

**KS-13834 L1 PERFORATOR
(TROUBLE RECORDER)
PIECE-PART DATA AND REPLACEMENT PROCEDURES**

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NOTICE

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1. GENERAL

1.01 This section covers the information necessary for ordering parts used in the maintenance of the KS-13834 L1 perforator for recording troubles in

- 4A and 4M central offices
- No. 5 crossbar central offices equipped with master test frame (MTF) and not arranged for wideband
- Crossbar tandem, step-by-step, and No. 1 crossbar central offices when arranged for automatic message accounting (AMA).

1.02 This section is reissued to incorporate Addendum 1, to update lubrication and tool requirements, and to revise Figure 12.

1.03 Piece parts, other than mounting hardware, which can be replaced in the field are listed in the index in Part 2. These parts are identified on Figures 1 through 25 which appear in Part 2 and which show the different parts together with their piece-part numbers and corresponding names. No text references are listed in the index for replacement procedures that are obvious and simple.

1.04 Part 3 covers the approved procedures for the replacement of the piece parts designated in Part 2.

1.05 Part 4 covers the approved procedures to be followed when transporting a spare KS-13834 L1 perforator between central office locations. Part 4 also covers the procedures for removing and replacing a perforator.

1.06 The KS-13834 L1 perforator may be made busy by inserting a 322A (make busy) plug into the TRMB jack on the trouble recorder panel associated with the test facilities or trouble recorder frame.

2. PIECE-PART DATA

2.01 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. When 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 parts or subassemblies for replacement purposes, give both the piece-part number or KS- number and the name of the part or subassembly shown in the following example:

P-463115 Card Hook Shoe

KS-13910 Hand Drive Assembly

Do not refer to the section number or to any information shown in parentheses.

2.03 Information enclosed by parentheses is not ordering information. This information may be references to notes, parts referred to in other portions of the section and not considered replaceable, or part names in general use in the field if the names differ from those assigned by the manufacturer.

2.04 When a part of a replaceable subassembly requires replacement but replacement procedures are not provided in Part 3, the subassembly shall be replaced.

2.05 The subassemblies listed below are maintained in a rotating stock by the Western Electric Company (Plymouth, Michigan) for emergency orders:

- KS-13904—Punch and Card Feed Assembly
- KS-13905—Cam Switch Assembly

- KS-13906—Clutch Drive Assembly
- KS-13907—In-Bin Assembly
- KS-13908—Out-Bin Assembly
- KS-13909—Latch Assembly
- KS-13910—Hand Drive Assembly
- P-463780—Motor Assembly (consisting of KS-5748 motor equipped with P-493686 pulley assembly).

2.06 When a subassembly is required, submit an emergency requisition in the usual manner. The Western Electric Company will ship the subassembly from the emergency-rotating stock located at Plymouth, Michigan. Since the pool of subassemblies is maintained for the entire Bell System, all defective subassemblies must be immediately shipped to Plymouth, Michigan. The emergency requisition should bear the following notation:

Emergency order to replace defective KS-_____ subassembly at the _____ central office. Obtain from emergency-rotating stock. Defective subassembly is being returned.

The defective subassembly should be forwarded with the emergency requisition.

2.07 On initially manufactured perforators, rotating parts were secured to associated shafts by clamp assemblies which made contact with only a sector of the shaft periphery. Later versions of the perforator were arranged with improved clamps which provided clamping around substantially the entire shaft periphery. With the new arrangement,

half of the clamp is made integral to the clamped part. Thus, the two clamp types are not interchangeable. When making replacements, order parts associated with the clamping arrangement provided. Replacement part information for both types of clamps is shown in Fig. 1, 8, and 10. In each figure, replacement part information is for the clamps used in currently manufactured perforators. Parts for the clamp assembly used with initially manufactured perforators are given in an accompanying note.

2.08 The earlier mounting arrangement of yoke roller guides has been changed to provide greater margin for adjustment of the roller guide(s) position (Fig. 21). Also, a later type of roller guide has been furnished whereon the flanges are of equal width. The flange widths on earlier guides were unequal. The later roller guides are used to replace parts on both the earlier or later mounting arrangement. However, replace all four guides associated with the same yoke when replacing a roller guide on perforators with the earlier mounting arrangement. The most latest arrangement uses yoke guides with a new yoke assembly instead of the yoke roller guides (Fig. 21) and is not interchangeable.

2.09 Earlier model clutch drive assemblies (Fig. 7) are equipped with an index wheel and associated pointer marker. Perforator design changes manufactured after March 1966 deleted the index wheel and pointer marker as shown in Fig. 31 and 33.

2.10 The following index list the figures on which ordering information for all replaceable parts is shown. Reference are also given for part(s) replacement procedures provided in Part 3.

INDEX

| PART | ORDERING INFORMA- TION FIG. NO. | REPLACEMENT PROCEDURE (COVERED IN PART 3) |
|--|---|--|
| MOTOR, PULLEY ASSEMBLY, AND ASSOCIATED PARTS | | |
| Motor Belt | 2 | 3.10 |
| Motor | 1 | 3.11 |
| Pulley Assembly | 2 | 3.12 |
| Overload Clutch Coil Spring | 2 | 3.13 |
| Overload Clutch Flat Spring and Rollers | 2 | 3.14 |
| Motor Bracket Support Assembly | 3 | 3.15 |
| Idler Pulley Assembly | 4 | 3.16 |
| Idler Pulley | 4 | 3.17 |
| Idler Pulley Ratchet and Spring | 4 | 3.18 |
| Idler Pulley Mounting Bracket | 4 | 3.19 |
| DRIVE CHAINS AND IDLER SPROCKET | | |
| Cam Switch to Clutch Drive Chain and Idler Sprocket | 5 | 3.20 |
| Clutch Drive to Hand Drive Chain | 5 | 3.21 |
| KS-13906 CLUTCH DRIVE ASSEMBLY | | |
| Clutch Drive Assembly | 6 | 3.22 3.23 |
| Solenoid Assembly | 7 | 3.24 |
| Antioverthrow Pawl Spring | 6 | 3.25 |
| Contact Spring Assembly | 6 | 3.26 |
| KS-13910 HAND DRIVE ASSEMBLY AND ASSOCIATED PARTS | | |
| Hand Drive Assembly | 8 | 3.27 |
| Hand Drive to Punch and Card Feed Coupling | 8,9 | 3.28 |

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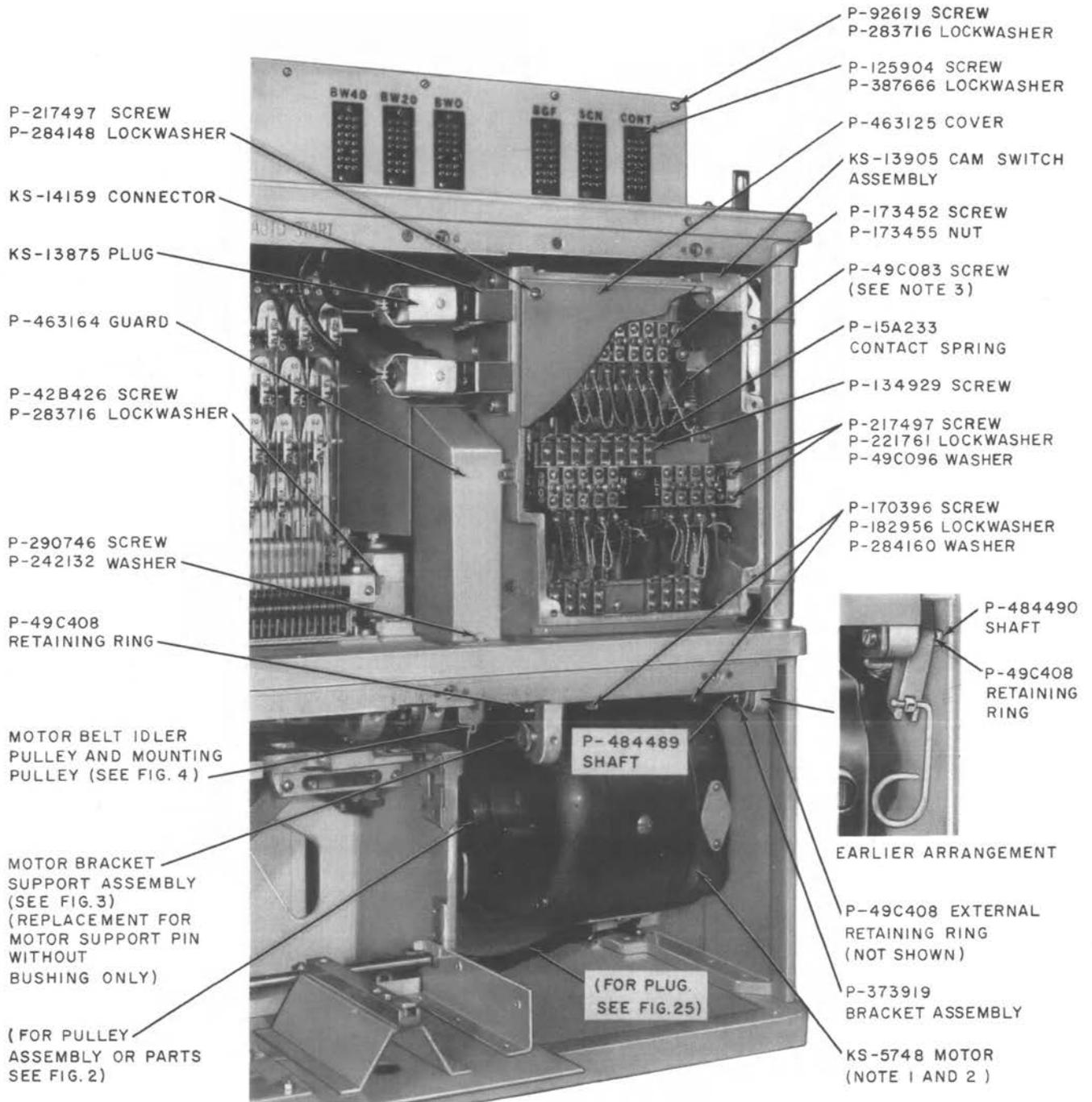
| PART | ORDERING INFORMA- TION FIG. NO. | REPLACEMENT PROCEDURE (COVERED IN PART 3) |
|--|---|--|
| KS-13909 LATCH ASSEMBLY | | |
| Latch Assembly | 9 | 3.29 |
| Brake Spring | 10 | 3.30 |
| Forward Stop Pawl Spring | 10 | 3.31 |
| Backward Stop Pawl Spring, Collar, and Elastic Stopnut | 10 | 3.32 |
| Contact Spring Assembly | 11 | 3.33 |
| Latch Magnet Assembly and Associated Parts | 10,11 | 3.34 |
| KS-13905 CAM SWITCH ASSEMBLY | | |
| Cam Switch Assembly | 1 | 3.35 3.36 |
| Contact Spring | 1 | 3.37 |
| Contact Screw | 1 | 3.38 |
| Idler Sprocket Spring | 5 | 3.39 |
| KS-13907 IN-BIN ASSEMBLY | | |
| In-Bin | 12 | 3.40 |
| Elevator Platform and Associated Parts | 12 | 3.41 |
| Elevator Platform Spring | 12 | 3.42 |
| Elevator Latch Spring | 13 | 3.43 |
| Microswitch | 14 | 3.44 |
| KS-13908 OUT-BIN ASSEMBLY | | |
| Out-Bin | 15 | 3.45 |
| KS-13904 PUNCH AND CARD FEED ASSEMBLY PARTS | | |
| Punch and Card Feed Assembly | | 3.46 |
| Punch Retaining Ring | 16,17 | 3.47 |
| Punch | 16,17 | 3.48 |
| Punch Retractable Spring | 17 | 3.49 |
| Throat Assembly | 18 | 3.50 |
| Throat Guide Plate | 18 | 3.51 |

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| PART | ORDERING INFORMA- TION FIG. NO. | REPLACEMENT PROCEDURE (COVERED IN PART 3) |
|--|---|--|
| Throat Stop | 18 | 3.52 |
| Throat Spring | 18 | 3.53 |
| Alarm Contact Spring Assembly | 18 | 3.54 |
| Card Hook Shoe | 18 | 3.55 |
| Card Hook Shoe Spring | 19 | 3.56 |
| Card Hook Shoe Link Assembly | 19 | 3.57 |
| KS-13902 CAM DRIVE ASSEMBLY PARTS | | |
| Camshaft Assemblies | 20 | 3.58 |
| Camshaft Bearings | 22 | 3.59 |
| Yoke Assembly | 22 | 3.60 |
| Yoke and Yoke Cam Follower | 22 | 3.61 |
| Yoke Roller Guides or Yoke Guides | 21 | 3.62 |
| Camshaft Lubricator Pad | 20 | 3.63 |

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| PART | ORDERING INFORMA- TION FIG. NO. | REPLACEMENT PROCEDURE (COVERED IN PART 3) |
|---|---|--|
| PARTS ASSOCIATED WITH KS-13903 SELECTOR | | |
| Selector Link | 23 | 3.64 |
| Selector Magnet, Armature, and Armature Retaining Strip | 23 | 3.65 |
| Interposer Latch Spring | 23 | 3.66 |
| Outer Comb Assembly | 23,24 | 3.67 |
| Comb, Comb Springs, and Clamp Bar | 24 | 3.68 |
| MISCELLANEOUS PARTS | | |
| Chaff Bin | 16 | 3.69 |
| Clamp Assembly | 1,8,10 | 3.70 |
| Plug Assembly | 1 | 3.71 |
| Terminal Block | 1 | 3.72 |
| Motor Plug | 25 | 3.73 |
| ALMB and ALMH Plugs | 25 | 3.74 |
| ALMB, ALMH, and MP1 Receptacles | 25 | 3.75 |



NOTES:

1. FOR A REPLACEMENT MOTOR, ORDER P-463780 MOTOR ASSEMBLY (WHICH CONSISTS OF KS-5748 MOTOR EQUIPPED WITH P-493686 PULLEY ASSEMBLY).
2. ORDER MOTOR BRUSHES AS "BRUSHES FOR KS-5748 MOTOR" G.E. CO. IF KS-5748 IS NOT STAMPED ON MOTOR NAME PLATE, GIVE ALL NAME PLATE DATA ON ORDER.
3. ORDER P-485085 CLAMP ASSEMBLY WHERE REQUIRED (SEE 2.07)

Fig. 1—KS-13905 Cam Switch Assembly, KS-5748 Motor, and Pulley Assembly

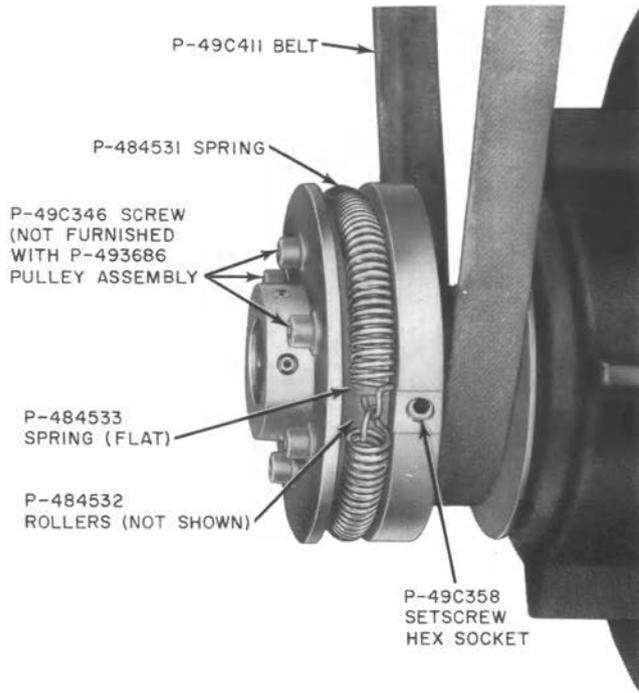


Fig. 2—Pulley Assembly

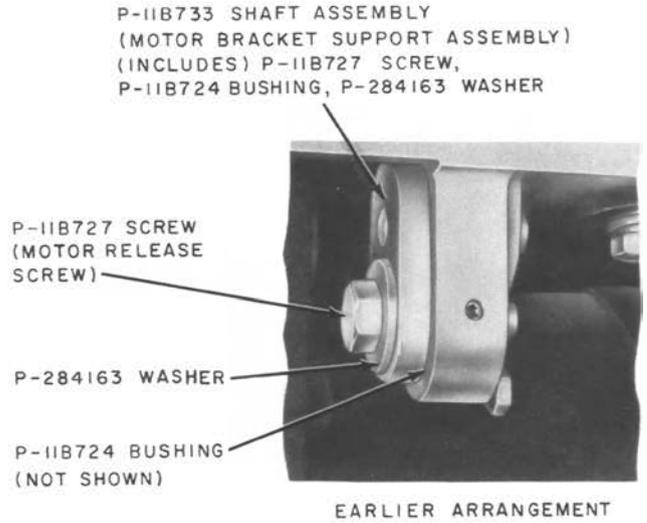


Fig. 3—Motor Bracket Support Assembly

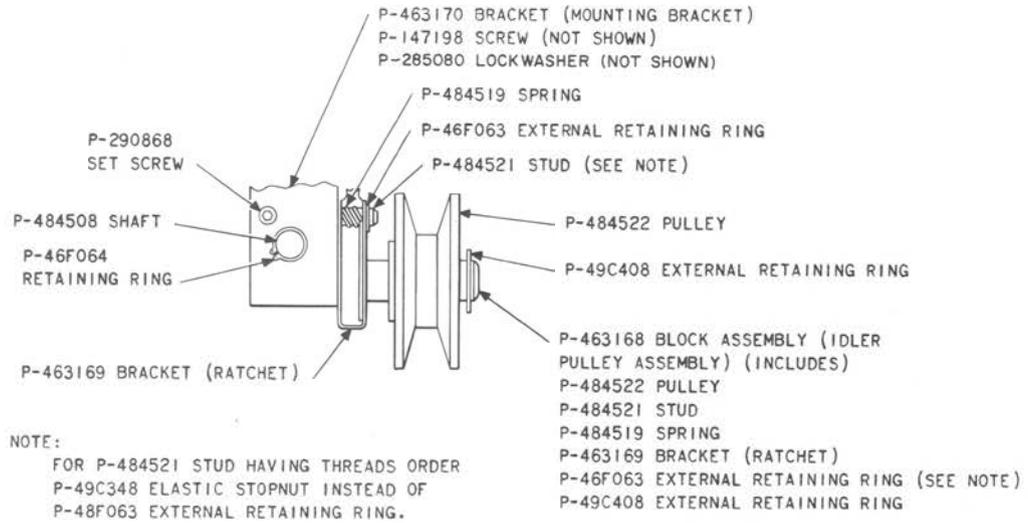
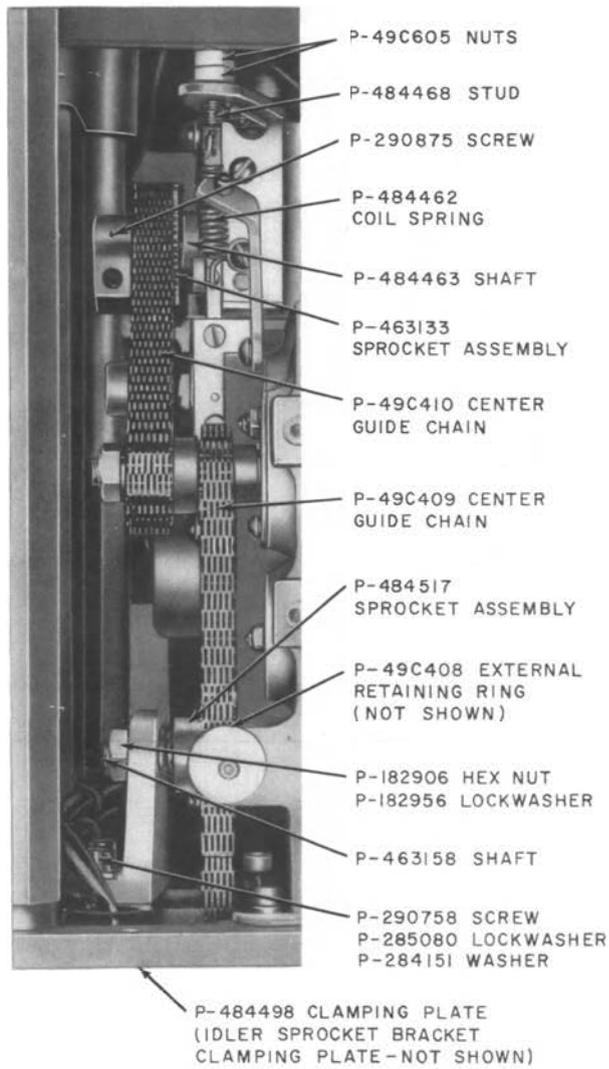


Fig. 4—Motor Belt Idler Pulley and Mounting Bracket



5—Drive Chains and Idler Sprocket (Guards Removed)

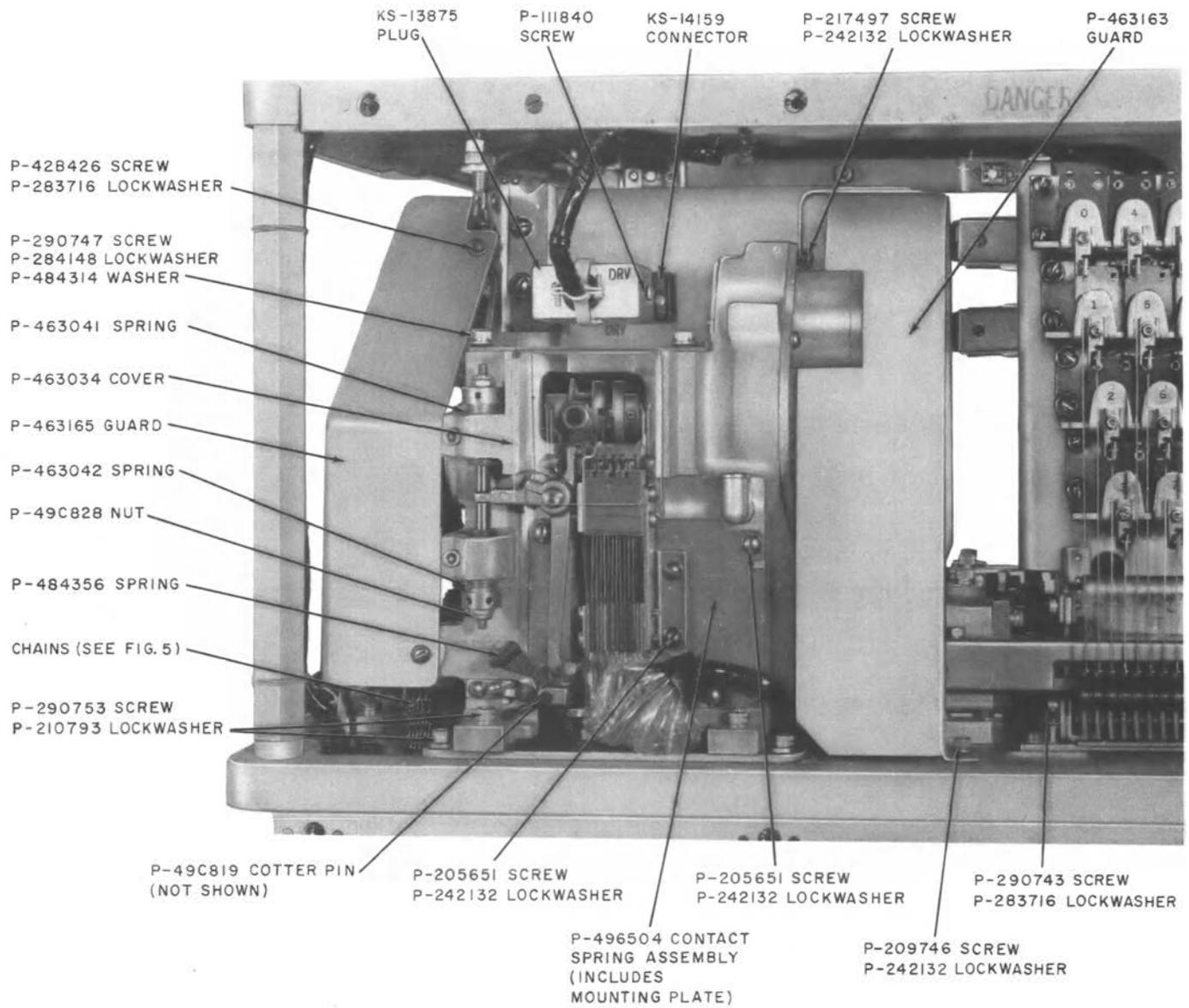


Fig. 6—KS-13906 Clutch Drive Assembly

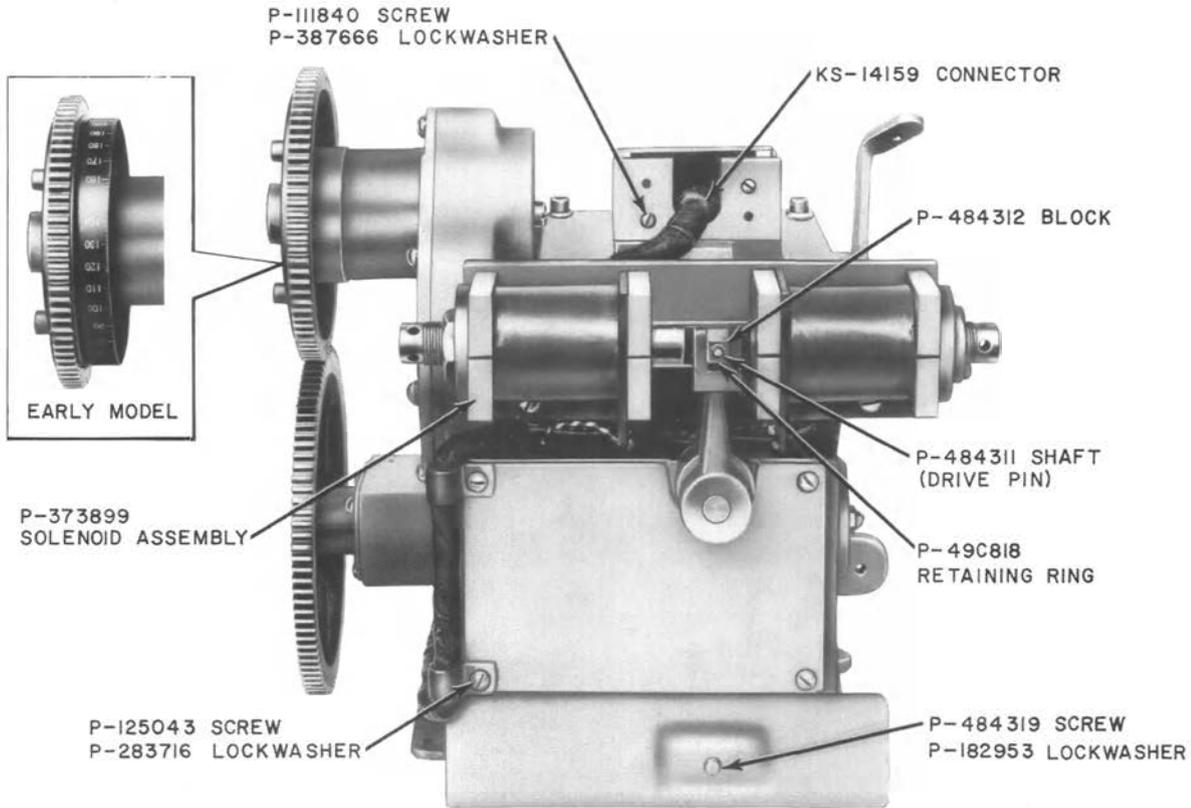
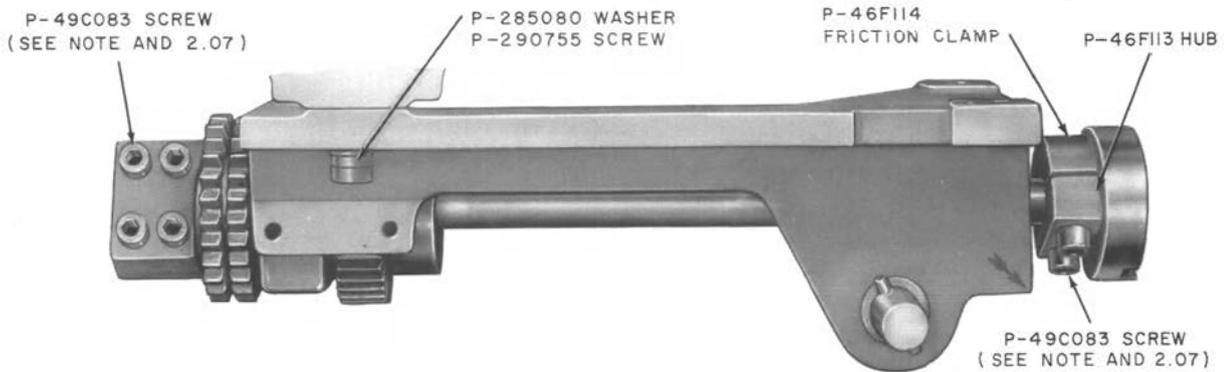


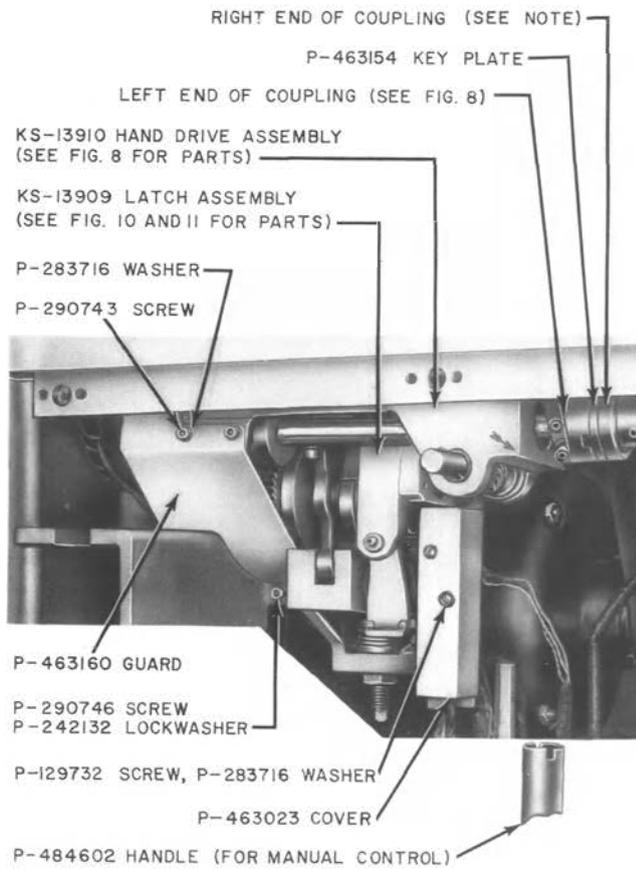
Fig. 7—KS-13906 Clutch Drive Assembly (Rear View)



NOTE:

CLAMP ASSEMBLIES INITIALLY PROVIDED (SEE 2.07) MAY BE ORDERED AS P-484165 CLAMP ASSEMBLY. WHERE THESE ARE USED, IF THE HUB IS TO BE REPLACED ORDER THE NEW HUB, FRICTION CLAMP AND SCREWS SHOWN IN THE FIGURE.

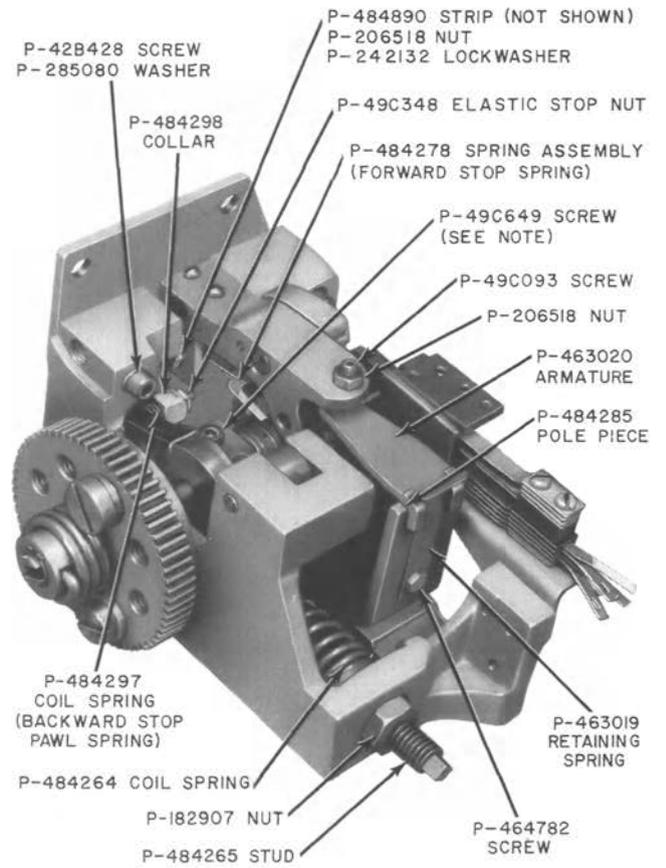
Fig. 8—KS-13910 Hand Drive Assembly



NOTE:

IF RIGHT END OF COUPLING REQUIRES REPLACEMENT ORDER P-46F113 HUB, P-46F114 FRICTION CLAMP, AND 2 P-49C083 SCREWS. THESE PARTS ALSO COMPRISE THE LEFT END OF COUPLING AS SHOWN IN FIG. 8.

