



NOTE

All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ± 0.13 [$\pm .005$] and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of .075 and .100 Box Pin Header Assembly and Receptacle Connector Components which are designed for printed circuit (pc) board and panel-mount applications. Headers and receptacles are available with various contact positions and pc board mounting patterns. All are designed to be installed by hand.

Each header and receptacle has mounting holes that will accept commercially available hardware such as rivets, screws, bolts and nuts, or specially designed TE Connectivity (TE) hardware. See Figure 1 for typical product features that will be referred to throughout this text. The illustrations present a composite of available mounting options and typical headers and receptacles. They do not depict actual applications or all header and receptacle styles.

Pin header assemblies and receptacle connectors are available with a variety of contact tail arrangements to meet various application requirements. Each is available with one of four types of contact tails: (1) solder tines, (2) wrap-type posts, (3) solder eyelets, and (4) crimp wire barrels (2.54 mm [.100 in.] headers and receptacles only). Wrap-type posts are available as 0.25 x 0.51 mm [.010 x .020 in.] posts for solder or single wire application, and 0.64 x 0.64 mm [.025 x .025 in.] posts for up to 3 wire applications. The crimp-type pin and receptacle contacts are designed for crimping of individual wires.

Straight-through contacts can be removed and replaced from unsealed connectors. Right-angle contacts are permanently retained in the housing and damage to these contacts will require replacement of the header or receptacle. To avoid damage or any contact tails, TE recommends that the headers and receptacles remain in their packaging container until ready for use. See Figure 2 for available contact styles.

When corresponding with TE Personnel, use the terminology provided in this specification to facilitate inquiries for information. Basic terms and features of this product are provided in Figures 1 and 2.

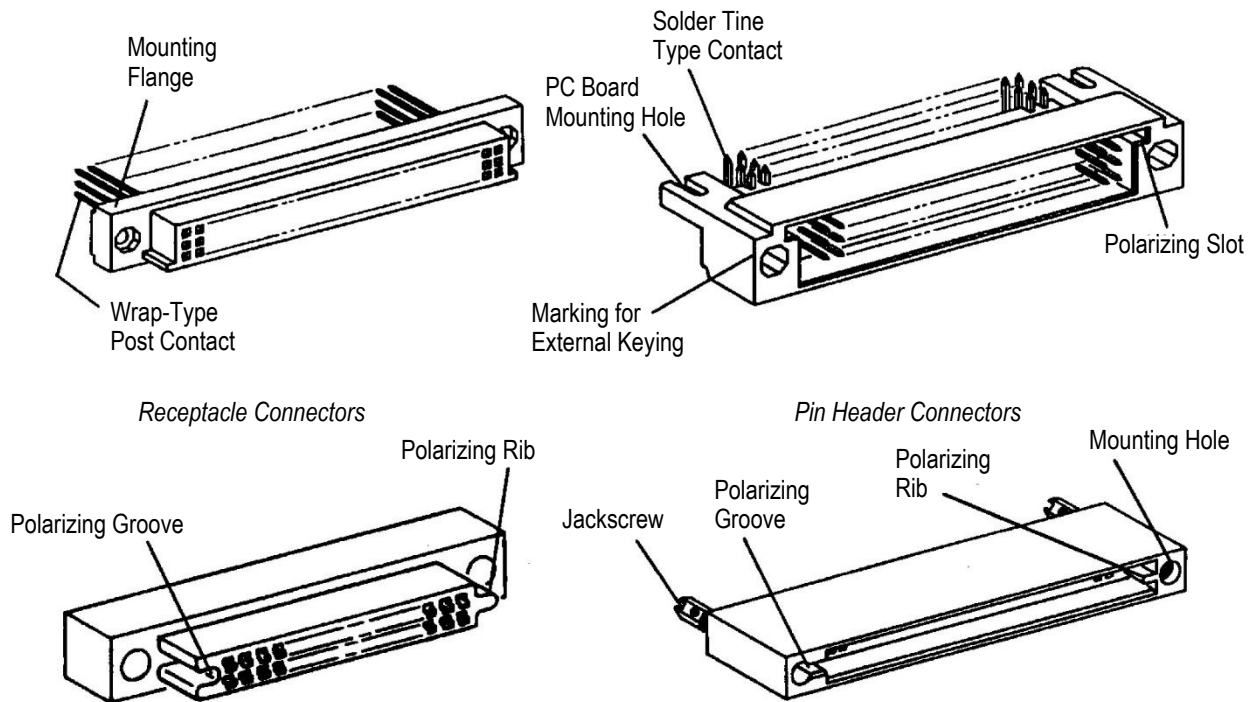


Figure 1

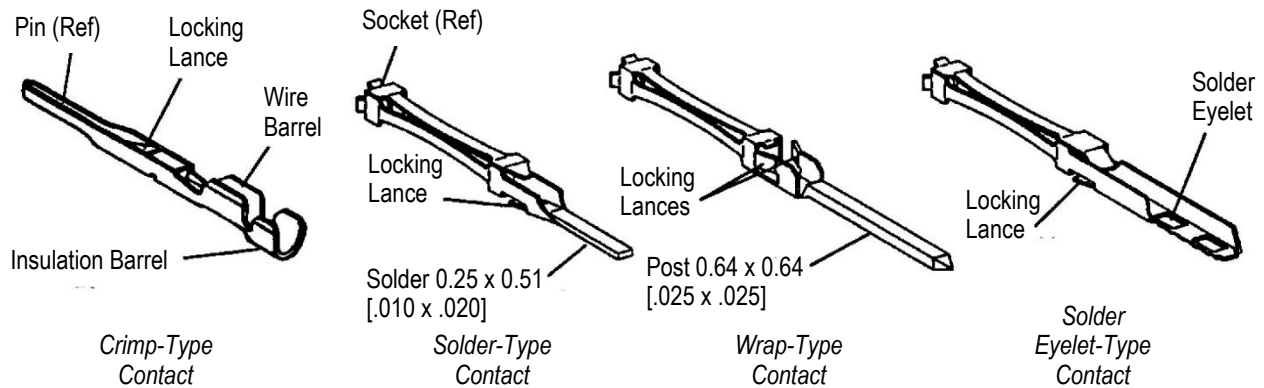


Figure 2

2. REFERENCE MATERIAL

2.1. Revision Summary

- Updated document to corporate requirements
- Updated complete document
- Added new information to tables in Figures 9 and 13 and Paragraph 3.7.C

2.2. Customer Assistance

Reference Product Base Part Number 531838 and Product Code 5365 are representative of Box Header Assemblies and Receptacle Connectors with Contacts on 1.90 x 2.54 mm [.075 and .100-in.] Centerlines. Use of these numbers will identify the product line and help you to obtain product and tooling information. Such information can be obtained through a local TE Representative, by visiting our website at www.te.com, or by calling PRODUCT INFORMATION or the TOOLING ASSISTANCE CENTER at the numbers at the bottom of page 1.

