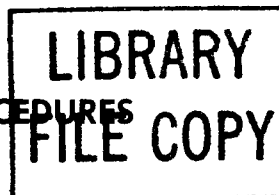


SMALL CROSSBAR SWITCHES PIECE-PART DATA AND REPLACEMENT PROCEDURES



CONTENTS	PAGE
1. GENERAL	1
2. PIECE-PART DATA	2
3. APPARATUS	2
4. REPLACEMENT PROCEDURES	5
A. General	5
B. Selecting Core and/or Coil Assembly	8
C. Vertical Unit Assembly	9
D. Holding Armature Assembly	11
E. Holding Core and/or Coil Assembly	11

Figures

1. Partial Front View of Switch With Bottom Selecting Bar Assembly Removed	6
2. Partial Front View of Switch Showing Comb and Support Bracket	7
3. Partial Rear View of Switch	10

1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of CA through CF codes of small crossbar switches and the approved replacement procedures.

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes. The Equipment Test List is not affected.

- (a) To rate the CF10 and CF11 Mfr Disc.
- (b) To add the CF12 switch to Table A
- (c) To rate the KS-20476, L1, nut driver Mfr Disc., replaced by the Utica 1/4-inch driver handle with Utica V8, 1/4 inch, 12-point socket.

1.03 The following Bell System Practices are referenced within this section:

SECTION	TITLE
030-721-701	Small Crossbar Switch Requirements and Adjusting Procedures
069-140-811	Soldered Connections Using Soldering Coppers Method of Making and Removing

1.04 Piece parts which may be replaced in the field are listed in Part 2.

1.05 Part 4 covers the approved procedures for the replacement of the piece parts designated in Part 2. No attempt should be made in the field to replace parts not so designated.

1.06 Before making any replacement on the apparatus covered herein, make the associated circuit busy in accordance with the approved methods.

1.07 Preparation of KS-16832, L2, Lubricant: This lubricant is provided in 2-ounce 1-pint containers. A small wide-mouth container, such as the 2-ounce jar in which the lubricant is available, should be used as a dispenser. If allowed to stand more than 1 day without agitation, the lubricant ingredients tend to separate; therefore, before each day's use, shake the container of lubricant for approximately 30 seconds to insure mixing of the ingredients. The proper method of shaking the lubricant consists of repeated, rapid turning of the container to an upside down position and back to the upright position.

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

tion. If the lubricant from a 1-pint container is to be used, the lubricant must be mixed as just described before it is poured into the smaller container. Under storage conditions, the cover should be tight on the container.

2. PIECE-PART DATA

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

2.02 Information enclosed by parentheses is not ordering information. This information may be references to notes or parts referred to in other portions of the section.

2.03 When ordering piece parts for replacement purposes, give both the number and the name of the piece part; for example, P-12F732 holding coil assembly. Do not refer to the BSP number or to any information shown in parentheses or brackets following the piece-part numbers.

2.04 Table A tabulates piece parts which are not common to all switch codes.

2.05 In some instances, preproduction models of the small crossbar switch were provided for installation. The affected codes, identification of preproduction models, and maintenance information peculiar to their construction follow.

(1) **CC-1:** Preproduction switches of this code can be identified by the existence of a dummy twin-wire block in the position farthest from the vertical unit base. These 10-level vertical units are mounted in a 12-level frame and cannot be replaced with standard piece parts. Consult Table A under "CC-1 Special" for piece-part ordering information. Adjustment procedures are standard.

(2) **CF-2:** Preproduction switches of this code can be identified by the existence of a dummy twin-wire block in the position farthest from the vertical unit base. These vertical units are not standard but are directly replaceable with the standard piece parts for the CF-2 switch, as shown in Table A. Adjustment procedures are standard.

3. APPARATUS

3.01 List of Tools and Materials: The following list of tools and materials are used in this section.

TOOLS	DESCRIPTION
388A	1/4-, 3/16-Inch Open-End Offset Wrench
474A	1/4-, 3/16-Inch Offset Box-Wrench
476B	3/16-Inch Hex Offset Socket Wrench
485A	Smooth-Jaw Pliers (KS-7665)
541A	1/4-Inch, 12-Point, Double-End Wrench
541B	9/32-Inch, 12-Point, Double-End Wrench
544A	1/4-Inch Hex Offset Socket Wrench
KS-6320	Orange Stick (2 required)
	Utica 1/4-Inch Driver Handle with Utica V-8, 12-Point, 1/4-Inch Socket
KS-21028, L1	Wrench, Core
KS-21029, L1	Guide, Hairpin
KS-21030 L1	Cutter, Tab
R-1441	Stone, Oil, or equivalent
R-2670	3/32-Inch Hex Socket Screw Wrench
	15/16-Inch Box-End Wrench (obtain locally)
	Holder, Lead, KOH-I-NOOR Adapto 5611, or equivalent (obtain locally)
MATERIALS	
KS-14666	Cloth

