

SOLDERLESS RIBBON CONNECTORS  
TOOLS, METHODS AND REQUIREMENTS

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1. GENERAL

1.1 Scope of Section

1.1.1 This section covers the methods, requirements, and tooling associated with the termination of wires or switchboard cable conductors in the terminals of solderless ribbon type connectors.

1.1.2 This section is limited only to the solderless ribbon connectors stated in the following paragraphs and shall not be considered as covering other similar type solderless connectors or solder-type connectors which are not recommended for field termination.

1.1.3 The requirements of this section shall be followed unless modified by the job specification or associated drawings.

1.1.4 Each figure in this section illustrates only conditions to which reference is made in the text and shall not be considered as covering other requirements that may be shown.

1.2 Precautions

1.2.1 General precautions to be taken against personal injury, equipment damage, and service interruptions are covered in Handbook 0 and are to be observed at all times as they apply to the operations being performed.

1.3 Approved Wire

1.3.1 The following wire gauge and insulation types are approved for termination in the solderless ribbon type connectors:

<u>Wire</u>	<u>Insulation</u>
24 Ga. Solid	PVC .045" Max. O.D.
26 Ga. Solid	PVC .045" Max. O.D.

1.4 Field Connectors

1.4.1 Ribbon type connectors with insulation piercing or insulation displacement type terminals that are manufactured by amp, amphenol or TRW-cinch in 7, 12, 18, 25 or 32 pair sizes may be field terminated by using either the R-4623 or R-4623A Tools.

This section includes material from the BTL X-18217 specification.

NOTICE

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**NOTE:** If connectors manufactured by other companies are furnished on the job, they cannot be field terminated by using either of the above tools. If this should happen, contact your Regional Technical Assistance Center (RTAC) Organization immediately and request tooling information.

### 1.5 Modular Splicing

1.5.1 Requirements and methods for the 710 Systematic Encapsulated Connecting System (SECS), the 3M Modular Splicing System (3M-MS<sup>2</sup>) and 711 Splicing System are covered in the 370, 380, and 390 series sections of this handbook and are not applicable to this section.

### 2. TOOLS

R-4623	Multiple Insertion Tool (TRW-Cinch)
R-4650	Single Insertion Tool
R-4623 (Det. 1)	32 Pair Conversion Adapter
R-4623 (Det. 2)	Mounting Fixture
R-4554	5X Illuminated Magnifier

**NOTE:** The above tools are contained in TS-533.

R-4623A Amp Terminating Tool

### 3. REQUIREMENTS

#### 3.1 General

3.1.1 The requirements for the termination of insulation displacement or insulation piercing type terminals employed within solderless ribbon type connectors shall be considered as being met providing the wire gauge and insulation type specified in Paragraph 1.3.1, the connectors specified in Paragraphs 6.1, 6.2, and 6.3 are utilized, and the visual inspection criteria listed in Figures 1, 2 or 3 can be met.

3.1.2 All connectors shall be visually inspected prior to the termination of any wires in the connector to be sure that the metal contact jaws or the plastic housings are not distorted. If a defect is found, discard the connector and use one that does meet the visual inspection criteria.

#### 3.2 TRW - Cinch Connectors

3.2.1 Figure 1 shows three cross-sectional views of the Cinch Ribbon Type Connector and the associated visual inspection criteria information required to meet approved terminations.

#### 3.3 Amp-Champ Connectors

3.3.1 Figure 2 shows cross-sectional views of the Amp-Champ Connector and the visual criteria information required to meet approved terminations.

### 3.4 Amphenol

3.4.1 Figure 3 shows three cross-sectional views of the Amphenol Micro-Pierce Connector and the visual criteria information required to meet approved terminations.

### 3.5 Wiring Errors

3.5.1 Inserted wires may be removed and replaced from a terminal for a maximum of five times. Extreme care should be exercised in removal of the inserted wire by lifting the lead upward toward the open end of the "U" slot or contact jaws, taking particular care not to damage the terminal.

3.5.1.1 When a wire which has previously been connected has to be reterminated, the old terminated portion of the wire shall be cut off prior to the retermination operation.

3.5.2 When reterminating wire in a "Amp-Champ" Connector, only the same wire gauge size which has been removed is allowed retermination, i.e., if a 26 gauge wire is removed from a terminal of the Amp-Champ only 26 gauge wire can be reterminated on that given terminal.

3.5.3 When reterminating wire in a Cinch or Amphenol Connector Terminal, the same wire gauge size or the next larger size wire gauge of that which has been previously terminated is allowed retermination, i.e., if a 26 gauge wire is removed from a terminal, a 24 or 26 gauge wire can be reterminated on that given terminal. Do not terminate 20 or 22 gauge wire.

### 3.6 Damaged Terminals

3.6.1 It is not economically practical to replace a damaged connector terminal and it is impossible to solder one of these connections without damaging the plastic barrier between the terminal rows, therefore, the entire connector must be replaced and reterminated. Do not solder these terminals.

### 4. TOOL INFORMATION

#### 4.1 General

4.1.1 There are two basic hand operated tools used to field terminate connectors. They are the R-4623 which is furnished in Tool Set 533 and the R-4623A which is self contained in its own case. The following is a description and a brief summary of all the tools and their use.

#### 4.2 R-4623 Multiple Insertion Tool

4.2.1 This tool is manufactured by the TRW-Cinch Company and it is the basic tool used to terminate conductors in the solderless ribbon type connectors. This tool (Figure 4) in its basic condition is arranged to terminate leads in the Cinch or Amphenol 14, 24, 36, and 50 position connectors. It will also terminate leads in the Amp 50 position connector. Refer to Paragraphs 5.1.2 and 5.2.1 for

the correct nest, comb, and insertion head combination. (Refer to Paragraph 4.8 for a problem that has developed with this tool.)

#### 4.3 R-4623, Det. 1

4.3.1 Detail 1 of the R-4623 is required to terminate 64 conductors (maximum) into the Cinch, Amp, and Amphenol 64 position connectors. Detail 1 consists of a 32 pair Nest, Comb, and Insertion Head. Refer to Figure 5.

#### 4.4 R-4650 Single Insertion Tool

4.4.1 This tool (Figure 6) is required to terminate or reterminate individual conductors in any of the connectors listed in this section where repair or modification type work is required. Detailed instructions for the tool operation are outlined in Paragraph 5.3 of this section.

#### 4.5 R-4554 Magnifier Light

4.5.1 This tool is a 5X(power) illuminated magnifier used to inspect and verify the condition of the solderless termination made on the completed connectors.

#### 4.6 R-4623 Det. 2 Mounting Bracket

4.6.1 This mounting bracket is used to hold the R-4623 Insertion Tool at a specific location on a 23" unequal duct type bay. This mounting bracket consists of the following (5) five parts: (See Figure 7.)

4.6.1.1 Two (2) standoff brackets used to hold the Insertion tool out away from the frame. Each standoff has a cam lever to lock the horizontal bar in place.

4.6.1.2 A two (2) piece horizontal mounting bar which fits between the two standoff brackets and can be locked into position by the standoff locking cam levers.

4.6.1.3 A one (1) piece pivot base plate which fastens to the bottom of the Insertion tool. This plate allows the tool to be pivoted in both directions and will accommodate cables entering from either the right or left side of the frame.

