

**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  $\pm 0.13$  [ $\pm .005$ ] 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 AMPLIMITE HD 22 Right-Angle Front Metal Shell Series 350 Connectors. The series designator is the dimension from the front of the connector flange to the center of the first solder-tail. The connectors are available with boardlocks in the mounting legs and 4-40 threaded inserts or 4-40 female screwlocks in the mounting flanges.

The connectors are available in 15, 26, 44, 62, and 78 positions, with shell sizes of 1 through 5 respectively. Each connector is marked with position numbers on the mating faces for circuit identification. The connector plugs contain pin contacts and the receptacles contain socket contacts. These pre-installed right-angle contacts have precision formed solder-tails. This document supercedes Application Specification 114-40021.

Figure 1 provides connector features and terms used throughout this specification. Use these terms when corresponding with Tyco Electronics Representatives to facilitate assistance.

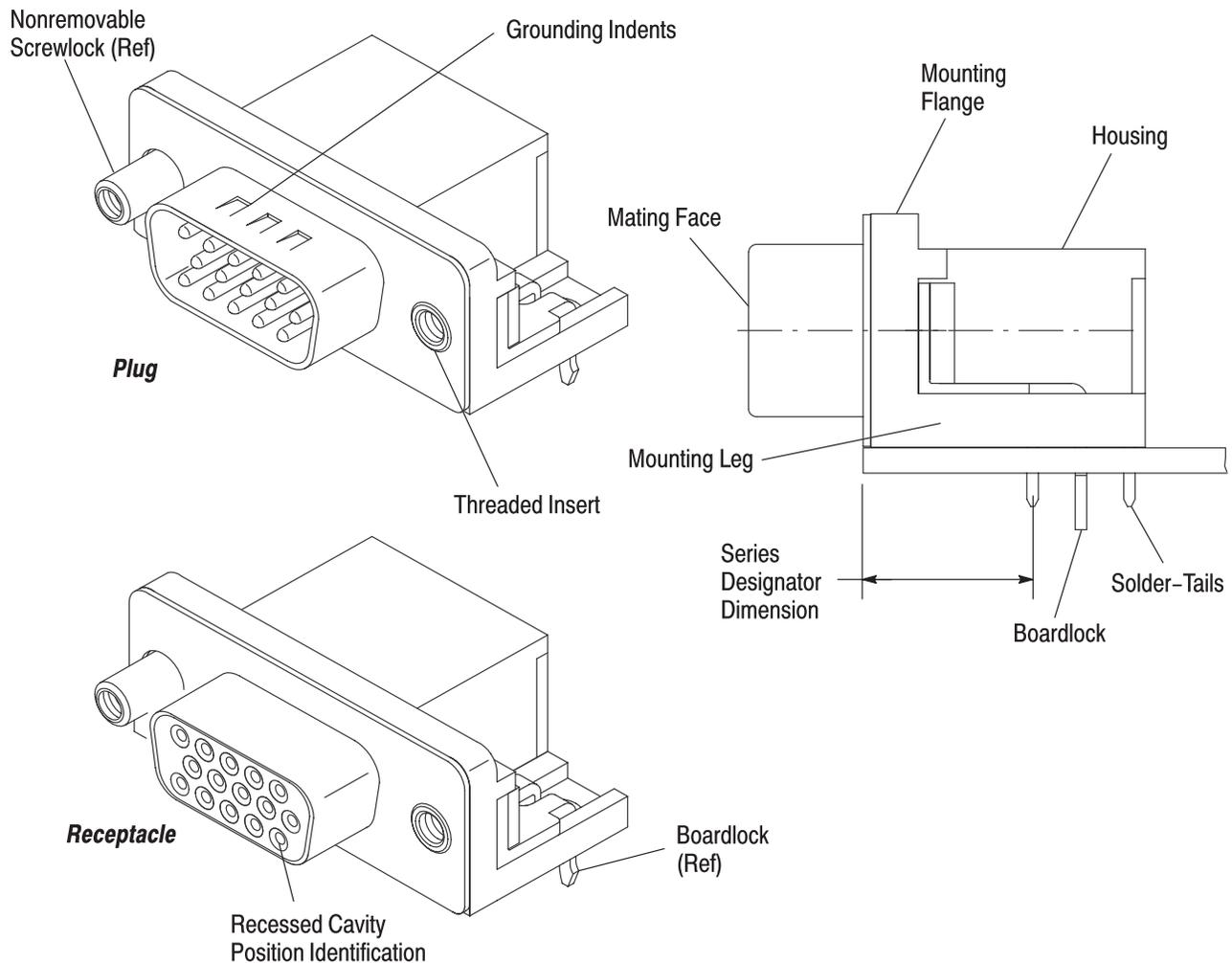


Figure 1

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

This paragraph is reserved for a revision summary covering the most recent additions and changes made to this specification which include the following:

- Initial release of document

### 2.2. Customer Assistance

Reference Base Part Number 5749771 and Product Code 4519 are representative numbers of AMPLIMITE HD 22 Right-Angle Front Metal Shell Connectors. Use of these numbers will identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local Tyco Electronics Representative or, after purchase, by calling the Tooling Assistance Center or the Product Information number at the bottom of page 1.

