

### 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 Quadrax Circular Connectors and Quadrax Contacts. The Quadrax Circular Connectors consist of free-hanging plugs, panel-mounted, and printed circuit (pc) board-mounted receptacles. Selected sizes from 9 to 25 are available. Standard back-shells are used to provide strain relief and cable tie off using wire ties or heat shrink boots. Tyco Electronics (Raychem\*) back-shells and adaptors or other M85049 style back-shells may be used.

The Quadrax Pin and Socket Contacts may be applied to cable and pin pc board contacts soldered to the pc board. The contact assembly contains an outer shell, a one-piece dielectric, and four signal contacts. An inner crimp ferrule is included with the cable applied contacts, and an optional sealing boot/plug is also available. These Quadrax Contacts may also be used in other connector systems such as ARINC 600 Connectors, and MIL-DTL-38999 style connectors. Contact Tyco Electronics Product Engineering for specific application requirements for these other product lines.

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

**NOTE:** Figures and illustrations are for identification only and are not drawn to scale.

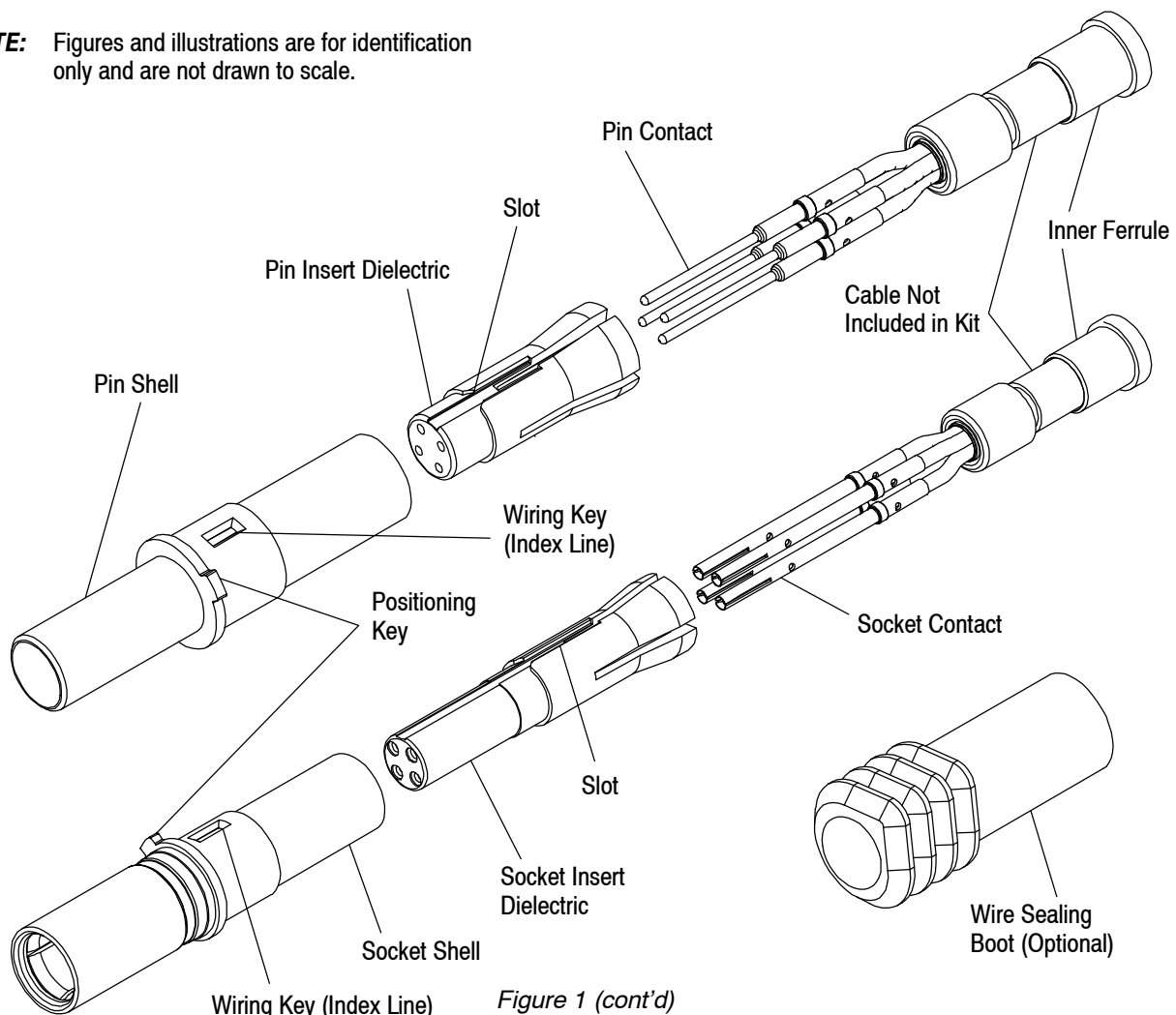
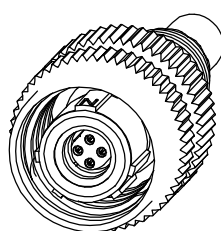
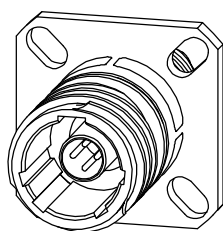


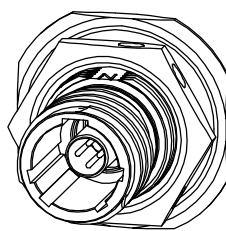
Figure 1 (cont'd)



