

**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 Miniature Rectangular (MR) pin and socket contacts and housings. These requirements are applicable to hand or automatic machine crimping tools.

When corresponding with TE Connectivity (TE) 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.

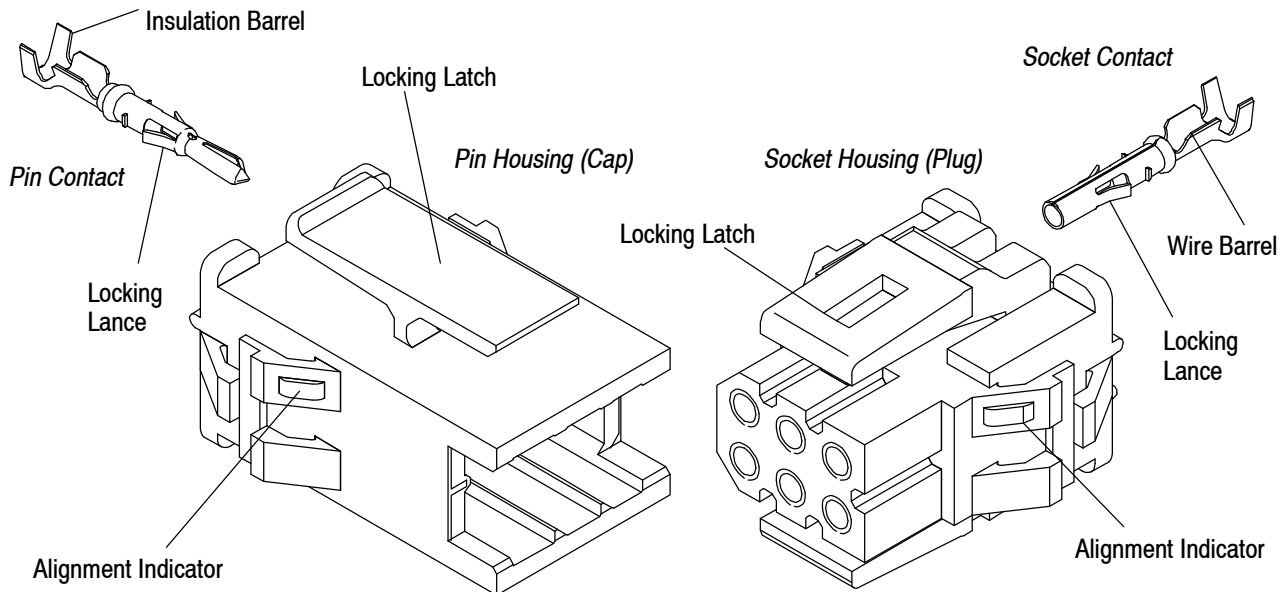


Figure 1

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

- Updated document to corporate requirements
- New logo

### 2.2. Customer Assistance

Reference Part Number 350967 and Product Code 1381 are representative numbers of the Miniature Rectangular (MR) Contacts and Housings. 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 numbers at the bottom of this page.

### 2.3. Drawings

Customer Drawings for specific products are available from the responsible TE 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 TE.

### 2.4. Product Specifications

Product Specification 108-1022 provides product performance and test information.

## 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; and customer manuals (409-series) that provides setup, operation, and maintenance of machines.

<u>Document Number</u>	<u>Document Title</u>
408-2498	Crimping Head Cross Reference for Pneumatic Tools
408-3295	Preparing Reel of Contacts for Application Tooling
408-4106	Straight Action Crimp Head Adapter 217201-1
408-4190	C-Head Pneumatic Adapter
408-4321	Pneumatic CERTI-CRIMP* Tool Holder 356304-1
408-7424	Checking Terminal Crimp Height or Gaging Die Closure
408-7749	Hand Crimping Tool 90326-1
408-7984	Insertion Tool 455830-1
408-8040	Heavy Duty Miniature Quick-Change Applicators (Side-Feed Type) with Mechanical
408-8059	General Preventive Maintenance for Applicators
408-8620	Service Hand Tool 696202-1
408-9570	Extraction Tool 455822-2 for Miniature Rectangular (MR) Contacts
408-9640	Crimp Quality Monitor Applicators for Side-Feed and End-Feed Applications
408-9816	Handling of Reeled Products
408-9930	PRO-CRIMPER* III Hand Crimping Tool Frame Assembly 354940-1
408-9973	PRO-CRIMPER III Hand Tool Assembly 58514-1 with Die Assembly 58514-2
409-5128	Basic AMP-O-LECTRIC* Model "K" Terminating Machine 565435-5
409-5842	AMP-O-LECTRIC Model "G" Terminating Machines 354500-[ ]
409-5852	AMPOMATOR* CLS III-G Lead Making Machine 122500-[ ]
409-5862	626 Pneumatic Tooling Assemblies 189721-[ ] and 189722-[ ]
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. Storage

#### A. Ultraviolet Light

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

#### B. Reel Storage

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

#### C. Shelf Life

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

#### D. Chemical Exposure

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

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

**NOTE**

Where the above environmental conditions exist, phosphor-bronze contacts are recommended.



### 3.2. Wire Selection and Preparation

#### A. Wire Selection

The contacts will accept stranded wire sizes 18 through 26 AWG. Wire insulation minimum and maximum diameters shall be as indicated in Figure 2.

