

panel mounting by means of a 0.164-32 inch RHM screw in one of the tapped holes ordinarily used for mounting a jack panel.

2.02 Where a vertical and horizontal form serves the same pieces of apparatus, the arrangement and dress of skinners should be as shown in Fig. 2.

B. Fanned Forms

2.03 In fanning at the LDF and TRDF in No. 1 crossbar, the switchboard cable leads may all be fanned through the inside holes of the fanning strips where this will avoid the necessity of splitting a pair over two fanning holes. Do not dispense with clamping of skinners to insure slack.

→ **2.04** Where fuse panels of No. 5 power ringing and tone distribution frames utilizing loose wiring are equipped with fanning strips, the loose wiring to these panels should be fanned from the cable bracket adjacent to the panel as shown in Fig. 5.

C. Spare and Unused Wires and Unequipped Wiring

2.05 At No. 1 crossbar line link primary bays and No. 5 crossbar line link basic frames, the wires in the line link MDF and LDF cables that would ordinarily be connected to the crossbar switch vertical terminals used for "no test" verticals should be formed out to their associated terminals but should not be connected. They should be doubled back on the horizontal form in the same manner as unequipped wiring.

2.06 Where certain springs or terminals on 286-, 287-, or similar-type relays and CA-, BU-, or similar-type terminal strips are not assigned a circuit function but the associated wiring or cabling provides leads for the total number of terminals on this apparatus, the leads associated with the unassigned terminals should be connected to them unless otherwise specified on the circuit drawing. The other end of such wiring (and also any multiple of this wiring through intervening apparatus) shall, unless otherwise specified on the circuit drawing, be treated as follows, depending on the apparatus on which it is terminated.

(a) *At other 286-, 287-, or similar-type relays or CA-, BU-, or similar-type terminal strips, connect all leads.*

(b) *At terminal strips having fanning strips, connect all leads.*

(1) An exception is in No. 5 crossbar for the multiple between wire spring markers and U-type connectors. Also, in the multiple between wire spring connectors and U-type markers where the unconnected leads shall be treated as follows. If the terminal numbers have not been assigned for leads not assigned a circuit function but these leads are connected to apparatus at the other end, these leads should be tagged for future identification and stored in paper or fiber tubes.

(c) *At 224-type (well type) and D terminal strips, connect such leads as are assigned a circuit function and dispose of the unassigned leads in the usual manner for spare wires at these terminal strips.*

(d) *At apparatus other than terminal strips, connect the leads that are assigned a circuit function and dispose of the unassigned leads in the usual manner for unequipped wiring.*

2.07 Where, at 286- or 287-type relays and CA- or BU-type terminal strips, certain leads provided in the associated wiring or cabling are not shown on the circuit cabling diagram Fig. and the terminals to which they would normally connect are assigned to some other circuit function, these leads should not be connected. In the case of sewed forms, they should be dropped off at the regular stitch for the terminal to which they normally would be connected and then sewed back on the forms. At terminal strips having fanning strips, they should be brought through the fanning holes associated with the terminals to which they would normally connect and then be doubled back on other fanning holes in the usual manner for unequipped wiring.

D. Sewing

2.08 At crossbar switches where there is a breakout from the horizontal arm at each switch vertical unit and the switch vertical units are on approximately 1-7/16 inch centers, the horizontal arm may be sewed with stitches only at the breaking-out points.

3. CONNECTING AND SOLDERING

3.01 On apparatus having bifurcated terminals (2 pronged) such as the magnet terminals on crossbar switches and multicontact relays, one of the prongs should be reserved for installer wiring if required. Where only local wiring is required, both lugs may be used if necessary to avoid congestion.

3.02 Connections to the split terminals of the number and ground terminal strips on translator frames (used in No. 1 crossbar offices arranged for automatic message accounting) are made without soldering as shown in Fig. 46.

3.03 When it is necessary to splice out short skimmers to the magnet terminals of 287-type relays, where these relays are installed in place of 245- or 263-type relays, a splice should be used as indicated in Fig. 25.

3.04 The 0 to 9 movable contact spring terminals on 263-type relays were arranged for both individual wiring and horizontal strapping. The corresponding fixed contact spring terminals on 286- and 287-type relays are arranged for horizontal strapping only. It may be necessary to connect both individual and strap wires to these terminals or to make either one of these connections. Where an individual connection only is to be made to one of these terminals, wind at least 1-1/2 turns of the wire around the terminal at the notch and solder the connection. Where both a horizontal strap and an individual wire are to be connected, first position the strap wire in the notch, then wrap at least 1-1/2 turns of individual wire around the terminal and the strap wire at the notch of the terminal and solder both wires to the terminal. Should it be necessary to connect a second individual wire, wrap at least 1-1/2 turns of the wire around the strap wire and solder the connection, keeping as close to the terminal as possible. In all cases, 1/32-inch clearance shall be maintained between adjacent soldered connections.

4. STRAPPING

4.01 The strapping on 287-type multicontact relays and crossbar switches shall be applied as shown in Fig. 25, 33, and 34. The protection and support of horizontal multiple strap-

ping for 286- and 287-type relays shall be applied as shown in Fig. 9 through 11 and 22 through 24. In the case of 287-type relays, it is desirable, although not a requirement, that the horizontal multiple (banjo) strapping be placed in the relay comb slots. However, a 1/16-inch minimum clearance must be maintained between adjacent strap wires and between the innermost strap wire and the relay bracket. The 1/16-inch minimum clearance shall also be maintained between adjacent horizontal strap wires on crossbar switches.

4.02 Crossbar Switches: Terminal spacers should be placed on the terminal end of crosspoint vertical unit crosspoints not connected by horizontal multiple (banjo) strapping. The P-11F754, P-11F755, P-11F756, and P-11F757 spacers for 3-, 4-, 5-, and 6-wire vertical units, respectively, are available for this purpose.

5. DRESSING OF SKINNERS

5.01 The dress of skimmers and method of running loose wiring, where specified, should be as shown in Fig. 1 through 8, 12 through 21, 26 through 28, 29 through 32, 35, and 36 through 45.

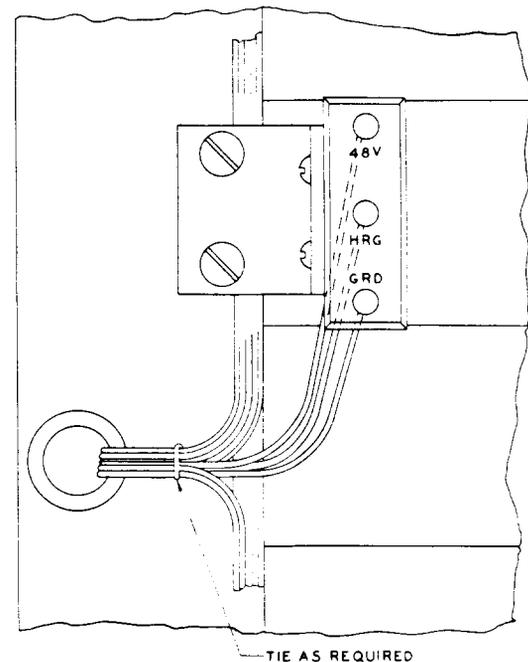


Fig. 1 - 55- and Similar-Type Connecting Blocks - Loose Wiring - No. 5 Crossbar

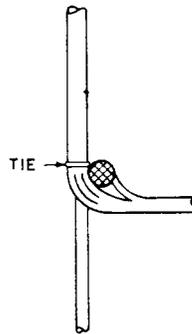


Fig. 2 - Cable Forms - Vertical and Horizontal Forms Serving Same Piece of Apparatus

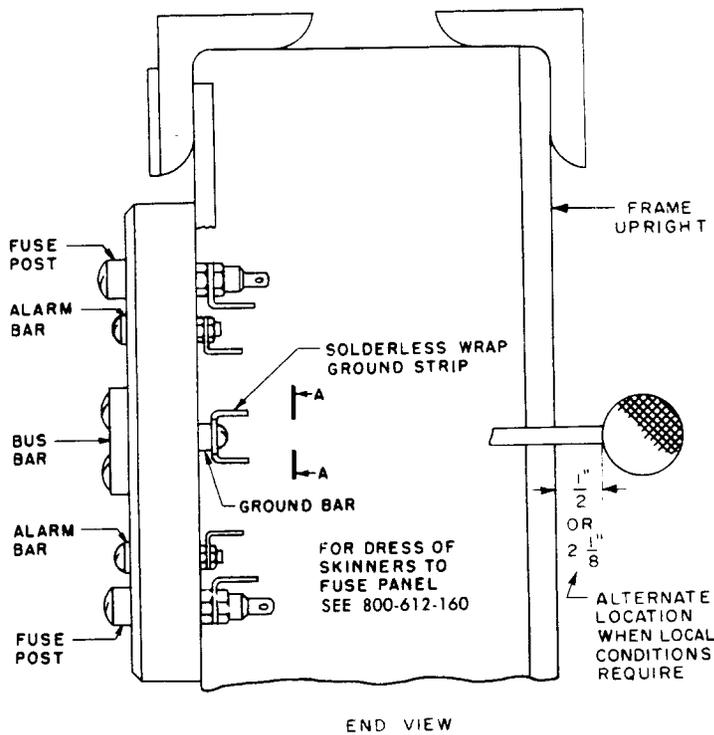
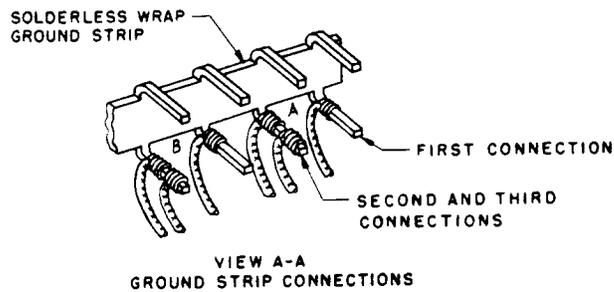


Fig. 3 - Frame Fuse Panel - 35-Type Fuses

NOTES:

1. PROVIDE LOCAL CABLE ARMS AS FOLLOWS:

TWO ROW PANELS

ONE CABLE ARM FOR GROUND AND THE TWO ROWS OF FUSES.

THREE ROW PANELS

ONE CABLE ARM FOR GROUND AND TOP ROW OF FUSES.

ONE CABLE ARM FOR BOTTOM TWO ROWS OF FUSES.

FOUR ROW PANELS

TWO CABLE ARMS AS SHOWN.

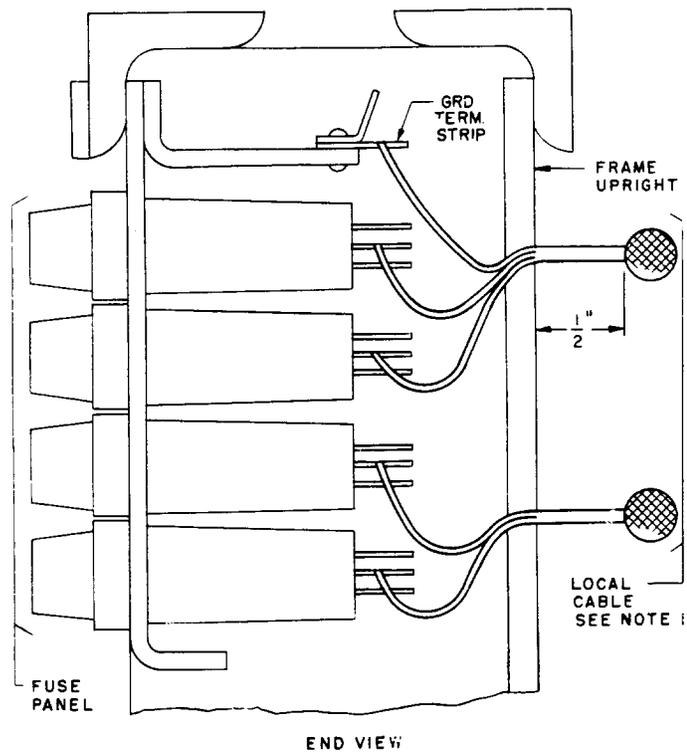


Fig. 4 - Frame Fuse Panel - 18- and Similar-Type Fuse Blocks - Bulb-Angle Frames

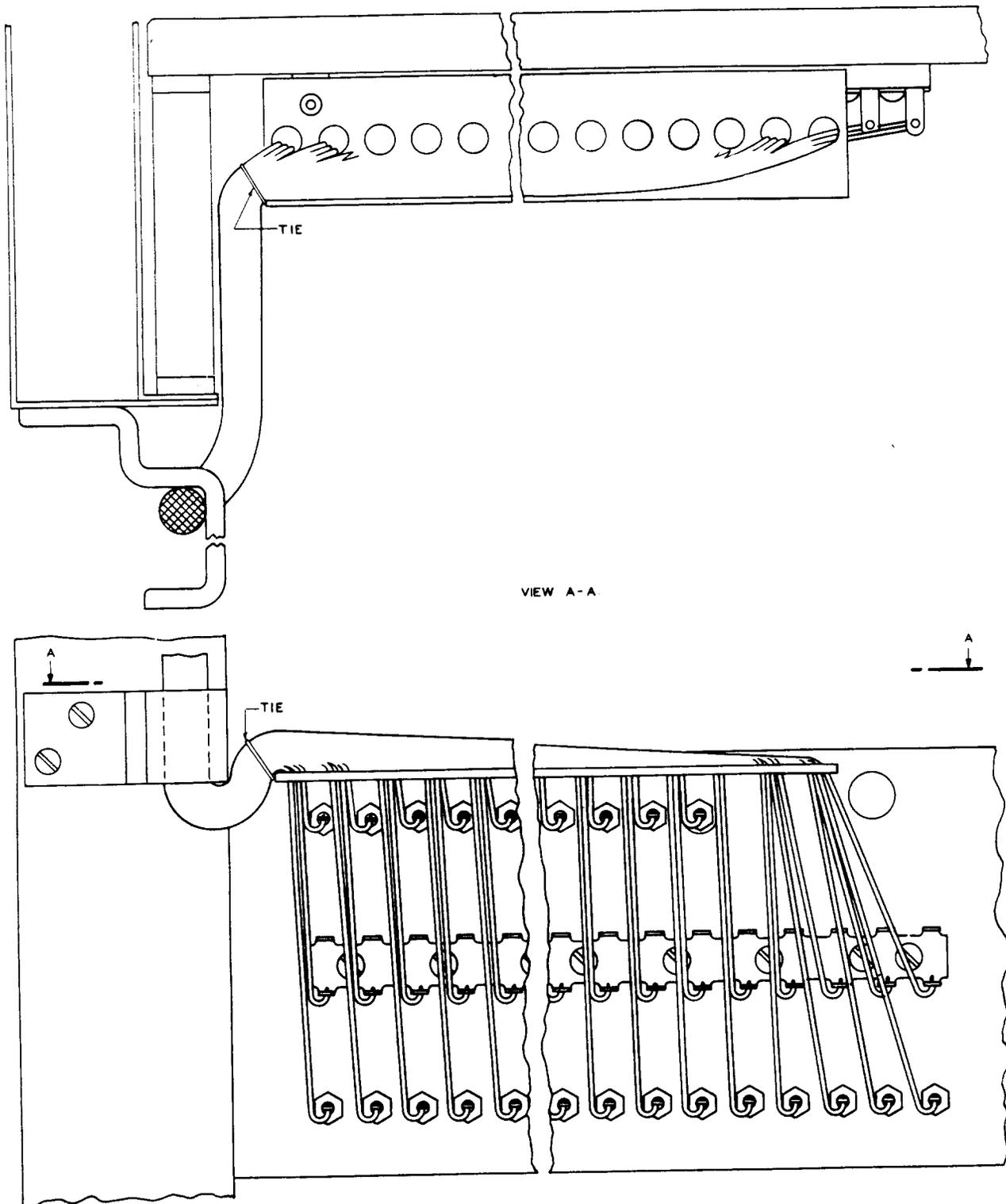


Fig. 5 - Frame Fuse Panel - 35-Type Fuses - Loose Wiring - No. 5 Crossbar

NOTE - LEADS TO THE GROUND BAR TERMINALS MAY BE IN SEPARATE STITCHES OR COMBINED WITH THE STITCHES TO THE FUSE PANEL TERMINALS.

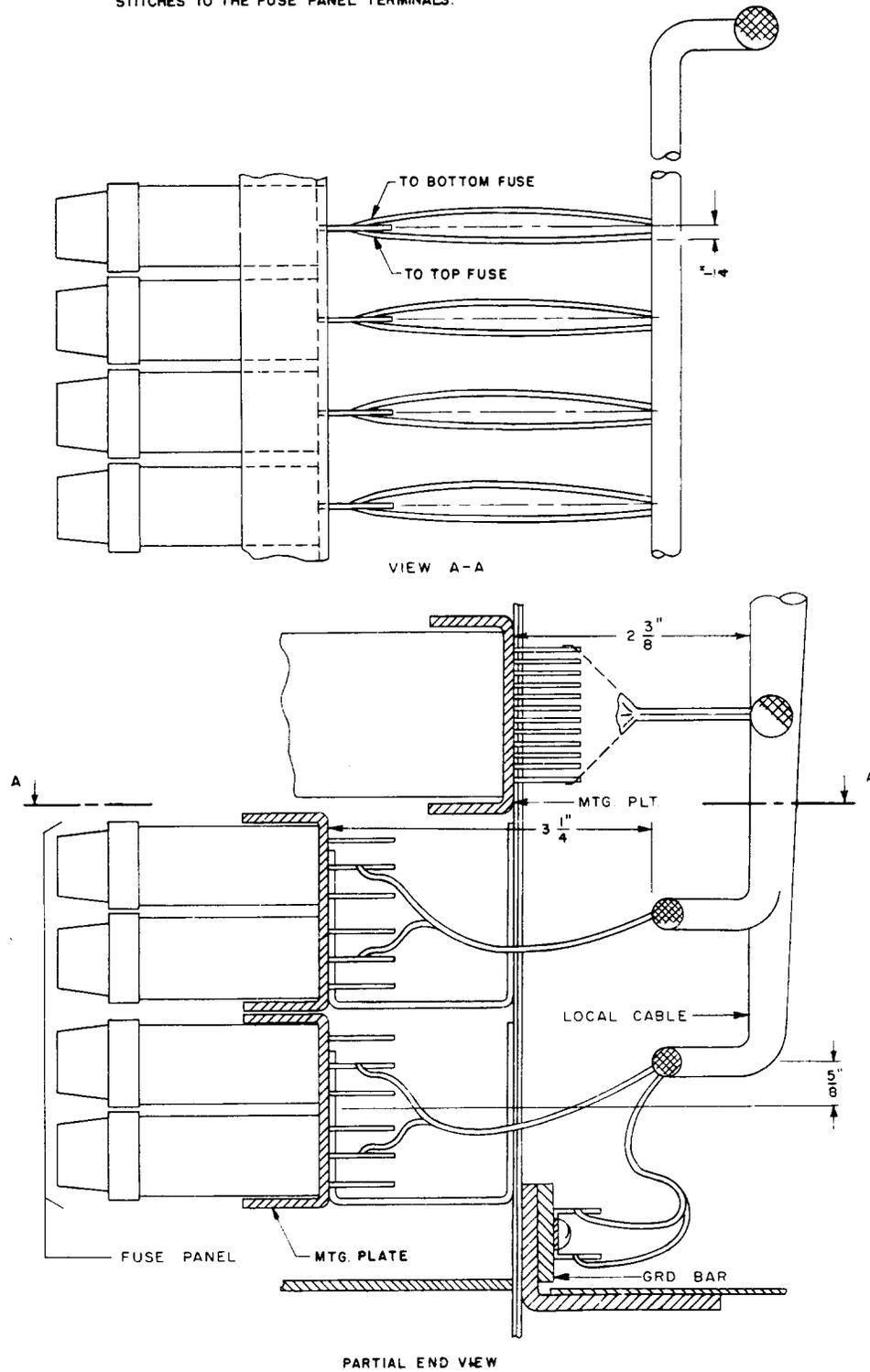


Fig. 6 - Frame Fuse Panel - 21- and Similar-Type Fuse Blocks -
Local Cable - No. 5 Crossbar