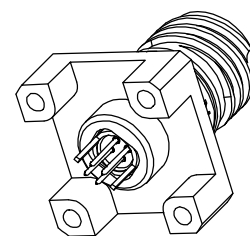
Size 9 Plug



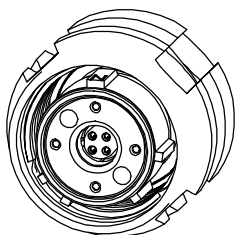
Size 9 Flange  
Mount Receptacle



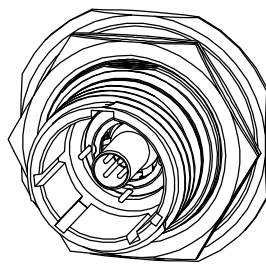
Size 9 Jam Nut  
Receptacle



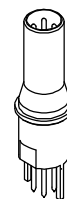
Size 9 PC Board  
Receptacle



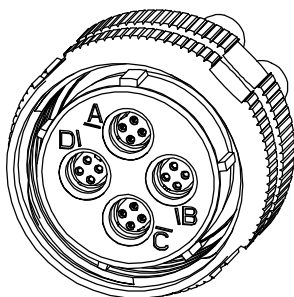
Size 13 Plug



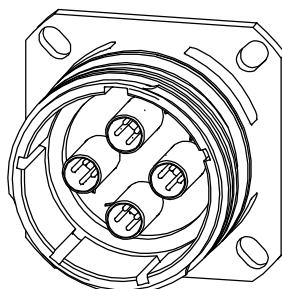
Size 13 Jam Nut  
Receptacle



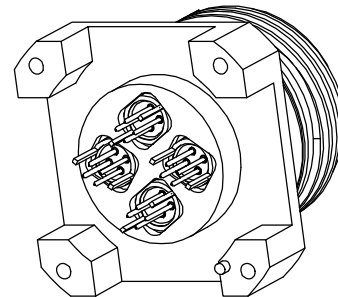
PC Board  
Contact



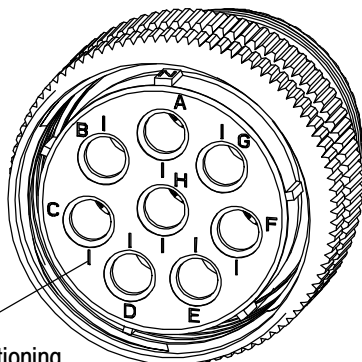
Size 19 Plug



Size 19 Flange  
Mount Receptacle

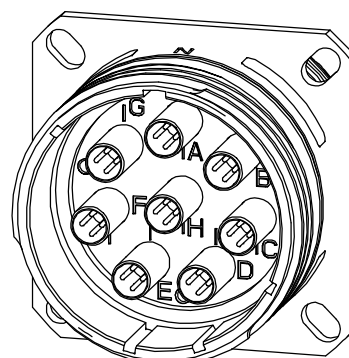


Size 19 PC Board  
Mount Receptacle



Contact Positioning  
Key Indicator

Size 25 Plug



Size 25 Panel  
Mount Receptacle

Figure 1 (end)

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

- Updated document to corporate requirements
- Added new callout to Figure 1

### 2.2. Customer Assistance

Reference Base Part Numbers 1445692, 1445693, Product Code H723, and Product Line Code 257-ARINC are representative numbers of Quadrax Circular Connectors and Contacts. 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 Center number at the bottom of page 1.

### 2.3. Drawings

Customer drawings for specific products are available from the service network. The information contained in the customer drawings takes priority if there is a conflict with this specification or with any other technical documentation supplied by Tyco Electronics. Contact the Product Information Center number at the bottom of page 1 if such a conflict is encountered.

### 2.4. Manuals

Manual 402-40 is available upon request and 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 108-2131 and Qualification Test Report 501-574 provides product performance and test information for the Quadrax Contacts. Test Specification 109-11 provides solderability requirements and evaluation methods. The circular connectors are tested to Product Specification 108-2199 which is similar to MIL-C-38999. Application Specification 114-13123 provides crimping procedures and requirements for the pin and socket contacts.

### 2.6. Instructional Material

The following list includes available instruction sheets (408-series) that may provide assembly procedures for product, operation, maintenance and repair of tooling.

<u>Document Number</u>	<u>Document Title</u>
408-2766	Coaxial Cable Stripper Cable Kits 603995
408-7424	Checking Terminal Crimp Height or Gaging Die Closure
408-7516	Application Tooling for Screw-Machine Contacts

## 3. REQUIREMENTS

### 3.1. Safety

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

### 3.2. Limitations

The connectors are designed to operate within a temperature range of -65° to 125°C [-85° to 257°F].

#### NOTE



*Temperature rating of the cable must be considered when determining operating temperature of the connector and cable assembly.*

### 3.3. Storage

#### A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition of components used in the contacts or connectors.

### B. Shelf Life

The contacts and connector kits should remain in the shipping containers until ready for use to prevent damage. These products should be used on a first in, first out basis to avoid storage contamination.

### C. Chemical Exposure

Do not store contacts or connector kits 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 if available.*



## 3.4. Cable Selection and Preparation

Special considerations must be adhered to in the cable stripping operation.

### A. Selection

The pin and socket contacts will accept a wire size of 22, 24, and 26 AWG in a 4-conductor (Quad) cable configuration in 100 Ohm and 150 Ohm. Cable suppliers such as Raychem and Tensolite may be used. Contact Tyco Electronics to confirm all cable sizes and compatible contacts.

