400-TYPE MOUNTINGS AND ASSOCIATED MODULAR-TYPE KEYS INSTALLATION AND MAINTENANCE

1. GENERAL

1.01 This section is reissued to:

- Add information for small capacity mountings.
- Change numerical designation of the mountings.
- Change information for installing keys and adjusting counterbalance in large mountings.

1.02 Due to extensive changes marginal arrows have been omitted.

2. INSTALLATION

2.01 These mountings may be installed in a desk, shelf, or panel cutout. The supporting surface should be smooth and even. The mounting should lie flat on the supporting surface without rocking. The flanges should not be inset in the supporting surface. (See Fig. 1.) The faceplate assembly covers the flanges and gives a finished appearance.

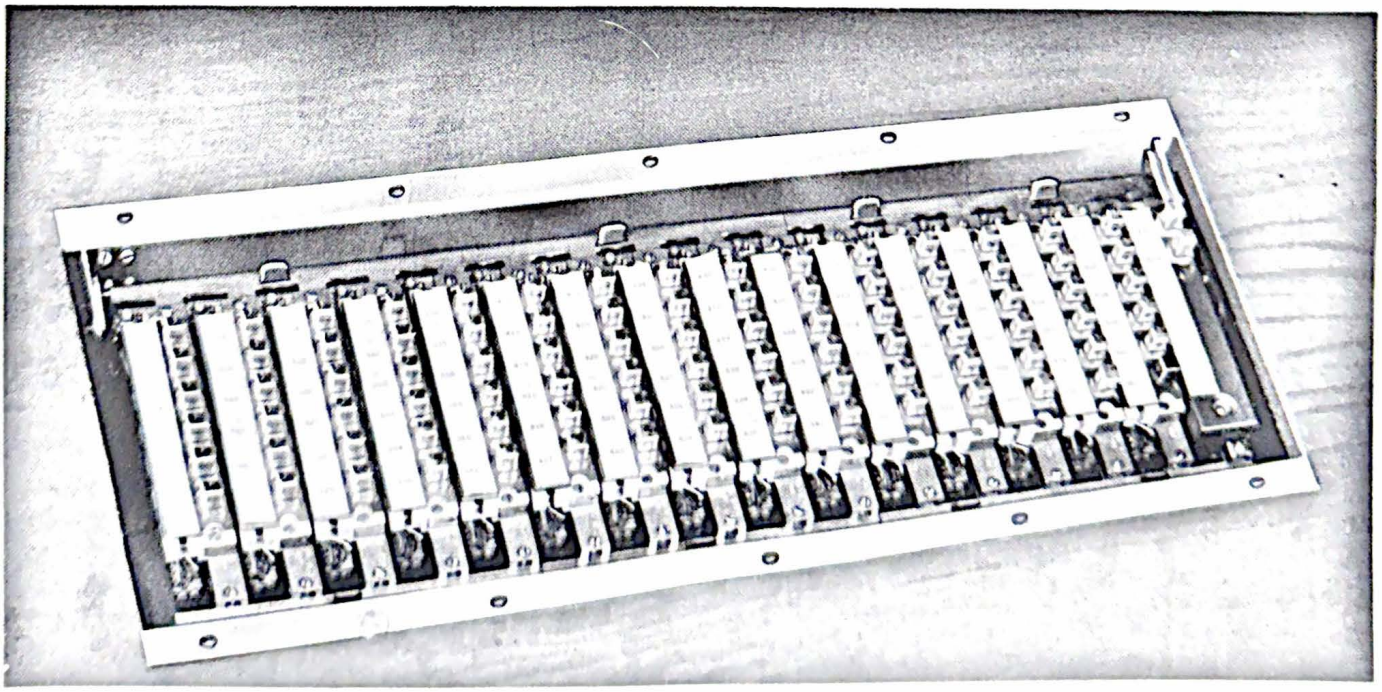


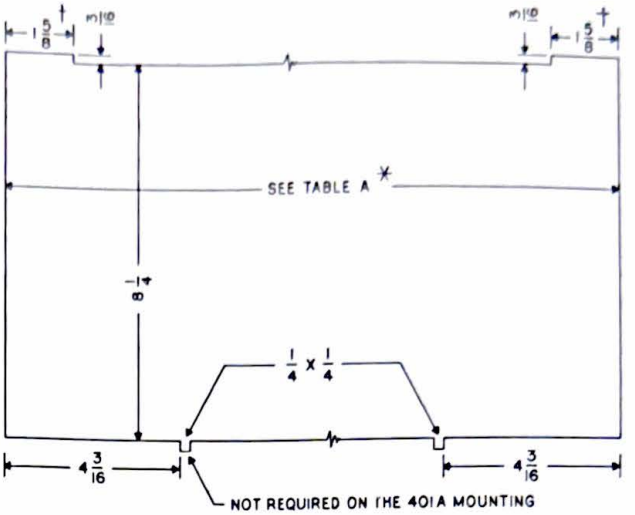
Fig. 1 — Mounting Typical Cutout

2.02 The dimensions of the cutout to be provided by the customer are shown in Table A and Fig. 2 and 3.

3. CONNECTING BLOCKS — LARGE CAPACITY

Mountings

3.01 One 64A connecting block is required for each group of five keys. The frame of the block provides support for the keys. Electrical connections between groups of keys and for the telephone set equipment are made on this block. The section entitled 400-Type Mountings and Associated Modular-Type Keys, Connections shows the position of the 64A connecting blocks in a block diagram of the system.



* UNITS OF LATER MANUFACTURE WILL BE ONE-HALF IN. LONGER AND ONE-HALF IN. DEEPER.

† THIS 1-5/8 IN. DIMENSION WILL BE REQUIRED FOR UNITS OF LATER MANUFACTURE. IT CAN BE REDUCED TO 1-3/8 IN. FOR EARLIER UNITS.