2.3. Drawings

Customer Drawings for product part numbers are available from the service network. If there is a conflict between the information contained in the Customer Drawings and this specification or with any other technical documentation supplied, the information contained in the Customer Drawings takes priority.

2.4. Manuals

Manual 402-40 can be used as a guide to soldering. This manual provides information on various flux types and characteristics with the commercial designation and flux removal procedures. A checklist is included in the manual as a guide for information on soldering problems.

2.5. Specifications

Product Specification 108-9003 provides product performance and test results.

2.6. Instructional Material

Instruction sheets (408-series) and customer manuals (409-series) provide product assembly instructions or tool setup and operation procedures. Documents available that pertain to this product are:

<u>Document Number</u>	<u>Document Title</u>
408-6623	1001 Series Box Connectors (Using Crimp, Snap-In Contacts)
408-6624	Box Connector Jackscrew Assemblies
408-6626	Clinching Tool 91117-3
408-6627	Clinching Tool for 3-Row Box Connectors
408-6660	Extraction Tools
408-7328	750, 751, 1000, and 1001 Series In-Line Box Connectors
408-7335	1000 Staggered Series Box Connectors
408-7424	Checking the Terminal Crimp Height or Gaging the Die Closure

<u>Document Number</u>	<u>Document Title</u>
408-7803	Clinching Tool 91117-1
408-8040	Heavy Duty Miniature Quick-Change Applicators (Side-Feed Type)
408-9344	Alignment Ring
408-9506	Insertion Tool 446167-1 For 1001 Series Box Pin Connectors
409-5128	Basic AMP-O-ELECTRIC* Model "K" Terminating Machine

3. REQUIREMENTS

3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

3.2. Storage

A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the product material.

B. Shelf Life

The product should remain in the shipping containers until ready for use to prevent deformation to components. The product should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

C. Chemical Exposure

Do not store product near any chemical listed below as they may cause stress corrosion cracking in the material.

Alkalies	Ammonia	Citrates	Phosphates	Citrates	Sulfur Compounds
Amines	Carbonates	Nitrites	Sulfur Nitrites		Tartrates

3.3. PC Board Mounting

A. Thickness

Header designs are available to accommodate pc board thicknesses of 2.44 mm [.096 in.] maximum. Receptacle designs are available to accommodate greater pc board thicknesses. For additional information, contact TE Engineering by one of the phone numbers listed at the bottom of page 1.

B. Layout

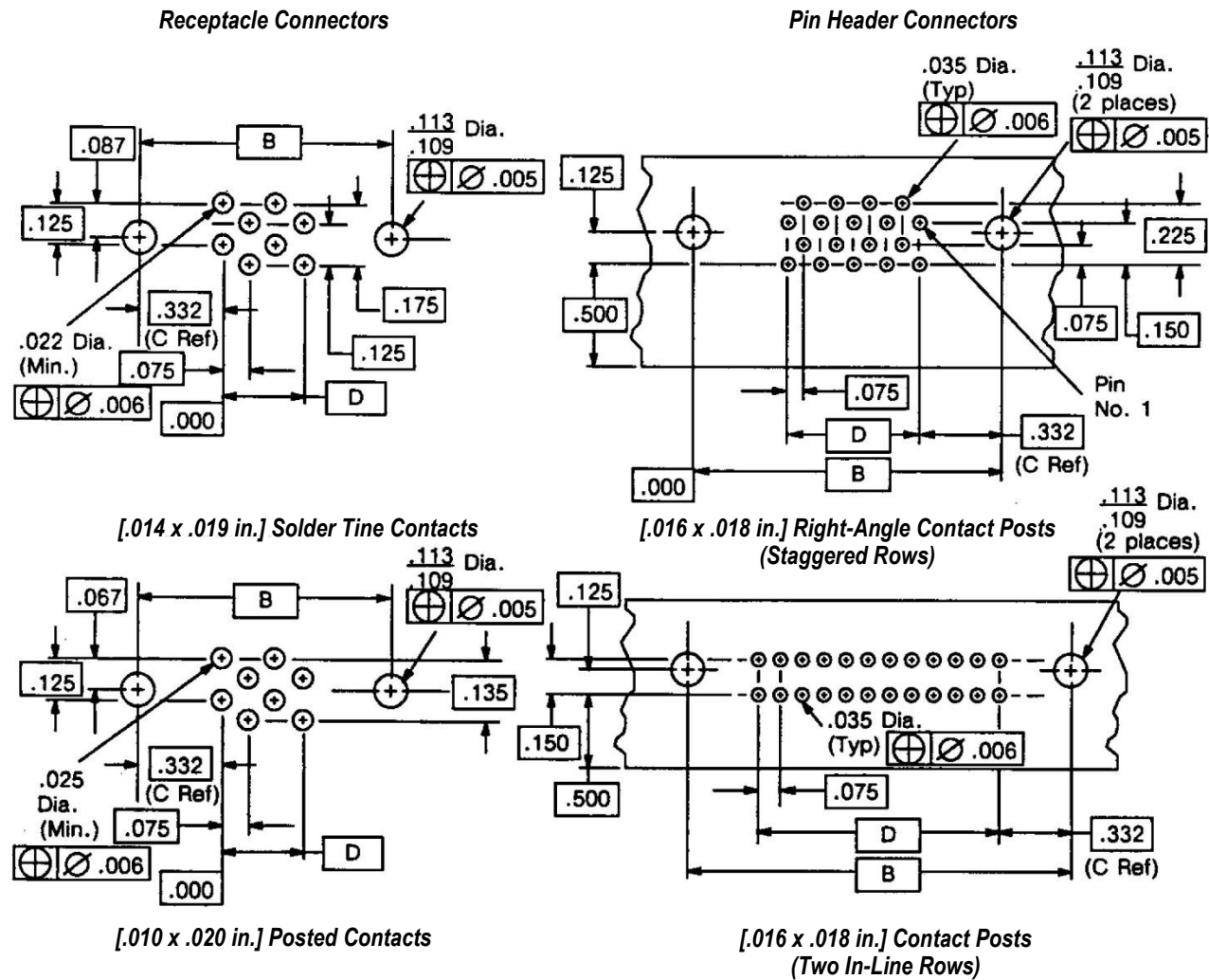
The 1.90 mm [.075 in.] centerline headers and receptacles are available with two and four rows of contact tails. The 2.54 mm [.100 in.] centerline headers and receptacles are available with two, three, or four contact tails. All solder tail contacts require precisely located holes. See Figure 3 for 1.90 mm [.075 in.] contact centerline spacing, and Figures 4 and 5 for 2.54 mm [.100 in.] centerline spacing.



