

**CONNECTING BLOCKS**  
**METHOD OF MAKING CONNECTIONS**  
**"COSMIC\*" I MAIN DISTRIBUTING FRAME SYSTEM**

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**1. GENERAL**

**1.01** This section covers methods of running jumpers and making connections to the connecting blocks on the COSMIC I main distributing frame system. A description of the COSMIC I main distributing frame system is covered in Section 201-222-101.

**1.02** This reissue is a general revision. The title has been changed to refer to the COSMIC I main distributing frame system. Figures and information have been added for connecting to the 112-type connecting blocks. Since this is a general revision, revision arrows have not been used to denote significant changes.

**2. FRAME COMPONENTS**

**A. Connecting Blocks**

**2.01** All connecting blocks for a COSMIC I main distributing frame must be the same type, either 78C- or 112C-. They are molded plastic with fanning strips attached with screws. They are available in three sizes as follows:

- 50-pair blocks (Fig. 1) consisting of 2-paired rows by 25 columns. Ten 50-pair blocks can be installed on each shelf numbered 1 and 11.
- 64-pair blocks (Fig. 2) consisting of 4-paired rows by 16 columns. Sixteen 64-pair blocks can be installed on each shelf numbered 2 through 10.
- 100-pair blocks (Fig. 3) consisting of 4-paired rows by 25 columns. Ten of the 100-paired blocks can be installed on each shelf numbered 2 through 10.

**2.02** Terminal fields of the connecting blocks are color-coded red (78C-type) or blue (112C-type) in a checkerboard fashion to eliminate parallax problems and facilitate terminal identification. The 78C-type has 4-beam terminals (Fig. 4). The 112C-type has 3-beam terminals (Fig. 5).

**2.03** Slotted fanning strips are attached to the connecting blocks with screws to prevent excessive jumper wire movement and are color coded to denote the connecting block function—blue for loop pairs, white for tie-pairs, ocher yellow for ESS, green

for crossbar, and orange for step-by-step. The fanning strips are hot stamped at the factory to eliminate stencilling and associated maintenance.

**B. Framework Filler Panel**

**2.04** A framework filler panel, an appearance item in blue, ocher yellow, or white is used to cover openings in the main distributing frame (MDF) or tie pair distributing frame (TPDF) where connecting blocks are to be installed at a later date or to fill unused openings in the frame.

**3. WIRE**

**3.01** Jumper wire coded DT-24P distributing frame wire is used with the COSMIC I main distributing frame system. This wire is a twisted pair of 24 AWG tin-plated copper conductors with an irradiated polyvinyl chloride (IPVC) insulation.

**4. TOOLS**

**A. Wire Insertion Tools 756C and 872A**

**4.01** The 756C wire insertion tool (Fig. 6) consists of a double-ended wire insertion head held in a plastic handle. One end of the insertion head is designed for installing a 24-gauge conductor into the twin clip of the 78C1A-50 through 78C2A-64 connecting blocks. The other end is designed for installing a 22-gauge conductor into connecting blocks with a single clip terminal. The insertion head can be rotated to either position by loosening the screw, rotating the head 180-degrees and retightening the screw to hold the head firmly in position. The 872A wire insertion tool (Fig. 7) is a direct replacement for the 756C tool. It has a single-ended wire insertion head designed for installing a 24-gauge conductor into the terminal of a 78C-type connecting block. The 872A tool was designed primarily for use on 78C-type connecting blocks manufactured between August 1977 and April 1978.

**B. Wire Insertion Tool 756C-2**

**4.02** The 756C-2 insertion tool is designed for installing a 24-gauge conductor into the terminal of a 112C-type connecting block. It has a fixed insertion head with wire-dress holes. The center portion of the head has a slot which is guided onto the middle beam of the terminal for installing a connection.

**4.03** Since none of the insertion tools have cut-off blades, the conductor must be cut to the proper length, including 20 inches of slack, prior to making the electrical connection to the connecting block terminal.

**4.04** When terminating connections, it is not necessary to strip insulation from the wire. The clip-type terminals on the connecting blocks are designed to cut through the wire insulation as the wire is inserted into the split portion of the terminal.

**Caution:** *Only the 756C or 872A wire insertion tool shall be used for quick-connecting to the 78-type connecting blocks. Only the 756C-2 wire insertion tool shall be used for quick-connecting to the 112-type connecting blocks. The wrong tool or procedure may cause unreliable connections, wire nicking, or other damage.*

#### C. Wire Removal Tool 724A

**4.05** The wire removal tool (Fig. 8) is provided for removing connections from the connecting blocks. The tool consists of a 2-prong fork with an insulated handle. The prongs of the tool are sized to fit around the beam of the terminal and underneath the wire. Use of the 724A wire removal tool insures long terminal clip reliability as well as eliminating the possibility of degrading adjacent wire connections during removal of jumper terminations from connecting blocks.

#### D. V-Notch Diagonal Pliers AT-7858

**4.06** After running jumper and measuring 20 inches of slack, the pliers are used to cut the wire before placing the jumper into the fanning strip. The excess wire should then be rewound on the wire reel.

### 5. RUNNING JUMPERS

#### A. Amount of Slack

**5.01** Leave approximately 20 inches of slack in all jumpers. Slack must be dressed back from both terminations through the fanning strips and horizontal wiring channels and into the vertical trough.

**5.02** A convenient method of measuring 20 inches is to measure down (or up) to the corresponding terminals on the connecting block located two shelves above or below the terminals where the jumper termination is to be made. (See Fig. 9.)