Fig. 2 — Cutout Dimensions

TABLE A

CUTOUT DIMENSIONS — FACEPLATE DIMENSIONS

Mounting			Minimum Depth Below Surface	Faceplate	
Code	Length	Width		Length	Width
			(inches)		
420A1	7-3/8	2	4	9.786	2.284
420A2	7-1/2	3-9/16	3-5/8	9.786	3.975
420A3	7-1/2	5*	3-5/8	10.571	9.786
421A1	7-1/2	3-9/16	3-5/8	9.786	3.975
421A2	7-1/2	4-7/8	3-5/8	9.786	5.288
421A3	7-1/2	5*	3-5/8	11.884	9.786
422A1	7-1/2	4-7/8	3-5/8	9.786	5.288
423A2	9-7/8	8-1/4†	4-1/4	10.478	9.786
423A3	16-1/2	8-1/4†	4-1/4	17.043	9.786
424A2	16-1/2	8-1/4†	4-1/4	17.043	9.786
424A3	23	8-1/4†	4-1/4	23.608	9.786
425A2	23	8-1/4†	4-1/4	23.608	9.786
425A3	29-1/2	8-1/4†	4-1/4	30.173	9.786
426A2	29-1/2	8-1/4†	4-3/4	30.173	9.786
430A2	13-11/16	2	3-7/8	14.934	2.158
431A1	13-11/16	2	3-7/8	14.934	2.158
431A2	20-1/8	2	4-1/4	21.238	2.158
432A1	20-1/8	2	4-1/4	21.238	2.158
690A2 Subscriber Set	6-5/16	6-13/16	3-7/16	9.786	7.1

* See Fig. 3

† See Fig. 2

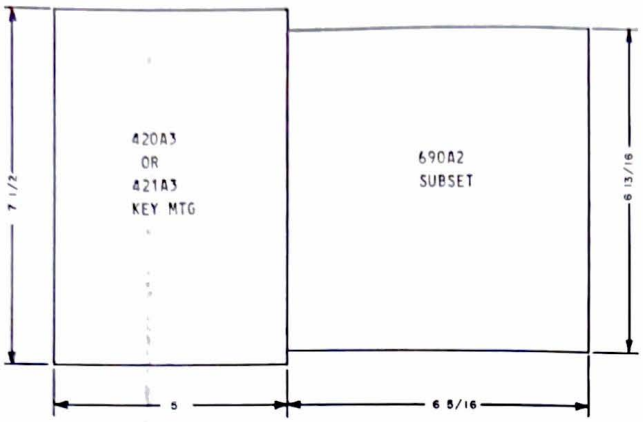


Fig. 3 — Cutout Dimensions, 420A3 and 421A3 Mountings with 690 A2 Subset

3.02 Mount the 64A connecting blocks as shown in Fig. 4 and 5.

3.03 The 63A connecting block should be mounted on the first or third 64A connecting block using the two screws from the 64A frame (Fig. 5). It should be mounted after the associated key has been placed to facilitate terminating the key leads.

3.04 No connecting blocks are used with the smaller mountings (6 to 18 line).

3.05 The connector cables used with the small mountings are described in the section entitled Connector Cable, Identification.