♦TABLE A♦

SWITCH	VERTICAL UNIT ASSEMBLY	HOLDING OFF-NORMAL ASSEMBLY	HOLDING COIL ASSEMBLY PART NO. OHMS	HOLDING ARMATURE ASSEMBLY	SELECTING BAR ASSEMBLY	SELECTING COIL ASSEMBLY PART NO. OHMS	SELECTING OFF-NORMAL SPRING ASSEMBLY	SWITCH COVER	SUPPORT BRACKET	COMB.	PAD
CA 1	P-12F623	P-12F786	P-12F733 1250	P-12F724	P-12F583 R.H. P-12F580 L.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F701	P-12F764	P-12F766	P-12F778
CB 1	P-12F586	—	P-12F732 1570	P-12F724	P-12F584 R.H. P-12F581 L.H.	P-12F561 600	—	P-12F702	P-12F764	P-12F766	P-12F788
CB2	P-12F587	840023055	P-12F732 1570	P-12F724	P-12F584 R.H. P-12F581 L.H.	P-12F561 600	—	P-12F702	P-12F764	P-12F766	P-12F778
CB 3	P-12F587* P-12F586†	840023055 —	P-12F732 1570 P-12F732 1570	P-12F724 P-12F724	P-12F584 R.H. P-12F581 L.H.	P-12F561 600	—	P-12F702	P-12F764	P-12F766	P-12F778
CB 4	P-12F590	840023139	P-12F732 1570	P-12F724	P-12F584 R.H. P-12F581 L.H.	P-12F561 600	—	P-12F702	P-12F764	P-2F766	P-12F778
CB 5	P-12F590* P-12F586†	840023139 —	P-12F732 1570 P-12F732 1570	P-12F724 P-12F724	P-12F584 R.H. P-12F581 L.H.	P-12F561 600	—	P-12F702	P-12F764	P-12F766	P-12F778
CB 6	P-12F586	840023006	P-12F372 1570	P-12F724	P-12F584 R.H. P-12F581 L.H.	P-12F561 600	—	P-12F702	P-12F764	P-12F766	P-12F778
CC 1	P-12F607	—	P-12F732 1570	P-12F724	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	—	P-12F703	P-12F764	P-12F766	P-12F778
CC 1 SPECIAL	840279228	—	P-12F732 1570	P-12F724	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	—	P-12F703	P-12F765	P-12F767	P-12F779
CC 3	P-12F618	840023006	P-12F733 1250	P-12F724	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	—	P-12F703	P-12F764	P-12F766	P-12F778
CC 4	P-12F619	840023063	P-12F733 1250	P-12F724	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F703	P-12F764	P-12F766	P-12F778
CC 5	P-12F620	—	P-12F733 1250	P-12F724	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F703	P-12F764	P-12F766	P-12F778
CC 6	P-12F622	—	P-12F733 1250	P-12F724	P-12F585 R.H. P-12F582 L.H.	P-12F564 43	840021505 R.H. 840021489 L.H.	P-12F703	P-12F764	P-12F766	P-12F778
CC 7	P-12F622	840023063‡	P-12F733 1250	P-12F724	P-12F582 L.H.	P-12F565 120	840021505 R.H. 840021489 L.H.	P-12F703	P-12F764	P-12F766	P-12F778
CC 8	P-12F612	840023097	P-12F733 1250	P-12F724	P-12F585 R.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F703	P-12F764	P-12F766	P-12F778
CC 9	P-12F618	840023055	P-12F733 1250	P-12F724	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	—	P-12F703	P-12F764	P-12F766	P-12F778
CD 1	P-12F621	—	P-12F733 1250	P-12F723	P-12F583 R.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F701	P-12F765	P-12F767	P-12F779
CD 2	P-12F616	—	P-12F733 1250	P-12F723	P-12F580 L.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F701	P-12F765	P-12F767	P-12F779

*Vertical units 10 through 19.

†Vertical units 0 through 9

‡Special Bottom Balance Spring Tension, 40 grams, minimum.

