

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 [± 0.005] 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 the application of Quadrax Rectangular Connectors and Quadrax Contacts. The Quadrax Rectangular Connectors consist of free-hanging plugs, panel-mounted and printed circuit (pc) board-mounted receptacles. Both two and twelve position size connectors are available. Backshell kits (ordered separately), are fastened to the connectors to provide strain relief and cable tie off using wire ties. The backshell kit consists of a strain relief plate with two captive screws and sealing boots (which must be ordered separately).

The Quadrax Pin and Socket Contacts may be applied to cable and pin pc board contacts soldered to the board. The contact assembly contains an outer shell, a one piece dielectric, and four 24 AWG 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 connectors. Contact TE Connectivity Product Engineering for specific application requirements for these other product lines.

When corresponding with TE Personnel, use the terminology provided on this specification to help facilitate your inquiry for information. Basic terms and features of this product line are provided in Figure 1.

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

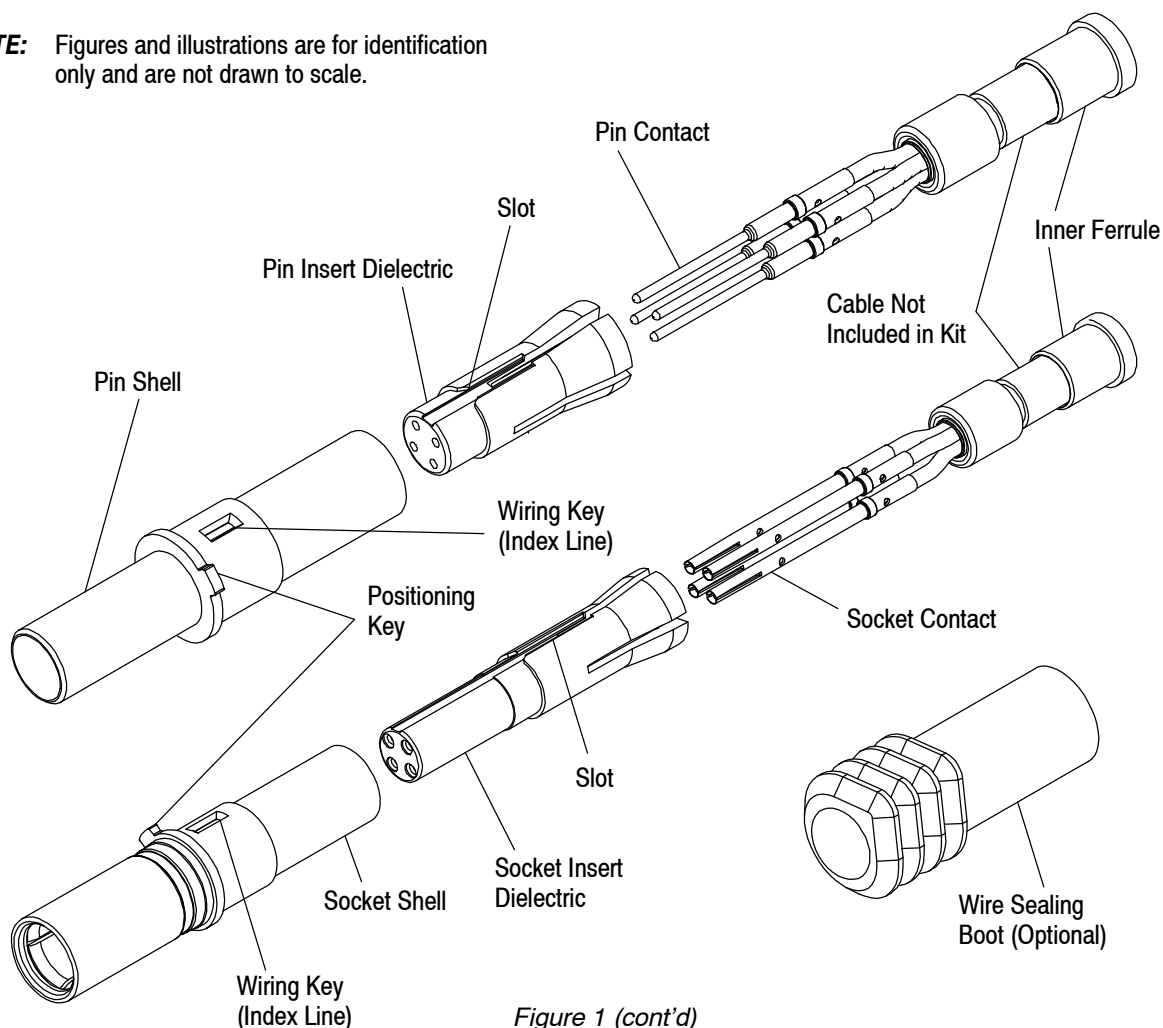


Figure 1 (cont'd)

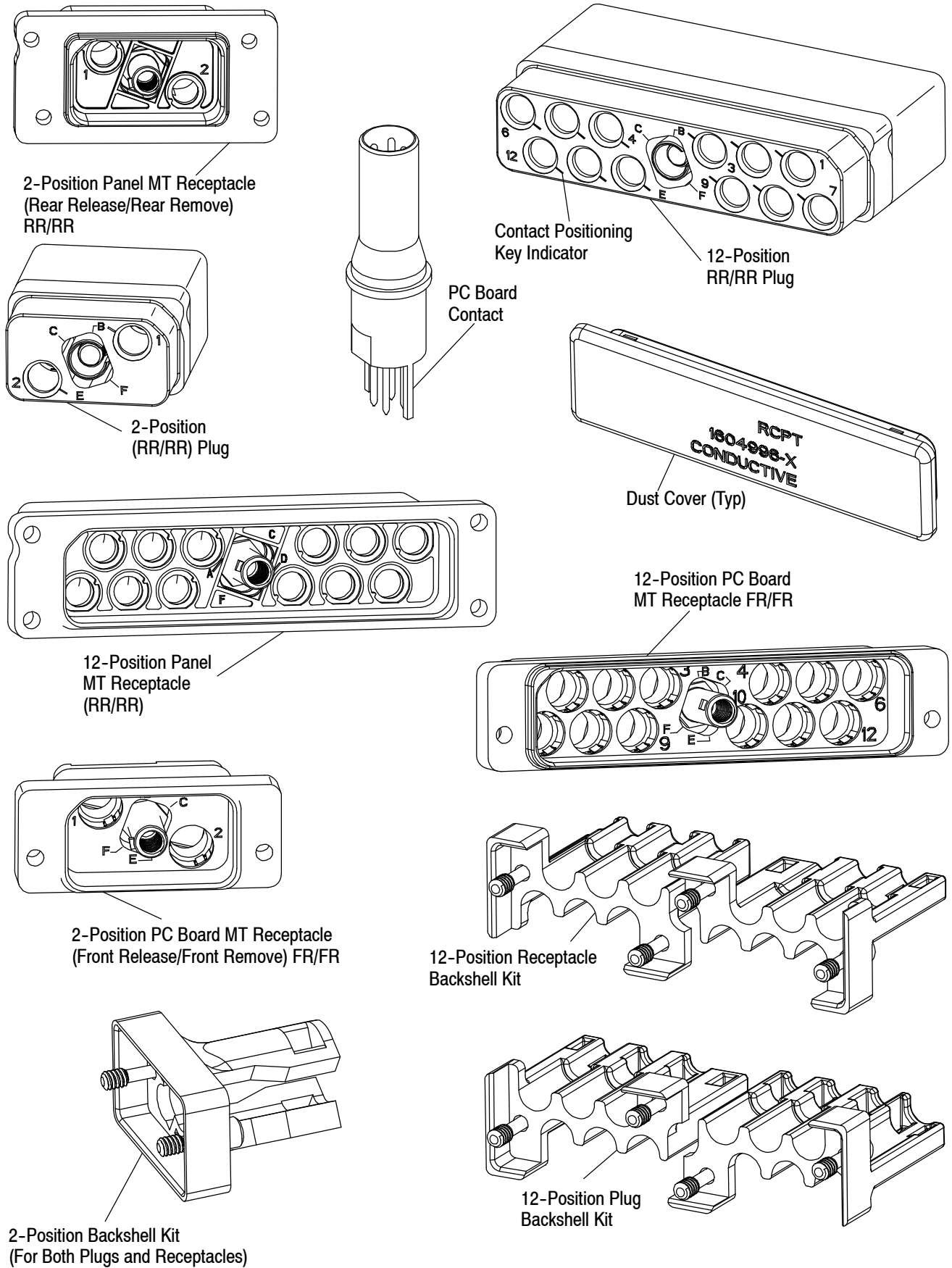


Figure 1 (end)

2. REFERENCE MATERIAL

2.1. Revision Summary

- Material changed to PTFE

2.2. Customer Assistance

Reference Base Part Number 1445692, Product Code H723, and Product Line Code 257-ARINC are representative numbers of Quadrax Rectangular 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 TE 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 TE. 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 rectangular connectors are tested to (Boeing Part Specification) BPS-C-193, referenced Test Report 502-1182.

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 |

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 24 AWG in a 4-conductor (Quad) cable configuration such as Tensolite NF 24Q100, Raychem* EPD-RWC-18279, and Boeing BMS13-72. Contact TE about other cable sizes and compatible contacts.

B. Preparation

1. Proper strip length is necessary to properly apply the cable to the contact. See Figure 2.

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

NOTE If a wire sealing boot is to be used, install the wire sealing boot onto the wire prior to stripping the wire. Minimize handling of the seal glands as it will reduce the lubricity.

NOTE To calculate cable length "L" (for a given total length), refer to the "NOTE" in Figure 2A.

2. Strip cable jacket to length indicated in Figure 2B.
3. Assemble the inner ferrule over the braid as shown in Figure 2C.
4. Comb the braid, dress over the inner ferrule, and trim the braid as shown in Figure 2D.
5. Cut the PTFE Tape (if present), foil and cable fillers to length as shown in Figure 2E.