#### 4.7 R-4623A Amp-Connector Tool

4.7.1 The basic R-4623A Tool is equipped to terminate 24 position Amp-Champ Connectors. In addition, adapters for both 36 and 50 position Amp-Champ Connectors are included as parts of the R-4623A Tool. An instruction sheet (IS-7559) along with the basic tool and the adapters are housed within a sturdy sheet metal shipping case. After job completion, be sure all parts, including the instruction sheet, are put back into the case before it is returned to Stockkeeping or shipped to another job location.

**NOTE:** The R-4623A Tool is only capable of terminating leads in 24 and 36 position Connectors. The 50 position Amp-Champ Connector can be

terminated with both the R-4623 and R-4623A Tools.

#### 4.8 Tool Problem

4.8.1 At the time the original R-4623 (TRW Certi-Clinch) tools were standardized, the Cinch Company only made a "ribbon" type connector that could be field terminated. Since that initial purchase of R-4623 Tools, the Cinch Company introduced a "superribbon" connector which can also be field terminated.

4.8.1.1 A problem arose when it was discovered that the initial tools purchased would not terminate the "superribbon" connectors. There is no way of determining which tools were initially purchased, however, we do know that they are Cinch Company serial numbers (1000-1300). These serial numbers are located on the back side of the tool behind the lever handle.

4.8.1.2 To further complicate the problem, some of the Regions sent the tools back to the TRW Company for modification. These modified tools were not identified in any manner. If you are going to field terminate "superribbon" connectors (they use them in the SLC-96 System) and the R-4623 Tool you have is serial numbered between 1000-1300, and the tool nest, comb, and knife blade has not been modified per Figure 10, send the tool back to Central Stockkeeping with a tag stating the tool requires modification. A replacement tool will be sent back to you upon request.

### 5. METHODS OF TERMINATION

#### 5.1 7 Through 25 Pair Connectors

5.1.1 The basic R-4623 Multiple Insertion Tool is set up to solderless terminate 7, 12, 18, and 25 pair connectors. However, it is not, as indicated in Paragraphs 4.2.1 and 5.4.1, equipped to handle 7, 12, and 18 pair Amp-Champ Connectors.

5.1.2 When any of the approved 7, 12, 18 or 25 pair connectors are to terminate conductors, the R-4623 Tool should be set up as follows:

- a. Use the 25 Pair Nest (smallest of the two nests) with "Type 1" facing upward to accept both the "Plug and Receptacle" Cinch and Amphenol Connectors.
- b. This 25 Pair Nest must also be used for the Amp Plug and Receptacle Connectors, however, the Nest must be positioned with "Type 2" facing upward.
- c. Place the 25 Slot Comb in position and secure with set screws.
- d. For the Cinch and Amphenol Plug or Receptacle Connectors, set the 25 tooth Insertion head in place and secure. Position the lever "up" for receptacles and "down" for plugs.

- e. When terminating on Amp Plugs or Receptacles, always position the lever in the "plug" position.

5.1.3 Assuming a 25 Pair Connector(s) is to be terminated at a specific location on a Duct Type Bay, the following procedure is recommended: (See Figure 8.)

- Step 1: Refer to the methods of cabling drawing and mount the R-4623, Det. 2 Fixture at the final connector position(s) or at a convenient distance above this position. This fixture position depends on several variable factors such as:
- a. Available mounting holes on the bay to mount the stand-offs.
  - b. One cable possibly serving a number of connectors at several horizontal locations within the bay.
  - c. One cable possibly serving several connectors mounted vertically within a given equipment panel.
- Step 2: Verify that the R-4623 Insertion Tool is set up for the correct connector. (Refer to Paragraph 5.1.2) and then fasten to the mounting fixture. Unlock handle and open.
- Step 3: Prepare cable(s) in accordance with the method of cabling drawing. It will be necessary to separate and tag the leads into groups/connector - when binders split, be careful not to lose their identity.
- Step 4: Measure the cable leads out to the correct connector termination point, allow about 2" of additional slack and cutoff. Place a PVC Tape Band back about 5" from the end of these cut leads. Do not lose binder identity.
- Step 5: From the method of cabling drawing, determine if the connector(s) will be a straight or side entry (90 degrees) and then rotate the cable clamp on the insertion tool into the correct position. Be sure that connector side 1 to 25 is facing upward in the Nest. If the connector is a side entry type, most of them have a strain relief clamp that indicates which side the cable leads enter from. (See Figure 8, Sequence 4.)

Step 6: Refer to the cable termination drawing or work sheets and separate the cable leads into two groups (1-25, 26-50). When a cable binder is split over two or more connectors, be very careful not to lose the binder identity. Align the tape mark on the cable leads with the embossed mark on the cable clamp and secure the leads in place with the clamp. Where individual cables (one cable/connector) are being terminated, refer to Figure 8, Sequence 6.

Step 7: After being sure the connector is placed in the Nest correctly (1-25 facing up), Lower the Comb into position and lock by rotating the comb latching lever into the forward position. (See Figure 8, Sequence 5.)

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**CAUTION:** DO NOT ATTEMPT TO LOWER THE INSERTION HEAD HANDLE UNTIL THIS LEVEL IS IN THE FORWARD (LOCKED) POSITION.

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Step 8: There are four "slot indicator" tabs furnished with this tool set (1) 25 Pair Plug, (2) 25 Pair Receptacle, (3) 32 Pair Plug, and (4) 32 Pair Receptacle. Select the proper tab and place it in the tab holder (see Figure 9). Use this tab as a guide while fanning cable leads into the comb slots.

Step 9: Refer to the cable lead termination drawing or work sheet and start fanning the leads into the slots of the Comb. Start with lead (1) and Fun Through lead (25). As the leads are placed into the slots, press them downward with your finger or thumb just in front of the Comb. This will provide some additional slack in case retermination is required. (See Figure 8, Sequence 8.)

Step 10: After the 25 conductors have been fanned into the slots of the Comb, verify for color code accuracy. Make sure the lever on the insertion head is in the proper position (plug or receptacle) and then bring the handle forward and down until it bottoms out. At this point, the leads are terminated and cutoff. (See Figure 8, Sequence 9.)

**NOTE:** If for some reason the handle must be raised before being bottomed out, there is a locking pin (pawl stop) located at the rear of the handle near the pivot point. Lift up on this pin and the handle will release for raising. (See Figure 8, Sequence 11.)

- Step 11: Lift the handle up and remove the cut cable lead ends from the Comb. (See Figure 8, Sequence 13.)
- Step 12: Release the Comb Latching Lever and lift the Comb up and to the rear. Remove the connector, turn it over (26-50 side up) and re-insert it back into the Nest. If the connector is being terminated via side entry, rotate the clamping device to the opposite side and then lower and lock the Comb in place again. (See Figure 8, Sequence 14.)
- Step 13: Again refer to the terminating drawing and fan the conductors into the Comb slots for 26 through 50. Remember leads 1 to 25 fan out in one direction and leads 26 to 50 fan out in the opposite direction. (See Figure 8, Sequence 16.)
- Step 14: Again verify the color code of the leads in the Comb slots, change if necessary, and proceed to terminate as described in Step 10.
- Step 15: Lift the handle and remove the cut cable lead ends from the Comb.
- Step 16: Release the Comb latching lever, lift up the Comb, release the cable from the clamping device and remove the connector from the holding Nest. (See Figure 8, Sequence 18.)
- Step 17: Verify the condition of the terminated leads with the R-4554 5X Illuminated Magnifier. If there happens to be a wiring error(s), remove the lead(s) by lifting straight upward toward the opening in the terminal slots. Be careful not to damage the terminal(s), to reinsert individual conductors into the proper terminal, refer to Paragraph 5.3.
- Step 18: Prior to starting the termination of another connector, temporarily identify the completed connector by attaching a tag or masking tape with proper connector number on it.