### B. Wire Preparation

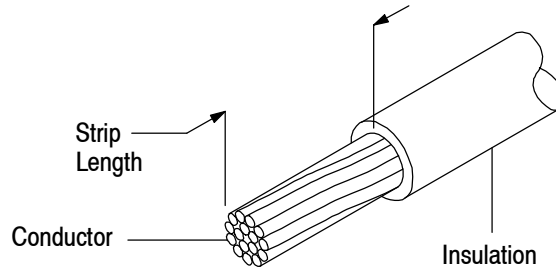
The wire strip length shall be as indicated in Figure 2.

**NOTE**

The applied crimp dimension (within the functional range of the product) is dependent on the termination tooling being used. Refer to the documentation (applicator logs and instruction sheets) supplied with the termination tooling for the applied crimp height. See Section 5, TOOLING.

**CAUTION**

DO NOT nick, scrape, or cut the wire conductor during the stripping operation.



#### AUTOMATIC MACHINE WIRE CRIMP DIMENSIONS

CONTACT TYPE		WIRE			WIRE BARREL CRIMP		INSUL BARREL CRIMP	
PIN	SOCKET	SIZE	INSUL DIA RANGE	STRIP LENGTH	HEIGHT RANGE	WIDTH (REF)	HEIGHT (MAX.)	WIDTH
LIVE SPLIT	SOLID	18	1.27-2.92 [.050-.115]	4.34-3.58 [.171-.141]	1.22-1.12 [.048-.044]	1.40 [.055]	3.12 [.123]	3.05 [.120]
		20			1.09-0.99 [.043-.039]			
		22-24			0.91-0.81 [.036-.032]			
		26	1.27-2.92 [.050-.115]	4.34-3.58 [.171-.141]	0.84-0.74 [.033-.029]	1.40 [.055]	3.12 [.123]	3.05 [.120]
		24-26	0.64-1.27 [.025-.050]		1.78 [.070]			

#### HAND TOOL WIRE CRIMP DIMENSIONS

CONTACT TYPE		WIRE			WIRE BARREL CRIMP		INSUL BARREL CRIMP	
PIN	SOCKET	SIZE	INSUL DIA RANGE	STRIP LENGTH	HEIGHT RANGE	WIDTH (REF)	HEIGHT (MAX.)	WIDTH
LIVE SPLIT	SOLID	18-20	1.27-2.92 [.050-.115]	4.34-3.58 [.171-.141]	1.02-0.92 [.040-.036]	1.40 [.055]	3.12 [.123]	3.05 [.120]
		22-26			0.76-0.66 [.030-.026]			
		24-26	0.64-1.27 [.025-.050]		1.78 [.070]			

Figure 2

### 3.3. Crimped Contact Requirements

The contact shall be located in desired tooling and crimped according to the instructions packaged with that tooling. See Section 5, TOOLING, of this document for details on tooling options and instructional materials.

**CAUTION**

Wire insulation shall NOT be cut or broken during the crimping operation, nor shall the insulation be crimped into the contact wire barrel. Reasonable care should be taken by tooling operators to provide undamaged wire terminations.

### A. Wire Barrel Crimp

The crimp applied to the wire portion of the contact is the most compressed area and is most critical in ensuring optimum electrical and mechanical performance of the crimped contact. The contact wire barrel crimp height must be within the dimension provided in Figure 2.

### B. Effective Crimp Length

For optimum crimp effectiveness, the crimp must be within the area shown and must meet the crimp dimensions provided in Figure 3. Effective crimp length shall be defined as that portion of the wire barrel, excluding bellmouth(s), fully formed by the crimping tool. Instructions for adjusting, repairing, and inspecting tools are packaged with the tools. See Section 5, TOOLING.

### C. Bellmouths

Front and rear bellmouths shall be evident and conform to the dimensions given in Figure 3.