### 2.3. Drawings

Customer Drawings for each product part number are available from the service network. The information contained in Customer Drawings takes priority if there is a conflict with this specification or with any technical documentation supplied by Tyco Electronics.

### 2.4. Manuals

Manual 402-40 is available upon request and can be used as a guide in soldering. This manual provides information on various flux types and characteristics along 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 108-1092 provides test information and performance requirements.

## 3. REQUIREMENTS

### 3.1. Storage

#### A. Ultraviolet Light

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

#### B. Shelf Life

The connectors should remain in the shipping containers until ready for use to prevent damage. The products should be used on a first in, first out basis to avoid storage contamination that could adversely affect signal transmissions.

#### C. Chemical Exposure

Do not store connectors near any chemicals listed below, as they may cause stress corrosion cracking in the components.

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

#### NOTE



Where the above environmental conditions exist, phosphor-bronze contacts are recommended instead of brass if available.

### 3.2. Connector Shell Size

The AMPLIMITE Metal Shell Connectors shell sizes conform to industry standard sizes. A composite of comparable receptacle configurations is provided in Figure 2.

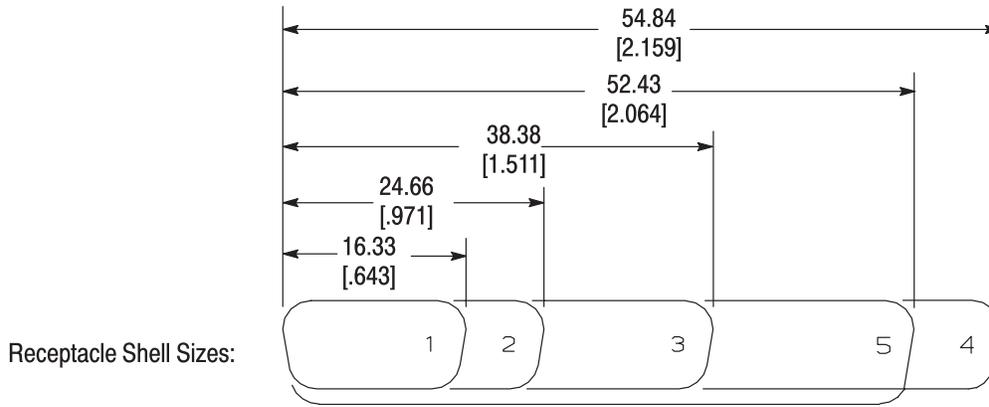
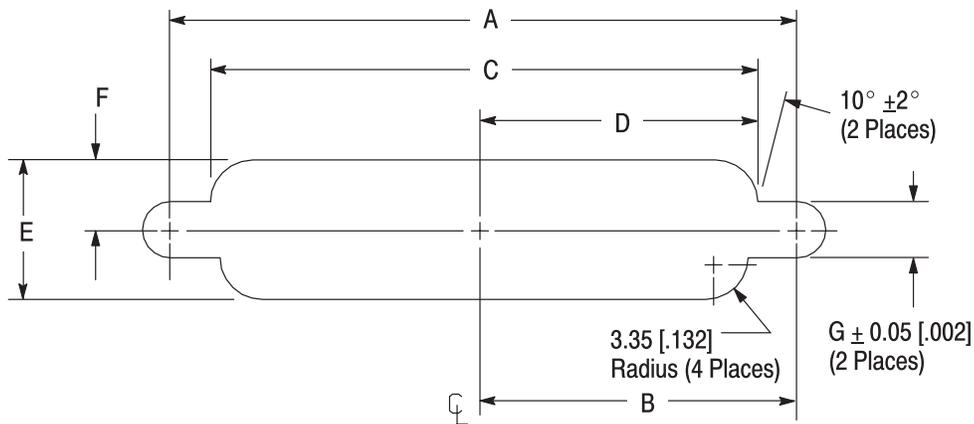


Figure 2

**3.3. Mounting Panel Cutout**

Panel mounting is optional for AMPLIMITE HD 22 Right-Angle Front Metal Shell Connectors. For pc board connectors, it will provide additional support for the solder joints during mating and unmating. PC board connectors can ONLY be rear mounted. Either front or rear mounting is acceptable for the cable connector. The connector mounting flanges may have 4-40 internal threads that will accept screwlocks or panel mounting hardware. Hardware attached to the connector flange shall be tightened to 0.45 N•m (4 in-lb) maximum. See Figure 3 for panel cutout dimensions.

Screwlocks are designed to secure a connector to a panel 1.58 mm [.062 in.] thick. They can be used with thinner panels; however, washers are recommended to make up the thickness difference and provide a bottoming surface for the mating connector flange. Screwlocks should be tightened to a torque of 0.45 N•m (4 in-lb) maximum. The 4-40 internal threads in the screwlocks will accept commercially available screws and jackscrews.