### B. Preparation

#### CAUTION

*Reasonable care must be taken not to nick, scrape, or cut any conductors during the stripping operation.*



#### NOTE

*Dimensions and procedures for stripping the cable may be found on Tyco Electronics Application Specification 114-13123.*



## 3.5. Crimped Contact Requirements

#### NOTE

*Dimensions and procedures for crimping the contacts may be found on Tyco Electronics Application Specification 114-13123.*



## 3.6. Pin Contact Assembly

#### NOTE

*Dimensions and procedures for assembling pin contacts and pin shell may be found on Tyco Electronics Application Specification 114-13123.*



## 3.7. Socket Contact Assembly

#### NOTE

*Dimensions and procedures for assembling the socket contacts and socket shell may be found on Tyco Electronics Application Specification 114-13123.*



## 3.8. Contact Cavity Numbering

Figure 2 provides information on contact cavity numbering with regards to standard and reverse number assignments for the pin and socket connector assembly per ARINC 600 Supplement 14.

NOTE



The same specific part number can be used as either a standard or reverse pin assignment. Cavity numbers 2 and 4 are the same for either standard or reverse assignment. On standard wiring assignment, position 1 will be adjacent to the wiring key (index line). On reverse assignment, position 3 will be adjacent to the wiring key. Standard versus reverse assignments are dependent on the location of cavity numbers 1 and 3.

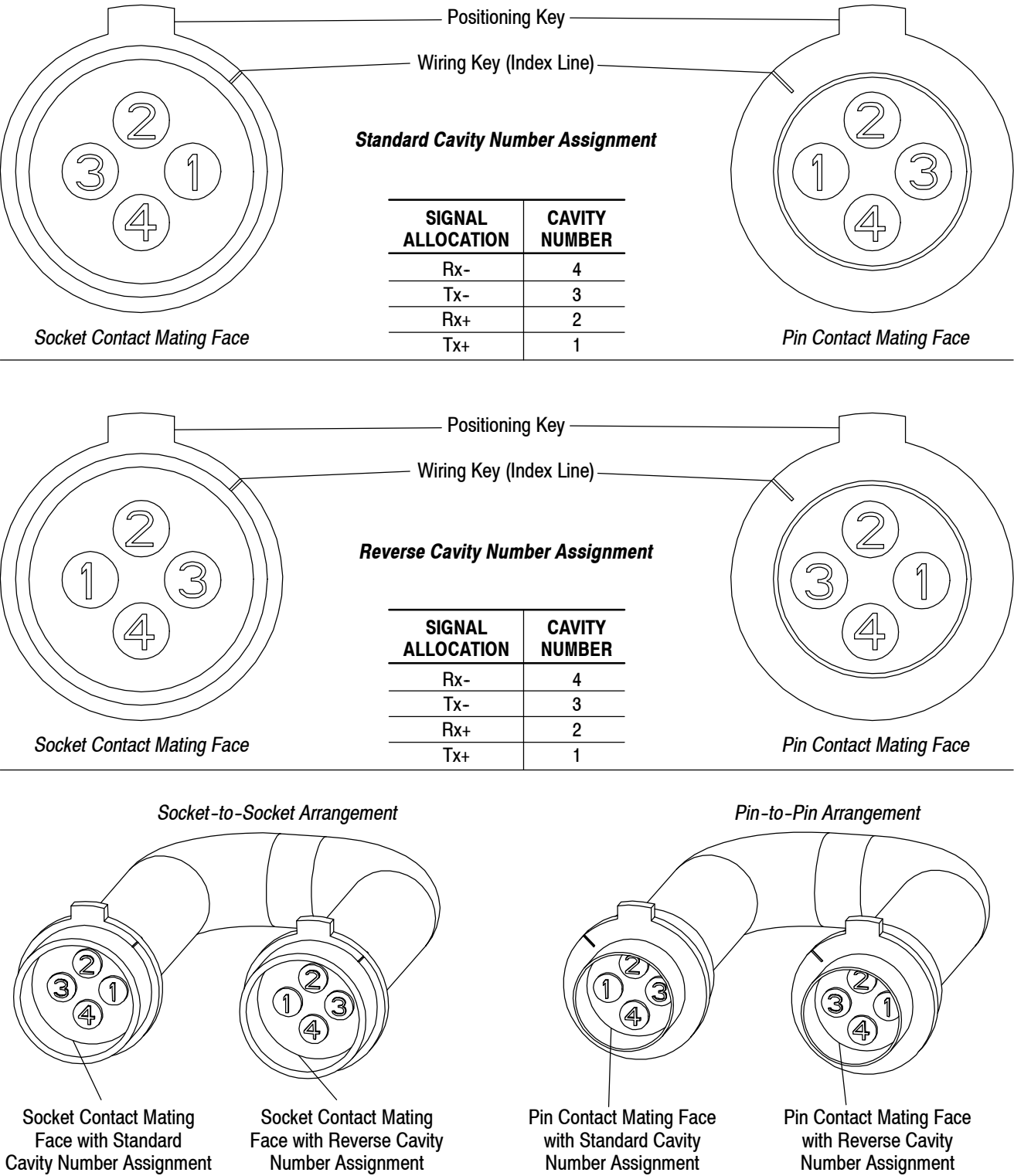


Figure 2

### 3.9. Installation of Quadrax Contacts Into Plug and Receptacle Connector Assemblies

The following paragraphs provide information on assembly procedures for the pin and socket contact assemblies installed in the receptacle and plug connectors.