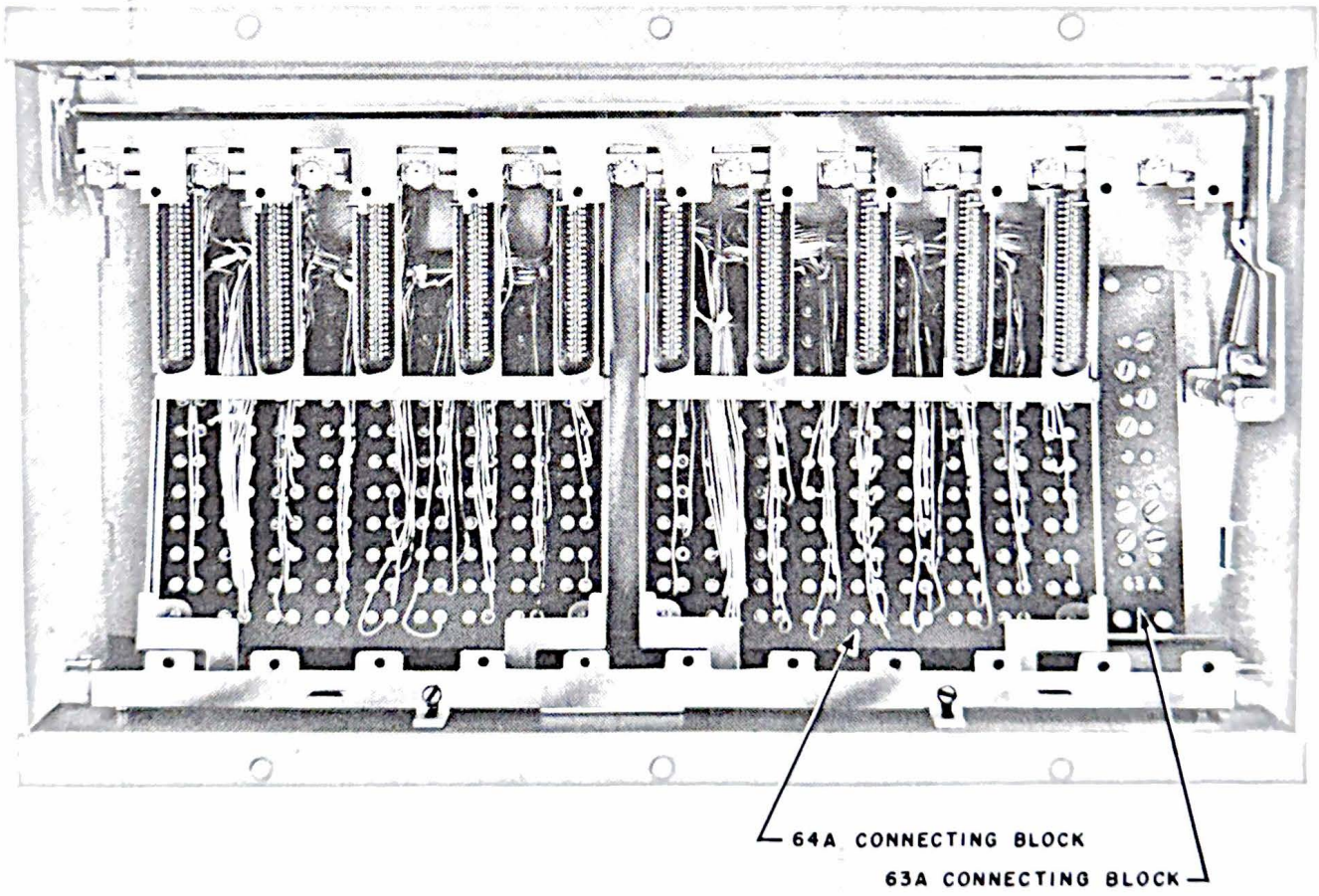


Fig. 4 — Top View of Connecting Blocks

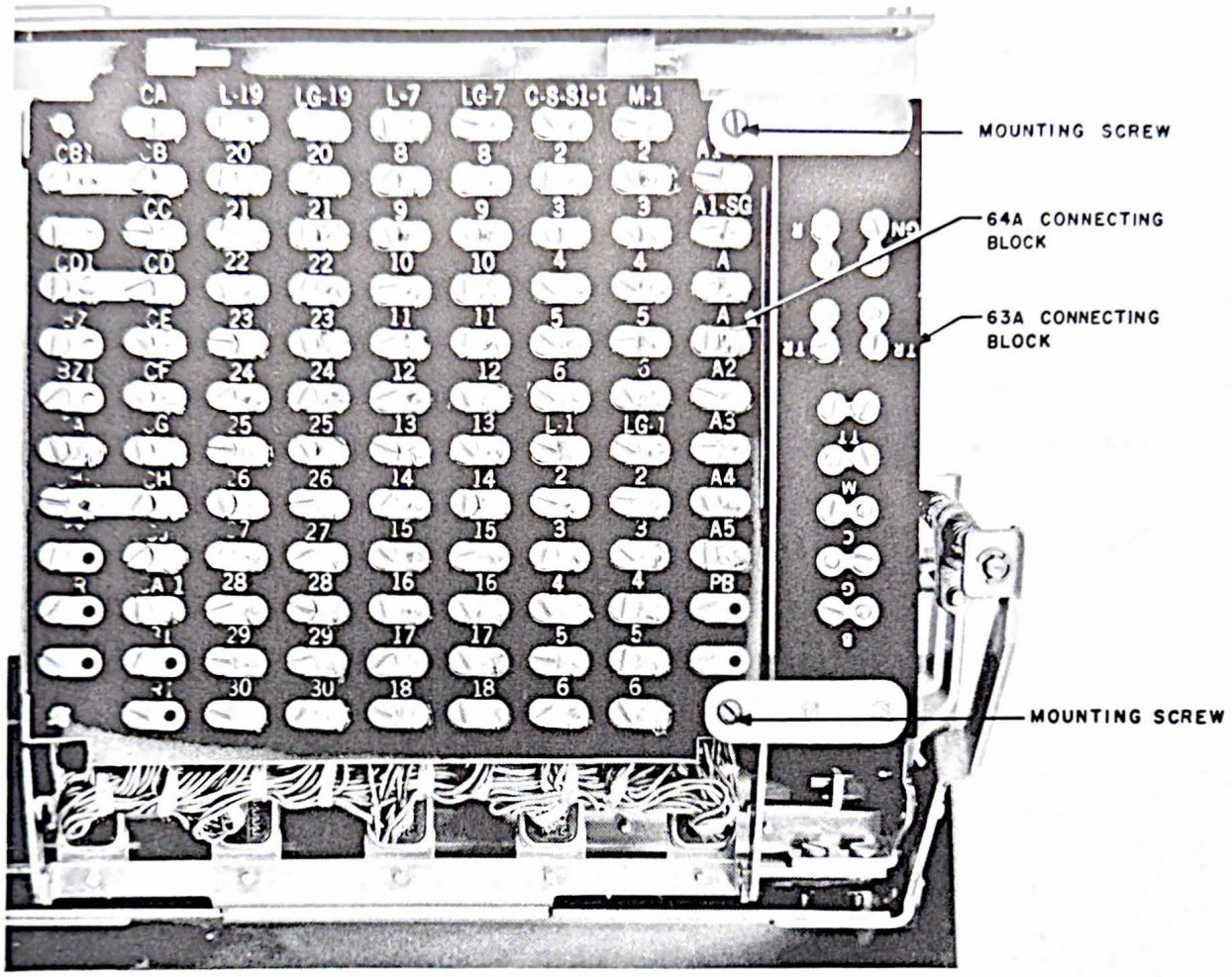


Fig. 5 — Bottom View of Connecting Blocks

4.00 INSTALLATION OF KEYS — ADJUSTMENT OF COUNTERBALANCE

Large Mounting

4.01 The following work operations should be performed in the order given:

1. Position the mounting at the angle in which it will be installed.

2. Check the PIVOT BAR for freedom of movement. There should be perceptible end play between the PIVOT BAR bracket bushing and the pivot arm bracket (A in Fig. 6). Adjustment may be made by moving the bracket. Two machine screws are provided for this purpose (B in Fig. 6).

3. The counterbalance is made adjustable to compensate for the different angles at which these mountings may be installed. The following preliminary adjustments should be made before installing the first key:

   - When the mounting is installed at an angle of 0 to 25 degrees from the horizontal, the upper spring on the counterbalance will control the PIVOT BAR action. Loosen the lock nut on the adjusting screw and turn the screw until the counterbalance arm is approximately parallel with the bracket (Fig. 7). The upper spring should be exerting a downward pressure on the adjusting block. A No. 48 tool may be used for making this adjustment.

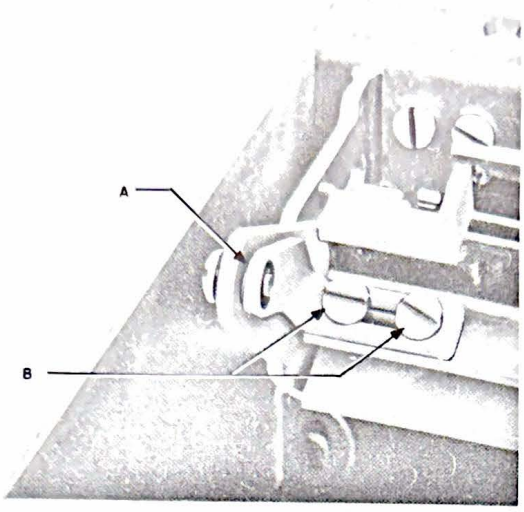


Fig. 6 — Pivot Bar, End-Play Adjustment

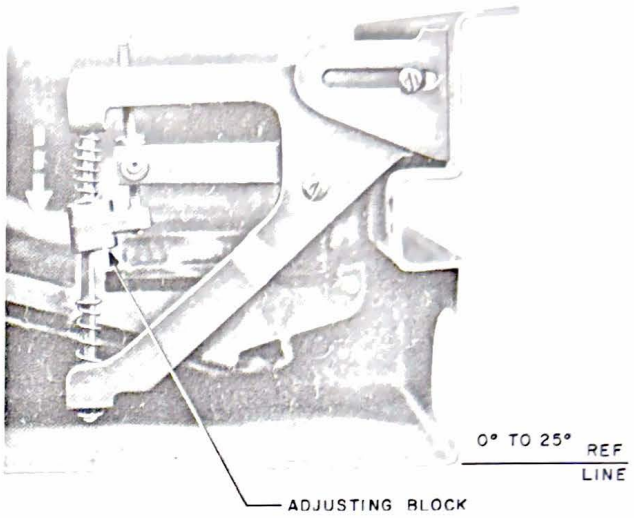


Fig. 7 — Installation at 0 to 25 Degrees

- When the mounting is installed at an angle of 25 to 35 degrees, the counterbalance should be neutralized; ie, neither upper nor lower spring exerting pressure on the adjusting block. The weight of the PIVOT BAR will control the position of the arm (Fig. 8).