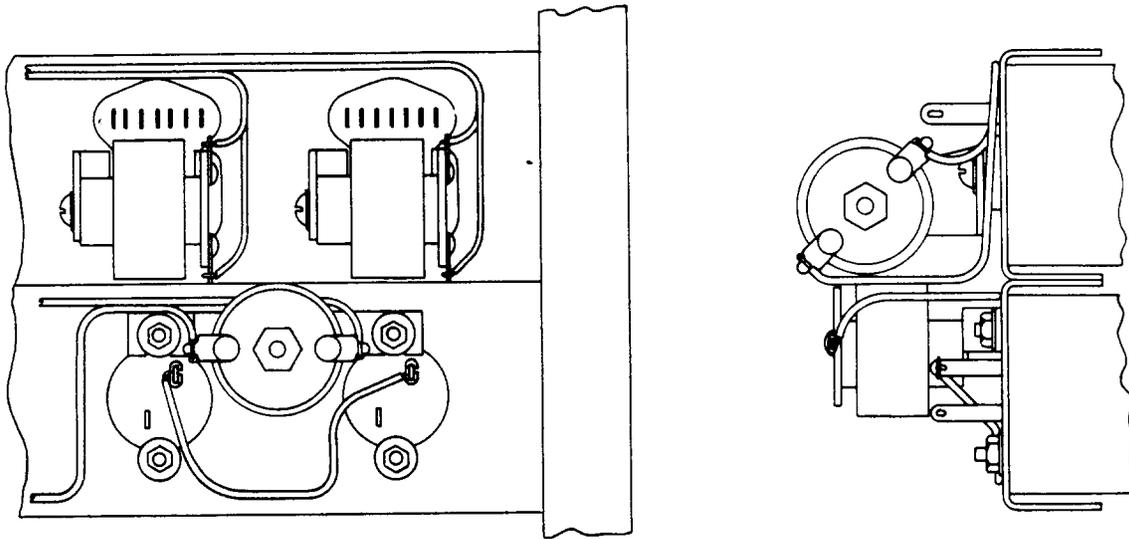


Fig. 7 – 200- and Similar-Type Inductors Mounted on Wiring Side — Surface Wiring

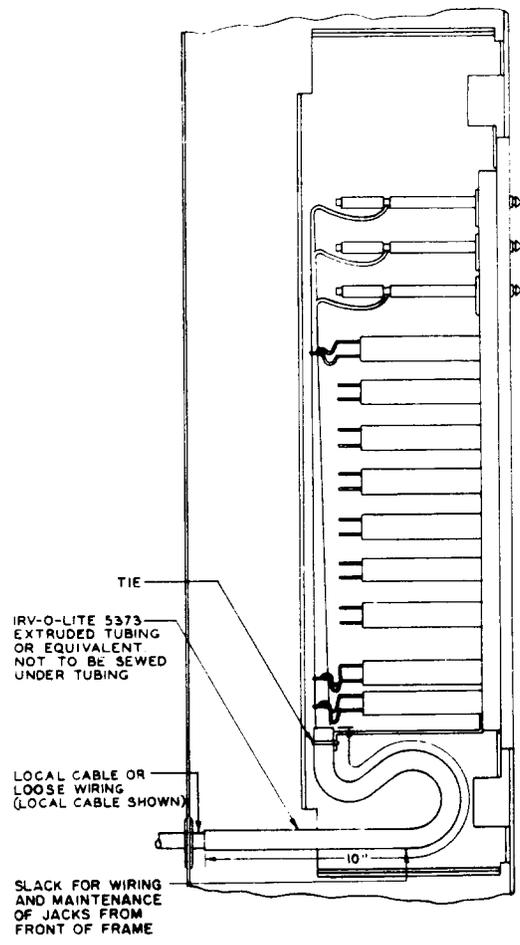


Fig. 8 – Jack Panel in Frame Upright Local Cable or Loose Wiring — No. 5 Crossbar

NOTES:

- 1 CLEARANCE BETWEEN SOLDERED CONNECTIONS ON BANJO STRAPPING SHALL BE $1/32"$
- 2 FURNISH ONE 99A APPARATUS BLANK FOR EACH UNEQUIPPED RELAY POSITION.

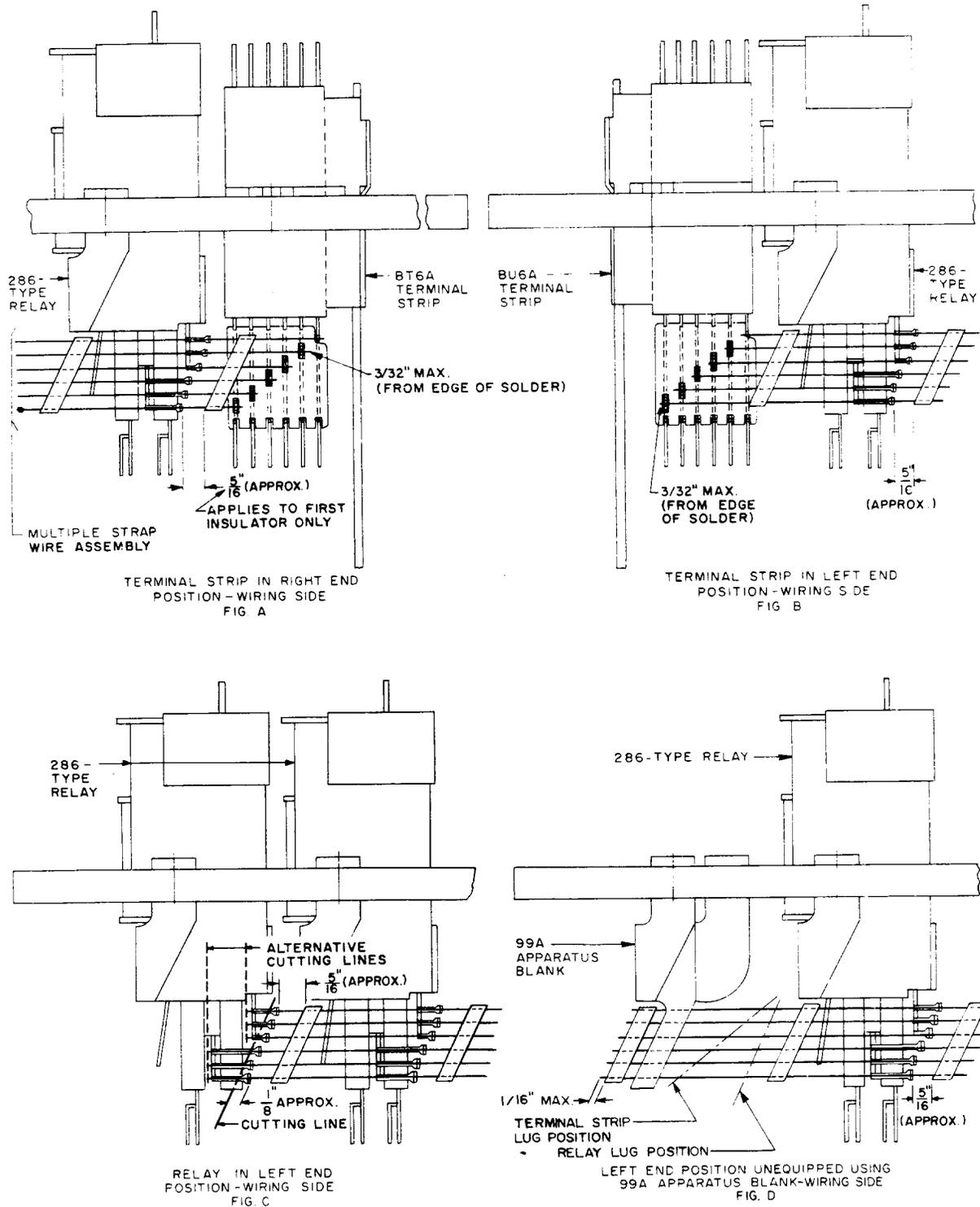


Fig. 9 - 286-Type Relays - Multicontact - BT6A and BU6A Terminal Strips - Arrangement of Multiple Strap Wire Assembly

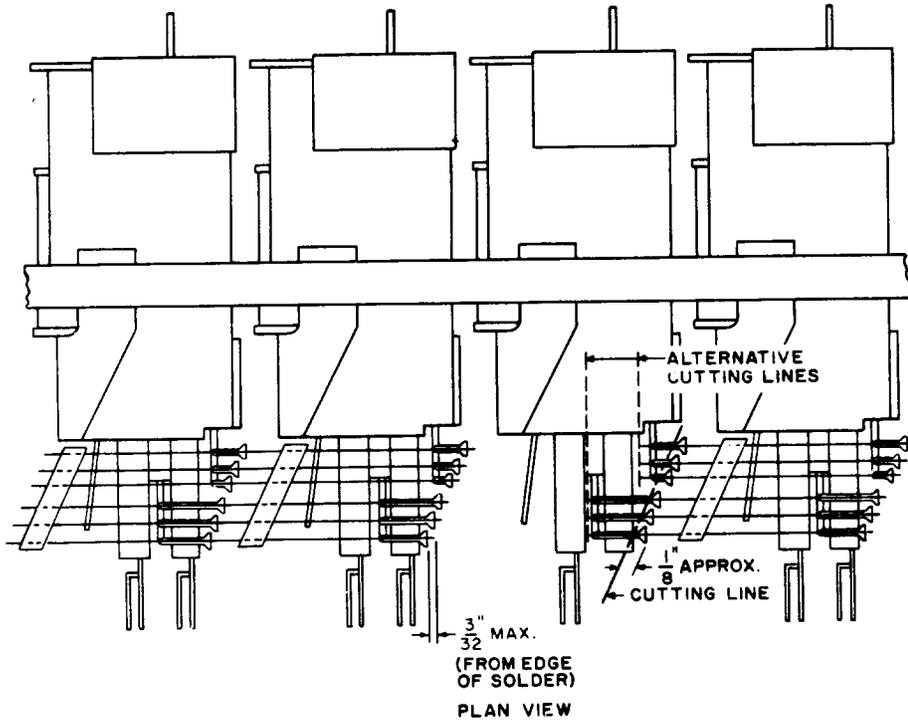


Fig. 10 - 286-Type Relays — Multicontact — Split in Horizontal Strap Wire Multiple Between Equipped Positions (See Fig. 11 for split between unequipped positions.)

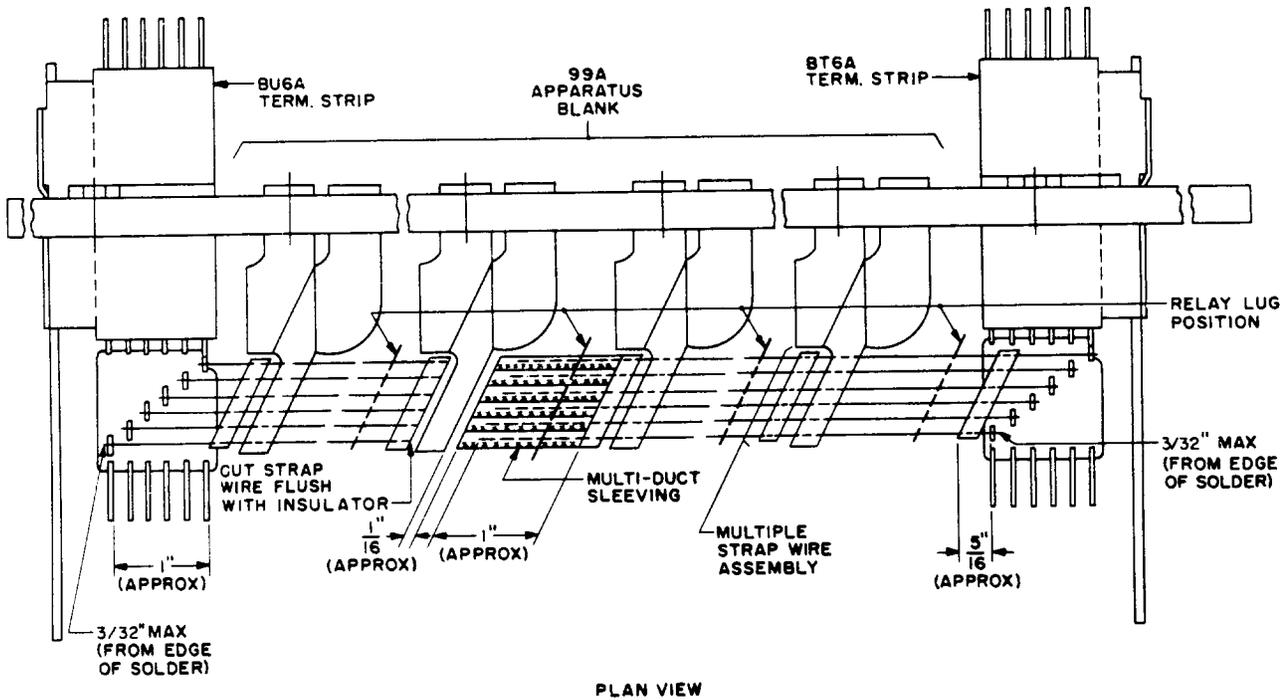
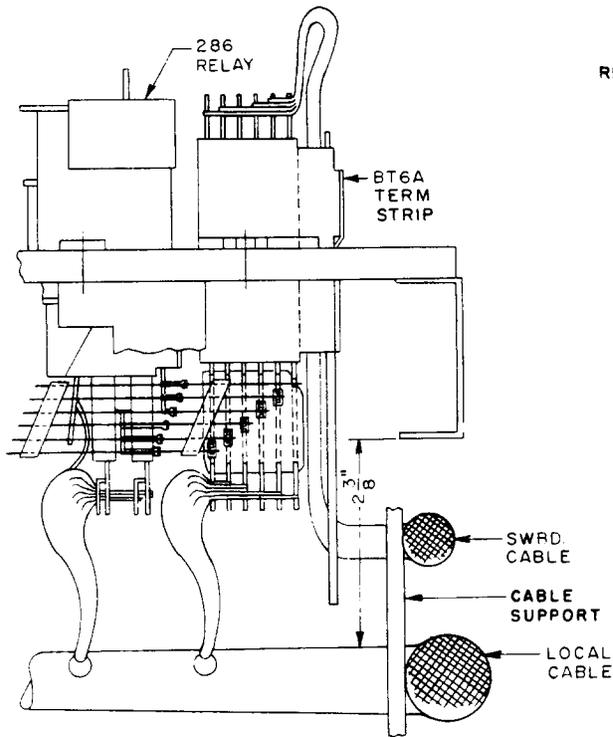
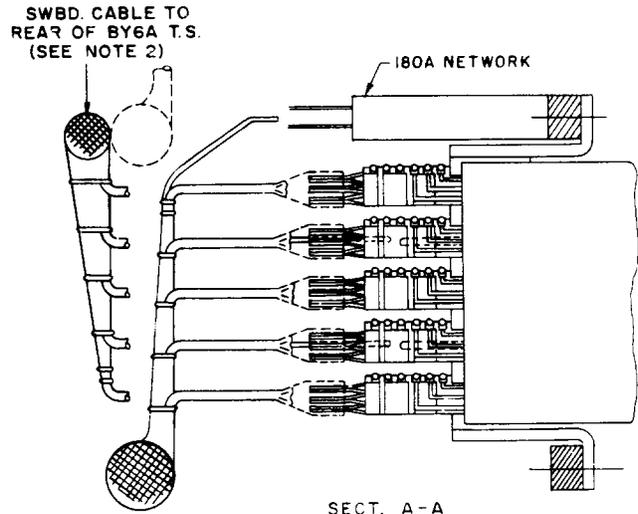


Fig. 11 - 286-Type Relays — Multicontact — Split in Horizontal Strap Wire Multiple Between Unequipped Positions (See Fig. 10 for split between equipped positions.)



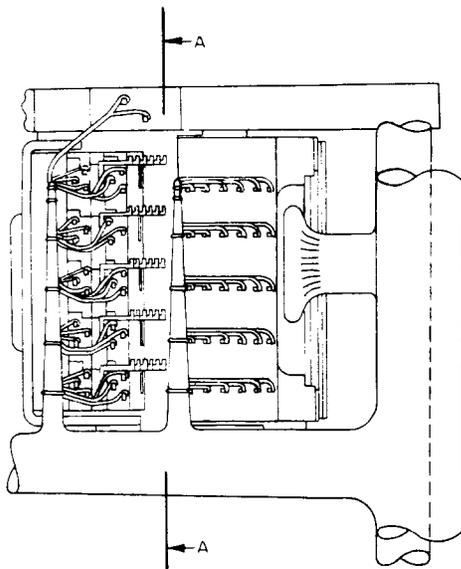
PLAN VIEW



SECT. A-A

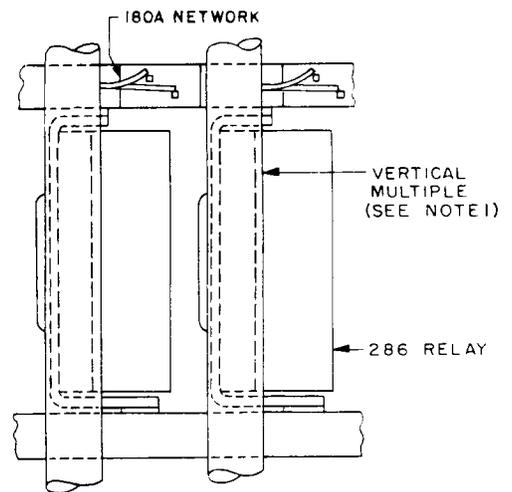
NOTES:

1. DRESS OF SKINNERS FROM VERTICAL MULTIPLE TO RELAYS AND NETWORKS SHALL BE THE SAME AS SHOWN IN FIG. A EXCEPT THAT A SEPARATE STITCH SHALL BE USED FOR THE NETWORK SKINNERS WHERE THE VERTICAL FORM PASSES THE NETWORKS.
2. WHEN SWBD CABLE IS CONNECTED TO THE REAR OF BY6A TS, DRESS THE LEADS IN THE SAME MANNER AS THE LOCAL CABLE LEADS TO BT6A TS AS SHOWN IN PLAN VIEW.



