.

1.07 Before making any replacement of the parts of a sequence switch, make the associated circuits busy in accordance with the approved methods before the work is started. Also, remove the fuses from the associated circuits. Take the necessary precautions to prevent interference with common leads to other switches.

2. PIECE-PART DATA

2.01 The figures included in this part show the various piece parts in their proper relation to other parts of the apparatus. The piece-part numbers of the various parts are given together with the names of the parts as listed by the Western Electric Company Merchandise Department. Where these names differ from those in general use in the field, the latter names, in some cases, are shown in parentheses.

2.02 When ordering piece parts for replacement purposes, give both the number and the name of the piece part, for

example, P-143477 Pole Piece. Do not refer to the BSP number, or to any information shown in parentheses following the piece-part numbers.

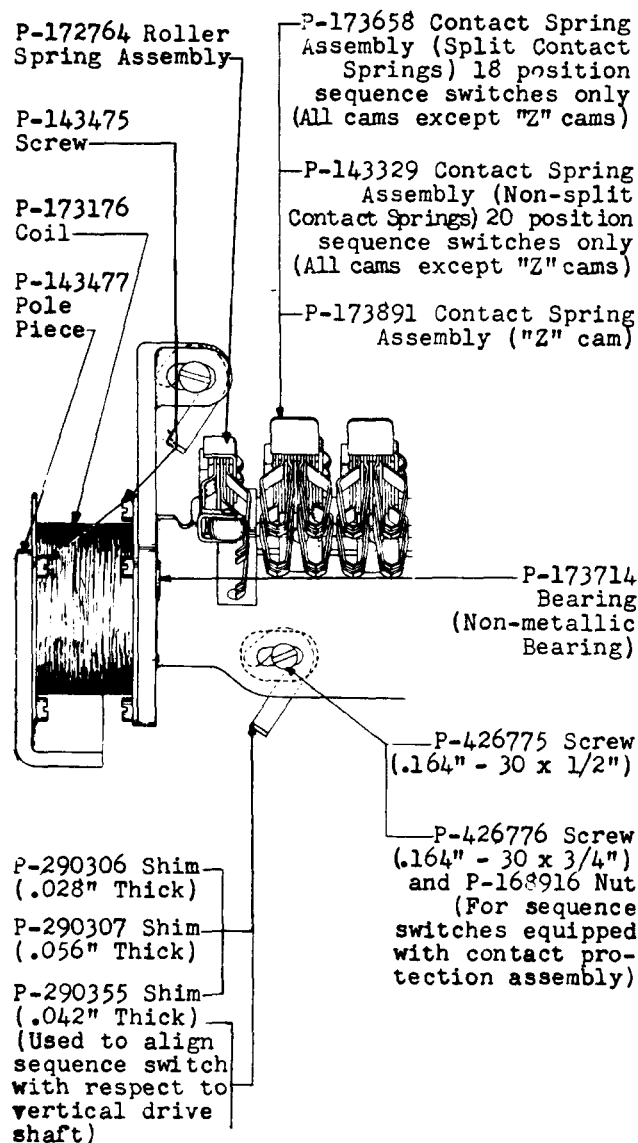


Fig. 1 - Contact Spring Assemblies, Drive Magnet, and Associated parts

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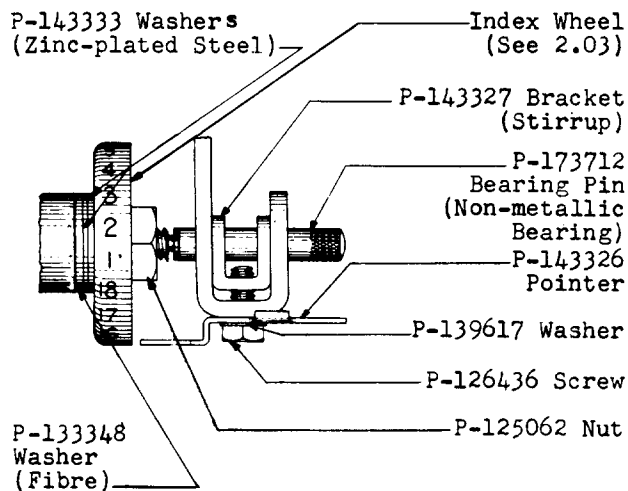


Fig. 2 - Bearing Pin and Associated Parts

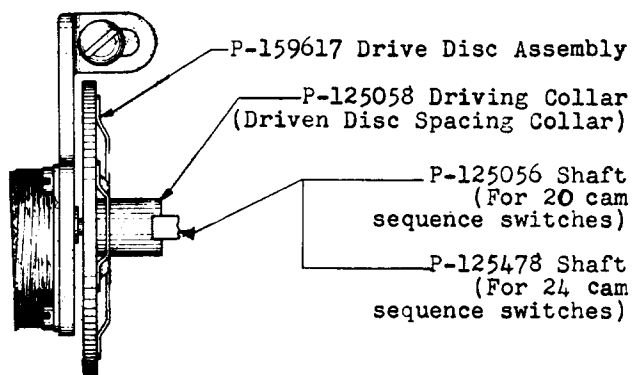


Fig. 3 - Driven Disc and Associated Parts

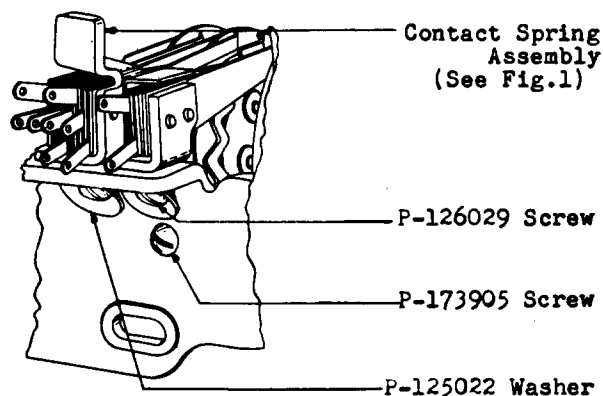


Fig. 4 - Contact Spring Assembly Mounting Screws and Washer. Index Tab at Rear of Spring Assembly Mounting Bracket