♦TABLE A (Contd)♦

SWITCH	VERTICAL UNIT ASSEMBLY	HOLDING OFF-NORMAL ASSEMBLY	HOLDING COIL ASSEMBLY PART NO. OHMS	HOLDING ARMATURE ASSEMBLY	SELECTING BAR ASSEMBLY	SELECTING COIL ASSEMBLY PART NO. OHMS	SELECTING OFF-NORMAL SPRING ASSEMBLY	SWITCH COVER	SUPPORT BRACKET	COMB.	PAD
CE 1	P-12F588	840023055	P-12F732 1570	P-12F723	P-12F584 R.H. P-12F581 L.H.	P-12F563 975	840021505 R.H. 840021489 L.H.	P-12F702	P-12F765	P-12F767	P-12F779
CE 2	P-12F589	840023006	P-12F732 1570	P-12F723	P-12F584 R.H. P-12F581 L.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F702	P-12F765	P-12F767	P-12F779
CF 1	P-12F616	—	P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-2F562§ 240 P-12F561 600	—	P-12F703	P-2F765	P-12F767	P-12F779
CF 2	P-12F606	—	P-12F732 1570	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F761 34	840021505 R.H. 840021489 L.H.	P-12F703	P-12F765	P-12F767	P-12F779
CF 3	P-12F617	840023147	P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F703	P-12F765	P-12F767	P-12F779
CF 4	P-12F616	—	P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	—	P-12F703	P-12F765	P-12F767	P-12F779
CF 5	P-12F621	—	P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F564 43	840021505 R.H. 840021489 L.H.	P-12F703	P-12F765	P-12F767	P-12F779
CF 6	P-12F616	—	P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	840021497 R.H. 840021471 L.H.	P-12F703	P-12F765	P-12F767	P-12F779
CF 7	P-12F624	840023063	P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	840021497 R.H. 840021471 L.H.	P-12F703	P-12F765	P-12F767	P-12F779
CF 8			P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F703	P-12F765	P-12F767	P-12F779
CF 9	P-12F612	840023089	P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F703	P-12F765	P-12F767	P-12F779
CF 10**	P-12F617	840023014	P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	840021505 R.H.¶ 840021489 L.H.	P-12F703	P-12F765	P-12F767	P-12F779
CF 11**	P-12F617	840023014	P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	840021505 R.H. 840021489 L.H.	P-12F703	P-12F765	P-12F767	P-12F779
CF 12	P-12F617	840023147(19) 840023113(13)	P-12F733 1250	P-12F723	P-12F585 R.H. P-12F582 L.H.	P-12F561 600	840021605 R.H. 840021489 L.H.	P-12F703	P-12F765	P-12F767	P-12F779

§Selecting coil assembly used on steering levels

¶Centering unit only on levels 0 and 1

**Mfr Disc.

840279210	Hairpin Select Wire
841526999	Hairpin Select Wire
KS-16832, L2	Lubricant
841526387	Terminal Spacer
KS-19578, L1	Trichloroethane
—	0.040-Inch Bare Tinned Copper Wire (18 awg)

4. REPLACEMENT PROCEDURES

A. General

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

4.02 Soldering of leads, when necessary, shall be done in accordance with Section 069-140-811.

4.03 After making any replacement of switch parts, the part or parts replaced shall meet the readjust requirements involved as specified in Section 030-721-701 covering this apparatus. Other parts for which adjustments may have been disturbed by the replacing operations shall be checked to the readjust requirements and an overall operation check shall be made of the switch before restoring the circuit to service.

4.04 *Selecting Bar (Fig. 1):* To replace the selecting bar, proceed as follows:

(a) ***Selecting Bar Mounted on Old-Type Frame:*** To replace the selecting bar on the old type frames, proceed as follows. See (b) for identification.

Note: Before removing selecting bars, identify the bars for replacement to their original positions. The bottom bar may be removed and replaced directly. For bars located at any other level, all bars below that level must first be removed.

(1) Remove the center support bracket comb mounting screws (Fig. 2) using the 541A wrench. Remove the comb and pad.

(2) Loosen the pivot screw locknut at both ends of the selecting bar with the 541B wrench.

Then using the 474A wrench, turn the pivot screw out sufficiently to disengage the free end of the bar. Repeat the above procedure for the armature end of the bar. Carefully remove the armature stud from between the centering springs of either the centering unit or selecting off-normal assembly and, while holding the bar toward the front of the switch, lower the bar until the selecting bar may be removed from the switch.