## 5.2 32 Pair (Max) Connectors

- 5.2.1 To terminate 32 Pair Connectors, it is necessary to position the Detail 1 Nest, Comb and Head in the R-4623 Tool. Use the following procedure to terminate leads on the various connectors:
- To terminate on 32 Pair Cinch and Amphenol Connectors, position the Nest with "Type 1" facing upward and secure in place.
  - To terminate on 32 Pair Amp Connectors, position the Nest with "Type 2" facing upward and secure in place.
  - Place the 32 Slot Comb in position and secure in place with allen wrench.
  - Place the 32 tooth Insertion Head in position and secure in place. Position the lever in the "Plug" position when terminating conductors in all approved plug end conductors.
  - When terminating conductors in the Cinch or Amphenol Receptacles, set the lever in the "Receptacle" position.
  - Follow Steps 1 through 18 as described in Paragraph 5.1.3.

## 5.3 Single Lead Termination

- 5.3.1 To terminate or reterminate a single lead conductor into one of the terminals of an approved connector, the following procedure is recommended:
- If the conductor is to be reterminated, first cut off that portion of the wire that was previously inserted into the connector terminal.
  - The single lead termination requires a "Free Hand" type of operation using the R-4650 Insertion Tool. Therefore, remove the connector from the Nest and hold with one hand.
  - Place the lead to be terminated in the proper connector terminal. Be sure to place the lead into the terminal as far as possible.
  - Using the R-4650 "Plier Type" Tool, approach the connector from the front "contact" side with the opposite hand.
  - Align the Insertion blade of the tool directly over the wire to be terminated.
  - Squeeze the tool firmly until lead is seated into the "U" slots or contact jaws of the terminal.
  - Verify the connection per Figures 1, 2 or 3 using the R-4554 Magnifier Light.

#### 5.4 12, 18, and 25 Pair Amp-Champ Connectors

5.4.1 When terminating leads in a 12 Pair (24 position) Amp-Champ Connector, the basic R-4623A Tool (Part No. 229378-8) should be used in accordance with the IS-7559 Instruction Sheet. This tool, because of the two side handles, is sometimes referred to as the amp "butterfly" tool.

5.4.2 When terminating leads in an 18 Pair (36 position) connector, the basic R-4623A Tool must be modified to replace the standard Comb and stuffer blades with the 36 Pin Adapter (Part No. 229713-1). After making this change, follow instruction sheet IS-7559.

5.4.3 When terminating leads in a 25 Pair (50 position) connector, the basic R-4623A Tool must be modified to replace the standard Comb and stuffer blades with the 50 Pin Adapter (Part No. 229763-1). The R-4623 Multiple Insertion Tool can also be used for terminating leads in 25 Pair Amp-Champ Connectors.

NOTE: Neither the R-4623 nor R-4623A Tool is equipped to field terminate the 7 Pair Amp-Champ Connector.

#### 6. USABLE FIELD CONNECTORS

##### 6.1 TRW-Cinch Connectors

6.1.1 TRW manufactures both "ribbon" and "superribbon" type connectors that can be field terminated with the R-4623 Hand Tool. The fact that many "KS" numbers have been assigned to these connectors has made it impossible to determine what codes are being sent to the field. Therefore, we have listed known "KS" numbered connectors that can be used in the field and a method of determining through the manufacturer's 10 digit part number, if they can be used in the field.

6.1.2 "KS" numbered ribbon connectors that can be terminated in the field. They are:

<u>KS No.</u>	<u>List</u>	<u>TRW Part No.</u>
16671	23	223-10-50-006
16672	26	223-11-50-007
16672	31	223-11-50-011
16689	18	223-15-50-003
16689	19	223-03-50-009
16689	20	223-15-50-008
16689	22	223-03-50-004
16689	29	223-03-50-009
16690	12	223-04-50-003
16690	13	223-04-50-004
16690	16	223-16-50-008
16690	18	223-16-50-009
16690	21	223-04-50-008
16786	19	223-13-50-003

6.1.3 The following method can be used to decipher the manufacturer's part number to determine if it can be connectorized in the field with the R-4623 Hand Tool. A typical TRW ribbon connector part number is (10) digits, such as:

#### 223-04-50-001

223 - The first (3) digits, 223, indicates that it is a "ribbon" type connector.

04 - Digits 4 and 5. When these digits are even, such as 02, 04, 06, etc., they indicate the connector is a plug. If the digits were odd, such as 01, 03, etc., they indicate the connector is a receptacle.

50 - Digits 6 and 7 indicates the number of positions or contacts. 50 indicates 25 Pair, etc.

001 - Digits 8 through 10 are basically not important. These digits indicate the type of hood, cable entry, clamping arrangement, etc., (these digits do not affect field termination).

6.1.4 "KS" numbered superribbon connectors that can be terminated in the field. They are:

<u>KS No.</u>	<u>List</u>	<u>TRW Part No.</u>
21997	1	224-15-50-002
21997	4	224-15-36-001
21997	5	224-15-24-001
21997	6	224-15-14-002
21997	7	224-15-36-002
21997	8	224-15-24-002
21997	9	224-15-14-003
21997	10	224-15-50-019
21998	1	224-16-50-002
21998	2	224-16-50-021
21998	5	224-16-64-002
21998	6	224-16-36-001
21998	7	224-16-24-001
21998	8	224-16-14-001
21998	9	224-16-64-003
21998	10	224-16-36-002
21998	11	224-16-24-002
21998	12	224-16-14-002
21998	13	224-16-50-020

6.1.5 The following method can be used to decipher the part number to determine if it can be connectorized in the field with the R-4623 Hand Tool. A typical "superribbon" connector part number is (10) digits such as:

#### 224-15-36-006

224 - The first (3) digits, 224, indicates that it is a "superribbon" type connector.

15 - Digits 4 and 5. When these digits are even, such as 02, 04, 06, etc., they indicate the connector is a receptacle. If the digits are odd, such as 01, 11, 15, etc., it indicates the connector is a plug.

36 - Digits 6 and 7 indicates the number of positions or contacts.

006 - Digits 8 through 10 are basically not

Important in determining field connectorization. These digits indicate the hood type, cable entry type, clamping arrangement, etc.

**6.2 Amphenol Connectors**

6.2.1 Only the Amphenol 157 Series "Micro-Pierce" Connectors can be field terminated. Again, like the "Cinch" connectors, we will list the known "KS" numbers that can be used in the field and a method of determining from the part number if it can be field terminated.

6.2.2 "KS" numbered Micro-Pierce connectors that can be terminated in the field.

They are:

<u>KS No.</u>	<u>List</u>	<u>Amphenol Part No.</u>
16671	22	157-72500-17
16672	26	157-22500-6
16672	30	157-82500-17
16689	18	157-72500-14
16689	19	157-72500-15
16689	20	157-72500-16
16689	22	157-72500-17
16690	12	157-82500-14
16690	13	157-82500-15
16785	16	157-32500-2
16785	54	157-32500-3
16786	19	157-42500-3
16786	20	157-42240-3
16786	58	157-42500-1

6.2.3 The following method can be used to decipher the part number to determine if it can be connectorized in the field with the R-4623 Hand Tool. A typical Amphenol "Micro-Pierce" Connector part number has either (9) or (10) digits such as:

157-32360-18

157 - The first (3) digits, 157, indicates that it is a "Micro-Pierce" type connector.

