



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  $\pm 0.13$  mm [ $\pm .005$  in.] 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 SHUR-PLUG .180 diameter terminal and receptacle contacts. These terminals and contacts have a wire size range of 24 through 10 AWG with an insulation diameter range of 1.47 to 4.45 mm [.058 to .175 in.]. SHUR-PLUG terminal and receptacle contacts are terminated with automatic machines.

When corresponding with TE Connectivity (TE) 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.

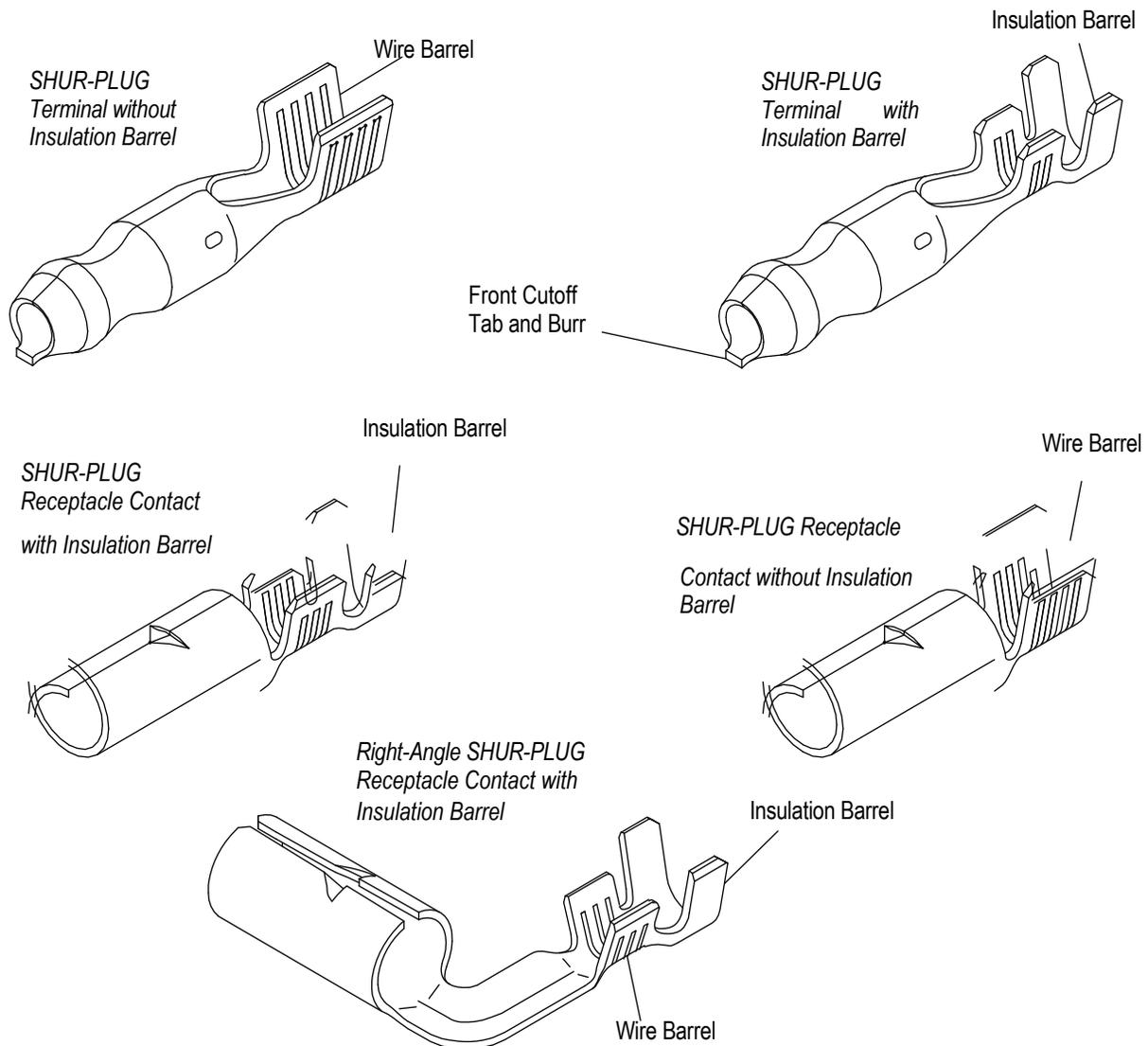


Figure 1

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

Revisions to this application specification include:

- Updated document to corporate requirements
- Changed information in Section 4, QUALIFICATIONS
- Updated Figure.5 dimension from distance to angle.

