

**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  $\pm 0.13$  [.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 the Miniature Circular Plastic Connector (CPC). The connector system is available in wire-to-wire, wire-to-board (vertical and right-angle), and wire-to-panel configurations. The connector is available in two shell sizes: Size 8 (1-4), or Size 11 (5-9) contact positions. The Mini-Universal MATE-N-LOK\* contacts used in these connectors are designed to accept a wire size range of 30 through 18 AWG and application may be done by machine for reel-mounted contacts, or by hand for replacement of loose-piece contacts.

**NOTE**

Refer to Application Specifications 114-13089 or 114-16017 for all termination, application information, and procedures for the contacts which are used in the Miniature CPC.

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

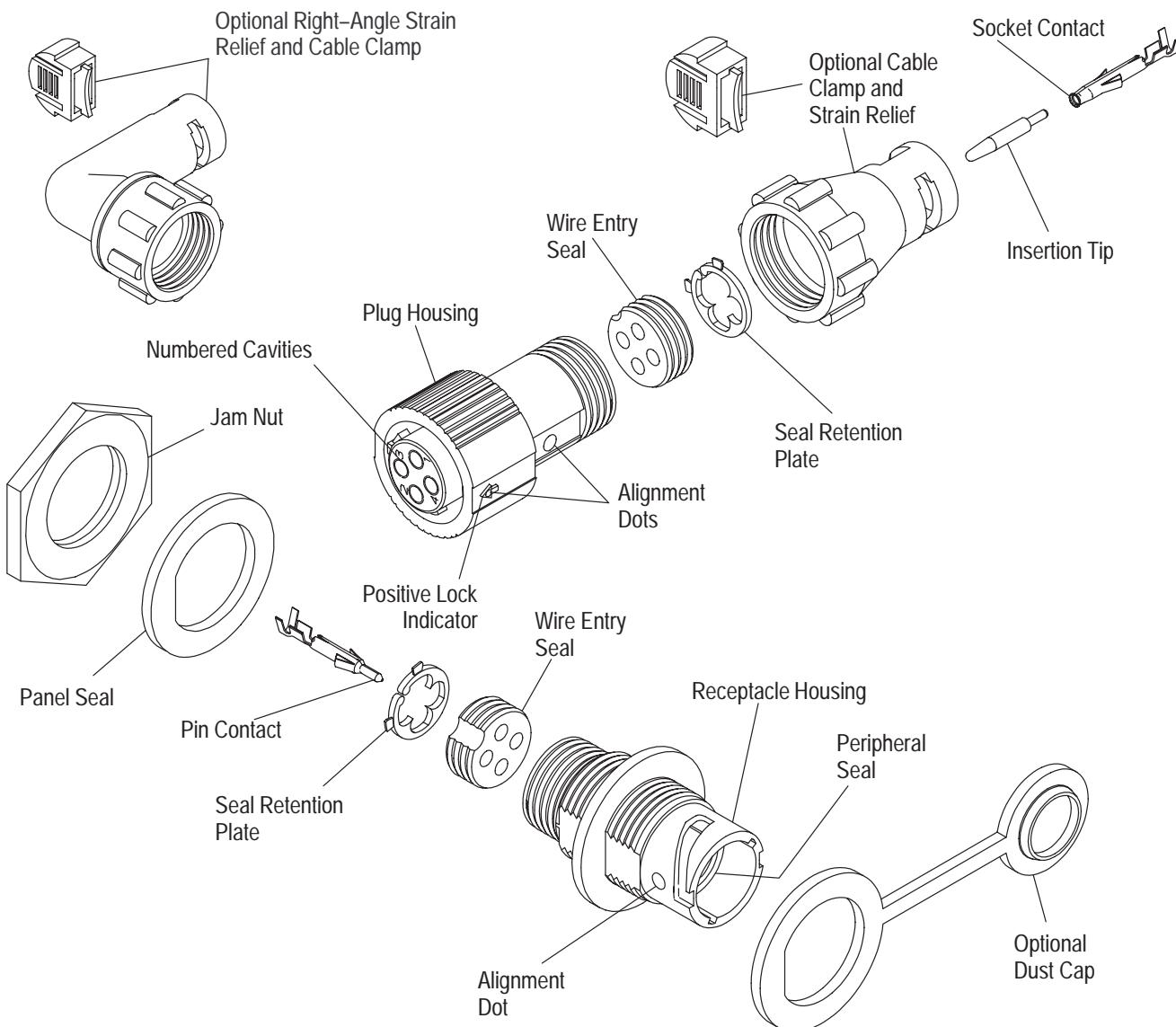


Figure 1

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

Per EC 0990-0642-03:

- Initial release of application specification

### 2.2. Customer Assistance

Reference base part numbers 1445390 and 1445421, and product code H314 are representative numbers of Miniature CPC. 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 (Field Sales Engineer, Field Applications Engineer, etc.) or, after purchase, by calling the Tooling Assistance Center or the FAX/Product Information number at the bottom of page 1.

### 2.3. Drawings

Customer Drawings for specific products are available from the responsible Tyco Electronics Engineering Department via 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.

### 2.4. Specifications

Application Specifications 114-13089 and 114-16017 provides information for termination and crimp requirements of the contacts used in these connector assemblies. Product Specification 108-2079 provides product performance and test results.

### 2.5. Instructional Material

The following list includes available instruction sheets (408-series) that provide assembly procedures for product, operation, maintenance and repair of tooling, as well as setup and operation procedures of applicators; and customer manuals (409-series) that provides setup, operation, and maintenance of machines.