CONN SHELL SIZE	DIMENSIONS							G	
	A	B	C	D	E	F	WITH SCREWLOCKS	WITHOUT SCREWLOCKS	
	1	24.99 [.984]	12.50 [.492]	20.47 [.806]	10.24 [.403]	11.40 [.449]	5.72 [.225]	5.74 [.226]	3.05 [.120]
2	33.32 [1.312]	16.66 [.656]	28.80 [1.134]	14.40 [.567]	11.40 [.449]	5.72 [.225]			
3	47.04 [1.852]	23.52 [.926]	42.52 [1.674]	21.26 [.837]	11.40 [.449]	5.72 [.225]			
4	63.50 [2.500]	31.75 [1.250]	59.08 [2.326]	29.54 [1.163]	11.40 [.449]	5.72 [.225]			
5	61.11 [2.406]	30.56 [1.203]	56.34 [2.218]	28.17 [1.109]	14.10 [.555]	7.06 [.278]			

Figure 3

**3.4. Mating Dimension**

**A. Pin-to-Socket**

The mating pin configuration must be in accordance with Military Specification MIL-C-39029. See Figure 4, View A, for dimensions.

**B. Connector-to-Connector**

The dimension in Figure 4, View B, is required to ensure full mating of connectors. This dimension must be considered when determining the method of mounting and the thickness of a panel when the connector is to be panel-mounted.

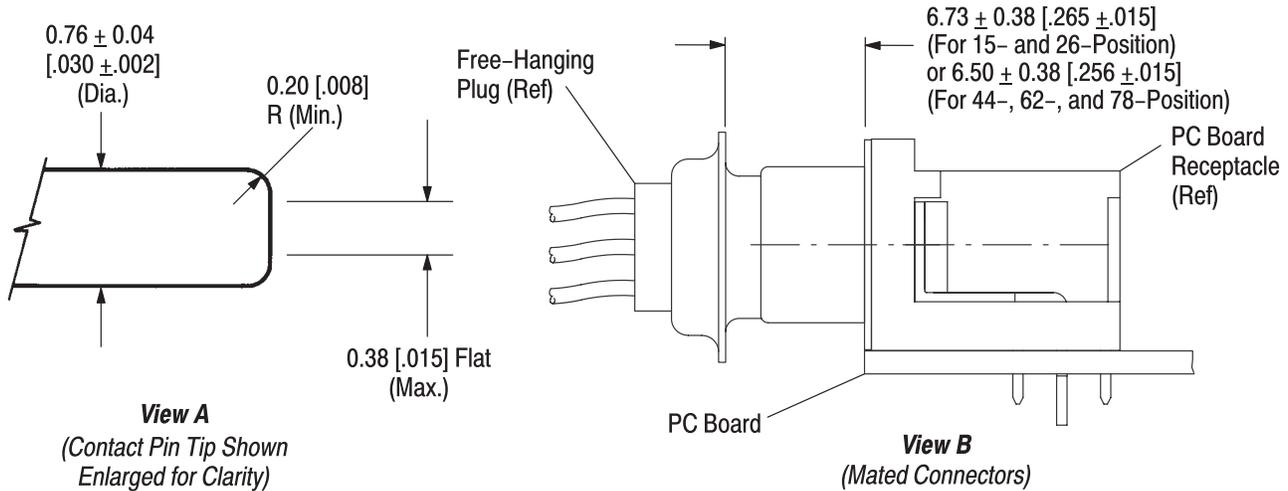


Figure 4

**3.5. Connector Spacing**

Care must be used to avoid interference between adjacent connectors and/or other components. The dimension is dependent on variable hardware used and the clearance required for mating connectors. The information provided in Figure 5 is to ensure proper mating for manual placement of connectors.

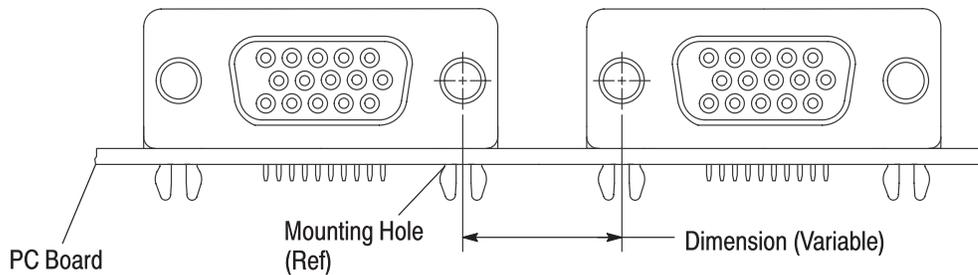


Figure 5

**3.6. PC Boards**

**A. Material and Thickness**

1. Board material will be glass epoxy (FR-4, G-10).
2. Board thickness shall be 1.57 mm [0.062 in.] for AMPLIMITE HD 22 Right-Angle Front Metal Shell Connectors with boardlocks.