#### A. Installation of Quadrax Pin Contact Assemblies in Receptacle Connectors

1. Install the pin shell sub-assembly into the receptacle assembly until the pin shell snaps in place. Line up the positioning key with the internal key on the connector. Refer to Figure 3A and 3B.
2. Install the insert block into a standard ARINC 600 Receptacle Shell according to the dimensions provided in Figure 3C.

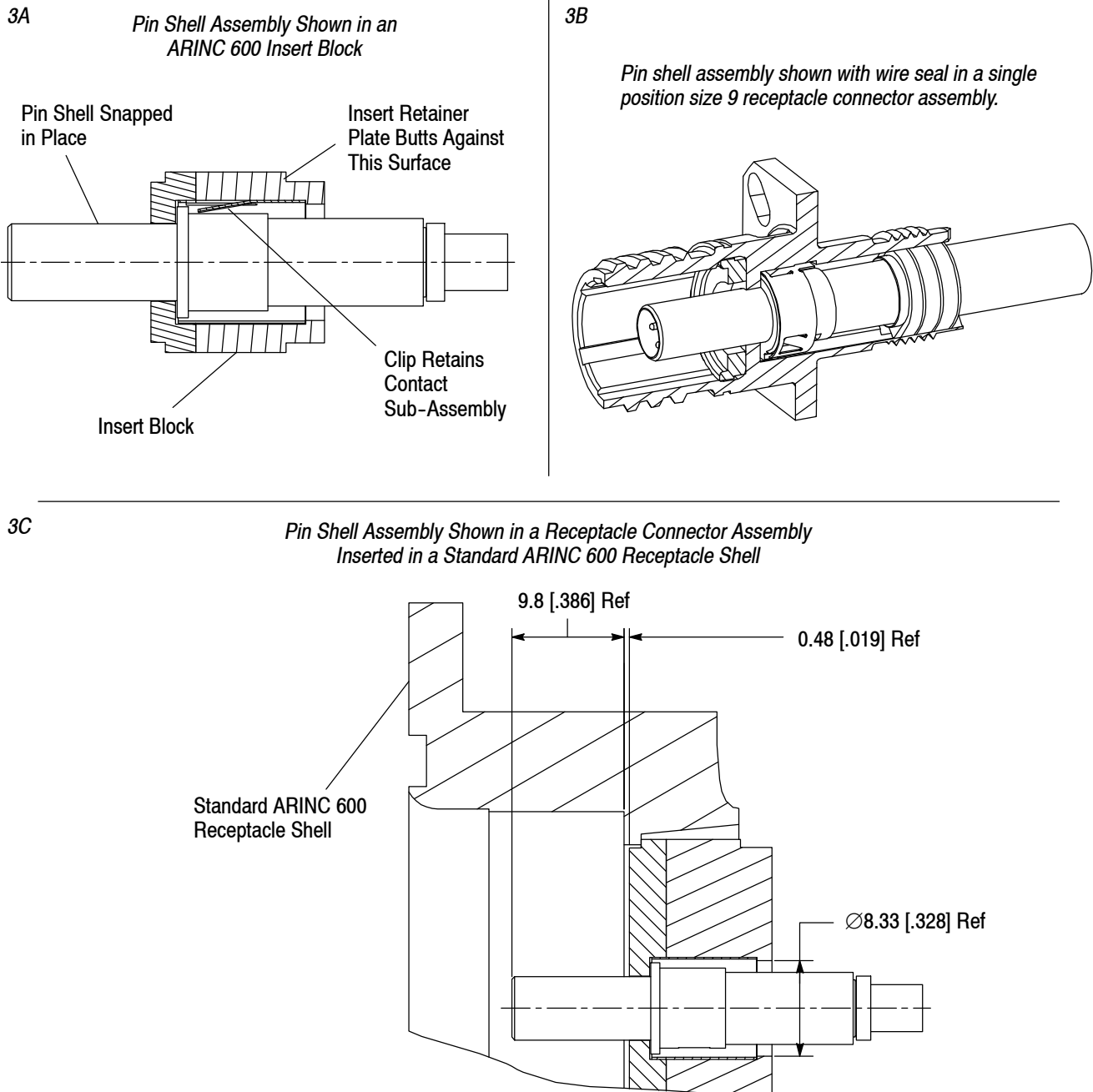
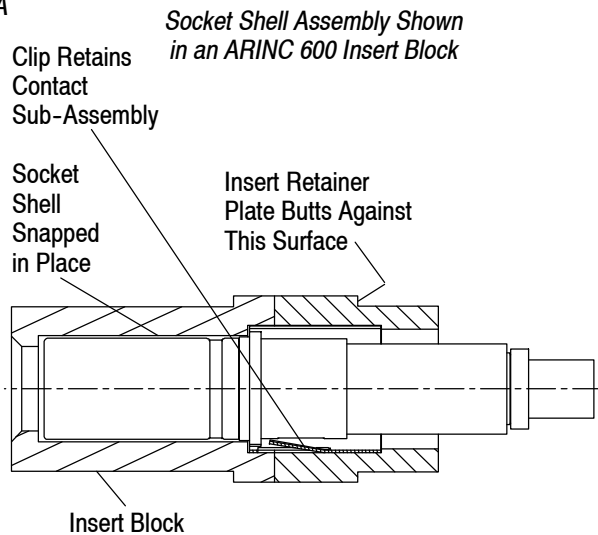