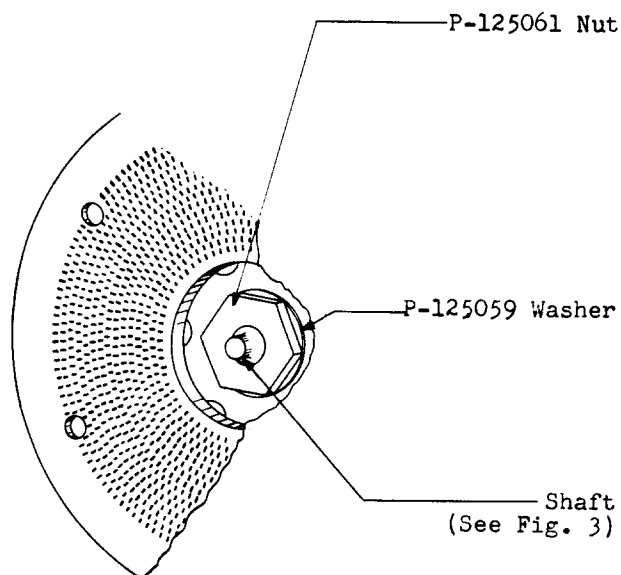


Fig. 5 - Driven Disc Clamping Nut and Washer

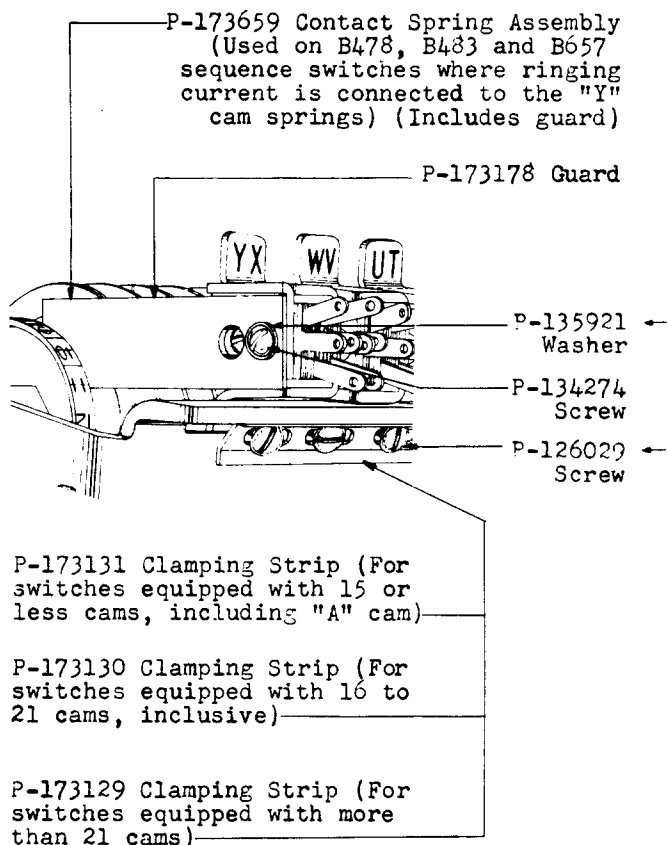


Fig. 6 - Clamping Strip and "Y" Cam Guard

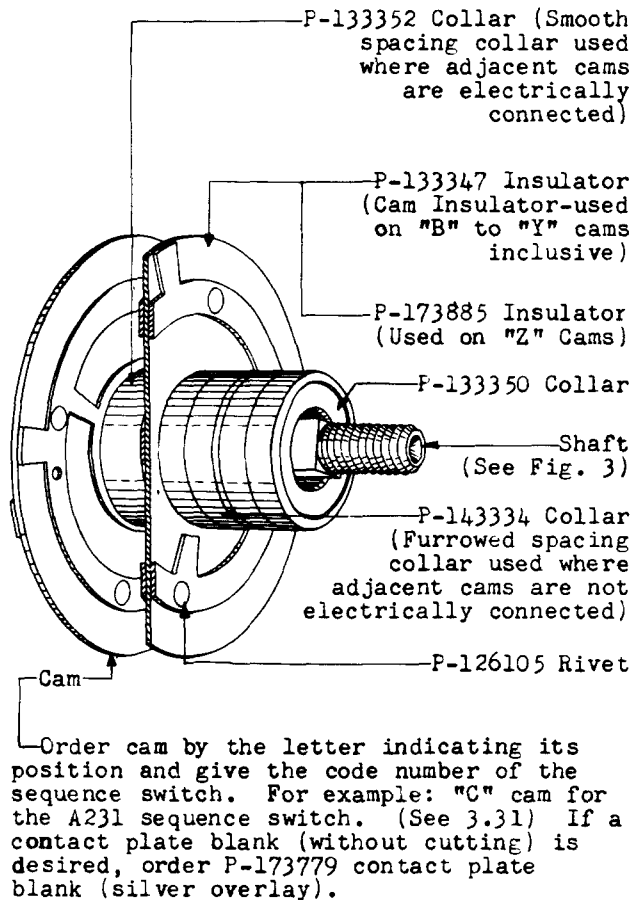


Fig. 7 - Cams and Associated Parts

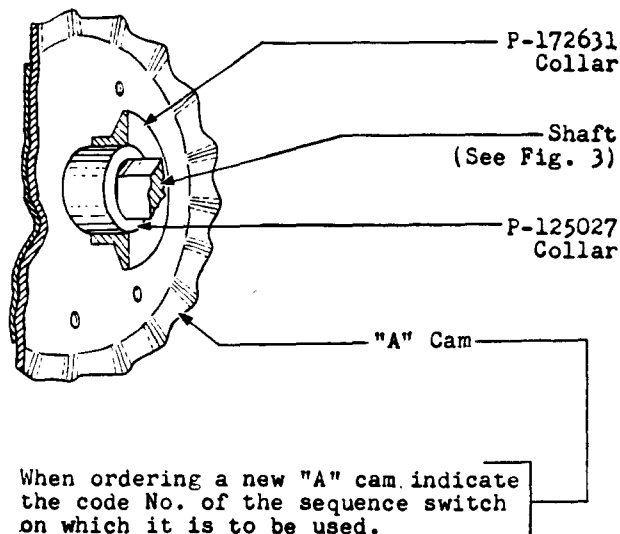


Fig. 8 - "A" Cam and Associated Parts

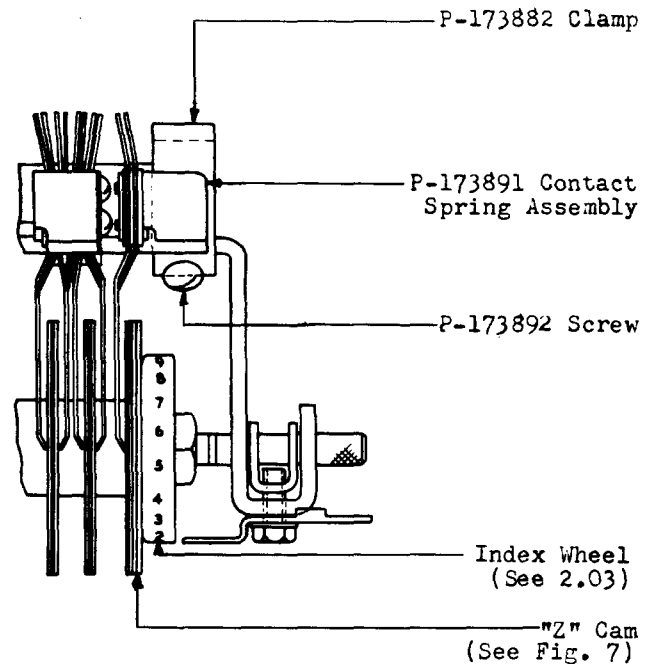


Fig. 9 - "Z" Cam Spring Assembly and Mounting Clamp

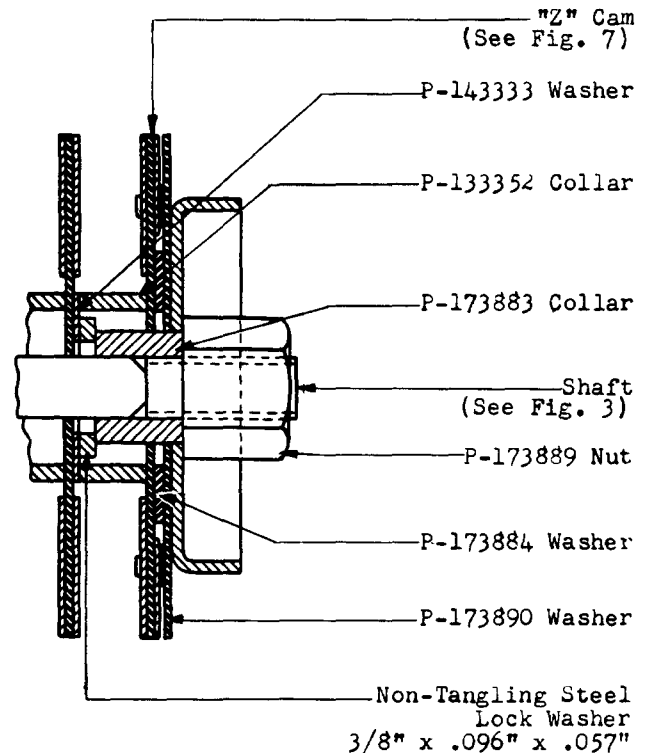


Fig. 10 - "Z" Cam and Associated Parts

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2.03 The following is a list of numbers and corresponding names of piece parts which are not common to all sequence switches.

Index Wheels (Fig. 2)

<u>Stamping</u>	<u>Piece-part Number</u>
1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18 (Switches not equipped with a "Z" cam)	P-125060 Indicating Wheel
1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18 (Switches equipped with a "Z" cam)	P-173886 Indicating Wheel
1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20	P-159244 Indicating Wheel
1-2-3-4-5-6-7-8-9-1-2-3-4-5-6-7-8-9	P-137090 Indicating Wheel
1-2-3-4-5-6-1-2-3-4-5-6-1-2-3-4-5-6	P-154686 Indicating Wheel
0-1-2-3-4-5-6-7-8-9-1-2-3-4-5-6-7-8	P-159200 Indicating Wheel
0-1-W-R-J-M-0-1-W-R-J-M-0-1-W-R-J-M	P-159199 Indicating Wheel
N-0-1-2-3-4-N-0-1-2-3-4-N-0-1-2-3-4	P-154192 Indicating Wheel
N-0-1-2-3-4-5-6-7-N-0-1-2-3-4-5-6-7	P-154193 Indicating Wheel

3. REPLACEMENT PROCEDURES

3.01 List of Tools, Gauges, and Materials

Code or
Spec No.

Description

Tools

33	11/32-inch Hex. Single-end Socket Wrench
47	1/2-inch Hex. Single-end Socket Wrench
203	Index Wheel Holder
206	30-degree Offset Screwdriver
207	90-degree Offset Screwdriver
215	Spring Adjuster

Code or
Spec No.

Description

Tools

225B (or replaced 225)	Cam Aligning Fixture
236	9/16-inch Hex. Open Single-end Offset Wrench
240	Scriber
253B	Brake Plate
258	Cam Spindle
348	Bearing Remover
352	Spring Separator
357	Spring Contact Clip and Insulator
397A	Anvil and Guide Plates
398A	Perforating Punch
398B	Rivet Heading Punch
KS-6263	9/32-inch Hex. Socket Wrench
-	Soldering Copper
-	4-ounce Riveting Hammer
-	6-1/2-inch P-long-nose Pliers
-	3-inch Cabinet Screwdriver
-	4-inch Regular Screwdriver
-	1/2-inch Offset Hex. Socket Wrench (J.H. Williams Co. No. 264A)

Gauges

45	Cam Checking Gauge (18-position Cams)
63	Cam Checking Gauge (20-position Cams)
85E	0.034-inch Thickness Gauge (or a flat piece of steel having a 0.120-inch hole through one end as covered in 3.46)

Materials

KS-7860	Petroleum Spirits
KS-14666 (or replaced D-98063)	Cloth
-	W.E. No 41 or No. 45 Black Stamping Ink
-	Q-58 Red Lacquer Ink (B. Meiners Co.)

3.02 Before replacing any part covered herein, check whether the replacing part is covered with a protective film of grease. If it is, remove the grease with KS-7860 petroleum spirits.

3.03 To facilitate the replacement of parts on the sequence switches, it may be advisable to remove the vertical drive shaft guard from the frame by removing the guard mounting screws with the 4-inch regular screwdriver. If, however, the guard is mounted on sliding brackets, it may be shifted out of the way without removing it from the frame.

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