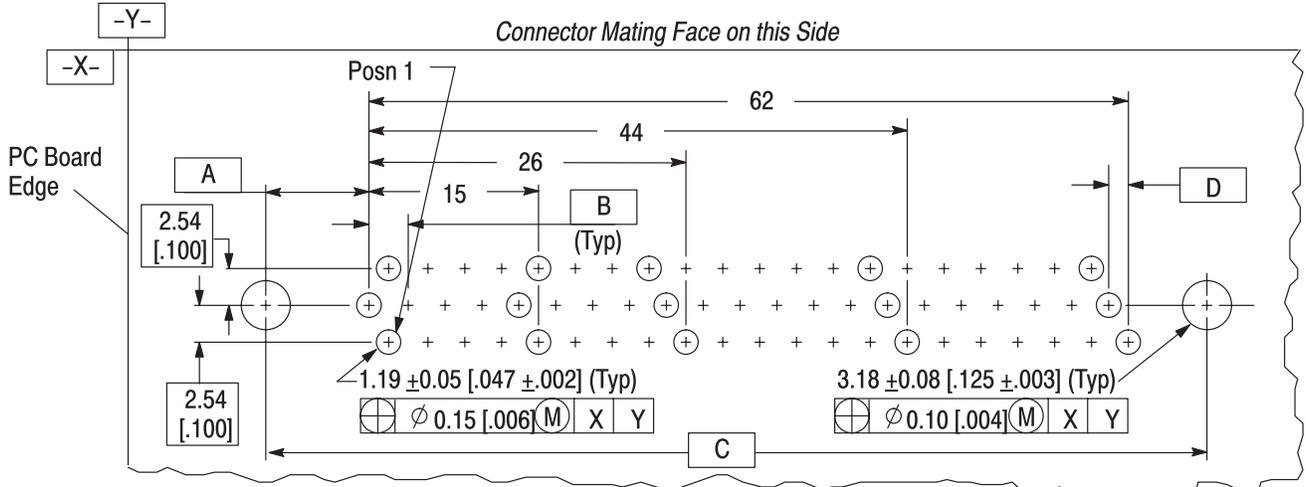
Contact the Product Information Center or the Tooling Assistance Center number listed at the bottom of page 1 for suitability of other board materials or thicknesses.

**B. Tolerance**

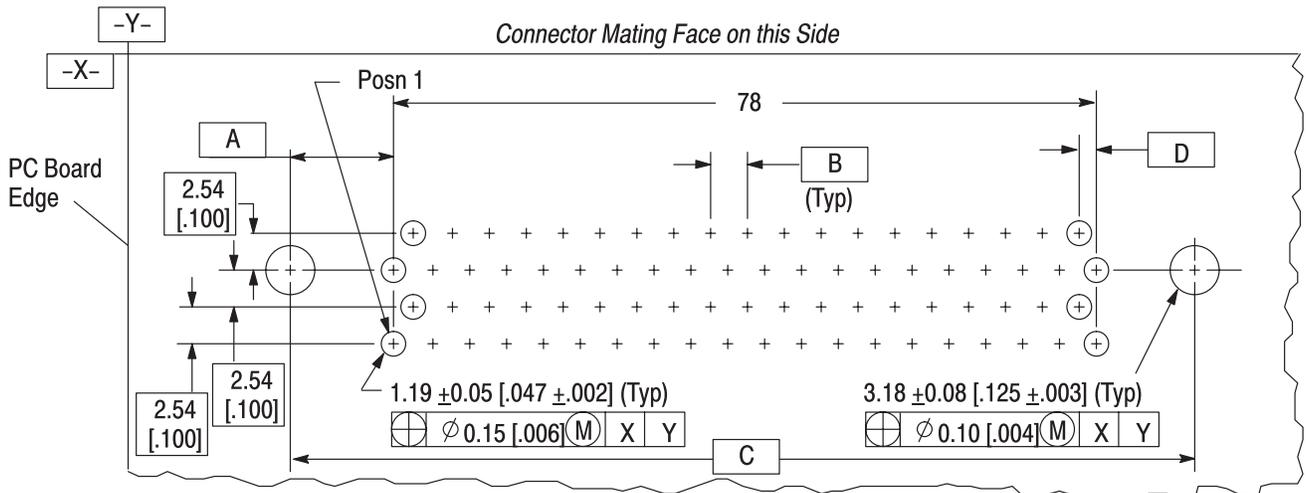
Maximum allowable bow of the pc board shall be 0.03 mm [0.001 in.] over the length of the connector.

**C. PC Board Layout**

The mounting and contact holes in the pc board must be precisely located to ensure proper placement and optimum performance of the connector. The connectors can be placed on the pc board manually. The following dimensions must be observed when preparing a pc board for AMPLIMITE HD 22 Right-Angle Front Metal Shell Connectors. See Figure 6.