2A

NOTE: Plug-to-Plug = $L_T - 32.46$ [1.278]
 Socket-to-Socket = $L_T - 37.39$ [1.472]
 Plug-to-Socket = $L_T - 34.92$ [1.375]

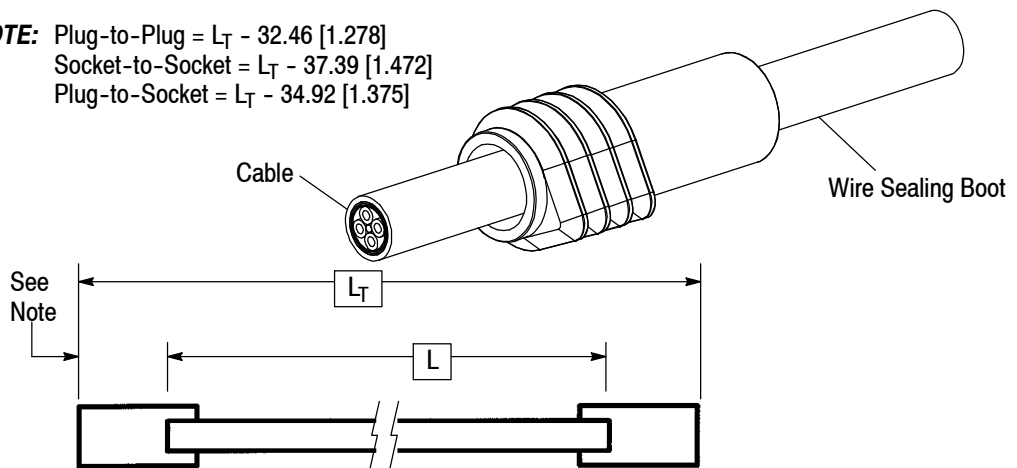
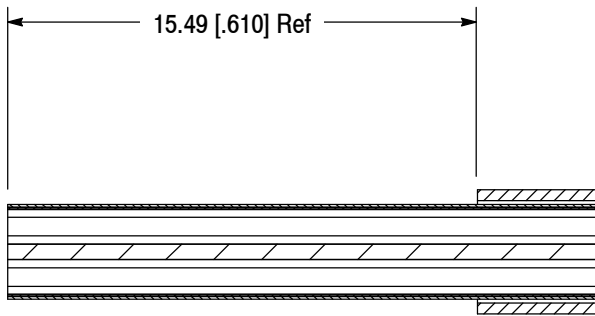


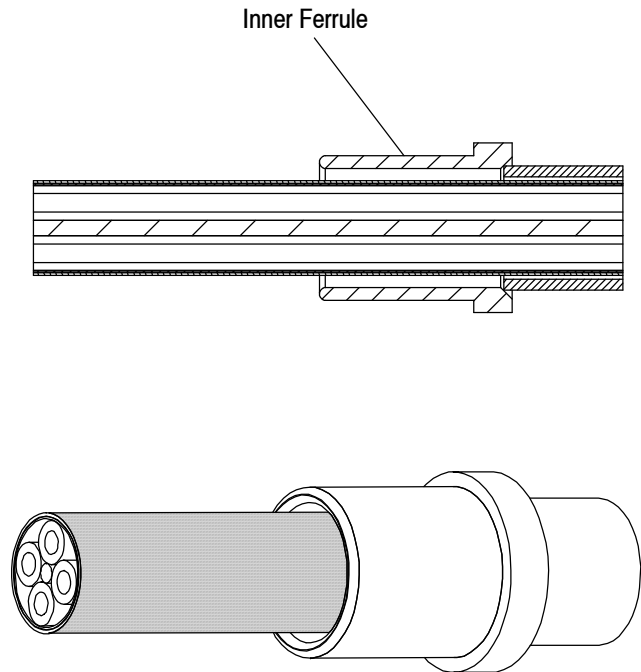
Figure 2 (cont'd)

Tensolite and Boeing are trademarks of their respective owners.

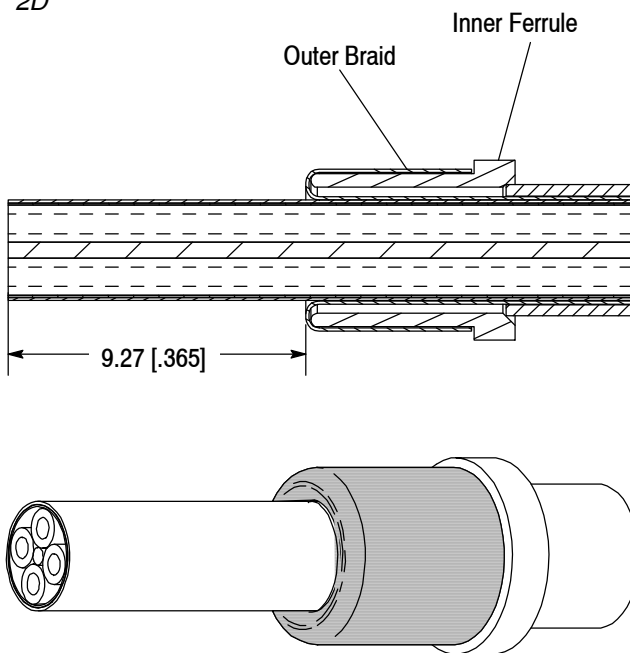
2B



2C



2D



2E

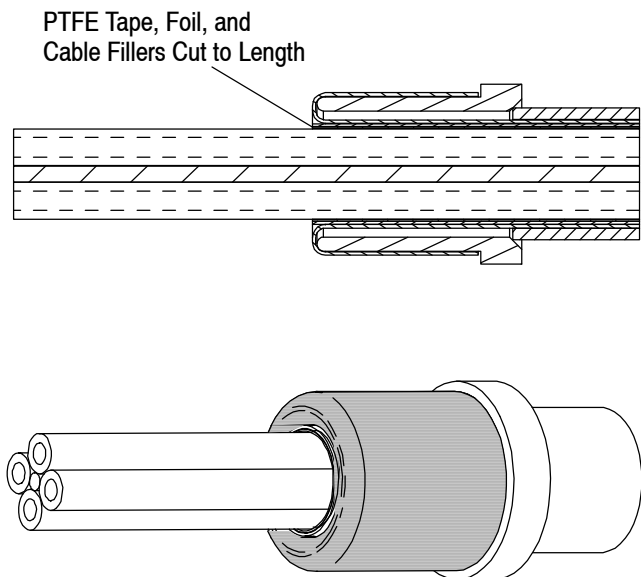


Figure 2 (end)

3.5. Discrete Wire Preparation

1. Fan out the four discrete wire conductors and strip away the insulation to the dimension as shown in Figure 3A.
2. Trim the inner core to the dimension as shown in Figure 3B.
3. Slide the pin or socket contact onto the wire as shown in Figure 3C.

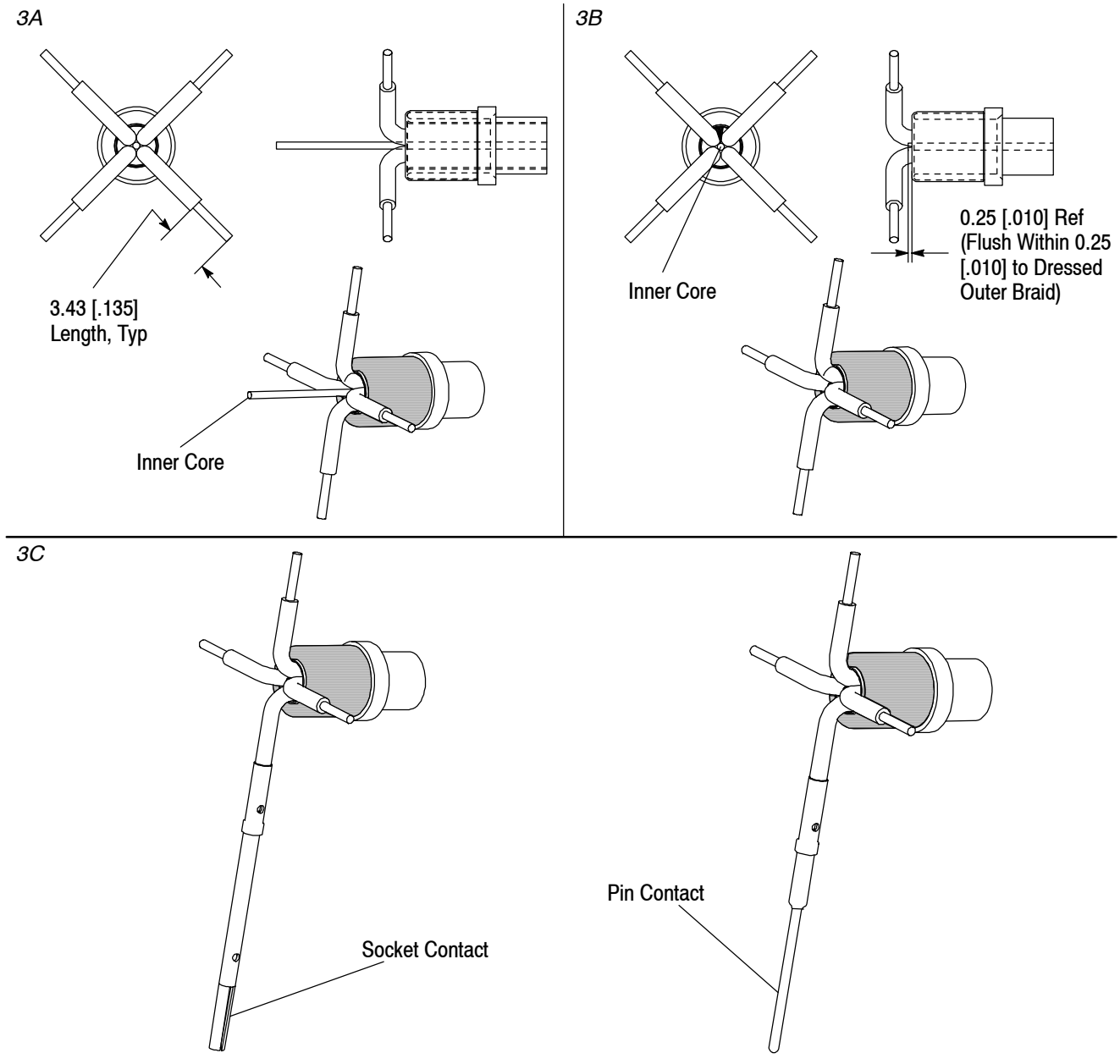


Figure 3

3.6. Crimped Contact Requirements

Crimp the pin or socket contacts, (four required), onto the stripped wires using crimping tool M22520/2-01 with die or positioner K709. Refer to Section 5, TOOLING and Instruction Sheet 408-7516. Refer to instructions packaged with crimp tooling for appropriate procedures.

A. Conductor Barrel Crimp

The crimp applied to the conductor barrel is the most compressed area and is most critical in ensuring optimum electrical and mechanical performance of the crimped contact. The conductor barrel crimp height must be within the dimension provided in Figure 4.

B. Effective Crimp Length

For optimum crimp effectiveness, the crimp must be within the area shown in Figure 4. Effective crimp length shall be defined as that portion of the conductor barrel, fully formed by the crimping tool. Instructions for adjusting, repairing, and inspecting tools are packaged with the tools. See Section 5, TOOLING.

NOTE: Pin contact shown, but requirements apply equally to the socket contact.

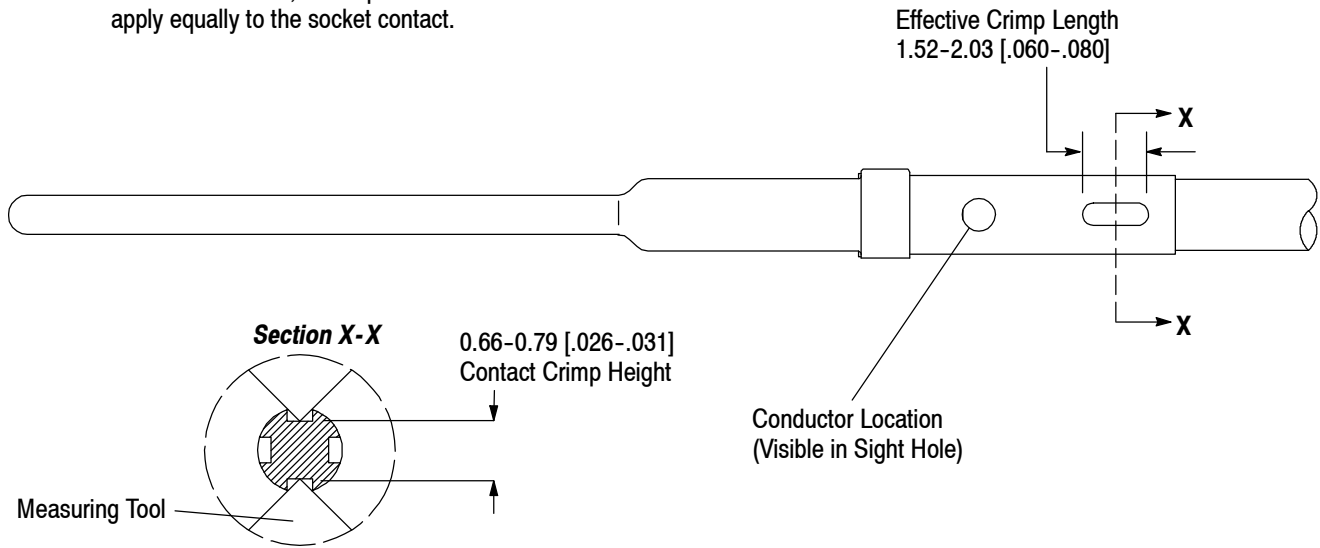


Figure 4

C. Twist and Roll

There shall be no twist, roll, deformation or other damage to the mating portion of the crimped contact that will prevent proper mating.