<u>Document Number</u>	<u>Document Title</u>
408-3295	Preparing Reel of Contacts for Application Tooling
408-4118	Extraction Tool 189727-1
408-4443	Straight Action Hand Tool 90717-2
408-7347	Insertion Tool 91002-1
408-7424	Checking Terminal Crimp Height or Gaging Die Closure
408-7984	Insertion Tool 455830-1
408-8040	Heavy Duty Miniature Quick-Change Applicators (Side-Feed Type)
408-8322	Heavy Duty Industrial (HD-I) Side-Feed Type Applicators
408-8490	Fine Adjust Assembly 879103-[ ] for Heavy Duty Industrial (HD-I) Type Applicators
408-8547	CERTI-CRIMP* II Straight Action Hand Tools 91522-1 and 91529-1
408-9640	Crimp Quality Monitor Applicators for Side-Feed and End-Feed Applications
408-9816	Handling of Reeled Products
408-9930	PRO-CRIMPER* II Hand Crimping Tool Frame Assembly 354940-1
408-9938	PRO-CRIMPER II Hand Tool Assembly 90758-1 with Die Assembly 90758-2
408-9962	PRO-CRIMPER II Hand Tool Assembly 90759-1 with Die Assembly 90759-2
408-9965	PRO-CRIMPER II Hand Tool Assembly 90870-1 with Die Assembly 90870-2
409-5128	Basic AMP-O-LECTRIC* Model "K" Terminating Machines, and Accessories
409-5842	AMP-O-LECTRIC Model "G" Terminating Machines 354500-[ ]
409-5852	AMPOMATOR* CLS III-G Lead Making Machine 122500-[ ]
409-5866	AMPOMATOR CLS IV Lead-Making Machine 217500-[ ]
409-5878	AMPOMATOR CLS IV+ Lead-making Machine 356500-[ ]
409-10012	AMP-O-MATIC* Side Feed Stripper-Crimper III Machine 1320895-[ ]
409-10016	Entry Level Terminator (ELT) Machine 1338600-[ ]
409-10027	Stripping Modules 1490500 and 1490502
409-10029	Stripping Modules 1490501 and 1490503

## 3. REQUIREMENTS

### 3.1. Safety

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

### 3.2. Storage

#### A. Reeled Contacts

When using reeled contacts, store coil wound reels horizontally and traverse wound reels vertically.

#### B. Ultraviolet Light

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

#### C. Shelf Life

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

#### D. Chemical Exposure

Do not store the contacts or connectors near any chemical 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.*

### 3.3. Materials

The wire entry seals are made of yellow or white Elastomer, the peripheral seal is made from gray Elastomer. The housing, coupling ring, and seal retention plate are made from black thermoplastic, the jam nut is made from nickel plated brass. The contacts are available in either a pre-tinned duplex finish plated with gold in the mating areas and tin-lead plated in the crimping area over nickel underplate on entire contact. The sockets are also available in brass or phosphor bronze.

### 3.4. Characteristics

The wire entry seals are color-coded for identification of the correct wire insulation range. The connectors have a pre-positioned 1/4 turn coupling ring with positive lock and alignment feature. As the coupling ring on the plug is threaded onto the receptacle it engages the positive lock. A slight turn beyond that point locks the connector together. The unique contact pattern for each position size helps prevent accidental mating with other position sizes. Connector housings with recessed mating faces have polarizing slots and those with flush mating faces have polarizing embossments to assure proper mating of circuits. Front or rear jam nut mounting is available, and alternate keys are available. No keying plugs are required since specific cavity amounts from 1 to 9-positions are available. See Figure 1.

### 3.5. Component Selection

Each connector must be used with specific seals and related components to ensure a sealed assembly for the required application. Mating connectors must have identical number of positions. A cross-reference of connector-to-seal and connector-to-connector is listed in Figure 2.

SHELL SIZE	PLUG HOUSING	RECPT ASSY	RECPT ASSY (PANEL MOUNT)	PANEL SEAL	STRAIN RELIEF		DUST CAP	JAM NUT	SOCKET INSERTION TIP
					STRAIGHT	RIGHT-ANGLE			
8	1445390-[]	1445389-[]	1445421-[]	1445420-1	1445730-1	1445771-1	1604089-1	1604196-1	1604816-1
11	1445807-[]	1445825-[]	1445816-[]	1445420-2	1445856-1	1546746-1● 1546746-2□	1604089-2	1445904-1	

●Open Style    □With Cover

Figure 2

### 3.6. Circuit Identification

Contact cavities are numbered on the plug and receptacle assembly on the wire entry and mating face of the housing. See Figures 1 and 5.

### 3.7. Wire Selection and Preparation

#### A. Type

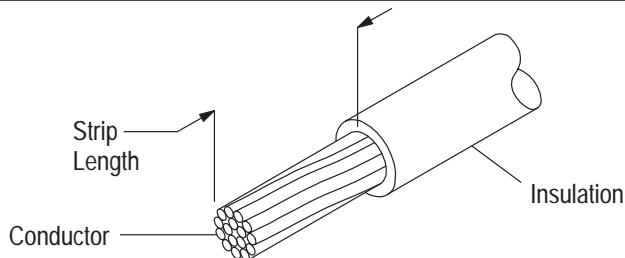
The wire size range for Miniature CPC is 30 to 18 AWG stranded wire with an insulation diameter range of 0.89–2.39 [.035–.110]. See Figure 3.

#### B. Preparation

Strip the wires according to the dimensions given in Figure 3.

**CAUTION**

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



WIRE SIZE RANGE	STRIP LENGTH	CRIMP HEIGHT
30-18	3.20–3.71 [.126–.146]	REFER TO THE DOCUMENTATION SUPPLIED WITH THE APPLICATION TOOLING PROVIDED IN SECTION 5 OF THIS DOCUMENT OR APPLICATION SPECIFICATIONS 114-13089 OR 114-16017

Figure 3

### 3.8. Contact Termination

Strip form contacts are designed to be crimped with a miniature applicator in a semi-automatic or automatic machine. Loose piece contacts are designed to be crimped with a hand crimping tool. Refer to the table in Figure 10 for the appropriate hand tools, applicators, and machines. Refer to Paragraph 2.5, Instructional Material, for information on crimp tooling and instructions. Terminate the contacts according to the dimensions and procedures provided in Application Specifications 114-13089 and 114-16017, and the referenced tooling documentation.

**NOTE**

*If strain reliefs are used, make sure they have been slid over the wires and out of the way before wire termination.*

### 3.9. Panel Mount Layout

Miniature CPC can be mounted to the front or back of a panel using the layout dimensions shown in Figure 4.