**Layout for 15, 26, 44, and 62 Position Connectors**



**Layout for 78 Position Connectors**

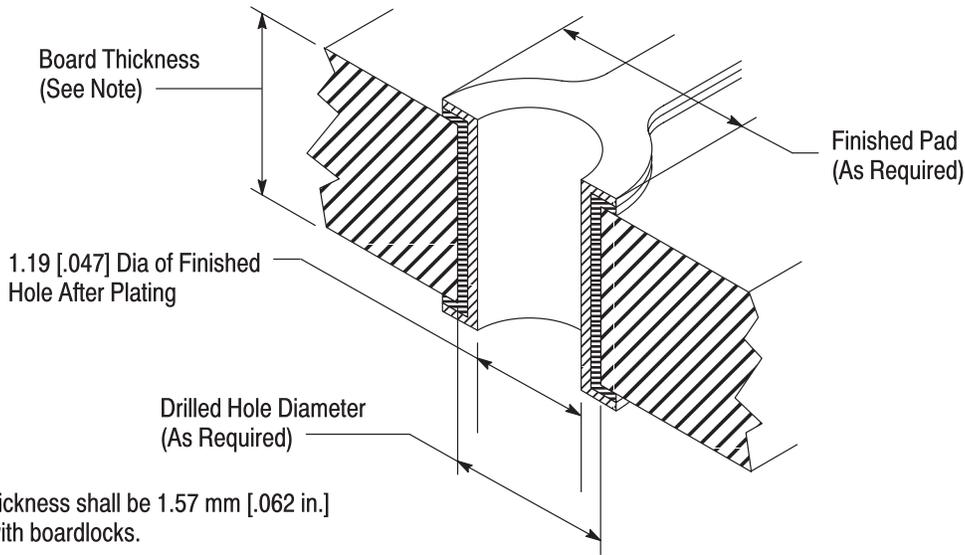
CONNECTOR		DIMENSIONS			
SHELL SIZE	POSITIONS	A	B	C	D
1	15	7.04 [.277]	2.29 [.090]	24.99 [.984]	1.14 [.045]
2	26	6.88 [.271]	2.29 [.090]	33.32 [1.312]	1.14 [.045]
3	44	6.88 [.271]	2.29 [.090]	47.04 [1.852]	1.14 [.045]
4	62	7.01 [.276]	2.41 [.095]	63.50 [2.500]	1.22 [.048]
5	78	7.65 [.301]	2.41 [.095]	61.11 [2.406]	1.22 [.048]

**NOTE:** The pc board layout shown is for receptacle connectors. The pc board layout for plug connectors is a mirror image of the layout shown.

Figure 6

**3.7. PC Board Solder-Tail Holes**

These connectors may be used with or without plated through holes. If plated, the drilled hole size, plating types, and plating thickness are dependent on your application requirements. The finished hole size must be as stated to provide unrestricted insertion and ensure adequate application of solder to the tails. See Figure 7.



**NOTE:** Board thickness shall be 1.57 mm [.062 in.] for connectors with boardlocks.

Figure 7

**3.8. Limitations**

Use the Product Specification referenced in Paragraph 2.5 for test procedures regarding these connectors.

**3.9. Polarizing and Keying**

The keystone configuration of each connector mating face prohibits the accidental inversion of mating connectors. To further reduce the possibility of incorrect mating of similar plug connectors, a keying plug may be placed in the receptacle connector. See Figure 8.

**NOTE** *If a keying plug is used, the pin cavity in the mating plug connector must be empty.*

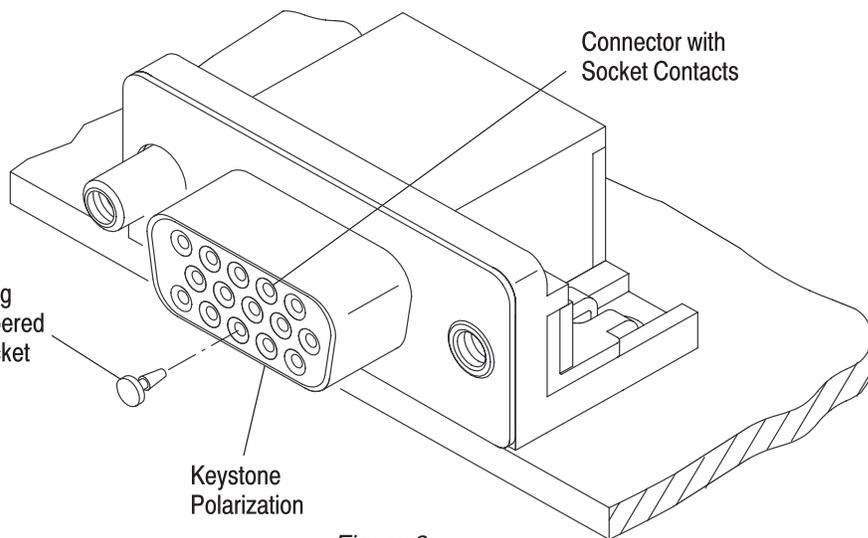


Figure 8

**3.10. PC Board Connectors**

The boardlocks in these connectors have gripping shoulders that pass through the pc board at the same time the contact solder-tails are inserted through the board. They lock into position when the housing is seated on the board. The initial insertion and extraction forces are: 62 N [14 pounds] maximum for insertion and 13 N [3 pounds] minimum for extraction.