#### B. Location Oriented Identification System (LOIS)

**5.03** LOIS designation provides the exact frame locations of the terminals and is keyed to the geometry and identifying characters provided on the COSMIC I main distributing frame, connecting blocks, and modular protection frame. The characters "U" or "L" will be inserted between the module shelf and connecting block numeric characters and is used to denote the direction from which the connecting block is entered with the jumper wire (Fig. 10). The character "U" will be inserted when the connecting block terminal row is 1 or 2, except when the module shelf is number 1. The character "L" will be inserted when the connecting block row is 3 or 4 or when the module shelf is 1.

#### C. Short Jumpers

**5.04** A short jumper is a jumper that goes into the vertical trough and does not go into the upper or lower express trough.

**Note:** Refer to Fig. 9 for jumper running functions and reference to letter designations for running short jumpers.

**5.05** To run a short jumper, locate the assigned terminal farthest from the wire reel (A). Dress the jumper into the primary fanning strip closest to the terminals (top for rows 1 and 2, bottom for rows 3 and 4, and bottom for all of shelf 1). Connect the jumper to the designated terminals. Dress the jumper into the secondary fanning strip and into the jumper channel towards the second termination and place the jumper behind jumper wire retainers (B).

**5.06** Run jumper up or down the vertical trough as required to reach desired jumper channel, dressing jumper behind wire retainer bars (C).

**Note:** If LOIS indicates "U" (upper), dress jumper into jumper channel above indicated connector block row. If LOIS indicates "L" (lower), dress jumper into jumper channel below indicated connector block row (Fig. 10).

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Route jumper in jumper channel behind the jumper wire retainers (D) and through the approximate secondary fanning strip slot (E). Before cutting jumper, measure approximately 20 inches of slack (paragraph 5.02). Dress the slack back through the secondary fanning strip (E), back through the jumper channel and into the vertical trough. Place jumper into the primary fanning strip and connect the jumper to the designated tip and ring terminals. Redress the jumper as necessary to remove any slack in the jumper channel.

### D. Long Jumpers

**5.07** A long jumper is a jumper that is run up or down in the vertical trough and into the upper or lower express trough.

**Note:** Refer to Fig. 9 for jumper running functions and reference to letter designations for running long jumpers.

**5.08** To run long jumpers, locate the assigned terminal farthest from the wire reel where the terminal is to be terminated (F). Place the jumper into the primary and secondary fanning strips closest to the terminals (top for rows 1 and 2, bottom for rows 3 and 4, and bottom for all of shelf 1). Connect the jumper to the designated terminals. Dress the jumper into the jumper channel (working towards the second termination) and place jumper into the jumper channel behind the jumper wire retainers (G). If jumper originates in terminal shelves 1L through 6U, run jumper in vertical trough towards upper express trough. If jumper originates in terminal shelves 6L through 11U, run jumper downward in vertical trough towards lower express trough. Dress jumper behind wire retainer bars and run jumper in upper or lower express trough until vertical trough is reached, which is immediately **prior to** the final terminal location regardless of the location of the terminal within the module. If upper express trough is used, place jumper behind jumper support bars. Run jumper up (or down) the vertical trough as required to reach the designated terminal shelf and place jumper behind wire retainer bars.

**Note 1:** If LOIS indicates "U", use jumper channel above indicated connector block row. If LOIS indicates "L", use jumper channel below indicated connector block row.

**Note 2:** Jumper may have to traverse more than one-half the height of the vertical trough

since an effort was made to keep the jumper as short as possible in the originating vertical trough.

Run jumper in jumper channel until second terminal location is reached and place jumper behind jumper wire retainers (H). Place jumper into secondary fanning strip (I). Before cutting jumper, measure approximately 20 inches of slack (paragraph 5.02). Dress the slack back through the secondary fanning strip, back through the jumper channel and into the vertical trough. Place the wire into the primary fanning strip and connect the jumper to the designated tip and ring terminals.

**Caution:** Once wires are terminated and are within the confines of the primary fanning strip, do not remove from the fanning strip for tracing or identification. This may cause the wire to break at the terminal clip due to torsional fatigue.

## 6. INSTALLING CONNECTIONS

**6.01** When installing a cross-connect wire into connecting block terminals, determine if the terminals to be connected appear in the upper or lower half of the block. The upper fanning strip is to be used for terminals in the upper half of the block and the lower fanning strip for terminals in the lower half. Locate the block column number in which the terminal appears. Snap the paired cross-connect wire into the slot immediately to the left of the column number. It is not necessary to strip the insulation from the wire prior to making a connection on these terminal blocks. The terminal is designed so that the insulation is broken at the point of contact sufficiently for electrical contact to be made when the wire is inserted.

**6.02** Before previously connected wires can be reconnected, the end of the wire with broken insulation must be cut off.

**Caution:** Once wires are terminated and within the confines of the fanning strip, do not remove from the fanning strip for tracing or identification.

**A. 78C-Type**

**6.03** To connect wires to 78C-type connecting block terminals, use the 756C or 872A wire insertion tool and proceed as follows:

- (1) Dress the wires into the proper primary and secondary fanning strip slot.
- (2) Grasp the wire insertion tool as shown in Fig. 11 in such a manner that pressure will be applied with the palm of the hand while holding the tool loosely with the thumb and fingers so that the insertion head is in a vertical position.
- (3) Insert the tip (or ring) conductor into the lower hole of the tool and bend the wire across the opening in the tool (Fig. 12 and 13).
- (4) Position the tool slightly above and to the left of the proper twin clip in the paired row of terminals. By moving the tool to the right, the wire can be guided between the two guideposts of the lower terminal slot of the twin clip.
- (5) Position the tool directly over the twin clip and gently push forward until the tool is in proper alignment with the terminal. Push the tool forward until it bottoms on the terminal. At this point, the wire has been inserted to the proper depth.
- (6) Withdraw the tool straight out from the terminal. In case unusual pressure (too low or too high) is encountered, inspect the connection. If the connection is improper, remove the wire with the 724A wire removal tool. Clip the end of the wire and reconnect.
- (7) Perform the same steps for the mating wire of the pair to the mating terminal in the paired row.