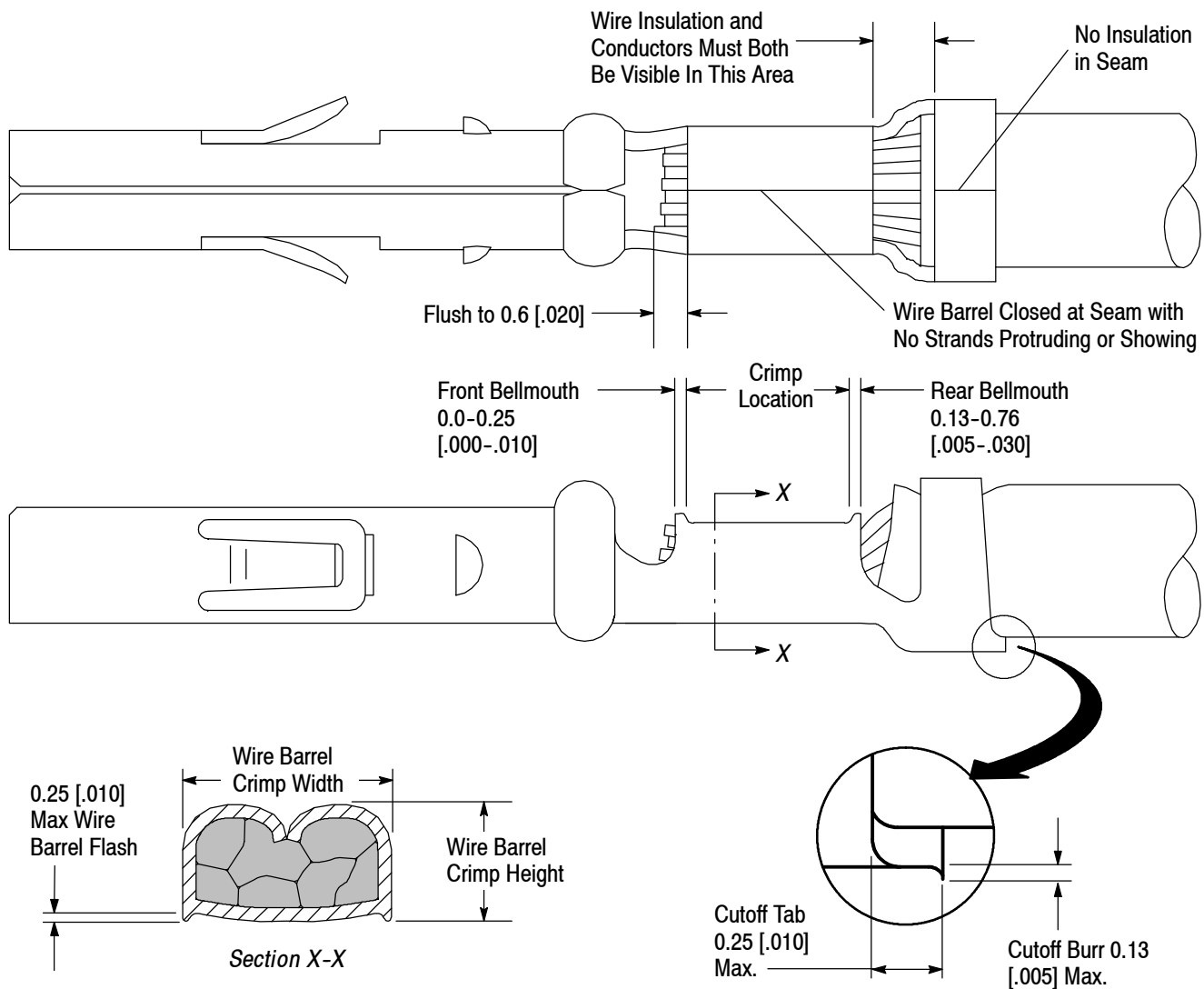


Figure 3

### D. Cutoff Tabs

The cutoff tab shall be cut to the dimensions shown in Figure 3.

### E. Burrs

The cutoff burr shall not exceed the dimensions shown in Figure 3.

**F. Wire Barrel Flash**

The wire barrel flash shall not exceed the dimensions shown in Figure 3, Section X-X.

**G. Insulation Barrel Crimp**

The insulation barrel shall grip the insulation firmly without cutting into it. Care must be taken to prevent cutting, nicking, or scraping of the insulation. Insulation crimp shall comply to width and height provided in Figure 3.

**H. Wire Location**

The wire conductor and insulation must be visible in the transition area between the wire and insulation barrels.

**I. Conductor Extension**

The conductor may extend beyond the wire barrel to the maximum shown.

**J. Wire Barrel Seam**

The wire barrel seam must be closed with no evidence of loose wire strands visible in the seam.

**K. Twist and Roll**

There shall be no twist, roll, deformation or other damage to the mating portion of the crimped contact that will impair usage of the contact. See Figure 4.

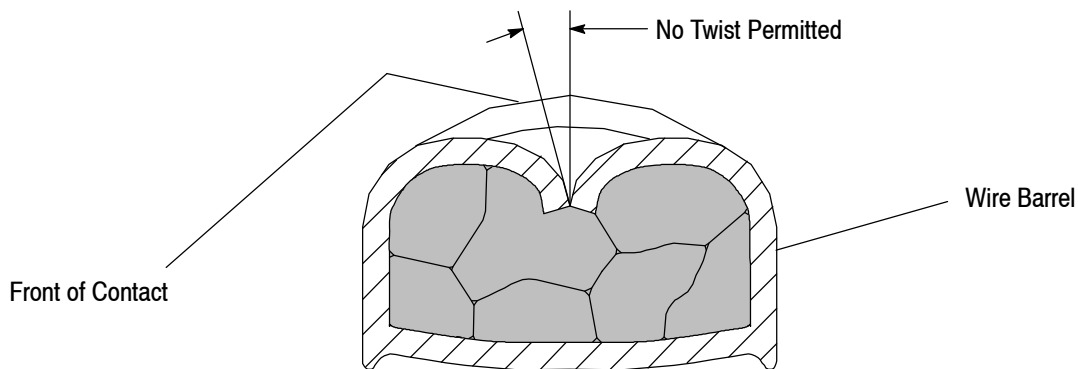
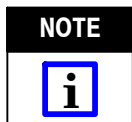


Figure 4

**L. Axial Concentricity**



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

1. Crimped insulation barrel shall fall into an area defined by a 3.43 mm [.135 in.] diameter circle whose center is the centerline of the contact as shown in Figure 5.
2. There shall be no twist or roll in crimped portion that will impair usage of the contact.

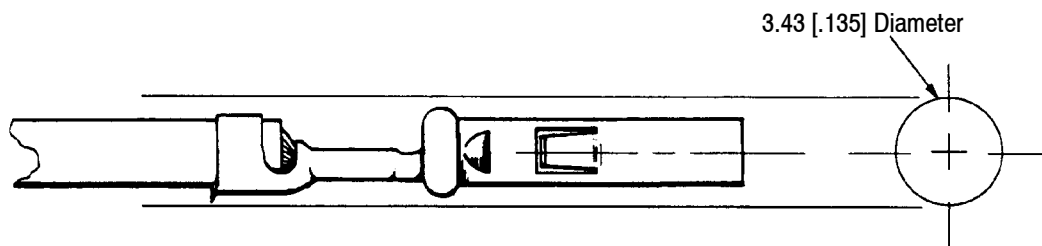


Figure 5

### 3.4. Housings

The connector assembly consists of a pin housing (cap) that accepts pins (live split); and socket housing (plug) that accept socket (solid) contacts. Both the plug and cap housing assemblies have individually numbered circuit identification on the back surface and are available in 2 through 36 circuit positions. See Figure 6.