### 2.2. Customer Assistance

Reference Product Base Part Number 42531 and Product Code 1176 are representative of SHUR-PLUG .180 diameter terminal and receptacle contacts. Use of these numbers will identify the product line and help you to obtain product and tooling information. Such information can be obtained through a local TE representative, by visiting our website at [www.te.com](http://www.te.com), or by calling PRODUCT INFORMATION or the TOOLING ASSISTANCE CENTER at the numbers at the bottom of page 1.

### 2.3. Drawings

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

### 2.4. 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
408-7424	Checking Terminal Crimp Height Gaging Die Closure
408-8039	HD Miniature Quick-Change Applicators (End-Feed Type)
408-8040	HD Miniature Quick-Change Applicators (Side-Feed Type)
408-8053	Conversion Guide for Miniature Quick-Change Applicators
408-8059	General Preventative Maintenance for Applicators
408-9816	Handling of Reeled Products
409-5128	Basic AMP-O-LECTRIC* Model "K" Terminating Machines
409-5257	5-Ton Press Assembly No. 565433-4
409-5289	Model "T" Terminating Unit No. 458000-4
409-5842	AMP-O-LECTRIC Model "G" Terminating Machines 354500-[ ] and 1213127-[ ]
409-5852	AMPOMATOR* CLS III-G Lead Making Machine 122500-[ ]
409-5878	AMPOMATOR CLS IV+ Lead-Making Machines 356500-[ ] and 1213400-[ ]

## 3. REQUIREMENTS

### 3.1. Storage

#### A. Reeled Contacts

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

#### B. Shelf Life

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

#### C. Chemical Exposure

Do not store 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	Sulfur Nitrites		Tartrates



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

### 3.2. Wire Size and Preparation

#### A. Wire Strip Length

Recommended wire strip lengths for the terminal wire barrels are listed in Figure 2.

WIRE BARREL LENGTH	WIRE STRIP LENGTH	FIXED SPACER BLOCK‡
2.36-2.74 [.093-.108]	3.18 [.125]	3.18 [.125]
2.77-3.58 [.109-.141]	3.96 [.156]	3.96 [.156]
3.61-4.42 [.142-.174]	4.78 [.188]	4.78 [.188]
4.44-5.26 [.175-.207]	5.56 [.219]	5.56 [.219]
5.28-6.10 [.208-.240]	6.35 [.250]	6.35 [.250]
6.12-6.93 [.241-.273]	7.14 [.281]	7.14 [.281]

‡Fixed spacer blocks used to set wire strip lengths in most commercially available wire stripping machines come in 0.79 mm [.031 in.] lengths.

Figure 2

#### B. Wire Preparation

The contacts will accept a wire size range of 24 to 10 AWG and may be terminated to either stranded or solid wire.



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.



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

### 3.3. Crimped Contact Requirements

Crimp contact to wire according to instructions packaged with applicable tooling. Figure 3 shows a typical contact as it should appear after crimping; these requirements apply equally to the socket contact.



When crimping, do not damage wire insulation.

#### A. Crimp Height

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 as shown in Figure 3.

#### B. 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 1.7 mm [.067 in.] minimum, and is 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.