3.05 After making any replacement of parts of a sequence switch, the part or parts replaced shall meet the readjust requirements involved as specified in Section 030-801-701. Other parts whose adjustments may have been disturbed by the replacing operations shall be checked to the readjust requirements and an over-all operation check shall be made of the switch before restoring the circuit to service.

3.06 Contact Spring Clamping Strip: To replace a contact spring clamping strip, remove all of the screws which hold the contact spring assemblies in place with a 4-inch regular screwdriver, taking care not to shift the position of the assemblies. Mount the contact spring clamping strip and insert the screws in place and securely tighten them.

Contact Spring Assembly

3.07 General: Where the assembly to be replaced is not associated with a "Z" cam and the index tab is located at the front of the spring assembly mounting bracket, proceed as outlined in 3.08. Where the index tab is located at the rear of the spring assembly mounting bracket, proceed as outlined in 3.09. To replace the spring assembly associated with the "Z" cam, proceed as outlined in 3.10. Where an assembly having crimped springs is to be replaced, proceed as outlined in 3.11.

3.08 Spring Assemblies With Index Tab Located at Front of Spring Assembly Mounting Bracket (Except the "Z" Cam): Disconnect the wires of the assembly to be replaced. Hold the assembly while removing the screw, and the washer where used, from the rear of the frame using the 4-inch regular screwdriver. Remove the assembly from the front of the frame. Spread the springs of the new spring assembly slightly and slip them in place on the cams by pushing the assembly toward the sequence switch frame. The assembly will come to rest at the proper place when the sequence switch frame is

reached. Fasten the assembly in place from the rear with the screw and washer, if provided. Center the spring assembly laterally and tighten the mounting screw securely. Solder the wires on the spring terminals.

3.09 Spring Assemblies With Index Tab Located at Rear of Spring Assembly Mounting Bracket: Hold the assembly while removing the screw, and the washer where used, from the rear of the frame using the 4-inch regular screwdriver. Remove the assembly from the rear of the frame. Insert the replacing spring assembly between the sequence switch frame and the mounting strap from the rear of the frame. Move the spring assembly as far forward as possible and then engage the inner sets of springs with their associated cams, lower the spring assembly, and engage the outer set of springs. Take care in doing this not to damage the springs. With both sets of springs engaging the cams, pull the assembly toward the sequence switch frame until it is in mounting position. Center it laterally and insert and securely tighten the mounting screw. Remove the wires from the terminals of the replaced spring assembly and solder them to the corresponding terminals on the new spring assembly.

3.10 Spring Assemblies Associated With "Z" Cams: Remove the setscrew on the underside of the clamp with the 4-inch regular screwdriver. Remove the clamp. Where the index tab is at the front of the assembly, proceed as outlined in 3.08. Where the index tab is at the rear of the assembly, proceed as outlined in 3.09. After substituting the new part, mount the clamp in place. Securely tighten the setscrew making sure that the point of the screw engages the hole in the spring assembly mounting bracket and that the springs are approximately parallel with the side of the "Z" cam.