**Note:** It is recommended that several trial connections be made on unused terminals to gain experience in the use of the wire insertion tool before making actual connections.

**Caution:** *Do not wiggle or rock the tool as this may promote wire breakage. Excessive pressure or striking the tool may force the terminal through the block.*

(8) For back tap connections, a similar procedure is used. Insert the tip (or ring) conductor into the upper hole and bend the wire across the opening in the tool.

(9) Position the tool slightly above and to the right of the proper twin clip in the paired row of terminals. By moving the tool to the left, the wire can be guided between the two guideposts of the upper terminal slot of the twin clip.

(10) Repeat (5), (6), and (7).

**Caution:** *Do not remove wires from the fanning strip during tracing operations. This may cause the wire to break at the clip due to torsional fatigue.*

**B. 112C-Type**

**6.04** To connect wires to 112-type connecting block terminals, use the 756C2 wire insertion tool and proceed as follows:

- (1) Dress the wires into the proper primary and secondary fanning strip slot.
- (2) Grasp the wire insertion tool, as shown in Fig. 11, in such a manner that pressure will be applied with the palm of the hand while holding the tool loosely with the thumb and fingers so that the insertion head is in a vertical position.
- (3) Insert the tip (or ring) conductor into the upper hole of tool and bend the wire across the opening in the tool.

**Note:** The upper terminal slot is used for the permanent cross-connection.

(4) Position the tool so that the slotted guide in the tool head is aligned with the center beam of the terminal. Gently push the tool forward as far as it will go. The wire is now inserted to the proper depth.

(5) Withdraw the tool from the terminal by gently pulling it straight back.

(6) Inspect the connection. If it is improper, remove it by using the 724A tool, clip the end of the wire and reconnect it.

- (7) Repeat (3) through (6) for the mating wire.
- (8) To bridge another connection, use the same procedure as in (1) through (8) except, in (3), the wire should be inserted into the bottom hole of the tool.

**Caution:** Do not remove wires from the fanning strip during tracing operations. This may cause the wire to break at the clip due to torsional fatigue.

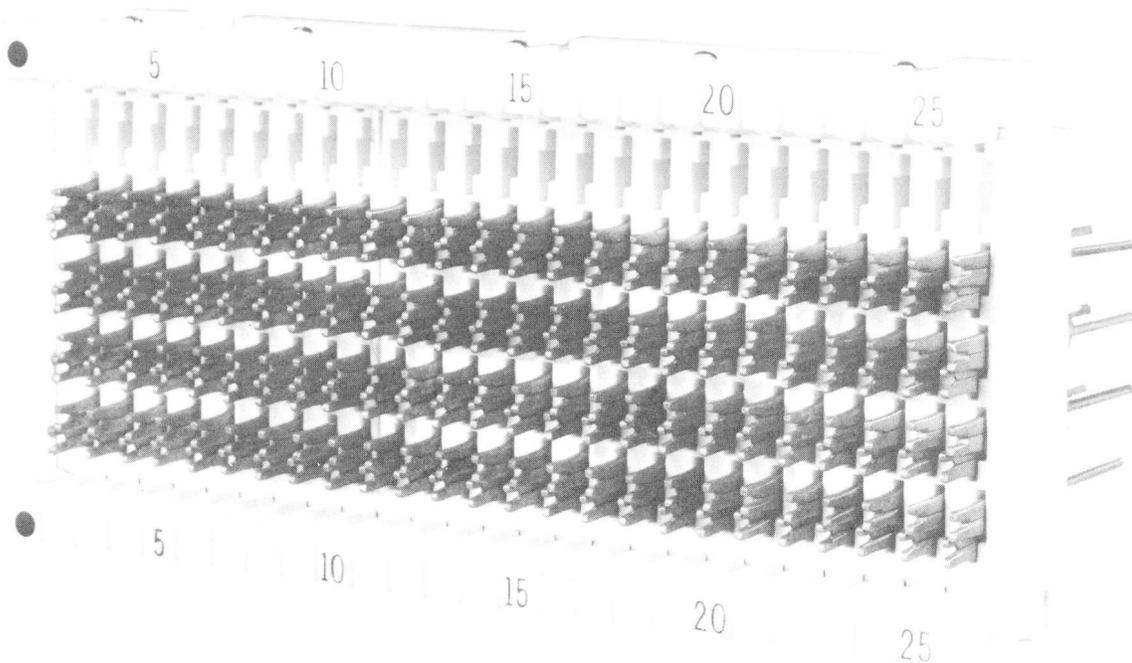
**7. REMOVING CONNECTIONS**

**7.01** To remove wires from the terminal block, place the 724A tool fingers around the terminal beam and under the wire. Grasp the tool as shown in Fig. 14 and lift the wire from the terminal and away from adjacent terminals.

**Caution:** The 724A tool must be used to remove wires from these connecting blocks. If a wire is removed by other means, the future reliability of the terminal can be greatly reduced. Other methods might also disturb adjacent connections.