32 - Digits 4 and 5 indicates whether the connector is a plug or receptacle and the type of hood entry: the number indicate the following:

(P) = Plug and (R) = Receptacle

- 12(P), 22(R) for Rack to Panel Connectors
- 32(P), 42(R) for Cable to Panel - Top Entry
- 52(P), 42(R) for Cable to Panel - Side Entry
- 72(P), 82(R) for Cable to Cable - End Entry
- 32(P), 62(R) for Cable to Cable - Top Entry

36 - Digits 6 and 7 indicates the number of positions or contacts 14 indicates 7 pair, etc.

0 - Digit 0 appears to have no apparent meaning so disregard.

18 - Digits 9 and/or 10 indicates the style and material of the connector hood.

**6.3 Amp-Champ Connectors**

6.3.1 The Amp-Champ Connector is the solderless insulation displacement type that can be field terminated. The known "KS" numbers and associated part numbers are listed below. However, we do not know of a method of deciphering the part number to determine if other Amp-Champ Connectors can be field terminated.

6.3.2 "KS" numbered Amp-Champ Connectors that can be field terminated are:

<u>KS No.</u>	<u>List</u>	<u>Amphenol Part No.</u>
21442	1	552493-4
21442	2	1-552493-4
21442	3	552493-1
21442	4	552493-2
21442	5	552636-1
21442	6	552493-3
21442	7	552636-2
21442	8	552493-5
21442	9	552898-1
21443	1	552492-4
21443	2	1-552492-1
21443	3	552492-1
21443	4	552492-5
21443	5	552638-1
21443	6	552492-3
21443	7	552638-2
21443	8	552897-1
21574	1	552643-1
21574	2	552643-2
21574	3	552643-3
21574	4	552713-1
21575	1	552645-1
21575	2	552712-1
21575	3	552645-2

**7. CONNECTOR COMPLETION**

**7.1 Continuity Test**

7.1.1 Following completion of the termination operation on the connectors, a complete continuity verification shall be made of all wiring terminated in the field. Refer to Section 180 of this handbook for No. 5 Crossbar System or to Handbook 50 for all other systems. Care should be taken not to disturb the terminations while continuity testing.

NOTE: Prior to performing continuity tests on transistorized equipment, refer to Handbook 50, Section 2.

**7.2 Spare - Unused Leads**

7.2.1 When the application drawing does not specify in what manner the spare and unused leads are to be disposed of, measure these leads out to the farthest termination point and cut off excess, identify these leads, fold them back on the main cable form and place them in a PVC tube. Secure the tube to the main cable form.

**7.3 Connector Enclosure**

7.3.1 After the connectors have been continuity tested and the unused leads disposed of, the installer must place the hood (cover) on the connector(s). Prior to fastening the hood, place a 1" slit section of jacket, two layers of PVC tape or other protection over the clamping area. This will not only provide protection for the cable leads, but it will also build up this area to assure satisfactory gripping of the connector clamp.

#### 7.4 Identification

7.4.1 Remove the Temporary Identification Tag and stamp or identify the connectors (plugs or receptacles) in accordance with the information shown on the application drawings.

### 8. VERIFICATION

#### 7.5 Completion

7.5.1 After all the connectors on a frame have been secured into their proper mated positions, dress and secure all cables and/or cable forms in accordance with this method of cabling drawing.

VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS	REFERENCE	
	PAR. NO.	FIG. NO.
8.1 <u>Solderless Ribbon Connectors - General</u>		
8.1.1 Do not terminate Solder-Type Ribbon Connectors.	1.1.2	
8.1.2 Solderless terminate only approved connectors.	1.4.1	
8.1.3 Use only approved wire and insulation.	1.3.1	
8.2 <u>Connector Requirements</u>		
8.2.1 Visually inspect connector prior to termination.	3.1.1	1,2,3
8.2.2 TRW-Cinch Connectors	3.2	
8.2.2.1 Visual Criteria	3.2.1	
a. Conductor inserted far enough into connector		1a
b. Conductor inserted deep enough into terminal jaws		1b
c. No distortion of metal contact jaws		1c
d. No distortion of plastic housing		1d
e. Wire entrapped in strain relief properly		1e
f. No breaks in wire prior to connector entry		1f
8.2.3 Amp-Champ Connectors	3.3	
8.2.3.1 Visual criteria	3.3.1	
a. Conductor inserted far enough into connector		2a
b. Conductor not inserted too deep into connector		2b
c. Conductor inserted deep enough into "U" Slots		2c
d. No damage to terminal "U" Slots		2d,e
e. No distortion of Plastic Body		2f
f. No break in Wire Past Retention Slot		2g
8.2.4 Amphenol Connector	3.4	
8.2.4.1 Visual Criteria	3.4.1	
a. Conductor inserted deep enough into connector		3a
b. Conductor inserted deep enough into contact jaws		3b
c. No distortion of metal contact jaws		3c
d. No distortion of plastic housing		3d
e. Wires entrapped in strain relief properly		3e
f. No breaks in wire prior to connector entry		3f
8.3 <u>Reterminated Wire</u>		
8.3.1 Reterminate wire in connector 5 times (max)	3.5.1	

VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS		REFERENCE	
		PAR. NO.	FIG. NO.
8.3.2	Cut off old terminated portion of wire	3.5.1.1	
8.3.2.1	Only reterminate same gauge of wire in Amp-Champ	3.5.2	
8.3.3	Reterminate same gauge or next larger gauge in Cinch or Amphenol Connector Terminals. Do not terminate 20 or 22 gauge wire.	3.5.3	
8.4	<u>Damaged Terminals</u>	3.6	
8.4.1	Do not solder damaged terminals. Replace entire connector.	3.6.1	
8.5	<u>Continuity Test</u>	7.1	
8.5.1	Continuity test all field terminated connectors.	7.1.1	
8.6	<u>Spare or Unused Leads</u>	7.2	
8.6.1	Dispose of according to drawing or tube and tie back on main form.	7.2.1	
8.7	<u>Connector Enclosure</u>	7.3	
8.7.1	Protect clamping area with piece of slit jacket, two layers of PVC tape or other protection.	7.3.1	
8.8	<u>Connector Identification</u>	7.4	
8.8.1	Stamp or identify connector according to drawing instructions.		
8.9	<u>Completion</u>	7.5	
8.9.1	Dress and secure cables/cable form according to method of cabling drawing.	7.5.1	

No arrows due to extensive revisions.