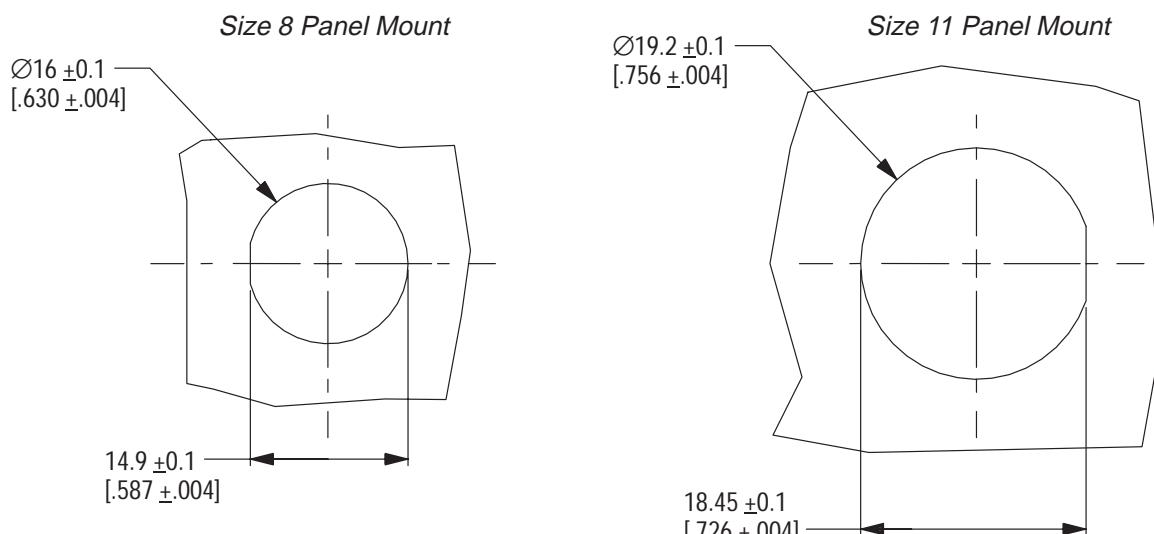
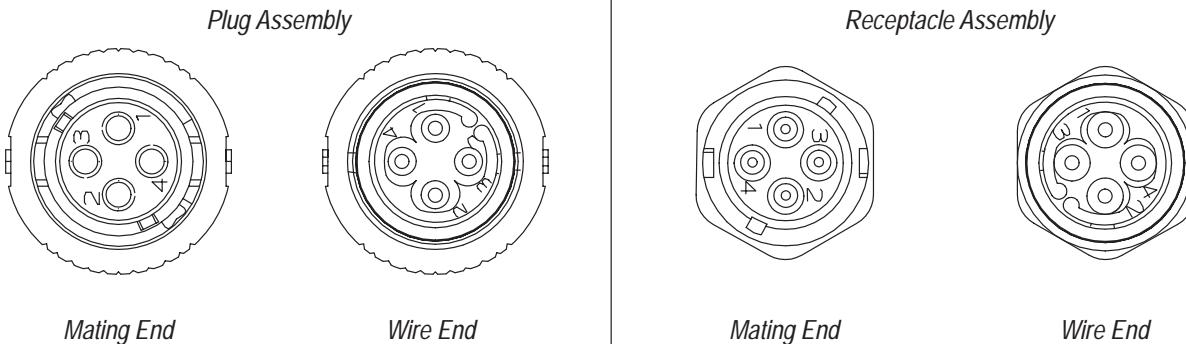


Figure 4

### 3.10. Housing Assemblies

Plug and receptacle housing assemblies are available in Size 8 (4-position), or Size 11 (9-position) configurations. Figure 5 shows these housings and numbered cavities for contacts.

#### Size 8 Connectors



#### Size 11 Connectors

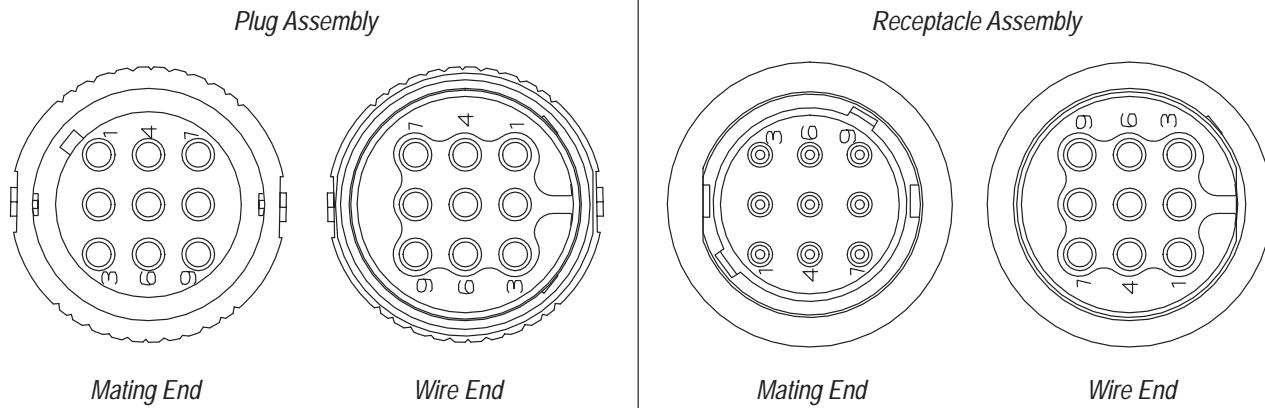


Figure 5

### 3.11. Installing Contacts into Housing

Locate the desired circuit into which the individual contact will be loaded, (refer to the circuit cavity numbers on the seal retention plate). The pin contact is inserted into the receptacle housing and the socket contact is inserted into the plug housing.