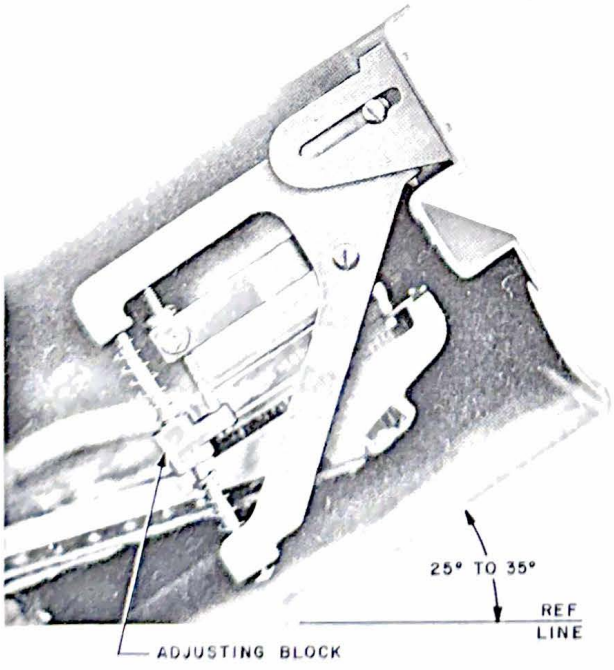


Fig. 8 — Installation at 25 to 35 Degrees

- When the mounting is installed at an angle of 35 to 75 degrees, the weight of the PIVOT BAR must be partially compensated by upward pressure on the adjusting block. Adjust the position of the block to a point where the lower spring holds the arm parallel to the bracket (Fig. 9).

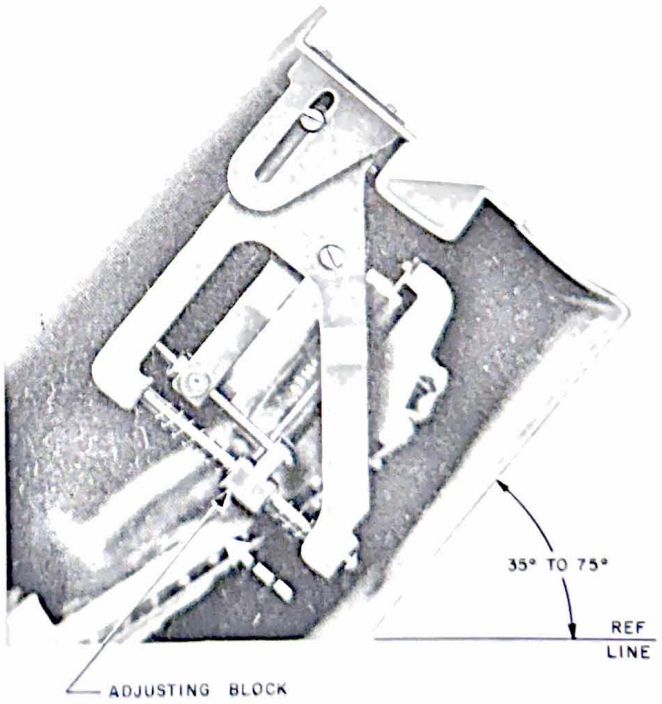


Fig. 9 — Installation at 35 to 75 Degrees

4. Fasten the front framework member *securely against the dust pan.*

5. Push all latch arm brackets against the PIVOT BAR. Retighten the Allen set screws.

Remove return springs from latch bars of all keys. See Fig. 10 for types of return springs.

6. Test the keys to determine that the latch bars are free from binding or sticking. This may be done by holding the key in a vertical position with the notched end of the latch bar up. The latch bar should fall freely into the key when raised with the fingers and released. With the key held in the vertical position, all locking-type buttons should latch when depressed.

7. Install the 599-type key. Tighten the screws about finger tight with screwdriver. Position this key as far toward the front frame member as slack in the front screw hole will allow and tighten the front screw firmly.