D. Straightness

The force applied during crimping may cause some bending between the crimped conductor barrel and the mating portion of the contact. Such deformation is acceptable within the limits shown in Figure 5.

1. Up and Down

The crimped contact shall not be bent above or below the datum line more than the amount shown in Figure 5.

2. Side to Side

The side-to-side bending of the contact may not exceed the limits provided in Figure 5.

NOTE *Periodic inspections must be made to ensure crimped contact formation is consistent as shown.*

NOTE: Angles are drawn for clarification only and are not to scale. Pin contact shown, but requirements apply equally to the socket contact.

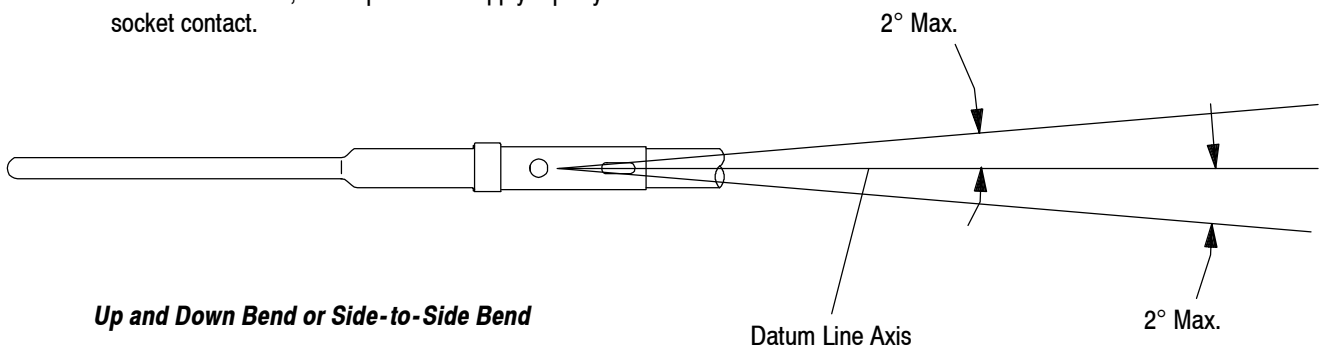


Figure 5

3.7. Pin Contact Assembly

1. Insert pin contacts into the pin dielectric until fully bottomed as shown in Figure 6A.
2. The back end of the dielectric should butt up against the inner ferrule/outer braid.

NOTE

For signal positioning, refer to Figure 8.



3. Insert and push the dielectric sub-assembly into the shell while keeping the slot on the dielectric aligned with the wiring key on the outside of the shell using Quadrax Ferrule Insertion Tool 1976593-2. See Figure 6B.
4. Continue pushing until the dielectric sub-assembly visually bottoms. See Figure 6C.
5. Crimp the pin shell by placing the crimp portion of the contact into the crimp tooling as provided in Section 5, TOOLING. The hex crimp should measure 5.54 mm [.218 in.] nominal across the flats.
6. After crimping, slide the sealing boot (if used), over the crimp area until the seal bottoms on the contact. Visually orient the sealing boot key with the contact positioning key.

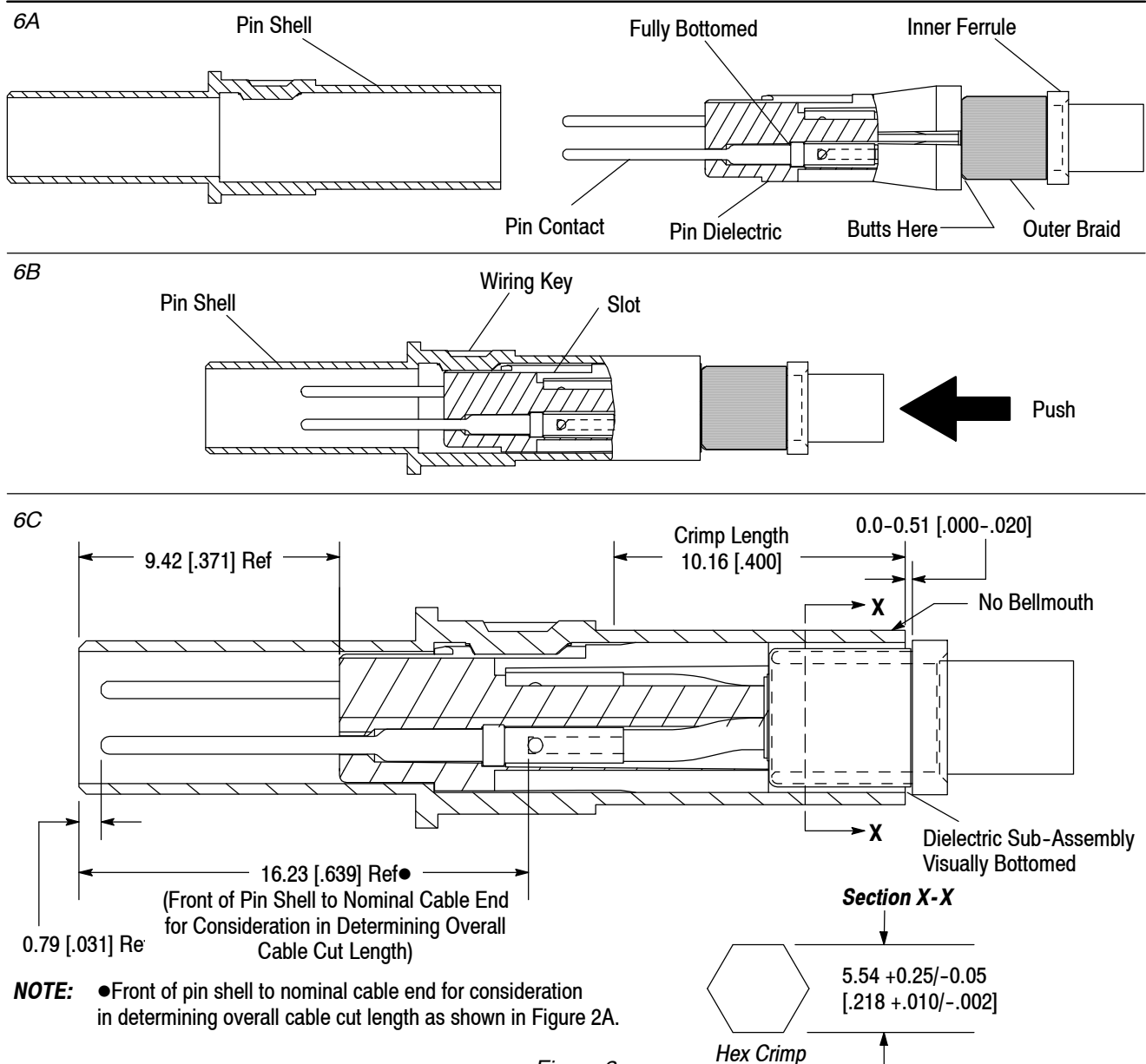


Figure 6

3.8. Socket Contact Assembly

1. Insert socket contacts into socket dielectric until fully bottomed as shown in Figure 7A.
2. The back end of the dielectric should butt up against the inner ferrule/outer braid.

NOTE

For signal positioning, refer to Figure 8.



3. Insert and push the dielectric sub-assembly into the shell while keeping the slot on the dielectric aligned with the wiring key on the outside of the shell using Quadrax Ferrule Insertion Tool 1976593-1. See Figure 7B.
4. Continue pushing until the dielectric sub-assembly visually bottoms. See Figure 7C.
5. Crimp the socket shell by placing the crimp portion of the contact into the crimp tooling as provided in Section 5, TOOLING. This hex crimp should measure 5.54 mm [.218 in.] nominal across the flats.
6. After crimping, slide the sealing boot (if used), over the crimp area until the seal bottoms on the contact. Visually orient the sealing boot key with the contact positioning key.

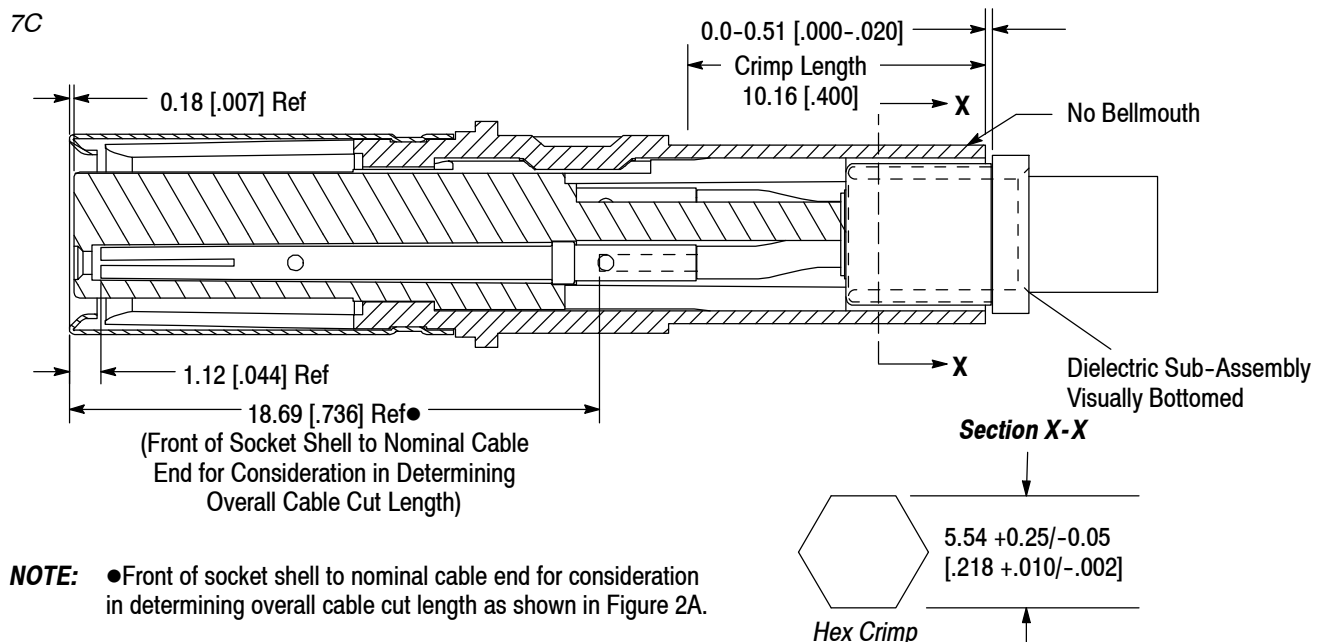
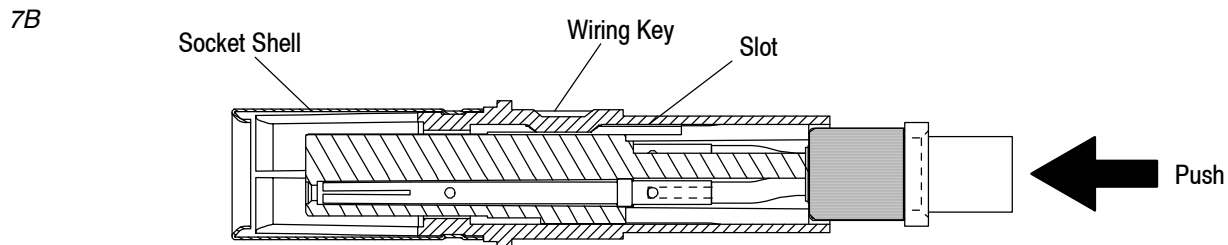
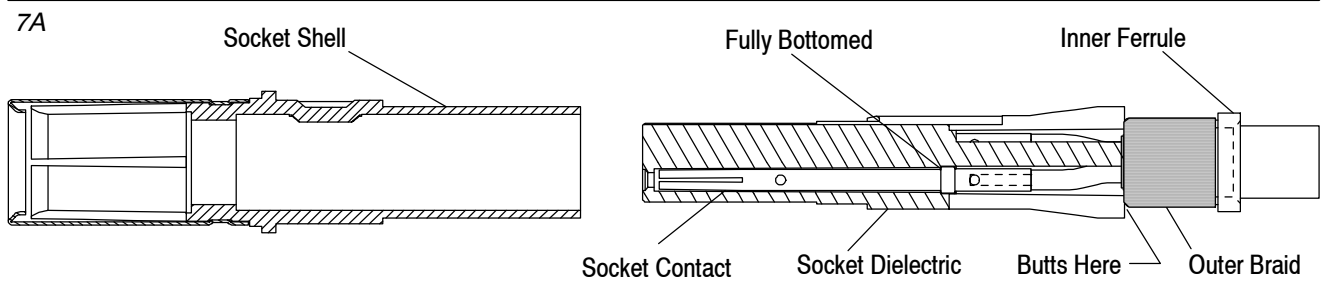