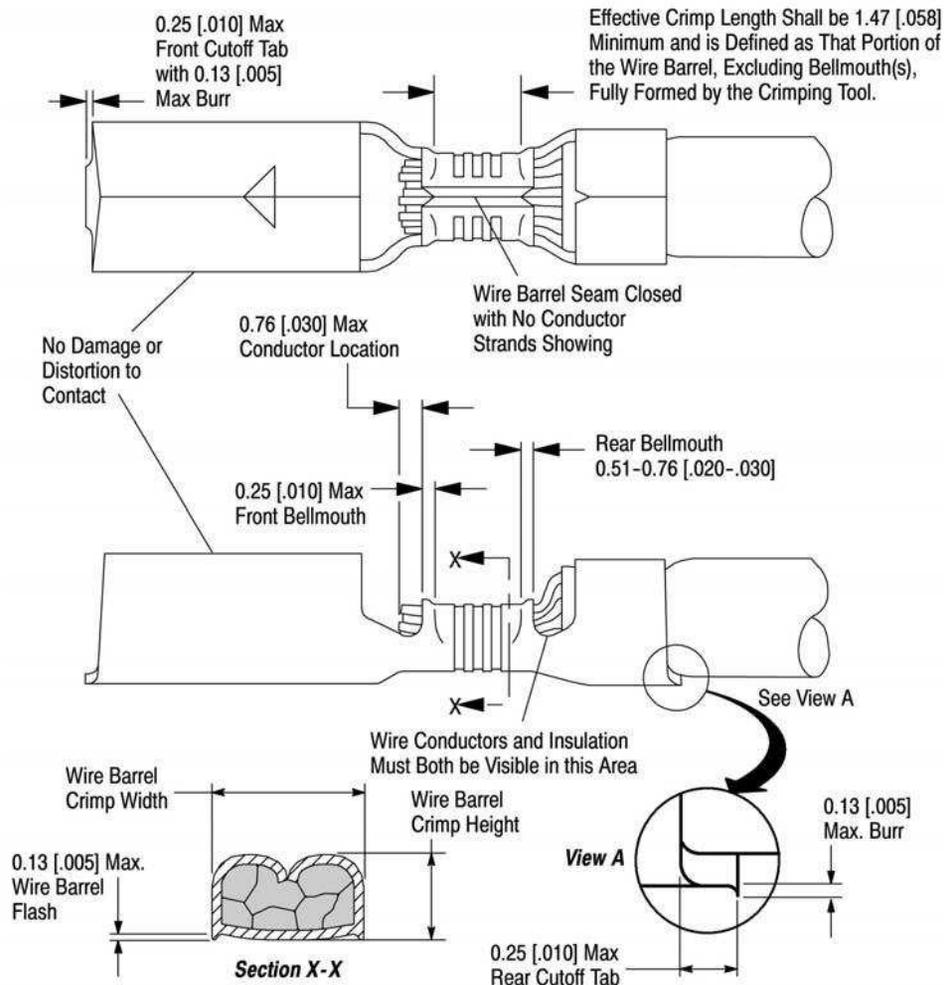


Figure 3

#### D. Cutoff Tabs

The cutoff tab shall be cut to the dimensions shown.

#### E. Burrs

The cutoff burr shall not exceed the dimensions shown.

#### F. Wire Barrel Flash

The wire barrel flash shall not exceed the dimensions shown in 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.

#### H. Wire Location

After crimping, 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.