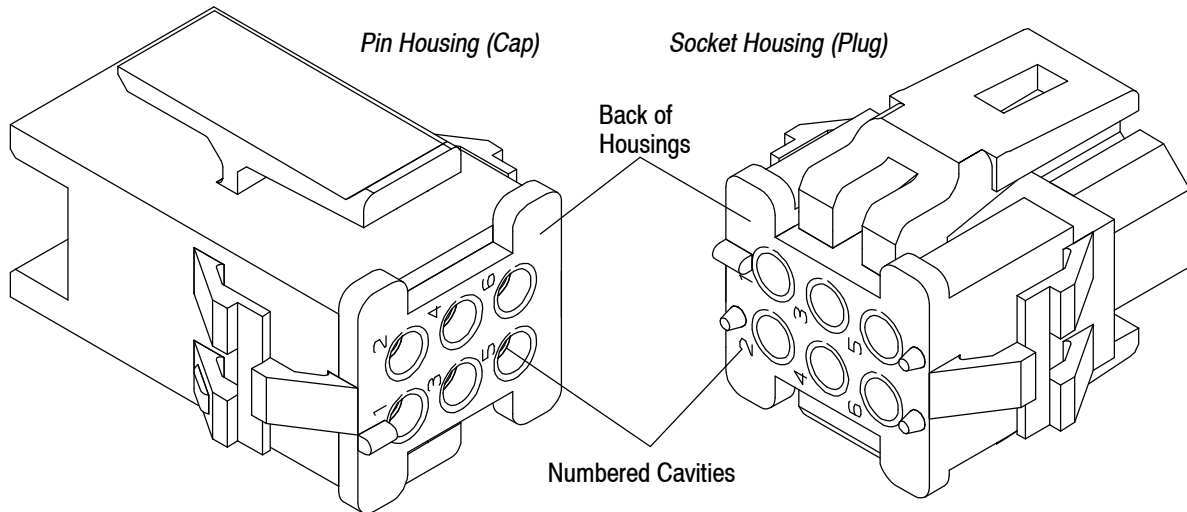


Figure 6

#### A. Assembly

Crimped pin and socket contacts shall be manually inserted in the rear of their respective housings. Insert contacts and join housing sections together as shown in Figure 7.

Align contact with desired circuit cavity at BACK of rear housing section. Push contact straight into cavity until a tactile and audible “click” is heard. When all necessary contacts have been inserted, complete assembly of the connector by mating the housing latches into the fully locked position. See Figure 7.

#### B. Disassembly

Depress both locking latches, pull apart to separate the housings.

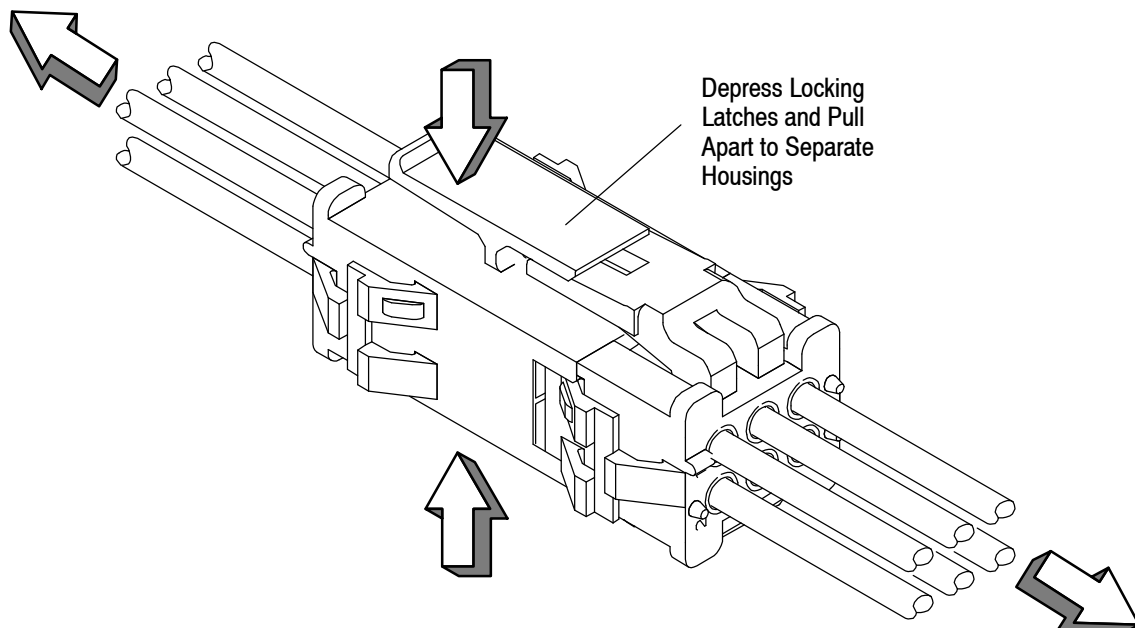


Figure 7

### 3.5. Panel Cutout Requirements

Typical panel cutout dimensions shown in Figure 8. See customer drawings for other panel cutout variations.