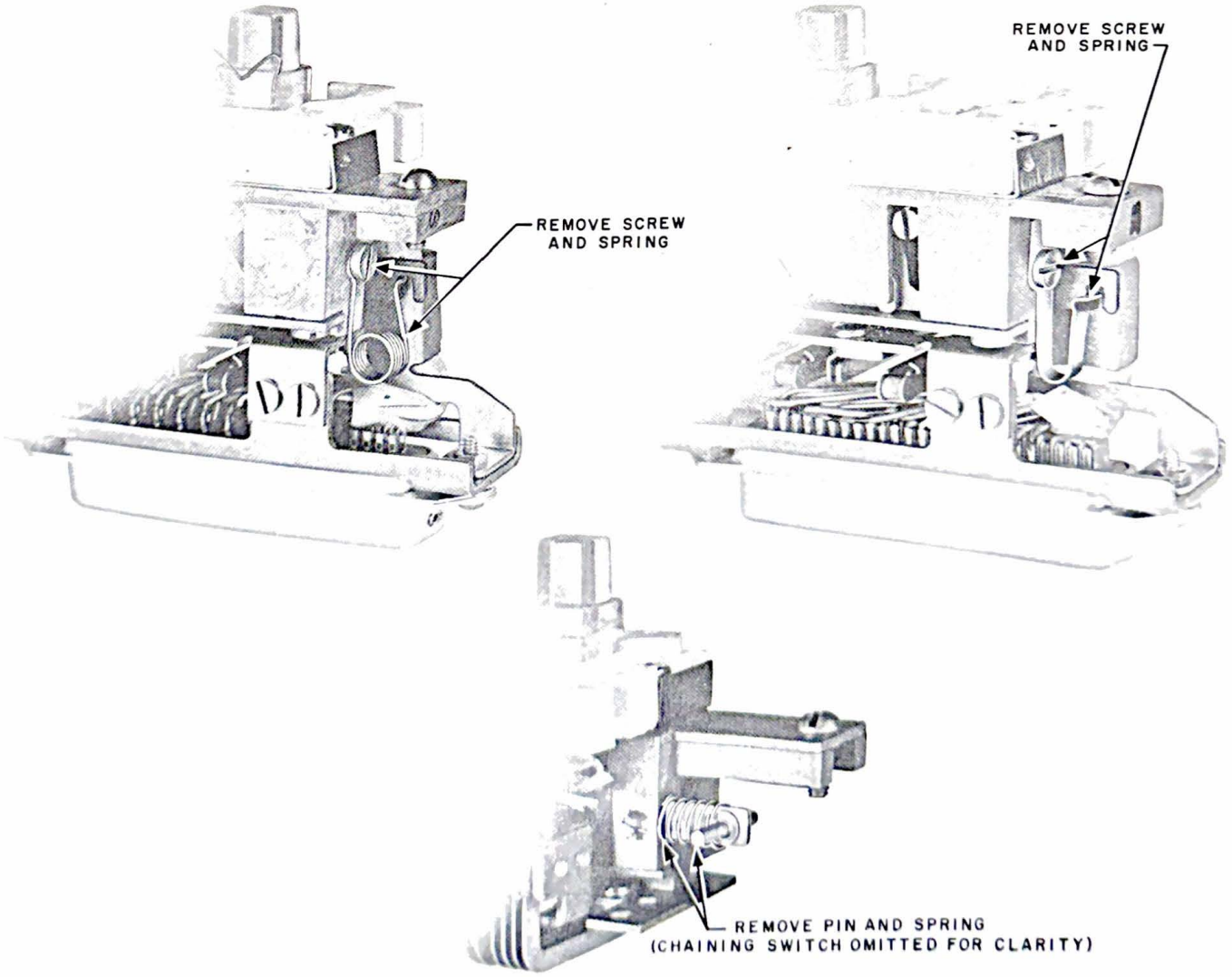


Fig. 10 — Typical Latch Bar Return Springs

8. Tighten the screw at the PIVOT BAR end of the key while holding the framework spread apart. Fig. 11 and 11A illustrate a method for making this adjustment. To avoid breaking the key mounting screws, use only enough force to hold the framework spread apart.

9. Loosen the Allen set screw holding the latch arm bracket for the 599 key. Push the latch bar fully into the key and retighten the set screw without disturbing the PIVOT BAR. The Allen set screw must be *very tight* to maintain this adjustment. An Allen No. 607 Handi-Hex key 5/64 inch or equivalent is recommended for tightening the set screws. In most cases the latch arm bracket will be against the PIVOT BAR and require no further adjustment.

10. Proper latching and releasing of key buttons is dependent upon the adjustment of the latch arm assembly and the pressure exerted against the latch bars by the PIVOT BAR assembly. Clockwise rotation of the counterbalance adjusting screw reduces the pressure against the latch bars. Counterclockwise rotation increases the pressure. If a button will not latch, the pressure should be increased by turning the adjusting screw *counterclockwise*. If a button will not release, the pressure should be reduced by turning the adjusting screw clockwise.

Adjust the counterbalance to a point where all buttons on the key installed in Step 9 will latch when depressed. The buttons should release on the upstroke of the HOLD button, but not release on the down stroke of the HOLD button.

11. Install the 621- or 622-type key. Push the latch arm assembly for this key against the PIVOT BAR and tighten the set screw securely. If the key is a 622-type, connect the battery supply to the solenoid. Refer to the section covering connections for 400-type key mountings.

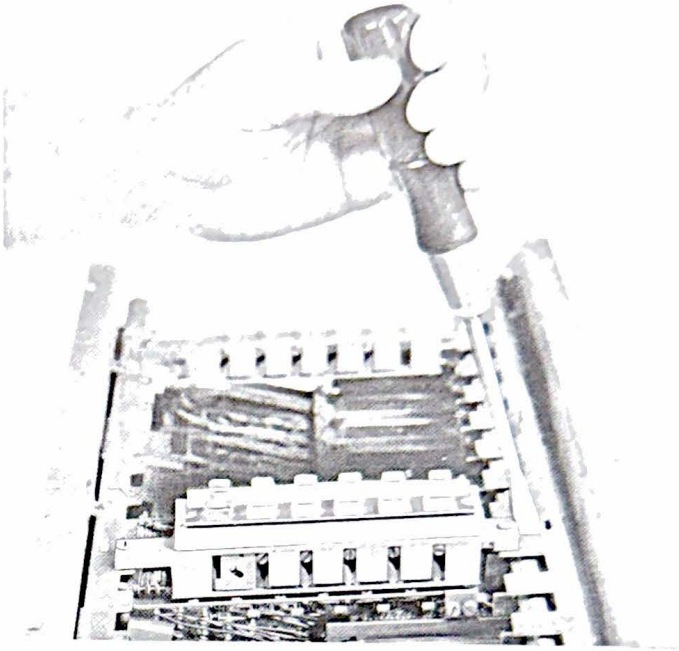


Fig. 11 — Spreading Framework

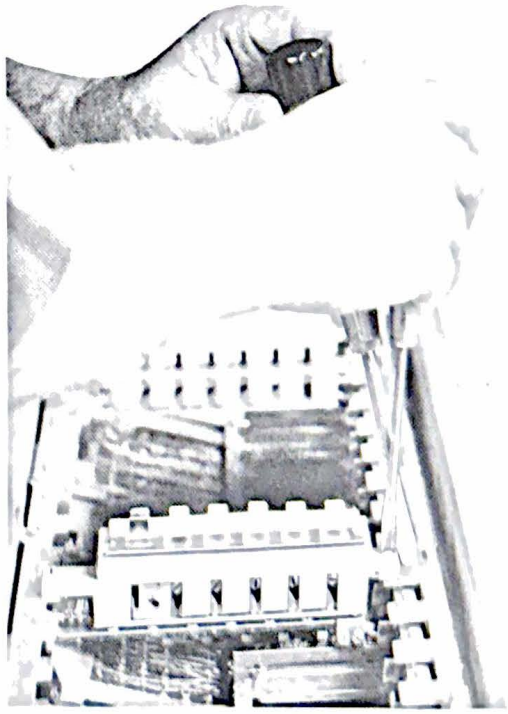


Fig. 11A — Tightening Mounting Screw

12. Install additional keys in the order given in Fig. 12. Test each key as it is installed. This sequence of installing and testing each key individually will detect errors in adjustments or malfunctioning keys quickly.

13. It may be necessary to adjust the position of the latch arm bracket for some keys. This should be done by moving the bracket away from the pivot bar in small increments as required. The entire line-up of keys should be tested after each adjustment to determine that the adjusted latch arm bracket is not restricting the throw of the PIVOT BAR. A slight forward pressure on the Handi-Hex Key as the set screw is being tightened will remove any slack in the coupling between the latch arm bracket and key latch bar. This ensures a finer adjustment.

14. It may be necessary to increase PIVOT BAR pressure as additional keys are added. Retest latching and release functions after each adjustment.

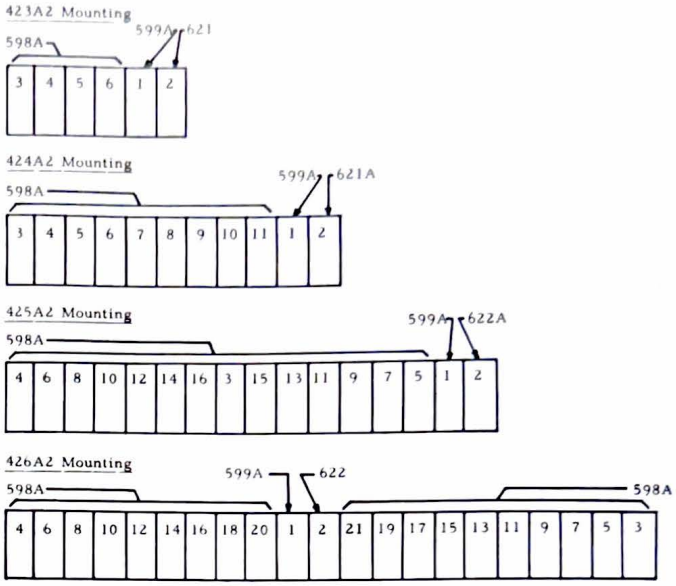
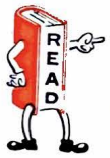


Fig. 12 — Sequence for Installing Keys, Large Capacity Mountings

5. CABLING

5.01 The hinged framework can accidentally fall to the closed position in the course of the following work operations. See Fig. 13 and 15 for the placing of the P-14E116 support bracket.