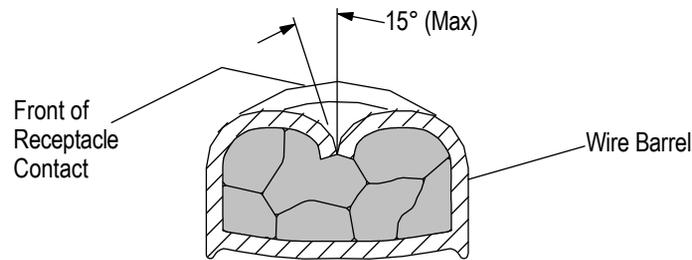


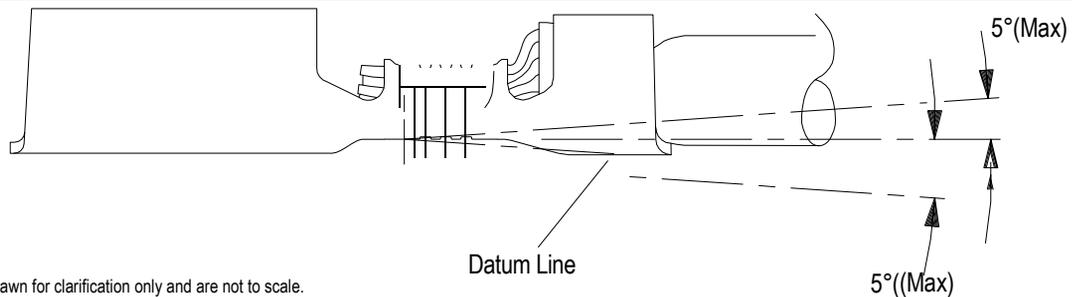
Figure 4

### L. Straightness

The force applied during crimping may cause some bending between the crimped wire barrel and the mating portion of the contact. Such deformation is acceptable within the limits provided in Figures 5 and 6.

#### 1. Up and Down

The crimped contact, including cutoff tab and burr, shall not be bent above or below the datum line more than the amount shown. See Figure 5.



NOTE: Angles are drawn for clarification only and are not to scale.

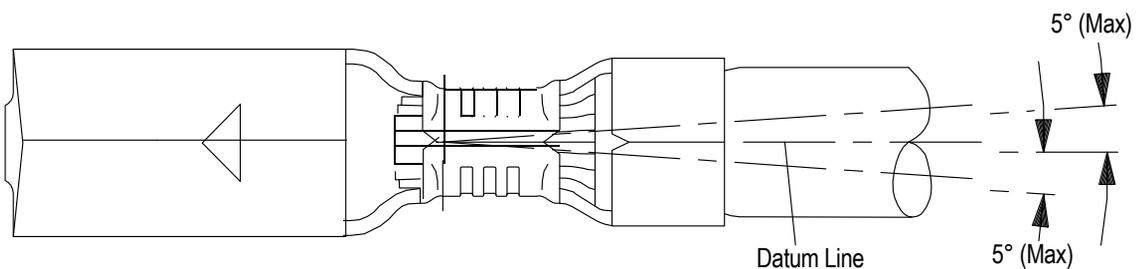
Figure 5

#### 2. Side to Side

The side-to-side bending of the contact may not exceed the limits provided in Figure 6.



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.

Figure 6

**NOTE**

The crimped terminal contact shall pass through a 25.4 mm [1.00 in.] long metal tube with an inside diameter of 5.08 mm [.200 in.].

### 3.4. Contact Repair

**CAUTION**

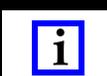
Once a terminal or contact has been damaged, it can not be used. It must be cut from the wire and replaced with a new one.

## 4. QUALIFICATIONS

Contact TE for agency evaluation and approval information for specific product part numbers.

## 5. TOOLING

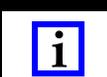
This section provides a selection of tools for various application requirements. Modified designs and additional tooling concepts may be available to meet other application requirements. For additional information, contact one of the service groups at the bottom of page 1. A listing of tooling recommendations covering the full wire size range is provided in Figure 7.

**NOTE**

TE 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.

- **Applicators**

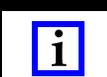
Applicators are designed for the full wire size range of strip-fed, precision formed contacts, and provide for high volume, heavy duty production requirements. The applicators can be used in bench or floor model power units.

**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.

**NOTE**

The Model "K" AMP-O-ELECTRIC terminating machine PN 565435-5 has been superseded by the Model "G" terminating machine PN 354500-1 (Customer Manual 409-5842) for new applications. For existing applications, the Model "K" is still recommended because of the large number of installed machines.