**3.11. Ancillary Items**

These connectors have been designed to be used with commercially available mating hardware with 4-40 threads. If you are designing a connector for a system requiring some special type of hardware, contact the Product Information number on page 1 for design assistance. See Figure 9.

**A. Screwlocks and Threaded Inserts**

Nonremovable screwlocks or threaded inserts provide a means of securing mating connectors with commercially available 4-40 threaded hardware. The torque limit for screwlocks attached to threaded inserts is 0.45 N•m [4 in-lb] applied from the mating face side. The maximum pushout force is 89 N [20 lb-force] applied from the mating face side.

**B. Attaching Hardware**

Commercially available jackscrews and retaining screws are recommended for securing mating connectors. They should be torqued to 0.23 N•m [2 in-lb].

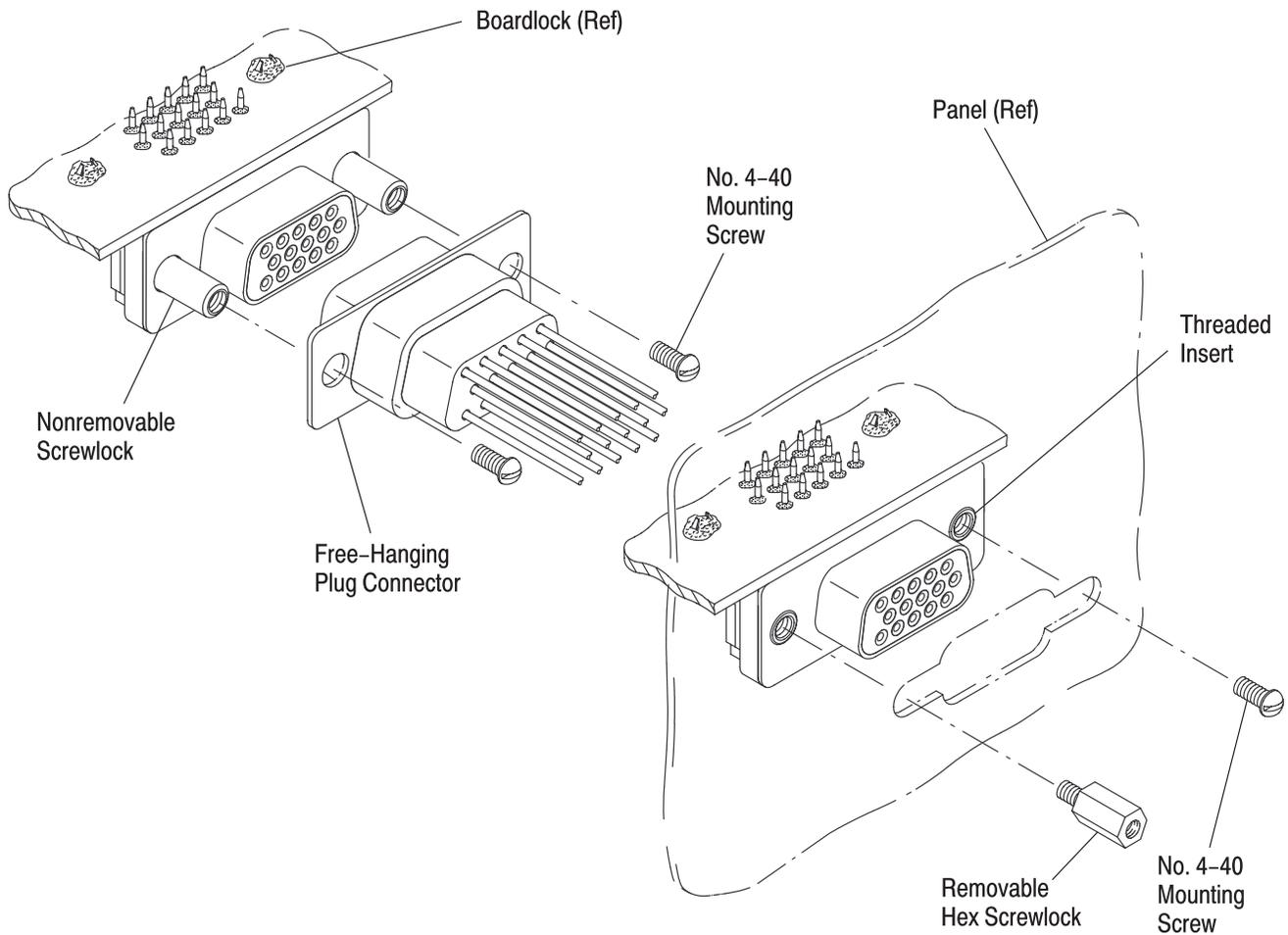


Figure 9

**3.12. Shielding**

These connectors feature nickel-plated steel shells which provide continuity for EMC (Electro Magnetic Compatibility) applications. When mated with corresponding metal shell connectors, shielding and grounding continuity are achieved. Use of boardlocks provides electrical continuity to any ground path on the pc board inclusive of hardware mounting holes.