3.11 Spring Assemblies With Crimped Springs: When a spring assembly having crimped springs is being replaced, shorten the new springs where necessary as covered in Section 030-801-812.

3.12 All Spring Assemblies: Stamp letters on the new spring assembly tabs corresponding to those on the assembly removed. Stamp red letters using B. Meiners Q-58 red lacquer ink where the associated cam is silver surfaced. Stamp black letters using W.E. No. 41 or No. 45 black stamping ink where the associated cam is bronze.

"A" Cam Roller and Spring Assembly

3.13 Block the sequence switch with the No. 253B brake plate. This will hold the camshaft assembly in position so that the new assembly can be placed in the same relative position as the old one. Unsolder the wires at the spring terminals and remove

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the two mounting screws with the 4-inch regular screwdriver. Then remove the assembly from the front of the frame.

3.14 Put the new assembly in place as covered in 3.08 and tighten both mounting screws. Solder the wires to the assembly and make sure that the requirement specified in Section 030-801-701 covering centering of contact springs on cams is met. If the requirement is not met because the "A" cam roller spring is too short or too long, adjust the position of the roller by means of the No. 215 spring adjuster. Apply the adjuster just back of the roller and grip the adjuster firmly so that the adjusting will be done as near the roller as possible. Solder the leads to the spring terminals and remove the No. 253B brake plate.

3.15 If required by local instructions, stamp the letters on the new "A" cam roller and spring assembly corresponding to the stamping on the one removed.

Cam Clamping Nut (Index Wheel End) and Index Wheel

3.16 Consult the circuit drawing to determine (1) whether there are any springs which must be kept closed while the camshaft assembly is removed and (2) whether there are any springs which cannot be closed even momentarily. If it is found that certain sets of springs should be kept closed, change the setting of the particular insulator or insulators of the No. 352 spring separator so that they will not insulate the springs in question. To do this, loosen the nut on the end of the separator with the No. 47 wrench. Remove the insulator or insulators and reinsert them at right angles to their original position. To prevent adjacent springs from making contact with each other while the spring separator is being put in place, insulate one of the springs in each case with the No. 357 contact clip as follows, before starting to remove the camshaft assembly.

3.17 To apply the No. 357 contact clip, place it over the spring with the metal tip away from the switch so that the bent end of the spring enters the notch in the clip. Press the back of the clip down so that the spring jaws engage the spring sufficiently to hold the clip in place. Pull forward on the clip and at the same time hold the jaws of the clip down over the spring. Do not pull with sufficient force to disturb the spring adjustment or to damage the clip.

3.18 Loosen the stirrup setscrew on the right end of the switch frame with the 4-inch regular screwdriver or the KS-6263 wrench depending on whether the setscrew has a slotted or a hexagonal head. Place the No. 352 spring separator in a position

No. 352 Spring Separator

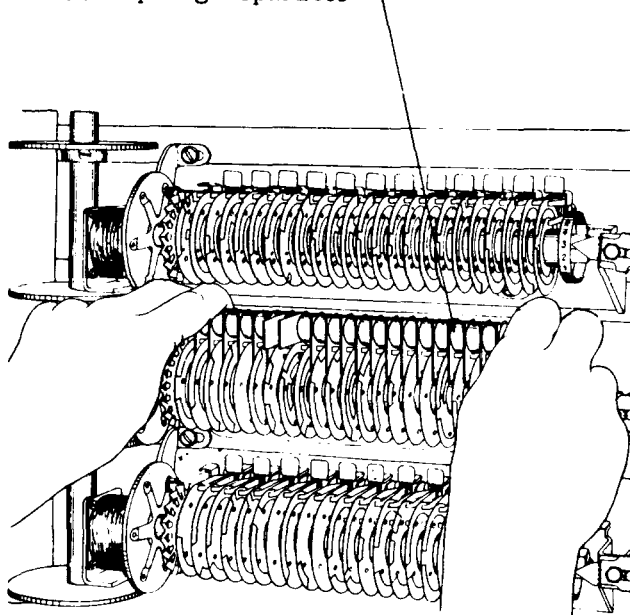


Fig. 11 - Method of Using the No. 352 Spring Separator

between the cams and the No. 3 and the No. 4 contact springs (on the index wheel side of cam) in which it may be easily moved into place to hold the springs separated when the camshaft assembly is removed.

3.19 Using both hands on the spring separator as shown in Fig. 11, pull the separator toward the front of the switch until the contact springs are approximately centered on the insulators of the separator.

3.20 Hold the camshaft assembly with the left hand and pull the bearing pin to the right until it is free from the camshaft. Hold the spring separator with the right hand and move the camshaft assembly to the right until the left end of the camshaft clears the left bearing. Hold the spring separator in position with the right hand and turn the camshaft assembly slightly in the direction of normal rotation with the left hand. At the same time, exert a downward pull on the assembly and move it until clear of the contact springs and the separator.

3.21 If more than one camshaft assembly is to be removed at a time, mark or tag the assembly with the frame and circuit number for identification.

3.22 Mount the camshaft assembly in the No. 225 or the No. 225B cam aligning fixture as shown in Fig. 12 or Fig. 13 and clamp the driven disc at a convenient point.

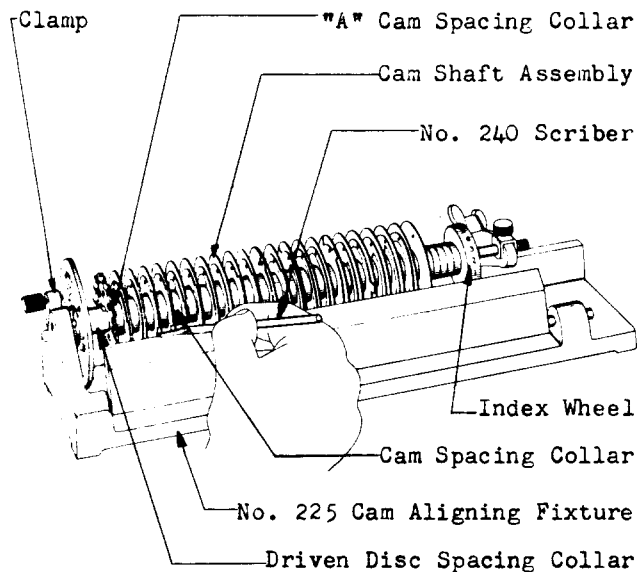


Fig. 12 - Method of Scribing Cams

Keep the clamp off the friction surface of the disc.

3.23 In some cases, the cam insulators may have become compressed slightly at the points where the cam spacing collars engage the cams. When this occurs, the cam spacing may become such as to prevent mounting the camshaft assembly in the No. 225B cam aligning fixture. In this case, remove the cam guide mounting screws with the 4-inch regular screwdriver and remove the cam guides from the fixture. Then mount the camshaft assembly in the fixture as covered in 3.22.

Note: If the camshaft assembly is being completely dismantled, add washers to improve the spacing of the cams at the time the parts are being reassembled as covered in 3.35.