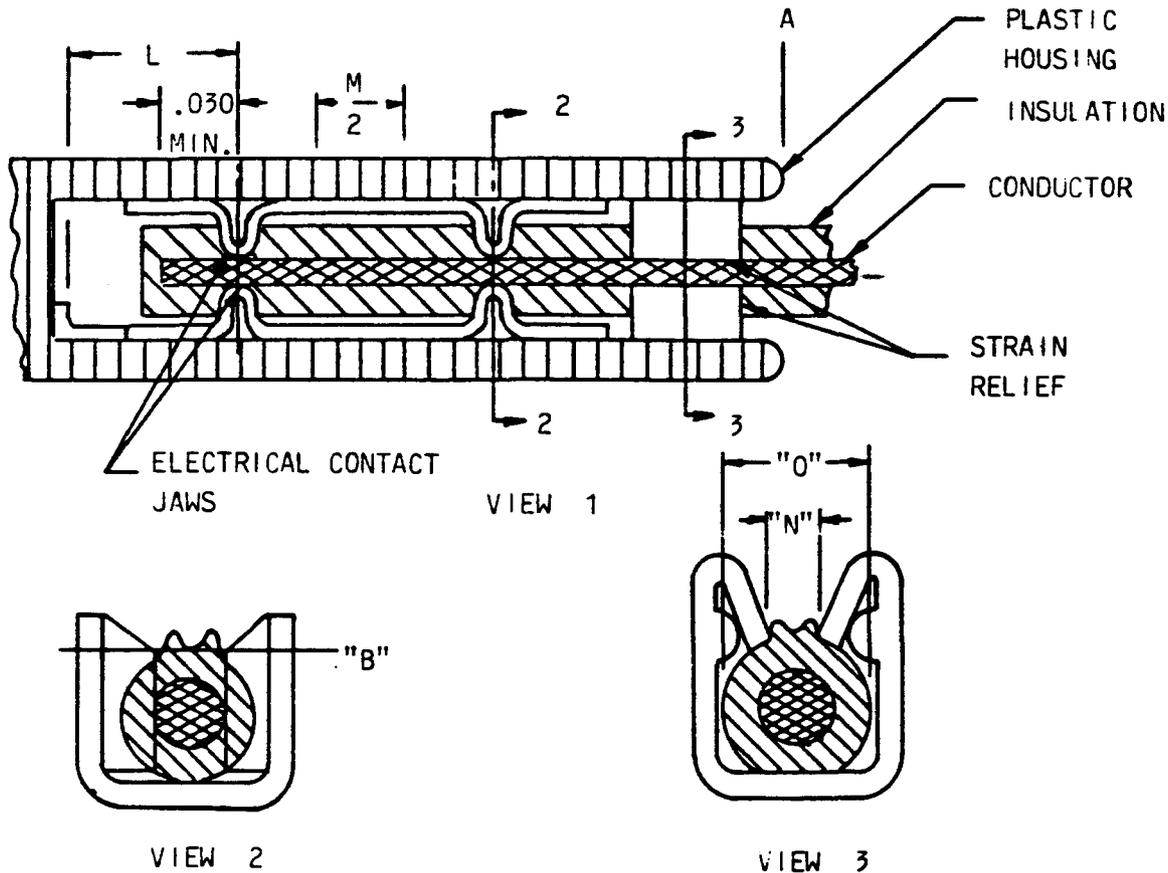
Brackets at side of paragraph indicates requirement.

Engineering Planning Manager  
(Installation)

Attachment  
Figures 1 through 9.

Reason for Reissue:

Complete revision.

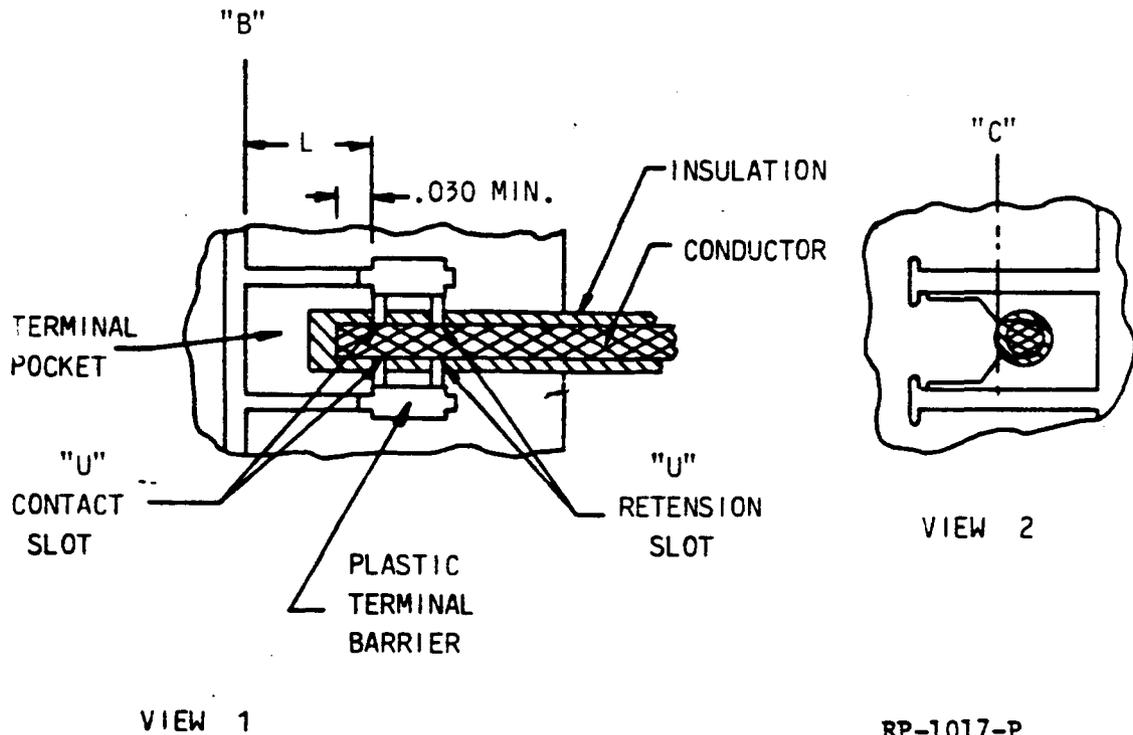


RP-1017-0

VISUAL INSPECTION CRITERIA

- A. THE COPPER CONDUCTOR SHALL EXTEND AT LEAST .030 INCH BEYOND THE ELECTRICAL CONTACT JAWS. THIS REQUIREMENT SHALL BE CONSIDERED AS BEING MET WHEN THE WIRE INSULATION OCCUPIES AT LEAST ONE HALF OF TERMINAL POCKET "L".
- B. THE COPPER CONDUCTOR SHALL BE COMPLETELY ENTRAPPED BETWEEN THE ELECTRICAL CONTACT JAWS. DUE TO INSULATION BUILD-UP THIS REQUIREMENT SHALL BE CONSIDERED MET WHEN AT LEAST ON HALF THE DISTANCE (M/2 MIN) BETWEEN THE TWO SETS OF ELECTRICAL CONTACTJAWS (VIEW 1).
- C. THERE SHALL BE NO DISTORTION OF THE METAL CONTACT JAWS.
- D. NO PART OF THE PLASTIC HOUSING SHALL BE DEFORMED.
- E. THE WIRE SHALL BE ENTRAPPED BY THE STRAIN RELIEF. DUE TO INSULATION BUILD-UP THIS REQUIREMENT SHALL BE CONSIDERED MET WHEN THE STRAIN RELIEF TAB OPENING "N" IS LESS THAN THE DIAMETER "O" OF THE WIRE INSULATION ENTRAPPED BELOW THE TABS.
- F. THERE SHALL BE NO BREAKS IN THE WIRE INSULATION TO THE RIGHT OF LINE "A" IN VIEW 1.