**3.13. Connector Placement**



*The connector should be handled only by the housing to avoid deformation, contamination, or other damage to the contact solder-tails.*

Determine which hole in the pc board is to receive the number one contact solder-tail, then orient the connector so the number one solder-tail is aligned with the hole. Start all solder-tails into the board; then, when the boardlocks starts to engage the board, press evenly on the connector until it seats on the pc board.

After the connector is snapped into the pc board, the boardlocks are soldered with the connector solder-tails during the soldering process.

**3.14. Soldering**

**A. Flux Selection**

Contact solder-tails must be fluxed prior to soldering with a mildly active 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.

**B. Soldering Guidelines**

AMPLIMITE HD 22 Right-Angle Front Metal Shell Connectors can be soldered using wave or equivalent soldering techniques. The temperatures and exposure time shall be within the ranges specified in Figure 10.



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

SOLDERING PROCESS	TEMPERATURE		TIME (At Max Temp)
	CELSIUS	FAHRENHEIT	
WAVE SOLDERING	265° ±5° ⚡	509° ±9° ⚡	10 ±.5 Seconds

⚡ Wave Temperature

Figure 10

**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 connectors for the time and temperature specified. See Figure 11.

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.



*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 can be used with no harmful affect to the connectors; however Tyco Electronics 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.*



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

CLEANER		TIME (Minutes)	TEMPERATURE (Maximum)
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	5	100°C [212°F]
KESTER 5779	Aqueous	5	100°C [212°F]
LONCOTERGE 520	Aqueous	5	100°C [212°F]
LONCOTERGE 530	Aqueous	5	100°C [212°F]
Terpene Solvent	Solvent	5	100°C [212°F]

Figure 11

**D. Drying**

When drying cleaned assemblies and printed circuit boards, make certain that temperature limitations are not exceeded: -55° to 105°C [-67° to 221°F]. Excessive temperatures may cause housing degradation.

**3.15. Checking Installed Connector**

The AMPLIMITE HD 22 Right-Angle Front Metal Shell Connector must be seated on the pc board to the dimensions shown in Figure 12.

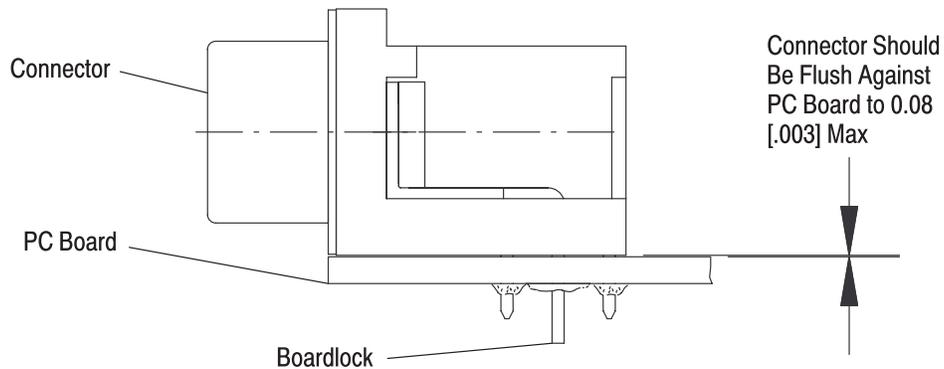


Figure 12

**3.16. Repair/Removal**

If the connector should become damaged, it must be replaced. The connector may be removed from the pc board by normal desoldering methods and replaced with a new connector.



*When repairing or replacing AMPLIMITE HD 22 Right-Angle Front Metal Shell Connectors, be careful not to damage other pc board components during the desoldering process.*

**4. QUALIFICATIONS**

AMPLIMITE HD 22 Right-Angle Front Metal Shell Connectors are Recognized by Underwriters' Laboratories, Inc. (UL) under File Number E-28476 and Certified by CSA International under File Number LR-16455.

## 5. TOOLING

The only tooling required for the hand placement of AMPLIMITE HD 22 Right-Angle Front Metal Shell Series 350 Connectors on a pc board is a pc board support. A pc board support should be used to prevent bowing of the pc board during the placement of a connector on the board. It should have flat surfaces with holes or a channel wide enough and deep enough to receive the solder-tails and boardlocks (if applicable) during installation of the connector on the board. See Figure 13.