3.24 Scribe a reference line on the edge of the cams with the No. 240 scriber, as shown in Fig. 12. Scribe a new reference line each time the camshaft assembly is dismantled.

3.25 Loosen the cam clamping nut with the No. 236 wrench while holding the index wheel with the No. 203 index wheel holder, as shown in Fig. 14.

3.26 Remove the camshaft assembly from the cam aligning fixture and remove the cam clamping nut at the same time holding the cams and collars in place.

3.27 Make the required replacement of the index wheel or the cam clamping nut at this time.

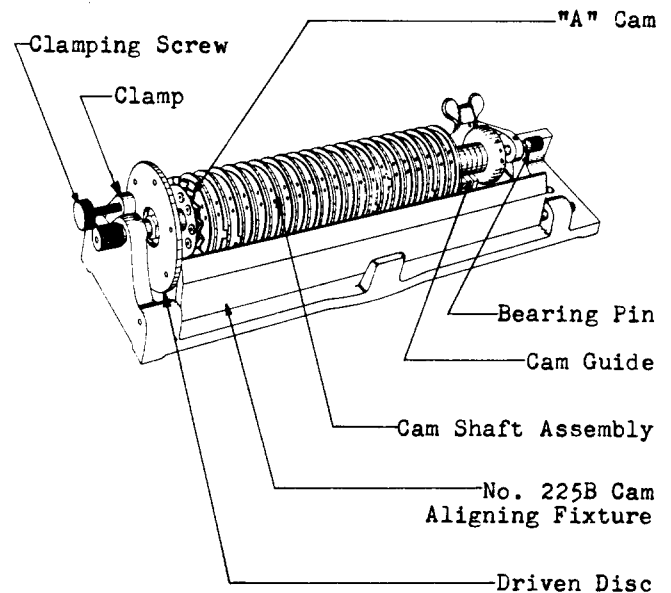


Fig. 13 - Method of Using the No. 225B Cam Aligning Fixture

3.28 If no other replacements are necessary, remount the camshaft assembly as covered in 3.38 to 3.40, inclusive. Reassemble the cam guides in the No. 225B cam aligning fixture, if removed.

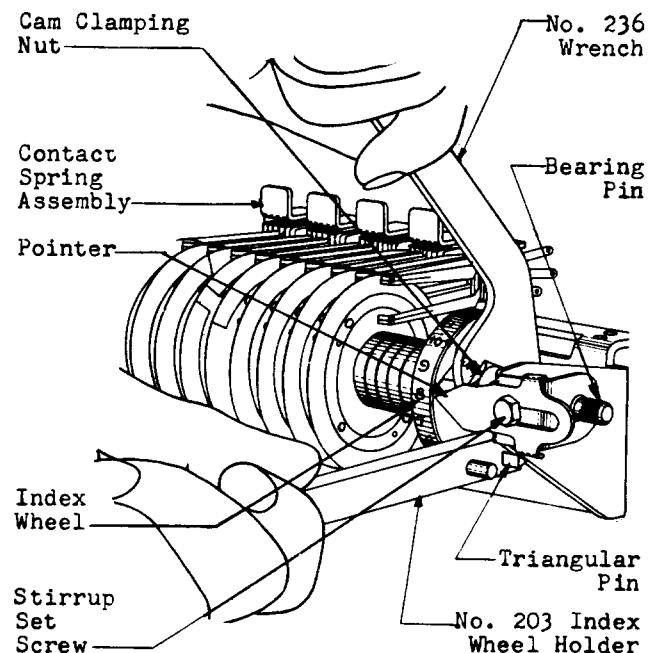


Fig. 14 - Method of Loosening the Cam Clamping Nut

- 3.29 Stripe the new index wheel as specified on the circuit drawing.

Cams, Cam Spacing Collars, and Camshaft

3.30 General: To replace any of these parts, first remove the camshaft assembly as outlined in 3.16 to 3.21, inclusive. Mount the camshaft assembly in the No. 225 or No. 225B cam aligning fixture as outlined in 3.22 and 3.23 so that the straight edge of the tool may be placed opposite the edge of a cutting on a cam to be retained on the shaft which corresponds to a similar cutting on the new cam or cams to be added.

3.31 In replacing a solid cam, the new cam may have a 10-degree cutting which was introduced to provide self-cleaning of contact surfaces.

3.32 If cams are being replaced on 18-position sequence switches in order to eliminate special adjustments, ascertain whether there are any other cams on the switch which are not being replaced, but which have special adjustments. Determine whether or not the special adjustments on these cams will be required after the other cams are replaced. Scribe a reference line on the edge of the cams as covered in 3.24 omitting the mark from the edge of the cams being retained which have special adjustments no longer required.

3.33 Remove the cam clamping nut and index wheel as covered in 3.25 and 3.26.

3.34 Hold the camshaft vertically and place the index wheel end of the shaft over the tip of the No. 258 cam spindle. Transfer the cams and collars to the spindle until the first cam or collar to be removed is reached, being careful to retain the transferred cams in alignment on the spindle. Insert the replacement cam on the spindle so that it is in alignment with the others and then remove the cam to be replaced from the assembly. Continue in this manner until all the cams or collars to be replaced have been removed. Be careful to arrange the replacement cams on the spindle so that they are in their proper positions, the letters stamped on the cams are in alignment, and all the rivet heads will be toward the index wheel when assembled on the camshaft. Check the new cams with the No. 45 or the No. 63 gauges as shown in Fig. 15 or Fig. 16 before placing them on the spindle. If the camshaft is to be replaced, transfer all the cams and collars to the No. 258 cam spindle at this time.

3.35 In case the cams were spaced too close together to permit mounting the camshaft assembly in the No. 225B cam aligning fixture as covered in 3.22 and 3.23, add one P-133348 washer between a cam near the center

of the camshaft assembly and its associated cam spacing collar. In some cases, it may be necessary to add two washers in order to obtain proper spacing, in which case, add one washer about 1/3 of the way from the driven disc and another washer about 1/3 of the way from the index wheel. Since these are insulating washers, take care to select cams which are insulated from their adjacent cam spacing collars when adding washers.

3.36 When all cams or collars to be changed have been removed and the replacing cams or collars put on the No. 258 cam spindle in their proper sequence, place the camshaft vertically over the tip of the spindle with the index wheel end down and transfer the cams from the spindle to the camshaft. Reassemble the washers, index wheel, and cam clamping nut on the shaft.

3.37 Mount the camshaft assembly in the cam aligning fixture and while rotating it, center the spacing collars on the shaft by tapping them with the blade of a screwdriver. Clamp the shaft so that the scribed marks on the cams are in alignment with the straight edge on the cam aligning fixture. Move the previously chosen edges of cuttings on the new cams into alignment on the straight edge in this position of the camshaft, if possible, or align the new cams by reference along the straight edge to marked ones having cuttings in some position which corresponds to cuttings on the new cams. If there are cams on the switch which had special adjustments no longer required, align these cams also by reference to other cams having cuttings in the same position.

