



**NOTE**

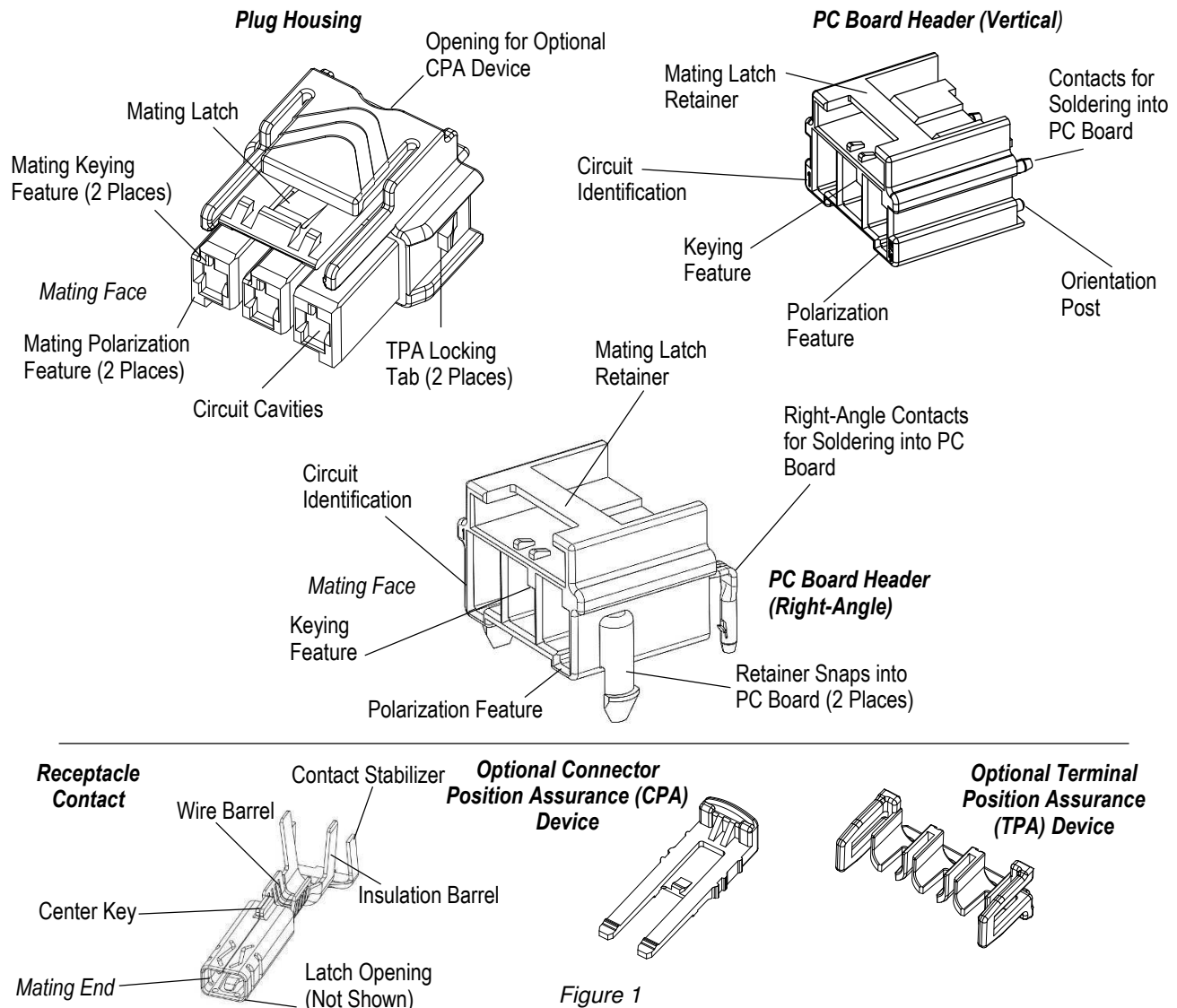
All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters. Unless otherwise specified, dimensions have a tolerance of  $\pm 0.13$  mm and angles have a tolerance of  $\pm 2^\circ$ . Figures and illustrations are for identification only and are not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

**1. INTRODUCTION**

This specification covers the requirements for application of the POWER TRIPLE LOCK\* (PTL) PC Board Header. The connector system consists of a plug housing that accepts receptacle contacts and a header assembly containing tab contacts. The housings have two through five positions with a centerline spacing of 6.0 mm and are available in vertical and right-angle configurations for soldering onto a PC Board.