FIG. 1 (PARS. 3.11, 3.21, and 5.31g)

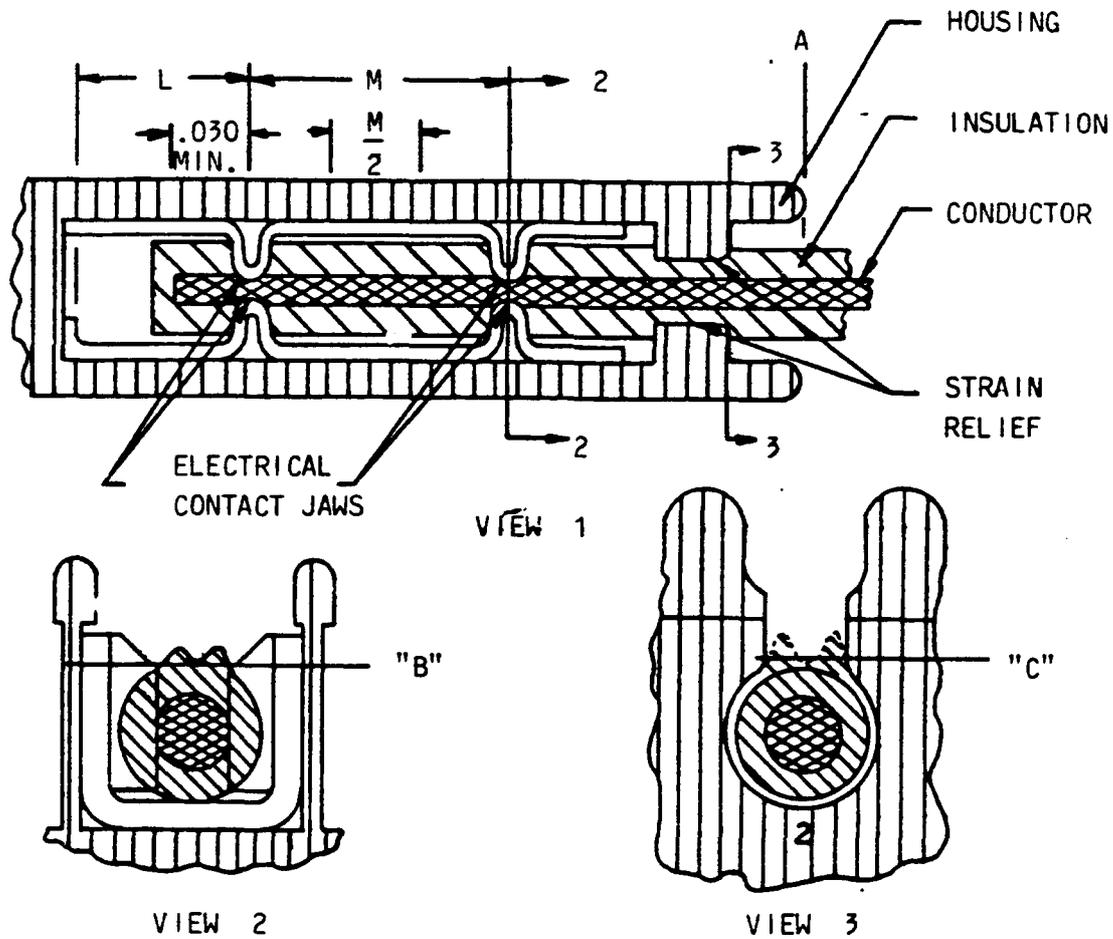


RP-1017-P

**VISUAL INSPECTION CRITERIA**

- A. THE COPPER CONDUCTOR SHALL EXTEND AT LEAST .030 INCH BEYOND THE "U" ELECTRICAL CONTACT SLOT. THIS REQUIREMENT SHALL BE CONSIDERED MET IF THE WIRE INSULATION OCCUPIES AT LEAST ONE HALF ON THE TERMINAL POCKET LENGTH "L".
- B. THE WIRE SHALL NOT EXTEND TO THE LEFT OF LINE "B" IN THE TERMINAL POCKET.
- C. THE WIRE INSULATION SHALL NOT EXTEND TO THE LEFT OF LINE "C" OF THE CONTACT AND RETENTION SLOTS. DUE TO INSULATION BUILD-UP IN THE SLOTS THE EFFECTIVE OD OF THE INSULATION SHALL BE USED TO DETERMINE THIS REQUIREMENT.
- D. THERE SHALL BE NO DAMAGE TO THE "U" SLOTS CAUSED BY THE WIRE CONDUCTOR BEING INSERTED TOO DEEPLY SO AS TO BOTTOM OUT IN THE "U" SLOT.
- E. THERE SHALL BE NO DISTORTION OF THE TERMINAL EXCEPT THAT MINOR SCRAPING OF THE TERMINAL BRIDGES IS PERMISSIBLE PROVIDED THE TWO "U" SLOT MEMBERS REMAIN PARALLEL TO EACH OTHER AND PERPENDICULAR TO THE PLASTIC HOUSING.
- F. NO PART OF THE PLASTIC BODY SHALL BE DEFORMED EXCEPT THAT MINOR SCRAPING OF THE FRONT SURFACE (LEFT END OF VIEW 1) OF THE PLASTIC BARRIER IS PERMISSIBLE.
- G. THERE SHALL BE NO BREAKS IN THE WIRE INSULATION MORE THAN .020 INCH TO THE RIGHT OF THE RETENTION SLOT IN VIEW 1.

FIG. 2 (PARS. 3.11, 3.31, and 5.31g)