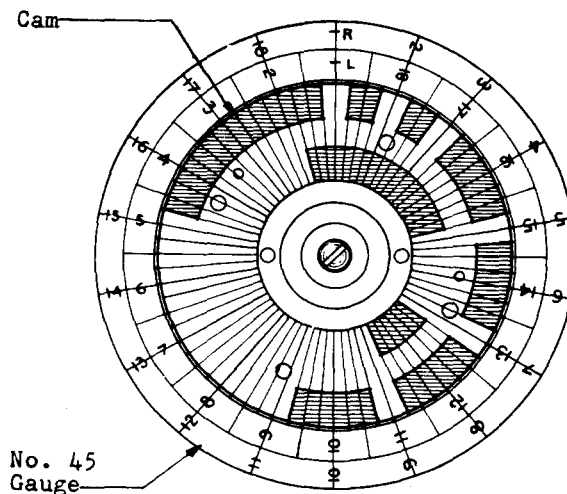


Fig. 15 - Method of Locating and Checking Positions of 18-position Cams With the No. 45 Gauge

- 3.38 Tighten the cam clamping nut using the No. 236 wrench and the No. 203

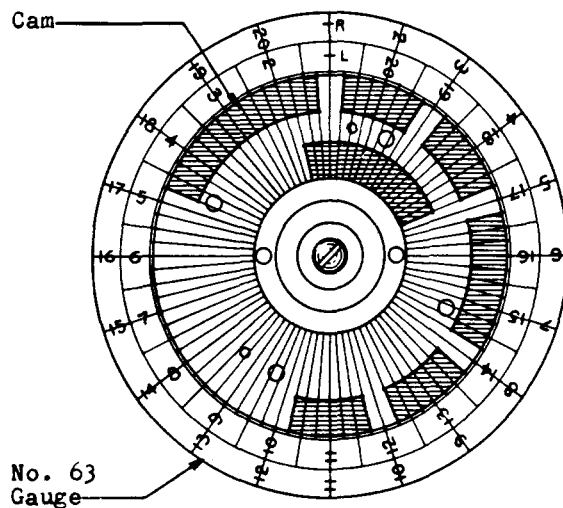


Fig. 16 - Method of Checking 20-position Cams With the No. 63 Gauge

index wheel holder. Check the alignment of the cams by means of the scribed marks on their edges before removing the camshaft assembly from the cam aligning fixture.

3.39 Before reassembling the camshaft assembly in the sequence switch, lubricate the camshaft bearings in accordance with Section 030-801-701.

3.40 Place the camshaft assembly in the sequence switch frame in such a position that the cams are directly below their associated springs. Raise the right end of the assembly and place the cams against the left sides of the insulators. Hold the spring separator with one hand and with the other hand exert a pressure to the right on the camshaft assembly so that the cams bear against the insulators of the separator as shown in Fig. 17 at the same time rotating the camshaft assembly in the direction of normal rotation and keeping the right end of the camshaft in front of the bearing pin. Raise the left end of the camshaft assembly until all of the cams have entered between their respective springs. Push the camshaft assembly to the right until the left end of the shaft will slip into its bearing. If the sequence switch is equipped with non-metallic bearings, in order to avoid damaging the bearing, it is important that the left end of the camshaft be in line with the hole in the bearing before allowing the shaft to come in contact with the bearing. Take care that the "A" spring is not damaged when raising the left end of the camshaft. Then push in the bearing pin at the right end of the shaft. Remove the No. 352 spring separator.

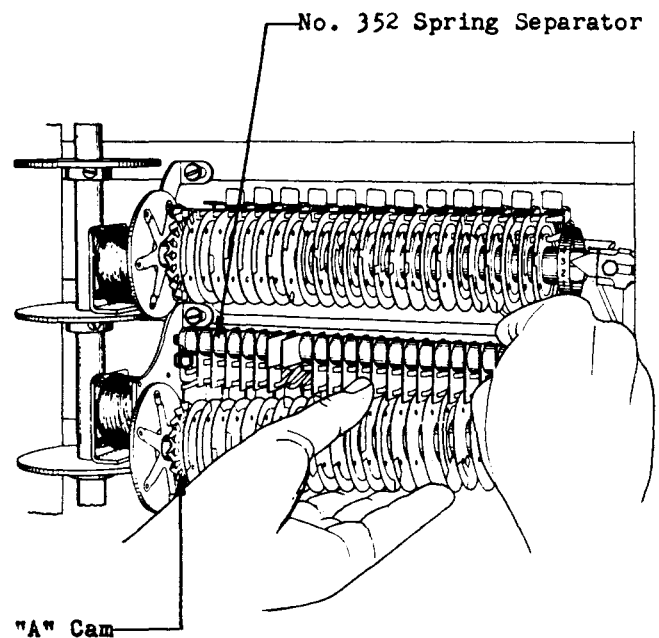


Fig. 17 - Method of Replacing a Sequence Switch Camshaft Assembly

3.41 When silver-surfaced cams are installed in a sequence switch, treat these cams in accordance with approved procedures.

Bearing and Bearing Pin

3.42 When replacing a bearing of the metallic (solid bronze) type with a new nonmetallic bearing, also replace the bearing pin with one of the nonmetallic type (fiber tip). Do not install a bearing pin of the nonmetallic type unless the sequence switch is equipped with or is being equipped with a nonmetallic bearing. This will provide for most economical maintenance and also indicate the type of bearing at the driven disc end when determining the need of lubrication.

3.43 Place a new bearing on the No. 398B rivet heading punch, as shown in Fig. 18, and check that the tip of the punch is slightly underflush with the outer surface of the metallic portion of the bearing as indicated. To adjust the punch to this position, unscrew the head and loosen the setscrew with the 3-inch cabinet screwdriver. Then adjust the projection of the punch by turning the threaded portion as required. Tighten the setscrew and remount the head. Do not attempt to replace a bearing with a No. 398B punch improperly adjusted, because damage to the bearing or the coil of the switch may result.

3.44 To replace a bearing, remove the camshaft assembly as covered in 3.16 to 3.21, inclusive. Apply the No. 348 bearing remover between the bearing and the sequence switch frame as shown in Fig. 19 and tap the tip of the bearing remover with the 4-ounce riveting hammer. Repeat this operation, moving the bearing remover to each of the positions indicated by the dotted lines in Fig. 19. Never strike the bearing remover at right angles to the length of the remover and take care to tap the remover gently so as to avoid damaging the magnet. Continue in this manner, each time applying the bearing remover at a different position so as to gradually work the bearing out of the sequence switch frame.

3.45 Wrap a piece of dry KS-14666 cloth around the blade of a 3-inch cabinet screwdriver and wipe out any grease which may be in the hole in the frame from which the bearing was removed. Place the new bearing on the No. 398B punch and then place the bearing in position in the hole in the sequence switch frame. Drive the bearing into the frame with the 4-ounce riveting hammer, as shown in Fig. 20, taking care that the bearing is seated against the face of the sequence switch frame and also taking care to hold the handle of the hammer approximately horizontal and to strike the punch squarely.