Fig. 9—KS-13909 Latch Assembly, KS-13910 Hand Drive Assembly, and Associated Parts



NOTE:

ORDER P-484286 CLAMP ASSEMBLY WHERE REQUIRED (SEE 2.07)

Fig. 10—KS-13909 Latch Assembly

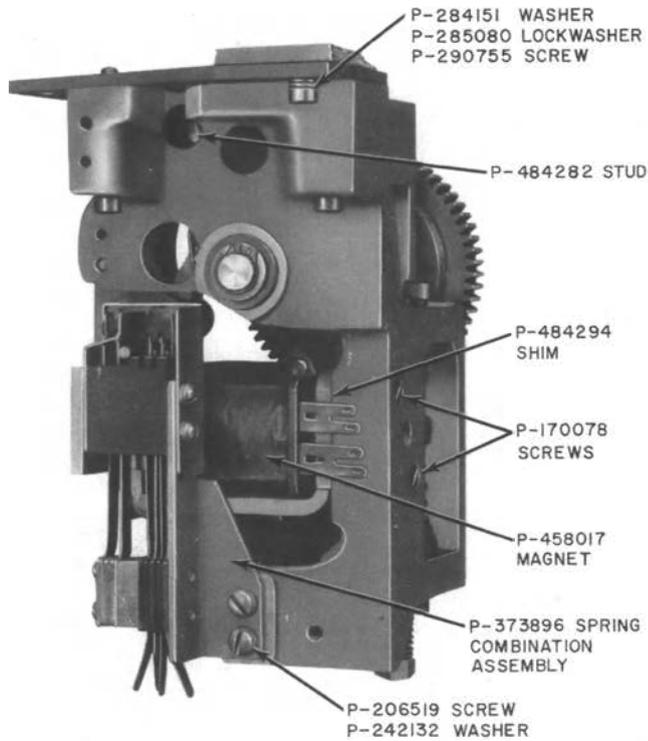


Fig. 11—KS-13909 Latch Assembly (Side View)

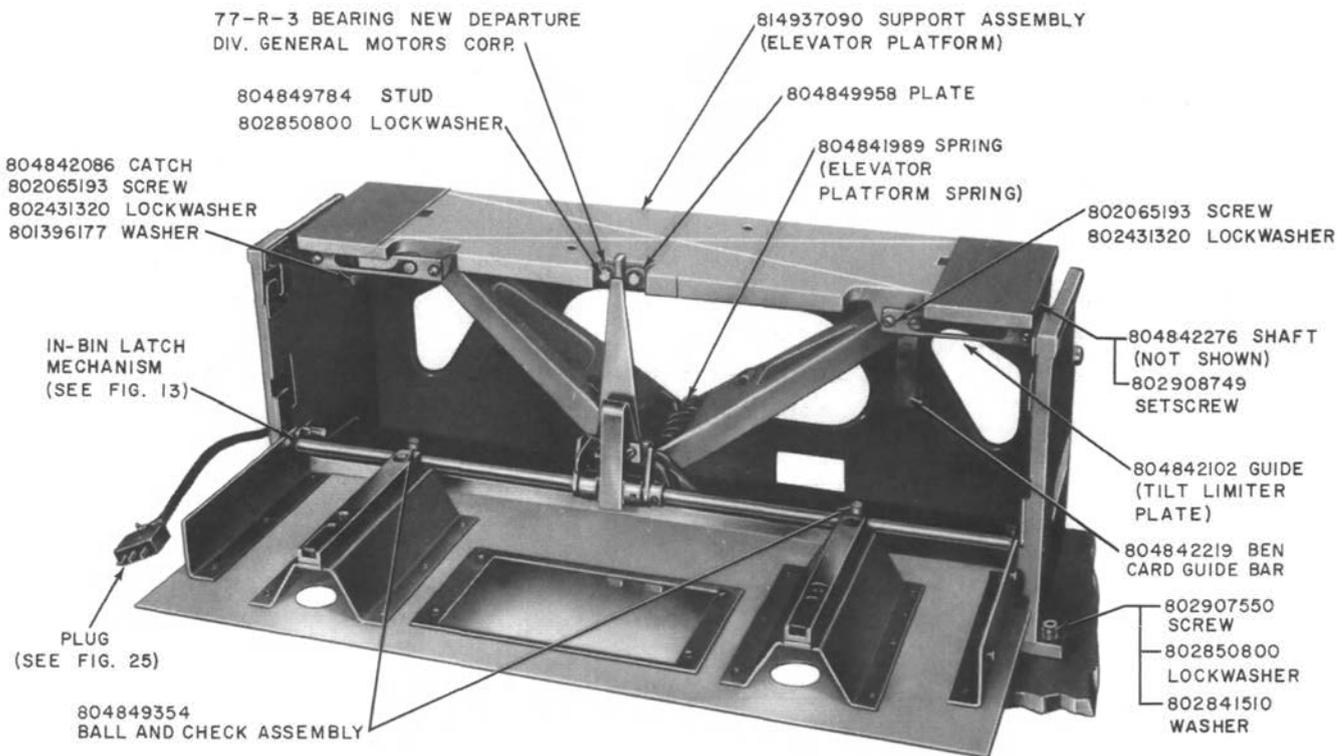


Fig. 12—KS-13907 In-Bin Assembly

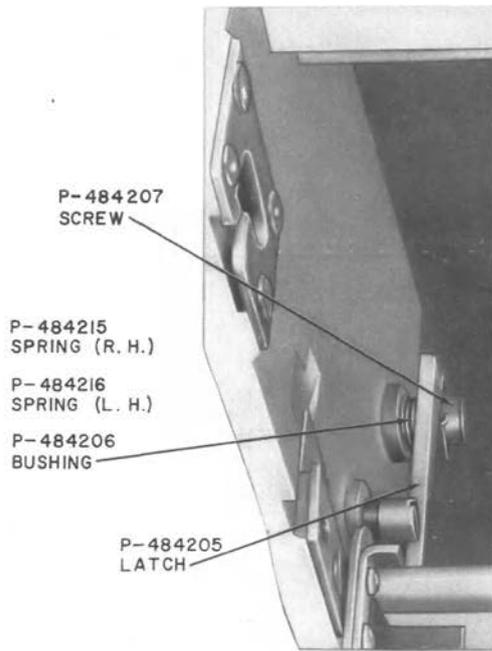


Fig. 13—In-Bin Latch Mechanism

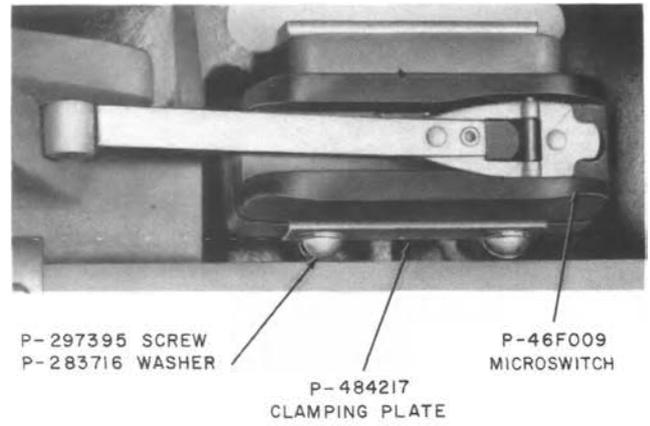


Fig. 14—In-Bin Microswitch

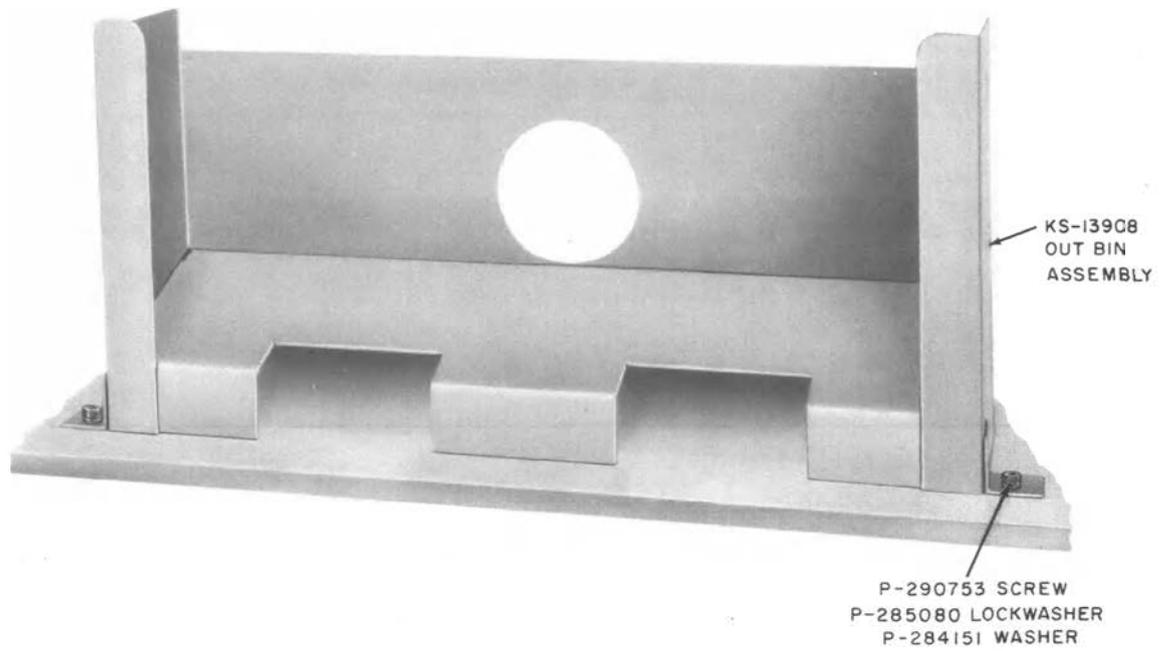
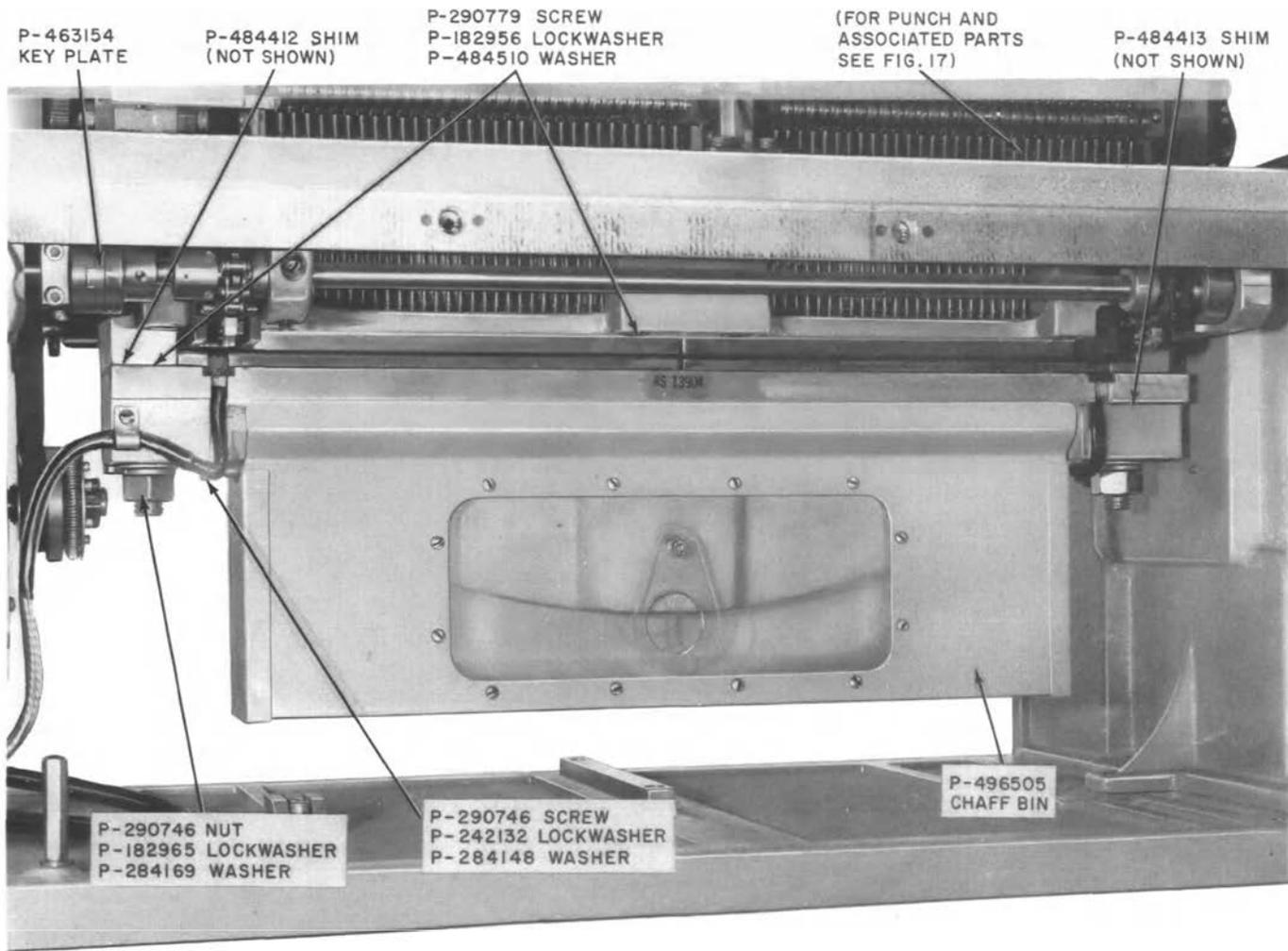


Fig. 15—KS-13908 Out-Bin Assembly (Later Production)



16—KS-13904 Punch and Card Feed Assembly and P-496505 Chaff Bin Mounted in Perforator (Front View)

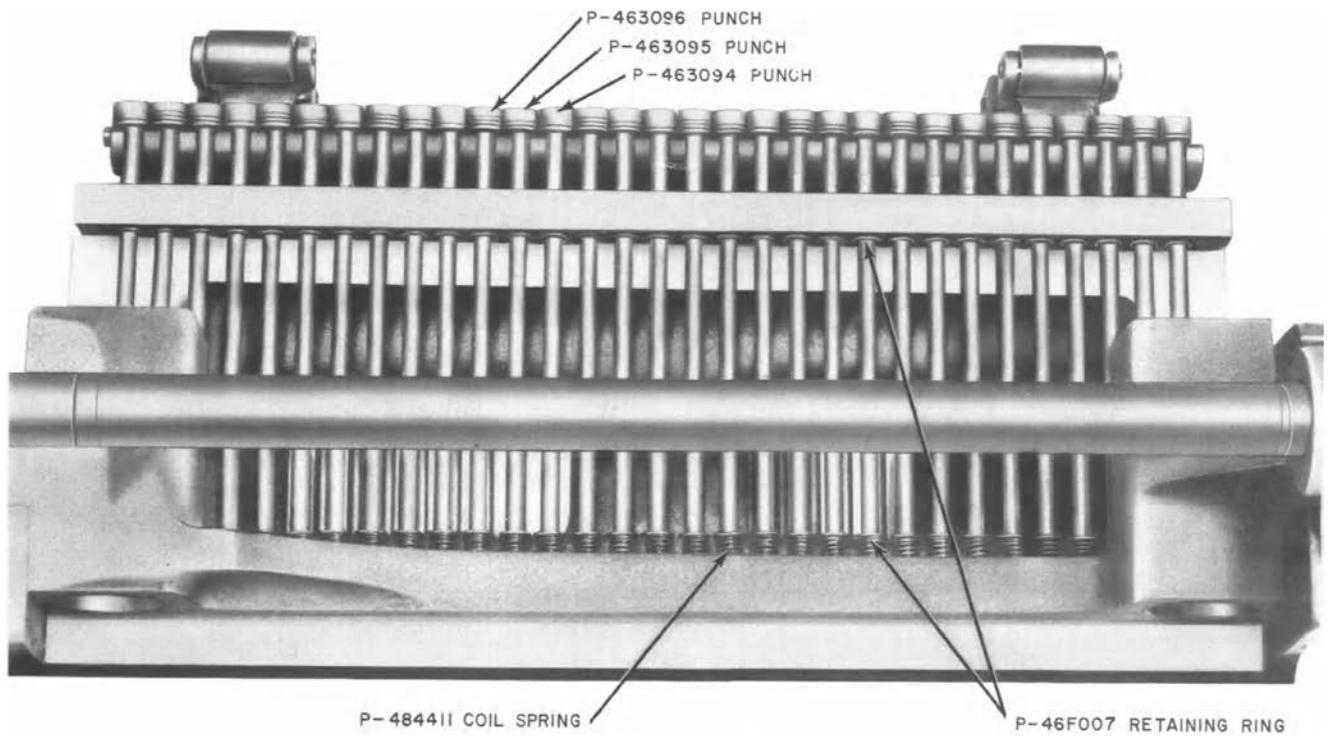


Fig. 17—KS-13904 Punch and Card Feed Assembly (Partial Front View)

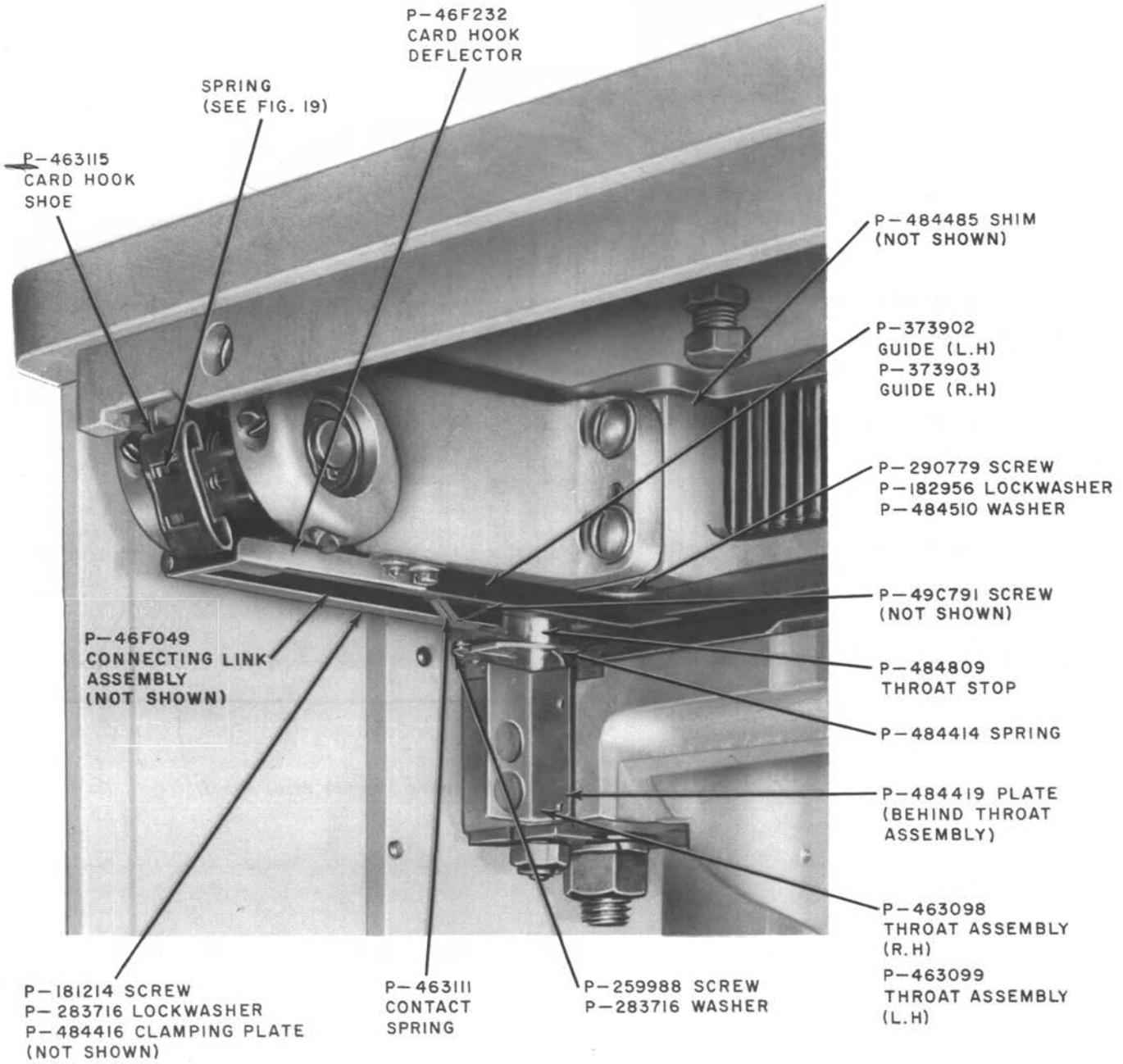
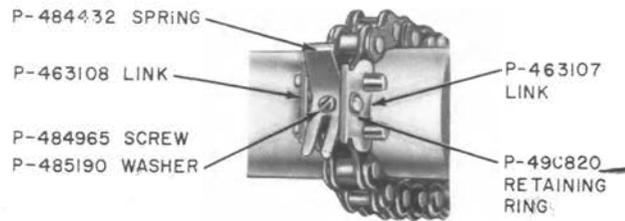
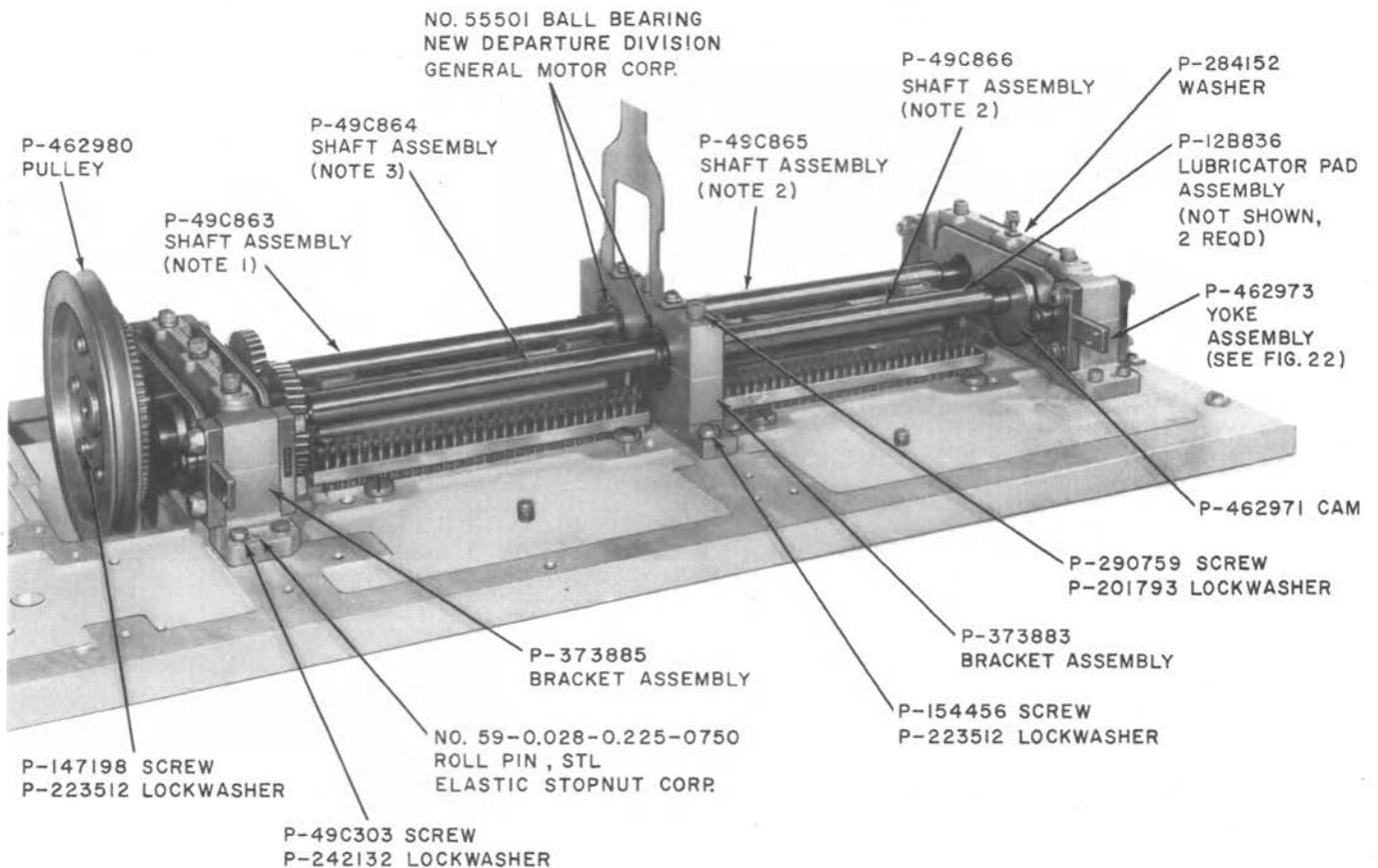


Fig. 18—KS-13904 Punch and Card Feed Assembly (Partial Rear View)



**Fig. 19—Card Hook Shoe Spring and Associated Parts
(Viewed from Rear of Perforator)**



NOTES:

1. INCLUDES SHAFT, 2 GEARS, CAM AND SPACER WHICH ARE NOT REPLACEABLE AS INDIVIDUAL PARTS.
2. INCLUDES SHAFT AND CAM WHICH ARE NOT REPLACEABLE AS INDIVIDUAL PARTS.
3. INCLUDES SHAFT, CAM AND GEAR WHICH ARE NOT REPLACEABLE AS INDIVIDUAL PARTS.

Fig. 20—KS-13902 Cam Drive Shaft Assemblies and Associated Parts

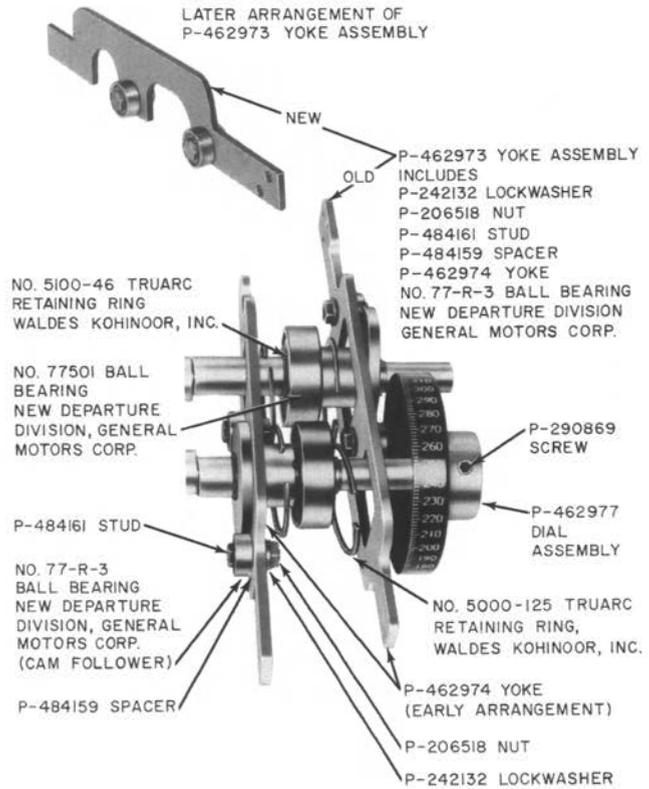
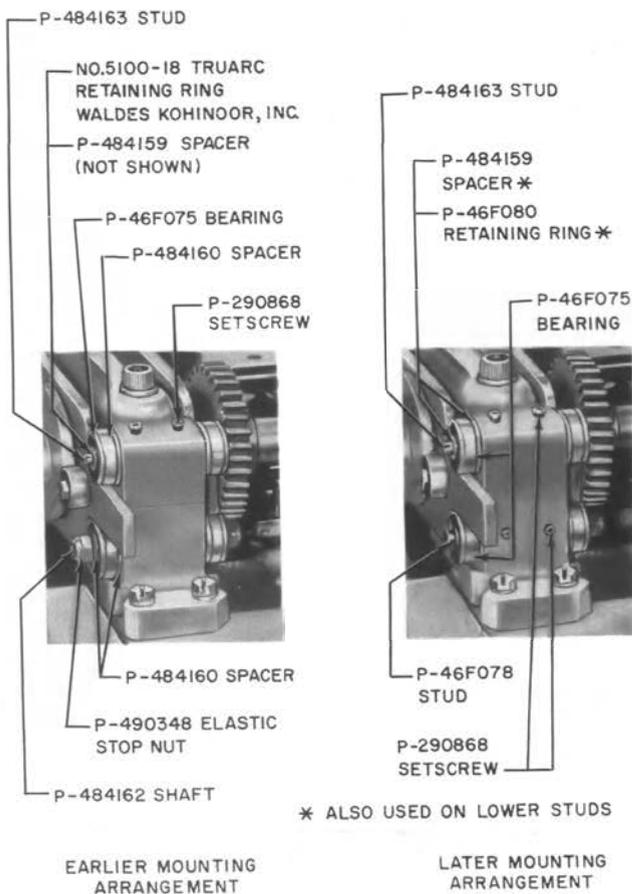


Fig. 22—Yoke Assembly and Associated Parts

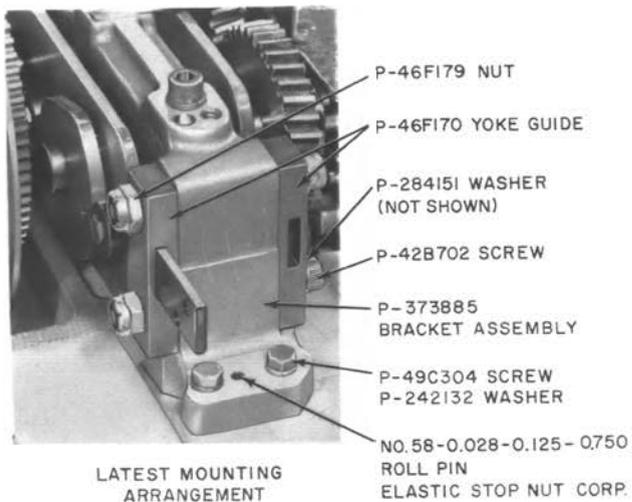


Fig. 21—Yoke Roller Guides and Associated Parts (2.08)