Figure 3

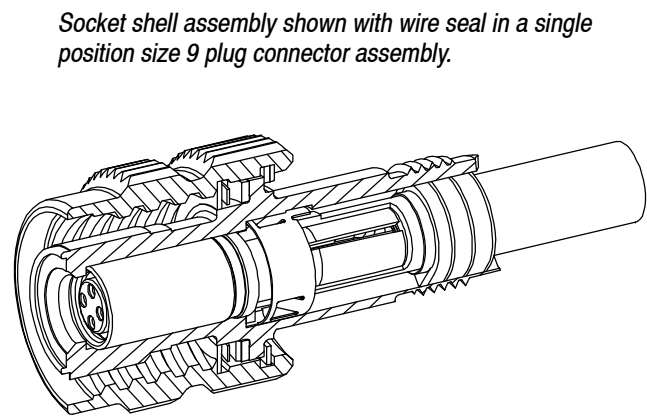
## B. Installation of Quadrax Socket Contact Assemblies Into Plug Connectors

1. Install the socket shell sub-assembly in the plug assembly until the socket shell snaps in place. Line up the positioning key with the internal key on the connector. Refer to Figure 4A and 4B.
2. Install the insert block into a standard ARINC 600 Plug Shell according to the dimensions provided in Figure 4C.

4A



4B



4C

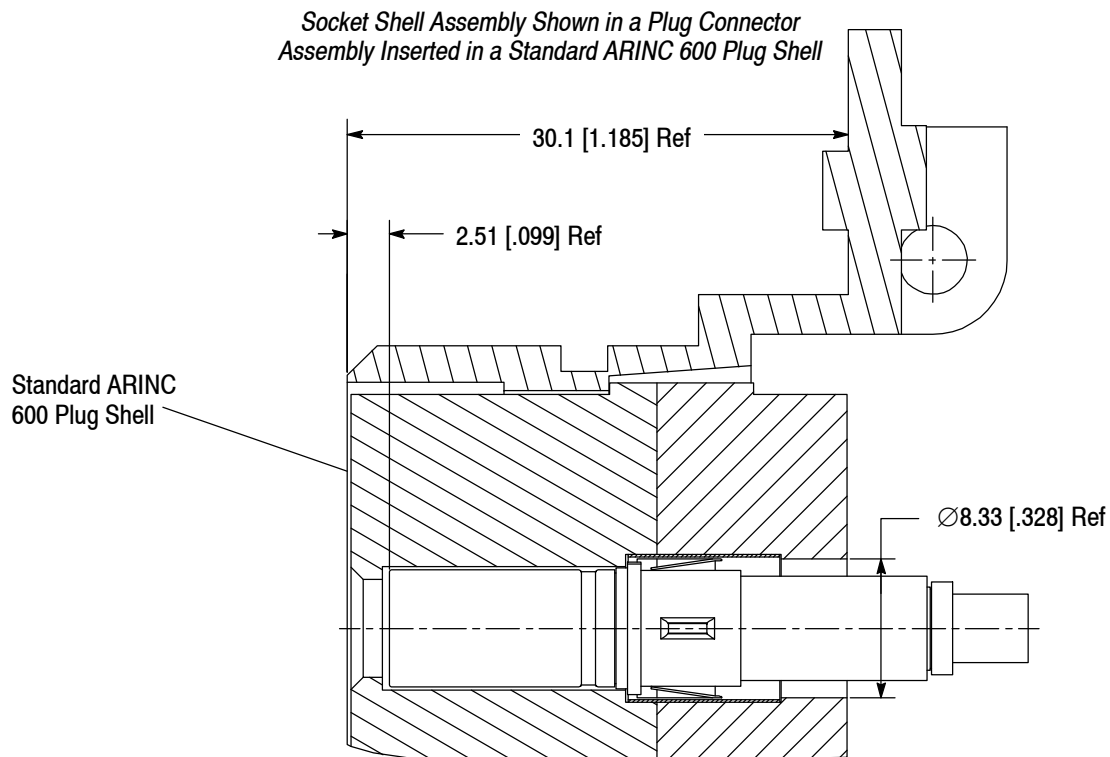
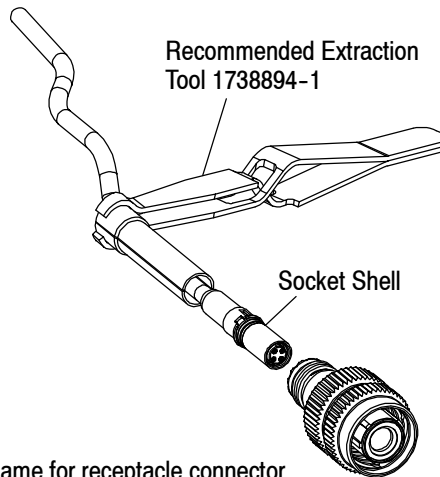


Figure 4

### 3.10. Removal of Quadrax Contacts from Plug and Receptacle Connector Assemblies (RR/RR)

Use recommended Extraction Tool 1738894-1 for removal of the pin or socket contacts from the plug or receptacle connector assemblies. Refer to Figure 5.

1. Slide sealing boot back up the cable and out of the way.
2. Insert extraction tool over wire insulation and bottom the tool in the cavity hole.
3. Pull up while holding the tool and cable. Contact should easily come out.