REAR VIEW

HORIZONTAL FORM WIRING
FIG. A



REAR VIEW

VERTICAL MULTIPLE WIRING
FIG. B

Fig. 12 - 286-Type Relays — Multicontact — 180A Networks — BT6A and BY6A Terminal Strips — Local and Switchboard Cable Wiring

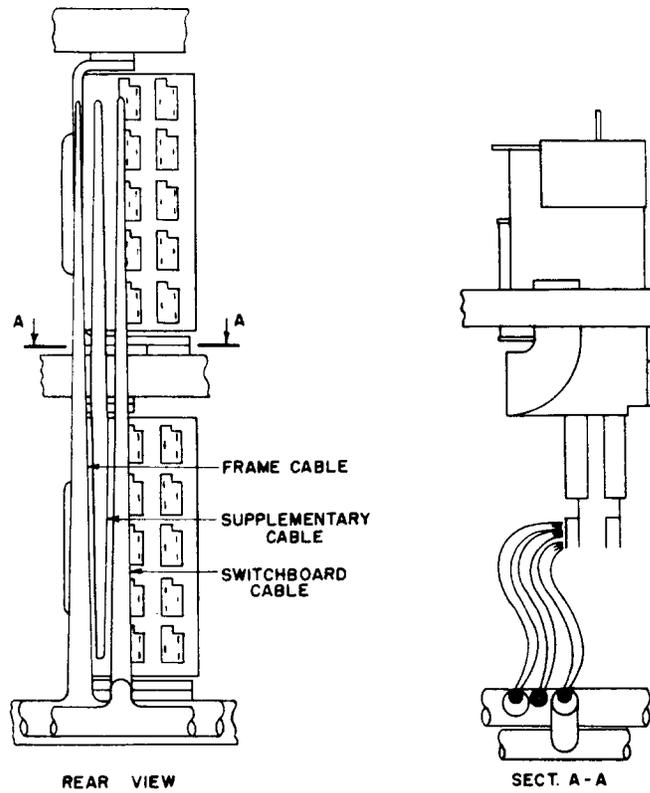
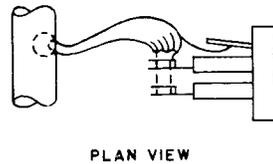
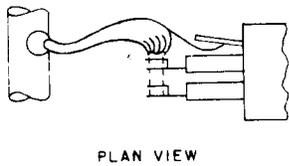


Fig. 13 - 286-Type Relays — Multicontact — Arrangement of Frame, Supplementary, and Switchboard Cables



NOTES:
1. THIS ARRANGEMENT SHOULD BE USED WHEN THE SIZE OF A SINGLE HORIZONTAL ARM WOULD BE EXCESSIVE.

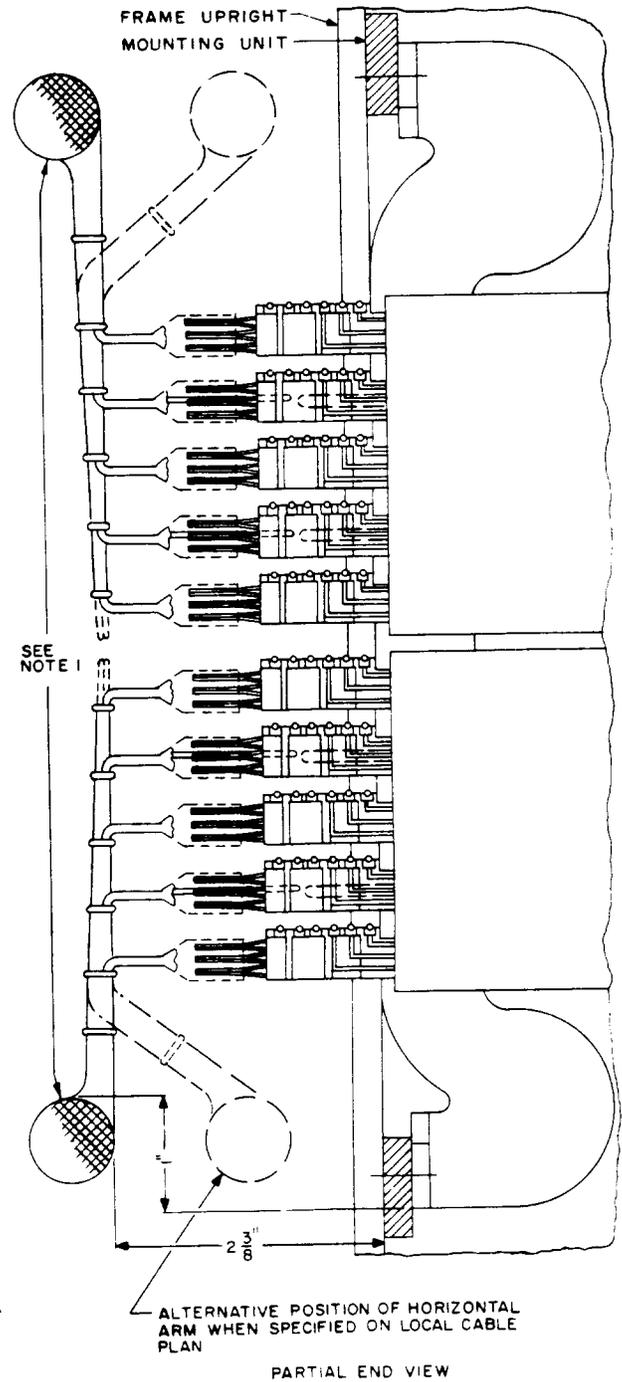
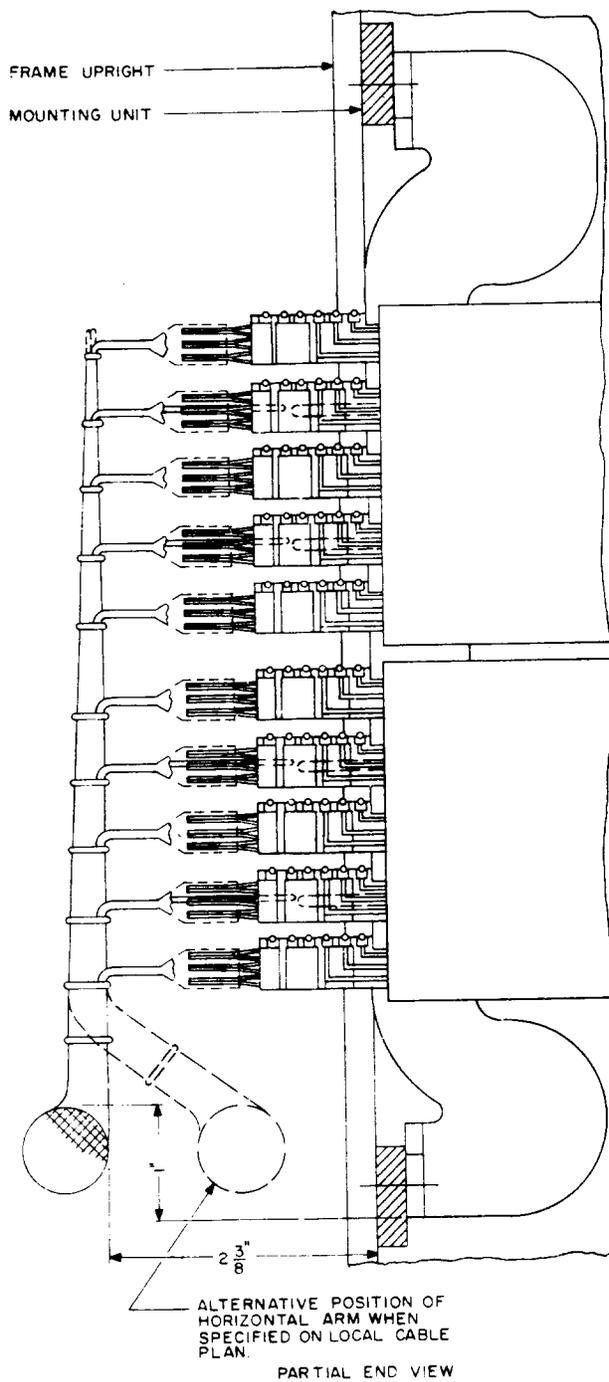


Fig. 14 - 287-, 288- and Similar-Type Relays (287 type shown) — Multicontact — Single Horizontal Main Form

Fig. 15 - 287-, 288-, and Similar-Type Relays (287 type shown) — Multicontact — Upper and Lower Horizontal Main Forms

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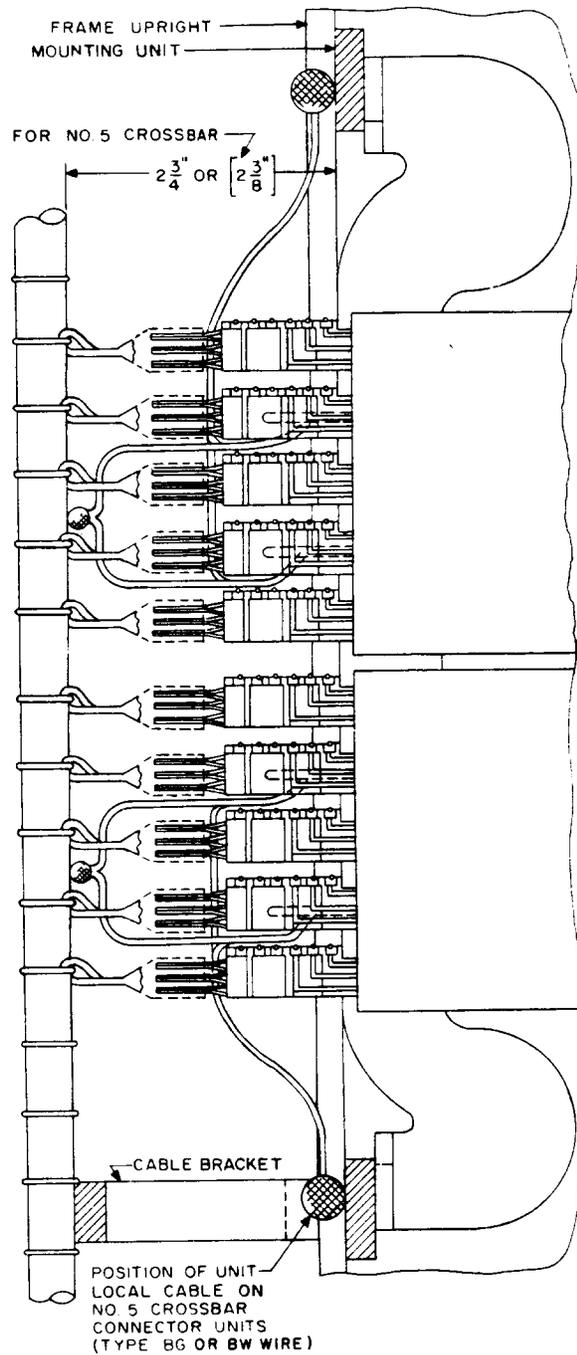
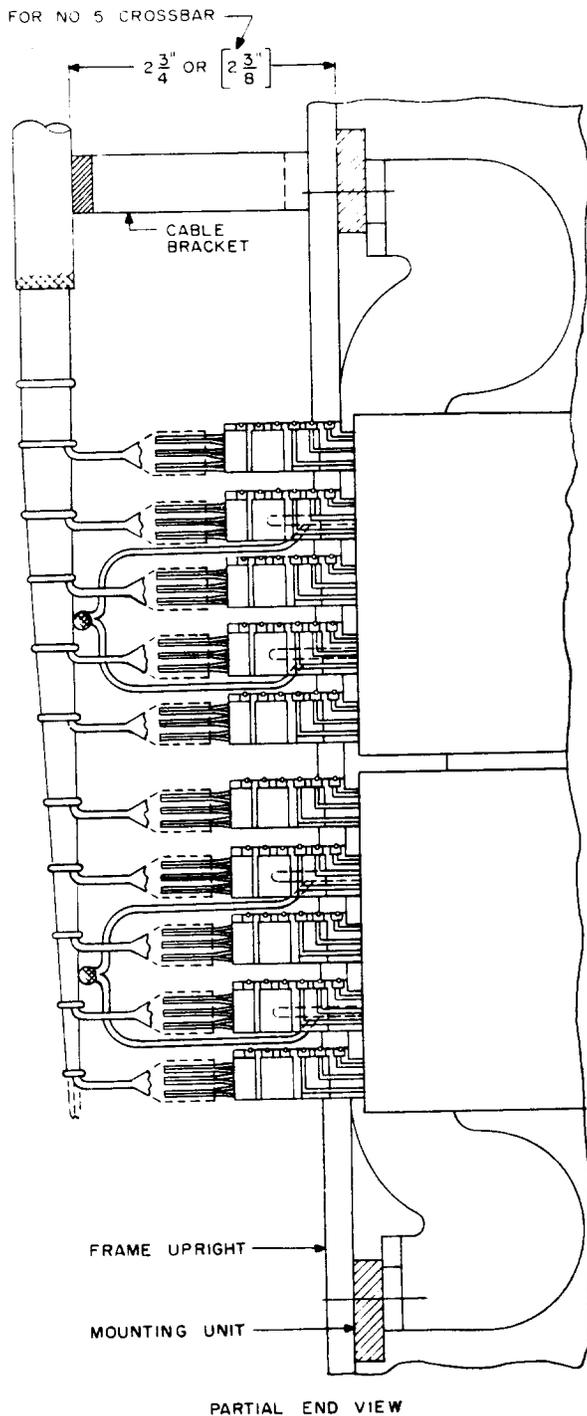
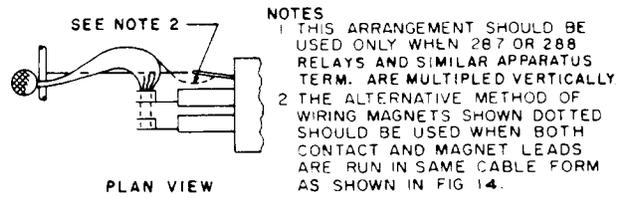
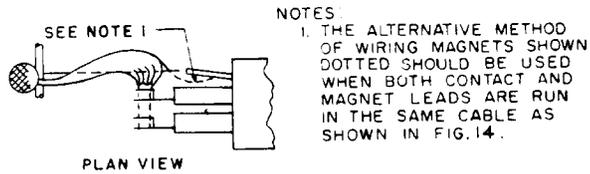


Fig. 16 - 287-, 288-, and Similar-Type Relays (287 type shown) — Multicontact — Vertical Switchboard Cable Wiring

Fig. 17 - 287-, 288-, and Similar-Type Relays (287 type shown) — Multicontact — Vertical Multiple Wiring

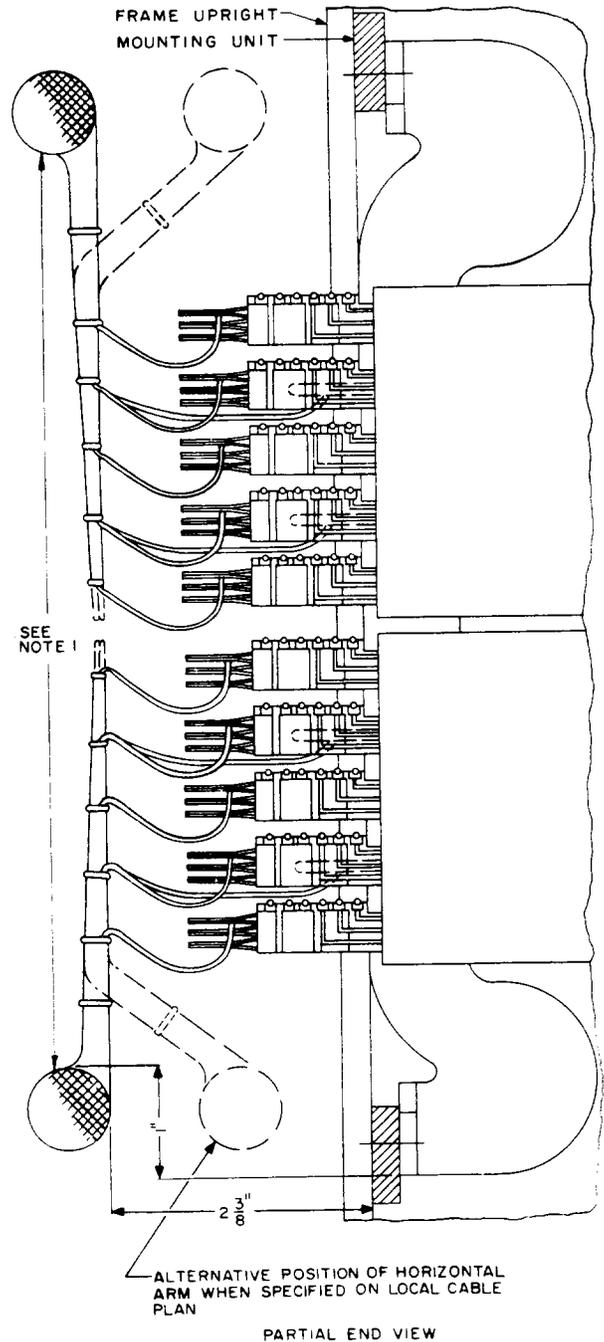
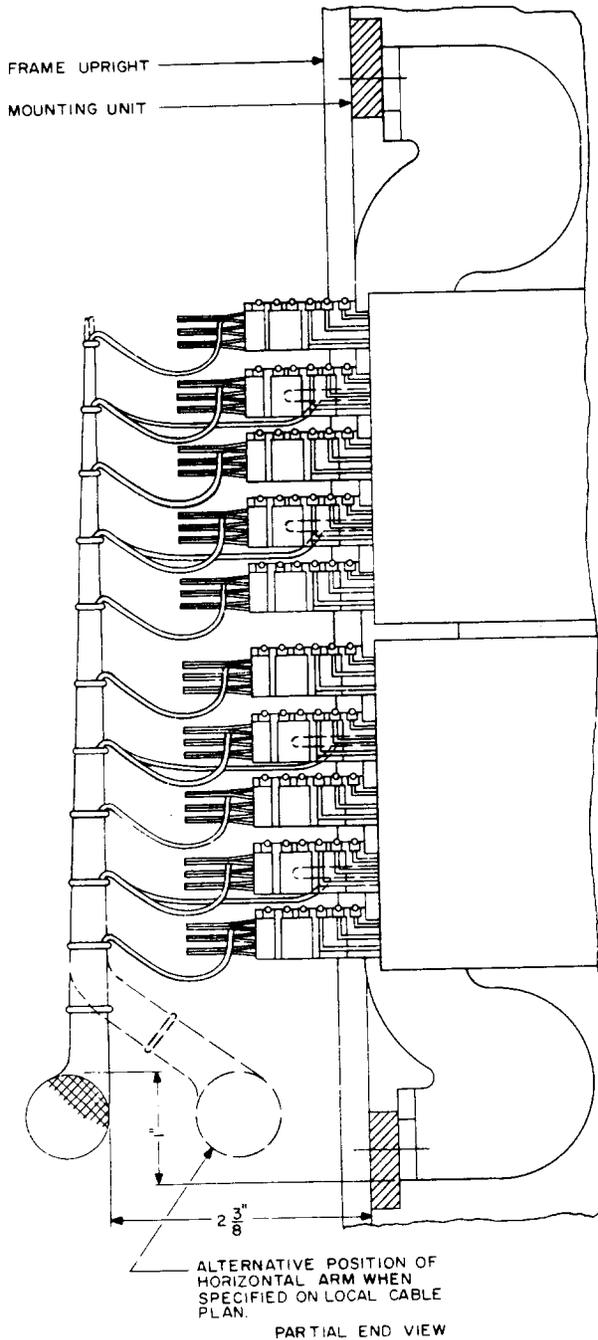
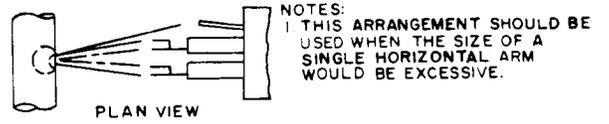
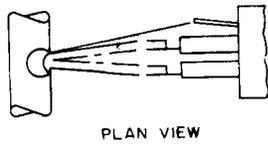


Fig. 18 - 287-, 288-, and Similar-Type Relays (287 type shown) — Multicontact — Single Horizontal Main Form (additions and replacements for 263-type relays)