To prevent injury to the hands, the P-14E116 support bracket must be in place during the work operations.

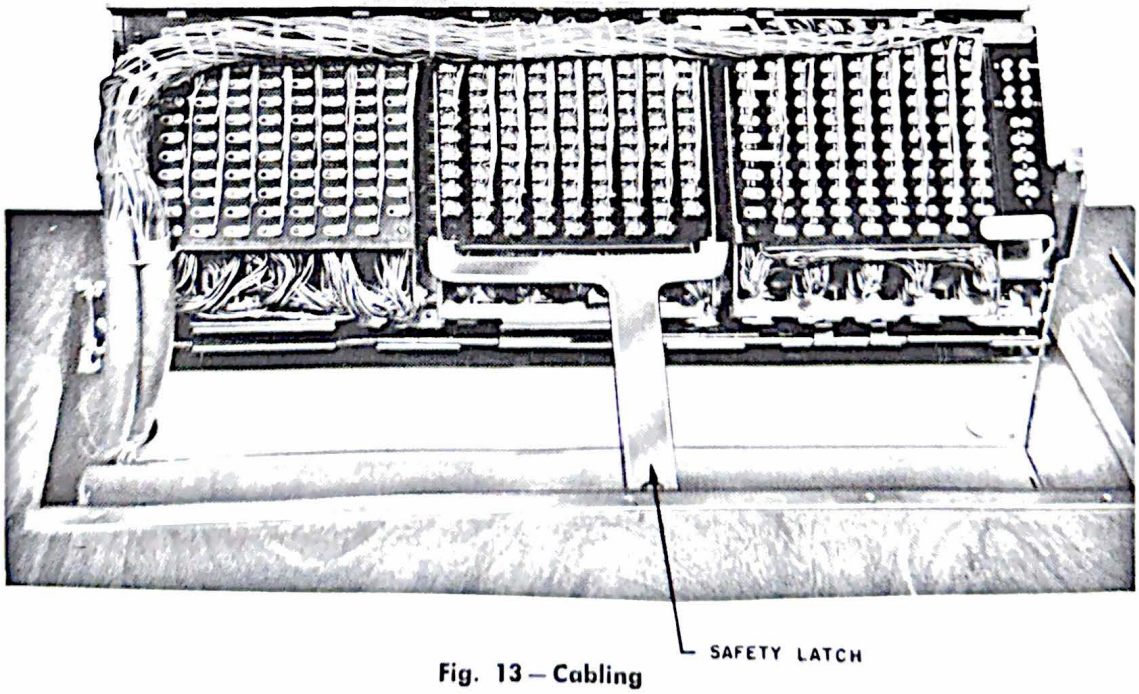


Fig. 13 — Cabling

5.02 The following sizes will provide for a full complement of keys in these mountings when concentrator equipment is used:

- 423A2-423A3 Mounting, one 50-pair cable
- 424A2-424A3 Mounting, one 100-pair cable
- 425A2-425A3 Mounting, one 100-pair cable, one 50-pair cable
- 426A2 Mounting, two 100-pair cables.

5.03 Two knockouts are provided for cable entrance to the mounting. The left side knockout should be used on the 423A, 424A, and 425A mountings (Fig. 13, 14, and 15). Both knockouts will be used on the 426A mounting.

5.04 A 7-1/2 inch slack loop must be left between the last cable support outside of the mounting and the 64A connecting block frame.