NOTE

The letters used in the layouts coincide with our customer drawing layouts to avoid confusion when working with both layouts. The letter "A", representing overall length on the customer drawing was not used on this document.

NOTE: All layouts shown are the component side of the pc board.



Refer to specific layout above and the following formulas for dimensions B and D.

B = Dimension "D" plus two times Dimension "C" [.332 in.].

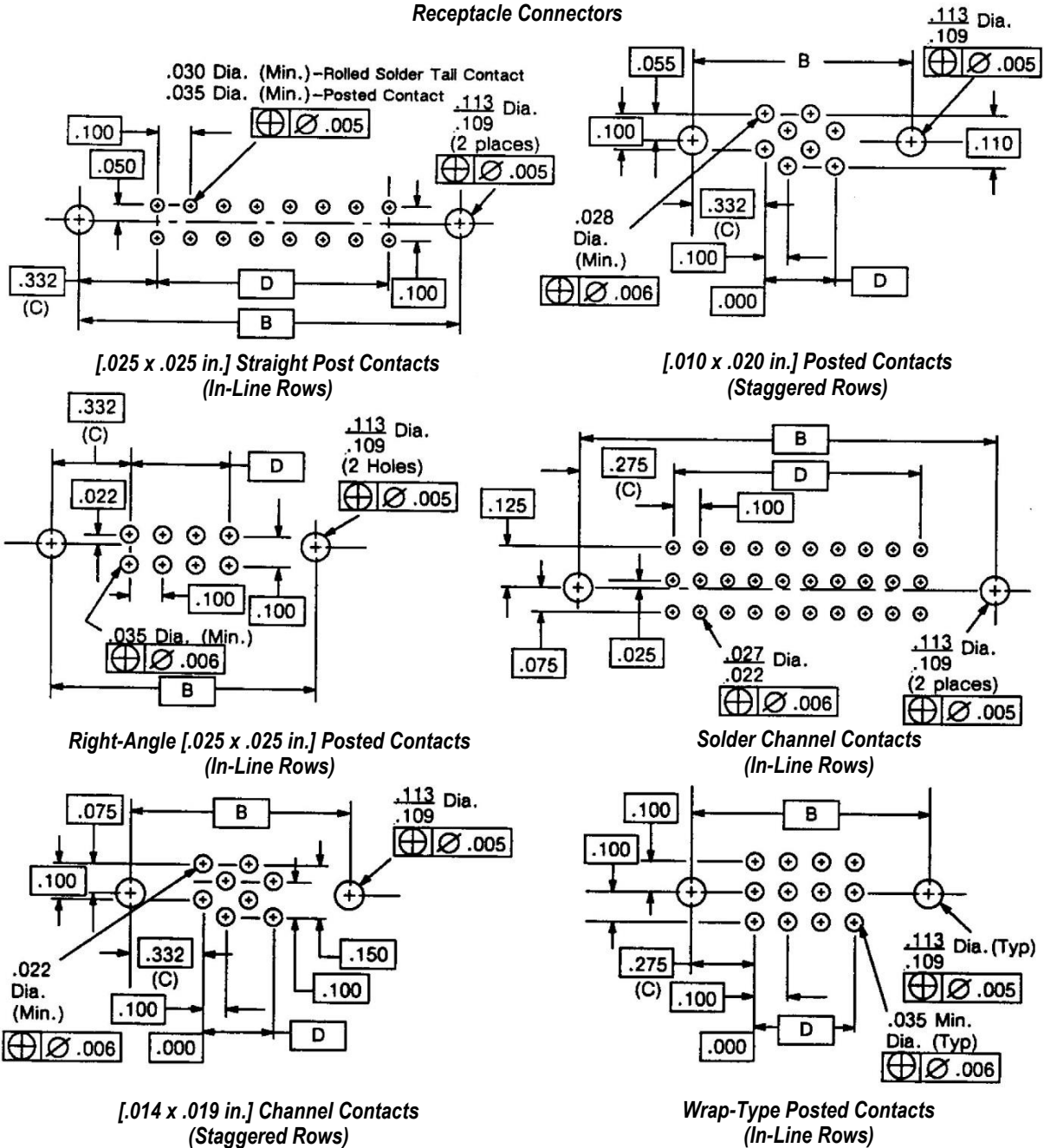
C = Dimension from end position to mounting hole.

D = The number of in-row positions, minus one position, times [.075 in.].

Figure 3

NOTE: All layouts shown are the component side of the pc board.

Receptacle Connectors



Refer to specific layout above and the following formulas for dimensions B and D.

B = Dimension "D" plus two times Dimension "C".