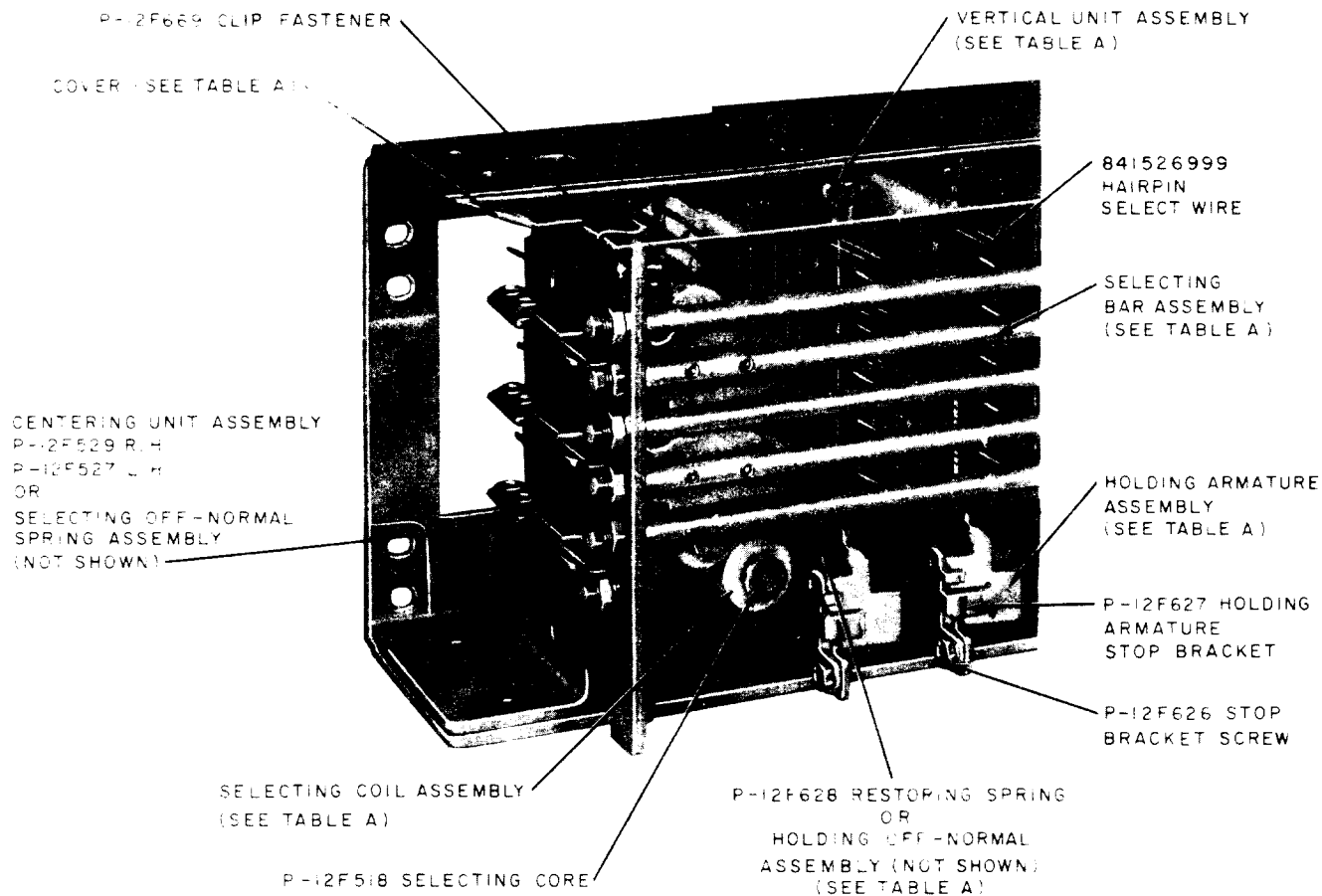
(3) Use caution to prevent damage to the bar, armature, or stud. Check the selecting bar and pivot screws for damage. Replace or repair as required.

(4) Thoroughly clean all parts with a KS-14666 cloth saturated with trichloroethane and flush out the selecting bar bearings using a clean toothpick dipped in trichloroethane. After the parts have become thoroughly dry, lubricate each bearing by applying one drop of KS-16832, L2, lubricant to the bearing hole with a piece of 0.040-inch bare tinned copper wire which has been dipped into the lubricant to a depth of 3/32-inch and quickly removed. Make sure the container of lubricant has been thoroughly mixed as described in paragraph 1.07.

(5) The selecting bars must be remounted in their respective positions from top to bottom. Carefully move the bar into its position on the switch, taking care that the selecting armature stud enters between the centering springs of the centering unit or selecting off-normal unit, as the case may be. Hold the bar so each select paddle will enter between its corresponding select wires. Place the armature end of the bar on the pivot screw. Turn the pivot screw into the bearing hole of the selecting bar; then start the remaining pivot screw into its bearing. Check the clearance between the wide part of the armature extension and the side of the switch frame. Adjust the clearance and endplay, and tighten the pivot screw locknuts. Wipe off any excess lubricant at the pivot bearings. Remount the center support bracket, pad, and comb. Check for proper alignment of selecting paddles.

(b) ***Selecting Bar Mounted on New-Type Frame:*** To replace the selecting bar mounted on the new type frame, proceed as follows:

Note: The new-type frame may be identified by the slots located between the pivot screw mounting holes.



◆ Fig. 1—Partial Front View of Switch With Bottom Selecting Bar Assembly Removed◆

(1) Selecting bars may be individually removed from this type frame by following sub-subparagraphs 4.04(a)(1) and (2) and shifting the bar until the selecting armature stud is aligned with one of the slots. Rotate the free end of the bar outward, and remove the bar from the switch.

Note: It may be necessary to loosen an adjacent selecting bar pivot screw to attain alignment of the selecting bar stud with a clearance slot.

(2) Clean as shown in sub-subparagraph 4.04(a)(4).

(3) Replace by aligning the selecting armature stud with the clearance slot, rotate the bar

into position, and follow the procedure outlined in sub-subparagraph 4.04(a)(5).