*NOTE: Typical 6 position panel cutout shown. For other panel cutout dimensions, see customer drawings.*

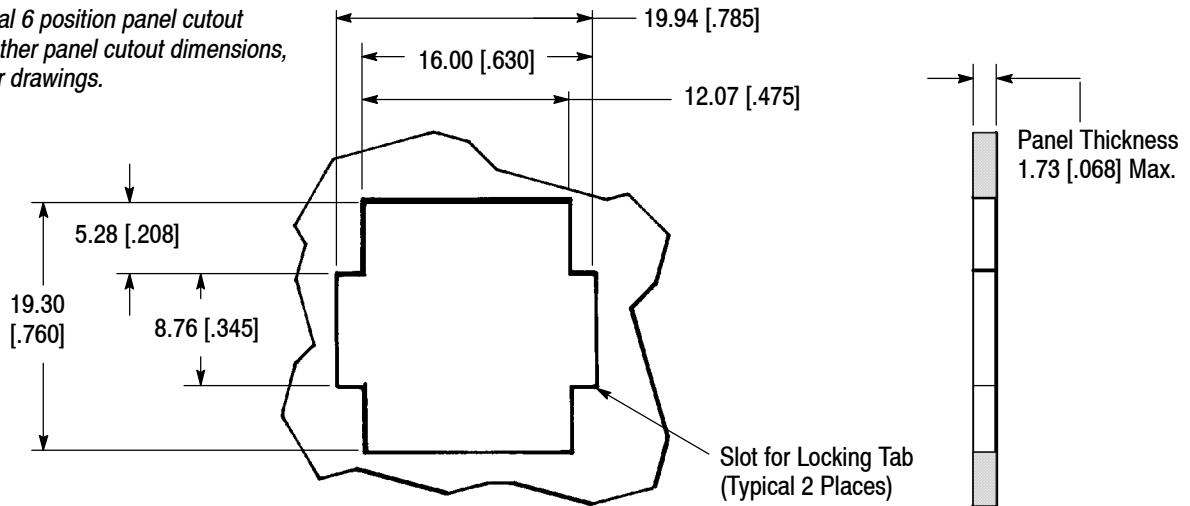


Figure 8

### 3.6. Polarization

The housings possess, ribs and slots which prohibit accidental inversion of a mating connector.

### 3.7. Ancillary Items

Contact the Product Information Center number at the bottom of page 1 for information on the following optional items.

#### A. Keying Plugs

Keying plugs are used in the plug housing to provide connector identification and polarization.

#### B. Commoning Bars

Commoning bars are used to common adjacent circuits of any row.

#### C. Strain Relief

Strain relief clamps are used to prevent stress on contacts caused by large wire bundles.

#### D. Grommets

Grommets are used with a strain relief clamp when a housing is NOT fully loaded and/or wire bundle is small.

### 3.8. Repair/Replace

Use Extraction Tool 455822-2 to remove individual contacts from housings for replacement or for relocation to another housing cavity. Damaged or worn contacts may be replaced provided there is sufficient slack, after restripping the wire, to insert the new contact.

**CAUTION** DO NOT re-use damaged or worn contacts. Instead, replace them with new contacts and discard the old ones.



## 4. QUALIFICATIONS

Miniature Rectangular (MR) pin and socket contacts and housings are Recognized by Underwriters Laboratories Inc. (UL) in File E28476, and Certified with CSA International in File LR7189.

## 5. TOOLING

Figure 9 provides tool part numbers and instructional material related to wire size.

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

**Hand 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 455830-1 which may be used with these contacts, refer to 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 455822-2 which may be used with these contacts, refer to Instruction Sheet 408-9570.

**Head**

A head fits into an applicator or hand tool and holds a die used for crimping the product.

**Dies**

A tooling component used in conjunction with an applicator or hand tool to apply product.

**Holder**

A component used to hold the head and dies in the power assembly or hand tool.

WIRE SIZE		TOOLING						
AWG RANGE	INSUL DIA RANGE	APPLICATOR (DOCUMENT)	POWER UNIT (DOCUMENT)	HAND TOOL (DOCUMENT)	PNEUMATIC TOOLING (DOCUMENT)			
					HAND TOOL	HEAD	DIES	HOLDER
24-26	0.64-1.27 [.025-.050]	466352-1 (408-8040)	122500-2, -3 (409-5852)	90326-1 (408-7749) or 58514-1 (408-9973) or 696202-1 (408-8620)	189721-1 (408-2498) (409-5862) or 189722-1 (408-2498) (409-5862)	217201-1 (408-4106)	90326-2 (---)	189928-1 (408-2498) (409-4190) or 356304-1 (408-4321)
			217500-1, -2 (409-5866)					
			356500-1, -2 (409-5878)					
		466352-2 (408-8040)	354500-1 (409-5842)					
		565435-5 (409-5128)						
		1338600-3, -4 (409-10016)						
466916-1 (408-8040)	1320895-1, -3 (409-10012)							

Figure 9 (cont'd)



WIRE SIZE		TOOLING						
AWG RANGE	INSUL DIA RANGE	APPLICATOR (DOCUMENT)	POWER UNIT (DOCUMENT)	HAND TOOL (DOCUMENT)	PNEUMATIC TOOLING (DOCUMENT)			
					HAND TOOL	HEAD	DIES	HOLDER
26-18	1.27-2.92 [.050-.115]	466351-1 (408-8040)	122500-2, -3 (409-5852)	91526-1 (---)	189721-1 (408-2498) (409-5862) or 189722-1 (408-2498) (409-5862)	217201-1 (408-4106)	90325-2 (---)	189928-1 (408-2498) (409-4190) or 356304-1 (408-4321)
			217500-1, -2 (409-5866)					
			356500-1, -2 (409-5878)					
		466351-2, -3 (408-8040)	354500-1 (409-5842)					
			565435-5 (409-5128)					
		466351-4 (408-8040)	1338600-3, -4 (409-10016)					
			354500-[ ] (409-5842)					
		466913-1 (---)	1338600-[ ] (409-10016)					
			1320895-1, -3 (409-10012)					
		567658-2 (408-8040)	354500-5 (409-5842)					
567832-1 (---)	1320895-2, -4 (409-10012)							