Optional connector position assurance (CPA) device and terminal position assurance (TPA) device are available to install onto the housing. These devices provide added security to ensure that the mated housings remain together and ensure proper contact insertion and retention in the circuit cavities. The CPA device prevents the plug housing mating latch from being accidentally depressed.

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



The housing features contact cavities each having a keying feature, mating polarization feature, a mating latch (plug) or mating latch retainer (header) that provides positive mating. The ribs surrounding the mating latch prevent wires from becoming caught underneath the latch. The polarization feature prevents mating housings of different sizes and keying configuration.

The vertical header has a plastic pin to orient it in the PC Board and the right-angle header has two retainers that snap into the PC Board and minimize the chance that it will lift off the PC Board during mating with the plug.

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

- ◆ Added VDE Certificate information

### 2.2. Customer Assistance

Reference Product Base Part Numbers 1969688 (vertical header assembly), 1969694 (right-angle header assembly), and Product Code EF11 are representative of the PTL PC Board header connector system. 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](http://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

Design Objective [108-32090](#) provides expected product performance and test results. Application Specification [114-106118](#) provides information pertaining to the assembly of the plug housing and crimping of the receptacle contact.

## 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

Vertical connectors will be loose piece bulk packaged in anti-static bags. Right-angle connectors will be shipped in plastic trays. 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.



### 3.4. Contact Hole Configuration

The contact holes in the PC Board must be prepared as specified in Figure 3.

**NOTE:** The drilled hole diameter must be sized so that the diameter of the finished hole after plating meets the dimensions as shown.

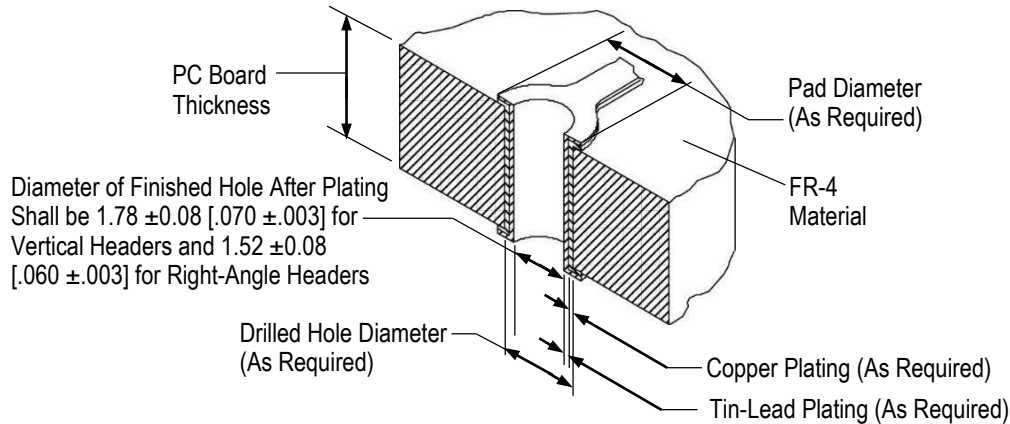


Figure 3

### 3.5. Soldering

#### A. Soldering Guidelines

PTL PC Board headers can be soldered using wave or equivalent soldering techniques. The temperatures and exposure time shall be within the ranges specified in Figure 4. We recommend using SN60 or SN62 solder for these header assemblies.

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

Figure 4



**NOTE**

Manual 402-40 provides some guidelines for establishing solder practices. Refer to Paragraph 2.4, Manuals.

#### B. Fluxing

The contact solder tines 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. Call the Product Information number at the bottom of page 1 for consideration of other types of flux. Some fluxes that are compatible with these headers are provided in Figure 5.

TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			ALPHA	KESTER
RMA (Mildly Activated)	Mild	Noncorrosive	611	18/197
Center (Activated)	Medium	May be Corrosive	711, 809, 811	1544, 1545, 1547

Figure 5

#### C. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Consult with the supplier of the solder and flux for recommended cleaning solvents. The following is a listing of common cleaning solvents that will not affect the headers. The headers will be unaffected by any of these solvents for 5 minutes at room temperature.

Cleaners must be free of dissolved flux and other contaminants. We recommend cleaning with the PC Board on its edge. If using an aqueous cleaner, we recommend standard equipment such as a soak-tank or an automatic in-line machine. See Figure 6.

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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 6



**DANGER**

Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Trichloroethylene and Methylene Chloride can be used with no harmful effect to the headers; however, TE does not recommend them because of the harmful occupational and environmental effects. Both are carcinogenic (cancer-causing) and Trichloroethylene is harmful to the earth's ozone layer.



**NOTE**

If you have a particular solvent that is not listed, contact the Product Information number at the bottom of page 1.

**D. Drying**

When drying clean assemblies and PC Boards, air drying is recommended. Temperature for the headers should not exceed 125°C [257°F] for a period of five minutes with no degradation to the connector components. Degradation could result from extreme temperatures.

**E. Checking Installed Header**

All solder joints should conform to those specified in Test Specification 109-11.

**F. Conformal Coating (Potting)**

PC Boards with PTL Vertical Headers can be encapsulated with a conformal coating provided the compound does not exceed the height shown in Figure 7.

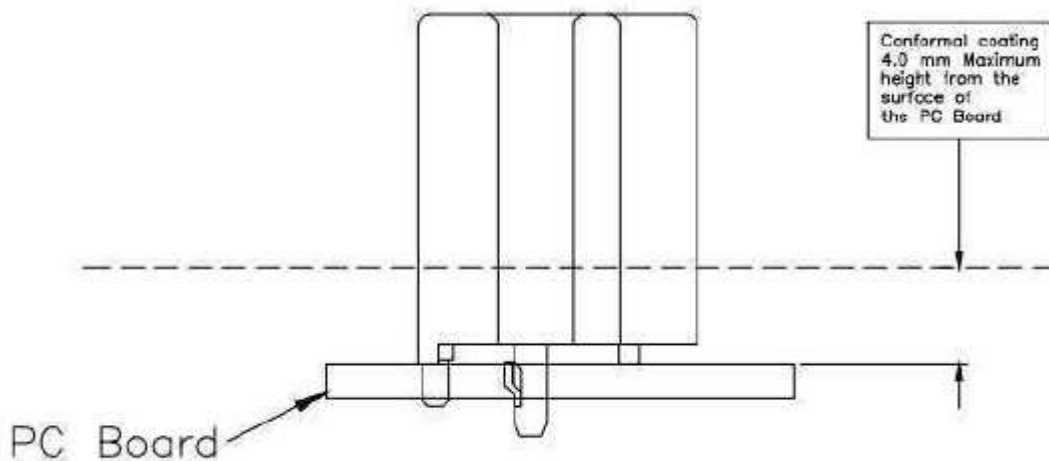


Figure 7

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### 3.6. Keying

Only plug housings and headers with identical keying configuration will mate. At this time, single row Key A and Key B headers are available. Refer to TE customer drawings for details of specific keying configurations.

### 3.7. Optional TPA and CPA Devices

An optional TPA device is available for the plug housing, and an optional CPA device is available to secure the plug housing to the header assembly.

The following requirements apply for installation (refer to Figure 8):



**NOTE**

All contacts must be inserted before the devices can be installed into the housing.

- ◆ The CPA device must be fully inserted into the opening at the top of the wire end of the plug housing until the latch engages the plug housing. There should be an audible “click”. After installation, the tips of the legs must be visible at the top of the mating face of the header housing.
- ◆ The TPA device must be installed onto the wire end of the plug housing. Refer to Application Specification 114-106118 for installation and removal.

The following requirements apply for removal (refer to Figure 8):

- ◆ The CPA device must be removed by depressing the tips of the legs, and sliding the CPA device out of the housing.