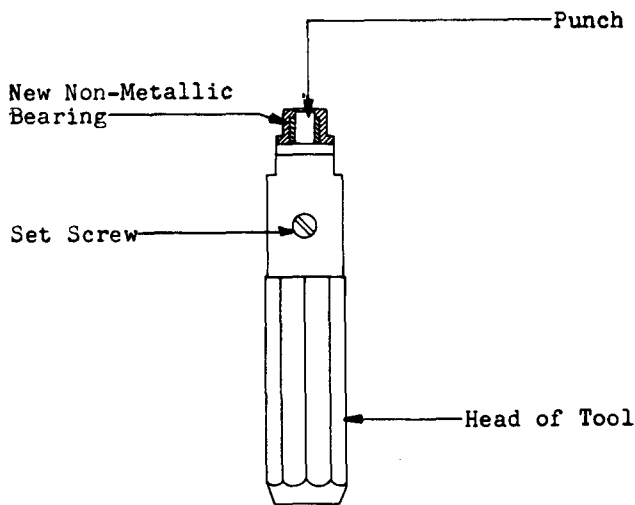


Fig. 18 - Method of Adjusting No. 398B Rivet Heading Punch When Used to Replace Bearings

3.46 With a dry KS-14666 cloth, wipe the old grease off the magnet end of the camshaft. Check that the bearing surfaces of the drive magnet end of the camshaft are not worn to less than 0.120 inch in diameter by making sure that this bearing will not

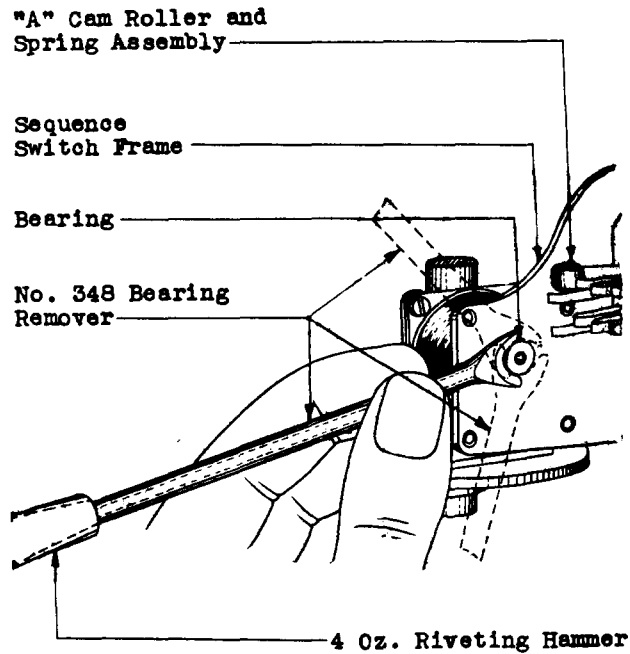


Fig. 19 - Method of Starting Removal of Bearing

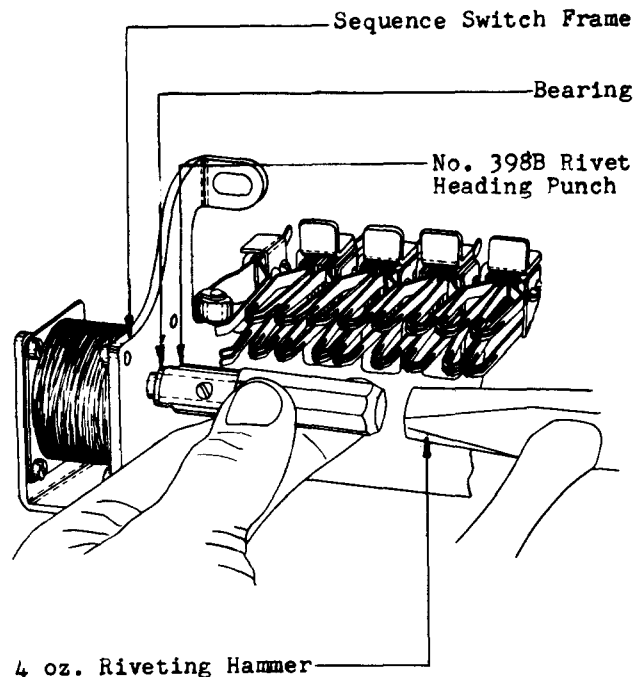


Fig. 20 - Method of Replacing Bearing

go through the 0.120-inch hole in the No. 85E gauge. If a No. 85E gauge having this hole is not available, prepare a gauge from

a flat piece of sheet steel (such as a No. 85E gauge) approximately 5 inches by 1/2 inch by 1/32 inch and drill a 0.120-inch hole through this piece of steel. A new No. 31 gauge commercial twist drill will drill a hole of the proper size. If the camshaft bearing is worn to less than 0.120 inch in diameter, replace the camshaft with a new one as covered in 3.30 to 3.38, inclusive.

3.47 Reassemble the camshaft as covered in 3.40 being sure to use a bearing pin of the nonmetallic type. Do not lubricate the new bearing at the magnet end. Lubricate the bearing at the index wheel end as covered in Section 030-801-701.

Pole Piece and "R" Magnet

3.48 In order to obtain access to the rear pole piece or "R" magnet mounting screws, it may be necessary to remove the sequence switch mounting screws with the 4-inch regular screwdriver and pull the sequence switch forward, taking care not to damage the wiring.

3.49 Pole Piece: To remove the pole piece, loosen the clamping screws with the Nos. 206 and 207 offset screwdrivers. Substitute the new part and tighten the clamping screws securely.

3.50 "R" Magnet: Before disconnecting the wires to the "R" magnet terminals, make a note of the arrangement of the wiring of the magnet because on some bays the wires to alternate magnets are reversed. Unsolder the wires from the "R" magnet terminals and loosen the two magnet clamping screws on the back edge of the inside spoolhead with the Nos. 206 and 207 offset screwdrivers. Remove the two front screws attaching the magnet to the frame. In the case of "R" magnets having white cellulose acetate magnet coil covering, remove only the upper of the two front screws attaching the magnet to the frame, loosen the lower screw, and remove the magnet from the frame.

3.51 See that the rear magnet clamping screws on the frame are out far enough to allow the magnet spoolhead to slip under their heads. Place the new magnet in position and place the front screw or screws in the frame through the magnet spoolhead.

3.52 Tighten the screws securely, taking care that the pole piece is parallel to the driving disc on the vertical drive shaft. Then resolder the wires to the "R" magnet terminals. Reassemble the sequence switch on the frame if it was dismantled.

Driven Disc, Driven Disc Clamping Washer, Driven Disc Spacing Collar, "A" Cam, and "A" Cam Spacing Collar

3.53 To replace any of these parts, remove the camshaft assembly from the frame and scribe the cams as covered in 3.16 to 3.24, inclusive.

3.54 Loosen the cam clamping nut at the driven disc end with the No. 47 wrench. If difficulty is experienced removing the cam clamping nut, loosen the nut using the J. H. Williams Co. No. 264A wrench. Then remove and replace the defective parts. In replacing the "A" cam, make sure that the new cam is located properly with respect to the other cams as specified in Section 030-801-701. Tighten the cam clamping nut with the No. 47 wrench.

Caution: Do not use the J. H. Williams Co. No. 264A wrench to tighten the clamping nut.

3.55 Reassemble the camshaft assembly and mount it in the frame as covered in 3.37 to 3.40, inclusive.

Spacing Washer

3.56 If the sequence switch is equipped with a protection assembly, use the No. 33 wrench or the P-long-nose pliers to loosen the protection assembly mounting nut. Loosen the three mounting screws with the 4-inch regular screwdriver. Remove the mounting screw beneath which the spacing washer or washers are required. Hold the washer or washers in the fingers and slide them between the sequence switch frame and the strap over the sequence switch mounting screw hole. Tighten the other mounting screws to hold the washer or washers in place. Then grasp the head of the mounting screw with the P-long-nose pliers and insert the screw in the mounting hole. Tighten the mounting screws securely.