4.05 Hairpin Select Wire (Fig. 1): This procedure is directly applicable to early production switches having one-piece pivot blocks and hairpin select wires with straight tips. Some early switches have hairpin select wires with a radius at the tip of one or both legs of the select wire. Where this condition exists, the radius must be clipped off before proceeding with select wire replacement. Later switches are equipped with multipiece pivot blocks having a retaining tab to prevent accidental dislodging of the hairpin select wire. Because of this feature, an additional operation to remove the retaining tab, as outlined in (a) is required prior to select wire replacement.

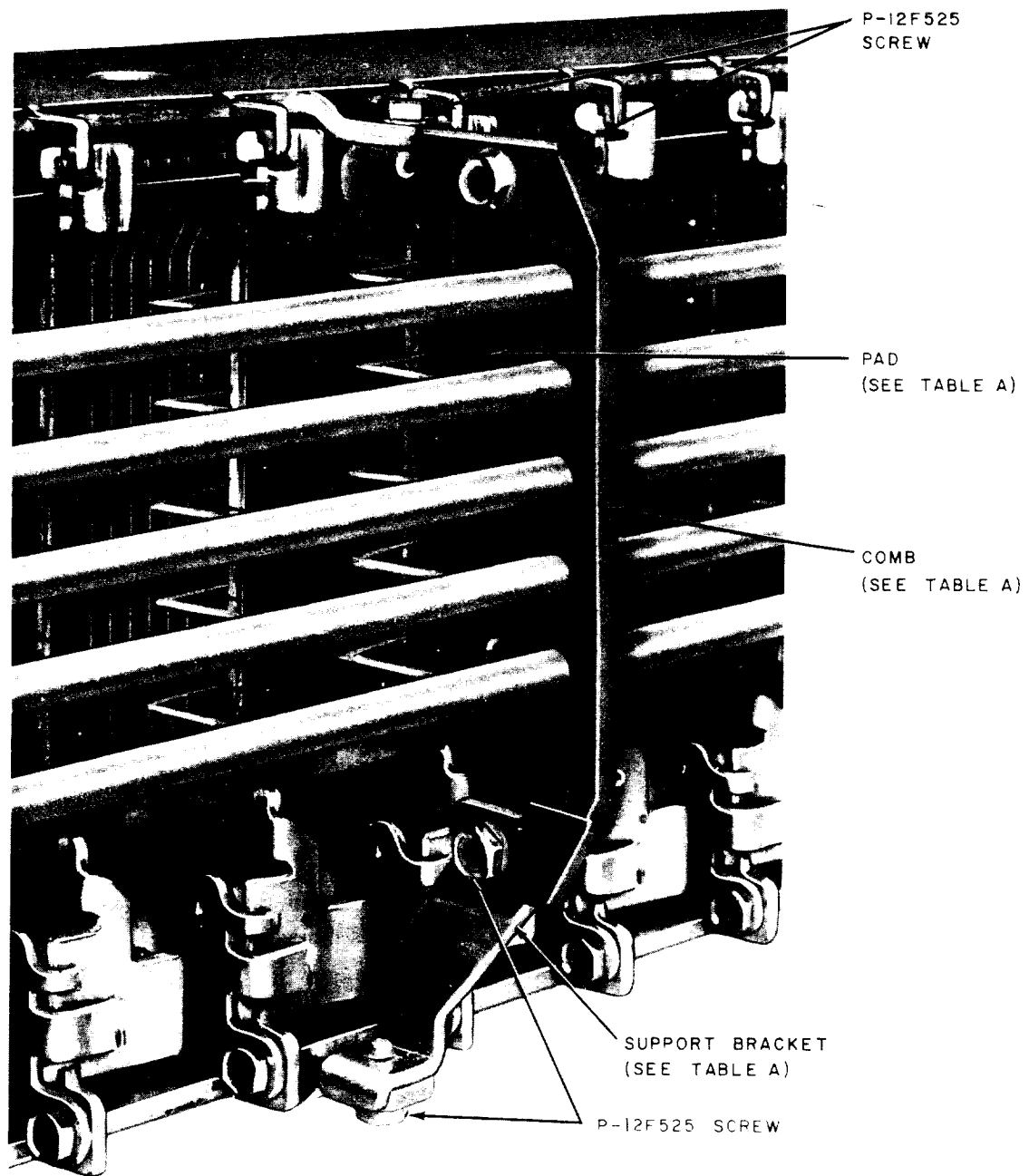


Fig. 2—Partial Front View of Switch Showing Comb and Support Bracket

Warning 1: Keep the insulating strip between the strapping and the orange stick to prevent strapping damage.

Warning 2: Careless removal of the retaining tab will result in loosening of the staked top of the pivot block post or damage to the select wire bearing surface and will necessitate replacement of the vertical unit.