Fig. 19 - 287-, 288-, and Similar-Type Relays (287 type shown) — Upper and Lower Horizontal Main Forms (additions and replacements for 263-type relays)

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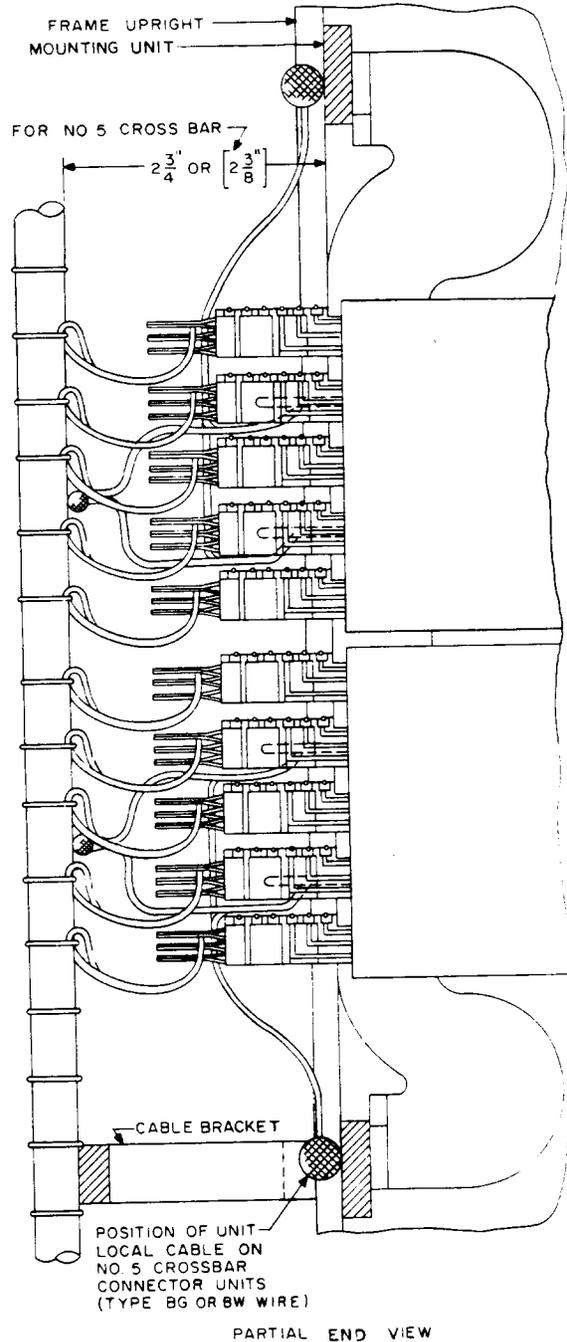
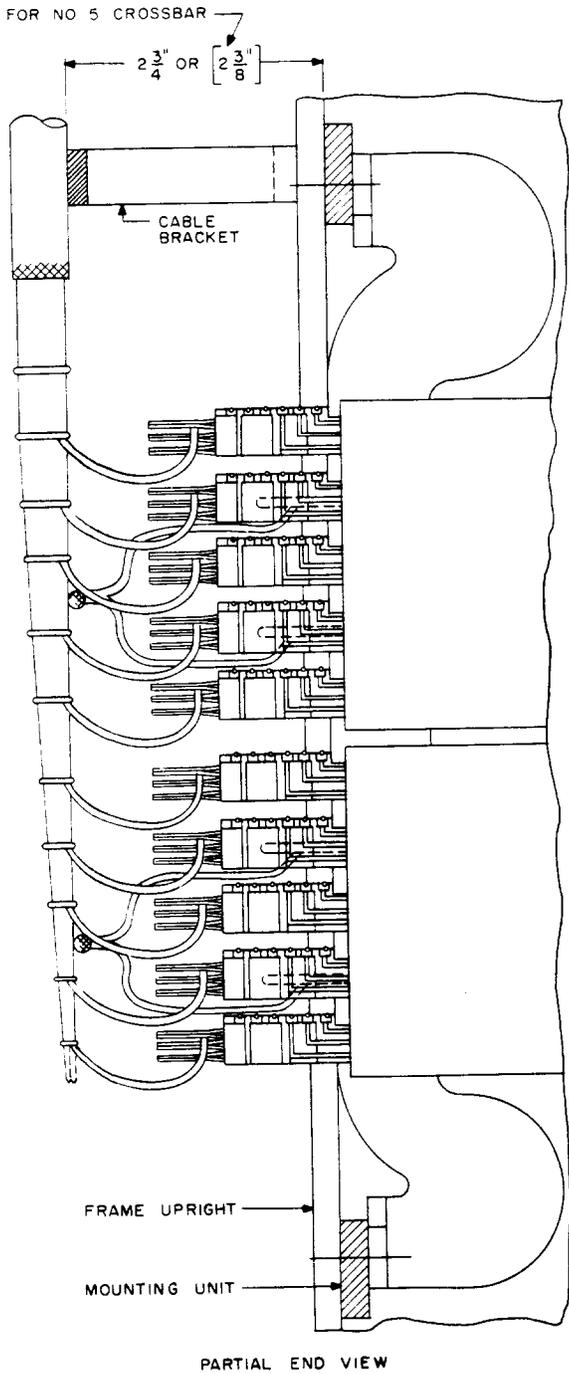
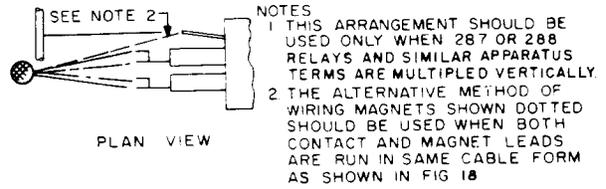
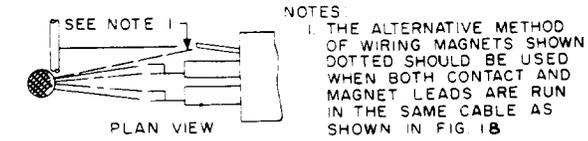


Fig. 20 - 287-, 288-, and Similar-Type Relays (287 type shown) — Multicontact — Vertical Switchboard Cable Wiring (additions and replacements for 263-type relays)

Fig. 21 - 287-, 288-, and Similar-Type Relays (287 type shown) — Multicontact — Vertical Multiple Wiring (additions and replacements for 263-type relays)

NOTES:

1. FURNISH ONE APPARATUS BLANK AND TEN MULTI-DUCT SLEEVES FOR FIVE OR LESS UNEQUIPPED RELAY POSITIONS. FURNISH A SECOND APPARATUS BLANK FOR SIX OR MORE UNEQUIPPED POSITIONS. THE SECOND BLANK SHALL BE LOCATED MIDWAY BETWEEN THE LAST EQUIPPED RELAY AND THE APPARATUS BLANK IN THE END POSITION.
2. TO ALLOW FOR THE DIFFERENCE IN THE SPACING DIMENSIONS BETWEEN THE MULTI-DUCT SLEEVING AND THE RELAY SPADE TERMINALS, THE SLEEVING MAY BE SPLIT AT THE END ADJACENT TO THE LAST EQUIPPED RELAY INTO TWO EQUAL OR NEAR EQUAL GROUPS FOR A DISTANCE UP TO APPROX THE CENTER OF THE NEXT POSITION.
3. TO INSTALL ADDITIONAL RELAYS, REMOVE SLEEVES FROM THE SUPPORT, SLIDE THE SLEEVING BACK AS REQUIRED AND CUT OFF SURPLUS.
4. USE MULTI-DUCT SLEEVING HAVING THE SAME NUMBER OF DUCTS AS THE NUMBER OF STRAPS IN THE GROUP TO BE SLEEVED. HOWEVER, IT IS PERMISSIBLE TO HAVE ONE UNUSED DUCT IN THE SLEEVING. DO NOT SUBSTITUTE TWO OR MORE MULTI-DUCT SLEEVES HAVING SMALLER NUMBERS OF DUCTS FOR ONE MULTI-DUCT SLEEVING HAVING A LARGER NUMBER OF DUCTS.
5. WHEN THE UNEQUIPPED POSITION IS AT THE RIGHT END OF THE RELAY ASSEMBLY (AS VIEWED FROM REAR OF FRAME), 1 3/8 INCH MIN STRAP WIRE SHALL BE STORED IN THE SAME MANNER AS SHOWN FOR THE LEFT END.

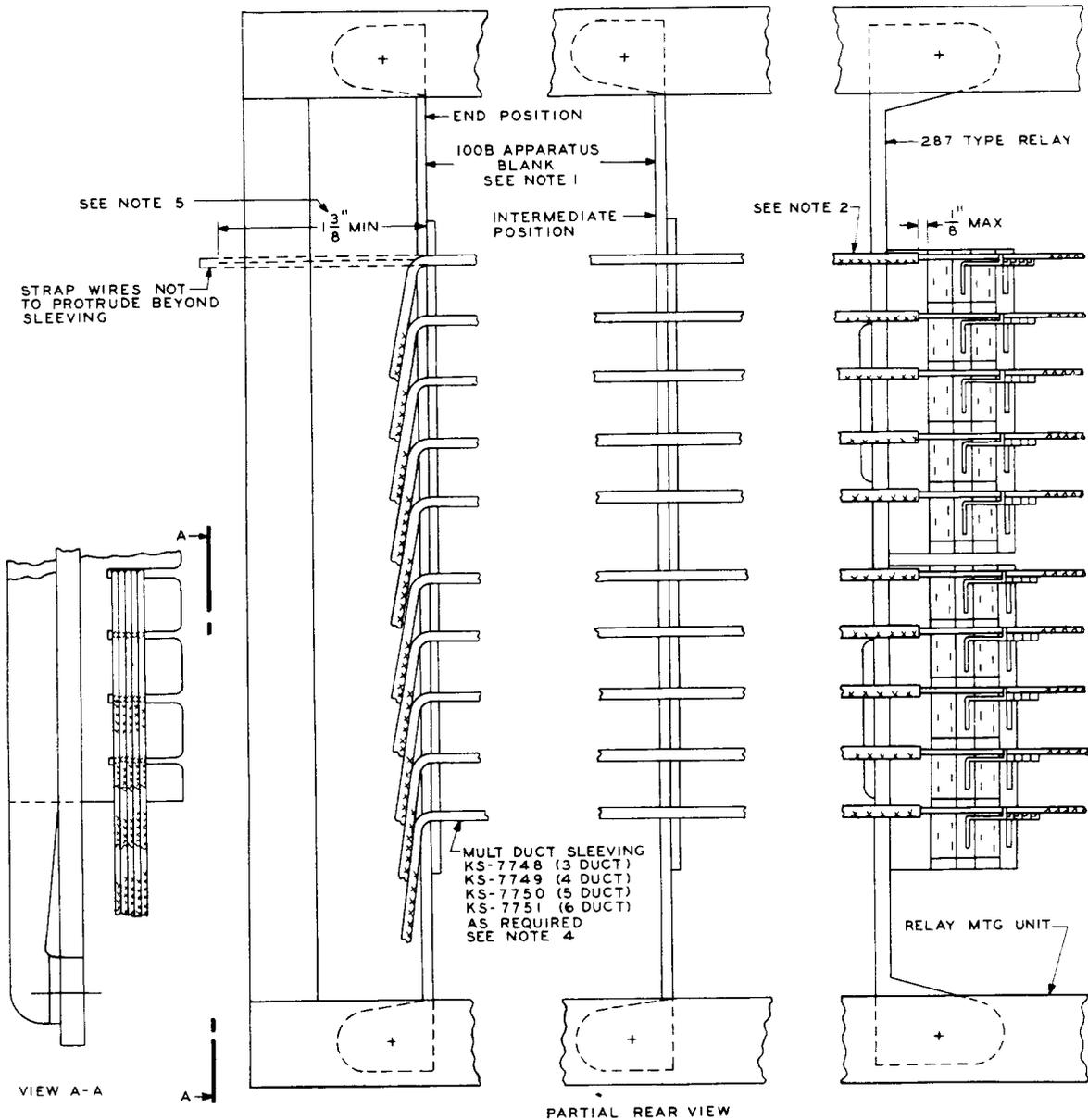


Fig. 22 - 287- and Similar-Type Relays — Multicontact — Protection and Support of Horizontal Multiple at Unequipped Relay Positions When Multiple Is Connected at One End

- NOTES:
1. FURNISH ONE 100A APPARATUS BLANK (WHICH INCLUDES TEN KEYS, P-15A903) FOR EACH UNEQUIPPED RELAY POSITION.
 2. THE HORIZONTAL LEVEL BARE STRAP WIRE SHALL NOT EXTEND MORE THAN $\frac{3}{32}$ " MAX. BEYOND EDGE OF SOLDER AT END OF STRAP.

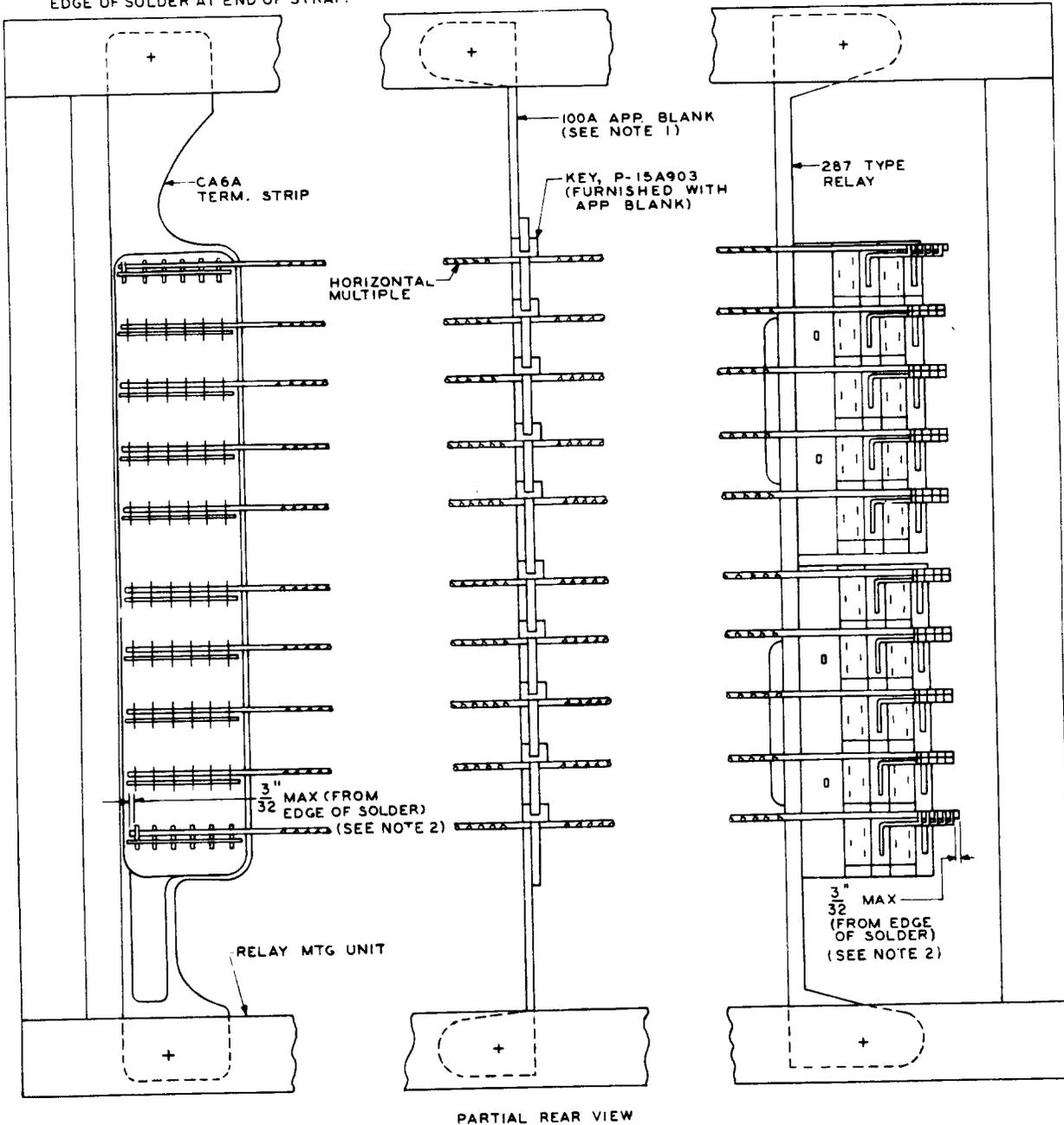


Fig. 23 - 287- and Similar-Type Relays - Multicontact - Support of Horizontal Multiple at Unequipped Relay Positions When Multiple Is Connected at Both Ends

NOTE:
 1. THIS FIGURE IS PROVIDED TO PERMIT CUTTING CONTINUOUS MULTIPLE STRAP WIRE, AS SHOWN, TO FACILITATE MANUFACTURING EFFORT WHEN THE RELAY ASSEMBLY IS COMPOSED OF TWO OR MORE SEPARATE CIRCUITS AND REQUIRING CUT IN MULTIPLE STRAPS BETWEEN UNEQUIPPED RELAY POSITIONS.

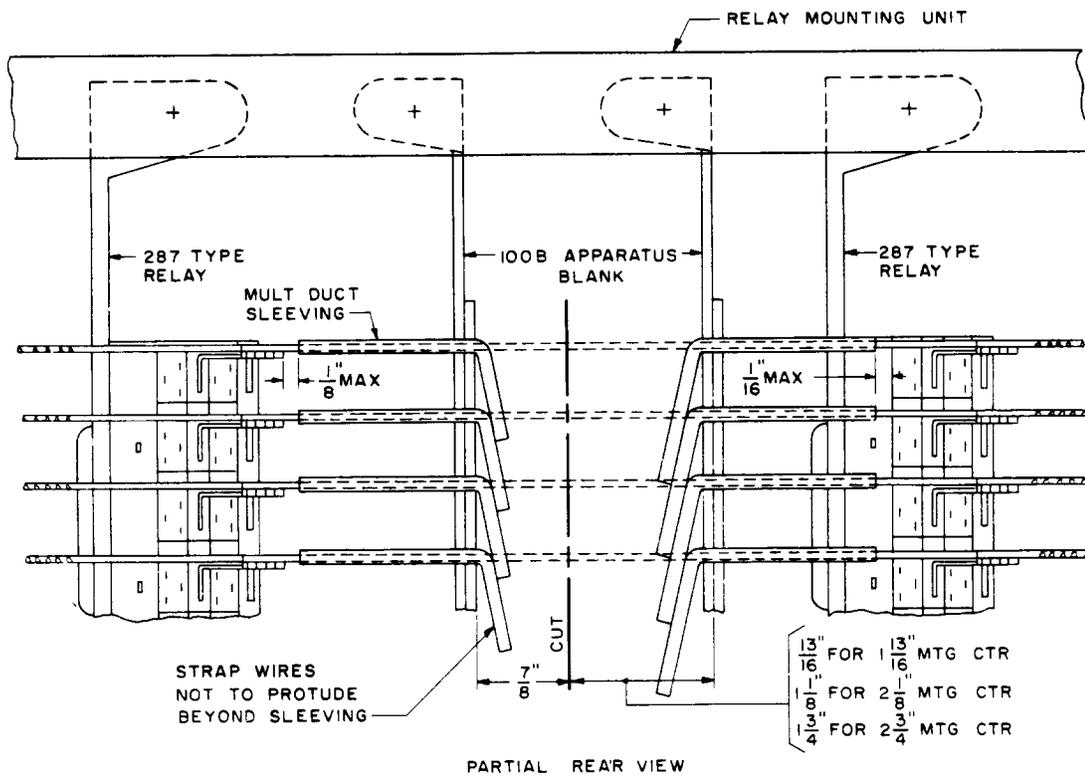


Fig. 24 — 287-Type Relays — Cutting of Horizontal Multiple Between Two Unequipped Positions on Multicontact Relay Assemblies

NOTES:

1. THIS FIGURE IS PROVIDED FOR THE DRESS OF INTERMAGNET WIRING ON 287 TYPE RELAYS WHEN THEY ARE ADDED TO FRAMES INITIALLY WIRED FOR 245 OR 263 TYPE RELAYS.
2. WHEN BATTERY FEEDER IS COMMON TO TWO OR MORE RELAYS AND STRAP WIRE IS USED, THIS LEAD SHALL BE CONNECTED APPROX. MIDWAY BETWEEN THE LAST TWO 263 TYPE RELAYS BY WRAPPING 1 1/2 TURNS OF BARE WIRE AROUND A SKINNED PORTION OF STRAP WIRE AND SOLDERING.
3. WHEN BATTERY FEEDER (SHOWN DOTTED) IS INDIVIDUAL TO EACH RELAY, A SPLICE WILL BE REQUIRED WHEN ADDING 287 TYPE RELAYS.