### 3.8. Mating and Unmating

The mating face of the header must align with the mating face of the plug housing, then they must be pushed together until the mating latch is secured to the latch retainer. There should be an audible “click”. Refer to Figure 8.



**CAUTION**

Once an audible click is heard, do not apply additional force when mating. To avoid damage, do not impose any force other than in-line force for mating (i.e.) no twisting, bending, or other out of plane force.

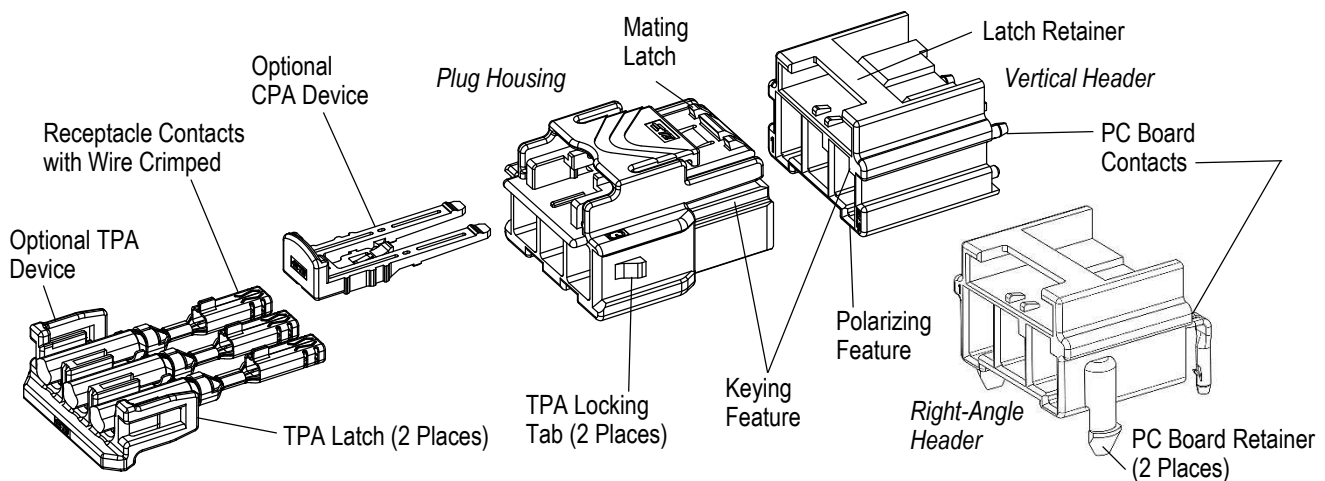


Figure 8

To unmate, if used, the CPA device must be withdrawn (but not removed). The plug housing mating latch must be depressed until it is released from the latch retainer, then the housing can be pulled straight apart.

### 3.9. Replacement and Repair

Damaged headers must be removed, discarded, and replaced with new components. If a housing or a contact in the header is damaged, the entire header requires replacement. Connected plugs must first be disconnected and removed.

**CAUTION**

*When removing connector headers from PC Boards, reasonable care should be taken to remove the headers straight and in-line in relation to the PC Boards. Improper removal could result in damage to the wires, housing, contacts, or PC Board.*

## 4. QUALIFICATION

### 4.1. Underwriters Laboratories Inc. (UL)

The PTL Header Connector System is Recognized in the Component Recognition Program of UL File No. E28476.

### 4.2. Verband der Elektrotechnik (VDE)

PTL Headers are certified by VDE per IEC 61984 in Certificate 40045889 when mated to the appropriate PTL plug housings and receptacle contacts.

## 5. TOOLING

#### ◆ Robotic Equipment

The robotic equipment must have a true position accuracy tolerance of 0.25 mm [.010 in.] to properly locate the headers for insertion. This includes gripper and fixture tolerances as well as equipment repeatability.