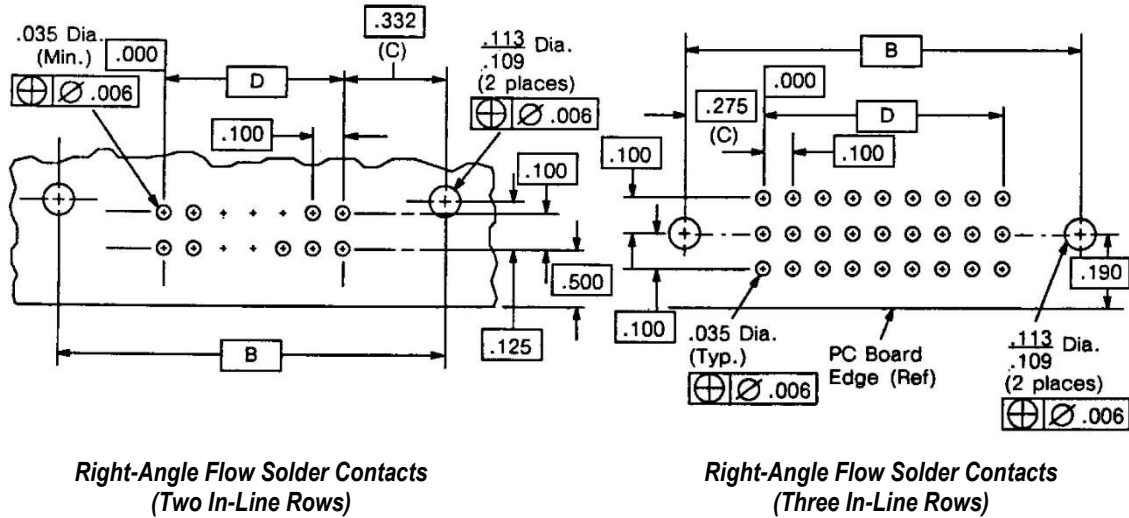
C = Dimension from end position to mounting hole.

D = The number of in-row positions, minus one position, times [.100 in.].

Figure 4

NOTE: All layouts shown are the component side of the pc board.

Pin Header Connectors



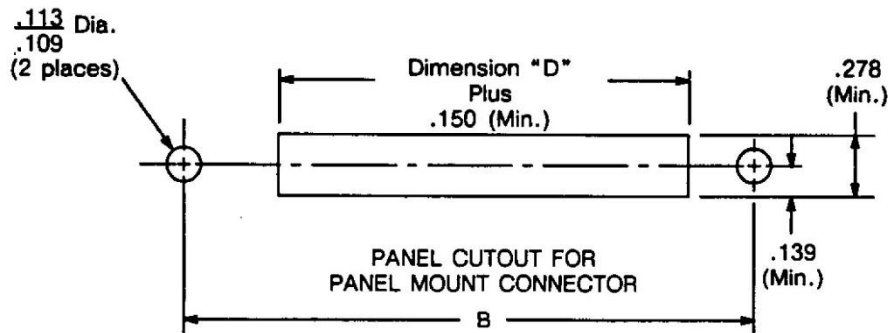
Refer to specific layout above and the following formulas for dimensions B and D.

- B = Dimension "D" plus two times Dimension "C".
- C = Dimension from end position to mounting hole.
- D = The number of in-row positions, minus one position, times [.100 in.].

Figure 5

3.4. Panel-Mounting

Front panel-mounting is recommended to provide mating and unmating. Figure 6 provides panel cutout dimensions.



Refer to specific connector pc board (Figure 3, 4, or 5) for dimensions B and D.

Figure 6

3.5. Limitations

Refer to Product Specification 108-9003 for testing procedures and any limitations that may apply to these headers and receptacles.

3.6. Polarization and Keying

Each header and receptacle has a polarizing design that ensures proper orientation for mating. When more than one header and receptacle of the same configuration is used in an area, they can be keyed to prevent mis-mating. Keying sleeves are available for internal keying of 2.54 mm [.100 in.] headers and receptacles with staggered contact positions. Keying kits are available for external keying of headers and receptacles with octagonal keying cavities. See Figure 7.

i **NOTE**
 Pin headers are designed for rivet-type keying and receptacles are designed for screw-type keying.