- (a) **Retaining Tab Removal:** Carefully separate the switch strapping with an orange stick. Insert the KS-21030, L1, tool into the lead holder and, with the chisel edge of the tool parallel to and just to the left of the parting line on the retaining tab, make a vertical cut across the tab by plunging the chisel edge of the tool into the tab in successive overlapping cuts. This operation should be done in a series of passes, limiting the force against the tab to 2 pounds, to prevent loosening of the staked top of the pivot block post or damage to the bearing surface of the select wire. Continue until the tab snaps off. Proper removal of the retaining tab will produce a cut surface which is in a plane parallel to and slightly to the left of the plane of the pivot block, thereby permitting unrestricted removal of the select wire.

For this reason, the chisel edge of the KS-21030, L1, tool should be maintained in a razor sharp condition by frequent honing.

(b) **Replacing Defective Hairpin Select**

Wire: This procedure for replacing a defective hairpin select wire is best performed by two telephone craft persons. From the front of the switch, align the KS-21029, L1, tool with the defective select wire so each leg of the tool lies on opposite sides of the controlling selecting bar. Insert the tool into the switch, starting each leg of the select wire into one of the tubular legs of the tool. Slide the tool carefully through the windows of the crosspoint operate cards, continuing until the tool stops at the pretension bend of earlier or the loop of later model select wires.

- (c) From the rear of the switch, carefully separate the horizontal strapping directly behind the defective select wire to provide sufficient clearance for select wire removal.

- (d) From the front of the switch, exert a force against the KS-21029, L1, tool, snapping the

select wire off its post. Continue pushing until the tubular legs of the tool extend beyond the horizontal strapping.

Warning: Applied force that deforms the select wire will remove the built-in pretension in the select wire and result in early switch failure.

- (e) Remove the defective select wire from the KS-21029, L1, tool and, maintaining orientation with the short leg uppermost, insert the legs of the new select wire into the tubular legs of the tool. Apply a force on the loop of the new select wire, and guide the select wire through the horizontal strapping until it enters the groove on the pivot block post. Using a KS-6320 orange stick, press gently against the loop of the select wire until it snaps on to the pivot block post.

Note: The most important difference between the earlier and later hairpin select wires is in the additional pretension bend found in the earlier select wires. This bend is located between the tip of the legs and the loop and produces a force against the holding armature. To ensure proper switch operation, the replacement select wire must be of the same type. For earlier switches having the additional pretension bend, use an 840279210 hairpin select wire. For later select wires use an 841526999 hairpin select wire.

- (f) Remove the KS-21029, L1, tool from the switch, and carefully restore the horizontal strapping to its original position.

- (g) Check the new hairpin select wire for proper operation in Section 030-721-701.

B. Selecting Core and/or Coil Assembly

4.06 General: Identify and then remove all selecting bars necessary to obtain access to the defective core or coil assembly (Fig. 1) as covered in paragraph 4.04. From the rear of the switch, remove the wiring to the selecting coil (if the coil is to be replaced) and the selecting core locknut. Turn the core clockwise from the rear of the switch until the KS-21028, L1, tool touches the bearing plate. Return to the front of the switch, disengage the threaded portion of the core from the bearing plate, and pull the core from the coil assembly.

Note: A suitable 15/16-inch box-end wrench may be used on the wrenching section of the KS-

21028, L1, wrench to loosen select core locknuts. However, the box-end wrench should not be used to tighten the locknuts after core adjustment.

4.07 Removing the Coil Assembly: The bobbin used for the selecting magnet assembly is equipped with a locking tab to prevent relative motion between the core and bobbin during switch operation. After the selecting core has been removed, shift any coil assembly located in either of the two innermost columns of coils toward the center of the switch and any coil assembly located in either of the outermost columns of coils away from the center of the switch. Pull the assembly straight out of the switch.

4.08 Replacing the Coil Assembly: Replace in reverse order of removal by inserting the coil assembly while holding it to the removal position described above. After insertion, shift any coil assembly in an outermost column toward the center of the switch and any coil in an innermost column away from the center of the switch. Insert the selecting core, and thread it into the bearing plate. Return to the rear of the switch and, using the KS-21028, L1, tool, thread the core through the bearing plate and install the locknut. Replace the coil wiring. Install the selecting bars to their original positions. After all adjustments have been made, recheck all selecting bars for proper operation.

4.09 Selecting Off-Normal Spring Assembly or Centering Unit (Fig. 1): Remove the wired connections, where applicable. Loosen the selecting off-normal mounting screw using the R-2670 wrench or the centering unit using the 544A wrench. Rotate the unit upward to clear the screw, slide the unit outward to clear the selecting armature stud, and pull forward. Install the new unit in reverse order of removal. Connect the leads to their proper terminals where applicable.

4.10 Holding Off-Normal Spring Assembly (Fig. 1): From the rear of the switch, remove the wiring to the holding off-normal spring assembly. Loosen the spring assembly bracket mounting screw with the 388A wrench. Slide the assembly rearward out of the switch. Mount the new spring assembly, taking care to position the tip of the spring on the stud of the armature and the emboss lies within the slot in the base. Securely tighten the mounting screw. Connect the wiring to the proper terminals of the spring assembly.