**8. DESIGNATION OF SPECIAL SERVICE LINES**

**8.01** Identification and protection of special service terminals are provided by D-clip terminal insulators AT8301 (Fig. 15) on the 78C-type connecting blocks and J-clip terminal insulators AT 8993 on the 112C-type connecting blocks. These are narrow U shaped channels made of red plastic. These insulators are of the proper length to protect both the tip and ring terminals.



**Fig. 1 — 50-Pair Connecting Block**

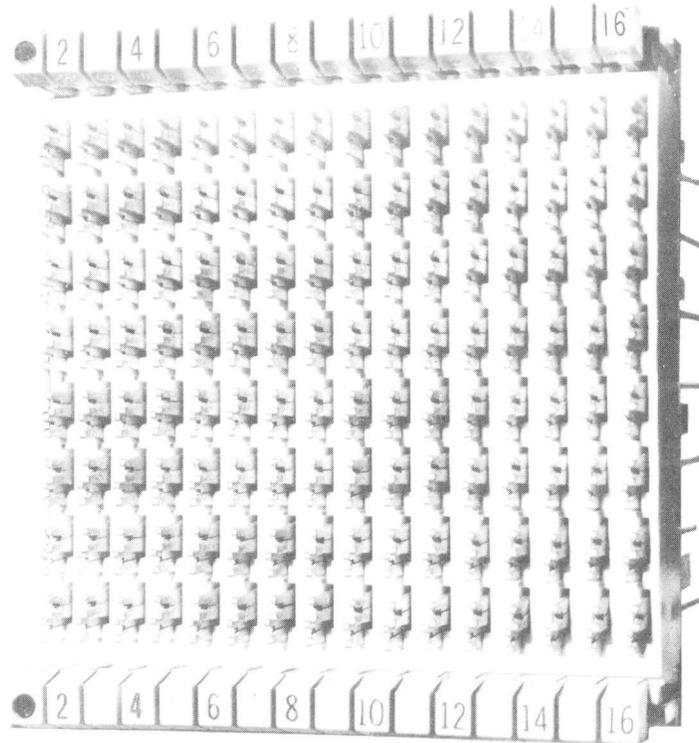