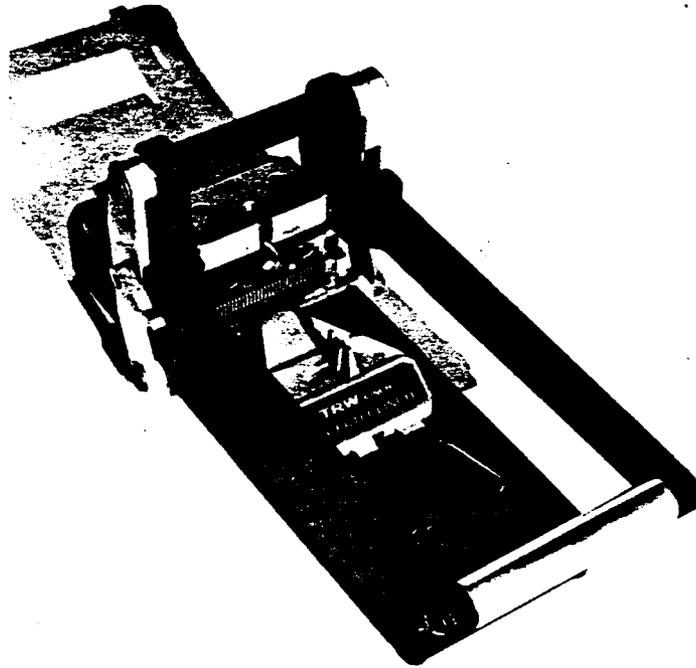


RP-1017-Q

**VISUAL INSPECTION**

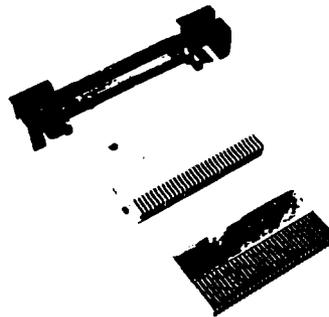
- A. THE COPPER CONDUCTOR SHALL EXTEND AT LEAST .030 INCH BEYOND THE ELECTRICAL CONTACT JAWS. THIS REQUIREMENT SHALL BE CONSIDERED MET WHEN THE WIRE INSULATION OCCUPIES AT LEAST ONE HALF OF THE TERMINAL POCKET LENGTH "L".
- B. THE COPPER CONDUCTOR SHALL BE COMPLETELY ENTRAPPED BETWEEN THE ELECTRICAL CONTACT JAWS. DUE TO INSULATION BUILD-UP THIS REQUIREMENT SHALL BE CONSIDERED MET WHEN THE WIRE INSULATION FALLS BELOW LINE "B" (VIEW 2) FOR AT LEAST ON HALF THE DISTANCE (M/2 MIN) BETWEEN THE TWO SETS OF ELECTRICAL CONTACT JAWS (VIEW 1).
- C. THERE SHALL BE NO DISTORTION OF THE METAL CONTACT JAWS.
- D. NO PART OF THE PLASTIC HOUSING SHALL BE DEFORMED.
- E. THE WIRE SHALL BE ENTRAPPED BY THE STRAIN RELIEF. DUE TO INSULATION BUILD-UP THIS REQUIREMENT SHALL BE CONSIDERED MET WHEN THE EFFECTIVE DIAMETER OF THE WIRE FALL BELOW THE EFFECTIVE DIAMETER OF THE STRAIN RELIEF HOLE, LINE "C" IN VIEW 3.
- F. THERE SHALL BE NO BREAKS IN THE WIRE INSULATION TO THE RIGHT OF LINE "A" IN VIEW 1.

FIG. 3 (PARS. 3.11, 3.41, and 5.31g)



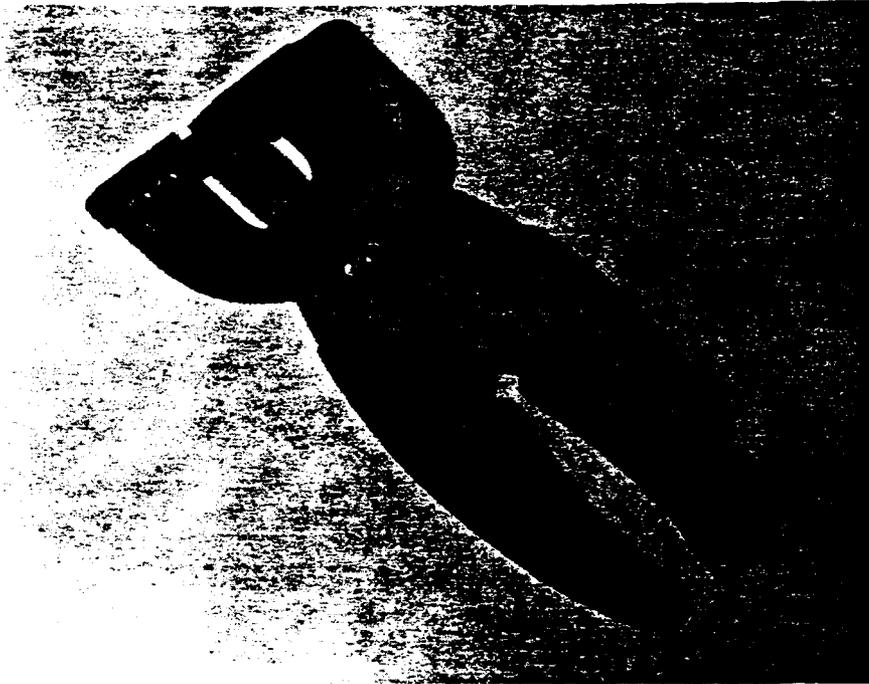
RP-0966-H

FIG. 4 R-4623 TOOL (PAR. 4.21)



RP-0966-J

FIG. 5 R-4623 DET. 1  
(PAR. 4.31)



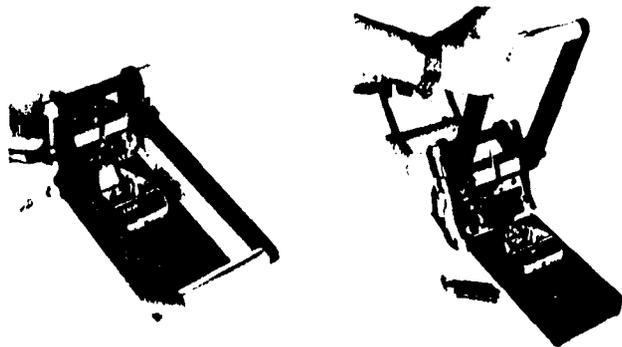
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FIG. 6 R-4650 (PAR. 4.41)



RP-0966-M

FIG. 7 R-4623 DET. 2 (PAR. 4.61)



- 1 - UNLOCK R-4623 TOOL HANDLE
- 2 - RAISE TOOL HANDLE
- 3 - PROPER NEST, COMB AND HEAD COMBINATION
- 4 - INSERT CONNECTOR
- 5 - LOCK COMB AND ADJUST CLAMP
- 6 - CLAMP CABLE IN PLACE
- 7 - SEPARATE CABLE LEADS
- 8 - START FANNING LEADS
- 9 - FIRST SIDE COMPLETELY FANNED
- 10 - START LOWERING INSERTION HEAD
- 11 - RELEASE HANDLE WHEN REQUIRED
- 12 - TERMINATE CABLE LEADS
- 13 - REMOVE CUT-OFF CABLE LEAD ENDS
- 14 - TURN OVER CONNECTOR AND ROTATE CLAMP
- 15 - AGAIN LOWER COMB IN PLACE - LOCK
- 16 - FAN REMAINING LEADS
- 17 - COMPLETE CONNECTOR TERMINATIONS
- 18 - REMOVE COMPLETED CONNECTOR

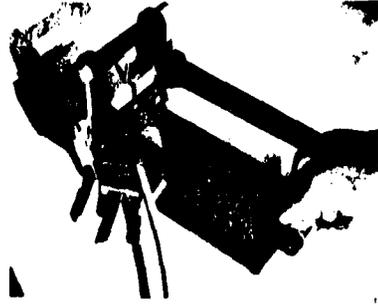
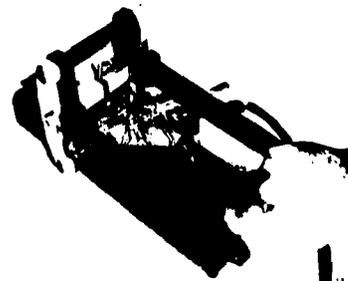
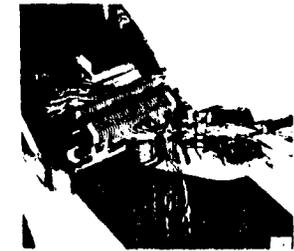
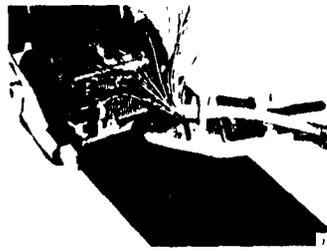
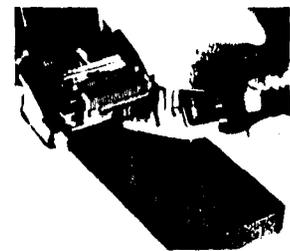
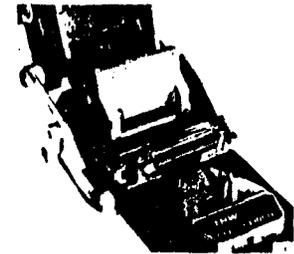
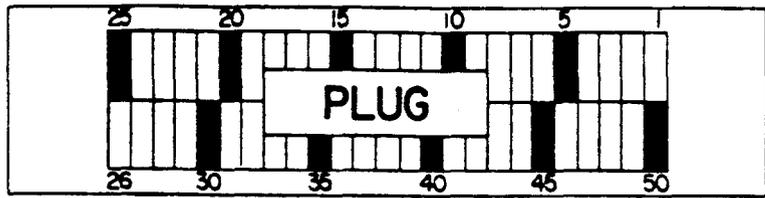
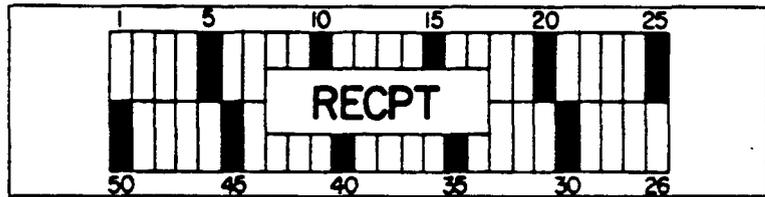