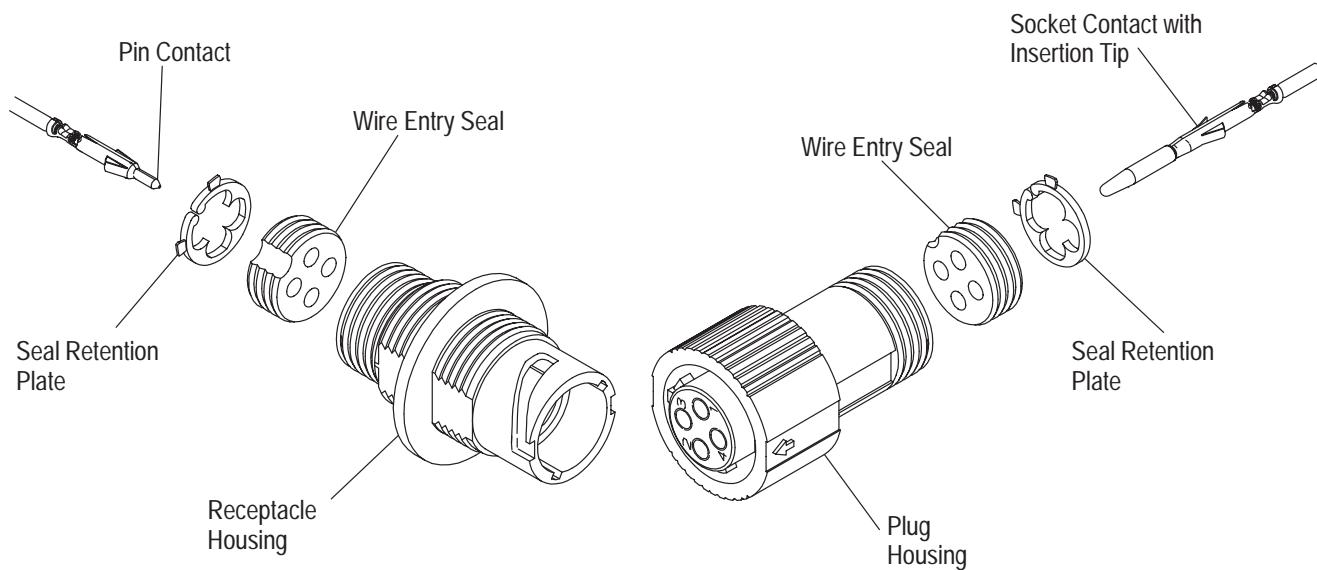
The contact must be inserted through the gland in the wire entry seal, thereby puncturing the gland and into the contact cavity from the wire end of the plug or receptacle housing until it bottoms (there should be an audible "click"). Each contact must be locked into place. Gently pull on the wire to ensure proper contact locking.

Tyco Electronics recommends using a socket insertion tip, (part number 1604816-1), to insert the socket contacts into the plug housing with small insulation diameters of 0.89–1.5 [.035–.059]. The insertion tip prevents the mating (blunt end) of the socket contact from being damaged when insertion into the seal is made. Once the contact is fully seated, the insertion tip is removed from the front of the connector and reused for the remaining socket contacts. Refer to Figure 6.

**NOTE**

*The insertion tip is inserted into the socket body prior to inserting the socket contact into the seal.*

Normally an insertion tool is not required to insert contacts into housings. However if the contact and frail wires need some assistance, the use of an insertion tool is recommended. Refer to the information provided on Instruction Sheet 7984 for contact insertion using insertion tool 455830-1.



**NOTE:** Size 8 shown, but size 11 is same for insertion purposes.

Figure 6

### 3.12. Strain Relief

If wire at the rear of the housing is subjected to strain, then strain relief kits are available for each connector size. Each includes a strain relief housing and two clamps. They can be attached to free-hanging or panel-mounted plug and receptacle connectors, and they can be placed on the cable before or after crimping contacts to the conductors; however, the strain relief must be placed on the cable before the contacts are inserted into the housing. After all the contacts have been inserted into their respective housing, slide the strain relief body up the cable and thread it onto the back of the connector before the clamp is secured. Select the proper locking insert clamp based on cable diameter and press in into the strain relief body until it locks in place with the desired clamping force. See Figure 7.

**NOTE**

*Pliers may be required to push the locking insert into the strain relief body to the desired clamping location.*

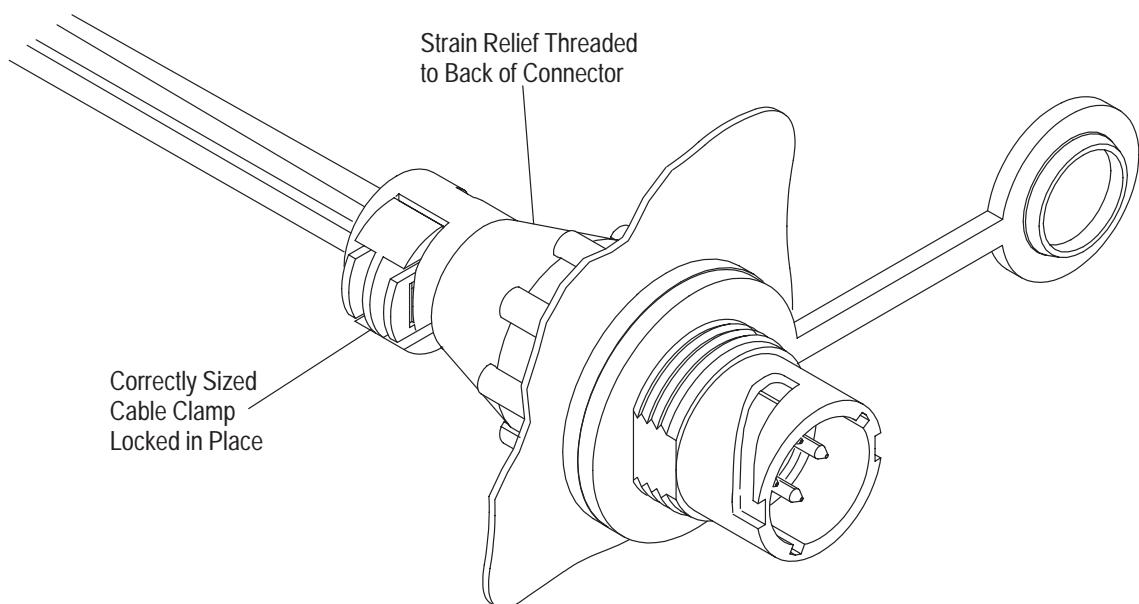


Figure 7

### 3.13. Wire Dress

**NOTE**

If a strain relief is used on the connector, the wires may be dressed to an angle at the end of the strain relief. However, without use of a strain relief, the wires should not be dressed closer than 2.50 inches from the back of the housing. To prevent damage to contacts and/or housing, avoid exerting stress on wire.

If necessary, wires can be bundled together and supported with cable ties or similar device. Wires must not be stretched or confined in any way. Therefore, the wires must remain perpendicular to the connector and avoid an excessively sharp bend radius. The minimum distance for the cable tie off, measured from the housing at the wire end of the connector to the cable tie is shown in Figure 8. It is also recommended that individual wires be dressed to a bend radius of at least ten times the wire outside diameter. Likewise, cable bundles should be dressed to a bend radius of at least ten times the diameter of the bundle.