Note: The reduced clearances existing on 3-wire switch codes preclude direct removal of holding off-normal assemblies. However, adequate clearance can be obtained by loosening the top and removing the bottom mounting screws on both the affected vertical unit and the vertical unit adjacent to the defective holding off-normal. Once this has been done, the vertical units can be separated sufficiently to permit removal of the holding off-normal assembly using the method outlined by paragraph 4.10.

4.11 Holding Armature Restoring Spring (Fig. 1): To replace the holding armature restoring spring, proceed as follows:

- (1) Remove the restoring spring by using two KS-6320 orange sticks, applying a light force against the rear spring tab in the direction to push the tab back through the slot in the base while applying a force to the tip of the spring in a direction toward the back of the switch. This will cause the spring to snap out of the base.
- (2) Replace the spring by using two KS-6320 orange sticks, one of which is cut down to fit the hole in the end of the spring. Rest the tip of the spring on the holding armature stud and slide the spring back, while holding the spring against the base until the front tab drops into the base slot, and move the spring forward to enter the back tab into the base. The portion of the spring between the locking tabs must lie flat against the base; if it does not, replace the spring with a new part.

C. Vertical Unit Assembly (Fig. 1 and 3)

4.12 Removing Vertical Unit Assembly: To remove the vertical unit assembly, proceed as follows:

- (1) At the rear of the switch, remove insulator strips where applicable from between strapping levels.
- (2) Using the 485A smooth-jaw pliers and a small soldering iron, lift each crosspoint terminal wire off of the horizontal strapping tape if supplied.
- (3) Remove local cable wiring from the holding magnet, crosspoints, front multiple, and holding off-normal terminals where applicable.
- (4) Remove both vertical unit mounting screws (*left-hand threads*).

- (5) At the front of the switch, remove the protective switch cover.
- (6) Remove comb and pad [sub-subparagraph 4.04(a)(1)] from the center support bracket.
- (7) Mark the position of the selecting bar assemblies, and remove them (paragraph 4.04) from the switch.
- (8) If the replacement involves vertical unit 9 or 10, loosen or remove the center support bracket as required to provide clearance for removing the vertical unit.
- (9) Slide the vertical unit forward and out of the switch, using care not to snag and damage the adjacent vertical units.

4.13 Mounting Vertical Unit Assembly: To mount the vertical unit assembly, proceed as follows:

- (1) Thoroughly inspect the new vertical unit for defects or damage.
- (2) When crosspoints are not to be connected to horizontal strapping tape, install 841526387 terminal spacers on all levels of the vertical unit terminals to stiffen the terminals and provide a stop for the wire-wrap tool when making connections.
- (3) At the front of the switch, carefully insert the vertical unit into the switch, avoiding all contact with the adjacent vertical units, and index the base tabs into the frame slots.