Figure 7

3.9. Contact Cavity Numbering

Figure 8 provides information on contact cavity numbering with regards to standard and reverse number assignments for the pin and socket connector assembly per ARINC 600, Appendix K.

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.

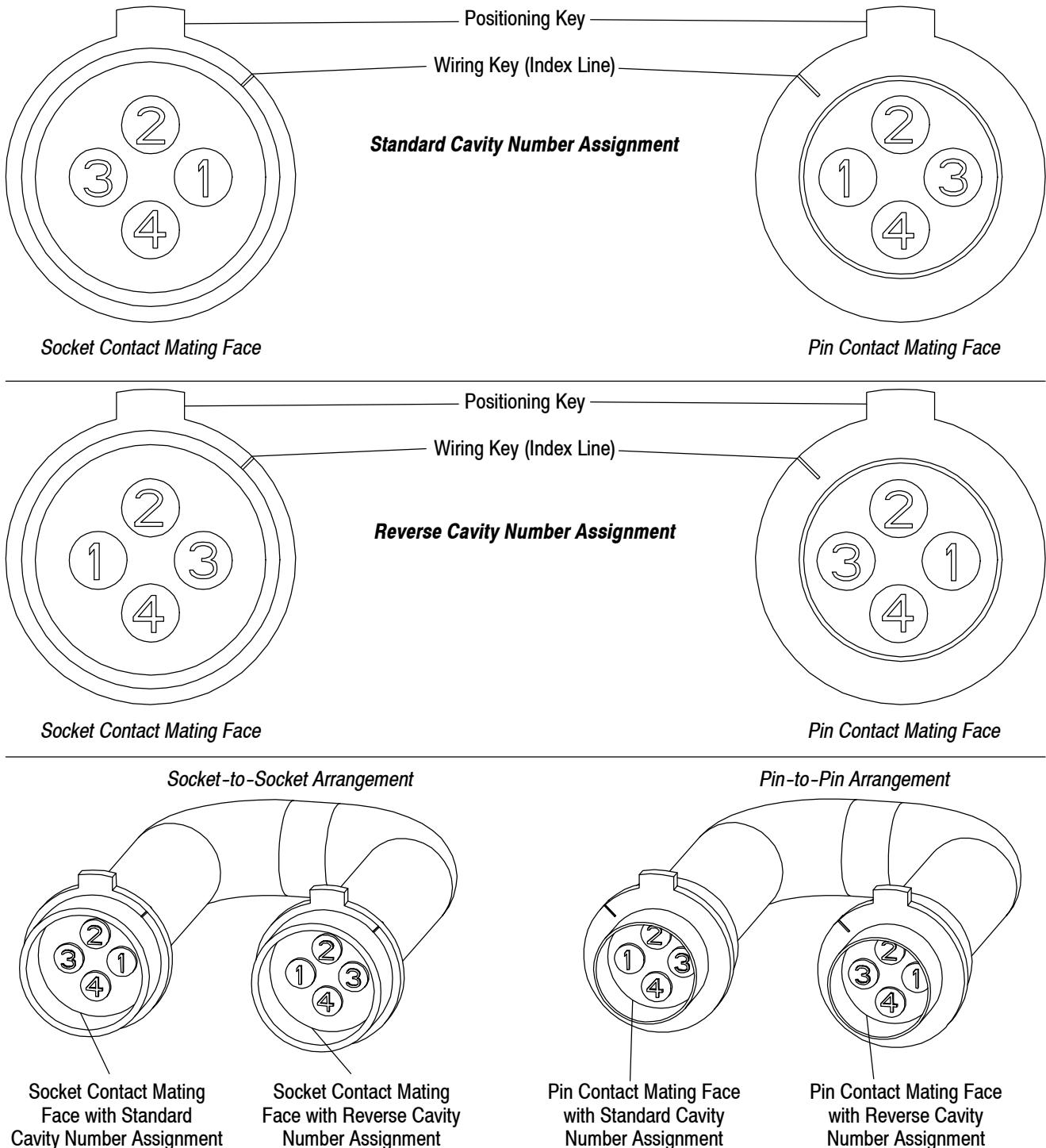


Figure 8

3.10. Installation of Jackpost and Jackscrew

1. Place the jack-post (or jack-screw) inside the connector shell cavity and align the polarization code indicator and hex flats with the desired letter on the shell. Polarization codes A through F are available, however, only codes B, C, E, and F are shown on the shell. See Figure 9.
2. On the other side of the connector, run the retention nut down onto the threads of the jack-post (or jack-screw), and then tighten the nut with the Retention Nut Wrench 1604972-1 to a torque value of 1.13 N•m [10 in. lbf].

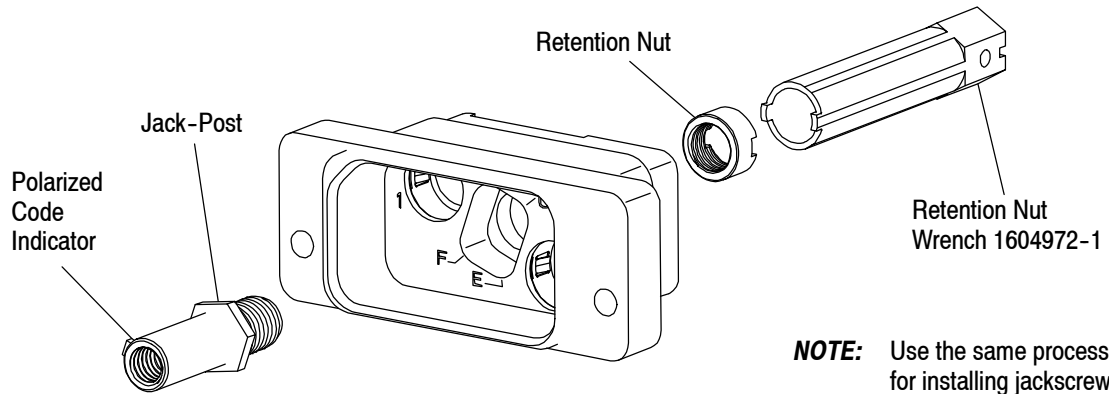


Figure 9

3.11. 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.

NOTE *Prior to inserting the contacts into the 2-position connector, insert the terminated cables through the backshell.*

A. Installation of Quadrax Pin Contact Assemblies in Receptacle Connectors

1. Install the pin shell sub-assembly in the insert block or receptacle assembly until the pin shell snaps in place. Line up the positioning key with the internal key on the connector. See Figure 10A and 10B.
2. Install the insert block into a standard ARINC 600 Receptacle Shell according to the dimensions provided in Figure 10C.

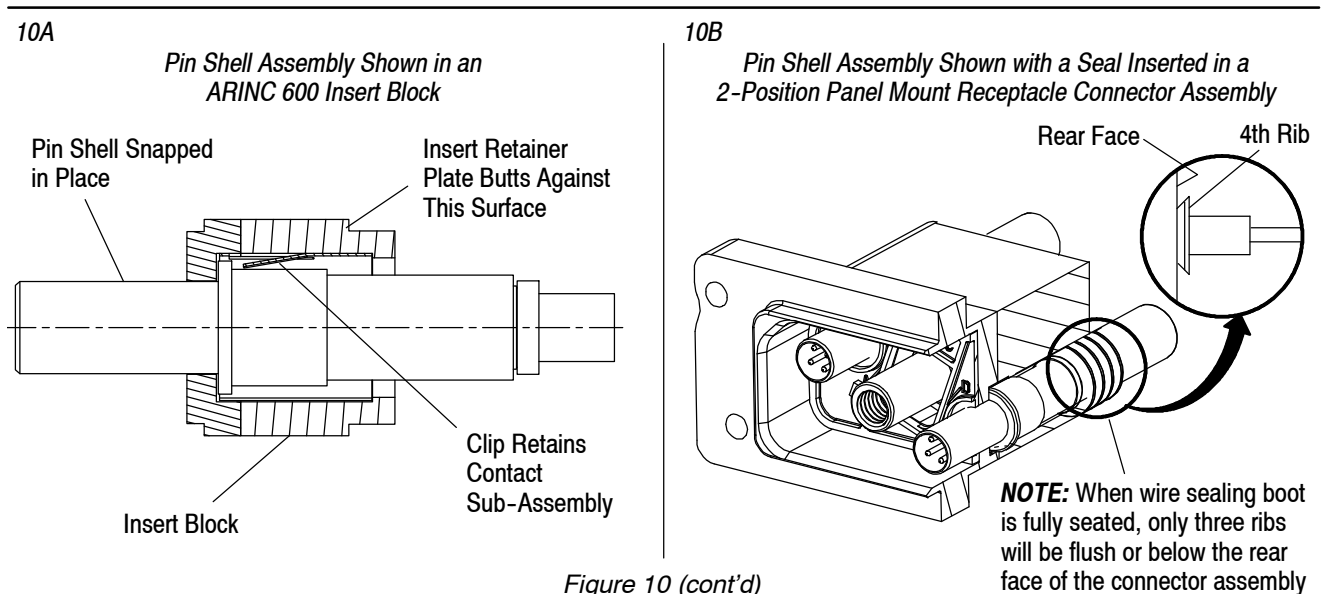


Figure 10 (cont'd)

10C

Pin Shell Assembly Shown in a Receptacle Connector Assembly
Inserted in a Standard ARINC 600 Receptacle Shell