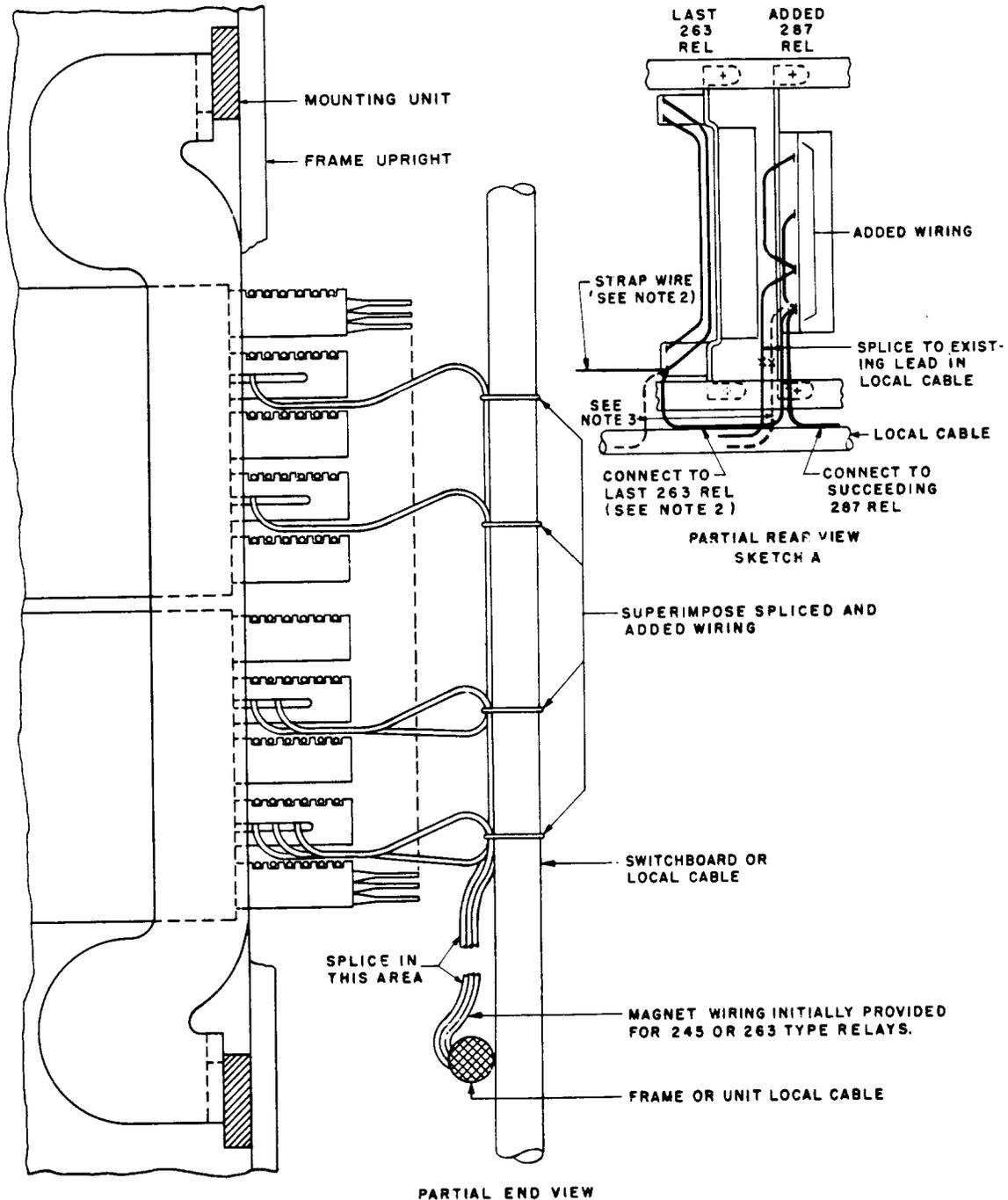


Fig. 25 - 287- and Similar-Type Relays — Multicontact — Intermagnet Wiring

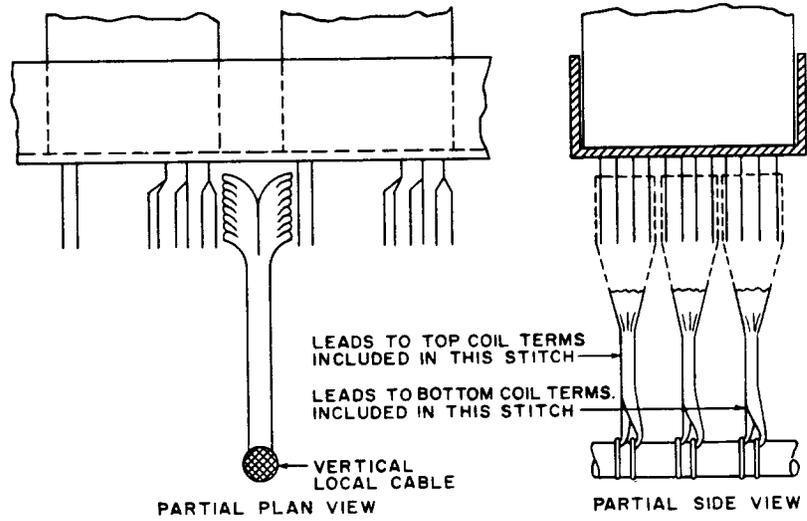


Fig. 26 - AF- and Similar-Type Relays — Vertical Local Cable Serving Two Relays

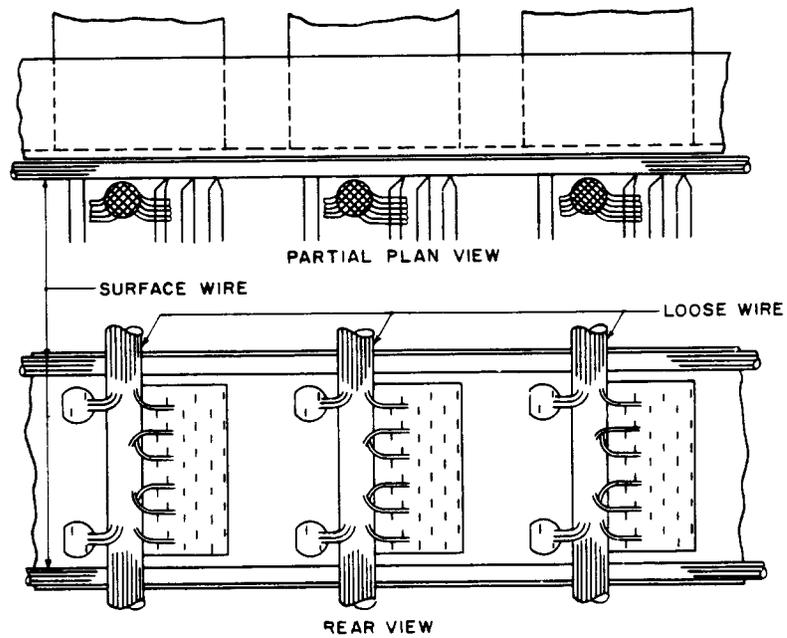


Fig. 27 - AF-Type Relays — Vertical Loose Wiring and Surface Wiring

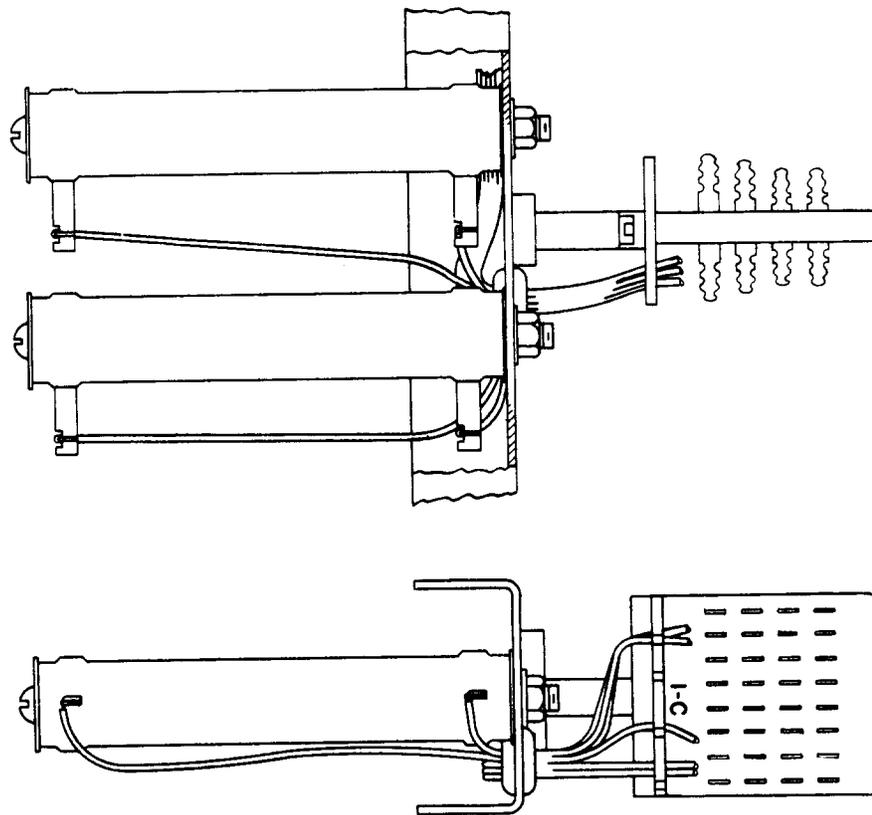
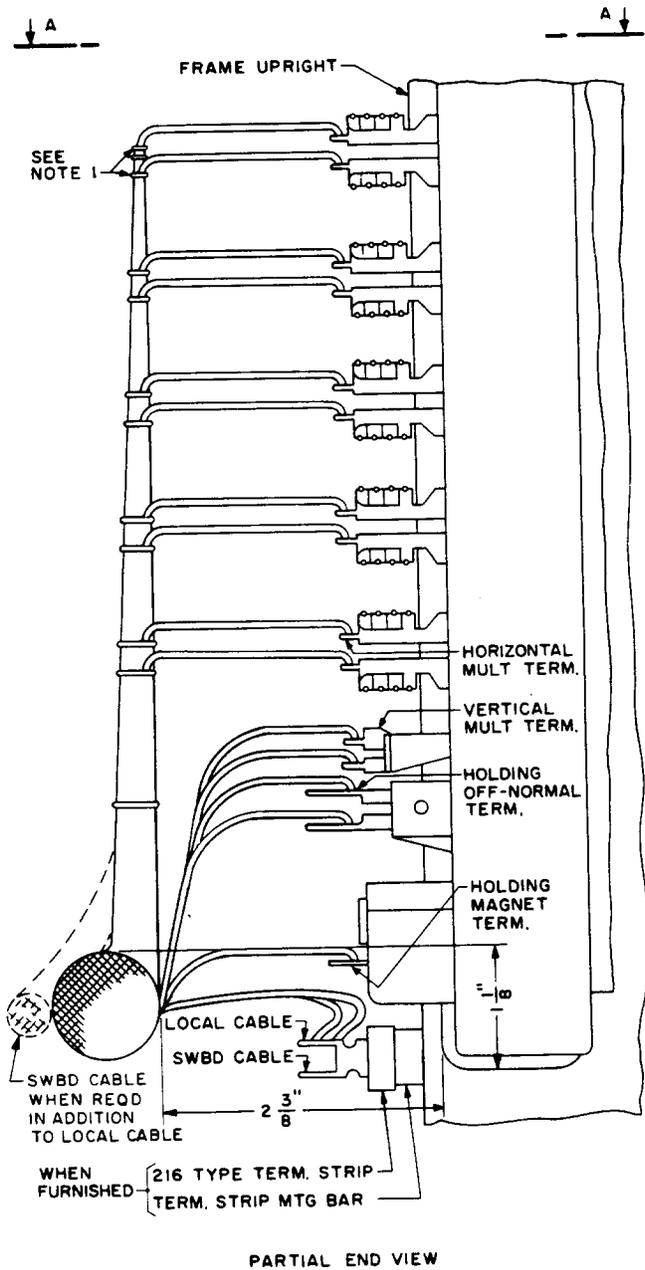
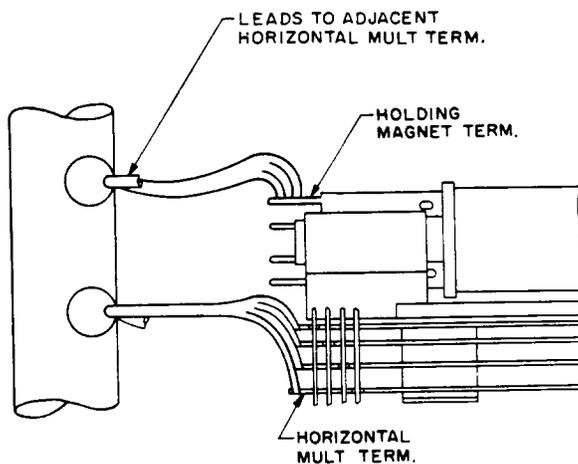


Fig. 28 - 100- and Similar-Type Resistors — Surface Wiring



NOTES:

1. SINGLE STITCH MAY BE USED ON FRAMES WHEN EXTRA STITCH IS NOT REQUIRED TO SEPARATE LEADS OF SAME COLOR.



VIEW A-A

Fig. 29 - 324- and Similar-Type Switches — (wrapped-type terminals) —
Single Horizontal Main Form

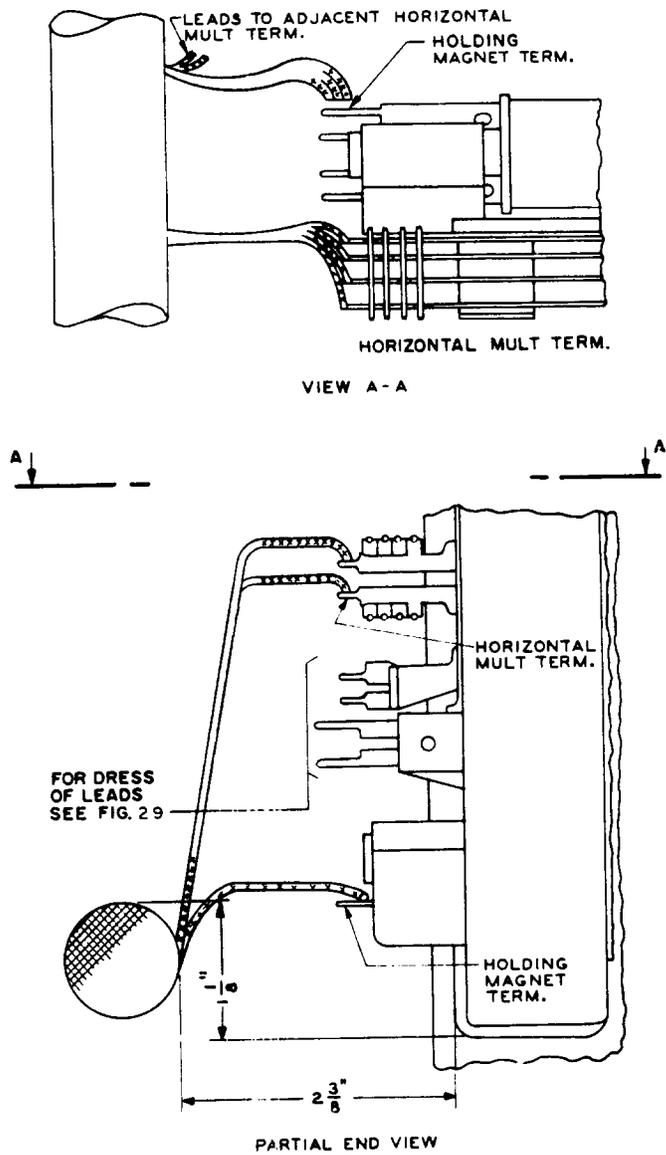


Fig. 30 - 324- and Similar-Type Switches — (wrapped-type terminals) — Wiring to "0" and "1" Level Terminals

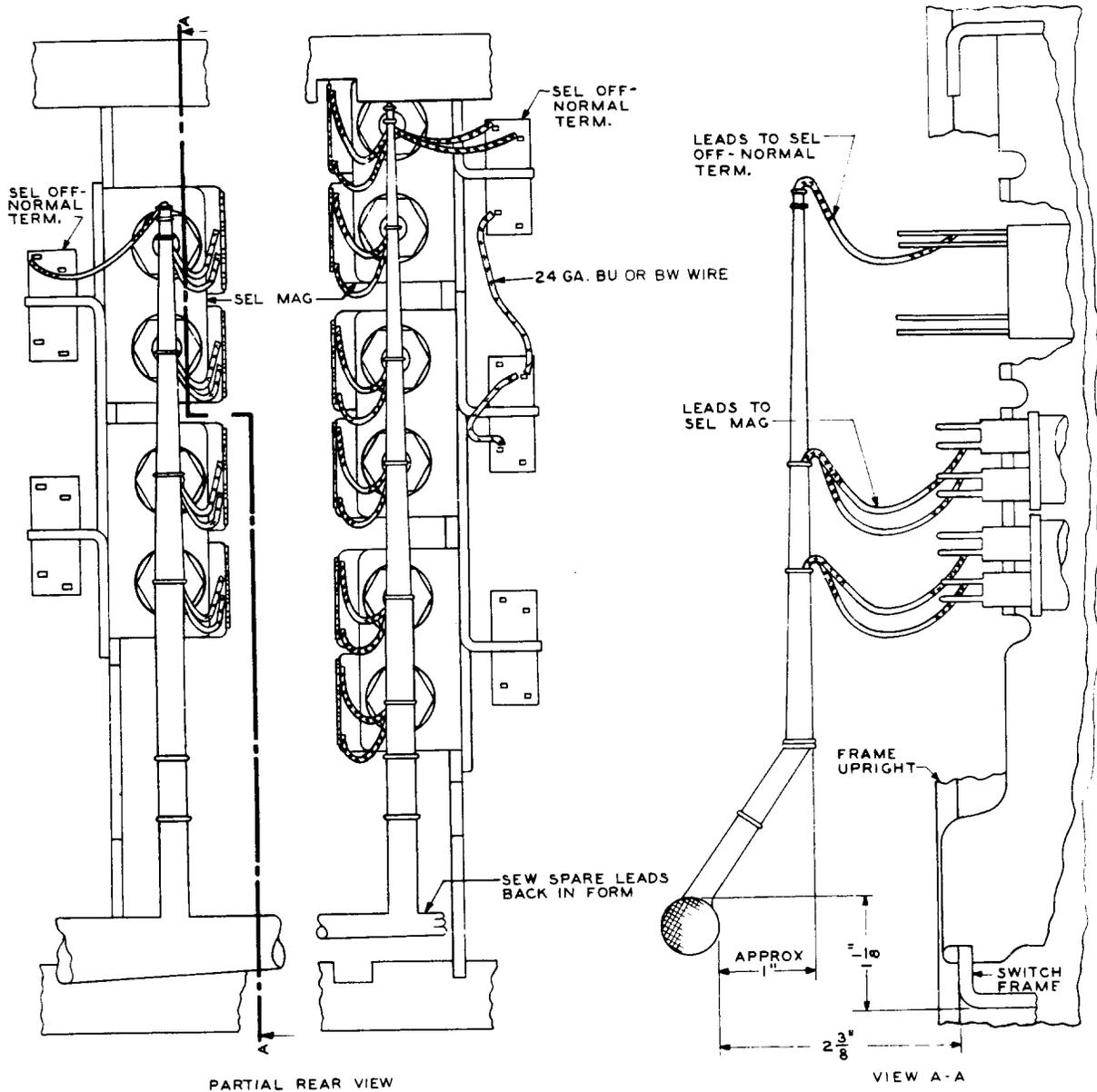


Fig. 31 - 324- and Similar-Type Switches — (wrapped-type terminals) —
 Selecting Magnets and Selecting Off-Normal Spring Terminals