Fig. 2—64-Pair Connecting Block

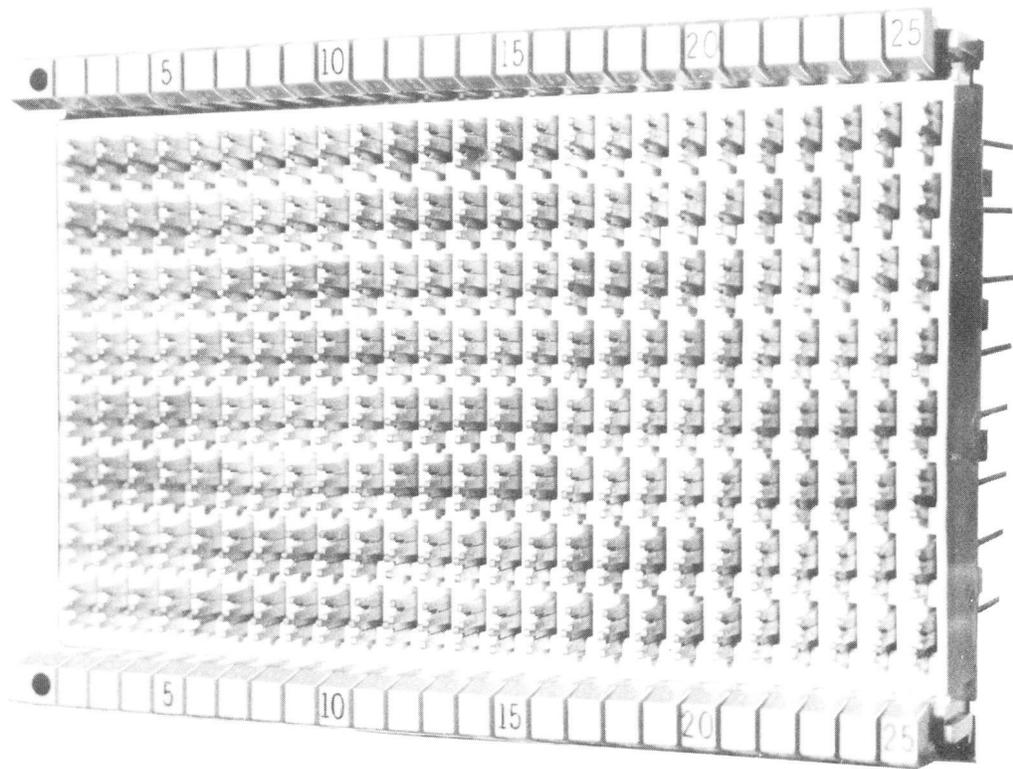


Fig. 3—100-Pair Connecting Block

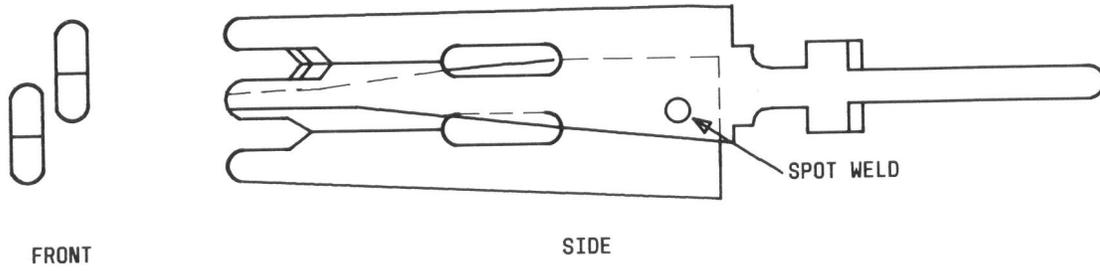


Fig. 4—Views of Terminal Used on 78-type Connecting Block

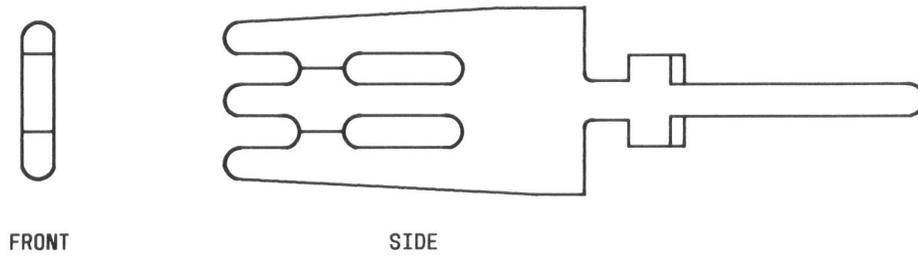


Fig. 5—Views of Terminal Used on 112-Type Connecting Block



Fig. 6—756C Wire Insertion Tool

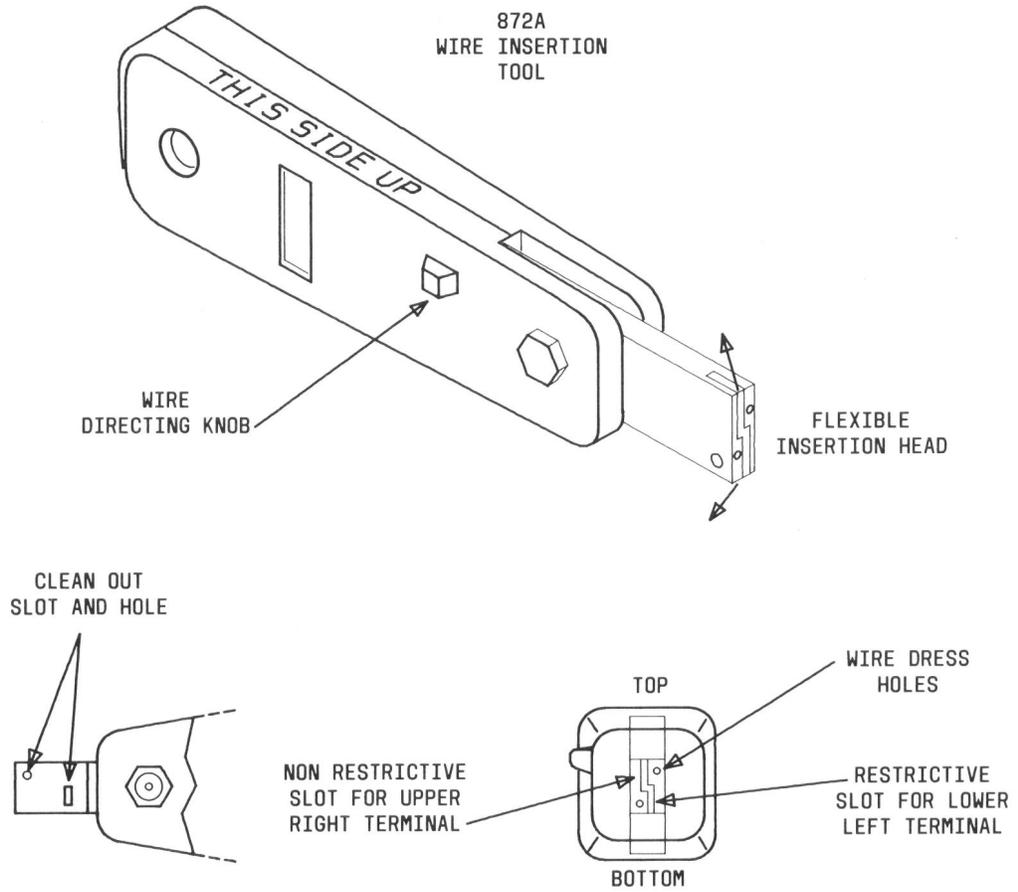
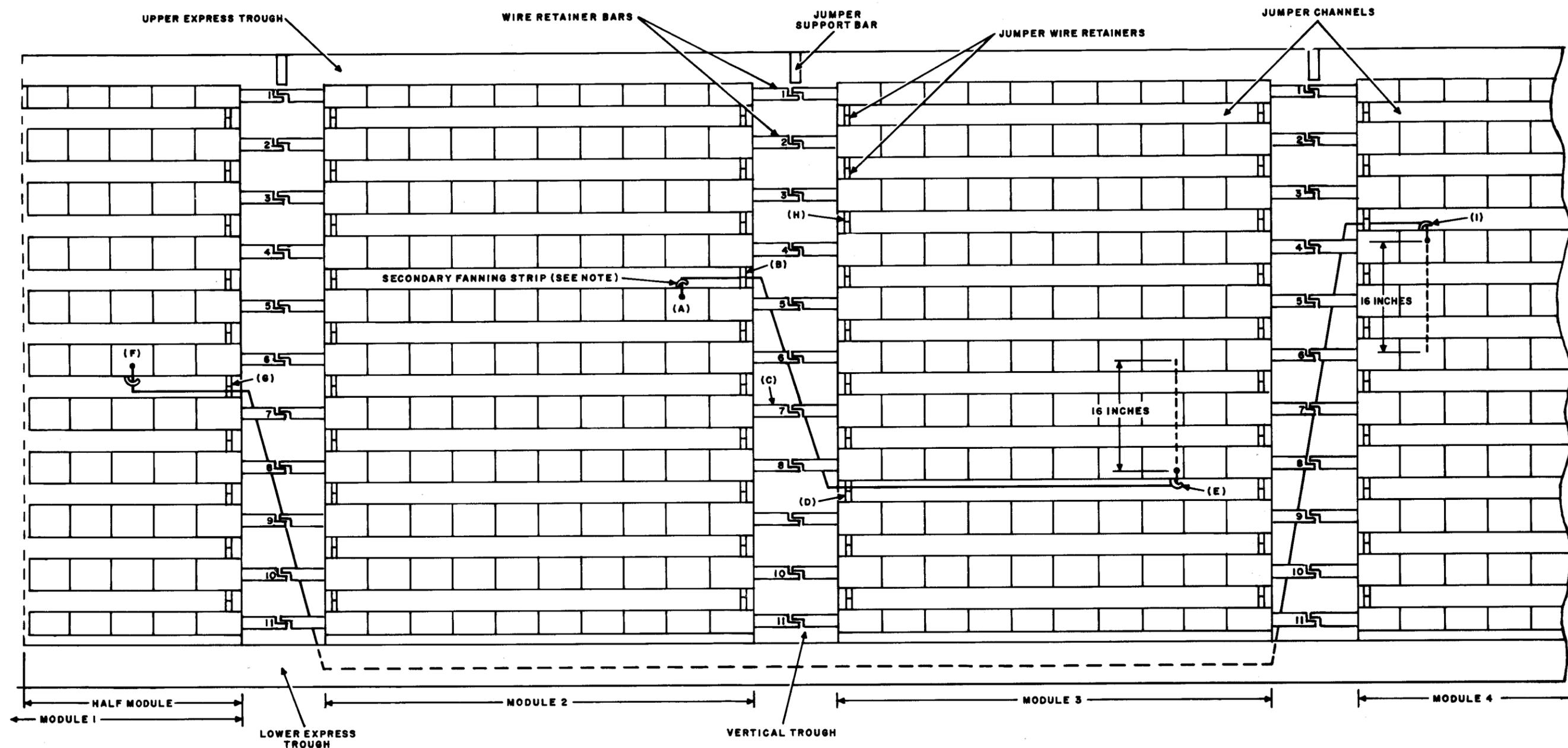