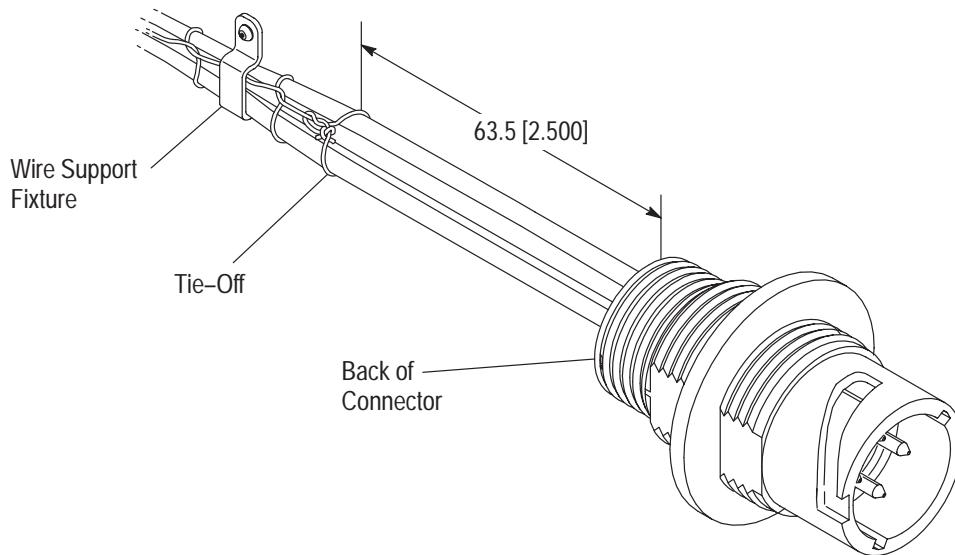


Figure 8

### 3.14. Connector Mating

When mating the plug and receptacle connector, make sure the alignment dots are aligned prior to mating the connectors. This ensures proper alignment and mating without damage to the connectors. See Figure 9.

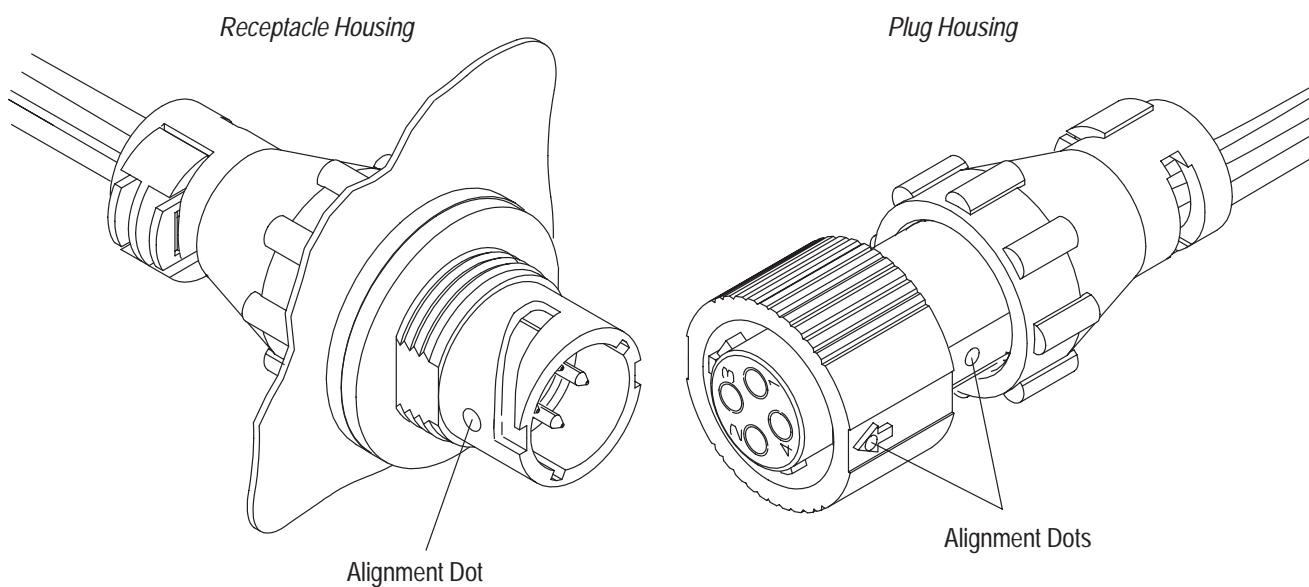


Figure 9

### 3.15. Repair/Removal

**NOTE**

*If a damaged contact is apparent before the contacts are inserted into the housing, cut the wire in back of the contact, re-strip the wire end, and apply a new contact on the wire.*

Contacts are not repairable once a termination has been made. Any defective contact should be removed and replaced with a new one. Connector housings, retention plate seals, wire entry seals, panel seals, or cavity plug seals are not repairable. Any damaged or defective component MUST NOT be used.

The following procedures should be observed when disassembling the Miniature CPC for contact removal or re-termination:

1. Remove wire entry seal locking plate by using a small, flat blade screwdriver to disengage the seal retention plate from the connector housing.
2. Use the same screwdriver to unseat the wire entry seal from the connector housing. The screwdriver is pushed down between the seal and the connector housing, then pried loose. Care should be taken not to tear the seal.
3. Slide the seal back along the wires.
4. Extract the contacts using Extraction Tool 189727-1. Refer to Instruction Sheet 408-4118.
5. Cut off the contact to be replaced, and re-terminate a new contact.
6. Insert the contacts back in the correct respective circuits.
7. Slide the seal back down the wires and seat it into the connector housing. The screwdriver can be used to push the seal edges down to ensure proper seating.
8. Replace the seal retention plate by snapping it into the slots in the connector housing.

## 4. QUALIFICATIONS

Miniature CPC have been Recognized by Underwriters Laboratories, Inc. (UL) under File E28476, and have been Investigated to CSA International Standards by UL.

## 5. TOOLING

This section provides a selection of tools for various application requirements. Modified designs and additional tooling concepts may be available to meet other application requirements. For additional information, contact one of the service groups at the bottom of page 1. A listing of tooling recommendations covering the full wire size range is provided in Figure 10.