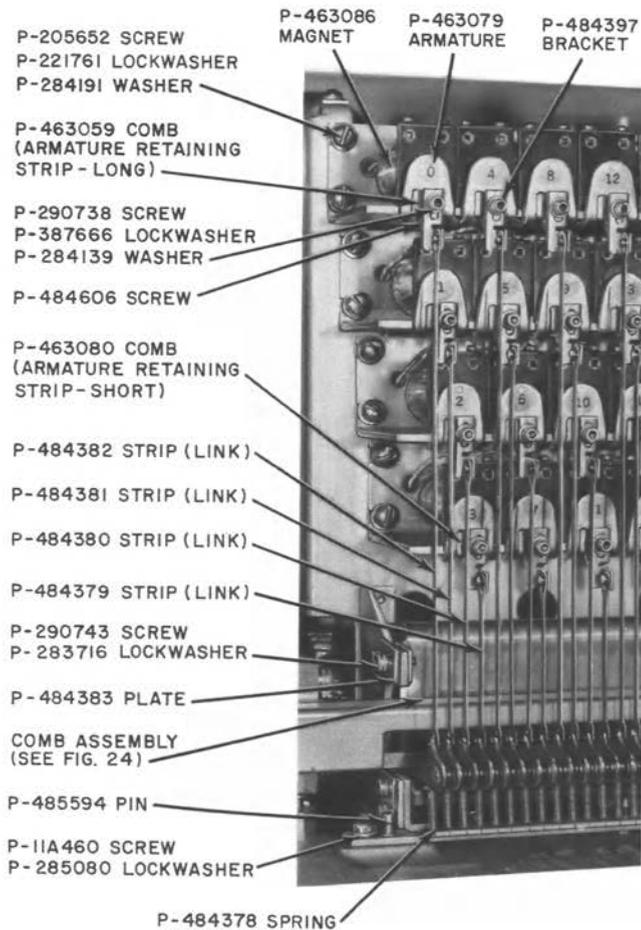


Fig. 23—Selector Assembly and Associated Parts

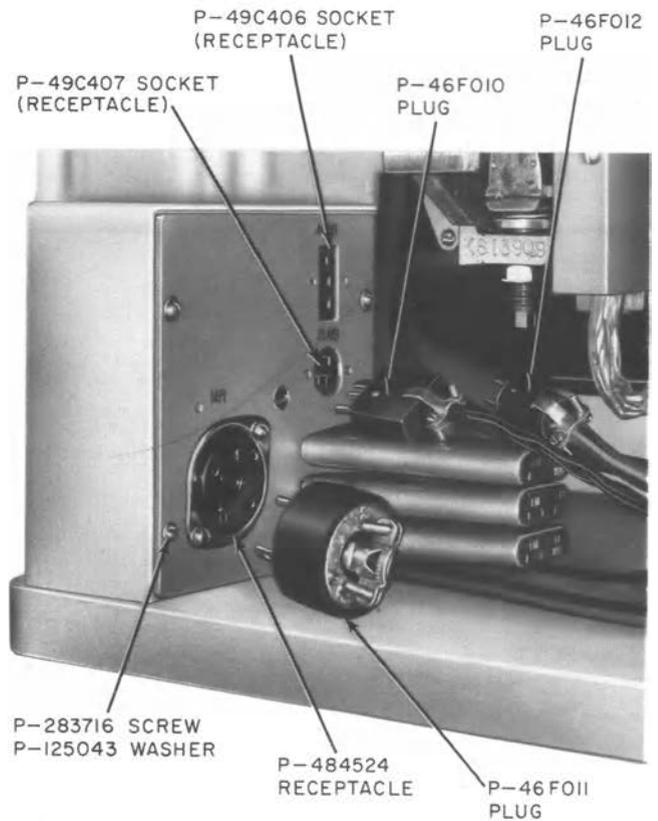


Fig. 25—Receptacles and Plugs

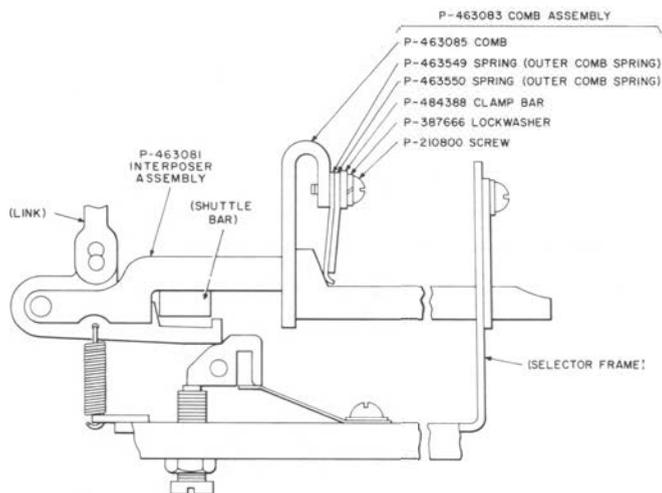


Fig. 24—Outer Comb Assembly and Associated Parts

SECTION 034-305-801

3. REPLACEMENT PROCEDURES

3.01 *List of Tools, Gauges, and Materials*

| CODE OR SPEC NO. | DESCRIPTION | | |
|---------------------|--|---------|--|
| | | R-1102 | Spudger |
| | | R-1378 | Numbering set |
| | | R-1455 | C clamp |
| | | R-1482 | H-type combination file |
| | | R-1770 | 1/2- and 9/16-inch double-end flat wrench |
| | | R-1497 | Self-locking rope hoist |
| | | | ◆On the replaced R-1546 1/4-ton chain hoist◆ |
| | | R-2485 | 5/32-inch hex socket screw wrench |
| | | R-2670 | 3/32-inch hex socket screw wrench |
| | | R-2670 | 3/32-inch hex socket screw wrench [modified per 3.67(3)] |
| | | R-2671 | 1/8-inch hex socket screw wrench |
| | | R-2672 | 1/4-inch hex socket screw wrench |
| | | R-2812 | 3/16-inch hex socket screw wrench |
| | | R-2958 | 5/64-inch hex socket screw wrench |
| | | R-2959 | 1/16-inch hex socket screw wrench |
| | | R-2964 | 7/32-inch hex socket screw wrench |
| | | R-2965 | Mirror |
| | | †R-2967 | 1/8-inch straight hex socket screw with handle |
| | | †R-2968 | 5/32-inch straight hex socket screw with handle |
| | | R-2975 | Snap ring pliers |
| | | R-3193 | 9/32- and 11/32-inch open double-end wrench (2 required) |
| | | R-3415 | 7/64-inch hex socket screw wrench |
| | | R-3415 | 7/64-inch hex socket screw wrench [modified per 3.67(3)] |
| | | R-3416 | 9/64-inch hex socket screw wrench |
| 236 | 9/16-inch open single-end offset wrench | | |
| 240 | Scriber | | |
| ◆276 | 1/4-inch hex single-end socket wrench◆ | | |
| 330B | Adjuster | | |
| 373 | Wrench | | |
| 417A | 1/4- and 3/8-inch open double-end flat wrench | | |
| 418A | 5/16- and 7/32-inch hex. open double-end flat wrench | | |
| 476A | 3/16-inch hex offset socket wrench | | |
| 485A | Smooth-jaw pliers | | |
| 486A | Oil can | | |
| 565A | 90-degree offset screwdriver | | |
| KS-6320 | Orange stick | | |
| ◆KS-8097 | 7/16- and 5/8-inch 12-point offset box wrench◆ | | |
| KS-8511 | 4-1/2 inch bent tweezers | | |
| KS-14164 | No. 4 brush | | |
| KS-14322 | Torque rod | | |
| KS-14335 | 7/16-inch open offset box wrench | | |
| KS-14336 | Screwdriver | | |
| KS-14474 | Dolly | | |
| KS-14475 | Cover | | |
| R-1005 | Jewelers screwdriver | | |

| | |
|---------|---|
| R-5850 | 5/8- and 3/4-inch open double-end offset wrench |
| R-81438 | Hoisting chain |
| — | 2-7/8 inch jewelers screwdriver No. 1017 Stanley tool |
| — | 5/16-inch socket wrench No. 3410 Stevens Walden, Inc |
| — | Combination pliers |
| — | No. 1002 bearing puller equipped with No. 1002-L1 single-end arms Owatonna Tool Company |
| — | 1/8-inch drive pin punch No. 565 L. S. Starrett Company |
| — | 4-ounce riveting hammer |
| — | Plastic tip hammer No. 91-PH Snap-On Tools Corp, Kenosha, Wisconsin (or equivalent) |
| — | E-0120 Truarc applicator, Waldes Kohinoor, Long Island City, N. Y. |
| — | 3-inch C screwdriver |
| — | 4-inch E screwdriver |
| — | B long-nose pliers |
| — | China marking pencil |
| — | 2- by 3- by 6-inch wood block (obtain locally) (2 required) |
| — | 1-1/4 by 6-1/2 inch wood block (obtain locally) |
| — | 1/2-inch brass or copper rod, 4 inches long (obtain locally) |
| — | 1/4-inch drill rod, 4 inches long (obtain locally) |

GAUGES

| | |
|---------|----------------------|
| R-8550 | 6-inch steel scale |
| KS-6938 | Thickness gauge nest |

MATERIALS

| | |
|-------------|-------------------------|
| R-2880 | Black stamping ink |
| KS-6824 | Sealing compound |
| KS-7470 | Oil |
| KS-14614 | Antiseize compound |
| KS-16832 L2 | Lubricant |
| KS-19139 L1 | Lubricant |
| KS-19578 L1 | Trichloroethane |
| — | No. 6 waxed twine |
| — | 22-gauge insulated wire |

†The R-2967 and R2968 straight hex socket screw wrenches with handle are intended to supplement the hex socket screw wrenches specified herein when parts are difficult to get at or when sufficient torque cannot be developed using the hex socket screw wrenches.

3.02 Where reference is made in the procedures for the use of a hex socket screw wrench, select the proper size hex socket screw wrench from among the hex socket screw wrenches listed in 3.01.

3.03 Before removing the outer covers or making any replacement of parts on an in-service perforator, make the perforator busy in accordance with 1.06. Prevent injury due to automatic starting of the perforator by removing the MP and CONT connectors in the order specified and conditioning the perforator to the home position in accordance with Section 034-305-701.

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

3.05 After making any replacement of parts on a KS-13834 L1 perforator, the replaced part(s) shall meet the associated readjustment requirements as specified in Section 034-305-701. The adjustment of other related parts which may have been disturbed by the replacing operation shall be checked to the associated readjustment requirements. Also, an overall operation check shall be made before restoring the perforator to service.

SECTION 034-305-801

3.06 Unless otherwise specified, apply KS-14614 antiseize compound on all screws before assembling into threaded holes in aluminum.

3.07 Before replacing any perforator part(s), refer to Section 034-305-701 to determine the lubrication requirement for the part. When lubrication of a new part is required but the information is not provided in Section 034-305-701, the part replacement procedure specifies the lubrication. The part should be lubricated prior to perforator assembly. Where part lubrication prior to perforator assembly is not possible, make sure that the parts are lubricated in accordance with Section 034-305-701 after assembly in the perforator. Check and make sure that the lubricant has not been removed by handling. Relubricate as required.

PERFORATOR OUTER COVERS

3.08 The covers that enclose the perforator unit must be removed for access to the mechanism.

3.09 When the in-bin is mounted in the perforator, take care that the rise of the elevator platform is always checked by the weight of at least 1/2 pack of cards and restrain the latching mechanism by using the hands to prevent sudden upward release of the platform. A lack of caution may result in damage to the throats and other parts of the in-bin mechanism.

MOTOR, PULLEY ASSEMBLY, AND ASSOCIATED PARTS

3.10 Motor Belt: To replace the motor belt (Fig. 26), proceed as follows.

- (1) Remove the gear and pulley guard mounted on the left side of the cam switch using a hex socket screw wrench.
- (2) Release the take-up bracket lever located to the immediate right of the take-up bracket and slide the idler pulley forward to release the tension on the drive belt.
- (3) Push the motor inward until the tension on the motor pulley is released. Support the motor in this position.
- (4) Slide the motor belt over the side of the eccentric camshaft pulley.
- (5) Remove the belt from the motor pulley.

- (6) Mount the replacement belt in reverse order of removal.
- (7) Reposition the idler pulley take-up bracket to remove the motor belt slack.
- (8) Remount the gear and pulley guard.

3.11 Motor: To replace the motor (Fig. 26 and 27), proceed as follows.

- (1) Remove the motor belt in accordance with 3.10.
- (2) If the perforator is arranged with a spring support arm, proceed as follows.
 - (a) Hold the spring support arm in place.
 - (b) Pull out and downward on the ringed handle to release the handle from the arm.
- (3) Remove the motor mounting screw and two washers from the right side of the motor support bracket using the R-1770 wrench or hex socket screw wrench.
- (4) Using the R-2975 pliers, remove the retaining ring from the right side of the right motor support shaft (pin).
- (5) If a shaft (pin) is provided at the left side of the motor support bracket, remove the retaining ring from the right side of the shaft using the R-2975 pliers.
- (6) If two motor bracket support assemblies arranged with knobs are provided, proceed as follows.
 - (a) Loosen the motor release setscrews using a hex socket screw wrench
 - (b) Pull out the motor bracket release knob sufficiently to release the motor bracket.
- (7) If the left side of the motor bracket is supported by an earlier arrangement of the motor bracket support assembly (Fig. 27), proceed as follows.
 - (a) Loosen the motor release pin setscrew using a hex socket screw wrench

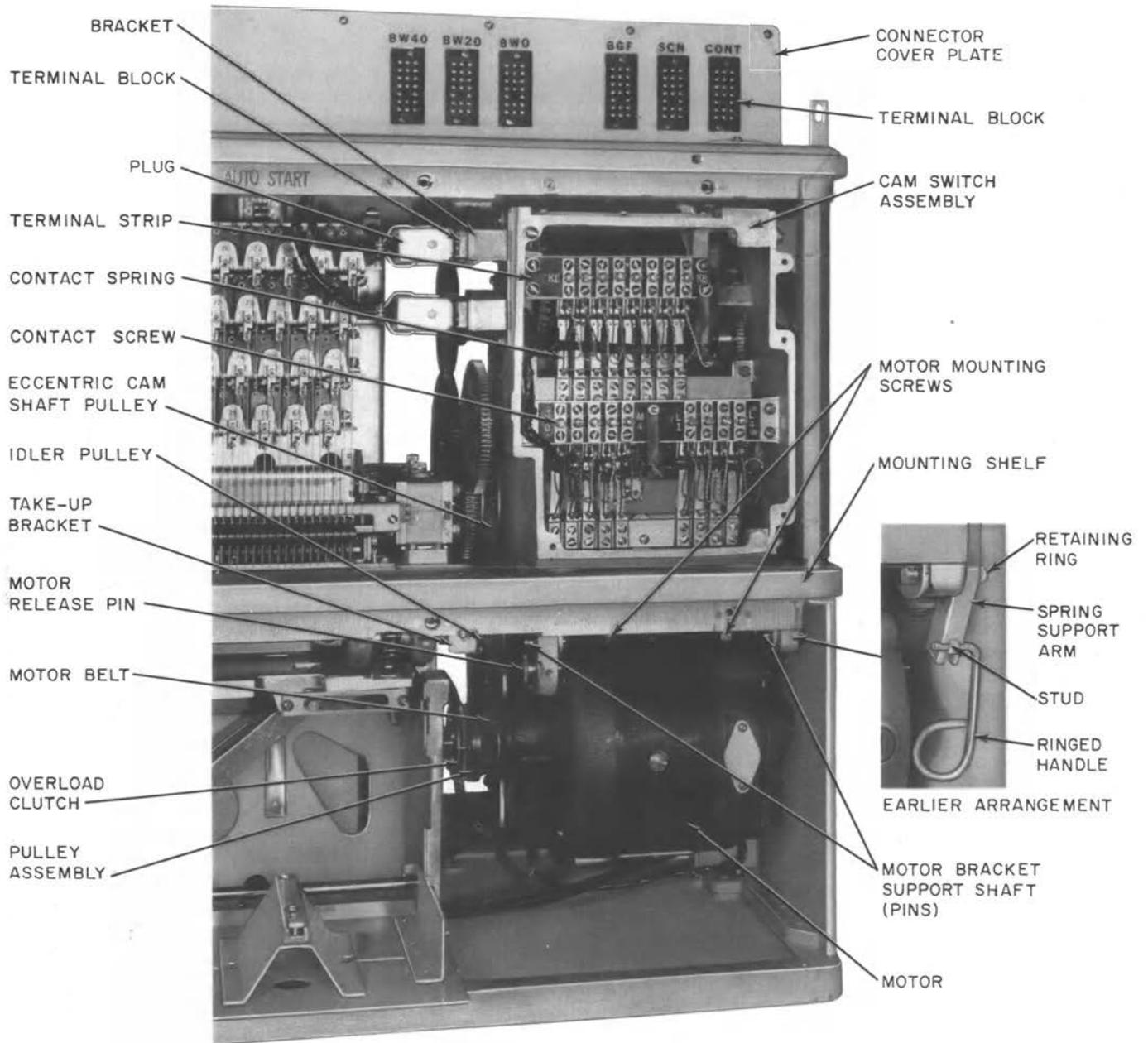
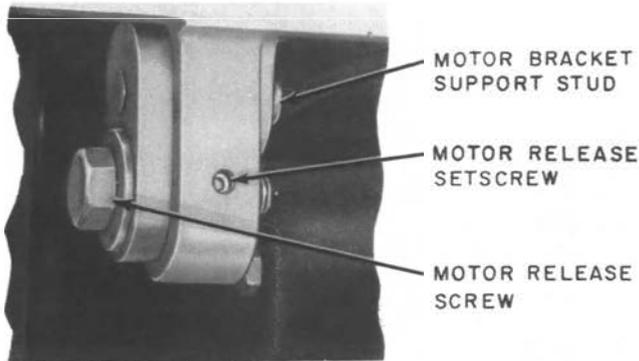
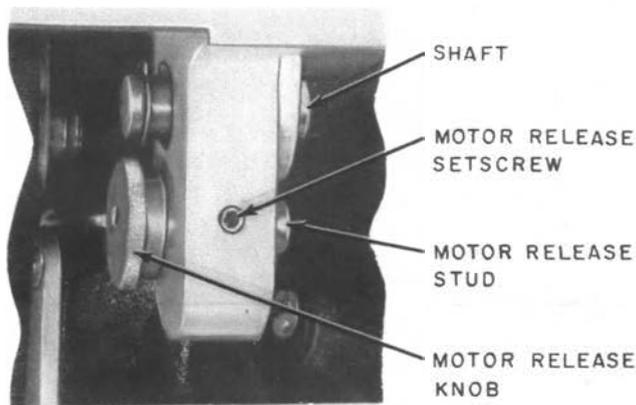


Fig. 26—KS-13834 L1 Perforator (Rear View with Covers and Rear Guards Removed)



EARLIER ARRANGEMENT
(REPLACEMENT FOR MOTOR
SUPPORT STUD WITHOUT BUSHING)



LATER ARRANGEMENT

Fig. 27—Motor Bracket Support Assembly

- (b) Remove the motor release screw using a 236 wrench.
- (8) Allow the motor to swing forward.
- (9) From the front of the perforator, disconnect the motor plug from the MP1 plug receptacle.
- (10) Support the motor and remove the right motor support shaft and the spring support shaft arm if provided.
- (11) Remove the left support shaft and the plate with the motor bracket support stud.
- (12) Remove the motor and pulley assembly.

- (13) Transfer the motor bracket to the replacement motor using a hex socket screw wrench. Omit the screw from the right front mounting hole.
- (14) If the pulley assembly is secured on the motor shaft by means of two setscrews, proceed as follows.
 - (a) Loosen the setscrews using a hex socket screw wrench.
 - (b) Remove the pulley assembly.
 - (c) Transfer the pulley to the replacement motor shaft.
 - (d) Mount the pulley so that the setscrews in the hub will engage the flats on the motor shaft.
 - (e) Position the pulley so that there is a clearance of approximately 0.035 inch between the hub of the pulley and the motor housing.
 - (f) Check the clearance adjacent to the motor shaft using the KS-6938 thickness gauge nest.
 - (g) Securely tighten the setscrews.
- (15) If the pulley assembly is pinned to the motor shaft, proceed as follows.
 - (a) Drive out the roll pin using the 1/8-inch pin punch and 4-ounce riveting hammer.
 - (b) Remove the pulley.
 - (c) Mount a replacement pulley assembly on the shaft of the replacement motor in accordance with (14)(d) through (g).
- (16) Support the replacement motor so that the associated holes in the motor bracket and casting are in alignment.
- (17) Insert the right motor bracket support shaft.
- (18) Insert the left motor bracket support shaft or the stud in the plate of the motor bracket support assembly.

Note: If the stud arrangement is provided, make sure that the notches in the plate engage the projections on the bushings in the castings and securely tighten the motor release screw.

- (19) Tighten the motor release setscrew(s).
- (20) Remount the spring support arm on the right motor support shaft as required.
- (21) Remount the motor support spring on the spring support arm as required.
- (22) Remount the retaining rings.
- (23) Insert and securely tighten the motor mounting screw on the right side of the motor bracket and make sure both washers are in place.
- (24) Remount the motor belt in accordance with 3.10.

3.12 Pulley Assembly: To replace the pulley assembly (Fig. 26, 27, and 28), proceed as follows.

- (1) Remove the motor belt in accordance with 3.10.
- (2) If the perforator is arranged with a spring support arm, proceed as follows.
 - (a) Hold the spring support arm in place.
 - (b) Pull out and downward on the ringed handle to release the handle from the arm.
- (3) If two motor bracket support assemblies arranged with knobs are provided, proceed as follows.
 - (a) Loosen the motor release pin setscrews using a hex socket screw wrench.
 - (b) Pull out the motor bracket release knob sufficiently to release the motor bracket.
 - (c) Allow the motor to swing forward until the motor studs lock the motor in the forward position.

(4) If the left side of the motor bracket is supported by the earlier arrangement equipped with a motor release screw, proceed as follows.

- (a) Loosen the motor release pin setscrew using a hex socket screw wrench.
 - (b) Remove the motor release screw using the 236 wrench.
 - (c) Allow the motor to swing forward.
 - (d) Temporarily remount the motor release setscrew to hold the motor in the forward position.
- (5) If the pulley assembly is secured on the motor shaft by means of two setscrews, proceed as follows.

- (a) Remove the two setscrews using a hex socket screw wrench.
- (b) Remove the pulley assembly.

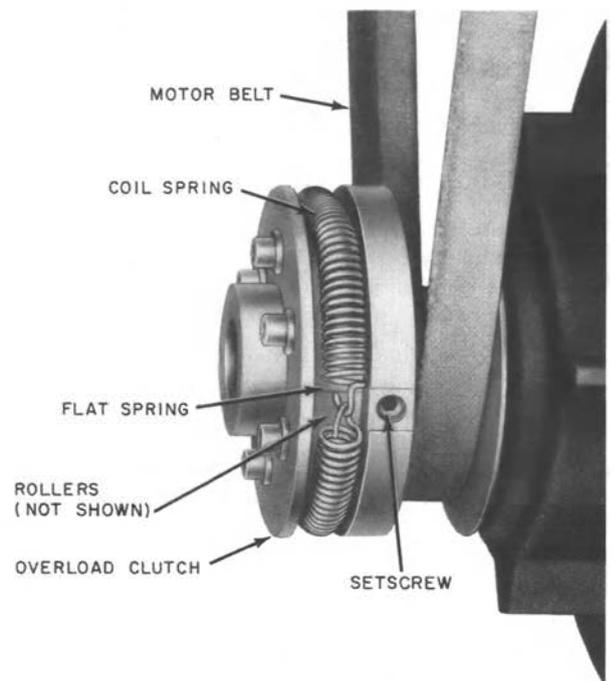


Fig. 28—Pulley Assembly

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- (6) If the pulley assembly is pinned to the shaft, proceed as follows.
 - (a) Drive out the roll pin using the 1/8-inch drive pin punch and 4-ounce riveting hammer.
 - (b) Remove the pulley assembly.
- (7) Mount the replacement pulley so that the setscrews in the hub will engage the flats on the motor shaft.
- (8) Position the pulley so that there is a clearance of approximately 0.035 inch between the hub of the pulley and the motor housing.
- (9) Check the clearance adjacent to the motor shaft using the KS-6938 thickness gauge nest.
- (10) Securely tighten the setscrews.
- (11) Restore the motor to operating position.
- (12) Remount the motor belt in accordance with 3.10.

3.13 Overload Clutch Coil Spring: To replace the overload clutch coil spring (Fig. 28), proceed as follows.

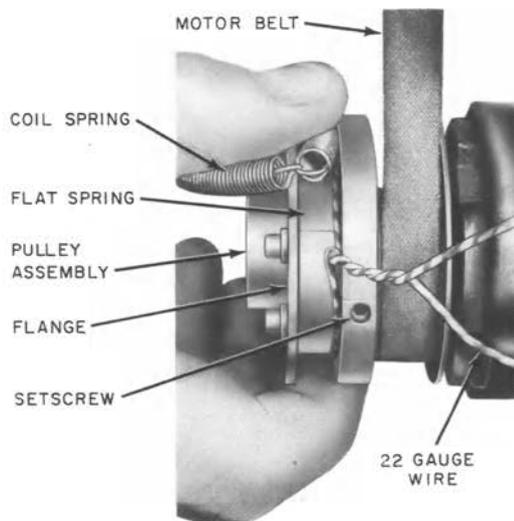
- (1) Rotate the pulley assembly until the coil spring hooked ends are accessible.
- (2) Wrap a piece of 22-gauge insulated wire around the clutch to the right of the coil spring as shown in Fig. 29.
- (3) Twist the ends of the wire uptight to hold the flat spring in place while replacing the coil spring in place.
- (4) Place the left hand under the pulley assembly, and apply light pressure against the coil spring to prevent the spring from getting out of control while unhooking the spring ends with the P long-nose pliers.
- (5) Hook the free ends of the replacement coil spring together.
- (6) Place the spring hooked ends on top of the flat spring and, while holding the hooked

ends in this position, roll the remainder of the coil spring over the side of the clutch flange and into position.

- (7) Remove the wire from the clutch.

3.14 Overload Clutch Flat Spring and Rollers: To replace the flat spring or rollers (Fig. 28), proceed as follows.

- (1) Rotate the pulley assembly until the coil spring hooked ends are accessible.
- (2) Place the left hand under the clutch assembly and apply light pressure with the fingers against the coil spring.
- (3) Carefully unhook the coil spring using the P long-nose pliers which will permit the coil, the flat springs, and the bottom three rollers to drop into the hand.
- (4) Remove the remaining three rollers and flat spring by rotating the pulley assembly.
- (5) Replace parts as required and make sure that the rollers are adequately lubricated with KS-19139 lubricant.
- (6) To reassemble, position the three top rollers and make sure that they are properly seated.
- (7) Place the central portion of the flat spring over the three rollers.
- (8) While holding the spring and three rollers in place with the fingers, rotate the pulley assembly so that the rollers are at the bottom.
- (9) Insert the remaining three rollers and wrap the flat spring around them, overlapping the ends of the spring.
- (10) Wrap a piece of 22-gauge insulated wire around the clutch, as shown in Fig. 29, to hold the flat spring in place.
- (11) Remount the coil spring in accordance with 3.13.
- (12) Apply a film of KS-7470 oil to the coil spring and the adjacent surfaces of the overload clutch in accordance with Section 034-305-701.



29—Method of Mounting Overload Clutch Spring

3.15 Motor Bracket Support Assembly:

To replace the motor bracket support assembly (Fig. 27) supporting pin, proceed as follows.

Note: As initially manufactured, the left side of the motor mounting bracket was supported by a stud mounted directly in a hole in the casting. The stud is held in position by retaining rings. On later production models, a bushing is provided in the casting to serve as a bearing for the stud which should eliminate the necessity for replacement. The stud without a bushing at the left side of the motor bracket together with the associated motor release setscrew may be replaced by the motor bracket support assembly shown in Fig. 27.

- (1) If no bearing for the stud is provided, loosen the motor release pin setscrew using a hex socket screw wrench and remove the motor release screw.
- (2) Remove the retaining ring from the right side of the motor bracket support stud using the R-2975 pliers.
- (3) While supporting the motor with the right hand, remove the support stud from the left side of the casting.
- (4) Lower the motor so that it is supported by the belt.

- (5) Position the bushing on the motor release screw so that the projections on the bushing engage the notches in the assembly plate.
- (6) Tighten the motor release screw finger tight.
- (7) Position the motor so that the associated holes in the motor bracket and casting are aligned.
- (8) Mount the assembly with the motor bracket support stud inserted in the upper hole of the casting and the bushing on the motor release screw in the larger hole directly below.
- (9) Push the assembly inward until the plate is against the side of the casting and release the motor.
- (10) Securely tighten the motor release screw using the 236 wrench.
- (11) Tighten the setscrew in the casting using a hex socket screw wrench.

3.16 Idler Pulley Assembly: To replace the idler pulley assembly, proceed as follows.

- (1) Remove the motor belt in accordance with 3.10.
- (2) Remove the outer retaining ring from the shaft passing through the mounting bracket using the R-2975 pliers.
- (3) Push the shaft inward as far as possible with the R-1102 spudger and remove the inner retaining ring from the shaft.
- (4) Remove the assembly by pulling the shaft forward through the hole in the mounting bracket.
- (5) Position the replacement assembly with the pulley facing the motor and the holes in the mounting block in line with the holes in the mounting bracket.
- (6) Reinsert the shaft and mount the inner and outer retaining rings.
- (7) Remount the motor belt in accordance with 3.10.

3.17 Idler Pulley: To replace the idler pulley, proceed as follows.

- (1) Remove the idler pulley assembly in accordance with 3.16.
- (2) Remove the retaining ring from the idler pulley shaft using the R-2975 pliers.
- (3) Remove the pulley.
- (4) Mount the replacement pulley and pulley retaining ring.
- (5) Remount the idler pulley assembly in accordance with 3.16.

3.18 Idler Pulley Ratchet and Spring: To replace the idler pulley ratchet or spring, proceed as follows.

Note: As initially manufactured, the stud which mounts the idler pulley ratchet and spring was a hexagon head threaded stud secured in position by an elastic stopnut. On later production models, a headless stud without threads was provided. This stud, shown in Fig. 4, is secured in position by a setscrew and an external retaining ring.

(a) **Ratchet or Spring**

- (1) Remove the idler pulley in accordance with 3.17.
- (2) Proceed to (b) or (c) as applicable.

(b) **Stud With Elastic Stopnut**

- (1) Remove the elastic stopnut using the 418A wrench and 4-inch E screwdriver.
- (2) Disengage the ratchet spring from the block and remove the stud.
- (3) Remove the ratchet and spring.
- (4) Substitute replacement parts as required.
- (5) Position the spring in the ratchet channel in line with the holes for the stud with the short projection of the spring to the left and the long projection downward when facing the channel.

(6) Insert the stud from the right through the hole in the ratchet and the coils of the spring.

(7) Mount the stud in the idler pulley block from the pulley shaft end of the block and insert the end of the spring in the block hole.

(8) Mount the elastic stopnut and tighten sufficiently to allow the ratchet to move without binding.

(9) Remount the pulley in accordance with 3.17.

(10) Remount the idler pulley assembly in accordance with 3.16.

(c) **Stud With External Retaining Ring**

(1) Remove the retaining ring at the end of the stud using the R-2975 pliers.

(2) Disengage the ratchet spring from the block and remove the ratchet and spring.

(3) Substitute replacement parts as required.

(4) Position the spring in the ratchet channel in line with the holes for the stud with the short projection of the spring to the left and the long projection downward when facing the channel.

(5) Mount the ratchet and spring on the stud and insert the end of the spring in the hole in the block.

(6) Remount the retaining ring.

(7) Remount the pulley in accordance with 3.17.

(8) Remount the idler pulley assembly in accordance with 3.16.

3.19 Idler Pulley Mounting Bracket (Includes Ratchet Teeth): To replace the idler pulley mounting bracket, proceed as follows.

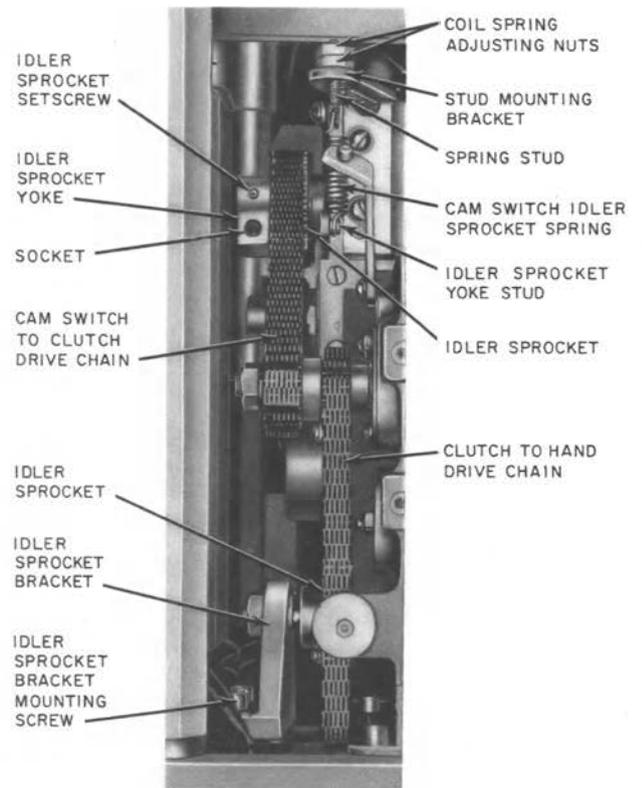
- (1) Remove the idler pulley assembly in accordance with 3.16.

- (2) Remove the bracket using the 3-inch C screwdriver.
- (3) Mount the replacement bracket with the narrow end to the front of the projector.
- (4) Securely tighten the mounting screws and make sure the washers are in place.
- (5) Remount the idler pulley assembly in accordance with 3.16.

DRIVE CHAINS AND IDLER SPROCKET

3.20 Cam Switch to Clutch Drive Chain and Idler Sprocket: To replace the idler sprocket (Fig. 30) and drive chain, proceed as follows.

- (1) Remove the drive chain guard using a hex socket screw wrench.
- (2) Release the tension on the drive chain by removing the coil spring adjusting nuts from the cam switch idler sprocket spring stud using the R-1770 and the 236 wrenches.
- (3) Remove the spring and yoke stud.
- (4) Loosen the idler sprocket setscrew using a hex socket screw wrench.
- (5) Support the sprocket to prevent it from falling, and slide the idler sprocket shaft to the left sufficiently to clear the sprocket. To facilitate sliding the sprocket shaft, apply the R-1102 spudger to the inner end of the shaft.
- (6) Remove the sprocket.
- (7) If only the sprocket is to be replaced, substitute the replacement sprocket and proceed to (14).
- (8) If the chain is to be replaced, remove the chain from the clutch drive sprocket.
- (9) Slide the free portion of the chain through to the cam switch side of the frame.
- (10) Remove the chain from the cam switch sprocket.



30—Drive Chains and Cam Switch Idler Sprocket Spring (Guards Removed)

- (11) Grasp the chain at both ends, turning the lower portion on its side and slide this portion up between the cam switch socket and the frame.
- (12) Remove the chain.
- (13) Substitute the replacement chain, reassembling all parts in the reverse order of removal.
- (14) Hook the free end of the spring to the idler sprocket yoke before mounting the spring stud.
- (15) Position the stud in the hole provided in the stud mounting bracket.
- (16) Insert the KS-14322 torque rod into the socket in the idler sprocket yoke.
- (17) Apply sufficient upward pressure on the rod to permit mounting the adjusting nuts on the spring stud.

- (18) Adjust chain tension in accordance with Section 034-305-701.
- (19) Remount the drive chain guard.

3.21 Clutch Drive to Hand Drive Chain:

To replace the hand drive chain (Fig. 30), proceed as follows.

- (1) Remove the cam switch to clutch drive chain in accordance with 3.20.
- (2) Remove the hand drive gear and chain guard using a hex socket screw wrench.
- (3) Loosen the idler sprocket bracket mounting screws using a straight hex socket screw wrench with handle.
- (4) Pull the bracket forward to release the chain tension.
- (5) Disengage the chain from the hand drive sprocket and remove the chain.
- (6) Substitute the replacement chain, placing it on the hand drive sprocket.
- (7) Slide the idler bracket to the innermost position and tighten the mounting screws finger tight.
- (8) Check by eye that the faces of the idler sprocket and associated sprockets are within 1/16-inch alignment.
- (9) Adjust the idler sprocket bracket as required.
- (10) Remount the hand drive gear and chain guard.
- (11) Reassemble the clutch drive to cam switch chain in accordance with 3.20.

KS-13906 Clutch Drive Assembly

3.22 General: The clutch drive assembly consists of two parts: the clutch drive unit and the clutch drive assembly mounting plate. When replacing a clutch drive assembly, it may be necessary to replace both the clutch drive unit and the mounting plate in accordance with 3.23. If a part on the clutch drive unit is to be replaced, it may be necessary to remove the clutch drive unit.