**NOTE:** Plug connector show, process is same for receptacle connector.

Figure 5

### 3.11. Installation and Removal of PC Board Contacts in PC Board Connectors (Front Release/Front Remove) FR/FR Contacts

#### A. Installation

The pc board Quadrax Pin Contacts are keyed to line-up with the keys in the connector shells. Visually line up the keys and insert the contact from the front of the connector shell until the contact bottoms behind the retention clip. Refer to Figure 6.

#### B. Removal

1. Use recommended Extraction Tool 1738894-1 for removal of the contacts from the connector shell. Note that the contacts must be de-soldered from the pc board prior to removing them from the shell. See Figure 6.
2. Insert the extraction tool over the contact until it bottoms on the contact shoulder.
3. Pull up while holding the tool and the contact. The contact should easily come out.

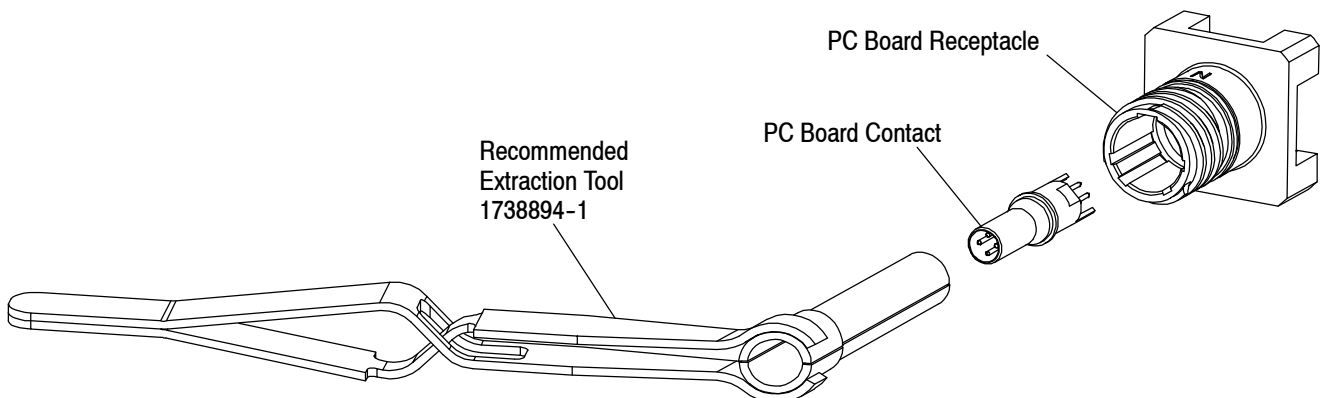


Figure 6



### 3.12. PC Board Contacts and Connectors

#### A. PC Board Material and Thickness

1. PC board material may be glass epoxy (FR-4, G-10), or other Tyco Electronics Engineering approved substrates.
2. The pc board contact can be installed on various thickness of pc board. Board thickness may vary depending upon the application, however, contact tail length through the pc board becomes important for wave soldering operations. A recommended minimum of 1.27 mm [.050 in.] of the contact solder tail should protrude through the pc board.

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

#### B. Contact Holes

The contact holes in the pc board must be precisely located to ensure proper placement and optimum performance of the connector, and must be prepared to the requirements provided in Figure 7.

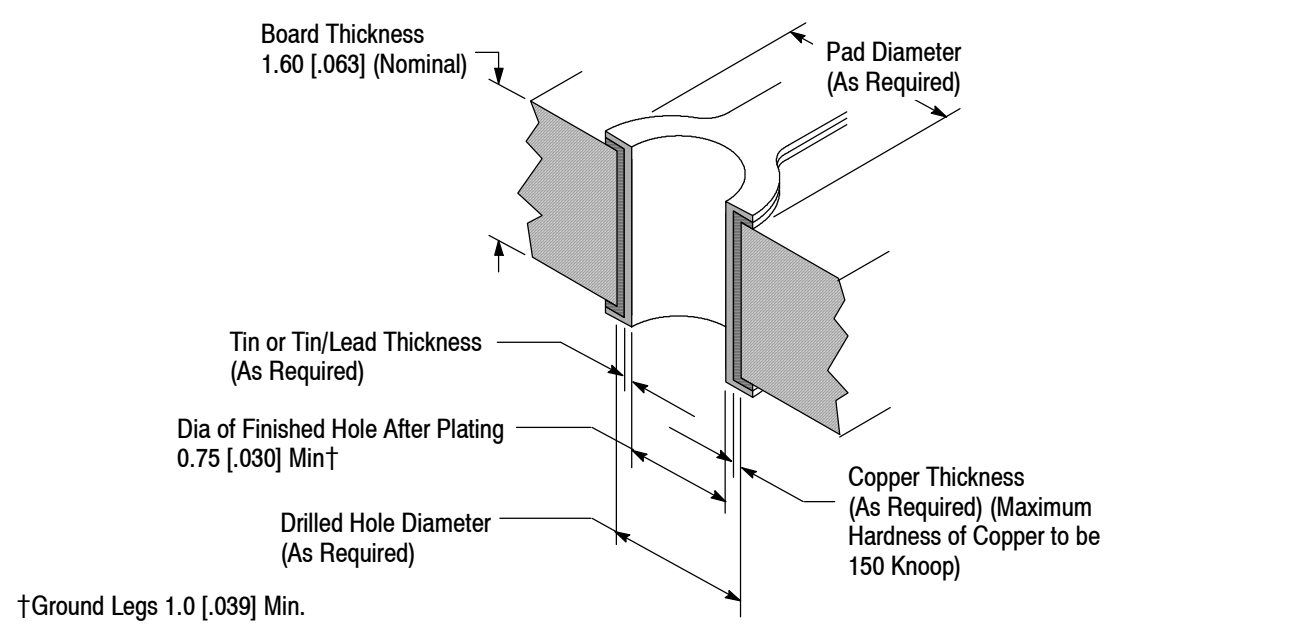


Figure 7

### 3.13. Connector Spacing

Care must be taken to avoid interference between adjacent connectors and/or other components. There is no required spacing between connectors, however spacing may be dependent on variable hardware used and the clearance required for mating connectors.