WIRE SIZE, AWG	INSULATION DIAMETER	APPLICATOR (DOCUMENT)	CONTACT PN	POWER UNIT (DOCUMENT)	
24-20	1.47-2.08 [.058-.082]	466527-2 (408-8040)	62416	354500-1# (409-5842)	
		4151239-1 (408-35042)	2178570-1	565435-5# (409-5128)	
20-16	2.29-3.01 [.090-.120]	687934-1 (408-8039)	42531 42539 60404	122500-2*, -3* (409-5852) 356500-1*, -2* (409-5878) 1213400-1*, -2* (409-5878)	
		687934-2 (408-8039)	61817 150639	354500-1# (409-5842) 565435-5# (409-5128)	
		687975-1 (408-8039)	505038	122500-2*, -3* (409-5852) 356500-1*, -2* (409-5878) 1213400-1*, -2* (409-5878)	
					687975-2 (408-8039)
	2.54-3.56 [.100-.140]	466436-1 (408-8040)	60017 62486	122500-2*, -3* (409-5852) 356500-1*, -2* (409-5878) 1213400-1*, -2* (409-5878)	
		466436-2 (408-8040)	63176	354500-1# (409-5842) 565435-5# (409-5128)	
		466436-3 (408-8040)	--	354500-[ ] (409-5842)	
		4151240-1 (408-35042)	1955663-1		
	18-14	2.29-3.18 [.090-.125]	466081-1 (408-8039)	60793 62739	122500-2*, -3* (409-5852) 356500-1*, -2* (409-5878) 1213400-1*, -2* (409-5878)
			466093-1 (408-8039)		
		2.29-3.18 [.090-.125]	466081-2 (408-8039)	60660 62715	122500-2*, -3* (409-5852) 356500-1*, -2* (409-5878) 1213400-1*, -2* (409-5878)
			466093-2 (408-8039)		
3.05-4.45 [.120-.175]		466088-1* (408-8039)	61412 61597 61790	354500-1# (409-5842) 565435-5# (409-5128)	
		466175-1 (408-8039)			
		466088-2* (408-8039)	60660 62715		
		466175-3 (408-8039)	61412 61597 61790		
		680614-2 (408-8039)	--		
14-10	---	466433-1* (408-8040)	42865 63156	122500-2*, -3* (409-5852) 356500-1*, -2* (409-5878) 1213400-1*, -2* (409-5878)	
		466643-1 (408-8039)	42868 42891		
		680150-1 (408-8039)	63830		
		680440-1 (408-8040)	42865		

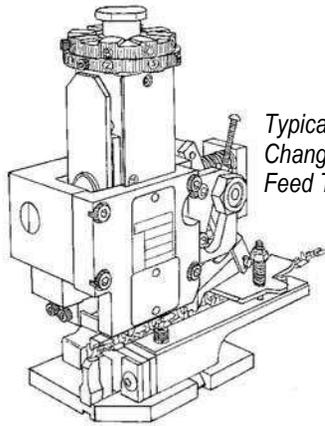
Figure 7 (Cont'd)

\* Obsolete  
# Superseded

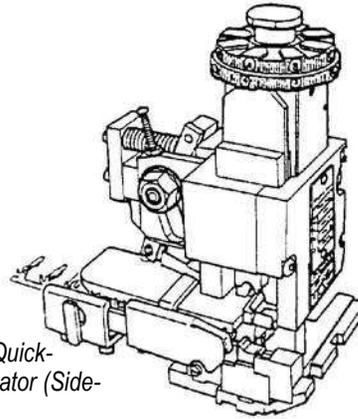
14-10	466433-4 (408-8040)	42865	354500- [] (409-5842)
	680440-3 (408-8040)		
	466433-2 (408-8040) 466433-3 (408-8040) 680006-2 (408-8040)	42865	354500-1# (409-5842) 565435-5# (409-5128)
	466643-2 <sup>2</sup> (408-8039) 680005-2 (408-8039)	42868 42891	
	680150-2 (408-8039)	63830	
	680439-2 (408-8039)	42868	
	680440-2 (408-8040)	42865	
	680603-2 (408-8039)	1217070	
	680439-1 (408-8039)	42868	
	680599-1	1217074	122500-2*, -3* (409-5852) 356500-1*, -2* (409-5878)
			565433-4 (409-5257)

Figure 7 (Cont'd)