**NOTE**

*Tyco Electronics Tooling Engineers have designed machines for a variety of application requirements. For assistance in setting up prototype and production line equipment, contact Tyco Electronics Tool Engineering through your local Tyco Electronics Representative or call the Tooling Assistance Center number at the bottom of page 1.*

- **Hand Crimping Tool**

Hand crimping tools that accommodate the full wire size range are designed for prototype and low-volume applications such as repair of damaged contacts.

- **Applicator**

Applicators are designed for the full wire size range of strip-fed, precision formed contacts, and provide for high volume, heavy duty, production requirements. The applicators can be used in bench or floor model power units.

**NOTE**

*Each applicator is shipped with a metal identification tag attached. DO NOT remove this tag or disregard the information on it. Also, a packet of associated paperwork is included in each applicator shipment. This information should be read before using the applicator; then it should be stored in a clean, dry area near the applicator for future reference. Some changes may have to be made to the applicators to run in all related power units. Contact the Tooling Assistance Center number located at the bottom of page 1 for specific changes.*

- **Power Units**

A power unit is an automatic or semi-automatic device used to assist in the application of a product. Power unit includes the power source used to supply the force or power to an applicator.

- **Insertion/Extraction Tooling**

Insertion Tools are designed for contacts crimped to small fragile wire. They are designed to stabilize the contact during insertion. For use of Insertion Tool 91002-1 which may be used with these contacts, refer to Instruction Sheet 408-7347; or Insertion Tool 455830-1, use Instruction Sheet 408-7984. Extraction Tools are designed to release the locking lance inside the connector housing without damaging the housing or contacts. For use of Extraction Tool 189727-1 which may be used with these contacts, refer to Instruction Sheet 408-4118.

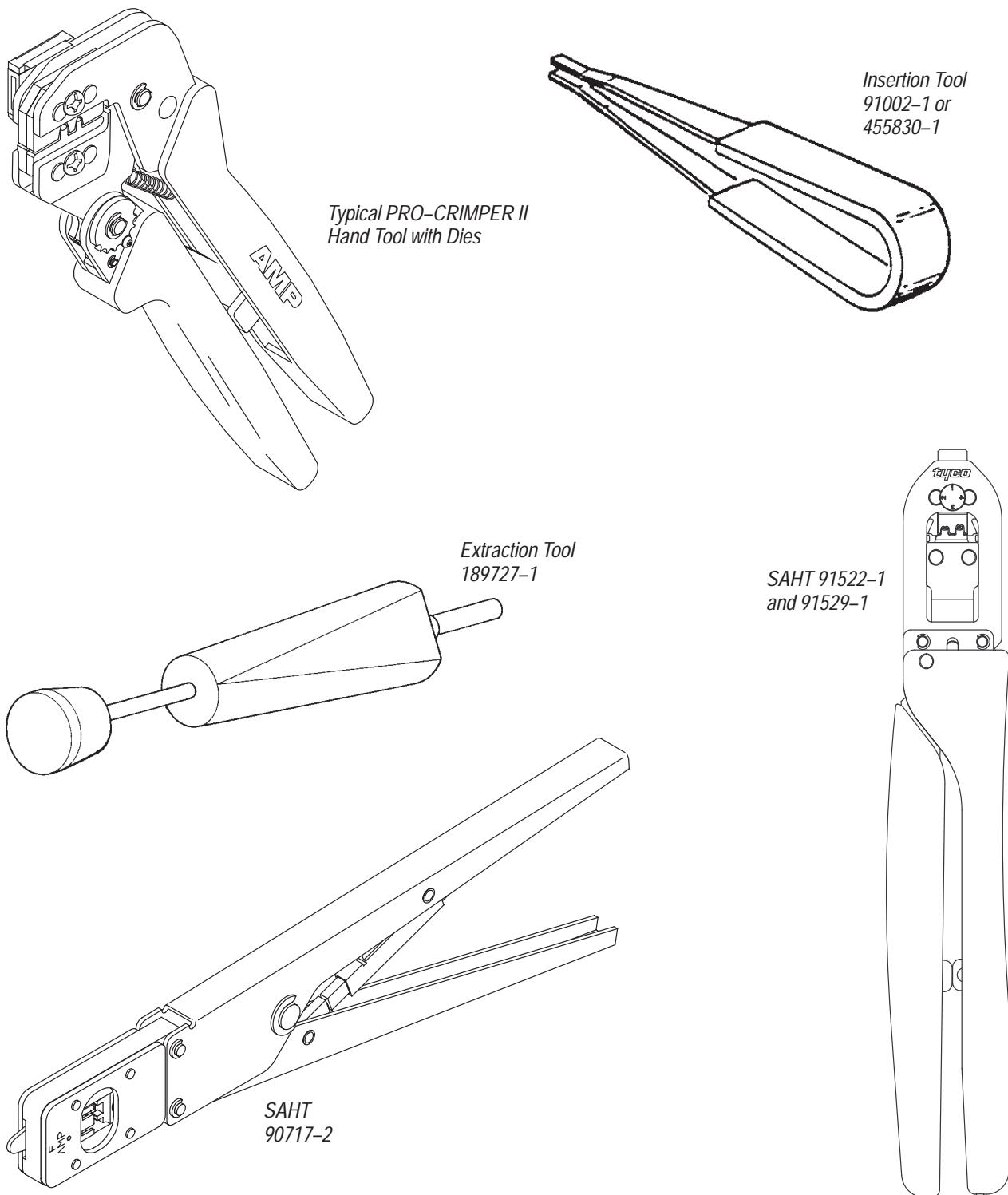
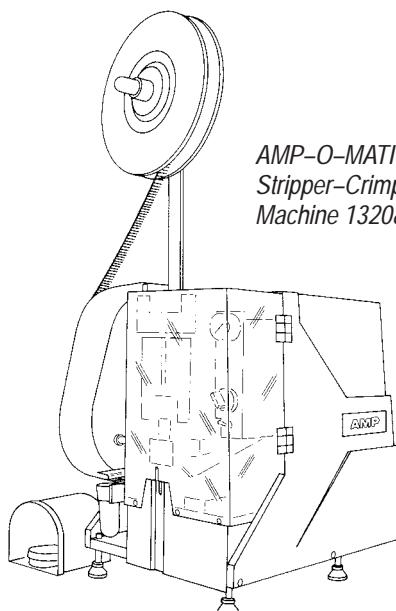
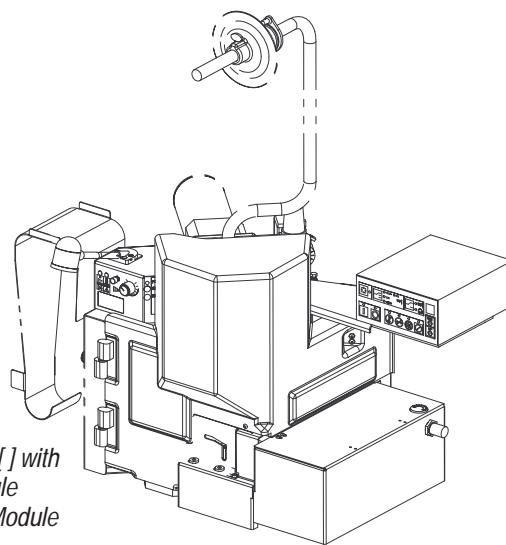