### 3.14. Placement



*Connectors should be handled only by the housing to avoid deformation, contamination, or damage to the contacts.*

When placing connectors on the pc board, make sure that the contacts are aligned and started into the matching holes before seating the connector onto the pc board.

### 3.15. Soldering Connectors

The PC Board Quadrax Connector can be soldered with wave, vapor phase, or infrared reflow processes, provided the temperatures and exposure time are within the ranges specified in Figure 8. Tyco Electronics recommends the use of SN60 or SN62 solder for the connectors. Refer to Paragraph 2.4 for instructional material that is available for establishing soldering guidelines.

SOLDERING PROCESS	TEMPERATURE		TIME (At Max Temperature)
	CELSIUS	FAHRENHEIT	
Wave Soldering	260●	500●	5 Seconds
Vapor Phase Soldering	215	419	5 Minutes
Infrared Reflow Soldering	230	446	5 Minutes

● Wave Temperature

Figure 8

### A. Flux Selection

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 phone number at the bottom of page 1 for consideration of other types of flux. Some fluxes that are compatible with these connectors are provided in Figure 9.

FLUX TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			KESTER	ALPHA
Type RMA (Mildly Activated)	Mild	Noncorrosive	186	611

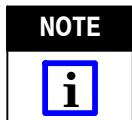
Figure 9

### B. 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 10.



*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)	TEMPERATURES (Maximum)	
NAME	TYPE		CELSIUS	FAHRENHEIT
ALPHA 2110	Aqueous	1	132	270
BIOACT EC-7	Solvent	5	100	212
Butyl CARBITOL	Solvent	1	Room Ambient	
Isopropyl Alcohol	Solvent	5	100	212
KESTER 5778	Aqueous	5	100	212
KESTER 5779	Aqueous	5	100	212
LONCOTERGE 520	Aqueous	5	100	212
LONCOTERGE 530	Aqueous	5	100	212
Terpene Solvent	Solvent	5	100	212

Figure 10

### C. Drying

When drying cleaned connectors, make certain that temperature limitations are not exceeded: -40° to 105° C [-40° to 221°F]. Excessive temperatures may cause degradation.

### 3.16. Checking Installed Connector

All solder joints should conform to those specified in Test Specification 109-11. The connector must seat on the pc board to within the tolerance of 0-0.25 mm [.000-.010 in.].

### 3.17. Panel Cutouts

Recommended panel cutouts are shown in MIL-C-38999, Figure 11.

### 3.18. Mating/Unmating

To properly mate and unmate the two halves of a connector system, the free-hanging plug must be properly keyed with the same polarization code as its' mating receptacle. To mate the connectors, bring the connectors together by lining up the keying features and turning the coupling nut to the specified torque requirements per MIL-C-38999, Table IV. The full mate indicator on the receptacle should be fully covered by the coupling nut to indicate a fully mated position.

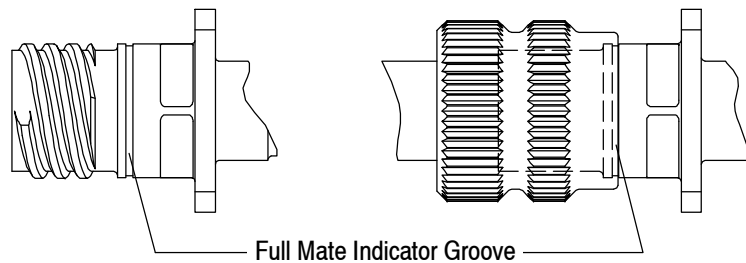


Figure 11

### 3.19. Repair/Replacement

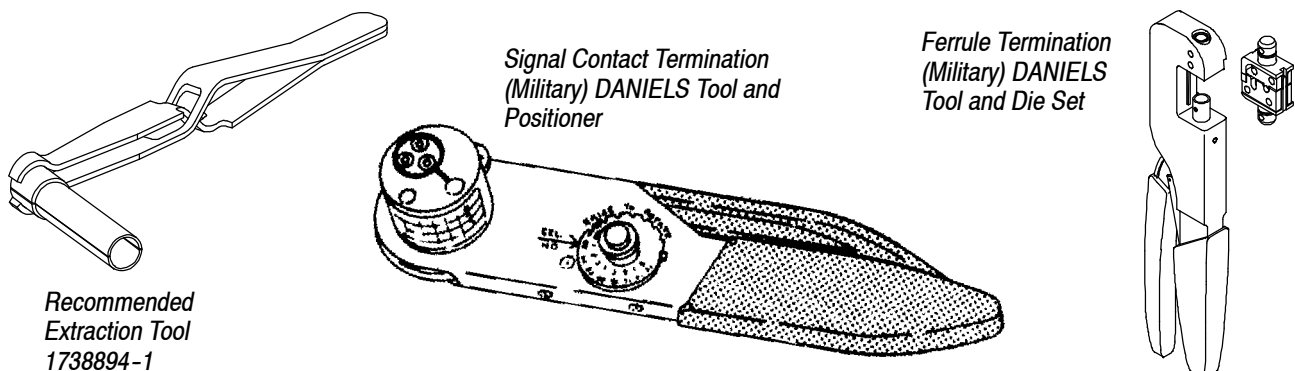
Damaged components must not be used. If a damaged component is evident, it must be removed and replaced with a new one. Terminated contacts and ferrules must not be re-terminated.