3.23 KS-13906 Clutch Drive Assembly:

To replace the clutch drive assembly (Fig. 31), proceed as follows.

- (1) Disconnect the DRV plug.
- (2) Remove the drive chain guards using a hex socket screw wrench.
- (3) Remove the drive chains in accordance with 3.20 and 3.21.

Note: Complete removal of the drive chains from the cam switch and hand drive sprockets is not necessary.

- (4) Remove the three clutch drive unit mounting screws.
- (5) Remove the screw located under the rear of the clutch drive unit just above the mounting plate using the 4-inch E screwdriver.
- (6) Remove the two screws in the front of the unit using a hex socket screw wrench.
- (7) Slide the clutch drive unit out to clear the locating pin and flange on the gear of the mounting plate.
- (8) Remove the unit.
- (9) Remove the clutch drive assembly mounting plate screws using a hex socket screw wrench.
- (10) Reassemble the clutch drive unit on the mounting plate.
- (11) Remove the mounting plate from the replacement clutch drive assembly using a hex socket screw wrench.

Note: If the vent hole screw and the plastic plug (used for shipping purposes) are on the replacement clutch drive assembly, remove the vent hole screw and install a P-484318 vent hole screw. Remove and discard the plastic plug. The locations of these items are shown in Fig. 32.

- (12) Mount the plate in the perforator.
- (13) Insert and tighten the mounting screws finger tight.

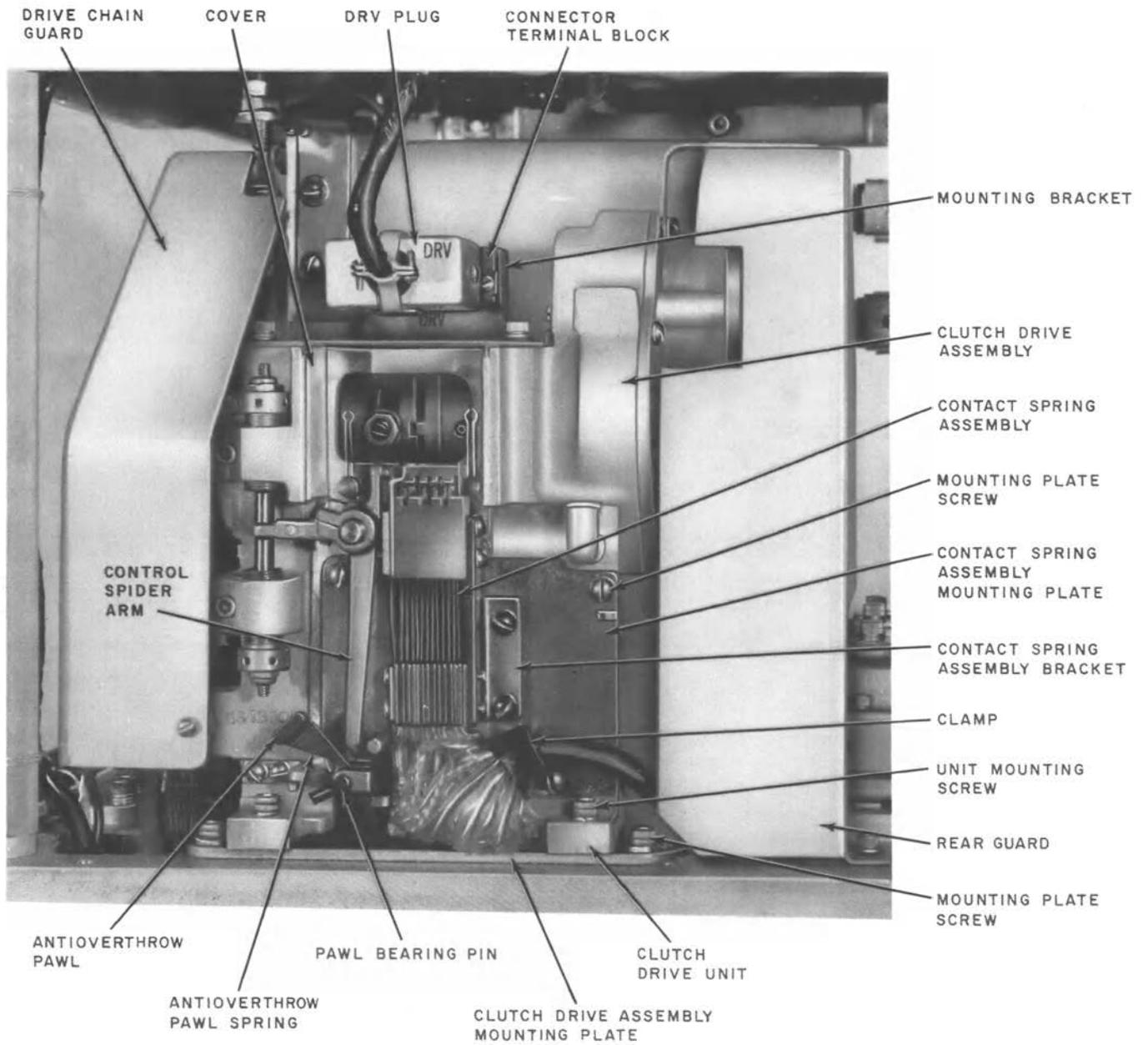


Fig. 31—KS-13906 Clutch Drive Assembly (Front View)

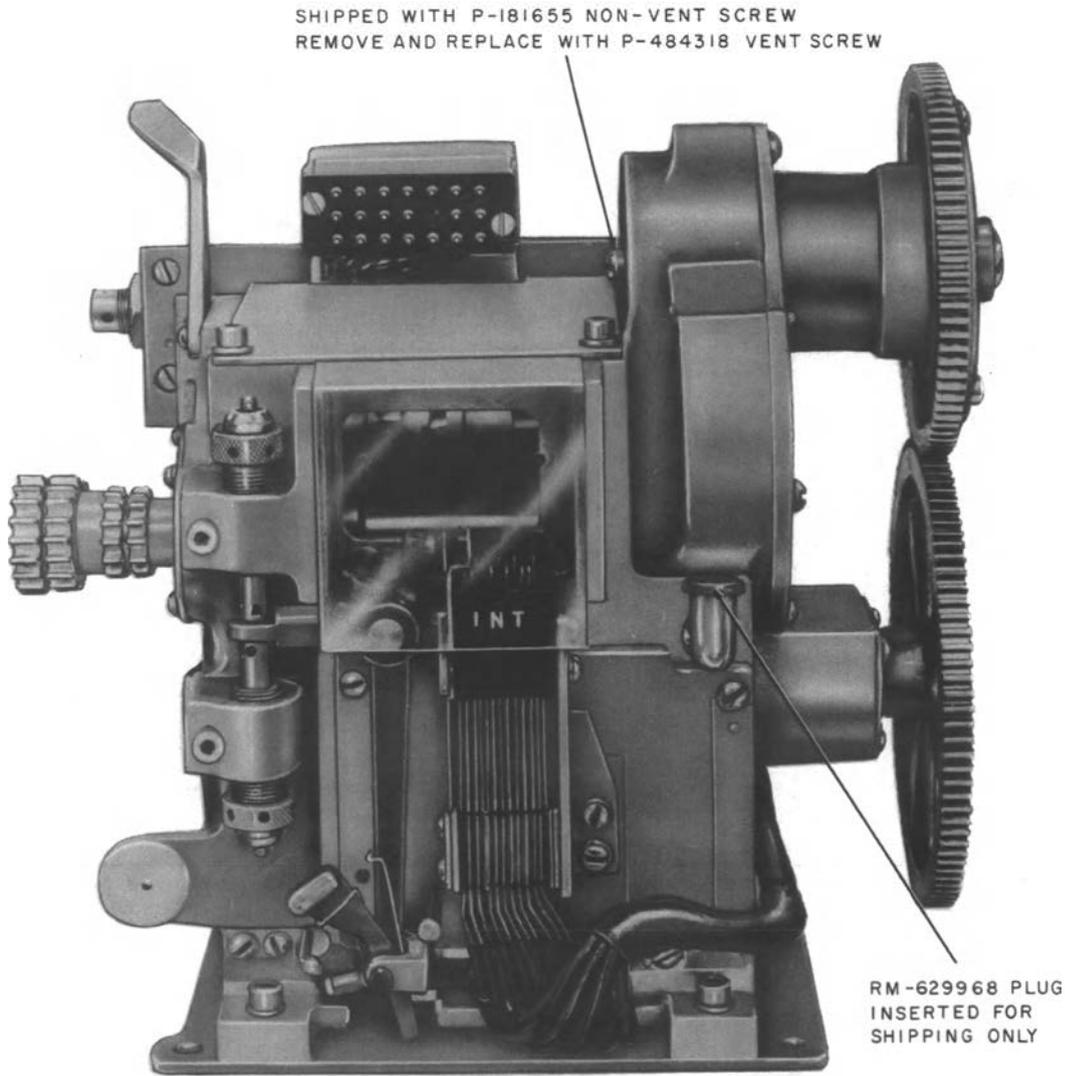


Fig. 32—Clutch Drive (Front View)

- (14) Check the phasing requirement in accordance with Section 034-305-701.
- (15) Slide the clutch drive unit into place.
- (16) Insert and tighten the rear screw.
- (17) Check that the clutch drive gear is not misaligned with the cam drive gear more than 1/32 inch and that there is perceptible backlash between the gears.
- (18) If the alignment is not satisfactory, shift the clutch drive assembly mounting plate, as required, by tapping the edge of the plate with a screwdriver.
- (19) Remove the rear screw that was inserted (16) to secure the clutch drive unit in place, and remove the clutch drive unit taking care not to shift the position of the mounting plate.
- (20) Tighten the mounting plate screws securely.
- (21) Apply a small amount of KS-6824 sealing compound around the head of each screw and the adjacent mounting plate surface using the KS-14164 brush.
- (22) Remount the clutch drive unit.
- (23) Insert and securely tighten all mounting screws.

- (24) Remount the drive chains in accordance with 3.20 and 3.21.
- (25) Remount the drive chain guards.
- (26) Connect the DRV plug.

3.24 Solenoid Assembly: To replace the solenoid assembly (Fig. 33), proceed as follows.

- (1) Remove the clutch drive assembly in accordance with 3.22 and 3.23.
- (2) Tag and unsolder the leads from the solenoid coil terminals.
- (3) If the cable from the terminal block is routed, as shown in Fig. 33, proceed to (a); or if the cable is routed between the solenoid plunger and the mounting plate, proceed to (b).

(a) Terminal Block Cable as Shown in Fig. 33

- (1) Remove the screws which mount one of the plunger stop mounting plates using the 3-inch C screwdriver.
- (2) Remove the stop and plate.
- (3) Remove the solenoid assembly mounting screws.
- (4) Lift the solenoid assembly upward and disengage the drive pin block from the fork (arm).
- (5) Remove the drive pin retaining ring and block from one end of the drive pin using the KS-8511 tweezers.
- (6) Slide the drive pin out through the hole in the solenoid plunger.

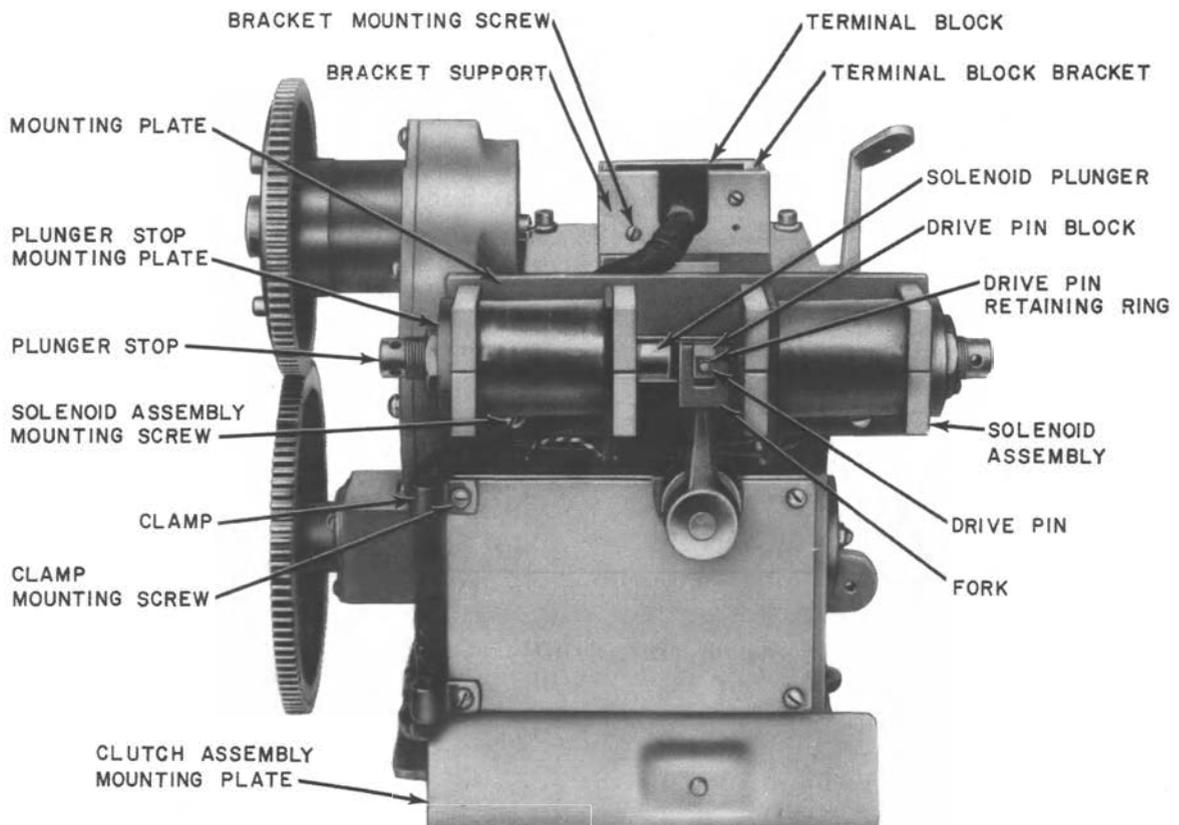


Fig. 33—KS-13906 Clutch Drive Assembly (Rear View of Later Model)

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- (7) Remove the plunger from the solenoid assembly.
- (8) Remove the solenoid assembly from the clutch drive.
- (9) If necessary to obtain sufficient slack in the cable, remove the cable clamps.
- (10) Mount the drive pin, blocks, and retaining ring on the replacement solenoid assembly.
- (11) Remount the cable assembly as required.
- (12) Route the cable as shown in Fig. 33 and mount the replacement solenoid securely on the clutch drive unit.
- (13) Connect the leads to the coil terminals.
- (14) Check that the clutch drive unit is lubricated and adjusted in accordance with Section 034-305-701.
- (15) Mount the unit in the perforator.
- (16) Reassemble the drive chains in accordance with 3.20 and 3.21.

(b) ***Terminal Block Cable Routed Between Solenoid Plunger and Mounting Plate***

- (1) Remove the solenoid assembly mounting screws using the 4-inch E screwdriver.
- (2) Lift the solenoid assembly upward and disengage the drive pin block from the forked arm.
- (3) Remove the assembly from the free end of the cable.
- (4) Remove the drive pin retaining ring and block from one end of the drive pin using the KS-8511 tweezers.
- (5) Slide the drive pin out through the hole in the solenoid plunger.
- (6) Reassemble the drive pin, block, and retainer ring on the replacement solenoid assembly.

- (7) Route the cable as shown in Fig. 33 and mount the replacement solenoid securely on the clutch drive unit.
- (8) Connect the leads to the coil terminals.
- (9) Check that the clutch drive unit is lubricated and adjusted in accordance with Section 034-305-701.
- (10) Mount the unit in the perforator.
- (11) Reassemble the drive chains in accordance with 3.20 and 3.21.

3.25 *Antioverthrow Pawl Spring:* To replace the antioverthrow pawl spring (Fig. 31), proceed as follows.

- (1) Remove the cotter pin from the end of the pawl bearing pin with the P long-nose pliers.
- (2) Disengage the spring from the antioverthrow pawl and the control spider arm. To facilitate spring removal, use the KS-6320 orange stick.
- (3) Grasp the end of the pawl bearing pin and remove.
- (4) Remove the antioverthrow pawl and spring.
- (5) Substitute the replacement spring by connecting the spring end which has the large hook to the antioverthrow pawl and the other end to the control spider arm.
- (6) Position the pawl and remount the bearing pin.
- (7) Insert the cotter pin in the hole in the pawl bearing pin.
- (8) Bend both legs of the cutter pin around the end of the bearing pin.

3.26 *Contact Spring Assembly:* To replace the contact spring assembly (Fig. 31), proceed as follows.

- (1) Remove the spring assembly cover by grasping the cover with the fingers and sliding the cover upward.
- (2) Remove the cable clamp mounting screw using the 4-inch E screwdriver.

- (3) Slide the sleeving back from over the soldered connections.
- (4) Unsolder and tag the leads.
- (5) Remove the mounting screws from the contact spring assembly mounting plate using the 4-inch E screwdriver.
- (6) Remove the mounting plate from the dowel pins, and move the plate to the right and outward so that the plate clears the control spider.
- (7) Mount the replacement contact spring assembly in the reverse order of removal.
- (8) Insert and securely tighten the mounting screws.
- (9) Connect and solder all leads to the proper terminals.
- (10) Check all terminals for loose connections, and then slide the sleeving back over the soldered connections.
- (11) Perform the clutch drive contact spring assembly requirements in accordance with Section 034-305-701.
- (12) Apply KS-6824 sealing compound to the side and ends of the spring assembly bracket and adjacent mounting plate surface using the KS-14164 brush.
- (4) Remove the chain from the hand drive chain sprocket.
- (5) Loosen the clamp screws (Fig. 35) in the hand drive to punch and card feed coupling using a straight hex socket screw wrench with handle.
- (6) Slide the loose portion of the coupling to the left and remove the key plate.
- (7) Loosen the latch unit mounting screws sufficiently to free the meshing of the latch unit to hand drive gears using a straight hex socket screw wrench with handle.
- (8) Remove the hand drive mounting screws (Fig. 34) using a straight hex socket screw wrench with handle and support the hand drive unit before removing the last mounting screw.
- (9) Lower the hand drive unit to clear the dowel pins and remove the unit from the perforator.
- (10) Slide the left portion of the coupling off the hand drive shaft and transfer the coupling to the replacement hand drive assembly.
- (11) Position the coupling so that the hand drive shaft does not extend into the keyway.
- (12) Mount the replacement hand drive assembly in the perforator.
- (13) Reassemble the hand drive to punch and card feed coupling by rotating the punch and card feed shaft to align the index lines of the card feed mechanism just as the card hook shoe leaves the chain guide.

KS-13910 HAND DRIVE ASSEMBLY AND ASSOCIATED PARTS

3.27 *KS-13910 Hand Drive Assembly:* To replace the hand drive assembly (Fig. 30, 34, and 35), proceed as follows.

- (1) Remove the two drive chain guards using a hex socket screw wrench.
- (2) Loosen the idler sprocket bracket mounting screws (Fig. 30) using a straight hex socket screw wrench with handle.
- (3) Pull the bracket forward to release the tension on the clutch to hand drive chain.
- (14) Securely tighten the coupling clamp screws.
- (15) Position the latch unit and securely tighten the mounting screws.
- (16) Check the alignment of the latch to hand drive gears in accordance with 3.29.
- (17) Remount the drive chain and guards.
- (18) Make sure that all screws are securely tightened.

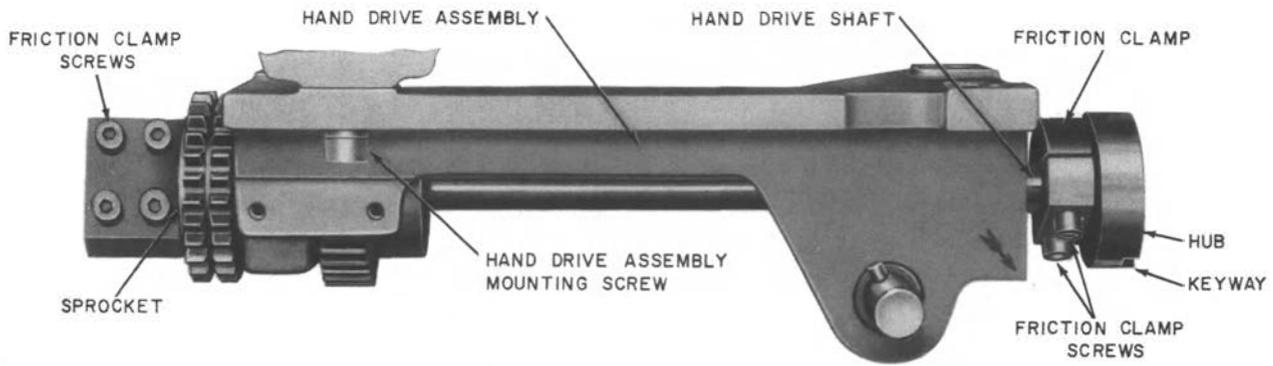


Fig. 34—KS-13910 Hand Drive Assembly

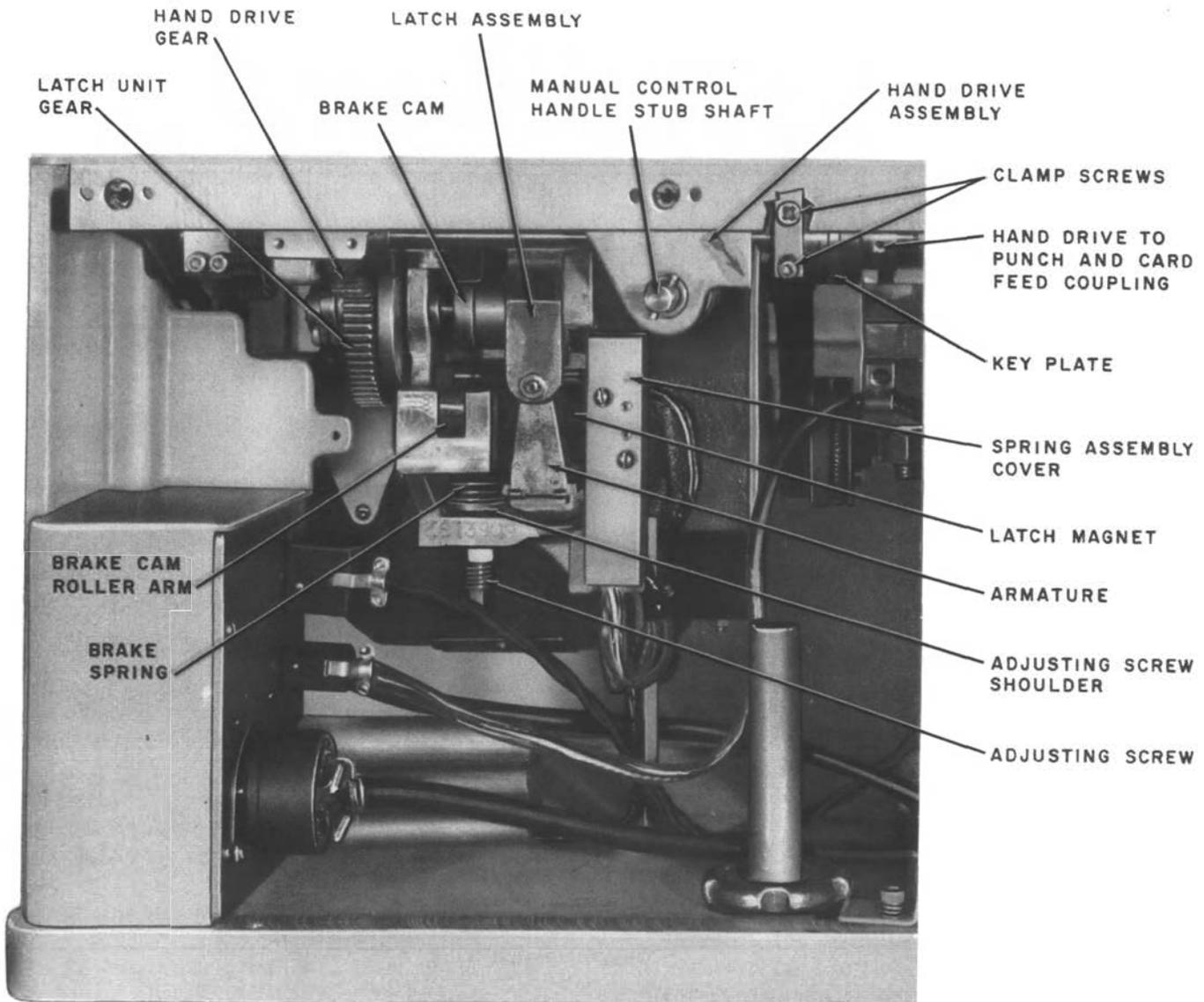


Fig. 35—Latch and Hand Drive

3.28 *Hand Drive to Punch and Card Feed Coupling*

(a) **Key Plate:** To replace the key plate (Fig. 35), proceed as follows.

- (1) Loosen the clamp screws (Fig. 34) in the driving (left) portion of the coupling.
- (2) Slide the coupling to the left and remove the key plate.
- (3) Substitute the replacement key plate and reposition the loose portion of the coupling.
- (4) Securely tighten the clamp screws.

(b) **Driving Portion of Coupling:** To replace the driving (left) portion of the coupling, proceed as follows.

- (1) Remove the hand drive assembly in accordance with 3.27.
- (2) Remove the driving portion of the coupling from the hand drive shaft (Fig. 35).
- (3) Substitute the replacement driving portion of the coupling and remount the hand drive assembly in accordance with 3.27.

(c) **Driven Portion of Coupling:** To replace the driven (right) portion of the coupling, proceed as follows.

- (1) Remove the hand drive assembly in accordance with 3.27.
- (2) If the driven portion of the coupling is secured to the shaft by a friction clamp (Fig. 34) or by clamp assemblies, loosen the clamp using a straight hex socket screw wrench with handle and remove the coupling from the shaft.
- (3) If the driven portion of the coupling is pinned to the shaft, remove the pin using the 1/8-inch drive pin punch and 4-ounce riveting hammer and remove the coupling from the shaft.
- (4) Substitute the replacement coupling and remount the hand drive assembly in accordance with 3.27.

KS-13909 LATCH ASSEMBLY

3.29 **Latch Assembly:** To replace the latch assembly (Fig. 35 and 38), proceed as follows.

- (1) Remove the hand drive assembly in accordance with 3.27.
- (2) Unsolder and tag the leads of the spring and coil terminals.
- (3) Remove the three latch unit mounting plate mounting screws using a straight hex socket screw wrench with handle. (These screws may be identified by the KS-6824 sealing compound placed around the head of each screw. Take care to support the latch assembly before removing the last mounting screw.)
- (4) Grasp the latch assembly with both hands, and carefully lower and remove the assembly.
- (5) Mount the replacement latch assembly.
- (6) Insert and tighten the mounting screws finger tight.
- (7) Remount the hand drive assembly in accordance with 3.27.
- (8) Check that the latch unit gear is not misaligned with the hand drive gear more than 1/32 inch and that there is perceptible backlash between the gears in accordance with Section 034-305-701.
- (9) If the alignment is not satisfactory, shift the mounting plate as required by tapping the edge of the plate with a screwdriver.
- (10) When the alignment is satisfactory, securely tighten the mounting screws.
- (11) Apply a small amount of KS-6824 sealing compound around the head of each screw and adjacent mounting plate surfaces.
- (12) Reconnect, solder, and dress all leads.
- (13) Check that the perforator is in phase in accordance with Section 034-305-701.
- (14) Remount the guard.
- (15) Securely tighten all screws.

3.30 Brake Spring: To replace the brake spring (Fig. 35), proceed as follows.

- (1) Place the manual control handle on the stub shaft.
- (2) Manually operate the LCH magnet armature and rotate the handle clockwise.
- (3) Release the armature and continue to rotate the handle until the brake cam is clear of the brake cam roller arm.
- (4) Count the number of threads on the brake spring adjusting screw below the nut or measure the distance below the bottom of the screw to the locknut using the R-8550 scale.
- (5) Loosen the locknut using R-5850 wrench.
- (6) Turn the screw counterclockwise as far as possible using the 418A wrench.
- (7) Grasp the spring at the second turn from the bottom using the 485A pliers.
- (8) Lift the spring sufficiently to clear the adjusting screw shoulder and move the spring out and down to disengage from the brake cam roller arm.
- (9) Seat one end of the replacement spring over the roller arm shoulder and hold the spring in place with the thumb.
- (10) Grasp the spring at the second turn from the bottom using the 485A pliers.
- (11) Lift the spring to seat over the adjusting screw shoulder.
- (12) Return the brake spring adjusting screw to the original position.
- (13) Securely tighten the locknut.
- (14) Lubricate the front and rear portions of the adjusting screw shoulder by applying two drops of KS-7470 oil using the 486A oil can. Apply the lubricant at a point between the contacting surface of the spring bottom turn and the adjusting screw shoulder.

3.31 Forward Stop Pawl Spring: To replace the forward stop pawl spring (Fig. 36 and 37), proceed as follows.

- (1) Remove the two drive chain guards using a hex socket screw wrench.
- (2) Mark the gear tooth of the latch and the corresponding tooth space in the latch engaging gear of the hand drive using a pencil. (The pencil marks are to aid aligning the gears when remounting the latch assembly.)
- (3) Remove the latch assembly from the perforator in accordance with 3.29 except remove the three latch assembly mounting screws instead of the latch assembly plate mounting screws.
- (4) Remove the locknut, washer, and strip from the end of the adjusting screw using the R-3193 wrench and KS-14336 screwdriver.
- (5) Remove the forward stop spring adjusting screw by sliding the screw to the right with the R-1102 spudger and then grasping the screw head with the P long-nose pliers.
- (6) Remove the screw through the circular spring adjusting screw hole provided in the latch casting as shown in Fig. 38.
- (7) Lower the forward stop pawl spring from the bracket using the P long-nose pliers.
- (8) Apply one drop of KS-7470 oil to the top of each turn of the replacement spring using the 486A oil can.
- (9) Insert the free end of the replacement spring through the opening in the assembly bracket top as shown in Fig. 37.
- (10) Push the spring into the bracket.
- (11) Tilt the free end of the spring and place the tines over forward stop roller bearing pin as shown in Fig. 36.
- (12) Position the spring in the bracket so that the inner end will slip into the slot of the adjusting screw when the screw is inserted.
- (13) Reassemble the adjusting screw, washer, strip, and locknut.

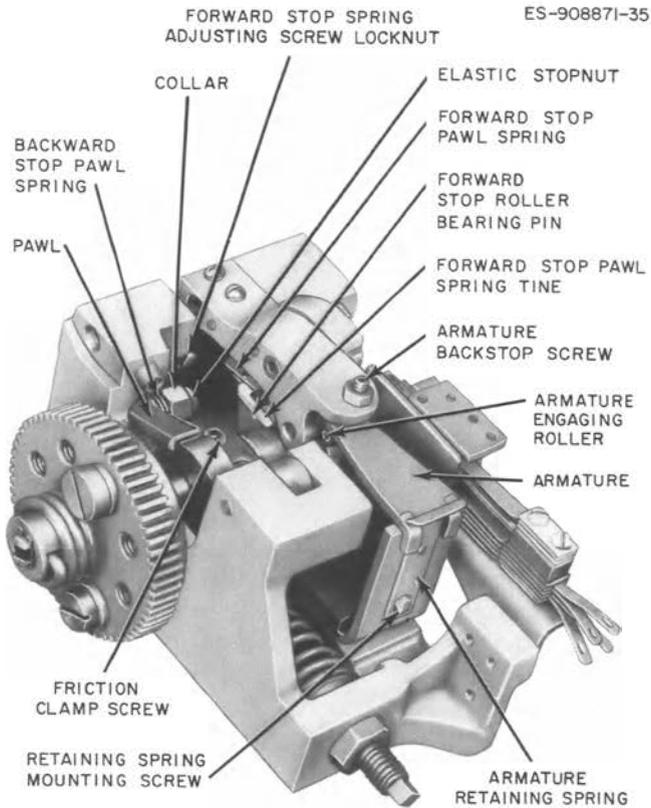


Fig. 36—Latch Unit

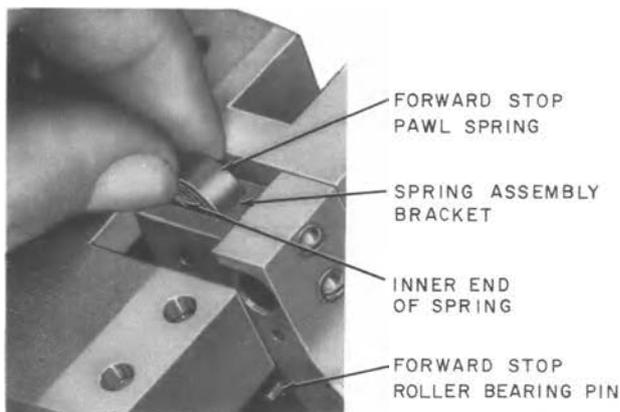


Fig. 37—Replacing Forward Stop Pawl Spring

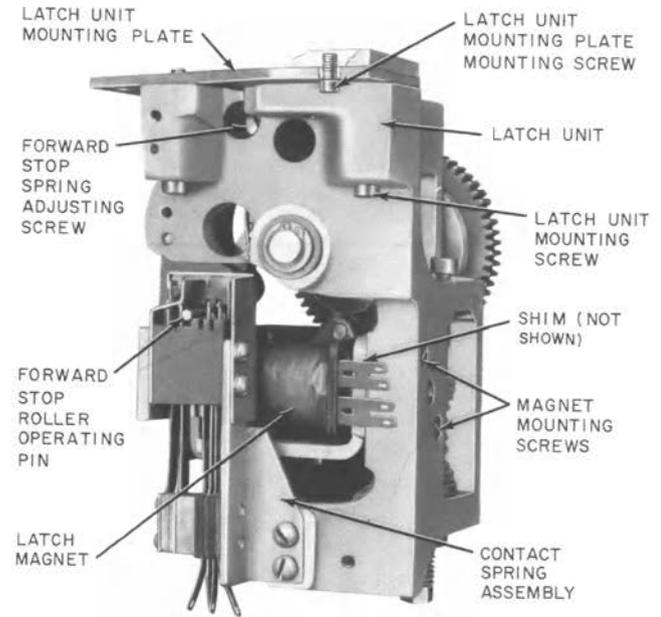


Fig. 38—KS-13909 Latch Assembly (Spring Assembly Cover Removed)

- (14) Adjust the spring tension in accordance with Section 034-305-701.
- (15) Remount the latch and hand drive assemblies into the perforator in accordance with 3.27 and 3.29.
- (16) Check and make sure that the pencil lines marked on the latch and hand drive gears are in alignment.
- (17) Remount the chain guards.