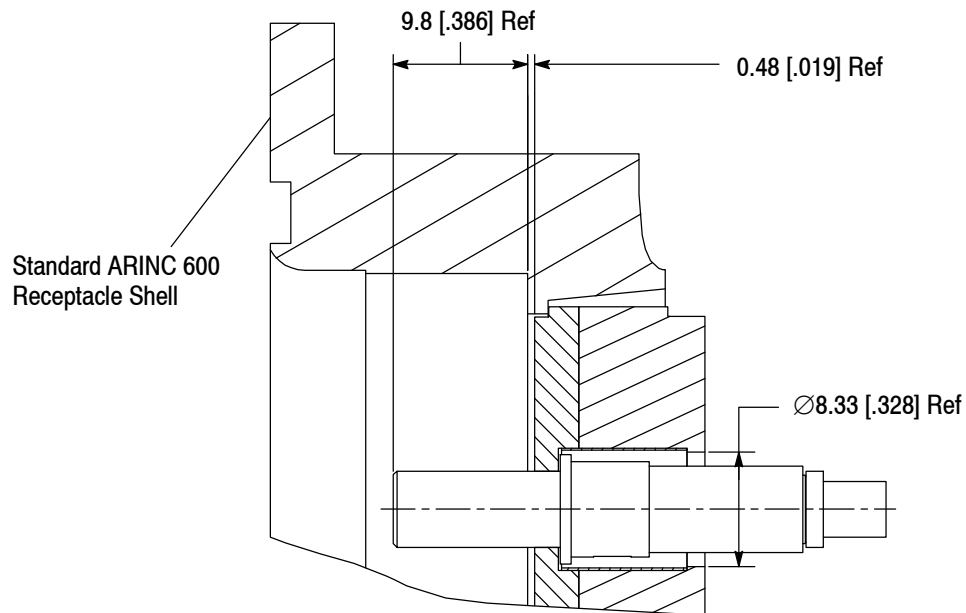


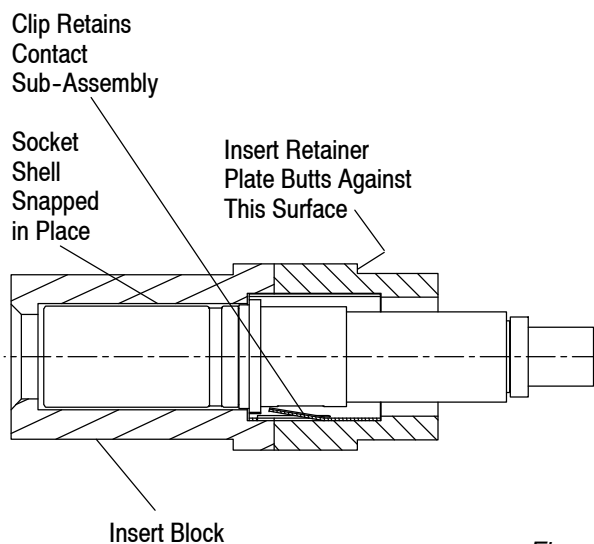
Figure 10 (end)

B. Installation of Quadrax Socket Contact Assemblies Into Plug Connectors

1. Install the socket shell sub-assembly in the insert block or plug assembly until the socket shell snaps in place. Line up the positioning key with the internal key on the connector. See Figure 11A and 11B.
2. Install the insert block into a standard ARINC 600 Plug Shell according to the dimensions provided in Figure 11C.

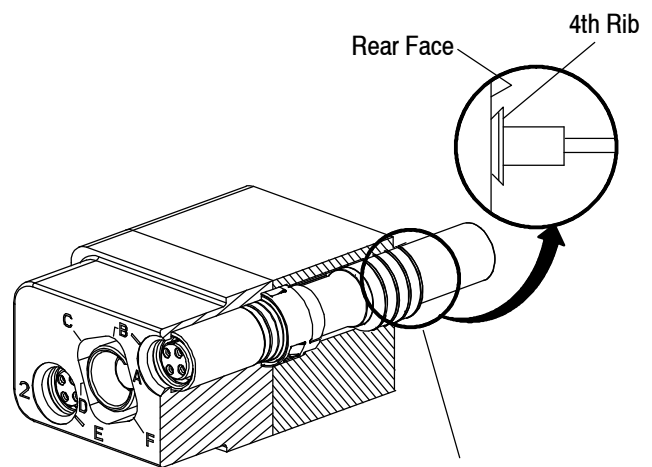
11A

Socket Shell Assembly Shown in an
ARINC 600 Insert Block



11B

Socket Shell Assembly Shown with a Seal Inserted in a
2-Position Free-Hanging Plug Connector Assembly



NOTE: When wire sealing boot is fully seated, only three ribs will be flush or below the rear face of the connector assembly

Figure 11 (cont'd)

11C

Socket Shell Assembly Shown in a Plug Connector Assembly
Inserted in a Standard ARINC 600 Plug Shell

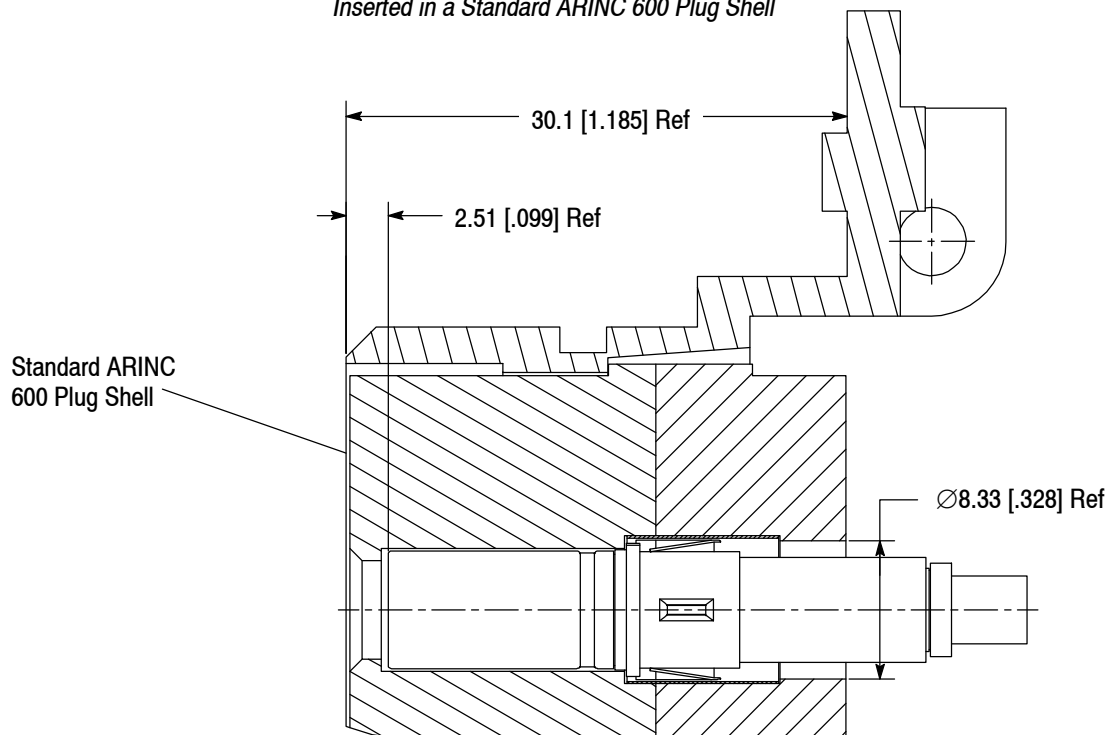


Figure 11 (end)

3.12. Installation of Backshells Onto Connector Assemblies

The following paragraphs provide information on assembly procedures for the 2- and 12-position backshell assemblies.

A. Installation of 2- Position Backshell Assembly

NOTE



Prior to installing the 2-position backshell assembly onto the connector shell, the contacts and cables must be run or fished through the backshell.

1. Place the backshell down onto the back end of the connector shell as shown in Figure 12. The backshell should be flush with the back end of the connector shell and pressed down on the sealing boots/plugs.
2. Using a 7/64 inch Allen wrench, tighten the captive screws to a torque value of 1.13 N•m [10 in. lbf], and apply a cable tie (customer supplied) through the back of the backshell assembly as shown in Figure 12.
3. The installed backshell assembly should meet the dimensions shown in Figure 12.

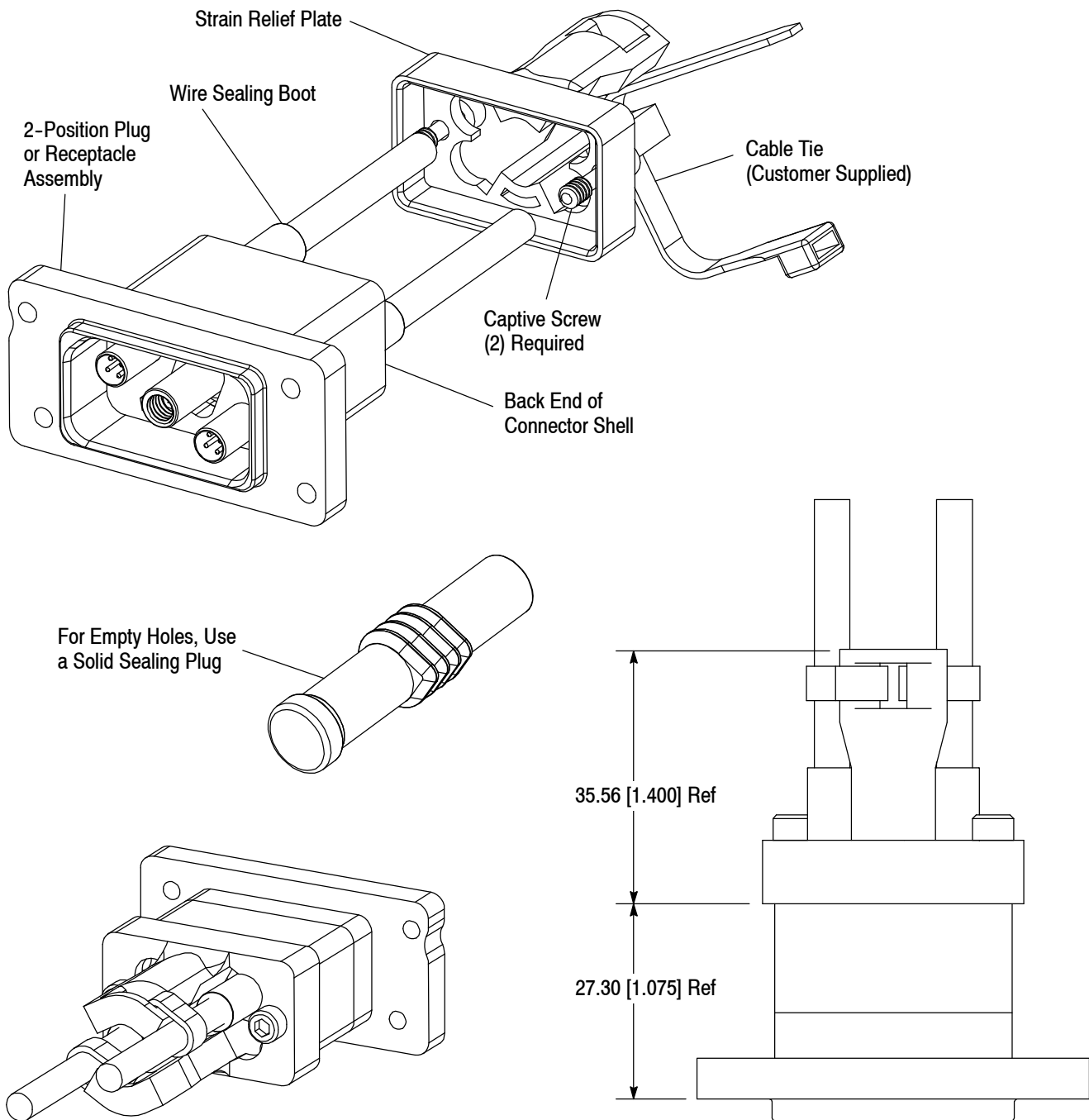


Figure 12

B. Installation of a 12-Position Backshell Assembly

1. Place the backshell down onto the back end of the connector shell between the rows of contacts as shown in Figure 13. The backshell should be flush with the back end of the connector shell, and pressed down on the sealing boots/plugs.
2. Using a 7/64 inch Allen wrench, tighten the captive screws to a torque value of 1.13 N•m [10 in. lbf], and apply a cable tie (customer supplied) through the back of the backshell assembly as shown in Figure 13.
3. The installed backshell assembly should meet the dimensions shown in Figure 13.