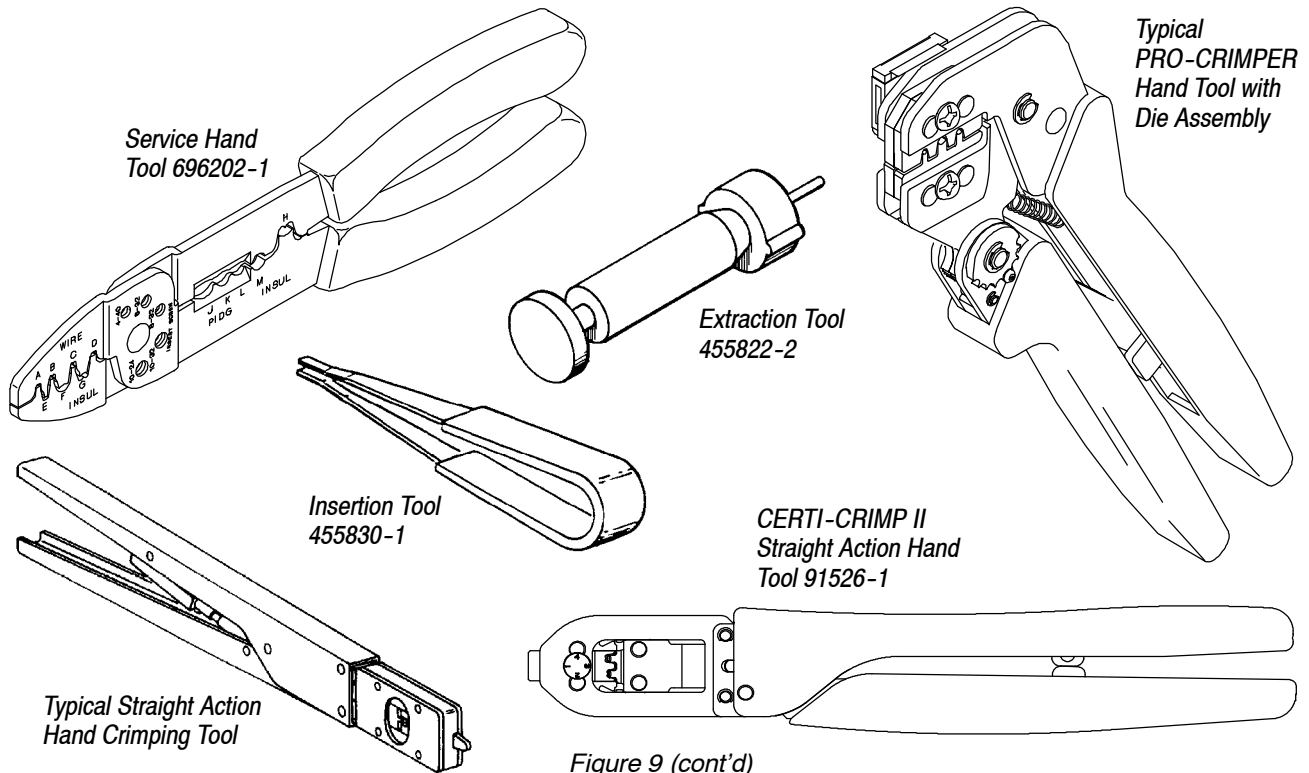
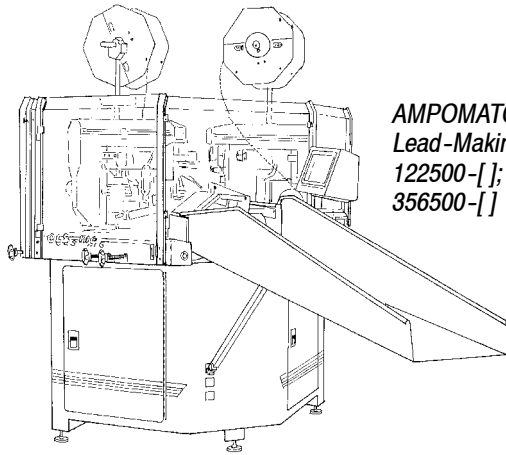
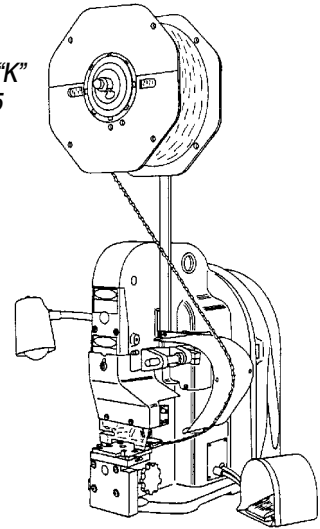


Figure 9 (cont'd)