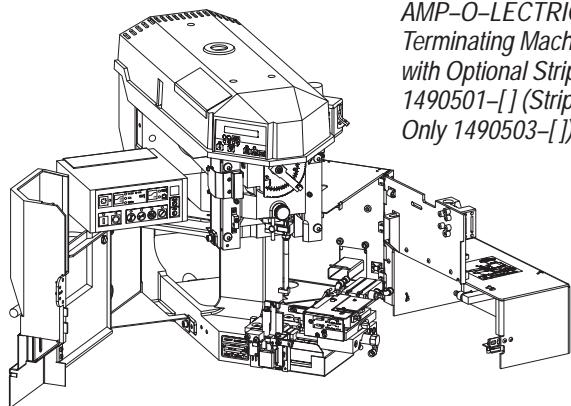
Figure 10 (cont'd)



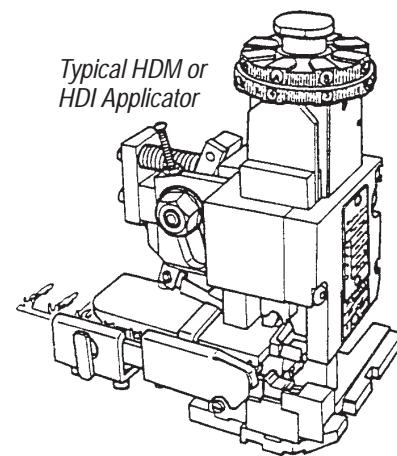
*AMP-O-MATIC Side Feed  
 Stripper-Crimper II  
 Machine 1320895-[]*



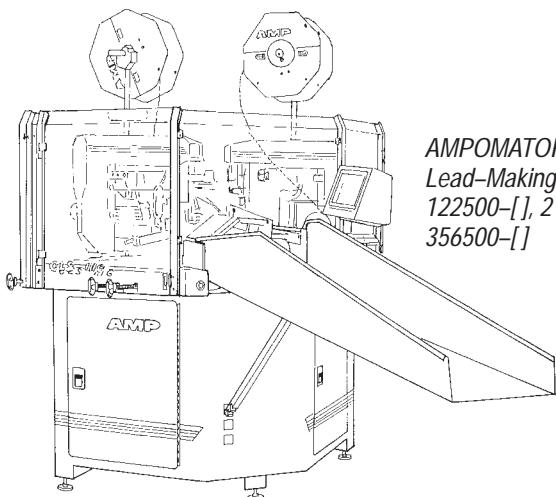
*ELT Machine 1338600-[] with  
 Optional Stripping Module  
 1490500-[] (Stripping Module  
 Only 1490502-[])*



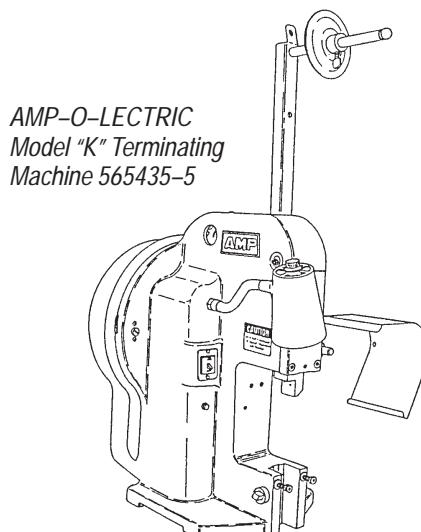
*AMP-O-LECTRIC Model "G"  
 Terminating Machine 354500-[]  
 with Optional Stripping Module  
 1490501-[] (Stripping Module  
 Only 1490503-[])*



*Typical HDM or  
 HDI Applicator*



*AMPOMATOR CLS  
 Lead-Making Machines  
 122500-[], 217500-[], and  
 356500-[]*



*AMP-O-LECTRIC  
 Model "K" Terminating  
 Machine 565435-5*

*Figure 10 (cont'd)*

WIRE SIZE RANGE, AWG	INSULATION DIAMETER	APPLICATOR (DOCUMENT)	POWER UNIT (DOCUMENT)	HAND TOOL (DOCUMENT)	INSERTION TOOL (DOCUMENT)	EXTRACTION TOOL (DOCUMENT)
30-26	0.89-1.27 [.035-.050]	567418-1 (408-8040)	122500-2, -3 (409-5852)	90717-2 (408-4443) or 90870-1 (408-9965)	91002-1 (408-7347) or 455830-1 (408-7984)	189727-1 (408-4118)
			217500-1 (409-5866)			
			356500-1, -2 (409-5878)			
			565435-5 (409-5128)			
		567418-2 (408-8040)	1338600-3, -4 (409-10016)			
			354500-[ ] (409-5842)			
		567418-3 (408-8040)	1338600-[ ] (409-10016)			
			1320895-1, -3 (409-10012)			
26-22	1.19-1.75 [.047-.069]	567066-3 (408-8040)	122500-2, -3 (409-5852)	90758-1 (408-9938) or 91529-1 (408-8547)	91002-1 (408-7347) or 455830-1 (408-7984)	189727-1 (408-4118)
			217500-1 (409-5866)			
			356500-1, -2 (409-5878)			
		567066-4 (408-8040)	565435-5 (409-5128)			
			1338600-3, -4 (409-10016)			
		567066-5 (408-8040)	354500-[ ] (409-5842)			
			1338600-[ ] (409-10016)			
		567829-1	1320895-2, -4 (409-10012)			
22-18	1.50-2.39 [.059-.110]	567067-1 (408-8040)	466986-1	90759-1 (408-9962) or 91522-1 (408-8547)	91002-1 (408-7347) or 455830-1 (408-7984)	189727-1 (408-4118)
			122500-2, -3 (409-5852)			
			217500-1 (409-5866)			
			356500-1, -2 (409-5878)			
		567067-2 (408-8040)	565435-5 (409-5128)			
			1338600-3, -4 (409-10016)			
		567067-3 (408-8040)	354500-[ ] (409-5842)			
			1338600-[ ] (409-10016)			