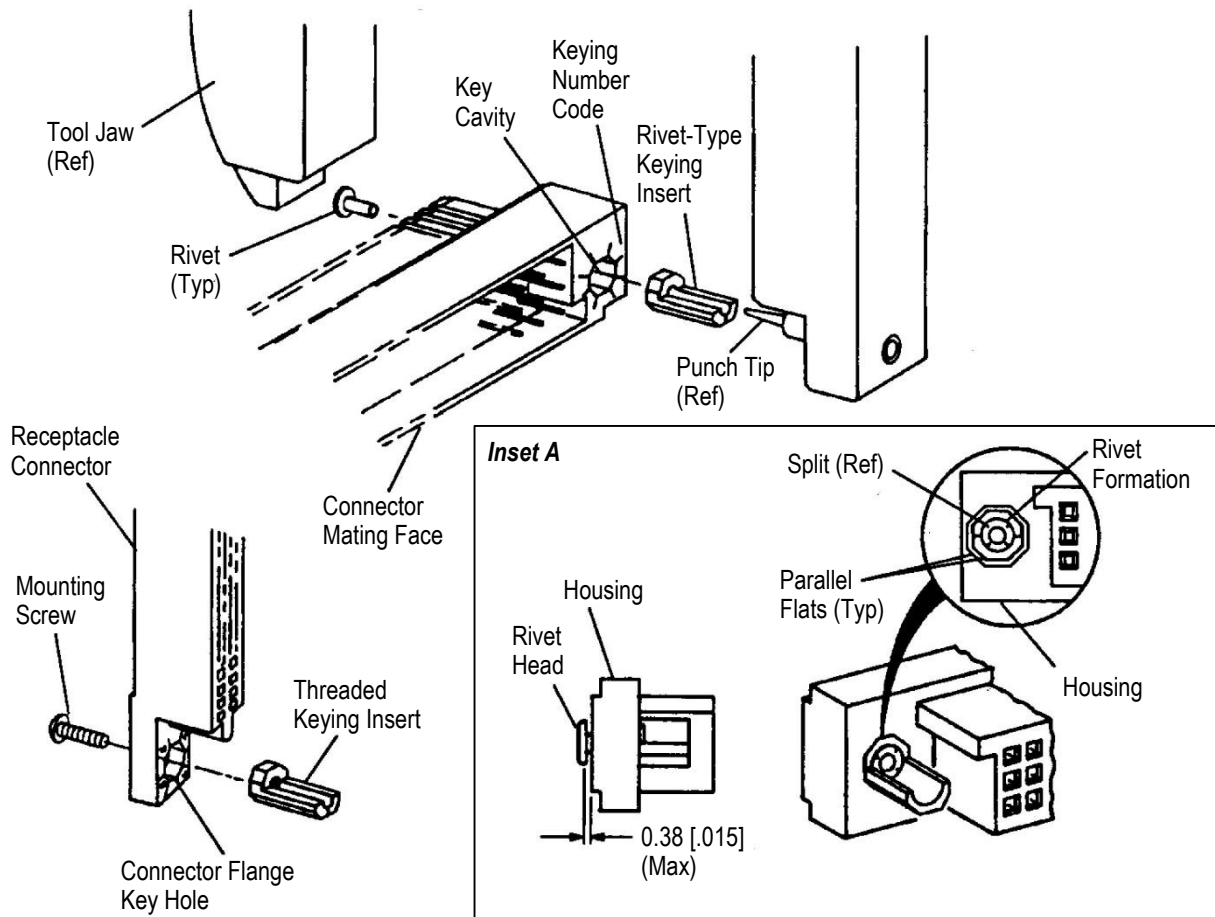


Figure 7

Keys must be installed properly to ensure mating of the headers and receptacles. See Inset A, Figure 7.

1. The rivet formation may have a maximum of four splits. None of the split lengths should exceed 50% of the formation length.
2. The flat sides of the key must be parallel to the flat sides in the housing.
3. The space between the rivet head and housing may not exceed 0.38 mm [.015 in.].

3.7. Hardware (See Figure 8)

A. Commercially Available Hardware

Commercially available 2-56 screws, lockwashers, and nuts are recommended for securing headers and receptacles to the pc boards.

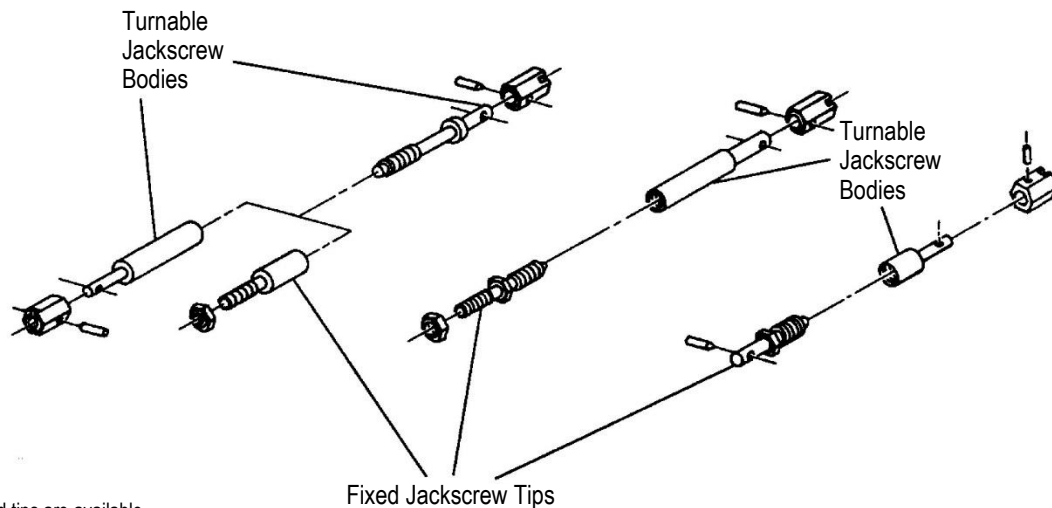
B. Jackscrew Assemblies

A variety of TE Fixed and Turnable Jackscrew Assemblies have been designed to accommodate the various styles of headers and receptacles. These assemblies provide a means of locking mated free-hanging and panel-mount headers and receptacles. Some typical components are shown in Figure 8. Refer to the instruction sheets packaged with the jackscrews for assembly procedure.



NOTE

Jackscrews cannot be used when external keying is used.



NOTE: All bodies and tips are available with either internal or external threads.

Figure 8

3.8. Contact Extraction

Headers and receptacles with damaged straight-through contacts can be repaired by removing the damaged contact and replacing it with a new one. Right-angle contacts are permanently retained in the housing. Damage to a contact will necessitate the replacement of the header or receptacle.

A. Solder and Wrap-Type Contacts

Socket contacts are released from the back of the contact cavity and pin contacts are released from the front of the contact cavity. Refer to Section 5, TOOLING for tooling information.

B. Crimp-Type Contacts

Pin and socket contacts are released and removed through the back of the connector.

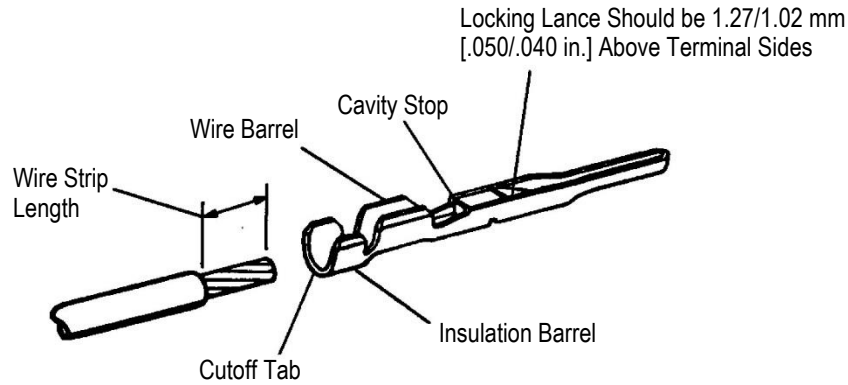
3.9. Crimp-Type Contacts (For 2.54 mm [.100 in.] Centerline Receptacle Connectors Only)

A. Selection

Crimp contacts are designed for stranded wires of the sizes and insulation ranges provided in Figure 9. The table provides the wire strip length, and the crimp height and crimp width ranges for hand tool and heavy-duty applicator automatic machine application.