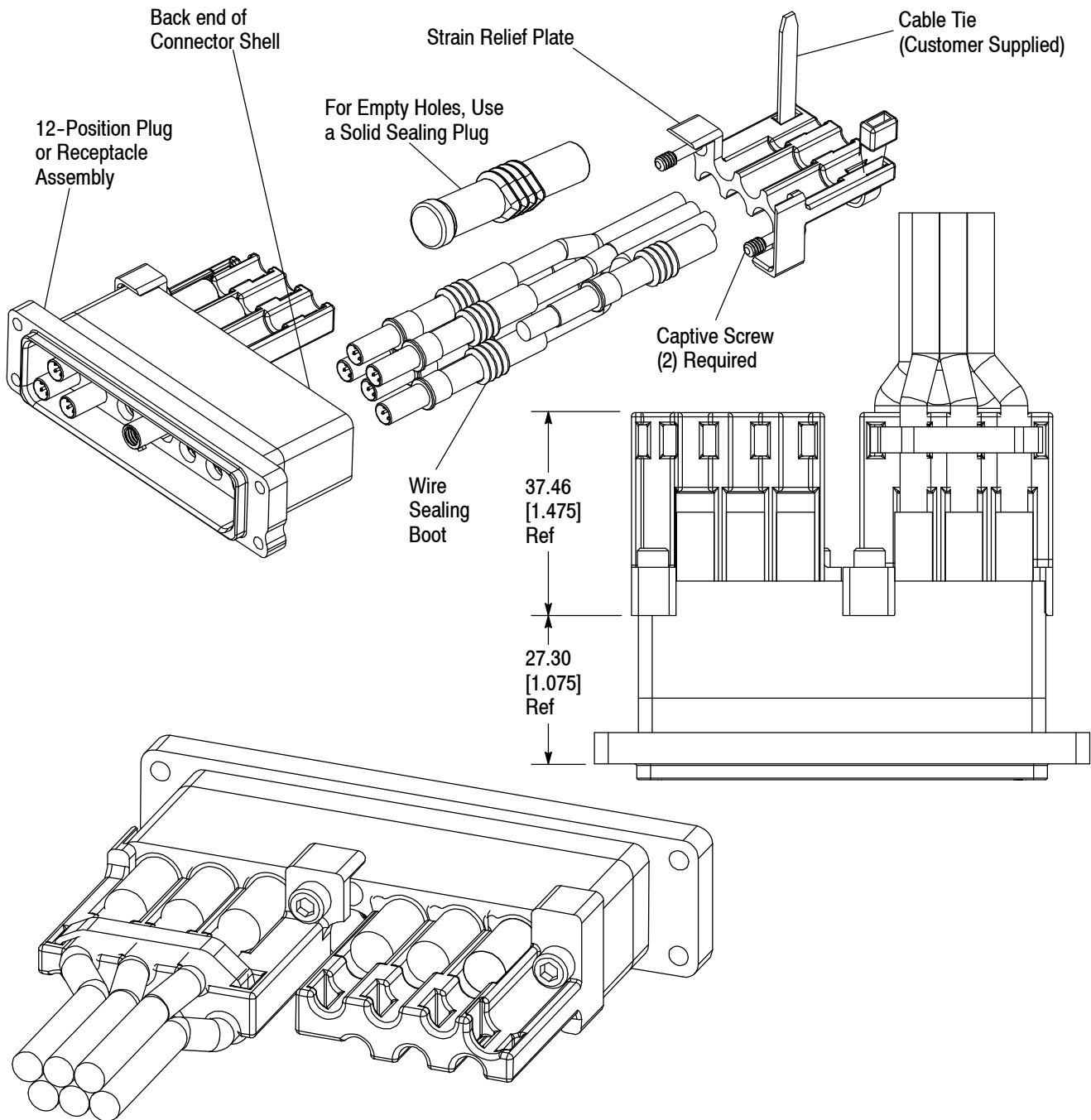
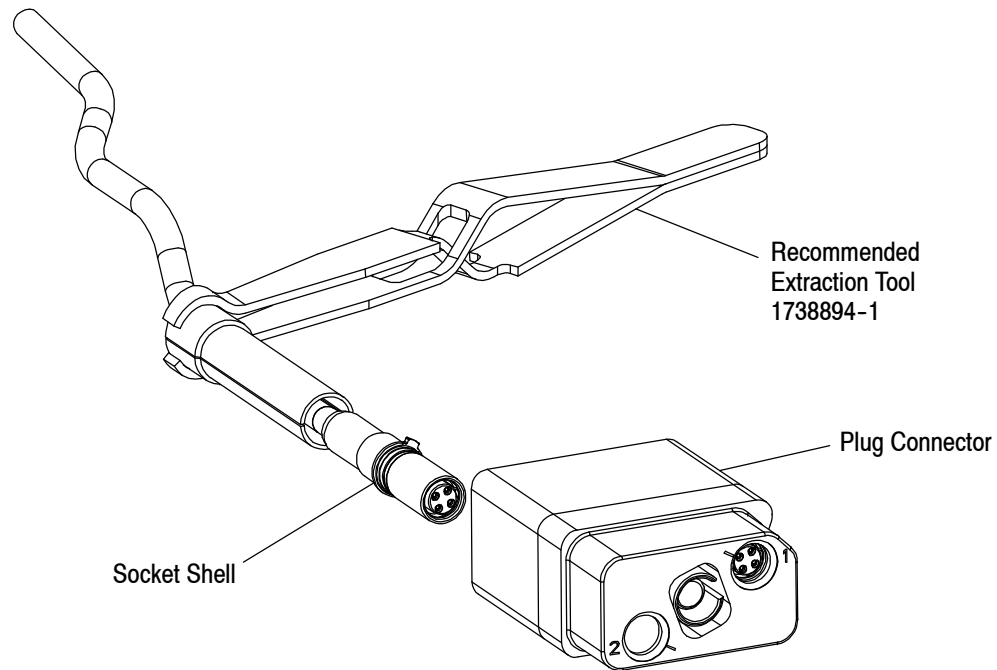


Figure 13

3.13. 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 14.

1. Cut wire tie and remove backshell by loosening captive screws.
2. Slide sealing boot back up the cable and out of the way.
3. Insert extraction tool over wire insulation and bottom the tool in the cavity hole.
4. Pull up while holding the tool and cable. Contact should easily come out.



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

Figure 14

3.14. 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 15.

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 15.
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.

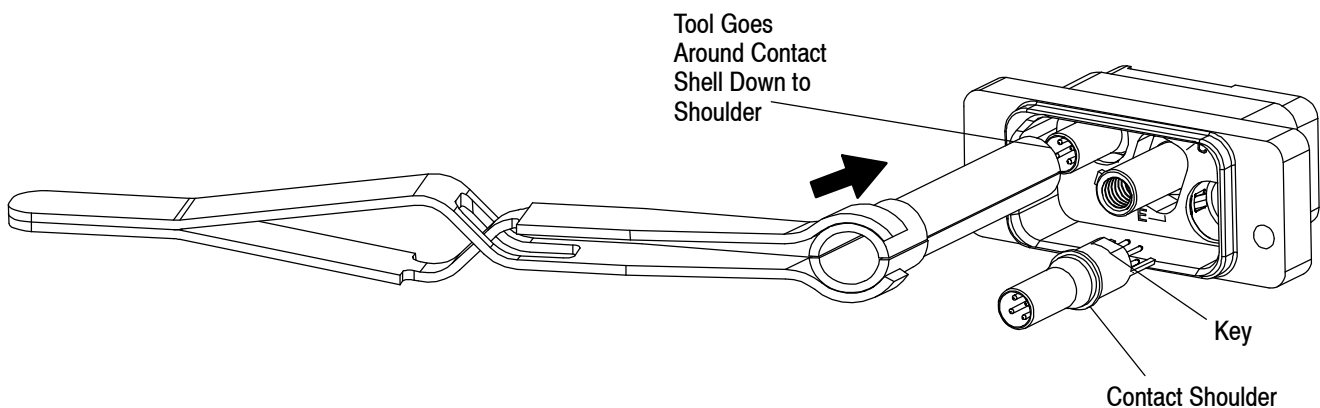


Figure 15

D. 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 17.

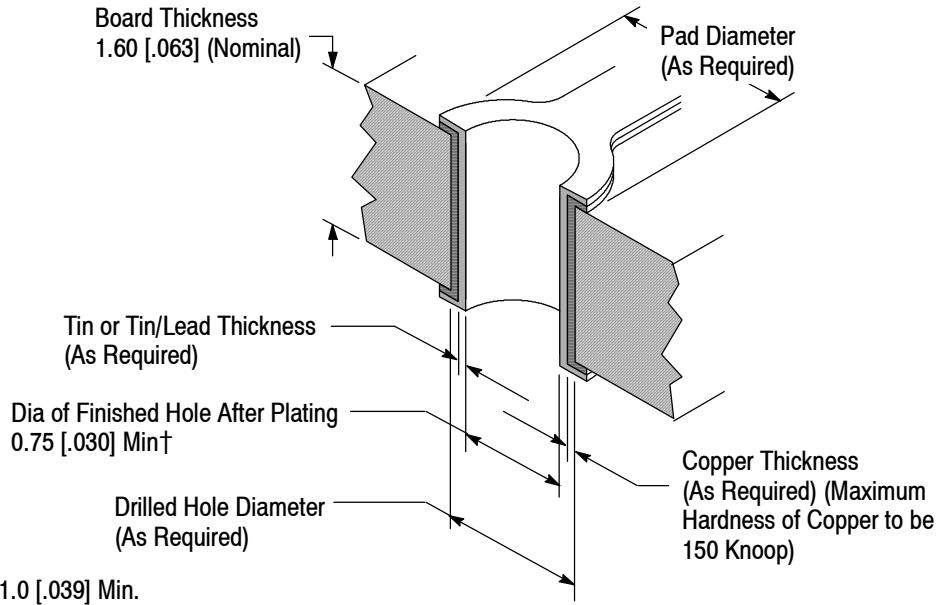


Figure 17

3.16. 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.

3.17. Placement

CAUTION 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.

3.18. 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 18. TE 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 18

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 19.

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

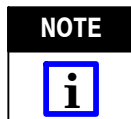
Figure 19

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 20.



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 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.



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 20

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.

3.19. Checking Installed Connector

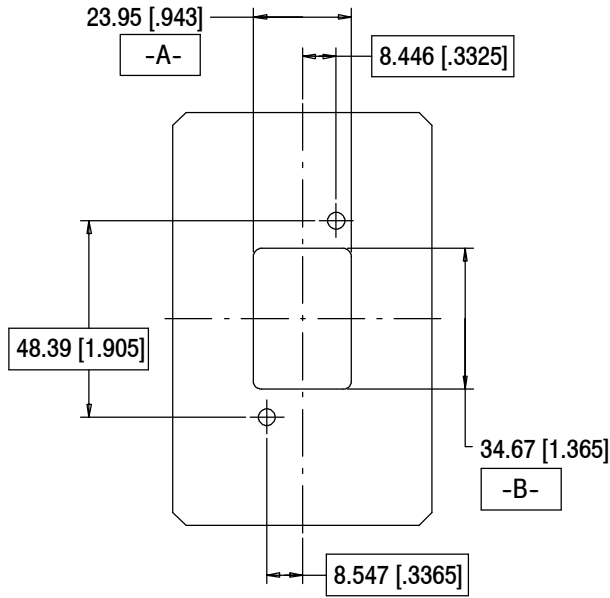
All solder joints should conform to those specified in Test Specification 109-11. The connector must seat on the pc board to within the tolerance of 0.00-0.25 mm [.000-.010 in.].