3.32 Backward Stop Pawl Spring, Collar, and Elastic Stopnut: To replace the backward stop pawl spring, collar, or stopnut (Fig. 36), proceed as follows.

- (1) Remove the two drive guards using hex socket screw wrenches.
- (2) Mark the gear tooth of the latch gear and the corresponding tooth space in the latch engaging gear of the hand drive using a pencil. (The pencil marks are to aid in aligning the gears when remounting the latch assembly.)

- (3) Remove the latch assembly from the perforator in accordance with 3.29 except remove the three latch assembly mounting screws instead of the latch assembly plate mounting screws.
- (4) Remove the locknut by inserting the 5/16-inch socket wrench in the hole provided in the latch assembly casting while holding the collar stationary using the KS-14335 wrench.
- (5) Remove the collar and stop pawl spring from the stud.
- (6) Substitute replacement parts as required.
- (7) Mount the spring on the stud so that the free end rests on the backward stop pawl.
- (8) Mount the collar on the stud.
- (9) Make sure that the end of the spring is inserted into the hole provided in the collar.
- (10) Mount a replacement elastic stopnut on the stud and tighten the stopnut securely. (Do not reuse the old stopnut.)
- (11) Lubricate the parts and adjust the spring tension in accordance with Section 034-305-701.
- (12) Remount the latch and hand drive assemblies into the perforator in accordance with 3.27 and 3.29.
- (13) Check and make sure that the pencil lines marked on the latch and hand drive gears are in alignment.
- (14) Remount the chain guards.

3.33 Contact Spring Assembly: To replace the contact spring assembly (Fig. 38), proceed as follows.

- (1) Unsolder and tag the leads from the terminals.
- (2) Remove the out-bin in accordance with 3.45.
- (3) Remove the spring assembly mounting screws using the 4-inch E screwdriver.
- (4) Remove the cover from the replacement spring assembly using the 3-inch C screwdriver.

- (5) Substitute the replacement spring assembly and make sure that the springs are positioned with relation to the forward stop roller operating pin as shown in Fig. 38.
- (6) Insert and securely tighten the mounting screws.
- (7) Solder the leads to the proper terminals.
- (8) Check the requirements in accordance with Section 034-305-701.
- (9) Remount the cover on the spring assembly.
- (10) Remount the out-bin in accordance with 3.45.

3.34 Latch Magnet and Associated Parts:

To replace the latch magnet and associated parts (Fig. 36 and 38), proceed as follows.

- (1) Remove the drive chain guards using hex socket screw wrenches.
- (2) Mark the gear tooth of the latch gear and the corresponding tooth space in the latch engaging gear of the hand drive using a pencil. (The pencil marks are to aid aligning the gears when remounting the latch assembly.)
- (3) Remove the latch assembly from the perforator in accordance with 3.29 except remove the three latch unit mounting screws instead of the latch unit plate mounting screws.
- (4) Remove the magnet mounting screws using the 3-inch C screwdriver.
- (5) Grasp the magnet at the armature and swing the top of the armature to clear the armature backstop screw and armature engaging roller.
- (6) Remove the magnet from the latch unit. Take care in removing the magnet so that the shim between the magnet and casting is also removed.
- (7) Loosen the armature retaining spring mounting screw using the 366 wrench.
- (8) Slide the armature retaining spring from under the head of the mounting screw and remove the retaining spring and armature.

- (9) Substitute replacement parts as required.
- (10) If the magnet is to be replaced, remove the magnet mounting screw nut using the **KS-8097** wrench and remove the magnet. Substitute a replacement magnet and mount securely in place.
- (11) Remount the armature and retaining spring and securely tighten the mounting screw.
- (12) Remount the magnet and also insert the shim between the magnet and casting. Take care that the tip of the armature is positioned between the armature backstop screw and armature engaging roller.
- (13) Insert and securely tighten the mounting screws.
- (14) Remount the latch and hand drive assemblies in the perforator in accordance with 3.27 and 3.29.
- (15) Check and make sure that the pencil lines marked on the latch and hand drive gears are in alignment.
- (16) Lubricate the parts in accordance with Section 034-305-701.
- (17) Remount the chain guards.

KS-13905 CAM SWITCH ASSEMBLY

3.35 General

- (a) As initially manufactured, the cam switch assembly consisted of two parts: the cam switch unit and the dowel plate. On later production models, the dowel plate was eliminated from the assembly. The assembly arranged without the dowel plate is interchangeable with an assembly equipped with a dowel plate. The assembly without a dowel plate is used as a replacement for an assembly equipped with a dowel plate in accordance with 3.36.
- (b) Removal of the cam switch from the perforator is not necessary when replacing a part on the cam switch assembly. If removal of a cam switch equipped with a dowel plate is necessary for other reasons, remove only the cam switch mounting screws using a hex socket screw wrench. The cam switch mounting screws heads are not

coated with antiseize compound, but the dowel plate mounting screw heads are coated with antiseize compound.

3.36 Cam Switch Assembly: To replace the cam switch assembly (Fig. 26), proceed as follows.

- (1) Disconnect the SCN1 and CONT1 plugs.
- (2) Remove the two drive chain guards using a hex socket screw wrench.
- (3) Remove the cam switch to clutch drive chain from the clutch drive sprocket in accordance with 3.20.

Note: The cam switch sprocket drive chain (8) is removed after the cam switch assembly has been removed.

- (4) Remove the motor in accordance with 3.11.
 - (5) Remove the cam switch mounting screws and the dowel plate mounting screws, as required using a hex socket screw wrench. (Screws are reached from the under side of the mounting shelf.)
 - (6) If the switch assembly is equipped with a dowel plate, take care to support the plate before removing the last dowel plate mounting screw and remove the dowel plate.
 - (7) Grasp the cam switch with both hands, raise the switch slightly to disengage the gears, and then remove the cam switch assembly from the perforator.
 - (8) Remove the drive chain from the cam switch sprocket.
- Note:** A plain washer, P-42E227, is required under the head of each mounting screw when installing a cam switch assembly not equipped with a dowel plate.
- (9) Place the drive chain over the sprocket of the replacement cam switch assembly.
 - (10) Push the drive chain ahead of the cam switch.
 - (11) Mount the cam switch by meshing the cam switch and cam drive gears. Also check

that the M cam dial is set at 0 degrees before meshing the cam switch gear with the cam drive gear.

- (12) Insert and securely tighten the mounting screws.
- (13) Check that the cam switch gear is aligned with the cam drive gear within 1/32 inch and that there is perceptible backlash between the gears.
- (14) If the alignment is not satisfactory, shift the unit by tapping the bottom edge using a screwdriver.
- (15) When alignment is satisfactory, securely tighten the mounting screws.
- (16) Reassemble the drive chain in accordance with 3.20.
- (17) Remount the motor in accordance with 3.11.
- (18) Remount the chain guards.
- (19) Reconnect the SCN1 and CONT1 plugs.

3.37 Contact Spring: To replace a contact spring (Fig. 26), proceed as follows.

- (1) Disconnect the SCN1 and CONT1 plugs.
- (2) Remove the cam switch transparent cover mounting screws using the 4-inch E screwdriver.
- (3) Unsolder the lead from the spring terminal.
- (4) Remove the terminal strip mounting screws using the 4-inch E screwdriver.
- (5) Pull the terminal strip away from the cam switch assembly, and let the strip hang supported by the cable form.
- (6) Remove the contact spring mounting screws using the 4-inch E screwdriver.
- (7) Substitute the replacement spring and check all spring tension requirements in accordance with Section 034-305-701.
- (8) Remount the terminal strip and securely tighten all mounting screws.

- (9) Resolder the lead to the spring terminal.
- (10) Reposition the cable and check for broken leads.
- (11) Perform all requirements and adjustments upon the replaced contact spring in accordance with Section 034-305-701.
- (12) Remount the transparent cover.
- (13) Reconnect the SCN1 and CONT1 plugs.

3.38 Contact Screw: To replace a contact screw (Fig. 26), proceed as follows.

- (1) Disconnect the SCN1 and CONT1 plugs.
- (2) Remove the cam switch transparent cover mounting screws using the 4-inch E screwdriver.
- (3) Remove the cover.
- (4) Loosen the locknut on the contact screw using the 276 socket wrench.
- (5) Remove the contact screw using the 3-inch C screwdriver.
- (6) Transfer the locknut to the replacement contact screw.
- (7) Mount the contact screw on the terminal strip.
- (8) Adjust the contact position in accordance with the procedure for make and break of cam switch contacts in Section 034-305-701.
- (9) Tighten the locknut.
- (10) Remount the transparent cover.
- (11) Reconnect the SCN1 and CONT1 plugs.

3.39 Idler Sprocket Spring: To replace the cam switch idler sprocket spring (Fig. 30), proceed as follows.

- (1) Remove the drive chain guard using a hex socket screw wrench.
- (2) Remove the two spring adjusting nuts located on the top of the stud mounting bracket using the R-1770 and the 236 wrenches.

- (3) Remove the spring stud from the hole in the mounting bracket.
- (4) Unhook the spring from the spring stud and substitute a replacement spring.
- (5) Hook the free end of the spring in the idler sprocket yoke stud.
- (6) Position the spring stud in the mounting bracket hole.
- (7) Insert the KS-14322 torque rod into the socket in the idler sprocket yoke.
- (8) Apply sufficient upward pressure on the rod to permit mounting the nut on the spring stud.
- (9) Adjust the spring tension in accordance with Section 034-305-701.
- (10) Remount the chain guard.
- (8) Disengage the card in the channel from the card hook shoes.
- (9) Remove and discard this card.
- (10) Examine the bottom surface, the center guide channel of the in-bin, and the corresponding surfaces of the perforator for dirt and foreign particles. Clean the parts in accordance with Section 034-305-701 as required.
- (11) Make sure that the elevator platform is depressed to the latched position.
- (12) Slide the in-bin into place against the stops and securely tighten the screws.
- (13) Reconnect the ALMB plug.
- (14) Place the card stack on the platform and manually feed a card into the card channel in accordance with Section 034-305-701.

KS-13907 IN-BIN ASSEMBLY

3.40 In-Bin: To replace the in-bin (Fig. 39), proceed as follows.

- (1) Disconnect the ALMB plug.
- (2) Open the in-bin door by lifting and swinging the door outward.
- (3) Depress the elevator platform until the platform latches on both sides by pressing downward evenly on the card stack with the fingers of both hands.
- (4) Swing the card and elevator guide bar outward and against the door.
- (5) Remove the card stack.

Note: While working on the in-bin, take care that the rise of the elevator platform is always checked by the hand or by the weight of the card stack.

- (6) Remove the in-bin mounting screws using a hex socket screw wrench.
- (7) Slide the in-bin out of the perforator.

3.41 Elevator Platform and Associated Parts: To replace the elevator platform and/or associated parts (Fig. 39, 40 and 41), proceed as follows.

- (1) Remove the in-bin in accordance with 3.40.
- (2) Remove the time limiter plate mounting screws using the 4-inch E screwdriver.
- (3) Remove the time limit plates using the 4-inch E screwdriver.
- (4) Remove the elevator platform.
- (5) Remove the catch mounting screws and transfer the catches to the replacement platform using the 4-inch E screwdriver.
- (6) Remove the two shafts on the platform underside by removing the associated setscrews using a hex socket screw wrench.
- (7) Mount these parts on the replacement platform.
- (8) Remove both card and elevator guide bar roller mounting studs using the 373 wrench.
- (9) Transfer the rollers and associated parts to the replacement platform.

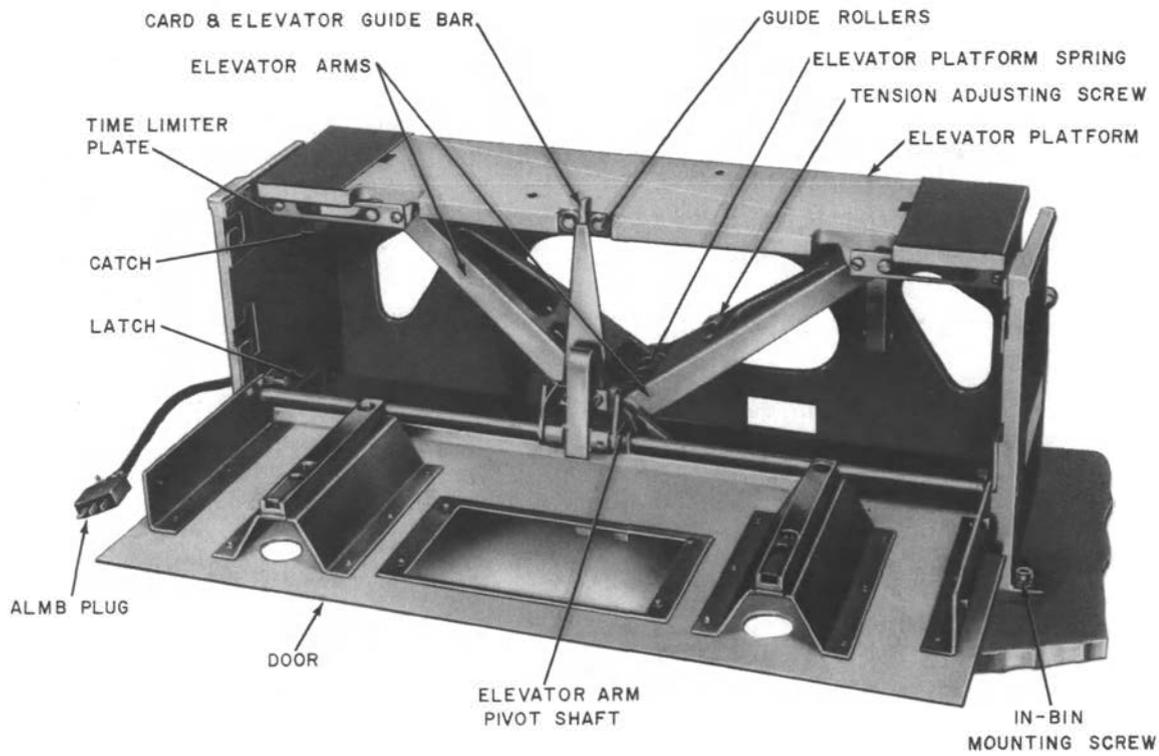


Fig. 39—KS-13907 In-Bin Assembly (Front View)

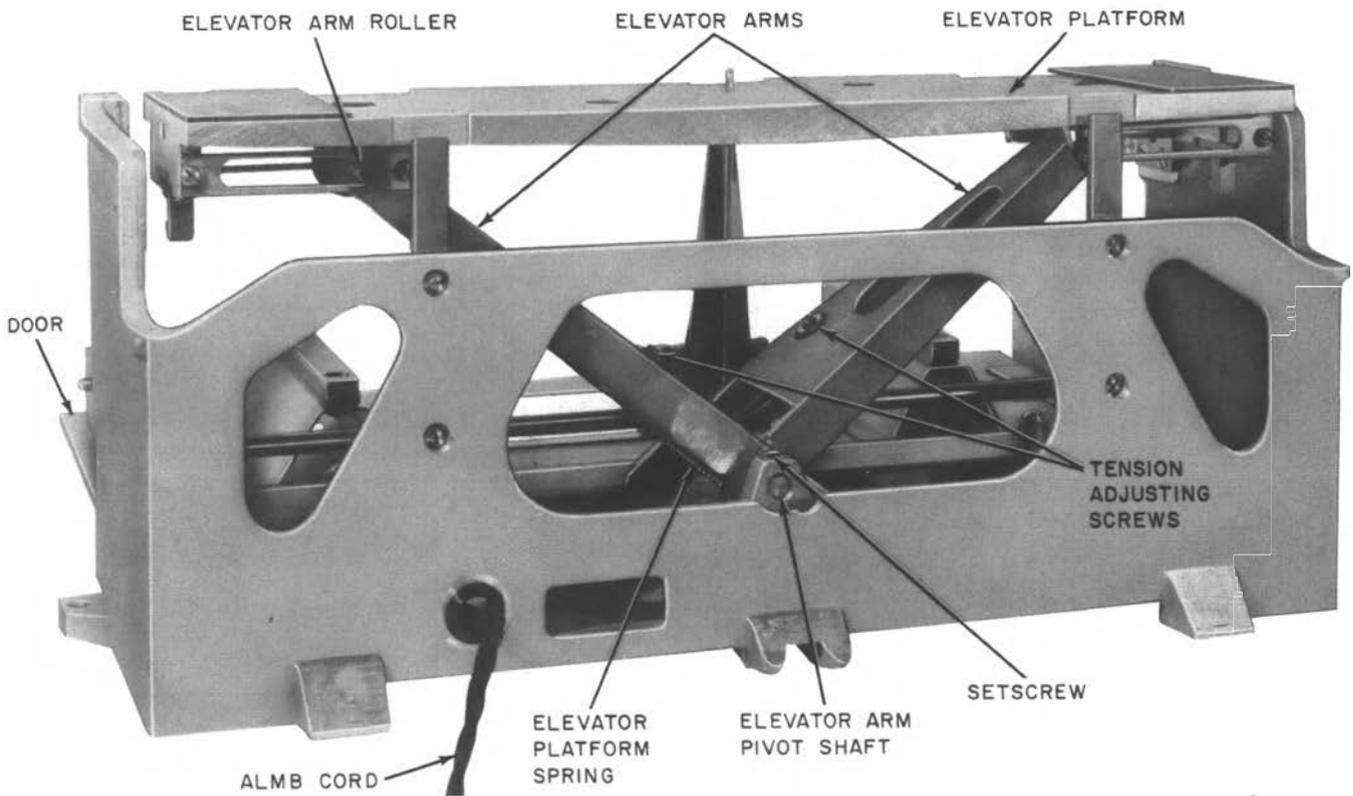


Fig. 40—KS-13907 In-Bin Assembly (Rear View)

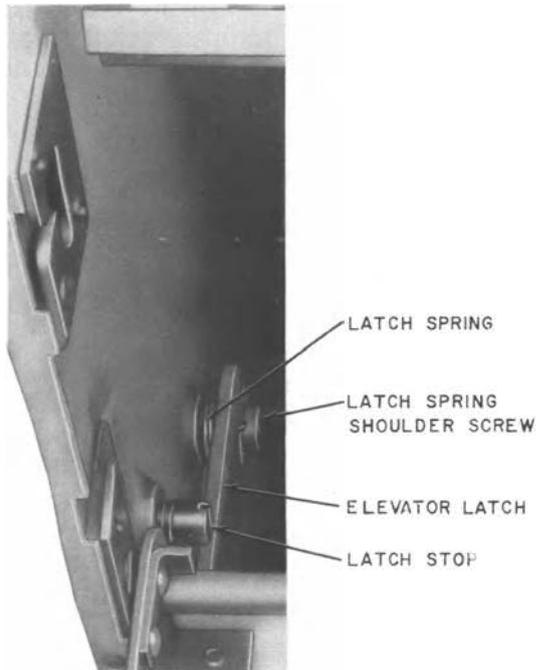


Fig. 41—Elevator Latch Spring

- (10) Mount the replacement platform on the in-bin.
- (11) Remount the tilt limiter plates.
- (12) Remount the in-bin in accordance with 3.40.

3.42 Elevator Platform Spring: To replace the elevator platform spring(s) (Fig. 39, 40, and 41) proceed as follows:

- (1) Remove the in-bin from the perforator in accordance with 3.40.
- (2) Place the in-bin on a flat surface.
- (3) Swing the card and elevator guide bar upwards until the bar engages the notch in the elevator platform.
- (4) Place a hand on the elevator platform to retard the platform rapid rise, close the in-bin door by swinging the door upward to a vertical position, and then push the door down, thus, unlatching the platform.
- (5) Allow the platform to rise to the uppermost position.

- (6) Open the in-bin door by raising and swinging the door outward.
- (7) Swing the card and elevator guide bar outward against the door.
- (8) Loosen the setscrew at the end of the elevator arm pivot shaft using a hex socket screw wrench.
- (9) Push the front end of the shaft inward using the R-1102 spudger until the flattened rear end of the shaft protrudes beyond the mounting bracket.
- (10) Grasp the rear end of the shaft using the combination pliers and remove the shaft.
- (11) Lift the elevator platform upward and remove the platform from the bin.
- (12) Place the platform on a flat surface so that the elevator platform spring faces upward.
- (13) Disengage the ends of the spring from the tension adjusting screws and remove the spring.
- (14) Mount the replacement spring on the elevator arms so that the elongated hole in each end of the spring engages and rests on the shoulder of the associated tension adjusting screw.
- (15) Remount the elevator platform in the bin.
- (16) Insert the elevator arm pivot shaft from the rear of the bin so that the flat ends of the shaft face upward.
- (17) Securely tighten the setscrews.
- (18) Check that the elongated hole in each end of the spring still engages and rests on the shoulder end of the associated tension adjusting spring using the R-2965 adjustable mirror.
- (19) If necessary, manually reposition the ends of the spring by tilting the elevator platform to facilitate spring replacement.
- (20) Check the tension of the elevator spring in accordance with Section 034-305-701.

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- (21) Remount the bin in accordance with 3.40.
- (22) Replace the card stack on the platform.
- (23) Manually feed a card into the card channel in accordance with Section 034-305-701.

3.43 Elevator Latch Spring: To replace the elevator latch spring (Fig. 41), proceed as follows.

- (1) Remove the in-bin from the perforator and release the elevator platform in accordance with 3.42.
- (2) Remove the latch spring shoulder screw using the KS-14336 screwdriver.
- (3) Remove the latch and latch spring from the screw.
- (4) Mount the replacement spring on the shoulder of the screw by hooking the short face end to the latch.
- (5) Apply a small amount of KS-6824 sealing compound to the screw threads using the KS-14164 brush. Take care that the sealing compound does not get on the shoulder portion of the screw or on the turns of the spring.
- (6) Remount the latch and make sure that the latch tip is positioned under the latch stop.
- (7) Insert and securely tighten the shoulder screw.
- (8) Remount the in-bin in accordance with 3.40.

3.44 Microswitch: To replace the microswitch (Fig. 42), proceed as follows.

- (1) Remove the in-bin in accordance with 3.40.
- (2) Place the in-bin on its side with the bottom out.
- (3) Unsolder and tag the microswitch leads.
- (4) Remove the microswitch mounting screws using the 3-inch C screwdriver by inserting the screwdriver through the provided hole in the in-bin base.

- (5) Substitute the replacement microswitch, and make sure the tip of the microswitch operating spring is positioned under the elevator arm stud.
- (6) Insert and securely tighten the mounting screws.
- (7) Reconnect and solder the microswitch terminal leads.
- (8) Replace the in-bin in accordance with 3.40.

KS-13908 OUT-BIN ASSEMBLY

3.45 Out-Bin: To replace the out-bin, proceed as follows.

- (1) Remove the out-bin mounting screws using a hex socket screw wrench.
- (2) Remove the out-bin.
- (3) Slide the replacement out-bin into place and securely tighten the mounting screws.

KS-13904 PUNCH AND CARD FEED ASSEMBLY PARTS

3.46 Punch and Card Feed Assembly Removal: To remove the punch and card feed assembly (Fig. 43 and 46), proceed as follows.

Note: The punch and card feed assembly is not replaceable as a unit because selection of mounting shims is required for initial mounting in the perforator. However, the punch and card feed assembly may be removed from the perforator for replacement of parts in accordance with 3.47, 3.48, and 3.49, respectively.

Caution: *When removing and remounting the punch and card feed assembly, special precautions must be taken to insure that*

- (a) *The shims at the mounting screw holes are not damaged or lost.*
- (b) *The original location of each shim is carefully noted, and*
- (c) *All shims are returned to their original positions when the assembly is mounted.*

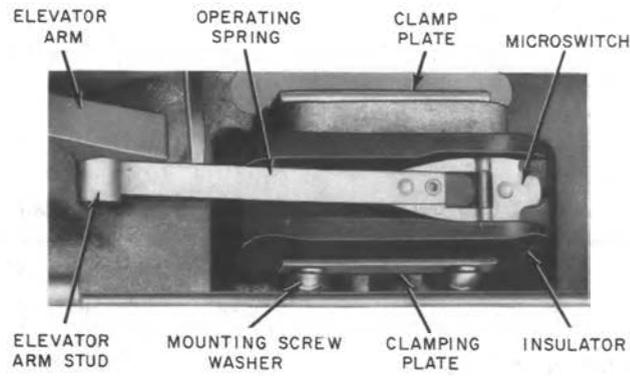


Fig. 42—In-Bin Microswitch

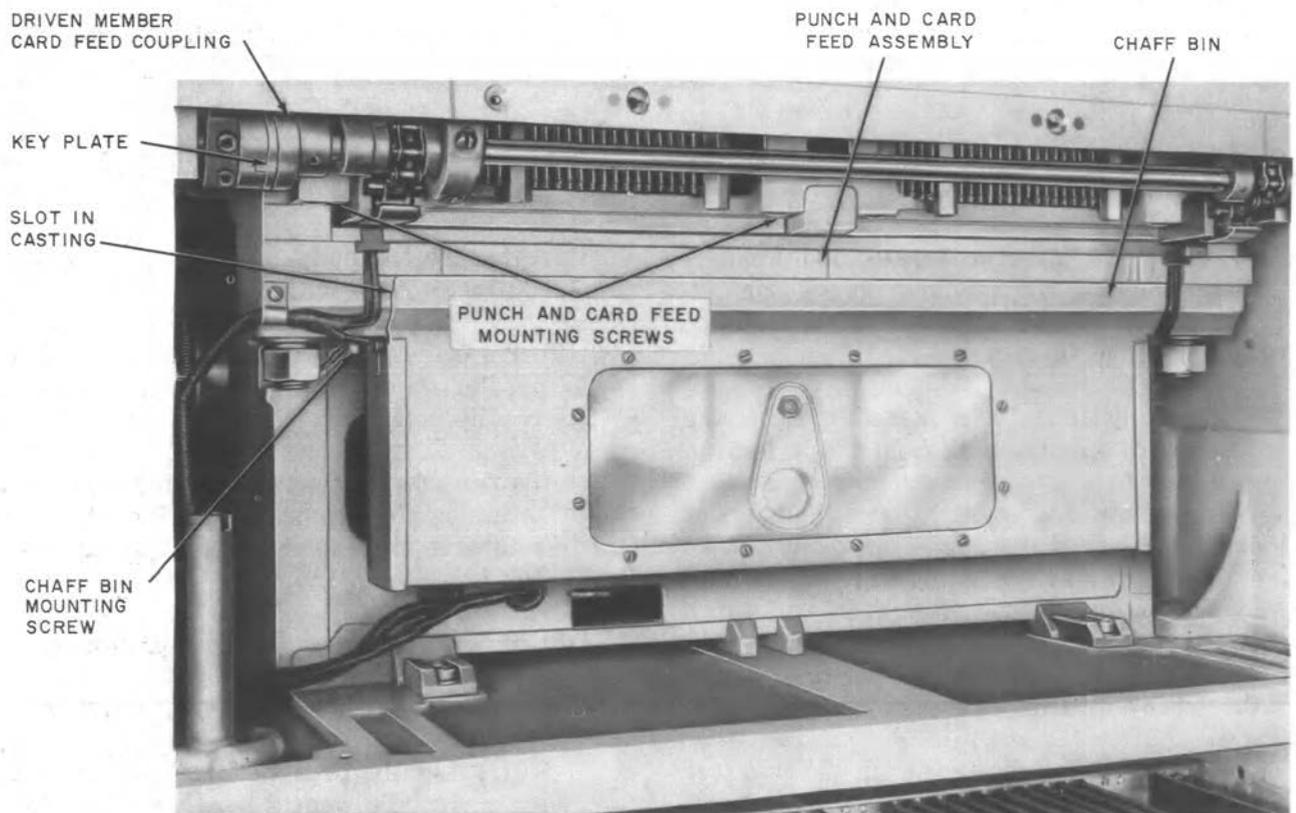


Fig. 43—KS-13904 Punch and Card Feed Assembly and Chaff Bin (Out-Bin Removed)

SECTION 034-305-801

- (1) Remove the in-bin, out-bin, and chaff bin in accordance with 3.40, 3.45, and 3.69, respectively.
- (2) Disconnect the ALMH plug.
- (3) Loosen the clamp screws in the left portion of the card feed coupling using a hex socket screw wrench.
- (4) Slide the coupling member to the left to disengage the other coupling member.
- (5) Remove the coupling key plate.
- (6) Remove all except two mounting screws and washers at the opposite ends of the punch and card assembly using a hex socket screw wrench.

Note: In some cases, the washers may remain in the mounting screw holes. Make sure they are removed and kept with the mounting screws to prevent loss of the washers.
- (7) Support the assembly before removing the last two screws.
- (8) Remove the last two screws and washers while holding the assembly in position.
- (9) Remove the support.
- (10) Carefully lower the assembly from the dowel pins and remove from the perforator.

Note: Note the position and number of shims at each mounting screw hole. Some of the shims may remain on mounting surface in the perforator and others on the punch and card feed assembly. These shims must be returned to their original positions before the punch and card feed assembly is remounted.

- (11) Check the replacement punch and card feed assembly for damage.
- (12) Lubricate the replacement punch and card feed assembly in accordance with Section 034-305-701.
- (13) Place the shims on the assembly in their original positions.

- (14) Mount the punch and card feed assembly in reverse order of removal.
- (15) Draw the screws up equally in turn and tighten all securely.
- (16) Remount the key plate and connect the card feed coupling by rotating the driven member as required to align the feed mechanism index lines just as a card hook shoe is leaving the chain guide.
- (17) Adjust the driving member of the coupling so that key plate lateral play does not exceed 1/16 inch.
- (18) Securely tighten the coupling clamp screws.
- (19) Remount the chaff bin, out-bin, and in-bin in accordance with 3.67, 3.45, and 3.40, respectively.
- (20) Reconnect the ALMH plug.

3.47 Punch Retaining Ring: To replace the upper and/or lower retaining ring(s) (Fig. 44), proceed as follows.

- (1) Remove the punch and card feed assembly in accordance with 3.46.
- (2) Place the punch and card feed assembly on a flat surface so that the ring to be replaced is readily accessible.

Note: Each punch is equipped with two retaining rings as shown in Fig. 44. If both retaining rings are to be replaced, replace the lower ring first.

- (3) Proceed to (a) or (b) as appropriate.

(a) **Lower Punch Retaining Ring**

- (1) Lightly place the forefinger of one hand on the punch head from which the lower ring is to be removed and to prevent turning of the punch when the ring is removed.
- (2) Firmly grasp the curved portion of the retaining ring directly opposite the ring opening using the P long-nose pliers.