Fig. 7—872A Wire Insertion Tool



Fig. 8—724A Wire Removal Tool



NOTE:  
 PRIMARY FANNING STRIP IS MOUNTED  
 TO THE TERMINAL BLOCK.

Fig. 9—Method of Running Jumpers

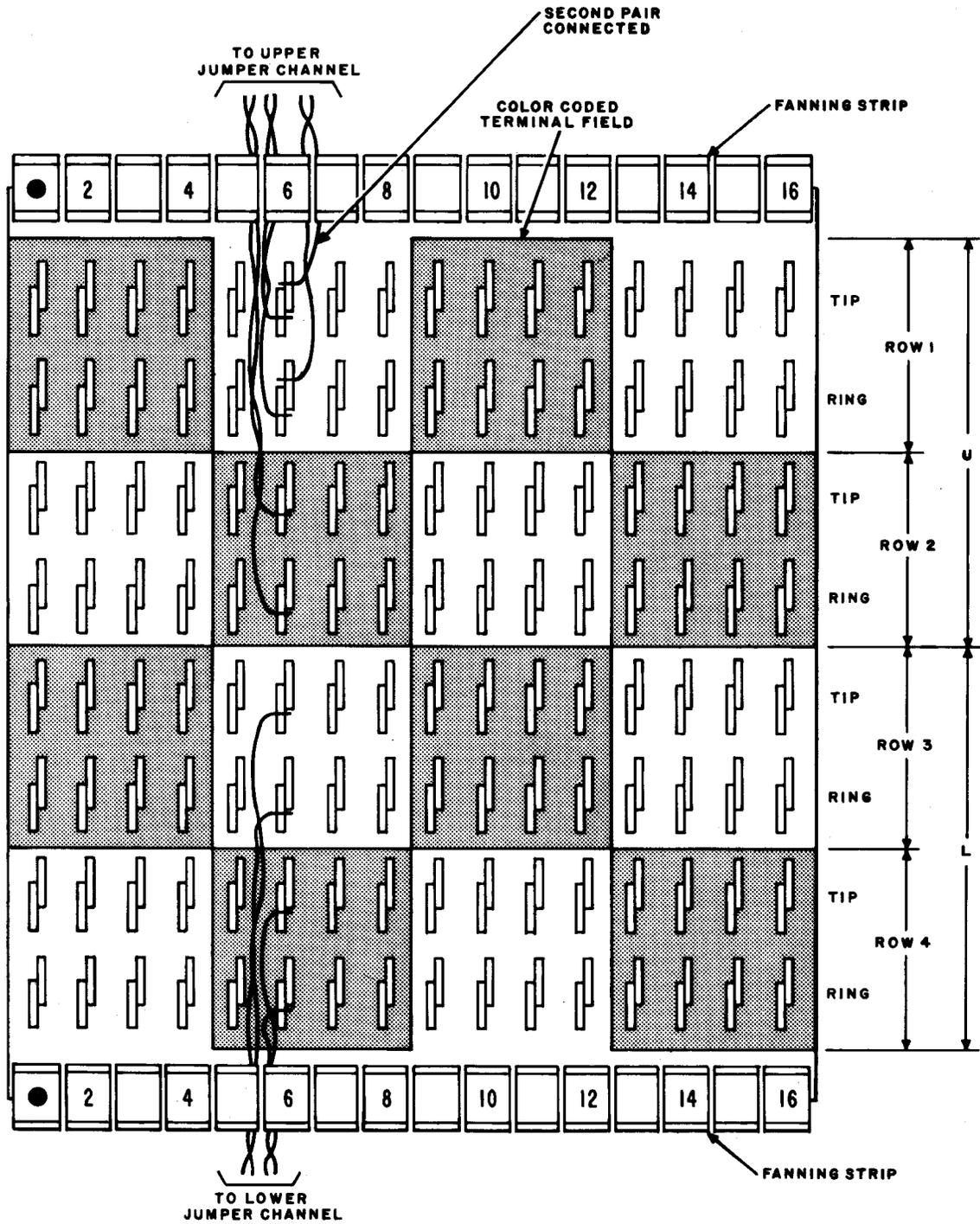


Fig. 10—Method of Terminating Jumpers