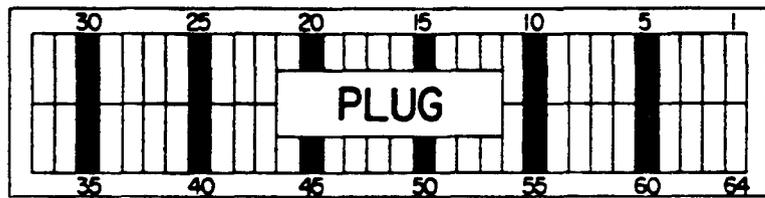
FIG. 8 SEQUENCE OF TERMINATION  
(PAR. 5.13)



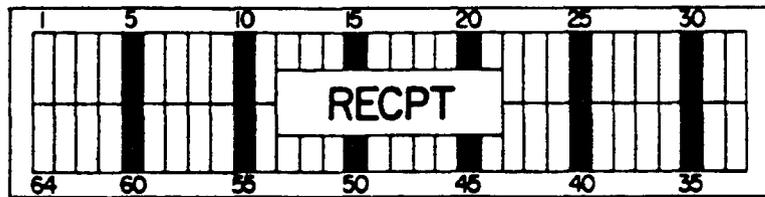
25 PAIR PLUG END



25 PAIR RECEPTACLE END



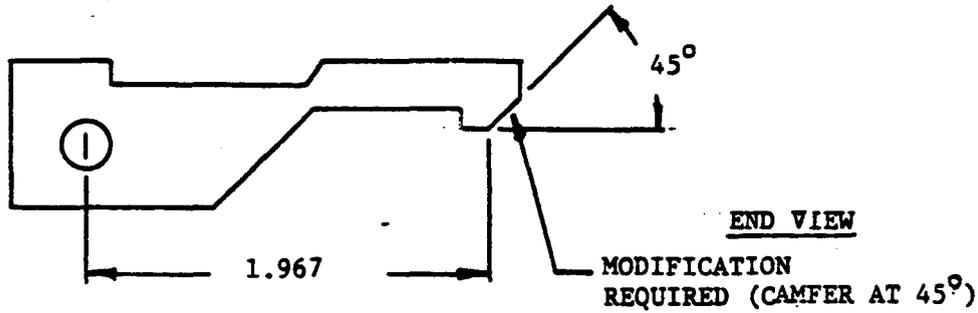
32 PAIR PLUG END



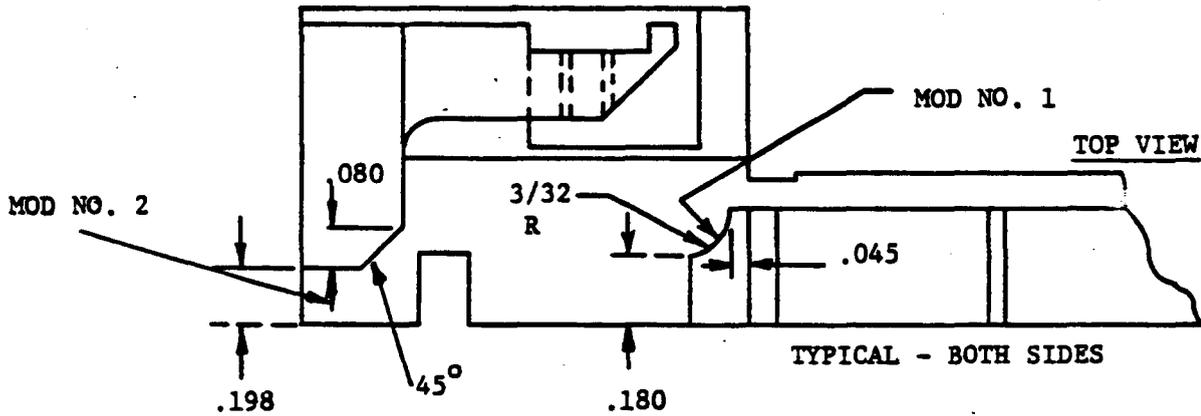
32 PAIR RECEPTACLE END

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FIG. 9 SLOT INDICATOR TABS  
(PAR. 5.13, STEP 8)

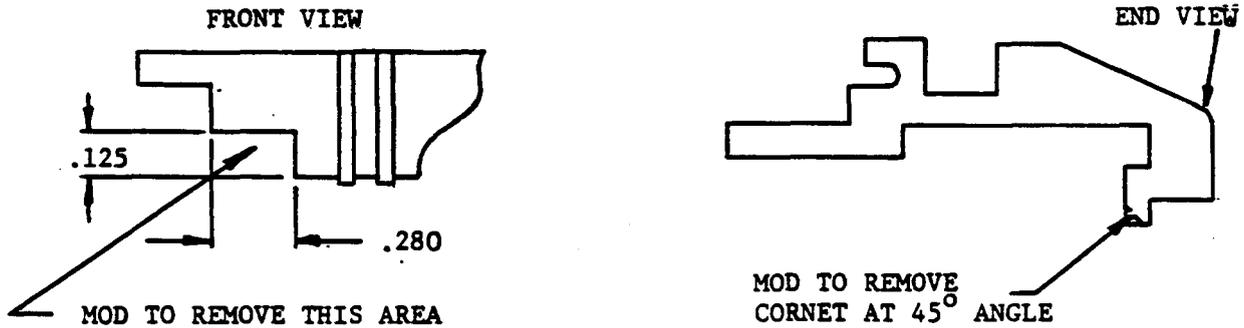


KNIFE HOLDER (PART 1)



MOD NO. 1 - THIS WAS CUT AT 45° - A 3/32<sup>R</sup> WAS ADDED FOR CLEARANCE  
 MOD NO. 2 - THIS AREA WAS SOLID. .198" MILLED OUT AND 45° CAMFER  
 ADDED FOR CLEARANCE.

25 PAIR NEST (PART - 2)



25 PAIR COMB (PART - 3)

RP-1017-X

FIG. 10 R-4623 (CERTI-CLINCH) TOOL  
 3-PART MODIFICATION REQUIRED TO ACCOMMODATE  
 "SUPERIBBON" CONNECTORS (PAR. 4.812)