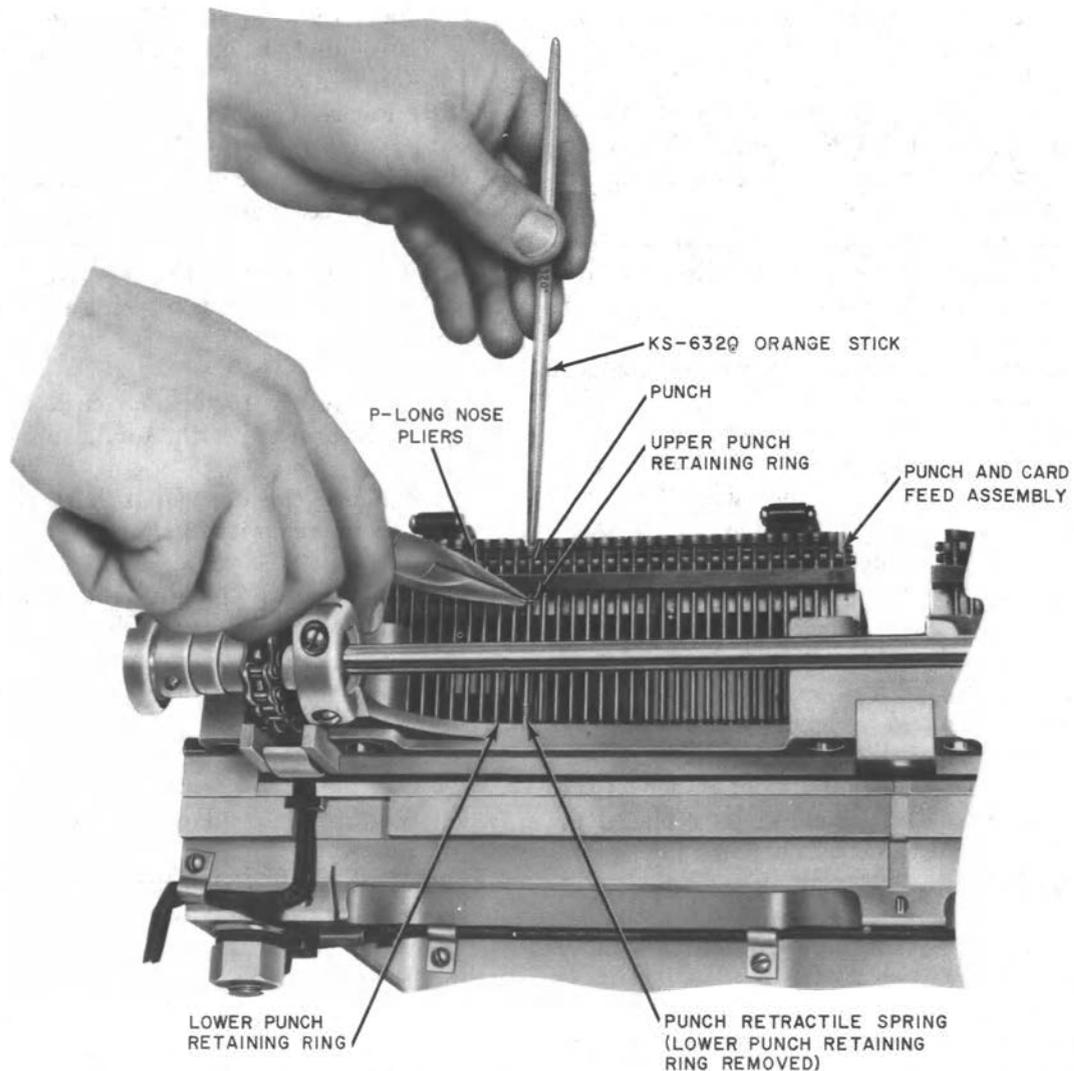


Fig. 44—Punch and Card Feed Assembly (Removing Upper Punch Retaining Ring)

- (3) Remove the ring from the punch by pulling the ring off with the pliers.
 - (4) Grasp the replacement ring using the pliers in a similar manner, and place the opening in the ring on top of the punch retractile spring.
 - (5) Depress the spring until the ring is in line with the groove in the punch.
 - (6) Push the ring against the punch to snap the ring into the groove.
 - (7) Check and make sure that the ring fits snugly in the groove.
 - (8) If the ring does not fit snugly, replace the ring.
 - (9) Proceed to (b) as required or remount the punch and card feed assembly in accordance with 3.46.
- (b) Upper Punch Retaining Ring**
- (1) Depress the punch using the KS-6320 orange stick to gain access to the upper ring.
 - (2) Firmly grasp the curved portion of the retaining ring directly opposite the ring opening using the P long-nose pliers.

- (3) Remove the ring from the punch by pulling the ring off with the pliers.
- (4) While holding the punch depressed and using the KS-6320 orange stick, snap the replacement ring into position using the pliers.
- (5) Check and make sure that the ring fits snugly in the groove.
- (6) If the ring does not fit snugly, replace the ring.
- (7) Remount the punch and card feed assembly in accordance with 3.46.

3.48 Punch: To replace a punch (Fig. 45), proceed as follows.

Note: Three lengths of punches are used in the punch and card feed assembly. The punch length is designated by horizontal scorings on the punch head. When replacing a punch, make sure that the replacement punch is the same length as the punch to be replaced as indicated by the same number of scorings on the punch head.

- (1) Remove the punch and card feed assembly in accordance with 3.46.
- (2) Remove the lower and upper retaining rings in accordance with 3.47.
- (3) While holding the punch retractile spring using the P long-nose pliers as shown in Fig. 45, remove the punch.
- (4) Hold the retractile spring in position using the pliers.
- (5) Insert the replacement punch through the guide plate hole and through the retractile spring, and then into the stripper plate hole.
- (6) Remount the lower and upper retaining rings in accordance with 3.47.
- (7) Depress and release the punch several times using the KS-6320 orange stick to check the freedom of operation of the punch.
- (8) If the punch sticks, remove the upper retaining ring.

- (9) Raise the punch sufficiently to turn the punch through 180 degrees.
- (10) Repeat (7).
- (11) Remount the punch and card feed assembly in accordance with 3.46.

3.49 Punch Retractable Spring: To replace the punch retractile spring (Fig. 44), proceed as follows.

- (1) Remove the punch and card feed assembly in accordance with 3.46.
- (2) Remove the upper punch retaining ring in accordance with 3.47.
- (3) While lightly holding the retractile spring using the P long-nose pliers as shown in Fig. 45, manually raise the punch until there is sufficient clearance to remove the spring.
- (4) Remove the spring.
- (5) Mount the replacement spring using the pliers by lowering the punch so that it passes through the spring and then into the stripper plate hole.
- (6) Remount the upper retaining ring in accordance with 3.47.
- (7) Check the freedom of movement of the punch by depressing and releasing the punch several times using the KS-6320 orange stick.

3.50 Throat Assembly: To replace the throat assembly (Fig. 46), proceed as follows.

- (1) Remove the in-bin in accordance with 3.40.
- (2) Loosen the throat stop mounting screw using a hex socket screw wrench.
- (3) Swing the free end of the throat stop outward to clear the throat assembly.
- (4) Slide the throat assembly up and carefully pull the assembly away from the throat guide plate.
- (5) Check the requirements on the replacement throat assembly in accordance with Section 034-305-701.

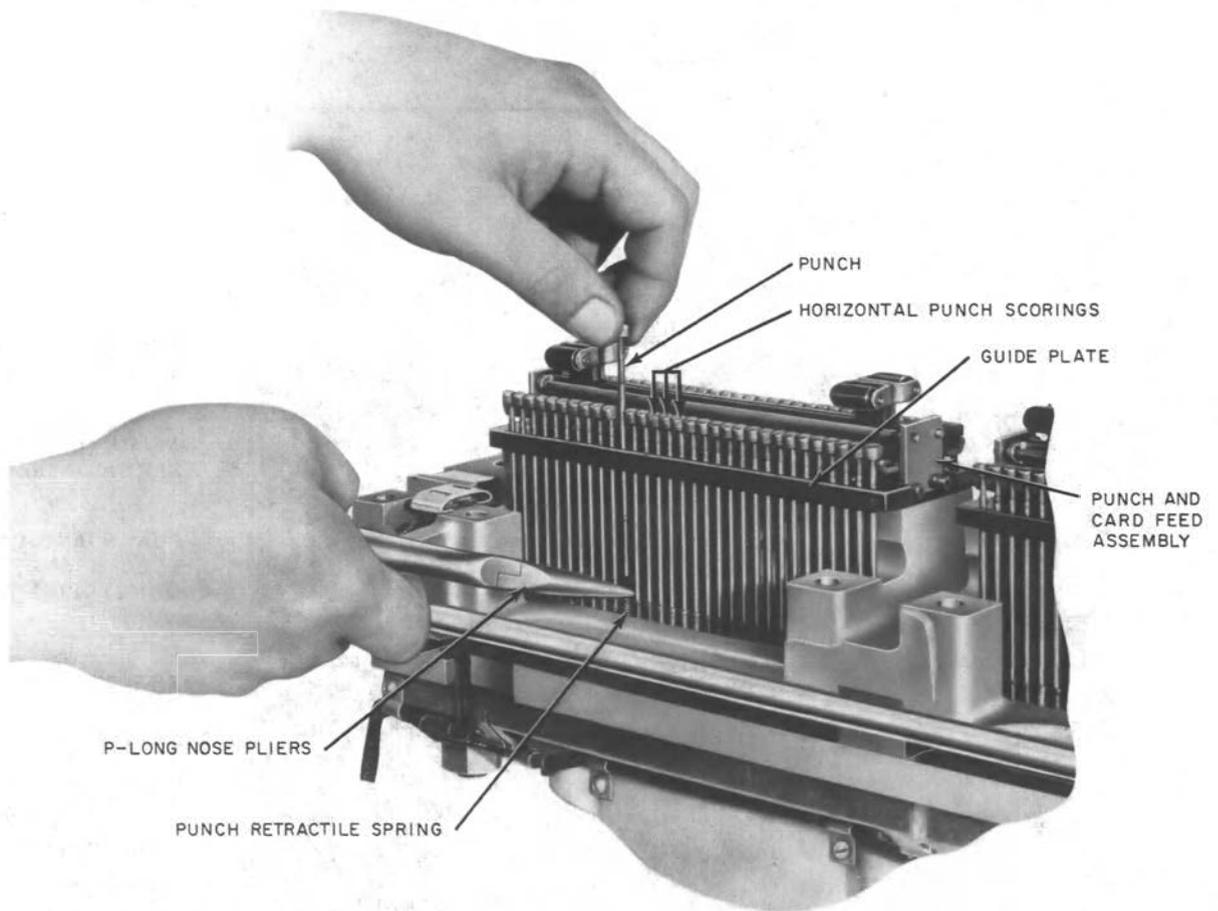


Fig. 45—Punch and Card Feed Assembly (Removing Punch)

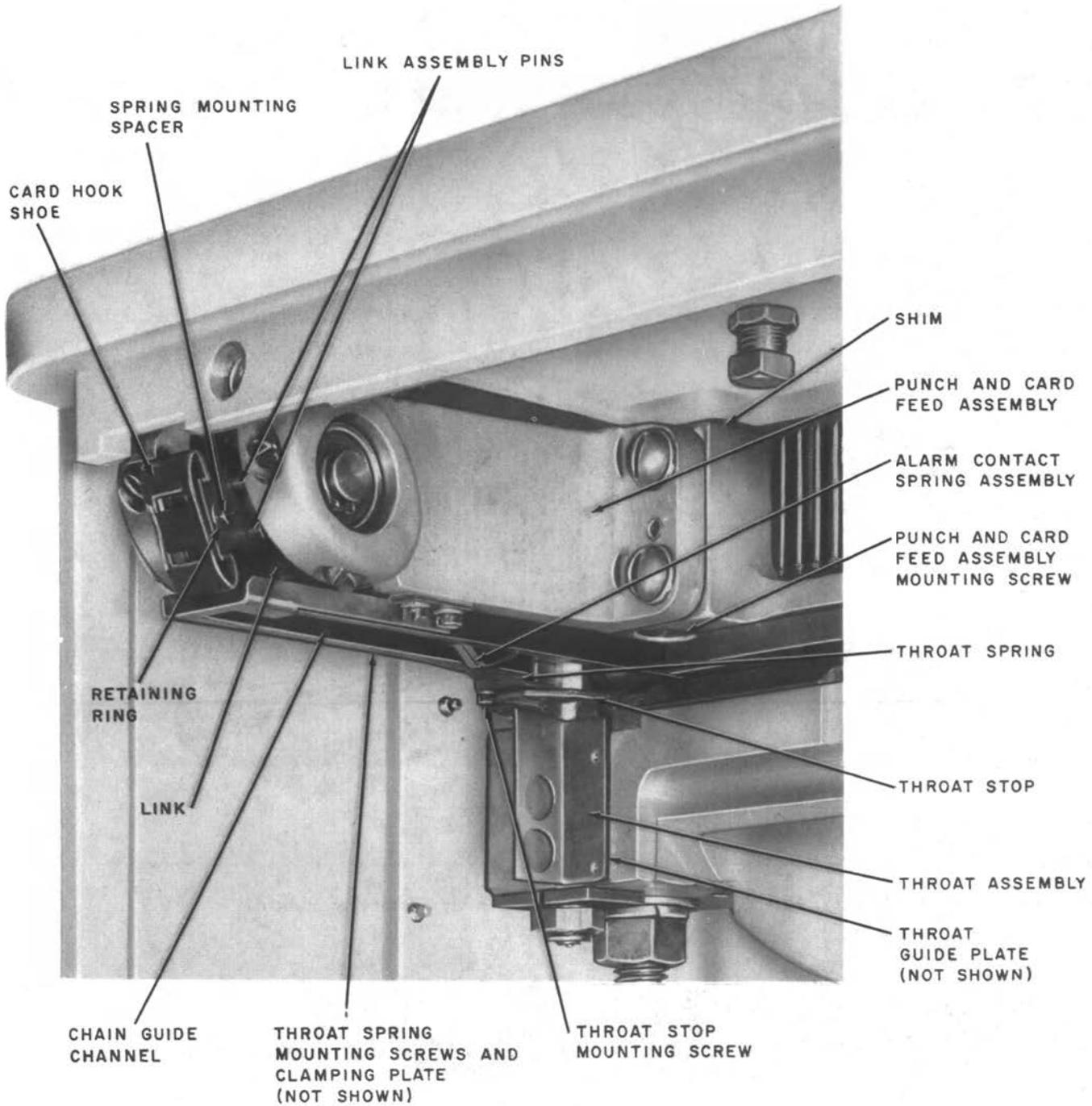


Fig. 46—KS-13904 Punch and Card Feed Assembly (In-Bin Removed)

- (6) Insert the throat mounting into the large opening of the throat guide plate slots and then slide the throat assembly down.
- (7) Swing the throat stop to the inner most position and securely tighten the mounting screws.
- (8) When tightening the right-hand throat stop mounting screw, hold the throat stop to the innermost position.
- (9) Remount the in-bin in accordance with 3.40.

3.51 Throat Guide Plate: To replace the throat guide plate (Fig. 46), proceed as follows.

- (1) Remove the throat assembly in accordance with 3.50.
- (2) Remove the guide plate mounting screw and guide plate using the 4-inch E screwdriver.
- (3) Make sure that the front and rear contacting surfaces of the replacement guide plate are free of oil, dirt, and foreign matter.
- (4) Mount the replacement plate by inserting and securely tightening the mounting screw.
- (5) Remount the throat assembly in accordance with 3.50.

3.52 Throat Stop: To replace the throat stop (Fig. 46), proceed as follows.

- (1) Remove the in-bin in accordance with 3.40.
- (2) Remove the throat stop mounting screw and lockwasher using a hex socket screw wrench.
- (3) Remove the throat stop.
- (4) Mount the replacement throat stop in reverse order of removal.
- (5) Hold the throat stop in the innermost position and securely tighten the mounting screw.
- (6) Remount the in-bin in accordance with 3.40.

3.53 Throat Spring: To replace the throat spring (Fig. 46), proceed as follows.

- (1) Remove the in-bin in accordance with 3.40.
- (2) Remove the throat spring mounting screws and clamping plate using the 3-inch C screwdriver.
- (3) Substitute the replacement spring and mount the clamping plate by inserting the mounting screws.
- (4) Make sure that the spring is located as specified in Section 034-305-701 and then tighten the screws.
- (5) Remount the in-bin in accordance with 3.40.

3.54 Alarm Contact Spring Assembly: To replace the alarm contact spring assembly (Fig. 46), proceed as follows.

- (1) Open the in-bin door.
- (2) Place the manual control handle on the stub shaft.
- (3) Manually operate the LCH magnet armature and rotate the handle clockwise.
- (4) Release the LCH armature.
- (5) Continue to rotate the handle until the contact spring assembly is about to enter the chain guide channel.
- (6) Remove the spring assembly mounting screw from the link assembly using the R-1005 jewelers screwdriver.
- (7) Remove the spring assembly.
- (8) Substitute the replacement spring assembly.
- (9) Mount the replacement spring assembly on the link assembly and securely tighten the mounting screw.
- (10) Rotate the manual control handle in a clockwise direction until the perforator is restored to the home position.
- (11) Close the in-bin door.

3.55 Card Hook Shoe: To replace a card hook shoe (Fig. 46 and 47), proceed as follows.

- (1) Open the in-bin door.
- (2) Place the manual control handle on the stub shaft.
- (3) Manually operate the LCH magnet armature and rotate the handle clockwise.
- (4) Release the LCH armature.
- (5) Continue to rotate the handle until the card hook shoe is about to enter the chain guide channel, as shown in Fig. 46.
- (6) Remove the retaining ring from the end of the spring mounting spacer by inverting the E-0120 Waldes Truarc applicator and pressing it against the open end of the ring.
- (7) Move the link assembly to the left by pushing on the two large link assembly pins using the 3-inch C screwdriver.
- (8) Slide the card hook shoe to the left.
- (9) Grasp the link using the 485A pliers and remove the link from the link assembly pins.
- (10) Remove the card hook shoe by sliding it to the right.
- (11) Mount the replacement card hook shoe by sliding it over the card hook spring from right to left, taking care not to damage the spring.
- (12) Press lightly on the shoe to hook the tip under the back portion of the link, as shown in Fig. 47.

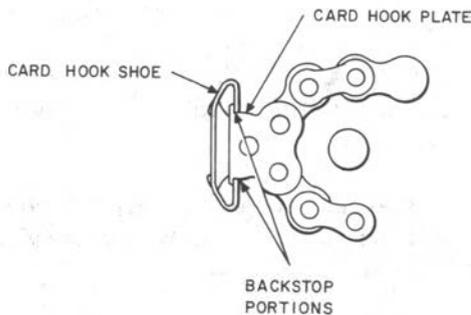


Fig. 47—Position of Card Hook Shoe

- (13) Remount the link on the link assembly pins by depressing the card hook shoe slightly to clear the back stop portions of the link.
- (14) Slide the link on the spacer.
- (15) Remount the retaining ring on the spacer using the E-0120 Waldes Truarc applicator.
- (16) Rotate the manual control handle clockwise until the perforator is returned to the home position.
- (17) Close the in-bin door.

3.56 Card Hook Shoe Spring: To replace a card hook shoe spring (Fig. 48), proceed as follows.

- (1) Position the card hook shoe in accordance with 3.55.
- (2) Make a mark on the end of the shoe farthest from the chain guide channel using a china marking pencil.
- (3) Remove the card hook shoe in accordance with 3.55.
- (4) Remove the spring mounting screw and washer using the 3-inch C screwdriver.
- (5) Remove the spring.
- (6) Apply a small amount of KS-6824 sealing compound to the mounting screw threads using the KS-14164 brush.
- (7) Mount the screw and washer loosely in place.
- (8) Substitute the replacement spring with the split end down and positioned as shown in Fig. 48.

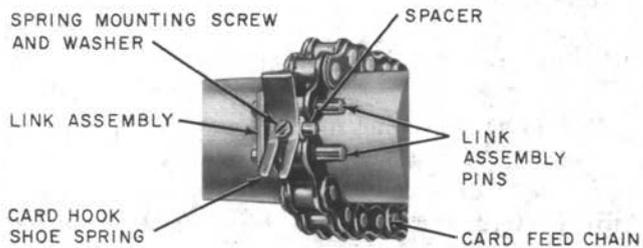


Fig. 48—Card Hook Shoe Spring and Link Assembly (Viewed From Rear of Perforator)

- (9) Securely tighten the screw.
- (10) Remount the card hook shoe in accordance with 3.55 and make sure the shoe is positioned so the mark on the shoe is at the end farthest from the chain guide channel.

3.57 Card Hook Shoe Link Assembly: To replace a card hook shoe link assembly (Fig. 46, 48, and 49), proceed as follows.

- (1) Remove the punch and card feed assembly in accordance with 3.46.
- (2) Position the assembly on a bench so the chain associated with the card hook shoe link assembly to be replaced is easily accessible, as shown in Fig. 49.
- (3) Rotate the drive shaft, as required, to bring the connecting link assembly of the chain to the position shown in Fig. 49.
- (4) Spread the split end of the connecting link assembly spring lock using the R-1005 jewelers screwdriver.

- (5) Remove the link assembly from the pin adjacent to the split end.
- (6) Slide the spring lock toward the other pin and remove the spring lock.
- (7) Remove the cover plate from the link pins and remove the link.
- (8) Remove the chain from the punch and card feed assembly.

Note: If card hook shoe link assemblies are to be replaced on both chains, complete replacement procedures on one chain and remount that chain before performing replacement procedures on the other chain.

- (9) Lay the chain out along the bench and carefully note the position in the chain of the card hook shoe link assembly to be replaced.
- (10) Remove the card hook shoe and shoe spring from the link assembly in accordance with 3.55 and 3.56.

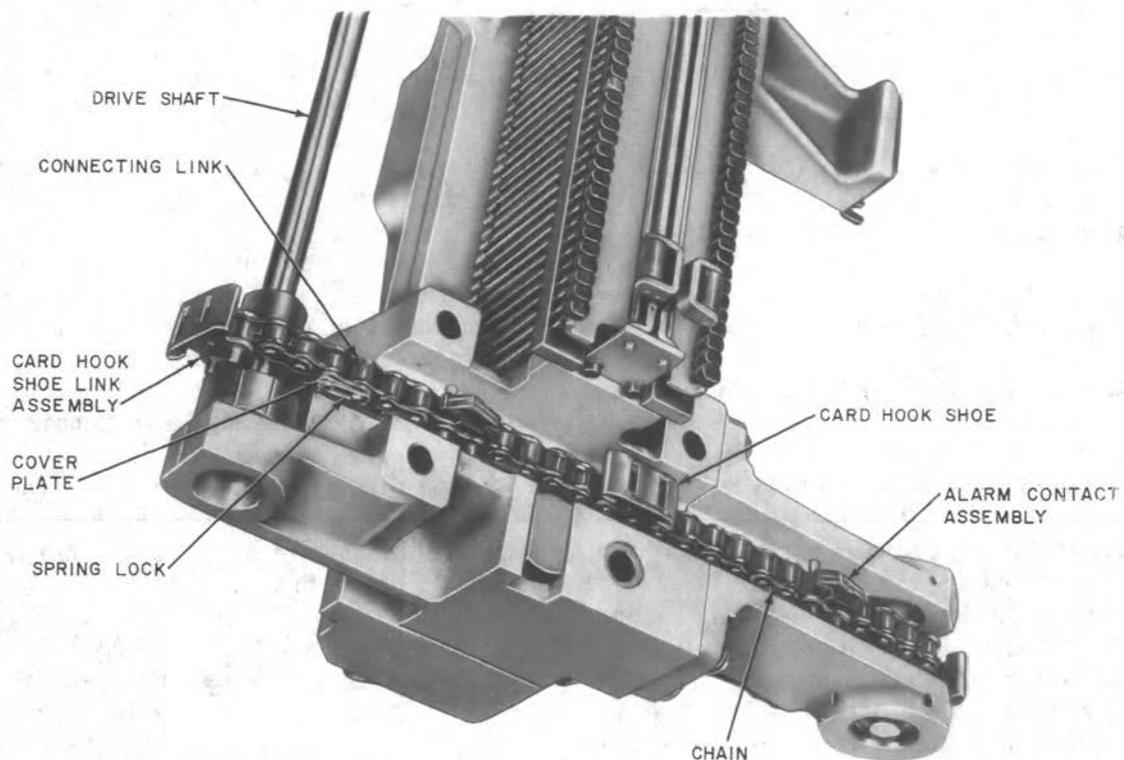


Fig. 49—Punch and Card Feed Assembly (Removed from Perforator)

- (11) Remove the link assembly from the chain.

Note: If more than one card hook shoe link assembly on the same chain is to be replaced, complete replacement procedures on an individual assembly before beginning replacement procedures on the next assembly. This sequence prevents reassembling the chain with incorrect spacing between successive card hook shoes and alarm contact spring assemblies.

- (12) Mount the replacement card hook shoe assembly in the chain and make sure the snap ring is on the same side as the snap rings on the other card hook assemblies.
- (13) Remount the card hook shoe spring and shoe in accordance with 3.55 and 3.56.
- (14) Tilt the punch and card feed assembly in the opposite direction, as shown in Fig. 48, to gain access to farthest chain guide channel end from the drive shaft.
- (15) Select the end of the chain with an adjacent card hook shoe and feed the chain into the nearest end of the channel. Feed the chain through the channel around the sprockets and position the chain ends where they were located prior to connecting link assembly removal (Fig. 49).
- (16) Make sure the adjacent card hook shoe is in the same relative position as the corresponding hook shoe on the other chain.
- (17) Remount the connecting link, link cover plate, and spring lock.
- (18) Remount the punch and card feed assembly in accordance with 3.46.

KS-13902 CAM DRIVE ASSEMBLY PARTS

3.58 Camshaft Assemblies: As initially manufactured, the camshaft assemblies were arranged with gears located on the shaft(s) using Woodruff keys and held in position using retaining rings. On later production models, camshaft assemblies were arranged with gears and cams pinned to the shaft(s) using roll pins. In either case, the gear and/or cam on the shaft is also replaced if a camshaft requires replacement. The replacement camshaft assembly is furnished with

the gear and/or cam pinned to the shaft. The associated bearings are not supplied as a component of replacement camshaft assemblies. To replace a camshaft assembly, proceed as follows.

- (1) Arrange for the perforator to be removed from the frame in accordance with 4.02 and located on a bench so that all sides of the perforator are accessible.

Removing Selectors (Fig. 50)

- (2) Remove the panel from each end of the perforator (Fig. 26) using the 3-inch C screwdriver.
- (3) Remove the clutch drive and cam switch assemblies in accordance with 3.23 and 3.36, respectively.
- (4) Remove the motor belt in accordance with 3.10.
- (5) Remove the connector coverplate using the 3-inch C screwdriver.
- (6) Remove the mounting screws of all connectors using the 3-inch C screwdriver.
- (7) Manually rotate the shafts to move the shuttle bars to their extreme *in* position.
- (8) See Fig. 50 for orientation of the shuttle bar guide.
- (9) Remove the shuttle bar guide using a hex socket screw wrench, and take care not to lose the shim, if provided, on which the guide is mounted.
- (10) In accordance with instructions in the callout of Fig. 50 securely tie each end of the shuttle bar to the comb mounting bracket using No. 6 waxed twine to prevent the interposer from disengaging the outer comb when the shuttle bar is disconnected.
- (11) Remove the two shuttle bar mounting screws and lockwashers at each of the bar.
- (12) Remove the three bottom and three top selector mounting screws and washers using the 565A offset screwdriver.

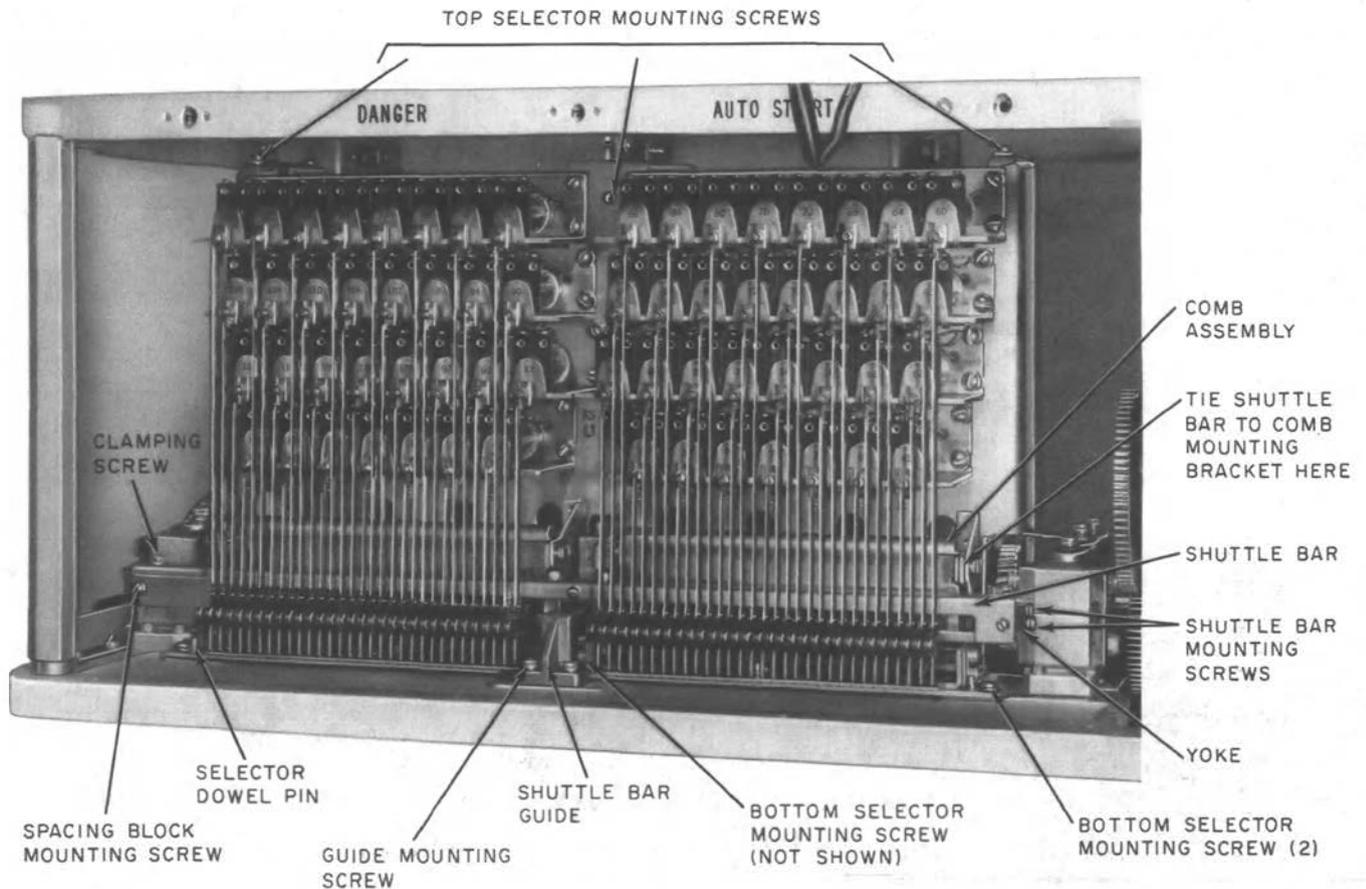


Fig. 50—KS-13903 Selector and Associated Parts

- (13) Remove the dowel pin from each end of the selector using the P long-nose pliers and the shank of the 4-inch E screwdriver as a fulcrum.
- (14) Free the connectors from their mounting brackets.
- (15) Grasp both ends of the selector and gently pull the selector forward to disengage the slots at the bottom from their associated locating screws in the perforator frame (Fig. 51).
- (16) Tilt the selector inward and raise sufficiently to clear the latch stop limiters (Fig. 51).
- (17) Remove the selector.
- (18) Repeat (9) through (11), as required, for the other selector.

Remove Camshaft Assemblies (Fig. 51)

- (19) Remove the selector support bracket mounting screws using the 4-inch E screwdriver or a hex socket screw wrench and remove the bracket.
- (20) Mark the front end of the upper half of both the left (L) and right (R) bearing supports using a pencil with an L and R marked, respectively, to assure that the bearing supports are remounted in the original positions.
- (21) If the latest arrangement of bearing supports equipped with yoke guides instead of yoke roller guides is provided, remove the yoke guide mounting screws using the 417A and a hex socket screw wrench and remove the yoke guides and yoke assemblies.

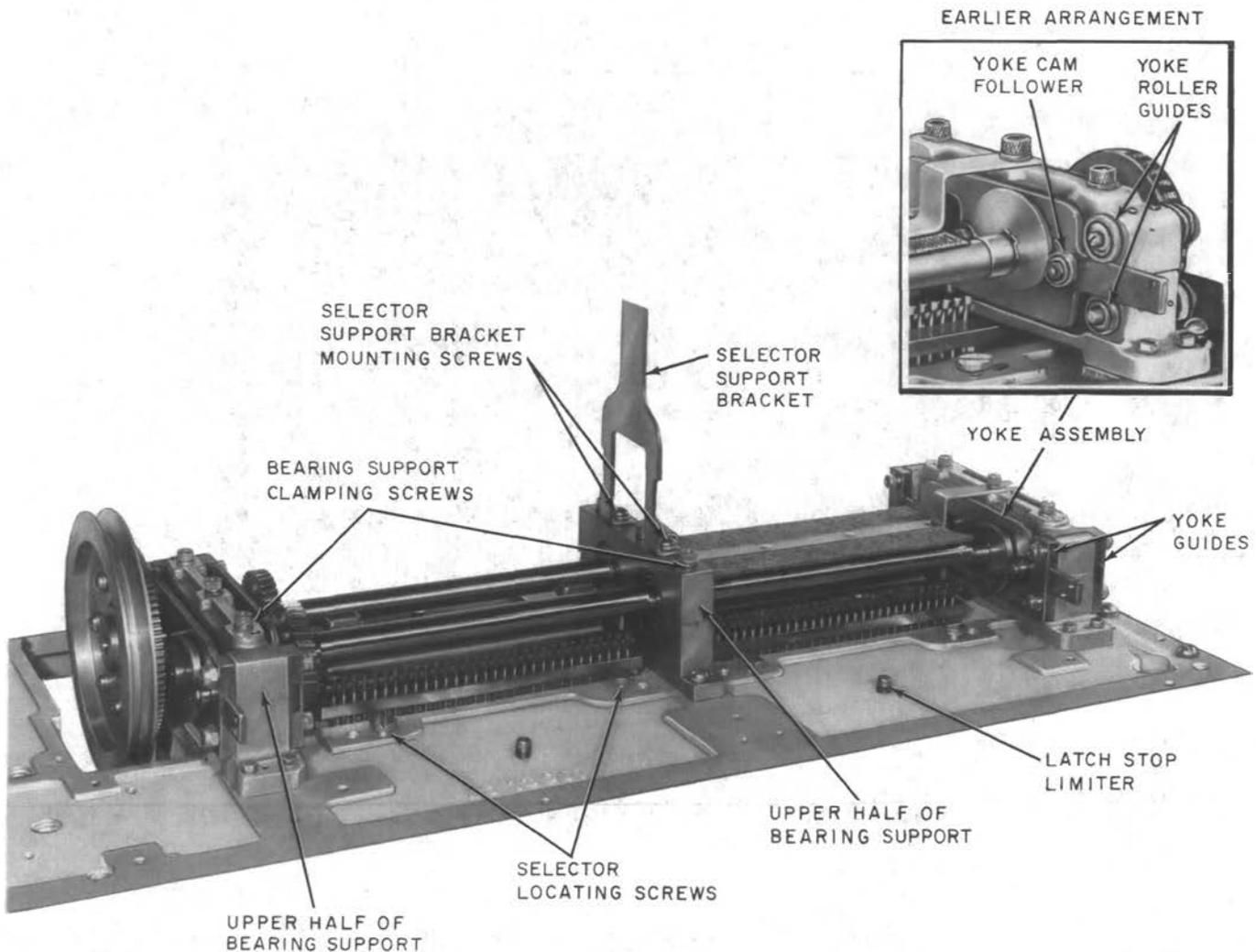


Fig. 51—KS-13902 Cam Drive Assembly

(22) Remove the bearing support clamping screws using a 4-inch E screwdriver or a hex socket screw wrench.