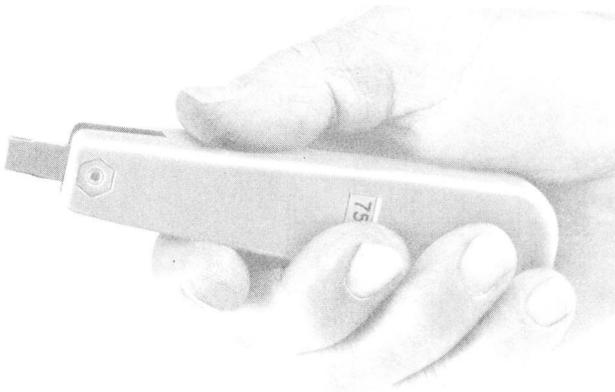


Fig. 11—Proper Method of Holding Wire Insertion Tool

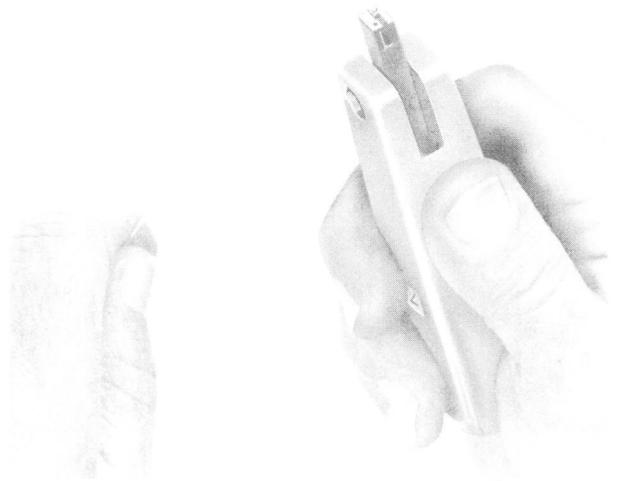


Fig. 12—Proper Method of Using 756C Tool

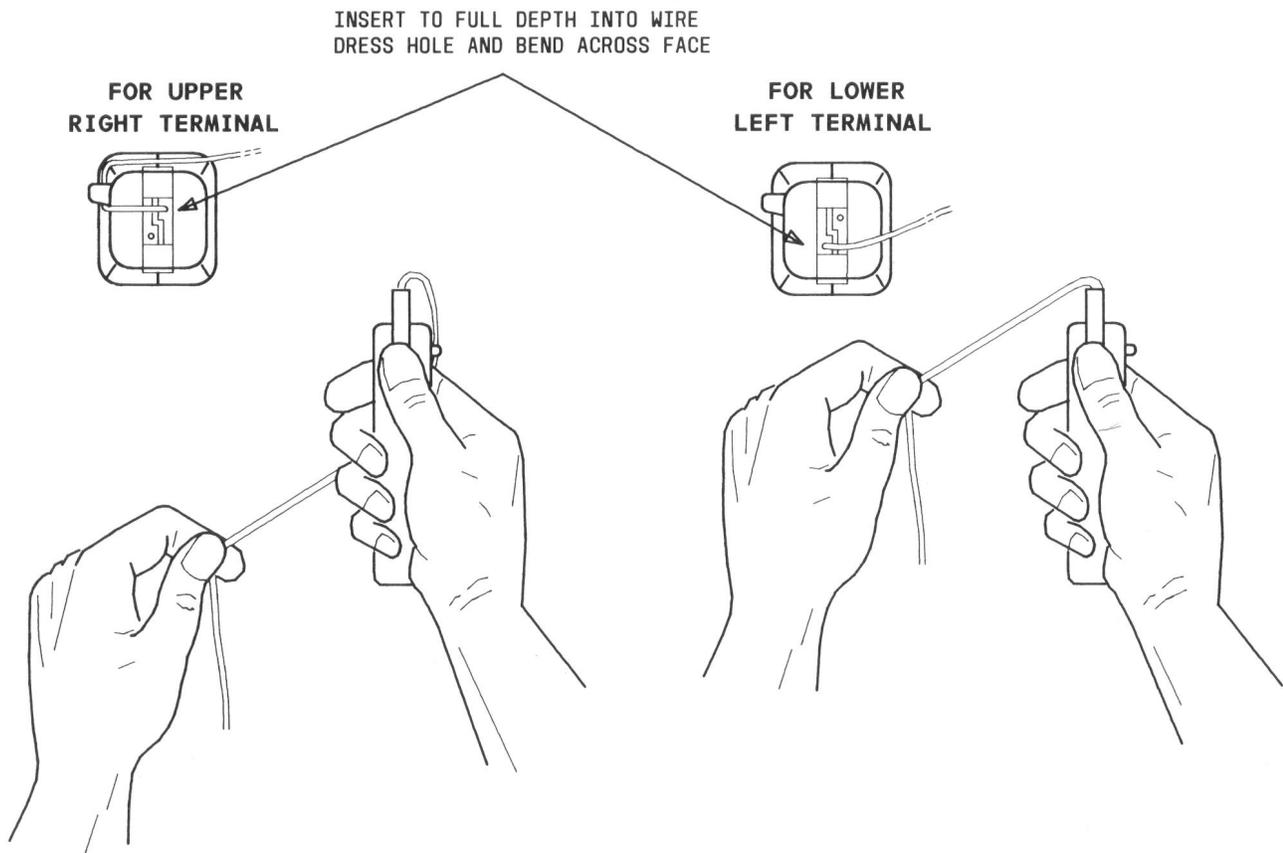