3.20. Panel Cutouts

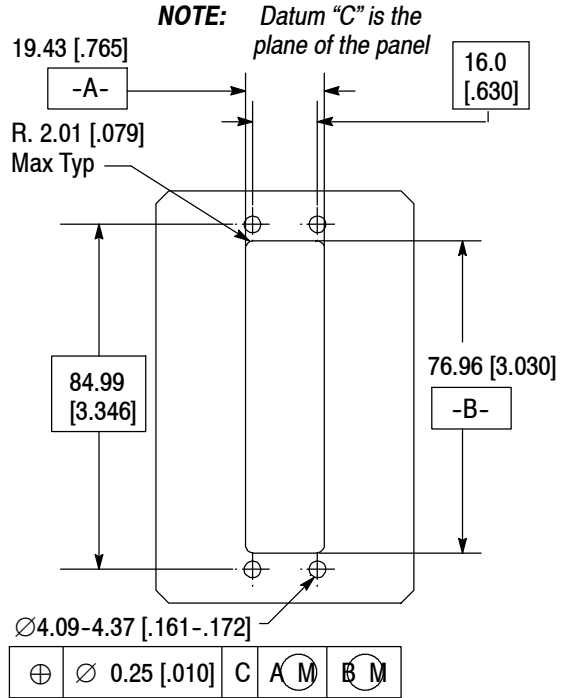
Panel cutout dimensions and pc board mount cutouts for the 2- and 12-position Quadrax Rectangular Connectors are shown in Figure 21. The panel-mount connector can be attached to the panels with customer supplied 6-32 UNC fasteners with a torque value of 1.13 N•m [10 in. lbf].

ALPHA, BIOACT, CARBITOL, KESTER, and LONCOTERGE are trademarks of their respective owners.

Recommended Panel Cutout Dimensions

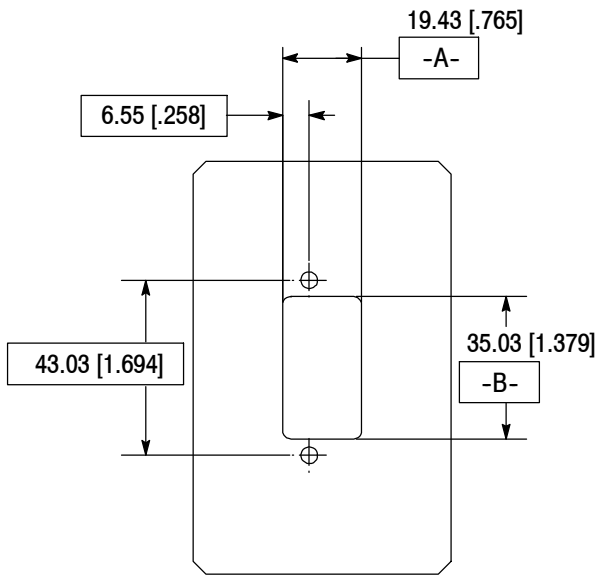
 Panel Stock Thickness:
 1.27-1.78 [.050-.070]


2-Position Panel Mount Connector

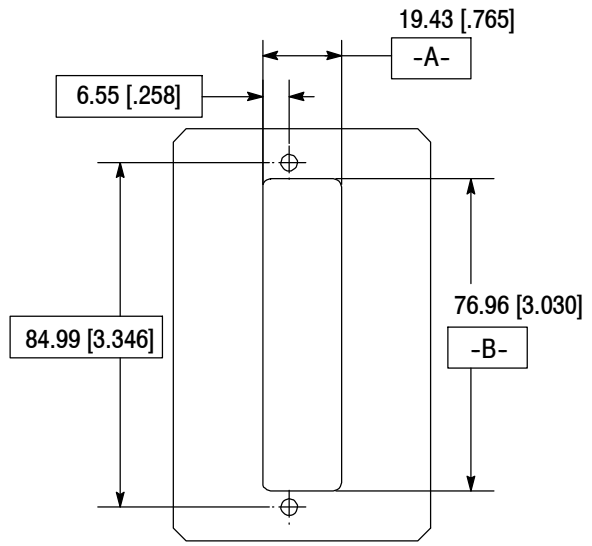


Typ 2X or 4X As Shown

12-Position Panel Mount Connector



2-Position PC Board Mount Connector



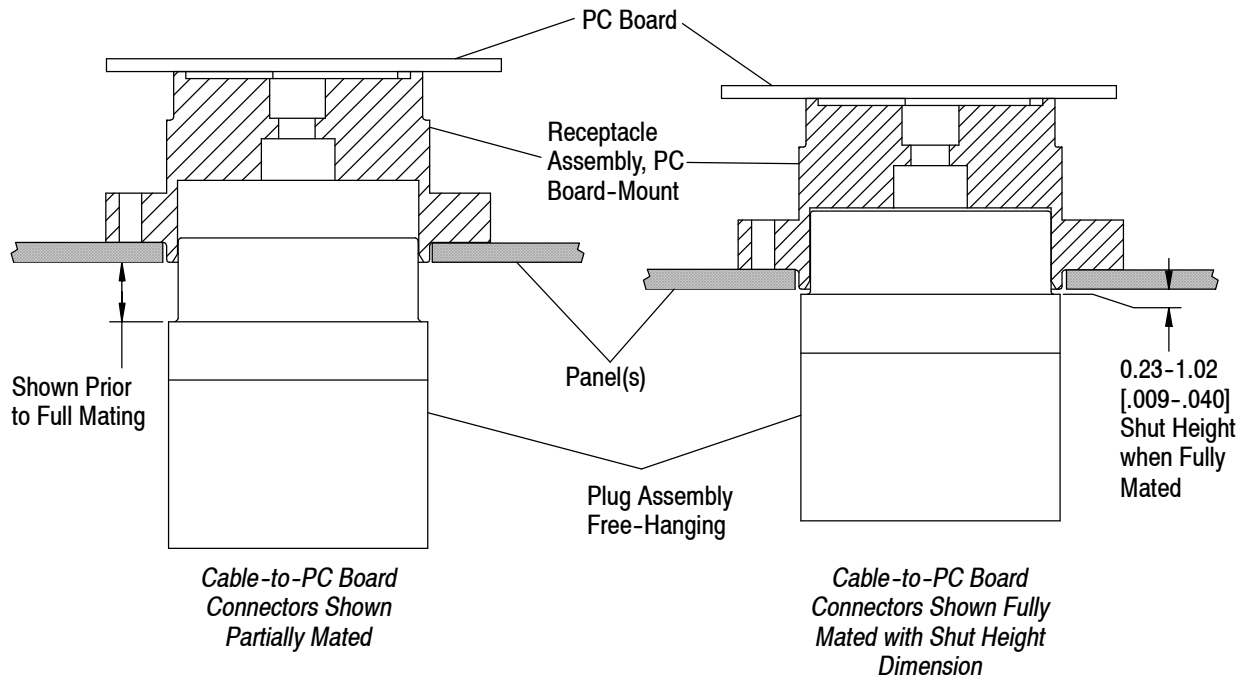
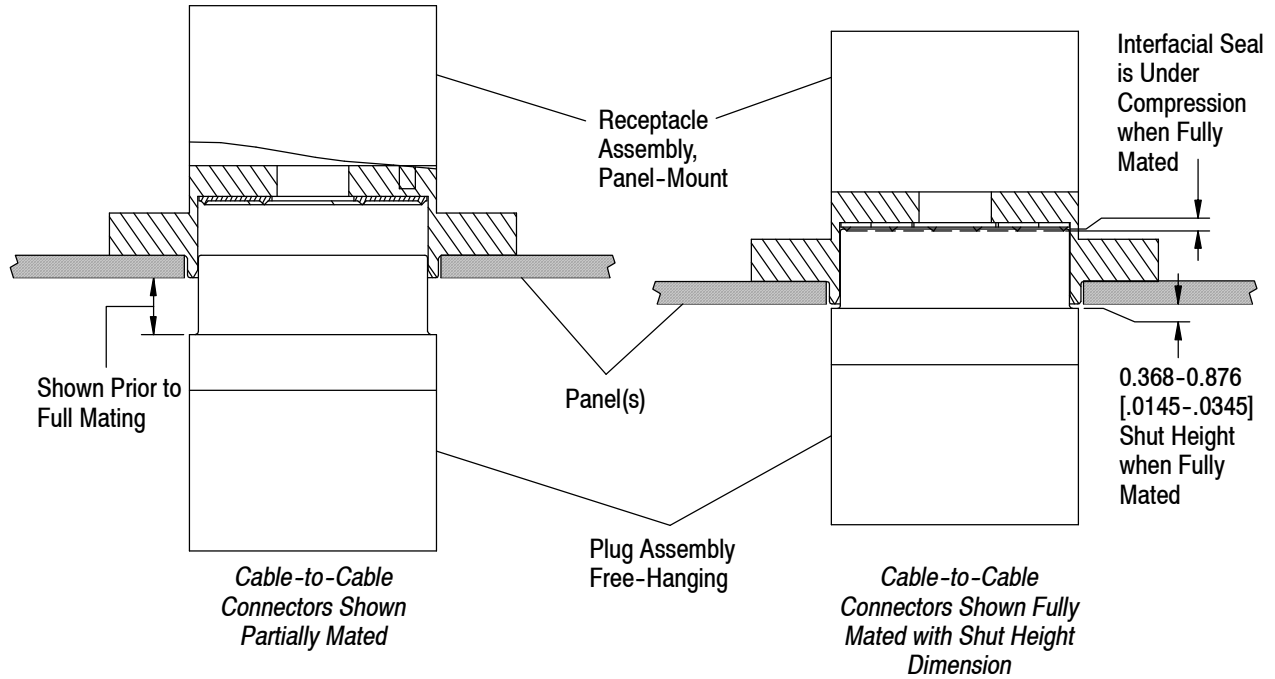
12-Position PC Board Mount Connector

Figure 21

3.21. 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. For example, "A" polarization should be visible on both connector halves if they are to successfully mate.

To mate the connectors, bring them together by fastening the jack screw to the mating jack-post. A 9/64" Allen Wrench is required and a torque value of .79 N•m [7 in. lbf] should be achieved. Do not over torque the jackscrew. Refer to Figure 22 for the proper mating dimensions. To unmate the two connector halves, loosen the jackscrew until the connectors are separated.

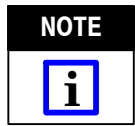


NOTE: Panels not shown for clarity.