(23) Remove the lubricator pads, if provided.

Note: On some production models of the perforator, tapped holes threaded to receive the bearing support clamping screws are provided near four clamping screws on the upper half of the two outside bearing supports. The clamping screws may be used to raise the upper half of the bearing support and to free the support from the internal dowel pins when this arrangement is provided.

(24) If tapped holes threaded to receive clamping screws are provided, proceed as follows.

(a) Thread four clamping screws into the holes until they bottom upon the lower bearing support.

(b) Alternately turn each screw of one bearing support clockwise a little at a time using the 4-inch E screwdriver or a hex socket screw wrench until the upper half of the bearing is raised sufficiently to be removed from the dowel pins.

(c) Remove the bearing support and clamping screws from the tapped holes.

(d) Repeat (b) and (c) for the other bearing support.

- (25) If tapped holes for use of clamping screws are not provided, remove the upper half of the bearing support by carefully raising the support off the dowel pins.
- (26) Remove the three clamping screws from the center bearing support using the 4-inch E screwdriver or a hex socket screw wrench.
- (27) Carefully remove the upper half of the bearing support.
- (28) If the earlier arrangement of the yoke assembly (Fig. 22) which couples both front and rear camshafts together is provided, proceed as follows.

(a) Place two blocks of wood, approximately 2 by 3 by 6-inches long, on a clean flat surface 1-foot apart to support the yoke connected camshaft assemblies.

(b) Disengage the large bearing retaining rings (Fig. 52) from their grooves in the lower bearing support by raising the outer end of each shaft assembly.

(c) Remove the camshaft assemblies and place the assemblies on the wood blocks as shown in Fig. 53.

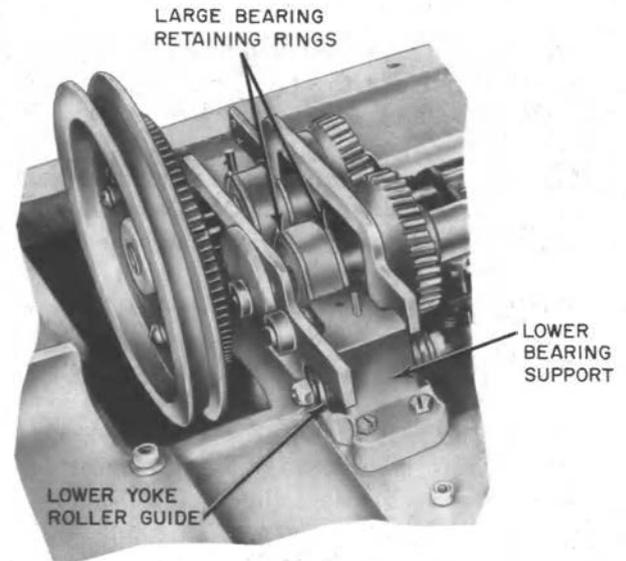
- (29) If later arrangement of the yoke assembly (Fig. 22) which allows separation of camshaft assemblies is provided, proceed as follows.

(a) Place two blocks of wood, approximately 2 by 3 by 6-inches long, on a clean flat surface 1-foot apart to support the separate camshaft assemblies.

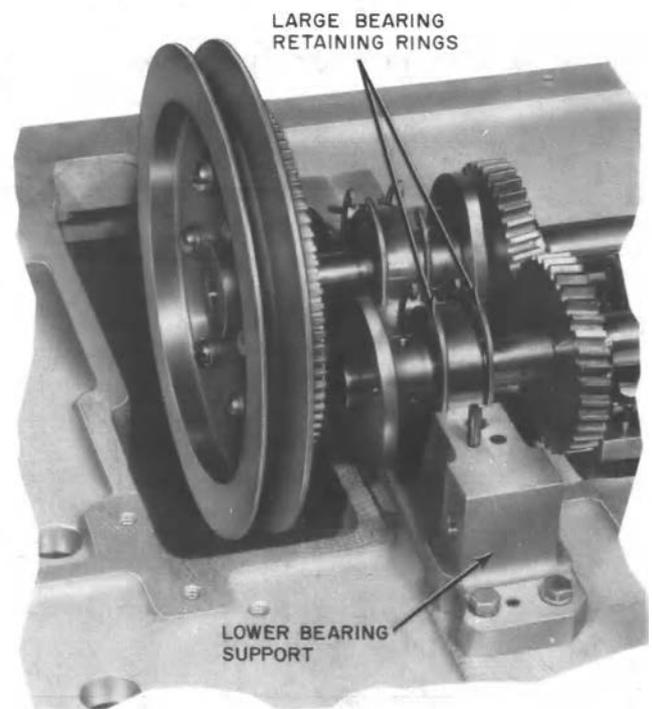
(b) Remove the four yoke assemblies.

(c) Disengage the large bearing retaining rings (Fig. 52) from their grooves in the lower bearing support by raising the outer end of each shaft assembly.

(d) Separately remove both shaft assemblies, and place on the wooden blocks similar to the assemblies shown in Fig. 53.



EARLIER ARRANGEMENT



LATER ARRANGEMENT

Fig. 52—Cam Drive Assembly (Partial View)

Removing Dial (Fig. 53)

- (30) If the dial is arranged with a hub to secure the dial to the shaft, loosen the setscrews in the hub using a hex socket screw wrench.
- (31) If the dial is arranged with a clamp assembly to secure the dial to the shaft, loosen the clamp assembly using a hex socket screw wrench.
- (32) Remove the dial.

Removing Pulley and Gear (Fig. 53)

- (33) If the pulley and gear are arranged with pins to secure the pulley and gear to the camshaft, proceed as follows.
- (a) Scribe a line using the 240 scribe on the gear and adjacent surface of the shaft to obtain the same relative position of parts during reassembly.
- (b) Remove the pulley using the 4-inch E screwdriver.
- (c) Remove the roll pin securing the pulley to the shaft by applying the 1/8-inch drive

pin punch to the roll pin and tapping the punch lightly using the 4-ounce riveting hammer.

- (d) Remove the pulley and gear.

(34) If the pulley and gear are not arranged with pins to secure the pulley and gear to the camshaft, proceed as follows.

- (a) Remove the nut and lockwasher on the end of the shaft using the R-1770 wrench.
- (b) Remove the pulley and gear.

Right Front and Right Rear Camshafts (Fig. 53)

- (35) If the cam on the outer end of the rear shaft is arranged with a pin to secure the cam to the shaft, proceed as follows.
- (a) Remove the roll pin by applying the 1/8-inch drive punch to the pin and tapping the punch lightly using the 4-ounce riveting hammer.
- (b) Remove the cam.

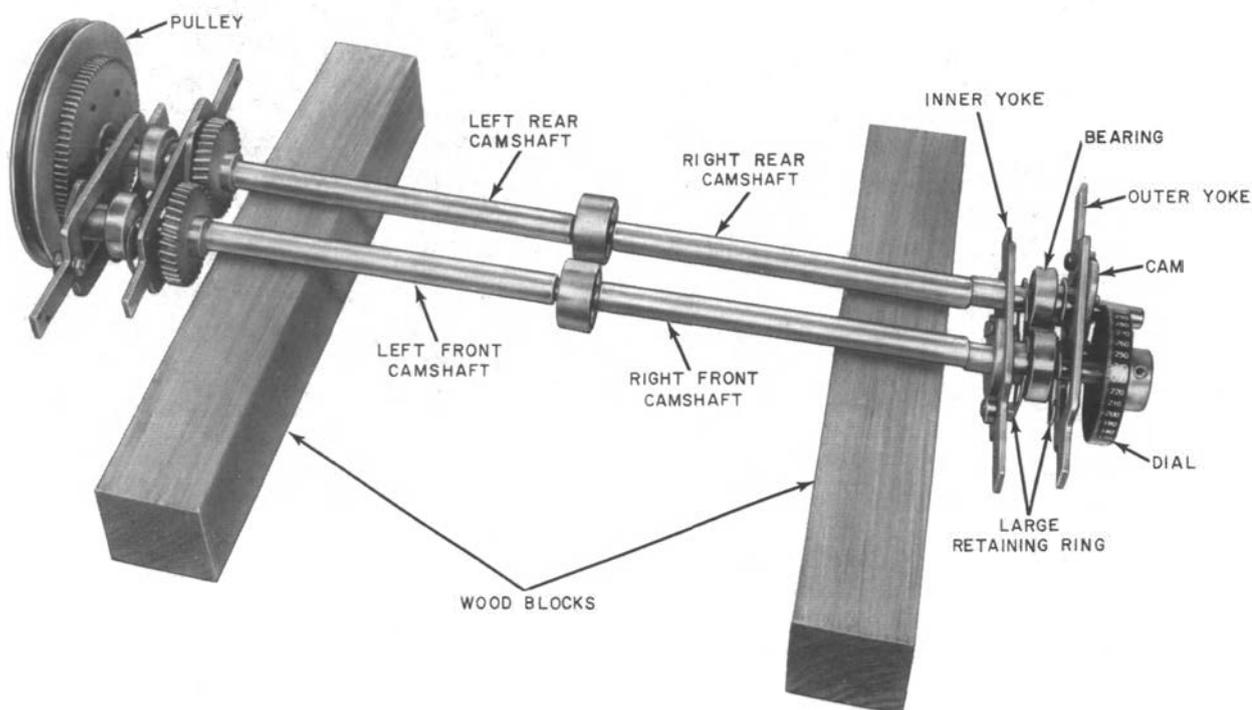


Fig. 53—Cam Drive Shaft Assemblies and Associated Parts

- (36) If the cam on the outer end of the rear shaft is not arranged with a pin to secure the cam to the shaft, proceed as follows.
- Remove the small retaining ring on the shaft at the outer end of the cam using the R-2975 adjustable snap-ring pliers.
 - Remove the cam using the bearing puller.
 - Remove the Woodruff key from the shaft using the side cutting pliers to grasp the key.
- (37) Remove the outer yoke assembly as appropriate.
- (38) Remove the large retaining rings.
- (39) Remove the small bearing retaining ring on the front shaft using the R-2975 pliers.
- (40) Remove the inner yoke assembly as appropriate.
- (41) Remove the large retaining rings.

Disengaging Camshafts

- (42) If front and rear camshaft assemblies are coupled together with the earlier yoke assembly arrangement, proceed as follows.
- Place the assembly in a vise with the shaft to be replaced held loosely between the vise jaws. (Fig. 54 shows the assembly positioned in a vise for removal of the right rear camshaft.)
 - Disengage the right rear camshaft from the center bearing by applying the 4-inch length of 1/4-inch drill rod to the step in the shaft (Fig. 54).
 - Tap the drill rod lightly using the 4-ounce riveting hammer. (Hold the drill rod as nearly parallel as possible to the shaft when tapping the rod.)
 - Remove the assembly from the vise after the camshaft has been disengaged.
 - Remove the center bearing from the mating shaft using the bearing puller.

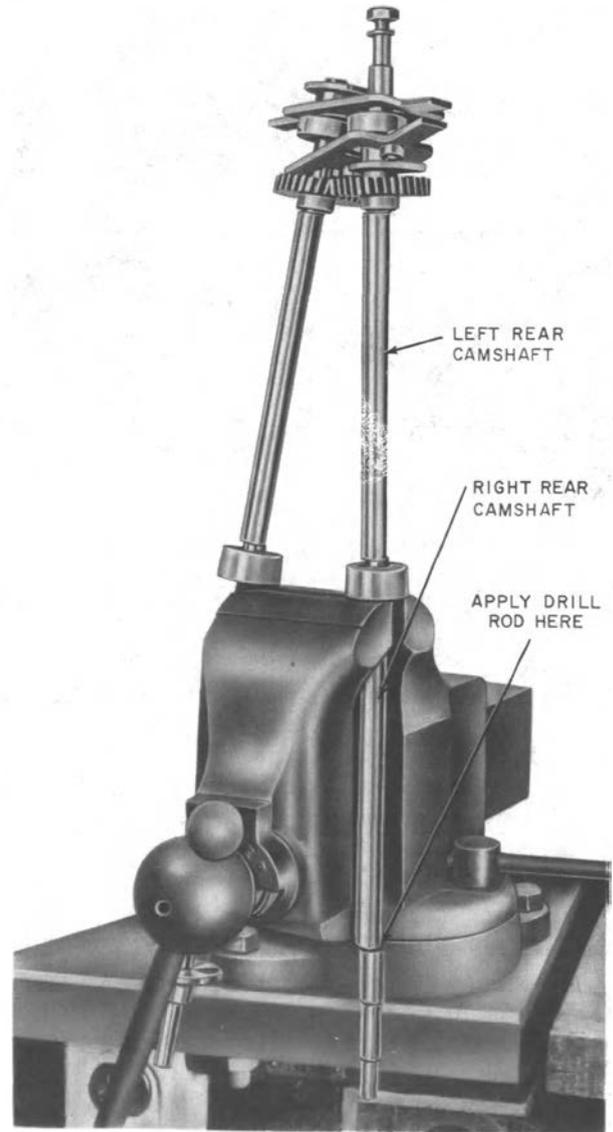


Fig. 54—Removing Right Rear Camshaft (Earlier Yoke Assembly Arrangement)

- If the front shaft is to be replaced, repeat (a) through (e) for the front shaft.
- (43) If the front and rear camshafts are not coupled together by use of the later yoke assembly arrangement, proceed as follows.
- Place the rear camshaft assemblies on a flat surface.
 - Grasp the center bearing (Fig. 55) loosely and very lightly tap the large gear surface using the plastic tip hammer until the camshafts are separated.

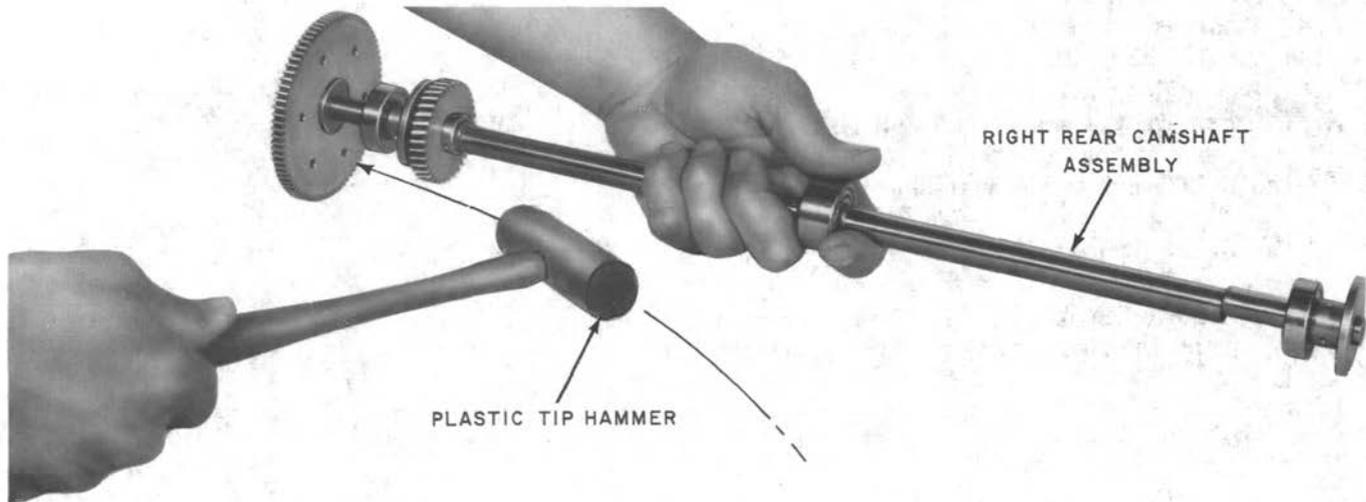


Fig. 55—Disengaging Rear Camshaft Assemblies (Later Arrangement)

- (c) Remove the center bearing from the shaft to be replaced using the bearing puller as required.
- (d) If the front shaft is to be replaced, similarly disengage the two front camshaft assemblies by repeating (a) through (c).

- (45) Place the end of the camshaft which mates with the camshaft being replaced against the wood block as shown in Fig. 56 (old yoke assembly coupled camshaft or individual camshaft).

Mounting Replacement Right Camshaft Assemblies and Associated Parts

- (44) Clamp one wood block to a flat surface using the R-1445 C clamp as shown in Fig. 56.

- (46) If the right rear camshaft assembly on a previously nonpinned assembly is being replaced, partially replace the retaining nut on the thread portion of the left rear camshaft so that the camshaft is slightly overflush with the end of the shaft before placing against the block.

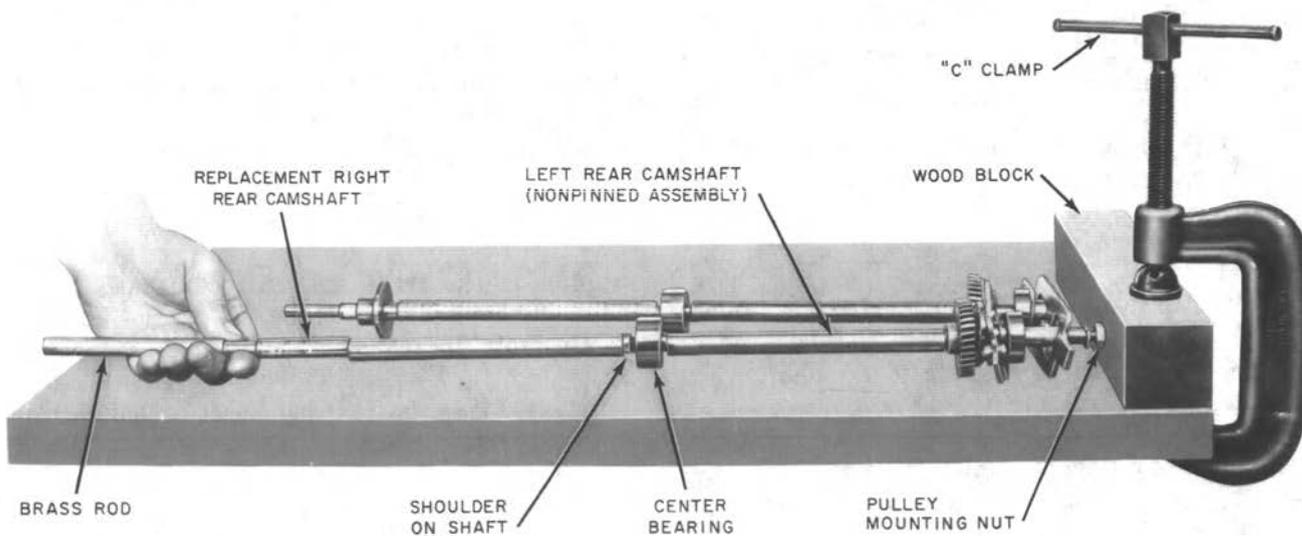


Fig. 56—Engaging Right Rear Camshaft (Earlier Arrangement)

- (47) Start the replacement center bearing on the camshaft and positioned so that the shaft shoulder seats against the inner race of the center bearing by using a brass or copper tube approximately 3-inches long which just fits over the shaft and engages the inner race only.

Note: The ends of the tube should be at right angles to the length and at least one end should be smooth.

- (48) Place the smooth end of the tube against the inner race of the bearing.
- (49) Tap the tube lightly using the 4-ounce hammer to force the bearing into position.

Note: The replacement camshaft assembly is furnished with the cam pinned to the shaft.

- (50) If the right rear camshaft assembly is being replaced, proceed as follows.

(a) Scribe lines on the cam and shaft using the 240 scriber to maintain the same relative position of parts when remounting the cam.

(b) Remove the roll pin securing the cam to the shaft using the 1/8-inch drive pin punch and 4-ounce riveting hammer.

(c) Remove the cam.

- (51) Start the replacement camshaft into the center bearing so that the shaft mates properly with the other shaft in the bearing.

- (52) If front and rear camshafts are coupled with an earlier yoke assembly arrangement, proceed as follows.

(a) Position the 4-inch length of 1/2-inch brass rod on the other end of the shaft, and tap the rod lightly using the 4-ounce riveting hammer until the shoulder on the camshaft seats against the inner race of the center bearing.

(b) Place the inner yoke on the camshaft as shown in Fig. 53.

- (53) If the front and rear camshafts are not coupled by the later yoke assembly arrangement, proceed as follows.

- (a) Position the camshaft assemblies vertically, and locate the hand around the center bearing as shown in Fig. 57.

(b) Tap the top end of the camshaft using the plastic tip hammer until the shoulder of the camshaft seats against the inner race of the bearing.

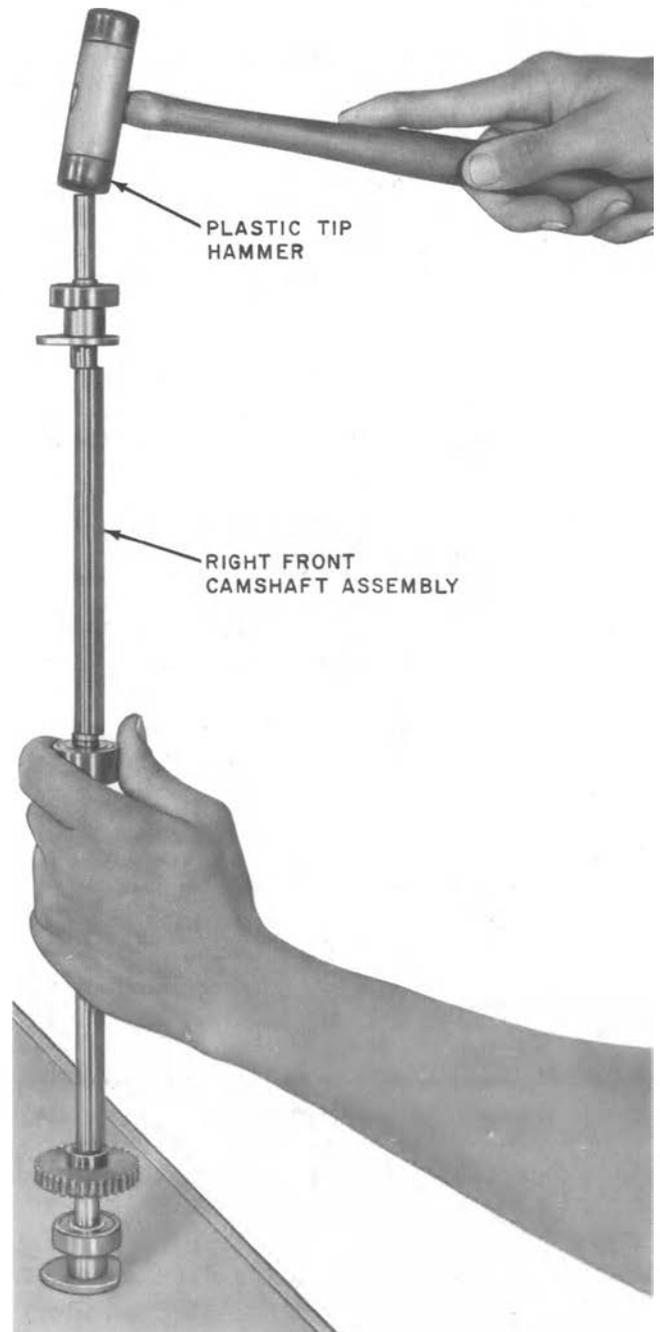


Fig. 57—Assembling Right Front Camshaft to Left Front Camshaft (Later Arrangement)

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- (54) Place the large inner retaining ring on the shaft.
- (55) Mount replacement outer bearing on both shafts by starting each bearing on the associated shaft with the bearing positioned against the small retaining ring on the right rear camshaft and against the cam collar on the right rear camshaft by using the brass tubing in accordance with (47) through (49).
- (56) Mount the small bearing retaining ring in the associated groove on the right front camshaft as required.
- (57) Mount the outer large retaining ring.
- (58) Mount the outer yoke assembly (earlier arrangement) as shown in Fig. 53 as required.
- (59) Mount the cam on the right rear shaft with the associated collar facing the bearing, and make sure that the scribed lines on the cam and shaft are in alignment.
- (60) Position the cam so that the hole in the cam is in line with the hole in the shaft.
- (61) Remount the roll pin using the 1/8-inch drive pin punch and 4-ounce riveting hammer.
- (62) Remount the dial and clamp assembly on the right front camshaft but do not tighten the clamp screws.
- (63) Remount the pulley on the left rear camshaft aligning the scribe lines on the pinned assemblies.

Left Front and Left Rear Camshaft Assemblies (Fig. 52 and 53)

- (64) Remove the cam on the left front camshaft, the outer yoke assembly (as appropriate), the bearings on both shafts, and the inner yoke assembly (as appropriate) in accordance with (35) through (41).

Note: Do not remove the gears on either shaft or the cam on the left rear camshaft.

- (65) Disengage the camshaft assembly to be replaced in accordance with (42) or (43).

- (66) Mount the replacement camshaft assembly in accordance with (44) through (63).

Note: The replacement camshaft assembly is furnished with the gear and cam pinned to the shaft.

- (67) If the left front camshaft is being replaced, remove the cam from this shaft before inserting the shaft in the center bearing.

Note: Removal of the cam from the left camshaft is not required.

- (68) Remount the yoke assemblies (old arrangement), bearing, and cam in accordance with (44) through (63).

Remounting Camshaft Assemblies

- (69) Mount the camshaft assemblies (old yoke assembly coupled or individual left and right assemblies in the perforator with the pulley extending into the opening in the casting and the bearings resting on the lower bearing supports.
- (70) Engage the gears so that the dot on one gear is adjacent to and in line with the dot on the mating gear.
- (71) Mount the large bearing retaining rings in their respective grooves in the lower bearing supports as shown in Fig. 52.
- (72) Position the dial to indicate 180 degrees when the dots on the gears are in alignment.
- (73) Securely tighten the clamp assembly or setscrews using a hex socket screw wrench.
- (74) Remount the upper half of each bearing support in the proper position.
- (75) Remount the lubricator pads.
- (76) Insert and securely tighten the bearing support clamping screws using a hex socket screw wrench or the 4-inch E screwdriver.
- (77) If the later yoke assembly arrangement is provided, proceed as follows.
 - (a) Remount the four yoke assemblies.

- (b) Remount a yoke guide on both ends of each yoke assembly.
 - (c) Install and securely tighten the yoke guide, mounting screws, washers, and nuts using the 417A and a hex socket screw wrench.
- (78) Remount the selector support bracket on the center bearing support and securely tighten the mounting screws.

Remounting Selectors (Fig. 50 and 51).

- (79) Remove the in-bin and out-bin in accordance with 3.40 and 3.45, respectively.
- (80) Loosen the clamp screws of the left portion of the card feed coupling using a hex socket screw wrench and disengage this member by sliding the coupling to the left.
- (81) Remove the coupling key plate.
- (82) Lower the punch and card feed assembly by loosening each mounting screw four turns using a hex socket screw wrench.
- (83) If the assembly does not follow the mounting screws, pull the assembly down so that the assembly rests on the screw heads.
- (84) Mount the KS-13903 L1 selector at the front (out-bin side) and the KS-13903 L2 selector at the rear (in-bin side) of the perforator.
- (85) Grasp both ends of the selector from the magnet side, and with the selector tilted inward, position the selector in the perforator so that the latch stop limiters enter the associated holes in the bottom of the selector.
- (86) Move the selector to an upright position, and push the selector inward until the slots at the bottom of the selector fully engage their associated locating screws in the perforator frame.
- (87) Remount the dowel pin at each end of the selector.
- (88) Remount the shuttle bar guide, and make sure that the shuttle bar mounting shim is in place if the shim is provided.
- (89) Securely tighten the guide mounting screws.
- (90) Connect the yoke assemblies to the shuttle bar, and remove the cord holding the shuttle bar in place.
- (91) Position the connectors on the associated mounting bracket, and securely tighten the connector mounting screws.
- (92) Remount the connector cover plate and the perforator side panels.
- (93) Remount the clutch drive and cam switch assemblies in accordance with 3.23 and 3.36, respectively.
- (94) Turn up the screws of the card feed assemblies equally in succession and tighten all securely.
- (95) Check that the latch is in the home position in accordance with Section 034-305-701.
- (96) Align the index lines of the card feed mechanism just as a card hook shoe is leaving the chain guide while working from the front of the perforator.
- (97) Remount the card feed coupling key plate and reconnect the coupling.
- (98) Make sure that the index lines of the card feed mechanism are aligned just as a card hook shoe is leaving the chain guide.
- (99) Securely tighten the clamp screw.
- (100) Remount the in-bin and out-bin in accordance with 3.40 and 3.45, respectively.
- (101) Check the phasing and card feed and perforation requirements in accordance with Section 034-305-701.

3.59 Camshaft Bearings: To replace camshaft bearings, proceed as follows.

- (1) Remove the outer camshaft bearings in accordance with 3.58(1) through (41).
- (2) If the center bearings are to be replaced, proceed as follows.
 - (a) Disengage the shafts in accordance with 3.58(42) or (43).

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- (b) Remove the center bearings using the bearing puller.
- (3) Mount the replacement bearings and reassemble the parts in accordance with 3.58(35) through (101).

3.60 Yoke Assembly: To replace a yoke guide assembly (Fig. 51), proceed as follows.

- (1) If the earlier yoke assembly arrangement is provided, proceed as follows.
 - (a) Remove the outer or inner yoke assemblies in accordance with 3.58(1) through (41) and (64) through (68).
 - (b) Substitute the replacement assembly and reassemble the parts in accordance with 3.58(44) through (101).
- (2) If the later yoke assembly arrangement is provided, proceed as follows.
 - (a) Remove the four yoke assemblies in accordance with 3.58(1) through (21).
 - (b) Substitute the replacement assembly and reassemble the parts in accordance with 3.58(77) through (101).

3.61 Yoke and Cam Follower: To remove the yoke and cam follower (Fig. 21 and 51), proceed as follows.

- (1) If the earlier yoke assembly arrangement is provided, proceed as follows.
 - (a) Remove the inner or outer yoke assembly in accordance with 3.58(1) through (41) and (64) through (68).
 - (b) Remove the cam follower using the \blacklozenge 276 and R-3193 wrenches.

Note: If one cam follower requires replacement, replace both followers. Substitute replacement parts as required.

- (c) Place the cam follower and the spacer on the stud.
- (d) Insert the stud in the hole in the side of the yoke which will be adjacent to the cam on the eccentric shaft.

- (e) Mount the lockwasher and nut.
- (f) Securely tighten the nut using the \blacklozenge 276 and R-3193 wrenches.
- (g) Mount the yoke assembly.
- (h) Reassemble the parts in accordance with 3.58(44) through (101).

- (2) If the later yoke assembly arrangement is provided, proceed as follows.
 - (a) Remove the yoke assembly in accordance with 3.58(1) through (21).
 - (b) Remove the cam follower using the \blacklozenge 276 and R-3193 wrenches.

Note: If one cam follower requires replacement, replace both followers.

- (c) Place the replacement cam follower and the spacer on the stud.
- (d) Insert the stud in the hole in the side of the yoke which will be adjacent to the cam on the eccentric shaft.
- (e) Mount the lockwasher and nut.
- (f) Securely tighten the nut using the \blacklozenge 276 and R-3193 wrenches.
- (g) Mount the yoke assembly.
- (h) Reassemble the parts in accordance with 3.58(77) through (101).

3.62 Yoke Roller Guides or Yoke Guides: To replace yoke roller guides (Fig. 52) or yoke guides (Fig. 51) (Note 2), proceed as follows.

Note 1: If a yoke roller guide is to be replaced on a perforator provided with the later mounting arrangement (2.08), proceed in accordance with (a) and/or (b) as appropriate. If a newer type roller guide is to be replaced on a perforator provided with the earlier mounting arrangement, proceed in accordance with (c) and/or (d) as appropriate. If, in accordance with 2.08, all four earlier type roller guides associated with the same yoke are to be replaced by newer type roller guide on a perforator having the earlier mounting arrangement, proceed in accordance with (e).

Note 2: Yoke roller guides are replaced by yoke guides in the most latest manufactured perforators. Replace yoke guides in accordance with 3.61(2) except do not remove the yoke assembly.