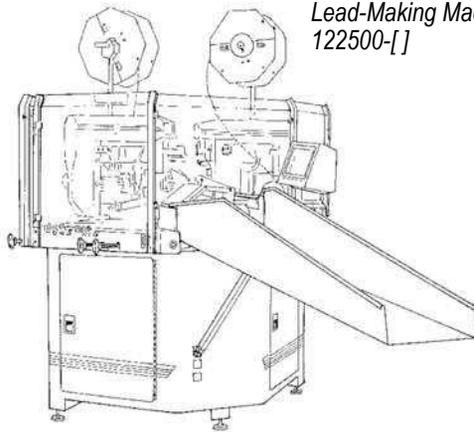
\* Obsoleted  
# Superseded



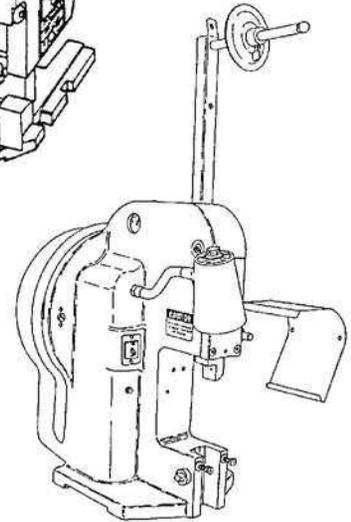
Typical HDM Quick-Change Applicator (End-Feed Type)



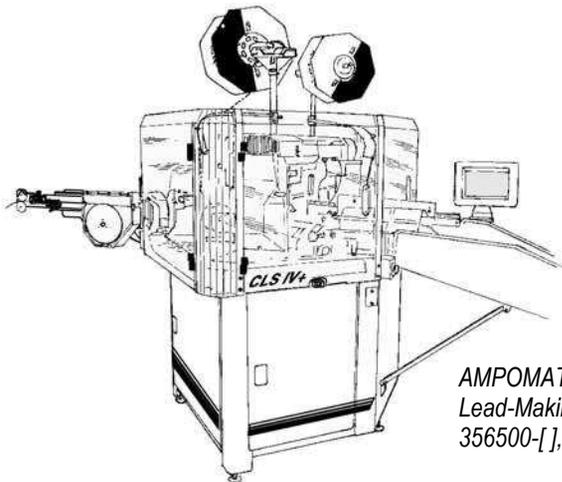
Typical HDM Quick-Change Applicator (Side-Feed Type)



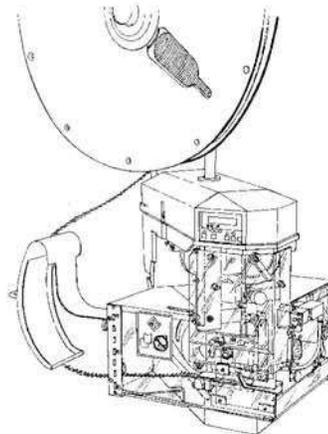
AMPOMATOR CLS III-G±  
Lead-Making Machine  
122500-[]



AMP-O-LECTRIC Model  
"K" Terminating Machine  
Power Unit 565435

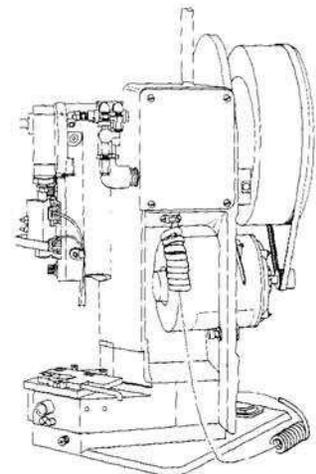


AMPOMATOR CLS IV±  
Lead-Making Machine  
356500-[], 1213400-[]



AMP-O-LECTRIC Model "G"  
Terminating Machine Power  
Unit 354500-[], 1213127-[]