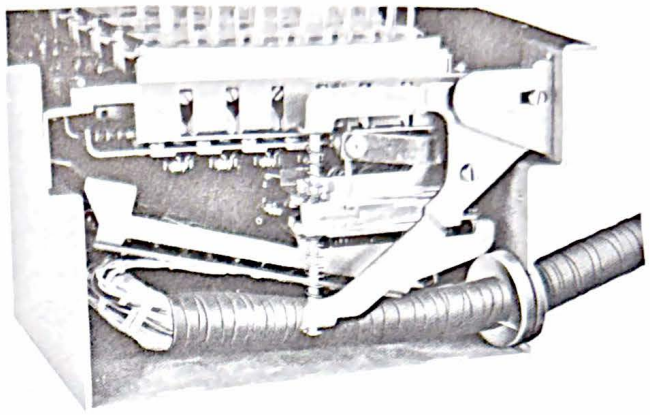


Fig. 14 — Fasten Cable to 64A Connecting Block

5.05 Fig. 15 illustrates a typical arrangement of the cable on a 64A connecting block frame.

5.06 Fig. 16 illustrates a method of forming the cables on the 64A connecting blocks.

5.07 The tables in Section **512-240-400** should be used to determine the assignment of the cable conductors.

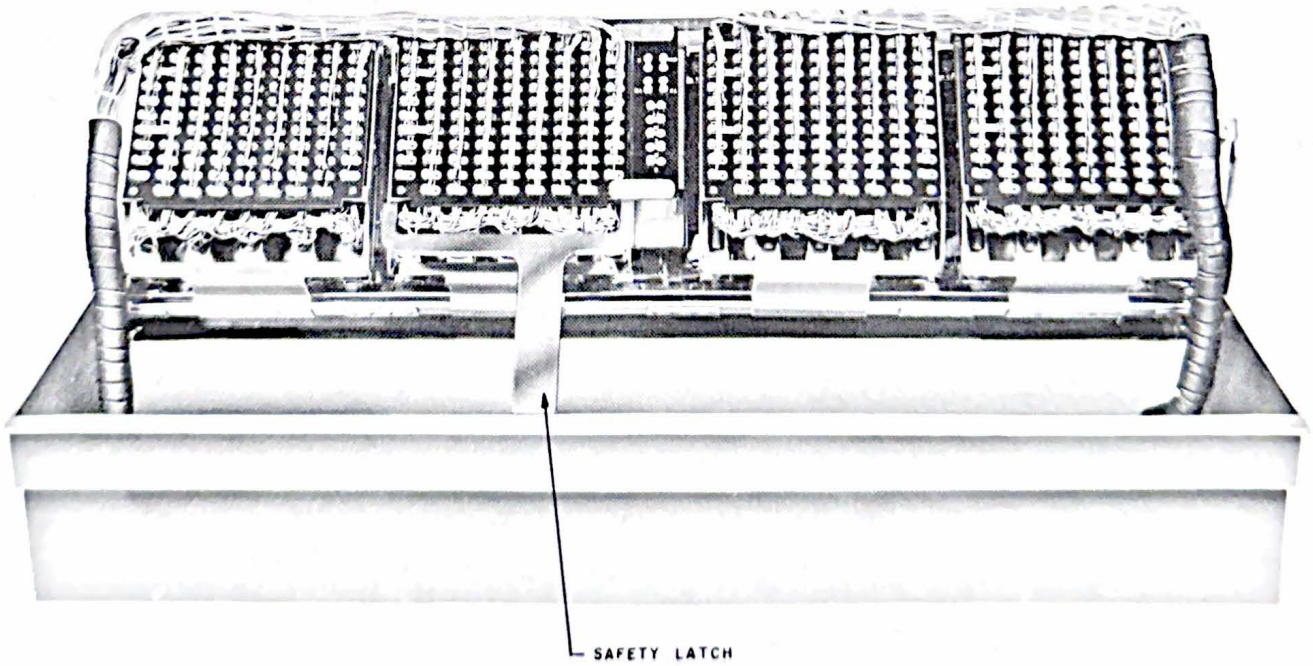


Fig. 15 — Cable Entrance, Right Side 404A Mounting

6. DESIGNATION STRIPS

6.01 The Form E-4646 (8-58) designation strips are used with the modular-type keys in these mountings. They are placed on the P-10E866 light shields on the 598- and 599-type keys. On 621A or 622A keys the designation strip is placed on the key cover. The adhesive backing strips should be removed from the designation strip before it is pressed in place.

7. FACEPLATE ASSEMBLY

7.01 To assemble the faceplate, mat, and bezel:

1. Lay the faceplate upside down on a smooth surface, top edge on the left side.
2. Place the mat upside down on the faceplate with the cutouts in exact alignment.
3. Hold the bezel upside down with the top edge on the left.
4. Slide the mat and faceplate into the edge grooves of the bezel slowly. Observe that the narrow sections of the paper mat do not catch on the steel bezel.

7.02 The faceplate assembly fastens to the mounting with four spring clips. The spring clips should engage the studs with a positive grip.

7.03 The cutouts in the faceplate should be carefully aligned to slip over P-10E863 collars on the keys. *Forcing* the faceplate into alignment may result in bending the steel bezel and a poor fit.

8. KEY MAINTENANCE

8.01 Refer to the section entitled Telephone Sets, THE CALL DIRECTOR, Maintenance, for the maintenance of the 598- and 599-type keys.

621A and 622A Keys

8.02 The following requirements should be checked on maintenance visits that require removal of the keys:

- All assembly screws shall be tight; gauge by feel.
- All mechanical parts shall operate freely without binding; gauge by feel.
- The Lucite buttons and collars shall not be chipped, broken, or dirty. The button assembly may be removed for cleaning or replacement by removing the two mounting screws. Clean Lucite parts with a water-dampened cloth. *Do not use lubricants or solvents*
- Soldered terminations should be tight and without excess solder.

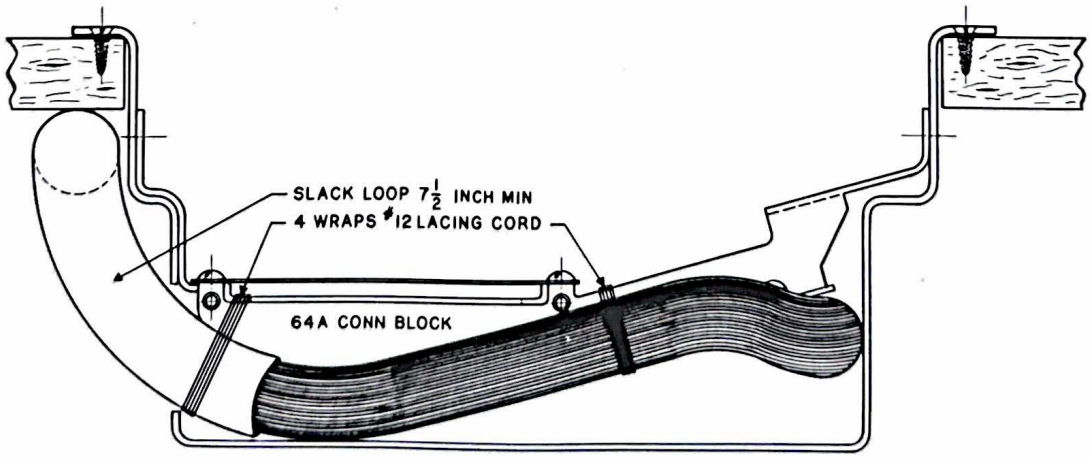


Fig. 16 — Cabling, 404A Mounting

- The wire leads shall be dressed away from moving parts.

- The make contacts of the flash key shall make before the break contacts break; gauge by eye (A in Fig. 17).

- There shall be perceptible stud gap between the stud and the tang on the make contact; gauge by eye (B in Fig. 17).

- Contact pressure of made contacts shall be minimum 15 grams. Use 70H gauge.

- Contact separation shall be 0.006 inch minimum; gauge by eye (C in Fig. 17).

622A Key — Solenoid Booster Maintenance

8.03 The solenoid booster is designed to reduce the button pressure required to release operated keys in the larger mountings. If trouble develops in this unit, these requirements should be checked.