(a) ***Lower Yoke Roller Guides and Studs (Later Mounting Arrangement)***

- (1) Remove the camshaft assemblies in accordance with 3.58(1) through (29).
- (2) If a yoke roller guide is to be replaced, proceed as follows.
 - (a) Remove the outer retaining ring associated with yoke roller guide to be replaced using the R-2975 pliers.
 - (b) Remove the outer spacer and yoke roller guide.
 - (c) Mount the replacement yoke roller guide.
 - (d) Remount the spacer and retaining ring.
- (3) If the yoke roller guide stud is to be replaced, proceed as follows.
 - (a) Remove the outer retaining ring associated with the yoke roller guide to be replaced using the R-2975 pliers.
 - (b) Remove the outer spacer and yoke roller guide.
 - (c) Remove the inner spacer and retaining ring.
 - (d) Loosen the setscrew associated with the stud using a hex socket wrench.
 - (e) Remove the stud.
 - (f) Mount the inner retaining ring, inner spacer, yoke roller guide, outer spacer, and retaining ring on the replacement stud.
 - (g) Mount the stud and associated parts but do not tighten the setscrew.
- (4) Remount the cam drive in accordance with 3.58(69) through (71).

- (5) Adjust the position of the yoke roller guide stud so that the flanges of the roller guide do not bind on the sides of the yoke.

- (6) Tighten the stud mounting setscrews.

- (7) Reassemble other parts in accordance with 3.58(69) through (71) or (74) through (101).

(b) ***Upper Yoke Roller Guides and Studs (Later Mounting Arrangement)***

- (1) Remove the upper half of the camshaft bearing support assembly in accordance with 3.58(1) through (27).

- (2) If the yoke roller guide is to be replaced, proceed as follows.

- (a) Remove the outer retaining ring associated with the yoke roller guide to be replaced using the R-2975 pliers.

- (b) Remove the outer spacer and yoke roller guide.

- (c) Mount the replacement yoke roller guide.

- (d) Remount the spacer and retaining ring.

- (3) If the yoke roller guide stud is to be replaced, proceed as follows.

- (a) Remove the outer retaining ring associated with the yoke roller guide to be replaced using the R-2975 pliers.

- (b) Remove the outer spacer and yoke roller guide.

- (c) Remove the inner spacer.

- (d) Remove the inner retaining ring using the R-2975 pliers.

- (e) Loosen the associated stud using a hex socket screw wrench.

- (f) Remove the stud.

- (g) Mount the inner retaining ring, spacer, yoke roller guide, outer spacer, and retaining ring on the replacement stud.

(h) Mount the stud with associated parts in the upper half of the bearing support, but do not tighten the setscrew.

(i) Using the 3-inch C screwdriver, turn the stud to the position in which maximum clearance will be obtained between the yoke roller guide and yoke when the bearing support is remounted.

(j) Remount the upper half of the bearing support in accordance with 3.58(72) through (76).

(k) Position the yoke roller guide stud laterally so that the flanges of the yoke roller guide do not bind on the sides of the yoke.

(l) Using the 3-inch C screwdriver, turn the stud until perceptible clearance is obtained between the upper yoke roller guide and yoke when the yoke rests on the lower assembly.

(m) Securely tighten the setscrew.

(4) Reassemble other parts in accordance with 3.58(69) through (101).

(c) ***Lower Yoke Roller Guides and Shaft (Earlier Mounting Arrangement)***

(1) Remove the camshaft assemblies in accordance with 3.58(1) through (29).

(2) If a yoke roller guide is to be replaced, proceed as follows.

(a) Remove the elastic stopnut securing the yoke roller guide to be replaced using the 418A wrench.

(b) Remove the outer spacer and yoke roller guide.

(c) Mount the replacement yoke roller guide and spacer.

(d) Mount and securely tighten a replacement elastic stopnut. (Do not reuse the old stopnut.)

(3) If a yoke roller guide shaft is to be replaced, proceed as follows.

(a) Remove the elastic stopnuts securing the yoke roller guide shaft to be replaced using the 418A wrench.

(b) Remove the outer spacer, yoke roller guide, and inner spacer from both ends of the shaft.

(c) Mount the replacement shaft.

(d) Mount a spacer, yoke roller guide, and spacer, respectively, on one end of the replacement shaft.

(e) Mount a replacement elastic stopnut flush with the end of the shaft. (Do not reuse the old stopnut.)

(f) Similarly, mount a spacer, yoke roller guide, and spacer on the other end of the shaft.

(g) Mount a replacement elastic stopnut and securely tighten.

(4) Reassemble other parts in accordance with 3.58(69) through (101).

(d) ***Upper Yoke Roller Guides and Studs (Earlier Mounting Arrangement)***

(1) Remove the upper half of the camshaft bearing support assembly in accordance with 3.58(1) through (27).

(2) If a yoke roller guide is to be replaced, proceed as follows.

(a) Remove the retaining ring associated with the roller guide to be replaced using the R-2975 pliers.

(b) Remove the outer spacer and yoke roller guides.

(c) Mount the replacement yoke roller guide.

(d) Remount the spacer and retaining ring.

- (3) If the yoke roller guide stud is to be replaced, proceed as follows.
- (a) Remove the retaining ring associated with the roller guide to be replaced using the R-2975 pliers.
 - (b) Remove the outer spacer and yoke roller guides.
 - (c) Remove the inner spacer.
 - (d) Loosen the setscrew associated with the stud using a hex socket screw wrench.
 - (e) Remove the stud.
 - (f) Place the inner (thick) spacer, yoke roller guide, outer (thin) spacer, and retaining ring, respectively, on the slotted end of the replacement stud.
 - (g) Mount the stud with associated parts in the upper half of the bearing support, but do not tighten the setscrew.
 - (h) Using the 3-inch C screwdriver, turn the stud to the position in which maximum clearance will be obtained between the yoke roller guide and yoke when the bearing support is mounted.
 - (i) Remount the upper half of the camshaft bearing support in accordance with 3.58(72) through (76).
 - (j) Loosen the setscrew and turn the stud using the 3-inch C screwdriver until perceptible clearance is obtained between the upper yoke roller guide and the yoke when the yoke rests on the lower yoke roller guide.
 - (k) Securely tighten the setscrew.
 - (l) Make sure that the inner spacer in the stud is firmly against the bearing support.
- (4) Reassemble the other parts in accordance with 3.58(79) through (101).
- (e) **Replacing Earlier Type Roller Guides**
- (1) If all four earlier type yoke roller guides associated with the same yoke are to be replaced by later type yoke roller guides, proceed as follows.
 - (a) Replace the lower yoke roller guides in accordance with 3.62(c).
 - (b) Replace the upper yoke roller guides in accordance with 3.62(d).
 - (c) Reassemble the other parts in accordance with 3.58(69) through (78) except do not connect the yokes to the shuttle bar or remove the cord that holds the shuttle bar in place.
 - (d) Loosen the spacer block mounting screw and the clamping screw at the end of the shuttle bar to be connected to the yoke associated with the yoke roller guides which were replaced using the 3-inch C screwdriver and 418A wrench.
 - (e) Connect the yoke to the block and tighten the connecting screws friction tight.
 - (f) Tighten the spacer block mounting screw and the clamping screw.
 - (g) Tighten the connecting screws.
 - (h) Remove the cord holding the shuttle bar in place.
 - (i) Reassemble the remaining parts in accordance with 3.58(91) through (101).
- 3.63 Camshaft Lubricator Pad:** To replace a lubricator pad (Fig. 20), proceed as follows.
- Note:** The camshaft lubricator pads are located between the selectors so that the bracket of each pad is in line with the middle clamping screws of the camshaft bearing support. The outer slotted end of each bracket is secured under the washer of the end bearing support clamping screw, while the inner notched end of the bearing fits around the washer of the center bearing support clamping screw.

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- (1) Remove the screw and washer which secures the slotted outer end of the lubricator pad bracket using the KS-14336 screwdriver.
- (2) Remove the lubricator pad.
- (3) Position the replacement pad so that the notched inner end of the pad bracket fits around the washer of the center bearing support clamping screw and the slot in the outer end of the bracket is over the hole from which the screw was removed.
- (4) Remount the screw and washer.
- (5) Lubricate the pad in accordance with Section 034-305-701.

PARTS ASSOCIATED WITH KS-13903 SELECTOR

3.64 Selector Link: To replace a selector link (Fig. 58), proceed as follows.

- (1) Loosen the link bracket clamp screw on the selector magnet armature using a hex socket screw wrench.
- (2) Slide the bracket down and disengage the upper end of the link from the bracket pin through the large opening in end of the link.
- (3) Swing the link outward to a horizontal position.
- (4) Disengage the lower end from the interposer latch pin through the large opening in that end of the link.
- (5) Substitute the replacement link and reassemble in reverse order.
- (6) Make sure that when positioning the link bracket a sufficient amount of end play is left in the link to permit the armature to operate.

3.65 Selector Magnet, Armature, and Armature Retaining Strip: To replace a selector magnet, armature, and/or armature retaining strip (Fig. 58), proceed as follows.

- (1) Remove the links from all selector magnets in the horizontal row of the part to be replaced and also from the magnets above this row in accordance with 3.64.

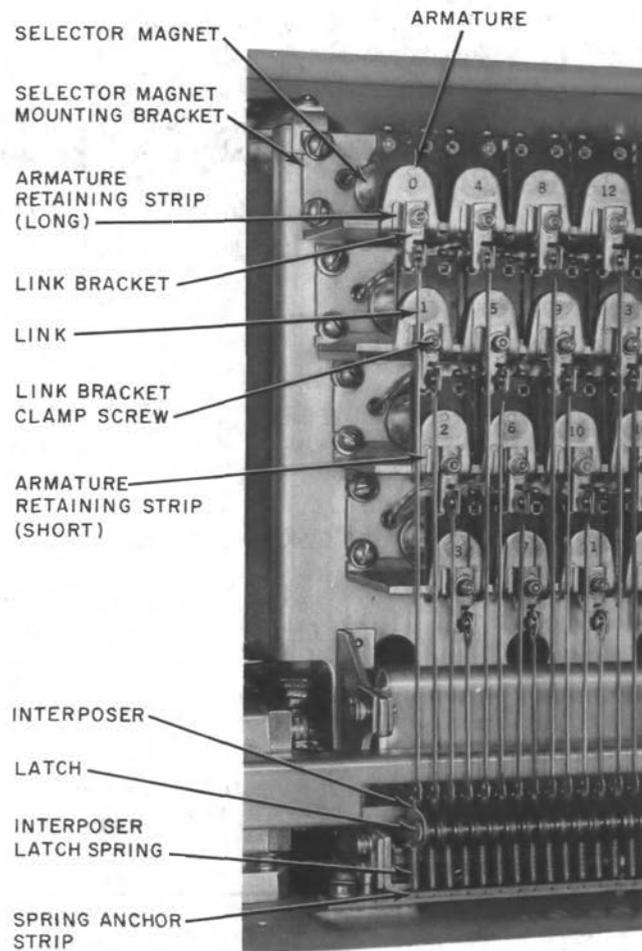


Fig. 58—Selector and Associated Parts

- (2) If a part in any but the top row is to be replaced, slide all the link brackets in the row above the part to be replaced to their uppermost position and tighten the clamp screws.
- (3) Using the 4-inch E screwdriver, remove the screws and lockwashers from the mounting bracket of the part to be replaced.
- (4) Carefully pull the mounting bracket and attached leads away from the selector unit.
- (5) Suspend the bracket by the leads in front of the unit and take care not to damage the connections.
- (6) If a magnet is to be replaced, proceed as follows.
 - (a) Unsolder the leads from the magnet terminals.

- (b) Carefully turn the mounting bracket bottom up.
 - (c) Remove the sealing compound from the heads of the armature retaining strip mounting screws and mounting bracket surface using KS-19578 L1 trichloroethane and the KS-14164 brush.
 - (d) Remove the retaining strip mounting screws using the 476A wrench.
 - (e) Remove the armatures and carefully set them aside.
 - (f) Remove the magnet mounting nut and lockwasher using the #276 wrench.
 - (g) Remove the magnet.
 - (h) Mount the replacement magnet and securely tighten the mounting nut.
 - (i) Remount all the armatures, taking care to replace them in the positions from which removed.
 - (j) Remount the armature retaining strip and securely tighten the mounting screws.
 - (k) Check the armature adjustments in accordance with Section 034-305-701.
 - (l) Apply a small amount of KS-6824 sealing compound around the head of each screw and adjacent surface of the mounting bracket using a KS-14164 brush.
 - (m) Solder the leads to the magnet.
 - (n) Remount the links in accordance with 3.64.
- (7) If an armature or armature retaining strip is to be replaced, proceed as follows.
- (a) Proceed in accordance with (6) except that it will not be necessary to unsolder the magnet leads or remove the magnet.
 - (b) Substitute replacement parts as required.
 - (c) Reassemble parts in reverse order of removal.

3.66 Interposer Latch Spring: To replace an interposer latch spring (Fig. 58), proceed as follows.

- (1) Disengage the latch end of the spring using the KS-8511 tweezers.
- (2) Disengage the end of the spring attached to the spring anchor strip using the KS-8511 tweezers.
- (3) Substitute the replacement spring.
- (4) Hook the replacement spring to the spring anchor strip.
- (5) Hook the other end of the spring to the latch.

3.67 Outer Comb Assembly: To replace the comb assembly (Fig. 50), proceed as follows.

- (1) If replacing combs at the front of the perforator, move the shuttle bar to its outermost position by pulling up on the motor belt.
- (2) If replacing combs at the rear of the perforator, move the shuttle bar to its outermost position by pulling down on the motor belt.
- (3) Remove three selector links at each end of the comb in accordance with 3.64.

Note: If a modified R-2670 or R-3415 wrench is not available, modify a wrench as follows. File a notch around the short leg of the wrench approximately 1/8 inch from the bend using the R-1482 file. Break off the end of the short leg at the notch. Remove any burrs and chamfer the edges using the file.

- (4) Loosen the comb assembly clamping screws at each end of the comb assembly using the modified R-2670 or R-3415 wrench.
- (5) Raise the comb assembly and disengage the comb assembly teeth from the interposers.
- (6) Remove the assembly by passing it laterally through the opening between the selector links and the selector frame at the side of the perforator.

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- (7) Remove the clamping screws, washers, and clamping plate from each end of the comb assembly.
- (8) Copy the stenciled numbers from the old comb assembly on the replacement assembly using the R-1378 numbering set and R-2880 black stamping ink.
- (9) Insert the replacement comb assembly in reverse order of removal.
- (10) Position the assembly on the top of the steps of the interposer.
- (11) Move the comb laterally so that the step of each interposer is engaged in its associated comb slot. (Engagement of the interposers in the comb slots may be facilitated by slightly moving the interposers laterally as required.)
- (12) Place a block of wood approximately 1-1/4 inches square by 6-1/2 inches long on the frame of the perforator against the outer ends of the interposers.
- (13) Press the wood block firmly against the interposers, and clamp the block in this position using the C clamp. (This arrangement prevents forward movement of the interposers when positioning the replacement comb assembly.)
- (14) Grasp the ends of the comb assembly and carefully move it forward and downward so that the comb springs are behind and the comb teeth are in front of the interposer steps with the comb against the top of the interposers.
- (15) Mount the comb assembly with the rear clamping screws, tighten the screws friction tight, and make sure that the lockwashers are in place.
- (16) Insert and tighten the front clamping screws friction tight.
- (17) Maintain the comb assembly in a vertical position, and push it down against the interposers and back against the interposer steps using the KS-6320 orange stick.
- (18) Remove the wood block.
- (19) Check for clearance between the latch and shuttle bar by the in and out movement of the interposers.
- (20) If there is clearance, push the interposers back using the wood block and push the comb against the interposer steps using the KS-6320 orange stick until there is no clearance. Remove the wood block.
- (21) Carefully move each side of the comb assembly slightly outward until there is slight clearance between the latch and shuttle bar.
- (22) Check the clearance again by the in and out movement.
- (23) Raise each end of the comb assembly using the blade of the 3-inch C screwdriver under the rear clamping screw of the comb assembly until there is perceptible clearance between the top of each interposer and the top of the associated comb plot.
- (24) Securely tighten the clamping screw.
- (25) Check the latch engagement requirement in accordance with Section 034-305-701.
- (26) If the requirement is not met, reposition the comb assembly in accordance with (17) through (20).
- (27) When the requirement is met, remount the selector links in accordance with 3.64.

3.68 Comb, Comb Springs, and/or Clamp Bar: To replace the comb, comb springs, and/or clamp bar, proceed as follows.

- (1) Remove the comb assembly from the selector frame in accordance with 3.67.
- (2) Remove the clamp bar mounting screws and washers using the 3-inch C screwdriver.
- (3) Substitute replacement parts as required.
- (4) Reassemble in reverse order of removal.
- (5) Make sure that the spring tines overlap both sides of their associated comb slots by a minimum of 0.005 inch as gauged by eye.

- (6) Securely tighten the mounting screws.
- (7) Remount the comb assembly in accordance with 3.67.

MISCELLANEOUS PARTS

3.69 Chaff Bin: To replace the chaff bin (Fig. 44), proceed as follows.

- (1) Remove the out-bin in accordance with 3.45.
- (2) Remove the in-bin mounting screws using a hex socket screw wrench.
- (3) Pull the in-bin out approximately 2 inches.
- (4) Support the shaft bin and remove the mounting screws using a hex socket screw wrench.
- (5) Lower the shaft bin to clear the mounting surface on the punch and card feed assembly.
- (6) Swing the bottom of the bin out and remove the bin.
- (7) Substitute the replacement shaft bin and hold the bin so that the window is away from the perforator.
- (8) Slide the bin under the punch and card feed assembly slightly to the left of its normal position.
- (9) Lift the right end of the bin into position first. Make sure that the bin is properly seated and that the cable is not damaged during the mounting operation.
- (10) Insert and securely tighten the mounting screws.
- (11) Remount the out-bin in accordance with 3.45.
- (12) Slide the in-bin back into position and securely tighten the mounting screws.

3.70 Clamp Assemblies: To replace a clamp assembly (Fig. 59) of the type provided on initial production models of the perforator (2.07), proceed as follows.

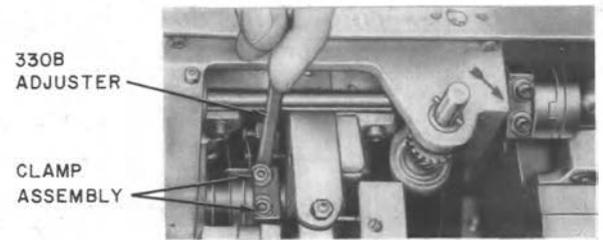


Fig. 59—Method of Holding Clamp Assemblies of Type Initially Provided

- (1) Position the clamp assembly screw for removal by turning the manual control handle or pulling up or down on the motor belt until the screw is accessible.
 - (2) Hold the rear clamp in place either using the finger or the 330B adjuster as shown in Fig. 59 before attempting to remove or replace the clamp assembly screw.
 - (3) Remove the screw using a hex socket screw wrench.
- Note:** Where there are two sets of clamps to be replaced, replace one set at a time in order to maintain the existing adjustments.
- (4) Remove the front clamp using the P long-nose pliers.
 - (5) Rotate the shaft counterclockwise to bring the rear clamp to the front position.
 - (6) Remove the clamp using the P long-nose pliers.
 - (7) Apply a film of KS-16832 lubricant to all surfaces of the replacement clamp assembly and mounting screw threads using the KS-14184 brush.
 - (8) Substitute the replacement clamp and mount the threaded half of the clamp assembly first. Take care that the clamp is positioned with the beveled portion resting against the shaft.
 - (9) Rotate the shaft while holding the clamp in place and mount the front half of the clamp.
 - (10) Insert and securely tighten the mounting screw.

3.71 Plug Assembly (Fig. 60): To replace a plug assembly, proceed as follows.

- (1) Disconnect the plug from the connector terminal block.
- (2) Remove the screws from the cable clamp using the 3-inch C screwdriver.
- (3) Remove the tape from the cable for a distance of approximately 3 inches back from the plug assembly.
- (4) Remove the plug cover mounting screws and washers using the 3-inch C screwdriver.
- (5) Slide the cover back along the cable.
- (6) Remove the cover mounting brackets from the plug terminal block.
- (7) Unsolder and tag the leads. Note the position of the 0 terminal.
- (8) Remove the cover.
- (9) Remove the cover and cover brackets from the terminal block of the replacement plug.
- (10) Slide the cover of the replacement plug onto the cable.
- (11) Make arrangements to support the terminal block until a few of the leads are resoldered.

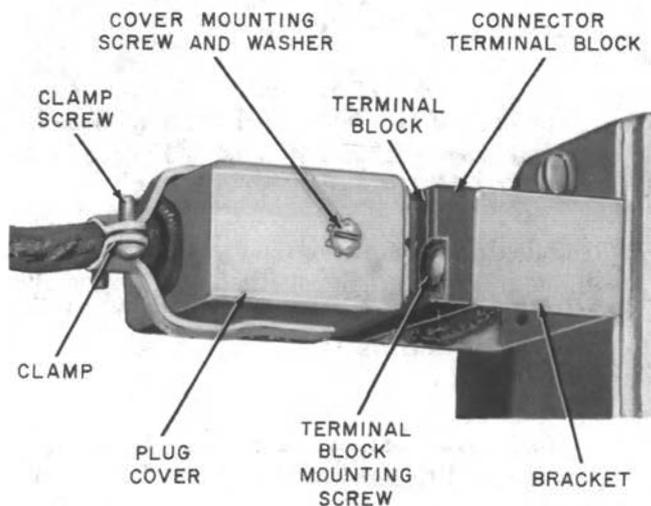


Fig. 60—Plug and Connector Assembly

- (12) Check the solder crosses and dress the leads after all leads are resoldered.
- (13) Assemble the bracket and cover in reverse order of removal and securely tighten all screws.
- (14) Insert the plug in the connector.

3.72 Terminal Block: To replace a connector terminal block (Fig. 60), proceed as follows.

- (1) Disconnect the plug.
- (2) Remove the terminal block mounting screws using the 3-inch C screwdriver.
- (3) Note the position of the 0 terminal before removing the terminal block from the mounting bracket.
- (4) Grasp the terminal block using the fingers and pull the block clear of the mounting bracket.
- (5) Move the terminal block so that the soldered connections can be reached.
- (6) Unsolder and tag the leads.
- (7) Connect and solder the leads to the replacement terminal block.
- (8) Check for solder crosses before mounting the terminal block.
- (9) Mount the terminal block on the bracket, and take care that the leads are dressed clear of the bracket before tightening the screws.

- (10) Connect the plug.

3.73 Motor Plug: To replace the motor plug (Fig. 61), proceed as follows.

- (1) Disconnect the plug from the receptacle.
- (2) Remove the terminal insulator from the prongs of the plug.
- (3) Disconnect the leads from the terminal using the 3-inch C screwdriver.
- (4) Tag the leads for later identification.

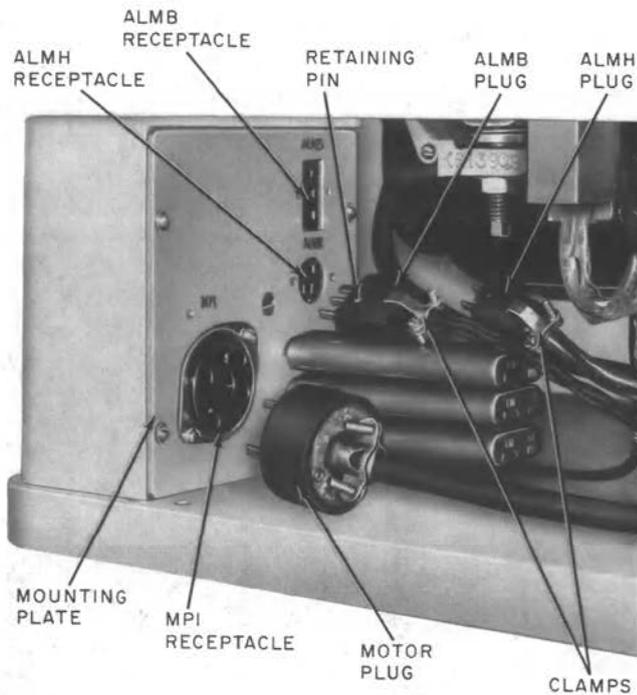


Fig. 61—Receptacles and Plugs

- (5) Loosen the cord clamping screws and pull the disconnected cord out through the opening in the plug.
- (6) Substitute the replacement plug and connect the leads.
- (7) Make sure that all screws are securely tightened.
- (8) Connect the plug to the receptacle.

3.74 ALMB and ALMH Plugs: To replace the ALMB or ALMH plug (Fig. 61), proceed as follows.

- (1) Disconnect the plug from the receptacle.
- (2) Remove the cover retaining pin by pushing on the extended end of the pin using the P long-nose pliers.
- (3) Grasp the pin head using the pliers and remove the pin.

- (4) Loosen the two clamp screws using the 3-inch C screwdriver.
- (5) Slide the plug cover back along the cable to reach the terminals.
- (6) Unsolder and tag the leads.
- (7) Slide the plug cover off the free end of the cable.
- (8) Remove the cover from the replacement plug and slide it over the cable.
- (9) Solder the leads to the plug terminals.
- (10) Reassemble all parts in reverse order of removal and securely tighten the screws.
- (11) Connect the plug to the receptacle.

3.75 ALMB, ALMH, and MPI Receptacles: To replace the ALMB, ALMH, or MPI receptacles (Fig. 61), proceed as follows.

- (1) Disconnect all plugs from the mounting plate assembly.
- (2) Make sure that all power has been removed from the receptacles.
- (3) Remove the mounting plate screws using the 3-inch C screwdriver.
- (4) Pull the mounting plate forward and turn the plate sufficiently to reach the terminals.
- (5) Disconnect the leads using the 3-inch C screwdriver.
- (6) Remove the receptacle mounting screws using the 3-inch C screwdriver.
- (7) Substitute the replacement receptacle.
- (8) Connect and dress all leads.
- (9) Check for loose or broken connections.
- (10) Remount the mounting plate and reconnect the plugs.

4. GENERAL INFORMATION

4.01 *Method of Handling Area-Spare Perforator*

- (a) The area-spare perforator is intended to be used for emergencies only and should be stored in a central location.
- (b) When the perforator is not in use or in use as an emergency perforator, the perforator should be mounted on a KS-14474 dolly. When the perforator is not in use, it should also be covered with the KS-14475 cover and should be stored in a location free from dampness and which provides protection from possible damage.
- (c) Ten P20A cords and one P2BH cord are supplied with each spare perforator. Patching cords facilitate connecting the perforator to the recorder bay receptacles without mounting the spare perforator in the frame. When the cords are not in use, they should be stored in the zipper compartment in the top of the KS-14475 cover.

4.02 *Mounting and Removal of KS-13834 Perforator*(a) *Mounting*

- (1) Secure the R-1497 rope hoist to the auxiliary frame.

Note: The framing bar should be located so the chain hoist will hang approximately 6 inches from the front side of the frame.

- (2) Move the dolly truck into position under the hoist and in front of the frame with the rear of the perforator facing the frame.
- (3) Attach the R-81438 hoisting chain to the perforator, as shown in Fig. 62.
- (4) Raise the perforator off the dolly truck using the hoist and move the dolly trunk away from the front of the frame.
- (5) Continue raising the perforator until the bottom of the unit is slightly above the level of the mounting brackets on the frame uprights.

R-1497 SELF LOCKING ROPE HOIST (OR THE REPLACED R-1844 CHAIN HOIST)

MOUNTING BRACKETS ON FRAME UPRIGHTS

R-81438 HOISTING CHAIN

PLACE HOOKS IN 3/4 IN. HOLES IN WEBS OF TOP CASTING AS SHOWN

KS-13834 PERFORATOR UNIT

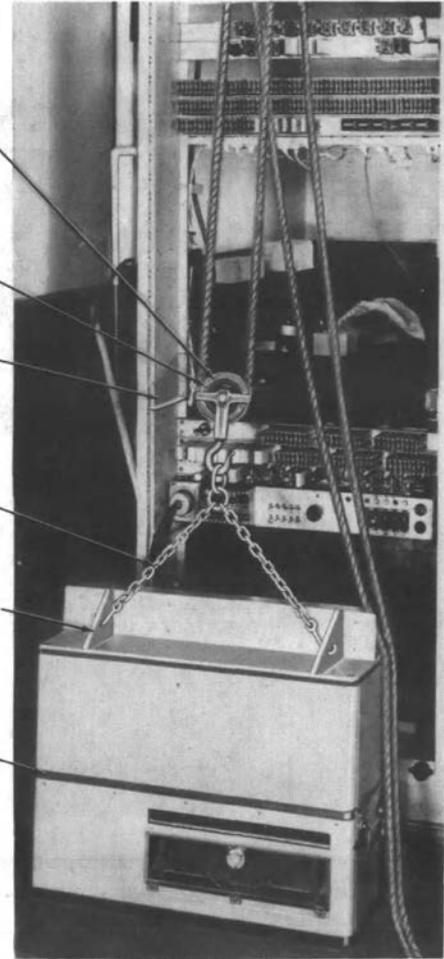


Fig. 62—Perforator in Position for Hoisting from Dolly Truck

- (6) Guide the perforator back in position, while operating the hoist, onto the mounting brackets on the frame uprights.

Caution 1: Exercise care to prevent the perforator and/or hoisting chain from rubbing or damaging the apparatus mounted above and below the perforator mounting space.

Caution 2: Do not remove the hoisting chain from the perforator until the perforator has been properly secured in place with mounting screws.

- (7) Fasten the bottom of the perforator to the mounting brackets using the slotted hexagon head screws furnished with the perforator.

- (8) Fasten the back of the perforator to the frame uprights using the round head screws and hexagon nuts. These are inserted from the rear of the frame through the tapped holes in the mounting bars and extended through the slotted holes in the mounting brackets located at the top rear of the perforator.
- (9) Place nuts on the screws and securely tighten to lock the perforator in position.
- (10) Remove the hoisting chain from the perforator.

- (11) Remove the wood blocks used to protect the perforator during shipment. The blocks must be removed before operating the motor (Fig. 63).

- (b) **Removal:** Reverse the mounting procedure in accordance with (a).

Caution: Attach the hoisting chain to the perforator before removing the mounting screws.

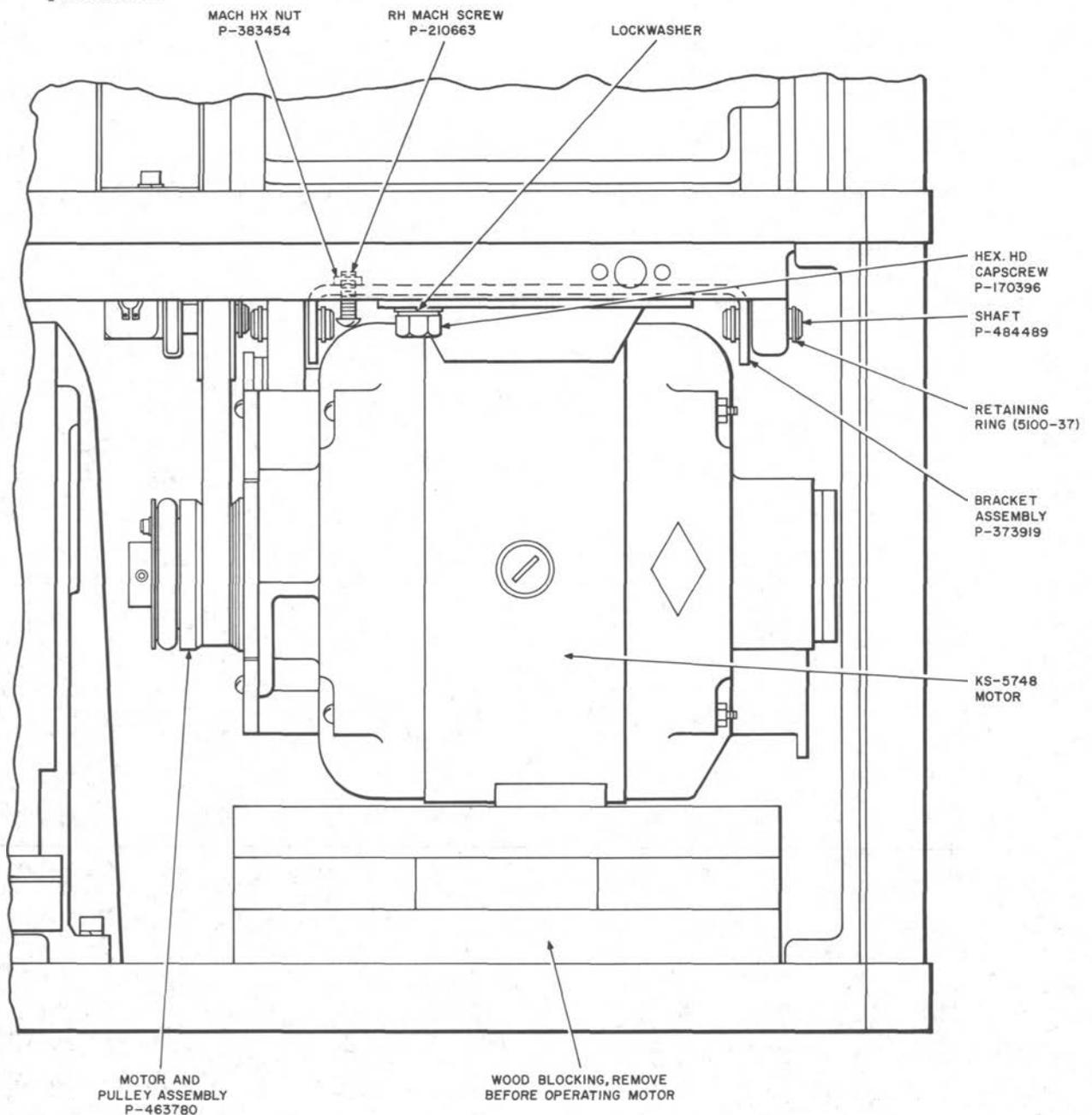


Fig. 63—Motor in KS-13834 L1 Perforator