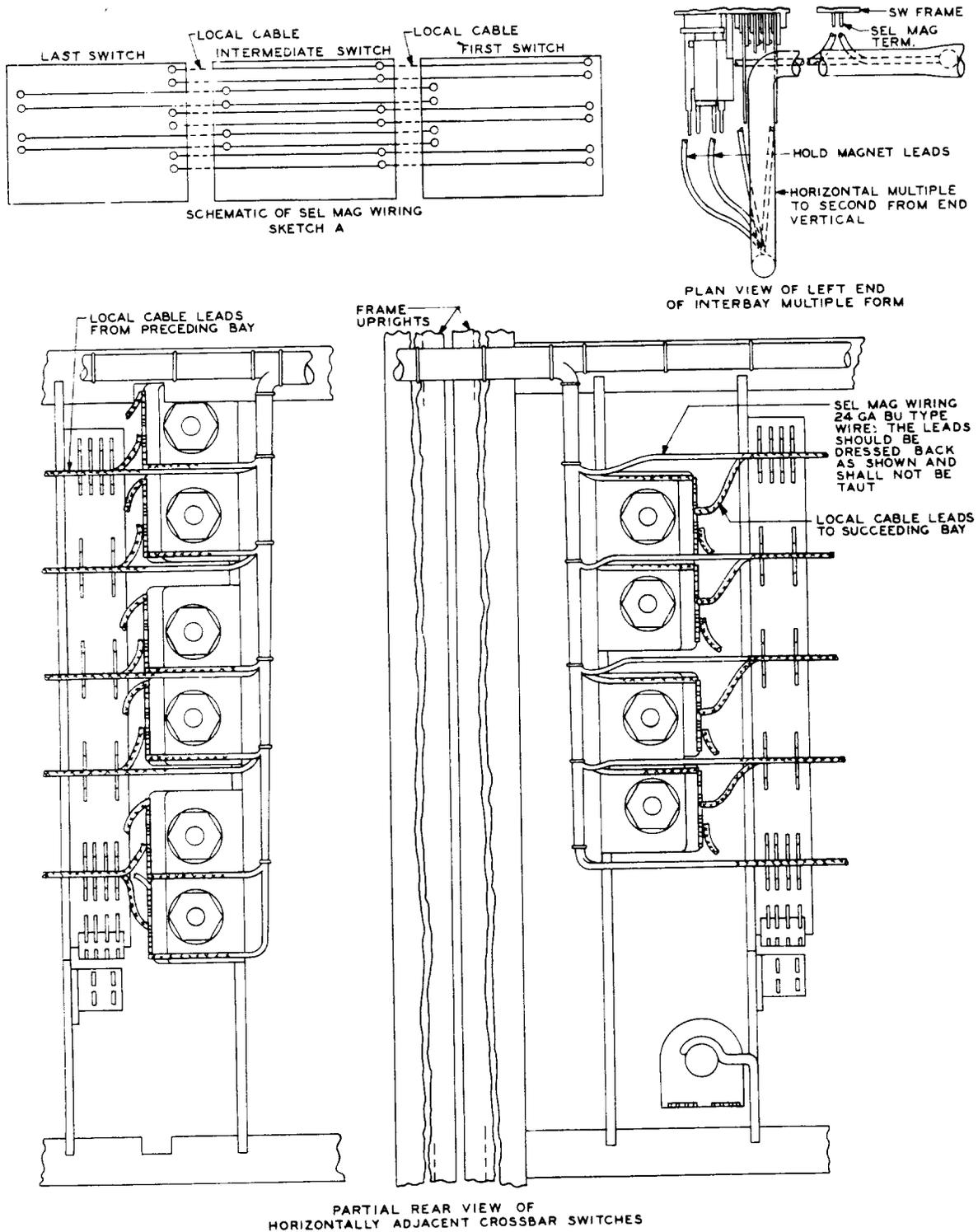


Fig. 32 - 324- and Similar-Type Switches — (wrapped-type terminals) — Interbay Wiring of Horizontal Multiple, Selecting Magnets, and Battery and Ground Leads — No. 1 Crossbar

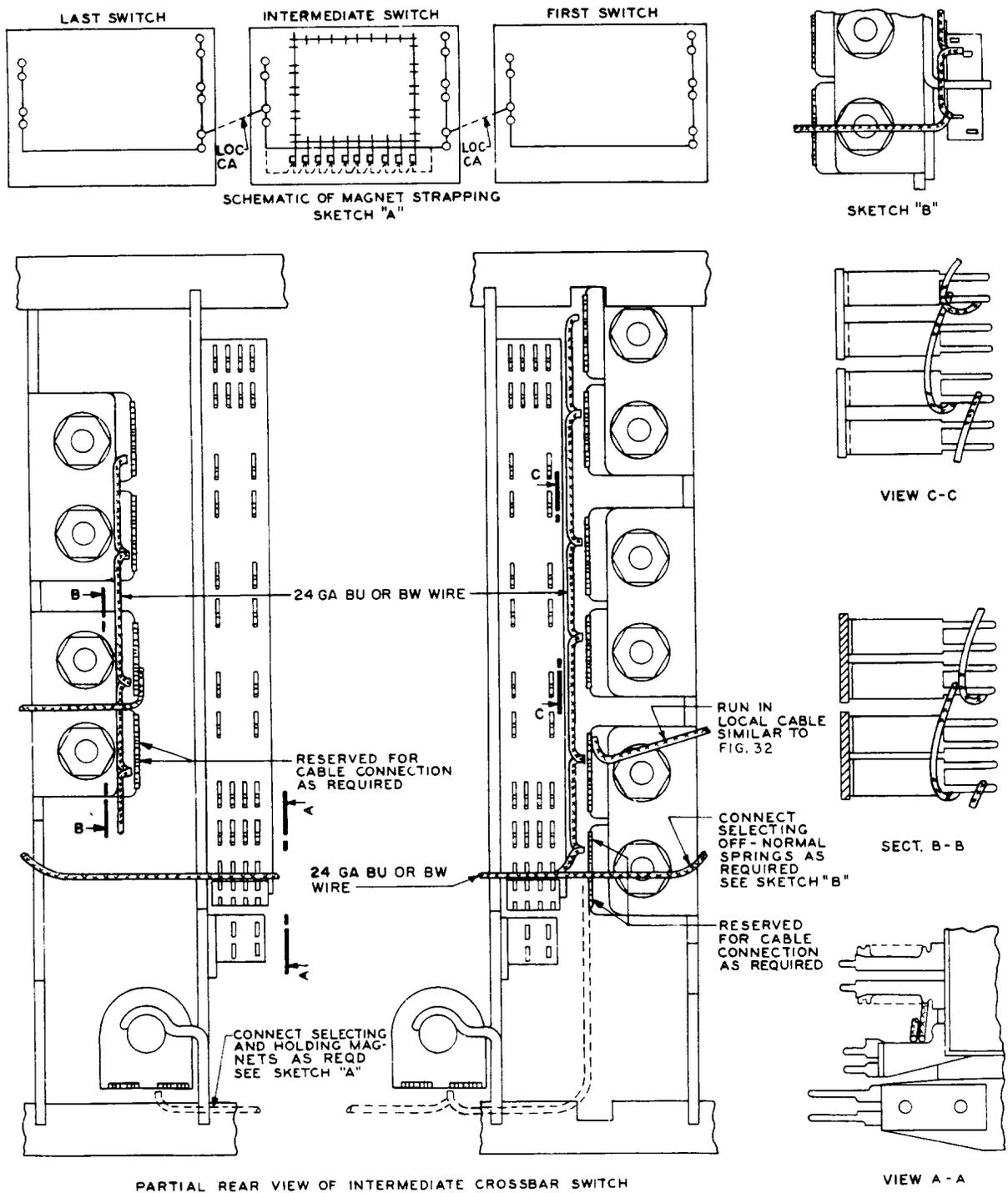


Fig. 33 - 324- and Similar-Type Switches — (wrapped-type terminals) — Magnet Strapping

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NOTES:

1. ALTERNATE METHOD OF DRESSING THE STRAPS BETWEEN THE HOLD MAGNETS WHEN THE SWITCH IS STRAPPED IN A CROSSBAR FRAME INSTEAD OF THE BENCH POSITION.
2. WHEN IT IS NECESSARY TO FAN THE HOLDING OFF-NORMAL TERMINALS PRIOR TO APPLYING THE SOLDERLESS WRAPPED CONNECTIONS, THE BENDING SHALL BE CONFINED TO THE 13/64 INCH WIDE FLAT PORTION OF THE TERMINAL AND THERE SHALL BE NO PERCEPTIBLE BOW IN THE 0.060 INCH WIDE PORTION OF THE TERMINAL.
3. WHERE SPLIT HORIZONTAL MULTIPLES ARE TO BE GROUPED TOGETHER, THE SPLIT SHOULD BE BRIDGED BY MEANS OF A "U" SHAPED LOCAL CABLE FORM CONNECTING THE GROUPS OF TERMINALS ON ADJACENT SWITCH VERTICAL UNITS. THIS FORM SHOULD BE SUPERIMPOSED ON THE HORIZONTAL FORM ALONG THE BOTTOM OF THE SWITCH AND THE SKINNERS TO THE HORIZONTAL MULTIPLE TERMINALS SHOULD BE DRESSED SIMILAR TO OTHER LEADS TO SWITCH HORIZONTAL TERMINALS.
4. WHEN THE 20 GA HORIZONTAL LEVEL STRAPPING IS NOT CONNECTED, THREE HORIZONTAL MULTIPLE TERMINALS MAY BE STRAPPED TOGETHER.
5. THE 20 GA HORIZONTAL LEVEL BARE STRAP WIRE SHALL NOT EXTEND MORE THAN 3/32" MAX BEYOND EDGE OF SOLDER AT END OF STRAP.

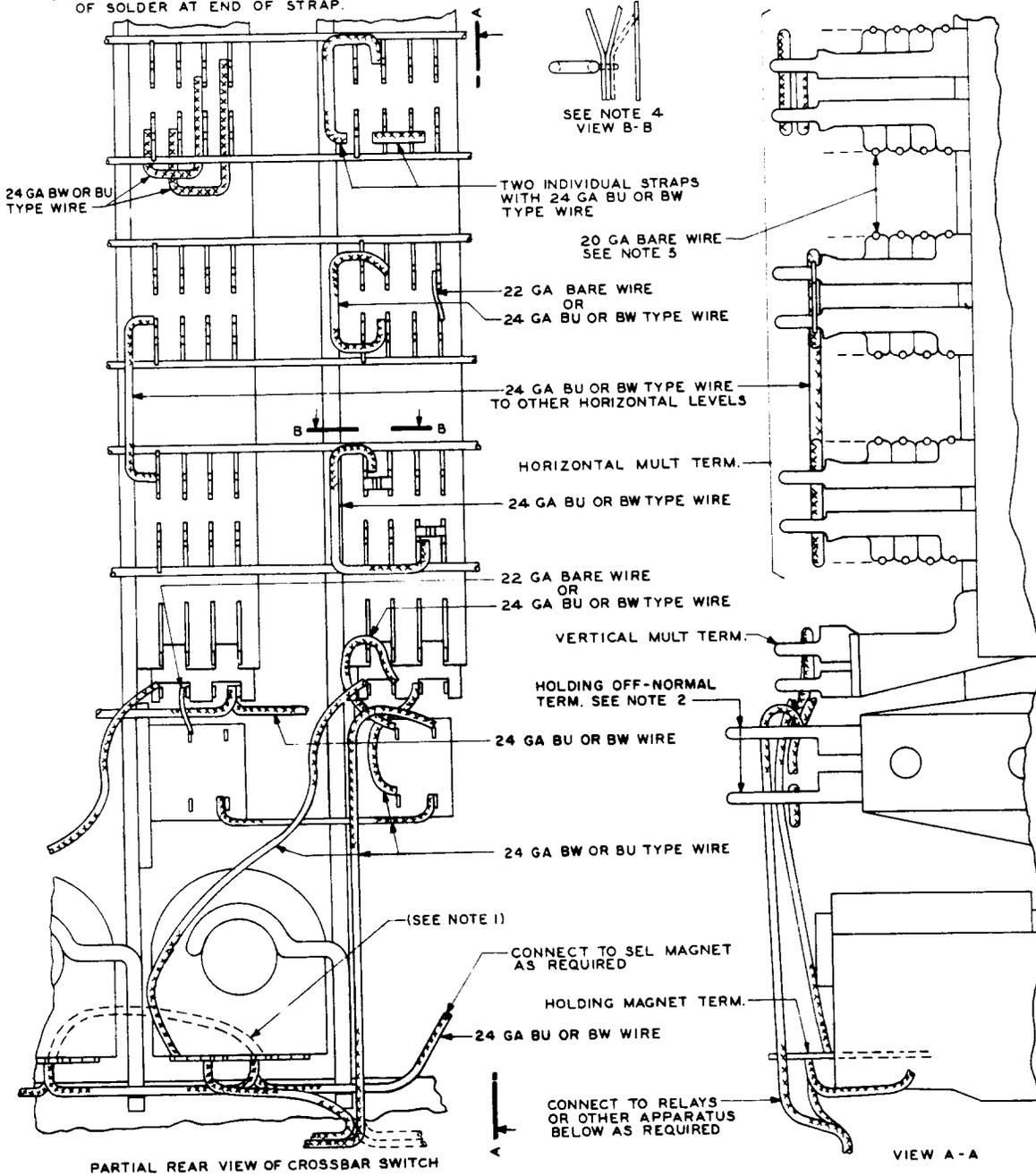


Fig. 34 - 324- and Similar-Type Switches — (wrapped-type terminals) — Strapping of Switch Vertical Units

NOTE: NOT OVER EIGHT VERTICAL ROWS OF TERMINALS SHOULD BE SERVED BY THE SAME CABLE ARM.

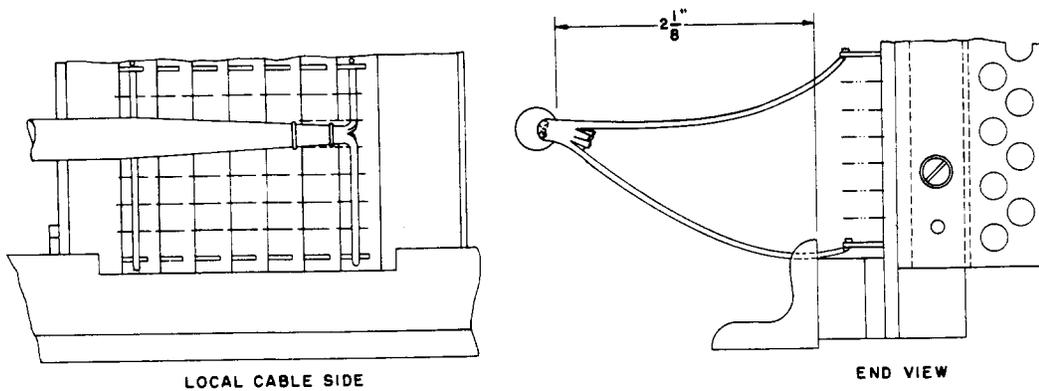


Fig. 35 - 215- and Similar-Type Terminal Strips — Wiring From Sewed Form

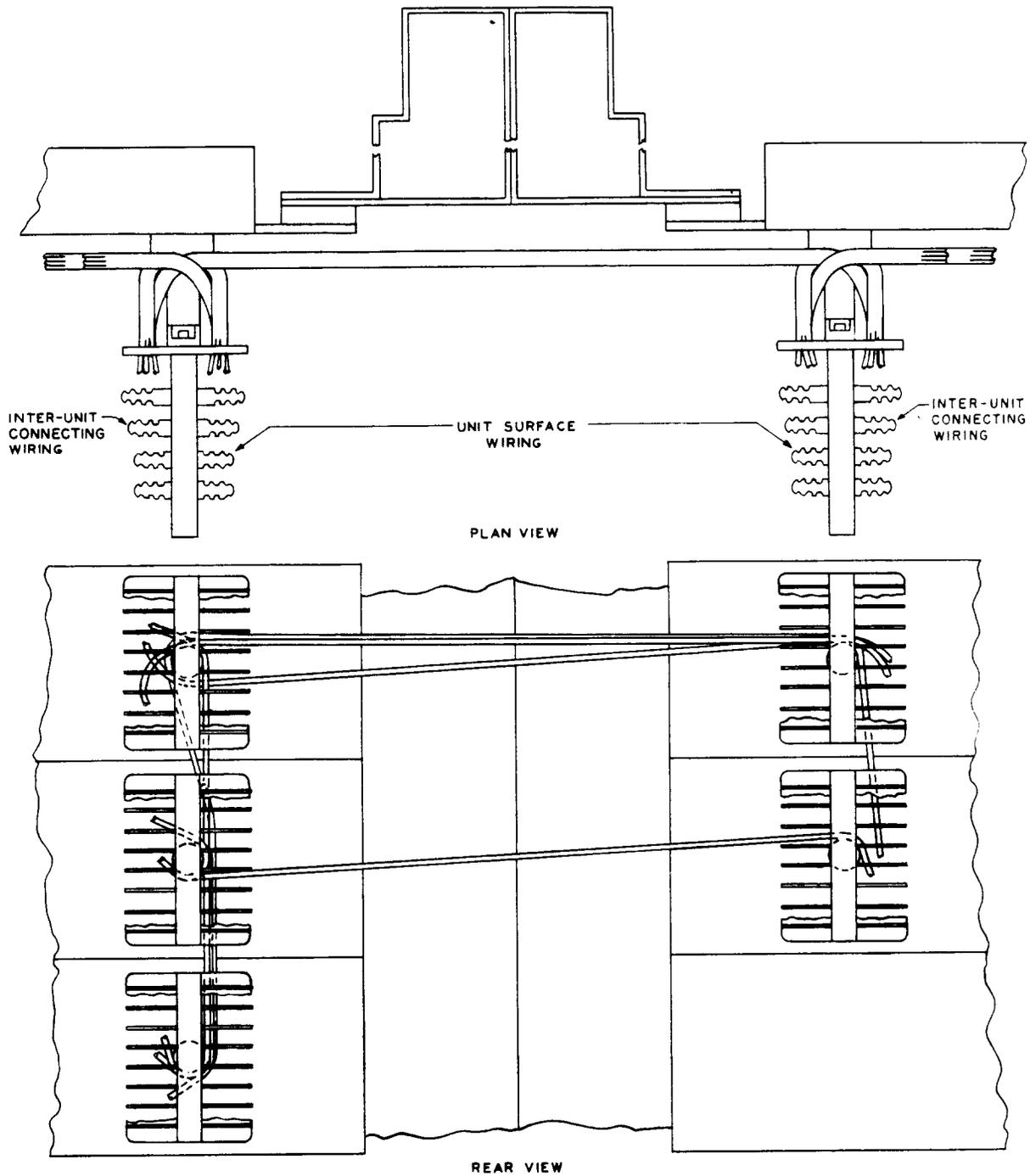


Fig. 36 - 227- and Similar-Type Terminal Strips — Nonwire-Spring Registers and Senders — Functional Unit Interconnecting Wiring — No. 5 Crossbar