#### ◆ Board Supports

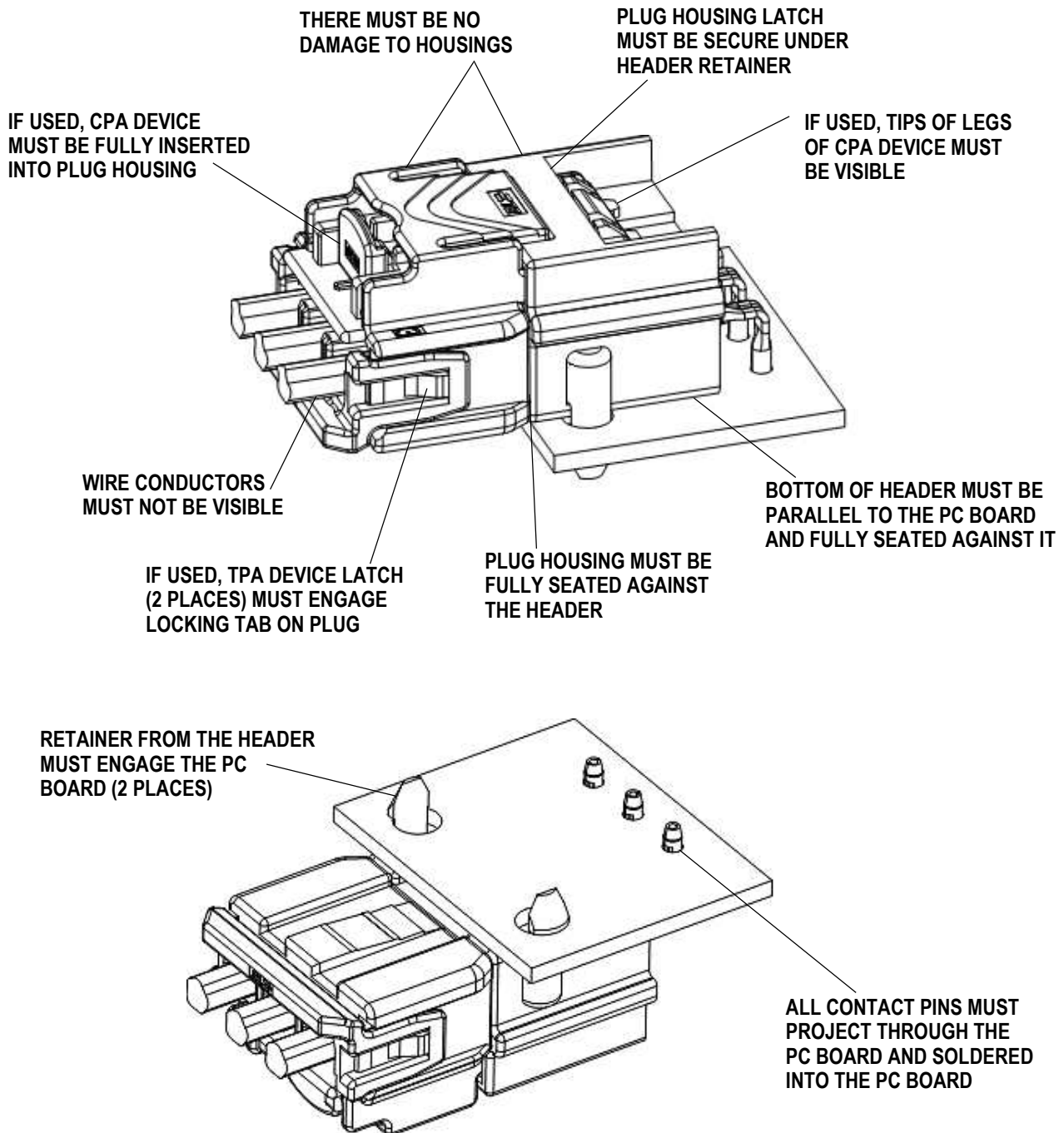
A PC Board support must be used to prevent bowing of the PC Board during the placement of a header on the Board. It should have flat surfaces with holes or a channel wide enough and deep enough to receive the contact solder tails and Board-locks or other attaching hardware during installation of the header on the Board.

#### ◆ Crimp Tools

A list of applicator and machine recommendations for crimping the receptacle contacts can be found in Application Specification 114-106118.

## 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 9. VISUAL AID**