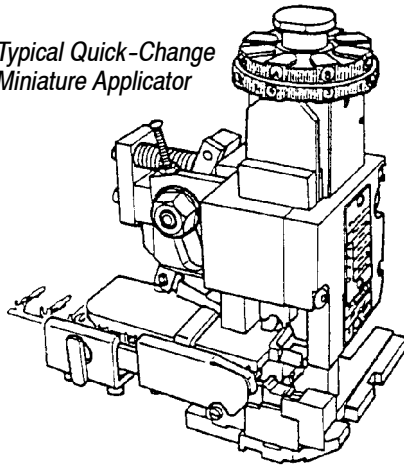


**AMPOMATOR CLS**  
Lead-Making Machines  
122500-[]; 217500-[];  
356500-[]

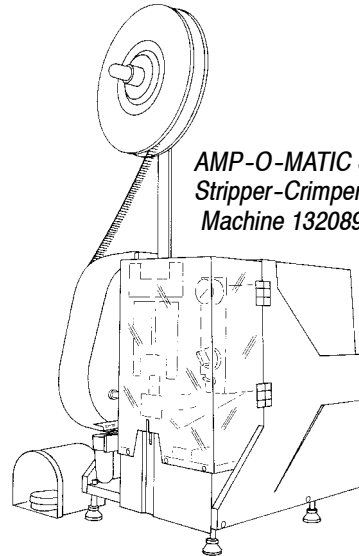
**AMP-O-LECTRIC Model "K"**  
Terminating Unit 565435-5



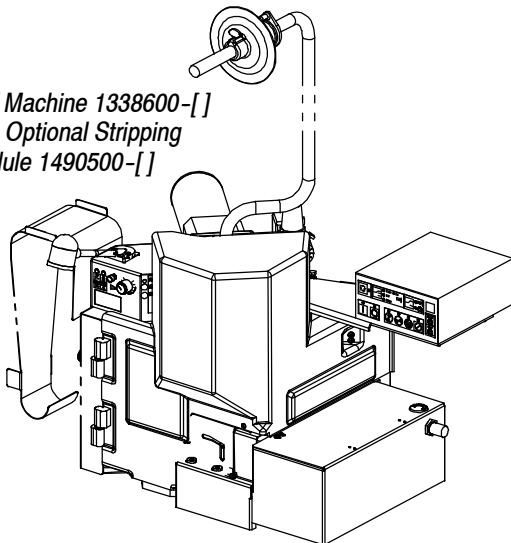
**Typical Quick-Change**  
Miniature Applicator



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



**ELT Machine 1338600-[]**  
with Optional Stripping  
Module 1490500-[]



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

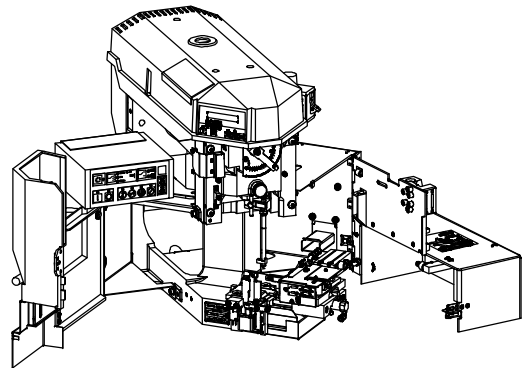


Figure 9 (cont'd)