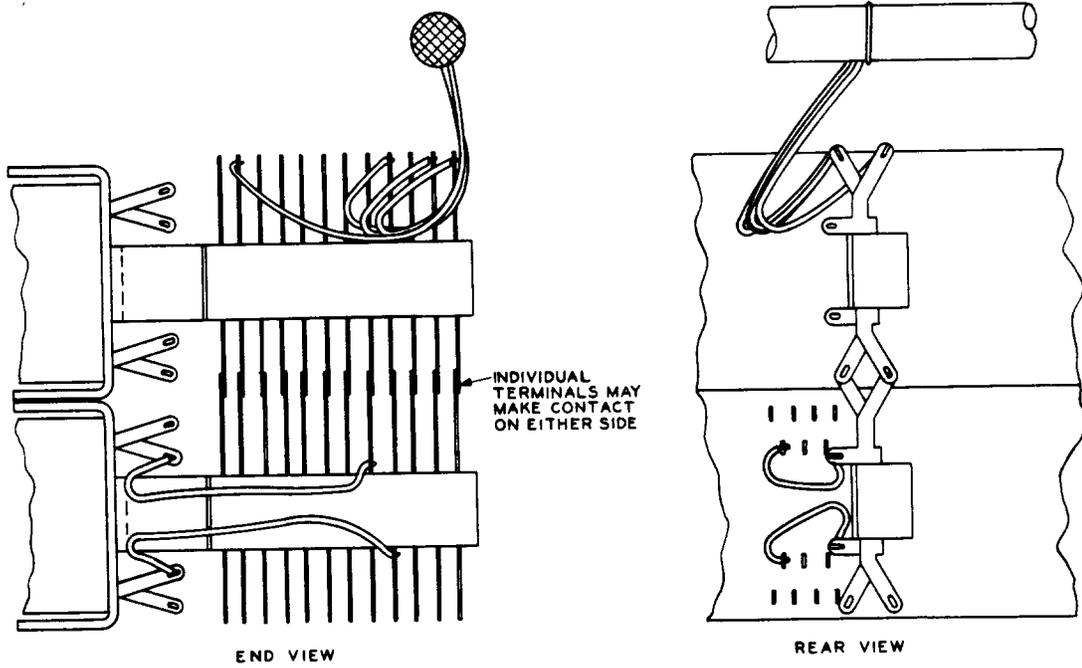


Fig. 37 - 238- and Similar-Type Terminal Strips — No. 5 Crossbar

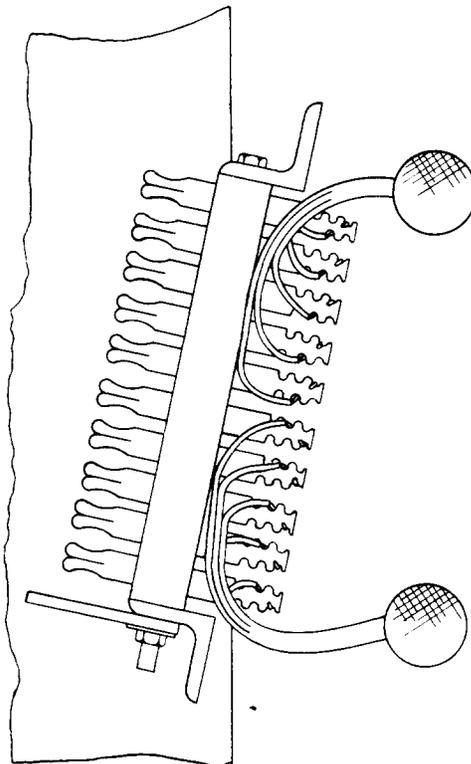


Fig. 38 - 239-, 240-, and Similar-Type Terminal Strips — Translator Frame

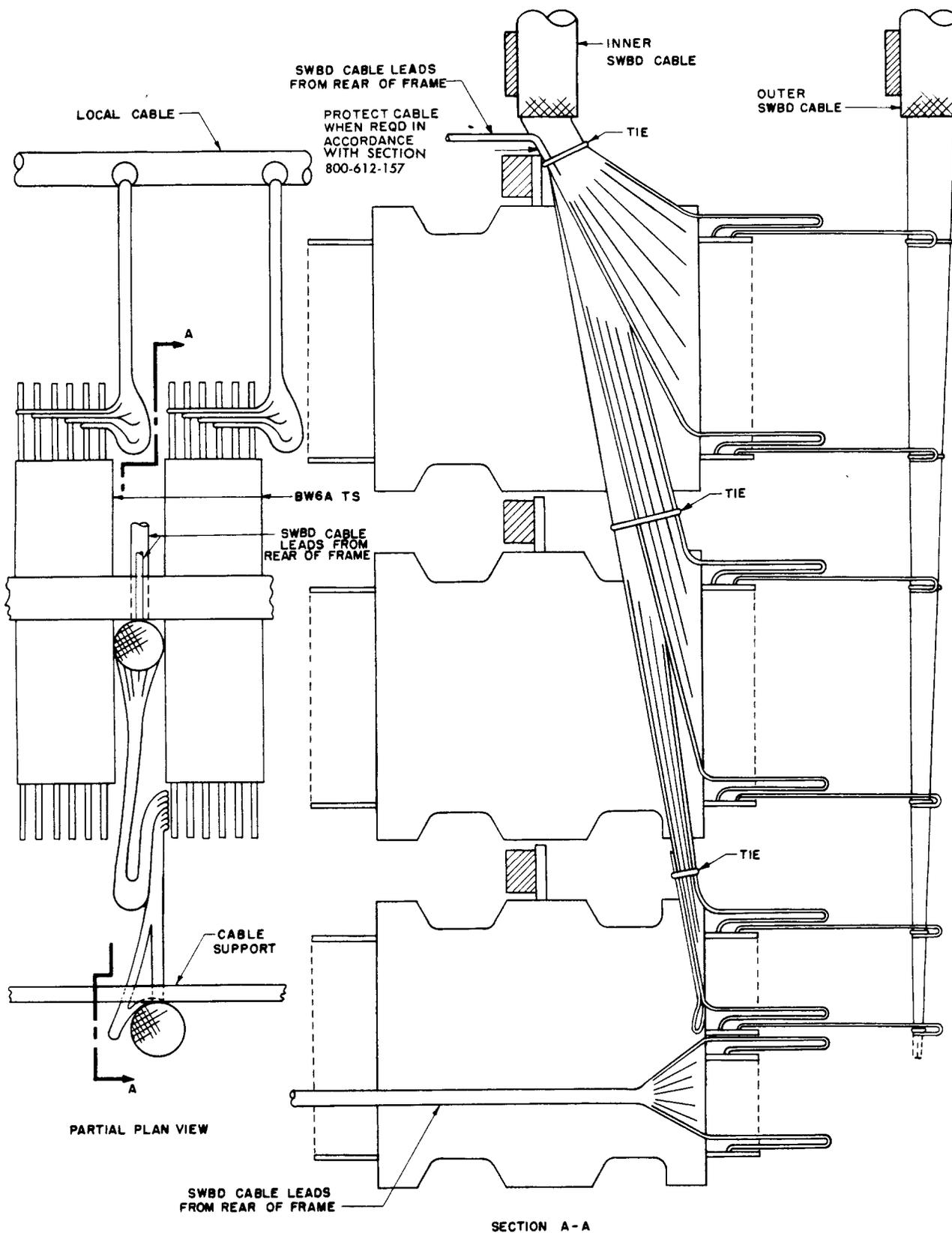


Fig. 39 - BW6A Terminal Strips — Inner and Outer Switchboard Cables — Sewed or Loose Wire Forms (loose wire form shown)

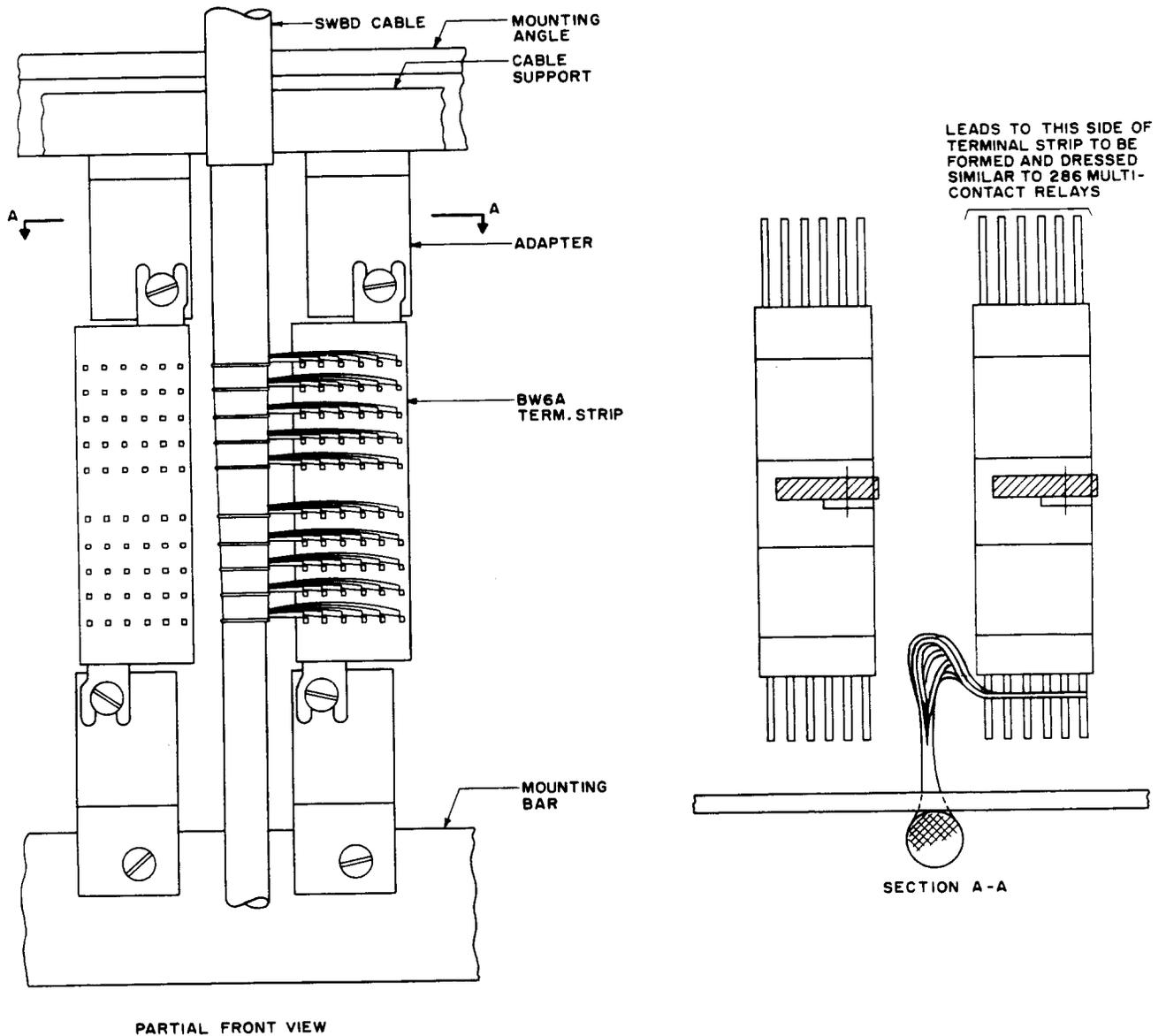


Fig. 40 - BW6A Terminal Strips - Mounted at Top of Frame - Switchboard Cable on Front - AMA Recorder Frames

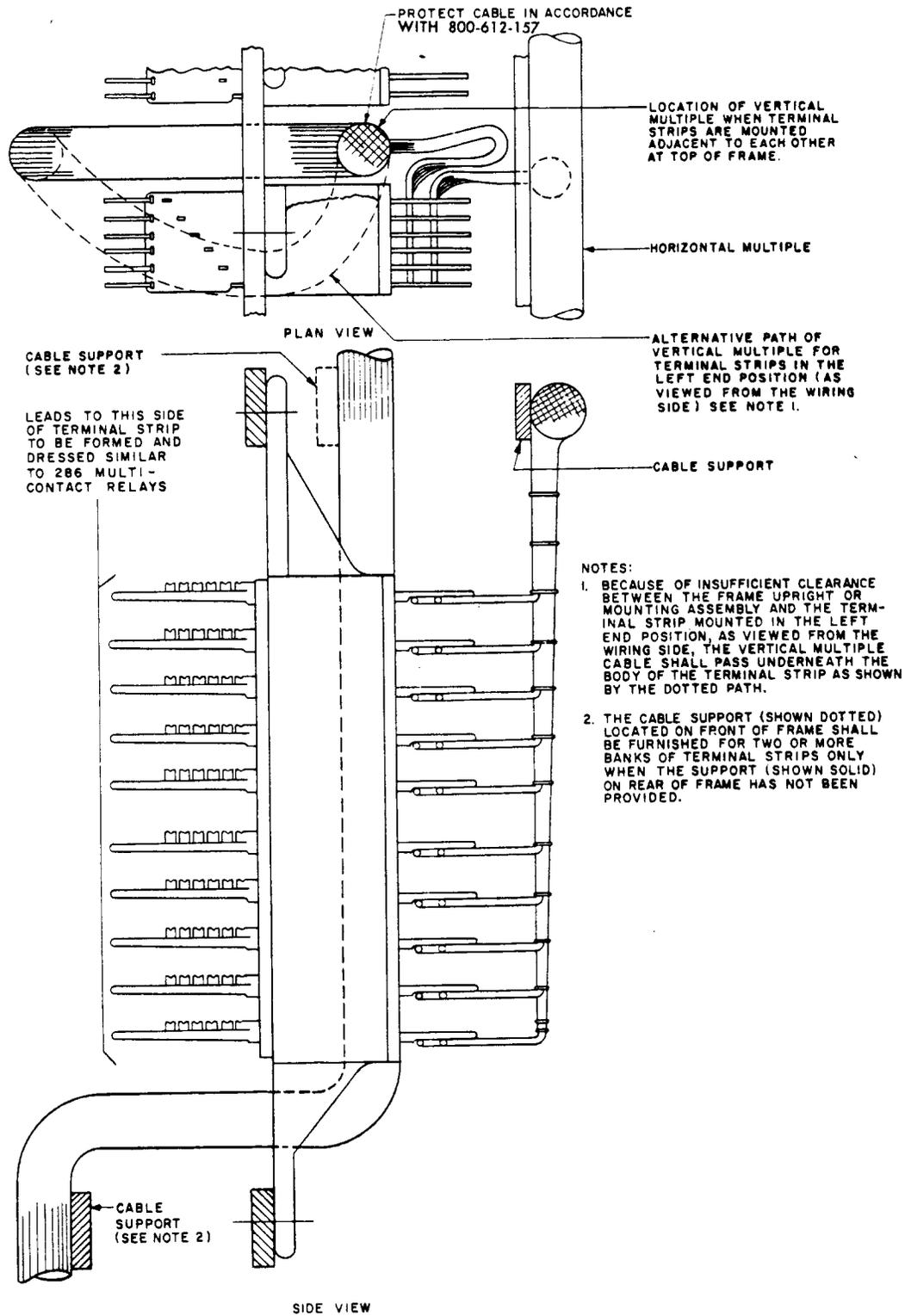


Fig. 41 - CA6A Terminal Strips Mounted at Top of Frame

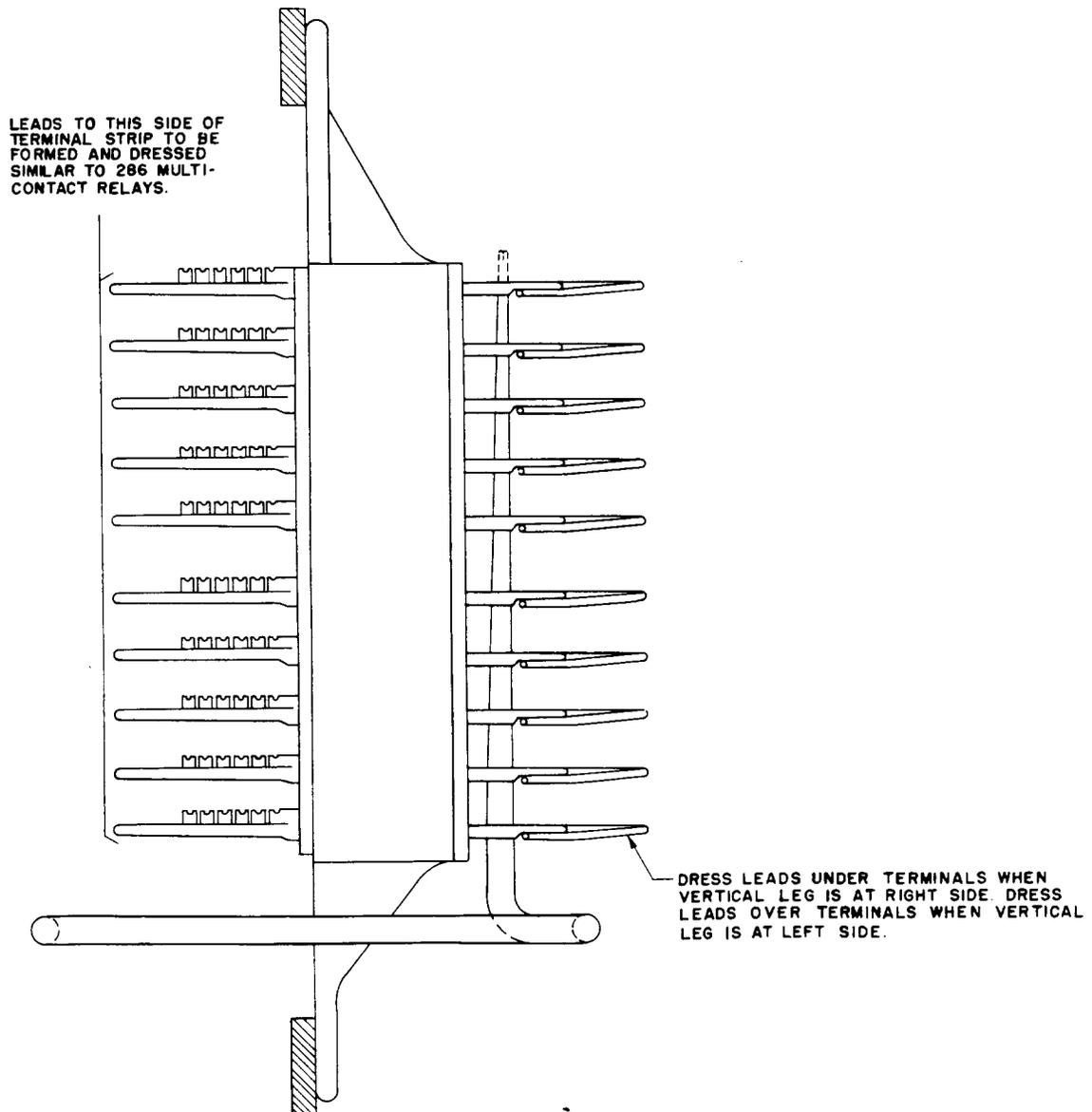
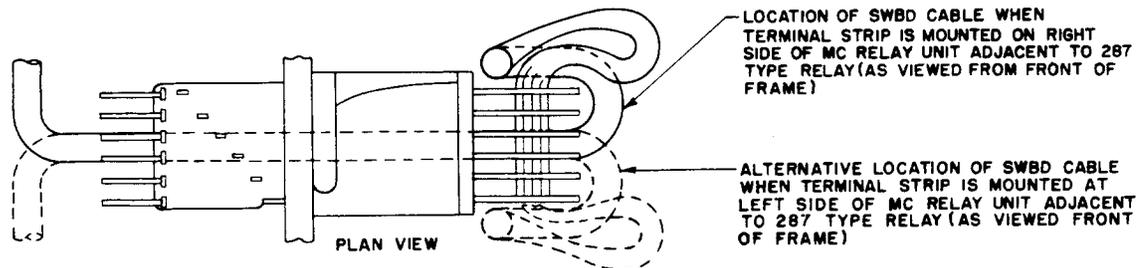