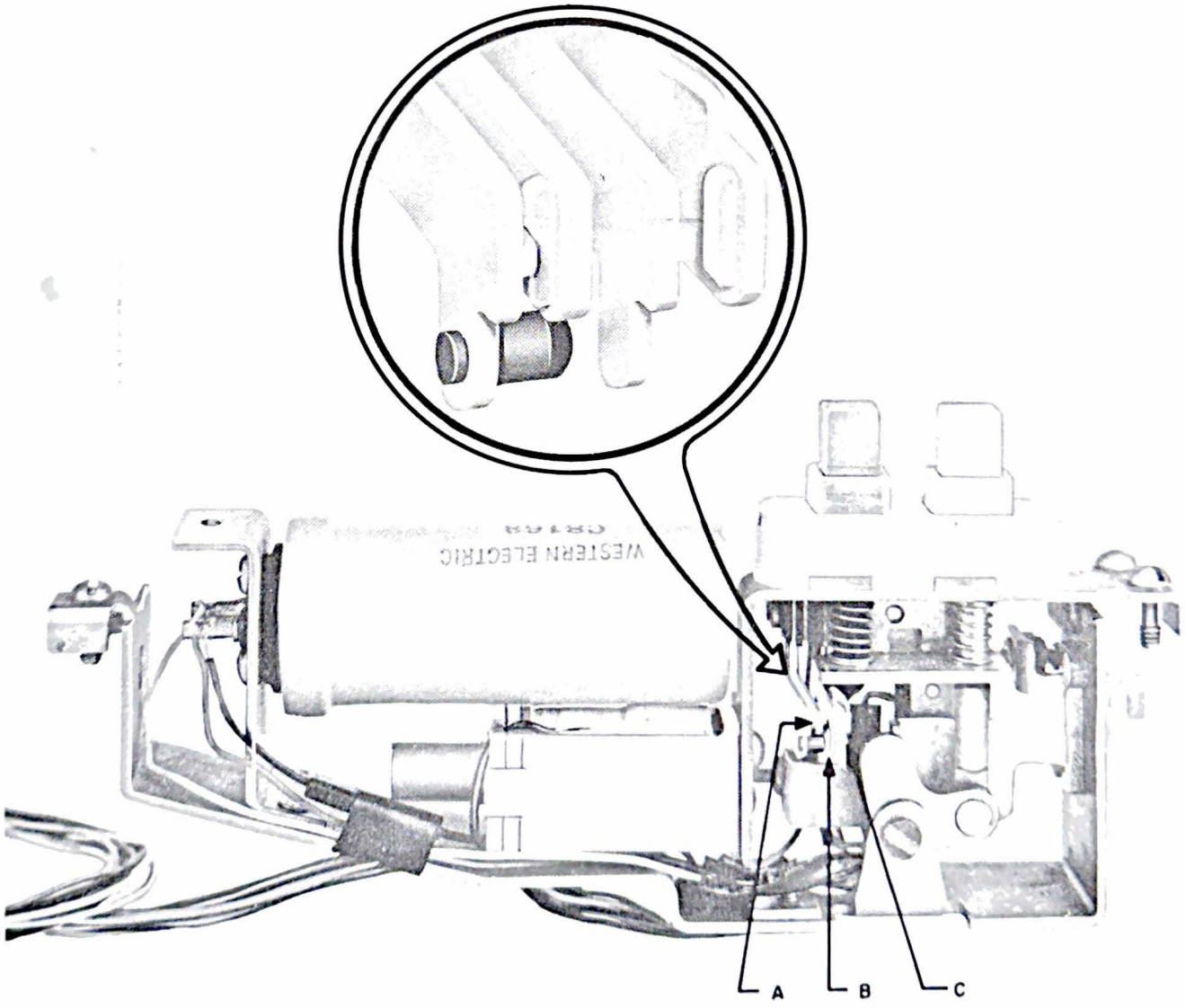


Fig. 17 — 622A Key, Right Side

- The solenoid slug should be 0.005 inch to 0.015 inch from the bottom of the solenoid at the completion of the stroke. Gauge by feel. To adjust the position of the slug, loosen the locknut with a 388A tool, and turn the slug in or out with the fingers (Fig. 18).

- The *red* capacitor lead should be NEGATIVE. To check the polarity, disconnect the *red* lead at the 63A connecting block. Connect a suitable voltmeter to terminals B and G. A positive indication should be obtained with the + voltmeter lead on G and the − voltmeter lead on B.

- The MICRO SWITCH should energize the solenoid with approximately 0.030 inch travel of the latch bar; gauge by eye (A in Fig. 18). Adjust with screw (B in Fig. 18).

- The total solenoid stroke should be 0.125 inch; gauge by eye. Restriction of the stroke may be caused by an improperly adjusted PIVOT BAR bracket or the solenoid slug striking the bottom of the solenoid. Set the latch arm bracket in accordance with 4.01, Step 12.

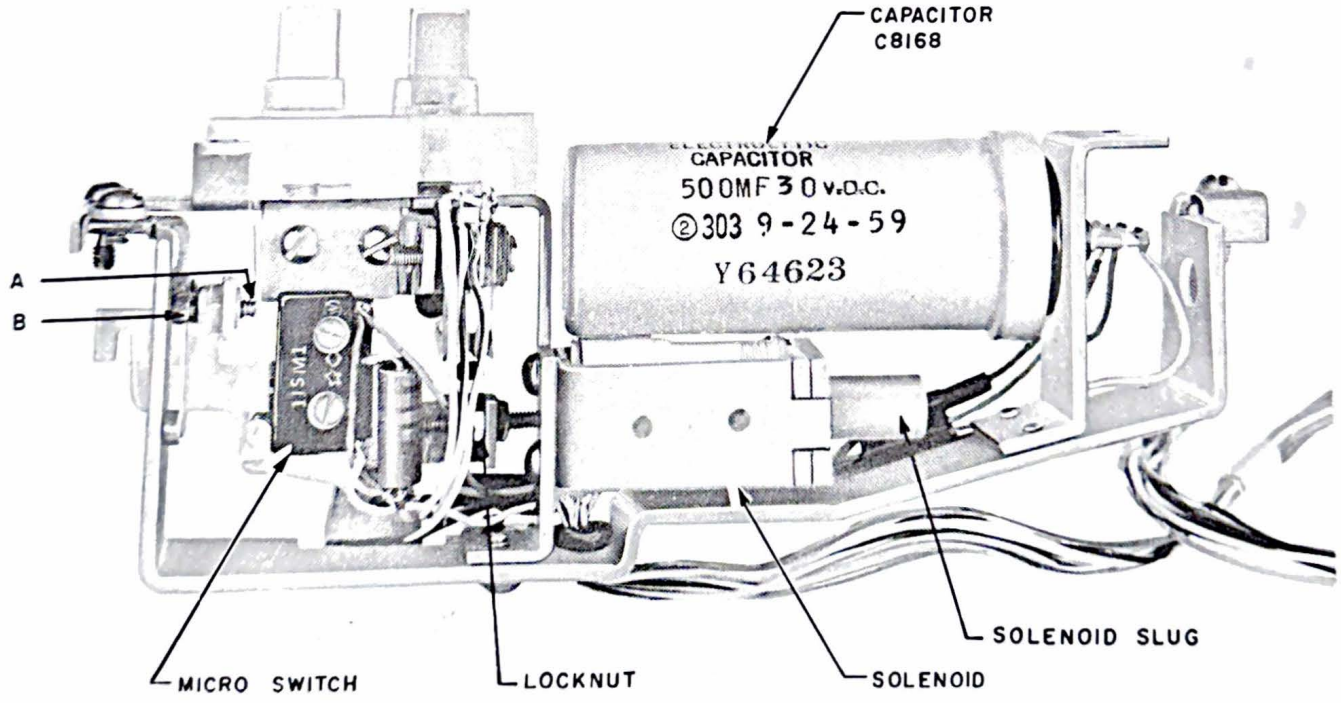


Fig. 18 — 622A Key, Cover Removed