Model "T"  
Terminating Unit  
458000-4

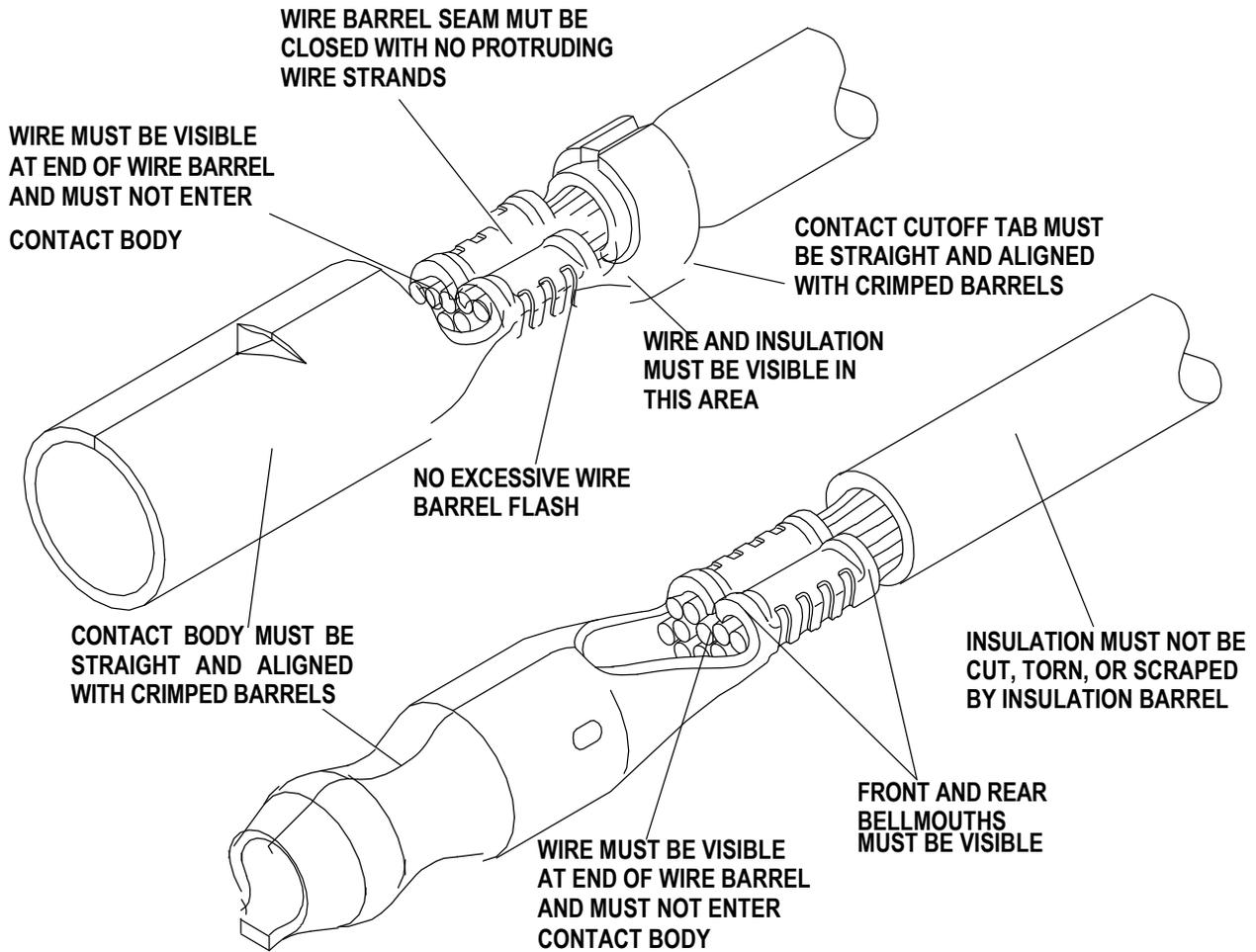


**†NOTE:** These applicators and power units are shown for reference only. Contact your TE Representative, or call one of the phone numbers at the bottom of page 1 for availability of all equipment.

Figure 7 (End)

## 6. VISUAL AID

The illustration below shows a typical application of this product. 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 8. VISUAL AID**