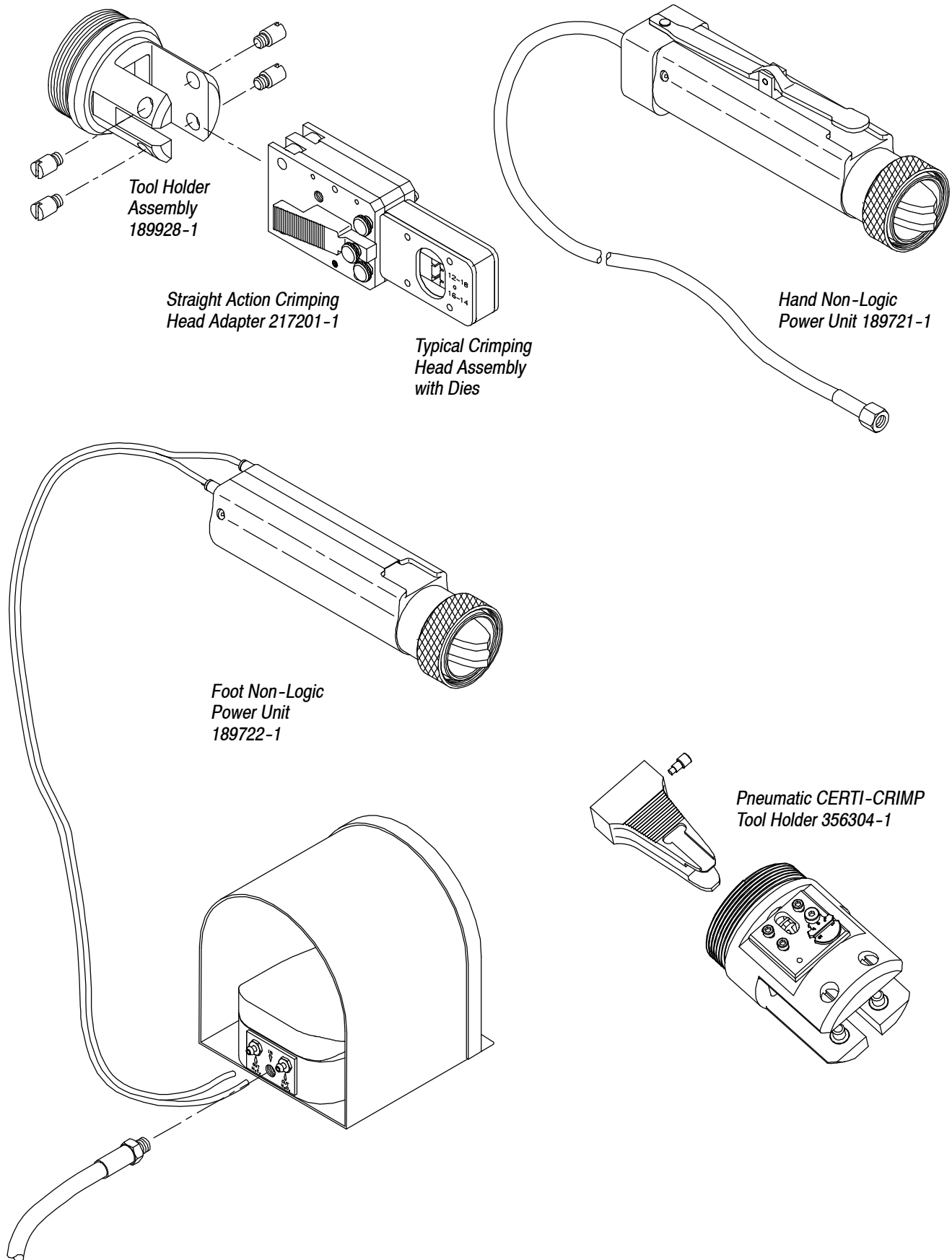
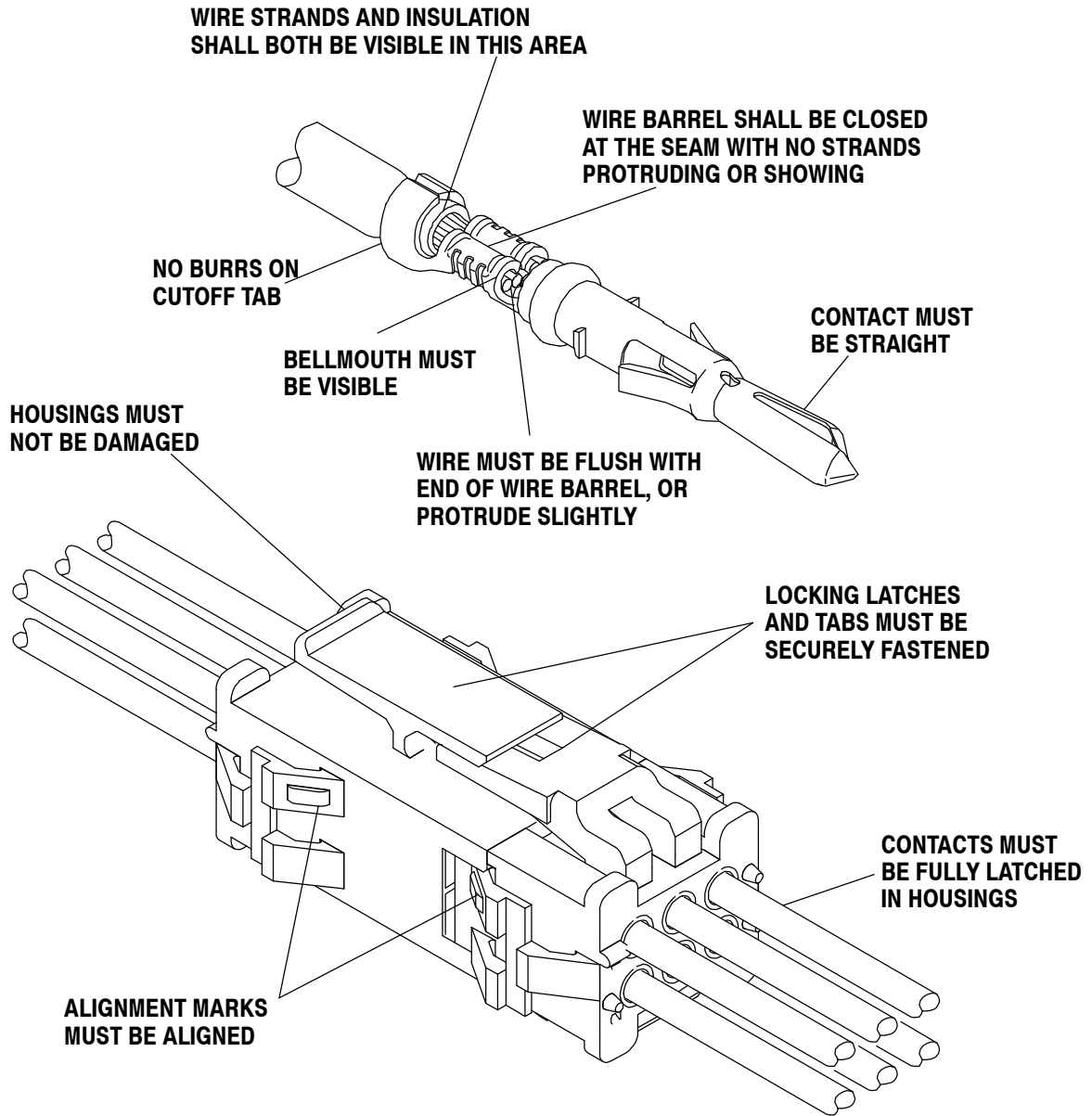


Figure 9 (end)

**6. VISUAL AID**

Figure 10 shows a typical application of a Miniature Rectangular (MR) Contact and Housing. 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.



**FIGURE 10. VISUAL AID**