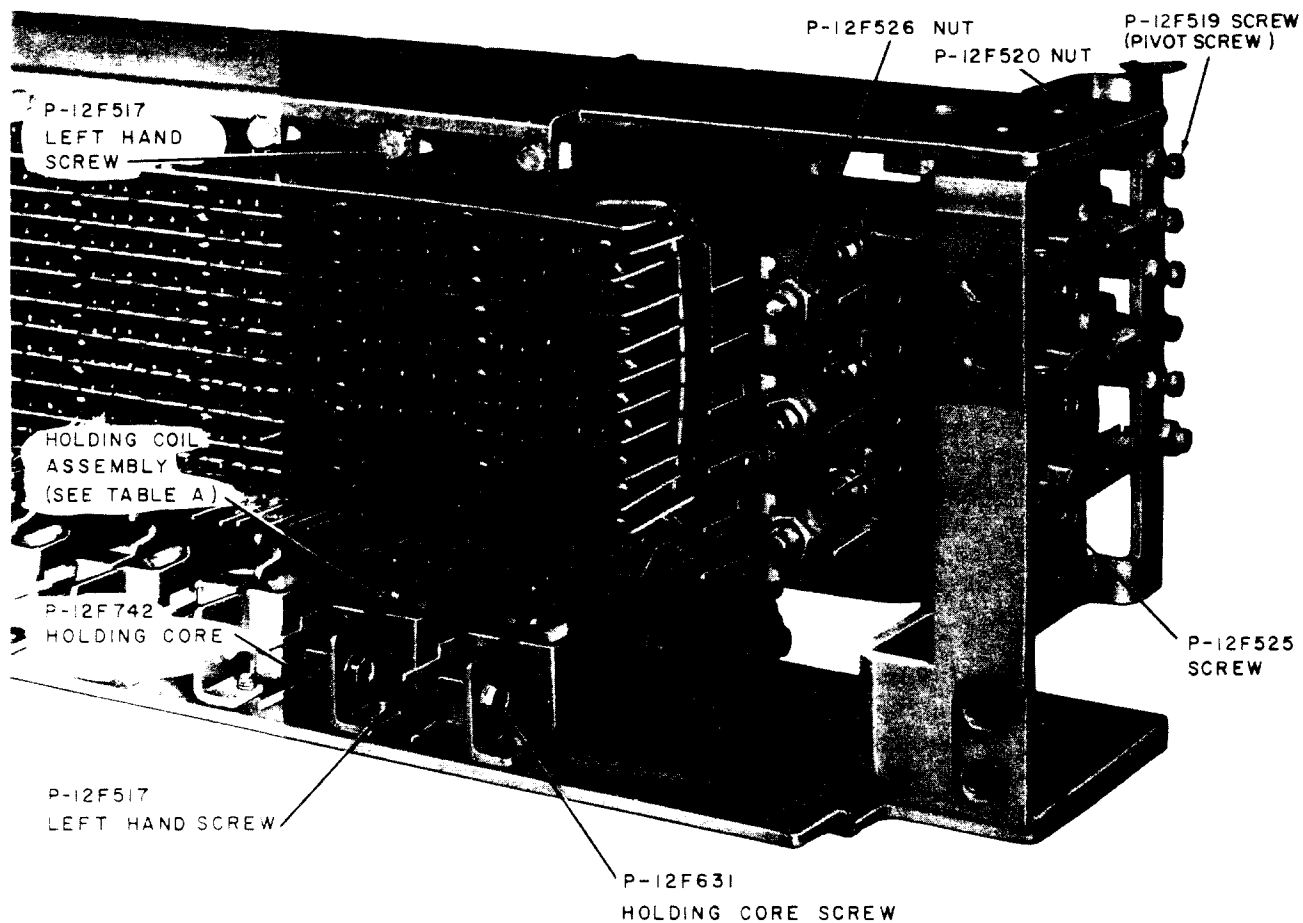


Fig. 3—Partial Rear View of Switch

Note: Installation is easier when performed by two craft persons, one in front and the other at the rear of the frame to guide the vertical unit into position.

- (4) At the rear of the switch, insert and start both vertical unit mounting screws (**left-hand threads**).
- (5) Tighten mounting screws to required torque.
- (6) Connect holding magnet and holding off-normal wires where applicable.
- (7) Connect strapping to the crosspoint terminals by soldering, using a small soldering iron and a KS-6320 orange stick to hold the strapping tape near the appropriate terminal.
- (8) Connect front multiple and crosspoint wiring where applicable.
- (9) Insert insulator strips between levels of strapping where applicable.
- (10) Check each level of strapping electrically to ensure correctness of jumper connections.
- (11) Tie insulator strips into position.
- (12) At the front of the switch, install or tighten the center support bracket if applicable.
- (13) Replace the selecting bar assemblies to their original positions according to subparagraph 4.04(a)(5).
- (14) Replace the pad and comb to the center support bracket.
- (15) Adjust selecting bar endplay.
- (16) Check entire switch for proper selecting bar function; adjust if required.
- (17) Check new vertical unit for holding magnet operation and requirements.
- (18) Check the new vertical unit for select and preselect functional operation; adjust if required.
- (19) Install protective cover.

D. Holding Armature Assembly (Fig. 1)

4.14 Removing Holding Armature: Remove the stop bracket screw with the 541A wrench and then remove the stop bracket. Grasp the bottom of the armature and gently rotate it to clear the operating cards and slowly draw the armature outward and downward to free it from the top bearing lug. Remove the armature from the switch assembly making sure that it does not catch on any select wires.

4.15 Mounting Holding Armature: Grasp the bottom right corner of the armature, and carefully insert the top of the armature into the bearing lug of the vertical unit making sure that the armature does not catch on the select wires or operating cards. Position the bottom of the armature on the armature support lug. Remount the stop bracket, and adjust for correct armature travel. Tighten the stop bracket screw.

E. Holding Core and/or Coil Assembly (Fig. 3)

4.16 Removing Core and Coil Assembly: From the rear of the switch with the 541A wrench, remove both the wiring to the holding coil (if the coil is to be replaced) and the holding core screw. From the front of the switch, remove the holding armature stop bracket and holding armature and slide the core and/or coil assembly out of the switch.

Note: In some instances it may be necessary to remove the holding armature stop bracket from the adjacent vertical unit to provide clearance for removing the coil assembly.

4.17 Mounting Core and Coil Assembly: Insert the core into the coil assembly so the beveled or marked side of the core is adjacent to the terminals of the bobbin, and replace in reverse order of removal with care that front bobbin lug drops into the slot in the vertical unit base. After installing the holding armature and stop bracket, adjust the core for proper hold armature position and readjust the hold armature stop bracket. Connect any leads that were removed to their proper terminals. Reinstall and adjust the holding armature stop bracket on the adjacent vertical unit where applicable.