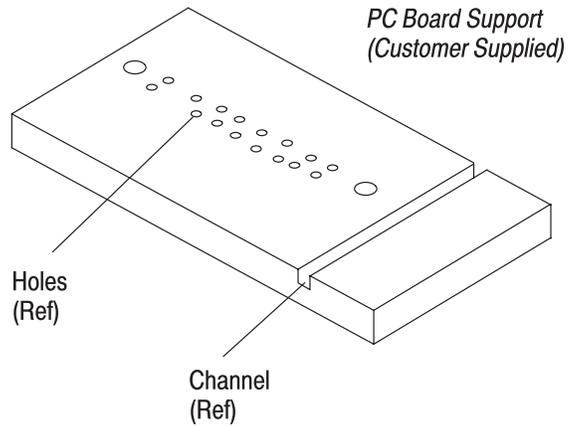


Figure 13

6. VISUAL AID

Figure 14 shows a typical application of AMPLIMITE HD 22 Right-Angle Front Metal Shell Connectors. 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.

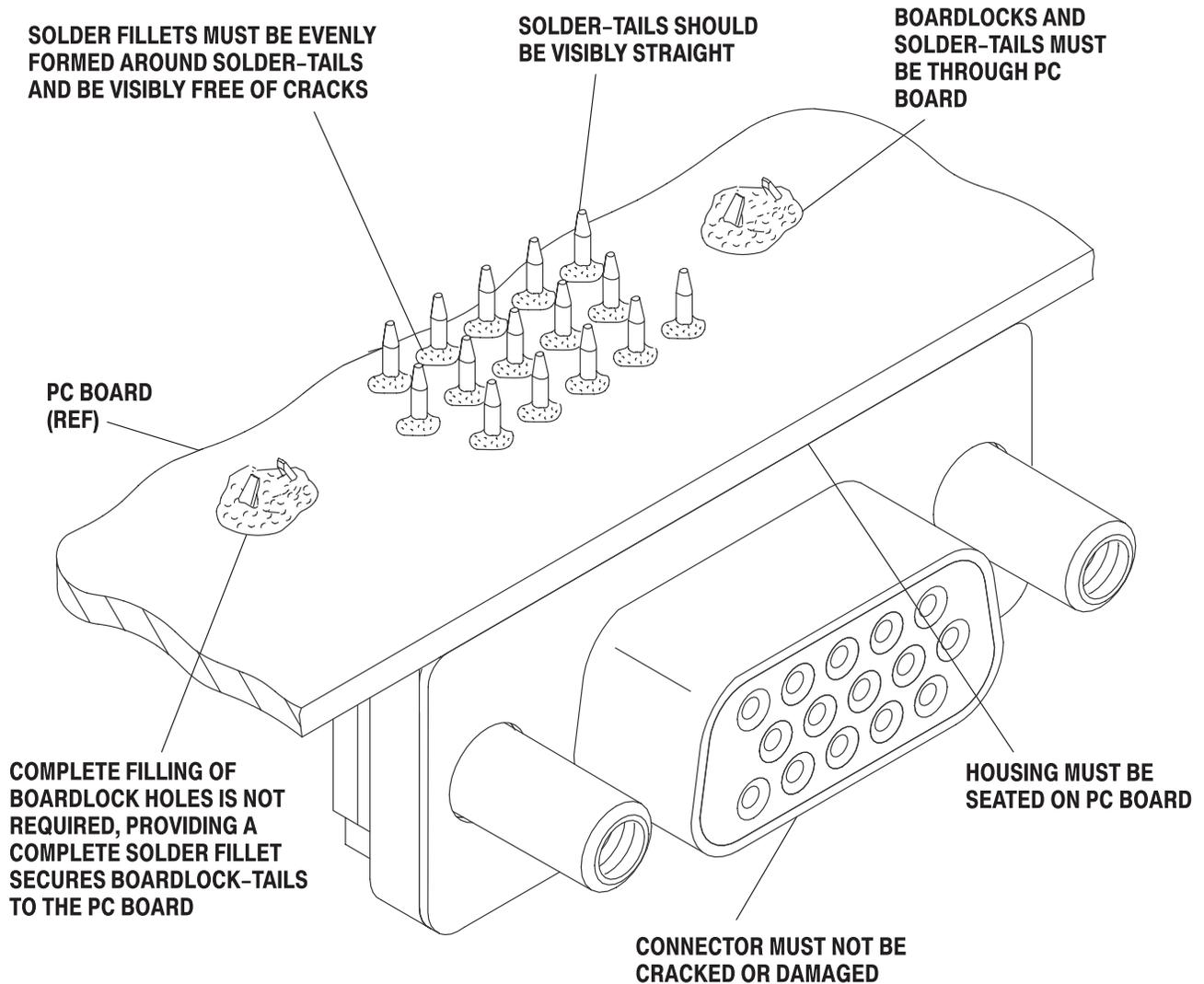


FIGURE 14. VISUAL AID