*Figure 10 (cont'd)*

WIRE SIZE RANGE, AWG	INSULATION DIAMETER	APPLICATOR (DOCUMENT)	POWER UNIT (DOCUMENT)	HAND TOOL (DOCUMENT)	INSERTION TOOL (DOCUMENT)	EXTRACTION TOOL (DOCUMENT)
22-18	1.50-2.39 [.059-.110]	567608-1 (408-8040)	122500-2, -3 (409-5852)			
			217500-1 (409-5866)			
			356500-2 (409-5878)			
		567608-2 (408-8040)	354500-1 (409-5842)			
		567850-1	1320895-2, -4 (409-10012)			
		1238050-1, -6, -71, -76 (408-8322)	122500-2, -3 (409-5852)	90759-1 (408-9962)	91002-1 (408-7347)	
			217500-1 (409-5866)	or	or	
			356500-1, -2 (409-5878)	91522-1 (408-8547)	455830-1 (408-7984)	
		1238050-2, -72 (408-8322)	354500-[ ] (409-5842)			189727-1 (408-4118)
			1338600-[ ] (409-10016)			
		1528003-1, -6, -71, -76 (408-8322)	122500-2, -3 (409-5852)			
			217500-1 (409-5866)			
			356500-1, -2 (409-5878)			
		1528003-2, -72	354500-[ ] (409-5842)			
			1338600-[ ] (409-10016)			

Figure 10 (end)

## 6. VISUAL AID

Figure 11 shows a typical application of a Miniature CPC. 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.

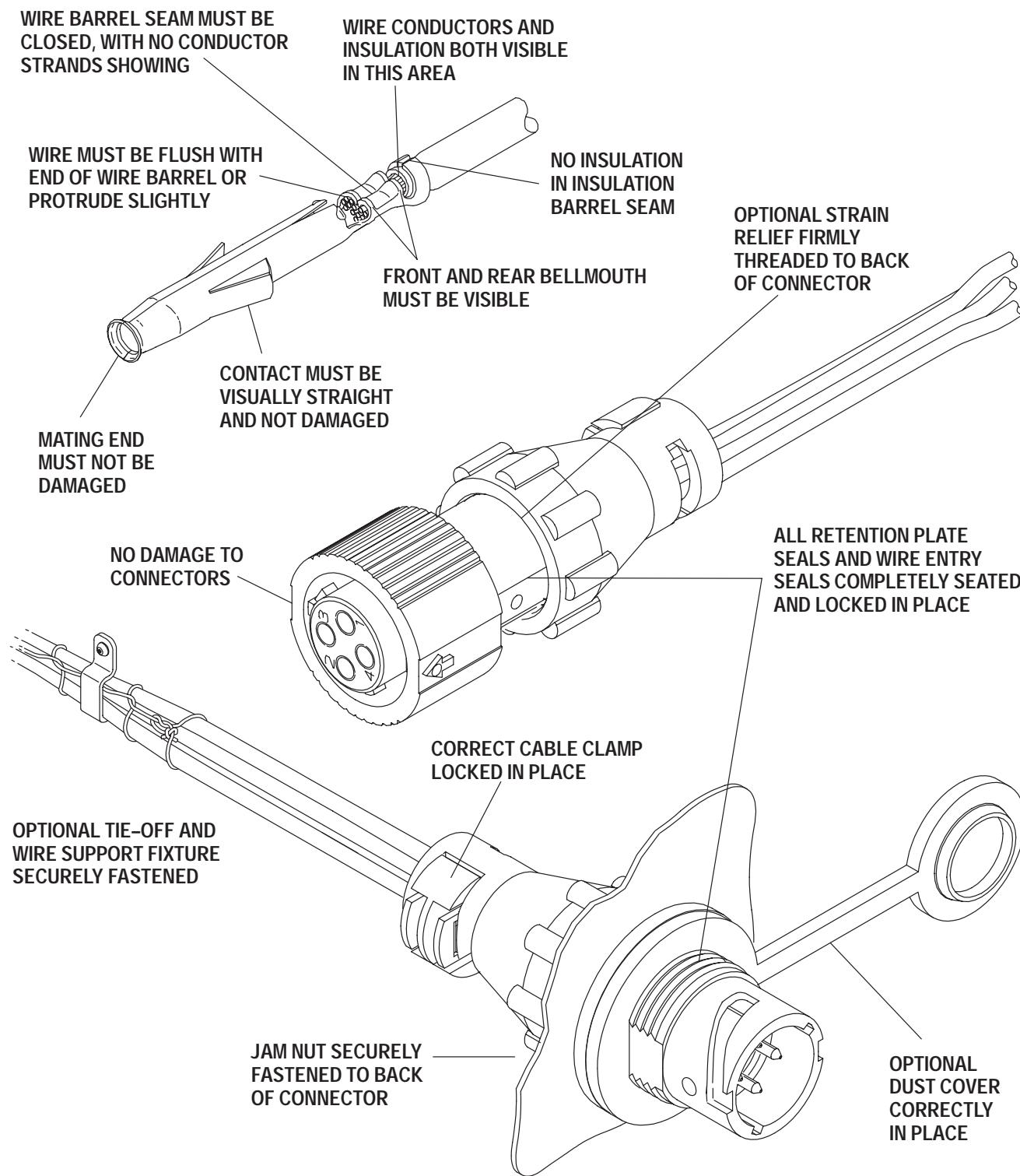


FIGURE 11. VISUAL AID