B. Contact Locking Lance and Cavity Stop

The highest point of the contact locking lance should be as indicated in Figure 9 to ensure that it will engage the recess inside the contact cavity. The cavity stop should also be level with the sides to prevent over-insertion into the contact cavity. Inspection of several uncrimped contacts will provide the required visual appearance before and after crimping.



CONTACT AND WIRE RANGE (AWG)	WIRE			WIRE BARREL CRIMP HEIGHT AND WIDTH				CRIMPED WIRE TENSILE STRENGTH
	SIZE (AWG)	DIAMETER (MAX)	STRIP LENGTH	APPLICATOR 466625-3		HAND TOOL 2217745-1		
				HEIGHT	WIDTH	HEIGHT ±0.05 [.002]	WIDTH (REF)	
530750 22-26	22	1.17-1.37 [.046-.054]	3.56 [.140]	0.91 [.036]	1.07 [.042]	0.76 [.030]	1.07 [.042]	49 N [11lb-in.]
	24	1.02-1.22 [.040-.048]	3.56 [.140]	0.86 [.034]	1.07 [.042]	0.76 [.030]	1.07 [.042]	31 N [7 lb-in.]7
	26	0.89-1.24 [.035-.049]	3.56 [.140]	0.76 [.030]	1.07 [.042]	0.76 [.030]	1.07 [.042]	20 N [4 lb-in.]4

Figure 9

C. Contact Crimp and Tensile Strength

The crimp applied to the wire barrel portion of a contact is the most compressed area and is the most critical to ensure optimum performance and tensile strength of a termination. The effective length shall be 2.16 mm [.085 in.] minimum (excluding bellmouths) over the length of the wire barrel. See Figure 9.

The wire barrel will be crimped in the “F” crimp configuration where the ends of the wire barrel are turned inward and the insulation barrel will be crimped to the “O” crimp configuration where the ends of the insulation barrel will butt against each other. See Figure 9 for crimp dimensions.

D. Contact Cutoff Tab

Cutoff tab length shall not exceed 0.25 mm [.010 in.] and cutoff burr shall not exceed 0.08 mm [.003 in.].

E. Bellmouth

A rear bellmouth will appear due to extrusion of the contact metal during termination. It may be 0.13 mm [.005 in.] minimum with a height of 0.38 mm [.015 in.] maximum.

F. Wire Barrel Seam

The wire barrel shall be completely closed with no protruding wire strands. Crimp flash along the sides of the wire barrel that are caused by the crimp pressure and allowable tolerances in the tool shall not exceed 0.13 mm [.005 in.].

G. Conductor Location

The conductor of the wire may be flush to 0.38 mm [.015 in.] protrusion from the front of the wire barrel. Both insulation and conductor should be visible in the transition area between the insulation and the wire barrel. No insulation may be crimped in the wire barrel.

H. Vertical and Horizontal Straightness

Contacts must be straight and aligned within tolerances shown in Figure 10.

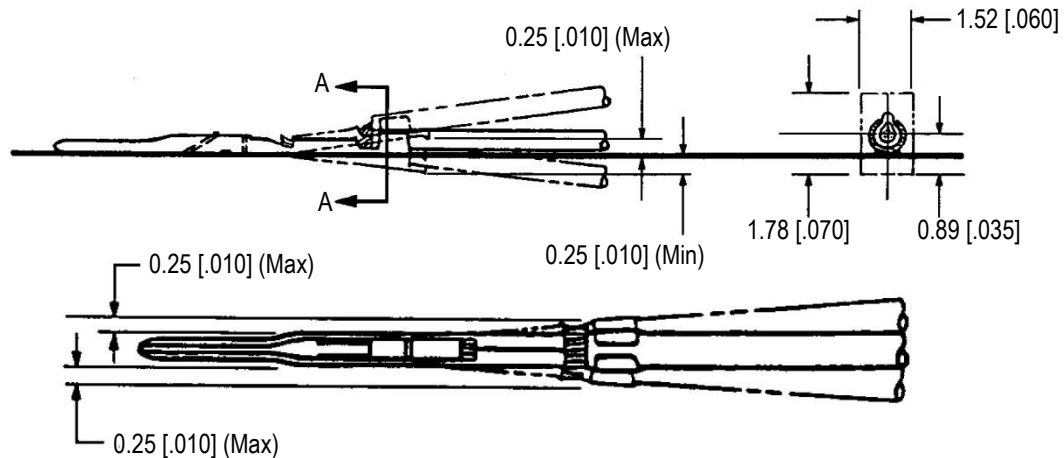


Figure 10

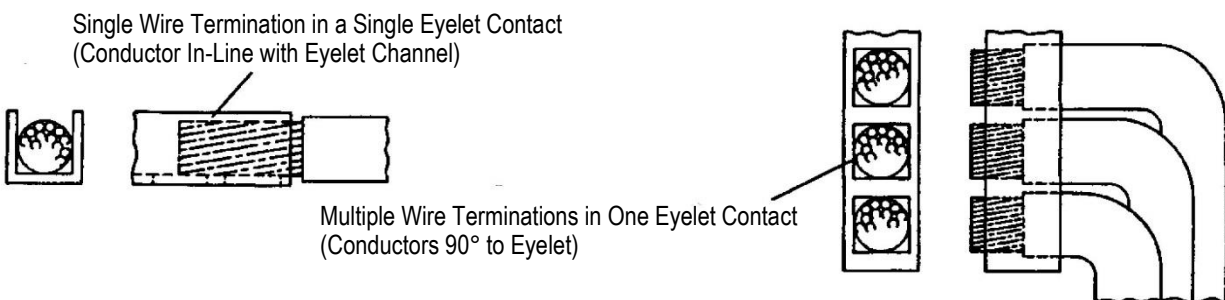
I. Twist or Roll

The vertical center of the crimp barrels should be in alignment with the vertical center of the mating end of the contact and the horizontal center should be 0.89 mm [.035 in.] above the contact base line. See Figure 10.