Fig. 13—Proper Method of Using 872A Tool

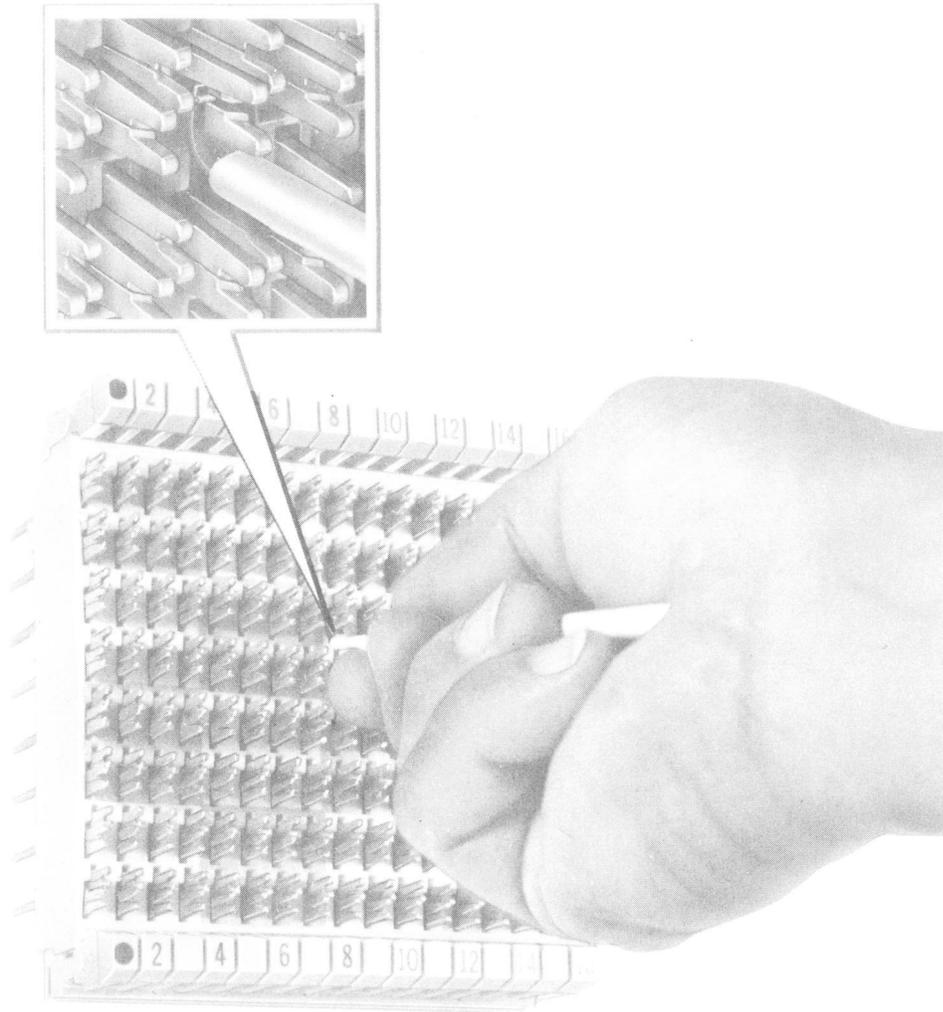


Fig. 14—Use of 724A Wire Removal Tool

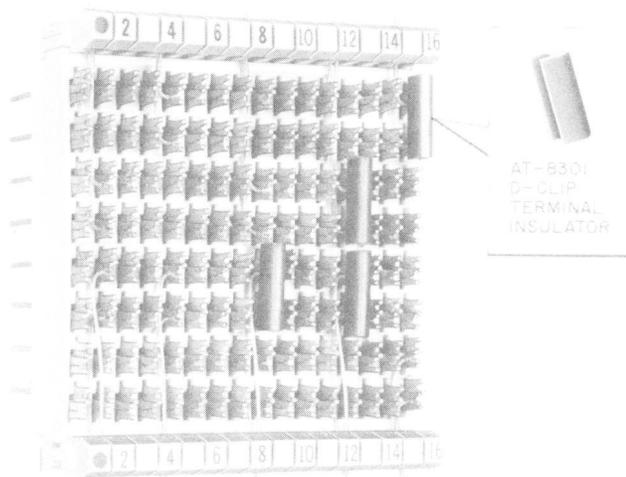


Fig. 15—Special Service Marking on 78C2A-64 Connecting Block