Fig. 42 - CA6A Terminal Strips — Mounted on MC Relay Unit Adjacent to 287-Type Relay

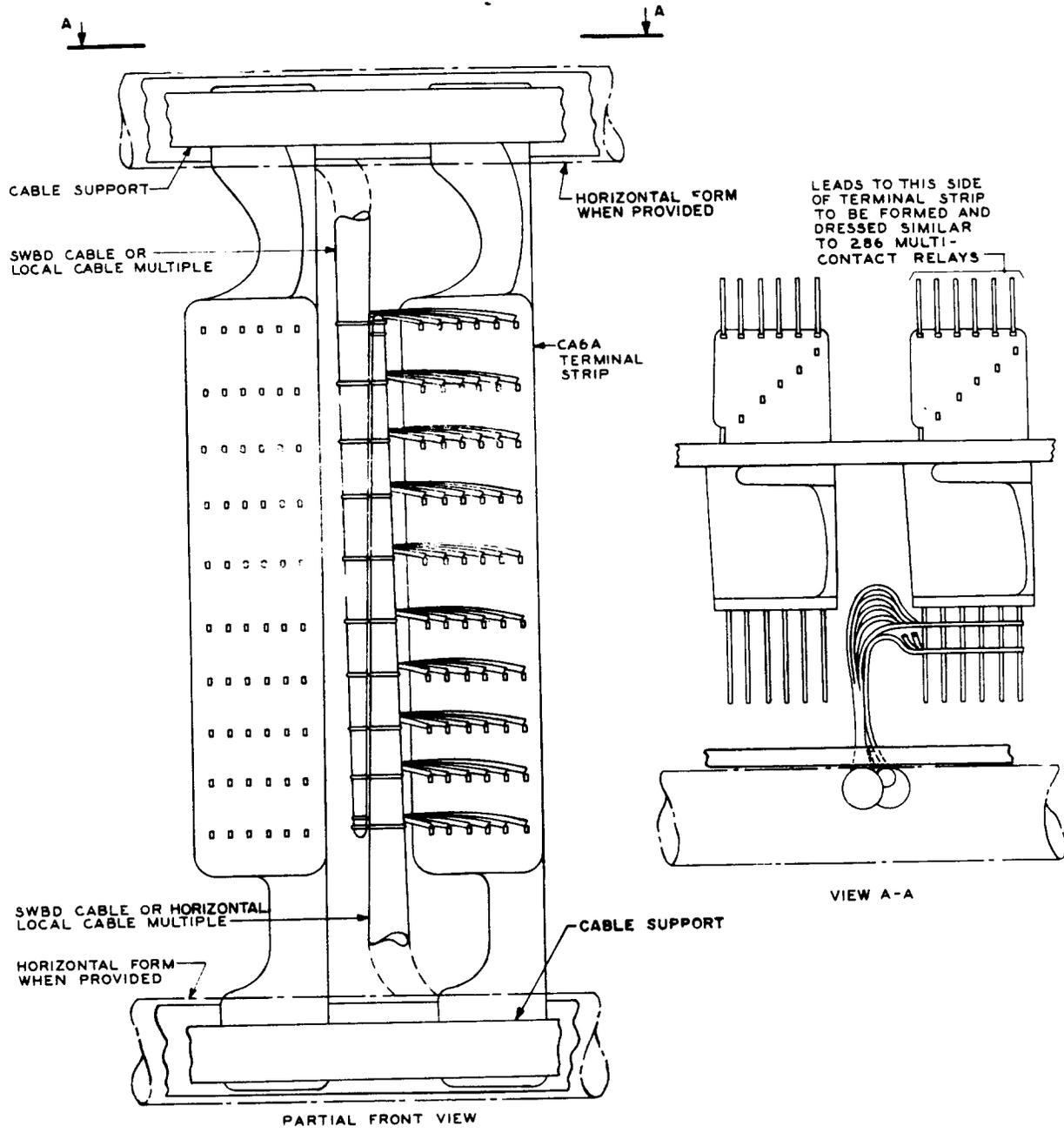
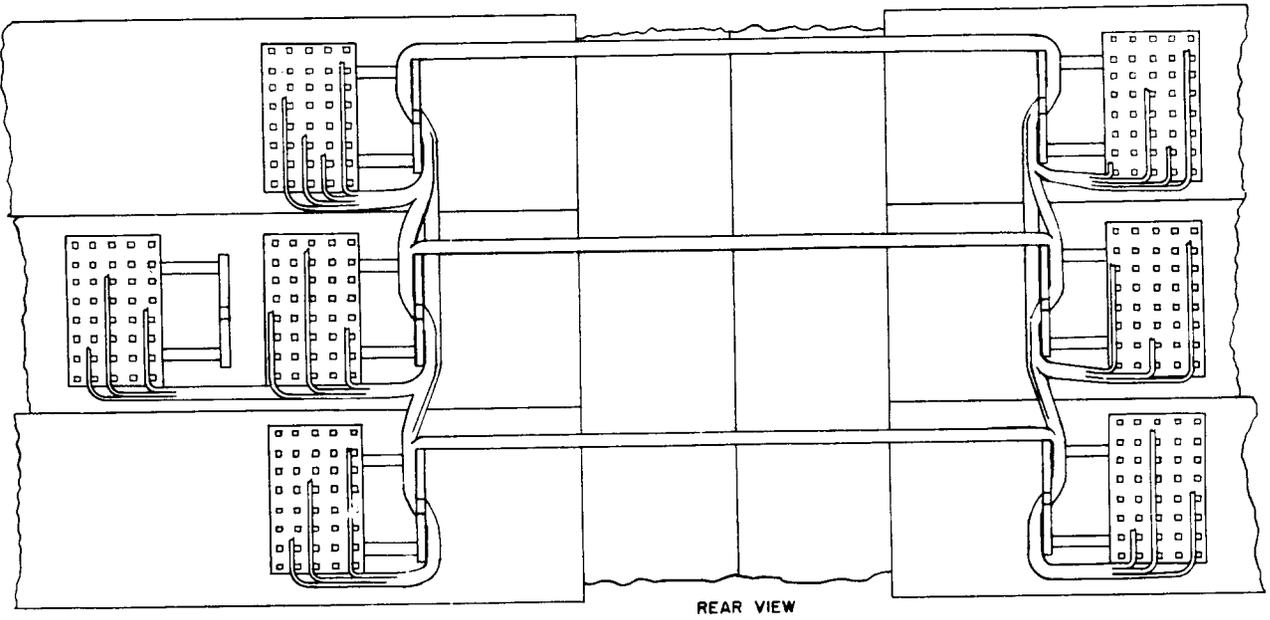
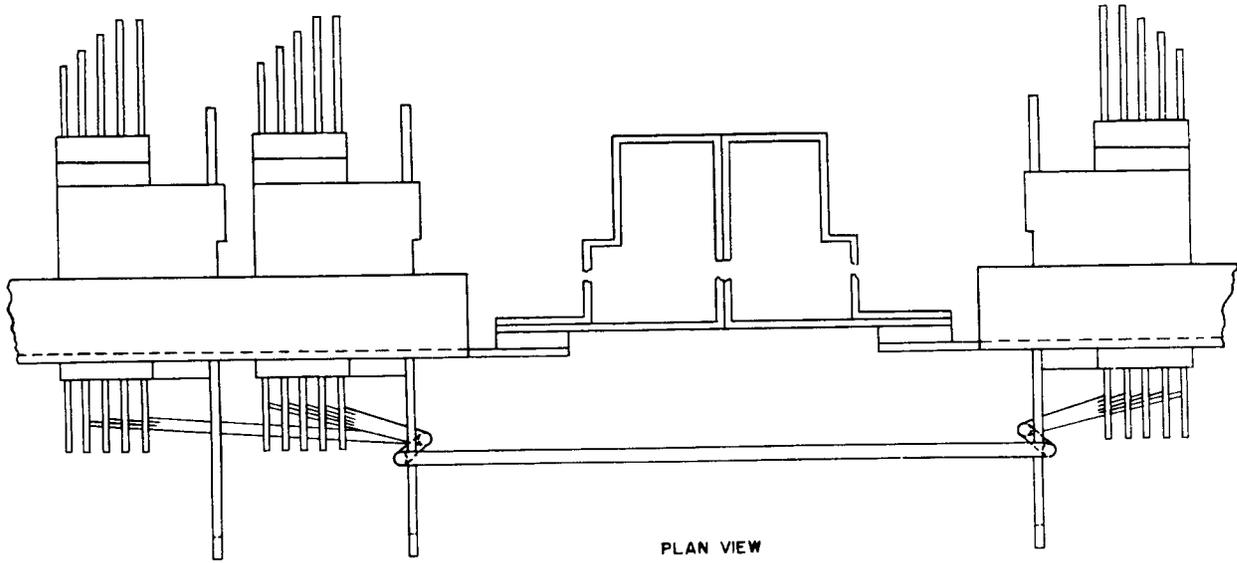


Fig. 43 - CA6A Terminal Strips — Mounted at Top of Frame-Switchboard Cable on Front — No. 1 Crossbar



**Fig. 44 - D-Type Terminal Strips - Nonwire-Spring Registers and Senders -
Functional Unit Interconnecting Wiring - No. 5 Crossbar**

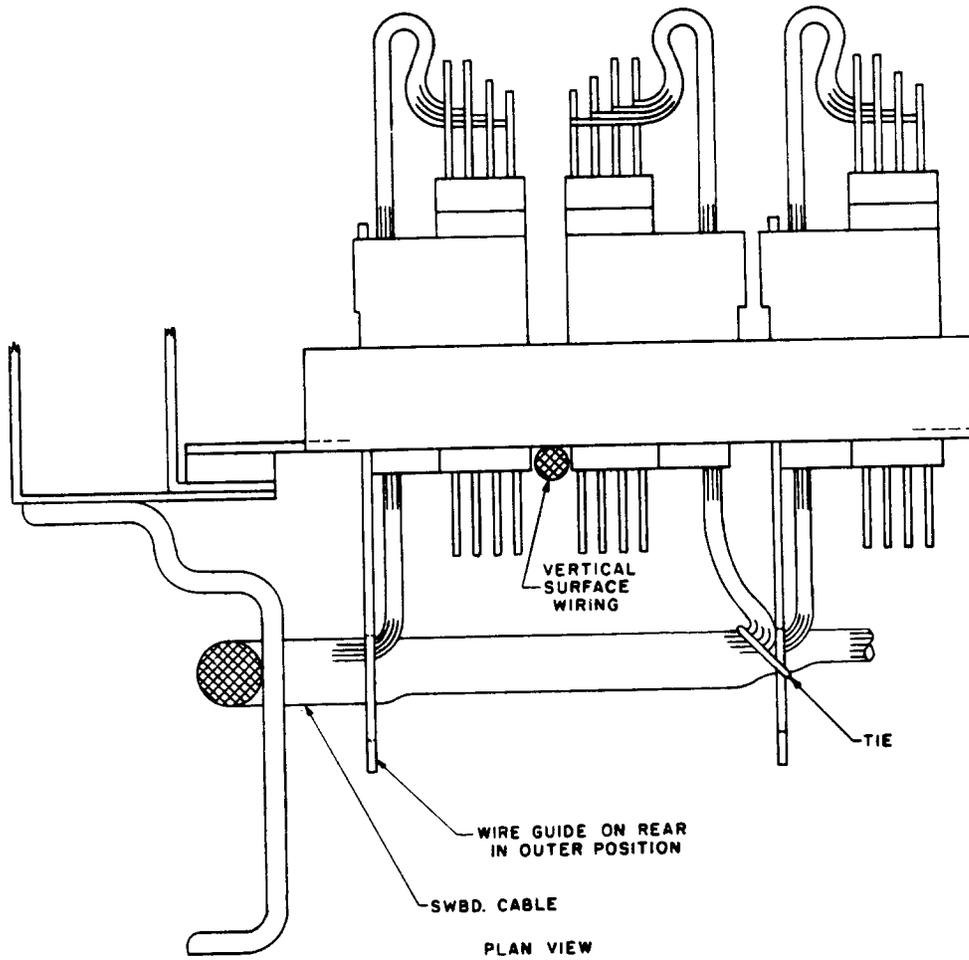


Fig. 45 - D-Type Terminal Strips — Terminal Strip Arrangement — No. 5 Crossbar

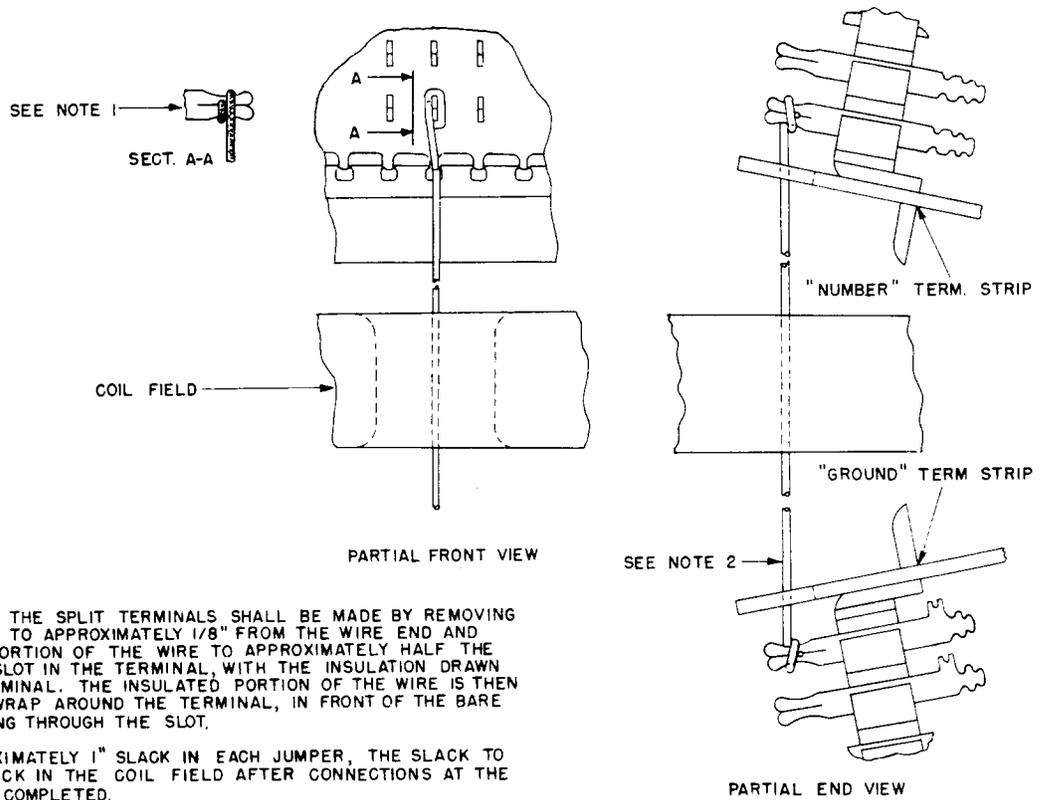


Fig. 46 - Cross Connections Between Number and Ground Terminal Strips -
Translator Frame

REASONS FOR REISSUE

1. Former 3.03(a) covering the sleeving used on 263-type relays is omitted. This relay is "Manufacture Discontinued" and has no further application.
2. Former 3.04 covering intermagnet surface wiring for multicontact relays is omitted because of no further application.
3. 2.04 covering loose wiring on No. 5 fuse panels is revised to omit "crossbar relay rack" frames and add "power ringing and tone distribution" frames.
4. 4.01 is revised to include the 1/16-inch minimum clearance for horizontal strapping on crossbar switches.
5. 4.02 covering the spacers to be used on the crosspoints of crossbar switches is added.
6. Various figures have been brought up to date to show presently manufactured equipment and apparatus.
7. Fig. 2 covering vertical and horizontal cable forms serving the same piece of apparatus is revised for clarity.
8. Fig. 4 covering 18-type fuse blocks on bulb-angle frames is revised to reduce the clearance from 3/4 inch to 1/2 inch between the frame upright and the local cable arm.
9. Fig. 6 covering 21- and similar-type fuse blocks is revised to move the lower local cable breakout arm up 5/8 inch from the center of the lower mounting plate.
10. Former Fig. 9 through 15 covering wiring on 263- and similar-type relays are omitted because of no further application.
11. Fig. 9 through 11 covering multiple strap wiring on 286-type relays are revised to change the distance from the edge of solder to the end of the multiple strap from 1/16 to 3/32 inch.
12. Fig. 12 covering wiring to 286-type relays is revised to clarify note 2.
13. Fig. 23 covering horizontal straps on 287- and similar-type relays is revised to add note 2.
14. Former Fig. 33 through 35 covering 276-, 292-, and similar-type relays are omitted. These requirements are now covered in dressing of skimmers Section 800-612-160.
15. Former Fig. 39 through 44 covering wiring to solder-type terminals on 324- and similar-type crossbar switches are omitted because of no further application.
16. Fig. 29 covering wiring to 324- and similar-type switches is revised to change the lead dress and add reference to switchboard cable when required.
17. Fig. 30 covering wiring to 324- and similar-type switches is revised to change the lead dress.
18. Fig. 31 covering the wiring to the select magnets of 324-type switches is revised to add a method of dress on the select off-normal terminals.
19. Fig. 34 covering vertical strapping on 324- and similar-type switches is revised to omit the bare wire strap on the hold off-normal terminals, to add note 1, and to add an additional method of strapping crosspoint terminals.
20. Former Fig. 52 covering 218- and similar-type terminal strips is omitted because of no further application.
21. Former Fig. 53 covering strapping on 221-type terminal strips is omitted because of no further application.
22. Fig. 40 covering BW6A terminal strips is revised to show a new method of lead dress.