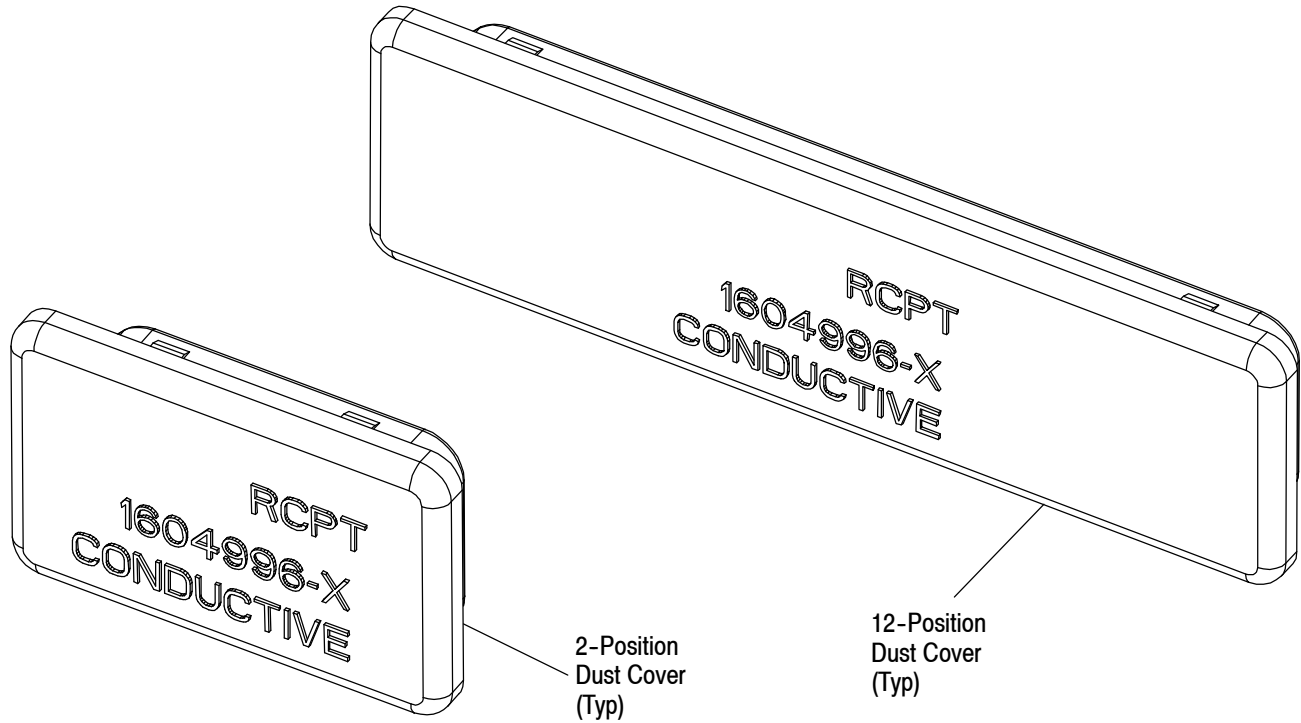
Figure 22

3.22. Ancillary Items

Optional dust covers for the 2- and 12-position Quadrax Rectangular Receptacle Connectors are available for purchase through your local TE Representative or by calling the PRODUCT INFORMATION number at the bottom of page 1. See Figure 23.



If a dust cover is supplied with the connector, it can easily be removed by prying it off by hand. It can be placed back on by hand and is used to protect the connector and installed contacts while they are not in use. See Figure 23.



NOTE: Receptacle Dust Covers Shown, Plug Dust Covers Also Available.

Figure 23

3.23. 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.

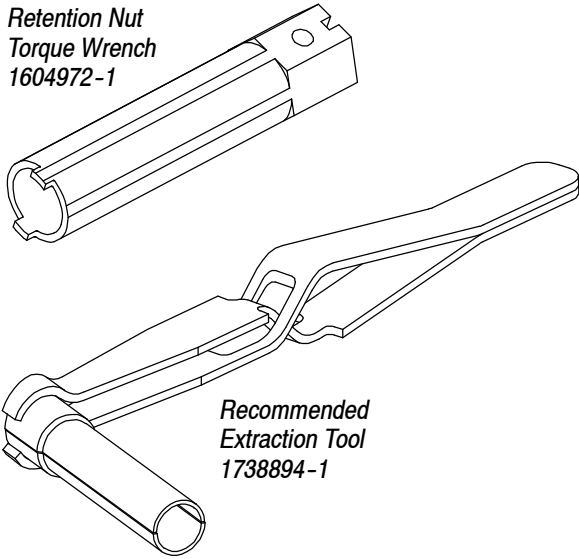
4. QUALIFICATIONS

Quadrax Rectangular Connectors are tested to Boeing BPS-C-193, referenced Test Report 502-1182. See also Paragraph 2.5.

5. TOOLING

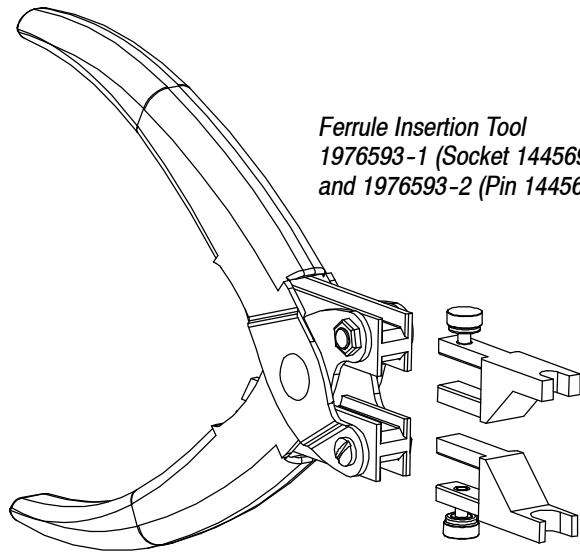
Quadrax Contacts and ferrules can be terminated using hand crimping tools that accommodate the wire size specified. Military (DANIELS) tool, positioner, and die sets are available to crimp the screw-machine pin or socket contact, and ferrule. See Figure 24 for recommended tooling.

Retention Nut
Torque Wrench
1604972-1



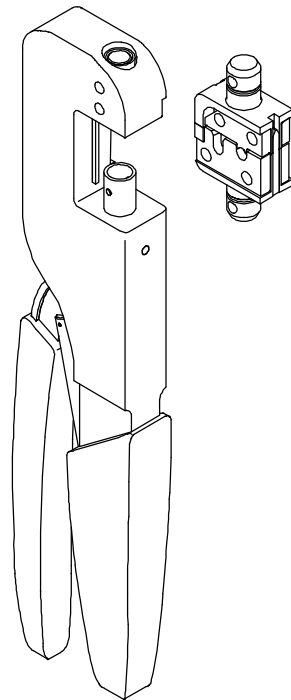
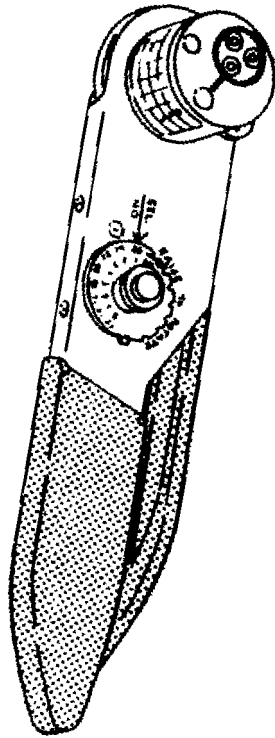
Recommended
Extraction Tool
1738894-1

Ferrule Insertion Tool
1976593-1 (Socket 1445693)
and 1976593-2 (Pin 1445692)



Ferrule Termination
(Military) DANIELS
Tool and Die Set

Signal Contact Termination
(Military) DANIELS Tool and
Positioner



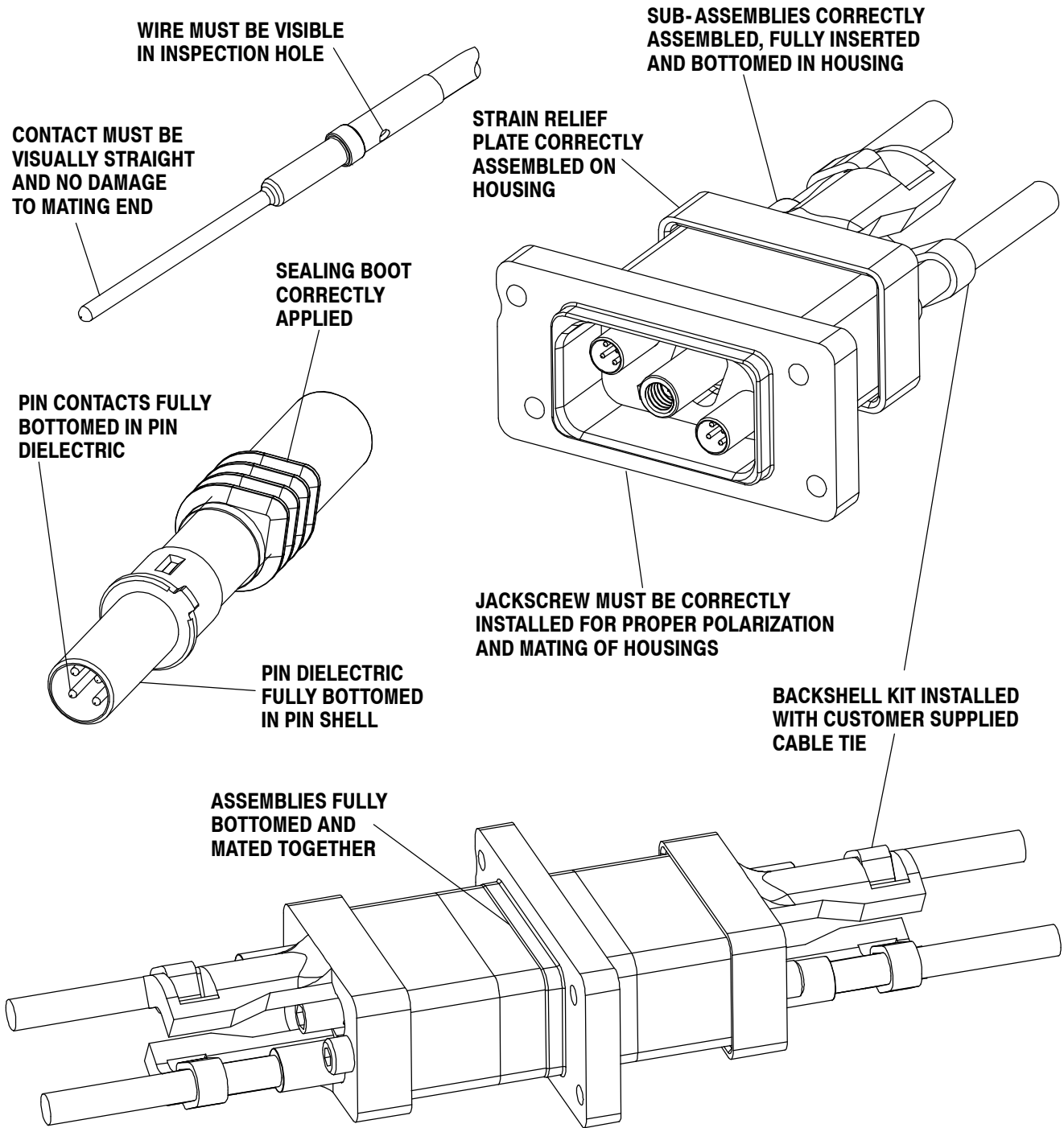
| WIRE SIZE (AWG) | CONTACT TYPE | CONTACT TERMINATION TOOLING | | | FERRULE TERMINATION TOOLING | | EXT TOOL | RETENTION NUT TORQUE WRENCH |
|-----------------|---------------|-----------------------------|-----------------------|------------------|--|-------------|-----------|-----------------------------|
| | | HAND TOOL | POSITIONER OR DIE SET | SELECTOR SETTING | HAND TOOL | DIE SET | | |
| 24 | Pin or Socket | M22520/2-01 | K709 | 5 | M22520/5-01 or 608650-1 or 1976593-1, -2 | M22520/5-45 | 1738894-1 | 1604972-1 |
| 26 | | | | 4 | | | | |

Figure 24

6. VISUAL AID

Figure 25 shows a typical application of Quadrax Rectangular 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.

NOTE: PIN CONTACT SHOWN, SOCKET CONTACT REQUIREMENTS ARE THE SAME.



NOTE: PANEL REMOVED FOR CLARITY ON MATED HOUSINGS.

FIGURE 25. VISUAL AID