## 4. QUALIFICATIONS

Internal qualifications have not yet been completed for Quadrax Circular Connectors and Contacts.

## 5. TOOLING

Quadrax Contacts and ferrules can be terminated using hand crimping tools that accommodate the wire size specified. Military (DANIELS) tool, positioner, and die sets are available to crimp the screw-machine pin or socket contact, and ferrule. See Figure 12 for recommended tooling.

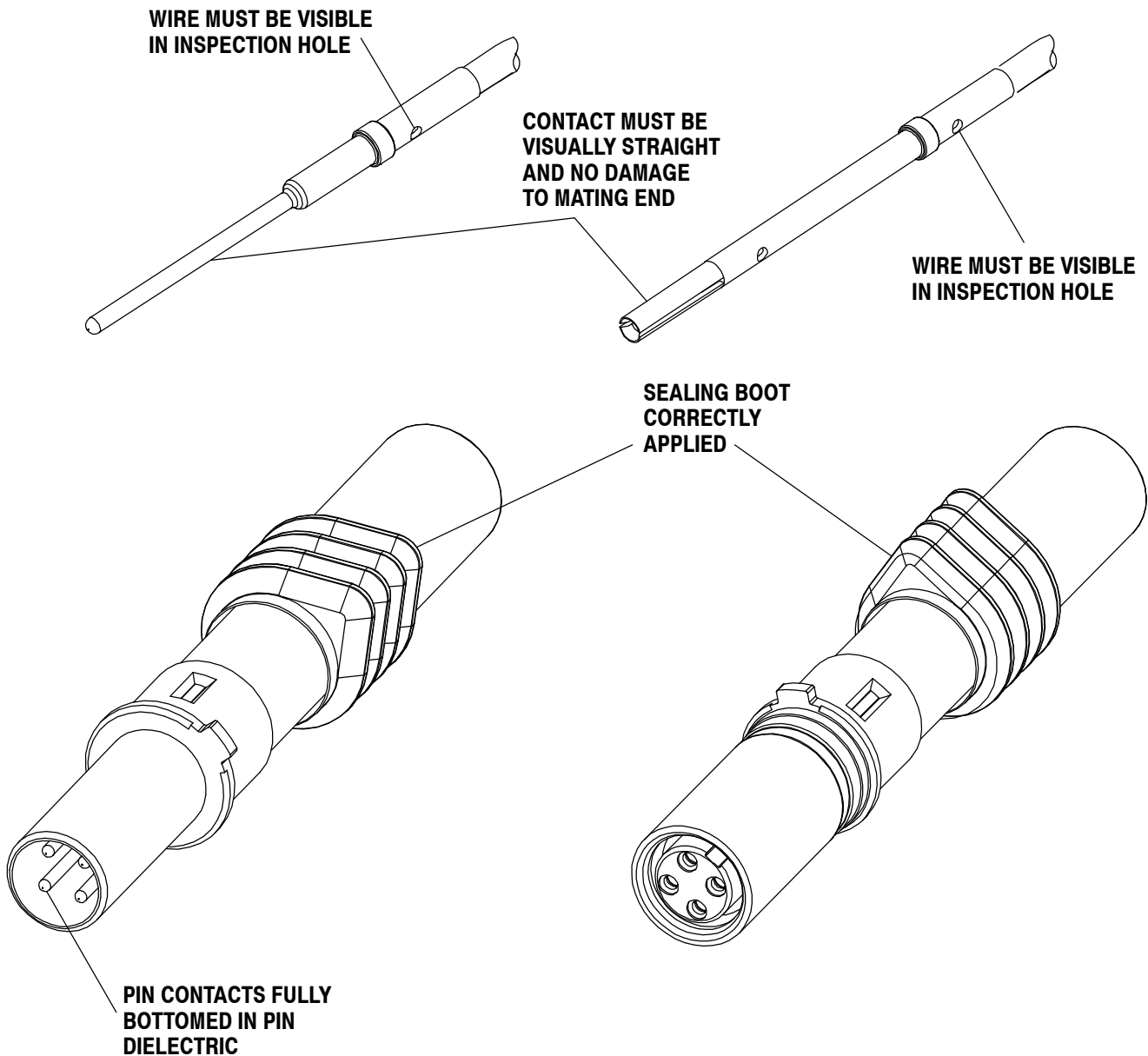


WIRE SIZE (AWG)	CONTACT TYPE	CONTACT TERMINATION TOOLING		FERRULE TERMINATION TOOLING		RECOMMENDED EXTRACTION TOOL
		HAND TOOL	POSITIONER OR DIE SET	HAND TOOL	DIE SET	
26-22	Pin or Socket	M22520/2-01	K709	M22520/5-01 or 608650-1	5-45	1738894-1

Figure 12

## 6. VISUAL AID

Figure 13 shows a typical application of Quadrax Circular Connectors and Contacts. These illustrations 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 13. VISUAL AID**