3.10. Soldering

A. Solder Eyelet Contacts

The contacts are designed for single wire or multiple wire terminations with soldering of each wire being done by a hand soldering technique. When only a single wire is used in a single contact, the wire conductor should be placed lengthwise in the contact channel and soldered into position. When multiple wires are to be attached to a single contact, the wires should be bent to the correct position BEFORE placing the conductors in the solder eyelet. See Figure 11.



NOTE: Dress Wires BEFORE Soldering.

Figure 11

B. Solder Tine Contacts

Headers and receptacles with solder tine contacts can be mounted and secured to a pc board by hand, wave, or flow soldering techniques.



NOTE

Right-angle pin headers with three rows of contacts have a shroud that extends beyond the board edge as indicated in Figure 12. The exposed portion must be protected from the solder when wave soldering is used. TE recommends one of two methods that utilizes fluoropolymer based material.

1. Application of fluoropolymer backed adhesive tape (KAPTON No. 54123) over the mating ace and the exposed area of the housing prior to soldering.
2. Use of the cover 445207-1 will protect surfaces exposed to infrared preheat and solder wave elements. Advantages of this method are: (1) ease of installation, and (2) repeated use.

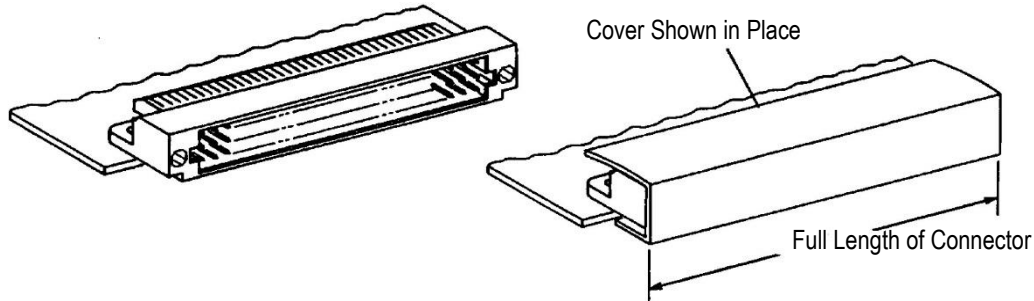


Figure 12

C. Flux Selection (Figure 13)

Contact solder tails must be fluxed prior to soldering with a mildly active, rosin base flux. Selection of the flux will depend on the type of pc board and other components mounted on the board. Additionally, the flux must be compatible with the wave solder line, manufacturing, health, and safety requirements.

TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			ALPHA	KESTER
RMA	Mild	Noncorrosive	611	186

Figure 13

D. Process

The connectors can be soldered using wave soldering or equivalent soldering techniques. Manual 402-40 provides guidelines for establishing soldering practices. The temperature and exposure time shall be as specified in Figure 14.

SOLDERING PROCESS	TEMPERATURE	TIME (At Max Temperature)
Wave	260°C [500°F] (Wave Temperature)	5 Seconds

Figure 14

E. Cleaning

After soldering, removal of fluxes, residues, an activators is necessary. Consult with the supplier of the solder and flux for recommended cleaning solvents. Cleaners must be free of dissolved flux and other contaminants. Common cleaning solvents with times and temperatures that will not affect these connectors is specified in Figure 15.

It is recommended that cleaning takes place with the pc board on its edge. If using an aqueous cleaner, it is recommended using standard equipment such as a soak-tank or an automatic in-line machine.



DANGER

Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Refer to the manufacturer's Material Safety Data Sheet (MSDS) for characteristics and handling of cleaners. Trichloroethylene and Methylene Chloride is not recommended because of harmful occupational and environmental effects. Both are carcinogenic (cancer-causing).

KAPTON, ALPHA, and KESTER are trademarks of their respective owners.

CLEANER		TIME (Minutes)	TEMPERATURE (Max)
NAME	TYPE		
ALPHA 2110	Aqueous	1	132°C [270°F]
BIOACT EC-7	Solvent	5	100°C [212°F]
Butyl CARBITOL	Solvent	1	Ambient Room
Isopropyl Alcohol	Solvent	5	100°C [212°F]
KESTER 5778	Aqueous		
KESTER 5779	Aqueous		
LONCOTERGE 520	Aqueous		
LONCOTERGE 530	Aqueous		
Terpene	Solvent		

Figure 15



NOTE

If a particular cleaning solvent is not listed, contact PRODUCT INFORMATION at the number at the bottom of page 1.

F. Drying

When drying cleaned assemblies, temperature limitations must not be exceeded: -55° to 125°C [-67° to 257°].

4. QUALIFICATION

Box Header Assemblies and Receptacle Connectors that are marked with the number M55302 are qualified to Military Specification M55302.

5. TOOLING

Hand crimping tools and mini-applicators are available for applying crimp-type contacts. Keying tools are available for applying rivet keys, and extraction tools are available for removing straight-through contacts. Instruction sheets describing tool operation are packaged with the tool. See Figure 16