Repairing Sequence Switch Cams (Except "A" Cams)

3.57 Remove the cams to be repaired from the camshaft assembly as covered in 3.30 to 3.34, inclusive. Then proceed as follows.

3.58 To obtain best results, the punch of the No. 398A perforating punch must project approximately 3/16 inch and the punch of the No. 398B rivet heading punch must project a distance which is slightly less than the thickness of the rivet guide

plate of the No. 397A anvil and guide plates. To adjust the projection of the Nos. 398A or 398B punches, unscrew the head and loosen the setscrew in the side with the 3-inch cabinet screwdriver. Then adjust the projection of the punch by turning the threaded portion as required. Tighten the setscrew and remount the head.

3.59 Should continued usage require it, recondition the No. 398A punch to facilitate removal of the rivets, by grinding the face of the punch flat.

3.60 The side of the No. 397A anvil and guide plates designated "punch" is designed for use with the No. 398A punch, to facilitate the removal of the old rivets. The side designated "rivet" is designed for use with the No. 398B punch to facilitate the assembly of the new micarta insulator with the old metal cam parts.

3.61 Place the damaged cam over the guide pins on the punch side of the No. 397A anvil and guide plates with the rivet heads on top. Place the "punch" guide plate over the guide pins with the side designated "punch" on top. Insert the punch into the guide holes and remove the rivets by giving the head of the punch a sharp blow with the 4-ounce riveting hammer.

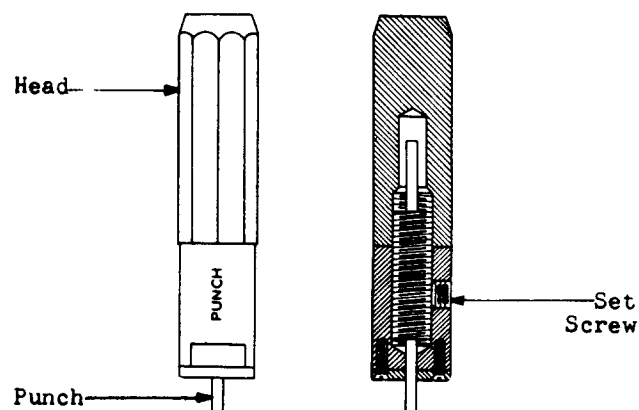


Fig. 21 - No. 398A Perforating Punch

3.62 To reassemble a cam, place four new rivets, heads down, in the counterbores in the anvil on the "rivet" side of the No. 397A anvil and guide plates. Then place the top metal cam part, as removed from the "punch" side, over the guide pins and rivets. Make sure that the numerical or letter designation on the cam part is placed next to the anvil. Next, place the micarta insulator and the other metal cam part over the guide pins, making sure that the designation letters on the metal part

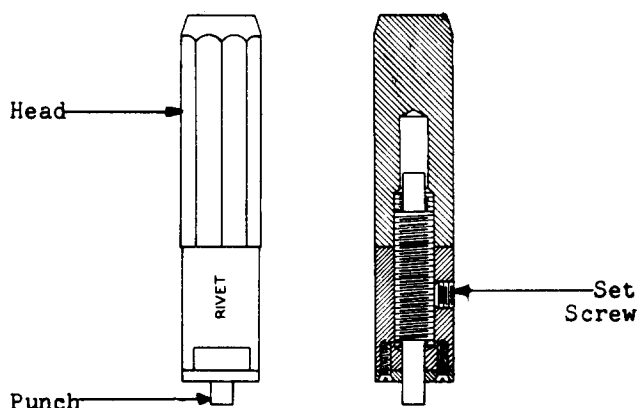


Fig. 22 - No. 398B Rivet Heading Punch

are facing upward. Place the "rivet" guide plate over the parts.

3.63 Insert the No. 398B punch in each of the guide holes, hold it in the vertical position and head the rivets by giving the end of the punch a sharp blow with the 4-ounce riveting hammer.

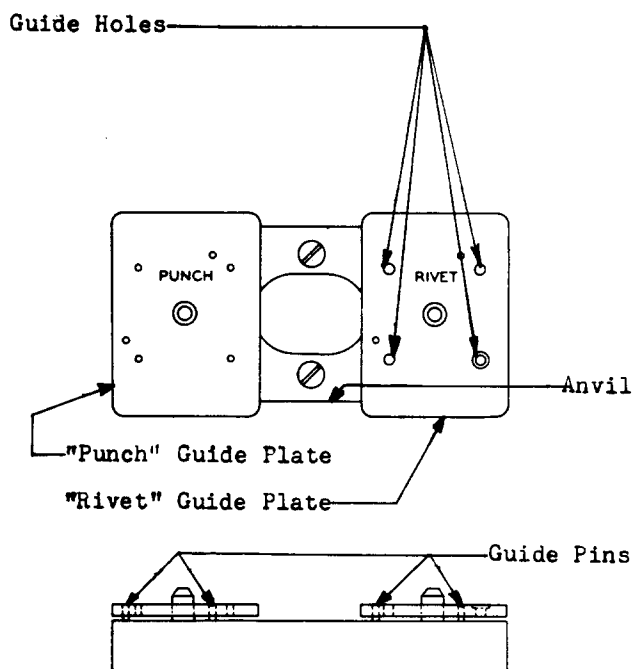


Fig. 23 - No. 397A Anvil and Guide Plates

3.64 To facilitate removal of a repaired cam as well as to avoid possible injury to the insulator, lift the cam from the

No. 397A anvil and guide plates in as near a vertical plane as possible.

3.65 When all of the defective cams have been removed, repaired, and placed on the No. 258 cam spindle in their proper sequence, transfer the cams and spacing collars from the spindle to the cam shaft as covered in 3.35 and 3.36. Reassemble the index wheel on the shaft and thread the cam clamping nut on the shaft.

3.66 Mount the camshaft assembly in the cam aligning fixture and while rotating it, center the spacing collars on the shaft by tapping them with the blade of a screwdriver. Clamp the shaft so that the scribed marks on the cams are in alignment with the straight edge on the cam aligning fixture.

3.67 Tighten the cam clamping nut with the No. 236 wrench and the No. 203 index wheel holder. Check the alignment of the cams by means of the scribed marks on their edges before removing the camshaft assembly from the cam aligning fixture.

3.68 Reassemble the camshaft in the sequence switch as outlined in 3.39 and 3.40.

REASONS FOR REISSUE

1. To revise figures to show binding head instead of roundhead spring assembly mounting screws. (Figs. 4 and 6).
2. To revise piece-part information as required (Fig. 6).
3. To revise the list of tools, gauges, and materials (3.01).
4. To delete reference for cleaning "A" cams (previously 3.15).
5. To revise the procedure covering the use of the No. 203 index wheel holder (3.25).
6. To revise procedures for treating silver-surfaced cams (3.41).
7. To revise the heading covering the repair of sequence switch cams, so as to cover all cams except "A" cams (3.57).