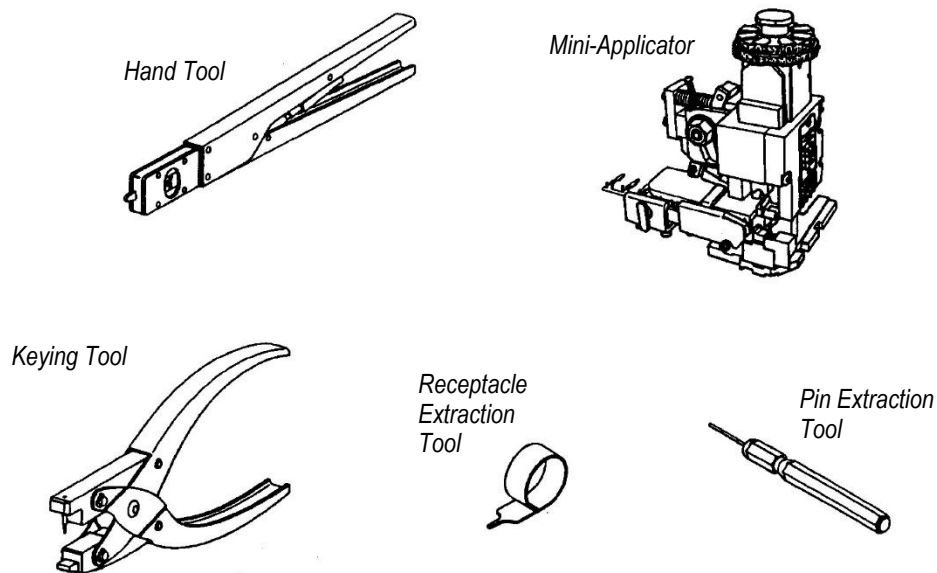


Figure 16 (cont'd)

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HAND TOOL AND APPLICATOR		
CONTACT WIRE SIZE (AWG)	HAND TOOL	APPLICATOR (DOCUMENT)
26-22	2217745-1	466625-3 (408-8040)

RIVET KEYING TOOLS		
CONNECTOR CONFIGURATION	TOOL	DOCUMENT
3-Row 2.54 mm [.100 in.]●	91117-4	408-6627
2-Row 1.90 mm [.075 in.] & 2.54 mm [.100 in.]	91117-1	408-7803
3-Row 1.90 mm [.075 in.] & 2.54 mm [.100 in.]	91117-3	408-6626

EXTRACTION TOOLS		
CONTACT TYPE	TOOL	DOCUMENT
Pin	91156-1	408-6660
Receptacle	91035-1	408-7328

●For guide pin keying inserts only.

Figure 16 (end)

6. VISUAL AID

The illustration below shows a typical application of this product. This illustration should be used by production personnel to ensure a correctly applied product. Applications which do not appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.

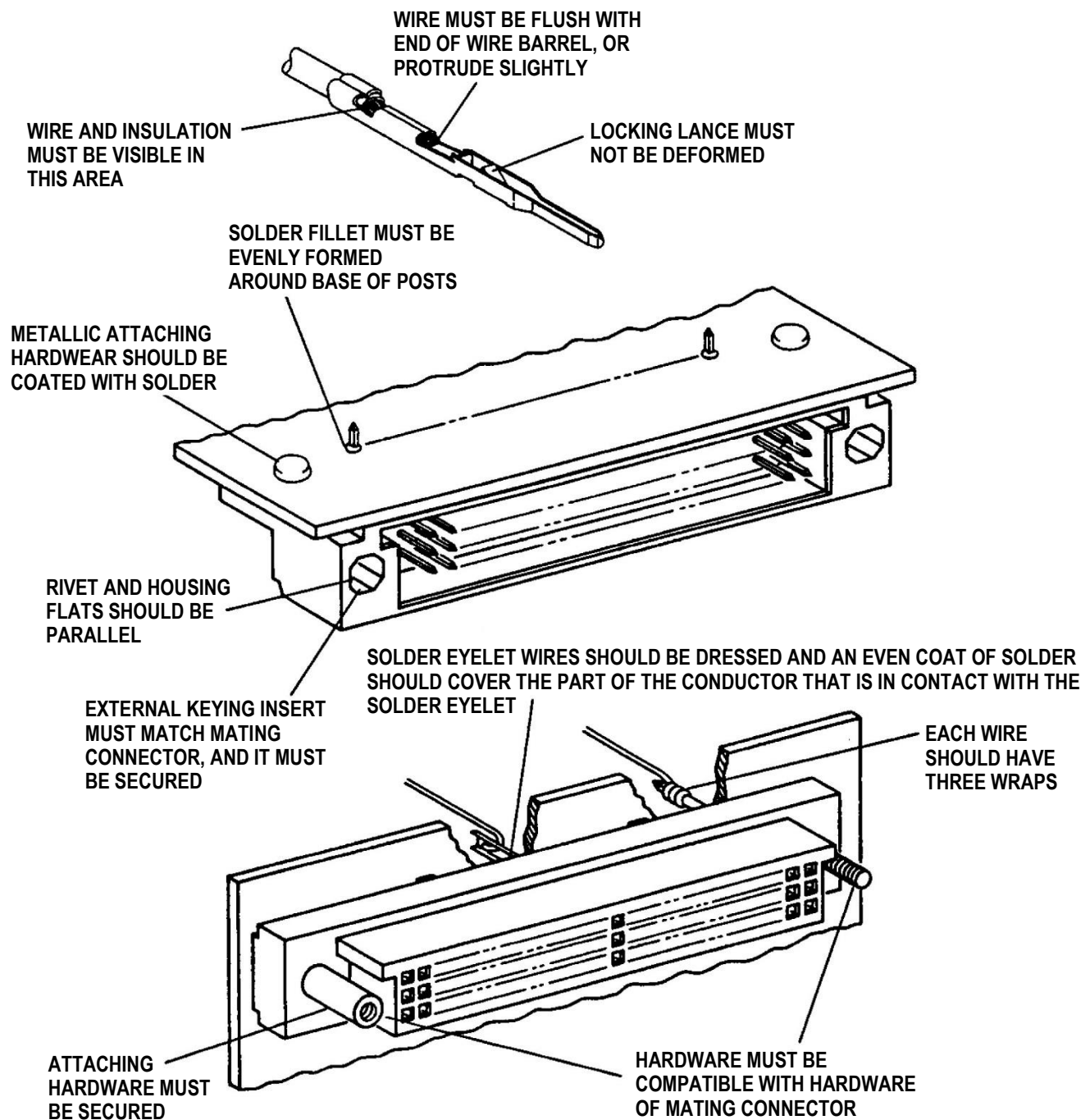


FIGURE 17. VISUAL AID